SFI SYSTEM

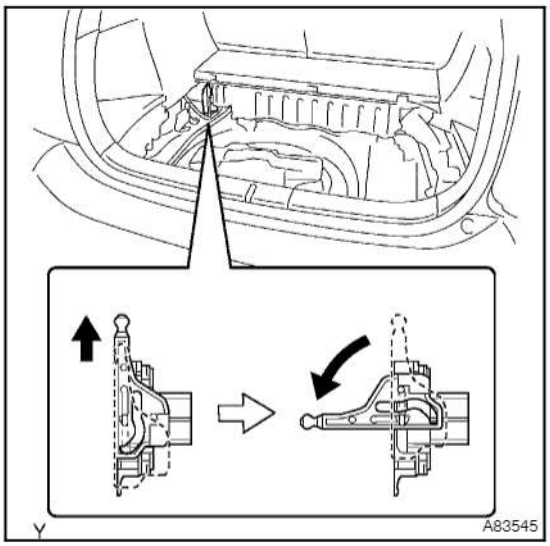
05IGX–01

PRECAUTION

1. PRECAUTIONS FOR HIGH–VOLTAGE CIRCUIT INSPECTION AND SERVICE

(a) Technicians to be engaged in inspection and service on high–voltage components and systems should receive special training.

(b) All the high–voltage wire harness connectors are colored orange: the HV battery and other high–voltage components are identified by the "High Voltage" caution labels. Do not touch these connectors and components before removing the service plug. Remove the service plug prior to touching these connectors and components.

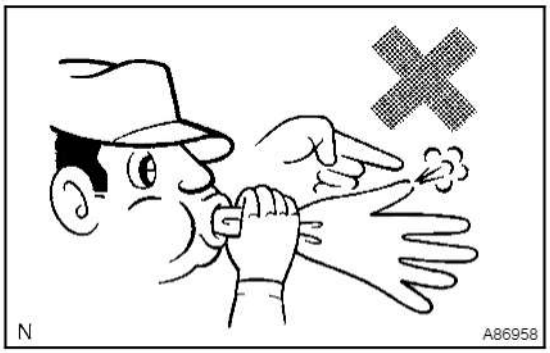


(c) Before inspecting or servicing the high–voltage components/systems, be sure to take safety precautions such as wearing insulated gloves and removing the service plug to prevent electric shock or electrocution. Store the removed service plug in your pocket to prevent other technicians from reinstalling it while you are servicing high–voltage components/systems.

(d) After removing the service plug, wait at least for 5 minutes before touching any of the high–voltage connectors and terminals.

HINT:

At least 5 minutes is required to discharge electricity from the high–voltage condenser inside the inverter.

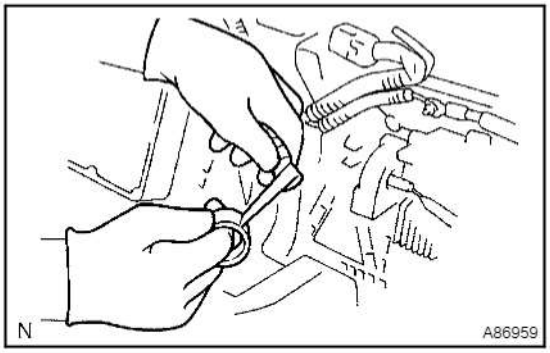


(e) Before wearing insulated gloves, make sure that they are not ruptured, torn or damaged in any other way. Do not wear wet insulated gloves.

(f) When servicing, be careful not to drop metallic materials like a mechanical pencil or tools etc. Causing a short circuit may result.

(g) Wear the insulated gloves before touching a bare high–voltage terminal. Verify that electricity has discharged from the terminal (approximately 0 V) using an electrical tester.

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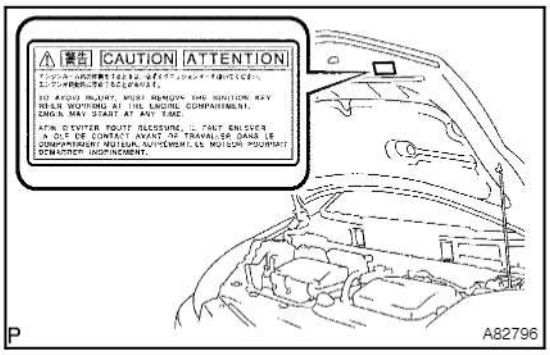


(h) After disconnecting or exposing a high–voltage connector or terminal, insulate it immediately using insulation tape.

(i) The screw of a high–voltage terminal should be tightened firmly to the specified torque. Either insufficient or excessive tightening torque can cause HV system failure.

(j) Call other technicians' attention to prevent accidents during working on the high–voltage components/systems by posting a sign to notify them (see page 01–5).

(k) Prior to reinstalling the service plug, again, verify whether or not any parts or tools have been left behind, and check if high–voltage terminal screws have been securely tightened as well as the connectors have been properly reconnected.

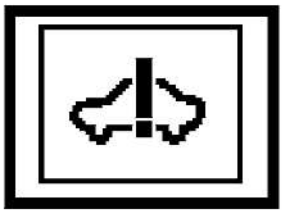


2. PRECAUTIONS TO BE OBSERVED WHEN INSPECTING OR SERVICING ENGINE COMPARTMENT

The PRIUS automatically turns the engine ON and OFF when the power switch is ON (READY lamp on the instrument panel is being illuminated). Turn the HV main system OFF before servicing inside the engine compartment.

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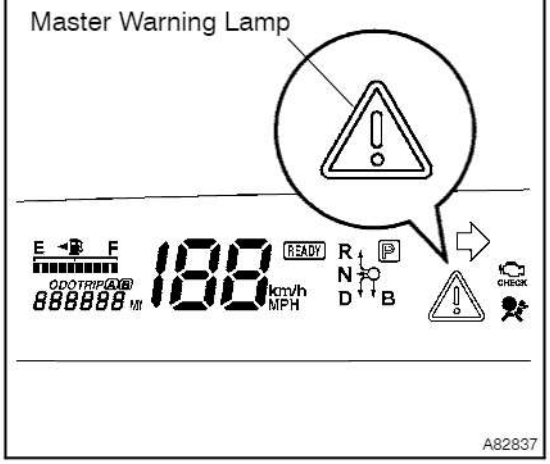
Multi Information Display:



HV System Warning

A82839

Combination Meter:



A82837

3. INSPECTION MODE

HINT:

- The PRIUS automatically stops the engine while the vehicle is stopped with the engine warmed up and battery well charged if the A/C compressor operation is not required. Therefore, even if the vehicle stops for any reason such as a check of ignition timing, inspection mode should be activated when continuous operation of the engine is required.

Activating inspection mode (Using the intelligent tester II)

(1) Connect the intelligent tester II to the DLC3.
(2) Turn the power switch ON (IG).
(3) Turn the intelligent tester II ON.
(4) On the intelligent tester II, select the item: Powertrain / Hybrid Control / Active Test / Inspection mode – 2WD inspection / ON.
(5) Activate inspection mode and check that the HV system warning on the multi–information display flashes and the master warning lamp on the combination meter is illuminated.
(6) Start the engine by pushing the power switch with depressing the brake pedal.

Deactivating inspection mode

(1) Turn the power switch OFF. Inspection mode and the HV main system are killed simultaneously.

NOTICE:

- **The idling speed in inspection mode is approximately 1,000 rpm. The number of revolutions will increase up to 1,500 rpm if the accelerator pedal is depressed to a degree of less than 60%, and up to 2,500 rpm in a case of 60% or more.**
- **If a diagnosis code is recorded when entering inspection mode, the master warning lamp and the error warning light on the multi–center display illuminates.**
- **When the master warning lamp illuminates during operation in inspection mode, deactivate inspection mode and inspect the diagnosed area.**
- **Traveling on a road without deactivating inspection mode may damage the transaxle.**

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4. FOR USING INTELLIGENT TESTER II

CAUTION:

Observe the following items for safety reasons:

- **Read its instruction book before using the tester.**
- **Prevent the tester cable from being caught on the pedals, shift lever and steering wheel when driving with the tester connected to the vehicle.**
- **When driving the vehicle for testing purposes using the tester, two persons are required. One is for driving the vehicle, and the other operates the tester.**

5. INITIALIZATION

NOTICE:

When disconnecting the negative (–) battery cable, initialize the following systems after the terminal is reconnected.

System Name	See page
Power Window Control System	05–1727

HINT:

Initialization can not be completed by only removing the battery.

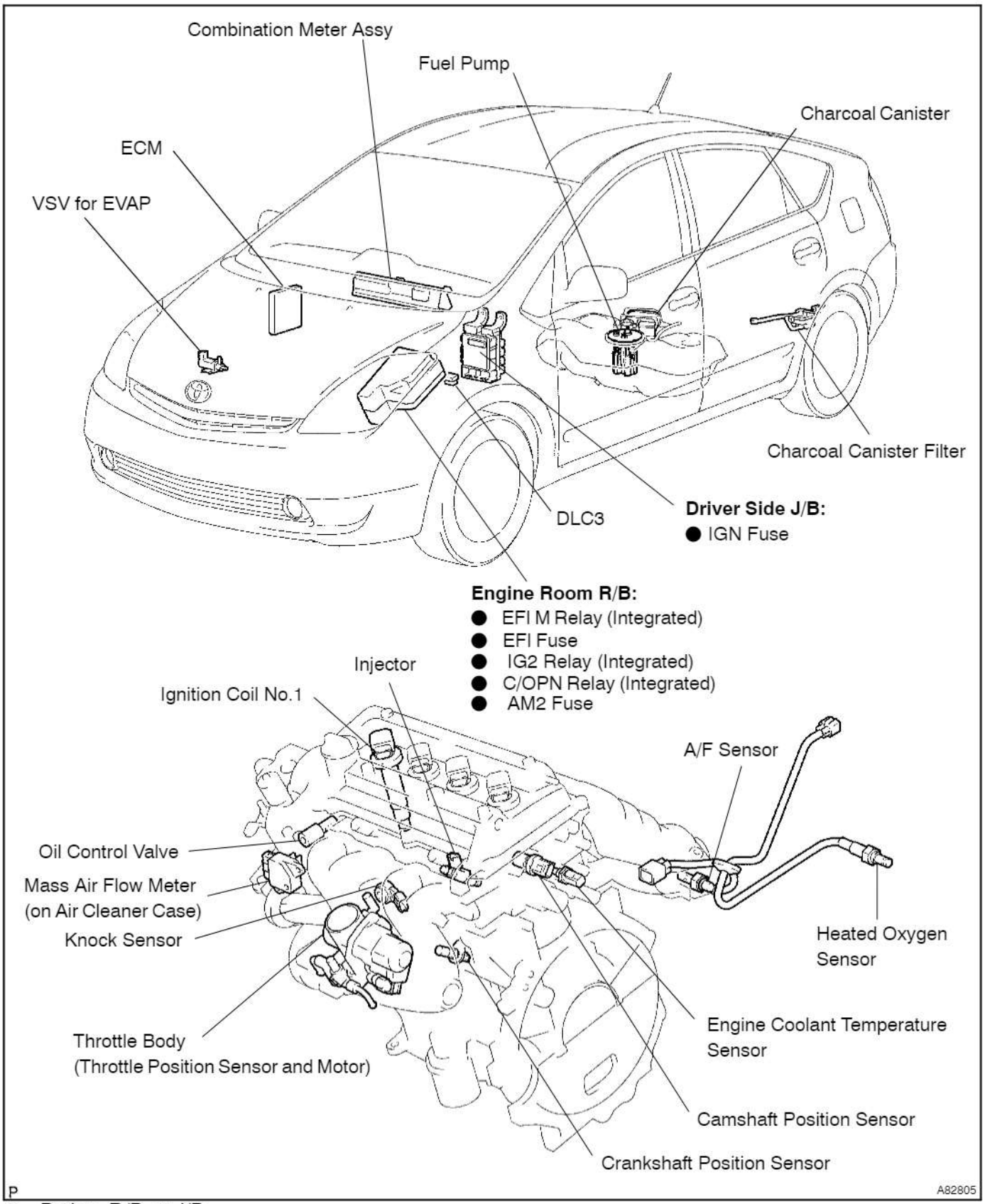
6. NOTICES FOR HYBRID SYSTEM ACTIVATION

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

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054JE-10

LOCATION

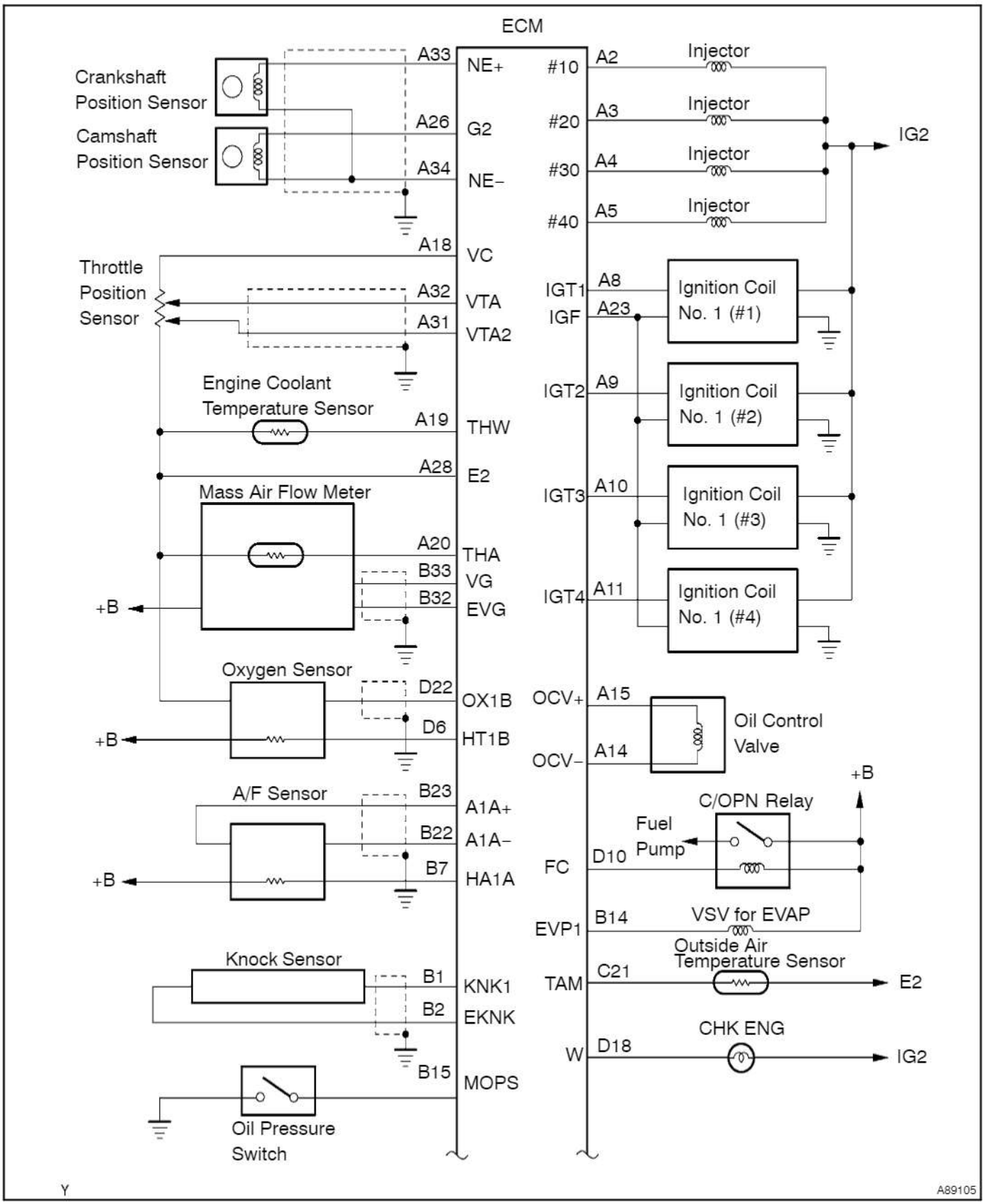


● Built in R/B or J/B

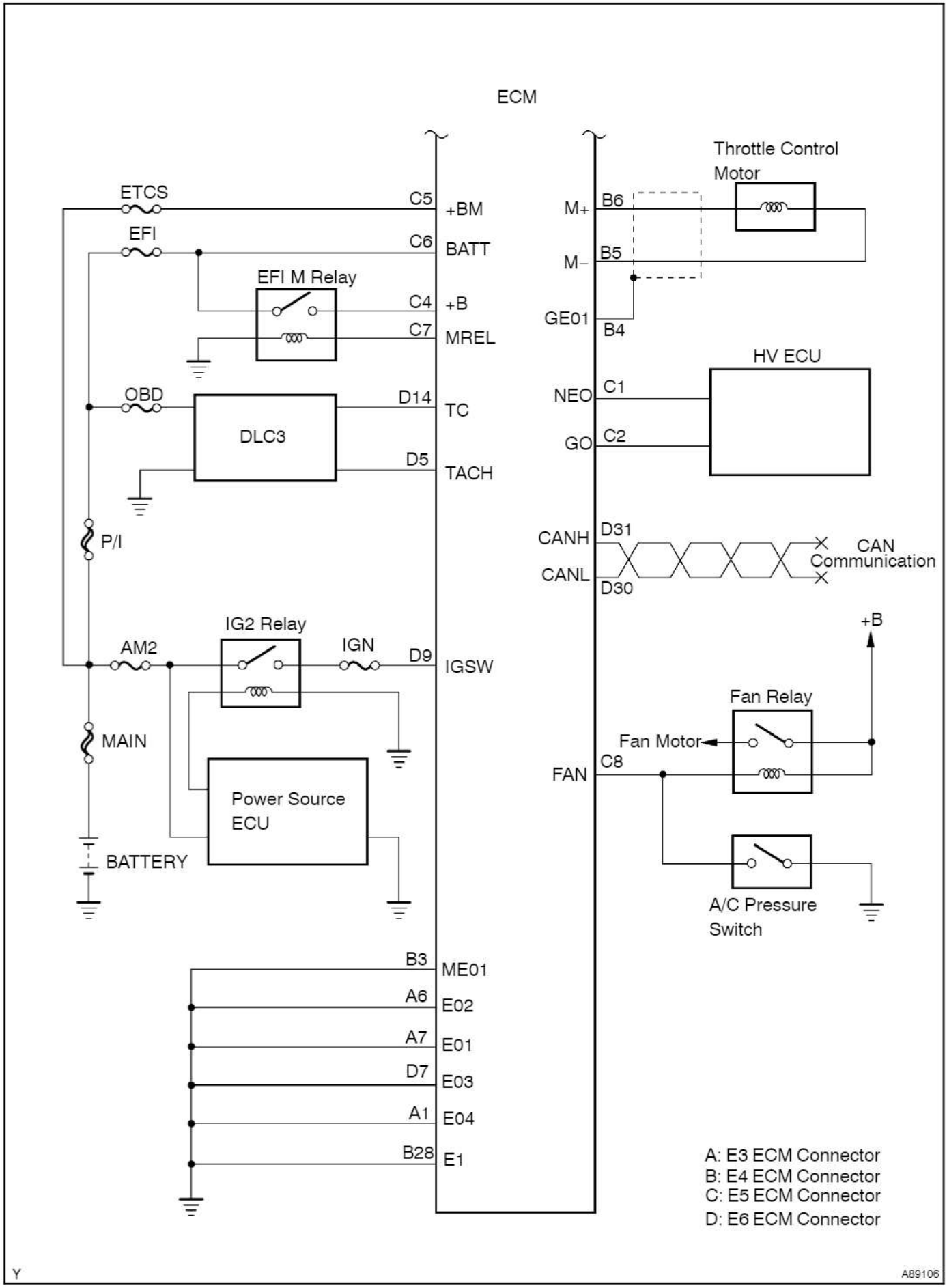
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05IIY–01

SYSTEM DIAGRAM

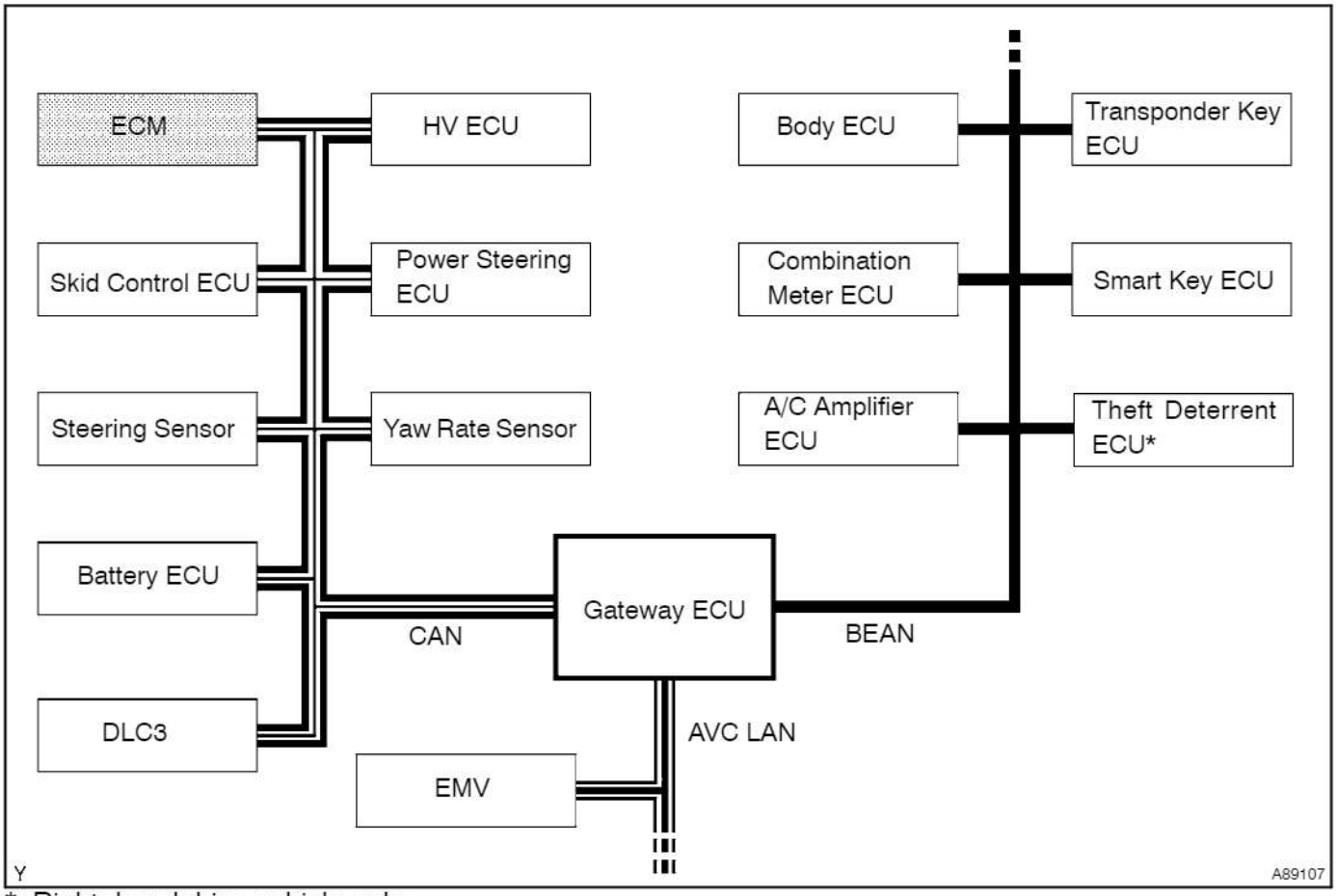


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COMMUNICATION WITH OTHER COMPUTERS



*: Right–hand drive vehicle only.

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COMMUNICATIONS

The ECM communicates with the following ECM and ECUs using the signals listed below. The following table explains receiving and sending signals by ECM or ECU.

Transmit To	Receive From	Signal	Communication Line
HV ECU	ECM	• Inspection mode signal • MIL illumination requirement • Shift position information • Ready state • Starter ON	CAN
ECM	HV ECU	• Ambient temperature • Intake air temperature • Radiator fan drive • Engine warm–up requirement • Engine rpm	CAN
ECM	Battery ECU	• Engine rpm	CAN
ECM	Power steering ECU	• Inspection mode	CAN
ECM	Skid Control ECU	• Inspection mode	CAN, BEAN
ECM	Body ECU	• Inspection mode • Engine rpm	BEAN, CAN
Conbination Meter ECU	ECM	• Fuel level	BEAN, CAN
ECM	Combination Meter ECU	• Engine coolant temperature • Engine rpm • Injection volume • Inspection mode • Engine oil pressure switch	BEAN, CAN
ECM	Air conditioner Amplifier ECU	• Engine coolant temperature • Engine rpm • Ambient air temperature	BEAN, CAN
ECM	Smart Key ECU	• Engine rpm	BEAN, CAN
ECM	EMV	• Engine coolant temperature • Inspection mode • Engine oil pressure switch	ACV LAN, CAN

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054JB-12

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used at step 3, 4, 5, 7 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05–13)

3	CONNECT INTELLIGENT TESTER II TO DLC3

HINT:
If the display indicates a communication fault in the tester, inspect DLC3.

4	CHECK DTC AND FREEZE FRAME DATA (See page 05–25)

HINT:
Record or print DTCs and freeze frame data, if needed.

5	CLEAR DTC AND FREEZE FRAME DATA (See page 05–25)

6	VISUAL INSPECTION

7	SETTING CHECK MODE DIAGNOSIS (See page 05–29)

8	PROBLEM SYMPTOM CONFIRMATION

HINT:
If the engine does not start, perform steps 10 and 12 first.

Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

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9	SYMPTOM SIMULATION

10	DTC CHECK (See page 05–25)

Malfunction code	A
No code B	B

B → GO TO STEP 12

A

11	DTC CHART (See page 05–39)

GO TO STEP 14

12	BASIC INSPECTION (See page 05–15)

Wrong parts not confirmed	A
Wrong parts confirmed	B

B → GO TO STEP 17

A

13	PROBLEM SYMPTOMS TABLE (See page 05–17)

Wrong circuit confirmed	A
Wrong parts confirmed	B

B → GO TO STEP 17

A

14	CHECK ECM POWER SOURCE CIRCUIT (See page 05–197)

15	CIRCUIT INSPECTION

Malfunction not confirmed	A
Malfunction confirmed	B

B → GO TO STEP 18

A

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16	CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

GO TO STEP 18

17	PARTS INSPECTION

18	IDENTIFICATION OF PROBLEM

19	ADJUSTMENT AND/OR REPAIR

20	CONFIRMATION TEST

END

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054JC-12

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		VIN	
License Plate No.		Production Date	
Date Vehicle Brought in		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	

Data 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. ____ °C/____ °F)
	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 _____

Check Engine Lamp (CHK ENG)		☐ Remains on	☐ Sometimes lights up ☐ Does not light up
DTC Inspection	Normal mode (Pre–check)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )

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05IGY–01

CHECK FOR INTERMITTENT PROBLEMS

HINT:

Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect when the ECM is in test mode with a intelligent tester II. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default) using 2 trip detection logic.

(a) Clear the DTCs (see page 05–25).
(b) Switch the intelligent tester II from normal mode to check mode (see page 05–29).
(c) Perform a simulation test (see page 01–36).
(d) Check the connector(s) and terminal(s) (see page 01–46).
(e) Wiggle the harness(s) and connector(s) (see page 01–46).

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BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check with the engine stopped and power switch OFF.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–17**

OK

3	CHECK IF ENGINE STARTS

NG → **GO TO STEP 6**

OK

4	CHECK AIR FILTER

(a) Visually check if the air filter is not contaminated dirt or oil.

NG → **REPLACE AIR FILTER**

OK

5	CHECK IDLE SPEED (See page 14–1)

NG → **PROCEED TO PAGE 14–1 AND CONTINUE TO TROUBLESHOOT**

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–17

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6	CHECK FUEL PRESSURE (See page 11–7)

NG → PROCEED TO PAGE 11–3 AND CONTINUE TO TROUBLESHOOT

OK

7	CHECK FOR SPARK (See page 18–6)

NG → PROCEED TO PAGE 18–3 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05–17

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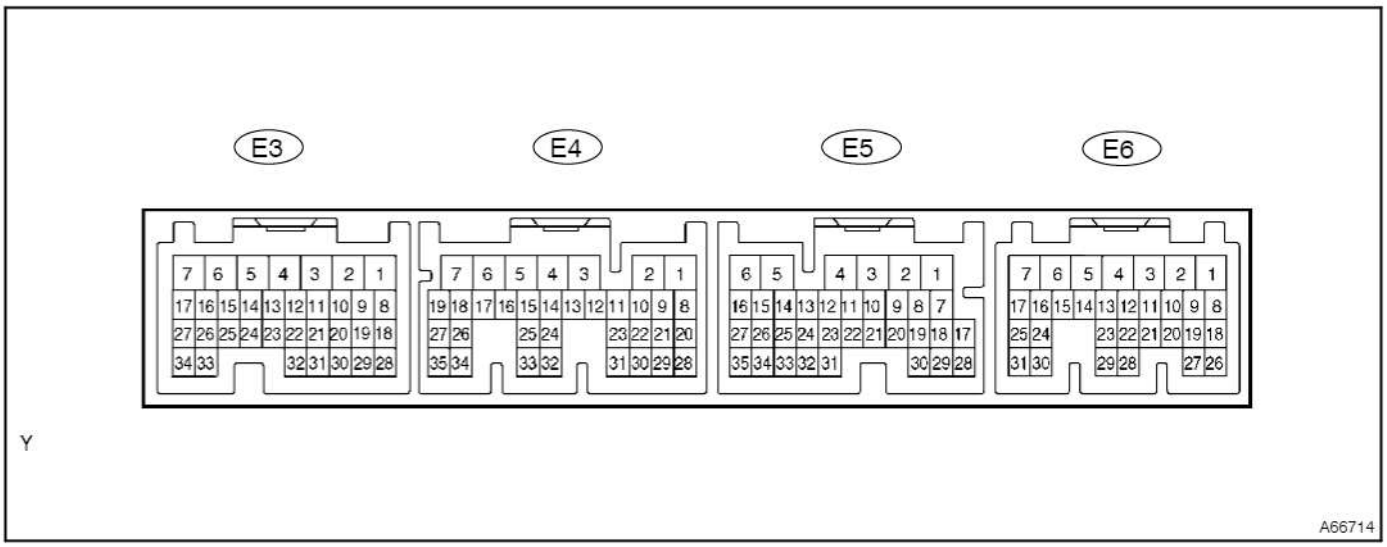
PROBLEM SYMPTOMS TABLE

When the malfunction is not confirmed in the diagnostic trouble code check and the problem still can not be confirmed in the basic inspection, use this table and troubleshoot according to the priority order given below.

Engine does not crank (Does not start)	1. MG1 2. Hybrid system 3. Immobilizer 4. Push start system	— 05–229 05–2051 —
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Spark plug 4. Immobilizer system 5. Injector 6. ECM 7. Crankshaft position sensor circuit	05–197 05–204 18–3 05–2051 11–7 10–5 05–124
No complete combustion (Does not start)	1. Fuel pump control circuit 2. Spark plug 3. Immobilizer system 4. Injector 5. Crankshaft position sensor circuit	05–204 18–3 05–2051 11–7 05–124
Engine cranks normally but difficult to start	1. Fuel pump control circuit 2. Compression 3. Spark plug 4. Injector 5. Crankshaft position sensor circuit	05–204 14–1 18–3 11–7 05–124
Difficult to start with cold engine	1. Fuel pump control circuit 2. Spark plug 3. Injector 4. Crankshaft position sensor circuit	05–204 18–3 11–7 05–124
Difficult to start with hot engine	1. Fuel pump control circuit 2. Spark plug 3. Injector 4. Crankshaft position sensor circuit	05–204 18–3 11–7 05–124
High engine idle speed (Poor idling)	1. ECM power source circuit 2. Electronic throttle control system	05–197 11–7
Low engine idle speed (Poor idling)	1. Fuel pump control circuit 2. Electronic throttle control system 3. Injector	05–204 05–10 11–7
Rough idling (Poor idling)	1. Compression 2. Electronic throttle control system 3. Injector 4. Fuel pump control circuit 5. Spark plug	14–1 05–10 11–7 05–204 18–3
Hunting (Poor idling)	1. ECM power source circuit 2. Electronic throttle control system 3. Fuel pump control circuit	05–197 05–10 05–204
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. Injector 3. Spark plug 4. HV transaxle	05–204 11–7 18–3 —
Surging (Poor driveability)	1. Fuel pump control circuit 2. Spark plug 3. Injector	05–204 18–3 11–7
Engine stalls soon after starting	1. Fuel pump control circuit 2. Electronic throttle control system 3. Immobilizer 4. Crankshaft position sensor circuit	05–204 05–10 05–2051 05–124

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TERMINALS OF ECM



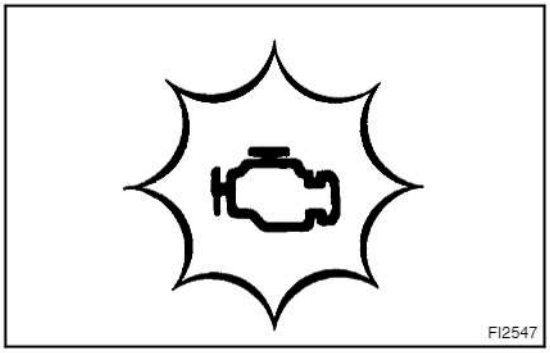
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "STD Voltage".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
BATT (E5–6) – E1 (E4–28)	R – BR	Battery	Always	9 to 14
+B (E5–4) – E1 (E4–28)	B – BR	Power source of ECM	Power switch ON (IG)	9 to 14
+BM (E5–5) – E1 (E4–28)	GR – BR	Power source of ETCS	Always	9 to 14
IGSW (E6–9) – E1 (E4–28)	O – BR	Power switch signal	Power switch ON (IG)	9 to 14
MREL (E5–7) – E1 (E4–28)	G – BR	Main relay control signal	Power switch ON (IG)	9 to 14
VC (E3–18) – E2 (E3–28)	R – BR	Power source of sensor (a specific voltage)	Power switch ON (IG)	4.5 to 5.5
NE+ (E3–33) – NE– (E3–34)	R – G	Crankshaft position sensor	Idling (during inspection mode)	Pulse generation
G2 (E3–26) – NE– (E3–34)	R – G	Camshaft position sensor	Idling (during inspection mode)	Pulse generation
VTA (E3–32) – E2 (E3–28)	P – BR	Throttle position sensor	Power switch ON (IG), Throttle valve fully closed	0.5 to 1.2
VTA (E3–32) – E2 (E3–28)	P – BR	Throttle position sensor	HV system ON, During active test to open throttle valve (see page 05–31)	3.2 to 4.8
VTA2 (E3–31) – E2 (E3–28)	L – BR	Throttle position sensor	Power switch ON (IG), Accelerator pedal released	2.0 to 2.9
VTA2 (E3–31) – E2 (E3–28)	L – BR	Throttle position sensor	HV system ON, During active test to open throttle valve (see page 05–31)	4.6 to 5.5
VG (E4–33) – EVG (E4–32)	G – R	Mass air flow meter	Idling (during inspection mode), A/C switch OFF	1.0 to 1.5
THA (E3–20) – E2 (E3–28)	W – BR	Intake air temperature sensor	Idling (during inspection mode), Intake air temperature at 20°C	0.5 to 3.4
THW (E3–19) – E2 (E3–28)	W – BR	Engine coolant temperature sensor	Idling (during inspection mode), Engine coolant temperature at 80°C	0.2 to 1.0
#10 (E3–2) – E01 (E3–7)	Y – BR	Injector	Power switch ON (IG)	9 to 14
#20 (E3–3) – E01 (E3–7)	B – BR	Injector	Power switch ON (IG)	9 to 14
#30 (E3–4) – E01 (E3–7)	L – BR	Injector	Power switch ON (IG)	9 to 14
#40 (E3–5) – E01 (E3–7)	R – BR	Injector	Power switch ON (IG)	9 to 14

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
IGT1 (E3–8) – E1 (E4–28)	Y – BR	Ignition coil No. 1 (#1) (Ignition signal)	Idling (during inspection mode)	Pulse generation (See page 05–131)
IGT2 (E3–9) – E1 (E4–28)	W – BR	Ignition coil No. 1 (#2) (Ignition signal)	Idling (during inspection mode)	Pulse generation (See page 05–131)
IGT3 (E3–10) – E1 (E4–28)	G – BR	Ignition coil No. 1 (#3) (Ignition signal)	Idling (during inspection mode)	Pulse generation (See page 05–131)
IGT4 (E3–11) – E1 (E4–28)	Y – BR	Ignition coil No. 1 (#4) (Ignition signal)	Idling (during inspection mode)	Pulse generation (See page 05–131)
KNK1 (E4–1) – EKNK (E4–2)	B – W	Knock sensor	Idling (during inspection mode)	Pulse generation (See page 05–120)
IGF (E3–23) – E1 (E4–28)	B – BR	Ignition confirmation signal	Idling (during inspection mode)	Pulse generation (See page 05–131)
A1A+ (E4–23) – E1 (E4–28)	G – BR	A/F sensor	Power switch ON (IG)	3.0 to 3.6
A1A– (E4–22) – E1 (E4–28)	R – BR	A/F sensor	Power switch ON (IG)	2.7 to 3.3
OX1B (E6–22) – E2 (E3–28)	Y – BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation
HA1A (E4–7) – E04 (E3–1)	Y – BR	A/F sensor heater	Idling (during inspection mode)	Below 3.0
HA1A (E4–7) – E04 (E3–1)	Y – BR	A/F sensor heater	Power switch ON (IG)	9 to 14
HT1B (E6–6) – E03 (E6–7)	G – BR	Heated oxygen sensor heater	Idling (during inspection mode)	Below 3.0
HT1B (E6–6) – E03 (E6–7)	G – BR	Heated oxygen sensor heater	Power switch ON (IG)	9 to 14
EVP1 (E4–14) – E1 (E4–28)	R – BR	EVAP VSV	Power switch ON (IG)	9 to 14
M+ (E4–6) – E1 (E4–28)	L – BR	Throttle actuator control motor	Idling (during inspection mode)	Pulse generation
M– (E4–5) – E1 (E4–28)	P – BR	Throttle actuator control motor	Idling (during inspection mode)	Pulse generation
OCV+ (E3–15) – OCV– (E3–14)	Y – W	Camshaft timing oil control	Power switch ON (IG)	Pulse generation (See page 05–45)
TAM (E5–21) – E2 (E3–28)	W – BR	Outside air temperature sensor	Ambient air temperature –40°C to 140°C (–40 to 284°F)	0.8 to 1.3
MOPS (E4–15) – E1 (E4–28)	Y – BR	Engine oil pressure	Power switch ON (IG), Not engine running	9 to 14
FAN (E5–8) – E1 (E4–28)	LG – BR	Cooling fan relay	Power switch ON (IG), Engine coolant Temp. less than 94.5°C	9 to 14
W (E6–18) – E1 (E4–28)	LG – BR	CHK ENG	Idling (during inspection mode)	9 to 14
W (E6–18) – E1 (E4–28)	LG – BR	CHK ENG	Power switch ON (IG)	Below 3.0
FC (E6–10) – E1 (E4–28)	G – BR	Fuel pump control	Power switch ON (IG)	9 to 14
FC (E6–10) – E1 (E4–28)	G – BR	Fuel pump control	Idling (during inspection mode)	Below 3.0
TC (E6–14) – E1 (E4–28)	P – BR	Terminal TC of DLC3	Power switch ON (IG)	9 to 14
NEO (E5–1) – E1 (E4–28)	LG – BR	Revolution signal	Idling (during inspection mode)	Pulse generation
GO (E5–2) – E1 (E4–28)	Y – BR	Revolution signal	Idling (during inspection mode)	Pulse generation
CANH (E6–31) – E1 (E4–28)	B – BR	CAN communication line	Power switch ON (IG)	Pulse generation
CANL (E6–30) – E1 (E4–28)	W – BR	CAN communication line	Power switch ON (IG)	Pulse generation

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DIAGNOSIS SYSTEM

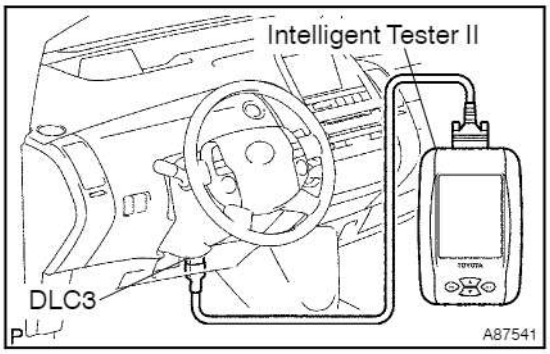
05IIZ–01

1. Description

Description for Euro–OBD (European spec.)

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect a general OBD scan tool complying with ISO 15031–4 or the intelligent tester II to the vehicle, and read various data output from the vehicle's ECM.
- Euro–OBD regulations require that the vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the power train control components which affect vehicle emissions, or malfunction in the computers. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15031–4 are recorded in the ECM memory (see page 05–39).

If the malfunction does not reoccur in 3 consecutive trips, the CHK ENG goes off automatically but the DTCs remain recorded in the ECM memory



- To check the DTCs, connect the OBD scan tool or intelligent tester II to Data Link Connector 3 (DLC3) on the vehicle. The OBD scan tool or intelligent tester II also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see its instruction book.)

  DTCs include ISO controlled codes and manufacturer controlled codes. ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set by the manufacturer within the prescribed limits (see page 05–39).
- In order to enhance the OBD function on vehicles and develop the Off–Board diagnosis system, CAN communication is introduced in this system. (CAN: Controller Area Network) It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows a high speed communication between the systems and to simplify the wire harness connection.

  Since the CAN communication is equipped in this system, intelligent tester II connecting to the DLC3 is necessary to display any information from the ECM on the tester (also the communication be-

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tween the intelligent tester II and the ECM uses CAN communication signal).

- The diagnosis system operates in normal mode during normal vehicle use. It also has check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to check mode using the intelligent tester II when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (intelligent tester II only) (see step 3).
- * 2 trip detection logic:
  When a malfunction is first detected, the pending fault code is stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip) (However, the power switch must be OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

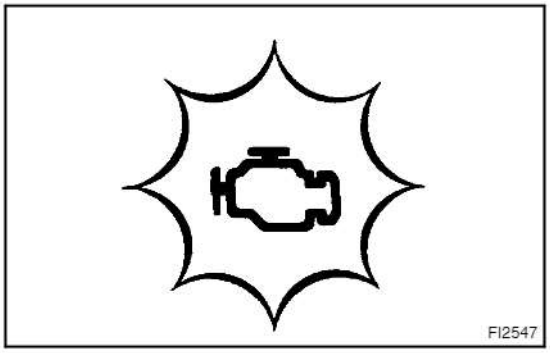
Priorities for troubleshooting:

If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.

If no instruction is given, troubleshoot according to the following priorities.

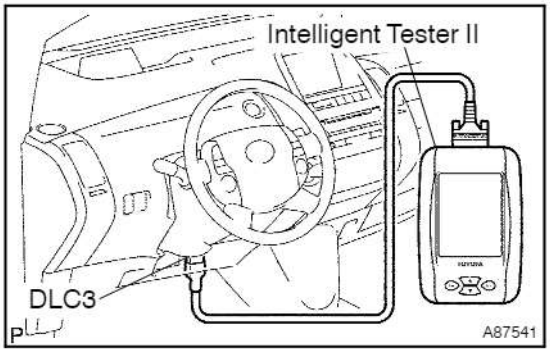
(1) DTCs other than fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) and misfire (DTCs P0300 – P0304).
(2) Fuel trim malfunction (DTCs P0171 and P0172).
(3) Misfire (DTCs P0300 – P0304).

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

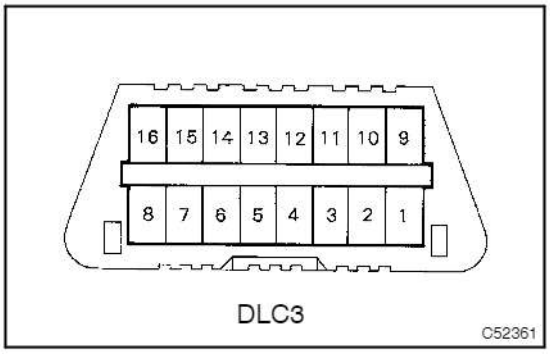
- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the intelligent tester II to the vehicle, and read off various data output from the vehicle's ECM.
- The vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) on the instrument panel when the computer detects malfunction in the computer itself or in drive system components. In addition, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (see page 05–39). If the malfunction does not recur, the CHK ENG will be disappeared by turning off the power switch but the recorded DTC will remain in the ECM memory.



- To check the DTCs, connect the intelligent tester II to the Data Link Connector 3 (DLC3) on the vehicle The intelligent tester II also enables you to erase the DTCs and check the freeze frame data and various forms of engine data. (For operating instructions, see its instruction book.)
- In order to enhance the OBD function on vehicles and develop the Off–Board diagnosis system, CAN communication is introduced in this system (CAN: Controller Area Network). It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows a high speed communication between the systems and to simplify the wire harness connection.
  Since the CAN communication is equipped in this system, intelligent tester II connecting to the DLC3 is necessary to display any information from the ECM on the tester (also the communication between the intelligent tester II and the ECM uses CAN communication signal).
- The diagnosis system operates in normal mode during normal vehicle use. It also has check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and to ensure a thorough malfunction detection. By switching the ECM to check mode using the intelligent tester II when troubleshooting, a technician can cause the CHK ENG to illuminate for a malfunction that is only detected once or momentarily (intelligent tester II only) (see step 3).

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- * 2 trip detection logic:
  When a malfunction is first detected, the pending fault code is stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to illuminate (2nd trip) (however, the power switch must be turned OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition (fuel system, calculator load, water temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred. (see page 05–26).



2. CHECK DLC3

The vehicle's ECM uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always
CANH	6	CAN "High" line	CANL	54 to 69 Ω	Power switch OFF
CANH	6	CAN "High" line	Battery positive	1 MΩ or higher	Power switch OFF
CANH	6	CAN "High" line	CG	1 kΩ or higher	Power switch OFF
CANL	4	CAN "Low" line	Battery Positive	1 MΩ or higher	Power switch OFF
CANL	4	CAN "Low" line	CG	1 kΩ or higher	Power switch OFF

HINT:

When you use the intelligent tester II, first connect a cable of the tester to the DLC3. Next, turn ON the main power of the PRIUS by pushing the power switch (IG ON). Finally turn the tester ON. If the screen displays NO INFORMATION AVAILABLE and bus check is also failed, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in

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the tester itself, so consult the Service Department listed in its instruction book.

3. INSPECT BATTERY VOLTAGE

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

4. CHECK CHK ENG

(a) The CHK ENG illuminates when the power switch is turned (IG ON) and the HV main system is not in operation.

HINT:

If the CHK ENG is not illuminated, troubleshoot the CHK ENG circuit (see page 05–209).

(b) When the HV main system is activated (READY ON), the CHK ENG should turn off. If the CHK ENG illuminates again, the diagnosis system has detected malfunction or abnormality in the diagnosis system.

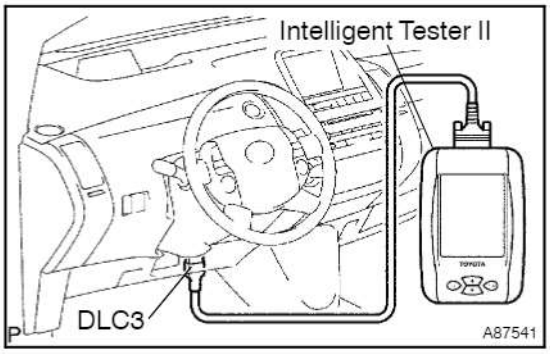
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DTC CHECK/CLEAR

NOTICE:

- **If no DTC appears in normal mode:**
  On the intelligent tester II, check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- **When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**

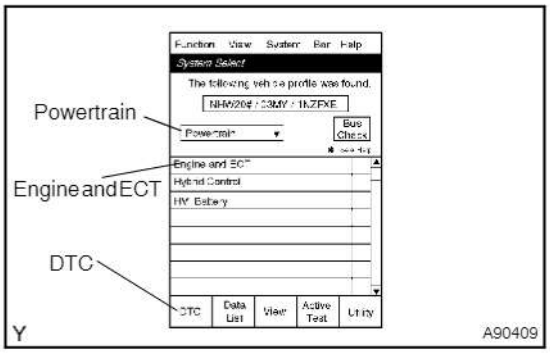


1. CHECK DTC (Using the intelligent tester II)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) On the tester, enter the following menus: Powertrain / Engine and ECT / DTC.
(d) Check DTCs and freeze frame data, and then write them down.
(e) See page 05–39 to confirm the details of the DTCs.

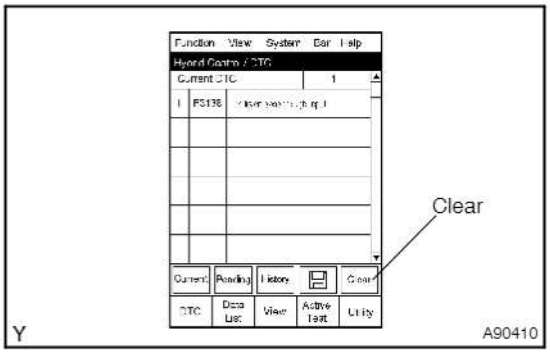
NOTICE:

- **Turn OFF the HV main system (IG OFF) after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated again, the CHK ENG illuminates and the DTCs are recorded in the ECM.**



2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) On the tester, enter the following menus: Powertrain / Engine and ECT / DTC / Clear.
(d) Erase DTCs and freeze frame data by pressing the YES button on the tester.



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FREEZE FRAME DATA

DESCRIPTION

The freeze frame data records the engine condition (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when malfunction is detected. When troubleshooting, it can help determine if the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich and other data. at the time of the malfunction occurred.

HINT:

If it is impossible to replicate the problem even though a DTC is detected, confirm the freeze frame data.

LIST OF FREEZE FRAME DATA

Intelligent Tester II Display (Abbreviation)	Measure Item/Range	Diagnostic Note
Calculate Load (Cal Load)	Calculated load	Calculate load by ECM
Coolant Temp	Engine coolant temperature	If the value is –40°C, sensor circuit is open If the value is 140°C, sensor circuit is shorted
Short FT#1	Short–term fuel trim	Short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
Long FT#1	Long–term fuel trim	Overall fuel compensation carried out in long–term to compensate a continual deviation of the short–term fuel trim from the central valve
Engine Speed (Engine Spd)	Engine speed	—
Vehicle Speed (Vehicle Spd)	Vehicle speed	Speed indicated on speedometer
IGN Advance (Ign Advance)	Ignition advance	—
Intake Air	Intake air temperature	If the value is –40°C, sensor circuit is open If the value is 140°C, sensor circuit is shorted
MAF	Mass air flow volume	If the value is approximately 0.0 g/s: • Mass air flow meter power source circuit • VG circuit open or short If the value is 160.0 g/s or more: • E2G circuit open
Throttle Position (Throttle Pos)	Throttle position	Read the value with power switch ON (Do not start engine)
O2S B1 S2	Heated oxygen sensor output	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
O2FT B1 S2	Fuel trim at Heated oxygen sensor	Same as SHORT FT #1
Engine Run Time (Eng Run Time)	Cumulative engine running time	—
AF FT B1 S1	Fuel trim at sensor	—
AFS B1 S1	Sensor output	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
Warm–up Cycle Cleared DTC (Wu Cyc DTC Dist)	Warm–up cycle after DTC cleared	—
Distance from DTC Cleared (Dist DTC Clear)	Accumulated distance from DTC cleared	—
Battery Voltage (BATT)	Battery voltage	—
Air–Fuel Ratio	Air–fuel ratio	—

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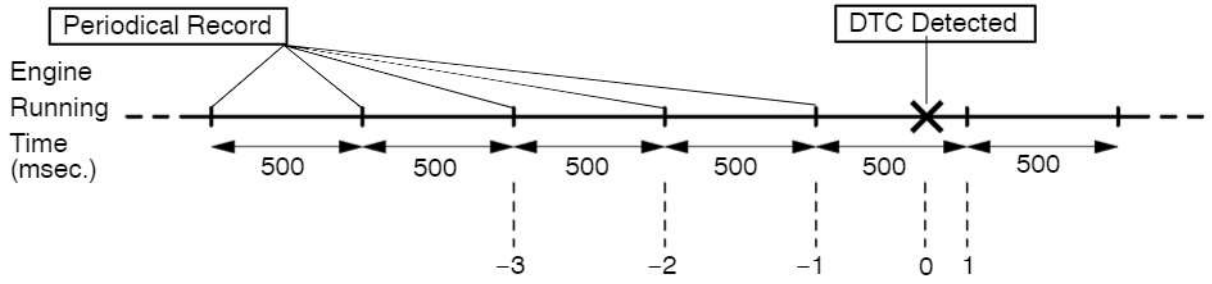
Intelligent Tester II Display (Abbreviation)	Measure Item/Range	Diagnostic Note
Throttle Sensor Position (Throttle Pos)	Throttle sensor positioning	Read the value with the power switch ON (Do not start engine)
Ambient Temperature (Ambient Temp)	Ambient air temperature	If the value is −40°C, sensor circuit is open If the value is 140°C, sensor circuit is shorted
Throttle Sensor Position #2 (Throttle Pos #2)	Throttle sensor positioning #2	—
Throttle Motor (Throttle Mot)	Throttle motor	—
Time after DTC Cleared (Time DTC Clear)	Cumulative time after DTC cleared	—
Knock Correct Learn Value (Knock Crrt Val)	Correction learning value of knocking	—
Knock Feedback Value (Knock FB Val)	Feedback value of knocking	—
Purge Flow	Purge flow	—
Idle Fuel Cut (FC Idl)	Idle fuel cut	ON: when throttle valve fully closed and engine speed is over 1,500 rpm
FC TAU	FC TAU: Fuel cut during very light load	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete
VVTL Aim Angle (Bank 1) (VVTL Aim Angle #1)	VVT aim angle	—
VVT Change Angle (Bank 1) (VVT Chng Angl #1)	VVT change angle	—
VVT OCV Duty (Bank 1) (VVT OCV Duty B1)	VVT OCV operation duty	—
EVAP Purge VSV (Evap (Purge) VSV)	EVAP purge VSV	VSV for EVAP is controlled by the ECM (ground side duty control)
Fuel Pump/Speed Status (Fuel Pump/Speed)	Fuel pump speed status	—
VVT Control Status (VVT Ctrl B1)	VVT control status	—
Electric Fan Motor (Fan Motor)	Electric fan motor	—
Initial Engine Coolant Temp (Ini Cool Temp)	Initial engine coolant temperature	—
Initial Intake Air Temp (Ini Intake Temp)	Initial intake air temperature	—
Injection Volume (Cylinder 1) (Inj Vol)	Injection volume	—
Injector	Injector	Cumulative fuel injection amount for last 10 times
Total FT#1	Total fuel trim	—
Misfire RPM	Misfire RPM	—
Misfire Load	Misfire load	—
Cylinder #1,#2,#3,#4 Misfire Rate (Cyl #1, #2, #3, #4)	Misfire ratio of the cylinder 1 to 4	Displayed in only idling
All Cylinders Misfire Rate (Cyl All)	All cylinder misfire rate	Displayed in only idling
Ignition	Ignition	Misfire count
Misfire Margin	Misfire monitoring	—
Engine Oil Pressure SW (Eng Oil Pres SW)	Engine oil pressure switch signal	Always ON while engine is running

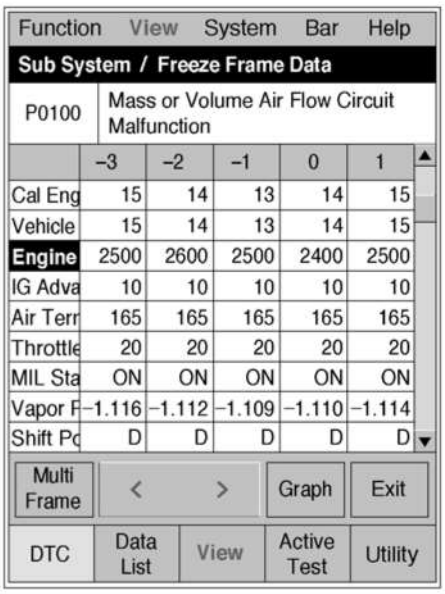
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”Multi–Frame” Freeze Frame Data

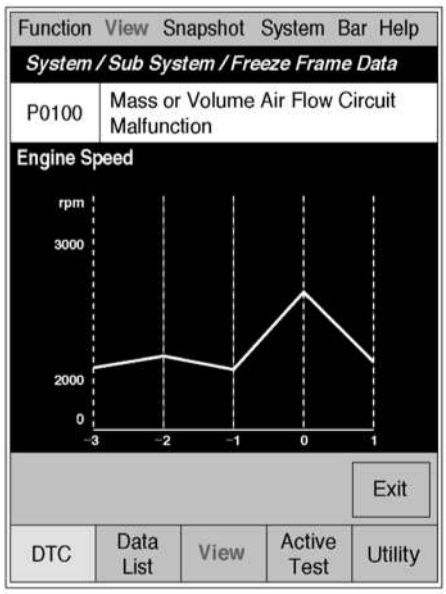
The ECM actually records the engine condition inside its memory every 500 milliseconds (msec) while the system is ON. On the intelligent tester II, multi–frame freeze frame data can be displayed. Thus, not only the list but also the graph of multi–frame freeze frame data is displayed in order that the technicians may investigate the malfunction condition more easily. In addition, 5 periodic records of the engine condition including a record the time the DTC was set can be displayed as shown, while the conventional hand–held tester could display only 1 periodic record.

Multi–Frame Freeze Frame Data:





List



Line Graph

Y

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Intelligent Tester II Display

Tester Display	Description
1	First periodical record data after DTC detection
0	Data of the time DTC was detected
–1	Periodical record data of 500 milliseconds before record ”1”
–2	Periodical record data of 500 milliseconds before record ”–1”
–3	Periodical record data of 500 milliseconds before record ”–2”

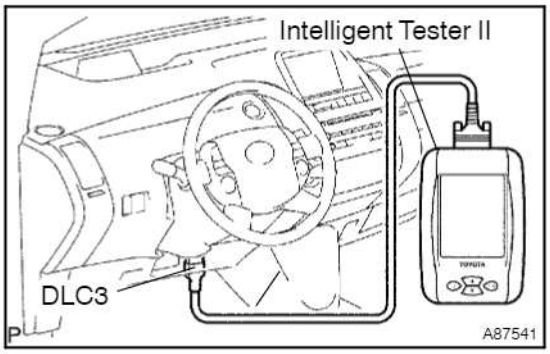
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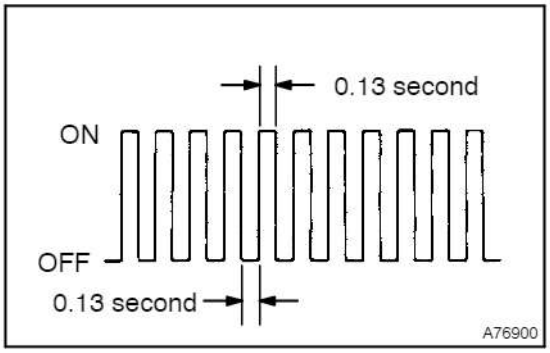
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CHECK MODE PROCEDURE

HINT:

Compared to normal mode, check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in normal mode can also be detected in check mode.





1. CHECK MODE PROCEDURE (Using the intelligent tester II)

(a) Check the initial conditions.
  (1) Battery positive voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N position
  (4) A/C switched OFF

(b) Connect the intelligent tester II to the DLC3.

(c) Turn the power switch ON (IG).

(d) Change the ECM to check mode using the intelligent tester II. Make sure the CHK ENG flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester II is used to change the ECM from normal mode to check mode or vice–versa, or 2) during check mode, the power switch is switched from ON to ACC or OFF.

(e) Start the HV main system (READY ON). The CHK ENG should turn off after the system starts.

(f) Simulate the condition of the malfunction described by the customer.

(g) After simulating the malfunction condition DTCs, freeze frame data and other data using the intelligent tester II.

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

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG ON).

(c) On the tester, enter the following menus: Powertrain / Engine and ECT / DTC / Clear.

(d) Erase DTCs and freeze frame data by pressing the YES button on the tester.

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FAIL–SAFE CHART

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

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0031 P0032 P0037 P0038	The sensor heater is turned OFF	Power switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	"Pass" condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20°C (68°F)	"Pass" condition detected
P0115 P0117 P0118	Engine coolant temperature is fixed at 80°C (176°F)	"Pass" condition detected
P0120 P0122 P0123	Fuel cut intermittently	Power switch OFF
P0121	Fuel cut intermittently	"Pass" condition detected and power switch OFF
P0325	Maximum ignition timing retardation	Power switch OFF
P0351 P0352 P0353 P0354	Fuel cut	"Pass" condition detected
P657	VTA is fixed at about 16 % and fuel cut intermittently	"Pass" condition detected and power switch OFF
P2102 P2103	VTA is fixed at about 16 % and fuel cut intermittently	Power switch OFF
P2119	VTA is fixed at about 16 % and fuel cut intermittently	"Pass" condition detected and power switch OFF

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05IHI-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II Data List allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

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

(a) Warm up the engine.
(b) Turn the power switch OFF.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).
(e) Turn the intelligent tester II ON.
(f) Enter the following menus: Powertrain / Engine and ECT / Data List.
(g) According to the display on the tester, read items in Data List.

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Injector	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 1 to 3 ms (Inspection mode)	—
IGN Advance (Ign Advance)	Ignition timing advance for No. 1 cylinder/ Min.: –64 deg., Max.: 63.5 deg.	Idling: BTDC 7 to 15° (Inspection mode)	—
Calculate Load (Cal Load)	Calculated load by ECM/ Min.: 0 %, Max.: 100 %	• Idling: 10 to 20 % (Inspection mode) • Running without load (1,500 rpm): 10 to 20 %	—
MAF	Air flow rate from MAF meter/ Min.: 0 g/s, Max.: 655 g/s	Idling: 3 to 7 g/s (1,500 rpm)	If the value is approximately 0.0 g/s: • Mass air flow meter power source circuit open • VG circuit open or short If the value is 160.0 g/s or more: • E2G circuit open
Engine Speed (Engine Spd)	Engine speed/ Min.: 0 rpm, Max.: 16383 rpm	Idling 1,000 rpm (when putting the engine in inspection mode)	—
Coolant Temp	Engine coolant temperature/ Min.: –40 °C, Max.: 140 °C	After warming up: 80 to 100°C (176 to 212°F)	• If the value is –40°C (–40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
Intake Air	Intake air temperature/ Min.: –40 °C, Max.: 140 °C	Equivalent to ambient air temperature	• If the value is –40°C (–40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
Throttle Position (Throttle Pos)	Absolute throttle position sensor/ Min.: 0 %, Max.: 100 %	• Throttle fully closed: 10 to 24 % • Throttle fully open: 64 to 96 %	Read the value with intrusive operation (active test)
Vehicle Speed (Vehicle Spd)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
Throttle Position No.2 (Throttle Pos #2)	Throttle position sensor No.2 output voltage/ Min.: 0 V, Max.: 5.0 V	• Throttle fully closed: 2.0 to 2.9 V • Throttle fully open: 4.6 to 5.5 V	Read the value with intrusive operation (active test)
Throttle Require Position (Throttle Req Pos)	Throttle requirement position/ Min.: 0 V, Max.: 5 V	Idling: 0.5 to 1.0 V (Inspection mode)	—

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Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Throttle Motor Open Duty (Throtl Opn Duty)	Throttle motor opening duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is depressed, duty ratio is increased
Throttle Motor Close Duty (Throtl Cls Duty)	Throttle motor closed duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is released quickly, duty ratio is increased
Throttle Motor (Throttle Mot)	Whether or not throttle motor control is permitted/ ON or OFF	Idling: ON (Inspection mode)	Read the value with the power switch ON (Do not start engine)
ETCS Actuator Power (+BM)	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON (inspection mode)	—
Accelerator Idle Position (Accel Idl Pos)	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
Throttle Idle Position (Throttl Idl Pos)	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
Fail Safe Drive (Fail #1)	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
Fail Safe Drive (Main CPU) (Fail #2)	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
Throttle Fully Close Learn (Thrtl Learn Val)	Throttle fully closed (learned value) Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	—
Throttle Motor Current (Throttle Mot)	Throttle motor current Min.: 0 A, Max.: 80 A	Idling: 0 to 3.0 A (Inspection mode)	—
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 70 km/h (44 mph): 0.1 to 0.9 V	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1/ Min.: 0 V, Max.: 7.999 V	Idling 2.8 to 3.8 V (Inspection mode)	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
Short FT#1	Short–term fuel trim of bank 1/ Min.: –100 %, Max.: 99.2%	0 ± 20 %	This item is the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
Long FT#1	Long–term fuel trim of bank 1/ Min.: –100 %, Max.: 99.2 %	0 ± 20 %	This item is the overall fuel compensation carried out in long–term to compensate a continual deviation of the short–term fuel trim from the central value
Total FT#1	Total fuel trim of bank 1: Average value for fuel trim system of bank 1/ Min.: –0.5, Max.: 0.496	Idling: –0.2 to 0.2 (Inspection mode)	—
O2FT B1 S2	Short–term fuel trim associated with the bank 1 sensor 2/ Min.: –100 %, Max.: 99.2 %	0 ± 20 %	Same as SHORT FT #1
AF FT B1 S1	Short–term fuel trim associated with the bank 1 sensor 1/ Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) = Lean • Stoichiometric air–fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = RICH	—

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Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Fuel System Status (Bank 1) (Fuel Sys #1)	Fuel system status (Bank1) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL (Inspection mode)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor(s) as feedback for fuel control. • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor which is used for fuel control is malfunctioning
Idle Fuel Cut (FC Idl)	Fuel cut idle/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 2,800 rpm
MIL*2	CHK ENG status/ ON or OFF	CHK ENG ON: ON	—
ST1	Starter signal/ ON or OFF	Cranking: ON	—
Fuel Pump/Speed Status (Fuel Pump/Speed)	Fuel pump/speed status/ ON or OFF	Idling: ON (Inspection mode)	—
EVAP Purge VSV (Evap (Purge) VSV)	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
Ignition	Ignition counter/ Min.: 0, Max.: 800	0 to 800	—
Cylinder #1,#2,#3,#4 Misfire Rate (Cyl #1, #2, #3, #4)	Misfire ratio of the cylinder 1 to 4/ Min.: 0, Max.: 255	0 %	This item is displayed in only idling
Misfire Load	Engine load for first misfire range/ Min.: 0 g/rev, Max.: 3.98 g/rev	Misfire 0: 0 g/rev	—
Misfire RPM	Engine RPM for first misfire range/ Min.: 0 rpm, Max.: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete
Check Mode	Check mode/ ON or OFF	Check mode ON: ON	See page 05–29
Engine Run Time (Eng Run Time)	Engine run time/ Min.: 0 second, Max.: 65535 seconds	Time after engine start	Service data
MIL ON Run Distance*2 (MIL On Run Dist)	CHK ENG ON run distance/ Min.: 0 second, Max.: 65535 seconds	Distance after DTC is detected	—
Warm–up Cycle Cleared DTC (Wu Cyc DTC Dist)	Warm–up cycle after DTC cleared/ Min.: 0, Max.: 255	—	Number of warm–up cycles after DTC is cleared
Distance from DTC Cleared (Dist DTC Clear)	Distance from DTC cleared/ Min.: 0 km/h, Max.: 65535 km/h	Equivalent to drive distance after DTCs were erased	—
Battery Voltage (BATT)	Battery voltage/ Min.: 0 V, Max.: 65.535 V	Idling: 9 to 14 V (Inspection mode)	—
Air–Fuel Ratio	Air fuel ratio: Min.: 0, Max.: 1.999	During idling: 1,500 rpm 0.8 to 1.2	—
Throttle Sensor Position (Throttle Pos)	Throttle sensor positioning/ Min.: 0 %, Max.: 100 %	Idling 10 to 18 % (Inspection mode)	Calculated value based on VTA1

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Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Ambient Temperature (Ambient Temp)	Ambient air temperature/ Min.: −40°C, Max.: 215°C	Equivalent to ambient air temperature	• If the value is −40°C: sensor circuit is open • If the value is 215°C: sensor circuit is shorted
Throttle Sensor Position #2 (Throttle Pos #2)	Throttle sensor positioning #2/ Min.: 0 %, Max.: 100 %	—	Calculated value based on VTA2
Throttle Motor (Throttle Mot)	Throttle motor Min.: 0 %, Max.: 100 %	Idling: 0.5 to 40 % (Inspection mode)	—
Running Time from MIL ON (MIL ON Run Time)	Running time from CHK ENG ON/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to running time after CHK ENG was ON	—
Time after DTC Cleared (Time DTC Clear)	Time after DTC cleared/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to time after DTC was erased	—
Knock Correct Learn Value (Knock Crrt Val)	Correction learning value of knocking/ Min.: −64 CA, Max.: 1984 CA	0 to 22 °CA Driving: 70 km/h (44 mph)	Service data
Knock Feedback Value (Knock FB Val)	Feedback value of knocking/ Min.: −64 CA, Max.: 1984 CA	−22 to 0 °CA Driving: 70 km/h (44 mph)	Service data
Purge Flow	Purge flow/ Min.: 0 %, Max.: 102.4 %	Idling: 0 to 100 %	—
Cylinder Number (Cylinder)	Cylinder number/ Min.: 0, Max.: 255	—	Identifying the cylinder number
Model Year	Model year/ Min.: 0, Max.: 255	—	Identifying the model year
Throttle Position No.1 (Throttle Pos #1)	Throttle position sensor No. 1 output voltage/ Min.: 0 V, Max.: 4.9 V	• Throttle fully closed: 0.5 to 1.2 V • Throttle fully opened : 3.2 to 4.8 V	—
Throttle Motor Current (Throttle Mot)	Throttle motor current/ Min.: 0 A, Max.: 19.92 A	Idling: 0 to 3.0 A	—
Throttle Sens Open Pos #1 (Throttle Ssr #1)	Throttle sensor opener position No. 1/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
Throttle Sens Open Pos #2 (Throttle Ssr #2)	Throttle sensor opener position No. 2/ Min.: 0 V, Max.: 4.98 V	2.2 to 2.6 V	ETCS service data
Throttle Position Command (Thrtl Comnd Val)	Throttle position command value/ Min.: 0 V, Max.: 4.98 V	0.5 to 4.8 V	ETCS service data
Throttle Sens Open #1 (AD) (Thrtl Ssr #1 AD)	Throttle sensor opener position No.1 (AD)/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
Actuator Power Supply (Actuator Power)	Actuator power supply/ ON or OFF	Idling ON (Inspection mode)	ETCS service data
Open Side Malfunction (Opn Malfunction)	Open side malfunction/ ON or OFF	—	ETCS service data
System Guard (Sys Guard Judge)	System guard/ ON or OFF	—	ETCS service data
Throttle Position No.1 (Throttle Pos #1)	Throttle position No. 1/ Min.: 0 V, Max.: 5 V	—	ETCS service data
Throttle Position No.2 (Throttle Pos #2)	Throttle position No. 2/ Min.: 0 V, Max.: 5 V	—	ETCS service data

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Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Throttle Motor Duty (Open) (Thrtl Mot (Opn))	Throttle motor duty ratio (open)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
Throttle Motor Duty (Close) (Thrtl Mot (Cls))	Throttle motor duty ratio (close)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
+BM Voltage	+BM voltage/ Min.: 0, Max.: 19.92	Idling: 10 to 15 V	ETCS service data
#Codes ()	#Codes/ Min.: 0, Max.: 255	—	Number of detected DTC
VVTL Aim Angle (Bank 1) (VVTL Aim Angle #1)	VVT aim angle (bank 1)/ Min.: 0 %, Max.: 100 %	Idling: 0 %	VVT duty signal value during intrusive operation
VVT Change Angle (Bank 1) (VVT Chng Angl #1)	VVT change angle/ Min.: 0°FR, Max.: 60°FR	Idling: 0 to 5 °FR	Displacement angle during intrusive operation
VVT OCV Duty (Bank 1) (VVT OCV Duty B1)	VVT OCV operation duty/ Min.: 0 %, Max.: 100 %	Idling: 0 %	Requested duty value for intrusive operation
VVT Control Status (VVT Ctrl B1)	VVT control status/ ON or OFF	—	Support for VVT active test
Electric Fan Motor (Fan Motor)	Electric fan motor/ ON or OFF	—	Support for fan motor active test
Initial Engine Coolant Temp (Ini Cool Temp)	Initial engine coolant temperature/ Min.: −40°C, Max.: 140°C	Close to ambient temperature	Service data
Initial Intake Air Temp (Ini Intake Temp)	Initial intake air temperature/ Min.: −40°C, Max.: 140°C	Close to ambient temperature	Service data
Injection Volume (Cylinder 1) (Inj Vol)	Injection volume (cylinder 1)/ Min.: 0 ml, Max.: 2.048 ml	0 to 0.5 ml	Quantity of fuel injection volume for 10 times
All Cylinders Misfire Rate (Cyl All)	All cylinders misfire rate/ Min.: 0, Max.: 255	0 to 35	—
Misfire Margin	Misfire monitoring/ MIn.: −100 %, Max.: 99.22 %	−100 to 99.2 %	Misfire detecting margin
Requested Engine Torque (Req Eng Trq)	Requested engine torque/ Min.: 0 kW, Max.: 16383.75 kW	0 to 57 kw	Flag information for hybrid vehicle
HV Target Engine Speed (HV Trgt Eng Spd)	HV target engine speed/ Min.: 0 rpm, Max.: 6375 rpm	0 to 5000 rpm	Flag information for hybrid vehicle
Actual Engine Torque (Act Engine Spd)	Actual engine torque/ Min.: −128 Nm, Max.: 127 Nm	−128 to 127 Nm	Flag information for hybrid vehicle
Estimated Engine Torque (Est Engine Trq)	Estimated engine torque/ Min.: 0 Nm, Max.: 510 Nm	0 to 120 Nm	Flag information for hybrid vehicle
Engine Run Time	Engine run time/ Min.: 0 second, Max.: 255 seconds	0 to 255 seconds	Flag information for hybrid vehicle
Request Engine Run Time (Engine Run Time)	Request engine run time/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
Judge Time Engine Ignition (Ignition Time)	Judgment time for ignition of engine/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
Judge Time Engine Output (Output Time)	Judgment time for engine output/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle

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Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Fuel Level	Fuel level/ 0: EMPTY/1: NOT EMP	—	Flag information for hybrid vehicle
F/C for Engine Stop Req (Fuel Cut)	Fuel cut for engine stop request/ 0: OFF/1: ON	—	Flag information for hybrid vehicle
Engine Independent (Indpendnt Opr)	Engine independently operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Racing Operation (Racing)	Rev–up operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Request Warm–up (Warm Up)	Request warm–up/ 0: NOT REQ/1: REQUEST	—	Flag information for hybrid vehicle
Engine Independent Control (Indpndnt Cntrl)	Engine independently control operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Engine Oil Pressure SW (Eng Oil Pres SW)	Engine oil pressure switch signal/ 0: OFF / 1: ON	Indicating ON while engine is running	—

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

*2: MIL stands for Malfunction Indicator Lamp. It is referring to CHK ENG.

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2. ACTIVE TEST

HINT:

Performing Active Test using the intelligent tester II allows the relay, VSV, actuator and so on to operate without parts removal. Performing Active Test as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display DATA LIST during Active Test.

(a) Warm up the engine.
(b) Turn the power switch OFF.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).
(e) Turn the intelligent tester II ON.
(f) Enter the following menus: Powertrain / Engine and ECT / Active Test.
(g) According to the display on tester, perform items in Active Test.

Intelligent Tester II Display (Abbreviation)	Test Details	Diagnostic Note
Control the Injection Volume (Inj Vol)	[Test Details] Control the injection volume Min.: –12.5 %, Max.: 25 % [Vehicle Condition] Engine speed: 3,000 rpm or less	• All injectors are tested at once • Injection volume is gradually changed between –12.5 and 25 %
Control the Injection Volume for A/F Sensor (A/F Control)	[Test Details] Control the injection volume –12.5 or 25 % (Change the injection volume –12.5 % or 25 %.) [Vehicle Condition] Engine speed: 3,000 rpm or less	The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and heated oxygen sensor To display the graph indication, enter "Active Test / A/F CONTROL / USER DATA", then select "AFS B1S1 and O2S B1S2" or "AFS B2S1 and O2S B2S2" by pressing "YES" button and followed by "ENTER" button and then "F4" button
Activate the VSV for Evap (Evap VSV (Alone))	[Test Details] Activate the VSV for EVAP control ON or OFF	—
Control the Fuel Pump / Speed (Fuel Pump/Spd)	[Test Details] Control the fuel pump ON or OFF	—
Activate the VVT System (VVT Ctrl B1)	[Test Details] Activate the VVT system (Bank 1) ON or OFF	• ON: Rough idle or engine stall • OFF: Normal engine speed
Connect the TC and TE1 (TC/TE1)	[Test Details] Connect the TC and TE1 ON or OFF	—
Control the Idle Fuel Cut Prohibit (FC Idl Prohbt)	[Test Details] Control the idle fuel cut prohibit ON or OFF	During idling
Control the Electric Cooling Fan (Cooling Fan)	[Test Details] Control the electric cooling fan ON or OFF	—
Control the ETCS Open/Close Slow Speed (ETCS Slow (Open/Close))	[Test Details] Control the ETCS opening/closing slow speed ON or OFF	Throttle valve intrusive operation
Control the ETCS Open/Close Fast Speed ETCS Fast (Open/Close))	[Test Details] Control the ETCS opening/closing fast speed ON or OFF	Throttle valve intrusive operation
Control the Cylinder #4 Fuel Cut (Fuel Cut#4)	[Test Details] Control the cylinder #4 fuel cut ON or OFF	Cylinder No. 4 fuel cut for power balance

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Intelligent Tester II Display (Abbreviation)	Test Details	Diagnostic Note
Control the Cylinder #3 Fuel Cut (Fuel Cut#3)	[Test Details] Control the cylinder #3 fuel cut ON or OFF	Cylinder No. 3 fuel cut for power balance
Control the Cylinder #2 Fuel Cut (Fuel Cut#2)	[Test Details] Control the cylinder #2 fuel cut ON or OFF	Cylinder No. 2 fuel cut for power balance
Control the Cylinder #1 Fuel Cut (Fuel Cut#1)	[Test Details] Control the cylinder #1 fuel cut ON or OFF	Cylinder No. 1 fuel cut for power balance
Control the VVT (Bank 1) (VVT B1)	[Test Details] Control the VVT (bank 1) Min.: –128 %, Max.: 127 %	—

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054JD-12

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your readings 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 the codes listed in the table below. For details of each code, refer to "See page " under the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P0010 (05–45)	Camshaft Position "A" Actuator Circuit (Bank 1)	• Open or short in oil control valve circuit • Oil control valve • ECM	○	○
P0011 (05–48)	Camshaft Position "A" –Timing Over–Advanced or System Performance (Bank 1)	• Valve timing • Oil control valve • Camshaft timing gear assembly • ECM	○	○
P0012 (05–48)	Camshaft Position "A" –Timing Over– Retarded (Bank 1)	• Same as DTC P0011	○	○
P0016 (05–52)	Crankshaft Position – Camshaft Position Correlation (Bank 1 Sensor A)	• Mechanical system (Timing chain has jumped a tooth, chain stretched) • ECM	○	○
P0031 (05–53)	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	• Open or short in heater circuit of A/F sensor • A/F sensor heater • EFI M relay (Integration relay) • ECM	○	○
P0032 (05–53)	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	• Short in heater circuit of A/F sensor • A/F sensor heater • EFI M relay (Integration relay) • ECM	○	○
P0037 (05–57)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	• Open or short in heater circuit of the heated oxygen sensor • Heated oxygen sensor heater • EFI M relay (integration relay) • ECM	○	○
P0038 (05–57)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	• Short in heater circuit of the heated oxygen sensor • Heated oxygen sensor heater • EFI M relay (integration relay) • ECM	○	○
P0100 (05–61)	Mass or Volume Air Flow Circuit	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM	○	○
P0102 (05–61)	Mass or Volume Air Flow Circuit Low Input	• Open in mass air flow meter circuit • Mass air flow meter • ECM	○	○
P0103 (05–61)	Mass or Volume Air Flow Circuit High Input	• Short in mass air flow meter circuit • Mass air flow meter • ECM	○	○
P0110 (05–67)	Intake Air Temperature Circuit	• Open or short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM	○	○
P0112 (05–67)	Intake Air Temperature Circuit Low Input	• Short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM	○	○
P0113 (05–67)	Intake Air Temperature Circuit High Input	• Open in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM	○	○
P0115 (05–71)	Engine Coolant Temperature Circuit	• Open or short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM	○	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P0116 (05–75)	Engine Coolant Temperature Circuit Range/Performance Problem	• Engine coolant temperature sensor	○	○
P0117 (05–71)	Engine Coolant Temperature Circuit Low Input	• Short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM	○	○
P0118 (05–71)	Engine Coolant Temperature Circuit High Input	• Open in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM	○	○
P0120 (05–76)	Throttle/Pedal Position Sensor/ Switch "A" Circuit	• Open or short in throttle position sensor circuit • Throttle position sensor (built in throttle body) • ECM	○	○
P0121 (05–82)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	• Throttle position sensor (built in throttle body)	○	○
P0122 (05–76)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	• Throttle position sensor • Open in VTA1 circuit • Open in VC circuit (when the VC circuit is open, DTCs P0222 and P2135 are also output simultaneously) • ECM	○	○
P0123 (05–76)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	• Throttle position sensor (built in throttle body) • Open in VTA circuit • Open in E2 circuit • VC and VTA circuits are short–circuited • ECM	○	○
P0136 (05–83)	Oxygen Sensor Circuit Malfunction (Bank 1 sensor 2)	• Heated oxygen sensor	○	○
P0137 (05–83)	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	• Open or short in heated oxygen sensor circuit • Heated oxygen sensor • Heated oxygen sensor heater • EFI M relay (integration relay)	○	○
P0138 (05–83)	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	• Short in heated oxygen sensor circuit • Heated oxygen sensor	○	○
P0171 (05–95)	System Too Lean (Bank 1)	• Air induction system • Injector has blockage • Mass air flow meter • Engine coolant temperature sensor • Fuel pressure • Gas leakage in exhaust system • Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater (bank 1 sensor 1) • EFI M relay (integration relay) • PCV valve and hose • PCV hose connection • ECM	○	○
P0172 (05–95)	System Too Rich (Bank 1)	• Injector has leakage or blockage • Mass air flow meter • Engine coolant temperature sensor • Ignition system • Fuel pressure • Gas leakage in exhaust system • Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater (bank 1 sensor 1) • EFI M relay (integration relay) • ECM	○	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P0220 (05–76)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM	○	○
P0222 (05–76)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	• Throttle position sensor • Open in VTA2 circuit open • Open in VC circuit (when the VC circuit is open, DTCs P0122 and P2135 are also output simultaneously)	○	○
P0223 (05–76)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	• Throttle position sensor	○	○
P0300 (05–107)	Random/Multiple Cylinder Misfire Detected	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Mass air flow meter • Engine coolant temperature sensor • Compression pressure • Valve clearance • Valve timing • PCV hose connection • PCV hose • ECM	○*2	○
P0301 (05–107)	Cylinder 1 Misfire Detected	• Same as DTC P0300	○*2	○
P0302 (05–107)	Cylinder 2 Misfire Detected	• Same as DTC P0300	○*2	○
P0303 (05–107)	Cylinder 3 Misfire Detected	• Same as DTC P0300	○*2	○
P0304 (05–107)	Cylinder 4 Misfire Detected	• Same as DTC P0300	○*2	○
P0325 (05–120)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	• Open or short in knock sensor circuit • Knock sensor (looseness) • ECM	○	○
P0327 (05–120)	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	• Short in knock sensor circuit • Knock sensor • ECM	○	○
P0328 (05–120)	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	• Open in knock sensor circuit • Knock sensor • ECM	○	○
P0335 (05–124)	Crankshaft Position Sensor "A" Circuit	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Signal plate (crankshaft) • ECM	○	○
P0340 (05–128)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Timing chain has jumped a tooth • ECM	○	○
P0341 (05–128)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	• Same as DTC P0340	○	○
P0351 *3 (05–131)	Ignition Coil "A" Primary/Secondary Circuit	• Ignition system • Open or short in IGF or IGT1 circuit between ignition coil with igniter and ECM • Ignition coil No. 1 (#1) • ECM	○	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P0352 *3 (05–131)	Ignition Coil "B" Primary/Secondary Circuit	• Ignition system • Open or short in IGF or IGT2 circuit between ignition coil with igniter and ECM • Ignition coil No. 1 (#2) • ECM	○	○
P0353 *3 (05–131)	Ignition Coil "C" Primary/Secondary Circuit	• Ignition system • Open or short in IGF or IGT3 circuit between ignition coil with igniter and ECM • Ignition coil No. 1 (#3) • ECM	○	○
P0354 *3 (05–131)	Ignition Coil "D" Primary/Secondary Circuit	• Ignition system • Open or short in IGF or IGT4 circuit between ignition coil with igniter and ECM • Ignition coil No. 1 (#4) • ECM	○	○
P0420 (05–139)	Catalyst System Efficiency Below Threshold (Bank 1)	• Gas leakage in exhaust system • A/F sensor (bank 1 sensor 1) • Heated oxygen sensor (bank 1 sensor 2) • Three–way catalytic converter (Exhaust manifold)	○	○
P0443 (05–144)	Evaporative Emission Control System Purge Control Valve circuit	• Open or short in VSV for EVAP circuit • VSV for EVAP • ECM	○	○
P0505 (05–148)	Idle Air Control System	• Open or short in idle speed control (ISC) valve circuit • Idle speed control (ISC) valve stuck closed • ECM • Air induction system • PCV valve and hose	○	○
P0560 (05–150)	System Voltage	• Open in back up power source circuit • ECM	○	○
P0604 (05–153)	Internal Control Module Random Access Memory (RAM) Error	• ECM	○	○
P0606 (05–153)	ECM/PCM Processor	• ECM	○	—
P0607 (05–153)	Control Module Performance	• ECM	○	○
P0657 (05–153)	Actuator Supply Voltage Circuit/Open	• ECM	○	○
P2102 (05–154)	Throttle Actuator Control Motor Circuit Low	• Open or short in throttle control motor circuit • Throttle control motor • ECM	○	○
P2103 (05–154)	Throttle Actuator Control Motor Circuit High	• Short in throttle control motor circuit • Throttle control motor • Throttle valve • Throttle body assembly • ECM	○	○
P2111 (05–157)	Throttle Actuator Control System Stuck Open	• Throttle control motor circuit • Throttle control motor • Throttle body • Throttle valve	○	○
P2112 (05–157)	Throttle Actuator Control System Stuck Closed	• Throttle control motor circuit • Throttle control motor • Throttle body • Throttle valve	○	○
P2118 (05–159)	Throttle Actuator Control Motor Current Range/Performance	• Open in ETCS power source circuit • ETCS fuse • ECM	○	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P2119 (05–163)	Throttle Actuator Control Throttle Body Range/Performance	• Electric throttle control system • ECM	○	○
P2135 (05–76)	Throttle/Pedal Position Sensor/ Switch "A"/"B" Voltage Correlation	• VTA and VTA2 circuits are short–circuited • Open in VC circuit • Throttle position sensor	○	○
P2195 (05–165)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	• Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater • Integration relay • A/F sensor heater and relay circuit • Air induction system • Fuel pressure • Injector • PCV hose connection • ECM	○	○
P2196 (05–165)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	• Same as DTC P2195	○	○
P2238 (05–177)	Oxygen Sensor Pumping Current Circuit Low (for A/F sensor Bank 1 sensor 1)	• Open or short in A/F sensor (bank 1 sensor 1) • A/F sensor (bank 1 sensor 1) • A/F sensor heater • EFI M relay (integration relay) • A/F sensor heater and relay circuit • ECM	○	○
P2239 (05–177)	Oxygen Sensor Pumping Current Circuit High (for A/F sensor Bank 1 sensor 1)	• Same as DTC P2238	○	○
P2251 (05–177)	Oxygen Sensor Reference Ground Circuit/Open (for A/F sensor Bank 1 sensor1)	• Same as DTC P2238	○	○
P2252 (05–177)	Oxygen Sensor Reference Ground Circuit Low (for A/F sensor Bank 1 sensor1)	• Same as DTC P2238	○	○
P2253 (05–177)	Oxygen Sensor Reference Ground Circuit High (for A/F sensor Bank 1 sensor1)	• Same as DTC P2238	○	○
P2A00 (05–182)	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	• Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater • EFI M relay (integration relay) • A/F sensor heater and relay circuit • Air induction system • Fuel pressure • Injector • PCV hose connection • ECM	○	○
P3190 (05–191)	Poor Engine Power	• Air induction system • Throttle body • Fuel pressure • Engine • Air flow meter • Lack of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM	○	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P3191 (05–191)	Engine Does Not Start	• Air induction system • Throttle body • Fuel pressure • Engine • Air flow meter • Lack of fuel • Coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM	○	○
P3193 (05–191)	Fuel Run Out	• Lack of fuel • ECM	○	○
U0293 (05–196)	Lost Communication With HV ECU	• Wire harness • HV ECU • ECM	○	○

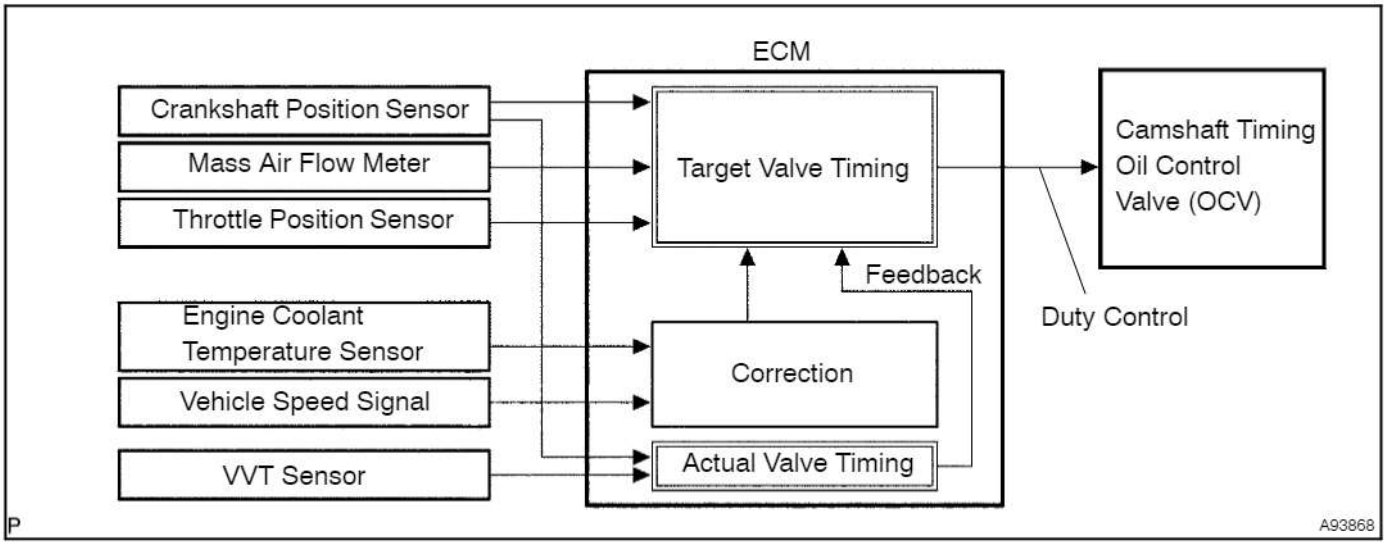
*1: "○" ... CHK ENG illuminates, "—" ... CHK ENG does not illuminate.
*2: CHK ENG illuminates or blinks
*3: This DTC indicates a malfunction related to the primary circuit.

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DTC	P0010	CAMSHAFT POSITION "A" ACTUATOR CIRCUIT (BANK 1)

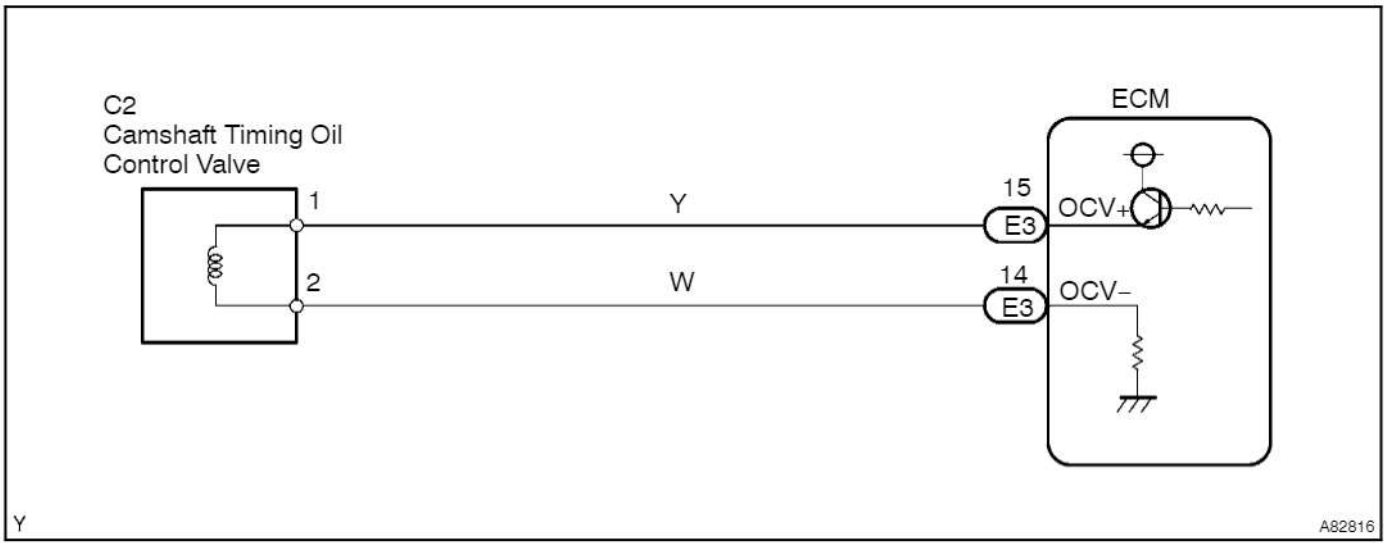
CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target "duty–cycle" control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed based on engine operation condition such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV based on the signals from several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft is optimized, the engine torque and fuel economy improve, and exhaust emissions decrease. The ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor. The ECM performs feedback control and verifies target valve timing.



DTC No.	DTC Detection Condition	Trouble Area
P0010	Open or short in oil control valve circuit	• Open or short in oil control valve circuit • Oil control valve • ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(OPERATE OCV)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Put the engine in inspection mode (see page 05–1).
(e) Start the engine and warm it up.
(f) Select the item: Powertrain / Engine and ECT / Active Test / Activate the VVT System (Bank 1).
(g) Using the intelligent tester II, operate the OCV and check the engine speed.

Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NOTICE:

Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

NG

2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV) (See page 10–5)

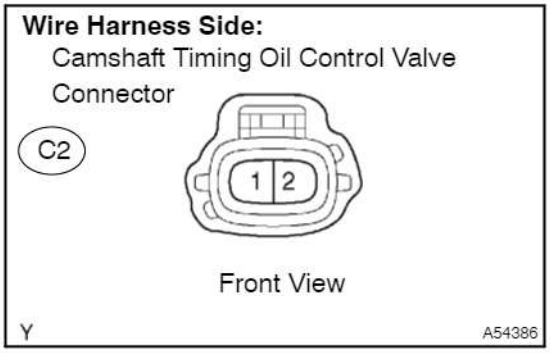
OK: OCV has no contamination and moves smoothly.

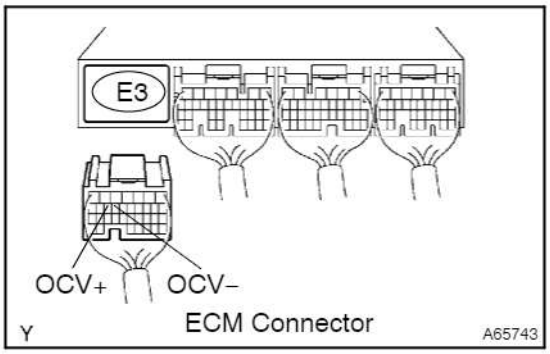
NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

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3 CHECK HARNESS AND CONNECTOR(CAMSHAFT TIMING OIL CONTROL VALVE (OCV) – ECM)





(a) Disconnect the C2 camshaft timing oil control valve connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Oil control valve (C2–1) – OCV+ (E3–15)	Below 1 Ω
Oil control valve (C2–2) – OCV– (E3–14)	Below 1 Ω

Standard (Check for short):

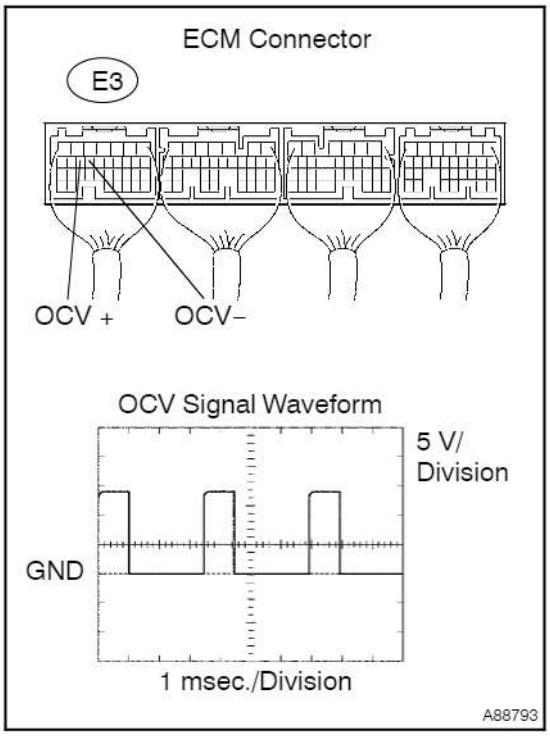
Tester Connection	Specified Condition
Oil control valve (C2–1) or OCV+ (E3–15) – Body ground	10 kΩ or higher
Oil control valve (C2–2) or OCV– (E3–14) – Body ground	10 kΩ or higher

(d) Reconnect the camshaft timing oil control valve connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT ECM(OCV SIGNAL)



(a) Put the engine in inspection mode (see page 05–1).
(b) Start the engine and warm it up.
(c) During idling, check the waveform between the specified terminals of the E3 ECM connector using an oscilloscope.

Standard:

Tester Connection	Specified Condition
OCV+ (E3–15) – OCV– (E3–14)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10–24)**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

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DTC	P0011	CAMSHAFT POSITION "A" –TIMING OVER–ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC	P0012	CAMSHAFT POSITION "A" –TIMING OVER–RETARDED (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P0010 on page 05–45.

DTC No.	DTC Detection Condition	Trouble Area
P0011 P0012	After engine is warmed up, condition (a) or (b) continues at engine speed of 900 to 5,000 rpm: (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	• Valve timing • Oil control valve • Camshaft timing gear assembly • ECM

WIRING DIAGRAM

Refer to DTC P0010 on page 05–45.

INSPECTION PROCEDURE

HINT:

Advanced timing over standard level (Valve timing is out of specified range)	P0011
Retarded timing over standard level (Valve timing is out of specified range)	P0012

- If DTC P0011 or P0012 is present, check the VVT system circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK VALVE TIMING(CHECK FOR LOOSE AND A JUMPED TOOTH OF TIMING CHAIN) (See page 14–6)

OK: The match marks of crankshaft pulley and camshaft pulley are aligning.

NG → ADJUST VALVE TIMING (See page 14–6)

OK

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2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(OPERATE OCV)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Put the engine in inspection mode (see page 05–1).
(e) Start the engine and warm it up.
(f) Select the item: Powertrain / Engine and ECT / Active Test / Activate the VVT System (Bank 1).
(g) Using the intelligent tester II, operate the OCV and check the engine speed.

Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NOTICE:
Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.

NG → **Go to step 4**

OK

3	CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page 05–25).
(b) Start the HV system and warm the engine up.
(c) Drive the vehicle with the shift position B at vehicle speed of more than 44 mph (70 km/h) approximately for 10 minutes or more.
(d) Read output DTC using the intelligent tester II.

OK: No DTC output.

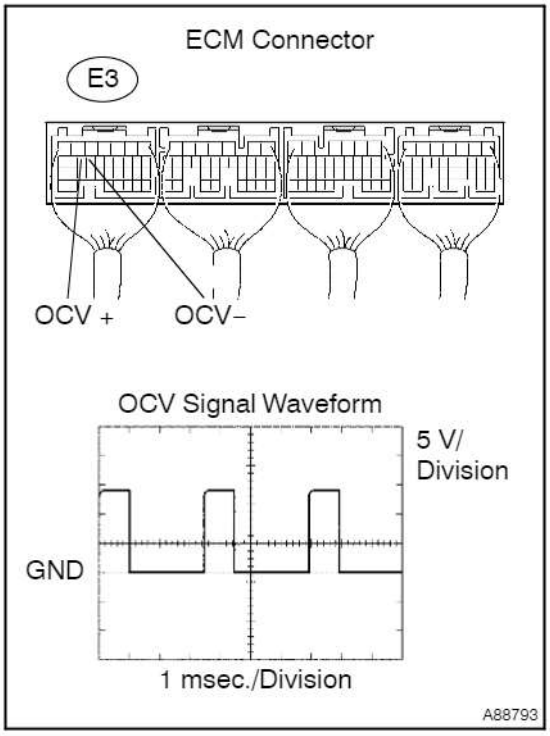
HINT:
*: DTC P0011 or P0012 is output when a foreign object in engine oil is caught in some part of the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

OK → **VVT SYSTEM OK***

NG

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4	INSPECT ECM(OCV SIGNAL)



(a) During idling, check the waveform between the specified terminals of the E3 ECM connector using an oscilloscope.

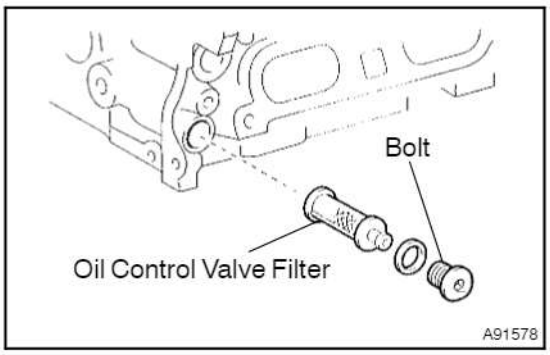
Standard:

Tester Connection	Specified Condition
OCV+ (E3–15) – OCV– (E3–14)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10–24)**

OK

5	INSPECT OIL CONTROL VALVE FILTER (See page 14–128)



(a) Remove the air cleaner inlet bolt and oil control valve filter.
(b) Check for blockages in the oil control valve filter.
(c) Reinstall the filter, bolt and air cleaner inlet.

NOTICE:
If necessary, clean the filter.

OK: The filter has not clogged.

NG → **REPLACE OIL CONTROL VALVE FILTER (See page 14–128)**

OK

6	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV) (See page 10–5)

OK: OCV has no contamination and moves smoothly.

OK → **Go to step 8**

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)

GO

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8	INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14–98)

OK → Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK CHECK IF DTC OUTPUT RECURS

(a) Erase the DTCs by using the intelligent tester II (see page 05–25).
(b) Start the HV system, and warm the engine up.
(c) Drive the vehicle with the shift position in B at the vehicle speed of more than 70 km/h (44 mph) approximately for 10 minutes or more.
(d) Read output DTC using the intelligent tester II.
OK: No DTC output.

HINT:
*: DTC P0011 or P0012 is output when a foreign object in engine oil is caught in some part of the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

OK → VVT SYSTEM OK*

NG

REPLACE ECM (See page 10–24)

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DTC	P0016	CRANKSHAFT POSITION – CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page 05–124.

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and VVT sensor signal (2 trip detection logic)	• Mechanical system (Timing chain has jumped a tooth, chain stretched) • ECM

WIRING DIAGRAM

Refer to DTC P0335 on page 05–124.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK VALVE TIMING(CHECK FOR LOOSE AND A JUMPED TOOTH OF TIMING CHAIN) (See page 14–6)

OK: The match marks of crankshaft pulley and camshaft pulley are aligning.

NG → ADJUST VALVE TIMING (See page 14–6) (REPAIR OR REPLACE TIMING CHAIN)

OK ↓

REPLACE ECM (See page 10–24)

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DTC	P0031	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

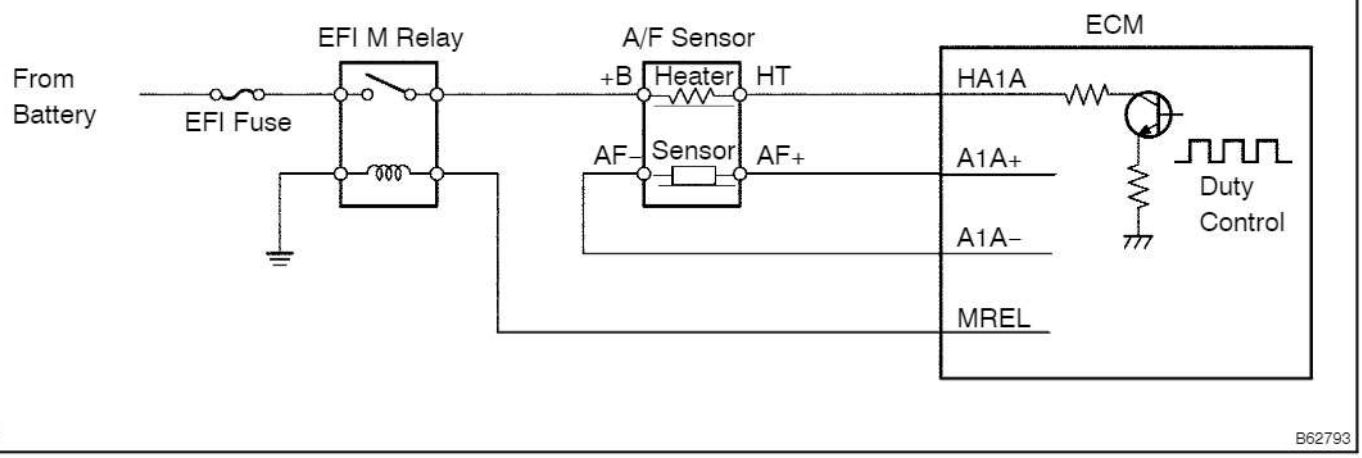
DTC	P0032	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

HINT:
Although each DTC title says "oxygen sensor," these DTCs are related to the air–fuel ratio sensor (A/F sensor).

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05–165.
HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The A/F sensor heater circuit uses a relay on the +B side of the circuit.

Reference (Bank 1 Sensor 1 System Diagram):



DTC No.	DTC Detection Condition	Trouble Area
P0031	Heater current is 0.8 A or less when the heater operates (1 trip detection logic)	• Open or short in heater circuit of A/F sensor • A/F sensor heater • EFI M relay (integration relay) • ECM
P0032	Heater current exceeds 10 A when the heater operates (1 trip detection logic)	• Short in heater circuit of A/F sensor • A/F sensor heater • EFI M relay (integration relay) • ECM

HINT:
- Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.
- Sensor 2 refers to the sensor mounted after the TWC and is located far from the engine assembly.

WIRING DIAGRAM

Refer to DTC P2195 on page 05–165.

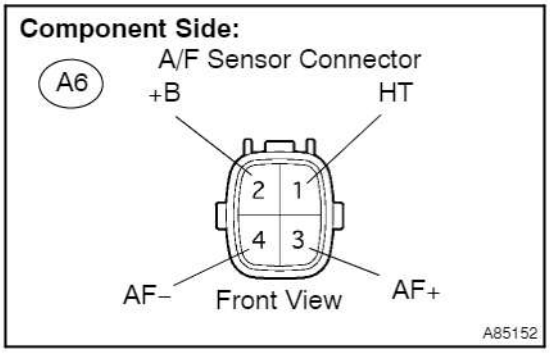
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INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- When DTC P0032 is detected, proceed to step 4 if heater resistance is in normal range.

1 INSPECT AIR FUEL RATIO SENSOR(HEATER RESISTANCE)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.

Standard:

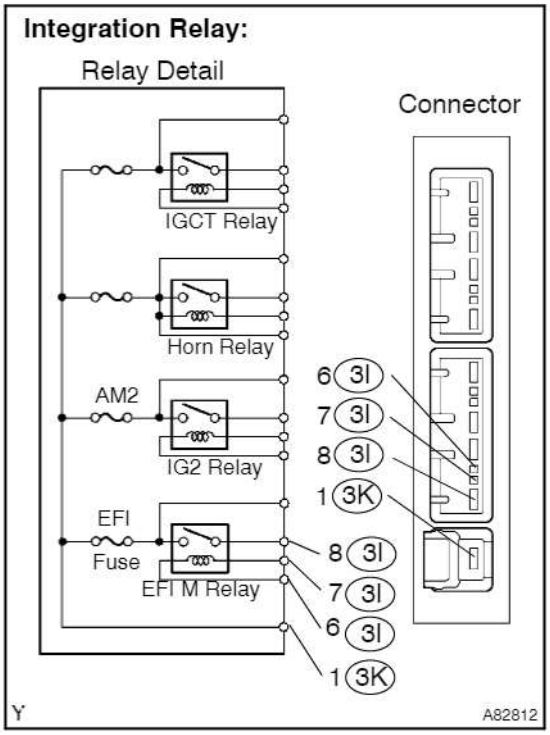
Tester Connection	Resistance
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

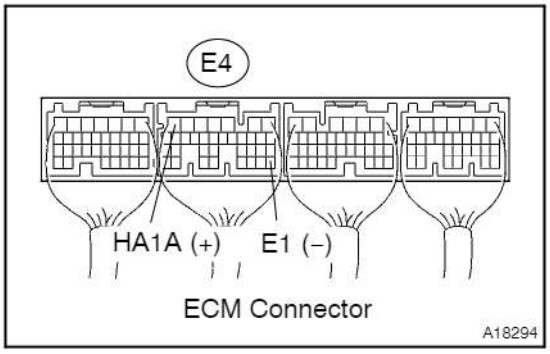
(c) Reinstall the integration relay.

NG → **REPLACE INTEGRATION RELAY**

OK

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3	INSPECT ECM(HA1A VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the applicable terminals of the E4 ECM connector.

Standard:

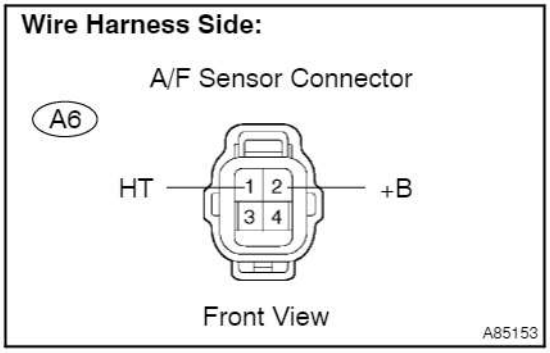
Tester Connection	Specified Condition
HA1A (E4–7) – E1 (E4–28)	9 to 14 V

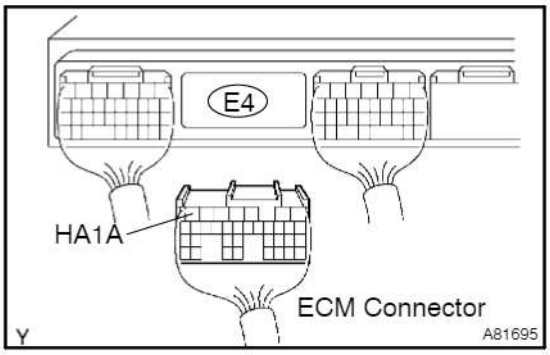
NG

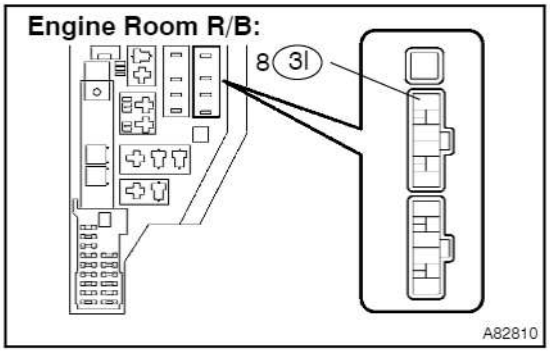
OK → **REPLACE ECM (See page 10–24)**

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4	CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM, A/F SENSOR – EFI M RELAY)







(a) Check the harness and the connectors between the ECM and the A/F sensor connectors.
  (1) Disconnect the A6 A/F sensor connector.
  (2) Disconnect the E4 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher
HT (A6–1) – +B (A6–2)	10 kΩ or higher

  (4) Reconnect the A/F sensor connector.
  (5) Reconnect the ECM connector.

(b) Check the harness and connectors between the A/F sensor connector and the EFI M relay.
  (1) Disconnect the A6 A/F sensor connector.
  (2) Remove the integration relay from the engine room R/B.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
+B (A6–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (A6–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

  (4) Reconnect the A/F sensor connector.
  (5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

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DTC	P0037	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

DTC	P0038	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

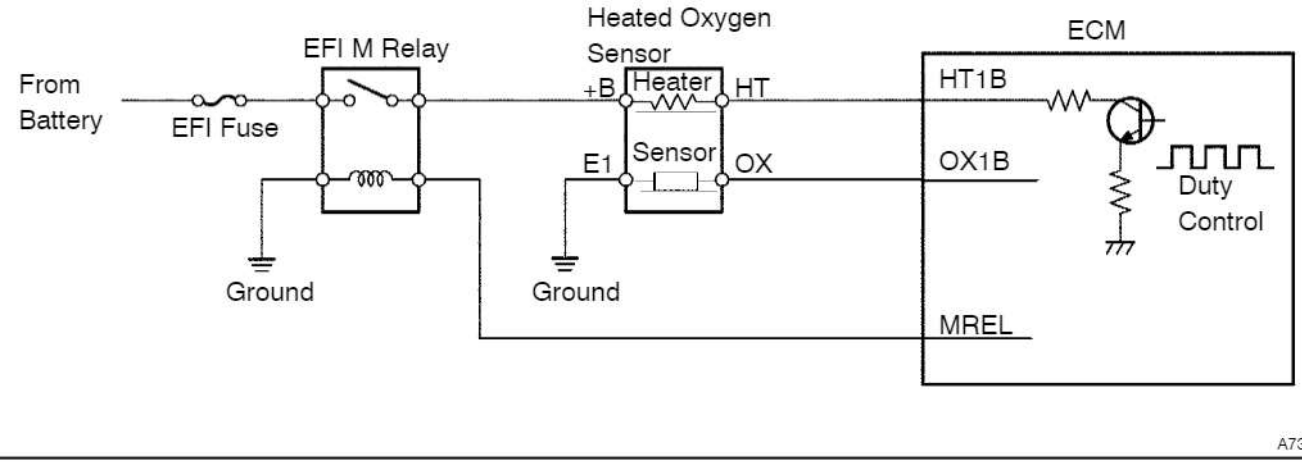
CIRCUIT DESCRIPTION

Refer to DTC P0136 on page 05–83.

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the +B side of the circuit.

Reference (Bank 1 Sensor 2 System Diagram):



DTC No.	DTC Detection Condition	Trouble Area
P0037	Heater current is 0.25 A or less when the heater operates with +B greater than 11.5 V (1 trip detection logic)	• Open or short in heater circuit of the heated oxygen sensor • Heated oxygen sensor heater • EFI M relay (integration relay) • ECM
P0038	When the heater operates, heater current exceeds 2 A (1 trip detection logic)	• Short in heater circuit of the heated oxygen sensor • Heated oxygen sensor heater • EFI M relay (integration relay) • ECM

HINT:

- Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.
- Sensor 2 refers to the sensor mounted after the TWC and is located far from the engine assembly.

WIRING DIAGRAM

Refer to DTC P0136 on page 05–83.

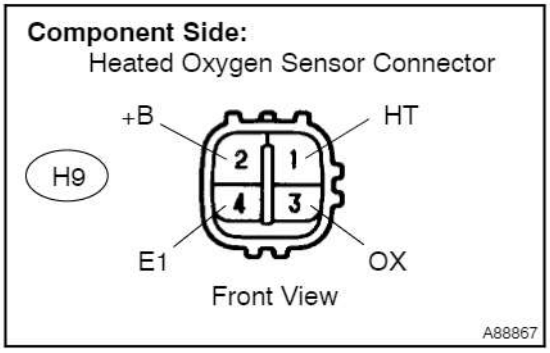
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INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- When DTC P0038 is detected, proceed to step 4 if heater resistance is in normal range.

1	INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)



(a) Disconnect the H9 heated oxygen sensor connector.

(b) Measure the resistance between the terminals of the heated oxygen sensor connector.

Standard (Bank 1 sensor 2):

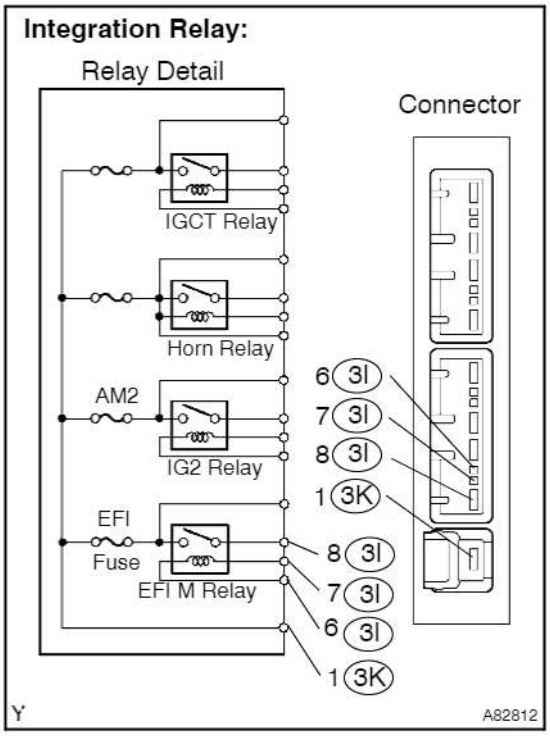
Tester Connection	Resistance
HT (H9–1) – +B (H9–2)	11 to 16 Ω at 20°C (68°F)
HT (H9–1) – E1 (H9–4)	10 kΩ or higher

(c) Reconnect the heated oxygen sensor connector.

NG → REPLACE HEATED OXYGEN SENSOR

OK

2	INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.

(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

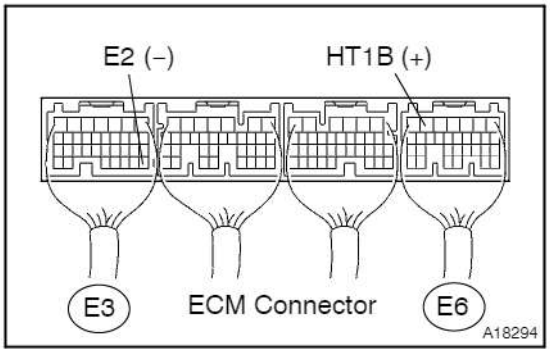
(c) Reinstall the integration relay.

NG → REPLACE INTEGRATION RELAY

OK

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3	INSPECT ECM(HT1B VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the applicable terminals of the E3 and E6 ECM connectors.

Standard:

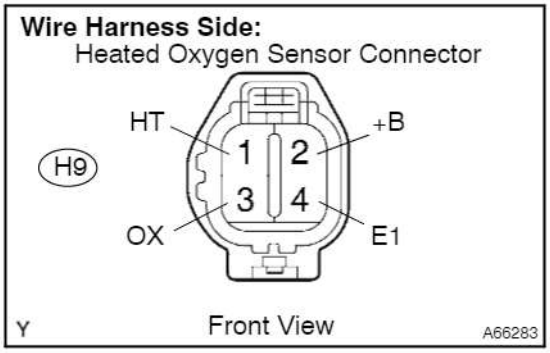
Tester Connection	Specified Condition
HT1B (E6–6) – E2 (E3–28)	9 to 14 V

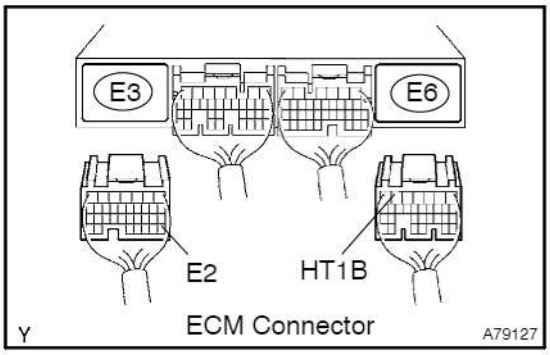
NG

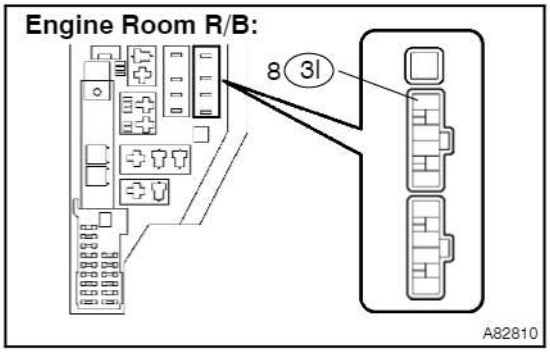
OK → **REPLACE ECM (See page 10–24)**

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4	CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR – ECM, HEATED OXYGEN SENSOR – EFI M RELAY)







(a) Check the harness and the connectors between the ECM and the heated oxygen sensor connectors.
  (1) Disconnect the H9 heated oxygen sensor connector.
  (2) Disconnect the E3 and E6 ECM connectors.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
HT (H9–1) – HT1B (E6–6)	Below 1 Ω
E1 (H9–4) – E2 (E3–28)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (H17–2) or HT1B (E6–6) – Body ground	10 kΩ or higher
HT (H9–1) – +B (H9–2)	10 kΩ or higher

  (4) Reconnect the heated oxygen sensor connector.
  (5) Reconnect the ECM connectors.

(b) Check the harness and the connectors between the heated oxygen sensor connector and the EFI M relay.
  (1) Disconnect the H9 heated oxygen sensor connector.
  (2) Remove the integration relay from the engine room R/B.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
+B (H9–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (H9–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

  (4) Reconnect the heated oxygen sensor connector.
  (5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

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DTC	P0100	MASS OR VOLUME AIR FLOW CIRCUIT

DTC	P0102	MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

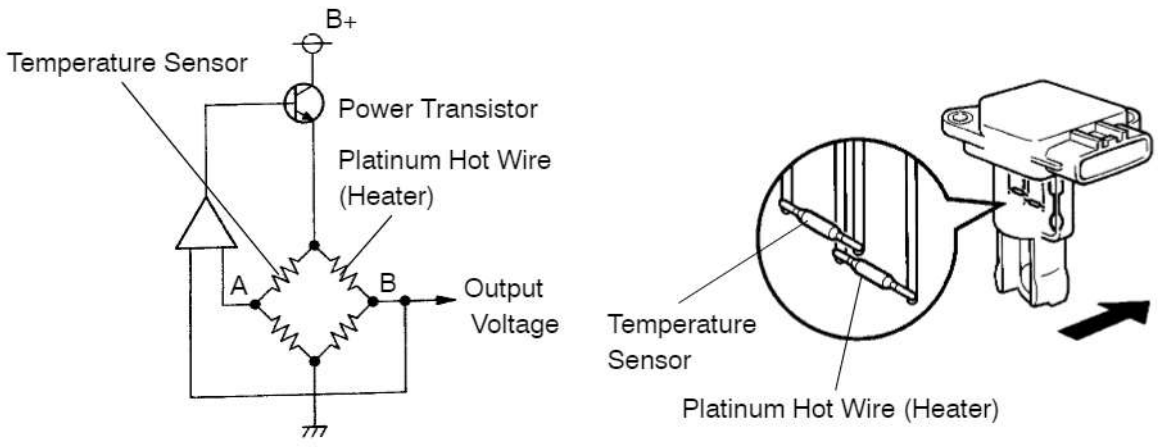
DTC	P0103	MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The MAF (Mass Air Flow) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provides a proper air–fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flowing through the sensor. The ECM interprets this voltage as the intake air amount.

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



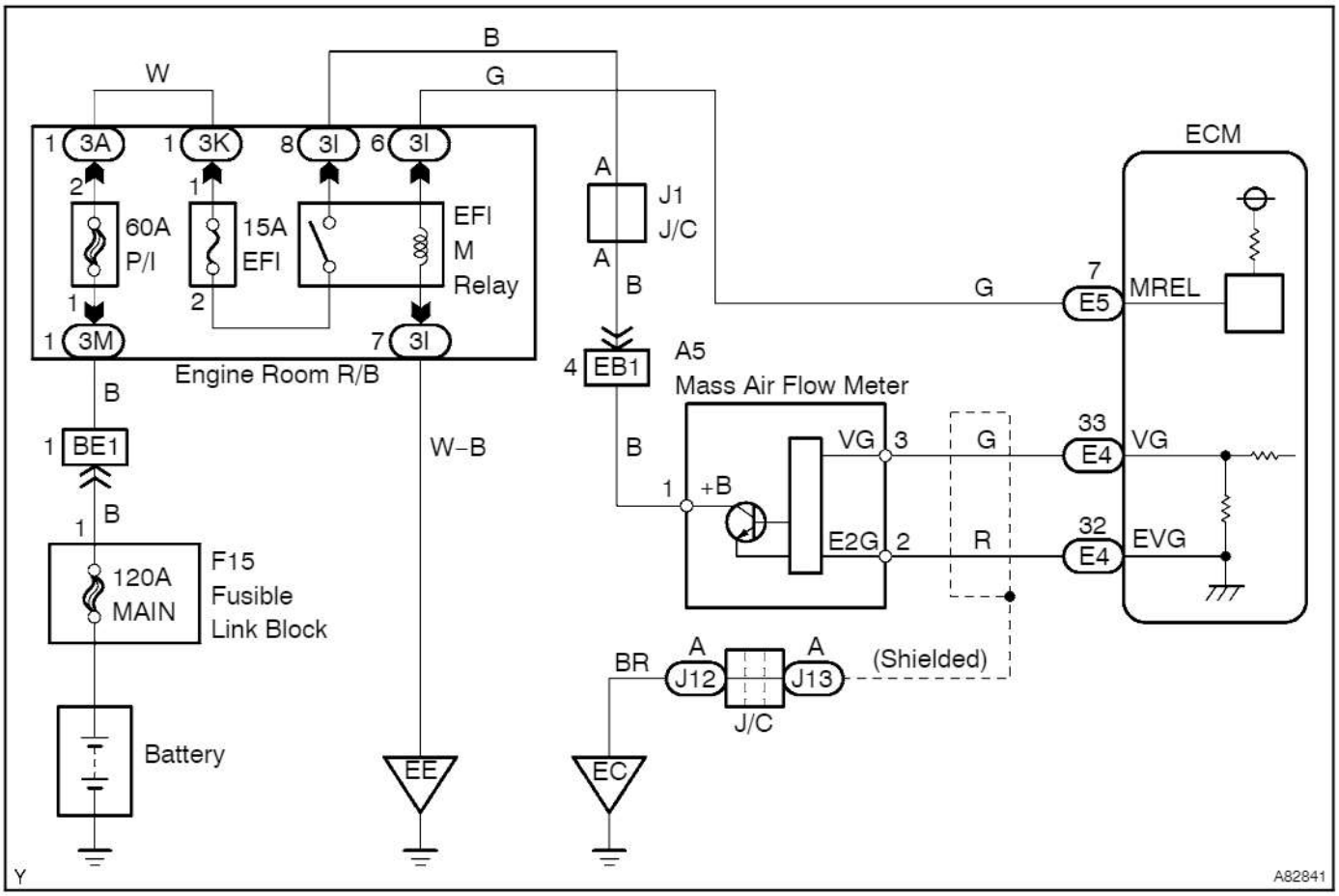
DTC No.	DTC Detection Condition	Trouble Area
P0100	When the mass air flow meter circuit has an open or a short for more than 3 seconds	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM
P0102	When the mass air flow meter circuit has an open for more than 3 seconds	• Open in mass air flow meter circuit • Mass air flow meter • ECM
P0103	When the mass air flow meter circuit has a short for more than 3 seconds	• Short in mass air flow meter circuit • Mass air flow meter • ECM

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HINT:
After confirming DTC P0100, P0102 or P0103, confirm the mass air flow ratio in Powertrain / Engine and ECT / Data List / MAF using the intelligent tester II.

Air Flow Rate (g/s)	Malfunction
Approximately 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

HINT:
Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1	READ VALUE OF INTELLIGENT TESTER II(MASS AIR FLOW RATE)

(a) Connect the intelligent tester II to the DLC3.
(b) Put the engine in inspection mode (see page 05–1).
(c) Start the engine.
(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / MAF. Read its value.

Result:

Air Flow Rate (g/s)	Proceed to
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

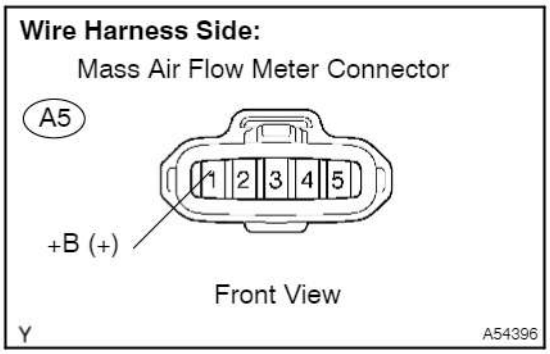
*1: The value must be changed when the throttle valve is opened or closed.

B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-14)**

A

2	INSPECT MASS AIR FLOW METER(POWER SOURCE)



(a) Turn the power switch ON (IG).
(b) Disconnect the A5 mass air flow meter connector.
(c) Measure the voltage between the terminal of the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
+B (A5–1) – Body ground	9 to 14 V

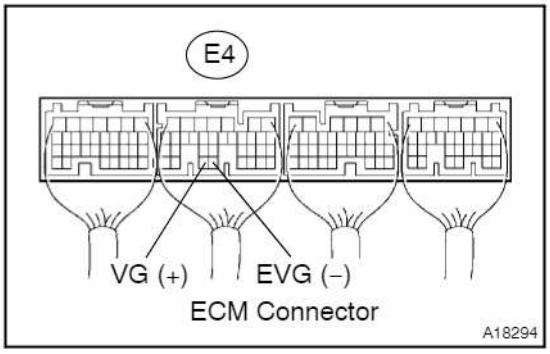
(d) Reconnect the mass air flow meter connector.

NG → **Go to step 5**

OK

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3 INSPECT ECM(VG VOLTAGE)



(a) Put the engine in inspection mode (see page 05–1).
(b) Start the engine.
(c) Measure the voltage between the specified terminals of the E4 ECM connector.

HINT:
The A/C switch should be turned OFF.

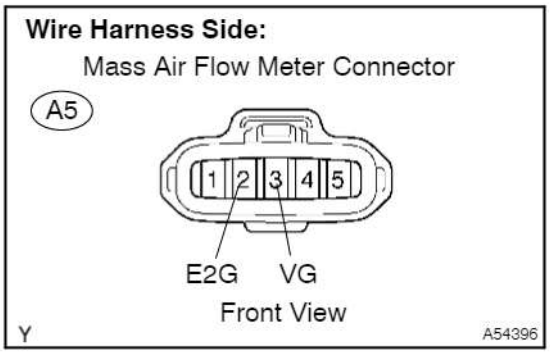
Standard:

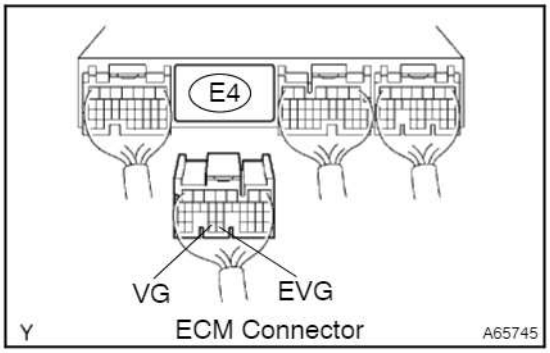
Tester Connection	Condition	Specified Condition
VG (E4–33) – EVG (E4–32)	Engine is idling	0.5 to 3.0 V

OK → **REPLACE ECM (See page 10–24)**

NG

4 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER – ECM)





(a) Disconnect the A5 mass air flow meter connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VG (A5–3) – VG (E4–33)	Below 1 Ω
E2G (A5–2) – EVG (E4–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VG (A5–3) or VG (E4–33) – Body ground	10 kΩ or higher

(d) Reconnect the mass air flow meter connector.
(e) Reconnect the ECM connector.

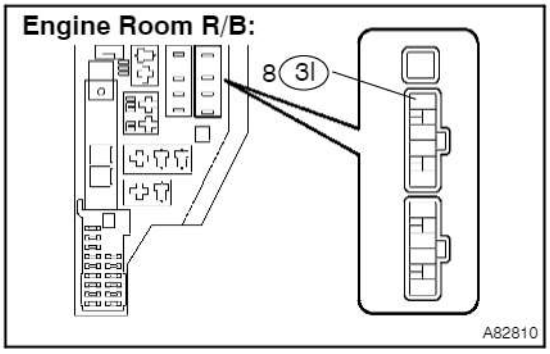
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

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5 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER – EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Disconnect the A5 mass air flow meter connector.
(c) Check the resistance between the wire harness side connectors.

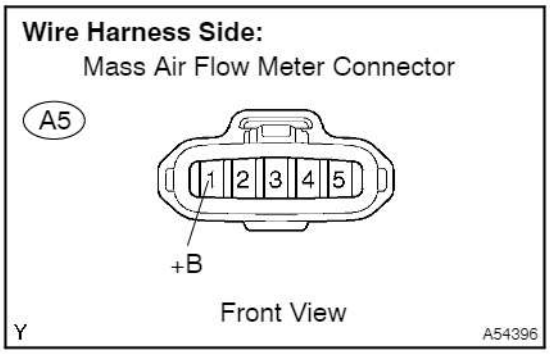
Standard (Check for open):

Tester Connection	Specified Condition
+B (A5–1) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (A5–1) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

(d) Reconnect the mass air flow meter connector.
(e) Reinstall the integration relay.

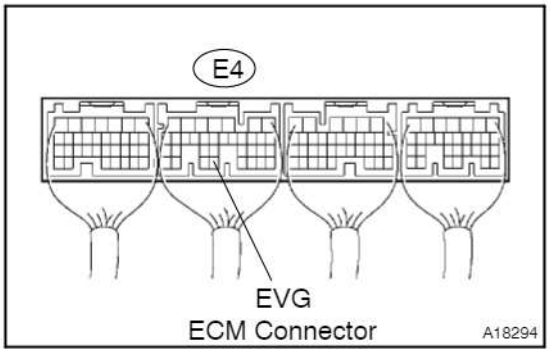


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK ECM POWER SOURCE CIRCUIT (See page 05–197)

6 INSPECT ECM(SENSOR GROUND)



(a) Check the resistance between the specified terminal of the E4 ECM connector and the body ground.

Standard:

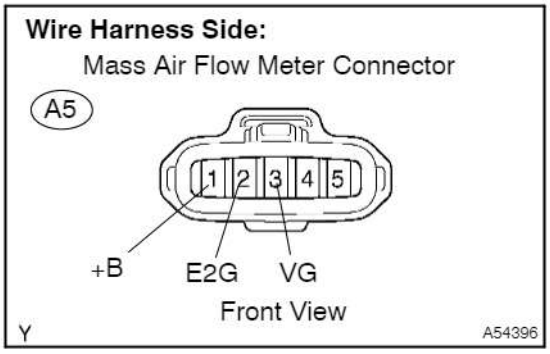
Tester Connection	Specified Condition
EVG (E4–32) – Body ground	Below 1 Ω

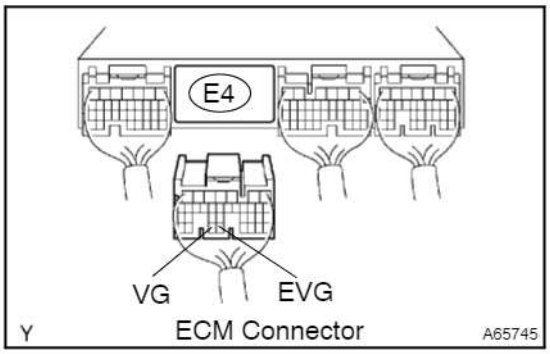
NG → REPLACE ECM (See page 10–24)

OK

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7 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER – ECM)





(a) Disconnect the A5 mass air flow meter connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VG (A5–3) – VG (E4–33)	Below 1 Ω
E2G (A5–2) – EVG (E4–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VG (A5–3) – +B (A5–1)	10 kΩ or higher

(d) Reconnect the mass air flow meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

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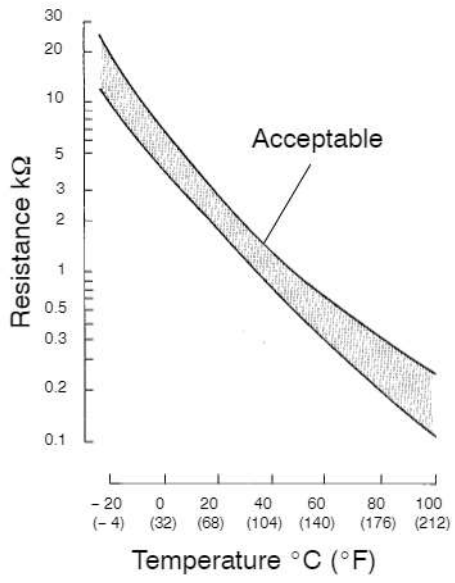
DTC	P0110	INTAKE AIR TEMPERATURE CIRCUIT

DTC	P0112	INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC	P0113	INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

(Figure 1)



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal (see Figure 1).

The intake air temperature sensor is connected to the ECM (see wiring diagram). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) 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 voltage at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 second	• Open or short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 second	• Short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 second	• Open in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM

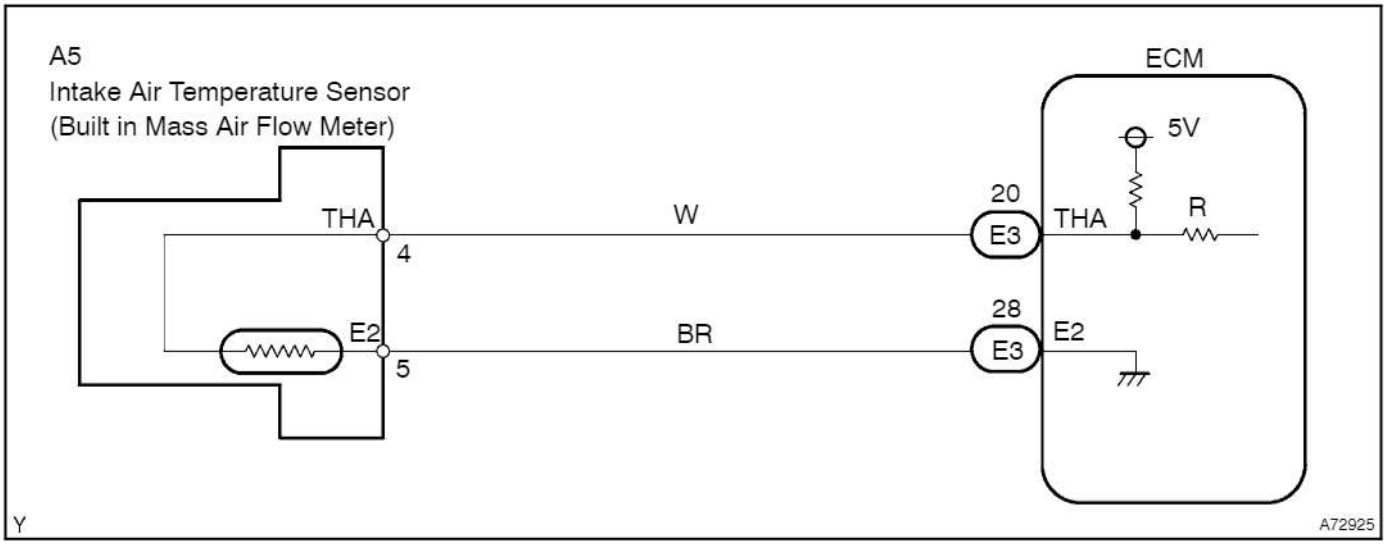
HINT:

After confirming DTC P0110, P0112 or P0113, confirm the intake air temperature in Powertrain / Engine and ECT / Data List / Intake Air using the intelligent tester II.

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

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	READ VALUE OF INTELLIGENT TESTER II(INTAKE AIR TEMPERATURE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air.
(e) Read the values.
Temperature value: Same as the ambient air temperature.
Result:

Temperature Displayed	Proceed to
–40°C (–40°F)	A
140°C (284°F)	B
OK (Same as ambient air temperature)	C

HINT:

- If there is an open circuit, the intelligent tester II indicates –40°C (–40°F).
- If there is a short circuit, the intelligent tester II indicates 140°C (284°F).

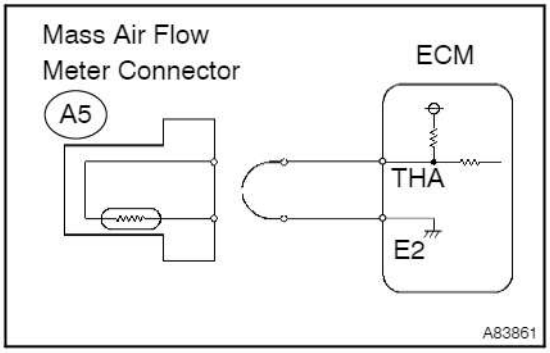
B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS**

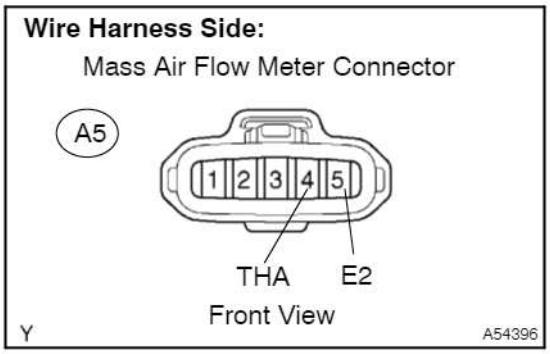
A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN WIRE HARNESS)



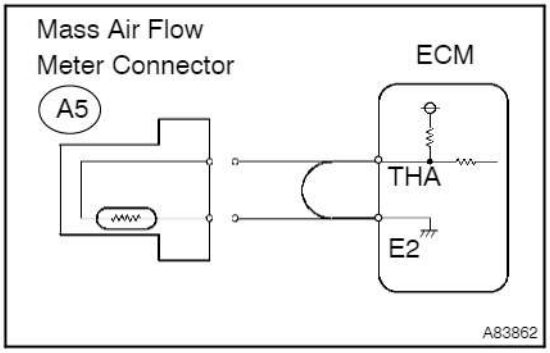
(a) Disconnect the A5 mass air flow meter connector.
(b) Connect terminals THA and E2 of the mass air flow meter wire harness side connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air. Read the values.
OK:
Temperature value: 140°C (284°F)
(e) Reconnect the mass air flow meter connector.



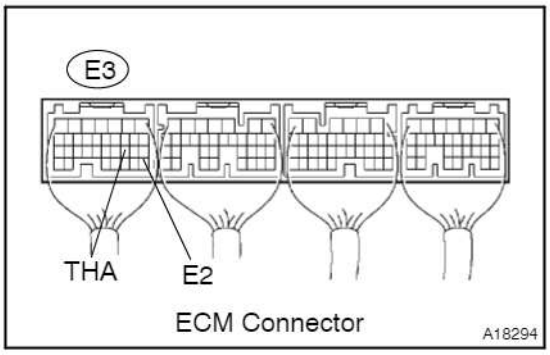
OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE MASS AIR FLOW SENSOR

NG

3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN ECM)



(a) Disconnect the A5 mass air flow meter connector.
(b) Connect terminals THA and E2 of the E3 ECM connector.
HINT:
Before checking, do a visual and contact pressure check on the ECM connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air. Read the values.
OK:
Temperature value: 140°C (284°F)
(e) Reconnect the mass air flow meter connector.



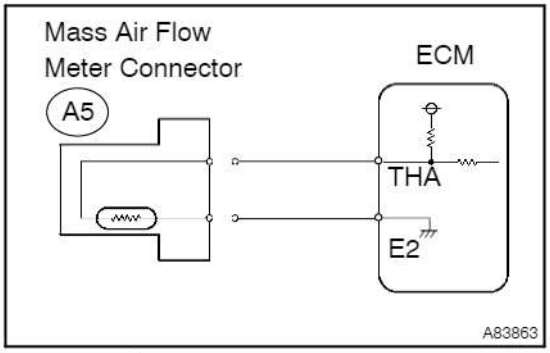
OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10–24)

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4	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR SHORT IN WIRE HARNESS)

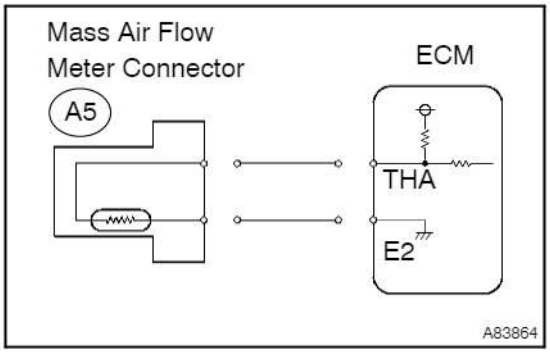


(a) Disconnect the A5 mass air flow meter connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air. Read the values.
OK:
Temperature value: –40°C (–40°F)
(d) Reconnect the mass air flow meter connector.

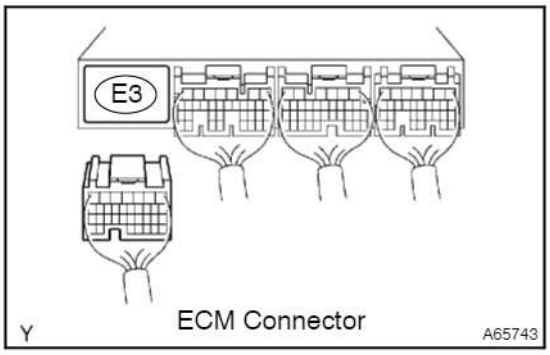
OK → **REPLACE MASS AIR FLOW METER**

NG

5	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR SHORT IN ECM)



(a) Disconnect the E3 ECM connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air. Read the values.
OK:
Temperature value: –40°C (–40°F)
(d) Reconnect the ECM connector.



OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

REPLACE ECM (See page 10–24)

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DTC	P0115	ENGINE COOLANT TEMPERATURE CIRCUIT

DTC	P0117	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC	P0118	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

A thermistor is built in the engine coolant temperature sensor and changes its resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM is the same as those of the intake air temperature sensor.

HINT:

If the ECM detects DTC P0115, P0117 or P0118, it operates the fail–safe function in which the engine coolant temperature is assumed to be 80 °C (176 °F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 second	• Open or short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 second	• Short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 second	• Open in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM

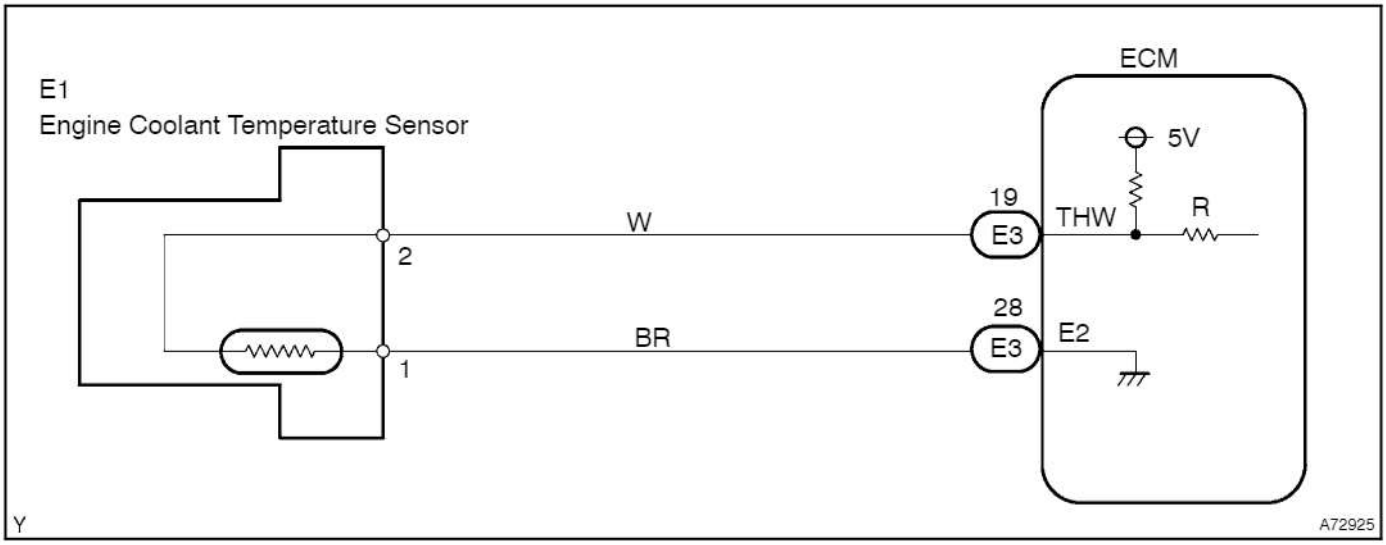
HINT:

After confirming DTC P0115, P0117 or P0118, confirm the engine coolant temperature in Powertrain / Engine and ECT / Data List / Coolant Temp using the intelligent tester II.

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

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	READ VALUE OF INTELLIGENT TESTER II(ENGINE COOLANT TEMPERATURE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II , select the item: Powertrain / Engine and ECT / Data List / Coolant Temp.
(e) Read the values.
(f) Measure the coolant temperature using a thermometer and compare the value with the value displayed on the intelligent tester II.

Temperature value: Almost same value as the actual engine coolant temperature.

Result:

Temperature Displayed	Proceed to
–40°C (–40°F)	A
140°C (284°F)	B
OK (Same as actual engine coolant temperature)	C

HINT:

- If there is an open circuit, the intelligent tester II indicates –40°C (–40°F).
- If there is a short circuit, the intelligent tester II indicates 140°C (284°F).

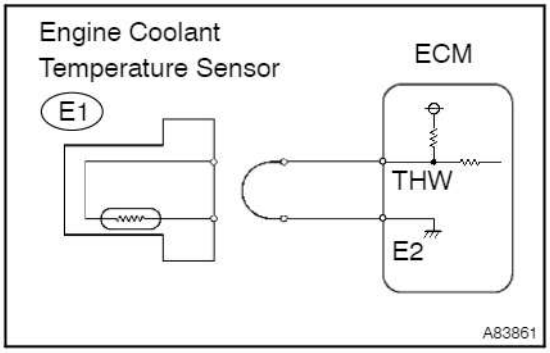
B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–14)

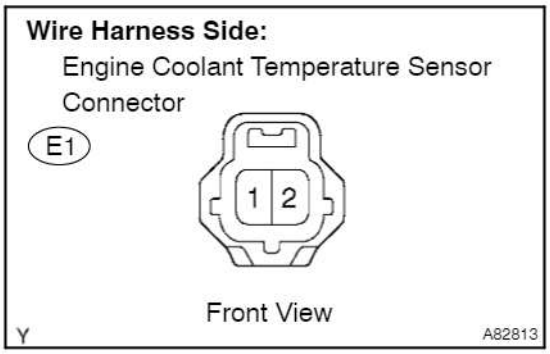
A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN WIRE HARNESS)



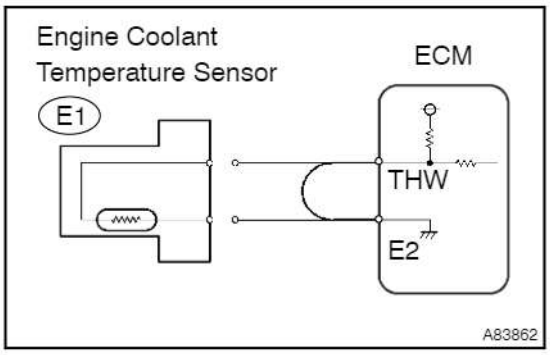
(a) Disconnect the E1 engine coolant temperature sensor connector.
(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Coolant Temp. Read the values.
OK:
Temperature value: 140°C (284°F)
(e) Reconnect the engine coolant temperature sensor connector.



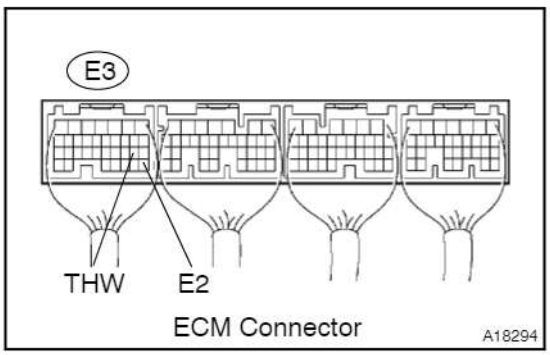
OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE ENGINE COOLANT TEMP. SENSOR

NG

3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN ECM)



(a) Disconnect the E1 engine coolant temperature sensor connector.
(b) Connect terminals THW and E2 of the E3 ECM connector.
HINT:
Before checking, do a visual and contact pressure check on the ECM connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Coolant Temp. Read the values.
OK:
Temperature value: 140°C (284°F)
(e) Reconnect the engine coolant temperature sensor connector.



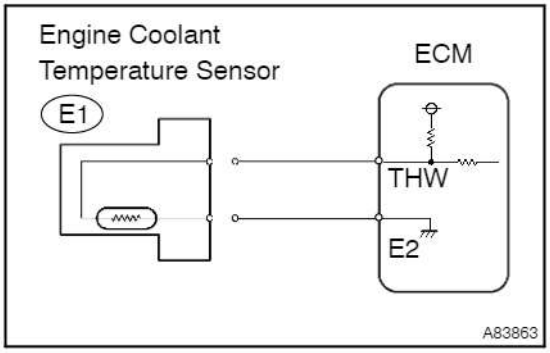
OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10–24)

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4	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR SHORT IN WIRE HARNESS)

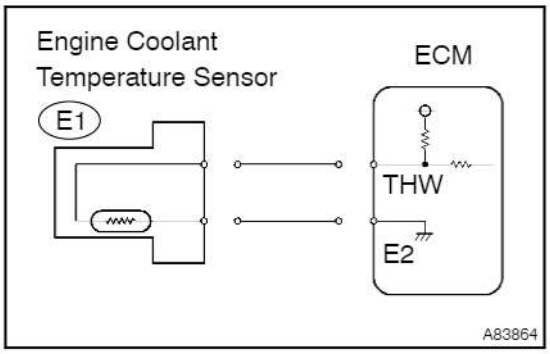


(a) Disconnect the E1 engine coolant temperature sensor connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Coolant Temp. Read the values.
OK:
Temperature value: –40°C (–40°F)
(d) Reconnect the engine coolant temperature sensor connector.

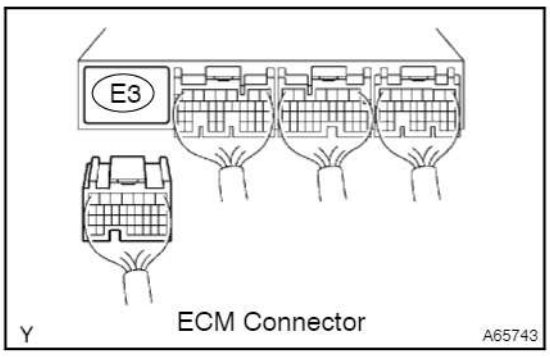
OK	REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

5	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR SHORT IN ECM)



(a) Disconnect the E3 ECM connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Coolant Temp. Read the values.
OK:
Temperature value: –40°C (–40°F)
(d) Reconnect the ECM connector.



OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

REPLACE ECM (See page 10–24)

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DTC	P0116	ENGINE COOLANT TEMPERATURE CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page 05–71.

DTC No.	DTC Detection Condition	Trouble Area
P0116	If the engine coolant temperature (ECT) was between –40°C (–40°F) and 60°C (140°F) when starting the engine, and conditions (a) and (b) are met (2 trip detection logic): (a) Vehicle is driven at varying speeds (acceleration and deceleration) for more than 250 seconds (b) ECT remains within 3°C (37.4°F) of the engine starting temperature	• Engine coolant temperature sensor

WIRING DIAGRAM

Refer to DTC P0115 on page 05–71.

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the engine coolant temperature sensor circuit may be open or short. Perform troubleshooting on DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

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DTC	P0120	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT

DTC	P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

DTC	P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT

DTC	P0220	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT

DTC	P0222	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW INPUT

DTC	P0223	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH INPUT

DTC	P2135	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION

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CIRCUIT DESCRIPTION

HINT:

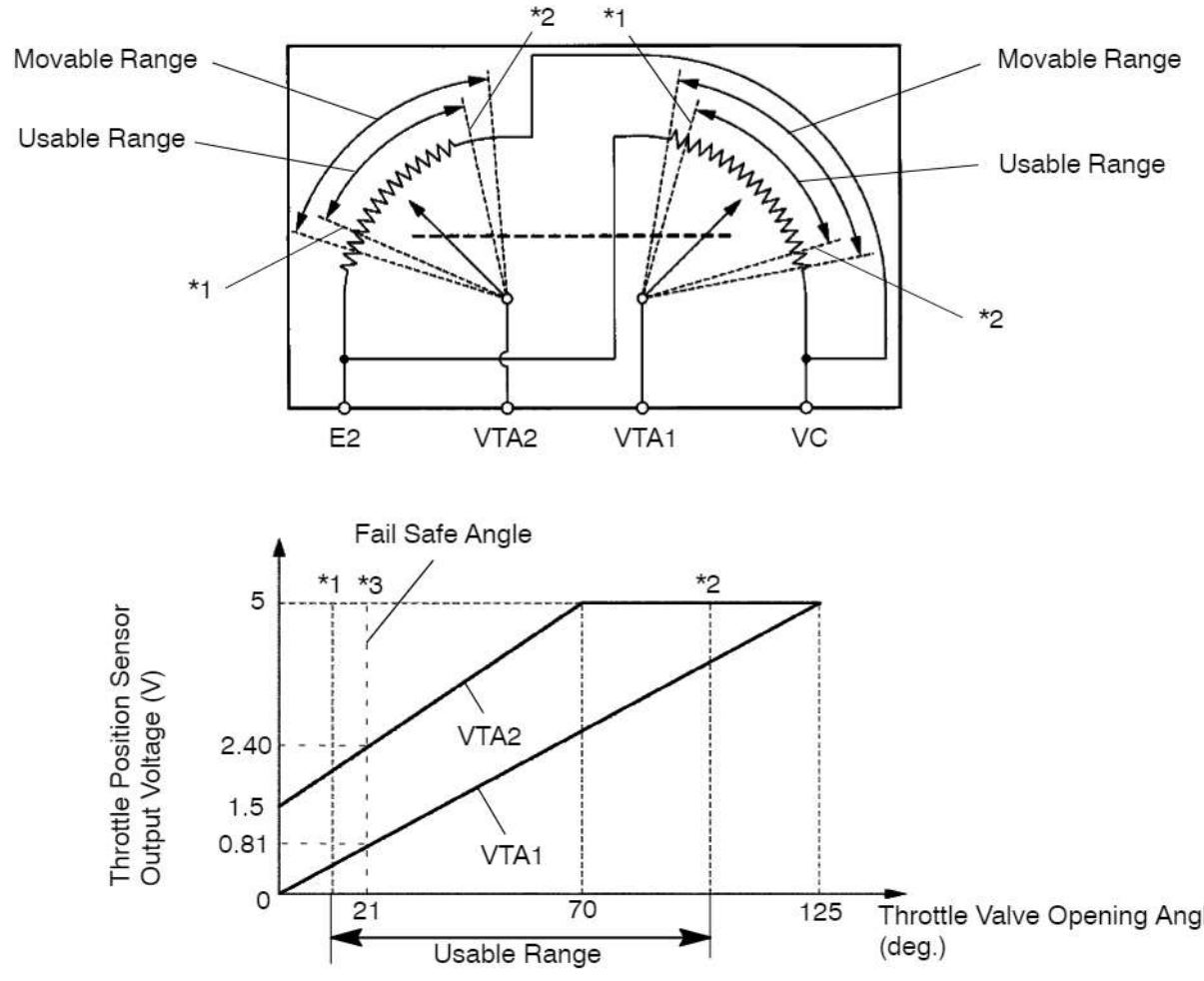
- This electrical throttle system does not use a throttle cable.
- This is procedures of throttle position sensor.

The throttle position sensor is mounted on the throttle body and it has 2 sensors to detect the throttle opening angle and a malfunction of the throttle position sensor itself.

The voltage applied to terminals VTA1 and VTA2 of the ECM changes between 0 V and 5 V in proportion to the opening angle of the throttle valve. The VTA1 is a signal to indicate the actual throttle valve opening angle which is used for the engine control, and the VTA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunction.

The ECM judges the actual opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to the driving condition.

When a malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the power switch is turned OFF.



*1: Throttle Valve Fully Closed (13.5°), VTA1 is 0 %

*2: Throttle Valve Fully Open (97.5°), VTA1 is approx 100 %

*3: Fail Safe Angle (16.5°), VTA1 is 3.5 %

Note: Throttle valve opening angle detected by the sensor terminal of VTA is expressed as percentage.

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DTC No.	DTC Detection Condition	Trouble Area
—	Conditions of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 seconds or more when Idle is ON	—
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA is 0.2V or less, or 4.8 V or more	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM
P0122	VTA is 0.2 V or less	• Short in throttle position sensor circuit • Throttle position sensor • ECM
P0123	VTA is 4.8 V or more	• Open in throttle position sensor circuit • Throttle position sensor • ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) and (b) are satisfied (a) VTA2 is 0.5 V or less, or VTA2 is 4.8 V or more (b) VTA is 0.2 V or more and 1.8 V or less	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM
P0222	VTA2 is 0.5 V or less	• Short in throttle position sensor circuit • Throttle position sensor • ECM
P0223	VTA2 is 4.8 V or more when VTA is 0.2 or more and 1.8 V or less	• Open in throttle position sensor circuit • Throttle position sensor • ECM
P2135	Condition (a) continues for 0.5 seconds or more, or condition (b) continues for 0.4 seconds or more: (a) Difference between VTA and VTA2 is 0.02 V or less (b) VTA is 0.2 V or less and VTA2 is 0.5 V or less	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM

HINT:

DTC No.	Main Trouble Area
P0122	• Throttle position sensor • Open in VTA1 circuit • VC circuit open (when the VC circuit is open, DTCs P0222 and P2135 are also output simultaneously) • ECM
P0123	• Throttle position sensor (built in throttle body) • Open in VTA circuit • Open in E2 circuit • VC and VTA circuits are short–circuited • ECM
P0222	• Throttle position sensor • Open in VTA2 circuit • VC circuit open (when the VC circuit is open, DTCs P0122 and P2135 are also output simultaneously)
P0223	• Throttle position sensor
P2135	• VTA1 and VTA2 circuits are short–circuited • Open in VC circuit • Throttle position sensor

NOTICE:

When malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the power switch is turned OFF.

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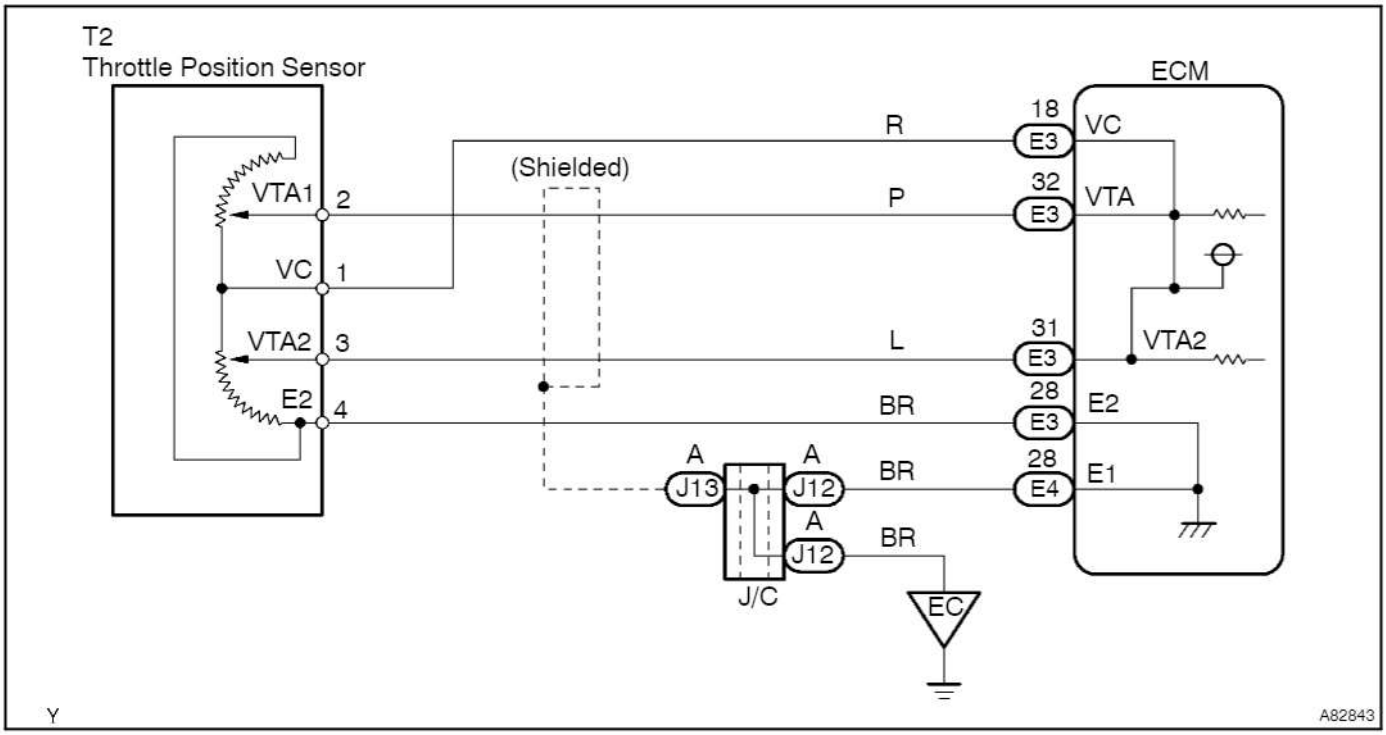
HINT:

- After confirming DTCs, confirm condition of the throttle valve opening angle (Data List/Throttle Position) and the closed throttle position switch (Data List/Throttle Position No.2) using the intelligent tester II.
- Throttle Position means the VTA1 signal (expressed as percentage), and Throttle Position No.2 means the VTA2 signal (expressed as volts.

Reference (Normal condition):

Tester display	Accelerator pedal released	Accelerator pedal depressed
Data List/Throttle Position	8 to 20 %	64 to 96 %
Data List/Throttle Position No.2	1.5 to 2.9 V	3.5 to 5.5 V

WIRING DIAGRAM



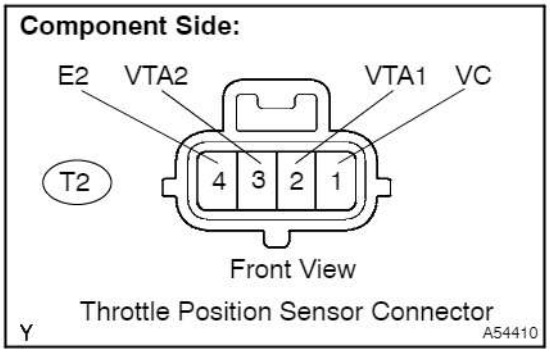
INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1 INSPECT THROTTLE POSITION SENSOR(RESISTANCE)



(a) Disconnect the T2 throttle position sensor connector.
(b) Measure the resistance between the terminals of the throttle position sensor.

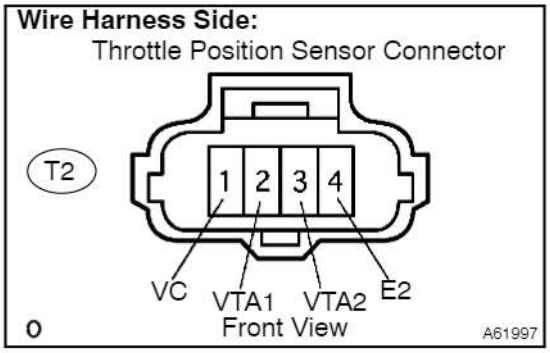
Standard:

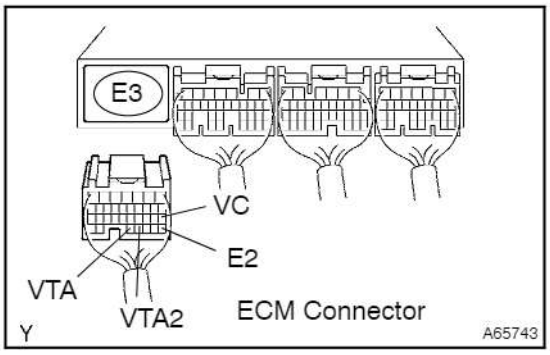
Throttle Position Sensor Terminal	Resistance
VC (1) – E2 (4)	1.2 to 3.2 kΩ at 20°C (68°F)
VTA1 (2) – E2 (4)	1.8 to 10.5 kΩ at 20°C (68°F)
VTA2 (3) – E2 (4)	1.8 to 10.5 kΩ at 20°C (68°F)

NG → **REPLACE THROTTLE W/MOTOR BODY ASSY** (See page 10–13)

OK

2 CHECK HARNESS AND CONNECTOR(ECM – THROTTLE POSITION SENSOR)





(a) Disconnect the T2 throttle position sensor connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard: Check for open

Tester Connection	Specified Condition
VC (T2–1) – VC (E3–18)	Below 1 Ω
VTA1 (T2–2) – VTA (E3–32)	Below 1 Ω
VTA2 (T2–3) – VTA2 (E3–31)	Below 1 Ω
E2 (T2–4) – E2 (E3–28)	Below 1 Ω

Standard: Check for short

Tester Connection	Specified Condition
VC (E3–18) – E2 (E3–28)	10 kΩ or higher
VTA (E3–32) – E2 (E3–28)	10 kΩ or higher
VTA2 (E3–31) – E2 (E3–28)	10 kΩ or higher

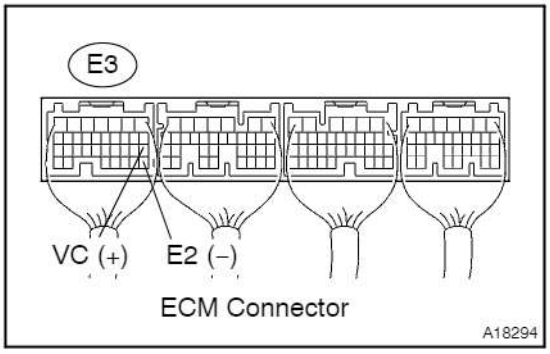
(d) Reconnect the ECM connector.
(e) Reconnect the throttle position sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	INSPECT ECM(VC – E2)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between terminals VC and E2 of the ECM connector.

Standard:

Tester Connection	Specified Condition
VC (E3–18) – E2 (E3–28)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10–24)**

OK

REPLACE THROTTLE W/MOTOR BODY ASSY (See page 05–14)

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DTC	P0121	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page 05–76.

HINT:

This is the purpose of troubleshooting the throttle position sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0121	Difference between VTA1 and VTA2 is out of threshold for 2 seconds	• Throttle position sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE THROTTLE W/MOTOR BODY ASSY (See page 10–13)

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DTC	P0136	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)

DTC	P0137	OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

DTC	P0138	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

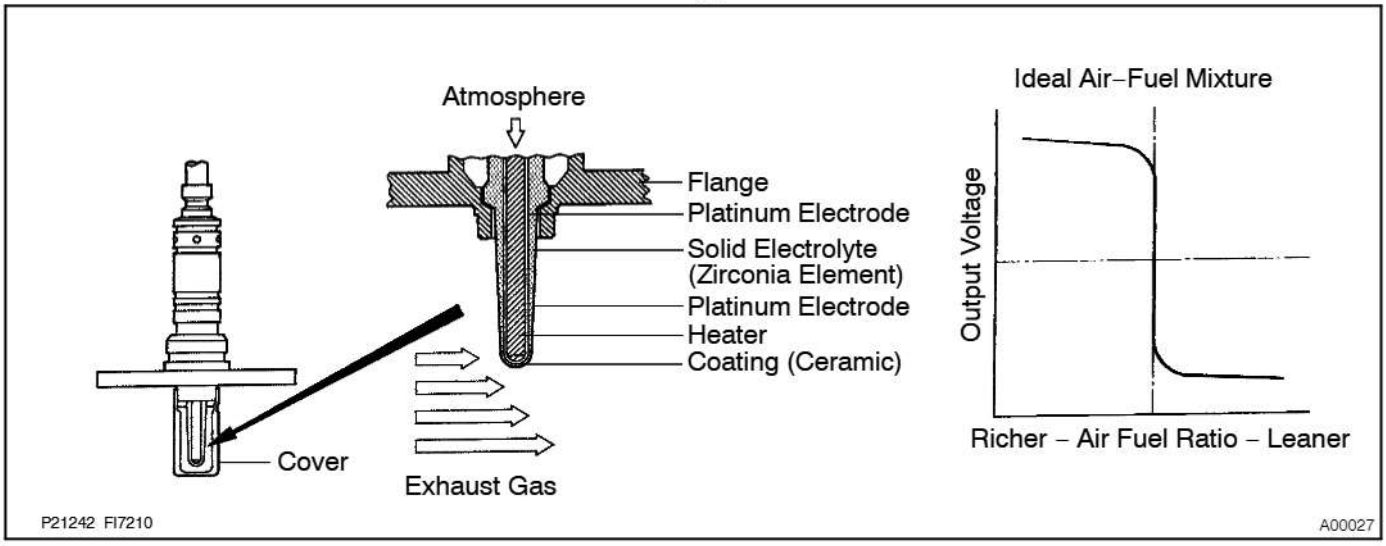
CIRCUIT DESCRIPTION

The heated oxygen sensor is used to monitor oxygen concentration in the exhaust. For optimum catalytic converter operation, the air–fuel mixture must be maintained near the ideal "stoichiometric" ratio. The oxygen sensor output voltage changes suddenly in the vicinity of the stoichiometric ratio. The ECM adjusts the fuel injection time so that the air–fuel ratio is nearly stoichiometric ratio.

When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust gas increases. The heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).

When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio, the oxygen will be vanished from the exhaust gas. The heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V).

The heated oxygen sensor includes a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater in order to heat the sensor for the accurate oxygen concentration detection.



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Active Air–Fuel Ratio Control

Usually the ECM performs the air–fuel ratio control so that the A/F sensor output indicates a near stoichiometric air–fuel ratio. This vehicle includes "active air–fuel ratio control" besides the regular air–fuel ratio control. The ECM performs the "active air–fuel ratio control" to detect deterioration in a catalyst and the heated oxygen sensor (sensor 2) malfunction. (Refer to the diagram below)

The "Active air–fuel ratio control" is performed for approximately 15 to 20 seconds during a vehicle driving with a warm engine. Under the "active air–fuel ratio control", the air–fuel ratio is forcibly regulated to go LEAN or RICH by the ECM.

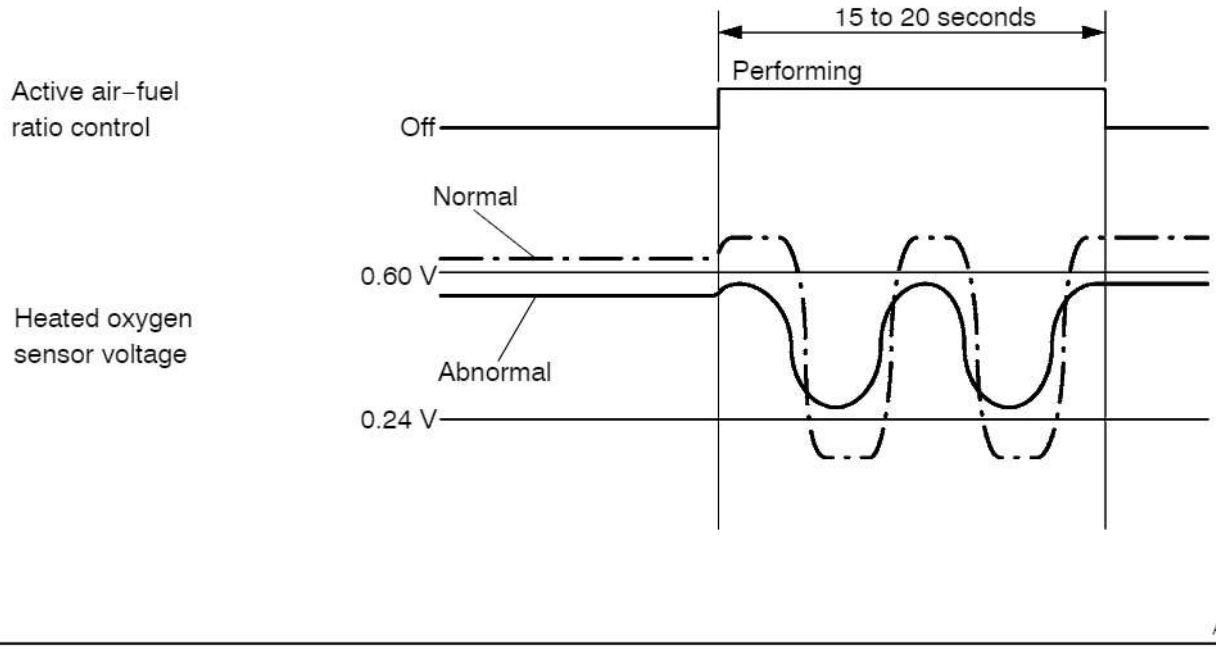
If the ECM detects malfunction, it is recorded in the following DTCs: DTC P0136 (Abnormal Voltage Output), DTC P0137 (Circuit open) and P0138 (Circuit Short).

Abnormal Voltage Output of Heated Oxygen Sensor (DTC P0136)

As the ECM is performing the "active air–fuel ratio control", the air–fuel ratio is forcibly regulated to go RICH or LEAN. If the sensor is not functioning properly, the voltage output variation is smaller.

Under the "active air–fuel ratio control", if the maximum voltage output of the heated oxygen sensor is less than 0.6 V, or the minimum voltage output is 0.24 V or more, the ECM determines that it is abnormal voltage output of the sensor (DTC P0136).

HEATED OXYGEN SENSOR CIRCUIT MALFUNCTION (P0136: ABNORMAL VOLTAGE):



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Oxygen Storage Capacity Detection in the Heated Oxygen Sensor Circuit (P0136, P0137 or P0138)

Under "active air–fuel ratio control", the ECM calculates the Oxygen Storage Capacity (OSC) * in the catalyst by forcibly regulating the air–fuel ratio to go RICH (or LEAN).

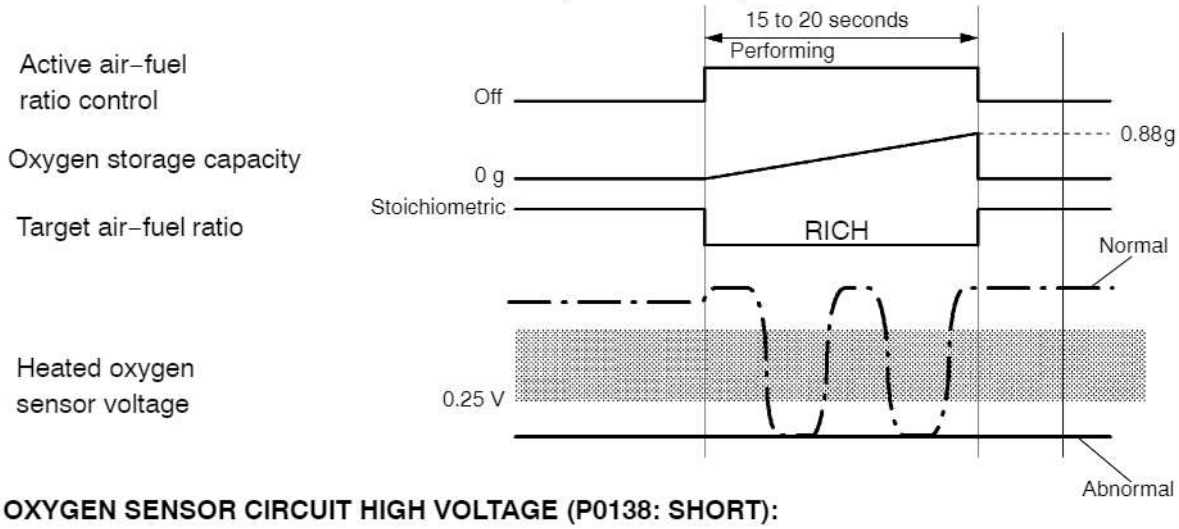
If the heated oxygen sensor has an open or short, or the voltage output by the sensor noticeably decreases, the OSC will indicate extraordinary high value. Even if the ECM attempts to continue regulating the air–fuel ratio to go RICH (or LEAN), the heated oxygen sensor output does not change.

When the value of OSC calculated by the ECM reaches 0.88 gram under the active air–fuel ratio control, although the targeted air–fuel ratio is RICH but the voltage output of the heated oxygen sensor is 0.25 V or less (LEAN), the ECM determines that it is an abnormal low voltage (DTC P0137). Also, the targeted air–fuel ratio is LEAN but the voltage output is 0.59 V or more (RICH), it is determined that the voltage output of the sensor is abnormally high (DTC P0138).

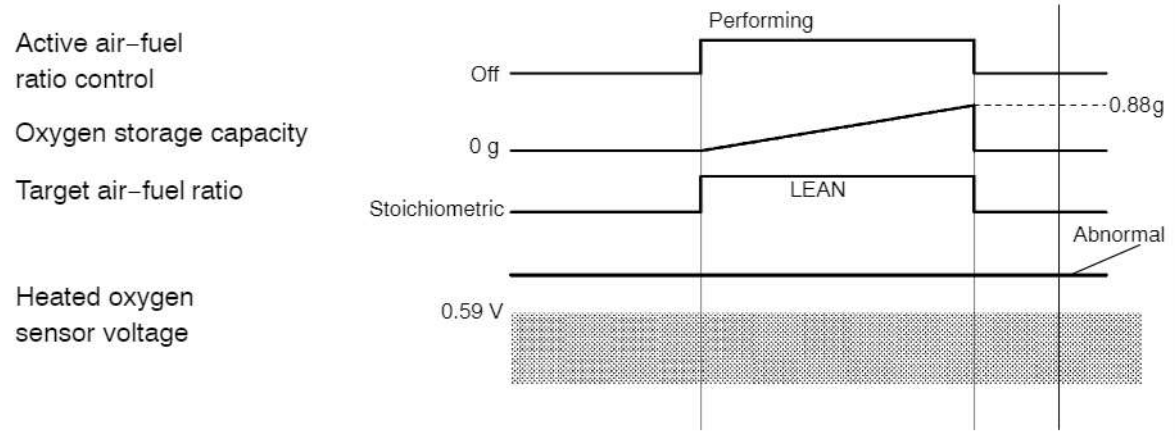
In addition to the OSC detection, if the fluctuation of the sensor voltage output is in a specific narrow range (more than 0.25 V and less than 0.59) despite the ECM ordering the air–fuel ratio to go RICH or LEAN while the OSC is above 0.88 gram, the ECM interprets this as a malfunction in the heated oxygen sensor circuit (DTC P0136).

*Oxygen Storage Capacity (OSC): A catalyst has a capability for storing oxygen. The OSC and the emission purification capacity of the catalyst are mutually related. The ECM judges if the catalyst has deteriorated based on the calculated OSC value.

HEATED OXYGEN SENSOR CIRCUIT LOW VOLTAGE (P0137: OPEN):



HEATED OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (P0138: SHORT):



Y A92775

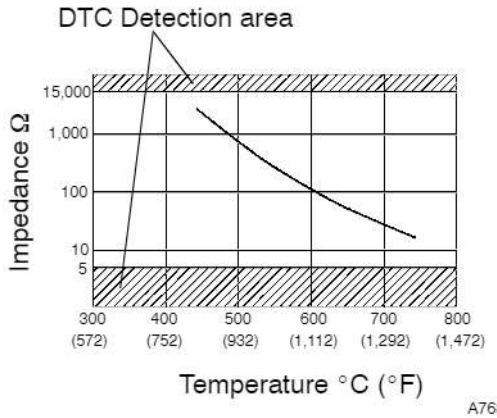
HINT:

DTC P0138 is also set if the voltage output from the heated oxygen sensor is more than 1.2 V for 10 seconds or more.

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Heated oxygen sensor impedance

Interrelation between temperature of the element and impedance:



During normal feedback control of the air–fuel ratio, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the signal from the oxygen sensor while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM detects that there is malfunction in the sensor when the measured impedance deviates from the standard range.

*: The effective resistance in an alternating current electrical circuit.

HINT:

The impedance can not be measured with an ohmmeter.

HINT:

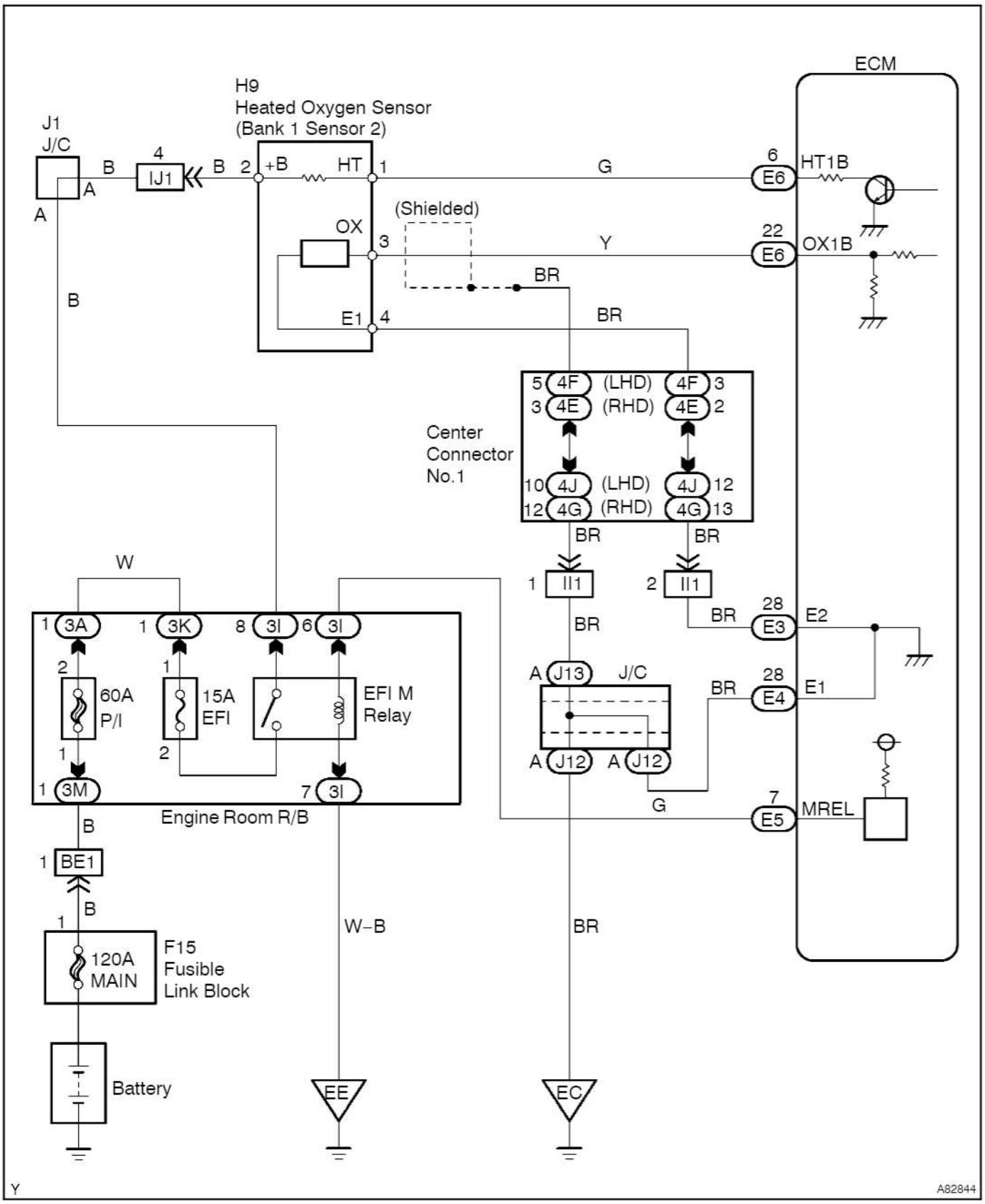
- DTC P0136 indicates deterioration of the heated oxygen sensor. The ECM sets the DTC by calculating the impedance of the sensor after the typical enabling conditions are satisfied (1 driving–cycle).
- DTC P0137 indicates an open or short circuit in the heated oxygen sensor system (1 driving–cycle). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 15 kΩ.

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DTC No.	DTC Detection Condition	Trouble Area
P0136	One of the following conditions is met: • Sensor impedance is less than 5 Ω when ECM presumes the sensor warmed–up as well as operated normally • Under active air–fuel ratio control, either of (a) and (b) is met: (a) Sensor output voltage is 0.2 V or more (b) Sensor output voltage is 0.6 V or less • Under active air–fuel ratio control, either of (a) and (b) is met: (a) Sensor output voltage is 0.25 V or more when OSC is 0.88 g or more and target air–fuel ratio is RICH (b) Sensor output voltage is 0.59 V or less when OSC is 0.88 g or more and target air–fuel ratio is LEAN	• Open or short in heated oxygen sensor (bank 1 sensor 2) circuit • Heated oxygen sensor (bank 1 sensor 2) • Heated oxygen sensor heater (bank 1 sensor 2) • EFI M relay
P0137	Either of the following conditions is met: • Sensor impedance is more than 15 kΩ for more than 55 seconds when ECM presumes the sensor warmed–up as well as operated normally • Under active air–fuel ratio control, all of the following conditions are met: (a) Sensor output voltage is less than 0.25 V (b) Target air–fuel ratio is RICH (c) OSC is 0.88 g or more	• Open in heated oxygen sensor (bank 1 sensor 2) circuit • EFI M relay • Heated oxygen sensor (bank 1 sensor 2) • Heated oxygen sensor heater (bank 1 sensor 2)
P0138	One of the following conditions is met: • Sensor short is detected even if sensor output voltage is 1.2 V or more for 30 seconds • Under active air–fuel ratio control, all of the following conditions are met: (a) Sensor output voltage is 0.59 V or more (b) Target air–fuel ratio is LEAN (c) OSC is 0.88 g or more • Sensor output voltage is more than 1.2 V for 10 seconds	• Short in heated oxygen sensor (bank 1 sensor 2) circuit • Heated oxygen sensor (bank 1 sensor 2) • Heated oxygen sensor heater (bank 1 sensor 2) • EFI M relay

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WIRING DIAGRAM



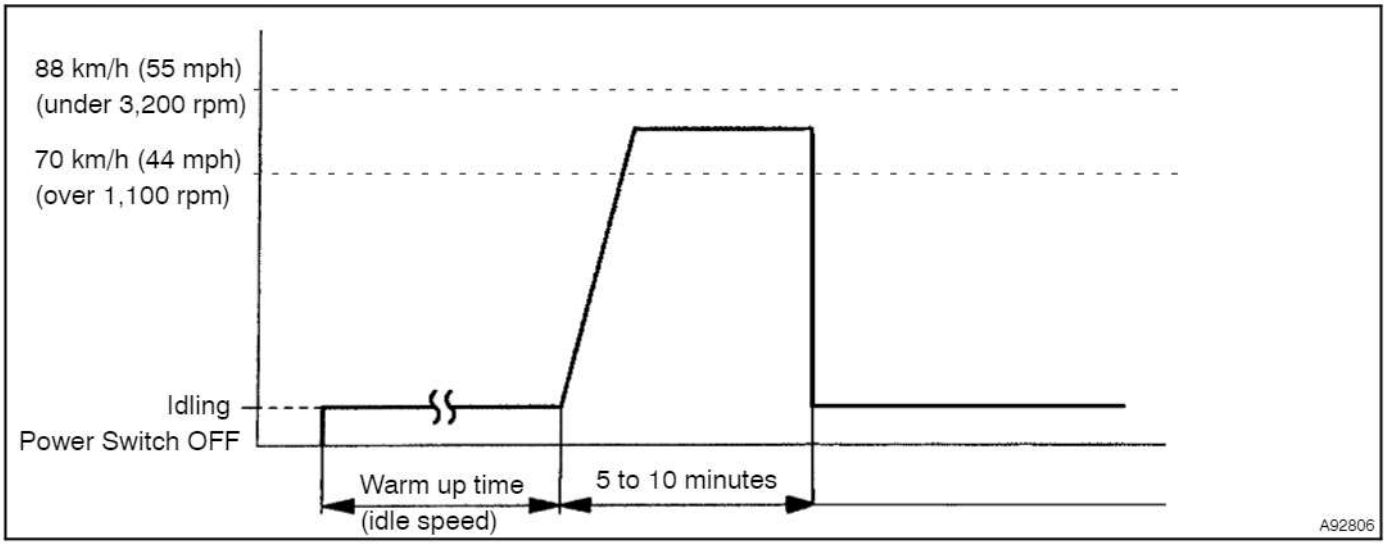
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CONFIRMATION ENGINE DRIVING for DTC P0136 and P0137

PURPOSE

HINT:

Performing this confirmation pattern will activate the DTC detection (P0136) of the ECM. This is very useful for verifying the completion of a repair.



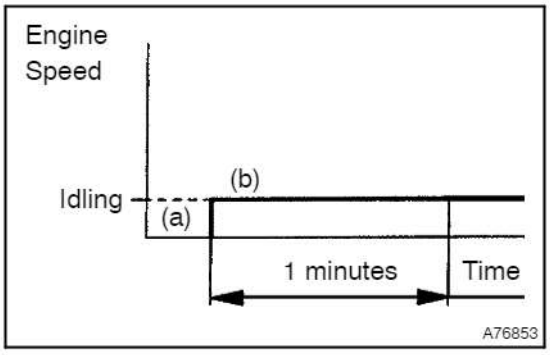
(a) Clear the DTCs (see page 05–25).
(b) Put the engine in inspection mode (see page 05–1).
(c) Start the engine and warm it up with all the accessory switches OFF.
(d) Deactivate the inspection mode and drive the vehicle at 70 to 120 km/h (44 to 70 mph) for 5 to 10 minutes.
(e) Read DTCs.

NOTICE:

- **If the conditions in this test are not strictly followed, no malfunction will be detected.**
- **Do not drive the vehicle without deactivating inspection mode. otherwise damaging the transaxle may result.**

CONFIRMATION DRIVING PATTERN for DTC P0138

PURPOSE



HINT:

Performing this confirmation pattern will activate the DTC detection (P0138) of the ECM. This is very useful for verifying the completion of a repair.

(a) Clear the DTCs (see page 05–25).
(b) Put the engine in inspection mode (see page 05–1).
(c) Start the engine and let the engine idle for 1 minute.
(d) Read DTCs.

NOTICE:

If the conditions in this test are not strictly followed, no malfunction will be detected.

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INSPECTION PROCEDURE

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0136, P0137 AND/OR P0138)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

HINT:
If any other codes besides "P0136, P0137 and/or P0138" are output, perform the troubleshooting for those DTCs first.

B → **REPLACE GO TO RELEVANT DTC CHART (See page 05–39)**

A

2	PERFORM ACTIVE TEST ON INTELLIGENT TESTER II(A/F CONTROL)

HINT:
Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:
The A/F CONTROL operation lowers the injection volume 12.5% or increases the injection volume 25%.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Select the item: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

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Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

–12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: More than 0.55 V

–12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 % → Output voltage: More than 3.35 V / Less than 3.0 V — **OK**	Injection volume +25 % –12.5 % → Output voltage: More than 0.55 V / Less than 0.4V — **OK**	—
Case 2	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Injection volume +25 % –12.5 % → Output voltage: More than 0.55 V / Less than 0.4V — **OK**	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 % → Output voltage: More than 3.35 V / Less than 3.0V — **OK**	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

To display the graph, select the item on the tester: View / Line graph.

Result:

Output voltage of A/F sensor	Output voltage of heated oxygen sensor	Proceed to
OK	OK	A
NG	OK	B
OK	NG	C
NG	NG	D

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B	GO TO DTC P2238
C	Go to step 5
D	GO TO DTC P0171

A

3 PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

4 READ OUTPUT DTCS(DTC P0136, P0137 AND/OR P0138 ARE OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

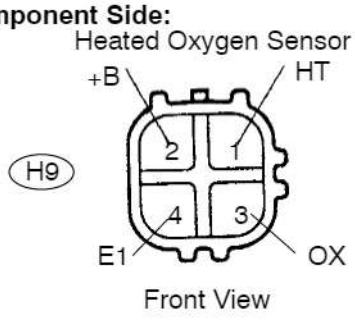
B	REPLACE HEATED OXYGEN SENSOR

A

CHECK FOR INTERMITTENT PROBLEMS

5 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)

Component Side:



(a) Disconnect the H9 heated oxygen sensor connector.
(b) Measure the resistance between the terminals of the heated oxygen sensor connector.

Standard:

Tester Connection	Specified Condition
HT (H9–1) – +B (H9–2)	11 to 16 Ω at 20 °C (68 °F)
HT (H9–1) – E1 (H9–4)	10 kΩ or higher

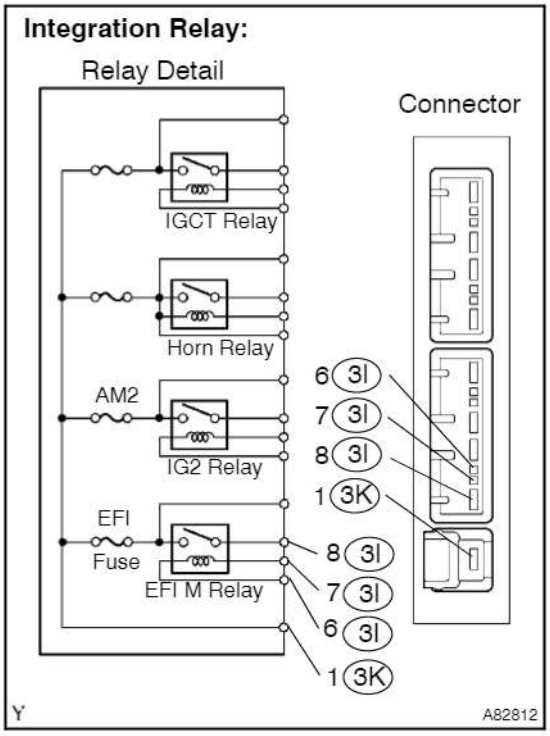
(c) Reconnect the heated oxygen sensor connector.

NG	REPLACE HEATED OXYGEN SENSOR

OK

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6 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.

(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

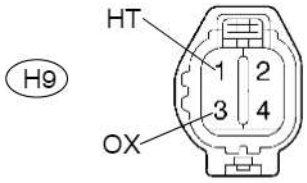
NG → **REPLACE INTEGRATION RELAY**

OK

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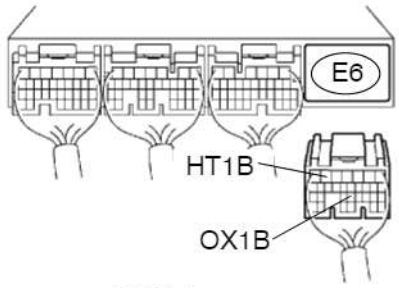
7 CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR – ECM)

Wire Harness Side:
Heated Oxygen Sensor Connector



Front View

A79118



Y ECM Connector A65748

(a) Disconnect the H9 heated oxygen sensor connector.
(b) Disconnect the E6 ECM connectors.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

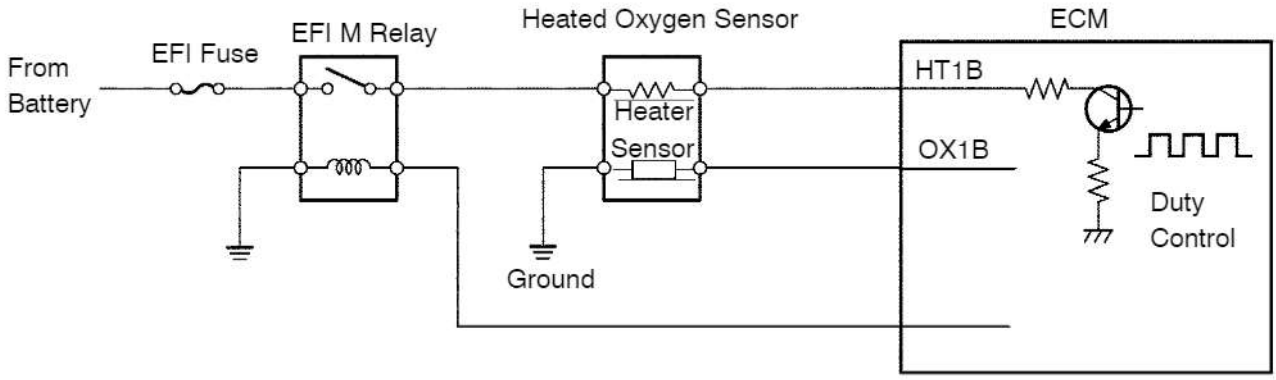
Tester Connection	Specified Condition
HT (H9–1) – HT1B (E6–6)	Below 1 Ω
OX (H9–3) – OX1B (E6–22)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (H9–1) or HT1B (E6–6) – Body ground	10 kΩ or higher
OX (H9–3) or OX1B (E6–22) – Body ground	10 kΩ or higher

(d) Reconnect the heated oxygen sensor connector.
(e) Reconnect the ECM connector.

Reference (Bank 1 Sensor 2 System Diagram):



P A73886

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

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DTC	P0171	SYSTEM TOO LEAN (BANK 1)

DTC	P0172	SYSTEM TOO RICH (BANK 1)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short–term fuel trim and the long–term fuel trim.

The short–term fuel trim is the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio. The signal from the A/F sensor indicates whether the air–fuel ratio is RICH or LEAN compared to the stoichiometric air–fuel ratio. This variance triggers a reduction in the fuel volume if the air–fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.

The long–term fuel trim is the overall fuel compensation in order to balance the short–term fuel trim for a continual deviation from the central value, by individual engine differences, operating environment and deterioration.

If both the short–term fuel trim and the long–term fuel trim are LEAN or RICH beyond a certain value, it is detected as malfunction in the SFI system. The ECM illuminates the CHK ENG and DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0171	When air–fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	• Air induction system • Injector has blockage • Mass air flow meter • Engine coolant temperature sensor • Fuel pressure • Gas leakage in exhaust system • Open or short in A/F sensor (bank 1, sensor 1) circuit • A/F sensor (bank 1, sensor 1) • A/F sensor heater (bank 1, sensor 1) • EFI M relay • PCV valve and hose • PCV hose connection • ECM
P0172	When air–fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	• Injector has leakage or blockage • Mass air flow meter • Engine coolant temperature sensor • Ignition system • Fuel pressure • Gas leakage in exhaust system • Open or short in A/F sensor (bank 1, sensor 1) circuit • A/F sensor (bank 1, sensor 1) • A/F sensor heater • EFI M relay • ECM

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 may be recorded. The CHK ENG then illuminates.
- If the total of the short–term fuel trim value and long–term fuel trim value is between +33 % and –30 % (engine coolant temperature is more than 75°C [167°F]), the system is functioning normally.

WIRING DIAGRAM

Refer to DTC P2195 on page 05–165.

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INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:

The A/F CONTROL operation lowers the injection volume 12.5% or increases the injection volume 25%.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Select the item: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

–12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

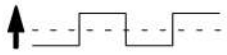
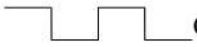
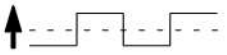
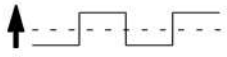
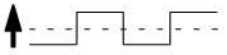
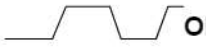
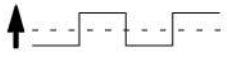
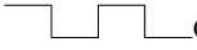
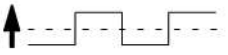
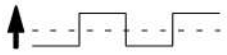
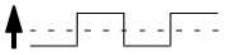
+25 % → rich output: More than 0.55 V

–12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

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	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	—
Case 2	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0V  OK	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.
To display the graph, select the item on the tester: View / Line graph.
HINT:

- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high A/F sensor voltage could be caused by a RICH air–fuel mixture. Check the conditions that would cause the engine to run with the RICH air–fuel mixture.
- A low A/F sensor voltage could be caused by a LEAN air–fuel mixture. Check the conditions that would cause the engine to run with the LEAN air–fuel mixture.

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1	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: No vacuum leakage.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

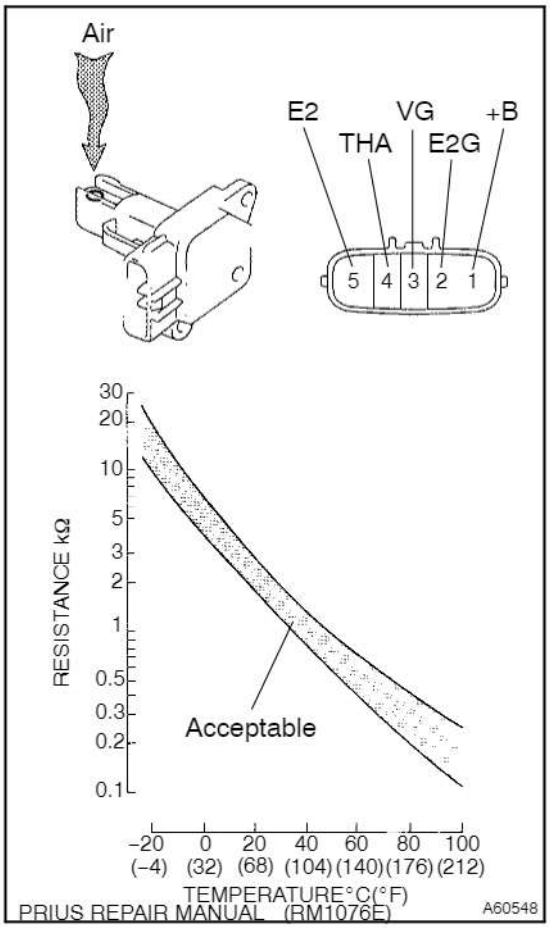
3	INSPECT FUEL INJECTOR ASSY(INJECTION AND VOLUME) (See page 11–9)

OK:
Injection volume: 36 to 46 cm^3 (2.1 to 2.8 cu in.) per 15 seconds.

NG → **REPLACE FUEL INJECTOR ASSY (See page 11–12)**

OK

4	INSPECT MASS AIR FLOW METER



(a) Remove the mass air flow meter.
(b) Inspect output voltage.
  (1) Apply battery voltage across terminals +B and E2G.
  (2) Connect the positive (+) tester prove to terminal VG, and negative (–) tester prove to terminal E2G.
  (3) Blow air into the mass air flow meter, and check that the voltage fluctuates.

Standard:

Tester Connection	Specified Condition
VG (3) – E2G (2)	Sensor output voltage fluctuates between 0.3 V and 4.8 V

(c) Inspect resistance.
  (1) Measure the resistance between the terminals of the intake air temperature sensor.

Standard:

Tester Connection	Specified Condition
THA (4) – E2 (5)	13.6 to 18.4 kΩ at –20°C (–4°F)
THA (4) – E2 (5)	2.21 to 2.69 kΩ at 20°C (68°F)
THA (4) – E2 (5)	0.49 to 0.67 kΩ at 60°C (140°F)

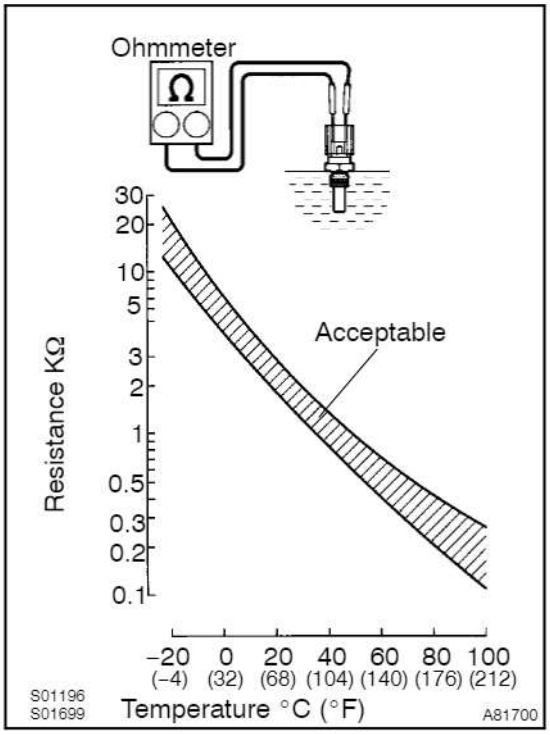
(d) Reinstall the mass air flow meter.

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NG → REPLACE MASS AIR FLOW METER

OK

5 INSPECT ENGINE COOLANT TEMPERATURE SENSOR(RESISTANCE)



(a) Remove the engine coolant temperature sensor.

(b) Measure the resistance between the terminals of the engine coolant temperature sensor.

Standard:

Tester Connection	Specified Condition
1 – 2	2 to 3 kΩ at 20°C (68°F)
1 – 2	0.2 to 0.4 kΩ at 80°C (176°F)

NOTICE:

When checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

(c) Reinstall the engine coolant temperature sensor.

NG → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

6 CHECK FOR SPARK AND IGNITION (See page 18–3)

OK: Spark occurs.

NG → REPAIR OR REPLACE IGNITION SYSTEM COMPONENTS

OK

7 CHECK FUEL PRESSURE (See page 18–3)

(a) Check the fuel pressure (high or low pressure).

OK:

Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf·cm^2, 44 to 50 psi)

NG → REPLACE FUEL SYSTEM

OK

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8	CHECK FOR EXHAUST GAS LEAKAGE

OK: No gas leak.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT (See page 15–1)**

OK

9	READ VALUE OF INTELLIGENT TESTER II(OUTPUT VOLTAGE OF AIR FUEL RATIO SENSOR (BANK 1 SENSOR 1))

(a) Connect the intelligent tester II to the DLC 3.
(b) Put the engine in inspection mode (see page 05–1).
(c) Warm up the A/F sensors (bank 1 sensor 1) by running the engine at 2,500 rpm with the accelerator pedal depressed more than 60 % for approximately 90 seconds.
(d) Read A/F sensor voltage output on the intelligent tester II.
(e) On the intelligent tester II, enter the menus: Powertrain / Engine and ECT / Data List.
(f) Select the monitor item: AFS B1S2 and Engine Speed.

HINT:

If necessary, record the data using the SNAPSHOT function.

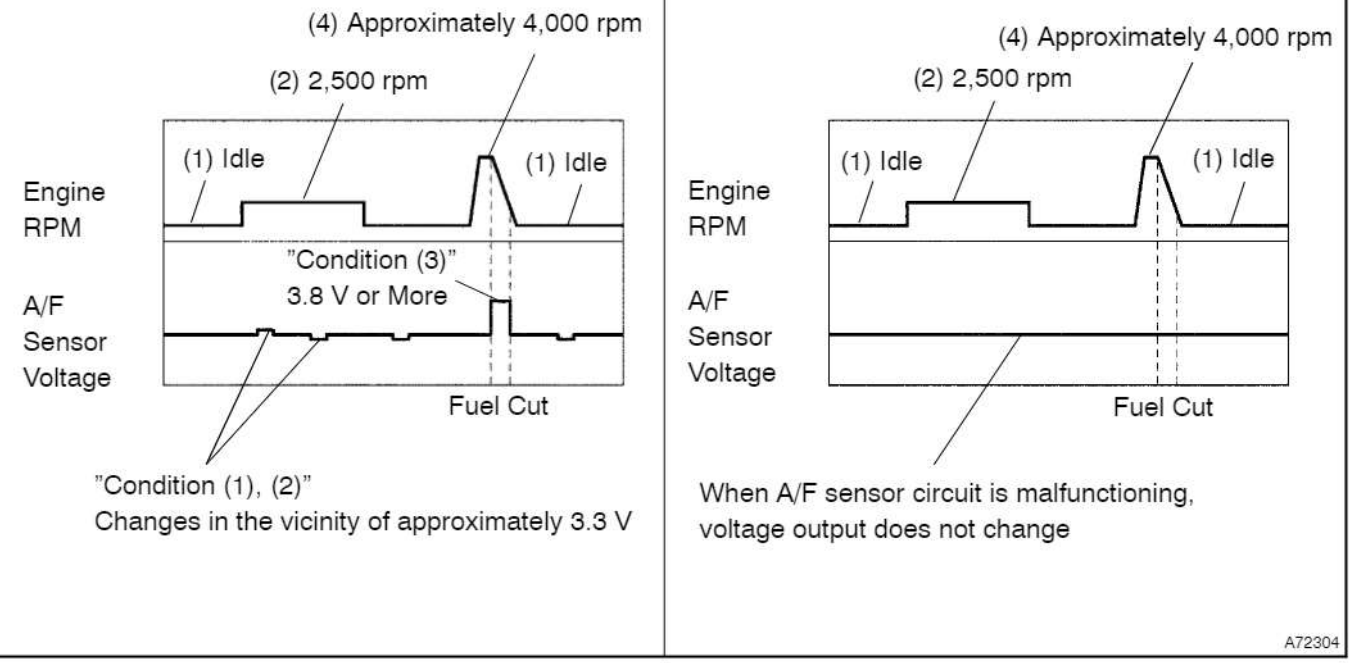
(g) Monitor the A/F sensor voltage carefully.
(h) Check the A/F sensor voltage output under the following conditions:
  (1) Put the engine in inspection mode and allow the engine to idle for 30 seconds.
  (2) Put the engine in inspection mode and running the engine at 2,500 rpm with depressing the accelerator pedal more than 60 % (where engine RPM is not suddenly changed).
  (3) Deactivate inspection mode and drive the vehicle with the shift position in B.
  (4) Accelerate the vehicle to 70 km/h (44 mph) and quickly release the accelerator pedal so that the throttle valve is fully closed.

CAUTION:

- **Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.**
- **Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.**

Standard:
Condition (1) and (2)
Voltage changes in the vicinity of 3.3 V (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (4)
A/F sensor voltage increases to 3.8 V or more during engine deceleration (when fuel cut) as shown in the illustration.

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HINT:

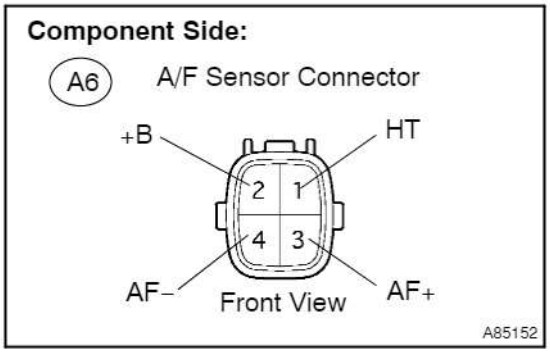
- To display the graph, select the item on the tester: View / Line graph.
- Whenever the output voltage of the A/F sensor remains at approximately 3.3 V (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have an open–circuit. (This will happen also when the A/F sensor heater has an open–circuit.)
- Whenever the output voltage of the A/F sensor remains at a certain value of approximately 3.8 V or more, or 2.8 V or less (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have a short–circuit.
- The ECM will stop fuel injection (fuel cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor voltage output.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal was reconnected, the vehicle must be driven over 16 km/h (10 mph) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

OK	**Go to step 17**

NG

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10 INSPECT AIR FUEL RATIO SENSOR(HEATER RESISTANCE)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.

Standard:

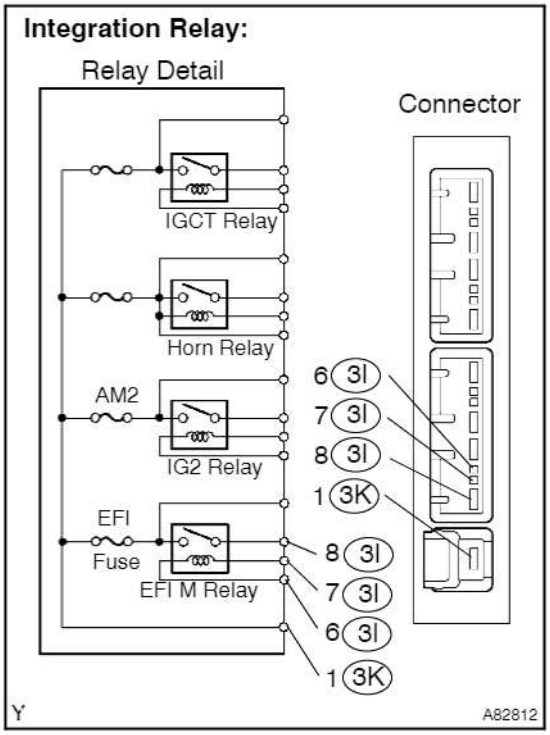
Tester Connection	Specified Condition
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68 °F)

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR FUEL RATIO SENSOR

OK

11 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

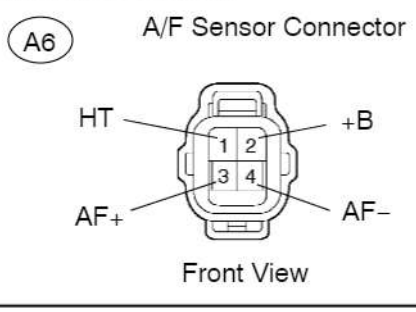
NG → REPLACE INTEGRATION RELAY

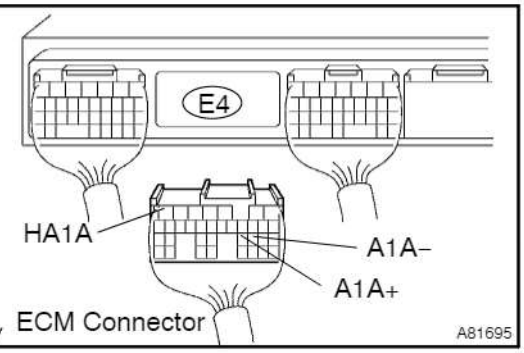
OK

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12 CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM)

Wire Harness Side:





(a) Disconnect the A6 A/F sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

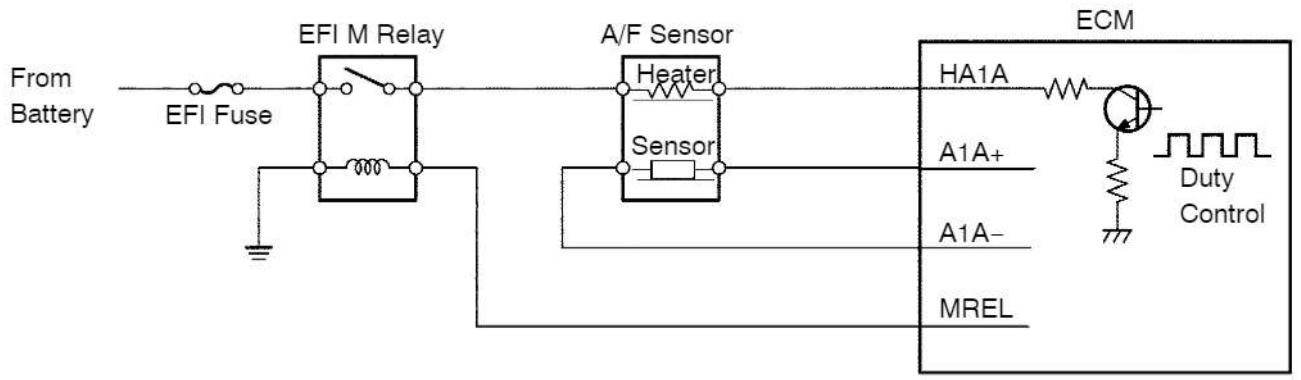
Tester Connection	Specified Condition
AF+ (A6–3) – A1A+ (E4–23)	Below 1 Ω
AF– (A6–4) – A1A– (E4–22)	Below 1 Ω
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
AF+ (A6–3) or A1A+ (E4–23) – Body ground	10 kΩ or higher
AF– (A6–4) or A1A– (E4–22) – Body ground	10 kΩ or higher
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the ECM connector.

Reference (Bank 1 Sensor 1 System Diagram):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

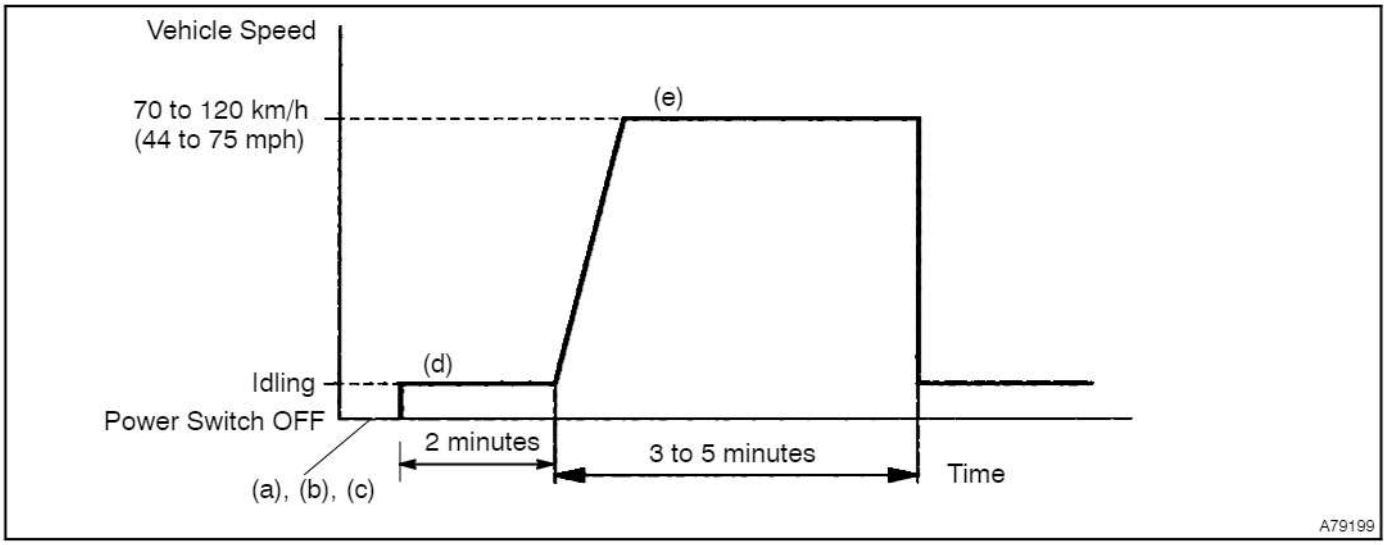
OK

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13	REPLACE AIR FUEL RATIO SENSOR

GO

14	PERFORM CONFIRMATION DRIVING PATTERN



(a) Clear the DTCs (see page 05–25).
(b) Connect the intelligent tester II to the DLC3.
(c) Switch the ECM from normal mode to check mode using the intelligent tester II (see page 05–29).
(d) Put the engine in inspection mode, and start the engine and warm it up with all the accessory switched OFF.
(e) Deactivate inspection mode and drive the vehicle at 70 to 120 km/h (44 to 75 mph) and engine speed of 1,100 to 3,200 rpm for 3 to 5 minutes.

HINT:
If malfunction exists, the CHK ENG will be illuminated during step (e).

NOTICE:

- **If the conditions in this test are not strictly followed, no malfunction will be detected. If you do not have the intelligent tester II, turn the power switch OFF after performing steps (d) and (e), then perform step (e) again.**
- **Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.**

GO

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15	READ OUTPUT DTCS(SEE IF DTC P0171 AND/OR P0172 ARE OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
No output	A
P0171 and/or P0172	B

B → **REPLACE ECM (See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN (Refer to step 14)**

A

16	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

YES

DTCS ARE CAUSED BY RUNNING OUT OF FUEL

17	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

GO

18	READ OUTPUT DTCS(SEE IF DTC P0171 AND/OR P0172 ARE OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II , select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
P0171 and/or P0172	A
No output	B

B → **Go to step 22**

A

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19	REPLACE AIR FUEL RATIO SENSOR

GO

20	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

GO

21	READ OUTPUT DTCS(SEE IF DTC P0171 AND/OR P0172 ARE OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result:

Display (DTC Output)	Proceed to
No output	A
P0171 and/or P0172	B

B → **REPLACE ECM (See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN (Refer to step 14)**

A

22	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

YES

DTCS ARE CAUSED BY RUNNING OUT OF FUEL

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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

CIRCUIT DESCRIPTION

When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust gas in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emissions levels. High concentrations of HC can also cause to temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the CHK ENG. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.
If the misfiring rate exceeds the threshold and could cause emissions deterioration, the ECM illuminates the CHK ENG.

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DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions 1 trip detection logic: CHK ENG blinks 2 trip detection logic: CHK ENG illuminates	• Open or short in engine wire harness • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Mass air flow meter • Engine coolant temperature sensor • Compression pressure • Valve clearance • Valve timing • PCV hose connection • PCV hose • ECM
P0301 P0302 P0303 P0304	• For any particular 200 revolutions of engine, misfiring is detected which can cause catalyst overheating (This causes CHK ENG to blink) • For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	• Open or short in engine wire harness • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Mass air flow meter • Engine coolant temperature sensor • Compression pressure • Valve clearance • Valve timing • PCV hose connection • PCV hose • ECM

HINT:

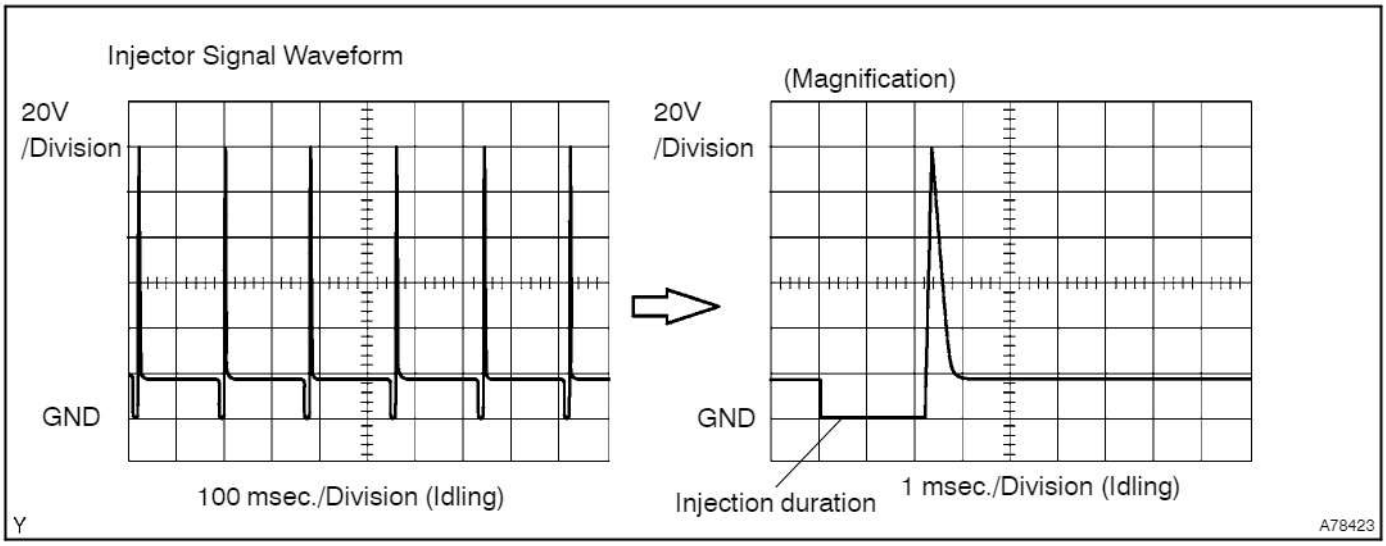
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.

Reference: Inspection using oscilloscope

With the engine idling, check the waveform between terminals #10 to #40 and E01 of the ECM connectors.

HINT:

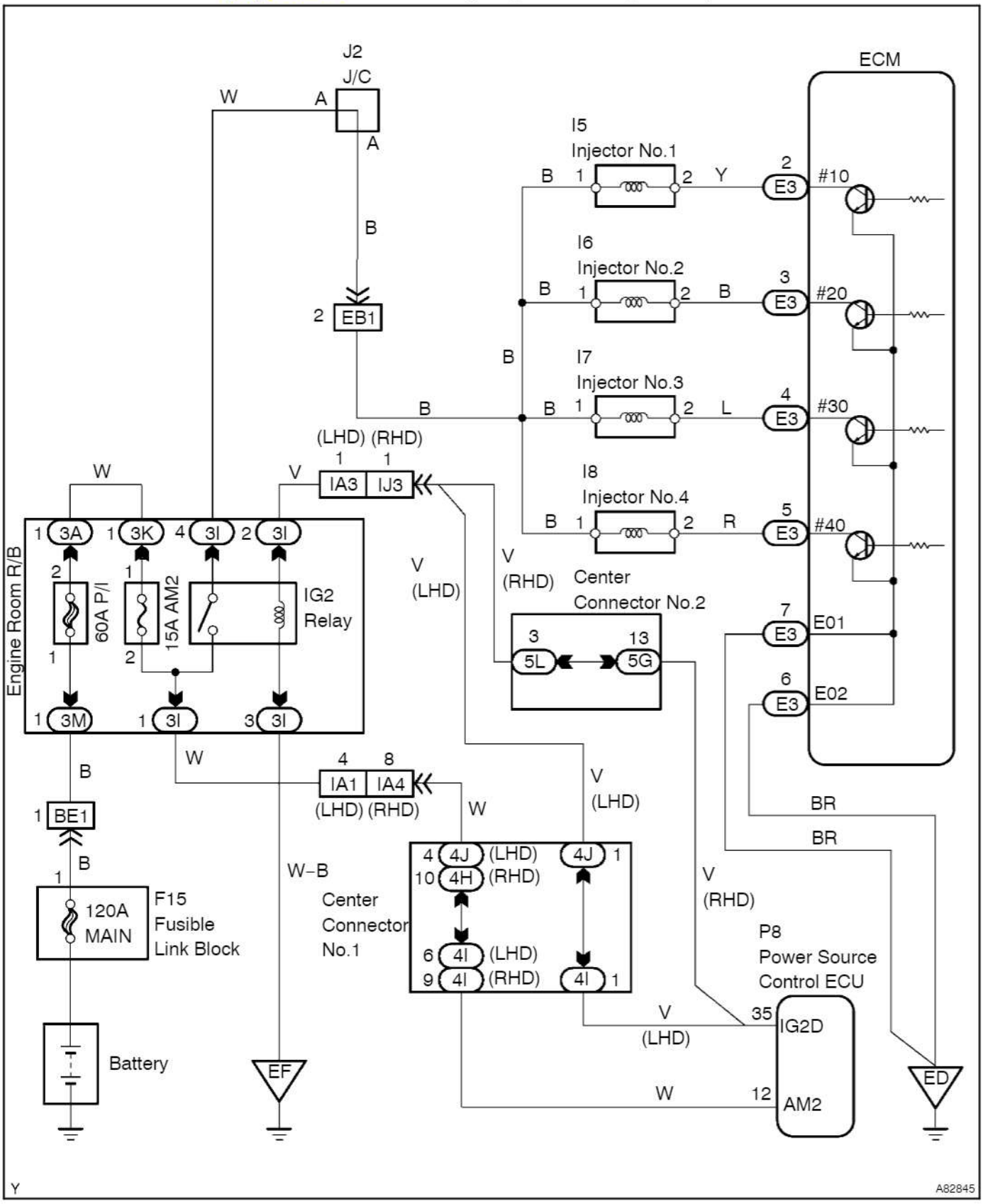
The correct waveform is as shown.



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WIRING DIAGRAM

Refer to DTC P0351 on page 05–131 for the wiring diagram of the ignition system.



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CONFIRMATION DRIVING PATTERN

(a) Connect the intelligent tester II to the DLC3.
(b) Record DTCs and the freeze frame data.
(c) Switch the ECM from normal mode to check mode using the intelligent tester II (see page 05–29).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with an engine speed (ENGINE SPD), engine load (CALC LOAD) and other data stored in the freeze frame data.

If you have no intelligent tester II, turn the main power OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the misfire DTCs, it is necessary to drive with Misfire RPM and Misfire Load in the Data List for the period of time in the chart below. Take care not to turn the power switch OFF. Turning the power switch OFF switches the diagnosis system from check mode to normal mode and all DTCs, freeze frame data and other data are erased.

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

(f) Check if there is a misfire, DTC and freeze frame data. Record the DTCs, freeze frame data and misfire counter data if needed.
(g) Push the power switch (IG OFF) and wait at least for 5 seconds.

INSPECTION PROCEDURE

HINT:

- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non–misfire DTCs first.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing repairs, confirm that there is no misfire (see confirmation driving pattern).
- When either of Short FT #1 and Long FT #1 in the freeze frame data is over the range of ±20 %, there is a possibility that the air–fuel ratio is inclining either to RICH (–20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during engine warm–up.
- If the misfire cannot be reproduced, the reason may be because of the driving the vehicle with lack of fuel, use of improper fuel, a stain on the ignition plug, etc.
- Be sure to check the value on the misfire counter after repairs.

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

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC output)	Proceed to
P0300, P0301, P0302, P0303 and/or P0304	A
P0300, P0301, P0302, P0303 and/or P0304, and other DTCs	B

HINT:
If any other codes besides P0300, P0301, P0302, P0303 or P0304 are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART** (See page 05–39)

A

2	CHECK WIRE HARNESS, CONNECTOR AND VACUUM HOSE IN ENGINE ROOM

(a) Check the connection conditions of the wire harness and connectors.
(b) Check the vacuum hose piping for disconnection or breakage.

OK: Connected correctly and no damage on wire harness.

NG → **REPAIR OR REPLACE, THEN CONFIRM THAT THERE IS NO MISFIRE**

OK

3	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

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4	READ VALUE OF INTELLIGENT TESTER II(NUMBER OF MISFIRE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Put the engine in inspection mode (see page 05–1).
(e) Start the engine.
(f) Select the item: Powertrain / Engine and ECT / Data List / Cylinder #1 Misfire Rate to Cylinder #4 Misfire Rate.
(g) Read the number of misfire cylinders on the intelligent tester II.

HINT:
When a misfire is not reproduced, be sure to branch below based on the stored DTC.

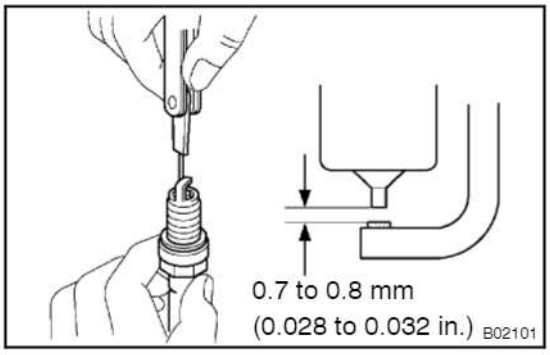
Result:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15**

A

5	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER



(a) Remove the ignition coil No.1 assembly.
(b) Remove the spark plug.
(c) Check the spark plug type.

Recommended spark plug:

DENSO made	SK16R11

(d) Check the spark plug electrode gap.

Electrode gap: 0.7 to 0.8 mm (0.028 to 0.032 in.)
Maximum electrode gap: 1.16 mm (0.046 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on the used plug.

(e) Check the electrode for carbon deposits.
(f) Perform a spark test.

CAUTION:

Absolutely disconnect the each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

(1) Install the spark plug to the ignition coil No.1, and connect the ignition coil No.1 connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

OK: Spark jumps across electrode gap.

(g) Reinstall the spark plug.
(h) Reinstall the ignition coil No.1 assembly.

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OK → Go to step 8

NG

6	CHANGE NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

(a) Change to the normal spark plug.
(b) Perform a spark test.

CAUTION:
Absolutely disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.

(1) Install the spark plug to the ignition coil No.1, and connect the ignition coil No.1 connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

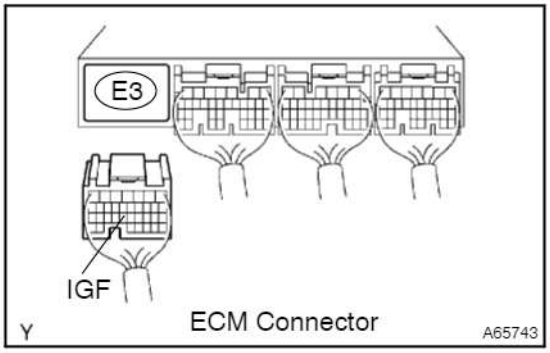
OK: Spark jumps across electrode gap.

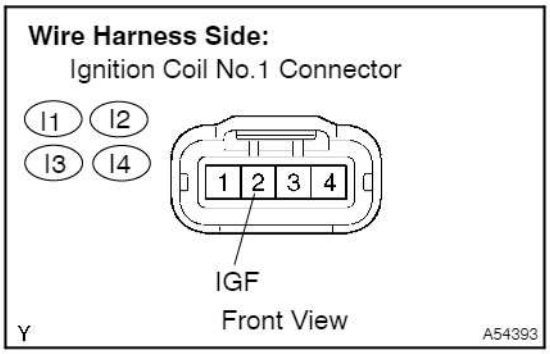
OK → REPLACE SPARK PLUG

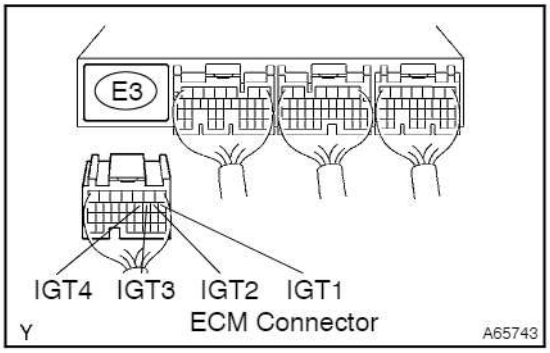
NG

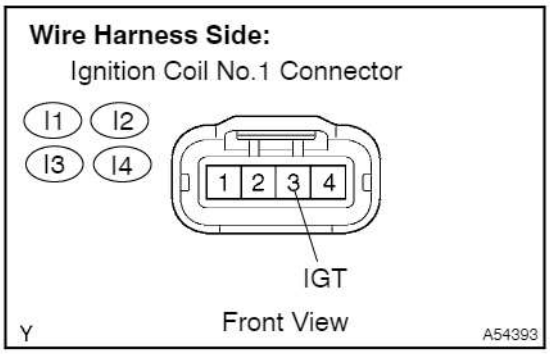
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7 CHECK HARNESS AND CONNECTOR OF MISFIRING CYLINDER(IGNITION COIL NO.1 – ECM)









(a) Check the harness and connectors between the ignition coil No.1 and ECM (IGF terminal) connectors.

(1) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.

(2) Disconnect the E3 ECM connector.

(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IGF (I1–2) – IGF (E3–23)	Below 1 Ω
IGF (I2–2) – IGF (E3–23)	Below 1 Ω
IGF (I3–2) – IGF (E3–23)	Below 1 Ω
IGF (I4–2) – IGF (E3–23)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IGF (I1–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I2–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I3–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I4–2) or IGF (E3–23) – Body ground	10 kΩ or higher

(4) Reconnect the ignition coil connector.

(5) Reconnect the ECM connector.

(b) Check the harness and connectors between the ignition coil No.1 and ECM (IGT terminal) connectors.

(1) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.

(2) Disconnect the ECM E3 connector.

(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IGT (I1–3) – IGT1 (E3–8)	Below 1 Ω
IGT (I2–3) – IGT2 (E3–9)	Below 1 Ω
IGT (I3–3) – IGT3 (E3–10)	Below 1 Ω
IGT (I4–3) – IGT4 (E3–11)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IGT (I1–3) or IGT1 (E3–8) – Body ground	10 kΩ or higher
IGT (I2–3) or IGT2 (E3–9) – Body ground	10 kΩ or higher
IGT (I3–3) or IGT3 (E3–10) – Body ground	10 kΩ or higher
IGT (I4–3) or IGT4 (E3–11) – Body ground	10 kΩ or higher

(4) Reconnect the ignition coil No.1 connector.

(5) Reconnect the ECM connector.

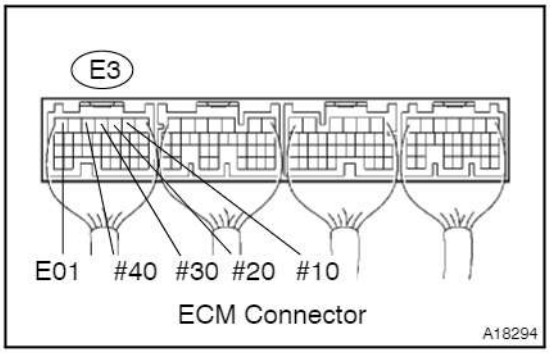
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OK → REPLACE IGNITION COIL NO.1

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

8	INSPECT ECM TERMINAL OF MISFIRING CYLINDER(#1, #2, #3 OR #4 VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the applicable terminals of the E3 ECM connector.

Standard:

Symbols (Terminal No.)	Specified condition
#10 (E3–2) – E01 (E3–7)	9 to 14 V
#20 (E3–3) – E01 (E3–7)	9 to 14 V
#30 (E3–4) – E01 (E3–7)	9 to 14 V
#40 (E3–5) – E01 (E3–7)	9 to 14 V

OK → Go to step 11

NG

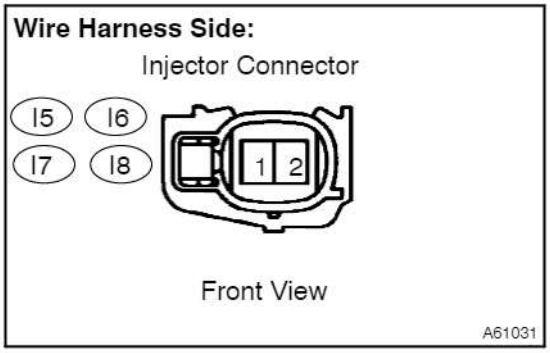
9	INSPECT FUEL INJECTOR RESISTANCE OF MISFIRING CYLINDER (See page 11–9)

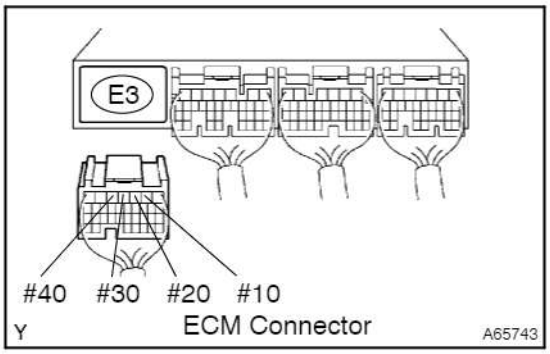
NG → REPLACE FUEL INJECTOR ASSY (See page 11–12)

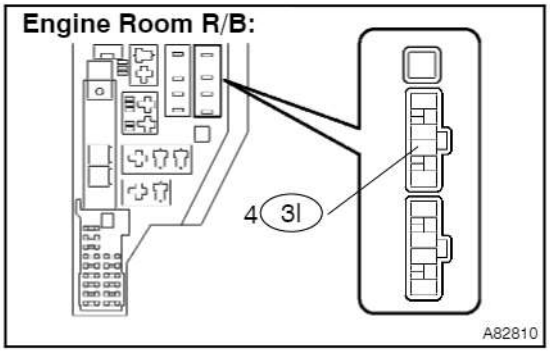
OK

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10	CHECK HARNESS AND CONNECTOR OF MISFIRING CYLINDER(INJECTOR – ECM, INJECTOR – IG2 RELAY)







(a) Check the harness and connectors between the injector and ECM connectors.
(1) Disconnect the I5, I6, I7 or I8 injector connector.
(2) Disconnect the E3 ECM connector.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Injector (I5–2) – #10 (E3–2)	Below 1 Ω
Injector (I6–2) – #20 (E3–3)	Below 1 Ω
Injector (I7–2) – #30 (E3–4)	Below 1 Ω
Injector (I8–2) – #40 (E3–5)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Injector (I5–2) or #10 (E3–2) – Body ground	10 kΩ or higher
Injector (I6–2) or #20 (E3–3) – Body ground	10 kΩ or higher
Injector (I7–2) or #30 (E3–4) – Body ground	10 kΩ or higher
Injector (I8–2) or #40 (E3–5) – Body ground	10 kΩ or higher

(4) Reconnect the injector connector.
(5) Reconnect the ECM connector.

(b) Check the harness and connectors between the injector connector and IG2 relay.
(1) Disconnect the I5, I6, I7 or I8 injector connector.
(2) Remove the integration relay from the engine room R/B.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Injector (I5–1) – IG2 relay (3I–4)	Below 1 Ω
Injector (I6–1) – IG2 relay (3I–4)	Below 1 Ω
Injector (I7–1) – IG2 relay (3I–4)	Below 1 Ω
Injector (I8–1) – IG2 relay (3I–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Injector (I5–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
Injector (I6–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
Injector (I7–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
Injector (I8–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher

(4) Reconnect the injector connector.
(5) Reinstall the integration relay connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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11	INSPECT FUEL INJECTOR INJECTION AND VOLUME OF MISFIRING CYLINDER (See page 11–9)

OK:
Injection volume: 36 to 46 cm^3 (2.1 to 2.8 cu in.) per 15 seconds.

NG → REPLACE FUEL INJECTOR ASSY (See page 11–12)

OK

12	CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER (See page 14–1)

OK:
Compression pressure: 728 kPa (7.4 $kgf \cdot cm^2$, 106 psi)
Minimum pressure: 537 kPa (5.4 $kgf \cdot cm^2$, 77 psi)

NG → REPAIR OR REPLACE

OK

13	CHECK VALVE CLEARANCE OF MISFIRING CYLINDER (See page 14–6)

OK:
Valve clearance (cold):
Intake: 0.17 to 0.23 mm (0.007 to 0.009 in.)
Exhaust: 0.27 to 0.33 mm (0.011 to 0.013 in.)

NG → ADJUST VALVE CLEARANCE (See page 14–6)

OK

14	SWITCH STEP BY NUMBER OF MISFIRE CYLINDER(REFER TO RESULT OF STEP 4)

HINT:
- If the result of step 4 is "1 or 2 cylinders", proceed to A.
- If the result of step 4 is "more than 3 cylinders", proceed to B.

B → CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

A

15	CHECK VALVE TIMING(CHECK FOR LOOSENESS OR A JUMPED TOOTH OF THE TIMING CHAIN) (See page 14–6)

OK: The match marks of crankshaft pulley and camshaft pulley are aligning.

NG → ADJUST VALVE TIMING (See page 14–6) (REPAIR OR REPLACE TIMING CHAIN)

OK

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16	CHECK FUEL PRESSURE (See page 11–7)

OK:

Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf·cm^2, 44 to 50 psi)

NG → **CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER**

OK

17	READ VALUE OF INTELLIGENT TESTER II(INTAKE AIR TEMPERATURE AND MASS AIR FLOW RATE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Check the intake air temperature.
  (1) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Intake Air.
  (2) Read the value.

  OK:

  Temperature: Equivalent to ambient air temperature.
(e) Check the air flow rate.
  (1) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / MAF.
  (2) Read the value.

  Standard:

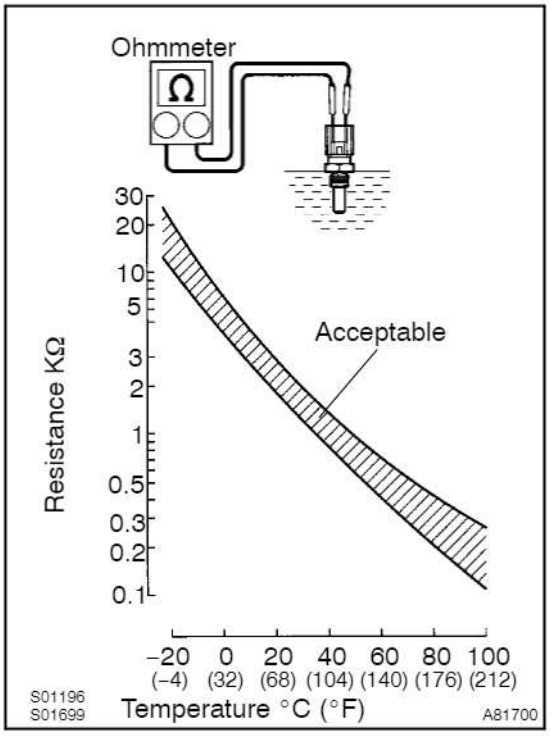
Condition	Air flow rate (gm/s)
Power switch On (do not start engine)	0.0
Idling (Inspection mode)	3.2 to 4.7
Running without load (Inspection mode, throttle open: 2,500 rpm)	13.1 to 18.9
During vehicle running (Vehicle speed is more than 38 mph)	Air flow rate fluctuates

NG → **REPLACE MASS AIR FLOW METER**

OK

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18	INSPECT ENGINE COOLANT TEMPERATURE SENSOR(RESISTANCE)



(a) Remove the engine coolant temperature sensor.
(b) Measure the resistance between the terminals of the engine coolant temperature sensor.

Standard:

Tester Connection	Specified Condition
1 – 2	2 to 3 kΩ at 20°C (68°F)
1 – 2	0.2 to 0.4 kΩ at 80°C (176°F)

NOTICE:

When checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

19	SWITCH STEP BY NUMBER OF MISFIRE CYLINDER(REFER TO RESULT OF STEP 4)

HINT:

- If the result of step 4 is "1 or 2 cylinders", proceed to A.
- If the result of step 4 is "more than 3 cylinders", proceed to B.

B → **AGAIN GO TO STEP 5**

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

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DTC	P0325	KNOCK SENSOR 1 CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

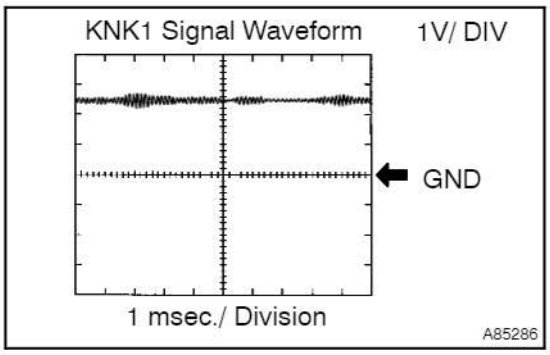
DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

A flat type knock sensor (non–resonant type) has the structure that can detect vibration in a wider band of the frequency from about 6 kHz to 15 kHz and has the following features.
Knock sensors are fitted on the cylinder block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates voltage when it becomes deformed. The generation of the voltage occurs when the cylinder block vibrates due to the knocking. If the engine knocking occurs, in order to suppress it, the ignition timing is retarded.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	Knock sensor signal level remains at low for more than 10 seconds	• Open or short in knock sensor circuit • Knock sensor (under–torqued or looseness) • ECM
P0327	Output voltage of the knock sensor is 0.5 V or less	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of the knock sensor is 4.5 V or more	• Open in knock sensor circuit • Knock sensor • ECM

HINT:
If the ECM detects the DTC P0325,P0327 and P0328, it enters fail–safe mode in which the corrective retarded angle value is set to its maximum value.

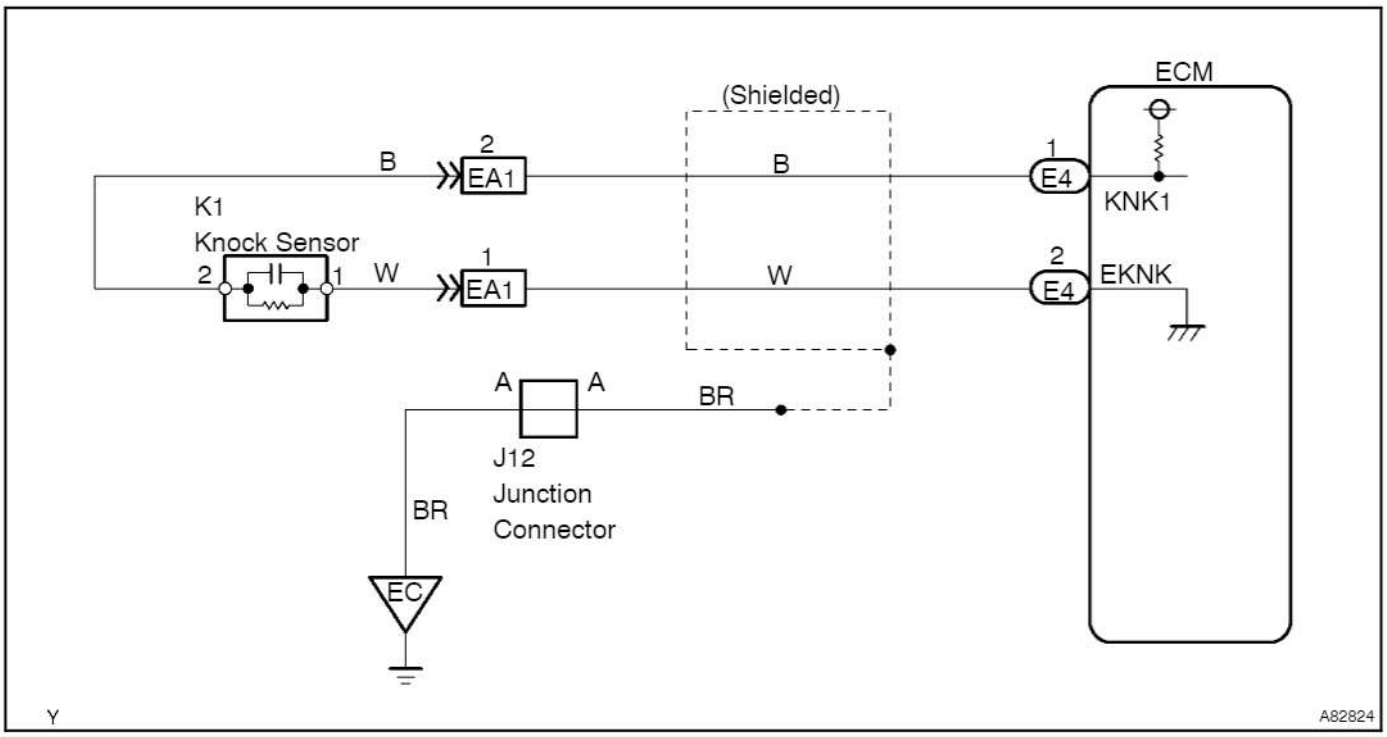


Reference: Inspection by using an oscilloscope.

(1) After warming up, run the engine at 4,000 rpm, check the waveform between terminals KNK1 and EKNK of the ECM connector.

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ OUTPUT DTCS

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Clear the DTCs (see page 05–25).
(f) Put the engine in inspection mode (see page 05–1).
(g) Warm up the engine.
(h) Run the engine at 2,500 rpm for 10 seconds or more.
(i) Read DTCs.

Result :

Display (DTC output)	Proceed to
P0325	A
P0325, P0327 and/or P0328	B
No output	C

B → **Go to step 3**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

A

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2 INSPECT KNOCK SENSOR

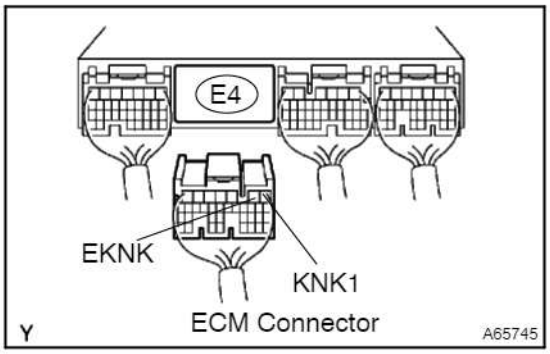
(a) Check the knock sensor installation.
OK:
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NG → **SECURELY REINSTALL SENSOR**

OK

REPLACE KNOCK SENSOR (See page 10–20)

3 CHECK HARNESS AND CONNECTOR(ECM – KNOCK SENSOR)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance between the terminals of the E4 ECM connector.
Standard:

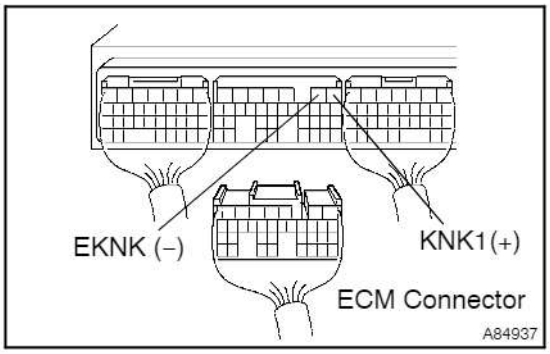
Tester Connection	Specified Condition
KNK1 (E4–1) – EKNK (E4–2)	120 to 280 KΩ at 20°C (68°F)

(c) Reconnect the ECM connector.

NG → **Go to step 5**

OK

4 INSPECT ECM(KNK1 – EKNK VOLTAGE)



(a) Disconnect the E4 ECM connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the E4 ECM terminals.
Standard:

Tester Connection	Specified Condition
KNK1 (E4–1) – EKNK (E4–2)	4.5 to 5.5 V

(d) Reconnect the ECM connector.

NG → **REPLACE ECM (See page 10–24)**

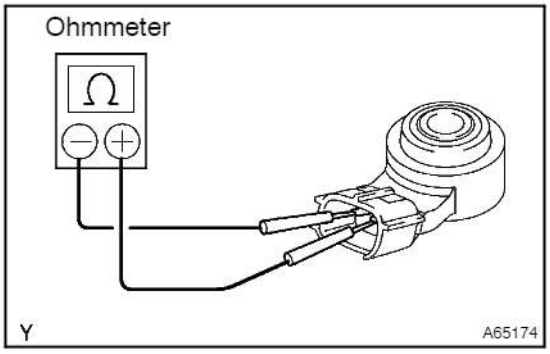
OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

NOTICE:
Fault may be intermittent. Check wire harness and connectors carefully.

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5	INSPECT KNOCK SENSOR



(a) Remove the knock sensor.
(b) Measure the resistance between the terminals.
Standard:

Tester Connection	Specified Condition
KNK1 (K1–2) – EKNK (K1–1)	120 to 280 KΩ at 20°C (68°F)

(c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR** (See page 10–20)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

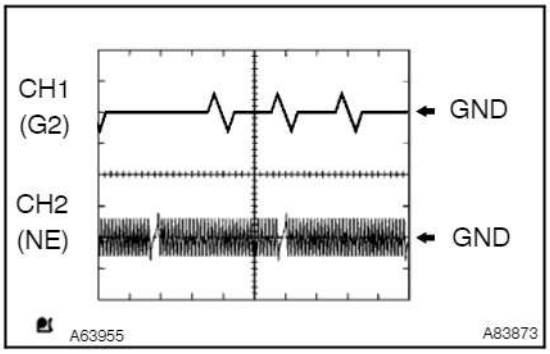
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DTC	P0335	CRANKSHAFT POSITION SENSOR "A" CIRCUIT

CIRCUIT DESCRIPTION

The crankshaft position sensor consists of a crankshaft position sensor plate and a pick–up coil.
The sensor plate has 34 teeth and is installed on the crankshaft. The pick–up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick–up coil, a pulse signal is created. The pick–up coil generates 34 signals per engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detection Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM at engine speed of 600 rpm or more (2 trip detection logic)	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Signal plate (crankshaft) • ECM

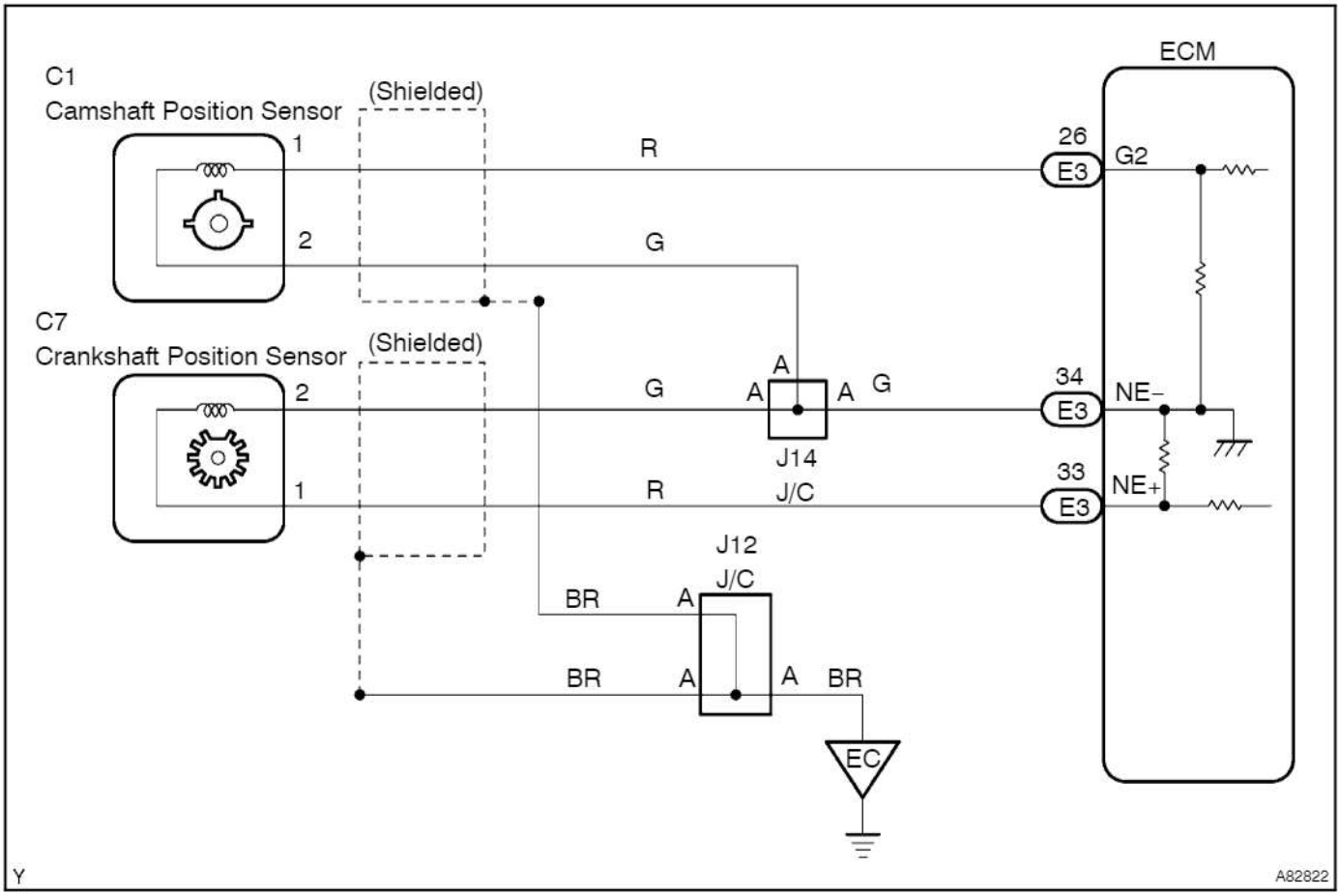


Reference: Inspection using an oscilloscope.
HINT:
The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: G2 – NE– CH2: NE+ – NE–
Equipment Setting	5 V/Division, 20 ms/Division
Condition	During cranking or idling

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

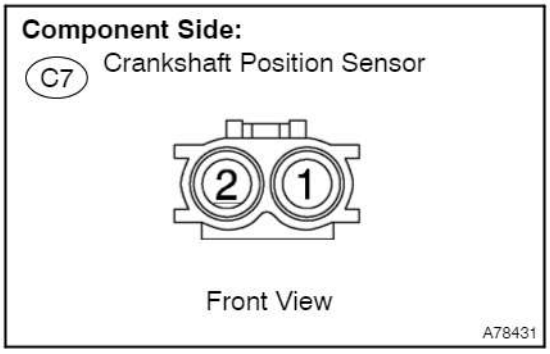
- If no trouble is found in the diagnostic troubleshooting procedure of DTC P0335, troubleshoot the engine mechanical systems.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

- READ VALUE OF INTELLIGENT TESTER II
  (a) Connect the intelligent tester II to the DLC3.
  (b) Turn the power switch ON (IG).
  (c) Turn the intelligent tester II ON.
  (d) Put the engine in inspection mode (see page 05–1).
  (e) Start the engine.
  (f) On the intelligent tester II, select the item: Powertrain / Engine and ECT / Data List / Engine Speed.

The engine speed can be observed in DATA LIST using the intelligent tester II. If there is no NE signal from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output from the crankshaft position sensor is insufficient, the engine speed will be indicated as lower PRM (than the actual RPM).

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1 INSPECT CRANKSHAFT POSITION SENSOR(RESISTANCE)



(a) Disconnect the C7 crankshaft position sensor connector.
(b) Measure the resistance between the terminals of the crankshaft position sensor connector.

Standard:

Tester Connection	Specified Condition
1 – 2	985 to 1,600 Ω at cold
1 – 2	1,265 to 1,890 Ω at hot

NOTICE:

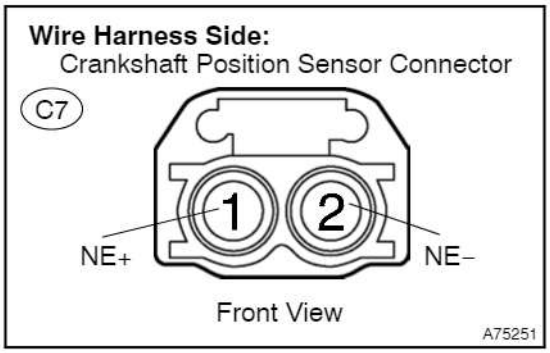
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately –10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

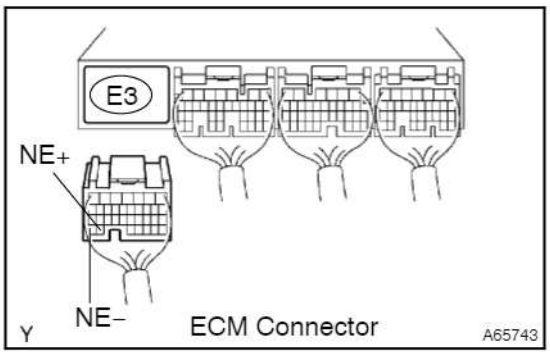
(c) Reconnect the crankshaft position sensor connector.

NG → **REPLACE CRANKSHAFT POSITION SENSOR (See page 18–10)**

OK

2 CHECK HARNESS AND CONNECTOR(CRANKSHAFT POSITION SENSOR – ECM)





(a) Disconnect the C7 crankshaft position sensor connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
NE+ (C7–1) – NE+ (E3–33)	Below 1 Ω
NE– (C7–2) – NE– (E3–34)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NE+ (C7–1) or NE+ (E3–33) – Body ground	10 kΩ or higher
NE– (C7–2) or NE– (E3–34) – Body ground	10 kΩ or higher

(d) Reconnect the crankshaft position sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	CHECK SENSOR INSTALLATION(CRANKSHAFT POSITION SENSOR)

(a) Check that the crankshaft position sensor is properly installed.
OK: Sensor is installed correctly.

NG → SECURELY REINSTALL SENSOR

OK

4	CHECK CRANKSHAFT POSITION SENSOR PLATE(TEETH OF SENSOR PLATE(CRANKSHAFT))

(a) Check the teeth of the sensor plate.
OK: No deformation on the teeth of the signal plate.

NG → REPLACE CRANKSHAFT POSITION SENSOR PLATE

OK

REPLACE ECM (See page 10–24)

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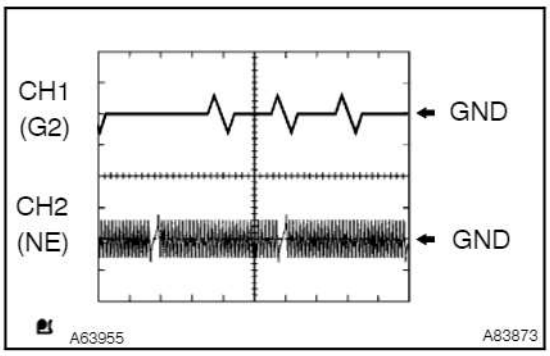
DTC	P0340	CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341	CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 SINGLE SENSOR)

CIRCUIT DESCRIPTION

The variable valve timing (VVT) sensor consists of a magnet, iron core and pickup coil.
The variable valve (VV) signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley.
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 voltage in the pickup coil.
This sensor monitors a timing rotor located on the camshaft and is used to detect an camshaft angle by the ECM. The camshaft rotation synchronizes with the crankshaft rotation, and this sensor communicates the rotation of the camshaft timing rotor as a pulse signal to the ECM. Based on the signal, the ECM controls fuel injection time and ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Timing chain has jumped a tooth • ECM
P0341	While crankshaft rotates twice, camshaft position sensor signal is input to ECM 12 times or more (1 trip detection logic) • Hint: Under normal condition, the camshaft position sensor signal is input into the ECM 3 times per 2 engine revolutions	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Timing chain has jumped a tooth • ECM



Reference: Inspection using an oscilloscope.
HINT:
The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: G2 – NE– CH2: NE+ – NE–
Equipment Setting	5 V/Division, 20 ms/Division
Condition	During cranking or idling

WIRING DIAGRAM

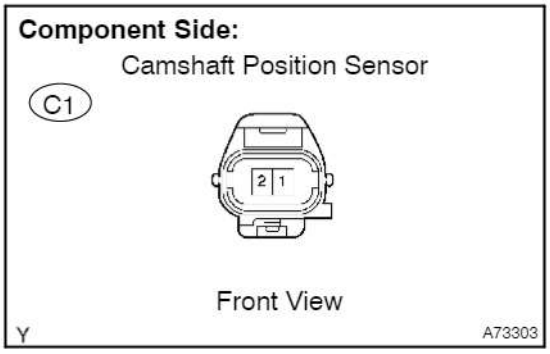
Refer to DTC P0335 on page 05–124.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1 INSPECT CAMSHAFT POSITION SENSOR(RESISTANCE)



(a) Disconnect the C1 camshaft position sensor connector.
(b) Measure the resistance between the terminals of camshaft position sensor connector.

Standard:

Tester Connection	Specified Condition
1 – 2	1,630 to 2,740 Ω at cold
1 – 2	2,065 to 3,225 Ω at hot

NOTICE:

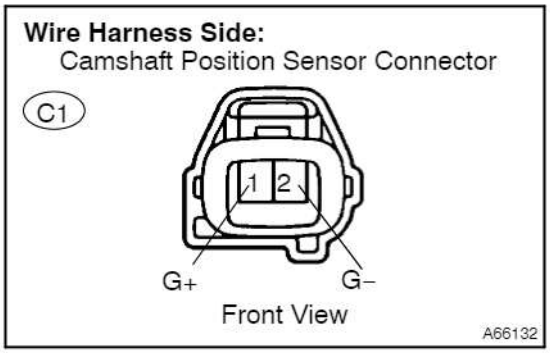
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately –10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

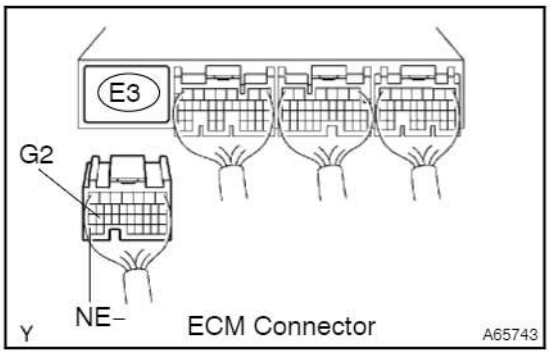
(c) Reconnect the camshaft position sensor connector.

NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

2 CHECK HARNESS AND CONNECTOR(CAMSHAFT POSITION SENSOR – ECM)





(a) Disconnect the C1 camshaft position sensor connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
G+ (C1–1) – G2 (E3–26)	Below 1 Ω
G– (C1–2) – NE– (E3–34)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
G+ (C1–1) or G2 (E3–26) – Body ground	10 kΩ or higher
G– (C1–2) or NE– (E3–34) – Body ground	10 kΩ or higher

(d) Reconnect the camshaft position sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	CHECK SENSOR INSTALLATION(CAMSHAFT POSITION SENSOR)

(a) Check that the camshaft position sensor is properly installed.
OK: Sensor is installed correctly.

NG → SECURELY REINSTALL SENSOR

OK

4	CHECK CAMSHAFT TIMING GEAR ASSY

(a) Check the teeth of the signal plate.
OK: No deformation on the camshaft lobes.

NG → REPLACE CAMSHAFT TIMING GEAR ASSY

OK

REPLACE ECM (See page 10–24)

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DTC	P0351	IGNITION COIL "A" PRIMARY/SECONDARY CIRCUIT

DTC	P0352	IGNITION COIL "B" PRIMARY/SECONDARY CIRCUIT

DTC	P0353	IGNITION COIL "C" PRIMARY/SECONDARY CIRCUIT

DTC	P0354	IGNITION COIL "D" PRIMARY/SECONDARY CIRCUIT

CIRCUIT DESCRIPTION

HINT:

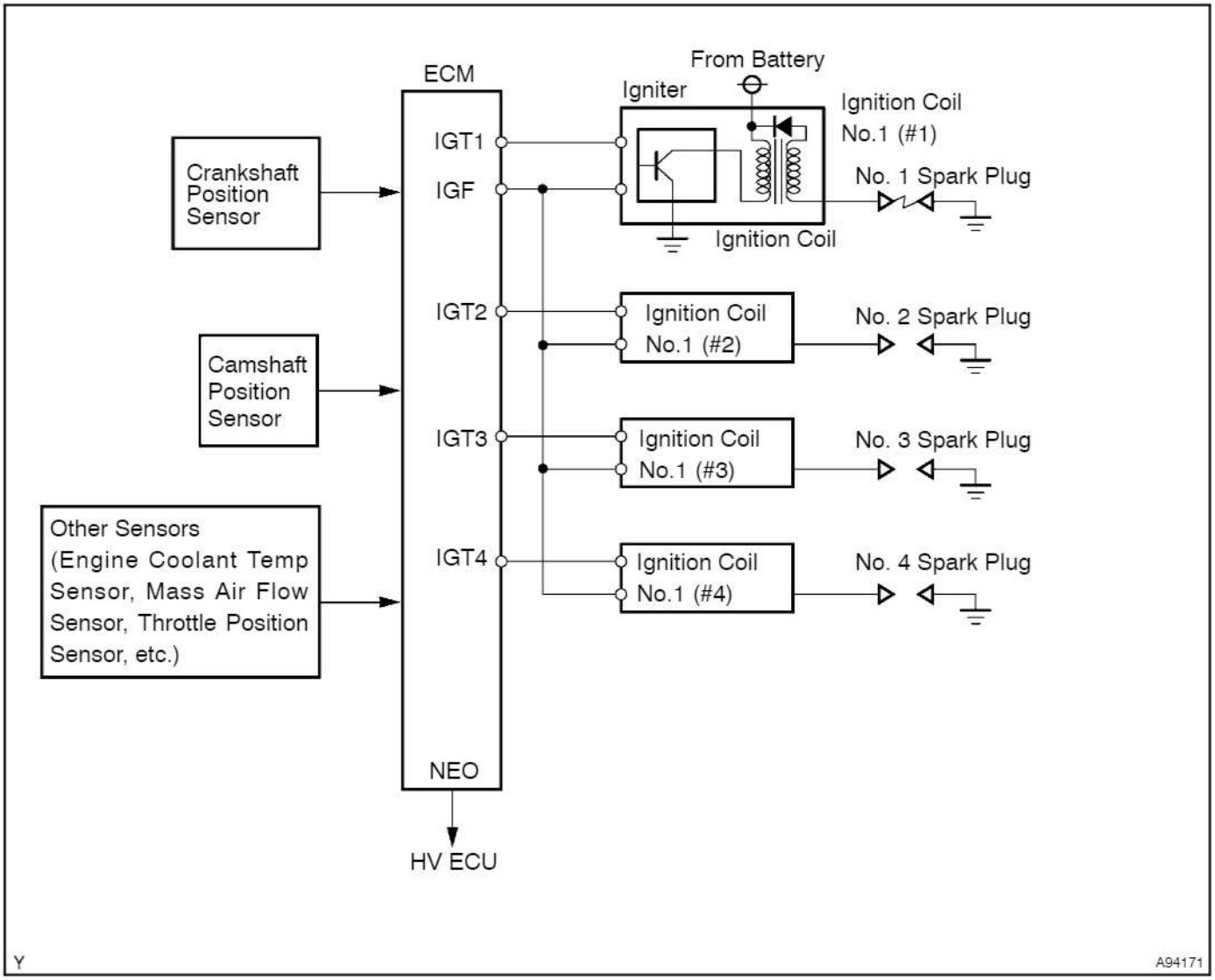
- These DTCs indicate malfunction related to the primary circuit.
- If DTC P0351 is displayed, check the ignition coil No.1 (#1) circuit.
- If DTC P0352 is displayed, check the ignition coil No.1 (#2) circuit.
- If DTC P0353 is displayed, check the ignition coil No.1 (#3) circuit.
- If DTC P0354 is displayed, check the ignition coil No.1 (#4) circuit.

A Direct Ignition System (DIS) is used on this vehicle.

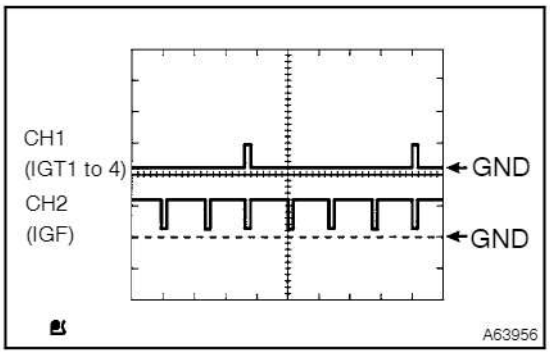
The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition (IGT) signals for each cylinder. Using the IGT signal, the ECM turns ON and OFF the power transistor inside the igniter and this switches ON and OFF the current to the primary coil. When the current flow to the primary coil is cut off, high–voltage is generated in the secondary coil and this voltage is applied to the spark plugs to spark inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation (IGF) signal to the ECM.

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DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine is running	• Ignition system • Open or short in IGF or IGT circuit from ignition coil with igniter to ECM (ignition coil circuit 1 through 4) • Ignition coil No.1 (ignition coil circuit 1 through 4) • ECM

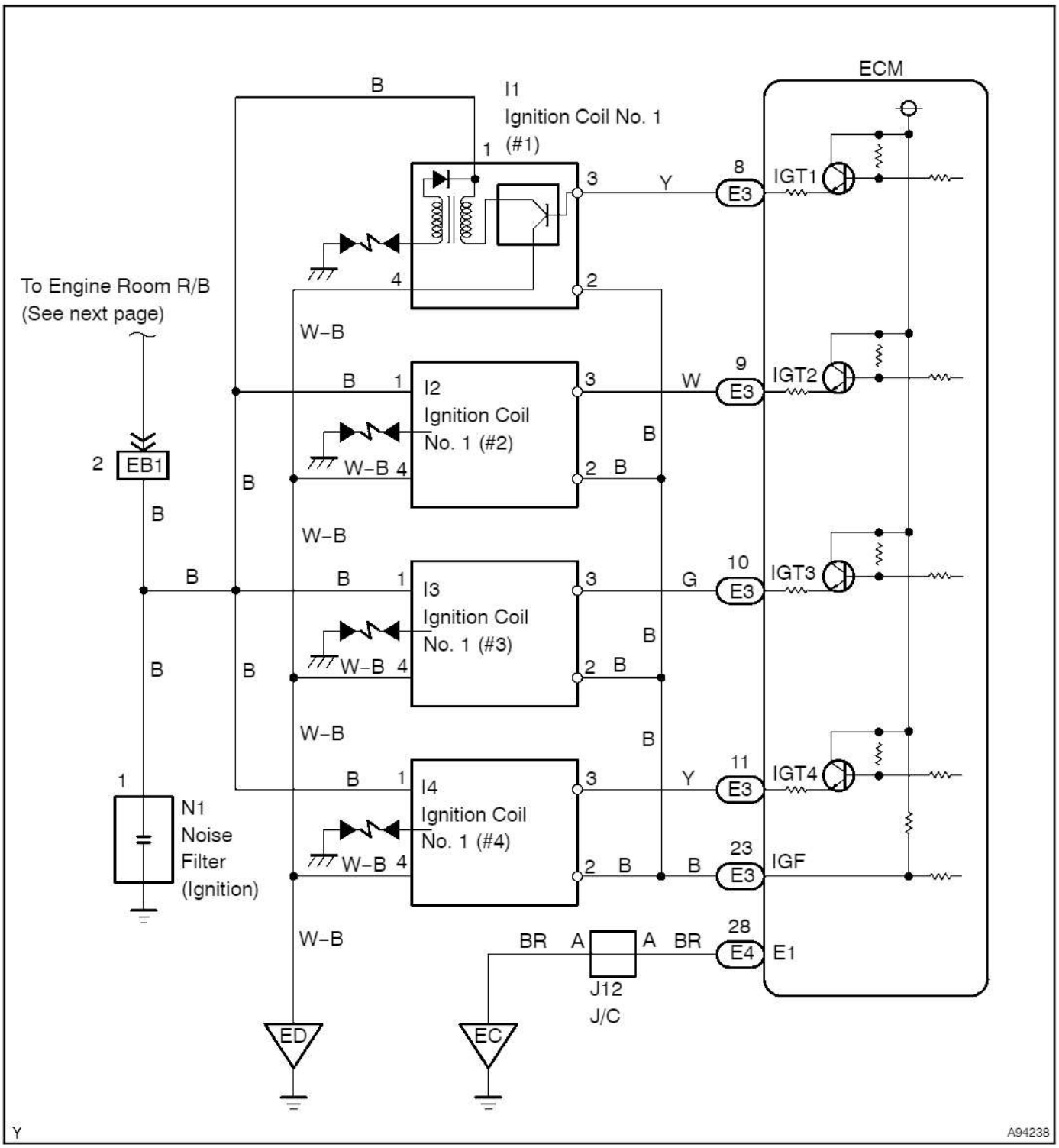


Reference: Inspection using an oscilloscope.
HINT:
The correct waveform is as shown on the left.

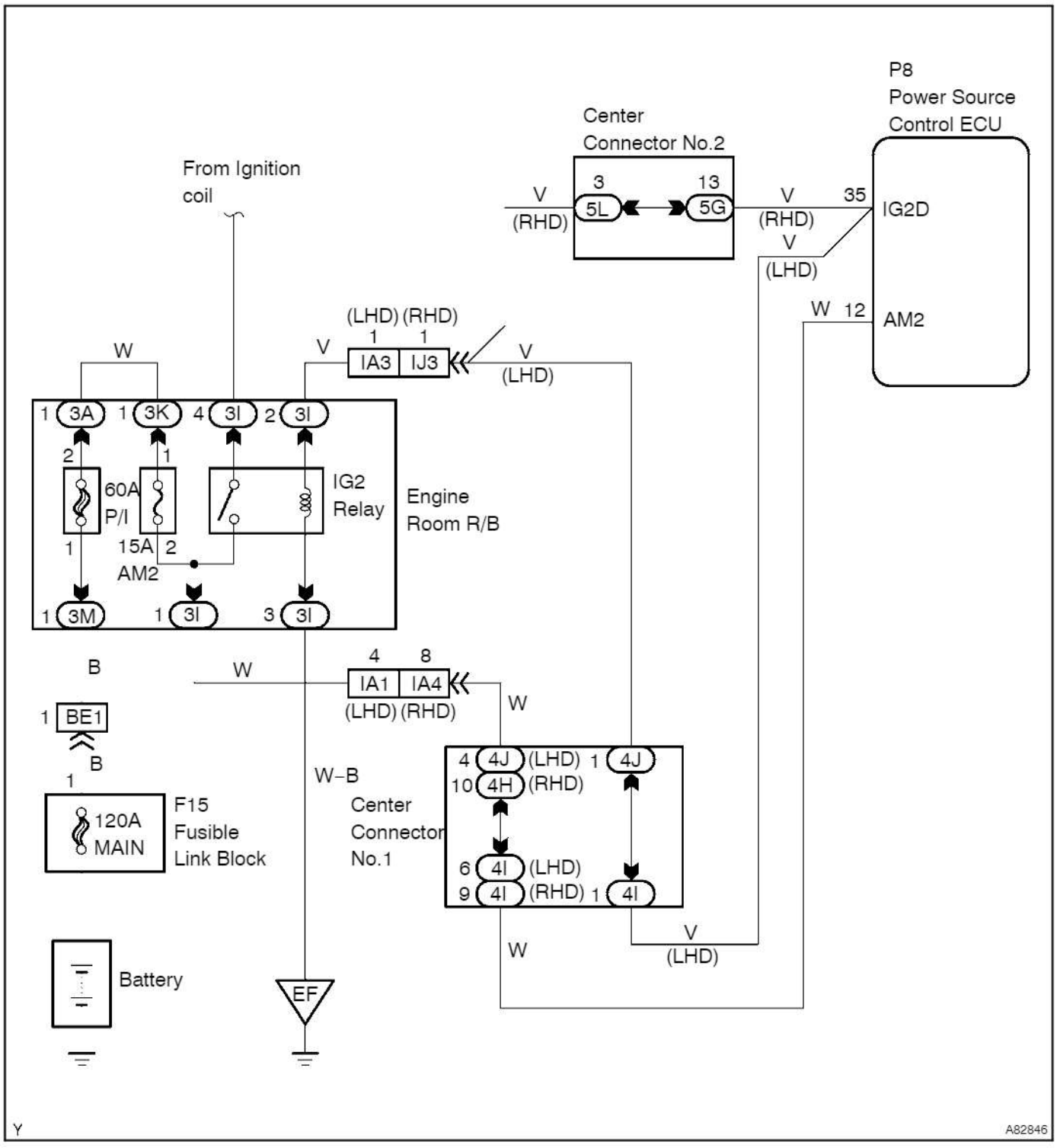
Item	Contents
Terminal	CH1: IGT1, IGT2, IGT3, IGT4 – E1 CH2: IGF – E1
Equipment Setting	2 V/Division, 20 ms/Division
Condition	While the engine is cranking or idling

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WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

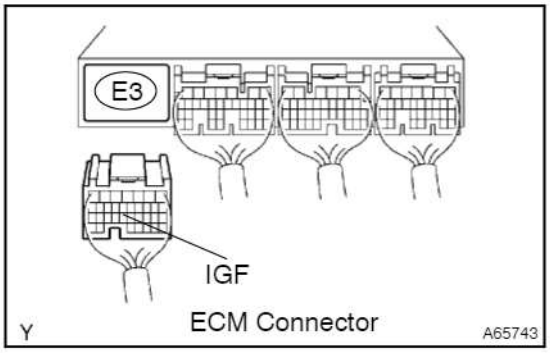
1	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See page 18–3)

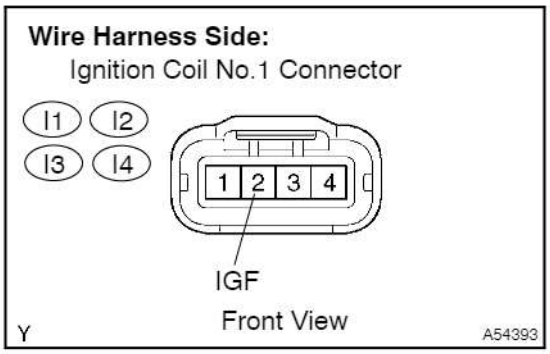
OK: Spark occurs.

NG → **Go to step 4**

OK

2	CHECK HARNESS AND CONNECTOR(IGNITION COIL NO.1 – ECM (IGF SIGNAL TERMINAL))





(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IGF (I1–2) – IGF (E3–23)	Below 1 Ω
IGF (I2–2) – IGF (E3–23)	Below 1 Ω
IGF (I3–2) – IGF (E3–23)	Below 1 Ω
IGF (I4–2) – IGF (E3–23)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IGF (I1–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I2–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I3–2) or IGF (E3–23) – Body ground	10 kΩ or higher
IGF (I4–2) or IGF (E3–23) – Body ground	10 kΩ or higher

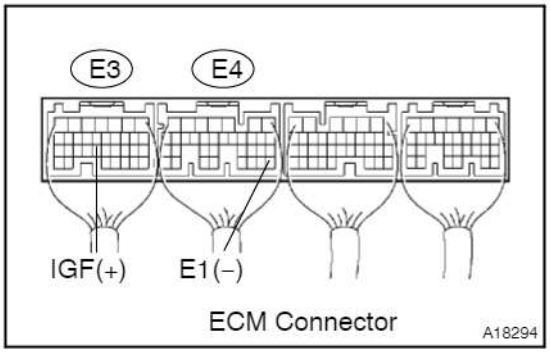
(d) Reconnect the ignition coil No.1 connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3 INSPECT ECM(IGF VOLTAGE)



(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the specified terminals of the E3 and E4 ECM connectors.

Standard:

Tester Connection	Specified Condition
IGF (E3–23) – E1 (E4–28)	4.5 to 5.5 V

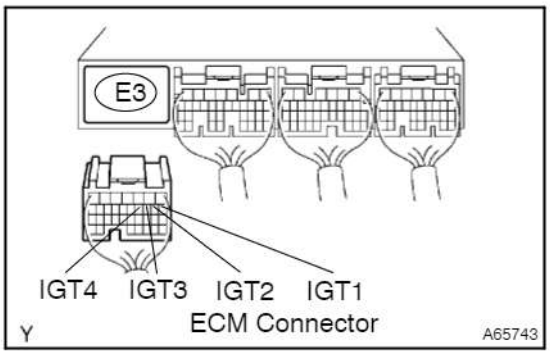
(d) Reconnect the ignition coil No.1 connector.

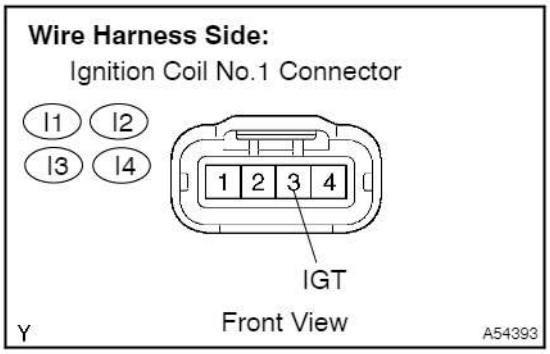
NG → **REPLACE ECM (See page 10–24)**

OK

REPLACE IGNITION COIL NO.1

4 CHECK HARNESS AND CONNECTOR(IGNITION COIL NO.1 – ECM (IGT SIGNAL TERMINAL))





(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.
(b) Disconnect the E3 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IGT (I1–3) – IGT1 (E3–8)	Below 1 Ω
IGT (I2–3) – IGT2 (E3–9)	Below 1 Ω
IGT (I3–3) – IGT3 (E3–10)	Below 1 Ω
IGT (I4–3) – IGT4 (E3–11)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IGT (I1–3) or IGT1 (E3–8) – Body ground	10 kΩ or higher
IGT (I2–3) or IGT2 (E3–9) – Body ground	10 kΩ or higher
IGT (I3–3) or IGT3 (E3–10) – Body ground	10 kΩ or higher
IGT (I4–3) or IGT4 (E3–11) – Body ground	10 kΩ or higher

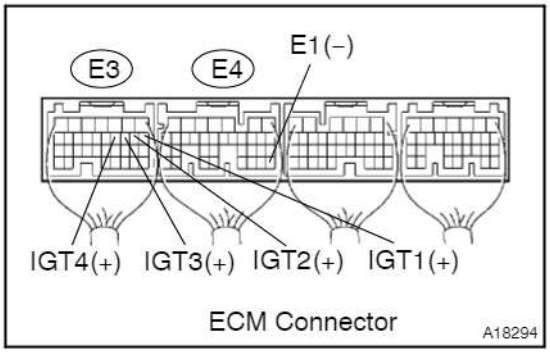
(d) Reconnect the ignition coil No.1 connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5 INSPECT ECM(IGT1, IGT2, IGT3 OR IGT4 VOLTAGE)



(a) Measure the voltage between the applicable terminals of the E3 and E4 ECM connectors when the engine is cranked.

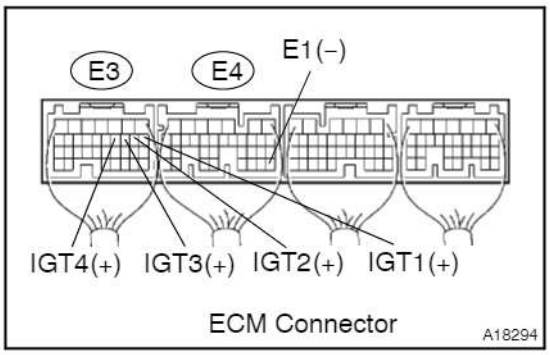
Standard:

Tester Connection	Specified Condition
IGT1 (E3–8) – E1 (E4–28)	Between 0.1 V and 4.5 V
IGT2 (E3–9) – E1 (E4–28)	Between 0.1 V and 4.5 V
IGT3 (E3–10) – E1 (E4–28)	Between 0.1 V and 4.5 V
IGT4 (E3–11) – E1 (E4–28)	Between 0.1 V and 4.5 V

NG → **REPLACE ECM (See page 10–24)**

OK

6 INSPECT ECM(IGT1, IGT2, IGT3 OR IGT4 VOLTAGE)



(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.

(b) Measure the voltage between the applicable terminals of the E3 and E4 ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
IGT1 (E3–8) – E1 (E4–28)	4.5 V or more
IGT2 (E3–9) – E1 (E4–28)	4.5 V or more
IGT3 (E3–10) – E1 (E4–28)	4.5 V or more
IGT4 (E3–11) – E1 (E4–28)	4.5 V or more

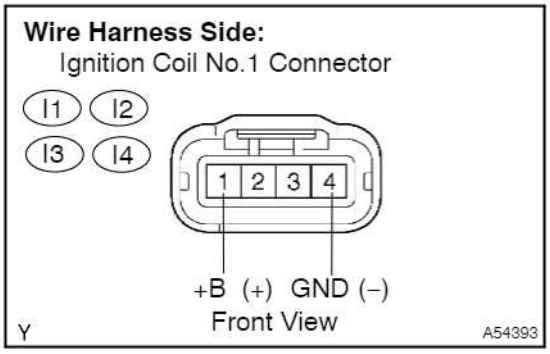
(c) Reconnect the ignition coil No.1 connector.

NG → **REPLACE ECM (See page 10–24)**

OK

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7 INSPECT IGNITION COIL NO.1(POWER SOURCE)



(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminal of the wire harness side connector and body ground.

Standard:

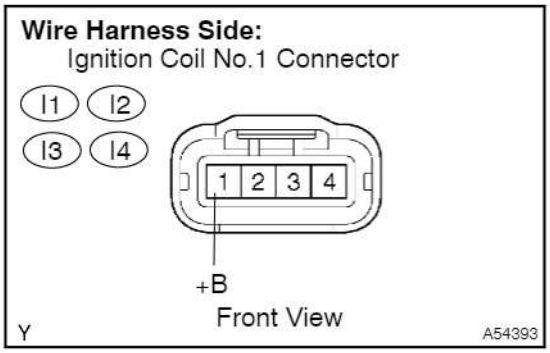
Tester Connection	Specified Condition
+B (I1–1) – GND (I1–4)	9 to 14 V
+B (I2–1) – GND (I2–4)	9 to 14 V
+B (I3–1) – GND (I3–4)	9 to 14 V
+B (I4–1) – GND (I4–4)	9 to 14 V

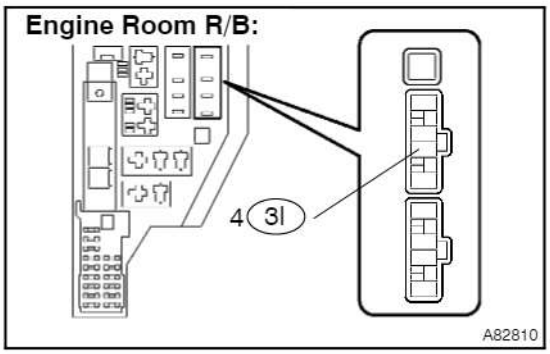
(d) Reconnect the ignition coil No.1 connector.

OK → REPLACE IGNITION COIL NO.1

NG

8 CHECK HARNESS AND CONNECTOR(IGNITION COIL NO.1 – IG2 RELAY)





(a) Disconnect the I1, I2, I3 or I4 ignition coil No.1 connector.
(b) Remove the integration relay from engine room R/B.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
+B (I1–1) – IG2 relay (3I–4)	Below 1 Ω
+B (I2–1) – IG2 relay (3I–4)	Below 1 Ω
+B (I3–1) – IG2 relay (3I–4)	Below 1 Ω
+B (I4–1) – IG2 relay (3I–4)	Below 1 Ω
GND (I1–4) – Body ground	Below 1 Ω
GND (I2–4) – Body ground	Below 1 Ω
GND (I3–4) – Body ground	Below 1 Ω
GND (I4–4) – Body ground	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (I1–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
+B (I2–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
+B (I3–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher
+B (I4–1) or IG2 relay (3I–4) – Body ground	10 kΩ or higher

(d) Reconnect the ignition coil No.1 connector.
(e) Reinstall the integration relay.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE IGNITION COIL NO.1

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DTC	P0420	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

CIRCUIT DESCRIPTION

The ECM uses 2 sensors mounted before and after the three–way catalytic converter (TWC) to monitor its' efficiency. The air–fuel ratio (A/F) sensor (sensor 1) sends pre–catalyst information to the ECM. The heated oxygen (O2) sensor (sensor 2) sends post–catalyst information to the ECM.

In order to detect deterioration in the catalyst, the ECM calculates Oxygen Storage Capacity (OSC) in the catalyst based on voltage output of the sensor 2 while performing "active air–fuel ratio control" instead of the conventional detecting method which uses the locus ratio.

The OSC is an indication value of the catalyst oxygen storage capacity and is used for representing how much the catalyst can store oxygen. When the vehicle is being driven with a warm engine, the active air–fuel ratio control is performed for approximately 15 to 20 seconds. When it is performed, the air–fuel ratio is forcibly regulated to go LEAN or RICH by the ECM, and if a RICH and LEAN cycle of the sensor 2 is long, the OSC will become greater. The greater OSC and capability of the catalyst are mutually related. The ECM judges if the catalyst has deteriorated based on the calculated OSC value. The ECM will illuminate the CHK ENG and a DTC will be set.

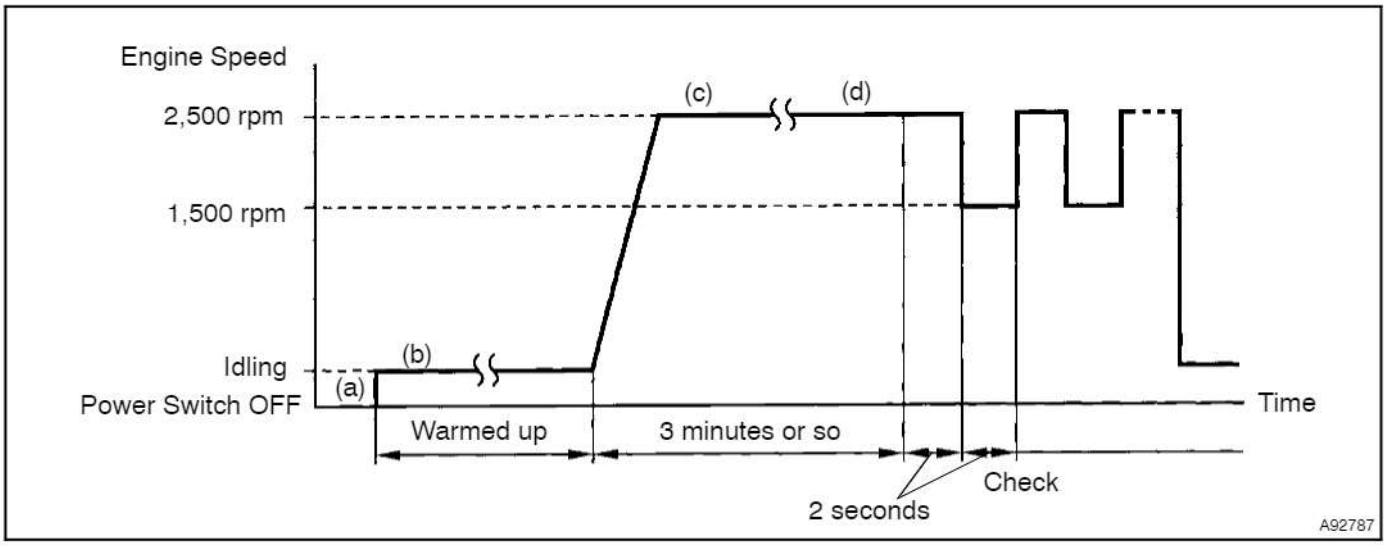
DTC No.	DTC Detection Condition	Trouble Area
P0420	OSC value is smaller than the standard value under "active air–fuel ratio control"	• Exhaust pipe with front and rear catalyst • Gas leakage in exhaust system • A/F sensor • Heated oxygen sensor

HINT:

- Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.
- Sensor 2 refers to the sensor mounted after the TWC and is located far from the engine assembly.

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CONDITIONING THE A/F SENSOR AND HEATED OXYGEN SENSOR FOR TESTING



(a) Connect the intelligent tester II to the DLC3.
(b) Put the engine in inspection mode. (see page 05–1)
(c) Start the engine and warm it up with all the accessories switched OFF until the engine coolant temperature becomes stable.
(d) Run the engine at 2,500 rpm for approximately for 3 minutes.
(e) Run the engine at 2,500 rpm for 2 seconds and 1,500 rpm for 2 seconds.
(f) Check waveform of the heated oxygen sensor (sensor 2).

HINT:

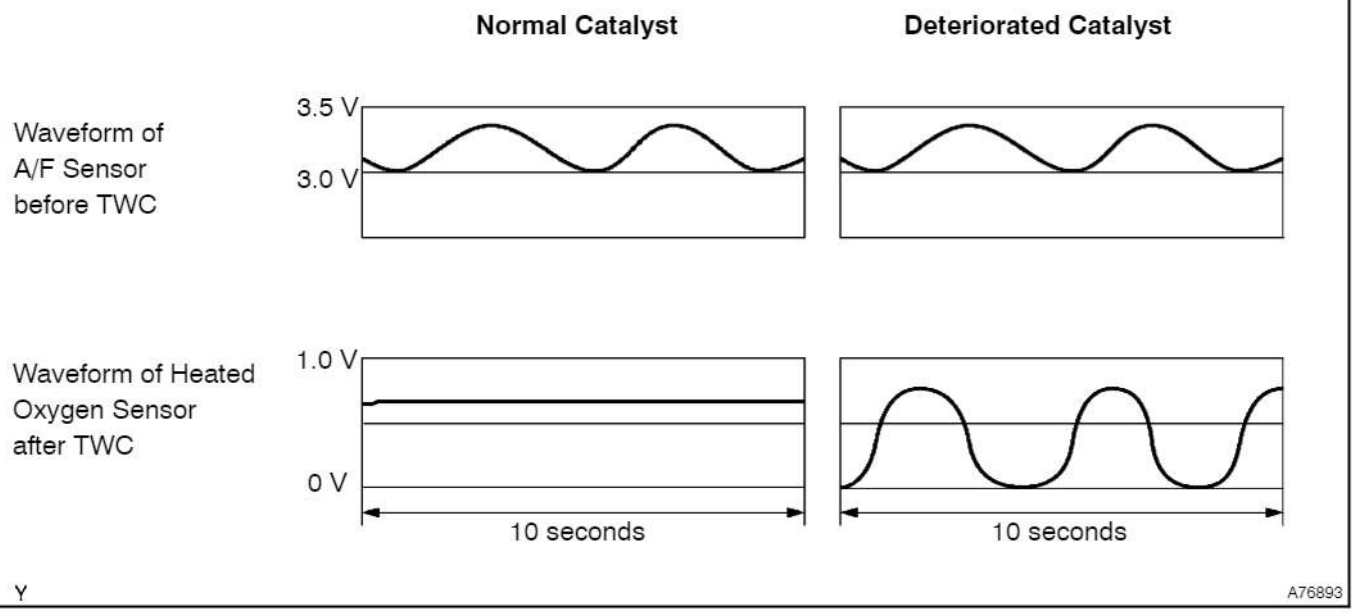
If either output of the A/F sensor and the heated oxygen sensor does not fluctuate or has noise, the sensor may be malfunctioning.

If voltage output of both sensors remain at LEAN or RICH, the air–fuel ratio may be extremely LEAN or RICH. In such case, perform the following A/F Control in Active Test using the intelligent tester II.

If the catalyst has deteriorated, the voltage output of the heated oxygen sensor (located after the TWC) fluctuates up and down widely even under normal driving ("active air–fuel ratio control" is not performed).

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Voltage output when "active air–fuel ratio control" is not performed:



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0420)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
P0420	A
P0420 and other DTCs	B

HINT:

If any other codes besides P0420 are output, perform troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (See page 05–39)

A

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2	CHECK FOR EXHAUST GAS LEAKAGE

OK: No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK ↓

3	INSPECT AIR FUEL RATIO SENSOR(BANK 1 SENSOR 1) (See page 05–165)

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK ↓

4	INSPECT HEATED OXYGEN SENSOR(BANK 1 SENSOR 2) (See page 05–83)

OK: Heated oxygen sensor output fluctuates during closed–loop operation.

NG → **REPLACE HEATED OXYGEN SENSOR**

OK ↓

REPLACE THREE–WAY CATALYTIC CONVERTER (REPLACE FRONT PIPE)

HINT:
Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:
The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Enter the menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

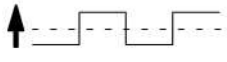
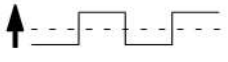
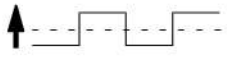
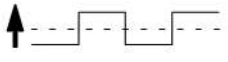
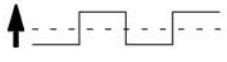
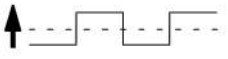
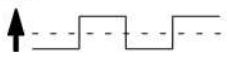
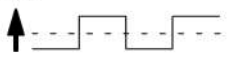
Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → rich output: Less than 3.0 V
–12.5 % → lean output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → rich output: More than 0.55 V
–12.5 % → lean output: Less than 0.4 V

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NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % –12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % –12.5 %  Output voltage Almost no reaction **NG**	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 %  Output voltage Almost no reaction **NG**	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.

To display the graph, select the item on the tester: View / Line graph.

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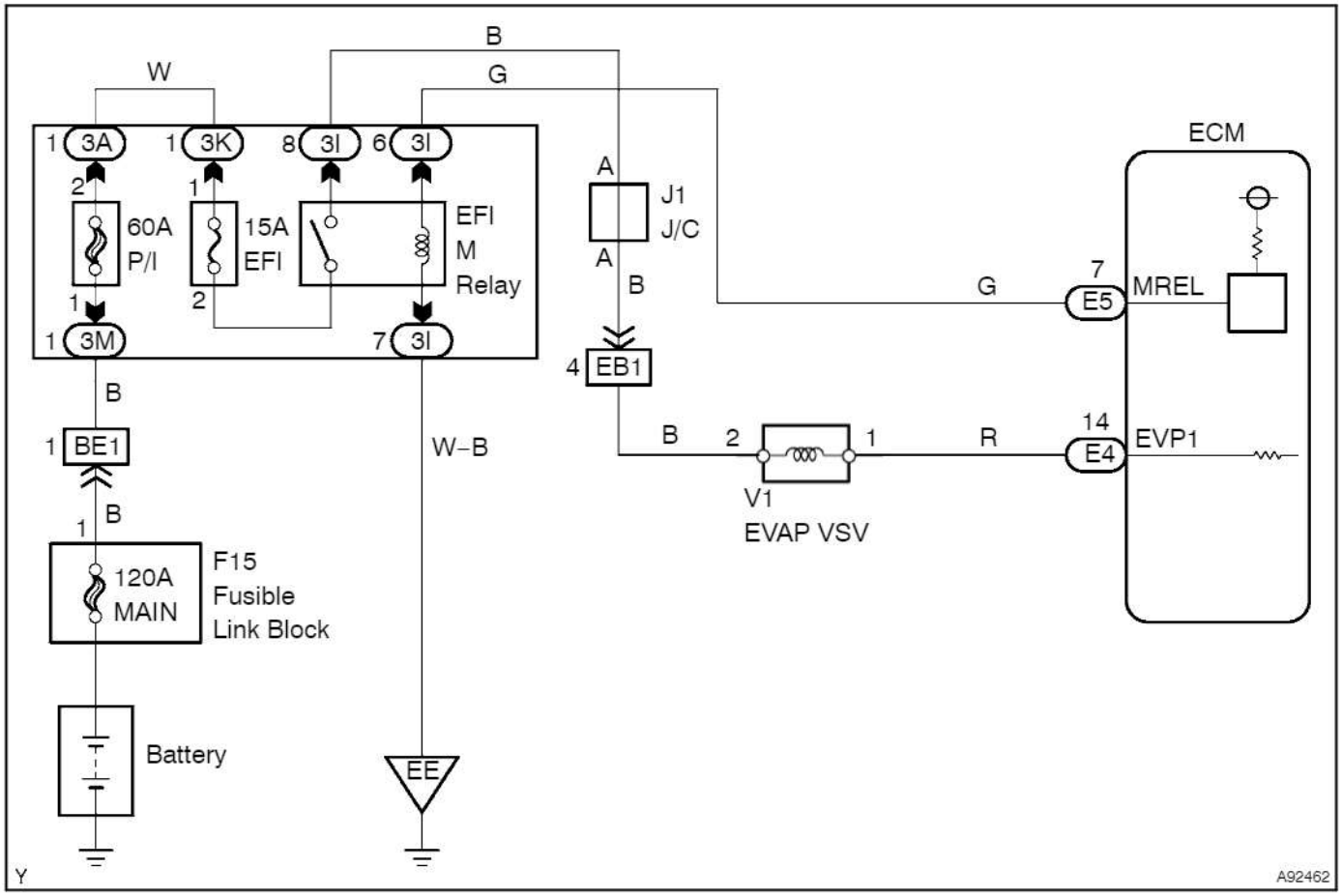
DTC	P0443	EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT

CIRCUIT DESCRIPTION

In order to reduce HC emissions, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.
The ECM changes the duty signal to the VSV for EVAP so that the intake of HC emissions is appropriate for the driving conditions (engine load, engine speed, vehicle speed, etc.) after the engine is warmed up.

DTC No.	DTC Detecting Condition	Trouble Area
P0443	Proper response to ECM command does not occur (1 trip detection logic)	• Open or short in EVAP VSV circuit • EVAP VSV • ECM

WIRING DIAGRAM



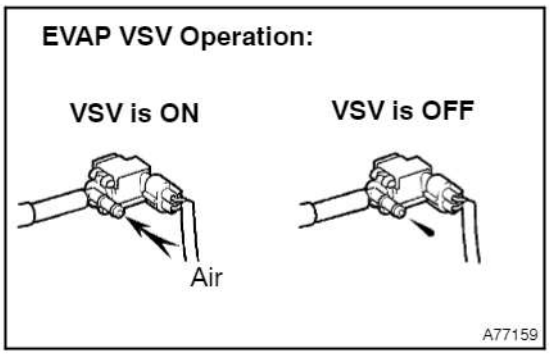
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INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(EVAP VSV)



(a) Disconnect the vacuum hose of the EVAP VSV from the charcoal canister.
(b) Put the engine in inspection mode.
(c) Start the engine.
(d) Select the item: Powertrain / Engine and ECT / Active Test / Activate the VSV for Evap Control.
(e) Check if the disconnected hose applies suction to your finger when operating the EVAP VSV using the intelligent tester II.

Standard:

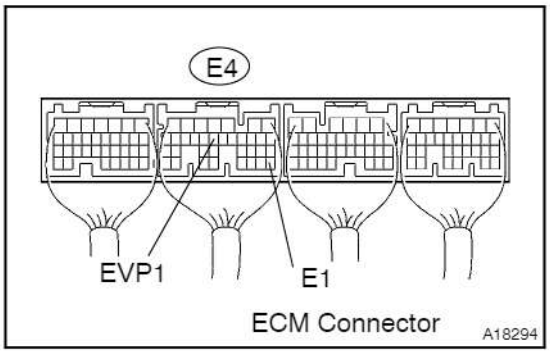
Tester Operation	Specified Condition
VSV is ON	Applies suction to your finger
VSV is OFF	Applies no suction to your finger

(f) Reconnect the vacuum hose.

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

NG

2	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the terminals of the E4 ECM connectors.

Standard:

Symbols (Terminal No.)	Specified Condition
EVP1 (E4–14) – E1 (E4–28)	9 to 14 V

OK → **REPLACE ECM (See page 10–24)**

NG

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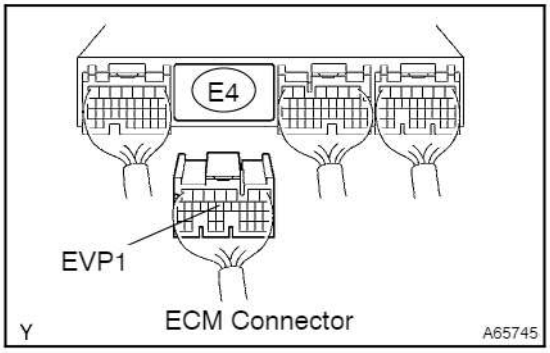
3	INSPECT CHARCOAL CANISTER VACUUM SWITCHING VALVE(OPERATION OF EVAP VSV) (See page 12–7)

OK: Air from port E flows out through port F when applying battery voltage.

NG → **REPLACE CHARCOAL CANISTER VACUUM SWITCHING VALVE**

OK

4	CHECK HARNESS AND CONNECTOR(ECM – EVAP VSV)



(a) Disconnect the E4 ECM connector.
(b) Disconnect the V1 EVAP VSV connector.
(c) Check the resistance between the wire harness side connector.

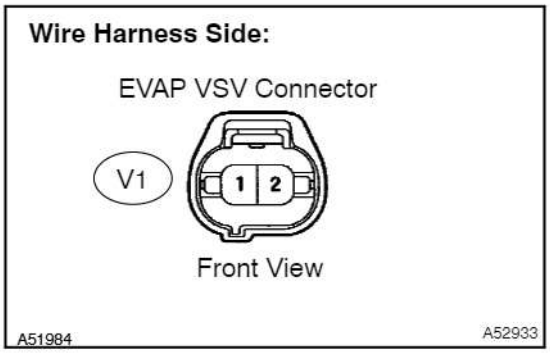
Standard (Check for open):

Tester connection	Specified condition
EVAP VSV (V1–1) – EVP1 (E4–14)	Below 1 Ω

Standard (Check for short):

Tester connection	Specified condition
EVAP VSV (V1–1) or EVP1 (E4–14) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the EVAP VSV connector.

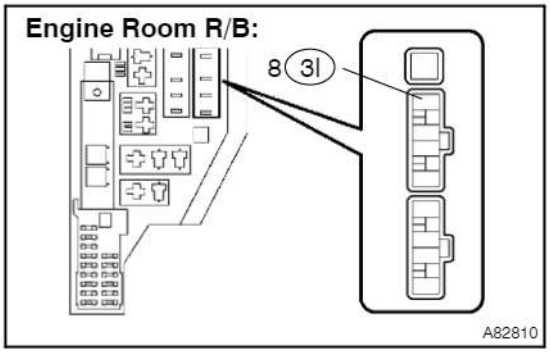


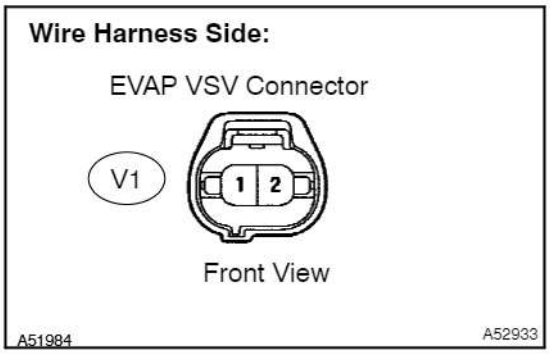
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	CHECK HARNESS AND CONNECTOR(EFI M RELAY – EVAP VSV)





(a) Inspect the EFI fuse.
  (1) Remove the EFI fuse from the engine room R/B.
  (2) Check the resistance of the EFI fuse.
  Standard: Below 1 Ω
  (3) Reinstall the EFI fuse.
(b) Remove the integration relay from the engine room R/B.
(c) Disconnect the V1 EVAP VSV connector.
(d) Check the resistance between the wire harness side connector.

Standard (Check for open):

Tester connection	Specified condition
EVAP VSV (V1–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester connection	Specified condition
EVAP VSV (V1–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

(e) Reinstall the integration relay.
(f) Reconnect the EVAP VSV connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

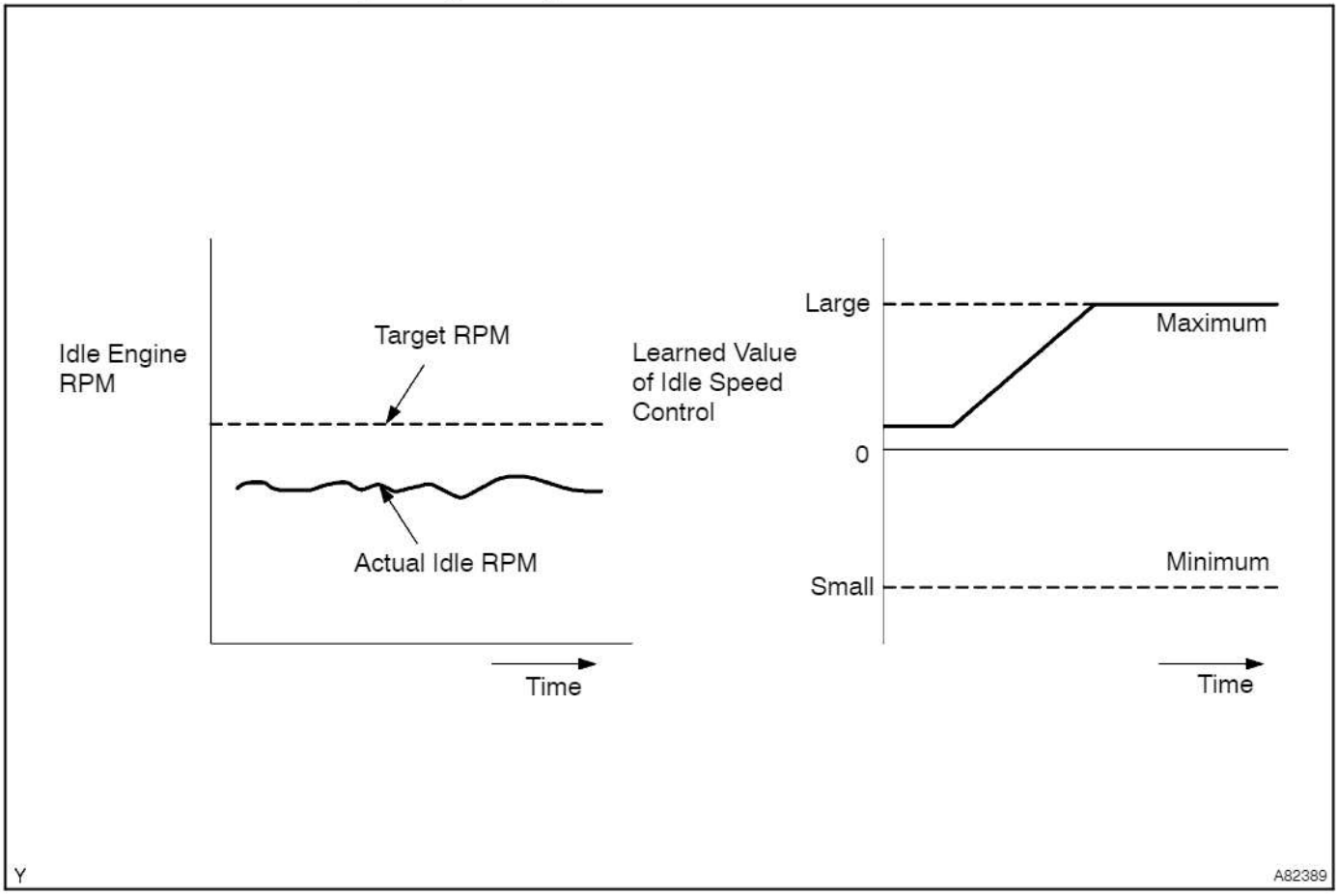
INSPECT ECM POWER SOURCE CIRCUIT (See page 05–197)

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DTC	P0505	IDLE AIR CONTROL SYSTEM

CIRCUIT DESCRIPTION

The idle speed is controlled by the Electronic Throttle Control System (ETCS).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. If the actual idle RPM varies more than a specified amount or a learned value of the idle speed control remains at the maximum or minimum five times or more during a trip, the ECM concludes that there is a problem in the idle speed control ECM function. The ECM will turn on the CHK ENG and a DTC is set.
Example:
If the actual idle RPM varies from the target idle RPM by more than 200 (*1) rpm five times during a drive cycle, the ECM will turn on the CHK ENG and a DTC is set.
HINT:
*1: RPM threshold varies depending on engine loads.



DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (1 trip detection logic)	• Electric throttle control system • Air induction system • PCV hose connection • ECM

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0505)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
P0505	A
P0505 and other DTCs	B

HINT:

If any other codes besides P0505 are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART** (See page 05–39)

A

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.

OK: No leak in the air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

CHECK ELECTRIC THROTTLE CONTROL SYSTEM (See page 10–3)

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DTC	P0560	SYSTEM VOLTAGE

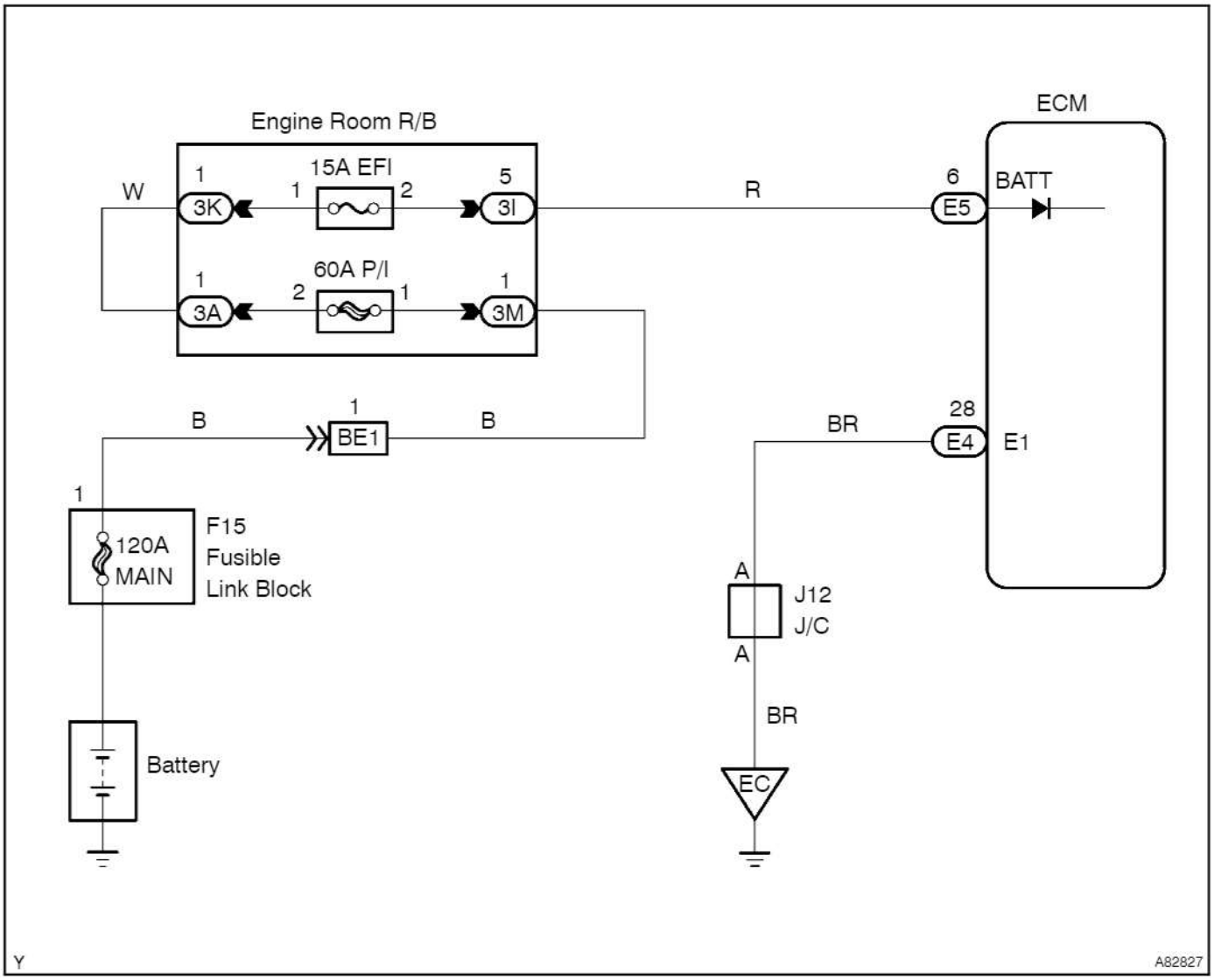
CIRCUIT DESCRIPTION

The battery supplies electricity to the ECM even if the ignition switch is OFF. This electricity allows the ECM to store DTC history, freeze frame data, fuel trim values, and other data. If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the CHK ENG and a DTC will be set.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in back–up power source circuit	• Open in back–up power source circuit • ECM

HINT:
If DTC P0560 is present, the ECM will not store other DTCs.

WIRING DIAGRAM



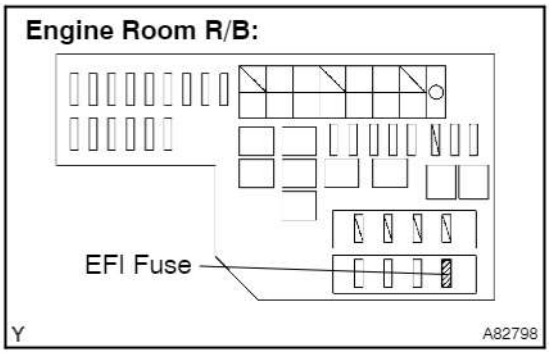
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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE(EFI FUSE)

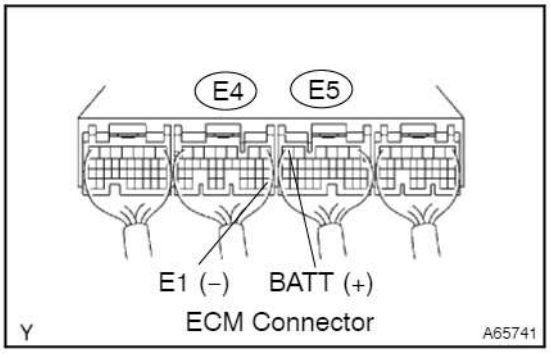


(a) Remove the EFI fuse from the engine room R/B.
(b) Check the resistance of the EFI fuse.
Standard: Below 1 Ω
(c) Reinstall the EFI fuse.

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE**

OK

2	INSPECT ECM(BATT VOLTAGE)



(a) Measure the voltage between the specified terminals of the E4 and E5 ECM connectors.
Standard:

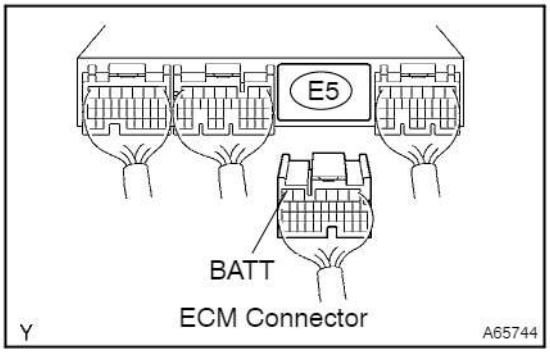
Tester Connection	Specified Condition
BATT (E5–6) – E1 (E4–28)	9 to 14 V

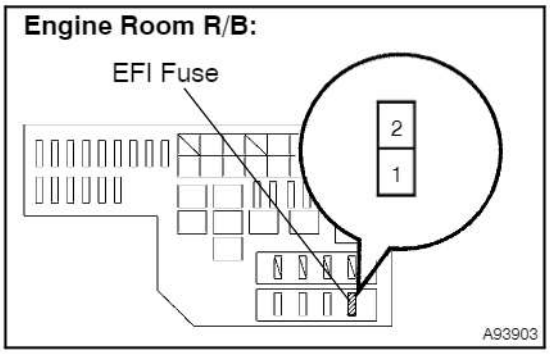
OK → **REPLACE ECM (See page 10–24)**

NG

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3	CHECK HARNESS AND CONNECTOR(ECM – EFI FUSE, EFI FUSE – BATTERY)





(a) Check the harness and the connectors between the EFI fuse and the ECM connector.
  (1) Remove the integration relay from the engine room R/B.
  (2) Disconnect the E5 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
EFI fuse (2) – BATT (E5–6)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
EFI fuse (2) or BATT (E5–6) – Body ground	10 kΩ or higher

  (4) Reinstall the integration relay.
  (5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the EFI fuse and the battery.
  (1) Remove the integration relay from the engine room R/B.
  (2) Disconnect the positive battery terminal.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery positive terminal – EFI fuse (1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Battery positive terminal or EFI fuse (1) – Body ground	10 kΩ or higher

  (4) Reinstall the integration relay.
  (5) Reconnect the positive battery terminal.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ENGINE ROOM RELAY BLOCK

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DTC	P0604	INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC	P0606	ECM/PCM PROCESSOR

DTC	P0607	CONTROL MODULE PERFORMANCE

DTC	P0657	ACTUATOR SUPPLY VOLTAGE CIRCUIT/OPEN

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self–check ensures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the CHK ENG.

The ECM memory status is diagnosed by internal "mirroring" of the main CPU and the sub CPU to detect random access memory (RAM) errors. The two CPUs also perform continuous mutual monitoring.

The ECM sets a DTC if: 1) output from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detection Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM internal error	• ECM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ECM (See page 10–24)

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DTC	P2102	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

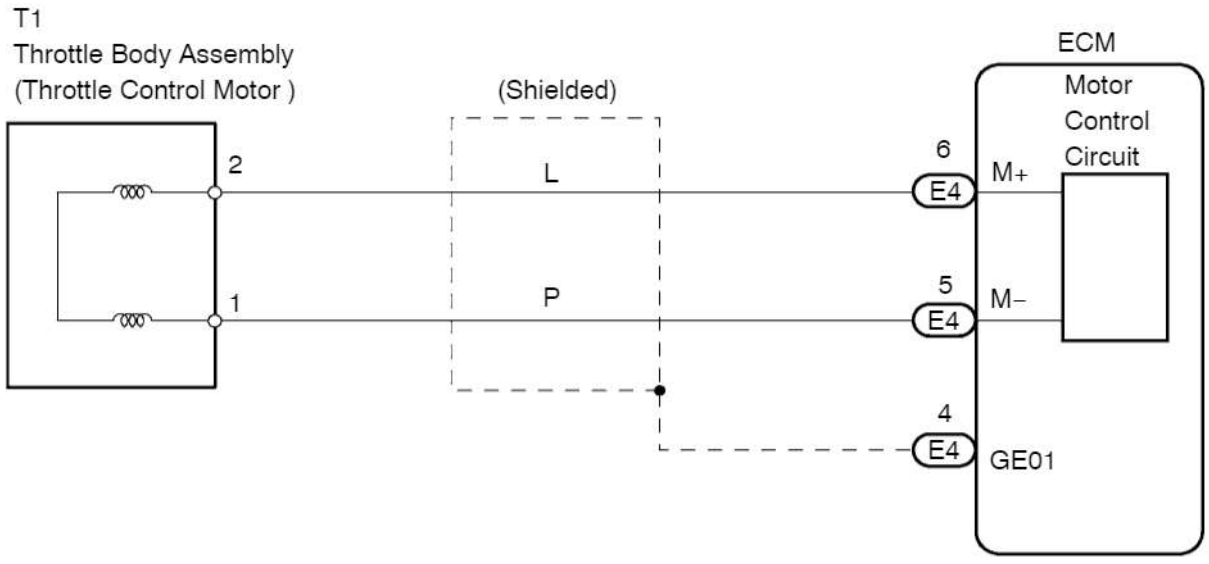
DTC	P2103	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle motor and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (a) Throttle control motor output duty is 80 % or more (b) Throttle control motor current is 0.5 A or less	• Open in throttle control motor circuit • Throttle control motor • ECM
P2103	Following conditions are met: • Throttle control motor current is 10 A or more (0.6 second) • When electronic throttle actuator is ON (i.e. actuator power is ON or actuator power supply voltage is 8 V or more), hybrid IC current limiter port fails	• Short in throttle control motor circuit • Throttle control motor • Throttle valve • Throttle body assembly • ECM

WIRING DIAGRAM



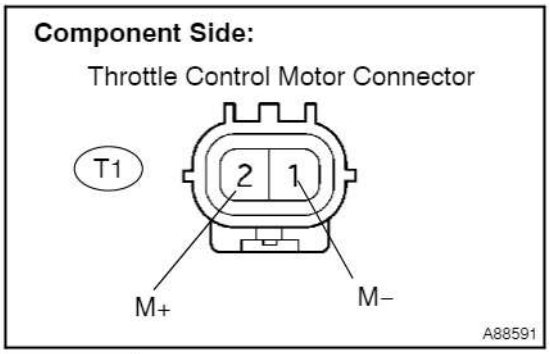
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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT THROTTLE W/MOTOR BODY ASSY(THROTTLE CONTROL MOTOR)



(a) Disconnect the throttle control motor connector.

(b) Using an ohmmeter, measure the motor resistance between terminals 1 (M–) and 2 (M+).

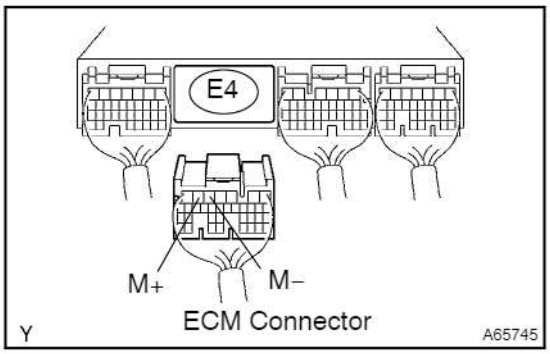
Standard:

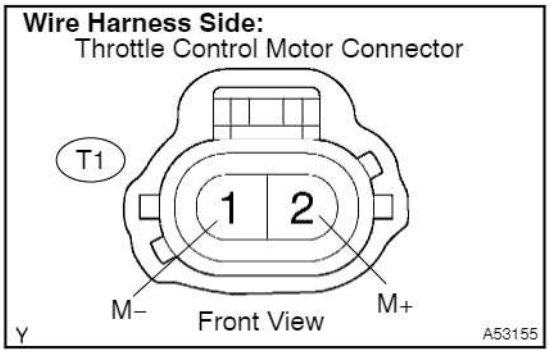
Tester Connection	Specified Condition
M– (1) – M+ (2)	0.3 to 100 Ω at 20°C (68°F)

NG → **REPLACE THROTTLE W/MOTOR BODY ASSY (See page 10–13)**

OK

2 CHECK HARNESS AND CONNECTOR(ECM – THROTTLE CONTROL MOTOR)





(a) Disconnect the E4 ECM connector.

(b) Disconnect the throttle control motor connector.

(c) Check the resistance between the wire harness side connectors.

Standard: (check for open)

Tester Connection	Specified Condition
Throttle control motor (2) – M+ (E4 –6)	Below 1 Ω
Throttle control motor (1) – M– (E4 –5)	Below 1 Ω

Standard: (check for short)

Tester Connection	Specified Condition
Throttle control motor (2) or M+ (E4–6) – Body ground	10 kΩ or higher
Throttle control motor (1) or M– (E4–5) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector and the throttle control motor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	INSPECT THROTTLE W/MOTOR BODY ASSY

(a) Visually check between the throttle valve and its housing for foreign objects.
Also, check if the valve can open and close smoothly.

OK: The throttle valve is not contaminated by foreign objects and can move smoothly.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

REPLACE ECM (See page 10–24)

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DTC	P2111	THROTTLE ACTUATOR CONTROL SYSTEM – STUCK OPEN

DTC	P2112	THROTTLE ACTUATOR CONTROL SYSTEM – STUCK CLOSED

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides to ECM with feedback to control the throttle motor and set the throttle valve angle in response to driver input.

HINT:

This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle motor locked during ECM orders to open	• Throttle control motor circuit • Throttle control motor • Throttle body • Throttle valve
P2112	Throttle motor locked during ECM orders to close	• Throttle control motor circuit • Throttle control motor • Throttle body • Throttle valve

WIRING DIAGRAM

Refer to DTC P2102 on page 05–154.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P2111 AND/OR P2112)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
P2111 or P2112	A
P2111 or P2112, and other DTCs	B

HINT:

If any other codes besides P2111 and/or P2112 are output, perform troubleshooting for those DTCs first.

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B → GO TO RELEVANT DTC CHART (See page 05–39)

A

2	INSPECT THROTTLE W/MOTOR BODY ASSY(VISUALLY CHECK THROTTLE VALVE)

(a) Check for contamination between the throttle valve and its housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.

NG → REPLACE THROTTLE W/MOTOR BODY ASSY

OK

3	CHECK DTC OUTPUT(IN ADDITION TO DTC P2111 AND/OR P2112 ARE OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Clear the DTC.
(e) Put the engine in inspection mode (see page 05–1).
(f) Start the engine, and depress and release the accelerator pedal quickly (fully opens and closes the throttle valve).
(g) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(h) Start the engine, and depress and release the accelerator pedal quickly (fully opens and closes the throttle valve).
(i) Read DTCs.

Result:

Display (DTC Output)	Proceed to
P2111 and/or P2112	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

A

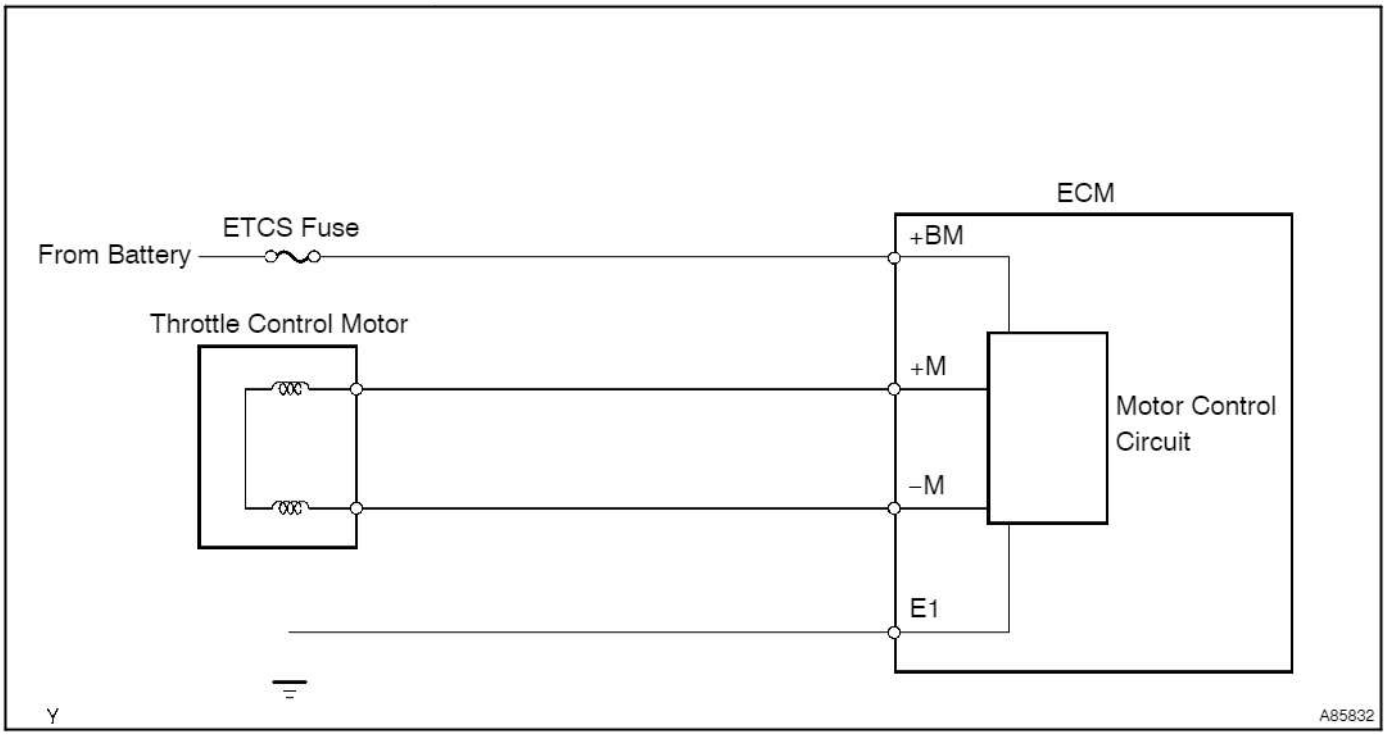
REPLACE ECM (See page 10–24)

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DTC	P2118	THROTTLE ACTUATOR CONTROL MOTOR CURRENT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

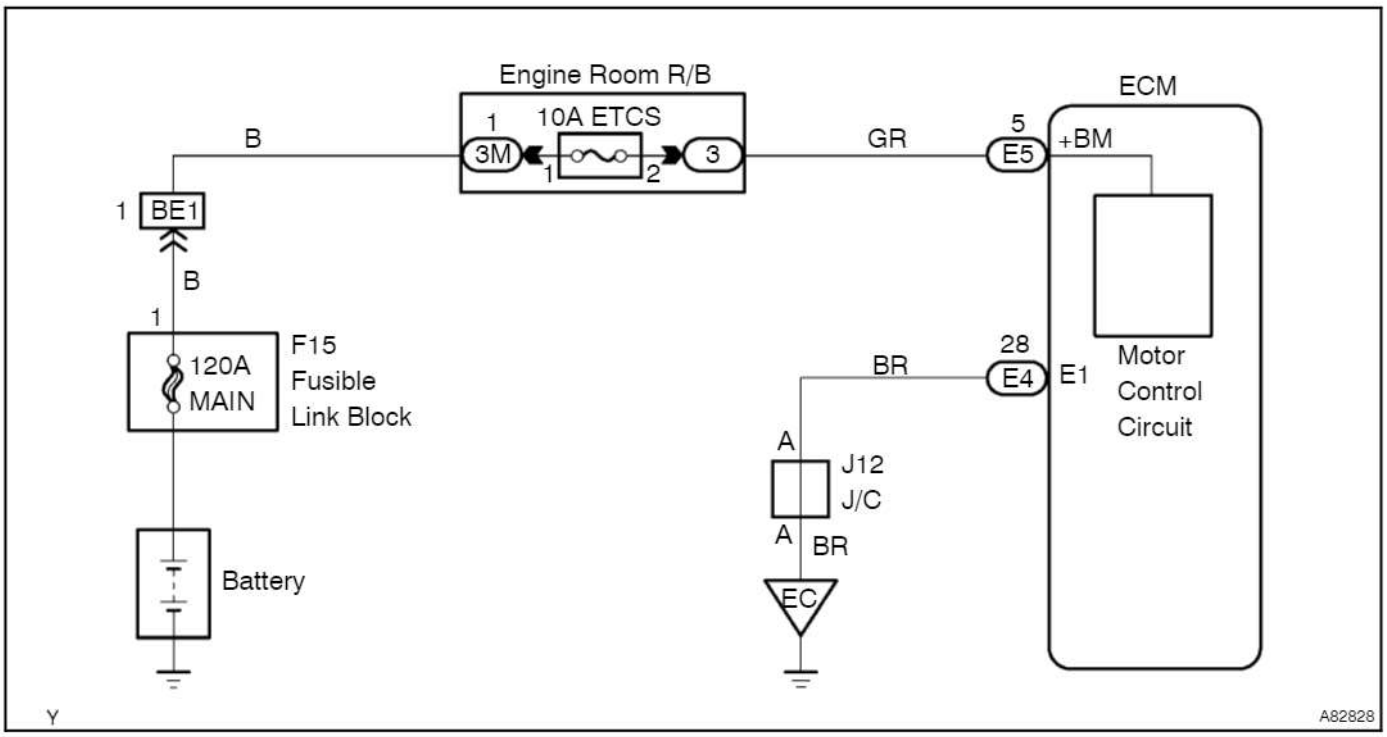
The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.
When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch OFF. The ECM then allows current to flow to the motor and the motor can be restarted.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit	• Open in ETCS power source circuit • ETCS fuse • ECM

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WIRING DIAGRAM



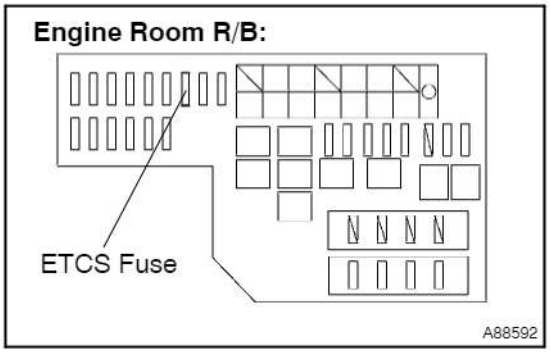
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1	CHECK FUSE(ETCS FUSE)

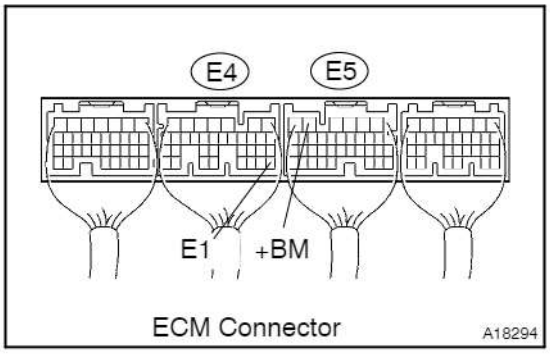


(a) Remove the ETCS fuse from the engine room R/B.
(b) Check the resistance of the ETCS fuse.
Standard: Below 1 Ω
(c) Reinstall the ETCS fuse.

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE**

OK

2	INSPECT ECM(+BM VOLTAGE)



(a) Measure the voltage between the specified terminals of the E4 and E5 ECM connectors.
Standard:

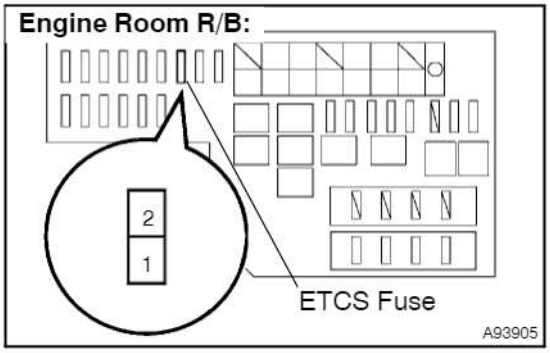
Tester Connection	Specified Condition
+BM (E5–5) – E1 (E4–28)	9 to 14 V

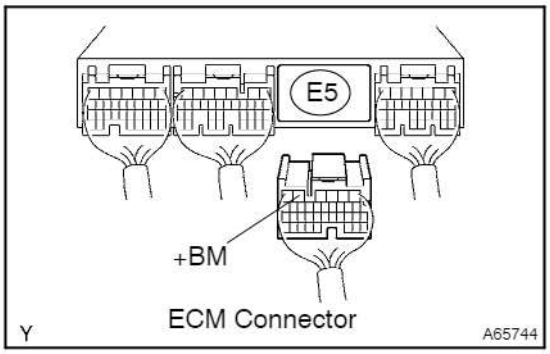
OK → **REPLACE ECM (See page 10–24)**

NG

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3	CHECK HARNESS AND CONNECTOR(ECM – ETCS FUSE, ETCS FUSE – BATTERY)





(a) Check the harness and the connectors between the ETCS fuse and the ECM connector.
  (1) Remove the ETCS fuse from the engine room R/B.
  (2) Disconnect the E5 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
ETCS fuse (2) – +BM (E5–5)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
ETCS fuse (2) or +BM (E5–5) – Body ground	10 kΩ or higher

  (4) Reinstall the ETCS fuse.
  (5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the ETCS fuse and the battery.
  (1) Remove the ETCS fuse from the engine room R/B.
  (2) Disconnect the positive battery terminal.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery positive terminal – ETCS fuse (1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Battery positive terminal or ETCS fuse (1) – Body ground	10 kΩ or higher

  (4) Reinstall the ETCS fuse.
  (5) Reconnect the positive battery terminal.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE FUSIBLE LINK BLOCK ASSY

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DTC	P2119	THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of a throttle motor that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system.
The ECM operates the throttle motor to position the throttle valve for proper response to driver inputs. The throttle position sensor, mounted on the throttle body, provides this signal to the ECM so that the ECM can regulate the throttle motor.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from its target angle	• Electric throttle control system • ECM

WIRING DIAGRAM

Refer to DTC P2102 on page 05–154.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P2119)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result:

Display (DTC Output)	Proceed to
P2119	A
P2119 and other DTCs	B

HINT:
If any other codes besides P2119 are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (See page 05–39)**

A

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2	CHECK IF DTC OUTPUT RECURS

(a) Clear the DTC (see page 05–25).
(b) Allow the engine to idle for 15 seconds.
(c) Securely apply the parking brake, and place the shift position in D.
(d) Depress the brake pedal securely and the accelerator pedal fully for 5 seconds.
(e) Read DTCs.

HINT:

Actual throttle position (TP) sensor voltage can be confirmed using the intelligent tester II [Data List / THROTTLE POS #1]

Standard: No DTC output.

OK → **SYSTEM OK**

NG

REPLACE THROTTLE W/MOTOR BODY ASSY (See page 10–15)

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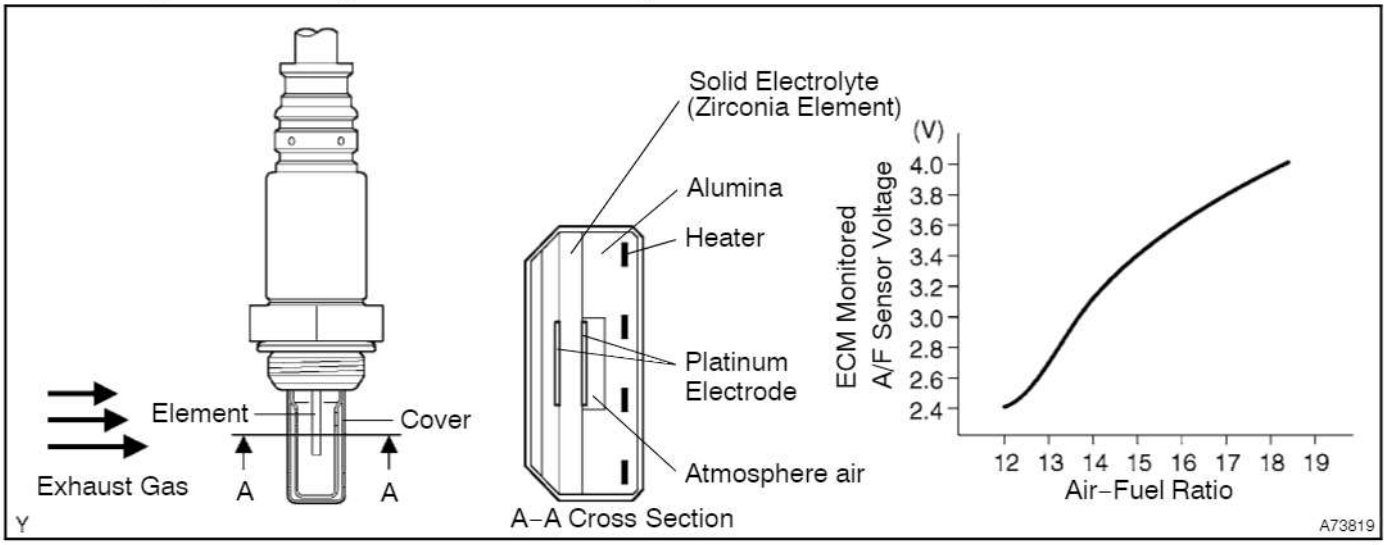
DTC	P2195	OXYGEN (A/F) SENSOR SIGNAL STUCK LEAN (BANK 1 SENSOR 1)

DTC	P2196	OXYGEN (A/F) SENSOR SIGNAL STUCK RICH (BANK 1 SENSOR 1)

HINT:
Although each DTC title says "oxygen sensor", these DTCs are related to the A/F sensor.

CIRCUIT DESCRIPTION

The air–fuel ratio (A/F) sensor provides output voltage* which is almost equal to the existing air–fuel ratio. The A/F sensor output voltage is used to provide feedback for the ECM to control the air–fuel ratio.
With the A/F sensor output, the ECM can determine deviation from the stoichiometric air–fuel ratio and control proper injection time. If the A/F sensor is malfunctioning, the ECM is unable to accurately control the air–fuel ratio.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is also controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater to heat the sensor to facilitate detection of accurate oxygen concentration.
The A/F sensor is a planar type. Compared to a conventional type, the sensor and heater portions are narrower. Because the heat of the heater is conducted through the alumina to zirconia (of the sensor portion), sensor activation is accelerated.
To obtain a high purification rate of CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used. The converter is most efficient when the air–fuel ratio is maintained near the stoichiometric air–fuel ratio.
*: The voltage value changes inside the ECM only.



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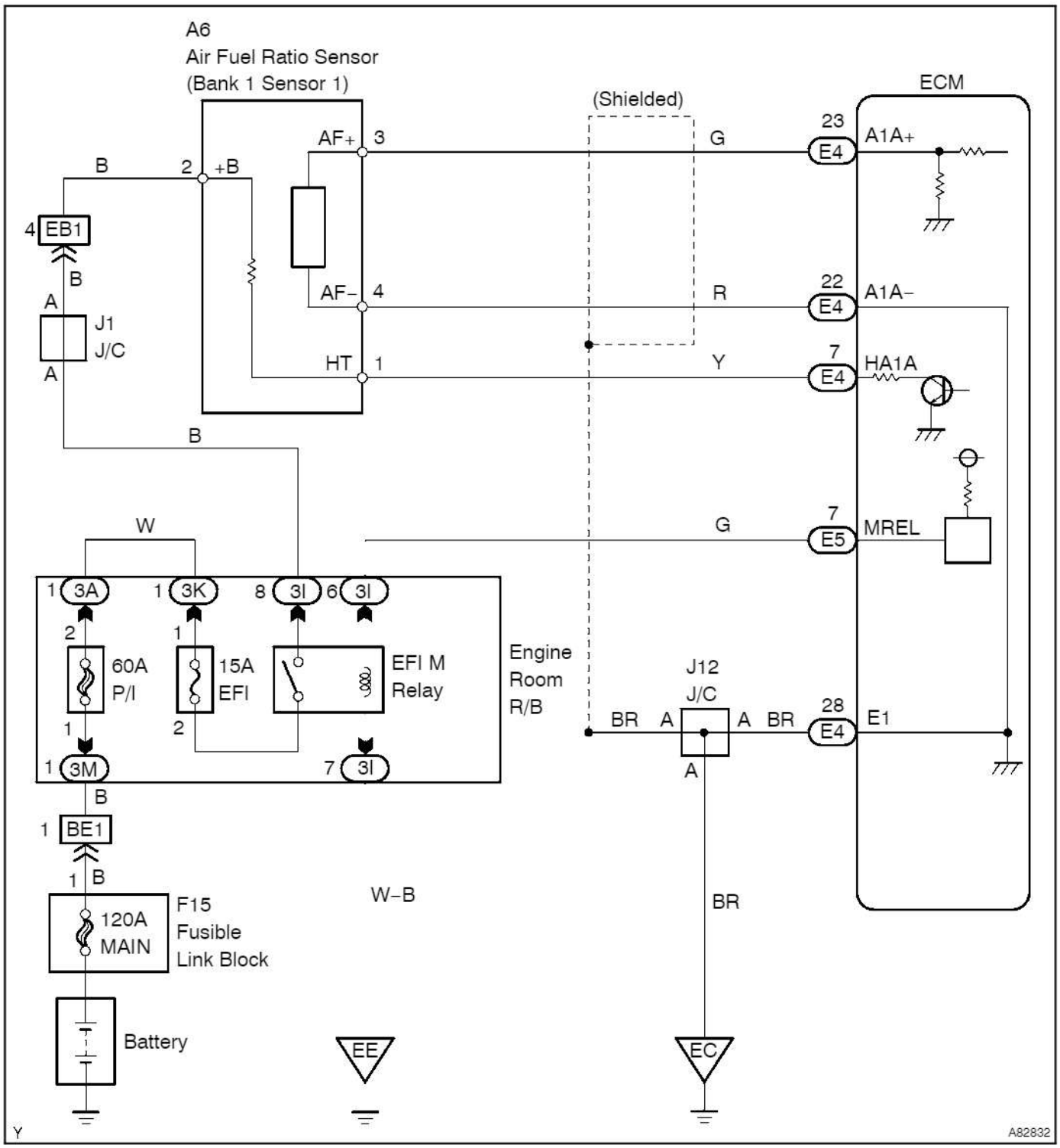
DTC No.	DTC Detection Condition	Trouble Area
P2195	Conditions (a) and (b) continue for 2 seconds or more : (a) A/F sensor voltage is more than 3.8 V (b) Heated oxygen sensor voltage is 0.15 V or more	• Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater • Integration relay • A/F sensor heater and relay circuit • Air induction system • Fuel pressure • Injector • PCV hose connection • ECM
P2196	Conditions (a) and (b) continue for 2 seconds or more : (a) A/F sensor voltage is less than 2.8 V (b) Heated oxygen sensor voltage is less than 0.85 V	• Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater • Integration relay • A/F sensor heater and relay circuit • Air induction system • Fuel pressure • Injector • PCV hose connection • ECM

HINT:

- Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.
- After confirming DTC P2195 and P2196, confirm voltage output of A/F sensor (AFS B1 S1) in Powertrain / Engine and ECT / Data List using the intelligent tester II.
- The A/F sensor output voltage and the short–term fuel trim value can be read using the intelligent tester II.
- The ECM controls the voltage of the A1A+, and A1A– terminals of the ECM to a fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the intelligent tester II.

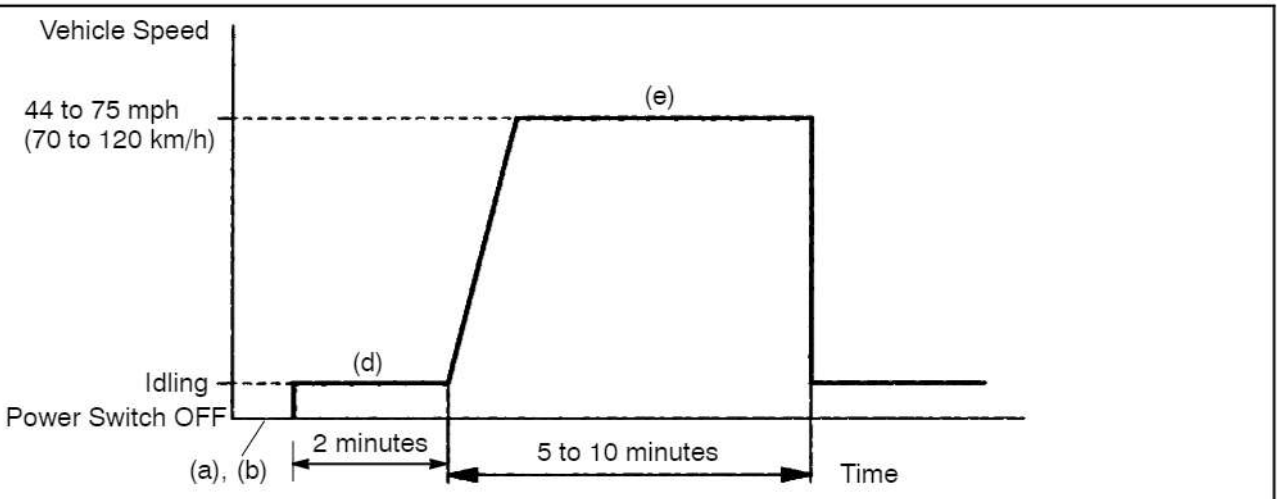
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WIRING DIAGRAM



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CONFIRMATION DRIVING PATTERN



(a) Connect the intelligent tester II to the DLC3.
(b) Switch the ECM from normal mode to check mode using the intelligent tester II (see page 05–29).
(c) Put the engine in inspection mode (see page 05–1).
(d) Start the engine and warm it up with all the accessories switched OFF.
(e) Deactivate inspection mode and drive the vehicle at 70 to 120 km/h (44 to 75 mph) for 5 to 10 minutes.

HINT:
If a malfunction exists, the CHK ENG will be illuminated during step (e).

NOTICE:

- **If the conditions in this test are not strictly followed, no malfunction will be detected. If you do not have the intelligent tester II, turn the power switch OFF after performing steps (d) and (e), then perform steps (d) and (e) again.**
- **Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.**

INSPECTION PROCEDURE

HINT:
Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:
The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Select the item: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

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Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

–12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: More than 0.55 V

–12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 % → Output voltage: More than 3.35 V / Less than 3.0 V — **OK**	Injection volume +25 % –12.5 % → Output voltage: More than 0.55 V / Less than 0.4V — **OK**	—
Case 2	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Injection volume +25 % –12.5 % → Output voltage: More than 0.55 V / Less than 0.4V — **OK**	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 % → Output voltage: More than 3.35 V / Less than 3.0V — **OK**	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Injection volume +25 % –12.5 % → Output voltage: Almost no reaction — **NG**	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.

To display the graph, select the item on the tester: View / Line graph.

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HINT:

- A low A/F sensor voltage could be caused by a RICH air fuel mixture. Check the conditions that would cause the engine to run with the RICH air–fuel mixture.
- A high A/F sensor voltage could be caused by a LEAN air fuel mixture. Check the conditions that would cause the engine to run with the LEAN air–fuel mixture.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO A/F SENSOR DTC)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II , select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display	Proceed to
A/F sensor circuit DTCs	A
A/F sensor circuit DTCs and other codes	B

HINT:

If any other codes besides A/F sensor DTCs are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART** (See page 05–39)

A

2	READ VALUE OF INTELLIGENT TESTER II(OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the intelligent tester II to the DLC 3.
(b) Put the engine in inspection mode (see page 05–1).
(c) Warm up the A/F sensors (bank 1 sensor 1) by running the engine at 2,500 rpm with the accelerator pedal depressed more than 60 % for approximately 90 seconds.
(d) Read A/F sensor voltage output on the intelligent tester II.
(e) On the intelligent tester II, enter the menus: Powertrain / Engine and ECT / Data List.
(f) Select the monitor item: AFS B1S2 and Engine Speed.

HINT:

If necessary, record the data using the SNAPSHOT function.

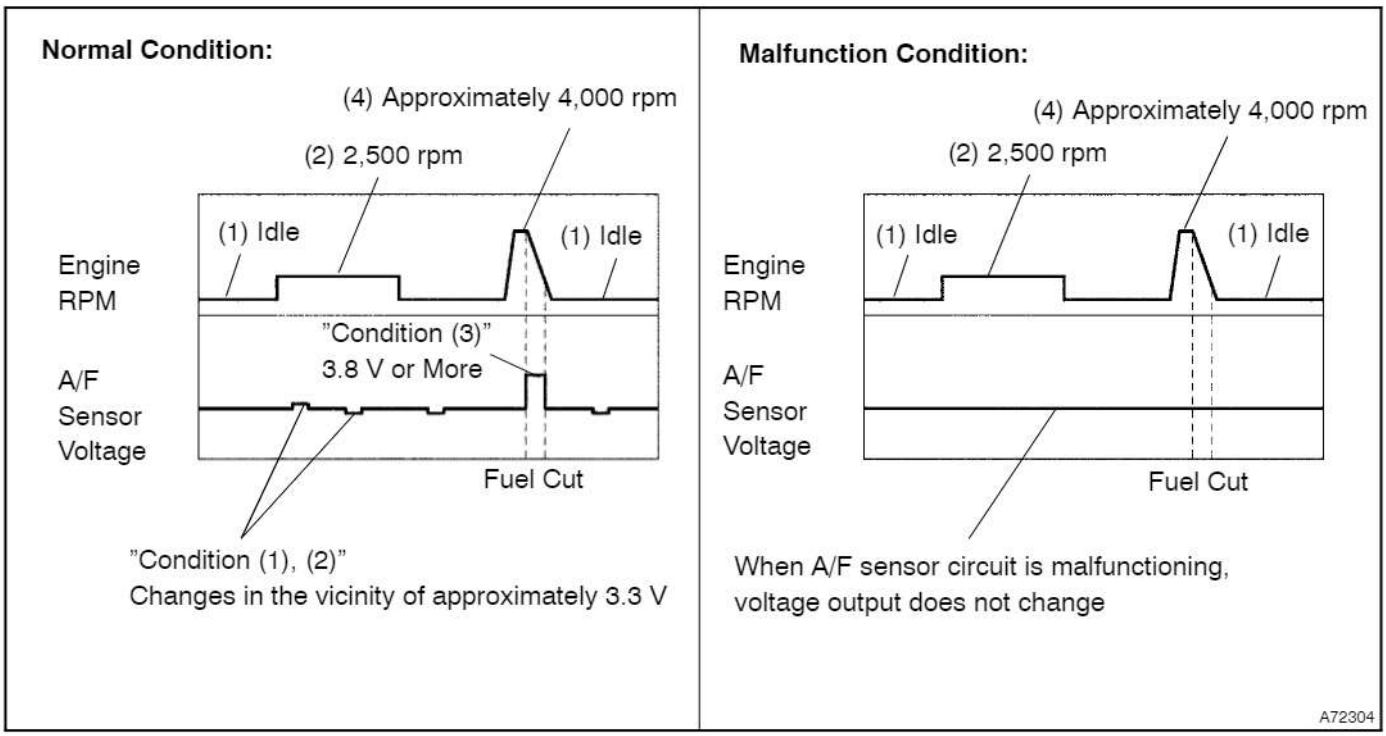
(g) Monitor the A/F sensor voltage carefully.
(h) Check the A/F sensor voltage output under the following conditions:
  (1) Put the engine in inspection mode and allow the engine to idle for 30 seconds.
  (2) Put the engine in inspection mode and running the engine at 2,500 rpm with depressing the accelerator pedal more than 60 % (where engine RPM is not suddenly changed).
  (3) Deactivate inspection mode and drive the vehicle with the shift position in B.
  (4) Accelerate the vehicle to 70 km/h (44 mph) and quickly release the accelerator pedal so that the throttle is fully closed.

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CAUTION:

- **Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.**
- **Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.**

Standard:
Condition (1) and (2)
Voltage changes in the vicinity of 3.3 V (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (4)
A/F sensor voltage increases to 3.8 V or more during engine deceleration (when fuel cut) as shown in the illustration.



HINT:

- To display the graph, select the item on the tester: View / Line graph.
- Whenever the output voltage of the A/F sensor remains at approximately 3.3 V (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have an open–circuit. (This will happen also when the A/F sensor heater has an open–circuit.)
- Whenever the output voltage of the A/F sensor remains at a certain value of approximately 3.8 V or more, or 2.8 V or less (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have a short–circuit.
- The ECM will stop fuel injection (fuel cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor voltage output.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal was reconnected, the vehicle must be driven over 16 km/h (10 mph) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.

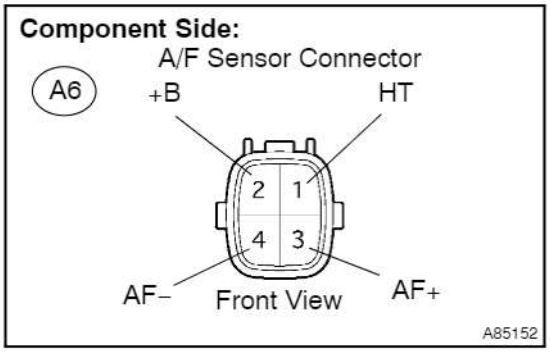
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- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

OK → Go to step 13

NG

3 INSPECT AIR FUEL RATIO SENSOR(RESISTANCE OF A/F SENSOR HEATER)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.

Resistance:

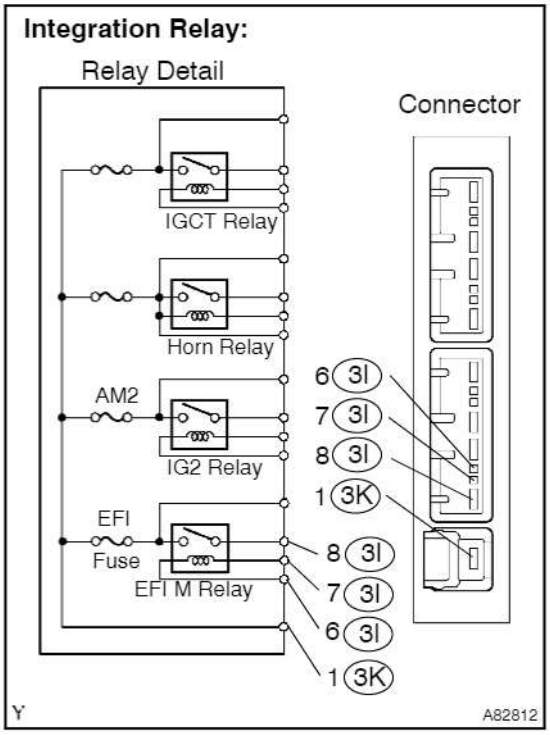
Tester Connection	Resistance
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR FUEL RATIO SENSOR

OK

4 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

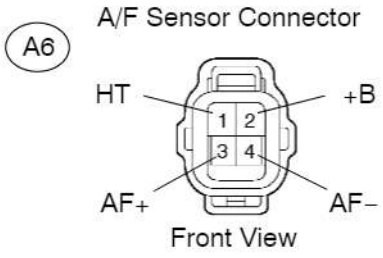
NG → REPLACE INTEGRATION RELAY

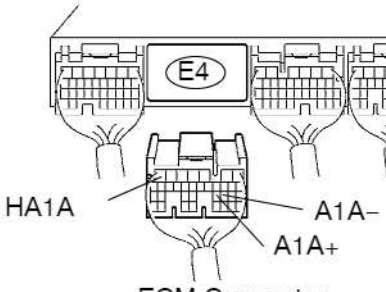
OK

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5 CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM)

Wire Harness Side:





(a) Disconnect the A6 A/F sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

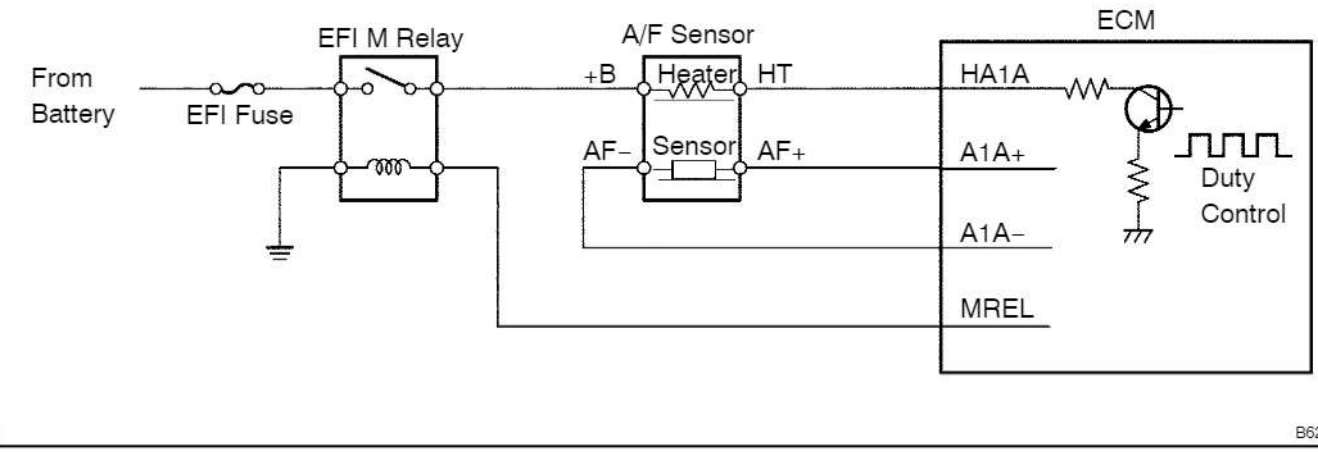
Tester Connection	Specified Condition
AF+ (A6–3) – A1A+ (E4–23)	Below 1 Ω
AF– (A6–4) – A1A– (E4–22)	Below 1 Ω
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
AF+ (A6–3) or A1A+ (E4–23) – Body ground	10 kΩ or higher
AF– (A6–4) or A1A– (E4–22) – Body ground	10 kΩ or higher
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the ECM connector.

Reference (Bank 1 Sensor 1 System Diagram):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: No leak in the air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK FUEL PRESSURE (See page 11–7)

(a) Check fuel pressure (High or low fuel pressure).
OK:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf·cm^2, 44 to 50 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

8	INSPECT FUEL INJECTOR ASSY (See page 11–9)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
OK:
Injection volume: 36 to 46 cm^3 (2.1 to 2.8 cu in.) per 15 seconds.

NG → **REPLACE FUEL INJECTOR ASSY (See page 11–12)**

OK

9	REPLACE AIR FUEL RATIO SENSOR

GO

10	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

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11	READ OUTPUT DTCS(SEE IF A/F SENSOR DTCS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read the DTCs.

Result :

Display	Proceed to
No output	A
A/F sensor circuit DTC	B

B → **REPLACE ECM(See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN**

A

12	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

YES: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

YES

DTCS ARE CAUSED BY RUNNING OUT OF FUEL

13	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

14	READ OUTPUT DTCS(SEE IF A/F SENSOR DTCS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II , select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display	Proceed to
A/F sensor circuit DTCs	A
No output	B

B → **Go to step 18**

A

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15	REPLACE AIR FUEL RATIO SENSOR

GO

16	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

17	READ OUTPUT DTCS(SEE IF A/F SENSOR DTCS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display	Proceed to
No output	A
A/F sensor circuit DTCs	B

B → REPLACE ECM (See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN

A

18	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

YES

DTCS ARE CAUSED BY RUNNING OUT OF FUEL

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DTC	P2238	OXYGEN SENSOR PUMPING CURRENT CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2239	OXYGEN SENSOR PUMPING CURRENT CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2252	OXYGEN SENSOR REFERENCE GROUND CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2253	OXYGEN SENSOR REFERENCE GROUND CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

HINT:
Although the each DTC title says "oxygen sensor", these DTCs are related to the A/F sensor.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05–165.

DTC No.	DTC Detecting Condition	Trouble Area
P2238	• Conditions (a) or (b) continues for 5 seconds or more : (a) AF+ is 0.5 V or less (b) (AF+) – (AF–) is 0.8 V or more • A/F sensor admittance: Less than 0.022 1/Ω	• Open or short in A/F sensor circuit • A/F sensor • A/F sensor heater • EFI M relay • A/F sensor heater and relay circuit • ECM
P2239	• Condition (a) continues for 5.0 seconds or more : (a) AF+ is more than 4.5 V (b) (AF+) – (AF–) is more than 0.8 V	• Open or short in A/F sensor circuit • A/F sensor • A/F sensor heater • EFI M relay • A/F sensor heater and relay circuit • ECM
P2252	AF– is 0.5 V or less for 5.0 seconds or more	• Open or short in A/F sensor circuit • A/F sensor • A/F sensor heater • EFI M relay • A/F sensor heater and relay circuit • ECM
P2253	AF– is more than 4.5 V for 5.0 seconds or more	• Open or short in A/F sensor circuit • A/F sensor • A/F sensor heater • EFI M relay • A/F sensor heater and relay circuit • ECM

WIRING DIAGRAM

Refer to DTC P2195 on page 05–165.

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INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:

The A/F CONTROL operation lowers the injection volume 12.5% or increases the injection volume 25%.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Select the item: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

–12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

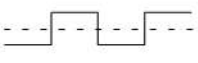
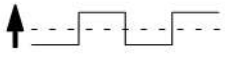
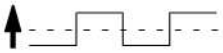
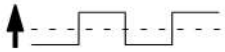
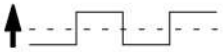
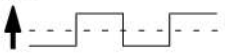
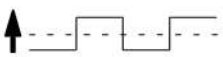
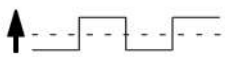
+25 % → rich output: More than 0.55 V

–12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

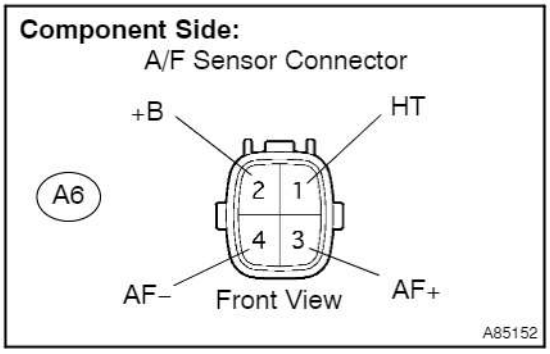
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	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	—
Case 2	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0V  OK	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.
To display the graph, select the item on the tester: View / Line graph.
HINT:
Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1 INSPECT AIR FUEL RATIO SENSOR(RESISTANCE OF A/F SENSOR HEATER)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.

Resistance:

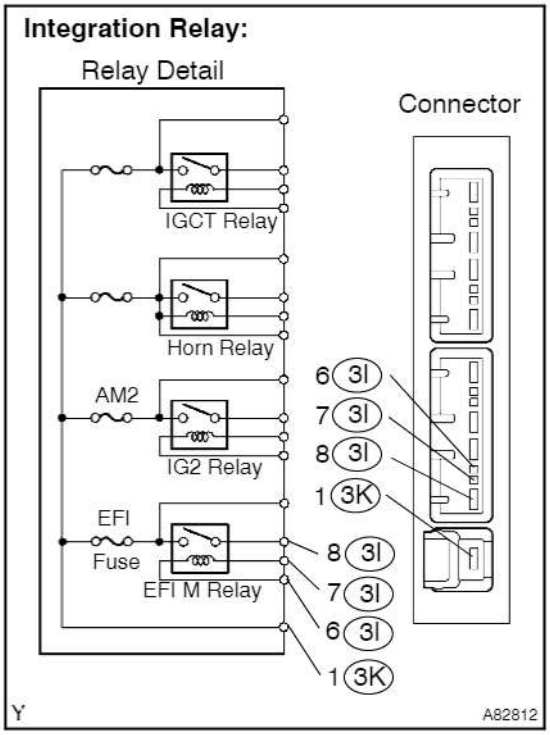
Tester Connection	Resistance
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR FUEL RATIO SENSOR

OK

2 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

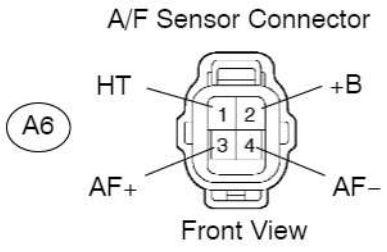
NG → REPLACE INTEGRATION RELAY

OK

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3 CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM)

Wire Harness Side:



(a) Disconnect the A6 A/F sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

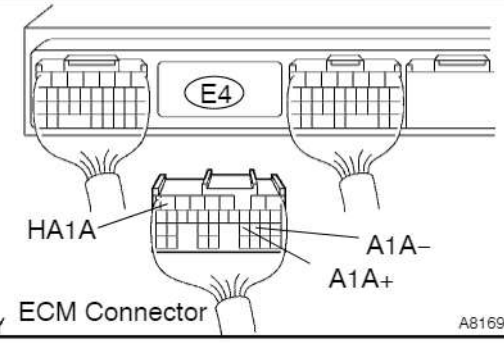
Standard (Check for open):

Tester Connection	Specified Condition
AF+ (A6–3) – A1A+ (E4–23)	Below 1 Ω
AF– (A6–4) – A1A– (E4–22)	Below 1 Ω
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

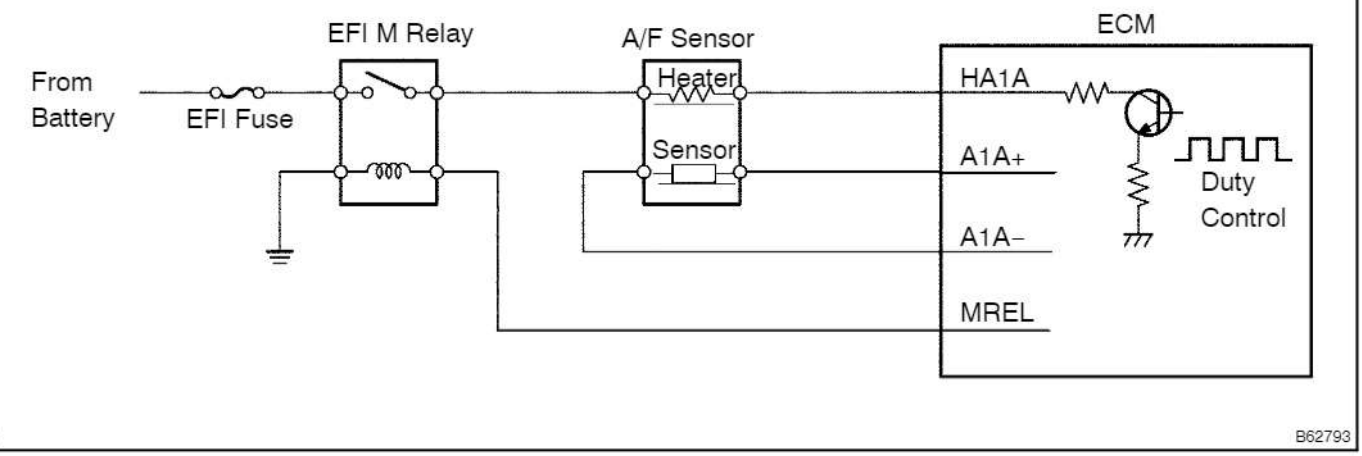
Standard (Check for short):

Tester Connection	Specified Condition
AF+ (A6–3) or A1A+ (E4–23) – Body ground	10 kΩ or higher
AF– (A6–4) or A1A– (E4–22) – Body ground	10 kΩ or higher
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the ECM connector.



Reference (Bank 1 Sensor 1 System Diagram):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE ECM (See page 10–24)

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DTC	P2A00	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05–165.

DTC No.	DTC Detection Condition	Trouble Area
P2A00	When A/F sensor output voltage change is below compared to fuel trim change, ECM judges that A/F sensor circuit response is slow if conditions (a), (b) and (c) are met (2 trip detection logic): (a) After engine is warmed up (b) Engine speed is 1,100 rpm or more (c) Vehicle speed 60 km/h (37.5 mph) or more	• Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1) • A/F sensor heater • EFI M relay • A/F sensor heater and relay circuit • Air induction system • Fuel pressure • Injector • PCV hose connection • ECM

HINT:

Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.

WIRING DIAGRAM

Refer to DTC P2195 on page 05–165.

INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be found by performing the Active Test / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform Active Test using the intelligent tester II.

HINT:

The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the intelligent tester II to the DLC3 on the vehicle.
(2) Turn the power switch ON (IG).
(3) Put the engine in inspection mode (see page 05–1).
(4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(5) Select the item: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
(6) Select the monitor item: AFS B1S1 and O2S B1S2.
(7) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

–12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

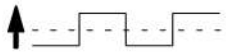
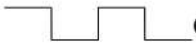
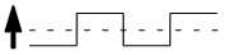
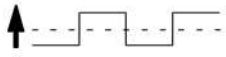
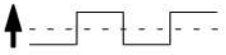
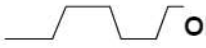
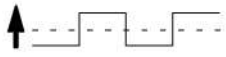
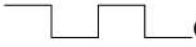
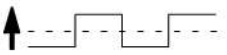
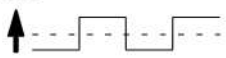
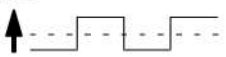
+25 % → rich output: More than 0.55 V

–12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

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	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	—
Case 2	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage More than 0.55 V Less than 0.4V  OK	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 % –12.5 %  Output voltage More than 3.35 V Less than 3.0V  OK	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Injection volume +25 % –12.5 %  Output voltage Almost no reaction NG	Extremely RICH or LEAN actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.
To display the graph, select the item on the tester: View / Line graph.
HINT:

- DTC P2A00 may be also detected, when the air fuel ratio remains RICH or LEAN.
- A low A/F sensor voltage could be caused by a LEAN air–fuel mixture. Check the conditions that would cause the engine to run with the LEAN air–fuel mixture.
- A high A/F sensor voltage could be caused by a RICH air–fuel mixture. Check the conditions that would cause the engine to run with the RICH air–fuel mixture.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1	CHECK OTHER DTC OUTPUT(IN ADDITION TO A/F SENSOR DTC)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display (DTC Output)	Proceed to
P2A00	A
P2A00 and other DTCs	B

HINT:
If any other code besides P2A00 are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (See page 05–39)**

A

2	READ VALUE OF INTELLIGENT TESTER II(OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the intelligent tester II to the DLC 3.
(b) Put the engine in inspection mode (see page 05–1).
(c) Warm up the A/F sensors (bank 1 sensor 1) by running the engine at 2,500 rpm with depressing the accelerator pedal more than 60 % for approximately 90 seconds.
(d) Read A/F sensor voltage output on the intelligent tester II.
(e) On the intelligent tester II, enter the menus: Powertrain / Engine and ECT / Data List.
(f) Select the monitor item: AFS B1S2 and Engine Speed.

HINT:
If necessary, record the data using the SNAPSHOT function.

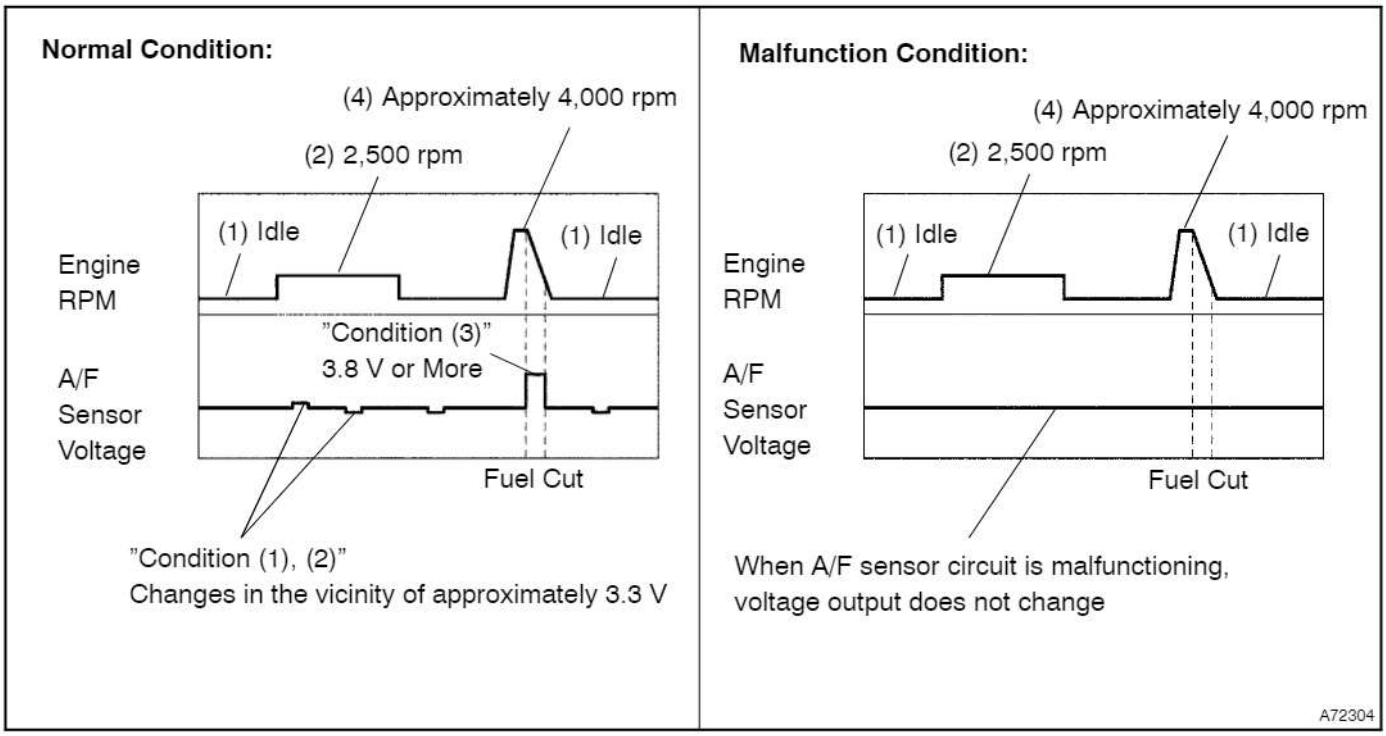
(g) Monitor the A/F sensor voltage carefully.
(h) Check the A/F sensor voltage output under the following conditions:
  (1) Put the engine in inspection mode and allow the engine to idle for 30 seconds.
  (2) Put the engine in inspection mode and running the engine at 2,500 rpm with depressing the accelerator pedal more than 60 % (where engine RPM is not suddenly changed).
  (3) Deactivate inspection mode and drive the vehicle with the shift position in B.
  (4) Accelerate the vehicle to 70 km/h (44 mph) and quickly release the accelerator pedal so that the throttle is fully closed.

CAUTION:

- **Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.**
- **Do not drive the vehicle without deactivating inspection mode, otherwise damaging the transaxle may result.**

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Standard:
Condition (1) and (2)
Voltage changes in the vicinity of 3.3 V (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (4)
A/F sensor voltage increases to 3.8 V or more during engine deceleration (when fuel cut) as shown in the illustration.



HINT:

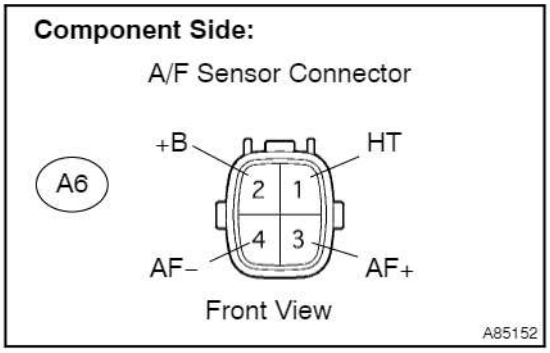
- To display the graph, select the item on the tester: View / Line graph.
- Whenever the output voltage of the A/F sensor remains at approximately 3.3 V (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have an open–circuit. (This will happen also when the A/F sensor heater has an open–circuit.)
- Whenever the output voltage of the A/F sensor remains at a certain value of approximately 3.8 V or more, or 2.8 V or less (see diagram Malfunction Condition) under any condition as well as the above conditions, the A/F sensor may have a short–circuit.
- The ECM will stop fuel injection (fuel cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor voltage output.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal was reconnected, the vehicle must be driven over 16 km/h (10 mph) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

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OK → Go to step 14

NG

3 INSPECT AIR FUEL RATIO SENSOR(RESISTANCE OF A/F SENSOR HEATER)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.
Standard:

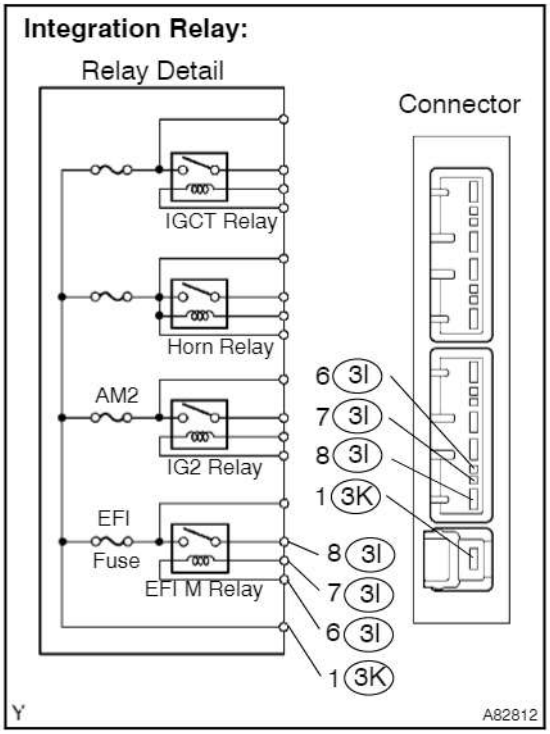
Tester Connection	Resistance
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR FUEL RATIO SENSOR

OK

4 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.
Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

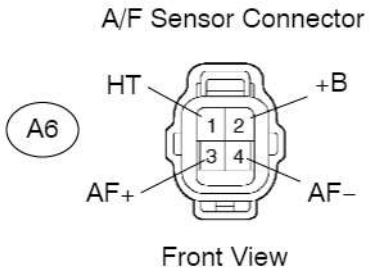
NG → REPLACE INTEGRATION RELAY

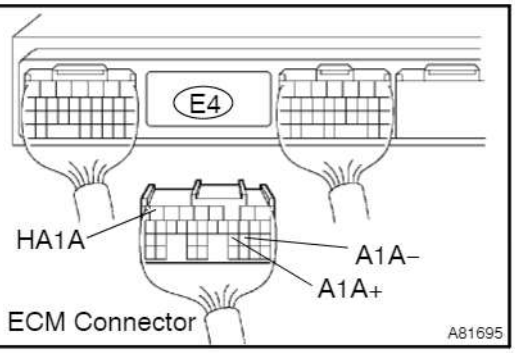
OK

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5 CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM)

Wire Harness Side:





(a) Disconnect the A6 A/F sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

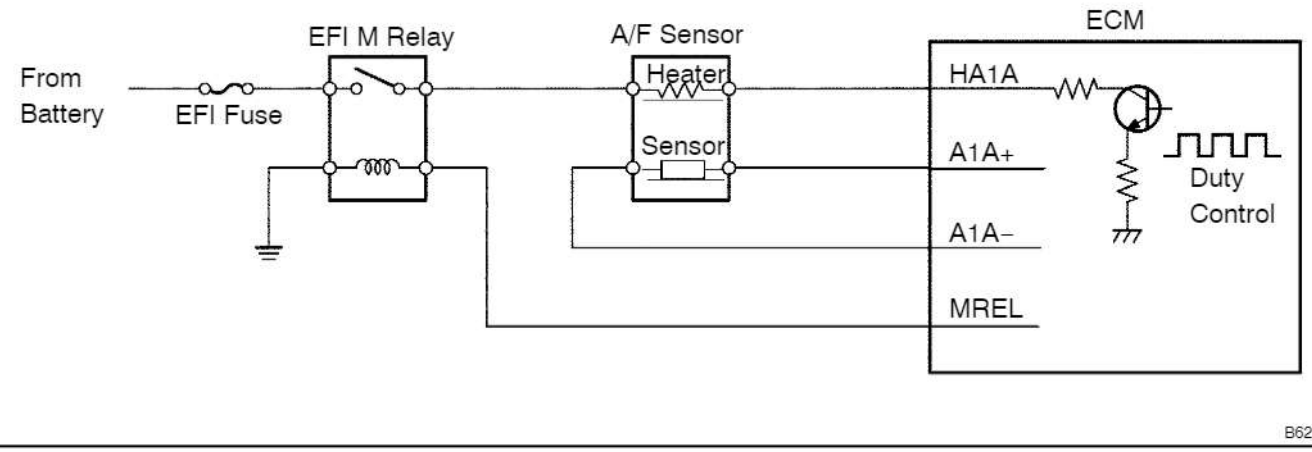
Tester Connection	Specified Condition
AF+ (A6–3) – A1A+ (E4–23)	Below 1 Ω
AF– (A6–4) – A1A– (E4–22)	Below 1 Ω
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
AF+ (A6–3) or A1A+ (E4–23) – Body ground	10 kΩ or higher
AF– (A6–4) or A1A– (E4–22) – Body ground	10 kΩ or higher
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the ECM connector.

Reference (Bank 1 Sensor 1 System Diagram):



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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6	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in air induction system.
OK: No leak in the air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

7	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

8	CHECK FUEL PRESSURE (See page 11–7)

(a) Check fuel pressure (high or low fuel pressure).
OK:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf·cm^2, 44 to 50 psi)

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

9	INSPECT FUEL INJECTOR ASSY (See page 11–12)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
OK:
Injection volume: 36 to 46 cm^3 (2.1 to 2.8 cu in.) per 15 seconds.

NG → REPLACE FUEL INJECTOR ASSY (See page 11–12)

OK

10	REPLACE AIR FUEL RATIO SENSOR

GO

11	PERFORM CONFIRMATION DRIVING PATTERN (See page 05–165)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05–165).

GO

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12	READ OUTPUT DTC(SEE IF A/F SENSOR DTC IS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display (DTC output)	Proceed to
No output	A
P2A00 again.	B

B → **REPLACE ECM (See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05–165)**

A

13	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

14	PERFORM CONFIRMATION DRIVING PATTERN (See page 05–165)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05–165).

GO

15	READ OUTPUT DTC(SEE IF A/F SENSOR DTC IS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display (DTC output)	Proceed to
P2A00	A
No output	B

B → **Go to step 19**

A

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16	REPLACE AIR FUEL RATIO SENSOR

GO

17	PERFORM CONFIRMATION DRIVING PATTERN (See page 05–165)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05–165).

GO

18	READ OUTPUT DTC(SEE IF A/F SENSOR DTC IS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

Display (DTC output)	Proceed to
No output	A
P2A00	B

B → REPLACE ECM (See page 10–24) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05–165)

A

19	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

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DTC	P3190	POOR ENGINE POWER

DTC	P3191	ENGINE DOES NOT START

DTC	P3193	FUEL RUN OUT

CIRCUIT DESCRIPTION

From the HV ECU, the ECM receives data such as power output required for the engine (required output), estimated torque produced by the engine (estimated torque), engine RPM of control target (target RPM), whether the engine is in start mode or not. Then, based on the required output and target RPM, the ECM calculates a target torque that is to be produced by the engine and compares it with the estimated torque. If the estimated torque is very low compared with the target torque, or the engine start mode continues for the duration calvulated by water temperature, an abnormal condition is detected.

DTC No.	DTC Detecting Condition	Trouble Area
P3190	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value • Engine start mode is not active • Target torque is a fixed value • Ratio of estimated torque against target torque is less than 20%	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM
P3191	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value • Engine start mode is active	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM
P3193	Following conditions are met: • Fuel low level signal input into ECM • Detection condition for P3190 or P3191 is satisfied	• Out of fuel • ECM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P3190, P3191 AND/OR P3193)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result:

Display (DTC output)	Proceed to
P3190, P3191 and/or P3193	A
P3190, P3191 and/or P3193, and other DTCs	B

HINT:
If any other codes besides P0300, P0301, P0302, P0303 or P0304 are output, perform troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART** (See page 05–39)

A

2	CHECK SHORTAGE OF FUEL

(a) Check for fuel level.
OK: There is enough fuel to operate the engine in the tank.

HINT:
The fuel level check can be performed by intelligent tester. Refer to Data List / Fuel Level on page 05–31.

NG → **REFILL FUEL**

OK

3	CHECK AIR INDUCTION SYSTEM

OK: The air induction system has no leakage and blockages.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

4	CHECK FOR UNUSUAL NOISE OR VIBRATION WHEN STARTING ENGINE OR RACING

OK: Unusual noise and vibration do not occur.

NG → **REPAIR OR REPLACE**

OK

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5	CHECK FUEL PRESSURE (See page 18–3)

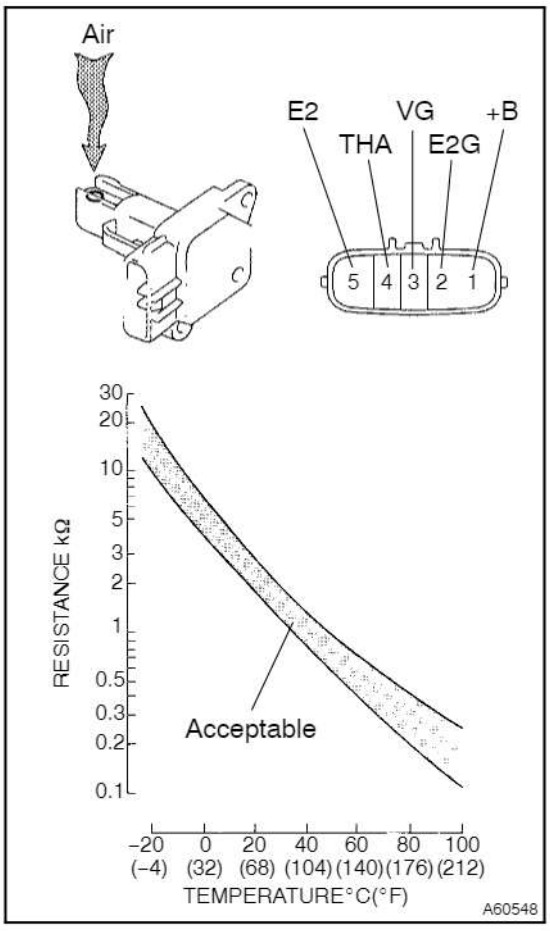
OK:

Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 50 psi)

NG → CHECK AND REPAIR FUEL SYSTEM

OK

6	INSPECT MASS AIR FLOW METER



(a) Remove the mass air flow meter.

(b) Inspect output voltage.

(1) Apply battery voltage across terminals +B and E2G.

(2) Connect the positive (+) tester prove to terminal VG, and negative (–) tester prove to terminal E2G.

(3) Blow air into the mass air flow meter, and check that the voltage fluctuates.

Standard:

Tester Connection	Specified Condition
VG (3) – E2G (2)	Sensor output voltage fluctuates between 0.3 V and 4.8 V

(c) Inspect resistance.

(1) Measure the resistance between terminals of the mass air flow meter.

Standard:

Tester Connection	Specified Condition
THA (4) – E2 (5)	13.6 to 18.4 kΩ at –20°C (–4°F)
THA (4) – E2 (5)	2.21 to 2.69 kΩ at 20°C (68°F)
THA (4) – E2 (5)	0.49 to 0.67 kΩ at 60°C (140°F)

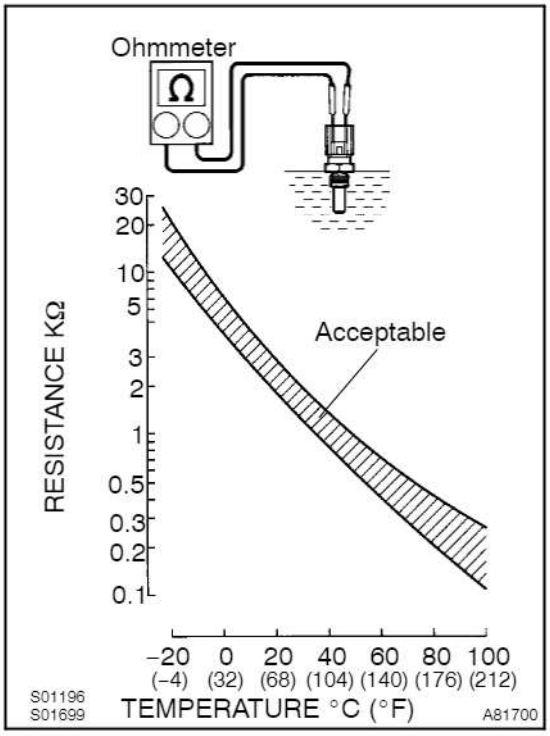
(d) Reinstall the mass air flow meter.

NG → REPLACE MASS AIR FLOW METER

OK

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7 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the engine coolant temperature sensor.
(b) Measure the resistance between the terminals of the engine coolant temperature sensor.

Standard:

Tester Connection	Specified Condition
1 – 2	2 to 3 kΩ at 20°C (68°F)
1 – 2	0.2 to 0.4 kΩ at 80°C (176°F)

NOTICE:

In case of checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.

HINT:

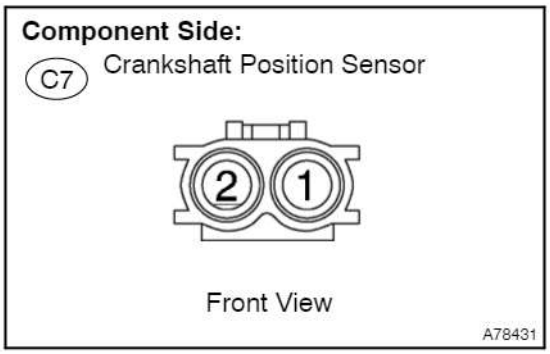
Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

(c) Reinstall the engine coolant temperature sensor.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

8 INSPECT CRANKSHAFT POSITION SENSOR



(a) Disconnect the C7 crankshaft position sensor connector.
(b) Measure the resistance between the terminals of the crankshaft position sensor connector.

Standard:

Tester Connection	Specified Condition
1 – 2	985 to 1,600 Ω at cold
1 – 2	1,265 to 1,890 Ω at hot

(c) Reconnect the crankshaft position sensor connector.

NOTICE:

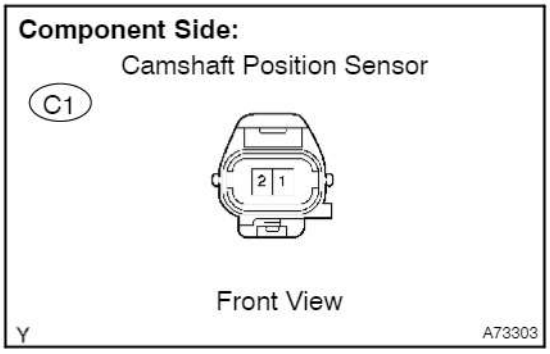
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately –10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

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9 INSPECT CAMSHAFT POSITION SENSOR



(a) Disconnect the C1 camshaft position sensor connector.
(b) Measure the resistance between the terminals of camshaft position sensor connector.

Standard:

Tester Connection	Specified Condition
1 – 2	1,630 to 2,740 Ω at cold
1 – 2	2,065 to 3,225 Ω at hot

(c) Reconnect the camshaft position sensor connector.

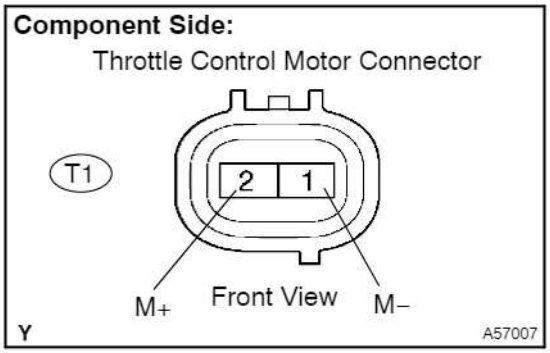
NOTICE:

Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately –10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

10 INSPECT THROTTLE CONTROL MOTOR



(a) Disconnect the throttle control motor connector.
(b) Using an ohmmeter, measure the motor resistance between terminals 1 (M–) and 2 (M+).

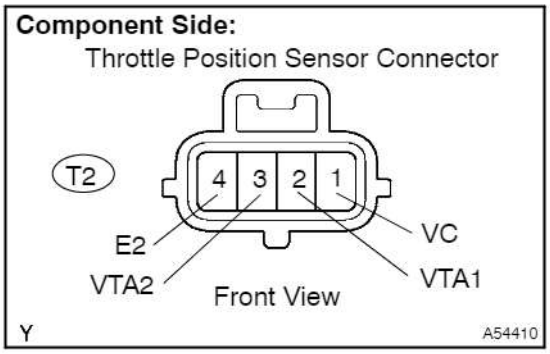
Standard:

Tester Connection	Specified Condition
1 – 2	0.3 to 100 Ω at 20 °C (68 °F)

NG → **REPLACE THROTTLE CONTROL MOTOR**

OK

11 INSPECT THROTTLE POSITION SENSOR



(a) Disconnect the throttle position sensor connector.
(b) Measure the resistance between the terminals of the throttle position sensor.

Standard:

Throttle position sensor terminal	Resistance
VC (1) – E2 (4)	1.2 to 3.2 kΩ at 20°C (68°F)
VTA1 (2) – E2 (4)	1.8 to 10.5 kΩ at 20°C (68°F)
VTA2 (3) – E2 (4)	1.8 to 10.5 kΩ at 20°C (68°F)

NG → **REPLACE THROTTLE POSITION SENSOR**

OK

REPLACE ECM (See page 10–24)

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DTC	U0293	LOST COMMUNICATION WITH HV ECU

CIRCUIT DESCRIPTION

The Controller Area Network (CAN) is a serial data communication system for real–time application. It is a multiplex communication system designed for on–vehicle use that provides a superior communication speed of 500 kbps and a capability to detect malfunction. Through the combination of the CANH and CANL bus lines, the CAN is able to maintain communication based on differential voltage.

HINT:

- Malfunction in the CAN bus (communication line) can be checked through the DLC3 connector, except in case of an open circuit in the DLC3 sub bus line.
- DTCs pertaining to CAN communication can be accessed through the use of the intelligent tester II (with CAN extension module).
- Malfunction in the DLC3 sub bus line cannot be detected through CAN communication, even though the DLC3 connector is connected to CAN communication.

DTC No.	DTC Detecting Condition	Trouble Area
U0293	When communication with HV ECU is interrupted	• Wire harness • HV ECU • ECM

WIRING DIAGRAM

Refer to CAN Communication System on page 05–2308.

INSPECTION PROCEDURE

Refer to CAN Communication System on page 05–2312.

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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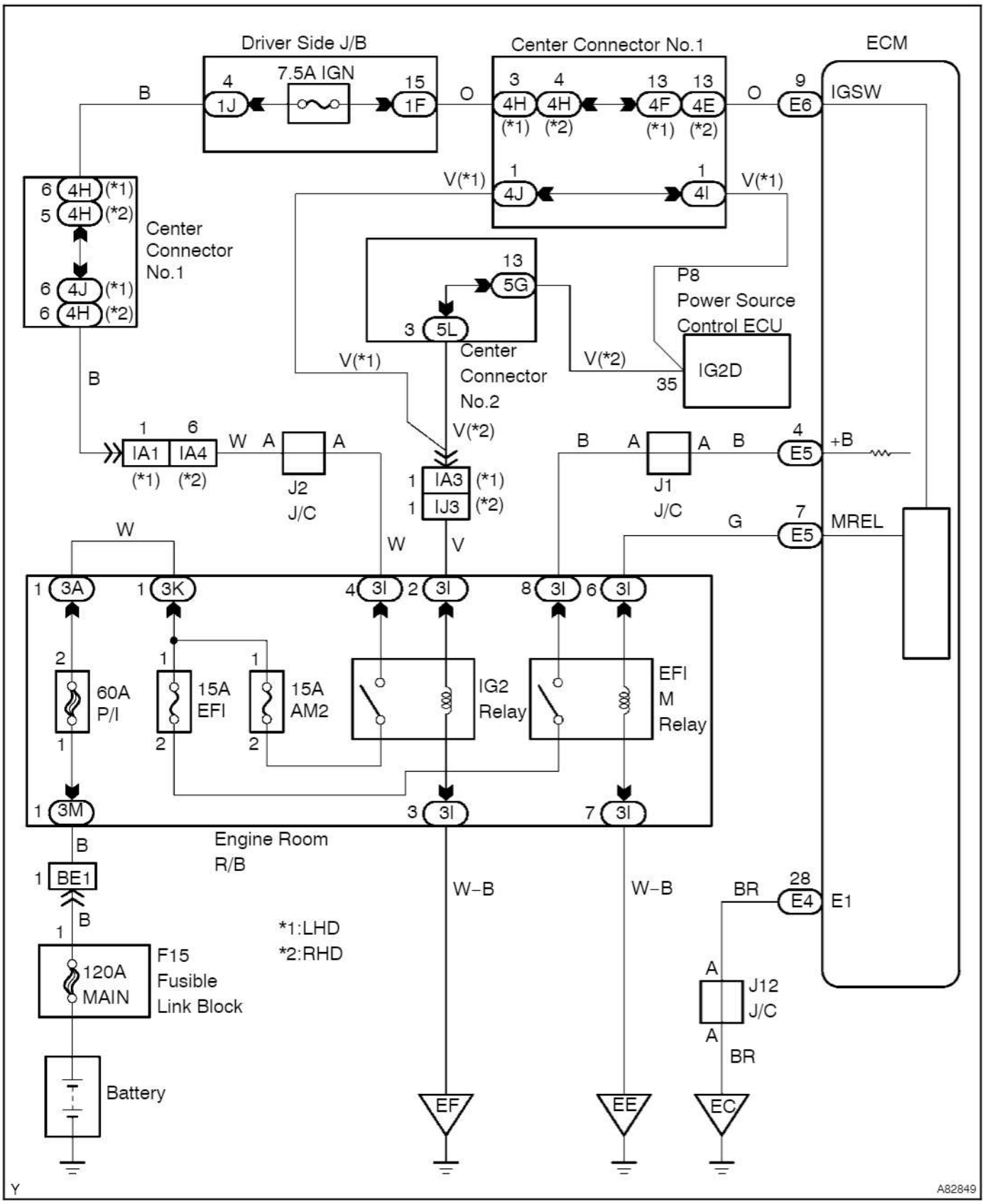
ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

The power source circuit of the hybrid system differs from the conventional power source circuit in the method in which the battery voltage is supplied to IGSW terminal of the ECM. The hybrid system has adopted one relay to serve as an ignition switch, which is controlled by the power source control ECU.
When the HV system is turned ON, the power source control ECU actuates the IG2 relay, which applies the battery voltage to IGSW terminal of the ECM. This causes the MREL terminal to transmit a signal to the EFI M relay. Then, the current that passes through the contact points of the EFI M relay (which is actuated by the MREL signal) flows to the +B terminal of the ECM.
When the ignition switch is turned OFF, the ECM keeps the EFI M relay ON for a maximum of 2 seconds, in order to initialize the throttle valve.

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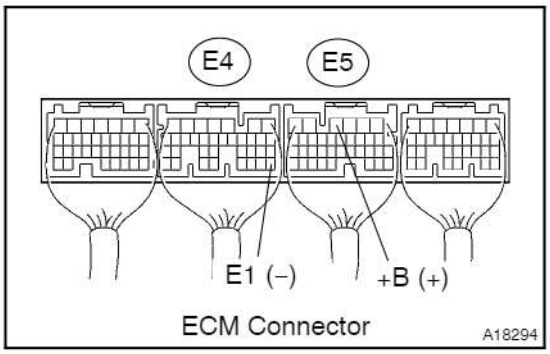
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT ECM(+B VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E5 ECM connectors.

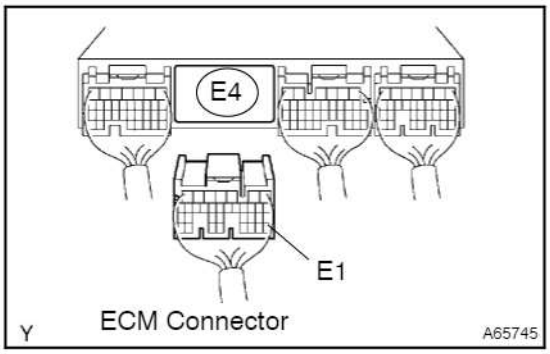
Standard:

Tester Connection	Specified Condition
+B (E5–4) – E1 (E4–28)	9 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–17)**

NG

2 CHECK HARNESS AND CONNECTOR(ECM – BODY GROUND)



(a) Disconnect the E4 ECM connector.
(b) Check the resistance between the wire harness side connectors.

Standard (Check for open):

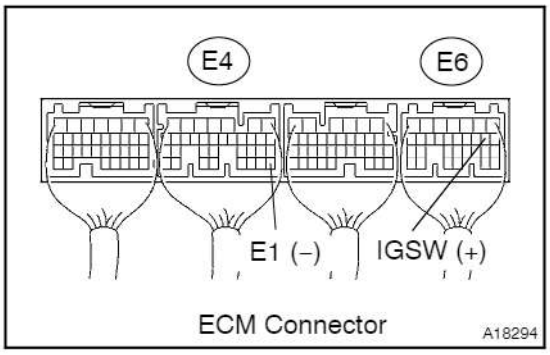
Tester Connection	Specified Condition
E1 (E4–28) – Body ground	Below 1 Ω

(c) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT ECM(IGSW VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E6 ECM connectors.

Standard:

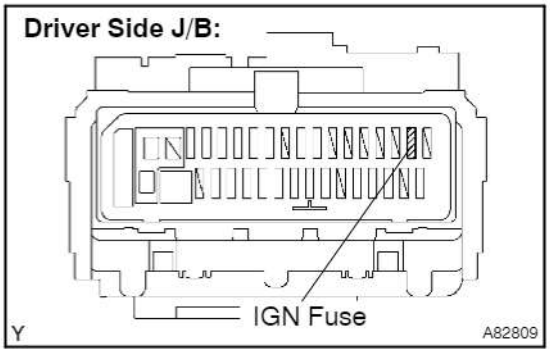
Tester Connection	Specified Condition
IGSW (E6–9) – E1 (E4–28)	9 to 14 V

OK → **Go to step 7**

NG

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4 CHECK FUSE(IGN FUSE)

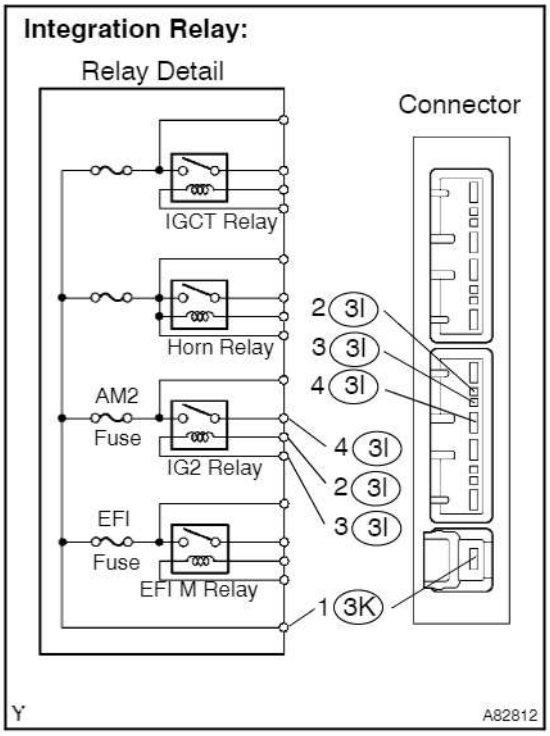


(a) Remove the IGN fuse from the driver side J/B.
(b) Check the resistance of the IGN fuse.
Standard: Below 1 Ω
(c) Reinstall the IGN fuse.

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE**

OK

5 INSPECT INTEGRATION RELAY(IG2 RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the IG2 relay.
Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–4)	10 kΩ or higher
(3K–1) – (3I–4)	Below 1 Ω (Apply battery voltage to terminals 3I–2 and 3I–3)

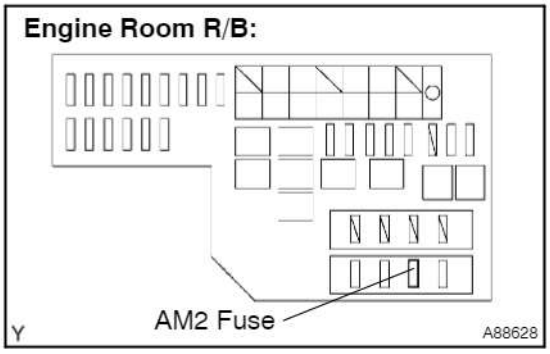
(c) Reinstall the integration relay.

NG → **REPLACE INTEGRATION RELAY**

OK

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6 CHECK FUSE(AM2 FUSE)



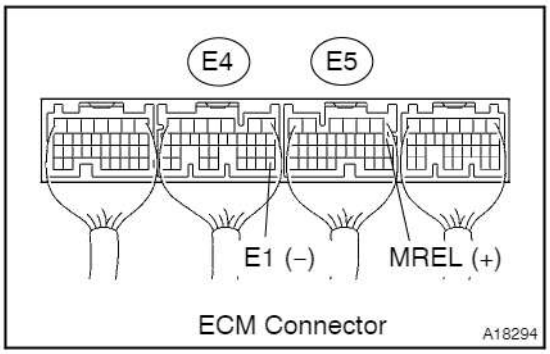
(a) Remove the AM2 fuse from the engine room R/B.
(b) Check the resistance of the AM2 fuse.
Standard: Below 1 Ω
(c) Reinstall the AM2 fuse.

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (BATTERY – IG2 RELAY, IG2 RELAY – ECM)

7 INSPECT ECM(MREL VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E5 ECM connectors.

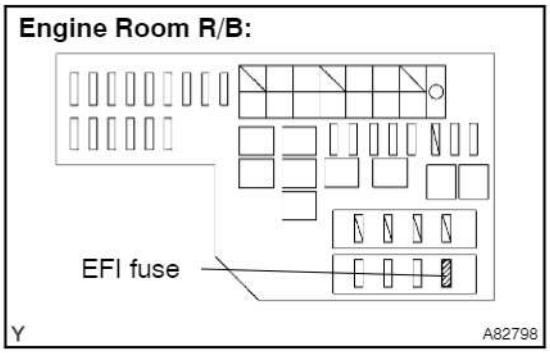
Standard:

Tester Connection	Specified Condition
MREL (E5–7) – E1 (E4–28)	9 to 14 V

NG → **REPLACE ECM (See page 10–24)**

OK

8 CHECK FUSE(EFI FUSE)



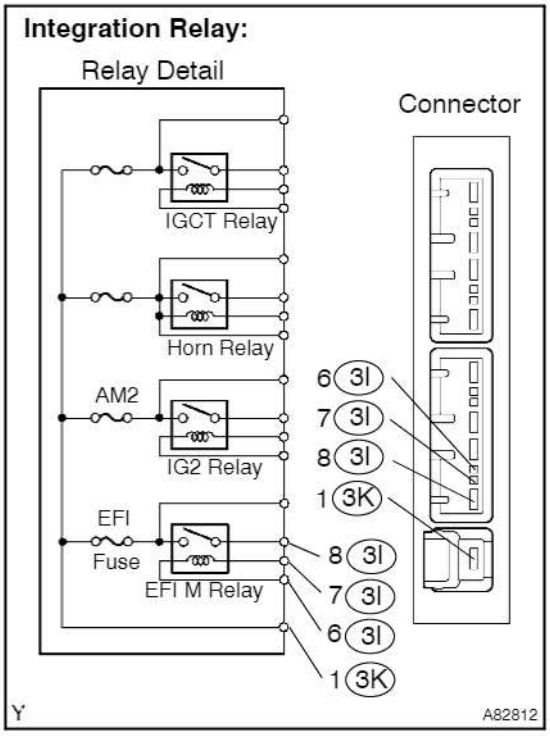
(a) Remove the EFI fuse from the engine room R/B.
(b) Check the resistance of the EFI fuse.
Standard: Below 1 Ω
(c) Reinstall the EFI fuse.

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE**

OK

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9	INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.

(b) Inspect the EFI M relay.

Standard:

Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

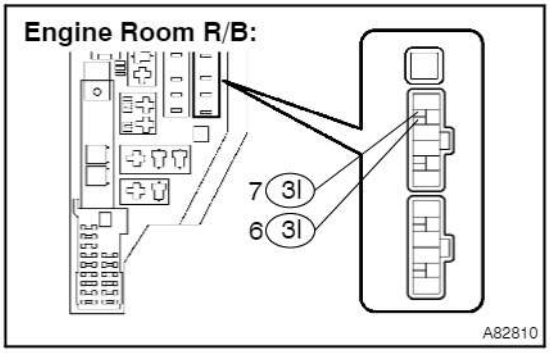
(c) Reinstall the integration relay.

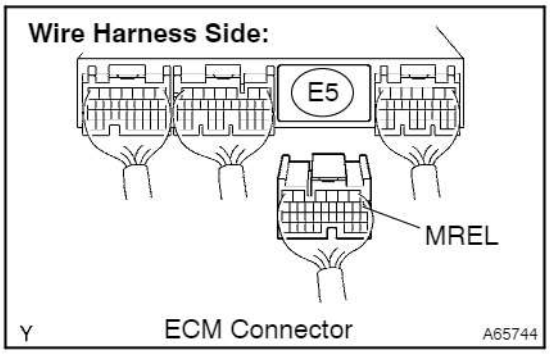
NG → **REPLACE INTEGRATION RELAY**

OK

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10	CHECK HARNESS AND CONNECTOR(EFI M RELAY – ECM, EFI M RELAY – BODY GROUND)





(a) Check the harness and connectors between the EFI M relay and ECM connector.
  (1) Remove the integration relay from the engine room R/B.
  (2) Disconnect the E5 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
EFI M relay (3I–6) – MREL (E5–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
EFI M relay (3I–6) or MREL (E5–7) – Body ground	10 kΩ or higher

  (4) Reinstall the integration relay.
  (5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the EFI M relay and the body ground.
  (1) Remove the integration relay from the engine room R/B.
  (2) Check the resistance between the wire harness side connector and the body ground.

Standard (Check for open):

Tester Connection	Specified Condition
EFI M relay (3I–7) – Body ground	Below 1 Ω

  (3) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (TERMINAL +B OF ECM – BATTERY POSITIVE TERMINAL)

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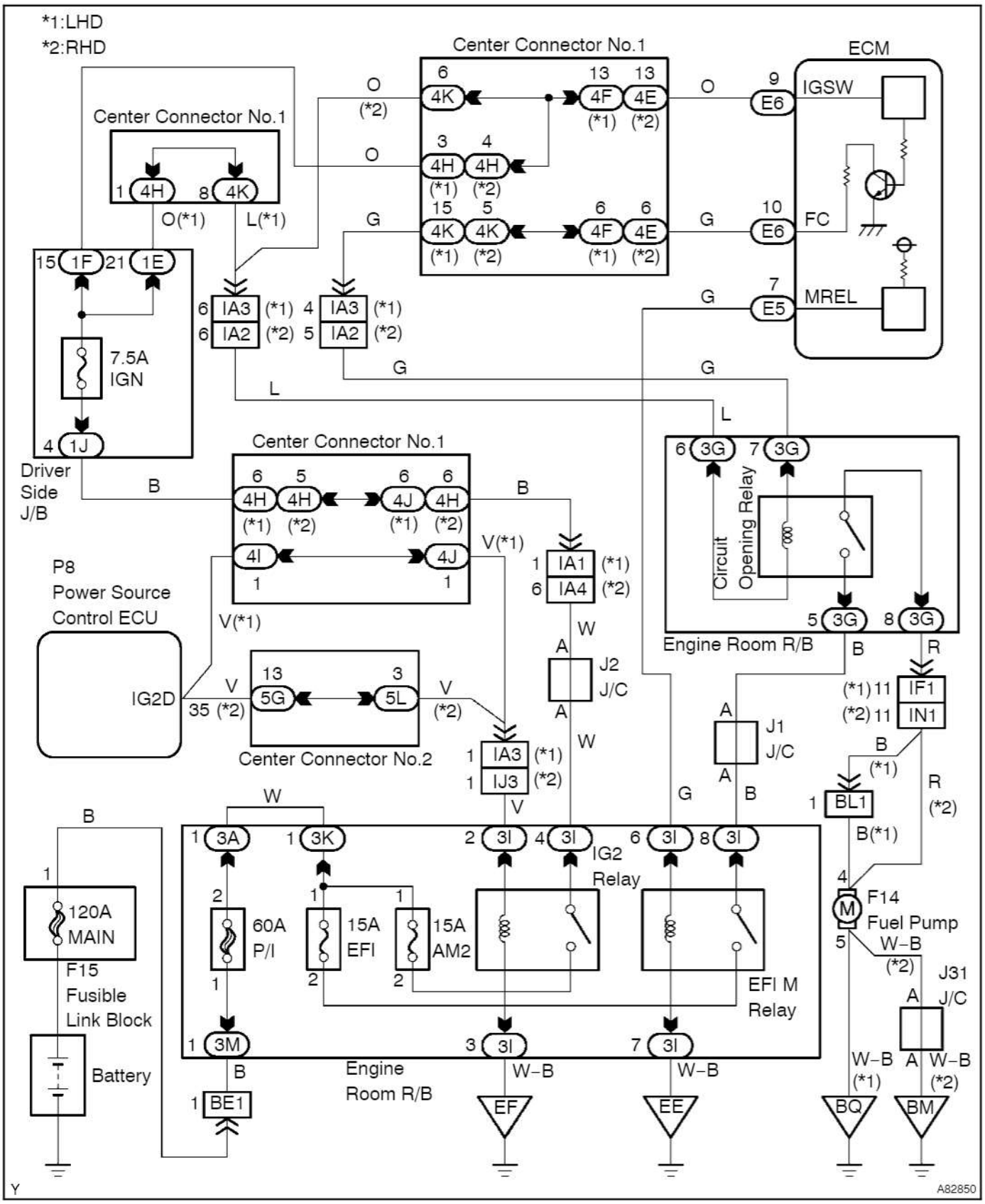
FUEL PUMP CONTROL CIRCUIT

CIRCUIT DESCRIPTION

The fuel pump is operated by the ECM according to the vehicle running condition. After the ECM receives the engine start requirement signal from the HV ECU, an NE signal comes in immediately when the engine is cranked by MG1 (basically, the fuel pump can operate while the NE signal is generated).
The ECM grounds the FC terminal line after receiving NE signal. It causes to energize the coil in the circuit opening relay, and the current flows to the fuel pump.
When the signal to stop the engine comes from HV ECU to the ECM, or when the fuel cut operation is performed such as decelerating by the engine brake, the fuel pump is stopped.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(OPERATE CIRCUIT OPENING RELAY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Select the item: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump/Speed.
(e) Check the relay operation while operating it using the intelligent tester II.
Standard: Operating noise can be heard from the relay.

OK → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

NG

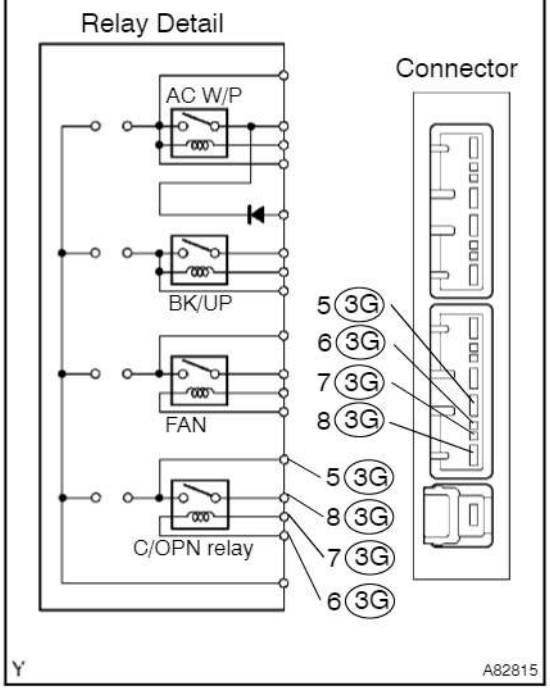
2	INSPECT POWER SOURCE CIRCUIT (See page 05–197)

NG → REPAIR OR REPLACE POWER SOURCE CIRCUIT COMPONENTS

OK

3	INSPECT INTEGRATION RELAY(C/OPN RELAY)

Integration Relay:



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the circuit opening relay.
Standard:

Tester Connection	Specified Condition
(3G–5) – (3G–8)	10 kΩ or higher
(3G–5) – (3G–8)	Below 1 Ω (Apply battery voltage to terminals 3G–6 and 3G–7)

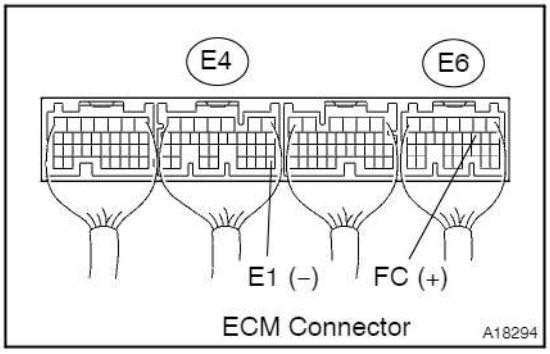
(c) Reinstall the integration relay.

NG → REPLACE INTEGRATION RELAY

OK

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4 INSPECT ECM(FC VOLTAGE) (CHECK VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E6 ECM connectors.

Standard:

Tester Connection	Specified Condition
FC (E6–10) – E1 (E4–28)	9 to 14 V

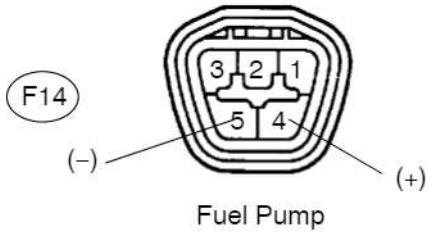
OK → **Go to step 5**

NG

CHECK AND REPAIR HARNESS OR CONNECTOR

5 INSPECT FUEL PUMP

Component Side:



(a) Inspect the fuel pump resistance.
(1) Disconnect the fuel pump connector.
(2) Measure the resistance between terminals 4 and 5.

Standard:

Tester Connection	Specified Condition
4 – 5	0.2 to 3.0 Ω at 20°C (68°F)

(b) Inspect the fuel pump operation.
(1) Apply battery voltage to the fuel pump terminals. Check that the pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

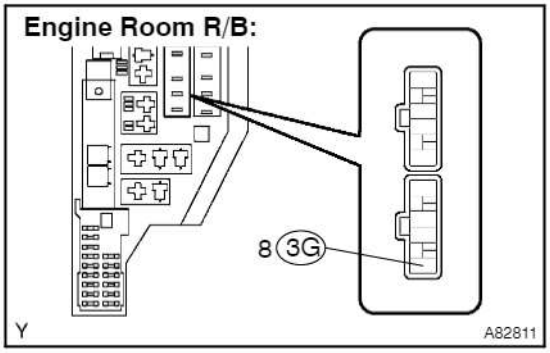
(2) Reconnect the fuel pump connector.

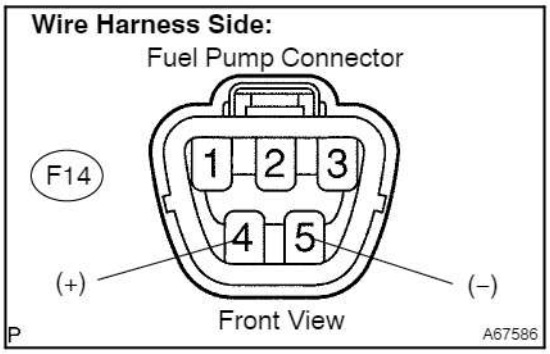
NG → **REPAIR OR REPLACE FUEL PUMP** (See page 11–23)

OK

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6	CHECK HARNESS AND CONNECTOR(C/OPN RELAY – FUEL PUMP, FUEL PUMP – BODY GROUND)





(a) Check the harness and the connector between the circuit opening relay and the fuel pump connector.
  (1) Remove the integration relay from the engine room R/B.
  (2) Disconnect the F14 fuel pump connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Circuit opening relay (3G–8) – Fuel pump (F14–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Circuit opening relay (3G–8) or Fuel pump (F14–4) – Body ground	10 kΩ or higher

  (4) Reinstall the integration relay.
  (5) Reconnect the fuel pump connector.

(b) Check the harness and the connectors between the fuel pump connector and the body ground.
  (1) Disconnect the F14 fuel pump connector.
  (2) Check the resistance between the wire harness side connector and the body ground.

Standard (Check for open):

Tester Connection	Specified Condition
Fuel pump (F14–5) – Body ground	Below 1 Ω

  (3) Reconnect the fuel pump connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

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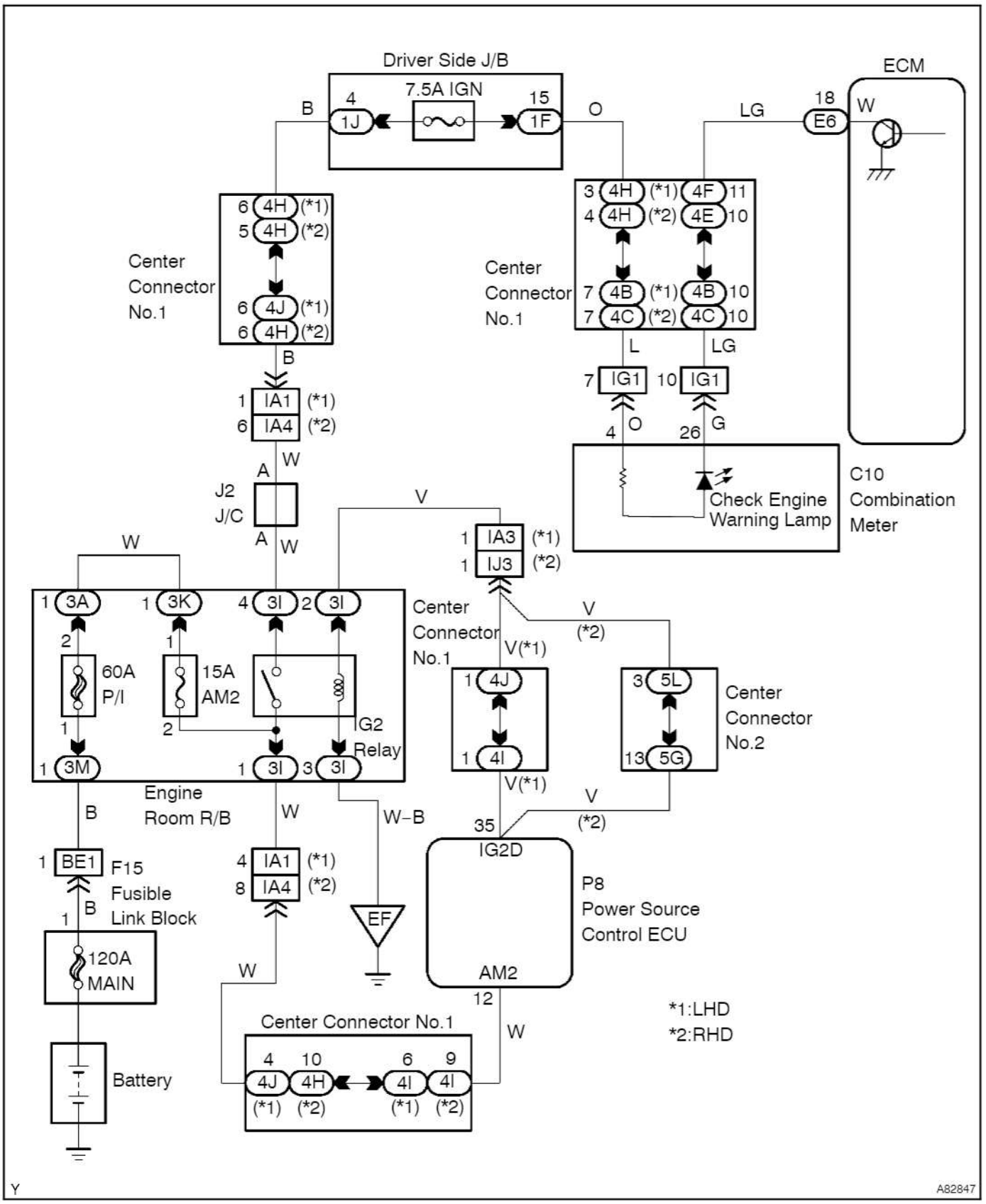
CHECK ENGINE WARNING LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The IG2 relay energized by the power source control ECU applies the battery voltage to the check engine warning lamp in the combination meter while the main system is turned ON.
When it is necessary, the ECM grounds the W terminal line and illuminates CHK ENG.
In order to perform functional check visually, the CHK ENG is illuminated when the power switch is first turned ON. If the CHK ENG is ON or OFF all of the time, use the procedure below to troubleshoot it. The CHK ENG is used to indicate vehicle malfunction which was detected by the ECM. Follow this procedure using the intelligent tester II to determine cause of the problem and to check the CHK ENG.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Troubleshoot each trouble symptom in accordance with the chart below .

CHK ENG remains on	Start inspection from step 1
CHK ENG is not illuminated	Start inspection from step 3

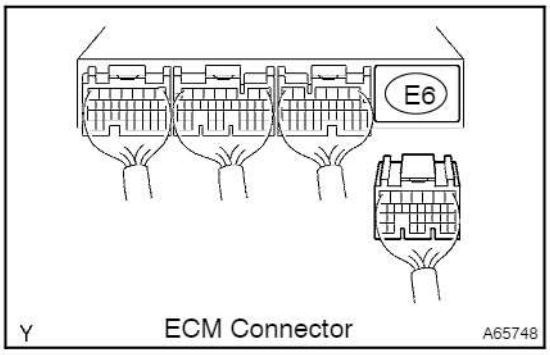
1 CLEAR DTC

(a) Connect the intelligent tester II to the DLC 3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Read DTCs (see page 05–25).
(e) Clear the DTCs (see page 05–25).
(f) Check that CHK ENG is not illuminated.
Standard: CHK ENG is not illuminated.

OK → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page 05–39)**

NG

2 CHECK HARNESS AND CONNECTOR(CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the E6 ECM connector.
(b) Turn the power switch ON (IG).
(c) Check that CHK ENG is not illuminated.
Standard: CHK ENG is not illuminated.
(d) Reconnect the ECM connector.

OK → **REPLACE ECM (See page 10–24)**

NG

CHECK AND REPAIR HARNESS AND CONNECTOR (COMBINATION METER – ECM)

3 CHECK THAT CHK ENG IS ILLUMINATED

(a) Check that CHK ENG is illuminated when the power switch is turned ON (IG ON).
Standard: CHK ENG is illuminated.

OK → **SYSTEM OK**

NG

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4	INSPECT COMBINATION METER ECU

(a) See the combination meter troubleshooting on page 05–1684.

NG → REPAIR OR REPLACE BULB OR COMBINATION METER ASSEMBLY

OK

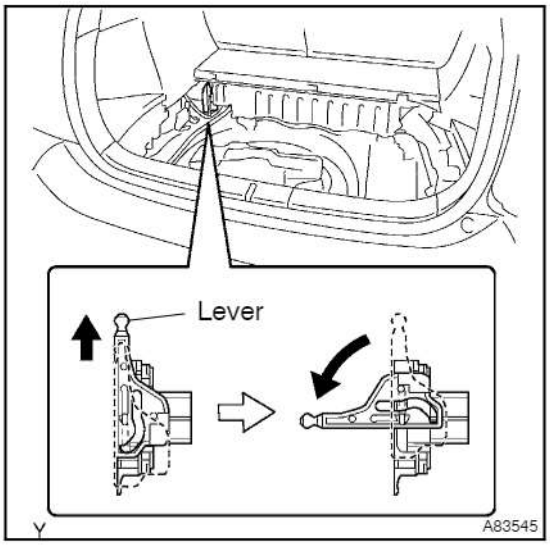
CHECK AND REPAIR HARNESS AND CONNECTOR (COMBINATION METER – ECM)

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HYBRID CONTROL SYSTEM

PRECAUTION

05IGZ–01



1. Precautions for inspecting the hybrid control system

(a) Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip (see page 01–5). After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, do not turn the power switch ON (READY) unless instructed by the repair manual.

(b) After disconnecting the service plug grip, wait at least for 5 minutes before touching any of high–voltage connectors or terminals.

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

(c) Since liquid leakage may occur, wear protective goggles when checking inside the HV battery.

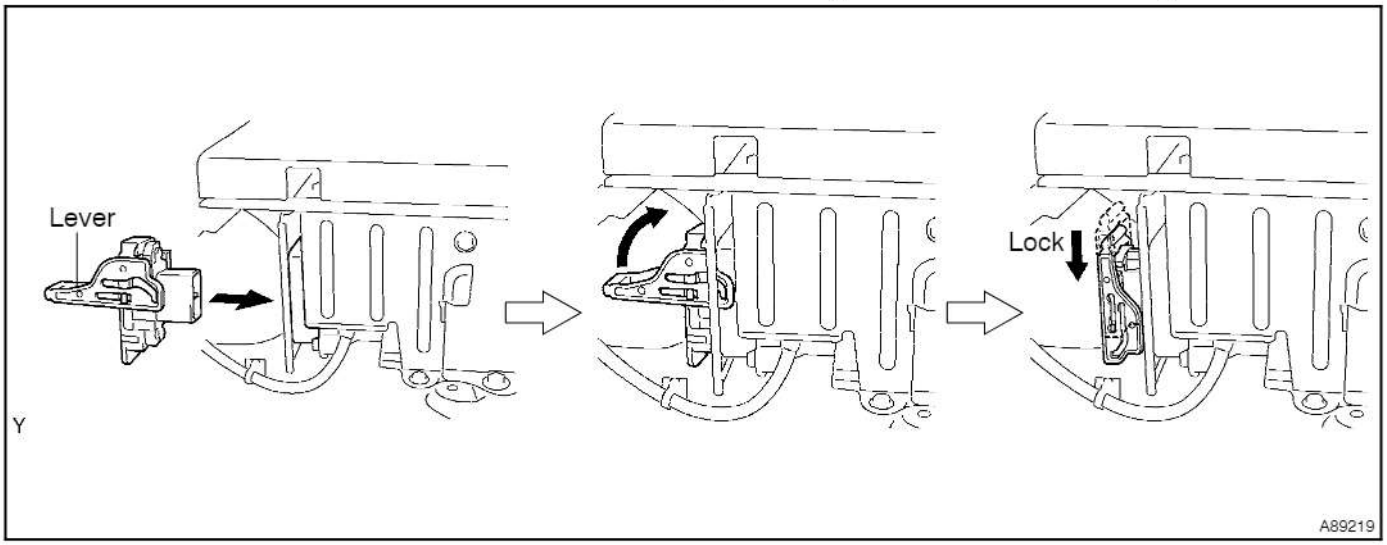
(d) Wear insulated gloves, turn the power switch OFF, and disconnect the negative terminal of the auxiliary battery before touching any of the orange–colored wires of the high–voltage system.

(e) Turn the power switch OFF before performing a resistance check.

(f) Turn the power switch OFF before disconnecting or reconnecting any connector.

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(g) To install this service plug grip, the lever must be flipped and locked downward. Once it is locked in place, it turns the interlock switch ON. Make sure to lock it securely because if you leave it unlocked, the system will output a DTC pertaining to the interlock switch system.



2. NOTICE FOR INITIALIZATION

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

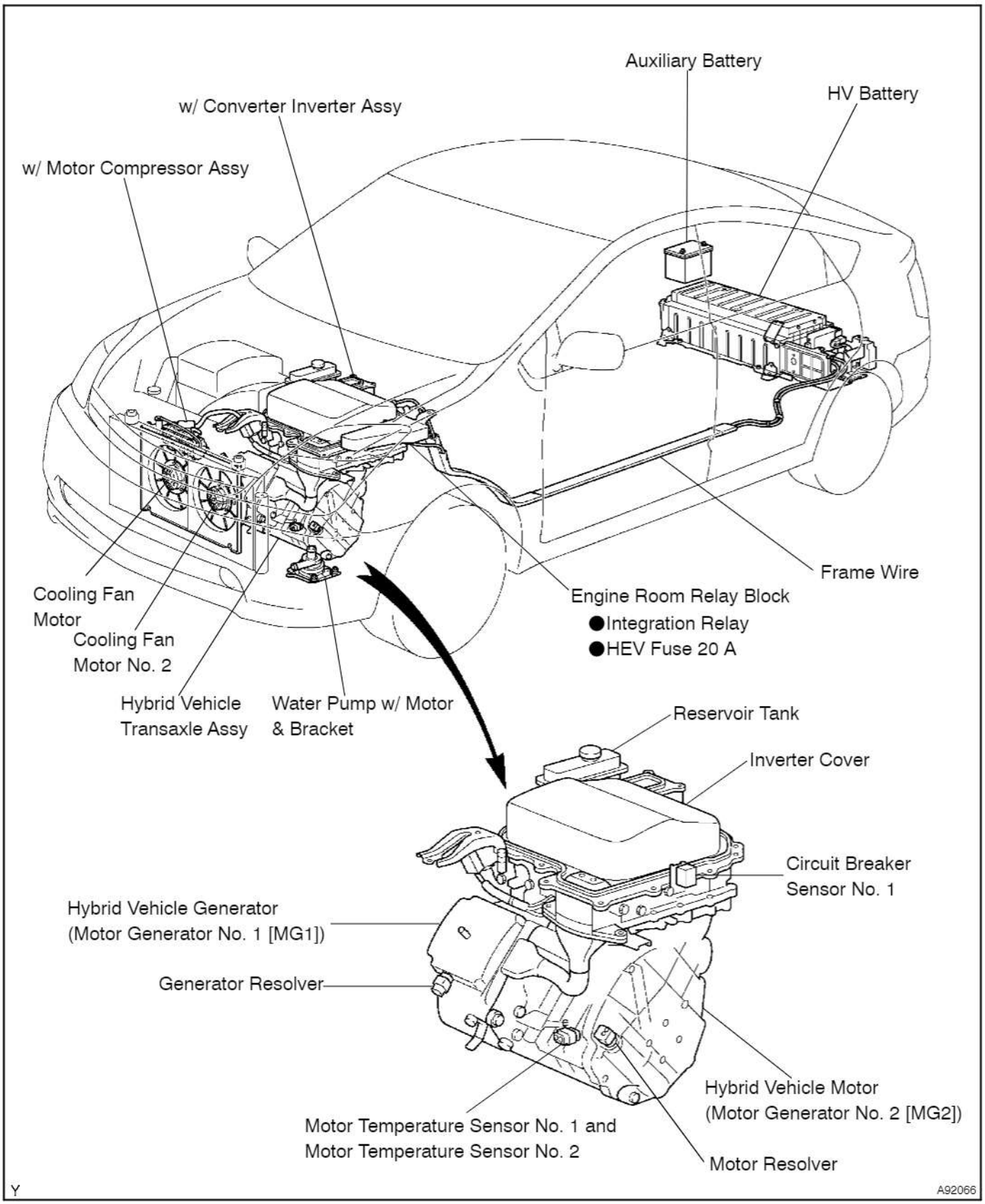
3. NOTICE FOR HYBRID SYSTEM ACTIVATION

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

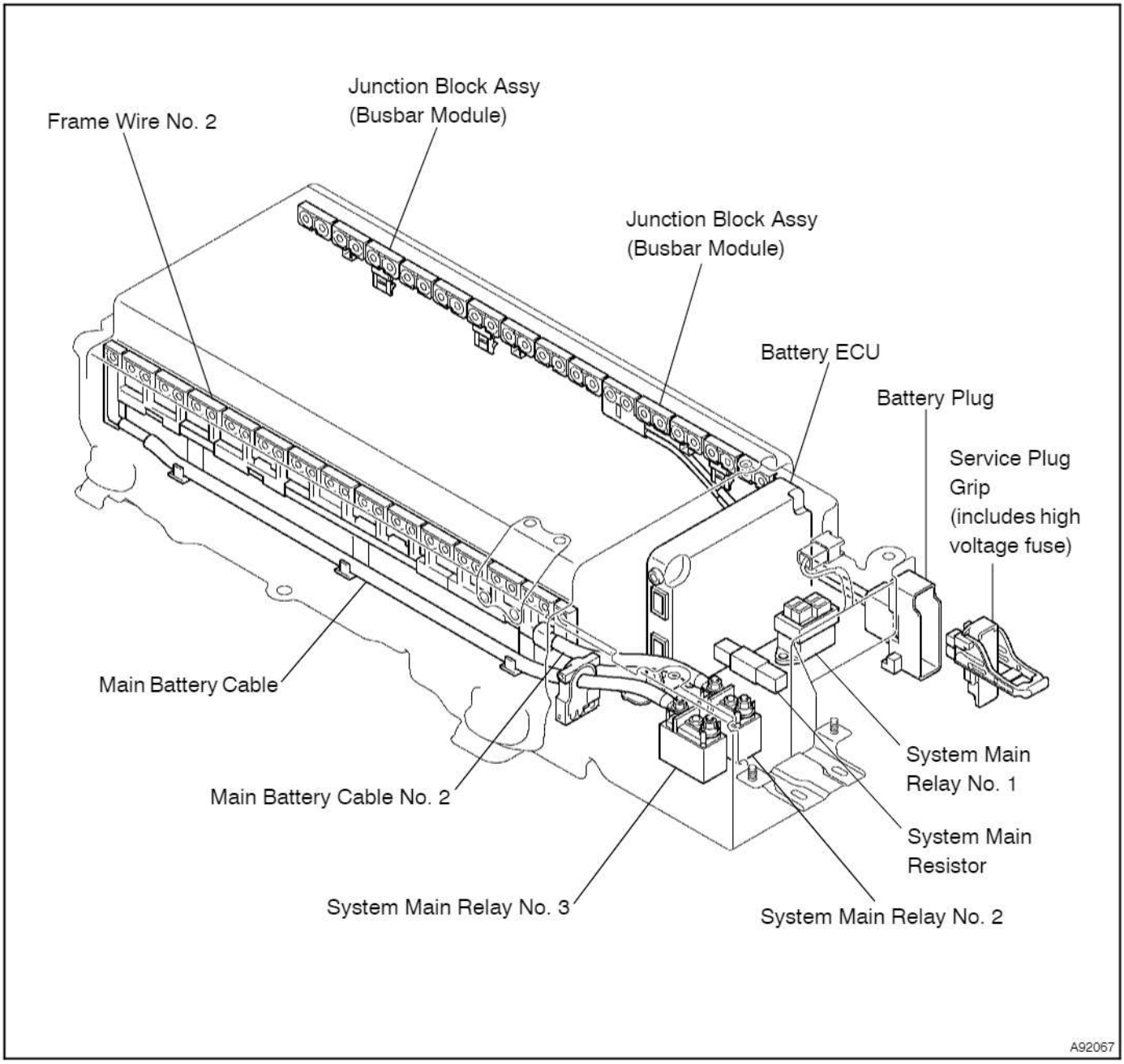
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05IH0-01

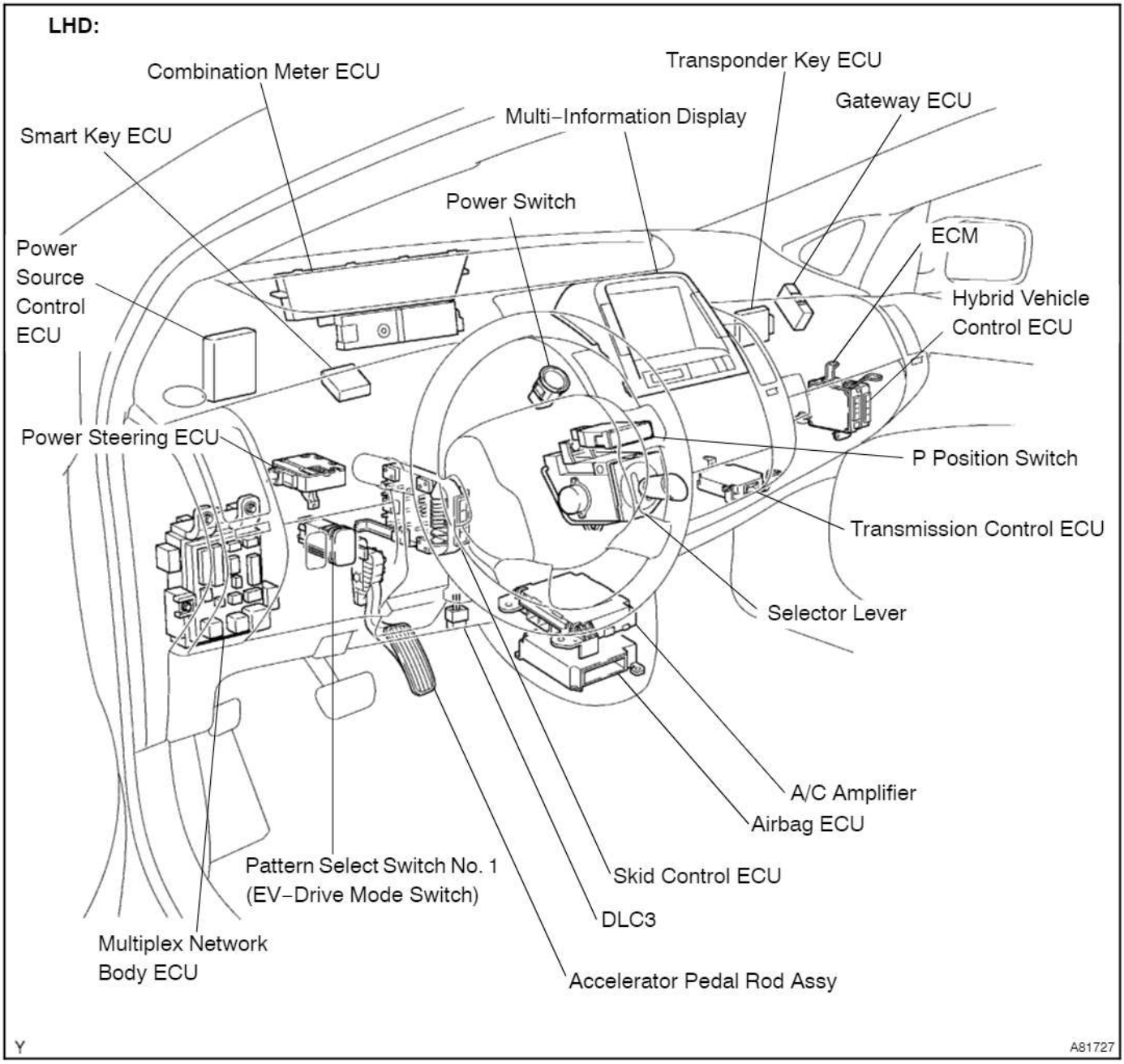
LOCATION



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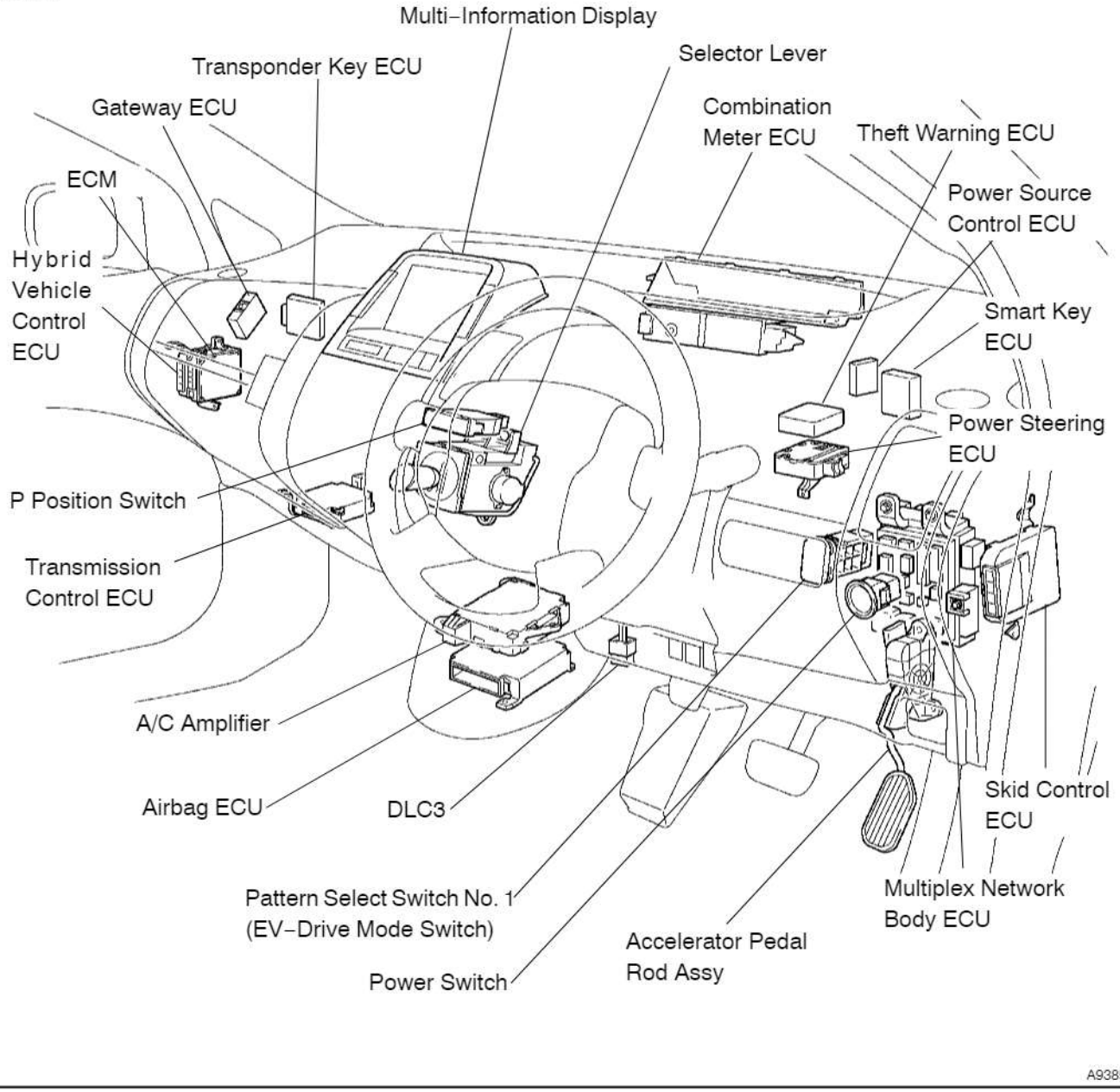


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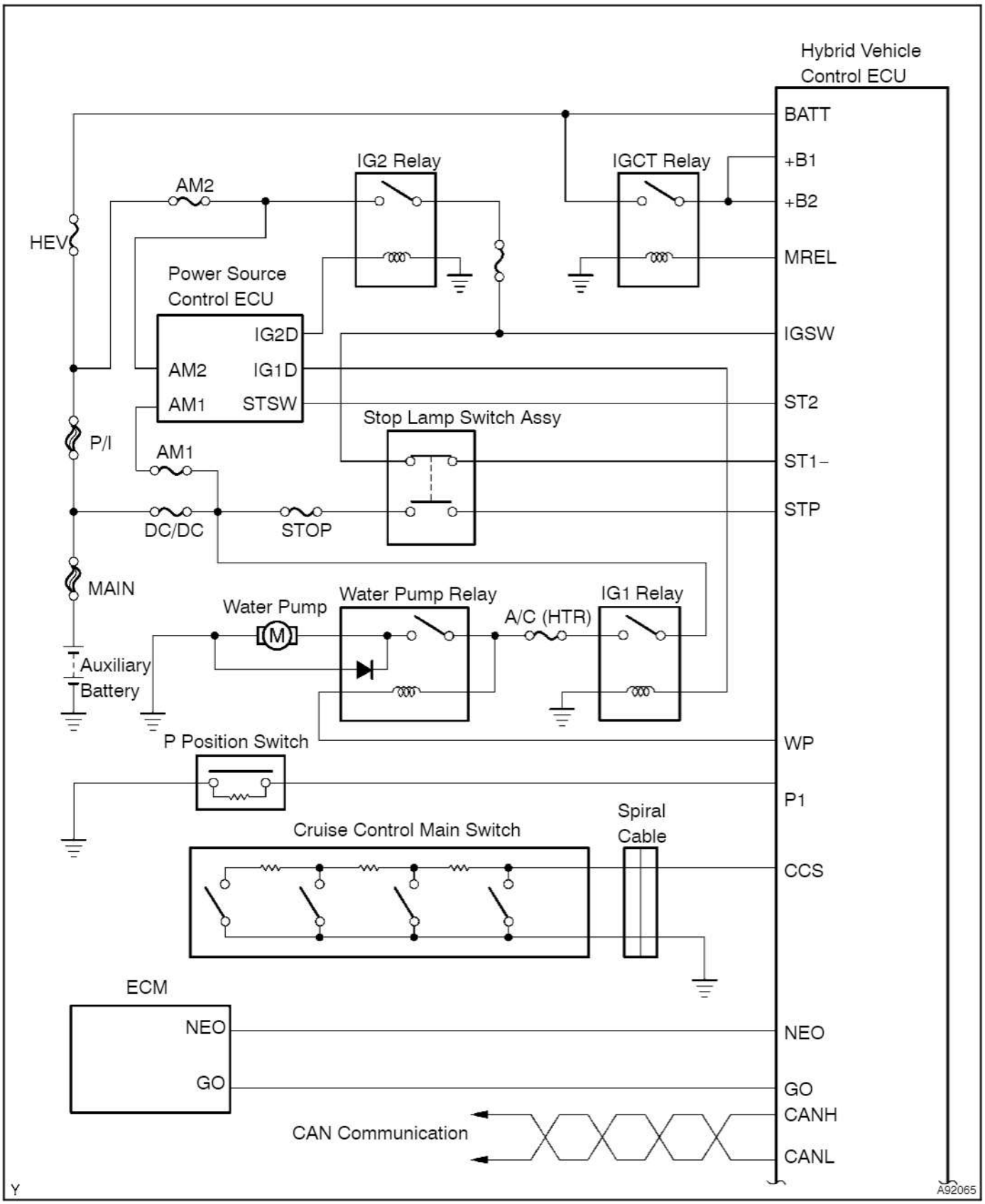
RHD:



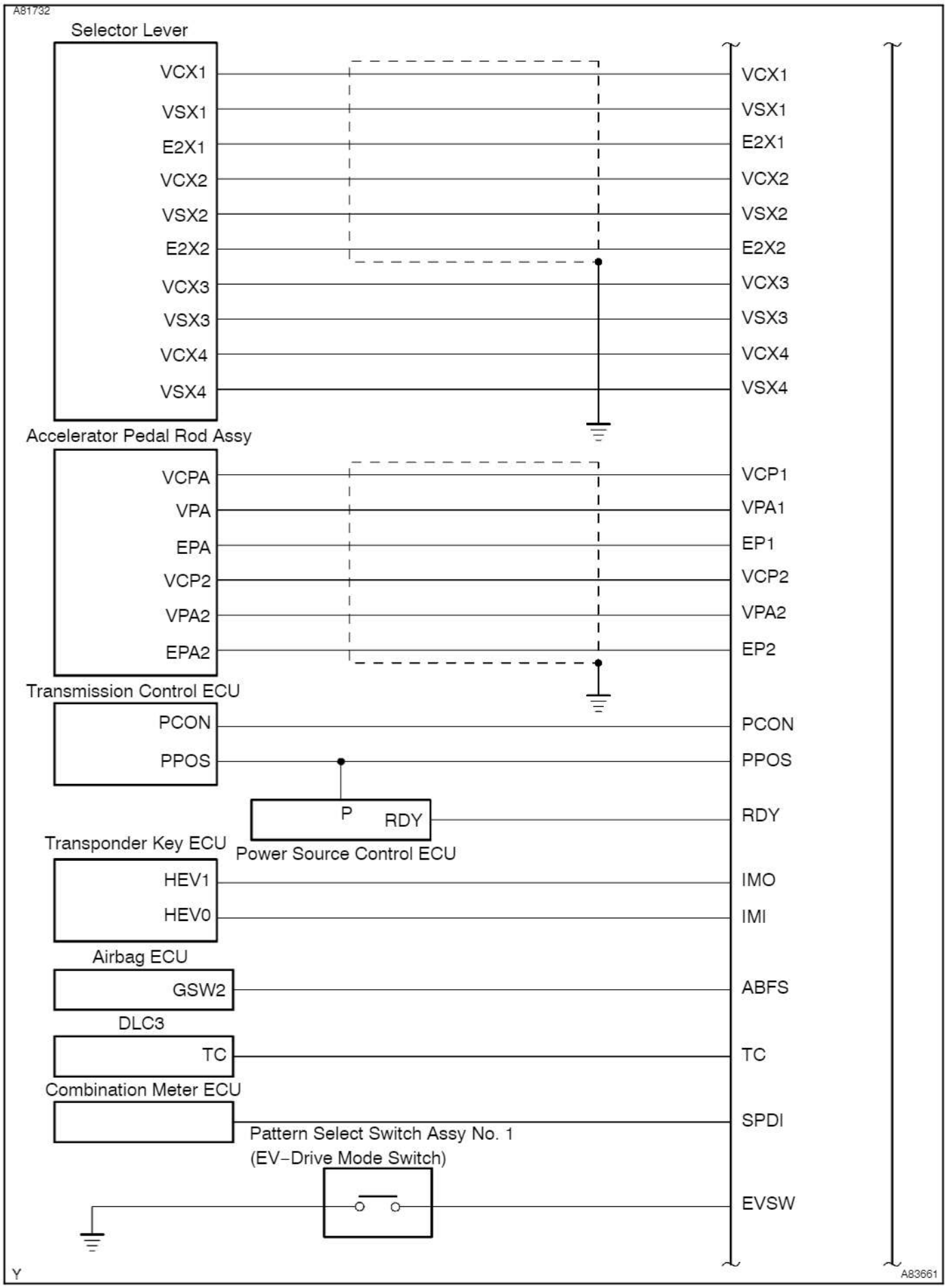
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05IH2-01

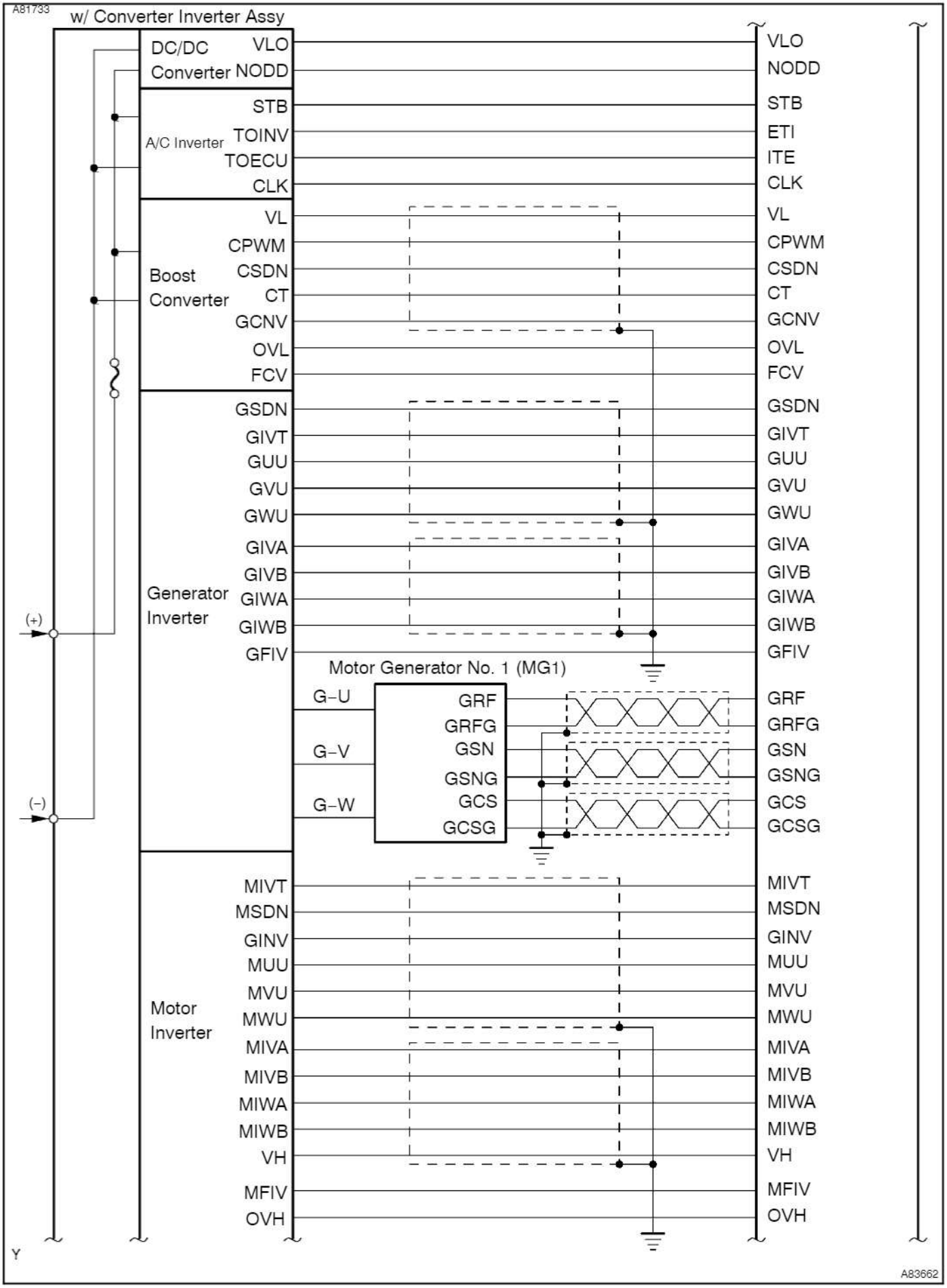
SYSTEM DIAGRAM



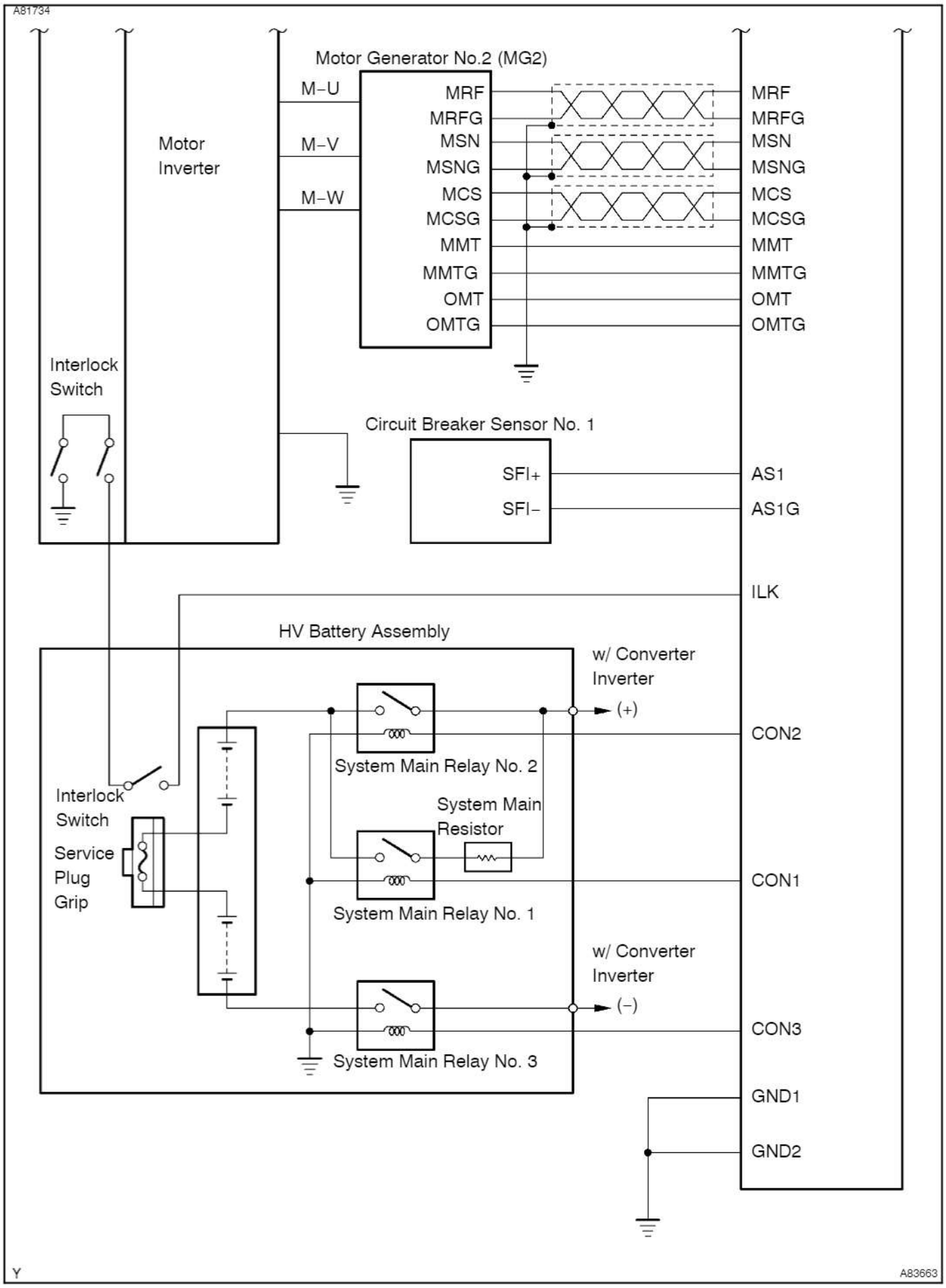
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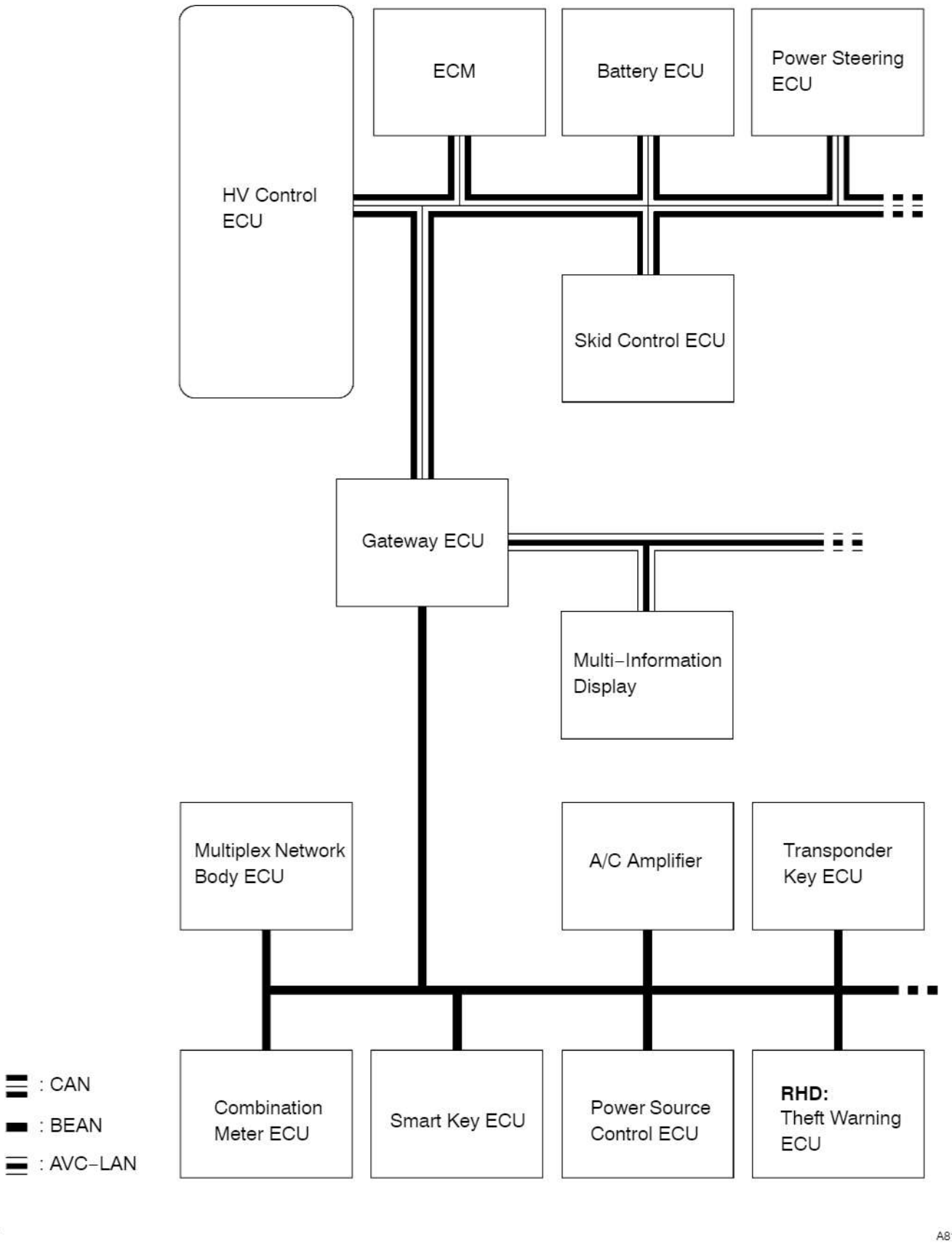


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Communication Diagram:



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05IH3–01

SYSTEM DESCRIPTION

1. GENERAL

The THS–II control system consists of the following control.

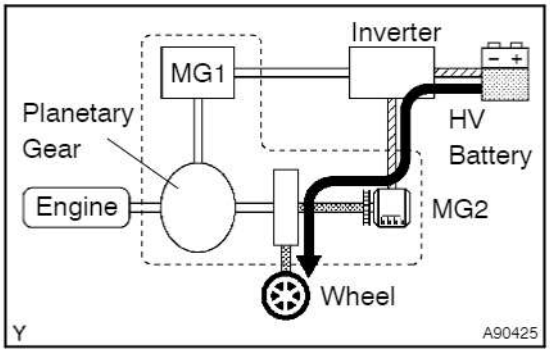
Item	Outline
HV control ECU Control	• The HV control ECU controls the MG1, MG2, engine, regenerative brake control and HV battery SOC. These factors are determined by the shift position, accelerator pedal position and vehicle speed. • The HV control ECU monitors the SOC and temperature of the HV battery, MG1 and MG2, in order to optimally control these items. • When the shift position is in N, the HV control ECU effects shutdown control to electrically stop the MG1 and MG2. • If the drive wheels rotate without traction, the HV control ECU performs the motor traction control that provides a restraint on a rotation of MG2, in order to protect the planetary gear unit and prevent MG1 from generating excessive electricity. • For the purpose of protecting the circuit from high voltage and ensuring the reliability of the circuit shutdown, the HV control ECU effects SMR control through the use of 3 relays to connect and shut down the high–voltage circuit.
ECM Control	The ECM receives the demand power and the target rpm, which were sent from the HV control ECU, and controls the ETCS–i system, fuel injection volume, ignition timing and VVT–i system.
Inverter Control	• In accordance with the signals provided by the HV control ECU, the inverter converts a direct current (HV battery) into an alternating current (MG1 and MG2), or vice versa. In addition, the inverter supplies the AC (MG1) power to the AC (MG2). However, when electricity is supplied from MG1 to MG2 , the electricity is converted into DC inside the inverter. • The HV control ECU sends the signal to the power transistor in the inverter for switching the U, V and W phase of the MG1 and MG2 in order to drive the MG1 and MG2. • The HV control ECU shuts down if it receives an overheating, over–current, or fault voltage signal from the inverter.
Boost Converter Control	• In accordance with the signals provided by the HV control ECU, the boost converter boosts the nominal voltage of DC 201.6 V (for HV battery) up to the maximum voltage of DC 500 V. • The maximum voltage of AC 500 V generated by the MG1 or MG2 is converted into a direct current by the inverter, the boost converter drops the direct current to DC 201.6 V (for HV battery) based on the signals from the HV control ECU.
Converter Control	• DC/DC converter drops the nominal voltage of DC 201.6 V into DC 12 V in order to supply electricity to body electrical components, as well as to recharge the auxiliary battery (DC 12 V). • This converter controls the terminals of the auxiliary battery to a constant voltage.
A/C Inverter Control	A/C inverter converts the nominal voltage of the HV battery from DC 201.6 to AC 201.6 V and supplies power to operate the electric compressor of the A/C system.
MG1 and MG2 Main Control	• MG1, which is rotated by the engine, generates high voltage (maximum voltage of AC 500 V) in order to operate the MG2 and charge the HV battery. Also, it functions as a starter to start the engine. • MG2 primarily provides additional power to the engine in order to increase the overall drive force. During braking, or when the accelerator pedal is not depressed, it generates electricity to recharge the HV battery (regenerative brake system). • Speed sensors detect the speed and position of the MG1 and MG2 and output them to the HV control ECU. • A temperature sensor mounted on the MG2 detects a MG2 temperature and transmits it to the HV control ECU.
Skid Control ECU Control	During braking, the skid control ECU calculates the total braking force and transmits regenerative brake force request to the HV control ECU. Upon receiving this signal, the HV control ECU calculates the regeneration brake demand power value and transmits it to the skid control ECU. Based on this, the skid control ECU calculates and executes the required hydraulic pressure brake force.
Battery ECU Control	The battery ECU effects monitor control to monitor the conditions of the HV battery and cooling fan control to keep the HV battery at a predetermined temperature. Thus, it optimally controls these components.
Shift Control	• The HV control ECU detects the shift position (P, R, N, D, or B) in accordance with the signal provided by the shift position sensor, and controls the MG1, MG2, and engine, in order to create the driving conditions that suit the selected shift position. • The transmission control ECU detects that the driver has pressed the P position switch through a signal provided by the HV control ECU. Then, transmission control ECU operates the shift control actuator in order to mechanically lock the transaxle.

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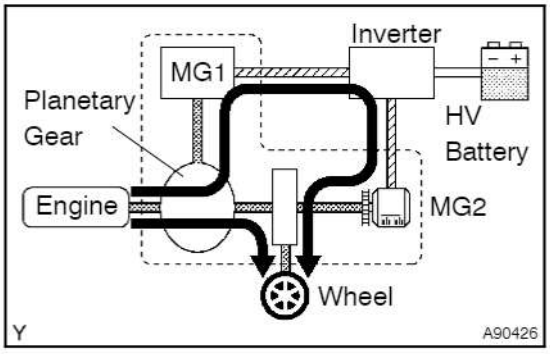
Item	Outline
During Collision Control	At the time of a collision, if the HV control ECU receives an airbag deployment signal from the airbag ECU or an actuation signal from the circuit breaker sensor located in the inverter, it turns OFF the SMR and power switch in order to shut off the entire power supply.
Motor Drive Mode Control	When the EV–drive mode switch located on the instrument panel is manually pushed on by the driver, the HV control ECU operates the vehicle to run with only MG2 if required conditions are satisfied.
Cruise Control System Operation Control	When the cruise control ECU built in the HV control ECU receives a cruise control switch signal, it calculates the cruise control request value, and calculates the motive forces of the engine, MG1, and MG2 to achieve an optimal combination.
Indicator and Warning Lamp Illumination Control	Illuminates or blinks the lamps to inform the driver of the vehicle condition or system malfunction.
Diagnosis	When the HV control ECU detects malfunction, the HV control ECU diagnoses and memorizes values corresponding to the failure.
Fail–Safe	When the HV control ECU detects malfunction, the HV control ECU stops or controls the actuator and ECUs according to the data already stored in its memory.

2. BASIC OPERATION

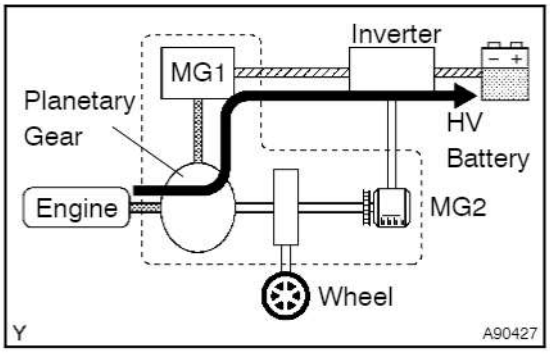
(a) This system controls the following modes in order to achieve the most efficient operations to match the driving conditions:



(1) Supply of electrical power from the HV battery to MG2 provides force to drive the wheels.

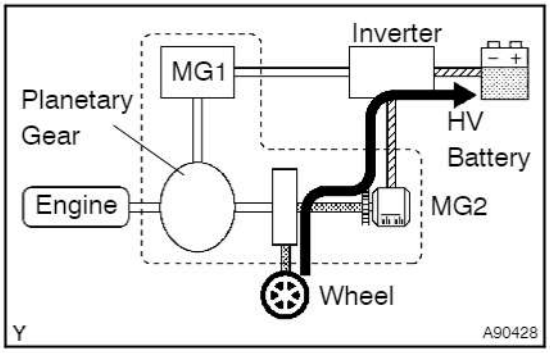


(2) While the wheels are being driven by the engine via the planetary gear, MG1 is rotated by the engine via the planetary gears, in order to supply the generated electricity to MG2.



(3) MG1 is rotated by the engine via the planetary gear, in order to charge the HV battery.

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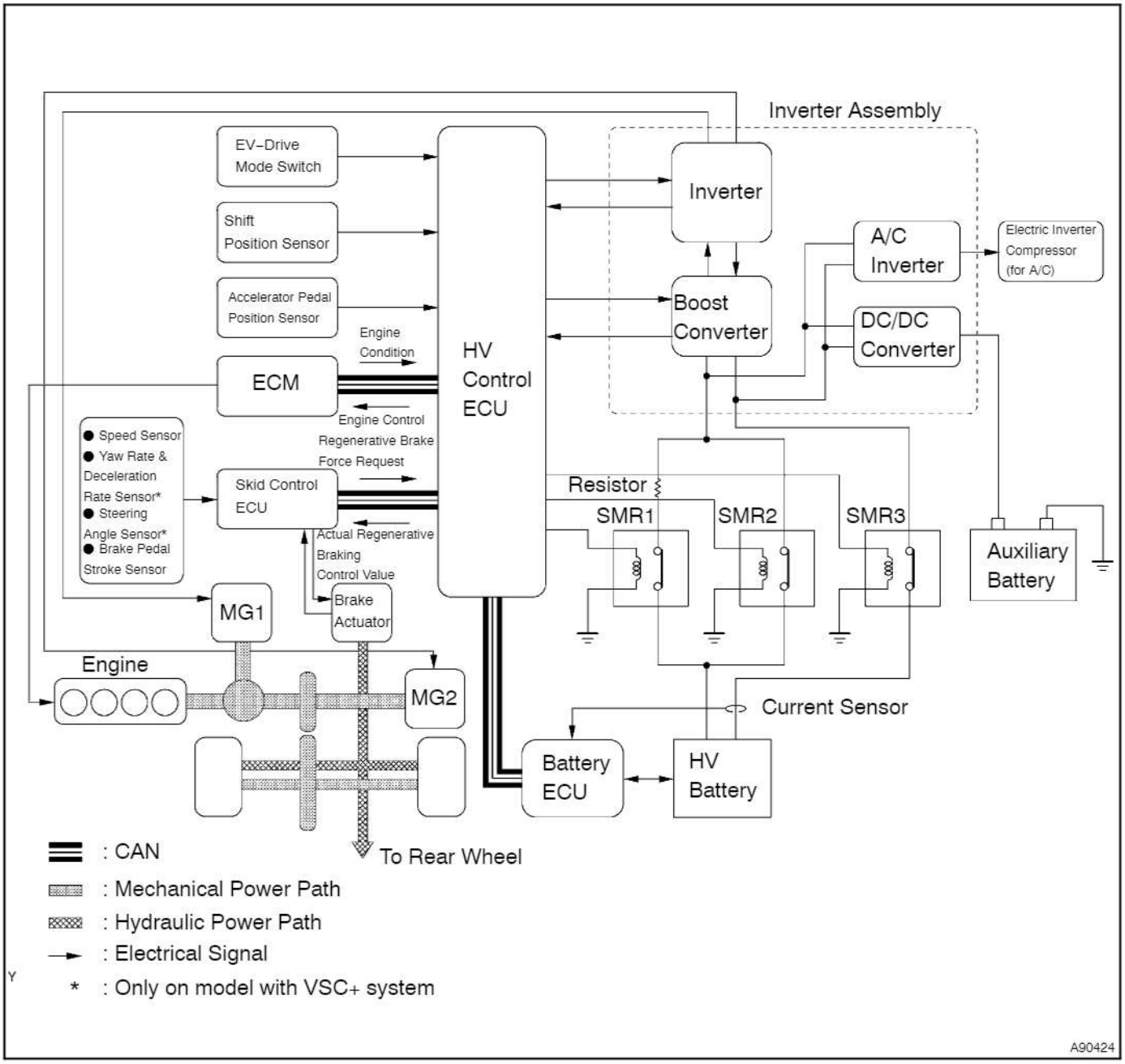


(4) When the vehicle is decelerating, kinetic energy from the wheels is recovered and converted into electrical energy and used to recharge the HV battery by means of MG2.

(b) The HV control ECU switches between these modes ((1), (2), (3), (1) + (2) + (3), or (4)) according to the driving condition. However, when the SOC (State of Charge) of the HV battery is low, the HV battery is charged by the engine by turning MG1.
As a result, it achieves far greater fuel economy compared to conventional gasoline engine vehicles, at a reduced level of exhaust gas emissions. Furthermore, this revolutionary power–train has eliminated the constraints that are associated with electric vehicles (such as their short cruising range or their reliance on external recharging units).

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3. SYSTEM DIAGRAM



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4. FUNCTION OF MAIN COMPONENTS

Item	Outline
MG1	MG1, which is rotated by the engine, generates high–voltage electricity in order to operate the MG2 or charge the HV battery. Also, it functions as a starter to start the engine.
MG2	• Driven by electrical power from the MG1 or HV battery, and generates motive force for the vehicle. • During braking, or when the accelerator pedal is not depressed, it generates electricity to recharge the HV battery (regenerative brake control).
Planetary Gear Unit	Distributes the engine's drive force as appropriate to directly drive the vehicle as well as the generator.
HV Battery	Supplies electric power to the MG2 during start–off, acceleration, and uphill driving. Recharged during braking or when the accelerator pedal is not depressed.
Inverter	Converts the high–voltage DC (HV battery) into AC (MG1 and MG2) and vice versa (converts AC into DC).
Boost Converter	Boosts the nominal voltage of the HV battery from DC 201.6 to DC 500 V and vice versa (drops DC 500 V to DC 201.6 V).
DC/DC Converter	Drops the nominal voltage of DC 201.6 V into DC 12 V in order to supply electricity to body electrical components, as well as to recharge the auxiliary battery (DC 12 V).
A/C Inverter	Converts the nominal voltage of DC 201.6 V of the HV battery to AC 201.6 V and supplies power to operate the electric inverter compressor of the A/C system.
HV Control ECU	Information from each sensor as well as from the ECUs (ECM, Battery ECU, skid control ECU, and EPS ECU) is received, and based on this the required torque and output power is calculated. Sends the calculated result to the ECM, inverter assembly, battery ECU and skid control ECU.
ECM	Activates the ETCS–i (Electronic Throttle Control System–intelligent) in accordance with the target engine speed and required engine motive force received from the HV control ECU.
Battery ECU	Monitors the charging condition of the HV battery.
Skid Control ECU	Controls the regenerative brake that is effected by the MG2 and the hydraulic brake so that the total braking force equals that of a conventional vehicle that is equipped only with hydraulic brakes. Also, performs the brake system control (ABS with EBD, Brake Assist, and VSC+*) conventionally.
Accelerator Pedal Position Sensor	Converts the accelerator pedal position angle into an electrical signal and outputs it to the HV control ECU.
Shift Position Sensor	Converts the shift position into an electrical signal and outputs it to the HV control ECU.
SMR (System Main Relay)	Connects and disconnects the high–voltage power circuit between battery and inverter assembly, through the use of a signal from the HV control ECU.
Interlock Switch (for Inverter Cover and Service Plug Grip)	Verifies that the cover of both the inverter and the service plug grip have been installed.
Circuit Breaker Sensor	The high–voltage circuit is intercepted if a vehicle collision has been detected.
Service Plug Grip	Shuts off the high–voltage circuit of the HV battery when this plug is removed for vehicle inspection or maintenance.

*: Only on model with VSC+ System

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05IH4–01

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used at step 3, 4, 5, 8.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05–231)

3	CONNECT INTELLIGENT TESTER II TO DLC3

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

4	CHECK AND RECORD DTC AND FREEZE FRAME DATA (See page 05–246)

HINT:
If a DTC related to the CAN communication system malfunction is output, first troubleshoot and repair the CAN communication (see page 05–2312).

5	CLEAR DTC (See page 05–246)

6	PROBLEM SYMPTOM CONFIRMATION

(a) When the malfunction does not occur, go to A.
(b) When the malfunction occurs, go to B.

B	Go to step 8

A

7	SYMPTOM SIMULATION

8	CHECK DTC (See page 05–246)

9	DTC CHART (See page 05–268)

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10	CIRCUIT INSPECTION

11	IDENTIFICATION OF PROBLEM

12	ADJUSTMENT AND/OR REPAIR

13	CONFIRMATION TEST

END

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05IH5-01

CUSTOMER PROBLEM ANALYSIS CHECK

Prius Problem Check Sheet

Please fill in the blanks within bold frame

Name of Dealer	Person in Charge at Headquarters	Person in Charge at Dealer
Office		

Vehicle Specifications

Model Code	NHW 20 –AHE	Problem Occurrence Date	. .	Odometer Reading	miles km
Licence No.		Service Entry Date	. .	Production date	. .
VIN		Option	☐ Navigation (☐ equipped by manufacturer ☐ dealer) ☐ Cold climate specifications ☐ others ( )		

Interview Results

Contents of complaint (Status when and before/after occurring in the order of events as correct as possible)	Characteristics of Customer	
	Vehicle used before	
	Main use area	☐ city area ☐ suburbs ☐ mountain area ☐ other ( )
	Frequency in use	☐ every day ☐ ____ times/week or month

Driving Condition	Road Condition	Vehicle Condition			
Vehicle Speed _____ mph _____ km/h ☐ when starting ☐ when accelerating ☐ when normal driving ☐ when decelerating ☐ when braking ☐ when stopping ☐ when parking ☐ when turning ☐ when ABS actuating ☐ cruise control driving ☐ EV mode driving ☐ others ( )	☐ level road ☐ up hill or down hill ☐ dry paved road ☐ wet paved road ☐ rough paved road ☐ unpaved road ☐ snowy or frozen road ☐ bump or curb ☐ others ( )	☐ Power switch ON (not getting ready) ☐ when starting ☐ right after starting ☐ until____ minute after starting ☐ until____ minute after starting of driving ☐ when stopping system Status of engine ☐ while stopping engine ☐ when revolving engine HV battery indication ☐ _____/8 segments ☐ unidentified A/C status ☐ ON ☐ OFF ☐ unidentified	Power switch indicator ☐ illumination (orange or green) ☐ blink ☐ no illumination Shift position (indication) ☐ P ☐ R ☐ N ☐ D ☐ B ☐ when operating _____ → _____ ☐ no indication ☐ blink ☐ unidentified P position switch status ☐ illumination ☐ blink ☐ no illumination ☐ unidentified	Warning lamp ☐ ⚠ ☐ engine ☐ charge ☐ PS ☐ HV battery ☐ HV ☐ brake (yellow or red) ☐ ABS ☐ VSC ☐ slip ☐ coolant ☐ other warning ( ) ☐ no warning lamp	Brake operation ☐ brake slowly ☐ brake suddenly ☐ operation with a left foot ☐ not operating Accelerator pedal operation ☐ when depressing ☐ when releasing ☐ when getting a foot off from the pedal Frequency in occurrence ☐ always ☐ _____ times/week or month ☐ only once
Weather: _____ Temperature: _____ °F _____ °C Fuel level ____/10 segments	☐ unidentified ☐ unidentified ☐ unidentified				

Vehicle Verification Results

Diagnostic trouble code					
HV ★				Brake ★	
INF				INF	
SFI ★		Power Source Control		Gateway	
Battery ★		A/C		Smart	
Transmission Control ★		SRS		Immobilizer	
EPS ★		Body		Theft Deterrent	
				Navigation	

★: Indicates that the system has a function to store the freeze frame data. If DTCs have been set, please attach the freeze frame data.

Vehicle Inspection Results (Verification items, reason to identify/presume the cause parts, etc.)	Duplication Status
	☐ always ☐ sometimes conditions when the malfunction occurred ( ) ☐ no reproduction
Replacement Parts	**Confirmation Results After Repair**
Problem parts: No/Yes (Sending date: . .)	☐ normal ☐ reproduction ☐ other ( )

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05IH6-01

CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test (see page 01–36).
  (1) In the simulation test, reproduce the driving condition at the trouble occurrence according to the customer's comments and freeze frame data recorded with DTCs, such as an opening angle of the accelerator pedal, SOC, engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

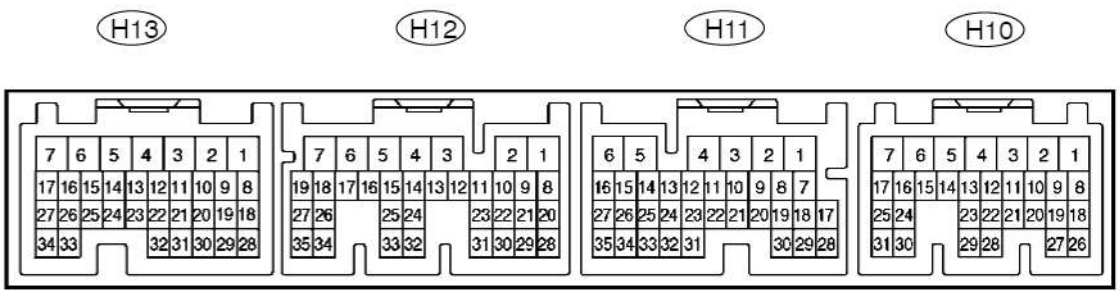
(b) Check the connector(s) and terminal(s) (see page 01–46).

(c) Wiggle the harness and connector(s) (see page 01–46).

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05IH8-01

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
ST2 (H10–5) – GND1 (H10–1)	Y – W–B	Starter signal	Power switch ON (READY)	9 to 14
IGSW (H10–7) – GND1 (H10–1)	O – W–B	IG signal	Power switch ON (IG)	9 to 14
BATT (H11–6) – GND1 (H10–1)	Y – W–B	Auxiliary battery (for measuring the battery voltage and for the HV control ECU memory)	Always	9 to 14
+B1 (H12–7) – GND1 (H10–1)	L – W–B	Power source of HV control ECU	Power switch ON (IG)	9 to 14
+B2 (H12–6) – GND1 (H10–1)	L – W–B	Power source of HV control ECU	Power switch ON (IG)	9 to 14
MREL (H12–4) – GND1 (H10–1)	O – W–B	Main relay	Power switch ON (IG)	9 to 14
CANH (H10–8) – GND1 (H10–1)	B – W–B	HIGH–level CAN bus line	Power switch ON (IG)	Pulse generation (see waveform 1)
CANL (H10–9) – GND1 (H10–1)	W – W–B	LOW–level CAN bus line	Power switch ON (IG)	Pulse generation (see waveform 2)
NEO (H12–12) – GND1 (H10–1)	LG – W–B	Engine speed signal	Engine running	Pulse generation (see waveform 3)
GO (H12–13) – GND1 (H10–1)	Y – W–B	G signal	Engine running	Pulse generation (see waveform 4)
SPDI (H10–19) – GND1 (H10–1)	V – W–B	Vehicle speed signal	Driving at approximately 20 km/h (12 mph)	Pulse generation (see waveform 5)
VPA1 (H12–26) – EP1 (H12–27)	L – B	Accelerator pedal position sensor (for the HV system)	Power switch ON (IG), accelerator pedal released	0.5 to 1.1
VPA1 (H12–26) – EP1 (H12–27)	L – B	Accelerator pedal position sensor (for the HV system)	Power switch ON (IG), engine stopped in P position, accelerator pedal fully depressed	2.6 to 4.5
VPA2 (H12–34) – EP2 (H12–35)	W – R	Accelerator pedal position sensor (for the sensor malfunction detection)	Power switch ON (IG),accelerator pedal fully depressed	1.2 to 2.0
VPA2 (H12–34) – EP2 (H12–35)	W – R	Accelerator pedal position sensor (for the sensor malfunction detection)	Power switch ON (IG), engine stopped in P position, accelerator pedal released	3.4 to 5.3
VCP1 (H12–25) – EP1 (H12–27)	Y – B	Power source of accelerator pedal position sensor (for VPA1)	Power switch ON (IG)	4.5 to 5.5

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
VCP2 (H12–33) – EP2 (H12–35)	G – R	Power source of accelerator pedal position sensor (for VPA2)	Power switch ON (IG)	4.5 to 5.5
VSX1 (H10–25) – E2X1 (H10–15)	B – R	Shift position sensor (main)	Power switch ON (IG), selector lever home position	2.0 to 3.0
VSX1 (H10–25) – E2X1 (H10–15)	B – R	Shift position sensor (main)	Power switch ON (IG), selector lever moved to R position	RHD: 0.2 to 1.0 LHD: 4.0 to 4.8
VSX1 (H10–25) – E2X1 (H10–15)	B – R	Shift position sensor (main)	Power switch ON (IG), selector lever moved to B or D position	RHD: 4.0 to 4.8 LHD: 0.2 to 1.0
VSX2 (H10–24) – E2X2 (H10–14)	L – Y	Shift position sensor (sub)	Power switch ON (IG), selector lever home position	2.0 to 3.0
VSX2 (H10–24) – E2X2 (H10–14)	L – Y	Shift position sensor (sub)	Power switch ON (IG), selector lever moved to R position	RHD: 0.2 to 1.0 LHD: 4.0 to 4.8
VSX2 (H10–24) – E2X2 (H10–14)	L – Y	Shift position sensor (sub)	Power switch ON (IG), selector lever moved to B or D position	RHD: 4.0 to 4.8 LHD: 0.2 to 1.0
VCX1 (H10–17) – E2X1 (H10–15)	W – R	Power source of shift position sensor (for VSX1)	Power switch ON (IG)	4.5 to 5.5
VCX2 (H10–16) – E2X2 (H10–14)	G – Y	Power source of shift position sensor (for VSX2)	Power switch ON (IG)	4.5 to 5.5
VSX3 (H10–23) – GND1 (H10–1)	BR – W–B	Select position sensor (main)	Power switch ON (IG), selector lever home position	RHD: 3.0 to 4.85 LHD: 0.5 to 2.0
VSX3 (H10–23) – GND1 (H10–1)	BR – W–B	Select position sensor (main)	Power switch ON (IG), selector lever moved to R, N or D position	RHD: 0.5 to 2.0 LHD: 3.0 to 4.85
VSX4 (H10–30) – GND1 (H10–1)	SB – W–B	Select position sensor (sub)	Power switch ON (IG), selector lever home position	RHD: 3.0 to 4.85 LHD: 0.5 to 2.0
VSX4 (H10–30) – GND1 (H10–1)	SB– W–B	Select position sensor (sub)	Power switch ON (IG), selector lever moved to R, N or D position	RHD: 0.5 to 2.0 LHD: 3.0 to 4.85
VCX3 (H10–21) – GND1 (H10–1)	W – W–B	Power source of select position sensor (for VSX3)	Power switch ON (IG)	9 to 14
VCX4 (H10–31) – GND1 (H10–1)	P – W–B	Power source of select position sensor (for VSX4)	Power switch ON (IG)	9 to 14
NODD (H12–24) – GND1 (H10–1)	V – W–B	DC/DC movement monitor or stop request signal	When converter is in normal operation	5 to 7
NODD (H12–24) – GND1 (H10–1)	V – W–B	DC/DC movement monitor or stop request signal	When converter is improper	2 to 4
NODD (H12–24) – GND1 (H10–1)	V – W–B	DC/DC movement monitor or stop request signal	When converter is required to stop	0.1 to 0.5
VLO (H12–31) – GND1 (H10–1)	L – W–B	Two–stage selector signal	Converter switching to 14 V output	13 to 14
VLO (H12–31) – GND1 (H10–1)	L – W–B	Two–stage selector signal	Converter switching to 13.5 V output	Below 0.5
TC (H10–6) – GND1 (H10–1)	P – W–B	Terminal TC of DLC3	Power switch ON (IG)	9 to 14
STP (H11–3) – GND1 (H10–1)	L – W–B	Stop lamp switch	Brake pedal depressed	9 to 14
STP (H11–3) – GND1 (H10–1)	L – W–B	Stop lamp switch	Brake pedal released	2 to 3
ABFS (H10–20) – GND1 (H10–1)	L – W–B	Airbag deployment signal	Power switch ON (READY) (2 seconds after ACC ON)	Pulse generation (see waveform 6 to 8)
AS1 (H12–15) – AS1G (H12–16)	Y – W	Circuit breaker sensor No. 1	Satellite signal system normal	2.5 to 2.9
ILK (H11–1) – GND1 (H10–1)	V – W–B	Interlock switch	Power switch ON (IG), inverter cover and service plug grip installed normally	Below 1

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
ILK (H11–1) – GND1 (H10–1)	V – W–B	Interlock switch	Power switch ON (IG), inverter cover or service plug grip detached	9 to 14
CON1 (H12–1) – GND1 (H10–1)	R – W–B	System main relay No. 1	Power switch OFF to ON (READY)	Pulse generation (see waveform 9)
CON2 (H12–2) – GND1 (H10–1)	G – W–B	System main relay No. 2	Power switch OFF to ON (READY)	Pulse generation (see waveform 9)
CON3 (H12–3) – GND1 (H10–1)	Y – W–B	System main relay No. 3	Power switch OFF to ON (READY)	Pulse generation (see waveform 9)
VH (H11–26) – GINV (H11–23)	Y – W–B	Inverter condenser voltage monitor	Power switch ON (READY)	1.6 to 3.8
GUU (H11–15) – GINV (H11–23)	B – Y	Generator switch U signal	Power switch ON (IG)	Pulse generation (see waveform 10)
GVU (H11–14) – GINV (H11–23)	G – Y	Generator switch V signal	Power switch ON (IG)	Pulse generation (see waveform 10)
GWU (H11–13) – GINV (H11–23)	Y – Y	Generator switch W signal	Power switch ON (IG)	Pulse generation (see waveform 10)
GIVA (H11–34) – GINV (H11–23)	W – Y	Generator V phase current	Power switch ON (IG)	Approximately 0
GIVB (H11–33) – GINV (H11–23)	B – Y	Generator V phase current	Power switch ON (IG)	Approximately 0
GIWA (H11–32) – GINV (H11–23)	R – Y	Generator W phase current	Power switch ON (IG)	Approximately 0
GIWB (H11–31) – GINV (H11–23)	G – Y	Generator W phase current	Power switch ON (IG)	Approximately 0
GIVT (H11–27) – GINV (H11–23)	W – Y	Generator inverter temperature sensor	Power switch ON (IG)	2 to 4.5
GSDN (H11–16) – GINV (H11–23)	R – W–B	Generator shutdown signal	Power switch ON (READY), N position	0.2 to 0.7
GSDN (H11–16) – GINV (H11–23)	R – W–B	Generator shutdown signal	Power switch ON (READY), P position	5.1 to 13.6
GFIV (H11–35) – GINV (H11–23)	GR – W–B	Generator inverter fail signal	Power switch ON (IG), inverter normal	5.4 to 7.4
GFIV (H11–35) – GINV (H11–23)	GR – W–B	Generator inverter fail signal	Power switch ON (IG), inverter abnormal	2 to 3
GRF (H13–27) – GRFG (H13–26)	B – W	Generator resolver signal	Generator resolver stopped or rotating	Pulse generation (see waveform 11, 12)
GSN (H13–22) – GSNG (H13–21)	R – G	Generator resolver signal	Generator resolver stopped or rotating	Pulse generation (see waveform 11, 12)
GCS (H13–23) – GCSG (H13–24)	Y – BR	Generator resolver signal	Generator resolver stopped or rotating	Pulse generation (see waveform 11, 12)
OMT (H13–30) – OMTG (H13–29)	B – G	Motor temperature sensor No. 2	Refer to DATA LIST on page 05–262	–
MUU (H11–9) – GINV (H11–23)	B – Y	Motor switch U signal	Power switch ON (IG)	Pulse generation (see waveform 13)
MVU (H11–10) – GINV (H11–23)	W – Y	Motor switch V signal	Power switch ON (IG)	Pulse generation (see waveform 13)
MWU (H11–11) – GINV (H11–23)	R – Y	Motor switch W signal	Power switch ON (IG)	Pulse generation (see waveform 13)
MIVA (H11–30) – GINV (H11–23)	G – Y	Motor V phase current	Power switch ON (IG)	Approximately 0
MIVB (H11–21) – GINV (H11–23)	W – Y	Motor V phase current	Power switch ON (IG)	Approximately 0
MIWA (H11–29) – GINV (H11–23)	R – Y	Motor W phase current	Power switch ON (IG)	Approximately 0

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
MIWB (H11–20) – GINV (H11–23)	B – Y	Motor W phase current	Power switch ON (IG)	Approximately 0
MIVT (H11–19) – GINV (H11–23)	L – Y	Motor inverter temperature sensor	Power switch ON (IG)	2 to 4.5
MSDN (H11–8) – GINV (H11–23)	G – W–B	Motor shutdown signal	Power switch ON (READY), N position	0.2 to 0.7
MSDN (H11–8) – GINV (H11–23)	G – W–B	Motor shutdown signal	Power switch ON (READY), P position	5.1 to 13.6
OVH (H11–22) – GINV (H11–23)	BR – W–B	Motor inverter over voltage signal	Power switch ON (IG), inverter normal	5.3 to 7.3
OVH (H11–22) – GINV (H11–23)	BR – W–B	Motor inverter over voltage signal	Power switch ON (IG), inverter abnormal	1.9 to 2.9
MFIV (H11–18) – GINV (H11–23)	G – W–B	Motor inverter fail signal	Power switch ON (IG), inverter normal	5.4 to 7.4
MFIV (H11–18) – GINV (H11–23)	G – W–B	Motor inverter fail signal	Power switch ON (IG), inverter abnormal	2 to 3
MRF (H13–34) – MRFG (H13–33)	L – P	Motor resolver signal	Motor resolver stopped or rotating	Pulse generation (see waveform 11, 12)
MSN (H13–20) – MSNG (H13–19)	G – R	Motor resolver signal	Motor resolver stopped or rotating	Pulse generation (see waveform 11, 12)
MCS (H13–32) – MCSG (H13–31)	Y – BR	Motor resolver signal	Motor resolver stopped or rotating	Pulse generation (see waveform 11, 12)
MMT (H13–18) – MMTG (H13–28)	B – R	Motor temperature sensor No. 1	Refer to DATA LIST on page 05–262	–
VL (H12–30) – GCNV (H12–8)	Y – G	Boost converter input voltage	Power switch ON (READY)	1.9 to 3.4
OVL (H12–22) – GCNV (H12–8)	B – G	Boost converter over voltage signal	Power switch ON (IG), boost converter normal	5.3 to 7.7
OVL (H12–22) – GCNV (H12–8)	B – G	Boost converter over voltage signal	Power switch ON (IG), boost converter abnormal	1.9 to 3.0
FCV (H12–20) – GCNV (H12–8)	W – G	Boost converter fail signal	Power switch ON (IG), boost converter normal	5.3 to 7.7
FCV (H12–20) – GCNV (H12–8)	W – G	Boost converter fail signal	Power switch ON (IG), boost converter abnormal	1.9 to 3.0
CT (H12–21) – GCNV (H12–8)	R – G	Boost converter temperature sensor	Power switch ON (IG)	2.0 to 4.5
CPWM (H12–10) – GCNV (H12–8)	B – G	Boost converter PWM switch signal	Power switch ON (READY), parking brake ON, D position, brake pedal and accelerator pedal depressed	Pulse generation (see waveform 14)
CSDN (H12–9) – GCNV (H12–8)	W – G	Boost converter shutdown signal	Power switch ON (IG)	5.6 or higher
CSDN (H12–9) – GCNV (H12–8)	W – G	Boost converter shutdown signal	Power switch ON (READY)	Below 0.7
ST1– (H11–2) – GND1 (H10–1)	G – W–B	Stop lamp switch (opposite to STP)	Power switch ON (IG) and brake pedal depressed	Below 0.5
ST1– (H11–2) – GND1 (H10–1)	G – W–B	Stop lamp switch (opposite to STP)	Power switch ON (IG) and brake pedal released	9 to 14
CCS (H10–13) – GND1 (H10–1)	V – W–B	Cruise control switch	Cruise control system – Terminal of ECU – CCS terminal (see page 05–2452)	–
EVSW (H10–27) – GND1 (H10–1)	B – W–B	EV–drive mode switch	Power switch ON (IG), EV–drive mode switch ON	Below 1
EVSW (H10–27) – GND1 (H10–1)	B – W–B	EV–drive mode switch	Power switch ON (IG), EV–drive mode switch OFF	9 to 14
IMI (H10–18) – GND1 (H10–1)	W – W–B	Immobilizer communication	Immobilizer communicating	Pulse generation (see waveform 15)

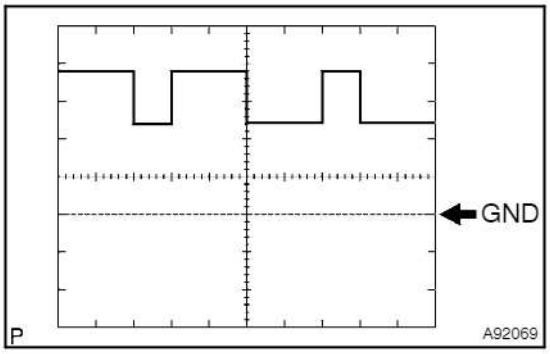
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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
IMO (H10–26) – GND1 (H10–1)	R – W–B	Immobilizer communication	Immobilizer communicating	Pulse generation (see waveform 15)
P1 (H11–17) – GND1 (H10–1)	Y – W–B	P position switch	Power switch ON (IG), P position switch ON	3 to 5
P1 (H11–17) – GND1 (H10–1)	Y – W–B	P position switch	Power switch ON (IG), P position switch OFF	7 to 12
PCON (H13–9) – GND1 (H10–1)	LG – W–B	P position control signal	Power switch ON (IG)	Pulse generation (see waveform 16)
PPOS (H13–10) – GND1 (H10–1)	W – W–B	P position signal	Power switch ON (IG)	Pulse generation (see waveform 16)
RDY (H10–28) – GND1 (H10–1)	R – W–B	READY control signal	Power switch ON (IG)	Pulse generation (see waveform 17)
RDY (H10–28) – GND1 (H10–1)	R – W–B	READY control signal	Power switch ON (READY)	Pulse generation (see waveform 18)
CLK (H12–17) – GND1 (H10–1)	G – W–B	A/C communication	Power switch ON (IG), A/C operating	Pulse generation (see waveform 19)
ITE (H12–14) – GND1 (H10–1)	Y – W–B	A/C communication	Power switch ON (IG), A/C operating	Pulse generation (see waveform 19)
ETI (H11–24) – GND1 (H10–1)	R – W–B	A/C communication	Power switch ON (IG), A/C operating	Pulse generation (see waveform 19)
STB (H11–25) – GND1 (H10–1)	W – W–B	A/C communication	Power switch ON (IG), A/C operating	Pulse generation (see waveform 19)
WP (H12–5) – GND1 (H10–1)	O – W–B	Water pump relay control	Power switch ON (IG), A/C operating	Below 2
GND1 (H10–1) – Body ground	W–B – Body ground	Ground	Always (resistance check)	Below 5 Ω
GND2 (H10–4) – Body ground	W–B – Body ground	Ground	Always (resistance check)	Below 5 Ω

1. Oscilloscope waveforms

HINT:

In the oscilloscope waveform samples, which are provided here for informational purposes. Noise and fluttering waveforms have been omitted.



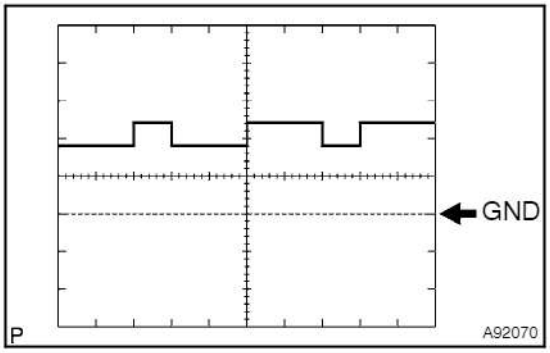
(a) Waveform 1 (HIGH–level CAN bus line)

Item	Contents
Terminal	CANH – GND1
Equipment Setting	1 V/Division, 2 μs/Division
Condition	Power switch ON (IG)

HINT:

The waveform varies depending on the contents of communication.

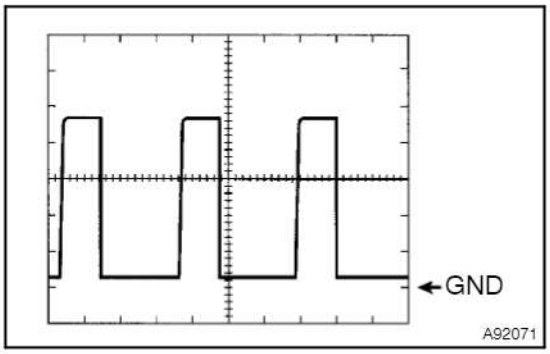
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(b) Waveform 2 (LOW–level CAN bus line)

Item	Contents
Terminal	CANL – GND1
Equipment Setting	1 V/Division, 2 μs/Division
Condition	Power switch ON (IG)

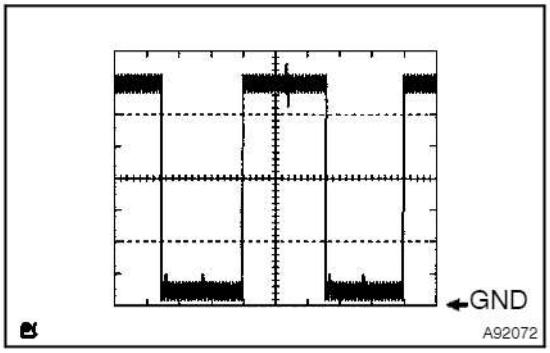
HINT:
The waveform varies depending on the contents of communication.



(c) Waveform 3 (engine speed signal)

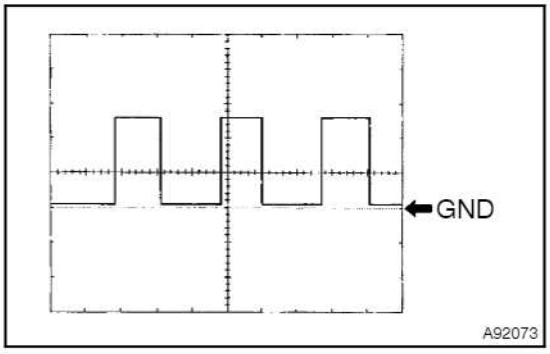
Item	Contents
Terminal	NEO – GND1
Equipment Setting	1 V/Division, 2 ms/Division
Condition	Engine idling

HINT:
The pulse cycle becomes shorter as the engine speed increases.



(d) Waveform 4 (G signal)

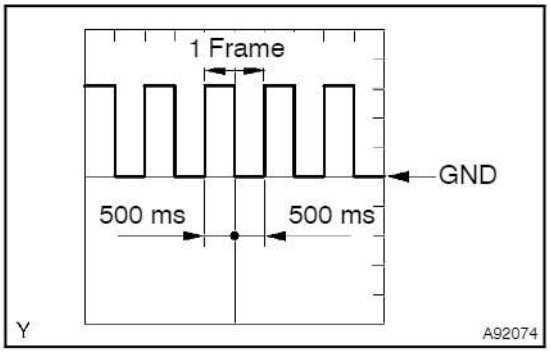
Item	Contents
Terminal	GO – GND1
Equipment Setting	2 V/Division, 20 ms/Division
Condition	Engine idling



(e) Waveform 5 (vehicle speed signal)

Item	Contents
Terminal	SPDI – GND1
Equipment Setting	2 V/Division, 20 ms/Division
Condition	Driving at approximately 20 km/h (12 mph)

HINT:
The higher the vehicle speed, the shorter the cycle and higher the voltage.

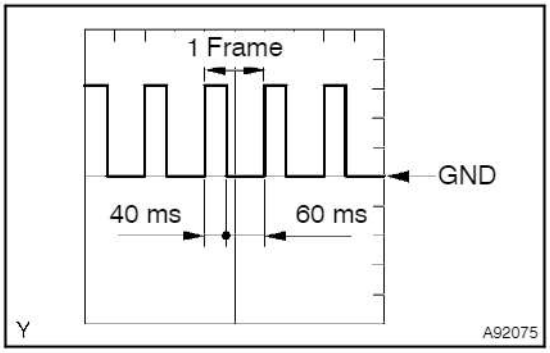


(f) Waveform 6 (airbag deployment signal)

Item	Contents
Terminal	ABFS – GND1
Equipment Setting	1 V/Division, 500 ms/Division
Condition	Power switch ON (READY) (2 seconds after ACC ON) Airbag system normal

HINT:
The waveform on the left is repeated when the airbag system is normal.

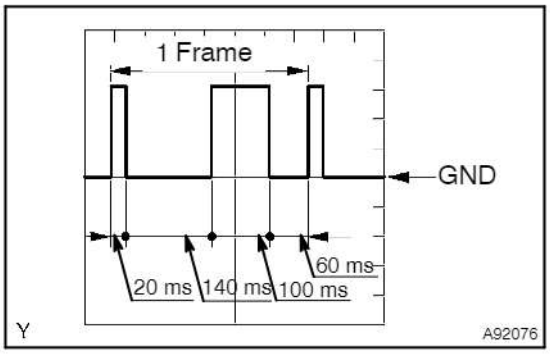
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(g) Waveform 7 (airbag deployment signal)

Item	Contents
Terminal	ABFS – GND1
Equipment Setting	1 V/Division, 50 ms/Division
Condition	Power switch ON (READY) (2 seconds after ACC ON) Airbag system abnormal

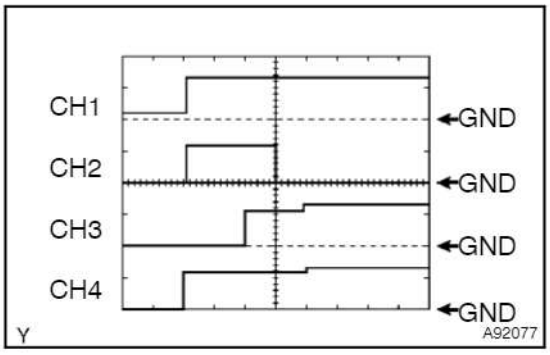
HINT:
The waveform on the left is repeated when the airbag system is abnormal.



(h) Waveform 8 (airbag deployment signal)

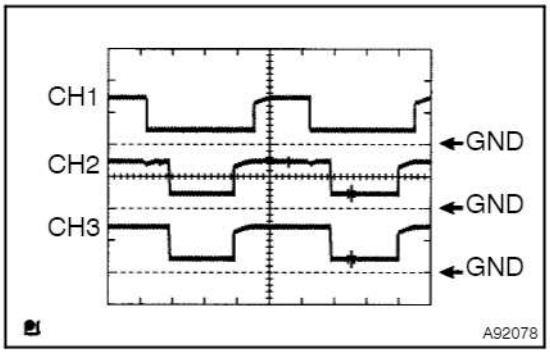
Item	Contents
Terminal	ABFS – GND1
Equipment Setting	1 V/Division, 50 ms/Division
Condition	Power switch ON (READY) (2 seconds after ACC ON) Airbag system deployed (during collision)

HINT:
When the airbag system is deployed, after 1 frame of transmission indicating a normal condition is completed, the waveform on the left is repeated for 50 frames. After that, normal transmission returns.



(i) Waveform 9 (system main relay signal)

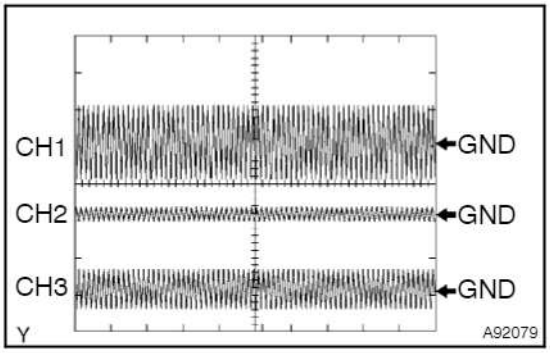
Item	Contents
Terminal	CH1: IGSW – GND1 CH2: CON1 – GND1 CH3: CON2 – GND1 CH4: CON3 – GND1
Equipment Setting	10 V/Division, 100 ms/Division
Condition	Power switch OFF to ON (READY)



(j) Waveform 10 (generator switch U, V, and W signal)

Item	Contents
Terminal	CH1: GUU – GINV CH2: GVU – GINV CH3: GWU – GINV
Equipment Setting	10 V/Division, 20 μs/Division
Condition	Power switch ON (IG)

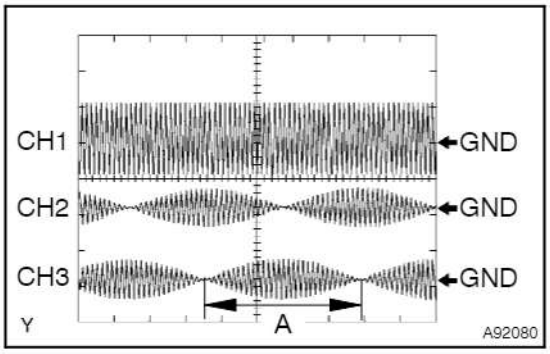
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(k) Waveform 11 (generator or motor resolver)

Item	Contents
Terminal (Generator Resolver)	CH1: GRF – GRFG CH2: GSN – GSNG CH3: GCS – GCSG
Terminal (Motor Resolver)	CH1: MRF – MRFG CH2: MSN – MSNG CH3: MCS – MCSG
Equipment Setting	CH1: 10 V/Division, 1 ms/Division CH2, 3: 5 V/Division, 1 ms/Division
Condition	Generator or motor stopped

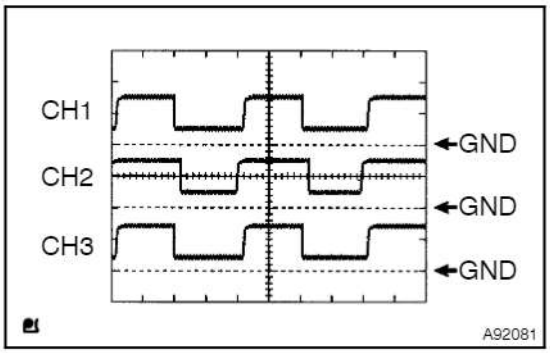
HINT:
The phases and the waveform height of the GSN and GCS, or the MSN and MCS change depending on the stopped position of rotor.



(l) Waveform 12 (generator or motor resolver)

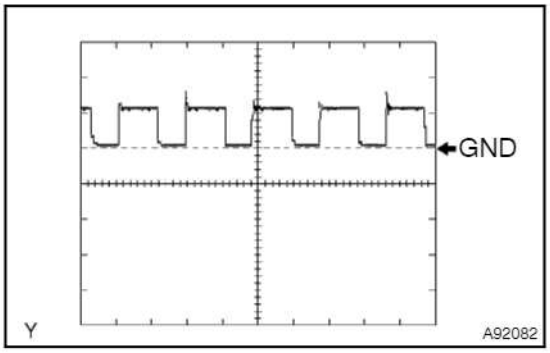
Item	Contents
Terminal (Generator Resolver)	CH1: GRF – GRFG CH2: GSN – GSNG CH3: GCS – GCSG
Terminal (Motor Resolver)	CH1: MRF – MRFG CH2: MSN – MSNG CH3: MCS – MCSG
Equipment Setting	CH1: 10 V/Division, 1 ms/Division CH2, 3: 5 V/Division, 1 ms/Division
Condition	Generator or motor stopped

HINT:
Distance "A" in the diagram becomes shorter as the rotor speed increases.



(m) Waveform 13 (motor switch U, V, and W signal)

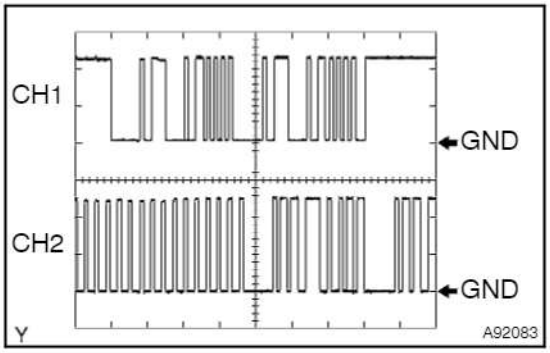
Item	Contents
Terminal	CH1: MUU – GINV CH2: MVU – GINV CH3: MWU – GINV
Equipment Setting	10 V/Division, 50 μs/Division
Condition	Power switch ON (IG)



(n) Waveform 14 (boost converter PWM switch signal)

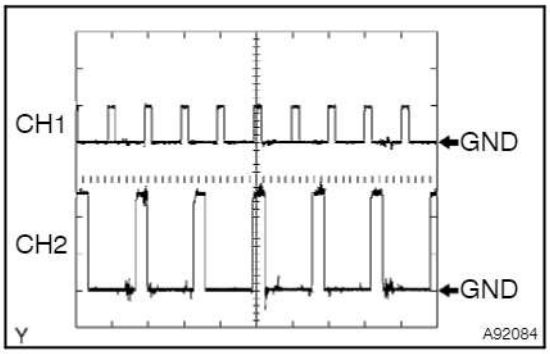
Item	Contents
Terminal	CPWM – GCNV
Equipment Setting	10 V/Division, 50 μs/Division
Condition	Power switch ON (READY), parking brake ON, D position, brake pedal and accelerator pedal depressed

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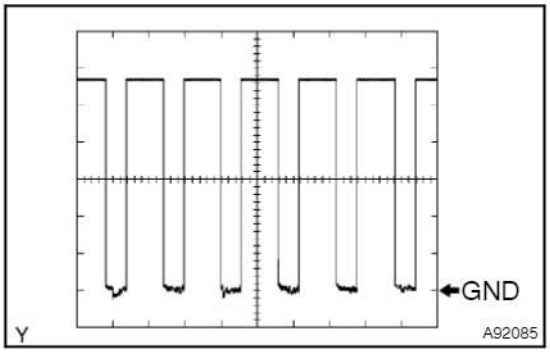
(o) Waveform 15 (immobilizer communication)

Item	Contents
Terminal	CH1: IMO – GND1 CH2: IMI – GND1
Equipment Setting	5 V/Division, 200 ms/Division
Condition	Immobilizer communicating



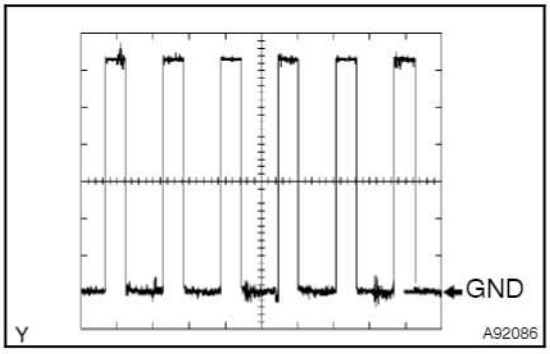
(p) Waveform 16 (P position control signal, P position signal)

Item	Contents
Terminal	CH1: PCON – GND1 CH2: PPOS – GND1
Equipment Setting	5 V/Division, 20 ms/Division
Condition	Power switch ON (IG)



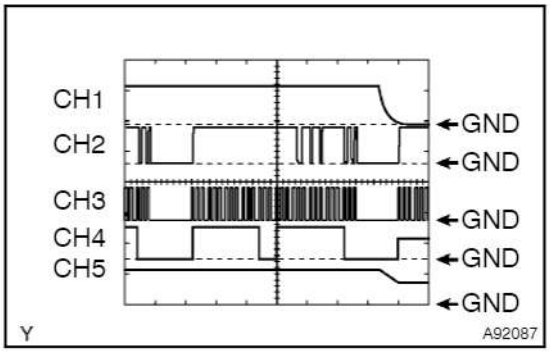
(q) Waveform 17 (READY control signal)

Item	Contents
Terminal	RDY – GND1
Equipment Setting	2 V/Division, 20 ms/Division
Condition	Power switch ON (IG)



(r) Waveform 18 (READY control signal)

Item	Contents
Terminal	RDY – GND1
Equipment Setting	2V/Division, 20ms/Division
Condition	Power switch ON (READY)



(s) Waveform 19 (A/C communication)

Item	Contents
Terminal	CH1: IGSW – GND1 CH2: ITE – GND1 CH3: CLK – GND1 CH4: ETI – GND1 CH5: STB– GND1
Equipment Setting	10 V/Division, 50 ms/Division
Condition	Power switch ON (IG) and A/C operating

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05IH9–01

DIAGNOSIS SYSTEM

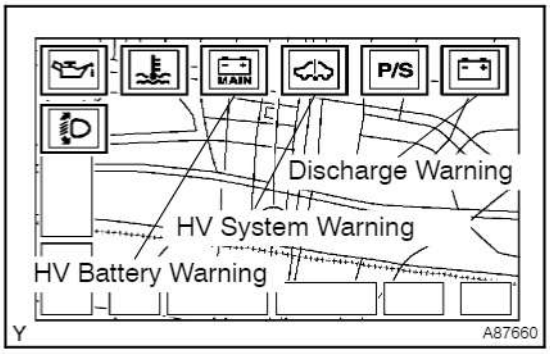


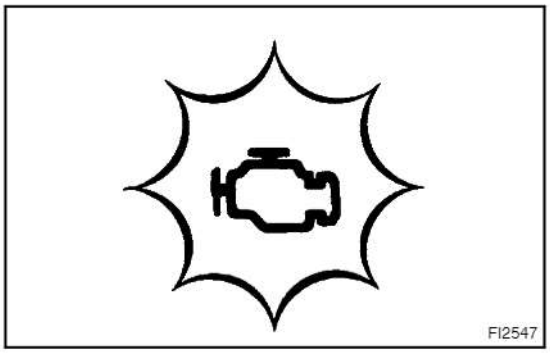
1. DESCRIPTION

(a) The HV control ECU has a self–diagnosis system. If the computer, the hybrid vehicle control system or the components operate improperly, the ECU diagnoses improper operation to detect malfunction, and illuminates the master warning lamp in the combination meter together with any of indicators on the multi–information display, the HV system warning, the HV battery warning or the discharge warning.

HINT:

The master warning lamp illuminates when THS II fails and it blinks when in inspection mode.



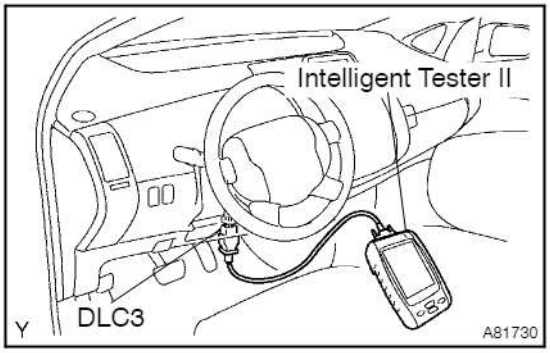


(b) Description for Euro–OBD (European spec.)

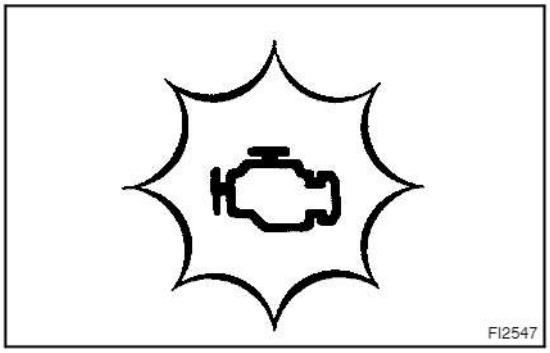
- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the OBD scan tool complying with ISO 15031–4 or the intelligent tester II to the vehicle, and read various data output from the vehicle's ECUs.
- Euro–OBD regulations require that the vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) in the instrument panel when the computer detects malfunction in: 1) the emission control systems/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computers. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15031–4 are recorded in the HV control ECU memory (see page 05–268).

If the malfunction does not recur in 3 consecutive trips, the CHK ENG will go off automatically. However the DTCs remain recorded in the HV control ECU memory.

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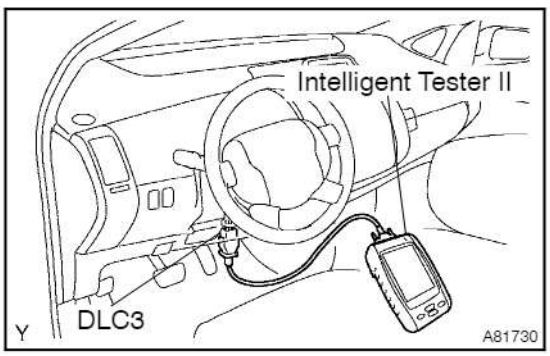
- To check the DTCs, connect the intelligent tester II or OBD scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester II or OBD scan tool also enables you to erase the DTCs and check the freeze frame data and various forms of the THS II data (for operating instructions, refer to their respective instruction manuals). The DTCs include ISO controlled codes and manufacturer controlled codes. ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set by a manufacturer within the prescribed limits (see the DTC chart on page 05–268).
- Freeze frame data:
  The freeze frame data records the driving condition when malfunction is detected. When troubleshooting, it can help determine if the vehicle was running, braked, stopped, or reversed.



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

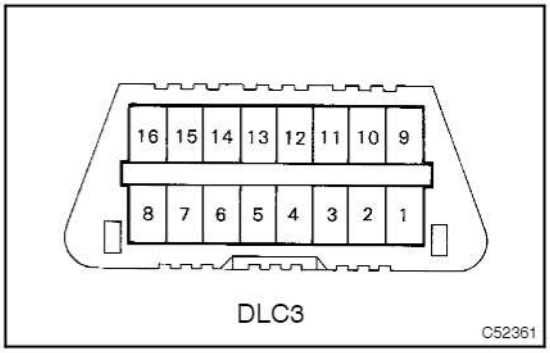
- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the intelligent tester II to the vehicle, and read various data output from the vehicle's ECU.
- The vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) in the instrument panel when the computer detects malfunction in the computer itself or in drive system components. In addition, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the HV control ECU memory (see page 05–268).

If the malfunction does not recur, the CHK ENG will go off when the power switch is turned OFF. However the DTCs remain recorded in the HV control ECU memory.



- To check the DTCs, connect the intelligent tester II to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester II also enables you to erase the DTCs and check the freeze frame data and various forms of THS II data (for operating instructions, refer to its instruction manual).

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2. CHECK DLC3

The HV control ECU uses the ISO 9141–2 (Euro–OBD)/ ISO 14230(M–OBD) for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 9141–2/ ISO 14230 format.

Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	11 to 14 V	Always
CANH	6	HIGH–level CAN bus line	14 – LOW–level CAN bus line	54 to 69 Ω	Power switch OFF
CANH	6	HIGH–level CAN bus line	16 – Battery positive	1 MΩ or higher	Power switch OFF
CANH	6	HIGH–level CAN bus line	4 – Chassis ground	1 kΩ or higher	Power switch OFF
CANL	14	LOW–level CAN bus line	16 – Battery positive	1 MΩ or higher	Power switch OFF
CANL	14	LOW–level CAN bus line	4 – Chassis ground	1 kΩ or higher	Power switch OFF

HINT:

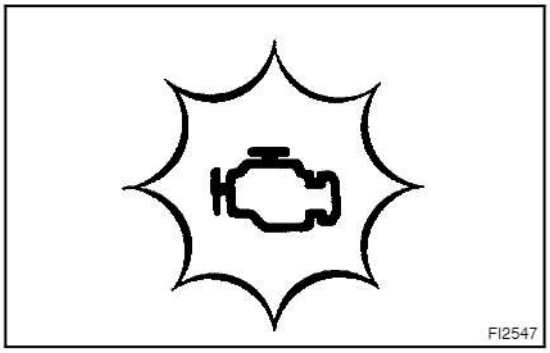
If the display shows no information available when you have connected the cable of intelligent tester II to the DLC3, turned the power switch ON and operated the intelligent tester II, there is a problem on the vehicle side or tester side.

- If the communication is normal when the tester is connected to another vehicle of the same model, inspect the DLC3 and communication bus on the original vehicle.
- If the communication is still impossible when the tester is connected to another vehicle of the same model, the problem is probably in the tester itself, so consult the Service Department listed in its instruction manual.

3. INSPECT AUXILIARY BATTERY

(a) Measure the voltage of the auxiliary battery.
Voltage: 11 to 14 V

(b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.

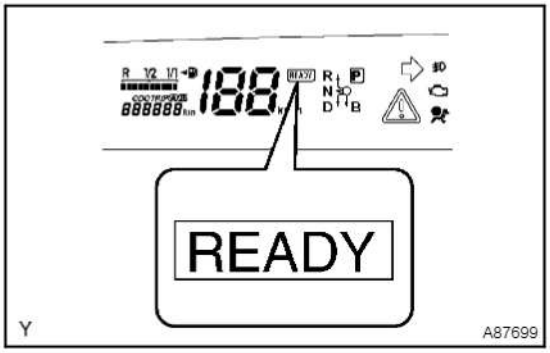


4. CHECK CHK ENG

(a) The CHK ENG illuminates when the power switch is turned ON and the "READY" lamp is OFF.

If the CHK ENG is not illuminated, troubleshoot the CHK ENG circuit (see page 05–209).

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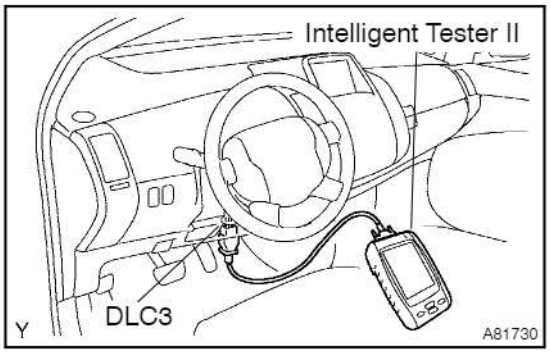
(b) When the "READY" turns on, the CHK ENG should turn off.

If the CHK ENG remains on, the diagnosis system has detected malfunction or abnormality in the system.

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05IHA-01

DTC CHECK/CLEAR

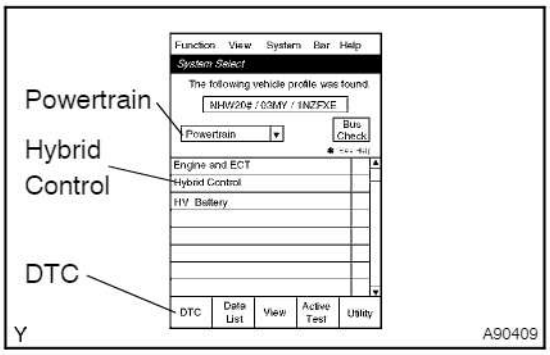


1. CHECK DTC (HYBRID CONTROL)

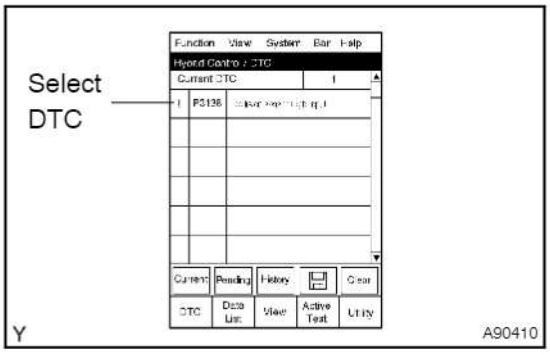
(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the intelligent tester II ON.

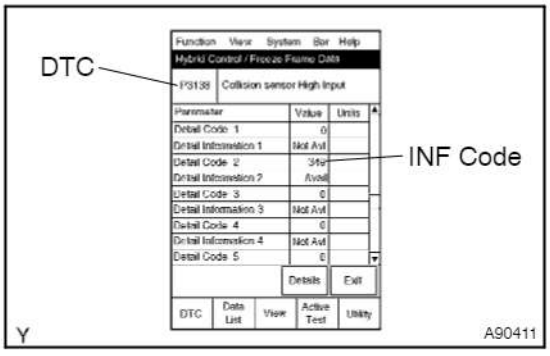


(d) On the System Select screen, enter the following menus: Powertrain / Hybrid Control / DTC. Read DTCs of the HV control system.



2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select that DTC in order to display its freeze frame data.



(b) Read recorded freeze frame data at the time of detection of a DTC.

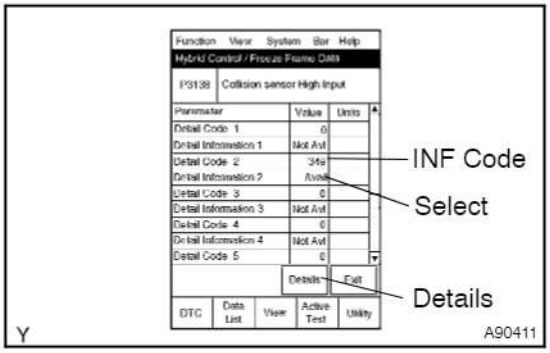
NOTICE:

Information code (INF code) is displayed in one of the columns, detail code 1 to 5, on the freeze frame data screen. Check the details by following the procedures in the following steps.

HINT:

In the case shown in the illustration, refer to troubleshooting for DTC P3138 and INF code 349.

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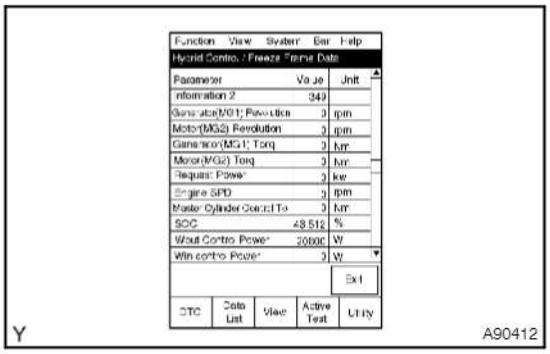
(c) Read information.

(1) Select Detail Information beneath Detail Code which has an INF code.

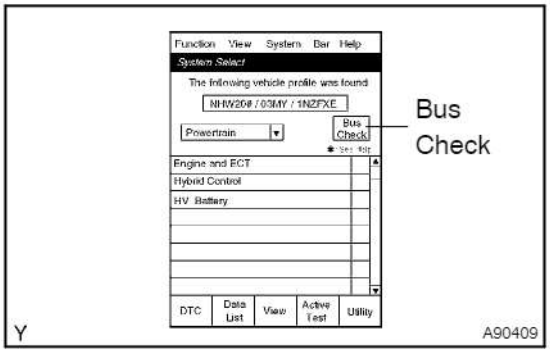
HINT:

Detail Code 2 has the INF code 349 in the illustration. In this case, Detail Information 2 should be selected.

(2) Press the "Details" key.

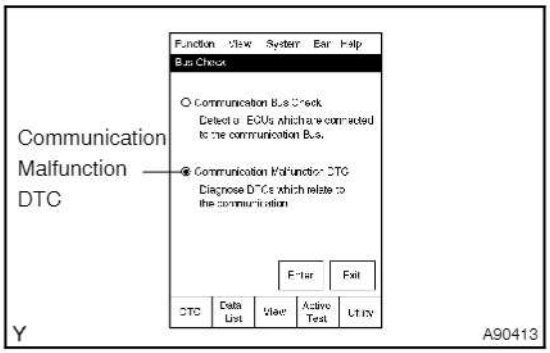


(3) Information is displayed as shown in the illustration.



3. CHECK DTC (BUS CHECK)

(a) On the System Select screen, select Bus Check.



(b) On the Bus Check screen, select Communication Malfunction DTC, in order to read the DTCs for a communication error.

HINT:

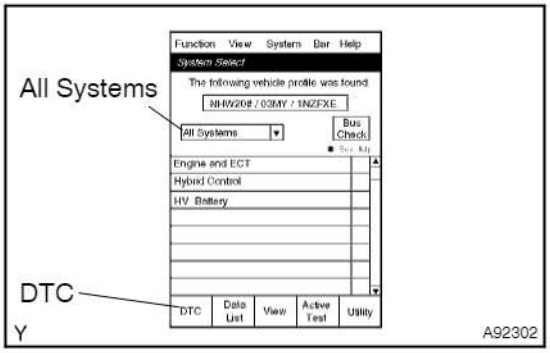
If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair malfunction in the CAN communication (see page 05–2312).

4. CHECK DTC (SYSTEMS OTHER THAN HYBRID CONTROL)

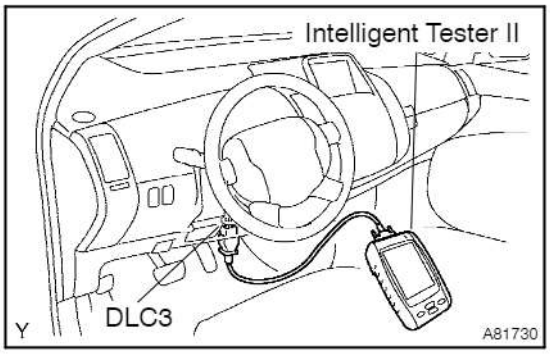
HINT:

The HV control ECU maintains mutual communication with the computers, including the ECM, battery ECU, skid control ECU, power steering ECU and other. Therefore, if the HV control ECU outputs a warning, it is necessary to check and record the DTCs of all the systems.

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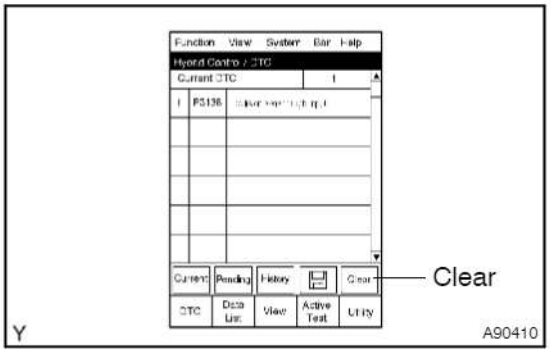


(a) On the System Select screen, enter the following menus: All Systems / DTC.
(b) If DTCs are present, check the relevant systems.



5. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) Check that the shift position is in the P position.



(e) Display the Hybrid Control / DTC screen and press the Clear key at the bottom right area of the screen.

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information (see page 05–249) and operation history data (see page 05–253).

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INFORMATION/FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

The freeze frame data records the driving condition at the time of detection of a DTC. It is used for estimating or simulating the condition of the vehicle when malfunction occurred. To check the details of the hybrid vehicle control system, check the detailed information for the DTC (Information).

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select a DTC in order to display its freeze frame data.
(f) Check the freeze frame data of the DTC that has been detected.
(g) Check information of the DTC (see next page).

Freeze frame data:

Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Suspected Vehicle Status When Malfunction Occurs
Freeze Frame DTC (Freeze DTC)	DTC corresponding to displayed freeze frame data	—
Engine Coolant Temp (Coolant Temp)	Engine coolant temperature/ Min.: –40°C, Max.: 140°C	Cold or warm engine
Vehicle Spd (Vehicle Spd)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Stopped, or driving (low, medium, and high speeds)
Engine Run Time (Eng Run Time)	Elapsed time after starting engine Min.: 0 s, Max.: 65,535 s	Elapsed time from engine start
+B (+B)	Auxiliary battery voltage/ Min.: 0 V, Max.: 65.535 V	Condition of auxiliary battery
Accel Pedal Pos #1 (Accel Pos #1)	Accelerator pedal position sensor No. 1/ Min.: 0 %, Max.: 100 %	Idling, accelerating, or decelerating
Accel Pedal Pos #2 (Accel Pos #2)	Accelerator pedal position sensor No. 2/ Min.: 0 %, Max.: 100 %	Idling, accelerating or decelerating (For comparison with above to detect failure of accelerator pedal position sensor No .1)
Ambient Temperature (Ambient Temp)	Ambient air temperature/ Min.: –40°C, Max.: 215°C	Ambient air temperature
Intake Air Temperature (Intake Air Temp)	Intake air temperature/ Min.: –40°C, Max.: 140°C	Ambient air temperature
DTC Clear Warm Up (DTC Clear Warm)	The number of times engine is warmed up after clearing DTCs/ Min.: 0, Max.: 255	Frequency of the malfunction recurrence after clearing DTCs
DTC Clear Run Distance (DTC Clear Run)	Drive distance after clearing DTCs/ Min.: 0 km, Max.: 65,535 km	Frequency of the malfunction recurrence after clearing DTCs
DTC Clear Min (DTC Clear Min)	Elapsed time after clearing DTCs/ Min.: 0 min, Max.: 65,535 min	Frequency of the malfunction recurrence after clearing DTCs
Type of ECU (ECU Type)	Type of ECU	—
Detail Code 1 to 5 (Code 1 to 5)	Information code	—
Detail information 1 to 5 (Information 1 to 5)	Availability of detailed information	—

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2. INFORMATION

HINT:

Similar to freeze frame data, information records operating condition of the HV system and components at the time of detection of a DTC.

(a) Select Detail Information beneath Detail Code which has an INF code.

(b) Press the "Details" key.

(c) Check the information of the DTC.

Information:

Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Suspected Vehicle Status When Malfunction Occurs
Information n (Information n)	Information code	Indication of system with malfunction
Generator (MG1) Rev (MG1 Rev)	MG1 revolution/ Min.: –16,384 rpm, Max.: 16,256 rpm	MG1 speed • Forward rotation appears as "+" • Backward rotation appears as "–"
Motor (MG2) Revolution (MG2 Rev)	MG2 revolution/ Min.: –16,384 rpm, Max.: 16,256 rpm	MG2 speed (proportionate to vehicle speed) • Forward rotation appears as "+" • Backward rotation appears as "–" Moving direction of vehicle • Forward direction appears as "+" • Backward direction appears as "–"
Generator (MG1) Torq (MG1 Torq)	MG1 torque/ Min.: –512 Nm, Max.: 508 Nm	When MG1 rotation in + direction: • Torque appears as "+" while MG1 discharges • Torque appears as "–" while MG1 charges When MG1 rotation in – direction: • Torque appears as "–" while MG1 discharges • Torque appears as "+" while MG1 charges
Motor (MG2) Torq (MG2 Torq)	MG2 torque/ Min.: –512 Nm, Max.: 508 Nm	When MG2 rotation in + direction: • Torque appears as "+" while MG2 discharges • Torque appears as "–" while MG2 charges When MG2 rotation in – direction: • Torque appears as "–" while MG2 discharges • Torque appears as "+" while MG2 charges
Inverter Temp (MG1) (Invert Temp–MG1)	MG1 inverter temperature/ Min.: –50°C, Max.: 205°C	MG1 inverter temperature
Inverter Temp (MG2) (Invert Temp–MG2)	MG2 inverter temperature/ Min.: –50°C, Max.: 205°C	MG2 inverter temperature
Motor Temp MG2 (No2) (MG2 (No2) Temp)	Transaxle fluid temperature/ Min.: –50°C, Max.: 205°C	Transaxle fluid temperature
Motor Temp MG2 (No1) (MG2 (No1) Temp)	MG2 temperature/ Min.: –50°C, Max.: 205°C	MG2 temperature
Request Power (Power Rqst)	Request engine power/ Min.: 0 W, Max.: 255 kW	Engine power output requested to ECM
Engine Spd (Engine Spd)	Engine speed/ Min.: 0 rpm, Max.: 16,320 rpm	Engine speed
Master Cylinder Ctrl Trq (Mcyl Ctrl Power)	Master cylinder control torque/ Min.: –512 Nm, Max.: 508 Nm	Brake force requested by driver
SOC (SOC)	Battery state of charge/ Min.: 0 %, Max.: 100 %	State of charge of HV battery
WOUT Control Power (WOUT Ctrl Power)	Power value discharge control/ Min.: 0 W, Max.: 81,600 W	Discharge amount of HV battery
WIN Control Power (WIN Ctrl Power)	Power value charge control/ Min.: –40,800 W, Max.: 0 W	Charge amount of HV battery

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Suspected Vehicle Status When Malfunction Occurs
Drive Condition ID (Drive Condition)	Drive condition ID • Engine stopped: 0 • Engine about to be stopped: 1 • Engine about to be started: 2 • Engine operated or operating: 3 • Generating or loading movement: 4 • Revving up with P position: 6	Engine operating condition
Power Resource VB (Pwr Resource VB)	HV battery voltage/ Min.: 0 V, Max.: 510 V	HV battery voltage
Power Resource IB (Pwr Resource IB)	HV battery current/ Min.: –256 A, Max.: 254 A	Charging/discharging state of HV battery • Discharging amperage indicated by a positive value • Charging amperage indicated by a negative value
Shift Sensor Shift Pos (Shift Position)	Shift position (P, R, N, D or B position)	Shift position
Accel Sensor Main (Acc Sensor Main)	Accelerator pedal position sensor main/ Min.: 0 %, Max.: 100 %	Idling, accelerating, or decelerating
Auxiliary Batt Voltage (Aux. Batt V)	Auxiliary battery voltage/ Min.: 0 V, Max.: 20 V	State of auxiliary battery
Converter Temperature (Converter Temp)	Boost converter temperature/ Min.: –50°C, Max.: 205°C	Boost converter temperature
VL–Voltage before Raise (VL)	High voltage before it is boosted/ Min.: 0 V, Max.: 510 V	High voltage level before it is boosted
VH–Voltage after Raise (VH)	High voltage after it is boosted/ Min.: 0 V, Max.: 765 V	High voltage level after it is boosted
The Time of Ignition ON (IG ON Time)	The time after power switch ON (IG)/ Min.: 0 min, Max.: 255 min	Time elapsed with power switch ON (IG)
Vehicle Speed (Max) (Vehicle Spd–Max)	Maximum vehicle speed/ Min.: –256 km/h, Max.: 254 km/h	Maximum vehicle speed
A/C Power (A/C Consmpt Pwr)	A/C consumption power/ Min.: 0 kW, Max.: 5 kW	A/C load
Engine Stop Request (Eng Stop Rqst)	Engine stop request/ NO or YES	Presence of engine stop request
Engine Idling Request (Idling Request)	Engine idling request/ NO or YES	Presence of idle stop request
Engine Fuel Cut (Engine Fuel Cut)	Engine fuel cut request/ NO or YES	Presence of fuel cut request
Main Batt Charging Rqst (HV Batt Ch Rqst)	HV battery charging request/ NO or YES	Presence of HV battery charging request
Engine Warming Up Rqst (Eng Warm Up Rqt)	Engine warming up request/ NO or YES	Presence of engine warm–up request
Stop Switch (Stop SW Cond)	Stop lamp switch ON condition/ NO or YES	Brake pedal depressed or released
Cruise Control (Cruise Control)	Cruise control active condition/ NO or YES	Operation under cruise control ON or OFF
Exclusive Information 1 to 7 (Exclusive Info 1 to 7)	Exclusive information (in form of numerical data)	Exclusive Information linked to Information
Occurrence Order (Occurence Ordr)	Occurrence sequence of information	Occurrence sequence of information
Inv–T (MG1) aftr IG–ON (Invt Tmp–MG1 IG)	MG1 inverter temperature after power switch ON (IG)/ Min.: –50°C, Max.: 205°C	MG1 inverter temperature soon after power switch ON (IG)
Inv–T (MG2) aftr IG–ON (Invt Tmp–MG2 IG)	MG2 inverter temperature after power switch ON (IG)/ Min.: –50°C, Max.: 205°C	MG2 inverter temperature soon after power switch ON (IG)

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Suspected Vehicle Status When Malfunction Occurs
Mtr–T (MG2) aftr IG–ON (MG2 Temp IG)	MG2 temperature after power switch ON (IG)/ Min.: –50°C, Max.: 205°C	MG2 temperature soon after power switch ON (IG)
Conv–Tmp after IG–ON (Converter Temp IG)	Boost converter temperature after power switch ON (IG)/ Min.: –50°C, Max.: 205°C	Boost converter temperature soon after power switch ON (IG)
SOC after IG–ON (SOC IG)	Battery state of charge after power switch ON (IG)/ Min.: 0 %, Max.: 100 %	Battery state of charge soon after power switch ON (IG)
Inv–Temp (MG1) MAX (Invt Tmp–MG1Max)	MG1 inverter maximum temperature/ Min.: –50°C, Max.: 205°C	Overheating state of MG1 inverter
Inv–Temp (MG2) Max (Invt Tmp–MG2Max)	MG2 inverter maximum temperature/ Min.: –50°C, Max.: 205°C	Overheating state of MG2 inverter
Mtr–Temp (MG2) Max (MG2 Temp Max)	MG2 maximum temperature/ Min.: –50°C, Max.: 205°C	Overheating state of MG2
Converter Temp Max (Convrtr Tmp Max)	Boost converter maximum temperature/ Min.: –50°C, Max.: 205°C	Overheating state of boost converter
Status of Charge Max (SOC Max)	Maximum status of charge/ Min.: 0 %, Max.: 100 %	Over–charging of HV battery
Status of Charge Min (SOC Min)	Minimum status of charge/ Min.: 0 %, Max.: 100 %	Over–discharging of HV battery

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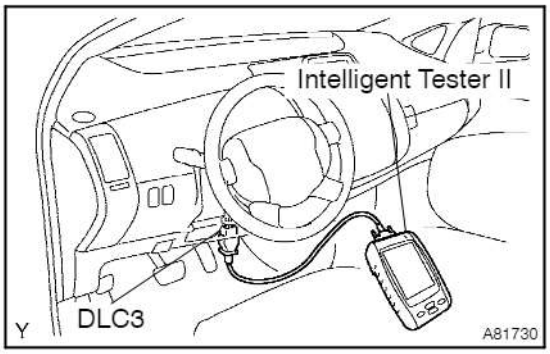
05IHC-01

OPERATION HISTORY DATA

1. OPERATION HISTORY DATA

HINT:

The operation history data records the special operations performed by the driver and the number of abnormal conditions that have been input into the HV control ECU.



(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Select the menu to view the number of special operations or controls that have been effected.

HINT:

- Latest Operation (Latest Oper): Among the past occurrences, the number of special operations or controls that have been effected during the most recent 1 trip detection.
- Latest Trip (Latest Trip): The number of trips after the occurrence of Latest Operation.
- Operation before Latest (Bef Latst Oper): The number of occurrences 1 previously from Latest Operation.
- Trip before Latest (Bef Latst Trip): The number of trips after the occurrence of Operation before Latest.

Operation history data:

Intelligent Tester II Display (abbreviation)	Count Condition
Shift gear before READY (SHIFT BEF READY)	Selector lever moved when READY lamp blinking
N range control by busy shift (N RANGE CTRL 2)	N position control effected due to frequent shifting operation
Step accelerator in N range (STEP ACCEL IN N)	Accelerator pedal depressed in N position
Auxiliary Battery Low (AUX. BATT LOW)	Auxiliary battery voltage below 9.5 V
HV ECU Intermittent problems (HV INTERMITTENT)	Instantaneous open at IGSW terminal of HV control ECU
MG2 (No1) temperature high (MG2 (NO1) TEMP HIGH)	Motor temperature climbed above 174°C (345°F)
MG2 (No2) temperature high (MG2 (NO2) TEMP HIGH)	Transaxle fluid temperature climbed above 162°C (324°F)
MG2 (motor) Inverter temperature high (MG2 INV TEMP HI)	Motor inverter temperature climbed above 111°C (232°F)
MG1 (generator) Inverter temperature high (MG1 INV TEMP HI)	Generator inverter temperature climbed above 111°C (232°F)
Main Battery low voltage (MAIN BATT LOW)	Battery state of charge dropped below 30 %

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Intelligent Tester II Display (abbreviation)	Count Condition
Resister over heat (RESIST OVR HEAT)	Limit resistor forecast temperature climbed above 120°C (248°F)
Coolant heating (COOLANT HEAT)	Inverter coolant forecast temperature climbed above 65°C (149°F)
Converter heating (CONVERTER HEAT)	Boost converter temperature climbed above 111°C (232°F)
Shift P in running (SHIFT P IN RUN)	Shifted to P while driving
Shift backward direction (BKWRD DIR SHIFT)	Shifted to R while moving forward or to D or B while moving in reverse
Prevention control of staying (PREVENT STAYING)	Engine speed stays in resonance frequency band

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FAIL–SAFE CHART

1. FAIL–SAFE CHART

DTC No.	Detection Item	INF Code	Driving Condition
B2799	Immobilizer malfunction	539	Impossible to drive
B2799	Immobilizer malfunction	540	Impossible to drive
B2799	Immobilizer malfunction	541	Impossible to drive
B2799	Immobilizer malfunction	542	Impossible to drive
B2799	Immobilizer malfunction	543	Impossible to drive
B2799	Immobilizer malfunction	544	Impossible to drive
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	137	Normal driving
P0338	Crankshaft Position Sensor "A" Circuit High Input	600	Normal driving
P0340	Camshaft Position Sensor "A" Circuit	532	Normal driving
P0343	Camshaft Position Sensor "A" Circuit High Input	601	Normal driving
P0500	Vehicle Speed Sensor "A"	352	Cruise control driving impossible
P0560	System Voltage	117	Normal driving
P0571	Brake Switch "A" Circuit	115	Cruise control driving impossible
P0607	Control Module Performance	116	Cruise control driving impossible
P0705	Transmission Range Sensor Circuit	571	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	572	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	573	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	574	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	575	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	576	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	577	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	578	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	595	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0705	Transmission Range Sensor Circuit	596	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0851	Park/Neutral Switch Input Circuit Low	579	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0852	Park/Neutral Switch Input Circuit High	580	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P0A08	DC/DC Converter Status Circuit	264	Normal driving
P0A09	DC/DC Converter Status Circuit Low Input	265	Normal driving
P0A09	DC/DC Converter Status Circuit Low Input	591	Normal driving
P0A0F	Engine Failed to Start	204	Limited driving
P0A0F	Engine Failed to Start	205	Limited driving
P0A0F	Engine Failed to Start	238	Limited driving
P0A0F	Engine Failed to Start	533	Limited driving
P0A0F	Engine Failed to Start	534	Limited driving
P0A10	DC/DC Converter Status Circuit High Input	263	Normal driving
P0A10	DC/DC Converter Status Circuit High Input	592	Normal driving
P0A1D	Hybrid Powertrain Control Module	134	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	135	Impossible to drive

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DTC No.	Detection Item	INF Code	Driving Condition
P0A1D	Hybrid Powertrain Control Module	139	Normal driving
P0A1D	Hybrid Powertrain Control Module	140	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	141	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	142	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	143	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	144	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	145	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	148	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	149	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	150	Limited driving
P0A1D	Hybrid Powertrain Control Module	151	Limited driving
P0A1D	Hybrid Powertrain Control Module	152	Limited driving
P0A1D	Hybrid Powertrain Control Module	155	Limited driving
P0A1D	Hybrid Powertrain Control Module	156	Limited driving
P0A1D	Hybrid Powertrain Control Module	158	Limited driving
P0A1D	Hybrid Powertrain Control Module	159	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	160	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	163	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	164	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	165	Limited driving
P0A1D	Hybrid Powertrain Control Module	166	Normal driving
P0A1D	Hybrid Powertrain Control Module	167	Limited driving
P0A1D	Hybrid Powertrain Control Module	168	Limited driving
P0A1D	Hybrid Powertrain Control Module	177	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	178	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	180	Limited driving
P0A1D	Hybrid Powertrain Control Module	181	Limited driving
P0A1D	Hybrid Powertrain Control Module	182	Limited driving
P0A1D	Hybrid Powertrain Control Module	183	Limited driving
P0A1D	Hybrid Powertrain Control Module	184	Limited driving
P0A1D	Hybrid Powertrain Control Module	185	Limited driving
P0A1D	Hybrid Powertrain Control Module	186	Limited driving
P0A1D	Hybrid Powertrain Control Module	187	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	188	Limited driving
P0A1D	Hybrid Powertrain Control Module	189	Limited driving
P0A1D	Hybrid Powertrain Control Module	192	Limited driving
P0A1D	Hybrid Powertrain Control Module	193	Limited driving
P0A1D	Hybrid Powertrain Control Module	195	Limited driving
P0A1D	Hybrid Powertrain Control Module	196	Limited driving
P0A1D	Hybrid Powertrain Control Module	197	Limited driving
P0A1D	Hybrid Powertrain Control Module	198	Normal driving
P0A1D	Hybrid Powertrain Control Module	199	Limited driving
P0A1D	Hybrid Powertrain Control Module	200	Limited driving
P0A1D	Hybrid Powertrain Control Module	390	Limited driving
P0A1D	Hybrid Powertrain Control Module	392	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	393	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	511	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	512	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	564	Limited driving
P0A1D	Hybrid Powertrain Control Module	565	Limited driving
P0A1D	Hybrid Powertrain Control Module	567	Impossible to drive

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DTC No.	Detection Item	INF Code	Driving Condition
P0A1D	Hybrid Powertrain Control Module	568	Limited driving
P0A1D	Hybrid Powertrain Control Module	569	Limited driving
P0A1D	Hybrid Powertrain Control Module	570	Impossible to drive
P0A1D	Hybrid Powertrain Control Module	615	Limited driving
P0A1F	Battery Energy Control Module	123	Limited driving
P0A1F	Battery Energy Control Module	129	Limited driving
P0A1F	Battery Energy Control Module	593	Normal driving
P0A2B	Drive Motor "A" Temperature Sensor Circuit Range/ Performance	248	Normal driving
P0A2B	Drive Motor "A" Temperature Sensor Circuit Range/ Performance	250	Normal driving
P0A2C	Drive Motor "A" Temperature Sensor Circuit Low	247	Normal driving
P0A2D	Drive Motor "A" Temperature Sensor Circuit High	249	Normal driving
P0A37	Generator Temperature Sensor Circuit Range/Performance	258	Normal driving
P0A37	Generator Temperature Sensor Circuit Range/Performance	260	Normal driving
P0A38	Generator Temperature Sensor Circuit Low	257	Normal driving
P0A39	Generator Temperature Sensor Circuit High	259	Normal driving
P0A3F	Drive Motor "A" Position Sensor Circuit	243	Limited driving
P0A40	Drive Motor "A" Position Sensor Circuit Range/Performance	500	Limited driving
P0A41	Drive Motor "A" Position Sensor Circuit Low	245	Limited driving
P0A4B	Generator Position Sensor Circuit	253	Limited driving
P0A4C	Generator Position Sensor Circuit Range/Performance	513	Limited driving
P0A4D	Generator Position Sensor Circuit Low	255	Limited driving
P0A51	Drive Motor "A" Current Sensor Circuit	174	Limited driving
P0A60	Drive Motor "A" Phase V Current	288	Limited driving
P0A60	Drive Motor "A" Phase V Current	289	Limited driving
P0A60	Drive Motor "A" Phase V Current	290	Limited driving
P0A60	Drive Motor "A" Phase V Current	292	Limited driving
P0A60	Drive Motor "A" Phase V Current	294	Limited driving
P0A60	Drive Motor "A" Phase V Current	501	Limited driving
P0A63	Drive Motor "A" Phase W Current	296	Limited driving
P0A63	Drive Motor "A" Phase W Current	297	Limited driving
P0A63	Drive Motor "A" Phase W Current	298	Limited driving
P0A63	Drive Motor "A" Phase W Current	300	Limited driving
P0A63	Drive Motor "A" Phase W Current	302	Limited driving
P0A63	Drive Motor "A" Phase W Current	502	Limited driving
P0A72	Generator Phase V Current	326	Limited driving
P0A72	Generator Phase V Current	327	Limited driving
P0A72	Generator Phase V Current	328	Limited driving
P0A72	Generator Phase V Current	330	Limited driving
P0A72	Generator Phase V Current	333	Limited driving
P0A72	Generator Phase V Current	515	Limited driving
P0A75	Generator Phase W Current	334	Limited driving
P0A75	Generator Phase W Current	335	Limited driving
P0A75	Generator Phase W Current	336	Limited driving
P0A75	Generator Phase W Current	338	Limited driving
P0A75	Generator Phase W Current	341	Limited driving
P0A75	Generator Phase W Current	516	Limited driving

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DTC No.	Detection Item	INF Code	Driving Condition
P0A78	Drive Motor "A" Inverter Performance	266	Limited driving
P0A78	Drive Motor "A" Inverter Performance	267	Limited driving
P0A78	Drive Motor "A" Inverter Performance	272	Normal driving
P0A78	Drive Motor "A" Inverter Performance	278	Normal driving
P0A78	Drive Motor "A" Inverter Performance	279	Limited driving
P0A78	Drive Motor "A" Inverter Performance	280	Normal driving
P0A78	Drive Motor "A" Inverter Performance	282	Limited driving
P0A78	Drive Motor "A" Inverter Performance	283	Normal driving
P0A78	Drive Motor "A" Inverter Performance	284	Limited driving
P0A78	Drive Motor "A" Inverter Performance	285	Normal driving
P0A78	Drive Motor "A" Inverter Performance	286	Limited driving
P0A78	Drive Motor "A" Inverter Performance	287	Limited driving
P0A78	Drive Motor "A" Inverter Performance	304	Normal driving
P0A78	Drive Motor "A" Inverter Performance	305	Normal driving
P0A78	Drive Motor "A" Inverter Performance	306	Limited driving
P0A78	Drive Motor "A" Inverter Performance	308	Impossible to drive
P0A78	Drive Motor "A" Inverter Performance	503	Limited driving
P0A78	Drive Motor "A" Inverter Performance	504	Limited driving
P0A78	Drive Motor "A" Inverter Performance	505	Limited driving
P0A78	Drive Motor "A" Inverter Performance	506	Limited driving
P0A78	Drive Motor "A" Inverter Performance	507	Normal driving
P0A78	Drive Motor "A" Inverter Performance	508	Normal driving
P0A78	Drive Motor "A" Inverter Performance	510	Normal driving
P0A78	Drive Motor "A" Inverter Performance	523	Limited driving
P0A78	Drive Motor "A" Inverter Performance	586	Limited driving
P0A7A	Generator Inverter Performance	309	Limited driving
P0A7A	Generator Inverter Performance	321	Normal driving
P0A7A	Generator Inverter Performance	322	Limited driving
P0A7A	Generator Inverter Performance	323	Normal driving
P0A7A	Generator Inverter Performance	324	Limited driving
P0A7A	Generator Inverter Performance	325	Limited driving
P0A7A	Generator Inverter Performance	342	Limited driving
P0A7A	Generator Inverter Performance	343	Limited driving
P0A7A	Generator Inverter Performance	344	Limited driving
P0A7A	Generator Inverter Performance	517	Limited driving
P0A7A	Generator Inverter Performance	518	Limited driving
P0A7A	Generator Inverter Performance	519	Limited driving
P0A7A	Generator Inverter Performance	520	Limited driving
P0A7A	Generator Inverter Performance	522	Normal driving
P0A90	Drive Motor "A" Performance	239	Limited driving
P0A90	Drive Motor "A" Performance	240	Limited driving
P0A90	Drive Motor "A" Performance	241	Limited driving
P0A90	Drive Motor "A" Performance	242	Limited driving
P0A90	Drive Motor "A" Performance	251	Limited driving
P0A90	Drive Motor "A" Performance	509	Limited driving
P0A90	Drive Motor "A" Performance	602	Limited driving
P0A90	Drive Motor "A" Performance	604	Limited driving
P0A90	Drive Motor "A" Performance	605	Limited driving
P0A92	Hybrid Generator Performance	261	Limited driving
P0A92	Hybrid Generator Performance	521	Limited driving
P0A92	Hybrid Generator Performance	606	Limited driving

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DTC No.	Detection Item	INF Code	Driving Condition
P0A92	Hybrid Generator Performance	607	Limited driving
P0A93	Inverter Cooling System Performance	346	Normal driving
P0A93	Inverter Cooling System Performance	347	Normal driving
P0A94	DC/DC Converter Performance	442	Limited driving
P0A94	DC/DC Converter Performance	545	Limited driving
P0A94	DC/DC Converter Performance	546	Limited driving
P0A94	DC/DC Converter Performance	547	Limited driving
P0A94	DC/DC Converter Performance	548	Limited driving
P0A94	DC/DC Converter Performance	549	Limited driving
P0A94	DC/DC Converter Performance	550	Limited driving
P0A94	DC/DC Converter Performance	551	Limited driving
P0A94	DC/DC Converter Performance	552	Limited driving
P0A94	DC/DC Converter Performance	553	Limited driving
P0A94	DC/DC Converter Performance	554	Limited driving
P0A94	DC/DC Converter Performance	555	Limited driving
P0A94	DC/DC Converter Performance	556	Limited driving
P0A94	DC/DC Converter Performance	557	Limited driving
P0A94	DC/DC Converter Performance	558	Normal driving
P0A94	DC/DC Converter Performance	559	Limited driving
P0A94	DC/DC Converter Performance	560	Normal driving
P0A94	DC/DC Converter Performance	561	Limited driving
P0A94	DC/DC Converter Performance	583	Normal driving
P0A94	DC/DC Converter Performance	584	Normal driving
P0A94	DC/DC Converter Performance	585	Normal driving
P0A94	DC/DC Converter Performance	587	Limited driving
P0A94	DC/DC Converter Performance	588	Limited driving
P0A94	DC/DC Converter Performance	589	Normal driving
P0A94	DC/DC Converter Performance	590	Normal driving
P0AA1	Hybrid Battery Positive Contactor Circuit Stuck Closed	224	Normal driving
P0AA1	Hybrid Battery Positive Contactor Circuit Stuck Closed	226	Impossible to drive
P0AA1	Hybrid Battery Positive Contactor Circuit Stuck Closed	231	Impossible to drive
P0AA1	Hybrid Battery Positive Contactor Circuit Stuck Closed	233	Impossible to drive
P0AA2	Hybrid Battery Positive Contactor Circuit Stuck Open	225	Normal driving
P0AA2	Hybrid Battery Positive Contactor Circuit Stuck Open	227	Impossible to drive
P0AA4	Hybrid Battery Negative Contactor Circuit Stuck Closed	228	Impossible to drive
P0AA4	Hybrid Battery Negative Contactor Circuit Stuck Closed	232	Limited driving
P0AA5	Hybrid Battery Negative Contactor Circuit Stuck Open	229	Impossible to drive
P2120	Throttle/Pedal Position Sensor/Switch "D" Circuit	111	Limited driving
P2121	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance	106	Limited driving
P2121	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance	114	Limited driving
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input	104	Limited driving

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DTC No.	Detection Item	INF Code	Driving Condition
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input	105	Limited driving
P2125	Throttle/Pedal Position Sensor/Switch "E" Circuit	112	Limited driving
P2126	Throttle/Pedal Position Sensor/Switch "E" Circuit Range/Performance	109	Limited driving
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input	107	Limited driving
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input	108	Limited driving
P2138	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation	110	Limited driving
P3000	Battery Control System Malfunction	123	Limited driving
P3000	Battery Control System Malfunction	125	Limited driving
P3000	Battery Control System Malfunction	388	Limited driving
P3000	Battery Control System Malfunction	389	Limited driving
P3000	Battery Control System Malfunction	603	Limited driving
P3004	High Voltage Power Resource Malfunction	131	Impossible to drive
P3004	High Voltage Power Resource Malfunction	132	Normal driving
P3004	High Voltage Power Resource Malfunction	133	Limited driving
P3009	High Voltage Power Short Circuit	526	Normal driving
P3009	High Voltage Power Short Circuit	611	Normal driving
P3009	High Voltage Power Short Circuit	612	Normal driving
P3009	High Voltage Power Short Circuit	613	Normal driving
P3009	High Voltage Power Short Circuit	614	Normal driving
P3102	Transmission Control ECU Malfunction	524	Impossible to drive
P3102	Transmission Control ECU Malfunction	525	Impossible to drive
P3102	Transmission Control ECU Malfunction	581	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P3102	Transmission Control ECU Malfunction	582	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P3102	Transmission Control ECU Malfunction	597	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P3102	Transmission Control ECU Malfunction	598	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P3102	Transmission Control ECU Malfunction	599	If shift position cannot be fixed: Impossible to drive If shift position is being fixed: Normal driving
P3107	Lost Communication with Airbag System Control Module	213	Normal driving
P3107	Lost Communication with Airbag System Control Module	214	Normal driving
P3107	Lost Communication with Airbag System Control Module	215	Normal driving
P3108	Lost Communication with A/C System Control Module	535	Normal driving
P3108	Lost Communication with A/C System Control Module	536	Normal driving
P3108	Lost Communication with A/C System Control Module	537	Normal driving
P3108	Lost Communication with A/C System Control Module	538	Normal driving
P3108	Lost Communication with A/C System Control Module	594	Normal driving
P3110	HV Main Relay Malfunction	223	Normal driving
P3110	HV Main Relay Malfunction	527	Impossible to drive

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DTC No.	Detection Item	INF Code	Driving Condition
P3137	Collision Sensor Low Input	348	Normal driving
P3138	Collision Sensor High Input	349	Normal driving
P3140	HV Interlock Switch Operation	350	Normal driving
P3143	HV Interlock Switch Open/Short	351	Normal driving
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit Range/Performance	276	Normal driving
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit Range/Performance	277	Normal driving
P3212	Drive motor "A" Inverter Temperature Sensor Circuit Range/Performance	275	Normal driving
P3213	Drive Motor "A" Inverter Temperature Sensor Circuit High	274	Normal driving
P3221	Generator Inverter Temperature Sensor Circuit Range/Performance	314	Normal driving
P3221	Generator Inverter Temperature Sensor Circuit Range/Performance	315	Normal driving
P3222	Generator Inverter Temperature Sensor Circuit High/Low	313	Normal driving
P3223	Generator Inverter Temperature Sensor Circuit High	312	Normal driving
P3226	DC/DC (Boost) Converter Temperature Sensor Malfunction	562	Normal driving
P3226	DC/DC (Boost) Converter Temperature Sensor Malfunction	563	Normal driving
U0100	Lost Communication with ECM/PCM "A"	211	Limited driving
U0100	Lost Communication with ECM/PCM "A"	212	Limited driving
U0100	Lost Communication with ECM/PCM "A"	530	Limited driving
U0111	Lost Communication with Battery Energy Control Module "A"	208	Limited driving
U0111	Lost Communication with Battery Energy Control Module "A"	531	Limited driving
U0129	Lost Communication with Brake System Control Module	220	Regenerative brake ineffective
U0129	Lost Communication with Brake System Control Module	222	Regenerative brake ineffective
U0129	Lost Communication with Brake System Control Module	528	Regenerative brake ineffective
U0129	Lost Communication with Brake System Control Module	529	Regenerative brake ineffective
U0131	Lost Communication with Power Steering Control Module	433	Normal driving
U0131	Lost Communication with Power Steering Control Module	434	Normal driving
U0146	Lost Communication with Gateway "A"	435	Normal driving

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05IHH–01

DATA LIST/ACTIVE TEST

1. DATA LIST

NOTICE:

- **The values of DATA LIST could vary significantly with slight differences in measurement, differences in the environment in which the measurements are obtained, or the aging of the vehicle. Thus, definite standards or judgment values are unavailable. Therefore, there may be a malfunction even if a measured value is within the reference range.**
- **In case of intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions, in order to reach an overall judgment by comparing all the items of DATA LIST.**

HINT:

Using DATA LIST displayed by the intelligent tester II, you can read the value of the switches, sensors, actuators and so on without parts removal. Reading DATA LIST as a first step of troubleshooting is one method to shorten diagnostic time.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) According to the display on the tester, read DATA LIST.

Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
Engine Coolant Temp (Coolant Temp)	Engine coolant temperature/ Min.: –40°C, Max.: 140°C	After warming up: 80 to 100°C (176 to 212°F)	• If the value is –40°C (–40°F): Open in sensor circuit • If the value is 140°C (284°F): Short in sensor circuit
Vehicle Spd (Vehicle Spd)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	—
Engine Run Time (Eng Run Time)	Elapsed time after starting engine Min.: 0 s, Max.: 65,535 s	—	—
+B (+B)	Auxiliary battery voltage/ Min.: 0 V, Max.: 65.535 V	Constant: Auxiliary battery voltage ±3 V	—
Accel Pedal Pos #1 (Accel Pos #1)	Accelerator pedal position sensor No. 1/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
Accel Pedal Pos #2 (Accel Pos #2)	Accelerator pedal position sensor No. 2/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
Ambient Temperature (Ambient Temp)	Ambient air temperature/ Min.: –40°C, Max.: 215°C	Power switch ON (IG): Same as ambient air temperature	—
Intake Air Temperature (Intake Air Temp)	Intake air temperature/ Min.: –40°C, Max.: 140°C	Constant: Same as ambient air temperature	—
DTC Clear Warm Up (DTC Clear Warm)	The number of times engine is warmed up after clearing DTCs/ Min.: 0, Max.: 255	CHK ENG OFF, engine coolant temperature increases from below 22°C (71.6°F) before starting the engine to above 70°C (158°F) after starting the engine: Increases once	—
DTC Clear Run Distance (DTC Clear Run)	Drive distance after clearing DTCs/ Min.: 0 km, Max.: 65,535 km	—	—
DTC Clear Min (DTC Clear Min)	Elapsed time after clearing DTCs/ Min.: 0 min, Max.: 65,535 min	—	—
MIL on Run Distance (MIL on Run Dist)	Drive distance after malfunction occurrence/ Min.: 0 km, Max.: 65,535 km	—	—

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
MIL on Engine Run Time (MIL On Eng Time)	Elapsed time after starting engine with CHK ENG ON/ Min.: 0 min, Max.: 65,535 min	—	—
MIL Status (MIL Status)	CHK ENG status/ ON or OFF	CHK ENG ON: ON	Constant ON: Repair in accordance with detected DTCs
Motor (MG2) Revolution (MG2 Rev)	MG2 revolution/ Min.: –16,383 rpm, Max.: 16,383 rpm	—	—
Motor (MG2) Torq (MG2 Torq)	MG2 torque/ Min.: –500 Nm, Max.: 500 Nm	—	—
M (MG2) Trq Exec Val (MG2 Trq Exc Val)	MG2 torque execution value/ Min.: –512 Nm, Max.: 508 Nm	After full–load acceleration with READY lamp ON and engine stopped: Less than ±20 % of MG2 TORQ	—
Generator (MG1) Rev (MG1 Rev)	MG1 revolution/ Min.: –16,383 rpm, Max.: 16,383 rpm	—	—
Generator (MG1) Torq (MG1 Torq)	MG1 torque/ Min.: –500 Nm, Max.: 500 Nm	—	—
G (MG1) Trq Exec Val (MG1 Trq Exc Val)	MG1 torque execution value/ Min.: –512 Nm, Max.: 508 Nm	1 second has elapsed after the engine was started automatically with READY lamp ON, engine stopped, A/C fan Hi, head lamp ON and the P position: Less than ±20 % of MG1 TORQ	—
Regenerative Brake Torq (Regen Exec Torq)	Regenerative brake execution torque/ Min.: 0 Nm, Max.: 186 Nm	—	—
Rqst Regen Brake Torq (Regen Rqst Torq)	Regenerative brake request torque/ Min.: 0 Nm, Max.: 186 Nm	Vehicle speed 30 km/h (19 mph) and master cylinder hydraulic pressure –200 Nm: Changes with brake pedal pressure	—
Inverter Temp–(MG1) (MG1 Invert Temp)	MG1 inverter temperature/ Min.: –50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is –50°C (–58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
Inverter Temp–(MG2) (MG2 Invert Temp)	MG2 inverter temperature/ Min.: –50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is –50°C (–58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
Motor Temp No2 (Motor2 Temp)	Transaxle fluid temperature/ Min.: –50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is –50°C (–58°F): Open or +B short in sensor circuit • If the value is 205°C (401°F): GND short in sensor circuit
Motor Temp No1 (Motor1 Temp)	MG2 motor temperature/ Min.: –50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is –50°C (–58°F): Open or +B short in sensor circuit • If the value is 205°C (401°F): GND short in sensor circuit

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
Converter Temperature (Converter Temp)	Boost converter temperature/ Min.: –50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 60°C (77 to 140°F)	• If the value is –50°C (–58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
Accelerator Degree (Accelerator)	Accelerator pedal depressed angle/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
Request Power (Power Rqst)	Engine power output request value/ Min.: 0 W, Max.: 320,000 W	—	—
Target Engine Rev (Target Eng Spd)	Target engine speed/ Min.: 0 rpm, Max.: 8,000 rpm	—	—
Engine Spd (Engine Spd)	Engine speed/ Min.: 0 rpm, Max.: 8,000 rpm	Idling*: 950 to 1,050 rpm	—
Vehicle Spd (Vehicle Spd)	Resolver vehicle speed/ Min.: –256 km/h, Max.: 254 km/h	Driving at 40 km/h (25 mph): 40 km/h (25 mph)	—
Master Cylinder Ctrl Trq (Mcyl Ctrl Power)	Braking torque that is equivalent to the master cylinder hydraulic pressure/ Min.: –512 Nm, Max.: 508 Nm	Brake pedal depressed: Changes with brake pedal pressure	—
Status of Charge (SOC)	Battery state of charge/ Min.: 0 %, Max.: 100 %	Constant: 0 to 100 %	—
WOUT Control Power (WOUT Ctrl Power)	Discharge control power value/ Min.: 0 W, Max.: 81,600 W	21,000 W or less	—
WIN Control Power (WIN Ctrl Power)	Charge control power value/ Min.: –40,800 W, Max.: 0 W	–25,000 W or more	—
Discharge Rqst to SOC (Dchg Rqst SOC)	Discharge request to adjust SOC/ Min.: –20,480 W, Max.: 20,320 W	• Uniform on–board charging: –4,400 W • Usually: 0 W	—
Power Resource VB (Pwr Resource VB)	HV battery voltage/ Min.: 0 V, Max.: 510 V	READY lamp ON and P position: 150 to 300 V	—
Power Resource IB (Pwr Resource IB)	HV battery current/ Min.: –256 A, Max.: 254 A	—	—
VL–Voltage before Raise (VL)	High voltage before it is boosted/ Min.: 0 V, Max.: 510 V	Power switch ON (READY): Practically the same as the HV battery voltage	• If the value is 0 V: Open or GND short in sensor circuit • If the value is 510 V: +B short in sensor circuit
VH–Voltage after Raise (VH)	High voltage after it is boosted/ Min.: 0 V, Max.: 765 V	Engine revved up in P position: HV battery voltage to 500 V	• If the value is 0 V: Open or GND short in sensor circuit • If the value is 765 V: +B short in sensor circuit
Raising Pressure Ratio (Rais Pres Ratio)	Boost ratio/ Min.: 0 %, Max.: 100 %	The pre–boost voltage and the post–boost voltage are equal: 0 to 10 %	—
Drive Condition ID (Drive Condition)	Drive condition ID/ Min.: 0, Max.: 6	• Engine stopped: 0 • Engine about to be stopped: 1 • Engine about to be started: 2 • Engine operated or operating: 3 • Generating or loading movement: 4 • Revving up with P position: 6	—

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
Shift Sensor Main (M Shift Sensor)	Output voltage of the shift position sensor (main)/ Min.: 0 V, Max.: 5 V	• Selector lever in home position: 2.0 to 3.0 V • Shifting into R position: LHD: 4.0 to 4.8 V RHD: 0.2 to 1.0 V • Shifting into B or D position: LHD: 0.2 to 1.0 V RHD: 4.0 to 4.8 V	—
Shift Sensor Sub (S Shift Sensor)	Output voltage of the shift position sensor (sub)/ Min.: 0 V, Max.: 5 V	• Selector lever in home position: 2.0 to 3.0 V • Shifting into R position: LHD: 4.0 to 4.8 V RHD: 0.2 to 1.0 V • Shifting into B or D position: LHD: 0.2 to 1.0 V RHD: 4.0 to 4.8 V	—
Shift Sensor Select Main (Sm Shift Sensor)	Output voltage of the select position sensor (main)/ Min.: 0 V, Max.: 5 V	• Selector lever in home position: LHD: 0.5 to 2.0 V RHD: 3.0 to 4.85 V • Shifting into R, N or D position: LHD: 3.0 to 4.85 V RHD: 0.5 to 2.0 V	—
Shift Sensor Select Sub (Ss Shift Sensor)	Output voltage of the select position sensor (sub)/ Min.: 0 V, Max.: 5 V	• Selector lever in home position: LHD: 0.5 to 2.0 V RHD: 3.0 to 4.85 V • Shifting into R, N or D position: LHD: 3.0 to 4.85 V RHD: 0.5 to 2.0 V	—
Shift Sensor Shift Pos (Shift Position)	Shift position	P, R, N, D or B	—
A/C Consumption Pwr (A/C Consmpt Pwr)	A/C consumption power/ Min.: 0 kW, Max.: 5 kW	—	—
Driving Condition (Drive Condition)	Driving condition	• MG1 load: MG1 • MG2 load: MG2	—
Short Wave Highest Val (Short Wave High)	Waveform voltage in leak detection circuit in battery ECU/ Min.: 0 V, Max.: 5 V	READY lamp is left ON for 2 minutes, and the pre–boost voltage and the post–boost voltage are equal: 4 V or more	—
Type of ECU (ECU Type)	Type of ECU	HV ECU	—
Num of Current Code (Current DTCs)	The number of current DTCs/ Min.: 0, Max.: 255	—	—
Num of History Code (History DTCs)	The number of history DTCs/ Min.: 0, Max.: 255	—	—
Check Mode (Check Mode)	Check mode/ ON or OFF	—	—
Engine Stop Request (Eng Stop Rqst)	Engine stop request/ NO or RQST	Requesting engine stop: RQST	—
Engine Idling Request (Idling Request)	Engine idling request/ NO or RQST	Requesting idle: RQST	—
Main Batt Charging Rqst (HV Batt Ch Rqst)	HV battery charging request/ NO or RQST	Requesting HV battery charging: RQST	—
Engine Stop Inhibit Rqst (Eng Stp Inhibit)	Engine stop inhibit request/ NO or RQST	Requesting engine intermittent prohibition: RQST	—

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Intelligent Tester II Display (abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
Aircon Request (Aircon Request)	Engine starting request from A/C amplifier/ NO or RQST	Requesting engine start from A/C amplifier: RQST	—
Engine Warming Up Rqst (Eng Warm Up Rqt)	Engine warm–up request/ NO or RQST	Requesting engine warm–up: RQST	—
Sys Main Rly – Cont1 (Smr Cont1)	Operating condition of system main relay No. 1/ ON or OFF	Power switch ON (READY): OFF	—
Sys Main Rly – Cont2 (Smr Cont2)	Operating condition of system main relay No. 2/ ON or OFF	Power switch ON (READY): ON	—
Sys Main Rly – Cont3 (Smr Cont3)	Operating condition of system main relay No. 3/ ON or OFF	Power switch ON (READY): ON	—
MG1 Gate Status (MG1 Gate)	MG1 gate status/ ON or OFF	Shutting down generator inverter: ON	—
MG2 Gate Status (MG2 Gate)	MG2 gate status/ ON or OFF	Shutting down motor inverter: ON	—
Converter Gate Status (Cnv Gate)	Boost converter gate status/ ON or OFF	Shutting down boost converter: ON	—
Aircon Gate Status (A/C Gate)	A/C gate status/ ON or OFF	Shutting down A/C inverter: ON	—
Smart Key Status (Smart Key)	Electronic key ID code check status/ ON or OFF	When electronic key ID code corresponds to ID code registered in ECU: ON	—

*: If no conditions are specifically stated for "Idling", it means the engine for inspection mode, the shift position is in P, the A/C switch is OFF, and accelerator pedal is not depressed.

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2. ACTIVE TEST

NOTICE:

Beware that if the connector to the intelligent tester II becomes disconnected or a communication error occurs during ACTIVE TEST, the vehicle could become inoperative (READY lamp OFF).

HINT:

Performing ACTIVE TEST using the intelligent tester II allows the relay, VSV, actuator and so on to operate without parts removal. Performing ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display items in DATA LIST during ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / Hybrid Control / Active Test.
(e) According to the display on the tester, perform ACTIVE TEST.

Intelligent tester II Display (abbreviation)	Purpose	Test Details	Test Condition
Inspection Mode – 2WD Inspection * (Inspection Mod1)	• To check its operation while the engine is running • To disable traction control while performing a speedometer test or the like	• Runs the engine continuously with the P position • Cancels the traction control that is effected when the rotational difference between the front and rear wheels is excessive other than the P position	Power switch ON (IG), HV system normal, not in inspection mode, and other active tests not being executed
Inspection Mode – 2WD Chassis–Dynamo * (Inspection Mod2)	To disable traction control while performing a speedometer test or the like	Cancels the traction control that is effected when the rotational difference between the front and rear wheels is excessive other than the P position	Power switch ON (IG), HV system normal, not in inspection mode, and other active tests not being executed
Forcible Stop of Inverter Drive * (Inverter Stop)	To determine if there is an internal leak in the inverter or the HV control ECU	Keeps the inverter power transistor actuation signal ON	Power switch ON (IG), P position, HV system normal, inverter actuation not being disabled, shutting down inverter, and other active tests not being executed
Cranking Request * (Cranking Rqst)	To crank the engine continuously in order to measure the compression	Allows the engine to continue cranking by activating the generator continuously	Power switch ON (IG), HV system normal, not in cranking mode, and other active tests not being executed

NOTICE:

***: The intelligent tester II results in a communication error and the vehicle's READY lamp turns OFF upon the completion of ACTIVE TEST. Therefore, in order to use the tester again, turn the power switch OFF, and restart by turn it ON.**

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DIAGNOSTIC TROUBLE CODE CHART

05IHJ–01

DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	539	Immobilizer malfunction	• Immobilizer system	X	X	–
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	540	Immobilizer malfunction	• Immobilizer system	X	X	–
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	541	Immobilizer malfunction	• Immobilizer system	X	X	–
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	542	Immobilizer malfunction	• Immobilizer system	X	X	–
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	543	Immobilizer malfunction	• Immobilizer system	X	X	–
B2799 (05–2078) *4 (05–2115) *5	Immobilizer Malfunction	544	Immobilizer malfunction	• Immobilizer system	X	X	–
P0336 (05–287)	Crankshaft Position Sensor "A" Circuit Range/Performance	137	Engine speed sensor deviation malfunction (CAN communication)	• Wire harness or connector • Crankshaft position sensor • Camshaft position sensor • HV control ECU	X	○	• HV system
P0338 (05–290)	Crankshaft Position Sensor "A" Circuit High Input	600	NEO signal circuit malfunction	• Wire harness or connector • HV control ECU	X	○	• HV system
P0340 (05–287)	Camshaft Position Sensor "A" Circuit	532	Engine speed sensor deviation malfunction (pulse signal)	• Wire harness or connector • Crankshaft position sensor • Camshaft position sensor • HV control ECU	X	○	• HV system
P0343 (05–290)	Camshaft Position Sensor "A" Circuit High Input	601	GO signal circuit malfunction	• Wire harness or connector • HV control ECU	X	○	• HV system
P0500 (05–2460)	Vehicle Speed Sensor "A"	352	No input of vehicle speed signal during cruise control driving	• Cruise control system	X	X	–
P0560 (05–292)	System Voltage	117	HV control ECU back–up power source circuit malfunction	• Wire harness or connector • HEV fuse	○	○	• HV system
P0571 (05–2464)	Brake Switch "A" Circuit	115	Open or short in stop lamp switch circuit	• Cruise control system	X	X	–
P0607 (05–2469)	Control Module Performance	116	When STP signal of HV control ECU is inconsistent with that of skid control ECU, with cruise control indicator ON	• Cruise control system	X	X	–
P0705 (05–295)	Transmission Range Sensor Circuit	571	Open or GND short in shift main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	572	+B short in shift main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	573	Open or GND short in shift sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0705 (05–295)	Transmission Range Sensor Circuit	574	+B short in shift sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	575	Open or GND short in select main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	576	+B short in select main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	577	Open or GND short in select sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	578	+B short in select sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	595	Difference between shift main sensor value and shift sub sensor value is large	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0705 (05–295)	Transmission Range Sensor Circuit	596	Difference between select main sensor value and select sub sensor value is large	• Wire harness or connector • Selector lever • HV control ECU	X	○	• HV system
P0851 (05–306)	Park/Neutral Switch Input Circuit Low	579	GND short in P position switch circuit	• Wire harness or connector • P position switch • HV control ECU	X	○	• HV system
P0852 (05–306)	Park/Neutral Switch Input Circuit High	580	Open or +B short in P position switch circuit	• Wire harness or connector • P position switch • HV control ECU	X	○	• HV system
P0A08 (05–309)	DC/DC Converter Status Circuit	264	DC/DC converter malfunction	• w/ converter inverter assembly	X	○	• HV system • Discharge
P0A09 (05–310)	DC/DC Converter Status Circuit Low Input	265	Open or GND short in NODD signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly	X	○	• HV system • Discharge
P0A09 (05–312)	DC/DC Converter Status Circuit Low Input	591	Open or GND short in VLO signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly	X	○	• HV system • Discharge
P0A0F (05–314)	Engine Failed to Start	204	Abnormal signal input from ECM (abnormal engine output)	• ECM • SFI system	X	○	• HV system
P0A0F (05–314)	Engine Failed to Start	205	Abnormal signal input from ECM (engine is unable to start)	• ECM • SFI system	X	○	• HV system
P0A0F (05–315)	Engine Failed to Start	238	Engine does not start even though cranking it (transaxle input malfunction [engine system])	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU	X	○	• HV system
P0A0F (05–314)	Engine Failed to Start	533	Abnormal signal input from ECM (abnormal engine output by running out of fuel)	• ECM • SFI system	X	○	• HV system
P0A0F (05–314)	Engine Failed to Start	534	Abnormal signal input from ECM (engine is unable to start by running out of fuel)	• ECM • SFI system	X	○	• HV system
P0A10 (05–310)	DC/DC Converter Status Circuit High Input	263	+B short in NODD signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly	X	○	• HV system • Discharge

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A10 (05–312)	DC/DC Converter Status Circuit High Input	592	+B short in VLO signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly	X	○	• HV system • Discharge
P0A1D (05–320)	Hybrid Powertrain Control Module	134	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	135	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	139	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	140	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	141	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–324)	Hybrid Powertrain Control Module	142	ST signal of HV control ECU is ON with power switch OFF	• Wire harness or connector • Power source control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	143	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	144	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	145	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	148	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	149	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	150	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	151	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	152	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	155	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	156	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	158	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	159	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	160	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	163	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	164	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	165	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	166	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	167	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	168	HV control ECU internal error	• HV control ECU	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A1D (05–320)	Hybrid Powertrain Control Module	177	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	178	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	180	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	181	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	182	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	183	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	184	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	185	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	186	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	187	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	188	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	189	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	192	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	193	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	195	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	196	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	197	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	198	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	199	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	200	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–327)	Hybrid Powertrain Control Module	390	Charge control malfunction	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	392	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	393	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	511	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	512	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	564	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	565	HV control ECU internal error	• HV control ECU	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A1D (05–320)	Hybrid Powertrain Control Module	567	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–328)	Hybrid Powertrain Control Module	568	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–328)	Hybrid Powertrain Control Module	569	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	570	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1D (05–320)	Hybrid Powertrain Control Module	615	HV control ECU internal error	• HV control ECU	○	○	• HV system
P0A1F (05–329)	Battery Energy Control Module	123	Abnormal signal input from battery ECU (ROMRAM malfunction)	• HV battery system • Battery ECU	○	○	• HV system
P0A1F (05–330)	Battery Energy Control Module	129	HV battery voltage circuit malfunction	• HV battery voltage circuit • Service plug grip • High voltage fuse • Battery plug • Battery ECU	○	○	• HV system
P0A1F (05–333)	Battery Energy Control Module	593	IG2 signal circuit of battery ECU malfunction	• Wire harness or connector • Battery ECU	○	○	• HV system
P0A2B (05–335)	Drive Motor "A" Temperature Sensor Circuit Range/Performance	248	Motor temperature sensor No. 1 malfunction	• Hybrid vehicle motor	X	○	• HV system
P0A2B (05–335)	Drive Motor "A" Temperature Sensor Circuit Range/Performance	250	Motor temperature sensor No. 1 performance problem	• Hybrid vehicle motor	X	○	• HV system
P0A2C (05–336)	Drive Motor "A" Temperature Sensor Circuit Low	247	GND short in motor temperature sensor No. 1 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	X	○	• HV system
P0A2D (05–336)	Drive Motor "A" Temperature Sensor Circuit High	249	Open or +B short in motor temperature sensor No. 1 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	X	○	• HV system
P0A37 (05–342)	Generator Temperature Sensor Circuit Range/Performance	258	Motor temperature sensor No. 2 malfunction	• Hybrid vehicle motor	X	○	• HV system
P0A37 (05–343)	Generator Temperature Sensor Circuit Range/Performance	260	Motor temperature sensor No. 2 performance problem	• Hybrid vehicle motor • Transaxle fluid leakage • HV transaxle assembly	X	○	• HV system
P0A38 (05–344)	Generator Temperature Sensor Circuit Low	257	GND short in motor temperature sensor No. 2 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	X	○	• HV system
P0A39 (05–344)	Generator Temperature Sensor Circuit High	259	Open or +B short in motor temperature sensor No. 2 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	X	○	• HV system
P0A3F (05–349)	Drive Motor "A" Position Sensor Circuit	243	Interphase short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	○	○	• HV system
P0A40 (05–349)	Drive Motor "A" Position Sensor Circuit Range/Performance	500	Motor resolver output is out of normal range	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A41 (05–349)	Drive Motor "A" Position Sensor Circuit Low	245	Open or short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU	○	○	• HV system
P0A4B (05–353)	Generator Position Sensor Circuit	253	Interphase short in generator resolver circuit	• Wire harness or connector • Hybrid vehicle generator • HV control ECU	○	○	• HV system
P0A4C (05–353)	Generator Position Sensor Circuit Range/Performance	513	Generator resolver output is out of normal range	• Wire harness or connector • Hybrid vehicle generator • HV control ECU	○	○	• HV system
P0A4D (05–353)	Generator Position Sensor Circuit Low	255	Open or short in generator resolver circuit	• Wire harness or connector • Hybrid vehicle generator • HV control ECU	○	○	• HV system
P0A51 (05–356)	Drive Motor "A" Current Sensor Circuit	174	HV control ECU internal error	• HV control ECU	X	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	288	Phase V current sub sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	289	Open in phase V current sub sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	290	Phase V current main sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	292	Open in phase V current main sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	294	Phase V current main and sub sensors of motor inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A60 (05–357)	Drive Motor "A" Phase V Current	501	Phase V current main and sub sensors of motor inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	296	Phase W current sub sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	297	Open in phase W current sub sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	298	Phase W current main sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	300	Open in phase W current main sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	302	Phase W current main and sub sensors of motor inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A63 (05–357)	Drive Motor "A" Phase W Current	502	Phase W current main and sub sensors of motor inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A72 (05–361)	Generator Phase V Current	326	Phase V current sub sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A72 (05–361)	Generator Phase V Current	327	Open in phase V current sub sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A72 (05–361)	Generator Phase V Current	328	Phase V current main sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A72 (05–361)	Generator Phase V Current	330	Open in phase V current main sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A72 (05–361)	Generator Phase V Current	333	Phase V current main and sub sensors of generator inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A72 (05–361)	Generator Phase V Current	515	Phase V current main and sub sensors of generator inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	334	Phase W current sub sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	335	Open in phase W current sub sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	336	Phase W current main sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	338	Open in phase W current main sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	341	Phase W current main and sub sensors of generator inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A75 (05–361)	Generator Phase W Current	516	Phase W current main and sub sensors of generator inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–365)	Drive Motor "A" Inverter Performance	266	Open or GND short in inverter voltage (VH) signal circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0A78 (05–365)	Drive Motor "A" Inverter Performance	267	+B short in inverter voltage (VH) signal circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0A78 (05–373)	Drive Motor "A" Inverter Performance	272	Abnormality in motor PWM circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–376)	Drive Motor "A" Inverter Performance	278	+B short in motor inverter over–voltage (OVH) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A78 (05–378)	Drive Motor "A" Inverter Performance	279	Motor inverter over–voltage (OVH) signal detection (over–voltage by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–376)	Drive Motor "A" Inverter Performance	280	Open or GND short in motor inverter over–voltage (OVH) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–387)	Drive Motor "A" Inverter Performance	282	Motor inverter over voltage (OVH) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–390)	Drive Motor "A" Inverter Performance	283	+B short in motor inverter fail (MFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–392)	Drive Motor "A" Inverter Performance	284	Motor inverter fail (MFIV) signal detection (inverter overheating)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–390)	Drive Motor "A" Inverter Performance	285	Open or GND short in motor inverter fail (MFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–400)	Drive Motor "A" Inverter Performance	286	Motor inverter fail (MFIV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–403)	Drive Motor "A" Inverter Performance	287	Motor inverter fail (MFIV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–410)	Drive Motor "A" Inverter Performance	304	Open or +B short in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–410)	Drive Motor "A" Inverter Performance	305	GND short in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–412)	Drive Motor "A" Inverter Performance	306	Failure in monitoring MG2 torque performance	• Hybrid vehicle motor • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–415)	Drive Motor "A" Inverter Performance	308	Collision signal input from airbag ECU or circuit breaker sensor No. 1	• Supplemental restraint system • Circuit breaker sensor No. 1	○	○	• HV system
P0A78 (05–378)	Drive Motor "A" Inverter Performance	503	Motor inverter over–voltage (OVH) signal detection (over–voltage by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A78 (05–378)	Drive Motor "A" Inverter Performance	504	Motor inverter over–voltage (OVH) signal detection (over–voltage by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–403)	Drive Motor "A" Inverter Performance	505	Motor inverter fail (MFIV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–403)	Drive Motor "A" Inverter Performance	506	Motor inverter fail (MFIV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–410)	Drive Motor "A" Inverter Performance	507	Open in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–416)	Drive Motor "A" Inverter Performance	508	Motor gate shutdown (MSDN) signal malfunction	• Wire harness or connector • HV control ECU	○	○	• HV system
P0A78 (05–418)	Drive Motor "A" Inverter Performance	510	Motor inverter gate malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–420)	Drive Motor "A" Inverter Performance	523	Inverter voltage (VH) sensor offset malfunction	• System main relay • w/ converter inverter assembly	○	○	• HV system
P0A78 (05–422)	Drive Motor "A" Inverter Performance	586	Inverter voltage (VH) sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–424)	Generator Inverter Performance	309	Abnormality in generator PWM circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–426)	Generator Inverter Performance	321	+B short in generator inverter fail (GFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–428)	Generator Inverter Performance	322	Generator inverter fail (GFIV) signal detection (inverter overheating)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–426)	Generator Inverter Performance	323	Open or GND short in generator inverter fail (GFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–436)	Generator Inverter Performance	324	Generator inverter fail (GFIV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–439)	Generator Inverter Performance	325	Generator inverter fail (GFIV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P0A7A (05–446)	Generator Inverter Performance	342	Open or +B short in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–446)	Generator Inverter Performance	343	GND short in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–448)	Generator Inverter Performance	344	Failure in monitoring MG1 torque performance	• Hybrid vehicle generator • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–439)	Generator Inverter Performance	517	Generator inverter fail (GFIV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–439)	Generator Inverter Performance	518	Generator inverter fail (GFIV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–446)	Generator Inverter Performance	519	Open in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A7A (05–451)	Generator Inverter Performance	520	Generator gate shutdown (GSDN) signal malfunction	• Wire harness or connector • HV control ECU	○	○	• HV system
P0A7A (05–453)	Generator Inverter Performance	522	Generator inverter gate malfunction	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A90 (05–455)	Drive Motor "A" Performance	239	HV transaxle input malfunction (shaft damaged)	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU	○	○	• HV system
P0A90 (05–461)	Drive Motor "A" Performance	240	Generator locked	• Hybrid vehicle generator	○	○	• HV system
P0A90 (05–455)	Drive Motor "A" Performance	241	HV transaxle input malfunction (torque limiter slipping)	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU	○	○	• HV system
P0A90 (05–462)	Drive Motor "A" Performance	242	Planetary gear locked	• HV transaxle assembly	○	○	• HV system
P0A90 (05–463)	Drive Motor "A" Performance	251	MG2 magnetic force deterioration or same phase short circuit	• Hybrid vehicle motor	○	○	• HV system
P0A90 (05–465)	Drive Motor "A" Performance	509	MG2 system malfunction	• Hybrid vehicle motor • w/ converter inverter assembly	○	○	• HV system
P0A90 (05–455)	Drive Motor "A" Performance	602	HV transaxle output malfunction	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU	○	○	• HV system
P0A90 (05–467)	Drive Motor "A" Performance	604	MG2 power balance malfunction (small power balance)	• Battery current sensor • Hybrid vehicle motor	○	○	• HV system

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P0A90 (05–467)	Drive Motor "A" Performance	605	MG2 power balance malfunction (large power balance)	• Battery current sensor • Hybrid vehicle motor	○	○	• HV system
P0A92 (05–469)	Hybrid Generator Performance	261	MG1 magnetic force deterioration or same phase short circuit	• Hybrid vehicle generator	○	○	• HV system
P0A92 (05–470)	Hybrid Generator Performance	521	MG1 system malfunction	• Hybrid vehicle generator • w/ converter inverter assembly	○	○	• HV system
P0A92 (05–472)	Hybrid Generator Performance	606	MG1 power balance malfunction (small power balance)	• Battery current sensor • Hybrid vehicle generator	○	○	• HV system
P0A92 (05–472)	Hybrid Generator Performance	607	MG1 power balance malfunction (large power balance)	• Battery current sensor • Hybrid vehicle generator	○	○	• HV system
P0A93 (05–474)	Inverter Cooling System Performance	346	Inverter cooling system malfunction (water pump system malfunction)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	○	○	• HV system
P0A93 (05–474)	Inverter Cooling System Performance	347	Inverter cooling system malfunction (electric cooling fan system malfunction)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–477)	DC/DC Converter Performance	442	Abnormal voltage execution value	• w/ converter inverter assembly	○	○	• HV system
P0A94 (05–479)	DC/DC Converter Performance	545	Open or GND short in boost converter over–voltage (OVL) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–479)	DC/DC Converter Performance	546	+B short in boost converter over–voltage (OVL) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–481)	DC/DC Converter Performance	547	Boost converter over voltage (OVL) signal detection (over voltage by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–481)	DC/DC Converter Performance	548	Boost converter over voltage (OVL) signal detection (over voltage by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–481)	DC/DC Converter Performance	549	Boost converter over voltage (OVL) signal detection (over voltage by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–489)	DC/DC Converter Performance	550	Boost converter over–voltage (OVL) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system

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P0A94 (05–492)	DC/DC Converter Performance	551	Open or GND short in boost converter fail (FCV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–492)	DC/DC Converter Performance	552	+B short in boost converter fail (FCV) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–494)	DC/DC Converter Performance	553	Boost converter fail (FCV) signal detection (boost converter overheating)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–503)	DC/DC Converter Performance	554	Boost converter fail (FCV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–503)	DC/DC Converter Performance	555	Boost converter fail (FCV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–503)	DC/DC Converter Performance	556	Boost converter fail (FCV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–510)	DC/DC Converter Performance	557	Boost converter fail (FCV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–513)	DC/DC Converter Performance	558	GND short in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–513)	DC/DC Converter Performance	559	Open or +B short in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–513)	DC/DC Converter Performance	560	Open in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–515)	DC/DC Converter Performance	561	Abnormal boost converter gate shutdown (CSDN) signal	• Wire harness or connector • HV control ECU	○	○	• HV system
P0A94 (05–517)	DC/DC Converter Performance	583	Open or GND short in boost converter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0A94 (05–517)	DC/DC Converter Performance	584	+B short in boost converter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0A94 (05–523)	DC/DC Converter Performance	585	Boost converter voltage (VL) sensor performance problem	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system

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P0A94 (05–525)	DC/DC Converter Performance	587	Difference between voltages from HV battery voltage (VB) sensor and boost converter voltage (VL) sensor is large	• Wire harness or connector • w/ converter inverter assembly • Service plug grip • High voltage fuse • Battery ECU	○	○	• HV system
P0A94 (05–529)	DC/DC Converter Performance	588	Abnormality in boost converter PWM circuit	• Wire harness or connector • w/ converter inverter assembly	○	○	• HV system
P0A94 (05–531)	DC/DC Converter Performance	589	Open or GND short in boost converter voltage (VL) signal circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0A94 (05–531)	DC/DC Converter Performance	590	+B short in boost converter voltage (VL) signal circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	○	○	• HV system
P0AA1 (05–537)	Hybrid Battery Positive Contactor Circuit Stuck Closed	224	Open or +B short in system main relay No. 1 circuit	• Wire harness or connector • System main relay No. 1 • HV control ECU	X	○	• HV system
P0AA1 (05–540)	Hybrid Battery Positive Contactor Circuit Stuck Closed	226	Open or +B short in system main relay No. 2 circuit	• Wire harness or connector • System main relay No. 2 • HV control ECU	X	○	• HV system
P0AA1 (05–542)	Hybrid Battery Positive Contactor Circuit Stuck Closed	231	System main relay terminal of HV battery positive side stuck closed	• System main relay No. 1 • System main relay No. 2	X	○	• HV system
P0AA1 (05–543)	Hybrid Battery Positive Contactor Circuit Stuck Closed	233	System main relay terminals of HV battery positive and negative sides stuck closed	• System main relay No. 1 • System main relay No. 2 • System main relay No. 3	X	○	• HV system
P0AA2 (05–537)	Hybrid Battery Positive Contactor Circuit Stuck Open	225	GND short in system main relay No. 1 circuit	• Wire harness or connector • System main relay No. 1 • HV control ECU	X	○	• HV system
P0AA2 (05–540)	Hybrid Battery Positive Contactor Circuit Stuck Open	227	GND short in system main relay No. 2 circuit	• Wire harness or connector • System main relay No. 2 • HV control ECU	X	○	• HV system
P0AA4 (05–544)	Hybrid Battery Negative Contactor Circuit Stuck Closed	228	Open or +B short in system main relay No. 3 circuit	• Wire harness or connector • System main relay No. 3 • HV control ECU	○	○	• HV system
P0AA4 (05–546)	Hybrid Battery Negative Contactor Circuit Stuck Closed	232	System main relay terminal of HV battery negative side stuck closed	• System main relay No. 3	○	○	• HV system
P0AA5 (05–544)	Hybrid Battery Negative Contactor Circuit Stuck Open	229	GND short in system main relay No. 3 circuit	• Wire harness or connector • System main relay No. 3 • HV control ECU	X	○	• HV system
P2120 (05–547)	Throttle/Pedal Position Sensor/ Switch "D" Circuit	111	Accelerator pedal position main sensor value does not change while its sub sensor value changes	• Accelerator pedal rod assembly	X	○	• HV system
P2121 (05–547)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Performance	106	Internal error of accelerator pedal position main sensor	• Accelerator pedal rod assembly	X	○	• HV system

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P2121 (05–547)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Performance	114	Accelerator pedal not smoothly returning to its original position	• Accelerator pedal rod assembly	X	○	• HV system
P2122 (05–548)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input	104	Open or GND short in accelerator pedal position main sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU	X	○	• HV system
P2123 (05–548)	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input	105	+B short in accelerator pedal position main sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU	X	○	• HV system
P2125 (05–547)	Throttle/Pedal Position Sensor/ Switch "E" Circuit	112	Accelerator pedal position sub sensor value does not change while its main sensor value changes	• Accelerator pedal rod assembly	X	○	• HV system
P2126 (05–547)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Range/Performance	109	Internal error of accelerator pedal position sub sensor	• Accelerator pedal rod assembly	X	○	• HV system
P2127 (05–548)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input	107	Open or GND short in accelerator pedal position sub sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU	X	○	• HV system
P2128 (05–548)	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input	108	+B short in accelerator pedal position sub sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU	X	○	• HV system
P2138 (05–547)	Throttle/Pedal Position Sensor/ Switch "D"/"E" VoltageCorrelation	110	Difference between main sensor value and sub sensor value is large	• Accelerator pedal rod assembly	X	○	• HV system
P3000 (05–553)	Battery Control System Malfunction	123	Abnormal signal input from battery ECU (HV battery system malfunction)	• HV battery system • Battery ECU	○	○	• HV system
P3000 (05–553)	Battery Control System Malfunction	125	Abnormal signal input from battery ECU (High voltage fuse blown out)	• HV battery system • Battery ECU	○	○	• HV system
P3000 (05–554)	Battery Control System Malfunction	388	Abnormal signal input from battery ECU (discharge inhibition control malfunction)	• HV control system • Fuel shortage • HV battery assembly	X	○	• HV battery
P3000 (05–556)	Battery Control System Malfunction	389	Abnormal signal input from battery ECU (drop of high voltage)	• HV control system • HV battery assembly	X	○	• HV battery
P3000 (05–553)	Battery Control System Malfunction	603	Abnormal signal input from battery ECU (HV battery cooling system malfunction)	• HV battery system • Battery ECU	○	○	• HV system
P3004 (05–557)	High Voltage Power Resource Malfunction	131	High voltage fuse has blown out, service plug grip is disconnected or limiter resistance is cut off	• HV battery system • System main resistor • System main relay No. 1 • System main relay No. 3 • Main battery cable • Main battery cable No. 2 • Frame wire • w/ converter inverter assembly • HV control ECU	X	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P3004 (05–564)	High Voltage Power Resource Malfunction	132	Inverter voltage sensor malfunction, or limiter resistance increases	• HV control system • System main resistor • System main relay No. 1 • System main relay No. 3 • Main battery cable • Main battery cable No. 2 • Frame wire • w/ converter inverter assembly • HV control ECU	X	○	• HV system
P3004 (05–570)	High Voltage Power Resource Malfunction	133	Abnormal signal input from battery ECU	• HV battery system • Battery ECU	X	X	–
P3009 (05–571)	High Voltage Power Short Circuit	526	Insulation resistance of high voltage circuit and body is low	• Frame wire • System main relay • System main resistor • HV battery assembly • w/ motor compressor assembly • Battery ECU • HV transaxle assembly • w/ converter inverter assembly • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly	X	○	• HV system
P3009 (05–571)	High Voltage Power Short Circuit	611	Insulation resistance of A/C compressor motor or A/C inverter is low	• w/ motor compressor assembly • w/ converter inverter assembly	X	○	• HV system
P3009 (05–571)	High Voltage Power Short Circuit	612	Insulation resistance of HV battery, battery ECU, system main relay, or system main resistor is low	• HV battery assembly • Battery ECU • System main relay • System main resistor • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly	X	○	• HV system
P3009 (05–571)	High Voltage Power Short Circuit	613	Insulation resistance of HV transaxle or motor and generator inverters is low	• HV transaxle assembly • w/ converter inverter assembly	X	○	• HV system
P3009 (05–571)	High Voltage Power Short Circuit	614	Insulation resistance of motor and generator inverters, A/C inverter, system main relay, system main resistor, or frame wire is low	• Frame wire • System main relay • System main resistor • HV battery assembly • w/ converter inverter assembly • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	524	BEAN communication problem of transmission control ECU	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	525	Transmission control ECU IG OFF command malfunction	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system

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P3102 (05–590)	Transmission Control ECU Malfunction	581	Transmission control ECU malfunction	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	582	P position (PPOS) signal is logically inconsistent	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	597	GND short in P position (PPOS) signal circuit	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	598	+B short in P position (PPOS) signal circuit	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3102 (05–590)	Transmission Control ECU Malfunction	599	P position (PPOS) signal malfunction (output pulse is abnormal)	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU	X	○	• HV system
P3107 (05–593)	Lost Communication with Airbag System Control Module	213	GND short in communication circuit between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU	X	○	• HV system
P3107 (05–593)	Lost Communication with Airbag System Control Module	214	Open or +B short in communication circuit between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU	X	○	• HV system
P3107 (05–593)	Lost Communication with Airbag System Control Module	215	Abnormal communication signals between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU	X	○	• HV system
P3108 (05–595)	Lost Communication with A/C System Control Module	535	Serial communication malfunction	• Wire harness or connector • w/ converter inverter assembly	X	X	–
P3108 (05–595)	Lost Communication with A/C System Control Module	536	A/C inverter malfunction	• Wire harness or connector • w/ converter inverter assembly	X	X	–
P3108 (05–597)	Lost Communication with A/C System Control Module	537	A/C amplifier malfunction	• A/C amplifier	X	X	–
P3108 (05–595)	Lost Communication with A/C System Control Module	538	Open in STB signal circuit	• Wire harness or connector • w/ converter inverter assembly	X	X	–
P3108 (05–598)	Lost Communication with A/C System Control Module	594	CAN communication malfunction	• CAN communication system	X	X	–
P3110 (05–599)	HV Main Relay Malfunction	223	IGCT relay is always closed	• Wire harness or connector • Integration relay (IGCT relay)	X	○	• HV system
P3110 (05–599)	HV Main Relay Malfunction	527	IG2 logical inconsistency	• Wire harness or connector • Integration relay (IG2 relay)	X	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P3137 (05–601)	Collision Sensor Low Input	348	GND short in circuit breaker sensor No. 1 circuit	• Wire harness or connector • Circuit breaker sensor No. 1	X	○	• HV system
P3138 (05–601)	Collision Sensor High Input	349	Open or +B short in circuit breaker sensor No. 1 circuit	• Wire harness or connector • Circuit breaker sensor No. 1	X	○	• HV system
P3140 (05–603)	HV Interlock Switch Operation	350	Operating safety devices with vehicle stopped (ILK signal is ON)	• Service plug grip installation • Inverter cover installation	X	○	• HV system
P3143 (05–604)	HV Interlock Switch Open/Short	351	Open in interlock signal circuit while vehicle is running	• Wire harness or connector • Battery plug (interlock switch No. 2) • w/ converter inverter assembly (interlock switch No. 1)	X	○	• HV system
P3211 (05–607)	Drive Motor "A" Inverter Temperature Sensor Circuit Range/Performance	276	Sudden change in motor inverter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
P3211 (05–607)	Drive Motor "A" Inverter Temperature Sensor Circuit Range/Performance	277	Motor inverter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
P3212 (05–612)	Drive Motor "A" Inverter Temperature Sensor Circuit High/Low	275	Open or GND short in motor inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	X	○	• HV system
P3213 (05–612)	Drive Motor "A" Inverter Temperature Sensor Circuit High	274	+B short in motor inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	X	○	• HV system
P3221 (05–618)	Generator Inverter Temperature Sensor Circuit Range/Performance	314	Sudden change in generator inverter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
P3221 (05–618)	Generator Inverter Temperature Sensor Circuit Range/Performance	315	Generator inverter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
P3222 (05–623)	Generator Inverter Temperature Sensor Circuit High/Low	313	Open or GND short in generator inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	X	○	• HV system
P3223 (05–623)	Generator Inverter Temperature Sensor Circuit High	312	+B short in generator inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU	X	○	• HV system

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
P3226 (05–629)	DC/DC (Boost) Converter Temperature Sensor Malfunction	562	Sudden change in boost converter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
P3226 (05–629)	DC/DC (Boost) Converter Temperature Sensor Malfunction	563	Boost converter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly	X	○	• HV system
U0100 (05–634)	Lost Communication with ECM/ PCM "A"	211	CAN communication problem between ECM and HV control ECU (no signal input)	• CAN communication system	○	○	• HV system
U0100 (05–634)	Lost Communication with ECM/ PCM "A"	212	CAN communication problem between ECM and HV control ECU (transmission error)	• CAN communication system	○	○	• HV system
U0100 (05–634)	Lost Communication with ECM/ PCM "A"	530	CAN communication problem between ECM and HV control ECU (CAN communication system malfunction)	• CAN communication system	○	○	• HV system
U0111 (05–634)	Lost Communication with Battery Energy Control Module "A"	208	CAN communication problem between battery ECU and HV control ECU (no signal input)	• CAN communication system	○	○	• HV system
U0111 (05–634)	Lost Communication with Battery Energy Control Module "A"	531	CAN communication problem between battery ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system	○	○	• HV system
U0129 (05–634)	Lost Communication with Brake System Control Module	220	CAN communication problem between skid control ECU and HV control ECU (no signal input)	• CAN communication system	X	○	• HV system
U0129 (05–634)	Lost Communication with Brake System Control Module	222	CAN communication problem between skid control ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system	X	○	• HV system
U0129 (05–634)	Lost Communication with Brake System Control Module	528	CAN communication problem between skid control ECU and HV control ECU (transmission error)	• CAN communication system	X	○	• HV system
U0129 (05–634)	Lost Communication with Brake System Control Module	529	CAN communication problem between skid control ECU and HV control ECU (regenerative torque malfunction)	• CAN communication system	X	○	• HV system
U0131 (05–634)	Lost Communication with Power Steering Control Module	433	CAN communication problem between power steering ECU and HV control ECU (no signal input)	• CAN communication system	X	X	–

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DTC No. (See Page)	Detection Item	INF Code	Detection Condition	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning*3
U0131 (05–634)	Lost Communication with Power Steering Control Module	434	CAN communication problem between power steering ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system	X	X	–
U0146 (05–634)	Lost Communication with Gateway "A"	435	CAN communication problem between gateway ECU and HV control ECU (no signal input)	• CAN communication system	X	○	• HV system

*1: "○" ... CHK ENG is illuminated, "X" ... CHK ENG is not illuminated.
*2: "○" ... Master warning lamp is illuminated, "X" ... Master warning lamp is not illuminated.
*3: Warning on the multi–information display
*4: w/ smart entry system
*5: w/o smart entry system

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DTC	P0336/137	CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

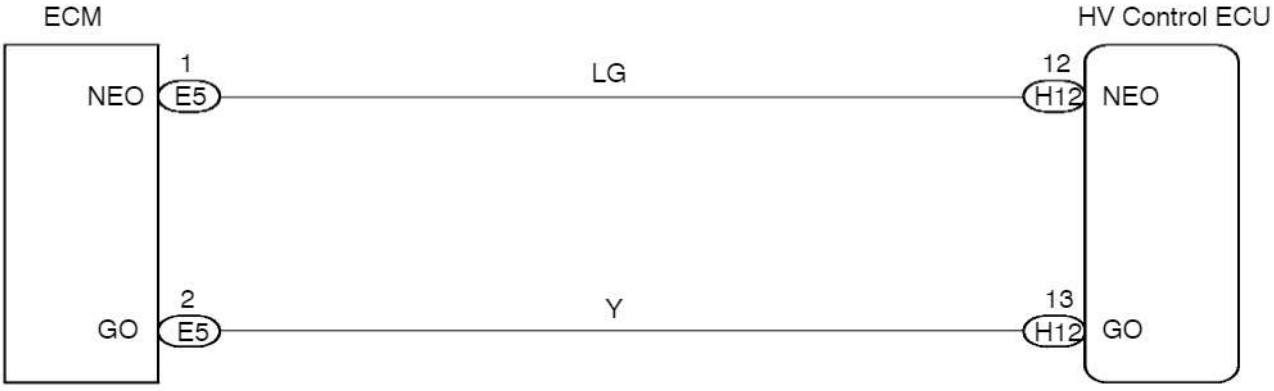
DTC	P0340/532	CAMSHAFT POSITION SENSOR "A" CIRCUIT

CIRCUIT DESCRIPTION

If there is any malfunction in the communication values or pulse inputs, the HV control ECU detects it by comparing the following three speeds: the engine speed transmitted by the ECM via CAN (Controller Area Network) communication, the engine speed obtained through pulse inputs, and the engine speed calculated from the MG1 and MG2 speeds.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0336	137	Engine speed sensor deviation malfunction (CAN communication)	• Wire harness or connector • Crankshaft position sensor • Camshaft position sensor • HV control ECU
P0340	532	Engine speed sensor deviation malfunction (pulse signal)	• Wire harness or connector • Crankshaft position sensor • Camshaft position sensor • HV control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

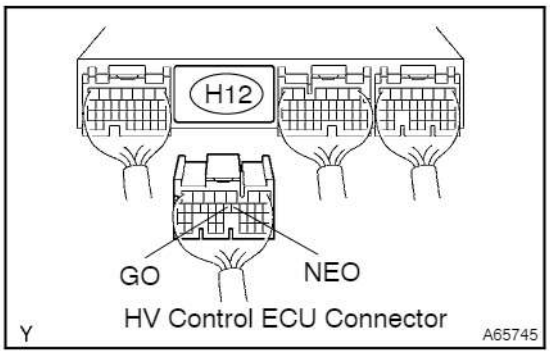
1	READ OUTPUT DTC(ENGINE)

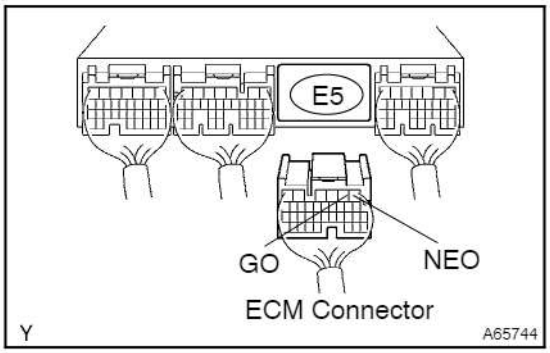
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result: DTCs are output

YES	GO TO RELEVANT DTC CHART (See page 05–39)

NO

2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – ECM)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
NEO (H12–12) – NEO (E5–1)	Below 1 Ω
GO (H12–13) – GO (E5–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NEO (H12–12) or NEO (E5–1) – Body ground	10 kΩ or higher
GO (H12–13) or GO (E5–2) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the HV control ECU connector.

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	INSPECT CRANKSHAFT POSITION SENSOR (See page 18–6)

NG	REPLACE CRANKSHAFT POSITION SENSOR (See page 18–10)

OK

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4	INSPECT CAMSHAFT POSITION SENSOR (See page 18–6)

NG → REPLACE CAMSHAFT POSITION SENSOR (See page 18–8)

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0338/600	CRANKSHAFT POSITION SENSOR "A" CIRCUIT HIGH INPUT

DTC	P0343/601	CAMSHAFT POSITION SENSOR "A" CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

Refer to DTC P0336 (INF 137) on page 05–287.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0338	600	NEO signal circuit malfunction	• Wire harness or connector • HV control ECU
P0343	601	GO signal circuit malfunction	• Wire harness or connector • HV control ECU

WIRING DIAGRAM

Refer to DTC P0336 (INF 137) on page 05–287.

INSPECTION PROCEDURE

1	READ OUTPUT DTC(ENGINE)

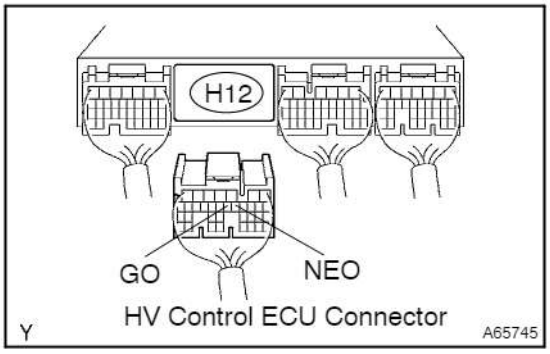
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result: DTCs are output

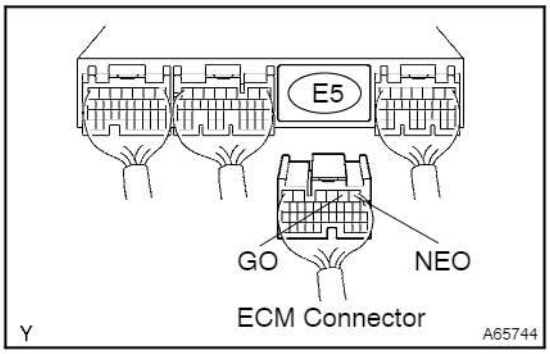
YES → **GO TO RELEVANT DTC CHART (See page 05–39)**

NO

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2 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – ECM)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
NEO (H12–12) – NEO (E5–1)	Below 1 Ω
GO (H12–13) – GO (E5–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NEO (H12–12) or NEO (E5–1) – Body ground	10 kΩ or higher
GO (H12–13) or GO (E5–2) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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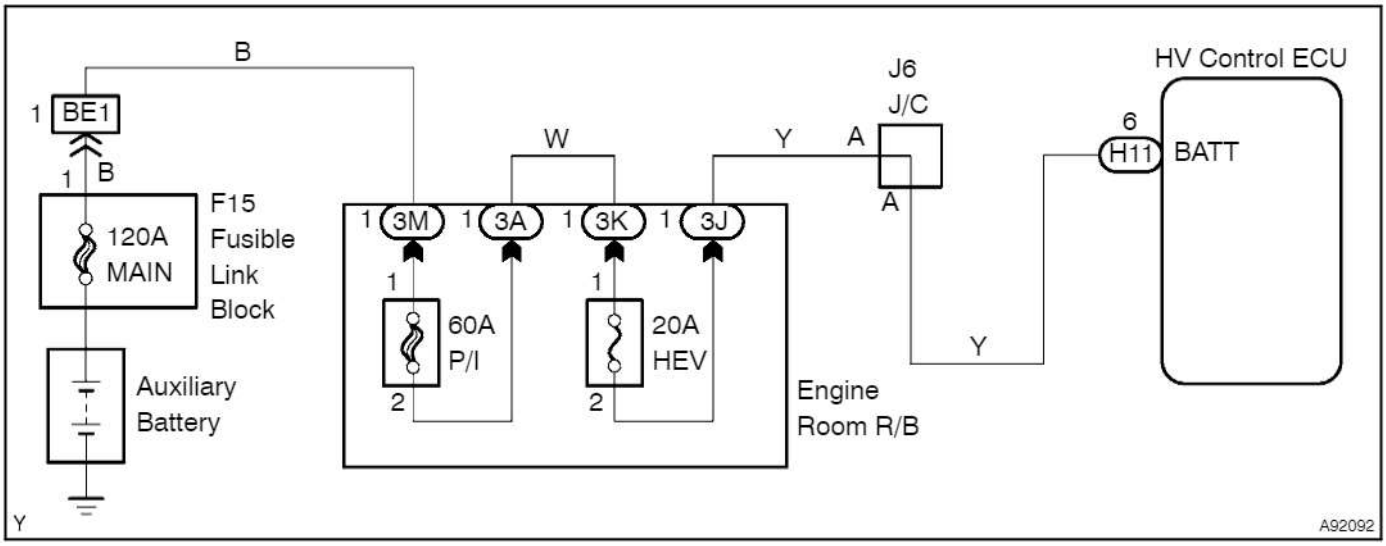
DTC P0560/117 SYSTEM VOLTAGE

CIRCUIT DESCRIPTION

Since the ECU back–up power source is used for DTCs and freeze frame data memory, the back–up power source (BATT) continues to be supplied to the HV control ECU even though the power switch is turned OFF.

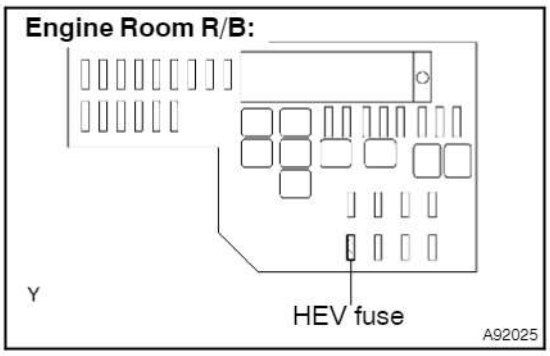
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0560	117	HV control ECU back–up power source circuit malfunction	• Wire harness or connector • HEV fuse

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(HEV 20 A)



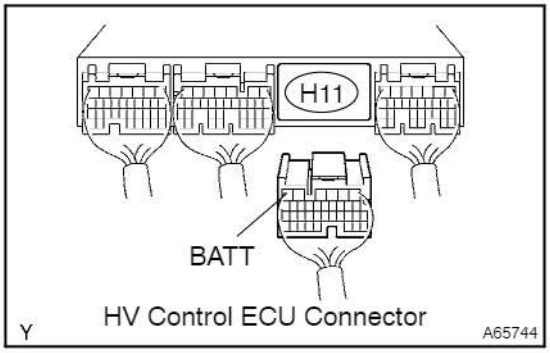
(a) Remove the HEV fuse from the engine room R/B.
(b) Check the resistance in the HEV fuse.
Standard: Below 1 Ω
(c) Reinstall the HEV fuse.

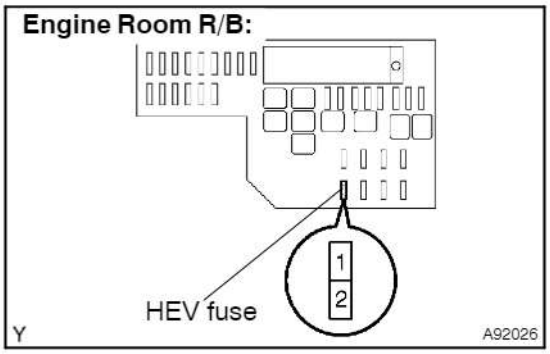
NG → **Go to step 3**

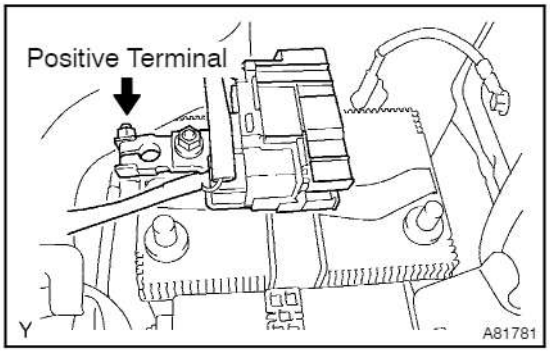
OK

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – AUXILIARY BATTERY)







(a) Disconnect the negative auxiliary battery terminal.
(b) Disconnect the positive auxiliary battery terminal.
(c) Remove the HEV fuse from the engine room R/B.
(d) Disconnect the H11 HV control ECU connector.
(e) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
BATT (H11–6) – HEV fuse (2)	Below 1 Ω

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
HEV fuse (1) – positive auxiliary battery terminal	Below 1 Ω

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(g) Reconnect the HV control ECU connector.
(h) Reinstall the HEV fuse.
(i) Reconnect the positive auxiliary battery terminal.
(j) Reconnect the negative auxiliary battery terminal.

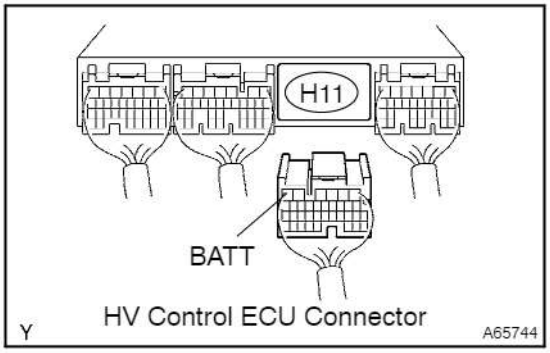
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

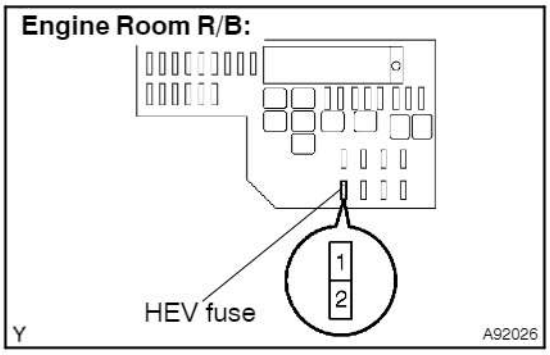
OK

CHECK AND REPAIR CONNECTOR CONNECTION

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3	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – HEV FUSE)





(a) Disconnect the H11 HV control ECU connector.
(b) Remove the HEV fuse from the engine room R/B.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for short):

Tester Connection	Specified Condition
BATT (H11–6) or HEV fuse (2) – Body ground	10 kΩ or higher

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the HEV fuse.
(e) Reconnect the HV control ECU connector.

NG → **AFTER REPAIRING OR REPLACING HARNESS OR CONNECTOR, REPLACE FUSE (HEV 20A)**

OK

REPLACE FUSE (HEV 20 A)

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DTC	P0705/571	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/572	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/573	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/574	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/575	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/576	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/577	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/578	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/595	TRANSMISSION RANGE SENSOR CIRCUIT
DTC	P0705/596	TRANSMISSION RANGE SENSOR CIRCUIT

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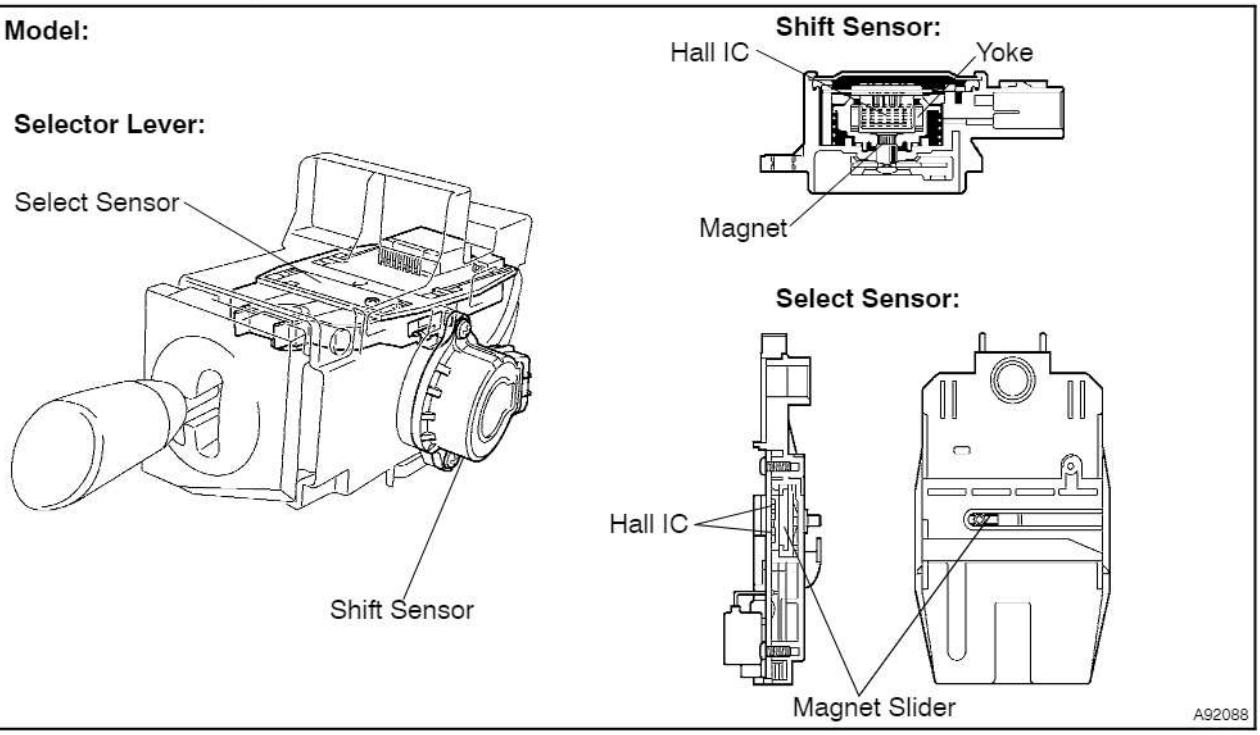
CIRCUIT DESCRIPTION

HINT:

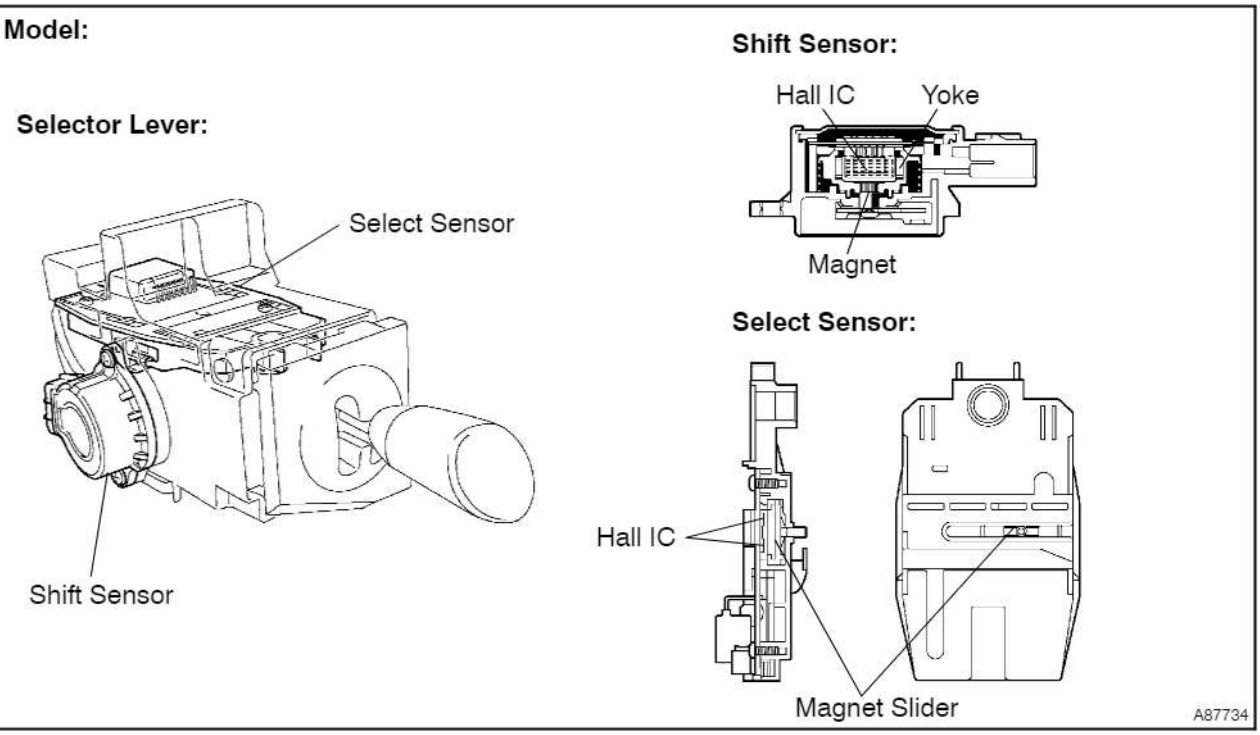
- The shift control system is a linkless type that does not use a shift cable.
- The shift and select sensors are non–contact type.

The selector lever is a momentary type, which returns to its home position by spring reaction as the driver's hand is released from the selector lever after shifting. The selector lever contains a shift sensor and a select sensor to detect the selector lever position (R, N, D or B). Because both sensors are controlled electrically by Hall elements, they can accurately detect shift positions in a reliable manner. Both sensors contain two systems of detection circuits, main and sub.

RHD Model:

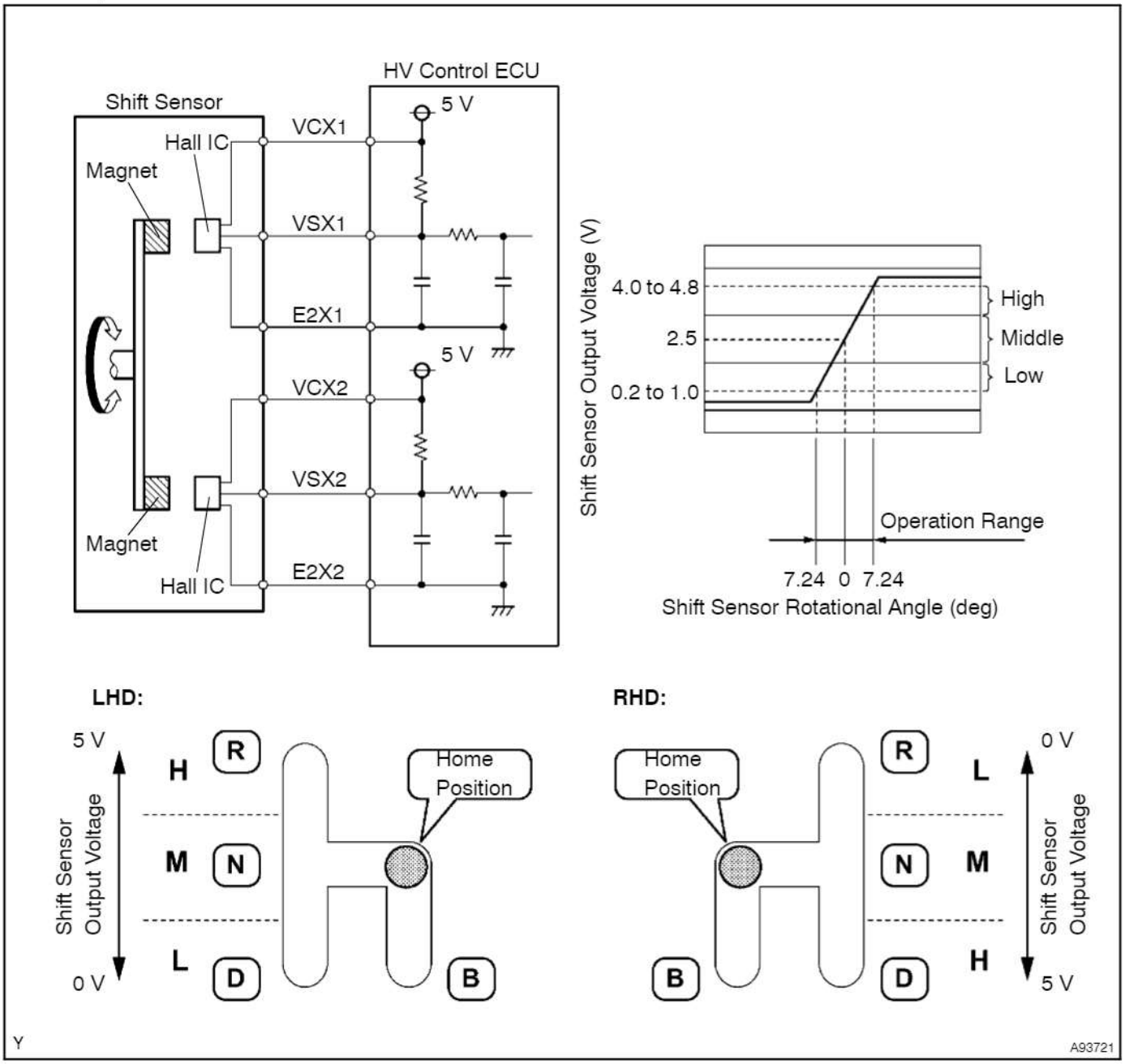


LHD Model:



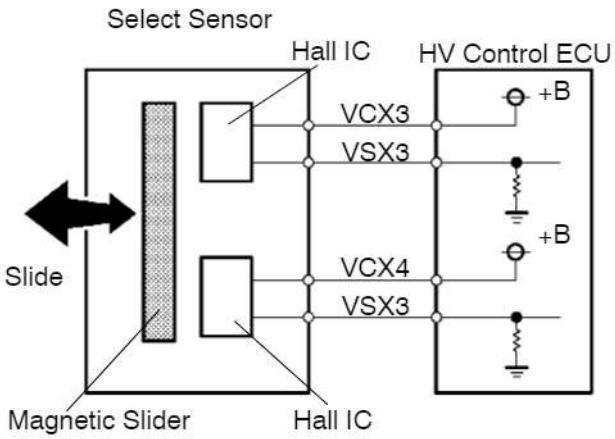
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The shift sensor outputs voltage, which varies between 0 and 5 V in accordance with the vertical movement of the selector lever, to the HV control ECU. On a right–hand drive (RHD) model, the HV control ECU interprets low level voltage input from the shift sensor as the R position, middle level voltage as the home or N position, and high level voltage as the D or B position. On a left–hand drive (LHD) model, low level voltage is interpreted as the D or B position, middle level voltage as the home or N position, and high level voltage as the R position.

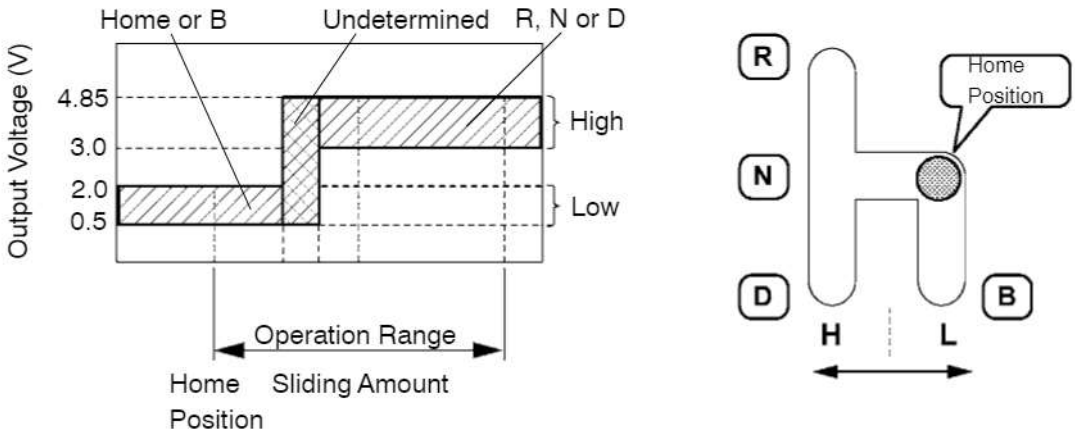


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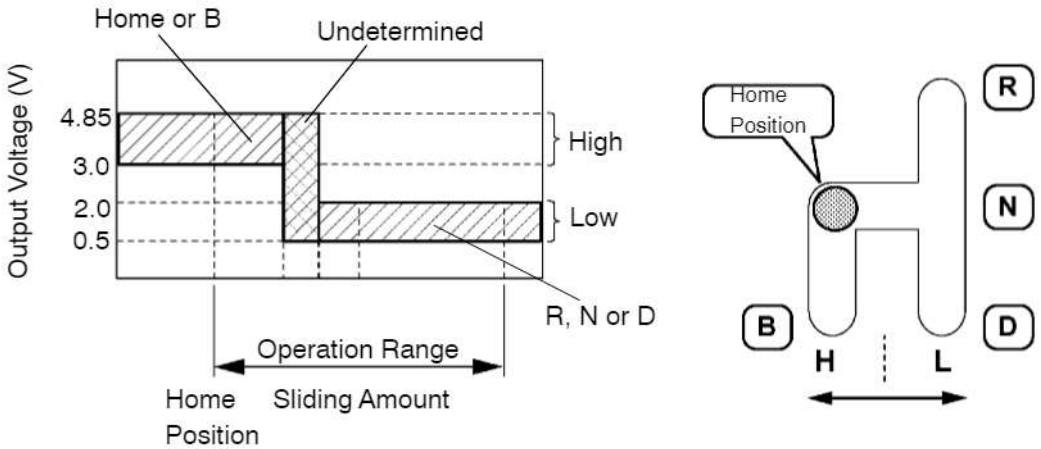
The select sensor outputs voltage, which varies between 0 and 5 V in accordance with the horizontal movement of the selector lever, to the HV control ECU. On a right–hand drive (RHD) model, the HV control ECU interprets low level voltage input from the select sensor as the R, N, or D position, and high level voltage as the home or B position. On a left–hand drive (LHD) model, low level voltage is interpreted as the home or B position, and high level voltage as the R, N or D position.
The HV control ECU determines the position of the selector lever in accordance with the combination of the signals from the shift sensor and select sensor.



LHD:



RHD:



Y

A93720

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DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0705	571	Open or GND short in shift main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	572	+B short in shift main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	573	Open or GND short in shift sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	574	+B short in shift sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	575	Open or GND short in select main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	576	+B short in select main sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	577	Open or GND short in select sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	578	+B short in select sub sensor circuit	• Wire harness or connector • Selector lever • HV control ECU
P0705	595	Difference between shift main sensor value and shift sub sensor value is large	• Wire harness or connector • Selector lever • HV control ECU
P0705	596	Difference between select main sensor value and select sub sensor value is large	• Wire harness or connector • Selector lever • HV control ECU

HINT:

After confirming DTC P0705 (INF 571, 572, 573, or 574), confirm Shift Sensor Main and Sub voltages using the intelligent tester II.

Shift Sensor Main and Sub

R Position (Main)	Home or N Position (Main)	D or B Position (Main)	R Position (Sub)	Home or N Position (Sub)	D or B Position (Sub)	Trouble Area
0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	Open in VCX1 circuit
RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	Open in VCX2 circuit
0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	Open or short in VSX1 circuit
RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	Open or short in VSX2 circuit
4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	Open in E2X1 circuit
RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	2.0 to 3.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	4.8 to 5.0 V	4.8 to 5.0 V	4.8 to 5.0 V	Open in E2X2 circuit

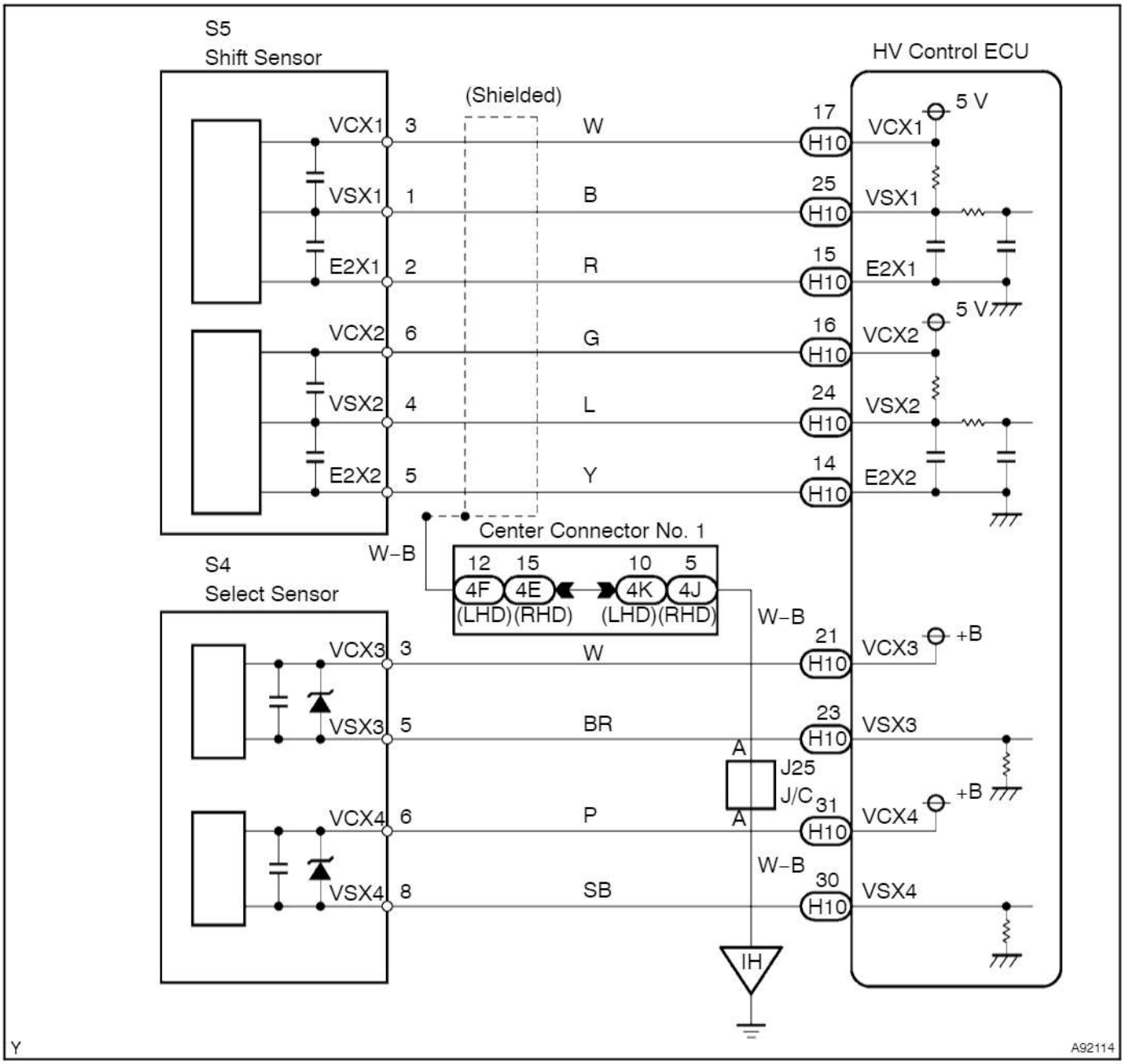
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HINT:
After confirming DTC P0705 (INF 575, 576, 577, or 578), confirm Shift Sensor Select Main and Select Sub voltages using the intelligent tester II.

Shift Sensor Select Main and Select Sub

R, N or D Position (Select Main)	Home or B Position (Select Main)	R, N or D Position (Select Sub)	Home or B Position (Select Sub)	Trouble Area
0 to 0.5 V	0 to 0.5 V	RHD: 0.5 to 2.0 V LHD: 3.0 to 4.85 V	RHD: 3.0 to 4.85 V LHD: 0.5 to 2.0 V	Open or GND short in VCX3 or VSX3 circuit
RHD: 0.5 to 2.0 V LHD: 3.0 to 4.85 V	RHD: 3.0 to 4.85 V LHD: 0.5 to 2.0 V	0 to 0.5 V	0 to 0.5 V	Open or GND short in VCX4 or VSX4 circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II(SHIFT SENSOR MAIN AND SUB)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Shift Sensor Main and Sub voltage values on the intelligent tester II.

Result:

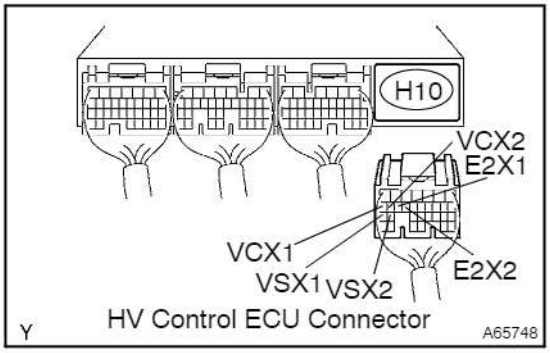
Shift Position	Shift Sensor Main	Shift Sensor Sub
R position	RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V	RHD: 0.2 to 1.0 V LHD: 4.0 to 4.8 V
Home or N position	2.0 to 3.0 V	2.0 to 3.0 V
D or B position	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V	RHD: 4.0 to 4.8 V LHD: 0.2 to 1.0 V

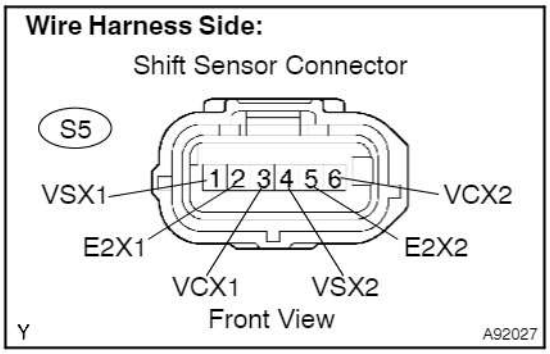
OK → **Go to step 4**

NG

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – SHIFT SENSOR)





(a) Disconnect the H10 HV control ECU connector.
(b) Disconnect the S5 shift sensor connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VCX1 (H10–17) – Body ground	Below 1 V
VSX1 (H10–25) – Body ground	Below 1 V
E2X1 (H10–15) – Body ground	Below 1 V
VCX2 (H10–16) – Body ground	Below 1 V
VSX2 (H10–24) – Body ground	Below 1 V
E2X2 (H10–14) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VCX1 (H10–17) – VCX1 (S5–3)	Below 1 Ω
VSX1 (H10–25) – VSX1 (S5–1)	Below 1 Ω
E2X1 (H10–15) – E2X1 (S5–2)	Below 1 Ω
VCX2 (H10–16) – VCX2 (S5–6)	Below 1 Ω
VSX2 (H10–24) – VSX2 (S5–4)	Below 1 Ω
E2X2 (H10–14) – E2X2 (S5–5)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VCX1 (H10–17) or VCX1 (S5–3) – Body ground	10 kΩ or higher
VSX1 (H10–25) or VSX1 (S5–1) – Body ground	10 kΩ or higher
E2X1 (H10–15) or E2X1 (S5–2) – Body ground	10 kΩ or higher
VCX2 (H10–16) or VCX2 (S5–6) – Body ground	10 kΩ or higher
VSX2 (H10–24) or VSX2 (S5–4) – Body ground	10 kΩ or higher
E2X2 (H10–14) or E2X2 (S5–5) – Body ground	10 kΩ or higher

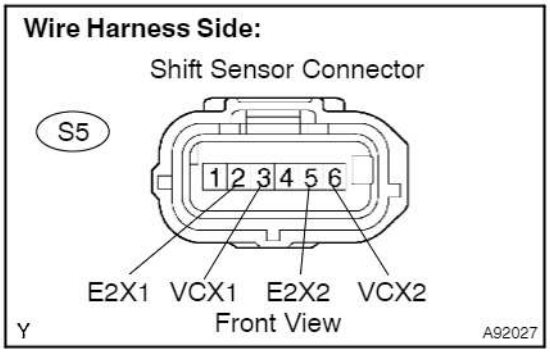
(g) Reconnect the shift sensor connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3 INSPECT HYBRID VEHICLE CONTROL ECU(VCX1 AND VCX2 VOLTAGE)



(a) Disconnect the S5 shift sensor connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the shift sensor connector.

Standard:

Tester Connection	Specified Condition
VCX1 (S5–3) – E2X1 (S5–2)	4.5 to 5.5 V
VCX2 (S5–6) – E2X2 (S5–5)	4.5 to 5.5 V

(d) Reconnect the shift sensor connector.

OK → **Go to step 7**

NG

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

4 READ VALUE OF INTELLIGENT TESTER II(SHIFT SENSOR SELECT MAIN AND SUB)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Shift Sensor Select Main and Sub voltage values on the intelligent tester II.

Result:

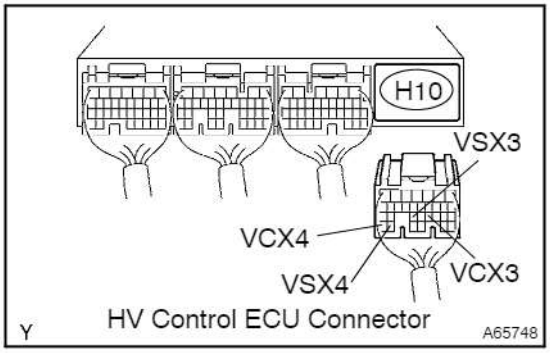
Shift Position	Shift Sensor Select Main	Shift Sensor Select Sub
R, N or D position	RHD: 0.5 to 2.0 V LHD: 3.0 to 4.85 V	RHD: 0.5 to 2.0 V LHD: 3.0 to 4.85 V
Home or B position	RHD: 3.0 to 4.85 V LHD: 0.5 to 2.0 V	RHD: 3.0 to 4.85 V LHD: 0.5 to 2.0 V

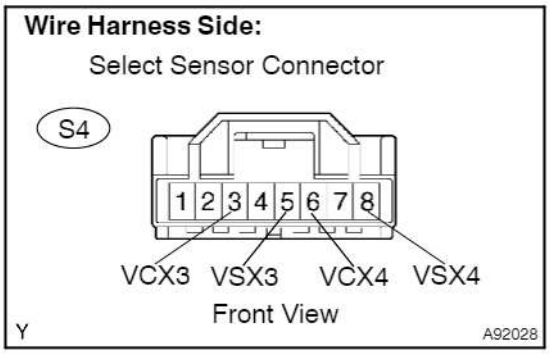
OK → **Go to step 7**

NG

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5	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – SELECT SENSOR)





(a) Disconnect the H10 HV control ECU connector.
(b) Disconnect the S4 select sensor connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VCX3 (H10–21) – Body ground	Below 1 V
VSX3 (H10–23) – Body ground	Below 1 V
VCX4 (H10–31) – Body ground	Below 1 V
VSX4 (H10–30) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VCX3 (H10–21) – VCX3 (S4–3)	Below 1 Ω
VSX3 (H10–23) – VSX3 (S4–5)	Below 1 Ω
VCX4 (H10–31) – VCX4 (S4–6)	Below 1 Ω
VSX4 (H10–30) – VSX4 (S4–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VCX3 (H10–21) or VCX3 (S4–3) – Body ground	10 kΩ or higher
VSX3 (H10–23) or VSX3 (S4–5) – Body ground	10 kΩ or higher
VCX4 (H10–31) or VCX4 (S4–6) – Body ground	10 kΩ or higher
VSX4 (H10–30) or VSX4 (S4–8) – Body ground	10 kΩ or higher

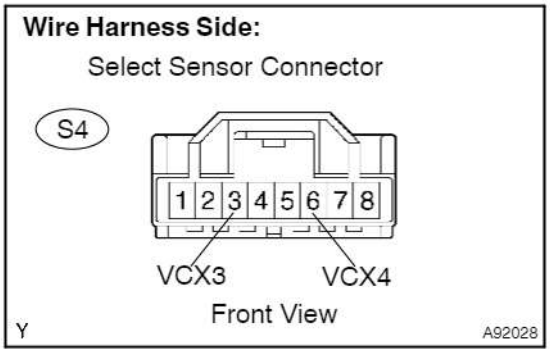
(g) Reconnect the select sensor connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6 INSPECT HYBRID VEHICLE CONTROL ECU(VCX3 AND VCX4 VOLTAGE)



(a) Disconnect the S4 select sensor connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the select sensor connector and body ground.
Standard:

Tester Connection	Specified Condition
VCX3 (S4–3) – Body ground	9 to 14 V
VCX4 (S4–6) – Body ground	9 to 14 V

(d) Reconnect the select sensor connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

OK

7 REPLACE SELECTOR LEVER

GO

8 READ OUTPUT DTC(DTC P0705 IS NOT OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC / Clear.
(e) Perform a simulation test.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(g) Read DTCs.
Result: DTC P0705 is not output again

YES → **SYSTEM OK**

NO

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0851/579	PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

DTC	P0852/580	PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

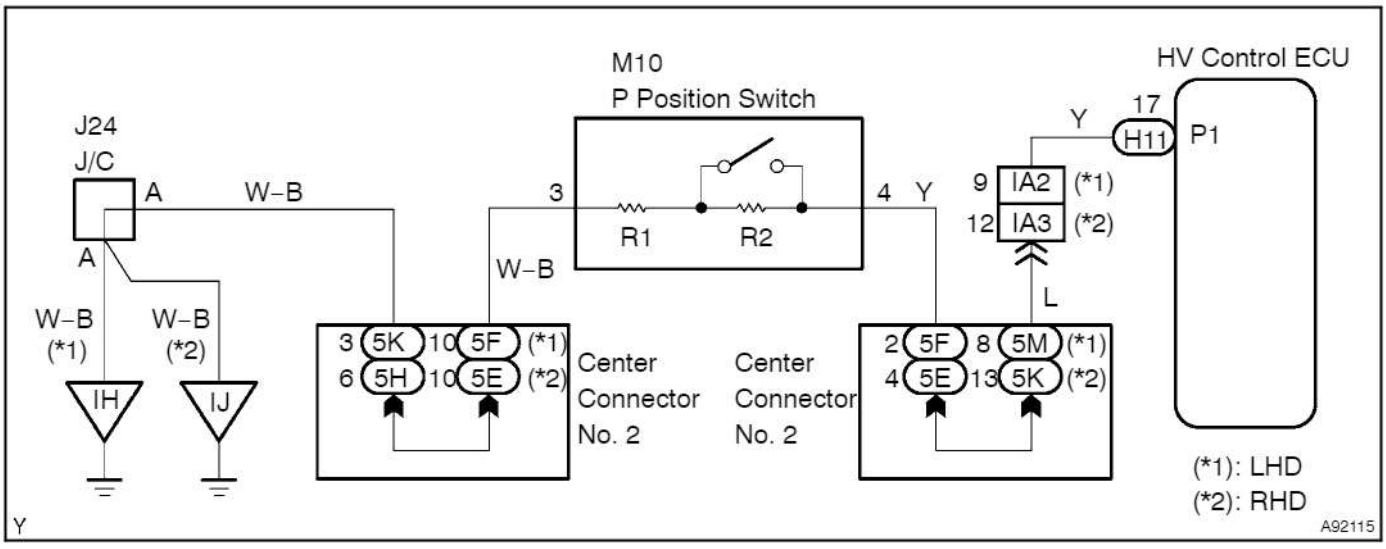
CIRCUIT DESCRIPTION

Instead of having a parking position as one of the positions of the conventional shift lever, a P position switch is provided independently in the upper area of the selector lever. The switch is based on a momentary type operation mode, in which the button does not lock mechanically.

The P position switch contains resistors R1 and R2. When the P position switch is not pressed, the switch provides a combined resistance of R1 and R2; and when the P position switch is pressed, the switch provides only the resistance of R1. The voltage at the P1 terminal of the HV control ECU varies with the changes in the resistance of the switch. The HV control ECU determines the P position switch operation intended by the driver according to this resistance signal.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0851	579	GND short in P position switch circuit	• Wire harness or connector • P position switch • HV control ECU
P0852	580	Open or +B short in P position switch circuit	• Wire harness or connector • P position switch • HV control ECU

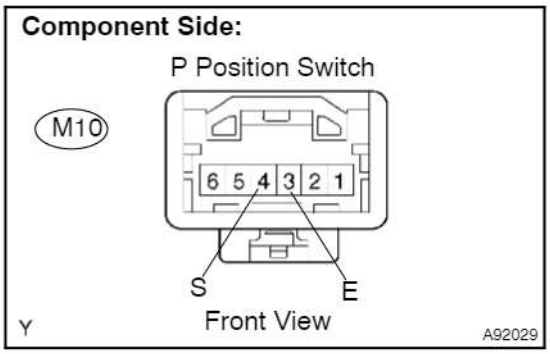
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT P POSITION SWITCH



(a) Remove the P position switch.
(b) Check the resistance between the terminals of the P position switch connector.

Standard:

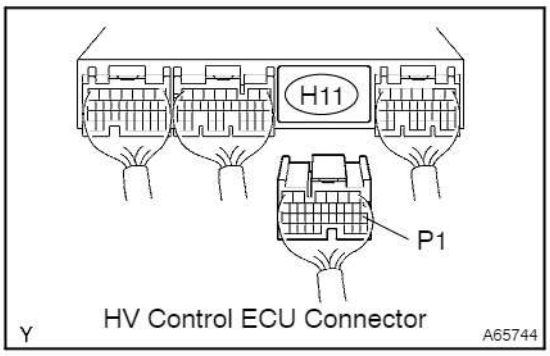
Symbols (Terminal No.)	Condition	Resistance
S (M10–4) – E (M10–3)	Keep switch pressed	680 Ω
S (M10–4) – E (M10–3)	Release switch	4,580 Ω

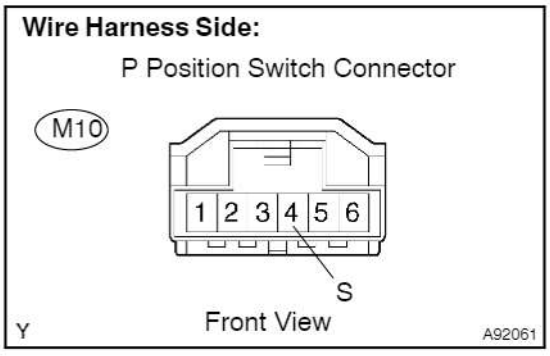
(c) Reinstall the P position switch.

NG → **REPLACE P POSITION SWITCH**

OK

2 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – P POSITION SWITCH)





(a) Disconnect the H11 HV control ECU connector.
(b) Disconnect the M10 P position switch connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
P1 (H11–17) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
P1 (H11–17) – S (M10–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
P1 (H11–17) or S (M10–4) – Body ground	10 kΩ or higher

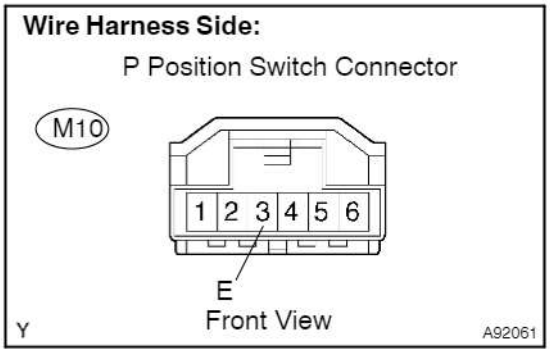
(g) Reconnect the P position switch connector.
(h) Reconnect the the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	CHECK HARNESS AND CONNECTOR(P POSITION SWITCH – BODY GROUND)



(a) Disconnect the M10 P position switch connector.
(b) Check the resistance between the terminal of the P position switch connector and body ground.

Standard (Check for open):

Tester Connection	Specified Condition
E (M10–3) – Body ground	Below 1 Ω

(c) Reconnect the P position switch connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A08/264	DC/DC CONVERTER STATUS CIRCUIT

CIRCUIT DESCRIPTION

Refer to DTC P0A09 (INF 265) on page 05–310.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A08	264	DC/DC converter malfunction	• w/ converter inverter assembly

INSPECTION PROCEDURE

When the HV control ECU detects an internal malfunction in the DC/DC converter, it sets DTC P0A08 (INF 264). If the information (INF) code is present, replace the w/ converter inverter assembly.

REPLACE W/ CONVERTER INVERTER ASSY (See page 21–25)

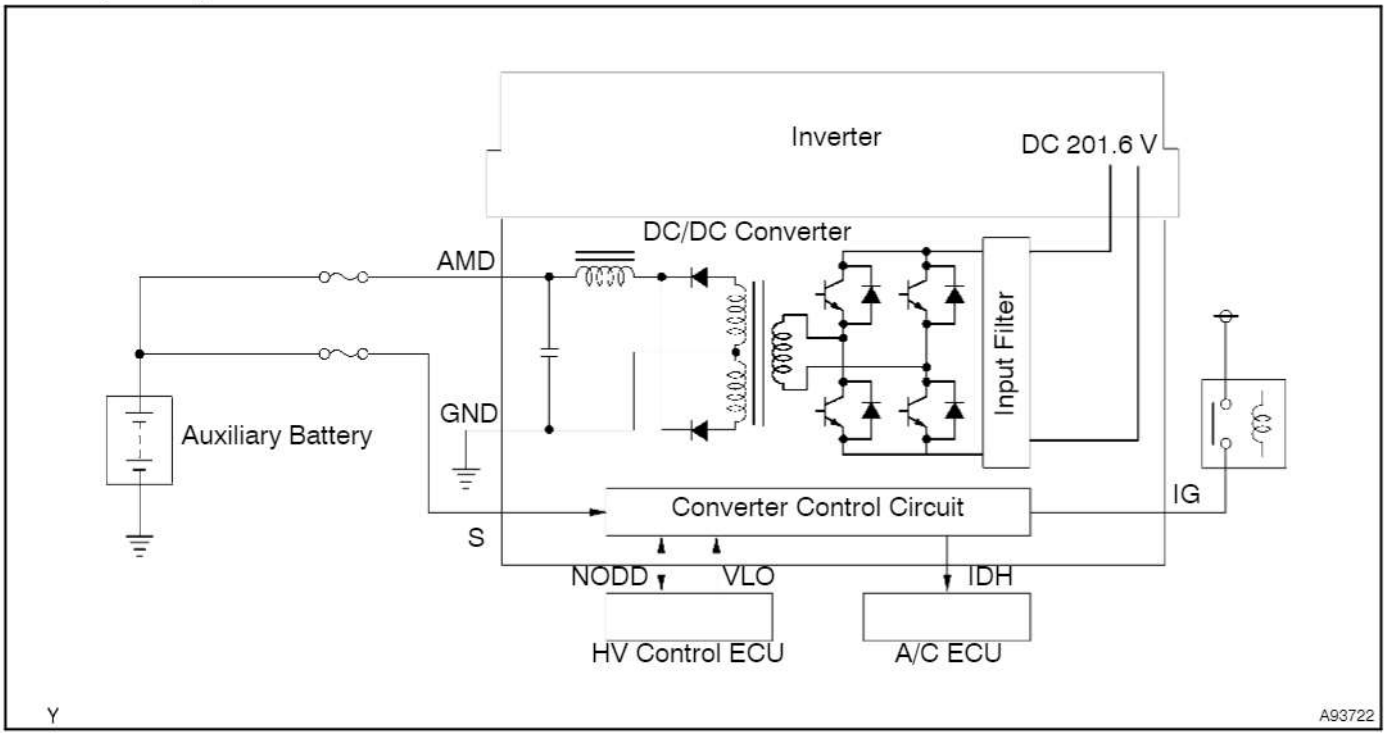
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DTC	P0A09/265	DC/DC CONVERTER STATUS CIRCUIT LOW INPUT

DTC	P0A10/263	DC/DC CONVERTER STATUS CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The DC/DC converter converts the DC 201.6 V of the HV battery into DC 12 V in order to supply power to the vehicle's lighting, audio and ECU systems. In addition, it charges the auxiliary battery.
A transistor bridge circuit initially converts DC 201.6 V into alternating current, and a transformer lowers its voltage. Then, it is rectified and smoothed (into DC) and converted into DC 12 V.
The DC/DC converter controls the output voltage in order to keep a constant voltage at the terminals of the auxiliary battery.

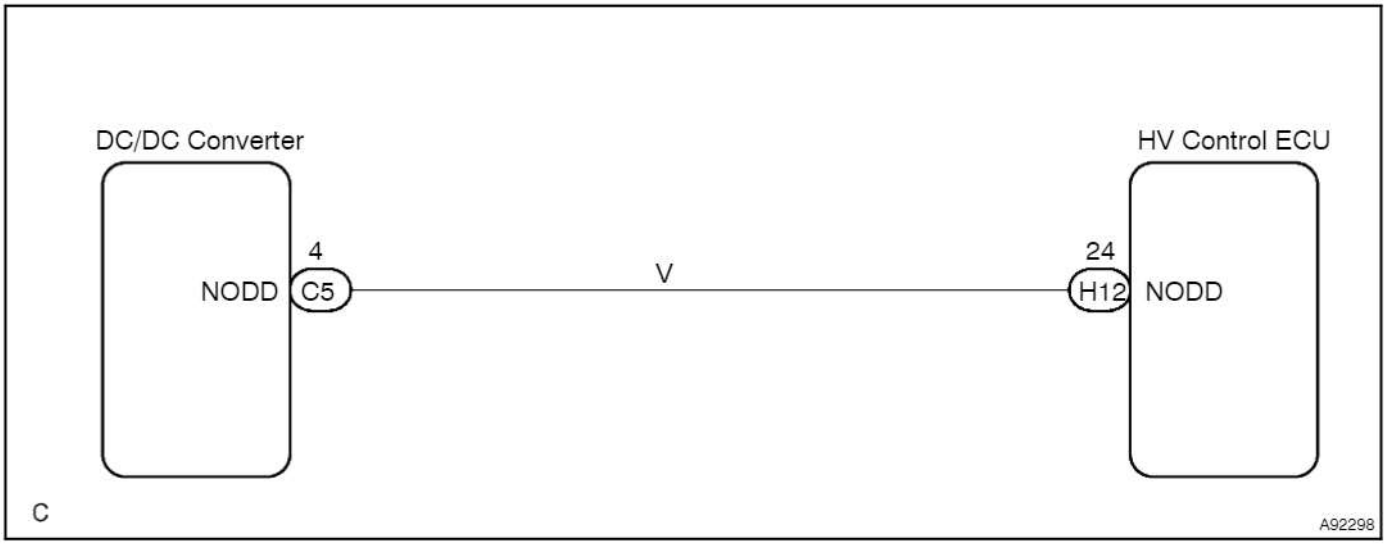


The HV control ECU uses the NODD signal line to transmit a stop command to the DC/DC converter and receive signals indicating the normal or abnormal conditions of the 12 V charging system.
If the vehicle is being driven with an inoperative DC/DC converter, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the HV control ECU monitors the operation of the DC/DC converter and alerts the driver if it detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A09	265	Open or GND short in NODD signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly
P0A10	263	+B short in NODD signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly

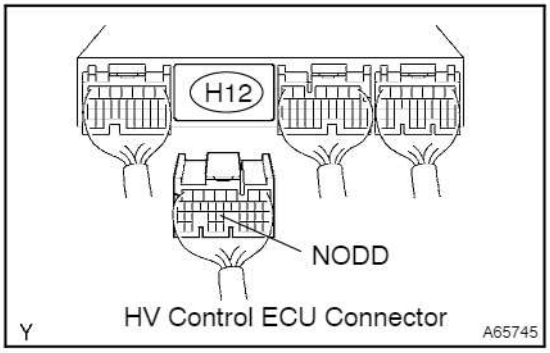
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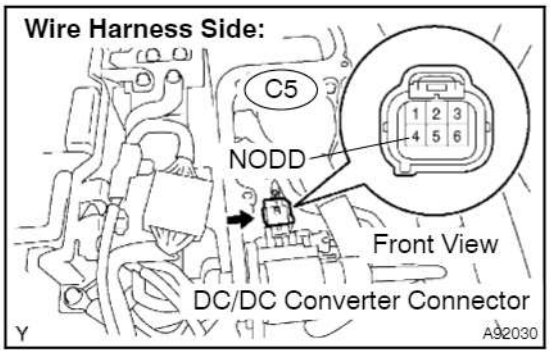
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – DC/DC CONVERTER)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the C5 DC/DC converter connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
NODD (H12–24) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
NODD (H12–24) – NODD (C5–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NODD (H12–24) or NODD (C5–4) – Body ground	10 kΩ or higher

(g) Reconnect the DC/DC converter connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A09/591	DC/DC CONVERTER STATUS CIRCUIT LOW INPUT

DTC	P0A10/592	DC/DC CONVERTER STATUS CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

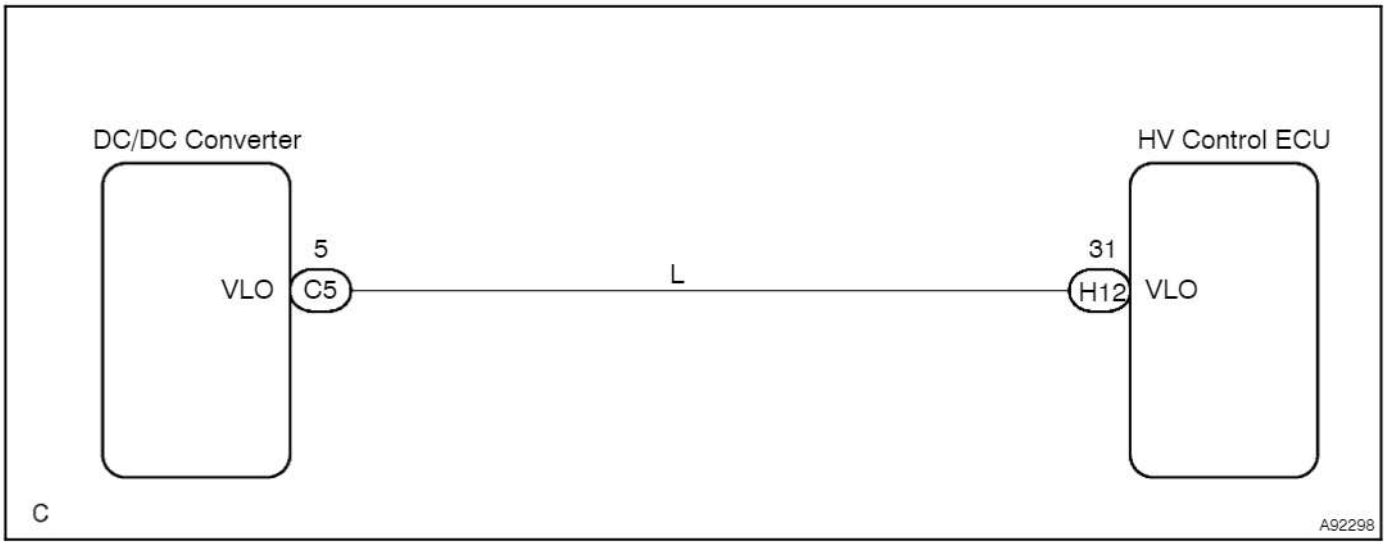
See the description of the DC/DC converter on page 05–310.

The HV control ECU sends the output voltage switch signal to the DC/DC converter via the VLO signal line in order to switch output voltage according to vehicle status.

If the vehicle is being driven with an inoperative DC/DC converter, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the HV control ECU monitors the operation of the DC/DC converter and alerts the driver if it detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A09	591	Open or GND short in VLO signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly
P0A10	592	+B short in VLO signal circuit of DC/DC converter	• Wire harness or connector • w/ converter inverter assembly

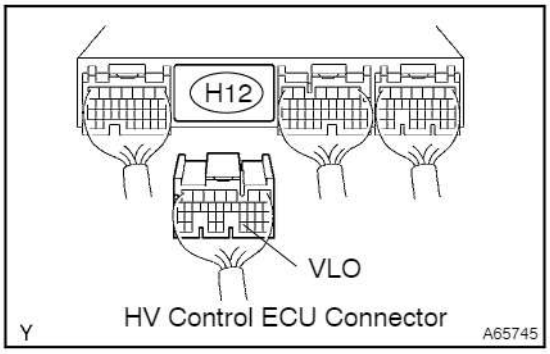
WIRING DIAGRAM

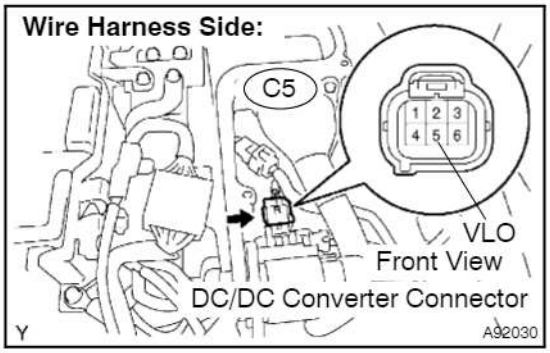


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – DC/DC CONVERTER)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the C5 DC/DC converter connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VLO (H12–31) – Body ground	Below 1V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VLO (H12–31) – VLO (C5–5)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VLO (H12–31) or VLO (C5–5) – Body ground	10 kΩ or higher

(g) Reconnect the DC/DC converter connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A0F/204	ENGINE FAILED TO START

DTC	P0A0F/205	ENGINE FAILED TO START

DTC	P0A0F/533	ENGINE FAILED TO START

DTC	P0A0F/534	ENGINE FAILED TO START

CIRCUIT DESCRIPTION

The HV control ECU performs the fail–safe control, when the ECM detects an error which will affect THS control.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A0F	204	Abnormal signal input from ECM (abnormal engine output)	• ECM • SFI system
P0A0F	205	Abnormal signal input from ECM (engine is unable to start)	• ECM • SFI system
P0A0F	533	Abnormal signal input from ECM (abnormal engine output by running out of fuel)	• ECM • SFI system
P0A0F	534	Abnormal signal input from ECM (engine is unable to start by running out of fuel)	• ECM • SFI system

INSPECTION PROCEDURE

1	READ OUTPUT DTC(ENGINE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART** (See page 05–39)

NO

REPLACE ECM (See page 10–24)

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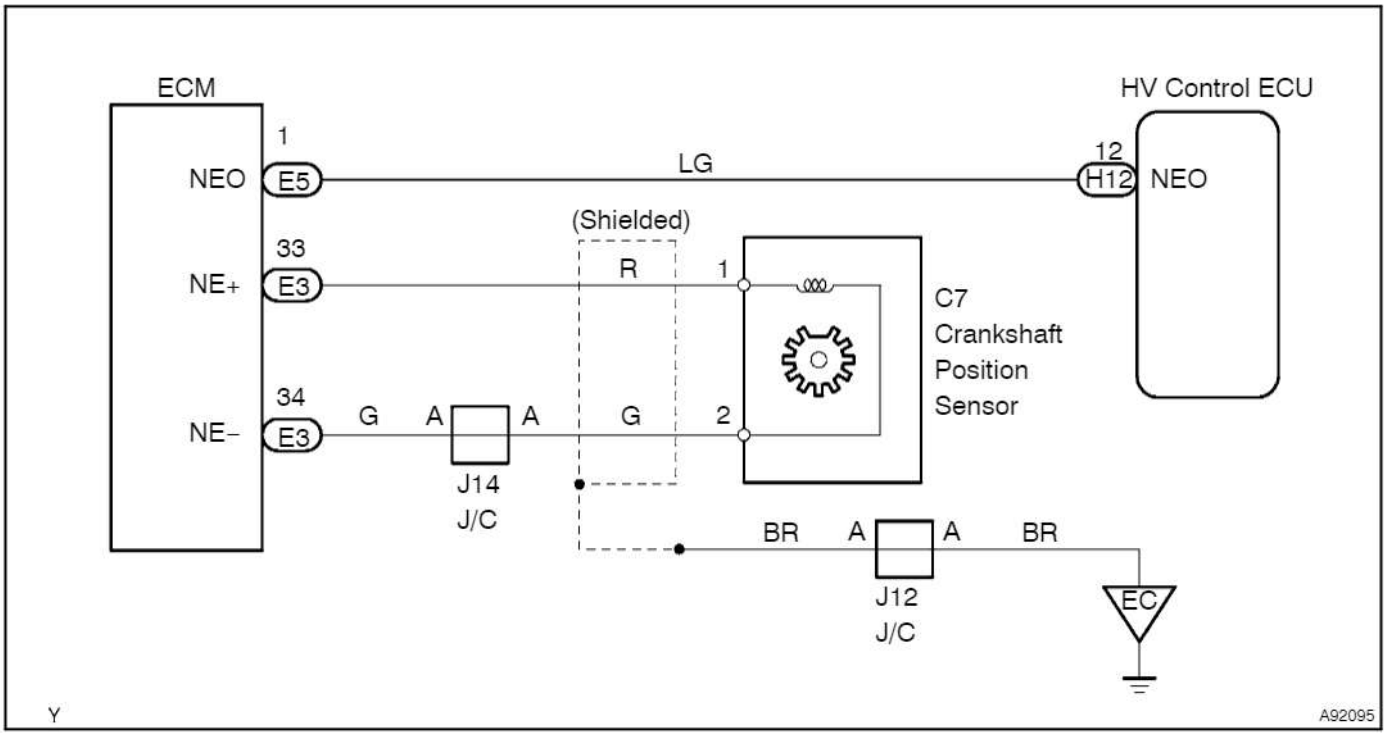
DTC	P0A0F/238	ENGINE FAILED TO START

CIRCUIT DESCRIPTION

The HV control ECU detects this DTC and effects fail–safe control if the engine or transaxle gear has seized up, or foreign objects have been caught in either of them.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A0F	238	Engine does not start even though cranking it (transaxle input malfunction [engine system])	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ OUTPUT DTC(ENGINE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result: DTCs are output

YES	GO TO RELEVANT DTC CHART (See page 05–39)

NO

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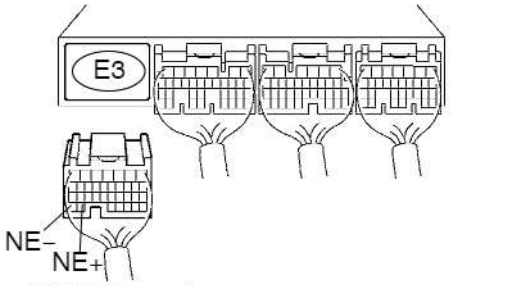
2	CHECK CRANKSHAFT PULLEY REVOLUTION

(a) Turn the power switch OFF.
(b) Jack up the vehicle.
(c) Manually turn the crankshaft pulley to check if the crankshaft rotates.
OK: The crankshaft rotates

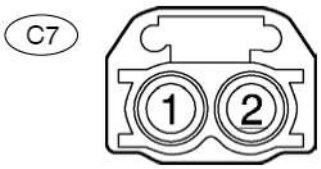
NG → **Go to step 11**

OK

3	CHECK HARNESS AND CONNECTOR(ECM – CRANKSHAFT POSITION SENSOR)



Wire Harness Side:
Crankshaft Position Sensor Connector



(a) Disconnect the E3 ECM connector.
(b) Disconnect the C7 crankshaft position sensor connector.
(c) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
NE+ (E3–33) – Crankshaft position sensor (C7–1)	Below 1 Ω
NE– (E3–34) – Crankshaft position sensor (C7–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NE+ (E3–33) or Crankshaft position sensor (C7–1) – Body ground	10 kΩ or higher
NE– (E3–34) or Crankshaft position sensor (C7–2) – Body ground	10 kΩ or higher

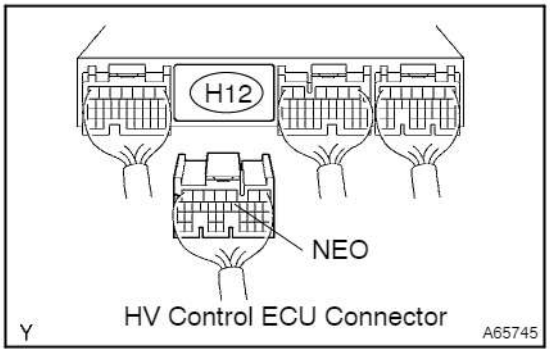
(d) Reconnect the crankshaft position sensor connector.
(e) Reconnect the ECM connector.

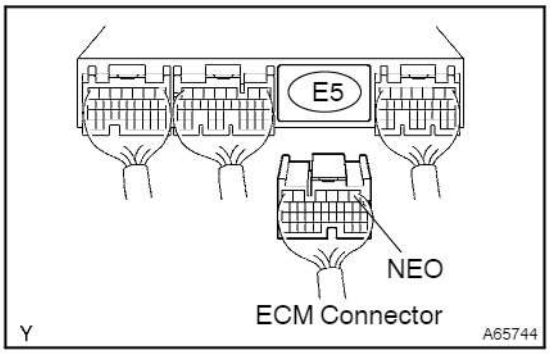
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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4 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – ECM)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
NEO (H12–12) – NEO (E5–1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NEO (H12–12) or NEO (E5–1) –Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK AND CLEAR DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Check and record the DTCs, the freeze frame data, and the information.
(f) Clear the DTCs of Hybrid Control.

GO

6 CHECK READY LAMP ON

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Generator (MG1) Rev and Engine Spd values.
(f) Turn the power switch ON (READY).

OK: READY lamp turns ON

HINT:
If the READY lamp does not turn ON, and the reading on the intelligent tester II shows DTC P0A90 (INF 239) (HV transaxle input malfunction [shaft damaged]), or the MG1 turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.

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NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

7 CHECK ENGINE REV–UP

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Generator (MG1) Rev and Engine Spd values.
(f) With the READY lamp turned ON, depress the accelerator pedal for 10 seconds while the shift position is in the P position.

OK: The engine revs up

HINT:
If the engine does not rev up, and the reading on the intelligent tester II shows DTC P0A90 (INF 239) (HV transaxle input malfunction [shaft damaged]), or the MG1 turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

8 CHECK CREEP MOVEMENT

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Jack up the vehicle.
(d) Depress the brake pedal, move the selector lever to the D position, and release the brake pedal.

OK: The wheels turn (creep movement)

HINT:
If the wheels do not turn, and the reading on the intelligent tester II shows DTC P0A90 (INF 602) (HV transaxle output malfunction), replace the hybrid vehicle transaxle assembly.

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

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9	CHECK ENGINE ACCELERATION SPEED

(a) Connect the intelligent tester II to the DLC3.
(b) While driving at the vehicle speed of more than 10 km/h (6 mph), fully depress the accelerator pedal to raise the engine speed.
OK: The engine speed increases smoothly

HINT:
If the engine over–revs or the reading on the intelligent tester II shows DTC P0A90 (INF 241) (HV transaxle input malfunction [torque limiter slipping]), replace the transmission input damper.

NG → **REPLACE TRANSMISSION INPUT DAMPER ASSY**

OK ↓

10	CHECK CAUSE OF INCREASE IN REVOLUTION RESISTANCE

(a) Investigate what has caused the revolution resistance of the transaxle and engine to become greater.
(1) Check the engine lubrication system and transaxle lubrication system.
(2) Check the engine coolant and transaxle coolant.
(3) Check for any breakdowns in engine itself and transaxle itself.
Result: There is no fault

NO → **REPAIR MALFUNCTION PARTS AND COMPONENTS**

YES ↓

PERFORM SIMULATION TEST. IF SYMPTOM IS NOT REPRODUCED, REPLACE ENGINE, HV TRANSAXLE AND HV CONTROL ECU

11	CHECK FRONT TIRE REVOLUTION

(a) Turn the power switch ON (IG).
(b) Depress the brake pedal, move the selector lever to the N position.
(c) Jack up the vehicle.
(d) Manually turn the crankshaft pulley to check if the front tires rotate.
OK: The front tires rotate

NG → **REPAIR OR REPLACE ENGINE ASSY**

OK ↓

REPAIR OR REPLACE HYBRID VEHICLE TRANSAXLE ASSY

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DTC	P0A1D/134	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/135	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/139	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/140	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/141	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/143	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/144	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/145	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/148	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/149	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/150	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/151	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/152	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/155	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/156	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/158	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/159	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/160	HYBRID POWERTRAIN CONTROL MODULE

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DTC	P0A1D/163	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/164	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/165	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/166	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/167	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/168	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/177	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/178	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/180	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/181	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/182	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/183	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/184	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/185	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/186	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/187	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/188	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/189	HYBRID POWERTRAIN CONTROL MODULE

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DTC	P0A1D/192	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/193	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/195	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/196	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/197	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/198	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/199	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/200	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/392	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/393	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/511	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/512	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/564	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/565	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/567	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/570	HYBRID POWERTRAIN CONTROL MODULE
DTC	P0A1D/615	HYBRID POWERTRAIN CONTROL MODULE

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CIRCUIT DESCRIPTION

The HV control ECU performs self–checks to detect an internal operating malfunction in the ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	134 135 139 140 141 143 144 145 148 149 150 151 152 155 156 158 159 160 163 164 165 166 167 168 177 178 180 181 182 183 184 185 186 187 188 189 192 193 195 196 197 198 199 200 392 393 511 512 564 565 567 570 615	HV control ECU internal error	• HV control ECU

INSPECTION PROCEDURE

If any of the above information (INF) codes is present, replace the HV control ECU.

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

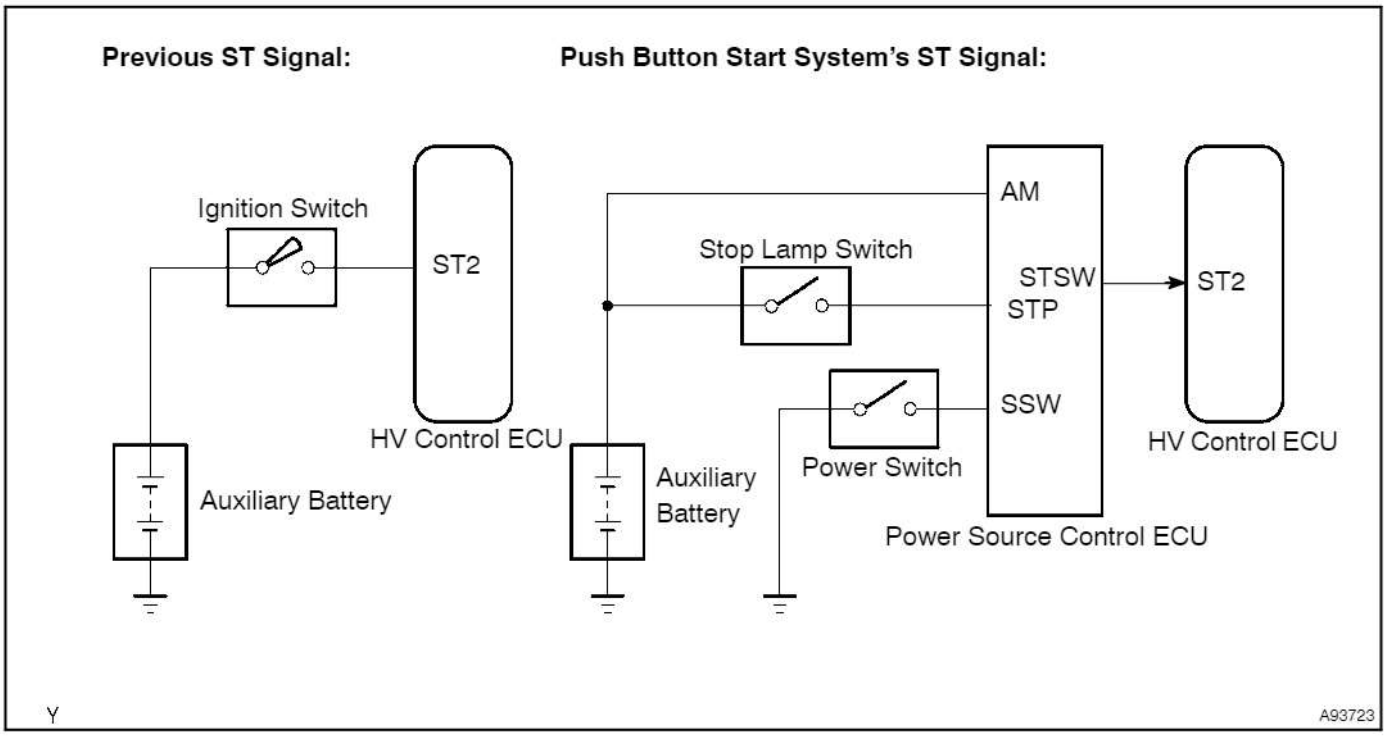
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DTC	P0A1D/142	HYBRID POWERTRAIN CONTROL MODULE

CIRCUIT DESCRIPTION

When the ST turned ON at the ignition switch on the previous model, the ignition switch transmitted the ST signal to the HV control ECU.

The new Prius has adopted a push button start system. When the driver pushes on the power switch while depressing the brake pedal, the power source control ECU transmits the ST signal to the HV control ECU.

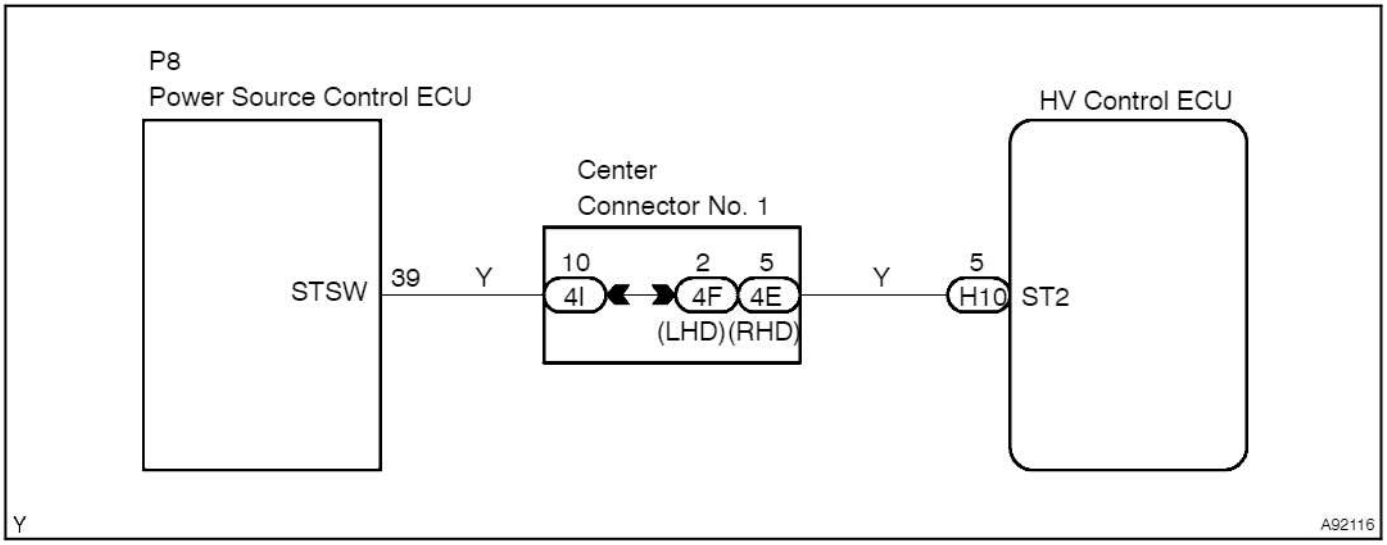


The HV control ECU monitors the ST signal to detect malfunction. If the ST signal is shorted to the +B power supply, the ST will be constantly ON, which will cause the HV system to start by merely turning the power switch ON (IG). The HV control ECU monitors the ST signal to prevent this from occurring.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	142	ST signal of HV control ECU is ON with power switch OFF	• Wire harness or connector • Power source control ECU

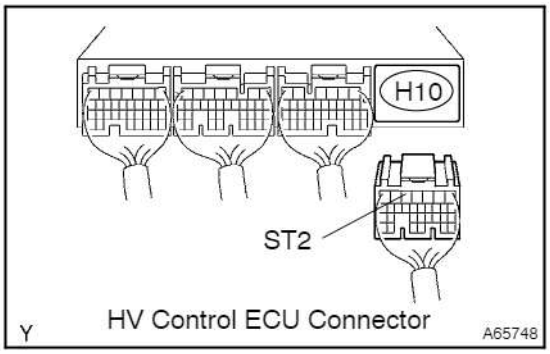
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT HYBRID VEHICLE CONTROL ECU(ST2 VOLTAGE)



(a) Disconnect the H10 HV control ECU connector.

(b) Measure the voltage between the terminal of the HV control ECU connector and body ground with the power switch turned OFF.

Standard:

Tester Connection	Specified Condition
ST2 (H10–5) – Body ground	Below 1 V

(c) Reconnect the HV control ECU connector.

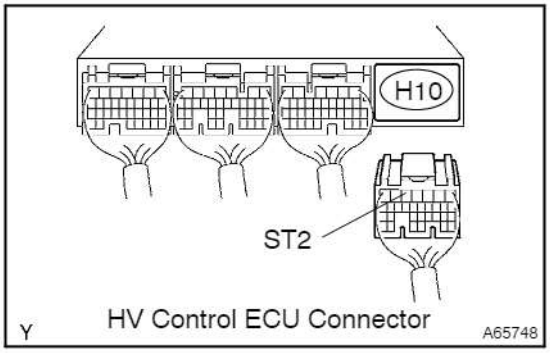
NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–232)

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – POWER SOURCE CONTROL ECU)

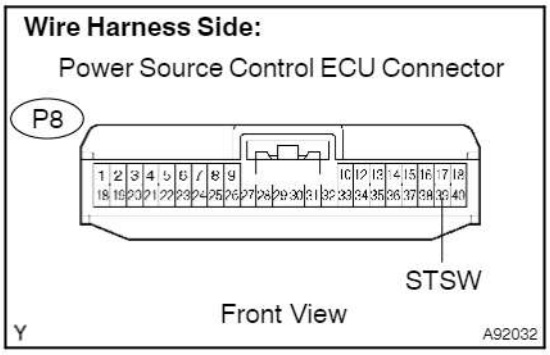


(a) Disconnect the H10 HV control ECU connector.
(b) Disconnect the P8 power source control ECU connector.
(c) Measure the voltage between the terminal of the HV control ECU connector or power source control ECU and body ground with the power switch turned OFF.

Standard:

Tester Connection	Specified Condition
ST2 (H10–5) or STSW (P8–39) – Body ground	Below 1 V

(d) Reconnect the power source control ECU connector.
(e) Reconnect the HV control ECU connector.



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE POWER SOURCE CONTROL ECU

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DTC	P0A1D/390	HYBRID POWERTRAIN CONTROL MODULE

CIRCUIT DESCRIPTION

The HV control ECU performs self–checks to detect an internal operating malfunction in the ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	390	Charge control malfunction	• HV control ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A1D (INF 390) and other DTCs are output

HINT:
If any other codes besides P0A1D (INF 390) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A1D/568	HYBRID POWERTRAIN CONTROL MODULE

DTC	P0A1D/569	HYBRID POWERTRAIN CONTROL MODULE

CIRCUIT DESCRIPTION

The HV control ECU performs self–checks to detect an internal operating malfunction in the ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	568 569	HV control ECU internal error	• HV control ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A0F (INF 243), P0A40 (INF 500) or P0A41 (INF 245) for the motor resolver is output

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC P0A1F/123 BATTERY ENERGY CONTROL MODULE

CIRCUIT DESCRIPTION

Based on a malfunction signal received from the battery ECU, the HV control ECU alerts the driver and effects fail–safe control.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1F	123	Abnormal signal input from battery ECU (ROMRAM malfunction)	• HV battery system • Battery ECU

INSPECTION PROCEDURE

HINT:

After repairing the malfunction, restart the system (to turn the READY lamp ON) and recheck the DTC.

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART (See page 05–665)**

NO

REPLACE BATTERY ECU ASSY (See page 21–100)

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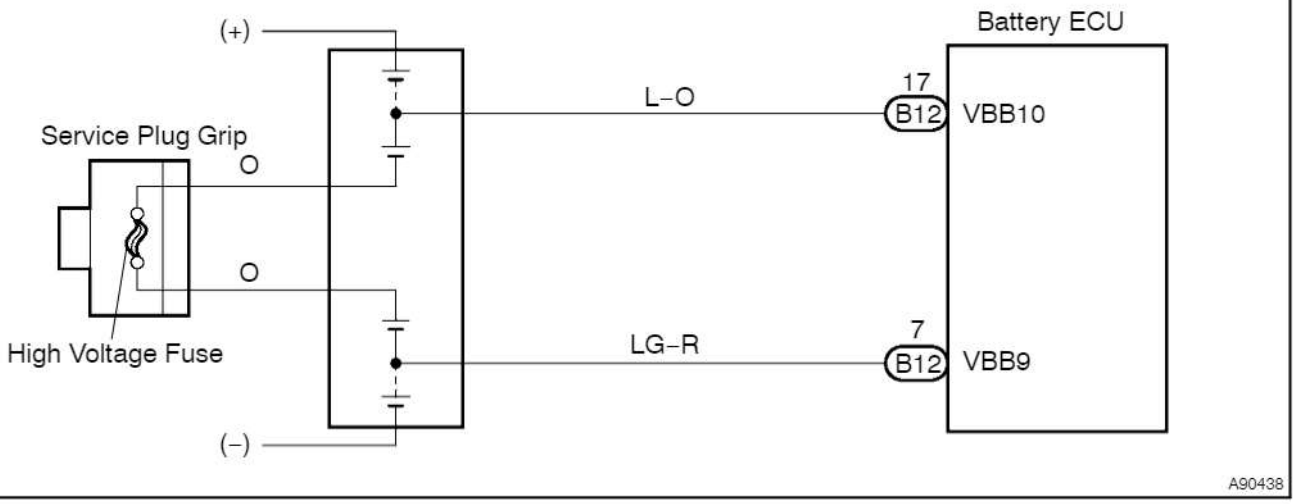
DTC P0A1F/129 BATTERY ENERGY CONTROL MODULE

CIRCUIT DESCRIPTION

The battery ECU transmits information on the HV battery voltage to the HV control ECU via CAN communication.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1F	129	HV battery voltage circuit malfunction	• HV battery voltage circuit • Service plug grip • High voltage fuse • Battery plug • Battery ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result: DTCs are output

YES	GO TO RELEVANT DTC CHART (See page 05–665)

NO

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2 READ OUTPUT DTC(HYBRID CONTROL)

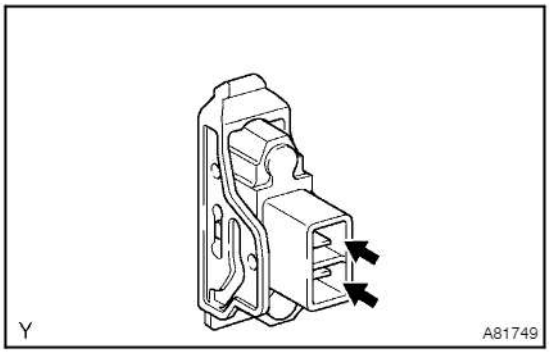
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output.

DTC No.	INF Code	Detection Item	See Page
P0AA1	226	Hybrid Battery Positive Contactor Circuit Stuck Closed	05–540
P0AA2	227	Hybrid Battery Positive Contactor Circuit Stuck Open	05–540
P0AA4	228	Hybrid Battery Negative Contactor Circuit Stuck Closed	05–544
P0AA5	229	Hybrid Battery Negative Contactor Circuit Stuck Open	05–544

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

3 INSPECT SERVICE PLUG GRIP



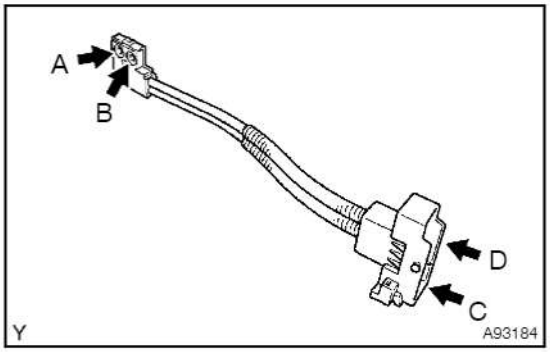
CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Check the resistance between the terminals of the service plug grip.
Standard: Below 1 Ω

NG → **Go to step 5**

OK

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4 INSPECT BATTERY PLUG



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the battery plug (see page 21–79).
(c) Check the resistance between the terminals of the battery plug.
Standard:

Tester Connection	Specified Condition
A – C	Below 1 Ω
B – D	Below 1 Ω

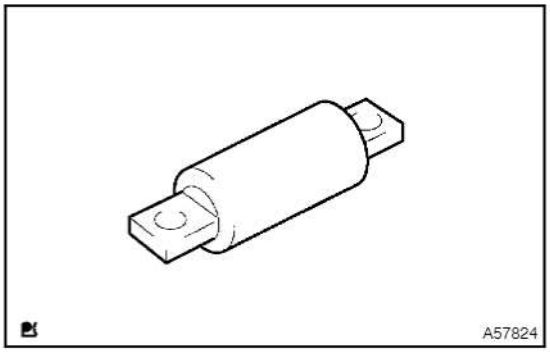
(d) Reinstall the battery plug (see page 21–79).
(e) Reinstall the HV battery assembly (see page 21–56).

NG → **REPLACE BATTERY PLUG**

OK

REPLACE BATTERY ECU ASSY (See page 21–100)

5 INSPECT HIGH VOLTAGE FUSE



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Remove the high voltage fuse (see page 21–120).

HINT:
The high voltage fuse is enclosed in the service plug grip.

(b) Check the resistance between the terminals of the high voltage fuse.
Standard: Below 1 Ω
(c) Reinstall the high voltage fuse (see page 21–120).

NG → **REPLACE HIGH VOLTAGE FUSE**

OK

REPLACE SERVICE PLUG GRIP

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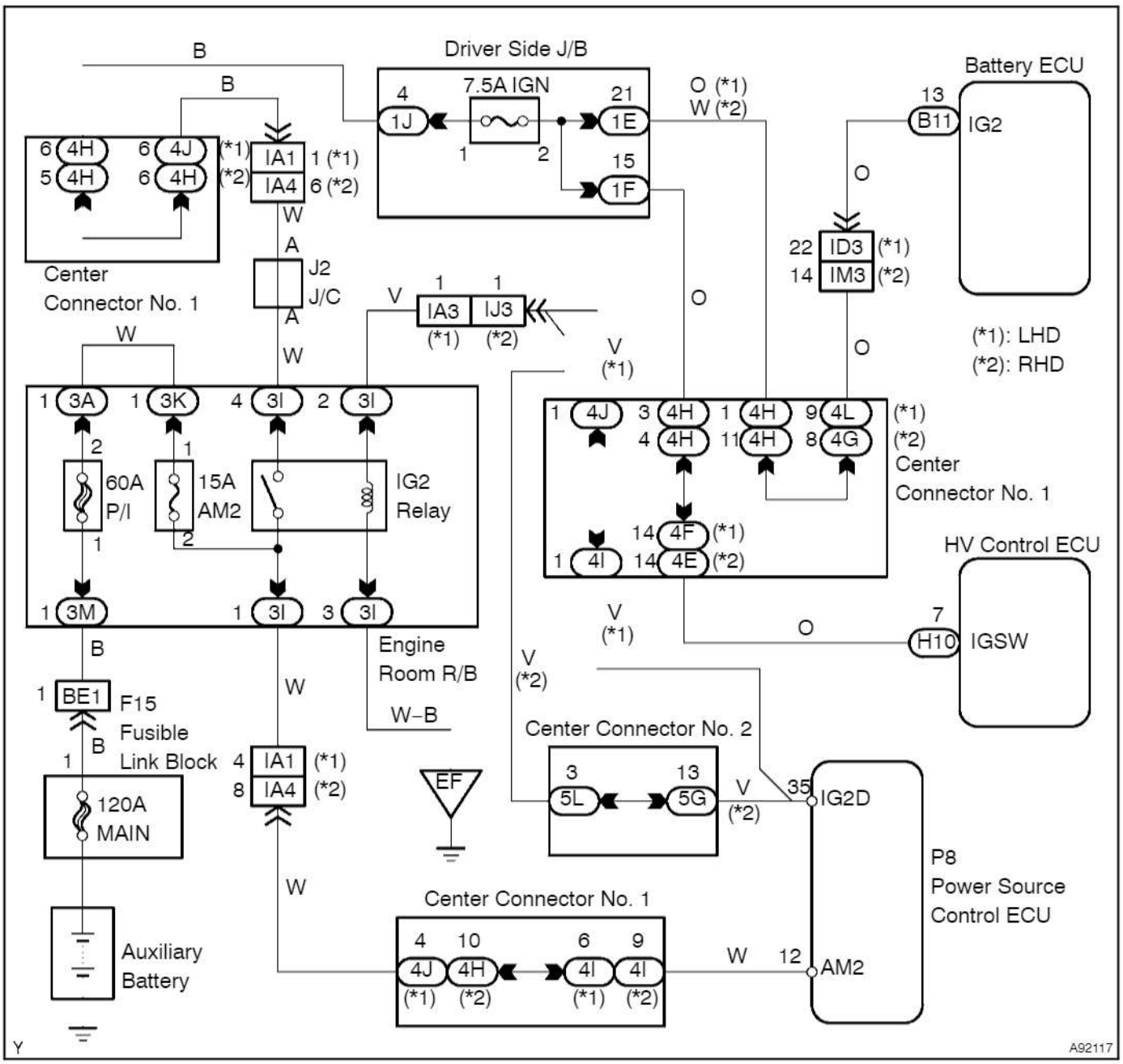
DTC P0A1F/593 BATTERY ENERGY CONTROL MODULE

CIRCUIT DESCRIPTION

The battery ECU transmits information on the IG2 voltage of the battery ECU to the HV control ECU via CAN communication.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1F	593	IG2 signal circuit of battery ECU malfunction	• Wire harness or connector • Battery ECU

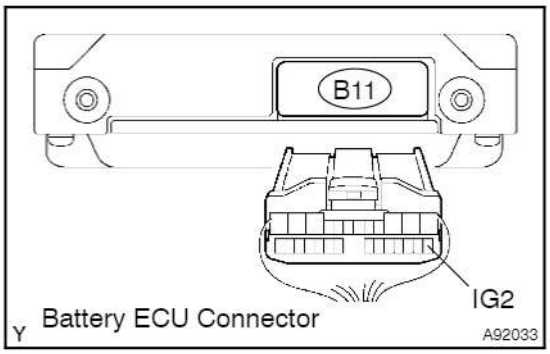
WIRING DIAGRAM

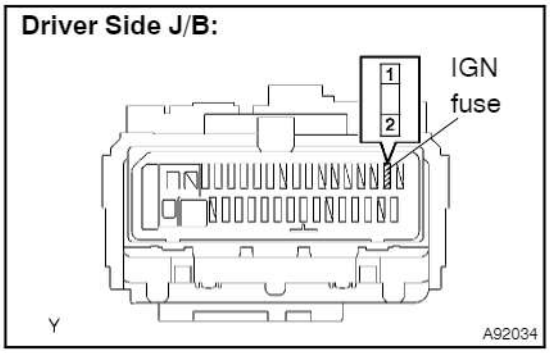


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(BATTERY ECU – IGN FUSE)





(a) Disconnect the B11 battery ECU connector.
(b) Remove the IGN fuse from the driver side J/B.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IG2 (B11–13) – IGN fuse (2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IG2 (B11–13) or IGN fuse (2) – Body ground	10 kΩ or higher

NOTICE:
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the IGN fuse.
(e) Reconnect the battery ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY ECU ASSY (See page 21–100)

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DTC	P0A2B/248	DRIVE MOTOR "A" TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

DTC	P0A2B/250	DRIVE MOTOR "A" TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A2C (INF 247) on page 05–336.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A2B	248	Motor temperature sensor No. 1 malfunction	• Hybrid vehicle motor
P0A2B	250	Motor temperature sensor No. 1 performance problem	• Hybrid vehicle motor

INSPECTION PROCEDURE

If the information (INF) code 248 or 250 is present, replace the hybrid vehicle motor.

HINT:

The motor temperature sensor No. 1 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

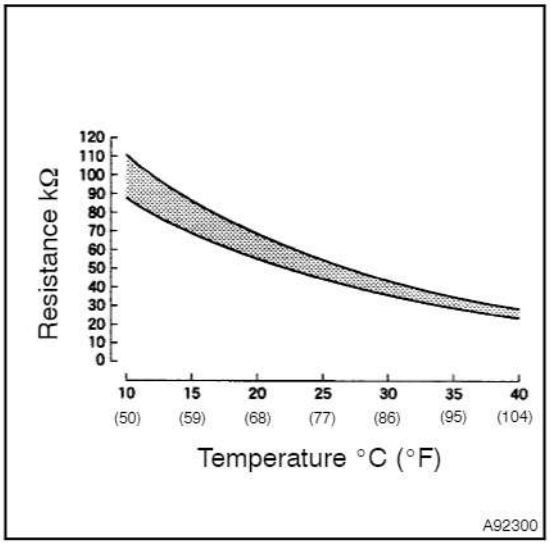
REPLACE HYBRID VEHICLE MOTOR ASSY

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DTC	P0A2C/247	DRIVE MOTOR "A" TEMPERATURE SENSOR CIRCUIT LOW

DTC	P0A2D/249	DRIVE MOTOR "A" TEMPERATURE SENSOR CIRCUIT HIGH

CIRCUIT DESCRIPTION



The resistance of the thermistor, which is enclosed in the motor temperature sensor No. 1, changes in accordance with the changes in the temperature of the motor. The lower the motor temperature, the higher the resistance of the thermistor. Conversely, the higher the temperature, the lower the resistance.
The motor temperature sensor No. 1 is connected to the HV control ECU. The power voltage of 5 V is supplied from the MMT terminal of the HV control ECU to the motor temperature sensor No. 1 via resistor R. Because resistor R and the motor temperature sensor No. 1 are connected in series, the resistance changes with the changes in temperature of the motor, which causes the MMT terminal voltage to also change.
Based on this signal, the HV control ECU limits the load in order to prevent the motor from overheating. Furthermore, the HV control ECU checks the motor temperature sensor No. 1 for a wiring malfunction and the sensor for malfunction.

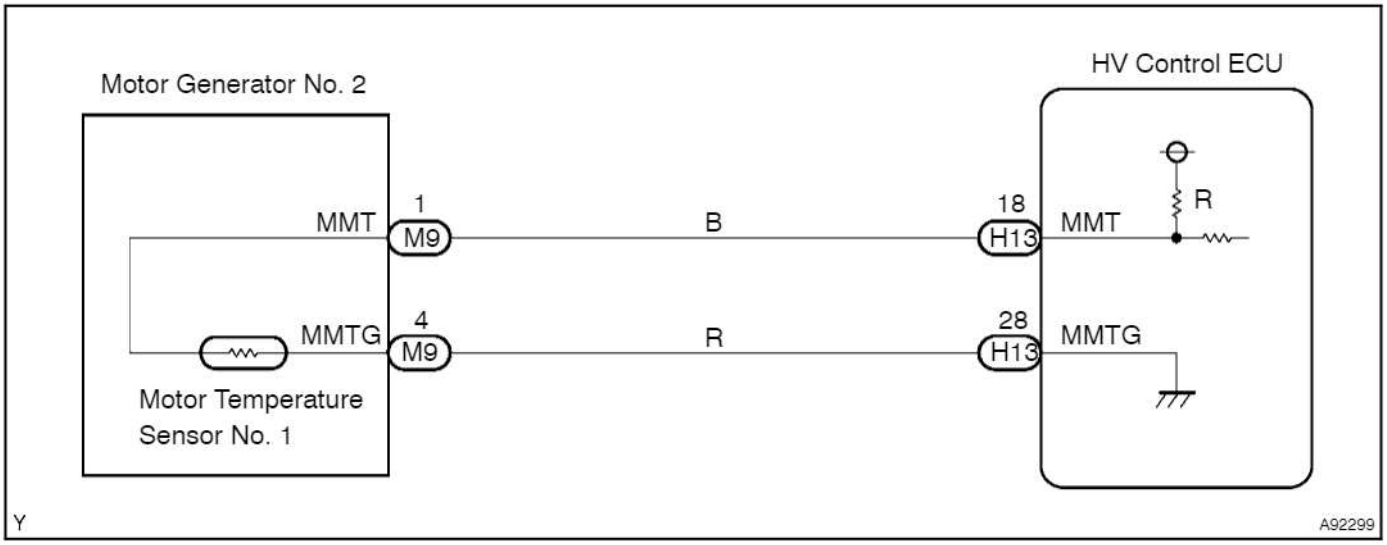
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A2C	247	GND short in motor temperature sensor No. 1 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU
P0A2D	249	Open or +B short in motor temperature sensor No. 1 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU

HINT:
After confirming DTC P0A2C (INF 247) or P0A2D (INF 249), confirm Motor Temp No.1 in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–50°C (–58°F)	Open or +B short circuit
205°C (401°F)	GND short circuit

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WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II(MOTOR TEMP NO.1)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Motor Temp No. 1 value on the intelligent tester II.

Result:

Temperature Displayed	Proceed to
–50°C (–58°F)	A
205°C (401°F)	B
–49°C to 204°C (–57°F to 400°F)	C

HINT:

- If there is an open or +B short circuit, the intelligent tester II indicates –50°C (–58°F).
- If there is a GND short circuit, the intelligent tester II indicates 205°C (401°F).

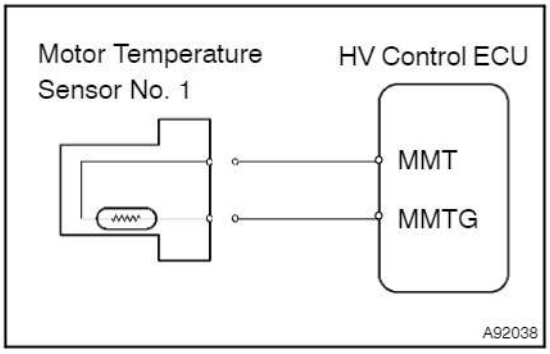
B → **Go to step 5**

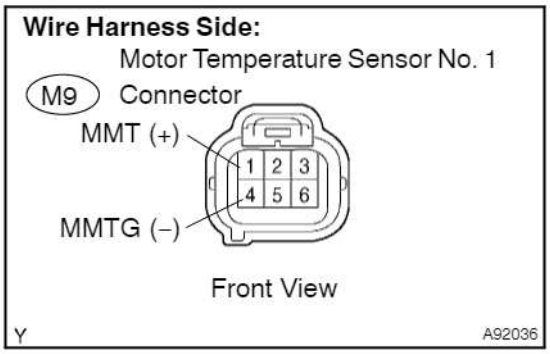
C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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2 INSPECT HYBRID VEHICLE MOTOR ASSY(CHECK FOR OPEN OR +B SHORT)





(a) Disconnect the M9 motor temperature sensor No. 1 connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the motor temperature sensor No.1 connector.

Result:

Tester Connection	Voltage	Proceed to
MMT (M9–1) – MMTG (M9–4)	Approximately 5 V	A
MMT (M9–1) – MMTG (M9–4)	9 to 14V	B
MMT (M9–1) – MMTG (M9–4)	Approximately 0 V	C

HINT:
The motor temperature sensor No.1 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

(d) Reconnect the motor temperature sensor No. 1 connector.

B → **Go to step 3**

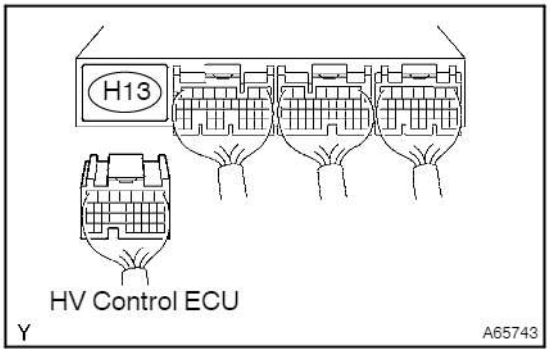
C → **Go to step 4**

A

REPLACE HYBRID VEHICLE MOTOR ASSY

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3	CHECK HARNESS AND CONNECTOR(CHECK FOR +B SHORT)

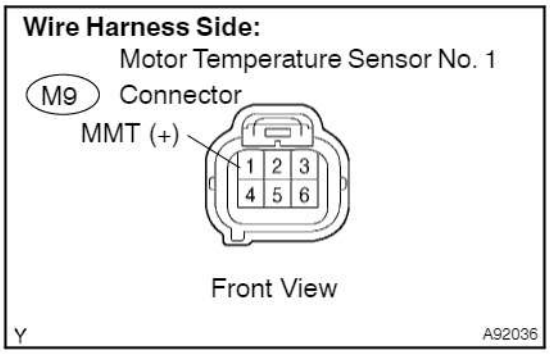


(a) Disconnect the H13 HV control ECU connector.
(b) Disconnect the M9 motor temperature sensor No.1 connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the motor temperature sensor No. 1 connector and body ground.

Standard:

Tester Connection	Specified Condition
MMT (M9–1) – Body ground	Approximately 0 V

(e) Reconnect the HV control ECU connector.
(f) Reconnect the motor temperature sensor No. 1 connector.



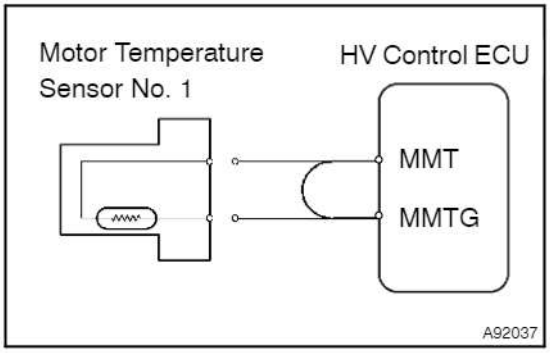
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

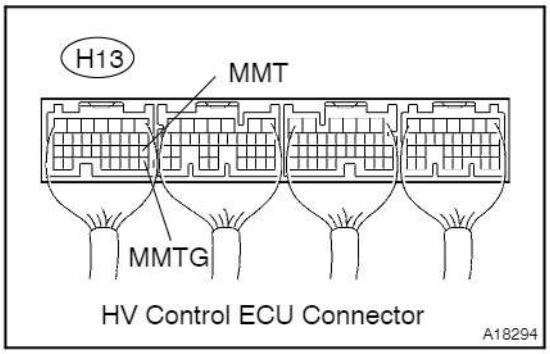
OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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4	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the M9 motor temperature sensor No. 1 connector.
(b) Connect terminals MMT and MMTG of the H13 HV control ECU connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Motor Temp No. 1 value.
Standard: 205°C (401°F)

HINT:
If the intelligent tester II indicates a temperature of –50°C (–58°F), check the connection of the HV control ECU. If it is connected normally, replace the HV control ECU.

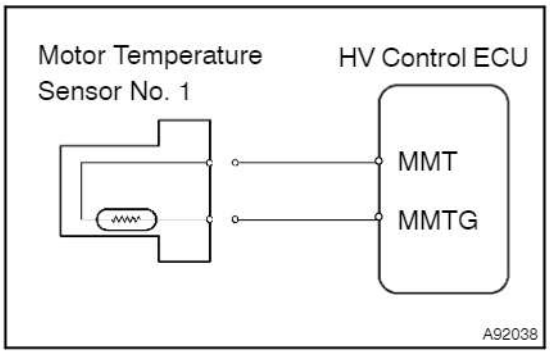
(f) Reconnect the motor temperature sensor No. 1 connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR GND SHORT IN WIRE HARNESS)



(a) Disconnect the M9 motor temperature sensor No. 1 connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Motor Temp No. 1 value.
Standard: –50°C (–58°F)
(e) Reconnect the motor temperature sensor No. 1 connector.

HINT:
The motor temperature sensor No.1 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

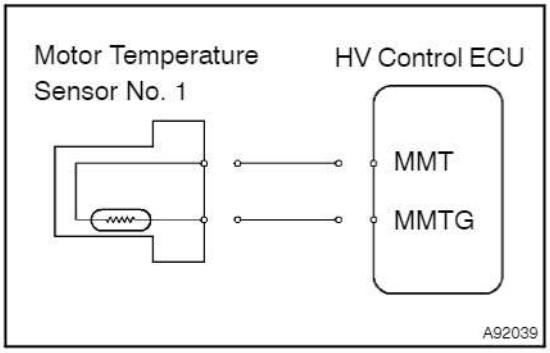
NG → **Go to step 6**

OK

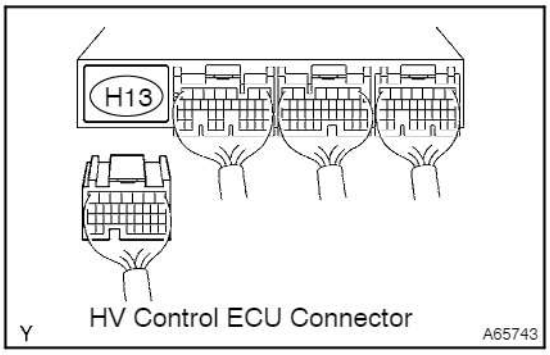
REPLACE HYBRID VEHICLE MOTOR ASSY

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6	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR GND SHORT IN HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the H13 HV control ECU connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Motor Temp No. 1 value.
Standard: –50°C (–58°F)
(e) Reconnect the HV control ECU connector.



NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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DTC	P0A37/258	GENERATOR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A38 (INF 257) on page 05–344.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A37	258	Motor temperature sensor No. 2 malfunction	• Hybrid vehicle motor

INSPECTION PROCEDURE

If the information (INF) code 258 is present, replace the hybrid vehicle motor.

HINT:

The motor temperature sensor No. 2 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

REPLACE HYBRID VEHICLE MOTOR ASSY

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DTC	P0A37/260	GENERATOR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A38 (INF 257) on page 05–344.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A37	260	Motor temperature sensor No. 2 performance problem	• Hybrid vehicle motor • Transaxle fluid leakage • HV transaxle assembly

INSPECTION PROCEDURE

1	CHECK TRANSAXLE FLUID LEVEL (See page 22–1)

(a) Check if the transaxle is filled with fluid to the specified level.
OK: The transaxle is filled with fluid to the specified level

HINT:
The motor temperature sensor No. 2 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

NG → **REPAIR OIL LEAKAGE, OR REPLACE HYBRID VEHICLE TRANSAXLE**

OK

REPLACE HYBRID VEHICLE MOTOR ASSY

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DTC	P0A38/257	GENERATOR TEMPERATURE SENSOR CIRCUIT LOW

DTC	P0A39/259	GENERATOR TEMPERATURE SENSOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The motor temperature sensor No. 2 detects the temperature of the transaxle fluid. The resistance of the thermistor installed in the motor temperature sensor No. 2 varies with the changes in the transaxle fluid temperature. The construction in the motor temperature sensor No. 2 and how it is connected to the HV control ECU are the same as those of the motor temperature sensor No. 1 (see the circuit description on page 05–336).

Based on the signal provided by the motor temperature sensor No. 2, the HV control ECU limits the load to prevent the motor from overheating. Furthermore, the HV control ECU checks the motor temperature sensor No. 2 for a wiring malfunction and the sensor for malfunction.

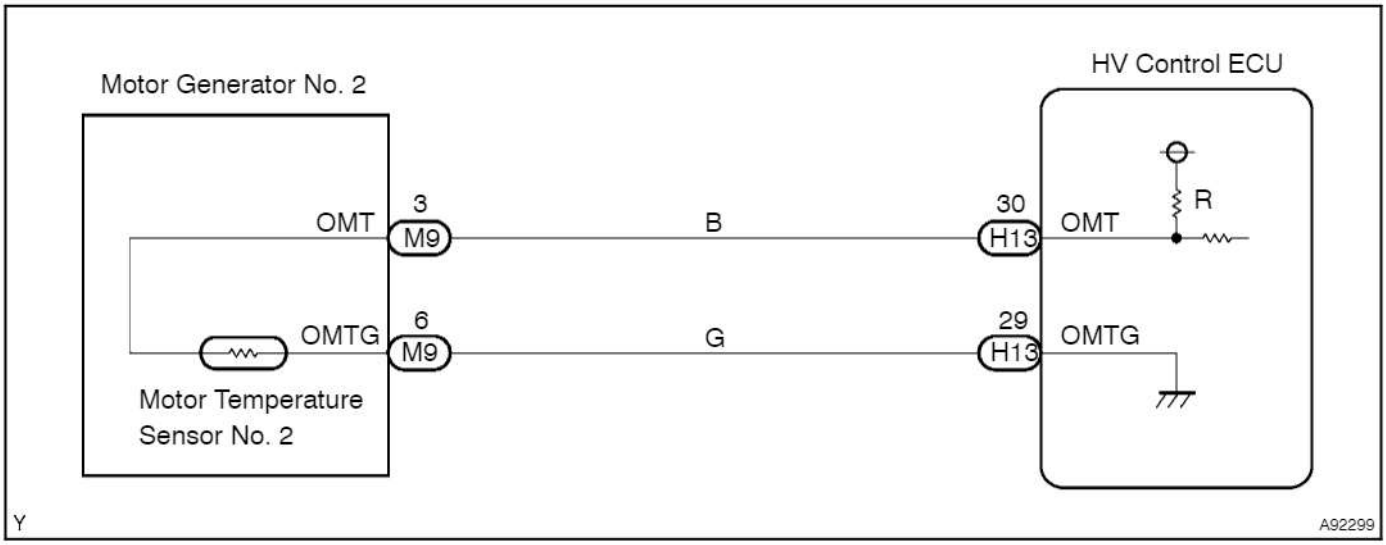
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A38	257	GND short in motor temperature sensor No. 2 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU
P0A39	259	Open or +B short in motor temperature sensor No. 2 circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU

HINT:

After confirming DTC P0A38 (INF 257) or P0A39 (INF 259), confirm Motor Temp No.2 in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–50°C (–58°F)	Open or +B short circuit
205°C (401°F)	GND short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER II(MOTOR TEMP NO. 2)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Motor Temp No. 2 value on the intelligent tester II.

Result:

Temperature Displayed	Proceed to
–50°C (–58°F)	A
205°C (401°F)	B
–49°C to 204°C (–57°F to 400°F)	C

HINT:

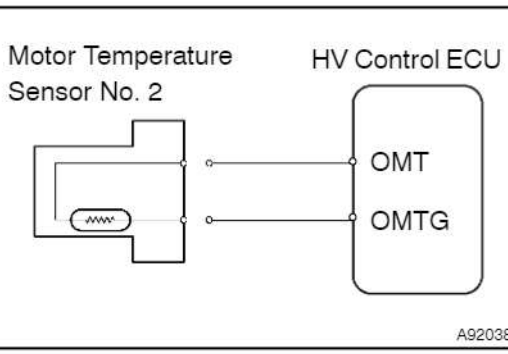
- If there is an open or +B short circuit, the intelligent tester II indicates –50°C (–58°F).
- If there is a GND short circuit, the intelligent tester II indicates 205°C (401°F).

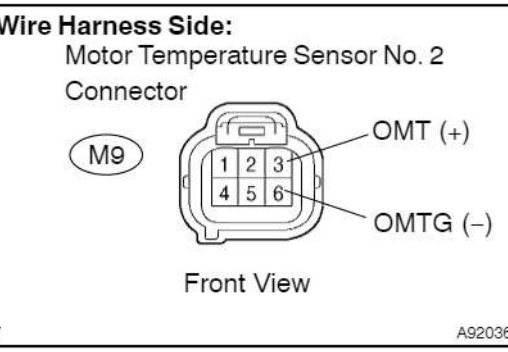
B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

2 INSPECT HYBRID VEHICLE MOTOR ASSY(CHECK FOR OPEN OR +B SHORT)





(a) Disconnect the M9 motor temperature sensor No. 2 connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the motor temperature sensor No. 2 connector.

Result:

Tester Connection	Voltage	Proceed to
OMT (M9–3) – OMTG (M9–6)	Approximately 5 V	A
OMT (M9–3) – OMTG (M9–6)	9 to 14V	B
OMT (M9–3) – OMTG (M9–6)	Approximately 0 V	C

HINT:

The motor temperature sensor No. 2 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

(d) Reconnect the motor temperature sensor No. 2 connector.

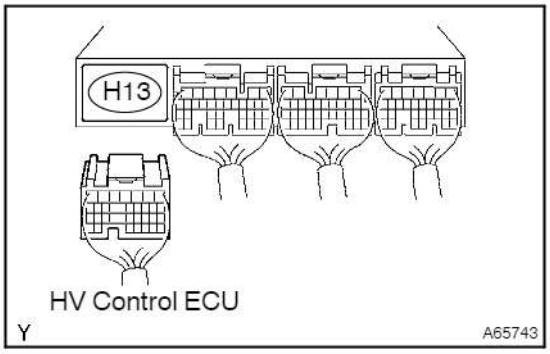
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B	Go to step 3
C	Go to step 4

A

REPLACE HYBRID VEHICLE MOTOR ASSY

3 CHECK HARNESS AND CONNECTOR(CHECK FOR +B SHORT)

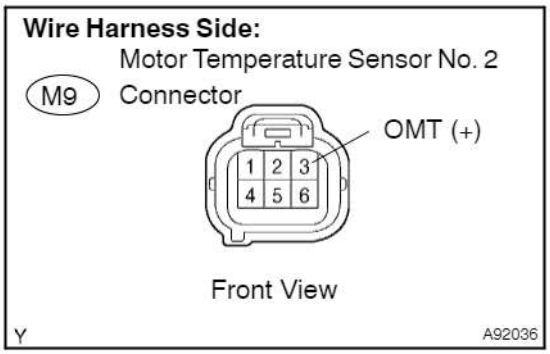


(a) Disconnect the H13 HV control ECU connector.
(b) Disconnect the M9 motor temperature sensor No. 2 connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the motor temperature sensor No. 2 connector and body ground.

Standard:

tester Connection	Specified Condition
OMT (M9–3) – Body ground	Approximately 0 V

(e) Reconnect the HV control ECU connector.
(f) Reconnect the motor temperature sensor No. 2 connector.



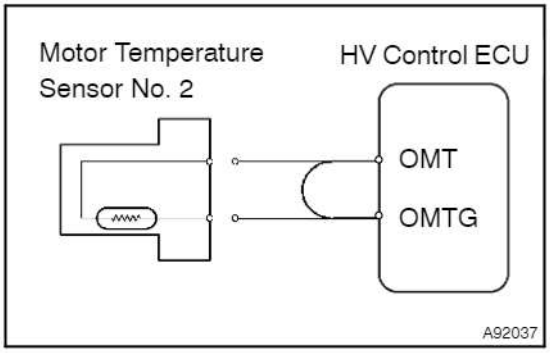
NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

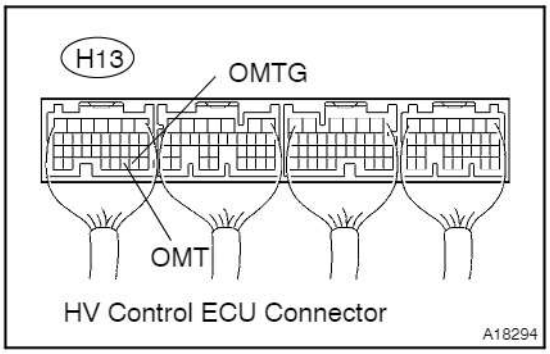
OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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4	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR OPEN IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the M9 motor temperature sensor No. 2 connector.
(b) Connect terminals OMT and OMTG of the H13 HV control ECU connector.
(c) Turn the power switch ON (IG).
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Motor Temp No. 2 value.
Standard: 205°C (401°F)

HINT:
If the intelligent tester II indicates a temperature of –50°C (–58°F), check the connection of the HV control ECU. If it is connected normally, replace the HV control ECU.

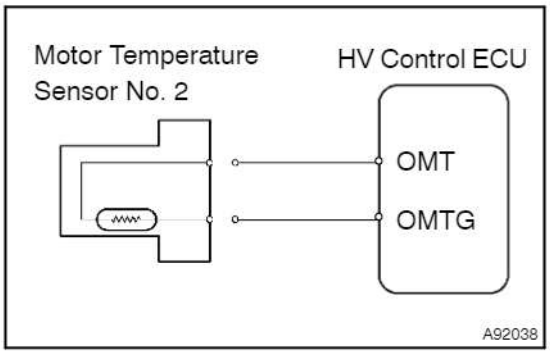
(f) Reconnect the motor temperature sensor No. 2 connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR GND SHORT IN WIRE HARNESS)



(a) Disconnect the M9 motor temperature sensor No. 2 connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Motor Temp No. 2 value.
Standard: –50°C (–58°F)
(e) Reconnect the motor temperature sensor No. 2 connector.

HINT:
The motor temperature sensor No. 2 is unavailable as an individual service part. Therefore, when replacing it, the hybrid vehicle motor must be replaced.

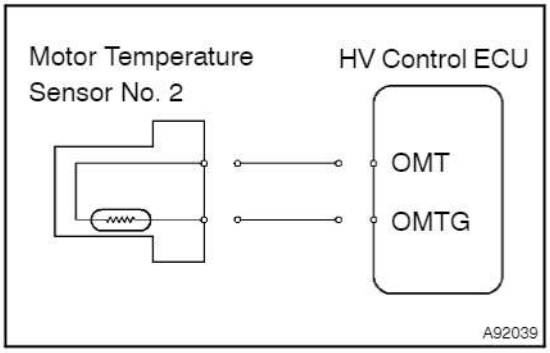
NG → **Go to step 6**

OK

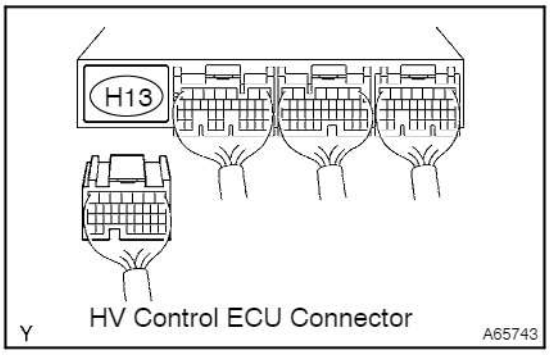
REPLACE HYBRID VEHICLE MOTOR ASSY

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6	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR GND SHORT IN HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the H13 HV control ECU connector.
(b) Turn the power switch ON (IG).
(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Motor Temp No. 2 value.
Standard: –50°C (–58°F)
(e) Reconnect the HV control ECU connector.



NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

OK →

REPAIR OR REPLACE HARNESS OR CONNECTOR

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DTC	P0A3F/243	DRIVE MOTOR "A" POSITION SENSOR CIRCUIT

DTC	P0A40/500	DRIVE MOTOR "A" POSITION SENSOR CIRCUIT RANGE/PERFORMANCE

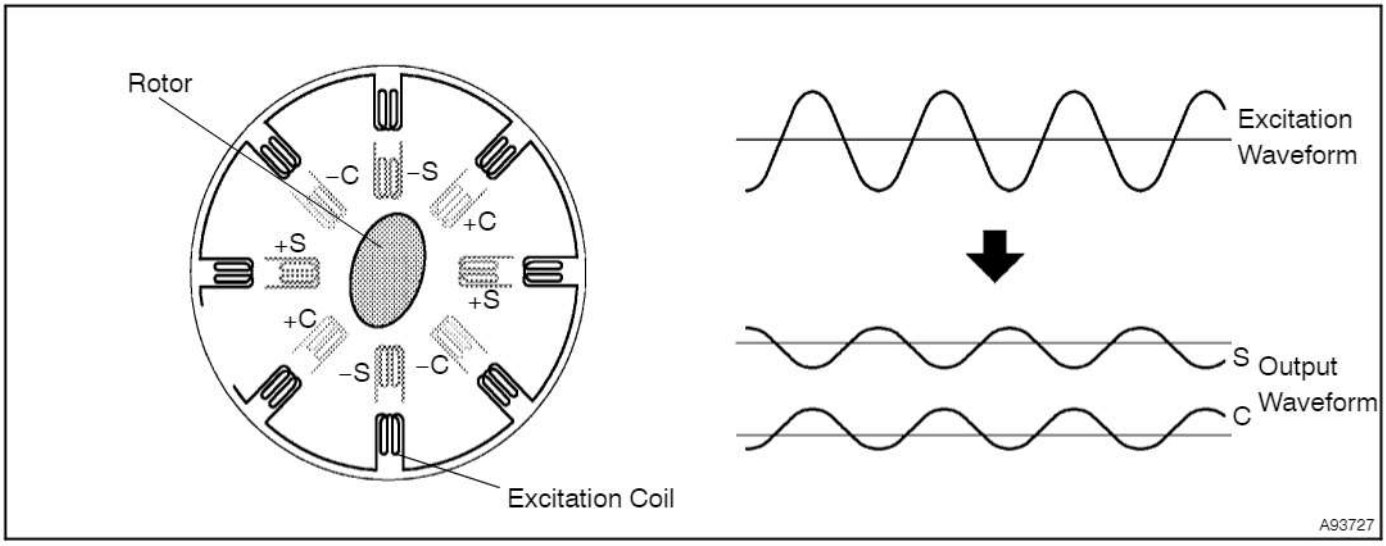
DTC	P0A41/245	DRIVE MOTOR "A" POSITION SENSOR CIRCUIT LOW

CIRCUIT DESCRIPTION

The motor resolver is a type of sensor that detects the position of the magnetic poles, which are indispensable for ensuring the highly efficient control of the MG1 and MG2.

The stator of the resolver contains an excitation coil and two detection coils. Because the rotor has an oval shape, the gap between the stator and the rotor changes as the rotor turns. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the position of the sensor rotor.

The HV control ECU detects the absolute position of the rotor in accordance with the phases of detection coils S and C and the height of their waveform. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

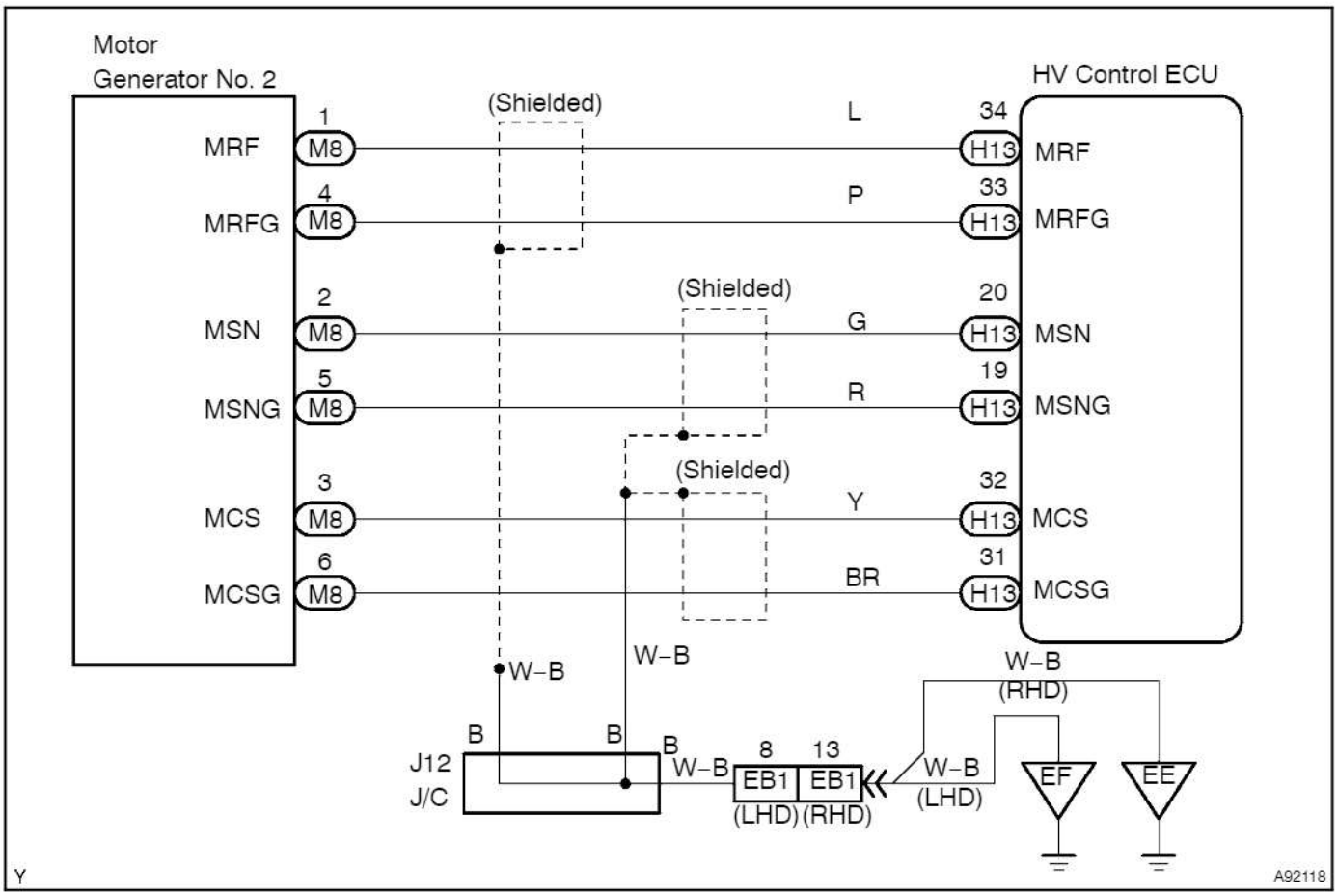


The HV control ECU monitors the output signals of the motor resolver and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A3F	243	Interphase short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU
P0A40	500	Motor resolver output is out of normal range	• Wire harness or connector • Hybrid vehicle motor • HV control ECU
P0A41	245	Open or short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle motor • HV control ECU

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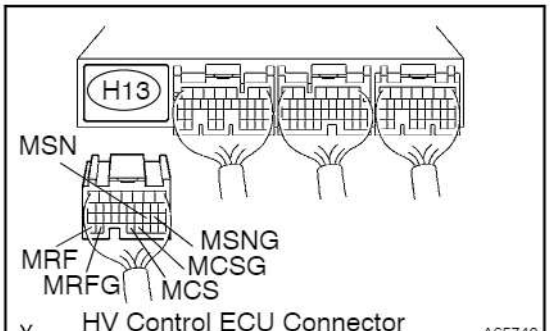
WIRING DIAGRAM

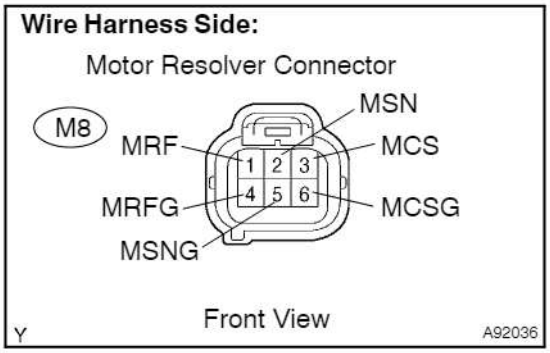


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – MOTOR RESOLVER)





(a) Disconnect the H13 HV control ECU connector.
(b) Disconnect the M8 motor resolver connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MRF (H13–34) – Body ground	Below 1 V
MRFG (H13–33) – Body ground	Below 1 V
MSN (H13–20) – Body ground	Below 1 V
MSNG (H13–19) – Body ground	Below 1 V
MCS (H13–32) – Body ground	Below 1 V
MCSG (H13–31) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MRF (H13–34) – MRF (M8–1)	Below 1 Ω
MRFG (H13–33) – MRFG (M8–4)	Below 1 Ω
MSN (H13–20) – MSN (M8–2)	Below 1 Ω
MSNG (H13–19) – MSNG (M8–5)	Below 1 Ω
MCS (H13–32) – MCS (M8–3)	Below 1 Ω
MCSG (H13–31) – MCSG (M8–6)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MRF (H13–34) or MRF (M8–1) – Body ground	10 kΩ or higher
MRFG (H13–33) or MRFG (M8–4) – Body ground	10 kΩ or higher
MSN (H13–20) or MSN (M8–2) – Body ground	10 kΩ or higher
MSNG (H13–19) or MSNG (M8–5) – Body ground	10 kΩ or higher
MCS (H13–32) or MCS (M8–3) – Body ground	10 kΩ or higher
MCSG (H13–31) or MCSG (M8–6) – Body ground	10 kΩ or higher

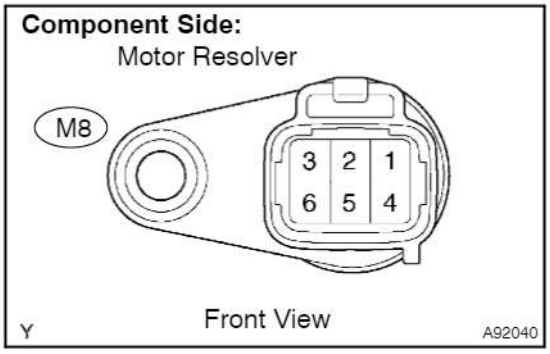
(g) Reconnect the motor resolver connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

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2 INSPECT MOTOR RESOLVER



(a) Measure the resistance between the terminals of the motor resolver.

Standard:

Tester Connection	Specified Condition
MRF (M8–1) – MRFG (M8–4)	7.65 to 10.2 Ω
MSN (M8–2) – MSNG (M8–5)	12.6 to 16.8 Ω
MCS (M8–3) – MCSG (M8–6)	12.6 to 16.8 Ω
Each terminal listed above – Transaxle housing	10 kΩ or higher

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A4B/253	GENERATOR POSITION SENSOR CIRCUIT

DTC	P0A4C/513	GENERATOR POSITION SENSOR CIRCUIT RANGE/PERFORMANCE

DTC	P0A4D/255	GENERATOR POSITION SENSOR CIRCUIT LOW

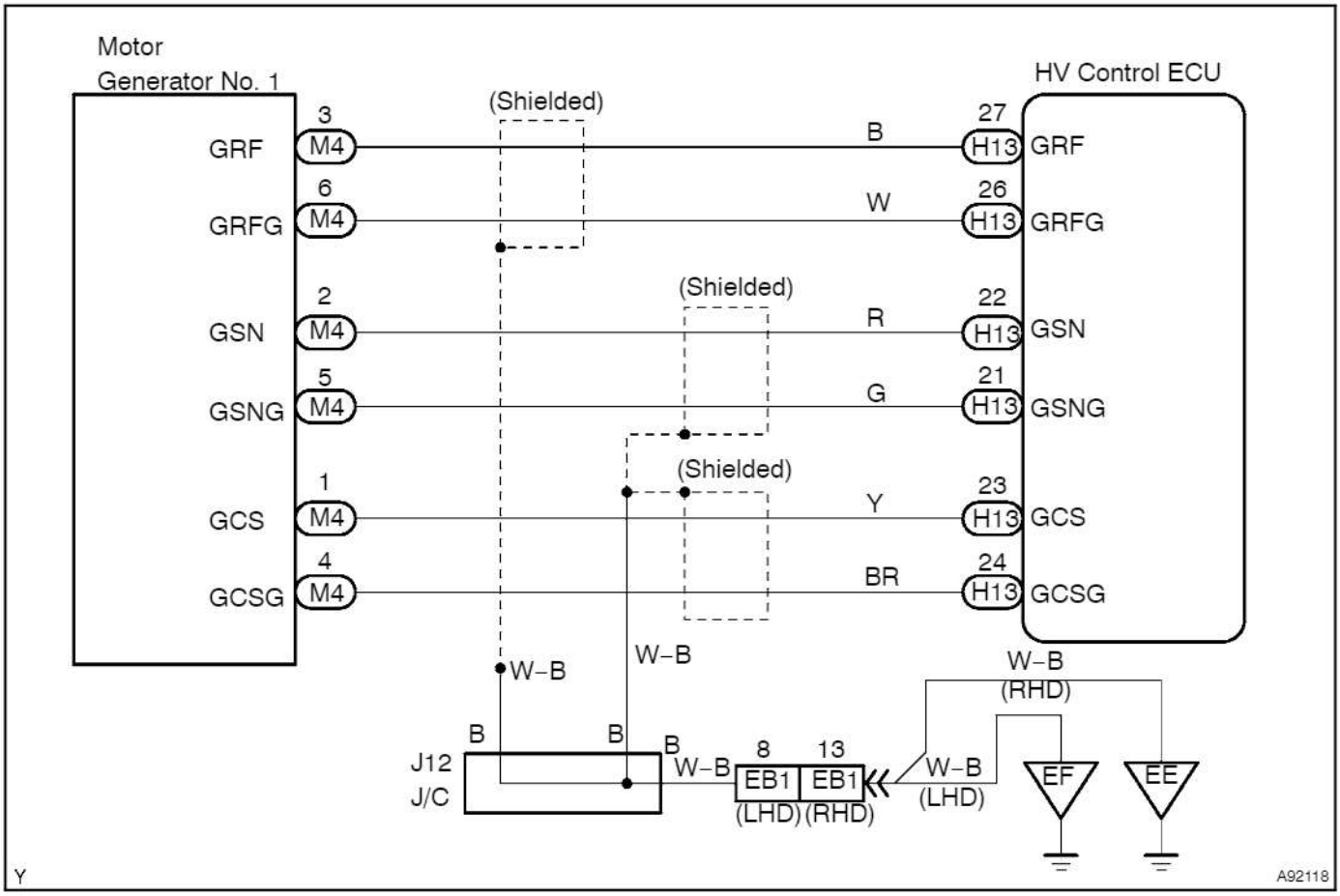
CIRCUIT DESCRIPTION

The generator resolver detects the position of the magnetic poles, which are indispensable for ensuring the highly efficient control of the MG1 and MG2. The construction of the generator resolver and how it is connected to the HV control ECU are the same as those of the motor resolver (see the circuit description on page 05–349).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A4B	253	Interphase short in generator resolver circuit	• Wire harness or connector • Hybrid vehicle generator • HV control ECU
P0A4C	513	Generator resolver output is out of normal range	• Wire harness or connector • Hybrid vehicle generator • HV control ECU
P0A4D	255	Open or short in generator resolver circuit	• Wire harness or connector • Hybrid vehicle generator • HV control ECU

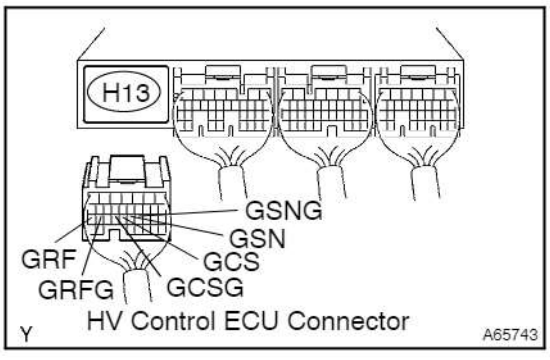
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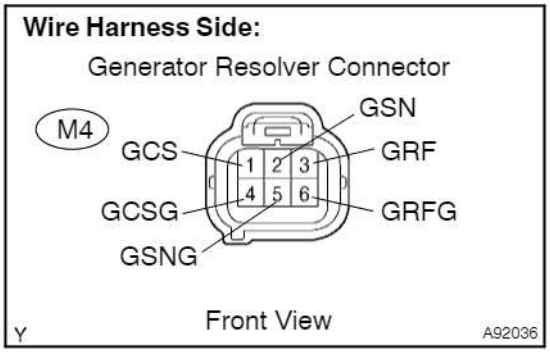
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – GENERATOR RESOLVER)





(a) Disconnect the H13 HV control ECU connector.
(b) Disconnect the M4 generator resolver connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GRF (H13–27) – Body ground	Below 1 V
GRFG (H13–26) – Body ground	Below 1 V
GSN (H13–22) – Body ground	Below 1 V
GSNG (H13–21) – Body ground	Below 1 V
GCS (H13–23) – Body ground	Below 1 V
GCSG (H13–24) – Body ground	Below 1 V

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(e) Turn the power switch OFF.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GRF (H13–27) – GRF (M4–3)	Below 1 Ω
GRFG (H13–26) – GRFG (M4–6)	Below 1 Ω
GSN (H13–22) – GSN (M4–2)	Below 1 Ω
GSNG (H13–21) – GSNG (M4–5)	Below 1 Ω
GCS (H13–23) – GCS (M4–1)	Below 1 Ω
GCSG (H13–24) – GCSG (M4–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GRF (H13–27) or GRF (M4–3) – Body ground	10 kΩ or higher
GRFG (H13–26) or GRFG (M4–6) – Body ground	10 kΩ or higher
GSN (H13–22) or GSN (M4–2) – Body ground	10 kΩ or higher
GSNG (H13–21) or GSNG (M4–5) – Body ground	10 kΩ or higher
GCS (H13–23) or GCS (M4–1) – Body ground	10 kΩ or higher
GCSG (H13–24) or GCSG (M4–4) – Body ground	10 kΩ or higher

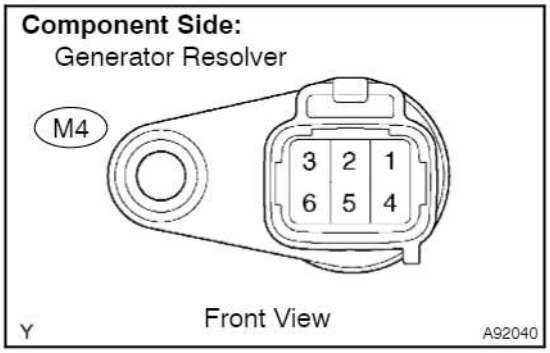
(g) Reconnect the generator resolver connector.

(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT GENERATOR RESOLVER



(a) Measure the resistance between the terminals of the generator resolver.

Standard:

Tester Connection	Specified Condition
GCS (M4–1) – GCSG (M4–4)	12.6 to 16.8 Ω
GSN (M4–2) – GSNG (M4–5)	12.6 to 16.8 Ω
GRF (M4–3) – GRFG (M4–6)	7.65 to 10.2 Ω
Each terminal listed above – Transaxle housing	10 kΩ or higher

NG → **REPLACE HYBRID VEHICLE GENERATOR ASSY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A51/174	DRIVE MOTOR "A" CURRENT SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The HV control ECU performs self–checks to detect an internal operating malfunction in the ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A51	174	HV control ECU internal error	• HV control ECU

INSPECTION PROCEDURE

If the information (INF) code is present, replace the HV control ECU.

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A60/288	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A60/289	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A60/290	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A60/292	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A60/294	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A60/501	DRIVE MOTOR "A" PHASE V CURRENT
DTC	P0A63/296	DRIVE MOTOR "A" PHASE W CURRENT
DTC	P0A63/297	DRIVE MOTOR "A" PHASE W CURRENT
DTC	P0A63/298	DRIVE MOTOR "A" PHASE W CURRENT
DTC	P0A63/300	DRIVE MOTOR "A" PHASE W CURRENT
DTC	P0A63/302	DRIVE MOTOR "A" PHASE W CURRENT
DTC	P0A63/502	DRIVE MOTOR "A" PHASE W CURRENT

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CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

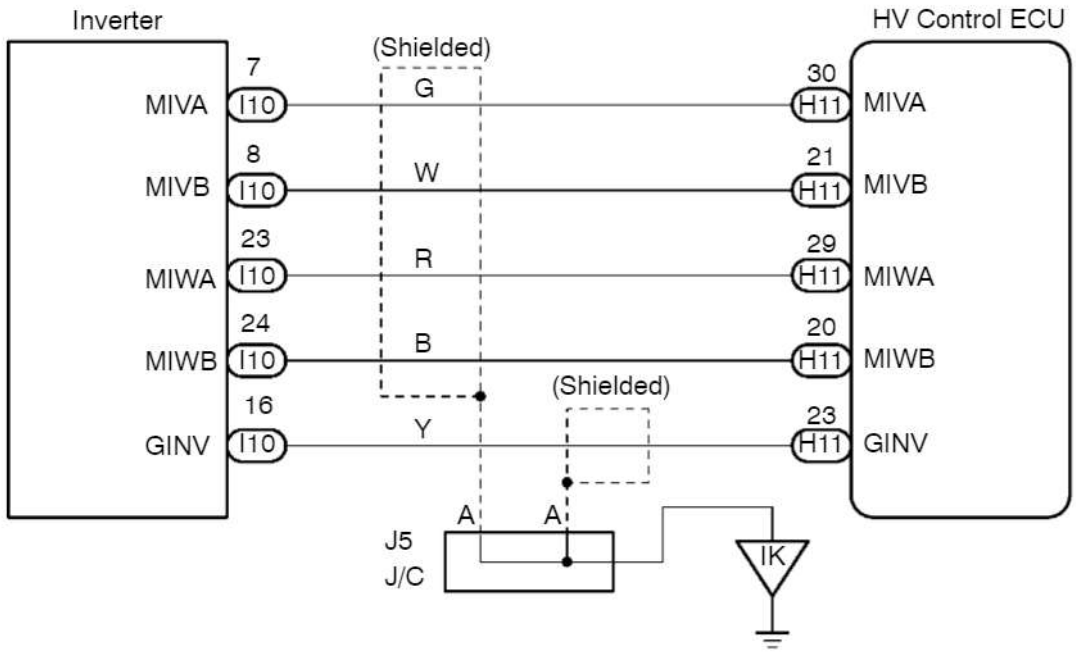
The motor inverter current sensors detect the amperage that flows through the V and W phase cables between the inverter and MG1/MG2. The inverter transmits information that is necessary for effecting control, such as the amperage and voltage, to the HV control ECU.

The HV control ECU monitors the inverter current sensors to detect a malfunction in the sensor system. Thus, this does not intend detecting a malfunction in the high voltage system.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A60	288	Phase V current sub sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A60	289	Open in phase V current sub sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A60	290	Phase V current main sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A60	292	Open in phase V current main sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A60	294	Phase V current main and sub sensors of motor inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly
P0A60	501	Phase V current main and sub sensors of motor inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A63	296	Phase W current sub sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A63	297	Open in phase W current sub sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A63	298	Phase W current main sensor of motor inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A63	300	Open in phase W current main sensor circuit of motor inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A63	302	Phase W current main and sub sensors of motor inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly
P0A63	502	Phase W current main and sub sensors of motor inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly

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WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	**CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)**

CAUTION:

Wear insulated gloves before performing the following operation.

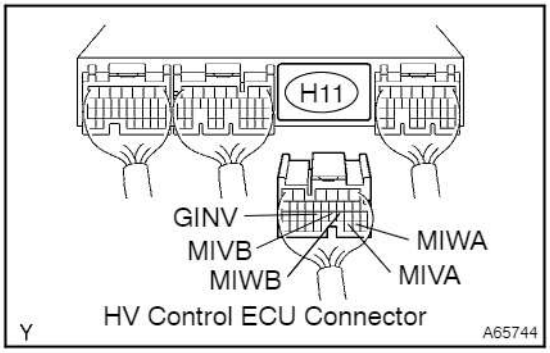
(a) Turn the power switch OFF.

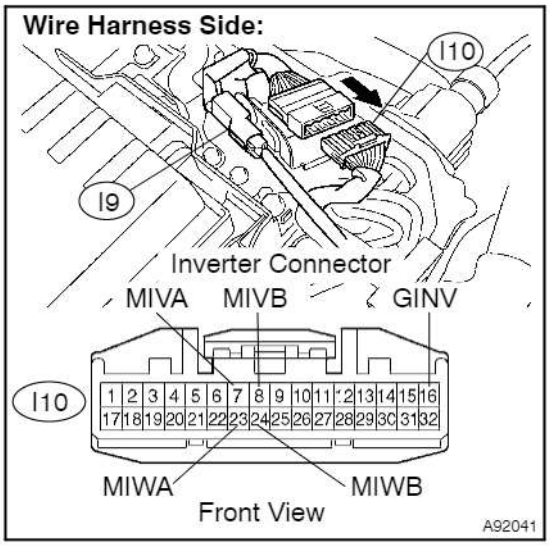
(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

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(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MIVA (H11–30) – Body ground	Below 1 V
MIVB (H11–21) – Body ground	Below 1 V
MIWA (H11–29) – Body ground	Below 1 V
MIWB (H11–20) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MIVA (H11–30) – MIVA (I10–7)	Below 1 Ω
MIVB (H11–21) – MIVB (I10–8)	Below 1 Ω
MIWA (H11–29) – MIWA (I10–23)	Below 1 Ω
MIWB (H11–20) – MIWB (I10–24)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MIVA (H11–30) or MIVA (I10–7) – Body ground	10 kΩ or higher
MIVB (H11–21) or MIVB (I10–8) – Body ground	10 kΩ or higher
MIWA (H11–29) or MIWA (I10–23) – Body ground	10 kΩ or higher
MIWB (H11–20) or MIWB (I10–24) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A72/326	GENERATOR PHASE V CURRENT
DTC	P0A72/327	GENERATOR PHASE V CURRENT
DTC	P0A72/328	GENERATOR PHASE V CURRENT
DTC	P0A72/330	GENERATOR PHASE V CURRENT
DTC	P0A72/333	GENERATOR PHASE V CURRENT
DTC	P0A72/515	GENERATOR PHASE V CURRENT
DTC	P0A75/334	GENERATOR PHASE W CURRENT
DTC	P0A75/335	GENERATOR PHASE W CURRENT
DTC	P0A75/336	GENERATOR PHASE W CURRENT
DTC	P0A75/338	GENERATOR PHASE W CURRENT
DTC	P0A75/341	GENERATOR PHASE W CURRENT
DTC	P0A75/516	GENERATOR PHASE W CURRENT

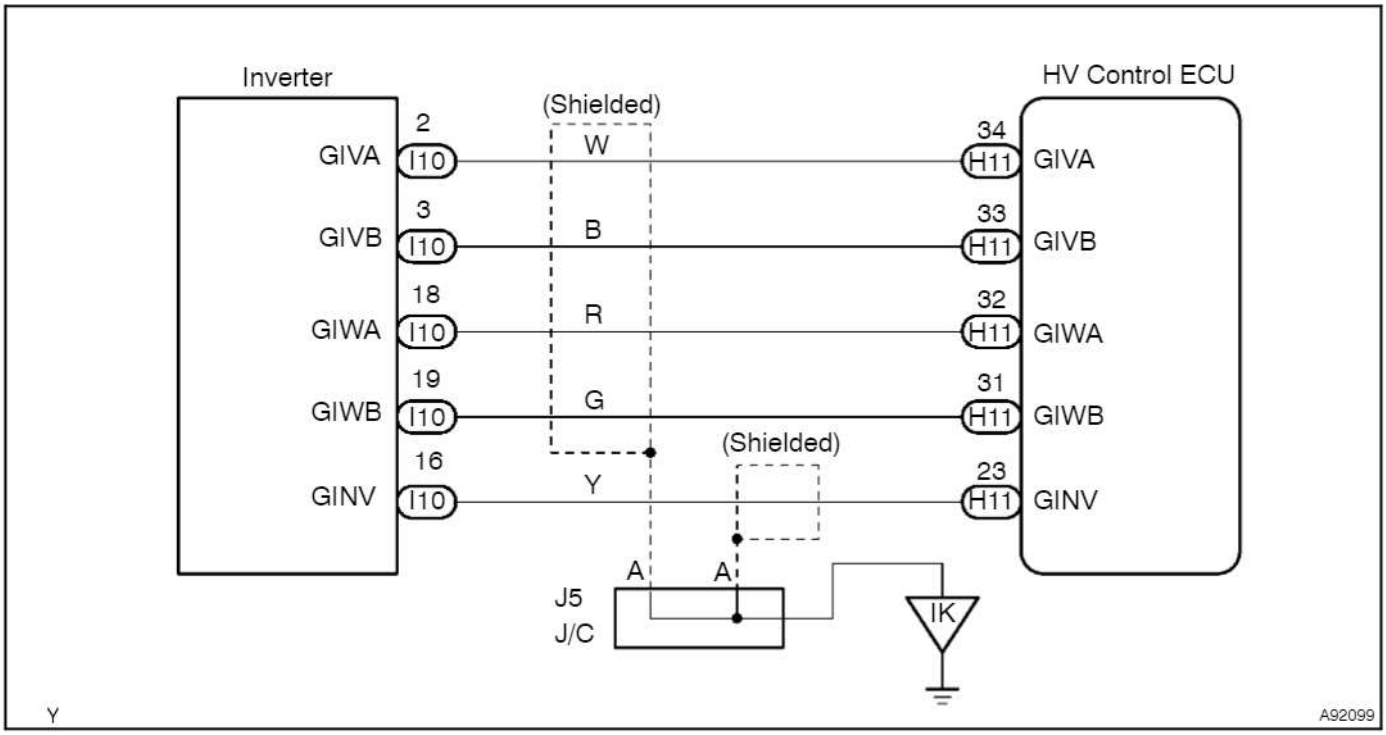
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CIRCUIT DESCRIPTION

Refer to DTC P0A60 (INF 288) on page 05–357.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A72	326	Phase V current sub sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A72	327	Open in phase V current sub sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A72	328	Phase V current main sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A72	330	Open in phase V current main sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A72	333	Phase V current main and sub sensors of generator inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly
P0A72	515	Phase V current main and sub sensors of generator inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A75	334	Phase W current sub sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A75	335	Open in phase W current sub sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A75	336	Phase W current main sensor of generator inverter current sensor malfunction	• Wire harness or connector • w/ converter inverter assembly
P0A75	338	Open in phase W current main sensor circuit of generator inverter current sensor	• Wire harness or connector • w/ converter inverter assembly
P0A75	341	Phase W current main and sub sensors of generator inverter current sensor performance problem	• Wire harness or connector • w/ converter inverter assembly
P0A75	516	Phase W current main and sub sensors of generator inverter current sensor offset malfunction	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



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INSPECTION PROCEDURE

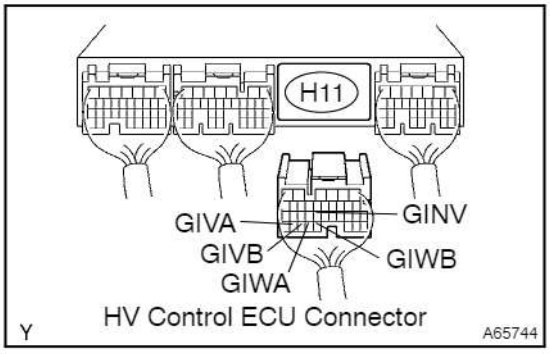
CAUTION:

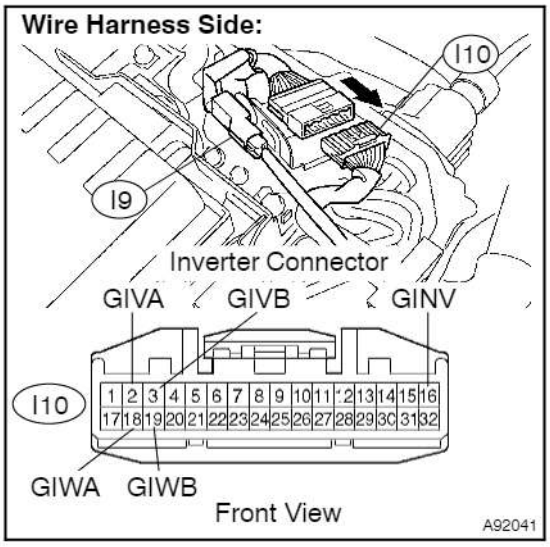
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GIVA (H11–34) – Body ground	Below 1 V
GIVB (H11–33) – Body ground	Below 1 V
GIWA (H11–32) – Body ground	Below 1 V
GIWB (H11–31) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GIVA (H11–34) – GIVA (I10–2)	Below 1 Ω
GIVB (H11–33) – GIVB (I10–3)	Below 1 Ω
GIWA (H11–32) – GIWA (I10–18)	Below 1 Ω
GIWB (H11–31) – GIWB (I10–19)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

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Standard (Check for short):

Tester Connection	Specified Condition
GIVA (H11–34) or GIVA (I10–2) – Body ground	10 kΩ or higher
GIVB (H11–33) or GIVB (I10–3) – Body ground	10 kΩ or higher
GIWA (H11–32) or GIWA (I10–18) – Body ground	10 kΩ or higher
GIWB (H11–31) or GIWB (I10–19) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/266	DRIVE MOTOR "A" INVERTER PERFORMANCE

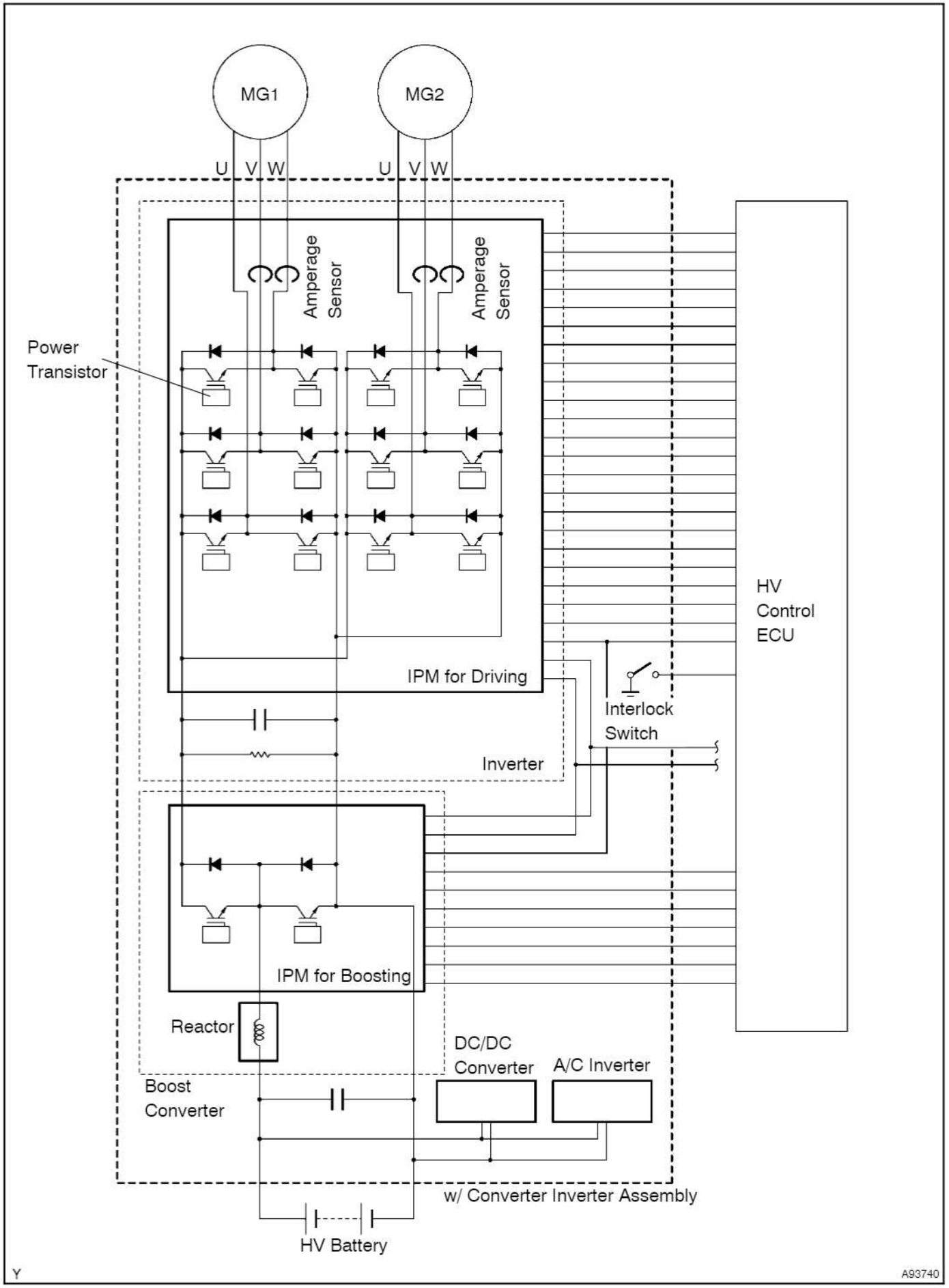
DTC	P0A78/267	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

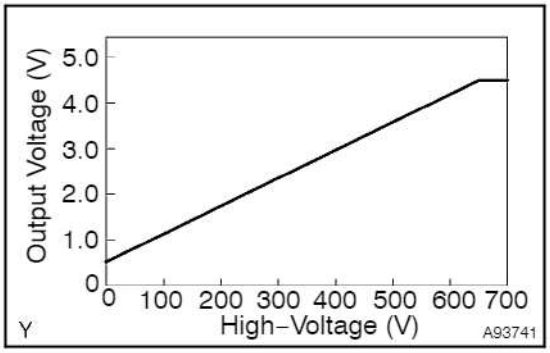
The inverter converts the high–voltage direct current of the HV battery and the alternating current for the MG1/MG2. The inverter contains a three–phase bridge circuit, which consists of six power transistors each for the MG1 and the MG2, in order to convert the direct current and the three–phase alternating current. The HV control ECU controls the actuation of the power transistors.

The inverter transmits information that is necessary for effecting control, such as the amperage and voltage, to the HV control ECU.

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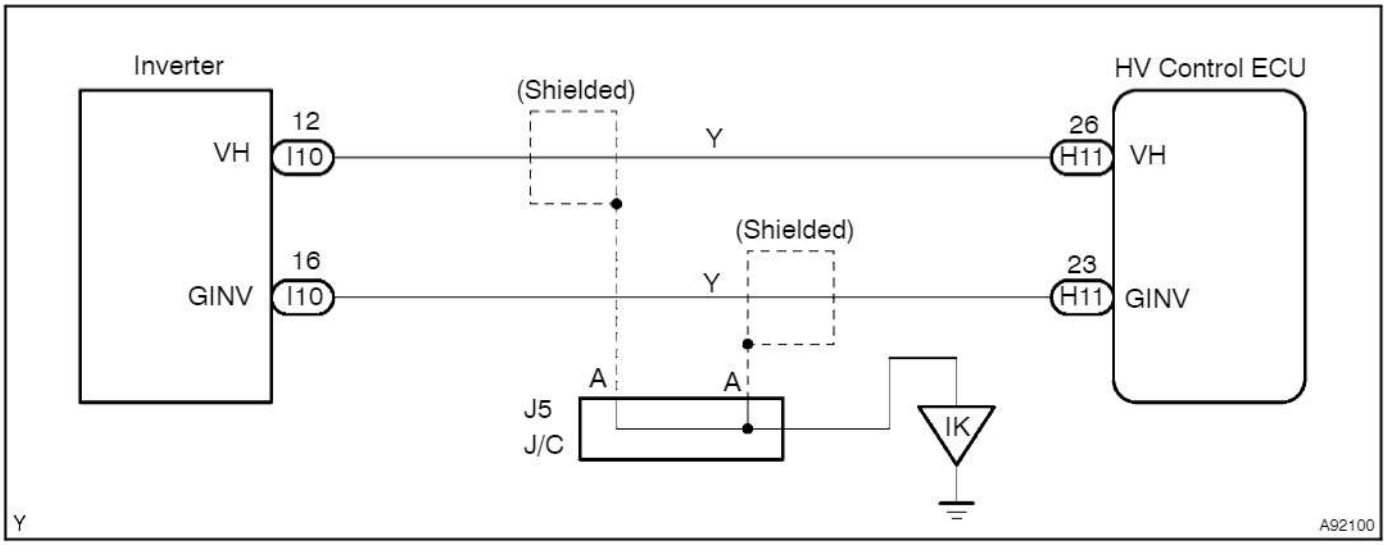
The HV control ECU uses a voltage sensor, which has been built into the inverter, to detect the high voltage after it is boosted and for boost control.
The inverter voltage sensor outputs a voltage that varies between 0 and 5 V in accordance with the changes in the high voltage. The higher the high voltage, the higher the output voltage, and the lower the high voltage, the lower the output voltage.
The HV control ECU monitors the inverter voltage and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	266	Open or GND short in inverter voltage (VH) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P0A78	267	+B short in inverter voltage (VH) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

HINT:
After confirming DTC P0A78 (INF 266 or 267), confirm VH–Voltage after Raise in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Voltage Displayed	Malfunction
765 V	+B short circuit
0 V	Open or GND short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A1D is output

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

2	READ VALUE OF INTELLIGENT TESTER II(VH–VOLTAGE AFTER RAISE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the VH–Voltage after Raise value on the intelligent tester II.
Result:

Voltage Displayed	Proceed to
765 V	A
0 V	B
1 to 764 V	C

HINT:
- If there is a +B short circuit, the intelligent tester II indicates 765 V.
- If there is an open or GND short circuit, the intelligent tester II indicates 0 V.

B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN WIRE HARNESS)

CAUTION:
Wear insulated gloves before performing the following operation.

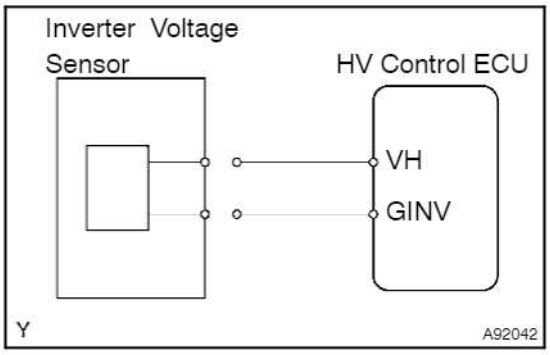
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

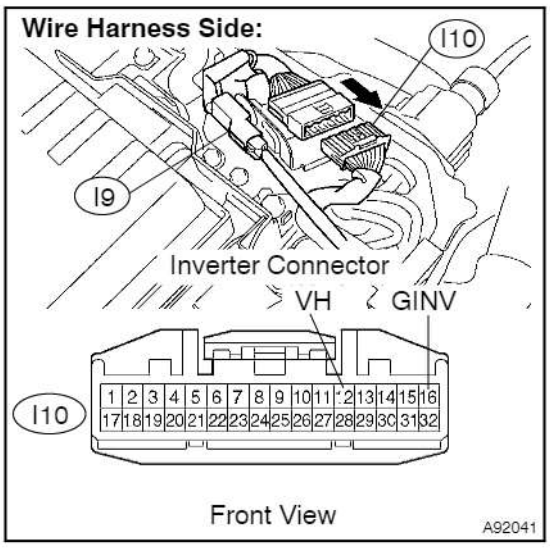
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the I10 inverter connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the VH–Voltage after Raise value on the intelligent tester II.
Standard: 0 V
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).





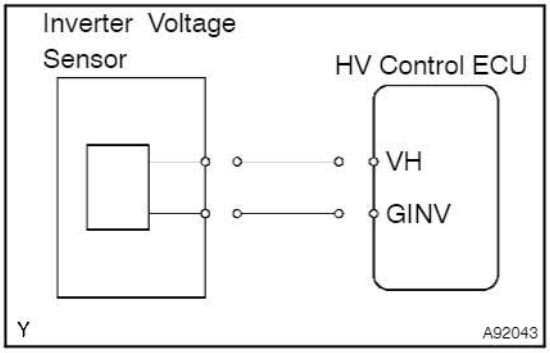
NG → **Go to step 4**

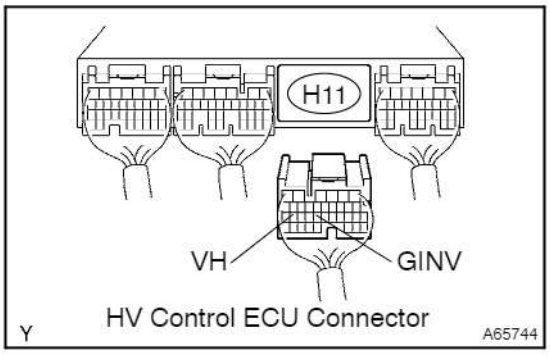
OK →

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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4	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H11 HV control ECU connector.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the VH–Voltage after Raise value on the intelligent tester II.

Standard: 0 V

(e) Reconnect the HV control ECU connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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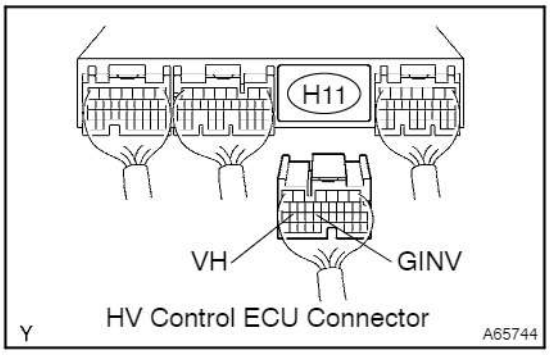
5	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the H11 HV control ECU connector.
(e) Disconnect the I10 inverter connector.
(f) Check the resistance between the wire harness side connectors.



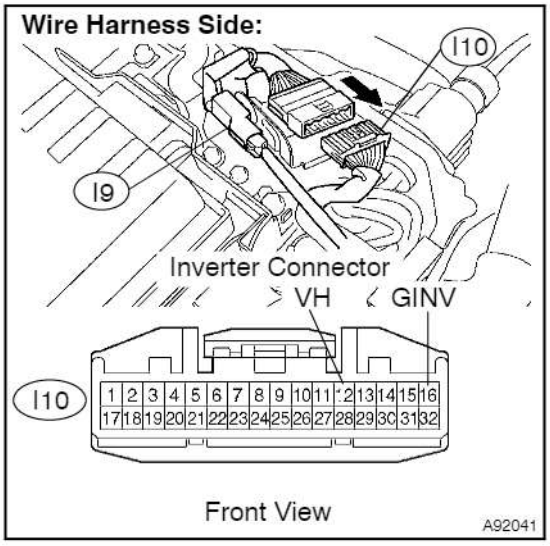
Standard (Check for open):

Tester Connection	Specified Condition
VH (H11–26) – VH (I10–12)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VH (H11–26) or VH (I10–12) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(g) Reconnect the inverter connector.
(h) Reconnect the HV control ECU connector.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

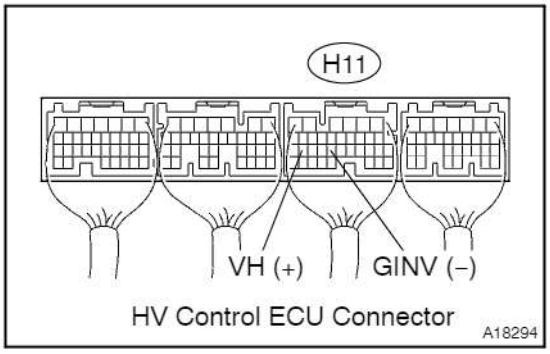


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6	INSPECT HYBRID VEHICLE CONTROL ECU(VH VOLTAGE)



(a) Turn the power switch ON (READY).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – GINV (H11–23)	1.6 to 3.8 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A78/272	DRIVE MOTOR "A" INVERTER PERFORMANCE

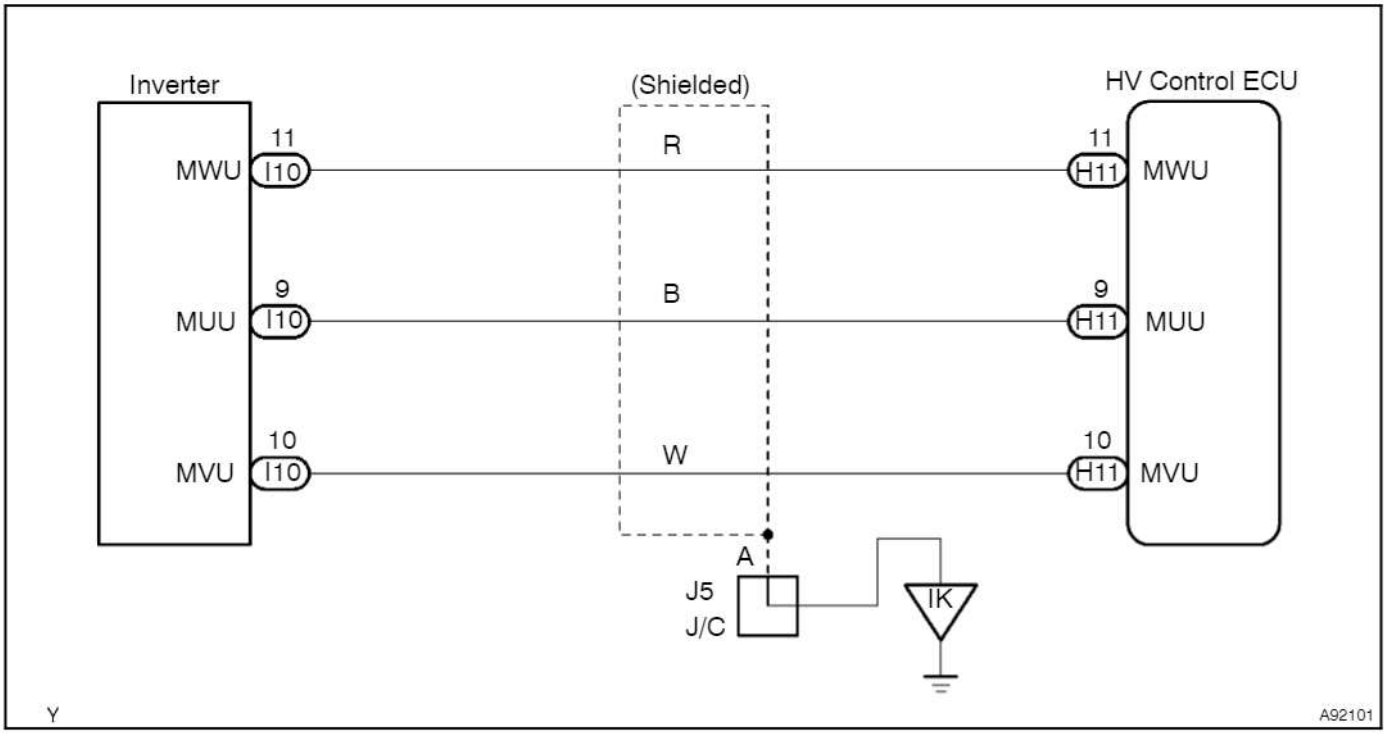
CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

The inverter switches the power transistors ON and OFF in accordance with power transistor actuation signals received from the HV control ECU, in order to change the direction of the current that flows through the MG1/MG2. Also, the inverter regulates the duration of the switching time through PWM (Pulse Width Modulation) control, in order to control the voltage that is applied to the MG1/MG2.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	272	Abnormality in motor PWM circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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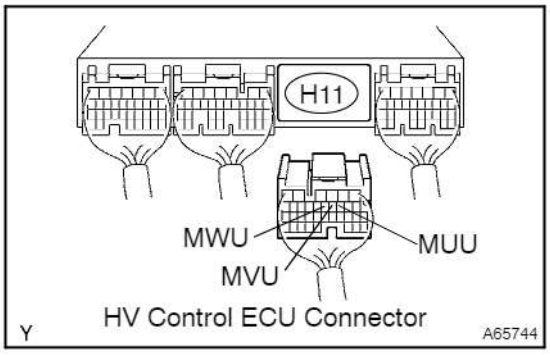
1	READ OUTPUT DTC(HYBRID CONTROL)

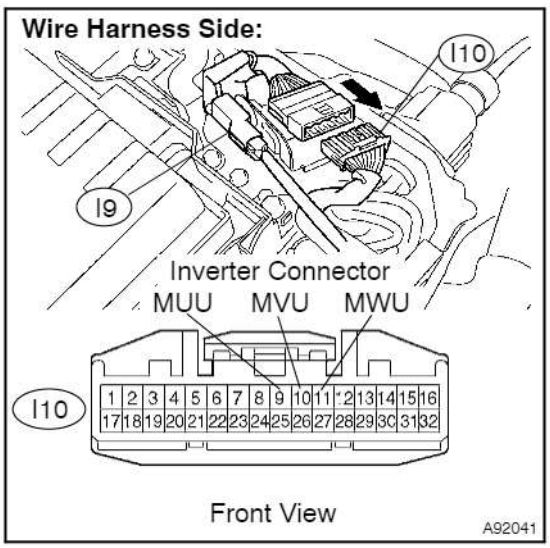
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A1D is output

YES → **GO TO RELEVANT DTC CHART** **(See page 05–268)**

NO

2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MUU (H11–9) – MUU (I10–9)	Below 1 Ω
MVU (H11–10) – MVU (I10–10)	Below 1 Ω
MWU (H11–11) – MWU (I10–11)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MUU (H11–9) or MUU (I10–9) – Body ground	10 kΩ or higher
MVU (H11–10) or MVU (I10–10) – Body ground	10 kΩ or higher
MWU (H11–11) or MWU (I10–11) – Body ground	10 kΩ or higher

(g) Reconnect the inverter connector.
(h) Reconnect the HV control ECU connector.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/278	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/280	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

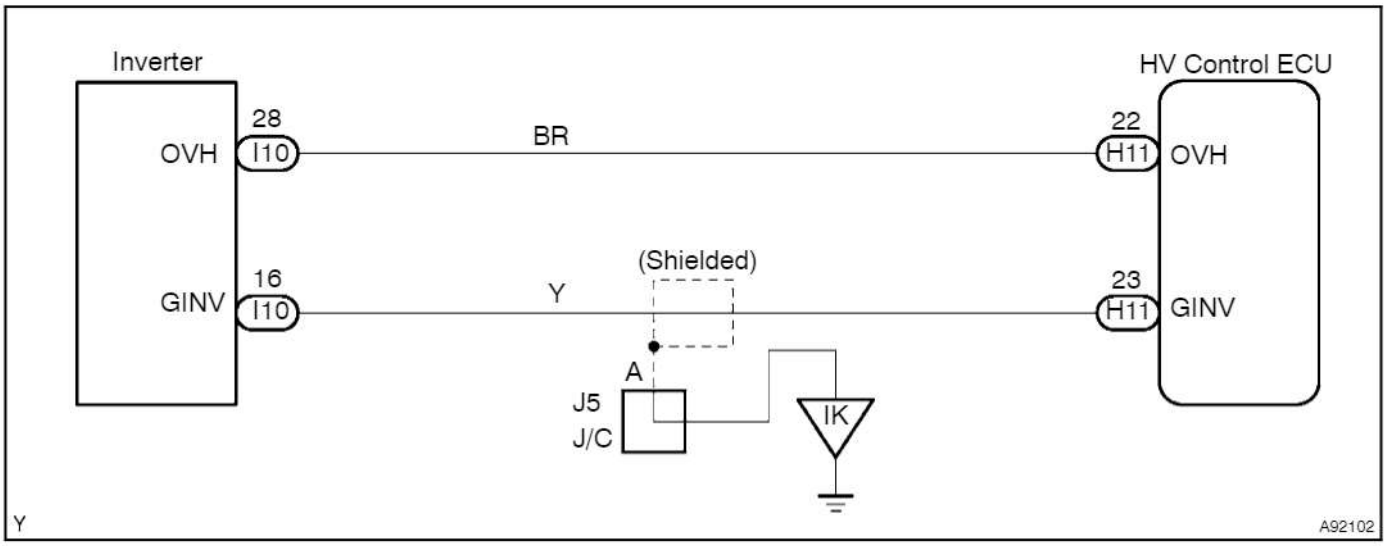
See the description of the inverter on page 05–365.

If the motor inverter detects a circuit malfunction or over–voltage, the inverter transmits this information to the OVH terminal of the HV control ECU via the motor inverter over–voltage signal line.

The HV control ECU monitors the motor inverter over–voltage signal line to detect the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	278	+B short in motor inverter over–voltage (OVH) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A78	280	Open or GND short in motor inverter over–voltage (OVH) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

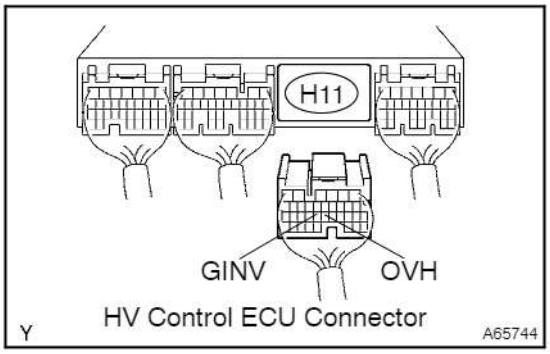
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

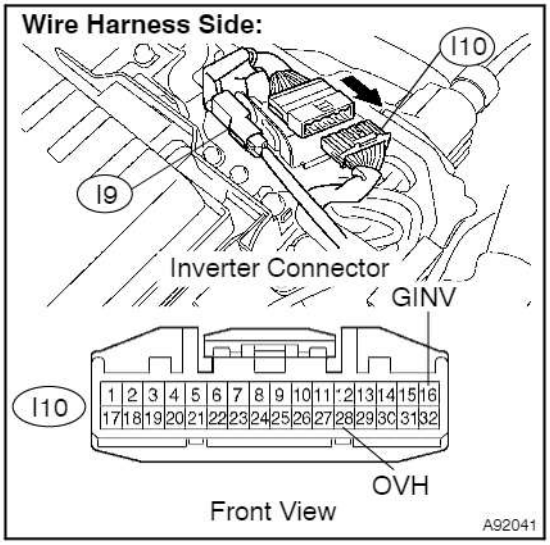
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
OVH (H11–22) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
OVH (H11–22) – OVH (I10–28)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
OVH (H11–22) or OVH (I10–28) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.

(k) Reconnect the HV control ECU connector.

(l) Reinstall the inverter cover (see page 21–25).

(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/279	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/503	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/504	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

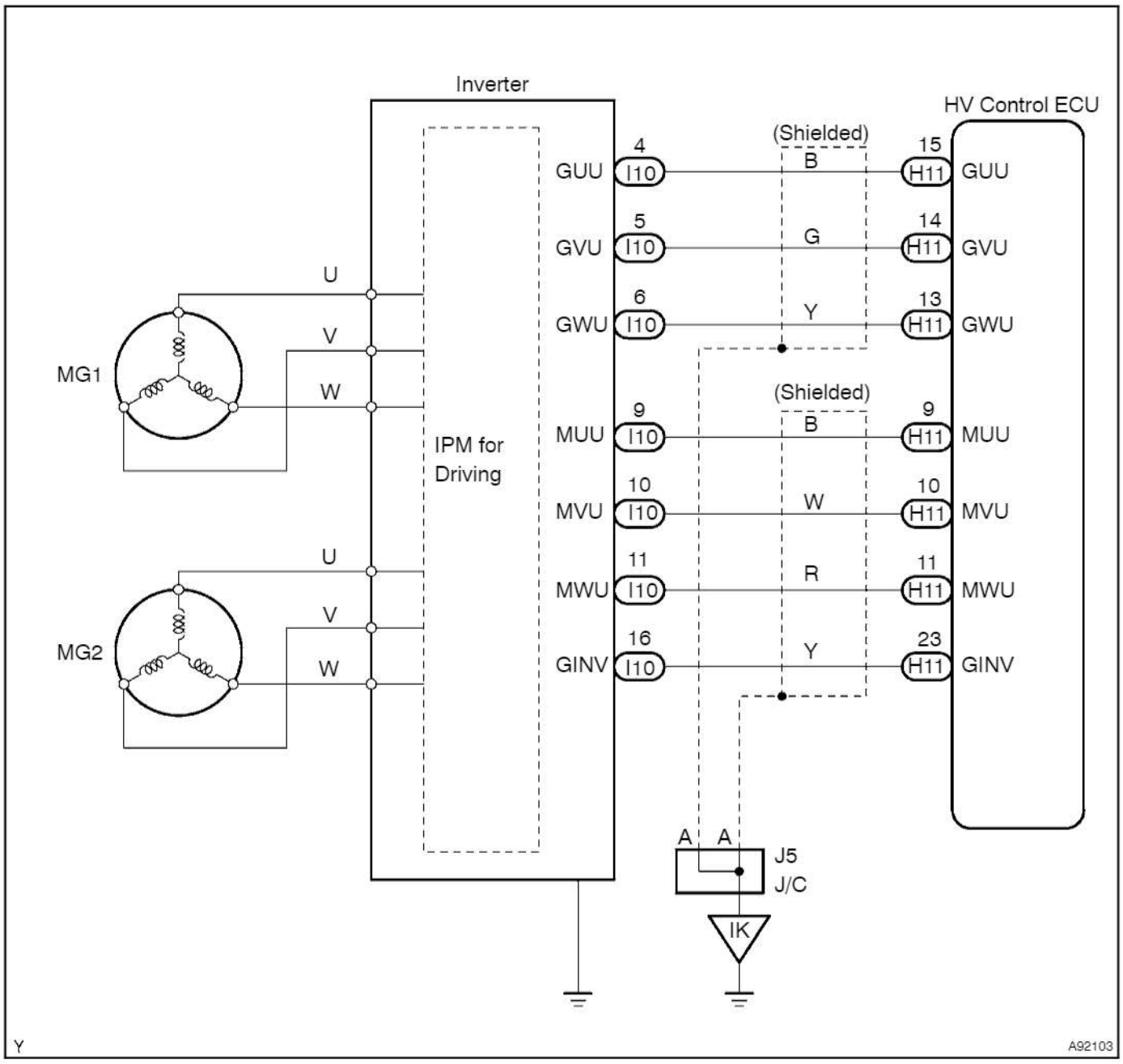
See the description of the inverter on page 05–365.

If the motor inverter detects a circuit malfunction or over–voltage, the inverter transmits this information to the OVH terminal of the HV control ECU via the motor inverter over–voltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	279	Motor inverter over–voltage (OVH) signal detection (over–voltage by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A78	503	Motor inverter over–voltage (OVH) signal detection (over–voltage by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A78	504	Motor inverter over–voltage (OVH) signal detection (over–voltage by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

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WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 3)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A78 to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 279, 503, or 504, and press the "Details" key.
(g) Read Exclusive Information 3.
Result: –32 to 32 (during driving without battery power)

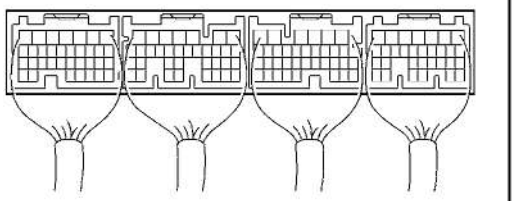
HINT:

If the value is inside the range shown above, DTCs other than P0A78 (INF 279, 503 and 504) have been detected as well. Perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

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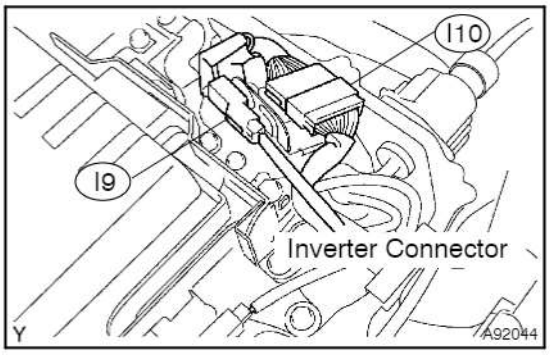
3	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

4	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both the service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A78 to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 279, 503, or 504, and press the "Details" key.
(g) Read Exclusive Information 4.
Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

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B → REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

C → REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

D → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

A

5 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both the service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTCs listed in the table below are output

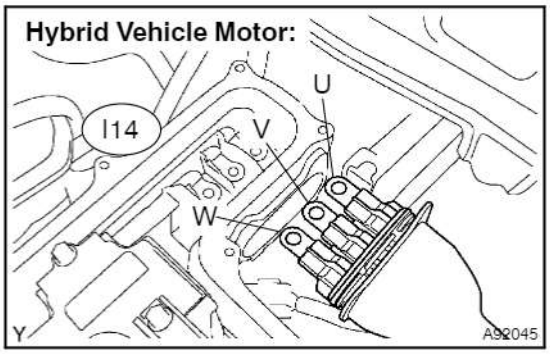
DTC No.	INF Code	Detection Item	See Page
P0A78	266	Drive Motor "A" Inverter Performance	05–365
P0A94	558 or 560	DC/DC Converter Malfunction	05–513
P0A94	588	DC/DC Converter Malfunction	05–529
P0A94	589	DC/DC Converter Malfunction	05–531
P0AA2	227	Hybrid Battery Positive Contactor Circuit Stuck Open	05–540
P0AA5	229	Hybrid Battery Negative Contactor Circuit Stuck Open	05–544
P3000	125	Battery Control System Malfunction	05–553
P3004	131	HIgh Voltage Power Resource Malfunction	05–557

YES → GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE

NO

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6 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

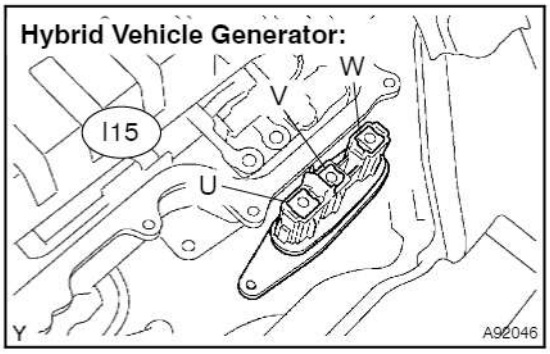
(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

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7 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.

(b) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(c) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(d) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(e) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(f) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

NG → **REPLACE HYBRID VEHICLE GENERATOR ASSY**

OK

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8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

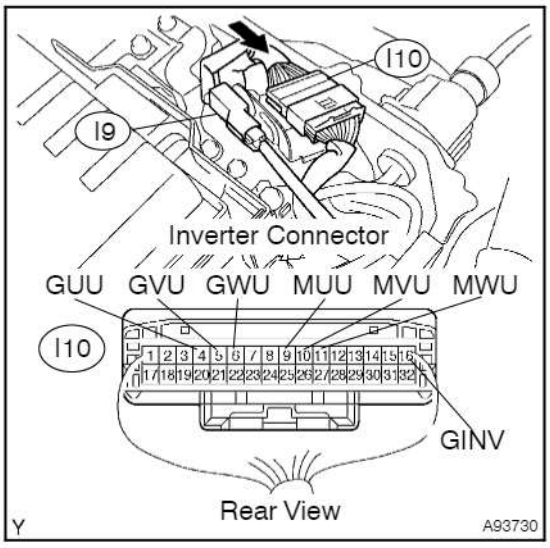
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



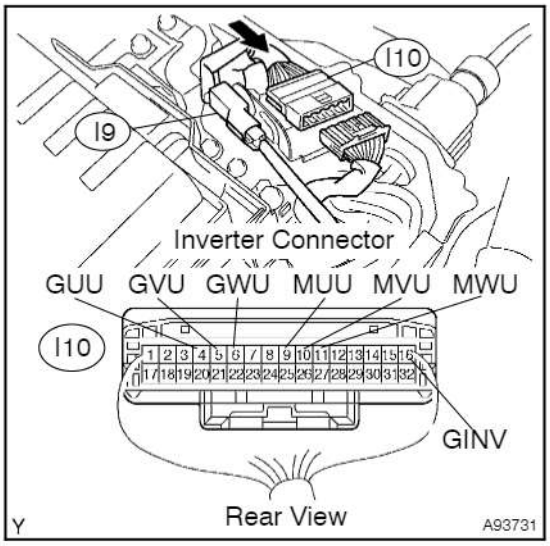
NG → **Go to step 9**

OK

REPLACE HYBRID VEHICLE CONTROL ECU AND W/CONVERTER INVERTER ASSY
(See page 21–128 and 21–25)

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9	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A78/282	DRIVE MOTOR "A" INVERTER PERFORMANCE

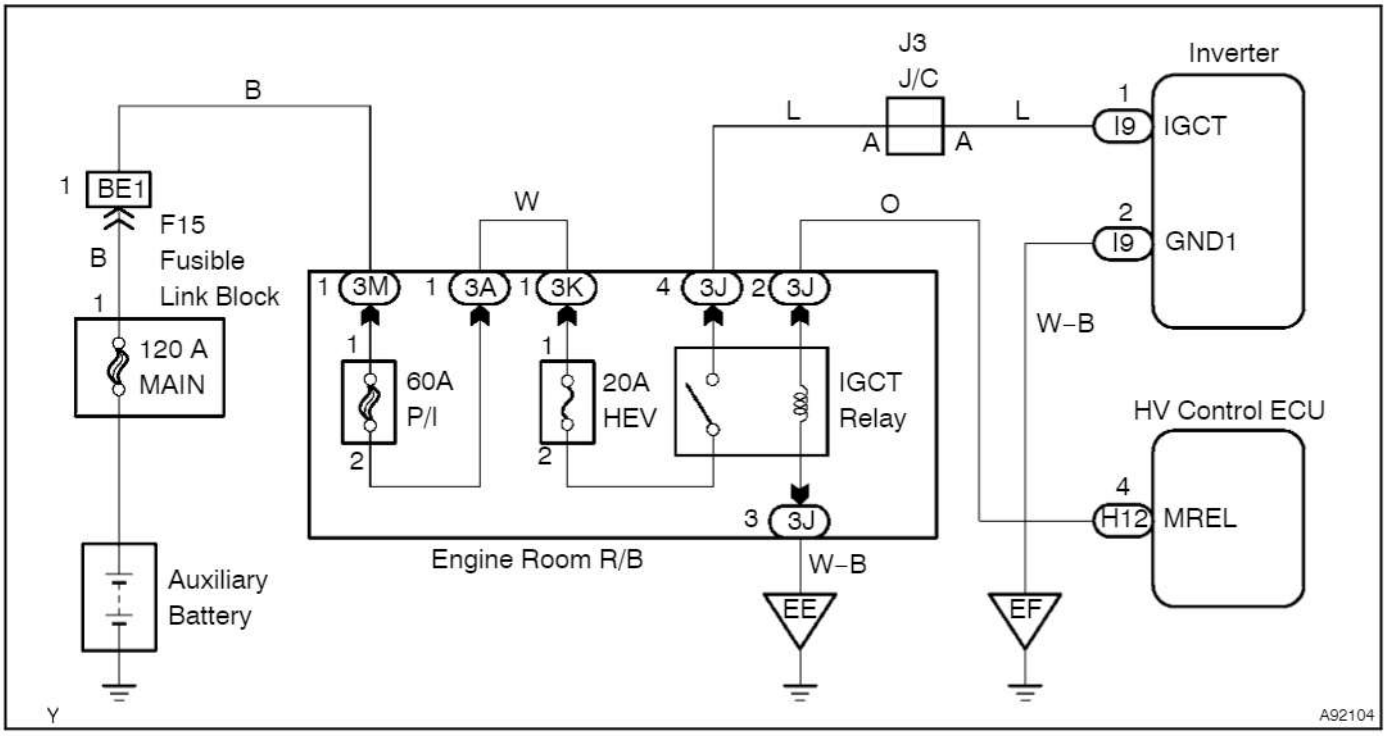
CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the motor inverter detects a circuit malfunction or over–voltage, the inverter transmits this information to the OVH terminal of the HV control ECU via the motor inverter over–voltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	282	Motor inverter over voltage (OVH) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC listed in table below is output

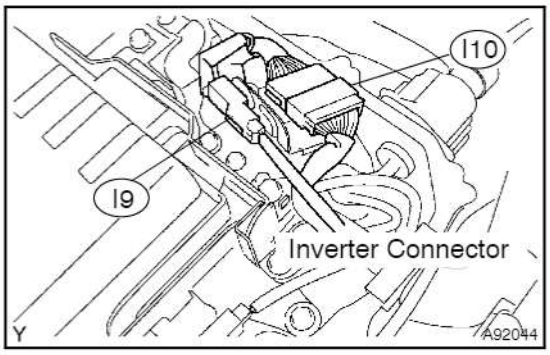
DTC No.	INF Code	Detection Item	See Page
P0A78	278 or 280	Drive Motor "A" Inverter performance	05–376

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → **CONNECT SECURELY**

OK

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3	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTCs P0A78 (INF 282, 286) and P0A7A (INF 324) (inverter circuit malfunction) are output

NO	REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

YES

4	INSPECT W/CONVERTER INVERTER ASSY(IGCT VOLTAGE)

CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Turn the power switch ON (IG).

HINT:

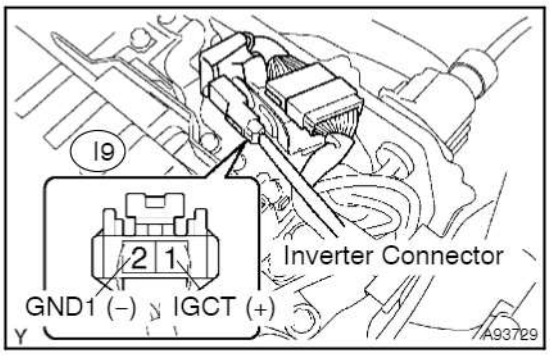
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the inverter connector.

Standard:

Tester Connection	Specified Condition
IGCT (I9–1) – GND1 (I9–2)	8 V or more

(f) Turn the power switch OFF.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/283	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/285	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

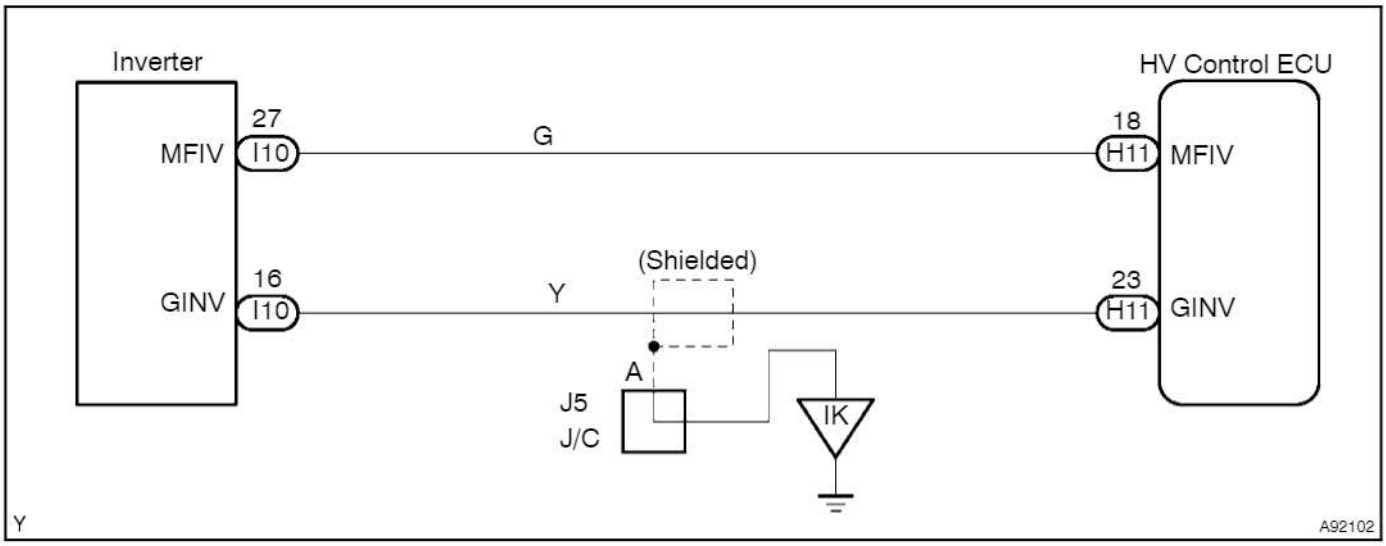
See the description of the inverter on page 05–365.

If the motor inverter has a circuit malfunction, internal short, or overheats, the inverter transmits this information to the MFIV terminal of the HV control ECU via the motor inverter fail signal line.

The HV control ECU monitors the motor inverter fail signal line and detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	283	+B short in motor inverter fail (MFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A78	285	Open or GND short in motor inverter fail (MFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

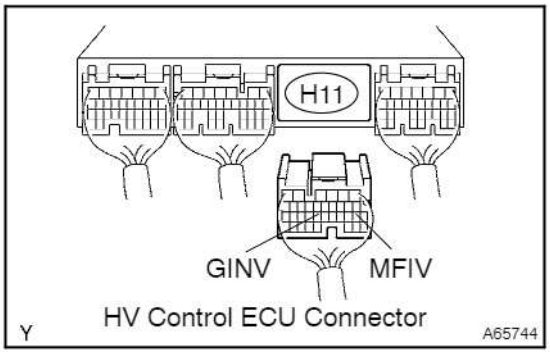
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

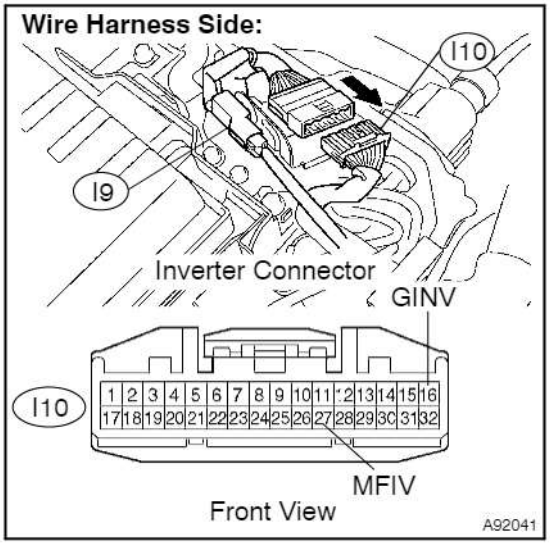
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MFIV (H11–18) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MFIV (H11–18) – MFIV (I10–27)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MFIV (H11–18) or MFIV (I10–27) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.

(k) Reconnect the HV control ECU connector.

(l) Reinstall the inverter cover (see page 21–25).

(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/284	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the motor inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the MFIV terminal of the HV control ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	284	Motor inverter fail (MFIV) signal detection (inverter overheating)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2 CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.
OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

3 CHECK COOLANT HOSE

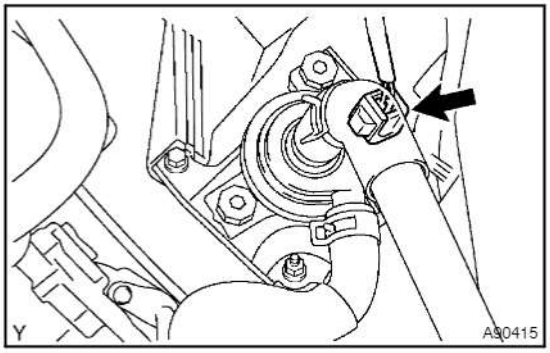
(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).
OK: The hoses of the cooling system are not bent or clogged

NG → **CORRECT TO NORMAL CONDITION**

OK

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4	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

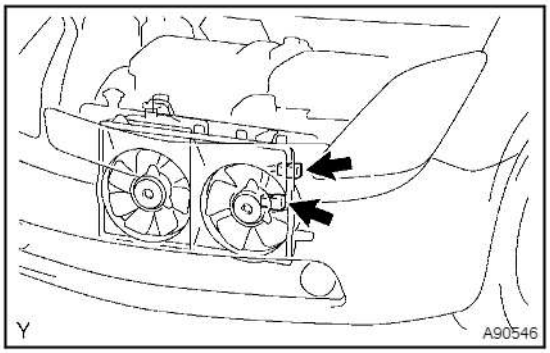
5	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

6	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

7	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

OK

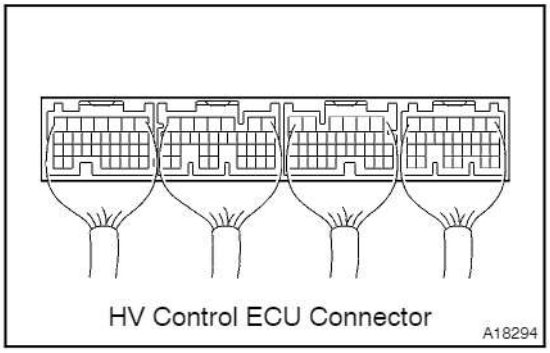
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8	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

9	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)



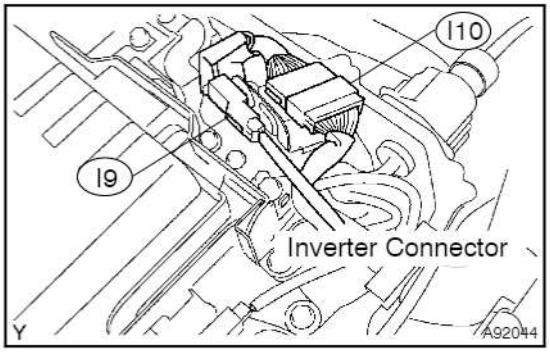
(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

10	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

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11	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A78 to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 284 and press the "Details" key.
(g) Read Exclusive Information 4.

Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

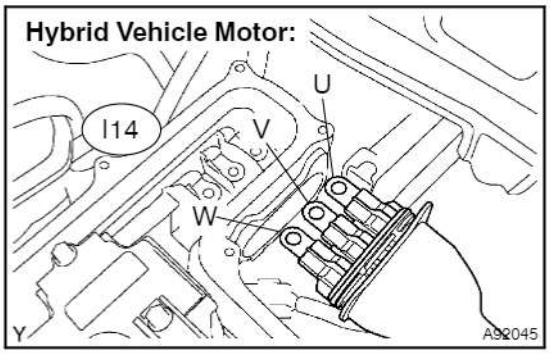
C → **REPLACE W/CONVERTER INVERTER ASSY** (See page 21–25)

D → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY** (See page 22–11)

A

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12 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

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13	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

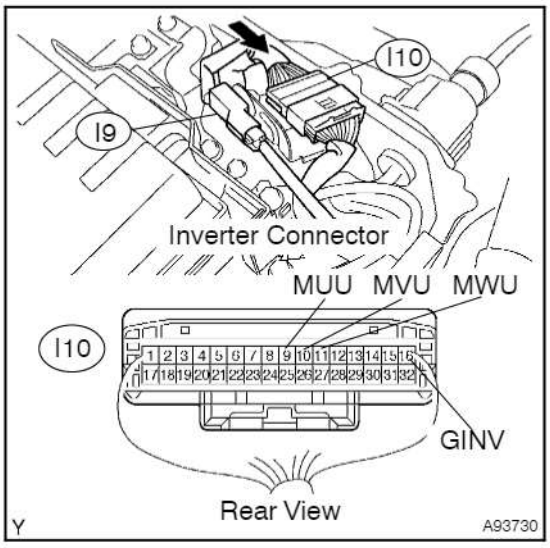
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



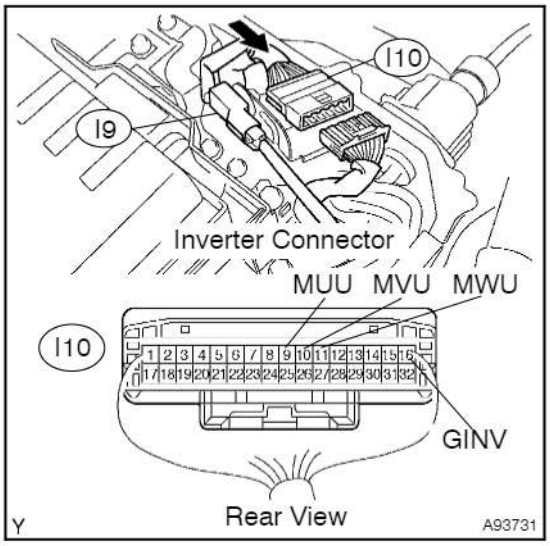
NG → **Go to step 14**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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14	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A78/286	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the motor inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the MFIV terminal of the HV control ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	286	Motor inverter fail (MFIV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) on page 05–387.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC listed in the table below is output

DTC No.	INF Code	Detection Item	See Page
P0A78	283 or 285	Drive Motor "A" Inverter performance	05–390

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

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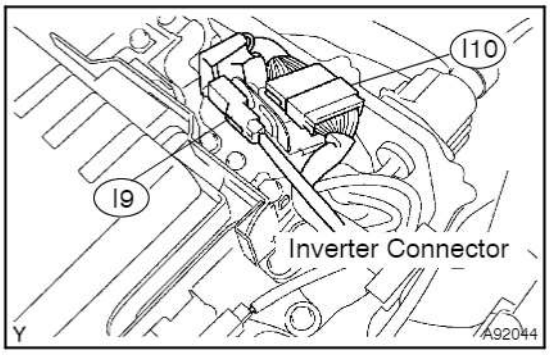
2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

3	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs P0A78 (INF 282, 286) and P0A7A (INF 324) (inverter circuit malfunction) are output

NO → REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

YES

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4	INSPECT W/CONVERTER INVERTER ASSY(IGCT VOLTAGE)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Turn the power switch ON (IG).

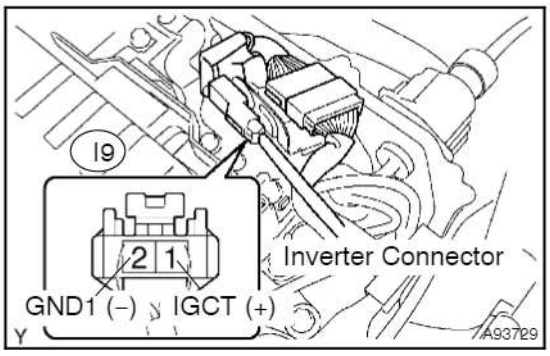
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the inverter connector.

Standard:

Tester Connection	Specified Condition
IGCT (I9–1) – GND1 (I9–2)	8 V or more

(f) Turn the power switch OFF.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/287	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/505	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/506	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the motor inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the MFIV terminal of the HV control ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	287	Motor inverter fail (MFIV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly
P0A78	505	Motor inverter fail (MFIV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly
P0A78	506	Motor inverter fail (MFIV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	READ OUTPUT DTC(HYBRID CONTROL)

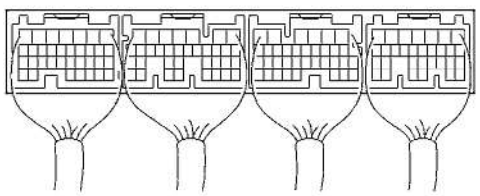
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

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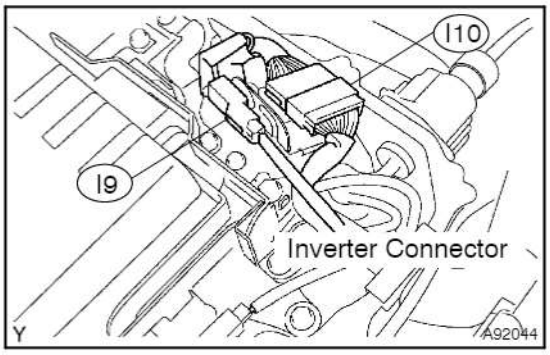
3	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.



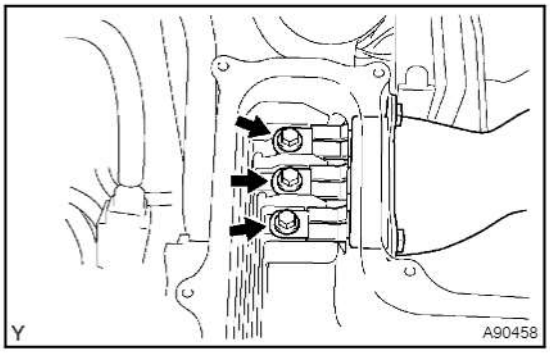
NG → CONNECT SECURELY

OK

4	CHECK HYBRID VEHICLE MOTOR ASSY

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Check if the three–phase alternating current cable installation bolts on the hybrid vehicle motor are tightened to the specified torque.
Standard: 8.0 N·m (82 kgf·cm 71in.·lbf)
(c) Reinstall the inverter cover (see page 21–25).
(d) Reinstall the service plug grip (see page 21–120).



NG → TIGHTEN THEM TO SPECIFIED TORQUE

OK

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5	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A78 to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 287, 505, or 506 and press the "Details" key.
(g) Read Exclusive Information 4.

Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

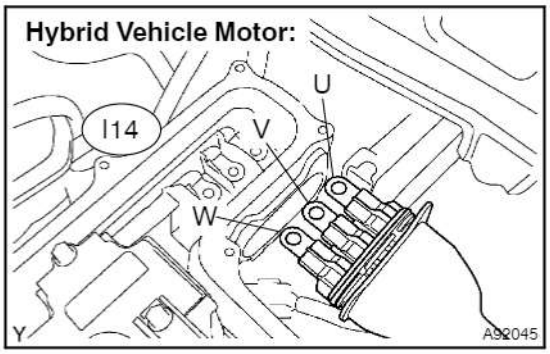
C → **REPLACE W/CONVERTER INVERTER ASSY** (See page 21–25)

D → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY** (See page 22–11)

A

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6 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

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7	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

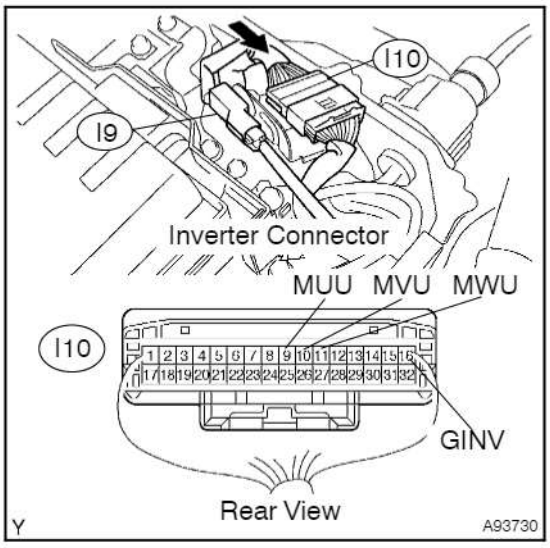
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



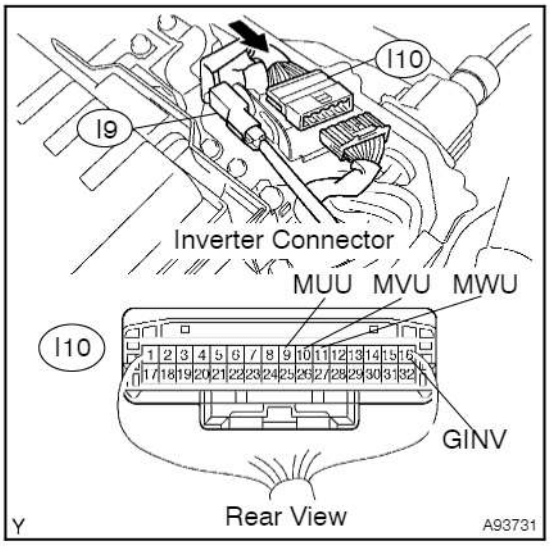
NG → **Go to step 8**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A78/304	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/305	DRIVE MOTOR "A" INVERTER PERFORMANCE

DTC	P0A78/507	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

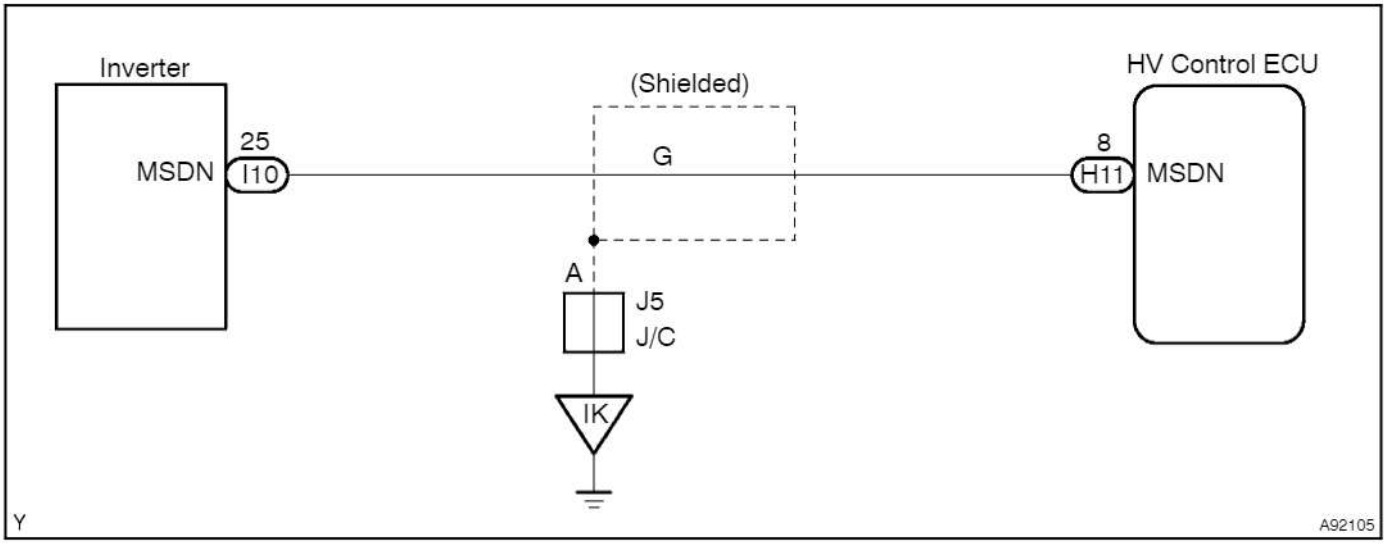
See the description of the inverter on page 05–365.

Upon receiving a motor gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG2 by turning OFF the power transistors that are actuating the MG2.

The HV control ECU monitors the motor gate shutdown signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	304	Open or +B short in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A78	305	GND short in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A78	507	Open in motor gate shutdown (MSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

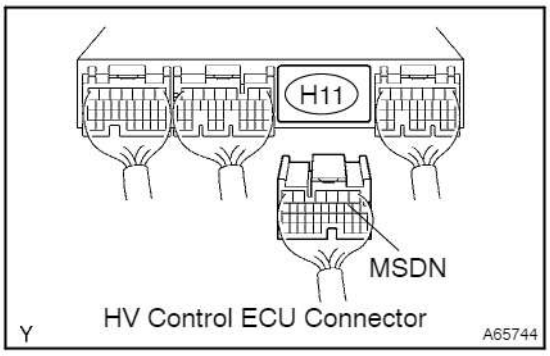
CAUTION:

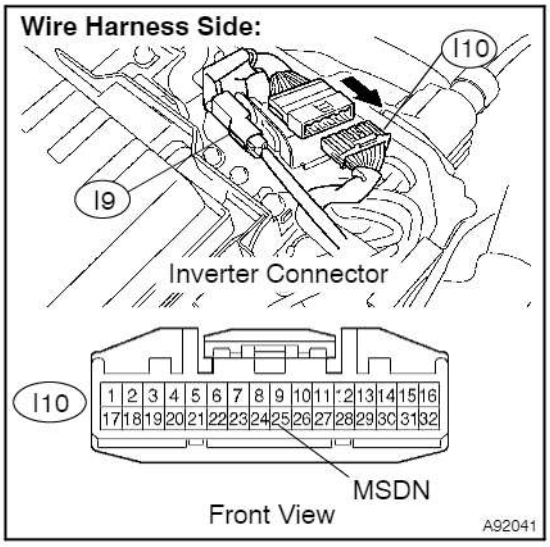
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

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HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MSDN (H11–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MSDN (H11–8) – MSDN (I10–25)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MSDN (H11–8) or MSDN (I10–25) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/306	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

The HV control ECU controls MG2 torque in accordance with the driving condition.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	306	Failure in monitoring MG2 torque performance	• Hybrid vehicle motor • w/ converter inverter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A78 (INF 306) and other DTCs are output

HINT:

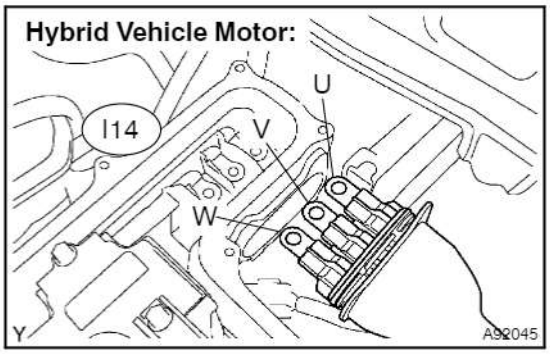
If any other codes besides P0A78 (INF 306) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

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NG → REPLACE HYBRID VEHICLE MOTOR ASSY

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/308	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

The HV control ECU receives a collision signal from the airbag ECU and the circuit breaker sensor No. 1 to determine that the vehicle has been damaged. Then, it cuts off the high–voltage system to ensure safety. If the HV control ECU receives the collision signal only from the airbag ECU, it turns OFF the system main relay and the power switch. If the HV control ECU receives the collision signal only from the circuit breaker sensor No. 1, it turns only the system main relay OFF.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	308	Collision signal input from airbag ECU or circuit breaker sensor No. 1	• Supplemental restraint system • Circuit breaker sensor No. 1

INSPECTION PROCEDURE

1	CHECK VEHICLE FOR ANY DAMAGE

(a) Check the vehicle for any damage.
Result: The vehicle is damaged.

YES → **REPAIR VEHICLE**

NO

2	GO TO SUPPLEMENTAL RESTRAINT SYSTEM (See page 05–1159)

(a) Troubleshoot the airbag system.
Result: There is malfunction in the airbag system.

NO → **REPLACE CIRCUIT BREAKER SENSOR NO.1**

YES

REPAIR MALFUNCTION PARTS AND COMPONENTS

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DTC	P0A78/508	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.
Upon receiving a motor gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG2 by turning OFF the power transistors that are actuating the MG2.
The HV control ECU monitors the motor gate shutdown signal and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	508	Motor gate shutdown (MSDN) signal malfunction	• Wire harness or connector • HV control ECU

WIRING DIAGRAM

Refer to DTC P0A78 (INF 304) on page 05–410.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A78 (INF 508) and other DTCs are output

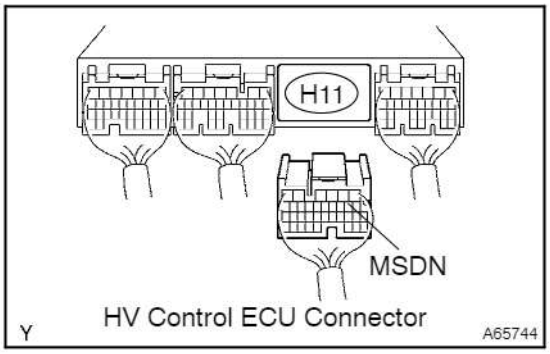
HINT:
If any other codes besides P0A78 (INF 508) are output, perform troubleshooting for those DTCs first.

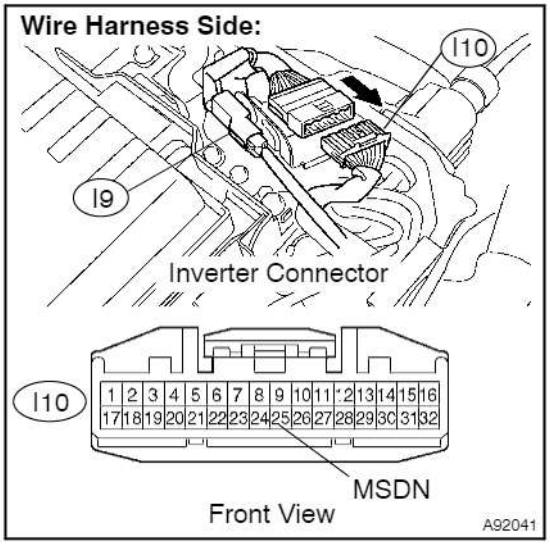
YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the H11 HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MSDN (H11–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MSDN (H11–8) – MSDN (I10–25)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MSDN (H11–8) or MSDN (I10–25) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A78/510	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.
Upon receiving a motor gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG2 by turning OFF the power transistors that are actuating the MG2.
The HV control ECU monitors the motor inverter gate and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	510	Motor inverter gate malfunction	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 304) on page 05–410.

INSPECTION PROCEDURE

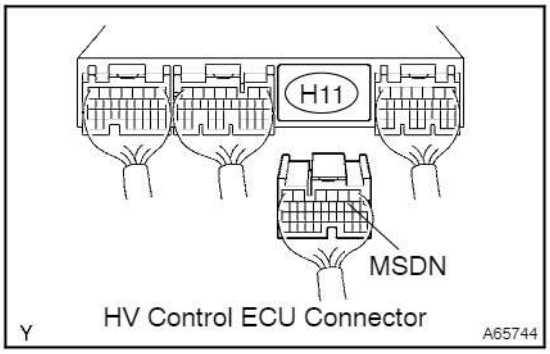
CAUTION:

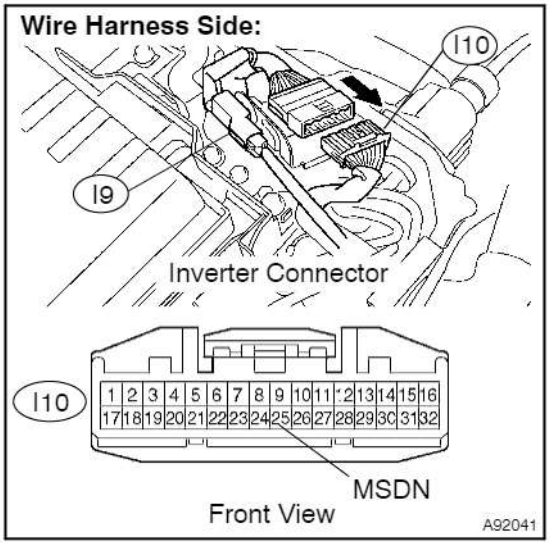
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the H11 HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
MSDN (H11–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MSDN (H11–8) – MSDN (I10–25)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MSDN (H11–8) or MSDN (I10–25) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/523	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A78 (INF 266) on page 05–365.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	523	Inverter voltage (VH) sensor offset malfunction	• System main relay • w/ converter inverter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A78 (INF 523) and other DTCs are output

HINT:

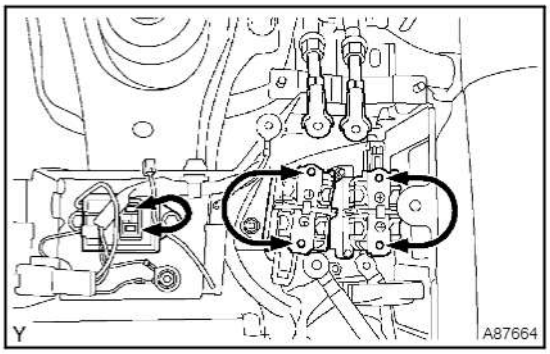
If any other codes besides P0A78 (INF 523) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK SYSTEM MAIN RELAYS FOR STICKING



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect all the high–voltage terminals of the system main relays.
(d) Check the resistance at the switch side of the system main relays.
Standard: 10 kΩ or higher
(e) Connect the high–voltage terminals of the system main relays.
(f) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE STUCK SYSTEM MAIN RELAY**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A78/586	DRIVE MOTOR "A" INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A78 (INF 266) on page 05–365.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	586	Inverter voltage (VH) sensor performance problem	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 266) on page 05–365.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A78 (INF 586) and other DTCs are output

HINT:

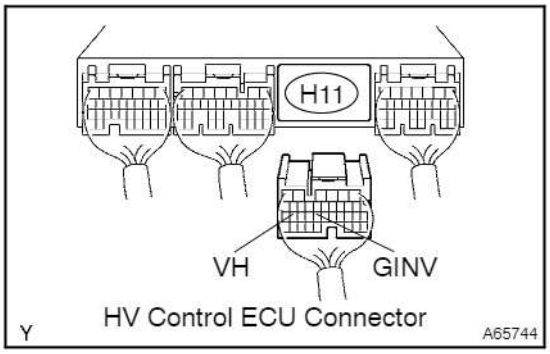
If any other codes besides P0A78 (INF 586) are output, perform troubleshooting for those DTCs first.

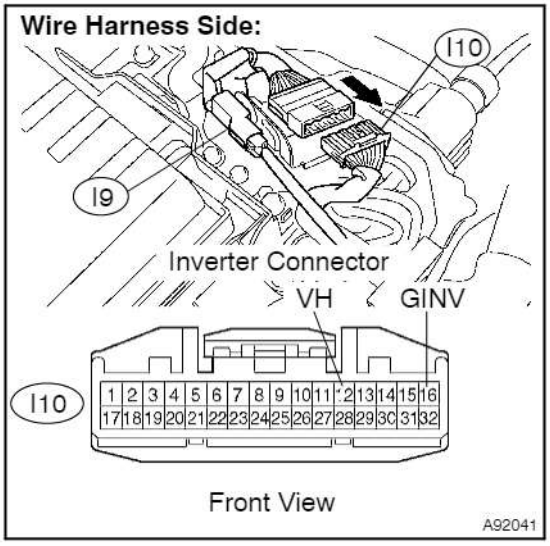
YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VH (H11–26) – VH (I10–12)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VH (H11–26) or VH (I10–12) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.

(k) Reconnect the HV control ECU connector.

(l) Reinstall the inverter cover (see page 21–25).

(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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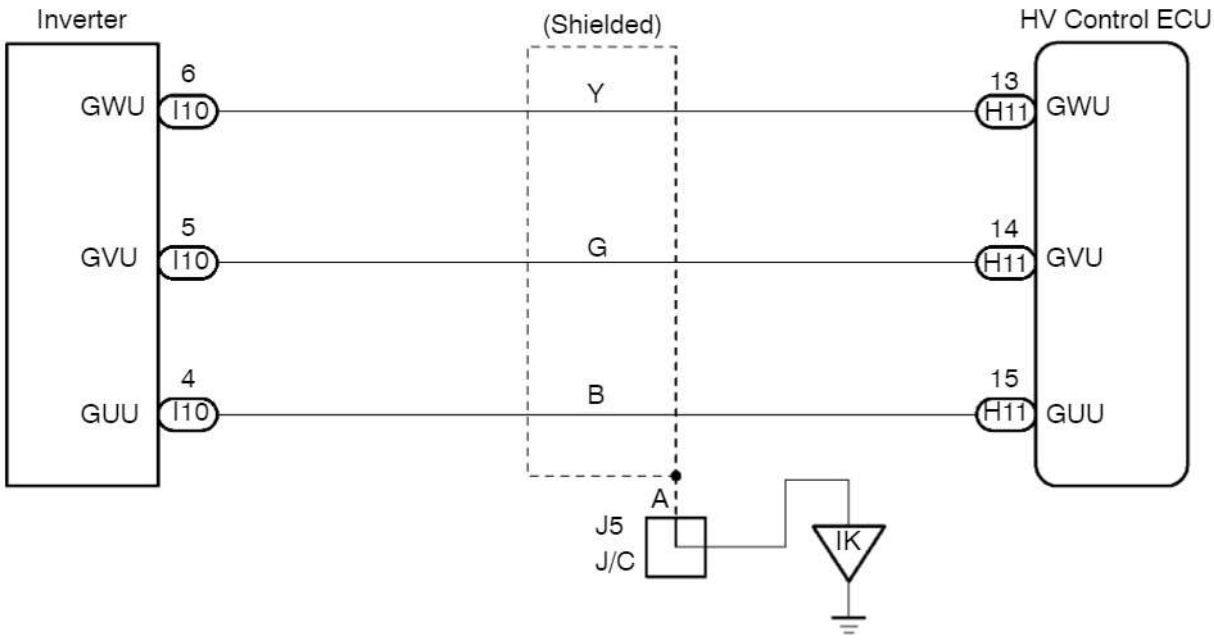
DTC P0A7A/309 GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A78 (INF 272) on page 05–373.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	309	Abnormality in generator PWM circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

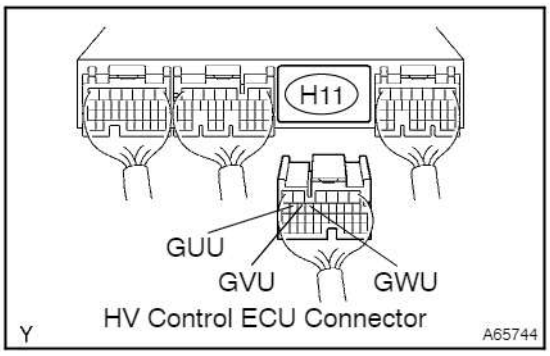
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A1D is output

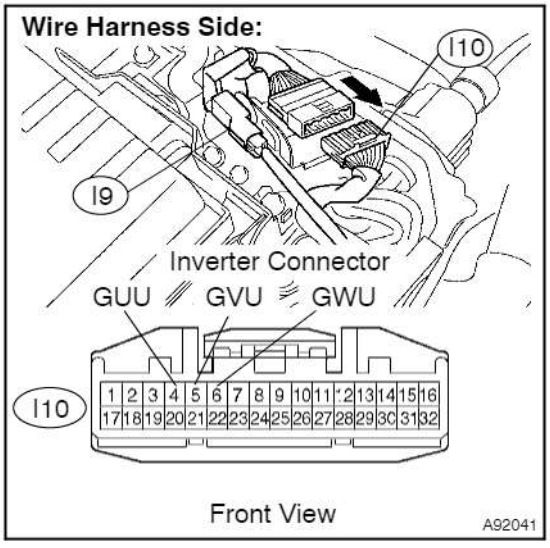
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YES	GO TO RELEVANT DTC CHART (See page 05–268)

NO

2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

(d) Disconnect the H11 HV control ECU connector.

(e) Disconnect the I10 inverter connector.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GUU (H11–15) – GUU (I10–4)	Below 1 Ω
GVU (H11–14) – GVU (I10–5)	Below 1 Ω
GWU (H11–13) – GWU (I10–6)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GUU (H11–15) or GUU (I10–4) – Body ground	10 kΩ or higher
GVU (H11–14) or GVU (I10–5) – Body ground	10 kΩ or higher
GWU (H11–13) or GWU (I10–6) – Body ground	10 kΩ or higher

(g) Reconnect the inverter connector.

(h) Reconnect the HV control ECU connector.

(i) Reinstall the inverter cover (see page 21–25).

(j) Reinstall the service plug grip (see page 21–120).

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A7A/321	GENERATOR INVERTER PERFORMANCE

DTC	P0A7A/323	GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

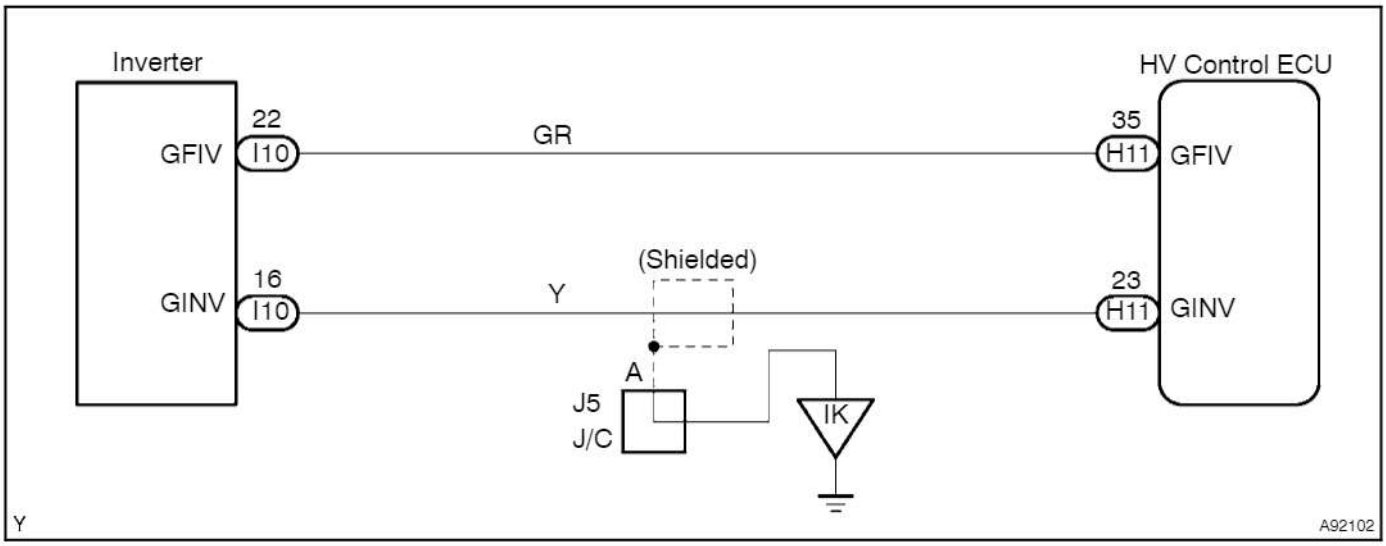
See the description of the inverter on page 05–365.

If the generator inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the GFIV terminal of the HV control ECU via the generator inverter fail signal line.

The HV control ECU monitors the generator inverter fail signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	321	+B short in generator inverter fail (GFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A7A	323	Open or GND short in generator inverter fail (GFIV) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

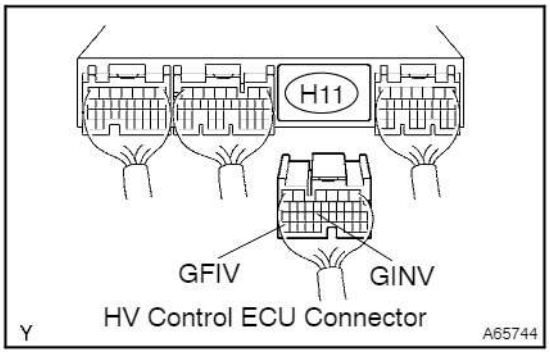
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

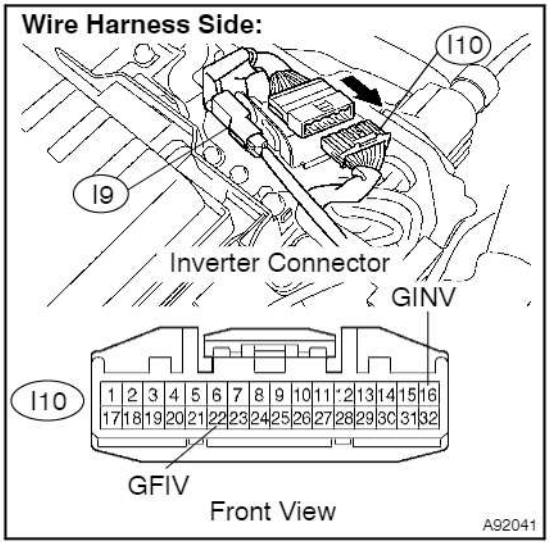
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GFIV (H11–35) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GFIV (H11–35) – GFIV (I10–22)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GFIV (H11–35) or GFIV (I10–22) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.

(k) Reconnect the HV control ECU connector.

(l) Reinstall the inverter cover (see page 21–25).

(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A7A/322 GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the generator inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the GFIV terminal of HV control ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	322	Generator inverter fail (GFIV) signal detection (inverter overheating)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2 CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.
OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

3 CHECK COOLANT HOSE

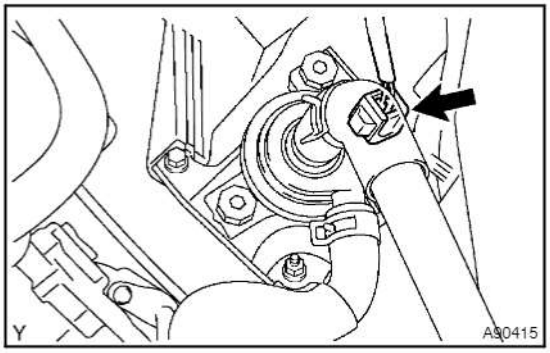
(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).
OK: The hoses of the cooling system are not bent or clogged

NG → **CORRECT TO NORMAL CONDITION**

OK

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4	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

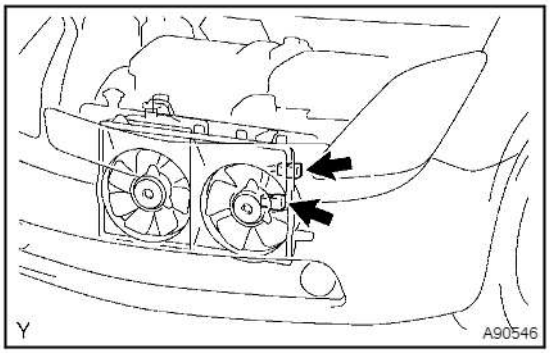
5	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

6	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

7	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

OK

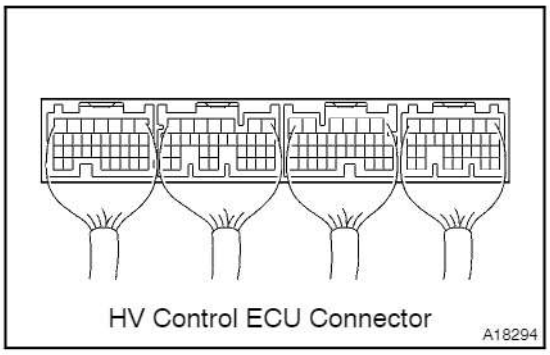
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8	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

9	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)



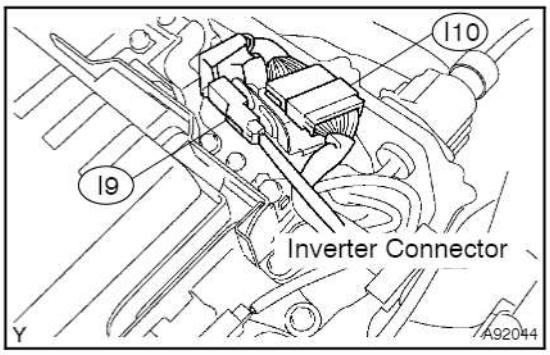
(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

10	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

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11	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A7A to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 322 and press the "Details" key.
(g) Read Exclusive Information 4.

Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

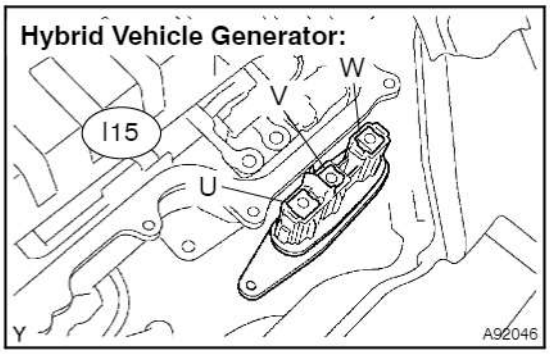
C → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

D → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)**

A

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12 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

(d) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

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NG	REPLACE HYBRID VEHICLE GENERATOR ASSY

OK

13	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

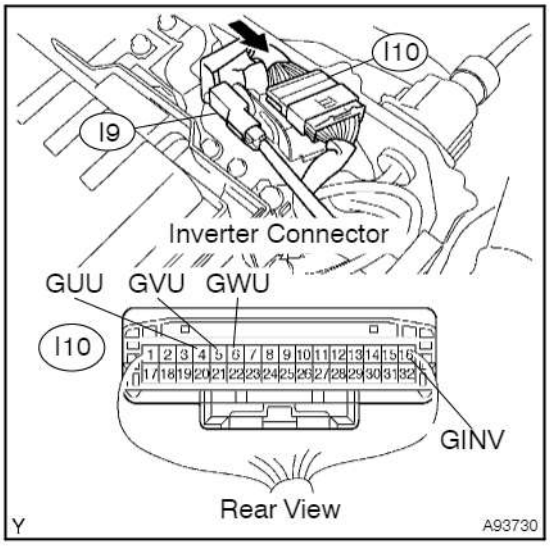
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



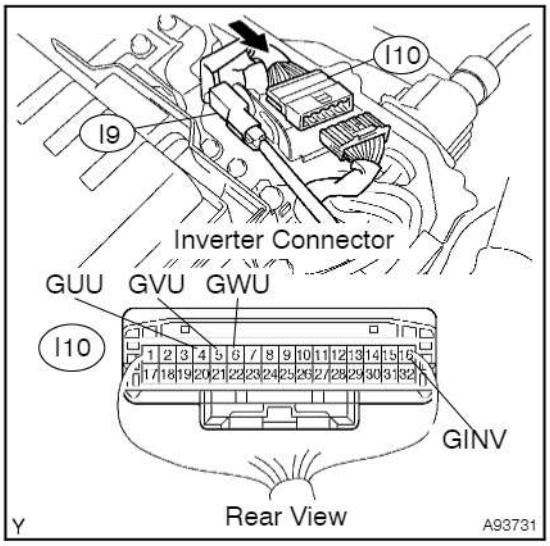
NG	Go to step 14

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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14	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC P0A7A/324 GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the generator inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the GFIV terminal of HV control ECU via generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	324	Generator inverter fail (GFIV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) on page 05–387.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC listed in the table below is output

DTC No.	INF Code	Detection Item	See Page
P0A7A	321 or 323	Generator Inverter Performance	05–426

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

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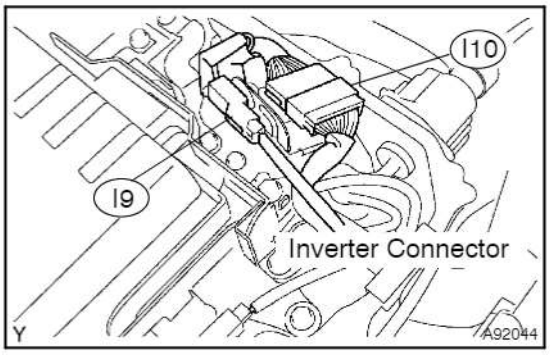
2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

3	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs P0A78 (INF 282, 286) and P0A7A (INF 324) (inverter circuit malfunction) are output

NO → REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

YES

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4	INSPECT W/CONVERTER INVERTER ASSY(IGCT VOLTAGE)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Turn the power switch ON (IG).

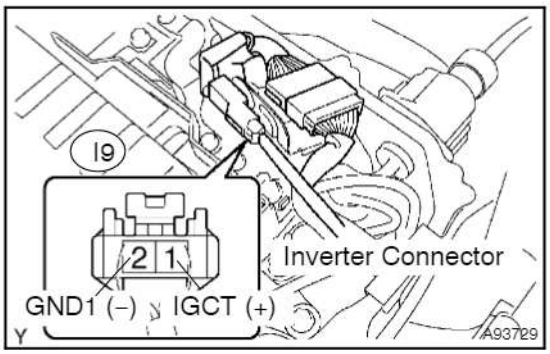
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the inverter connector.

Standard:

Tester Connection	Specified Condition
IGCT (I9–1) – GND1 (I9–2)	8 V or more

(f) Turn the power switch OFF.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A7A/325	GENERATOR INVERTER PERFORMANCE

DTC	P0A7A/517	GENERATOR INVERTER PERFORMANCE

DTC	P0A7A/518	GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

If the generator inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the GFIV terminal of HV control ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	325	Generator inverter fail (GFIV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A7A	517	Generator inverter fail (GFIV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A7A	518	Generator inverter fail (GFIV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	READ OUTPUT DTC(HYBRID CONTROL)

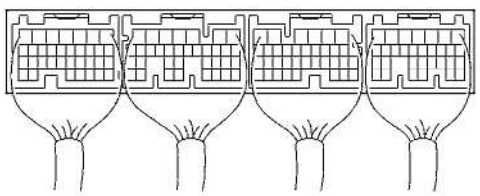
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

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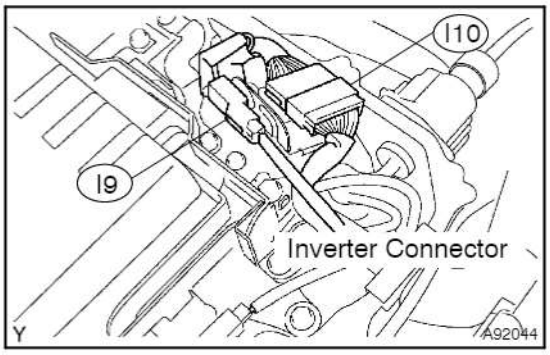
3	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.



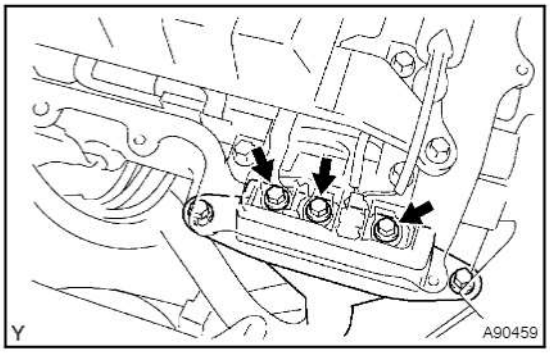
NG → CONNECT SECURELY

OK

4	CHECK HYBRID VEHICLE GENERATOR ASSY

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Check if the three–phase alternating current cable installation bolts on the hybrid vehicle generator are tightened to the specified torque.
Standard: 8.0 N·m (82 kgf·cm 71in.·lbf)
(c) Reinstall the inverter cover (see page 21–25).
(d) Reinstall the service plug grip (see page 21–120).



NG → TIGHTEN THEM TO SPECIFIED TORQUE

OK

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5	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A7A to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 325, 517, or 518 and press the "Details" key.
(g) Read Exclusive Information 4.

Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

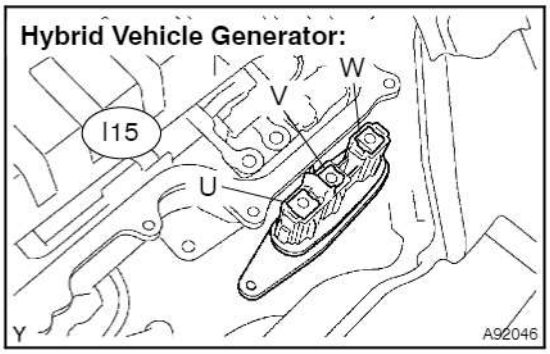
C → **REPLACE W/CONVERTER INVERTER ASSY** (See page 21–25)

D → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY** (See page 22–11)

A

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6 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

(d) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

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NG	REPLACE HYBRID VEHICLE GENERATOR ASSY

OK

7	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

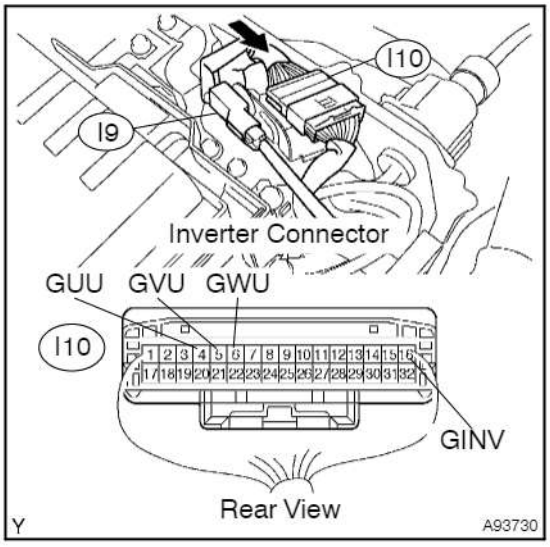
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



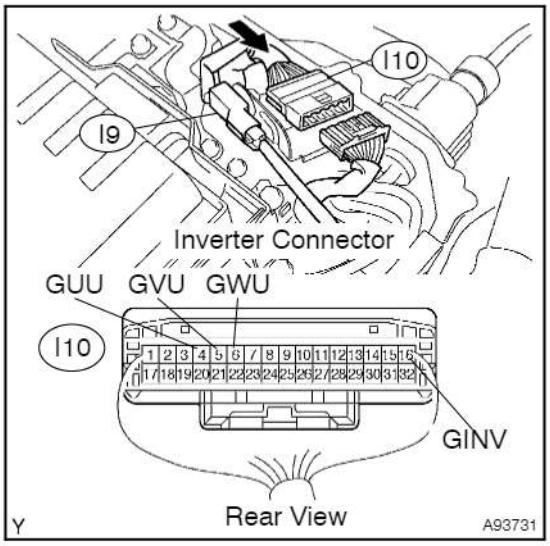
NG	Go to step 8

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A7A/342	GENERATOR INVERTER PERFORMANCE

DTC	P0A7A/343	GENERATOR INVERTER PERFORMANCE

DTC	P0A7A/519	GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

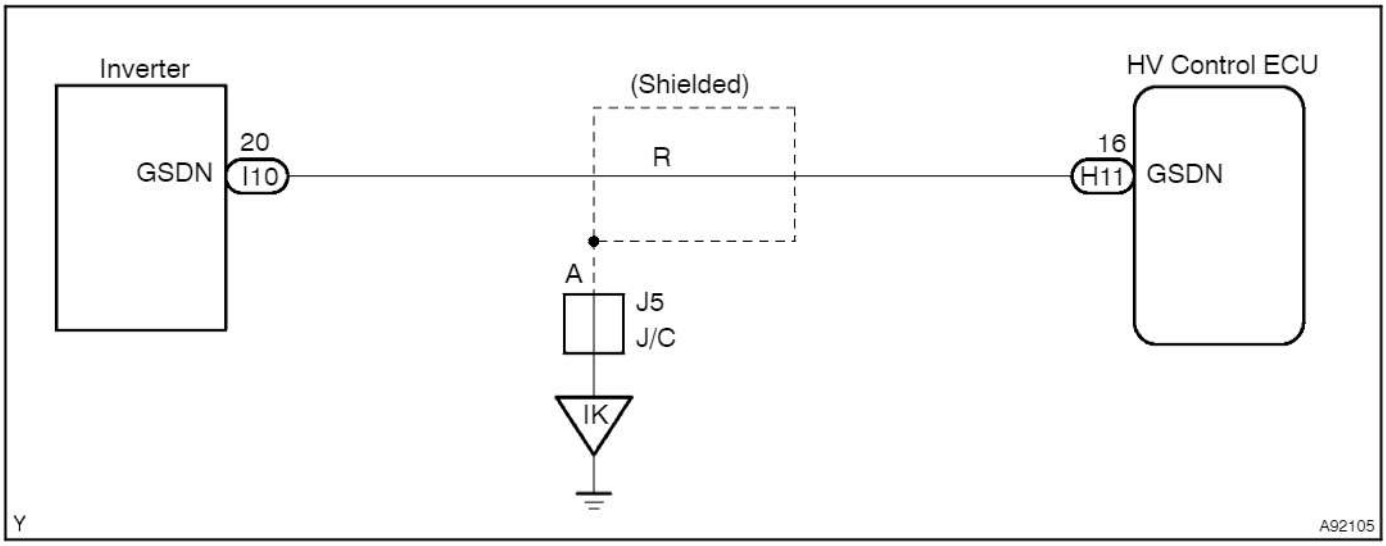
See the description of the inverter on page 05–365.

Upon receiving a generator gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG1 by turning OFF the power transistors that are actuating the MG1.

The HV control ECU monitors the generator gate shutdown signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	342	Open or +B short in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A7A	343	GND short in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A7A	519	Open in generator gate shutdown (GSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

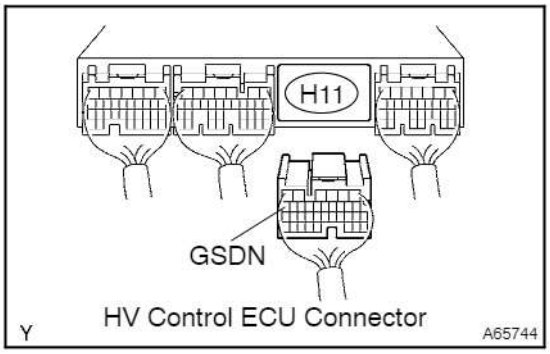
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

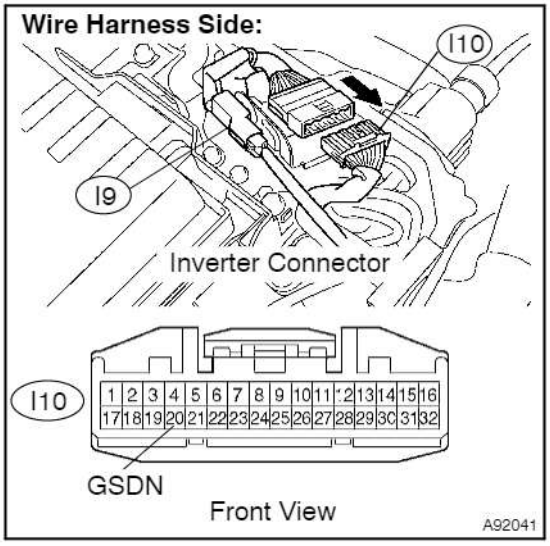
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GSDN (H11–16) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GSDN (H11–16) – GSDN (I10–20)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GSDN (H11–16) or GSDN (I10–20) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A7A/344 GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

The HV control ECU controls MG1 torque in accordance with the driving condition.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	344	Failure in monitoring MG1 torque performance	• Hybrid vehicle generator • w/ converter inverter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A7A (INF 344) and other DTCs are output

HINT:

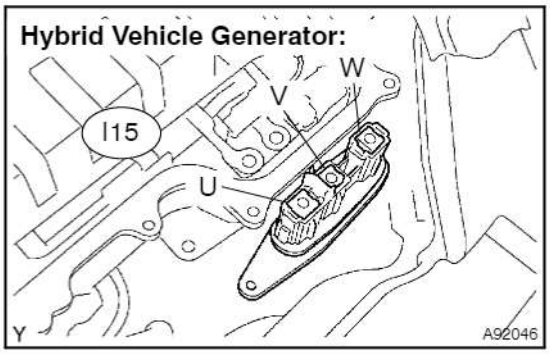
If any other codes besides P0A7A (INF 344) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

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NG → REPLACE HYBRID VEHICLE GENERATOR ASSY

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A7A/520 GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.

Upon receiving a generator gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG1 by turning OFF the power transistors that are actuating the MG1.

The HV control ECU monitors the generator gate shutdown signal and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	520	Generator gate shutdown (GSDN) signal malfunction	• Wire harness or connector • HV control ECU

WIRING DIAGRAM

Refer to DTC P0A7A (INF 342) on page 05–446.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A7A (INF 520) and other DTCs are output

HINT:

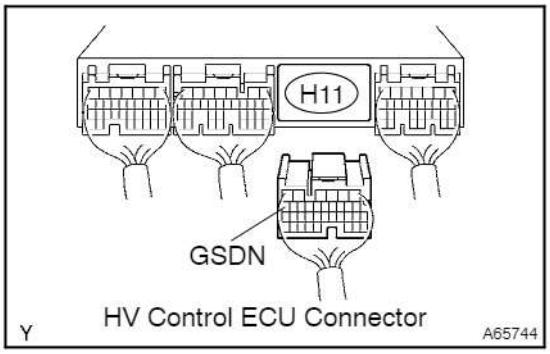
If any other codes besides P0A7A (INF 520) are output, perform troubleshooting for those DTCs first.

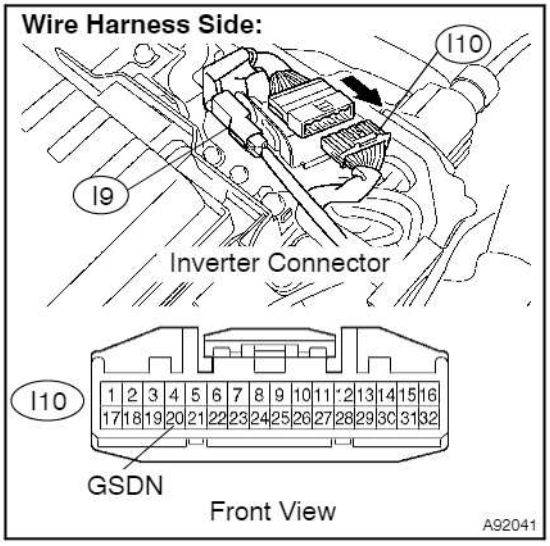
YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GSDN (H11–16) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GSDN (H11–16) – GSDN (I10–20)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GSDN (H11–16) or GSDN (I10–20) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A7A/522	GENERATOR INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the inverter on page 05–365.
Upon receiving a generator gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG1 by turning OFF the power transistors that are actuating the MG1.
The HV control ECU monitors the generator inverter gate and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	522	Generator inverter gate malfunction	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A7A (INF 342) on page 05–446.

INSPECTION PROCEDURE

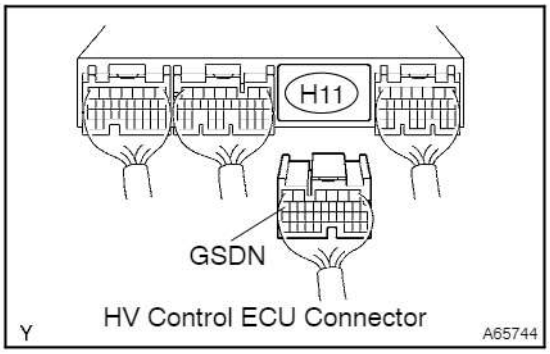
CAUTION:

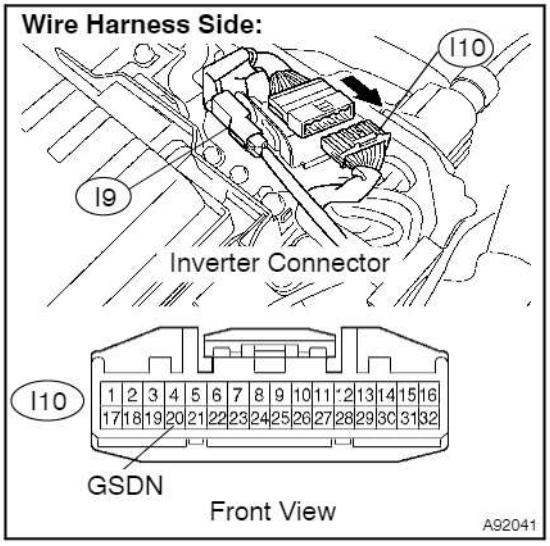
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
GSDN (H11–16) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GSDN (H11–16) – GSDN (I10–20)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GSDN (H11–16) or GSDN (I10–20) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A90/239	DRIVE MOTOR "A" PERFORMANCE

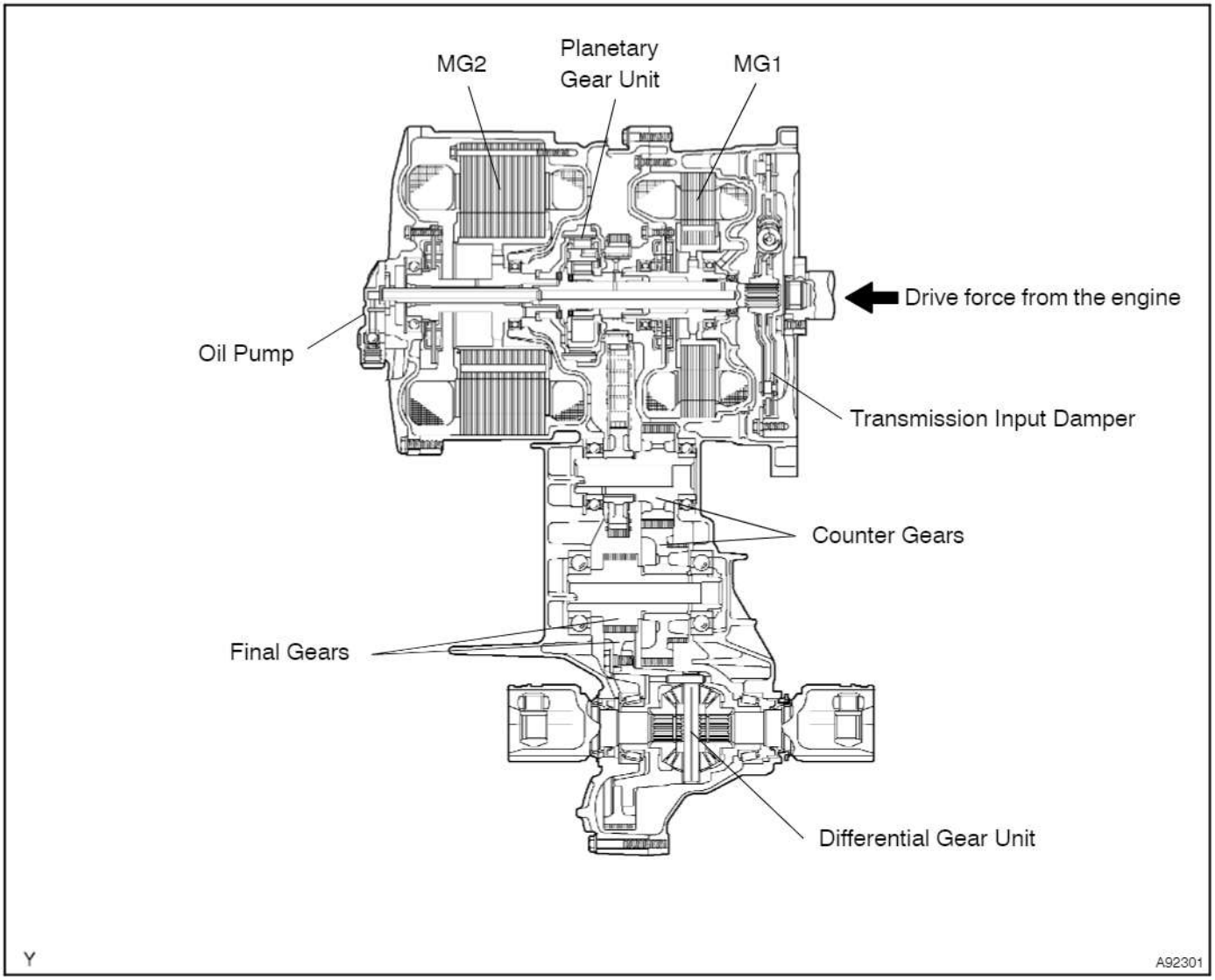
DTC	P0A90/241	DRIVE MOTOR "A" PERFORMANCE

DTC	P0A90/602	DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

The HV transaxle consists of a planetary gear unit, MG1, and MG2.
A gear unit uses the planetary gear to split engine output in accordance with a driving request during driving the vehicle or charging its internal HV battery.
The MG2 provides assist to the engine output while increasing the drive force of the vehicle. Furthermore, the MG2 effects regenerative braking by converting the energy (which is consumed in the form of heat during normal braking) into electrical energy and recovering it into the HV battery. Through regenerative braking, as well as decelerating the vehicle, the MG2 generates high–voltage electrical power which is used for the purpose of charging the HV battery.
The MG1 supplies electrical power, which is used for charging the HV battery or for driving the MG2. It also has a stepless transmission function to control the transaxle by regulating the amount of generation of electrical energy, which effectively varies the MG1 speed. In addition, the MG1 is used as a starter motor to start the engine.
The transmission input damper absorbs the shock that accompanies transmission of the drive force from the engine.

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DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	239	HV transaxle input malfunction (shaft damaged)	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU
P0A90	241	HV transaxle input malfunction (torque limiter slipping)	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU
P0A90	602	HV transaxle output malfunction	• Engine assembly • HV transaxle assembly (shaft or gear) • Transmission input damper • Wire harness or connector • HV control ECU

WIRING DIAGRAM

Refer to DTC P0A0F (INF 238) on page 05–315.

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INSPECTION PROCEDURE

1	READ OUTPUT DTC(ENGINE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.
Result: DTCs are output

YES	GO TO RELEVANT DTC CHART (See page 05–39)

NO

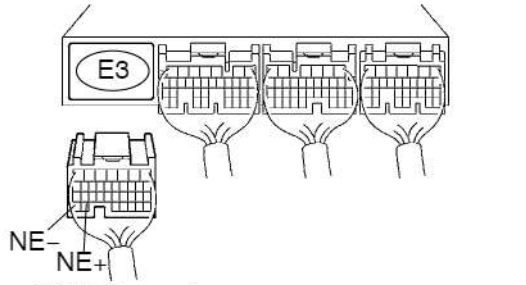
2	CHECK CRANKSHAFT PULLEY REVOLUTION

(a) Turn the power switch OFF.
(b) Jack up the vehicle.
(c) Manually turn the crankshaft pulley to check if the crankshaft rotates.
OK: The crankshaft rotates

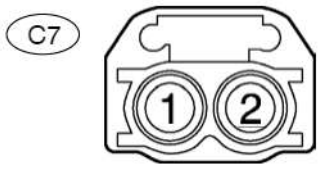
NG	Go to step 10

OK

3	CHECK HARNESS AND CONNECTOR(ECM – CRANKSHAFT POSITION SENSOR)



Wire Harness Side:
Crankshaft Position Sensor Connector



(a) Disconnect the E3 ECM connector.
(b) Disconnect the C7 crankshaft position sensor connector.
(c) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
NE+ (E3–33) – Crankshaft position sensor (C7–1)	Below 1 Ω
NE– (E3–34) – Crankshaft position sensor (C7–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NE+ (E3–33) or Crankshaft position sensor (C7–1) – Body ground	10 kΩ or higher
NE– (E3–34) or Crankshaft position sensor (C7–2) – Body ground	10 kΩ or higher

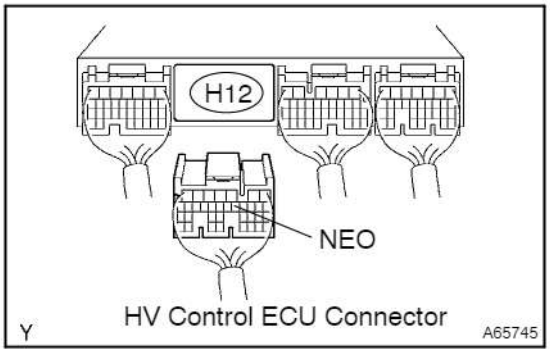
(d) Reconnect the crankshaft position sensor connector.
(e) Reconnect the ECM connector.

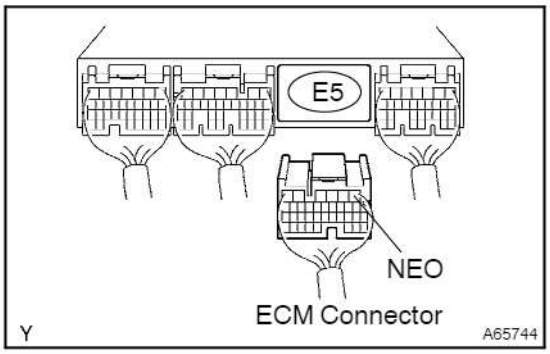
NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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4 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – ECM)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
NEO (H12–12) – NEO (E5–1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
NEO (H12–12) or NEO (E5–1) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK AND CLEAR DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Check and record the DTCs, the freeze frame data, and the information.
(f) Clear the DTCs of Hybrid Control.

GO

6 CHECK READY LAMP ON

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Generator (MG1) Rev and Engine Spd values.
(f) Turn the power switch ON (READY).

OK: READY lamp turns ON

HINT:
If the READY lamp does not turn ON, and the reading on the intelligent tester II shows DTC P0A90 (INF 239) (HV transaxle input malfunction [shaft damaged]), or the MG1 turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.

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NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

7 CHECK ENGINE REV–UP

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Generator (MG1) Rev and Engine Spd values.
(f) With the READY lamp turned ON, depress the accelerator pedal for 10 seconds while the shift position is in the P position.

OK: The engine revs up

HINT:
If the engine does not rev up, and the reading on the intelligent tester II shows DTC P0A90 (INF 239) (HV transaxle input malfunction [shaft damaged]), or the MG1 turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

8 CHECK CREEP MOVEMENT

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Jack up the vehicle.
(d) Depress the brake pedal, move the selector lever to the D position, and release the brake pedal.

OK: The wheels turn (creep movement)

HINT:
If the wheels do not turn, and the reading on the intelligent tester II shows DTC P0A90 (INF 602) (HV transaxle output malfunction), replace the hybrid vehicle transaxle assembly.

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

OK

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9	CHECK ENGINE ACCELERATION SPEED

(a) Connect the intelligent tester II to the DLC3.
(b) While driving at the vehicle speed of more than 10 km/h (6 mph), fully depress the accelerator pedal to raise the engine speed.
OK: The engine speed increases smoothly

HINT:
If the engine over–revs or the reading on the intelligent tester II shows DTC P0A90 (INF 241) (HV transaxle input malfunction [torque limiter slipping]), replace the transmission input damper.

NG → **REPLACE TRANSMISSION INPUT DAMPER ASSY**

OK

PERFORM SIMULATION TEST. IF SYMPTOM IS NOT REPRODUCED, REPLACE HV TRANSAXLE AND HV CONTROL ECU

10	CHECK FRONT TIRE REVOLUTION

(a) Turn the power switch ON (IG).
(b) Depress the brake pedal, move the selector lever to the N position.
(c) Jack up the vehicle.
(d) Manually turn the crankshaft pulley to check if the front tires rotate.
OK: The front tires rotate

NG → **REPAIR OR REPLACE ENGINE ASSY**

OK

REPAIR OR REPLACE HYBRID VEHICLE TRANSAXLE ASSY

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DTC	P0A90/240	DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A90 (INF 239) on page 05–455.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	240	Generator locked	• Hybrid vehicle generator

INSPECTION PROCEDURE

If the information (INF) code is present, replace the hybrid vehicle generator.

REPLACE HYBRID VEHICLE GENERATOR ASSY

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DTC	P0A90/242	DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A90 (INF 239) on page 05–455.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	242	Planetary gear locked	• HV transaxle assembly

INSPECTION PROCEDURE

If the information (INF) code is present, replace the HV transaxle assembly.

REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

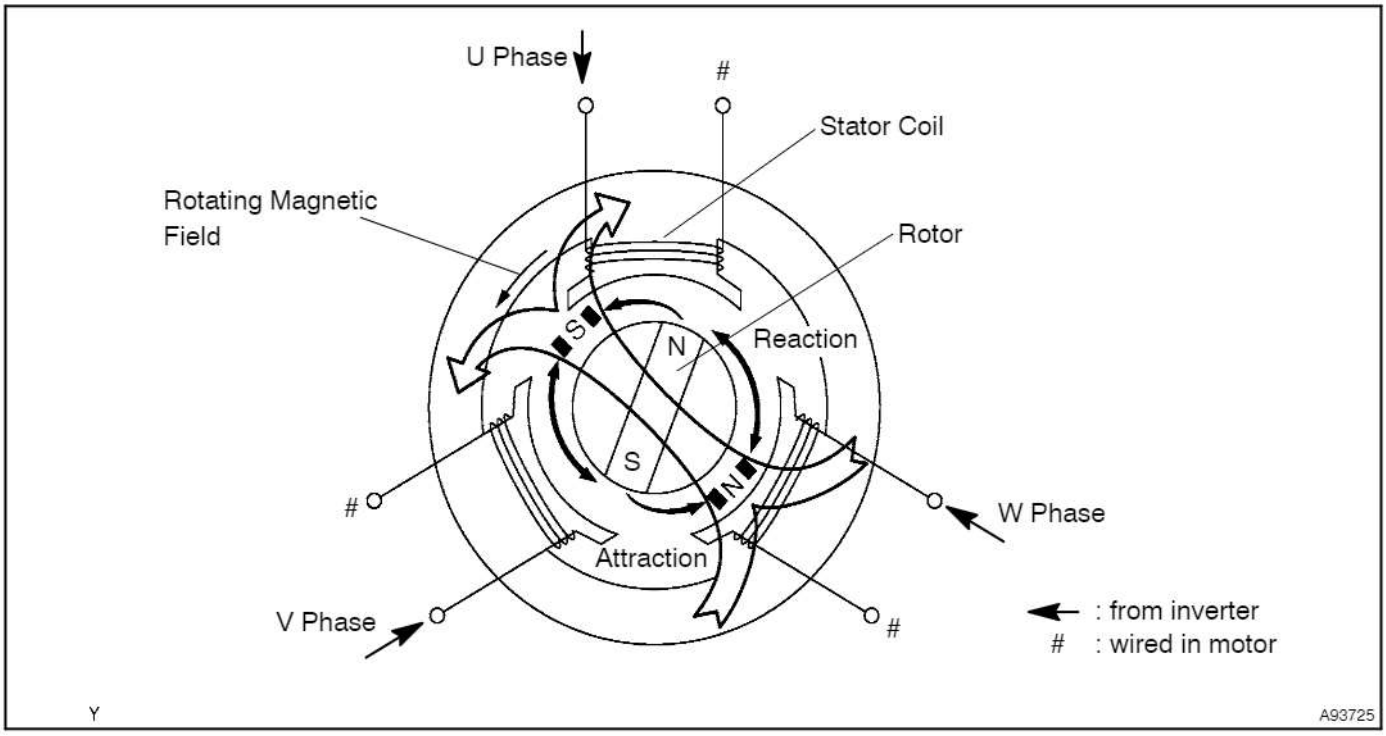
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DTC P0A90/251 DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

When three–phase alternating current flows through the three–phase windings of the stator coil, a rotating magnetic field is generated in the motor. The system controls the rotating magnetic field in accordance with the rotating position and speed of the rotor. As a result, the permanent magnets provided on the rotor are pulled in the rotating direction, which cause the generation of torque.

The generated torque is practically proportionate to the amount of current. Therefore, the system controls the speed of the motor by regulating the frequency of the alternating current. Furthermore, the system properly controls the rotating magnetic field and the angle of the rotor magnets in order to generate high torque in an efficient manner, even at high speeds.



DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	251	MG2 magnetic force deterioration or same phase short circuit	• Hybrid vehicle motor

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A90 (INF 251) and other DTCs are output

HINT:

If any other codes besides P0A90 (INF 251) are output, perform troubleshooting for those DTCs first.

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YES → GO TO RELEVANT DTC CHART (See page 05–268)

NO

REPLACE HYBRID VEHICLE MOTOR ASSY

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DTC P0A90/509 DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the MG1/MG2 on page 05–463.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	509	MG2 system malfunction	• Hybrid vehicle motor • w/ converter inverter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A90 (INF 509) and other DTCs are output

HINT:

If any other codes besides P0A90 (INF 509) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

2 INSPECT HYBRID VEHICLE MOTOR ASSY

CAUTION:

Wear insulated gloves before performing the following operation.

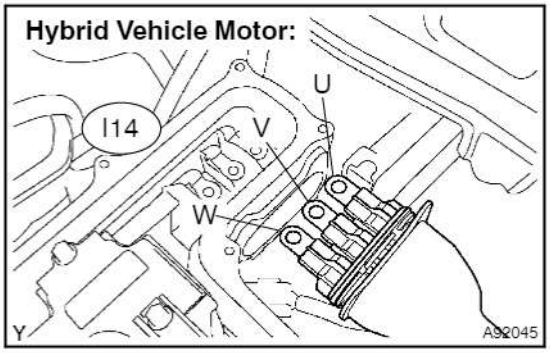
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

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(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.

(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:

If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

R20 = Rt ÷ (1 + 0.00393 × (T – 20))

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

(i) Reinstall the inverter cover (see page 21–25).

(j) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A90/604	DRIVE MOTOR "A" PERFORMANCE

DTC	P0A90/605	DRIVE MOTOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the MG1/MG2 on page 05–463.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	604	MG2 power balance malfunction (small power balance)	• Battery current sensor • Hybrid vehicle motor
P0A90	605	MG2 power balance malfunction (large power balance)	• Battery current sensor • Hybrid vehicle motor

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART (See page 05–665)**

NO

2	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A90 (INF 604 or 605) and other DTCs are output

HINT:

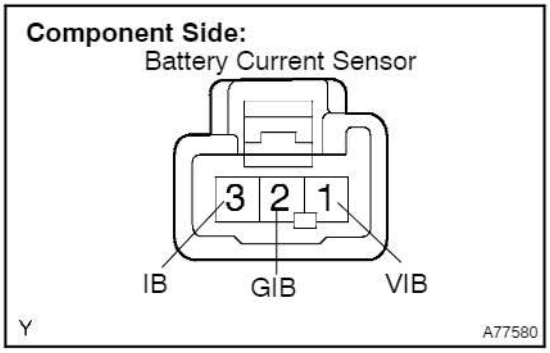
If any other codes besides P0A90 (INF 604 or 605) are output, perform troubleshooting for those DTCs first.

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YES → GO TO RELEVANT DTC CHART (See page 05–268)

NO

3 INSPECT BATTERY CURRENT SENSOR



(a) Remove the battery current sensor (see page 21–97).

(b) Measure the resistance between terminals 1 (VIB) and 2 (GIB).

Standard:

Tester Connection	Resistance
Positive probe to terminal 1 (VIB) Negative probe to terminal 2 (GIB)	3.5 to 4.5 kΩ
Positive probe to terminal 2 (GIB) Negative probe to terminal 1 (VIB)	5 to 7 kΩ or more

(c) Measure the resistance between terminals 1 (VIB) and 3 (IB).

Standard:

Tester Connection	Resistance
Positive probe to terminal 1 (VIB) Negative probe to terminal 3 (IB)	3.5 to 4.5 kΩ
Positive probe to terminal 3 (IB) Negative probe to terminal 1 (VIB)	5 to 7 kΩ or more

(d) Measure the resistance between terminals 2 (GIB) and 3 (IB).

Standard: 0.2 kΩ or less

NOTICE:

Even if the probes are changed around, the resistance will not vary.

(e) Reinstall the battery current sensor (see page 21–97).

NG → REPLACE BATTERY CURRENT SENSOR (See page 21–97)

OK

REPLACE HYBRID VEHICLE MOTOR ASSY

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DTC P0A92/261 HYBRID GENERATOR PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the MG1/MG2 on page 05–463.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	261	MG1 magnetic force deterioration or same phase short circuit	• Hybrid vehicle generator

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A92 (INF 261) and other DTCs are output

HINT:
If any other codes besides P0A92 (INF 261) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO →

REPLACE HYBRID VEHICLE GENERATOR ASSY

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DTC P0A92/521 HYBRID GENERATOR PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the MG1/MG2 on page 05–463.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	521	MG1 system malfunction	• Hybrid vehicle generator • w/ converter inverter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A92 (INF 521) and other DTCs are output

HINT:

If any other codes besides P0A92 (INF 521) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

2 INSPECT HYBRID VEHICLE GENERATOR ASSY

CAUTION:

Wear insulated gloves before performing the following operation.

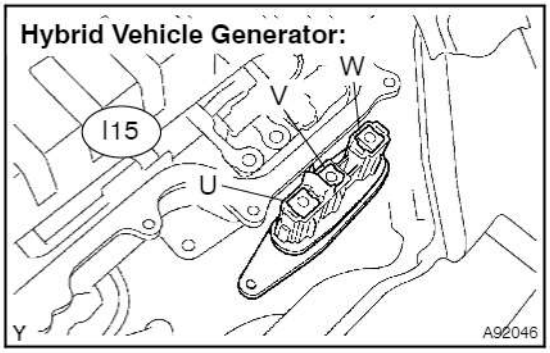
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

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(d) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(e) Using milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:

If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

R20 = Rt ÷ (1 + 0.00393 × (T – 20))

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

(i) Reinstall the inverter cover (see page 21–25).

(j) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE HYBRID VEHICLE GENERATOR ASSY**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A92/606	HYBRID GENERATOR PERFORMANCE

DTC	P0A92/607	HYBRID GENERATOR PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the MG1/MG2 on page 05–463.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	606	MG1 power balance malfunction (small power balance)	• Battery current sensor • Hybrid vehicle generator
P0A92	607	MG1 power balance malfunction (large power balance)	• Battery current sensor • Hybrid vehicle generator

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART (See page 05–665)**

NO

2	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A92 (INF 606 or 607) and other DTCs are output

HINT:

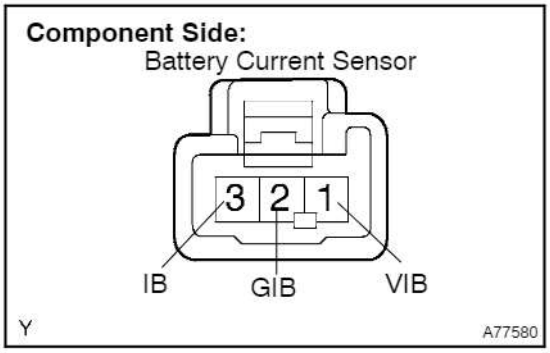
If any other codes besides P0A92 (INF 606 or 607) are output, perform troubleshooting for those DTCs first.

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YES → GO TO RELEVANT DTC CHART (See page 05–268)

NO

3 INSPECT BATTERY CURRENT SENSOR



(a) Remove the battery current sensor (see page 21–97).

(b) Measure the resistance between terminals 1 (VIB) and 2 (GIB).

Standard:

Tester Connection	Resistance
Positive probe to terminal 1 (VIB) Negative probe to terminal 2 (GIB)	3.5 to 4.5 kΩ
Positive probe to terminal 2 (GIB) Negative probe to terminal 1 (VIB)	5 to 7 kΩ or more

(c) Measure the resistance between terminals 1 (VIB) and 3 (IB).

Standard:

Tester Connection	Resistance
Positive probe to terminal 1 (VIB) Negative probe to terminal 3 (IB)	3.5 to 4.5 kΩ
Positive probe to terminal 3 (IB) Negative probe to terminal 1 (VIB)	5 to 7 kΩ or more

(d) Measure the resistance between terminals 2 (GIB) and 3 (IB).

Standard: 0.2 kΩ or less

NOTICE:

Even if the probes are changed around, the resistance will not vary.

(e) Reinstall the battery current sensor (see page 21–97).

NG → REPLACE BATTERY CURRENT SENSOR (See page 21–97)

OK

REPLACE HYBRID VEHICLE GENERATOR ASSY

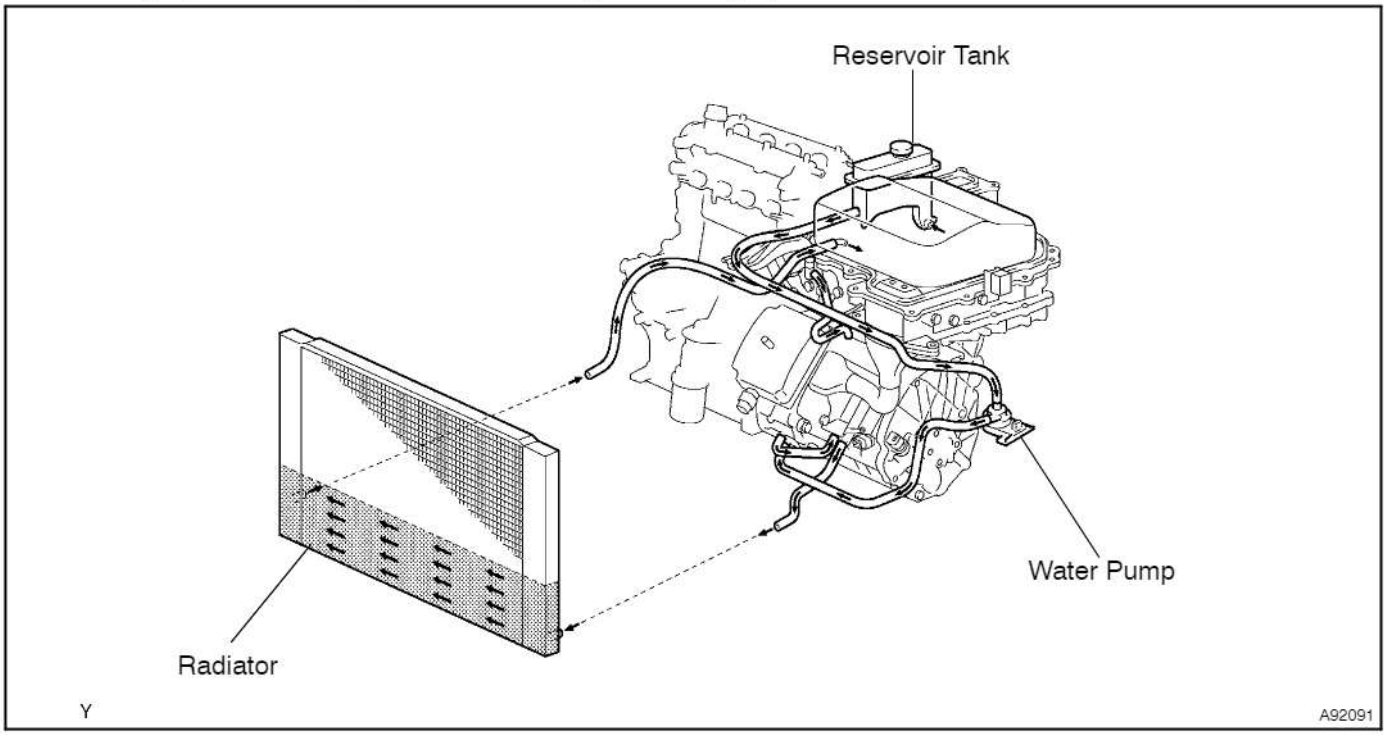
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DTC	P0A93/346	INVERTER COOLING SYSTEM PERFORMANCE

DTC	P0A93/347	INVERTER COOLING SYSTEM PERFORMANCE

CIRCUIT DESCRIPTION

The inverter converts the high–voltage direct current of the HV battery into the alternating current for the MG1 and the MG2. The inverter generates heat during the conversion process, and this heat could damage the inverter if a cooling system is unavailable. Therefore, similar to the MG1 and the MG2, the inverter is cooled by a dedicated cooling system, which consists of an electric water pump, cooling fan, and radiator. This cooling system is independent of the engine cooling system.



The HV control ECU monitors the electric water pump, cooling fan and cooling system, and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A93	346	Inverter cooling system malfunction (water pump system malfunction)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly
P0A93	347	Inverter cooling system malfunction (electric cooling fan system malfunction)	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly

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INSPECTION PROCEDURE

1	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.
OK: There is a sufficient amount of coolant for the inverter

NG → ADD HV COOLANT (See page 22–4)

OK

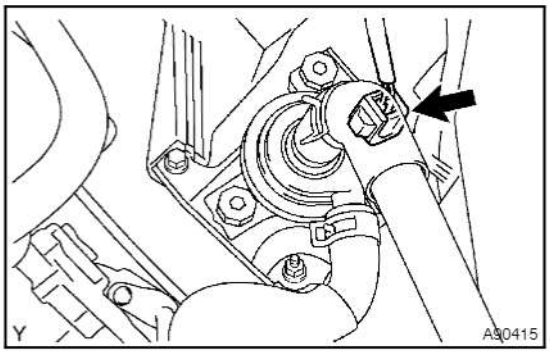
2	CHECK COOLANT HOSE

(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).
OK: The hoses of the cooling system are not bent or clogged

NG → CORRECT TO NORMAL CONDITION

OK

3	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

4	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

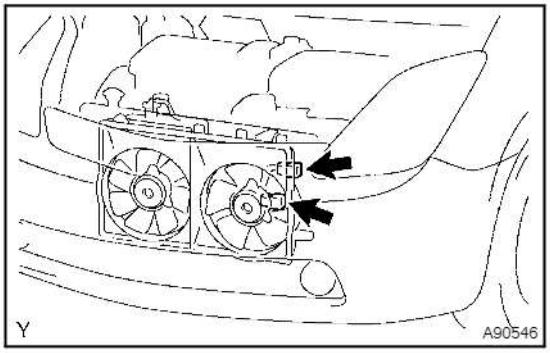
(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

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5	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

6	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → **REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT**

OK

7	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → **REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

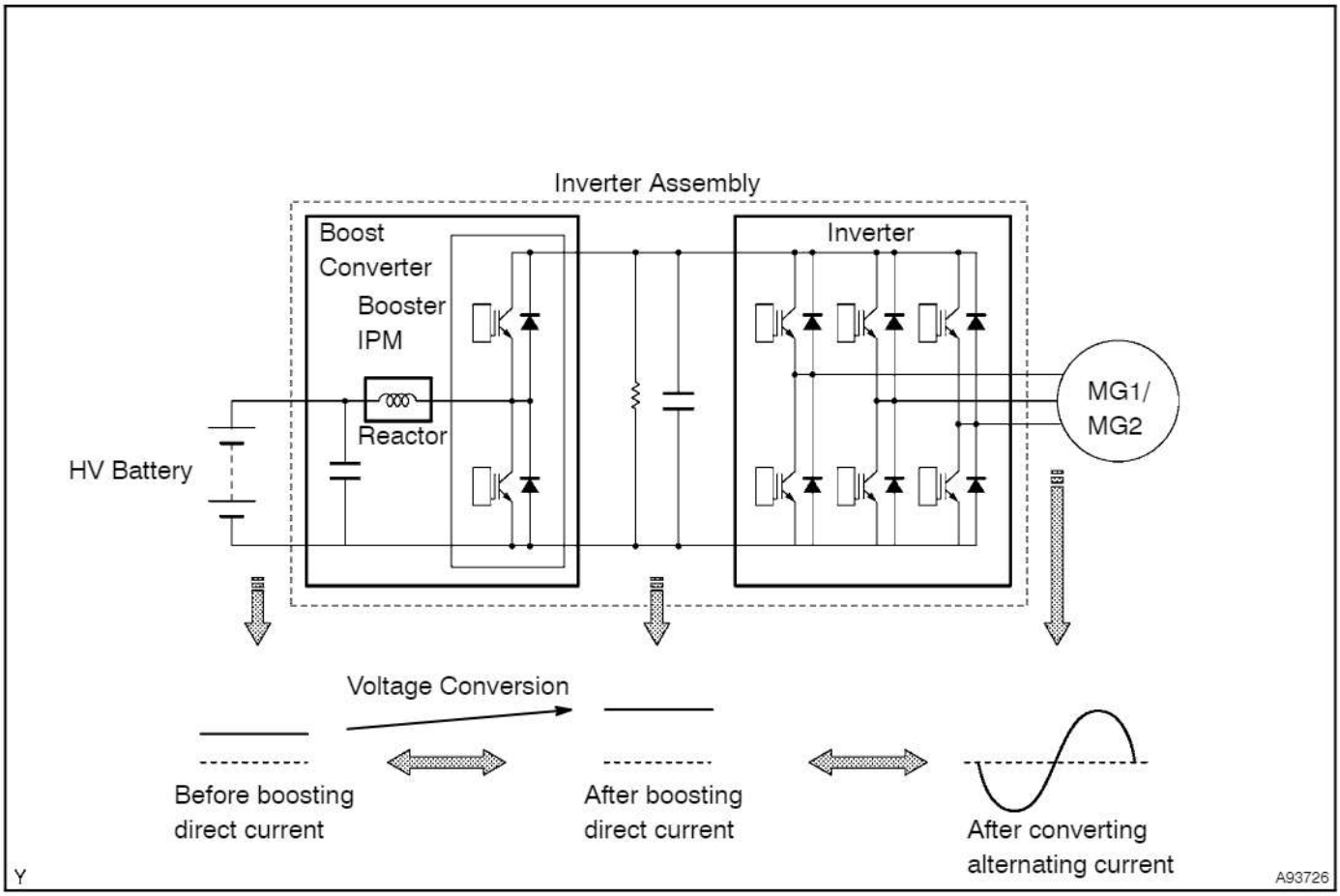
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DTC P0A94/442 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

The boost converter contains a booster IPM (Intelligent Power Module), which includes an IGBT (Insulated Gate Bipolar Transistor) and a reactor. The HV control ECU actuates the IGBT, which controls the current in the reactor.

The boost converter boosts the high–voltage direct current rated at 201.6 V to an approximate direct current voltage of 500 V. The inverter converts the voltage that has been boosted by the boost converter into alternating current, which is used for driving the MG1/MG2. When the MG1/MG2 operates as a generator, the alternating current of approximately 500 V from the MG1/MG2 is converted into direct current by the inverter. Then, the boost converter drops this voltage to a direct current voltage rated at 201.6 V in order to charge the HV battery.



The HV control ECU uses a voltage sensor that is built into the boost converter to detect the high voltage (VL) before it is boosted. Also, it uses a voltage sensor that is built into the inverter to detect the high voltage (VH) after it has been boosted.

Based on the voltage before and after it has been boosted, the HV control ECU boosts it to a target voltage by controlling the operation of the boost converter.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	442	Abnormal voltage execution value	• w/ converter inverter assembly

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INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P0A94 (INF 442) and other DTCs are output

HINT:
If any other codes besides P0A94 (INF 442) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A94/545	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/546	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

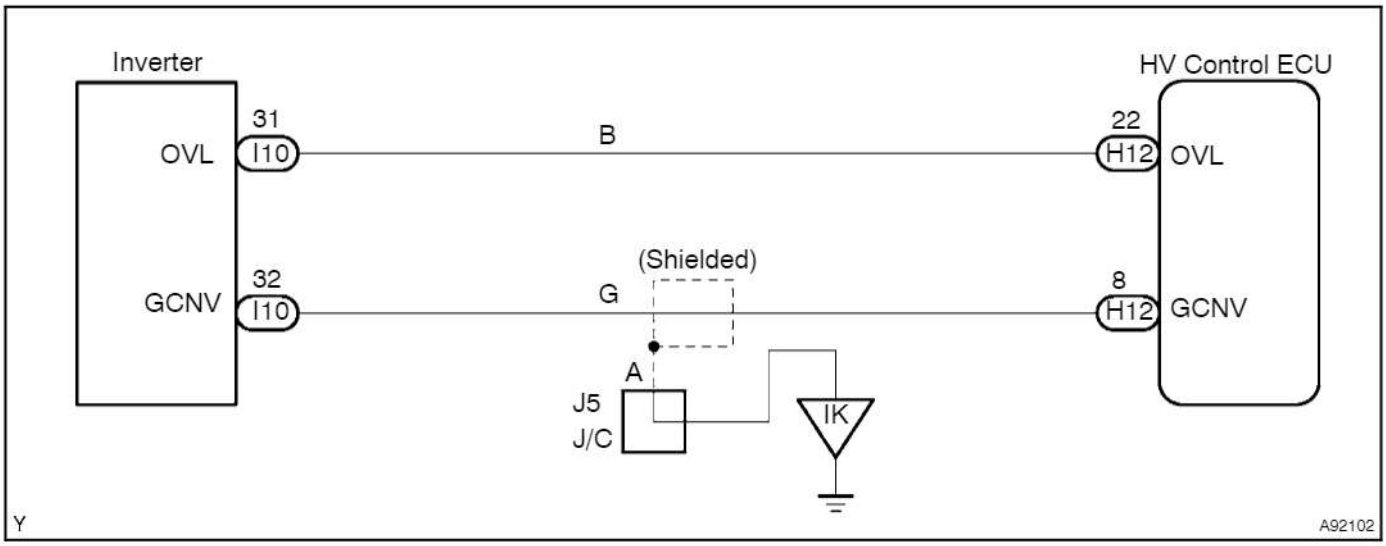
See the description of the boost converter on page 05–477.

If the boost converter detects a circuit malfunction or over–voltage, the boost converter transmits this information to the OVL terminal of the HV control ECU via the boost converter over–voltage signal line.

The HV control ECU monitors the boost converter over–voltage signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	545	Open or GND short in boost converter over–voltage (OVL) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A94	546	+B short in boost converter over–voltage (OVL) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

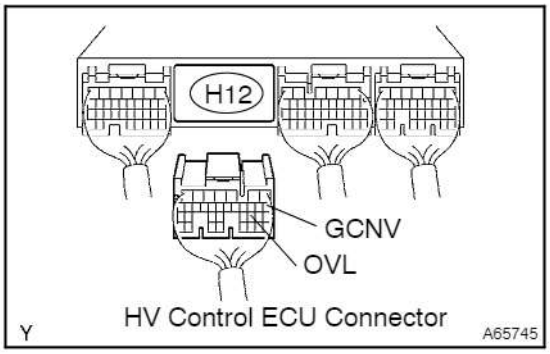
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

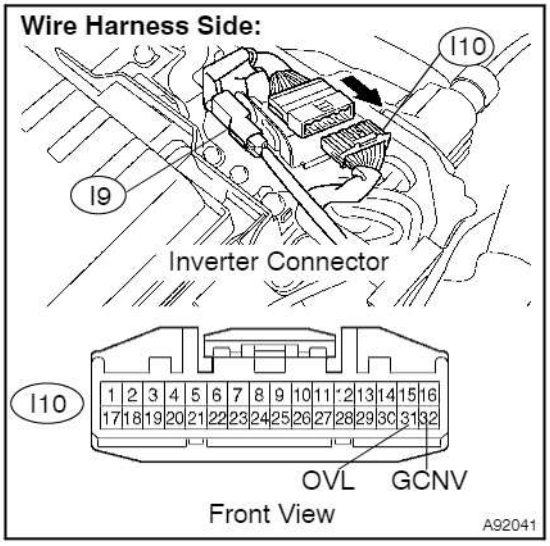
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
OVL (H12–22) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
OVL (H12–22) – OVL (I10–31)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
OVL (H12–22) or OVL (I10–31) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A94/547	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/548	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/549	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of booster converter on page 05–477.

If the boost converter detects a circuit malfunction or over–voltage, the boost converter transmits that information to the OVL terminal of the HV control ECU via the boost converter over–voltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	547	Boost converter over–voltage (OVL) signal detection (over–voltage by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	548	Boost converter over–voltage (OVL) signal detection (over–voltage by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	549	Boost converter over–voltage (OVL) signal detection (over–voltage by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 3)

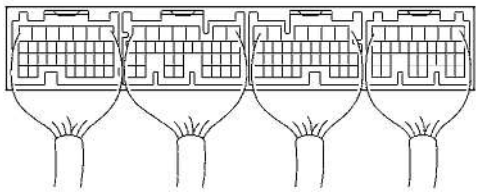
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A94 to display its freeze frame data.
(f) Select Information beneath Detail Code which has INF code 547, 548, or 549 and press the "Details" key.
(g) Read Exclusive Information 3.
Result: –32 to 32 (during driving without battery power)

HINT:
If the value is inside the range shown above, DTCs other than P0A78 (INF 547, 548 and 549) have been detected as well. Perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

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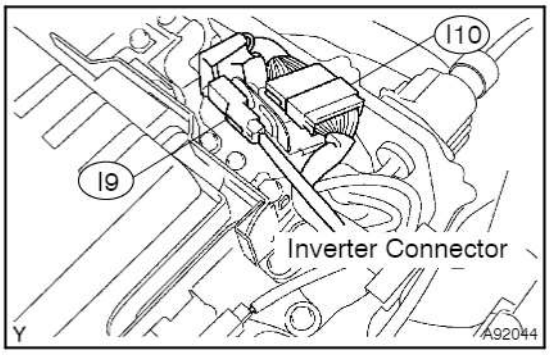
3	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

4	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A94 to display its freeze frame data.
(f) Select Information beneath Detail Code which has INF code 547, 548, or 549 and press the "Details" key.
(g) Read Exclusive Information 4.
Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

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B	REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)
C	REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)
D	REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

A

5	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTCs listed in the table below are output

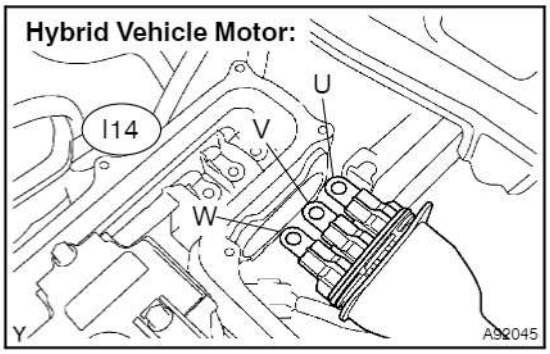
DTC No.	INF Code	Detection Item	See Page
P0A78	266	Drive Motor "A" Inverter Performance	05–365
P0A94	558 or 560	DC/DC Converter Malfunction	05–513
P0A94	588	DC/DC Converter Malfunction	05–529
P0A94	589	DC/DC Converter Malfunction	05–531
P0AA2	227	Hybrid Battery Positive Contactor Circuit Stuck Open	05–540
P0AA5	229	Hybrid Battery Negative Contactor Circuit Stuck Open	05–544
P3000	125	Battery Control System Malfunction	05–553
P3004	131	HIgh Voltage Power Resource Malfunction	05–557

YES	GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE

NO

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6 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

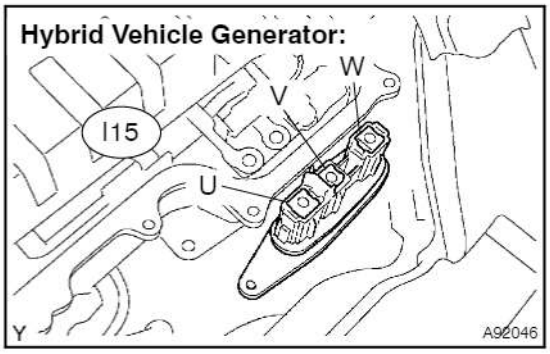
(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → REPLACE HYBRID VEHICLE MOTOR ASSY

OK

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7 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.

(b) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(c) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(d) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(e) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(f) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

NG → **REPLACE HYBRID VEHICLE GENERATOR ASSY**

OK

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8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

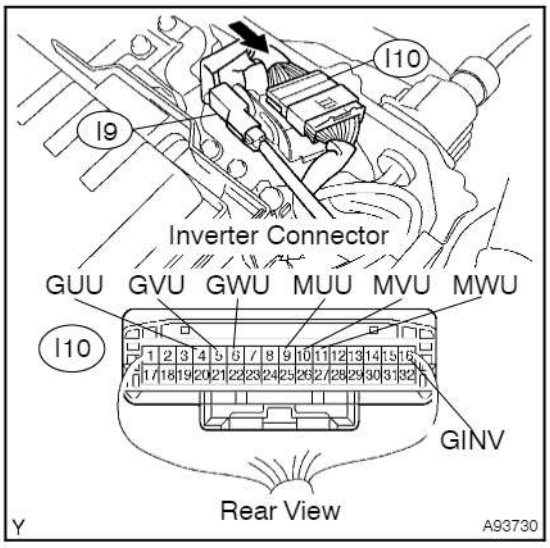
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



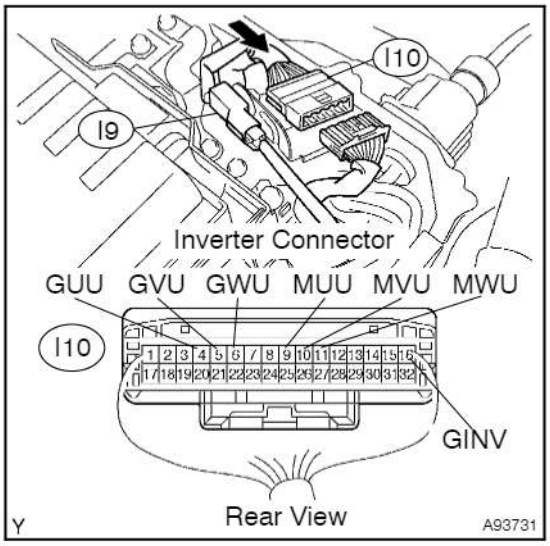
NG → **Go to step 9**

OK

REPLACE HYBRID VEHICLE CONTROL ECU AND W/CONVERTER INVERTER ASSY
(See page 21–128 and 21–25)

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9	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC P0A94/550 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of boost converter on page 05–477.

If the boost converter detects a circuit malfunction or over–voltage, the boost converter transmits that information to the OVL terminal of the HV control ECU via the boost converter over–voltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	550	Boost converter over–voltage (OVL) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) on page 05–387.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC listed in the table below is output

DTC No.	INF Code	Detection Item	See Page
P0A94	545 or 546	DC/DC Converter Malfunction	05–479

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

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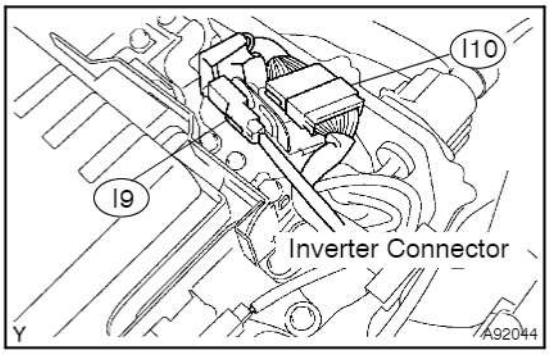
2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

3	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs P0A78 (INF 282, 286) and P0A7A (INF 324) (inverter circuit malfunction) are output

NO → REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

YES

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4	INSPECT W/CONVERTER INVERTER ASSY(IGCT VOLTAGE)

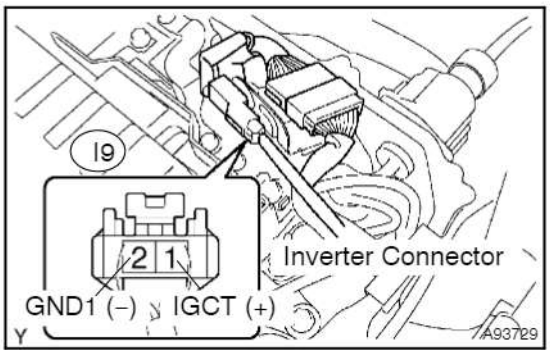
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.



(e) Measure the voltage between the terminals of the inverter connector.

Standard:

Tester Connection	Specified Condition
IGCT (I9–1) – GND1 (I9–2)	8 V or more

(f) Turn the power switch OFF.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A94/551	DC/DC CONVERTER PERFORMANCE

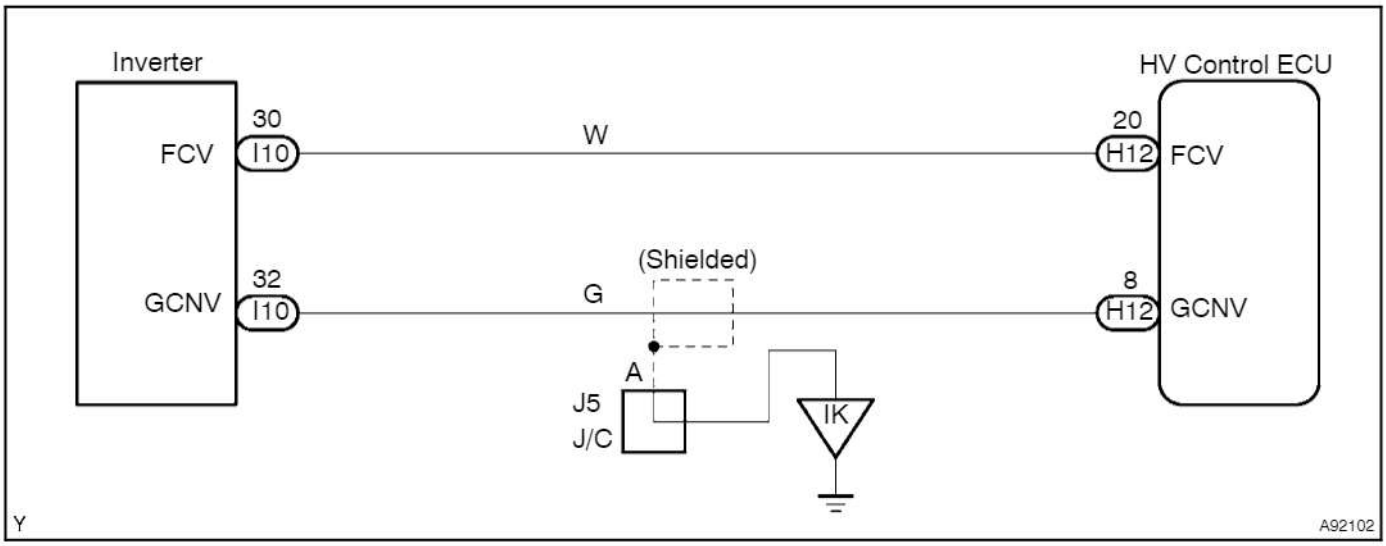
DTC	P0A94/552	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.
If the boost converter has a circuit malfunction, or internal short, or overheats, the boost converter transmits this information to the FCV terminal of the HV control ECU via the boost converter fail signal line.
The HV control ECU monitors the boost converter fail signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	551	Open or GND short in boost converter fail (FCV) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A94	552	+B short in boost converter fail (FCV) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

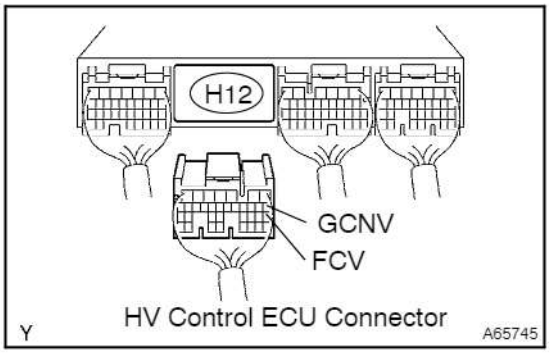
CAUTION:

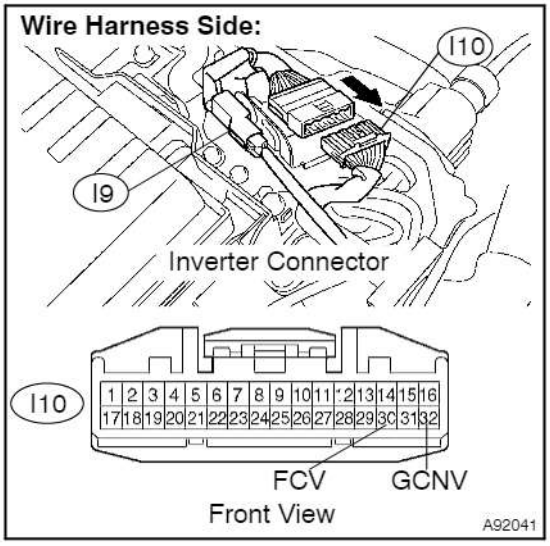
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.

(d) Remove the inverter cover (see page 21–25).

(e) Disconnect the I10 inverter connector.

(f) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
FCV (H12–20) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.

(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
FCV (H12–20) – FCV (I10–30)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
FCV (H12–20) or FCV (I10–30) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.

(k) Reconnect the HV control ECU connector.

(l) Reinstall the inverter cover (see page 21–25).

(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A94/553 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.

If the boost converter has a circuit malfunction, internal short, or overheats, the boost converter transmits that information to the FCV terminal of the HV control ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	553	Boost converter fail (FCV) signal detection (boost converter overheating)	• Wire harness or connector • Inverter cooling system • water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2 CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.
OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

3 CHECK COOLANT HOSE

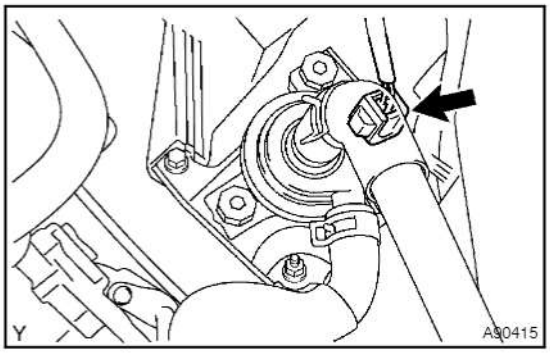
(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).
OK: The hoses of the cooling system are not bent or clogged

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NG → CORRECT TO NORMAL CONDITION

OK

4	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

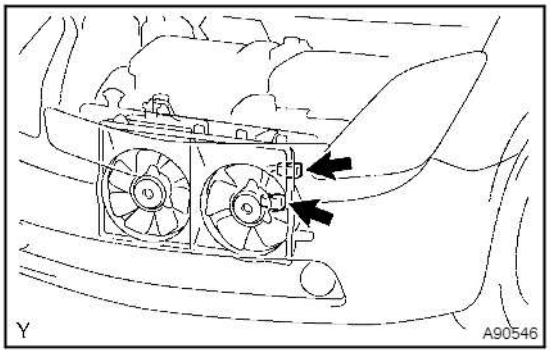
5	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

6	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

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7	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

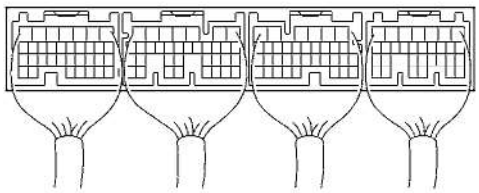
OK

8	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

9	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

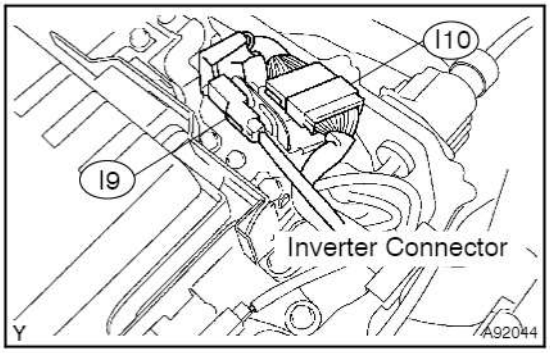
NG → CONNECT SECURELY

OK

10	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).

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(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).

NG → **CONNECT SECURELY**

OK

11 CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A94 to display its freeze frame data.
(f) Select Detail Information (INF) beneath Detail Code which has INF code 553 and press the "Details" key.
(g) Read Exclusive Information 4.
Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

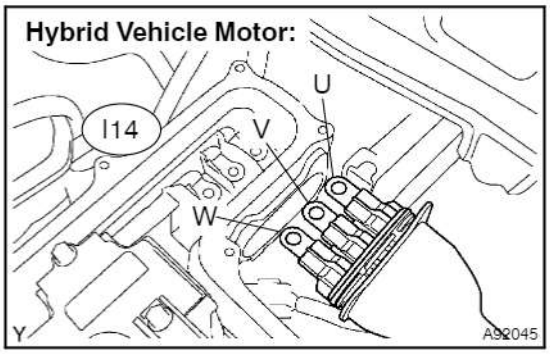
C → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

D → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)**

A

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12 INSPECT HYBRID VEHICLE MOTOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.

NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

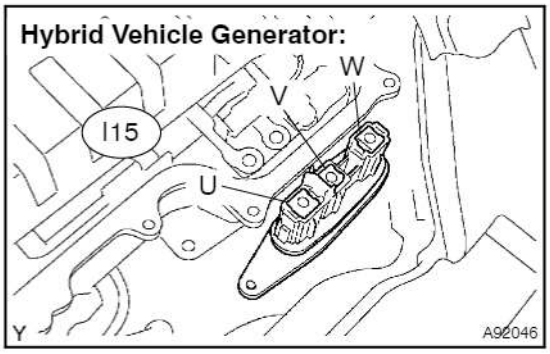
(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

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13 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.

(b) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(c) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(d) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

(e) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(f) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

NG → **REPLACE HYBRID VEHICLE GENERATOR ASSY**

OK

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14	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

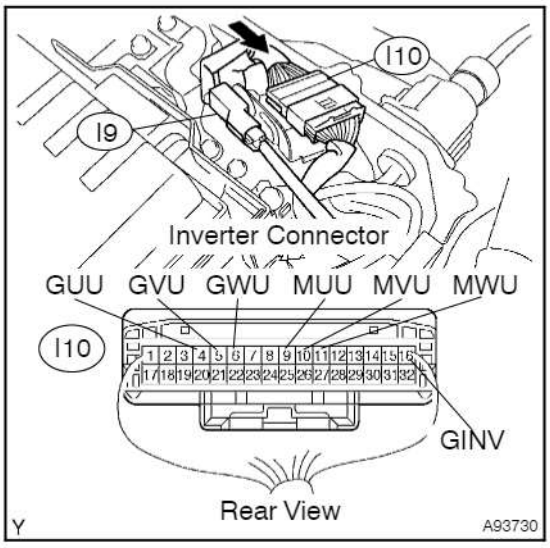
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



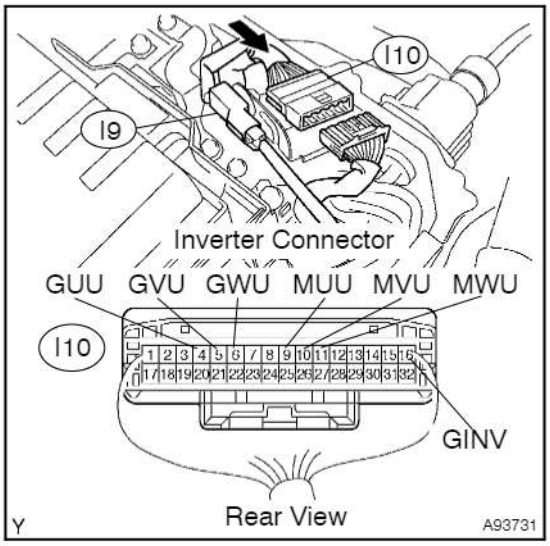
NG → **Go to step 15**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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15	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A94/554	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/555	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/556	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.

If the boost converter has a circuit malfunction, internal short, or overheats,the boost converter transmits that information to the FCV terminal of the HV control ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	554	Boost converter fail (FCV) signal detection (over current by HV control ECU malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	555	Boost converter fail (FCV) signal detection (over current by inverter assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	556	Boost converter fail (FCV) signal detection (over current by HV transaxle assembly malfunction)	• Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page 05–378.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	READ OUTPUT DTC(HYBRID CONTROL)

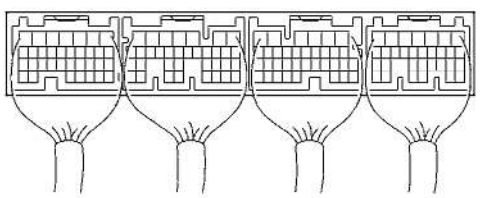
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A41	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC/DC Converter Malfunction
P0AA1, P0AA2, P0AA4 or P0AA5	System Main Relay Circuit System
P3000, P3004, P3009 or P3110	High Voltage System
P3211	Drive Motor "A" Inverter Temperature Sensor Circuit System
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC/DC Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART (See page 05–268). FIND A PAGE NUMBER TO PROCEED TO ITS DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

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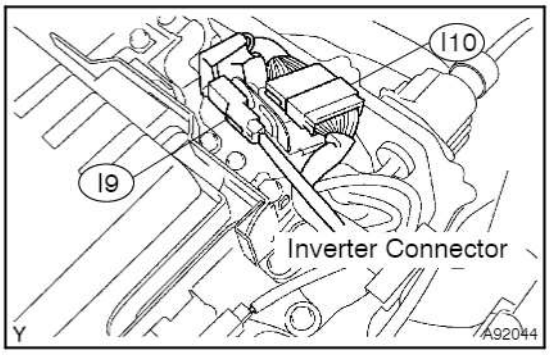
3	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.



NG → **CONNECT SECURELY**

OK

4	CONFIRM INFORMATION(EXCLUSIVE INFORMATION 4)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Select DTC P0A94 to display its freeze frame data.
(f) Select Detail Information beneath Detail Code which has INF code 554, 555, or 556 and press the "Details" key.
(g) Read Exclusive Information 4.
Result:

Displayed in Exclusive Information 4	Proceed to
–127 to –120, –95 to –88, –63 to –56, –31 to –24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
–119 to –112, –87 to –80, –55 to –48, –23 to –16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
–111 to –104, –79 to –72, –47 to –40, –15 to –8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
–103 to –96, –71 to –64, –39 to –32, –7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

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B	REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)
C	REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)
D	REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)

A

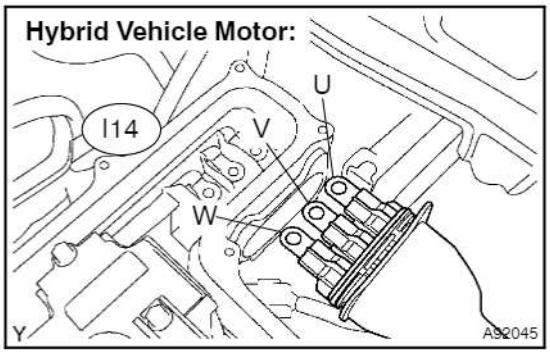
5	INSPECT HYBRID VEHICLE MOTOR ASSY

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cable for the hybrid vehicle motor from the inverter.
(e) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor.



NOTICE:
If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14–1) – V (I14–2)	Below 135 mΩ at 20°C
V (I14–2) – W (I14–3)	Below 135 mΩ at 20°C
W (I14–3) – U (I14–1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.
R20 = Rt ÷ (1 + 0.00393 × (T – 20))
R20: Resistance converted to 20 °C (mΩ)
Rt: Resistance between measured lines (mΩ)
T: Ambient air temperature during measurement (°C)

(f) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

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(g) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

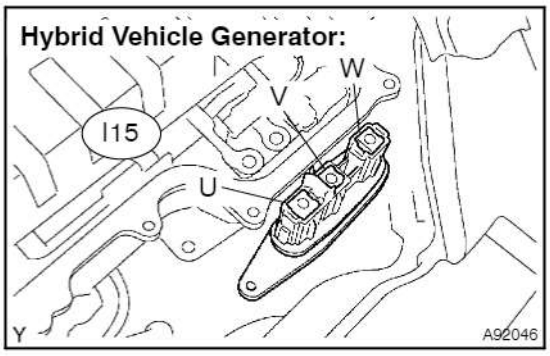
Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher

(h) Reconnect the three–phase alternating current cable for the hybrid vehicle motor.

NG → **REPLACE HYBRID VEHICLE MOTOR ASSY**

OK

6 INSPECT HYBRID VEHICLE GENERATOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.

(b) Disconnect the three–phase alternating current cable for the hybrid vehicle generator from the inverter.

(c) Using a milliohm meter, measure the resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:
If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15–1) – V (I15–2)	Below 109 mΩ at 20°C
V (I15–2) – W (I15–3)	Below 109 mΩ at 20°C
W (I15–3) – U (I15–1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$R20 = Rt \div (1 + 0.00393 \times (T - 20))$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

(d) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

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(e) Using a megohmmeter, check the insulation resistance between the three–phase alternating current cable terminals of the hybrid vehicle generator and the body ground.
Standard:

Tester Connection	Specified Condition
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

(f) Reconnect the three–phase alternating current cable for the hybrid vehicle generator.

NG	REPLACE HYBRID VEHICLE GENERATOR ASSY

OK

7	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)

CAUTION:
Wear insulated gloves before performing the following operation.

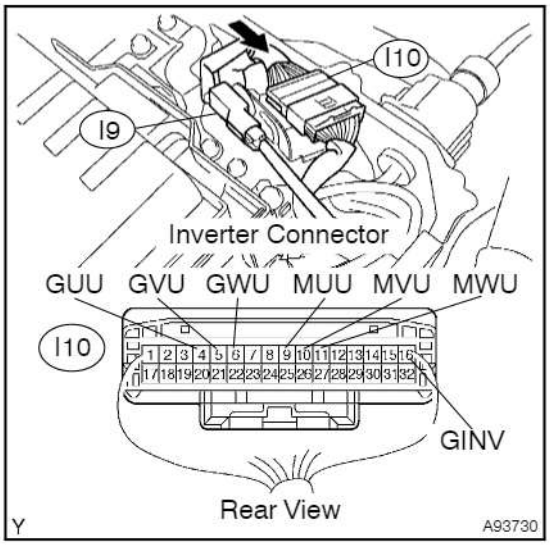
(a) Check that the service plug grip and inverter cover have been removed.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(f) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	12 to 16 V
MVU (I10–10) – GINV (I10–16)	12 to 16 V
MWU (I10–11) – GINV (I10–16)	12 to 16 V
GUU (I10–4) – GINV (I10–16)	12 to 16 V
GVU (I10–5) – GINV (I10–16)	12 to 16 V
GWU (I10–6) – GINV (I10–16)	12 to 16 V

(g) Turn the power switch OFF.



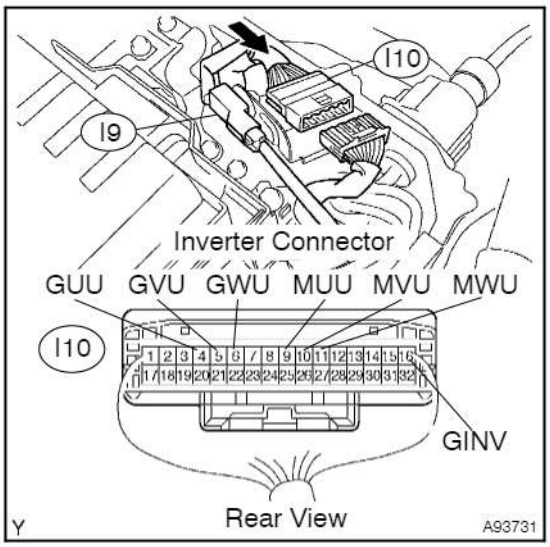
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NG	Go to step 8

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(FORCIBLE STOP OF INVERTER DRIVE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I10 inverter connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Turn the intelligent tester II ON.
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Active Test.
(g) Measure the voltage between the terminals of the inverter connector while effecting Forcible Stop of Inverter Drive.
Standard:

Tester Connection	Specified Condition
MUU (I10–9) – GINV (I10–16)	14 to 16 V
MVU (I10–10) – GINV (I10–16)	14 to 16 V
MWU (I10–11) – GINV (I10–16)	14 to 16 V
GUU (I10–4) – GINV (I10–16)	14 to 16 V
GVU (I10–5) – GINV (I10–16)	14 to 16 V
GWU (I10–6) – GINV (I10–16)	14 to 16 V

(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

NG	REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC P0A94/557 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of booster converter on page 05–477.

If the boost converter has a circuit malfunction, internal short, or overheats, the boost converter transmits that information to the FCV terminal of the HV control ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	557	Boost converter fail (FCV) signal detection (circuit malfunction)	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) on page 05–387.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC listed in the table below is output

DTC No.	INF Code	Detection Item	See Page
P0A94	551 or 552	DC/DC Converter Malfunction	05–492

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

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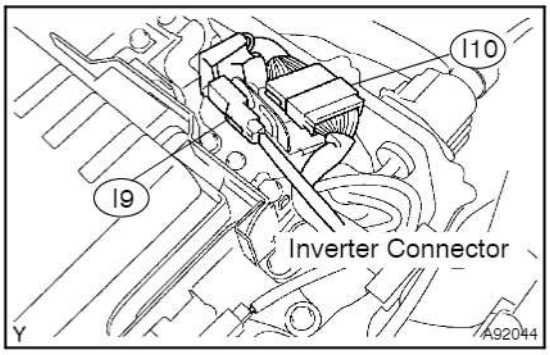
2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.
(e) Reinstall the inverter cover (see page 21–25).
(f) Reinstall the service plug grip (see page 21–120).



NG → CONNECT SECURELY

OK

3	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTCs P0A78 (INF 282, 286) and P0A7A (INF 324) (inverter circuit malfunction) are output

NO → REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

YES

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4	INSPECT W/CONVERTER INVERTER ASSY(IGCT VOLTAGE)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Turn the power switch ON (IG).

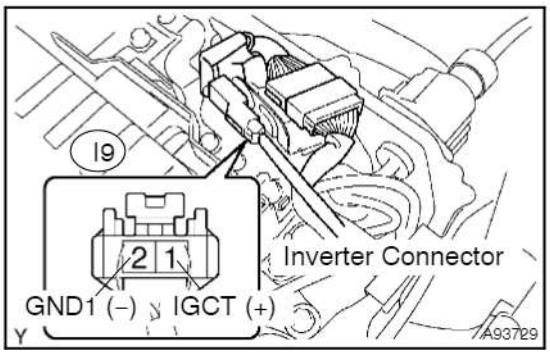
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the inverter connector.

Standard:

Tester Connection	Specified Condition
IGCT (I9–1) – GND1 (I9–2)	8 V or more

(f) Turn the power switch OFF.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P0A94/558	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/559	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/560	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

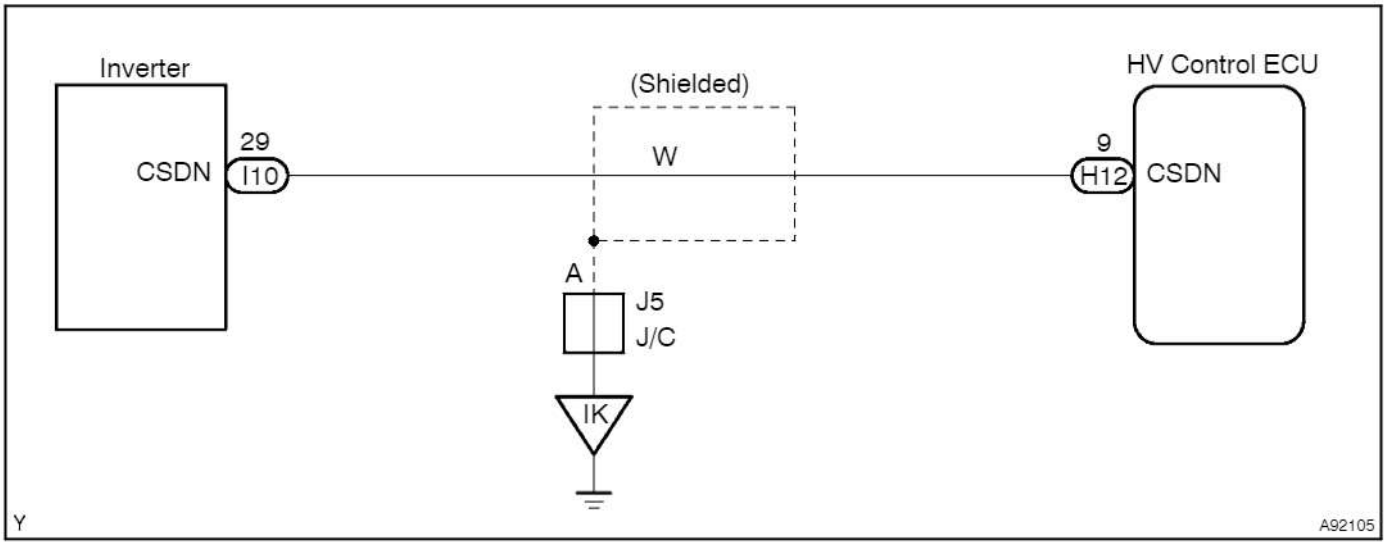
See the description of the boost converter on page 05–477.

Upon receiving a boost converter gate shutdown signal from the HV control ECU, the boost converter forcefully stops the operation of the boost converter by turning OFF the power transistors that are actuating the boost converter.

The HV control ECU monitors the boost converter gate shutdown signal line and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	558	GND short in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A94	559	Open or +B short in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly
P0A94	560	Open in boost converter gate shutdown (CSDN) signal circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

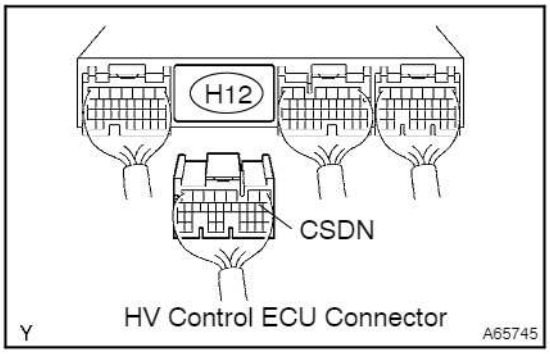
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

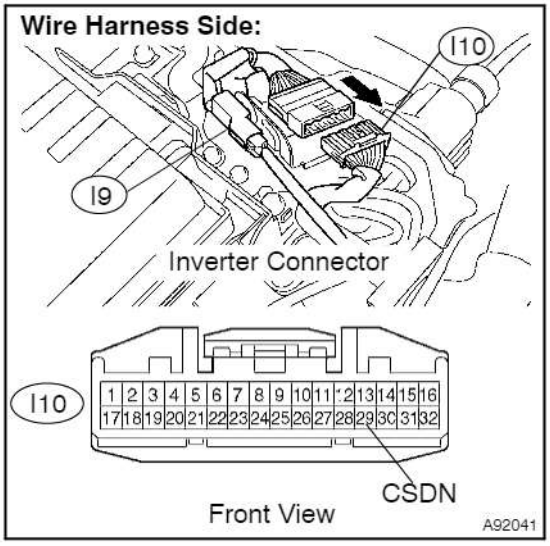
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CSDN (H12–9) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CSDN (H12–9) – CSDN (I10–29)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CSDN (H12–9) or CSDN (I10–29) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A94/561 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.

Upon receiving a boost converter gate shutdown signal from the HV control ECU, the boost converter forcefully stops the operation of the boost converter by turning OFF the power transistors that are actuating the boost converter.

The HV control ECU monitors the boost converter gate shutdown signal and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	561	Abnormal boost converter gate shutdown (CSDN) signal	• Wire harness or connector • HV control ECU

WIRING DIAGRAM

Refer to DTC P0A94 (INF 558) on page 05–513.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A94 (INF 561) and other DTCs are output

HINT:

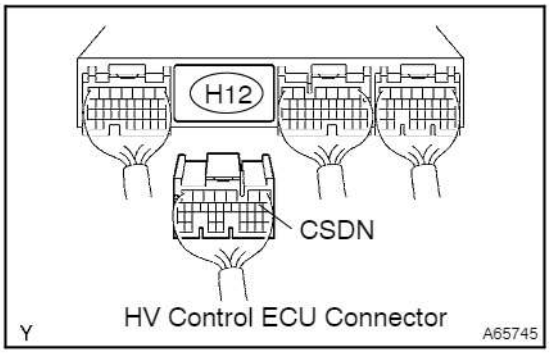
If any other codes besides P0A94 (INF 561) are output, perform troubleshooting for those DTCs first.

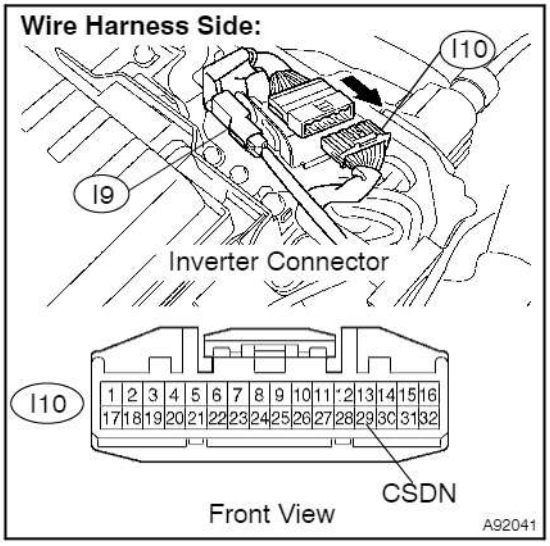
YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CSDN (H12–9) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CSDN (H12–9) – CSDN (I10–29)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CSDN (H12–9) or CSDN (I10–29) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

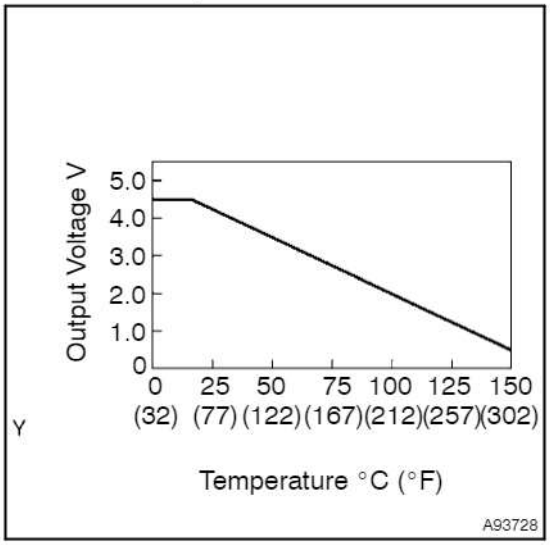
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DTC	P0A94/583	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/584	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.



The HV control ECU uses a temperature sensor, which is built into the boost converter, to detect the temperature of the boost converter.

The boost converter temperature sensor outputs a voltage, which varies between 0 and 5 V in accordance with the changes in the temperature. The higher the boost converter temperature, the lower the output voltage. Conversely, the lower the temperature, the higher the output voltage.

The HV control ECU limits the load based on the signals transmitted by the boost converter temperature sensor, in order to prevent the boost converter from overheating. Furthermore, the HV control ECU detects malfunction in the wiring of the boost converter temperature sensor, as well as in the sensor itself.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	583	Open or GND short in boost converter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P0A94	584	+B short in boost converter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

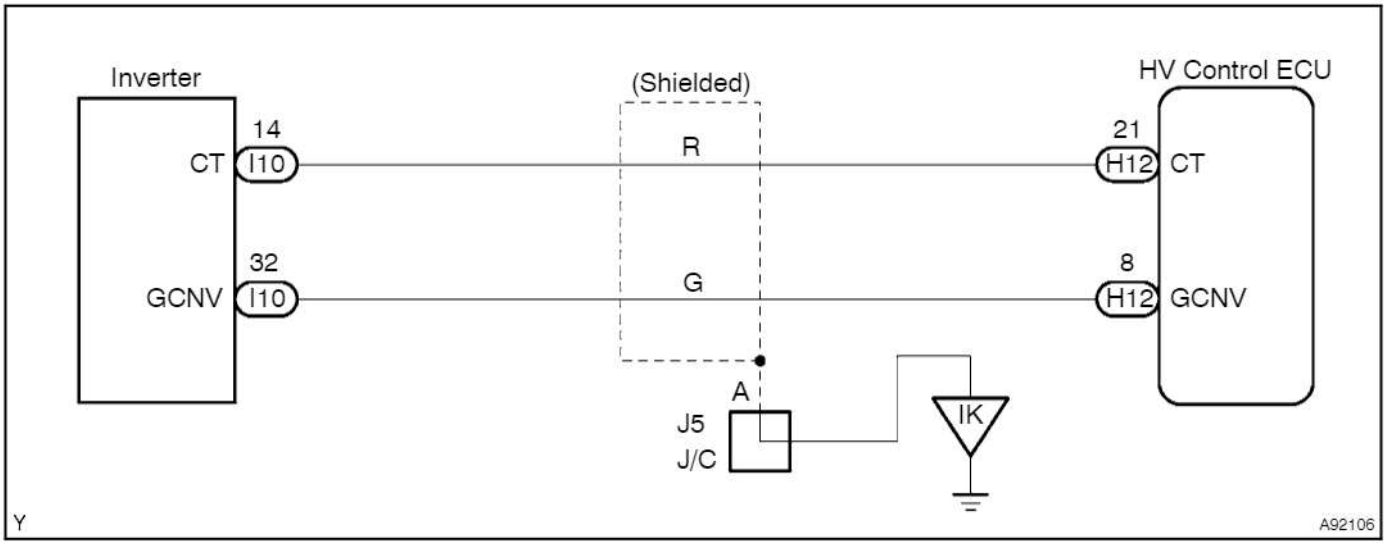
HINT:

After confirming DTC P0A94 (INF 583 or 584), confirm Converter Temperature in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–50°C (–58°F)	+B short circuit
205°C (401°F)	Open or GND short circuit

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WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ VALUE OF INTELLIGENT TESTER II(CONVERTER TEMPERATURE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Converter Temperature value on the intelligent tester II.

Result:

Temperature Displayed	Proceed to
–50°C (–58°F)	A
205°C (401°F)	B
–49°C to 204°C (–57°F to 400°F)	C

HINT:

- If there is a +B short circuit, the intelligent tester II indicates –50°C (–58°F).
- If there is an open or GND short circuit, the intelligent tester II indicates 205°C (401°F).

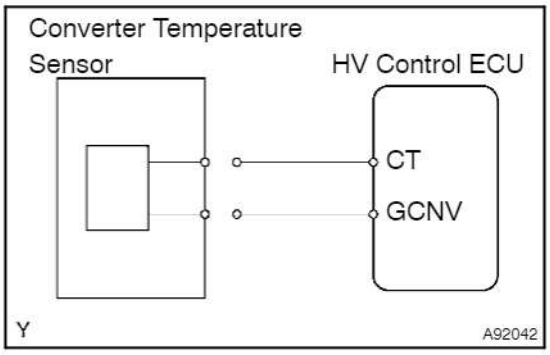
B → **Go to step 4**

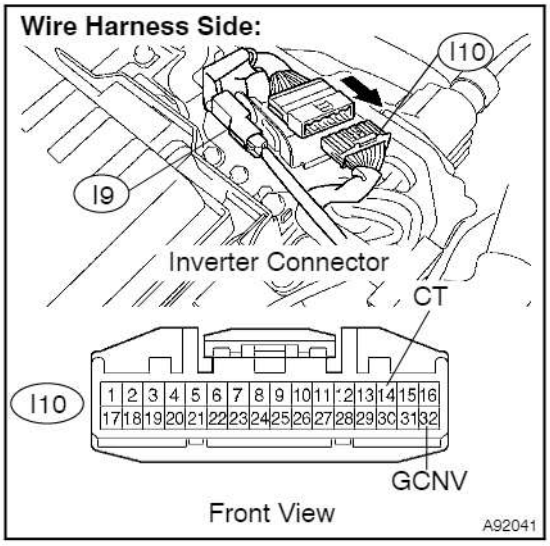
C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN WIRE HARNESS)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the I10 inverter connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the Converter Temperature value on the intelligent tester II.
Standard: 205°C (401°F)
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

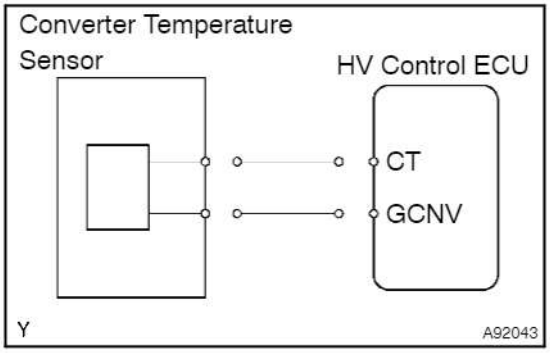
NG → **Go to step 3**

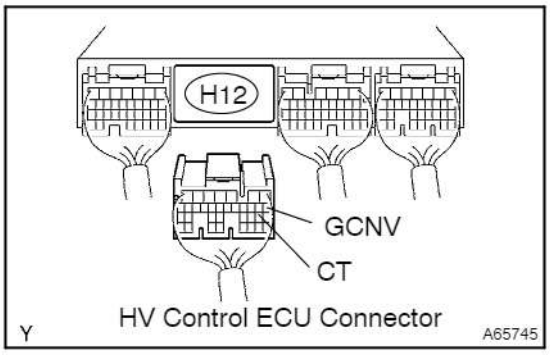
OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H12 HV control ECU connector.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Converter Temperature value on the intelligent tester II.

Standard: 205°C (401°F)

(e) Reconnect the HV control ECU connector.

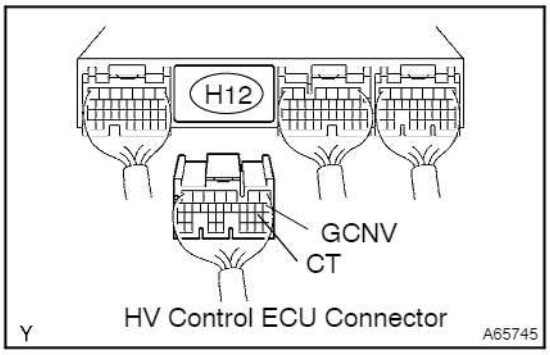
NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

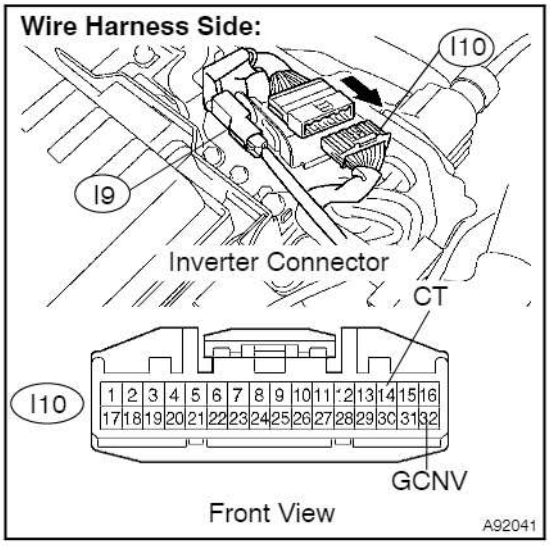
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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4	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

(d) Disconnect the H12 HV control ECU connector.

(e) Disconnect the I10 inverter connector.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CT (H12–21) – CT (I10–14)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CT (H12–21) or CT (I10–14) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(g) Reconnect the inverter connector.

(h) Reconnect the HV control ECU connector.

(i) Reinstall the inverter cover (see page 21–25).

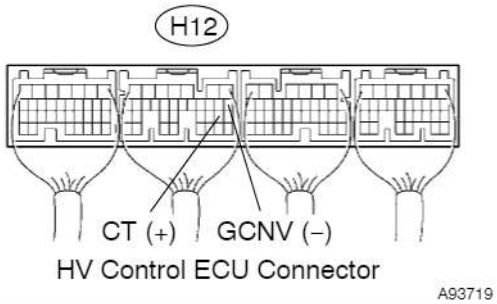
(j) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	INSPECT HYBRID VEHICLE CONTROL ECU(CT VOLTAGE)



(a) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H12 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
CT (H12–21) – GCNV (H12–8)	2.0 to 4.5 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0A94/585	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P0A94 (INF 589) on page 05–531.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	585	Boost converter voltage (VL) sensor performance problem	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A94 (INF 589) on page 05–531.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P0A94 (INF 585) and other DTCs are output

HINT:

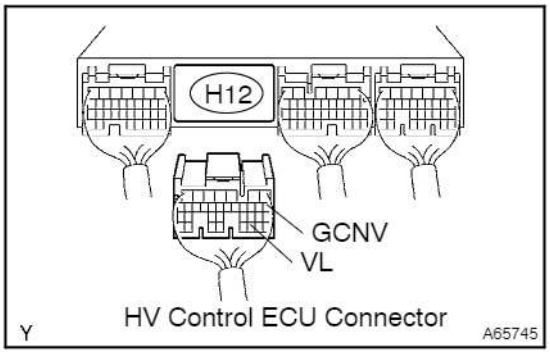
If any other codes besides P0A94 (INF 585) are output, perform troubleshooting for those DTCs first.

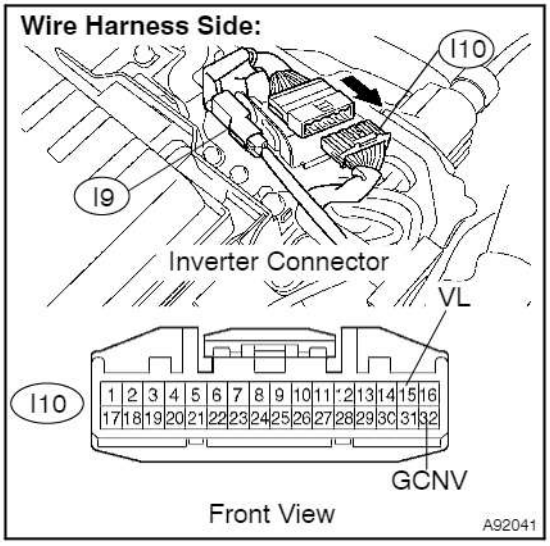
YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VL (H12–30) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VL (H12–30) – VL (I10–15)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VL (H12–30) or VL (I10–15) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC P0A94/587 DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.

The HV control ECU uses two voltage sensors, VL and VB, to detect voltage levels. The VL sensor that has been built into the boost converter is used to detect the high voltage before it is boosted. The VB sensor that has been built into the battery ECU is used to detect voltage of the HV battery.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	587	Difference between voltages from HV battery voltage (VB) sensor and boost converter voltage (VL) sensor is large	• Wire harness or connector • w/ converter inverter assembly • Service plug grip • High voltage fuse • Battery ECU

WIRING DIAGRAM

Refer to DTC P0A94 (INF 589) on page 05–531.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
Only DTC P0A94 (INF 587)	A
DTCs P0A94 (INF 587), and P0A1F (INF 129) (HV battery voltage circuit malfunction)	B
DTCs P0A94 (INF 587), and P0A94 (INF 442) (Abnormal voltage execution value)	C
DTCs P0A94 (INF 587), and P0A94 (INF 585) (Boost converter voltage (VL) sensor performance problem)	D
DTCs other than above	E

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B	GO TO DTC P0A1F/129 (See page 05–330)
C	Go to step 4
D	GO TO DTC P0A94/585 (See page 05–523)
E	AFTER PERFORMING STEP 4, GO TO RELEVANT DTC CHART (See page 05–268)

A

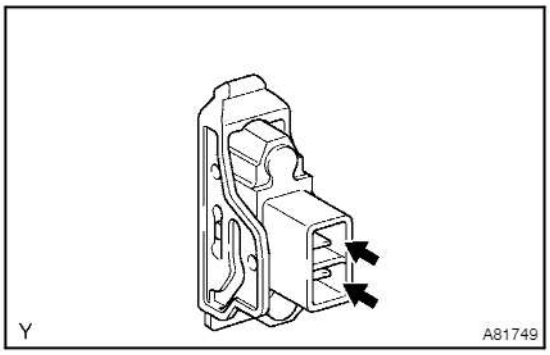
2 READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTCs are output

YES	GO TO RELEVANT DTC CHART (See page 05–665)

NO

3 INSPECT SERVICE PLUG GRIP



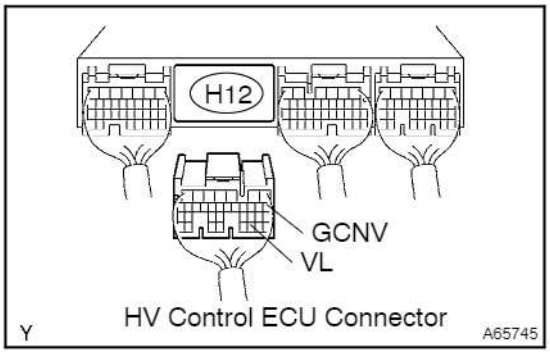
CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Check the resistance between the terminals of the service plug grip.
Standard: Below 1 Ω
(d) Reinstall the service plug grip (see page 21–120).

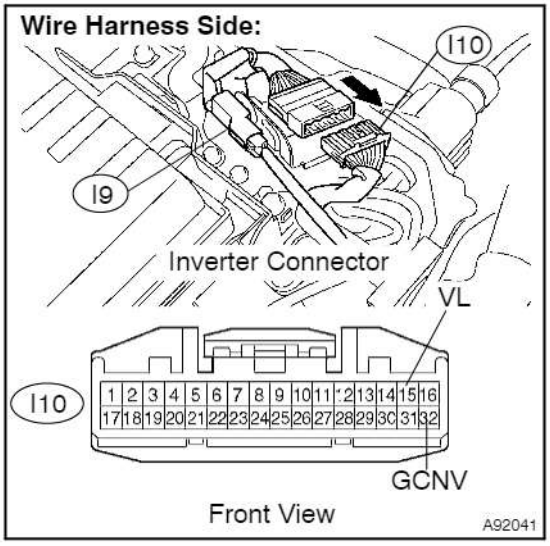
NG	Go to step 6

OK

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4	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VL (H12–30) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VL (H12–30) – VL (I10–15)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VL (H12–30) or VL (I10–15) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	CHECK OUTPUT DTC

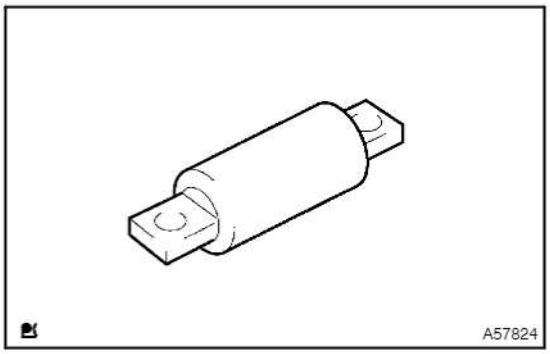
(a) Proceed to A if only DTC P0A94 (INF 587) is output as a result of DTC reading in step 1.
(b) Proceed to B if DTCs P0A94 (INF 587) and P0A94 (INF 442) are output as a result of DTC reading in step 1.

B → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

A

REPLACE W/CONVERTER INVERTER ASSY AND BATTERY ECU ASSY (See page 21–25 and 21–100)

6	INSPECT HIGH VOLTAGE FUSE



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Remove the high voltage fuse (see page 21–120).

HINT:
The high voltage fuse is enclosed in the service plug grip.

(b) Check the resistance between the terminals of the high voltage fuse.
Standard: Below 1 Ω
(c) Reinstall the high voltage fuse (see page 21–120).

NG → **REPLACE HIGH VOLTAGE FUSE**

OK

REPLACE SERVICE PLUG GRIP

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DTC	P0A94/588	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

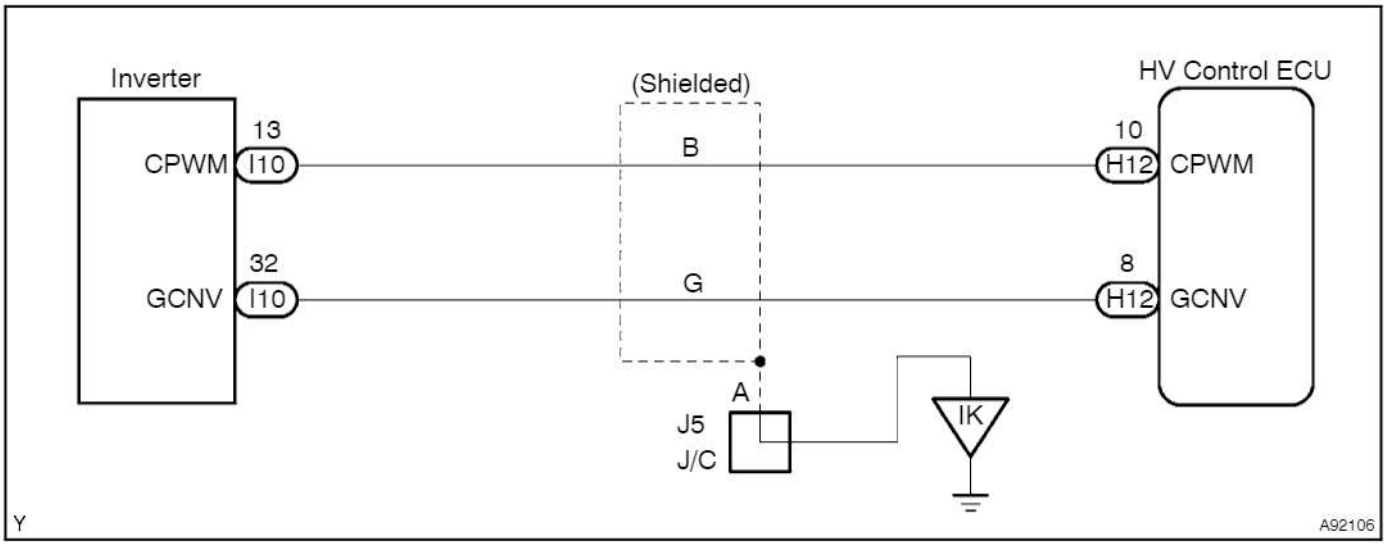
See the description of the boost converter on page 05–477.

The boost converter switches the power transistors ON and OFF in accordance with the power transistor actuation signals received from the HV control ECU, in order to change the current that flows into the reactor. Also, the boost converter regulates the duration of the switching time through PWM (Pulse Width Modulation) control, in order to control the boosting voltage.

The HV control ECU monitors the boost converter PWM circuit and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	588	Abnormality in boost converter PWM circuit	• Wire harness or connector • w/ converter inverter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

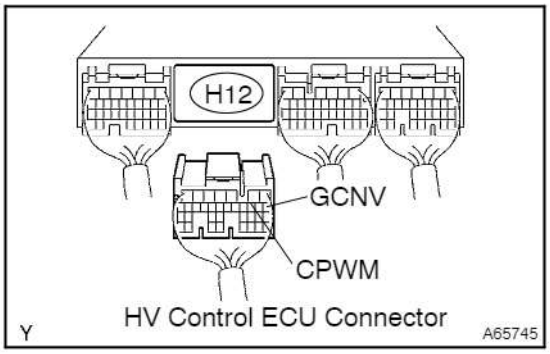
- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

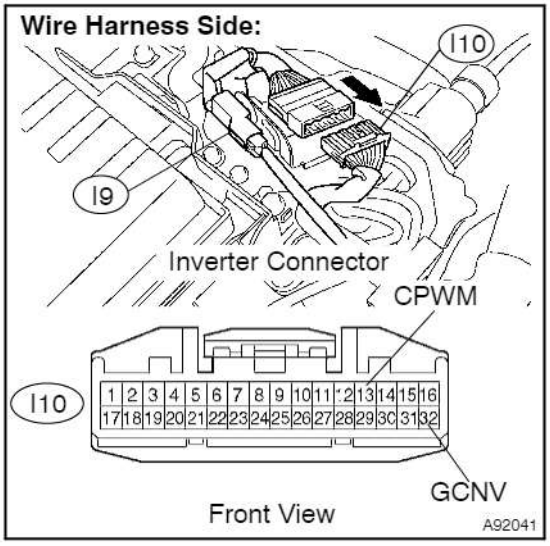
HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see page 21–25).
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CPWM (H12–10) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CPWM (H12–10) – CPWM (I10–13)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CPWM (H12–10) or CPWM (I10–13) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–120)

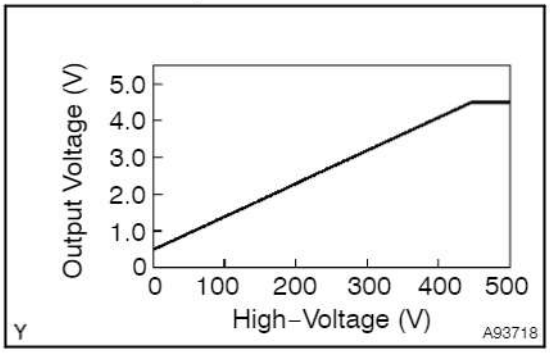
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DTC	P0A94/589	DC/DC CONVERTER PERFORMANCE

DTC	P0A94/590	DC/DC CONVERTER PERFORMANCE

CIRCUIT DESCRIPTION

See the description of the boost converter on page 05–477.



The HV control ECU uses a voltage sensor, which has been built into the boost converter, to detect the high voltage before it is boosted and for boost control.

The boost converter voltage sensor outputs a voltage that varies between 0 and 5 V in accordance with the changes in the high voltage. The higher the high voltage, the higher the output voltage, and the lower the high voltage, the lower the output voltage.

The HV control ECU monitors a signal line of the boost converter voltage sensor and detects malfunction.

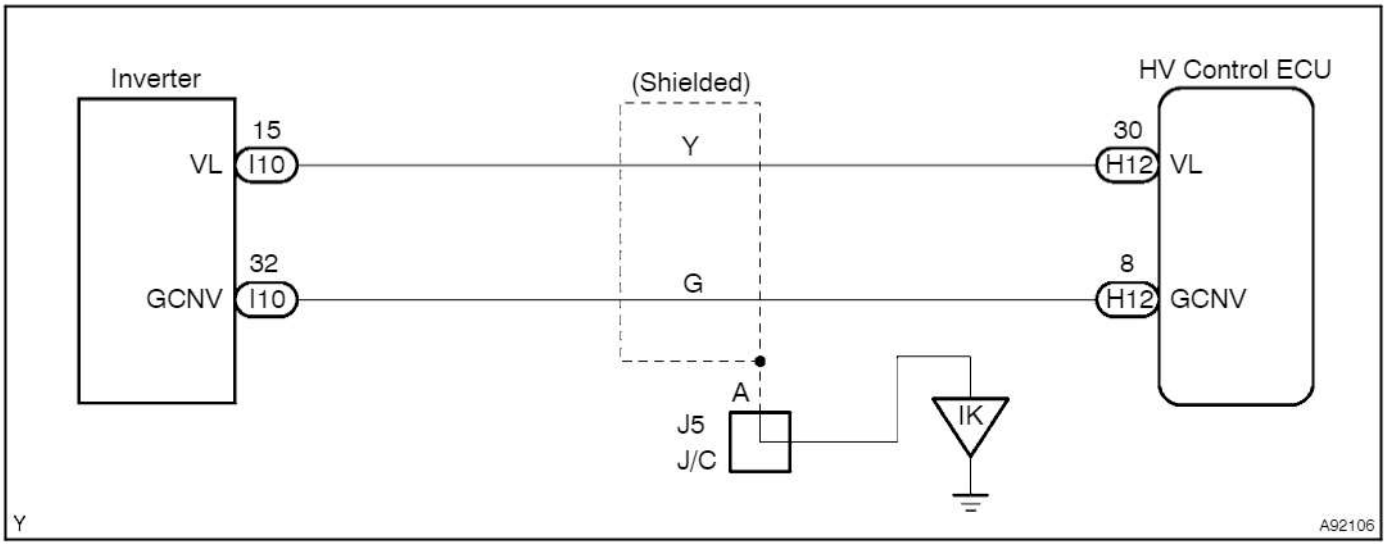
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	589	Open or GND short in boost converter voltage (VL) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P0A94	590	+B short in boost converter voltage (VL) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

HINT:

After confirming DTC P0A94 (INF 589 or 590), confirm VL–Voltage before Raise in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Voltage Displayed	Malfunction
510 V	+B short circuit
0 V	Open or GND short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ VALUE OF INTELLIGENT TESTER II(VL–VOLTAGE BEFORE RAISE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the VL–Voltage before Raise value on the intelligent tester II.

Result:

Voltage Displayed	Proceed to
510 V	A
0 V	B
1 to 509 V	C

HINT:

- If there is a +B short circuit, the intelligent tester II indicates 510 V.
- If there is an open GND short circuit, the intelligent tester II indicates 0 V.

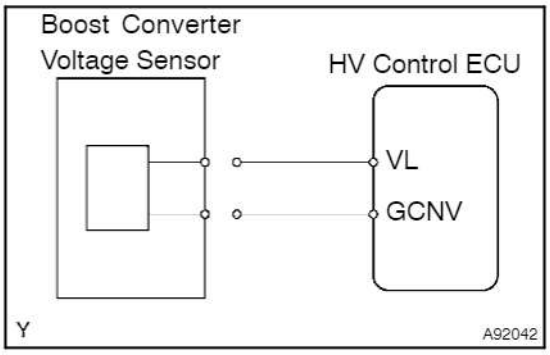
B → **Go to step 4**

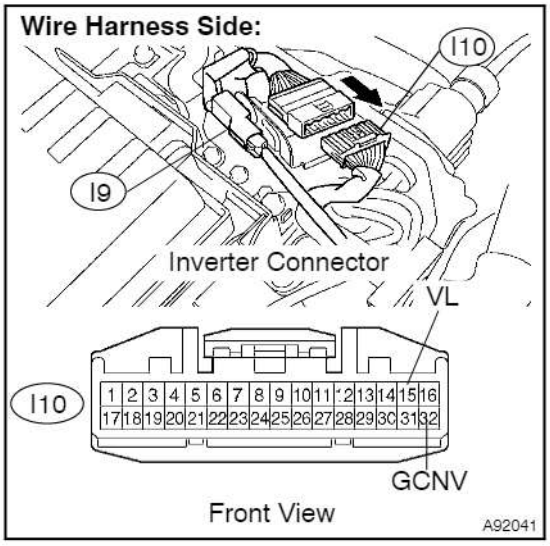
C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN WIRE HARNESS)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the I10 inverter connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the VL–Voltage before Raise value on the intelligent tester II.
Standard: 0 V
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

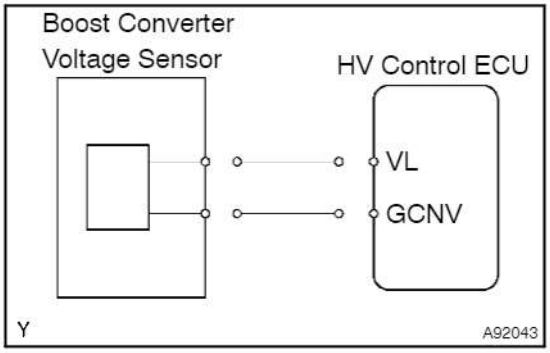
NG	Go to step 3

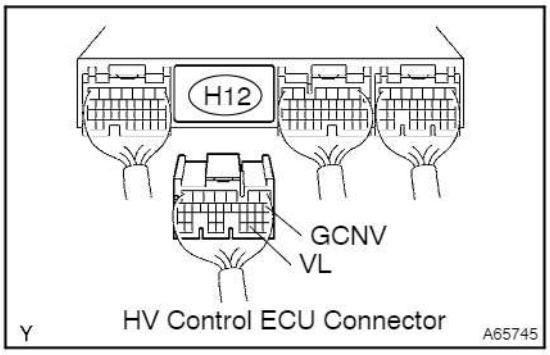
OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H12 HV control ECU connector.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the VL–Voltage before Raise value on the intelligent tester II.
Standard: 0 V
(e) Reconnect the HV control ECU connector.

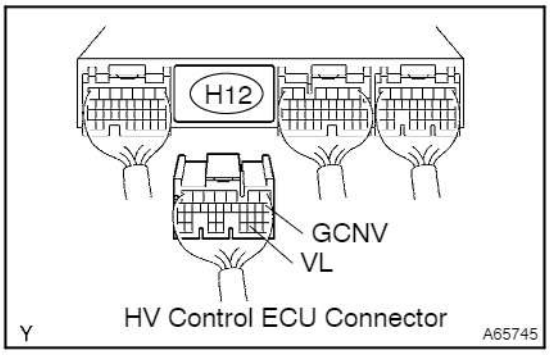
NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

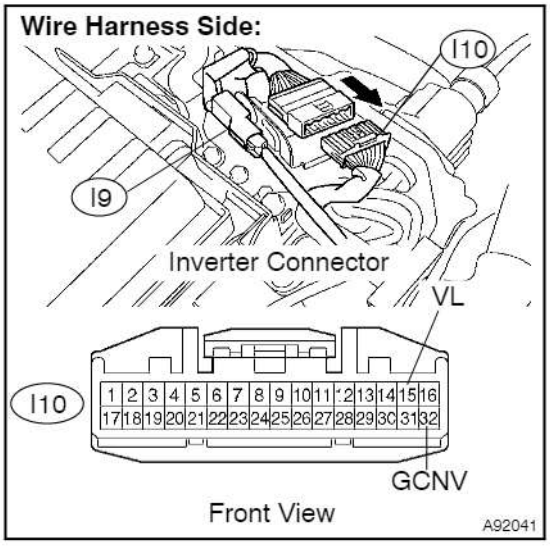
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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4	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

(d) Disconnect the H12 HV control ECU connector.

(e) Disconnect the I10 inverter connector.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VL (H12–30) – VL (I10–15)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VL (H12–30) or VL (I10–15) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(g) Reconnect the inverter connector.

(h) Reconnect the HV control ECU connector.

(i) Reinstall the inverter cover (see page 21–25).

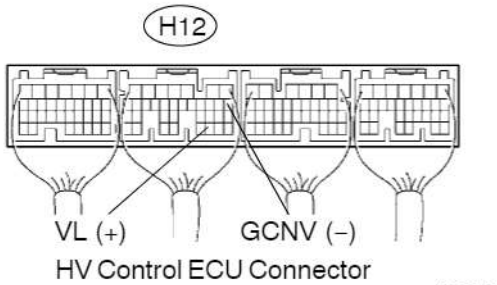
(j) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	INSPECT HYBRID VEHICLE CONTROL ECU(VL VOLTAGE)



(a) Turn the power switch ON (READY).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H12 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
VL (H12–30) – GCNV (H12–8)	1.9 to 3.4 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

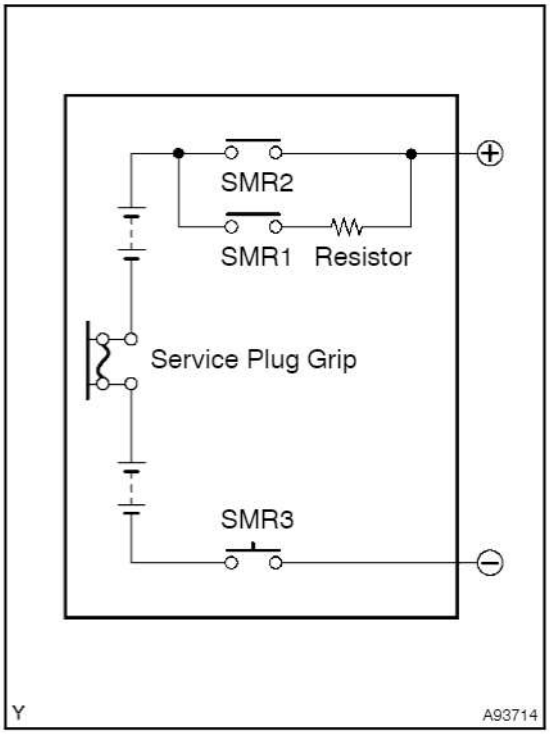
REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0AA1/224	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK CLOSED

DTC	P0AA2/225	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK OPEN

CIRCUIT DESCRIPTION



The SMRs (System Main Relays) connect and disconnect the high–voltage power supply circuit in accordance with requests from the HV control ECU. To ensure a reliable operation, they consists of a total of three relays (one for the negative side and two for the positive side).

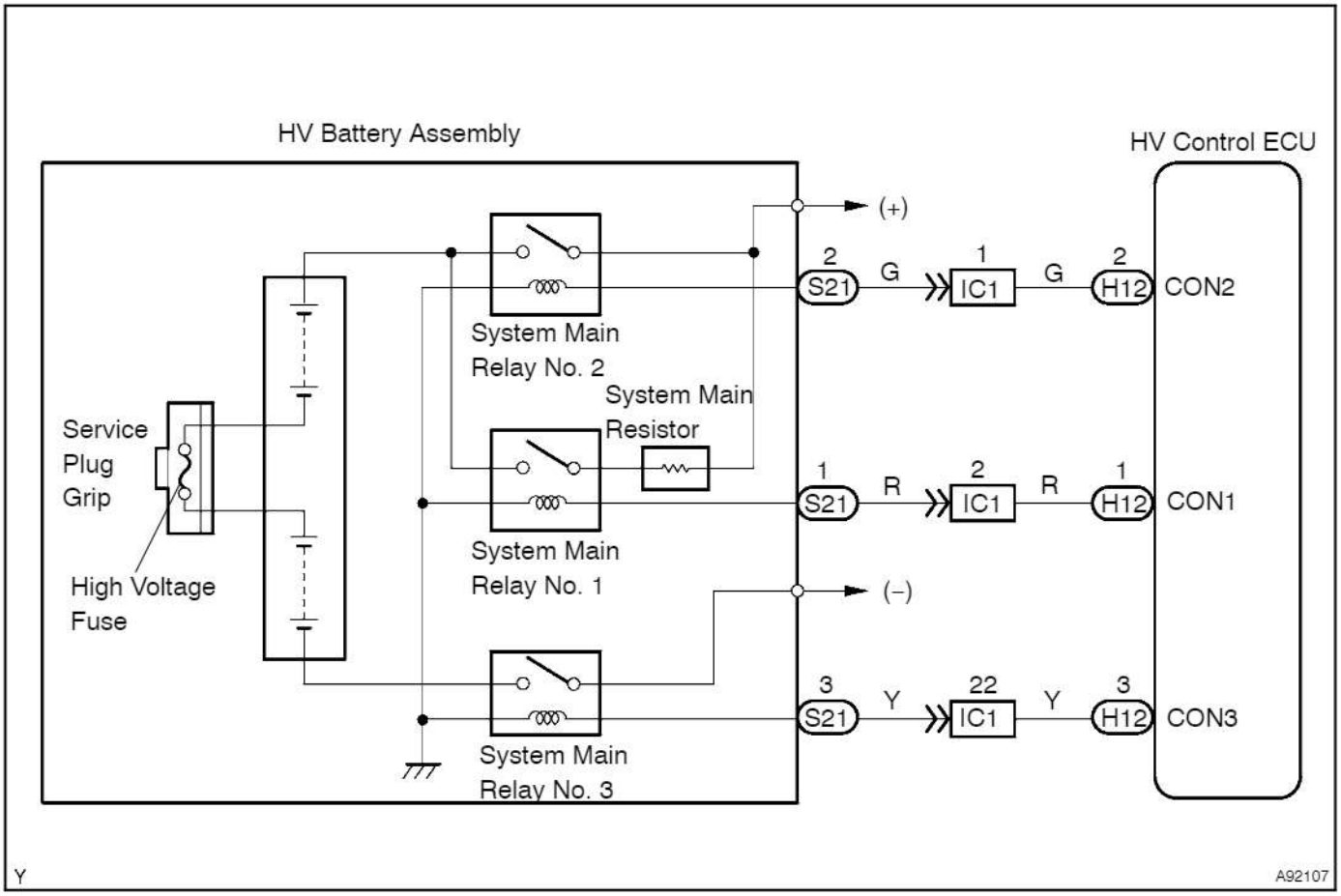
To connect, SMR1 and SMR3 turn ON initially. Then, SMR2 turns ON and SMR1 turns OFF. This process protects the circuit from the high–voltage surge current by allowing the limit current to flow via the resistor. To disconnect, SMR2 and SMR3 turn OFF in that order. The HV control ECU checks that the relays have turned OFF properly.

The HV control ECU monitors the proper operation of the SMRs (CON1, CON2 and CON3) to check for malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	224	Open or +B short in system main relay No. 1 circuit	• Wire harness or connector • System main relay No. 1 • HV control ECU
P0AA2	225	GND short in system main relay No. 1 circuit	• Wire harness or connector • System main relay No. 1 • HV control ECU

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WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

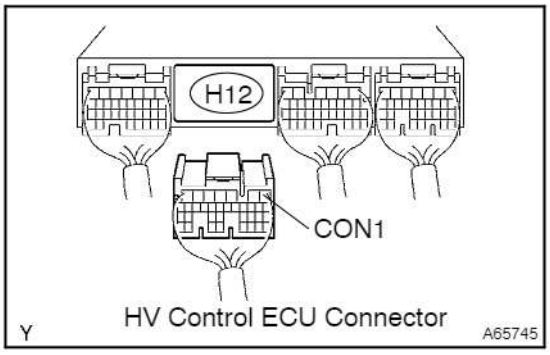
1	**INSPECT SYSTEM MAIN RELAY NO.1 (See page 21–42)**

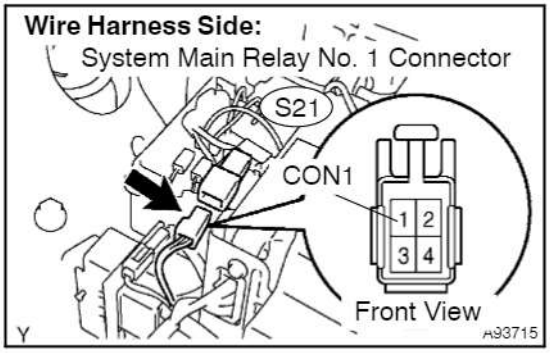
NG → **REPLACE SYSTEM MAIN RELAY NO.1 (See page 21–85)**

OK

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – SYSTEM MAIN RELAY NO.1)





CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see page 21–120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.

(d) Disconnect the S21 system main relay No. 1 connector.

(e) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with the service plug grip removed.

(f) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CON1 (H12–1) – Body ground	Below 1 V

(g) Turn the power switch OFF.

(h) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CON1 (H12–1) – CON1 (S21–1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CON1 (H12–1) or CON1 (S21–1) – Body ground	10 kΩ or higher

(i) Reconnect the system main relay No. 1 connector.

(j) Reconnect the HV control ECU connector.

(k) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0AA1/226	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK CLOSED

DTC	P0AA2/227	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK OPEN

CIRCUIT DESCRIPTION

Refer to DTC P0AA1 (INF 224) on page 05–537.

The HV control ECU monitors the proper operation of the system main relay No. 2 (CON2) to check for malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	226	Open or +B short in system main relay No. 2 circuit	• Wire harness or connector • System main relay No. 2 • HV control ECU
P0AA2	227	GND short in system main relay No. 2 circuit	• Wire harness or connector • System main relay No. 2 • HV control ECU

WIRING DIAGRAM

Refer to DTC P0AA1 (INF 224) on page 05–537.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

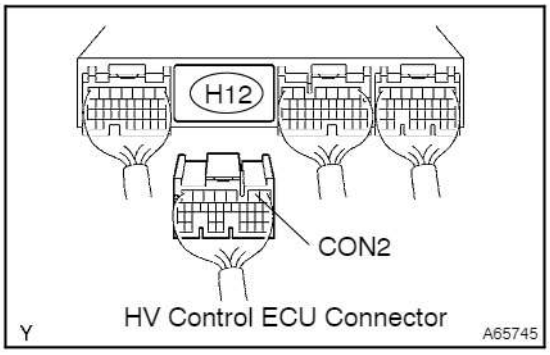
1	INSPECT SYSTEM MAIN RELAY NO.2 (See page 21–42)

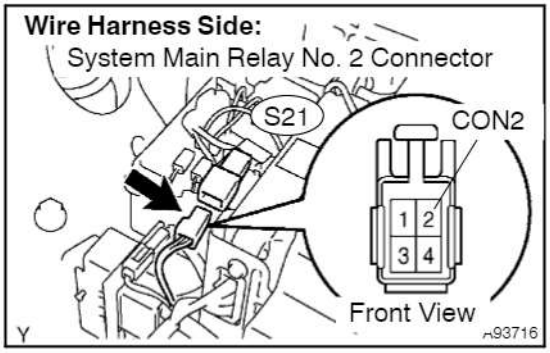
NG → REPLACE SYSTEM MAIN RELAY NO.2 (See page 21–89)

OK

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – SYSTEM MAIN RELAY NO. 2)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Disconnect the S21 system main relay No. 2 connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with the service plug grip removed.

(f) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CON2 (H12–2) – Body ground	Below 1 V

(g) Turn the power switch OFF.
(h) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CON2 (H12–2) – CON2 (S21–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CON2 (H12–2) or CON2 (S21–2) – Body ground	10 kΩ or higher

(i) Reconnect the system main relay No. 2 connector.
(j) Reconnect the HV control ECU connector.
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0AA1/231	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK CLOSED

CIRCUIT DESCRIPTION

Refer to DTC P0AA1 (INF 224) on page 05–537.

Because it might be impossible to shut off the high–voltage system if either of the system main relay No. 1 and No. 2 becomes stuck, the HV control ECU monitors the two relays and stops the system if malfunction is found in either relay.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	231	System main relay terminal of HV battery positive side stuck closed	• System main relay No. 1 • System main relay No. 2

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	INSPECT SYSTEM MAIN RELAY NO.1 (See page 21–42)

NG → REPLACE SYSTEM MAIN RELAY NO.1 (See page 21–85)

OK

REPLACE SYSTEM MAIN RELAY NO.2 (See page 21–89)

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DTC	P0AA1/233	HYBRID BATTERY POSITIVE CONTACTOR CIRCUIT STUCK CLOSED

CIRCUIT DESCRIPTION

Refer to DTC P0AA1 (INF 224) on page 05–537.

Because it might be impossible to shut off the high–voltage system if any one of the system main relay No. 1 to No. 3 becomes stuck, the HV control ECU monitors the three relays and stops the system if malfunction is found in either relay.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	233	System main relay terminals of HV battery positive and negative sides stuck closed	• System main relay No. 1 • System main relay No. 2 • System main relay No. 3

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	INSPECT SYSTEM MAIN RELAY NO.1 (See page 21–42)

NG → REPLACE SYSTEM MAIN RELAY NO.1 (See page 21–85)

OK

2	INSPECT SYSTEM MAIN RELAY NO.2 (See page 21–42)

NG → REPLACE SYSTEM MAIN RELAY NO.2 (See page 21–89)

OK

REPLACE SYSTEM MAIN RELAY NO.3 (See page 21–92)

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DTC	P0AA4/228	HYBRID BATTERY NEGATIVE CONTACTOR CIRCUIT STUCK CLOSED

DTC	P0AA5/229	HYBRID BATTERY NEGATIVE CONTACTOR CIRCUIT STUCK OPEN

CIRCUIT DESCRIPTION

Refer to DTC P0AA1 (INF 224) on page 05–537.

The HV control ECU monitors the proper operation of the system main relay No. 3 (CON3) to check for malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA4	228	Open or +B short in system main relay No. 3 circuit	• Wire harness or connector • System main relay No. 3 • HV control ECU
P0AA5	229	GND short in system main relay No. 3 circuit	• Wire harness or connector • System main relay No. 3 • HV control ECU

WIRING DIAGRAM

Refer to DTC P0AA1 (INF 224) on page 05–537.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

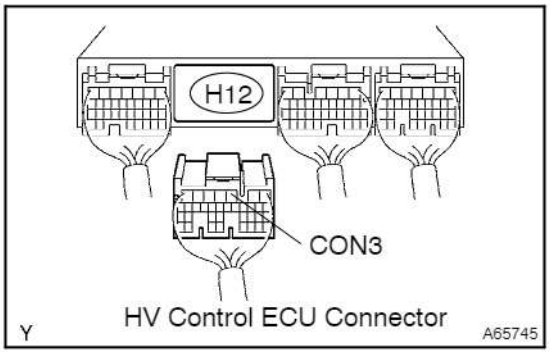
1	INSPECT SYSTEM MAIN RELAY NO.3 (See page 21–42)

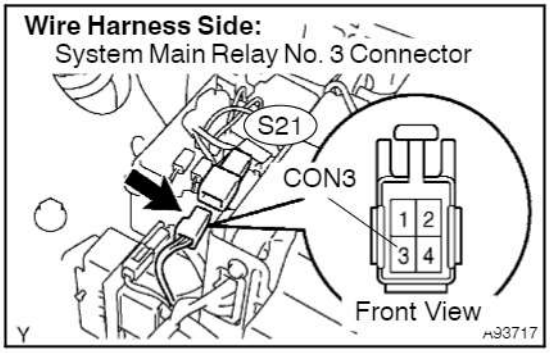
NG → REPLACE SYSTEM MAIN RELAY NO.3 (See page 21–92)

OK

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – SYSTEM MAIN RELAY NO. 3)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.
(d) Disconnect the S21 system main relay No. 3 connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with the service plug grip removed.

(f) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CON3 (H12–3) – Body ground	Below 1 V

(g) Turn the power switch OFF.
(h) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CON3 (H12–3) – CON3 (S21–3)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CON3 (H12–3) or CON3 (S21–3) – Body ground	10 kΩ or higher

(i) Reconnect the system main relay No. 3 connector.
(j) Reconnect the HV control ECU connector.
(k) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P0AA4/232	HYBRID BATTERY NEGATIVE CONTACTOR CIRCUIT STUCK CLOSED

CIRCUIT DESCRIPTION

Refer to DTC P0AA1 (INF 224) on page 05–537.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AA4	232	System main relay terminal of HV battery negative side stuck closed	• System main relay No. 3

INSPECTION PROCEDURE

If the information (INF) code is present, replace the system main relay No. 3.

REPLACE SYSTEM MAIN RELAY NO. 3 (See page 21–92)

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DTC	P2120/111	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT

DTC	P2121/106	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT RANGE/PERFORMANCE

DTC	P2121/114	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT RANGE/PERFORMANCE

DTC	P2125/112	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT

DTC	P2126/109	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT RANGE/PERFORMANCE

DTC	P2138/110	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D”/”E” VOLTAGE CORRELATION

HINT:
This is the repair procedure for the accelerator pedal position sensor.

CIRCUIT DESCRIPTION

Refer to DTC P2122 (INF 104) on page 05–548.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P2120	111	Accelerator pedal position main sensor value does not change while its sub sensor value changes	• Accelerator pedal rod assembly
P2121	106	Internal error of accelerator pedal position main sensor	• Accelerator pedal rod assembly
P2121	114	Accelerator pedal not smoothly returning to its original position	• Accelerator pedal rod assembly
P2125	112	Accelerator pedal position sub sensor value does not change while its main sensor value changes	• Accelerator pedal rod assembly
P2126	109	Internal error of accelerator pedal position sub sensor	• Accelerator pedal rod assembly
P2138	110	Difference between main sensor value and sub sensor value is large	• Accelerator pedal rod assembly

INSPECTION PROCEDURE

If any of the above information (INF) code is present, replace the accelerator pedal rod assembly.

REPLACE ACCELERATOR PEDAL ROD ASSY (See page 21–131)

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DTC	P2122/104	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

DTC	P2123/105	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC	P2127/107	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

DTC	P2128/108	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

HINT:
This is the repair procedure for the accelerator pedal position sensor.

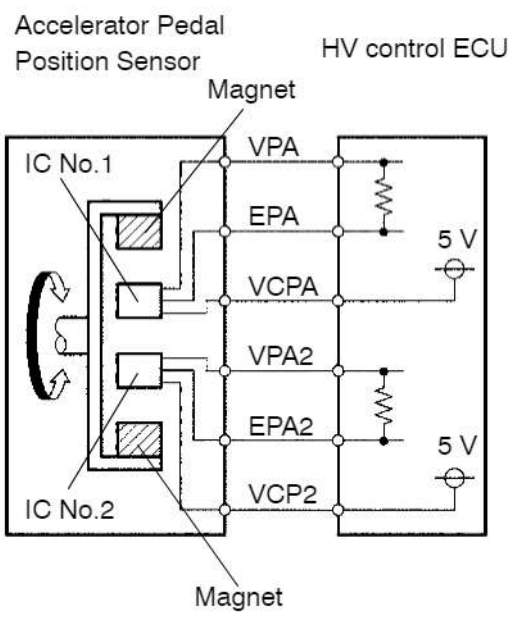
CIRCUIT DESCRIPTION

HINT:

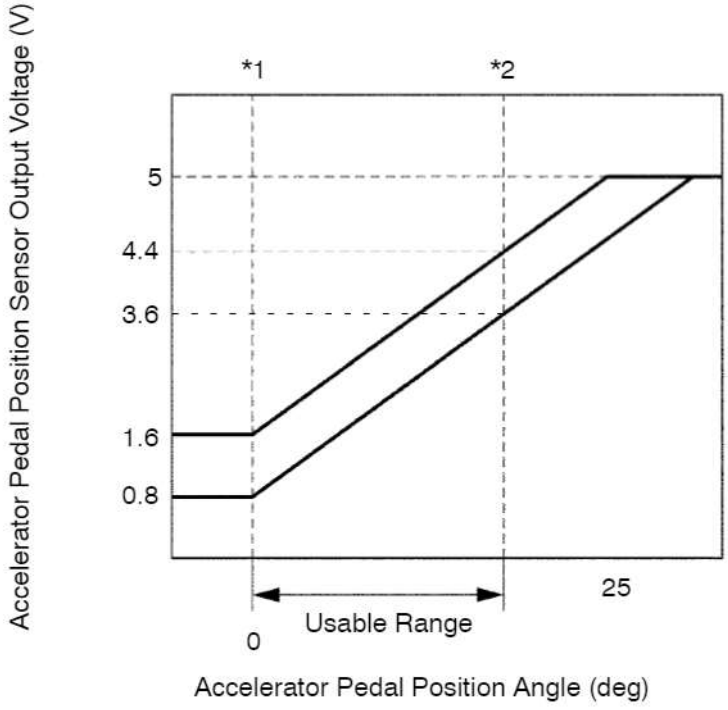
- This electrical throttle system does not use a throttle cable.
- This accelerator pedal position sensor is a non–contact type.

The accelerator pedal position sensor is mounted on the accelerator pedal to detect how much it is depressed. It has 2 sensor terminals (VPA and VPA2) to detect the accelerator pedal position and a malfunction of the accelerator pedal position sensor itself. Since this sensor is electronically controlled with hall elements, accurate control and reliability can be obtained.
In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the HV control ECU changes between 0 V and 5 V in proportion to the degree of depressing the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal position angle which is used for the HV system control, and the VPA2 is a signal to indicate the actual accelerator pedal position angle which is used for detecting a malfunction of the sensor itself (terminal VPA).
The HV control ECU judges how much the accelerator pedal is being depressed from the VPA and VPA2 signals, and controls the HV system based on the signals.

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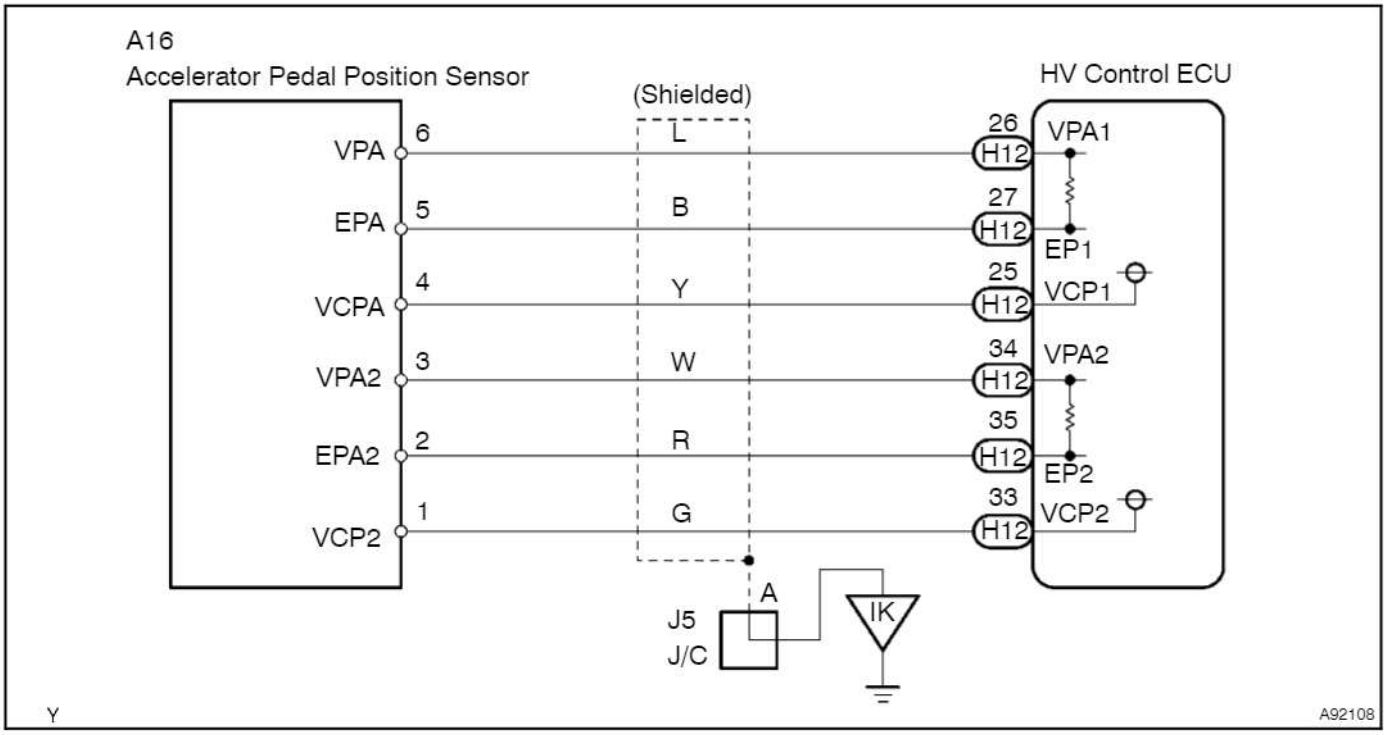
*1: Accelerator Pedal Released
*2: Accelerator Pedal Fully Depressed

A19803

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P2122	104	Open or GND short in accelerator pedal position main sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU
P2123	105	+B short in accelerator pedal position main sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU
P2127	107	Open or GND short in accelerator pedal position sub sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU
P2128	108	+B short in accelerator pedal position sub sensor circuit	• Wire harness or connector • Accelerator pedal rod assembly • HV control ECU

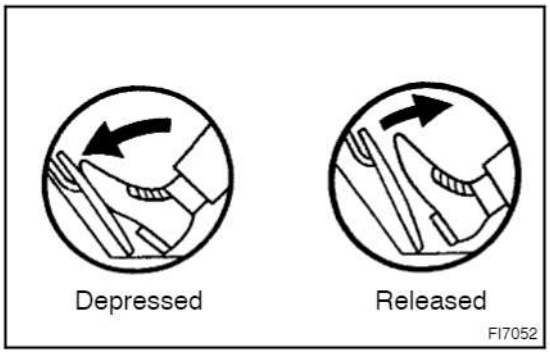
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II(ACCEL PEDAL POS #1 AND #2)



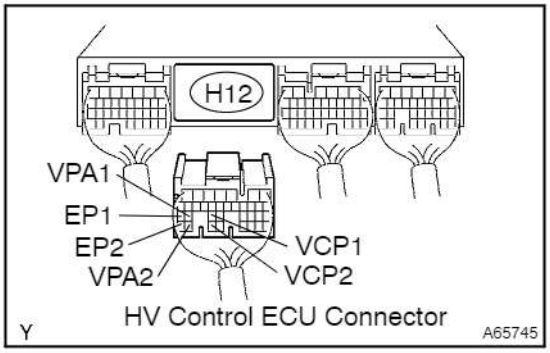
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Accelerator Pedal Pos #1 and #2 values on the intelligent tester II with the engine stopped.
OK: Changes with accelerator pedal pressure

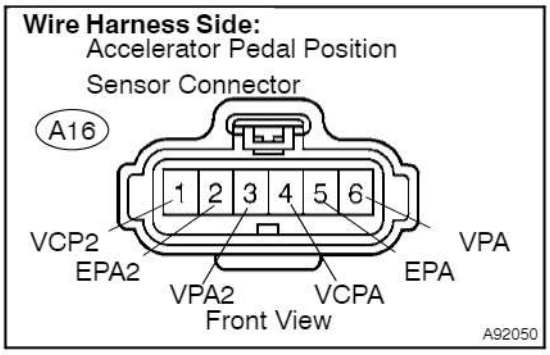
OK	Go to step 5

NG

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2 CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – ACCELERATOR PEDAL POSITION SENSOR)





(a) Disconnect the H12 HV control ECU connector.

(b) Disconnect the A16 accelerator pedal position sensor connector.

(c) Turn the power switch ON (IG).

(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VPA1 (H12–26) – Body ground	Below 1 V
VCP1 (H12–25) – Body ground	Below 1 V
EP1 (H12–27) – Body ground	Below 1 V
VPA2 (H12–34) – Body ground	Below 1 V
VCP2 (H12–33) – Body ground	Below 1 V
EP2 (H12–35) – Body ground	Below 1 V

(e) Turn the power switch OFF.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VPA1 (H12–26) – VPA (A16–6)	Below 1 Ω
VCP1 (H12–25) – VCPA (A16–4)	Below 1 Ω
EP1 (H12–27) – EPA (A16–5)	Below 1 Ω
VPA2 (H12–34) – VPA2 (A16–3)	Below 1 Ω
VCP2 (H12–33) – VCP2 (A16–1)	Below 1 Ω
EP2 (H12–35) – EPA2 (A16–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VPA1 (H12–26) or VPA (A16–6) – Body ground	10 kΩ or higher
VCP1 (H12–25) or VCPA (A16–4) – Body ground	10 kΩ or higher
EP1 (H12–27) or EPA (A16–5) – Body ground	10 kΩ or higher
VPA2 (H12–34) or VPA2 (A16–3) – Body ground	10 kΩ or higher
VCP2 (H12–33) or VCP2 (A16–1) – Body ground	10 kΩ or higher
EP2 (H12–35) or EPA2 (A16–2) – Body ground	10 kΩ or higher

(g) Reconnect the accelerator pedal position sensor connector.

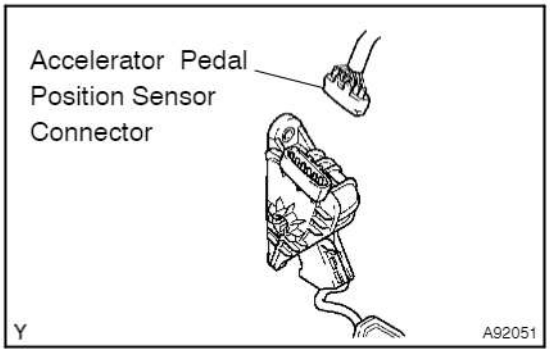
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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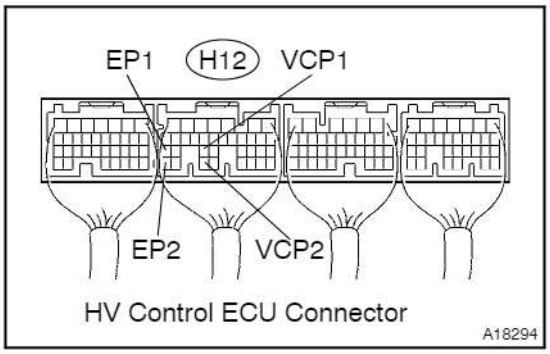
3 INSPECT HYBRID VEHICLE CONTROL ECU(VCP1 OR VCP2 VOLTAGE)



(a) Disconnect the A16 accelerator pedal position sensor connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the HV control ECU connector.
Standard:

Tester Connection	Specified Condition
VCP1 (H12–25) – EP1 (H12–27)	4.5 to 5.5 V
VCP2 (H12–33) – EP2 (H12–35)	4.5 to 5.5 V

(d) Reconnect the accelerator pedal position sensor connector.



NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

OK

4 REPLACE ACCELERATOR PEDAL ROD ASSY (See page 21–131)

GO

5 CHECK IF DTC OUTPUT RECURS(DTC P2122, P2123, P2127 OR P2128)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Perform a simulation test.
(f) Read DTCs.
Result: DTC P2122, P2123, P2127 or P2128 is not output again

YES → **SYSTEM OK**

NO

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P3000/123	BATTERY CONTROL SYSTEM MALFUNCTION

DTC	P3000/125	BATTERY CONTROL SYSTEM MALFUNCTION

DTC	P3000/603	BATTERY CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The HV control ECU gives warning to the driver and performs the fail–safe control, according to the abnormal signal received from the battery ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3000	123	Abnormal signal input from battery ECU (HV battery system malfunction)	• HV battery system • Battery ECU
P3000	125	Abnormal signal input from battery ECU (High voltage fuse blown out)	• HV battery system • Battery ECU
P3000	603	Abnormal signal input from battery ECU (HV battery cooling system malfunction)	• HV battery system • Battery ECU

INSPECTION PROCEDURE

HINT:

After repairing the malfunction, restart the system (to turn the READY lamp ON) and recheck the DTCs.

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART (See page 05–665)**

NO

REPLACE BATTERY ECU ASSY (See page 21–100)

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DTC	P3000/388	BATTERY CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

Based on the malfunction signal received from the battery ECU, the system alerts the driver and effects fail–safe control.
This DTC is output when the SOC (state of charge) of the HV battery decreases as a result of leaving the vehicle in the N position, running out of fuel, or malfunction in the HV control system.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3000	388	Abnormal signal input from battery ECU (discharge inhibition control malfunction)	• HV control system • Fuel shortage • HV battery assembly

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P3000 (INF 388) and other DTCs are output

HINT:
If any other codes besides P3000 (INF 388) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

2	CHECK AMOUNT OF GASOLINE

(a) Turn the power switch ON (IG).
(b) Check the amount of gasoline with the fuel gauge in the meter.
OK: Appropriate amount of gasoline

NG → **REFUEL GASOLINE**

OK

3	CHECK IF ENGINE STARTS

(a) Turn the power switch ON (READY).
(b) Check if the engine starts.
OK: The engine starts

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NO → REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

YES

LEAVE VEHICLE IN P POSITION, AND CHARGE HV BATTERY IN IDLE STATUS UNTIL IDLING STOPS

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DTC	P3000/389	BATTERY CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

Based on the malfunction signal received from the battery ECU, the system alerts the driver and effects fail–safe control.

This DTC is output if the HV battery is depleted or the HV control system has malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3000	389	Abnormal signal input from battery ECU (drop of high voltage)	• HV control system • HV battery assembly

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result: DTC P3000 (INF 389) and other DTCs are output

HINT:
If any other codes besides P3000 (INF 389) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART** (See page 05–268)

NO

2	CHECK IF ENGINE STARTS

(a) Turn the power switch ON (READY).
(b) Check if the engine starts.
OK: The engine starts

NG → **REPLACE HV SUPPLY BATTERY ASSY** (See page 21–56)

OK

LEAVE VEHICLE IN P POSITION, AND CHARGE HV BATTERY IN IDLE STATUS UNTIL IDLING STOPS

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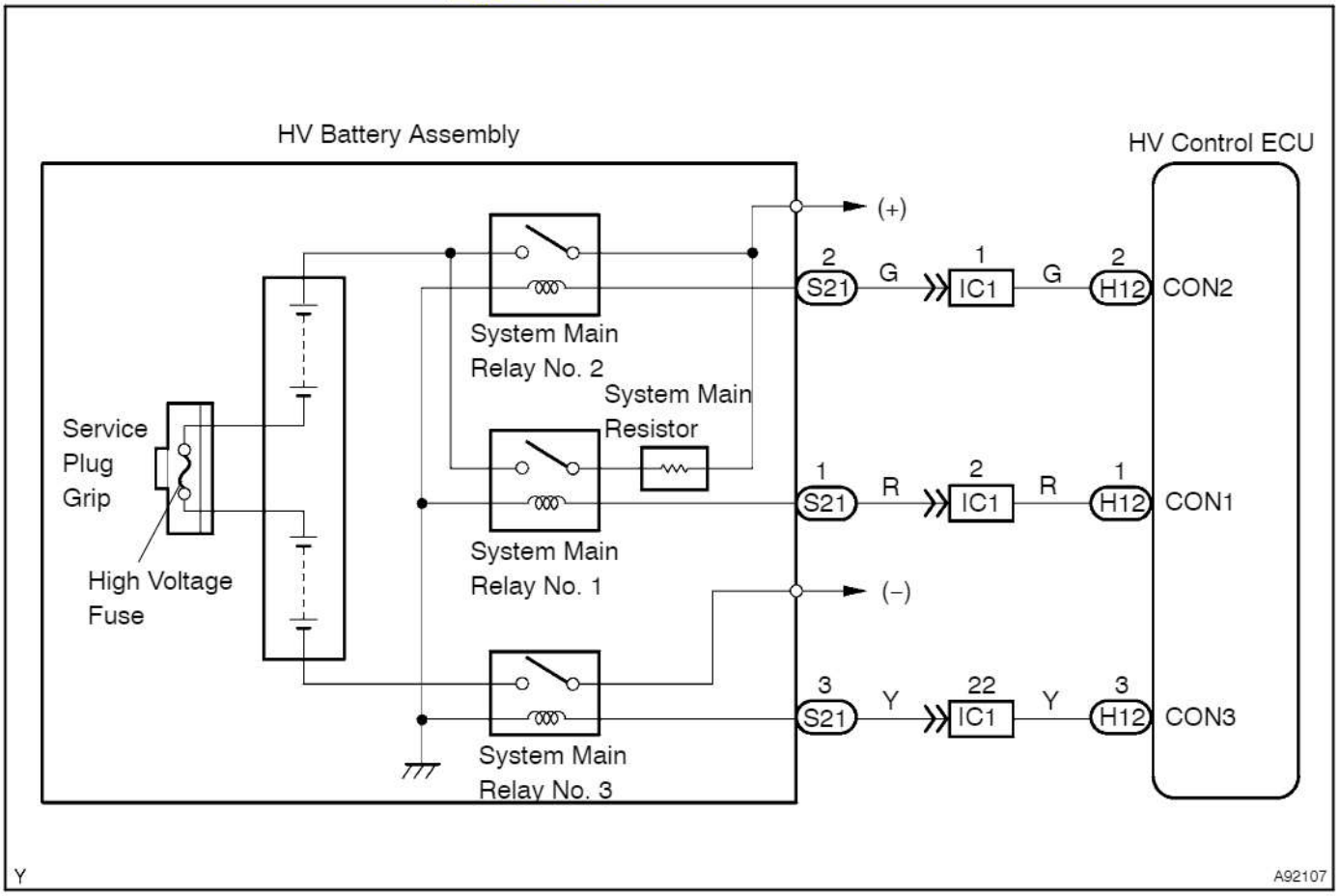
DTC	P3004/131	HIGH VOLTAGE POWER RESOURCE MALFUNCTION

CIRCUIT DESCRIPTION

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3004	131	High voltage fuse has blown out, service plug grip is disconnected or limiter resistance is cut off	• HV battery system • System main resistor • System main relay No. 1 • System main relay No. 3 • Main battery cable • Main battery cable No. 2 • Frame wire • w/ converter inverter assembly • HV control ECU

WIRING DIAGRAM

Refer to DTC P0A78 (INF 266) on page 05–365.



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

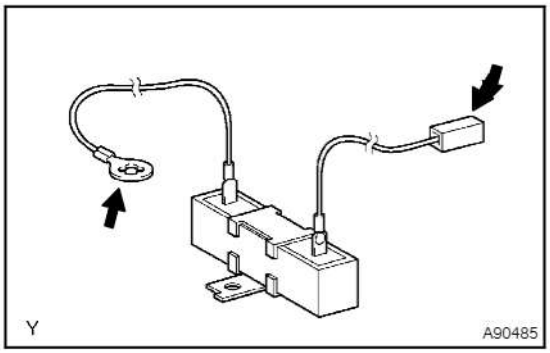
1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A95 is output

YES → **GO TO DTC P0A95 (See page 05–686)**

NO

2	INSPECT SYSTEM MAIN RESISTOR



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Remove the system main resistor (see page 21–94).
(b) Measure the resistance between the terminals.
Standard: 18 to 22 Ω
(c) Reinstall the system main resistor (see page 21–94).

NG → **REPLACE SYSTEM MAIN RESISTOR (See page 21–94)**

OK

3	INSPECT SYSTEM MAIN RELAY NO.1 (See page 21–42)

NG → **REPLACE SYSTEM MAIN RELAY NO.1 (See page 21–85)**

OK

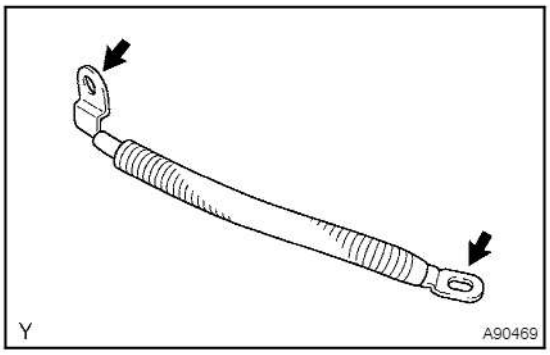
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4	INSPECT SYSTEM MAIN RELAY NO.3 (See page 21–42)

NG → REPLACE SYSTEM MAIN RELAY NO.3 (See page 21–92)

OK

5	INSPECT MAIN BATTERY CABLE



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the main battery cable (see page 21–68).
(c) Check the resistance between the terminals of the main battery cable.
Standard: Below 1 Ω

NG → REPLACE MAIN BATTERY CABLE

OK

6	INSPECT MAIN BATTERY CABLE

CAUTION:
Wear insulated gloves and goggles before performing the following operation.

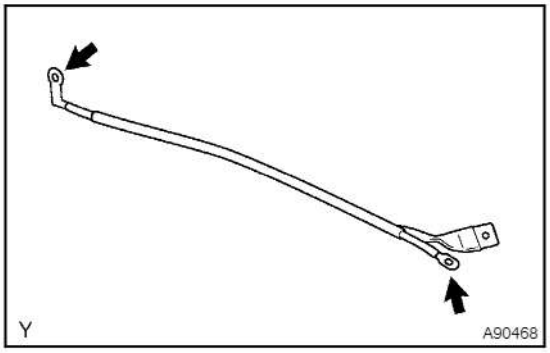
(a) Check the cover and terminals of the main battery cable for any abnormality.
OK: No abnormality is found on the cover and terminals.
(b) Check the terminals of the HV battery and the system main relay, which are to be connected to the main cable, for any abnormality.
OK: No abnormality is found on the terminals of the HV battery and system main relay.

NG → REPLACE MAIN BATTERY CABLE. IF NECESSARY, REPLACE HV BATTERY OR SYSTEM MAIN RELAY

OK

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7	INSPECT MAIN BATTERY CABLE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the main battery cable No. 2 with the HV battery assembly removed (see page 21–72).
(b) Check the resistance between the terminals of the main battery cable No. 2.
Standard: Below 1 Ω

NG	REPLACE MAIN BATTERY CABLE NO.2

OK

8	INSPECT MAIN BATTERY CABLE NO.2

CAUTION:
Wear insulated gloves and goggles before performing the following operation.

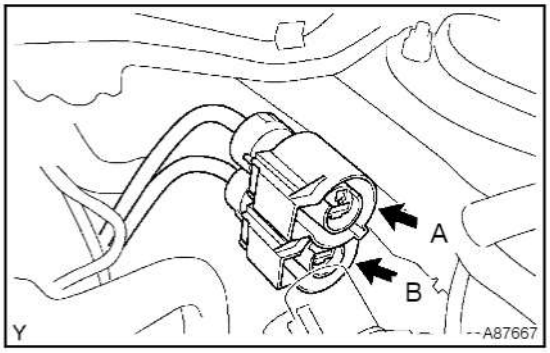
(a) Check the cover and terminals of the main battery cable No. 2 for any abnormality.
OK: No abnormality is found on the cover and terminals.
(b) Check the terminals of the HV battery and the system main relay, which are to be connected to the main battery cable No. 2, for any abnormality.
OK: No abnormality is found on the terminals of the HV battery and system main relay.

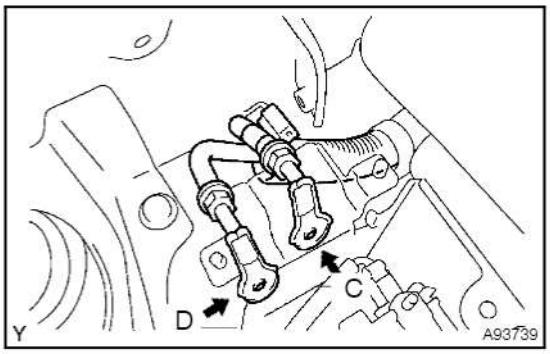
NG	REPLACE MAIN BATTERY CABLE NO. 2. IF NECESSARY, REPLACE HV BATTERY OR SYSTEM MAIN RELAY

OK

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9	INSPECT FRAME WIRE





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Disconnect the frame wire from the w/ converter inverter.
(b) Check that the frame wire has been disconnected from the system main relay.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the frame wire and body ground.
Standard:

Tester Connection	Specified Condition
A – Body ground	10 MΩ or higher
B – Body ground	10 MΩ or higher

(d) Check the resistance between the terminals of the frame wire.
Standard:

Tester Connection	Specified Condition
A – C	Below 1 Ω
B – D	Below 1 Ω

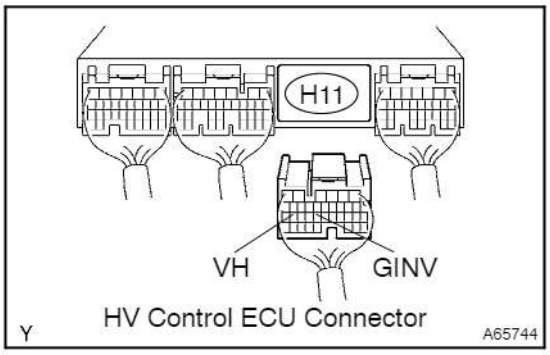
(e) Reinstall the HV battery assembly (see page 21–56).
(f) Reconnect the frame wire.

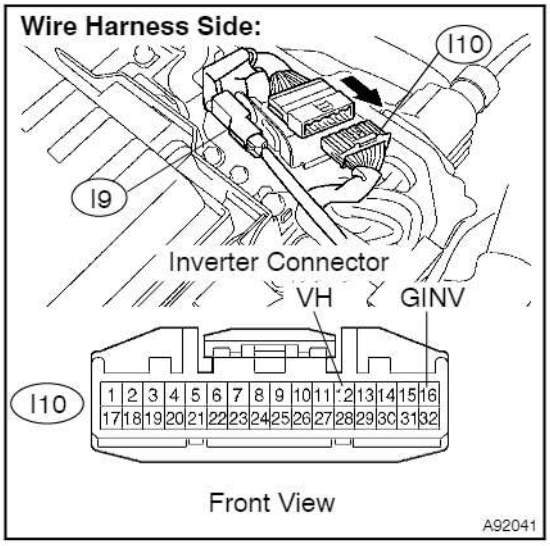
NG → **REPLACE FRAME WIRE**

OK

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10	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the H11 HV control ECU connector.
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for short):

Tester Connection	Specified Condition
VH (H11–26) or VH (I10–12) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

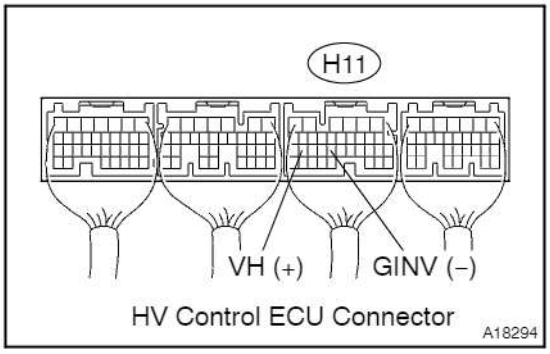
(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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11	INSPECT HYBRID VEHICLE CONTROL ECU(VH VOLTAGE)



(a) Turn the power switch ON (READY).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – GINV (H11–23)	1.6 to 3.8 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P3004/132	HIGH VOLTAGE POWER RESOURCE MALFUNCTION

CIRCUIT DESCRIPTION

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3004	132	Inverter voltage sensor malfunction, or limiter resistance increases	• HV control system • System main resistor • System main relay No. 1 • System main relay No. 3 • Main battery cable • Main battery cable No. 2 • Frame wire • w/ converter inverter assembly • HV control ECU

WIRING DIAGRAM

Refer to DTC P3004 (INF 131) on page 05–557.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC P3004 (INF 132) and other DTCs are output

HINT:

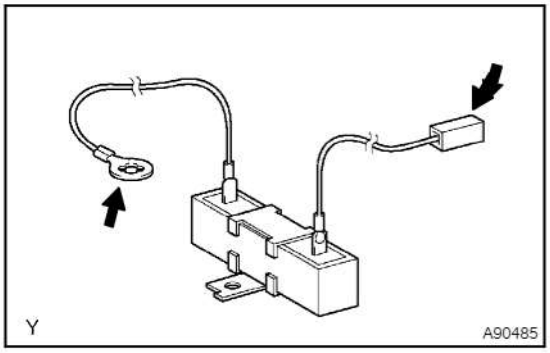
If any other codes besides P3004 (INF 132) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

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2	INSPECT SYSTEM MAIN RESISTOR



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the system main resistor (see page 21–94).
(b) Measure the resistance between the terminals.
Standard: 18 to 22 Ω
(c) Reinstall the system main resistor (see page 21–94).

NG → **REPLACE SYSTEM MAIN RESISTOR (See page 21–94)**

OK

3	INSPECT SYSTEM MAIN RELAY NO.1 (See page 21–42)

NG → **REPLACE SYSTEM MAIN RELAY NO.1 (See page 21–85)**

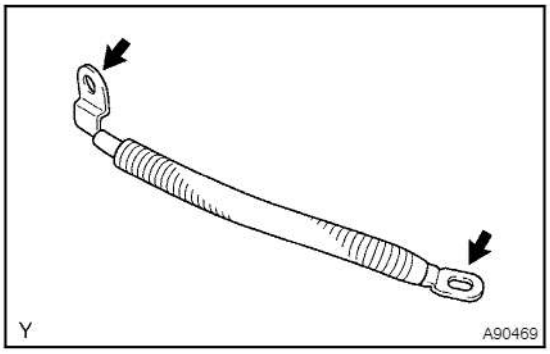
OK

4	INSPECT SYSTEM MAIN RELAY NO.3 (See page 21–42)

NG → **REPLACE SYSTEM MAIN RELAY NO.3 (See page 21–92)**

OK

5	INSPECT MAIN BATTERY CABLE



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the main battery cable (see page 21–68).
(c) Check the resistance between the terminals of the main battery cable.
Standard: Below 1 Ω

NG → **REPLACE MAIN BATTERY CABLE**

OK

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6	INSPECT MAIN BATTERY CABLE

CAUTION:
Wear insulated gloves and goggles before performing the following operation.

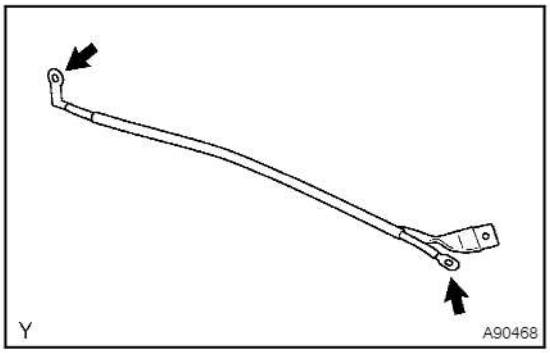
(a) Check the cover and terminals of the main battery cable for any abnormality.
OK: No abnormality is found on the cover and terminals.

(b) Check the terminals of the HV battery and the system main relay, which are to be connected to the main cable, for any abnormality.
OK: No abnormality is found on the terminals of the HV battery and system main relay.

NG → **REPLACE MAIN BATTERY CABLE. IF NECESSARY, REPLACE HV BATTERY OR SYSTEM MAIN RELAY**

OK

7	INSPECT MAIN BATTERY CABLE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the main battery cable No. 2 with the HV battery assembly removed (see page 21–72).

(b) Check the resistance between the terminals of the main battery cable No. 2.
Standard: Below 1 Ω

NG → **REPLACE MAIN BATTERY CABLE NO.2**

OK

8	INSPECT MAIN BATTERY CABLE NO.2

CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Check the cover and terminals of the main battery cable No. 2 for any abnormality.
OK: No abnormality is found on the cover and terminals.

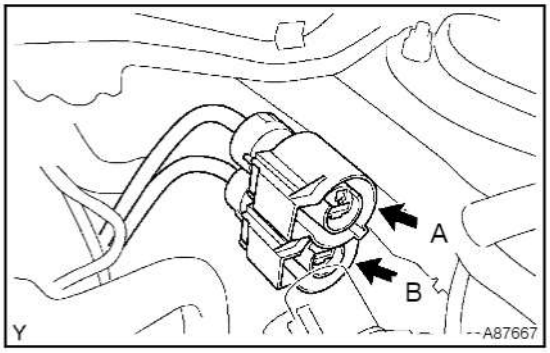
(b) Check the terminals of the HV battery and the system main relay, which are to be connected to the main battery cable No. 2, for any abnormality.
OK: No abnormality is found on the terminals of the HV battery and system main relay.

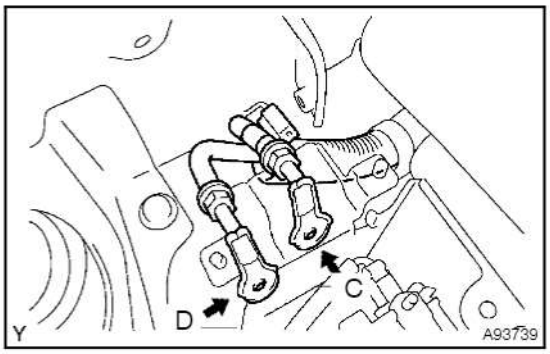
NG → **REPLACE MAIN BATTERY CABLE NO. 2. IF NECESSARY, REPLACE HV BATTERY OR SYSTEM MAIN RELAY**

OK

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9	INSPECT FRAME WIRE





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Disconnect the frame wire from the w/ converter inverter.
(b) Check that the frame wire has been disconnected from the system main relay.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the frame wire and body ground.
Standard:

Tester Connection	Specified Condition
A – Body ground	10 MΩ or higher
B – Body ground	10 MΩ or higher

(d) Check the resistance between the terminals of the frame wire.
Standard:

Tester Connection	Specified Condition
A – C	Below 1 Ω
B – D	Below 1 Ω

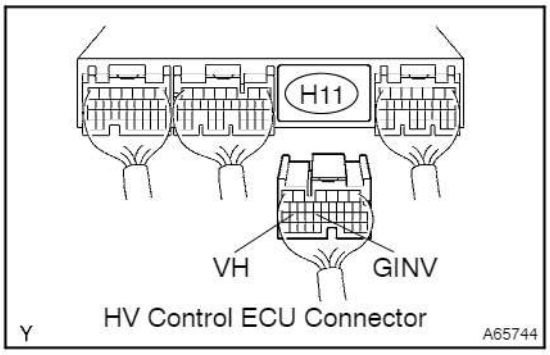
(e) Reinstall the HV battery assembly (see page 21–56).
(f) Reconnect the frame wire.

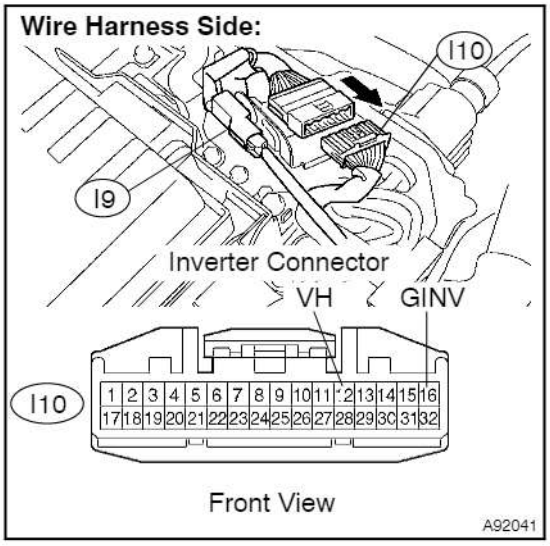
NG → **REPLACE FRAME WIRE**

OK

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10	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the H11 HV control ECU connector.
(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Check the resistance between the wire harness side connectors.

Standard (Check for short):

Tester Connection	Specified Condition
VH (H11–26) or VH (I10–12) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

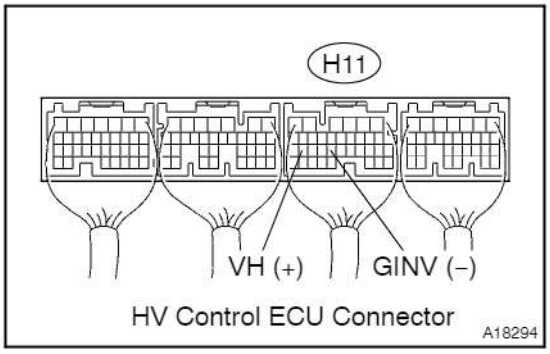
(j) Reconnect the inverter connector.
(k) Reconnect the HV control ECU connector.
(l) Reinstall the inverter cover (see page 21–25).
(m) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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11	INSPECT HYBRID VEHICLE CONTROL ECU(VH VOLTAGE)



(a) Turn the power switch ON (READY).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – GINV (H11–23)	1.6 to 3.8 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P3004/133	HIGH VOLTAGE POWER RESOURCE MALFUNCTION

CIRCUIT DESCRIPTION

The HV control ECU gives warning to the driver and performs the fail–safe control, according to the abnormal signal received from the battery ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3004	133	Abnormal signal input from battery ECU	• HV battery system • Battery ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(HV BATTERY)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART** (See page 05–665)

NO →

REPLACE BATTERY ECU ASSY (See page 21–100)

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DTC	P3009/526	HIGH VOLTAGE POWER SHORT CIRCUIT

DTC	P3009/611	HIGH VOLTAGE POWER SHORT CIRCUIT

DTC	P3009/612	HIGH VOLTAGE POWER SHORT CIRCUIT

DTC	P3009/613	HIGH VOLTAGE POWER SHORT CIRCUIT

DTC	P3009/614	HIGH VOLTAGE POWER SHORT CIRCUIT

CIRCUIT DESCRIPTION

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3009	526 *1	Insulation resistance of high voltage circuit and body is low	• Frame wire • System main relay • System main resistor • HV battery assembly • w/ motor compressor assembly • Battery ECU • HV transaxle assembly • w/ converter inverter assembly • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly
P3009	611 *2	Insulation resistance of A/C compressor motor or A/C inverter is low	• w/ motor compressor assembly • w/ converter inverter assembly
P3009	612 *2	Insulation resistance of HV battery, battery ECU, system main relay, or system main resistor is low	• HV battery assembly • Battery ECU • System main relay • System main resistor • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly
P3009	613 *2	Insulation resistance of HV transaxle or motor and generator inverters is low	• HV transaxle assembly • w/ converter inverter assembly
P3009	614 *2	Insulation resistance of motor and generator inverters, A/C inverter, system main relay, system main resistor, or frame wire is low	• Frame wire • System main relay • System main resistor • HV battery assembly • w/ converter inverter assembly • Main battery cable • Main battery cable No. 2 • Battery plug • Frame wire No. 2 • Junction block assembly

HINT:

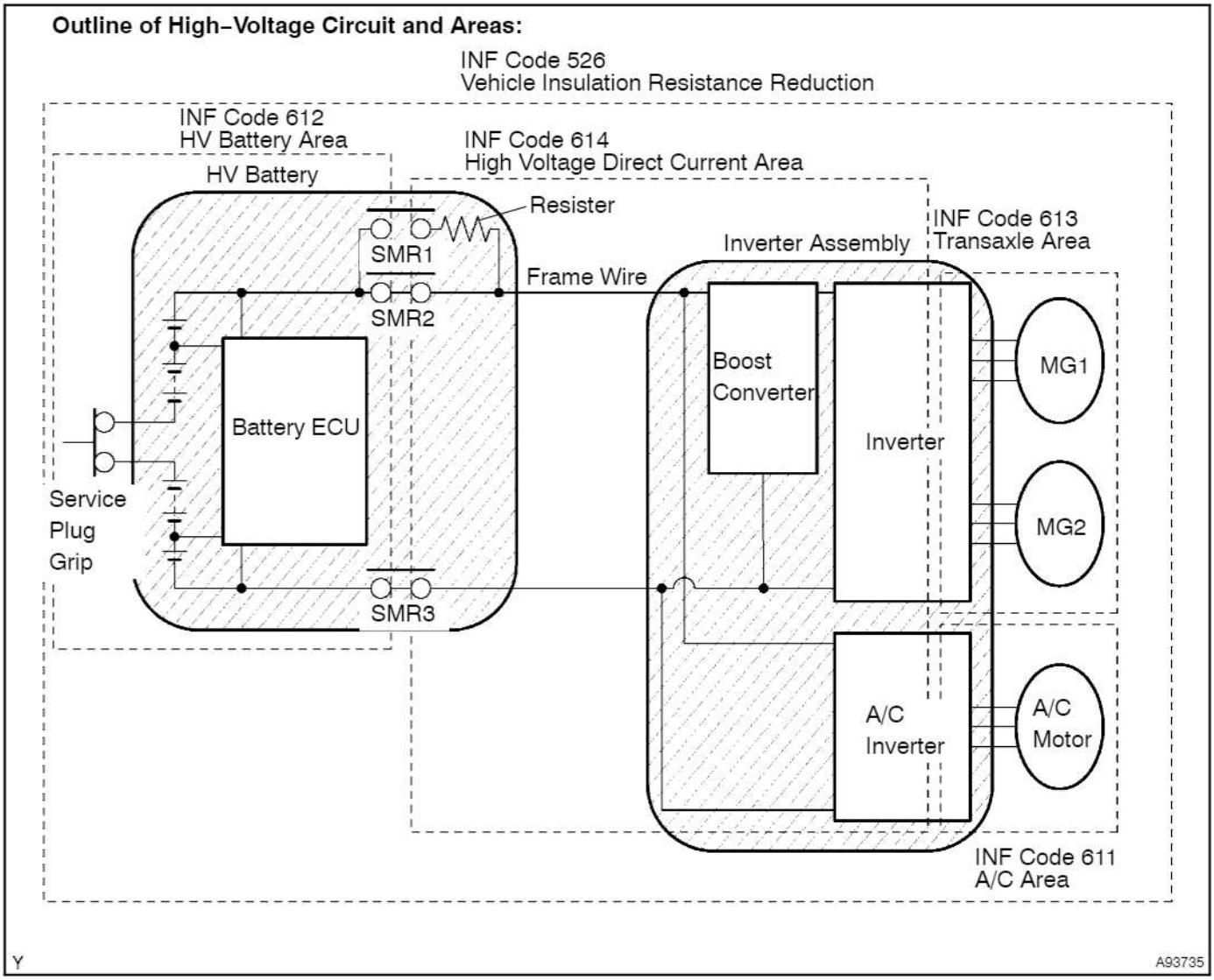
*1: Stored simultaneously when DTC P3009 is set.

*2: Stored when a malfunction area has been identified.

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WIRING DIAGRAM

Outline of High–Voltage Circuit and Areas:



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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1 READ OUTPUT DTC(HYBRID CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
DTC P3009	A
DTCs P3009 and P0A1D (HV control ECU malfunction)	B
DTCs P3009 and P0A1F (Battery ECU malfunction)	C
DTCs P3009 and P0A78 or P0A7A (Inverter system malfunction)	D

B → **GO TO DTC CHART (See page 05–268). FIND DTC P0A1D TO PROCEED TO ITS TROUBLESHOOTING FLOWCHART**

C → **GO TO DTC CHART (See page 05–268). FIND DTC P0A1F TO PROCEED TO ITS TROUBLESHOOTING FLOWCHART**

D → **GO TO DTC CHART (See page 05–268). FIND DTC P0A78 OR P0A7A TO PROCEED TO ITS TROUBLESHOOTING FLOWCHART**

A

2 READ OUTPUT INF CODE

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Display the freeze frame data for DTC P3009 and check its information (INF) code.

Result:

Display (INF Code Output)	Proceed to
Only 526 (Insulation resistance of high voltage circuit and body is low)	A
526 and 611 (Insulation resistance of A/C area is low)	B
526 and 612 (Insulation resistance of HV battery area is low)	C
526 and 613 (Insulation resistance of transaxle area is low)	D
526 and 614 (Insulation resistance of high voltage direct current area is low)	E

B → **Go to step 18**

C → **Go to step 5**

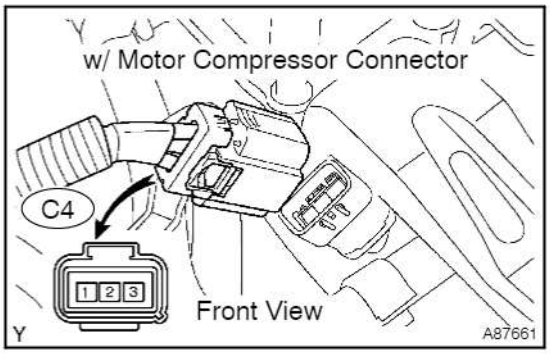
D → **Go to step 20**

E → **Go to step 21**

A

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3	CHECK W/MOTOR COMPRESSOR ASSY



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the C4 w/ motor compressor connector.
(d) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the w/ motor compressor connector and the body ground.

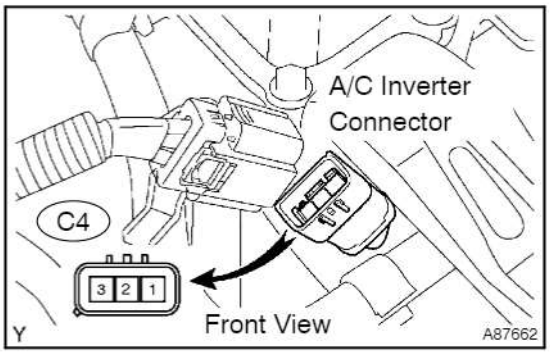
Standard:

Tester Connection	Specified Condition
C4–1 – Body ground	3.0 MΩ or higher
C4–2 – Body ground	3.0 MΩ or higher
C4–3 – Body ground	3.0 MΩ or higher

NG → **REPLACE W/MOTOR COMPRESSOR ASSY (See page 55–39)**

OK

4	CHECK INSULATION RESISTANCE(INVERTER, TRANSAXLE AND FRAME WIRE)



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Check that the w/ motor compressor connector has been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the A/C inverter connector and the body ground.

Standard:

Tester Connection	Specified Condition
C4–1 – Body ground	2.0 MΩ or higher
C4–2 – Body ground	2.0 MΩ or higher
C4–3 – Body ground	2.0 MΩ or higher

NG → **Go to step 15**

OK

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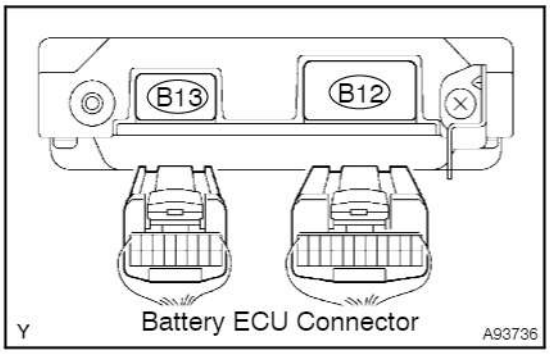
5	CHECK HV BATTERY AREA

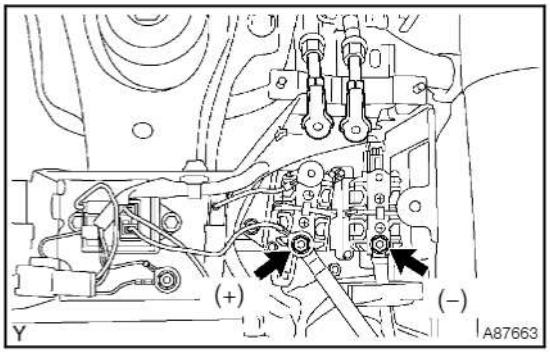
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Check that the service plug grip has been detached. If not, remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the B12 and B13 battery ECU connectors.
(d) Disconnect the main battery cables from the system main relays.
(e) Using a megohmmeter, check the insulation resistance between the positive terminal on the HV battery side of the system main relay and the body ground.
Standard: 10 MΩ or higher
(f) Using a megohmmeter, check the insulation resistance between the negative terminal on the HV battery side of the system main relay and the body ground.
Standard: 10 MΩ or higher





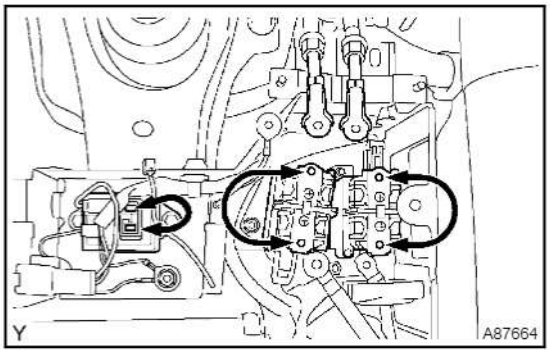
NG → Go to step 6

OK

REPLACE BATTERY ECU ASSY (See page 21–128)

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6	CHECK SYSTEM MAIN RELAYS FOR STICKING



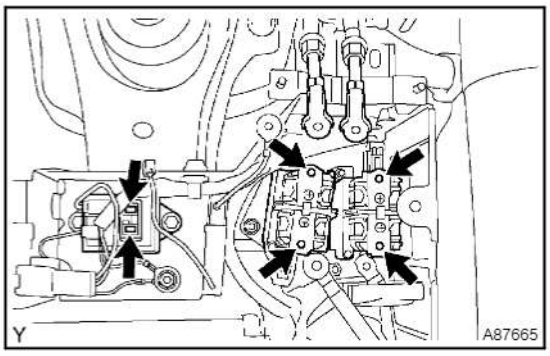
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Disconnect all the high–voltage terminals of the system main relays.
(c) Check the resistance at the switch side of the system main relays.
Standard: Below 1 Ω

NG	GO TO STEP 4 AFTER REPLACE STUCK SYSTEM MAIN RELAY

OK

7	CHECK SYSTEM MAIN RELAYS FOR INSULATION



CAUTION:
Wear insulated gloves before performing the following operation.

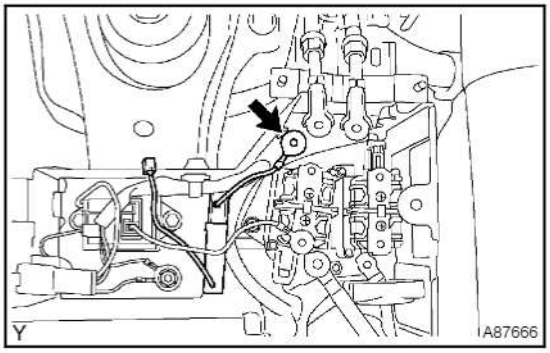
(a) Check that the service plug grip has been detached.
(b) Check that all the high–voltage terminals of the system main relays have been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the system main relays and the body ground.
Standard: 10 MΩ or higher

NG	REPLACE SYSTEM MAIN RELAY WITH REDUCED INSULATION RESISTANCE

OK

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8	CHECK SYSTEM MAIN RESISTOR FOR INSULATION



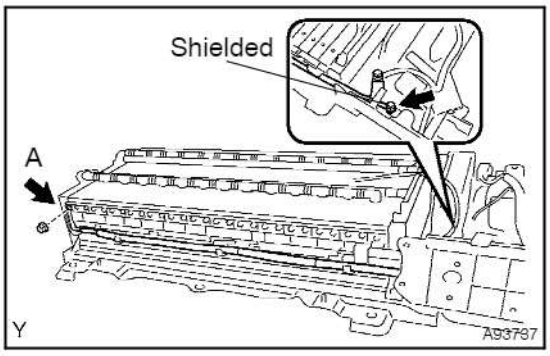
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Check that both terminals of the system main resistor have been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminal of the system main resistor and the body ground.
Standard: 10 MΩ or higher

NG → **REPLACE SYSTEM MAIN RESISTOR**

OK

9	INSPECT MAIN BATTERY CABLE



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

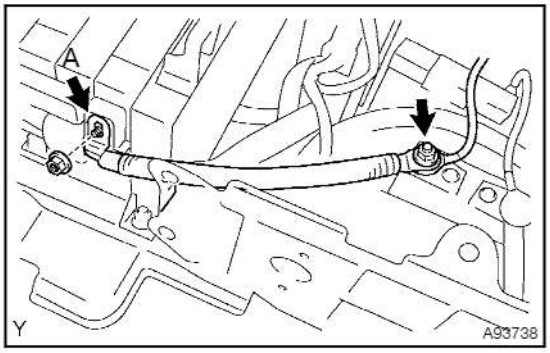
(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the battery cover (see page 21–56).
(c) Check if the main battery cable cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body
(d) Remove the terminal (A in the illustration) on the battery module side of the main battery cable only.
(e) Using a megohmmeter, check the insulation resistance between each terminal of the main battery cable and shield ground.
Standard: 10 MΩ or higher

NG → **REPLACE MAIN BATTERY CABLE**

OK

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10	INSPECT MAIN BATTERY CABLE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, check if the main battery cable No. 2 cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body

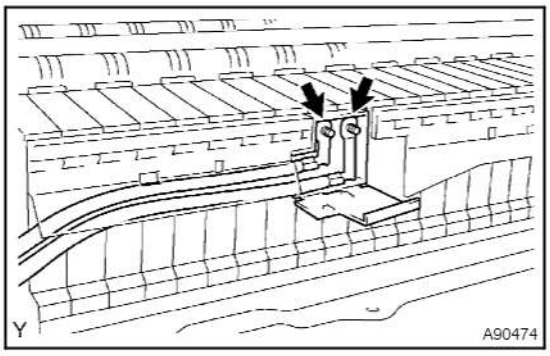
(b) Remove the terminal (A in illustration) on the battery module side of the main battery cable No. 2 only.

(c) Using a megohmmeter, check the insulation resistance between each terminal of the main battery cable No. 2 and shield ground.
Standard: 10 MΩ or higher

NG	REPLACE MAIN BATTERY CABLE NO.2

OK

11	INSPECT BATTERY PLUG



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, disconnect only the connecting terminal of the battery plug.

NOTICE:
Do not reinstall the service plug grip.

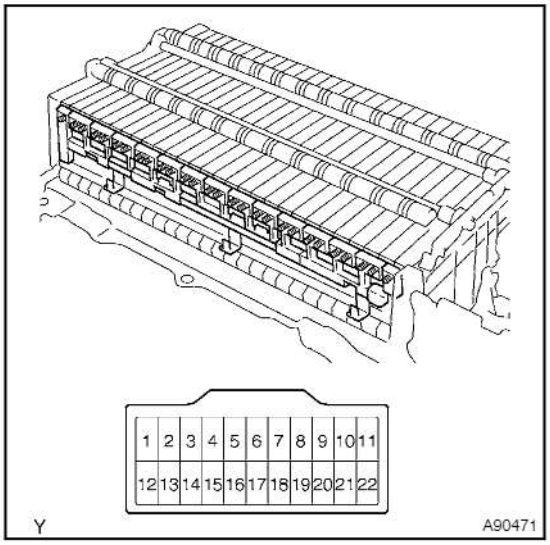
(b) Using a megohmmeter, check the insulation resistance between each terminal of the battery plug wire harness and body ground.
Standard: 10 MΩ or higher

NG	REPLACE BATTERY PLUG

OK

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12	INSPECT FRAME WIRE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, check if the frame wire No. 2 cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body.

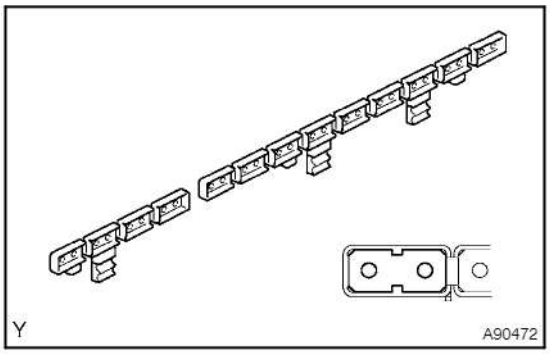
(b) Remove all the terminals on the battery module side of the frame wire No. 2.

(c) Using a megohmmeter, check the insulation resistance between each terminal of the frame wire No. 2 connector and the battery case.
Standard: 10 MΩ or higher

NG → **REPLACE FRAME WIRE NO.2**

OK

13	INSPECT JUNCTION BLOCK ASSY



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, remove the junction block assembly.

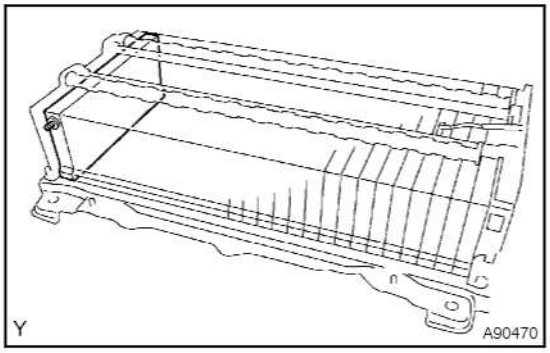
(b) Visually check the junction block assembly for any damage.
OK: No crack or damage

NG → **REPLACE JUNCTION BLOCK ASSY**

OK

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14	INSPECT HV BATTERY ASSY



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

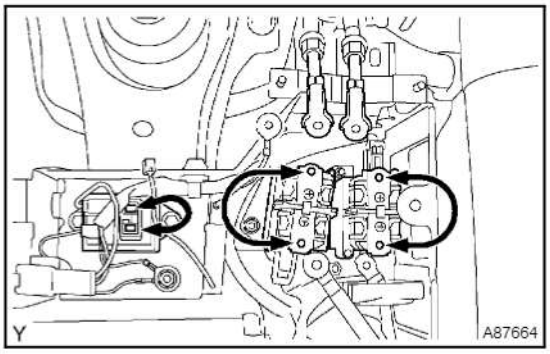
(a) Following the previous step, check the insulation resistance between each terminal (either the positive and negative side) of each battery module of the HV battery assembly and the battery case using a megohmmeter.
Standard: Some of the battery modules have continuity of below 10 MΩ

NG → **REPLACE BATTERY ECU ASSY (See page 21–128)**

OK

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

15	CHECK SYSTEM MAIN RELAYS FOR STICKING



CAUTION:
Wear insulated gloves before performing the following operation.

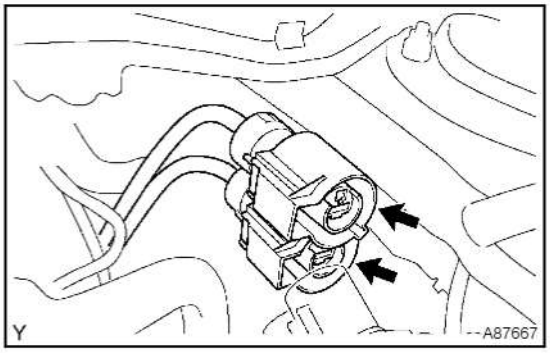
(a) Check that the service plug grip has been detached.
(b) Disconnect all the high–voltage terminals of the system main relays.
(c) Check the resistance at the switch side of the system main relays.
Standard: Below 1 Ω

NG → **GO TO STEP 4 AFTER REPLACE STUCK SYSTEM MAIN RELAY**

OK

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16 CHECK FRAME WIRE FOR INSULATION



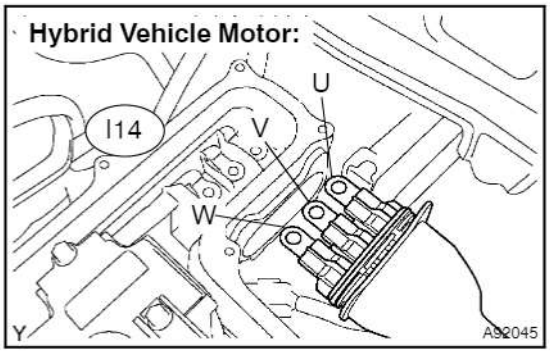
CAUTION:
Wear insulated gloves before performing the following operation.

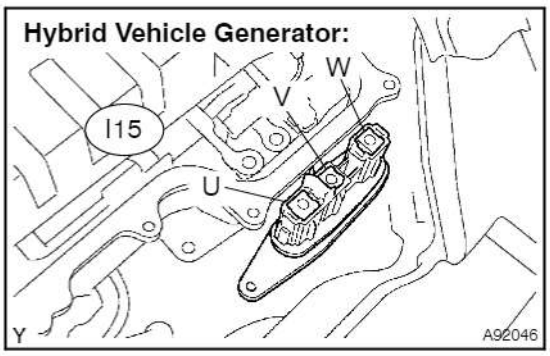
(a) Check that the service plug grip has been detached.
(b) Disconnect the frame wire from the inverter.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the frame wire and the body ground.
Standard: 10 MΩ or higher

NG → **REPLACE FRAME WIRE (See page 21–76)**

OK

17 CHECK HV TRANSAXLE ASSY FOR INSULATION





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Remove the inverter cover (see page 21–25).
(c) Disconnect the three–phase alternating current cables for the motor and generator from the inverter.
(d) Using a megohmmeter, check the insulation resistance between the six terminals of the three–phase alternating current cables on the transaxle side and the body ground.
Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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18 CHECK A/C AREA FOR INSULATION

CAUTION:
Wear insulated gloves before performing the following operation.

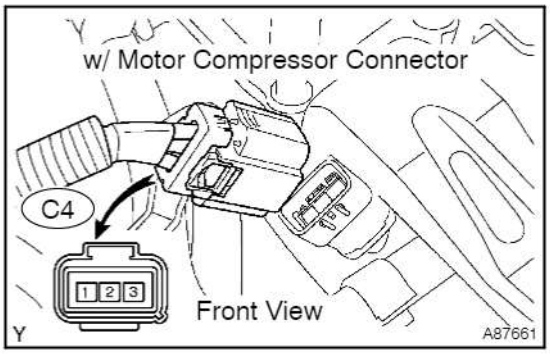
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the C4 w/ motor compressor connector.
(d) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the w/ motor compressor connector and the body ground.

Standard:

Tester Connection	Specified Condition
C4–1 – Body ground	3.0 MΩ or more
C4–2 – Body ground	3.0 MΩ or more
C4–3 – Body ground	3.0 MΩ or more



NG → **REPLACE W/MOTOR COMPRESSOR ASSY (See page 55–39)**

OK

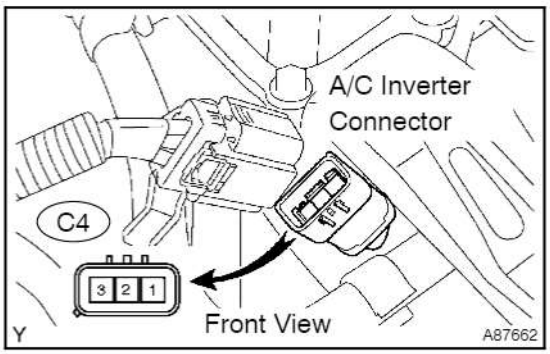
19 CHECK INVERTER FOR INSULATION

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Check that the w/ motor compressor connector has been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the A/C inverter connector and the body ground.

Standard:

Tester Connection	Specified Condition
C4–1 – Body ground	2.0 MΩ or more
C4–2 – Body ground	2.0 MΩ or more
C4–3 – Body ground	2.0 MΩ or more



NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE W/MOTOR COMPRESSOR ASSY (See page 55–39)

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20	CHECK HV TRANSAXLE AREA FOR INSULATION

CAUTION:
Wear insulated gloves before performing the following operation.

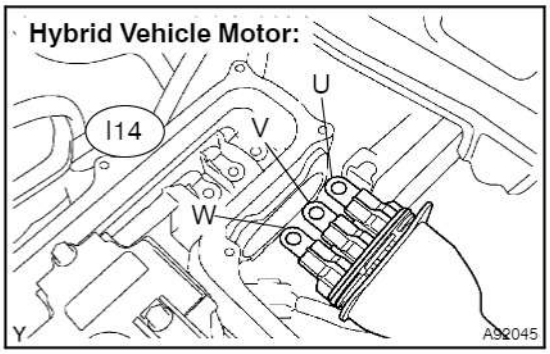
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

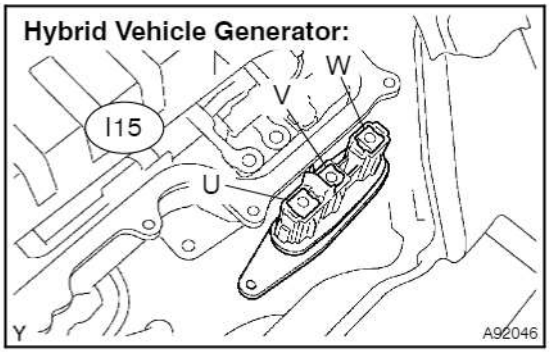
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the three–phase alternating current cables for the motor and generator from the inverter.
(e) Using a megohmmeter, check the insulation resistance between the six terminals of the three–phase alternating current cables on transaxle side and the body ground.

Standard:

Tester Connection	Specified Condition
U (I14–1) – Body ground	10 MΩ or higher
V (I14–2) – Body ground	10 MΩ or higher
W (I14–3) – Body ground	10 MΩ or higher
U (I15–1) – Body ground	10 MΩ or higher
V (I15–2) – Body ground	10 MΩ or higher
W (I15–3) – Body ground	10 MΩ or higher



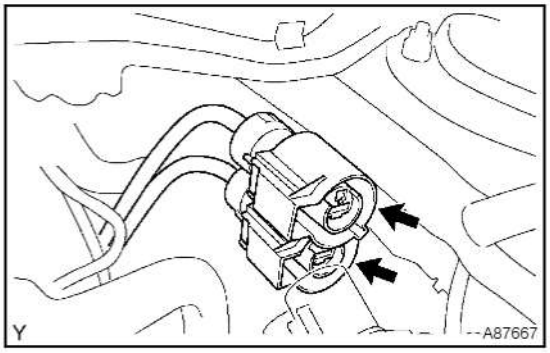


NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSY (See page 22–11)**

OK → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

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21	CHECK HIGH VOLTAGE DIRECT CURRENT AREA FOR INSULATION



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

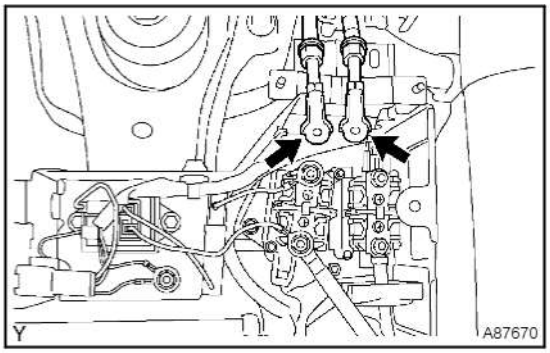
(c) Disconnect the frame wire from the inverter.
(d) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the frame wire and the body ground.
Standard: 10 MΩ or higher

NG	Go to step 22

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

22	CHECK FRAME WIRE FOR INSULATION



CAUTION:
Wear insulated gloves before performing the following operation.

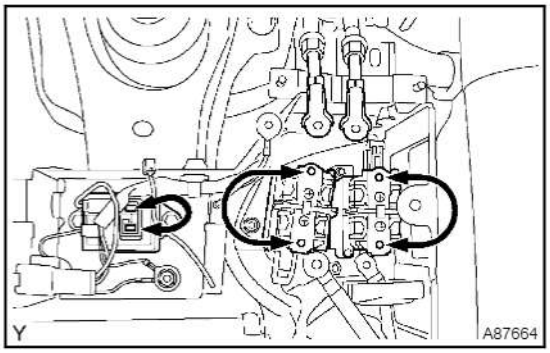
(a) Check that the service plug grip has been detached.
(b) Disconnect the frame wire from the system main relays.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the frame wire and the body ground.
Standard: 10 MΩ or higher

NG	REPLACE FRAME WIRE (See page 21–76)

OK

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23	CHECK SYSTEM MAIN RELAYS FOR STICKING



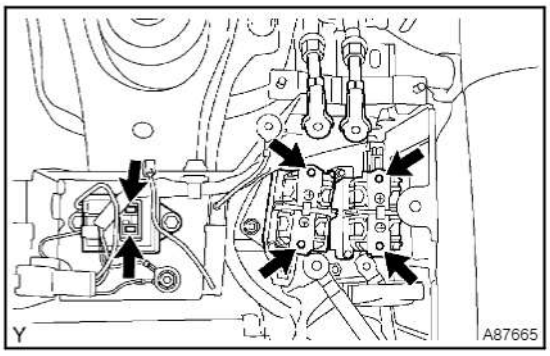
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Disconnect all the high–voltage terminals of the system main relays.
(c) Check the resistance at the switch side of the system main relays.
Standard: Below 1 Ω

NG → **GO TO STEP 4 AFTER REPLACE STUCK SYSTEM MAIN RELAY**

OK

24	CHECK SYSTEM MAIN RELAYS FOR INSULATION



CAUTION:
Wear insulated gloves before performing the following operation.

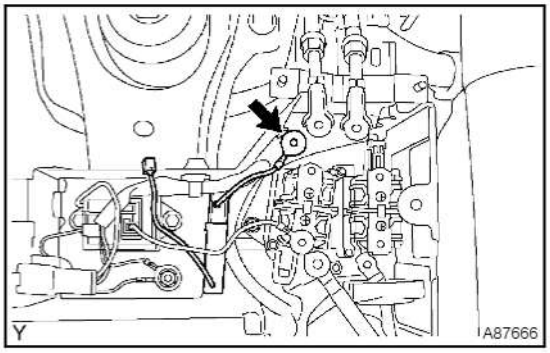
(a) Check that the service plug grip has been detached.
(b) Check that all the high–voltage terminals of the system main relays have been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminals of the system main relays and the body ground.
Standard: 10 MΩ or higher

NG → **REPLACE SYSTEM MAIN RELAY WITH REDUCED INSULATION RESISTANCE**

OK

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25	CHECK SYSTEM MAIN RESISTOR FOR INSULATION



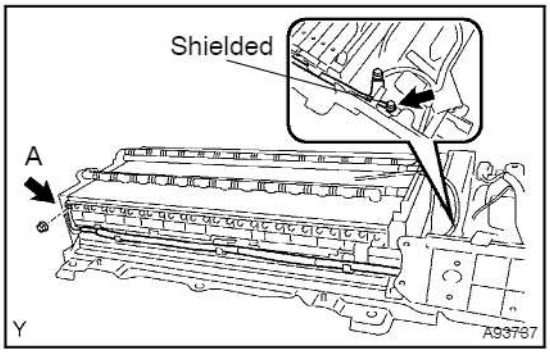
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip has been detached.
(b) Check that both terminals of the system main resistor have been disconnected.
(c) Using a megohmmeter, check the insulation resistance between the high–voltage terminal of the system main resistor and the body ground.
Standard: 10 MΩ or higher

NG → **REPLACE SYSTEM MAIN RESISTOR**

OK

26	INSPECT MAIN BATTERY CABLE



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

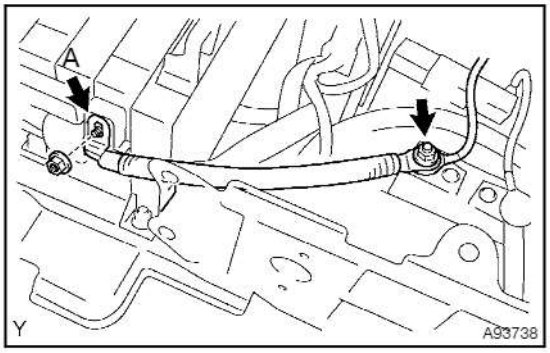
(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the battery cover (see page 21–56).
(c) Check if the main battery cable cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body
(d) Remove the terminal (A in the illustration) on the battery module side of the main battery cable only.
(e) Using a megohmmeter, check the insulation resistance between each terminal of the main battery cable and shield ground.
Standard: 10 MΩ or higher

NG → **REPLACE MAIN BATTERY CABLE**

OK

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27	INSPECT MAIN BATTERY CABLE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, check if the main battery cable No. 2 cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body

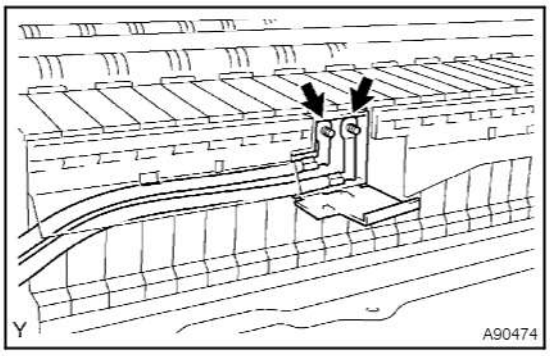
(b) Remove the terminal (A in illustration) on the battery module side of the main battery cable No. 2 only.

(c) Using a megohmmeter, check the insulation resistance between each terminal of the main battery cable No. 2 and shield ground.
Standard: 10 MΩ or higher

NG	REPLACE MAIN BATTERY CABLE NO.2

OK

28	INSPECT BATTERY PLUG



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, disconnect only the connecting terminal of the battery plug.

NOTICE:
Do not reinstall the service plug grip.

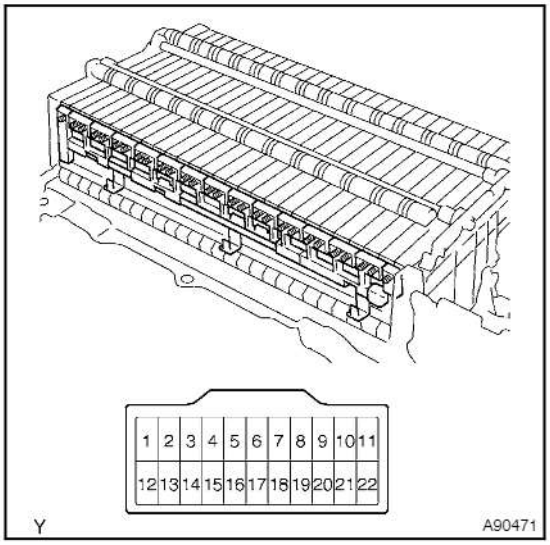
(b) Using a megohmmeter, check the insulation resistance between each terminal of the battery plug wire harness and body ground.
Standard: 10 MΩ or higher

NG	REPLACE BATTERY PLUG

OK

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29	INSPECT FRAME WIRE NO.2



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, check if the frame wire No. 2 cover is not damaged or internal electrical leads are not in contact with the battery case or body.
OK: Electrical leads are not in contact with the battery case or body.

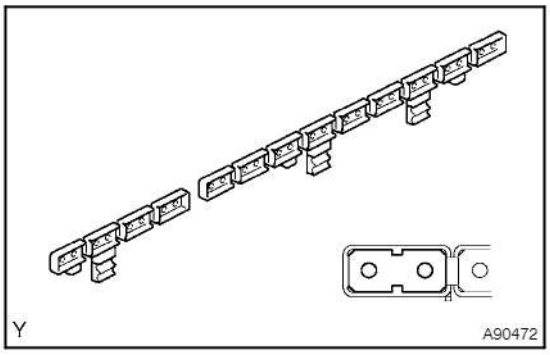
(b) Remove all the terminals on the battery module side of the frame wire No. 2.

(c) Using a megohmmeter, check the insulation resistance between each terminal of the frame wire No. 2 connector and the battery case.
Standard: 10 MΩ or higher

NG → **REPLACE FRAME WIRE NO.2**

OK

30	INSPECT JUNCTION BLOCK ASSY



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, remove the junction block assembly.

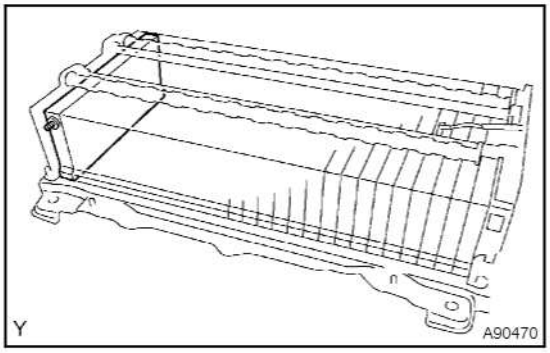
(b) Visually check the junction block assembly for any damage.
OK: No crack or damage

NG → **REPLACE JUNCTION BLOCK ASSY**

OK

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31	INSPECT HV BATTERY ASSY



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Following the previous step, check the insulation resistance between each terminal (either the positive and negative side) of each battery module of the HV battery assembly and the battery case using a megohmmeter.
Standard: Some of the battery modules have continuity of below 10 MΩ

NG → **REPLACE BATTERY ECU ASSY (See page 21–100)**

OK

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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DTC	P3102/524	TRANSMISSION CONTROL ECU MALFUNCTION

DTC	P3102/525	TRANSMISSION CONTROL ECU MALFUNCTION

DTC	P3102/581	TRANSMISSION CONTROL ECU MALFUNCTION

DTC	P3102/582	TRANSMISSION CONTROL ECU MALFUNCTION

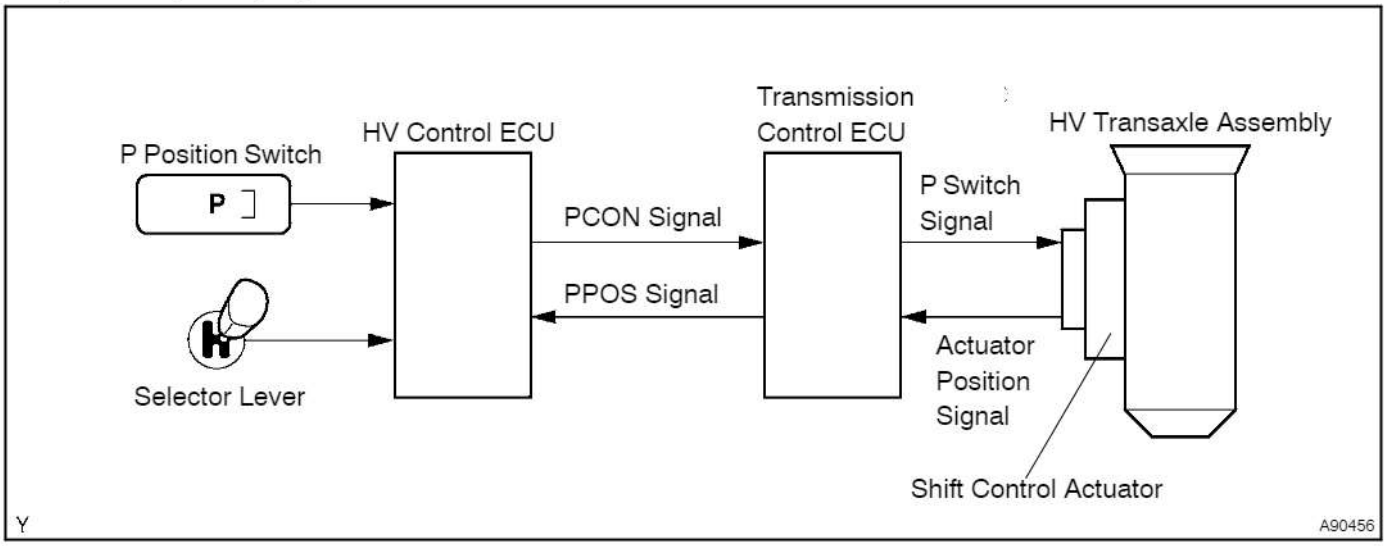
DTC	P3102/597	TRANSMISSION CONTROL ECU MALFUNCTION

DTC	P3102/598	TRANSMISSION CONTROL ECU MALFUNCTION

DTC	P3102/599	TRANSMISSION CONTROL ECU MALFUNCTION

CIRCUIT DESCRIPTION

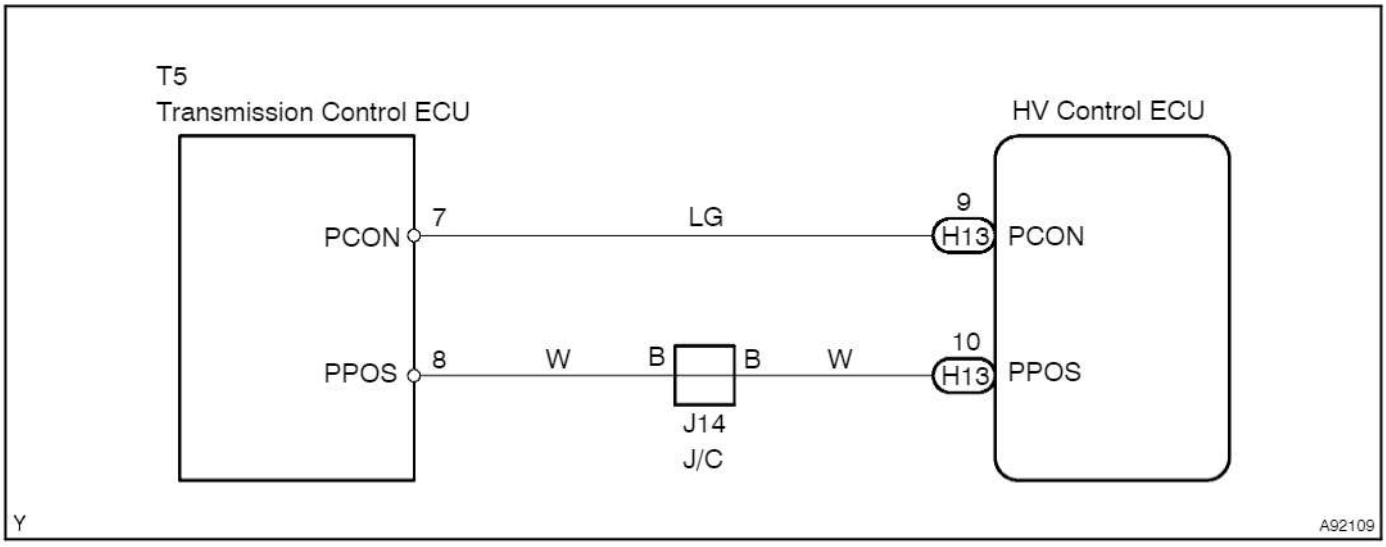
When a signal is input from the P position switch or selector lever, the HV control ECU transmits a P position control (PCON) signal to the transmission control ECU. Based on this signal, the transmission control ECU actuates the shift control actuator in order to mechanically lock or unlock the counter drive gear in the HV transaxle assembly. If the shift control actuator is in the P position, the transmission control ECU transmits a P position (PPOS) signal to the HV control ECU.



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DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3102	524	BEAN communication problem of transmission control ECU	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	525	Transmission control ECU IG OFF command malfunction	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	581	Transmission control ECU malfunction	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	582	P position (PPOS) signal is logically inconsistent	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	597	GND short in P position (PPOS) signal circuit	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	598	+B short in P position (PPOS) signal circuit	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU
P3102	599	P position (PPOS) signal malfunction (output pulse is abnormal)	• Wire harness or connector • Transmission control ECU • HV control ECU • Power source control ECU

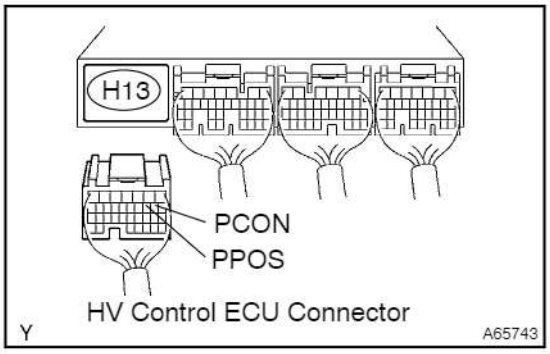
WIRING DIAGRAM

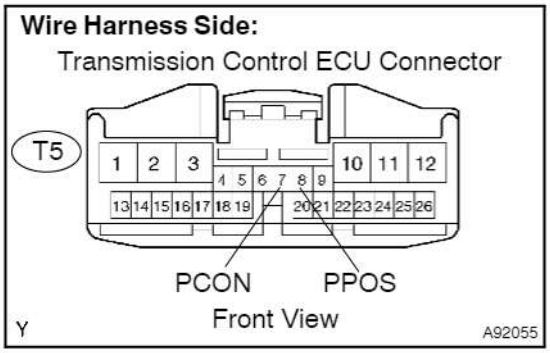


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – TRANSMISSION CONTROL ECU)





(a) Disconnect the H13 HV control ECU connector.
(b) Disconnect the T5 transmission control ECU connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
PCON (H13–9) – Body ground	Below 1 V
PPOS (H13–10) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
PCON (H13–9) – PCON (T5–7)	Below 1 Ω
PPOS (H13–10) – PPOS (T5–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
PCON (H13–9) or PCON (T5–7) – Body ground	10 kΩ or higher
PPOS (H13–10) or PPOS (T5–8) – Body ground	10 kΩ or higher

(g) Reconnect the transmission control ECU connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	READ OUTPUT DTC(TRANSMISSION CONTROL)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Transmission Control / DTC.
(e) Read DTCs.

Result: DTCs are output

YES → **GO TO RELEVANT DTC CHART** (See page 05–929)

NO

REPLACE HV CONTROL ECU, TRANSMISSION CONTROL ECU AND POWER SOURCE CONTROL ECU

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DTC	P3107/213	LOST COMMUNICATION WITH AIRBAG SYSTEM CONTROL MODULE

DTC	P3107/214	LOST COMMUNICATION WITH AIRBAG SYSTEM CONTROL MODULE

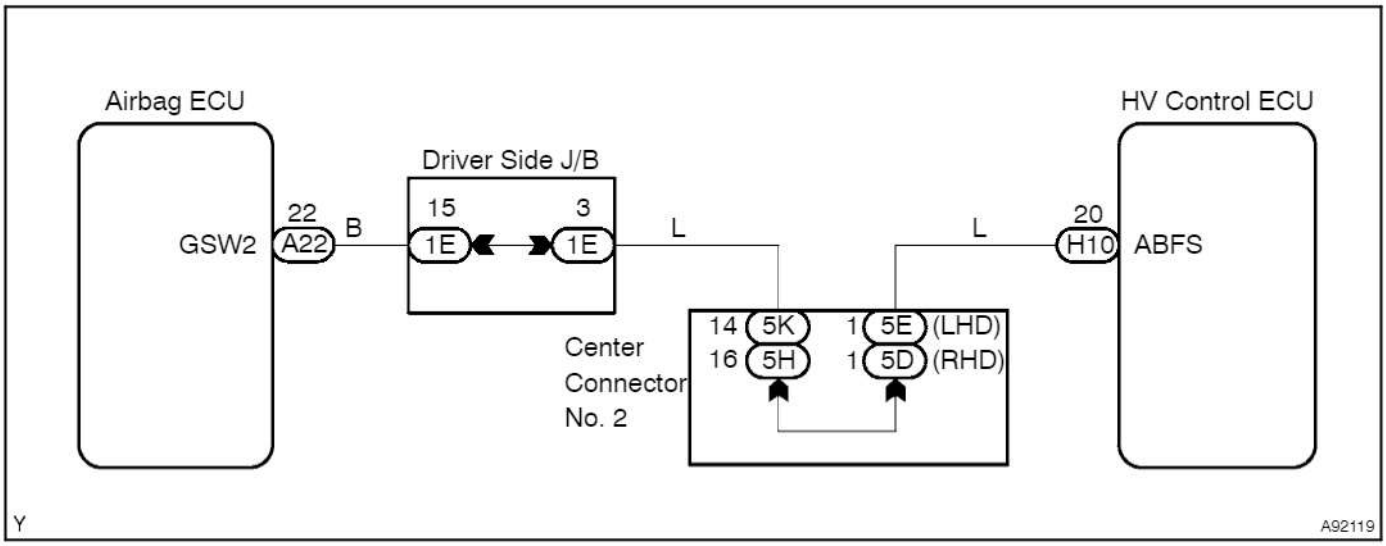
DTC	P3107/215	LOST COMMUNICATION WITH AIRBAG SYSTEM CONTROL MODULE

CIRCUIT DESCRIPTION

The HV control ECU detects a malfunction of the collision signal circuit from the airbag ECU and gives warning to the driver.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3107	213	GND short in communication circuit between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU
P3107	214	Open or +B short in communication circuit between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU
P3107	215	Abnormal communication signals between airbag ECU and HV control ECU	• Wire harness or connector • Airbag ECU

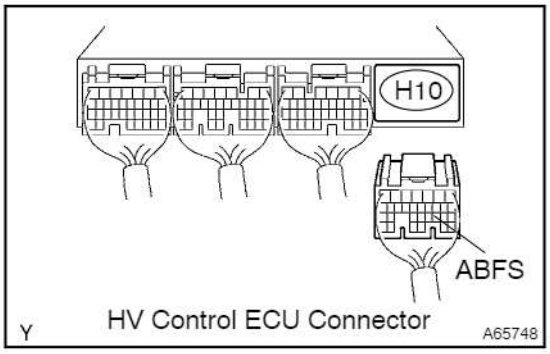
WIRING DIAGRAM

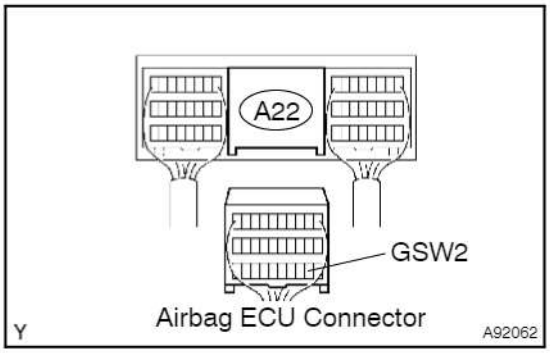


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – AIRBAG ECU)





(a) Disconnect the H10 HV control ECU connector.
(b) Disconnect the A22 airbag ECU connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
ABFS (H10–20) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
ABFS (H10–20) – GSW2 (A22–22)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
ABFS (H10–20) or GSW2 (A22–22) – Body ground	10 kΩ or higher

(g) Reconnect the airbag ECU connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR BAG ECU ASSY (See page 60–54)

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DTC	P3108/535	LOST COMMUNICATION WITH A/C SYSTEM CONTROL MODULE

DTC	P3108/536	LOST COMMUNICATION WITH A/C SYSTEM CONTROL MODULE

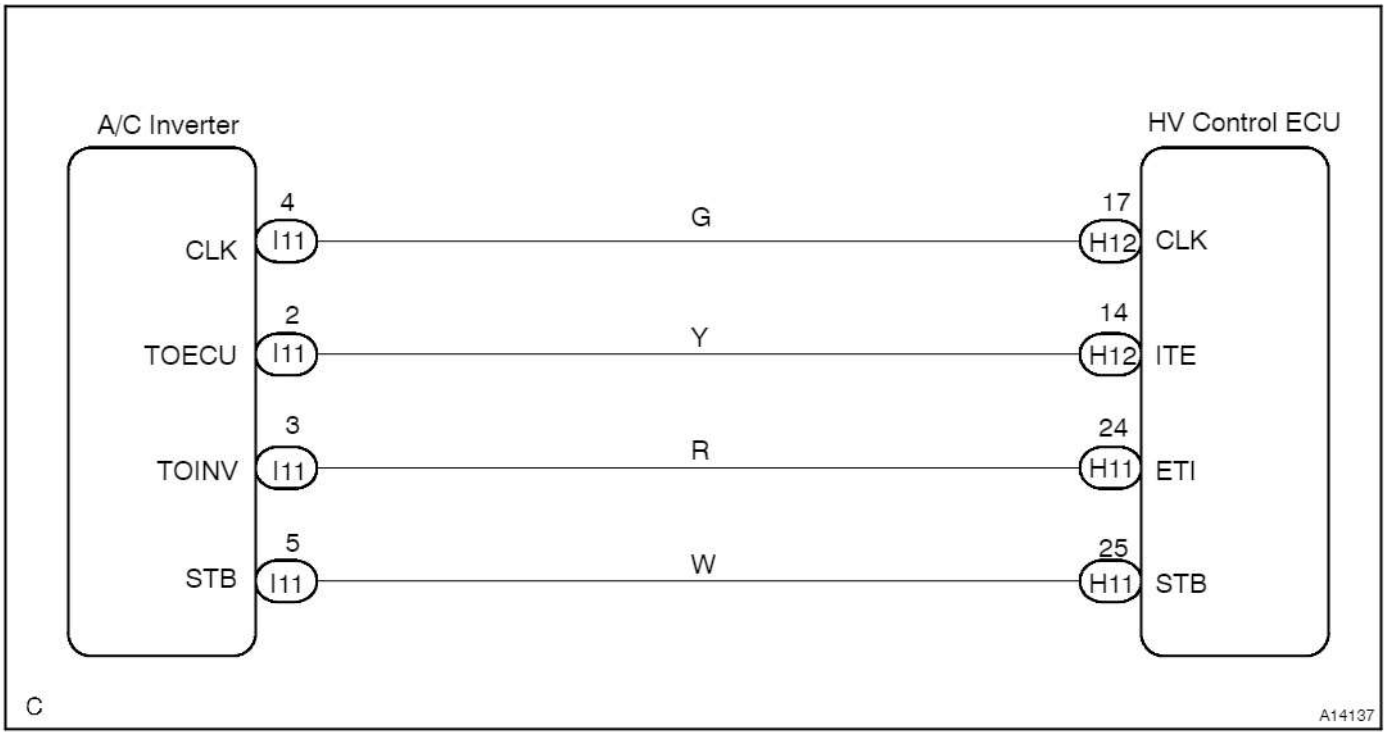
DTC	P3108/538	LOST COMMUNICATION WITH A/C SYSTEM CONTROL MODULE

CIRCUIT DESCRIPTION

The HV control ECU detects a wiring malfunction in the serial communication line of the A/C inverter.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3108	535	Serial communication malfunction	• Wire harness or connector • w/ converter inverter assembly
P3108	536	A/C inverter malfunction	• Wire harness or connector • w/ converter inverter assembly
P3108	538	Open in STB signal circuit	• Wire harness or connector • w/ converter inverter assembly

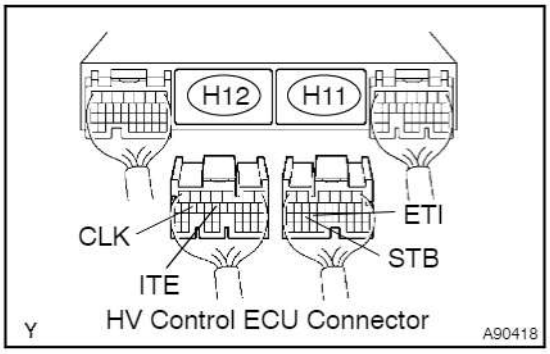
WIRING DIAGRAM

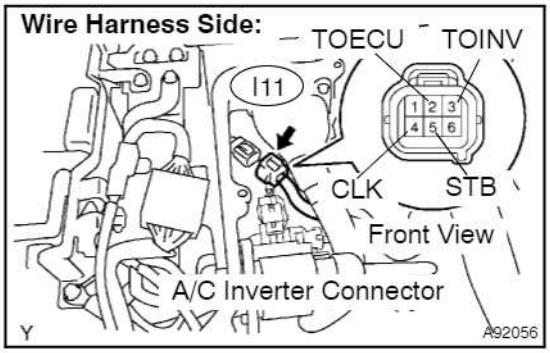


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – A/C INVERTER)





(a) Disconnect the H11 and H12 HV control ECU connectors.
(b) Disconnect the I11 A/C inverter connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
CLK (H12–17) – Body ground	Below 1 V
ITE (H12–14) – Body ground	Below 1 V
ETI (H11–24) – Body ground	Below 1 V
STB (H11–25) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CLK (H12–17) – CLK (I11–4)	Below 1 Ω
ITE (H12–14) – TOECU (I11–2)	Below 1 Ω
ETI (H11–24) – TOINV (I11–3)	Below 1 Ω
STB (H11–25) – STB (I11–5)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CLK (H12–17) or CLK (I11–4) – Body ground	10 kΩ or higher
ITE (H12–14) or TOECU (I11–2) – Body ground	10 kΩ or higher
ETI (H11–24) or TOINV (I11–3) – Body ground	10 kΩ or higher
STB (H11–25) or STB (I11–5) – Body ground	10 kΩ or higher

(g) Reconnect the A/C inverter connector.
(h) Reconnect the HV control ECU connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P3108/537	LOST COMMUNICATION WITH A/C SYSTEM CONTROL MODULE

CIRCUIT DESCRIPTION

Refer to DTC 3108 (INF 535) on page 05–595.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3108	537	A/C amplifier malfunction	• A/C amplifier

INSPECTION PROCEDURE

If the information (INF) code is present, replace the A/C amplifier.

REPLACE A/C AMPLIFIER

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DTC	P3108/594	LOST COMMUNICATION WITH A/C SYSTEM CONTROL MODULE

CIRCUIT DESCRIPTION

HINT:

DTC P3108 (INF 594) is one of the DTCs that indicate CAN communication malfunction.

Since the A/C amplifier is connected to BEAN (Body Electronics Area Network), the HV control ECU communicates with it using CAN (Controller Area Network) communication via the gateway ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3108	594	CAN communication malfunction	• CAN communication system

INSPECTION PROCEDURE

1	READ OUTPUT DTC(BUS CHECK)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Bus Check / Communication Malfunction DTC.
(e) Read and record DTCs.

HINT:

When DTCs other than CAN communication malfunction DTCs are output simultaneously, first correct the CAN communication problem, and then perform troubleshooting for other DTCs.

GO

GO TO CAN COMMUNICATION SYSTEM (See page 05–2312)

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DTC	P3110/223	HV MAIN RELAY MALFUNCTION

DTC	P3110/527	HV MAIN RELAY MALFUNCTION

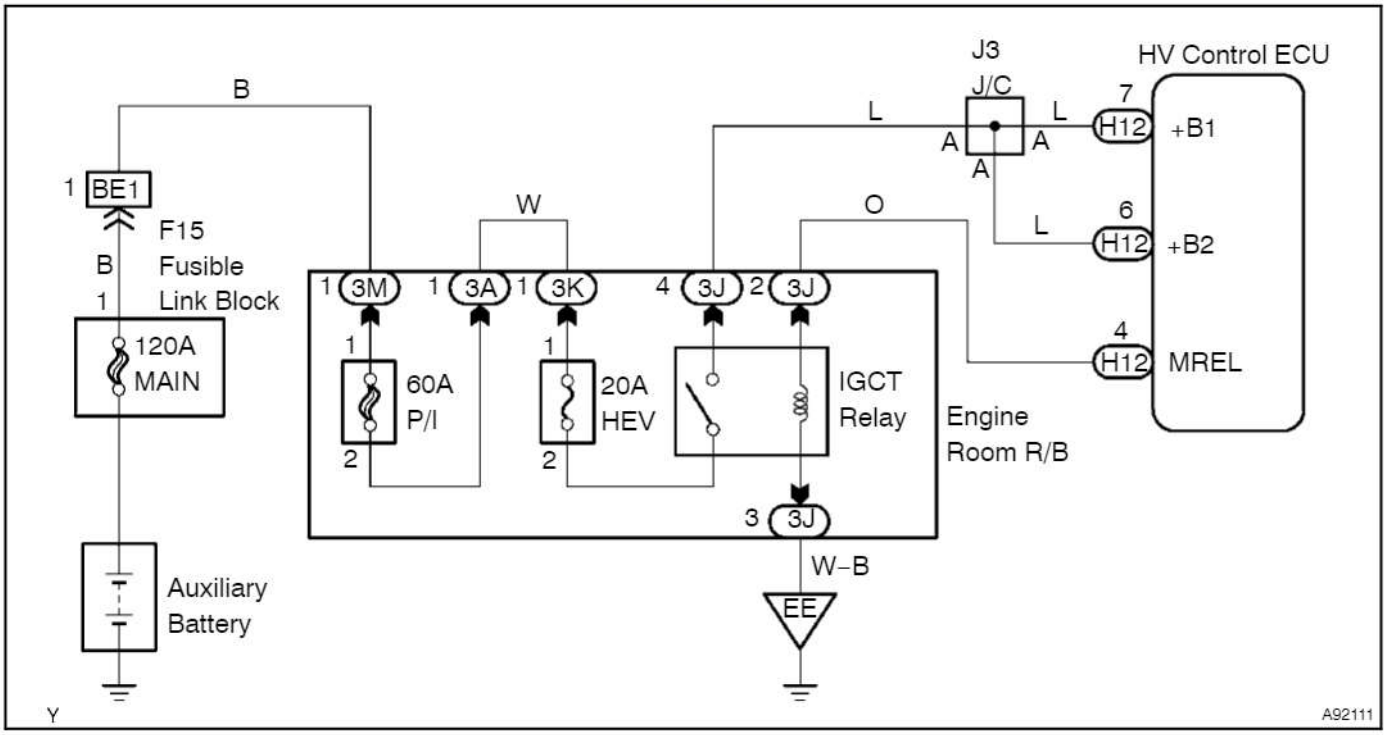
CIRCUIT DESCRIPTION

The HV control ECU monitors the IGCT relay and IG2 relay to detect malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3110	223	IGCT relay is always closed	• Wire harness or connector • Integration relay (IGCT relay)
P3110	527	IG2 logical inconsistency	• Wire harness or connector • Integration relay (IG2 relay)

WIRING DIAGRAM

Refer to the wiring diagram for the IG2 relay on page 05–333.



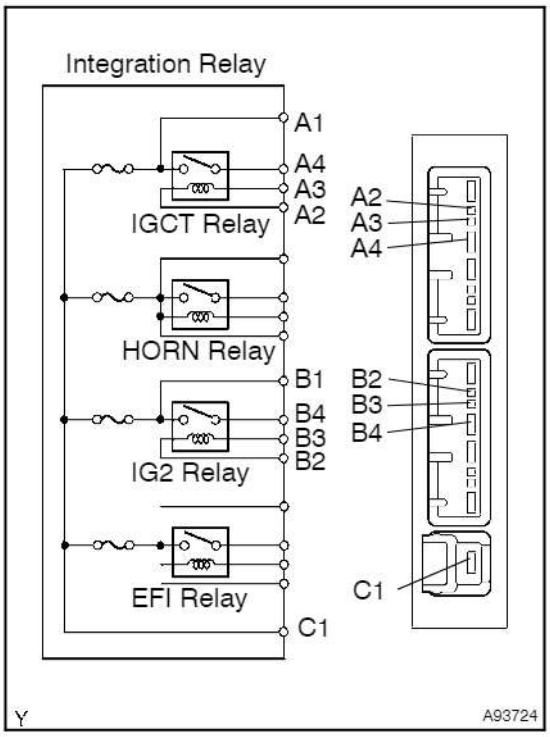
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INSPECTION PROCEDURE

HINT:

If there is a battery voltage at the +B, MREL or IGSW terminal of the HV control ECU even though the power switch is turned OFF, the circuit is shorted to the +B power supply.

1	INSPECT INTEGRATION RELAY(IGCT RELAY AND IG2 RELAY)



(a) Remove the integration relay from the engine room R/B.

(b) Inspect the IGCT relay.

(1) Check the resistance between the terminals of the integration relay.

Standard:

Tester Connection	Specified Condition
A4 – C1	10 kΩ or higher
A4 – C1 (Apply battery voltage to terminals A2 and A3)	Below 1 Ω

(c) Inspect the IG2 relay.

(1) Check the resistance between the terminals of the integration relay.

Standard:

Tester Connection	Specified Condition
B4 – C1	10 kΩ or higher
B4 – C1 (Apply battery voltage to terminals B2 and B3)	Below 1 Ω

NG → **REPLACE INTEGRATION RELAY (IGCT RELAY OR IG2 RELAY)**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR AFTER INSPECTION (HV CONTROL ECU – INTEGRATION RELAY)

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DTC	P3137/348	COLLISION SENSOR LOW INPUT

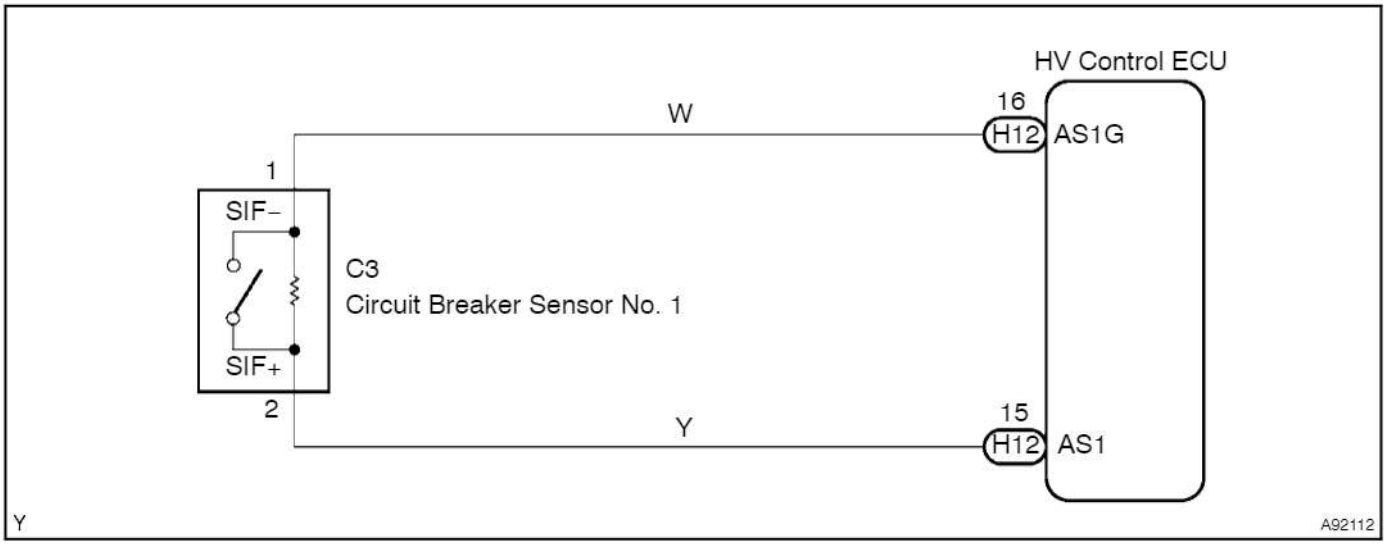
DTC	P3138/349	COLLISION SENSOR HIGH INPUT

CIRCUIT DESCRIPTION

The HV control ECU checks the line connection of the circuit breaker sensor (collision sensor) signal and gives warning to the driver if malfunction is detected.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3137	348	GND short in circuit breaker sensor No. 1 circuit	• Wire harness or connector • Circuit breaker sensor No. 1
P3138	349	Open or +B short in circuit breaker sensor No. 1 circuit	• Wire harness or connector • Circuit breaker sensor No. 1

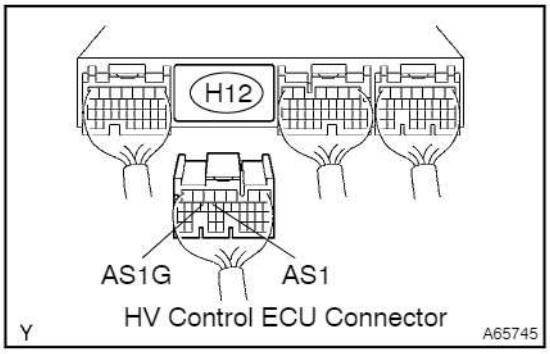
WIRING DIAGRAM

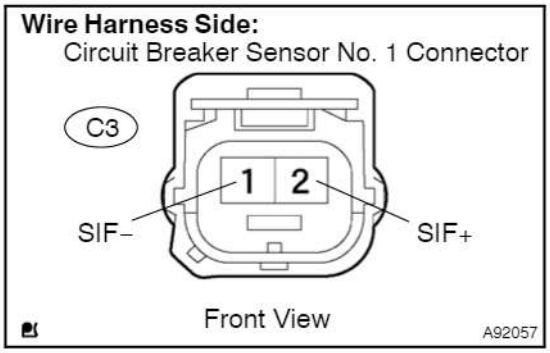


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – CIRCUIT BREAKER SENSOR NO. 1)





(a) Disconnect the H12 HV control ECU connector.
(b) Disconnect the C3 circuit breaker sensor No. 1 connector.
(c) Turn the power switch ON (IG).
(d) Measure the voltage between the terminals of the HV control ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
AS1 (H12–15) – Body ground	Below 1 V
AS1G (H12–16) – Body ground	Below 1 V

(e) Turn the power switch OFF.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
AS1 (H12–15) – SIF+ (C3–2)	Below 1 Ω
AS1G (H12–16) – SIF– (C3–1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
AS1 (H12–15) or SIF+ (C3–2) – Body ground	10 kΩ or higher
AS1G (H12–16) or SIF– (C3–1) – Body ground	10 kΩ or higher

(g) Reconnect the circuit breaker sensor No. 1 connector.
(h) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE CIRCUIT BREAKER SENSOR NO.1

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DTC P3140/350 HV INTERLOCK SWITCH OPERATION

CIRCUIT DESCRIPTION

If the HV control ECU detects the operation of the safety devices (removal of the service plug grip and inverter cover) while the vehicle is stopped (vehicle speed below 5 km/h [3 mph]), it will shut down the system main relays. If the safety devices are correctly reinstalled, it will resume the normal operation after the power source is supplied again. If it does not, there is a possibility of an open circuit, so perform the same inspection as the DTC P3143 (INF 351).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3140	350	Operating safety devices with vehicle stopped (ILK signal is ON)	• Service plug grip installation • Inverter cover installation

INSPECTION PROCEDURE

1	CHECK SERVISE PLUG GRIP INSTALLATION

(a) Check that the service plug grip has been installed properly.
Standard: The service plug grip has been installed properly

NG → **CORRECTLY REINSTALL**

OK

2	CHECK INVERTER COVER INSTALLATION

(a) Check that the inverter cover has been installed properly.
Standard: The Inverter cover has been installed properly

NG → **CORRECTLY REINSTALL**

OK

GO TO DTC P3143/351 (see page 05–604)

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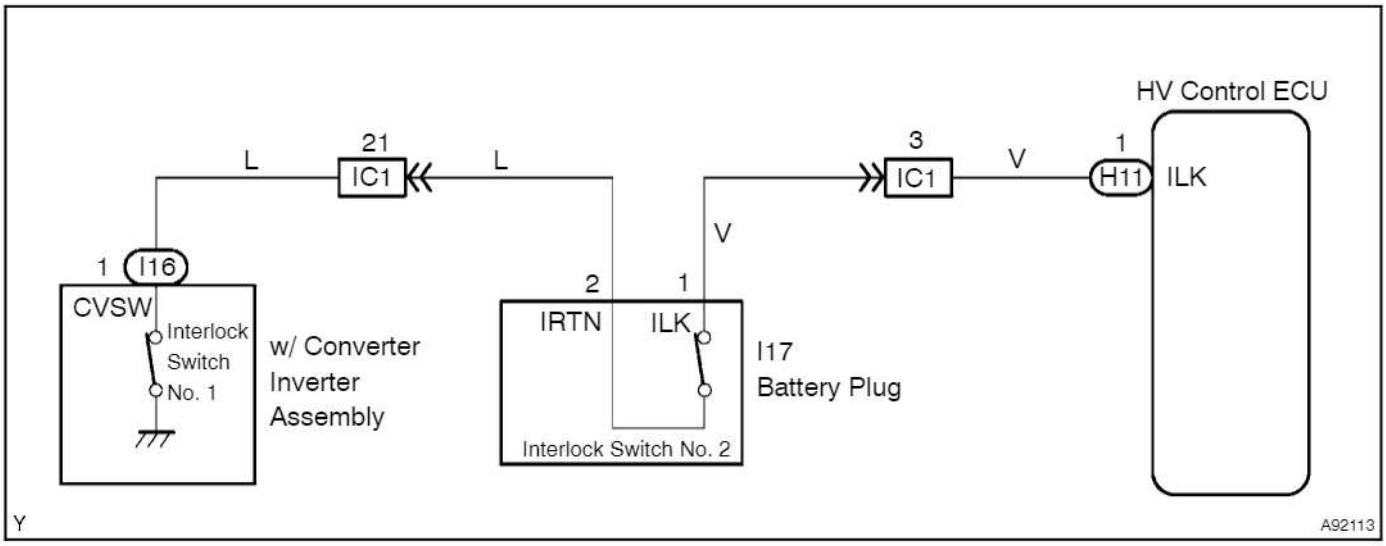
DTC P3143/351 HV INTERLOCK SWITCH OPEN/SHORT

CIRCUIT DESCRIPTION

A short pin for the interlock switch is provided on the service plug grip and the inverter cover. Therefore, the interlock signal line circuit opens when the service plug grip or the inverter cover is removed.
If the HV control ECU detects an open circuit in the interlock signal line while the vehicle is in motion (vehicle speed above 5 km/h [3 mph]), it stores the information (INF) code 351 in its memory and alerts the driver. While the vehicle is in motion, the HV control ECU will not shut down the high–voltage system even if an open circuit in the interlock system is detected.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3143	351	Open in interlock signal circuit while vehicle is running	• Wire harness or connector • Battery plug (interlock switch No. 2) • w/ converter inverter assembly (interlock switch No. 1)

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK INVERTER COVER INSTALLATION

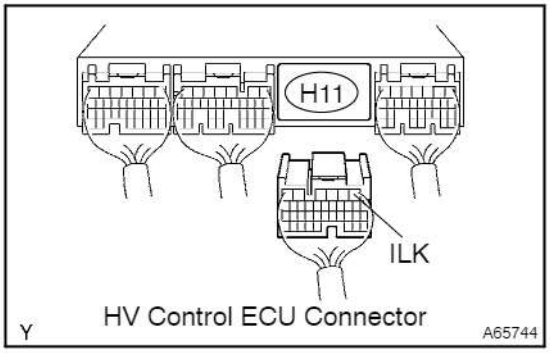
(a) Check that the inverter cover has been installed properly.
Standard: The inverter cover has been installed properly

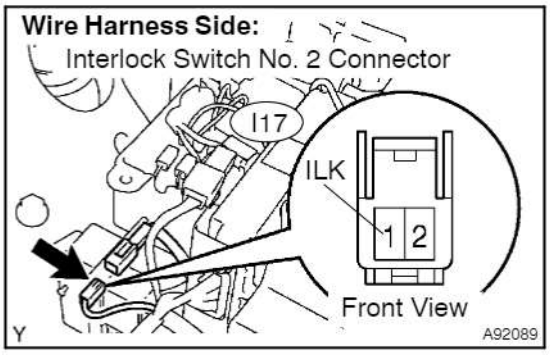
NG → **CORRECTLY REINSTALL**

OK

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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INTERLOCK SWITCH NO. 2)





(a) Disconnect the H11 HV control ECU connector.
(b) Disconnect the I17 interlock switch No. 2 connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
ILK (H11–1) – ILK (I17–1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
ILK (H11–1) or ILK (I17–1) – Body ground	10 kΩ or higher

(d) Reconnect the interlock switch No. 2 connector.
(e) Reconnect the HV control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(INTERLOCK SWITCH NO. 1 – INTERLOCK SWITCH NO. 2)

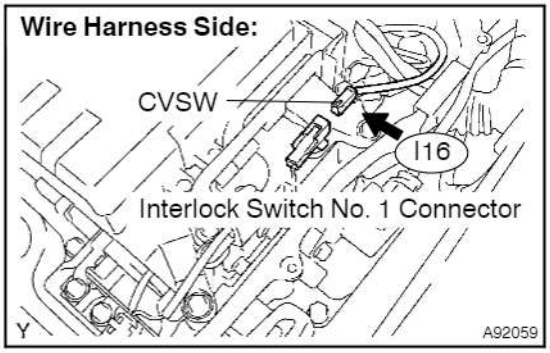
CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).

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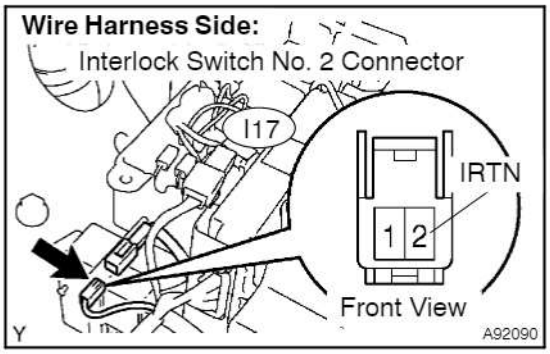
(d) Disconnect the I16 interlock switch No. 1 connector.
(e) Disconnect the I17 interlock switch No. 2 connector.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CVSW (I16–1) – IRTN (I17–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CVSW (I16–1) or IRTN (I17–2) – Body ground	10 kΩ or higher



(g) Reconnect the interlock switch No. 1 connector.
(h) Reconnect the interlock switch No. 2 connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

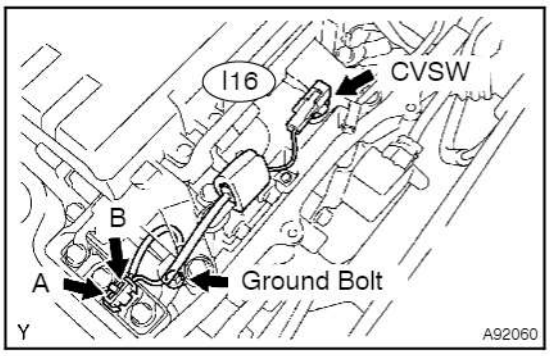
4 INSPECT W/CONVERTER INVERTER ASSY

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the I16 interlock switch No. 1 connector.
(c) Check that the ground bolt for the interlock switch is tightened to the specified torque.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
(d) Connect terminals A and B as shown in the illustration.
(e) Check the resistance between the I16 interlock switch No. 1 connector and body ground.

Standard:

Tester Connection	Specified Condition
CVSW (I16–1) – Body ground	Below 1 V



(f) Reconnect the interlock switch No. 1 connector.
(g) Reinstall the inverter cover (see page 21–25).
(h) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR WIRE HARNESS OR CONNECTOR, OR REPLACE W/ CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE BATTERY PLUG (See page 21–79)

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DTC	P3211/276	DRIVE MOTOR "A" INVERTER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

DTC	P3211/277	DRIVE MOTOR "A" INVERTER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P3212 (INF 275) on page 05–612.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3211	276	Sudden change in motor inverter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly
P3211	277	Motor inverter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P3212 (INF 275) on page 05–612.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.

OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

2	CHECK COOLANT HOSE

(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).

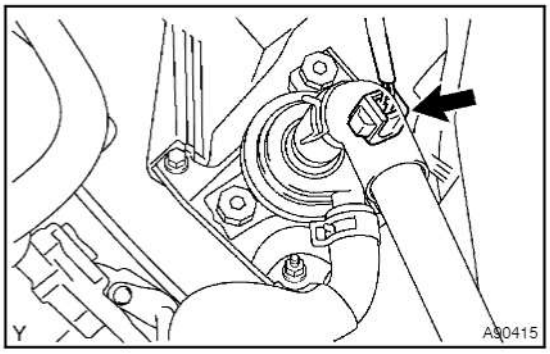
OK: The hoses of the cooling system are not bent or clogged

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NG → CORRECT TO NORMAL CONDITION

OK

3	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

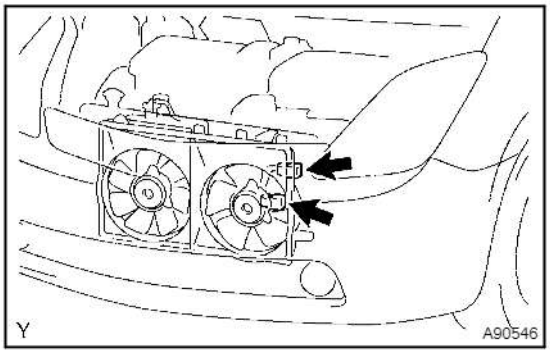
4	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

5	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

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6	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

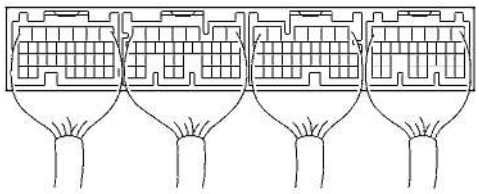
OK

7	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

8	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

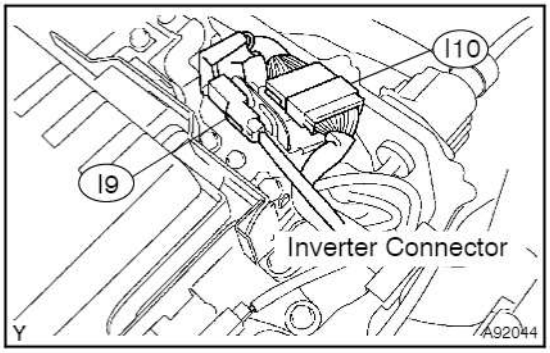
NG → CONNECT SECURELY

OK

9	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).

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(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

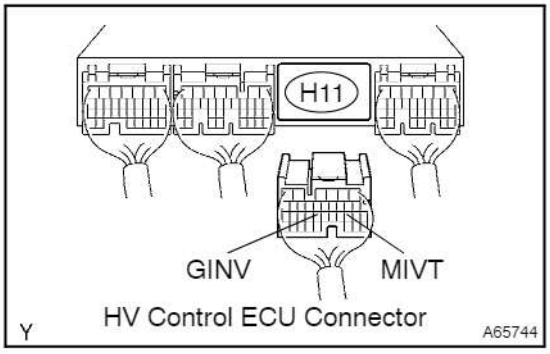
10	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the H11 HV control ECU connector.
(c) Disconnect the I9 and I10 inverter connectors.
(d) Turn the power switch ON (IG).

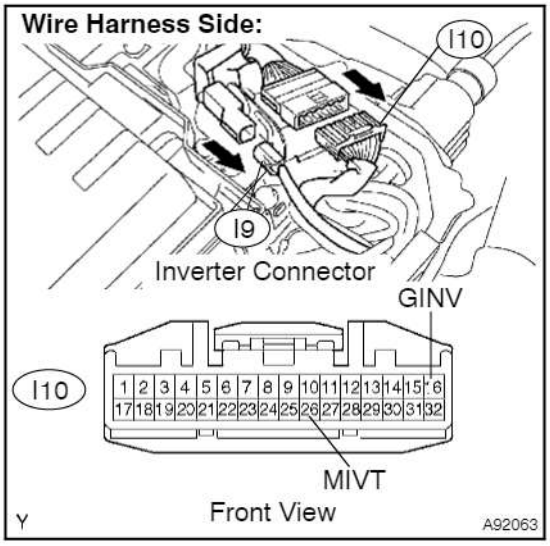
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard:



Tester Connection	Specified Condition
MIVT (H11–19) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(f) Turn the power switch OFF.
(g) Check the resistance between the wire harness side connectors.
Standard (Check for open):



Tester Connection	Specified Condition
MIVT (H11–19) – MIVT (I10–26)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MIVT (H11–19) or MIVT (I10–26) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(h) Reconnect the inverter connectors.
(i) Reconnect the HV control ECU connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P3212/275	DRIVE MOTOR "A" INVERTER TEMPERATURE SENSOR CIRCUIT HIGH/LOW

DTC	P3213/274	DRIVE MOTOR "A" INVERTER TEMPERATURE SENSOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The HV control ECU uses a temperature sensor, which is built into the inverter, to detect the temperature of the motor inverter. The same cooling system that is routed to the MG1 and MG2 cools the inverter. This cooling system is independent from the engine cooling system.

The characteristic of the motor inverter temperature sensor is the same as the boost converter temperature sensor (see the description on page 05–517).

The HV control ECU limits the load based on the signals transmitted by the motor inverter temperature sensor, in order to check the effectiveness of the inverter cooling system and prevent the inverter from overheating. Furthermore, the HV control ECU detects a malfunction in the wiring of the motor inverter temperature sensor, as well as in the sensor itself.

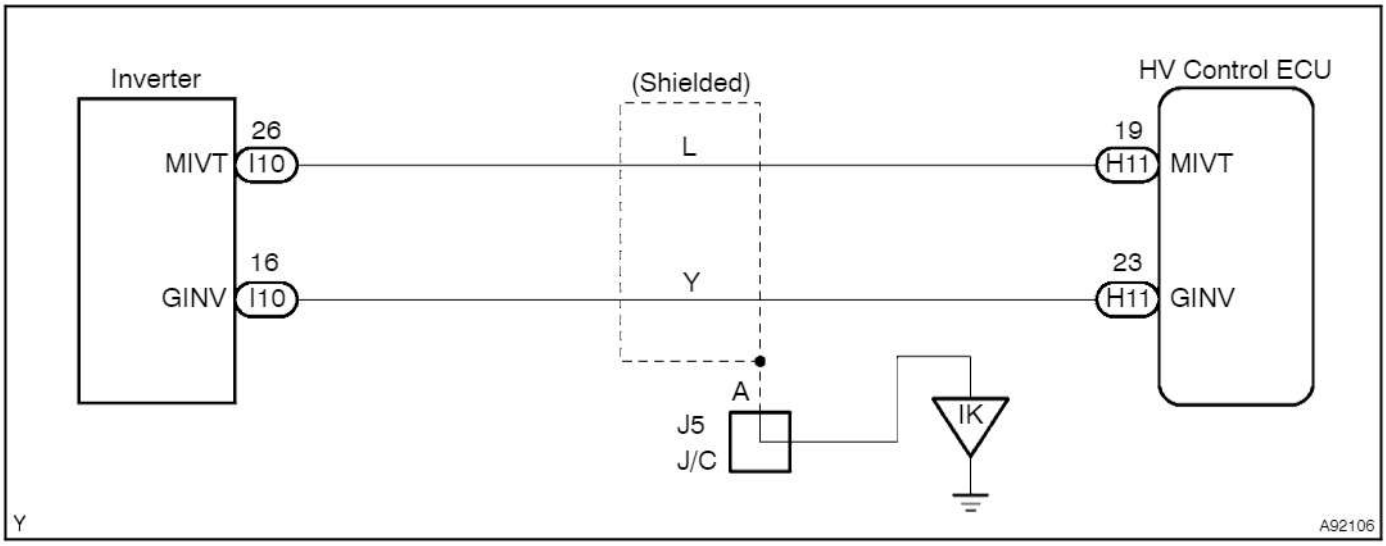
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3212	275	Open or GND short in motor inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P3213	274	+B short in motor inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

HINT:

After confirming DTC P3212 (INF 275) or P3213 (INF 274), confirm Inverter Temp–(MG2) in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–50°C (–58°F)	+B short circuit
205°C (401°F)	Open or GND short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ VALUE OF INTELLIGENT TESTER II(INVERTER TEMP–(MG2))

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Inverter Temp–(MG2) value on the intelligent tester II.

Result:

Temperature Displayed	Proceed to
–50°C (–58°F)	A
205°C (401°F)	B
–49°C to 204°C (–57°F to 400°F)	C

HINT:

- If there is a +B short circuit, the intelligent tester II indicates –50°C (–58°F).
- If there is an open or GND short circuit, the intelligent tester II indicates 205°C (401°F).

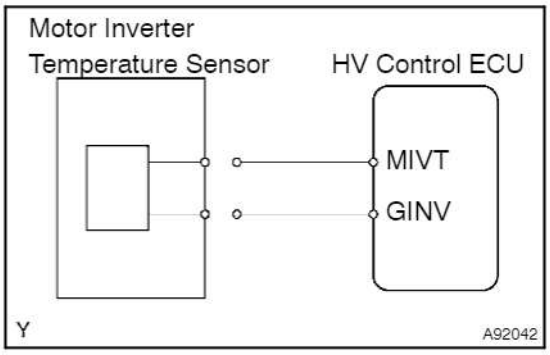
B → **Go to step 4**

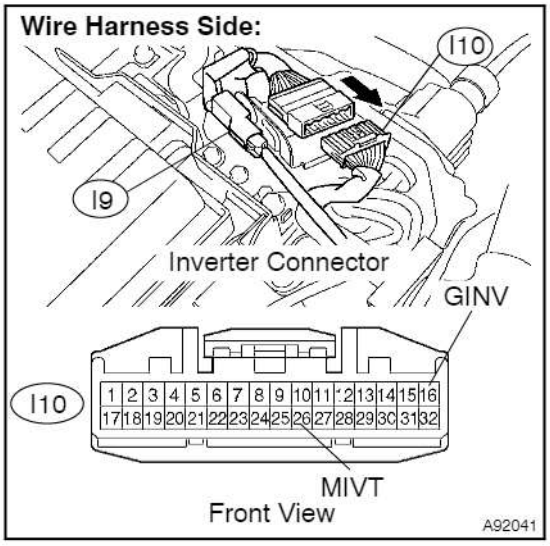
C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN WIRE HARNESS)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the I10 inverter connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the Inverter Temp–(MG2) value on the intelligent tester II.
Standard: 205°C (401°F)
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

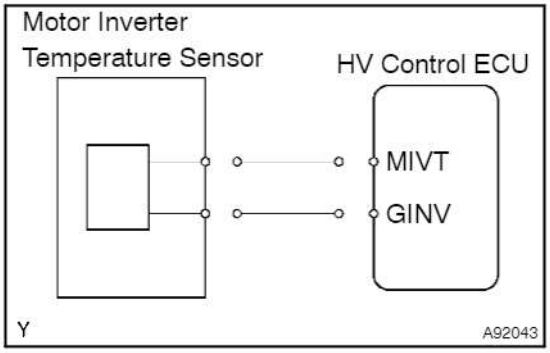
NG → **Go to step 3**

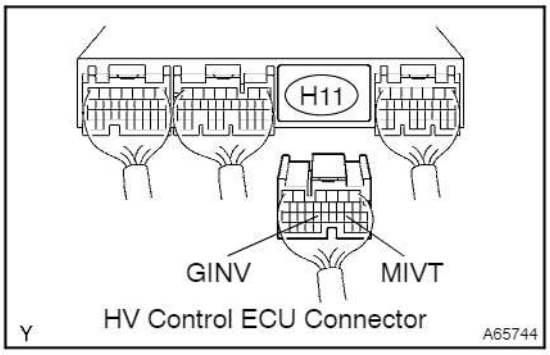
OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H11 HV control ECU connector.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Inverter Temp–(MG2) value on the intelligent tester II.

Standard: 205°C (401°F)

(e) Reconnect the HV control ECU connector.

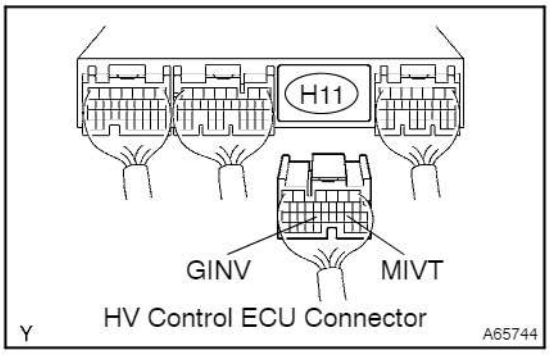
NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

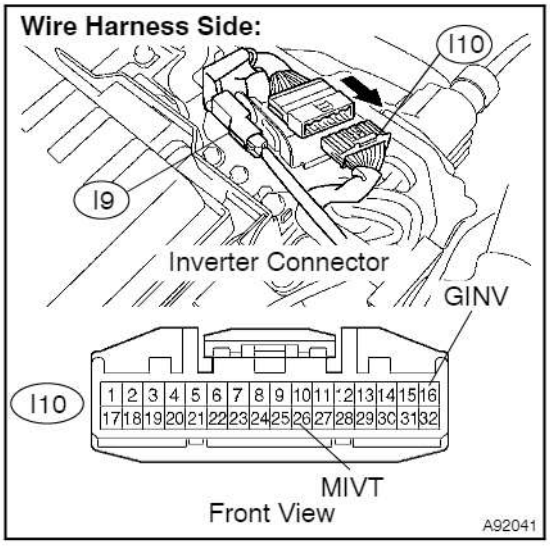
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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4	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the H11 HV control ECU connector.
(e) Disconnect the I10 inverter connector.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
MIVT (H11–19) – MIVT (I10–26)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
MIVT (H11–19) or MIVT (I10–26) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

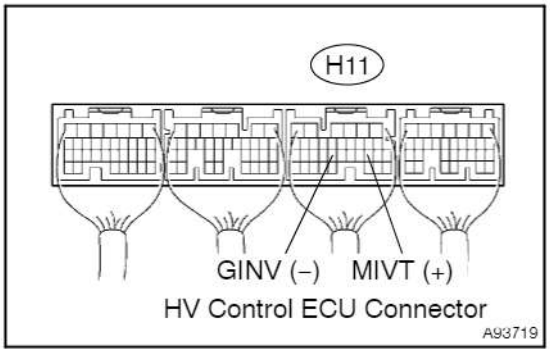
(g) Reconnect the inverter connector.
(h) Reconnect the HV control ECU connector.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	INSPECT HYBRID VEHICLE CONTROL ECU(MIVT VOLTAGE)



(a) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
MIVT (H11–19) – GINV (H11–23)	2.0 to 4.5 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P3221/314	GENERATOR INVERTER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

DTC	P3221/315	GENERATOR INVERTER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

Refer to DTC P3222 (INF 313) on page 05–623.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3221	314	Sudden change in generator inverter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly
P3221	315	Generator inverter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P3222 (INF 313) on page 05–623.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.

OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

2	CHECK COOLANT HOSE

(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).

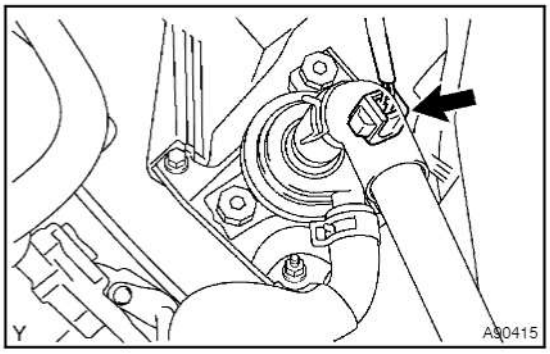
OK: The hoses of the cooling system are not bent or clogged

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NG → CORRECT TO NORMAL CONDITION

OK

3	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

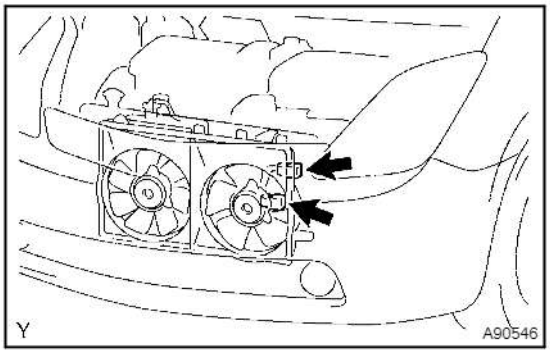
4	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

5	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

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6	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

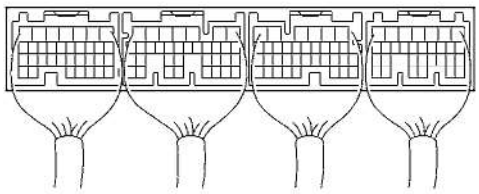
OK

7	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

8	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

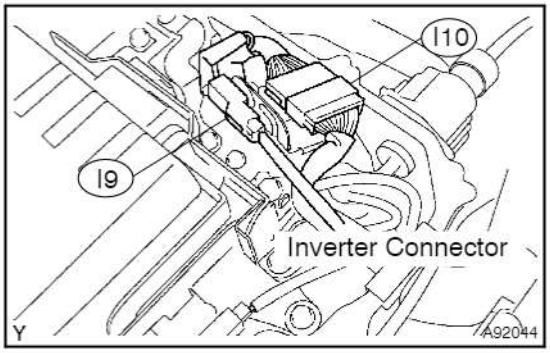
NG → CONNECT SECURELY

OK

9	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).

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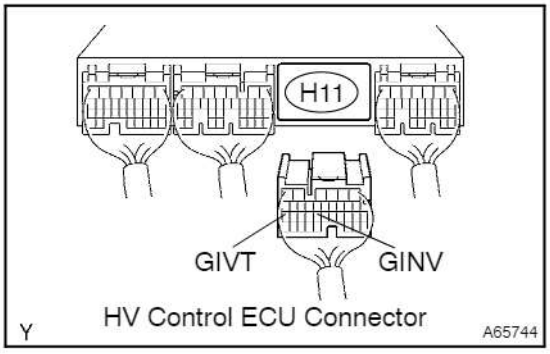


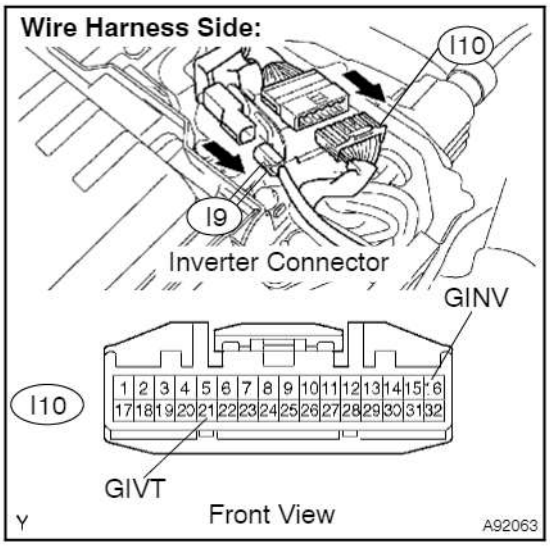
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

10	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the H11 HV control ECU connector.
(c) Disconnect the I9 and I10 inverter connectors.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard:

Tester Connection	Specified Condition
GIVT (H11–27) – Body ground	Below 1 V
GINV (H11–23) – Body ground	Below 1 V

(f) Turn the power switch OFF.
(g) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
GIVT (H11–27) – GIVT (I10–21)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GIVT (H11–27) or GIVT (I10–21) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

(h) Reconnect the inverter connectors.
(i) Reconnect the HV control ECU connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	P3222/313	GENERATOR INVERTER TEMPERATURE SENSOR CIRCUIT HIGH/LOW

DTC	P3223/312	GENERATOR INVERTER TEMPERATURE SENSOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The HV control ECU uses a temperature sensor, which is built into the inverter, to detect the temperature of the generator inverter. The same cooling system that is routed to the MG1 and MG2 cools the inverter. This cooling system is independent from the engine cooling system.

The characteristic of the generator inverter temperature sensor is the same as the boost converter temperature sensor (see the description on page 05–517).

The HV control ECU limits the load based on the signals transmitted by the generator inverter temperature sensor, in order to check the effectiveness of the inverter cooling system and prevent the inverter from overheating. Furthermore, the HV control ECU detects a malfunction in the wiring of the generator inverter temperature sensor, as well as in the sensor itself.

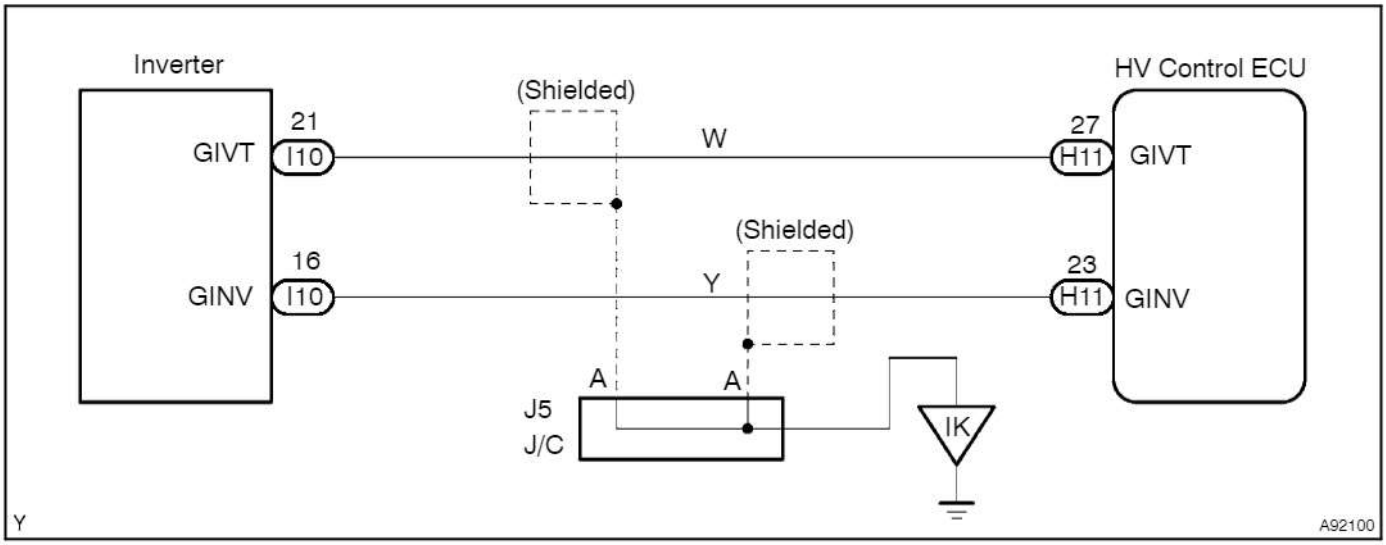
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3222	313	Open or GND short in generator inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P3223	312	+B short in generator inverter temperature sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

HINT:

After confirming DTC P3222 (INF 313) or P3223 (INF 312), confirm Inverter Temp–(MG1) in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–50°C (–58°F)	+B short circuit
205°C (401°F)	Open or GND short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ VALUE OF INTELLIGENT TESTER II(INVERTER TEMP–(MG1))

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Inverter Temp–(MG1) value on the intelligent tester II.

Result:

Temperature Displayed	Proceed to
–50°C (–58°F)	A
205°C (401°F)	B
–49°C to 204°C (–57°F to 400°F)	C

HINT:

- If there is a +B short circuit, the intelligent tester II indicates –50°C (–58°F).
- If there is an open or GND short circuit, the intelligent tester II indicates 205°C (401°F).

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–232)

A

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2	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN WIRE HARNESS)

CAUTION:
Wear insulated gloves before performing the following operation.

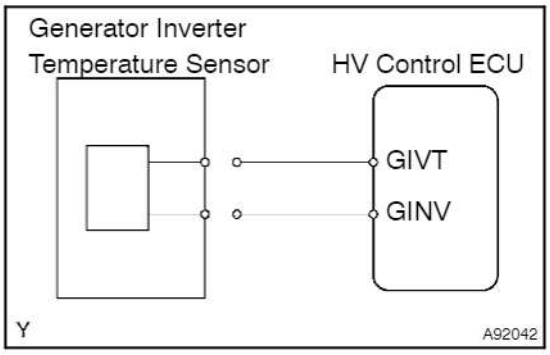
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

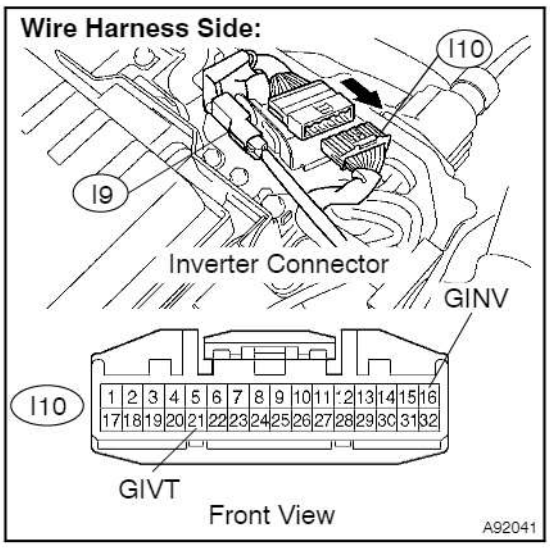
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the I10 inverter connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the Inverter Temp–(MG1) value on the intelligent tester II.
Standard: 205°C (401°F)
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).





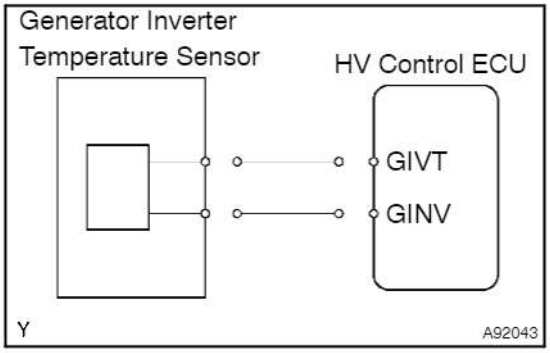
NG → **Go to step 3**

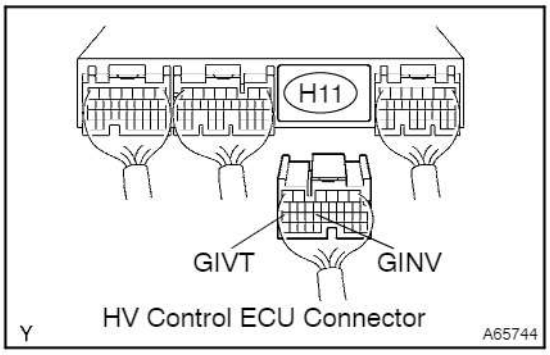
OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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3	READ VALUE OF INTELLIGENT TESTER II(CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H11 HV control ECU connector.
(b) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(c) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the Inverter Temp–(MG1) value on the intelligent tester II.
Standard: 205°C (401°F)
(e) Reconnect the HV control ECU connector.

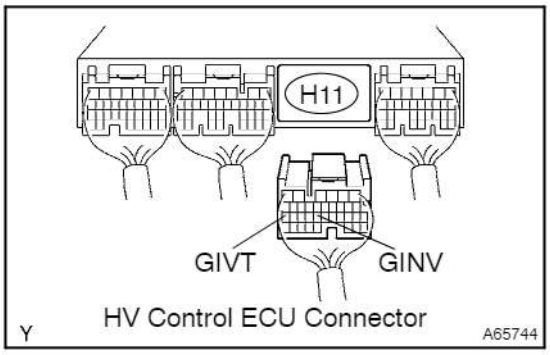
NG → **REPLACE HYBRID VEHICLE CONTROL ECU** (See page 21–128)

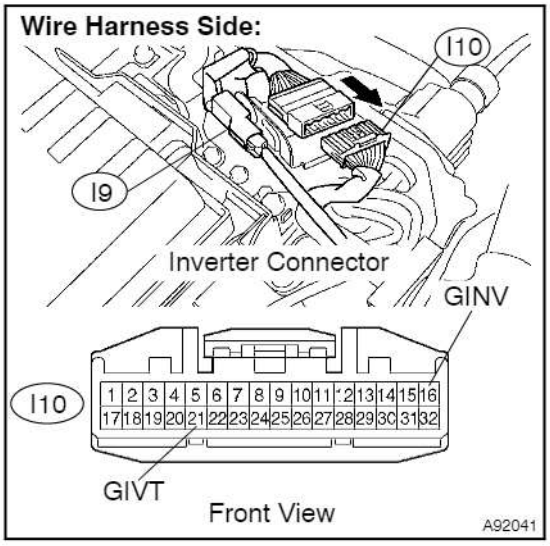
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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4	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see page 21–25).
(d) Disconnect the H11 HV control ECU connector.
(e) Disconnect the I10 inverter connector.
(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
GIVT (H11–27) – GIVT (I10–21)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
GIVT (H11–27) or GIVT (I10–21) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

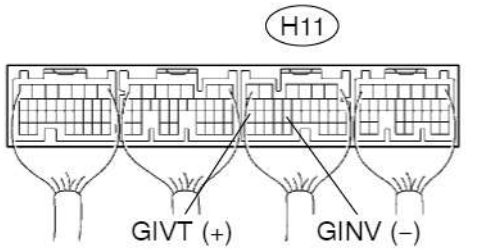
(g) Reconnect the inverter connector.
(h) Reconnect the HV control ECU connector.
(i) Reinstall the inverter cover (see page 21–25).
(j) Reinstall the service plug grip (see page 21–120).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	INSPECT HYBRID VEHICLE CONTROL ECU(GIVT VOLTAGE)



(a) Turn the power switch ON (IG).

HINT:

DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
GIVT (H11–27) – GINV (H11–23)	2.0 to 4.5 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)

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DTC	P3226/562	DC/DC(BOOST) CONVERTER TEMPERATURE SENSOR MALFUNCTION

DTC	P3226/563	DC/DC(BOOST) CONVERTER TEMPERATURE SENSOR MALFUNCTION

CIRCUIT DESCRIPTION

Refer to DTC P0A94 (INF 583) on page 05–517.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3226	562	Sudden change in boost converter temperature sensor output	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly
P3226	563	Boost converter temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Water w/ motor & bracket pump assembly • Cooling fan motor • Cooling fan motor No. 2 • w/ converter inverter assembly

WIRING DIAGRAM

Refer to DTC P0A94 (INF 583) on page 05–517.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.

OK: There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT (See page 22–4)**

OK

2	CHECK COOLANT HOSE

(a) Check that the hoses of the cooling system are not bent or clogged (see the cooling system on page 05–474).

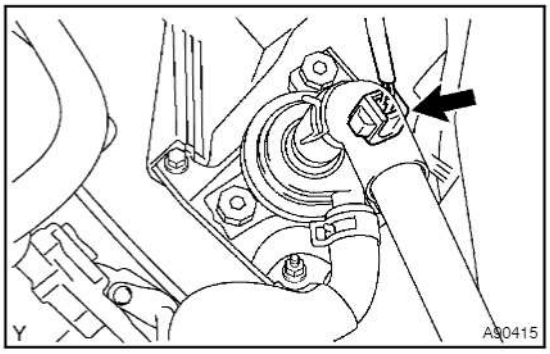
OK: The hoses of the cooling system are not bent or clogged

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NG → CORRECT TO NORMAL CONDITION

OK

3	CHECK CONNECTION CONDITION OF WATER PUMP CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the water pump connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

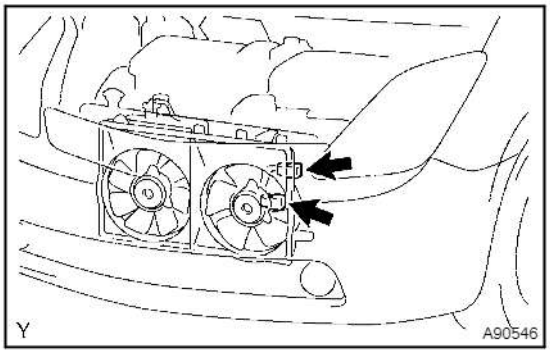
4	CHECK WATER W/MOTOR & BRACKET PUMP ASSY

(a) Turn the power switch ON (IG).
(b) Check the operation of the water pump.
OK: Coolant is sloshing in the reservoir tank

NG → REPLACE WATER W/MOTOR & BRACKET PUMP ASSY

OK

5	CHECK CONNECTION CONDITION OF COOLING FAN MOTOR CONNECTOR(LOOSENESS AND POOR CONTACT)



(a) Check the connection condition of the cooling fan motor connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

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6	INSPECT COOLING FAN MOTOR (See page 16–8)

NG → REPLACE COOLING FAN MOTOR AND ADD ENGINE COOLANT

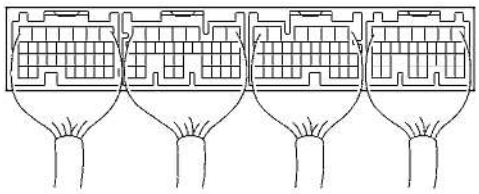
OK

7	INSPECT COOLING FAN MOTOR NO.2 (See page 16–8)

NG → REPLACE COOLING FAN MOTOR NO. 2 AND ADD ENGINE COOLANT

OK

8	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR(LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A18294

(a) Check the connection condition of all the connectors at the HV control ECU.
OK: Connectors have been connected securely and there is no poor connection.

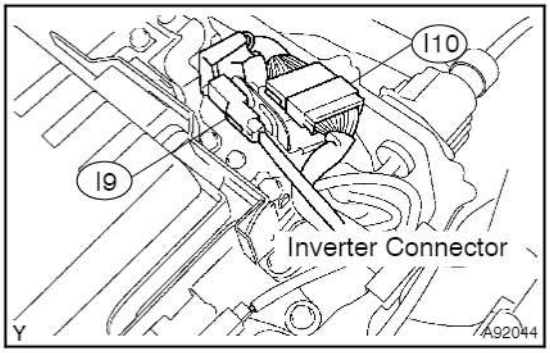
NG → CONNECT SECURELY

OK

9	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR(LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (see page 21–25).

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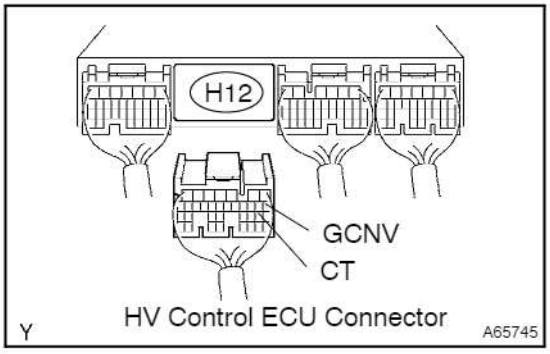


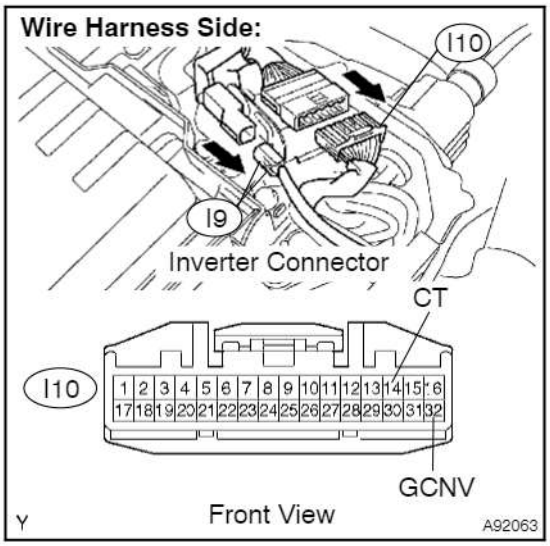
(d) Check the connection condition of the I9 and I10 inverter connectors.
OK: Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

OK

10	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – INVERTER)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Check that the service plug grip and inverter cover have been removed.
(b) Disconnect the H12 HV control ECU connector.
(c) Disconnect the I9 and I10 inverter connectors.
(d) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(e) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard:

Tester Connection	Specified Condition
CT (H12–21) – Body ground	Below 1 V
GCNV (H12–8) – Body ground	Below 1 V

(f) Turn the power switch OFF.
(g) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
CT (H12–21) – CT (I10–14)	Below 1 Ω
GCNV (H12–8) – GCNV (I10–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CT (H12–21) or CT (I10–14) – Body ground	10 kΩ or higher
GCNV (H12–8) or GCNV (I10–32) – Body ground	10 kΩ or higher

(h) Reconnect the inverter connectors.
(i) Reconnect the HV control ECU connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

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DTC	U0100/211	LOST COMMUNICATION WITH ECM/PCM ”A”
DTC	U0100/212	LOST COMMUNICATION WITH ECM/PCM ”A”
DTC	U0100/530	LOST COMMUNICATION WITH ECM/PCM ”A”
DTC	U0111/208	LOST COMMUNICATION WITH BATTERY ENERGY CONTROL MODULE ”A”
DTC	U0111/531	LOST COMMUNICATION WITH BATTERY ENERGY CONTROL MODULE ”A”
DTC	U0129/220	LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE
DTC	U0129/222	LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE
DTC	U0129/528	LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE
DTC	U0129/529	LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE
DTC	U0131/433	LOST COMMUNICATION WITH POWER STEERING CONTROL MODULE
DTC	U0131/434	LOST COMMUNICATION WITH POWER STEERING CONTROL MODULE
DTC	U0146/435	LOST COMMUNICATION WITH GATEWAY ”A”

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CIRCUIT DESCRIPTION

The HV control ECU transmits and receives signals to and from the ECM, battery ECU, skid control ECU, power steering ECU, and the gateway ECU via CAN (Controller Area Network) communication.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
U0100	211	CAN communication problem between ECM and HV control ECU (no signal input)	• CAN communication system
U0100	212	CAN communication problem between ECM and HV control ECU (transmission error)	• CAN communication system
U0100	530	CAN communication problem between ECM and HV control ECU (CAN communication system malfunction)	• CAN communication system
U0111	208	CAN communication problem between battery ECU and HV control ECU (no signal input)	• CAN communication system
U0111	531	CAN communication problem between battery ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system
U0129	220	CAN communication problem between skid control ECU and HV control ECU (no signal input)	• CAN communication system
U0129	222	CAN communication problem between skid control ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system
U0129	528	CAN communication problem between skid control ECU and HV control ECU (transmission error)	• CAN communication system
U0129	529	CAN communication problem between skid control ECU and HV control ECU (regenerative torque malfunction)	• CAN communication system
U0131	433	CAN communication problem between power steering ECU and HV control ECU (no signal input)	• CAN communication system
U0131	434	CAN communication problem between power steering ECU and HV control ECU (CAN communication system malfunction)	• CAN communication system
U0146	435	CAN communication problem between gateway ECU and HV control ECU (no signal input)	• CAN communication system

INSPECTION PROCEDURE

1	READ OUTPUT DTC(BUS CHECK)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON
(d) On the intelligent tester II, enter the following menus: Bus Check / Communication Malfunction DTC.
(e) Read and record DTCs.

Result: Only DTC U0100 (INF 211) or U0129 (INF 220) is output

HINT:
When DTCs other than CAN communication malfunction DTCs are output simultaneously, first correct the CAN communication problem, and then perform troubleshooting for other DTCs.

YES → **Go to step 3**

NO

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2 READ OUTPUT DTC(HYBRID CONTROL)

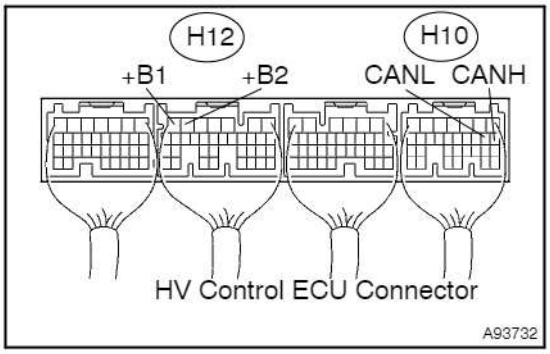
(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Check if DTC P3108 (INF 594) is output.

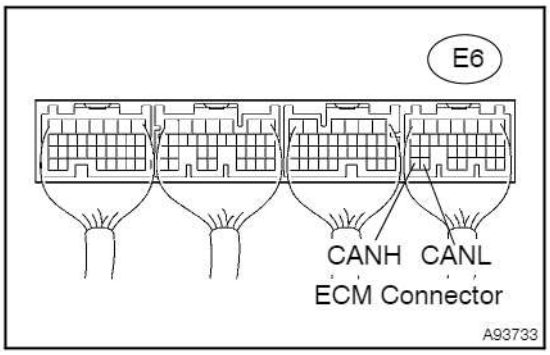
HINT:
DTC P3108 (INF 594) is one of the DTCs that indicates a CAN communication malfunction. If this DTC is present, record the DTC as the time of detection of other CAN communication malfunction DTCs.

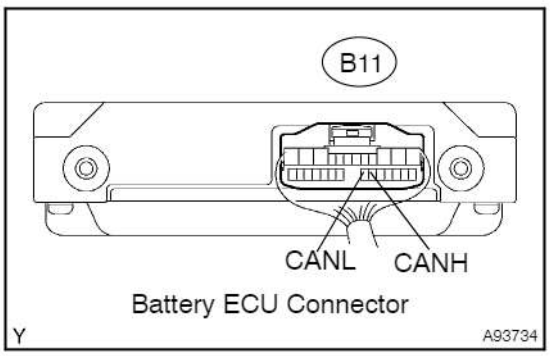
GO

GO TO CAN COMMUNICATION SYSTEM (See page 05–2312)

3 CHECK TERMINAL OF ECM AND ECUS(+B1, +B2, CANH AND CANL TERMINALS)







(a) Check connection condition of each connector of the HV control ECU, ECM and battery ECU, as well as contact condition of each terminal shown in the table below.

Type of ECU	Terminal No.	Symbols
HV control ECU	H12–7	+B1
HV control ECU	H12–6	+B2
HV control ECU	H10–8	CANH
HV control ECU	H10–9	CANL
ECM	E6–31	CANH
ECM	E6–30	CANL
Battery ECU	B11–18	CANH
Battery ECU	B11–19	CANL

OK: Connectors have been connected securely and there is no poor contact on each terminal.

NG → **CONNECT SECURELY**

OK

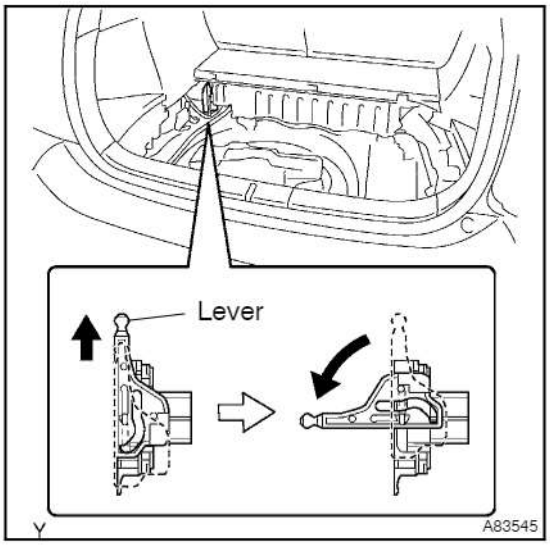
CHECK FOR INTERMITTENT PROBLEMS (See page 05–232)

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HYBRID BATTERY SYSTEM

PRECAUTION

05IG5–01



1. Precautions for inspecting the hybrid battery system

(a) Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip (see page 01–5). After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, do not turn the power switch ON (READY) unless instructed by the repair manual.

(b) After disconnecting the service plug grip, wait at least for 5 minutes before touching any of high–voltage connectors or terminals.

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

(c) Since liquid leakage may occur, wear protective goggles when checking inside the HV battery.

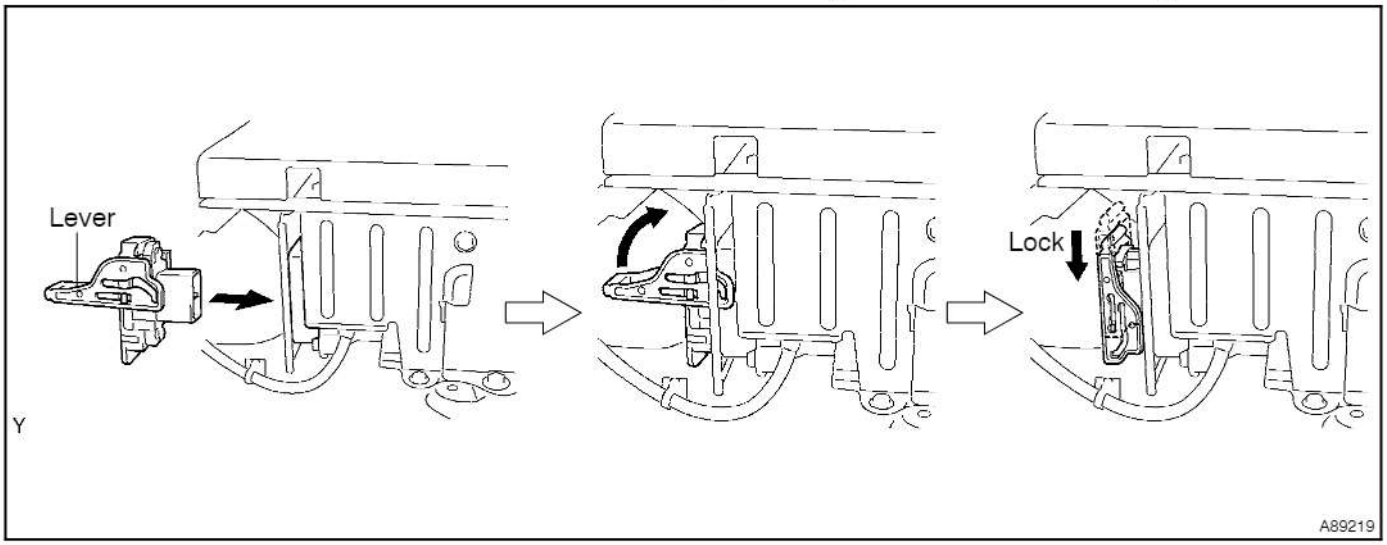
(d) Wear insulated gloves, turn the power switch OFF, and disconnect the negative terminal of the auxiliary battery before touching any of the orange–colored wires of the high–voltage system.

(e) Turn the power switch OFF before performing a resistance check.

(f) Turn the power switch OFF before disconnecting or reconnecting any connector.

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(g) To install this service plug grip, the lever must be flipped and locked downward. Once it is locked in place, it turns the interlock switch ON. Make sure to lock it securely because if you leave it unlocked, the system will output a DTC pertaining to the interlock switch system.



2. NOTICE FOR INITIALIZATION

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

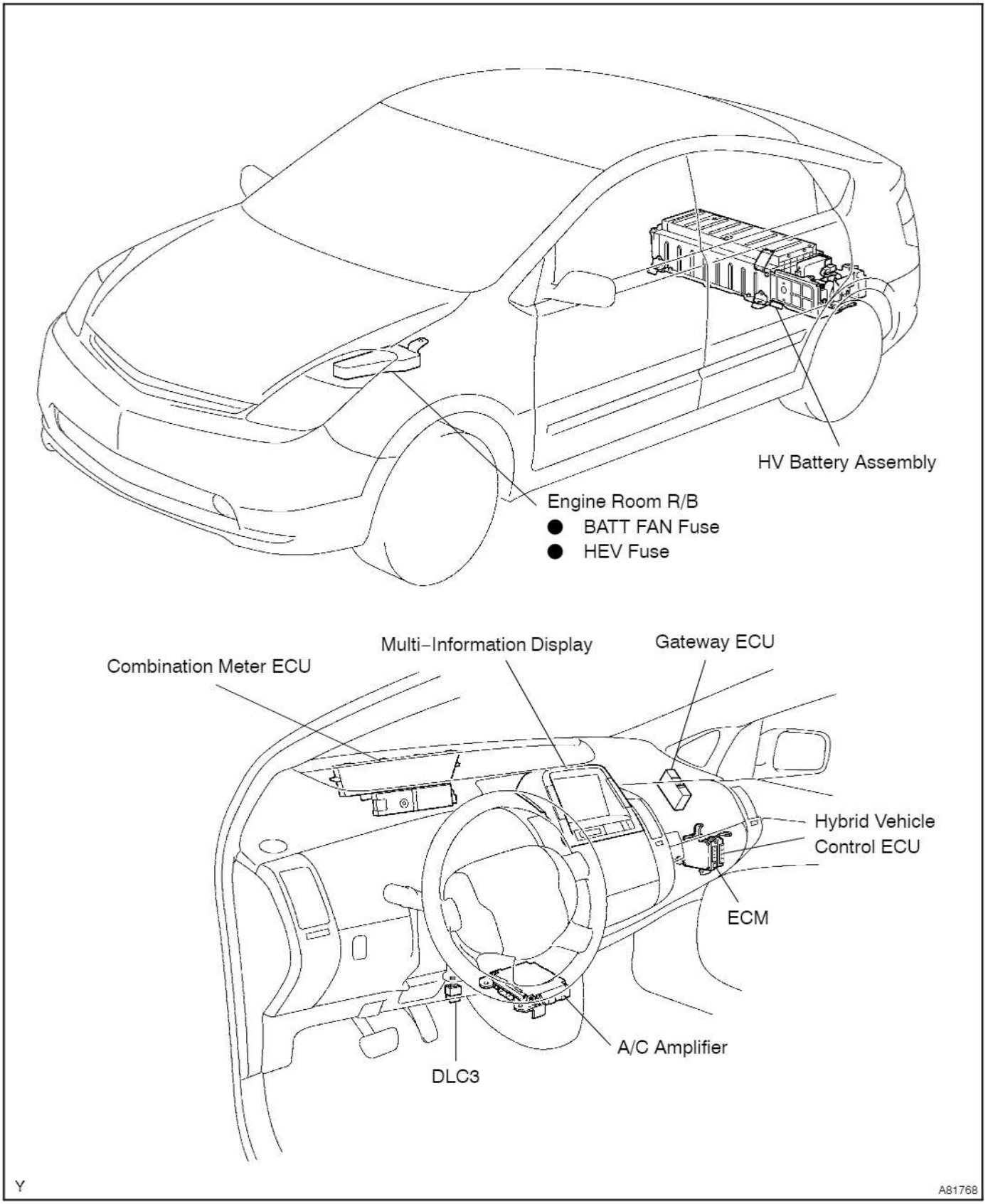
3. NOTICE FOR HYBRID SYSTEM ACTIVATION

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

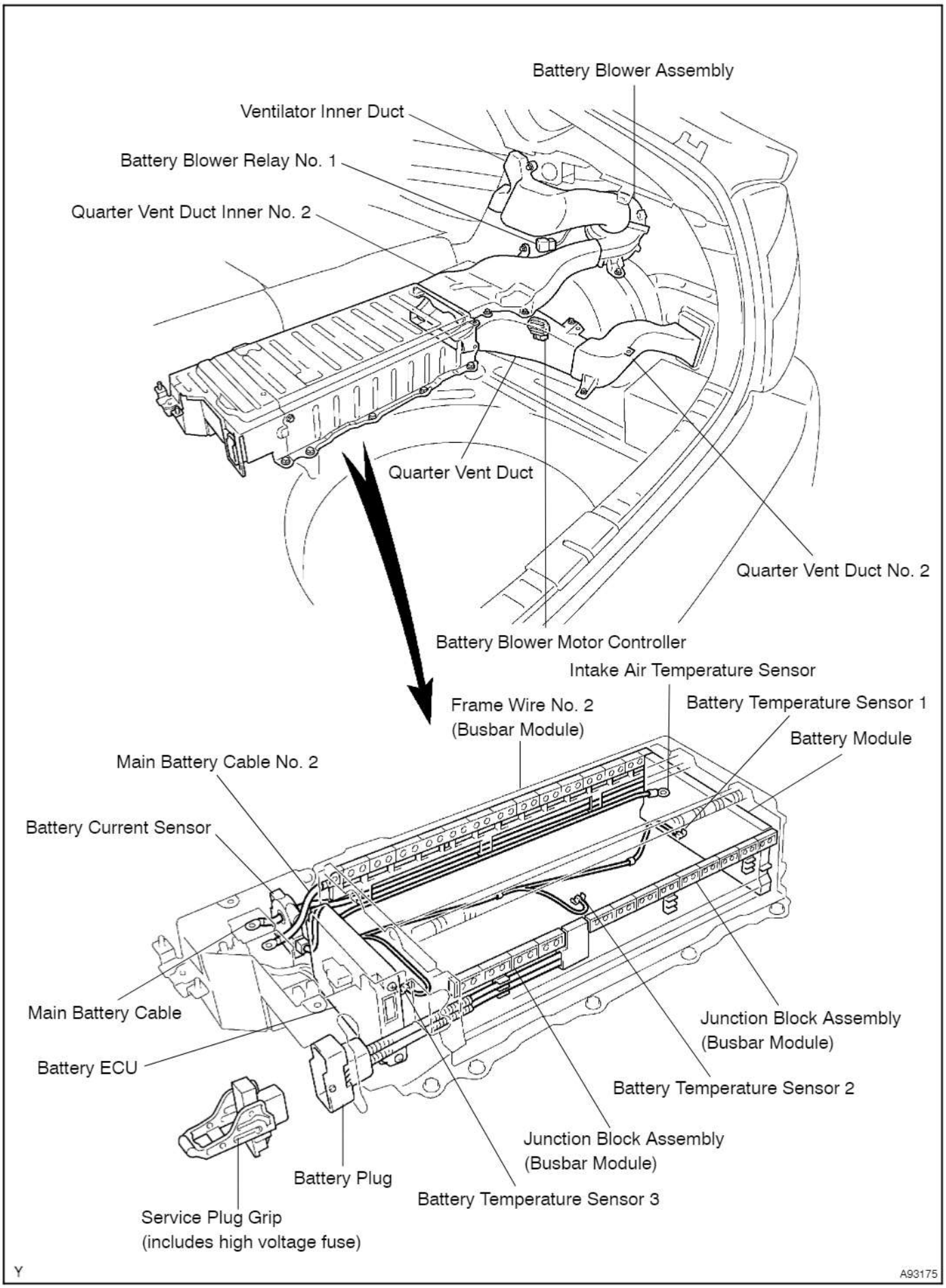
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05IG6-01

LOCATION



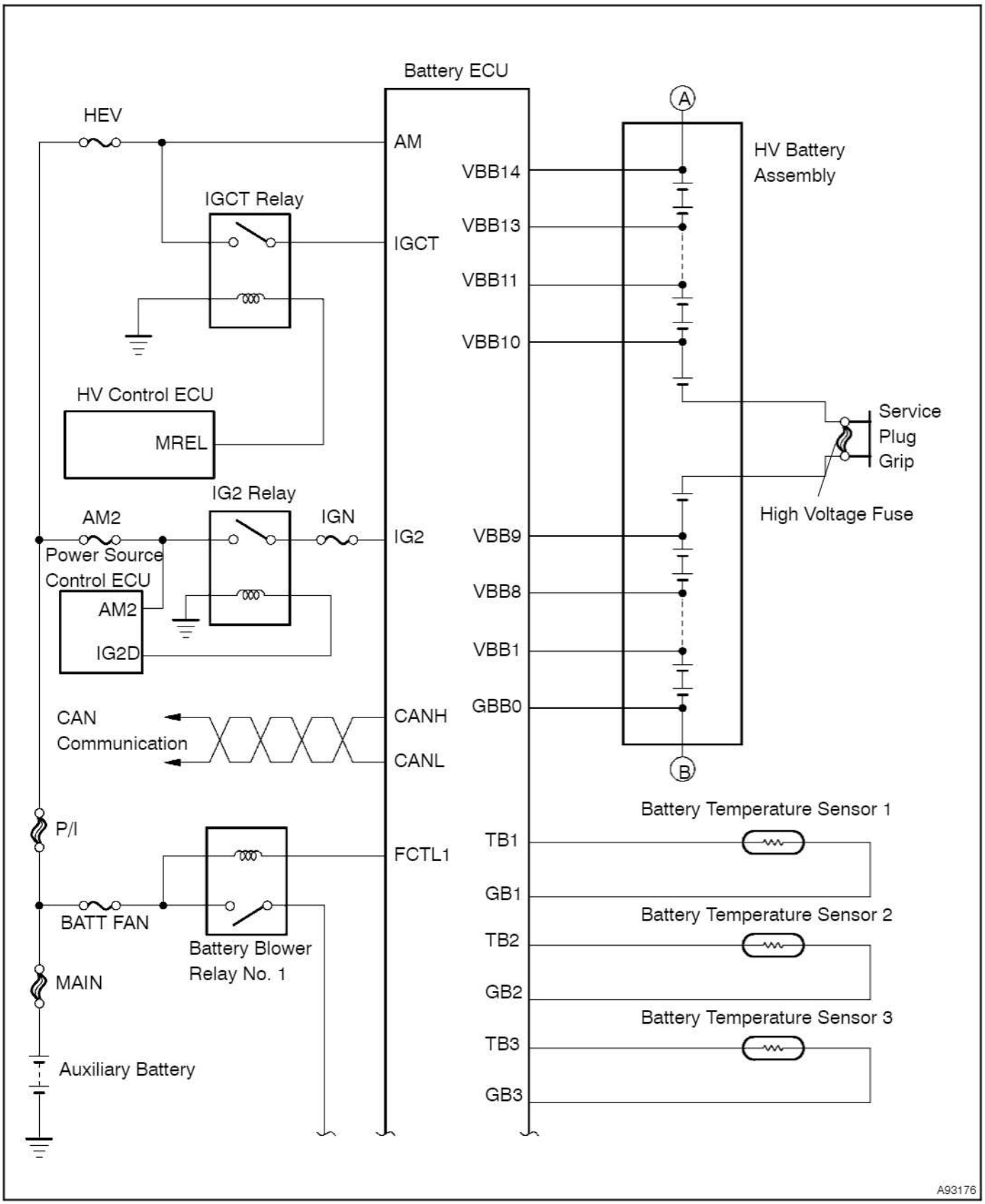
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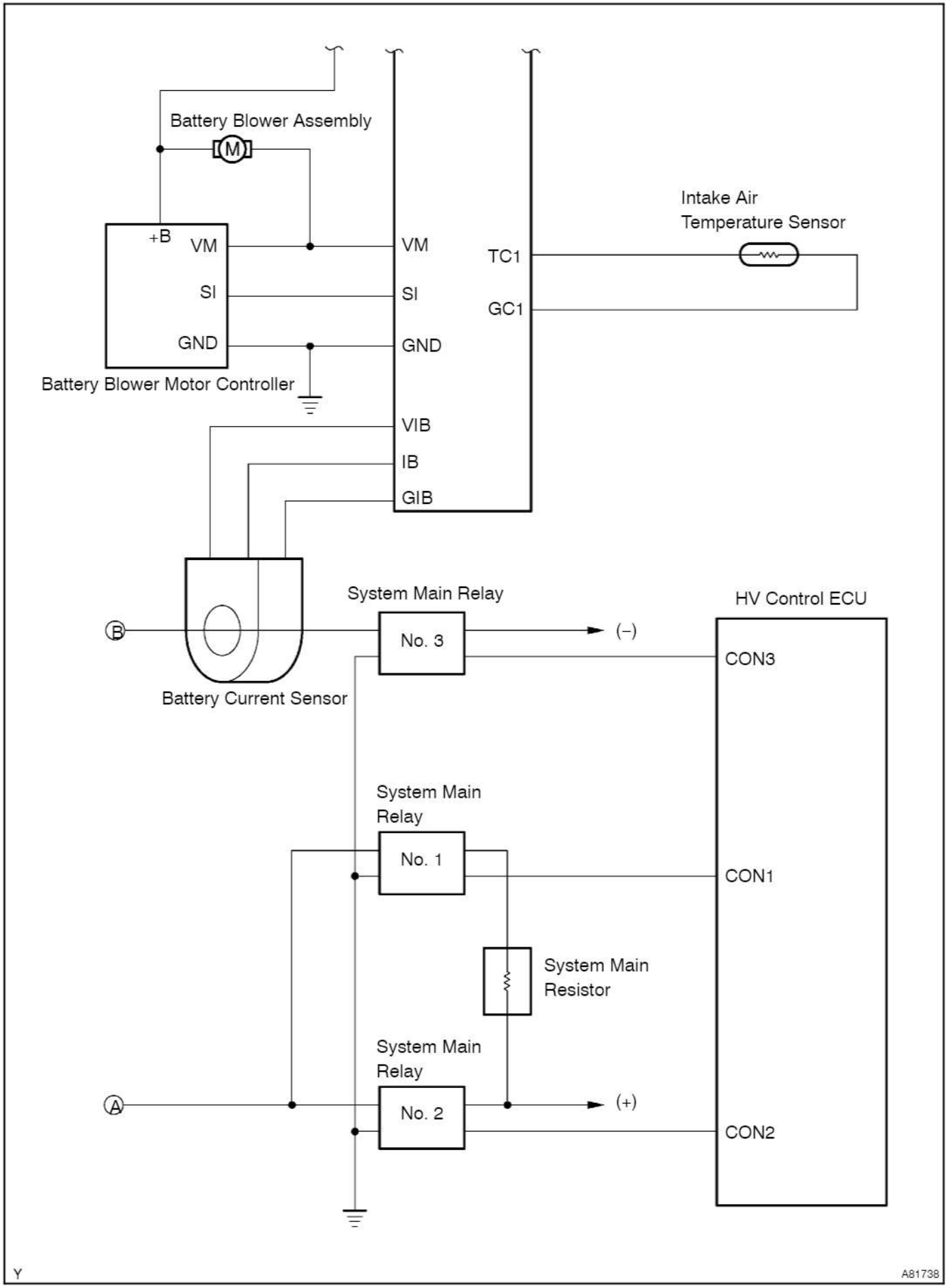
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05IG7-01

SYSTEM DIAGRAM

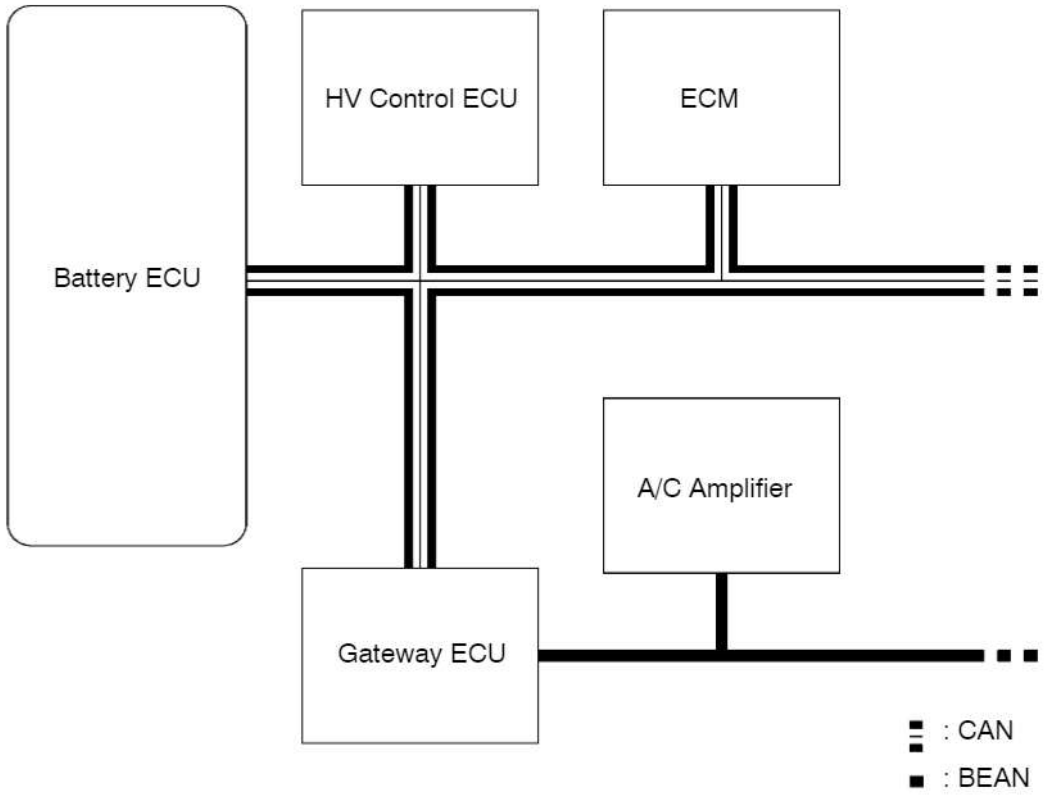


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Communication System Diagram:



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05IG8-01

SYSTEM DESCRIPTION

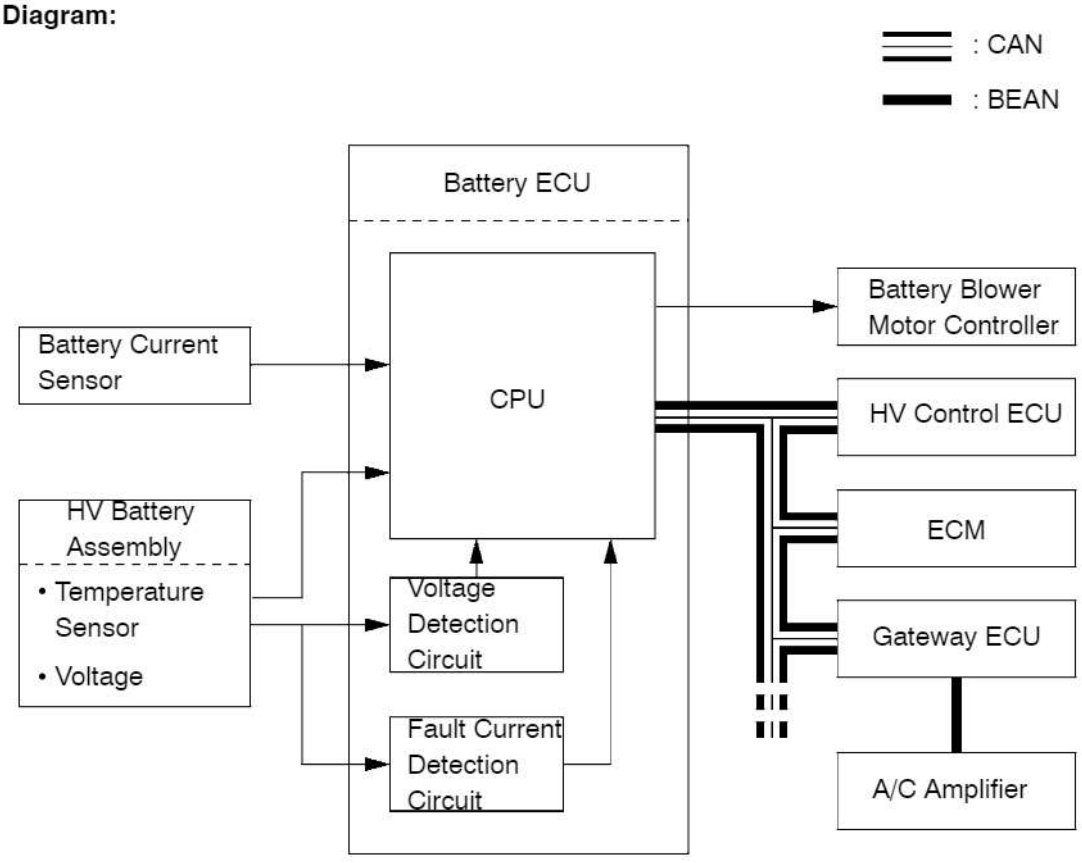
1. OUTLINE

The principal role of the hybrid battery system is to monitor the condition of the HV battery assembly through the use of the battery ECU and transmit this information to the HV control ECU. Furthermore, this system controls the battery blower motor controller in order to maintain a proper temperature at the HV battery assembly.

The battery ECU uses CAN (Controller Area Network) to maintain communication with the following devices: the HV control ECU, ECM, and A/C amplifier.*

*: Because it is connected to BEAN (Body Electronics Area Network), data is transmitted via the gateway ECU.

System Diagram:



2. CONTROL DESCRIPTION

(a) HV battery assembly management and fail–safe function.

(1) The battery assembly is repeatedly discharged at acceleration and charged by regenerating brakes at deceleration while driving. The battery ECU calculates SOC (state of charge) of the HV battery based on voltage, current, and temperature, and then sends the results to the HV control ECU. As a result, charge and discharge control is performed in the HV control ECU depending on the SOC.

(2) If malfunction occurs, the battery ECU performs a fail–safe function and protects the HV battery assembly in accordance with the extent of the malfunction.

(b) Battery blower motor control.

(1) To control an increase in the temperature of the HV battery assembly while the vehicle is being driven, the battery ECU determines and controls the operating mode of the battery blower assembly in accordance with the temperature of the HV battery assembly.

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(c) CHK ENG illumination control.

(1) If the battery ECU detects malfunction that affects the exhaust gas emissions, it will transmit an CHK ENG (check engine warning lamp) illumination request to the HV control ECU. (The battery ECU does not directly illuminate the CHK ENG.)

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05IG9–01

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used at step 3, 4, 5, 8.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05–648)

3	CONNECT INTELLIGENT TESTER II TO DLC3

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

4	CHECK AND RECORD DTC AND FREEZE FRAME DATA (See page 05–657)

HINT:
If a DTC related to the CAN communication system malfunction is output, first troubleshoot and repair the CAN communication (see page 05–2312).

5	CLEAR DTC (See page 05–657)

6	PROBLEM SYMPTOM CONFIRMATION

(a) When the malfunction does not occur, go to A.
(b) When the malfunction occurs, go to B.

B	Go to step 8

A

7	SYMPTOM SIMULATION

8	CHECK DTC (See page 05–657)

9	DTC CHART (See page 05–665)

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10	CIRCUIT INSPECTION

11	IDENTIFICATION OF PROBLEM

12	ADJUSTMENT AND/OR REPAIR

13	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

05IGA–01

Prius Problem Check Sheet

Please fill in the blanks within bold frame

Name of Dealer	Person in Charge at Headquarters	Person in Charge at Dealer
Office		

Vehicle Specifications

Model Code	NHW 20 –AHE	Problem Occurrence Date	. .	Odometer Reading	miles km
Licence No.		Service Entry Date	. .	Production date	. .
VIN		Option	☐ Navigation (☐ equipped by manufacturer ☐ dealer) ☐ Cold climate specifications ☐ others ( )		

Interview Results

Contents of complaint (Status when and before/after occurring in the order of events as correct as possible)	Characteristics of Customer	
	Vehicle used before	
	Main use area	☐ city area ☐ suburbs ☐ mountain area ☐ other ( )
	Frequency in use	☐ every day ☐ ____ times/week or month

Driving Condition	Road Condition	Vehicle Condition			
Vehicle Speed _____ mph _____ km/h ☐ when starting ☐ when accelerating ☐ when normal driving ☐ when decelerating ☐ when braking ☐ when stopping ☐ when parking ☐ when turning ☐ when ABS actuating ☐ cruise control driving ☐ EV mode driving ☐ others ( )	☐ level road ☐ up hill or down hill ☐ dry paved road ☐ wet paved road ☐ rough paved road ☐ unpaved road ☐ snowy or frozen road ☐ bump or curb ☐ others ( )	☐ Power switch ON (not getting ready) ☐ when starting ☐ right after starting ☐ until____ minute after starting ☐ until____ minute after starting of driving ☐ when stopping system Status of engine ☐ while stopping engine ☐ when revolving engine HV battery indication ☐ _____/8 segments ☐ unidentified A/C status ☐ ON ☐ OFF ☐ unidentified	Power switch indicator ☐ illumination (orange or green) ☐ blink ☐ no illumination Shift position (indication) ☐ P ☐ R ☐ N ☐ D ☐ B ☐ when operating _____ → _____ ☐ no indication ☐ blink ☐ unidentified P position switch status ☐ illumination ☐ blink ☐ no illumination ☐ unidentified	Warning lamp ☐ ⚠ ☐ engine ☐ charge ☐ PS ☐ HV battery ☐ HV ☐ brake (yellow or red) ☐ ABS ☐ VSC ☐ slip ☐ coolant ☐ other warning ( ) ☐ no warning lamp	Brake operation ☐ brake slowly ☐ brake suddenly ☐ operation with a left foot ☐ not operating Accelerator pedal operation ☐ when depressing ☐ when releasing ☐ when getting a foot off from the pedal Frequency in occurrence ☐ always ☐ _____ times/ week or month ☐ only once
Weather: _____ Temperature: _____ °F _____ °C Fuel level ____/10 segments	☐ unidentified ☐ unidentified ☐ unidentified				

Vehicle Verification Results

Diagnostic trouble code

HV ★				Brake ★	
INF				INF	
SFI ★		Power Source Control		Gateway	
Battery ★		A/C		Smart	
Transmission Control ★		SRS		Immobilizer	
EPS ★		Body		Theft Deterrent	
				Navigation	

★: Indicates that the system has a function to store the freeze frame data. If DTCs have been set, please attach the freeze frame data.

Vehicle Inspection Results (Verification items, reason to identify/presume the cause parts, etc.)	Duplication Status
	☐ always ☐ sometimes conditions when the malfunction occurred ( ) ☐ no reproduction
Replacement Parts	**Confirmation Results After Repair**
Problem parts: No/Yes (Sending date: . .)	☐ normal ☐ reproduction ☐ other ( )

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05IGB–01

CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

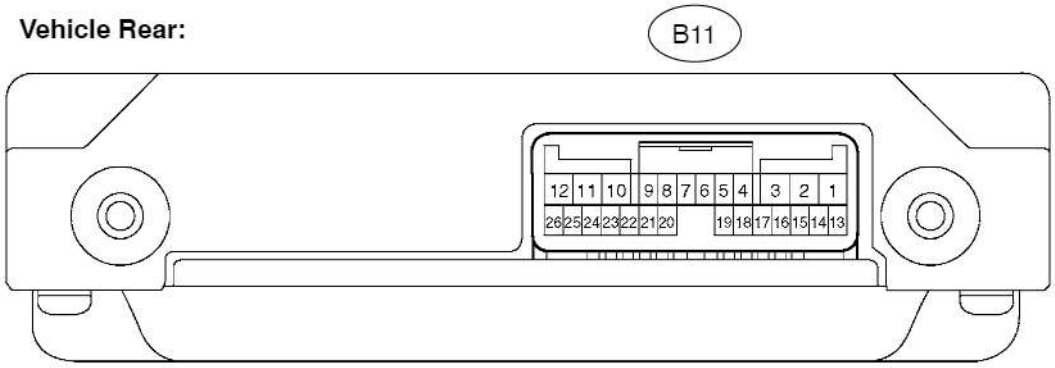
(a) Perform a simulation test (see page 01–36).
  (1) In the simulation test, reproduce the driving condition at the trouble occurrence according to the customer's comments and freeze frame data recorded with DTCs.
(b) Check the connector(s) and terminal(s) (see page 01–46).
(c) Wiggle the harness and connector(s) (see page 01–46).

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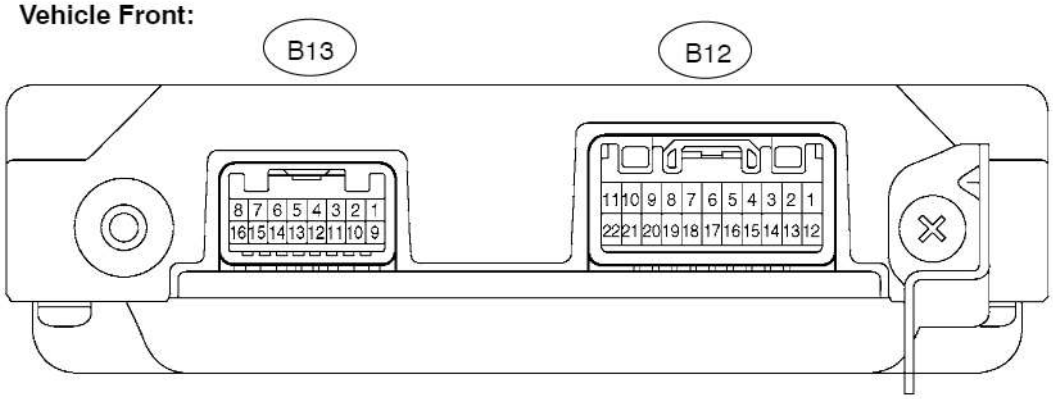
05IGH–01

TERMINALS OF ECU

Vehicle Rear:



Vehicle Front:



Y

A90442

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
AM (B11 – 1) – GND (B11 – 12)	G – W–B	Auxiliary battery (for measuring the battery voltage and for the battery ECU memory)	Always	9 to 14
IGCT (B11 – 2) – GND (B11 – 12)	L – W–B	Control signal	Power switch ON (READY)	9 to 14
VM (B11 – 9) – GND (B11 – 12)	V – W–B	Battery blower motor monitoring signal	Battery blower motor mode 1 actuation (at low speed)	10 to 14
VM (B11 – 9) – GND (B11 – 12)	V – W–B	Battery blower motor monitoring signal	Battery blower motor mode 6 actuation (at high speed)	2 to 6
FCTL1 (B11 – 10) – GND (B11 – 12)	BR – W–B	Battery blower relay No. 1	Battery blower motor actuation	Below 1
IG2 (B11 – 13) – GND (B11 – 12)	O – W–B	IG signal	Power switch ON (IG)	9 to 14
CANH (B11 – 18) – GND (B11 – 12)	B – W–B	HIGH–level CAN bus line	Power switch ON (IG)	Pulse generation (See waveform 1)
CANL (B11 – 19) – GND (B11 – 12)	W – W–B	LOW–level CAN bus line	Power switch ON (IG)	Pulse generation (See waveform 2)
SI (B11 – 24) – GND (B11 – 12)	Y – W–B	Battery blower motor actuation signal	Battery blower motor modes 1 to 6 actuation	Pulse generation (See waveform 3)
TB1 (B13 – 1) – GB1 (B13 – 2)	W – W	HV battery temperature sensor 1	HV battery temperature: –40 to 90°C (–40 to 194°F)	4.8 to 1.0
TB2 (B13 – 3) – GB2 (B13 – 4)	B – B	HV battery temperature sensor 2	HV battery temperature: –40 to 90°C (–40 to 194°F)	4.8 to 1.0

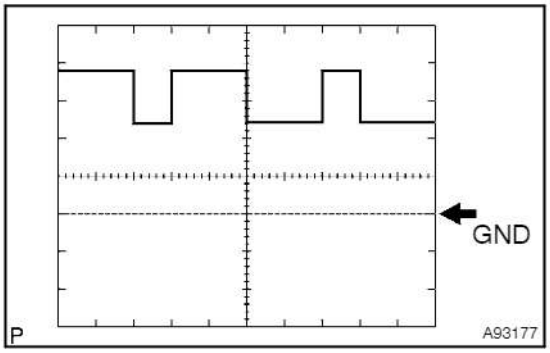
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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
TB3 (B13 – 5) – GB3 (B13 – 6)	L – L	HV battery temperature sensor 3	HV battery temperature: –40 to 90°C (–40 to 194°F)	4.8 to 1.0
TC1 (B13 – 9) – GC1 (B13 – 10)	G – G	Intake air temperature sensor	Intake air temperature: –40 to 90°C (–40 to 194°F)	4.8 to 1.0
VIB (B13 – 15) – GIB (B13 – 14)	—	Power source of battery current sensor (a specific voltage)	Power switch ON (IG)	4.5 to 5.5
IB (B13 – 16) – GIB (B13 – 14)	—	Battery current sensor	Power switch ON (READY)	0.5 to 4.5
GND (B11 – 12) – Body ground	W–B – Body ground	Ground	Always (resistance check)	Below 6 Ω

1. Oscilloscope waveforms

HINT:

In the oscilloscope waveform samples, which are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

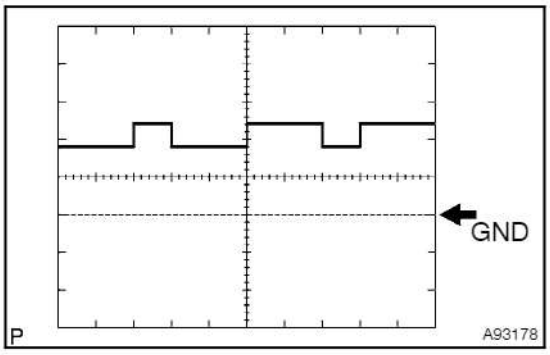


(a) Waveform 1 (HIGH–level CAN bus line)

Item	Contents
Terminal	CANH – GND
Equipment Setting	1 V/Division, 2 μs/Division
Condition	Power switch ON (IG)

HINT:

The waveform varies depending on the contents of the communication.



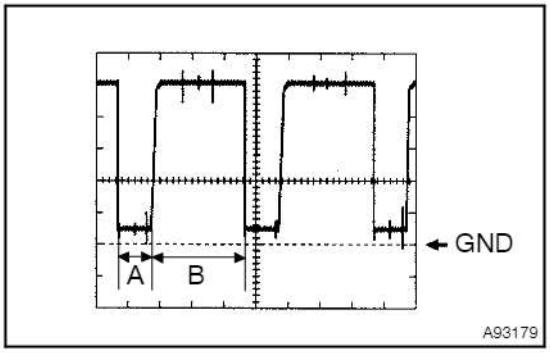
(b) Waveform 2 (LOW–level CAN bus line)

Item	Contents
Terminal	CANH – GND
Equipment Setting	1 V/Division, 2 μs/Division
Condition	Power switch ON (IG)

HINT:

The waveform varies depending on the contents of the communication.

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(c) Waveform 3 (battery blower motor actuation signal)

Item	Contents
Terminal	SI – GND
Equipment Setting	1 V/Division, 50 μs/Division
Condition	During vehicle stop

HINT:

Amplitude A and B in the diagram vary by mode.

Mode	A	B
1	44.4 μs	155.6 μs
2	44.4 μs	155.6 μs
3	51.6 μs	148.4 μs
4	59.0 μs	141.0 μs
5	59.0 μs	141.0 μs
6	146.4 μs	53.6 μs

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DIAGNOSIS SYSTEM

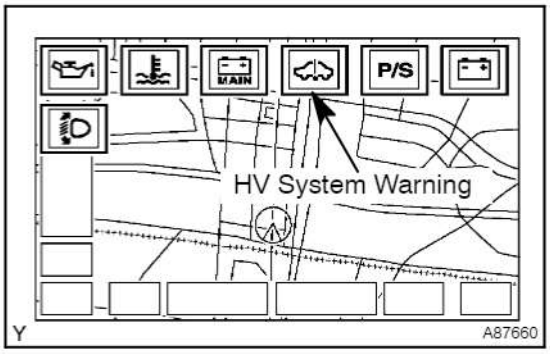


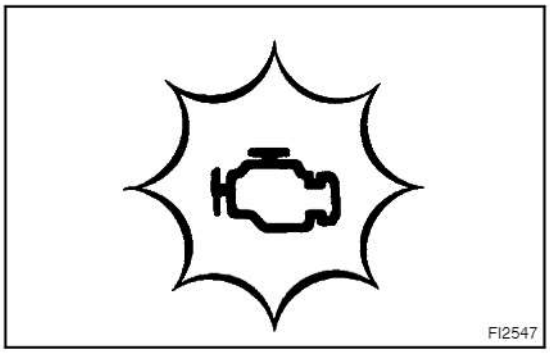
1. DESCRIPTION

(a) The battery ECU has a self–diagnosis system. If the computer, the HV battery system or the components operate improperly, the ECU diagnoses improper operation to detect malfunction, and illuminates the master warning lamp in the combination meter together with the HV system warning indicator on the multi–information display.

HINT:

The master warning lamp illuminates when HV battery system fails and it blinks when in inspection mode.



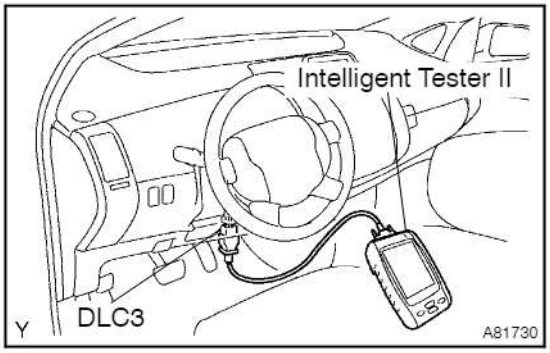


(b) Description for Euro–OBD (European spec.)

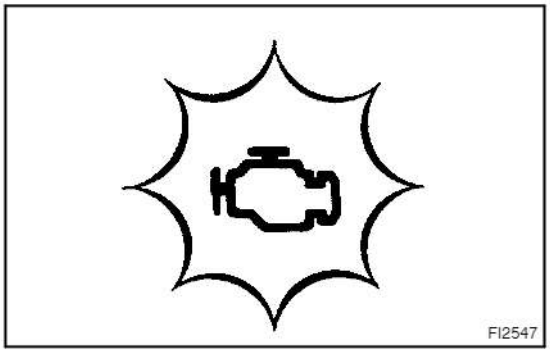
- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the OBD scan tool complying with ISO 15031–4 or the intelligent tester II to the vehicle, and read various data output from the vehicle's ECUs.
- Euro–OBD regulations require that the vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) in the instrument panel when the computer detects malfunction in: 1) the emission control systems/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computers. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15031–4 are recorded in the battery ECU memory (see page 05–665).

If the malfunction does not recur in 3 consecutive trips, the CHK ENG will go off automatically. However the DTCs remain recorded in the battery ECU memory.

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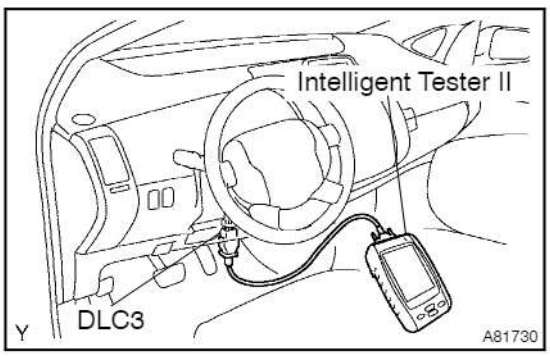
- To check the DTCs, connect the intelligent tester II or OBD scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester II or OBD scan tool also enables you to erase the DTCs and check the freeze frame data and various forms of the HV battery system data (for operating instructions, refer to their respective instruction manuals). The DTCs include ISO controlled codes and manufacturer controlled codes. ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set by a manufacturer within the prescribed limits (see the DTC chart on page 05–665).
- Freeze frame data:
  The freeze frame data records the driving condition when malfunction is detected. When troubleshooting, it can help determine if the vehicle was running, braked, stopped, or reversed.



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

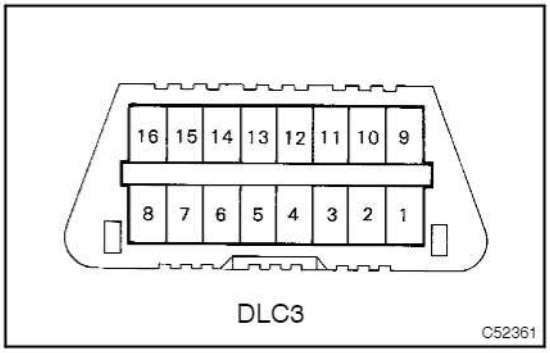
- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the intelligent tester II to the vehicle, and read various data output from the vehicle's ECU.
- The vehicle's on–board computer illuminates the check engine warning lamp (CHK ENG) in the instrument panel when the computer detects malfunction in the computer itself or in drive system components. In addition, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the battery ECU memory (see page 05–665).

If the malfunction does not recur, the CHK ENG will go off when the power switch is turned to OFF. However the DTCs remain recorded in the battery ECU memory.



- To check the DTCs, connect the intelligent tester II to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester II also enables you to erase the DTCs and check the freeze frame data and various forms of the HV battery system data (for operating instructions, refer to its instruction manual).

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2. CHECK DLC3

The battery ECU uses the ISO 9141–2 (Euro–OBD)/ ISO 14230(M–OBD) for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 9141–2/ ISO 14230 format.

Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	11 to 14 V	Always
CANH	6	HIGH–level CAN bus line	14 – LOW–level CAN bus line	54 to 69 Ω	Power switch OFF
CANH	6	HIGH–level CAN bus line	16 – Battery positive	1 MΩ or higher	Power switch OFF
CANH	6	HIGH–level CAN bus line	4 – Chassis ground	1 kΩ or higher	Power switch OFF
CANL	14	LOW–level CAN bus line	16 – Battery positive	1 MΩ or higher	Power switch OFF
CANL	14	LOW–level CAN bus line	4 – Chassis ground	1 kΩ or higher	Power switch OFF

HINT:

If the display shows no information available when you have connected the cable of intelligent tester II to the DLC3, turned the power switch ON and operated the intelligent tester II, there is a problem on the vehicle side or tester side.

- If the communication is normal when the tester is connected to another vehicle of the same model, inspect the DLC3 and communication bus on the original vehicle.
- If the communication is still impossible when the tester is connected to another vehicle of the same model, the problem is probably in the tester itself, so consult the Service Department listed in its instruction manual.

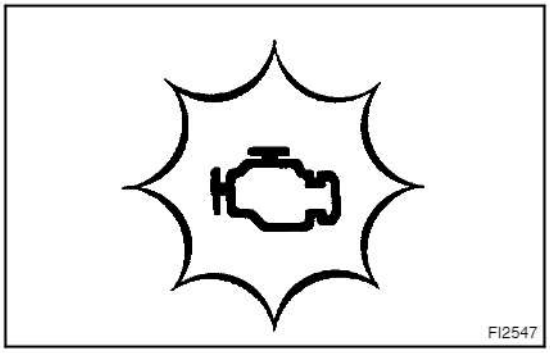
3. INSPECT AUXILIARY BATTERY

(a) Measure the voltage of the auxiliary battery.

Voltage: 11 to 14 V

(b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.

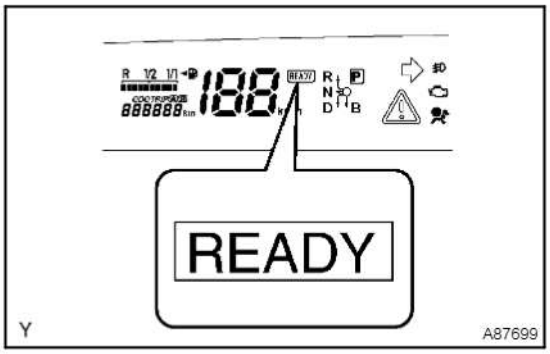
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4. CHECK CHK ENG

(a) The CHK ENG illuminates when the power switch is turned ON and the "READY" lamp is OFF.

If the CHK ENG is not illuminated, troubleshoot the CHK ENG circuit (see page 05–209).

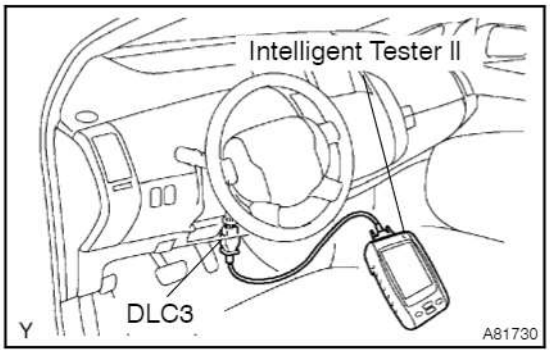


(b) When the "READY" turns on, the CHK ENG should turn off.

If the CHK ENG remains on, the diagnosis system has detected malfunction or abnormality in the system.

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DTC CHECK/CLEAR

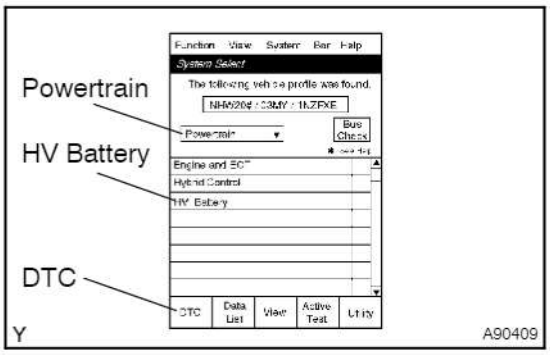


1. CHECK DTC (HV battery system)

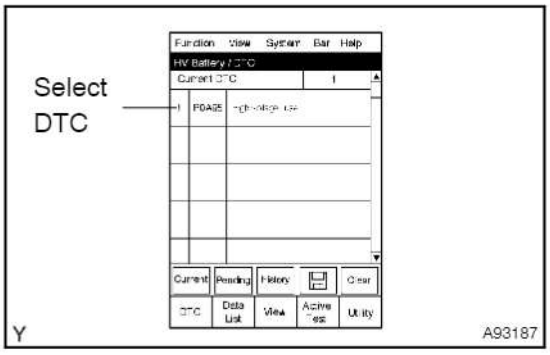
(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the intelligent tester II ON.

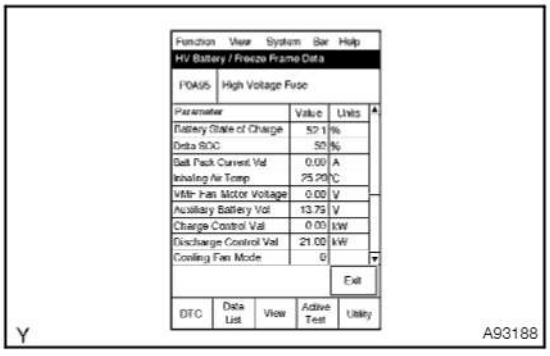


(d) On the System Select screen, enter the following menus: Powertrain / HV Battery / DTC. Read DTCs of the HV battery system.



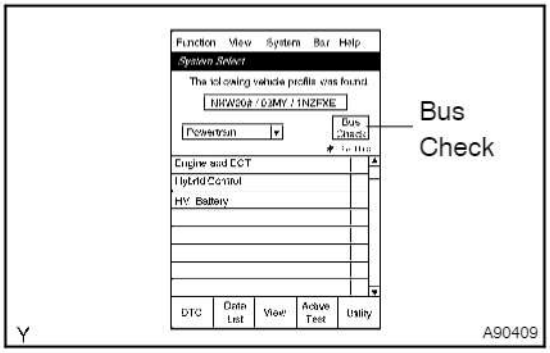
2. CHECK FREEZE FRAME DATA

(a) If a DTC is present, select that DTC in order to display its freeze frame data.



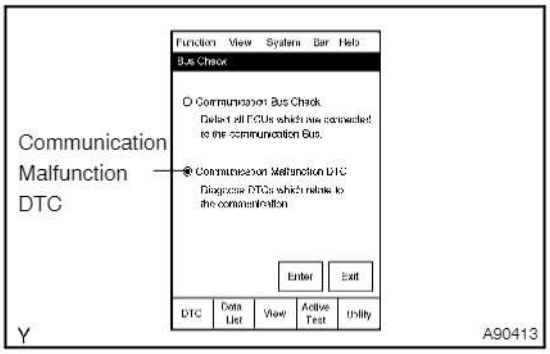
(b) Read recorded freeze frame data at the time of detection of a DTC.

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3. CHECK DTC (BUS CHECK)

(a) On the System Select screen, select Bus Check.



(b) On the Bus Check screen, select Communication Malfunction DTC, in order to read the DTCs for a communication error.

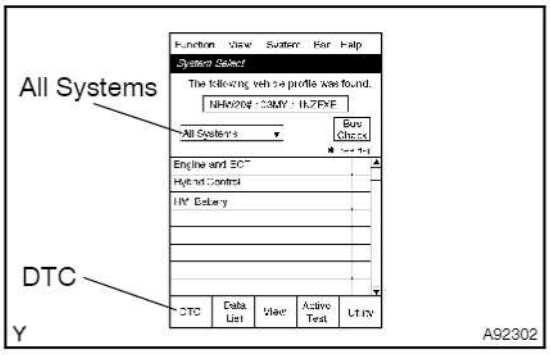
HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair malfunction in the CAN communication (see page 05–2312).

4. CHECK DTC (Systems other than HV battery)

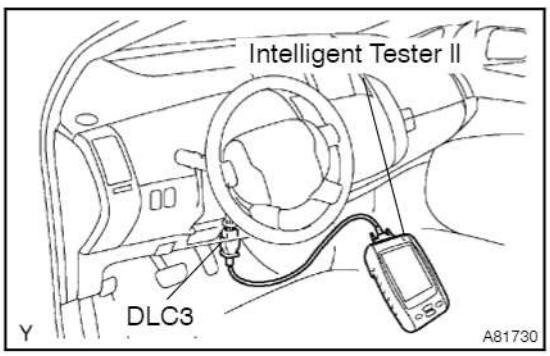
HINT:

The battery ECU maintains mutual communication with the computers, including the ECM, HV control ECU and other. Therefore, if the battery ECU outputs a warning, it is necessary to check and record the DTCs of all the systems.



(a) On the System Select screen, enter the following menus: All Systems / DTC.

(b) If DTCs are present, check the relevant systems.



5. CLEAR DTC

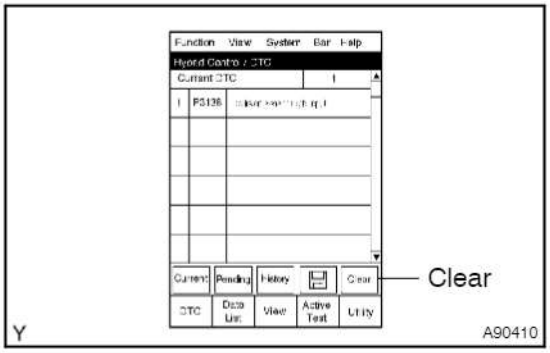
(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the intelligent tester II ON.

(d) Check that the shift position is in the P position.

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(e) Display the HV Battery / DTC screen and press the Clear key at the bottom right area of the screen.

NOTICE:

Clearing the DTCs will also clear the freeze frame data.

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05IGF-01

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

The freeze frame data records the operating condition of the HV battery system and components at the time of detection of a DTC. It is used for estimating or simulating the condition of the vehicle when malfunction occurred.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / HV Battery / DTC.
(e) Select a DTC in order to display its freeze frame data.
(f) Check the freeze frame data of the DTC that has been detected.

Freeze frame data

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range	Suspected Vehicle Status When Malfunction Occurs
Battery State of Charge (Battery SOC)	Battery state of charge/ Min.: 0 %, Max: 100 %	State of charge of HV battery
Delta SOC (Delta SOC)	Difference between maximum and minimum values of SOC at every battery block/ Min.: 0 %, Max.: 100 %	SOC variance
Batt Pack Current Val (IB Battery)	Current value of battery pack/ Min.: –327.68 A, Max.: 327.67 A	Charging/discharging condition of HV battery • Discharging amperage indicated by a positive value • Charging amperage indicated by a negative value
Inhaling Air Temp (Batt Inside Air)	Temperature of inhalation ambient air into battery pack/ Min.: –327.68°C, Max.: 327.67°C	Temperature of inhalation ambient air into battery pack
VMF Fan Motor Voltage (VMF Fan Voltage)	Battery blower motor voltage/ Min.: 0 V, Max.: 25.4 V	Actuation condition of battery blower motor
Auxiliary Battery Vol (Aux. Batt V)	Auxiliary battery voltage/ Min.: 0 V, Max.: 25.4 V	Condition of auxiliary battery
Charge Control Val (WIN)	Charge control wattage which is sent from battery ECU to HV control ECU/ Min.: –64 kW, Max.: 0 kW	Charge wattage of HV battery
Discharge Control Val (WOUT)	Discharge control wattage which is sent from battery ECU to HV control ECU/ Min.: 0 kW, Max.: 63.5 kW	Discharge wattage of HV battery
Cooling Fan Mode (Cooling Fan Spd)	Battery blower motor drive mode/ Min.: 0, Max.: 6	Stopped: 0 Low to high speed actuation: 1 to 6
ECU Control Mode (ECU Ctrl Mode)	ECU control mode/ Min.: 0, Max.: 4	Operating condition of HV battery
Standby Blower Request (SBLW Rqst)	Battery blower motor stop control request (standby blower)	Presence of stop control request to battery blower motor
Temp of Batt TB1 to TB3 (Batt Temp 1 to 3)	Temperature of HV battery/ Min.: –327.68°C, Max.: 327.67°C	Temperature of HV battery
Battery Block Vol–V01 to V14 (V1 to V14 Batt Block)	Battery block voltage/ Min.: –327.68 V, Max.: 327.67 V	Voltage variance among battery blocks

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05IGE–01

FAIL–SAFE CHART

1. FAIL–SAFE CHART

DTC No.	Detection Item	Driving Condition
P0560	System Voltage	Turns on READY and drives normally
P0A1F	Battery Energy Control Module	Turns on READY and drives in fail–safe mode
P0A7F	Hybrid Battery Pack Deterioration	Turns on READY and drives normally
P0A80	Replace Hybrid Battery Pack	Turns on READY and drives normally
P0A81	Hybrid Battery Pack Cooling Fan 1	Turns on READY and drives normally
P0A82	Hybrid Battery Pack Cooling Fan 1	Turns on READY and drives normally
P0A85	Hybrid Battery Pack Cooling Fan 1	Turns on READY and drives normally
P0A95	High Voltage Fuse	Turns on READY and drives in fail–safe mode (while the engine is running) Turns off READY and stops the HV control system (while the engine stops)
P0A9B	Hybrid Battery Temperature Sensor Circuit	Turns on READY and drives normally
P0AAC	Hybrid Battery Pack Air Temperature Sensor "A" Circuit	Turns on READY and drives normally
P3011	Battery Block 1 Becomes Weak	Turns on READY and drives in fail–safe mode
P3012	Battery Block 2 Becomes Weak	Turns on READY and drives in fail–safe mode
P3013	Battery Block 3 Becomes Weak	Turns on READY and drives in fail–safe mode
P3014	Battery Block 4 Becomes Weak	Turns on READY and drives in fail–safe mode
P3015	Battery Block 5 Becomes Weak	Turns on READY and drives in fail–safe mode
P3016	Battery Block 6 Becomes Weak	Turns on READY and drives in fail–safe mode
P3017	Battery Block 7 Becomes Weak	Turns on READY and drives in fail–safe mode
P3018	Battery Block 8 Becomes Weak	Turns on READY and drives in fail–safe mode
P3019	Battery Block 9 Becomes Weak	Turns on READY and drives in fail–safe mode
P3020	Battery Block 10 Becomes Weak	Turns on READY and drives in fail–safe mode
P3021	Battery Block 11 Becomes Weak	Turns on READY and drives in fail–safe mode
P3022	Battery Block 12 Becomes Weak	Turns on READY and drives in fail–safe mode
P3023	Battery Block 13 Becomes Weak	Turns on READY and drives in fail–safe mode
P3024	Battery Block 14 Becomes Weak	Turns on READY and drives in fail–safe mode
P3030	Disconnection between battery and ECU	Turns on READY and drives normally
P3056	Battery Current Sensor Circuit Malfunction	Turns on READY and drives normally
U0100	Lost Communication with ECM/PCM "A"	Turns on READY and drives normally
U0293	Lost Communication with Hybrid Vehicle control System	Turns on READY and drives normally

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DATA LIST/ACTIVE TEST

1. DATA LIST

NOTICE:

- **The values of DATA LIST could vary significantly with slight differences in measurement, differences in the environment in which the measurements are obtained, or the aging of the vehicle. Thus, definite standards or judgment values are unavailable. Therefore, there may be a malfunction even if a measured value is within the reference range.**
- **In case of intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions, in order to reach an overall judgment by comparing all the items of DATA LIST.**

HINT:

Using DATA LIST displayed by the intelligent tester II, you can read the value of the switches, sensors, actuators and so on without parts removal. Reading DATA LIST as a first step of troubleshooting is one method to shorten diagnostic time.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / HV Battery / Data List.
(e) According to the display on the tester, read DATA LIST.

Intelligent tester II Display (Abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
MIL Status (MIL Status)	CHK ENG status/ ON or OFF	CHK ENG ON: ON	Constant ON: Repair in accordance with detected DTCs
Mileage after Malfunc (Driving Mileage)	Accumulated driving mileage after the malfunction occurrence/ Min.: 0 km, Max.: 65,535 km	—	—
Battery State of Charge (Battery SOC)	Battery state of charge/ Min.: 0 %, Max: 100 %	Always: 0 to 100 %	—
Delta SOC (Delta SOC)	Difference between maximum and minimum values of SOC/ Min.: 0 %, Max.: 100 %	READY lamp ON, engine stopped and no electrical load: 0 to 60 %	—
Batt Pack Current Val (IB Battery)	Current value of battery pack/ Min.: –327.68 A, Max.: 327.67 A	• Instant soon after a full–load acceleration with the engine stopped: Maximum 140 A (room temperature) • When shifting into N position 1 second has elapsed after automatically engine started with P position, engine stopped, head lamp ON, A/C fan high, and READY lamp ON: Maximum 30 A	—
Inhaling Air Temp (Batt Inside Air)	Temperature of inhalation ambient air into battery pack/ Min.: –327.68°C, Max.: 327.67°C	Undisturbed for 1 day: same as ambient air temperature	—
VMF Fan Motor Voltage (VMF Fan Voltage)	Battery blower motor monitoring voltage/ Min.: –25.6 V, Max.: 25.4 V	Fan mode 1 with READY lamp ON and P position: 9.5 to 11.5 V	—
Auxiliary Battery Vol (Aux. Batt V)	Auxiliary battery voltage/ Min.: 0 V, Max.: 25.4 V	Equivalent to auxiliary battery voltage	—
Charge Control Val (WIN)	Charge control wattage which is sent from battery ECU to HV control ECU/ Min.: –64 kW, Max.: 0 kW	–25 kW or more	—

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Intelligent tester II Display (Abbreviation)	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
Discharge Control Val (WOUT)	Discharge control wattage which is sent from battery ECU to HV control ECU/ Min.: 0 kW, Max.: 63.5 kW	21 kW or less	—
Cooling Fan Mode (Cooling Fan Spd)	Battery blower motor actuation mode / Min.: 0, Max.: 6	Stopped: 0 Low to high speed actuation: 1 to 6	—
ECU Control Mode (ECU Ctrl Mode)	ECU control mode/ Min.: 0, Max.: 4	—	—
Standby Blower Request (SBLW Rqst)	Battery blower motor stop control request (standby blower)	ON/OFF	—
Temp of Batt TB1 to TB3 (Batt Temp 1 to 3)	Temperature of HV battery/ Min.: –327.68°C, Max.: 327.67°C	Undisturbed for 1 day: Same as ambient air temperature	—
Battery Block Num (Num Of Batt)	The number of battery blocks/ Min.: 0, Max.: 255	Always: 14	—
Batt Block Minimum Vol (Bat Block Min V)	Battery block minimum voltage/ Min.: –327.68 V, Max.: 327.67 V	SOC 50 to 60 %: 12 V or more	—
Minimum Batt Block No (Min Bat Block #)	Battery block number with minimum voltage	One of numbers 0 to 13	—
Batt Block Max Vol (Bat Block Max V)	Battery block maximum voltage/ Min.: –327.68 V, Max.: 327.67 V	SOC 55 to 60 %: 23 V or less	—
Max Battery Block No (Max Bat Block #)	Battery block number with maximum voltage	One of numbers 0 to 13	—
Battery Block Vol–V01 to V14 (V1 to V14 Batt Block)	Battery block voltage/ Min.: –327.68 V, Max.: 327.67 V	SOC 60 %: 12 to 20 V	—
Internal Resistance R01 to R14 (IR01 to 14)	Internal resistance of each battery block/ Min.: 0 Ω, Max.: 0.255 Ω	Always: 0.01 to 0.1 Ω	—
Compliance Regulation (Regulation)	Compliance regulation	Euro–OBD	—
Emission DTC Num (#Codes)	The number of emission related powertrain DTCs/ Min.: 0, Max.: 127	—	—
The Stored DTC Num (DTC)	The number of stored DTCs/ Min.: 0, Max.: 255	—	—

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2. ACTIVE TEST

NOTICE:

Beware that if the connector to the intelligent tester II becomes disconnected or a communication error occurs during ACTIVE TEST, the vehicle could become inoperative (READY lamp OFF).

HINT:

Performing ACTIVE TEST using the intelligent tester II allows the relay, VSV, actuator and so on to operate without parts removal. Performing ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display items in DATA LIST during ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the System Select screen, enter the following menus: Powertrain / HV Battery / Active Test.
(e) According to the display on the tester, perform ACTIVE TEST.

Intelligent Tester II Display (Abbreviation)	Purpose	Test Details	Test Condition
Driving the battery cooling fan (COOLING FAN SPD)	To check the operation and the speed of the battery blower motor	Stops the battery blower motor or operates it in modes 1 to 6	Disabled when a DTC is detected

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05IGI-01

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning *3	Memory
P0560 (05–667)	System Voltage	• Wire harness or connector • HEV fuse • Battery ECU	○	○	• HV system	○
P0A1F (05–670)	Battery Energy Control Module	• Battery ECU	○	○	• HV system	○
P0A7F (05–671)	Hybrid Battery Pack Deterioration	• HV battery assembly • Battery ECU	○	○	• HV system	○
P0A80 (05–672)	Replace Hybrid Battery Pack	• HV battery assembly • Battery ECU	○	○	• HV system	○
P0A81 (05–673)	Hybrid Battery Pack Cooling Fan 1	• Quarter vent duct (blower motor controller) • Battery ECU	X	○	• HV system	○
P0A82 (05–675)	Hybrid Battery Pack Cooling Fan 1	• Quarter vent duct • Quarter vent duct No. 2 • Quarter vent duct inner No. 2 • Ventilator inner duct • Battery blower assembly • Battery ECU	X	○	• HV system	○
P0A85 (05–677)	Hybrid Battery Pack Cooling Fan 1	• Wire harness or connector • BATT FAN fuse • Battery blower relay No. 1 • Battery blower assembly • Quarter vent duct (blower motor controller) • Battery ECU	X	○	• HV system	○
P0A95 (05–686)	High Voltage Fuse	• High voltage fuse • Service plug grip • Battery plug • Battery ECU	X	○	• HV system	○
P0A9B (05–689)	Hybrid Battery Temperature Sensor Circuit	• HV battery assembly (battery temperature sensor) • Battery ECU	○	○	• HV system	○
P0AAC (05–692)	Hybrid Battery Pack Air Temperature Sensor "A" Circuit	• HV battery assembly (intake air temperature sensor) • Battery ECU	○	○	• HV system	○
P3011 (05–694)	Battery Block 1 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3012 (05–694)	Battery Block 2 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3013 (05–694)	Battery Block 3 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3014 (05–694)	Battery Block 4 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3015 (05–694)	Battery Block 5 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3016 (05–694)	Battery Block 6 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3017 (05–694)	Battery Block 7 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3018 (05–694)	Battery Block 8 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3019 (05–694)	Battery Block 9 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3020 (05–694)	Battery Block 10 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○

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DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG *1	Master Warning Lamp *2	Warning *3	Memory
P3021 (05–694)	Battery Block 11 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3022 (05–694)	Battery Block 12 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3023 (05–694)	Battery Block 13 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3024 (05–694)	Battery Block 14 Becomes Weak	• HV battery assembly • Battery ECU	○	○	• HV system	○
P3030 (05–696)	Disconnection between Battery and ECU	• Junction block assembly (busbar module) • Frame wire No. 2 (busbar and wire harness) • Battery ECU	○	○	• HV system	○
P3056 (05–700)	Battery Current Sensor Circuit Malfunction	• HV battery assembly (wire harness or connector) • Battery current sensor • Battery ECU	○	○	• HV system	○
U0100 (05–704)	Lost Communication with ECM/ PCM "A"	• CAN communication system	○	○	• HV system	○
U0293 (05–704)	Lost Communication with Hybrid Vehicle Control System	• CAN communication system	○	○	• HV system	○

*1: "○" ... CHK ENG is illuminated, "X" ... CHK ENG is not illuminated.

*2: "○" ... Master warning lamp is illuminated, "X" ... Master warning lamp is not illuminated.

*3: Warning on the multi–information display.

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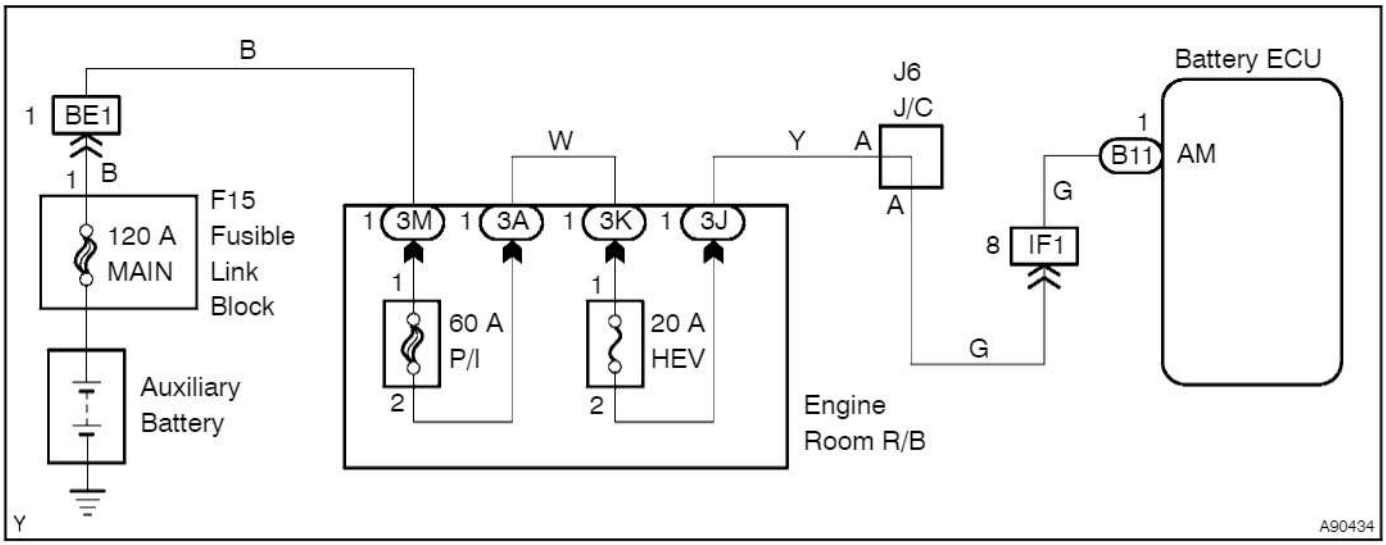
DTC	P0560	SYSTEM VOLTAGE

CIRCUIT DESCRIPTION

The battery power is constantly supplied to the AM terminal of the battery ECU for the purpose of maintaining the DTCs and freeze frame data in memory. This voltage is supplied as a backup even if the power switch is turned OFF.

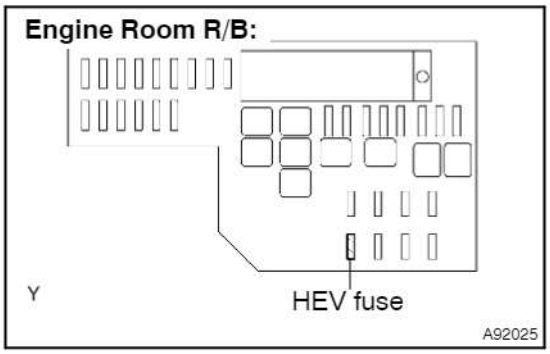
DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in auxiliary battery power supply system while battery power is supplied to terminal IGCT (1trip detection logic)	• Wire harness or connector • HEV fuse • Battery ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(HEV 20 A)



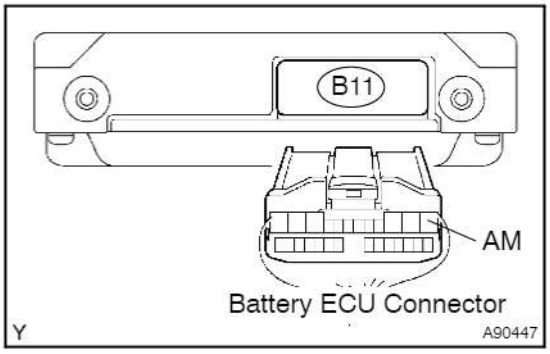
(a) Remove the HEV fuse from the engine room R/B.
(b) Check the resistance in the HEV fuse.
Standard: Below 1 Ω
(c) Reinstall the HEV fuse.

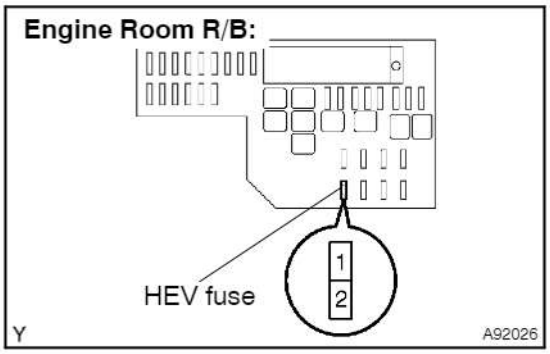
NG → **Go to step 3**

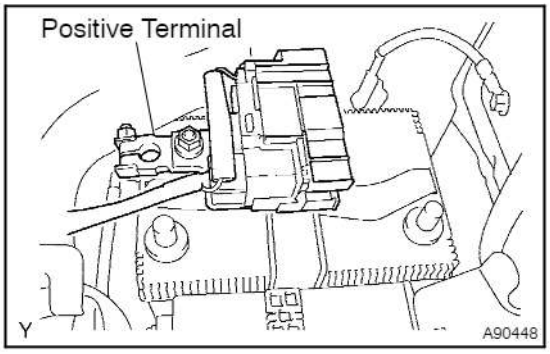
OK

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2 CHECK HARNESS AND CONNECTOR(BATTERY ECU – AUXILIARY BATTERY)







(a) Disconnect the negative auxiliary battery terminal.
(b) Disconnect the positive auxiliary battery terminal.
(c) Remove the HEV fuse from the engine room R/B.
(d) Disconnect the B11 battery ECU connector.
(e) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
AM (B11–1) – HEV fuse (2)	Below 1 Ω

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
HEV fuse (1) – positive auxiliary battery terminal	Below 1 Ω

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(g) Reconnect the battery ECU connector.
(h) Reinstall the HEV fuse.
(i) Reconnect the positive auxiliary battery terminal.
(j) Reconnect the negative auxiliary battery terminal.

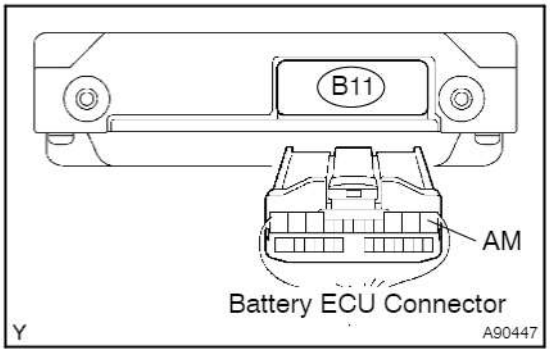
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPAIR CONNECTOR CONNECTION

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3	CHECK HARNESS AND CONNECTOR(BATTERY ECU – HEV FUSE)



(a) Disconnect the B11 battery ECU connector.
(b) Remove the HEV fuse from the engine room R/B.
(c) Check the resistance between the wire harness side connector and body ground.

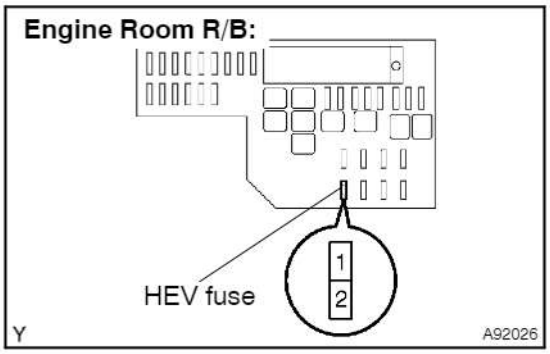
Standard (Check for short):

Tester Connection	Specified Condition
AM (B11–1) or HEV fuse (2) – Body ground	10 kΩ or higher

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reconnect the battery ECU connector.
(e) Reinstall the HEV fuse.



NG → **AFTER REPAIRING OR REPLACING HARNESS OR CONNECTOR, REPLACE FUSE (HEV 20A)**

OK

REPLACE FUSE (HEV 20 A)

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DTC	P0A1F	BATTERY ENERGY CONTROL MODULE

CIRCUIT DESCRIPTION

For the purpose of calculating the SOC (state of charge) of the HV battery and ensuring safety in the event of malfunction in the HV battery assembly, the battery ECU provides the following control functions:

- SOC calculation
  The battery ECU calculates the SOC by estimating the charging and discharging amperage and monitoring other values.
- Cooling fan control
  The battery ECU controls the battery blower assembly in order to protect the HV battery assembly from the heat that is generated during charging and discharging. By maintaining a stable temperature, it promotes the effective operation of the HV battery assembly.
- HV battery assembly malfunction monitoring
  If the battery ECU detects malfunction, it protects the HV battery assembly by limiting or stopping the charging or discharging of the HV battery in accordance with the temperature or voltage of the HV battery assembly.

DTC No.	DTC Detection Condition	Trouble Area
P0A1F	Battery ECU internal error (1 trip detection logic)	• Battery ECU

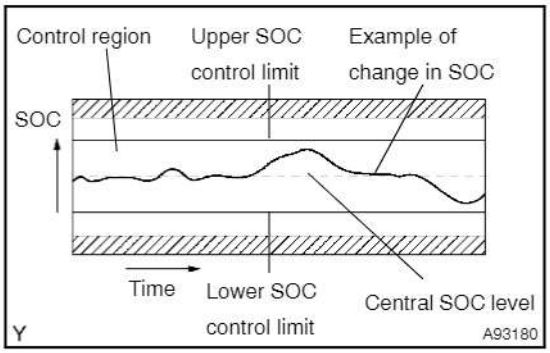
INSPECTION PROCEDURE

REPLACE BATTERY ECU ASSY (See page 21–100)

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DTC P0A7F HYBRID BATTERY PACK DETERIORATION

CIRCUIT DESCRIPTION



The battery ECU calculates the SOC (state of charge) of the HV battery by estimating the amperage that flows into the HV battery and monitoring other values.
The battery ECU sends the calculated SOC to the HV control ECU. The HV control ECU charge and discharge depending on driving patterns based on the information sent by the battery ECU.

DTC No.	DTC Detection Condition	Trouble Area
P0A7F	• Resistance of HV battery assembly is higher than standard (1 trip detection logic) • When the capacity difference between battery modules exceeds the specified value (2 trip detection logic)	• HV battery assembly • Battery ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY (See page 21–100)**

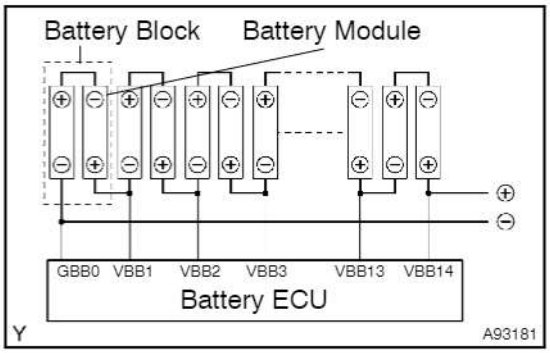
NO

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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DTC P0A80 REPLACE HYBRID BATTERY PACK

CIRCUIT DESCRIPTION



The HV battery assembly consists of nickel hydride batteries. Nickel hydride batteries do not require external charging. The SOC (state of charge) of the HV battery is maintained at a constant voltage level by the HV control ECU while the vehicle is being driven. In the HV battery assembly, 28 modules are connected in series, and each module has six 1.2 V cells that are connected in series. Thus, the HV battery assembly contains a total of 168 cells which produce 201.6 V.

The battery ECU, which monitors two modules as a single battery block, detects the battery block voltage at a total of 14 locations.

DTC No.	DTC Detection Condition	Trouble Area
P0A80	Voltage difference between battery blocks is higher than standard (2 trip detection logic)	• HV battery assembly • Battery ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY (See page 21–100)**

NO

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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DTC P0A81 HYBRID BATTERY PACK COOLING FAN 1

CIRCUIT DESCRIPTION

Refer to DTC P0A85 on page 05–677.

DTC No.	DTC Detection Condition	Trouble Area
P0A81	Voltage at motor is out of predetermined range in proportion to target control voltage (1 trip detection logic)	• Quarter vent duct (blower motor controller) • Battery ECU

INSPECTION PROCEDURE

1 READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

Result:

Display (DTC output)	Proceed to
P0A81	A
P0A81 and P0A1F	B
P0A81 and P0A85	C

B → **REPLACE BATTERY ECU ASSY (See page 21–100)**

C → **GO TO DTC P0A85 CHART (See page 05–677)**

A

2 REPLACE QUARTER VENT DUCT(BATTERY BLOWER MOTOR CONTROLLER)

(a) Replace the quarter vent duct (blower motor controller).
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).
(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC / Clear.
(f) Perform a simulation test.

GO

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3	READ OUTPUT DTC(DTC P0A81 IS OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A81 is output again

YES → **REPLACE BATTERY ECU ASSY** (See page 21–100)

NO

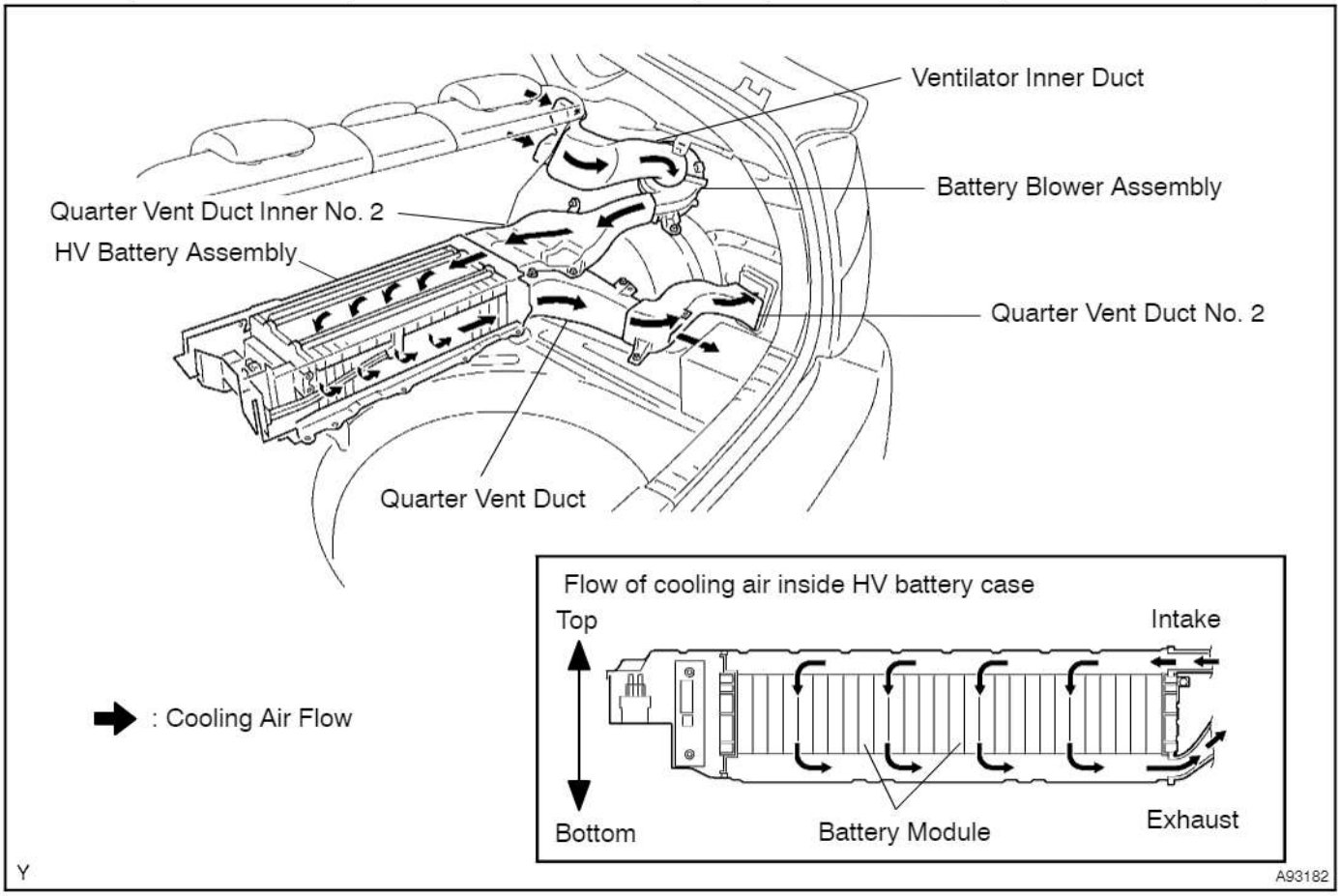
SYSTEM OK

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DTC	P0A82	HYBRID BATTERY PACK COOLING FAN 1

CIRCUIT DESCRIPTION

The cooling air flows into the inlet on the right of the rear seat and travels through an intake duct to the battery blower assembly on the right surface of the luggage compartment. Furthermore, the cooling air travels through an intake duct (which connects the battery blower assembly to the upper right surface of the HV battery assembly) and flows to the HV battery assembly.
The cooling air flows from the top to the bottom between the HV battery modules. After it has cooled the modules, it is discharged from the bottom right surface of the HV battery assembly.
The exhaust air travels through an exhaust duct on the right surface of luggage compartment and is discharged into the cabin as well as outside of the vehicle.
The battery ECU uses battery temperature sensors in order to detect the temperature of the HV battery assembly. Based on the results of this detection, the battery ECU controls the battery blower assembly. (Thus, the battery blower assembly starts when the HV battery temperature rises to a predetermined level.)



DTC No.	DTC Detection Condition	Trouble Area
P0A82	Difference between estimated battery temperature based on blower fan cooling performance and actual temperature is excessive (2 trip detection logic)	• Quarter vent duct • Quarter vent duct No. 2 • Quarter vent duct inner No. 2 • Ventilator inner duct • Battery blower assembly • Battery ECU

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INSPECTION PROCEDURE

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY (See page 21–100)**

NO

2	CHECK DUCT AND BLOWER

(a) Check the ducts and the blower listed below for disconnection and damage. Also, check if they have not clogged up with foreign substances.
(1) Quarter vent duct
(2) Quarter vent duct No. 2
(3) Quarter vent duct inner No. 2
(4) Ventilator inner duct
(5) Battery blower assembly

NG → **REMOVE FOREIGN SUBSTANCES OR REPLACE AFFECTED PARTS**

OK

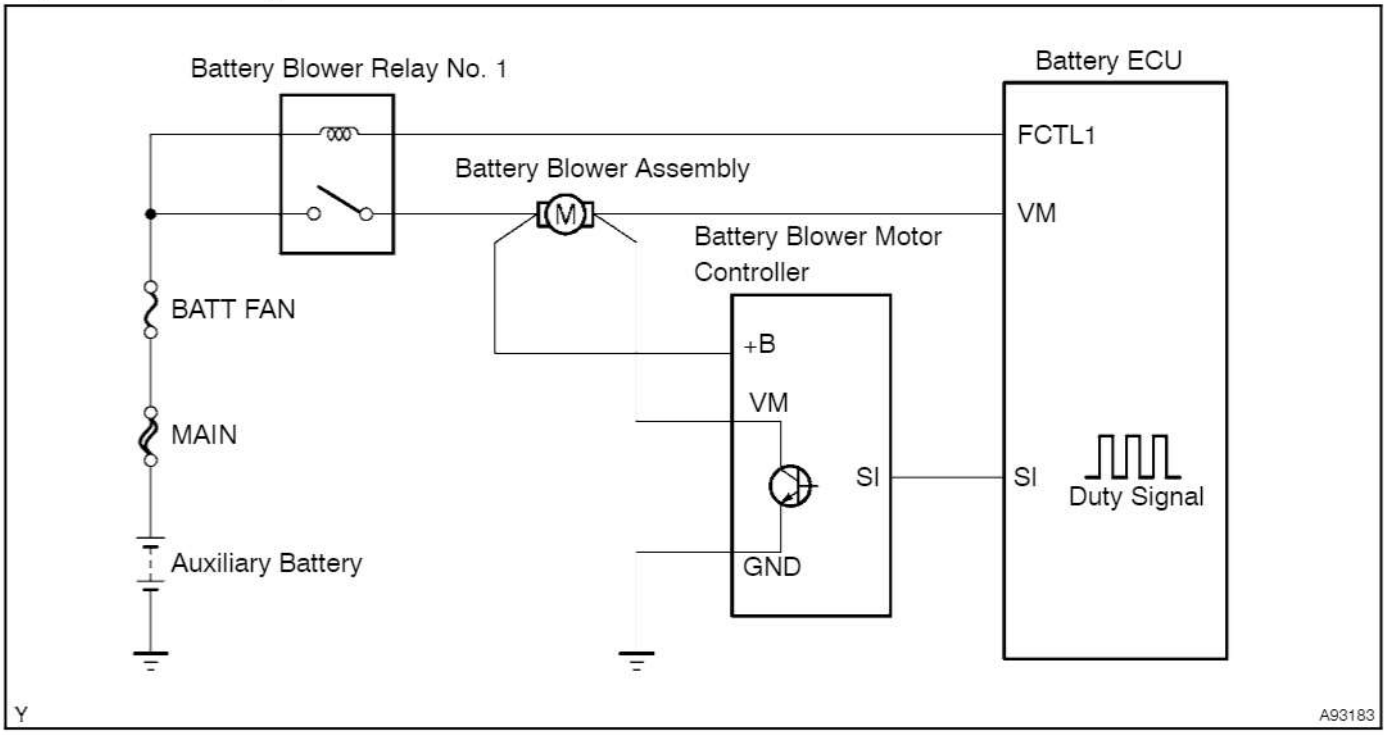
REPLACE BATTERY ECU ASSY (See page 21–100)

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DTC	P0A85	HYBRID BATTERY PACK COOLING FAN 1

CIRCUIT DESCRIPTION

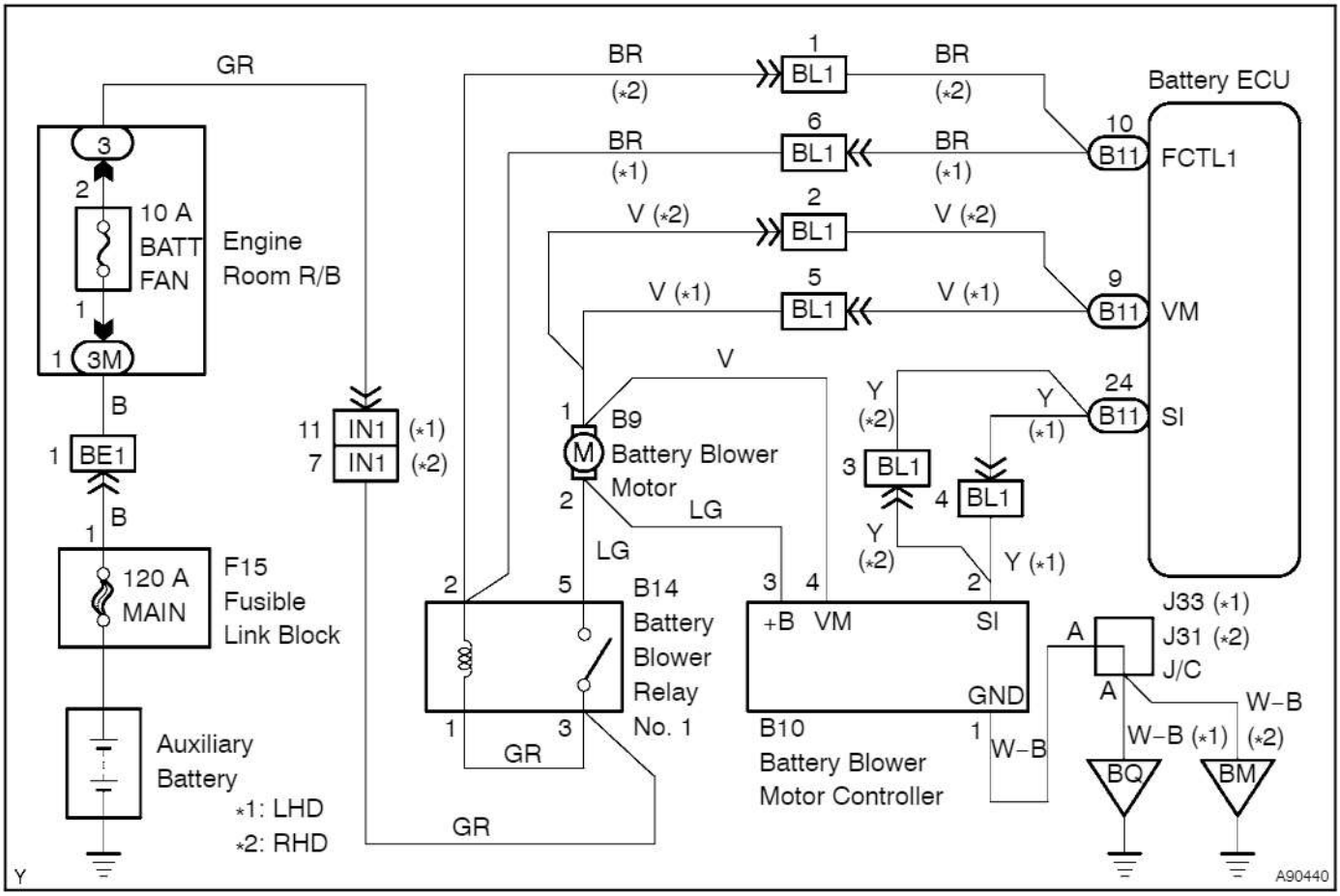
The blower motor controller regulates the voltage of the battery blower assembly. The blower motor controller has fins made of aluminum. The exhaust air from the HV battery assembly that flows through the quarter vent duct cools the blower motor controller, which is installed in the quarter vent duct.
The current flows from the FCTL1 terminal of the battery ECU to the relay coil of the battery blower relay No. 1 and as the contact point of the relay closes, the power is supplied to the battery blower assembly.
When a fan actuation signal is transmitted from the battery ECU, the blower motor controller adjusts voltage (VM) which is applied to the battery blower assembly in order to get the requested fan speed. The adjusted voltage is also transmitted to the VM terminal of the battery ECU in the form of a monitoring signal. The blower motor controller corrects the voltage at the blower motor by monitoring voltage at the +B terminal of the battery blower assembly.



DTC No.	DTC Detection Condition	Trouble Area
P0A85	At a constant vehicle speed, the voltage at the blower motor is out of the predetermined range in proportion to the target control voltage for more than 10 seconds (1 trip detection logic)	• Wire harness or connector • BATT FAN fuse • Battery blower relay No. 1 • Battery blower assembly • Quarter vent duct (battery blower motor controller) • Battery ECU

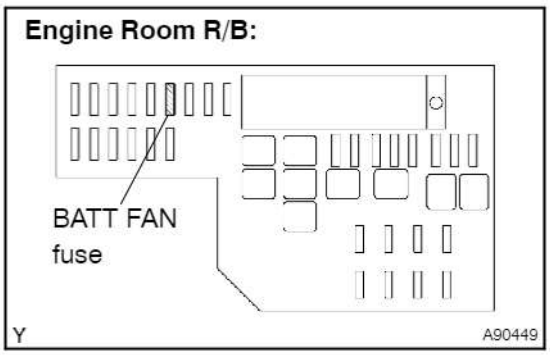
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(BATT FAN 10 A)



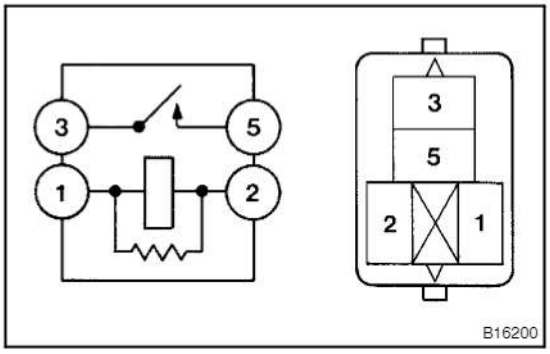
(a) Remove the BATT FAN fuse from the engine room R/B.
(b) Check the resistance in the BATT FAN fuse.
Standard: Below 1 Ω
(c) Reinstall the BATT FAN fuse.

NG → **Go to step 13**

OK

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2 INSPECT BATTERY BLOWER RELAY NO.1



(a) Remove the battery blower relay No. 1.
(b) Check the resistance between the terminals of the relay.
Standard:

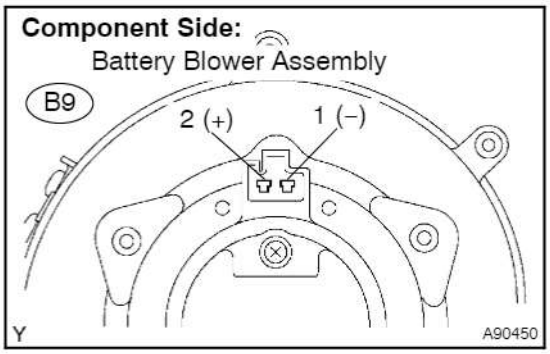
Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

(c) Reinstall the battery blower relay No. 1.

NG → **REPLACE BATTERY BLOWER RELAY NO.1**

OK

3 INSPECT BATTERY BLOWER ASSY



(a) Disconnect the B9 battery blower assembly connector.
(b) Connect the positive terminal of the battery to terminal 2 of the battery blower assembly connector, and the negative battery terminal to terminal 1 of the connector.
(c) Check that the blower fan rotates when voltage is applied.
OK: Blower fan rotates

NG → **REPLACE BATTERY BLOWER ASSY**

OK

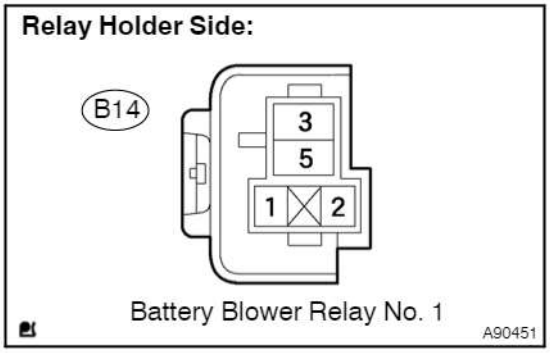
4 CHECK BATTERY BLOWER MOTOR CONTROLLER (See page 21–38)

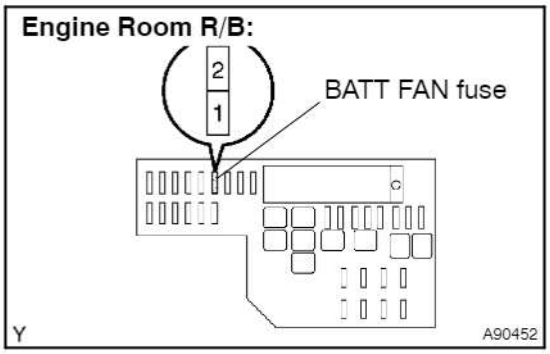
NG → **REPLACE QUARTER VENT DUCT (BATTERY BLOWER MOTOR CONTROLLER)**

OK

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5	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER RELAY NO. 1 – BATT FAN FUSE)





(a) Remove the B14 battery blower relay No. 1.
(b) Remove the BATT FAN fuse from the engine room R/B.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–1 and 3) – BATT FAN fuse (2)	Below 1 Ω

NOTICE:

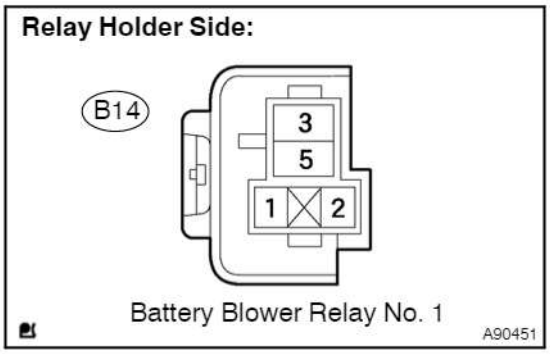
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

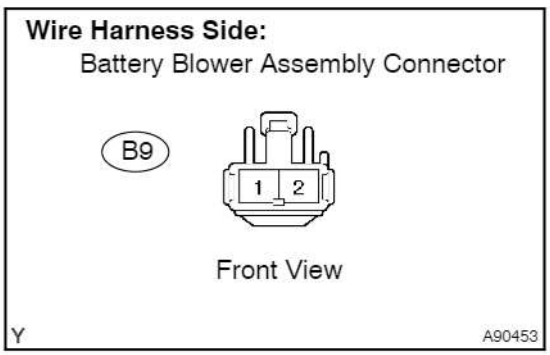
(d) Reinstall the battery blower relay No. 1.
(e) Reinstall the BATT FAN fuse.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER RELAY NO. 1 – BATTERY BLOWER ASSY)





(a) Remove the B14 battery blower relay No. 1.
(b) Disconnect the B9 battery blower assembly connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–5) – battery blower assembly (B9–2)	Below 1 Ω

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the battery blower relay No. 1.
(e) Reconnect the battery blower assembly connector.

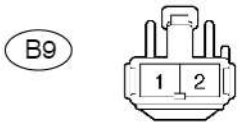
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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7 CHECK HARNESS AND CONNECTOR(BATTERY BLOWER ASSY – BATTERY BLOWER MOTOR CONTROLLER)

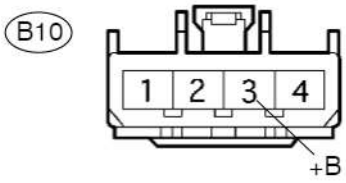
Wire Harness Side:
Battery Blower Assembly Connector



Front View

Y A90453

Wire Harness Side:
Battery Blower Motor Controller Connector



Front View

A90454

(a) Disconnect the B9 battery blower assembly connector.
(b) Disconnect the B10 battery blower motor controller connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower assembly (B9–2) – +B (B10–3)	Below 1 Ω

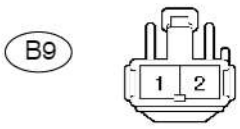
(d) Reconnect the battery blower assembly connector.
(e) Reconnect the battery blower motor controller connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

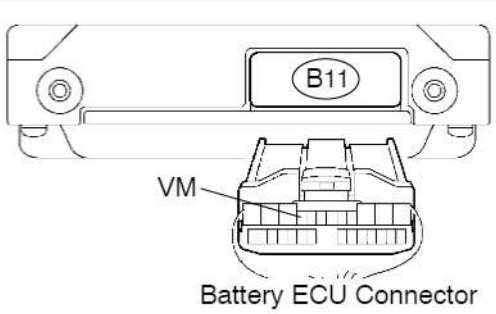
8 CHECK HARNESS AND CONNECTOR(BATTERY BLOWER ASSY – BATTERY ECU)

Wire Harness Side:
Battery Blower Assembly Connector



Front View

Y A90453



Battery ECU Connector

Y A90447

(a) Disconnect the B9 battery blower assembly connector.
(b) Disconnect the B11 battery ECU connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower assembly (B9–1) – VM (B11–9)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Battery blower assembly (B9–1) or VM (B11–9) – Body ground	10 kΩ or higher

(d) Reconnect the battery blower assembly connector.
(e) Reconnect the battery ECU connector.

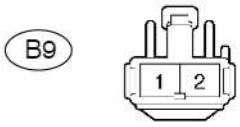
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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9 CHECK HARNESS AND CONNECTOR(BATTERY BLOWER ASSY – BATTERY BLOWER MOTOR CONTROLLER)

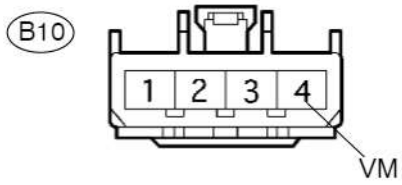
Wire Harness Side:
Battery Blower Assembly Connector



Front View

Y A90453

Wire Harness Side:
Battery Blower Motor Controller Connector



Front View

A90454

(a) Disconnect the B9 battery blower assembly connector.
(b) Disconnect the B10 battery blower motor controller connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower assembly (B9–1) – VM (B10–4)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Battery blower assembly (B9–1) or VM (B10–4) – Body ground	10 kΩ or higher

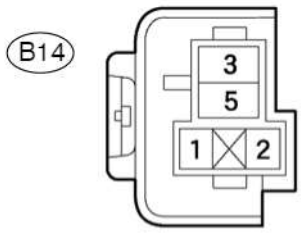
(d) Reconnect the battery blower assembly connector.
(e) Reconnect the battery blower motor controller connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

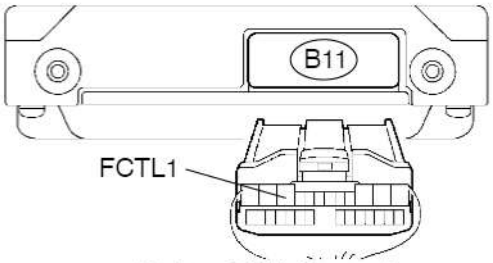
10 CHECK HARNESS AND CONNECTOR(BATTERY BLOWER RELAY NO. 1 – BATTERY ECU)

Relay Holder Side:



Battery Blower Relay No. 1

A90451



Battery ECU Connector

Y A90447

(a) Remove the B14 battery blower relay No. 1.
(b) Disconnect the B11 battery ECU connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–2) – FCTL1 (B11–10)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–2) or FCTL1 (B11–10) – Body ground	10 kΩ or higher

NOTICE:
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the battery blower relay No. 1.
(e) Reconnect the battery ECU connector.

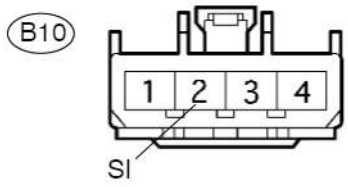
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

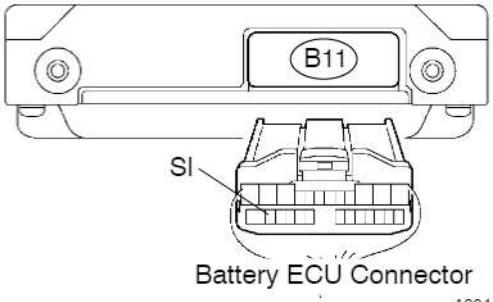
OK

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11	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER MOTOR CONTROLLER – BATTERY ECU)

Wire Harness Side:
Battery Blower Motor Controller Connector





(a) Disconnect the B10 battery blower motor controller connector.
(b) Disconnect the B11 battery ECU connector.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
SI (B10–2) – SI (B11–24)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
SI (B10–2) or SI (B11–24) – Body ground	10 kΩ or higher

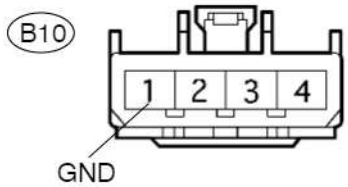
(d) Reconnect the battery blower motor controller connector.
(e) Reconnect the battery ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

12	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER MOTOR CONTROLLER – BODY GROUND)

Wire Harness Side:
Battery Blower Motor Controller Connector



(a) Disconnect the B10 battery blower motor controller connector.
(b) Check the resistance between the wire harness side connector and body ground.

Standard (Check for open):

Tester Connection	Specified Condition
GND (B10–1) – Body ground	Below 1 Ω

(c) Reconnect the battery blower motor controller connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

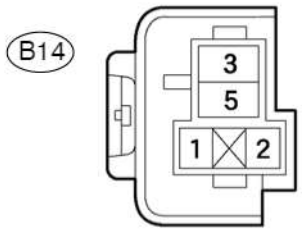
OK

REPLACE BATTERY ECU ASSY (See page 21–100)

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13	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER RELAY NO. 1 – BATT FAN FUSE)

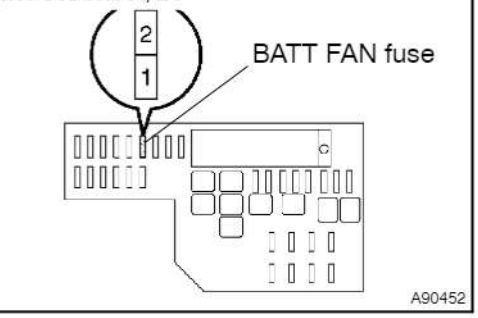
Relay Holder Side:



Battery Blower Relay No. 1

A90451

Engine Room R/B:



Y

A90452

(a) Remove the B14 battery blower relay No. 1.
(b) Remove the BATT FAN fuse from the engine room R/B.
(c) Check the resistance between the wire harness side connector and body ground.

Standard (Check for short):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–3) or BATT FAN fuse (2) – Body ground	10 kΩ or higher

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the battery blower relay No. 1.
(e) Reinstall the BATT FAN fuse.

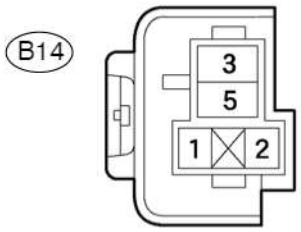
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR AND REPLACE FUSE (BATT FAN)**

OK

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14	CHECK HARNESS AND CONNECTOR(BATTERY BLOWER RELAY NO. 1 – BATTERY BLOWER ASSY)

Relay Holder Side:



Battery Blower Relay No. 1

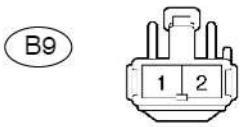
A90451

(a) Remove the B14 battery blower relay No. 1.
(b) Disconnect the B9 battery blower assembly connector.
(c) Disconnect the B10 battery blower motor controller connector.
(d) Check the resistance between the wire harness side connector and body ground.

Standard (Check for short):

Tester Connection	Specified Condition
Battery blower relay No. 1 (B14–5), battery blower assembly (B9–2) or +B (B10–3) – Body ground	10 kΩ or higher

Wire Harness Side:
Battery Blower Assembly Connector



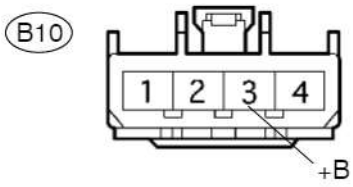
Front View

A90453

NOTICE:
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(e) Reinstall the battery blower relay No. 1.
(f) Reconnect the battery blower assembly connector.
(g) Reconnect the battery blower motor controller connector.

Wire Harness Side:
Battery Blower Motor Controller Connector



Front View

A90454

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR AND REPLACE FUSE (BATT FAN)

OK

15	CHECK BATTERY BLOWER MOTOR CONTROLLER (See page 21–38)

NG → REPLACE QUARTER VENT DUCT (BATTERY BLOWER MOTOR CONTROLLER)

OK

REPLACE BATTERY ECU ASSY (See page 21–100)

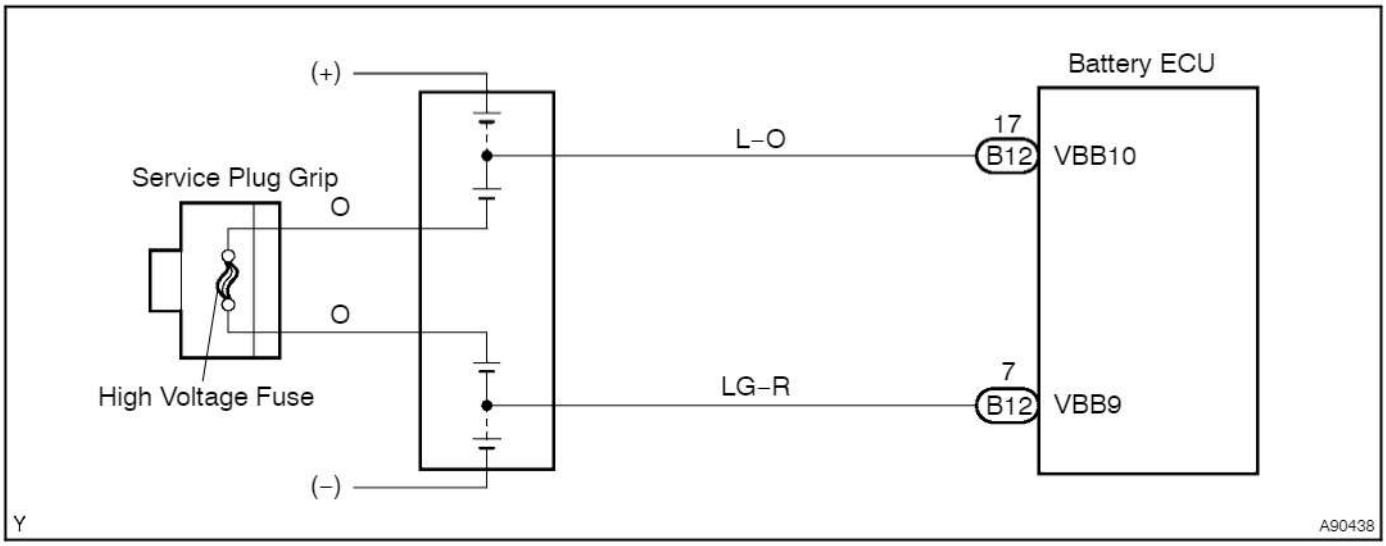
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DTC P0A95 HIGH VOLTAGE FUSE

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
P0A95	Voltage between VBB9 and VBB10 terminals is below standard in spite of interlock switch being engaged (1 trip detection logic)	• High voltage fuse • Service plug grip • Battery plug • Battery ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

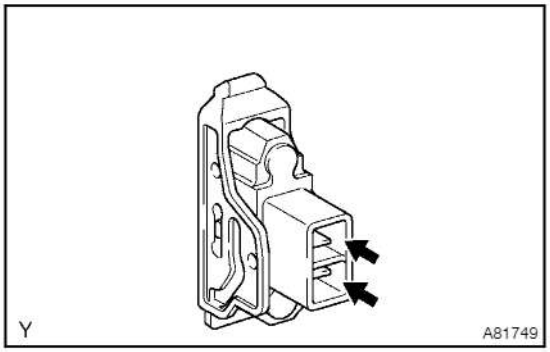
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY** (See page 21–100)

NO

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2	INSPECT SERVICE PLUG GRIP



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120)

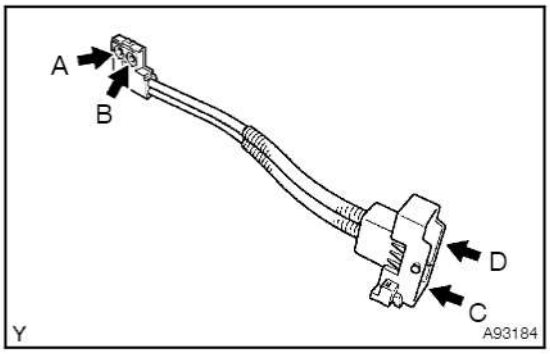
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Check the resistance between the terminals of the service plug grip.
Standard: Below 1 Ω

NG	Go to step 4

OK

3	INSPECT BATTERY PLUG



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the battery plug (see page 21–79).
(c) Check the resistance between the terminals of the battery plug.
Standard:

Tester Connection	Specified Condition
A – C	Below 1 Ω
B – D	Below 1 Ω

(d) Reinstall the battery plug (see page 21–79).
(e) Reinstall the HV battery assembly (see page 21–56).

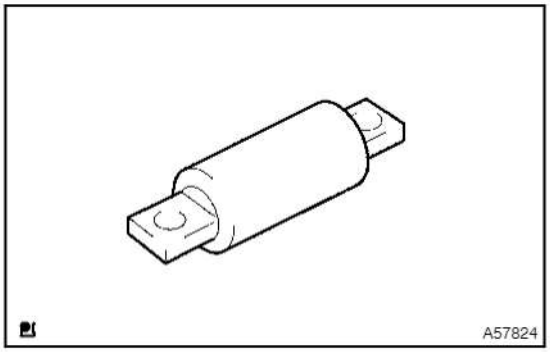
NG	REPLACE BATTERY PLUG

OK

REPLACE BATTERY ECU ASSY (See page 21–100)

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4	INSPECT HIGH VOLTAGE FUSE



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Remove the high voltage fuse (see page 21–120).

HINT:
The high voltage fuse is enclosed in the service plug grip.

(b) Check the resistance between the terminals of the high voltage fuse.
Standard: Below 1 Ω

(c) Reinstall the high voltage fuse.

NG → **REPLACE HIGH VOLTAGE FUSE**

OK

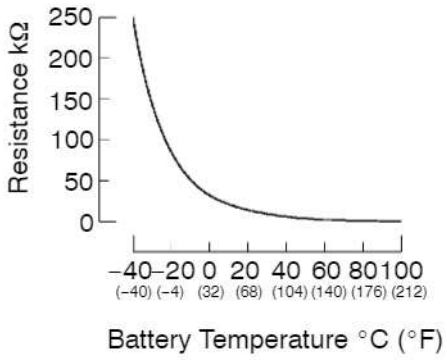
REPLACE SERVICE PLUG GRIP

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DTC	P0A9B	HYBRID BATTERY TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

Reference:
Sensor Characteristic Diagram



A93185

Three battery temperature sensors are located on the bottom of the HV battery assembly. The resistance of the thermistor, which is enclosed in each battery temperature sensor, changes in accordance with the changes in the temperature of the HV battery assembly. The lower the battery temperature, the higher the resistance of the thermistor. Conversely, the higher the temperature, the lower the resistance.
The battery ECU uses the battery temperature sensors to detect the temperature of the HV battery assembly. Based on the results of this detection, the battery ECU controls the battery blower assembly. (Thus, the blower fan starts when the HV battery temperature rises to a predetermined level.)

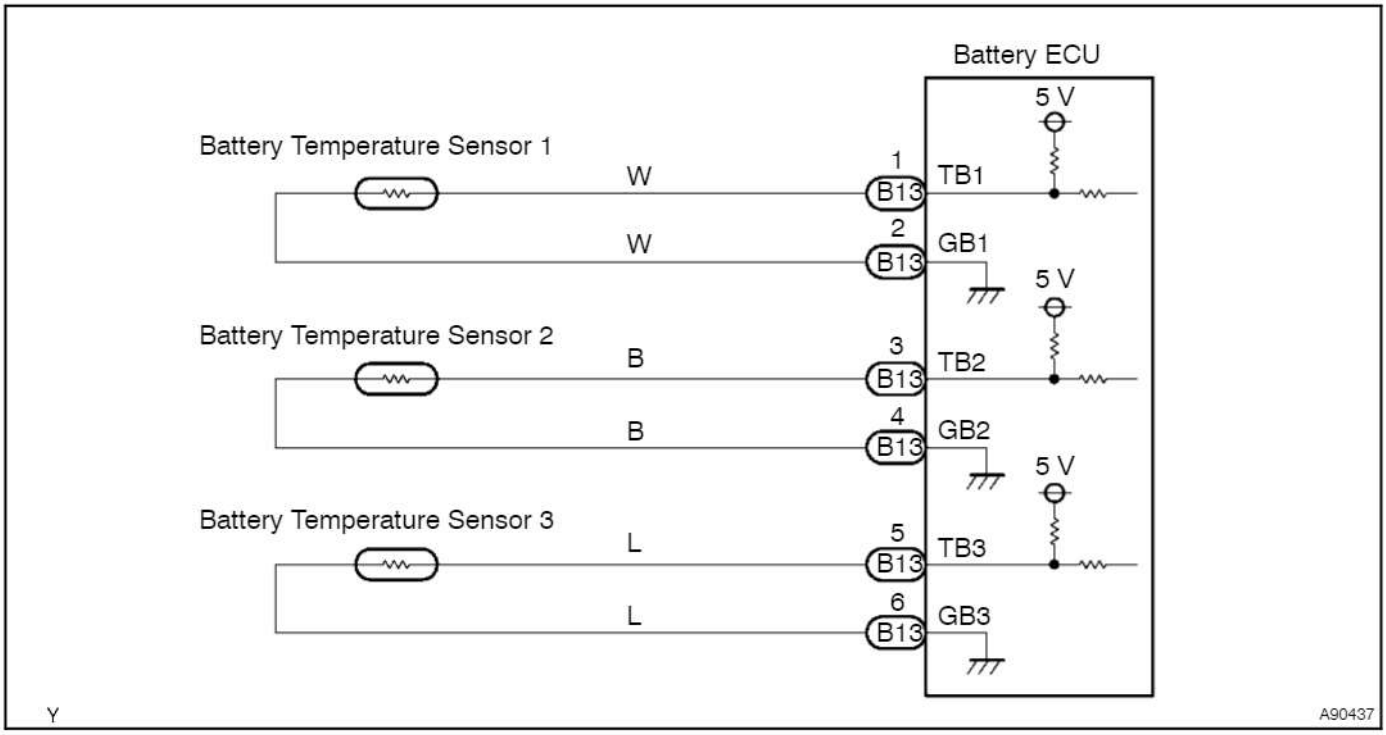
DTC No.	DTC Detection Condition	Trouble Area
P0A9B	• Temperature detected by battery temperature sensors is lower than standard (open), or higher than standard (short) (1 trip detection logic) • Malfunction in battery temperature sensor characteristics (1 trip detection logic)	• HV battery assembly (HV battery temperature sensor) • Battery ECU

HINT:
After confirming DTC P0A9B, confirm Temp of Batt TB1 to TB3 in Powertrain / HV Battery / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–45°C (–49°F) or less	Open or +B short circuit
95°C (203°F) or more	GND short circuit

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WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

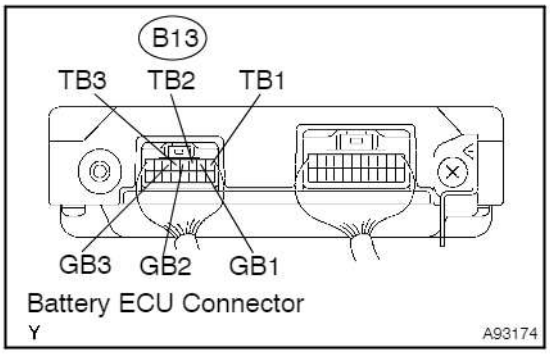
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY** (See page 21–100)

NO

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2	CHECK CONNECTION OF BATTERY TEMPERATURE SENSOR CONNECTOR



CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Check the connection condition of the B13 battery ECU connector.
OK: Connector has been connected securely and there is no poor connection.

HINT:
Since the battery temperature sensor is not available as a unit and if replacement is required, replace the entire HV battery assembly.

NG	CONNECT SECURELY

OK

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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DTC	P0AAC	HYBRID BATTERY PACK AIR TEMPERATURE SENSOR "A" CIRCUIT

CIRCUIT DESCRIPTION

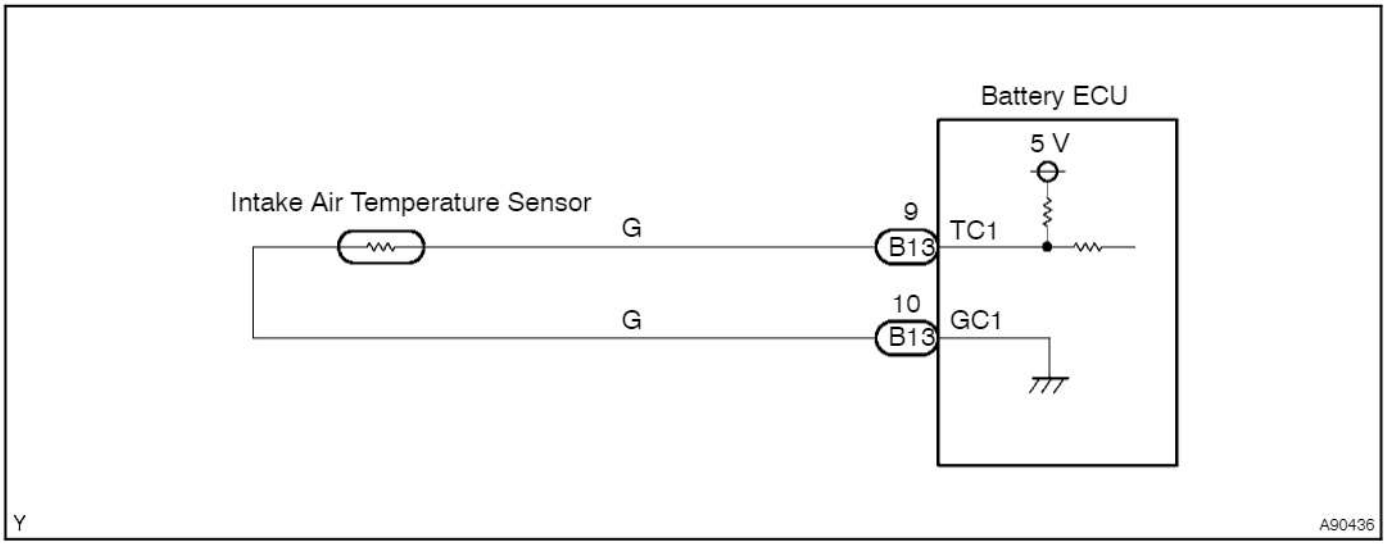
The intake air temperature sensor is provided on the HV battery assembly. Its resistance value varies with the changes in the intake air temperature. The characteristics of the intake air temperature sensor are the same as the battery temperature sensors (see page 05–689 for details).
The battery ECU uses the signals from the intake air temperature sensor for adjusting the air flow speed of the battery blower assembly.

DTC No.	DTC Detection Condition	Trouble Area
P0AAC	Temperature detected by intake air temperature sensor is lower than standard (open) or higher than standard (short) (1 trip detection logic)	• HV battery assembly (intake air temperature sensor) • Battery ECU

HINT:
After confirming DTC P0AAC, confirm Inhaling Air Temp in Powertrain / HV Battery / Data List using the intelligent tester II.

Temperature Displayed	Malfunction
–45°C (–49°F) or less	Open or +B short circuit
95°C (203°F) or more	GND short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:
At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

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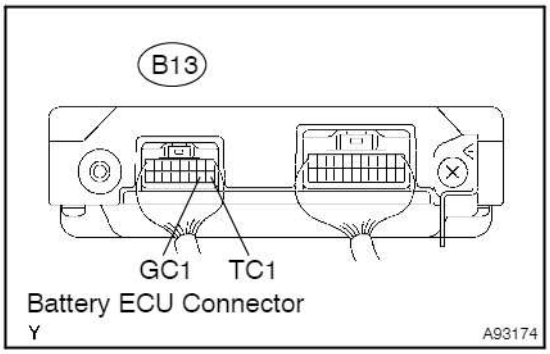
1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY (See page 21–100)**

NO

2	CHECK CONNECTION OF INTAKE AIR TEMPERATURE SENSOR CONNECTOR



CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Check the connection condition of the B13 battery ECU connector.
OK: Connector has been connected securely and there is no poor connection.

HINT:
Since the intake air temperature sensor is not available as a unit and if replacement is required, replace the entire HV battery assembly.

NG → **CONNECT SECURELY**

OK

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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DTC	P3011	BATTERY BLOCK 1 BECOMES WEAK
DTC	P3012	BATTERY BLOCK 2 BECOMES WEAK
DTC	P3013	BATTERY BLOCK 3 BECOMES WEAK
DTC	P3014	BATTERY BLOCK 4 BECOMES WEAK
DTC	P3015	BATTERY BLOCK 5 BECOMES WEAK
DTC	P3016	BATTERY BLOCK 6 BECOMES WEAK
DTC	P3017	BATTERY BLOCK 7 BECOMES WEAK
DTC	P3018	BATTERY BLOCK 8 BECOMES WEAK
DTC	P3019	BATTERY BLOCK 9 BECOMES WEAK
DTC	P3020	BATTERY BLOCK 10 BECOMES WEAK
DTC	P3021	BATTERY BLOCK 11 BECOMES WEAK
DTC	P3022	BATTERY BLOCK 12 BECOMES WEAK
DTC	P3023	BATTERY BLOCK 13 BECOMES WEAK
DTC	P3024	BATTERY BLOCK 14 BECOMES WEAK

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CIRCUIT DESCRIPTION

Refer to DTC P0A80 on page 05–672.

DTC No.	DTC Detection Condition	Trouble Area
P3011 P3012 P3013 P3014 P3015 P3016 P3017 P3018 P3019 P3020 P3021 P3022 P3023 P3024	Presence of a malfunctioning block is determined based on the voltages from the battery blocks (1 trip detection logic)	• HV battery assembly • Battery ECU

INSPECTION PROCEDURE

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY (See page 21–100)**

NO →

REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)

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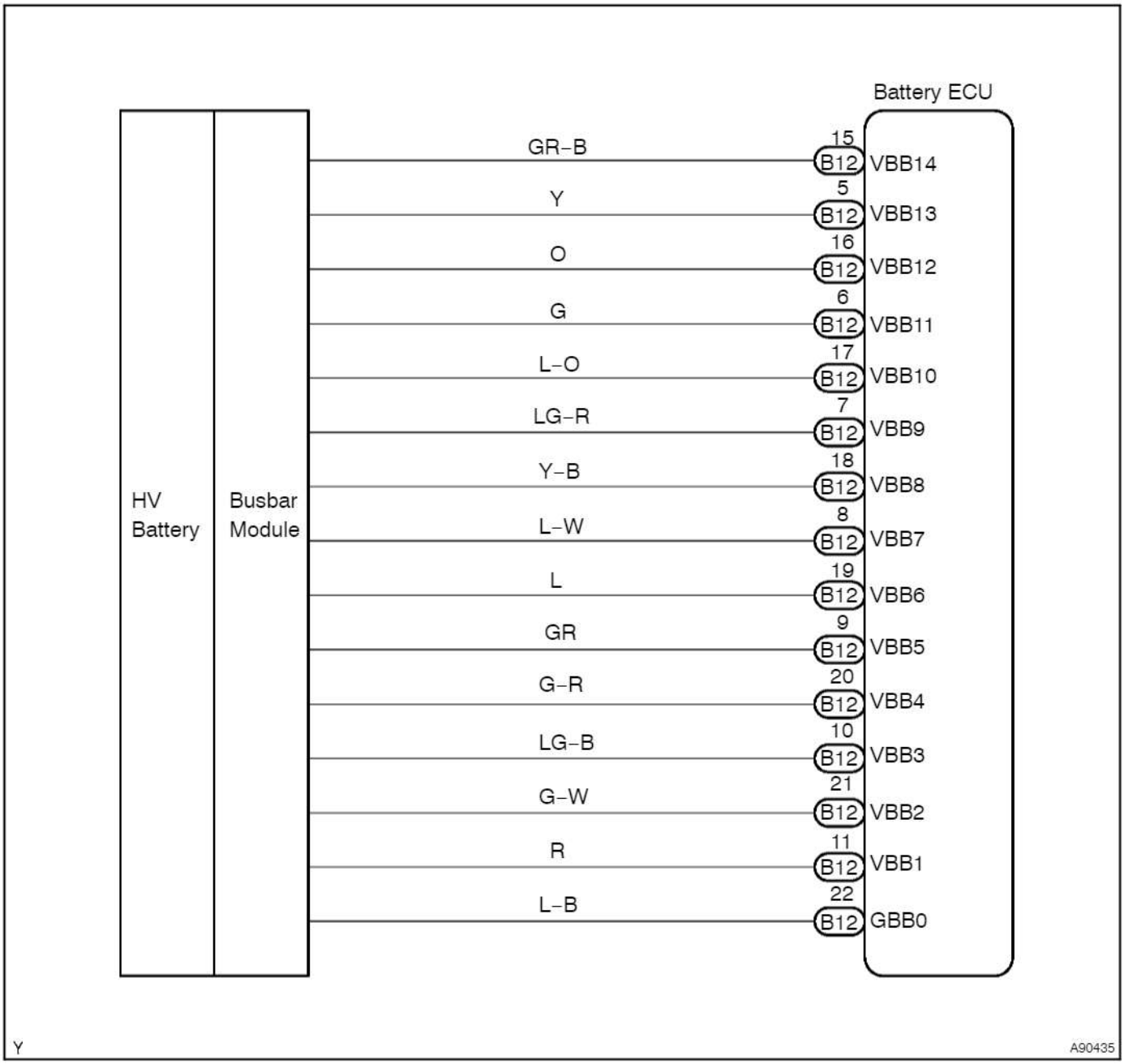
DTC	P3030	DISCONNECTION BETWEEN BATTERY AND ECU

CIRCUIT DESCRIPTION

Refer to DTC P0A80 on page 05–672.

DTC No.	DTC Detection Condition	Trouble Area
P3030	Either of the following conditions occurs (1 trip detection logic) • Voltage at a battery blocks is below 2V • Voltage of all the battery block is between –24 V and 2 V	• Junction block assembly (busbar module) • Frame wire No. 2 (busbar and wire harness) • Battery ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P0A1F is output

YES → **REPLACE BATTERY ECU ASSY** (See page 21–100)

NO

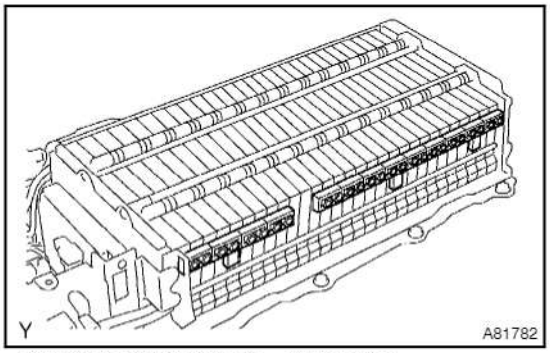
2	READ VALUE OF INTELLIGENT TESTER II(BATTERY BLOCK VOL –V01 TO V14)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / Data List.
(e) Read the Battery Block Vol –V01 to V14 on the intelligent tester II.
Standard: 2 V or more

OK → **Go to step 5**

NG

3	CHECK JUNCTION BLOCK ASSY(BUSBAR MODULE)



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

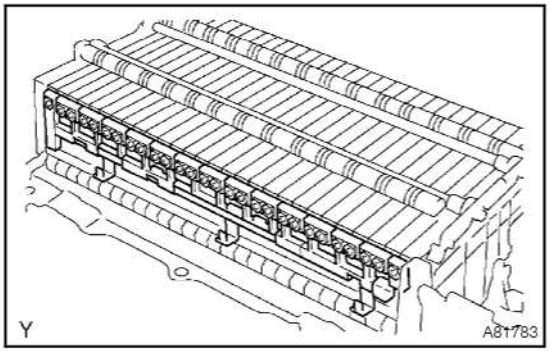
(a) Remove the HV battery assembly (see page 21–56).
(b) Remove the battery cover (see page 21–56).
(c) Check that the nuts retaining the junction block assembly are tightened to the specified torque.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

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NG → TIGHTEN THEM TO SPECIFIED TORQUE

OK

4	CHECK FRAME WIRE NO.2(BUSBAR MODULE)



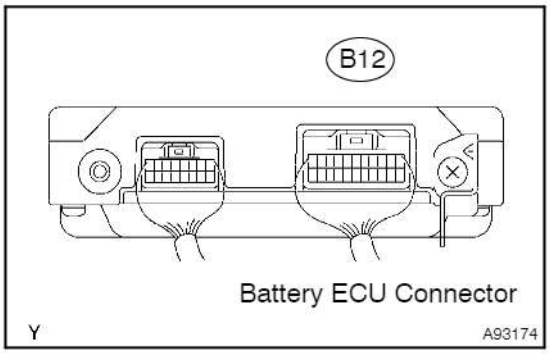
CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Check that the nuts retaining frame wire No. 2 are tightened to the specified torque.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NG → TIGHTEN THEM TO SPECIFIED TORQUE

OK

5	CHECK CONNECTION OF FRAME WIRE NO. 2 CONNECTOR



CAUTION:
Wear insulated gloves before performing the following operation.

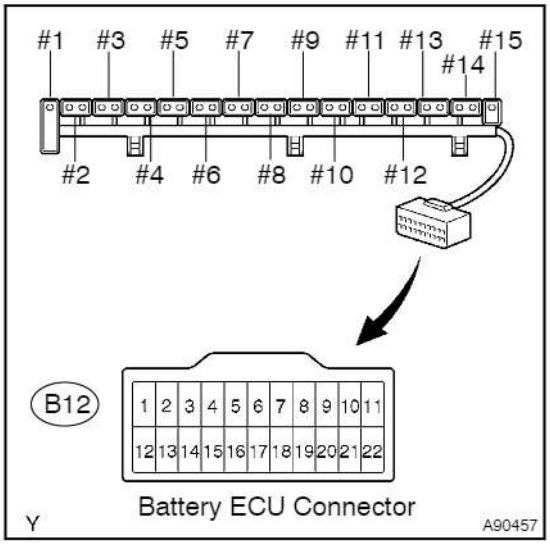
(a) Check the connection condition of the B12 battery ECU connector.
OK: Connector has been connected securely and there is no poor connection.

NG → CONNECT SECURELY

OK

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6	INSPECT FRAME WIRE NO.2(BUSBAR MODULE)



CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the frame wire No. 2 (see page 21–76).

(b) Check the resistance between each connector of frame wire No. 2 and the metal portion.

Standard (Check for open):

Tester Connection	Specified Condition
GBB0 (B12–22) – #1	Below 1 Ω
VBB1 (B12–11) – #2	Below 1 Ω
VBB2 (B12–21) – #3	Below 1 Ω
VBB3 (B12–10) – #4	Below 1 Ω
VBB4 (B12–20) – #5	Below 1 Ω
VBB5 (B12–9) – #6	Below 1 Ω
VBB6 (B12–19) – #7	Below 1 Ω
VBB7 (B12–8) – #8	Below 1 Ω
VBB8 (B12–18) – #9	Below 1 Ω
VBB9 (B12–7) – #10	Below 1 Ω
VBB10 (B12–17) – #11	Below 1 Ω
VBB11 (B12–6) – #12	Below 1 Ω
VBB12 (B12–16) – #13	Below 1 Ω
VBB13 (B12–5) – #14	Below 1 Ω
VBB14 (B12–15) – #15	Below 1 Ω

(c) Reinstall the frame wire No. 2.

NG → **REPLACE FRAME WIRE NO.2 (See page 21–76)**

OK

REPLACE BATTERY ECU ASSY (See page 21–100)

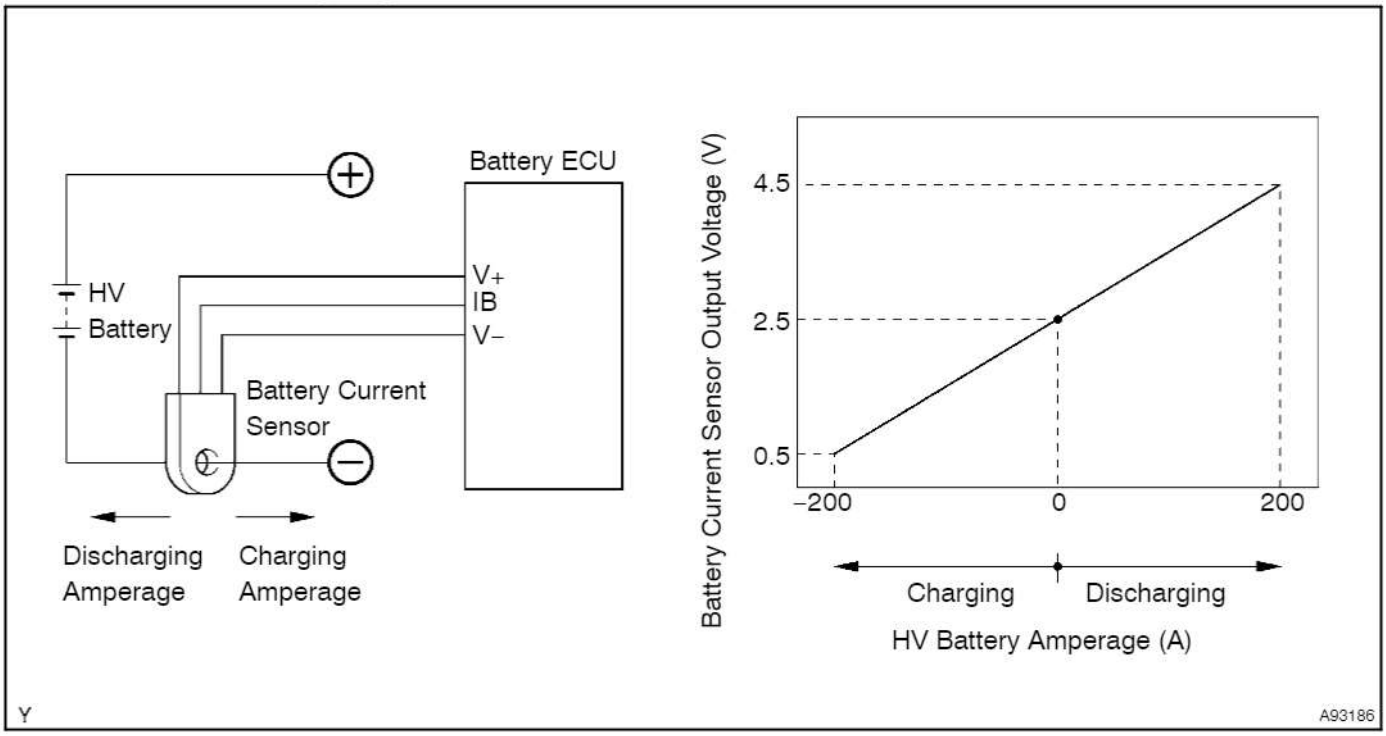
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DTC	P3056	BATTERY CURRENT SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The battery current sensor, which is mounted on the negative cable side of the HV battery assembly, detects the amperage that flows into the HV battery. The battery current sensor inputs a voltage (which varies between 0 to 5 V in proportion to the amperage) into the IB terminal of the battery ECU. An output voltage of the battery current sensor below 2.5 V indicates that the HV battery assembly is being charged, and above 2.5 V indicates that the HV battery assembly is being discharged.

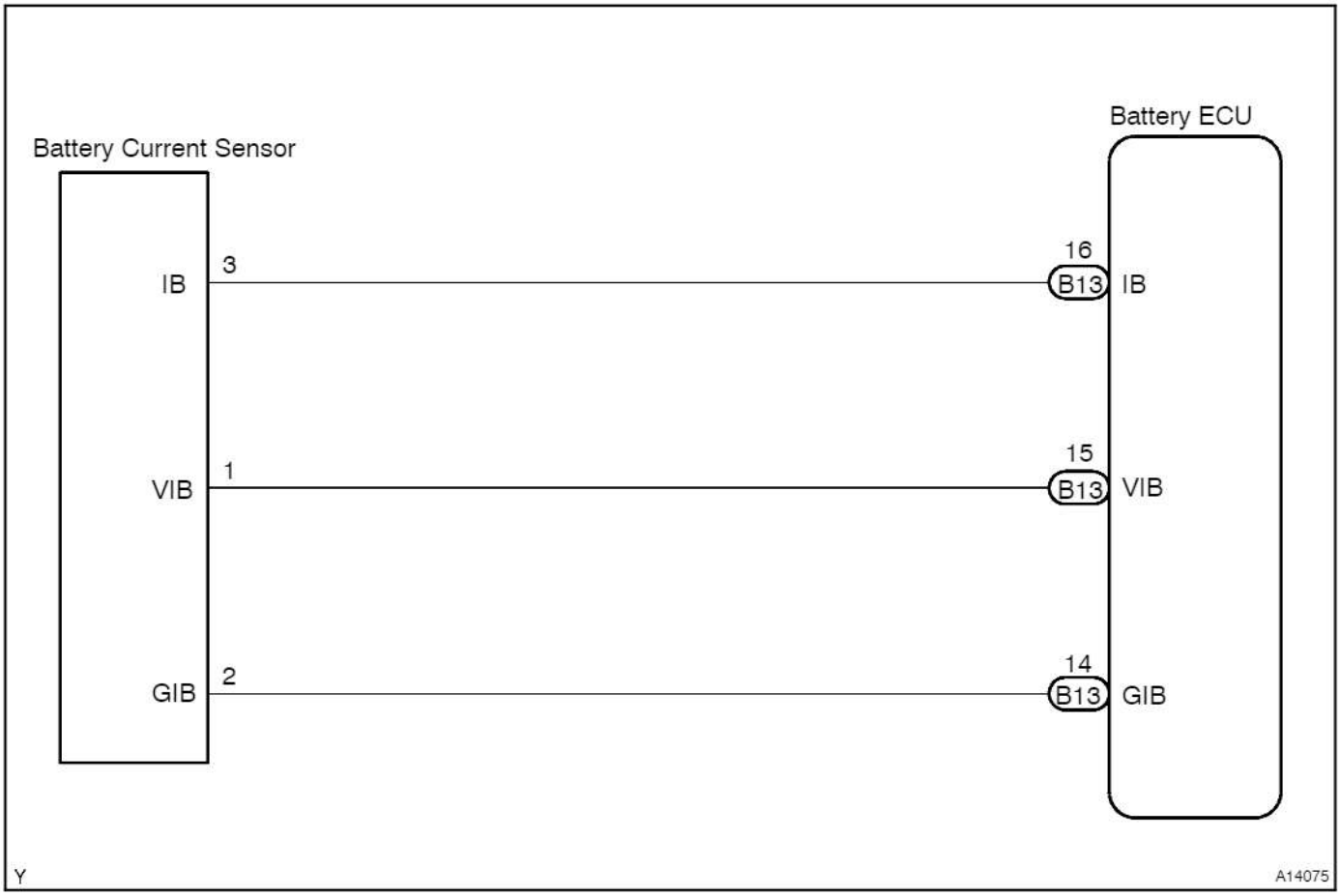
The battery ECU determines the charging and discharging amperage of the HV battery assembly based on the signals that are input to its IB terminal, and calculates the SOC (state of charge) of the HV battery through the estimation of the amperage.



DTC No.	DTC Detection Condition	Trouble Area
P3056	Malfunction in battery current sensor (1 or 2 trip detection logic)	• HV battery assembly (wire harness or connector) • Battery current sensor • Battery ECU

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WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high–voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high–voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high–voltage connectors or terminals.**

HINT:

At least 5 minutes is required to discharge the high–voltage condenser inside the inverter.

1	READ OUTPUT DTC(DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.

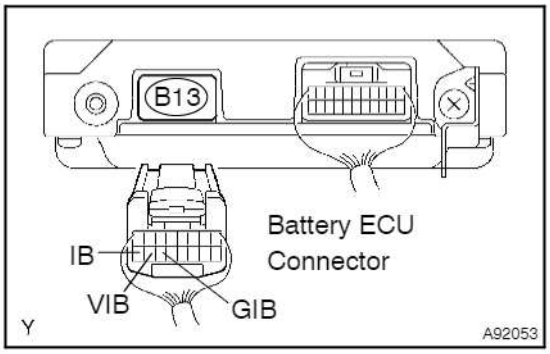
Result: DTC P0A1F is output

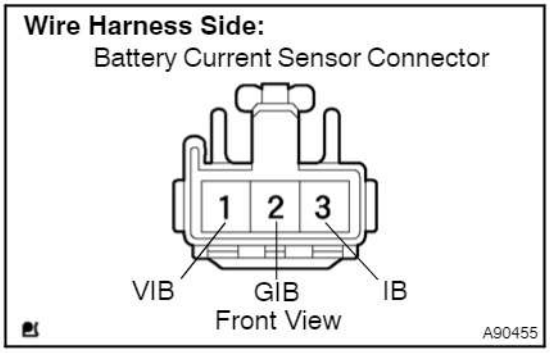
YES → **REPLACE BATTERY ECU ASSY** (See page 21–100)

NO

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2	CHECK HARNESS AND CONNECTOR(BATTERY ECU – BATTERY CURRENT SENSOR)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page 21–120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the B13 battery ECU connector.
(d) Disconnect the battery current sensor connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with the service plug grip removed.

(f) Measure the voltage between the terminals of the B13 battery ECU connector and body ground.

Standard:

Tester Connection	Specified Condition
IB (B13–16) – Body ground	Below 1 V
GIB (B13–14) – Body ground	Below 1 V
VIB (B13–15) – Body ground	Below 1 V

(g) Turn the power switch OFF.
(h) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
IB (B13–16) – battery current sensor (3)	Below 1 Ω
GIB (B13–14) – battery current sensor (2)	Below 1 Ω
VIB (B13–15) – battery current sensor (1)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
IB (B13–16) or battery current sensor (3) – Body ground	10 kΩ or higher
GIB (B13–14) or battery current sensor (2) – Body ground	10 kΩ or higher
VIB (B13–15) or battery current sensor (1) – Body ground	10 kΩ or higher

(i) Reconnect the battery current sensor connector.
(j) Reconnect the battery ECU connector.
(k) Reinstall the service plug grip (see page 21–120).

HINT:
Since the wire harness is not available as a unit and if it is impossible to repair, replace the entire HV battery assembly.

NG → **REPAIR WIRE HARNESS OR CONNECTOR, OR REPLACE HV SUPPLY BATTERY ASSY (See page 21–56)**

OK

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3	REPLACE BATTERY CURRENT SENSOR

(a) Replace the battery current sensor (see page 21–97).
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch ON (IG).
(d) Turn the intelligent tester II ON.
(e) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC / Clear.
(f) Perform a simulation test.

HINT:
Some of the steps involve the detection of 2 trips. Therefore, after performing a simulation test, turn the power switch OFF, and perform the simulation test again.

GO

4	READ OUTPUT DTC(DTC P3056 IS NOT OUTPUT AGAIN)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / HV Battery / DTC.
(e) Read DTCs.
Result: DTC P3056 is not output again

NO → **REPLACE BATTERY ECU ASSY (See page 21–100)**

YES

SYSTEM OK

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DTC	U0100	LOST COMMUNICATION WITH ECM/PCM "A"

DTC	U0293	LOST COMMUNICATION WITH HYBRID VEHICLE CONTROL SYSTEM

CIRCUIT DESCRIPTION

The battery ECU receives signals from the HV control ECU, ECM, and gateway ECU via CAN (Controller Area Network) communication.

DTC No.	DTC Detection Condition	Trouble Area
U0100	CAN communication malfunction (no signal reception) with ECM	• CAN communication system
U0293	CAN communication malfunction (no signal reception) with HV control ECU	• CAN communication system

INSPECTION PROCEDURE

1	READ OUTPUT DTC(BUS CHECK)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Bus Check / Communication Malfunction DTC, and record the DTCs.

HINT:
When DTCs other than CAN communication malfunction DTCs are output simultaneously, first correct the CAN communication problem, and then perform troubleshooting for other DTCs.

GO

GO TO CAN COMMUNICATION SYSTEM (See page 05–2312)

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ELECTRONICALLY CONTOROLLED BRAKE SYSTEM

05IJ1–01

PRECAUTION

1. TROUBLESHOOTING PRECAUTIONS

(a) When there is a malfunction with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.

(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the freeze frame data, and record it before disconnecting each connector or removing and installing parts.

(c) Since the system may be influenced by malfunctions in systems other than the brake control system, be sure to check for DTCs in other systems.

2. HANDLING PRECAUTIONS

(a) Do not remove or install the VSC+ or ECB (Electronically Controlled Brake) parts such as the steering sensor, yaw rate sensor or brake pedal stroke sensor except when required, as they cannot be adjusted correctly after removal or installation.

(b) Be sure to perform preparation before work and confirmation after work is completed by following the direction in the repair manual when working on the VSC+ or ECB system.

(c) Be sure to remove and install the ECU, actuator, each sensor, etc. with the power switch off unless it is not specified in the inspection procedure.

(d) Be sure to remove the 2 main relays before removal and installation, or replacement of the VSC+ or ECB parts.

(e) The removal or installation of the actuator, master cylinder or stroke simulator as well as some other procedures can cause the fluid level to drop below the fluid reservoir port. If this happens when performing such work, be sure to remove the 2 motor relays until the bleeding of the air in the pipeline is completed.

HINT:

- When the pump motor is operated with the air in the brake actuator hose, bleeding the air becomes difficult due to air in the actuator.
- The skid control ECU may operate the stroke simulator and drive the pump motor even when the power switch is off.
- The ECB system has its own auxiliary power source. This system can be operated after disconnecting the negative terminal from the auxiliary battery (12V) until the discharge is completed.
- With the power switch off, the skid control ECU can be operated for 2 minutes after the brake operation is finished.

(f) Removal of the main relay and motor relay

(1) Wait for 2 minutes after turning the power switch off, stopping the brake pedal operation and closing the driver door before removing the 2 relays.

HINT:

When the pump motor operates to prepare for the next operation just before the brake control system turns off.

(g) When removing and installing the ECU, actuator and each sensor, be sure to check that the normal display is output in test mode inspection and in DTC output inspection after installing all the parts.

3. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the power switch off.

NOTICE:

The DTC for a malfunctioning part that repeats after clearing the code is stored again.

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4. FAIL SAFE FUNCTION

(a) When a trouble occurs in the brake control systems, the skid control ECU lights up the warning lights (ECB, ABS, VSC+ and BRAKE) corresponding to the malfunctioning systems and prohibits ABS, VSC+ and brake assist operation.

(b) The control of the ECB can be continued by the normal parts except the malfunctioning parts according to the malfunction.

HINT:

- If control of the ECB for any of the 4 wheels is prohibited, that wheel loses brake booster function or braking ability.
- If one of the 4 wheels loses brake booster function, the feel when depressing brake pedal changes as the stroke simulator (pedal reactive force generating solenoid) operation is prohibited.
- If control of the ECB for all wheels is prohibited, the 2 front wheels lose brake booster function.

5. DRUM TESTER PRECAUTION

(a) When using the drum tester, be sure to follow the procedures below to prohibit the VSC+ operation.

NOTICE:

- **Make sure that the VSC warning light is blinking (move to TEST MODE)**
- **Secure the vehicle with the lock chain for safety**

6. CAN COMMUNICATION SYSTEM PRECAUTION

(a) The CAN communication system is used for the data communication between the skid control ECU, the steering sensor, the yaw rate sensor (deceleration sensor included) and other ECUs. If there is trouble with the CAN communication line, corresponding DTCs in the communication line are output.

(b) If the DTC in the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the VSC+ system while data communication is normal.

(c) Since the CAN communication line has its own length and route, it cannot be repaired temporarily with the bypass wire, etc.

NOTICE:

When disconnecting the negative (–) battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Power Window Control System	01–29

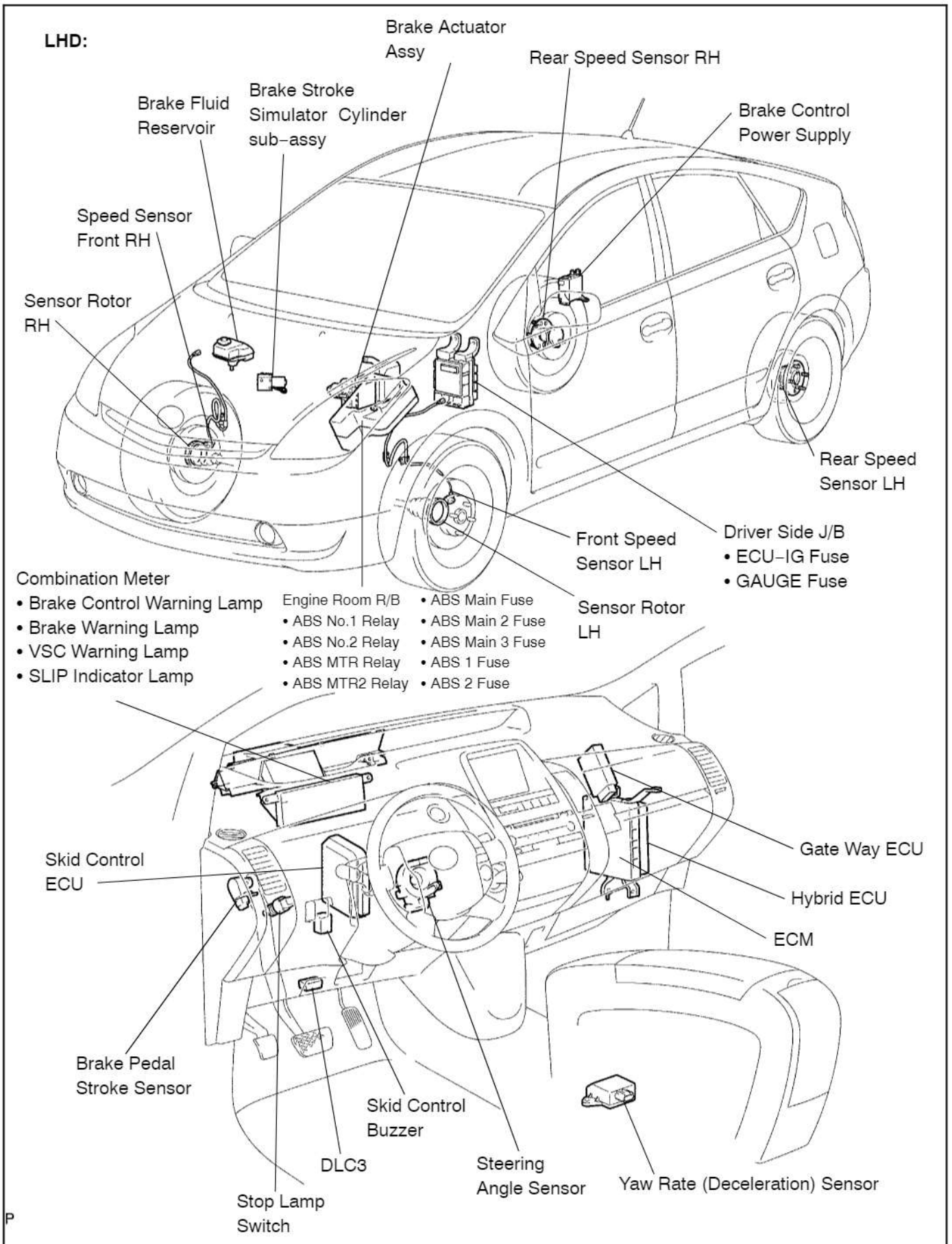
NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

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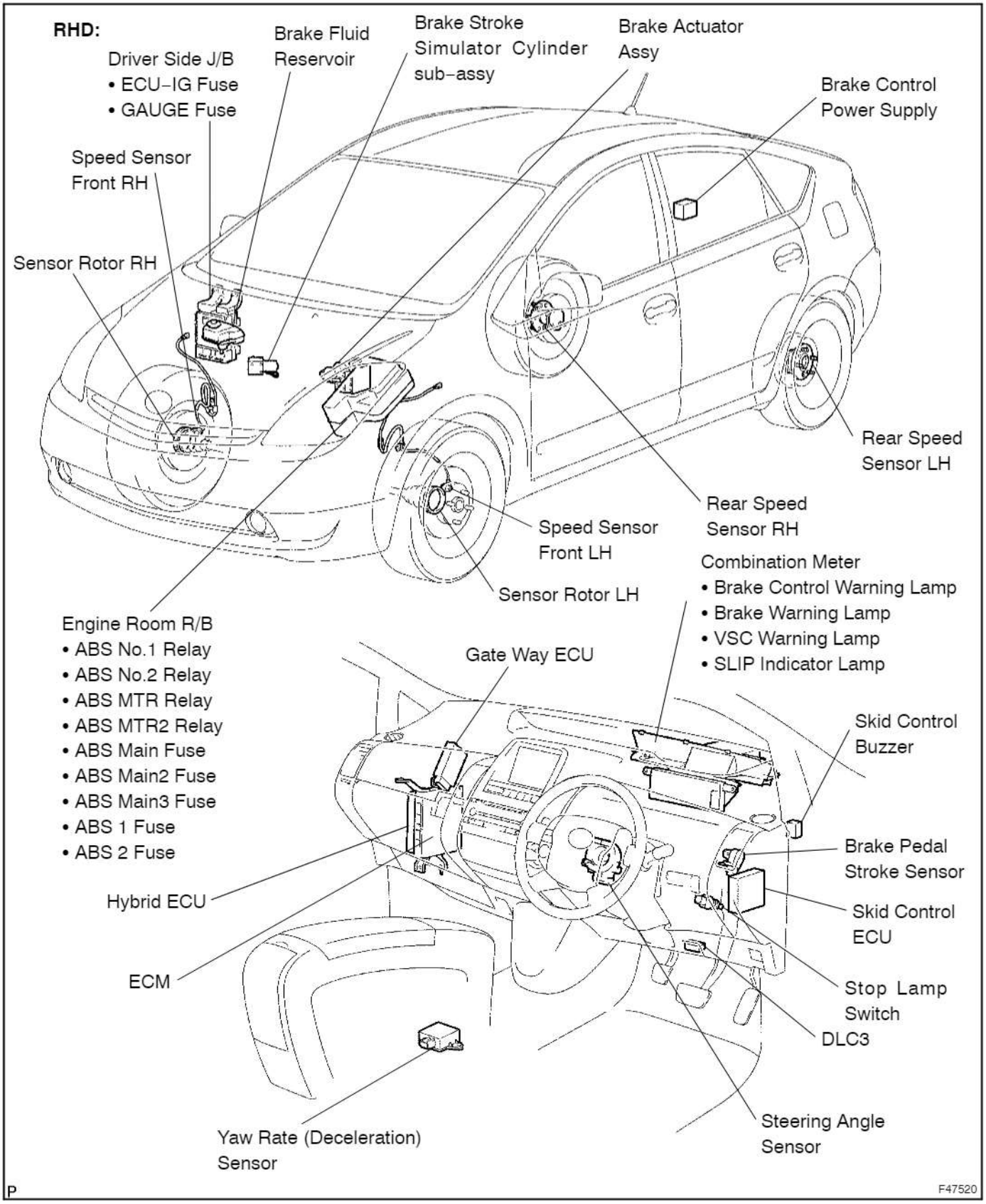
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LOCATION



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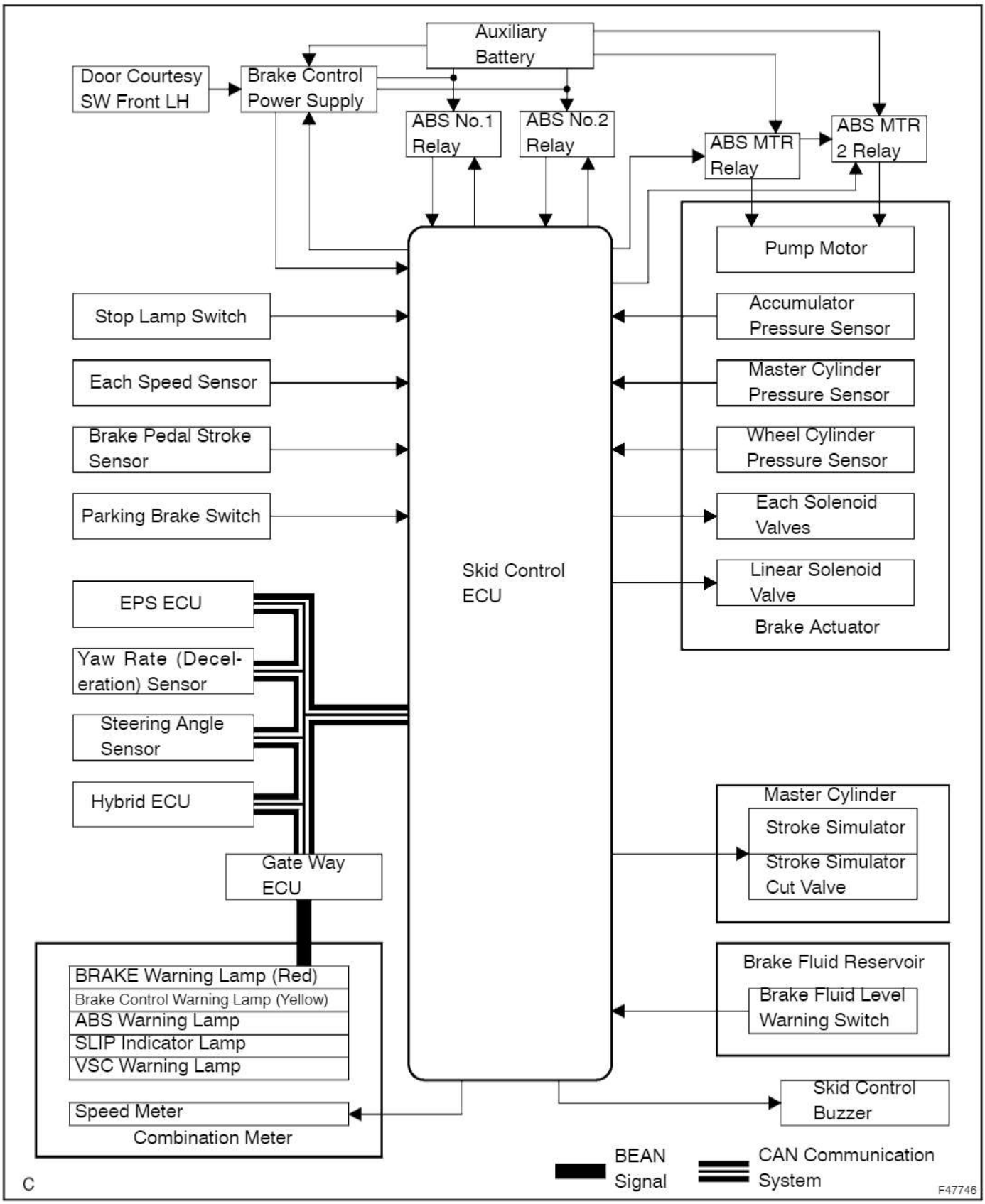
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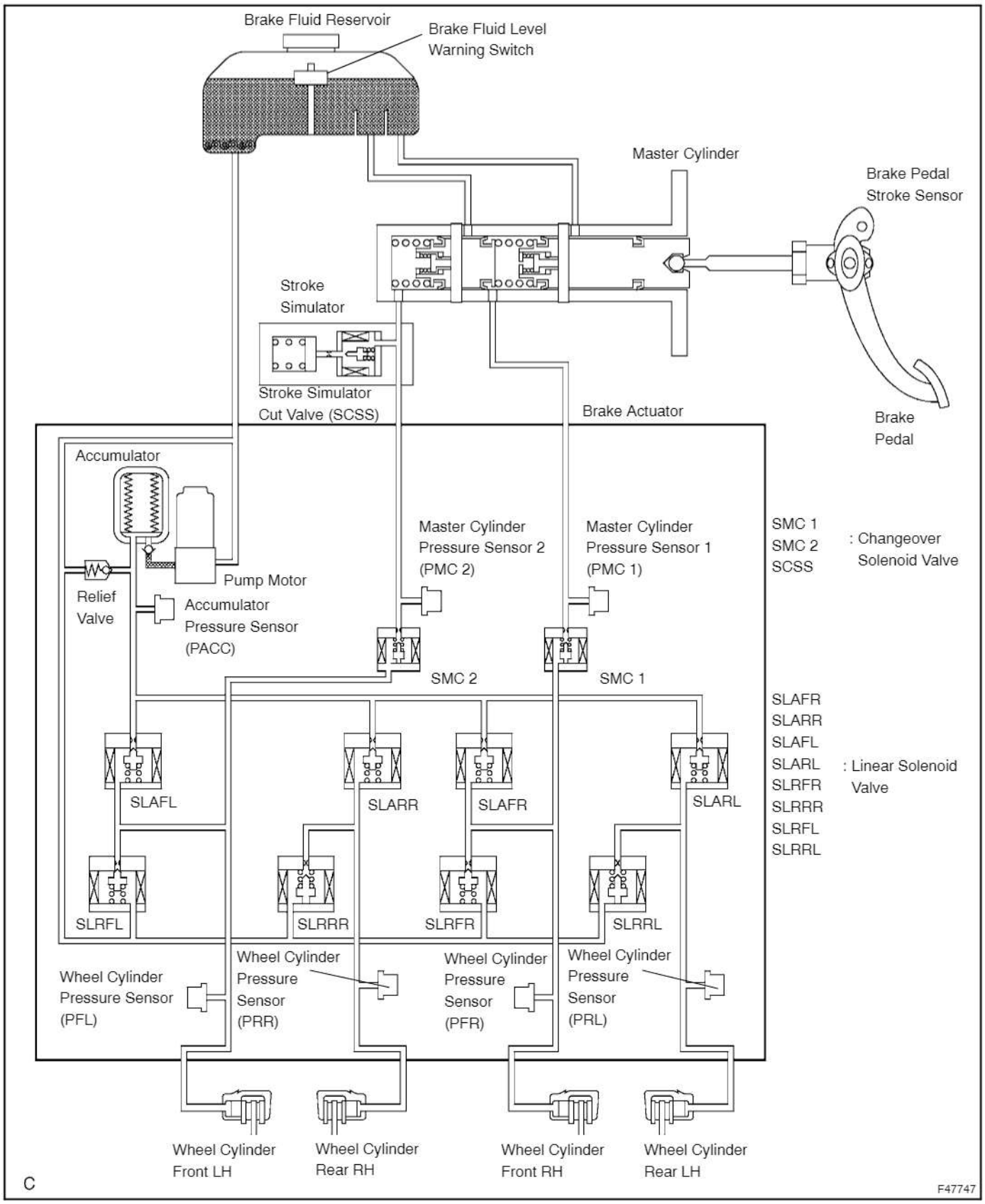
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05IJ3–01

SYSTEM DIAGRAM



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Transmitting ECU	Receiving ECU	Signal name	Communication line
Skid control ECU	Gateway ECU	Warning signal	CAN communication
Skid control ECU	Hybrid Control ECU	Vehicle wheel lock signal	CAN communication
Skid control ECU	Hybrid Control ECU	Vehicle wheel speed sensor signal	CAN communication
Skid control ECU	Hybrid Control ECU	VSC+, torque control signal	CAN communication
Skid control ECU	Hybrid Control ECU	ABS operation signal	CAN communication
Skid control ECU	Hybrid Control ECU	Cruise control cancel demand signal	CAN communication
Skid control ECU	Hybrid Control ECU	Communication error signal (from HV to ECB)	CAN communication
Skid control ECU	Hybrid Control ECU	Demand drive torque signal	CAN communication
Skid control ECU	Hybrid Control ECU	Braking torque signal	CAN communication
Skid control ECU	Hybrid Control ECU	Regeneration performing demand signal	CAN communication
Skid control ECU	Hybrid Control ECU	STP SW signal	CAN communication
Skid control ECU	Hybrid Control ECU	STP SW open signal	CAN communication
Skid control ECU	Hybrid Control ECU	Parking brake signal	CAN communication
Skid control ECU	Yaw rate (deceleration) sensor	Yaw rate (deceleration) signal	CAN communication
Skid control ECU	EPS ECU	Steering control signal	CAN communication
Hybrid Control ECU	Skid control ECU	Regeneration prohibit signal	CAN communication
Hybrid Control ECU	Skid control ECU	Regeneration deterioration notice signal	CAN communication
Hybrid Control ECU	Skid control ECU	Regeneration error signal	CAN communication
Hybrid Control ECU	Skid control ECU	Performing torque recognition signal	CAN communication
Hybrid Control ECU	Skid control ECU	Performing torque recognition signal	CAN communication
Hybrid Control ECU	Skid control ECU	Destination signal	CAN communication
Hybrid Control ECU	Skid control ECU	Throttle opening angle signal	CAN communication
Hybrid Control ECU	Skid control ECU	Accelerator information signal (Idle SW)	CAN communication
Hybrid Control ECU	Skid control ECU	Communication error signal (from ECB to HV)	CAN communication
Hybrid Control ECU	Skid control ECU	Wheel lock braking start signal	CAN communication
Hybrid Control ECU	Skid control ECU	Shift information signal	CAN communication
Hybrid Control ECU	Skid control ECU	Ready condition signal	CAN communication
Hybrid Control ECU	Skid control ECU	Braking torque demand signal	CAN communication
Hybrid Control ECU	Skid control ECU	SLIP indicator ON demand signal	CAN communication

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05ILO–01

SYSTEM DESCRIPTION

1. COMPONENTS AND FUNCTION

Skid Control ECU (*)	Calculates brake control in accordance with sensor/ECU signals or communication with the hybrid ECU.
Brake Control Power Supply Assy (*)	Charges the capacitor inside the unit and supplies power source to the system by discharging when the voltage of the vehicle's power source drops.
Speed sensor	Detects speed of each wheel and inputs the data into the skid control ECU.
Pedal stroke sensor (*)	Detects brake pedal stroke and inputs the data into the skid control ECU.
Yaw rate/deceleration sensor (*)	Detects forward/rearward and lateral acceleration, and then inputs the data into the skid control ECU
Steering sensor	Detects steering wheel angle and steering wheel direction, and then inputs the data into the skid control ECU.
Accumulator	Accumulates fluid pressure generated by the pump.
Accumulator pressure sensor (PACC)	Detects accumulator pressure and inputs the data into the skid control ECU.
Master cylinder	Generates pressure according to pedal effort.
Brake fluid reservoir	Stores master cylinder system/power supply system brake fluid. The brake fluid level warning switch built into the reservoir detects decrease of brake fluid.
Stroke simulator	Generates smooth pedal stroke in accordance with pedal effort during system control.
Stroke simulator cut valve (SCSS)	Changes intake/cutoff of brake fluid from master cylinder to stroke simulator. Sends oil pressure generated in master cylinder to stroke simulator during system control. Cuts brake fluid flow from master cylinder to stroke simulator when system is not controlling.
Master cylinder pressure sensor 1, 2 (PMC1, PMC2)	Detects fluid pressure inside the master cylinder and inputs the data into the skid control ECU.
Relief valve	Releases brake fluid into the reservoir and prevents excessively high power supply system pressure when the pump operates continuously due to malfunctions in parts such as accumulator oil pressure sensor.
Wheel cylinder pressure sensor	Detects the pressure in each wheel cylinder and inputs the data into the skid control ECU.
ABS No.1 relay ABS No.2 relay	Supplies power to each solenoid according to the skid control ECU signals. Supplies power to the skid control ECU. Stores power source after turning the power source off.
ABS MTR1 relay ABS MTR2 relay	Supplies power to each motor according to the skid control ECU signals. Drives relay1 under normal condition and drives relay 2 under the ABS operation. Substitutes relay operation when one relay malfunctions.
Changeover solenoid valve (SMC1, SMC2)	The changeover solenoid valve switches the brake hydraulic pressure passage depending on whether the system is in operation or not operation.
Linear solenoid valve (SLA##, SLR##)	Controls wheel cylinder hydraulic pressure according to regenerative braking force in order to generate braking force required by the driver under normal brake operation. Controls the hydraulic pressure of each wheel cylinder under ABS, VSC+ brake operation. SLA## adjusts the pressure increase level. SLR## adjusts the pressure decrease level.
Stop lamp switch	Illuminates the brake light when the brake pedal is depressed. (Sends brake ON signal to skid control ECU)
BRAKE warning light (Red)	Informs the driver that there is trouble with the ECB (normal brake) by turning on. Informs the driver when the parking brake is applied and brake fluid level drops by turning on.
BRAKE warning light ((Yellow) Brake Control warning light)	Informs the driver when there is trouble with ECB or a problem with the brake system that has no influence on driving, by turning on.
ABS warning light	Informs the driver that there is trouble with ABS by illuminating the light.
VSC warning light	Informs the driver that there is trouble with VSC+ by illuminating the light.
SLIP indicator	Informs the driver that VSC+, and ABS are operating by blinking the light.
Skid control buzzer	Informs the driver when there is trouble with the hydraulic pressure source or power source by continuous buzzer sound. Informs that VSC+ is operating by an intermittent buzzer sound.

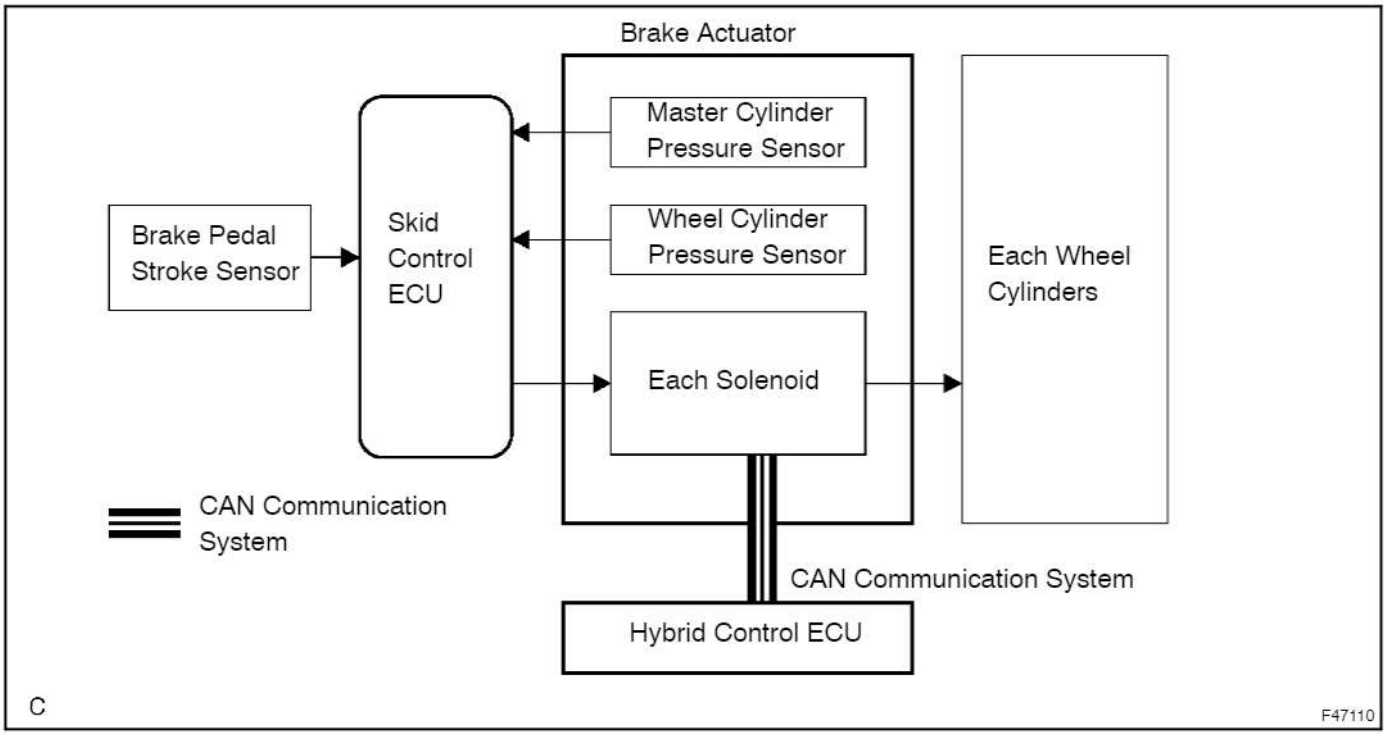
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*: The initialization of linear solenoid valve and calibration must be performed when the skid control ECU, actuator, stroke sensor, brake control power supply assy, yaw rate (deceleration) sensor, and steering sensor are replaced (see page 05–721).
It is necessary to perform zero point calibration of yaw rate/ deceleration sensor (see page 05–723).

2. OPERATION DESCRIPTION

ECB (Electronically Controlled Brake):

The skid control ECU receives signals from the pedal stroke sensor, master cylinder sensor and wheel cylinder pressure sensor. Based on these signals, the skid control ECU calculates necessary braking force for each wheel. The necessary hydraulic pressure braking force signal is sent to the Hybrid Control ECU via CAN communication. The skid control ECU receives a braking force (regenerative braking force) signal from the HV motor via CAN communication. The ECU calculates the necessary hydraulic pressure braking force based on the necessary braking force and regenerative braking force.
Necessary hydraulic pressure is supplied to each wheel by adjusting the brake accumulator (hydraulic pressure source) pressure with each solenoid valve.
If there is a problem with braking function, rest normally operating parts will maintain brake control as a fail–safe.

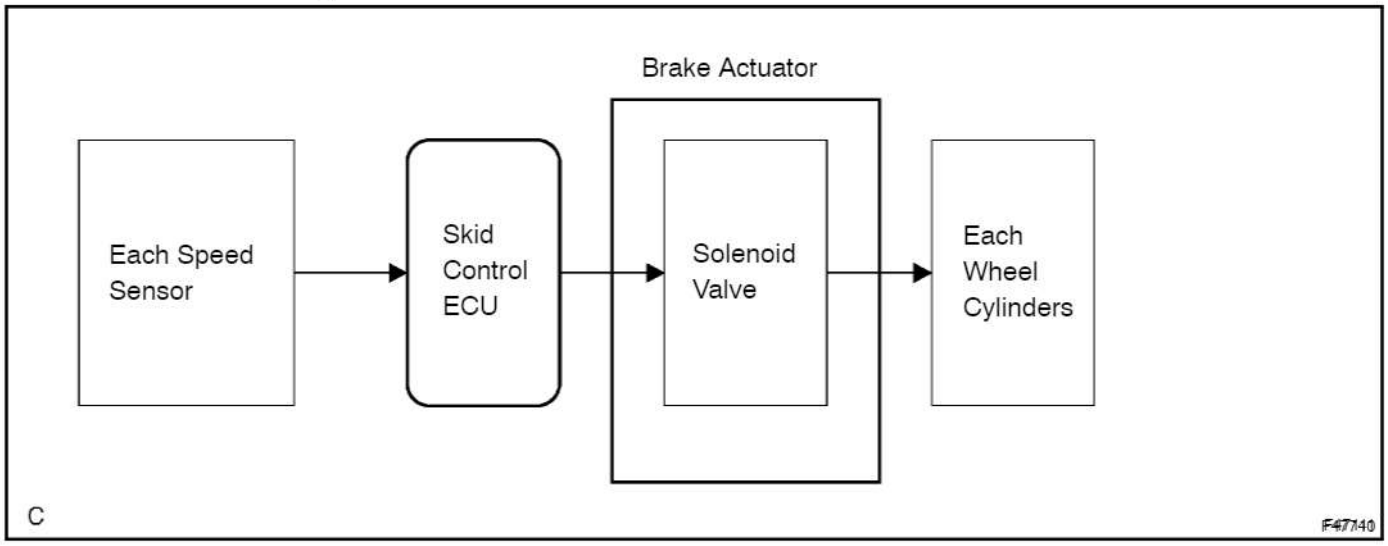


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ABS with EBD & VSC+:

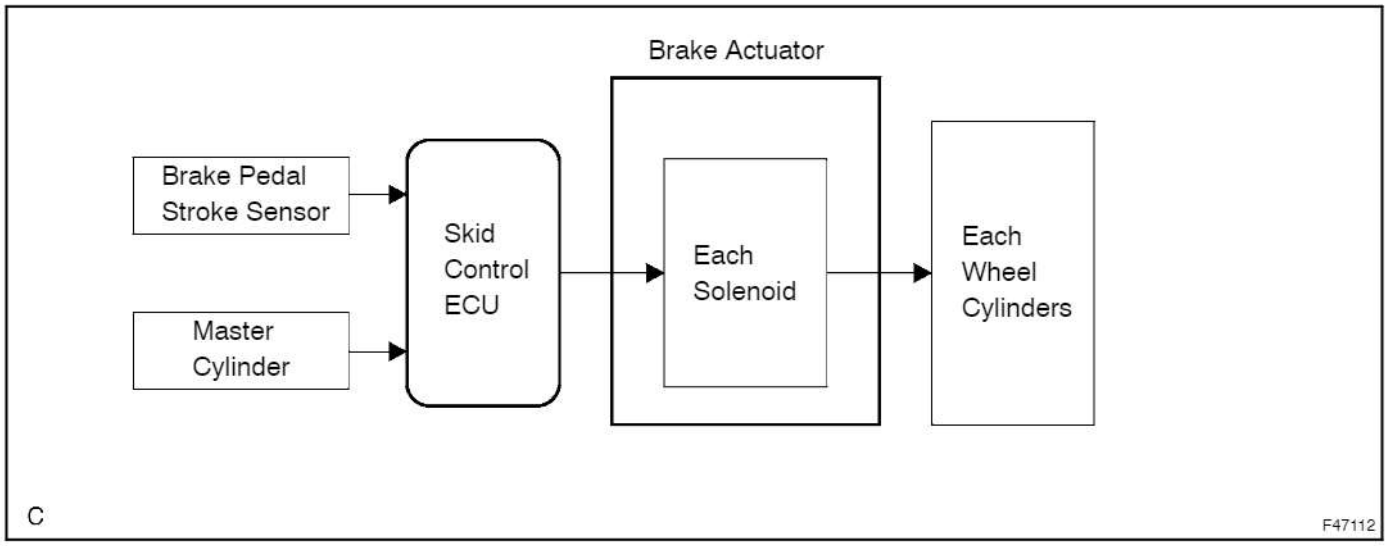
The skid control ECU receives a vehicle speed signal from each speed sensor and detects wheel's slip condition and then sends a control signal to the solenoid.

The solenoid valve controls each wheel cylinder's hydraulic pressure and optimizes hydraulic pressure allocation to each wheel cylinder.



BA (Brake Assist):

The skid control ECU receives the brake pedal stroke sensor signal and hydraulic pressure signal from the master cylinder pressure sensor and determines whether brake assist operation is necessary or not. If it is determined that brake assist operation is necessary, the ECU changes target hydraulic pressure applied to each wheel.



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HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used at step 3, 6, 9, 12.

1	Vehicle Brought to Workshop

2	Customer Problem Analysis (SEE PAGE 05–717)

3	Check and Clear DTCs and Freeze Frame Data (SEE PAGE 05–738)

4	Problem Symptom Confirmation

- Symptom does not occur: Go to step 5
- Symptom occur: Go to step 6

5	Symptom Simulation (SEE PAGE 01–46)

6	DTC Check (SEE PAGE 05–738)

- There is no output: Go to step 7
- There is output: Go to step 8

7	Problem Symptoms Table (SEE PAGE 05–729)

- Check for fluid leakage and Go to step 10

8	DTC Chart (SEE PAGE 05–750)

9	Circuit Inspection (SEE PAGE 05–754 to 05–905)

10	Identification of Problem

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11	Repair

12	Confirmation Test

End

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05IJ9-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & EBD Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

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

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ BA does not operate.	
	Brake Control Warning Light Abnormal	☐ Remains ON ☐ Does not Come On
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Come On
	Brake Warning Light Abnormal (PKB released)	☐ Remains ON ☐ Does not Come On

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

Freeze Frame Data	Stp SW	☐ ON ☐ OFF
	System	☐ NO SYS ☐ ABS ☐ BA ☐ FAIL SF
	IG ON	
	Vhcl Spd	km/h MPH

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VSC+ Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

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

Symptoms	☐ TRC does not operate. (Wheels spin when starting rapidly.)	
	☐ VSC+ does not operate. (Wheels sideslip at the time of sharp turning.)	
	Brake Control Warning Light Abnormal	☐ Remains ON ☐ Does not Come On
	VSC Warning Indicator Abnormal	☐ Displays ☐ Does not Display
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Come On
	Skid Control Buzzer Abnormal	☐ Sounds ☐ Does not Sound

Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

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

Freeze Frame Data	VSC SW	☐ ON ☐ OFF
	System	☐ VSC/TRC
	Shift Post	☐ P,N ☐ 2 ☐ R ☐ 3 ☐ D ☐ 4 ☐ L ☐ FAIL
	Steering	deg
	Yaw Rate	deg/s
	M/C 1	V
	Throtl	deg
	M/S Grad	MPa/s
	R & L G	G
	B & F G	G

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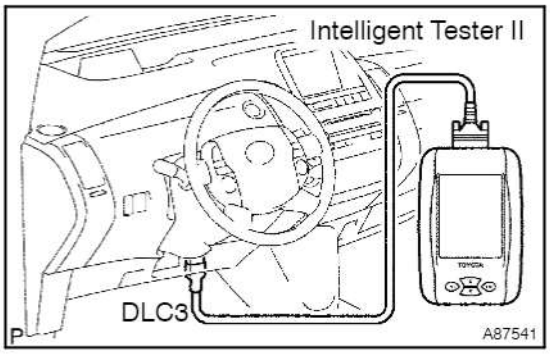
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CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

HINT:

A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected in the ECU data monitor function of the intelligent tester II.



(a) Turn the power switch off and connect the intelligent tester II to the DLC3.

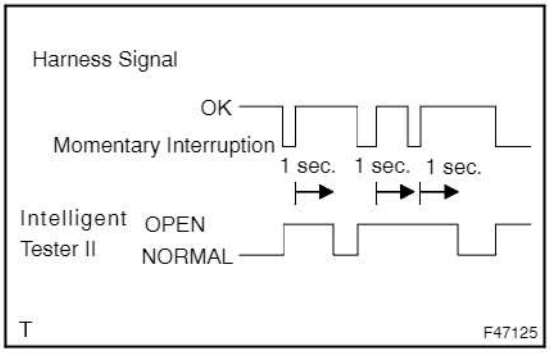
(b) Turn the power switch ON(READY). Follow the on–screen directions on the intelligent tester II to display the DATA LIST and select areas where momentary interruption should be monitored.

HINT:

A momentary interruption (open circuit) cannot be detected for 3 seconds after the power switch is turned on (initial check).

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FR Speed Open	FR speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition	–
FL Speed Open	FL speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition	–
RR Speed Open	RR speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition	–
RL Speed Open	RL speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition	–
Yaw Rate Open	Yaw rate sensor open detection	NORMAL : Normal condition	–
Deceleration Open	G sensor open detection	NORMAL : Normal condition	–
Steering Open	Steering sensor open detection	NORMAL : Normal condition	–
Master Cylinder 1 Open	Master Cylinder pressure sensor 1 open detection	NORMAL : Normal condition	–
Master Cylinder 2 Open	Master Cylinder pressure sensor 1 open detection	NORMAL : Normal condition	–
Pedal Stroke 1 Open	Pedal stroke 1 open	NORMAL : Normal condition	–
FR Wheel Cylinder Open	FR Wheel cylinder open	NORMAL : Normal condition	–
FL Wheel Cylinder Open	FL Wheel cylinder open	NORMAL : Normal condition	–
RR Wheel Cylinder Open	RR Wheel cylinder open	NORMAL : Normal condition	–
RL Wheel Cylinder Open	RL Wheel cylinder open	NORMAL : Normal condition	–
HV Open	HV communication open detection	NORMAL : Normal condition	–
Accumulator Open	ACC pressure sensor open detection	NORMAL : Normal condition	–

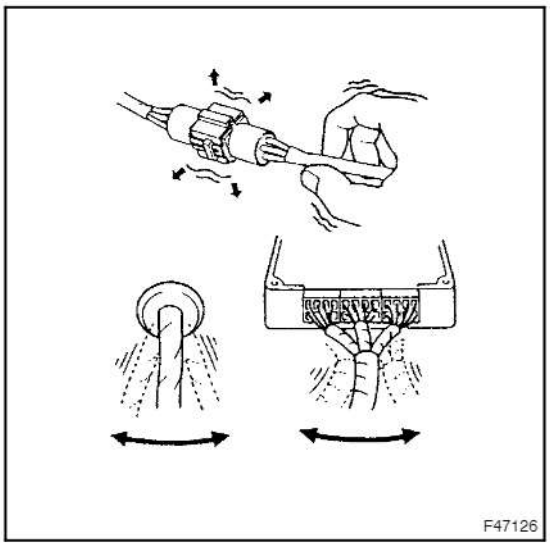
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HINT:

- If the intelligent tester II's status remains open, check the continuity between the ECU and the sensors, or between ECUs.
- The OPEN display on the intelligent tester II remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.

(c) While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between ECUs.
Result: Open–screen display does not change.



HINT:

- The connector and/or wire harness will be in momentary interruption (open circuit) if the chart fluctuates. Repair or replace connector and/or wire harness as one of them is faulty.

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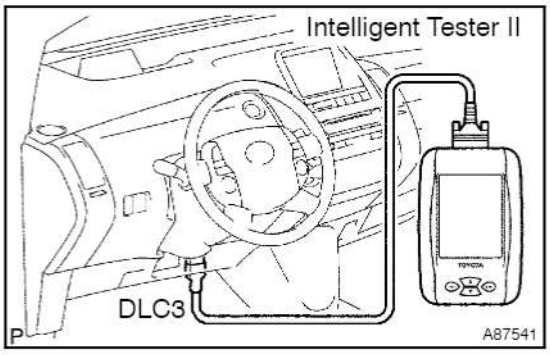
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INITIALIZATION

1. INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION

HINT:

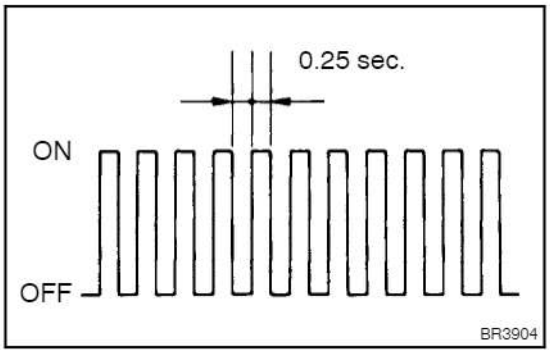
- Perform initialization of linear solenoid valve and calibration when the skid control ECU, brake actuator, or brake pedal stroke sensor is replaced.
- First perform the pedal stroke sensor zero point calibration and then initialization of linear solenoid valve and calibration when the brake stroke sensor is removed/installed or the brake pedal height is adjusted (see page 32–16).
- First bleed air and then perform initialization of linear solenoid valve and calibration when the brake actuator is replaced.
- Initialization of linear solenoid valve and calibration cannot be performed again once it is stored unless the data is cleared or damaged. Perform initialization of linear solenoid valve and calibration after the stored value is initialized, except when replacing the skid control ECU.
- DTC C1259/59 is stored and brake control is partly prohibited when the power switch is turned ON (READY) while the service plug grip of the HV battery is removed, preventing initialization of linear solenoid valve and calibration from being normally performed. In this case, connect the service plug grip with the power switch OFF and turn the power switch ON (READY) again to cancel the warning (brake control prohibition).
- If there is a problem with auxiliary battery (12V) voltage, initialization of linear solenoid valve and calibration cannot be completed normally. Make sure to check battery voltage before performing initialization of linear solenoid valve and calibration.
- If the actuator's temperature is high, initialization of linear solenoid valve and calibration may not be completed normally. In that case, wait until the temperature decreases and then perform initialization of linear solenoid valve and calibration.
- Do not depress the brake pedal during the initialization of linear solenoid valve and calibration procedure.



(a) Clear stored value of "initialization of linear solenoid valve and calibration".
  (1) Connect the intelligent tester II to the DLC3 with the power switch off.
  (2) Turn the power switch ON (READY) with the brake pedal released.
  (3) Check that the "P" position switch indicator (P) is on.
  (4) Turn the intelligent tester II power switch on and clear the stored value of initialization of linear solenoid valve and calibration following the screen.

(b) Perform "initialization of linear solenoid valve and calibration".
  (1) Connect the intelligent tester II to the DLC3 with the power switch off.
  (2) Turn the power switch ON (READY) with the brake pedal released.
  (3) Check that the main switch (parking switch) indicator (P) is on.

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(4) Turn the power switch ON (READY) with the brake pedal depressed to display the "READY ON" indicator on the meter.

(5) Select the TEST MODE following the intelligent tester II screen.

(6) Leave the vehicle stationary without depressing the brake pedal for 1 to 2 minutes. Check that the interval between blinks of the Brake Control warning light (BRAKE warning (Yellow)) changes from 1 second to 0.25 second.

NOTICE:

- **Leave the meter's "READY" indicator on during the initialization of linear solenoid valve and calibration. Do not drive the vehicle or depress the brake pedal.**
- **A DTC that indicates trouble with initialization of linear solenoid valve and calibration is stored if entering the TEST MODE with the shift lever in any position other than P.**

HINT:

- The time needed to complete initialization of linear solenoid valve and calibration varies depending on battery voltage.
- The Brake Control warning light (BRAKE warning (Yellow)) blinks at 1 second intervals during the initialization of linear solenoid valve and calibration and changes to the TEST MODE display when it is completed.
- The Brake Control warning light (BRAKE warning (Yellow)) blinks at 0.25 second intervals if the TEST MODE is normal.

(7) Check that DTC C1345/66 that indicates trouble with stroke sensor zero point learning is not output when the Brake Control warning light changes to the TEST MODE display upon initialization of linear solenoid valve and calibration completion.

(8) Enter the NORMAL MODE from the TEST MODE following the intelligent tester II screen.

2. YAW RATE SENSOR/DECELERATION SENSOR INITIALIZATION

HINT:

The zero point data of the yaw rate/deceleration sensor stored in the skid control ECU must be cleared when the yaw rate/deceleration sensor is replaced (see page 05–723).

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CALIBRATION

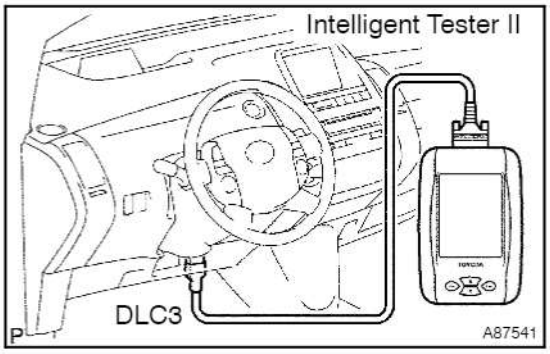
1. DESCRIPTION

(a) Zero point calibration is not performed until the data is cleared when the zero point is once stored. Zero point calibration should be performed after the zero point is cleared if the yaw rate (deceleration) sensor is replaced.

(b) Steering sensor zero point calibration is automatically performed with the vehicle driving straight.

(c) Follow the chart to perform calibration.

Replacing Parts	Necessary Operation
Skid Control ECU	Yaw rate (deceleration) sensor zero point calibration.
Yaw Rate (deceleration) sensor	5. Clearing zero point calibration data. 6. Yaw rate sensor and deceleration sensor zero point calibration.



2. CLEAR ZERO POINT CALIBRATION

(a) Clearing the DTCs.

(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch ON (READY).

(3) Operate the intelligent tester II to erase the codes.

HINT:

Refer to the intelligent tester II Operator's Manual for further details.

3. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR

NOTICE:

- **While obtaining the zero point, do not vibrate the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to do this on a level surface (with an inclination less than 1 degree).**

(a) Check that the steering wheel is in the straight–ahead position and move the shift lever to the P position.

(b) Connect the intelligent tester II to the DLC3.

(c) Turn the power switch ON (READY).

(d) Operate the intelligent tester II to test mode.

(e) Obtain the zero point of the yaw rate sensor and deceleration sensor.

(1) Keep the vehicle in the stationary condition on a level surface for 2 seconds or more.

(2) Check that the VSC warning light blinks.

HINT:

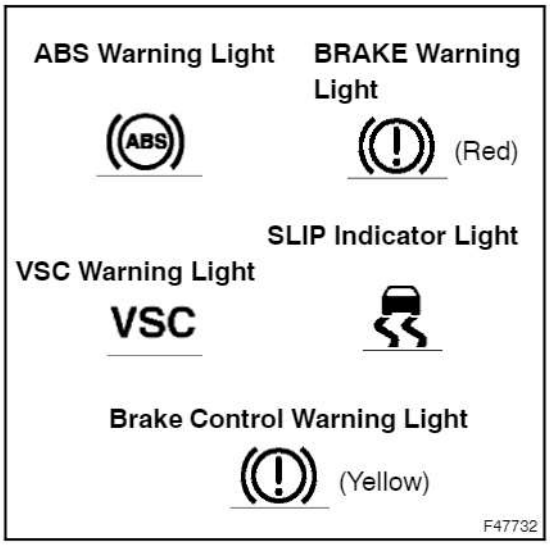
- If the VSC warning light does not blink, perform the zero point calibration again.
- The zero point calibration is performed only once after the system enters the test mode.
- Calibration cannot be performed again until the stored data is cleared once.

(f) Turn the power switch OFF.

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TEST MODE PROCEDURE



1. WARNING LIGHT AND INDICATOR LIGHT CHECK

(a) Release the parking brake pedal.

NOTICE:

When releasing the parking brake, move the "P" position switch into the P position to hold the vehicle for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the power switch ON (READY) check that the ABS warning light, VSC warning light, BRAKE warning light, Brake Control warning light and SLIP indicator light come on for approximately 3 seconds.

HINT:

If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC warning light circuit, BRAKE warning light circuit, Brake Control warning light circuit or SLIP indicator light circuit.

If the indicator remains on, proceed to troubleshooting for the light circuit below.

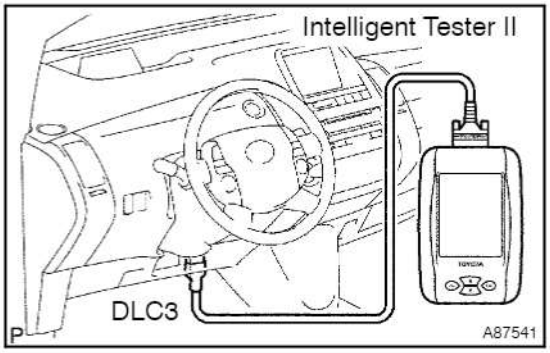
Trouble area	See Page
ABS warning light circuit	05–874
VSC warning light circuit	05–880
BRAKE warning light circuit	05–886
Brake Control warning light circuit	05–868
SLIP indicator light circuit	05–893

2. SENSOR SIGNAL CHECK BY TEST MODE

HINT:

- Set the vehicle in the TEST MODE and perform the following procedures to check operation of the deceleration sensor, master cylinder pressure sensor, speed sensor and yaw rate sensor.
- Check results are indicated by DTCs output only in the TEST MODE.
- Perform the following procedures (a) to (e) as a set.
- When entering the test mode, the skid control ECU once records all the test mode codes and clears the codes judged to be normal.
- The VSC+ function does not operate independent of whether the sensor check is normal or abnormal during test mode.
- When the mode returns to the normal mode, all the test mode codes are cleared.
- The ABS warning lamp and VSC warning light comes on if the sensor has a malfunction.

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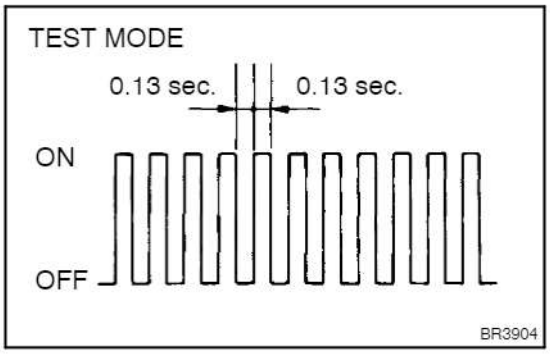
(a) PROCEDURES FOR TEST MODE

(1) Turn the power switch OFF.

(2) Connect the intelligent tester II to the DLC3.

(3) Check that the steering wheel is in the straight–ahead position and move the shift lever to the P position.

(4) Turn the power switch ON (READY).



(5) Check that the ABS warning light and VSC warning light indicates TEST MODE .

HINT:

If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble area	See Page
ABS warning light circuit	05–874
VSC warning light circuit	05–880

(6) Start the engine.

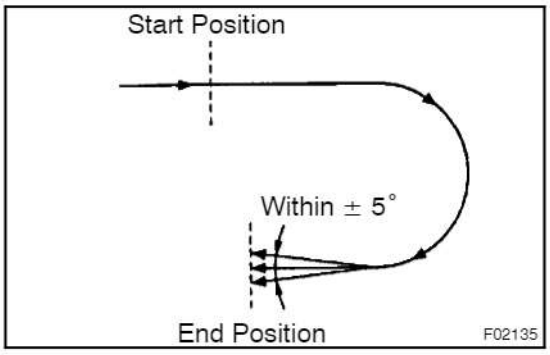
(b) DECELERATION SENSOR CHECK

(1) Check that the ABS warning light is blinking in TEST MODE.

(2) Keep the vehicle in the stationary condition on a level surface for 1 second or more.

HINT:

The blinking pattern of the ABS warning light and VSC warning light do not change. When the sensor is normal and in the test mode, if the above conditions are met, the check is completed.



(c) YAW RATE SENSOR CHECK

(1) Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 5 km/h (3 mph), turn the steering wheel either to left or right 90° or more, and maintain 180° circular drive for the vehicle.

NOTICE:

- **The vehicle direction at the beginning and the end should be 180 ± 5 degrees or less.**
- **While turning do not move the shift lever to the P position. Do not turn the power switch off.**

HINT:

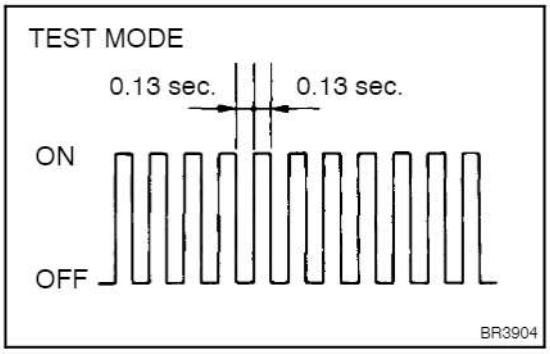
- The turning direction is not important.
- Turning should be completed within 2.0 seconds. However, it is possible to change the vehicle speed, stop or more backward.

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(2) Stop the vehicle and move the "P" position switch into the P position, check that the skid control buzzer sounds for 3 sec.

HINT:

- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (see page 05–898), then perform the sensor check again.
- If the skid control buzzer still won't sound, there is a malfunction in the VSC+ sensor, so check the DTC.
- Drive the vehicle in a 180° circle. At the end of the turn, the direction of the vehicle should be within 180° ± 5° of its start position.
- Do not spin the wheels.



(d) MASTER CYLINDER PRESSURE SENSOR CHECK

(1) Check that the ABS warning light is blinking in TEST MODE.

(2) Leave the vehicle in a stationary condition and the brake pedal in free condition for 1 second or more, and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

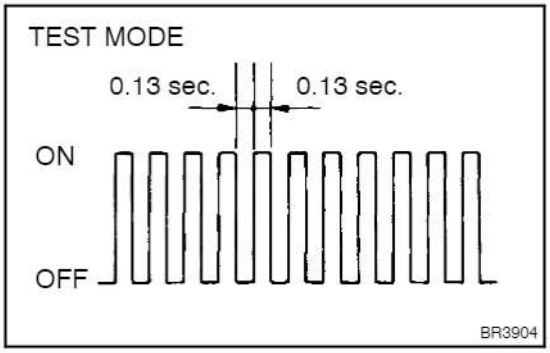
(3) While the vehicle is stopped, release the brake pedal.

(4) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 seconds.

HINT:

- While the ABS warning light is lit, maintain the condition a brake pedal load of approximately 98 N or more is applied.
- During the test mode, the ABS warning light comes on for 3 seconds every time the above pedal operation.
- If the master cylinder pressure sensor check is not completed, randomly depressing the brake pedal will cause the negative pressure to decrease further and the sensor check will be difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, turn the engine idle to make the negative pressure sufficient.
- Strongly depress the brake pedal when the negative pressure is insufficient the brake warning lamp may come on with the fail–safe function.

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(e) SPEED SENSOR CHECK

(1) Check the ABS warning light is blinking of TEST MODE.

(2) Start the sensor signal check.

(3) Drive the vehicle straight forward.
Drive the vehicle at a speed of 45 to 80 km/h (28 to 50 mph) or higher for several seconds and check that the ABS warning light goes off.

Vehicle Speed	Test	Check
0 to 45 km/h (0 to 28 mph)	Low speed test	Response of sensors
45 to 80 km/h (28 to 50 mph)	Middle speed test	Deviations of sensor signal

NOTICE:

- **Before the speed sensor check, the yaw rate sensor, deceleration sensor and master cylinder pressure sensor checks should be completed.**
- **If the sensor check begins with the steering wheel turned or the wheel spin, the speed sensor check may not be completed.**
- **After the warning lamp goes off, driving at 80 km/h (50 mph) or more will cause the test mode codes to be recorded again, before the speed reaches at 80 km/h (50 mph), decelerate and stop the vehicle.**
- **If the sensor check is not completed, the ABS warning lamp blinks even while driving and the ABS does not operate.**

HINT:

If the speed sensor check is completed, the ABS warning lamp does not come on while driving and blinks at test mode when the vehicle stops.

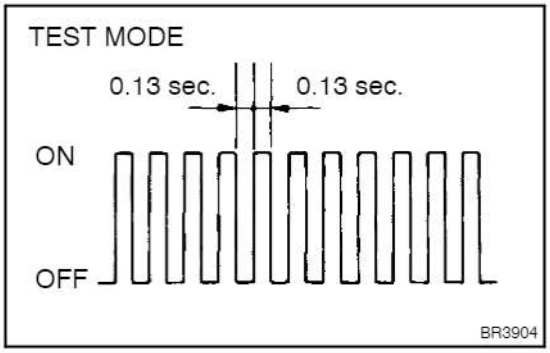
(f) END OF SENSOR CHECK

(1) If the sensor check is completed, the ABS warning lamp blinks (test mode) when the vehicle stops and the warning lamp is off when the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, deceleration sensor, speed sensor and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning lamp blinks even while the vehicle is driving and the ABS does not operate.**
- **If the DTC is detected during the test mode, the ABS warning lamp and VSC warning lamp comes on.**

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(g) READ TEST MODE CODE

(1) Using intelligent tester II, check the DTCs in the test mode. (Refer to the step h)

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTC. Check if the ABS warning lamp and VSC warning lamp are normal.**
- **If only the test mode codes are displayed, perform the test mode again.**
- **If the DTCs or test mode codes are displayed, repair the malfunction area, clear the DTCs and perform the test mode inspection.**

HINT:

- The test mode codes and DTCs are displayed.
- If the ABS is normal, the ABS warning lamp comes on for 0.25 seconds and goes off for 0.25 seconds repeatedly.

(h) DTC of TEST MODE:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Sensor rotor
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Sensor rotor
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Sensor rotor
C1274/74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Sensor rotor
C1275/75	Abnormal change in output voltage of right front speed sensor	Right front sensor rotor
C1276/76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277/77	Abnormal change in output voltage of right rear speed sensor	Right rear sensor rotor
C1278/78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor
C1279/79	Deceleration sensor is faulty	• Yaw rate (Deceleration) sensor • Sensor installation
C1281/81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor
C0371/71	Signal malfunction	Yaw rate sensor (Deceleration sensor)

HINT:

The code in this table are output only in TEST MODE.

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PROBLEM SYMPTOMS TABLE

If there are no DTCs output 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	Suspect Areas	See page
ABS does not operate BA does not operate EBD does not operate	1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit and ground circuit. 3. Speed sensor circuit 4. Check the brake actuator with a intelligent tester II. (Check brake actuator operation using the active test function.) If abnormal, check the hydraulic circuit for leakage. 5. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–782 05–754 05–761 32–62
ABS does not operate efficiently BA does not operate efficiently EBD does not operate efficiently	1. Check the DTC again and make sure that the normal code is output. 2. Speed sensor circuit 3. Stop lamp switch circuit 4. Check the brake actuator with a intelligent tester II. If abnormal, check the hydraulic circuit for leakage. 5. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–754 05–761 05–804 32–62
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	05–874 or 05–879 –
DTC of ABS check cannot be done	1. Check the DTC again and make sure that the normal code is output. 2. TC terminal circuit 3. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–901
Sensor signal check cannot be done	1. TS terminal circuit 2. Skid control ECU	05–905 –
VSC does not operate	1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit and ground circuit. 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Yaw rate (deceleration) sensor circuit 6. Steering sensor circuit 7. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–782 – 05–754 05–761 05–761 05–774
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	05–893 –

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Symptoms	Suspect Areas	See page
DTC of VSC check cannot be done	1. Check the DTC again and make sure that the normal code is output. 2. TC terminal circuit 3. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–901
VSC warning light abnormal	1. Check the DTC again and make sure that the normal code is output. 2. VSC warning circuit 3. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–880 or 05–885
Brake Control warning light abnormal	1. Check the DTC again and make sure that the normal code is output. 2. Brake Control warning circuit 3. If the symptoms still occur even after the above circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU.	05–738 05–868 or 05–873

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05IK8-01

TERMINALS OF ECU

1. CHECK BATTERY VOLTAGE

(a) Measure the battery voltage.
Standard: 10 to 14 V

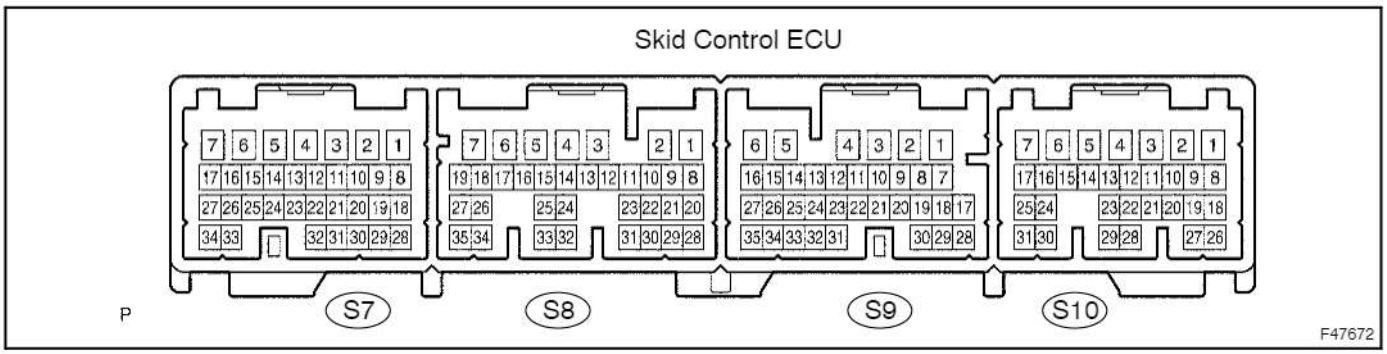
2. SKID CONTROL ECU ASSY INSPECTION

(a) Measure the voltage between each terminal or between each terminal and the body ground.
(b) Connect the intelligent tester II to the DLC3, and check the communication condition with the skid control ECU.
(c) Using an oscilloscope, check that the pulse generates between each terminal or between each terminal and the body ground.

NOTICE:

- **Inspection should be performed from the back of the connector with the connector connected to the skid control ECU.**
- **The voltage between terminals of the brake actuator assy may become 0 V due to the fail safe function when the ECB warning light comes on (malfunctioning).**

SKID CONTROL ECU



HINT: Inspect the ECU from the wire harness side while the connector is connected.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
R1+ (S7–2) – GND (S7–1)	P – W	Main relay power 1	Push start switch ON (READY)	9.1 to 13.6 V
BS1 (S7–3) – GND (S7–1)	B – W	Battery source 1	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	8.8 to 14 V
SMC1 (S7–4) – GND (S7–1)	Y – W	Master cut solenoid 1 output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
+BCTY (S7–5) – GND (S7–1)	V – W	Courtesy power input	Driver door open → close	Approx. 5 sec. 8 to 16 V → Below 1 V
SLAFR– (S7–6) – GND (S7–1)	W – W	FR solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
SLAFR+ (S7–7) – GND (S7–1)	R – W	FR solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)
E (S7–8) – GND (S7–1)	L – W	Pressure sensor ground	Push start switch OFF (READY)	Below 1 Ω
VCM1 (S7–9) – GND (S7–1)	P – W (LHD) B – W (RHD)	Pressure sensor power	Push start switch ON (READY)	4.75 to 5.25 V

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MR1+ (S7–11) – GND (S7–1)	GR – W (LHD) GR – W–B(RHD)	Motor relay power 1	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	8.8 to 14 V
SR1 (S7–12) – GND (S7–1)	L – W	Main relay output 1	Push start switch ON (READY) Approx. 1.5 sec. or more after pushing start switch ON (READY)	Below 1 V
SCSS (S7–13) – GND (S7–1)	BR – W	Stroke simulator cut solenoid output	Push start switch ON (READY) Brake pedal depressed	Below 1.5 V
SLARL+ (S7–15) – GND (S7–1)	L – W	RL solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)
SLRRL+ (S7–16) – GND (S7–1)	W – W	RL solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)
SLRFR+ (S7–17) – GND (S7–1)	Y – W	FR solenoid (+) output	Push start switch ON (READY) After approx. 1.5 sec., brake pedal depressed → released	Pulse generation (see waveform 2)
PRL (S7–18) – GND (S7–1)	G – W	RL pressure sensor input	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V
SG1 (S7–20) – GND (S7–1)	BR – W	Pressure sensor shield ground 1	Push start switch OFF	Below 1 Ω
PACC (S7–21) – GND (S7–1)	W – W	Accumulator pressure sensor input	Push start switch ON (READY) After pump motor operates and stops by pedal operation	3.3 to 4.7 V
FR– (S7–22) – GND (S7–1)	L – W	FR sensor (–) input	Push start switch OFF (READY)	Below 1 Ω
PFR (S7–23) – GND (S7–1)	Y – W	FR pressure sensor input	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V
MR1 (S7–25) – GND (S7–1)	L – W	Motor relay output 1	Push start switch ON (READY) Pump motor is operating	Below 1.5 V
SLRRL– (S7–26) – GND (S7–1)	P – W	RL solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
SLARL– (S7–27) – GND (S7–1)	LG – W	RL solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
MTT (S7–29) – GND (S7–1)	R – W	Motor test input	Push start switch ON (READY) Pump motor is operating	3.5 V or higher
PMC1 (S7–30) – GND (S7–1)	R – W	Master pressure sensor input 1	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V
PCK1 (S7–31) – GND (S7–1)	B – W	Pressure sensor check output 1	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	4.75 to 5.25 V
FR+ (S7–32) – GND (S7–1)	P – W	FR sensor (+) input	Vehicle speed input	Pulse generation (see waveform 3)
SLRFR– (S7–34) – GND (S7–1)	B – W	FR solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
+BI1 (S8–3) – GND (S8–1, 2)	B – W (LHD) B – W–B (RHD)	Main relay power input 1	Push start switch OFF	10 to 14 V

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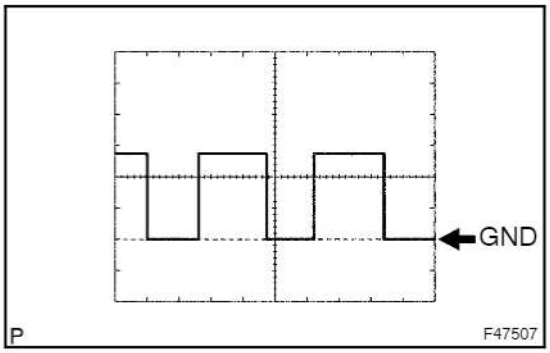
+BO1 (S8–5) – GND (S8–1, 2)	Y – W (LHD) B – W–B (RHD)	Main relay power output 1	Push start switch ON (READY)	8.8 to 14 V
IG1 (S8–7) – GND (S8–1, 2)	B – W (LHD) B – W–B (RHD)	IG1 power	Push start switch ON (READY)	10 to 14 V
RSS (S8–10) – GND (S8–1, 2)	BR – W	Speed sensor shield ground	Push start switch OFF (READY)	Below 1 Ω
BZ (S8–12) – GND (S8–1, 2)	BR – W	Warning buzzer output	Push start switch ON (READY) Buzzer is operating	Below 1 V
STP (S8–14) – GND (S8–1, 2)	R – W (LHD) L – W (RHD)	Stop light switch signal input	Push start switch ON (READY) Brake pedal depressed → released	10 to 12 V → Below 1.5 V
CAN–L (S8–18) – GND (S8–1, 2)	W – W	CAN communication (Send and receive–)	Check DTC using intelligent tester II	CAN communication's DTC is not output
CAN–H (S8–19) – GND (S8–1, 2)	B – W	CAN communication (Send and receive+)	Check DTC using intelligent tester II	CAN communication's DTC is not output
FAIL (S8–20) – GND (S8–1, 2)	P – W	Capacitor communication (Receive)	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 5)
SP1 (S8–22) – GND (S8–1, 2)	V – W	Speed meter output	Vehicle speed input	Pulse generation (see waveform 4)
RL– (S8–27) – GND (S8–1, 2)	B – W	RL sensor (–) input	Push start switch OFF	Below 1 Ω
D/G (S8–28) – GND (S8–1, 2)	W – W	Diagnosis output	Push start switch ON (READY)	9.1 to 13.6 V
ENA (S8–30) – GND (S8–1, 2)	B – W	Capacitor communication (Send)	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 6)
TS (S8–32) – GND (S8–1, 2)	L – W	Sensor diagnosis check input	Push start switch ON (READY)	Below 1.5 V → 9.1 to 13.6 V
VBZ (S8–33) – GND (S8–1, 2)	B – W	Warning buzzer power	Push start switch ON (READY)	9.1 to 13.6 V
RL+ (S8–35) – GND (S8–1, 2)	W – W	RL sensor (+) input	Vehicle speed input	Pulse generation (see waveform 3)
+BO2 (S9–4) – GND (S9–1, 2)	W – W–B	Main relay power output 2	Push start switch ON (READY)	8.8 to 14 V
+BI2 (S9–5) – GND (S9–1, 2)	R – W–B	Main relay power input 2	Push start switch OFF	10 to 14 V
VCSK (S9–6) – GND (S9–1, 2)	B – W–B	Stroke sensor power	Push start switch ON (READY)	3.75 to 4.95 V
SSK (S9–7) – GND (S9–1, 2)	Shielded – W–B	Stroke sensor shield ground	Push start switch OFF	Below 1 Ω
SKG (S9–8) – GND (S9–1, 2)	W – W–B	Stroke sensor ground	Push start switch OFF	Below 1 Ω
PKB (S9–14) – GND (S9–1, 2)	R – W–B	Parking brake signal input	Parking brake applied → released	Below 1.5 V → 9.1 to 13.6 V
SKS1 (S9–21) – GND (S9–1, 2)	R – W–B	Stroke sensor signal input 1	Push start switch ON (READY) Brake pedal released	0.46 to 1.35 V
SKS2 (S9–22) – GND (S9–1, 2)	G – W–B	Stroke sensor signal input 2	Push start switch ON (READY) Brake pedal released	2.56 to 4.35 V
RR– (S9–23) – GND (S9–1, 2)	B – W–B	RR sensor (–) input	Push start switch OFF	Below 1 Ω
RR+ (S9–31) – GND (S9–1, 2)	W – W–B	RR sensor (+) input	Vehicle speed input	Pulse generation (see waveform 3)
SLAFL+ (S10–1) – GND (S10–4)	P – W–B	FL solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)

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SLAFL– (S10–2) – GND (S10–4)	O – W–B	FL solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
SMC2 (S10–3) – GND (S10–4)	LG – W–B	Master cut solenoid 2 output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
IG2 (S10–5) – GND (S10–4)	O – W–B	IG2 power	Push start switch ON (READY)	10 to 14 V
LBL (S10–6) – GND (S10–4)	P – W–B	Brake fluid level switch input	Reservoir level switch OFF → ON	4 to 4.65 → Below 1.5 V
BS2 (S10–7) – GND (S10–4)	P – W–B	Battery source 2	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	8.8 to 14 V
SLRFL+ (S10–8) – GND (S10–4)	Y – W–B	FL solenoid (+) output	Push start switch ON (READY) After approx. 1.5 sec., brake pedal depressed → released	Pulse generation (see waveform 2)
SLARR– (S10–9) – GND (S10–4)	P – W–B	RR solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
SG2 (S10–12) – GND (S10–4)	Shielded – W–B	Pressure sensor shield ground 2	Push start switch OFF	Below 1 Ω
FSS (S10–13) – GND (S10–4)	BR – W–B	Speed sensor shield ground	Push start switch OFF	Below 1 Ω
VCM2 (S10–14) – GND (S10–4)	B – W–B	Pressure sensor power 2	Push start switch ON (READY)	4.75 to 5.25 V
SR2 (S10–15) – GND (S10–4)	V – W–B	Main relay output 2	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1 V
R2+ (S10–17) – GND (S10–4)	Y – W–B	Main relay power 2	Push start switch ON (READY)	9.1 to 13.6 V
SLRRR– (S10–18) – GND (S10–4)	BR – W–B	RR solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V
SLARR+ (S10–19) – GND (S10–4)	V – W–B	RR solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)
SLRRR+ (S10–20) – GND (S10–4)	R – W–B	RR solenoid (+) output	Push start switch ON (READY) Brake pedal depressed approx. 1.5 sec. after pushing start switch ON (READY)	Pulse generation (see waveform 1)
PCK2 (S10–21) – GND (S10–4)	L – W–B	Pressure sensor check output 2	Push start switch ON (READY)	4.75 to 5.25 V
FL– (S10–22) – GND (S10–4)	G – W–B	FL sensor (–) input	Push start switch OFF	Below 1 Ω
PFL (S10–23) – GND (S10–4)	R – W–B	FL pressure sensor input	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V
MR2+ (S10–25) – GND (S10–4)	R – W–B	Motor relay power 2	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	8.8 to Below 14 V
SLRFL– (S10–26) – GND (S10–4)	L – W–B	FL solenoid (–) output	Push start switch ON (READY) Approx. 1.5 sec. after pushing start switch ON (READY)	Below 1.5 V

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PMC2 (S10–27) – GND (S10–4)	W – W–B	Master pressure sensor input 2	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V
FL+ (S10–28) – GND (S10–4)	R – W–B	FL sensor (+) input	Vehicle speed input	Pulse generation (see waveform 3)
E2 (S10–29) – GND (S10–4)	G – W–B	Pressure sensor ground 2	Push start switch OFF	Below 1 Ω
MR2 (S10–30) – GND (S10–4)	G – W–B	Motor relay output 2	Push start switch ON (READY) Pump motor is operating	Below 1.5 V
PRR (S10–31) – GND (S10–4)	Y – W–B	RR pressure sensor input	Push start switch ON (READY) Brake pedal released	0.3 to 0.8 V



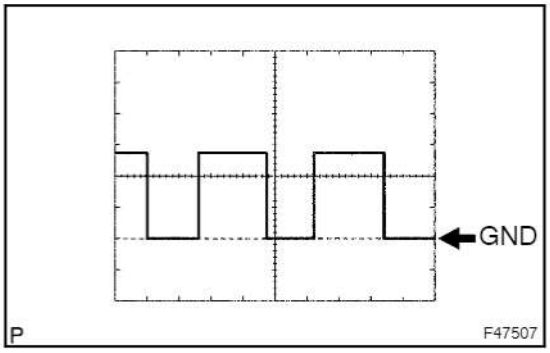
Waveform 1

NOTICE:

Normal waveform is output only when BS 1 and 2 voltages are normal (10 to 14 V).

HINT:

- While driving at approximately 20 km/h (12 mph).
- 5V/DIV, 200 ms/DIV.
- Brake pedal depressed.



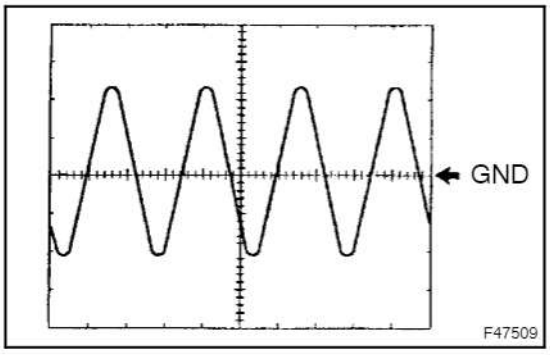
Waveform 2

NOTICE:

Normal waveform is output only when BS 1 and 2 voltages are normal (10 to 14 V).

HINT:

- While driving at approximately 20 km/h (12 mph).
- 5V/DIV, 200 ms/DIV.
- Brake pedal depress → released



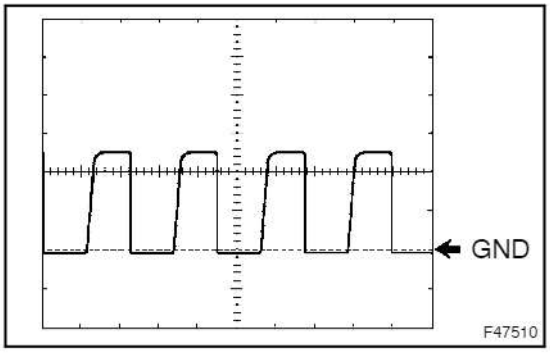
Waveform 3

NOTICE:

As the vehicle speed (tire rotating speed) becomes faster the cycle becomes shorter and the output voltage larger.

HINT:

- 1V/DIV, 2 ms/DIV.
- While driving at approximately 30 km/h (18 mph).



Waveform 4

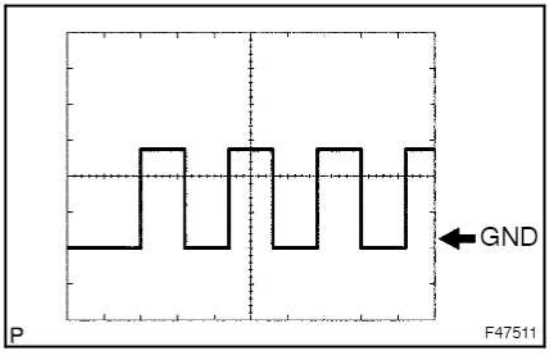
NOTICE:

As the vehicle speed (tire rotating speed) becomes faster the cycle becomes shorter.

HINT:

- 5V/DIV, 50 ms/DIV.
- While driving at approximately 20 km/h (12 mph).

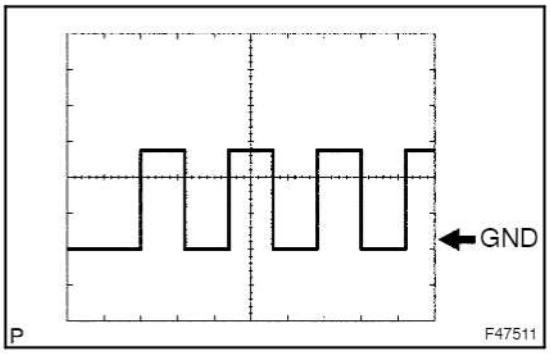
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Waveform 5

HINT:

- 5V/DIV, 200 ms/DIV.
- Power switch ON (READY)



Waveform 6

HINT:

- 5V/DIV, 100 ms/DIV.
- Power switch ON (READY)

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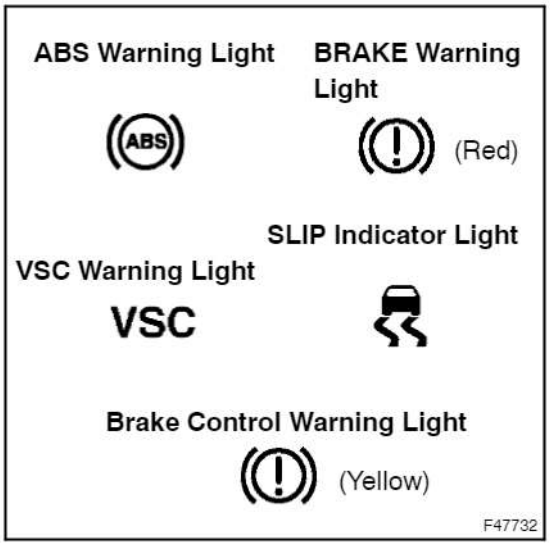
05IK8-01

DIAGNOSIS SYSTEM

1. DIAGNOSIS FUNCTION

On the combination meter, the BRAKE warning light (Red), BRAKE warning light ((Yellow) Brake Control warning light), ABS warning light or VSC warning light come on to inform the driver if trouble occurs in the skid control ECU input signal or actuator system.

If there is trouble in the oil pressure source (pump motor, accumulator) or the vehicle power supply is insufficient, the skid control buzzer sounds to warn the driver.



ABS Warning Light	Comes on when a failure in ABS, EBD or VSC+ occurs
VSC Warning Light	Comes on when a failure in VSC+ occurs
SLIP Indicator Light	Comes on while operating ABS or VSC+
BRAKE Warning Light ((Yellow) Brake Control warning light)	Comes on when a minor failure that does not affect normal driving occurs in the brake control system
BRAKE Warning Light (Red)	Comes on when a failure in the brake control system Comes on when the parking brake is applied or the brake fluid level is low.

2. DIAGNOSIS DISPLAY FUNCTION

DTCs detected by the ECU can be read by connecting the intelligent tester II and performing the read command. The DTC has a detailed code that can be checked on the freeze frame data screen.

3. BRAKE SYSTEM DISPLAY INITIAL CHECK

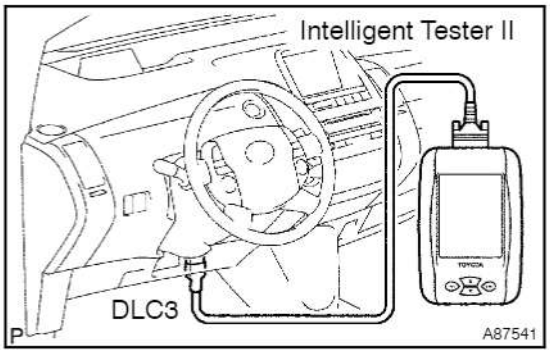
Turn the power switch ON (READY) and check that the ABS warning light, VSC warning light, Brake Control warning light, BRAKE warning light and SLIP indicator light come on, and then go off after approximately 3 seconds.

If any of the lights do not come on, check the bulb and the multiplex communication diagnosis.

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DTC CHECK/CLEAR



1. DTC CHECK (USING INTELLIGENT TESTER II)

(a) Checking DTCs.

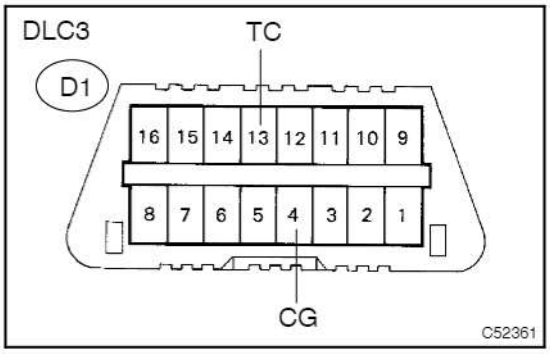
(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch ON (READY).

(3) Read the DTCs following the prompts on the tester screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.



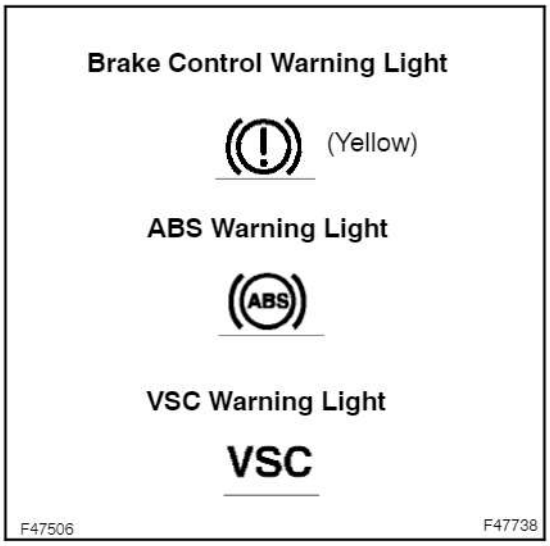
2. DTC CHECK (USING SST CHECK WIRE)

(a) Check DTCs.

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

SST 09843–18040

(2) Turn the power switch ON (READY).



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

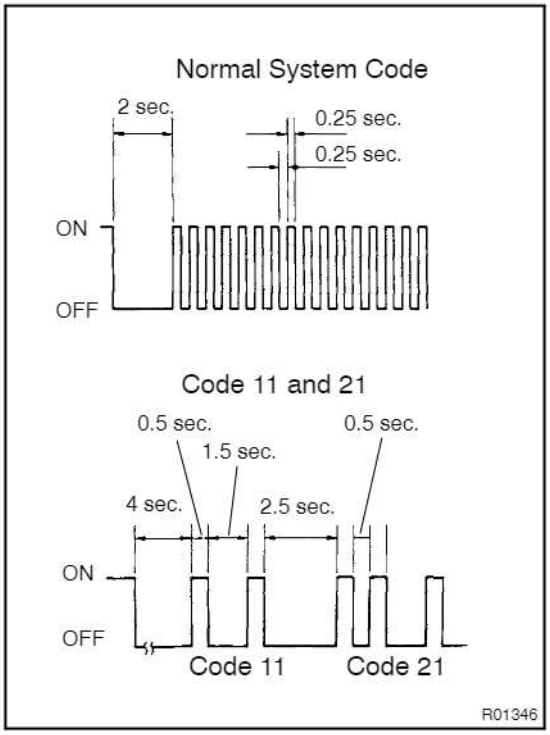
Brake Control warning light	DTC of ECB system
ABS warning light	DTC of ABS system
VSC warning light	DTC of VSC+ system

HINT:

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

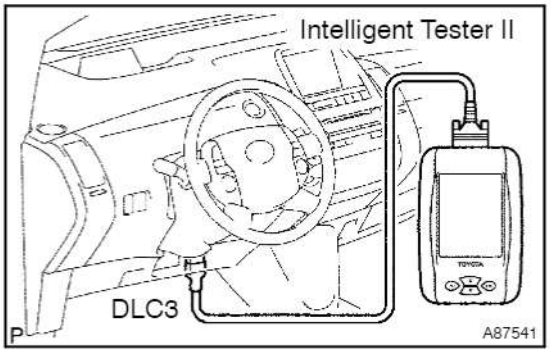
Trouble Area	See page
TC and CG terminal circuit	05–901
Brake Control warning light	05–868
ABS warning light circuit	05–874
VSC warning light circuit	05–880

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- As an example, the blinking patterns for a normal system code and trouble codes 11 and 21 are shown on the left.
  (4) Codes are explained in the code table on page 05–750.
  (5) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display.

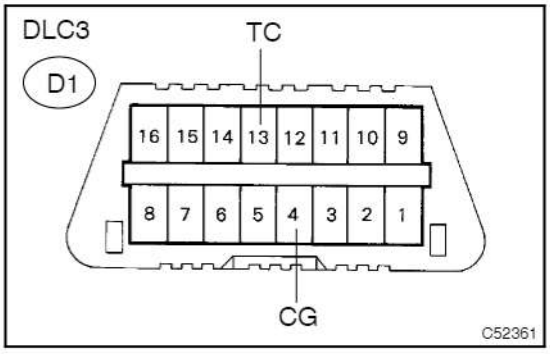
If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascend order.



3. CLEAR DTC (USING INTELLIGENT TESTER II)

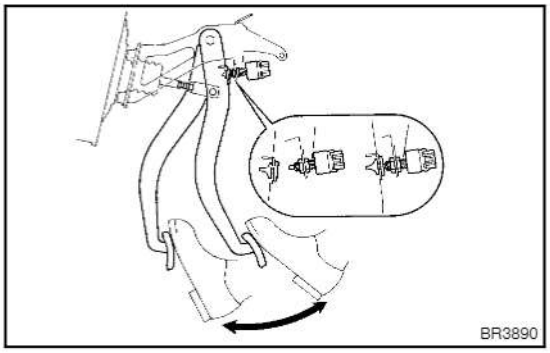
(a) Clearing the DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch ON (READY).
  (3) Operate the intelligent tester II to clear the codes.

HINT:
Refer to the intelligent tester II operator's manual for further details.



4. CLEAR DTC (USING SST CHECK WIRE)

(a) Clear the DTCs using the SST check wire.
  (1) Using SST, connect terminals TC and CG of the DLC3.
  SST 09843–18040
  (2) Turn the power switch ON (READY).



  (3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
  (4) Check that the warning light indicates a normal system code.
  (5) Remove the SST.

HINT:
Clearing the DTCs cannot be performed by removing the battery cable or the ECU–IG fuse.

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5. END OF CHECK/CLEAR

(a) Turn the power switch ON (READY).

(b) Check that the Brake Control warning lamp, ABS warning lamp and VSC warning lamp go off within approximately 3 seconds.

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05IKE-01

FREEZE FRAME DATA OF ABS

1. FREEZE FRAME DATA

HINT:

- Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the power switch has been turned from off to the On position since the last time ABS was activated. However, if the vehicle was stopped or at low speed (7 km/h (4.3 mph) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- Freeze frame data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored when the ABS operated is erased.
- Freeze frame data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) From the display on the tester, select the "FREEZE FRAME DATA".

Intelligent tester II display	Measurement Item	Reference Value
Freeze DTC	Freeze DTC	Min.: 0, Max.: 255
Buzzer	Skid Control Buzzer	ON/OFF
Reservoir Warning SW	Reservoir level warning switch	Reservoir level warning switch ON: ON, OFF: OFF
Parking Brake SW	PKB sw	PKB switch ON: ON, OFF: OFF
Shift Lever Position	Shift SFT Position	• Fail • P, N • R • D (M) • 4 • 3 • 2 • L
VSC/TRC OFF SW	VSC OFF switch	VSC OFF switch ON: ON, OFF: OFF
Stop Light SW	Stop light switch	Stop light switch ON: ON, OFF: OFF
Operated System	SYSTEM	• ABS • VSC (TRC) • BA • HAB • FAIL SAFE • PBA • PB • NO SYS
Number of IG ON	# IG ON	0
Vehicle Speed	Vehicle speed	Speed indicated on speedometer
Steering Angle Sensor	Steering sensor	• Left turn: Increase • Right turn: Drop (Deceleration)
Yaw Rate Sensor	Yaw rate sensor	–128 to 127
Master Cylinder Sensor 1	Master cylinder pressure	0 to 5 V
Pedal Stroke Sensor 1	Stroke sensor	0 to 5.1 V
Throttle Sensor	Throttle position sensor	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 125 deg.

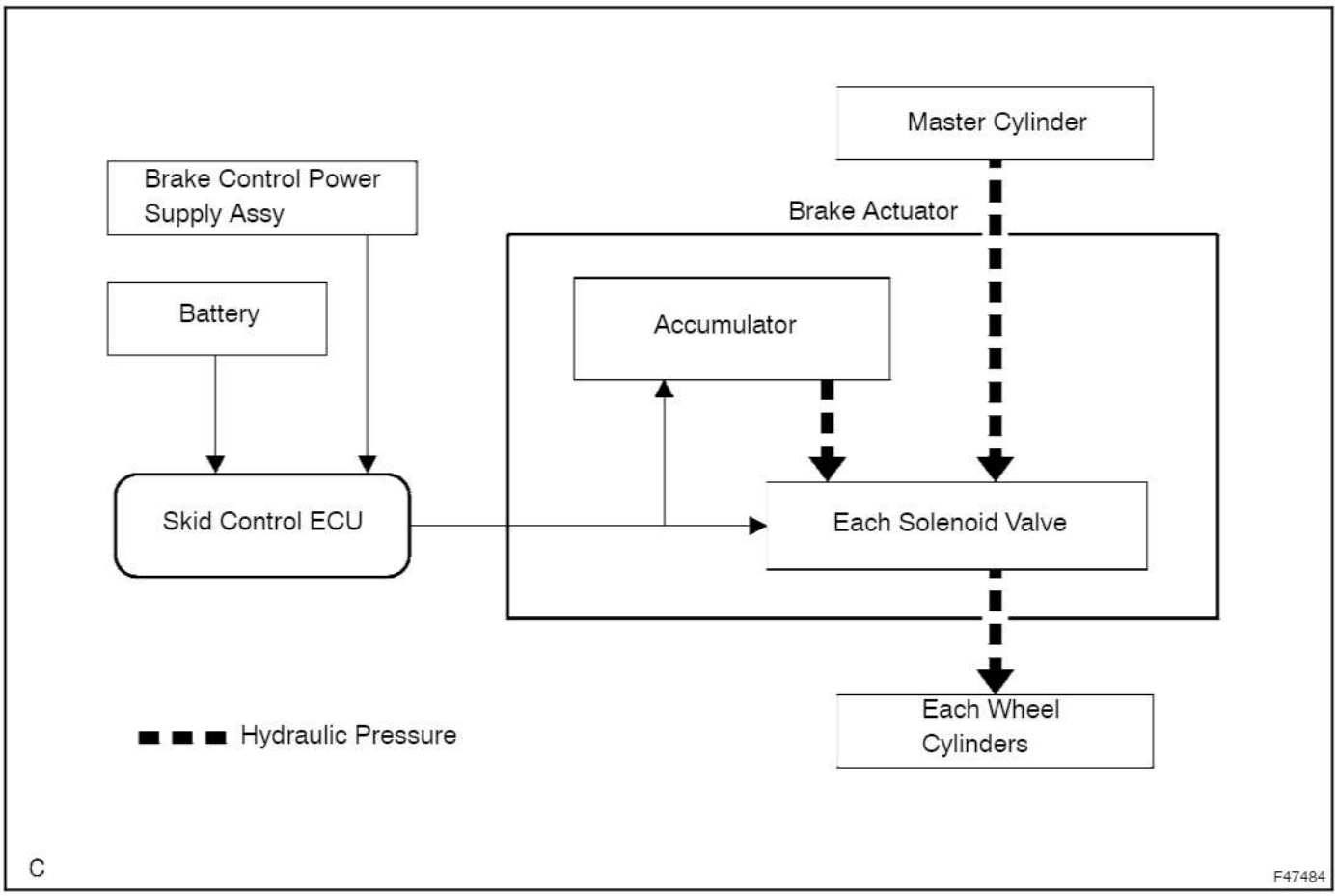
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Intelligent tester II display	Measurement Item	Reference Value
Master Cylinder Grad	Master pressure sensor grade	30 tp 225 Mpa/s
Right And Left G	Right and left G	–1869 to 1869
Back And Forth G	Back and forth G	–1869 to 1869
Vehicle Speed Grad	Vehicle speed grade	–1869 to 1869
FR Wheel Cylinder	FR wheel cylinder pressure sensor	0 to 5 V
FL Wheel Cylinder	FL wheel cylinder pressure sensor	0 to 5 V
RR Wheel Cylinder	RR wheel cylinder pressure sensor	0 to 5 V
RL Wheel Cylinder	RL wheel cylinder pressure sensor	0 to 5 V
ACCUM	Accumulator Pressure Sensor	0 to 5 V
Master Cylinder Sensor 2	Master cylinder pressure sensor 2	0 to 5 V
Pedal Stroke Sensor 2	Stroke sensor 2	0 to 5 V
MTT	MTT	0 to 5 V
IG1 Voltage	Voltage value of IG1	0 to 20 V
IG2 Voltage	Voltage value of IG2	0 to 20 V
BS1	BS1	0 to 20 V
BS2	BS2	0 to 20 V
VM1	VM1	0 to 20 V
VM2	VM2	0 to 20 V
+B1	+B1	0 to 5 V
+B2	+B2	0 to 5 V
FR Target Oil Pressure	Target oil pressure (FR)	0 to 20 V
FL Target Oil Pressure	Target oil pressure (FL)	0 to 20 V
RR Target Oil Pressure	Target oil pressure (RR)	0 to 20 V
RL Target Oil Pressure	Target oil pressure (RL)	0 to 20 V
SLAFR Solenoid Circuit	Current of SLAFR solenoid	0 to 1.5 A
SLAFL Solenoid Circuit	Current of SLAFL solenoid	0 to 1.5 A
SLARR Solenoid Circuit	Current of SLARR solenoid	0 to 1.5 A
SLARL Solenoid Circuit	Current of SLARL solenoid	0 to 1.5 A
SLRFR Solenoid Circuit	Current of SLRFR solenoid	0 to 1.5 A
SLRFL Solenoid Circuit	Current of SLRFL solenoid	0 to 1.5 A
SLRRR Solenoid Circuit	Current of SLRRR solenoid	0 to 1.5 A
SLRRL Solenoid Circuit	Current of SLRRL solenoid	0 to 1.5 A
FR Wheel Speed	Front Right Wheel speed	0 to 255 km/h
FL Wheel Speed	Front Left Wheel speed	0 to 255 km/h
RR Wheel Speed	Rear Right Wheel speed	0 to 255 km/h
RL Wheel Speed	Rear Left Wheel speed	0 to 255 km/h
Capacitor Mode	Capacitor mode	ON: ON, OFF: OFF
ECB Solenoid (SCSS)	SCSS	ON: ON, OFF: OFF
ECB Solenoid (SMC2)	SMC2	ON: ON, OFF: OFF
ECB Solenoid (SMC1)	SMC1	ON: ON, OFF: OFF
Motor Relay 2	Motor relay 2	ON: ON, OFF: OFF
Motor Relay 1	Motor relay 1	ON: ON, OFF: OFF
ECB Main Relay 2	Main relay 2 for ECB	ON: ON, OFF: OFF
ECB Main Relay 1	Main relay 1 for ECB	ON: ON, OFF: OFF
Detail	Detailed code for freeze DTC	0 to 65535

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05IKG–01

FAIL–SAFE CHART



1. FAIL–SAFE FUNCTION

(a) If a malfunction occurs in the skid control ECU, sensor signal, or actuator, rest normally operating parts will maintain brake control.

(b) If the brake control is stopped under such conditions as when trouble occurs with a hydraulic pressure source, the pressure generated in the master cylinder by the driver is applied to the wheel cylinder to ensure braking force.

(c) A power back–up unit is built in as an additional power source to supply stable power to the system.

(d) If the regenerative brake alone does not operate under such conditions as a communication error with the Hybrid ECU, control is switched so that all braking force is generated with the hydraulic pressure brake.

Trouble area	Generated braking force
Skid control ECU	Normally operating parts will control brake and generate braking force
Hydraulic pressure controlling parts	Normally operating parts will control brake and generate braking force
Hydraulic pressure source	Braking force generated by the driver

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05IKL–01

DATA LIST/ACTIVE TEST

HINT:

With the intelligent tester II connected to the DLC3 and the power switch in the ON position, the ECB, ABS and VSC+ data list can be displayed. Follow the prompts on the tester screen to access the DATA LIST.

1. DATA TEST

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
Yaw Rate Sensor	Yaw rate sensor / Min.: –128 deg/s, Max.: 128 deg/s	Min.: –128 deg/s Max.: 128 deg/s	–
Zero Yaw Rate Sensor	Memorized zero value / Min.: –128 deg/s, Max.: 128 deg/s	Min.: –128 degs Max.: 128 deg/s	–
Steering Angle Sensor	Steering sensor / Min.: –1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	–
1 System Brake	1 system brake / OPERATE or BEFORE	OPERATE: During operation	–
Regeneration Cooperation	Regenerate co operation / OPERATE or BEFORE	OPERATE: During operation	–
Air Bleeding Support	Air bleed availability / SUPPORT or NOT SUP	SUPPORT: During support	–
Parking Brake SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	–
Stop Light SW	Stop lamp switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
Test Mode	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	–
Reservoir Warning SW	Reservoir level warning switch / ON or OFF	ON: Reservoir level Normal NG: Reservoir level Low	–
FR Wheel Speed	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
FL Wheel Speed	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
RR Wheel Speed	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
RL Wheel Speed	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
Vehicle Speed	Maximum wheel speed sensor reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual vehicle speed	Speed indicated on speedometer
ECU IG Power Voltage	ECU power supply voltage TOO HIGH / TOO LOW / NORMAL	TOO HIGH: 9.5 V or over NORMAL: 9.5 V TOO LOW: Below 9.5 V	–

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Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
Deceleration Sensor 1	Deceleration sensor 1 reading / min.: −1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
Deceleration Sensor 2	Deceleration sensor 2 reading / min.: −1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
Master Cylinder Sensor 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed
Master Cylinder Sensor 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed
SLAFR Solenoid Circuit	Current of SLAFR solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLAFL Solenoid Circuit	Current of SLAFL solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLARR Solenoid Circuit	Current of SLARR solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLARL Solenoid Circuit	Current of SLARL solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLRFR Solenoid Circuit	Current of SLAFR solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLRFL Solenoid Circuit	Current of SLAFL solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLRRR Solenoid Circuit	Current of SLARR solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
SLRRL Solenoid Circuit	Current of SLARL solenoid / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	–
Pedal Stroke Sensor 1	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.7 to 1.3 V	–
Pedal Stroke Sensor 2	Stroke sensor 2 / min.: 0 V, max.: 5 V	When brake pedal is released: 3.7 to 4.3 V	–
ECB Solenoid (MC2)	MC2 / ON or OFF	ON: Operate	–
ECB Solenoid (MC1)	MC1 / ON or OFF	ON: Operate	–
ECB Solenoid (SSC)	SSC / ON or OFF	ON: Operate	–
Pattern Activation	A pattern drive is under enforcement / ON or OFF	ON: Operate	–
ECB Main Relay 2	Main relay 2 for ECB / ON or OFF	ON: Operate	–
ECB Main Relay 1	Main relay 1 for ECB / ON or OFF	ON: Operate	–
Accumulator Sensor 1	Accumulator pressure sensor 1 / min.: 0 V, max.: 5 V	Specified value: 3.2 to 4.0 V	–
FR Wheel Cylinder	Front Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	–
FL Wheel Cylinder	Front Left pressure sensor / min. 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	–
RR Wheel Cylinder	Rear Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	–
RL Wheel Cylinder	Rear Left pressure sensor / min. 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	–
Motor Relay 2	Motor relay 2 / ON or OFF	ON: Motor relay ON	–
Motor Relay 1	Motor relay 1 / ON or OFF	ON: Motor relay ON	–
VSC Existence	Existance of VSC / WITH or WITHOUT	WITH: WITH VSC+ System	–

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Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
Two Freeze Frames	There is two or more frame for freeze frame data / YES or NO	YES: There are two or more freeze frame data	–
FR Regenerative Request	Regenerative request torque (FR) / min.: 0 N·m, max.: 4080 N·m	ECB is not operate: 0 N·m	–
FL Regenerative Request	Regenerative request torque (FL) / min.: 0 N·m, max.: 4080 N·m	ECB is not operate: 0 N·m	–
RR Regenerative Request	Regenerative request torque (RR) / min.: 0 N·m, max.: 4080 N·m	–	–
RL Regenerative Request	Regenerative request torque (RL) / min.: 0 N·m, max.: 4080 N·m	–	–
FR Speed Open	FR speed sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
FL Speed Open	FL speed sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
RR Speed Open	RR speed sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
RL Speed Open	RL speed sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Yaw Rate Open	Yaw rate sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Deceleration Open	Deceleration sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Steering Open	Steering sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Master Cylinder 1 Open	Master cylinder pressure sensor 1 open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Master Cylinder 2 Open	Master cylinder pressure sensor 2 open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Pedal Stroke 1 Open	Stroke sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
FR Wheel Cylinder Open	FR wheel cylinder pressure sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
FL Wheel Cylinder Open	FL wheel cylinder pressure sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
RR Wheel Cylinder Open	RR wheel cylinder pressure sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
RL Wheel Cylinder Open	FR wheel cylinder pressure sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–

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Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
HV Open	HV communication open detection / OPN–DET or NORMAL	NORMAL: Normal condition	–
Accumulator Open	Accumulator pressure sensor open detection	NORMAL: Normal condition	–
Buzzer	Buzzer / ON or OFF	ON: Operate	–
Reservoir Warning SW	Reservoir level warning switch / ON or OFF	ON: Operate	–
Shift Lever Position	Shift position / FAIL / L / 2 / 3 / 4 / D (M) / R / P.N	–	
Stop Light SW	Stop light switch / ON or OFF	ON: Operate	–
Operated System	SYSTEM / ABS / VSC (TRAC) / BA / HAB / FAIL SAFE / PB / NOSYS	–	–
Number of IG ON	# IG ON / 0 – 31	0	–
Steering Angle Sensor	Steering sensor / Min.: –1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	–
Yaw Rate Sensor	Yaw rate sensor/ Min.: –128 deg/s, Max.: 128 deg/s	Min.: –128 deg/s Max.: 128 deg/s	–
Master Cylinder Sensor 1	Master cylinder pressure / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
Pedal Stroke Sensor 1	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is relesed (SKS1): 1.5 to 0.7 V When brake pedal is relesed (SKS2): 4.3 to 3.7 V	–
Throttle Sensor	Throttle position sensor / min.: 0 deg, max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	–
Master Cylinder Grade	Master pressure sensor grade / min.: –30Mpa/s, max.: 225 Mpa/s	When brake pedal is released: 0 MPa	–
Right And Left G	Right and left G / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	–
Back And Forth G	Back and forth G / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	–
Vehicle Speed Grade	Vehicle speed grade /min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	–

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester II allows the relay and actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time.

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

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (READY).

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

HINT:

Power switch must be turned to the ON position to proceed to the Active Test using the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS Warning Light	Turns ABS warning light ON / OFF	Observe combination meter
VSC Warning Light	Turns VSC warning light ON / OFF	Observe combination meter
Slip Indicator Light	Turns SLIP indicator light ON / OFF	Observe combination meter
Brake Warning Light	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC H/B Warning Buzzer	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard
ECB Indicator Light	Turns Brake Control warning light ON / OFF	Observe combination meter
ECB Main Relay 1	Turns MAIN RELAY 1 ON / OFF	Operation of solenoid (clicking sound) can be heard
ECB Main Relay 2	Turns MAIN RELAY 2 ON / OFF	Operation of solenoid (clicking sound) can be heard
Master Cut Valve 1	Turns Master cut valve 1 activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Master Cut Valve 2	Turns Master cut valve 2 activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Motor Relay 1	Turns MOTOR RELAY 1 ON / OFF	Operation of solenoid (clicking sound) can be heard
Motor Relay 2	Turns MOTOR RELAY 2 ON / OFF	Operation of solenoid (clicking sound) can be heard
ECB Invalid	Turns ECB invalid ON / OFF	Operation of solenoid (clicking sound) can be heard
Actuator Air Bleeding Pattern	Actuator air bleeding pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Stroke Simulator Cut Valve Pattern	Stroke simulator cut valve pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Power Supply Air Bleeding Pattern 1	Power supply air bleeding pattern activation 1 ON / OFF	Operation of solenoid (clicking sound) can be heard
Power Supply Air Bleeding Pattern 2	Power supply air bleeding pattern activation 2 ON / OFF	Operation of solenoid (clicking sound) can be heard

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Item	Vehicle Condition / Test Details	Diagnostic Note
RL Wheel Air Bleeding Pattern	RL wheel air bleeding pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard
RR Wheel Air Bleeding Pattern	RR wheel air bleeding pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Accumulator Zero Down	Accumulator zero down activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Pump Check Pattern	Pump check pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard
Drain System Air Bleeding Pattern	Drain system air bleeding pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard

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05IKN–01

DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective "DTC No." in the DTC chart.

DTC chart of ABS:

DTC No. (See page)	Detection Item	Trouble Area
C0200/31 (05–754)	Right front wheel speed sensor signal malfunction	• Right front speed sensor • Speed sensor circuit • Sensor rotor • Sensor installation
C0205/32 (05–754)	Left front wheel speed sensor signal malfunction	• Left front speed sensor • Speed sensor circuit • Sensor rotor • Sensor installation
C0210/33 (05–761)	Right rear wheel speed sensor signal malfunction	• Right rear speed sensor • Speed sensor circuit • Sensor rotor • Sensor installation
C0215/34 (05–761)	Left rear wheel speed sensor signal malfunction	• Left rear speed sensor • Speed sensor circuit • Sensor rotor • Sensor installation
C1235/35 (05–778)	Metal stick to speed sensor (FR)	• Right front speed sensor • Speed sensor circuit • Sensor installation
C1236/36 (05–778)	Metal stick to speed sensor (FL)	• Left front speed sensor • Speed sensor circuit • Sensor installation
C1238/38 (05–778)	Metal stick to speed sensor (RR)	• Right rear speed sensor • Speed sensor circuit • Sensor installation
C1239/39 (05–778)	Metal stick to speed sensor (RL)	• Left rear speed sensor • Speed sensor circuit • Sensor installation
C1243/43 (05–769)	Malfunction in deceleration sensor (constant output)	• Yaw rate (deceleration) sensor • Skid control ECU
C1244/44 (05–769)	Open or short circuit in deceleration sensor circuit	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor installation • Zero point calibration not done • Skid control ECU
C1245/45 (05–769)	Malfunction in deceleration sensor	• Yaw rate (deceleration) sensor • Zero point calibration not done • Skid control ECU
C1381/97 (05–769)	Malfunction in power supply voltage of yaw/deceleration sensor	• Yaw rate (deceleration) sensor circuit • Harness and connector • Skid control ECU

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(1) Drive the vehicle at the vehicle speed of 31 mph (50 km/h) and keep depressing the brake pedal strongly for approximately 3 seconds.
(2) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
(3) Clear the DTC (see page 05–738)

HINT:
In some cases, the intelligent tester II cannot be used when ABS warning light remains on.

DTC chart of VSC+:

DTC No. (See page)	Detection Item	Trouble Area
C1210/36 (05–769)	Zero point calibration of yaw rate sensor undone	• Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal.)
C1231/31 (05–774)	Malfunction in steering angle sensor	• Steering angle sensor • Skid control ECU
C1232/32 (05–769)	Malfunction in deceleration sensor	• Yaw rate (deceleration) sensor • Skid control ECU
C1234/34 (05–769)	Malfunction in yaw rate sensor	• Yaw rate (deceleration) sensor
C1310/51 (05–820)	Malfunction in HV system	• Hybrid control system (VSC, TRC system)
C1336/39 (05–769)	Zero point calibration of deceleration sensor undone	• Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal.)

DTC chart of ECB:

DTC No. (See page)	Detection Item	Trouble Area
C1202/68 (05–766)	Brake fluid level low / Open circuit in brake fluid level warning switch circuit	• Brake fluid level • Brake fluid level warning switch • Harness and connector • Skid control ECU
C1241/41 (05–782)	Low battery positive voltage or abnormally high battery positive voltage	• ABS No.1 relay • ABS No.2 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system
C1242/42 (05–782)	Open circuit in IG2 circuit	• ABS No.1 relay • ABS No.2 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system
C1246/46 (05–791)	Malfunction in master cylinder pressure sensor	• Brake actuator assy • Skid control ECU • Harness and connector
C1247/47 (05–798)	Malfunction in stroke sensor	• Brake pedal stroke sensor • Skid control ECU • Harness and connector

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C1249/49 (05–804)	Open circuit in stop light switch circuit	• Stop lamp switch • Stop lamp switch circuit • Stop lamp bulb
C1252/52 (05–810)	Hydro–booster pump motor malfunction	• Brake actuator assy
C1253/53 (05–810)	Hydro–booster pump motor relay malfunction	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1256/57 (05–818)	Accumulator low pressure malfunction	• Brake actuator assy (accumulator pressure, accumulator pressure sensor, pump motor)
C1259/58 (05–820)	HV system regenerative malfunction	• Hybrid control system
C1300/– (05–821)	Malfunction in ECU	• Skid control ECU
C1311/11 (05–822)	Open circuit in main relay 1	• ABS No.1 relay • Skid control ECU • Harness and connector
C1312/12 (05–822)	Short circuit in main relay 1	• ABS No.1 relay • Skid control ECU • Harness and connector
C1313/13 (05–822)	Open circuit in main relay 2	• ABS No.2 relay • Skid control ECU • Harness and connector
C1314/14 (05–822)	Short circuit in main relay 2	• ABS No.2 relay • Skid control ECU • Harness and connector
C1315/31 (05–830)	Changeover solenoid malfunction(SMC1)	• Brake actuator assy (SMC1) • Skid control ECU • Harness and connector
C1316/32 (05–830)	Changeover solenoid malfunction(SMC2)	• Brake actuator assy (SMC2) • Skid control ECU • Harness and connector
C1319/35 (05–838)	Changeover solenoid malfunction(SCSS)	• Stroke simulator • Skid control ECU • Harness and connector
C1341/62 (05–842)	Malfunction in hydraulic system(FR)	• Fluid leakage • Brake actuator assy • Disc rotor
C1342/63 (05–842)	Malfunction in hydraulic system(FL)	• Fluid leakage • Brake actuator assy • Disc rotor
C1343/64 (05–842)	Malfunction in hydraulic system(RR)	• Fluid leakage • Brake actuator assy • Disc rotor
C1344/65 (05–842)	Malfunction in hydraulic system(RL)	• Fluid leakage • Brake actuator assy • Disc rotor
C1345/66 (05–850)	Not learning linear valve offset abnormality	• Initialization of linear solenoid valve and calibration undone
C1352/21 (05–830)	Increasing pressure solenoid malfunction(FR)	• Brake actuator assy • Skid control ECU • Harness and connector

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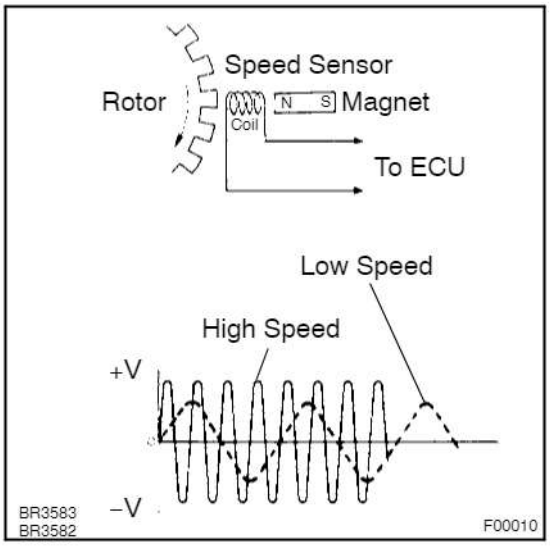
C1353/23 (05–830)	Increasing pressure solenoid malfunction(FL)	• Brake actuator assy • Skid control ECU • Harness and connector
C1354/25 (05–830)	Increasing pressure solenoid malfunction(RR)	• Brake actuator assy • Skid control ECU • Harness and connector
C1355/27 (05–830)	Increasing pressure solenoid malfunction(RL)	• Brake actuator assy • Skid control ECU • Harness and connector
C1356/22 (05–830)	Decreasing pressure solenoid malfunction(FR)	• Brake actuator assy • Skid control ECU • Harness and connector
C1357/24 (05–830)	Decreasing pressure solenoid malfunction(FL)	• Brake actuator assy • Skid control ECU • Harness and connector
C1358/26 (05–830)	Decreasing pressure solenoid malfunction(RR)	• Brake actuator assy • Skid control ECU • Harness and connector
C1359/28 (05–830)	Decreasing pressure solenoid malfunction(RL)	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61 (05–791)	Malfunction in W/C pressure sensor	• Brake actuator assy • Skid control ECU • Harness and connector
C1365/54 (05–851)	Malfunction in ACC pressure sensor	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU
C1368/67 (05–850)	Linear valve offset malfunction	• Initialization of linear solenoid valve and calibration undone • Skid control ECU
C1377/43 (05–856)	Capacitor malfunction	• Brake control power supply • Harness and connector • ABS No.1 fuse • ABS No.2 fuse • ABS No.3 fuse • Apply high voltage
C1378/44 (05–863)	Capacitor communication circuit malfunction	• Harness and connector • Skid control ECU
C1391/69 (05–867)	Abnormal leak of ACC PRESS	• Fluid leakage • Brake actuator assy
C1392/48 (05–798)	Un–correction of a zero point of the stroke sensor	• Brake pedal stroke sensor zero point calibration undone (initialization of linear solenoid valve and calibration undone) • Skid control ECU

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DTC	C0200/31	RIGHT FRONT SPEED SENSOR CIRCUIT

DTC	C0205/32	LEFT FRONT SPEED SENSOR CIRCUIT

CIRCUIT DESCRIPTION



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

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.

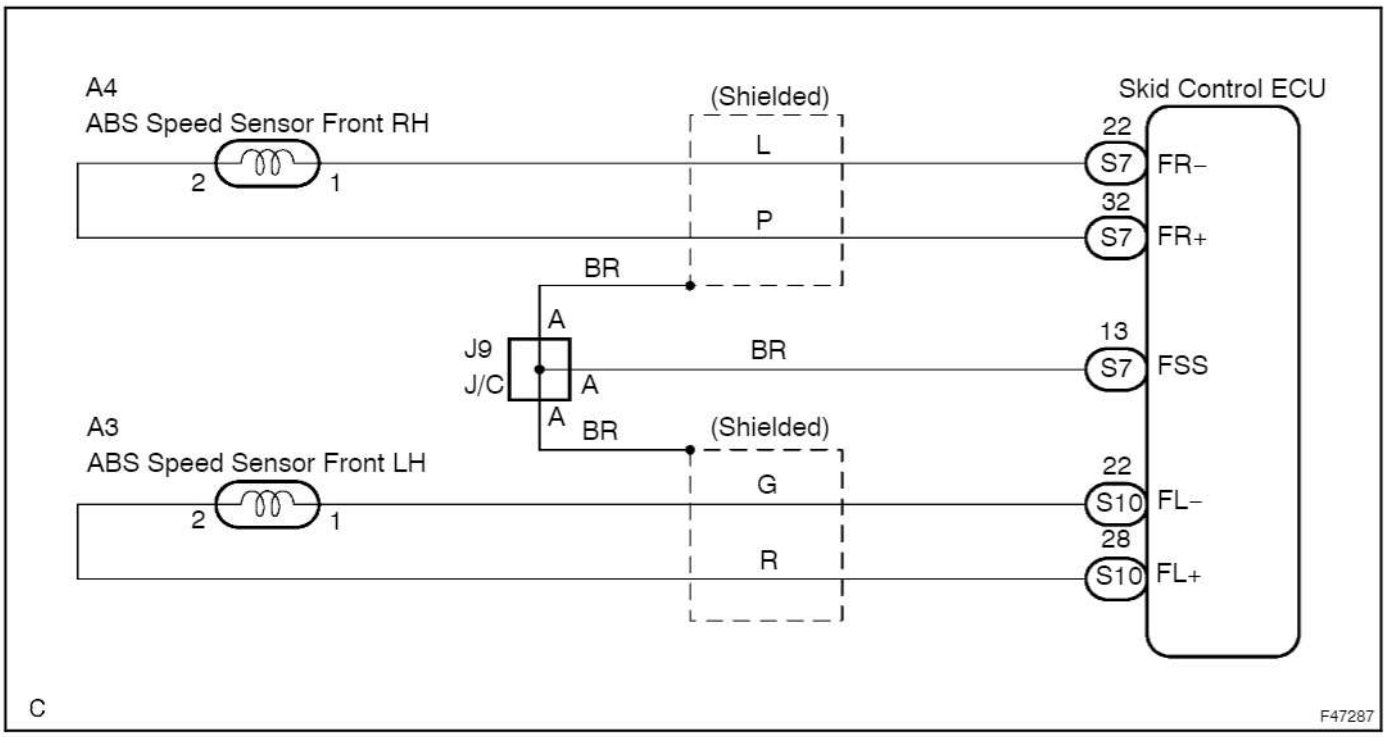
DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	• Speed of a malfunctioning wheel is 0 km/h (0 mph) for at lease 15 sec. when vehicle speed is 10 km/h (6 mph) or more. • Speed of the slowest wheel is less than 1/7th of the 2nd slowest wheel for at least 15 sec. when vehicle speed is 10 km/h (6 mph) or more. • Abnormal high wheel speed pulse is input for at least 15 sec. • Abnormal high wheel speed pulse is input at least 7 times when ECU is on. • Speed sensor pulse signal is instantly cut 7 times or more. • Speed sensor signal line is open for at least 0.5 sec.	• Right front and left front speed sensor • Each speed sensor circuit • Sensor rotor • Sensor installation

HINT:

- DTC C0200/31 is for the right front speed sensor.
- DTC C0205/32 is for the left front speed sensor.
- The BRAKE warning light comes on when speed sensor malfunctions are detected in two or more wheels.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MOMENTARY INTERRUPTION)

(a) Using the intelligent tester II, check for any momentary interruption in the wire harness and connector corresponding to a DTC (see page 05–719).

Item	Measurement Item / Range (Display)	Normal Condition
FR Speed Open	FR speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition
FL Speed Open	FL speed sensor open detection / OPEN or NORMAL	NORMAL : Normal condition

OK:

There are no momentary interruptions.

HINT:

Perform the above inspection before removing the sensor and connector.

NG → **Go to step 5**

OK

2	READ VALUE OF INTELLIGENT TESTER II(FRONT SPEED SENSOR)

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (READY).

(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
FR Wheel Speed	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
FL Wheel Speed	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester II and the speed value displayed on the speedometer when driving the vehicle.

OK:

There is almost no difference from the displayed speed value.

HINT:

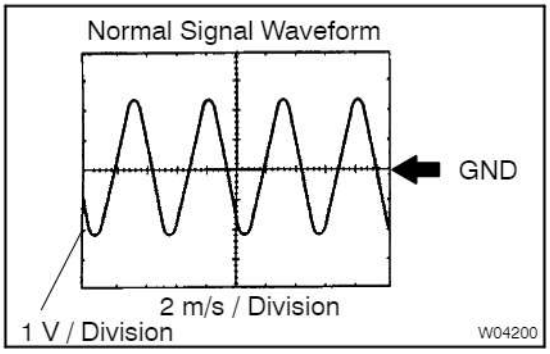
There is tolerance of ± 10 % in the speedometer indication.

NG → **Go to step 4**

OK

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3	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminal FR+ – FR– or FL+ – FL– of the skid control ECU.

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

OK:

A waveform as shown in a figure should be output.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 6

OK

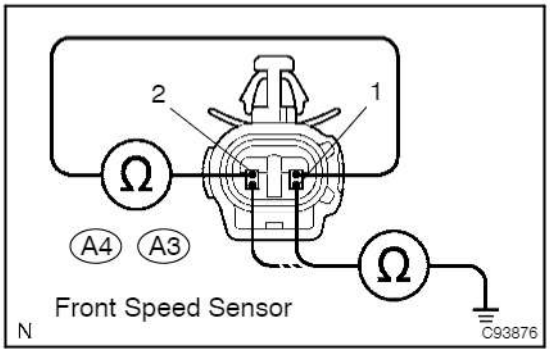
REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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4 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the connector's locking part and connecting part of the connector A3 or A4.

(b) Disconnect the speed sensor connector.

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

Standard:

LH:

Tester Connection	Specified Condition
A3–2 (FL+) – A3–1 (FL–)	1.4 to 1.8 kΩ

RH:

Tester Connection	Specified Condition
A4–2 (FR+) – A4–1 (FR–)	1.4 to 1.8 kΩ

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

Standard:

LH:

Tester Connection	Specified Condition
A3–1 (FL–) – Body ground	10 kΩ or higher
A3–2 (FL+) – Body ground	10 kΩ or higher

RH:

Tester Connection	Specified Condition
A4–1 (FL–) – Body ground	10 kΩ or higher
A4–2 (FL+) – Body ground	10 kΩ or higher

NOTICE:

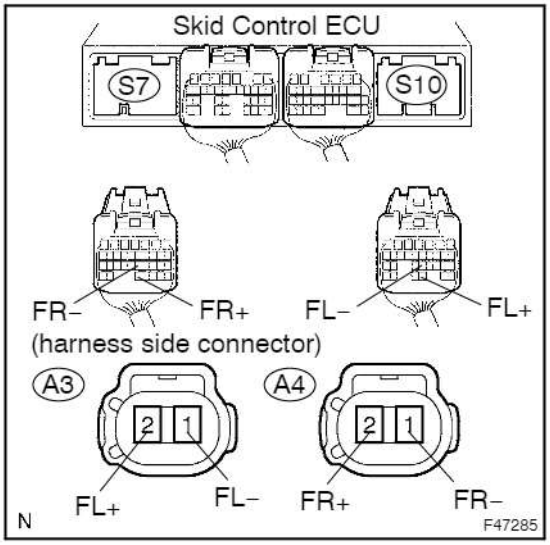
Check the speed sensor signal after replacement (see page 05–724).

NG → **REPLACE FRONT SPEED SENSOR (SEE PAGE 32–75)**

OK

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5	CHECK HARNESS AND CONNECTOR(FRONT SPEED SENSOR – SKID CONTORL ECU)



(a) Disconnect the skid control ECU connector and the front speed sensor connector.

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

Standard:

LH:

Tester Connection	Specified Condition
A3–1 (FL–) – S10–22 (FL–)	Below 1 Ω
A3–2 (FL+) – S10–28 (FL+)	Below 1 Ω

RH:

Tester Connection	Specified Condition
A4–1 (FR–) – S7–22 (FR–)	Below 1 Ω
A4–2 (FR+) – S7–32 (FR+)	Below 1 Ω

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

Standard:

LH:

Tester Connection	Specified Condition
A3–2 (FL+) – Body ground	10 kΩ or higher
A3–1 (FL–) – Body ground	10 kΩ or higher

RH:

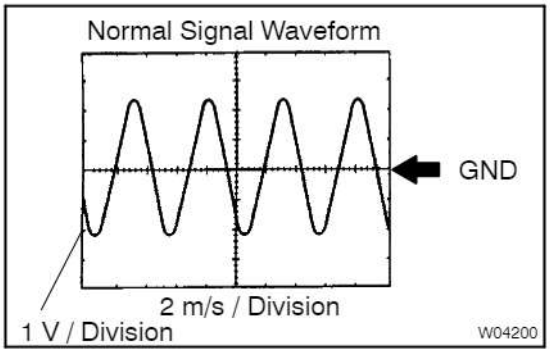
Tester Connection	Specified Condition
A4–2 (FR+) – Body ground	10 kΩ or higher
A4–1 (FR–) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminals FR+ – FR– or FL+ – FL– of the skid control ECU.

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

OK:

A waveform as shown in a figure should be output.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 7**

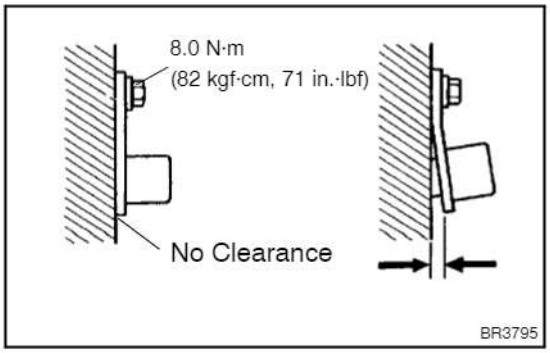
OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

7	INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.

OK:

- **There is no clearance between the sensor and front steering knuckle.**
- **The installation bolt is tightened properly.**

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

Check the speed sensor signal after the replacement (see page 05–724).

NG → **REPLACE FRONT SPEED SENSOR (SEE PAGE 32–75)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C0210/33	RIGHT REAR SPEED SENSOR CIRCUIT

DTC	C0215/34	LEFT REAR SPEED SENSOR CIRCUIT

CIRCUIT DESCRIPTION

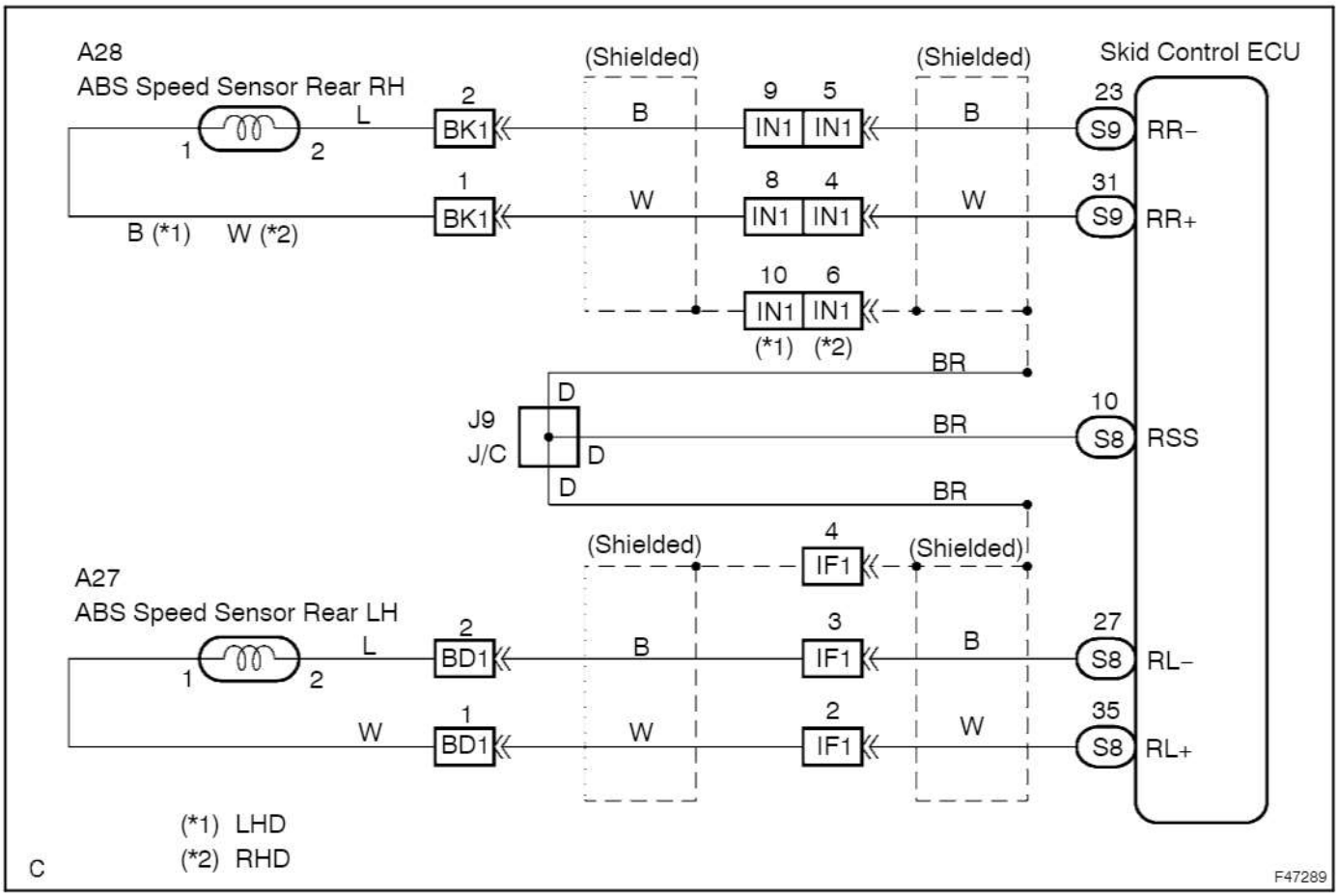
Refer to DTC C0200/31, C0205/32 on page 05–754.

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	• Speed of a malfunctioning wheel is 0 km/h (0 mph) for at least 15 sec. when vehicle speed is 10 km/h (6 mph) or more. • Speed of the slowest wheel is less than 1/7th of the 2nd slowest wheel for at least 15 sec. when vehicle speed is 10 km/h (6 mph) or more. • Abnormal high wheel speed pulse is input for at least 15 sec. • Abnormal high wheel speed pulse is input at least 7 times when ECU is on. • Speed sensor pulse signal is instantly cut 7 times or more. • Speed sensor signal line is open for at least 0.5 sec.	• Right rear and left rear speed sensor • Each speed sensor circuit • Sensor rotor • Sensor installation • Skid control ECU

HINT:

- DTC C0210/33 is for the right rear speed sensor.
- DTC C0215/34 is for the left rear speed sensor.
- The BRAKE warning light comes on when speed sensor malfunctions are detected in two or more wheels.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MOMENTARY INTERRUPTION)

(a) Using the intelligent tester II, check for any momentary interruption in the wire harness and connector corresponding to a DTC (see page 05–719).

Item	Measurement Item / Range (Display)	Normal Condition
RR Speed Open	RR speed sensor open detection / OPEN or NORMAL	NORMAL: Normal condition
RL Speed Open	RL speed sensor open detection / OPEN or NORMAL	NORMAL: Normal condition

OK:

There are no momentary interruption.

HINT:

Perform the above inspection before removing the sensor and connector.

NG → **Go to step 5**

OK

2	READ VALUE OF INTELLIGENT TESTER II(REAR SPEED SENSOR)

(a) Connect the intelligent tester II to the DLC3.

(b) Start the engine.

(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
RL Wheel Speed	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
RR Wheel Speed	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed by the intelligent tester II and the speed value displayed on the speedometer when driving the vehicle.

OK:

There is almost no difference in the displayed speed value.

HINT:

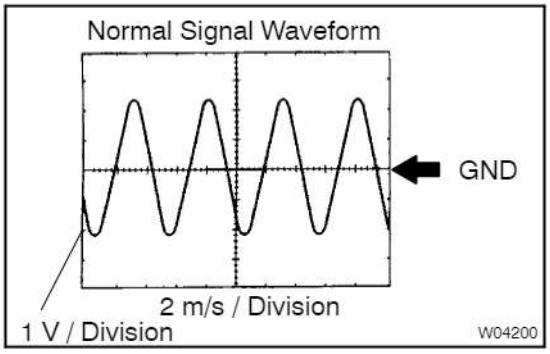
There is tolerance of ± 10 % in the speedometer indication.

NG → **Go to step 4**

OK

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3	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminals RR+ – RR– or RL+ – RL– of the skid control ECU.

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

OK:

A waveform as shown in a figure should be output.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 7

OK

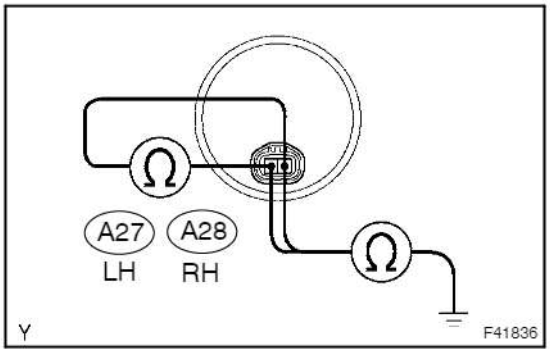
REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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4 INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 – 2	1.04 to 1.30 kΩ

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

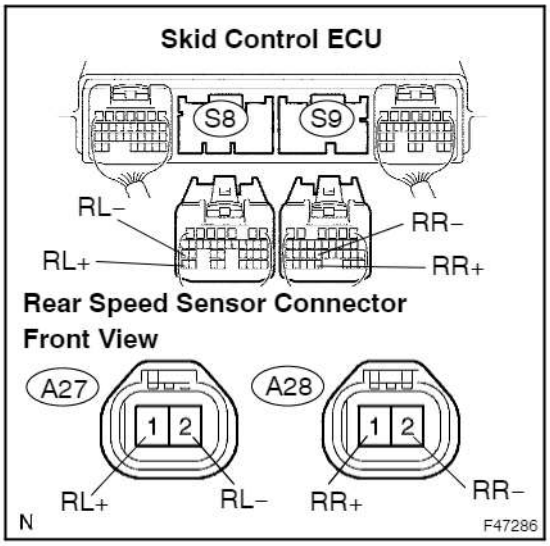
Standard:

Tester Connection	Specified Condition
1 – Body ground	10 kΩ or higher
2 – Body ground	10 kΩ or higher

NG → **REPLACE REAR SPEED SENSOR**

OK

5 CHECK HARNESS AND CONNECTOR(REAR SPEED SENSOR – SKID CONTORL ECU)



(a) Disconnect the skid control ECU connector and rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
A27–1 (RL+) – S8–35 (RL+)	Below 1 Ω
A27–2 (RL–) – S8–27 (RL–)	Below 1 Ω

RH:

Tester Connection	Specified Condition
A28–1 (RR+) – S9–31 (RR+)	Below 1 Ω
A28–2 (RR–) – S9–23 (RR–)	Below 1 Ω

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

Standard:

LH:

Tester Connection	Specified Condition
A27–1 (RL+) – Body ground	10 kΩ or higher
A27–2 (RL–) – Body ground	10 kΩ or higher

RH:

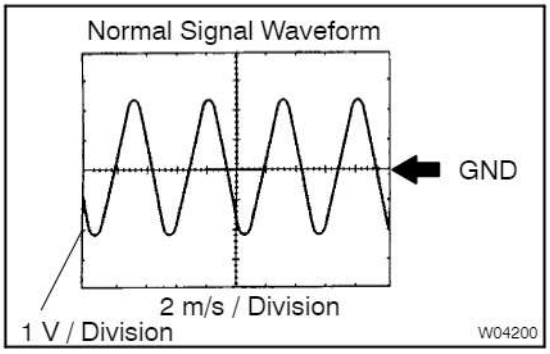
Tester Connection	Specified Condition
A28–1 (RR+) – Body ground	10 kΩ or higher
A28–2 (RR–) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminals RR+ – RR– or RL+ – RL– of the skid control ECU.

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

OK:

A waveform as shown in a figure should be output.

HINT:

- As vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 7**

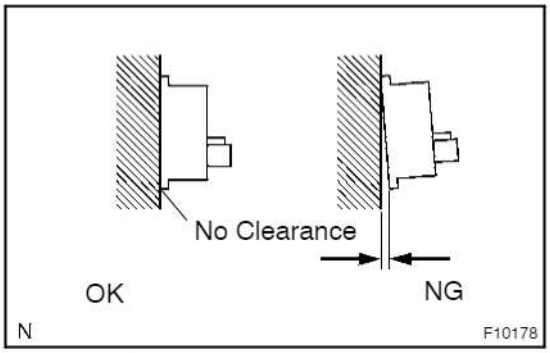
OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

7 INSPECT REAR SPEED SENSOR INSTALLATION



(a) Check the sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

NOTICE:

Check the speed sensor signal after the replacement (see page 05–724).

NG → **REPLACE REAR SPEED SENSOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

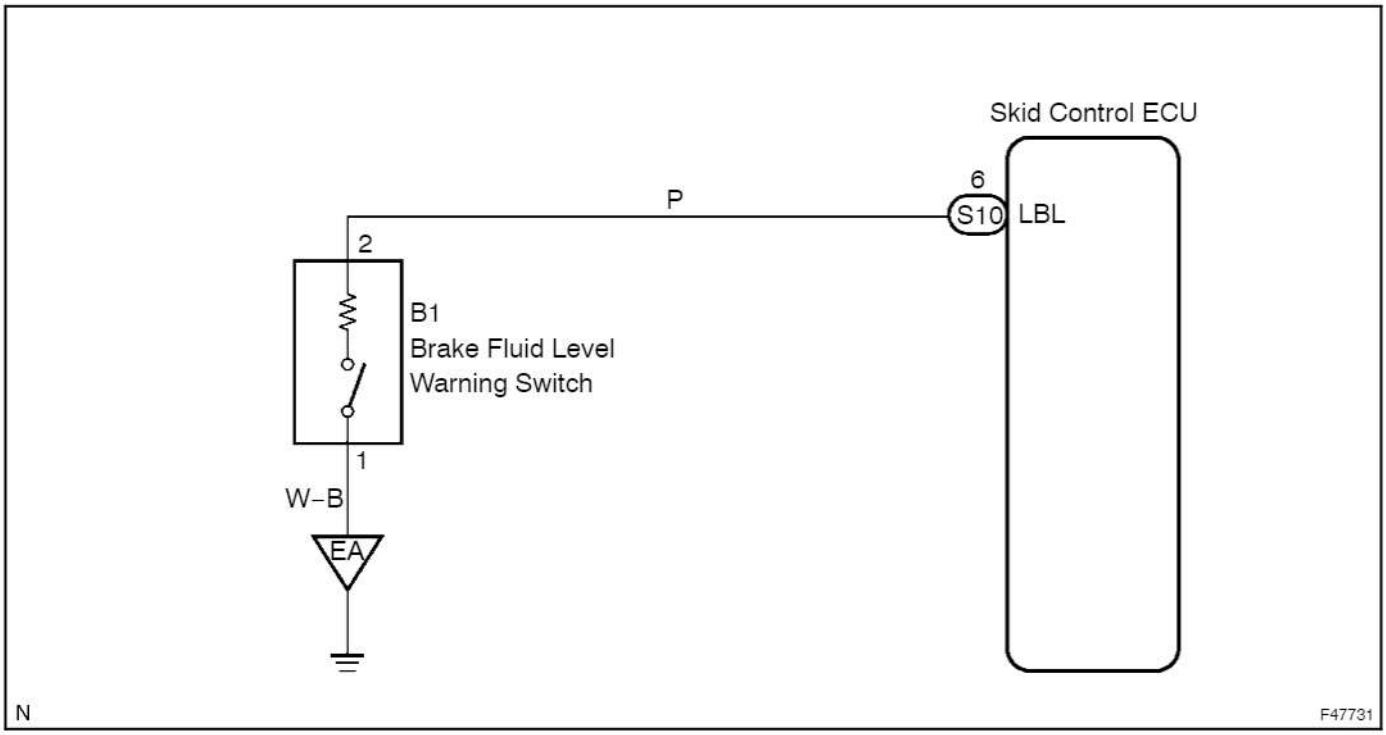
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DTC C1202/68 BRAKE FLUID LEVEL LOW

CIRCUIT DESCRIPTION

When a fluid level drop in the master cylinder reservoir is detected, the signal is input to the skid control ECU. When the DTC for the fluid level drop is memorized, the warning is canceled if the fluid level returns to normal and the other DTCs are not input.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1202/68	511	• Pump motor operates for specified period when reservoir level drops • Brake operation signal is input when the reservoir level is abnormal and the power switch is on.	• Brake fluid level • Brake fluid level warning switch • Harness or connector • Skid control ECU
C1202/68	512	SW signal circuit is open for 2 sec. or more.	• Brake fluid level switch • Harness or connector • Skid control ECU



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INSPECTION PROCEDURE

HINT:
When releasing the parking brake, set the chocks to hold the vehicle for safety.

1	CHECK BRAKE FLUID LEVEL IN RESERVOIR

(a) Check that the brake fluid level is sufficient.

HINT:

- If the fluid level drops, check for a fluid leak, and repair if found.
- If no leaks exist, add and adjust fluid and then check that the trouble code is not output again.

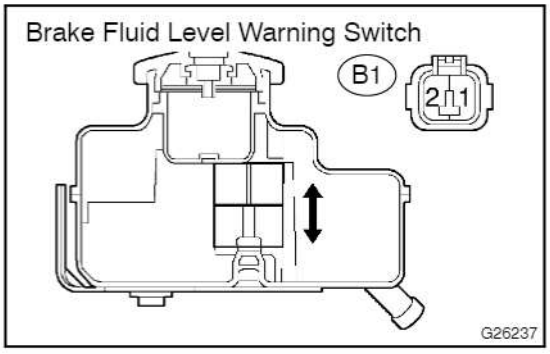
OK:

Brake fluid level is proper.

NG → **ADD BRAKE FLUID**

OK

2	INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

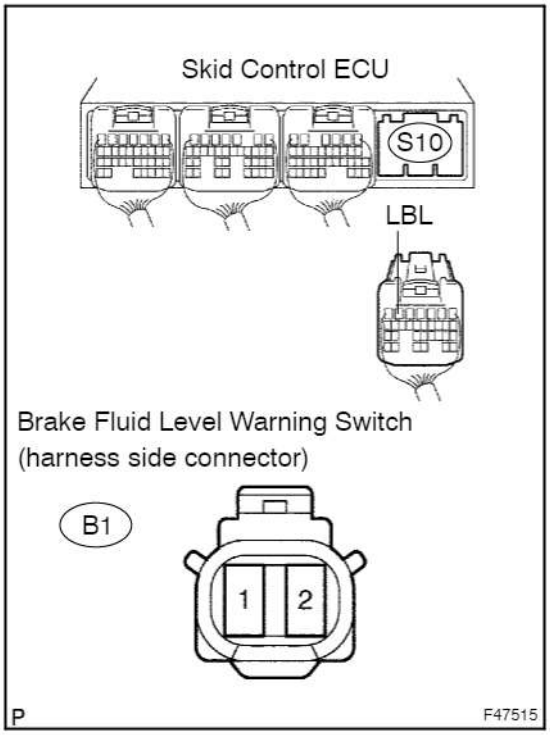
Tester Connection	Fluid Level	Specified Condition
(B1–1) – (B1–2)	Proper	1.8 to 2.16 kΩ
(B1–1) – (B1–2)	Below min.: level	Below 1 Ω

NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB–ASSY**

OK

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3 CHECK HARNESS AND CONNECTOR



(a) Disconnect the skid control ECU connector and the brake fluid level warning switch connector.

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

Standard:

Tester Connection	Specified Condition
S10–6 (LBL) – (B1–2)	Below 1 Ω

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

Standard:

Tester Connection	Specified Condition
S10–6 (LBL) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (see page 05–738).

(b) Turn the power switch ON (READY).

(c) Check the same DTCs are recorded (see page 05–738).

Result:

DTC is output	A
DTC is not output	B

B → **END**

HINT:
This DTC may be memorized due to a malfunction in the connector terminal connection, etc.

A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1210/36	ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE

DTC	C1232/32	MALFUNCTION IN DECELERATION SENSOR

DTC	C1234/34	MALFUNCTION IN YAW RATE SENSOR

DTC	C1243/43	MALFUNCTION IN DECELERATION SENSOR

DTC	C1244/44	OPEN OR SHORT IN DECELERATION SENSOR CIRCUIT

DTC	C1245/45	MALFUNCTION IN DECELERATION SENSOR

DTC	C1336/39	ZERO POINT CALIBRATION OF DECELERATION SENSOR UNDONE

DTC	C1381/97	MALFUNCTION IN POWER SUPPLY VOLTAGE YAW/DECELERATION SENSOR

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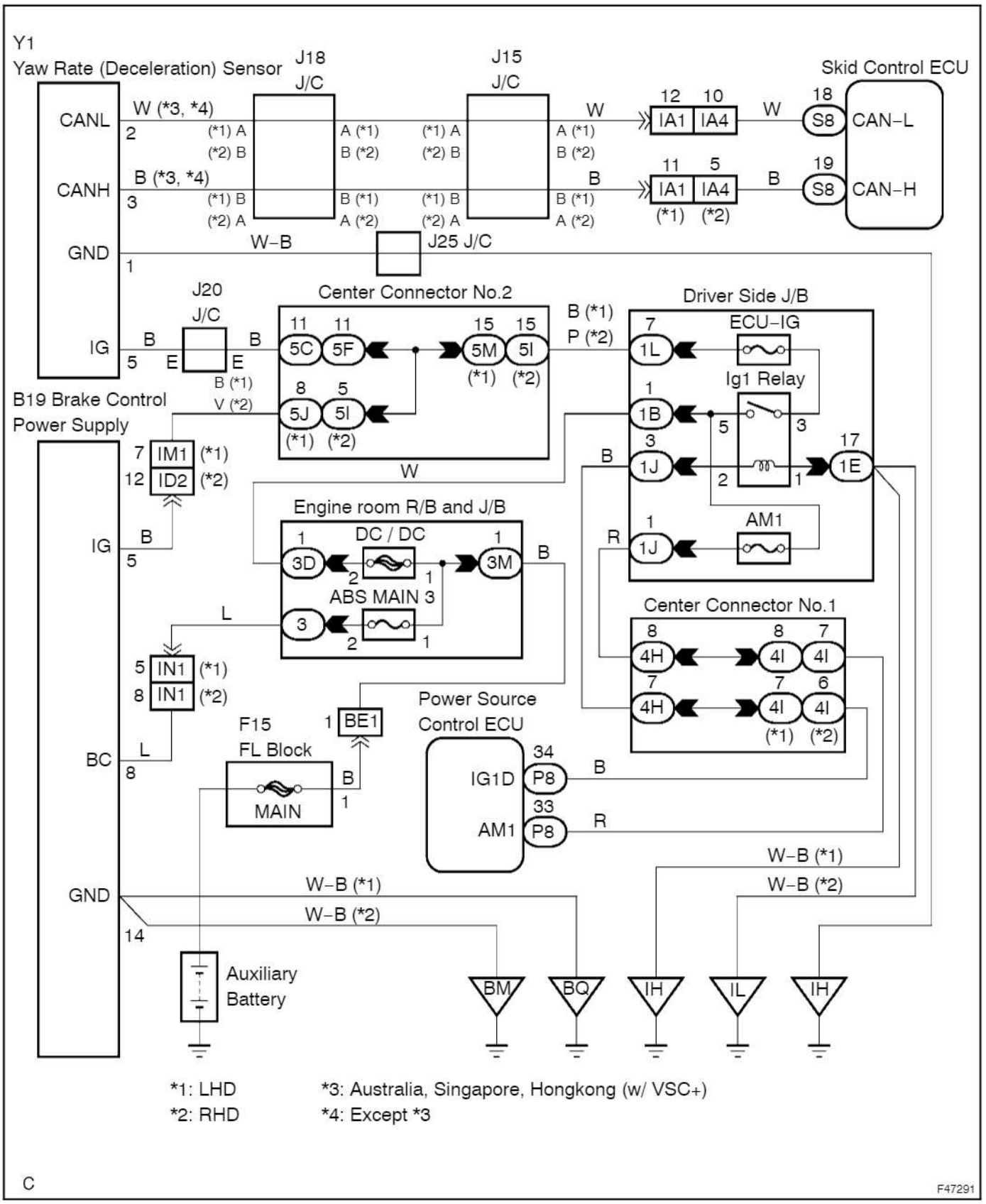
CIRCUIT DESCRIPTION

The yaw rate and deceleration sensor detect any gravity applied to the vehicle and transmit the signal to the skid control ECU via CAN communication (vehicle equipped with VSC+).
When a malfunction occurs in the communication line with the yaw rate sensor, DTC U0123/62 (yaw rate sensor communication malfunction) and DTC U0124/95 (deceleration sensor communication malfunction) are output.

DTC No.	DTC Detecting Condition	Trouble Area
C1210/36	Yaw rate sensor zero point calibration is unfinished.	• Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal.)
C1232/32	One GL1/2 signal fluctuation is within 80 mV and the other is 1.9 V or more for at least 30 sec. when vehicle speed is 10 km/h (6 mph)	• Yaw rate (deceleration) sensor • Skid control ECU
C1234/34	Signal of malfunction that is detected at sensor self–check is received when communication with the sensors is valid.	• Yaw rate (deceleration) sensor
C1243/43	Sensor sticking can be seen 16 times or more in a series at a speed between 30 km/h (18 mph) and 0 km/h (0 mph).	• Yaw rate (deceleration) sensor • Skid control ECU
C1244/44	Difference between GL1 and GL2 is not less than 0.4 G for at least 60 sec. after the difference is 0.6 G or more when the vehicle speed is 0 km/h (0 mph). Malfunction signal from deceleration sensor is received.	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor installation • Zero point calibration not done • Skid control ECU
C1245/45	Difference between the G value calculated from deceleration sensor value and vehicle speed exceeds 0.35 G for at least 60 sec. when vehicle speed is 30 km/h (18 mph).	• Yaw rate (deceleration) sensor • Zero point calibration not done • Skid control ECU
C1336/39	Vehicle speed increases with unfinished zero point calibration. Zero point calculation is not within specified range when zero point calibration is finished.	• Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal.)
C1381/97	Power source voltage is not within specified range when communication between skid control ECU and sensor is valid.	• Yaw rate (deceleration) sensor circuit • Harness and connector • Skid control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK DTC

(a) Clear the DTCs (see page 05–738).
(b) Turn the power switch ON (READY).
(c) Check that the trouble code for CAN communication DTCs U0073/94 and U0123/62 are not output.
Result:

A	CAN communication DTCs are not output.
B	CAN communication DTC U0073/94 or U0123/62 is output.
C	Only unfinished zero point calibration DTC C1210/36 or C1336/39 is output.

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

C → **Go to step 5**

A

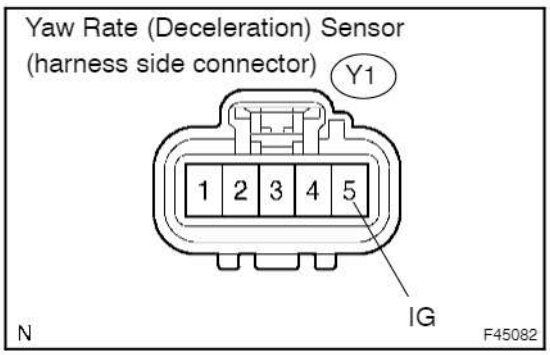
2	CHECK SENSOR INSTALLATION(YAW RATE (DECELERATION) SENSOR)

(a) Check that the yaw rate (deceleration) sensor has been installed properly.
OK:
- **The sensor should be tightened to the specified torque.**
- **The sensor should not be tilted.**

NG → **INSTALL YAW RATE SENSOR CORRECTLY (SEE PAGE 32–84)**

OK

3	CHECK HARNESS AND CONNECTOR(IG TERMINAL)



(a) Disconnect the yaw ratn (deceleration) sensor connector.
(b) Turn the power switch ON (READY).
(c) Measure the voltage according to the value(s) in the table below.
Standard:

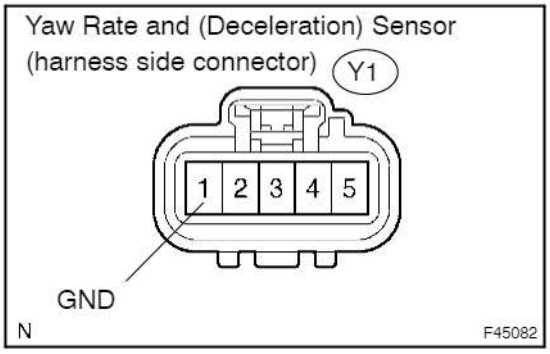
Tester Connection	Specified Condition
Y1–5 (IG) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

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4	CHECK HARNESS AND CONNECTOR(GND TERMINAL)



(a) Disconnect the yaw rate and deceleration sensor connector.

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

Standard:

Tester Connection	Specified Condition
Y1–1 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE YAW RATE SENSOR

5	PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR

(a) Perform the zero point calibration of the yaw rate sensor and deceleration sensor (see page 05–723).

NEXT

6	RECONFIRM DTC

(a) Clear the DTCs.

(b) Turn the power switch ON (READY).

(c) Check the same DTCs are recorded (see page 05–738).

Result:

DTC is not output	A
DTC is output	B

B → **REPLACE YAW RATE SENSOR**

A

END

HINT:
This DTC may be memorized due to a malfunction in the connector terminal.

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DTC	C1231/31	MALFUNCTION IN STEERING ANGLE SENSOR CIRCUIT

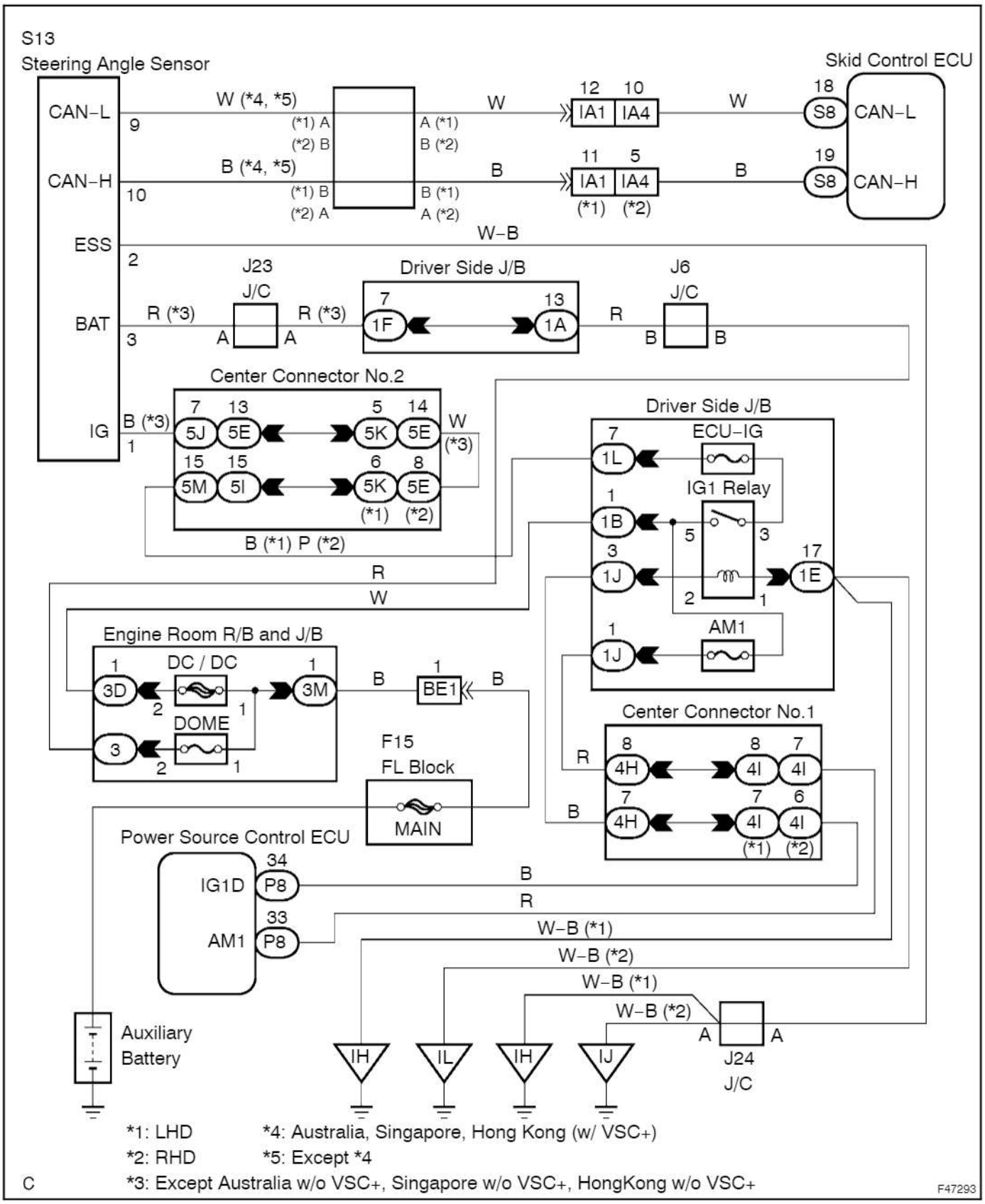
CIRCUIT DESCRIPTION

The skid control ECU inputs the steering sensor signal through the CAN communication. When a malfunction occurs in the communication line with the steering sensor, DTC U0126/63 (malfunction in communication with steering angle sensor) is output.

DTC No.	DTC Detecting Condition	Trouble Area
C1231/31	• Steering angle sensor malfunction signal is received when data transmission is valid (internal malfunction is detected at sensor self–check). • A signal of +B open in steering angle sensor is received when communication with sensor is valid.	• Steering angle sensor • Skid control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- When U0126 is output together with C1231/31, inspect and repair the trouble areas indicated by U0126/63 first.
- When the speed sensor or the yaw rate (deceleration) sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate (deceleration) sensor first, and then inspect and repair the steering angle sensor.

1	CHECK HARNESS AND CONNECTOR(MOMENTARY INTERRUPTION)

(a) Using the intelligent tester II, check for any momentary interruption in the wire harness and connectors between the skid control ECU and steering angle sensor (see page 05–719).

Item	Measurement Item / Range (Display)	Normal Condition
Yaw Rate Open	Yaw rate sensor open detection / OPN–DET or NORMAL	NORMAL: Normal condition

OK:

There are no momentary interruptions.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Steering Angle Sensor	Steering sensor/ Min.: –1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease

(d) Check that the steering angle sensor value of the steering angle sensor observed in the intelligent tester II changes when the steering wheel is moved.

OK:

Steering angle value should change.

NG → **Go to step 3**

OK

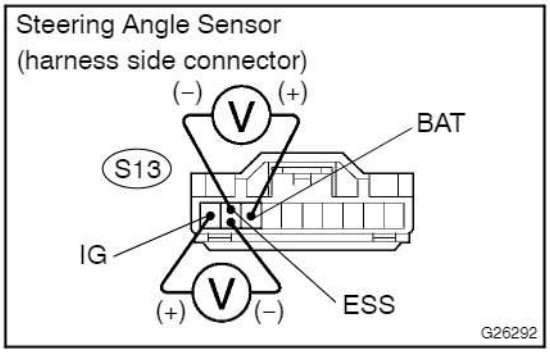
REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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3	CHECK TERMINAL VOLTAGE(STEERING ANGLE SENSOR CONNECTOR)



(a) Remove the steering wheel and the column lower cover.
(b) Disconnect the steering angle sensor connector.
(c) Turn the power switch ON (READY).
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S13–1 (IG) – S13–2 (ESS)	10 to 14 V

(e) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S13–3 (BAT) – S13–2 (ESS)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR (SEE PAGE 32–85)

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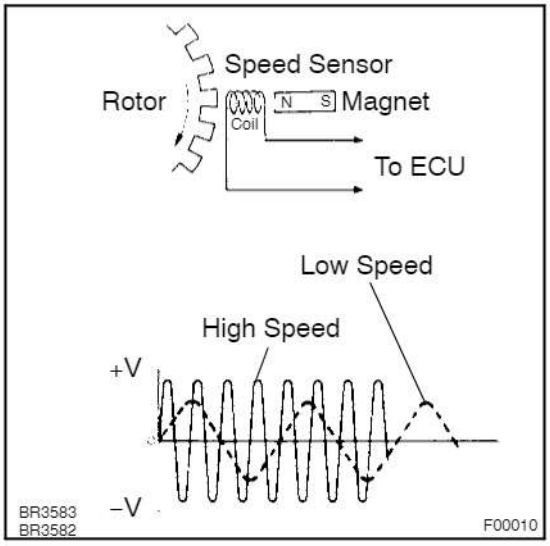
DTC	C1235/35	FOREIGN MATTER IS ATTACHED ON TIP OF RIGHT FRONT SENSOR

DTC	C1236/36	FOREIGN MATTER IS ATTACHED ON TIP OF LEFT FRONT SENSOR

DTC	C1238/38	FOREIGN MATTER IS ATTACHED ON TIP OF RIGHT REAR SENSOR

DTC	C1239/39	FOREIGN MATTER IS ATTACHED ON TIP OF LEFT REAR SENSOR

CIRCUIT DESCRIPTION



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

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.

When foreign matter adheres to the speed sensor tip or sensor rotor, or the rotor teeth are chipped, these DTCs are output. An abnormal waveform input from the sensor determines these conditions.

These DTCs may be detected when a malfunction occurs in the connector terminals or wire harness of the speed sensor circuit.

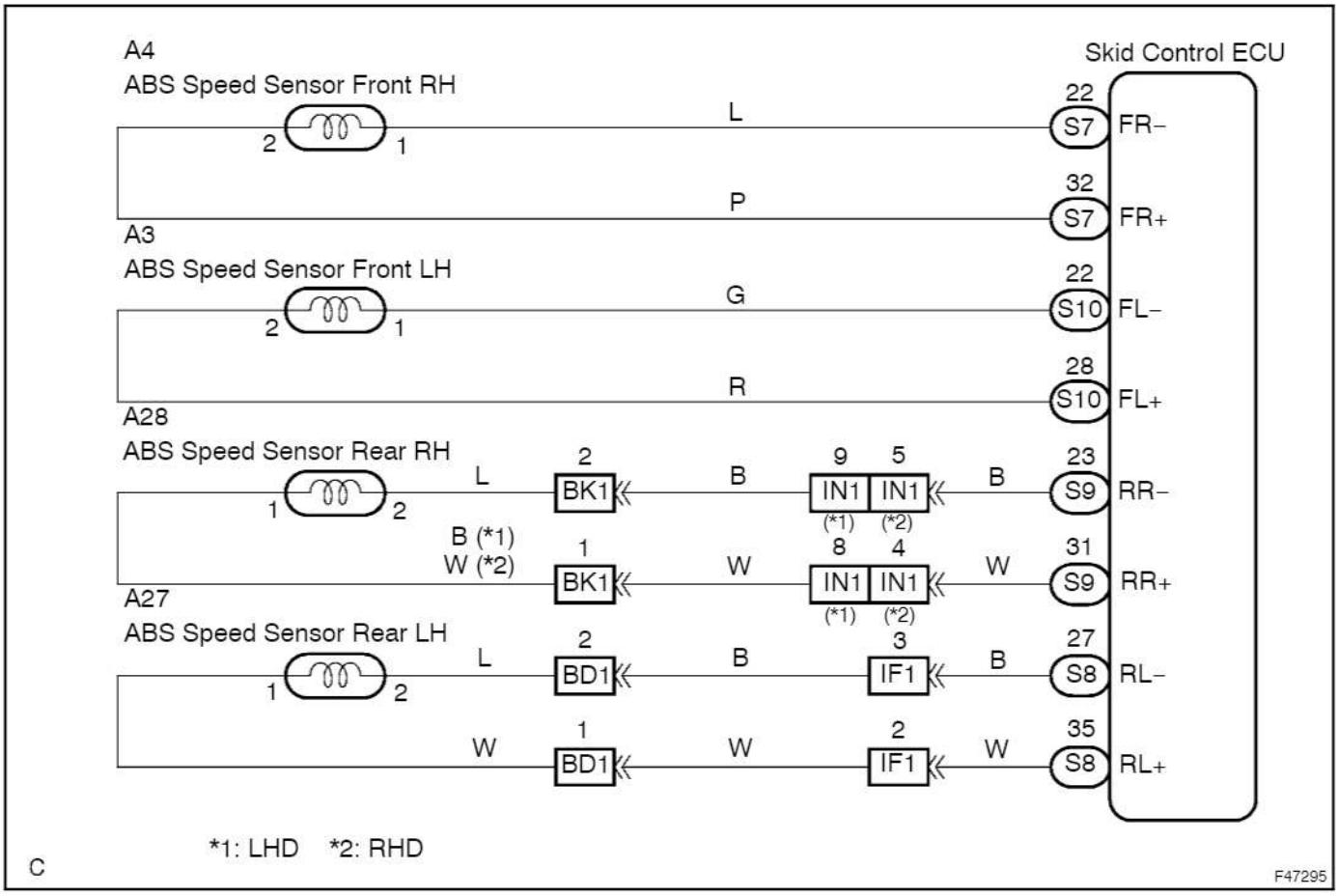
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DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1235/35	–	Pulse waveform of speed sensor signal is abnormal for at least 5 sec. when vehicle speed is 20 km/h (12 mph) or more.	• Right front speed sensor • Each speed sensor circuit • Sensor installation • Skid control ECU
C1236/36	303	Pulse waveform of speed sensor signal is abnormal for at least 5 sec. when vehicle speed is 20 km/h (12 mph) or more.	• Left front speed sensor • Each speed sensor circuit • Sensor installation • Skid control ECU
C1238/38	304	Pulse waveform of speed sensor signal is abnormal for at least 5 sec. when vehicle speed is 20 km/h (12 mph) or more.	• Right rear speed sensor • Each speed sensor circuit • Skid control ECU
C1239/39	305	Pulse waveform of speed sensor signal is abnormal for at least 5 sec. when vehicle speed is 20 km/h (12 mph) or more.	• Left rear speed sensor • Each speed sensor circuit • Skid control ECU

HINT:

- DTC C1235/35 is for the right front speed sensor.
- DTC C1236/36 is for the left front speed sensor.
- DTC C1238/38 is for the right rear speed sensor.
- DTC C1239/39 is for the left rear speed sensor.

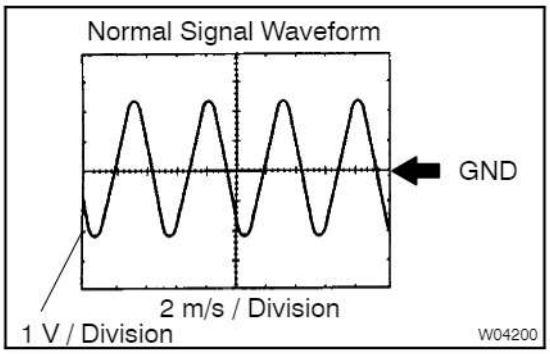
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminal FR+ – FR– or FL+ – FL– of the skid control ECU.

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

OK:

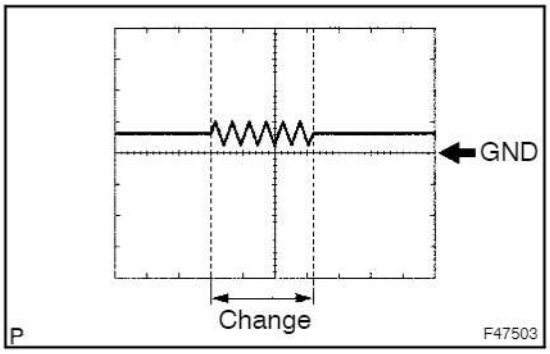
A waveform as shown in a figure should be output.

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 4

OK

2	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminal FR+ – FR– or FL+ – FL– of the skid control ECU.

(b) Check if the oscilloscope has any change when the wire harness connector is subject to vibration while the vehicle is stopped and the ignition switch is on.

(If the connector is poorly connected, vibration of the wire harness connector may cause a temporary stop in current flow.)

OK:

There is no change in a waveform.

OK	No Change	A
NG	Change	B

B	REPAIR OR REPLACE HARNESS OR CONNECTOR

A

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3	RECONFIRM DTC

(a) Clear the DTCs (see page 05–738).
(b) Turn the power switch ON (READY).
(c) Check the same DTCs are recorded (see page 05–738).

Result:

DTC is not output	A
DTC is output	B

B → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–729)

4	INSPECT SPEED SENSOR TIP

(a) Remove the front axle hub and front speed sensor.
(b) Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

NOTICE:
Check the speed sensor signal after the replacement (see page 05–724).

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

5	INSPECT SPEED SENSOR ROTOR

(a) Remove the front axle hub and front speed sensor rotor.
(b) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter on the rotors.

HINT:
If there is foreign matter in the rotor, remove it and check the output waveform after reassembly.

NOTICE:
Check the speed sensor signal after the replacement (see page 05–724).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

REPLACE SPEED SENSOR

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DTC	C1241/41	LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE

DTC	C1242/42	IG2 POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

These codes are memorized when the power source voltage for the skid control ECU drops or the voltage for the ABS No.1, ABS No.2 relay operation drops.
Codes may be memorized when the voltage of the auxiliary battery temporarily drops.
When the power source voltage is too high, the skid control ECU stops functioning and outputs no DTCs, and the ABS and BRAKE warning light remain on.
HINT:
DTC C1256/56 (accumulator low pressure) may be memorized if the power source voltage drops.

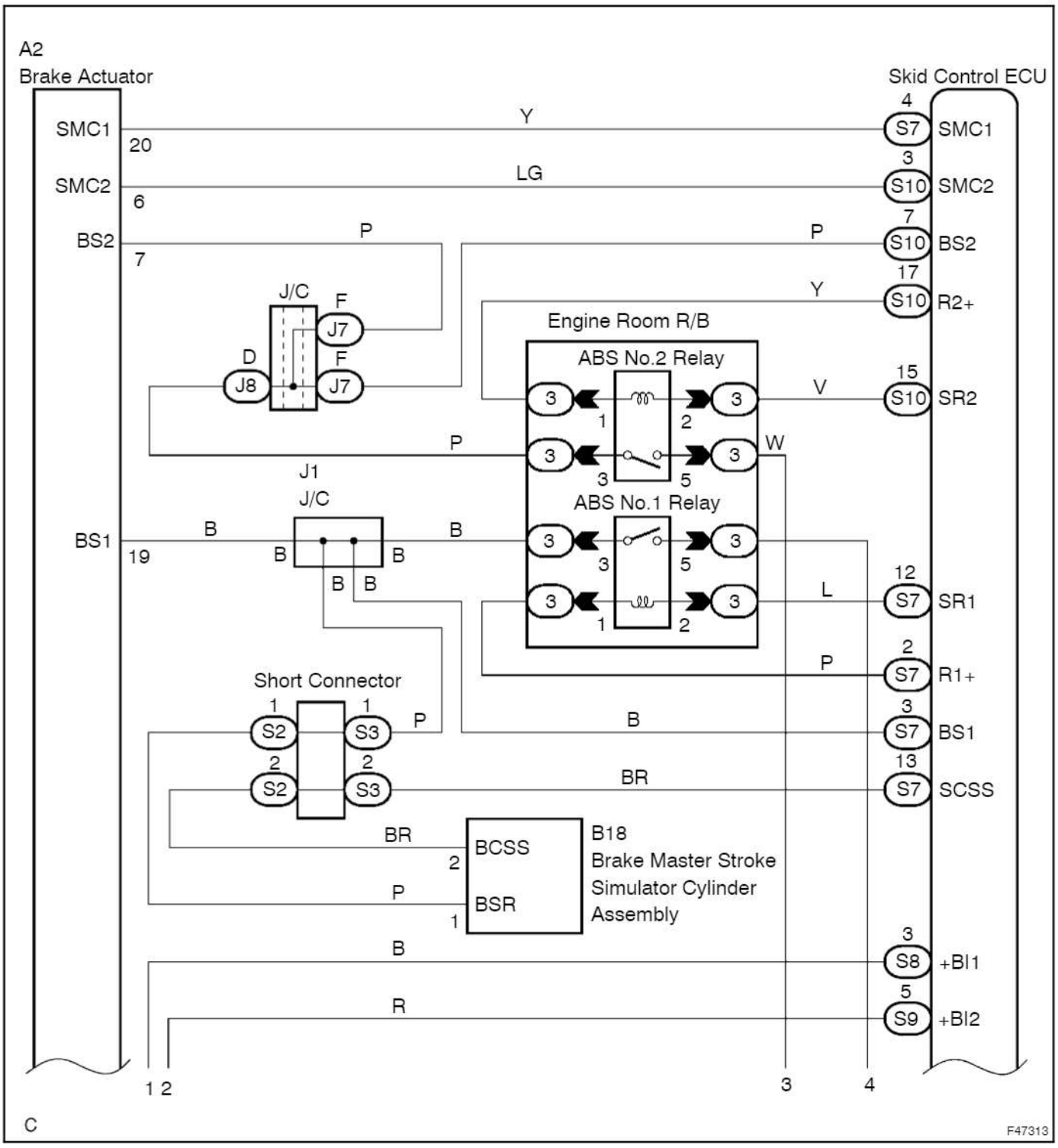
DTC No.	Detailed Code	DTC Condition	Trouble Area
C1241/41	81	System 1 is under the following conditions when READY is on: • Linear solenoid cannot receive enough current (brake is applied). • BS voltage is less than 8.9 V for at least 3 sec. (brake is not applied). • 12 V–power source voltage inside ECU is less than 8.5 V when main relay is opened or VCM voltage is less than 4.7 V or 5 V or more for at least 0.05 sec.	• ABS No.1 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system
C1241/41	82	System 2 is under the following conditions when READY is on: • Linear solenoid cannot receive enough current (brake is applied). • BS voltage is less than 8.9 V for at least 3 sec. (brake is not applied). • 12 V–power source voltage inside ECU is less than 8.5 V when main relay is opened or VCM voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• ABS No.2 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system
C1241/41	83	Capacitor mode signal is received from brake control power supply for 3 sec. or more when READY is on.	• Brake control power supply assy • Brake control power supply • Hybrid control system
C1241/41	84	ABS is requested to operate when the power source voltage of the main relay system is dropping.	• ABS No.1 relay • ABS No.2 relay • Harness and connector

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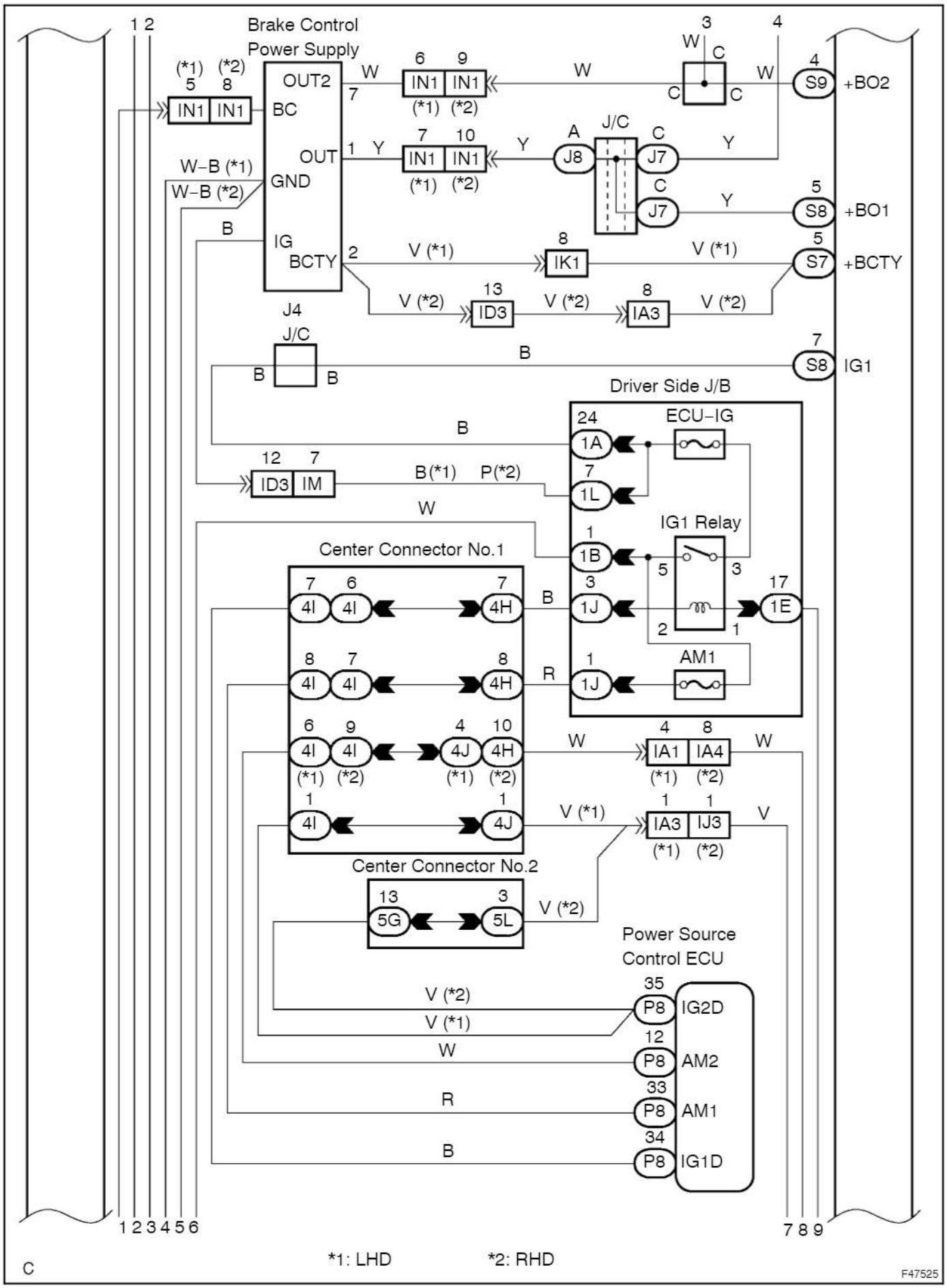
DTC No.	Detailed Code	DTC Condition	Trouble Area
C1242/42	87	Voltage is applied to IG2 terminal, but not applied to IG1 terminal for at least 4 sec.	• ABS No.1 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system
C1242/42	88	Voltage is applied to IG 1 terminal, but not applied to IG 2 terminal for at least 4 sec.	• ABS No.2 relay • Harness and connector • Skid control power supply circuit • Brake control power supply assy • Hybrid control system

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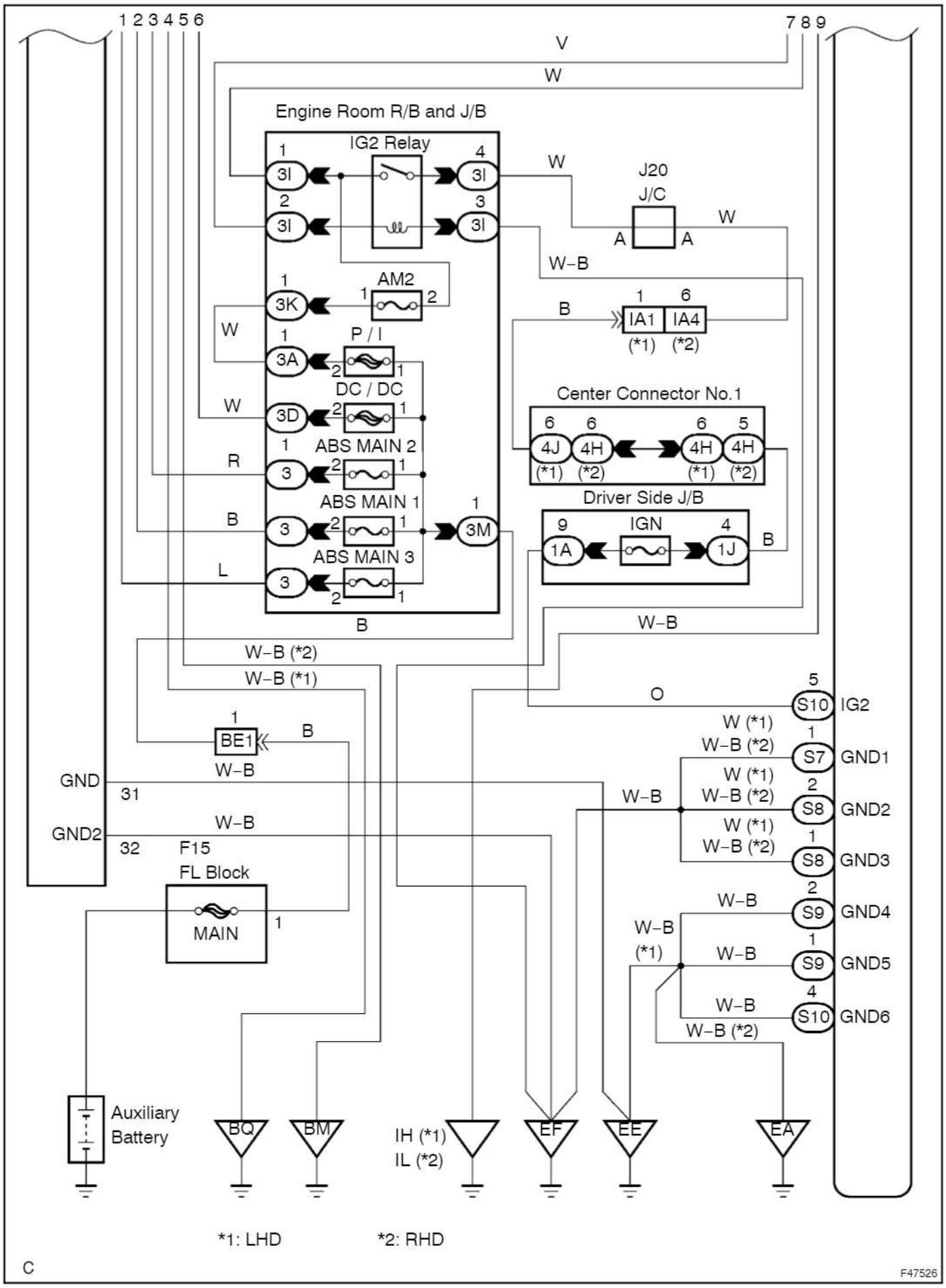
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK DTC(HYBRID CONTROL SYSTEM)

(a) Is DTC output for HYBRID CONTROL SYSTEM?
Result:

DTC is not output	A
DTC is output	B

B → **REPAIR HYBRID CONTROL SYSTEM (SEE PAGE 05–268)**

A

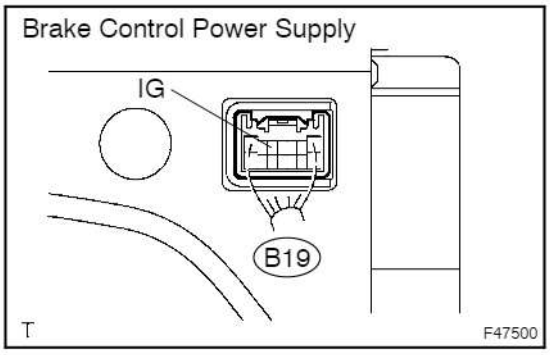
2	CHECK AUXILIARY BATTERY VOLTAGE

(a) Check the auxiliary battery voltage.
Standard:
10 to 14 V

NG → **CHARGE OR REPLACE AUXILIARY BATTERY**

OK

3	CHECK BRAKE CONTROL POWER SUPPLY



(a) Measure the voltage according to the value(s) in the table below.

HINT:
Measure the voltage behind the connector with the connector connected.

Standard:

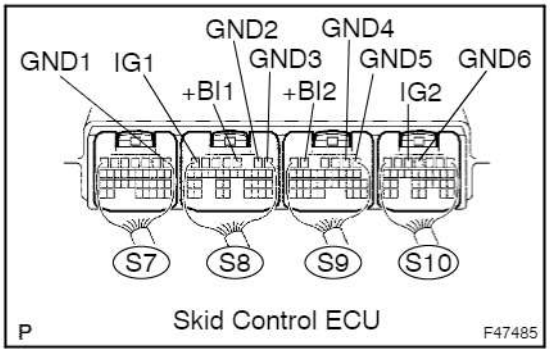
Tester Connection	Specified Condition
B19–5 (IG) – Body ground	10 to 14 V

NG → **CHARGE OR REPLACE BRAKE CONTROL POWER SUPPLY**

OK

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4 CHECK HARNESS AND CONNECTOR



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S8–7 (IG1) – Body ground	10 to 14 V
S10–5 (IG2) – Body ground	10 to 14 V
S8–3 (+BI1) – Body ground	10 to 14 V
S9–5 (+BI2) – Body ground	10 to 14 V

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

Standard:

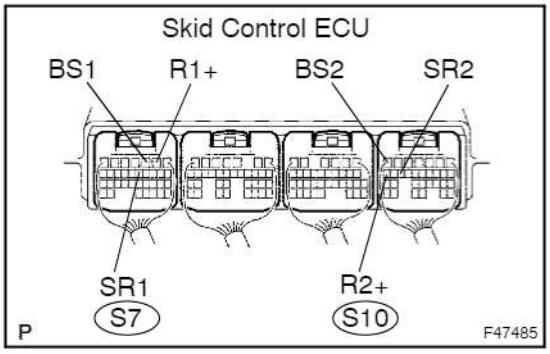
Tester Connection	Specified Condition
S7–1 (GND1) – Body ground	Below 1 Ω
S8–2 (GND2) – Body ground	Below 1 Ω
S8–1 (GND3) – Body ground	Below 1 Ω
S9–2 (GND4) – Body ground	Below 1 Ω
S9–1 (GND5) – Body ground	Below 1 Ω
S10–4 (GND6) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Condition	Specified Condition
S7–2 (R1+) – Body ground	Power switch ON (READY)	8 to 13 V
S10–17 (R2+) – Body ground	Power switch ON (READY)	8 to 13 V
S7–12 (SR1) – Body ground	Power switch ON (READY)	Below 1.5 V
S10–15 (SR2) – Body ground	Power switch ON (READY)	Below 1.5 V
S7–3 (BS1) – Body ground	Power switch ON (READY)	10 to 14 V
S10–7 (BS2) – Body ground	Power switch ON (READY)	10 to 14 V

Result:

All OK	A
NG (R1+, R2+)	B
NG (SR1, SR2, BS1, BS2)	C

B → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

C → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

A

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6	RECONFIRM DTC

(a) Clear the DTCs.
(b) Turn the power switch ON (READY).
(c) Check the same DTCs are recorded (see page 05–738).
Result:

DTC is not output	A
DTC is output	B

B → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

A →

END (DTC MAY BE STORED DUE TO TEMPORARY POWER SOURCE VOLTAGE DROP)

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DTC	C1246/46	MALFUNCTION IN MASTER CYLINDER PRESSURE SENSOR

DTC	C1364/61	MALFUNCTION IN W/C PRESSURE SENSOR

CIRCUIT DESCRIPTION

The master cylinder pressure sensor and the wheel cylinder pressure sensor are built into the brake actuator, and measure the master cylinder pressure and the wheel cylinder pressure send to the skid control ECU.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1246/46	191	Sensor power source 1 (VMC1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	192	Ratio of master pressure sensor output voltage 1 (PMC1) to sensor power source (VMC1) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	194	Sensor power source 2 (VMC2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	195	Ratio of master pressure sensor output voltage 2 (PMC2) to sensor power source (VMC2) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	197	Master pressure sensor output voltage 1 (PMC1) is abnormal.	• Brake actuator assy • Skid control ECU
C1246/46	198	Master pressure sensor output voltage 2 (PMC2) is abnormal.	• Brake actuator assy • Skid control ECU
C1246/46	199	Master pressure sensor output 1 (PMC1) is not approx. 0 Mpa when not braking.	• Brake actuator assy • Skid control ECU • Harness and connector • Stop input signal
C1246/46	200	Master pressure sensor output 2 (PMC2) is not approx. 0 Mpa when not braking.	• Brake actuator assy • Skid control ECU • Harness and connector • Stop input signal
C1246/46	201	PMC1 and PMC2 voltages are different when braking.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	202	Master pressure sensor 1 data (PMC1) is invalid.	• Brake actuator assy • Skid control ECU • Harness and connector
C1246/46	205	Master pressure sensor 2 data (PMC2) is invalid.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	221	Sensor power source 1 (VMC1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Harness and connector • Skid control ECU
C1364/61	222	Raio of FR right sensor output voltage (PFR) to sensor power source (VCM1) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector

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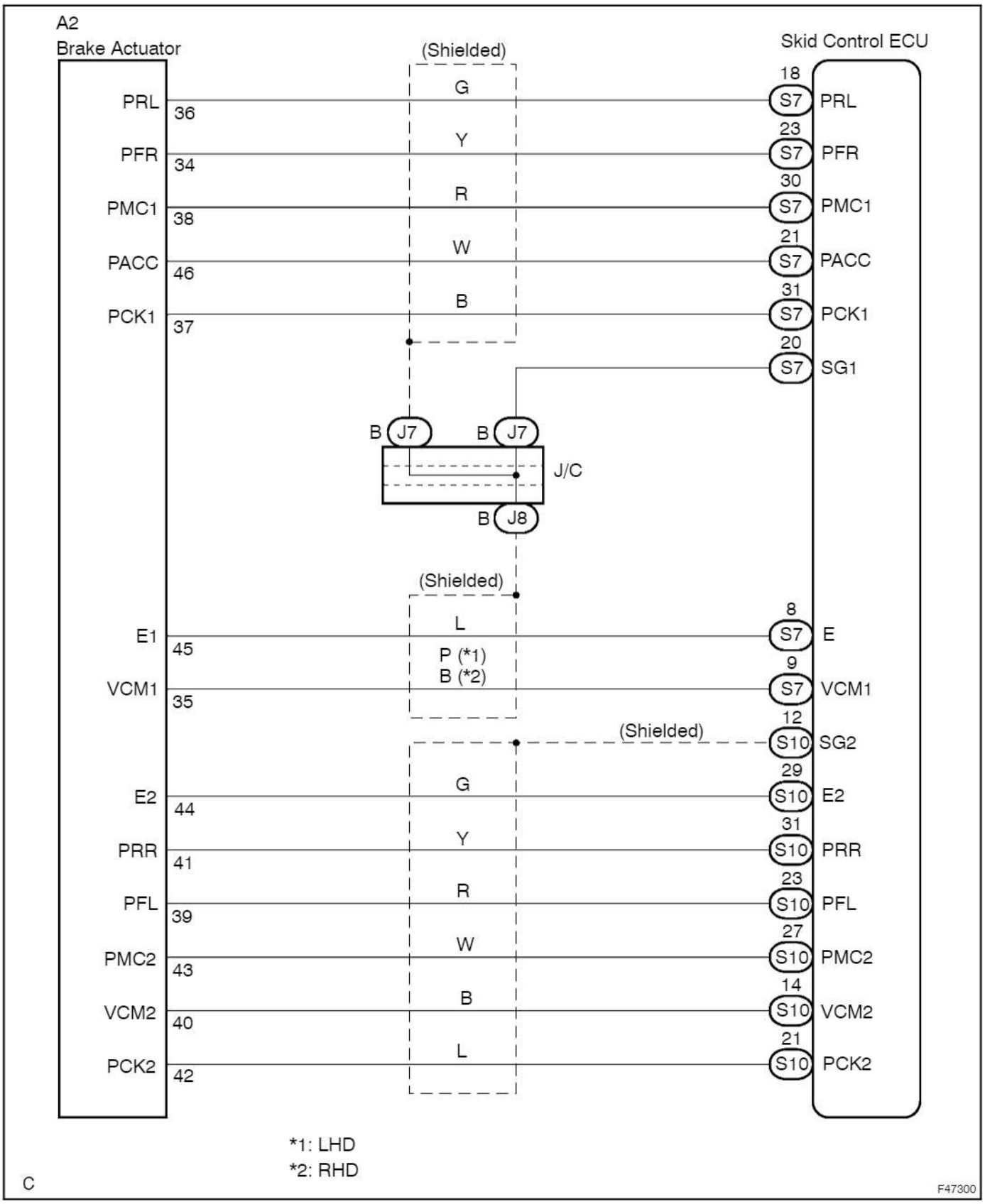
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1364/61	224	• FR right sensor output (PFR) is not approx. 0 Mpa when not braking. • FR right sensor (PFR) zero point malfunction. • Open or short in FR right sensor (PFR) circuit.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	225	Ratio of FR right sensor output voltage (PFR) to sensor power source (VCM1) is less than 90.5% for at least 0.1 sec. when self–diagnosis signal is output.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	227	Sensor power source 2 (VMC2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	228	Ratio of FR lefr sensor output voltage (PFL) to sensor power source (VCM2) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	230	• FR left sensor (PFL) is not approx. 0 Mpa when not braking. • FR left sensor (PFL) zero point malfunction • Open or short in FR right sensor (PFL) circuit.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	231	Ratio of FR left sensor output voltage (PFL) to sensor power source (VCM2) is less than 90.5% for at least 0.1 sec. when self–diagnosis signal is output.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	233	Sensor power source 2 (VMC2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	234	Ratio of RR right sensor output voltage (PRR) to sensor power source (VCM2) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	236	• RR right sensor output voltage (PRR) is not approx. 0 Mpa when not braking. • RR right sensor (PRR) zero point malfunction. • Open or short in RR sensor (PRR) circuit.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	237	Ratio of RR right sensor output voltage (PRR) to sensor power source (VCM2) is less than 90.5% for at least 0.1 sec. when self–diagnosis signal is output.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	239	Sensor power source (VMC1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	240	Ratio of RR left sensor output voltage (PRL) to sensor power source (VCM1) is less than 5% or 90.5% or more for at least 0.05 sec.	• Brake actuator assy • Skid control ECU • Harness and connector

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DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1364/61	226	Voltage difference before and after changing the pull–up resistance in the sensor signal input circuit is 0.3 V or more (poor connection).	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	232	Voltage difference before and after changing the pull–up resistance in the sensor signal input circuit is 0.3 V or more (poor connection).	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	238	Voltage difference before and after changing the pull–up resistance in the sensor signal input circuit is 0.3 V or more (poor connection).	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	242	• RR left sensor output (PRL) is not approx. 0 Mpa when not braking. • RR left sensor (PRL) zero point malfunction. • Open or short in RR left sensor (PRL) circuit.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	243	• Ratio of RR left sensor output voltage (PRL) to sensor power source (VCM1) is less than 90.5% for at least 0.1 sec. when sel–diagnosis signal is output.	• Brake actuator assy • Skid control ECU • Harness and connector
C1364/61	244	Voltage difference before and after changing the pull–up resistance in the sensor signal input circuit is 03 V or more (poor connection).	• Brake actuator assy • Skid control ECU • Harness and connector

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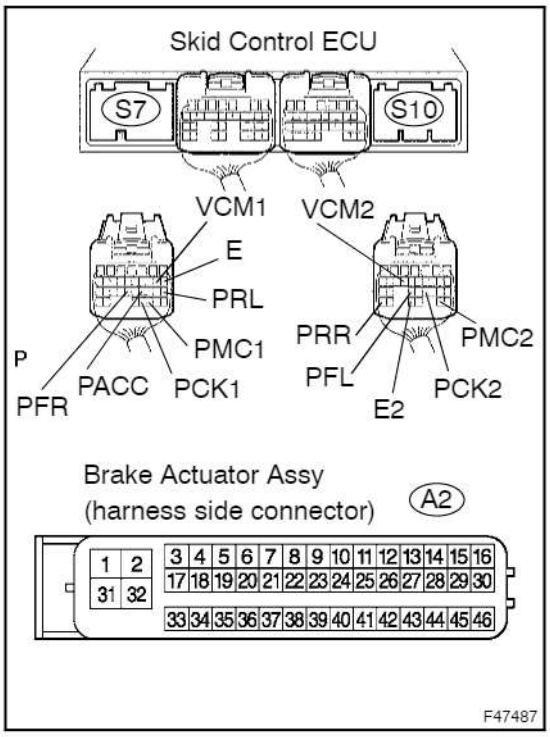
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR



(a) Disconnect the skid control ECU connector and brake actuator connector.

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

Standard:

Tester Connection	Specified Condition
S7–8 (E) – A2–45 (E1)	Below 1 Ω
S7–9 (VCM1) – A2–35 (VCM1)	Below 1 Ω
S7–18 (PRL) – A2–36 (PRL)	Below 1 Ω
S7–21 (PACC) – A2–46 (PACC)	Below 1 Ω
S7–23 (PFR) – A2–34 (PFR)	Below 1 Ω
S7–30 (PMC1) – A2–38 (PMC1)	Below 1 Ω
S7–31 (PCK1) – A2–37 (PCK1)	Below 1 Ω
S10–14 (VCM2) – A2–40 (VCM2)	Below 1 Ω
S10–21 (PCK2) – A2–42 (PCK2)	Below 1 Ω
S10–23 (PFL) – A2–39 (PFL)	Below 1 Ω
S10–27 (PMC2) – A2–43 (PMC2)	Below 1 Ω
S10–29 (E2) – A2–44 (E2)	Below 1 Ω
S10–31 (PRR) – A2–41 (PRR)	Below 1 Ω

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

Standard:

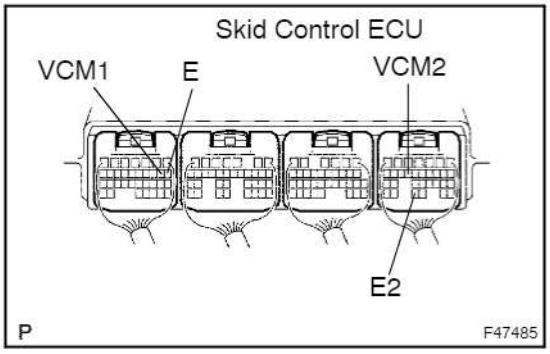
Tester Connection	Specified Condition
S7–8 (E) – Body ground	10 kΩ or higher
S7–9 (VCM1) – Body ground	10 kΩ or higher
S7–18 (PRL) – Body ground	10 kΩ or higher
S7–21 (PACC) – Body ground	10 kΩ or higher
S7–23 (PFR) – Body ground	10 kΩ or higher
S7–30 (PCM1) – Body ground	10 kΩ or higher
S7–31 (PCK1) – Body ground	10 kΩ or higher
S10–14 (VCM2) – Body ground	10 kΩ or higher
S10–21 (PCK2) – Body ground	10 kΩ or higher
S10–27 (PMC2) – Body ground	10 kΩ or higher
S10–29 (E2) – Body ground	10 kΩ or higher
S10–31 (PRR) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

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2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Condition	Specified Condition
S7–9 (VCM1) – Body ground	Power switch ON (READY)	4.75 to 5.25 V
S10–14 (VCM2) – Body ground	Power switch ON (READY)	4.75 to 5.25 V

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

Standard:

Tester Connection	Specified Condition
S7–8 (E) – Body ground	Below 1 Ω
S10–29 (E2) – Body ground	Below 1 Ω

NG → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

OK

3 INSPECT SKID CONTROL ECU ASSY

(a) Connect the intelligent tester II to the DLC3.

(b) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Master Cylinder Sensor 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
Master Cylinder Sensor 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

(c) Check the output value of the master cylinder pressure sensor on the intelligent tester II display.

OK:

When the pedal is depressed, displayed voltage on the intelligent tester II increase.

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

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4	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the pedal effort gauge.
(b) Install the LSPV gauge (SST) and bleed air (see page 32–4).
SST 09709–29018
(c) Connect the intelligent tester II to the DLC3.
(d) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
FR Wheel Cylinder	Front Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
FL Wheel Cylinder	Front Left pressure sensor / min. 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RR Wheel Cylinder	Rear Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RL Wheel Cylinder	Rear Left pressure sensor / min. 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

(e) Check the output value of the wheel cylinder pressure sensor at each fluid pressure during the ECB control.
Standard:

Front:

Fluid Pressure MPa (kgf/cm^2, psi)	FR PRESS SENS (DATA–LIST)	FL PRESS SENS (DATA–LIST)
3 (30.6, 435)	1.0 to 1.2 V	1.0 to 1.2 V
5.9 (59.8, 851)	1.6 to 1.8 V	1.6 to 1.8 V
7.9 (80.2, 1141)	2.0 to 2.2 V	2.0 to 2.2 V
9.9 (101.0, 1437)	2.35 to 2.6 V	2.35 to 2.6 V

Rear:

Fluid Pressure MPa (kgf/cm^2, psi)	RR PRESS SENS (DATA–LIST)	RL PRESS SENS (DATA–LIST)
3.8 (38.7, 550)	1.15 to 1.35 V	1.15 to 1.35 V
4.0 (40.8, 580)	1.25 to 1.5 V	1.25 to 1.5 V

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1247/47	MALFUNCTION IN STROKE SENSOR

DTC	C1392/48	UN–CORRECTION OF A ZERO POINT OF THE STROKE SENSOR

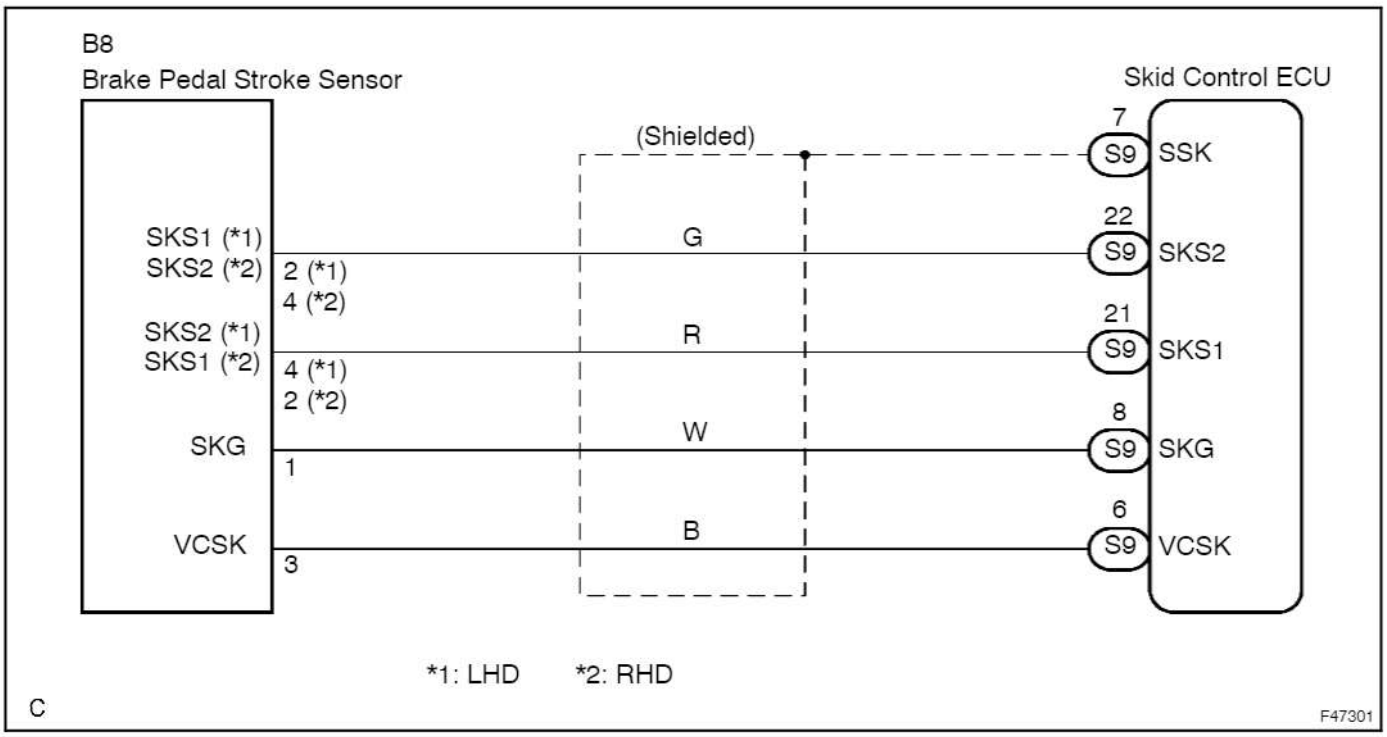
CIRCUIT DESCRIPTION

The stroke sensor inputs the pedal stroke into the skid control ECU.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1247/47	171	Sensor power source voltage (VCSK) is 3.6 V or less or 4.95 V or more for at least 1.2 sec.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	172	Ratio of sensor output voltage 1 (SKS1) to sensor power source voltage (VCSK) is less than 3% or 97% or more for at least 1.2 sec.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	173	Ratio of sensor output voltage 2 (SKS2) to sensor power source voltage (VCSK) is less than 3% or 97% or more for at least 1.2 sec.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	174	Sensor output 1 (SKS1) calculation value becomes 20 mm or more for at least 1.2 sec. at an interval of 0.006 sec. (changes due to interference).	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	175	Sensor output 2 (SKS2) calculation value becomes 20 mm or more for at least 1.2 sec. at an interval of 0.006 sec. (changes due to interference).	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	176	Zero point stored value (ratio to power source voltage) of sensor output 1 (SKS1) is 0.46 or more or 0.03 or less.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	177	Zero point stored value (ratio to power source voltage) of sensor output 2 (SKS2) is 0.97 or more or 0.48 or less.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	179	• Sum of SKS1/VSCK and SKS2/VSCK is 1.155 or more or 0.845 or less for at least 1 sec. • Difference between sensor output 1 (SKS1) and sensor output 2 (SKS2) is excessively large for at least 0.2 sec.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1247/47	180	• Difference between zero point output value and stored value is 0.5 or more for at least 0.05 sec. • Short between SKS1 and SKS2 output line.	• Brake pedal stroke sensor • Skid control ECU • Harness and connector
C1392/48	178	Zero point calibration of stroke sensor is unfinished.	• Brake pedal stroke sensor zero point calibration undone (initialization of linear solenoid valve and calibration undone) • Skid control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK BRAKE PEDAL

(a) Check that the brake pedal and the brake pedal stroke sensor are properly installed and that the pedal can be operated normally.
(b) Check the brake pedal height.
OK:
- **The brake pedal is securely installed.**
- **The pedal height is within the specified range (see page 32–16).**

NG → **ADJUST BRAKE PEDAL (SEE PAGE 32–16)**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal condition
Pedal Stroke Sensor 1	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.7 to 1.3 V
Pedal Stroke Sensor 2	Stroke sensor 2 / min.: 0 V, max.: 5 V	When brake pedal is released: 3.7 to 4.3 V

(d) Read the pedal stroke sensor voltage value on the intelligent tester II screen.
OK:
The Normal condition value displayed on the intelligent tester II.

NG → **ADJUST BRAKE PEDAL STROKE SENSOR ASSY**

OK

3	PERFORM INITIALIZATION OF LINEAR SOLENIOID VALVE AND CALIBRATION (SEE PAGE 05–721)

NEXT

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4	RECONFIRM DTC

(a) Clear the DTCs (see page 05–738).
(b) Turn the power switch ON (READY).
(c) Check the same DTCs are recorded.
Result:

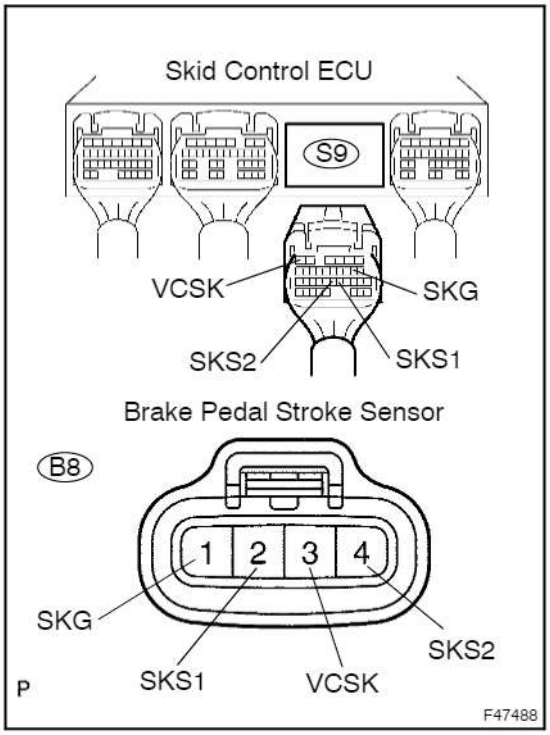
DTC is output	A
DTC is not output	B

B → **END**

HINT:
This DTC may be memorized due to a malfunction in the connector terminal connection, etc.

A

5	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU – BRAKE PEDAL STROKE SENSOR)



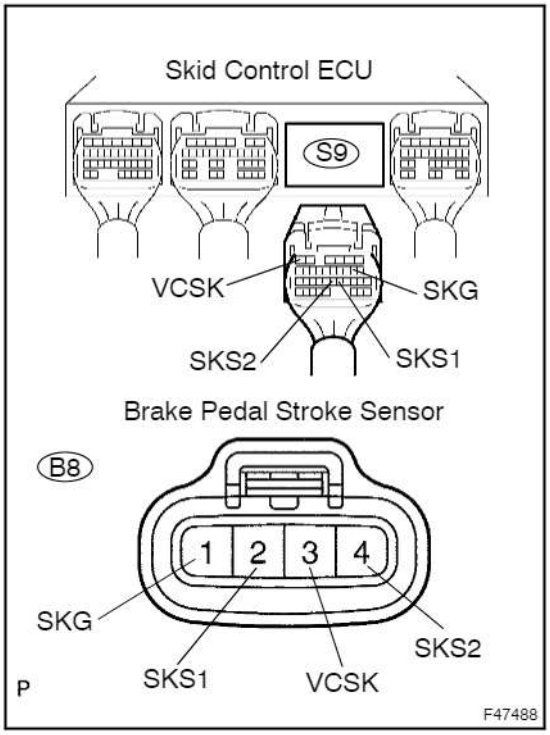
LHD:
(a) Disconnect the skid control ECU connector and brake pedal stroke sensor connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S9–6 (VCSK) – B8–3 (VCSK)	Below 1 Ω
S9–8 (SKG) – B8–1 (SKG)	Below 1 Ω
S9–21 (SKS1) – B8–2 (SKS2)	Below 1 Ω
S9–22 (SKS2) – B8–4 (SKS1)	Below 1 Ω

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

Tester Connection	Specified Condition
S9–6 (VCSK) – Body ground	10 kΩ or higher
S9–8 (SKG) – Body ground	10 kΩ or higher
S9–21 (SKS1) – Body ground	10 kΩ or higher
S9–22 (SKS2) – Body ground	10 kΩ or higher

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RHD:

(d) Disconnect the skid control ECU connector and brake pedal stroke sensor connector.

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

Standard:

Tester Connection	Specified Condition
S9–6 (VCSK) – B8–3 (VCSK)	Below 1 Ω
S9–8 (SKG) – B8–1 (SKG)	Below 1 Ω
S9–21 (SKS1) – B8–2 (SKS1)	Below 1 Ω
S9–22 (SKS2) – B8–4 (SKS2)	Below 1 Ω

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

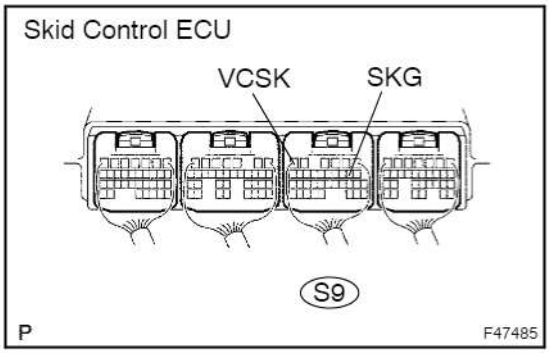
Standard:

Tester Connection	Specified Condition
S9–6 (VCSK) – Body ground	10 kΩ or higher
S9–8 (SKG) – Body ground	10 kΩ or higher
S9–21 (SKS1) – Body ground	10 kΩ or higher
S9–22 (SKS2) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(VCSK, SKG TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S9–6 (VCSK) – S9–8 (SKG)	3.6 to 4.95 V

NG → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

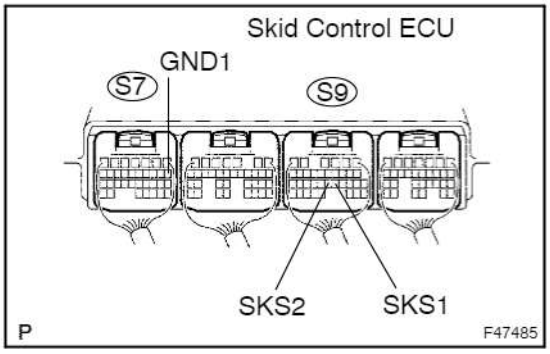
NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

OK

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7	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(SKS1, SKS2 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

- Measure the voltage from behind the connector with the connector connected to the skid control ECU.
- Slowly depress the brake pedal and check if the voltage between the skid control ECU terminal changes in accordance with the pedal operation.

Standard:

Tester Connection	Specified Condition
S9–21 (SKS1) – S7–1 (GND1)	1.8 to 3.1 V
S9–22 (SKS2) – S7–1 (GND1)	1.8 to 3.1 V

NG → **REPLACE BRAKE PEDAL STROKE SENSOR ASSY**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1249/49	OPEN CIRCUIT IN STOP LIGHT SWITCH CIRCUIT

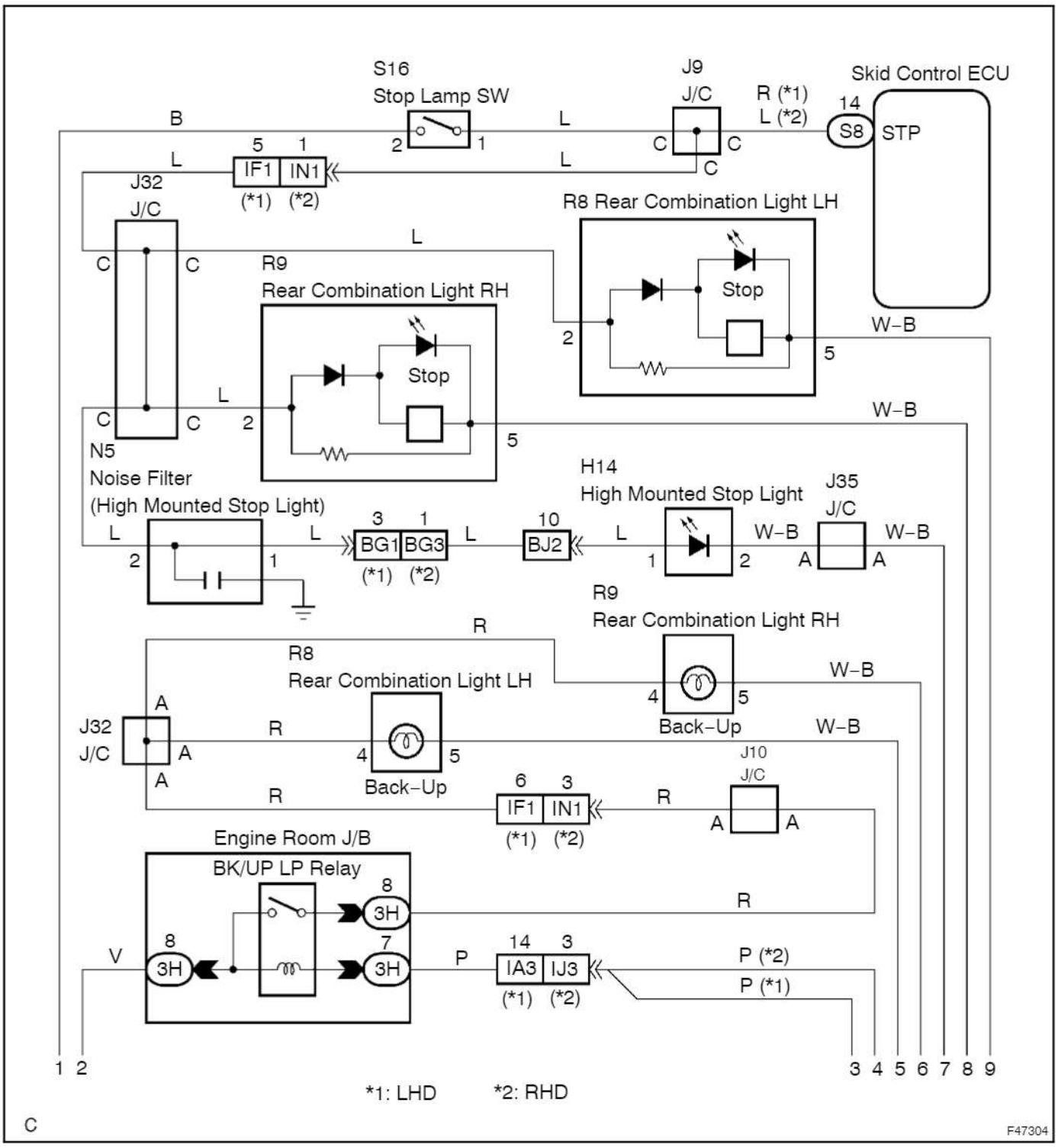
CIRCUIT DESCRIPTION

The skid control ECU inputs the stop lamp switch signal and detects braking condition.
The skid control ECU has a circuit for open detection inside. The skid control ECU outputs the DTC if it detects an open in the stop lamp signal input line when the stop lamp switch is off or an open in the stop lamp circuit (GND side).

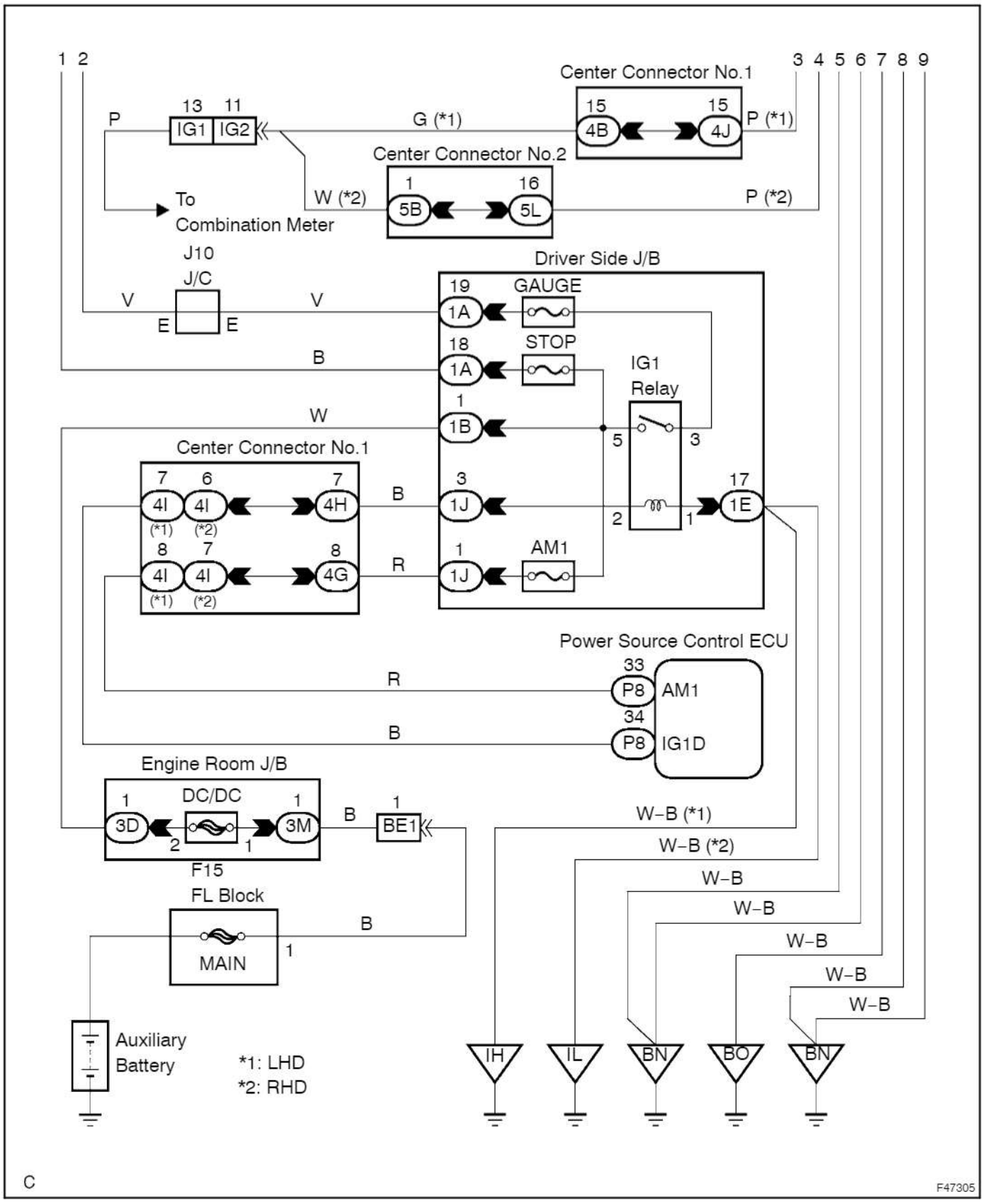
DTC No.	Detailed Code	DTC Detected Condition	Trouble Area
C1249/49	520	Stop lamp switch circuit is open for at least 10 sec. when IG1 terminal voltage is between 9.5 V and 17.02 V.	• Stop lamp switch • Stop lamp switch circuit • Stop lamp bulb

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK STOP LAMP SWITCH OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed and turns off when the brake pedal is released.

OK:

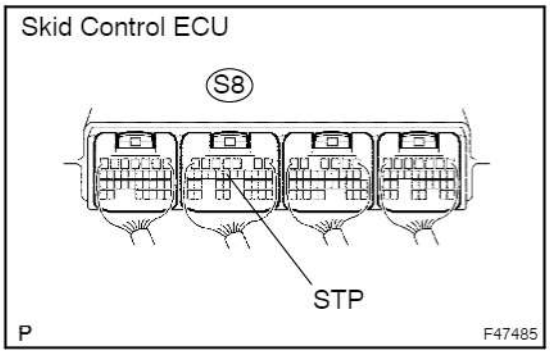
Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **Go to step 4**

HINT:
Check the stop lamp bulb as it may have burnt out.

OK

2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

HINT:
Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Switch Condition	Specified Condition
S8–14 (STP) – Body ground	Brake pedal depressed	8 to 14 V
S8–14 (STP) – Body ground	Brake pedal released	Below 1 V

NG → **Go to step 4**

OK

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3 RECONFIRM DTC

(a) Clear the DTCs (see page 05–738).
(b) Turn the power switch ON (READY).
(c) Check the same DTCs recorded (see page 05–738).

Result:

DTC is not output	A
DTC is output	B

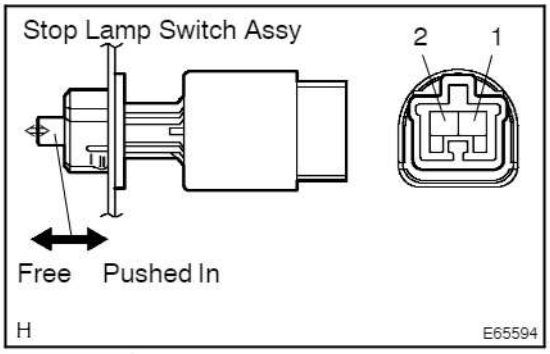
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–729)**

A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

4 INSPECT STOP LAMP SWITCH ASSY



(a) Disconnect the stop lamp switch assy connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

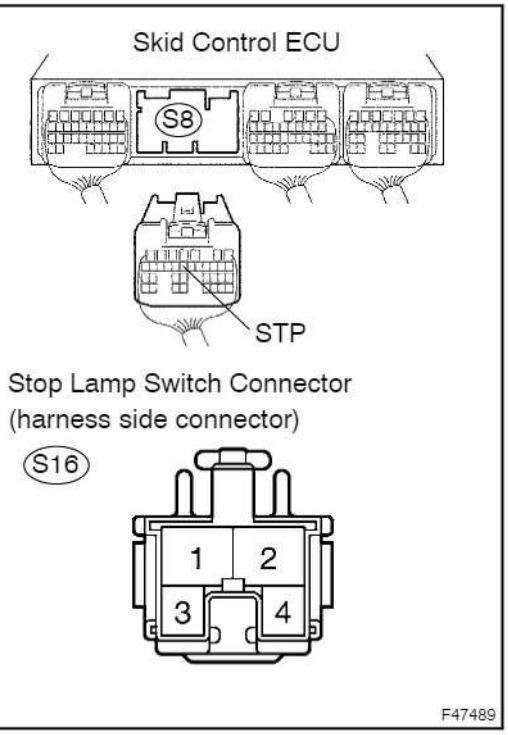
Switch Condition	Tester Connection	Specified Condition
Switch pin free	1 – 2	Below 1 Ω
Switch pin pushed in	1 – 2	10 kΩ or higher

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

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5	CHECK HARNESS AND CONNECTOR(STOP LAMP SWITCH – SKID CONTROL ECU)



(a) Disconnect the stop lamp switch connector and skid control ECU connector.

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

Standard:

Tester Connection	Specified Condition
S8–14 (STP) – S16–1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1252/52	BRAKE BOOSTER PUMP MOTOR ON TIME ABNORMALLY LONG

DTC	C1253/53	BRAKE BOOSTER PUMP MOTOR CIRCUIT

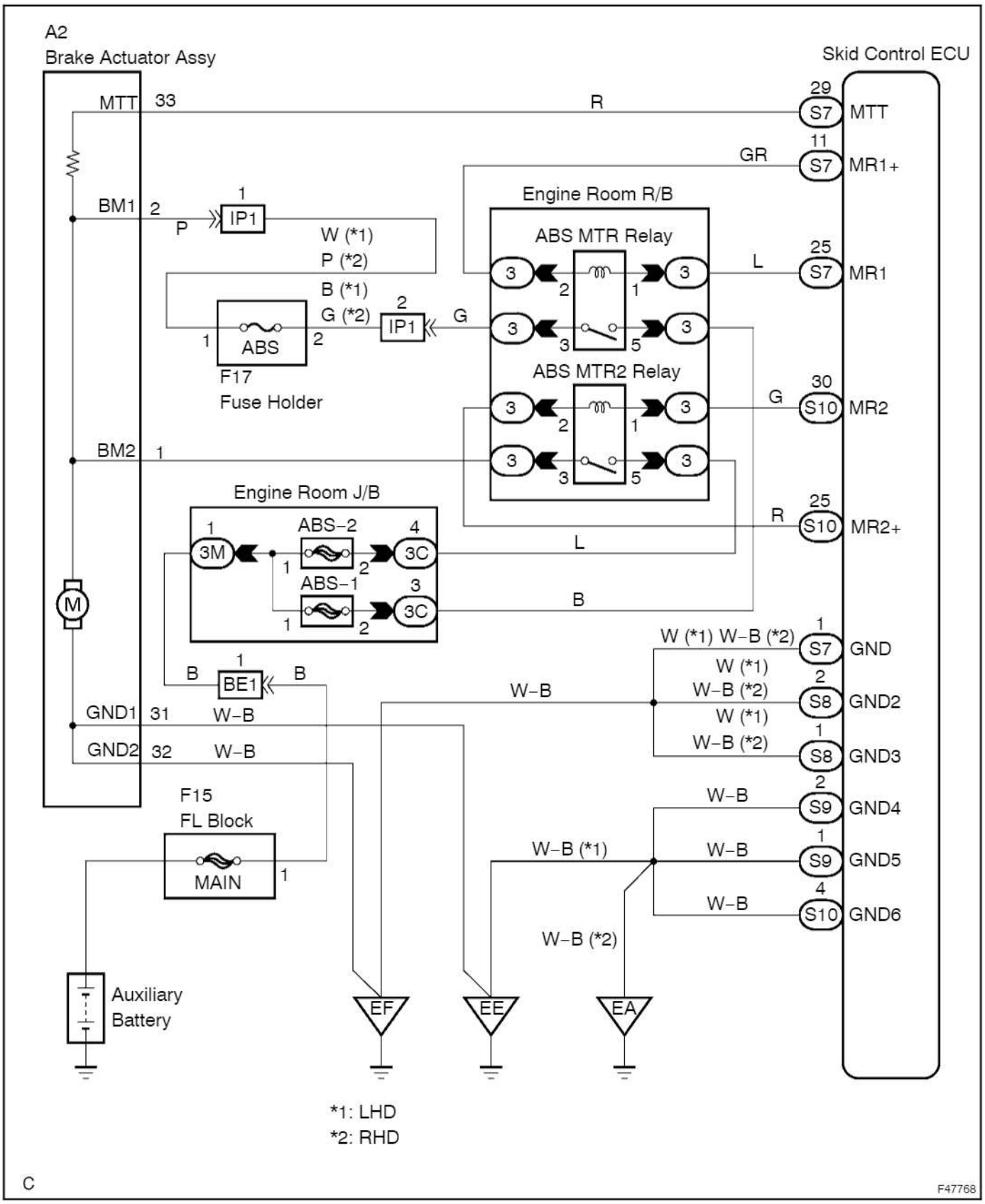
CIRCUIT DESCRIPTION

The skid control ECU detects decreases in the accumulator pressure according to the data from the accumulator pressure sensor, and then starts and stops the pump motor by operating the ABS motor relay.
The skid control ECU usually drives the motor relay 1 for ECB control, and the ABS motor relay 2 for ABS control. If either is malfunctioning, the other substitutes.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1252/52	130	Motor relay is ON for at least 5 min.	• Brake actuator assy
C1253/53	132	Motor relay 1 coil (monitor) is energized for at least 1 sec. when main relay 1 monitor (BS1) is 9.5 V or more and motor relay 1 is off.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	133	Motor relay 1 coil (monitor) is not energized for at least 1 sec. when main relay 1 monitor (BS1) is 9.5 V or more and motor relay 1 is on.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	134	MTT input is 3.5 V or less for at least 0.2 sec. when main relay 1 monitor (BS1) is 9.5 V or more and motor relay 1 is on.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	136	Motor relay 2 coil (monitor) is energized for at least 1 sec. when main relay 2 monitor (BS2) is 9.5 V or more and motor relay 2 is off.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	137	Motor relay 2 coil (monitor) is not energized for at least 1 sec. (0.2 sec. during initial check) when main rely 2 monitor (BS2) is 9.5 V or more and motor relay 2 is on.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	138	MTT input is 3.5 V or less for at least 1 sec. (0.2 sec. during initial check) when main relay 1 monitor (BS1) is 9.5 V or more and motor relay 2 is on.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy
C1253/53	140	MTT input is 3.5 V or more for at least 2 sec. when motor relay 1 and 2 are off.	• ABS MTR relay • ABS MTR2 relay • Harness and connector • Brake actuator assy

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(ABS MOTOR RELAY OPERATION)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the ACTIVE TEST mode on the intelligent tester II.
(d) Check the operation sound of the ABS motor individually when operating it with the intelligent tester II.

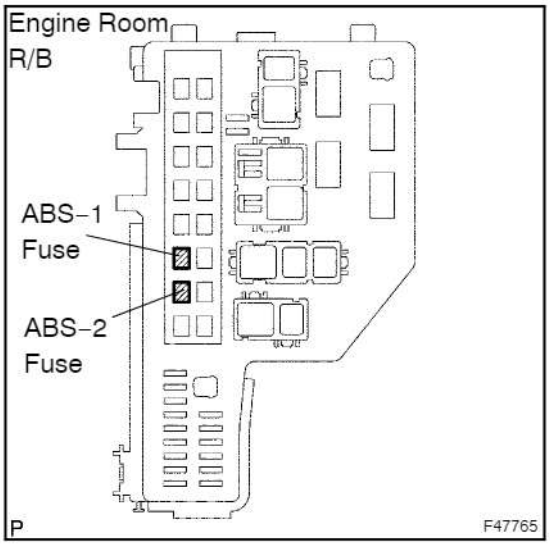
Item	Vehicle Condition / Test Details	Diagnostic Note
Motor Relay 1	Turns MOTOR RELAY 1 ON / OFF	Operation of solenoid (clicking sound) can be heard
Motor Relay 2	Turns MOTOR RELAY 2 ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:
The operation sound of the ABS motor should be heard.

NG → **Go to step 6**

OK

2	INSPECT FUSE(ABS–1, ABS–2 FUSE)



(a) Remove the ABS–1 and ABS–2 fuse from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

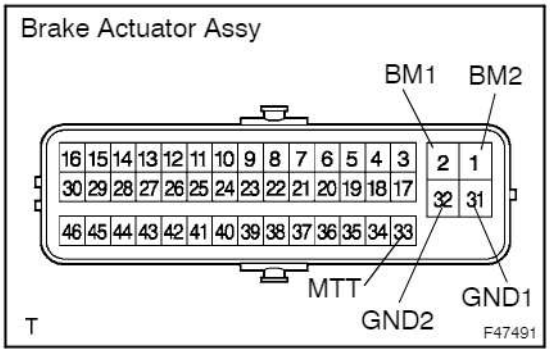
ABS–1	Below 1 Ω (Continuity)
ABS–2	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK

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3 INSPECT BRAKE ACTUATOR ASSY



(a) Disconnect the brake actuator assy connector.

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

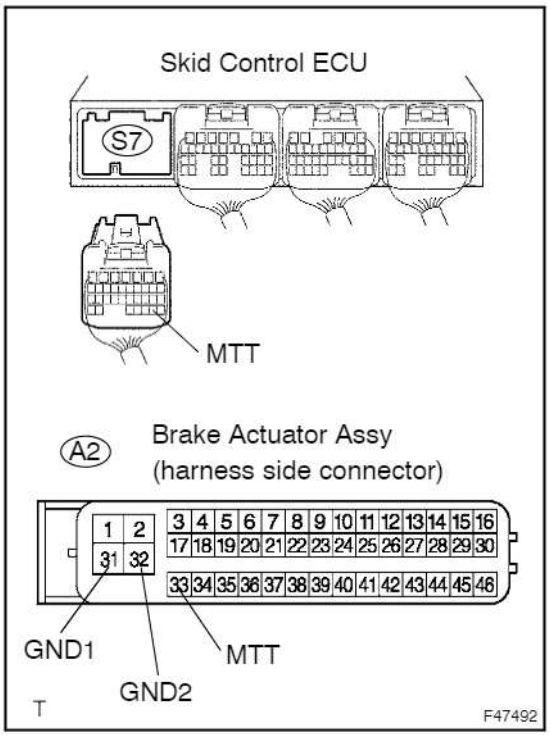
Standard:

Tester Connection	Specified Condition
1 (BM2) – 31 (GND1)	Below 10 Ω
2 (BM1) – 31 (GND1)	Below 10 Ω
1 (BM2) – 2 (BM1)	Below 1 Ω
31 (GND1) – 32 (GND2)	Below 1 Ω
1 (BM2) – 33 (MTT)	About 33 Ω
2 (BM1) – 33 (MTT)	About 33 Ω

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

4 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU – BRAKE ACTUATOR ASSY)



(a) Disconnect the skid control ECU connector and brake actuator assy connector.

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

Standard:

Tester Connection	Specified Condition
S7–29 (MTT) – A2–33 (MTT)	Below 1 Ω
A2–31 (GND1) – Body ground	Below 1 Ω
A2–32 (GND2) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the DTA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Accumulator Sensor 1	Accumulator pressure sensor 1 / min.: 0 V, max.: 5 V	Specified value: 3.2 to 4.0 V

(d) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester II with the motor stopped (not braking).
OK:
Accumulator (ACC) pressure sensor voltage does not drop.

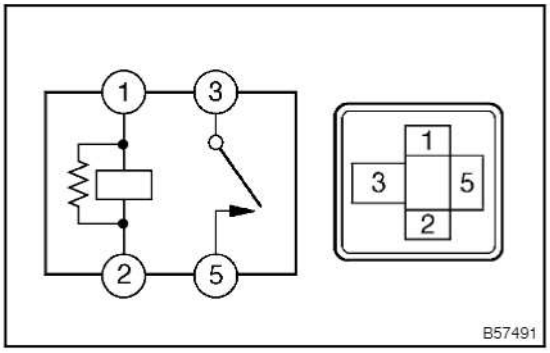
NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

6	INSPECT ABS MOTOR RELAY



(a) Remove the ABS motor relay and ABS motor relay 2.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

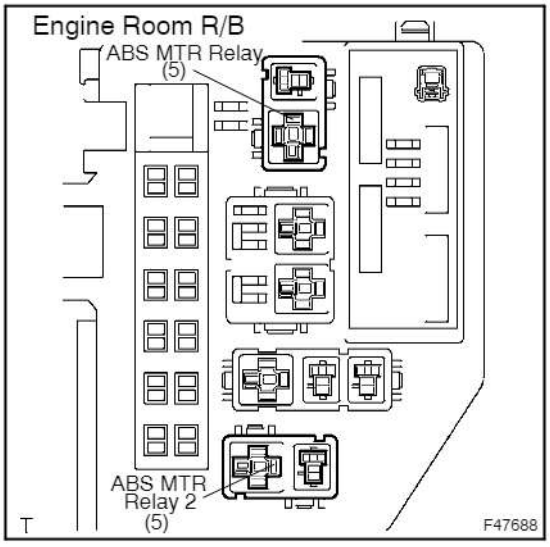
Tester Connection	Connection	Specified Resistance
3 – 5	Always	10 kΩ or higher (No continuity)
3 – 5	Apply B+ between terminal 1 and 2	Below 1 Ω

NG → **REPLACE ABS MOTOR RELAY**

OK

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7 CHECK HARNESS AND CONNECTOR



(a) Remove the ABS motor relay and ABS motor relay 2.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

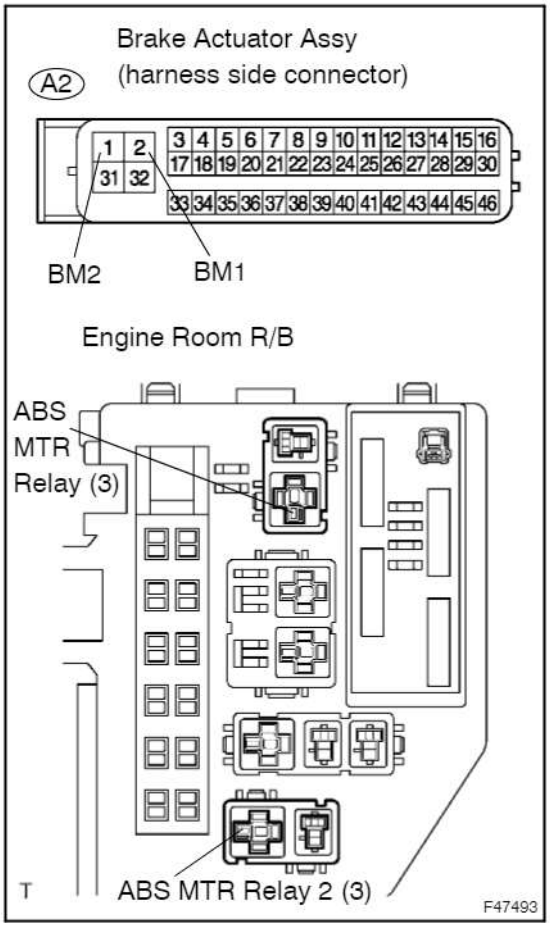
Tester Connection	Specified Condition
ABS Motor Relay (5) – Body ground	10 to 14 V
ABS Motor Relay 2 (5) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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8	CHECK HARNESS AND CONNECTOR(ENGINE ROOM R/B – BRAKE ACTUATOR)



(a) Disconnect the Brake actuator assy connector.
(b) Remove the ABS MTR Relay and ABS MTR Relay 2.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
A2–1 (BM2) – ABS MTR Relay 2 (3)	Below 1 Ω
A2–2 (BM1) – ABS MTR Relay (3)	Below 1 Ω

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

Standard:

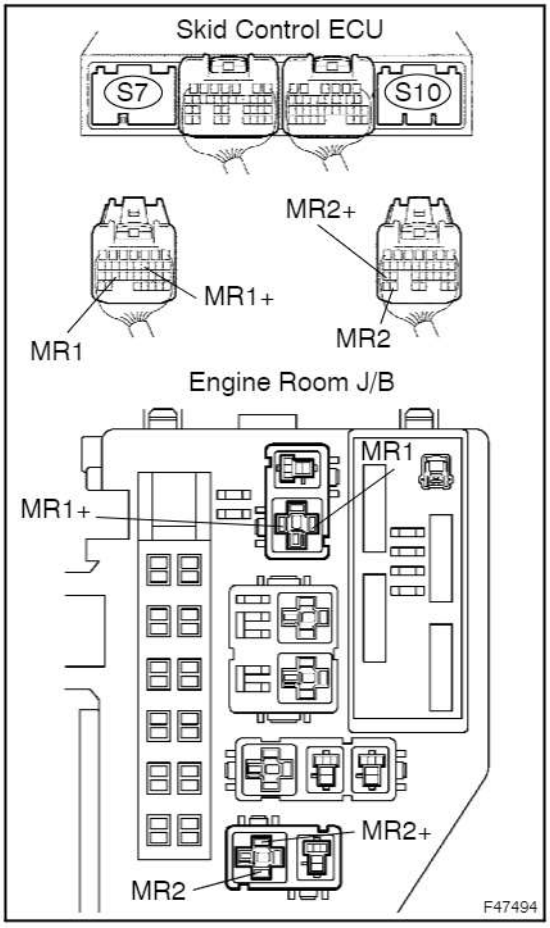
Tester Connection	Specified Condition
A2–1 (BM2) – Body ground	10 kΩ or higher
A2–2 (BM1) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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9	CHECK HARNESS AND CONNECTOR(ENGINE ROOM R/B – SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector.
(b) Remove the ABS MTR Relay and ABS MTR Relay 2.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S7–11 (MR1+) – ABS MTR Relay (2)	Below 1 Ω
S7–25 (MR1) – ABS MTR Relay (1)	Below 1 Ω
S10–25 (MR2+) – ABS MTR 2 Relay (2)	Below 1 Ω
S10–30 (MR2) – ABS MTR 2 Relay (1)	Below 1 Ω

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

Standard:

Tester Connection	Specified Condition
S7–11 (MR1+) – Body ground	10 kΩ or higher
S7–25 (MR1) – Body ground	10 kΩ or higher
S10–25 (MR2+) – Body ground	10 kΩ or higher
S10–30 (MR2) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC C1256/57 ACCUMULATOR LOW PRESSURE

CIRCUIT DESCRIPTION

The accumulator pressure sensor is built into the actuator and detects the accumulator pressure.
The skid control ECU turns on the Brake Control warning lamp and sounds the skid control buzzer if it senses a decrease in the accumulator pressure.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1256/57	141	• Braking operation is input when accumulator pressure is less than 12.45 MPa and vehicle speed is input (detected value changes if accumulator pressure is low after system start). • Accumulator pressure is less than 14.62 MPa for 120 sec. (changes according to power source voltage) after system start (stores the DTC after the conditions are met, and drives buzzer).	• Brake actuator assy (accumulator pressure, accumulator pressure sensor, pump motor)
C1256/57	143	• Any of the wheel cylinder pressure sensor value is lower than the target value for at least 0.5 sec. when accumulator pressure is less than 14.62 MPa and vehicle speed is input. • Accumulator pressure changes little when accumulator pressure is less than 14.62 MPa for at least 1 sec. without braking (pump motor is operating). • Accumulator pressure is less than 14.62 MPa for at least 0.5 sec. when motor relay is malfunctioning.	• Brake actuator assy (accumulator pressure, accumulator pressure sensor, pump motor)

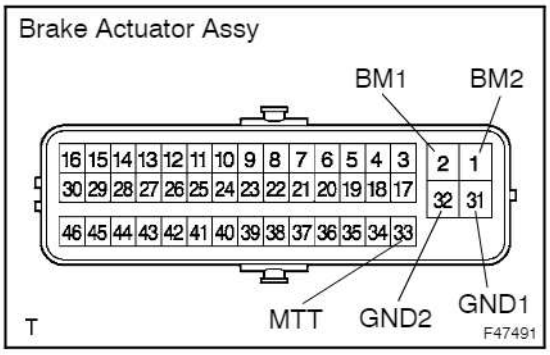
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INSPECTION PROCEDURE

HINT:

DTCs may be output if the accumulator pressure drops due to frequent braking (this is not a malfunction).

1	INSPECT BRAKE ACTUATOR ASSY



(a) Disconnect the brake actuator assy connector.

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

Standard:

Tester Connection	Specified Condition
1 (BM2) – 31 (GND1)	Below 10 Ω
2 (BM1) – 31 (GND1)	Below 10 Ω
1 (BM2) – 2 (BM1)	Below 1 Ω
31 (GND1) – 32 (GND2)	Below 1 Ω
1 (BM2) – 33 (MTT)	About 10 Ω
2 (BM1) – 33 (MTT)	About 10 Ω

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (READY).

(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Accumulator Sensor 1	Accumulator pressure sensor 1 / min.: 0 V, max.: 5 V	Specified value: 3.2 to 4.0 V

(d) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester II with the motor stopped (not braking).

OK:

ACC pressure sensor's output voltage does not drop.

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1259/58	HV SYSTEM REGENERATIVE MALFUNCTION

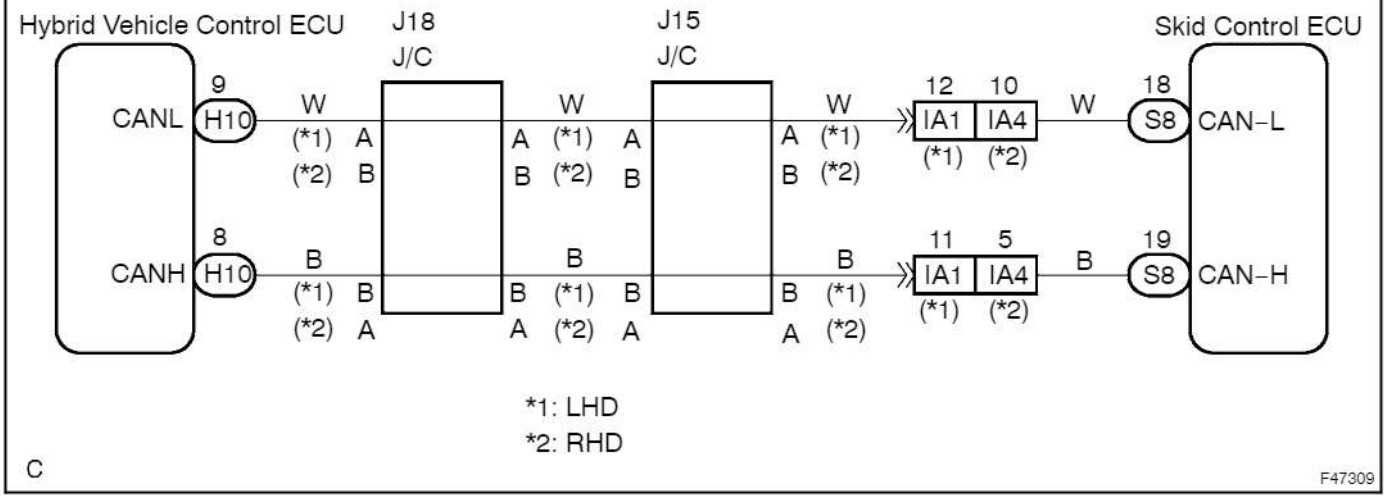
DTC	C1310/51	MALFUNCTION IN HV SYSTEM

CIRCUIT DESCRIPTION

The skid control ECU communicates with the hybrid control ECU and controls braking force according to the motor's regenerative force.
The skid control ECU sends VSC+ signals to the hybrid control ECU and inputs operating signal from the hybrid control ECU.
The skid control ECU uses CAN communication for communication with the hybrid control ECU. If a communication malfunction is memorized, the skid control ECU prohibits VSC+ operation and a part of ECB control by fail safe function.
C1259/58 is stored if the power switch ON (READY) with the HV battery service plug disconnected.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1259/58	150	The regeneration malfunction signal is input for at least 0.02 sec. when IG2 terminal voltage is 9.5 V or more for at least 2 sec. and communication with hybrid control computer is valid.	• Hybrid control system
C1310/51	–	The traction control prohibition signal is received for at least 0.07 sec. when IG2 terminal voltage is 10.5 V or more for at least 1.5 sec. and communication with hybrid control computer is valid.	• Hybrid control system (VSC+)

WIRING DIAGRAM



HINT:
This DTC is output from the skid control ECU when the hybrid control ECU sends a malfunction signal to the skid control ECU.

INSPECTION PROCEDURE

CHECK HYBRID CONTROL SYSTEM (SEE PAGE 05–268)

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DTC C1300/– MALFUNCTION IN ECU

CIRCUIT DESCRIPTION

The skid control ECU outputs this DTC if malfunctions are found in the circuit inside the computer by self–diagnosis.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1300/–	–	Malfunction in skid control ECU	Skid control ECU

INSPECTION PROCEDURE

1	CHECK DTC

(a) Clear the DTCs (see page 05–738).
(b) Turn the power switch ON (READY).
(c) Check the same DTCs are recorded.
Result:

DTC is output	A
DTC is not output	B

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–729)**

A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1311/11	OPEN CIRCUIT IN MAIN RELAY 1

DTC	C1312/12	SHORT CIRCUIT IN MAIN RELAY 1

DTC	C1313/13	OPEN CIRCUIT IN MAIN RELAY 2

DTC	C1314/14	SHORT CIRCUIT IN MAIN RELAY 2

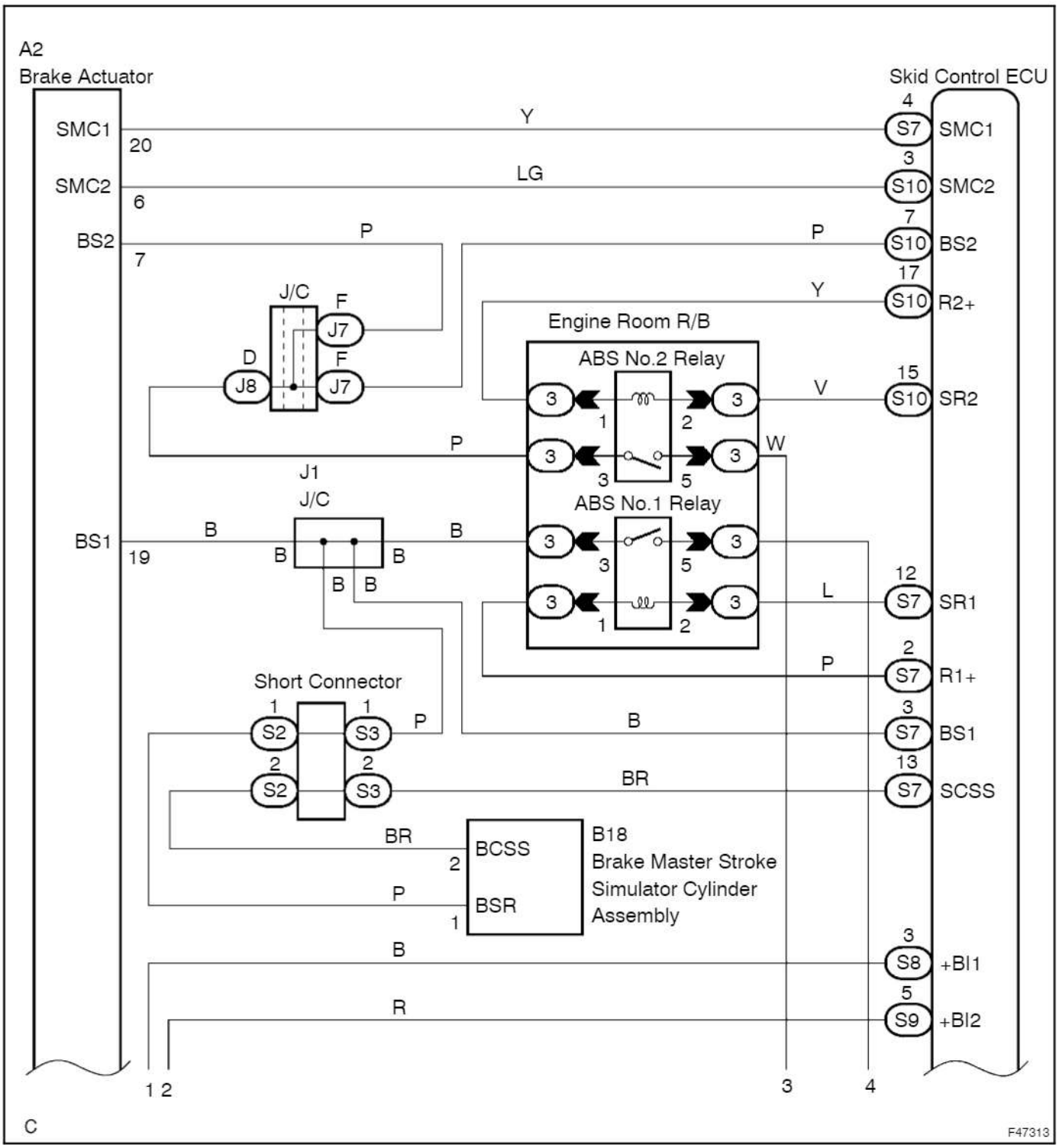
CIRCUIT DESCRIPTION

ABS main relay 1 (ABS No.1 relay) supplies power to the changeover solenoid and the linear solenoid. ABS main relay 2 (ABS No.2 relay) goes on for approximately 5 seconds after the power switch is turned off and the braking effort signal input is terminated. ABS main relay 2 (ABS No.2 relay) supplies electricity and maintains operating condition for the brake system when the power switch is off.

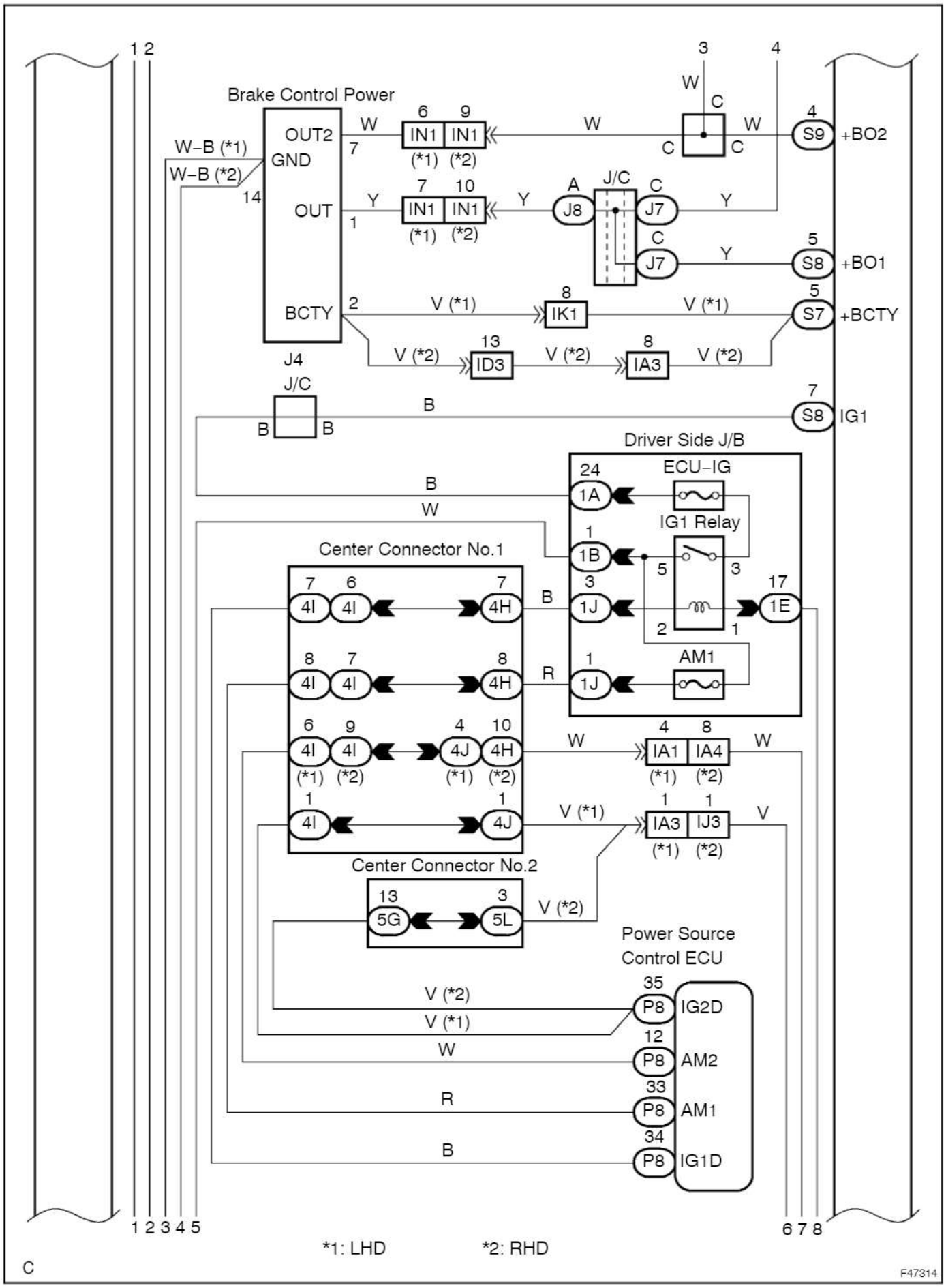
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1311/11	1	• Relay contact is off (BS 1 terminal is less than 3.5 V) for at least 0.2 sec. when R1+ terminal voltage is 9.5 V or more and main relay 1 is on. • R1+ terminal voltage is less than 9.5 V and main relay 1 cannot be on for at least 0.2 sec. when main relay 1 is turned on (BS 1 terminal is 3.5 V or more).	• ABS main relay 1 (ABS No.1 relay) • Skid control ECU • Harness and connector
C1312/12	3	Relay contact is on for at least 4 sec. when main relay 1 is off.	• ABS main relay 1 (ABS No.1 relay) • Skic control ECU • Harness and connector
C1313/13	4	• Relay contact is off (BS2 terminal is less than 3.5 V) for at least 0.2 sec. when R2+ terminal voltage is 9.5 V or more and main relay 2 is on. • R2+ terminal voltage is less than 9.5 V and main relay 2 cannot be on for at least 2 sec. when main relay 2 is turned on (BS 1 terminal is 3.5 V or more).	• ABS main relay 2 (ABS No.2 relay) • Skid control ECU • Harness and connector
C1314/14	6	Relay contact is on for at least 4 sec. when main relay 2 is off.	• ABS main relay 2 (ABS No.2 relay) • Skid control ECU • Harness and connector

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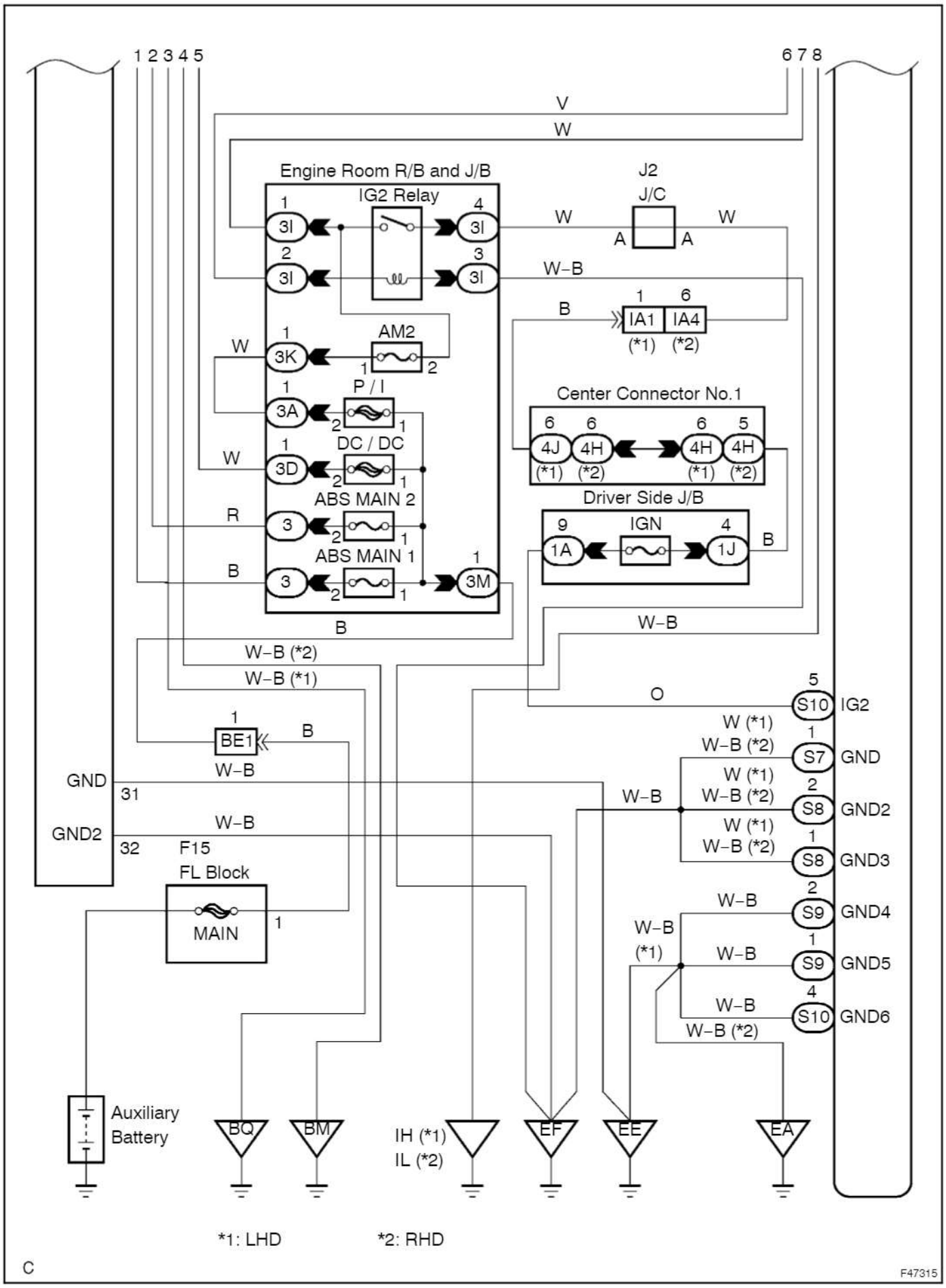
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(ABS NO.1 RELAY, ABS NO.2 RELAY OPERATION)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the ACTIVE TEST mode on the intelligent tester II.
(d) Check the operation sound of the ABS No.1, ABS No.2 relay.

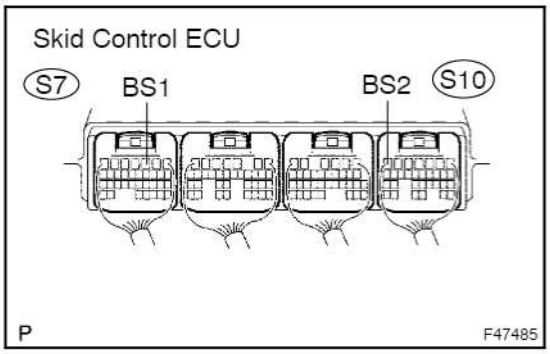
Item	Vehicle Condition / Test Details	Diagnostic Note
ECB Main Relay 1	Turns MAIN RELAY 1 ON / OFF	Operation of solenoid (clicking sound) can be heard
ECB Main Relay 2	Turns MAIN RELAY 2 ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:
Operation sound of ABS No.1 relay and ABS No.2 relay should be heard.

NG → **Go to step 3**

OK

2	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(BS1, BS2 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:
Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S7–3 (BS1) – Body ground	10 to 14 V
S10–7 (BS2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

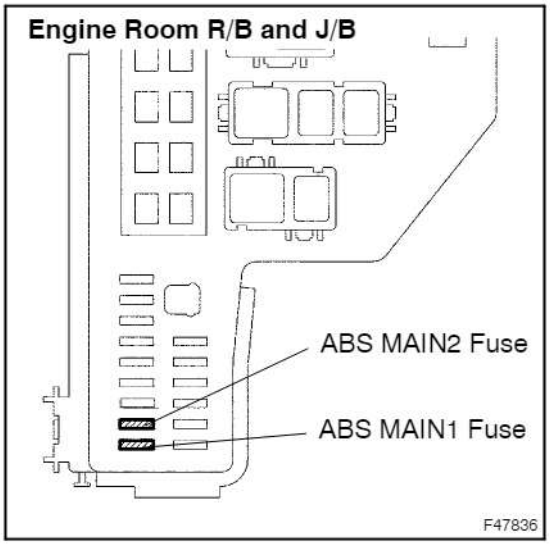
OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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3 INSPECT FUSE (ABS MAIN 1, ABS MAIN 2 FUSE)



(a) Remove the ABS MAIN 1 and ABS MAIN 2 fuse.
(b) Measure the resistance according to the value(s) in the table below.

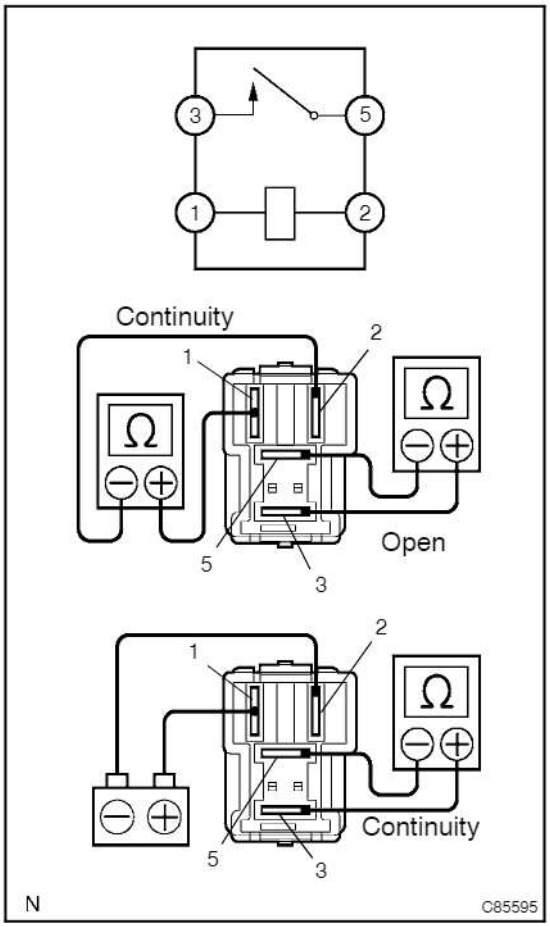
Standard:

ABS MAIN 1 Fuse	Below 1 Ω (Continuity)
ABS MAIN 2 Fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK

4 INSPECT ABS RELAY(ABS MAIN RELAY 1, ABS MAIN RELAY 2)



(a) Remove the ABS main relay 1 (ABS No.1 relay) and ABS main relay 2 (ABS No.2 relay).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
Terminal 1 – Terminal 2	100 Ω
Terminal 3 – Terminal 5	10 kΩ or higher (No Continuity)

(c) Apply battery voltage between terminals 1 and 2.
(d) Measure the resistance according to the value(s) in the table below.

Standard:

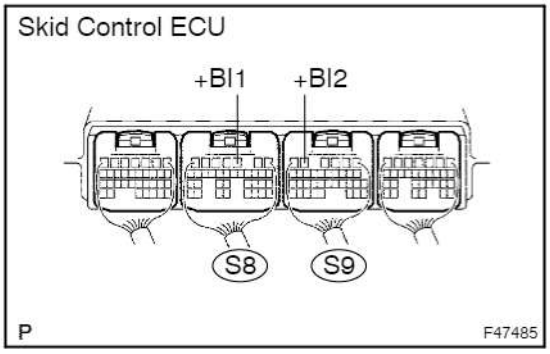
Tester Connection	Specified Condition
Terminal 3 – Terminal 5	Below 1 Ω (Continuity)

NG → **REPLACE ABS RELAY**

OK

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5 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(+BI1, +BI2 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

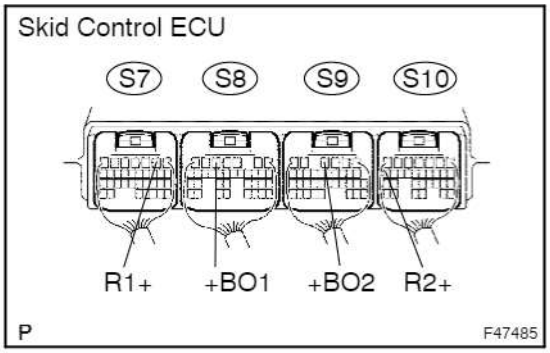
Standard:

Tester Connection	Specified Condition
S8–3 (+BI1) – Body ground	10 to 14 V
S9–5 (+BI2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(+BO1, +BO2, R1+, R2+ TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

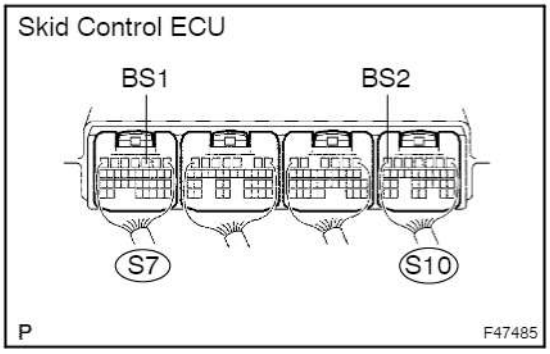
Tester Connection	Specified Condition
S7–2 (R1+) – Body ground	10 to 14 V
S8–5 (+BO1) – Body ground	10 to 14 V
S9–4 (+BO2) – Body ground	10 to 14 V
S10–17 (R2+) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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7	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(BS1, BS2 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S7–3 (BS1) – Body ground	10 to 14 V
S10–7 (BS2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1315/31	CHANGEOVER SOLENOID MALFUNCTION (SMC1)

DTC	C1316/32	CHANGEOVER SOLENOID MALFUNCTION (SMC2)

DTC	C1352/21	INCREASING PRESSURE SOLENOID MALFUNCTION (FR)

DTC	C1353/23	INCREASING PRESSURE SOLENOID MALFUNCTION (FL)

DTC	C1354/25	INCREASING PRESSURE SOLENOID MALFUNCTION (RR)

DTC	C1355/27	INCREASING PRESSURE SOLENOID MALFUNCTION (RL)

DTC	C1356/22	DECREASING PRESSURE SOLENOID MALFUNCTION (FR)

DTC	C1357/24	DECREASING PRESSURE SOLENOID MALFUNCTION (FL)

DTC	C1358/26	DECREASING PRESSURE SOLENOID MALFUNCTION (RR)

DTC	C1359/28	DECREASING PRESSURE SOLENOID MALFUNCTION (RR)

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CIRCUIT DESCRIPTION

Each solenoid adjust pressure which affects each wheel cylinder according to signals from the skid control ECU and controls the vehicle.

The master cut solenoid (SMC 1/2) is closed and blocks the master cylinder pressure from the ECB control pressure when the system is normal. The master cut solenoid is open and sends the master cylinder fluid pressure to the non–assisted brake wheel cylinders during the fail safe due to system malfunction.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1315/31	61	• SMC1 drive circuit is malfunctioning for 0.05 sec. or more. • Short to +B.	• Brake actuator assy (SMC1) • Skid control ECU • Harness and connector
C1315/31	62	Open circuit in SMC1 continues for 0.05 sec. or more when SMC1 is off	• Brake actuator assy (SMC1) • Skid control ECU • Harness and connector
C1315/31	63	Open circuit in SMC1 continues for 0.05 sec. or more when SMC1 is off.	• Brake actuator assy (SMC1) • Skid control ECU • Harness and connector
C1315/31	64	Over current in SMC1 continues for 0.05 sec. or more.	• Brake actuator assy (SMC1) • Skid control ECU • Harness and connector
C1316/32	66	• SMC1 driver circuit is malfunctioning for 0.05 sec. or more. • Short to +B.	• Brake actuator assy (SMC2) • Skid control ECU • Harness and connector
C1316/32	67	Open circuit in SMC2 continues for 0.05 sec. or more when SMC2 is off.	• Brake actuator assy (SMC2) • Skid control ECU • Harness and connector
C1316/32	68	Open circuit in SMC2 continues for 0.05 sec. or more.	• Brake actuator assy (SMC2) • Skid control ECU • Harness and connector
C1316/32	69	Over current in SMC2 continues for 0.05 sec. or more.	• Brake actuator assy (SMC2) • Skid control ECU • Harness and connector
C1352/21	11	Open circuit in SLAFR continues for 0.05 sec. or more when SLAFR is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1352/21	12	Open circuit in SLAFR continues for 0.05 sec. or more when SLAFR is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1352/21	13	Short to +B or voltage leak in SLAFR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1352/21	14	Over current in SLAFR continues for 0.05 sec. or more	• Brake actuator assy • Skid control ECU • Harness and connector
C1353/23	21	Open circuit in SLAFL continues for 0.05 sec. or more when SLAFL is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1353/23	22	Open circuit in SLAFL continues for 0.05 sec. or more when SLAFL is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1353/23	23	Short to +B or voltage leak in SLAFL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1353/23	24	Over current in SLAFL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1354/25	31	Open circuit in SLARR continues for 0.05 sec. or more when SLARR is off	• Brake actuator assy • Skid control ECU • Harness and connector

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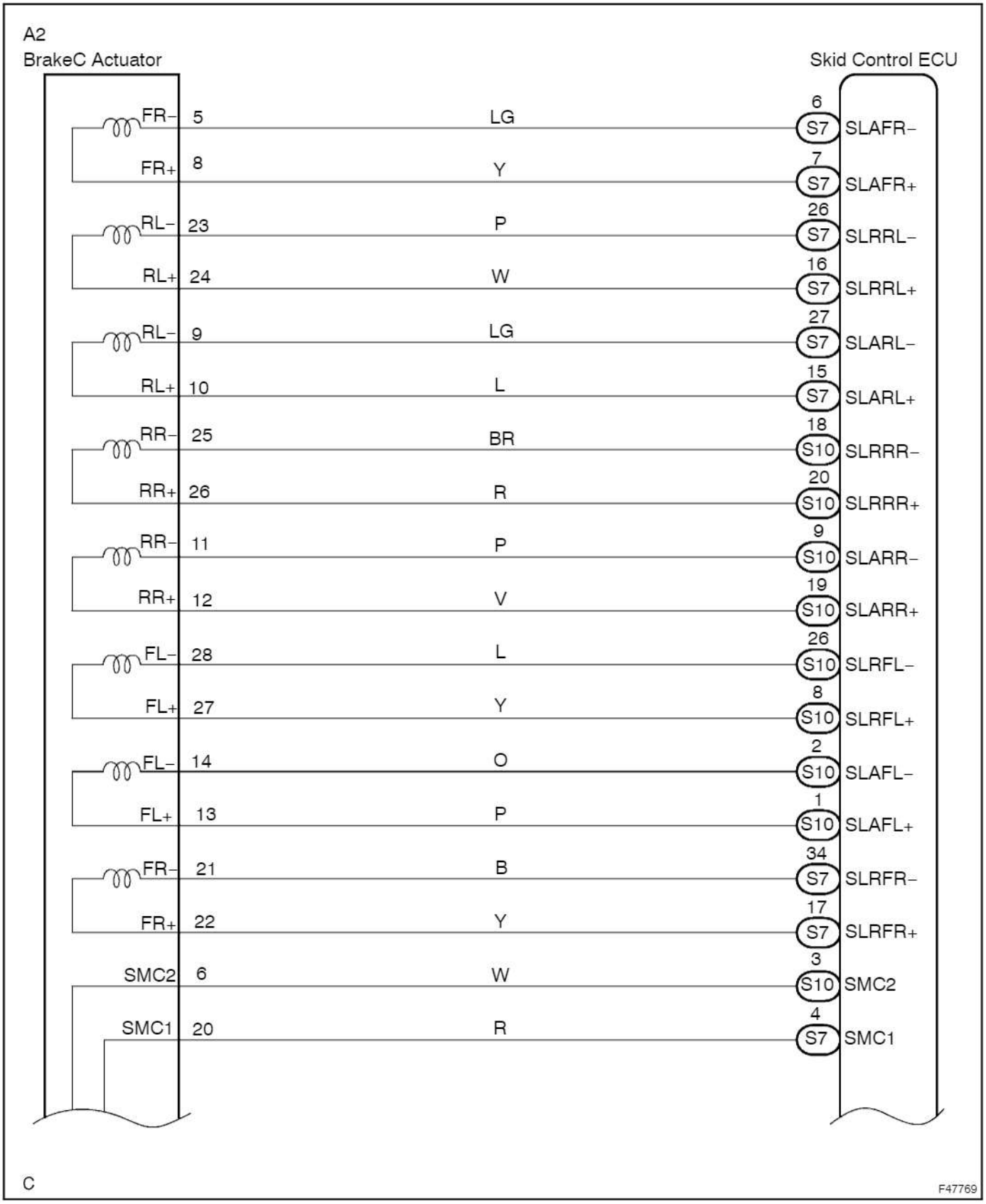
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1354/25	32	Open circuit in SLARR continues for 0.05 sec. or more when SLARR is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1354/25	33	Short to +B or voltage leak in SLARR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1354/25	34	Over current in SLARR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1355/27	41	Open circuit in SLARL continues for 0.05 sec. or more when SLARL is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1355/27	42	Open circuit in SLARL continues for 0.05 sec. or more when SLARL is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1355/27	43	Short to +B or voltage leak in SLARL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1355/27	44	Over current in SLARL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1356/22	16	Open circuit in SLRFR continues for 0.05 sec. or more when SLRFR is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1356/22	17	Open circuit in SLRFR continues for 0.05 sec. or more when SKRFR is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1356/22	18	Short to +B or voltage leak in SLRFR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1356/22	19	Over current in SLRFR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1357/24	26	Open circuit in SLRFL continues or 0.05 sec. or more when SLRFL is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1357/24	27	Open circuit in SLRFL continues for 0.05 sec. or more when SLRFL is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1357/24	28	Short to +B or voltage leak in SLRFL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1357/24	29	Over current in SLRFL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1358/26	36	Open circuit in SLRRR continues for 0.05 sec. or more when SLRRR is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1358/26	37	Open circuit in SLRRR continues for 0.05 sec. or more when SLRRR is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1358/26	38	Short to +B or voltage leak in SLRRR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1358/26	39	Over current in SLRRR continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector

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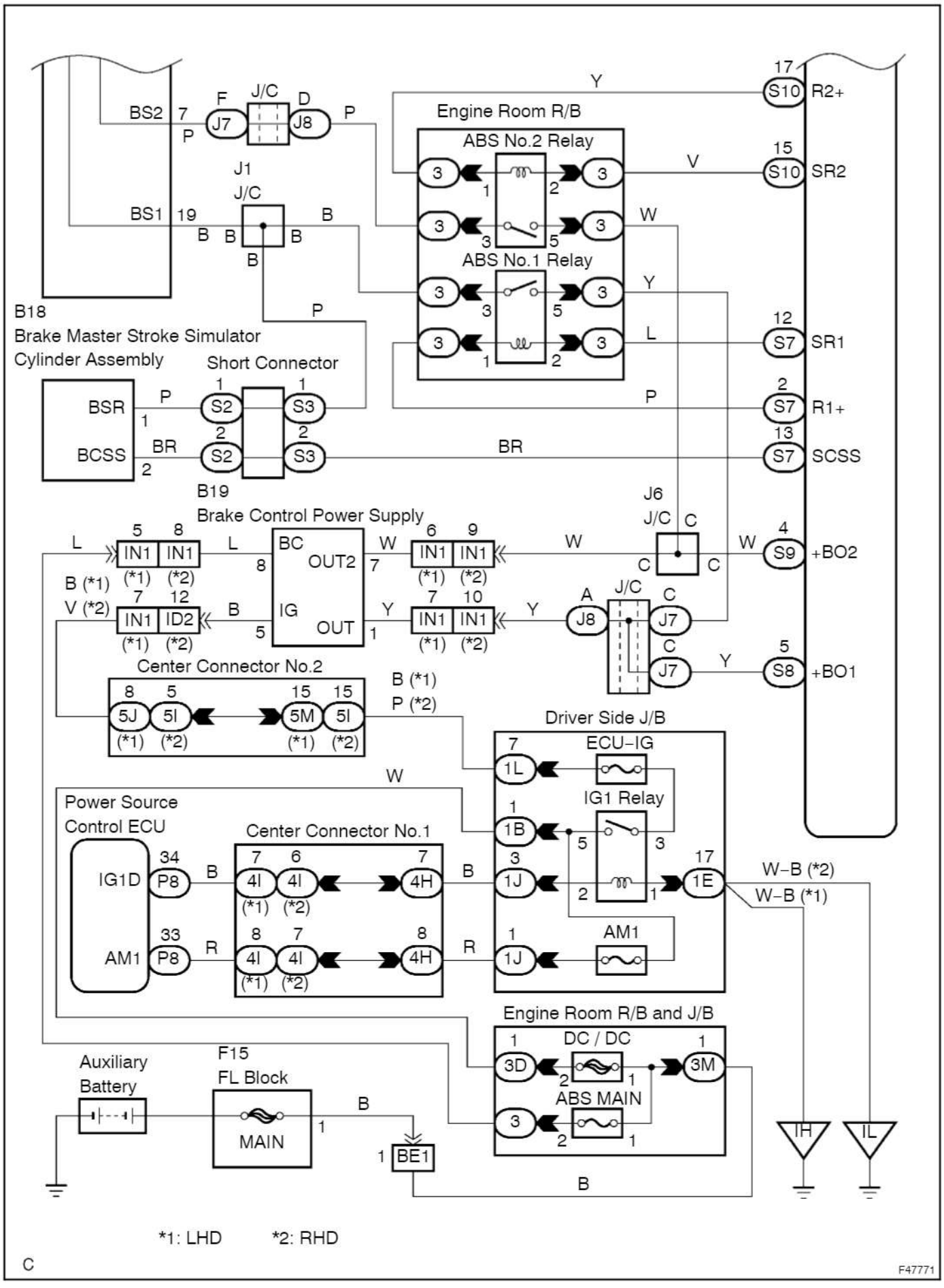
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1359/28	46	Open circuit in SLRRL continues for 0.05 sec. or more when SLRRL is off.	• Brake actuator assy • Skid control ECU • Harness and connector
C1359/28	47	Open circuit in SLRRL continues for 0.05 sec. or more when SLRRL is on.	• Brake actuator assy • Skid control ECU • Harness and connector
C1359/28	48	Short to +B or voltage leak in SLRRL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector
C1359/28	49	Over current in SLRRL continues for 0.05 sec. or more.	• Brake actuator assy • Skid control ECU • Harness and connector

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WIRING DIAGRAM



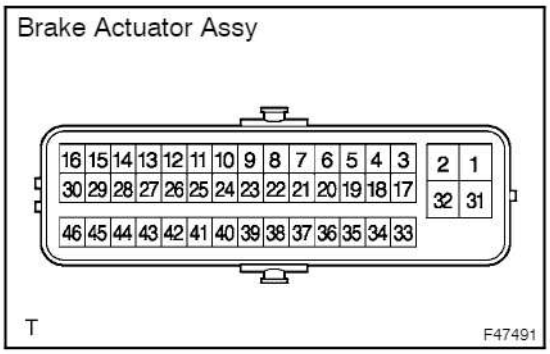
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INSPECTION PROCEDURE

1 INSPECT BRAKE ACTUATOR ASSY



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

HINT:
Check the brake actuator assy when it is cooled down.

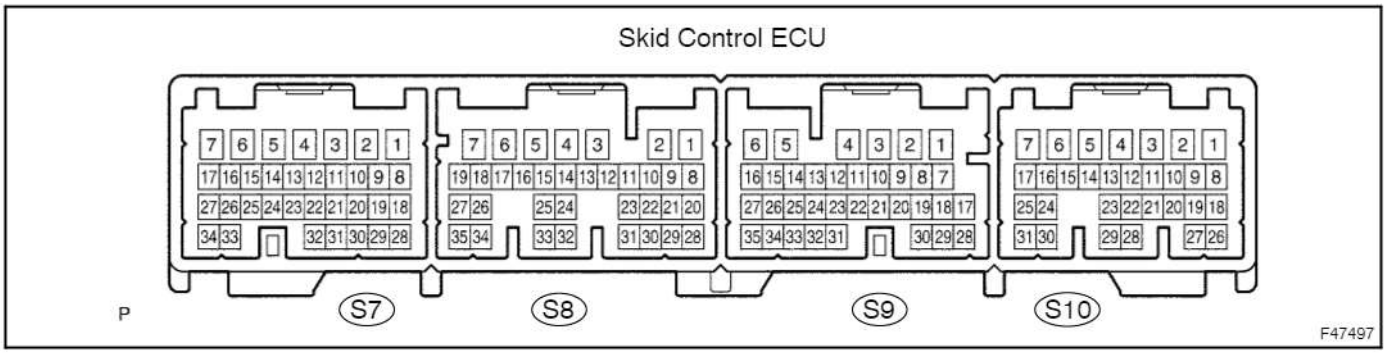
Standard:

Tester Connection	Specified Condition
20 (SMC1) – 7 (BS2)	14.6 to 24.6 Ω
6 (SMC2) – 19 (BS1)	14.6 to 24.6 Ω
8 (FR+) – 5 (FR–)	3.5 to 4.3 Ω
22 (FR+) – 21 (FR–)	3.5 to 4.3 Ω
13 (FL+) – 14 (FL–)	3.5 to 4.3 Ω
27 (FL+) – 28 (FL–)	3.5 to 4.3 Ω
12 (RR+) – 11 (RR–)	3.5 to 4.3 Ω
10 (RL+) – 9 (RL–)	3.5 to 4.3 Ω

NG → **REPLACE BRAKE ACTUATOR ASSY** (SEE PAGE 32–66)

OK

2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
S7–4 (SMC1) – Body ground	Power switch ON (READY) Brake pedal release	Below 10 to 14 V
S10–3 (SMC2) – Body ground	Power switch ON (READY) Brake pedal release	Below 10 to 14 V
S7–7 (SLAFR+) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S7–6 (SLAFR–) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S10–1 (SLAFL+) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S10–2 (SLAFL–) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)

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Tester Connection	Condition	Specified Condition
S10–19 (SLARR+) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S10–9 (SLARR–) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S7–15 (SLARL+) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S7–27 (SLARL–) – Body ground	Power switch ON (READY) Brake pedal release	Pulse generation (see waveform 5) (see page 05–731)
S7–17 (SLRFR+) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S10–8 (SLRFL+) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S10–20 (SLRRR+) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S7–16 (SLRRL+) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S7–34 (SLRFR–) – Body ground	Power switch ON (READY)	Below 1.5 V
S10–26 (SLRFL–) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S10–18 (SLRRR–) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V
S7–26 (SLRRL–) – Body ground	Power switch ON (READY) Brake pedal release	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC C1319/35 CHANGEOVER SOLENOID MALFUNCTION

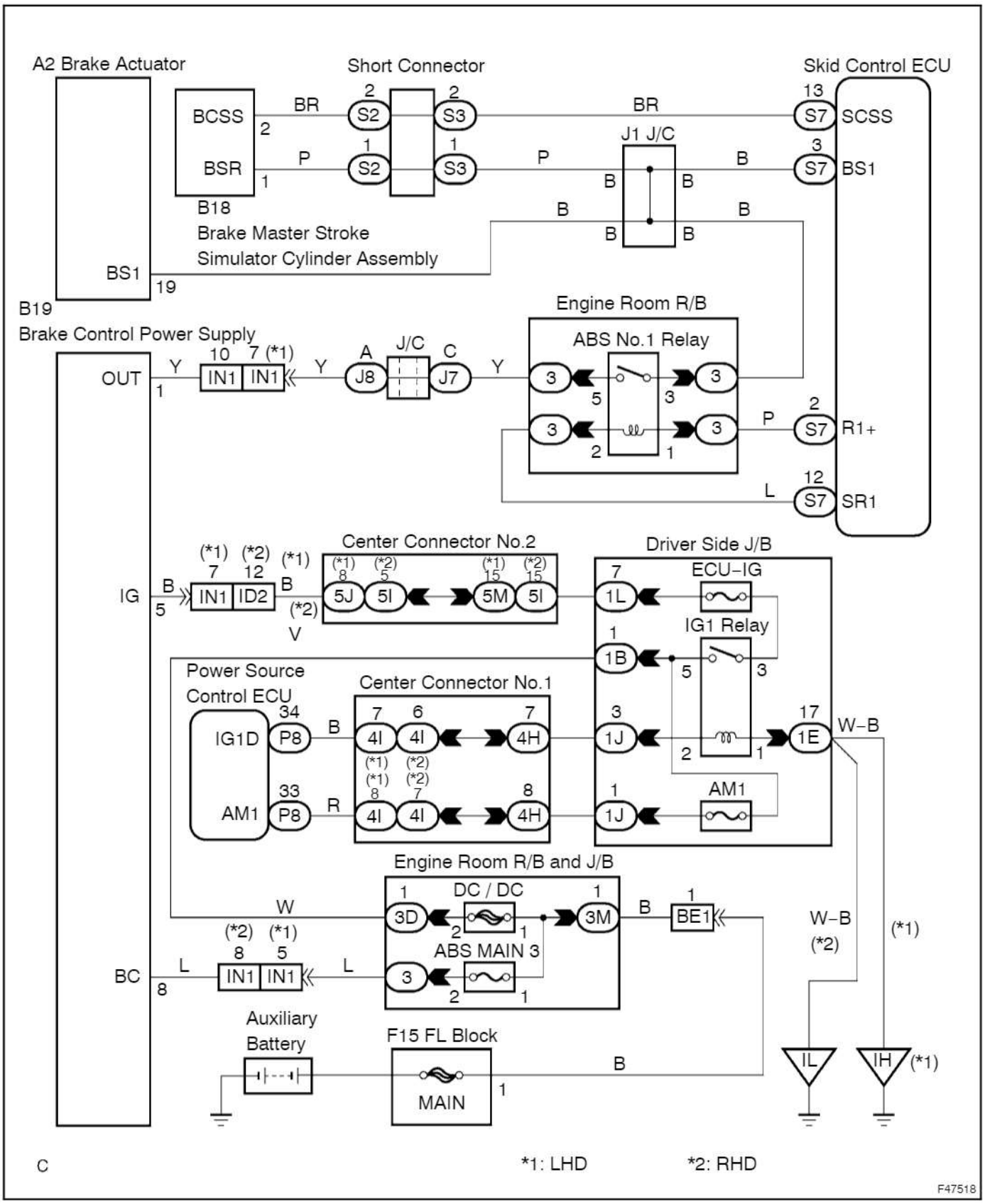
CIRCUIT DESCRIPTION

The stroke simulator solenoid (SCSS) generates pedal reactive effort during ECB control. If one of the 4 wheels loses brake booster function, the stroke simulator operation is prohibited.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1319/35	71	• SCSS drive circuit is malfunctioning for 0.05 sec. or more. • Short to +B in SCSS.	• Stroke simulator • Skid control ECU • Harness and connector
C1319/35	72	Current leaks for 0.05 sec. or more when SCSS is off.	• Stroke simulator • Skid control ECU • Harness and connector
C1319/35	73	Open circuit in SCSS continues for 0.05 sec. or more.	• Stroke simulator • Skid control ECU • Harness and connector
C1319/35	74	Over current in SCSS continues for 0.05 sec. or more.	• Stroke simulator • Skid control ECU • Harness and connector

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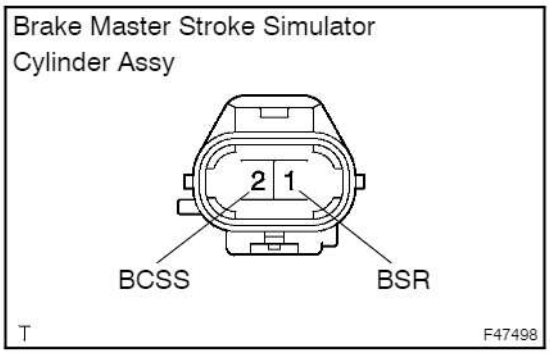
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT BRAKE MASTER STROKE SIMULATOR CYLINDER ASSY



(a) Disconnect brake master stroke simulator cylinder assy connector.

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

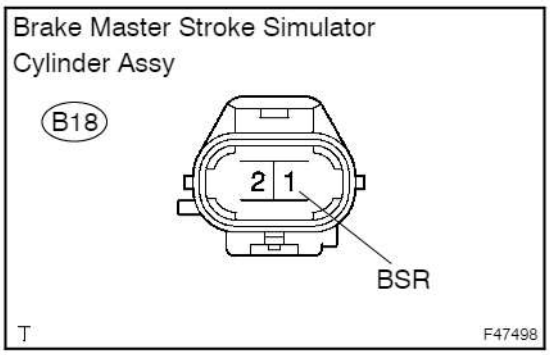
Standard:

Tester Connection	Specified Condition
1 (BSR) – 2 (BCSS)	22.3 to 38 Ω

NG → **REPLACE BRAKE MASTER STROKE SIMULATOR CYLINDER ASSY**

OK

2 INSPECT BRAKE MASTER STROKE SIMULATOR CYLINDER ASSY(BSR TERMINAL VOLTAGE)



(a) Connect the brake master stroke simulator cylinder assy connector.

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

HINT:

Measure the voltage from the behind the connector with the connector connected.

Standard:

Tester Connection	Condition	Specified Condition
B18–1 (BSR) – Body ground	power switch ON (READY)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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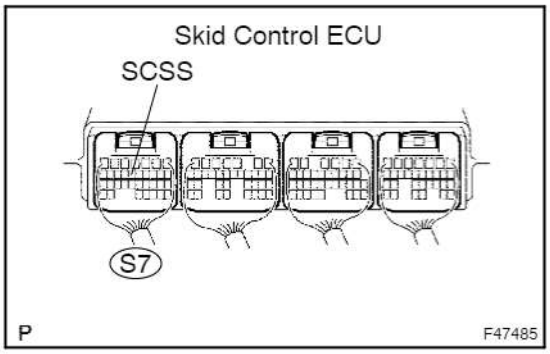
3 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(SCSS TERMINAL)

(a) Connect the intelligent tester II to the DLC3.

(b) Select the ACTIVE TEST mode on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
Stroke Simulator Cut Valve Pattern	Stroke simulator cut valve pattern activation ON / OFF	Operation of solenoid (clicking sound) can be heard

(c) Using intelligent tester II, turn the stroke simulator cylinder assy ON/OFF.



(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
S7–13 (SCSS) – Body ground	Brake Master Stroke Simulator Cylinder assy ON	Below 1.5 V
S7–13 (SCSS) – Body ground	Brake Master Stroke Simulator Cylinder assy OFF	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1341/62	MALFUNCTION IN HYDRAULIC SYSTEM (FR)

DTC	C1342/63	MALFUNCTION IN HYDRAULIC SYSTEM (FL)

DTC	C1343/64	MALFUNCTION IN HYDRAULIC SYSTEM (RR)

DTC	C1344/65	MALFUNCTION IN HYDRAULIC SYSTEM (RL)

CIRCUIT DESCRIPTION

The skid control ECU controls braking force according to the hybrid system regenerative braking force and inputs the fluid pressure necessary for operating each wheel cylinder according to the wheel cylinder pressure sensor.

DTCs may be stored if brake fluid leaks, wheel cylinder vibrates due to uneven wear of the brake disc rotor, or foreign matter enters the solenoid valve.

DTCs may be stored if the line pressure drops during air bleeding.

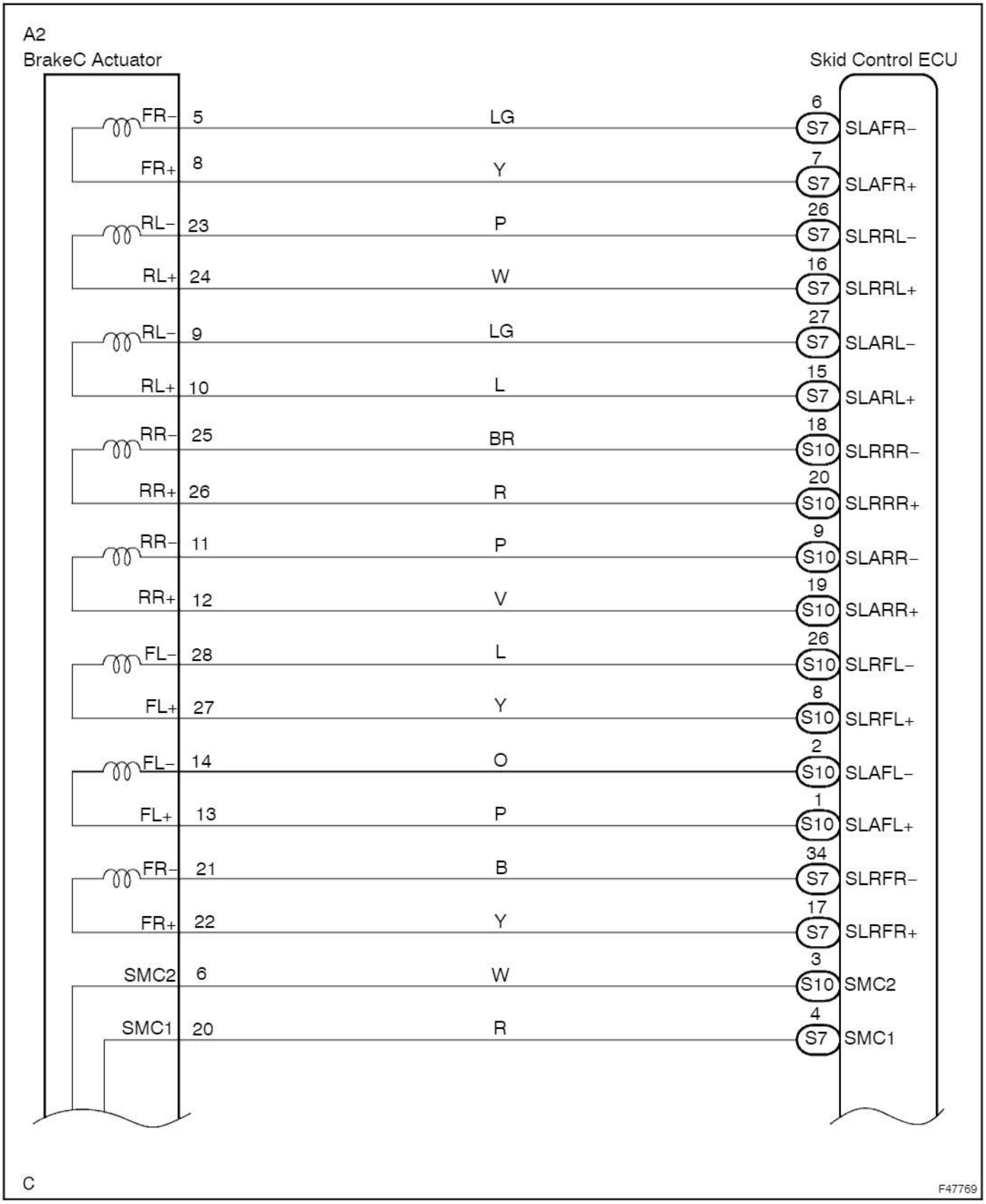
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1341/62	551	Hydraulic pressure control on FR wheel has deteriorated.	• Fluid leakage • Brake actuator assy
C1341/62	552	Hydraulic pressure control on FR wheel has deteriorated.	• Fluid leakage • Brake actuator assy
C1341/62	553	There is a malfunction, such as leakage in the pressure increase control valve of FR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1341/62	554	There is a malfunction, such as leakage in the pressure decrease control valve of FR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1341/62	555	There is a malfunction, such as leakage in the pressure decrease control valve of FR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1342/63	561	Hydraulic pressure control on FL wheel has deteriorated.	• Fluid leakage • Brake actuator
C1342/63	562	Hydraulic pressure control on FL wheel has deteriorated.	• Fluid leakage • Brake actuator
C1342/63	563	There is a malfunction, such as leakage in pressure increase control valve of FL wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1342/63	564	There is a malfunction, such as leakage in pressure decrease control valve of FL wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1342/63	565	There is a malfunction, such as leakage in pressure decrease control valve of FL wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1343/64	571	Hydraulic pressure control on RR wheel has deteriorated.	• Fluid leakage • Brake actuator
C1343/64	572	Hydraulic pressure control on RR wheel has deteriorated.	• Fluid leakage • Brake actuator

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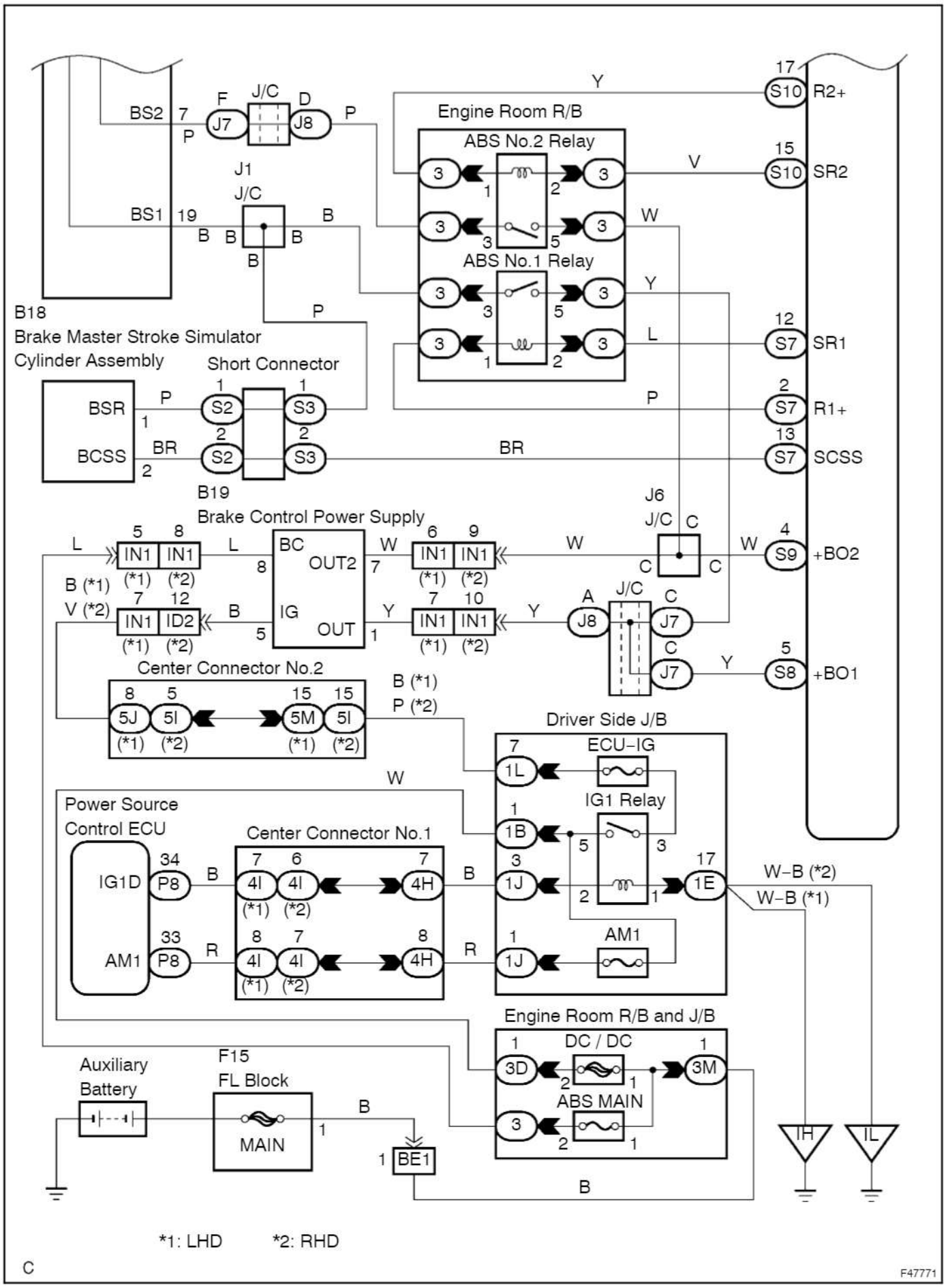
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1343/64	573	There is a malfunction, such as leakage in pressure increase control valve of RR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1343/64	574	There is a malfunction, such as leakage in pressure decrease control valve of RR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1343/64	575	There is a malfunction, such as leakage in pressure decrease control valve of RR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1344/65	581	Hydraulic pressure control on RL wheel has deteriorated.	• Fluid leakage • Brake actuator
C1344/65	582	Hydraulic pressure control on RL wheel has deteriorated.	• Fluid leakage • Brake actuator
C1344/65	583	There is a malfunction, such as leakage in pressure increase control valve of RR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1344/65	584	There is a malfunction, such as leakage in pressure decrease control valve of RR wheel.	• Fluid leakage • Brake actuator assy • Disc rotor
C1344/65	585	There is a malfunction, such as leakage in pressure decrease control valve of RL wheel.	• Fluid leakage • Brake actuator assy • Disc rotor

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WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When C1364/61 is output together with C1341/41, C1342/63, C1343/64 and C1344/65, inspect and repair the trouble areas indicated by C1364/61 first.

1	CHECK BRAKE FLUID LEAKAGE

(a) Check that there is no fluid leakage in the brake line between the brake actuator and the wheel cylinder which is the cause of DTCs.
(b) Check that the brake is not dragging.
OK:
There is no fluid leakage or dragging.

NG → **REPAIR OR REPLACE APPLICABLE PART**

OK

2	PERFORM AIR BLEED (SEE PAGE 32–4)

(a) Bleed the air out of the front and rear systems (see page 32–4).

3	RECONFIRM DTC

(a) Clear the DTCs.
(b) Turn the power switch ON (READY).
(c) Check if the same DTCs are recorded (see page 05–738).
Result:

DTC is output	A
DTC is not output	B

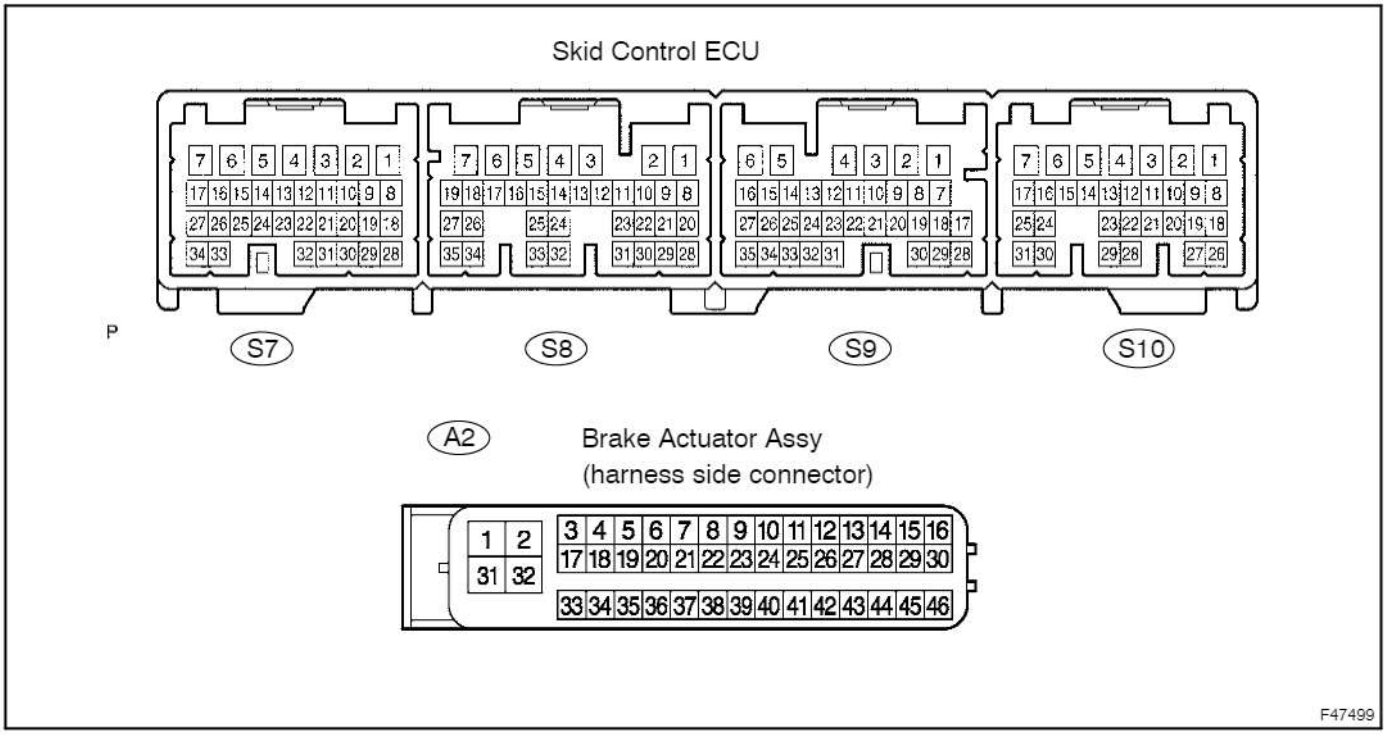
B → **END**

HINT:
DTC may be stored if foreign matter or air enters the solenoid valve.

A

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4	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU – BRAKE ACTUATOR ASSY)



(a) Disconnect the skid control ECU connectors and brake actuator connector.

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

Standard:

Tester Connection	Specified Condition
S7–6 (SLAFR–) – A2–5 (FR–)	Below 1 Ω
S7–7 (SLAFR+) – A2–8 (FR+)	Below 1 Ω
S7–15 (SLARL+) – A2–10 (RL+)	Below 1 Ω
S7–16 (SLRRL+) – A2–24 (RL+)	Below 1 Ω
S7–17 (SLRFR+) – A2–22 (FR+)	Below 1 Ω
S7–26 (SLRRL–) – A2–23 (RL–)	Below 1 Ω
S7–27 (SLARL–) – A2–9 (RL–)	Below 1 Ω
S7–34 (SLRFR–) – A2–21 (FR–)	Below 1 Ω
S10–1 (SLAFL+) – A2–13 (FL+)	Below 1 Ω
S10–2 (SLAFL–) – A2–14 (FL–)	Below 1 Ω
S10–8 (SLRFL+) – A2–27 (FL+)	Below 1 Ω
S10–9 (SLARR–) – A2–11 (RR–)	Below 1 Ω
S10–18 (SLRRR–) – A2–25 (RR–)	Below 1 Ω
S10–19 (SLARR+) – A2–12 (RR+)	Below 1 Ω
S10–20 (SLRRR+) – A2–26 (RR+)	Below 1 Ω
S10–26 (SLRFL–) – A2–28 (FL–)	Below 1 Ω

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

Tester Connection	Specified Condition
S7–6 (SLAFR–) – Body ground	10 kΩ or higher
S7–7 (SLAFR+) – Body ground	10 kΩ or higher
S7–15 (SLARL+) – Body ground	10 kΩ or higher
S7–16 (SLRRL+) – Body ground	10 kΩ or higher
S7–17 (SLRFR+) – Body ground	10 kΩ or higher
S7–26 (SLRRL–) – Body ground	10 kΩ or higher
S7–27 (SLARL–) – Body ground	10 kΩ or higher
S7–34 (SLRFR–) – Body ground	10 kΩ or higher
S10–1 (SLAFL+) – Body ground	10 kΩ or higher
S10–2 (SLAFL–) – Body ground	10 kΩ or higher
S10–8 (SLRFL+) – Body ground	10 kΩ or higher
S10–9 (SLARR–) – Body ground	10 kΩ or higher
S10–18 (SLRRR–) – Body ground	10 kΩ or higher
S10–19 (SLARR+) – Body ground	10 kΩ or higher
S10–20 (SLRRR+) – Body ground	10 kΩ or higher
S10–26 (SLRFL–) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the pedal effort gauge.
(b) Install the LSPV gauge (SST) and bleed air (see page 32–4).
SST 09709–29018
(c) Connect the intelligent tester II to the DLC3.
(d) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
FR Wheel Cylinder	Front Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
FL Wheel Cylinder	Front Left pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RR Wheel Cylinder	Rear Right pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RL Wheel Cylinder	Rear Left pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

(e) Check the output value of the wheel cylinder pressure at each fluid pressure during the ECB control.
Standard:

Front:

Fluid Pressure MPa (kgf/cm^2, psi)	FR PRESS SENS (DATA–LIST)	FL PRESS SENS (DATA–LIST)
3 (30.6, 435)	1.0 to 1.2 V	1.0 to 1.2 V
5.9 (59.8, 851)	1.6 to 1.8 V	1.6 to 1.8 V
7.9 (80.2, 1141)	2.0 to 2.2 V	2.0 to 2.2 V
9.9 (101.0, 1437)	2.35 to 2.6 V	2.35 to 2.6 V

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Rear:

Fluid Pressure MPa (kgf/cm^2, psi)	RR PRESS SENS (DATA–LIST)	RL PRESS SENS (DATA–LIST)
3.8 (38.7, 550)	1.15 to 1.35 V	1.15 to 1.35 V
4.0 (40.8, 580)	1.25 to 1.5 V	1.25 to 1.5 V

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

6	CHECK BRAKE DISC

(a) Disconnect the brake pedal stroke sensor connector.
(b) Carry out the running and braking test according to freeze frame data or customer problem analysis. Check the brake line pressure vibration caused due to uneven wear of the disc according to brake pedal vibration.
OK:
Brake pedal is not vibrates during braking.

HINT:
- The brake pedal does not kick back due to wheel cylinder piston vibration during ECB control.
- If the brake pedal stroke sensor connector is disconnected, the failsafe function prohibits ECB control.
- The active test does not prohibit ECB control when the vehicle is running, so disconnect the stroke sensor connector and carry out inspection.
- Disc wear can be checked by measuring the disc thickness.

NG → **REPLACE BRAKE DISC**

OK

REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC	C1345/66	NOT LEARNING LINEAR VALVE OFF SET ABNORMALITY

DTC	C1368/67	LINER VALVE OFFSET MALFUNCTION

CIRCUIT DESCRIPTION

The skid control ECU stores and corrects the difference in each individual part such as the stroke sensor, actuator solenoids, and stroke simulator solenoid. Perform initialization of linear solenoid valve and calibration if these parts are replaced.
The skid control ECU inputs the shift position P signal.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1345/66	501	Value of initialization of linear solenoid valve and calibration for the FR wheel is not stored.	• Initialization of linear solenoid valve and calibration undone
C1345/66	502	Value of initialization of linear solenoid valve and calibration for the FL wheel is not stored.	• Initialization of linear solenoid valve and calibration undone
C1345/66	503	Value of initialization of linear solenoid valve and calibration for the RR wheel is not stored.	• Initialization of linear solenoid valve and calibration undone
C1345/66	504	Value of initialization of linear solenoid valve and calibration for the RL wheel is not stored.	• Initialization of linear solenoid valve and calibration undone
C1368/67	505	Value of initialization of linear solenoid valve and calibration is not within the brake actuator's standard value.	• Initialization of linear solenoid valve and calibratio undone • Skid control ECU

INSPECTION PROCEDURE

1	PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION (SEE PAGE 05–721)

2	RECONFIRM DTC

(a) Clear the DTCs.
(b) Turn the power switch ON (READY).
(c) Check if the same DTCs are recorded (see page 05–738).
Result:

DTC is not output	A
DTC is output	B

B → REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)

A

END

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DTC	C1365/54	MALFUNCTION IN ACC PRESSURE SENSOR

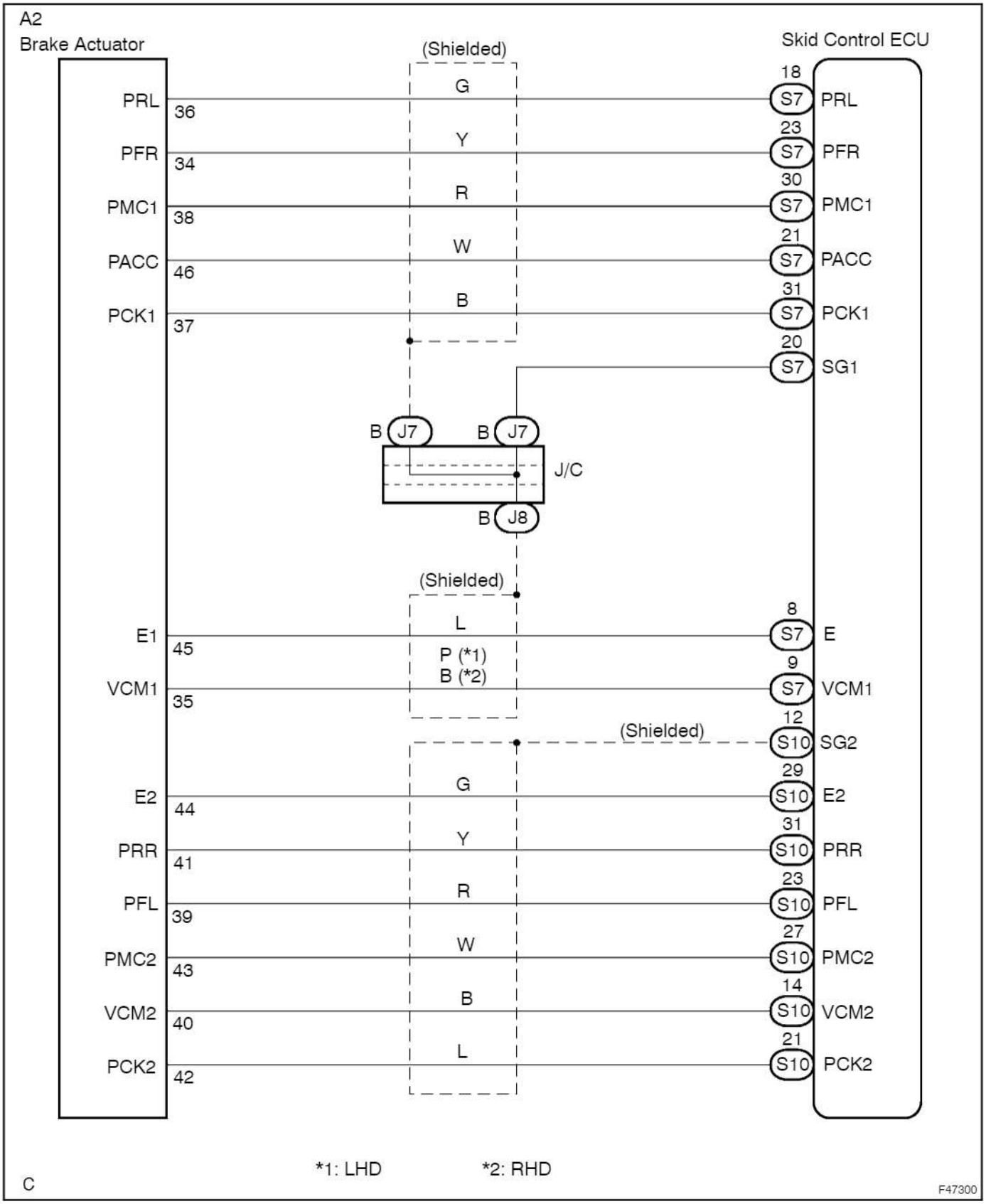
CIRCUIT DESCRIPTION

The accumulator (ACC) pressure sensor is built into the brake actuator.
The skid control ECU detects the accumulator pressure from the data sent from the accumulator pressure sensor, and then runs and stops the pump motor by operating the motor relay.
DTCs may be output if the accumulator pressure drops due to frequent braking (this is not a malfunction).

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1365/54	211	Sensor power 1 (VCM1) voltage is 4.7 V or less or 5.3 V or more for at least 0.05 sec.	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU
C1365/54	212	Ratio of accumulator pressure sensor output voltage (PACC) to sensor power 1 (VCM1) voltage is 5% or less or 90.5% or more for at least 0.05 sec.	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU
C1365/54	214	Total wheel cylinder pressure sensor exceeds 12 MPa after depressing brake pedal, but accumulator pressure sensor output voltage (PACC) changes less than 0.5 MPa for at least 0.5 sec.	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU
C1365/54	215	Ratio of accumulator pressure sensor output voltage (PACC) to sensor power 1 (VCM1) voltage is 90.5% or less for at least 0.1 sec. during self–diagnosis.	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU
C1365/54	216	Voltage difference is 0.3 V or more before and after changing the pull up resistance in sensor signal input circuit (loose contact).	• Brake actuator assy (accumulator pressure sensor) • Skid control ECU

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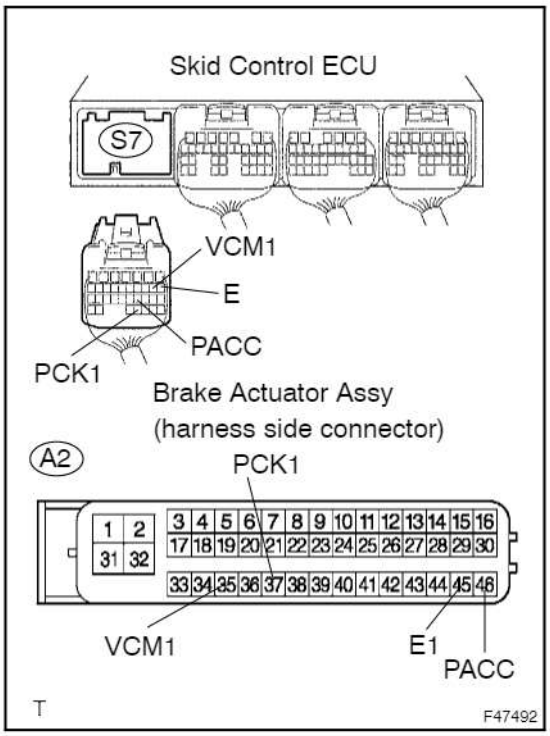
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR



(a) Disconnect the skid control ECU connector and brake actuator connector.

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

Standard:

Tester Connection	Specified Condition
S7–8 (E) – A2–45 (E1)	Below 1 Ω
S7–9 (VCM1) – A2–35 (VCM1)	Below 1 Ω
S7–21 (PACC) – A2–46 (PACC)	Below 1 Ω
S7–31 (PCK1) – A2–37 (PCK1)	Below 1 Ω

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

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

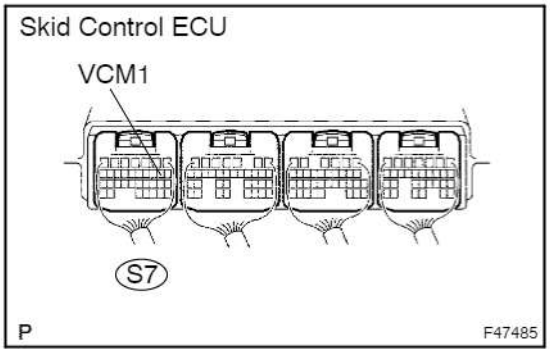
Tester Connection	Specified Condition
S7–8 (E) – Body ground	10 kΩ or higher
S7–9 (VCM1) – Body ground	10 kΩ or higher
S7–21 (PACC) – Body ground	10 kΩ or higher
S7–31 (PCK1) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(VCM1 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Condition	Specified Condition
S7–9 (VCM1) – Body ground	Power switch ON (READY)	4.75 to 5.25 V

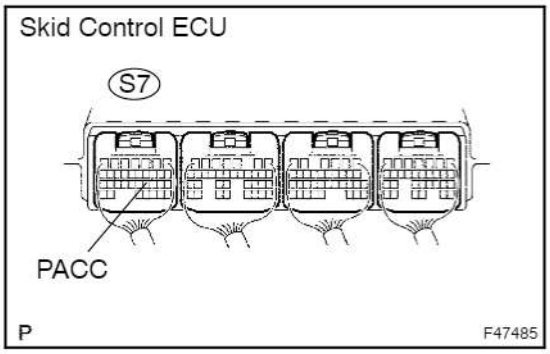
NG → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)**

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

OK

3 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(PACC TERMINAL)



(a) Check the auxiliary battery voltage.

Standard: 10 to 14 V

(b) Depress the brake pedal to operate the pump motor, and then check that the pump motor stops.

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

Standard:

Tester Connection	Specified Condition
S7–21 (PACC) – Body ground	3.3 to 4.7 V

NOTICE:

- **Do not depress the brake until after the pump motor stops and the voltage check is finished in order to keep the accumulator pressure.**
- **Check from behind the connector with the connector connected to the skid control ECU.**
- **Do not use a DATA LIST, as the sensor itself must be checked.**

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

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4	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Accumulator Sensor 1	Accumulator pressure sensor 1 / min.: 0 V, max.: 5 V	Specified value: 3.2 to 4.0 V

(d) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester II with the motor stopped (no braking).
OK:
Accumulator (ACC) pressure sensor voltage does not drop.

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC C1377/43 CAPACITOR MALFUNCTION

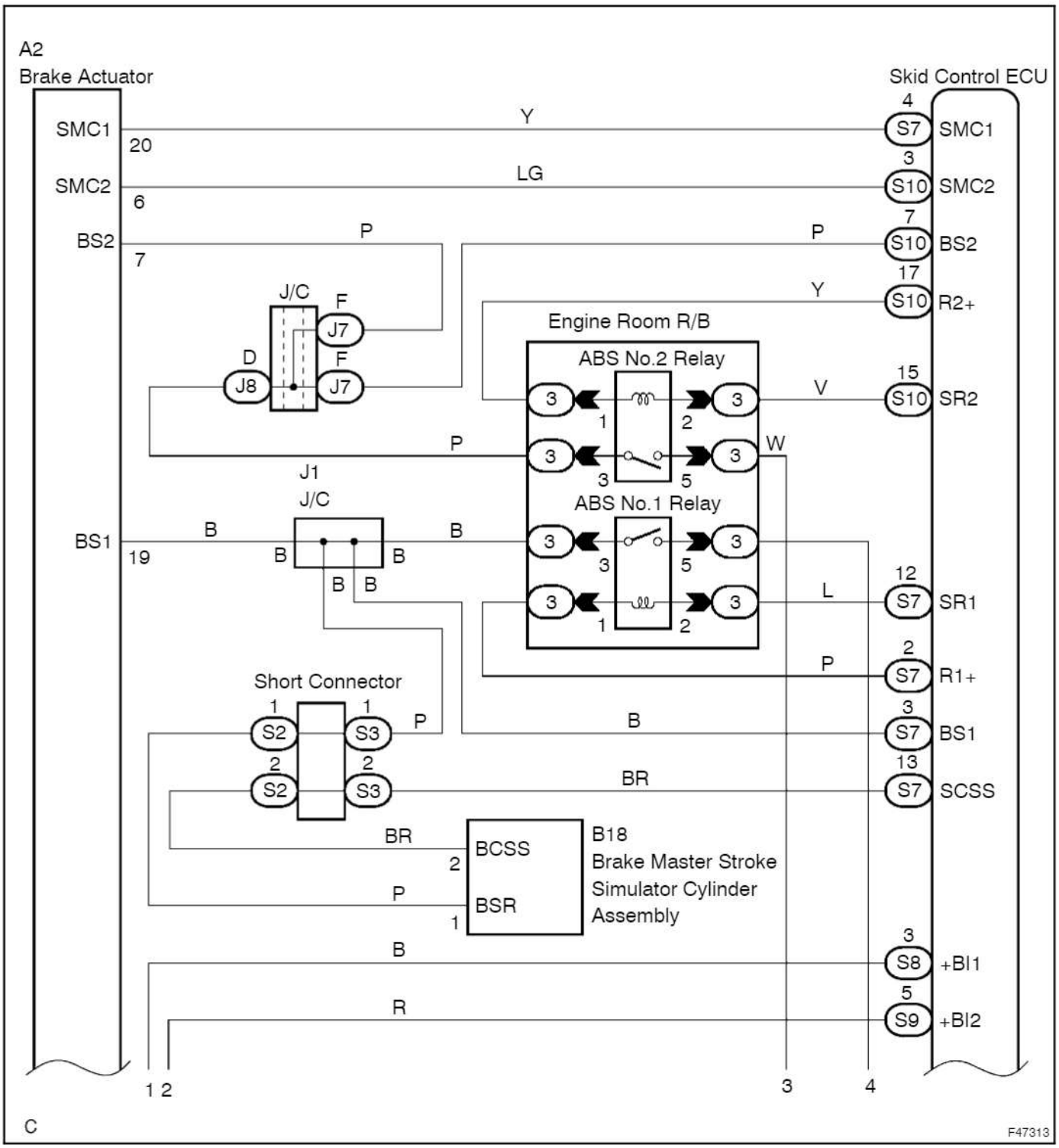
CIRCUIT DESCRIPTION

The brake control power supply assy (capacitor) provides auxiliary power for brake control when an auxiliary battery (12 V) voltage drops.

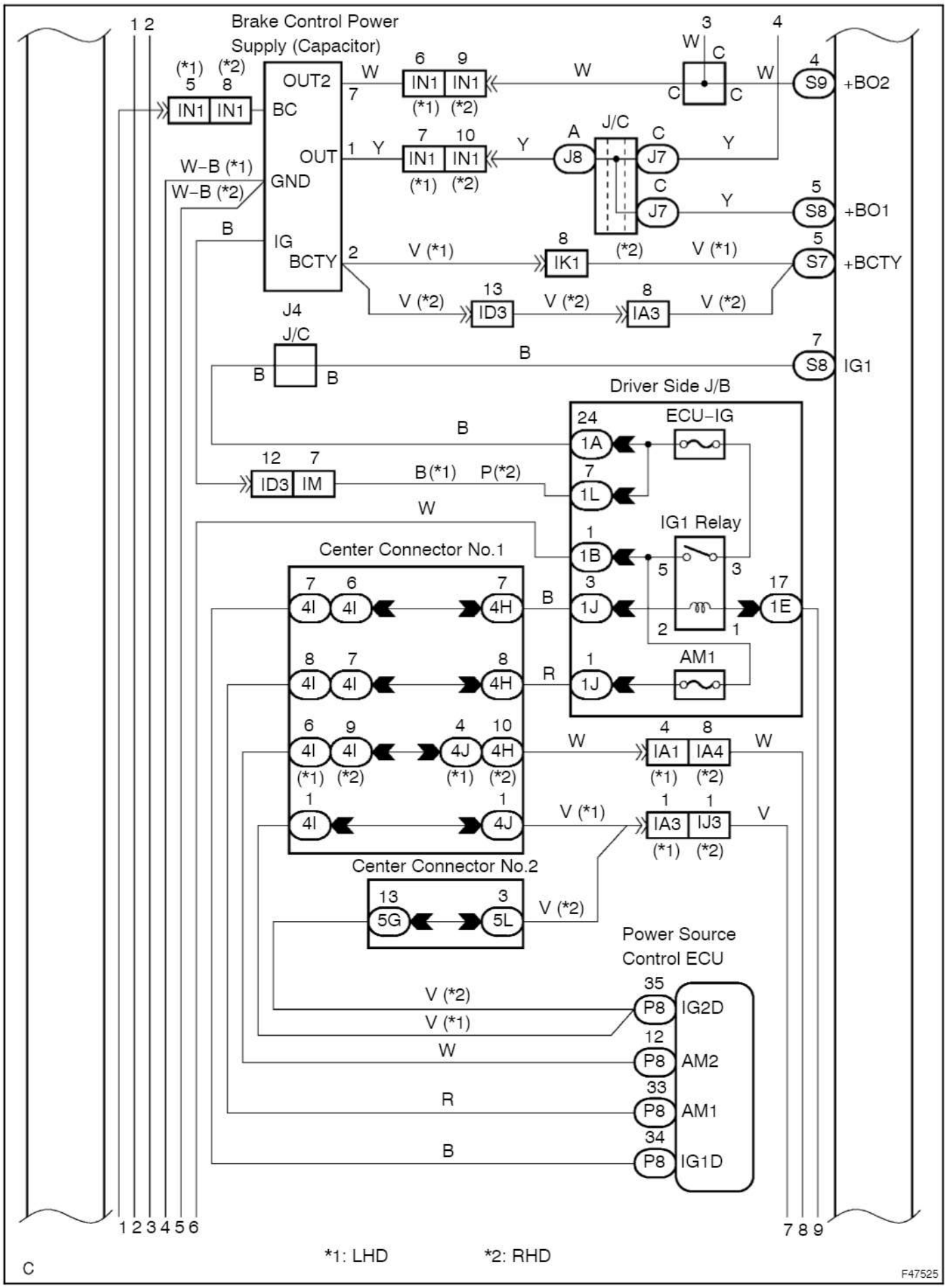
DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1377/43	101	Brake control power supply assy is deteriorated (indicates a need to replace).	• Brake control power supply
C1377/43	102	Self–discharge (current leak) is excessive (internal malfunction).	• Brake control power supply
C1377/43	103	Input voltage from the auxiliary battery (12 V) to the brake control power supply is 16.4 V or more for at least 10 sec.	• Brake control power supply
C1377/43	105	Circuit inside the power back up unit (charge) is malfunctioning.	• Brake control power supply
C1377/43	106	Circuit inside the power back up unit (back up output circuit) is malfunctioning.	• Brake control power supply
C1377/43	108	Circuit inside the power back up unit (voltage monitor circuit) is malfunctioning.	• Brake control power supply
C1377/43	109	Open circuit between auxiliary battery (12 V) and brake control powre supply power input (+BC terminal).	• Harness and connector • ABS No.3 fuse
C1377/43	110	• Open or short circuit between auxiliary battery (12 V) and capacitor output 1 (OUT 1). • Open or short circuit between auxiliary battery (12 V) and capacitor output 2 (OUT 2)	• Harness and connector • ABS No.1 fuse • ABS No.2 fuse

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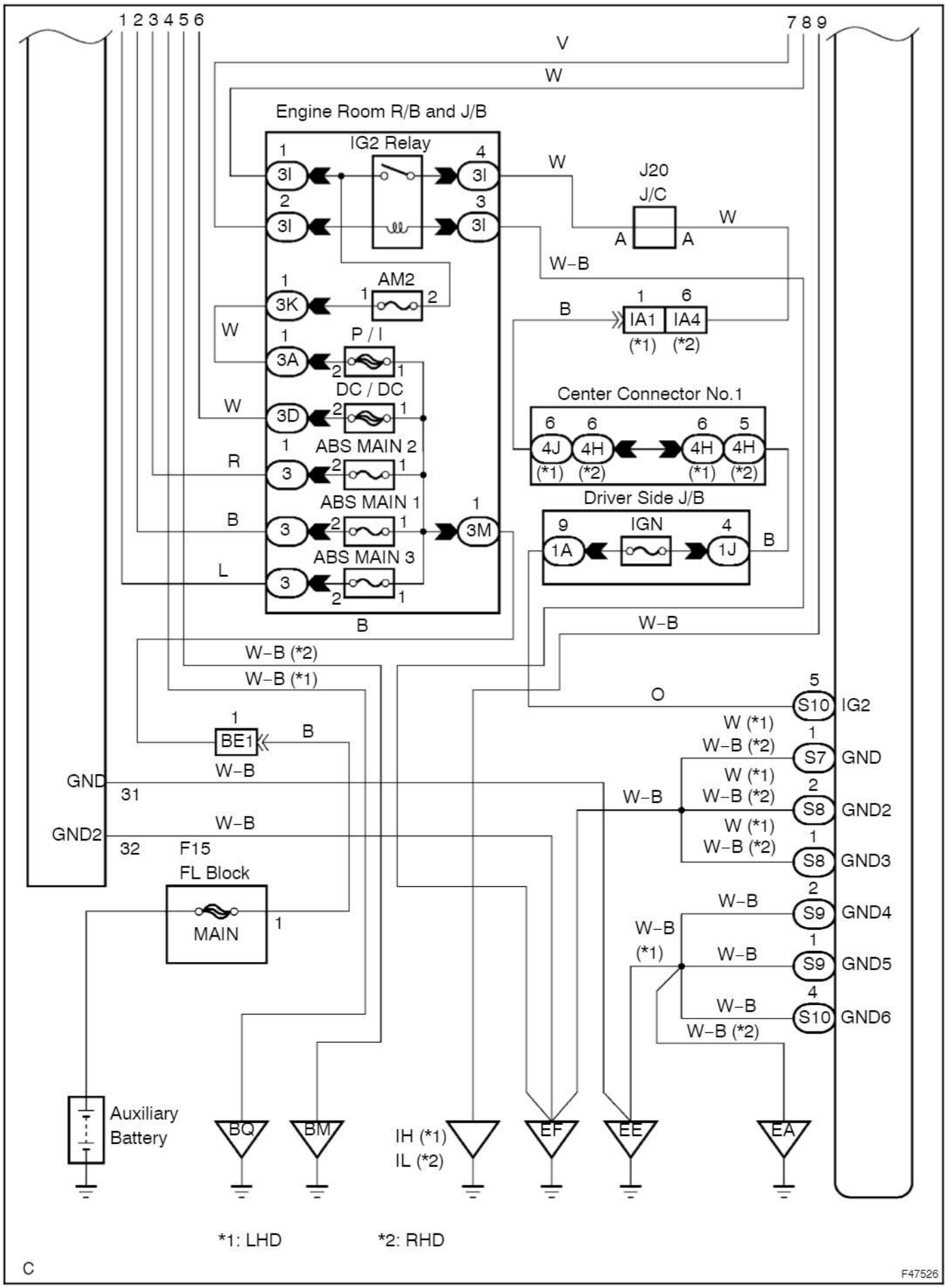
WIRING DIAGRAM



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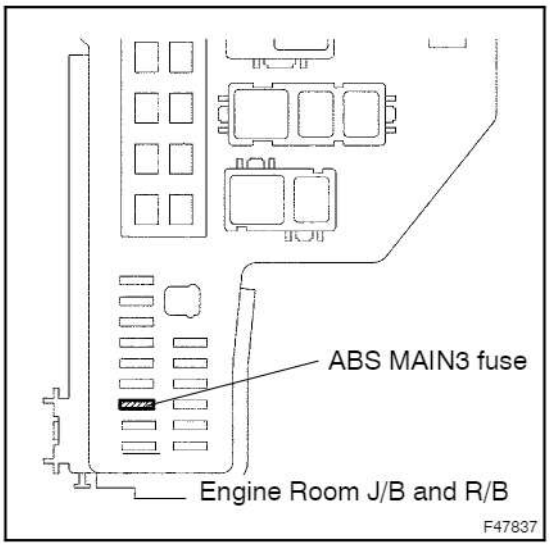
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INSPECTION PROCEDURE

1	INSPECT FUSE(ABS MAIN3 FUSE)



(a) Remove the ABS MAIN3 fuse from the engine room J/B and J/B.

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

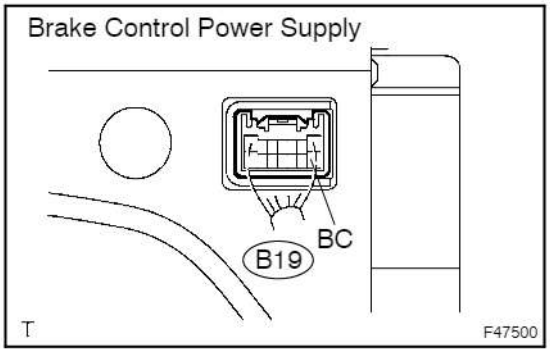
Standard:

ABS MAIN3 fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK

2	INSPECT BRAKE CONTROL POWER SUPPLY(BC TERMINAL VOLTAGE)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected.

Standard:

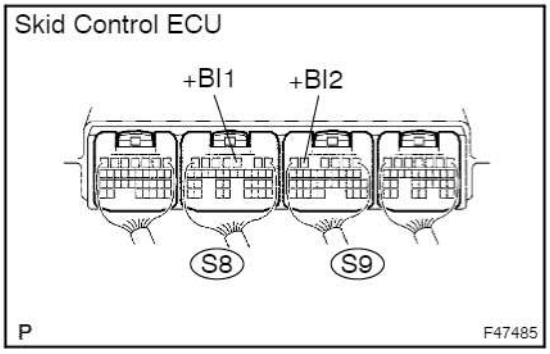
Tester Connection	Specified Condition
B19–8 (BC) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

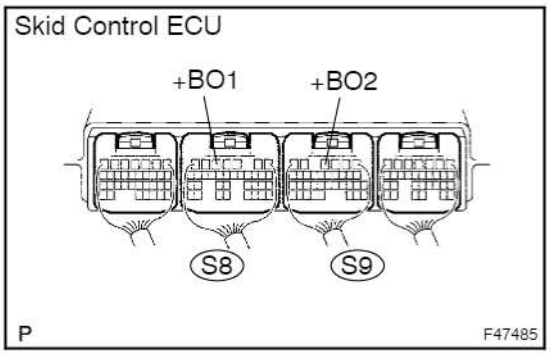
Standard:

Tester Connection	Specified Condition
S8–3 (+BI1) – Body ground	10 to 14 V
S9–5 (+BI2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

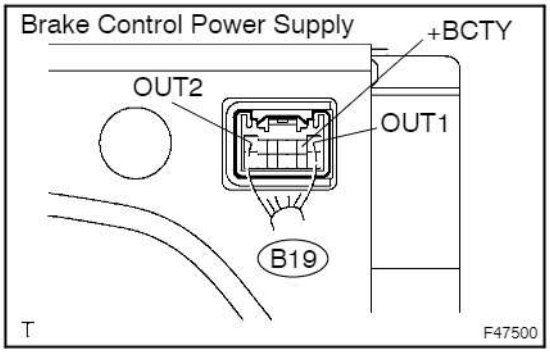
Tester Connection	Specified Condition
S8–5 (+BO1) – Body ground	10 to 14 V
S9–4 (+BO2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5 INSPECT BRAKE CONTROL POWER SUPPLY



(a) Turn the power switch ON (READY).
(b) Measure the voltage according to the value(s) in the table below.

HINT:
Measure the voltage from behind the connector with the connector connected.

Standard:

Tester Connection	Condition	Specified Condition
B19–1 (OUT1) – Body ground	Power switch ON (READY)	9 to 13 V
B19–2 (+BCTY) – Body ground	Power switch ON (READY)	9 to 13 V
B19–7 (OUT2) – Body ground	Power switch ON (READY)	9 to 13 V

NG → **REPLACE BRAKE CONTROL POWER SUPPLY**

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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DTC	C1378/44	CAPACITOR COMMUNICATION CIRCUIT MALFUNCTION

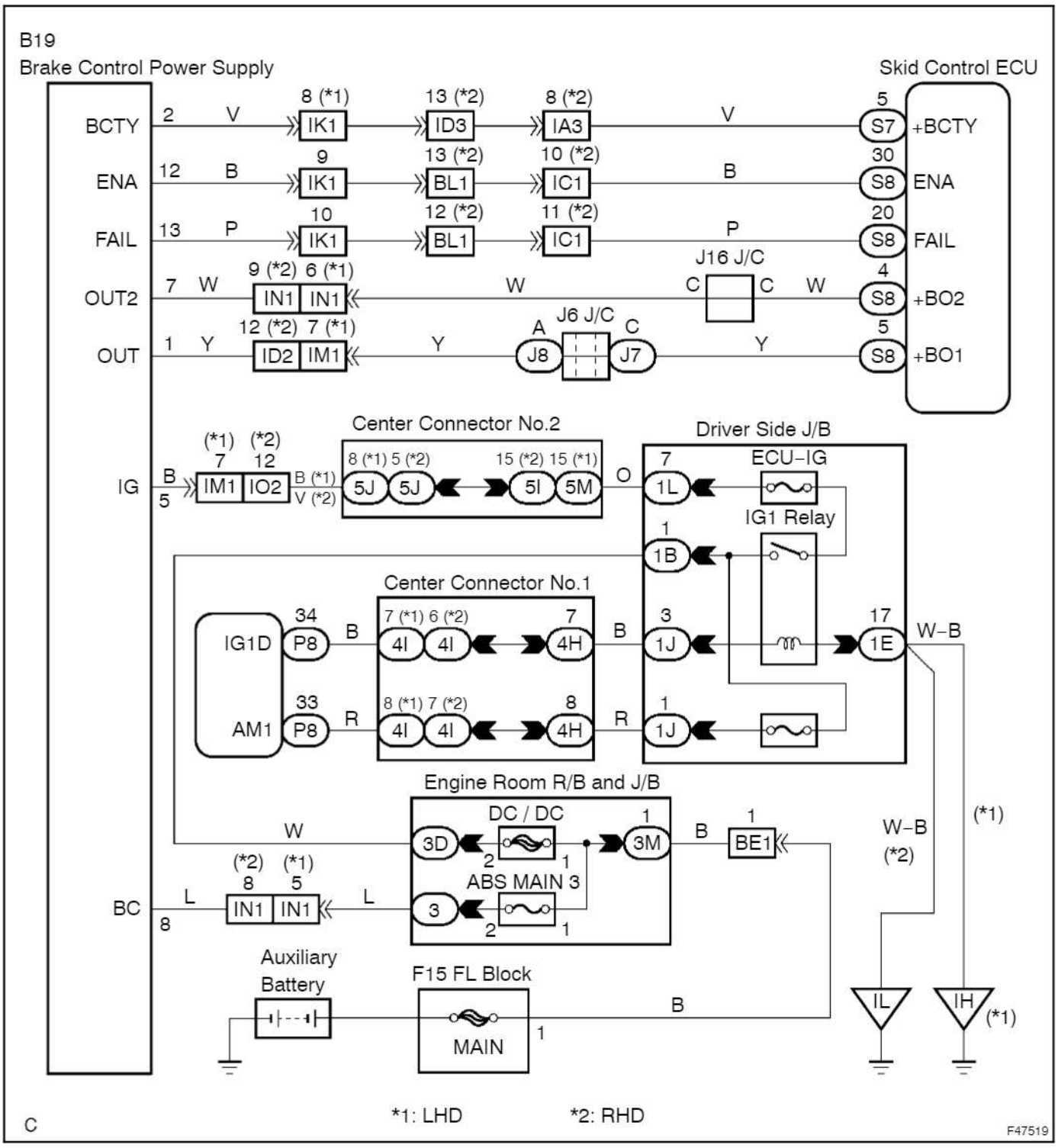
CIRCUIT DESCRIPTION

The brake control power supply assy (capacitor) provides auxiliary power for brake control when an auxiliary battery (12 V) voltage drops.
The FAIL and ENA line are placed between the skid control ECU and the brake control power supply assy. Signals indicating that the brake control power supply is in auxiliary mode are sent to the skid control ECU through the FAIL line.
Charge permit prohibition signals are sent to the brake control power supply through the ENA line.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1378/44	112	• Open or short in FAIL line. • Malfunction inside the power back up unit.	• Harness and connector • Skid control ECU
C1378/44	113	• Open or short in ENA line • Malfunction inside the skid control ECU (circuit for communication with the capacitor)	• Harness and connector • Skid control ECU

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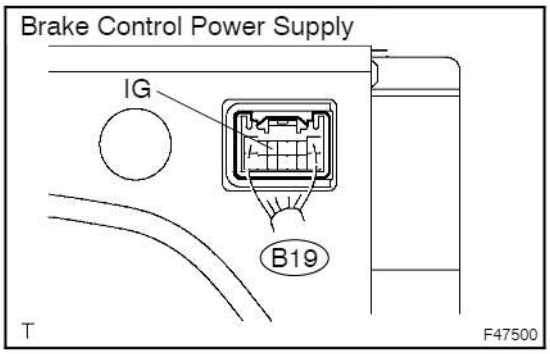
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT BRAKE CONTROL POWER SUPPLY ASSY



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector connected.

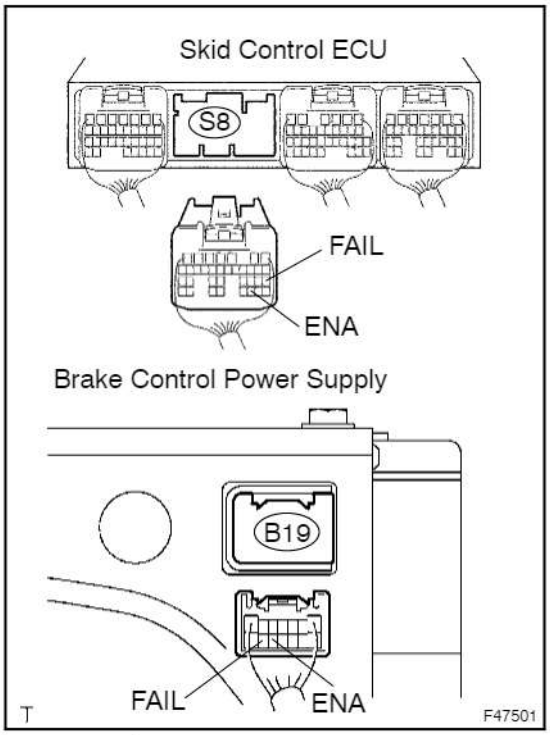
Standard:

Tester Connection	Condition	Specified Condition
B19–5 (IG) – Body ground	Power Switch ON (READY)	10 to 14 V

NG → **REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(FAIL, ENA TERMINAL)



(a) Disconnect the skid control ECU connector and brake control power supply connector.

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

Standard:

Tester Connection	Specified Condition
S8–30 (ENA) – B19–12 (ENA)	Below 1 Ω
S8–20 (FAIL) – B19–13 (FAIL)	Below 1 Ω

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

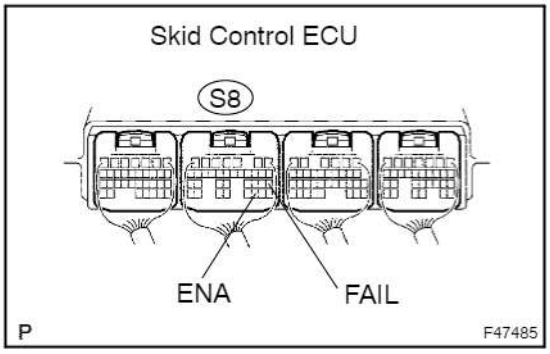
Tester Connection	Specified Condition
S8–30 (ENA) – Body ground	10 kΩ or higher
S8–20 (FAIL) – Body ground	10 kΩ or higher

NG → **REPLACE BRAKE CONTROL POWER SUPPLY**

OK

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3 INSPECT SKID CONTROL ECU ASSY

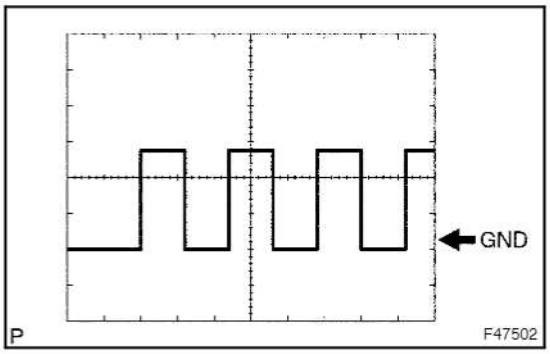


(a) Check the waveform between terminal S8–20 (FAIL) and the ground of the skid control ECU using an oscilloscope.

(b) Check the waveform between terminal S8–30 (ENA) and the ground of the skid control ECU using an oscilloscope.

OK:

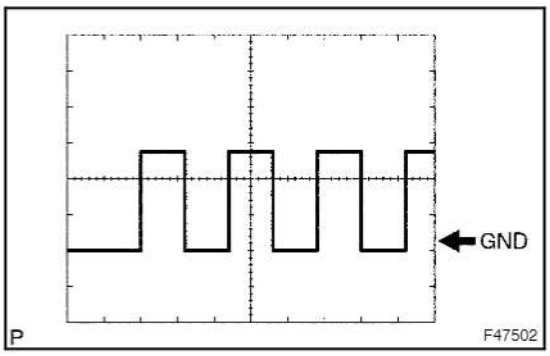
Waveform is output as shown in the illustration.



(1) Oscilloscope waveform (FAIL)

HINT:

- Terminals FAIL ⇔ GND
- Instrument 5 V / DIV, 200 ms / DIV
- Condition READY is displayed on the meter



(2) Oscilloscope waveform (ENA)

HINT:

- Terminals ENA ⇔ GND
- Instrument 5 V / DIV, 100 ms / DIV
- Condition READY is displayed on the meter

Result:

A	Both waveforms are normal
B	Waveform (ENA) is abnormal
C	Waveform (FAIL) is abnormal

B → **REPLACE BRAKE CONTROL POWER SUPPLY**

C → **REPLACE SKID CONTROL ECU ASSY**

A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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DTC C1391/69 ABNORMAL LEAK OF ACC PRESS

CIRCUIT DESCRIPTION

The DTC is stored if a brake fluid, internal or other leak is detected due to improper sealing in the actuator. Internal leakage is suspected if the pump motor operates frequently without braking.

DTC No.	Detailed Code	DTC Detecting Condition	Trouble Area
C1391/69	591	Accumulation performance is deteriorated (improper sealing inside the actuator, gas pressure drop inside the accumulator, leak in each pressure boosting valve).	• Fluid leakage • Brake actuator assy

INSPECTION PROCEDURE

1 CHECK BRAKE FLUID LEAKAGE

(a) Check that there is no fluid leakage in the brake line between the brake actuator and the wheel cylinder which is the cause of DTCs.

(b) Check that the brake is not dragging.

OK:

There is no fluid leakage or dragging.

NG → **REPAIR OR REPLACE APPLICABLE PART**

OK

2 READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (READY).

(c) Select the DATA LIST mode on the intelligent tester II.

Item	Measurement Item / Range (Display)	Normal Condition
Accumulator Sensor 1	Accumulator pressure sensor 1 / min.: 0 V, max.: 5 V	Specified value: 3.0 to 4.3 V

(d) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester II with the motor and check the output value on the intelligent tester II with the motor stopped (no braking).

OK:

Accumulator (ACC) pressure sensor voltage does not drop.

NG → **REPLACE BRAKE ACTUATOR ASSY (SEE PAGE 32–66)**

OK

REPLACE SKID CONTROL ECU (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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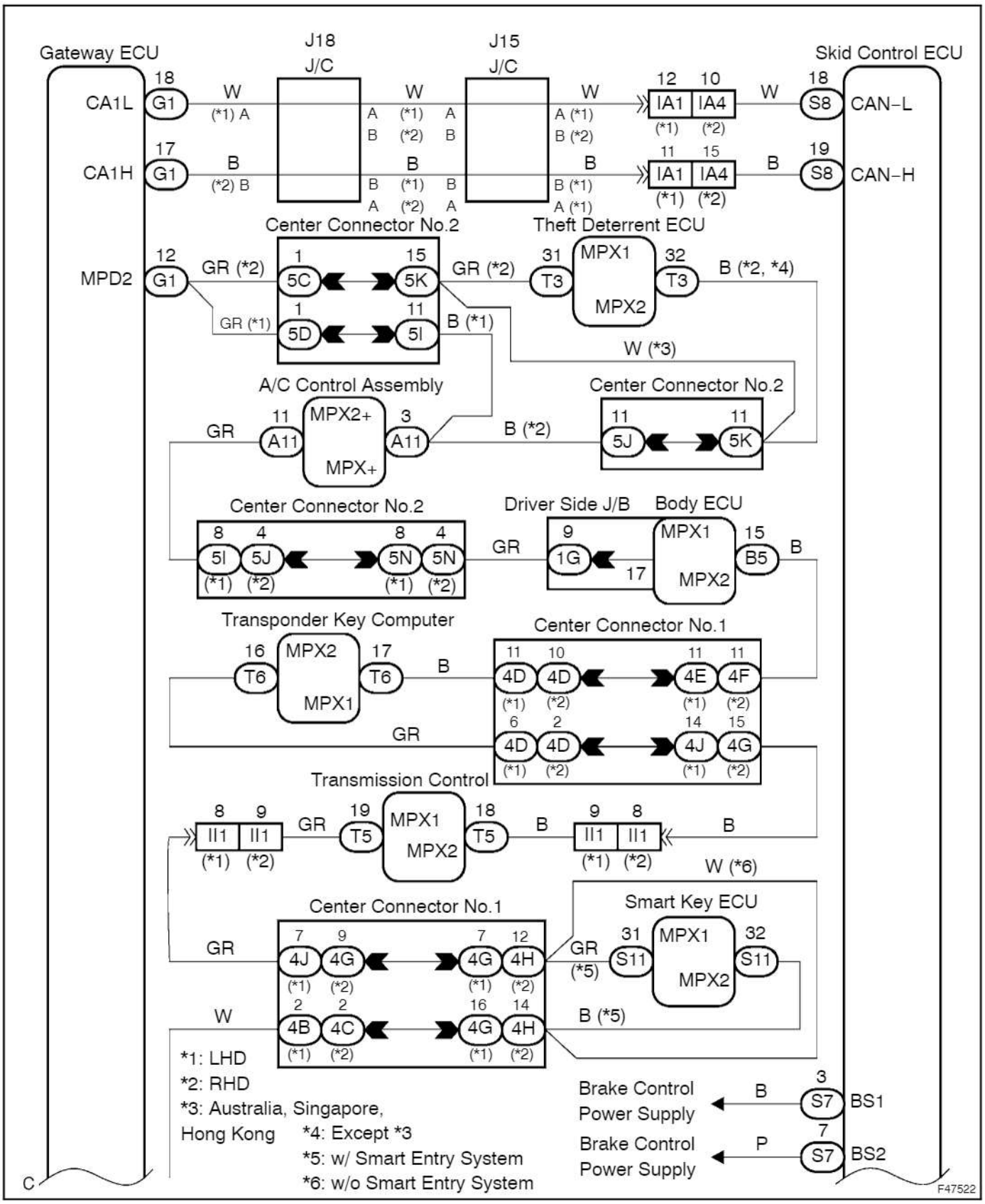
BRAKE CONTROL WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

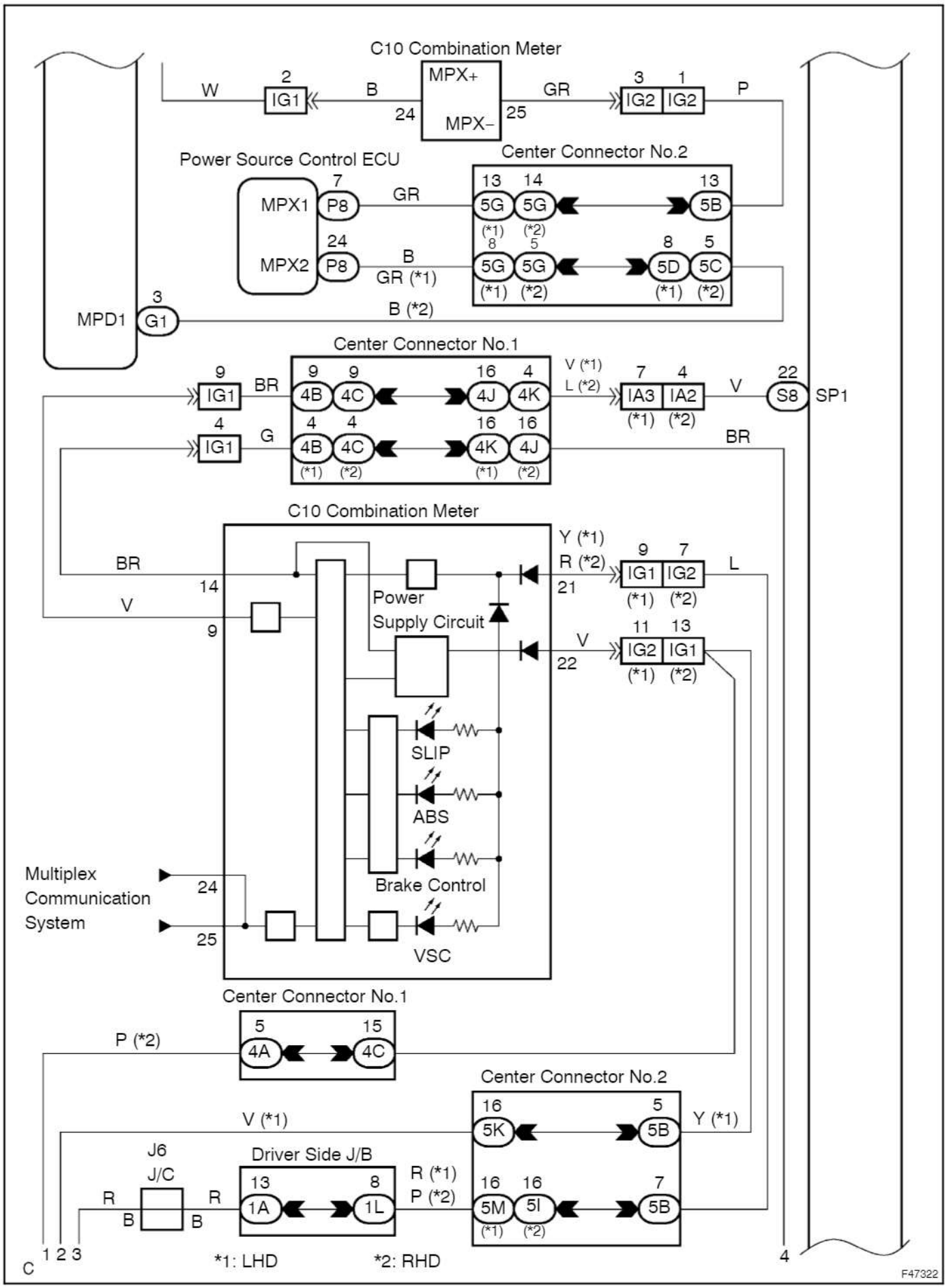
The skid control ECU is connected to the combination meter via CAN and Multiplex communications. Informs the driver when there is trouble with ECB or a problem with the brake system that has no influence on driving, by turning on.

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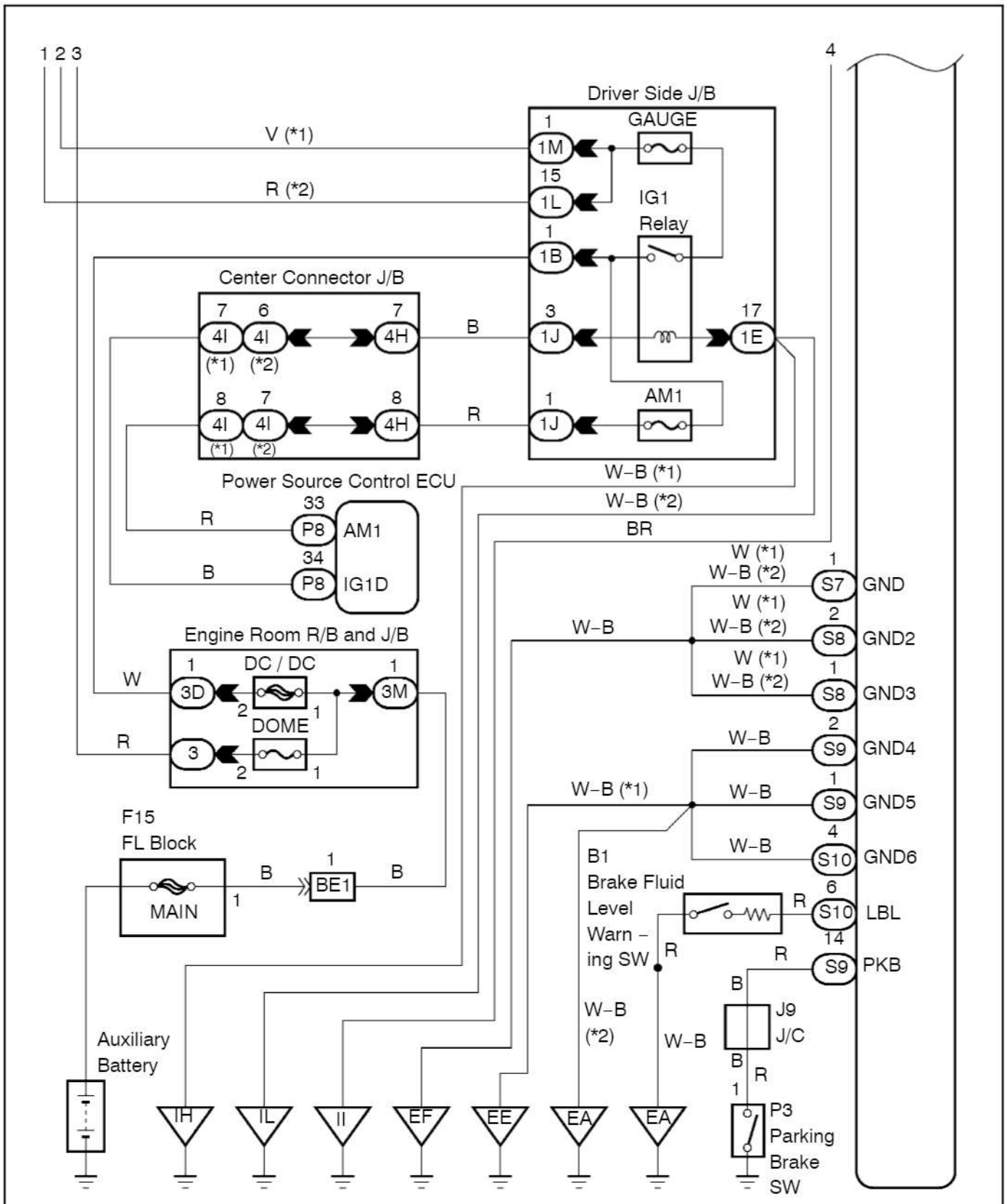
WIRING DIAGRAM



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*1: LHD
*2: RHD
*3: Australia, Singapore, Hong Kong
*4: Except *3
*5: w/ Smart Entry System
*6: w/o Smart Entry System

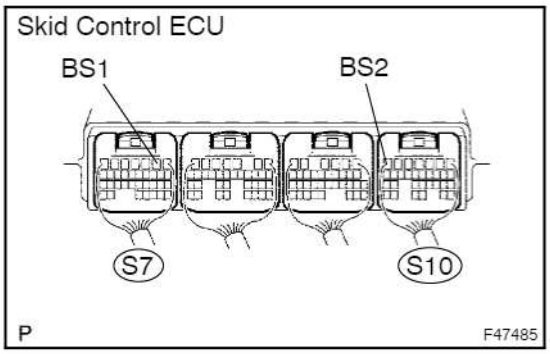
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INSPECTION PROCEDURE

1	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (BS1, BS2)



(a) Measure the voltage according to the value(s) in the table below.

HINT:
Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S7–3 (BS1) – Body ground	10 to 14 V
S10–7 (BS2) – Body ground	10 to 14 V

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II (SEE PAGE 05–868)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the item "ECB Light" in the ACTIVE TEST and operate the Brake Control indicator light on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
ECB Light	Turns Brake Control warning light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the Brake Control warning light are indicated on the combination meter when using the intelligent tester II.

OK:

The Brake Control indicator light turns on or off in accordance with the intelligent tester II.

NG → **REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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BRAKE CONTROL WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

INSPECTION PROCEDURE

1	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR CAN COMMUNICATION SYSTEM (SEE PAGE 05–2332)

A

2	INSPECT MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Is the DTC output for Multiplex communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2261)

A

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)

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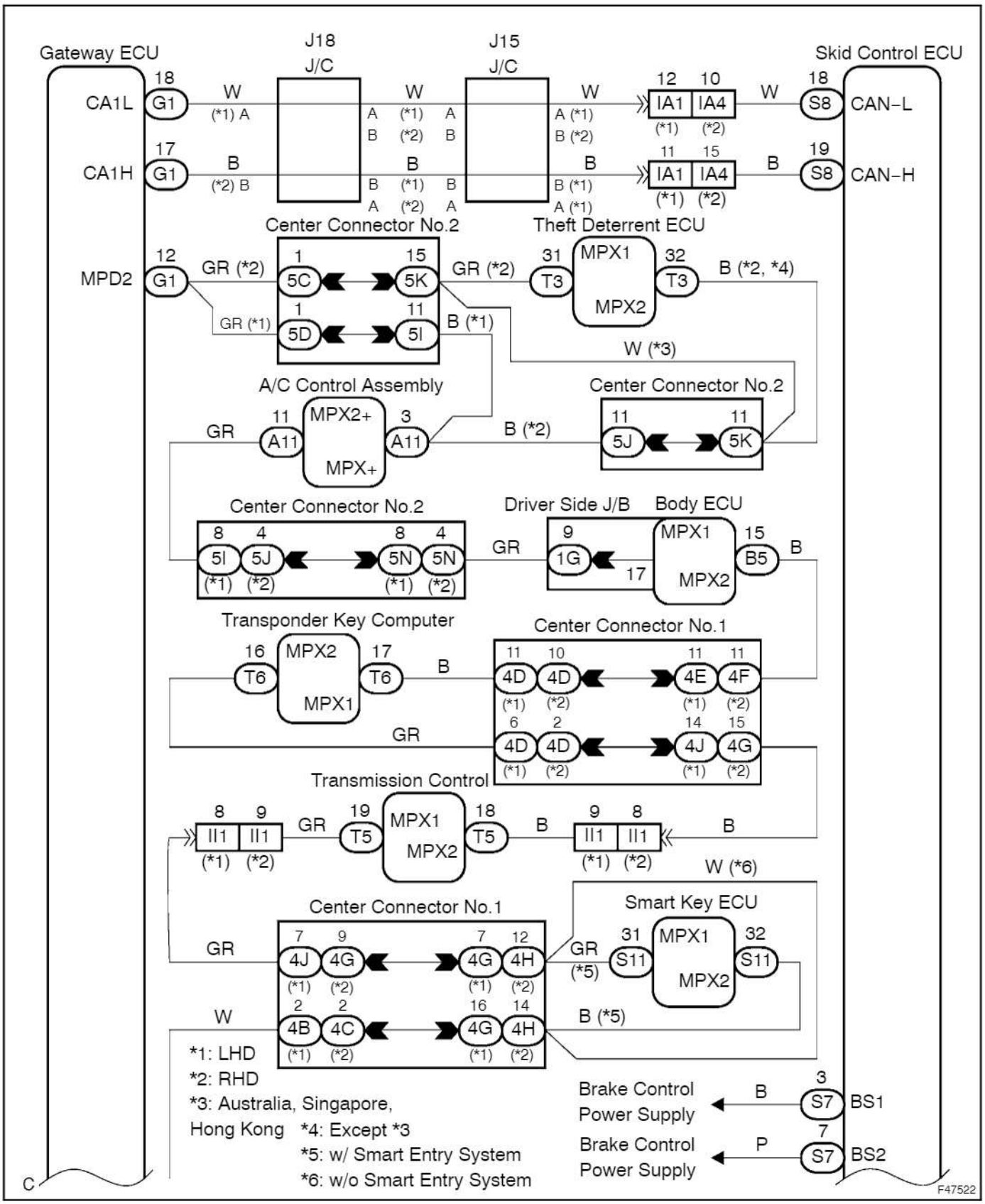
ABS WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

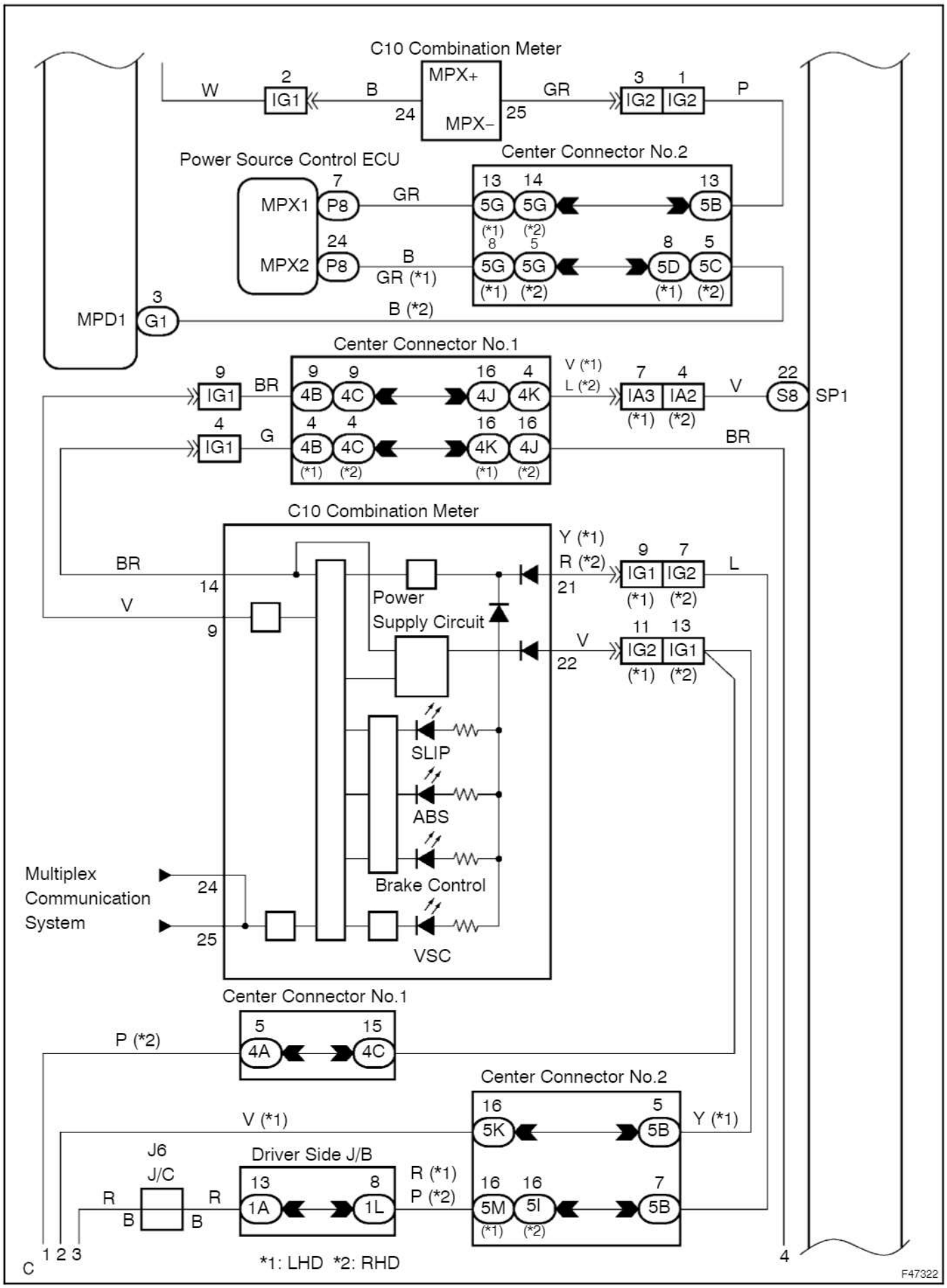
Inform the driver that there is trouble with ABS by illuminating the ABS warning light.
When DTC output is normal and the ABS warning lamp remains on, perform troubleshooting as indicated below.

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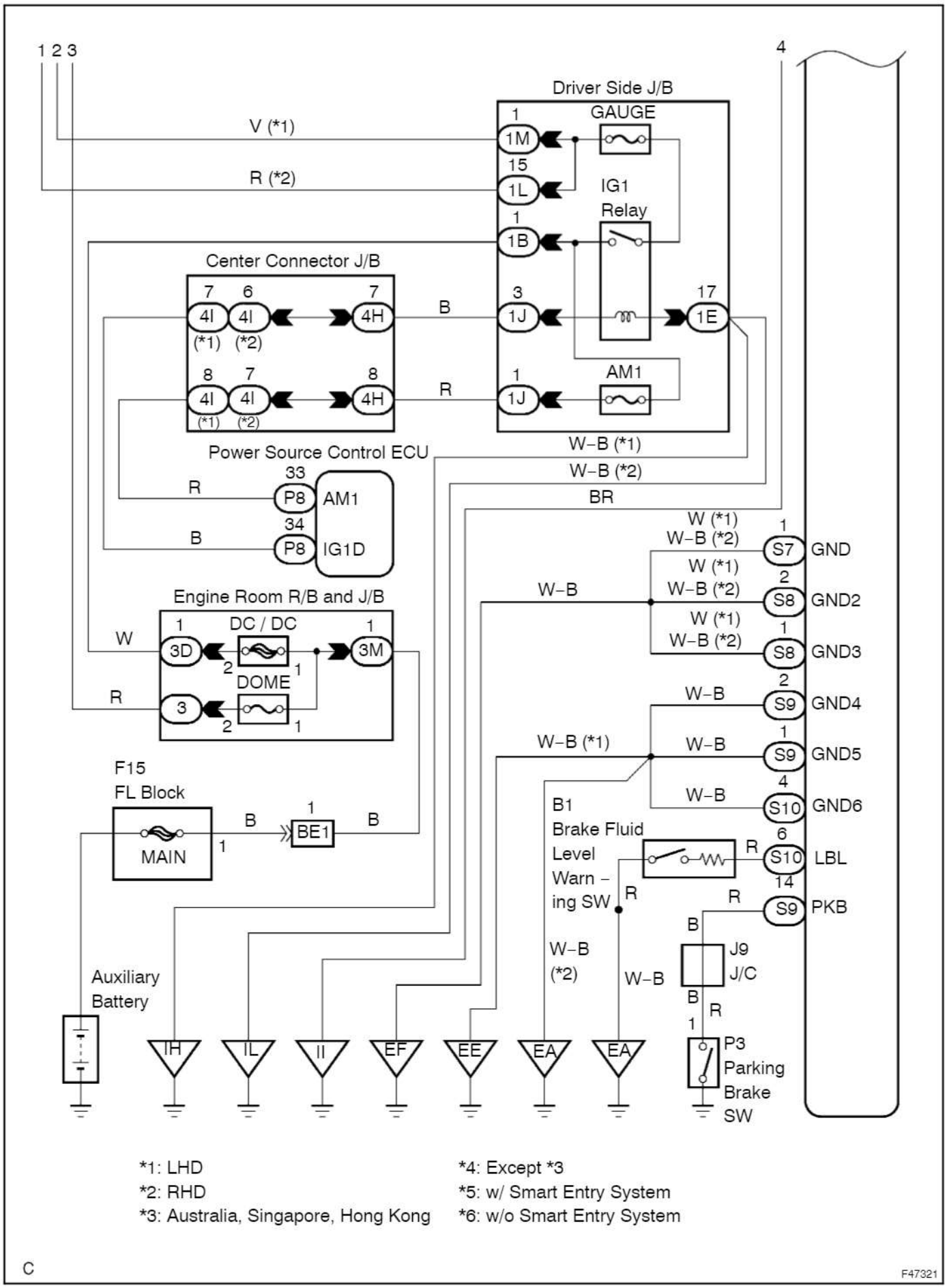
WIRING DIAGRAM



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*1: LHD
*2: RHD
*3: Australia, Singapore, Hong Kong
*4: Except *3
*5: w/ Smart Entry System
*6: w/o Smart Entry System

C

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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(ABS WARNING LIGHT)

(a) Connect the intelligent tester II to the DLC3 and start the engine.
(b) Select the item "ABS Warning Light" in the ACTIVE TEST and operate the ABS warning light on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS Warning Light	Turns ABS warning light ON / OFF	Observe combination meter

(c) Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the intelligent tester II.

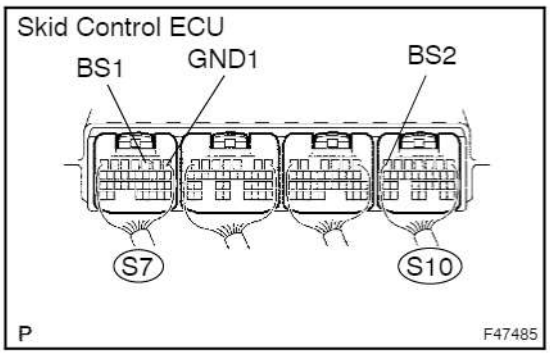
Standard:

The ABS warning light turns on or off in accordance with the intelligent tester II.

NG → **REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)**

OK

2	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (BS1,BS2 TERMINAL)



(a) Measure the voltage according to the value(s) in the table below.

HINT:

Measure the voltage from behind the connector with the connector connected to the skid control ECU.

Standard:

Tester Connection	Specified Condition
S7–3 (BS1) – S7–1 IGND1)	10 to 14 V
S10–7 (BS2) – S7–1 (GND1)	10 to 14 V

NG → **REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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ABS WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

INSPECTION PROCEDURE

1	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR CAN COMMUNICATION SYSTEM (SEE PAGE 05–2332)

A

2	INSPECT MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Is the DTC output for Multiplex communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2261)

A

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)

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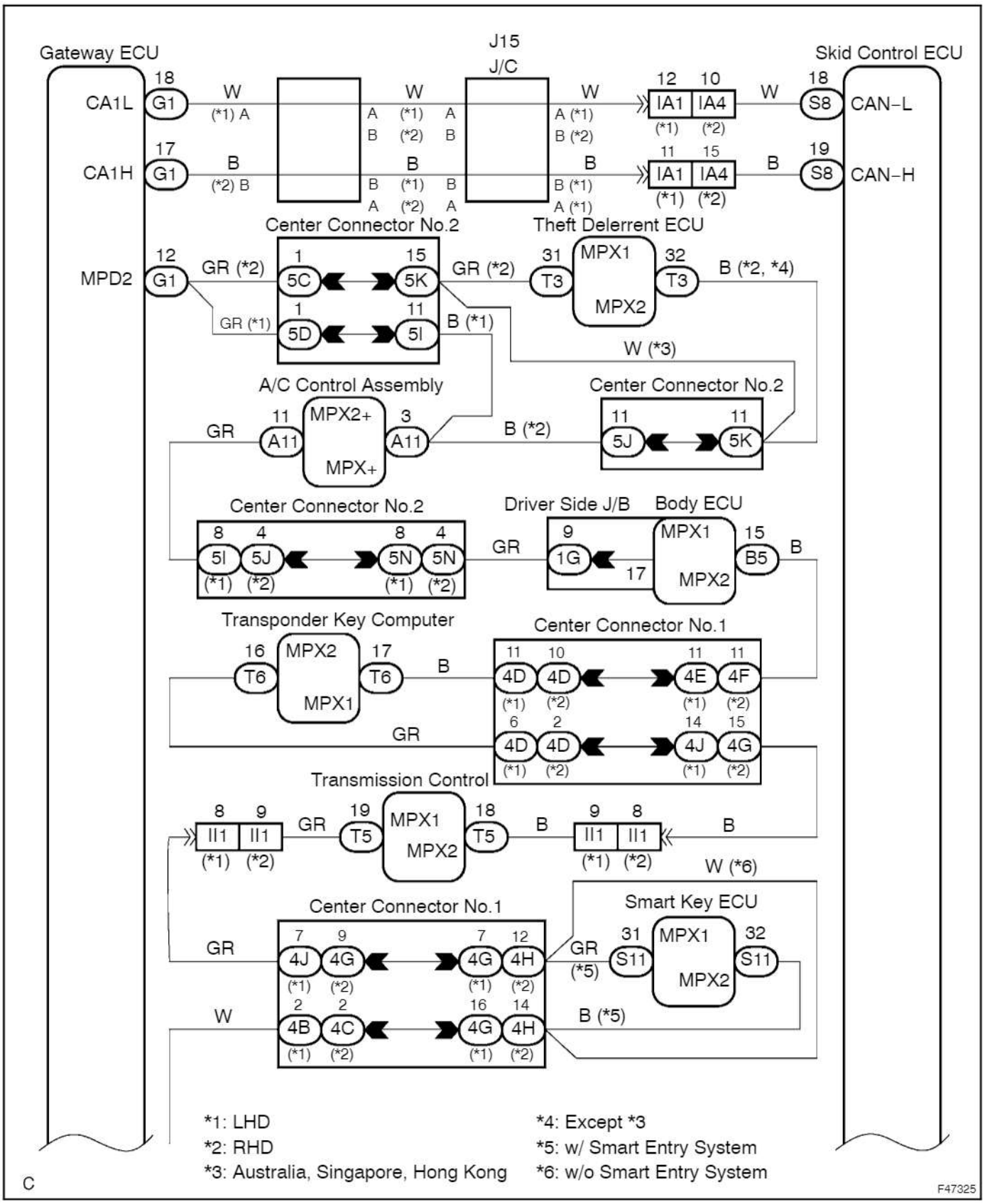
VSC WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

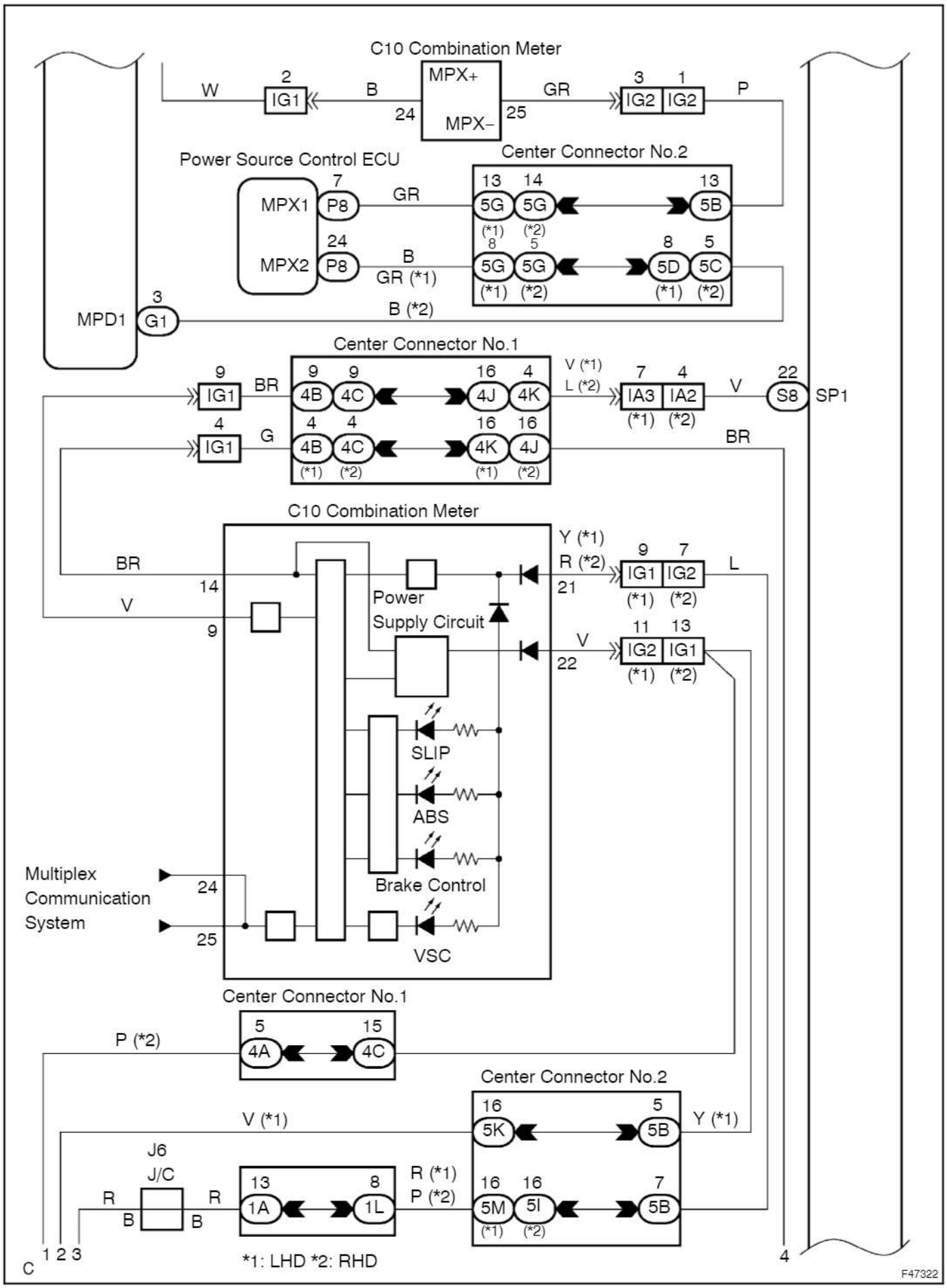
Inform the driver that there is trouble with VSC+ by illuminating the VSC warning light.
When DTC output is normal and the VSC warning lamp remains on, perform troubleshooting as indicated below.

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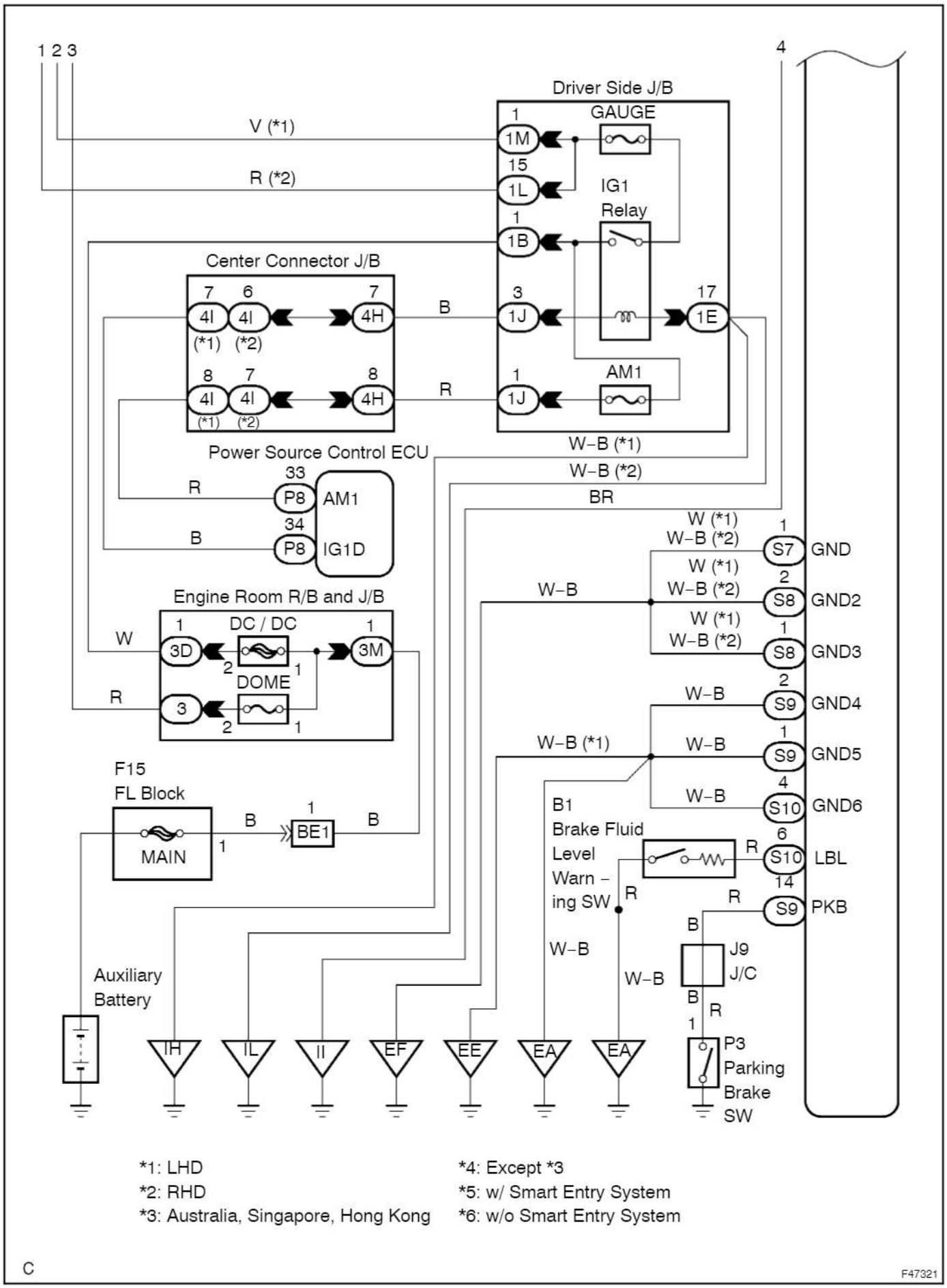
WIRING DIAGRAM



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*1: LHD
*2: RHD
*3: Australia, Singapore, Hong Kong
*4: Except *3
*5: w/ Smart Entry System
*6: w/o Smart Entry System

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INSPECTION PROCEDURE

1	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check the skid control ECU connector's connecting condition.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (READY).
(c) Select the item "VSC Warning Light" in the ACTIVE TEST and operate the VSC Warning light on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC Warning Light	Turns VSC warning light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the VSC warning light are indicated on the combination meter when using the intelligent tester II.
OK:
The VSC warning light turns on or off in accordance with the intelligent tester II.

NG → **REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)**

OK

REPLACE SKID CONTROL ECU (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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VSC WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

INSPECTION PROCEDURE

1	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR CAN COMMUNICATION SYSTEM (SEE PAGE 05–2332)

A

2	INSPECT MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Is the DTC output for Multiplex communication system?

Result:

DTC is not output	A
DTC is output	B

B → REPAIR MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2261)

A

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)

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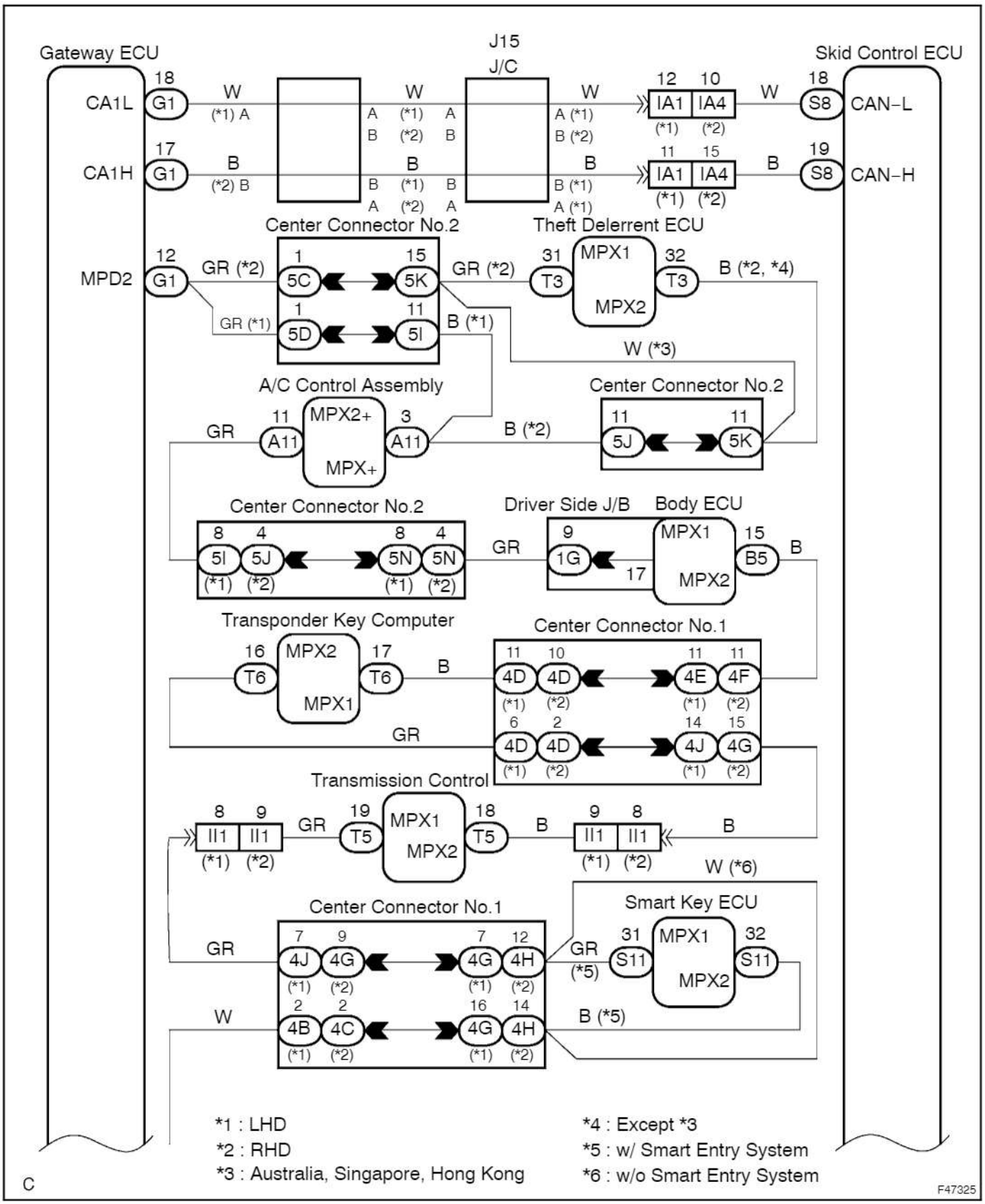
BRAKE WARNING LIGHT CIRCUIT

CIRCUIT DESCRIPTION

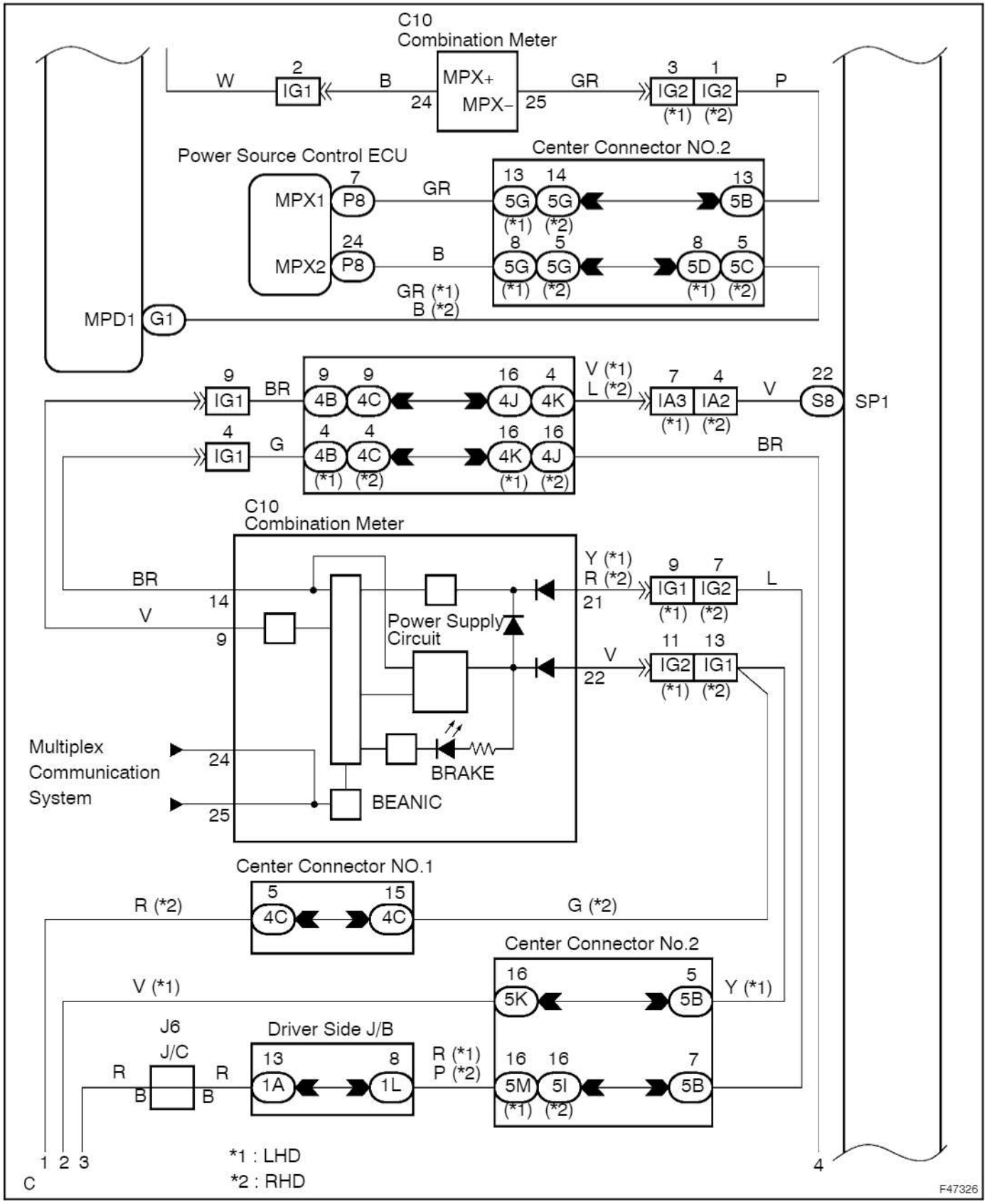
When DTC is normal and BRAKE warning light remains on, perform troubleshooting as indicated below.
The BRAKE warning light comes on when the brake fluid is insufficient or the parking brake is applied.
The skid control ECU is connected to the combination meter via CAN and Multiplex communications.

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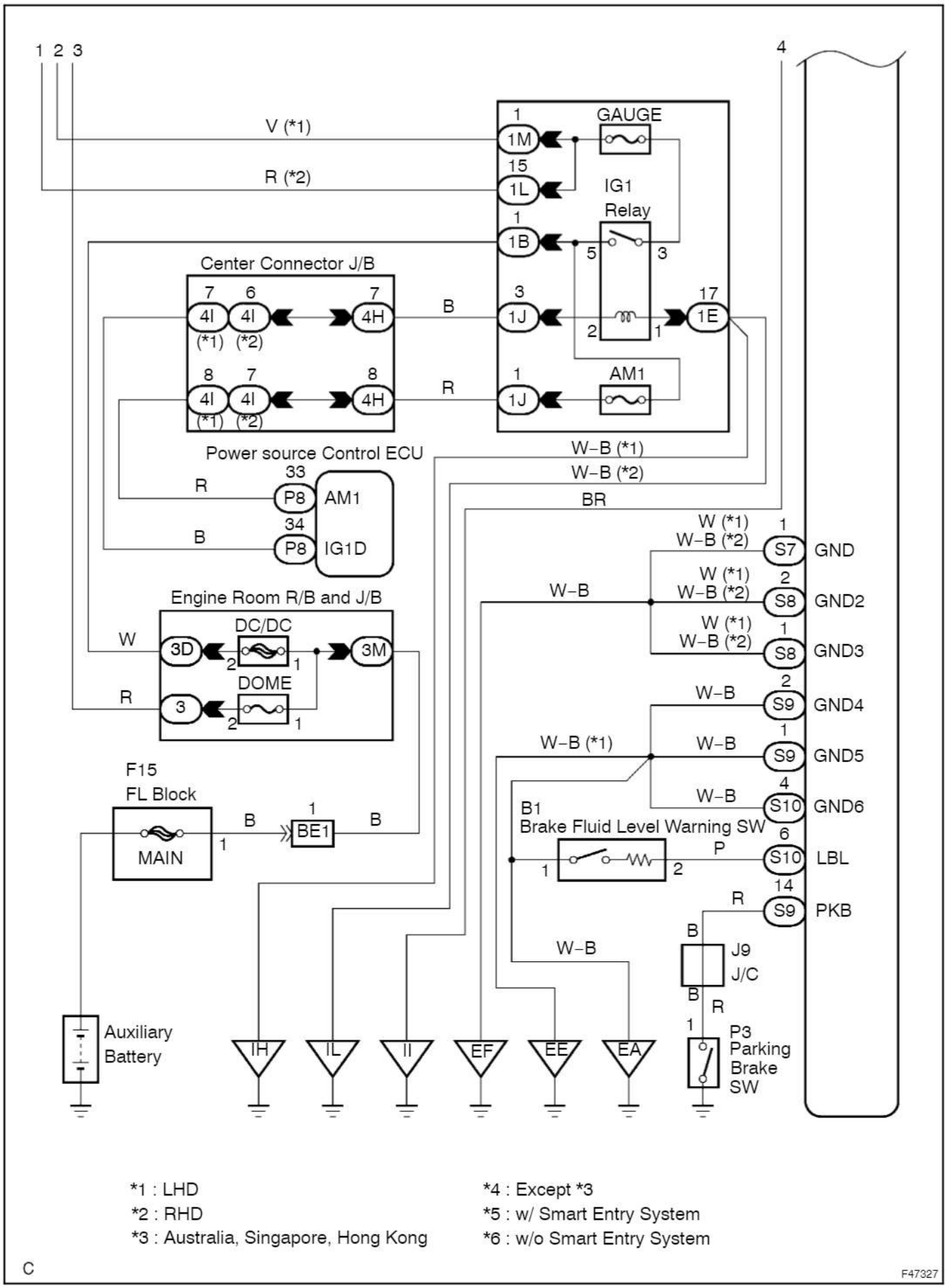
WIRING DIAGRAM



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*1 : LHD
*2 : RHD
*3 : Australia, Singapore, Hong Kong
*4 : Except *3
*5 : w/ Smart Entry System
*6 : w/o Smart Entry System

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INSPECTION PROCEDURE

1	CHECK BRAKE FLUID LEVEL IN RESERVOIR

Check that the brake fluid level is proper.

NG → **ADD BRAKE FLUID**

OK

2	CHECK DTC FOR ABS

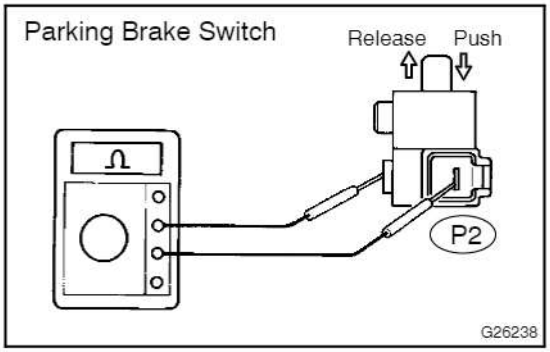
Are the DTC recorded? (see page 05–738)

NO → **Go to step 3**

YES

REPAIR CIRCUIT INDICATED BY OUTPUT CODE

3	INSPECT PARKING BRAKE SWITCH ASSY



(a) Remove the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

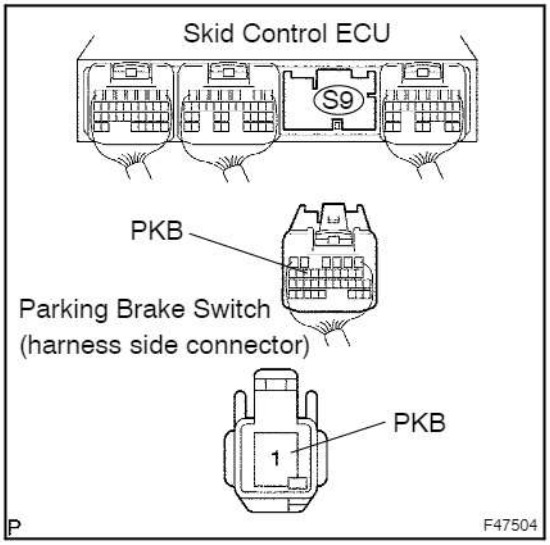
Tester Connection	Switch Condition	Specified Condition
P2–1 – Ground part	Released	Below 1 Ω
P2–1 – Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSY**

OK

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4 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU – PARKING BRAKE SWITCH)



(a) Disconnect the skid control ECU connector and the parking brake switch connector.

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

Standard:

Tester Connection	Specified Condition
S9–14 (PKB) – P3–1 (PKB)	Below 1 Ω

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

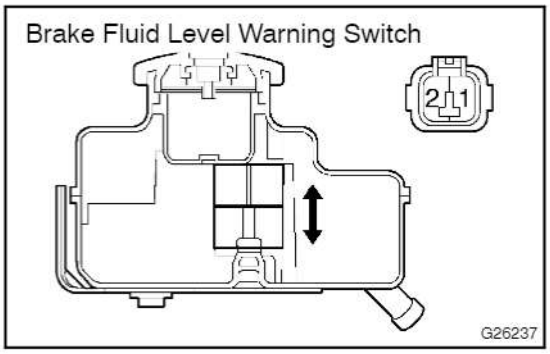
Standard:

Tester Connection	Specified Condition
S9–14 (PKB) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.

(b) Disconnect the brake fluid level warning switch connector.

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

Standard:

Tester Connection	Fluid Level	Specified Condition
(B1–1) – (B1–2)	Proper	1.8 to 2.16 kΩ
(B1–1) – (B1–2)	Below min.: level	Below 1 Ω

NG → **REPLACE BRAKE FLUID LEVEL WARNING SWITCH**

OK

6 INSPECT CAN COMMUNICATION SYSTEM

(a) Is the DTC output for CAN communication system?

Result:

DTC is not output	A
DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM** (SEE PAGE 05–2332)

A

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7	INSPECT MULTIPLEX COMMUNICATION SYSTEM

(a) Is the DTC output for Multiplex communication system?

Result:

DTC is not output	A
DTC is output	B

B → **REPAIR MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)**

A

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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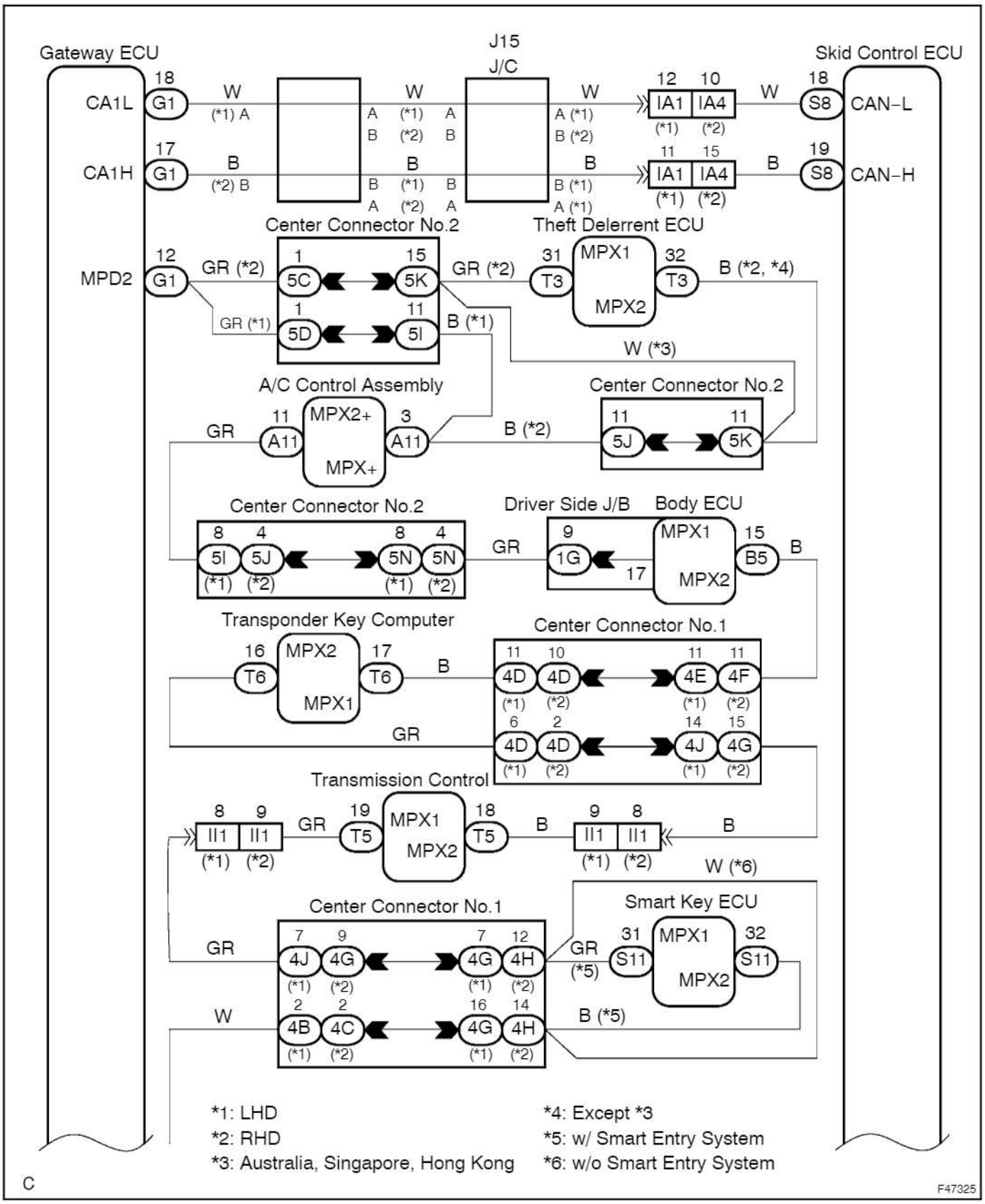
SLIP INDICATOR LIGHT CIRCUIT

CIRCUIT DESCRIPTION

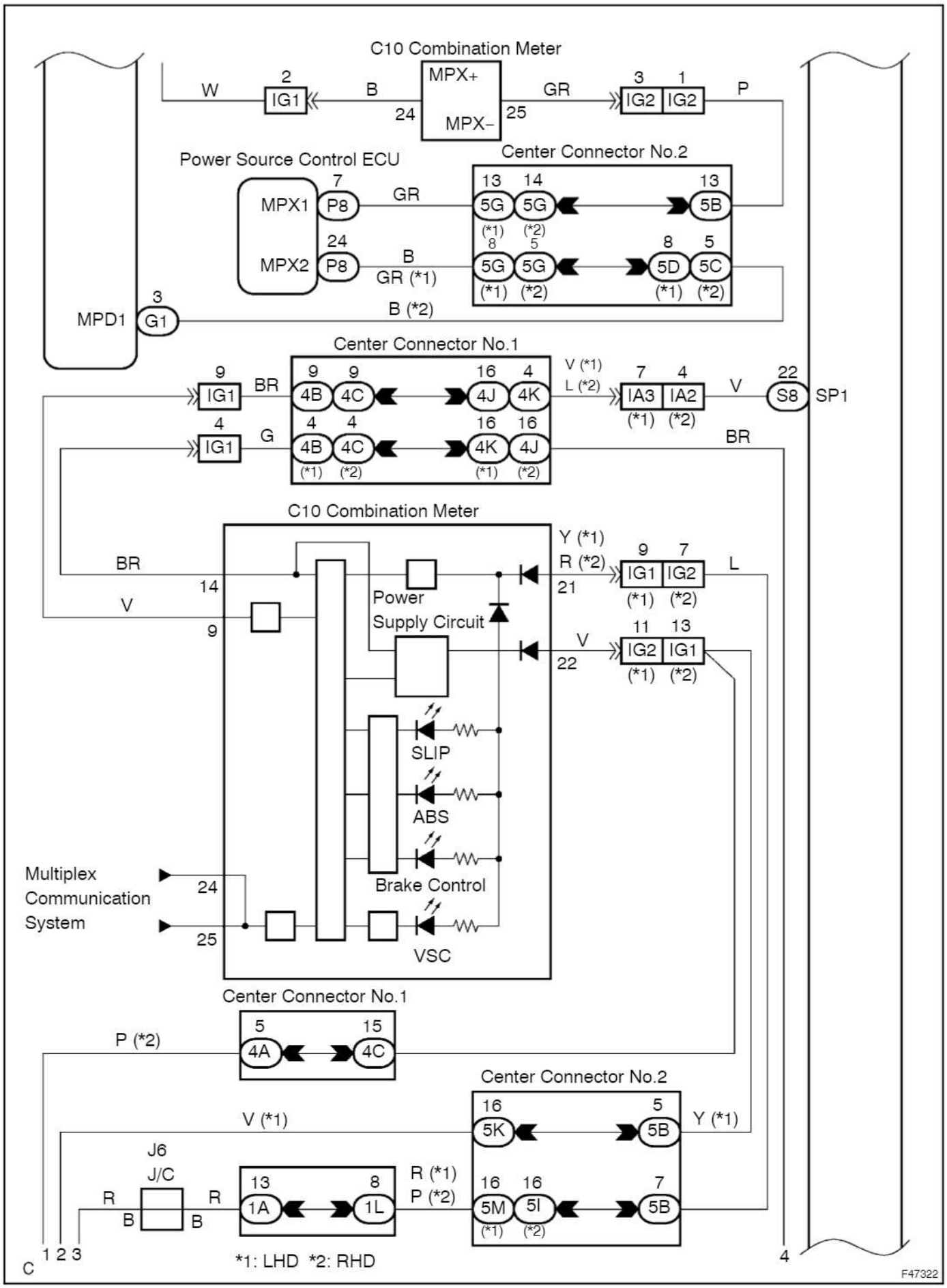
The SLIP indicator blinks during VSC+ operation.
The skid control ECU is connected to the combination meter via CAN and Multiplex communications.

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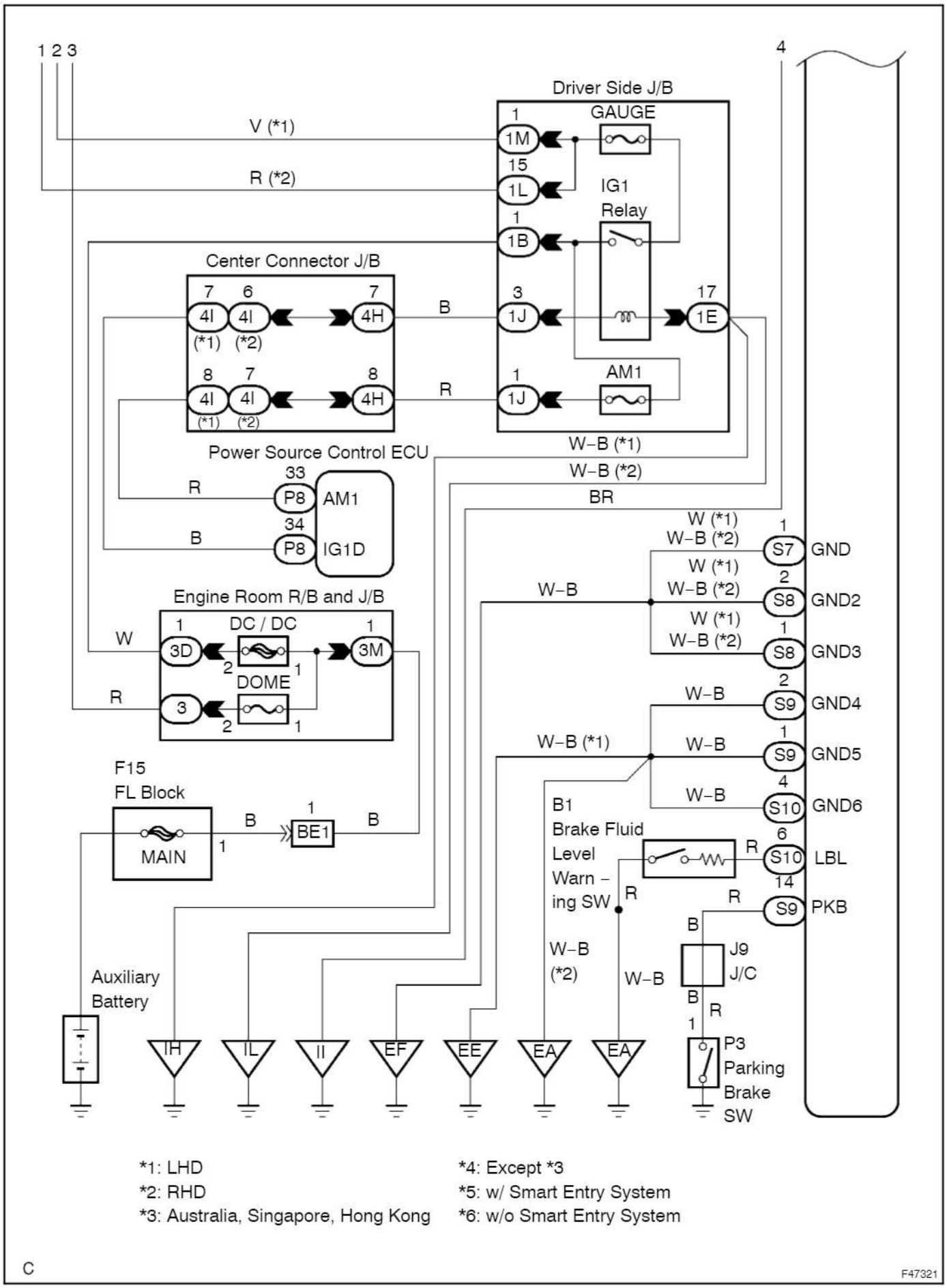
WIRING DIAGRAM



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*1: LHD
*2: RHD
*3: Australia, Singapore, Hong Kong
*4: Except *3
*5: w/ Smart Entry System
*6: w/o Smart Entry System

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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II (SLIP INDICATOR LIGHT)

(a) Connect the intelligent tester II to the DLC3.
(b) Start the engine.
(c) Select the item "Slip indicator Light" in the ACTIVE TEST and operate the SLIP indicator light on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
Slip Indicator Light	Turns SLIP indicator light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the SLIP indicator light are indicated on the combination meter when using the intelligent tester II.
OK:
Turn the SLIP indicator light on or off in accordance with the intelligent tester II.

NG → **Go to step 2**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

2	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?
Result:

DTC is not output	A
DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (SEE PAGE 05–2332)**

A

3	INSPECT MULTIPLEX COMMUNCATION SYSTEM (SEE PAGE 05–2250)

(a) Is the DTC output for Multiplex communication system?
Result:

DTC is not output	A
DTC is output	B

B → **REPAIR MULTIPLEX COMMUNCATION SYSTEM (SEE PAGE 05–2261)**

A

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 05–1684)

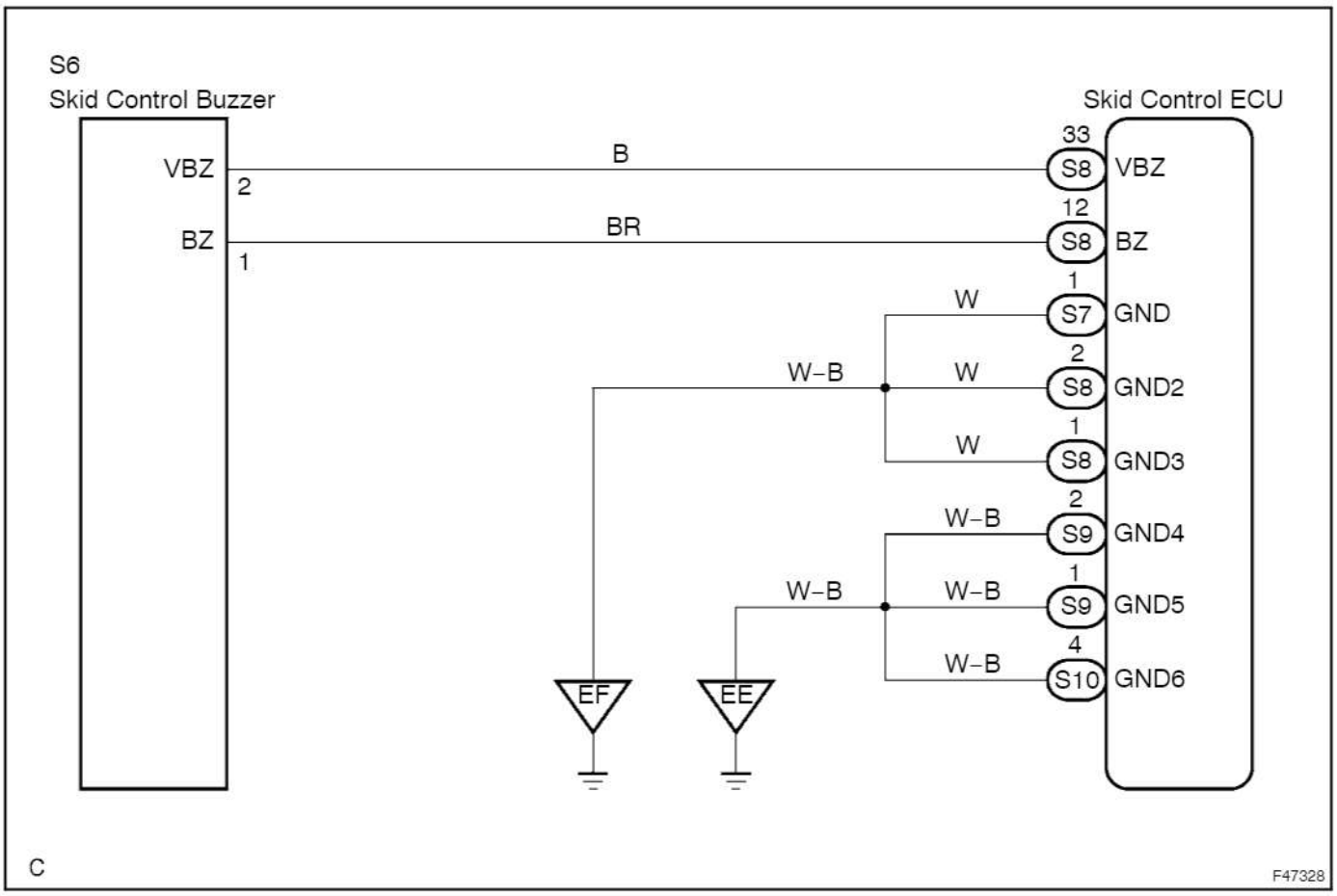
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SKID CONTROL BUZZER CIRCUIT

CIRCUIT DESCRIPTION

The skid control buzzer sounds and VSC warning lamp comes ON during VSC+ operation.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(SKID CONTROL BUZZER)

(a) Connect the intelligent tester II to the DLC3.
(b) Start the engine.
(c) Select the item "VSC H/B Warning Buzzer" in the ACTIVE TEST and operate the skid control buzzer on the intelligent tester II.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC H/B Warning Buzzer	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

(d) Check that skid control buzzer sounds by operating with the intelligent tester II.
OK:
The skid control buzzer sounds in accordance with operation of the intelligent tester II.

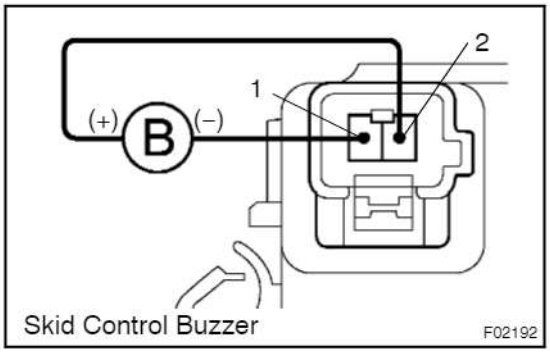
NG → **Go to step 2**

OK →

REPLACE SKID CONTROL ECU (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

2	INSPECT SKID CONTROL BUZZER ASSY



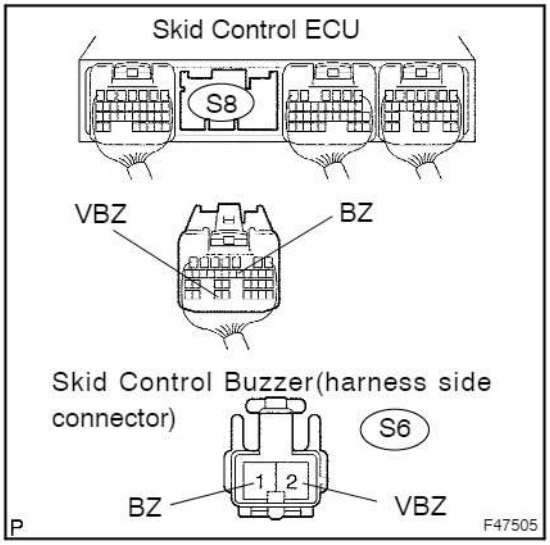
(a) Disconnect the skid control buzzer connector.
(b) Apply a battery positive voltage to terminals 1 and 2 of the skid control buzzer connector, and check that the buzzer sounds.
OK:
The skid control buzzer sound should be heard.

NG → **REPLACE SKID CONTROL BUZZER ASSY**

OK →

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3	CHECK HARNESS AND CONNECTOR(SKID CONTROL BUZZER – SKID CONTROL ECU)



(a) Disconnect the skid control buzzer connector and the skid control ECU connector.

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

Standard:

Tester Connection	Specified Condition
S8–33 (VBZ) – S6–2 (VBZ)	Below 1 Ω
S8–12 (BZ) – S6–1 (BZ)	Below 1 Ω

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

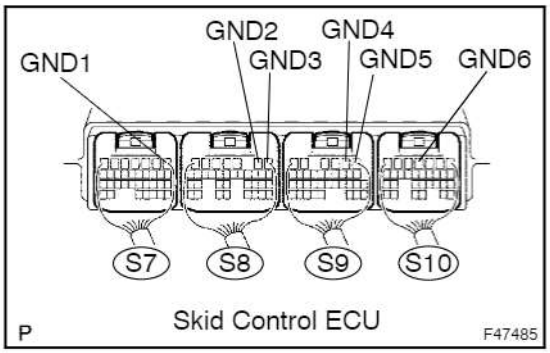
Standard:

Tester Connection	Specified Condition
S8–33 (VBZ) – Body ground	10 kΩ or higher
S8–12 (BZ) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR(GND – BODY GROUND)



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

Standard:

Tester Connection	Specified Condition
S7–1 (GND1) – Body ground	Below 1 Ω
S8–2 (GND2) – Body ground	Below 1 Ω
S8–1 (GND3) – Body ground	Below 1 Ω
S9–2 (GND4) – Body ground	Below 1 Ω
S9–1 (GND5) – Body ground	Below 1 Ω
S10–4 (GND6) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

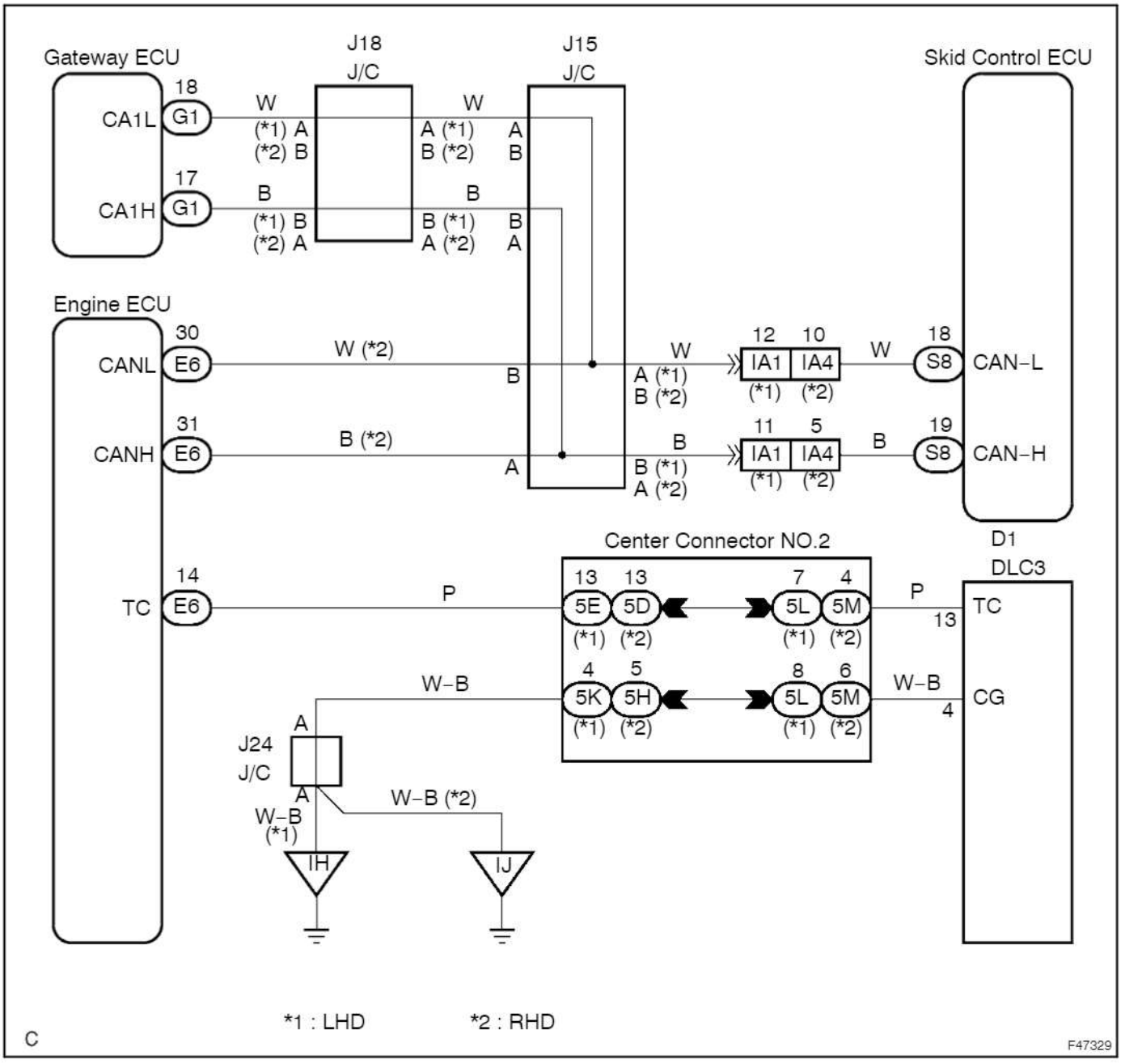
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TC AND CG TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

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

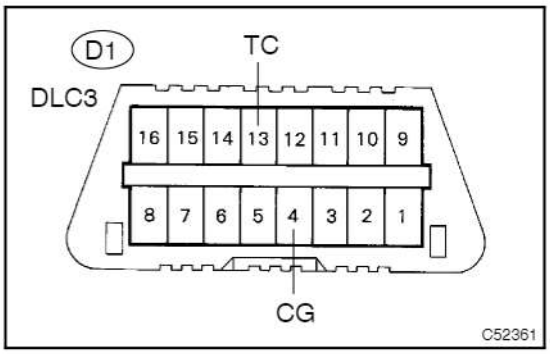
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT DLC3 TERMINAL VOLTAGE(TC TERMINAL)



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
D1–13 (TC) – D1–4 (CG)	10 to 14 V

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

Tester Connection	Specified Condition
D1–4 (CG) – Body ground	Below 1 Ω

NG → **GO TO STEP 3**

OK

2	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?
Result:

DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–2332)**

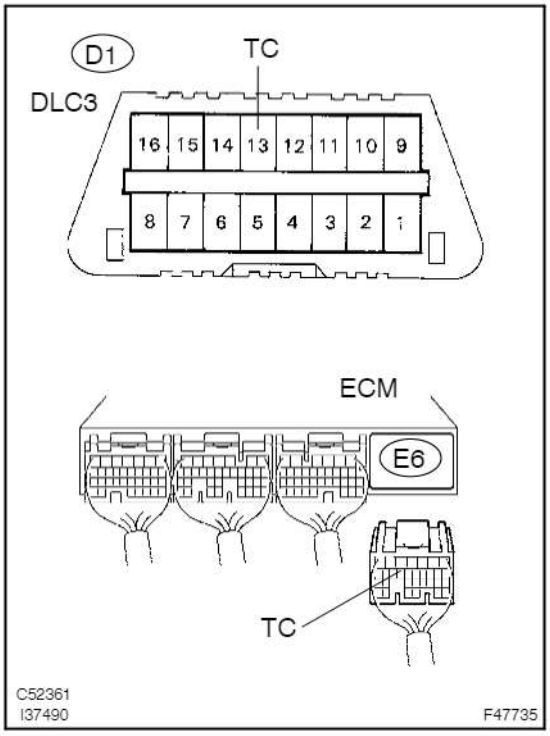
A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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3 INSPECT DLC3 TERMINAL VOLTAGE(TC TERMINAL)



(a) Turn the ignition switch to the ON position.
(b) Measure the resistance according to the value(s) in the table below.

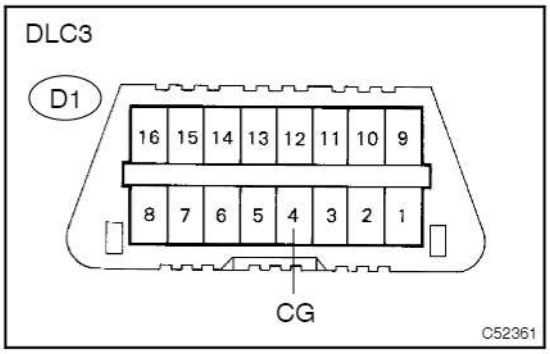
Standard:

Tester Connection	Specified Condition
D1–13 (TC) – E6–14 (TC)	Below 1 Ω

B → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR(BODY GROUND – DLC3)



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

Standard:

Tester Connection	Specified Condition
D1–4 (CG) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5	INSPECT CAN COMMUNICATION SYSTEM (SEE PAGE 05–2315)

(a) Is the DTC output for CAN communication system?
Result:

DTC is not output	A
DTC is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–2332)

A

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

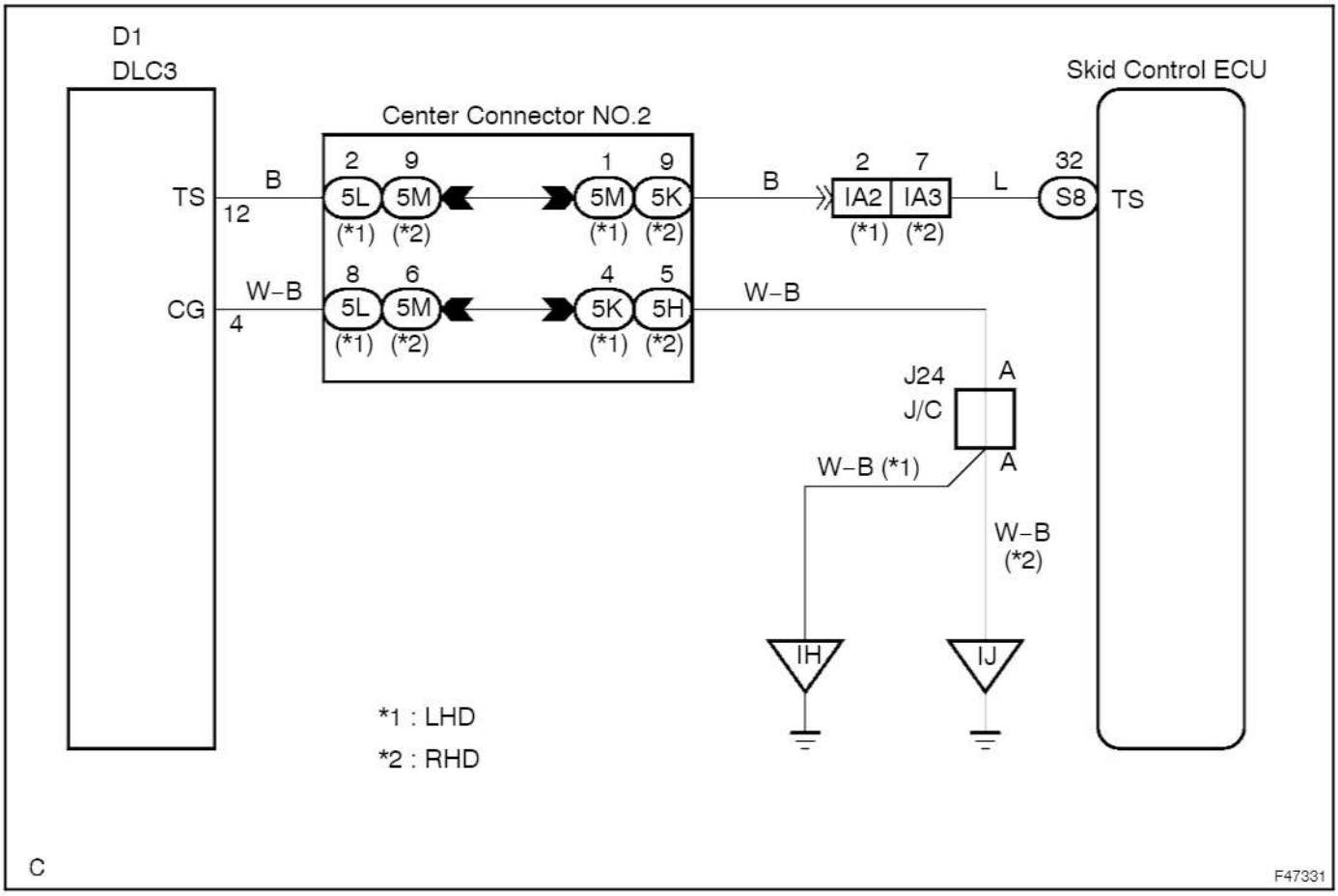
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TS AND CG TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

In the sensor check mode, a malfunction of the speed sensor that cannot be detected when the vehicle is stopped is detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to the ON position.

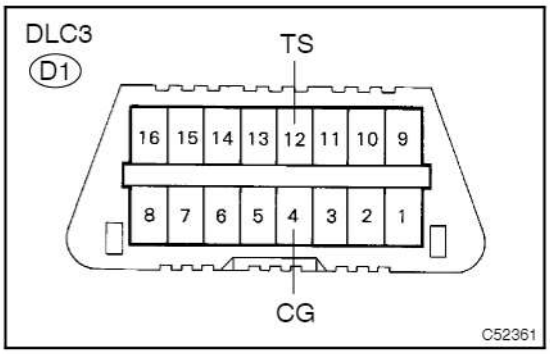
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT DLC3 TERMINAL VOLTAGE(TS TERMINAL)



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

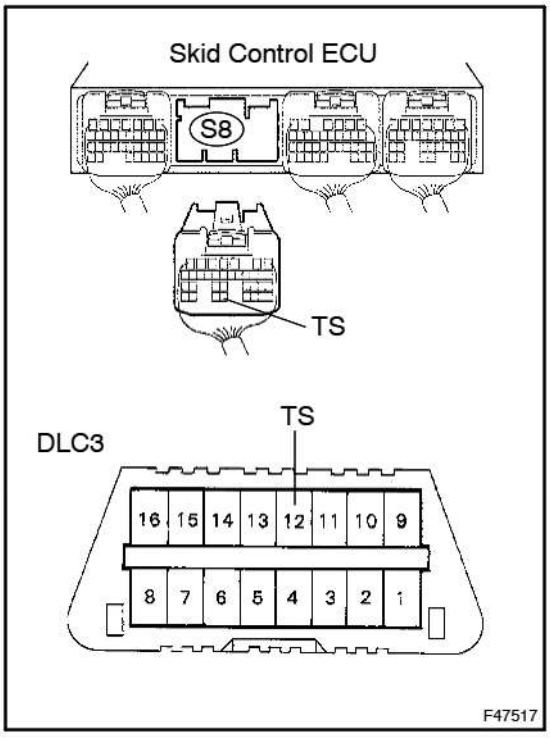
Standard:

Tester Connection	Specified Condition
D1–12 (TS) – D1–4 (CG)	10 to 14 V

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(DLC3 – SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S8–32 (TS) – D1–12 (TS)	Below 1 Ω

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

Standard:

Tester Connection	Specified Condition
S8–32 (TS) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

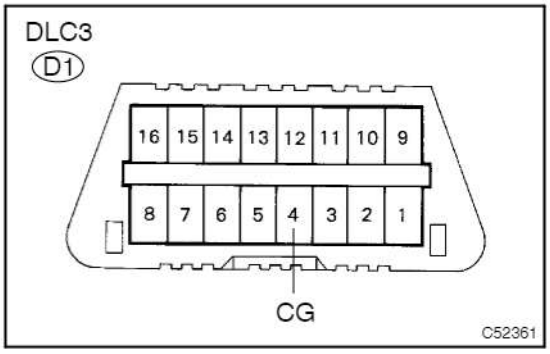
OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:
When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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3 CHECK HARNESS AND CONNECTOR(DLC3 – BODY GROUND)



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

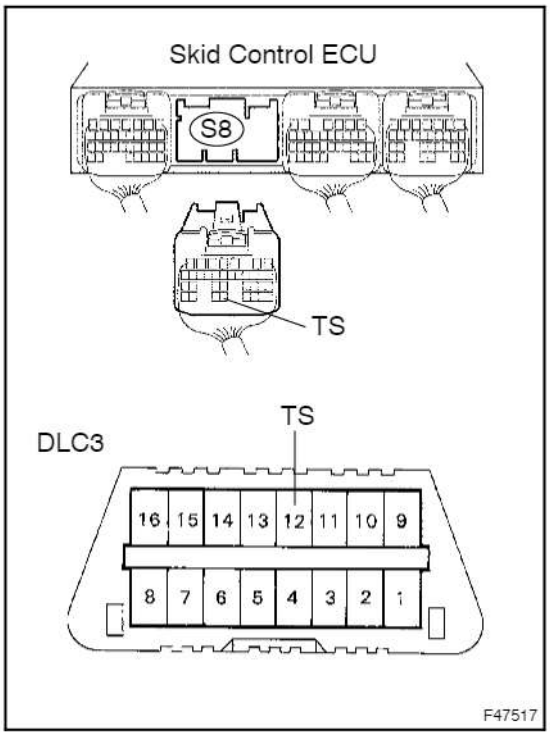
Standard:

Tester Connection	Specified Condition
D1–4 (CG) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR(DLC3 – SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector.

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

Standard:

Tester Connection	Specified Condition
S8–32 (TS) – D1–12 (TS)	Below 1 Ω

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

Standard:

Tester Connection	Specified Condition
S8–32 (TS) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 or 32–82)

NOTICE:

When replacing the skid control ECU assy, perform initialization of linear solenoid valve and calibration (see page 05–721).

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SHIFT CONTROL SYSTEM (PARKING LOCK CONTROL)

05ILV–02

PRECAUTION

NOTICE:

When the negative (–) battery terminal is disconnected, initialize the following systems after the terminal is reconnected.

System Name	See page
Power Window Control System	01–29

NOTICES FOR HYBRID SYSTEM ACTIVATION:

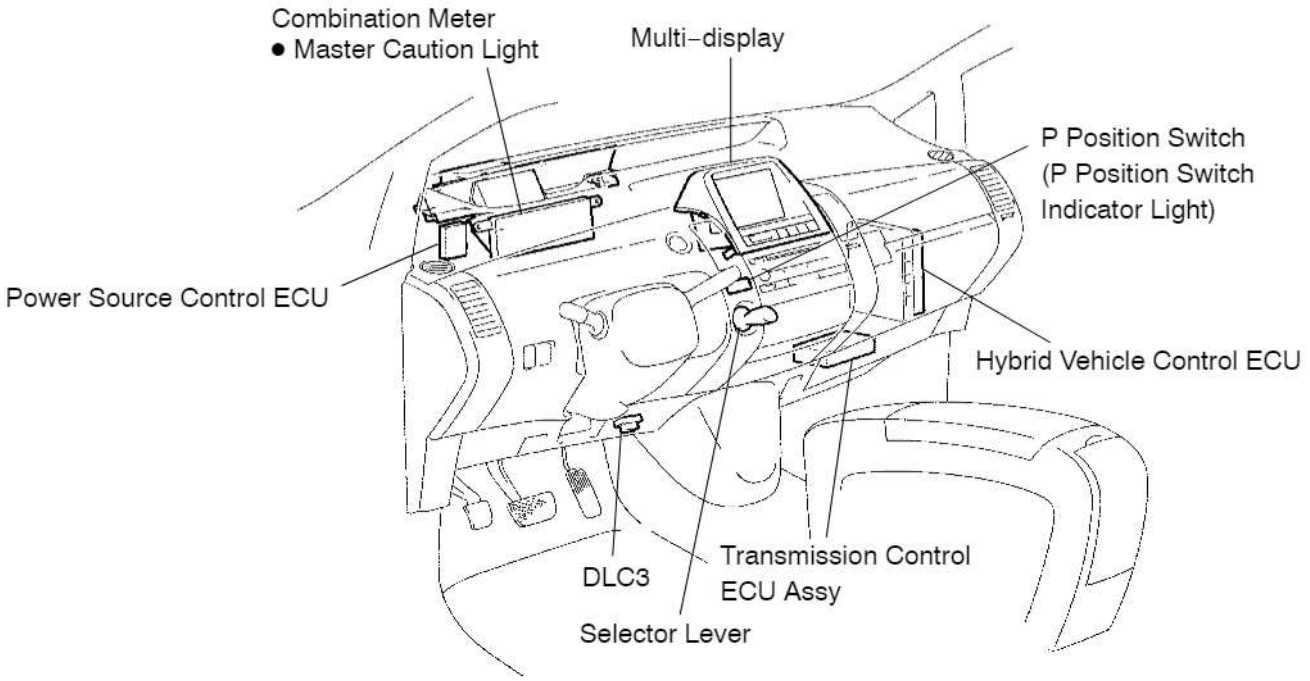
- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

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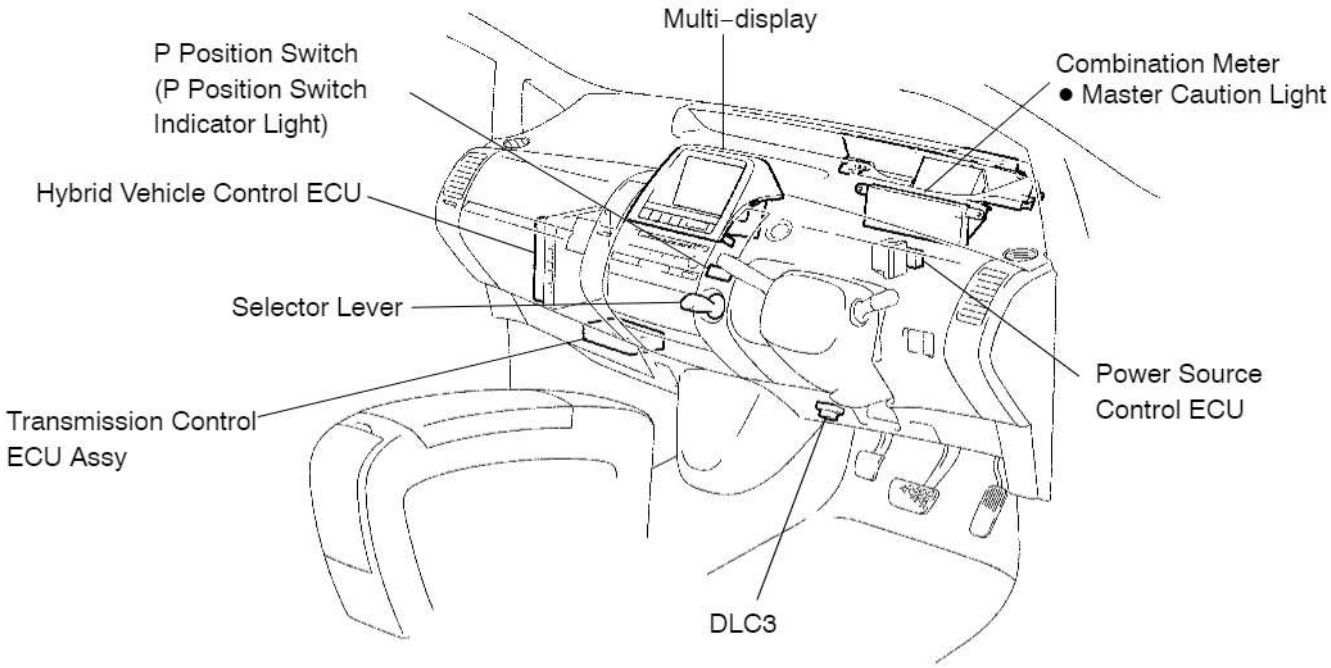
05J0A–01

LOCATION

LHD:

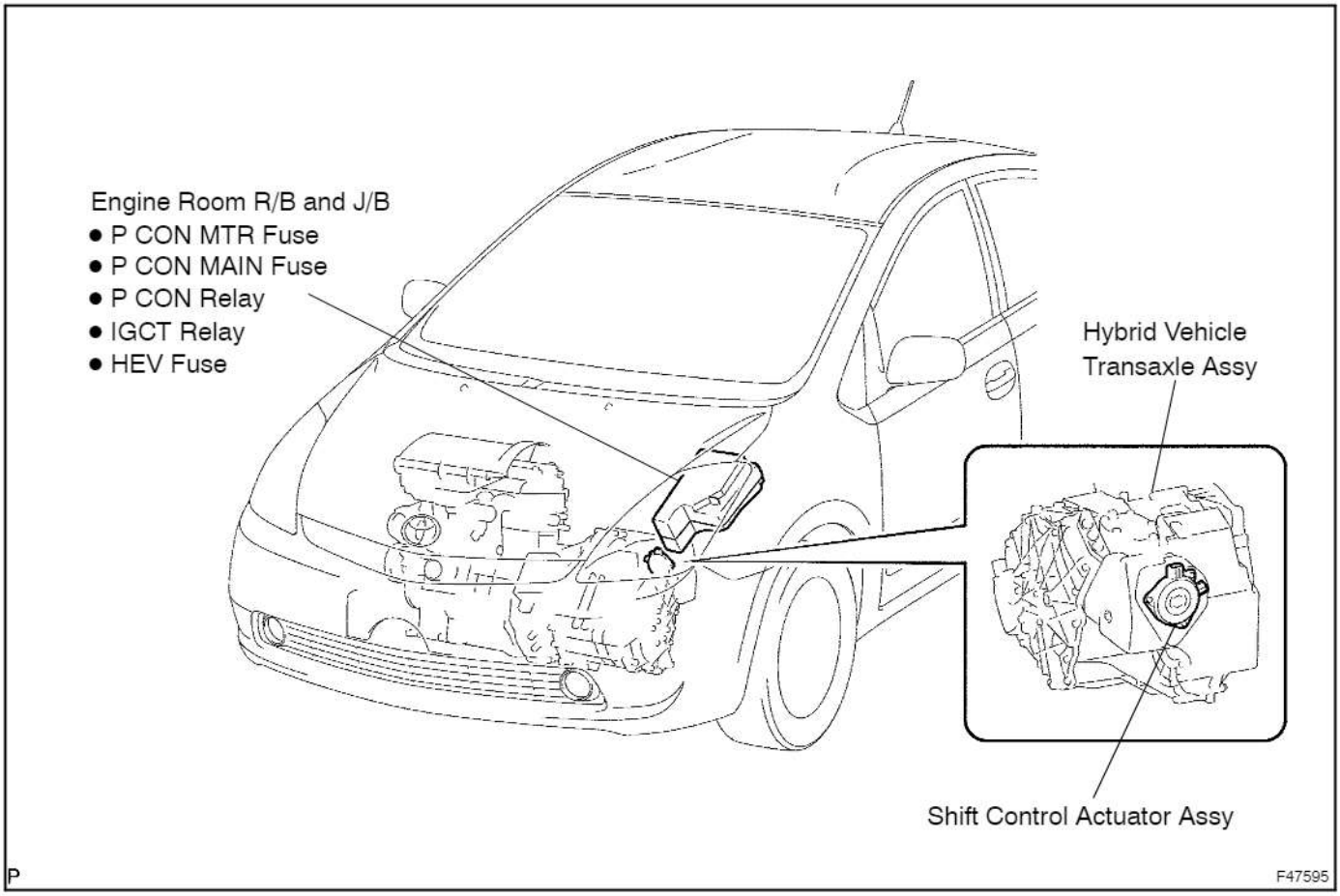


RHD:



P F47587

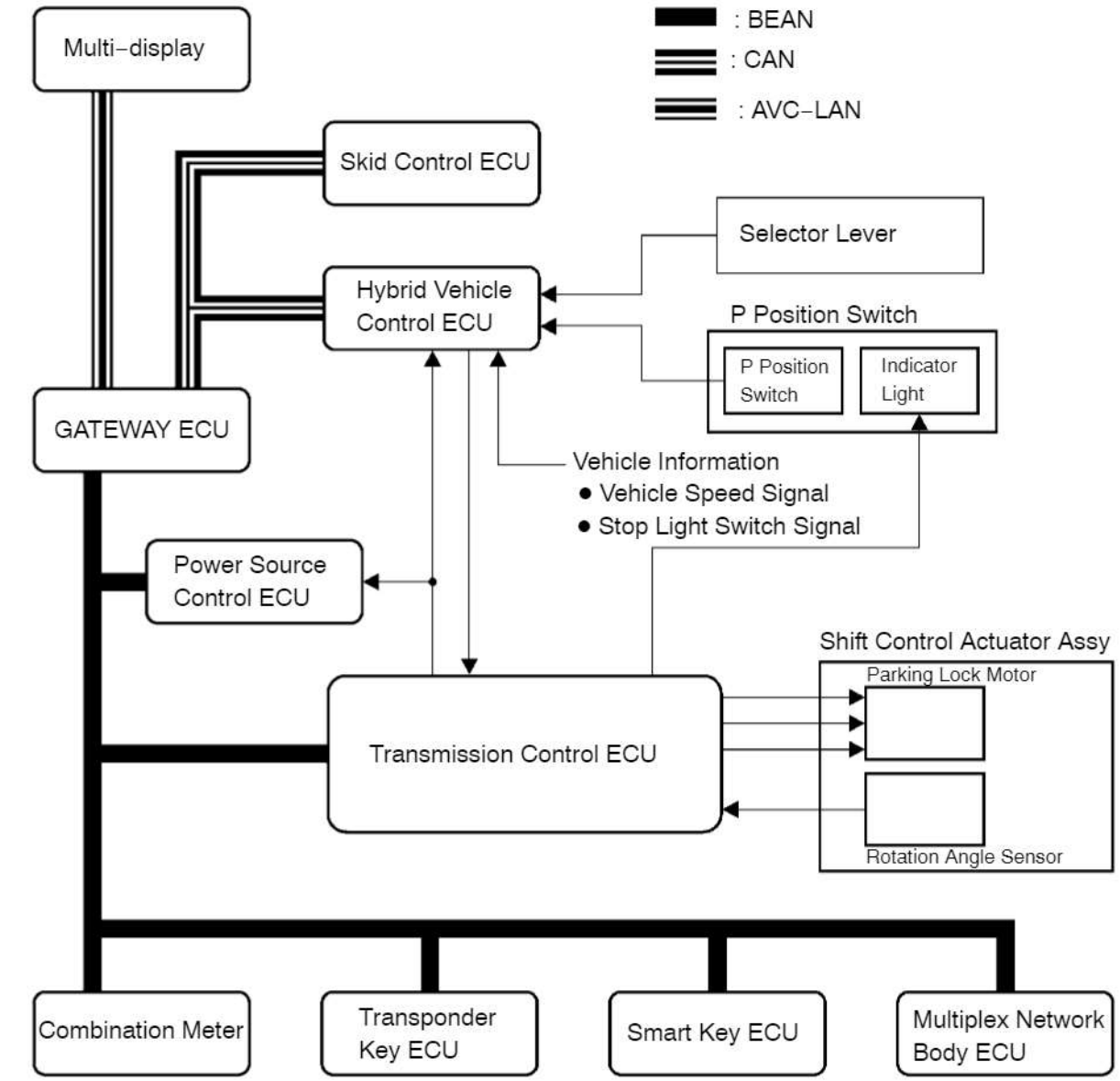
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05ILX-02

SYSTEM DIAGRAM



C

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Input and output signals of each ECU.

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
Skid Control ECU	Transmission Control ECU Assy	• PKB switch signal	CAN, BEAN
Power Source Control ECU	Transmission Control ECU Assy	• Power off preparation signal	BEAN
Multiplex Network Body ECU	Transmission Control ECU Assy	• Ignition switch signal • ACC switch signal	BEAN
Transmission Control ECU Assy	Ignition Control ECU	• P position state signal • Transmission control ECU trouble condition signal • Auto P cancel signal • Non–P position state signal • Auto P permit signal	BEAN
Transmission Control ECU Assy	Multi–display	• Transmission control ECU trouble signal	AVC–LAN, BEAN
Transmission Control ECU Assy	Combination Meter	• Transmission control ECU trouble signal	BEAN
Transmission Control ECU Assy	Transponder Key Amplifier	• P position state signal • Key condition signal	BEAN
Transmission Control ECU Assy	Smart Key ECU	• P position state signal	BEAN

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05ILY-02

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

The shift control system (parking lock control) electrically controls the parking lock mechanism, conventionally operated by cable, by using the actuator.

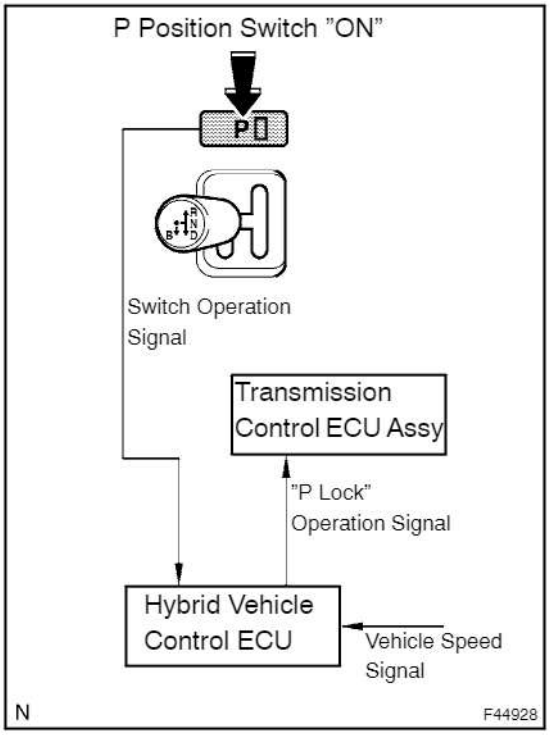
The transmission control ECU controls the shift control actuator assy, and also controls the entire system based on information from the hybrid vehicle control ECU.

The transmission control ECU detects DTCs when there are any malfunction in the system, and informs the driver of the malfunction by illuminating the P position switch indicator light and the master caution light and indicating an error message on the multi–display.

2. FUNCTION OF EACH COMPONENT

Parts name	Function
Shift Control Actuator Assy	• Composed of the parking lock motor and the rotation angle sensor. The motor is activated by electric current from the transmission control ECU assy. • Motor rotation is reduced by the cycloid reduction mechanism in the shift control actuator assy and then output. • The rotation angle sensor detects the motor rotation angle with the three hole ICs.
Transmission Control ECU Assy	• This ECU activates the shift control actuator assy based on signals from the hybrid vehicle control ECU and the power source control ECU. • This ECU controls the application timing of current to the parking lock motor based on signals from the rotation angle sensor.
Parking Lock Mechanism	• The parking lock pawl rotates according to the movement of the parking lock rod when the parking lock motor rotates, and engages with the parking gear on the transaxle side, causing the parking lock mechanism to lock or unlock.
Hybrid Vehicle Control ECU	• This ECU sends a P lock or P unlock demand signal to the transmission control ECU based on information from the selector lever and the P position switch.
Power Source Control ECU	• This ECU sends a signal with power off information to the transmission control ECU. The transmission control ECU then sends the signal to the hybrid vehicle control ECU.
P Position Switch Indicator Light	• This light comes on/goes off to indicate the P lock/unlock status and blinks to indicate a malfunction in the shift control system (parking lock control).
Combination Meter	• A malfunction in the transmission control ECU is indicated by the master caution light on the combination meter.
Multi–display	• A malfunction in the transmission control ECU is indicated on the multi–display.

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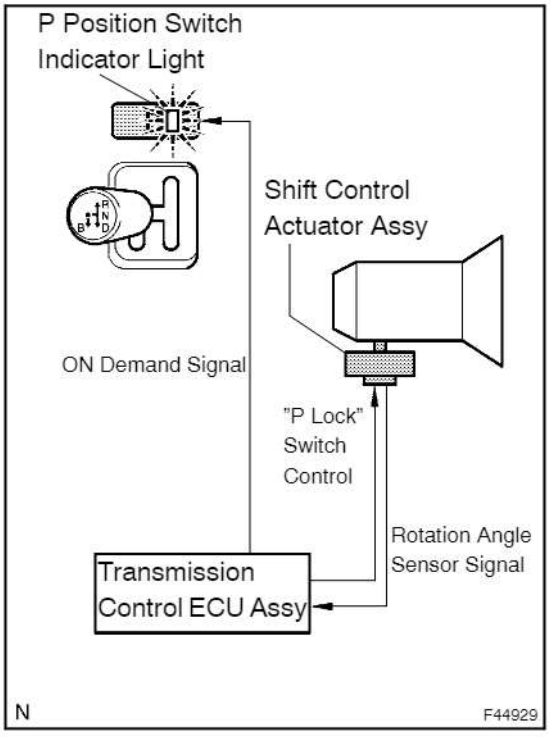
3. OPERATION DESCRIPTION

(a) Operation to switch to the P position:

(1) When the P position switch is turned on to activate parking lock, a signal is sent to the hybrid vehicle control ECU.

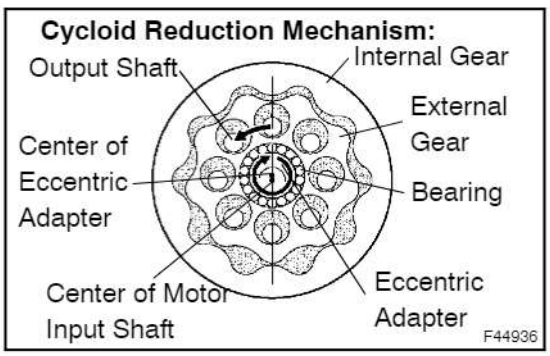
(2) The hybrid vehicle control ECU determines whether "P lock" is possible or not based on this signal and other vehicle information.

(3) If the hybrid vehicle control ECU determines that "P lock" is possible, it sends a "P lock" operation demand signal to the transmission control ECU.



(4) Receiving the signal, the transmission control ECU activates the shift control actuator assy in order to lock the parking lock mechanism and turns on the P position switch indicator light.

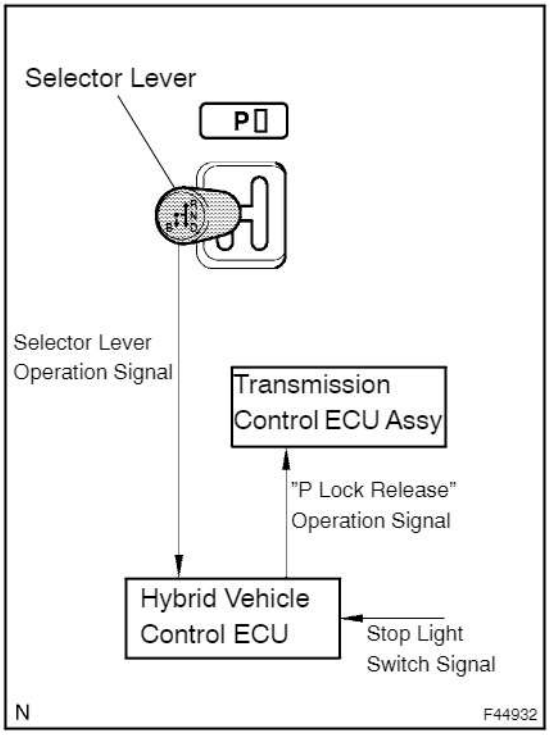
(5) At that time, the transmission control ECU controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator assy.



HINT:

In the cycloid reduction mechanism, the output shaft is linked to the external gear. Together, they rotate only a single tooth when the eccentric adapter, which is linked to the motor, rotates once. Driving force is increased like this so that the parking lock mechanism can be switched even when high output is required for parking on a hill, etc.

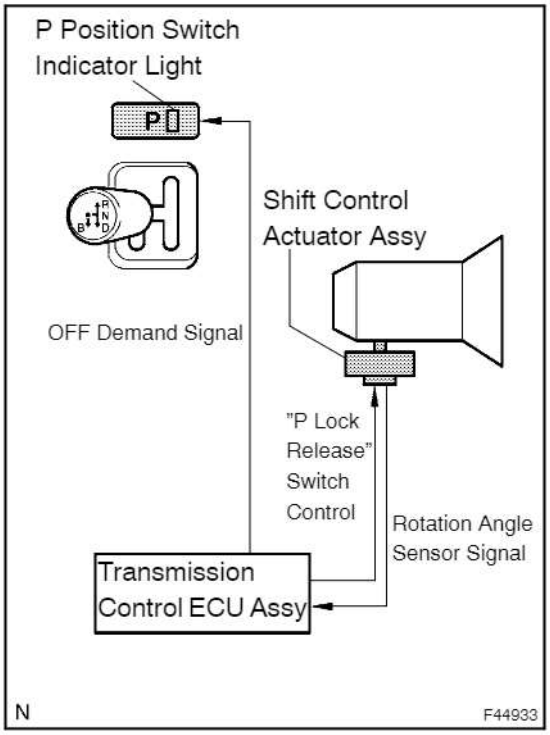
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(b) Operation to switch to a non–P position:

(1) When the hybrid system is started (the vehicle is ready to be driven) and the selector lever is moved to the R, N, or the D position with the brake pedal depressed, a signal is sent to the hybrid vehicle control ECU.

(2) This signal is then sent from the hybrid vehicle control ECU to the transmission control ECU as a "P lock release" operation demand signal.



(3) Receiving the signal, the transmission control ECU activates the shift control actuator assy in order to unlock the parking lock mechanism and turns off the P position switch indicator light.

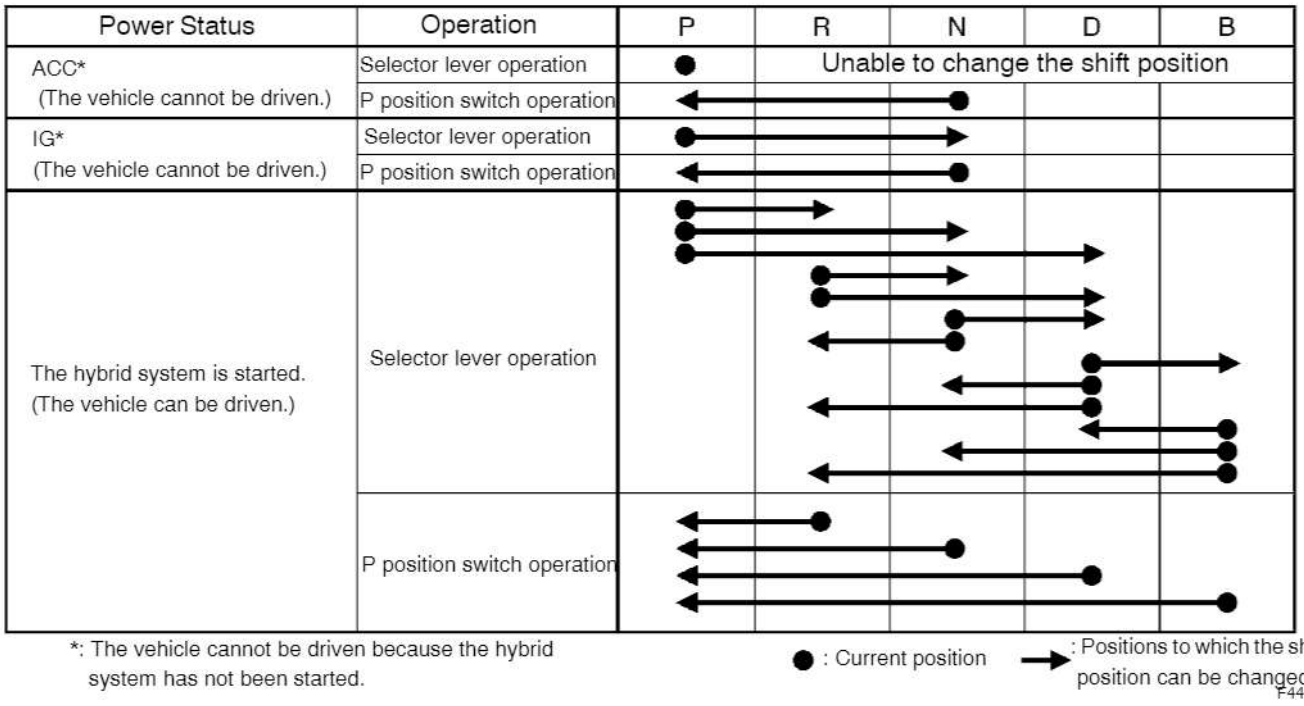
(4) At that time, the transmission control ECU controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator assy.

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4. SHIFT POSITION CHANGE FUNCTION

(a) The shift control system (parking lock control) comprehensively determines vehicle conditions and changes the shift position, as shown in the following chart, by cooperating with the shift control function of the hybrid system (except when the reject function, described later, is in operation).

(b) Other than indicated in the following chart, when the power switch is turned off with the vehicle stopped, the shift position is automatically changed to the P position.



N

5. REJECT FUNCTION

In the shift control system (parking lock control), there may be a situation in which a shift change cannot be done for safety reasons. When attempting to move the selector lever in such a situation, the system sounds a reject buzzer inside the meter and changes the shift position as shown in the following table.

Shift operation which causes the reject function to operate	Shift position after rejection
Shifting from the P position without depressing the brake pedal	Held in the P position
Shifting to the P position while driving	Changed to the N position
Shifting between forward and reverse positions while driving	Changed to the N position
Shifting to the B position from the position other than D	Changed to the N position

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05IM1-02

HOW TO PROCEED WITH TROUBLESHOOTING

The hand–held tester can be used during steps 3, 8 and 11.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–919)

3	CHECK AND CLEAR DTCs (SEE PAGE 05–924)

4	PROBLEM SYMPTOM CONFIRMATION

(a) Turn the power switch on (IG).
(b) Turn the P position switch on, or move the selector lever to the R, N, or D position with the brake pedal depressed to see if any problem symptom occurs.

- SYMPTOM DOES NOT OCCUR (Go to step 5)
- SYMPTOM OCCURS (Go to step 6)

5	SYMPTOM SIMULATION (SEE PAGE 01–36)

6	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

HINT:
The steering lock ECU is connected to the multiplex communication system. Therefore, be sure to check that there are no problems in the multiplex communication system before performing troubleshooting.

7	CHECK CAN COMMUNICATION SYSTEM (SEE PAGE 05–2312)

HINT:
This ECU is connected to the CAN communication system. Therefore, be sure to check that there are no troubles in the CAN communication system before performing troubleshooting.

8	DTC CHECK (SEE PAGE 05–924)

- DTC IS NOT OUTPUT (Go to step 9)
- DTC IS OUTPUT (Go to step 10)

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9	PROBLEM SYMPTOMS TABLE (SEE PAGE 05–920)

Go to step 11

10	DTC CHART (SEE PAGE 05–929)

11	CIRCUIT INSPECTION (SEE PAGE 05–931 to 05–969)

12	PROBLEM IDENTIFICATION

13	REPAIR OR REPLACEMENT

14	CONFIRMATION TEST

END

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05IM3–02

CUSTOMER PROBLEM ANALYSIS CHECK

SHIFT CONTROL SYSTEM (PARKING LOCK CONTROL) CHECK SHEET

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

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

Symptoms	☐ Parking lock mechanism cannot be switched
	☐ Vehicle cannot be driven
	☐ The shift position is not indicated on the meter
	☐ Shift position display (meter) and actual selector lever position are different

Check Item	**Waring light status**	☐ ON ( ) ☐ OFF
	Error message on the multi–display	☐ Displayed ☐ Not displayed
	P position switch indicator light status	☐ Comes on ⇔ Goes off ☐ Blinks quickly ☐ Blinks slowly

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

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05IM5–02

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
P position switch indicator light does not come on.	1. P position switch indicator light circuit 2. Transmission control ECU assy	05–969 –
P position switch indicator light does not go off.	1. P position switch indicator light circuit 2. Transmission control ECU assy	05–969 –

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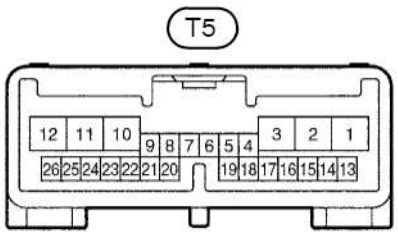
05J0B–01

TERMINALS OF ECU

1. TRANSMISSION CONTROL ECU ASSY

HINT:

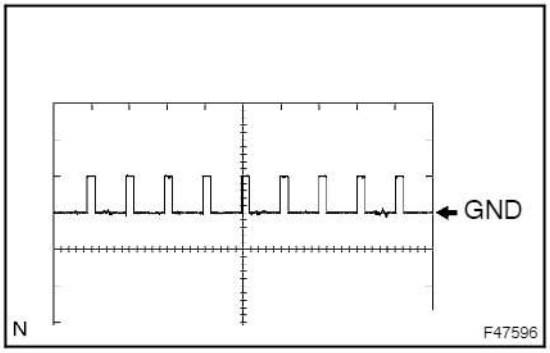
Inspect the connectors from the back side while the connector is connected.



P G27319

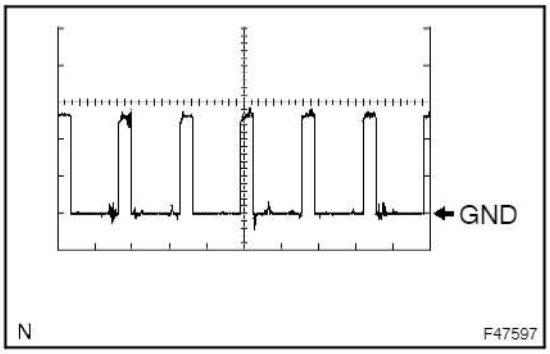
Terminal No. (Symbols)	Wiring color	Terminal description	Condition	Specified value
T5–1 – T5–15 (+B – E1)	L – W–B	Power source	Power switch on (IG)	9 to 14 V
T5–2 (E02) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
T5–3 (E01) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
T5–4 – T5–16 (RZ1 – E2)	L – P	Rotation angle sensor signal	Power switch on (IG)	4 to 5.5 V
T5–5 – T5–16 (RB – E2)	GR – P	Rotation angle sensor signal	Power switch on (IG)	4 to 5.5 V
T5–6 – T5–16 (RA – E2)	LG – P	Rotation angle sensor signal	Power switch on (IG)	4 to 5.5 V
T5–7 – T5–15 (PCON – E1)	LG – W–B	Communication Bus	Power switch on (IG)	Pulse generation (see wave form 1)
T5–8 – T5–15 (PPOS – E1)	W – W–B	Communication Bus	Power switch on (IG)	Pulse generation (see wave form 2)
T5–9 – T5–15 (IND – E1)	R – W–B	P position switch indicator light	P position switch on	Below 1 V
T5–10 – T5–15 (MWA – E1)	W – W–B	Parking lock motor	Power switch on (IG)	9 to 14 V
T5–11 – T5–15 (MVA – E1)	R – W–B	Parking lock motor	Power switch on (IG)	9 to 14 V
T5–12 – T5–15 (MUA – E1)	B – W–B	Parking lock motor	Power switch on (IG)	9 to 14 V
T5–13 – T5–15 (BATT – E1)	L – W–B	Power source (RAM)	Always	9 to 14 V
T5–14 – T5–15 (BMA – E1)	B – W–B	P CON relay	Power switch on (IG)	9 to 14 V
T5–15 (E1) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
T5–16 (E2) – Body ground	P – Body ground	Ground	Always	Below 1 V
T5–17 – T5–16 (VC – E2)	O – P	Power source (Rotation angle sensor)	Power switch on (IG)	4.5 to 5.5 V
T5–18 – T5–15 (MPX2 – E1)	B – W–B	Multiplex communication	Power switch off Power switch on (IG)	Below 1 V Pulse generation
T5–19 – T5–15 (MPX1 – E1)	GR – W–B	Multiplex communication	Power switch off Power switch on (IG)	Below 1 V Pulse generation
T5–20 – T5–15 (SIL – E1)	W – W–B	Diagnosis tester communication	Power switch on (IG)	8 V or higher

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(a) Wave form 1

Item	Content
Measure terminal	PCON – E1
Measure set	5V/DIV, 20 ms/DIV
Condition	Power switch on (IG)



(b) Wave form 2

Item	Content
Measure terminal	PPOS – E1
Measure set	5V/DIV, 20 ms/DIV
Condition	Power switch on (IG)

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05IMB–02

DIAGNOSIS SYSTEM

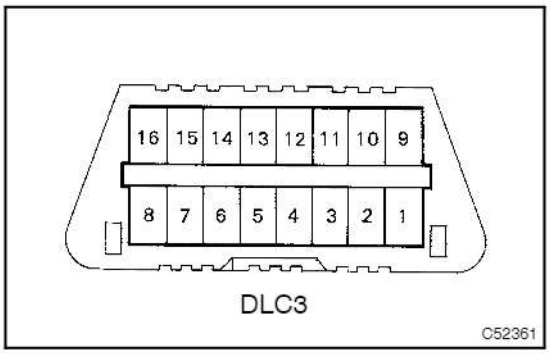
1. DESCRIPTION

(a) DIAGNOSTIC SYSTEM

When troubleshooting a vehicle with a diagnostic system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester II to the vehicle and reading various data output from the vehicle's transmission control ECU assy.

The transmission control ECU assy records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

To check the DTCs, connect the intelligent tester II to the DLC3 on the vehicle. The intelligent tester II enables you to erase the DTCs, activate the several actuators and check freeze frame data and data list.



(b) Check the DLC3.

The transmission control ECU follows the CAN and ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–3 and matches the ISO 9141–2/ISO 14230 format.

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL(7) – SG(5)	Bus "+" line	During communication	Pulse generation
CG(4) – Body ground	Chassis ground	Always	Below 1 Ω
SG(5) – Body ground	Signal ground	Always	Below 1 Ω
BAT(16) – Body ground	Battery positive	Always	11 to 14 V
CANH(6) – CANL (14)	HIGH–level CAN bus line	Power switch off	54 to 67 Ω
CANH(6) – Battery positive	HIGH–level CAN bus line	Power switch off	1 MΩ or higher
CANH(6) – CG(4)	HIGH–level CAN bus line	Power switch off	3 KΩ or higher
CANL(14) – Battery positive	LOW–level CAN bus line	Power switch off	1 MΩ or higher
CANL(14) – CG(4)	LOW–level CAN bus line	Power switch off	3 KΩ or higher

HINT:

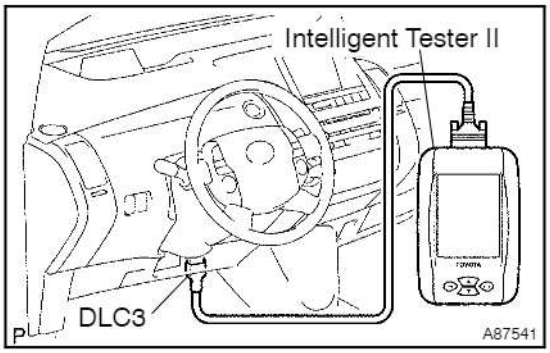
If the display shows "UNABLE TO CONNECT TO VEHICLE" after connecting the intelligent tester II cable to the DLC3 and turning the power switch on (IG), there is a problem with either the vehicle or tester.

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

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05IME–02

DTC CHECK/CLEAR



1. CHECK FOR DTCs

(a) Prepare the intelligent tester II.

(b) Connect the intelligent tester II to the DLC3 at the lower part of the instrument panel.

(c) Turn the power switch on (IG) and turn the intelligent tester II on.

(d) Use the intelligent tester II to check for DTCs and the freeze frame data, and note or print the result (see the operator's manual for operating instructions).

(e) See page 05–929 to confirm the details of the DTCs.

2. CLEAR DTCs

HINT:

The following procedures clear the DTCs and freeze frame data.

(a) When using the intelligent tester II:

Operate the intelligent tester II to clear the DTCs (see the operator's manual for operating instructions).

(b) When not using the intelligent tester II:

HINT:

Remove the P CON MAIN fuse to erase DTCs C2300, C2301, C2303, C2304, C2305, C2306, and C2307 because they cannot be erased with the intelligent tester II.

(1) Turn the power switch off.

(2) Remove the P CON MAIN fuse (7.5 A) for 60 seconds or more, and then reconnect it.

(3) Turn the power switch on (IG).

(4) Check that no DTCs are output.

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05IMH–02

FREEZE FRAME DATA

(c) The vehicle status, stored during system operation or at the time of an error code detection, can be displayed by the intelligent tester II.

(d) Only one record of freeze frame data is stored and the freeze frame data generated during system operation are updated whenever the vehicle status is changed. After storing the DTC, the freeze frame data is not updated.

Tester display	Measurement Item	Reference Value
Shift Pos Display (P)	shift position display (P)	ON or OFF
Shift Pos Display (Not P)	shift position display (not P)	ON or OFF
Master Caution Display	master caution display	DISP or NONDISP
PSW Indicator Mode	PSW indicator mode	OFF, ON, FAST, or SLOW
U Phase Voltage Value	U phase voltage value	min: 0 V, max: 20 V
V Phase Voltage Value	V phase voltage value	min: 0 V, max: 20 V
W Phase Voltage Value	W phase voltage value	min: 0 V, max: 20 V
Battery Voltage Value	BATT voltage value	min: 0 V, max: 20 V
IG (+B) Voltage Value	IG (+B) voltage value	min: 0 V, max: 20 V
P Sply Off Prepare Rqst Sig	power supply off preparation request signal	ON or OFF
Cmplte of Learn Lck Pos	completion of learning lock position	OK or NG
Cmplte of Learn Unlck Pos	completion of learning unlock position	OK or NG
# of Trip Cuntr after Learn	number of trip counter after learning	min: 0, max: 65535
Main Relay for Motor Drive	main relay for motor drive	ON or OFF
Sig of Electric Key Cond	signal of electrical key condition	ON or OFF
U Phase Crnt–Carry Status	U phase current–carrying status	ON or OFF
V Phase Crnt–Carry Status	V phase current–carrying status	ON or OFF
W Phase Crnt–Carry Status	W phase current–carrying status	ON or OFF
U Phase Voltage Status	U phase voltage status	ON or OFF
V Phase Voltage Status	V phase voltage status	ON or OFF
W Phase Voltage Status	W phase voltage status	ON or OFF
Battery Voltage Status	BATT voltage status	ON or OFF
IG(+B) Phase Voltage Status	IG (+B) phase voltage status	ON or OFF
ACC Condition Signal	ACC condition signal	ON or OFF
Init Drv Cntrl Completed	initial drive control completed	OK or NG
Complte of Detect Lck Pos	completion of detecting lock position	OK or NG
Complte of Detect Unlck Pos	completion of detecting unlock position	OK or NG
P/Not P Move Shft Range	P/Not P movable shift range	SET or UNSET
Main Relay	main relay	NORMAL or ABNOML
Vehicle Condition	vehicle condition	STOP or MOVE
Fail Rank	fail rank	min: 0, max: 255
Type of ECU	Type of ECU	min: 0, max: 65535
Detail Information1	detail information 1	Failure information is displayed in hexadecimal
Detail Information2	detail information 2	Failure information is displayed in hexadecimal
Detail Information3	detail information 3	Failure information is displayed in hexadecimal

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05IMK–02

FAIL–SAFE CHART

If the transmission control ECU assy detects a malfunction, the fail safe functions shown in the table below are activated.

DTC No.	Fail–safe function	Problem symptoms
C2300 C2301	Only the P position release operation is possible and the shift control actuator assy is activated.	• The shift position is not indicated on the meter. • Although the shift position is indicated on the meter, the vehicle cannot be driven.
C2303	–	The battery is dead.
C2304 C2305 C2306	The transaxle parking lock control relay is turned off.	The parking lock mechanism cannot be switched.
C2307	The transaxle parking lock control relay is turned off.	• The shift position is not indicated on the meter. • Although the shift position is indicated on the meter, the vehicle cannot be driven.
C2311	–	The parking lock mechanism cannot be switched.
C2312	–	The hybrid system does not start up.
C2318	–	The parking lock mechanism cannot be switched on a hill.

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05IMO–02

DATA LIST/ACTIVE TEST

1. DATA LIST

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester II on.

(c) Operate the intelligent tester II according to the steps on the display and select "DATA LIST".

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
Shift Pos Display (P)	shift position display (P)/ON or OFF	ON: Parking lock is in P position OFF: Parking lock is in non–P position	–
Shift Pos Display (Not P)	shift position display (not P)/ON or OFF	ON: Parking lock is in non–P position OFF: Parking lock is in P position	–
Master Caution Display	master caution display/DISP or NONDISP	DISP: Malfunction occurs in this system NONDISP: Malfunction does not occur in this system	–
PSW Indicator Mode	PSW indicator mode/OFF, ON, FAST, or SLOW	OFF: Parking lock is in non–P position ON: Parking lock is in P position FAST: Actuator takes long to switch between the P position and non–P position SLOW: Malfunction occurs in this system	–
U Phase Voltage Value	U phase voltage value/min: 0 V, max: 20 V	Actual U phase voltage 9 to 14 V	–
V Phase Voltage Value	V phase voltage value/min: 0 V, max: 20 V	Actual V phase voltage 9 to 14 V	–
W Phase Voltage Value	W phase voltage value/min: 0 V, max: 20 V	Actual W phase voltage 9 to 14 V	–
Battery Voltage Value	BATT voltage value/min: 0 V, max: 20 V	Actual power supply voltage 9 to 14 V	–
IG (+B) Voltage Value	IG (+B) voltage value/min: 0 V, max: 20 V	Actual power supply voltage 9 to 14 V	–
P Sply Off Prepare Rqst Sig	power supply off preparation request signal/ON or OFF	ON: Power is turned off by power source control ECU after receiving power switch off signal OFF: Any other condition	–
Cmplte of Learn Lck Pos	completion of learning lock position/OK or NG	OK: Lock position learning is complete NG: Lock position learning is not complete	–
Cmplte of Learn Unlck Pos	completion of learning unlock position/OK or NG	OK: Unlock position learning is complete NG: Unlock position learning is not complete	–
# of Trip Cuntr after Learn	number of trip counter after learning/min: 0, max: 65535	Actual number of trip counter	Reset the trip counter after 1,000 times
Main Relay for Motor Drive	main relay for motor drive/ON or OFF	ON: Motor drive main relay on OFF: Motor drive main relay off	–
Sig of Electric Key Cond	signal of electrical key condition/ ON or OFF	ON: Electrical key is recognized OFF: Electrical key is not recognized	–
Number of Diagnosis Code	Number of diagnosis code/min: 0, max: 255	Actual number of diagnosis code	–

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Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
U Phase Crnt–Carry Status	U phase current–carrying status/ ON or OFF	ON: U phase current flows OFF: U phase current does not flow	–
V Phase Crnt–Carry Status	V phase current–carrying status/ ON or OFF	ON: V phase current flows OFF: V phase current does not flow	–
W Phase Crnt–Carry Status	W phase current–carrying status/ ON or OFF	ON: W phase current flows OFF: W phase current does not flow	–
U Phase Voltage Status	U phase voltage status/ON or OFF	ON: U phase voltage is 6 V or more OFF: U phase voltage is less than 6 V	–
V Phase Voltage Status	V phase voltage status/ON or OFF	ON: V phase voltage is 6 V or more OFF: V phase voltage is less than 6 V	–
W Phase Voltage Status	W phase voltage status/ON or OFF	ON: W phase voltage is 6 V or more OFF: W phase voltage is less than 6 V	–
Battery Voltage Status	BATT voltage status/ON or OFF	ON: BATT voltage is more than 10 V OFF: BATT voltage is 10 V or less	–
IG(+B) Phase Voltage Status	IG (+B) phase voltage status/ON or OFF	ON: +B voltage is more than 10 V OFF: +B voltage is 10 V or less	–
ACC Condition Signal	ACC condition signal/ON or OFF	ON: ACC condition signal is normal OFF: ACC condition signal is interrupted	–
Init Drv Cntrl Completed	initial drive control completed/OK or NG	OK: Initial drive control is complete NG: Initial drive control is not complete	–
Complte of Detect Lck Pos	completion of detecting lock position/OK or NG	OK: Detection of lock position is complete NG: Detection of lock position is not complete	–
Complte of Detect Unlck Pos	completion of detecting unlock position/OK or NG	OK: Detection of unlock position is complete NG: Detection of unlock position is not complete	–
P/Not P Move Shft Range	P/Not P movable shift range/SET or UNSET	SET: P/Not P movable shift range is set UNSET: P/Not P movable shift range is unset	–
Main Relay	main relay/NORMAL or ABNOML	NORMAL: Main relay is normal ABNOML: Main relay is fault	–
Vehicle Condition	vehicle condition/STOP or MOVE	STOP: Vehicle is stopped MOVE: Vehicle is running	–
Type of ECU	Type of ECU/min: 0, max: 65535	Actual type of ECU	–

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DIAGNOSTIC TROUBLE CODE CHART

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

HINT:

- When the DTC C2300, C2301, C2304, C2305, C2306, C2307, C2311, and C2312 are detected, DTC P3102 indicating the shift control system (parking lock control) malfunctions are detected for the hybrid system as well. Because of this, the hybrid system DTCs must be cleared after clearing the shift control system (parking lock control) DTCs.
- Remove the P CON MAIN fuse to erase DTCs C2300, C2301, C2303, C2304, C2305, C2306, and C2307 because they cannot be erased with the intelligent tester II (see page 05–924).
- When a DTC is detected, the master caution light comes on and an error message is indicated on the multi–display.
- The indicator blinks quickly when it takes long to switch between the P position status and the P position release status.

DTC No. (See Page)	Circuit Inspection	Trouble Area	P Position Switch Indicator Light Condition
C2300 (*1) (05–931)	ACT System Malfunction	• Shift control actuator assy • Transaxle parking lock control relay • Transmission control ECU assy • Wire harness or connector	Blinks slowly
C2301 (*1) (05–940)	Shift Changing Time Malfunction	• Shift control actuator assy • Transmission control ECU assy	Blinks slowly
C2303 (*1) (05–942)	Relay Malfunction (+B Short)	• Transaxle parking lock control relay • Transmission control ECU assy • Wire harness or connector	Normal (*2)
C2304 (*1) (05–946)	Open or Short Circuit in U Phase	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector	Blinks slowly
C2305 (*1) (05–946)	Open or Short Circuit in V Phase	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector	Blinks slowly
C2306 (*1) (05–946)	Open or Short Circuit in W Phase	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector	Blinks slowly
C2307 (*1) (05–953)	Power Source Malfunction	• Transmission control ECU assy • Wire harness or connector • Parking lock motor (Shift control actuator assy)	Blinks slowly
C2310 (05–956)	Open or Short Circuit in BATT	• P CON MAIN fuse • Transmission control ECU assy • Wire harness or connector	Normal (*2)
C2311 (05–959)	HV Communication Line Malfunction	• Transmission control ECU assy • Hybrid vehicle control ECU • Wire harness or connector	Blinks slowly
C2312 (05–962)	Power Source Control ECU Communication Line Malfunction	• Transmission control ECU assy • Power source control ECU	Normal (*2)

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C2315 (05–964)	HV System Malfunction	• Hybrid vehicle control ECU • P position switch • Transmission control ECU assy • Wire harness or connector	Normal (*2)
C2318 (05–966)	Low Voltage Error (Power Supply Malfunction)	• HEV fuse • IGCT relay • Wire harness or connector • Auxiliary battery	Normal (*2)

*1: If DTC C2318 is output simultaneously, perform troubleshooting for DTC C2318 first.

*2: P position status: the P position switch indicator light is on.

P position release status: the P position switch indicator light is off.

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DTC C2300 ACT SYSTEM MALFUNCTION

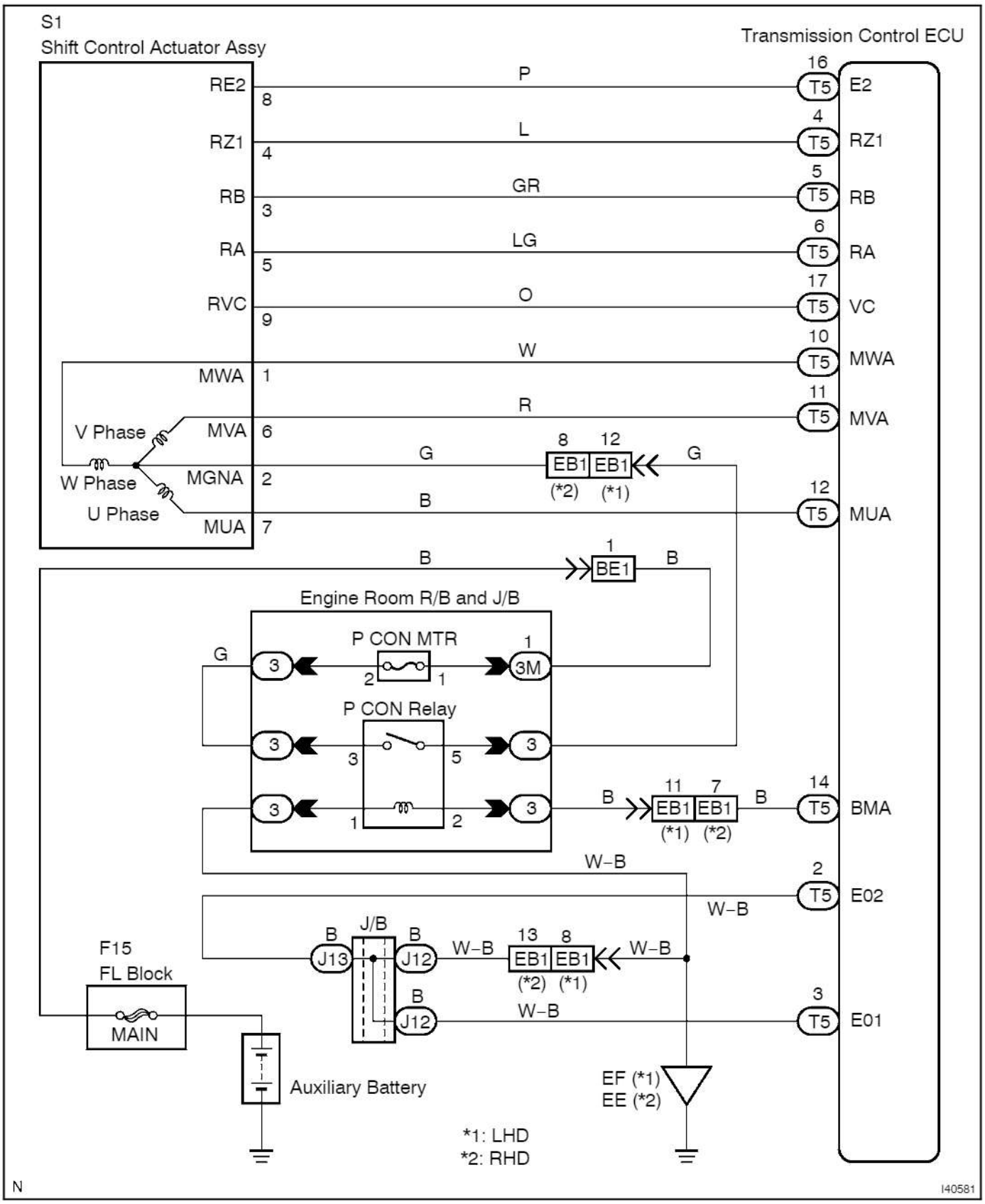
CIRCUIT DESCRIPTION

The shift control actuator assy consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU also detects the rotor rotation angle through the rotation angle sensor to control timing of current application to the coils. The transmission control ECU outputs this DTC when it detects a malfunction in the shift control actuator assy system.

DTC No.	DTC detecting condition	Trouble area
C2300	• Power switch on (IG). • There is an open or short circuit in the transaxle parking lock control relay and/or shift control actuator assy, or an internal abnormality in the shift control actuator assy.	• Shift control actuator assy • Transaxle parking lock control relay • Transmission control ECU assy • Wire harness or connector

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT(BESIDES DTC C2300)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Read the DTCs.

Result:

Display (DTC output)	Proceed to
No output	A
C2304, C2305, C2306 and C2318	B

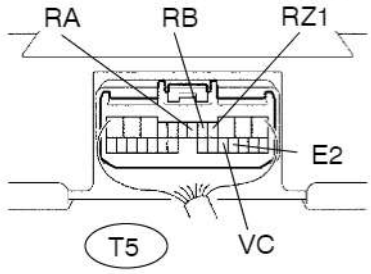
HINT:
If any other codes besides C2300 are output, perform the troubleshooting for those DTCs first.

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

A

2	INSPECT TRANSMISSION CONTROL ECU ASSY(VC, RA, RB, RZ1, E2 TERMINAL)

Transmission Control ECU Assy:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

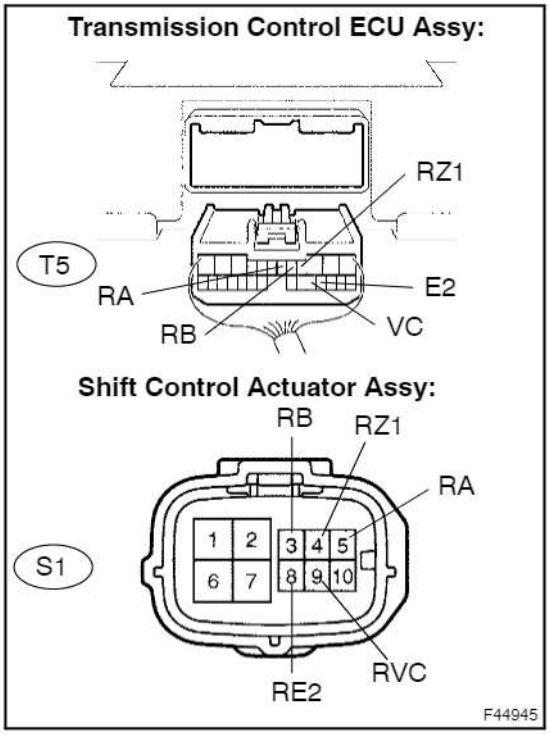
Tester connection (Symbols)	Condition	Specified condition
T5–4 (RZ1) – T5–16 (E2)	Power switch on (IG)	4 to 5.5 V
T5–5 (RB) – T5–16 (E2)	Power switch on (IG)	4 to 5.5 V
T5–6 (RA) – T5–16 (E2)	Power switch on (IG)	4 to 5.5 V
T5–17 (VC) – T5–16 (E2)	Power switch on (IG)	4 to 5.5 V

OK → **Go to step 5**

NG

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3 CHECK HARNESS AND CONNECTOR(SHIFT CONTROL ACTUATOR ASSY – TRANSMISSION CONTROL ECU ASSY)



(a) Disconnect the T5 connector from the transmission control ECU assy.

(b) Disconnect the S1 connector from the shift control actuator assy.

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

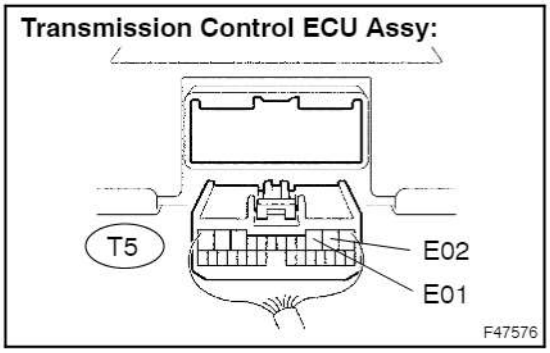
Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–17 (VC) – S1–9 (RVC)	Always	Below 1 Ω
T5–5 (RB) – S1–3 (RB)	Always	Below 1 Ω
T5–6 (RA) – S1–5 (RA)	Always	Below 1 Ω
T5–4 (RZ1) – S1–4 (RZ1)	Always	Below 1 Ω
T5–16 (E2) – S1–8 (RE2)	Always	Below 1 Ω
T5–4 (RZ1) – Body ground	Always	10 kΩ or higher
T5–5 (RB) – Body ground	Always	10 kΩ or higher
T5–6 (RA) – Body ground	Always	10 kΩ or higher
T5–17 (VC) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT TRANSMISSION CONTROL ECU ASSY(E01, E02 TERMINAL)



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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–2 (E02) – Body ground	Always	Below 1 Ω
T5–3 (E01) – Body ground	Always	Below 1 Ω

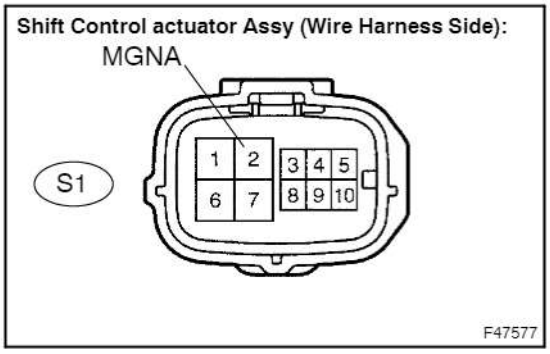
OK → **Go to step 14**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

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5 INSPECT SHIFT CONTROL ACTUATOR ASSY(MGNA TERMINAL)



(a) Disconnect the S1 connector from the shift control actuator assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
S1–2 (MGNA) – Body ground	Power switch on (IG)	9 to 14 V

NG → **Go to step 7**

OK

6 READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the intelligent tester II on.

(d) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester II.

Item	Measurement Item/ Range (Display)	Normal Condition
U Phase Voltage Value	U phase voltage value/min: 0 V, max: 20 V	Actual U phase voltage 9 to 14 V
V Phase Voltage Value	V phase voltage value/min: 0 V, max: 20 V	Actual V phase voltage 9 to 14 V
W Phase Voltage Value	W phase voltage value/min: 0 V, max: 20 V	Actual W phase voltage 9 to 14 V

Standard:

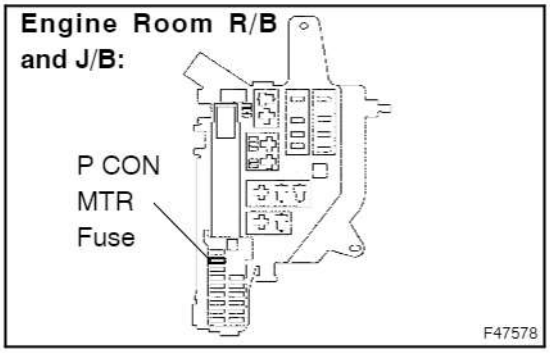
Voltage: 9 to 14 V

NG → **Go to step 13**

OK

REPLACE TRANSMISSION CONTROL ECU ASSY

7 INSPECT FUSE(P CON MTR FUSE)



(a) Remove the P CON MTR fuse from the engine room R/B and J/B.

(b) Check for continuity of the P CON MTR fuse.

Standard: Continuity

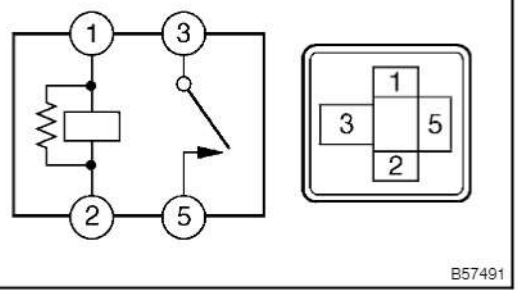
NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

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8 INSPECT TRANSAXLE PARKING LOCK CONTROL RELAY

P CON Relay:



(a) Remove the P CON relay from the engine room R/B and J/B.

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

Standard:

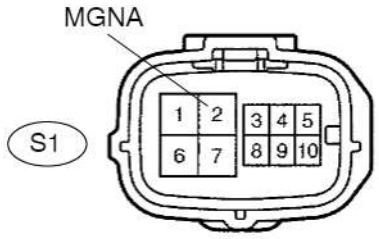
Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE TRANSAXLE PARKING LOCK CONTROL RELAY**

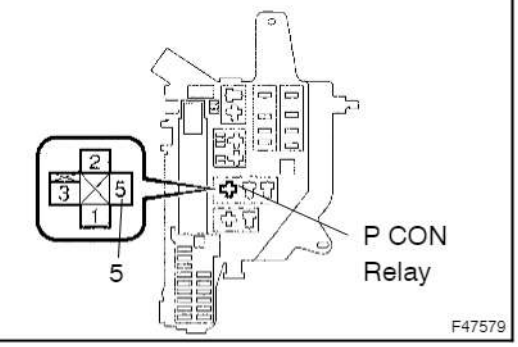
OK

9 CHECK HARNESS AND CONNECTOR(SHIFT CONTROL ACTUATOR ASSY – TRANSAXLE PARKING LOCK CONTROL RELAY)

Shift Control actuator Assy (Wire Harness Side):



Engine Room R/B and J/B:



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

Standard:

Tester connection (Symbols)	Condition	Specified condition
S1–2 (MGNA) – 5 (P CON Relay)	Always	Below 1 Ω
S1–2 (MGNA) – Body ground	Always	10 kΩ or higher

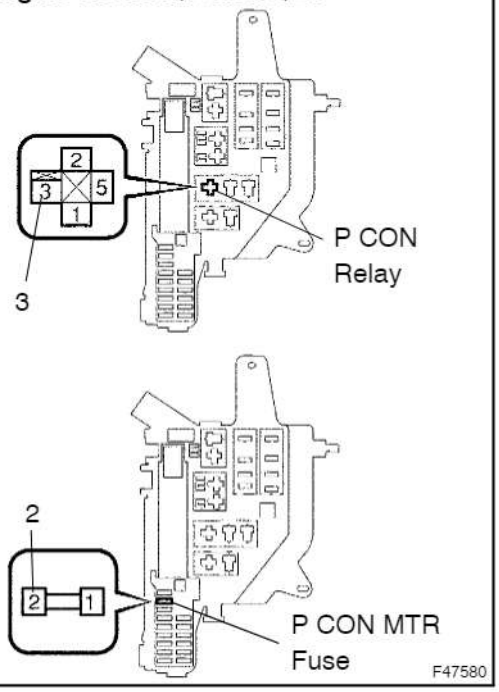
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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10 CHECK HARNESS AND CONNECTOR(TRANSAXLE PARKING LOCK CONTROL RELAY – P CON MTR FUSE)

Engine Room R/B and J/B:



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

Standard:

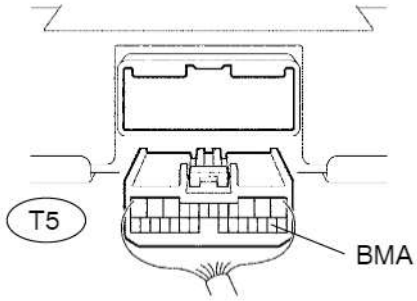
Tester connection (Symbols)	Condition	Specified condition
3 (P CON Relay) – 2 (P CON MTR Fuse)	Always	Below 1 Ω
3 (P CON Relay) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

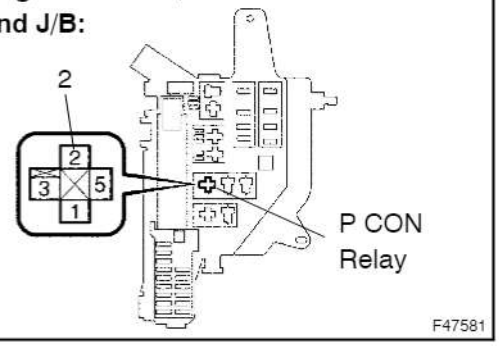
OK

11 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – TRANSAXLE PARKING LOCK CONTROL RELAY)

Transmission Control ECU Assy:



Engine Room R/B and J/B:



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

Standard:

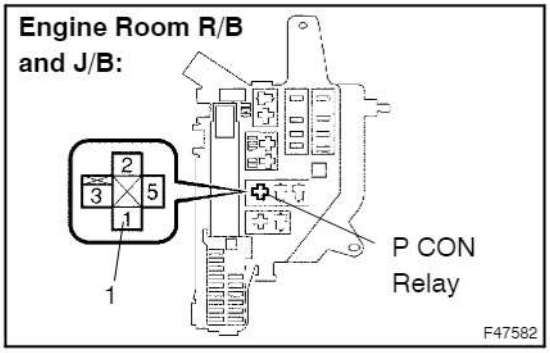
Tester connection (Symbols)	Condition	Specified condition
T5–14 (BMA) – 2 (P CON MTR Fuse)	Always	Below 1 Ω
T5–14 (BMA) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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12	CHECK HARNESS AND CONNECTOR(TRANSAXLE PARKING LOCK CONTROL RELAY – BODY GROUND)



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

Standard:

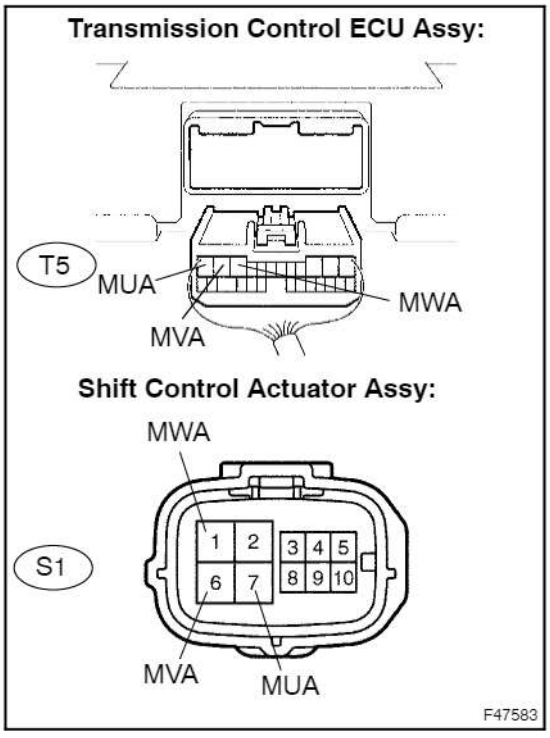
Tester connection (Symbols)	Condition	Specified condition
1 (P CON Relay) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (P CON MTR FUSE – BATTERY)

13	CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – SHIFT CONTROL ACTUATOR ASSY)



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

Standard:

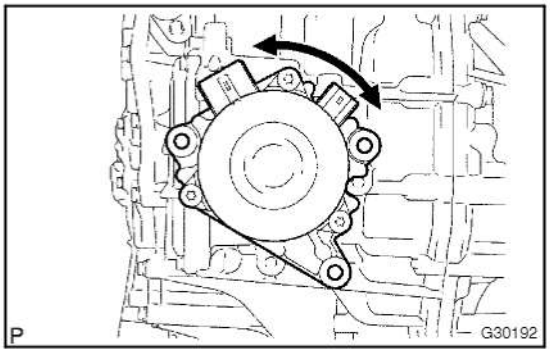
Tester connection (Symbols)	Condition	Specified condition
T5–10 (MWA) – S1–1 (MWA)	Always	Below 1 Ω
T5–11 (MVA) – S1–6 (MVA)	Always	Below 1 Ω
T5–12 (MUA) – S1–7 (MUA)	Always	Below 1 Ω
T5–10 (MWA) – Body ground	Always	10 kΩ or higher
T5–11 (MVA) – Body ground	Always	10 kΩ or higher
T5–12 (MUA) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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14	INSPECT SHIFT CONTROL ACTUATOR ASSY



(a) Remove the 3 bolts and transmission case cover.
(b) Remove the 3 bolts.
(c) Slightly pull the shift control actuator assy from the hybrid vehicle transaxle so that the shift control actuator assy can be turned.
(d) Turn the shift control actuator assy.
OK: The shift control actuator turns smoothly.

HINT:
There may be an internal actuator abnormality if the actuator does not turn smoothly.

NG → **REPLACE SHIFT CONTROL ACTUATOR ASSY** (SEE PAGE 22–6)

OK →

REPLACE TRANSMISSION CONTROL ECU ASSY

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DTC	C2301	SHIFT CHANGING TIME MALFUNCTION

CIRCUIT DESCRIPTION

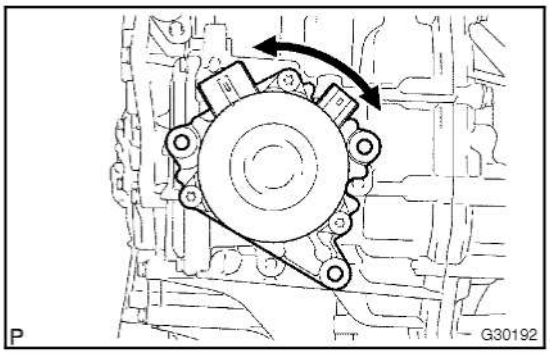
The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and then activates the shift control actuator. At the same time, the transmission control ECU detects length of time it takes for the parking lock mechanism to switch. The transmission control ECU outputs this DTC when this length of time is longer than specification.

DTC No.	DTC detecting condition	Trouble area
C2301	• Power switch on (IG). • There is an internal abnormality in the shift control actuator assy for 2 sec. or more (the parking lock motor runs idle).	• Shift control actuator assy • Transmission control ECU assy

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INSPECTION PROCEDURE

1	INSPECT SHIFT CONTROL ACTUATOR ASSY



(a) Remove the 3 bolts and transmission case cover.
(b) Remove the 3 bolts.
(c) Slightly pull the shift control actuator assy from the hybrid vehicle transaxle so that the shift control actuator assy can be turned.
(d) Turn the shift control actuator assy.
OK: The shift control actuator turns smoothly.

HINT:
There may be an internal actuator abnormality if the actuator does not turn smoothly.

NG → **REPLACE SHIFT CONTROL ACTUATOR ASSY** (SEE PAGE 22–6)

OK →

REPLACE TRANSMISSION CONTROL ECU ASSY

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DTC	C2303	RELAY MALFUNCTION (+B SHORT)

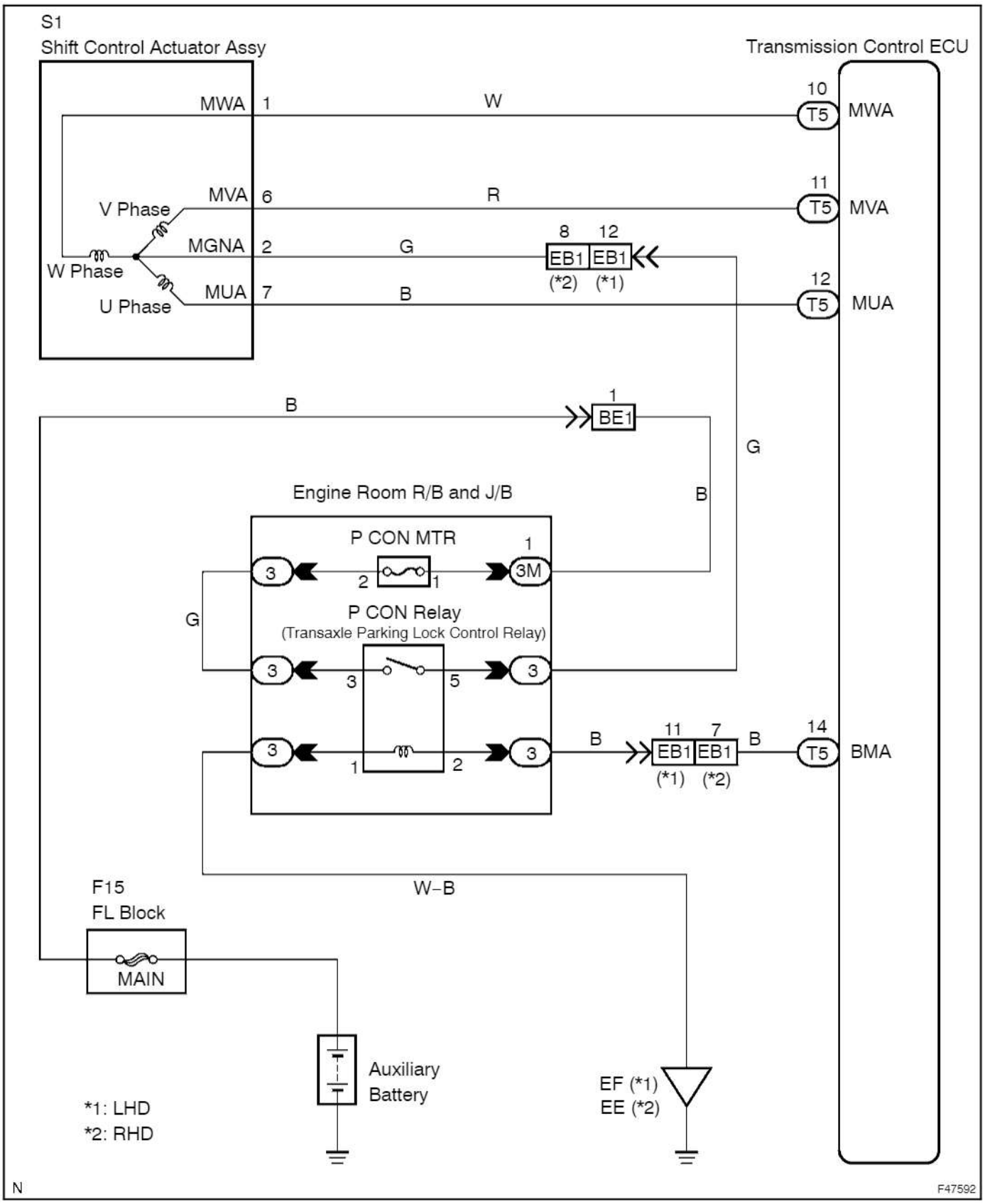
CIRCUIT DESCRIPTION

The transaxle parking lock control relay is activated by output voltage from the transmission control ECU and supplies power to the shift control actuator assy. The transmission control ECU outputs this DTC when it detects a malfunction in the transaxle parking lock control relay.

DTC No.	DTC detecting condition	Trouble area
C2303	• The transaxle parking lock control relay is off. • Voltage of the transmission control ECU terminals MUA, MVA, and MWA is 6 V or more for 64 ms or more.	• Transaxle parking lock control relay (P CON Relay) • Transmission control ECU assy • Wire harness or connector

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WIRING DIAGRAM

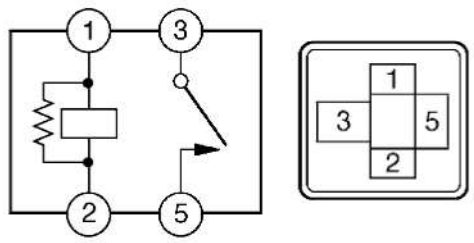


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INSPECTION PROCEDURE

1	INSPECT TRANSAXLE PARKING LOCK CONTROL RELAY(P CON RELAY)

P CON Relay:



(a) Remove the P CON relay from the engine room R/B and J/B.

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

Standard:

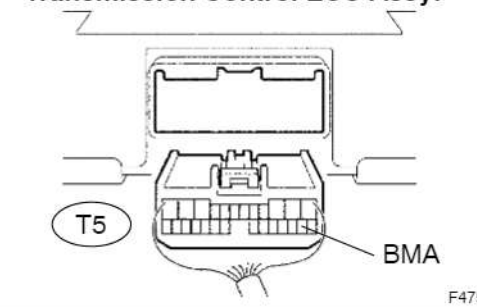
Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE TRANSAXLE PARKING LOCK CONTROL RELAY**

OK

2	CHECK HARNESS AND CONNECTOR(TRANSMISSIOIN CONTROL ECU ASSY – TRANSAXLE PARKING LOCK CONTROL RELAY)

Transmission Control ECU Assy:



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–14 (BMA) – Body ground	Always	Below 1 V

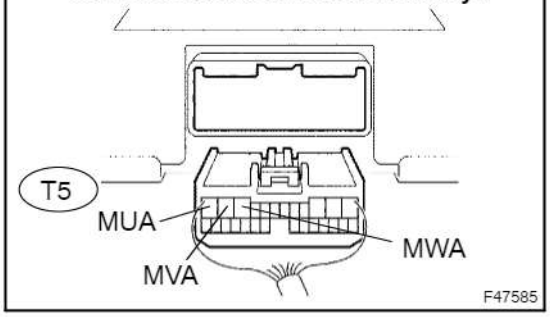
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3	CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – SHIFT CONTROL ACTUATOR ASSY)

Transmission Control ECU Assy:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

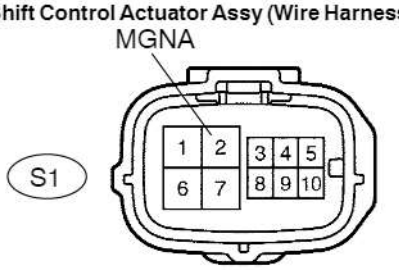
Tester connection (Symbols)	Condition	Specified condition
T5–10 (MWA) – Body ground	Always	Below 1 V
T5–11 (MVA) – Body ground	Always	Below 1 V
T5–12 (MUA) – Body ground	Always	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR(SHIFT CONTROL ACTUATOR ASSY – TRANSAXLE PARKING LOCK CONTROL RELAY)

Shift Control Actuator Assy (Wire Harness Side):



(a) Disconnect the S1 connector from the shift control actuator assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
S1–2 (MGNA) – Body ground	Always	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TRANSMISSION CONTROL ECU ASSY

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DTC	C2304	OPEN OR SHORT CIRCUIT IN U PHASE

DTC	C2305	OPEN OR SHORT CIRCUIT IN V PHASE

DTC	C2306	OPEN OR SHORT CIRCUIT IN W PHASE

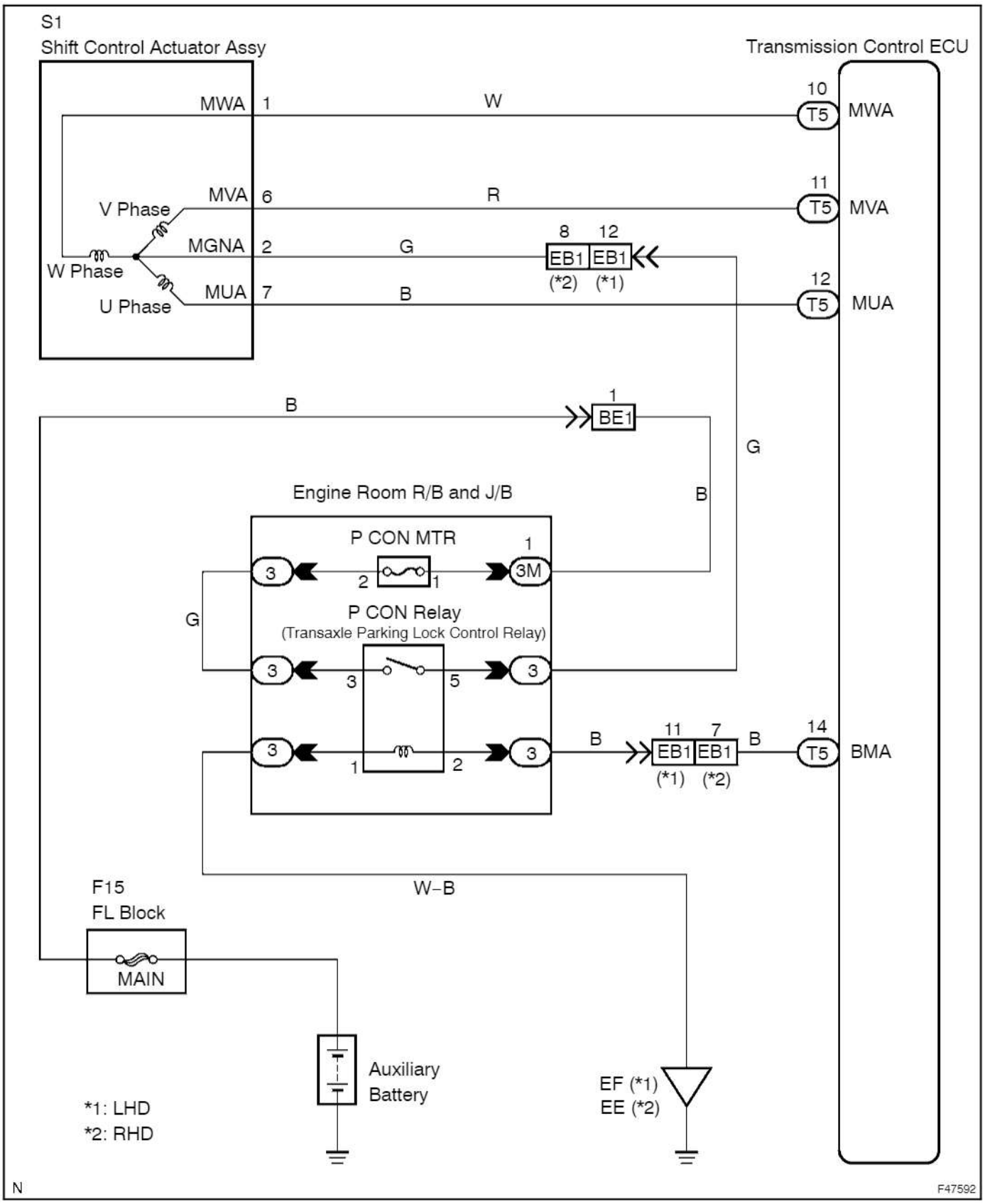
CIRCUIT DESCRIPTION

The shift control actuator assy consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs this DTC when it detects a malfunction in the parking lock motor system.

DTC No.	DTC detecting condition	Trouble area
C2304	• Power switch on (IG). (Battery voltage is 8 V or more) • Voltage of transmission control ECU terminal MUA is 6 V or less for 1 sec. or more.	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector
C2305	• Power switch on (IG). (Battery voltage is 8 V or more) • Voltage of transmission control ECU terminal MVA is 6 V or less for 1 sec. or more.	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector
C2306	• Power switch on (IG). (Battery voltage is 8 V or more) • Voltage of transmission control ECU terminal MWA is 6 V or less for 1 sec. or more.	• Shift control actuator assy • Transmission control ECU assy • Transaxle parking lock control relay • Wire harness or connector

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK DTC

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Read the DTCs.

Result:

Display (DTC output)	Proceed to
C2304, C2305, and C2306 are detected simultaneously	A
C2304, C2305, and C2306 are not detected simultaneously	B

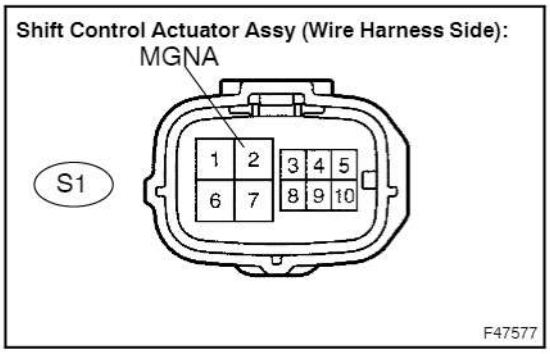
HINT:

- When DTCs C2304, C2305, and C2306 are detected simultaneously, there may be an open or short circuit between the shift control actuator and the battery.
- When DTCs C2304, C2305, and C2306 are not detected simultaneously, there may be an open or short circuit in the shift control actuator or between the actuator and the ECU.

B → **Go to step 7**

A

2	INSPECT SHIFT CONTROL ACTUATOR ASSY(MGNA TERMINAL)



(a) Disconnect the S1 connector from the shift control actuator assy.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

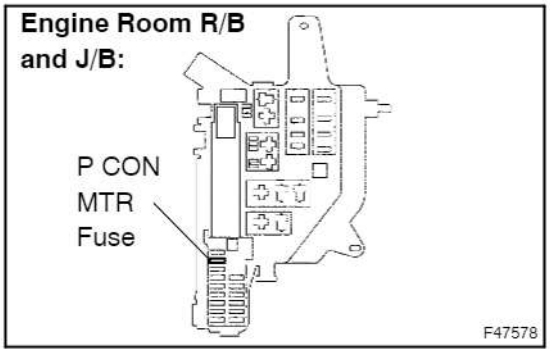
Tester connection (Symbols)	Condition	Specified condition
S1–2 (MGNA) – Body ground	Power switch on (IG)	9 to 14 V

OK → **Go to step 7**

NG

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3 INSPECT FUSE(P CON MTR FUSE)



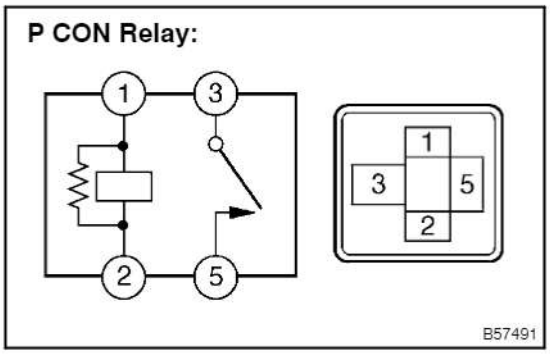
(a) Remove the P CON MTR fuse from the engine room R/B and J/B.

(b) Check for continuity of the P CON MTR fuse.
Standard: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

4 INSPECT TRANSAXLE PARKING LOCK CONTROL RELAY(P CON RELAY)



(a) Remove the P CON relay from the engine room R/B and J/B.

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

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

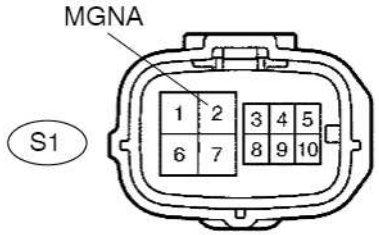
NG → **REPLACE TRANSAXLE PARKING LOCK CONTROL RELAY**

OK

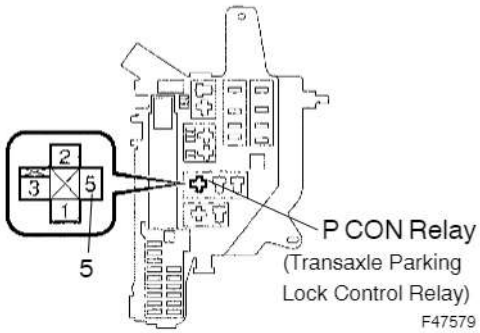
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5	CHECK HARNESS AND CONNECTOR(SHIFT CONTROL ACTUATOR ASSY – TRANSAXLE PARKING LOCK CONTROL RELAY)

Shift Control Actuator Assy (Wire Harness Side):



Engine Room R/B and J/B:



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

Standard:

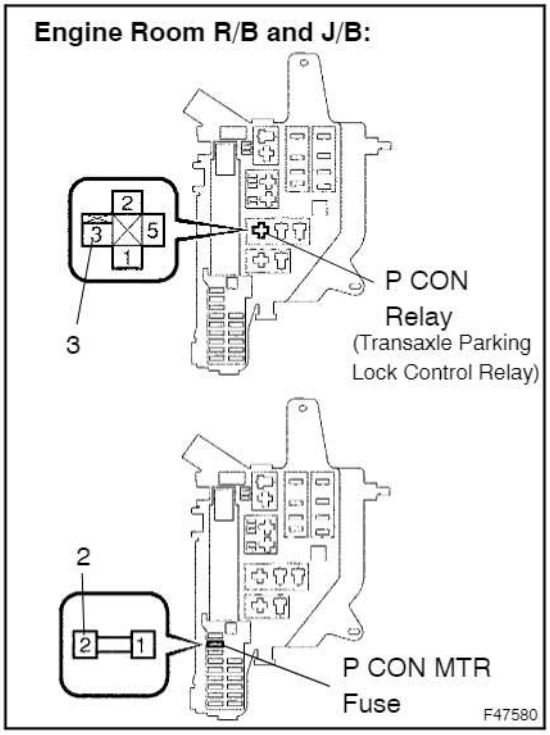
Tester connection (Symbols)	Condition	Specified condition
S1–2 (MGNA) – 5 (P CON Relay)	Always	Below 1 Ω
S1–2 (MGNA) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6 CHECK HARNESS AND CONNECTOR(TRANSAXLE PARKING LOCK CONTROL RELAY – P CON MTR FUSE)



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

Standard:

Tester connection (Symbols)	Condition	Specified condition
3 (P CON Relay) – 2 (P CON MTR Fuse)	Always	Below 1 Ω
3 (P CON Relay) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (P CON MTR FUSE – BATTERY)

7 READ VALUE ON INTELLIGENT TESTER II

(a) Connect the S1 connector to the shift control actuator assy.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the power switch on (IG).
(d) Turn the intelligent tester II on.
(e) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester II.

Item	Measurement Item/ Range (Display)	Normal Condition
U Phase Voltage Value	U phase voltage value/min: 0 V, max: 20 V	Actual U phase voltage 9 to 14 V
V Phase Voltage Value	V phase voltage value/min: 0 V, max: 20 V	Actual V phase voltage 9 to 14 V
W Phase Voltage Value	W phase voltage value/min: 0 V, max: 20 V	Actual W phase voltage 9 to 14 V

Standard:
Voltage: 9 to 14 V

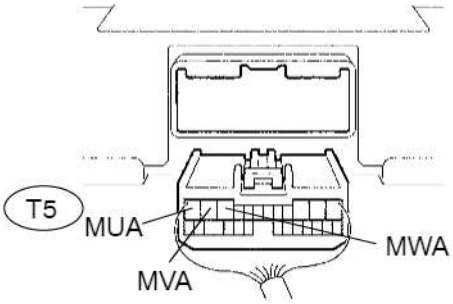
OK → **REPLACE TRANSMISSION CONTROL ECU ASSY**

NG

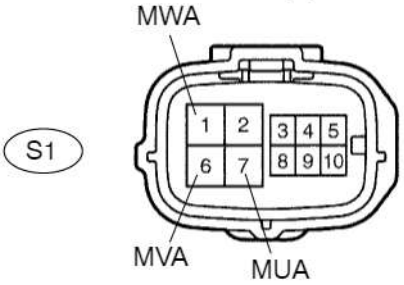
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8	CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – SHIFT CONTROL ACTUATOR ASSY)

Transmission Control ECU Assy:



Shift Control Actuator Assy (Wire Harness Side):



F47583

(a) Disconnect the T5 connector from the transmission control ECU assy.

(b) Disconnect the S1 connector from the shift control actuator assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–10 (MWA) – S1–1 (MWA)	Always	Below 1 Ω
T5–11 (MVA) – S1–6 (MVA)	Always	Below 1 Ω
T5–12 (MUA) – S1–7 (MUA)	Always	Below 1 Ω
T5–10 (MWA) – Body ground	Always	10 kΩ or higher
T5–11 (MVA) – Body ground	Always	10 kΩ or higher
T5–12 (MUA) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SHIFT CONTROL ACTUATOR ASSY (SEE PAGE 22–6)

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DTC	C2307	POWER SOURCE MALFUNCTION

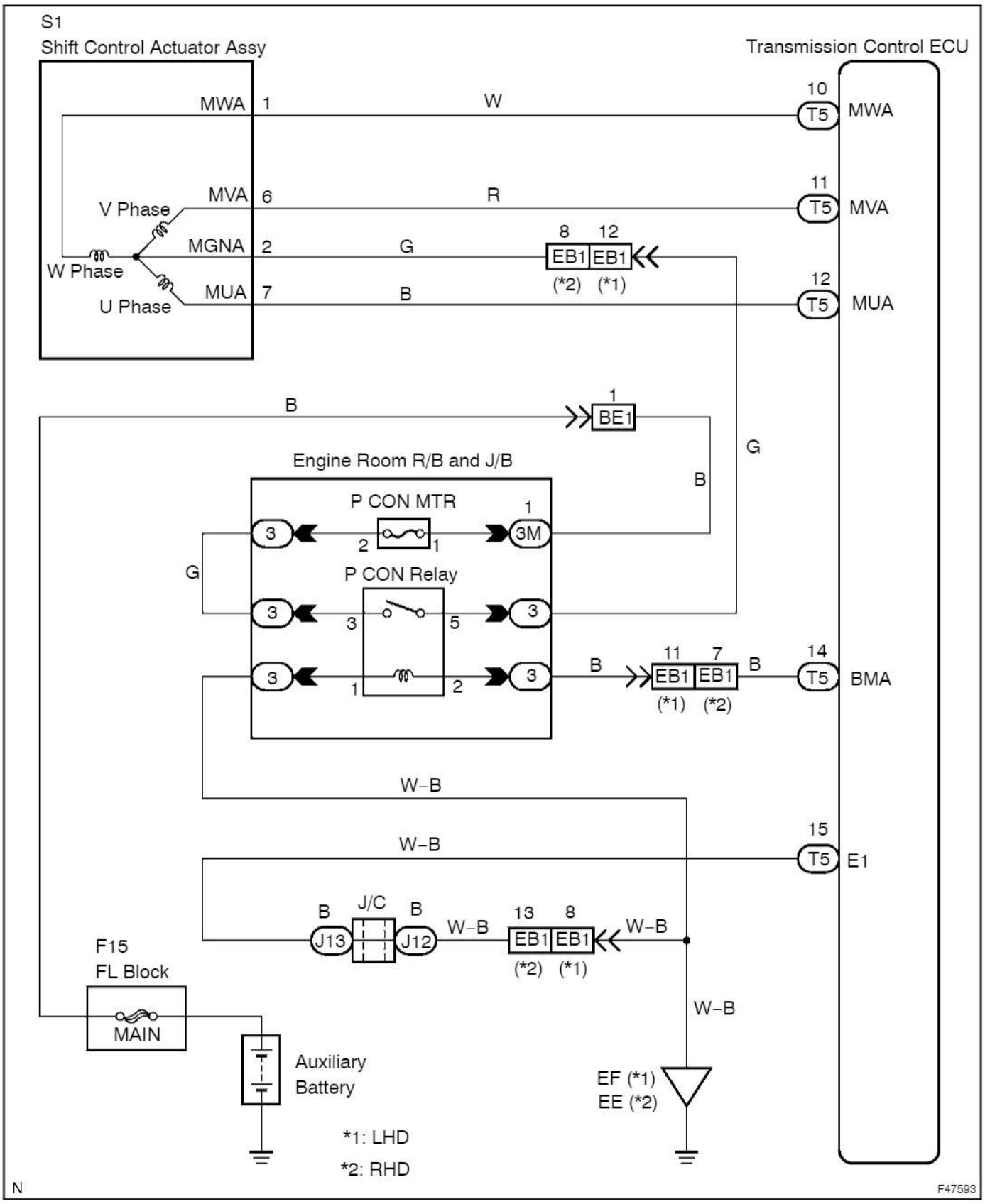
CIRCUIT DESCRIPTION

The shift control actuator assy consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs this DTC when it detects a malfunction in the parking lock motor system and/or the ground circuit.

DTC No.	DTC detecting condition	Trouble area
C2307	• Power switch on (IG) • The parking lock motor current is 50 A or more, or there is an open in the terminal E1 circuit of the transmission control ECU for 0.1 sec. or more.	• Transmission control ECU assy • Wire harness or connector • Parking lock motor (Shift control actuator assy)

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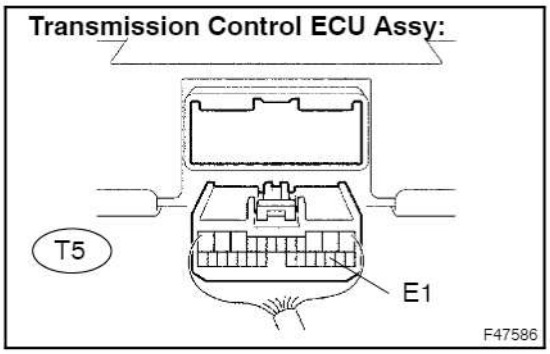
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT TRANSMISSION CONTROL ECU ASSY(E1 TERMINAL)



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

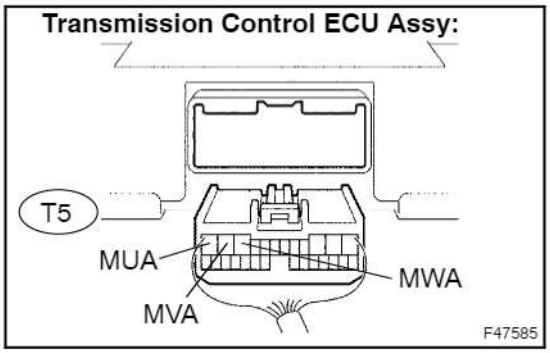
Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–15 (E1) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – SHIFT CONTROL ACTUATOR ASSY)



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–10 (MWA) – Body ground	Always	Below 1 V
T5–11 (MVA) – Body ground	Always	Below 1 V
T5–12 (MUA) – Body ground	Always	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TRANSMISSION CONTROL ECU ASSY

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DTC C2310 OPEN OR SHORT CIRCUIT IN BATT

CIRCUIT DESCRIPTION

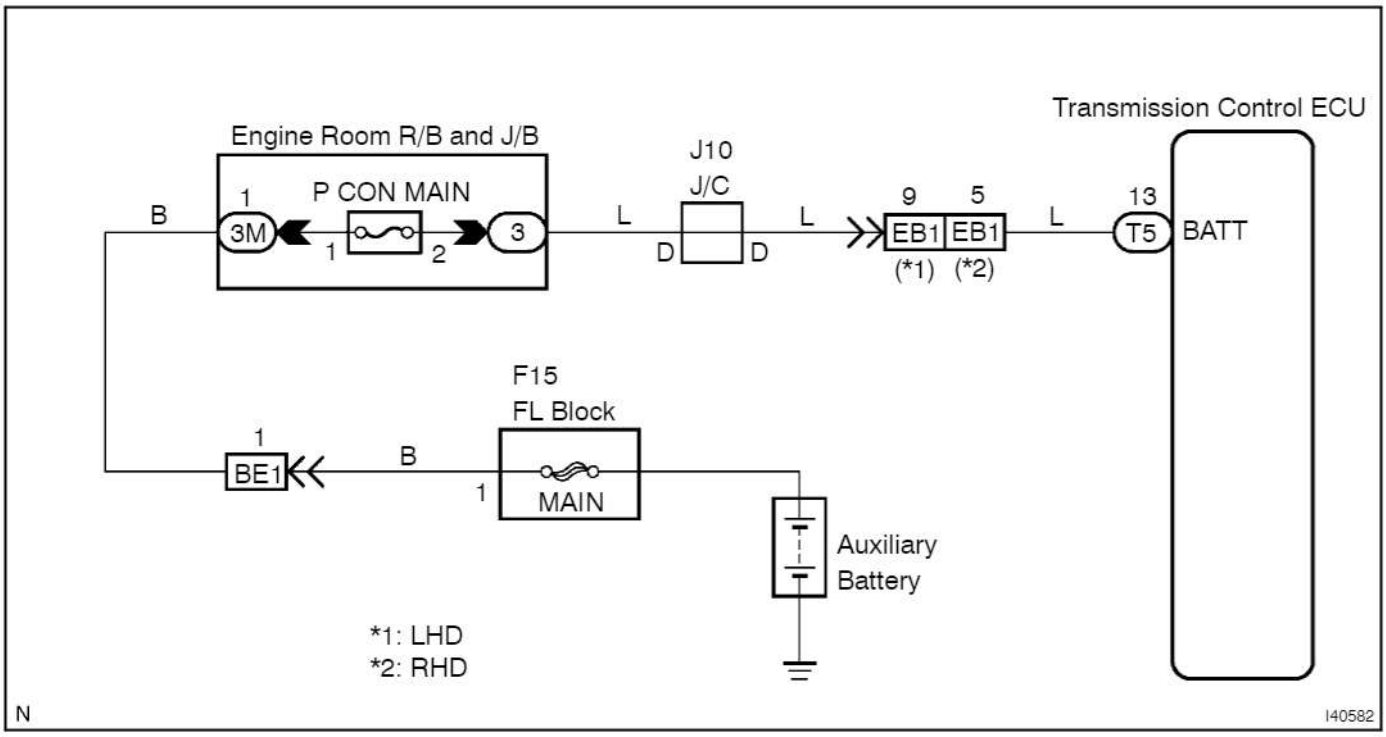
The auxiliary battery voltage is constantly applied to terminal BATT. The terminal BATT voltage is used to power the transmission control ECU memory. The transmission control ECU outputs this DTC when it detects a malfunction related to terminal BATT.

DTC No.	DTC detecting condition	Trouble area
C2310	• Power switch on (IG) • Terminal BATT voltage of the transmission control ECU is 10 V or less for 1 sec. or more.	• P CON MAIN fuse • Transmission control ECU assy • Wire harness or connector

HINT:

When there is an open or short in the BATT circuit, information on the actuator position ("P position" or "non–P position") stored in the ECU is cleared every time the power switch is turned off. Therefore, the ECU works to recognize the position each time the power switch is turned on. As a result, time from when the power switch is turned on until "READY ON" is indicated may become longer than normal.

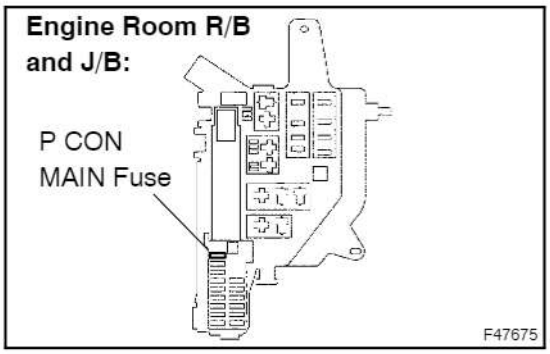
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT FUSE(P CON MAIN)



(a) Remove the P CON MAIN fuse from the engine room R/B and J/B.
(b) Check for continuity of the P CON MAIN fuse.
Standard: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

2	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester II.

Item	Measurement Item/ Range (Display)	Normal Condition
Battery Voltage Value	BATT voltage value/min: 0 V, max: 20 V	Actual power supply voltage 9 to 14 V

Standard:
Voltage: 9 to 14 V

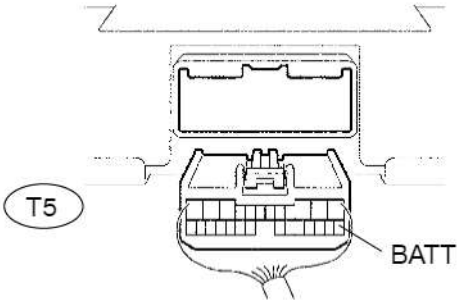
OK → **REPLACE TRANSMISSION CONTROL ECU ASSY**

NG

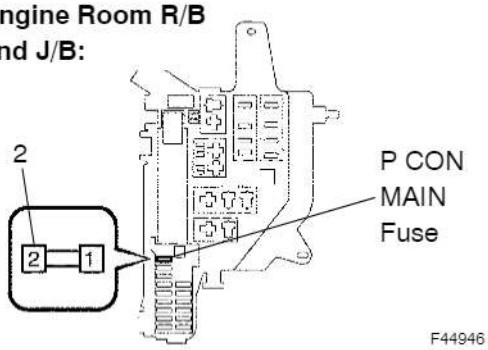
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3	CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – P CON MAIN FUSE)

Transmission Control ECU Assy:



Engine Room R/B and J/B:



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–13 (BATT) – 2 (P CON MAIN Fuse)	Always	Below 1 Ω
T5–13 (BATT) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (P CON MAIN FUSE – BATTERY)

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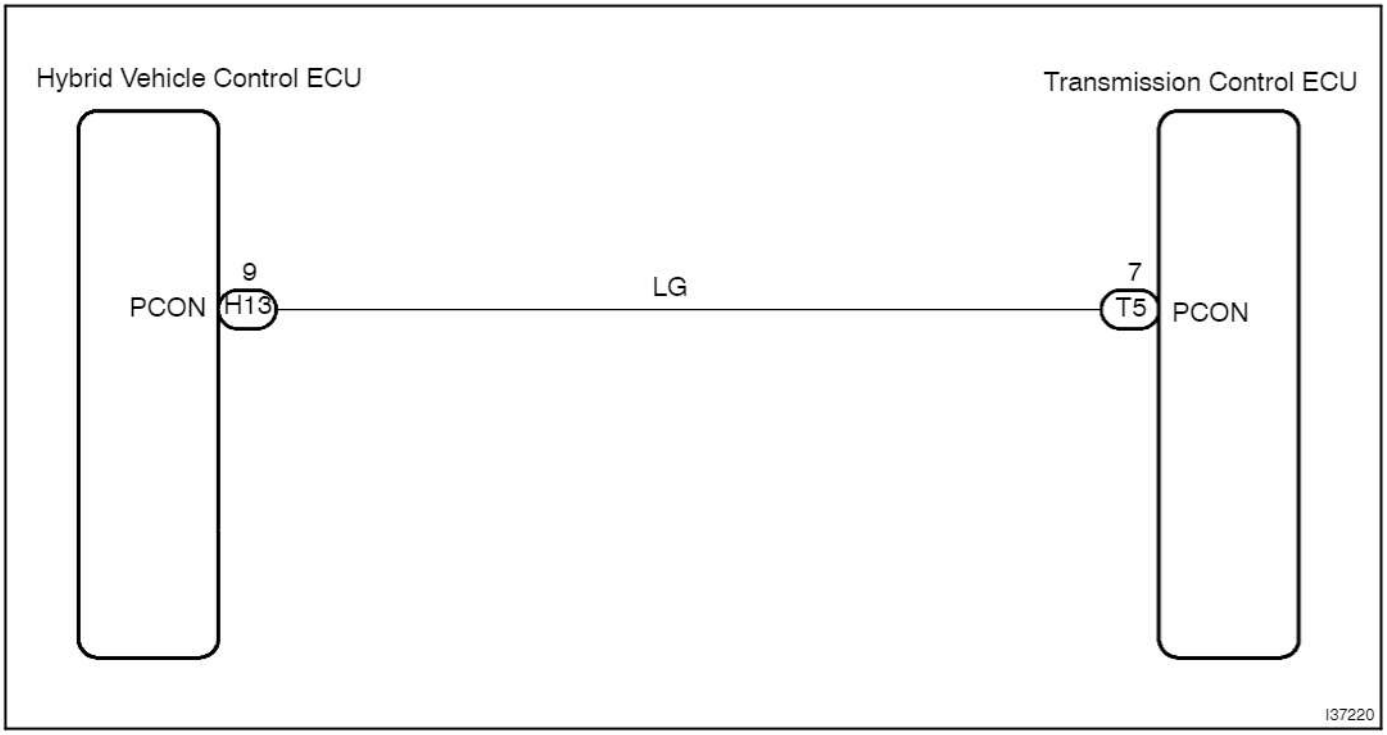
DTC	C2311	HV COMMUNICATION LINE MALFUNCTION

CIRCUIT DESCRIPTION

The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs this DTC when it detects a communication error between the hybrid vehicle control ECU and the transmission control ECU.

DTC No.	DTC detecting condition	Trouble area
C2311	• Power switch on (IG) • Signals from the hybrid control ECU cannot be received, or there is a problem with a pulse signal from the hybrid vehicle control ECU for 1 sec. or more.	• Transmission control ECU assy • Hybrid vehicle control ECU • Wire harness or connector

WIRING DIAGRAM

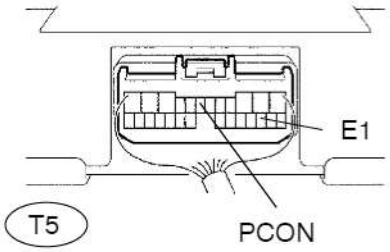


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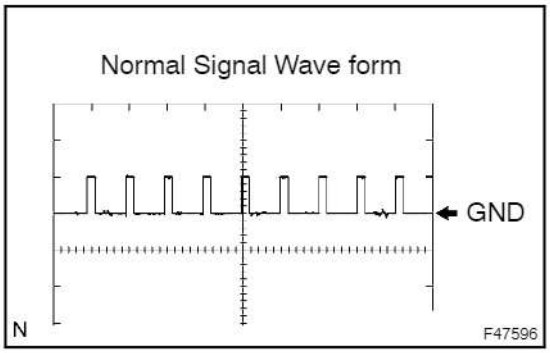
INSPECTION PROCEDURE

1	INSPECT TRANSMISSION CONTROL ECU ASSY(P CON TERMINAL)

Transmission Control ECU Assy:



F44947



F47596

(a) Check output wave form.

(1) Turn the power switch on (IG).

(2) Using an oscilloscope, check the output wave form between terminals PCON (7) and E1 (15) transmission control ECU assy T5 connector.

OK:

The output wave form appears as shown in the illustration.

Item	Contents
Tool setting	5V / DIV, 20 ms / DIV
Vehicle condition	Power switch on (IG)

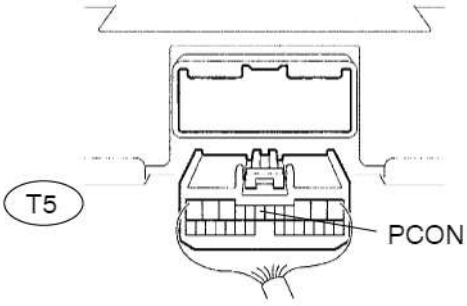
OK → **REPLACE TRANSMISSION CONTROL ECU ASSY**

NG

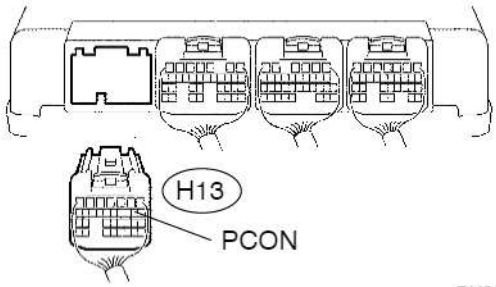
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2	CHECK HARNESS AND CONNECTOR(HYBRID VEHICLE CONTROL ECU – TRANSMISSION CONTROL ECU ASSY)

Transmission Control ECU Assy:



Hybrid Vehicle Control ECU:



F44948

(a) Disconnect the T5 connector from the transmission control ECU assy.

(b) Disconnect the H13 connector from the hybrid vehicle control ECU.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–7 (PCON) – H13–9 (PCON)	Always	Below 1 Ω
T5–7 (PCON) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

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DTC	C2312	POWER SOURCE CONTROL ECU COMMUNICATION LINE MALFUNCTION

CIRCUIT DESCRIPTION

The transmission control ECU assy receives power switch condition signals (OFF / ACC / IG) from the power source control ECU. The transmission control ECU assy outputs this DTC when it does not receive the signals.

DTC No.	DTC detecting condition	Trouble area
C2312	• Power switch on (IG) • Signals from the power source control ECU cannot be received for 10 sec. or more.	• Transmission control ECU assy • Power source control ECU

WIRING DIAGRAM

(SEE PAGE 05–2284)

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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Select the item below in the FREEZE FRAME DATA, and read its value displayed on the intelligent tester II.

Item	Measurement Item/ Range (Display)	Normal Condition
P Sply Off Prepare Rqst Sig	power supply off preparation request signal/ON or OFF	ON: Power is turned off by power source control ECU after receiving power switch off signal OFF: Any other condition

OK: ON is displayed.

NG → **REPLACE POWER SOURCE CONTROL ECU**

OK

REPLACE TRANSMISSION CONTROL ECU ASSY

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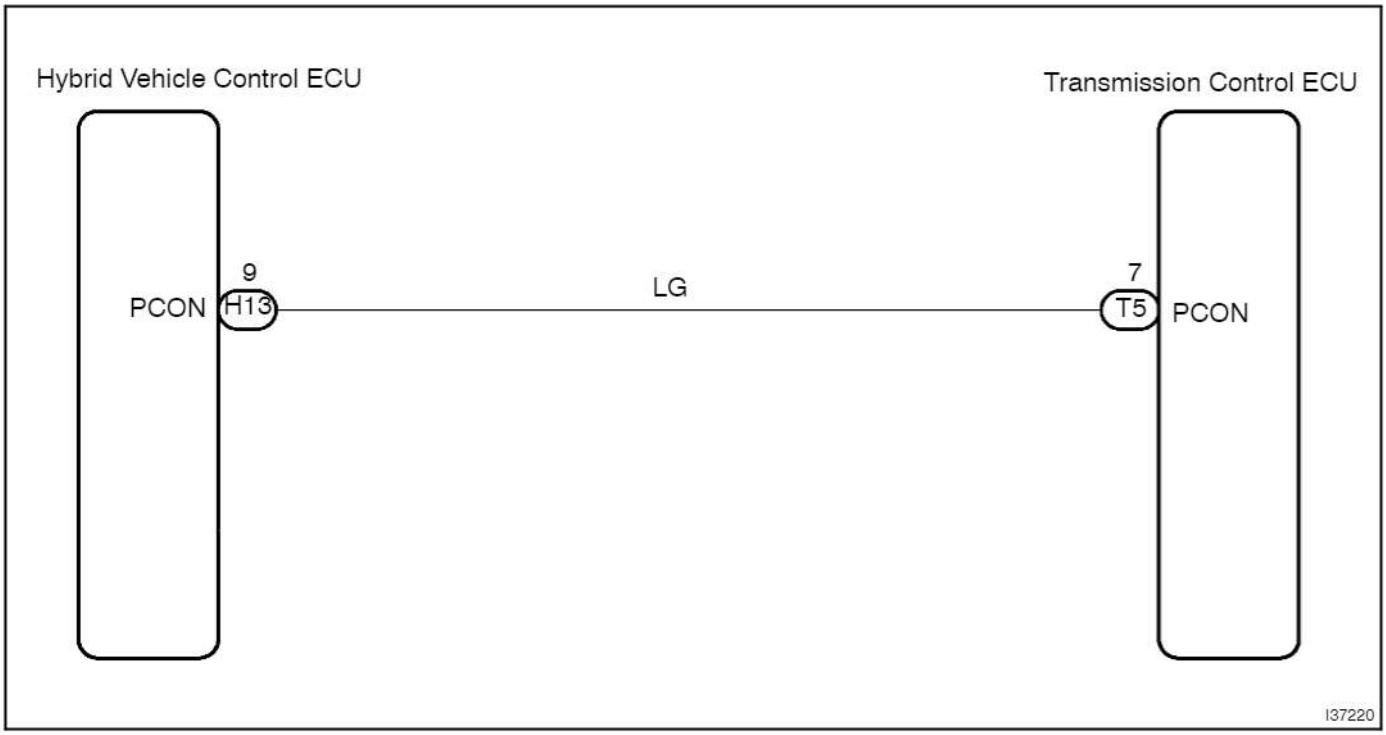
DTC	C2315	HV SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The transmission control ECU receives a P position switch signal from the hybrid vehicle control ECU and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. When the hybrid control ECU detects a malfunction with the P position switch or P position signal, it sends an information signal to the transmission control ECU. Receiving this signal, the transmission control ECU outputs this DTC.

DTC No.	DTC detecting condition	Trouble area
C2315	• Power switch on (IG) • A malfunction signal from the hybrid control ECU is received for 1 sec. or more.	• Hybrid vehicle control ECU • P position switch • Transmission control ECU assy • Wire harness or connector

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT(BESIDES DTC C2315)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Read the DTCs.

Result:

Display (DTC output)	Proceed to
No output	A
P0851–579, P0852–580, P3102–597, 598, and 599	B

HINT:

- DTCs P0851 and P0852 indicate P position switch malfunctions: DTC P0851–579 indicates "short to ground" and P0852–580 indicates "open" or "short to +B".
- DTC P3102 indicates a P position signal error: DTC P3102–597 indicates "short to ground", P3102–598 indicates "short to +B", and P3102–599 indicates "duty ratio error".

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–306, 05–590)**

A → **REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)**

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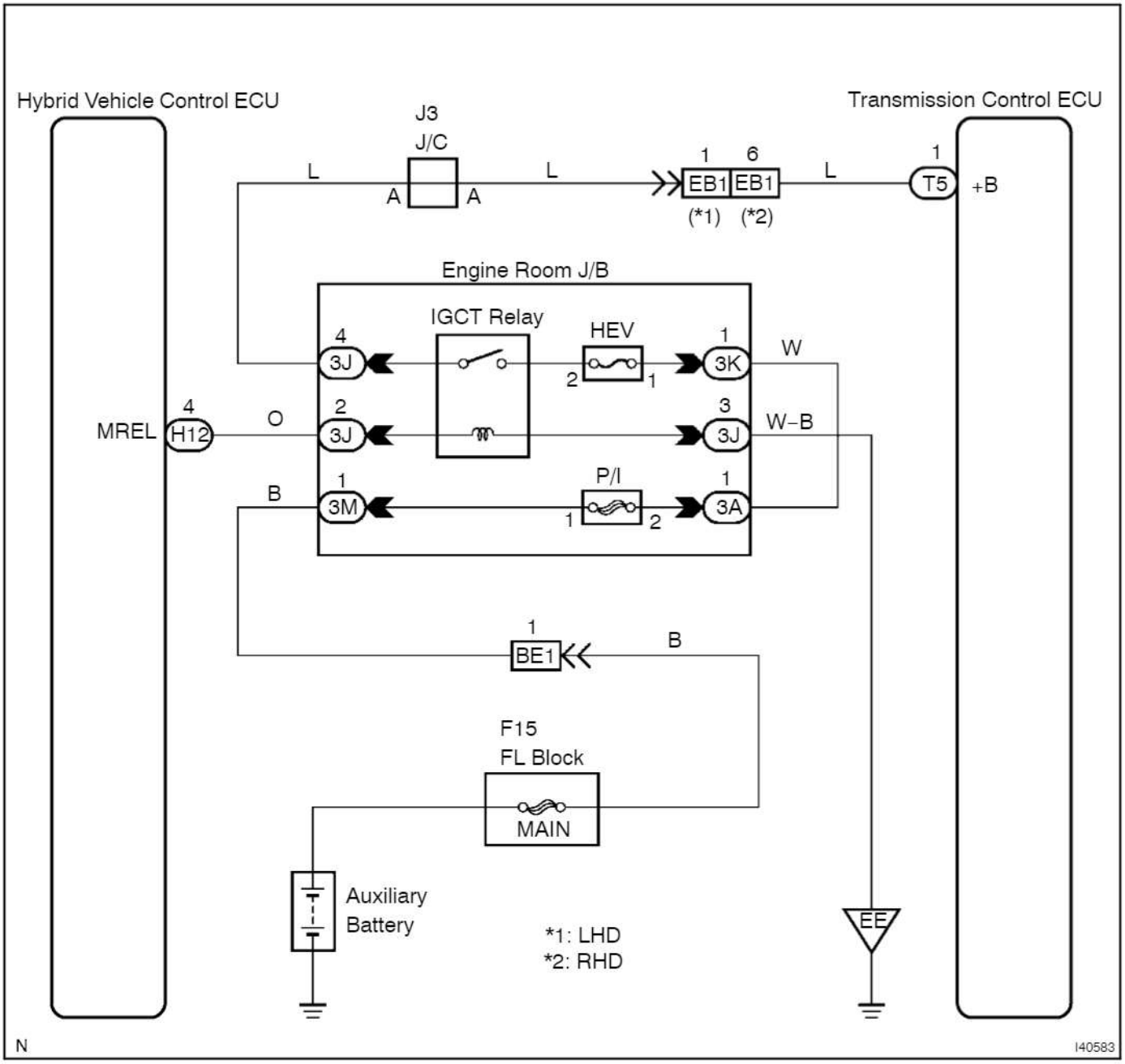
DTC	C2318	LOW VOLTAGE ERROR (POWER SUPPLY MALFUNCTION)

CIRCUIT DESCRIPTION

The auxiliary battery voltage is applied to terminal +B when the power switch is on (IG). The transmission control ECU outputs this DTC when the input voltage drops.

DTC No.	DTC detecting condition	Trouble area
C2318	• Power switch on (IG) • Terminal +B voltage of the transmission control ECU is 9.3 V or less for 1 sec. or more.	• HEV fuse • IGCT relay • Wire harness or connector • Auxiliary battery

WIRING DIAGRAM

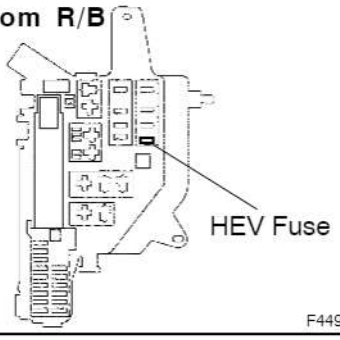


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INSPECTION PROCEDURE

1	INSPECT FUSE(HEV FUSE)

Engine Room R/B and J/B:



(a) Remove the HEV fuse from the engine room R/B and J/B.
(b) Check for continuity of the HEV fuse.
Standard: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

2	CHECK OTHER DTC OUTPUT(BESIDE C2318)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Read the DTCs.
Result:

Display (DTC output)	Proceed to
No output	A
P3110–223	B

HINT:
DTC P3110 indicates HV main relay malfunction: DTC P3110–223 indicates "IGCT relay malfunction".

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–599)**

A

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3	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester II on.
(d) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester II.

Item	Measurement Item/ Range (Display)	Normal Condition
IG (+B) Voltage Value	IG (+B) voltage value/min: 0 V, max: 20 V	Actual power supply voltage 9 to 14 V

Standard:
Voltage: 9 to 14 V

OK → **REPLACE TRANSMISSION CONTROL ECU ASSY**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM R/B AND J/B – TRANSMISSION CONTROL ECU ASSY)

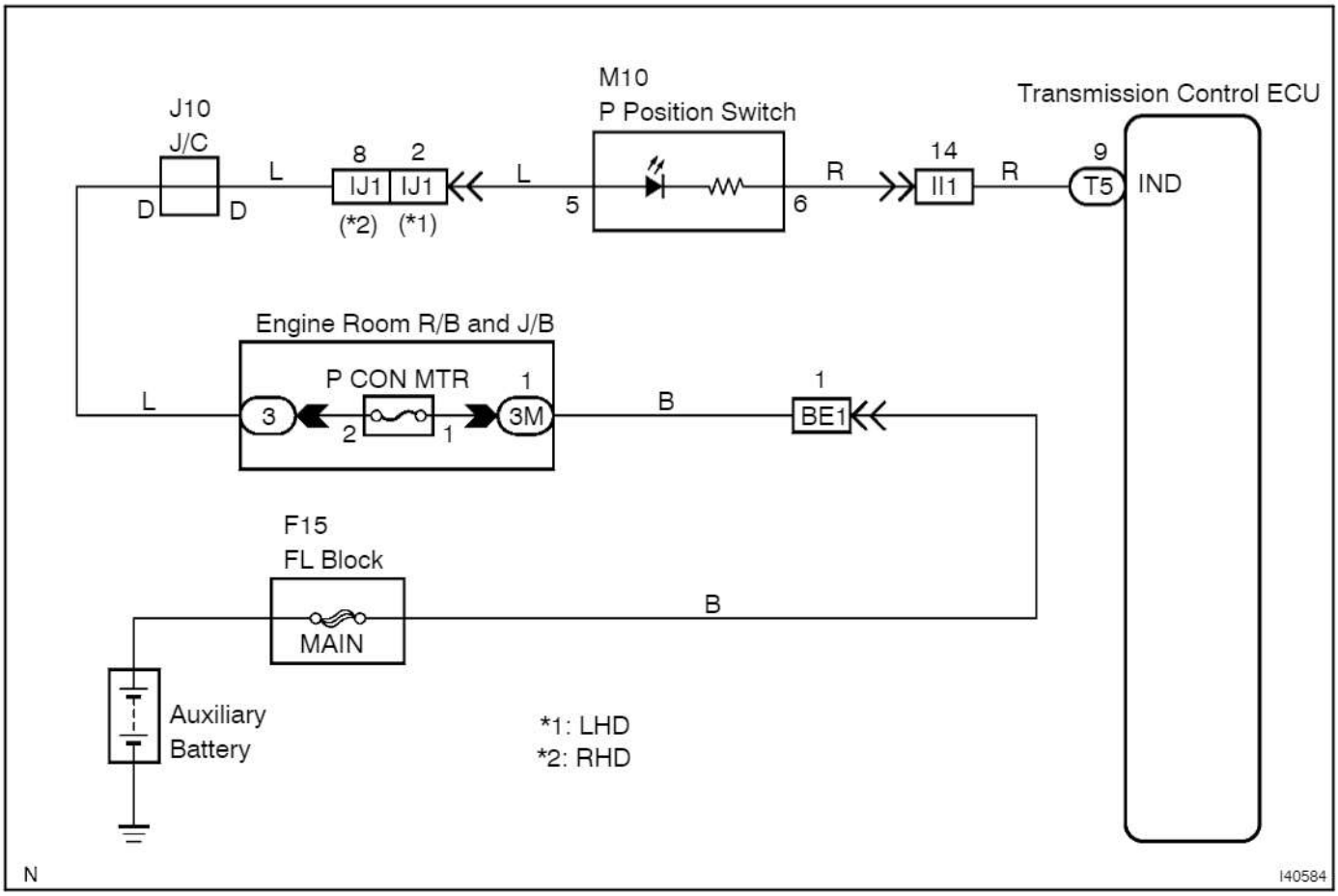
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P POSITION SWITCH INDICATOR LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The parking lock switch indicator light comes on or goes off to indicate the on/off status of the P position switch and blinks to indicate malfunction conditions of the system.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK INDICATOR LAMP

(a) Inspect the indicator light condition by operating the P position switch.
Result:

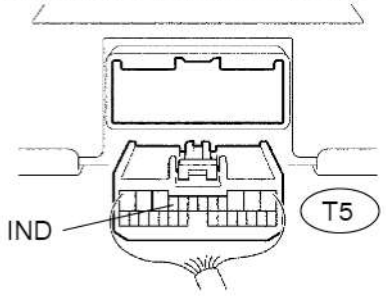
Condition	Proceed to
Indicator light does not go off.	A
Indicator light does not come on.	B

B → **Go to step 3**

A

2	CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – P POSITION SWITCH)

Transmission Control ECU Assy:



(a) Disconnect the T5 connector from the transmission control ECU assy.
(b) Disconnect the M10 connector from the P position switch.
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–9 (IND) – Body ground	Always	10 kΩ or higher

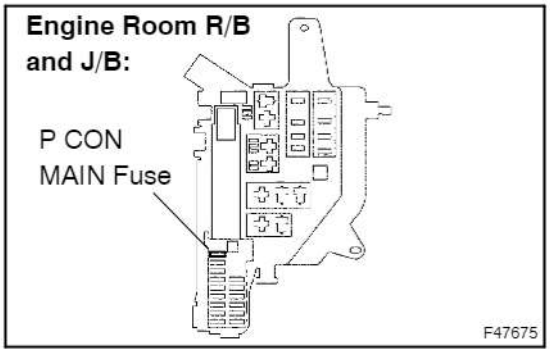
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TRANSMISSION CONTROL ECU ASSY

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3 INSPECT FUSE



(a) Remove the P CON MAIN fuse from the engine room R/B and J/B.

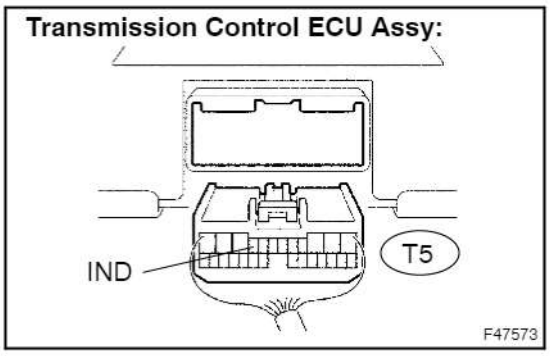
(b) Check for continuity of the P CON MAIN fuse.

Standard: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

4 INSPECT COMPUTER, TRANSMISSION CONTROL(IND TERMINAL)



(a) Disconnect the T5 connector from the transmission control ECU assy.

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

Standard:

Tester connection (Symbols)	Condition	Specified condition
T5–9 (IND) – Body ground	Always	9 to 14 V

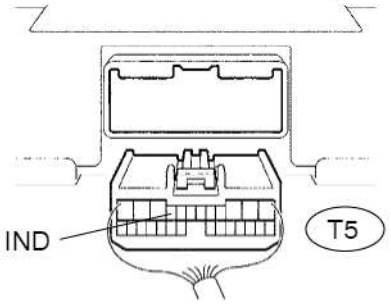
OK → **REPLACE TRANSMISSION CONTROL ECU ASSY**

NG

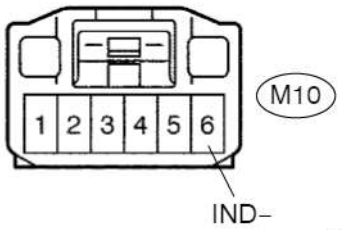
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5 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL ECU ASSY – P POSITION SWITCH)

Transmission Control ECU Assy:



P Position Switch (Wire Harness Side):



F47574

(a) Disconnect the M10 connector from the P position switch.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

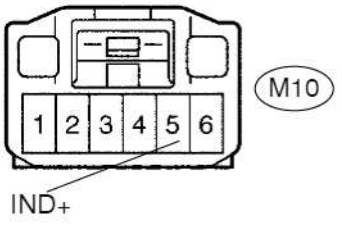
Tester connection (Symbols)	Condition	Specified condition
T5–9 (IND) – M10–6 (IND–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT P POSITION SWITCH

P Position Switch (Wire Harness Side):



F47575

(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection (Symbols)	Condition	Specified condition
M10–5 (IND+) – Body ground	Always	9 to 14 V

OK → **REPLACE P POSITION SWITCH**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (P POSITION SWITCH – BATTERY)

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ELECTRIC POWER STEERING SYSTEM

PRECAUTION

05IJ8–02

1. PRECAUTION

NOTICE FOR INITIALIZATION:

When the negative (–) battery terminal is disconnected, initialize the following system after the terminal is reconnected.

System Name	See page
Power Window Control System	01–29

NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

2. HANDLING PRECAUTIONS

(a) When handling the electronic parts:
  (1) Avoid any impact to electronic parts such as ECUs and relays. Replace with new ones if dropped or subjected to a severe blow.
  (2) Do not expose any electronic parts to high temperature and humidity.
  (3) Do not touch the connector terminals in order to prevent deformation or malfunctions due to static electricity.
  (4) When the power steering ECU assy has been replaced with a new one, perform steering zero point calibration (see page 05–981).

(b) When handling the steering column assy:
  (1) Avoid any impact to the steering column assy, especially to the motor or torque sensor. Replace with new parts if dropped or subjected to a severe blow.
  (2) Do not pull on the wire harness when moving the steering column assy.
  (3) When the steering column assy has been replaced, perform steering zero point calibration after initializing the steering zero point calibration signal (see page 05–981).

(c) When disconnecting and reconnecting the connectors:
  (1) When disconnecting the connector related to the electric power steering system, turn the power switch on (IG), center the steering wheel, turn the power switch off, and then disconnect the connector.
  (2) When reconnecting the connector related to the electric power steering system, ensure that the power switch is off. Center the steering wheel and then turn the power switch on (IG).

NOTICE:

Do not turn the power switch on (IG) when the steering wheel is not centered.

  (3) If the above operations are not carried out properly, the steering center point (zero point) will deviate, which may lead to a difference in steering effort between right and left. If there is a difference in steering effort between right and left, perform steering zero point calibration (see page 05–981).

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3. PRECAUTIONS FOR CAN COMMUNICATION

(a) CAN communication is used to receive information from the skid control ECU (ECB ECU) and to transmit warnings to the meter and the multi–display. When there are any problems in the CAN communication lines, DTCs indicating the communication line malfunctions are output.

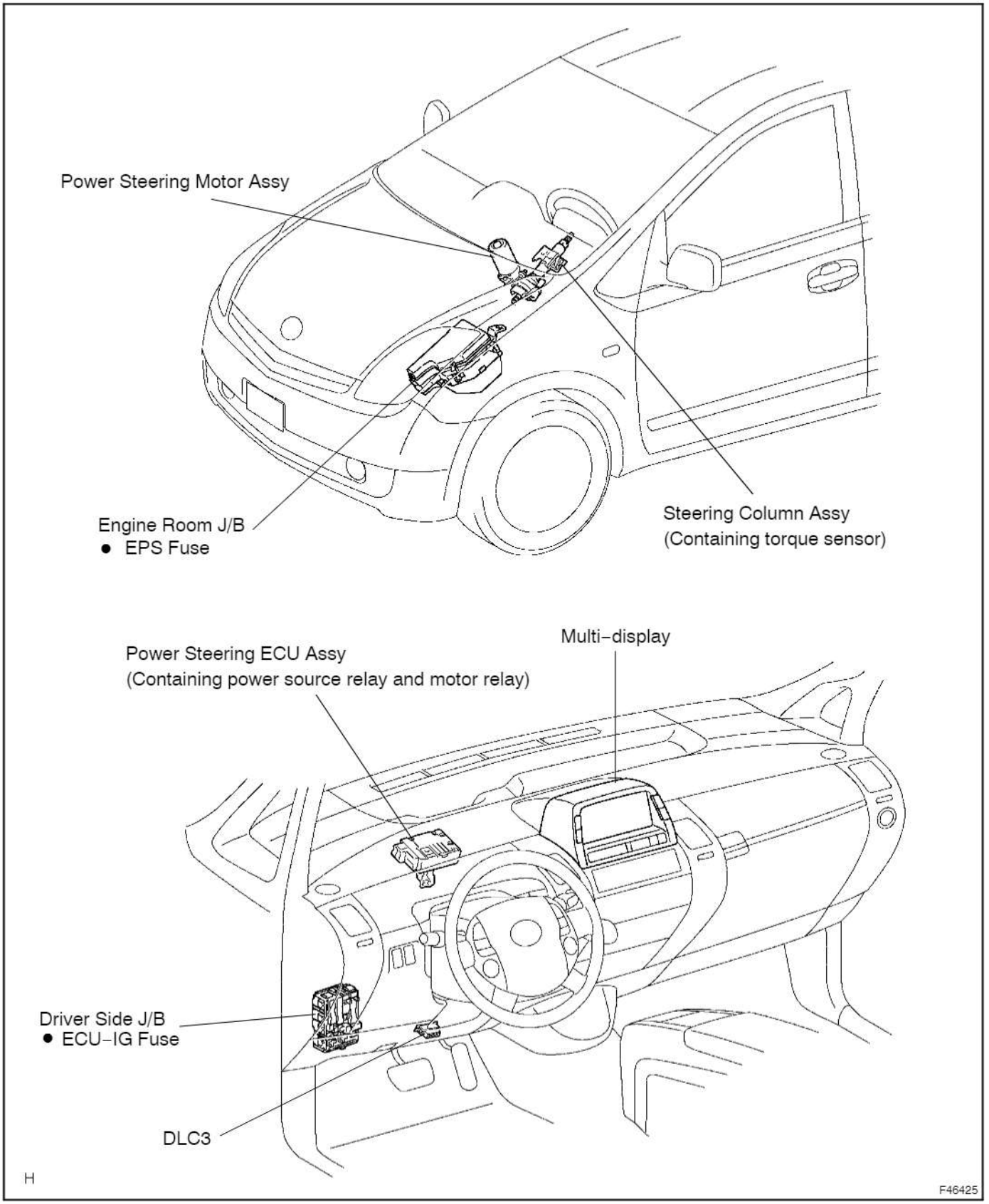
(b) Perform troubleshooting for the communication line problems when the CAN communication DTCs are output. Be sure to start troubleshooting on the electric power steering system when data communication is normal.

(c) Temporary fix or repair with bypass wiring, etc. is impossible because the length and path of each CAN communication line is specified.

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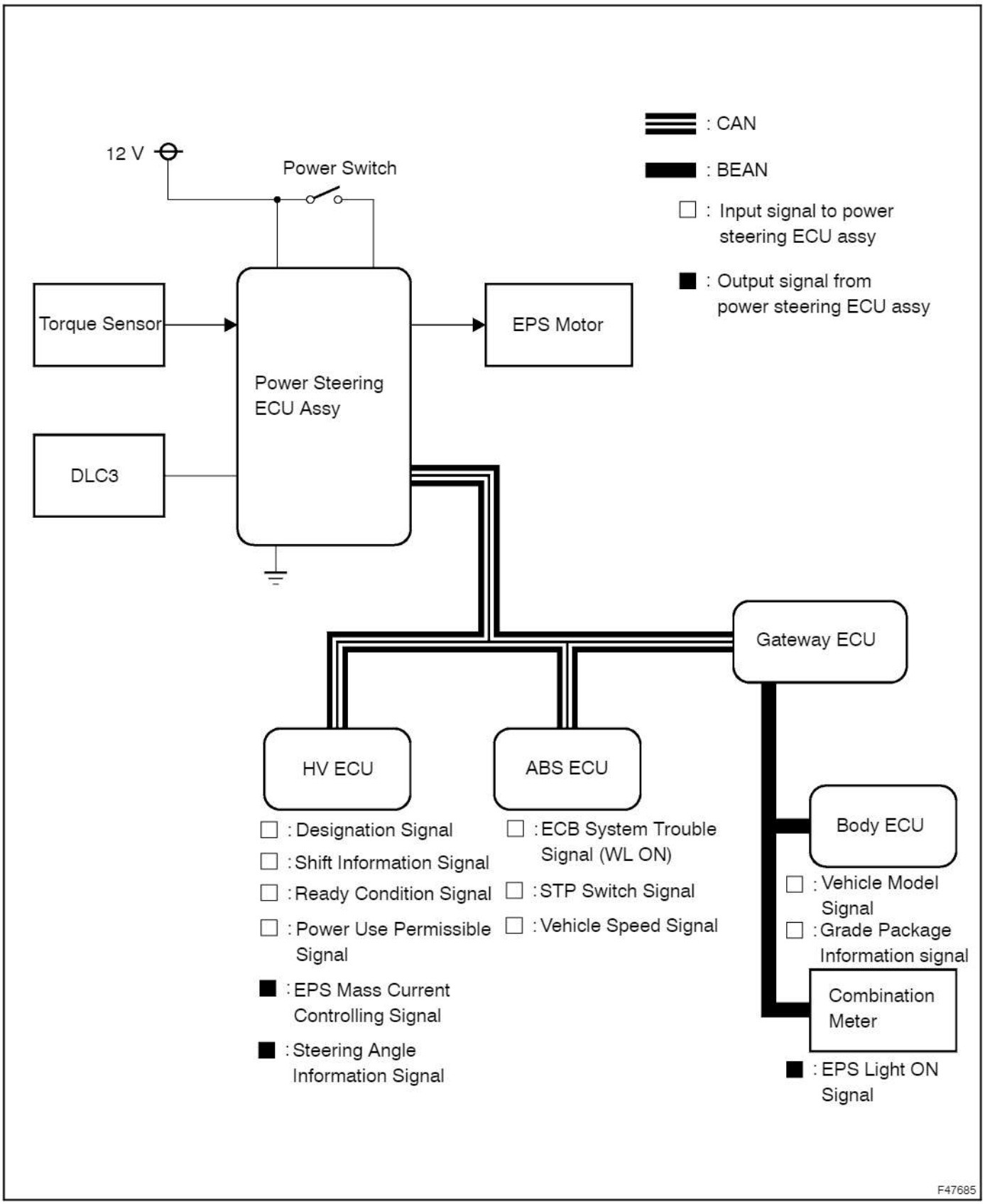
LOCATION



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05IJC-02

SYSTEM DIAGRAM



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05IJF-02

SYSTEM DESCRIPTION

1. DESCRIPTION

(a) The EPS system generates torque through the operation of the motor and the reduction gear installed on the column shaft in order to assist steering effort.
Directions and amount of assisting power are determined by signals from the torque sensor built into the steering column assy and by the power steering ECU assy, and controlled in accordance with vehicle speed. As a result, steering effort is controlled to be light during low speed driving and moderately high during high speed driving.

(1) Power steering ECU assy:
The power steering ECU assy calculates assisting power based on a steering torque signal from the torque sensor and a vehicle speed signal from the skid control ECU. It generates specified assisting torque by controlling current to the motor.

(2) Torque sensor:
The torque sensor detects steering effort generated when the steering wheel is turned and converts it to an electrical signal.

(3) EPS motor:
The EPS motor is activated by the current from the power steering ECU assy and generates torque to assist steering effort.

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05IJI–02

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting according to the following flowchart.

HINT:

- For further details, see the page given.
- The intelligent tester II can be used at steps 3, 4, 7, 10 and 13.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–980)

3	CHECK DTC AND FREEZE FRAME DATA (SEE PAGE 05–987)

(a) Record DTCs and freeze frame data.

4	CLEAR DTC AND FREEZE FRAME DATA (SEE PAGE 05–987)

5	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (GO TO STEP 6)
- SYMPTOM OCCURS (GO TO STEP 7)

6	SYMPTOM SIMULATION (SEE PAGE 01–36)

7	CHECK DTC (SEE PAGE 05–987)

(a) Recheck for DTCs.

HINT:

- Refer to the diagnostic trouble code chart when any DTCs are output.
- When any CAN communication system DTCs are output, perform troubleshooting on the CAN communication system first (see page 05–2312).
- When communication to the power steering ECU assy is not established through the intelligent tester II, inspect terminals SIL of the DLC3 and power steering ECU assy and inspect the IG circuit of the power steering ECU assy.

- NORMAL SYSTEM CODE IS OUTPUT: GO TO STEP 8
- TROUBLE CODE IS OUTPUT: GO TO STEP 9

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8	PROBLEM SYMPTOMS TABLE (SEE PAGE 05–984)

9	DTC CHART (SEE PAGE 05–993)

10	CIRCUIT INSPECTION (SEE PAGE 05–994 TO 05–1008)

11	IDENTIFICATION OF PROBLEM

12	REPAIR OR REPLACE

13	CONFIRMATION TEST

END

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05IJK–02

CUSTOMER PROBLEM ANALYSIS CHECK

EPS Check Sheet

Inspector's :
Name _____

Customer's Name		**VIN**	
		Production Date	/ /
Vehicle Model		**Licence Plate No.**	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ / (Engine ☐ Cold ☐ Warmed up)
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Steering is heavy.
	☐ Steering effort differs between right and left or is uneven.
	☐ While driving, steering effort does not change in accordance with vehicle speed.
	☐ The steering wheel does not return properly.
	☐ The steering wheel vibrates or abnormal noise comes from the steering column.
	☐ When a problem occurs: ☐ While turning the wheel around the center ☐ When turning the wheel with the vehicle stopped ☐ Always
	☐ Others

Master Warning Light Status	☐ ON ☐ OFF
Indication on Multi–display	☐ PS warning is indicated ☐ PS warning is not indicated

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)
Freeze Frame Data When any DTCs are output during the 1st time, record the freeze frame data as well as the DTCs.		

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05IJO-02

CALIBRATION

1. INITIALIZATION OF TORQUE SENSOR ZERO POINT CALIBRATION SIGNAL AND ZERO POINT CALIBRATION

NOTICE:

Initialize the torque sensor zero point calibration signal in the ECU and perform torque sensor zero point calibration under the following conditions:

- **The steering column assy (containing the torque sensor) has been replaced.**
- **The power steering ECU assy has been replaced.**
- **The steering wheel has been replaced.**
- **The steering gear assy has been replaced.**
- **There is a difference in steering effort between right and left.**

(a) Center the steering wheel and align the front wheels straight ahead.

(b) Connect the intelligent tester II to the DLC3.

(c) Turn the power switch on (IG) and then initialize the torque sensor zero point calibration signal and perform the zero point calibration by following the tester screen.

NOTICE:

Be sure not to turn the steering wheel during initialization and zero point calibration.

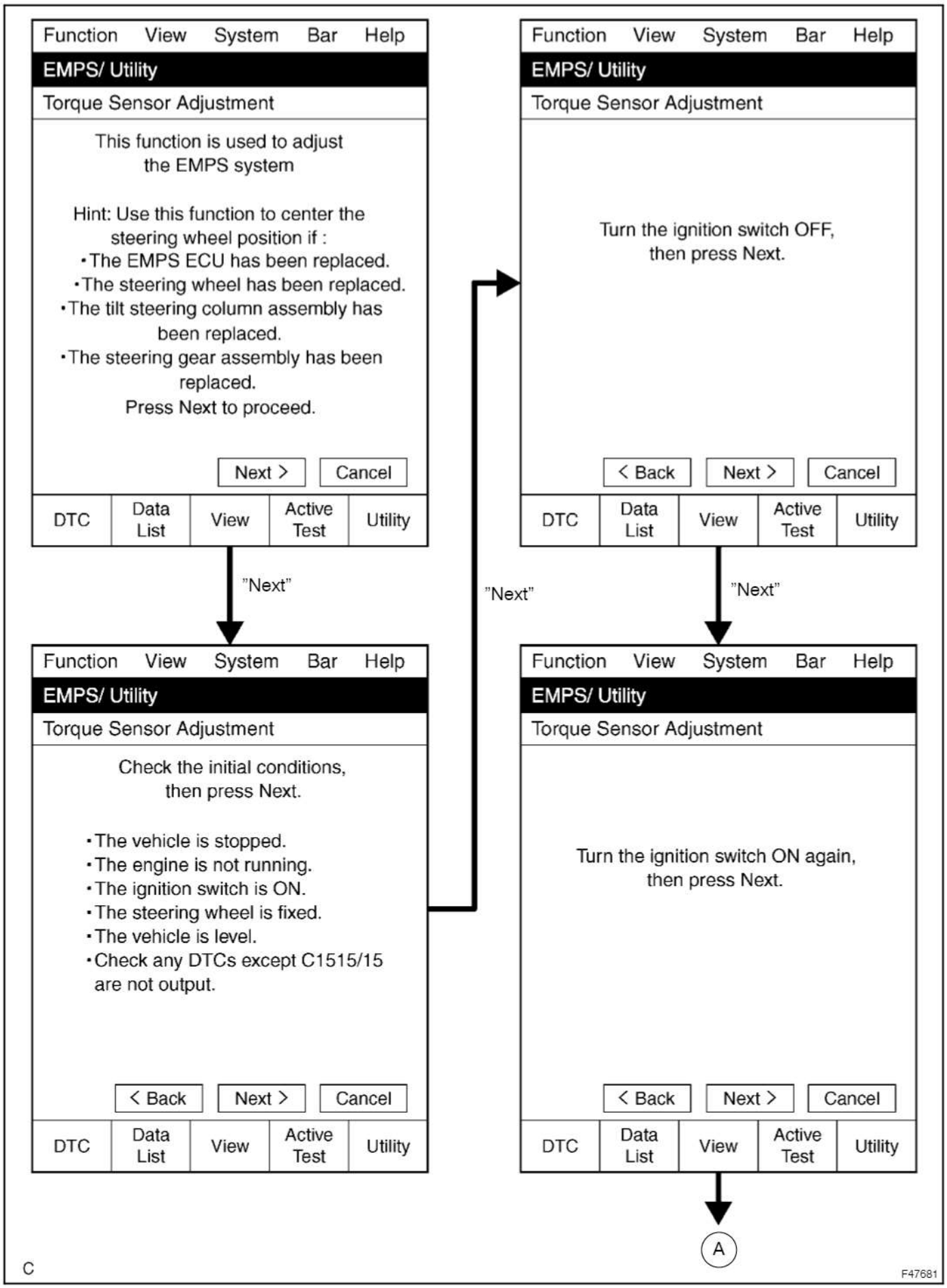
(d) Confirm that no DTCs are output after completing the operation.

(1) When DTC C1515 is output, see page 05–998.

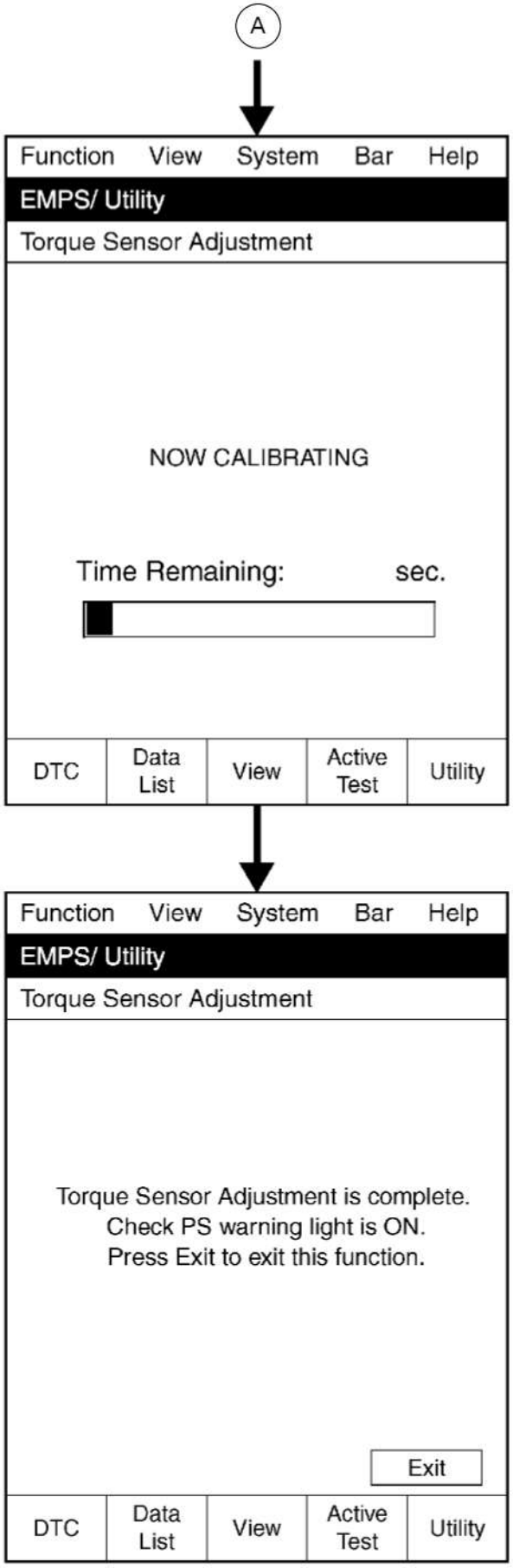
(2) When DTC C1516 is output, see page 05–999.

(3) When DTC C1534 is output, see page 05–1002.

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05IJQ–02

PROBLEM SYMPTOMS TABLE

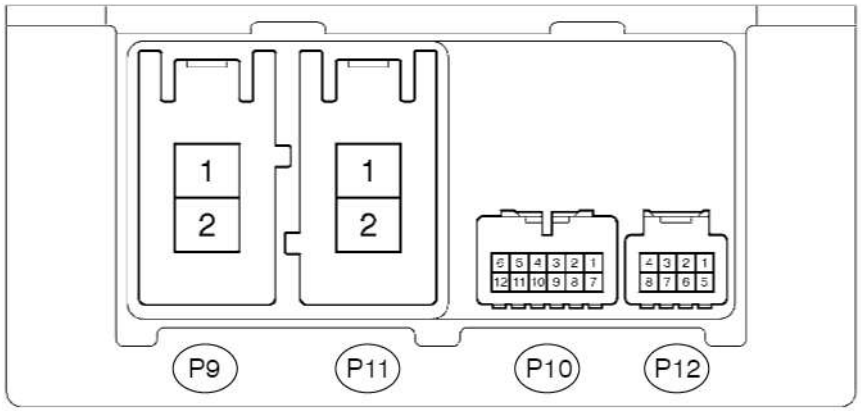
If the problem still occurs even after the normal system code was displayed during the DTC check, check the components for each problem symptom in the order given in the following table and proceed to the relevant troubleshooting page.

Symptom	Suspected Area	See page
Steering is heavy	1. Front tires (Improperly inflated, unevenly worn)	28–1
	2. Front wheel alignment (Incorrect)	26–5
	3. Front suspension (Lower ball joint)	26–21
	4. Steering gear assy	51–7
	5. Torque sensor (built into steering column)	50–8
	6. Steering column assy	50–8
	7. Power steering motor	50–8
	8. Battery and power source system	–
	9. Power source voltage of power steering ECU assy	01–36
	10.Power steering ECU assy	01–36
Steering effort differs between right and left or is uneven	1. Steering center point (zero point) is not recorded completely	05–981
	2. Front tires (Improperly inflated, unevenly worn)	28–1
	3. Front wheel alignment (Incorrect)	26–5
	4. Front suspension (Lower ball joint)	26–21
	5. Steering gear assy	51–7
	6. Torque sensor (built into steering column)	50–8
	7. Steering column assy	50–8
	8. Power steering motor	50–8
	9. Power steering ECU assy	01–36
While driving, steering effort does not change in accordance with vehicle speed or steering wheel does not return properly	1. Front suspension	–
	2. Speed sensor	32–75
	3. Skid control ECU	32–81 32–82
	4. Engine speed detection circuit	–
	5. ECM	10–24
	6. Torque sensor (built into steering column)	50–8
	7. Power steering motor	50–8
	8. Power steering ECU assy	01–36
	9. Controlling CAN communication system	05–2312
Clunking sound occurs when turning steering wheel back and forth while power steering is in operation	1. Front suspension	–
	2. Steering intermediate shaft	–
	3. Steering gear assy	51–7
Friction sound occurs when turning steering wheel during low speed driving	1. Power steering motor	50–8
	2. Steering column assy	50–8
High–pitched sound (squeaking) occurs when turning steering wheel slowly with vehicle stopped	Power steering motor	50–8
Steering wheel vibrates and noise occurs when turning steering wheel with the vehicle stopped	1. Power steering motor	50–8
	2. Steering column assy	50–8
PS warning is always indicated on multi–display	Refer to flowchart	05–1010

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05IJT–02

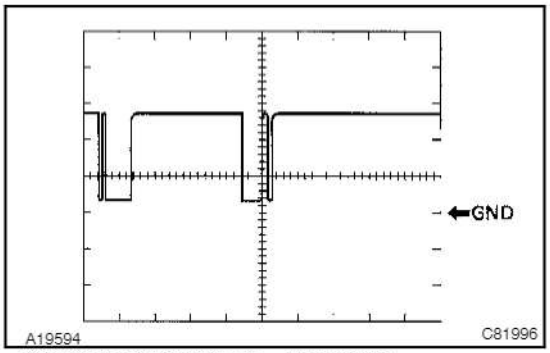
TERMINALS OF ECU



N

F44303

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PIG (P9–1) – PGND (P9–2)	W – W–B	EPS fuse	Always	10 to 16 V
PGND (P9–2) – Body ground	W–B – Body ground	Body ground	Always	Below 1 Ω
M1 (P11–1) – PGND (P9–2)	R – W–B	Power steering motor	• With power switch on (IG), turn the steering wheel to left • With power switch on (IG), turn the steering wheel to right	Below 1 V 10 to 16 V
M2 (P11–2) – PGND (P9–2)	B – W–B	Power steering motor	• With power switch on (IG), turn the steering wheel to left • With power switch on (IG), turn the steering wheel to right	10 to 16 V Below 1 V
CANH (P10–1) – CANL (P10–7)	B – W	CAN BUS	Power switch is off	108 to 132 Ω
SIL (P10–2) – PGND (P9–2)	W – W–B	DLC3	Communication is established by connecting the intelligent tester II to the DLC3	Pulse generation (See waveform 1)
IG (P10–6) – PGND (P9–2)	B – W–B	ECU–IG fuse	Power switch is on (IG)	10 to 16 V
TRQ1 (P12–5) – PGND (P9–2)	B – W–B	Torque sensor	With power switch on (IG), turn the steering wheel to left and right	0.3 to 4.7 V
TRQV (P12–6) – PGND (P9–2)	Y – W–B	Torque sensor	Power switch is on (IG)	7.5 to 8.5 V
TRQ2 (P12–7) – PGND (P9–2)	R – W–B	Torque sensor	With power switch on (IG), turn the steering wheel to left and right	0.3 to 4.7 V
TRQG (P12–8) – PGND (P9–2)	W – W–B	Torque sensor	Always	Below 1 Ω



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Waveform 1

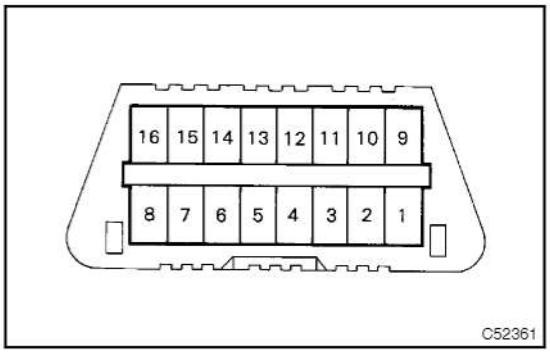
Reference:

Terminal	SIL – Body ground
Tool setting	5 V/DIV, 1 ms/DIV
Condition	Communication is established by connecting the intelligent tester II to the DLC3

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05IJW–02

DIAGNOSIS SYSTEM



1. CHECK THE DLC3

(a) Check the DLC3:

The power steering ECU assy uses CAN and ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–3 and matches the ISO 9141–2/ISO 14230 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Power switch off	54 to 67 Ω
CANH (6) – Battery positive	HIGH–level CAN bus line	Power switch off	1 MΩ or higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Power switch off	3 KΩ or higher
CANL (14) – Battery positive	LOW–level CAN bus line	Power switch off	1 MΩ or higher
CANL (14) – CG (4)	LOW–level CAN bus line	Power switch off	3 KΩ or higher

HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" after connecting the hand–held tester cable to the DLC3 and turning the ignition switch to the ON position, there is a problem either with the vehicle or the tester.

- If communication is normal when connecting the tester to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when connecting the tester to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's operator's manual.

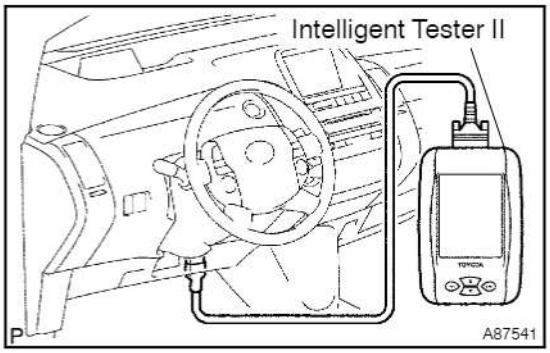
2. WARNING LIGHT

(a) When a problem occurs in the electric power steering system, the PS warning is indicated on the multi–display and the master warning light on the combination meter comes on to inform the driver of the problem.

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05IJZ-02

DTC CHECK/CLEAR



1. CHECK FOR DTCs

(a) Check for DTCs.

(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch on (IG).

(3) Read the DTCs by following the display on the intelligent tester II.

HINT:

Refer to the intelligent tester II operator's manual for further details.

2. CLEAR THE DTCs

(a) Clear the DTCs from the memory.

(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch on (IG).

(3) Clear the DTCs by following the display on the intelligent tester II.

HINT:

Refer to the intelligent tester II operator's manual for further details.

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05IK1-02

FREEZE FRAME DATA

NOTICE:

- **It is difficult to show the specified values (judgement values) clearly because freeze frame data values significantly change due to differences in measurement conditions, surroundings or vehicle conditions. Because of this reason, there may be a problem even when the values are within specifications.**
- **Turn the power switch on (IG) and park the vehicle on level ground to check the freeze frame data by using the intelligent tester II.**

(b) Connect the intelligent tester II to the DLC3.

(c) Turn the power switch on (IG) and check the freeze frame data by following the prompts on the display on the intelligent tester II.

Item	Item Description	Inspection Condition	Reference Value
Torque Sensor 1 Output	Torque sensor 1 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Torque Sensor 2 Output	Torque sensor 2 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Torque Sensor 3 Output	Torque value for assist control/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Meter Vehicle Velocity	Vehicle speed from meter/ Min.: 0 km/h, Max.: 255 km/h	1. Vehicle is stopped 2. Vehicle is driven at a constant speed	1. 0 km/h 2. No significant fluctuation
Motor Actual Current	Amount of current to motor/ Min.: –128 A, Max.: 127 A	–	–
Command Value Current	Demanded amount of current to motor/ Min.: –128 A, Max.: 127 A	–	–
Thermistor Temperature	ECU substrate temperature/ Min.: –50 °C, Max.: 205 °C	Power switch is on (IG)	–
PIG Power Supply	Power source voltage to activate motor/ Min.: 0 V, Max.: 25.5 V	Power steering is in operation	10 to 16 V
IG Power Supply	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	–	10 to 16 V
TRQ1 Zero Point Value	Zero point value of torque sensor 1/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V
TRQ2 Zero Point Value	Zero point value of torque sensor 2/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V
TRQ3 Zero Point Value	Zero point value of torque sensor for assist control/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V

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Item	Item Description	Inspection Condition	Reference Value
Motor Terminal Volt(+)	Motor terminal M1 voltage/ Min.: 0 V, Max.: 25.5 V	1. Turning steering wheel to right 2. Turning steering wheel to left	1. 10 to 16 V 2. Below 1 V
Motor Terminal Volt(–)	Motor terminal M2 voltage/ Min.: 0 V, Max.: 25.5 V	1. Turning steering wheel to right 2. Turning steering wheel to left	1. Below 1 V 2. 10 to 16 V
Number of Trouble Code	Number of detected DTCs when freeze frame data is stored/ Min.: 0 time, Max.: 255 times	–	–
Ready Status	HV system "READY"/ OFF/ON	HV system "READY" ⇔ Not "READY"	ON ⇔ OFF

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05IK3–02

FAIL–SAFE CHART

When a problem occurs in the electronic motor power steering system, the PS warning is indicated on the multi–display, the master warning light on the combination meter comes on, and steering power assist is stopped, fixed at a particular point, or decreased simultaneously to protect the system.

DTC No.	Malfunction	Fail–safe
C1511 C1512 C1513 C1514 C1517	Torque sensor malfunction	Power assist stops.
C1524	Motor malfunction	Power assist stops.
C1531 C1532	Power steering ECU malfunction	Power assist stops.
C1533	Temperature sensor malfunction in power steering ECU	Amount of power assist is limited.
C1551	IG power source voltage error	Power assist stops.
C1552	PIG power source voltage error	Power assist stops.
C1554	Power source relay malfunction	Power assist stops.
C1555	Motor relay malfunction	Power assist stops.
U0073	CAN bus malfunction	Amount of power assist is fixed for a speed of 70 km/h (43 mph).
U0121	ABS (ECB) ECU communication error	Amount of power assist is fixed for a speed of 70 km/h (43 mph).
–	Extremely high temperature in ECU	Amount of power assist is limited until ECU temperature goes down.
–	Power source voltage drop	Power assist is interrupted, but normal power assist is resumed when voltage returns.

HINT:

Amount of power assist may be decreased to prevent the motor and ECUs from overheating if the steering wheel is continuously turned when the vehicle is either stopped or driven at a low speed, or if the steering wheel is kept at either full lock position for a long time. In that case, amount of power assist returns to normal if the steering wheel is not turned for approximately 10 minutes with the engine idling.

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05IK5-02

DATA LIST/ACTIVE TEST

1. DATA LIST

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch on (IG).

(c) Operate the intelligent tester II according to the steps on the display and select "DATA LIST".

Item	Item Description	Inspection Condition	Reference Value
Torque Sensor 1 Output	Torque sensor 1 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Torque Sensor 2 Output	Torque sensor 2 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Torque Sensor 3 Output	Torque value for assist control/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Meter Vehicle Velocity	Vehicle speed from meter/ Min.: 0 km/h, Max.: 255 km/h	1. Vehicle is stopped 2. Vehicle is driven at a constant speed	1. 0 km/h 2. No significant fluctuation
Motor Actual Current	Amount of current to motor/ Min.: –128 A, Max.: 127 A	–	–
Command Value Current	Demanded amount of current to motor/ Min.: –128 A, Max.: 127 A	–	–
Thermistor Temperature	ECU substrate temperature/ Min.: –50 °C, Max.: 205 °C	Power switch is on (IG)	–
PIG Power Supply	Power source voltage to activate motor/ Min.: 0 V, Max.: 25.5 V	Power steering is in operation	10 to 16 V
IG Power Supply	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	–	10 to 16 V
TRQ1 Zero Point Value	Zero point value of torque sensor 1/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V
TRQ2 Zero Point Value	Zero point value of torque sensor 2/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V
TRQ3 Zero Point Value	Zero point value of torque sensor for assist control/ Min.: 0 V, Max.: 5 V	Steering wheel is not turned (without load)	2.3 to 2.7 V
Motor Terminal Volt(+)	Motor terminal M1 voltage/ Min.: 0 V, Max.: 25.5 V	1. Turning steering wheel to right 2. Turning steering wheel to left	1. 10 to 16 V 2. Below 1 V
Motor Terminal Volt(–)	Motor terminal M2 voltage/ Min.: 0 V, Max.: 25.5 V	1. Turning steering wheel to right 2. Turning steering wheel to left	1. Below 1 V 2. 10 to 16 V
Motor Overheat Record	Continuous overheat prevention control record/ REC/UNREC	–	–

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Item	Item Description	Inspection Condition	Reference Value
Motor Lo Power Record	PIG power source voltage drop record/ REC/UNREC	–	–
Control Mode	Codes indicating DTC detection timing during ECU control are displayed in hexadecimal	–	–
IG ON/OFF Times	Number of times power switch is turned on (IG) after DTC detection/ Min.: 0 time, Max.: 255 times	–	–
Number of Trouble Code	Number of detected DTCs when freeze frame data is stored/ Min.: 0 time, Max.: 255 times	–	–
Assist Map Select State	Selected assist map	–	–
ECU Identification	ECU identification information	–	–
Test Mode Status	Selected mode/ NORMAL MODE/TEST MODE	–	–
Ready Status	HV system "READY"/ OFF/ON	HV system "READY" ⇔ Not "READY"	ON ⇔ OFF

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05IK7–02

DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the "See page" under respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area
C1511 (05–994)	Torque sensor abnormal	• Steering column assy (Torque sensor) • Power steering ECU assy
C1512 (05–994)	Torque sensor abnormal	• Steering column assy (Torque sensor) • Power steering ECU assy
C1513 (05–994)	Torque sensor abnormal	• Steering column assy (Torque sensor) • Power steering ECU assy
C1514 (05–994)	Torque sensor power supply abnormal	• Steering column assy (Torque sensor) • Power steering ECU assy
C1515 (05–998)	Torque sensor zero point adjustment undone	–
C1516 (05–999)	Torque sensor zero point adjustment incomplete	–
C1517 (05–994)	Torque hold abnormal	• Steering column assy (Torque sensor) • Power steering ECU assy
C1524 (05–1000)	Motor abnormal	• Power steering motor • Power steering ECU assy
C1531 (05–1002)	ECU abnormal	Power steering ECU assy
C1532 (05–1002)	ECU abnormal	Power steering ECU assy
C1533 (05–1002)	ECU abnormal	Power steering ECU assy
C1534 (05–1002)	ECU abnormal	Power steering ECU assy
C1551 (05–1003)	IG power source voltage abnormal	• ECU–IG fuse • IG power source circuit • Power steering ECU assy
C1552 (05–1005)	PIG power supply voltage abnormal	• EPS fuse • PIG power source circuit • Power steering ECU assy
C1554 (05–1005)	Power supply relay failure	• EPS fuse • PIG power source circuit • Power steering ECU assy
C1555 (05–1005)	Motor relay welding failure	• EPS fuse • PIG power source circuit • Power steering ECU assy
C1581 (05–1007)	Assist map number un–writing	Power steering ECU assy
U0073 (05–1008)	Control module communication bus off	–
U0121 (05–1008)	Lost communication with anti–lock brake system (ABS) control module	–

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DTC	C1511	TORQUE SENSOR ABNORMAL

DTC	C1512	TORQUE SENSOR ABNORMAL

DTC	C1513	TORQUE SENSOR ABNORMAL

DTC	C1514	TORQUE SENSOR POWER SUPPLY ABNORMAL

DTC	C1517	TORQUE HOLD ABNORMAL

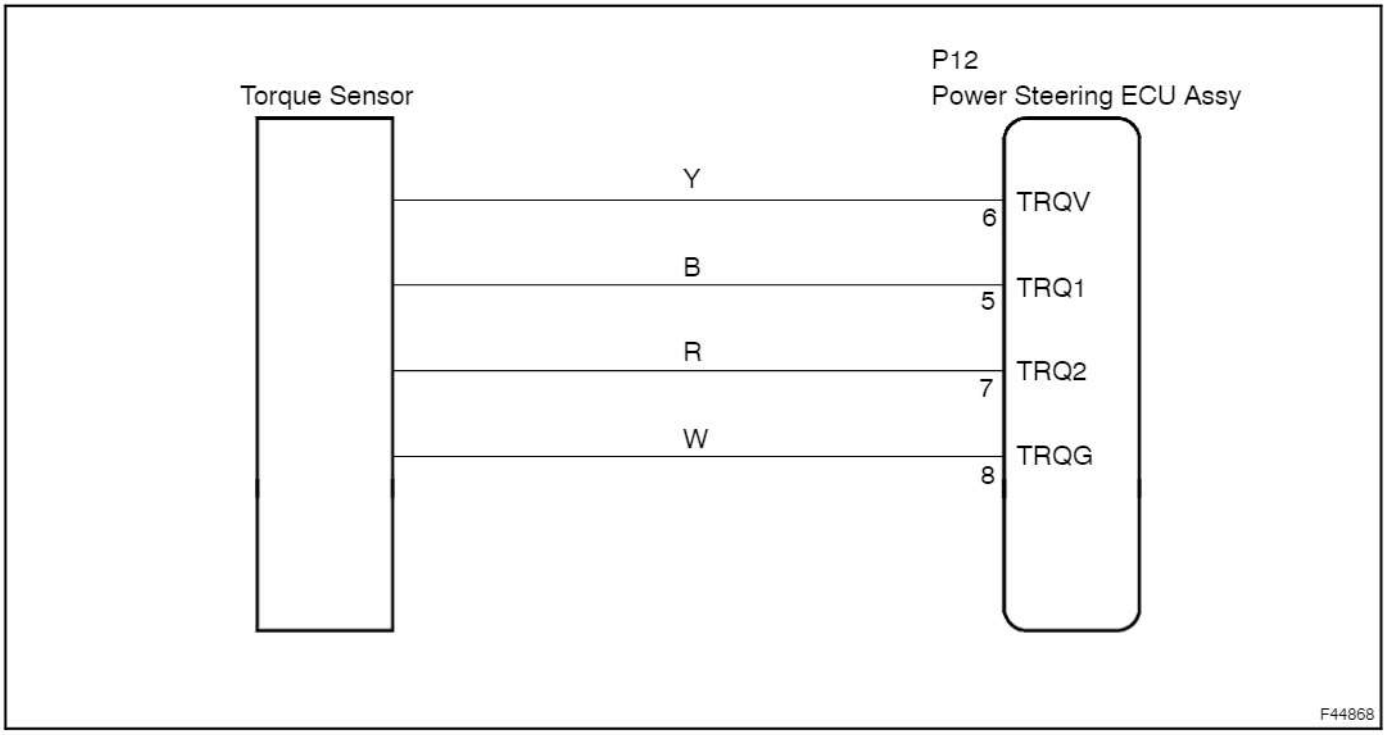
CIRCUIT DESCRIPTION

The torque sensor converts rotation torque input to the steering wheel into an electrical signal and sends it to the ECU. Based on this signal, the ECU detects steering effort.

DTC No.	Detection Item	Trouble Area
C1511	Torque sensor (TRQ1) signal error or stop	• Torque sensor (built into steering column assy) • Power steering ECU assy
C1512	Torque sensor (TRQ2) signal error or stop	• Torque sensor (built into steering column assy) • Power steering ECU assy
C1513	Deviation between torque sensors TRQ1 and TRQ2 is out of specification	• Torque sensor (built into steering column assy) • Power steering ECU assy
C1514	Torque sensor power source voltage error	• Torque sensor (built into steering column assy) • Power steering ECU assy
C1517	Temporary control due to malfunction related to torque sensor continues for a long time	• Torque sensor (built into steering column assy) • Power steering ECU assy

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

Connect the intelligent tester II to the DLC3.
Turn the power switch on (IG), and turn the intelligent tester II main switch on.
Select the items "Torque Sensor 1 Output" and "Torque Sensor 2 Output" in the DATA LIST.

Item	Item Description	Inspection Condition	Reference Value
Torque Sensor 1 Output	Torque sensor 1 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V
Torque Sensor 2 Output	Torque sensor 2 output value/ Min.: 0 V, Max.: 5 V	1. Steering wheel is not turned (without load) 2. Turning steering wheel to right with vehicle stopped 3. Turning steering wheel to left with vehicle stopped	1. 2.3 to 2.7 V 2. 2.5 to 4.7 V 3. 0.3 to 2.5 V

Read the values of "Torque Sensor 1 Output" and "Torque Sensor 2 Output" on the tester display when the steering wheel is centered (without load).

Standard:

Voltage: 2.3 to 2.7 V

Check the difference in values between "Torque Sensor 1 Output" and "Torque Sensor 2 Output" when the steering wheel is centered (without load).

Standard:

Voltage: 0.3 V or less

Read the value of the torque sensor on the tester display when the steering wheel is turned.

Turn the steering wheel from its center position to the right full lock position and read the values of "Torque Sensor 1 Output" and "Torque Sensor 2 Output" on the tester display.

Standard:

Voltage: 2.5 to 4.7 V

Turn the steering wheel from its center position to the left full lock position and read the values of "Torque Sensor 1 Output" and "Torque Sensor 2 Output" on the tester display.

Standard:

Voltage: 0.3 to 2.5 V

Check the difference in values between "Torque Sensor 1 Output" and "Torque Sensor 2 Output".

Standard:

Voltage: 0.3 V or less

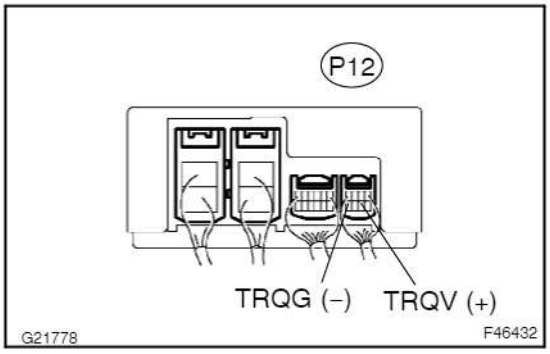
NG → **Go to step 2**

OK

REPLACE POWER STEERING ECU ASSY

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2 INSPECT STEERING COLUMN ASSY(TORQUE SENSOR)



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

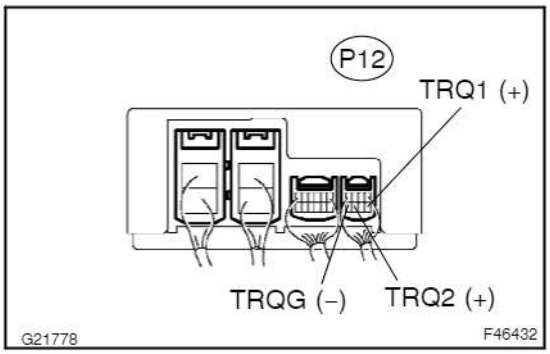
Standard:

Tester Connection	Condition	Specified Condition
P12–6 (TRQV) – P12–8 (TRQG)	Power switch is on (IG)	7.5 to 8.5 V

OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

3 INSPECT POWER STEERING ECU ASSY



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

Standard:

Tester Connection	Condition (Steering position)	Specified Condition
P12–5 (TRQ1) – P12–8 (TRQG)	Power switch is on (IG) (Center position)	2.3 to 2.7 V
P12–7 (TRQ2) – P12–8 (TRQG)	Power switch is on (IG) (Center position)	2.3 to 2.7 V
P12–5 (TRQ1) – P12–8 (TRQG)	Power switch is on (IG) (Turned to the right)	2.5 to 4.7 V
P12–7 (TRQ2) – P12–8 (TRQG)	Power switch is on (IG) (Turned to the right)	2.5 to 4.7 V
P12–5 (TRQ1) – P12–8 (TRQG)	Power switch is on (IG) (Turned to the left)	0.3 to 2.5 V
P12–7 (TRQ2) – P12–8 (TRQG)	Power switch is on (IG) (Turned to the left)	0.3 to 2.5 V

OK → **REPLACE STEERING COLUMN ASSY (SEE PAGE 50–8)**

NG

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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DTC	C1515	TORQUE SENSOR ZERO POINT ADJUSTMENT UNDONE

CIRCUIT DESCRIPTION

This DTC does not indicate a malfunction. The power steering ECU assy outputs this DTC when it determines that steering zero point calibration has not been performed.

DTC No.	DTC Detection Condition	Procedure
C1515	This DTC is detected when steering zero point calibration has not been performed.	There is no malfunction if this DTC is not output again after performing zero point calibration.

INSPECTION PROCEDURE

1	PERFORM ZERO POINT CALIBRATION OF TORQUE SENSOR (SEE PAGE 05–981)

2	RECONFIRM DTC (SEE PAGE 05–987)

(a) Check for DTCs.

Result:

A	DTCs are still output even after performing steering zero point calibration 3 times.
B	DTCs are still output even after performing steering zero point calibration once or twice.
C	Normal system code is output.

HINT:

Replace the steering column assy if DTCs are still output even after performing steering zero point calibration 3 times.

B	Go to step 1
C	END (Returned to normal by completion of zero point calibration)

A

REPLACE STEERING COLUMN ASSY (SEE PAGE 50–8)

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DTC	C1516	TORQUE SENSOR ZERO POINT ADJUSTMENT INCOMPLETE

CIRCUIT DESCRIPTION

This DTC does not indicate a malfunction. The power steering ECU assy outputs this DTC when it determines that torque sensor zero point calibration has not been completed normally.

DTC No.	DTC Detection Condition	Procedure
C1516	Steering zero point calibration has not been completed normally due to touching the steering wheel during calibration.	There is no malfunction if this DTC is not output again after clearing the DTCs, initializing the zero point calibration signal, and performing zero point calibration.

INSPECTION PROCEDURE

1	CLEAR DTC (SEE PAGE 05–987)

2	INITIALIZE ZERO POINT CALIBRATION SIGNAL OF TORQUE SENSOR (SEE PAGE 05–981)

3	PERFORM ZERO POINT CALIBRATION OF TORQUE SENSOR (SEE PAGE 05–981)

4	RECONFIRM DTC (SEE PAGE 05–987)

(a) Check for DTCs.

Result:

A	DTCs are still output even after performing steering zero point calibration 3 times.
B	DTCs are still output even after performing steering zero point calibration once or twice.
C	Normal system code is output.

HINT:

Replace the steering column assy if DTCs are still output even after performing steering zero point calibration 3 times.

B	Go to step 3

C	END (Returned to normal by completion of zero point calibration)

A

REPLACE STEERING COLUMN ASSY

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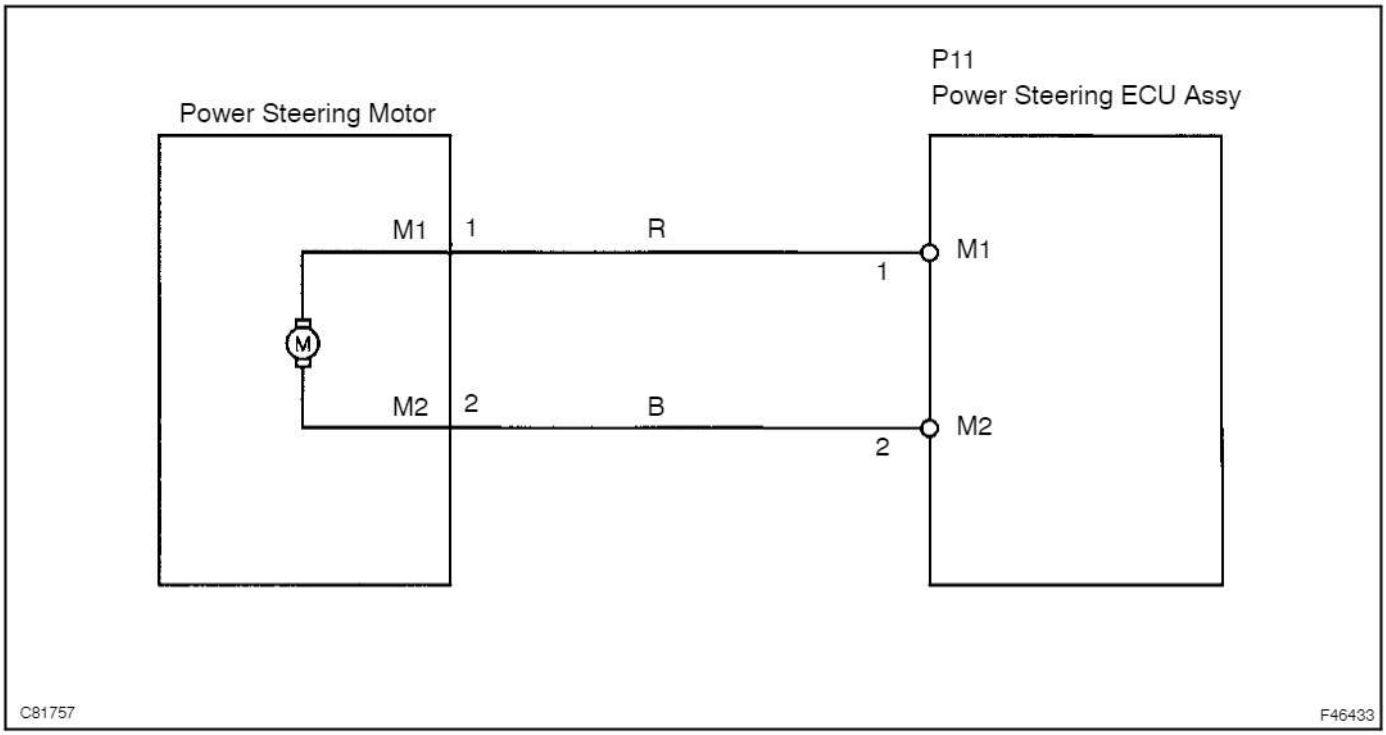
DTC C1524 MOTOR ABNORMAL

CIRCUIT DESCRIPTION

The power steering ECU assy supplies current to the power steering motor through this circuit.

DTC No.	DTC Detection Item	Trouble Area
C1524	Voltage error between motor terminals	• Power steering motor • Power steering ECU assy

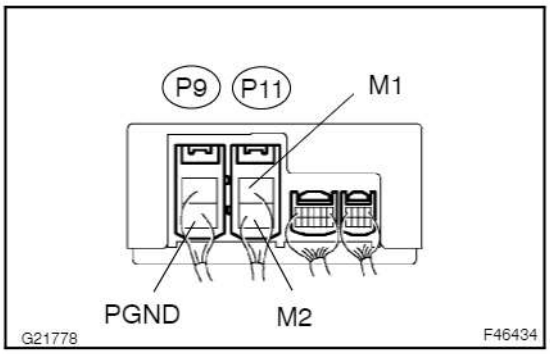
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT POWER STEERING ECU ASSY



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

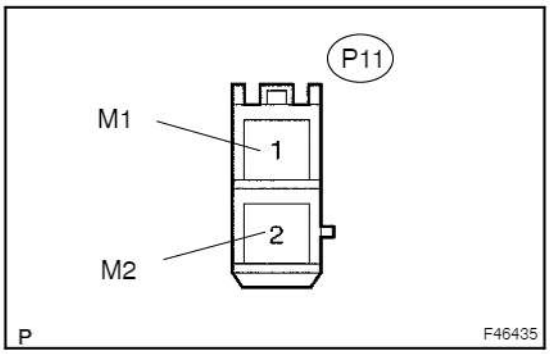
Standard:

Tester Connection	Condition	Specified Condition
P11–1 (M1) – P9–2 (PGND)	The steering wheel is turned to the left.	Below 1 V
P11–1 (M1) – P9–2 (PGND)	The steering wheel is turned to the right.	10 to 16 V
P11–2 (M2) – P9–2 (PGND)	The steering wheel is turned to the left.	10 to 16 V
P11–2 (M2) – P9–2 (PGND)	The steering wheel is turned to the right.	Below 1 V

NG → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

OK

2 INSPECT POWER STEERING MOTOR ASSY



(a) Tune the power switch off.
(b) Disconnect the "P9" connector from the power steering ECU assy.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
P11–1 (M1) – P11–2 (M2)	Always	0.04 to 0.1 Ω
P11–1 (M1) – Body ground	Always	10 kΩ or higher
P11–2 (M2) – Body ground	Always	10 kΩ or higher

NG → **REPLACE POWER STEERING MOTOR ASSY (SEE PAGE 50–8)**

OK

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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DTC	C1531	ECU ABNORMAL

DTC	C1532	ECU ABNORMAL

DTC	C1533	ECU ABNORMAL

DTC	C1534	ECU ABNORMAL

CIRCUIT DESCRIPTION

Fail–safe function operates to stop power assist while DTCs indicating ECU malfunctions are output. However, power assist continues when DTC C1534 is output because it indicates an EEPROM error in the ECU.

DTC No.	DTC Detection Item	Trouble Area
C1531	ECU internal malfunction (CPU malfunction) is detected.	Power steering ECU assy
C1532	ECU internal malfunction (Peripheral circuit malfunction) is detected.	Power steering ECU assy
C1533	ECU internal malfunction (Substrate temp. sensor malfunction) is detected.	Power steering ECU assy
C1534	ECU internal malfunction (EEPROM error) is detected.	Power steering ECU assy

INSPECTION PROCEDURE

1	RECONFIRM DTC (SEE PAGE 05–987)

(a) Check for DTCs.

OK:

DTCs other than C1531, C1532, C1533 and C1534 are not output.

NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–993)**

OK ↓

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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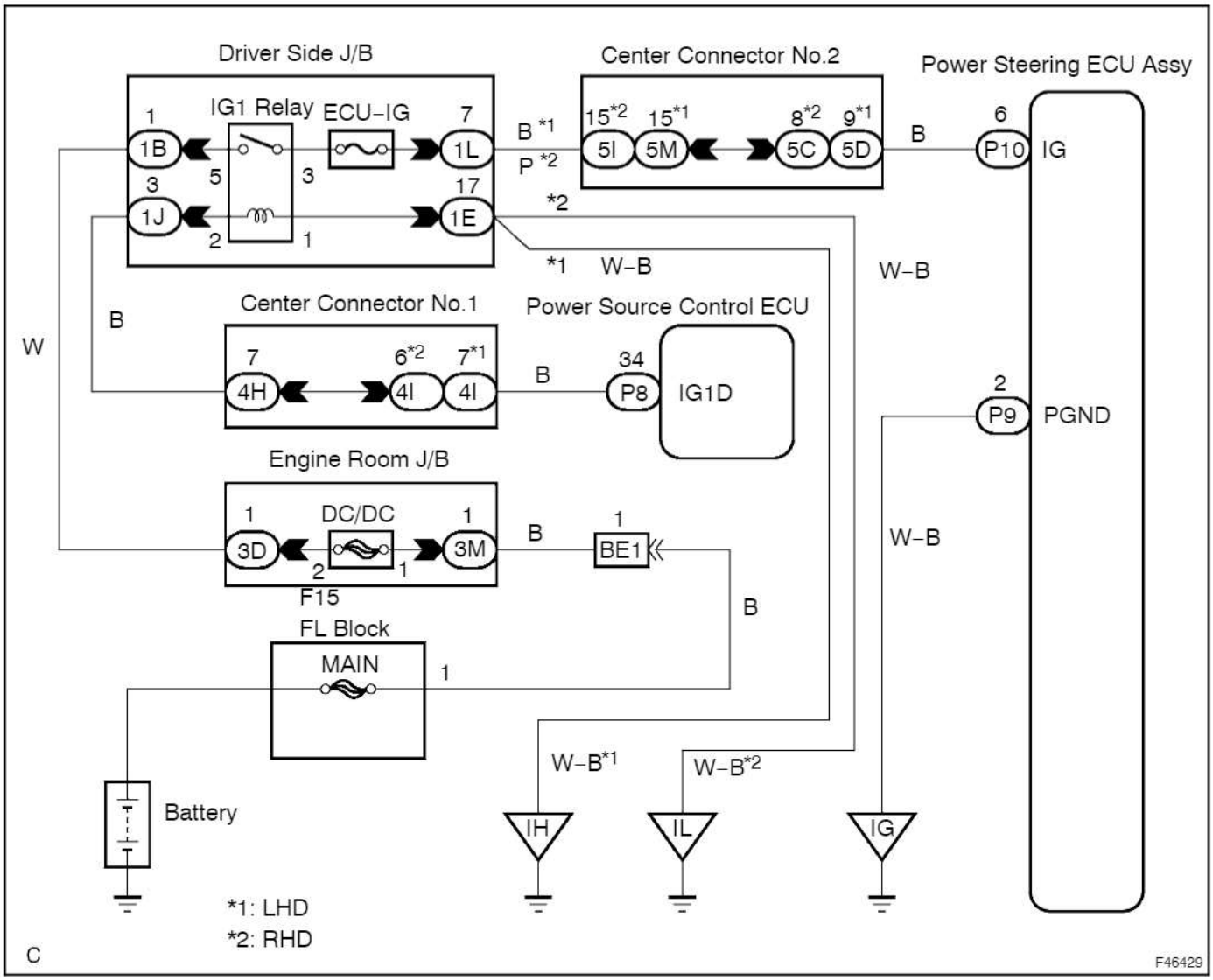
DTC C1551 IG POWER SOURCE VOLTAGE ABNORMAL

CIRCUIT DESCRIPTION

The power steering ECU Assy distinguishes on/off status of the power switch through this circuit.

DTC No.	DTC Detection Item	Trouble Area
C1551	There is an open or short in the IG power source circuit with the power switch on (IG).	• ECU–IG Fuse • IG power source circuit • Power steering ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

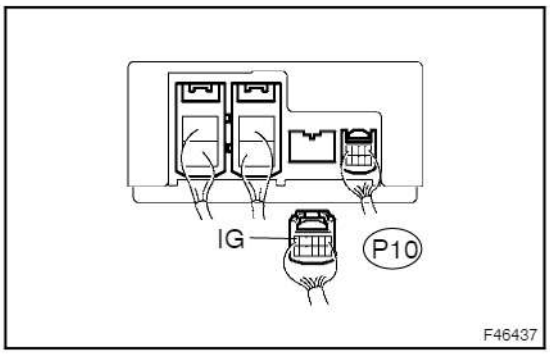
1	INSPECT FUSE(ECU–IG)

(a) Remove the ECU–IG fuse from the driver side J/B.
(b) Check continuity of the ECU–IG fuse.
Standard: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

2	CHECK HARNESS AND CONNECTOR(POWER STEERING ECU ASSY – BODY GROUND)



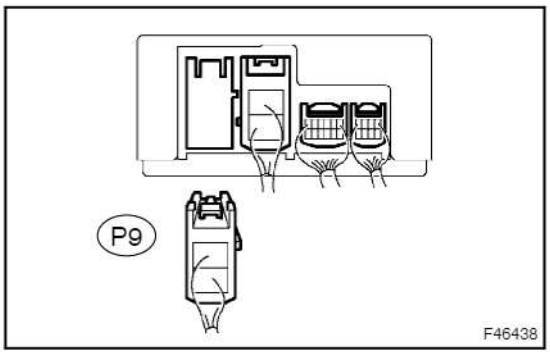
(a) Disconnect the "P10" connector from the power steering ECU assy.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard:

Tester Connection	Condition	Specified Condition
P8–6 (IG) – Body ground	Power switch is on (IG)	10 to 16 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(POWER STEERING ECU ASSY – BODY GROUND)



(a) Turn the power switch off.
(b) Disconnect the "P9" connector from the power steering ECU assy.
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Condition	Specified Condition
P9–2 (PGND) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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DTC	C1552	PIG POWER SUPPLY VOLTAGE ABNORMAL

DTC	C1554	POWER SUPPLY RELAY FAILURE

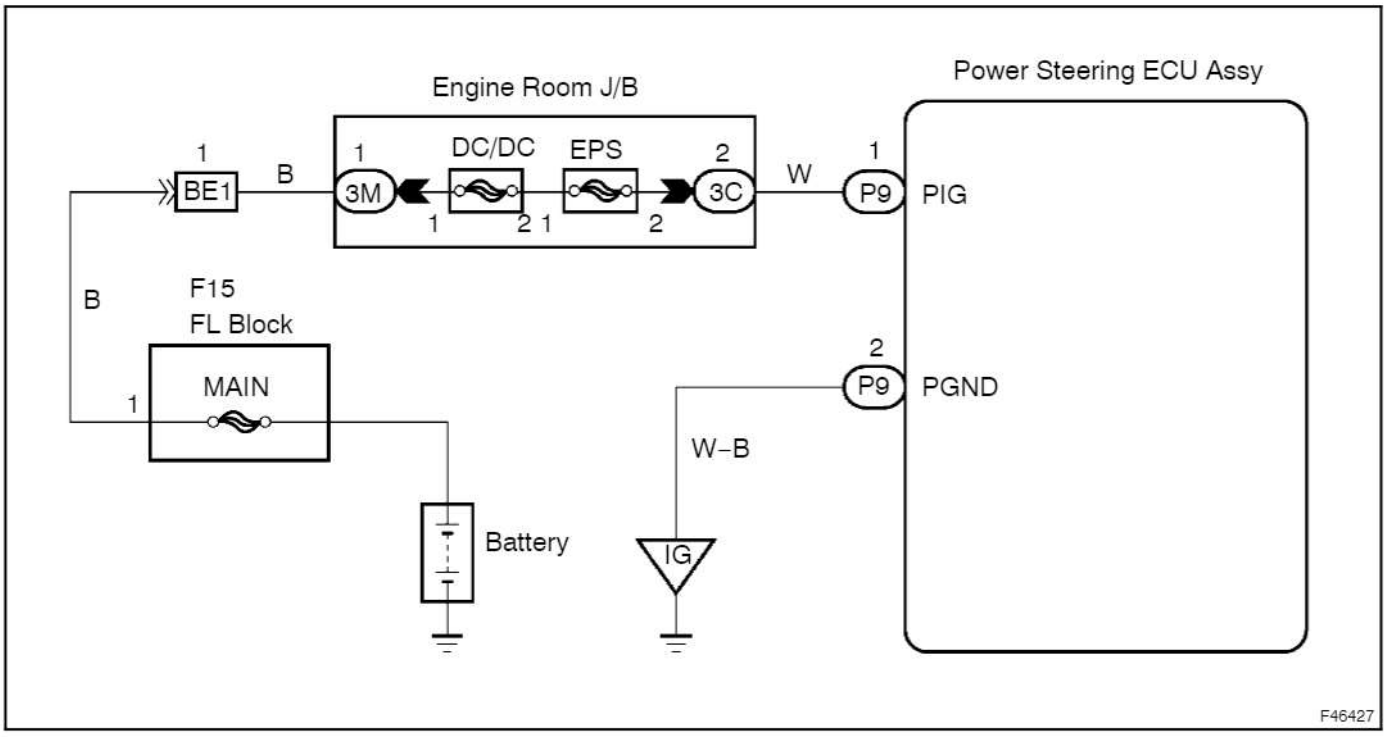
DTC	C1555	MOTOR RELAY WELDING FAILURE

CIRCUIT DESCRIPTION

When a problem occurs in the system, the power source relay (built into the power steering ECU assy) circuit and the motor relay (built into the power steering ECU assy) circuit are shut off to stop power assist. It is necessary to replace the ECU when there is a problem in the relay because each relay is built into the ECU.

DTC No.	DTC Detection Item	Trouble Area
C1552	PIG power source voltage error	• EPS Fuse • Power source relay (built into the power steering ECU assy) • Motor relay (built into the power steering ECU assy) • PIG power source circuit • Power steering ECU assy
C1554	Power source relay malfunction	• EPS Fuse • Power source relay (built into the power steering ECU assy) • PIG power source circuit • Power steering ECU assy
C1555	Motor relay malfunction	• EPS Fuse • Motor relay (built into the power steering ECU assy) • PIG power source circuit • Power steering ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

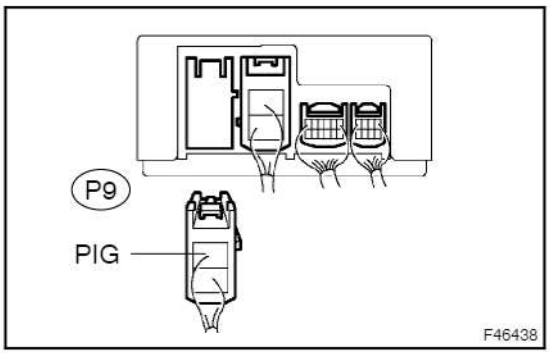
1	INSPECT FUSE(EPS FUSE)

(a) Remove the EPS fuse from the engine room J/B.
(b) Check continuity of the EPS fuse.
OK: Continuity

NG → **INSPECT FOR SHORT IN ALL COMPONENTS CONNECTED TO FUSE AND REPAIR OR REPLACE THEM IF NEEDED, AND REPLACE FUSE**

OK

2	CHECK HARNESS AND CONNECTOR(POWER STEERING ECU ASSY – BODY GROUND)



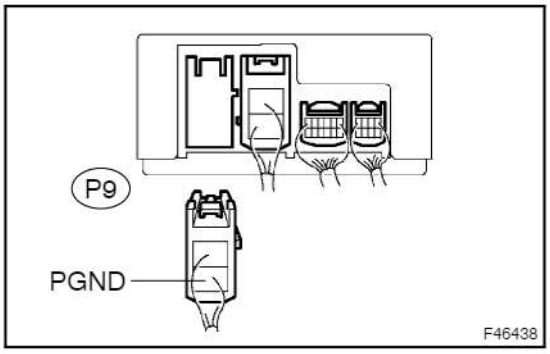
(a) Disconnect the "P9" connector from the power steering ECU assy.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester Connection	Condition	Specified Condition
P9–1 (PIG) – Body ground	Always	10 to 16 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(POWER STEERING ECU ASSY – BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Condition	Specified Condition
P9–2 (PGND) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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DTC	C1581	ASSIST MAP NUMBER UN–WRITING

CIRCUIT DESCRIPTION

The power steering ECU assy outputs this DTC when it determines that assist map is not written in the ECU. It is necessary to replace the power steering ECU assy when this code is output because this malfunction cannot be repaired.

HINT:

The assist map is data written in the power steering ECU assy to control assisting power. The assist map is selected from four types based on the vehicle specification communication data (designation and grade package information).

DTC No.	DTC Detection Item	Trouble Area
C1581	Assist map is not written in the power steering ECU assy.	Power steering ECU assy

INSPECTION PROCEDURE

1	RECONFIRM DTC (SEE PAGE 05–987)

(a) Check for DTCs.

OK:

DTCs other than C1581 are not output.

NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (SEE PAGE 05–993)**

OK ↓

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

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DTC	U0073	CONTROL MODULE COMMUNICATION BUS OFF

DTC	U0121	LOST COMMUNICATION WITH ANTI–LOCK BRAKE SYSTEM (ABS) CONTROL MODULE

CIRCUIT DESCRIPTION

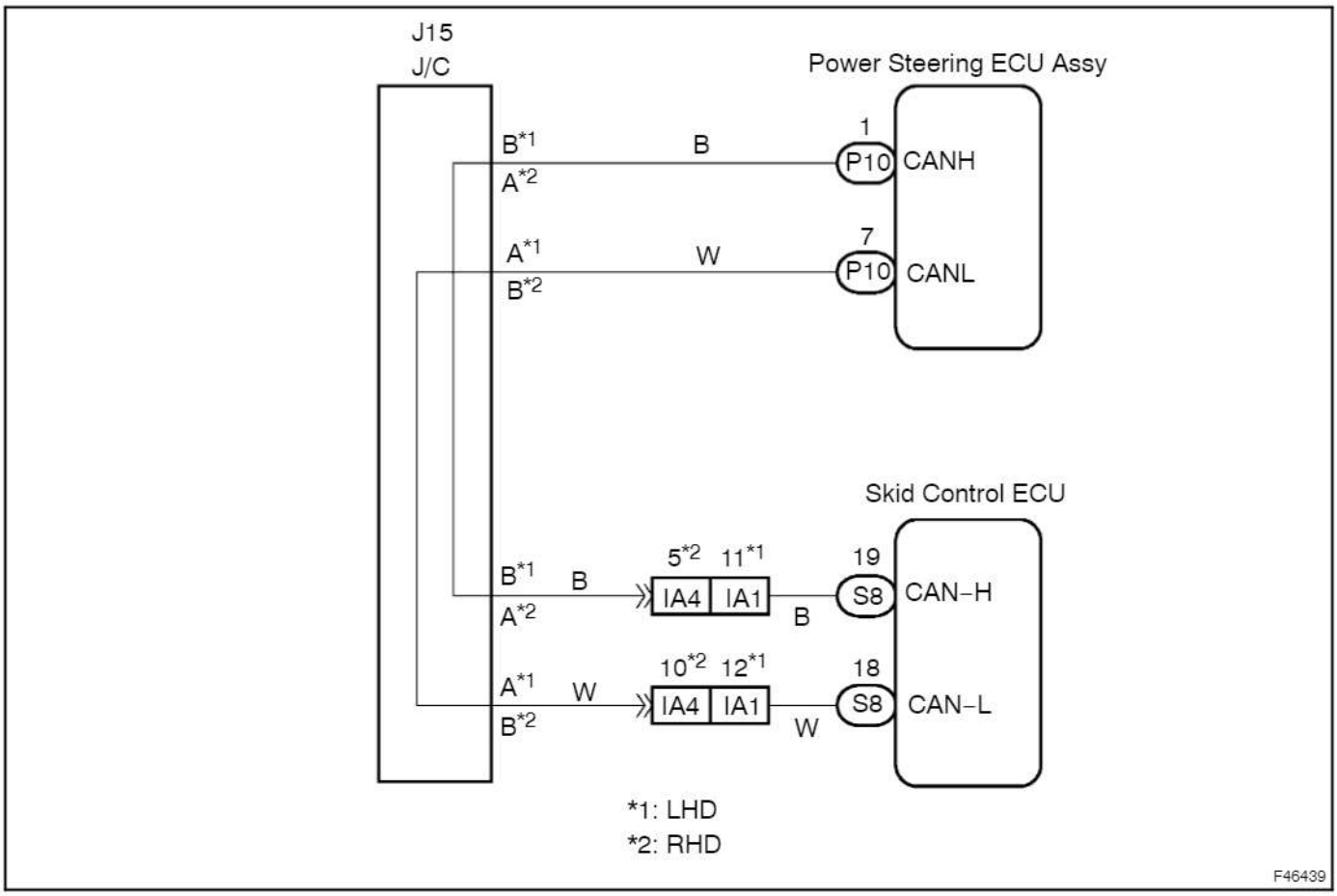
The power steering ECU assy receives signals from the skid control ECU (ECB ECU) and steering sensor via CAN communication.

DTC No.	DTC Detection Item	Inspection Area
U0073	CAN communication error (CAN bus is off)	CAN communication system
U0121	Skid control ECU communication error	• CAN communication system • Skid control ECU (when only U0121 is output)

HINT:

When two or more DTCs starting with "U" are output simultaneously, inspect the connectors and wire harness of each ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK DTC (SEE PAGE 05–987)

(a) Using the intelligent tester II, check for DTCs.

GO TO CAN COMMUNICATION SYSTEM TROUBLESHOOTING (SEE PAGE 05–2312)

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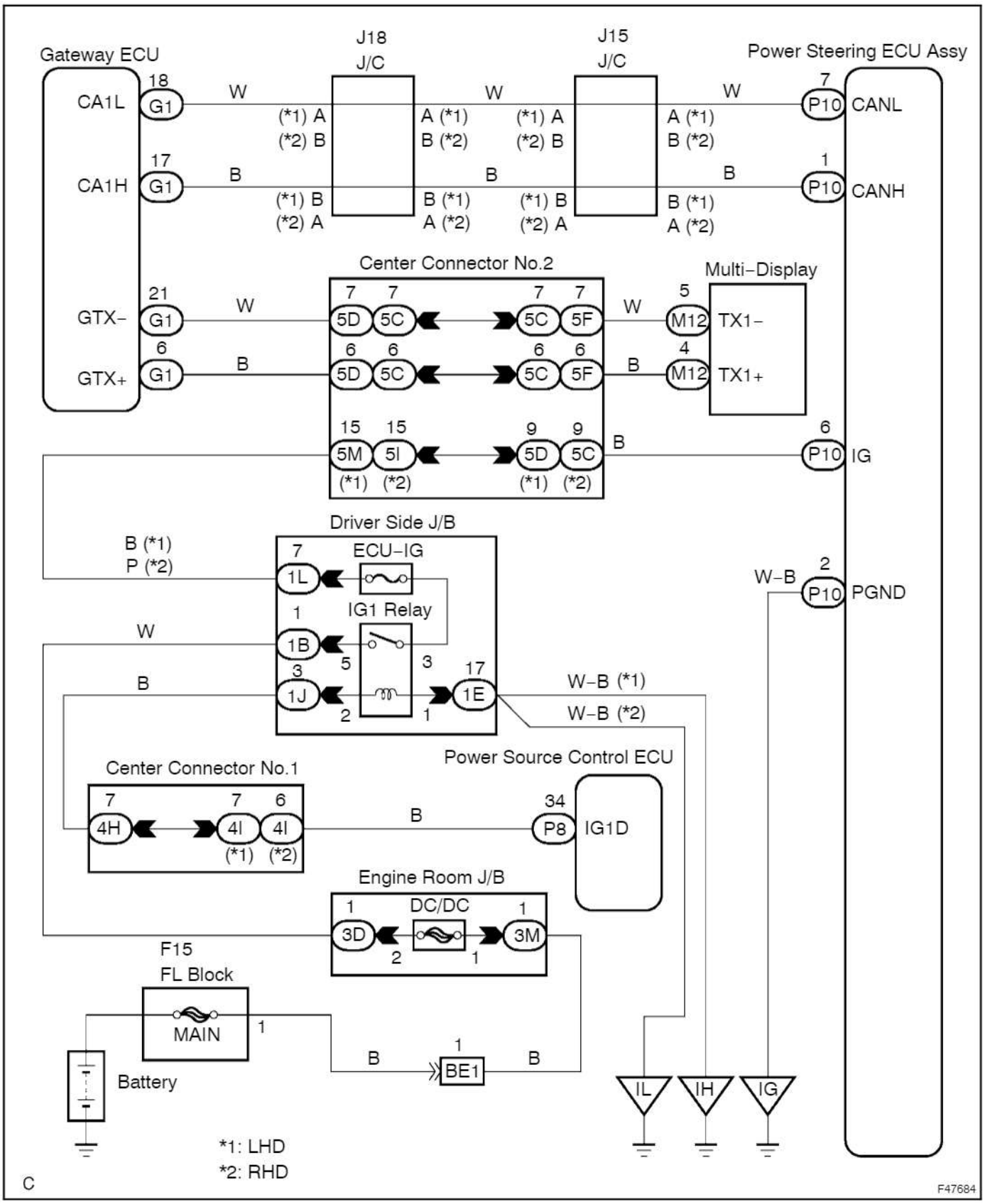
PS WARNING IS ALWAYS SHOWN ON MULTI–DISPLAY

CIRCUIT DESCRIPTION

Troubleshooting procedure for a situation when no DTCs are output but PS warning is always indicated is specified here. The PS warning remains on when there is an open in the IG circuit inputting power source voltage to the power steering ECU assy.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

(a) Check the indication condition of the PS warning while by wiggling the power steering ECU assy connector and wire harness up and down, and right and left.
OK:
PS warning indication does not change.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	INSPECT CAN COMMUNICATION SYSTEM

(a) Using the intelligent tester II, check for DTCs and confirm that there are no problems in the CAN communication system.
OK:
DTCs are not output.

NG → **GO TO CAN COMMUNICATION SYSTEM (SEE PAGE 05–2312)**

OK

3	INSPECT MULTIPLEX COMMUNICATION SYSTEM(BEAN)

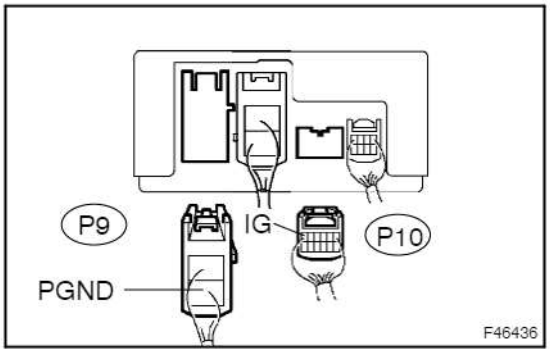
(a) Using the intelligent tester II, check for DTCs and confirm that there are no problems in the multiplex communication system (BEAN).
OK:
DTCs are not output.

NG → **GO TO MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)**

OK

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4	INSPECT POWER STEERING ECU ASSY



(a) Disconnect the "P9" and "P10" connectors from the power steering ECU assy.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
P10–6 (IG) – P9–2 (PGND)	Power switch is on (IG)	10 to 16 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

6	CHECK PS WARNING ON MULTI DISPLAY

(a) Check for the PS warning indication on the multi–display.

Standard:

The PS warning is not indicated.

OK → **END**

NG

REPLACE MULTI DISPLAY (SEE PAGE 67–7)

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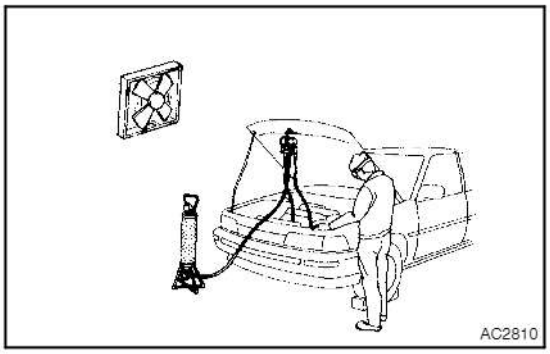
AIR CONDITIONING SYSTEM

PRECAUTION

05ILP–01

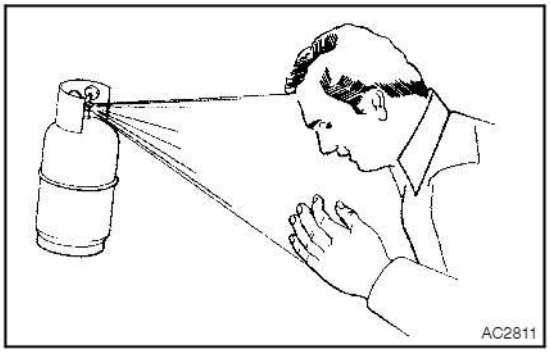
CAUTION:

Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.



1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME

2. ALWAYS WEAR EYE PROTECTION



3. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin:

(a) wash the area with lots of cold water.

CAUTION:

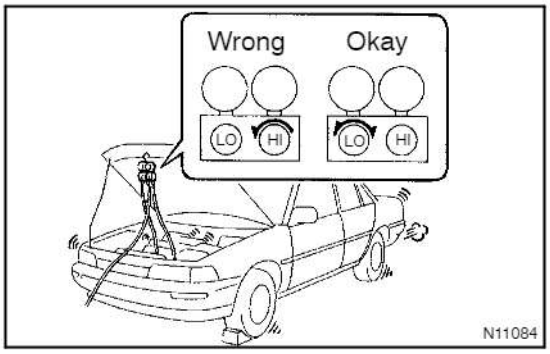
Do not rub your eyes or skin.

(b) apply clean petroleum jelly to the skin.

(c) go immediately to a hospital or see a physician for professional treatment.

4. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME

5. BE CAREFUL NOT TO DROP CONTAINER OR APPLY PHYSICAL SHOCKS TO IT



6. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM

If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur. Necessary care should be taken to avoid this.

7. DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING

Open and close only the low pressure valve. If the high pressure valves are opened, refrigerant flows in the reverse direction causing the charging cylinder to rupture.

8. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating, etc.

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9. NOTICE FOR INITIALIZATION:

(a) When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	see page
Power Window Control System	01–29

10. NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

11. PRECAUTIONS TO BE OBSERVED WHILE SERVICING

NOTICE:

- **For the electric inverter compressor, use the ND–OIL11.**
- **Electrical insulation performance may decrease significantly if even a small amount of oil other than ND–OIL11 is used (or enters) in the refrigeration cycle, causing the DTC to be output.**
- **If other oil is accidentally used and a DTC is output, collect the compressor oil in the compressor and replace it with ND–OIL11 to increase the ND–OIL11 ratio amount.**
- **Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND–OIL11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing the DTC to be output.**

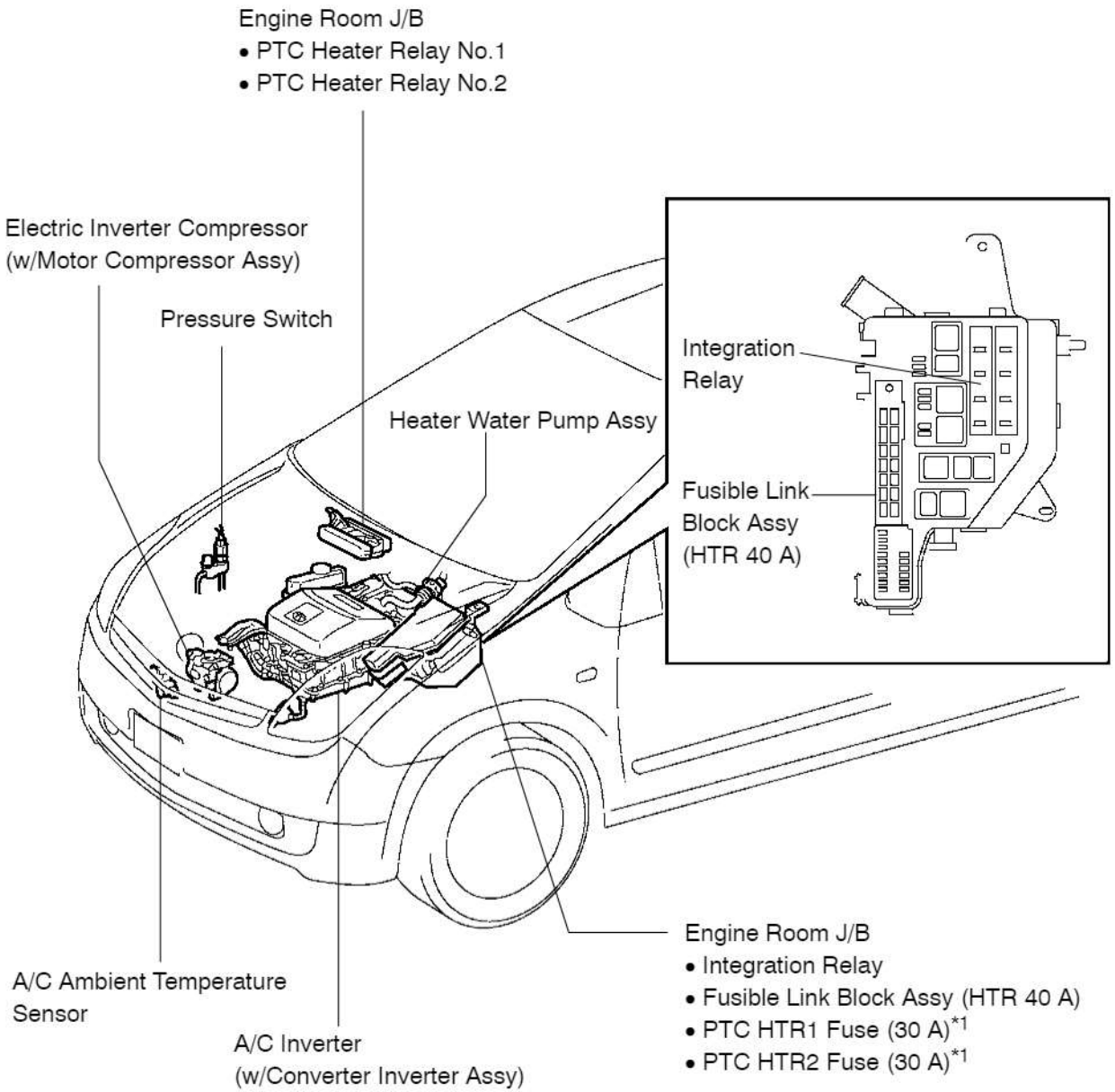
CAUTION:

Wear insulated gloves and pull out the service plug clip before inspection, as some of the procedures require disconnecting the high–voltage connectors (see page 05–1106).

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05CZ8-02

LOCATION

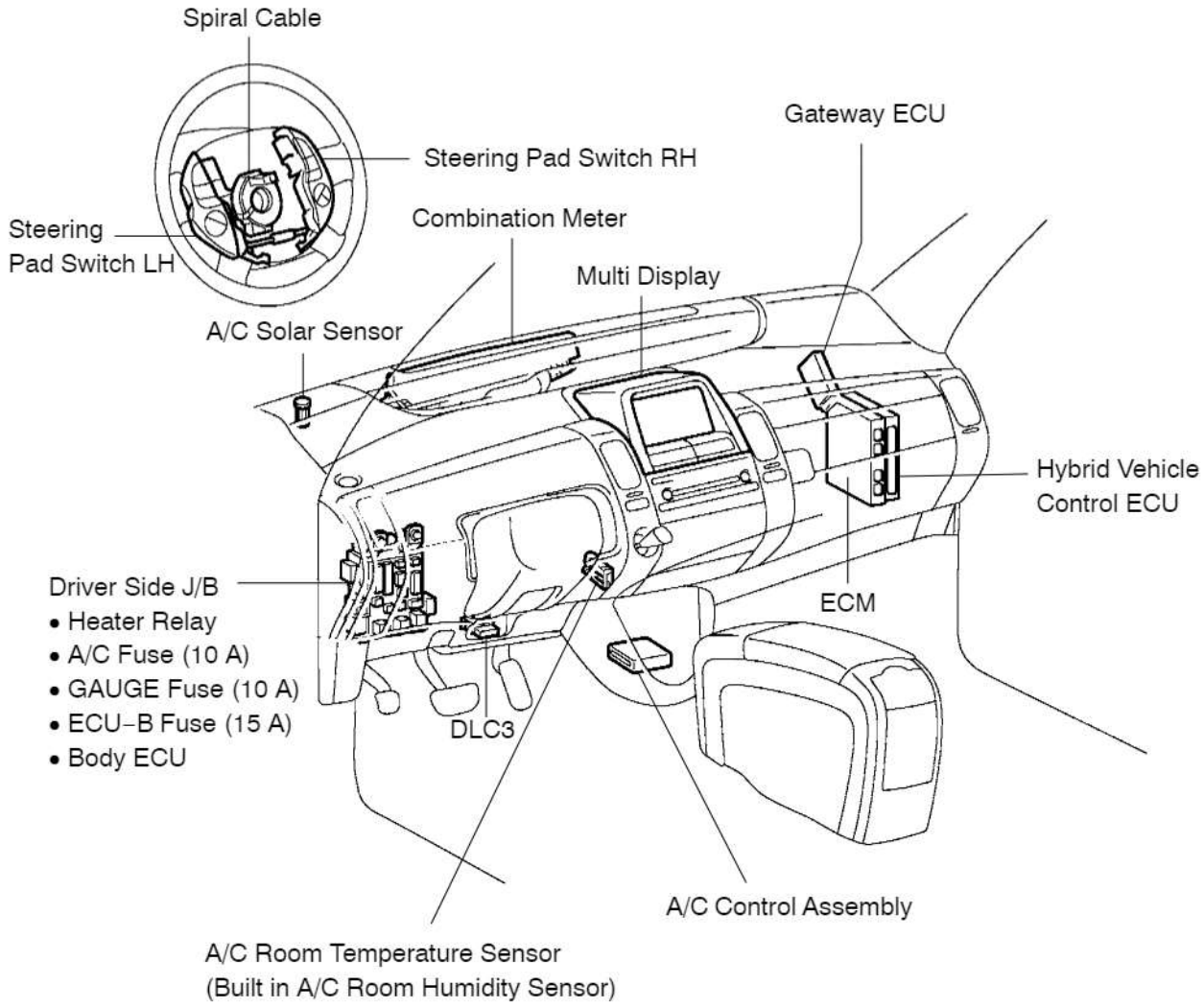


*1: Cold Area Models

C

I36307

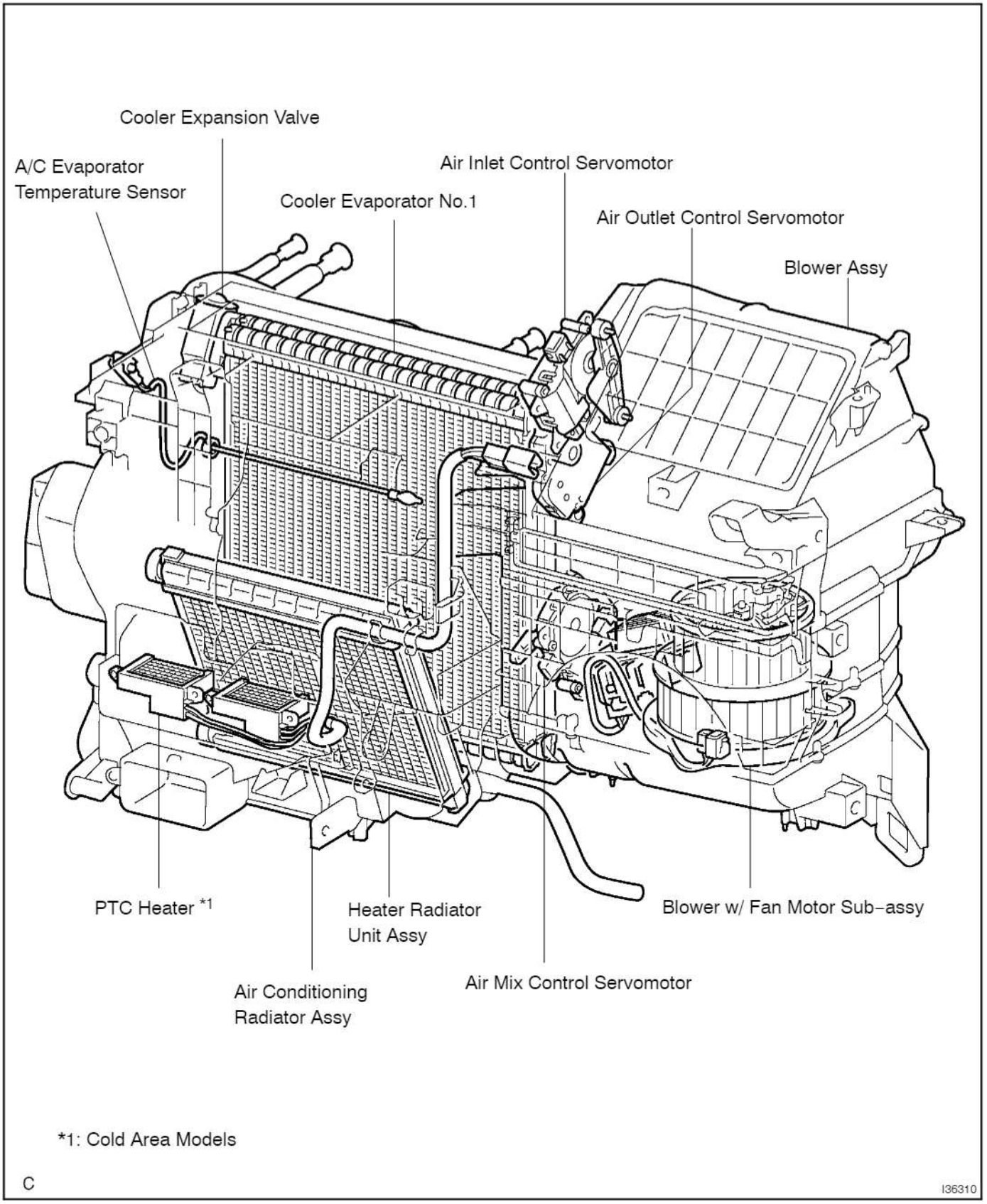
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C

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*1: Cold Area Models

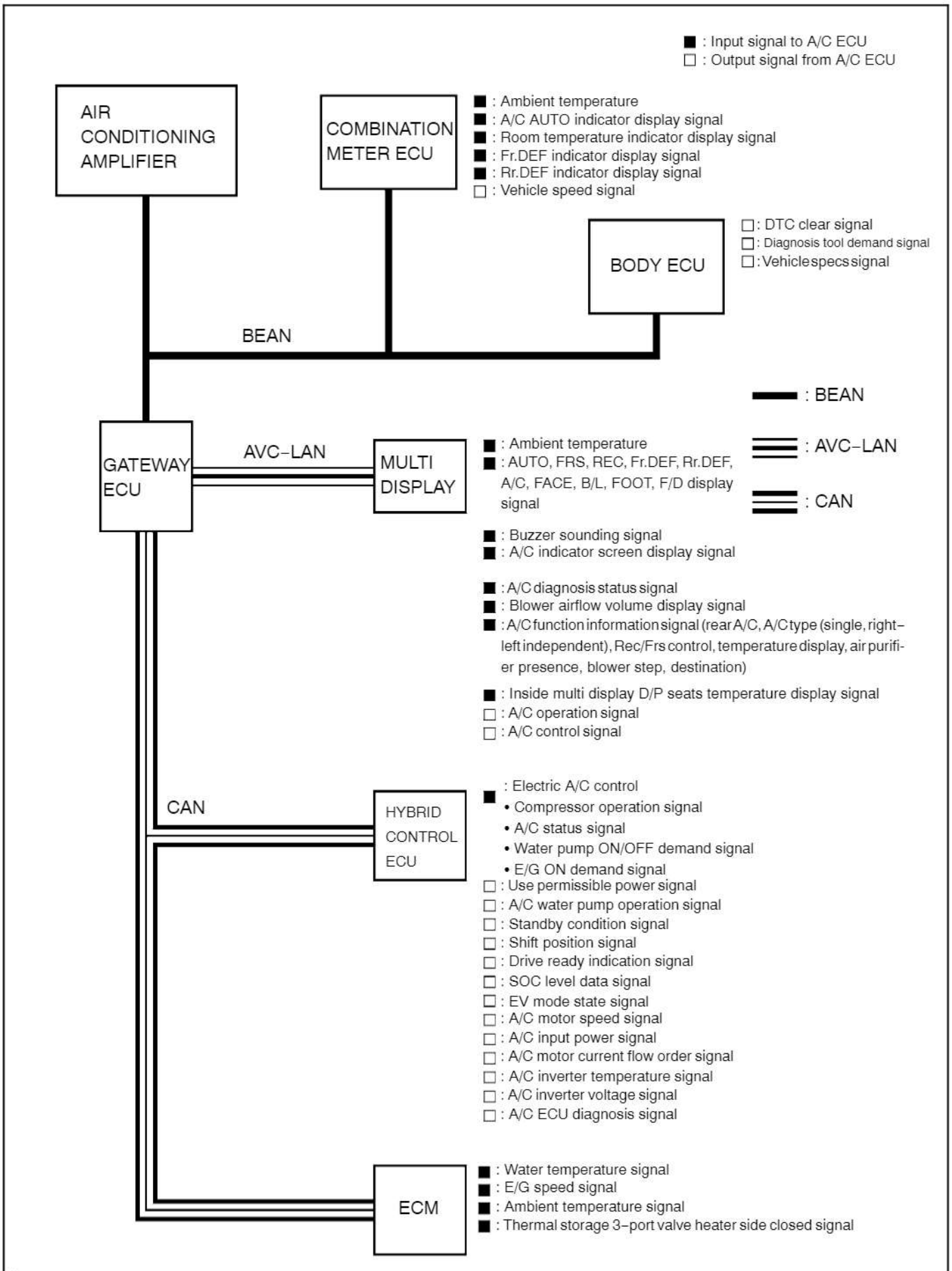
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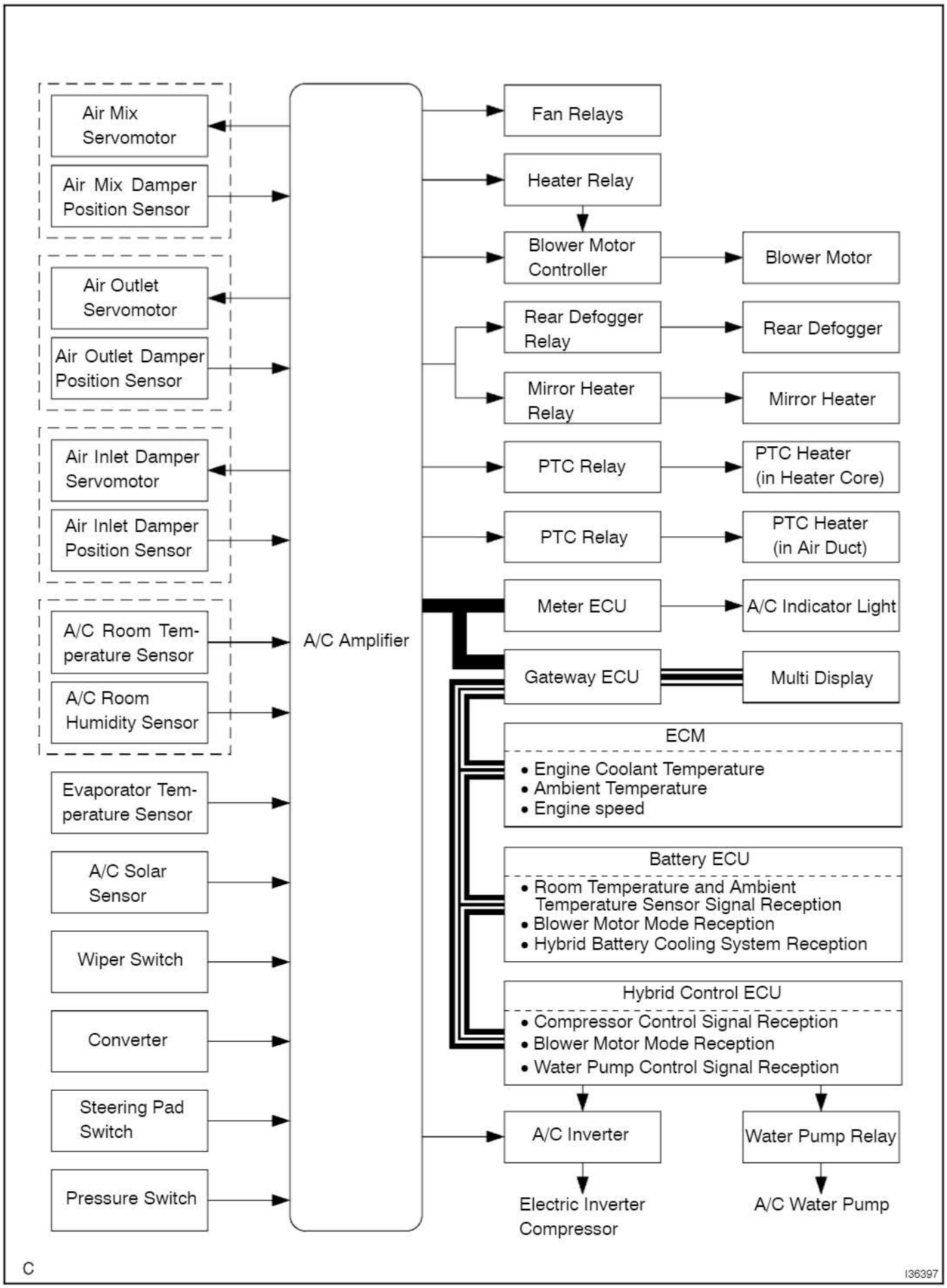
SYSTEM DIAGRAM



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05IN6–01

DESCRIPTION

1. GENERAL

The following changes have been made to the air conditioner system:

- An ES18 type Electric Inverter Compressor has been newly adopted. This compressor is driven by and alternating current provided by the A/C inverter, which is built into the inverter of the hybrid system. As a result, the air conditioning system is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
- A blower motor controller, which regulates the speed of the blower motor by controlling the output voltage in accordance with the duty cycle signal provided by the A/C amplifier, has been newly adopted. As a result, the power loss associated with the heat generation of the conventional blower linear controller has been reduced, thus realizing low fuel consumption.
- A humidity sensor function has been added to the room temperature sensor in order to optimize the amount of dehumidification effort during the operation of the air conditioning system.
- A compact, lightweight, and highly efficient SFA–II (Straight Flow Aluminum–II) heater core has been adopted on the RHD models. As in the past, the LHD models use the SFA (Straight Flow Aluminum) heater core.
- A compact, lightweight and highly efficient RS (Revolutionary Slim) evaporator has been adopted.
- A compact, lightweight and highly efficient MF–IV (Multi Flow–IV) condenser has been adopted.
- A compact, lightweight, and highly efficient electrical water pump has been adopted in order to ensure the proper heater performance while the engine is stopped.
- Fuzzy control has been adopted for calculating the required outlet air temperature (TAO: Temperature Air Outlet) and the blower volume in the automatic air conditioning control system. Accordingly, the air conditioning ECU is able to calculate the outlet air temperature, blower volume, air outlet, and compressor speed that is suited to the operating environment. As a result, the comfort level of the occupants has been improved.
- On the previous model, the air conditioner was controlled at the heater control panel. This control operation has been changed to the air conditioner screen display on the multi display and the steering pad switch, in order to improve the case of use.

2. AIR CONDITIONING OPERATION

- On the previous Prius, the air conditioner was controlled at the air conditioner control panel. On the new Prius, this control operation has been changed to the switches that appear on the air conditioner screen display of the multi display and the switches provided on the steering pad.
- In addition to the air conditioner screen display, the operating conditions of the AUTO, RECIRCULATION, front DEF, and rear DEF switches are indicated by the indicator lights in the combination meter.

3. HEATER CORE AND PTC HEATER

- A compact, lightweight, and highly efficient SFA–II (Straight Flow Aluminum–II) heater core has been adopted on the RHD models. As in the past, the LHD models use the SFA (Straight Flow Aluminum) heater core.
- The SFA–II heater core is the same straight flow (full–path flow) type heater core as the conventional SFA heater core. However, the SFA–II heater core has adopted a close–packed heater core structure to realize a compact and high–performance heater core.
- The two PTC (Positive Temperature Coefficient) heaters have been built into the heater core, and this heater core is offered as and option on the European LHD models.
- The PTC heater contains electrodes that are interposed with a PTC element, to which current is applied in order to warm the air that passes thought the fin. For details, PTC heater control on see page 05–1139.
- As optional equipment on the European LHD models, PTC heater has been provided in the air duct at the footwell outlet in front of the air conditioner unit. This PTC heater, which is a honeycombshaped PTC thermistor, directly warms the air that flows in the duct.

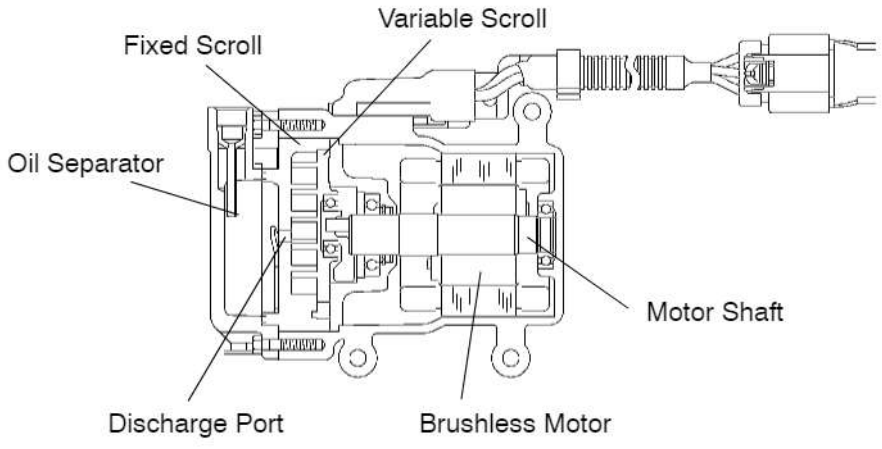
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4. COMPRESSOR

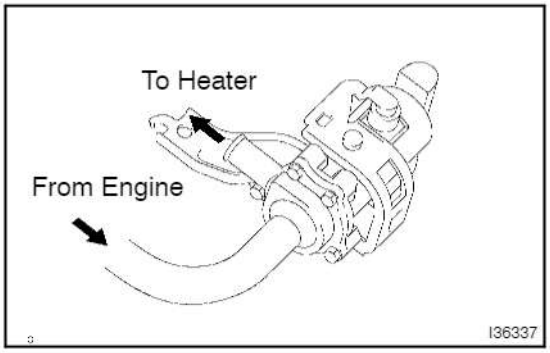
- Instead of the SCS06 scroll compressor that is actuated by the engine on the previous Prius, the new Prius has newly adopted and ES18 Electric Inverter Compressor that is actuated by a built–in electric motor. Except for the portion that is actuated by the electric motor, the basic construction and operation of this compressor are the same as in the scroll compressor used on the previous Prius.
- The electric motor is actuated by the alternating current power (201.6 V) supplied by the A/C inverter, which is integrated in the hybrid system inverter. As a result, the air conditioning control system on the new Prius is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
- Due to the adoption of an electrical inverter compressor, the compressor speed can be controlled at the required speed calculated by the A/C amplifier. Thus, the cooling and dehumidification performance and power consumption have been optimized.
- Low–moisture permeation hoses have been adopted for the suction and discharge hoses at the compressor in order to minimize the entry of moisture into the refrigeration cycle.
- The compressor uses high–voltage alternating current. If a short or open circuit occurs in the compressor wiring harness, the hybrid control ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor.
- For details on the electric compressor control effected by the A/C amplifier.
- The Electric Inverter Compressor consists of a spirally wound fixed scroll and variable scroll that form a pair, a brushless motor, an oil separator, and a motor shaft.
- The fixed scroll is integrated with the housing. Because the rotation of the shaft causes the variable scroll to revolve while maintaining the same posture, the volume of the space that is partitioned by both scrolls varies to perform the suction, compression, and the discharge of the refrigerant gas.
- Locating the suction port directly above the scrolls enables direct suction, thus realizing improved suction efficiency.
- Containing a built–in oil separator, this compressor is able to separate the compressor oil that is intermixed with the refrigerant and circulates in the refrigeration cycle, thus realizing a reduction in the oil circulation rate.

HINT:

In order ensure the proper insulation of the internal high–voltage portion of the compressor and the compressor housing, the new Prius has adopted a compressor oil (ND–OIL11) with a high level of insulation performance. Therefore, never use a compressor oil other than the ND–OIL11) type compressor oil or its equivalent.



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5. WATER PUMP

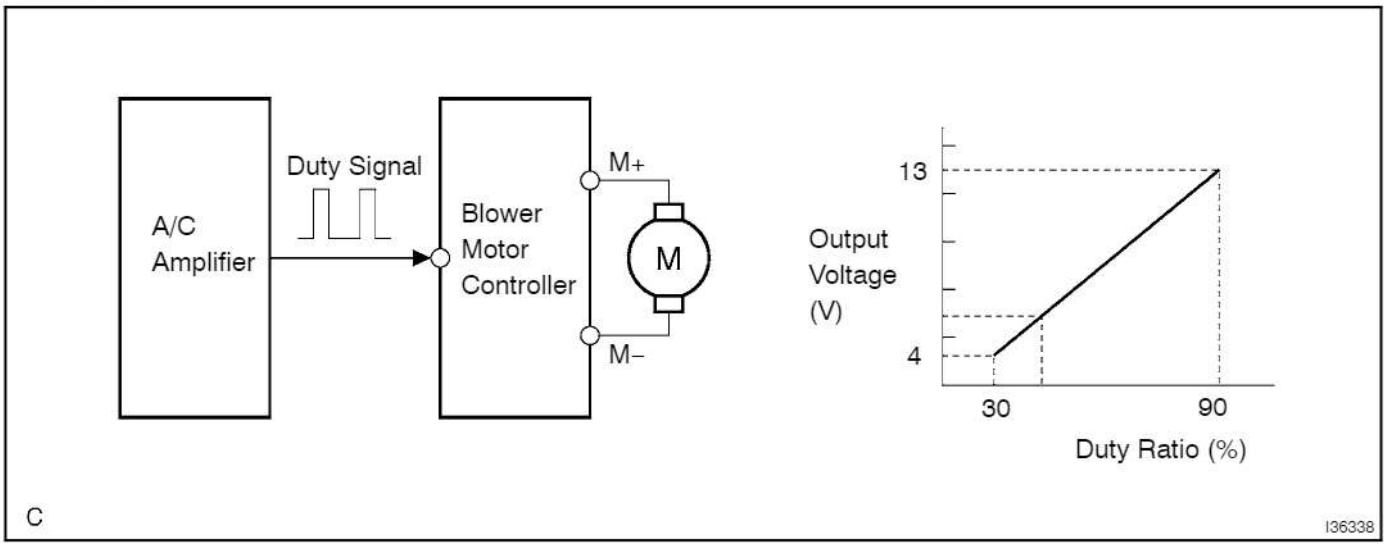
- Same as the previous Prius, an electrical water pump has been adopted. This provides a stable heater performance even if the engine is stopped because of a function of the THS–II.
- The New Prius has adopted a new type of electrical water pump in which the water flow resistance has been reduced. As a result, the bypass valve that was used on the previous Prius has been discontinued.

6. ROOM TEMPERATURE SENSOR AND HUMIDITY SENSOR

- A humidity sensor function has been added to the room temperature sensor. By enabling the detection of humidity in the vehicle interior, this function optimizes the amount of dehumidification effort during the operation of the air conditioning system. As a result, the power consumption of the compressor has been reduced and a comfortable level of humidity has been realized in the vehicle interior.
- The humidity–sensing resistance film that is built into the humidity sensor absorbs and releases the humidity in the vehicle interior. During the absorption and releasing processes, the humidity–sensing resistance film expands (during the absorption of humidity) and contracts (during drying). The clearance between the carbon particles in the humidity–sensing resistance film expands and contracts during absorption and drying, thus changing the resistance between the electrodes. The A/C amplifier determines the humidity in the vehicle interior through the changes in the output voltage of the humidity sensor that are caused by the resistance between the electrodes.

7. BLOWER MOTOR CONTROLLER

The blower pulse controller controls the voltage that is output to the blower motor in accordance with the duty cycle signals that are input by the A/C amplifier. It is characterized by a smaller amount of heat generation than the blower controller used on the previous model. As a result, the power loss associated with the heat generation of the conventional blower linear controller has been reduced, thus realizing low fuel consumption.



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8. A/C AMPLIFIER

The A/C amplifier has the following controls.

Control		Outline
Fuzzy Control		The fuzzy control determines the conformity levels of the temperature deviation, ambient temperature, and solar radiation by defining their respective mathematical functions. In addition by defining their respective mathematical functions. In addition, a fuzzy calculation method is used to calculate the required outlet air temperature (TAO) and the blower volume. Based on these calculations, the A/C amplifier effects the respective controls for the outlet air temperature, blower volume, compressor, and air outlet.
Outlet Air Temp. Control	Air Mix Damper Control	In response to the temperature control switch setting, the required outlet air temperature, evaporator temperature sensor, and engine coolant temperature sensor compensations are used by the air mix control damper control to calculate a tentative damper opening angle, through an arithmetic circuit in the air mix damper, to arrive at a target damper opening angle.
Blower Control	Blower Motor Start Up Control	When the blower motor is started up, the A/C amplifier transmits a blower motor actuation signal with a low duty cycle ratio to the blower pulse controller, which applies a low voltage to the blower motor, in order to operate the blower motor for 3 seconds at a low speed. This is designed to protect the blower pulse controller from a sudden start–up voltage surge.
	Manual Control	Sets the blower speed according to operation of the blower switch.
	Automatic Control	**Step Less Air Volume Control:** • When the AUTO switch located on the steering pad switch is pushed, or the air conditioning screen display of the multi display is touched, the A/C amplifier automatically regulates the duty ratio to the blower pulse controller in accordance with a calculation result by the fuzzy control in order to deliver step less air volume. **Warm–up Control:** • When the air outlet is in the FOOT, BI–LEVEL, or FOOT/DEF mode, the blower will not operate until the engine coolant temperature increases above a prescribed value. When the temperature increases above a prescribed value, the blower motor operates at the LO speed. **Time–Lagged Air Flow Control:** • 2 types of time–lagged air flow control (in accordance with the detected by the evaporator temperature sensor) help prevent hot air from being emitted from FACE or BI–LEVEL vent. **Sunlight Air Flow Control:** • Controls the blower speed in accordance with the intensity of the sunlight when the air outlet mode is at FACE or BI–LEVEL. The blower speed can be adjusted in response to the signal received from the solar sensor.
Air Outlet Control	Manual Control	Changes the air outlet in accordance with the selected position of the mode select switch.
	Automatic Control	**Mode Damper Switching Servomotor Control:** • When the AUTO switch is pushed, automatic control causes the mode servomotor to rotate to a desired position in accordance with the target damper opening, which is based on the calculation of the TAO. **Low–Temperature FOOT/DEF Control:** • In accordance with the engine coolant temperature, ambient temperature, amount of sunlight, required outlet temperature (TAO), and vehicle speed conditions, this control automatically switches the blower outlet between the FOOT/DEF modes to prevent the window from becoming fogged when the outside air temperature is low.

(Continued)

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Control		Outline
Air Inlet Control	Manual Control	Drives the air inlet servomotor according to the operation of the air inlet control switch and fixes the dampers in the FRESH or RECIRC position.
	Automatic Control	**Automatic RECIRC/FRESH control:** • When the AUTO switch is pressed, the system controls the servo motor in order to achieve the air inlet that has been calculated in accordance with the TAO. **DEF Mode Control:** • When switching the mode switching switch to DEF mode, A/C amplifier turns A/C mode ON forcibly and switched to FRESH mode when the ambient temperature is less than the specified temperature.
2–Way Flow Mode Control		At the time of selecting FRESH mode, A/C amplifier will judge it as 2–way flow mode when the blower outlet is selected to FOOT or FOOT/DEF, the tentative air mix damper opening angle is above the specified value (MAX HOT), and either the blower volume is more than the specified volume or the vehicle speed is less than the specified speed.
Half Inlet Air Mode Control		At the time of selecting FRESH mode, A/C amplifier will judge it as half inlet air mode when the blower outlet mode is selected to FACE or BI–LEVEL and TAO is more than the specified temperature, and operates both outlet air introduction and inlet air circulation at the same time.
Electric Inverter Compressor Control	Electric Inverter Compressor Speed Control	• The A/C amplifier calculates target compressor speed of the compressor based on the target evaporator temperature (which is calculated by the room temperature sensor, humidity sensor, ambient temperature sensor, and the solar sensor) and the actual evaporator temperature that is detected by the evaporator temperature sensor in order to control the compressor speed. • The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the A/C amplifier controls the compressor speed to an extent that would not inhibit the proper cooling performance or defogging performance.
Electrical Water Pump Control		When the blower motor is ON and the engine has been stopped by the hybrid control, the A/C amplifier turns ON the Electric water pump in accordance with the judgment of the air mix damper opening.
Engine Start Request Control		To ensure the proper heater performance when the hybrid system is started at low temperatures, the A/C amplifier transmits an engine start request to the hybrid control ECU in accordance with the TAO, engine coolant temperature sensor signal, and ambient temperature sensor signal.

(Continued)

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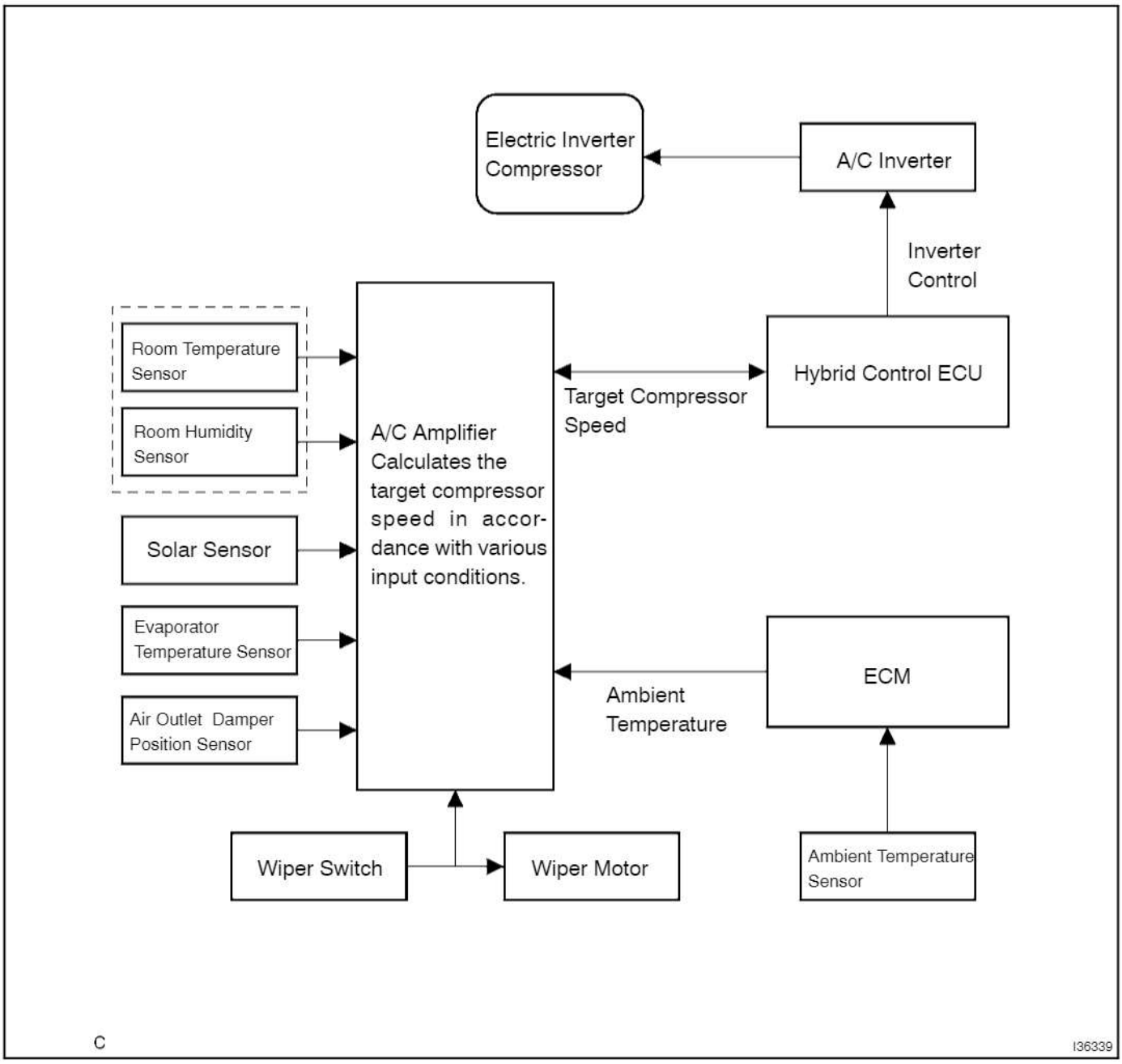
Control	Outline
PTC Heater Control (*1)	When the hybrid system is operating (READY) and the blower motor is turned ON, the A/C amplifier turns on the PTC heater if the conditions listed below are met. **Heater core integrated PTC Heater** • Air outlet is in the FOOT, FOOT/DEF or DEF mode. • Engine coolant temperature is below specified temperature. • Ambient temperature is below specified temperature. (DEF mode) • Tentative air mix damper opening angle is above the specified value. (MAX HOT) **Footwell air duct integrated PTC heater** • Air outlet is in the FOOT or FOOT/DEF mode. • Engine coolant temperature is below specified temperature. • Tentative air mix damper opening angle is above the specified value. (MAX HOT)
Electric Cooling Fan Control	The A/C amplifier controls the cooling fan in accordance with the vehicle speed signal, and compressor speed signal.
Rear Window Defogger Control	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger switch is switched on. Switches them off if the switch is pressed while they are operating.
Outer Temperature Indication Control	Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioning ECU, and shown in the multi display.
Self–Diagnosis	Checks the sensor and A/C inverter in accordance with operation of the air conditioning switches, then heater control panel display portion display portion a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not. (sensor check function)
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioner switches. (actuator check function)

(*1): Optional equipment for Europe LHD models

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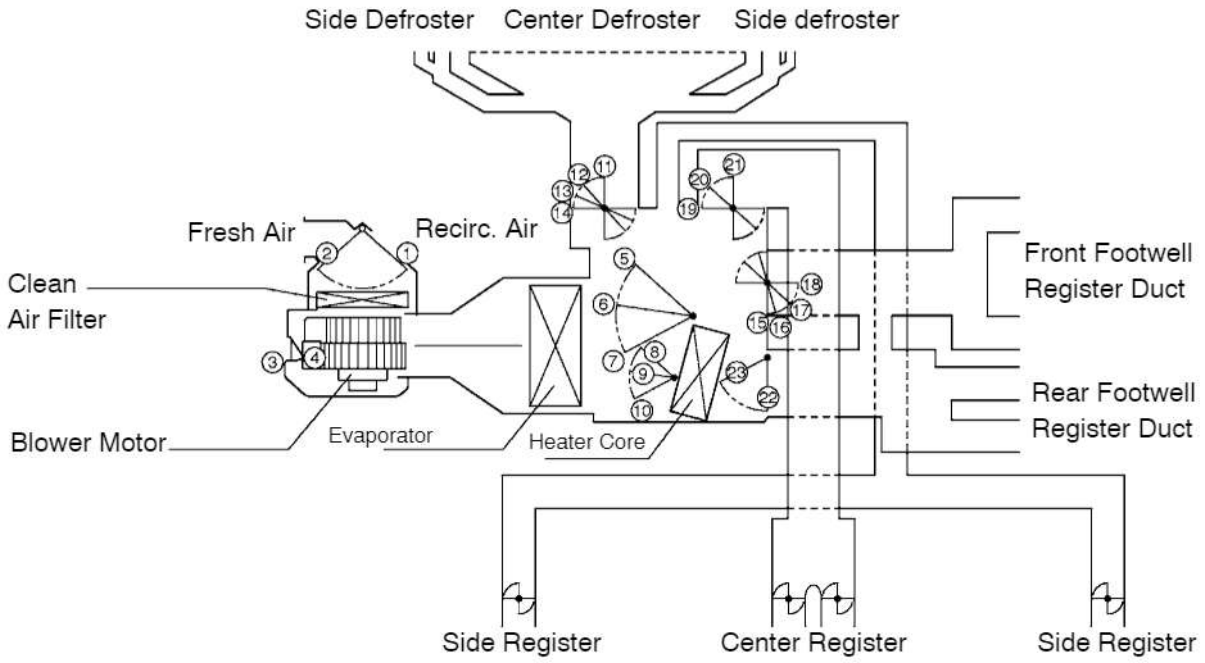
9. ELECTRIC INVERTER COMPRESSOR CONTROL

- The A/C amplifier calculates the target compressor speed based on the target evaporator temperature (calculated from the room temperature sensor, humidity sensor, ambient temperature sensor, and solar sensor) and the actual evaporator temperature detected by the evaporator temperature sensor. Then, the A/C amplifier transmits the target speed to the hybrid control ECU. The hybrid control ECU controls the A/C inverter based on the target speed data in order to control the compressor to a speed that suits the operating condition of the air conditioning system.
- The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the A/C amplifier controls the compressor speed to an extent that does not inhibit the proper cooling performance or defogging performance. As a result, comfort and low fuel consumption can be realized.



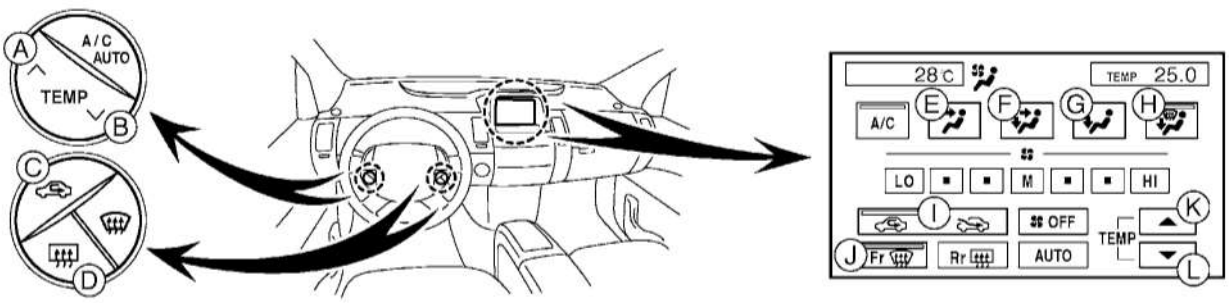
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10. MODEL POSITION AND DAMPER OPERATION



Control Damper	Control Position	Damper Position	Operation
Air Inlet Control Damper	Ⓒ or Ⓘ Indicator OFF	① ③	Brings in fresh air.
		② ④	Brings in fresh air while circulating internal air.
	Ⓒ or Ⓘ Indicator ON	② ④	Circulates internal air.
Air Mix Control Damper	Ⓐ Ⓑ or Ⓚ Ⓛ	⑤ to ⑥ to ⑦ / ⑧ ⑨ ⑩	Varies the mix ratio of warm and cool air in order to regulate the temperature continuously from WARM to COOL.
Mode Control Damper	Ⓓ or Ⓙ (DEF)	⑪ ⑰ ⑲ ㉒	Defrosts the window through the front defroster, side defrosters and side registers.
	Ⓗ (F / D)	⑫ ⑰ ⑲ ㉒ (⑪ ⑮ ⑲ ㉓) *1	Defrosts the window through the front defroster, side defrosters and side registers while warm air is also blown out to warm the footwell area.
	Ⓖ (FOOT)	⑬ ⑱ ⑲ ㉒ (⑫ ⑰ ⑲ ㉓) *1	Air is blown out of the footwell ducts and side registers.
	Ⓕ (B / L)	⑭ ⑰ ⑳ ㉒	Air is blown out of the footwell ducts and center and side registers.
	Ⓔ (FACE)	⑭ ⑮ ㉑ ㉒ (⑭ ⑯ ㉑ ㉒) *2	Air is blown out of the center and side registers.

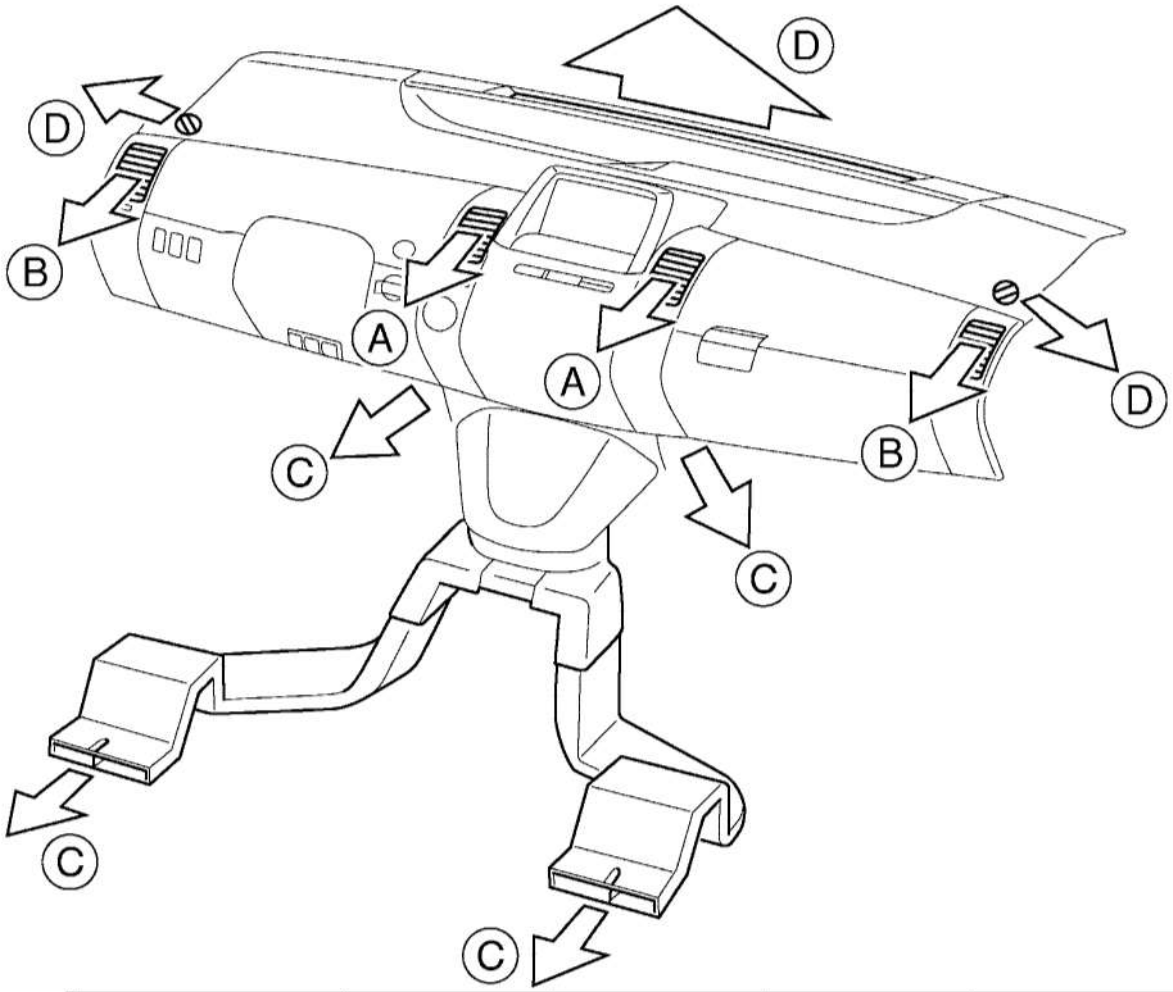
*1: During 2–way flow control
*2: Early stage of COOL during AUTO



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11. AIR OUTLETS AND AIR VOLUME RATIONS



AIR OUTLET / MODE	(A) Center Face	(B) Side Face	(C) Foot	(D) Defroster
FACE	○	○	— (○) *1	—
B / L	○	○	○	—
FOOT	—	○	○	○ (—) *2
F / D	—	○	○	○
DEF	—	○	—	○

HINT:

1. (○) indicates airflow and its size indicates the proportion of airflow volume.
2. (–) indicates that air is not blown out.
3. *1: Early stage of COOL during AUTO
4. *2: On Australia models, the defroster does blow air if FOOT is manually selected.

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0540L–03

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used at step 3, 6, 7, 8, 9, 14.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–1032)

(a) Confirm problem symptoms.

3	CHECK AND CLEAR DTCS (SEE PAGE 05–1040)

4	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (GO TO STEP 5)
- SYMPTOM OCCURS (GO TO STEP 6)

5	SYMPTOM SIMULATION

6	CHECK BODY MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Check for the DTC outputs.

- MULTIPLEX DTC OUTPUTS (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")
- NO MULTIPLEX DTC (GO TO STEP 7)

7	CHECK CAN COMMUNICATION SYSTEM (SEE PAGE 05–2312)

- CAN DTC OUTPUTS (PROCEED TO "CAN COMMUNICATION SYSTEM")
- NO CAN DTC (GO TO STEP 8)

8	DTC CHECK (OTHER THAN MULTIPLEX DTC) (SEE PAGE 05–1040)

- MALFUNCTION CODE (GO TO STEP 9)
- NORMAL CODE (GO TO STEP 10)

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9	DTC CHART (SEE PAGE 05–1047)

GO TO STEP 10

10	PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)
11	TERMINALS OF ECU (SEE PAGE 05–1037)
12	CIRCUIT INSPECTION (SEE PAGE 05–1049 – 05–1146)
13	IDENTIFICATION OF PROBLEM
14	REPAIR OR REPLACE
15	CONFIRMATION TEST

END

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0540M–03

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

Customer's Name		VIN	
		Production Date	
		Licence Plate 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 Faulty	☐ Blower motor does not operate ☐ Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control Faulty	☐ Cabin temperature does not go down ☐ Cabin temperature does not rise ☐ Response is slow
	Air Inlet Control Faulty	☐ Cannot change between FRS and REC (Always Fresh or Always Recirculating)
	Vent Control Faulty	☐ Mode does not change ☐ Unable to enter the desired mode

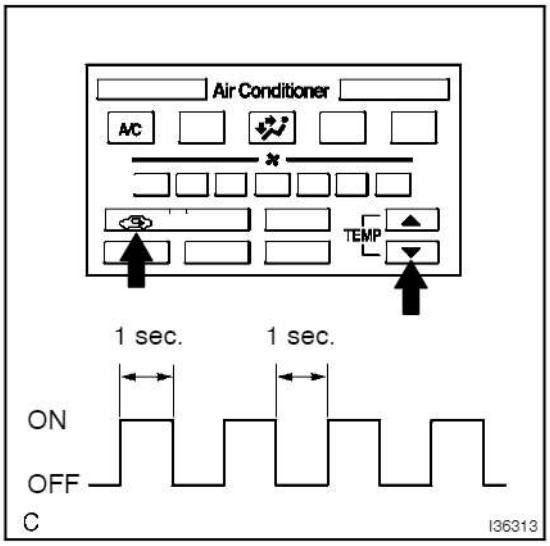
DTC Check	1st Time	☐ Normal System Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal System Code ☐ Malfunction Code (Code)

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ACTUATOR CHECK



1. ACTUATOR CHECK

(a) Start the engine to warm it up.

(b) Perform the indicator check.

(c) Push the R/F (Recirculation/Fresh) switch to perform the actuator check when the sensor check is started after the indicator check.

HINT:

Be sure to perform the actuator check with the power switch on (READY).

(d) As the actuator check (continuous) is repeated from steps 0 to 9 at 1 second intervals, check the temperature and airflow visually and by hand.

(e) If the steps are difficult to read because they change automatically, push the "Fr.DEF" switch to display the steps step by step so that they can be read easily. The items are displayed step by step each time the "Fr.DEF" switch is pushed.

HINT:

- The display blinks at 1 second intervals in the step operation.
- The illustration indicates that code 4 is output. Push the "TEMP–" switch to finish panel diagnosis.

HINT:

Push the "AUTO" switch to enter the sensor check mode.

Step No.	Display code	Conditions				
		Blower level	Air flow vent	Air inlet damper	Air mix damper	A/C compressor revolution speed (rpm)
1	0	0	FACE (–10.0 %)	FRESH (110.0 %)	"COOL" side (–10.0 %)	0
2	1	1	FACE (–10.0 %)	FRESH (110.0 %)	"COOL" side (–10.0 %)	0
3	2	17	FACE (–10.0 %)	FRESH (110.0 %)	"COOL" side (–10.0 %)	7,500
4	3	17	FACE (–10.0 %)	RECIRCULATION (–1.0 %)	"COOL" side (–10.0 %)	7,500
5	4	17	B/L (12 %)	RECIRCULATION (–1.0 %)	"COOL"/ "HOT " (50.0 % opened)	4,500
6	5	17	FOOT (49 %)	RECIRCULATION (–1.0 %)	"COOL"/ "HOT " (65.0 % opened)	4,500
7	6	17	FOOT (49 %)	RECIRCULATION (–1.0 %)	"HOT " side (100.0 %)	4,500
8	7	17	F/D (69 %)	RECIRCULATION (–1.0 %)	"COOL"/ "HOT " (65.0 % opened)	4,500
9	8	17	F/D (95 %)	RECIRCULATION (–1.0 %)	"COOL"/ "HOT " (90.0 % opened)	4,500
10	9	31	DEF (110.0 %)	RECIRCULATION (–1.0 %)	"COOL"/ "HOT " (50.0 % opened)	4,500

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CUSTOMIZE PARAMETERS

HINT:

The followings are the possible items to be customized.

NOTICE:

- **After confirming whether the items of the customer's request are applicable or not for the customized items, perform the customize operation.**
- **Be sure to record the current value before customizing.**
- **In case of performing the troubleshooting, pay attention as there is a possibility that the function is OFF by customizing. (Example: In case of the symptom in which "The wireless operation does not function"is displayed, check that the wireless operation is not OFF by customizing, then perform the troubleshooting.)**

AIR CONDITIONER

DISPLAY(ITEM)	DEFAULT	CONTENTS	SETTING
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To control with the shifted temperature against the display temperature.	+2C / +1C / NORMAL −1C / −2C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF.	MANUAL / AUTO
COMPRS/DEF OPER (Compressor/Air inlet DEF operation)	LINK	Function to turn the A/C ON automatically linking with the FRONT DEF button when the A/C is OFF.	NORMAL / LINK
FOOT/DEF MODE (Foot/DEF auto mode)	ON	Function to turn the air flow from FOOT/DEF to ON automatically when AUTO MODE is ON.	OFF / ON
AUTO BLOW UP (Foot/DEF automatic blow up function)	ON	Function to switch the blower level automatically when the defroster is ON.	OFF / ON
FOOT AIR LEAK (Foot air leak)	ON	Function to cut off the airstream felt underfoot while the vehicle is moving	OFF / ON
AMBINT TMP SFT (Ambient Temperature Shift)	NORMAL	To control with the shifted ambient temperature against the display ambient temperature.	+3C / +2C / +1C NORMAL / −1C / −2C / −3C

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0540Q–03

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.
HINT:
Inspect the "Fuse" and "Relay" before confirming the suspected area as shown in the charts below.
Inspect each malfunction circuit in numerical order for the corresponding symptom.
If the malfunction still exist even after checking and confirming that all the circuit are normal, replace the ECU.

Symptom	Suspect Area	See page
Entire A/C system does not operate	1. IG power source circuit	05–1124
	2. A/C amplifier assy	05–1037
Air Flow Control : No blower operation	1. Blower motor circuit	05–1146
	2. A/C amplifier assy	05–1037
Air Flow Control : No blower control	1. Blower motor circuit	05–1146
	2. A/C amplifier assy	05–1037
Air Flow Control : Insufficient air output	1. Blower motor circuit	05–1146
	2. A/C amplifier assy	05–1037
Temperature Control : No cool air comes out	1. Volume of refrigerant	55–6
	2. Refrigerant pressure	55–6
	3. Pressure switch circuit	05–1069
	4. Air mix damper control servomotor circuit	05–1087
	5. Air mix damper position sensor circuit	05–1072
	6. Room temperature sensor circuit	05–1049
	7. Room humidity sensor circuit	05–1102
	8. Ambient temperature sensor circuit	05–1054
	9. A/C inverter circuit	05–1106 05–1109 05–1112 05–1114 05–1115 05–1117 05–1118 05–1120
	10. A/C amplifier assy	05–1037
	11. Multiplex communication circuit	05–2250
Temperature Control : No warm air comes out	1. Air mix damper control servomotor circuit	05–1087
	2. Air mix damper position sensor circuit	05–1072
	3. Ambient temperature sensor circuit	05–1054
	4. Room temperature sensor circuit	05–1049
	5. Room humidity sensor circuit	05–1049
	6. Evaporator temperature sensor circuit	05–1059
	7. A/C amplifier assy	05–1037
	8. Multiplex communication circuit	05–2250
	9. Heater radiator	–
Temperature Control : Output air is warmer or cooler than set temperature or response is slow	1. Steering wheel pad switch circuit	05–1133
	2. Room temperature sensor circuit	05–1049
	3. Room humidity sensor circuit	05–1049
	4. Ambient temperature sensor circuit	05–1054
	5. Solar sensor circuit	05–1064
	6. Air mix damper control servomotor circuit	05–1087
	7. Air mix damper position sensor circuit	05–1072
	8. A/C amplifier assy	05–1037
	9. Multiplex communication circuit	05–2250

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Temperature Control : No temperature control (only Max. cool or Max. warm)	1. Steering wheel pad switch circuit 2. Air mix damper control servomotor circuit 3. Air mix damper position sensor circuit 4. A/C amplifier assy	05–1133 05–1087 05–1072 05–1037
No air inlet control	1. Air inlet damper control servomotor circuit 2. Air inlet damper position sensor circuit 3. A/C amplifier assy	05–1092 05–1077 05–1037
No air outlet control	1. Air outlet damper control servomotor circuit 2. Air outlet damper position sensor circuit 3. A/C amplifier assy	05–1097 05–1082 05–1037
Engine idle up does not occur, or is continuous	1. A/C inverter circuit 2. A/C amplifier assy 3. Multiplex communication circuit	05–1106 05–1109 05–1112 05–1114 05–1115 05–1117 05–1118 05–1120 05–1037 05–2250
Displayed set temperature value does not match with operation of temperature control switch	1. A/C amplifier assy	05–1037
Brightness does not change when rheostat volume or light control switch is adjusted	1. Illumination light system 2. A/C amplifier assy	– 05–1037
Unable to access the diagnosis mode	1. A/C amplifier assy	05–1037
DTC not recorded. Set mode is cleared when IG switch is turned off	1. Back–up power source circuit 2. A/C amplifier assy	05–1128 05–1037
Unable to control A/C with the steering pad switch	1. Steering pad switch circuit 2. A/C amplifier assy	– 05–1037
Unable to control A/C with the multi–display	1. Multiplex communication circuit 2. Multi–display assy 3. A/C amplifier assy	05–2250 05–1548 05–1037
The heater performance is low (The PTC heater does not function)*1	1. PTC heater circuit 2. Heater water pump circuit 3. A/C amplifier assy 4. Multiplex communication circuit	05–1139 05–1143 05–1037 05–2250

*1: The PTC heater operation may be stopped when an electrical load is large on the entire vehicle.

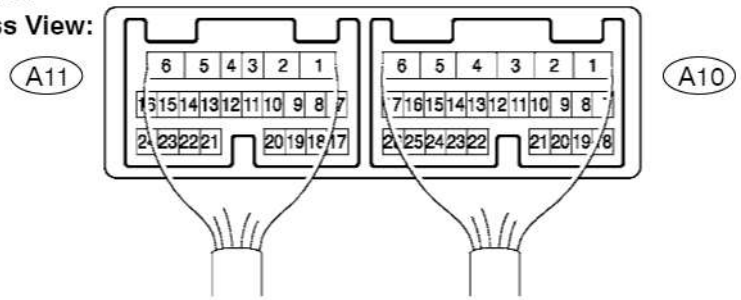
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05CZU-02

TERMINALS OF ECU

1. AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier
Connector Wire Harness View:



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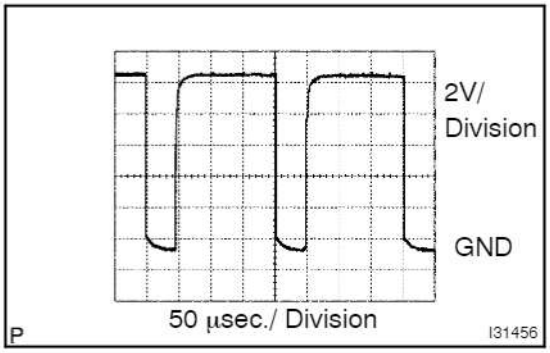
HINT:
Check from the rear of the connector with connected to the air conditioning amplifier.

Symbols (Terminal No.)	Wiring color	Terminal Description	Condition	Specification
AIR (A11–22) – GND (A11–1)	G – W–B	Recirculation/Fresh switch signal	Power switch: ON Recirculation/Fresh switch: FRESH → RECIRC	Below 1.0 → 10 to 14 V
AIF (A11–23) – GND (A11–1)	P – W–B	Recirculation/Fresh switch signal	Power switch: ON Recirculation/Fresh switch: RECIRC → FRESH	Below 1.0 → 10 to 14 V
AOF (A11–16) – GND (A11–1)	B – W–B	Mode switch signal	Power switch: ON Mode switch: DEF → FACE	Below 1.0 → 10 to 14 V
AOD (A11–24) – GND (A11–1)	Y – W–B	Mode switch signal	Power switch: ON Mode switch: FACE → DEF	Below 1.0 → 10 to 14 V
TPI (A10–19) – SGTPI (A10–4)	V – L	Recirculation/Fresh switch signal	Power switch: ON Recirculation/Fresh switch: RECIRC → FRESH	4.0 → 1.0 V
TPM (A10–18) – SGTPM (A10–23)	LG – P	Mode switch signal	Power switch: ON Mode switch: FACE → DEF	4.0 → 1.0 V
TP (A10–20) – SGTP (A10–14)	L – LG	Temperature switch signal	Power switch: ON Temperature switch: Max. COOL→ Max. HOT	4.0 → 1.0 V
SGTE (A10–5) – Body ground	Y – Body ground	Ground for evaporator temperature sensor	Always	Below 1.0 Ω
TE (A10–7) – SGTE (A10–5)	B – Y	Evaporator temperature sensor signal	Power switch: ON Evaporator temperature: 0 °C (32 °F)	2.0 to 2.4 V
TE (A10–7) – SGTE (A10–5)	B – Y	Evaporator temperature sensor signal	Power switch: ON Evaporator temperature: 15 °C (59 °F)	1.4 to 1.8 V
S5TPI (A10–3) – SGTPI (A10–4)	B–L	Power supply for air inlet damper position sensor	Power switch: ON	4.5 to 5.5 V
AMC (A11–19) – GND (A11–1)	B – W–B	Temperature switch	Power switch: ON Temperature switch: Max. HOT→ Max. COOL	Below 1.0 → 10 to 14 V
AMH (A11–17) – GND (A11–1)	R – W–B	Temperature switch	Power switch: ON Temperature switch: Max. COOL→ Max. HOT	Below 1.0 → 10 to 14 V
SGTPI (A10–4) – Body ground	L – Body ground	Ground for air inlet damper position sensor	Always	Below 1.0 Ω
SGTPM (A10–23) – Body ground	P – Body ground	Ground for air outlet damper position sensor	Always	Below 1.0 Ω
SGTP (A10–14) – Body ground	LG – Body ground	Ground for air mix damper position sensor	Always	Below 1.0 Ω

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Symbols (Terminal No.)	Wiring color	Terminal Description	Condition	Specification
S5TPM (A10–11) – SGTPM (A10–23)	O – P	Power supply for air outlet damper position sensor signal	Power switch: ON	4.5 to 5.5 V
S5TP (A10–13) – SGTP (A10–14)	P – LG	Power supply for air mix damper position sensor signal	Power switch: ON	4.5 to 5.5 V
IG (A11–5) – GND (A11–1)	B – W–B	Power switch signal	Power switch: LOCK or ACC → ON	0 → 10 to 14 V
+B (A11–6) – GND (A11–1)	Y – W–B	Back–up power source	Always	10 to 14 V
MPX+ (A11–3) – GND (A11–1)	B – W–B	Terminal for BEAN	Engine idling after engine warmed up	Pulse generation
MPX2+ (A11–11) – GND (A11–1)	GR – W–B	Terminal for BEAN	Engine idling after engine warmed up	Pulse generation
GND (A11–1) – Body ground	W–B – Body ground	Ground for main power supply	Always	Below 1.0 Ω
BLW (A11–2) – GND (A11–1)	W – W–B	Blower switch signal	Power switch: ON Blower switch: ON	Pulse generation (see waveform 1)
S5TS (A10–12) – GND (A11–1)	GR – W–B	Solar sensor	Power switch: ON Solar sensor covered with a cloth → Solar sensor exposed to electric light	Below 0.8 → 0.8 to 4.3 V
HR (A11–7) – GND (A11–1)	B – W–B	Blower switch signal	Power switch: ON Blower switch: OFF → ON	10 to 14 → Below 1.0 V
TR (A10–8) – SGTR (A10–22)	B – W	Room temperature sensor signal	Power switch: ON Cabin temperature: 25 → 40 °C (77 → 104 °F)	1.8 to 2.2 → 1.2 to 1.6 V
SGTR (A10–22) – Body ground	W – Body ground	Ground for room temperature sensor	Always	Below 1.0 Ω
ST1 (A10–2) – SGST (A10–15)	BR–G	Steering pad switch signal	Power switch: ON Steering pad switch: Fr.DEF → Rr.DEF → Recirculation → OFF	Below 0.3 → 0.8 to 1.5 → 2.0 to 2.9 → above 4.6 V
ST2 (A10–1) – SGST (A10–15)	LG–G	Steering pad switch signal	Power switch: ON Steering pad switch: AUTO → TEMP+ → TEMP– → OFF	Below 0.3 → 0.8 to 1.5 → 2.0 to 2.9 → above 4.6 V
SGST (A10–15) – Body ground	G – Body ground	Ground for steering pad switch	Always	Below 1.0 V
PSW (A10–6) – GND (A11–1)	R – W–B	Pressure switch signal	Power switch: ON Refrigerant pressure: Normal → More than 1,520 kPa (15.5 kgf/cm 2,220 psi)	Below 1.0 → 10 to 14 V
RH (A10–9) – GND (A11–1)	R – W–B	Humidity sensor signal	Power switch: ON Room humidity: 40 → 60 %	2.0 → 2.5 V
S5RM (A10–10) – GND (A11–1)	G – W–B	Power supply for humidity sensor	Power switch: ON	4.5 to 5.5 V
HTR0 (A10–17) – GND (A11–1)	BR – W–B	PTC heater signal	Power switch: ON Temperature switch: Max. HOT Coolant temperature: Below 55°C Blower switch: LO → OFF	Below 1.0 → 10 to 14 V
HTR2 (A10–25) – GND (A11–1)	P – W–B	PTC heater signal	Power switch: ON Temperature switch: Max. HOT Coolant temperature: Below 55°C Blower switch: LO → OFF	Below 1.0 → 10 to 14 V
IDH (A11–18) – GND (A11–1)	V – W–B	DC/DC converter signal	Power switch: ON (Voltage normal → over voltage)	10 to 14 → Below 1.0 V

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waveform 1:

Measure the waveform between terminal BLW (A11–2) of A/C amplifier and body ground.

OK:

Waveform operate as shown in the illustration.

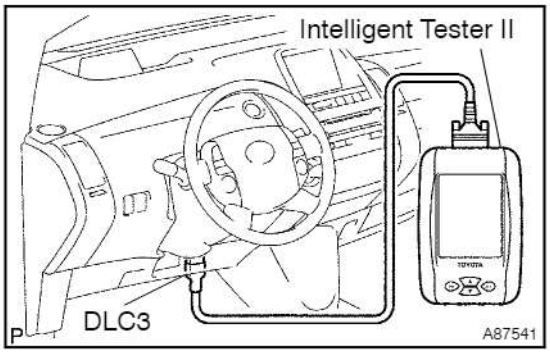
HINT:

- The correct waveform is shown in the illustration.
- Waveform cycle varies with the blower level.

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05IJS–01

DTC CHECK/CLEAR



1. DTC CHECK USING INTELLIGENT TESTER II

(a) Hook up the intelligent tester II to the DLC3.

(b) Power switch ON (ready).

(c) Read the DTC following the prompts on the tester screen. Please refer to the intelligent tester II operator's manual for further details.

(d) Clear the DTCs.

HINT:

After repairing the malfunctions, clear the DTC.

(1) Connect the intelligent tester II to DLC3.

(2) Turn the ignition switch to the ON position.

(3) Erase the DTCs following the prompts on the tester screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

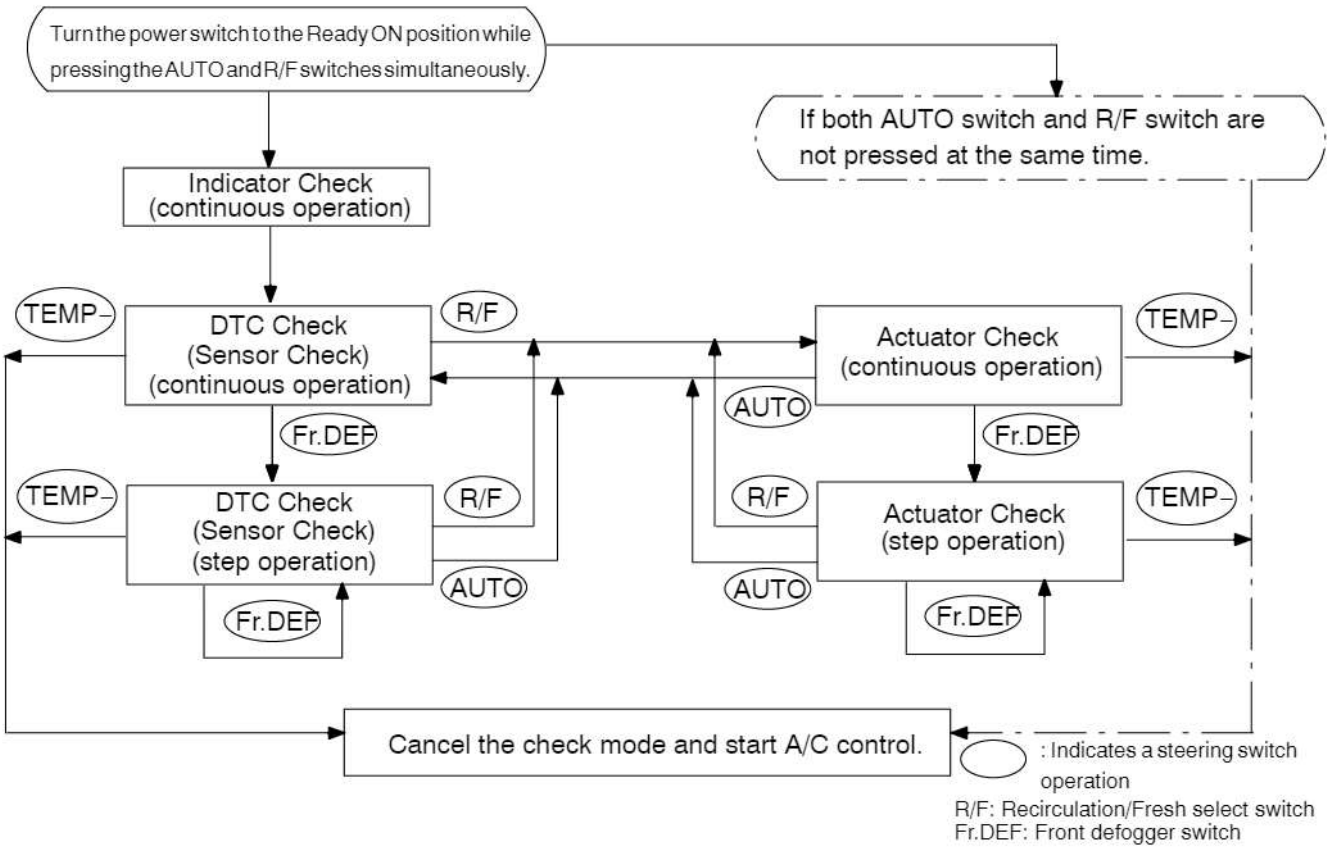
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05ILR–01

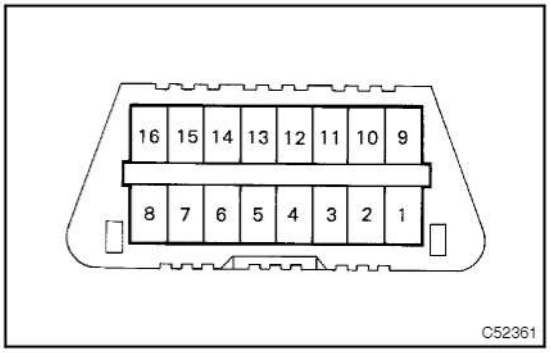
CHECK MODE PROCEDURE

1. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnostic check mode.



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2. CHECK THE DLC3

(a) Check the DLC3:

The air conditioning amplifier uses CAN and ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–3 and matches the ISO 9141–2/ISO 14230 format.

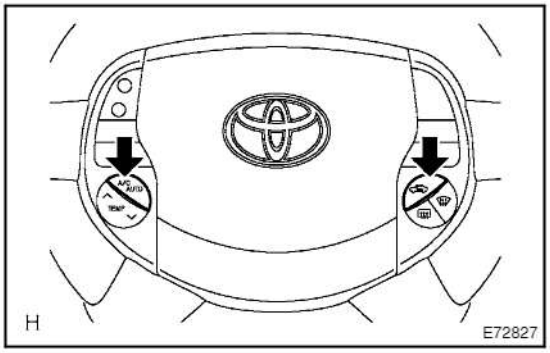
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Power switch off	54 to 67 Ω
CANH (6) – Battery positive	HIGH–level CAN bus line	Power switch off	1 MΩ or higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Power switch off	3 KΩ or higher
CANL (14) – Battery positive	LOW–level CAN bus line	Power switch off	1 MΩ or higher
CANL (14) – CG (4)	LOW–level CAN bus line	Power switch off	3 KΩ or higher

HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" after connecting the hand–held tester cable to the DLC3 and turning the ignition switch to the ON position, there is a problem either with the vehicle or the tester.

- If communication is normal when connecting the tester to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when connecting the tester to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's operator's manual.

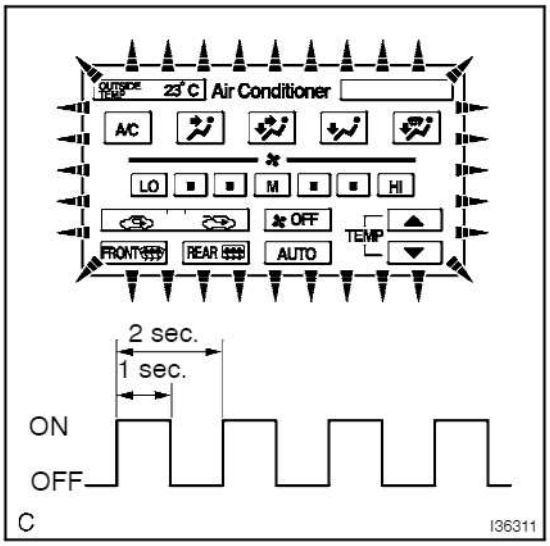
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3. INDICATOR CHECK

(a) Turn the power switch off.

(b) While pressing both the AUTO and R/F (Recirculation/ Fresh) switches on the steering switch, turn the power switch on (READY) from off.



(c) The indicator check is automatically performed when activating panel diagnosis. Check that all indicators and setting displays come on and go off 4 times at 1 second intervals.

Check that the buzzer sounds when the indicators come on.

HINT:

The sensor check is automatically started when the indicator check is completed.

(d) Push the "TEMP DOWN" switch to finish panel diagnosis.

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05ILU–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

From the DATA LIST displayed on the intelligent tester II, you can read the value of the display, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch to the ON position.

(c) From the display on the tester, select the "DATA LIST".

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Room temperature sensor (Room Temp)	Room temperature sensor / min.: –6.5°C (20.3°F) max.: 57.25°C (135.05°F)	Actual room temperature is displayed	Open in the circuit: –6.5°C (20.3°F) Short in the circuit: 57.25°C (135.05°F)
Ambient temperature sensor (Ambi Temp Sens)	Ambient temperature sensor / min.: –23.3°C (–9.94°F) max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in the circuit: –23.3°C (–9.94°F) Short: in the circuit: 65.95°C (150.71°F)
Evaporator temperature sensor (Evap Temp)	Evaporator temperature sensor / min.: –29.7°C (–21.46°F) max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in the circuit: –29.7°C (–21.46°F) Short in the circuit: 59.55°C (139.19°F)
Solar sensor (D side) Solar Sens–D	Solar sensor (Driver side) / min.: 0 max.: 255	Increases as brightness increases	Open in the circuit: 0 Short in the circuit: 255
Engine coolant temperature (Coolant Temp)	Engine coolant temperature / min.: 1.3°C (34.34°F) max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed while the engine is warmed up	–
Set temperature (D side) (Set Temp–D)	Set temperature (Driver side) / min.: 0 max.: 255	The same contents as a setting temperature display part are displayed	–
Estimated temperature (D side) (Estimate Temp–D)	Estimated temperature (Driver side) / min.: –358.4°C (–613.12°F) max.: 358.4°C (677.12°F)	Damper is at "MAX. COOL": –358.4°C (–613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	–
Air mix damper position (D side) (A/M Damp Pos–D)	Air mix damper position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	–
Air outlet damper position (A/O Damp Pos)	Air outlet damper position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
Air inlet damper position (A/I Damp Pos)	Air inlet damper position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "FRESH": 110.0% Damper is at "HALF–RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

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Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Air mix damper target position (D side) (A/M Damp Targ–D)	Air mix damper target position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	–
Air outlet damper target position (A/O Damp Targ)	Air outlet damper target position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
Air inlet damper target position (A/I Damp Targ)	Air inlet damper target position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "FRESH": 110.0% Damper is at "HALF–RECIR-CULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
Hand free telephone (Hand Free Tel)	Hands free telephone / OFF, ON	–	–
Blower motor speed level (Blower Level)	Blower motor speed level / min.: Level 0 max.: 31	Increases in the range between 0 and 31 as the speed increases.	–
Adjust ambient temperature (Ambi Temp)	Adjusted ambient temperature / min.: –30.8°C (–23.44°F) max.: 50.8°C (123.44°F)	–	–
Shift set temperature (Set Temp Shift)	Shift set temperature /+2C, +1C, NORMAL, –1C, –2C	Customized value will be dis-played	–
Air inlet mode (Air Inlet Mode)	Air inlet mode / AUTO, MANUAL	Customized value will be dis-played	–
Compressor mode (Compressor Mode)	Compressor mode / AUTO, MANUAL	Customized value will be dis-played	–
Compressor/DEF operation mode (Comprs/Def Oper)	Compressor / DEF operation mode / LINK, NORMAL	Customized value will be dis-played	–
Foot air leak (Foot Air Leak)	Foot air leak / ON, OFF	Customized value will be dis-played	–
Foot/DEF automatic blow up function (Auto Blow Up)	Foot / DEF automatic blow up function / ON, OFF	Customized value will be dis-played	–
Foot/DEF auto mode (Foot/Def Mode)	Foot / DEF auto mode / ON, OFF	Customized value will be dis-played	–
Ambient temperature shift (Ambient Tmp Sft)	Ambient temperature shift / +3C, +2C, +1C, NORMAL, –1C, 2C, 3C	Customized value will be dis-played	–
Destination (Destination)	Destination/ DOMEST, USA, EU-ROPE, AUSTRAL, MIDEAST, NO INFO	Changes with destinations	–
Destination (Destination)	Destination/ DOMEST, USA, EU-ROPE, AUSTRAL, MIDEAST, NO INFO	Changes with destinations	–
Humidity sensor (Humidity Sens)	Humidity sensor / min.: 0% max.: 100%	Actual room humidity is displayed	–
Compressor speed (Comprs Spd)	Compressor speed / min.: 0 rpm max.: 65,535 rpm	Displays actual rotation speed in the range between 0 rpm and 7,500 rpm	–

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Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Compressor target speed (Comprs Targ Spd)	Compressor target speed / min.: 0 rpm max.: 65,535 rpm	Displays target rotation speed in the range between 0 rpm and 7,500 rpm	–
Number of Trouble Codes (#Codes)	Number of trouble codes / min.: 0 max.: 255	Number of DTCs will be displayed	–

HINT:

*1: Australia models

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester II allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST on the intelligent tester II during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch to the ON position.

(c) From the display on tester, perform the "ACTIVE TEST".

ACTIVE TEST / AIR CONDITIONER:

Item	Test Details / Display (Range)	Diagnostic Note
Blower Motor (Blower Motor)	Blower motor / min.: 0 max.: 31	–
Air Mix Damper (D side) (Air Mix Damp–D)	Air mix damper (Driver side) / min.: –14% max.: 113.5%	–
Air Outlet Damper Position (A/O Mode Damp–D)	Air outlet damper position (Driver side) / min.: –14% max.: 113.5%	–
Air Inlet Damper Position (Linear) (A/I Damp–Linear)	Air inlet damper position (linear) / min.: –14% max.: 113.5%	–
Compressor Target Speed (Comprs Targ Spd)	Compressor target speed / min.: 0 max.: 255	–
Defogger Relay (Rear) (Defogger Rly–R)	Defogger relay (Rear) / OFF, ON	–
Water Pump (Water Pump Rly)	Water pump / OFF, ON	–
Electric Fan (Electrical Fan)	Electrical fan / OFF, ON	–
Defogger Relay (Rear) (Defogger Rly–R)	Defogger relay (Rear) / OFF, ON	–
Water Pump (Water Pump Rly)	Water pump / OFF, ON	–
Electric Fan (Electrical Fan)	Electrical fan / OFF, ON	–

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0540O–03

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTCs check (sensor check), check the circuit listed for the code in the table below (proceed to the page given for that circuit).

DTC No. (See Page)	Detection Item	Trouble Area	Memory*4
00	Normal	–	–
B1411/11*1 (05–1049)	Open or short in room temperature sensor circuit	• A/C room temperature sensor • Harness or connector between cooler A/C room temperature sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B1412/12*2 (05–1054)	Open or short in ambient temperature sensor circuit	• A/C ambient temperature sensor • Harness or connector between A/C ambient temperature sensor and ECM • ECM • Multiplex communication circuit • A/C amplifier	○ (8.5 min. or more)
B1413/13 (05–1059)	Open or short in evaporator temperature sensor circuit.	• A/C evaporator temperature sensor (A/C thermistor) • Harness or connector between A/C evaporator temperature sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B1421/21*3 (05–1064)	Open or short in solar sensor circuit. (If the check is performed in a dark place, DTC B1424/24 may be displayed.)	• A/C solar sensor • Harness or connector between A/C solar sensor and A/C amplifier or body ECU • A/C amplifier	○ (8.5 min. or more)
B1423/23 (05–1069)	• 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 body ground • Multiplex communication circuit • Refrigerant pipe line • A/C amplifier	–
B1431/31 (05–1072)	Open or short in power source circuit in air mix damper position sensor circuit.	• Air mix control servomotor (air mix damper position sensor) • Harness or connector between Air mix control servomotor and A/C amplifier • A/C amplifier	○ (1 min. or more)
B1432/32 (05–1077)	Open or short in power source circuit in air inlet damper position sensor circuit.	• Air inlet control servomotor (air inlet damper position sensor) • Harness or connector between air inlet control servomotor and A/C amplifier • A/C amplifier	○ (1 min. or more)
B1433/33 (05–1082)	Open or short in power source circuit in air outlet damper position sensor circuit.	• Air outlet control servomotor (air outlet damper position sensor) • Harness or connector between air outlet control servomotor and A/C amplifier • A/C amplifier	○ (1 min. or more)
B1441/41 (05–1087)	Air mix damper position sensor value does not change even if air conditioner amplifier assy operates air mix servomotor.	• Air mix control servomotor • Harness or connector between air mix control servomotor and A/C amplifier • A/C amplifier	○ (15 sec.)
B1442/42 (05–1092)	Air inlet damper position sensor value does not change even if A/C control assembly operated air inlet damper control servo motor.	• Air inlet control servomotor • Harness or connector between air inlet control servomotor and A/C amplifier • A/C amplifier	○ (15 sec.)
B1443/43 (05–1097)	Air outlet damper position sensor valve does not change even if air conditioner amplifier operated air outlet damper control servo motor.	• Air outlet control servomotor • Harness or connector between air outlet control servomotor and A/C amplifier • A/C amplifier	○ (15 sec.)

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B1462/62 (05–1102)	Open or short in room humidity sensor circuit	• A/C room humidity sensor (A/C room temperature sensor) • Harness or connector between A/C room humidity sensor (A/C room temperature sensor) and A/C amplifier • A/C amplifier	–
B1471/71 (05–1106)	Open or short in A/C inverter high voltage power resource system	• Hybrid control ECU • A/C inverter (w/converter inverter assy)	–
B1472/72 (05–1109)	Open or short in A/C inverter high voltage output system	• Hybrid control ECU • Electric inverter compressor (w/motor compressor assy) • A/C inverter (w/converter inverter assy)	–
B1473/73 (05–1112)	Open or short in A/C inverter start–up signal system	• Harness or connector between hybrid control ECU and A/C inverter (w/converter inverter assy) • A/C inverter (w/converter inverter assy) • Hybrid control ECU	–
B1474/74	A/C inverter (w/converter inverter assy) malfunction	• A/C inverter (w/converter inverter assy)	–
B1475/75 (05–1114)	Cooling water temperature in the inverter is outside the specified range (temperature is too high), or there is an open or short to ground in the temperature sensor circuit.	• A/C inverter (w/converter inverter assy)	–
B1476/76 (05–1115)	Motor's rotation load while the compressor is operating is too great or too small.	• Volume of refrigerant • Electric inverter compressor (w/motor compressor assy) • Cooling fan circuit	–
B1477/77 (05–1117)	An open or short to ground in the inverter's controlling power voltage circuit.	• A/C inverter (w/converter inverter assy)	–
B1498/98 (05–1118)	Communication line error or open between the hybrid control ECU and the A/C inverter (w/converter inverter assy)	• Harness or connector between hybrid control ECU and A/C inverter (w/converter inverter assy) • Hybrid control ECU • A/C inverter (w/converter inverter assy)	–
B1499/99 (05–2250)	Multiplex communication circuit	• Open in multiplex communication circuit	–
P3009–611 (05–1120)	High voltage system insulation malfunction.	• Electric inverter compressor (w/motor compressor assy) • A/C inverter (w/converter inverter assy) • Compressor oil	–

HINT:

- *1: If the room temperature is approx. –18.6°C (–3.7°F) or lower, DTC B1411/11 may be output even though the system is normal.
- *2: If the ambient temperature 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 performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) could be displayed.
- *4: The A/C amplifier memorizes the DTC of the respective malfunction that has occurred for a period of the time indicated in the brackets.

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DTC B1411 ROOM TEMPERATURE SENSOR CIRCUIT

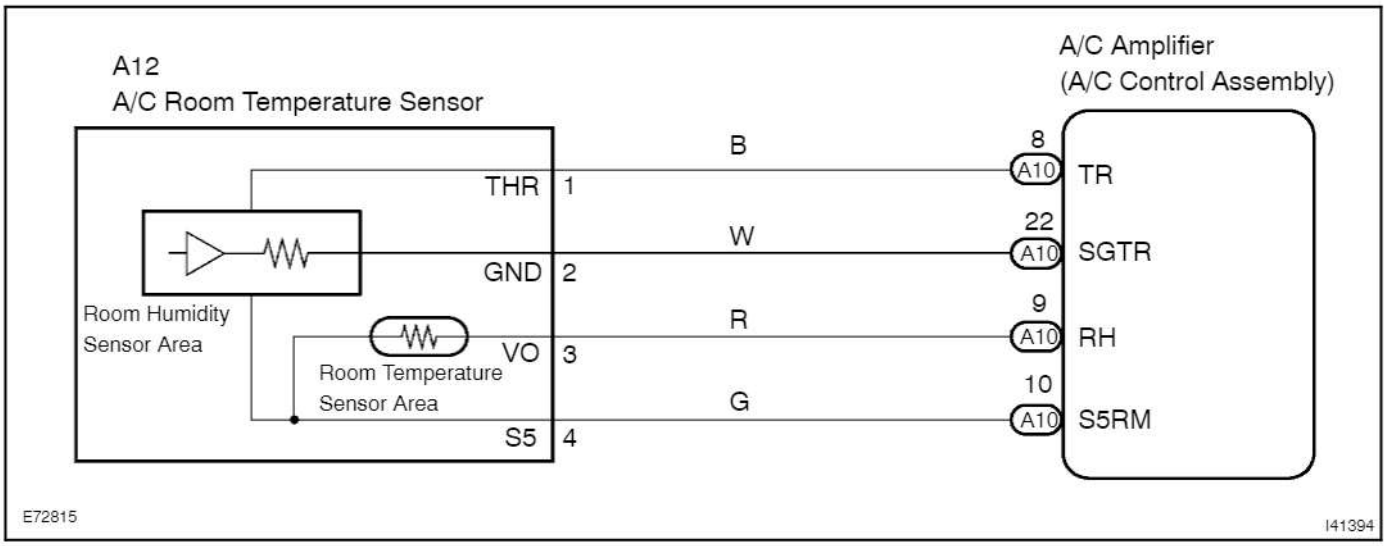
CIRCUIT DESCRIPTION

The A/C room temperature sensor is installed in the instrument panel to detect the room temperature and control the heater and air conditioner "AUTO" function. The resistance of the A/C room temperature sensor changes in accordance with the room temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier applies voltage (5V) to the A/C room temperature sensor and reads voltage changes as the resistance of the A/C room temperature sensor changes. This sensor also sends appropriate signals to the A/C amplifier. The room temperature sensor is integrated with the room humidity sensor.

DTC No.	Detection item	Trouble Area
B1411	Open or short in room temperature sensor circuit	• A/C room temperature sensor • Harness or connector between cooler A/C room temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Room temperature sensor (Room Temp)	Room temperature sensor / min.: −6.5°C (20.3°F) max.: 57.25°C (135.05°F)	Actual room temperature is displayed	Open in the circuit: −6.5°C (20.3°F) Short in the circuit: 57.25°C (135.05°F)

OK:

The display is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

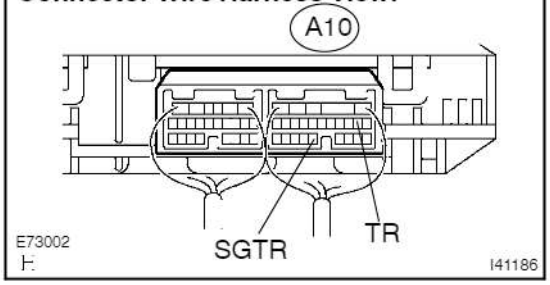
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(TR – SG–5)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–8 (TR) – A10–22 (SGTR)	Power switch ON (ON) at 25 °C (77 °F)	1.8 to 2.2 V
A10–8 (TR) – A10–22 (SGTR)	Power switch ON (ON) at 40 °C (104 °F)	1.2 to 1.6 V

HINT:

As the temperature increases, the voltage decreases.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

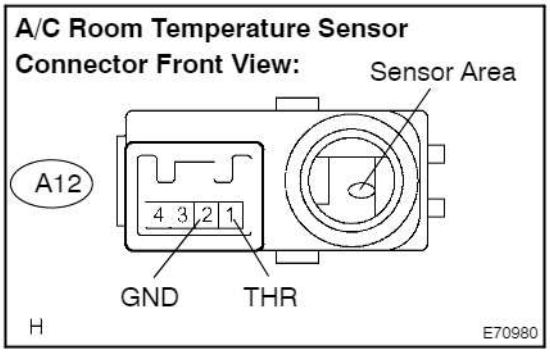
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

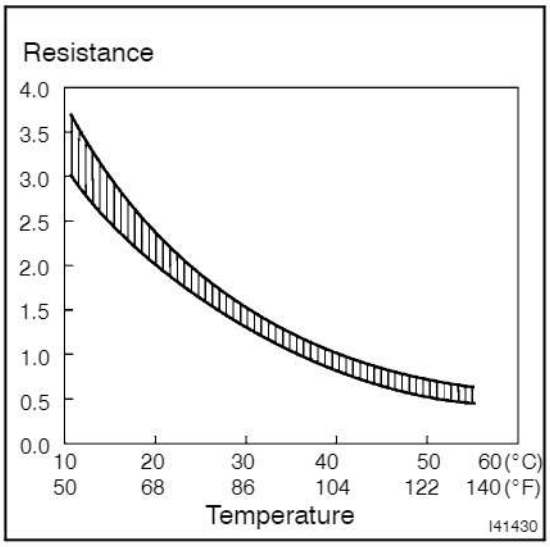
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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3 INSPECT A/C ROOM TEMPERATURE SENSOR





(a) Remove the A/C room temperature sensor.
(b) Disconnect the connector from A/C room temperature sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A12–1 (THR) – A12–2 (GND)	10°C (50°F)	3.00 to 3.73 kΩ
A12–1 (THR) – A12–2 (GND)	15°C (59°F)	2.45 to 2.88 kΩ
A12–1 (THR) – A12–2 (GND)	20°C (68°F)	1.95 to 2.30 kΩ
A12–1 (THR) – A12–2 (GND)	25°C (77°F)	1.60 to 1.80 kΩ
A12–1 (THR) – A12–2 (GND)	30°C (86°F)	1.28 to 1.47 kΩ
A12–1 (THR) – A12–2 (GND)	35°C (95°F)	1.00 to 1.22 kΩ
A12–1 (THR) – A12–2 (GND)	40°C (104°F)	0.80 to 1.00 kΩ
A12–1 (THR) – A12–2 (GND)	45°C (113°F)	0.65 to 0.85 kΩ
A12–1 (THR) – A12–2 (GND)	50°C (122°F)	0.50 to 0.70 kΩ
A12–1 (THR) – A12–2 (GND)	55°C (131°F)	0.44 to 0.60 kΩ
A12–1 (THR) – A12–2 (GND)	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph below).

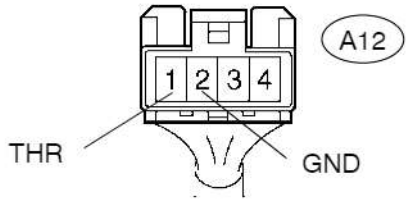
NG → **REPLACE A/C ROOM TEMPERATURE SENSOR**

OK

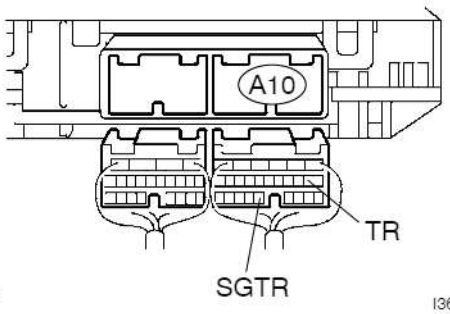
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4	CHECK HARNESS AND CONNECTOR(A/C ROOM TEMPERATURE SENSOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

A/C Room Temperature Connector Sensor Front View:



Air Conditioning Amplifier Wire Harness View:



(a) Disconnect the connector from A/C room temperature sensor and A/C amplifier.

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

Standard:

Tester connection	Condition	Specified condition
A10–8 (TR) – A12–1 (THR)	Always	Below 1 Ω
A10–22 (SGTR) – A12–2 (GND)	Always	Below 1 Ω
A10–8 (TR) – Body ground	Always	10 kΩ or higher
A10–22 (SGTR) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC B1412 AMBIENT TEMPERATURE SENSOR CIRCUIT

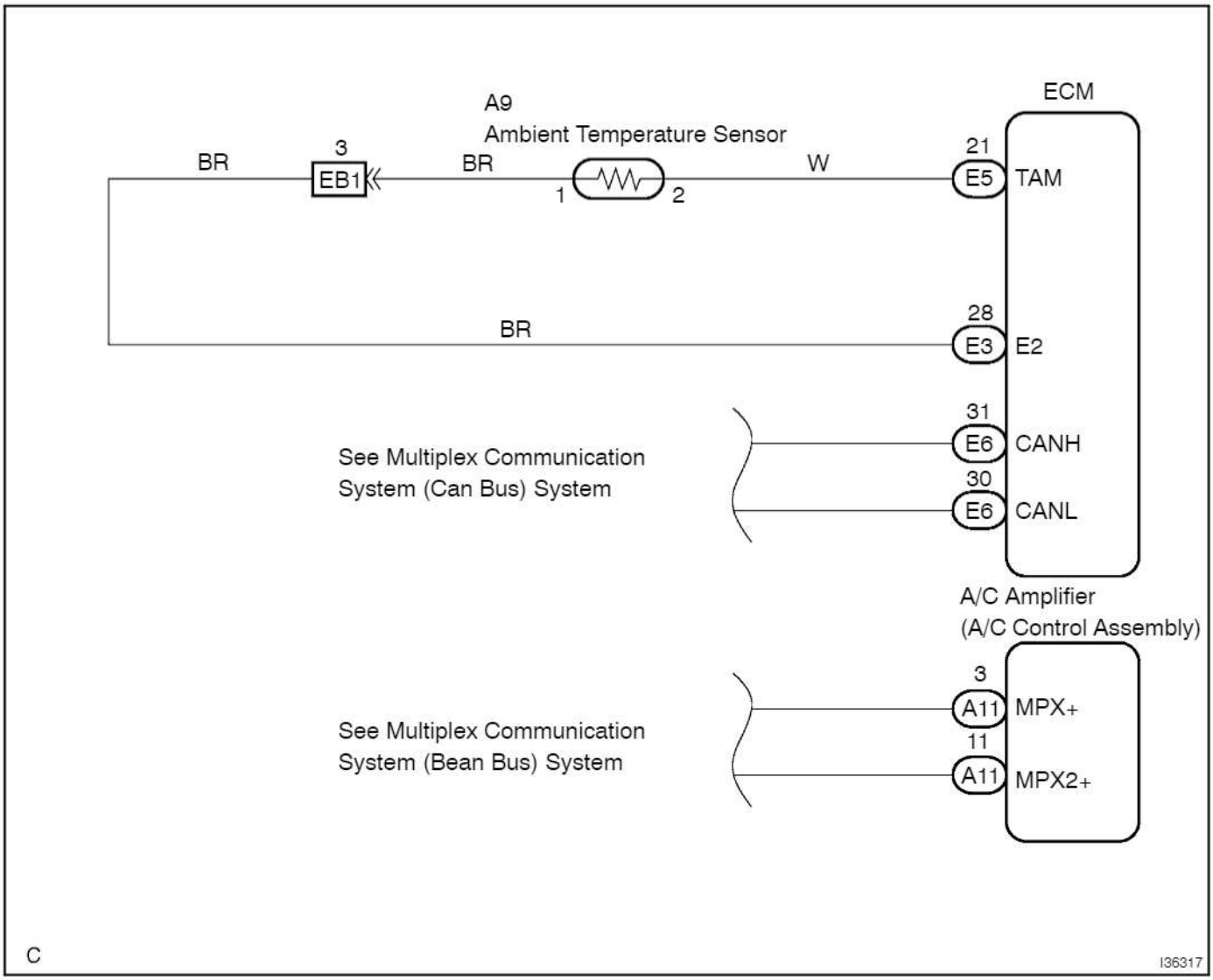
CIRCUIT DESCRIPTION

The A/C ambient temperature sensor is installed in the front part of the condenser to detect the ambient temperature and control the heater and air conditioner "AUTO" function. The sensor connected to the ECM detects fluctuation in the ambient temperature that is used for controlling the room temperature. The sensor sends a signal to the A/C amplifier via the ECM. The resistance of the A/C ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The ECM applies voltage (5V) to the A/C ambient temperature sensor and reads voltage changes as the resistance of the A/C ambient temperature sensor changes. The ECM sends the read signal to the A/C amplifier via CAN and body multiplex communications.

DTC No.	Detection item	Trouble Area
B1412	Open or short in ambient temperature sensor circuit	• A/C ambient temperature sensor • Harness or connector between A/C ambient temperature sensor and ECM • ECM • Multiplex communication circuit • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Ambient temperature sensor (Ambi Temp Sens)	Ambient temperature sensor / min.: –23.3°C (–9.94°F) max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in the circuit: –23.3°C (–9.94°F) Short: in the circuit: 65.95°C (150.71°F)

OK:

The display is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

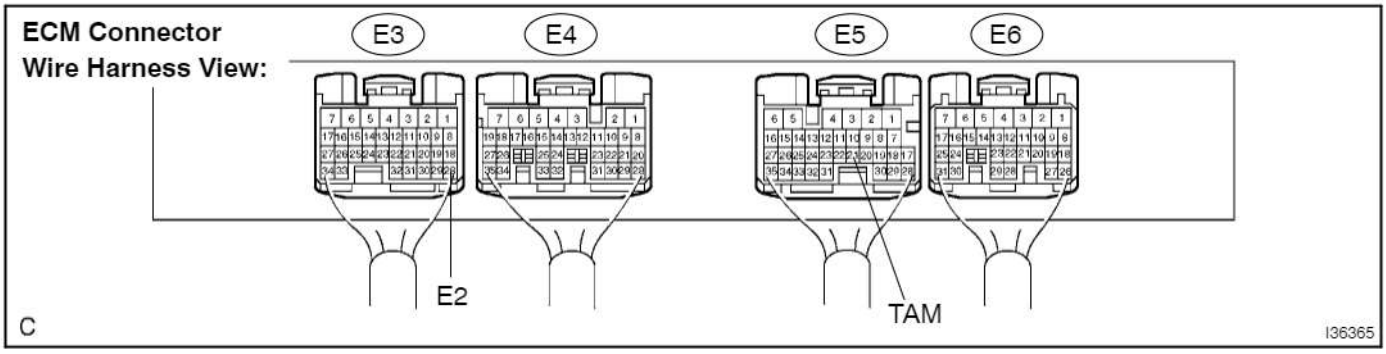
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2	INSPECT ECM(TAM – E2)



(a) Remove the ECM with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
E5–21 (TAM) – E3–28 (E2)	Power switch ON (ON) at 25 °C (77 °F)	1.8 to 2.2 V
E5–21 (TAM) – E3–28 (E2)	Power switch ON (ON) at 40 °C (104 °F)	1.2 to 1.6 V

HINT:

As the temperature increases, the voltage decreases.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

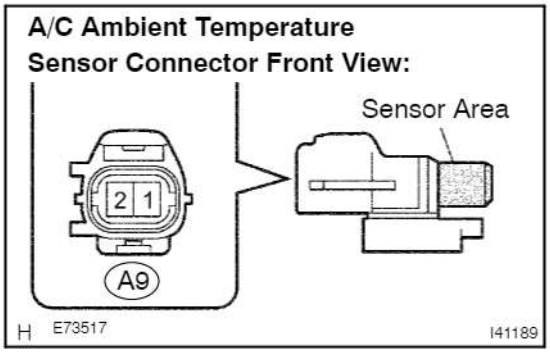
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)**

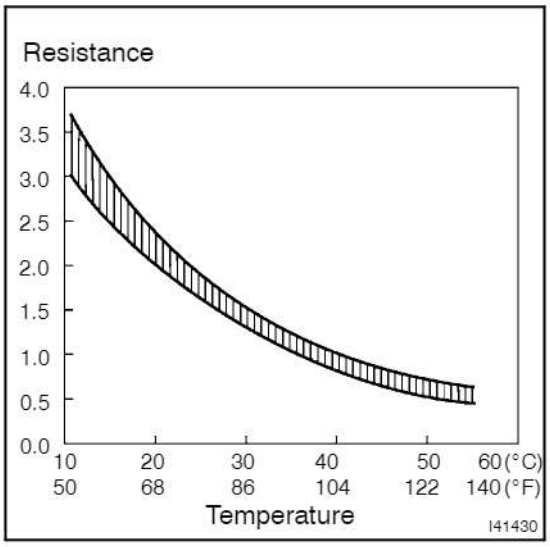
C → **REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)**

A

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3 INSPECT A/C AMBIENT TEMPERATURE SENSOR





(a) Remove the A/C ambient temperature sensor.
(b) Disconnect the connector from A/C ambient temperature sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A9–1 – A9–2	10°C (50°F)	3.00 to 3.73 kΩ
A9–1 – A9–2	15°C (59°F)	2.45 to 2.88 kΩ
A9–1 – A9–2	20°C (68°F)	1.95 to 2.30 kΩ
A9–1 – A9–2	25°C (77°F)	1.60 to 1.80 kΩ
A9–1 – A9–2	30°C (86°F)	1.28 to 1.47 kΩ
A9–1 – A9–2	35°C (95°F)	1.00 to 1.22 kΩ
A9–1 – A9–2	40°C (104°F)	0.80 to 1.00 kΩ
A9–1 – A9–2	45°C (113°F)	0.65 to 0.85 kΩ
A9–1 – A9–2	50°C (122°F)	0.50 to 0.70 kΩ
A9–1 – A9–2	55°C (131°F)	0.44 to 0.60 kΩ
A9–1 – A9–2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph below)

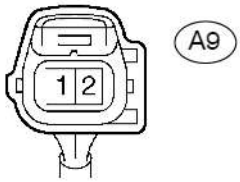
NG → **REPLACE A/C AMBIENT TEMPERATURE SENSOR**

OK

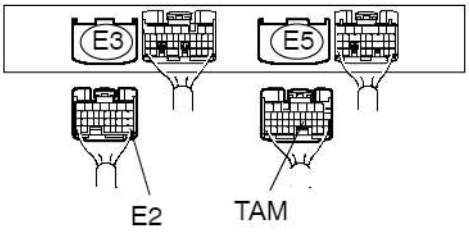
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4	CHECK HARNESS AND CONNECTOR(A/C AMBIENT TEMPERATURE SENSOR – ECM) (SEE PAGE 01–46)

A/C Ambient Temperature Sensor Connector Front View:



ECM Connector Wire Harness View:



(a) Disconnect the connector from A/C ambient temperature sensor.

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

Standard:

Tester connection	Condition	Specified condition
E5–21 (TAM) – A9–2	Always	Below 1 Ω
E3–28 (E2) – A9–1	Always	Below 1 Ω
E5–21 (TAM) – Body ground	Always	10 kΩ or higher
E3–28 (E2) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1413	EVAPORATOR TEMPERATURE SENSOR CIRCUIT

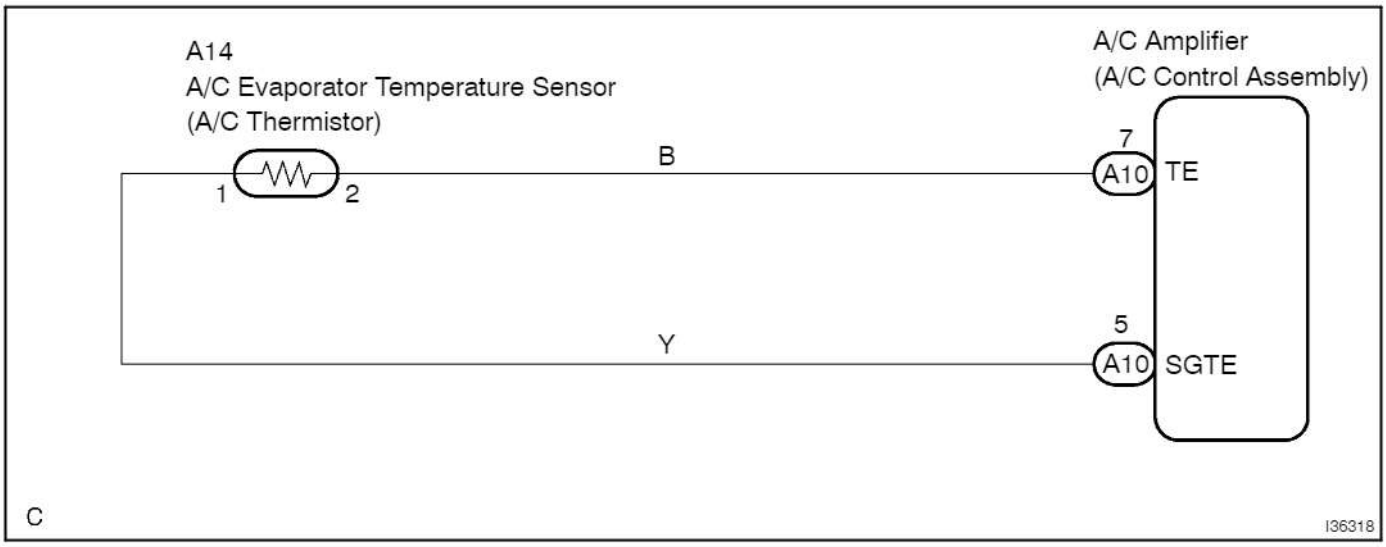
CIRCUIT DESCRIPTION

The A/C evaporator temperature sensor (A/C thermistor) is installed on the evaporator in the air conditioner unit to detect the cooled air temperature that has passed through the evaporator and control the air conditioning . It sends appropriate signals to the A/C amplifier. The resistance of the A/C evaporator temperature sensor (A/C thermistor) changes in accordance with the cooled air temperature that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier assy applies voltage (5V) to the A/C evaporator temperature sensor (A/C thermistor) and reads voltage changes as the resistance of the A/C evaporator temperature sensor (A/C thermistor) changes. This sensor is used for frost prevention.

DTC No.	Detection Item	Trouble Area
B1413	Open or short in evaporator temperature sensor circuit.	• A/C evaporator temperature sensor (A/C thermistor) • Harness or connector between A/C evaporator temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Evaporator temperature sensor (Evap Temp)	Evaporator temperature sensor / min.: –29.7°C (–21.46°F) max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in the circuit: –29.7°C (–21.46°F) Short in the circuit: 59.55°C (139.19°F)

OK:

The display is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

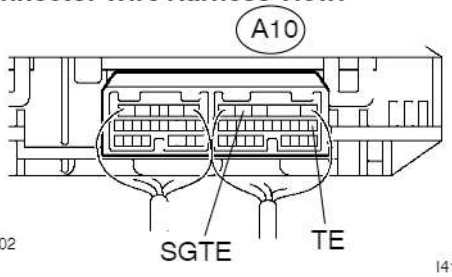
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(TE – SG)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–7 (TE) – A10–5 (SGTE)	Power switch ON (ON) at 0 °C (32 °F)	2.0 to 2.4 V
A10–7 (TE) – A10–5 (SGTE)	Power switch ON (ON) at 15 °C (59 °F)	1.4 to 1.8 V

HINT:

As the temperature increases, the voltage decreases.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

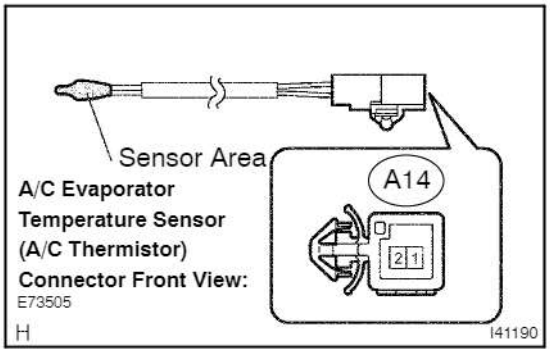
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)**

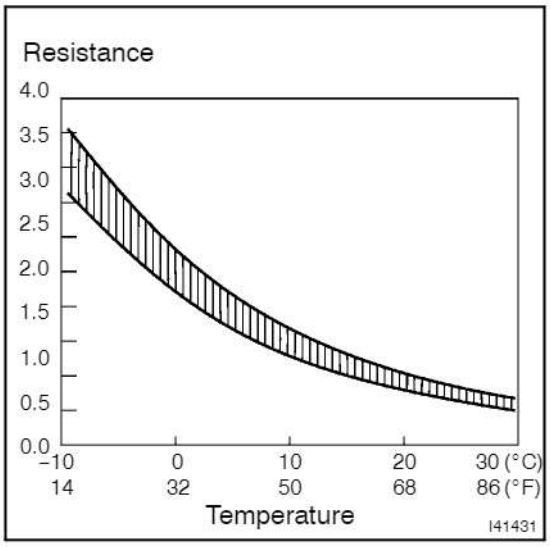
C → **REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)**

A

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3 INSPECT A/C EVAPORATOR TEMPERATURE SENSOR(A/C THERMISTOR)





(a) Remove the A/C evaporator temperature sensor (A/C thermistor).

(b) Disconnect the connector from A/C evaporator temperature sensor (A/C thermistor).

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

Standard:

Tester connection	Condition	Specified condition
A14–1 – A14–2	–10°C (14°F)	7.30 to 9.10 kΩ
A14–1 – A14–2	–5°C (23°F)	5.65 to 6.95 kΩ
A14–1 – A14–2	0°C (32°F)	4.40 to 5.35 kΩ
A14–1 – A14–2	5°C (41°F)	3.40 to 4.15 kΩ
A14–1 – A14–2	10°C (50°F)	2.70 to 3.25 kΩ
A14–1 – A14–2	15°C (59°F)	2.14 to 2.58 kΩ
A14–1 – A14–2	20°C (68°F)	1.71 to 2.05 kΩ
A14–1 – A14–2	25°C (77°F)	1.38 to 1.64 kΩ
A14–1 – A14–2	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decrease (see the graph below).

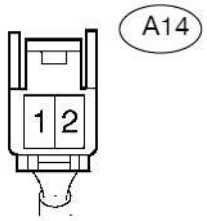
NG → **REPLACE A/C EVAPORATOR TEMPERATURE SENSOR(A/C THERMISTOR)**

OK

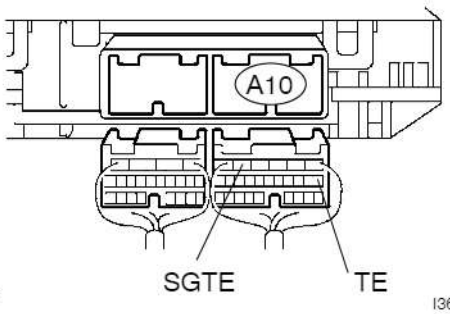
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4	CHECK HARNESS AND CONNECTOR(A/C EVAPORATOR TEMPERATURE SENSOR(A/C THERMISTOR) – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

A/C Evaporator Temperature Sensor (A/C Thermistor) Front View:



Air Conditioning Amplifier Wire Harness View:



(a) Disconnect the connector from A/C evaporator temperature sensor (A/C thermistor) and A/C amplifier.

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

Standard:

Tester connection	Condition	Specified condition
A10–7 (TE) – A14–2	Always	Below 1 Ω
A10–5 (SGTE) – A14–1	Always	Below 1 Ω
A10–7 (TE) – Body ground	Always	10 kΩ or higher
A10–5 (SGTE) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

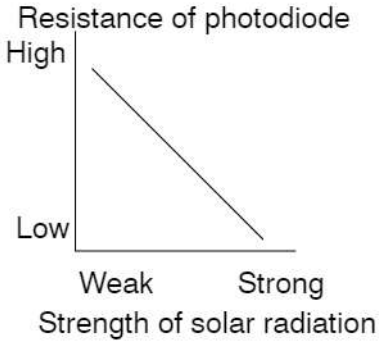
OK →

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1421	SOLAR SENSOR CIRCUIT (PASSENGER SIDE)

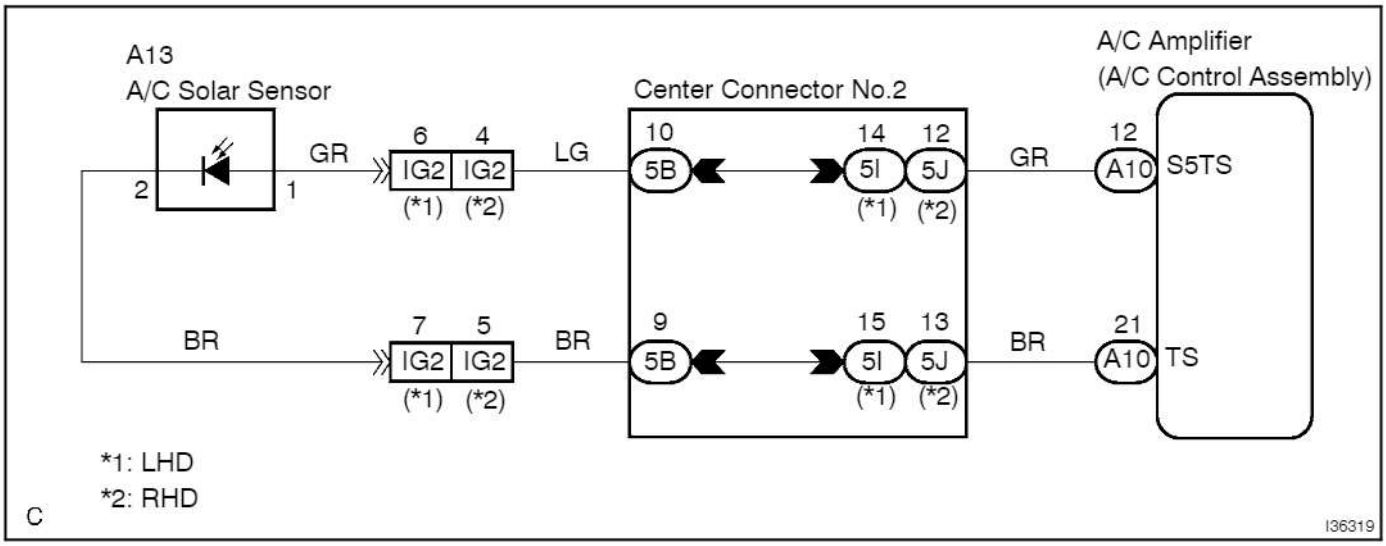
CIRCUIT DESCRIPTION



The A/C solar sensor is installed in the upper part of the instrument panel to detect the amount of solar sensor radiation with photodiode to control the heater and air conditioner "AUTO" function. It sends appropriate signals to the A/C amplifier. The output voltage of the A/C solar sensor changes in accordance with the amount of solar radiation. As the amount increases, the voltage increases. As the amount decreases, the voltage decreases. The A/C amplifier reads voltage output from the A/C solar sensor.

DTC No.	Detection Item	Trouble Area
B1421	Open or short in solar sensor circuit. (If the check is performed in a dark place, DTC B1424/24 may be displayed.)	• A/C solar sensor • Harness or connector between A/C solar sensor and A/C amplifier or body ECU • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Solar sensor (D side) Solar Sens–D	Solar sensor (Driver side) / min.: 0 max.: 255	Increases as brightness increases	Open in the circuit: 0 Short in the circuit: 255

OK:

The display is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

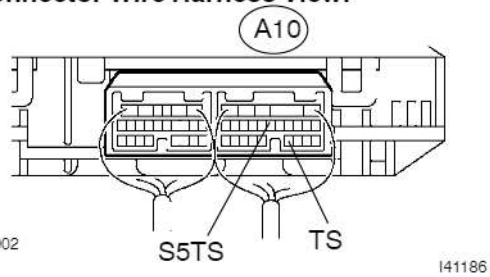
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(S5TS – TS)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the air A/C amplifier with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–12 (S5TS) – A10–21 (TS)	Power switch ON (ON) Sensor is subject to electric light	0.8 to 4.3 V
A10–12 (S5TS) – A10–21 (TS)	Power switch ON (ON) Sensor is covered with a cloth	Below 0.8 V

HINT:

- As the inspection light is moved away from the sensor, the voltage increases.
- Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the A/C solar sensor (cooler (solar sensor) thermistor).

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

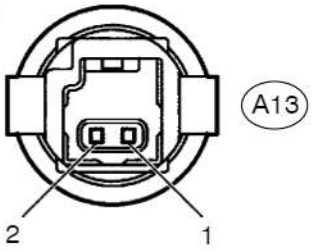
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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3 INSPECT A/C SOLAR SENSOR

A/C Solar Sensor Connector
Front View:



E50667 E72857

(a) Remove the A/C solar sensor.
(b) Disconnect the connector from the A/C solar sensor.
(c) Measure the resistance according to the value(s) in the table below.
(d) Connect the positive (+) lead from the ohmmeter to terminal 2 and negative (–) lead to terminal 1 of the A/C solar sensor.

Standard:

Tester connection	Condition	Specified condition
A13–1 – A13–2	Sensor is subject to electric light	Except ∞ Ω
A13–1 – A13–2	Sensor is covered with a cloth	∞ Ω (No continuity)

NOTICE:
The connection procedure for using a digital tester such as an TOYOTA electrical tester is shown above. When using an analog tester, connect the positive (+) lead to terminal 1 and negative (–) lead to terminal 2 of the A/C solar sensor.
HINT:

- As the inspection light is moved away from the sensor, the voltage increases.
- Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the A/C solar sensor.

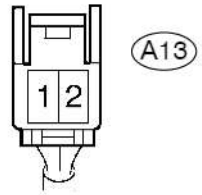
NG → **REPLACE A/C SOLAR SENSOR**

OK

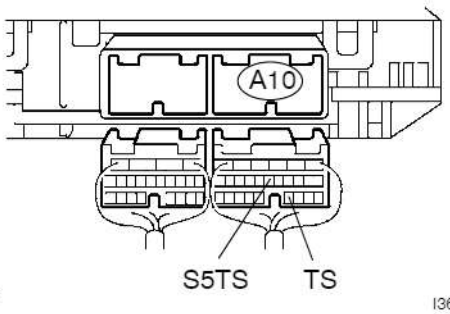
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4	CHECK HARNESS AND CONNECTOR(A/C SOLAR SENSOR – AIR CONDITONING AMPLIFIER) (SEE PAGE 01–46)

A/C Solar Sensor
Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C solar sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–12 (S5TS) – A13–1	Always	Below 1 Ω
A10–21 (TS) – A13–2	Always	Below 1 Ω
A10–12 (S5TS) – Body ground	Always	10 kΩ or higher
A10–21 (TS) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

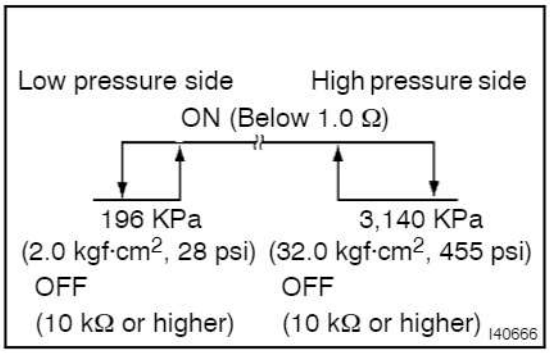
OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC B1423 PRESSURE SWITCH CIRCUIT

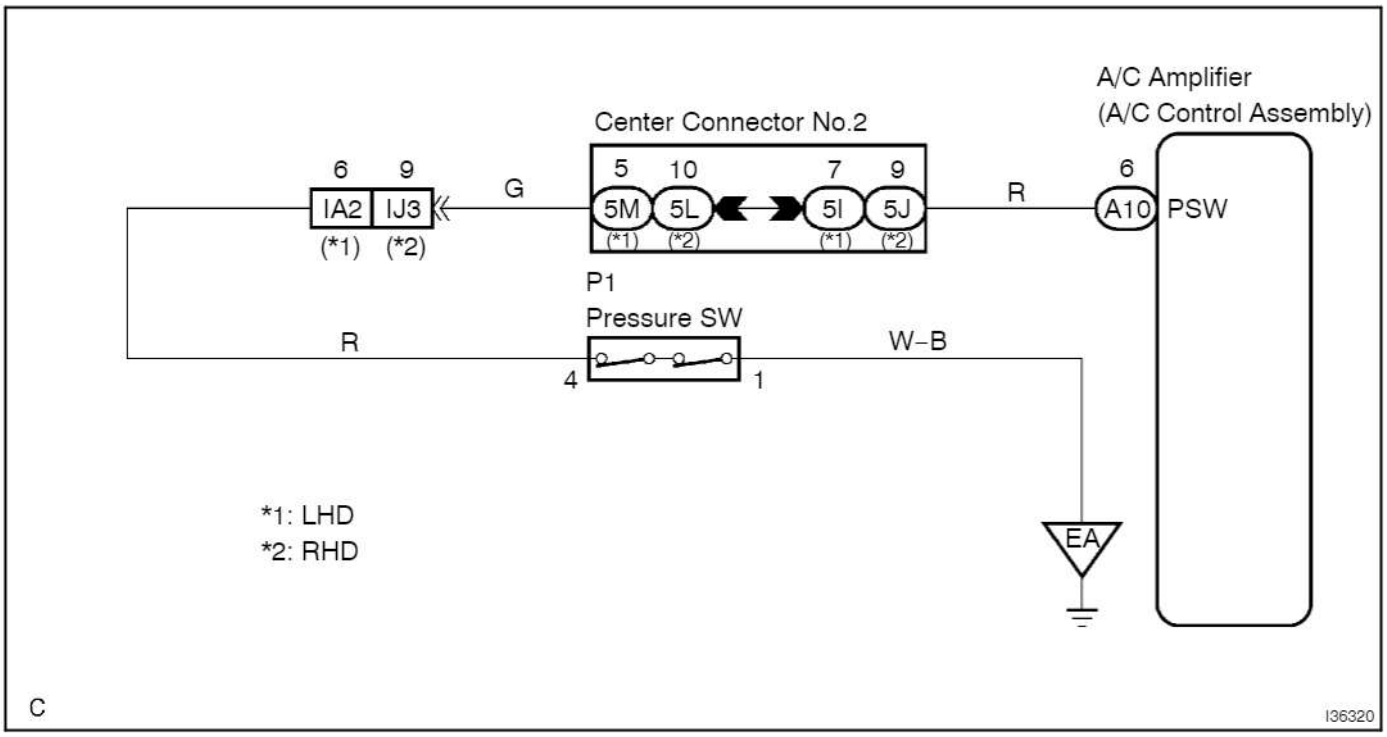
CIRCUIT DESCRIPTION



The pressure switch to detect the refrigerant pressure is located in the sight glass side of the pipe on the high–pressure side. This DTC is output when the refrigerant pressure is either significantly low (below 196 kPa (2.0 kgf/cm^2, 28 psi) or significantly high (over 3,140 kPa (32.0 kgf/cm^2, 455 psi). Then the pressure switch sends appropriate signals to the A/C amplifier. The pressure switch has built–in switches to detect high and low pressure and is turned off when either is determined to be defective. The A/C amplifier continuously monitors the pressure switch signal after the power switch is turned on. it stops compressor control and output the DTC when it detects the signal indicating that the switch is turned off.

DTC No.	Detection Item	Trouble Area
B1423	• 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 body ground • Multiplex communication circuit • Refrigerant pipe line • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT REFRIGERANT PRESSURE

(a) Set the manifold gauge.
(b) Read the manifold gauge pressure when these conditions are established.
Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 to 35°C (86 to 95°F)
- Power switch ON (ON)
- Blower speed control switch at "HI" position
- Temperature control dial at "COOL" position
- Air conditioning switch ON
- Fully open doors

Standard:
Pressure on high pressure side:
1.37 to 1.57 MPa (13.9 to 16.0 kgf·cm^2, 198 to 228 psi)

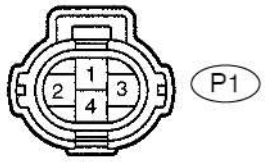
HINT:
If the refrigerant pressure is below 196 KPa (2.0 kgf·cm^2, 28 psi), the refrigerant amount in the air conditioning cycle may have decreased significantly for reasons such as a gas leakage.

NG → **INSPECT AND REPAIR AIR CONDITIONING CYCLE (SEE PAGE 55–12)**

OK

2	CHECK AIR CONDITIONING OPERATION

Pressure Switch Connector
Front View:



I40669

(a) Disconnect the connector from pressure switch.
(b) Connect terminals 1 and 4 of the connector of the pressure switch on the vehicle wire harness side using a service wire.
(c) Power switch ON (ON).
(d) Turn the air conditioning switch on and check that the compressor is operated.
(e) Check that the compressor is not operated when disconnecting terminals 1 and 4 (that were connected in the prior step).
OK:
Terminals 1 and 4 connected: the compressor is operated
Terminals 1 and 4 disconnected: the compressor is not operated

NG → **Go to step 3**

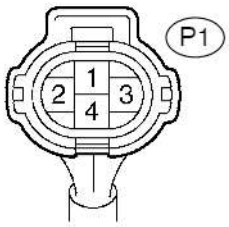
OK

REPLACE PRESSURE SWITCH (COOLER CONDENSER ASSY)

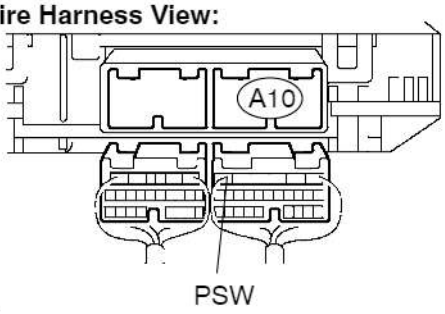
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3	CHECK HARNESS AND CONNECTOR(PRESSURE SWITCH – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Pressure Switch Connector
Front View:



Air Conditioning Amplifier Connector
Wire Harness View:



C

I36369

(a) Disconnect the connector from pressure switch.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–6 (PSW) – P1–4	Always	Below 1 Ω
P1–1 – Body ground	Always	Below 1 Ω
A10–6 (PSW) – Body ground	Always	10 kΩ or higher

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

A → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)**

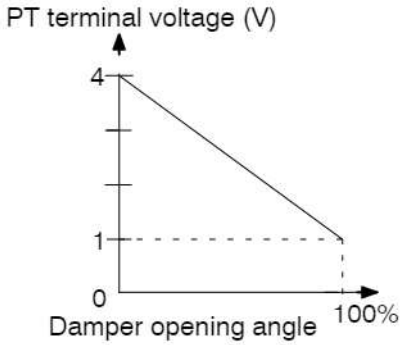
C

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1431	AIR MIX DAMPER POSITION SENSOR CIRCUIT (PASSENGER SIDE)

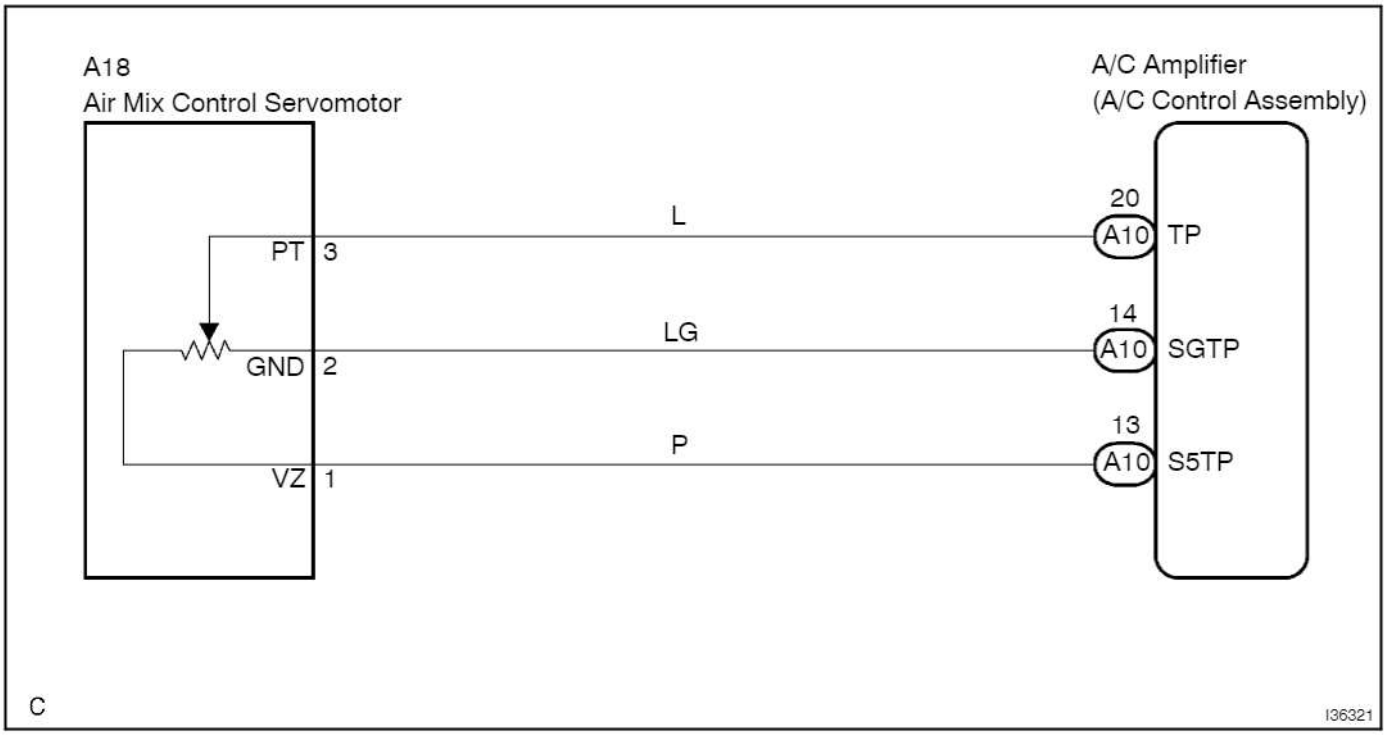
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix control servomotor (air mix damper) and sends the appropriate signals to the A/C amplifier. The position sensor is built in the air mix control servomotor. The position sensor's resistance changes as the air mix control servomotor arm moves.
It outputs voltage (5V) that is input to terminal 1 (VZ) and terminal 3 (PT) via the variable resistor, and then to the A/C amplifier. The A/C amplifier reads the arm position with the input voltage from the position sensor.

DTC No.	Detection Item	Trouble Area
B1431	Open or short in power source circuit in air mix damper position sensor circuit.	• Air mix control servomotor (air mix damper position sensor) • Harness or connector between Air mix control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air mix damper position (D side) (A/M Damp Pos–D)	Air mix damper position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0% Damper is at "MAX. HOT": 100.0% or 70.0%	–
Air mix damper target position (D side) (A/M Damp Targ–D)	Air mix damper target position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	–

OK:

The displayed is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

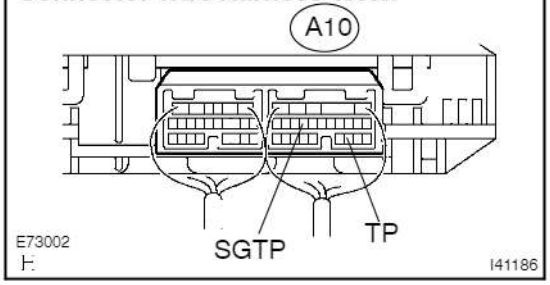
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(TP – SGTP)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.
(b) Change the set temperature to activate the air mix servomotor.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–20 (TP) – A10–14 (SGTP)	Power switch ON (ON) MAX. Hot Position	0.97 to 1.03 V
A10–20 (TP) – A10–14 (SGTP)	Power switch ON (ON) MAX. Cool Position	3.97 to 4.03 V

HINT:
As the set temperature increases, the voltage decreases gradually without interruption.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

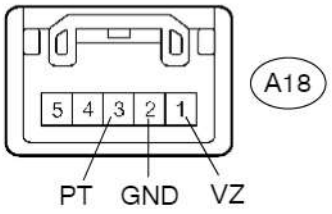
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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3 INSPECT AIR MIX CONTROL SERVOMOTOR

Air Mix Control Servomotor Connector Front View:



(a) Remove the air mix control servomotor.
(b) Disconnect the connector from air mix control servomotor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A18–1 (VZ) – A18–2 (GND)	Always	4.2 to 7.8 kΩ

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

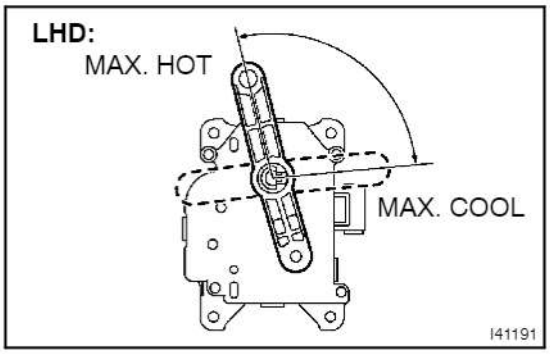
HINT:

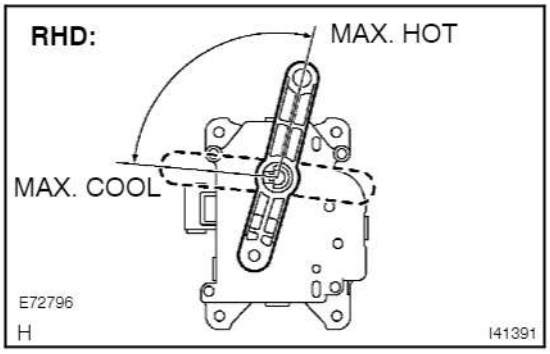
See page 05–1087 for the operation procedure for air mix control servomotor.

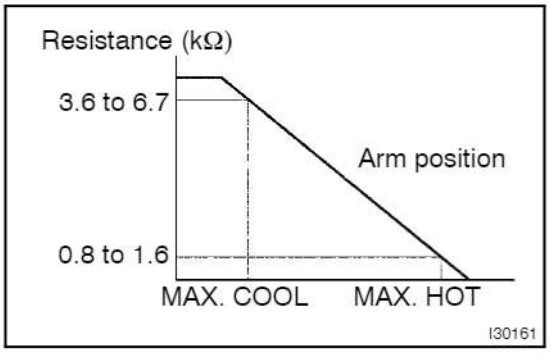
Standard:

Tester connection	Condition	Specified condition
A18–3 (PT) – A18–2 (GND)	Max. Cool Position	3.6 to 6.7 kΩ
A18–3 (PT) – A18–2 (GND)	Max. Hot Position	0.8 to 1.6 kΩ

(e) As the air mix control servomotor moves from cool side to hot side, the resistance decreases gradually without interruption.







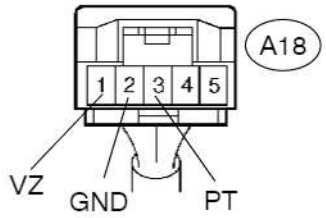
OK

NG → **REPLACE AIR MIX CONTROL SERVOMOTOR**

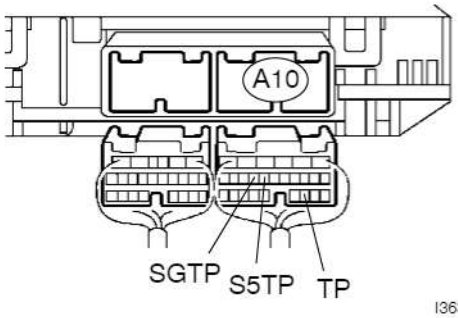
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4	CHECK HARNESS AND CONNECTOR(AIR MIX CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Mix Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector air mix control servomotor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–20 (TP) – A18–3 (PT)	Always	Below 1 Ω
A10–14 (SGTP) – A18–2 (GND)	Always	Below 1 Ω
A10–13 (S5TP) – A18–1 (VZ)	Always	Below 1 Ω
A10–20 (TP) – Body ground	Always	10 kΩ or higher
A10–14 (SGTP) – Body ground	Always	10 kΩ or higher
A10–13 (S5TP) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

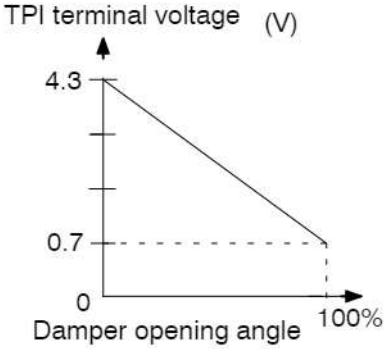
OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1432	AIR INLET DAMPER POSITION SENSOR CIRCUIT

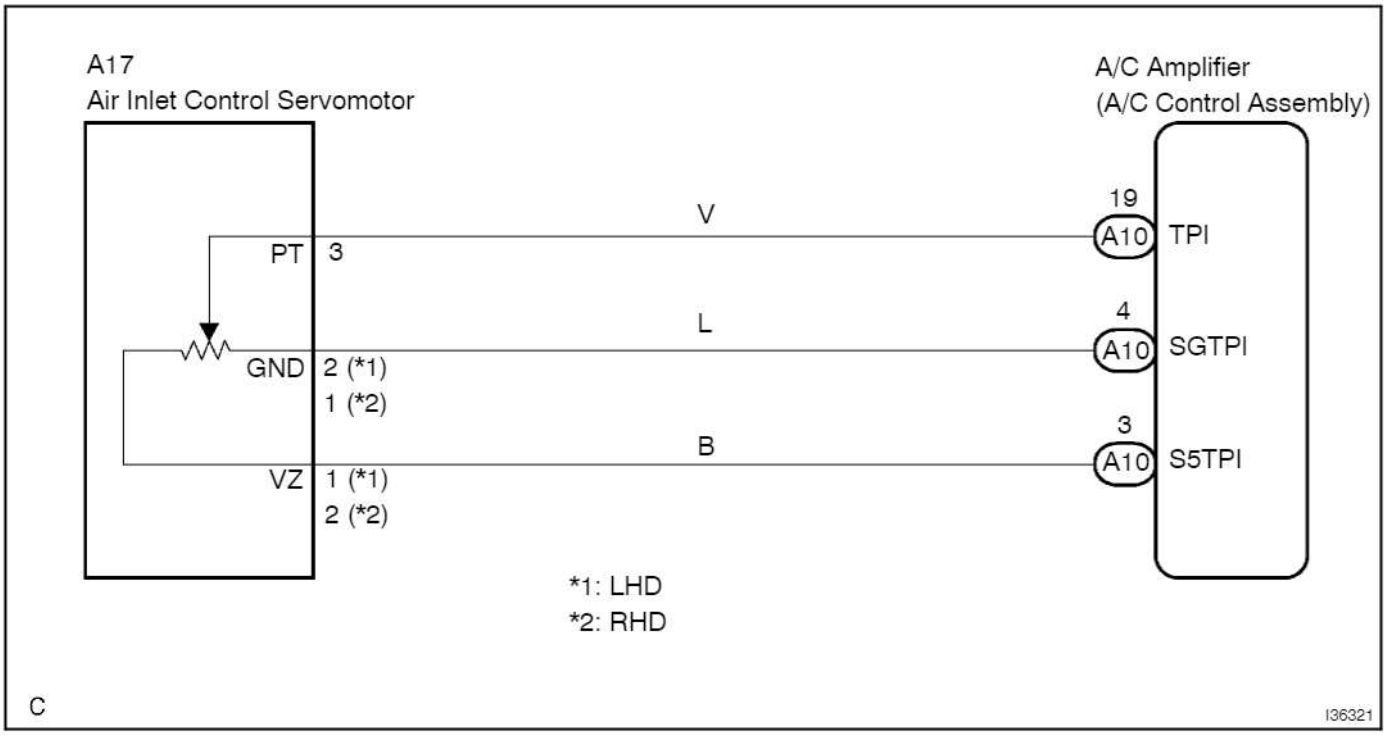
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet control servomotor and sends the appropriate signals to the A/C amplifier. The position sensor is built in the air inlet control servomotor.
The position sensor's resistance changes as the air inlet control servomotor arm moves.
It outputs voltage (5V) that is input to terminal 3 (VZ) and terminal 3 (PT) via the variable resister, and then to the A/C amplifier. The A/C amplifier reads the arm position with the input voltage from the position sensor.

DTC No.	Detection Item	Trouble Area
B1432	Open or short in power source circuit in air inlet damper position sensor circuit.	• Air inlet control servomotor (air inlet damper position sensor) • Harness or connector between air inlet control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air inlet damper position (A/I Damp Pos)	Air inlet damper position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "FRESH": 110.0% Damper is at "HALF–RECIR-CULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
Air inlet damper target position (A/I Damp Targ)	Air inlet damper target position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "FRESH": 110.0% Damper is at "HALF–RECIR-CULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:

The displayed is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

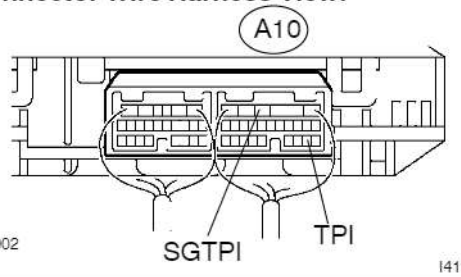
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(TPI – SGTPI)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove A/C amplifier with connectors still connected.
(b) Change the set REC/FRS to activate the air inlet servomotor.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–19 (TPI) – A10–4 (SGTPI)	Power switch ON (ON) RECIRC position	3.5 to 4.5 V
A10–19 (TPI) – A10–4 (SGTPI)	Power switch ON (ON) FRESH position	0.5 to 1.8 V

HINT:
As the air inlet servomotor is moved from REC side to FRS side, the voltage decreases gradually without interruption.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

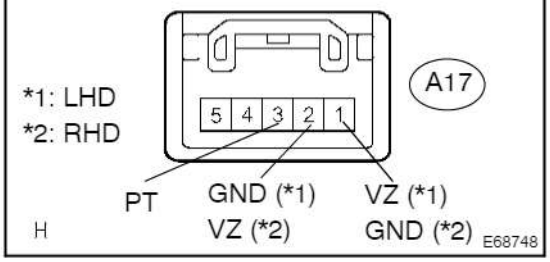
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

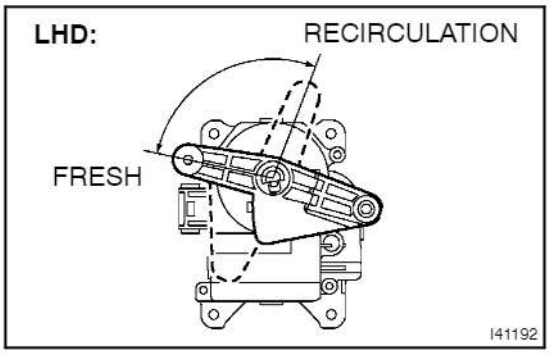
A

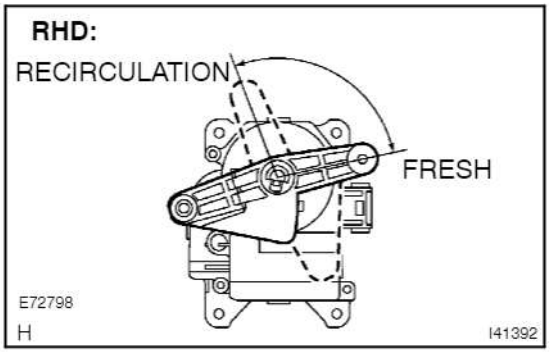
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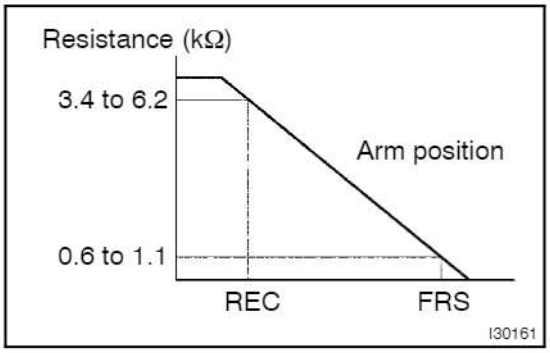
3 INSPECT AIR INLET CONTROL SERVOMOTOR

Air Inlet Control Servomotor Connector Front View:









(a) Remove the air inlet control servomotor.
(b) Disconnect the connector from air inlet control servomotor.
(c) Measure resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A17–1 (VZ) – A17–2 (GND) (*1)	Always	4.2 to 7.8 kΩ
A17–2 (VZ) – A17–1 (GND) (*2)	Always	4.2 to 7.8 kΩ

HINT:
*1: LHD
*2: RHD

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

HINT:
See page 05–1092 for the operation procedure of the air inlet control servomotor.

Standard:

Tester connection	Condition	Specified condition
A17–3 (PT) – A17–2 (GND) (*1)	RECIRCULATION position	3.4 to 6.2 kΩ
A17–3 (PT) – A17–2 (GND) (*1)	FRESH position	0.6 to 1.1 kΩ
A17–3 (PT) – A17–1 (GND) (*2)	RECIRCULATION position	3.4 to 6.2 kΩ
A17–3 (PT) – A17–1 (GND) (*2)	FRESH position	0.6 to 1.1 kΩ

HINT:
*1: LHD
*2: RHD

(e) As the air inlet control servomotor moves from fresh to recirculation, the resistance decreases gradually without interruption.

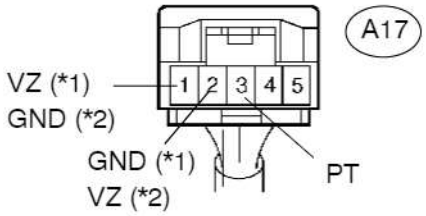
NG → **REPLACE AIR INLET CONTROL SERVOMOTOR**

OK

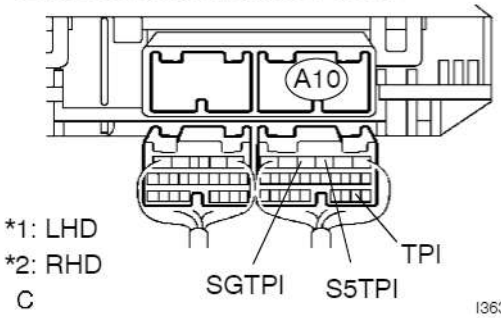
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4	CHECK HARNESS AND CONNECTOR(AIR INLET CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Inlet Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from air inlet control servomotor.

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

Standard:

Tester connection	Condition	Specified condition
A10–19 (TPI) – A17–3 (PT)	Always	Below 1 Ω
A10–4 (SGTPI) – A17–2 (GND) (*1)	Always	Below 1 Ω
A10–4 (SGTPI) – A17–1 (GND) (*2)	Always	Below 1 Ω
A10–3 (S5TPI) – A17–1 (VZ) (*1)	Always	Below 1 Ω
A10–3 (S5TPI) – A17–2 (VZ) (*2)	Always	Below 1 Ω
A10–19 (TPI) – Body ground	Always	10 kΩ or higher
A10–4 (SGTPI) – Body ground	Always	10 kΩ or higher
A10–3 (S5TPI) – Body ground	Always	10 kΩ or higher

HINT:
*1: LHD
*2: RHD

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

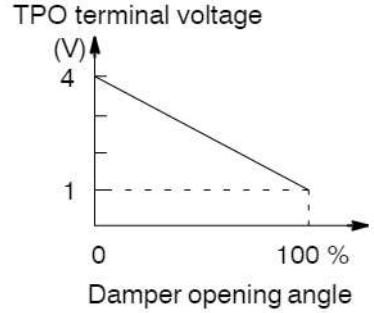
OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1433	AIR OUTLET DAMPER POSITION SENSOR CIRCUIT

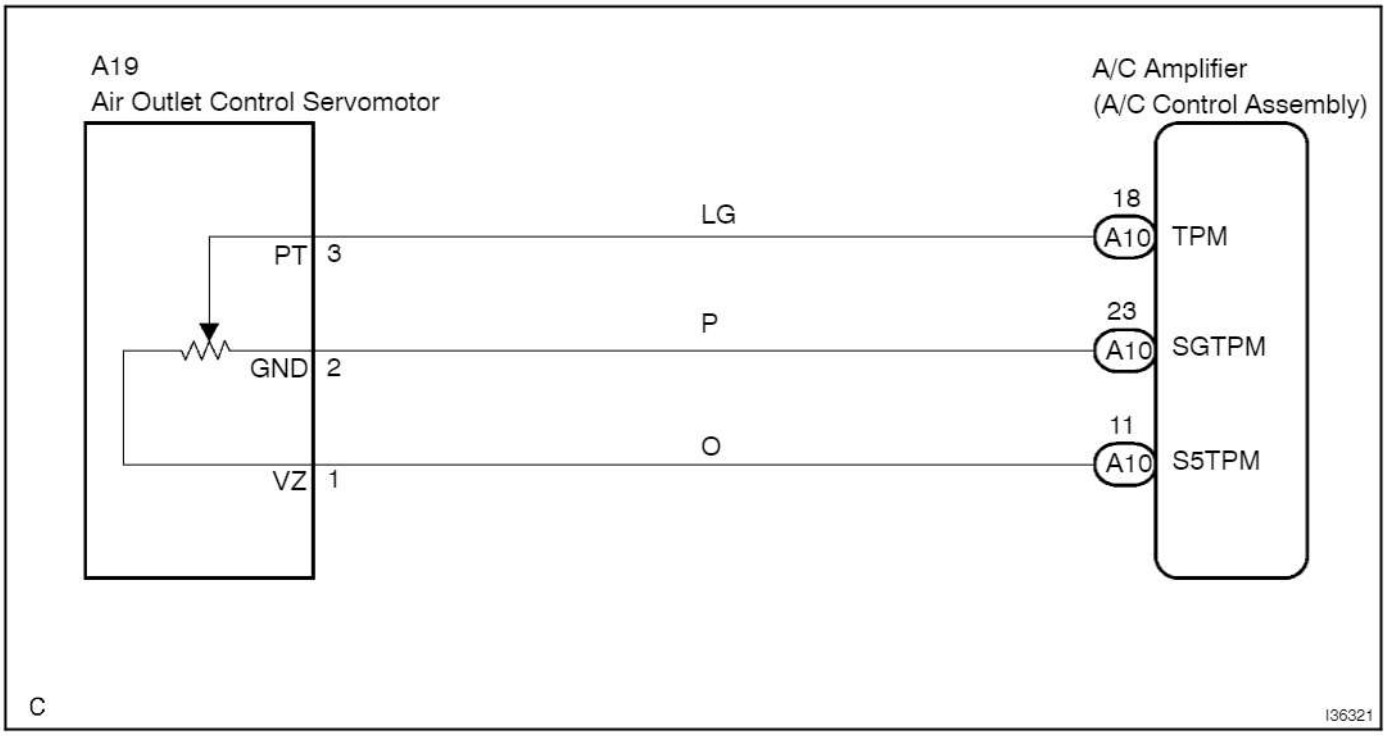
CIRCUIT DESCRIPTION



This sensor detects the position of the air outlet control servomotor and sends the appropriate signals to the A/C amplifier. The position sensor is built in the air outlet control servomotor. The potentiometer's resistance changes as the air outlet control servomotor arm moves.
It outputs voltage (5V) that is input to terminal 1 (VZ) and terminal 3 (PT) via the variable resister, and then to the A/C amplifier. The A/C amplifier reads the arm position with the input voltage from the potentiometer.

DTC No.	Detection Item	Trouble Area
B1433	Open or short in power source circuit in air outlet damper position sensor circuit.	• Air outlet control servomotor (air outlet damper position sensor) • Harness or connector between air outlet control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air outlet damper position (A/O Damp Pos)	Air outlet damper position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
Air outlet damper target position (A/O Damp Targ)	Air outlet damper target position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%

HINT:
*1: Australia models

OK:

The displayed is as specified in the normal condition.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

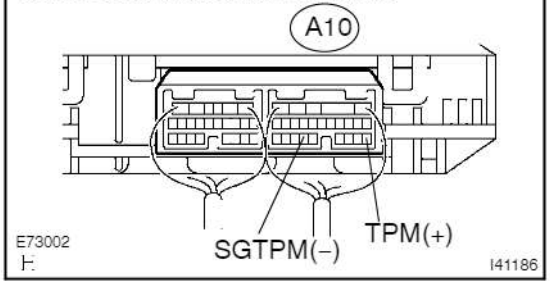
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(TPM – SGTPM)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–18 (TPM) – A10–23 (SGTPM)	Power switch ON (ON) FACE position	3.97 to 4.07 V
A10–18 (TPM) – A10–23 (SGTPM)	Power switch ON (ON) DEF position	0.97 to 1.03 V

HINT:

As the air outlet servomotor is moved from FACE side to DEF side, the voltage decreases gradually without interruption.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

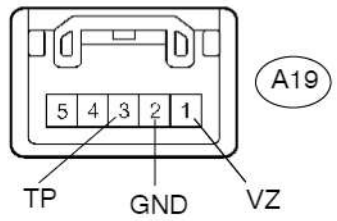
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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3 INSPECT AIR OUTLET CONTROL SERVOMOTOR

Air Outlet Control Servomotor Connector Front View:



(a) Remove the air outlet control servomotor.
(b) Disconnect the connector from air inlet control servomotor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A19–1 (VZ) – A19–2 (GND)	Always	4.2 to 7..2 kΩ

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

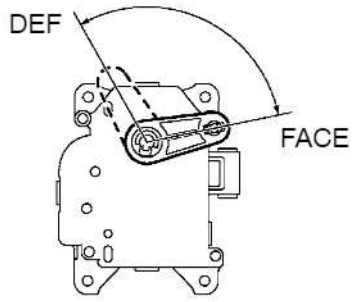
HINT:
See page 05–1097 for operation procedure for air outlet control servomotor.

Standard:

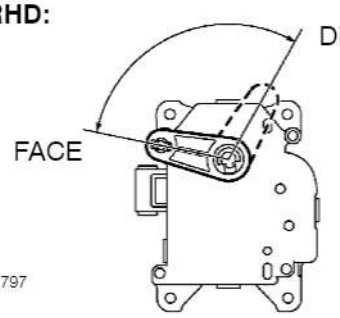
Tester connection	Condition	Specified condition
A19–3 (PT) – A19–2 (GND)	DEF position	0.6 to 1.1 kΩ
A19–3 (PT) – A19–2 (GND)	FACE position	3.6 to 6.7 kΩ

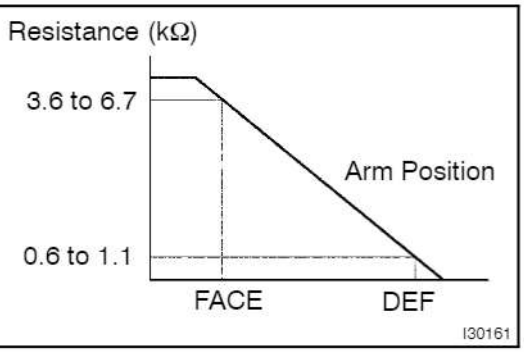
(e) As the air outlet control servomotor moved from DEF side to FACE side, the resistance decreases gradually without interruption.

LHD:



RHD:





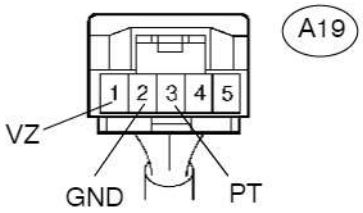
NG → **REPLACE AIR OUTLET CONTROL SERVOMOTOR**

OK

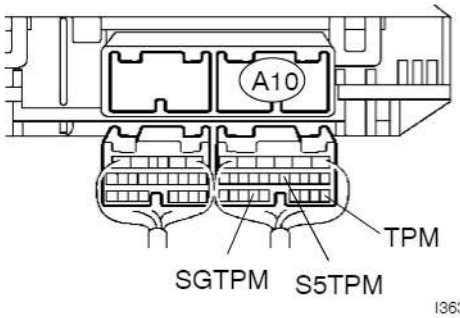
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4	CHECK HARNESS AND CONNECTOR(AIR OUTLET CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Outlet Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from air outlet control servomotor.

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

Tester connection	Condition	Specified condition
A10–18 (TPM) – A19–3 (PT)	Always	Below 1 Ω
A10–23 (SGTPM) – A19–2 (GND)	Always	Below 1 Ω
A10–11 (S5TPM) – A19–1 (VZ)	Always	Below 1 Ω
A10–18 (TPM) – Body ground	Always	10 kΩ or higher
A10–23 (SGTPM) – Body ground	Always	10 kΩ or higher
A10–11 (S5TPM) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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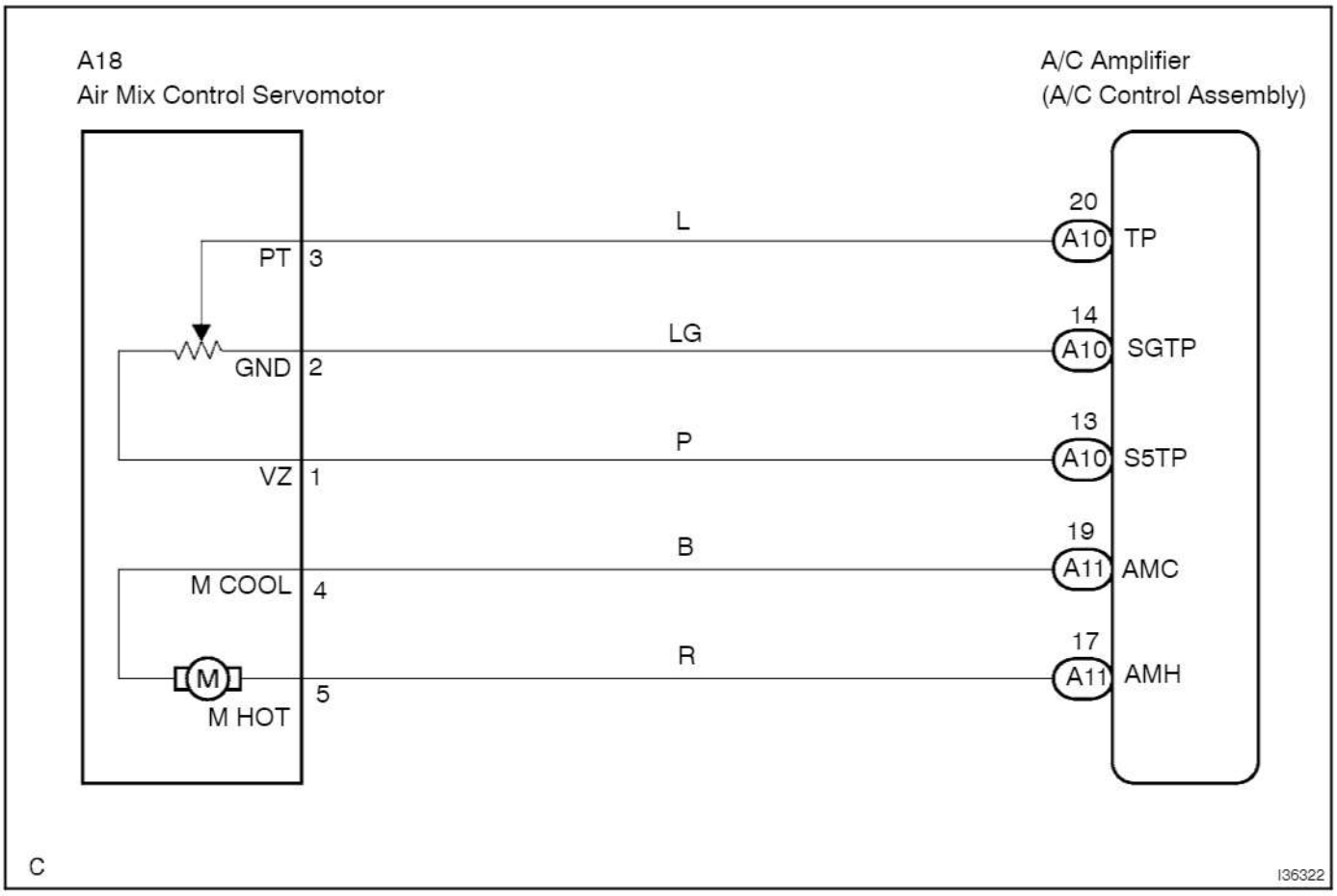
DTC	B1441	AIR MIX DAMPER CONTROL SERVOMOTOR CIRCUIT (PASSENGER SIDE)

CIRCUIT DESCRIPTION

The air mix control servomotor (air mix damper servo sub–assy) is controlled by the A/C amplifier.
The air mix control servomotor moves the air mix damper by rotating (normal, reverse) the motor with electrical power from the A/C amplifier.
This adjusts the mix ratio of the air that passes through the evaporator and heater core and controls the airflow temperature. Air flow temperature changes when moving the air mix damper to the target point. The target point can be detected with the air mix damper position sensor.

DTC No.	Detection Item	Trouble Area
B1441	Air mix damper position sensor value does not change even if air conditioner amplifier assy operates air mix servomotor.	• Air mix control servomotor • Harness or connector between air mix control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air mix damper position (D side) (A/M Damp Pos–D)	Air mix damper position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0%	–
Air mix damper target position (D side) (A/M Damp Targ–D)	Air mix damper target position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. COOL": –10.0%	–

OK:

When the target position is at the "MAX. COOL" (–10.0%), the actual opening angle is 19.0% or less.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air mix damper position (D side) (A/M Damp Pos–D)	Air mix damper position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. HOT": 100.0% or 71.0%	–
Air mix damper target position (D side) (A/M Damp Targ–D)	Air mix damper target position (Driver side) / min.: –14% max.: 113.5%	Damper is at "MAX. HOT": 100.0% or 71.0%	–

OK:

When the target position is at the "MAX. HOT" (100.0%), the actual opening angle is 81.0% or more.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

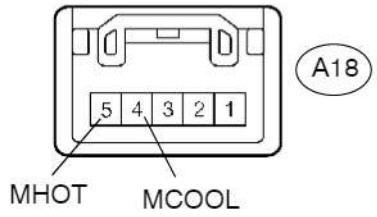
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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3 INSPECT AIR MIX CONTROL SERVOMOTOR

Air Mix Control Servomotor Connector Front View:



(a) Remove the air mix control servomotor.
(b) Disconnect the connector from air mix control servomotor.
(c) Connect the positive (+) lead from the battery to terminal 5 and negative (–) lead to terminal 4, then check that lever turns to "MAX. HOT" position smoothly.
(d) Measure the resistance according to the value(s) in the table below.

Standard:

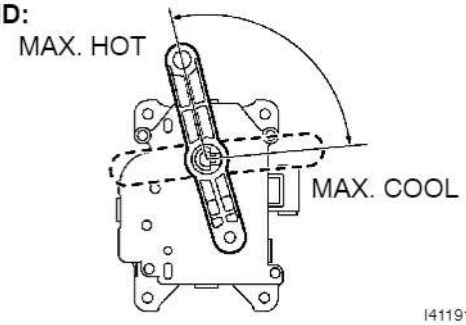
Tester connection	Condition	Specified condition
A18–3 (PT) – A18–2 (GND)	Max. Hot Position	0.8 to 1.6 kΩ

(e) Connect the positive (+) lead from the battery to terminal 4 and negative (–) lead to terminal 5, then check that lever turns to "MAX. COOL" position smoothly.
(f) Measure the resistance according to the value(s) in the table below.

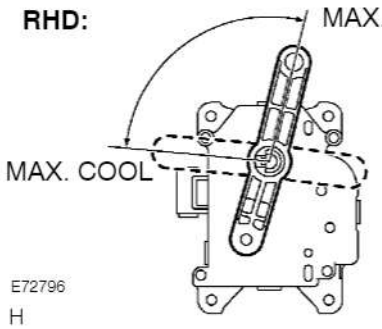
Standard:

Tester connection	Condition	Specified condition
A18–3 (PT) – A18–2 (GND)	Max. Cool Position	3.6 to 6.7 kΩ

LHD:



RHD:



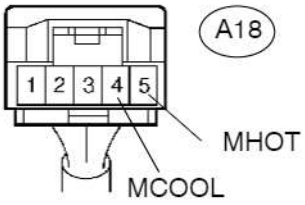
NG → **REPLACE AIR MIX CONTROL SERVOMOTOR**

OK

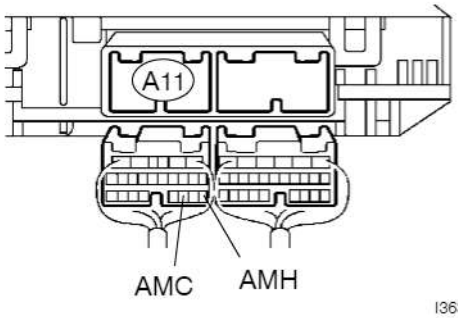
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4	CHECK HARNESS AND CONNECTOR(AIR MIX CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Mix Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from air mix control servomotor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11–19 (AMC) – A18–4 (MCOOL)	Always	Below 1 Ω
A11–17 (AMH) – A18–5 (MHOT)	Always	Below 1 Ω
A11–19 (AMC) – Body ground	Always	10 kΩ or higher
A11–17 (AMH) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1442	AIR INLET DAMPER CONTROL SERVOMOTOR CIRCUIT

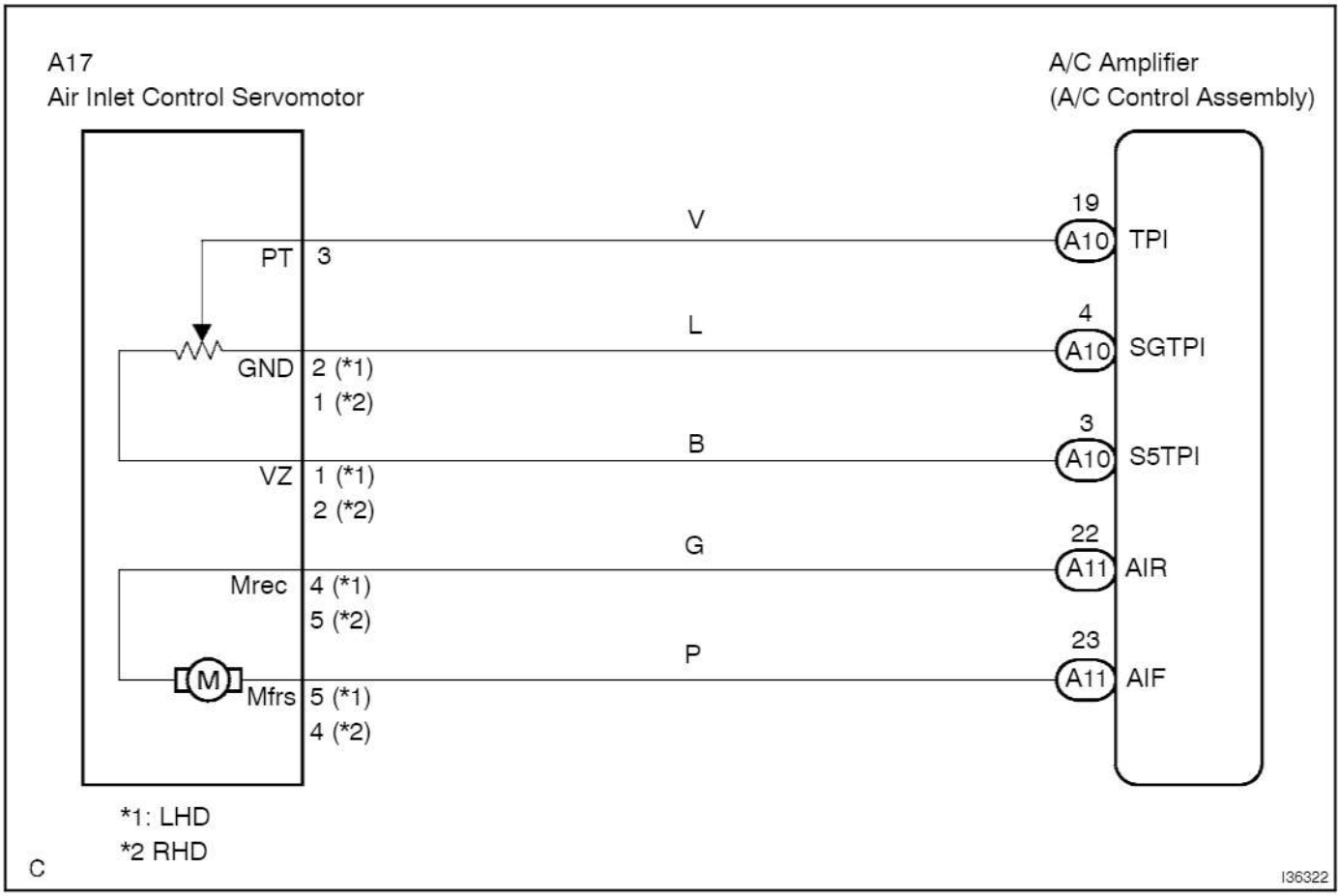
CIRCUIT DESCRIPTION

The air inlet control servomotor is controlled by the A/C amplifier and moves the air inlet control servomotor to the desired position.

The air inlet control servomotor switches between "RECIRCULATION" and "FRESH" by rotating the motor (normal, reverse) with electrical power from the A/C amplifier. This controls intake air and switches "RECIRCULATION", "FRESH" and "HALF–RECIRCULATION".

DTC No.	Detection Item	Trouble Area
B1442	Air outlet damper position sensor valve does not change even if air conditioner amplifier operated air outlet damper control servo motor.	• Air outlet control servomotor • Harness or connector between air outlet control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air inlet damper position (A/I Damp Pos)	Air inlet damper position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "HALF–RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
Air inlet damper target position (A/I Damp Targ)	Air inlet damper target position / min.: –14% max.: 113.5%	Damper is at "RECIRCULATION": –1.0% Damper is at "HALF–RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:

When the target position is at the "RECIRCULATION" (–1.0%), the actual opening angle is 19.0% or less.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air inlet damper position (A/I Damp Pos)	Air inlet damper position / min.: –14% max.: 113.5%	Damper is at "FRESH": 110.0% Damper is at "HALF–RECIR-CULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
Air inlet damper target position (A/I Damp Targ)	Air inlet damper target position / min.: –14% max.: 113.5%	Damper is at "FRESH": 110.0% Damper is at "HALF–RECIR-CULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:

When the target position is at the "FRESH" (110.0%), the actual opening angle is 81.0% or more.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

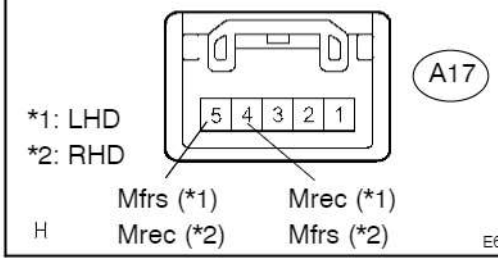
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

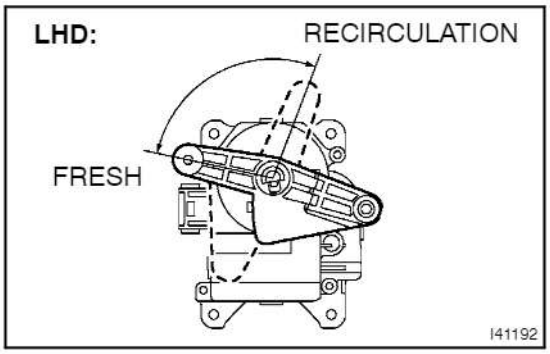
A

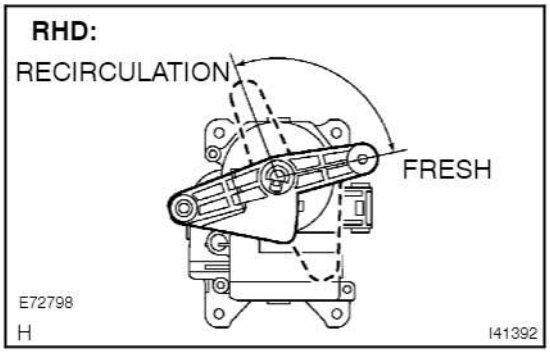
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3 INSPECT AIR INLET CONTROL SERVOMOTOR

Air Inlet Control Servomotor Connector Front View:







(a) Remove the damper air inlet servomotor.
(b) Disconnect the connector from air inlet control servomotor.
(c) Connect the positive (+) lead from the battery to terminal 5 (4) and negative (–) lead to terminal 4 (5) then check that the lever turns to "FRESH" position smoothly.

HINT:
( ): RHD

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

Standard:

Tester connection	Condition	Specified condition
A17–3 (PT) – A17–2 (GND) (*1)	FRESH position	0.6 to 1.1 kΩ
A17–3 (PT) – A17–1 (GND) (*2)	FRESH position	0.6 to 1.1 kΩ

HINT:
*1: LHD
*2: RHD

(e) Connect the positive (+) lead from the battery to terminal 4 (5) and negative (–) lead to terminal 5 (4) then check that the lever turns to "RECIRCULATION" position smoothly.

HINT:
( ): RHD

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

Standard:

Tester connection	Condition	Specified condition
A17–3 (PT) – A17–2 (GND) (*1)	RECIRCULATION position	3.4 to 6.2 kΩ
A17–3 (PT) – A17–1 (GND) (*2)	RECIRCULATION position	3.4 to 6.2 kΩ

HINT:
*1: LHD
*2: RHD

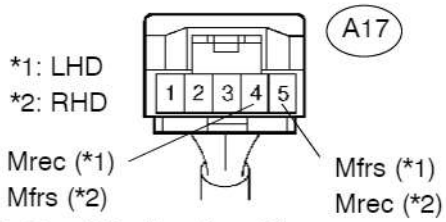
NG → **REPLACE AIR INLET CONTROL SERVOMOTOR**

OK

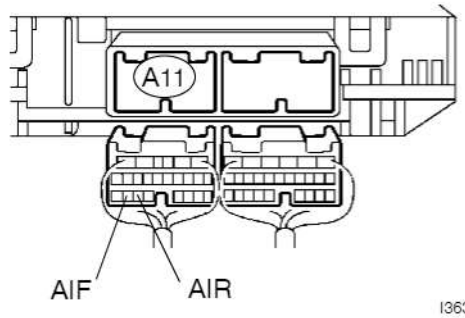
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4	CHECK HARNESS AND CONNECTOR(AIR INLET CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Inlet Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from air inlet control servomotor.

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

Standard:

Tester connection	Condition	Specified condition
A11–22 (AIR) – A17–4 (Mrec) (*1)	Always	Below 1 Ω
A11–22 (AIR) – A17–5 (Mrec) (*2)	Always	Below 1 Ω
A11–23 (AIF) – A17–5 (Mfrs) (*1)	Always	Below 1 Ω
A11–23 (AIF) – A17–4 (Mfrs) (*2)	Always	Below 1 Ω
A11–22 (AIR) – Body ground	Always	10 kΩ or higher
A11–23 (AIF) – Body ground	Always	10 kΩ or higher

HINT:
*1: LHD
*2: RHD

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1443	AIR OUTLET DAMPER CONTROL SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

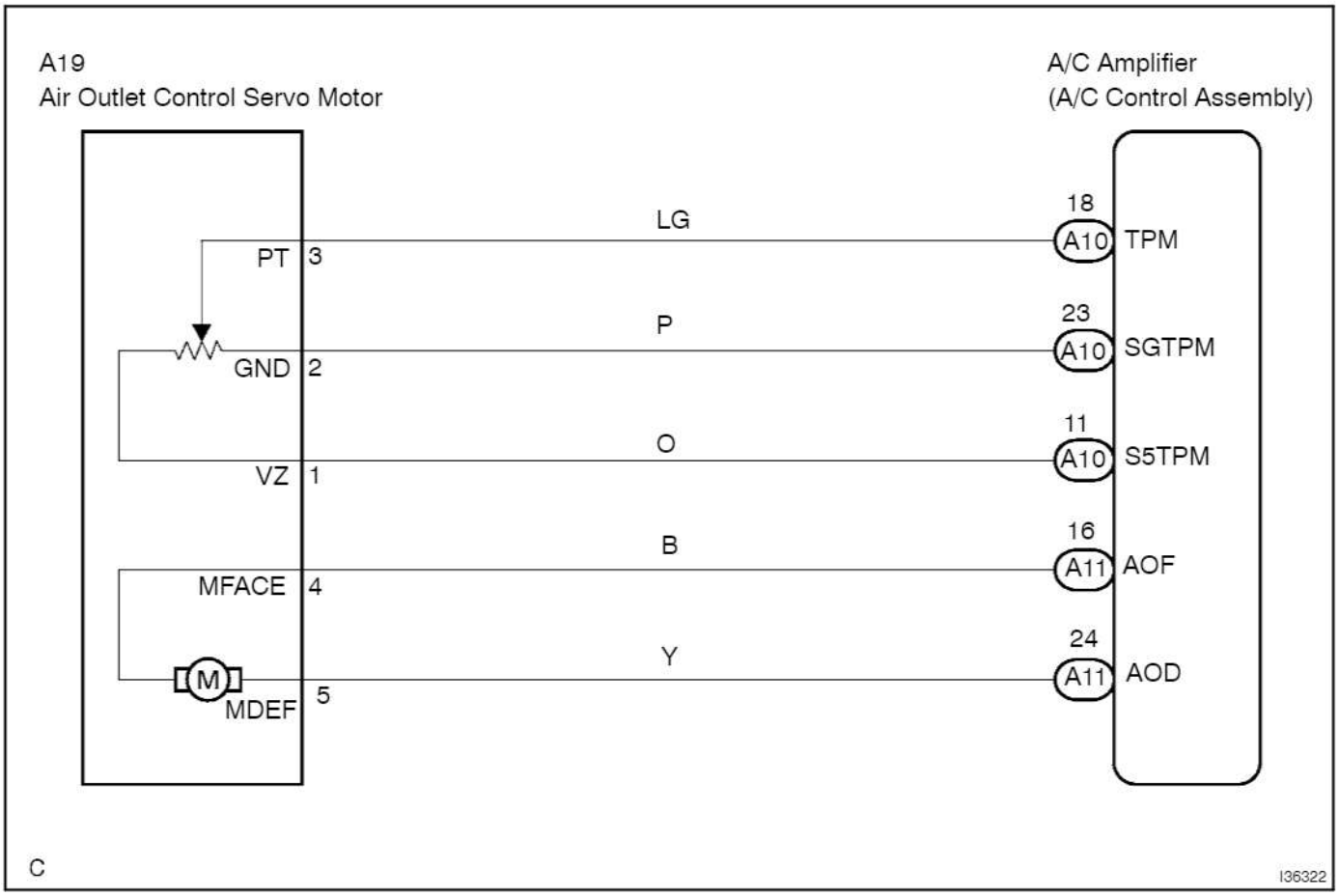
This circuit turns the servomotor and changes each damper position by receiving the signals from the A/C amplifier assy.

The air outlet damper servo switches the air outlet by rotating the motor (normal, reverse) with electrical power from the A/C amplifier.

When the AUTO switch is on, the A/C amplifier changes the mode between "FACE", "BI–LEVEL" and "FOOT" according to the temperature setting.

DTC No.	Detection Item	Trouble Area
B1443	Air outlet damper position sensor valve does not change even if air conditioner amplifier operated air outlet damper control servo motor.	• Air outlet control servomotor • Harness or connector between air outlet control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air outlet damper position (A/O Damp Pos)	Air outlet damper position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0%	Open in the circuit: 50.0%
Air outlet damper target position (A/O Damp Targ)	Air outlet damper target position / min.: –14% max.: 113.5%	Damper is at "FACE": –10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0%	Open in the circuit: 50.0%

HINT:
*1: Australia models

OK:

When the target position is at the "FACE" (–10.0%), the actual opening angle is 19.0% or less.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Air outlet damper position (A/O Damp Pos)	Air outlet damper position / min.: –14% max.: 113.5%	Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
Air outlet damper target position (A/O Damp Targ)	Air outlet damper target position / min.: –14% max.: 113.5%	Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% (33.5%)*1 Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%

HINT:
*1: Australia models

OK:

When the target position is at the "DEF" (110.0%), the actual opening angle is 81.0% or more.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (**SEE PAGE 05–1035**)

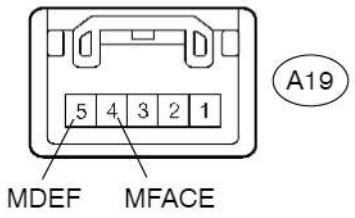
C → **REPLACE AIR CONDITIONING AMPLIFIER** (**SEE PAGE 55–52**)

A

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3 INSPECT AIR OUTLET CONTROL SERVOMOTOR

Air Outlet Control Servomotor Connector Front View:



(a) Remove the air outlet control servomotor.
(b) Disconnect the connector from air outlet control servomotor.
(c) Connect the positive (+) lead from the battery to terminal 4 and negative (–) lead to terminal 5 then check that the lever turns to "FACE" position smoothly.
(d) Measure the resistance according to the value(s) in the table below.

Standard:

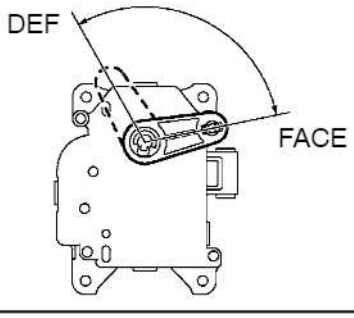
Tester connection	Condition	Specified condition
A19–3 (PT) – A19–2 (GND)	FACE position	3.6 to 6.7 kΩ

(e) Connect the positive (+) lead from the battery to terminal 5 and negative (–) lead to terminal 4 then check that the lever turn to "DEF" position smoothly.
(f) Measure the resistance according to the value(s) in the table below.

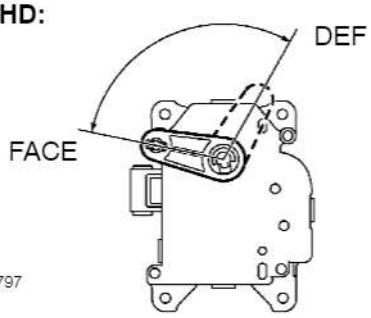
Standard:

Tester connection	Condition	Specified condition
A19–3 (PT) – A19–2 (GND)	DEF position	0.6 to 1.1 kΩ

LHD:



RHD:



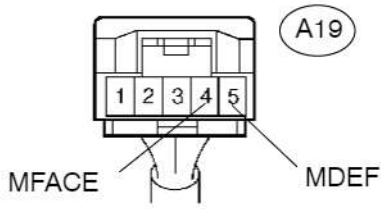
NG → **REPLACE AIR OUTLET CONTROL SERVOMOTOR**

OK

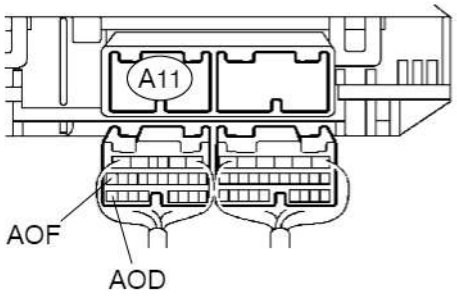
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4	CHECK HARNESS AND CONNECTOR(AIR OUTLET CONTROL SERVOMOTOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Outlet Control Servomotor Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from air outlet control servomotor and air conditioning amplifier.

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

Standard:

Tester connection	Condition	Specified condition
A11–16 (AOF) – A19–4 (MFACE)	Always	Below 1 Ω
A11–24 (AOD) – A19–5 (MDEF)	Always	Below 1 Ω
A11–16 (AOF) – Body ground	Always	10 kΩ or higher
A11–24 (AOD) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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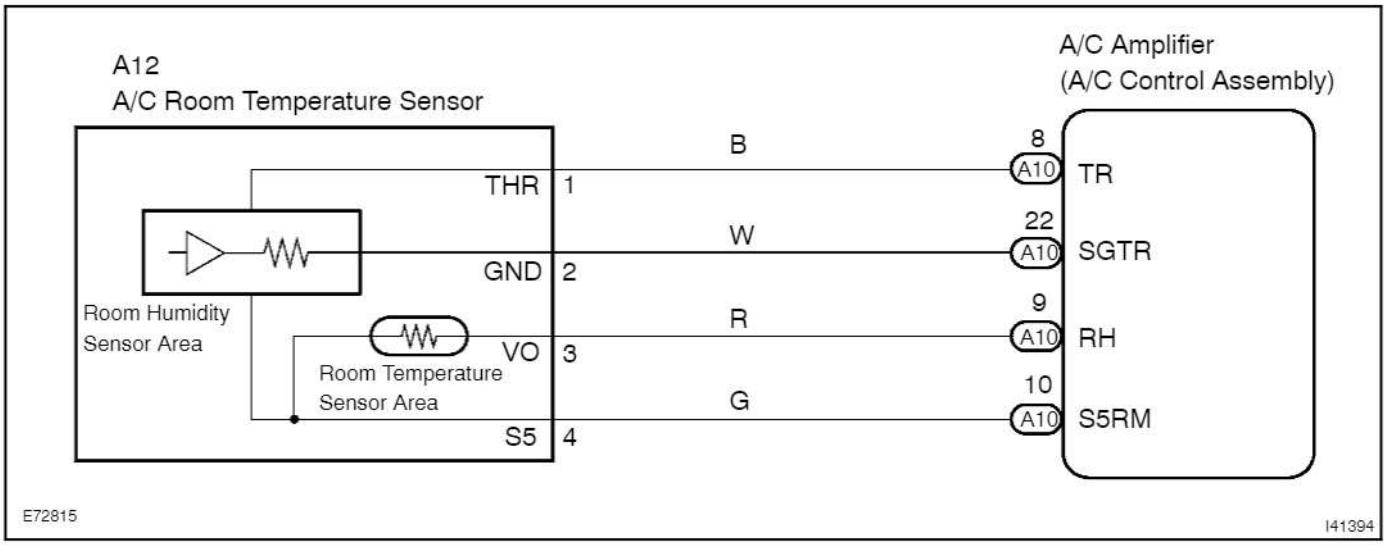
DTC B1462 ROOM HUMIDITY SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The A/C room humidity sensor detects room humidity. The voltage of the A/C room humidity sensor changes in accordance with room humidity. The A/C amplifier reads changes in the A/C room humidity sensor. The A/C room humidity sensor is integrated with A/C room temperature sensor.

DTC No.	Detection item	Trouble Area
B1462	Open or short in room humidity sensor circuit	• A/C room humidity sensor (A/C room temperature sensor) • Harness or connector between A/C room humidity sensor (A/C room temperature sensor) and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester II.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Humidity sensor (Humidity Sens)	Humidity sensor / min.: 0% max.: 100%	Actual room humidity is displayed	–

OK:

The displayed is as specified in the normal condition.

Result

NG	A
OK (Checking from the PROBLEM SYMPTOM TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

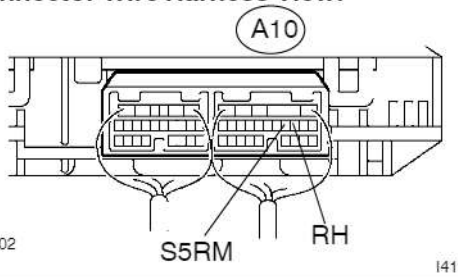
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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2 INSPECT AIR CONDITIONING AMPLIFIER(RH–S5RM)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–9 (RH) – A10–10 (S5RM)	Power switch ON at 25 °C (77 °F)	1.8 to 2.2 V
A10–9 (RH) – A10–10 (S5RM)	Power switch ON at 40 °C (104 °F)	1.2 to 1.6 V

HINT:

As the temperature increases, the voltage decreases.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1035)

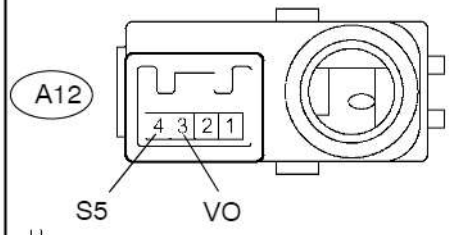
C → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

A

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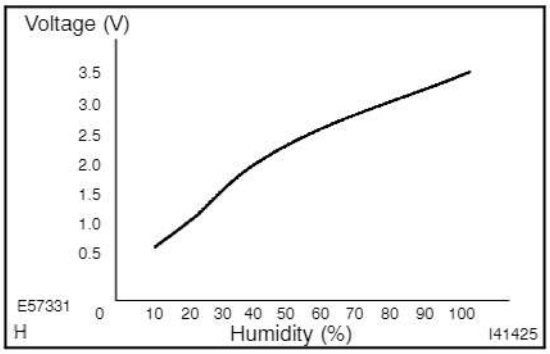
3 INSPECT A/C ROOM TEMPERATURE SENSOR (HUMIDITY SENSOR)

A/C Room Temperature Sensor Connector Front View:



(a) Remove the A/C room temperature sensor.
(b) Disconnect the connector from A/C room temperature sensor.
(c) Measure the resistance according to the value(s) in the table below.
Standard:
at 25°C (77°F) Humidity 40%: 1.61 to 2.24 V
at 25°C (77°F) Humidity 60%: 2.26 to 2.66 V

HINT:
As the humidity increases, the resistance decreases (see the graph below).

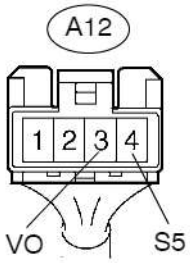


NG → **REPLACE A/C ROOM TEMPERATURE SENSOR**

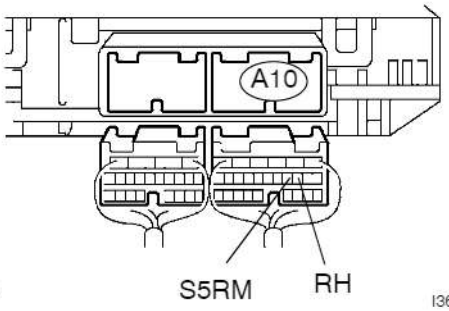
OK

4 CHECK HARNESS AND CONNECTOR(A/C ROOM HUMIDITY SENSOR – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

A/C Room Temperature Sensor Front View:



Air Conditioning Amplifier Wire Harness View:



(a) Disconnect the connector from A/C room temperature sensor and air conditioning amplifier.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A10–9 (RH) – A12–3 (VO)	Always	Below 1 Ω
A10–10 (S5RM) – A12–4 (S5)	Always	Below 1 Ω
A10–9 (RH) – Body ground	Always	10 kΩ or higher
A10–10 (S5RM) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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DTC	B1471	A/C INVERTER HIGH VOLTAGE POWER RESOURCE SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The A/C inverter assy monitors the power voltage from the main battery in the self circuit. It stops compressor control and outputs the DTC when the monitored voltage is outside the specified range.
The output DTC is memorized as previous trouble. Compressor control may not resume unless the power switch is turned off.
HINT:
The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

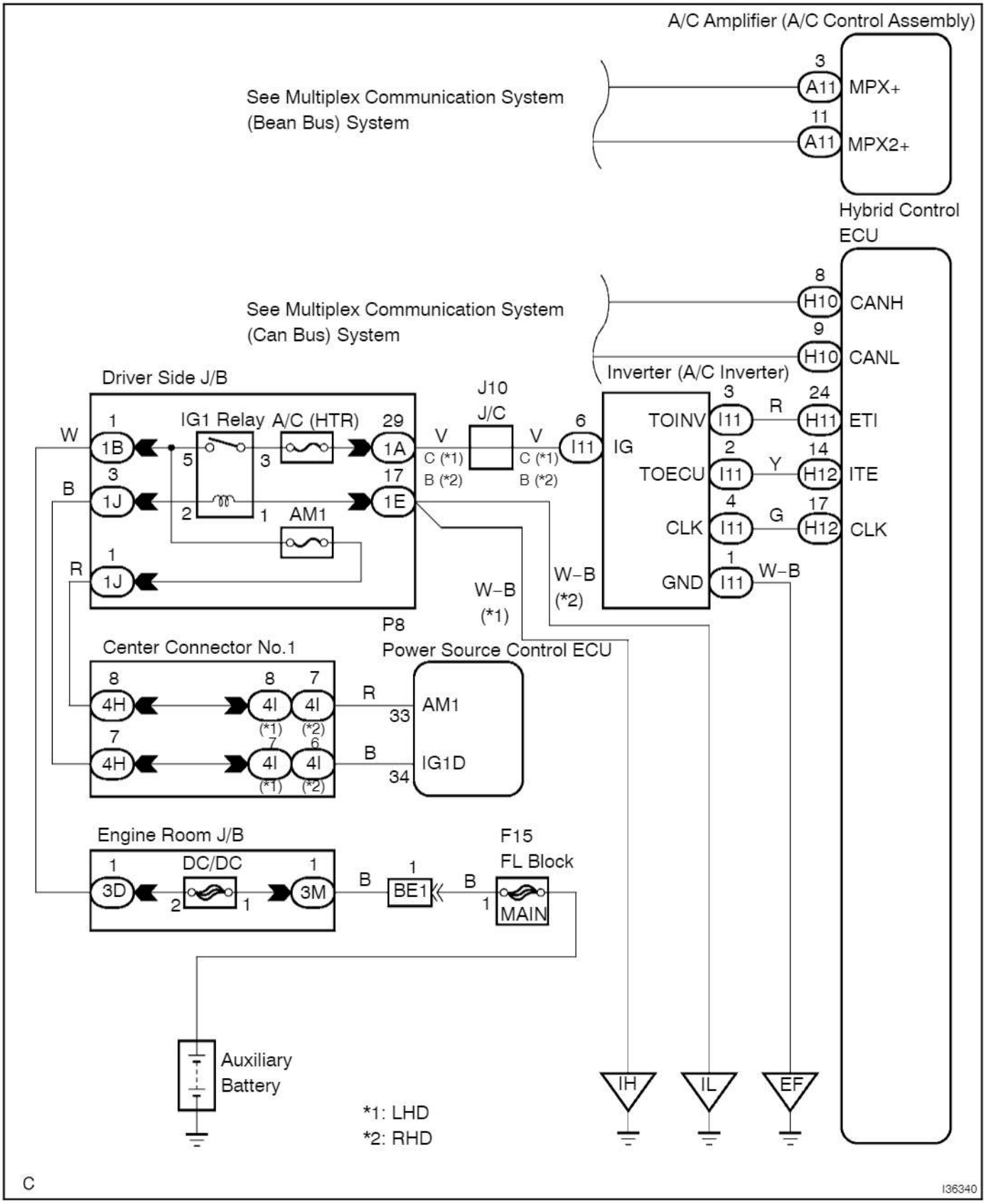
DTC No.	Detection item	Trouble Area
B1471	Open or short in A/C inverter high voltage power resource system	• Hybrid control ECU • A/C inverter (w/converter inverter assy)

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester II.
OK:
DTCs are not output in the hybrid control system.

NG → GO TO HYBRID CONTROL SYSTEM (SEE PAGE 05–268)

OK

REPLACE A/C INVERTER ASSY

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC	B1472	A/C INVERTER HIGH VOLTAGE OUTPUT SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The high voltage is output from the A/C inverter assy to the electric inverter compressor for driving the motor. Compressor control is stopped and the DTC is output if there is an open or short to ground in the output circuit.

The output DTC is memorized as previous trouble. Compressor control remains stopped unless the past and current DTCs are cleared by intelligent tester II.

CAUTION:

Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high–voltage connectors.

HINT:

The hybrid vehicle system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid system first if any DTCs from those systems are output simultaneously.

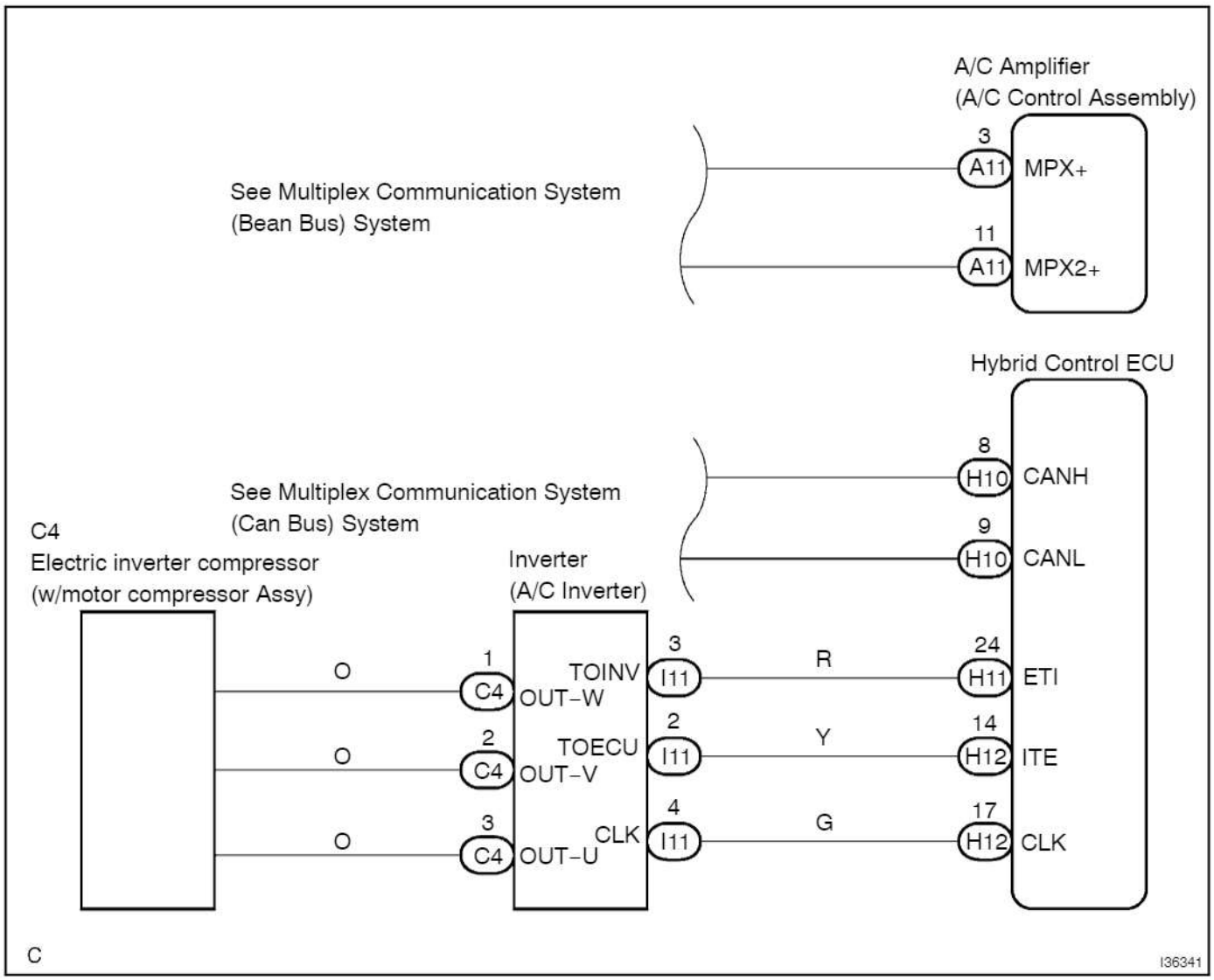
DTC No.	Detection item	Trouble Area
B1472	Open or short in A/C inverter high voltage output system	• Hybrid control ECU • Electric inverter compressor (w/motor compressor assy) • A/C inverter (w/converter inverter assy)

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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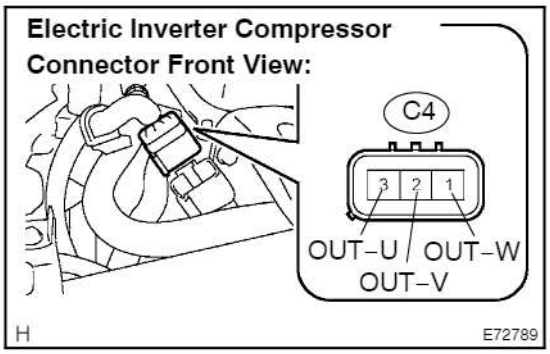
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT ELECTRIC INVERTER COMPRESSOR



(a) Remove the service plug grip.

CAUTION:

Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.

(b) Disconnect the electric inverter compressor connector.

(c) Measure the resistance according to the value(s) in the table below immediately after the compressor is stopped.

Standard:

Tester connection	Condition	Specified condition
C4–1 (OUT–W) – C4–2 (OUT–V)	Always	0.5 to 0.8 Ω
C4–1 (OUT–W) – C4–3 (OUT–U)	Always	0.5 to 0.8 Ω
C4–2 (OUT–V) – C4–3 (OUT–U)	Always	0.5 to 0.8 Ω

NG → **REPLACE ELECTRIC INVERTER COMPRESSOR**

OK

REPLACE A/C INVERTER ASSY

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC	B1473	A/C INVERTER START–UP SIGNAL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

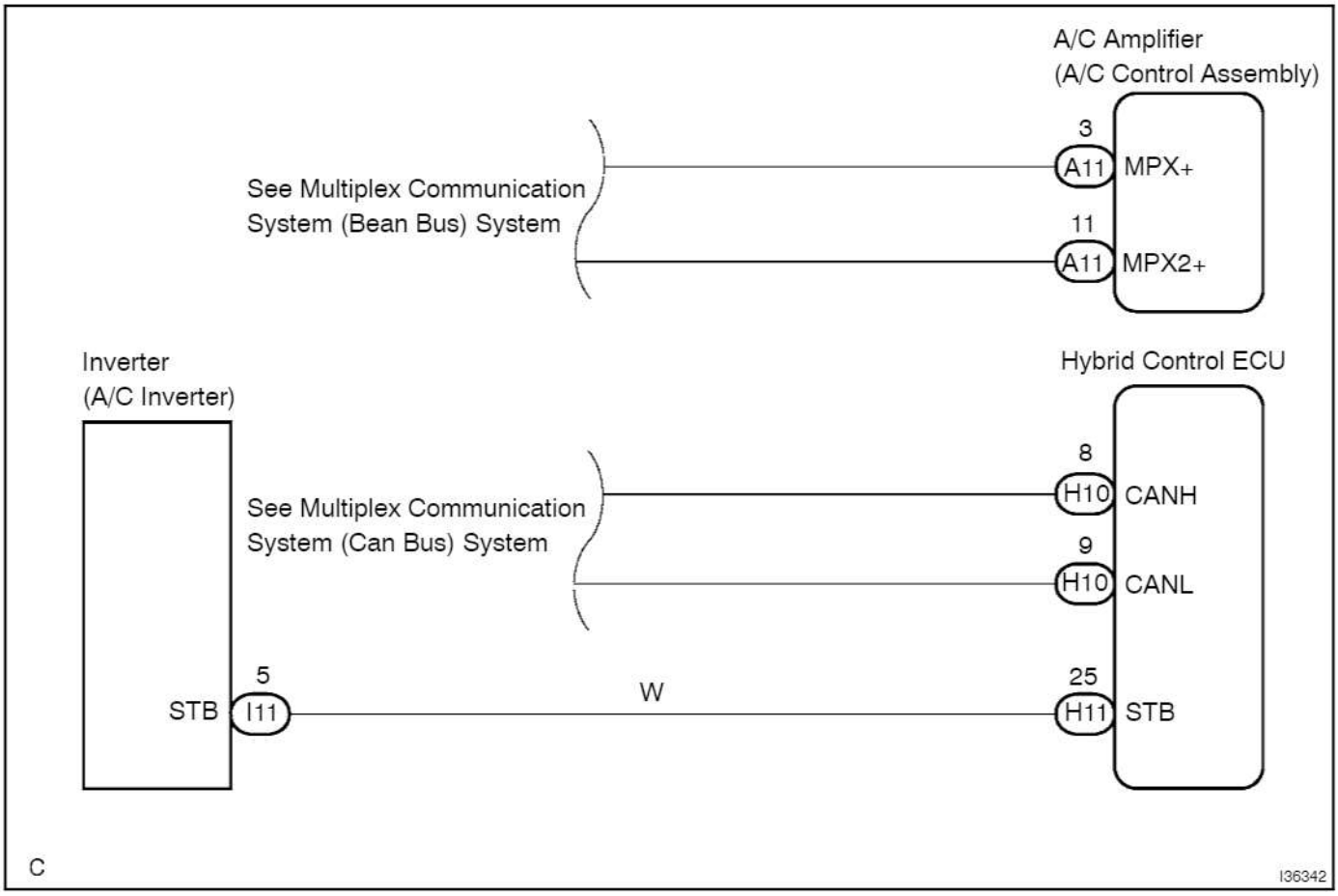
The inverter activation signal is sent to the A/C inverter assy from the hybrid control ECU. Compressor control is stopped and the DTC is output if there is an open or short in the signal circuit.

DTC No.	Detection item	Trouble Area
B1473	Open or short in A/C inverter start–up signal system	• Harness or connector between hybrid control ECU and A/C inverter (w/converter inverter assy) • A/C inverter (w/converter inverter assy) • Hybrid control ECU

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

WIRING DIAGRAM



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INSPECTION PROCEDURE

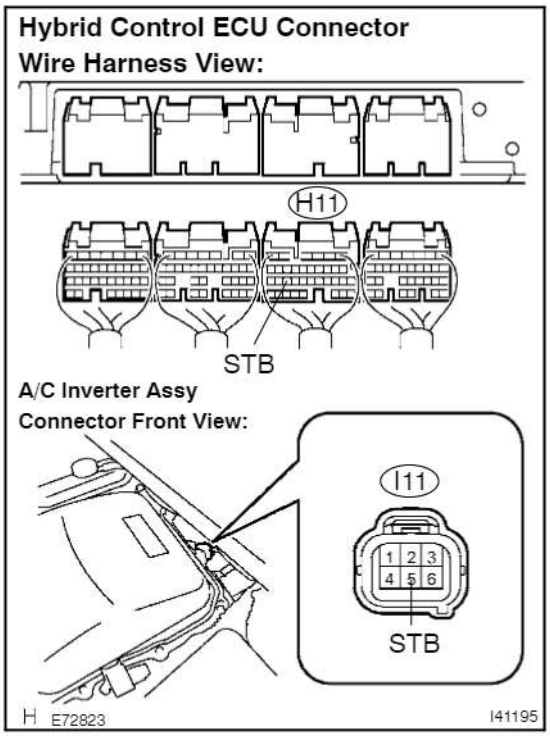
1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester II.
OK:
DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM (SEE PAGE 05–268)**

OK

2	CHECK HARNESS AND CONNECTOR (HYBRID CONTROL ECU – A/C INVERTER ASSY) (SEE PAGE 01–46)



(a) Disconnect the hybrid control ECU connector.
(b) Disconnect the A/C inverter assy connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
H11–25 (STB) – I11–5 (STB)	Always	0.5 to 0.8 Ω
H11–25 (STB) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE A/C INVERTER ASSY

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC	B1475	A/C INVERTER COOLING/HEATING SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The A/C inverter in the A/C inverter assy monitors the cooling water temperature with the temperature sensor. It stops compressor control and outputs the DTC when the monitored temperature is outside specified range (too high or too low).
The hybrid system and the air conditioning system monitor the cooling water temperature separately. If DTCs referring to an inverter cooling system malfunction are output simultaneously, there may be trouble such as insufficient cooling water.
If DTCs are output only for the air conditioning system, there may be an open or short in the temperature sensor circuit in the inverter.

DTC No.	Detection item	Trouble Area
B1475	Cooling water temperature in the inverter is outside the specified range (temperature is too high), or there is an open or short to ground in the temperature sensor circuit.	• A/C inverter (w/converter inverter assy)

INSPECTION PROCEDURE

1	CHECK COOLING WATER

NOTICE:
Even if DTCs are output only for the air conditioning system, inspect the cooling system first and check that it is normal as there may be trouble such as insufficient cooling water.

NG → **ADD COOLING WATER**

OK

2	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester II.
OK:
DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM (SEE PAGE 05–268)**

OK

REPLACE A/C INVERTER ASSY

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC	B1476	A/C INVERTER LOAD SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The A/C inverter assy stops compressor control and outputs the DTC if the rotation load is too great or too small while controlling motor rotation in the A/C inverter assy.
HINT:
Possible reasons could be as follows: Load is low when the refrigerant gas leaks, or load is too great when refrigerant gas is excessively charged, insufficient cooling performance due to condenser fan circuit trouble, or the compressor locked up.

DTC No.	Detection item	Trouble Area
B1476	Motor's rotation load while the compressor is operating is too great or too small.	• Volume of refrigerant • Electric inverter compressor (w/motor compressor assy) • Cooling fan circuit

INSPECTION PROCEDURE

1	CHECK COOLER CONDENSOR ASSY

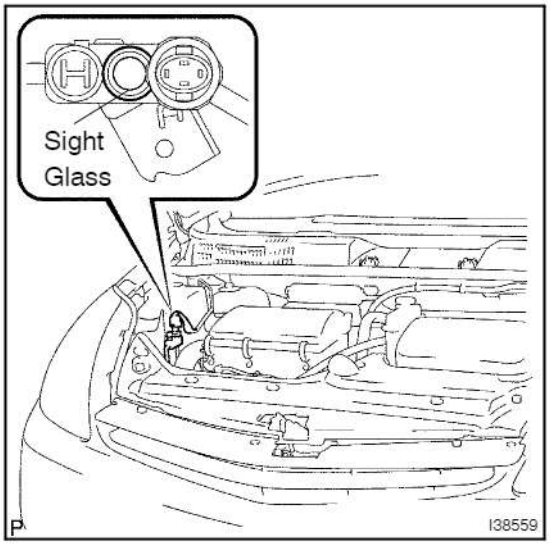
(a) Turn the power switch off and on (READY).
(b) Set the A/C temperature setting to "MAX. COOL" and the blower to " LO", and turn the A/C switch on.
(c) Check operation of the condenser fan.
Standard: The condenser fan rotates.

NG → **INSPECT COOLING FAN SYSTEM** (SEE PAGE 16–9)

OK

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2 CHECK HFC–134A (R134A)



(a) Inspect refrigerant volume.
(1) Check the sight glass of the cooler unit refrigerant liquid pipe E.
(2) Set the vehicle according to the conditions below.

Item	Condition
All Doors	Fully open
Temperature setting	Max. Cool
Blower Speed	HI
A/C	ON

(3) Check the sight glass.

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles exist	Insufficient*	(1) Check for gas leakage and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles exist (DTC 76 is output)	Empty, insufficient or excessive	Refer to 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet.	Proper or excessive	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant remains clear	Excessive	(1) Discharge refrigerant (2) Remove air and supply proper amount of purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Proper	–

*: Bubbles in the sight glass with room temperature higher than usual can be considered normal if cooling is sufficient.

NG → CHARGE REFRIGERANT (SEE PAGE 55–12)

OK

REPLACE ELECTRIC INVERTER COMPRESSOR

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC	B1477	A/C INVERTER LOW VOLTAGE POWER RESOURCE SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The A/C inverter assy monitors the controlling power voltage in the self circuit. It stops compressor circuit and outputs the DTC when the monitored voltage is outside the specified range.
The output DTC is memorized as previous trouble. The compressor control may not resume unless the power switch is turned off.

DTC No.	Detection item	Trouble Area
B1477	An open or short to ground in the inverter's controlling power voltage circuit.	• A/C inverter (w/converter inverter assy)

INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester II.
OK:
DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM (SEE PAGE 05–268)**

OK ↓

REPLACE A/C INVERTER

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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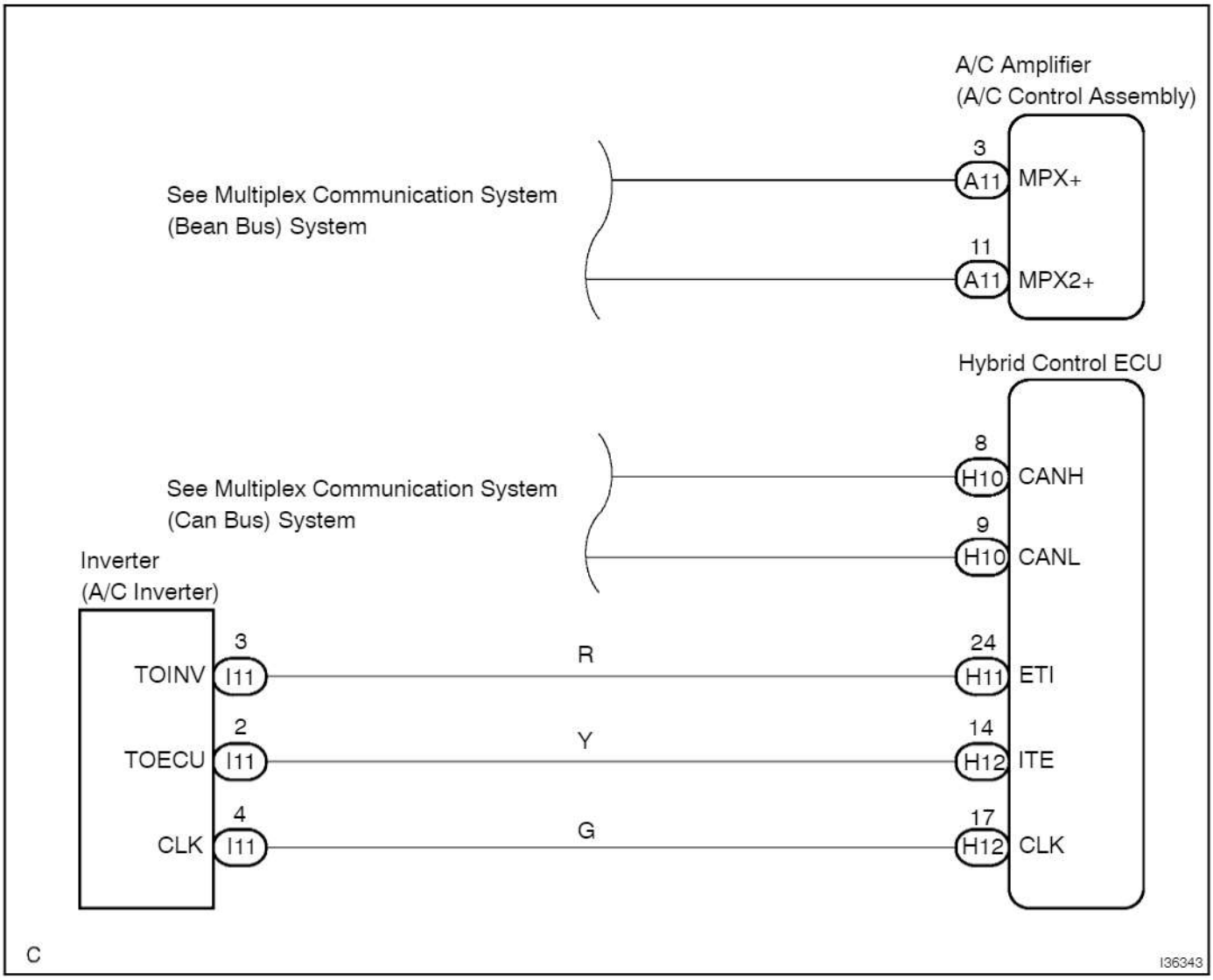
DTC	B1498	COMMUNICATIOIN MALFUNCTION (A/C INVERTER LOCAL)

CIRCUIT DESCRIPTION

The hybrid control ECU and A/C inverter assy transmit information to one another via communication line. Compressor control is stopped and the DTC is output if communication information is cut off or abnormal information occurs.
The output DTC is memorized as previous trouble.

DTC No.	Detection item	Trouble Area
B1498	Communication line error or open between the hybrid control ECU and the A/C inverter (w/converter inverter assy)	• Harness or connector between hybrid control ECU and A/C inverter (w/converter inverter assy) • Hybrid control ECU • A/C inverter (w/converter inverter assy)

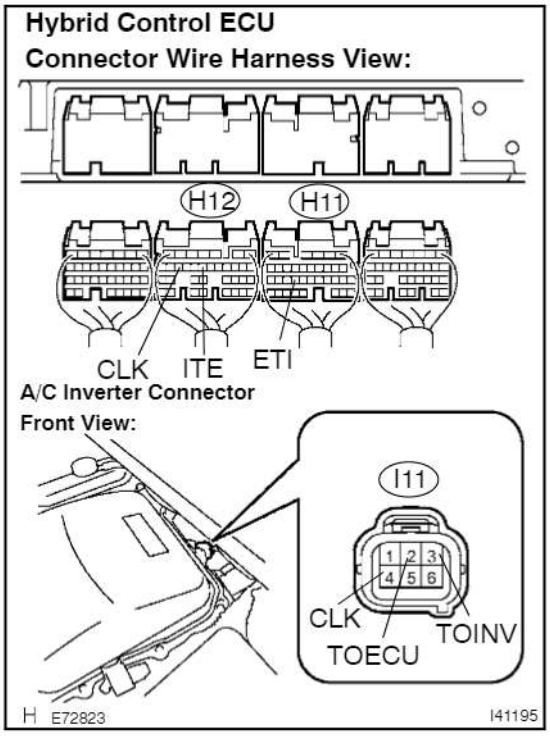
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (HYBRID CONTROL ECU AND A/C INVERTER) (SEE PAGE 01–46)



(a) Disconnect the hybrid control ECU connector.
(b) Disconnect the A/C inverter connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
H11–24 (ETI) – I11–3 (TOINV)	Always	Below 1 Ω
H12–14 (ITE) – I11–2 (TOECU)	Always	Below 1 Ω
H12–17 (CLK) – I11–4 (CLK)	Always	Below 1 Ω
H11–24 (ETI) – Body ground	Always	10 kΩ or higher
H12–14 (ITE) – Body ground	Always	10 kΩ or higher
H12–17 (CLK) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK DIAGNOSTIC TROUBLE CODE

(a) Connect the hybrid control ECU connector.
(b) Connect the A/C inverter connector.
(c) Check if DTCs for the hybrid control system are output using intelligent tester II.

OK:

DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM (SEE PAGE 05–268)**

OK

REPLACE A/C INVERTER

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

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DTC P3009–611 HIGH VOLTAGE POWER SHORT CIRCUIT

CIRCUIT DESCRIPTION

The DTC is output if there is insulation trouble with the high–voltage circuits in the air conditioning system. Insulation trouble with the electric inverter compressor or A/C inverter assy may be the cause. Any oil other than ND–OIL 11 may have entered the refrigeration cycle.

The motor driven with high–voltage is built into the electrical compressor and is cooled directly with refrigerant. Compressor oil (ND–OIL 11) with high insulation performance is used because a leakage of electrical power may occur if regular compressor oil (ND–OIL 8) is used.

NOTICE:

- **Electrical insulation performance may decrease significantly if even a small amount of oil other than ND–OIL 11 is used (or enters) in the refrigeration cycle, causing the DTC to be output.**
- **If other is accidentally used and a DTC is output, collect the oil in the refrigeration cycle into the compressor and replace it with ND–OIL 11 to increase the ND–OIL 11 ration amount.**
- **Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND–OIL 11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing the DTC to be output.**

CAUTION:

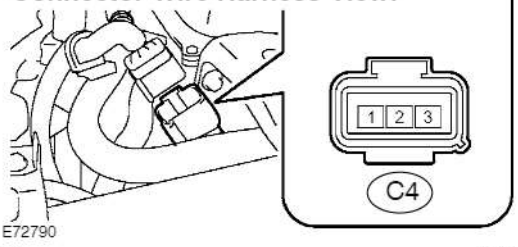
Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high–voltage connectors.

DTC No.	Detection item	Trouble Area
P3009–611	High voltage system insulation malfunction.	• Electric inverter compressor (w/motor compressor assy) • A/C inverter (w/converter inverter assy) • Compressor oil

INSPECTION PROCEDURE

1	INSPECT A/C INVERTER

Electric Inverter Compressor Connector Wire Harness View:



(a) Remove the service plug grip.

CAUTION:

Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.

(b) Disconnect the electric inverter compressor connector.

(c) Measure the resistance according to the value(s) in the table below immediately after the compressor is stopped.

Standard:

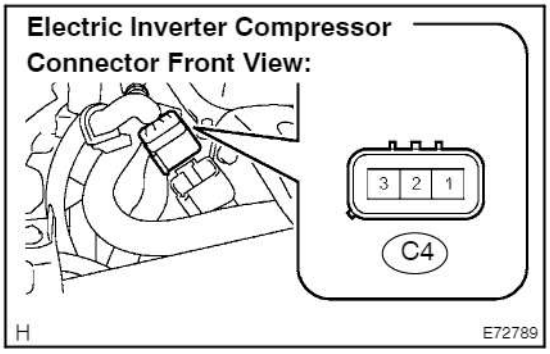
Tester connection	Condition	Specified condition
C4–1 – Body ground	Always	2 MΩ or higher
C4–2 – Body ground	Always	2 MΩ or higher
C4–3 – Body ground	Always	2 MΩ or higher

NG → REPLACE A/C INVERTER

OK

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2 INSPECT ELECTRIC INVERTER COMPRESSOR



(a) Remove the service plug grip.

CAUTION:

Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.

(b) Disconnect the electric inverter compressor connector.

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

Standard:

Tester connection	Condition	Specified condition
C4–1 – Body ground	Always	2 MΩ or higher
C4–2 – Body ground	Always	2 MΩ or higher
C4–3 – Body ground	Always	2 MΩ or higher

NG → **REPLACE ELECTRIC INVERTER COMPRESSOR**

NOTICE:

The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

OK

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3 INSPECT ELECTRIC INVERTER COMPRESSOR

(a) Connect the electric inverter compressor connector
(b) Install the service plug grip.

CAUTION:
Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.

(c) Turn the power switch on.
(d) Set the A/C setting temperature to 25°C (77°F) and the blower switch LO and then operate the compressor for 10 minutes to circulate the refrigerant cycle with refrigerant and collect as much compressor oil remaining in each component into the compressor as possible.

HINT:
Inspect with sufficient oil in the compressor since the insulation resistance of the compressor changes depending on the amount of oil in the compressor.

(e) Turn the power switch off, and leave the vehicle for a night to cool down the compressor's internal temperature.

NOTICE:
Do not operate the compressor before inspection.

HINT:
- Leave the vehicle until the compressor temperature decreases below ambient temperature. (As the compressor temperature decreases below the temperature of the condenser and evaporator, more oil can be stored in the compressor.)
- If there is significant difference in temperature between day and night time, it will take approximately 4 hours to cool down the compressor.

(f) Remove the service plug grip.

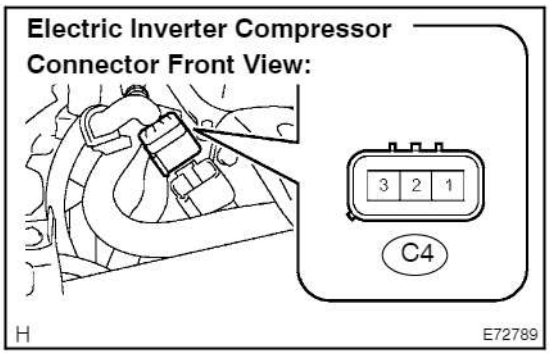
CAUTION:
Because the compressor has a high–voltage circuit, wear insulated gloves and pull out the service plug to cut the high–voltage circuit before inspection.

(g) Disconnect the electric inverter compressor connector.
(h) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C4–1 – Body ground	Always	3 MΩ or higher
C4–2 – Body ground	Always	3 MΩ or higher
C4–3 – Body ground	Always	3 MΩ or higher

NOTICE:
If the results are out of the specified range, replace the compressor without operating.



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NG → REPLACE ELECTRIC INVERTER COMPRESSOR

NOTICE:
The A/C inverter is integrated with the inverter assy. It is necessary to replace the PCU box assy if the A/C inverter (inverter assy) needs to be replaced because the A/C inverter (inverter assy) cannot be replaced alone.

OK

SYSTEM OK

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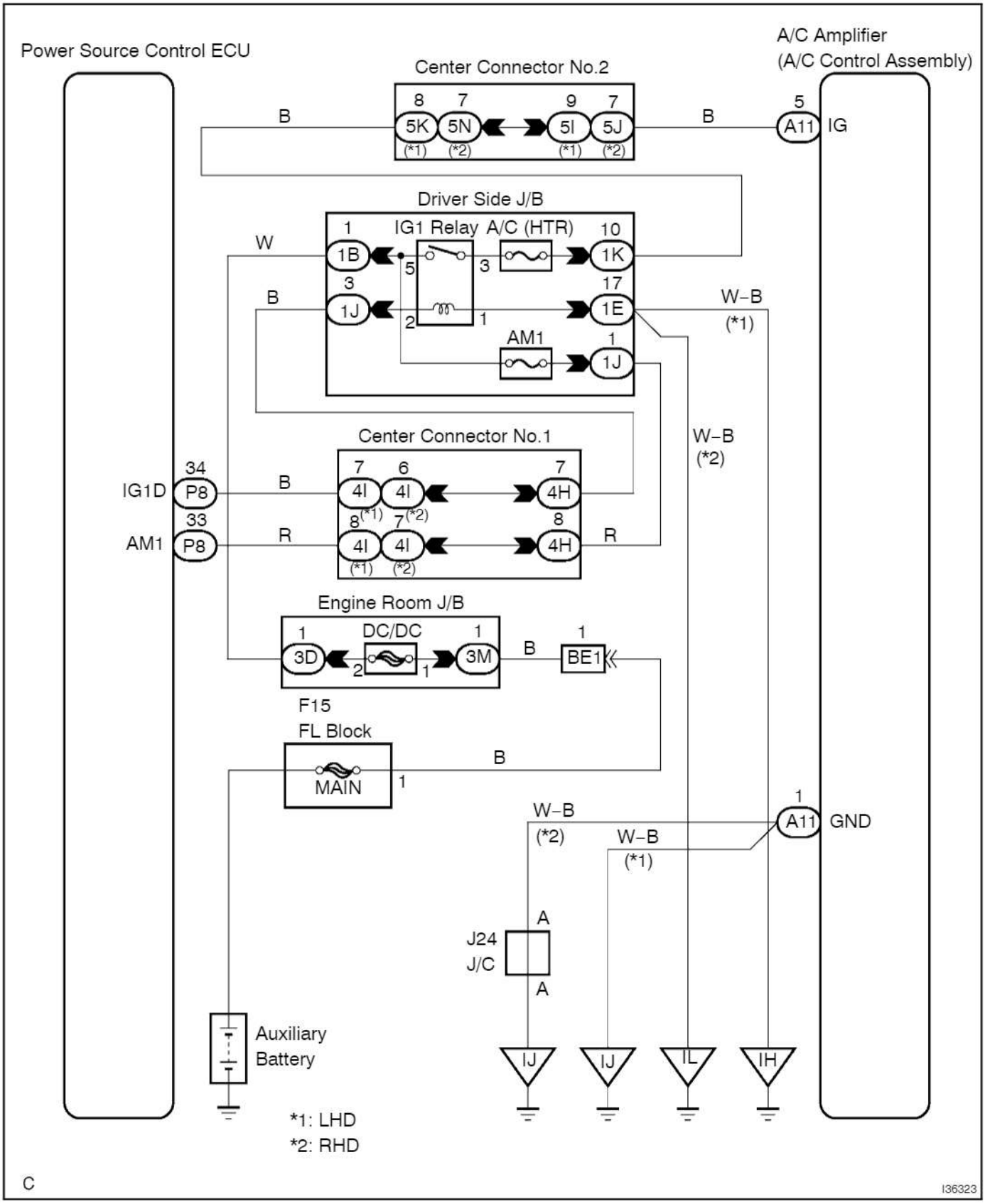
IG POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the main power source supplied to the A/C amplifier when the power switch is turned to the ON position. The power source supplied is used for operating the A/C amplifier and servomotor, etc.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT FUSE(A/C (HTR))

(a) Remove the A/C (HTR) fuse from the driver side J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

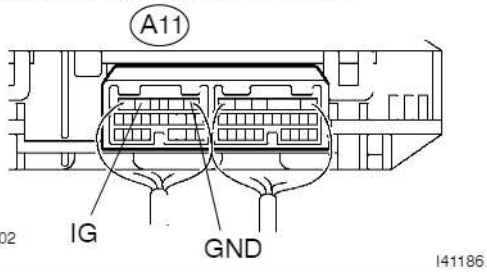
Tester item	Condition	Specified condition
A/C (HTR) fuse	Always	Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FAILURE FUSE (A/C (HTR))**

OK

2	INSPECT AIR CONDITIONING AMPLIFIER(IG – BODY GROUND)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A11–5 (IG) – A11–1 (GND)	Power switch ON	10 to 14 V

NG → **Go to step 3**

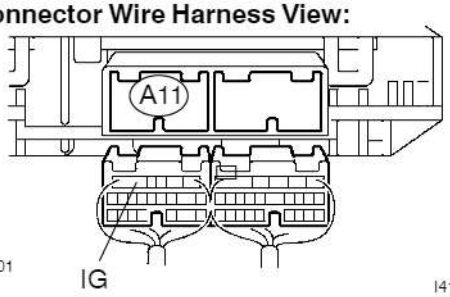
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1035)

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3	CHECK HARNESS AND CONNECTOR(AIR CONDITIONING AMPLIFIER ASSY – BATTERY) (SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

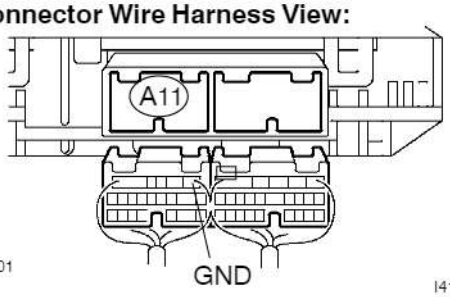
Tester connection	Condition	Specified condition
A11–5 (IG) – Body ground	Power switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR(AIR CONDITIONING AMPLIFIER – BODY GROUND)(SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



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

Standard:

Tester connection	Condition	Specified condition
A11–1 (GND) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

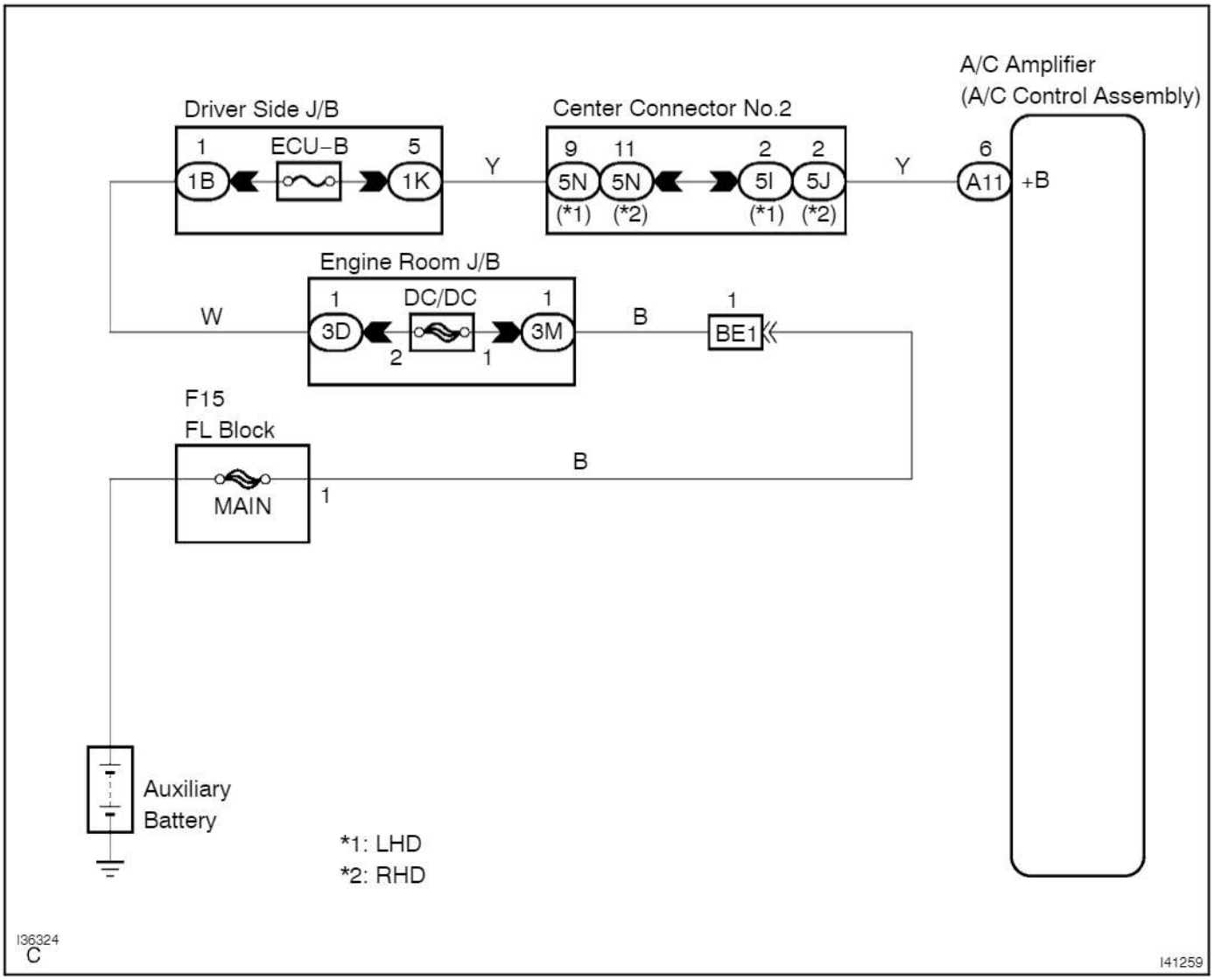
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BACK–UP POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the back–up power source circuit for the A/C amplifier. Power is supplied even when turning the power switch off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT FUSE(ECU–B)

(a) Remove the ECU–B fuse from the driver side J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

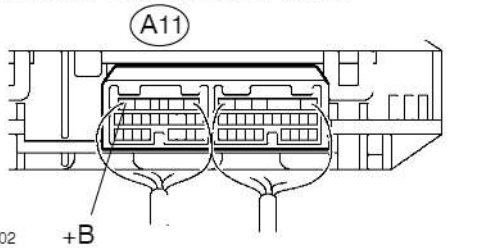
Tester item	Condition	Specified condition
ECU–B fuse	Always	Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FAILURE FUSE(ECU–B FUSE)**

OK

2	INSPECT AIR CONDITIONING AMPLIFIER(+B – BODY GND)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A11–6 (+B) – Body ground	Always	10 to 14 V

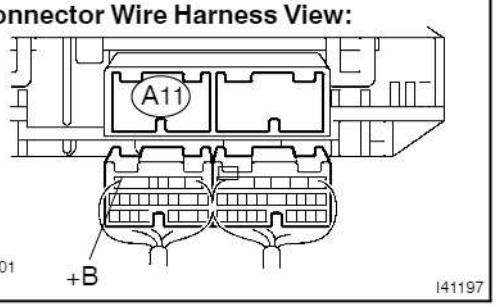
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)

3	CHECK HARNESS AND CONNECTOR(AIR CONDITIONING AMPLIFIER – BODY GROUND) (SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A11–6 (+B) – Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECU – A/C AMPLIFIER)**

OK

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

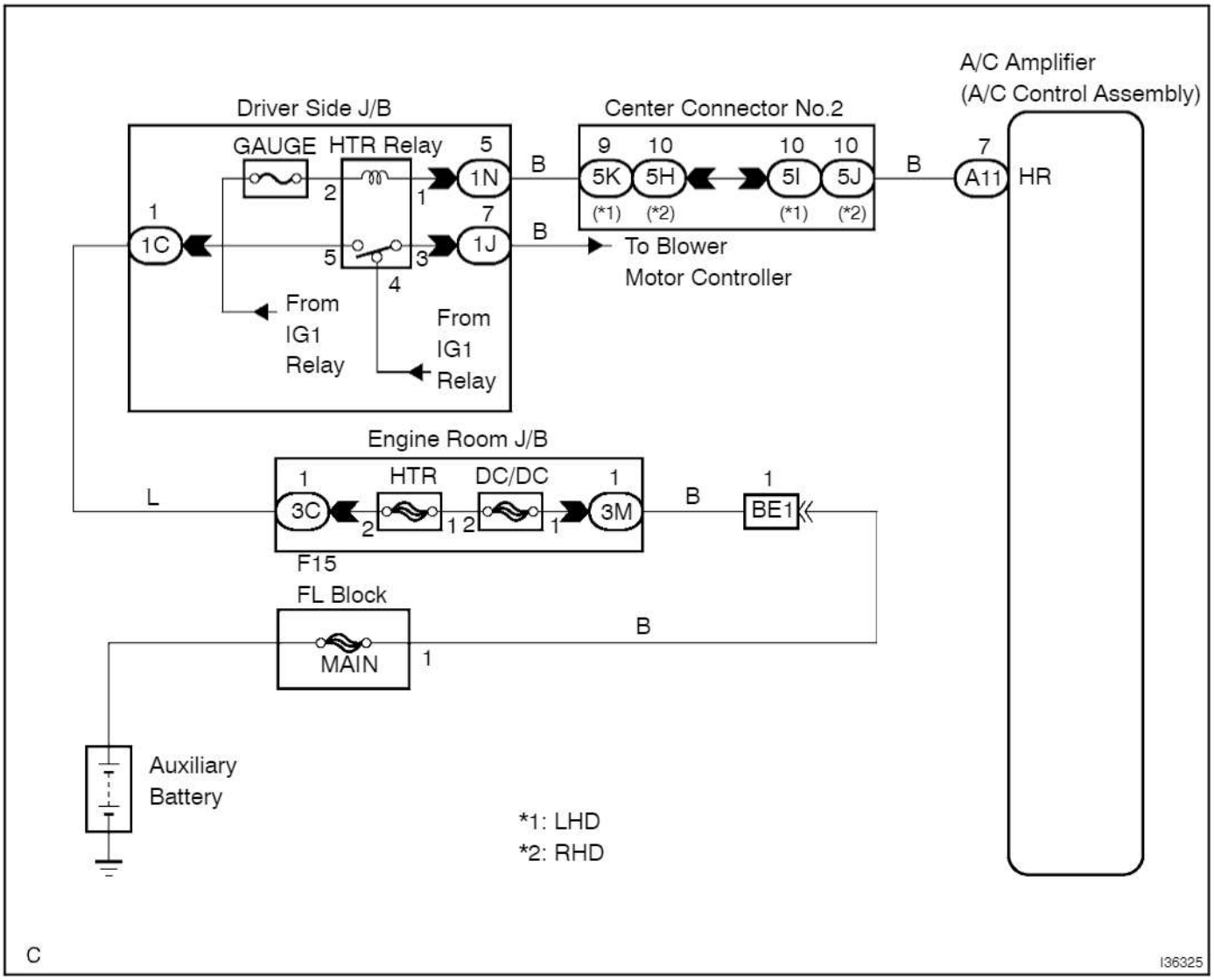
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HEATER RELAY CIRCUIT

CIRCUIT DESCRIPTION

The heater relay is turned on by signals from the A/C amplifier. It supplies power to the blower motor controller.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK FUSE(HTR)

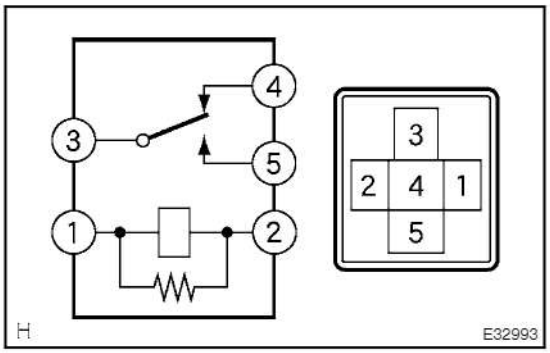
(a) Remove the HTR fuse from the engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester item	Condition	Specified condition
HTR fuse	Always	Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FAILURE FUSE(HTR FUSE)**

OK

2	INSPECT HEATER RELAY



(a) Measure the resistance according to the value(s) in the table below.
Standard:

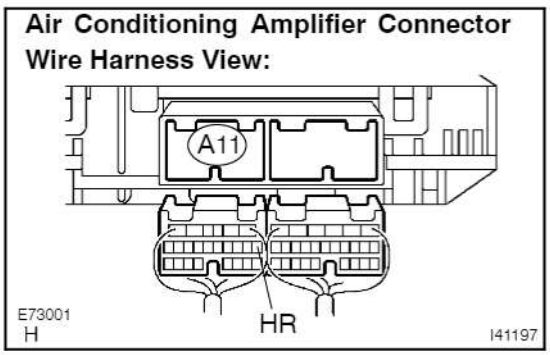
Tester connection	Condition	Specified condition
3 – 5	Always	10 kΩ or higher
3 – 5	When battery voltage applied to terminals 1 and 2	Below 1 Ω
3 – 4	Always	Below 1 Ω
3 – 5	When battery voltage applied to terminals 1 and 2	10 kΩ or higher

NG → **REPLACE HEATER RELAY**

OK

3	CHECK HARNESS AND CONNECTOR(BATTERY – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Measure the voltage according to the value(s) in the table below.

Tester connection	Condition	Specified condition
A11–7 (HR) – Body ground	Power switch ON	10 to 14 V

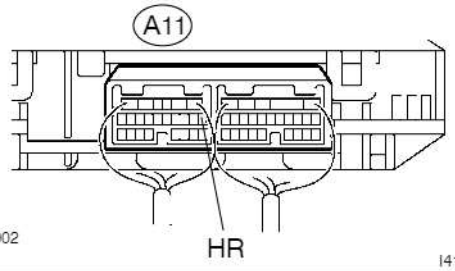
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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4	CHECK HARNESS AND CONNECTOR(AIR CONDITIONING AMPLIFIER – BATTERY) (SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Standard
A11–7 (HR) – Body ground	Power switch position OFF Blower switch position OFF	Below 1 V
A11–7 (HR) – Body ground	Power switch position ON Blower switch position ON	Below 1 V
A11–7 (HR) – Body ground	Power switch position ON Blower switch position OFF	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1035)

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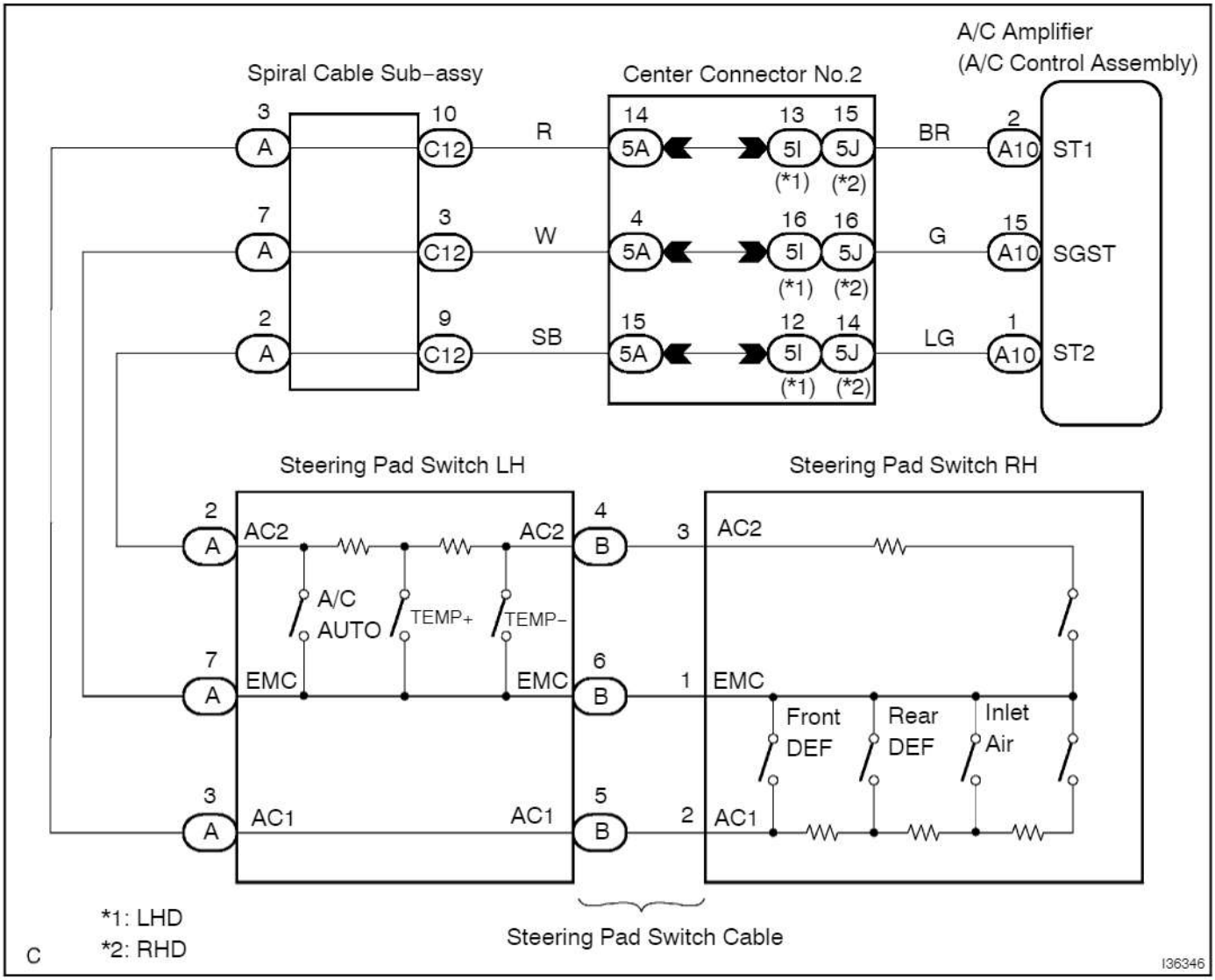
STEERING PAD SWITCH CIRCUIT

CIRCUIT DESCRIPTION

AUTO, TEMP UP (+), TEMP DOWN (–), Recirculation/Fresh, Fr. DEF and Rr. DEF switches are located on the steering pad switch.

The resistance of the steering pad switch changes in accordance with switch operation. The air conditioner amplifier assy outputs voltage to the steering pad switch and reads voltage changes according to the resistance changes with switch operation.

WIRING DIAGRAM

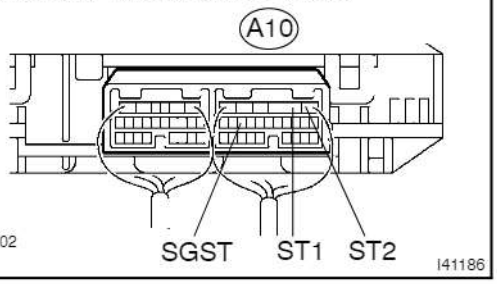


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INSPECTION PROCEDURE

1	INSPECT AIR CONDITIONING AMPLIFIER ASSY

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.

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

Standard:

Tester connection	Condition	Specified condition
A10–2 (ST1) – A10–15 (SGST)	Power switch ON Fr. DEF switch ON	Below 0.3 V
A10–2 (ST1) – A10–15 (SGST)	Power switch ON Rr. DEF switch ON	0.8 to 1.5 V
A10–2 (ST1) – A10–15 (SGST)	Power switch ON Recirculation/ Fresh switch ON	2.0 to 2.9 V
A10–1 (ST2) – A10–15 (SGST)	Power switch ON AUTO switch ON	Below 0.3 V
A10–1 (ST2) – A10–15 (SGST)	Power switch ON TEMP+ switch ON	0.8 to 1.5 V
A10–1 (ST2) – A10–15 (SGST)	Power switch ON TEMP– switch ON	2.0 to 2.9 V

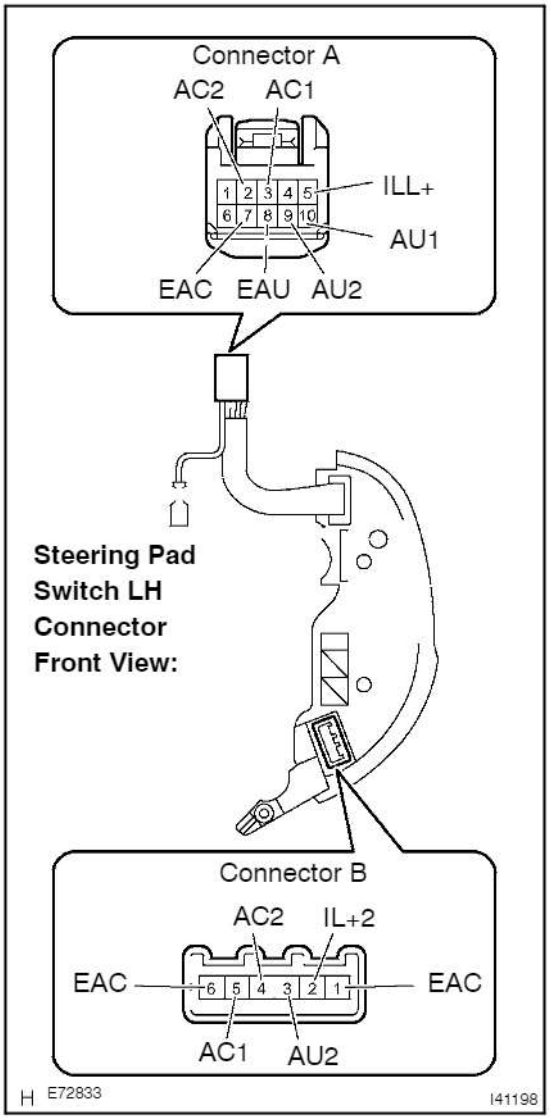
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1035)

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2 INSPECT STEERING PAD SWITCH LH



(a) Remove the steering pad switch LH.

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

Standard:

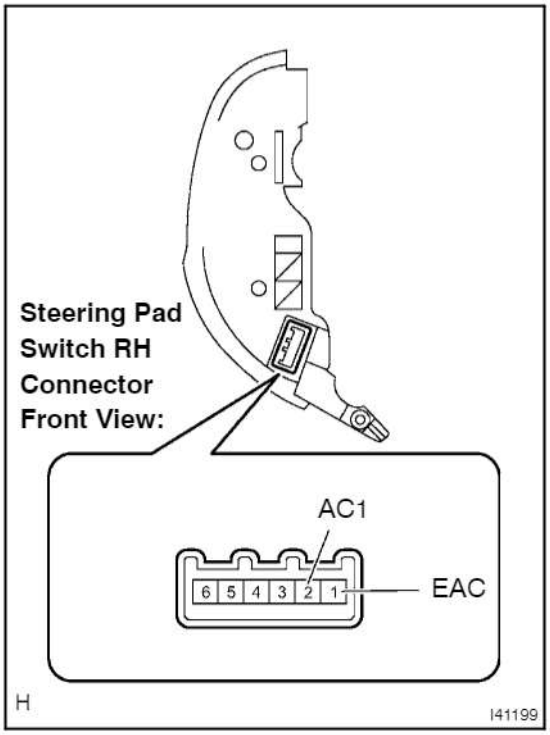
Tester connection	Condition	Specified condition
A2 (AC2) – B5 (AC1)	Always	1,210 Ω
A7 (EAC) – B6 (EAC)	Always	Below 1 Ω
A3 (AC1) – B5 (AC1)	Always	Below 1 Ω
A2 (AC2) – A7 (EAC)	AUTO switch ON	Below 1 Ω
A2 (AC2) – A7 (EAC)	TEMP + switch ON	300 Ω
A2 (AC2) – A7 (EAC)	TEMP – switch ON	1,210 Ω

NG → **REPLACE STEERING PAD SWITCH LH**

OK

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3 INSPECT STEERING PAD SWITCH RH



(a) Remove the steering pad switch RH.
(b) Measure resistance according to the value(s) in the table below.

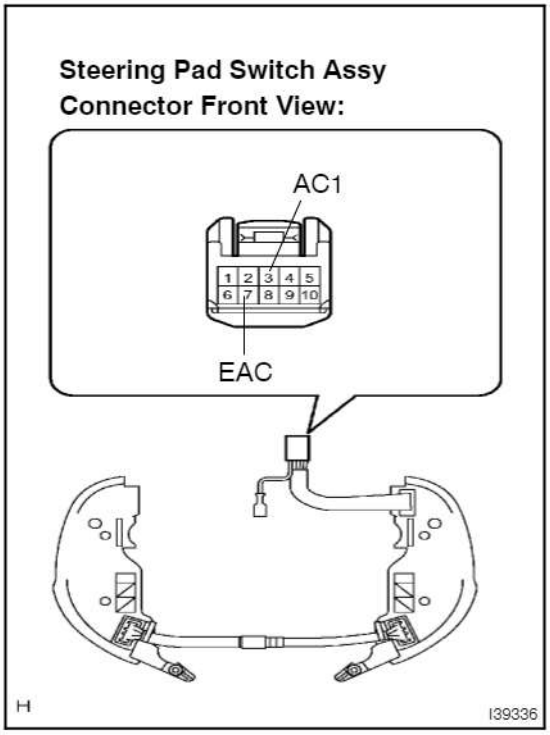
Standard:

Tester connection	Condition	Specified condition
2 (AC1) –1 (EAC)	Fr. DEF switch ON	Below 1 Ω
2 (AC1) –1 (EAC)	Rr. DEF switch ON	300 Ω
2 (AC1) –1 (EAC)	Recirculation/Freshswitch ON	1,210 Ω

NG → REPLACE STEERING PAD SWITCH RH

OK

4 INSPECT STEERING PAD SWITCH ASSY



(a) Connect the steering pad switched RH and LH to the steering pad switch cable.
(b) Measure resistance according to the value(s) in the table below.

Standard:

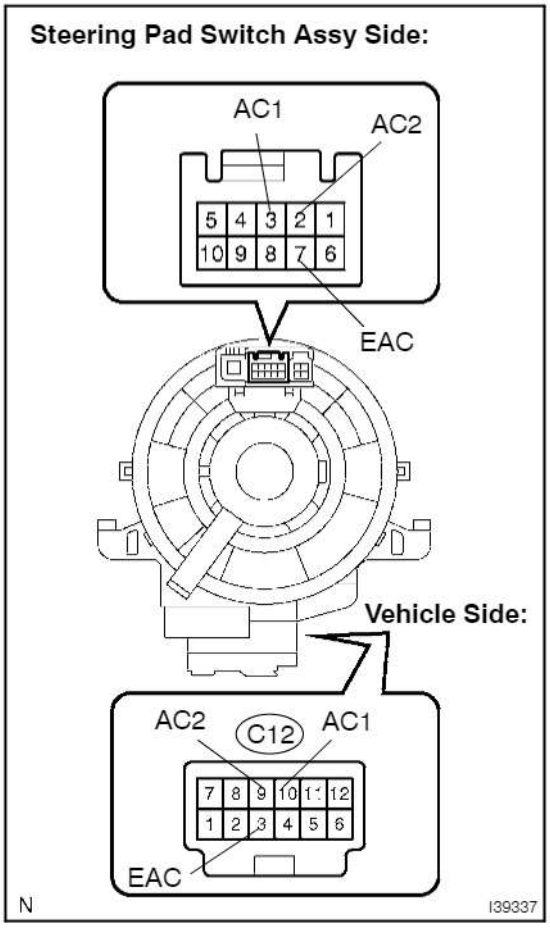
Tester connection	Condition	Specified condition
3 (AC1) – 7 (EAC)	Fr. DEF switch ON	Below 1 Ω
3 (AC1) – 7 (EAC)	Rr. DEF switch ON	300 Ω
3 (AC1) – 7 (EAC)	Recirculation/Freshswitch ON	1,210 Ω

NG → REPLACE STEERING PAD SWITCH ASSY

OK

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5 INSPECT SPIRAL CABLE SUB–ASSY



(a) Disconnect the spiral cable sub–assy connector.

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

Standard:

Tester connection	Condition	Specified condition
EAC (C12–3) – 7 (EAC)	Always	Below 1 Ω
AC2 (C12–9) – 2 (AC2)	Always	Below 1 Ω
AC1 (C12–10) – 3 (AC1)	Always	Below 1 Ω

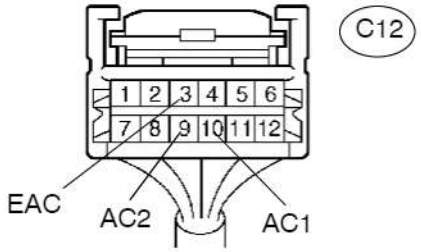
NG → **REPLACE SPIRAL CABLE SUB–ASSY**

OK

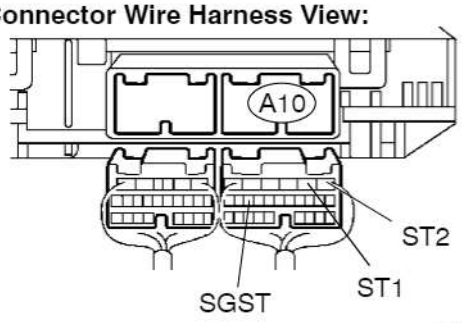
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6	CHECK HARNESS AND CONNECTOR(STEERING PAD SWITCH – AIR CONDITIONING AMPLIFIER) (SEE PAGE 01–46)

Steering Pad Switch Connector Front View:



Air Conditioning Amplifier Connector Wire Harness View:



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

Standard:

Tester connection	Condition	Specified condition
A10–2 (ST1) – C12–10 (AC1)	Always	Below 1 Ω
A10–15 (SGST) – C12–3 (EAC)	Always	Below 1 Ω
A10–1 (ST2) – C12–9 (AC2)	Always	Below 1 Ω
A10–2 (ST1) – Body ground	Always	10 kΩ or higher
A10–15 (SGST) – Body ground	Always	10 kΩ or higher
A10–1 (ST2) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE AIR CONDITIONING AMPLIFIER (SEE PAGE 55–52)

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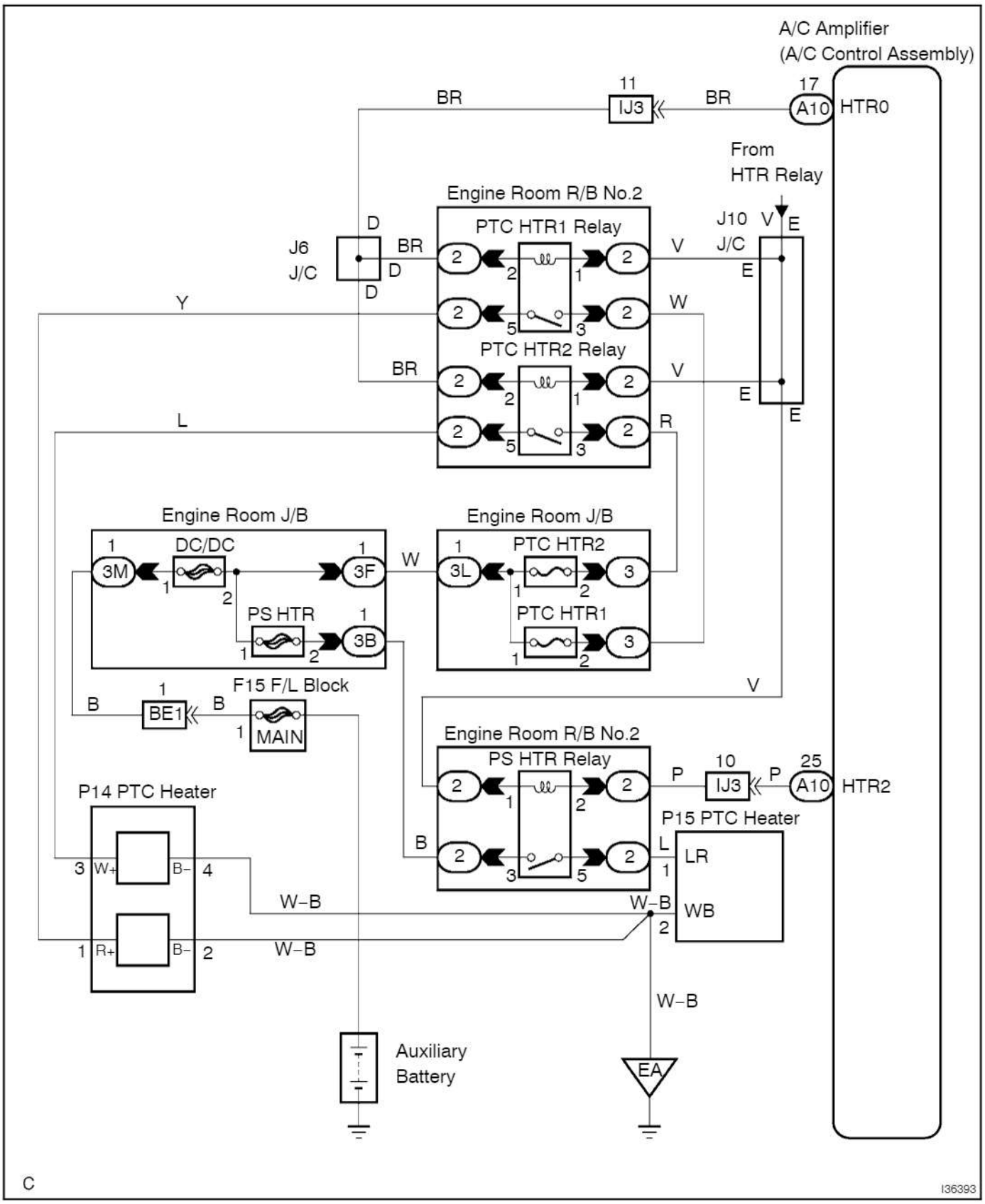
PTC HEATER CIRCUIT

CIRCUIT DESCRIPTION

The PTC heater is installed in the radiator in the heater unit on the driver and passenger's FOOT sides and operates when cooling water temperature is low and normal heater effectiveness is insufficient.
The air conditioner amplifier assy switches the circuit in the PTC relay and operates the PTC heater when the operating conditions (cooling water temperature is Below 55°C (131°F), setting temperature is MAX. HOT, air outlet damper position is FOOT or FOOT/DEF and blower switch in not OFF) are met.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT FUSE(PTC HTR1 (30A), PTC HTR2 (30A))

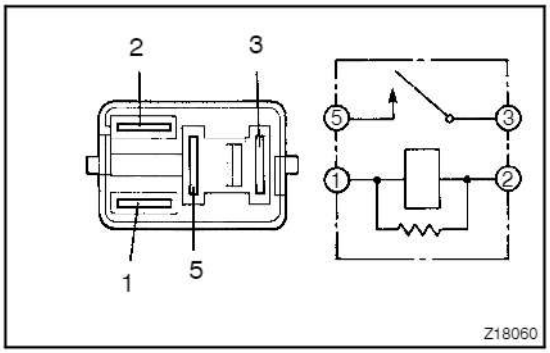
(a) Remove the PTC HTR1 (30A) and PTC HTR2 (30A) fuse from the engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester item	Condition	Specified condition
PTC HTR1 (30A) fuse	Always	Below 1 Ω
PTC HTR2 (30A) fuse	Always	Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FAILURE FUSE**

OK

2 INSPECT PTC HEATER RELAY(PTC HTR1, PTC HTR2)



(a) Remove the PTC heater relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below
Standard:

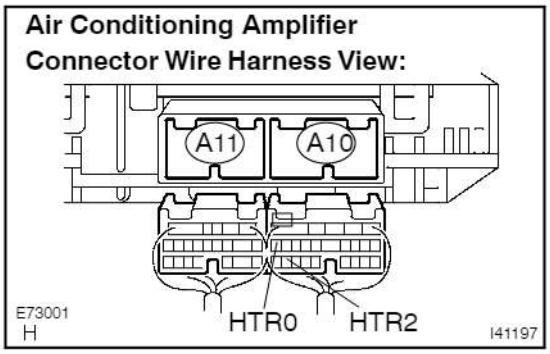
Tester connection	Condition	Specified condition
3 – 5	Always	10 kΩ or higher
3 – 5	When battery voltage applied to terminals 1 and 2	Below 1 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE PTC HEATER RELAY**

OK

3 CHECK HARNESS AND CONNECTOR (SEE PAGE 01–46)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connectors from air conditioning amplifier.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A10–17 (HTR0) – Body ground	Power switch ON	10 to 14 V
A10–25 (HTR2) – Body ground	Power switch ON	10 to 14 V

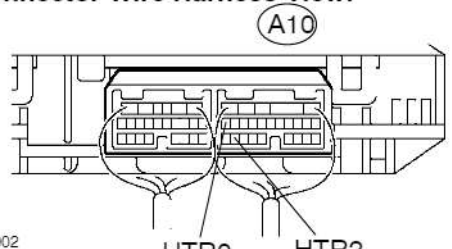
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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4 INSPECT AIR CONDITIONING AMPLIFIER ASSY

Air Conditioning Amplifier Connector Wire Harness View:



(a) Connect the connectors.
(b) Measure voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10–17 (HTR0) – Body ground	Power switch READY ON Set temperature: Max. hot Ventilator mode: FOOT Coolant temperature: 55°C (131 °F) or lower Blower switch: OFF → LO (after 30 sec.)	Below 1V → 10 to 14 V
A10–25 (HTR2) – Body ground	Power switch READY ON Set temperature: Max. hot Ventilator mode: FOOT Coolant temperature: 55°C (131 °F) or lower Blower switch: OFF → LO (after 30 sec.)	Below 1V → 10 to 14 V

HINT:

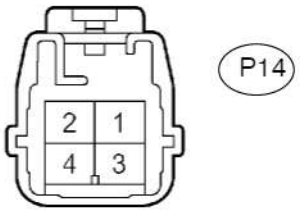
- PTC operation may stop when the electric load on the vehicle is high. Perform the inspection under conditions with low electric load (such as with headlights turned OFF).
- since the two PTC heaters are gradually turned to the ON position, perform the inspection 30 seconds after the blower switch is turned to the LO position.

NG → **REPLACE AIR CONDITIONING AMPLIFIER ASSY (SEE PAGE 55–52)**

OK

5 INSPECT PTC HEATER ASSY

PTC Heater Assy Connector Front View:



(a) Disconnect the connector from the PTC heater assy.
(b) Check the continuity between each terminal.

Standard:

Tester connection	Condition	Specified condition
P14–1 – P14–2	Always	Continuity (0.5 kΩ or higher)
P14–3 – P14–4	Always	Continuity (0.5 kΩ or higher)

NG → **REPLACE PTC HEATER ASSY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

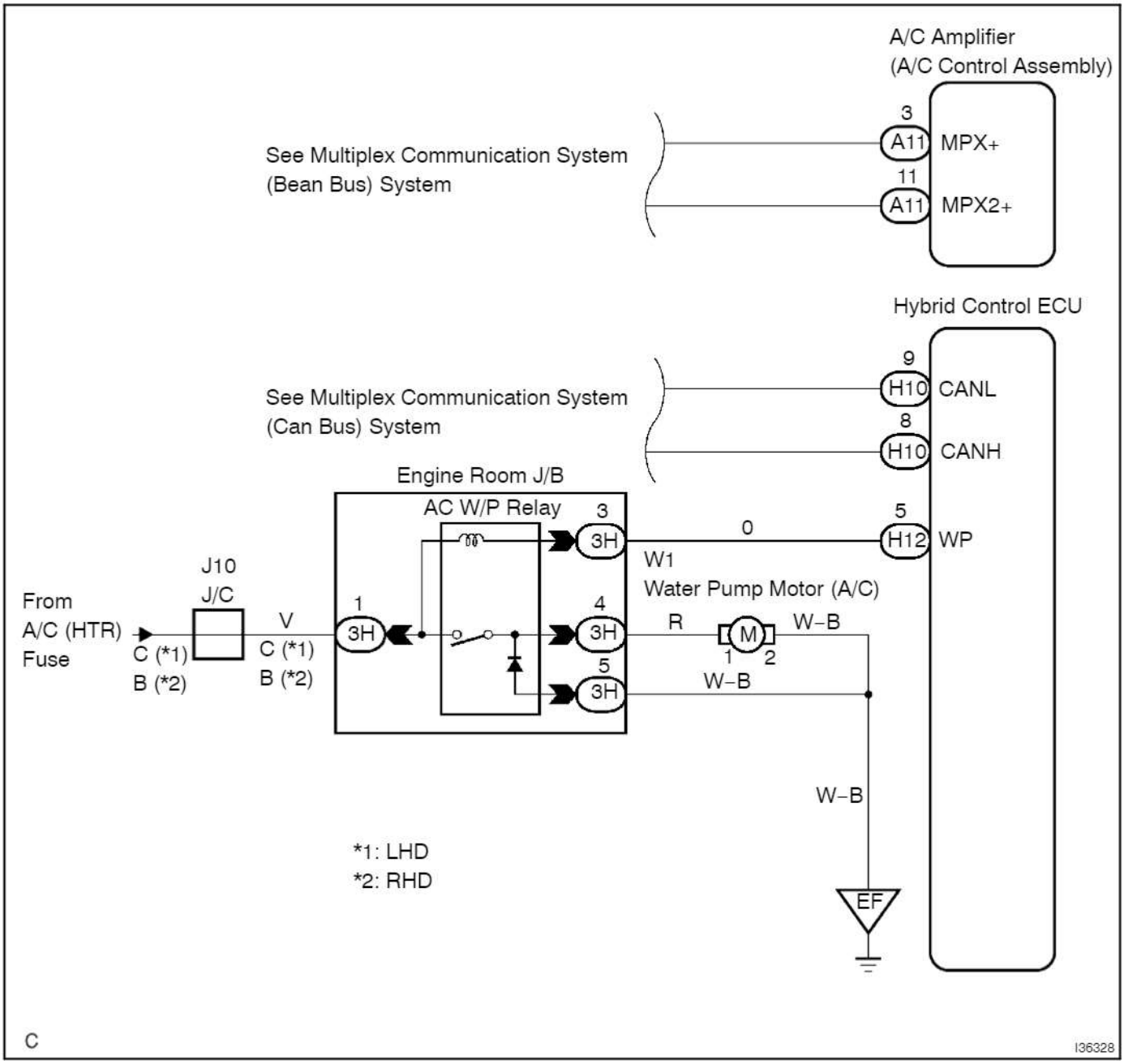
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HEATER WATER PUMP CIRCUIT

CIRCUIT DESCRIPTION

The heater water pump assy sends engine coolant to the heater core assy while the engine is stopped to prevent heater effectiveness from becoming low.
Directed by the air conditioner amplifier assy, Hybrid control ECU operates the water pump relay and drives the heater water pump assy.

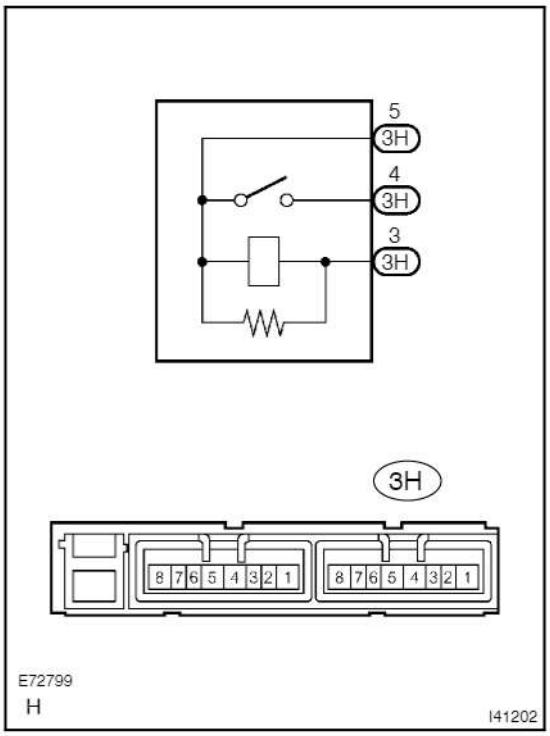
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT INTEGRATION RELAY



(a) Remove the integration relay from the engine room J/B.

NOTICE:

As the integration relay is connected to the relays and fuses in the other systems, remove it with the power switch off. (A DTC may be output if the power switch is on.)

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

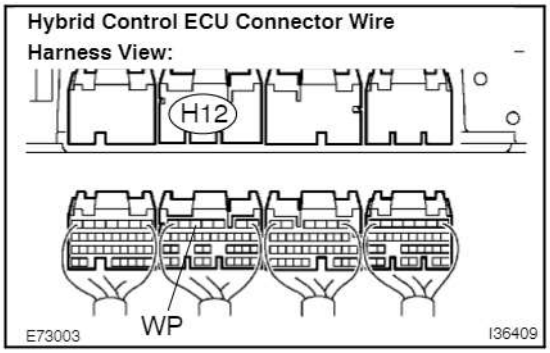
Standard:

Terminal No.	Condition	Specified condition
3H–4 – 3H–5	Always	Below 1 Ω
3H–4 – 3H–5	When battery voltage applied to terminals 3h–5 and 3H–3	Below 1 Ω

NG → REPLACE INTEGRATION RELAY

OK

2	CHECK HARNESS AND CONNECTOR (SEE PAGE 01–46)



(a) Install the integration relay.

(b) Disconnect the hybrid control ECU connectors.

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

Standard:

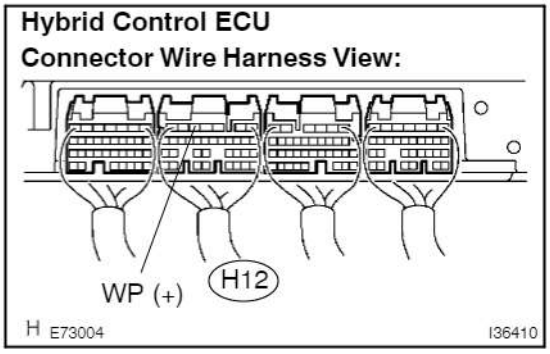
Tester connection	Condition	Specified condition
H12–5 (WP) – Body ground	Power switch ON	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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3 INSPECT HYBRID CONTROL ECU



(a) Connect the hybrid control ECU connectors.
(b) Measure voltage according to the value(s) in the table below.

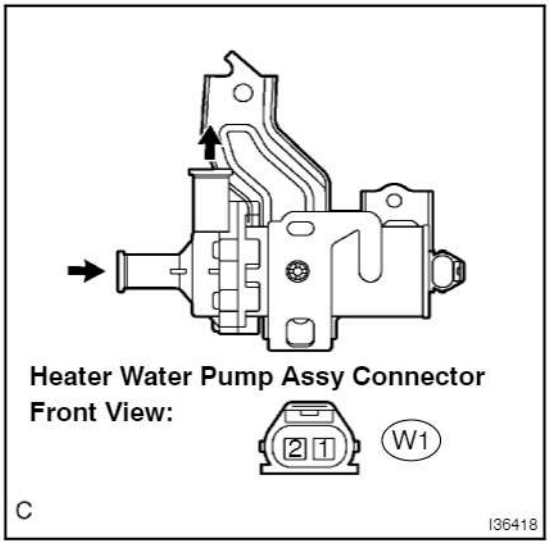
Standard:

Tester connection	Condition	Specified condition
H12–5 (WP) – Body ground	Not operate the heater water pump	10 to 14 V
H12–5 (WP) – Body ground	Operate the heater water pump	Below 1 V

NG → **REPLACE HYBRID CONTROL ECU**

OK

4 INSPECT HEATER WATER PUMP ASSY



(a) Remove the heater water pump.
(b) Connect positive (+) lead to terminal 1 of the heater water pump connector and negative (–) lead to terminal 2.

Standard: Heater water pump operates smoothly.

NOTICE:

Complete operation within 10 seconds if there is no water in the heater water pump.

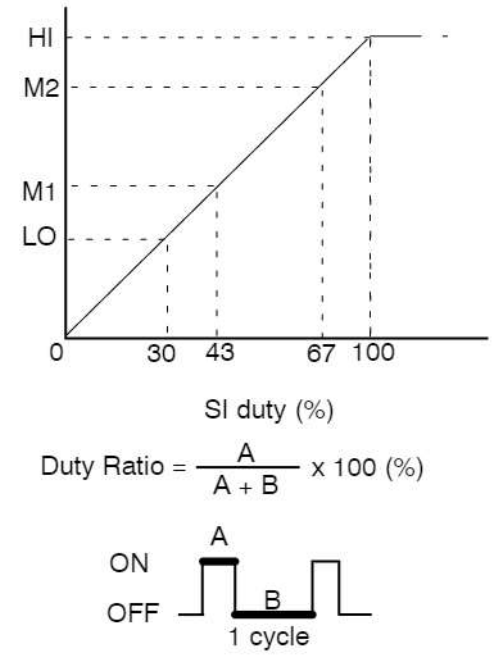
NG → **REPLACE HEATER WATER PUMP ASSY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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BLOWER MOTOR CIRCUIT



CIRCUIT DESCRIPTION

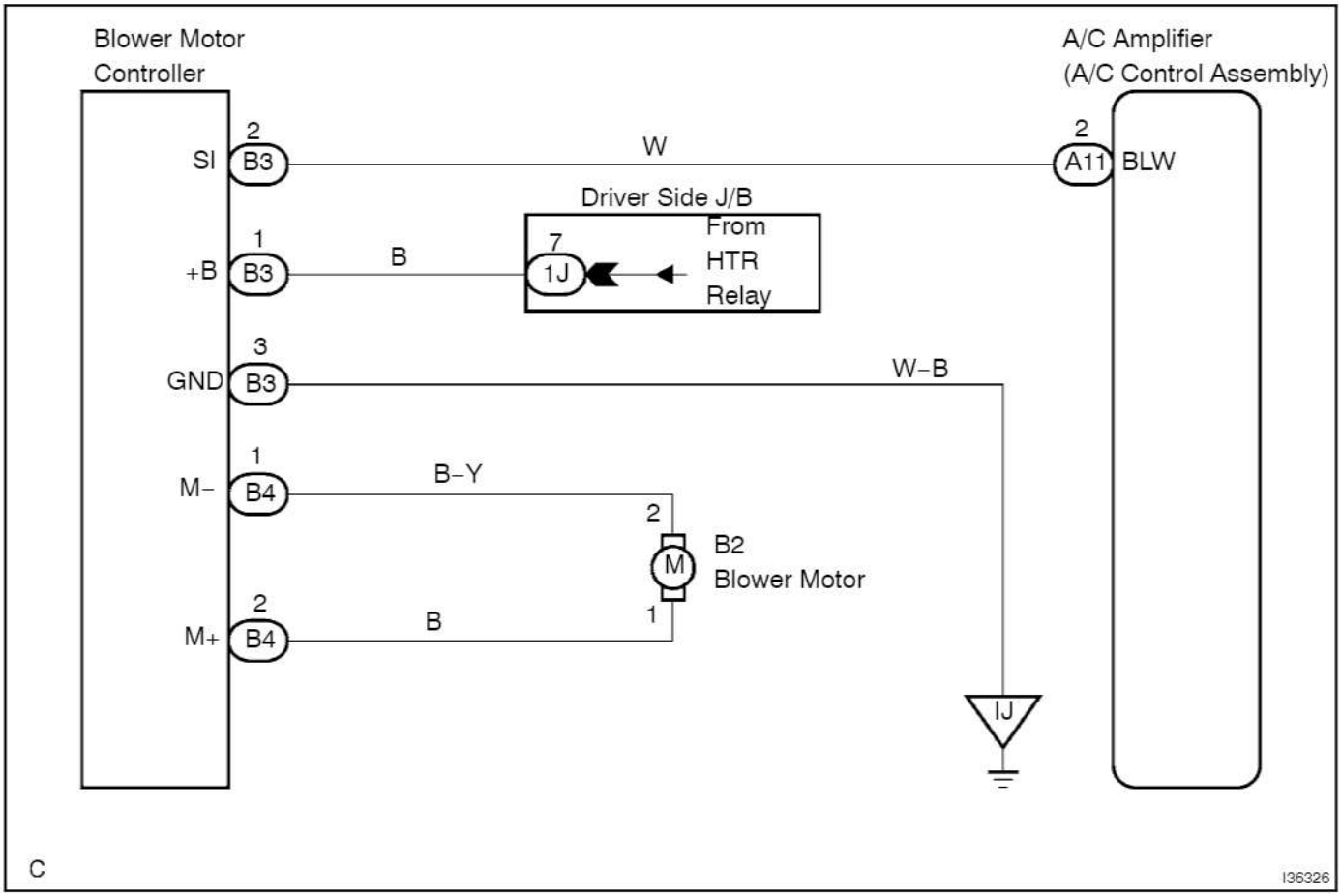
The blower motor is operated by signals from the A/C amplifier assy. Blower motor speed signals are transmitted by changes in the duty ratio.

Duty Ratio

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

The blower motor controller controls the blower motor speed. The blower motor controller reads the signal from the A/C amplifier and controls rotation and speed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to DLC3.
(b) Turn the power switch ON and push the intelligent tester II main switch ON.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

ACTIVE TEST / AIR CONDITIONER:

Item	Test Details/Display (Range)	Diagnostic Note
Blower Motor	Blower motor / min.: 0 max.: 31	–

Result:

OK	A
NG (Blower motor does not operate)	B
NG Blower motor operate but does not change speed)	C

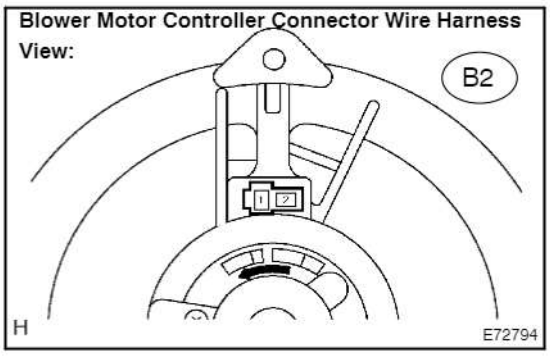
B → **Go to step 2**

C → **Go to step 6**

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1035)

2	INSPECT BLOWER W/FAN MOTOR SUB–ASSY



(a) Remove the cooling unit motor sub–assy w/fan.
(b) Connect positive (–) lead connected to terminal 1 of blower motor connector, negative (+) lead to terminal 2.
Standard: Blower motor operates smoothly.

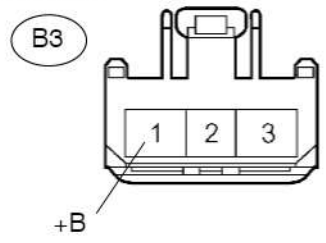
NG → **REPLACE BLOWER W/FAN MOTOR SUB–ASSY**

OK

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3	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER – BATTERY) (SEE PAGE 01–46)

Blower Motor Controller Connector
Front View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

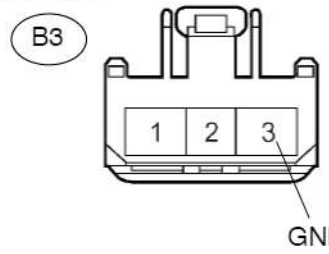
Tester connection	Condition	Specified condition
B3–1 (+B) – Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER – BODY GROUND) (SEE PAGE 01–46)

Blower Motor Controller Connector
Front View:



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

Standard:

Tester connection	Condition	Specified condition
B3–3 (GND) – Body ground	Always	Below 1 Ω

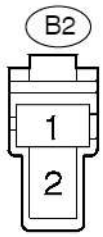
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

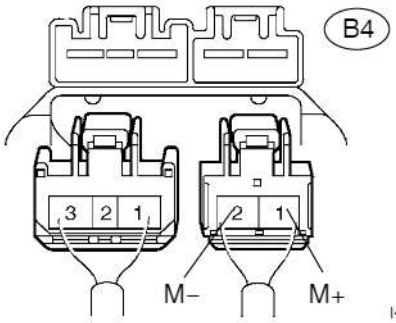
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5	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR – BLOWER MOTOR CONTROLLER) (SEE PAGE 01–46)

Blower Motor Connector Front View:



Blower Motor Controller Connector Wire Harness View:



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

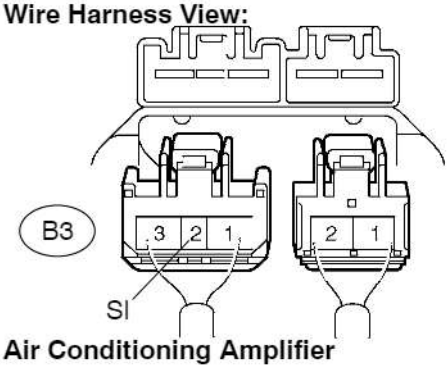
Tester connection	Condition	Specified condition
B4–1 (M+) – B2–2	Always	Below 1 Ω
B4–2 (M–) – B2–1	Always	Below 1 Ω
B4–1 (M+) – Body ground	Always	10 kΩ or higher
B4–2 (M–) – Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

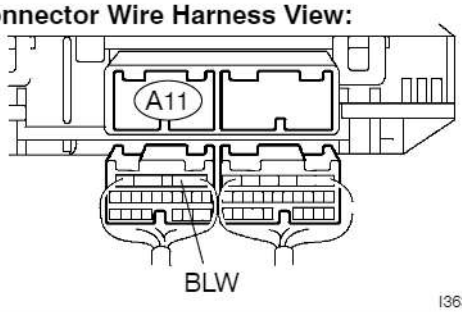
OK

6	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER – A/C AMPLIFIER) (SEE PAGE 01–46)

Blower Motor Controller Connector Wire Harness View:



Air Conditioning Amplifier Connector Wire Harness View:



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

Standard:

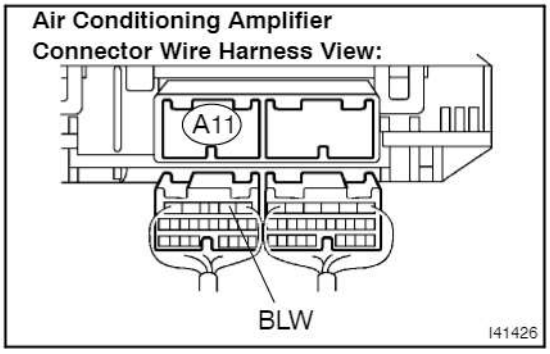
Tester connection	Condition	Specified condition
A11–2 (BLW) – B3–2 (SI)	Always	Below 1 Ω
A11–2 (BLW) – Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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7 INSPECT BLOWER MOTOR CONTROLLER



(a) Measure the voltage according to the value(s) in the table below.

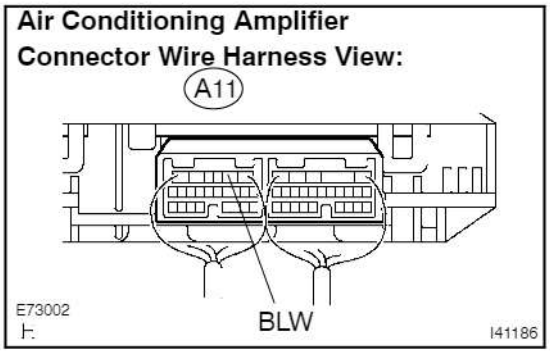
Standard:

Tester connection	Condition	Specified condition
B3–1 (+B) – Body ground	Always	10 to 14 V

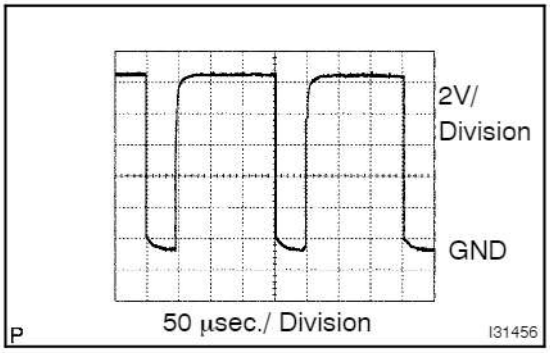
NG → **REPLACE BLOWER MOTOR CONTROLLER**

OK

8 INSPECT AIR CONDITIONING AMPLIFIER(BLW – BODY GROUND)



(a) Remove A/C amplifier with connectors still connected.
(b) Turn the power switch to the ON position.
(c) Blower switch is on (Lo).



(d) Measure the waveform between terminal BLW (A11–2) of A/C amplifier and body ground.

OK:

Waveform operate as shown in the illustration.

HINT:

- The correct waveform is shown in the illustration.
- Waveform cycle varies with the blower level.

NG → **REPLACE AIR CONDITIONING AMPLIFIER** (SEE PAGE 55–52)

OK

REPLACE BLOWER MOTOR CONTROLLER

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SUPPLEMENTAL RESTRAINT SYSTEM

PRECAUTION

05IN7-01

NOTICE:

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Power Window Control System	01–29

1. NOTICES FOR HYBRID SYSTEM ACTIVATION

NOTICE:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

2. HANDLING PRECAUTIONS FOR AIRBAG SENSOR

HINT:

The airbag sensors include the airbag ECU assy, airbag sensor front LH, airbag sensor front RH, side airbag sensor assy LH, side airbag sensor assy RH, airbag sensor rear LH, airbag sensor rear RH and seat position airbag sensor.

(a) Make sure that the power switch is off and wait at least 90 seconds after disconnecting the negative (–) terminal cable of the battery when performing the following.
  (1) Replacement of the airbag sensors
  (2) Adjustment of the front or rear door a vehicle equipped with a front seat airbag and curtain shield airbag

(b) When connecting or disconnecting the connectors, ensure that the airbag sensors have already been installed in the vehicle.

(c) Do not use airbag sensors that have been dropped during the operation or transportation.

(d) When installing the airbag sensors, ensure that they are affixed using the specified torque.

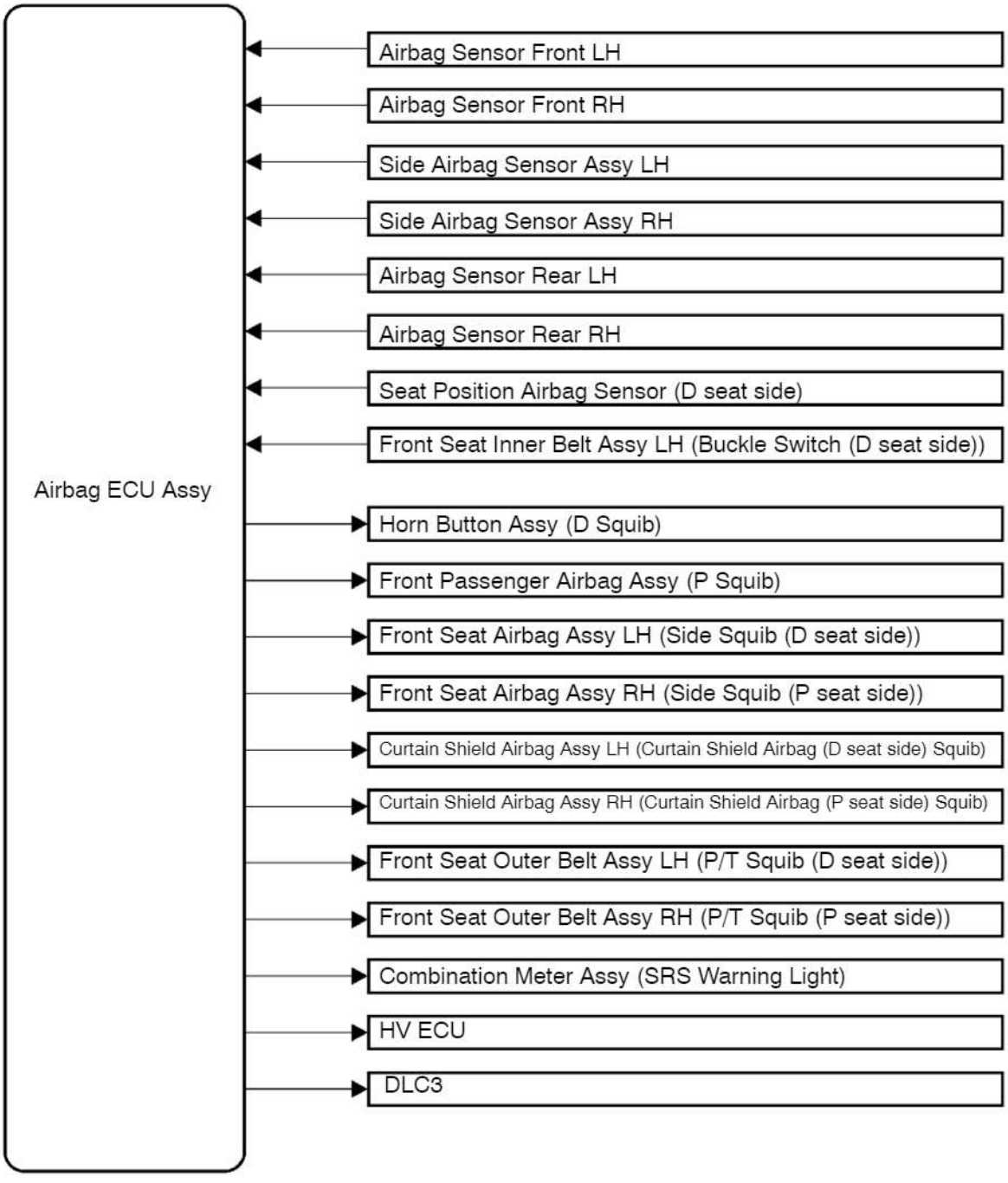
(e) Do not disassemble the airbag sensors.

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05IN8-01

SYSTEM DIAGRAM

LHD:

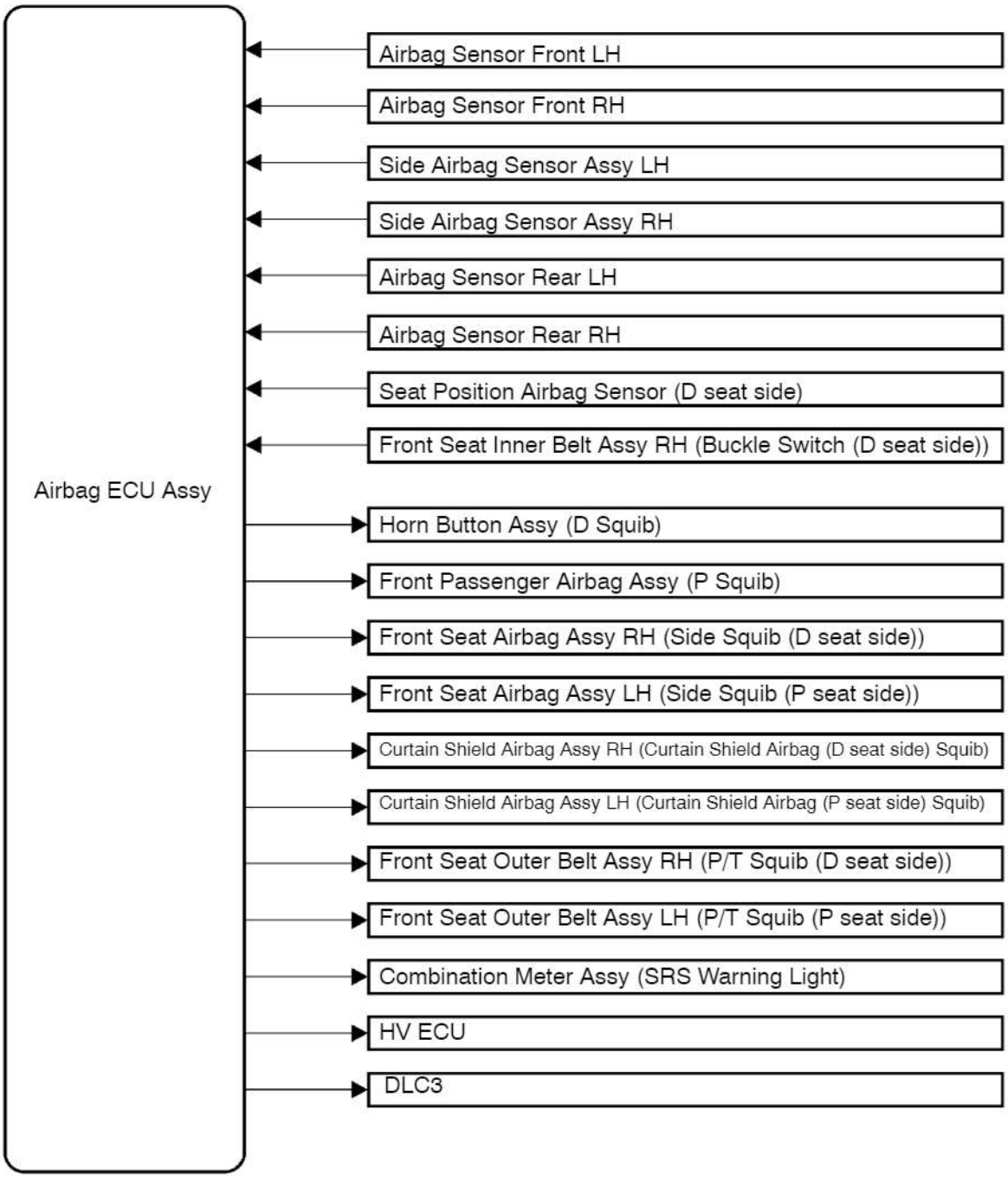


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RHD:



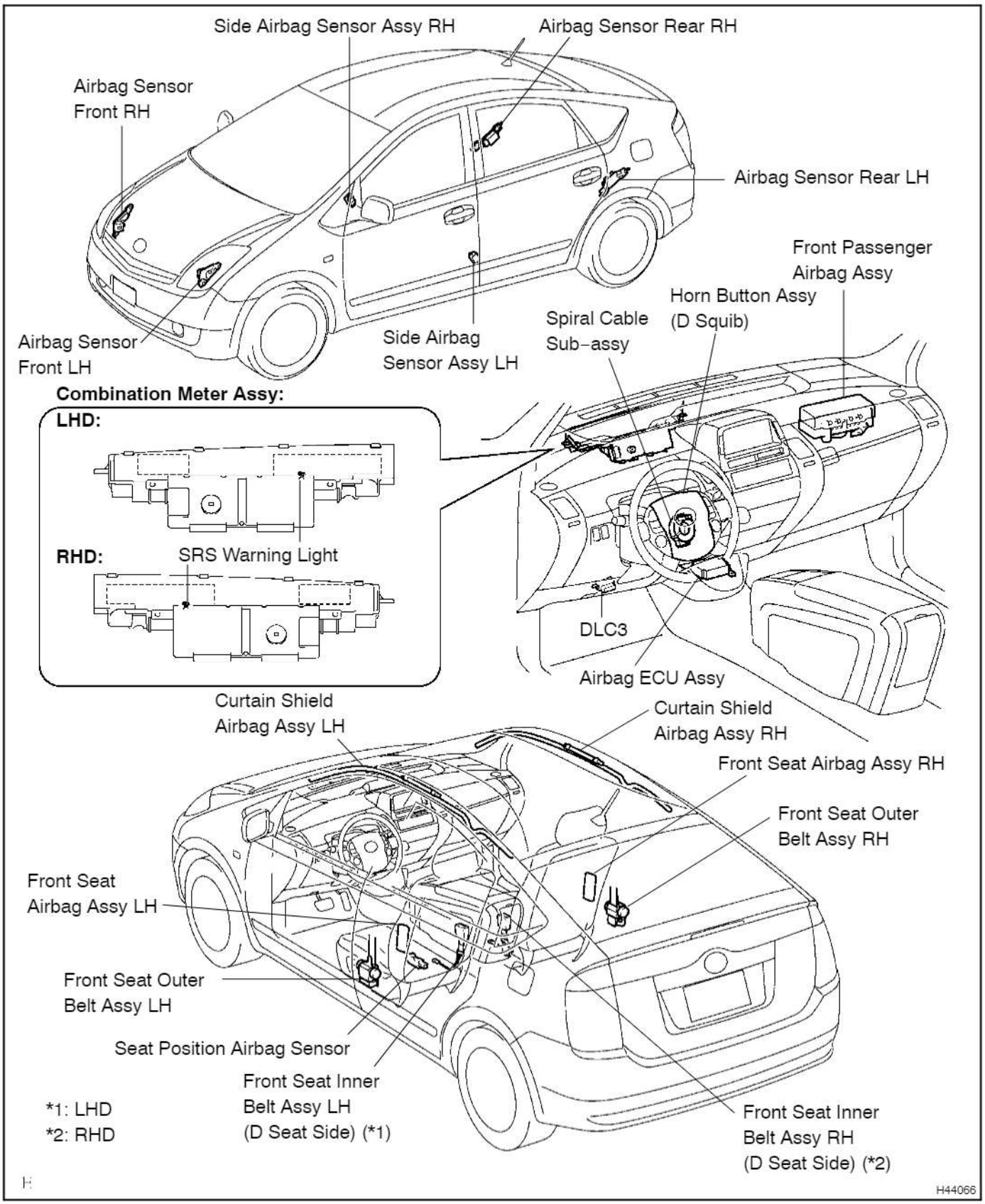
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050X1-26

LOCATION



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05IN9-01

SYSTEM DESCRIPTION

1. SES AIRBAG SYSTEM OUTLINE

(a) FRONTAL COLLISION

(1) The driver and front passenger airbags were designed to supplement seat belts in the event of a front collision in order to help reduce shock to the head and chest of the driver and front passenger.

(2) Frontal collisions are detected by the airbag ECU assy and two front airbag sensors. The driver and front passenger airbags and the seat belt pretensioner then operate simultaneously.

(3) Electrical deceleration sensors are built into the two front airbag sensors in the engine compartment in order to detect the severity of the impact during the initial stage of the collision. The deployment of the driver and front passenger airbags in controlled in two stages according to the severity of the impact.

(b) SIDE COLLISION

(1) The front seat airbag assy and curtain shield airbag assy were designed to help reduce shock to the driver, front passenger and rear outer passenger. The curtain shield airbag assy was designed to help reduce shock to the front and rear passengers in the event of a side collision.

(2) Side collisions are detected by the side airbag sensor assy installed in the bottom of the center pillar and the airbag sensor rear installed in the bottom of the rear pillar. Front side collisions are detected by the side airbag sensor assy, causing the front seat airbag assy and curtain shield airbag assy to deploy simultaneously. Rear side collisions are detected by the airbag sensor rear to deploy only the curtain shield airbag assy.

2. CONSTRUCTION AND OPERATION

(a) AIRBAG SENSOR FRONT

(1) The front airbag sensor assy's are installed on the right and left side members.

(2) The deceleration sensor is built into the airbag sensor front and distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a frontal collision Accordingly, the extent of the initial collision can be detected in detail.

(b) SIDE AIRBAG SENSOR ASSY

(1) The side airbag sensor assy's are installed on the right and left center pillars.

(2) The side airbag sensor assy consists of the deceleration sensor, ignition control circuit, and diagnostic circuit. The side airbag sensor assy receives signals from the deceleration sensor and determines whether the front seat airbag assy and curtain shield airbag assy should be activated, and diagnoses system malfunctions simultaneously.

(c) AIRBAG SENSOR REAR

(1) The airbag sensor rear is installed on the bottom of the right and left rear pillars respectively.

(2) The deceleration sensor is built into the airbag sensor rear and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a rear side collision.

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(d) AIRBAG ECU ASSY

(1) General

- The airbag ECU assy is installed on the center floor under the instrument panel.
- The airbag ECU assy consists of the deceleration sensor, safing sensor, electrical safing sensor, ignition control circuit and diagnostic circuit.
- The airbag ECU assy receives signals from the safing sensor built into the airbag ECU assy and from the deceleration sensor and safing sensor built into the airbag sensor front. The the airbag ECU assy determines whether or not the driver and front passenger airbags and the seat belt pretensioner should be activated, and diagnoses system malfunctions.
- The airbag ECU assy causes the front seat airbag assy and the curtain shield airbag assy to deploy when receiving signals from the deceleration sensor and the safing sensor built into the side airbag sensor assy.
- The airbag ECU assy receives signals from the deceleration sensors and the electrical safing sensors built into the airbag ECU assy and the airbag sensor rear, and determines whether or not the curtain shield airbag assy should be activated, and then diagnoses system malfunctions.
- The airbag ECU assy is operable using check mode, which can detect and output DTCs. If the mal function does not recur during troubleshooting, joggling each connector or driving on a city or rough road with the airbag ECU assy in check mode as a simulation method makes it possible to obtain more accurate information.

(2) Deceleration sensor and ignition control circuit

- The deceleration sensor is built into the airbag ECU assy, and the distortion created during a frontal or rear side collision based on the deceleration of the vehicle is converted into an electric signal.
- The ignition control circuit performs calculations based on the signal output from the deceleration sensors of the airbag ECU assy and airbag sensor front. If the calculated values are greater than the specified values, the airbag deploy.

(3) Safing sensor

- The safing sensor is built into the airbag ECU assy. During a frontal collision, the sensor turns on and outputs an ON signal to the airbag ECU assy if a deceleration rate greater than the specified value is applied to the safing sensor.

(4) Electronic safing sensor

- The electronic safing sensor is built into the airbag ECU assy. During a rear side collision, the sensor turns on and outputs an ON signal to the airbag ECU assy if a deceleration rate greater than the specified value is applied to the electronic safing sensor.

(5) Back–up power source

- The back–up power source consists of a condenser and a DC–DC converter. When the power system does not function during a collision, the condenser discharges and supplies electric power to the system. The DC–DC converter operates as a boosting transformer when the battery voltage falls below a predetermined level.

(6) Diagnostic circuit

- This circuit constantly diagnoses the system malfunctions. When a malfunction is detected, it lights up the SRS warning light on the combination meter assy to inform the driver.

(7) Memory circuit

- When a malfunction is detected in the diagnostic circuit, it is coded and stored in the memory circuit.

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(e) SRS WARNING LIGHT

(1) The SRS warning light is located on the combination meter assy. The SRS warning light informs the driver of detected malfunctions in the diagnostic circuit of the airbag ECU assy or the SRS airbag system. Under formal operating conditions when the power switch is turned on, the SRS warning light comes on for approximately 6 seconds and then goes off.

3. IGNITION JUDGEMENT AND CONDITIONS

(a) FRONTAL COLLISION

(1) When the vehicle collides in the hatched are (Fig.1) and shock is greater than the specified value, the driver and front passenger airbags are activated automatically. The deceleration sensor of the airbag ECU assy determines whether or not ignition in necessary based on signals from the deceleration sensor of the airbag sensor front.

(2) The safing sensor of the airbag ECU assy was designed to be turned on at a smaller deceleration rate than the deceleration sensor. If the safing sensor and the deceleration sensor turn on simultaneously, current flows to the squib and deploys the driver and front passenger airbags as shown in illustration Fig.2.

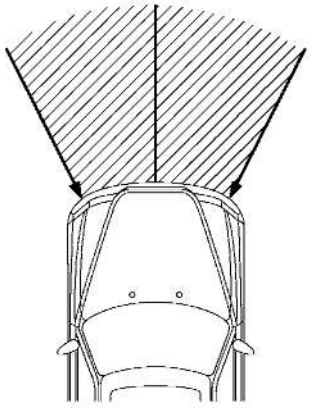
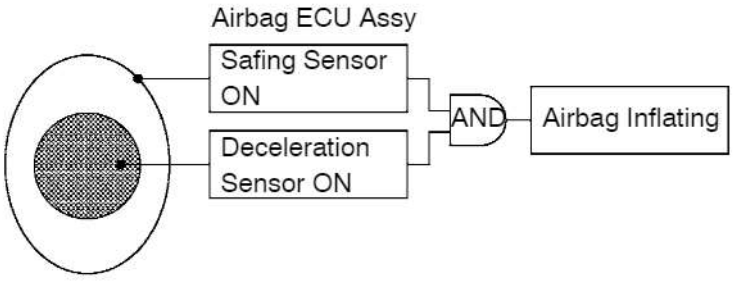


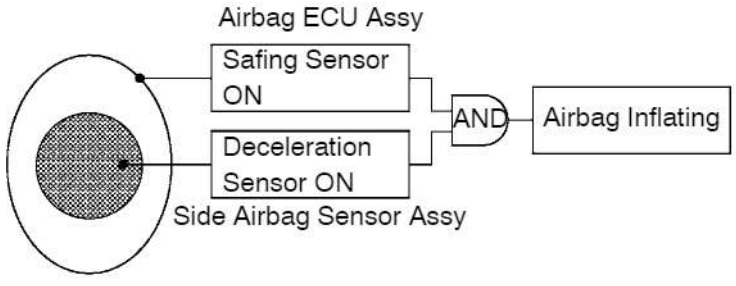
Fig.1



C H44048

(b) FRONT SIDE COLLISION

(1) The safing sensor of the side airbag sensor assy was designed to be turned on at a smaller deceleration rate than the deceleration sensor of the deceleration sensor. If the safing sensor and the deceleration sensor turn on simultaneously, current flows to the squib and deploys the driver and front passenger side airbags and curtain shield airbag as shown in the illustration below

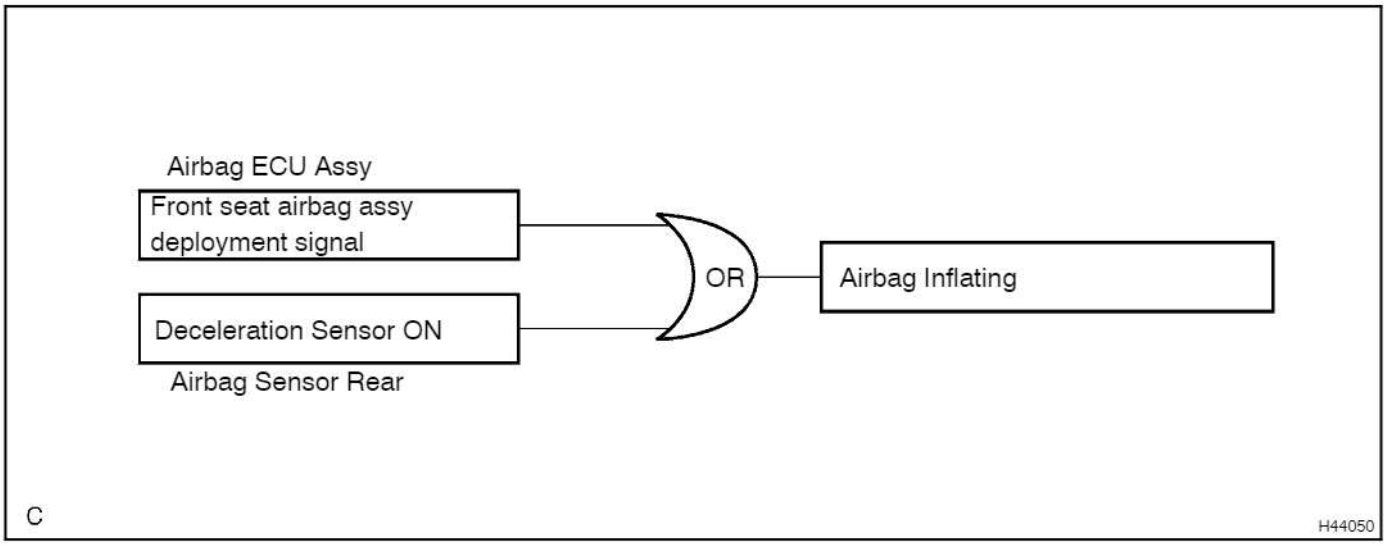


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(c) REAR SIDE COLLISION

(1) The curtain shield airbag deploys if the curtain shield airbag assy receives the ignition signal for the front seat airbag assy or for the curtain shield airbag assy (transmitted from the airbag sensor rear) as shown in the illustration below.



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050YF-25

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester II can be used in steps 3, 4, 6, 9, 10 and 11.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–1161)

(a) Confirm problem symptoms.

3	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Check for the DTC outputs.

- DTC IS OUTPUT: CHECK MULTIPLEX COMMUNICATION CIRCUIT (SEE PAGE 05-2250)
- DTC IS NOT OUTPUT: Go to step 4

4	CHECK CAN COMMUNICATION SYSTEM (SEE PAGE 05–2332)

(a) Check for the DTC outputs.

- DTC IS OUTPUT: CHECK CAN COMMUNICATION CIRCUIT (SEE PAGE 05-2332)
- DTC IS NOT OUTPUT: Go to step 5

5	WARNING LIGHT CHECK (SEE PAGE 05–1165)

6	CHECK DTC (Present and Past DTCs) (SEE PAGE 05–1170)

- DTC IS OUTPUT (Including Normal system code): Go to step 7
- DTC IS NOT OUTPUT: PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1162)

7	DTC CHART (SEE PAGE 05–1173)

8	CIRCUIT INSPECTION (SEE PAGE 05–1178 to 05–1435)

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9	REPAIR

10	CLEAR DTCs (Present and Past DTC) (SEE PAGE 05–1170)

11	CHECK DTC (Present and Past DTCs) (SEE PAGE 05–1170)

- DTC IS NOT OUTPUT: Go to step 12
- DTC IS OUTPUT: Go to step 7

12	CONFIRMATION TEST

END

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05INA–01

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet	Inspector's Name

Customer's Name		VIN	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought In		Odometer Reading	km Miles

Date Problem Occurred	
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Condition	
Details of Problem	

Vehicle Inspection, and Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnostic System Inspection

SRS Warning Light Inspection	1st Time	☐ Remains on ☐ Sometimes comes on ☐ Does not come on
	2nd Time	☐ Remains on ☐ Sometimes comes on ☐ Does not come on
DTC Inspection	1st Time	☐ Normal System Code ☐ Trouble Code [Code.]
	2nd Time	☐ Normal System Code ☐ Trouble Code [Code.]

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050YH-24

PROBLEM SYMPTOMS TABLE

HINT:

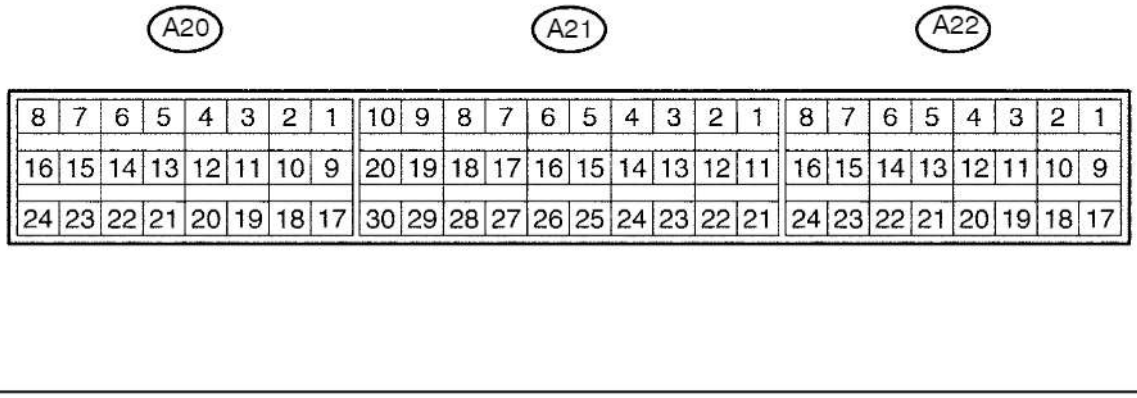
Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
• When the power switch is on (IG), the SRS warning light sometimes comes on after approximately 6 seconds. • The SRS warning light remains on when DTC is not output.	• SRS Warning Light Circuit Malfunction (Remains on when DTC is not output)	05–1439
• The SRS warning light does not come on with the power switch on (IG).	• SRS Warning Light Circuit Malfunction (Does not come on when the power switch is turned on (IG)).	05–1445
• SRS warning light is blink. • DTC cannot read.	• TC Terminal Circuit	05–1447

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050X3–16

TERMINALS OF ECU



Terminal No.	Terminal Symbol	Destination
A20–1	SFD+	Front seat airbag assy LH (Side squib (D seat side)) (*1) Front seat airbag assy RH (Side squib (D seat side)) (*2)
A20–2	SFD–	Front seat airbag assy LH (Side squib (D seat side)) (*2) Front seat airbag assy RH (Side squib (D seat side)) (*2)
A20–3	ICD–	Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2)
A20–4	ICD+	Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2)
A20–5	PD+	Front seat outer belt assy LH (P/T squib (D seat side)) (*1) Front seat outer belt assy RH (P/T squib (D seat side)) (*2)
A20–6	PD–	Front seat outer belt assy LH (P/T squib (D seat side)) (*1) Front seat outer belt assy RH (P/T squib (D seat side)) (*2)
A20–9	DSP+	Seat position airbag sensor
A20–10	DBE+	Front seat inner belt assy LH (D seat side) (*1) Front seat inner belt assy RH (D seat side) (*2)
A20–17	DSP–	Seat position airbag sensor
A20–18	DBE–	Front seat inner belt assy LH (D seat side) (*1) Front seat inner belt assy RH (D seat side) (*2)
A20–19	VUPD	Side airbag sensor assy LH (*1) Side airbag sensor assy RH (*2)
A20–20	VUCD	Airbag sensor rear LH (*1) Airbag sensor rear RH (*2)
A20–21	ESD	Side airbag sensor assy LH (*1) Side airbag sensor assy RH (*2)
A20–22	ESCD	Airbag sensor rear LH (*1) Airbag sensor rear RH (*2)
A21–1	P2+	Front passenger airbag assy (P squib, Dual stage – 2nd step)
A21–2	P2–	Front passenger airbag assy (P squib, Dual stage – 2nd step)
A21–3	P–	Front passenger airbag assy (P squib)
A21–4	P+	Front passenger airbag assy (P squib)
A21–5	D+	Horn button assy (D squib)
A21–6	D–	Horn button assy (D squib)
A21–7	D2–	Horn button assy (D squib, Dual stage – 2nd step)

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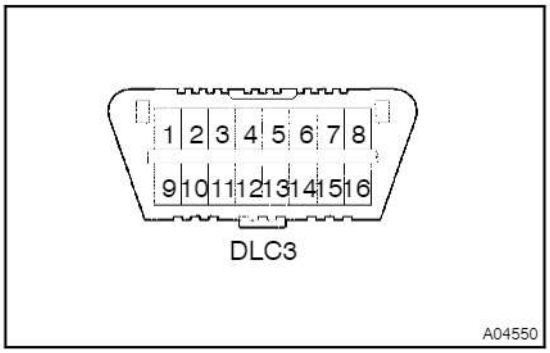
Terminal No.	Terminal Symbol	Destination
A21–8	D2+	Horn button assy (D squib, Dual stage – 2nd step)
A21–14	LA	Combination meter assy (SRS warning light)
A21–15	TC	DLC3
A21–16	SIL	DLC3
A21–21	IG2	IGN Fuse
A21–22	GSW2	HV ECU
A21–25	E1	Ground
A21–26	E2	Ground
A21–27	–SR	Airbag sensor front RH
A21–28	–SL	Airbag sensor front LH
A21–29	+SR	Airbag sensor front RH
A21–30	+SL	Airbag sensor front LH
A22–3	PP–	Front seat outer belt assy RH (P/T squib (P seat side)) (*1) Front seat outer belt assy LH (P/T squib (P seat side)) (*2)
A22–4	PP+	Front seat outer belt assy RH (P/T squib (P seat side)) (*1) Front seat outer belt assy LH (P/T squib (P seat side)) (*2)
A22–5	ICP+	Curtain shield airbag assy RH (Curtain shield airbag (P seat side) squib) (*1) Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2)
A22–6	ICP–	Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*1) Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2)
A22–7	SFP–	Front seat airbag assy RH (Side squib (P seat side)) (*1) Front seat airbag assy LH (Side squib (P seat side)) (*2)
A22–8	SFP+	Front seat airbag assy RH (Side squib (D seat side)) (*1) Front seat airbag assy LH (Side squib (P seat side)) (*2)
A22–19	ESCP	Airbag sensor rear RH (*1) Airbag sensor rear LH (*2)
A22–20	ESP	Side airbag sensor assy RH (*1) Side airbag sensor assy LH (*2)
A22–21	VUCP	Airbag sensor rear RH (*1) Airbag sensor rear LH (*2)
A22–22	VUPP	Side airbag sensor assy RH (*1) Side airbag sensor assy LH (*2)

*1: LHD
*2: RHD

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05IN8–01

DIAGNOSIS SYSTEM



1. CHECK DLC3

(a) The HV ECU uses the ISO 14230 and ISO 9141–2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J15031–3 and matches the ISO 14230 and ISO 9141–2 format.

Symbols (Terminals No.)	Terminal Description	Condition	Specified condition
SIL (7) – SG (5)	Bus " +" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Power switch is off	54 to 67 Ω
CANH (6) – Battery positive	HIGH–level CAN bus line	Power switch is off	1 MΩ or Higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Power switch is off	3 kΩ or Higher
CANL (14) – Battery positive	LOW–level CAN bus line	Power switch is off	1 MΩ or Higher
CANL (14) – CG (4)	LOW–level CAN bus line	Power switch is off	3 kΩ or Higher

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE after connecting the cable of the intelligent tester II to the DLC3, turning the power switch on (IG) and operating the intelligent tester II, there is a problem on the vehicle side or tool side.

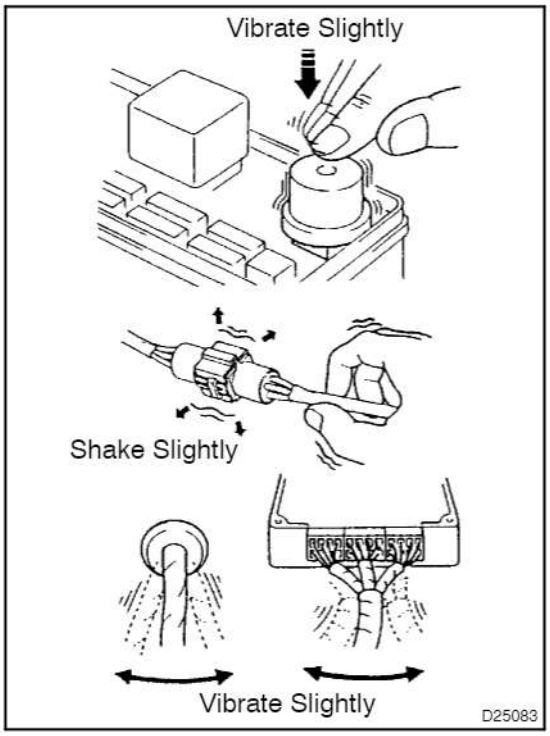
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's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

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2. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be simulated. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the power switch on (IG)).

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

HINT:

Shaking the relays too strongly may result in open relays.

(2) Slightly shake the connector vertically and horizontally.

(3) Slightly shake the wire harness vertically and horizontally.

The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

3. FUNCTION OF SRS WARNING LIGHT

(a) Primary check

(1) Turn the power switch off. Wait for at least 2 seconds, then turn the power switch on (IG). The SRS warning light comes on for approximately 6 seconds and the diagnosis of the SRS airbag system (including the seat belt) is performed.

HINT:

If trouble is detected during the primary check, the SRS warning light remains on even after the primary check period (for approximately 6 seconds after the power switch is turned on (IG)) has elapsed.

(b) Constant check

(1) After the primary check, the airbag ECU assy monitors the SRS airbag system for trouble.

HINT:

If trouble is detected during the constant check, the airbag ECU assy functions as follows:

- The SRS warning light comes on.
- The SRS warning light goes off and then comes on. This blinking pattern indicates the source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review

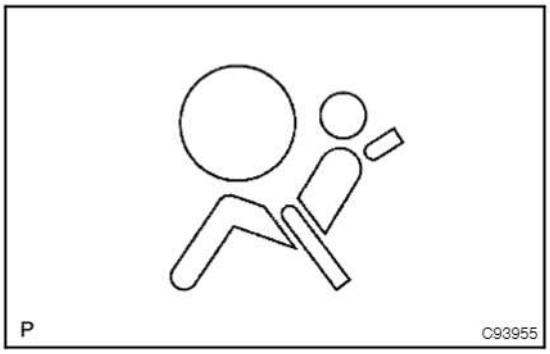
(1) When the SRS airbag system is normal:

The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the power switch is turned on (IG)).

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(2) When the SRS airbag system has trouble:
- The SRS warning light remains on.
- The SRS warning light goes off after the primary check, but comes on again during the constant check.
- The SRS warning light does not come on when turning the power switch from off to on (IG).

HINT:
The airbag ECU assy keeps the SRS warning light on if one of the airbags has been deployed.



4. SRS WARNING LIGHT CHECK

(a) Turn the power switch on (IG) and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the power switch is turned on (IG) (constant check).

HINT:
When any of the following symptoms occur, refer to the "Problem Symptoms Table" (see page 05–1162):
- The SRS warning light comes on occasionally even after the primary check period has elapsed, there may be an open or short in the SRS warning light circuit.
- The SRS warning light comes on even when a DTC or normal system code is not output.
- The SRS warning light does not come on when the power switch is turned from off to on (IG).

5. ACTIVATION PREVENTION MECHANISM

(a) An activation prevention mechanism is built into the connector (airbag ECU assy side) of the SRS airbag system squib circuit to prevent accidental airbag activation.

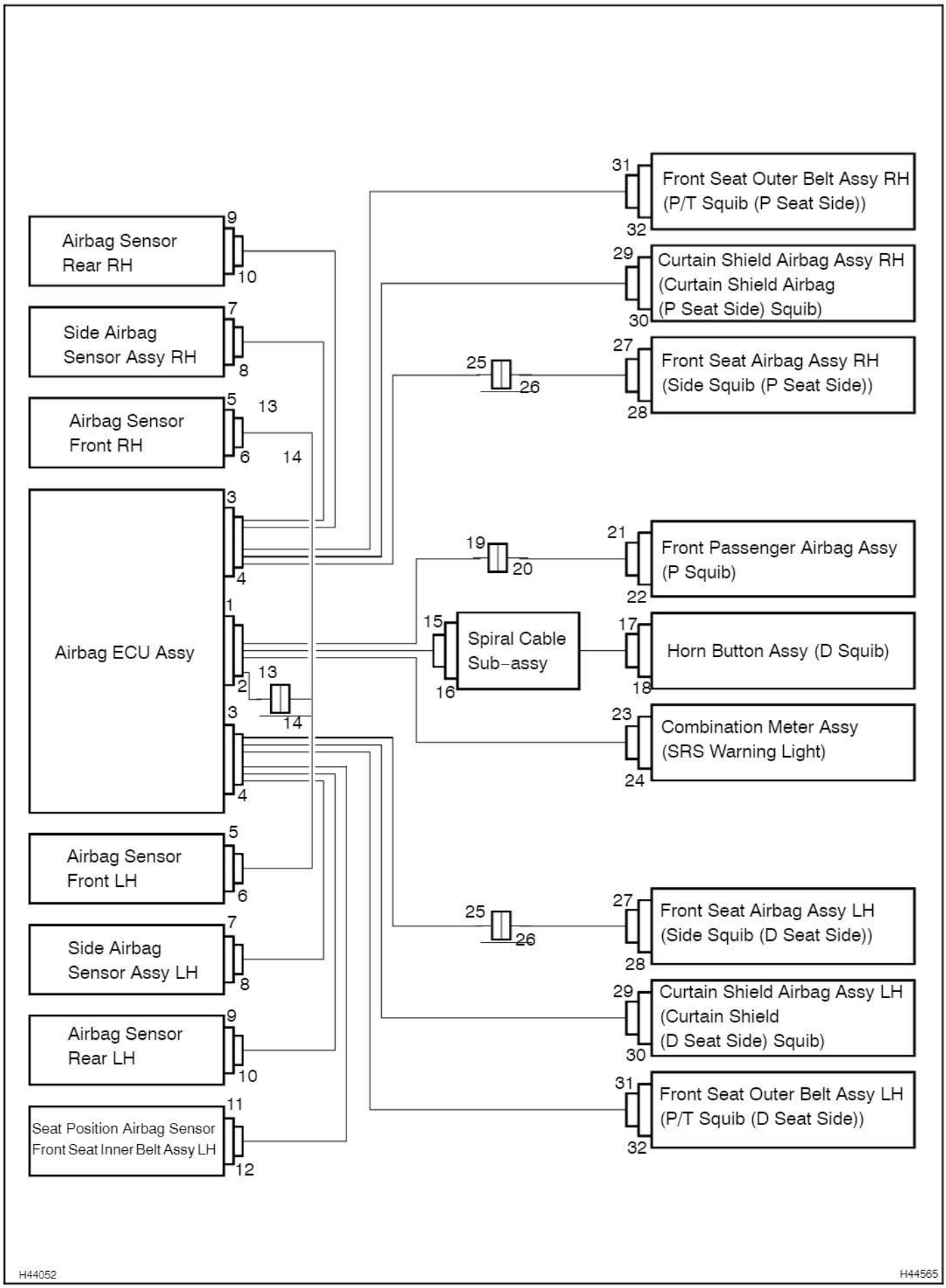
(b) This mechanism closes the circuit when the connector is disconnected by bringing the short spring into contact with the terminal and shutting off external electricity of prevent accidental SRS airbag activation.

(c) To release the activation prevention mechanism, insert a piece of paper with the same thickness as the male terminal between the terminal and the short spring to break the connection.

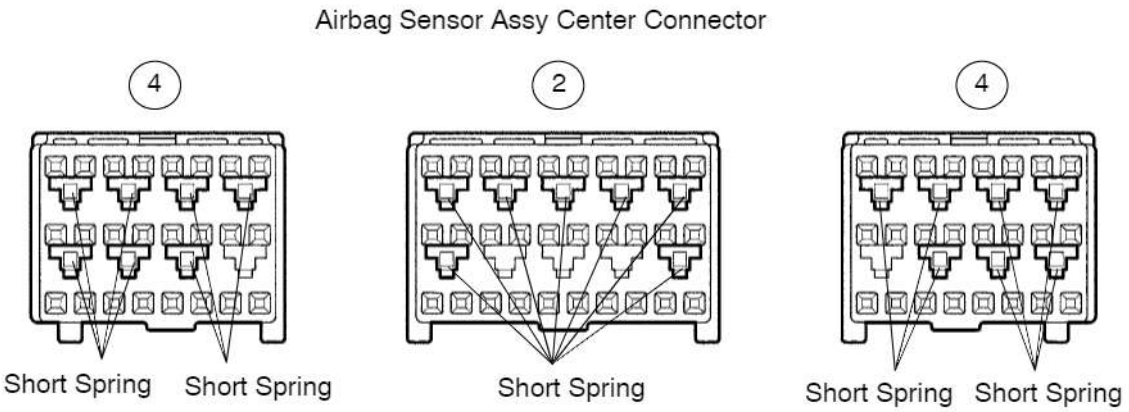
(d) Refer to the illustrations on the next 2 pages concerning connectors utilizing the activation prevention mechanism and its release method.

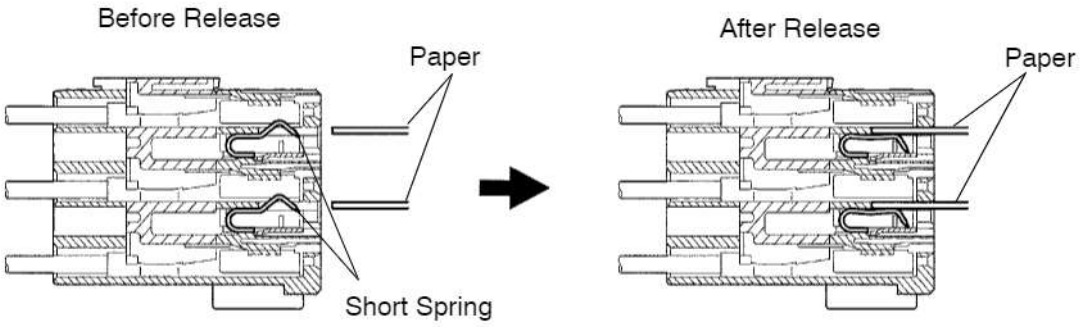
CAUTION:
Never release the activation prevention mechanism on the squib connector.
NOTICE:
- **Do not release the activation prevention mechanism unless specifically directed by the trouble-shooting procedure.**
- **To prevent the terminal and the short spring from being damaged, always use a piece of paper with the same thickness as the male terminal.**

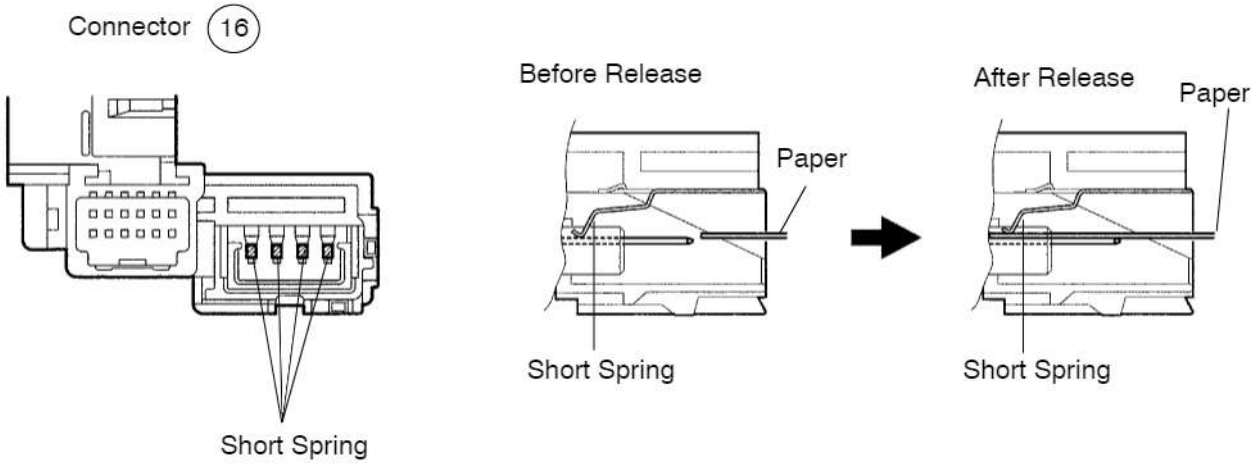
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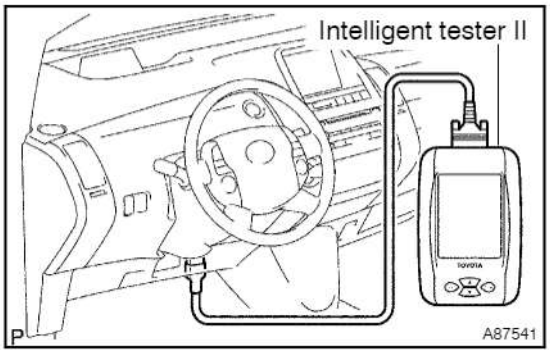
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05INC–01

DTC CHECK/CLEAR



1. DTC CHECK

(a) Check the DTCs.

(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch on (IG).

(3) Check the DTCs by following the prompts on the tester screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

(b) Clear the DTCs.

(1) Connect the intelligent tester II to the DLC3.

(2) Turn the power switch on (IG).

(3) Clear the DTCs by following the prompts on the tester screen.

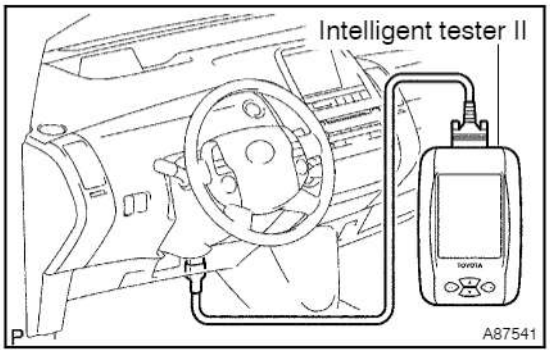
HINT:

Refer to the intelligent tester II operator's manual for further details.

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05IND–01

CHECK MODE PROCEDURE



1. CHECK MODE (SIGNAL CHECK)

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the "SIGNAL CHECK", and proceed checking with the intelligent tester II.

HINT:

- Malfunctions can be detected in the check mode better than the normal check mode.
- If the normal system code is output in the normal check mode even when a sensor signal malfunction is suspected, perform the inspection in the check mode.

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05INE-01

DATA LIST/ACTIVE TEST

HINT:

By accessing the DATA LIST displayed by the intelligent tester II, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step of troubleshooting and is one method to shorten labor time.

(d) Connect the intelligent tester II to the DLC3.

(e) Turn the power switch on (IG).

(f) Following the display on the tester screen, read the "DATA LIST".

1. DATA LIST FOR AIRBAG ECU ASSY

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT POSITION	Seat position (Driver side)/ FORWARD: Seat position forward BKWARD: Seat position back FAIL: Failure detected	FORWARD/BKWARD	–
PASSENGER DETECT	Passenger detection/ NG: Indeterminate data NONE: Seat vacant DETECT: Seat occupied FAIL: Failure detected	NG/NONE/DETECT	–
D BUCKLE SW	Buckle switch (Driver side)/ ON: Seat belt fastened OFF: Seat belt not fastened NG: In determinate data	ON/OFF	–
P BUCKLE SW	Buckle switch (Passenger side)/ ON: Seat belt fastened OFF: Seat belt not fastened NG: In determinate data	ON/OFF	–
DISPLAY TYPE	Display type identification information/ LR: Display indicated by LH/RH DP: Display indicated by Driver/Passenger	DP	–
#CODES	Number of past DTC recorded/ Min.: 0, Max.: 255	0	–

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050WZ–24

DIAGNOSTIC TROUBLE CODE CHART

1. DTCS FOR SUPPLEMENTAL RESTRAINT SYSTEM

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit).

HINT:

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in the memory by the airbag ECU assy. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If a code is not listed on the display chart, the airbag ECU assy may have failed.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to a squib, other trouble codes may not be detected. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:
  "○": DTC is corresponding to the check mode.
  "—": DTC is not corresponding to the check mode.

DTC No. (See Page)	Detection Item	Trouble Area	Check Mode	SRS Warning Light
B1000 (05–1178)	• Airbag ECU assy malfunction	• Instrument panel wire • Engine room main wire • Airbag ECU assy	–	ON
B1610 (05–1186)	• Front airbag sensor RH circuit malfunction	• Airbag sensor front RH • Airbag ECU assy • Instrument panel wire • Engine room main wire	–	ON
B1615 (05–1190)	• Front airbag sensor LH circuit malfunction	• Airbag sensor front LH • Airbag ECU assy • Instrument panel wire • Engine room main wire	–	ON
B1620 (05–1194)	• Side airbag sensor assembly (D seat side) malfunction	• Side airbag sensor assy LH (*1) • Side airbag sensor assy RH (*2) • Airbag ECU assy • Floor wire	–	ON
B1625 (05–1201)	• Side airbag sensor assembly (P seat side) malfunction	• Side airbag sensor assy RH (*1) • Side airbag sensor assy LH (*2) • Airbag ECU assy • Floor wire No.2	–	ON
B1630 (05–1208)	• Curtain shield airbag sensor (D seat side) malfunction	• Airbag sensor rear LH (*1) • Airbag sensor rear RH (*2) • Airbag ECU assy • Floor wire	–	ON
B1635 (05–1215)	• Curtain shield airbag sensor (P seat side) malfunction	• Airbag sensor rear RH (*1) • Airbag sensor rear LH (*2) • Airbag ECU assy • Floor wire No.2	–	ON
B1653 (05–1222)	• Seat position sensor assembly malfunction	• Seat position airbag sensor • Airbag ECU assy • Floor wire	–	ON
B1655 (05–1230)	• Seat belt buckle switch (D seat side) malfunction	• Front seat inner belt assy LH (*1) • Front seat inner belt assy RH (*2) • Airbag ECU assy • Floor wire	–	ON

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B1800 (05–1239)	• Short in D squib circuit	• Horn button assy (D squib) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1801 (05–1244)	• Open in D squib circuit	• Horn button assy (D squib) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1802 (05–1249)	• Short in D squib circuit (to ground)	• Horn button assy (D squib) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1803 (05–1254)	• Short in D squib circuit (to B+)	• Horn button assy (D squib) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1805 (05–1259)	• Short in P squib circuit	• Front passenger airbag assy (P squib) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1806 (05–1264)	• Open in P squib circuit	• Front passenger airbag assy (P squib) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1807 (05–1269)	• Short in P squib circuit (to ground)	• Front passenger airbag assy (P squib) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1808 (05–1274)	• Short in P squib circuit (to B+)	• Front passenger airbag assy (P squib) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1810 (05–1279)	• Short in D squib (Dual stage – 2nd step) circuit	• Horn button assy (D squib, Dual stage – 2nd step) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1811 (05–1284)	• Open in D squib (Dual stage – 2nd step) circuit	• Horn button assy (D squib, Dual stage – 2nd step) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1812 (05–1289)	• Short in D squib (Dual stage – 2nd step) circuit (to ground)	• Horn button assy (D squib, Dual stage – 2nd step) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1813 (05–1294)	• Short in D squib (Dual stage – 2nd step) circuit (to B+)	• Horn button assy (D squib, Dual stage – 2nd step) • Spiral cable sub–assy • Airbag ECU assy • Instrument panel wire	○	ON
B1815 (05–1299)	• Short in P squib (Dual stage – 2nd step) circuit	• Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1816 (05–1304)	• Open in P squib (Dual stage – 2nd step) circuit	• Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1817 (05–1309)	• Short in P squib (Dual stage – 2nd step) circuit (to ground)	• Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON

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B1818 (05–1314)	• Short in P squib (Dual stage – 2nd step) circuit (to B+)	• Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy • Instrument panel wire • Instrument panel wire No.2	○	ON
B1820 (05–1319)	• Short in side squib (D seat side) circuit	• Front seat airbag assy LH (Side squib (D seat side)) (*1) • Front seat airbag assy RH (Side squib (D seat side)) (*2) • Airbag ECU assy • Floor wire • Seat airbag No.1 wire	○	ON
B1821 (05–1325)	• Open in side squib (D seat side) circuit	• Front seat airbag assy LH (Side squib (D seat side)) (*1) • Front seat airbag assy RH (Side squib (D seat side)) (*2) • Airbag ECU assy • Floor wire • Seat airbag No.1 wire	○	ON
B1822 (05–1331)	• Short in side squib (D seat side) circuit (to ground)	• Front seat airbag assy LH (Side squib (D seat side)) (*1) • Front seat airbag assy RH (Side squib (D seat side)) (*2) • Airbag ECU assy • Floor wire • Seat airbag No.1 wire	○	ON
B1823 (05–1337)	• Short in side squib (D seat side) circuit (to B+)	• Front seat airbag assy LH (Side squib (D seat side)) (*1) • Front seat airbag assy RH (Side squib (D seat side)) (*2) • Airbag ECU assy • Floor wire • Seat airbag No.1 wire	○	ON
B1825 (05–1343)	• Short in side squib (P seat side) circuit	• Front seat airbag assy RH (Side squib (P seat side)) (*1) • Front seat airbag assy LH (Side squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2 • Seat airbag No.2 wire	○	ON
B1826 (05–1349)	• Open in side squib (P seat side) circuit	• Front seat airbag assy RH (Side squib (P seat side)) (*1) • Front seat airbag assy LH (Side squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2 • Seat airbag No.2 wire	○	ON
B1827 (05–1355)	• Short in side squib (P seat side) circuit (to ground)	• Front seat airbag assy RH (Side squib (P seat side)) (*1) • Front seat airbag assy LH (Side squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2 • Seat airbag No.2 wire	○	ON
B1828 (05–1361)	• Short in side squib (P seat side) circuit (to B+)	• Front seat airbag assy RH (Side squib (P seat side)) (*1) • Front seat airbag assy LH (Side squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2 • Seat airbag No.2 wire	○	ON
B1830 (05–1367)	• Short in curtain shield airbag (D seat side) squib circuit	• Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) • Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2) • Airbag ECU assy • Floor wire	○	ON
B1831 (05–1372)	• Open in curtain shield airbag (D seat side) squib circuit	• Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) • Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2) • Airbag ECU assy • Floor wire	○	ON
B1832 (05–1376)	• Short in curtain shield airbag (D seat side) squib circuit (to ground)	• Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) • Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2) • Airbag ECU assy • Floor wire	○	ON

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B1833 (05–1380)	• Short in curtain shield airbag (D seat side) squib circuit (to B+)	• Curtain shield airbag assy LH (Curtain shield airbag (D seat side) squib) (*1) • Curtain shield airbag assy RH (Curtain shield airbag (D seat side) squib) (*2) • Airbag ECU assy • Floor wire	○	ON
B1835 (05–1384)	• Short in curtain shield airbag (P seat side) squib circuit	• Curtain shield airbag assy RH (Curtain shield airbag (P seat side) squib) (*1) • Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1836 (05–1389)	• Open in curtain shield airbag (P seat side) squib circuit	• Curtain shield airbag assy RH (Curtain shield airbag (P seat side) squib) (*1) • Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1837 (05–1393)	• Short in curtain shield airbag (P seat side) squib circuit (to ground)	• Curtain shield airbag assy RH (Curtain shield airbag (P seat side) squib) (*1) • Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1838 (05–1397)	• Short in curtain shield airbag (P seat side) squib circuit (to B+)	• Curtain shield airbag assy RH (Curtain shield airbag (P seat side) squib) (*1) • Curtain shield airbag assy LH (Curtain shield airbag (P seat side) squib) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1900 (05–1401)	• Short in P/T squib (D seat side) circuit	• Front seat outer belt assy LH (P/T squib (D seat side)) (*1) • Front seat outer belt assy RH (P/T squib (D seat side)) (*2) • Airbag ECU assy • Floor wire	○	ON
B1901 (05–1406)	• Open in P/T squib (D seat side) circuit	• Front seat outer belt assy LH (P/T squib (D seat side)) (*1) • Front seat outer belt assy RH (P/T squib (D seat side)) (*2) • Airbag ECU assy • Floor wire	○	ON
B1902 (05–1410)	• Short in P/T squib (D seat side) circuit (to ground)	• Front seat outer belt assy LH (P/T squib (D seat side)) (*1) • Front seat outer belt assy RH (P/T squib (D seat side)) (*2) • Airbag ECU assy • Floor wire	○	ON
B1903 (05–1414)	• Short in P/T squib (D seat side) circuit (to B+)	• Front seat outer belt assy LH (P/T squib (D seat side)) (*1) • Front seat outer belt assy RH (P/T squib (D seat side)) (*2) • Airbag ECU assy • Floor wire	○	ON
B1905 (05–1418)	• Short in P/T squib (P seat side) circuit	• Front seat outer belt assy RH (P/T squib (P seat side)) (*1) • Front seat outer belt assy LH (P/T squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1906 (05–1423)	• Open in P/T squib (P seat side) circuit	• Front seat outer belt assy RH (P/T squib (P seat side)) (*1) • Front seat outer belt assy LH (P/T squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
B1907 (05–1427)	• Short in P/T squib (P seat side) circuit (to ground)	• Front seat outer belt assy RH (P/T squib (P seat side)) (*1) • Front seat outer belt assy LH (P/T squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2	○	ON

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B1908 (05–1431)	• Short in P/T squib (P seat side) circuit (to B+)	• Front seat outer belt assy RH (P/T squib (P seat side)) (*1) • Front seat outer belt assy LH (P/T squib (P seat side)) (*2) • Airbag ECU assy • Floor wire No.2	○	ON
Normal (05–1435)	• Voltage source drop	• Battery • Airbag ECU assy	–	ON
Normal	• System normal	–	–	OFF

*1: LHD
*2: RHD

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DTC B1000 AIRBAG ECU ASSY MALFUNCTION

CIRCUIT DESCRIPTION

The airbag ECU assy consists of the airbag sensor, the safing sensor, the drive circuit, the diagnostic circuit, the ignition control, etc.

If the airbag ECU assy receives signals from the airbag sensor, it determines whether or not the SRS should be activated.

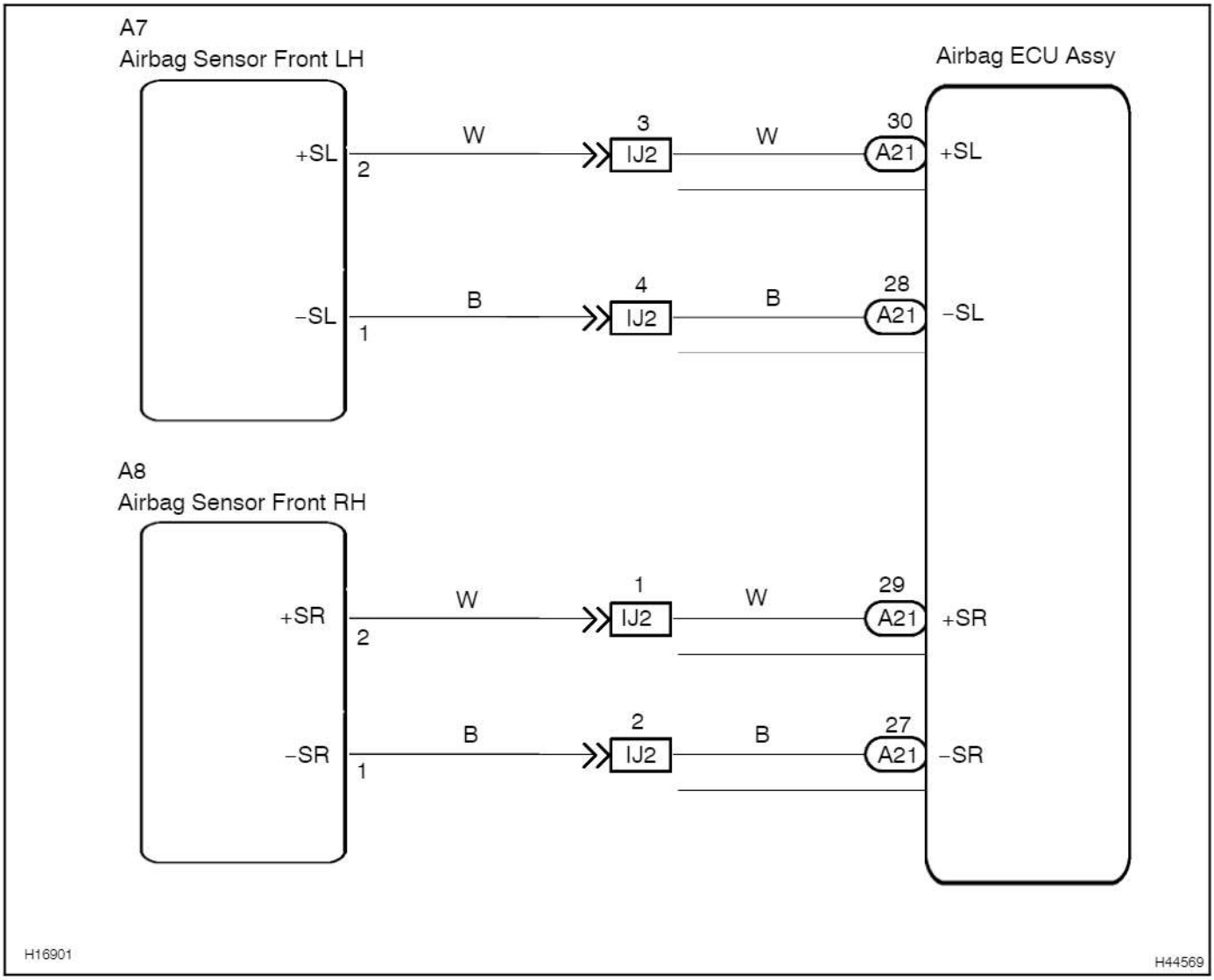
B1000 is recorded when a malfunction is detected in the airbag ECU assy.

DTC No.	DTC Detecting Condition	Trouble Area
B1000	• Airbag ECU assy malfunction • When the airbag ECU assy receives a line short signal, short to ground signal or B+ short signal in the front airbag sensor LH circuit for 2 seconds. • When the airbag ECU assy receives a line short signal, short to ground signal or B+ short signal in the front airbag sensor RH circuit for 2 seconds.	• Instrument panel wire • Engine room main wire • Airbag ECU assy

HINT:

When a trouble code is displayed simultaneously with B1000, repair the malfunction indicated by this code (except B1000) first.

WIRING DIAGRAM



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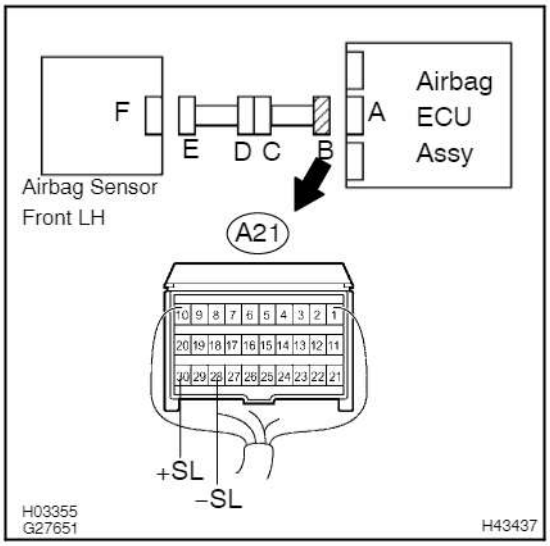
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT(TO B+)



(a) Disconnect the connector from the airbag sensor front LH.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard:

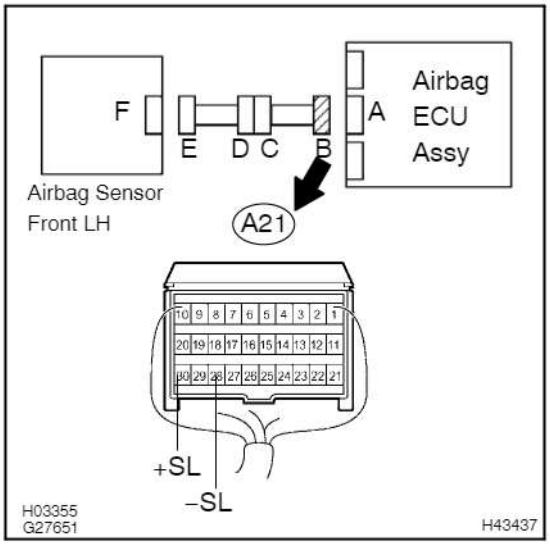
Tester connection	Condition	Specified condition
A21–30 (+SL) – Body ground	Power switch is on (IG)	Below 1 V
A21–28 (–SL) – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 8**

OK

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2 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT(SHORT)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

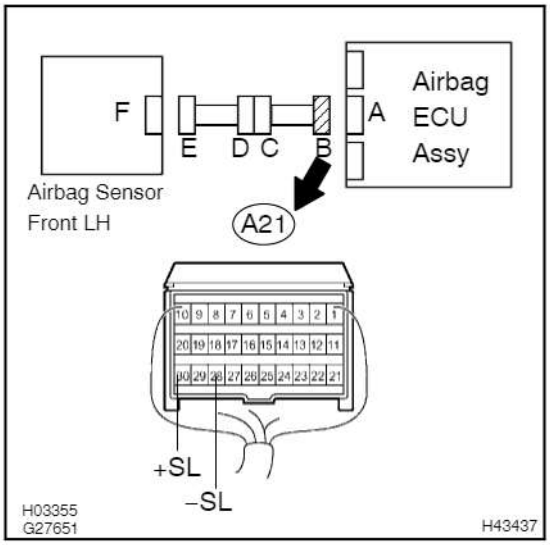
Standard:

Tester connection	Condition	Specified condition
A21–30 (+SL) – Body ground	Always	1 MΩ or Higher
A21–28 (–SL) – Body ground	Always	1 MΩ or Higher

NG → **Go to step 9**

OK

3 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT(TO GROUND)



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

Standard:

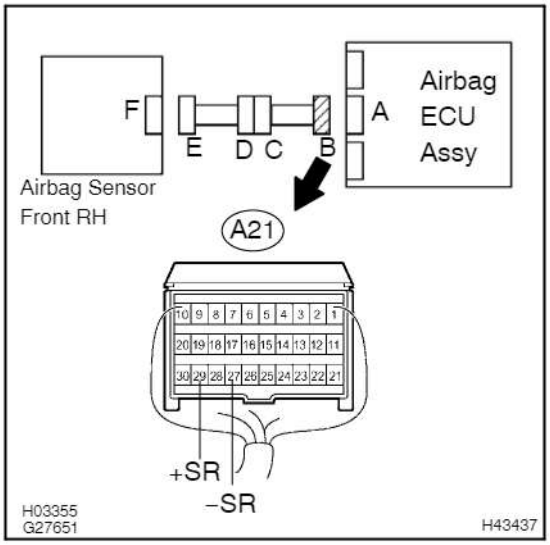
Tester connection	Condition	Specified condition
A21–30 (+SL) – Body ground	Always	1 MΩ or Higher
A21–28 (–SL) – Body ground	Always	1 MΩ or Higher

NG → **Go to step 10**

OK

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4 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT(TO B+)



(a) Disconnect the connector from the airbag sensor front RH.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

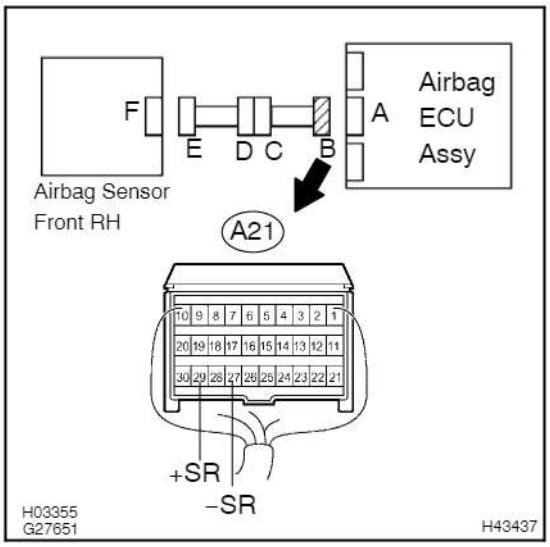
Standard:

Tester connection	Condition	Specified condition
A21–29 (+SR) – Body ground	Power switch is on (IG)	Below 1 V
A21–27 (–SR) – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 11**

OK

5 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT(SHORT)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

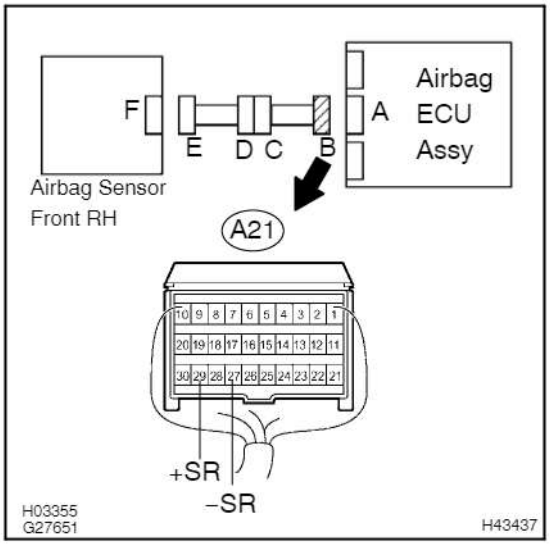
Tester connection	Condition	Specified condition
A21–29 (+SR) – A21–27 (–SR)	Always	1 MΩ or Higher

NG → **Go to step 12**

OK

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6 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT(TO GROUND)



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

Standard:

Tester connection	Condition	Specified condition
A21–29 (+SR) – Body ground	Always	1 MΩ or Higher
A21–27 (–SR) – Body ground	Always	1 MΩ or Higher

NG → **Go to step 13**

OK

7 CHECK AIR BAG ECU ASSY

(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in memory (see page 05–1170).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (see page 05–1170).

OK:

DTC B1000 is not output.

HINT:

Codes other than code B1000 may be output at this time, but they are not related to this check.

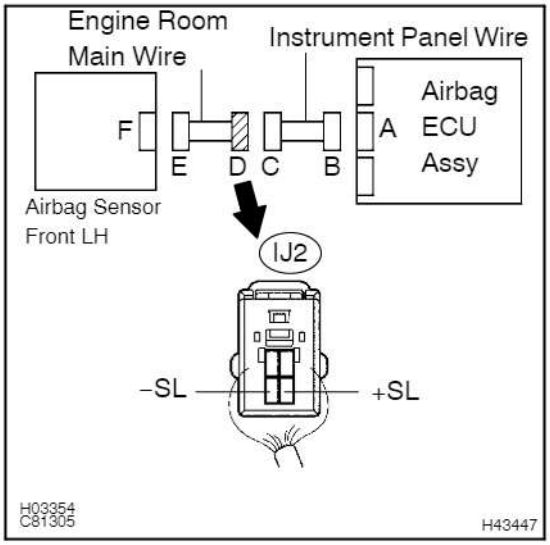
NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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8 CHECK ENGINE ROOM MAIN WIRE(TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the instrument panel wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard:

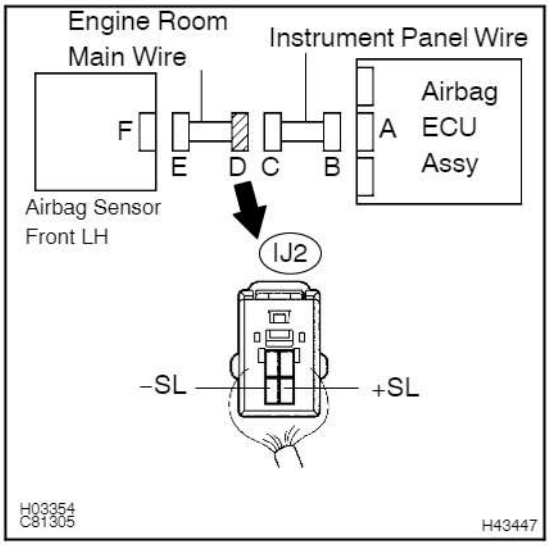
Tester connection	Condition	Specified condition
IJ2–3 (+SL) – Body ground	Power switch is on (IG)	Below 1 V
IJ2–4 (–SL) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

9 CHECK ENGINE ROOM MAIN WIRE(SHORT)



(a) Disconnect the engine room main wire connector from the instrument panel wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
IJ2–3 (+SL) – IJ2–4 (–SL)	Always	1 MΩ or Higher

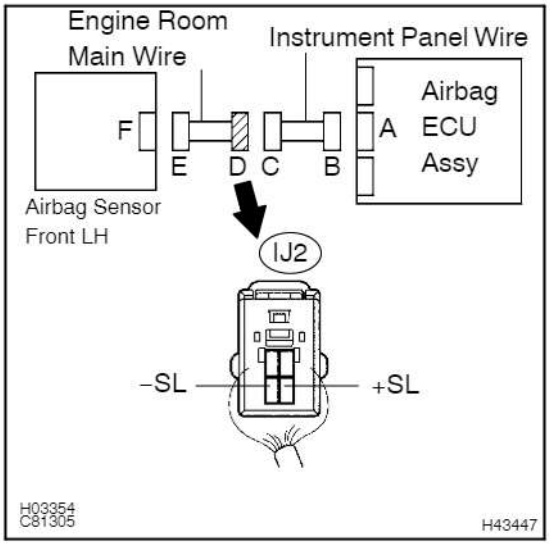
NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

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10 CHECK ENGINE ROOM MAIN WIRE(TO GROUND)



(a) Disconnect the engine room main wire connector from the instrument panel wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

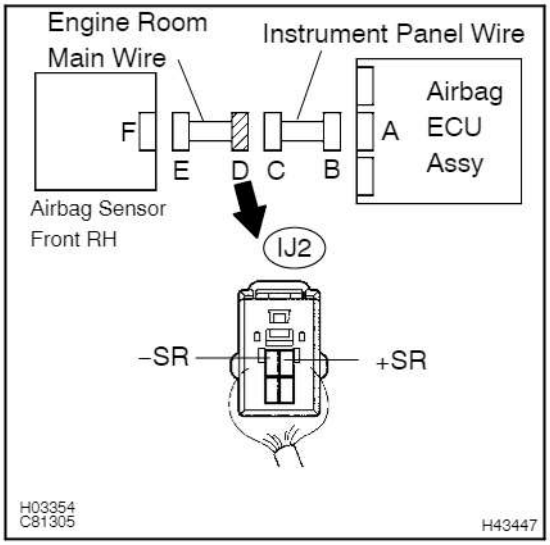
Tester connection	Condition	Specified condition
IJ2–3 (+SL) – Body ground	Always	1 MΩ or Higher
IJ2–4 (–SL) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

11 CHECK ENGINE ROOM MAIN WIRE(TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the instrument panel wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
IJ2–1 (+SR) – Body ground	Power switch is on (IG)	Below 1 V
IJ2–2 (–SR) – Body ground	Power switch is on (IG)	Below 1 V

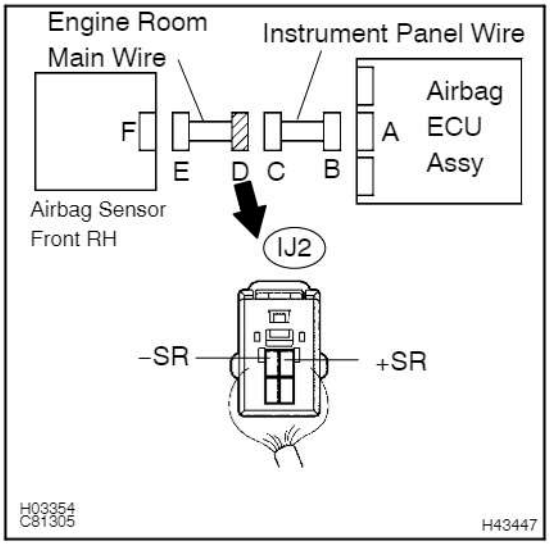
NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

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12 CHECK ENGINE ROOM MAIN WIRE(SHORT)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

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

Standard:

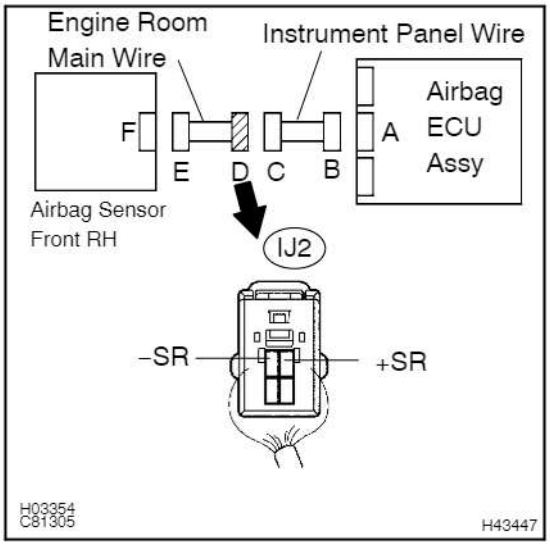
Tester connection	Condition	Specified condition
IJ2–1 (+SR) – IJ2–2 (–SR)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

13 CHECK ENGINE ROOM MAIN WIRE(TO GROUND)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

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

Standard:

Tester connection	Condition	Specified condition
IJ2–1 (+SR) – Body ground	Always	1 MΩ or Higher
IJ2–2 (–SR) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

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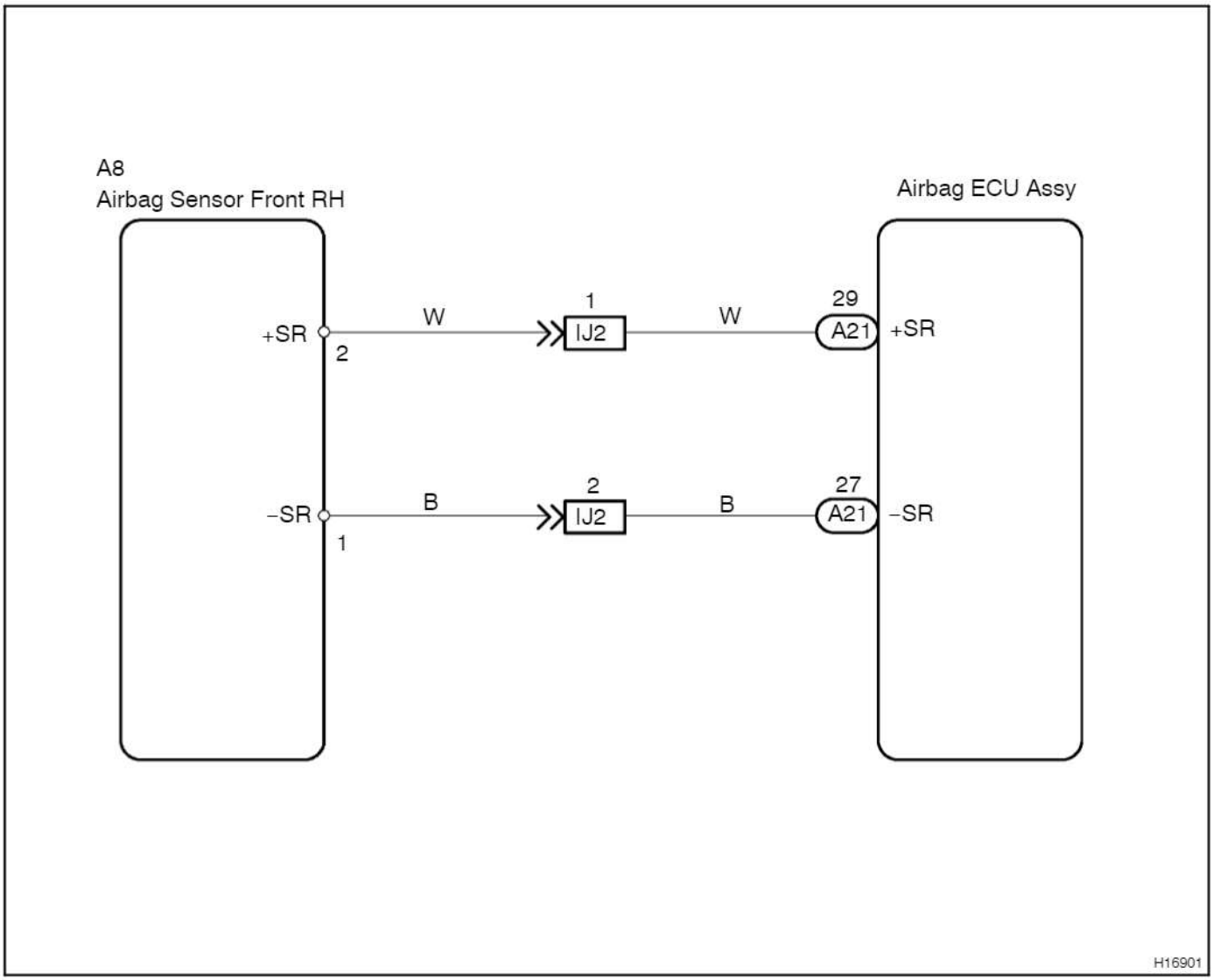
DTC	B1610	FRONT AIRBAG SENSOR (RH) MALFUNCTION

CIRCUIT DESCRIPTION

The front airbag sensor RH consists of the diagnostic circuit, the frontal deceleration sensor, etc.
If the airbag ECU assy receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.
DTC B1610 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1610	• When the airbag ECU assy receives an open signal in the front airbag sensor RH circuit for 2 seconds. • Airbag sensor front RH malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Engine room main wire • Airbag sensor front RH • Airbag ECU assy

WIRING DIAGRAM



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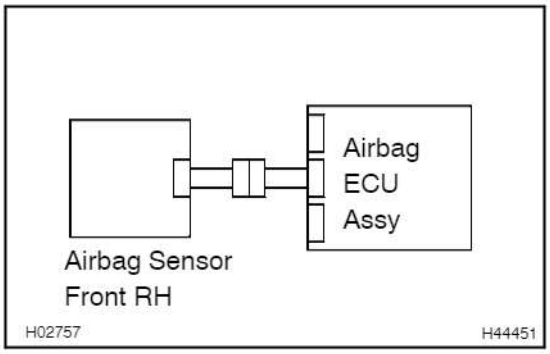
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1610 is not output.

HINT:

Codes other than code B1610 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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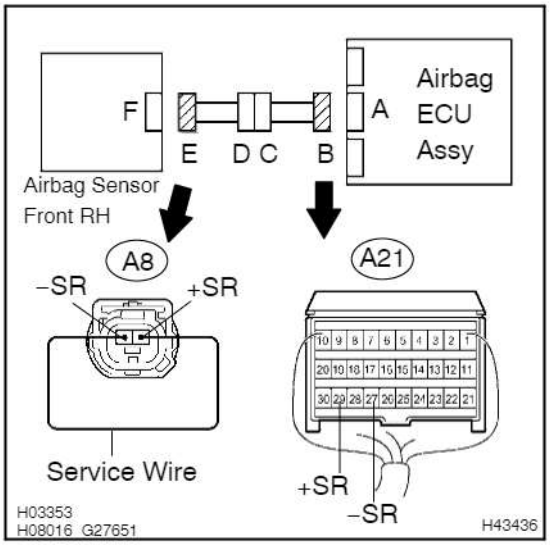
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag ECU assy and the airbag sensor front RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (OPEN)



(a) Disconnect the connectors from the airbag ECU assy and the airbag sensor front RH.
(b) Using a service wire, connect A8–2 (+SR) and A8–1 (–SR) of connector "E".

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

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

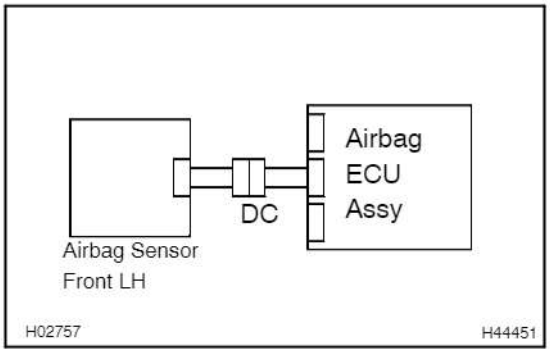
Tester connection	Condition	Specified condition
A21–29 (+SR) – A21–27 (–SR)	Always	Below 1 Ω

NG → **Go to step 5**

OK

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4 CHECK AIRBAG SENSOR FRONT RH



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the airbag sensor front RH with the airbag sensor front LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1610 is output.	A
DTC B1615 is output.	B
DTC B1610 or B1615 are not output.	C

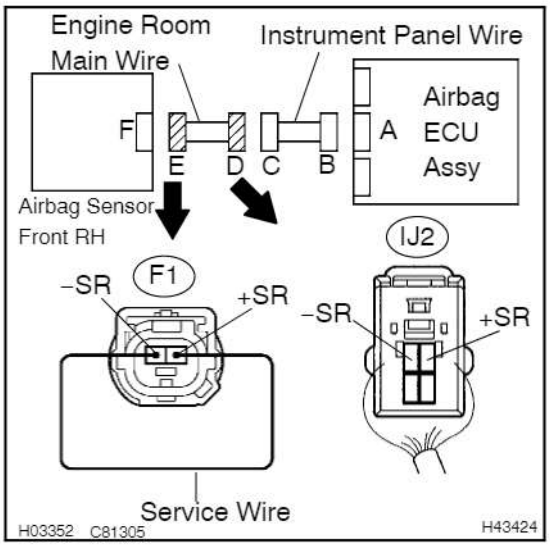
A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE AIRBAG SENSOR FRONT RH (SEE PAGE 60–56)**

C

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

5 CHECK ENGINE ROOM MAIN WIRE(OPEN)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

HINT:
The service wire has already been inserted into connector "E".

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

Standard:

Tester connection	Condition	Specified condition
IJ2–1 (+SR) – IJ2–2 (–SR)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

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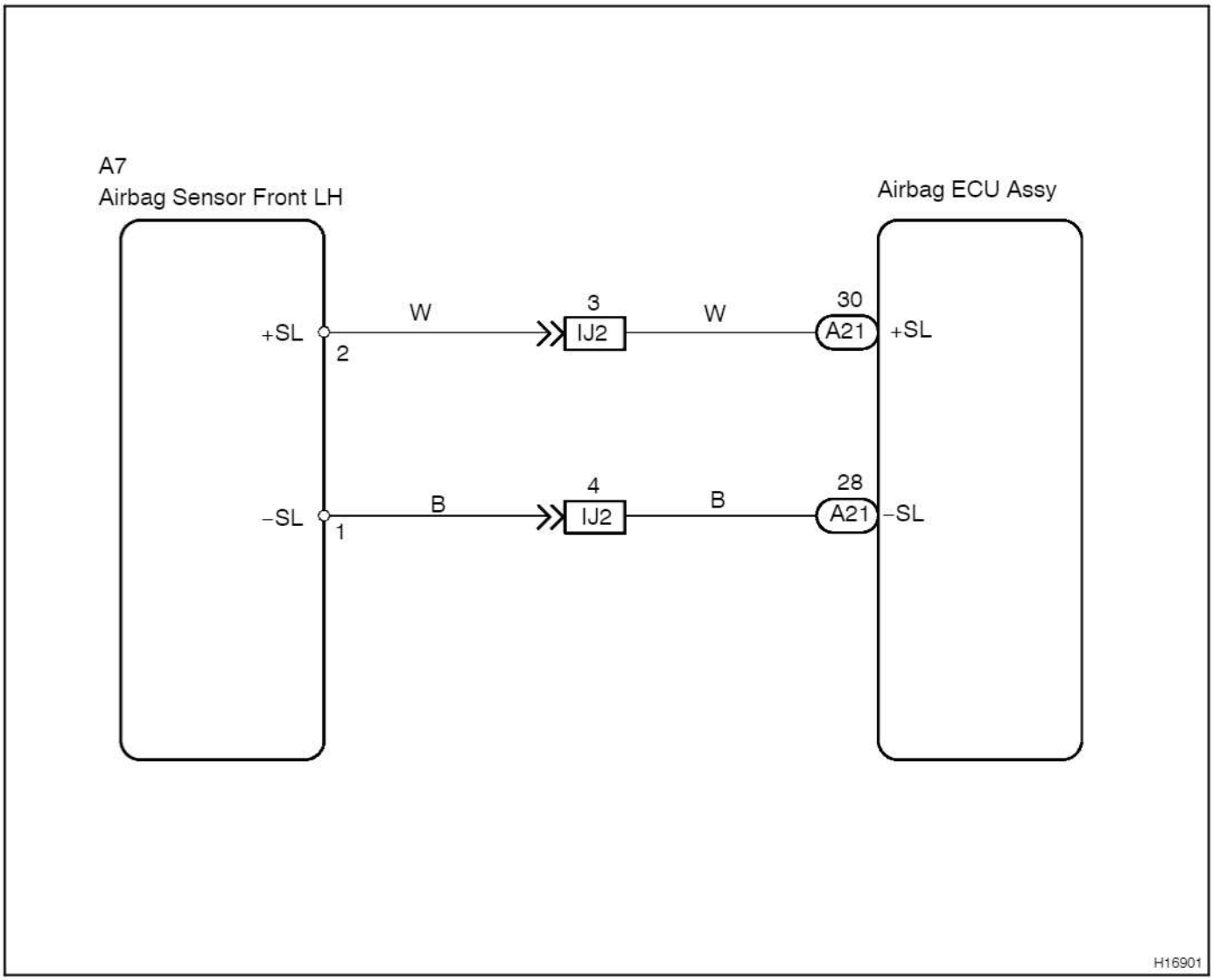
DTC	B1615	FRONT AIRBAG SENSOR (LH) MALFUNCTION

CIRCUIT DESCRIPTION

The front airbag sensor LH consists of the diagnostic circuit and the frontal deceleration sensor, etc.
If the airbag ECU assy receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.
DTC B1615 is recorded when a malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1615	• When the airbag ECU assy receives an open signal in the front airbag sensor LH circuit for 2 seconds. • Airbag sensor front LH malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Engine room main wire • Airbag sensor front LH • Airbag ECU assy

WIRING DIAGRAM



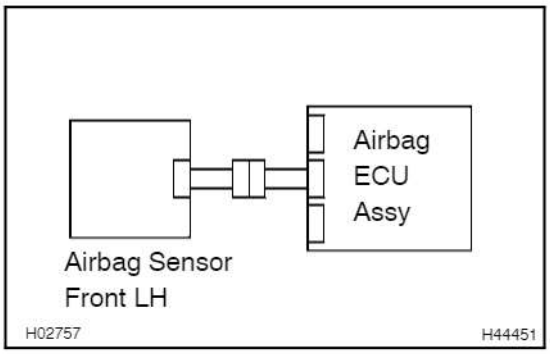
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INSPECTION PROCEDURE

CAUTION:
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1615 is not output.

HINT:
Codes other than code B1615 may be output at this time, but they are not related to this check.

NG	Go to step 2

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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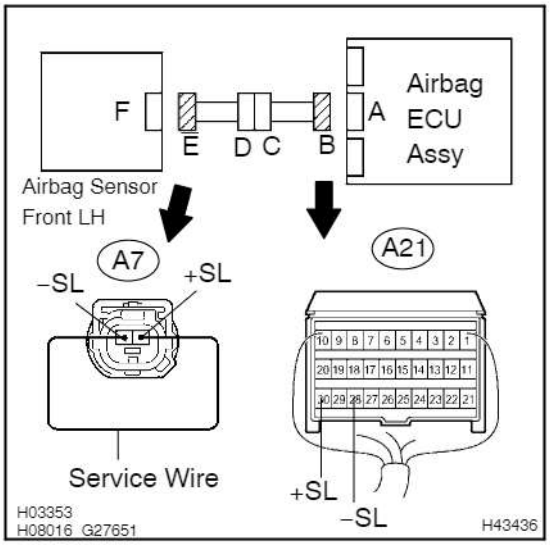
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connector is properly connected to the airbag ECU assy and the airbag sensor front LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT(OPEN)



(a) Disconnect the connectors from the airbag ECU assy and the airbag sensor front LH.
(b) Using a service wire, connect A7–2 (+SL) and A7–1 (–SL) of connector "E".

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

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

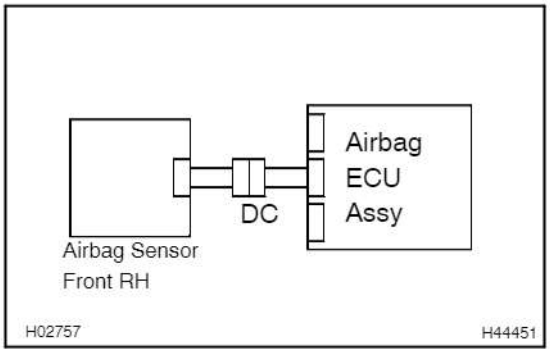
Tester connection	Condition	Specified condition
A21–30 (+SL) – A21–28 (–SL)	Always	Below 1 Ω

NG → **Go to step 5**

OK

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4 CHECK AIR BAG SENSOR FRONT LH



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the airbag sensor front RH with the airbag sensor front LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1615 is output.	A
DTC B1610 is output.	B
DTC B1610 or B1615 are not output.	C

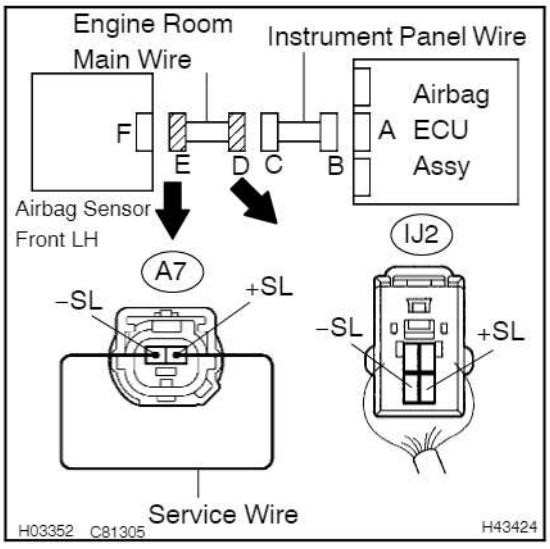
A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE AIR BAG SENSOR FRONT LH (SEE PAGE 60–56)**

C

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

5 CHECK ENGINE ROOM MAIN WIRE(OPEN)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

HINT:
The service wire has already been inserted into connector "E".

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

Standard:

Tester connection	Condition	Specified condition
IJ2–3 (+SL) – IJ2–4 (–SL)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

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DTC	B1620	SIDE AIRBAG SENSOR ASSEMBLY (D SEAT SIDE) MALFUNCTION

CIRCUIT DESCRIPTION

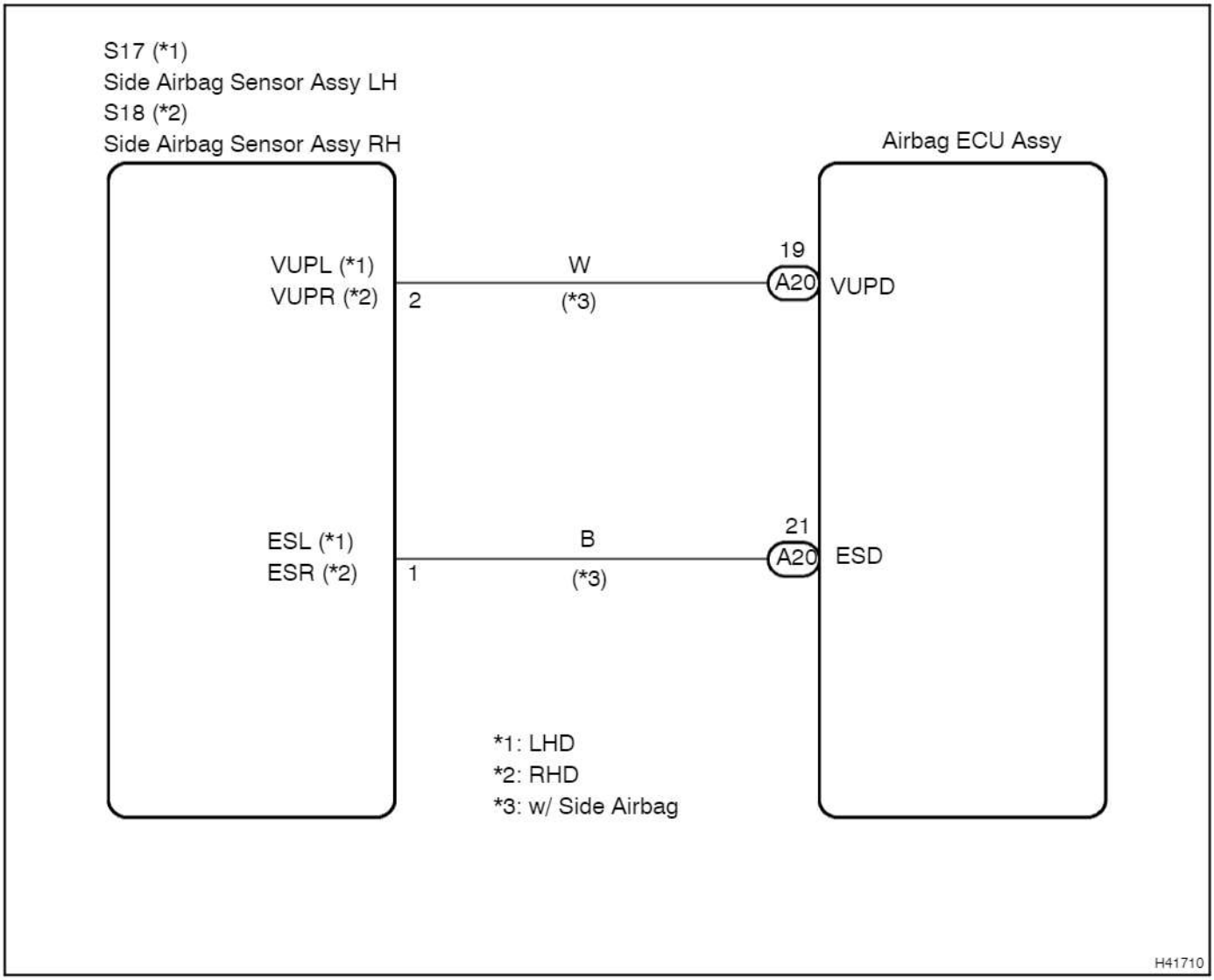
The side airbag sensor assembly (D seat side) consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag ECU assy receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1620 is recorded when a malfunction is detected in the side airbag sensor assembly (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1620	• When the Airbag ECU assy receives a line short signal, open signal, short to ground signal or B+ short signal in the side airbag sensor assembly (D seat side) circuit for 2 seconds. • Side airbag sensor assembly (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Side airbag sensor assy LH (LHD) • Side airbag sensor assy RH (RHD) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

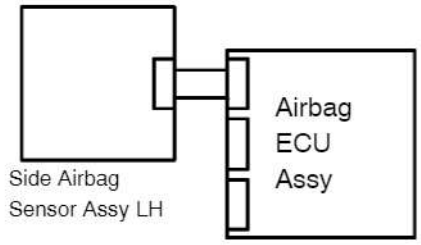
CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

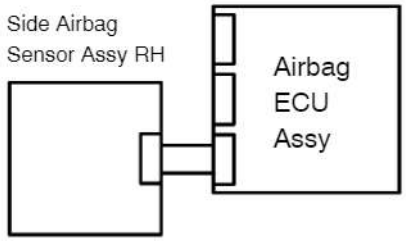
(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC

LHD:



RHD:



H44534
H44533
H44570

(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch is on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1620 is not output.

HINT:
Codes other than code B1620 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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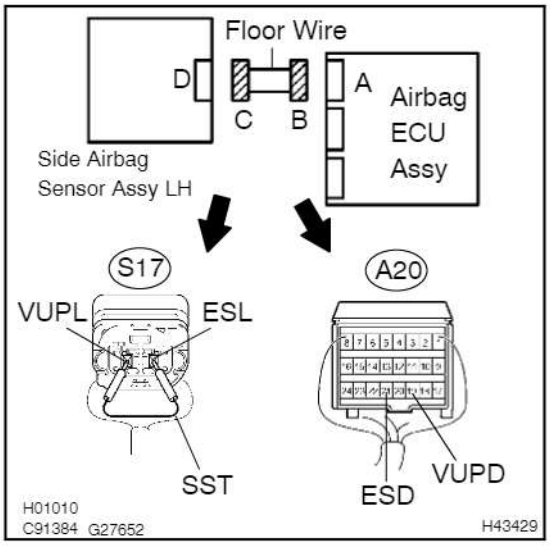
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Check that the connectors are properly connected to the airbag ECU assy and the side airbag sensor assy LH.
(d) RHD:
Check that the connectors are properly connected to the airbag ECU assy and the side airbag sensor assy RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

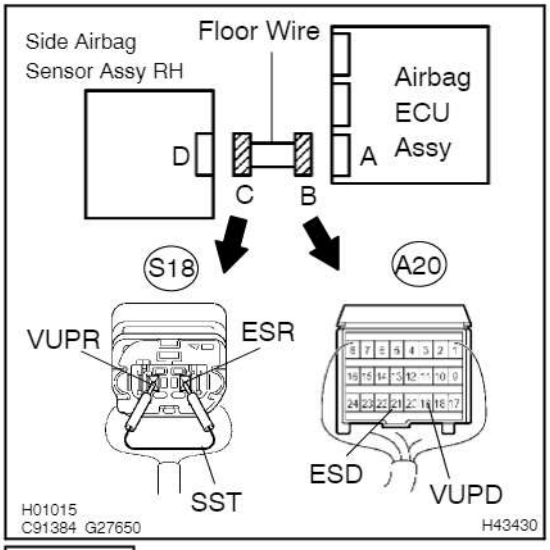
3	CHECK FLOOR WIRE(OPEN)



(a) LHD:
(1) Disconnect the connectors from the airbag ECU assy and the side airbag sensor assy LH.
(2) Using SST, connect S17–2 (VUPL) and S17–1 (ESL) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–19 (VUPD) – A20–21 (ESD)	Always	Below 1 Ω



(b) RHD:
(1) Disconnect the connectors from the airbag ECU assy and the side airbag sensor assy RH.
(2) Using SST, connect S18–2 (VUPR) and S18–1 (ESR) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.

Standard:

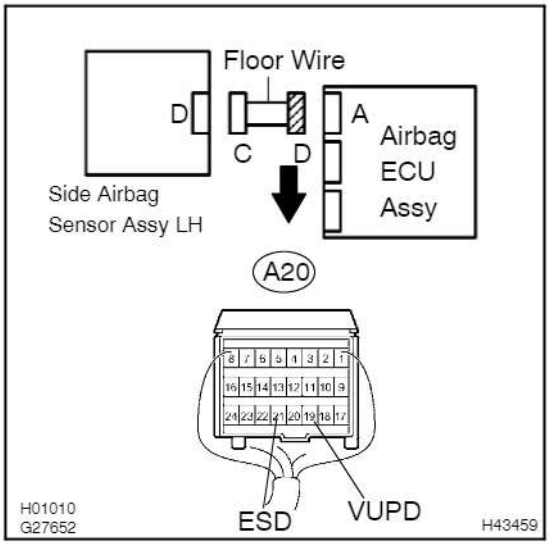
Tester connection	Condition	Specified condition
A20–19 (VUPD) – A20–21 (ESD)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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4	CHECK FLOOR WIRE(SHORT)



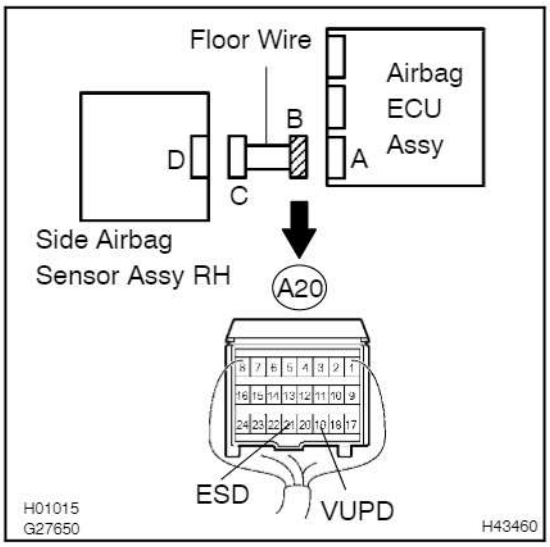
(a) LHD:

(1) Disconnect the SST from connector "C".

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

Standard:

Tester connection	Condition	Specified condition
A20–19 (VUPD) – A20–21 (ESD)	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the SST from connector "C".

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

Standard:

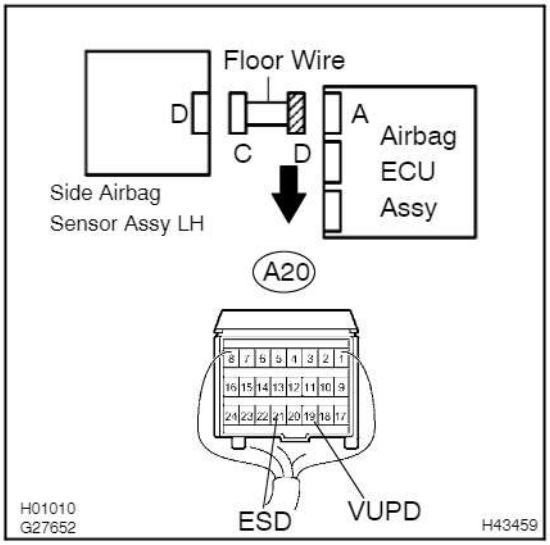
Tester connection	Condition	Specified condition
A20–19 (VUPD) – A20–21 (ESD)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5	CHECK FLOOR WIRE(TO B+)



(a) LHD:

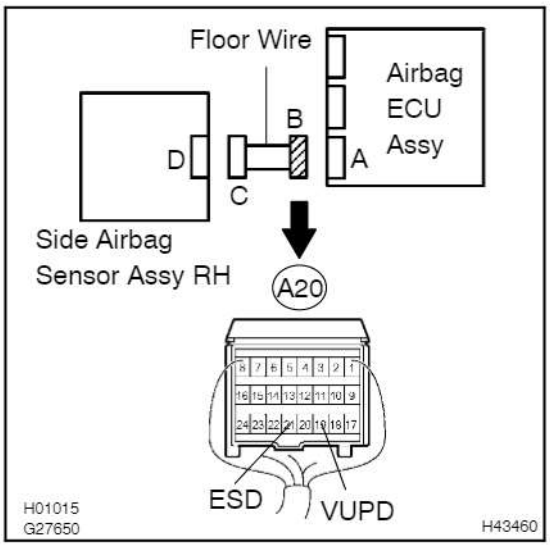
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–19 (VUPD) – Body ground	Power switch is on (IG)	Below 1 V
A20–21 (ESD) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

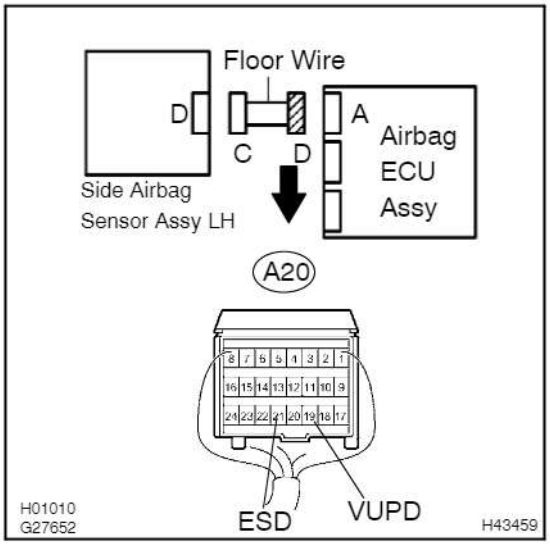
Tester connection	Condition	Specified condition
A20–19 (VUPD) – Body ground	Power switch is on (IG)	Below 1 V
A20–21 (ESD) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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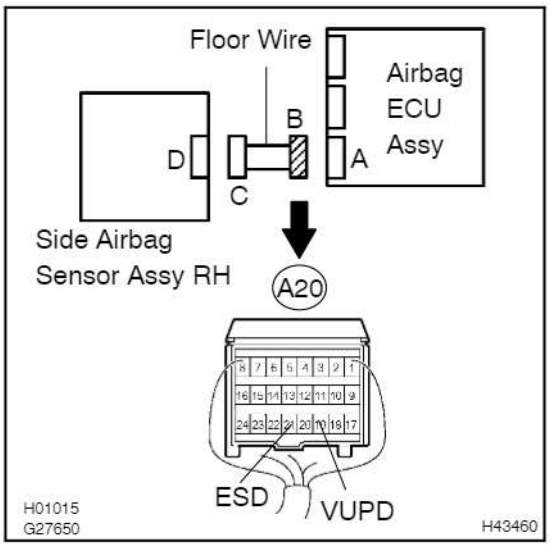
6 CHECK FLOOR WIRE(TO GROUND)



(a) LHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–19 (VUPD) – Body ground	Always	1 MΩ or Higher
A20–21 (ESD) – Body ground	Always	1 MΩ or Higher



(b) RHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

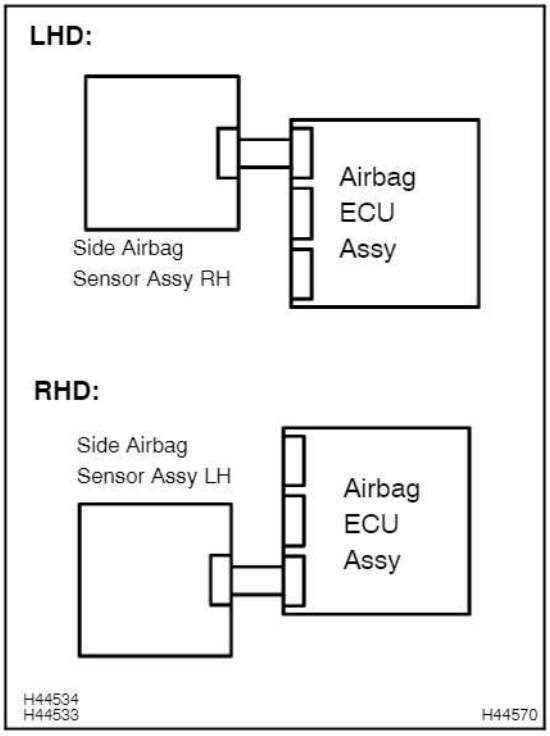
Tester connection	Condition	Specified condition
A20–19 (VUPD) – Body ground	Always	1 MΩ or Higher
A20–21 (ESD) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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7	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the side airbag sensor assy LH with RH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1620 is output.	A
DTC B1625 is output (LHD).	B
DTC B1625 is output (RHD).	C
DTC B1620 or B1625 are not output.	D

A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE SIDE AIR BAG SENSOR ASSY LH (SEE PAGE 60–58)**

C → **REPLACE SIDE AIR BAG SENSOR ASSY RH (SEE PAGE 60–58)**

D

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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DTC	B1625	SIDE AIRBAG SENSOR ASSEMBLY (P SEAT SIDE) MALFUNCTION

CIRCUIT DESCRIPTION

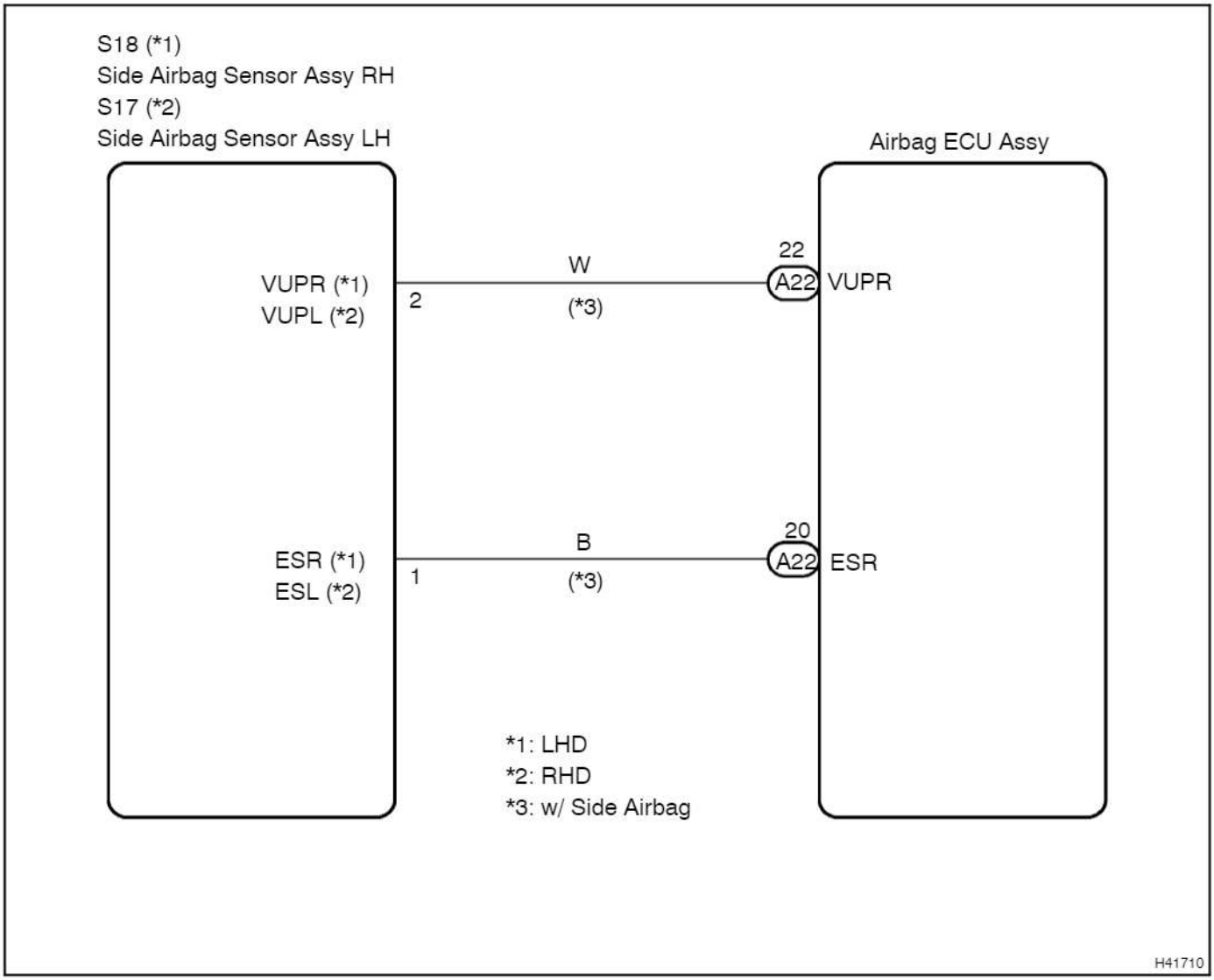
The side airbag sensor assembly (P seat side) consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag ECU assy receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1625 is recorded when a malfunction is detected in the side airbag sensor assembly (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1625	• When the airbag ECU assy receives a line short signal, open signal, short to ground signal or B+ short signal in the side airbag sensor assembly (P seat side) circuit for 2 seconds. • Side airbag sensor assembly (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Side airbag sensor assy RH (LHD) • Side airbag sensor assy LH (RHD) • Airbag ECU assy

WIRING DIAGRAM



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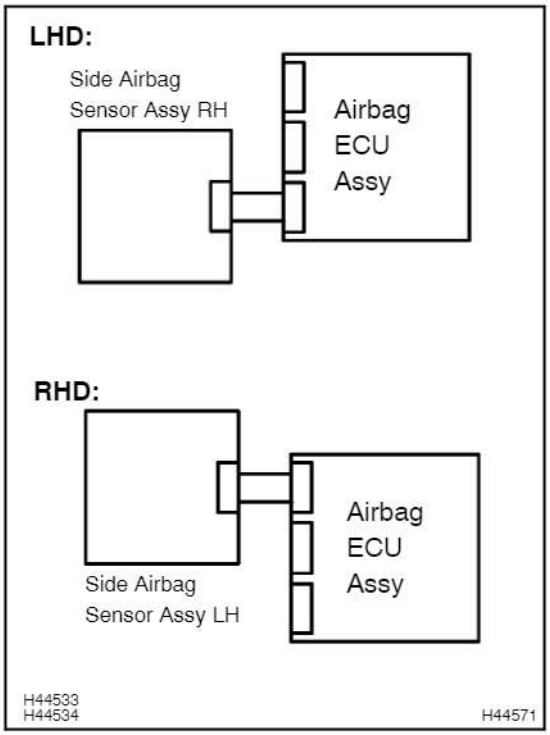
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1625 is not output.

HINT:
Codes other than code B1625 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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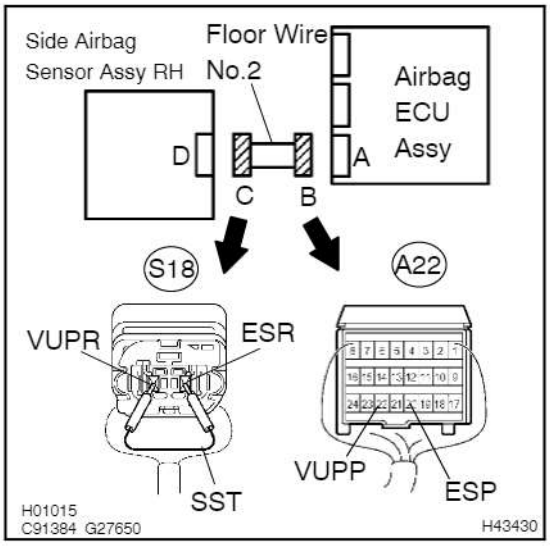
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Check that the connectors are properly connected to the airbag ECU assy and the side airbag sensor assy RH.
(d) RHD:
Check that the connectors are properly connected to the airbag ECU assy and the side airbag sensor assy LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

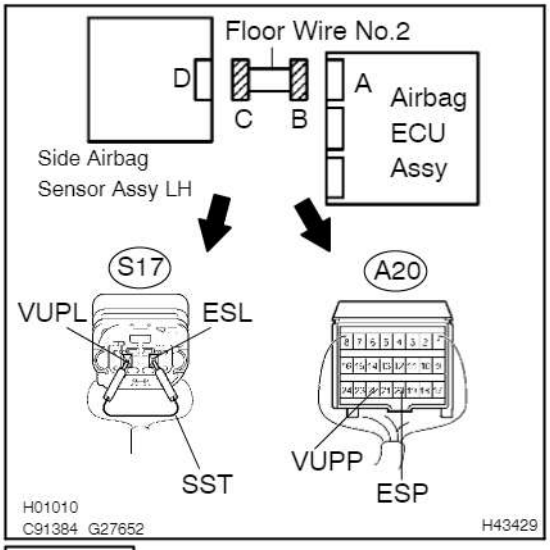
OK

3 CHECK FLOOR WIRE NO.2(OPEN)



(a) LHD:
(1) Disconnect the connectors from the airbag ECU assy and the side airbag sensor assy RH.
(2) Using SST, connect S18–2 (VUPR) and S18–1 (ESR) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A22–22 (VUPP) – A22–20 (ESP)	Always	Below 1 Ω



(b) RHD:
(1) Disconnect the connectors from the airbag ECU assy and the side airbag sensor assy RH.
(2) Using SST, connect S17–2 (VUPL) and S17–1 (ESL) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.
Standard:

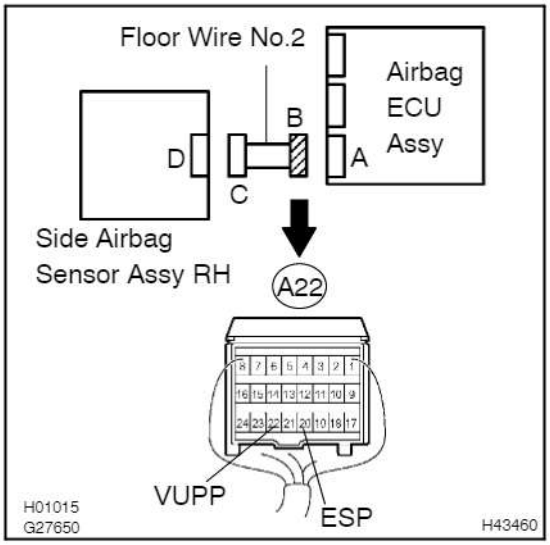
Tester connection	Condition	Specified condition
A22–22 (VUPP) – A22–20 (ESP)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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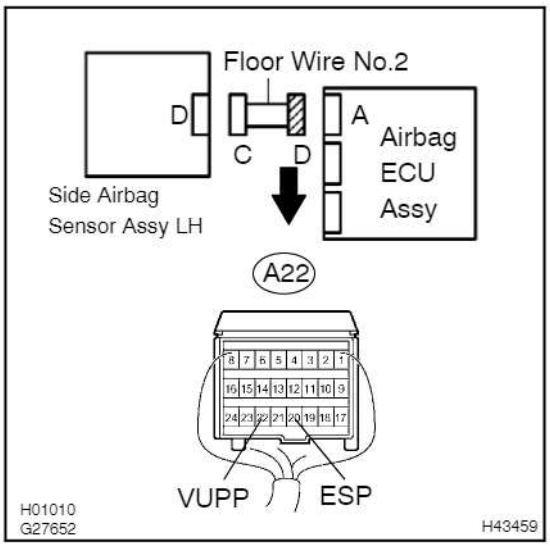
4 CHECK FLOOR WIRE NO.2(SHORT)



(a) LHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–22 (VUPP) – A22–20 (ESP)	Always	1 MΩ or Higher



(b) RHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

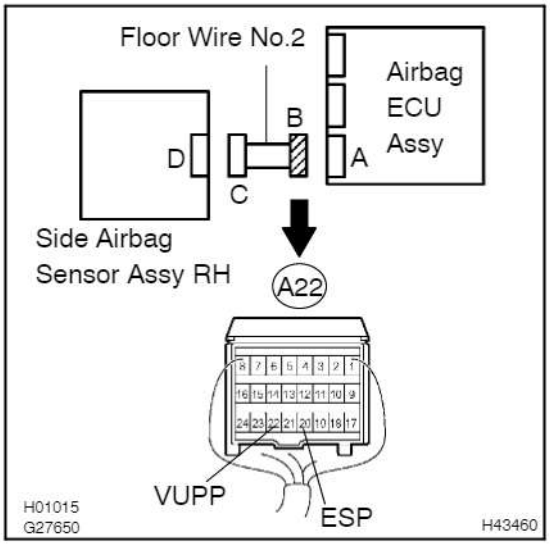
Tester connection	Condition	Specified condition
A22–22 (VUPP) – A22–20 (ESP)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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5 CHECK FLOOR WIRE NO.2(TO B+)



(a) LHD:

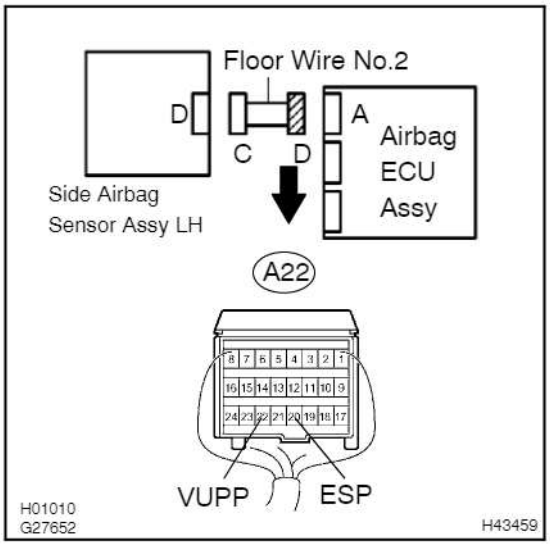
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–22 (VUPP) – Body ground	Power switch is on (IG)	Below 1 V
A22–20 (ESP) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

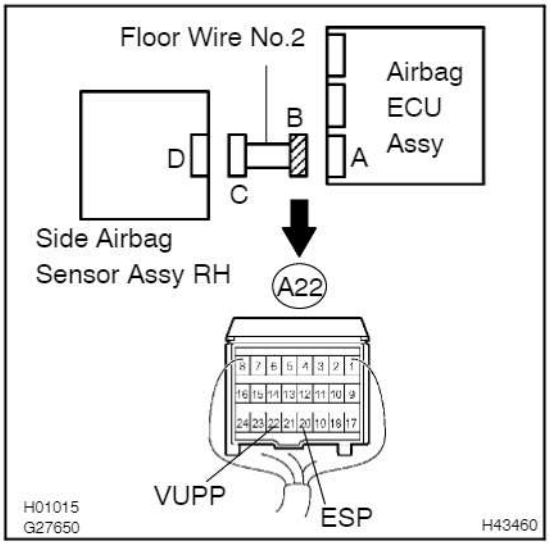
Tester connection	Condition	Specified condition
A22–22 (VUPP) – Body ground	Power switch is on (IG)	Below 1 V
A22–20 (ESP) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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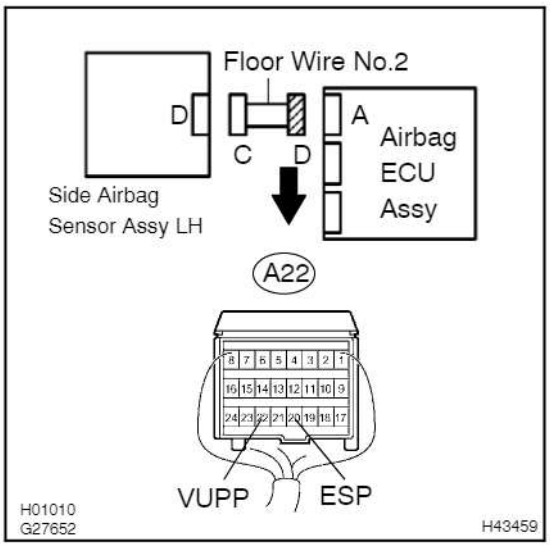
6 CHECK FLOOR WIRE NO.2(TO GROUND)



(a) LHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–22 (VUPP) – Body ground	Always	1 MΩ or Higher
A22–20 (ESP) – Body ground	Always	1 MΩ or Higher



(b) RHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

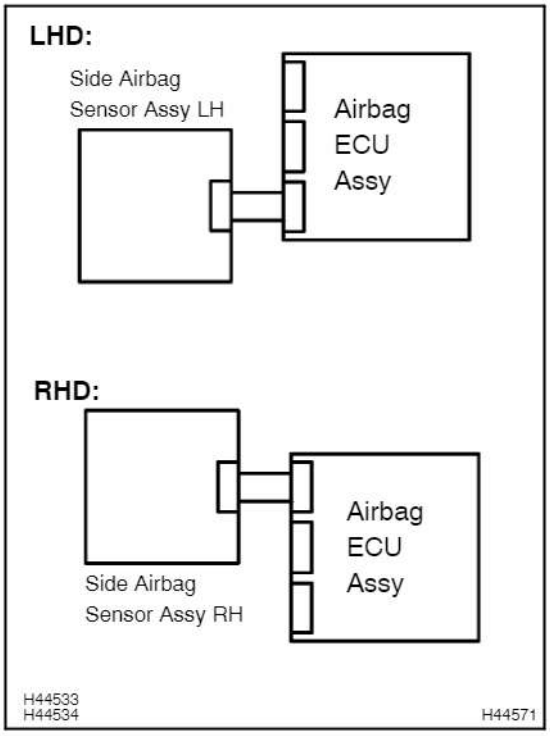
Tester connection	Condition	Specified condition
A22–22 (VUPP) – Body ground	Always	1 MΩ or Higher
A22–20 (ESP) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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7	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the side airbag sensor assy LH with RH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1625 is output.	A
DTC B1620 is output (LHD).	B
DTC B1620 is output (RHD).	C
DTC B1620 or B1625 are not output.	D

A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE SIDE AIR BAG SENSOR ASSY RH (SEE PAGE 60–58)**

C → **REPLACE SIDE AIR BAG SENSOR ASSY LH (SEE PAGE 60–58)**

D

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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DTC	B1630	CURTAIN SHIELD AIRBAG SENSOR (D SEAT SIDE) MALFUNCTION

CIRCUIT DESCRIPTION

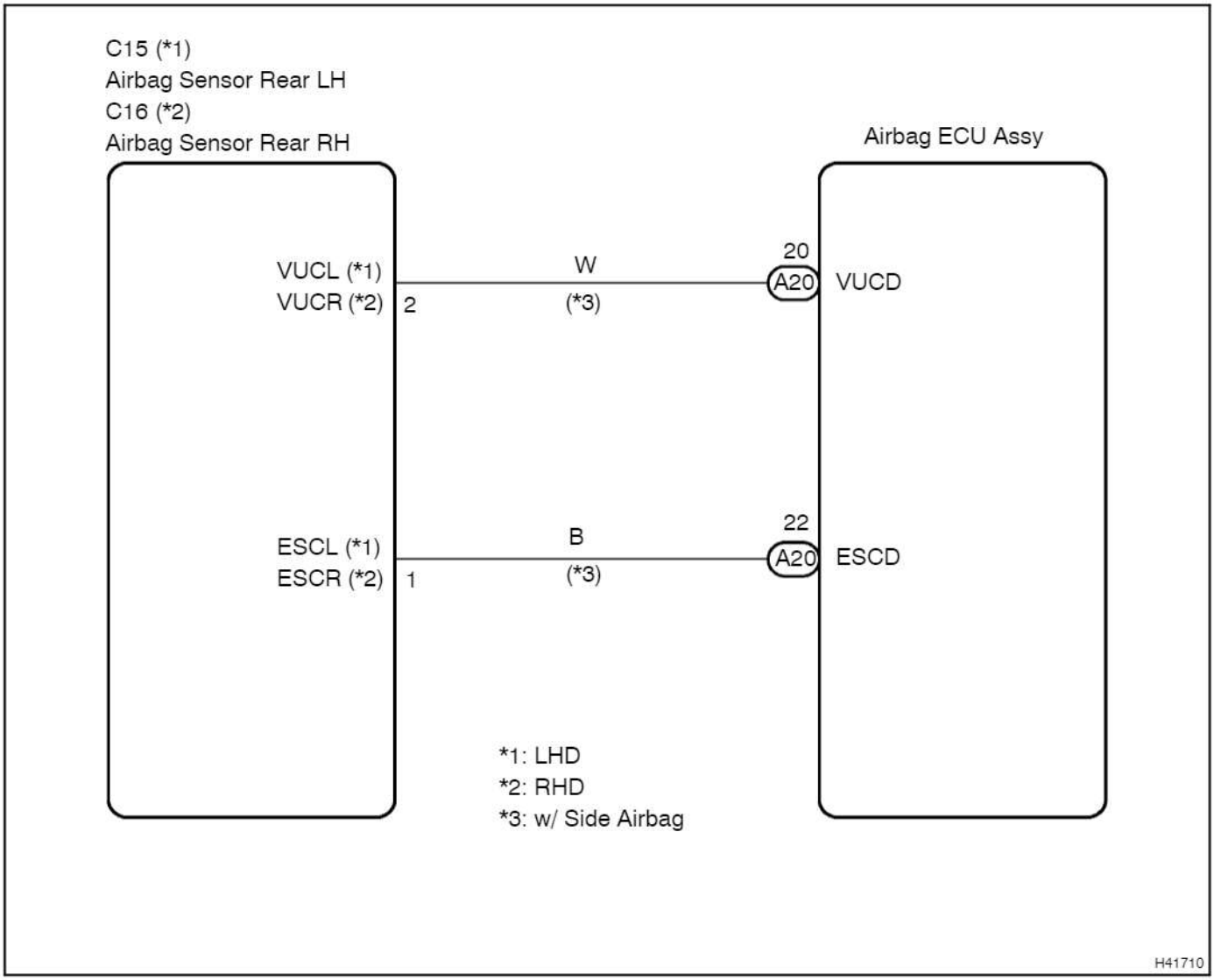
The curtain shield airbag sensor (D seat side) consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag ECU assy receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1630 is recorded when a malfunction is detected in the curtain shield airbag sensor (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1630	• When the airbag sensor assy receives a line short signal, open signal, short to ground signal or B+ short signal in the curtain shield airbag sensor (D seat side) circuit for 2 seconds. • Curtain shield airbag senosr (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Airbag sensor rear LH (LHD) • Airbag sensor rear RH (RHD) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

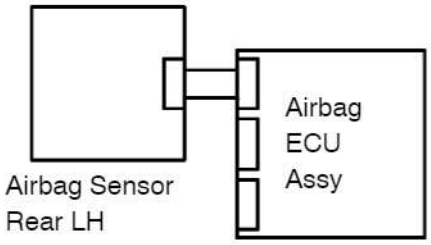
CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

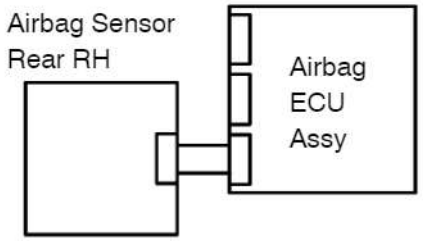
(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC

LHD:



RHD:



H44534
H44533
H44570

(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1630 is not output.

HINT:

Codes other than code B1630 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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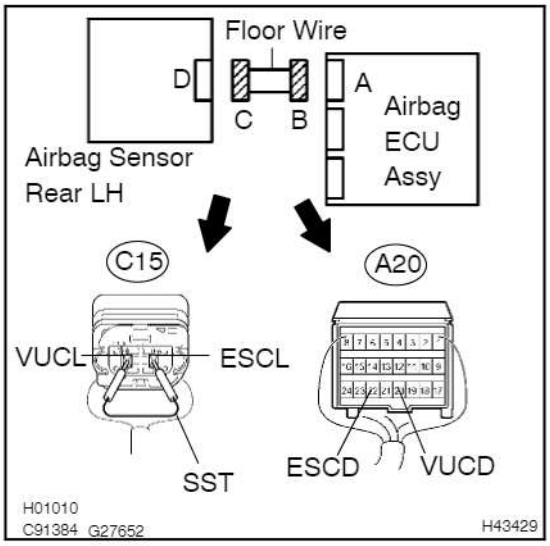
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Check that the connectors are properly connected to the airbag ECU assy and the airbag sensor rear LH.
(d) RHD:
Check that the connectors are properly connected to the airbag ECU assy and the airbag sensor rear RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

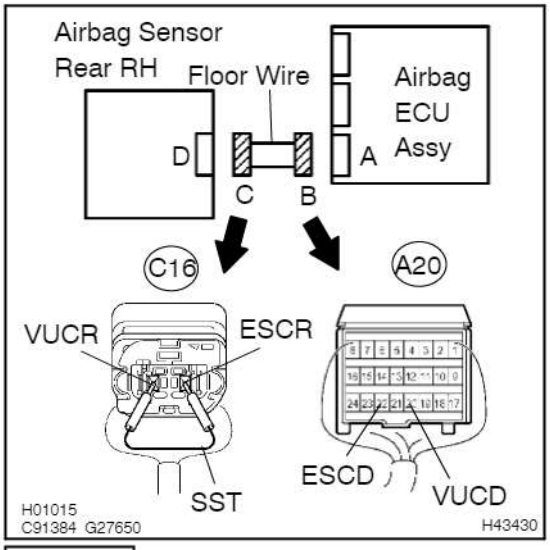
OK

3 CHECK FLOOR WIRE(OPEN)



(a) LHD:
(1) Disconnect the connectors from the airbag ECU assy and the airbag sensor rear LH.
(b) Using SST, connect C15–2 (VUCL) and C15–1 (ESCL) of connector "C".
SST 09843–18040
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A20–20 (VUCD) – A20–22 (ESCD)	Always	Below 1 Ω



(d) RHD:
(1) Disconnect the connectors from the airbag ECU assy and the airbag sensor rear LH.
(e) Using SST, connect C16–2 (VUCR) and C16–1 (ESCR) of connector "C".
SST 09843–18040
(f) Measure the resistance according to the value(s) in the table below.
Standard:

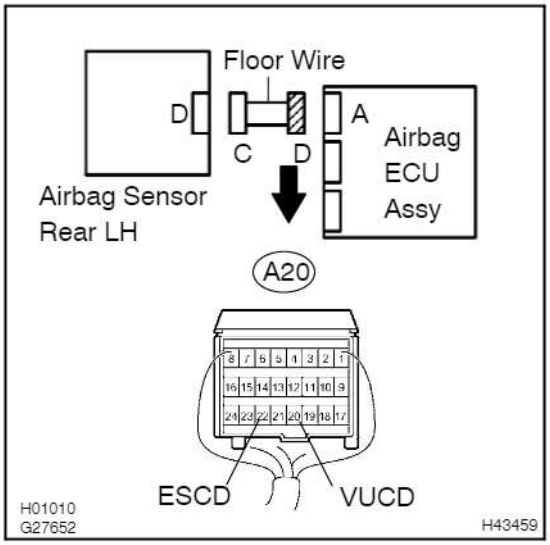
Tester connection	Condition	Specified condition
A20–20 (VUCD) – A20–22 (ESCD)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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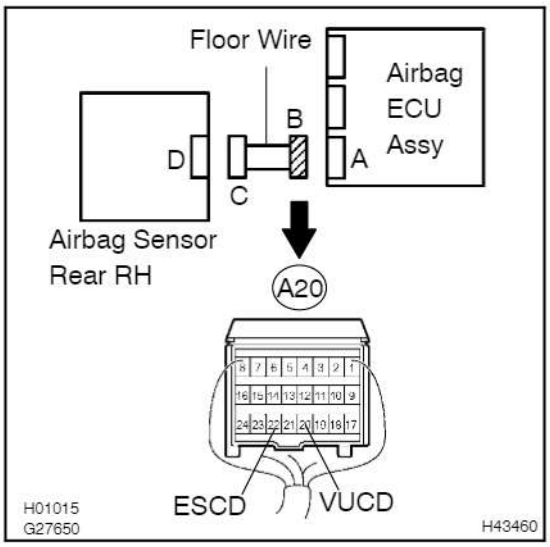
4 CHECK FLOOR WIRE(SHORT)



(a) LHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–20 (VUCD) – A20–22 (ESCD)	Always	1 MΩ or Higher



(b) RHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

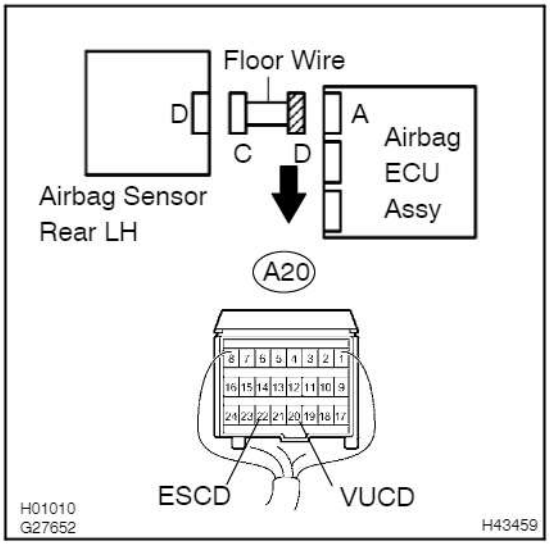
Tester connection	Condition	Specified condition
A20–20 (VUCD) – A20–22 (ESCD)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5	CHECK FLOOR WIRE(TO B+)



(a) LHD:

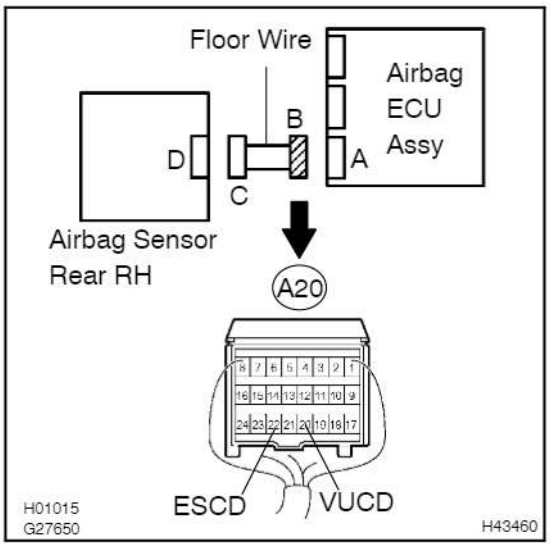
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–20 (VUCD) – Body ground	Power switch is on (IG)	Below 1 V
A20–22 (ESCD) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

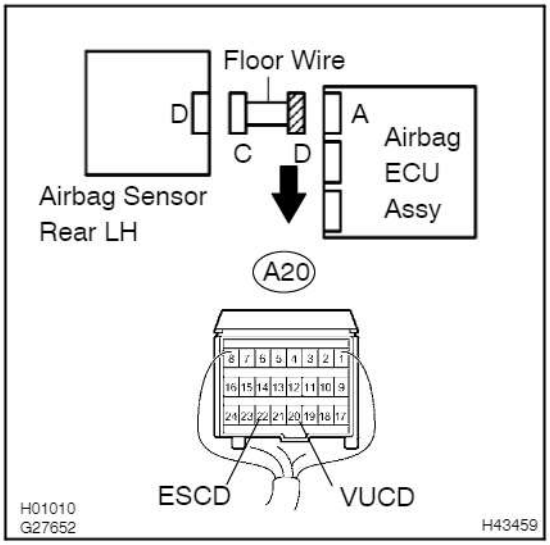
Tester connection	Condition	Specified condition
A20–20 (VUCD) – Body ground	Power switch is on (IG)	Below 1 V
A20–22 (ESCD) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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6 CHECK FLOOR WIRE(TO GROUND)



(a) LHD:

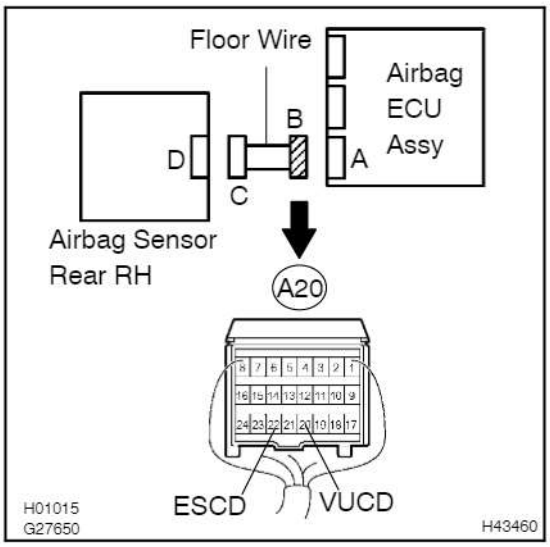
(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

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

Standard:

Tester connection	Condition	Specified condition
A20–20 (VUCD) – Body ground	Always	1 MΩ or Higher
A20–22 (ESCD) – Body ground	Always	1 MΩ or Higher



(b) RHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

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

Standard:

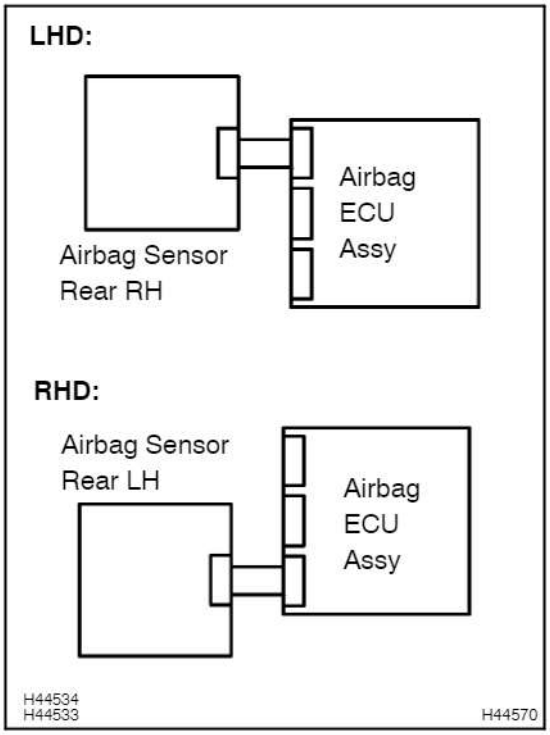
Tester connection	Condition	Specified condition
A20–20 (VUCD) – Body ground	Always	1 MΩ or Higher
A20–22 (ESCD) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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7	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the airbag sensor rear LH with RH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1630 is output.	A
DTC B1635 is output (LHD).	B
DTC B1635 is output (RHD).	C
DTC B1630 or B1635 are not output.	D

A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE AIR BAG SENSOR REAR LH (SEE PAGE 60–60)**

C → **REPLACE AIR BAG SENSOR REAR RH (SEE PAGE 60–60)**

D

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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DTC	B1635	CURTAIN SHIELD AIRBAG SENSOR (P SEAT SIDE) MALFUNCTION

CIRCUIT DESCRIPTION

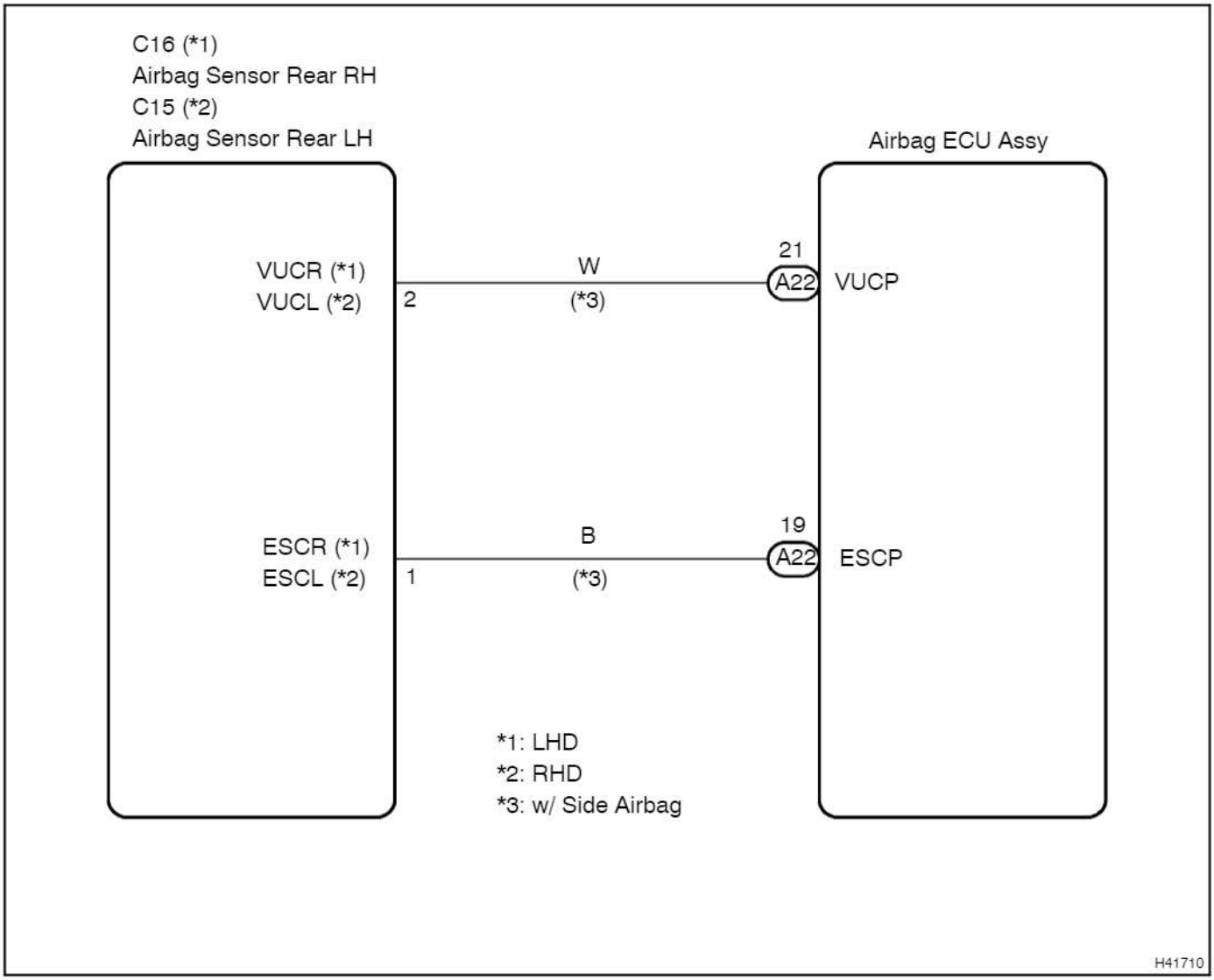
The curtain shield airbag sensor (P seat side) circuit consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag ECU assy receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1635 is recorded when a malfunction is detected in the curtain shield airbag sensor (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1635	• When the airbag ECU assy receives a line short signal, open signal, short to ground signal or B+ short signal in the curtain shield airbag sensor (P seat side) circuit for 2 seconds. • Curtain shield airbag sensor (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Airbag sensor rear RH (LHD) • Airbag sensor rear LH (RHD) • Airbag ECU assy

WIRING DIAGRAM



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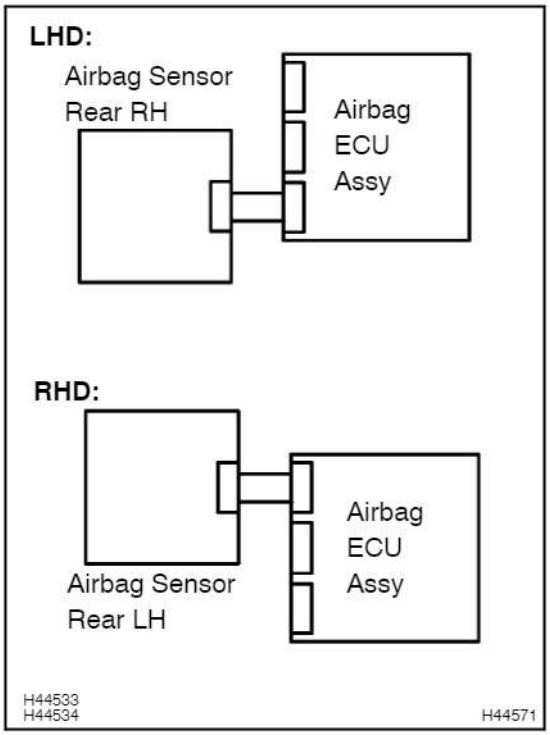
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1630 is not output.

HINT:
Codes other than code B1630 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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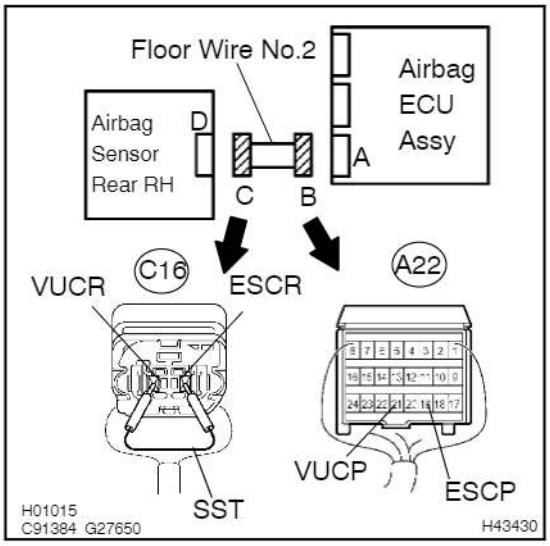
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Check that the connectors are properly connected to the airbag ECU assy and the airbag sensor rear RH.
(d) RHD:
Check that the connectors are properly connected to the airbag ECU assy and the airbag sensor rear LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

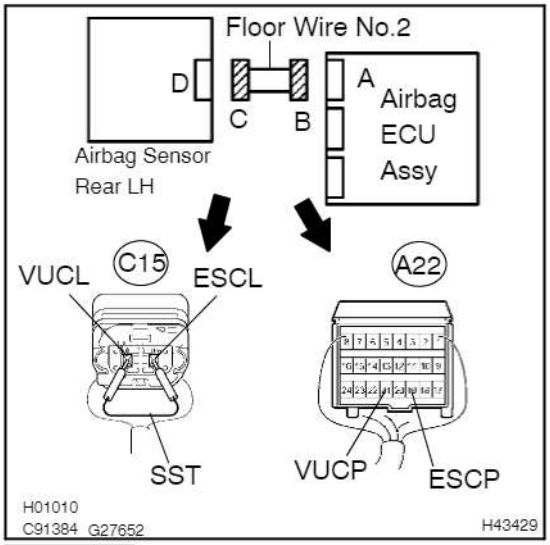
3 CHECK FLOOR WIRE NO.2(OPEN)



(a) LHD:
(1) Disconnect the connectors from the airbag ECU assy and the airbag sensor rear RH.
(2) Using SST, connect C16–2 (VUCR) and C16–1 (ESCR) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–21 (VUCP) – A22–19 (ESCP)	Always	Below 1 Ω



(b) RHD:
(1) Disconnect the connectors from the airbag ECU assy and the airbag sensor rear RH.
(2) Using SST, connect C15–2 (VUCL) and C15–1 (ESCL) of connector "C".
SST 09843–18040
(3) Measure the resistance according to the value(s) in the table below.

Standard:

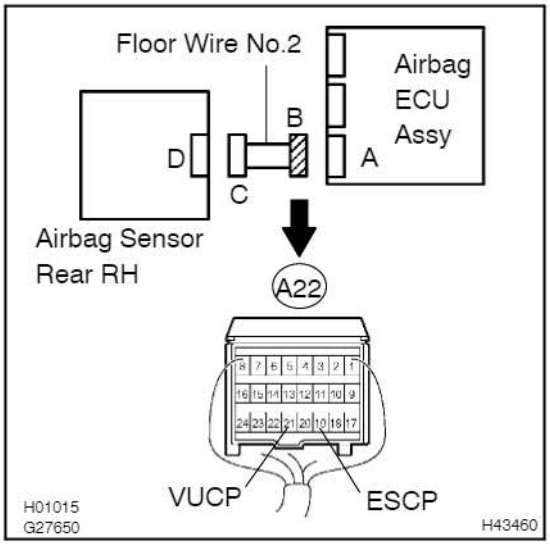
Tester connection	Condition	Specified condition
A22–21 (VUCP) – A22–19 (ESCP)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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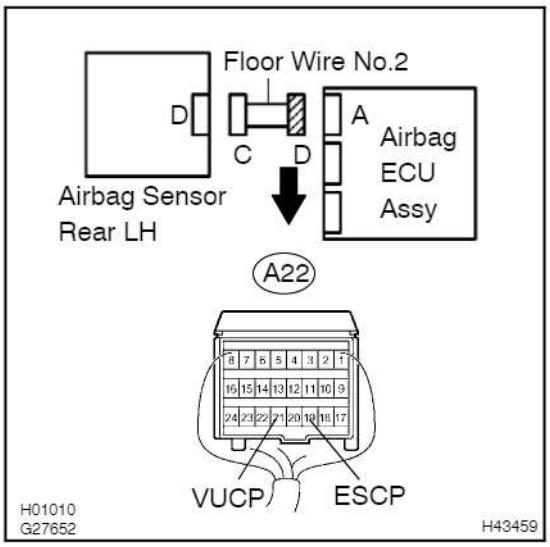
4	CHECK FLOOR WIRE NO.2(SHORT)



(a) LHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–21 (VUCP) – A22–19 (ESCP)	Always	1 MΩ or Higher



(b) RHD:
(1) Disconnect the SST from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

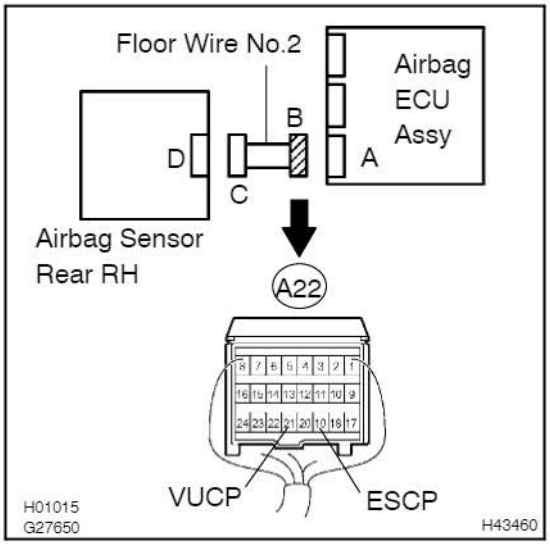
Tester connection	Condition	Specified condition
A22–21 (VUCP) – A22–19 (ESCP)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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5	CHECK FLOOR WIRE NO.2(TO B+)



(a) LHD:

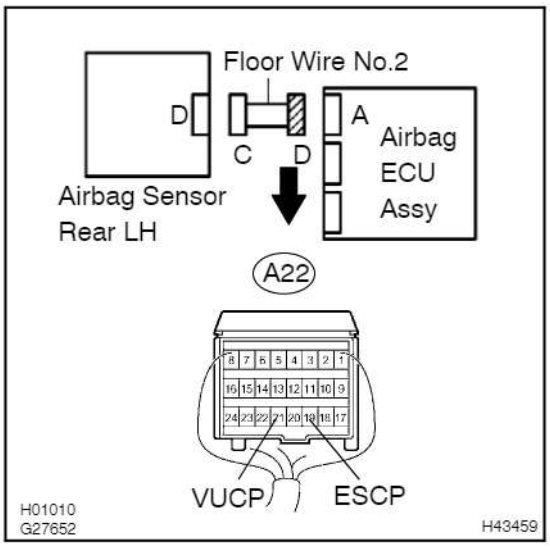
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–21 (VUCP) – Body ground	Power switch is on (IG)	Below 1 V
A22–19 (ESCP) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

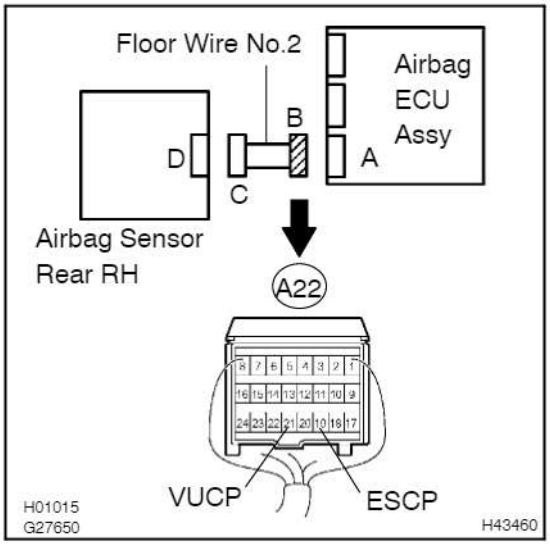
Tester connection	Condition	Specified condition
A22–21 (VUCP) – Body ground	Power switch is on (IG)	Below 1 V
A22–19 (ESCP) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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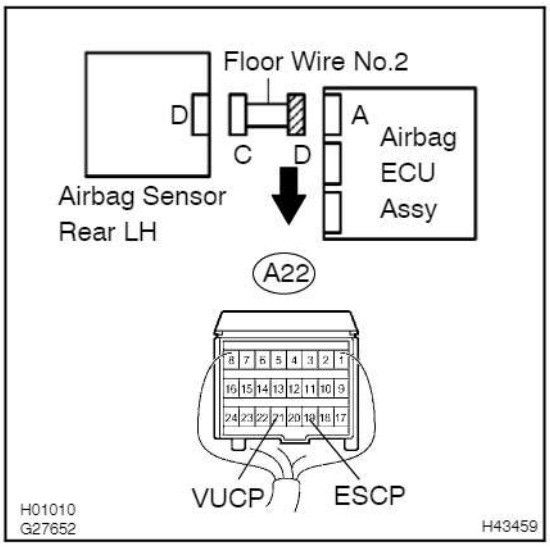
6	CHECK FLOOR WIRE NO.2(TO GROUND)



(a) LHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A22–21 (VUCP) – Body ground	Always	1 MΩ or Higher
A22–19 (ESCP) – Body ground	Always	1 MΩ or Higher



(b) RHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

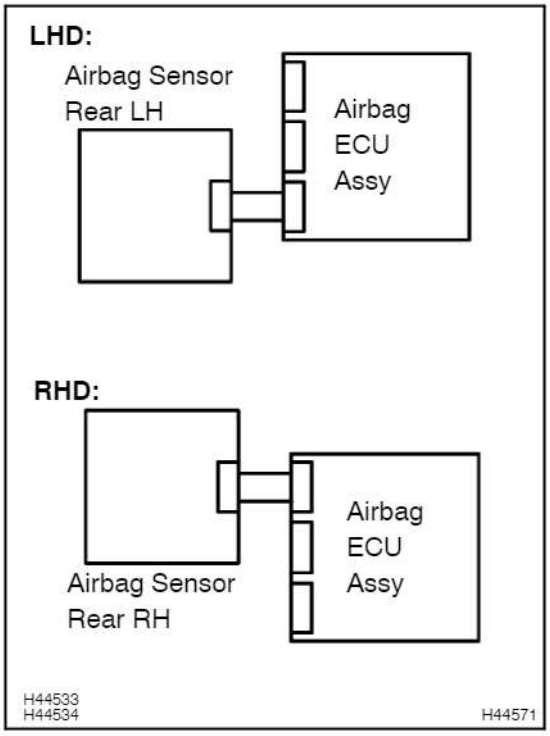
Tester connection	Condition	Specified condition
A22–21 (VUCP) – Body ground	Always	1 MΩ or Higher
A22–19 (ESCP) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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7 CHECK DTC



(a) Connect the connectors to the airbag ECU assy.
(b) Interchange the airbag sensor rear LH with RH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

Result:

DTC B1635 is output.	A
DTC B1630 is output (LHD).	B
DTC B1630 is output (RHD).	C
DTC B1630 or B1635 are not output.	D

A → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

B → **REPLACE AIR BAG SENSOR REAR RH (SEE PAGE 60–60)**

C → **REPLACE AIR BAG SENSOR REAR LH (SEE PAGE 60–60)**

D

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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DTC	B1653	SEAT POSITION SENSOR ASSEMBLY MALFUNCTION

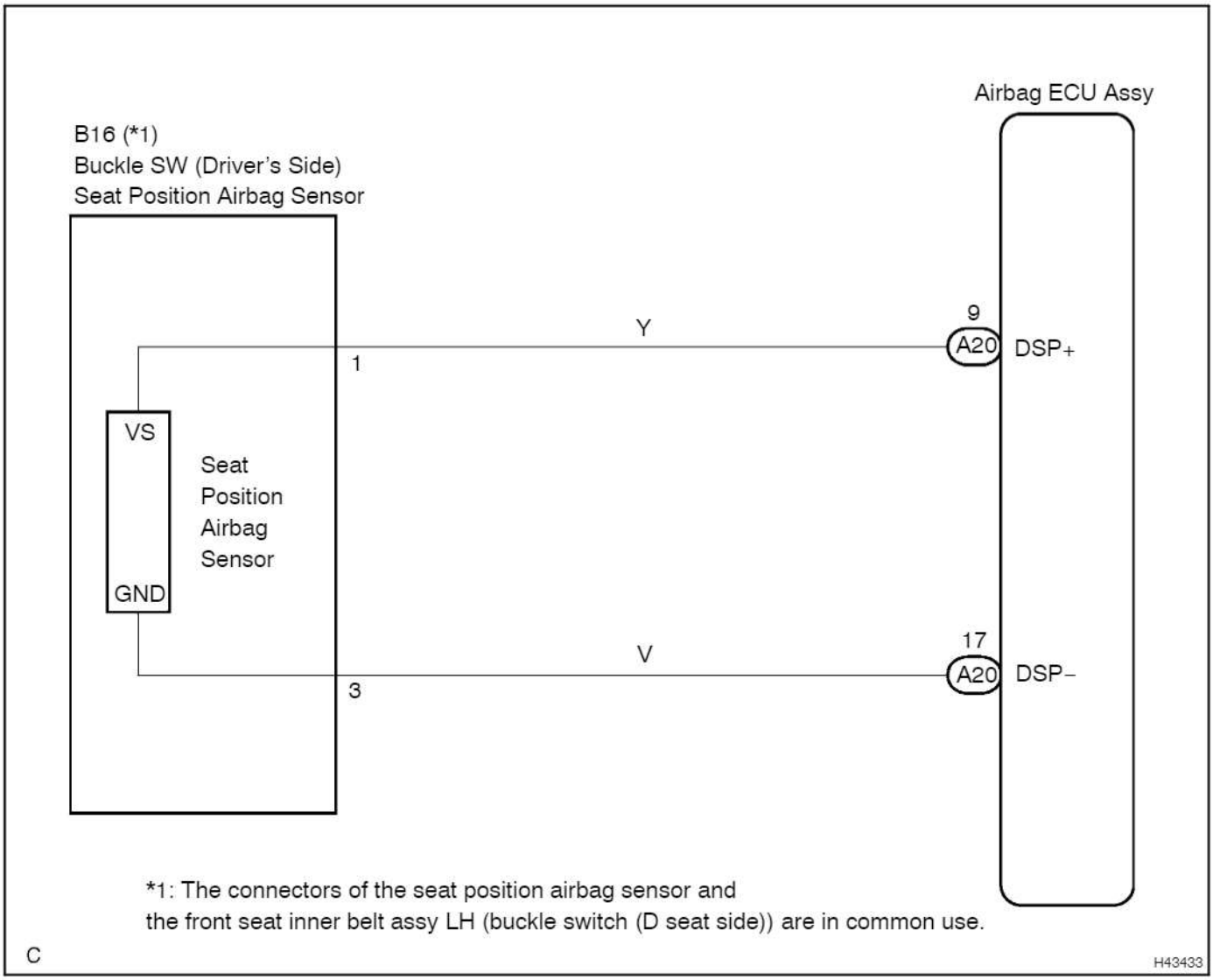
CIRCUIT DESCRIPTION

The seat position sensor assembly circuit consists of the airbag ECU assy and the seat position airbag sensor.

DTC B1653 is recorded when a malfunction is detected in the seat position sensor assembly circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1653	• When the airbag ECU assy receives a line short signal, open signal, short to ground signal or B+ short signal in the seat position sensor assembly circuit for 2 seconds. • Seat position airbag sensor malfunction • Airbag ECU assy malfunction	• Floor wire • Seat position airbag sensor (D seat side) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

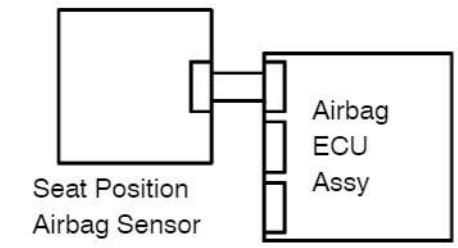
CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

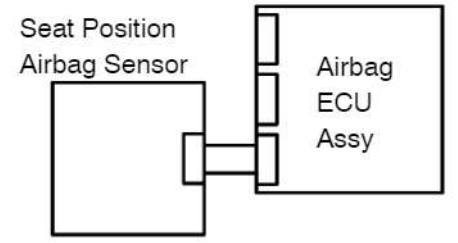
(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC

LHD:



RHD:



H44534
H44533
H44570

(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG) and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1653 is not output.

HINT:
Codes other than code B1653 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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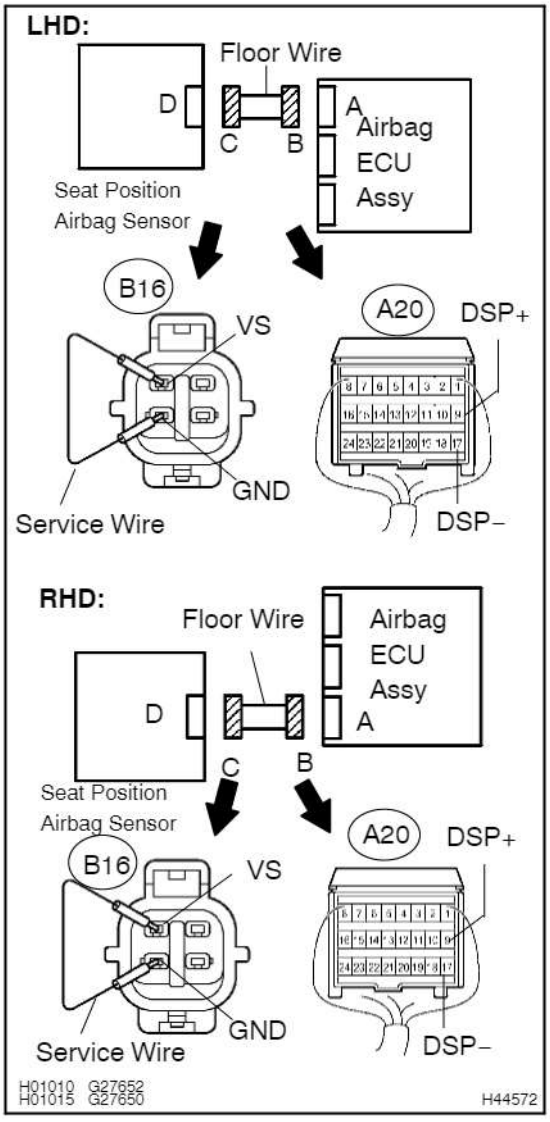
2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag ECU assy and the seat position airbag sensor.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE(OPEN)



(a) Disconnect the connectors from the airbag ECU assy and the seat position airbag sensor.
(b) Using a service wire, connect B16–1 (VS) and B16–3 (GND) of connector "C".

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

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

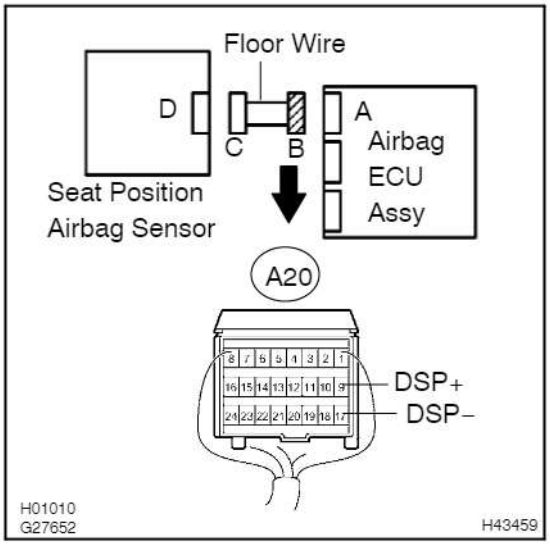
Tester connection	Condition	Specified condition
A20–9 (DSP+) – A20–17 (DSP–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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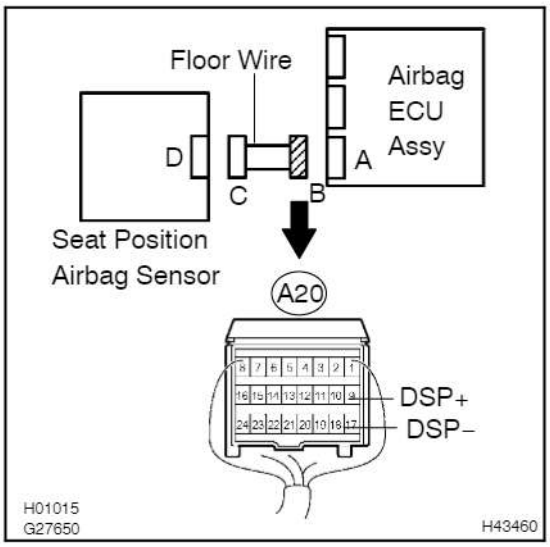
4 CHECK FLOOR WIRE(SHORT)



(a) LHD:
(1) Disconnect the service wire from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–9 (DSP+) – A20–17 (DSP–)	Always	1 MΩ or Higher



(b) RHD:
(1) Disconnect the service wire from connector "C".
(2) Measure the resistance according to the value(s) in the table below.

Standard:

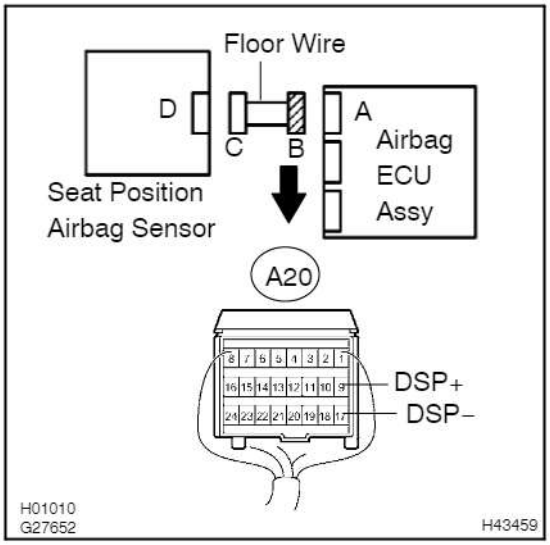
Tester connection	Condition	Specified condition
A20–9 (DSP+) – A20–17 (DSP–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5	CHECK FLOOR WIRE(TO B+)



(a) LHD:

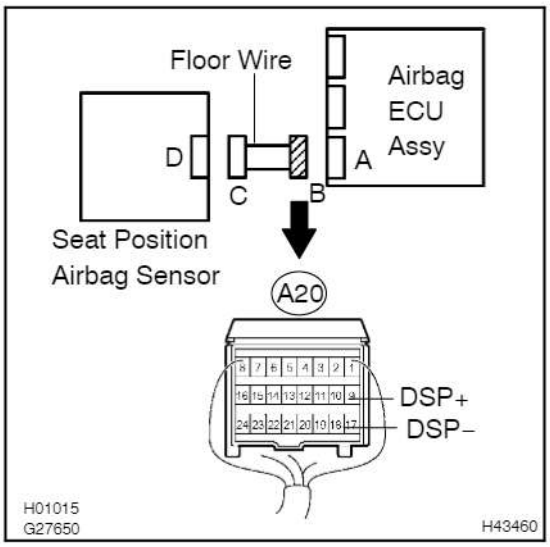
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–9 (DSP+) – Body ground	Power switch is on (IG)	Below 1 V
A20–17 (DSP–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

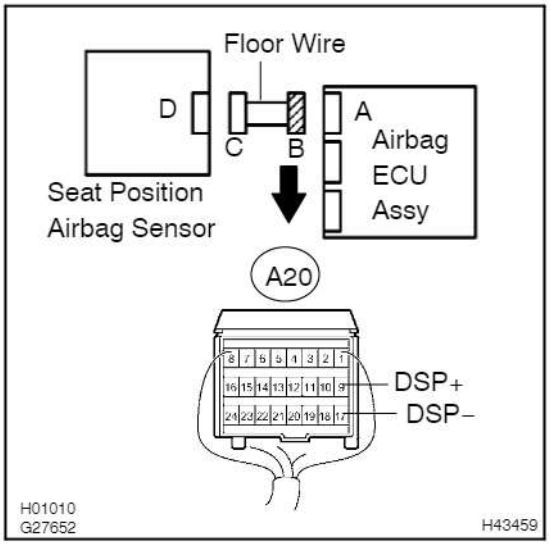
Tester connection	Condition	Specified condition
A20–9 (DSP+) – Body ground	Power switch is on (IG)	Below 1 V
A20–17 (DSP–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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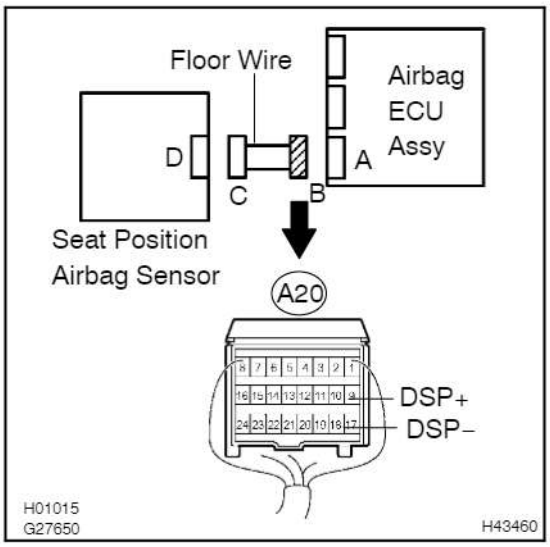
6 CHECK FLOOR WIRE(TO GROUND)



(a) LHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–9 (DSP+) – Body ground	Always	1 MΩ or Higher
A20–17 (DSP–) – Body ground	Always	1 MΩ or Higher



(b) RHD:
(1) Turn the power switch off.
(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

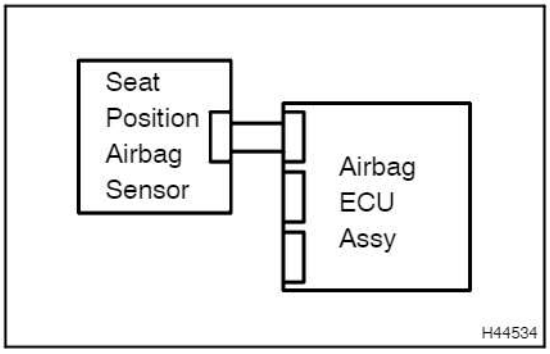
Tester connection	Condition	Specified condition
A20–9 (DSP+) – Body ground	Always	1 MΩ or Higher
A20–17 (DSP–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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7	CHECK SEAT POSITION AIR BAG SENSOR



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the connector to the seat position airbag sensor.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).
OK:
DTC B1653 is not output.

HINT:
Codes other than code B1653 may be output at this time, but they are not related to this check.

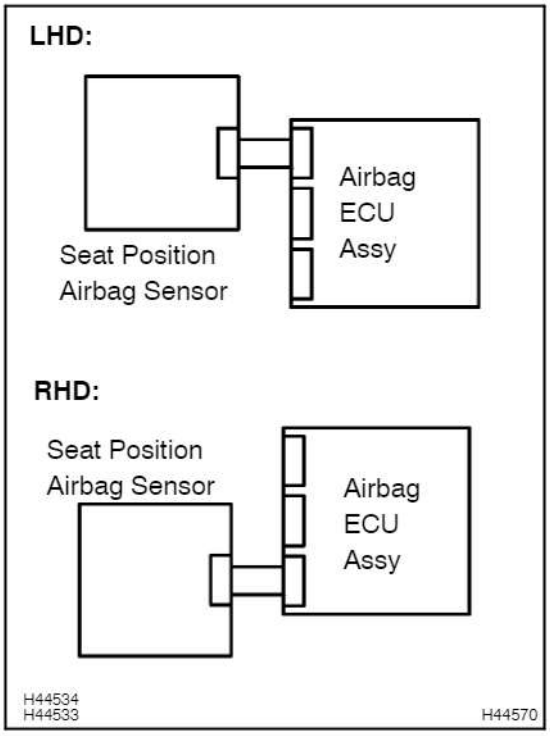
NG	Go to step 8

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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8	REPLACE SEAT POSITION AIR BAG SENSOR



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat position airbag sensor (see page 60–62).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05–1170).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (see page 05–1170).
OK:
DTC B1653 is not output.

HINT:
Codes other than code B1653 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

END

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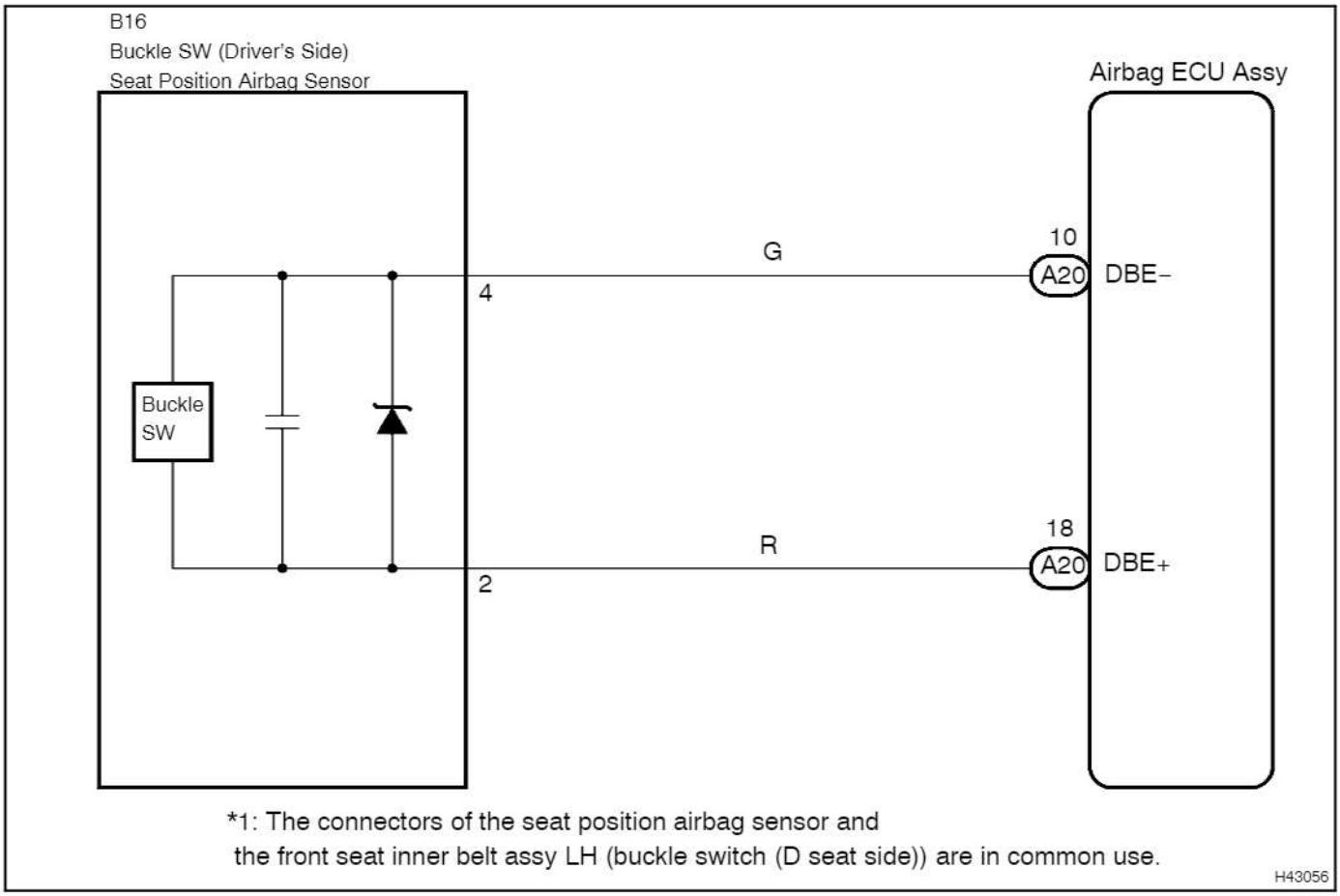
DTC	B1655	SEAT BELT BUCKLE SWITCH (D SEAT SIDE) MALFUNCTION

CIRCUIT DESCRIPTION

The seat belt buckle switch (D seat side) circuit consists of the airbag ECU assy and the front seat inner belt assy LH (buckle switch (D seat side)).
DTC B1655 is recorded when a malfunction is detected in the seat belt buckle switch (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1655	• When the airbag ECU assy receives a line short signal, an open signal, short to ground signal or B+ short signal in the seat belt buckle switch (D seat side) circuit for 2 seconds. • Seat belt buckle switch (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Front seat inner belt assy LH (LHD) (Buckle switch (D seat side)) • Front seat inner belt assy RH (RHD) (Buckle switch (D seat side)) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

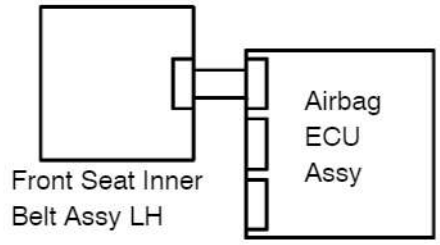
CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

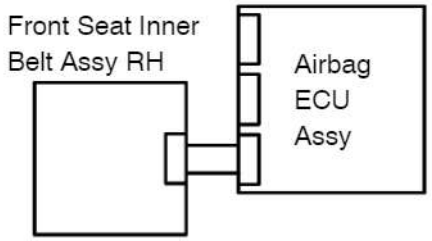
(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK DTC

LHD:



RHD:



H44534
H44533
H44570

(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG) and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1655 is not output.

HINT:

Codes other than code B1655 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

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2	CHECK CONNECTION OF CONNECTORS

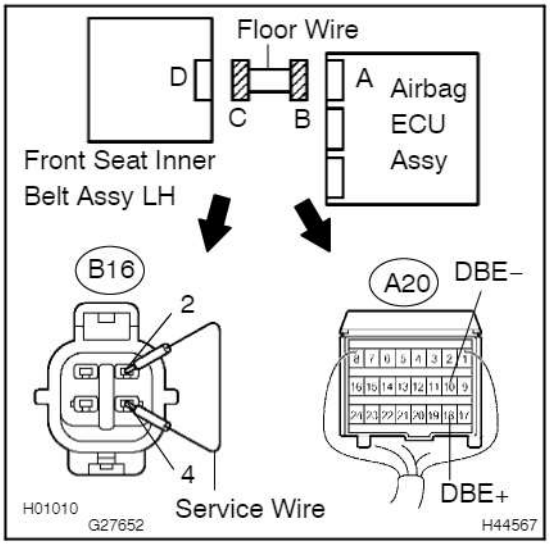
(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Check that the connectors are properly connected to the airbag ECU assy and the front seat inner belt assy LH.
(d) RHD:
Check that the connectors are properly connected to the airbag ECU assy and the front seat inner belt assy RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

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3	CHECK FLOOR WIRE(OPEN)



(a) LHD:
  (1) Disconnect the connectors from the airbag ECU assy and the front seat inner belt assy LH.

(b) Using a service wire, connect B16–2 and B16–4 of connector "C".

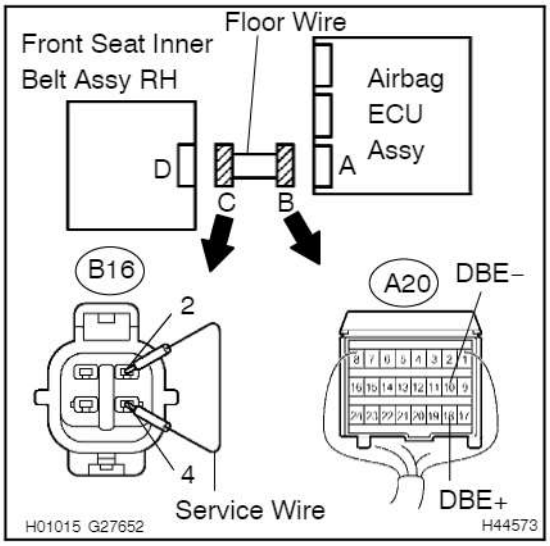
NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

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

Standard:

Tester connection	Condition	Specified condition
A20–18 (DBE+) – A20–10 (DBE–)	Always	Below 1 Ω



(d) RHD:
  (1) Disconnect the connectors from the airbag ECU assy and the front seat inner belt assy RH.

(e) Using a service wire, connect B16–2 and B16–4 of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

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

Standard:

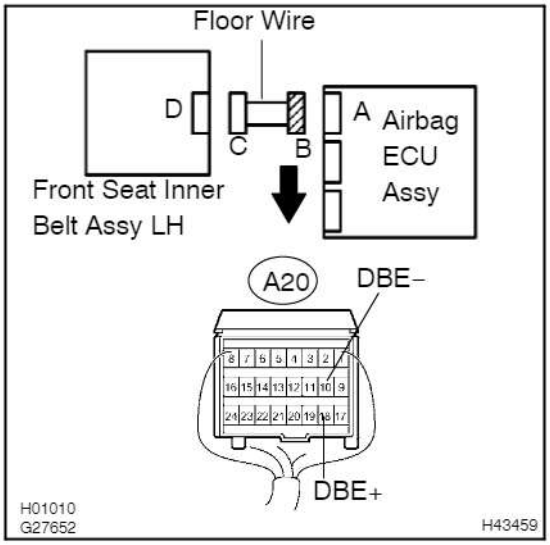
Tester connection	Condition	Specified condition
A20–18 (DBE+) – A20–10 (DBE–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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4	CHECK FLOOR WIRE(SHORT)



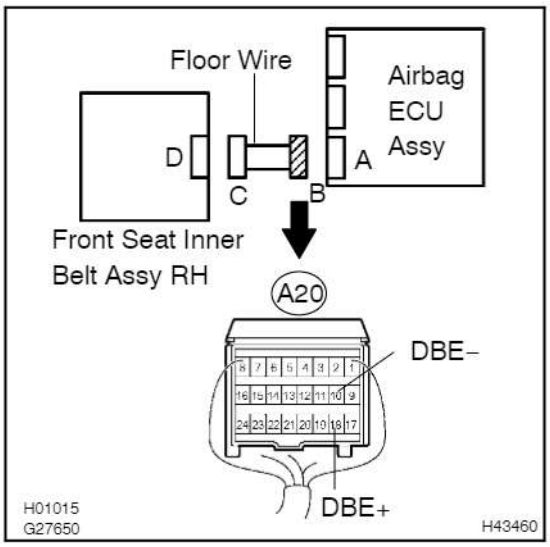
(a) LHD:

(1) Disconnect the service wire from connector "C".

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

Standard:

Tester connection	Condition	Specified condition
A20–18 (DBE+) – A20–10 (DBE–)	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the service wire from connector "C".

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

Standard:

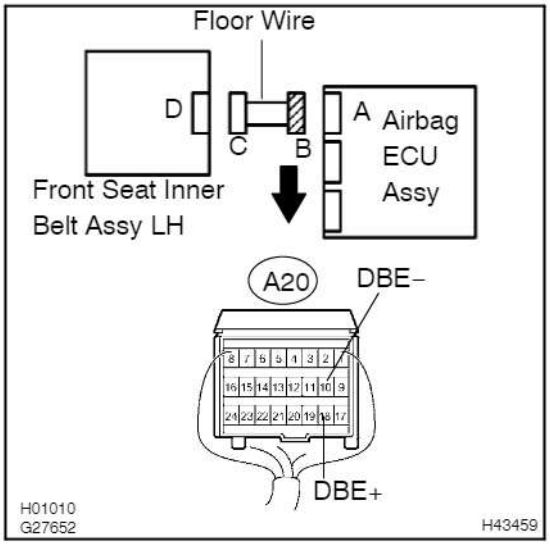
Tester connection	Condition	Specified condition
A20–18 (DBE+) – A20–10 (DBE–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5	CHECK FLOOR WIRE(TO B+)



(a) LHD:

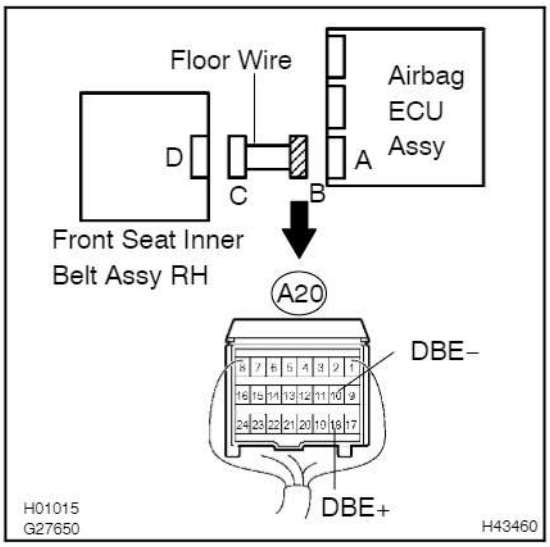
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20–18 (DBE+) – Body ground	Power switch is on (IG)	Below 1 V
A20–10 (DBE–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard:

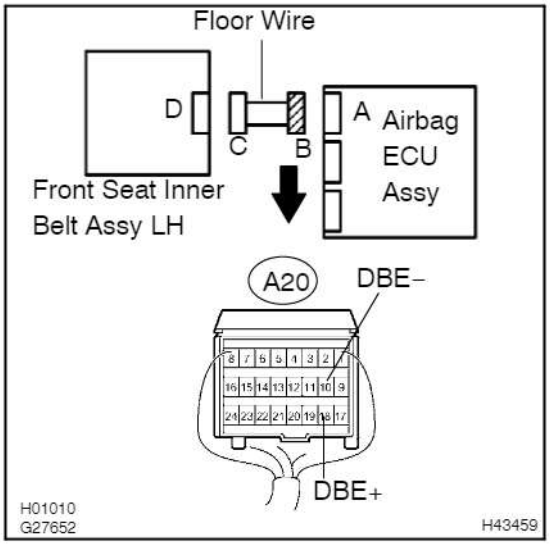
Tester connection	Condition	Specified condition
A20–18 (DBE+) – Body ground	Power switch is on (IG)	Below 1 V
A20–10 (DBE–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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6 CHECK FLOOR WIRE(TO GROUND)



(a) LHD:

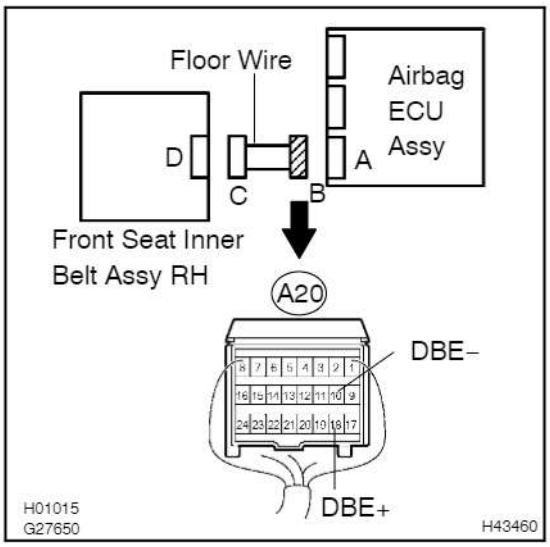
(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

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

Standard:

Tester connection	Condition	Specified condition
A20–10 (DBE+) – Body ground	Always	1 MΩ or Higher
A20–18 (DBE+) – Body ground	Always	1 MΩ or Higher



(b) RHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

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

Standard:

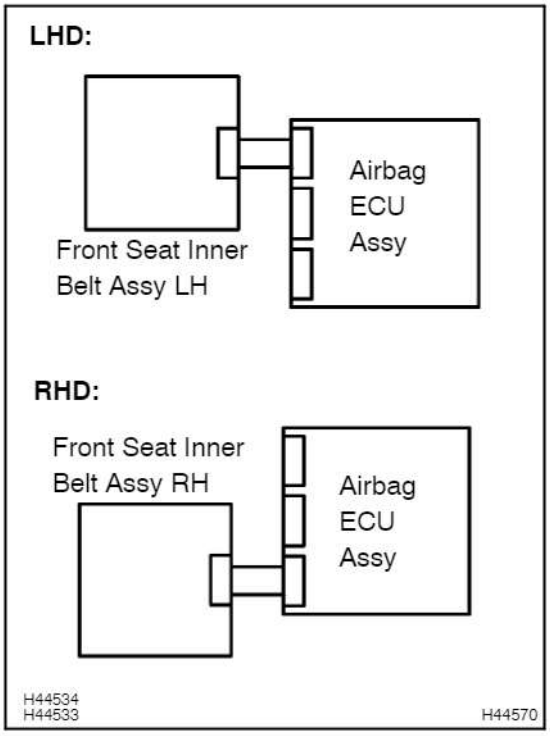
Tester connection	Condition	Specified condition
A20–10 (DBE+) – Body ground	Always	1 MΩ or Higher
A20–18 (DBE+) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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7	CHECK FRONT SEAT INNER BELT ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1655 is not output.

HINT:
Codes other than code B1655 may be output at this time, but they are not related to this check.

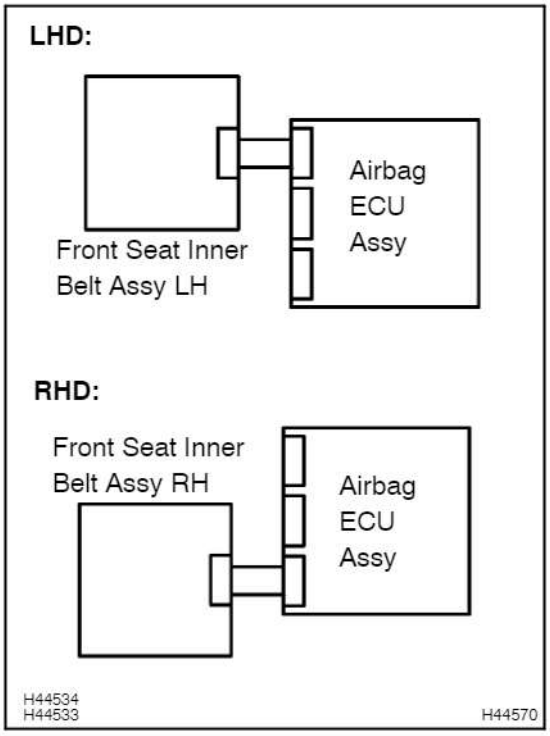
NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

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8	REPLACE FRONT SEAT INNER BELT ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Replace the front seat inner belt assy LH (see page 72–2).
(d) RHD:
Replace the front seat inner belt assy RH (see page 72–2).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

(e) Connect the connectors to the airbag ECU assy.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1655 is not output.

HINT:
Codes other than code B1655 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

END

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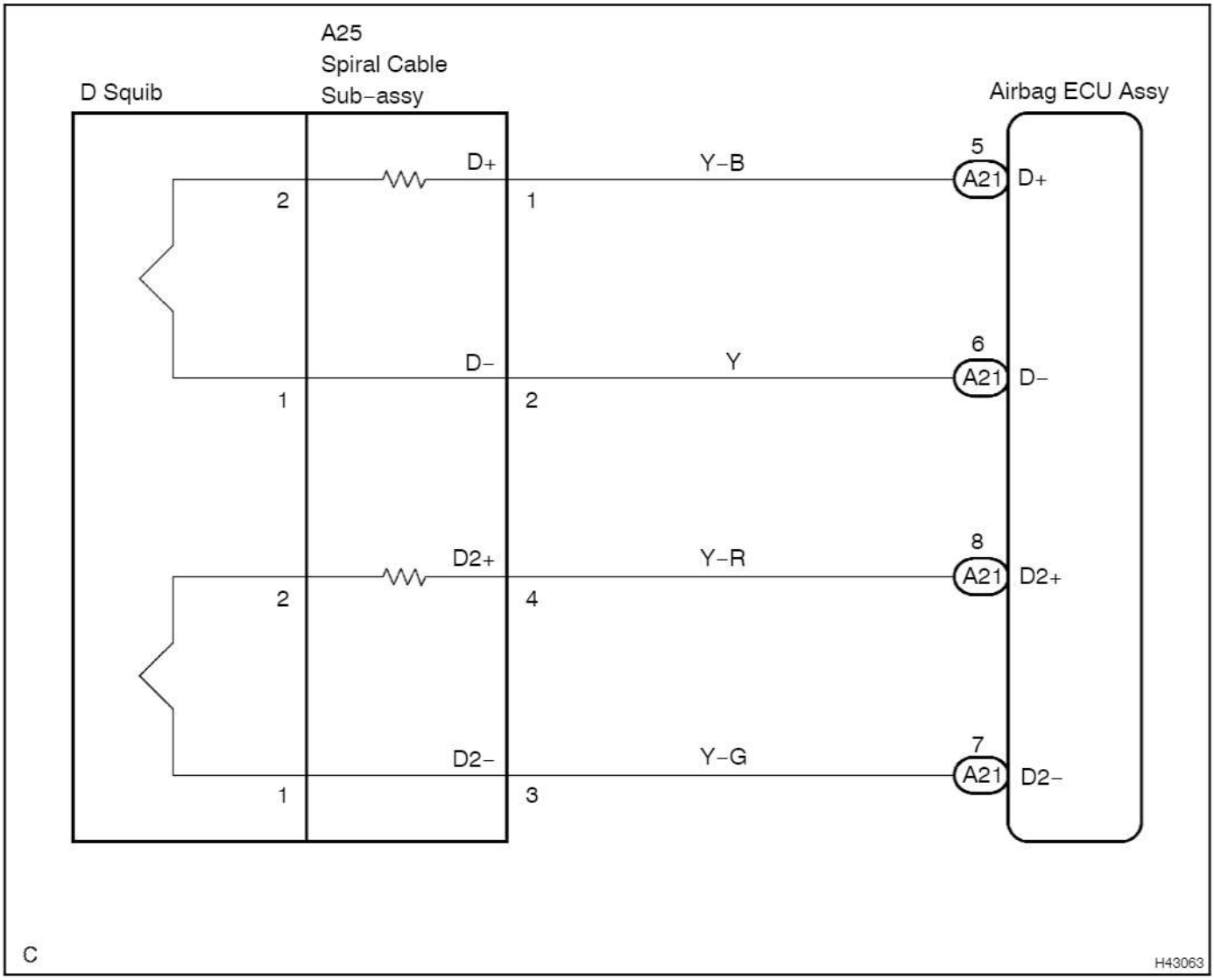
DTC	B1800	SHORT IN D SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1800 is recorded when a short circuit is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1800	• When the airbag ECU assy receives a line short signal 5 times in the D squib circuit during primary check. • D squib malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

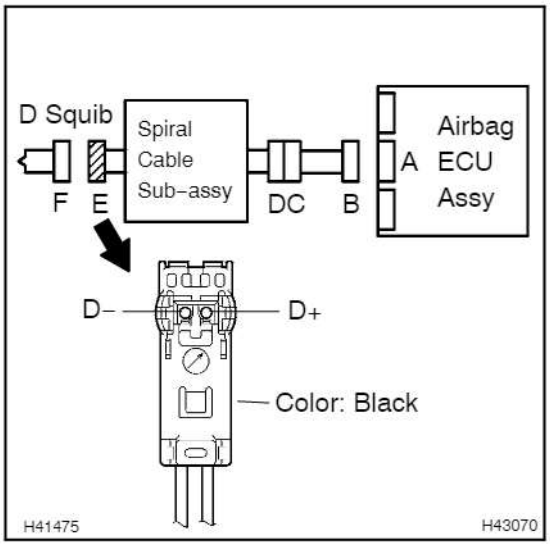
1	CHECK CONNECTOR

(a) Check that the spiral cable sub–assy connectors (on the horn button assy side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE SUB–ASSY** (**SEE PAGE 60–29**)

OK

2	CHECK D SQUIB CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



(a) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(b) Measure the resistance according to the value(s) in the table below.
Standard:

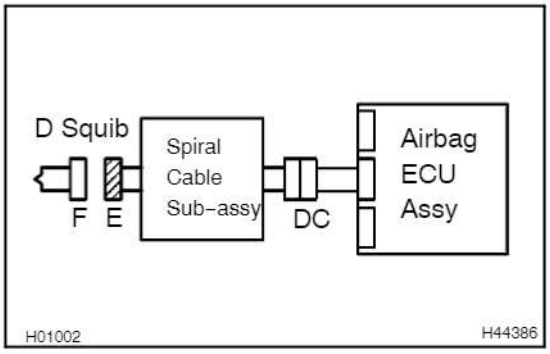
Tester connection	Condition	Specified condition
D+ – D–	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1800 is not output.

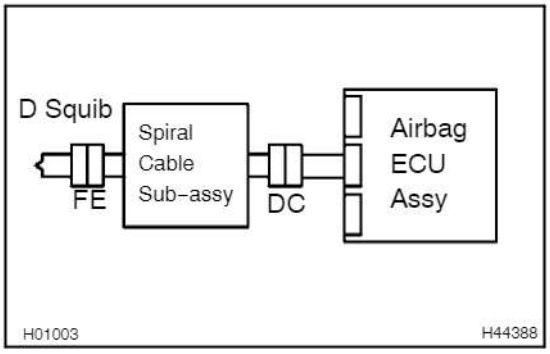
HINT:
Codes other than code B1800 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4	CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the horn button assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05–1170).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (see page 05–1170).
OK:
DTC B1800 is not output.

HINT:
Codes other than code B1800 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

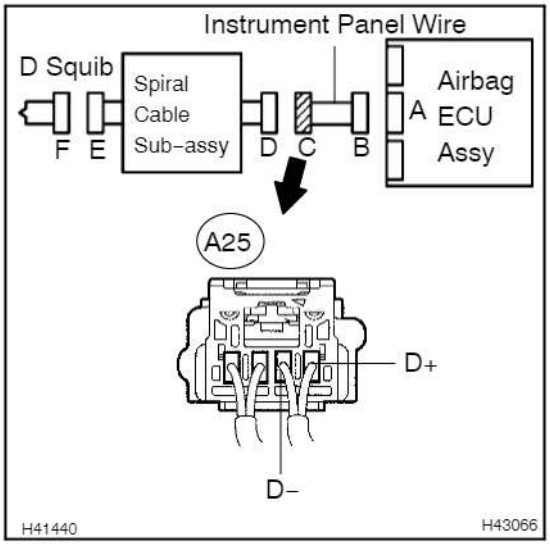
OK ↓

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

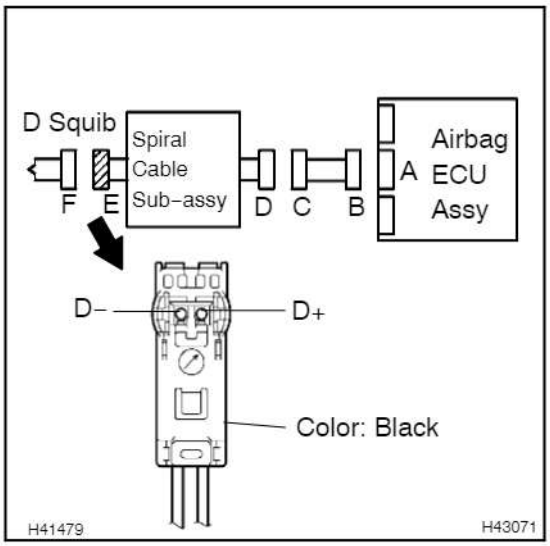
Standard:

Tester connection	Condition	Specified condition
A25–1 (D+) – A25–2 (D–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB–ASSY



(a) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
D+ – D–	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1801	OPEN IN D SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1801 is recorded when an open circuit is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1801	• When the airbag ECU assy receives an open signal in the D squib circuit for 2 seconds. • D squib malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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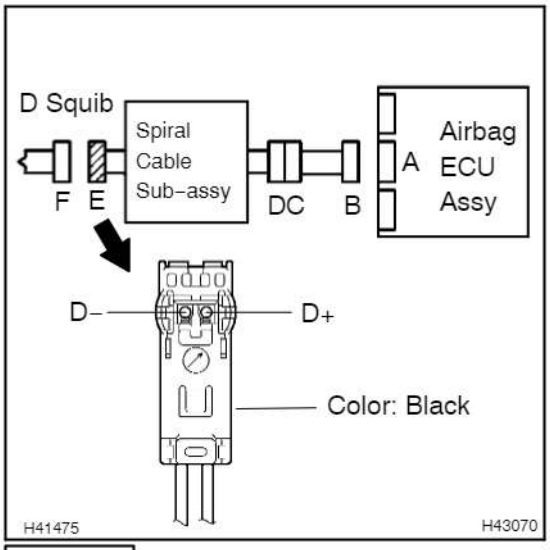
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



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

Standard:

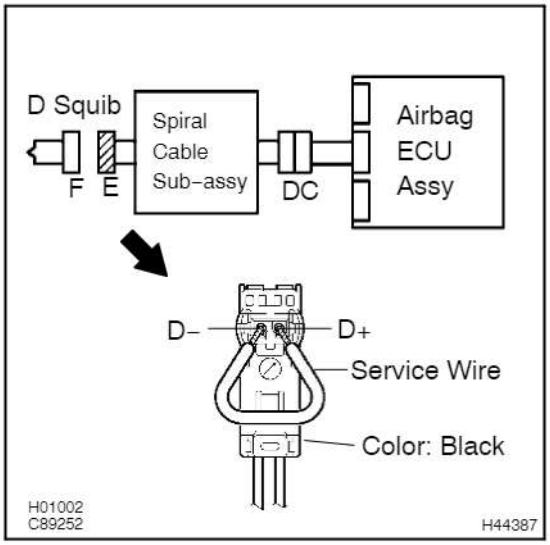
Tester connection	Condition	Specified condition
D+ – D–	Always	Below 1 Ω

OK

NG → **Go to step 4**

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect D+ and D– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1801 is not output.

HINT:

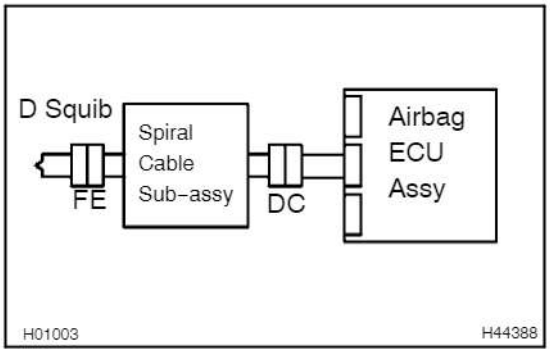
Codes other than code B1801 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3 CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1801 is not output.

HINT:
Codes other than code B1801 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

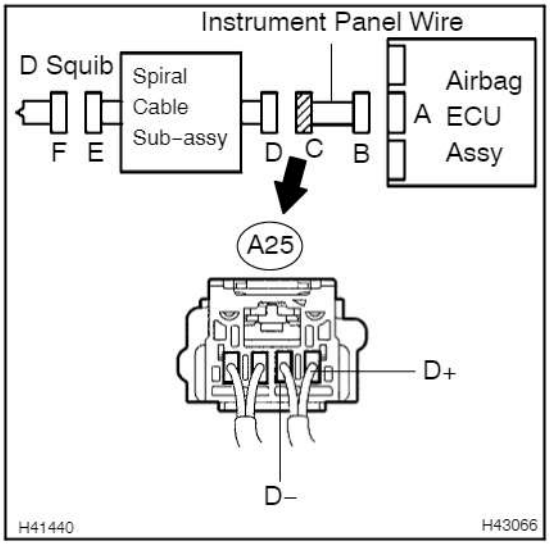
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

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

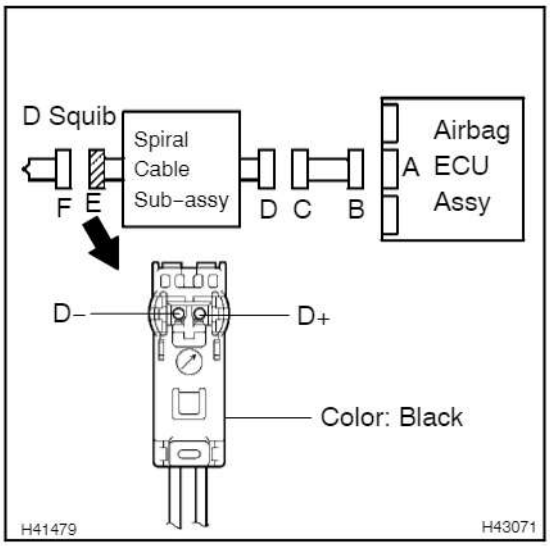
Standard:

Tester connection	Condition	Specified condition
A25–1 (D+) – A25–2 (D–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



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

Standard:

Tester connection	Condition	Specified condition
D+ – D–	Always	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC B1802 SHORT IN D SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1802 is recorded when a short to ground is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1802	• When the airbag ECU assy receives a short to ground signal in the D squib circuit for 0.5 seconds. • D squib malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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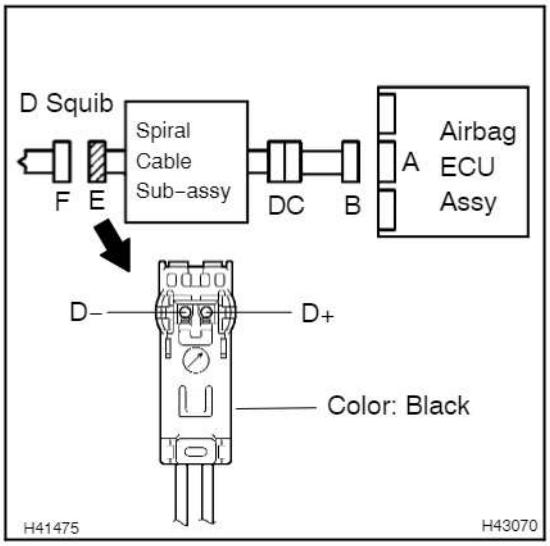
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



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

Standard:

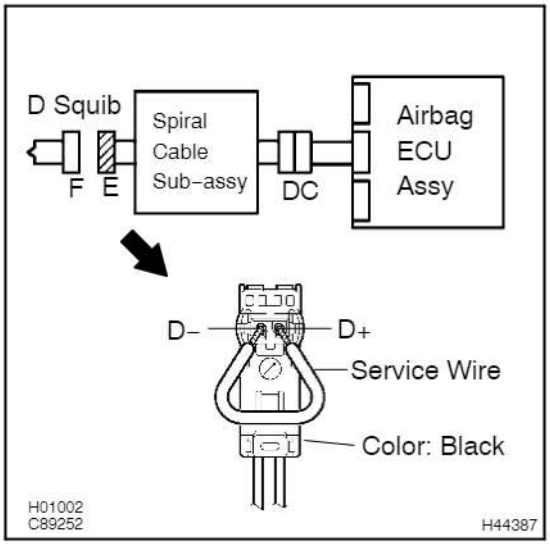
Tester connection	Condition	Specified condition
D+ – Body ground	Always	1 MΩ or Higher
D– – Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect D+ and D– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1802 is not output.

HINT:

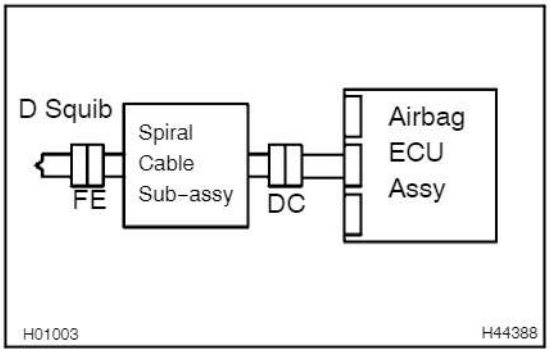
Codes other than code B1802 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3 CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1802 is not output.

HINT:
Codes other than code B1802 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

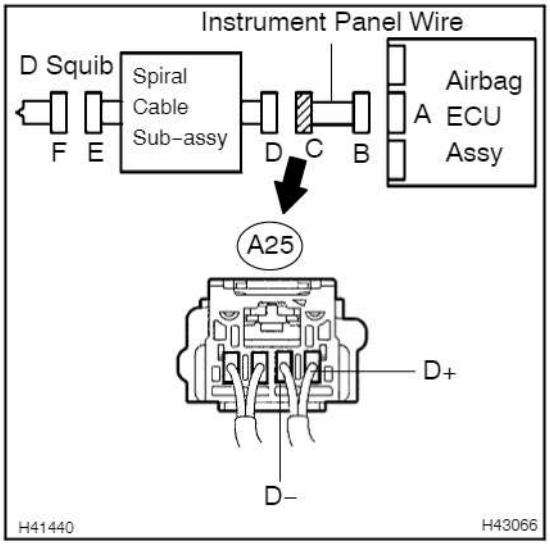
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

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

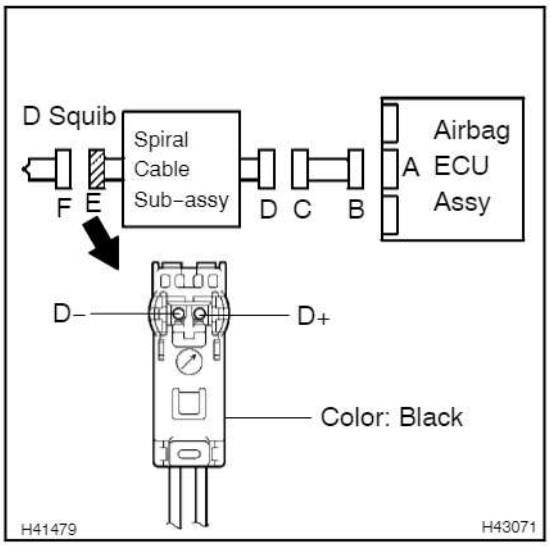
Standard:

Tester connection	Condition	Specified condition
A25–1 (D+) – Body ground	Always	1 MΩ or Higher
A25–2 (D–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



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

Standard:

Tester connection	Condition	Specified condition
D+ – Body ground	Always	1 MΩ or Higher
D– – Body ground	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1803	SHORT IN D SQUIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1803 is recorded when a short to B+ is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1803	• When the airbag ECU assy receives a B+ short signal in the D squib circuit for 0.5 seconds. • D squib malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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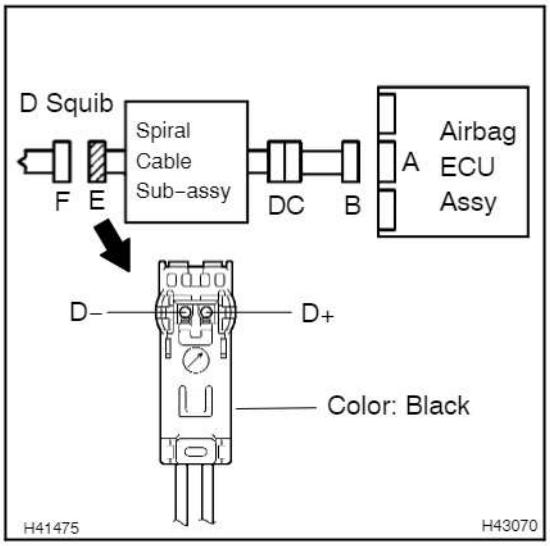
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard:

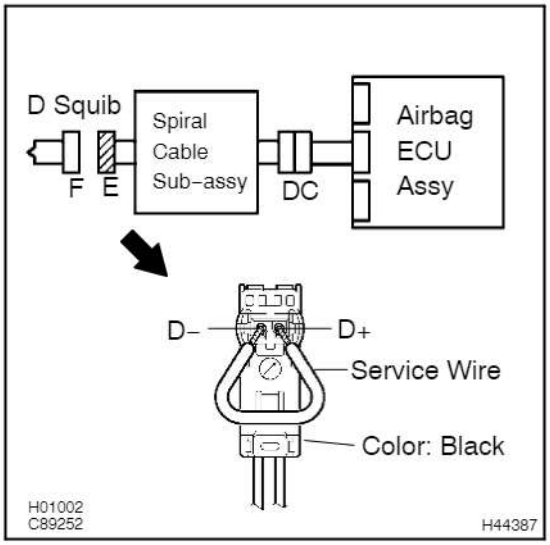
Tester connection	Condition	Specified condition
D+ – Body ground	Power switch is on (IG)	Below 1 V
D– – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) Using a service wire, connect D+ and D– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

OK:

DTC B1803 is not output.

HINT:

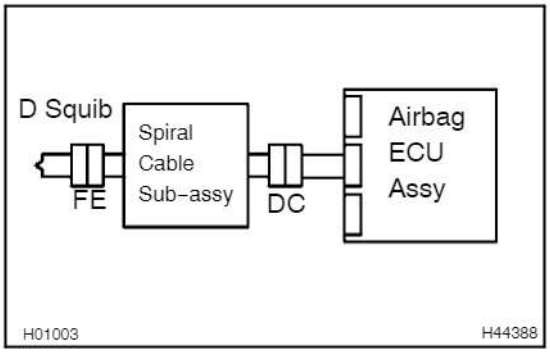
Codes other than code B1803 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1803 is not output.

HINT:
Codes other than code B1803 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)

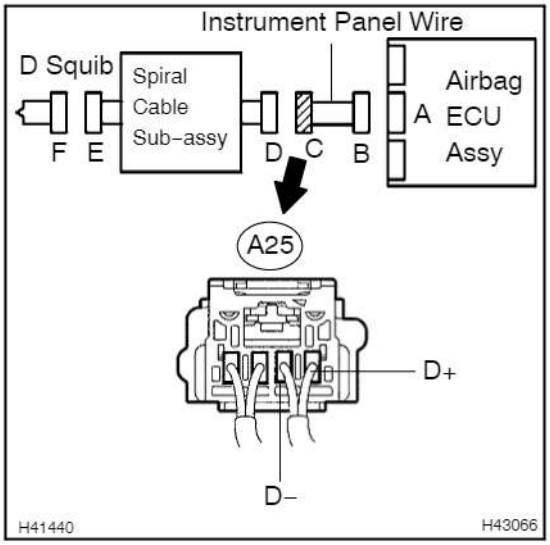
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the spiral cable sub–assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

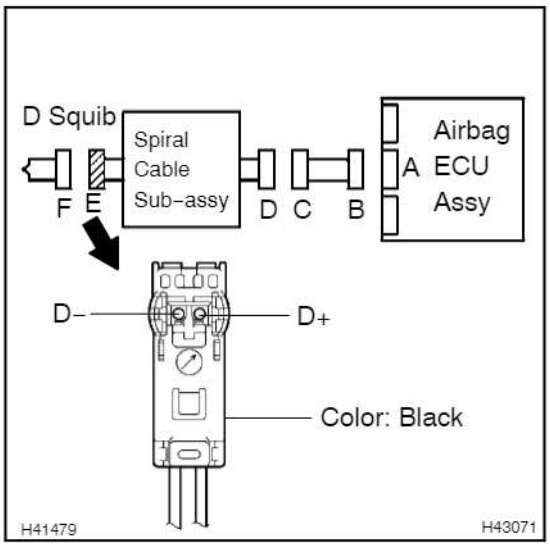
Standard:

Tester connection	Condition	Specified condition
A25–1 (D+) – Body ground	Power switch is on (IG)	Below 1 V
A25–2 (D–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



(a) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
D+ – Body ground	Power switch is on (IG)	Below 1 V
D– – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 60–29)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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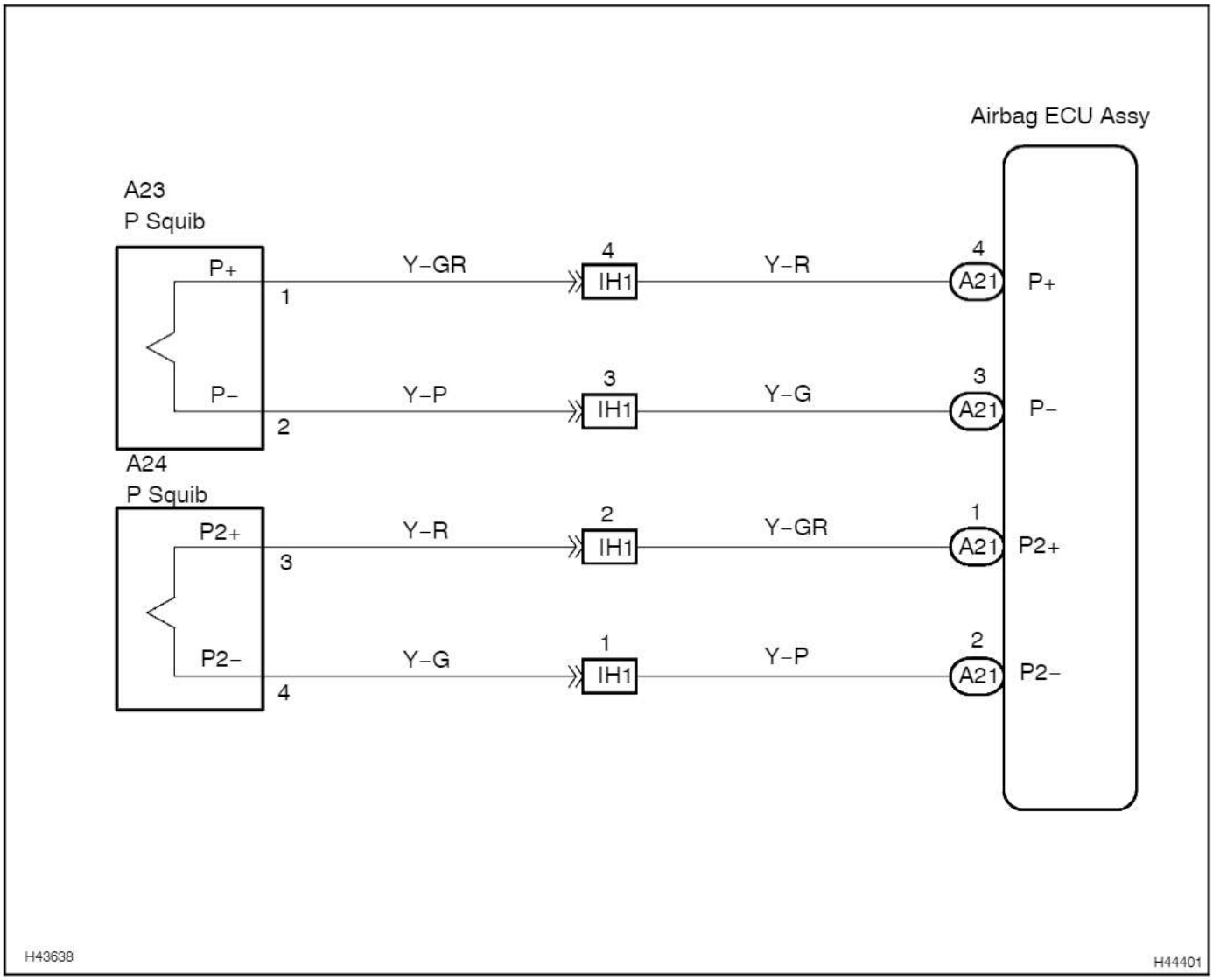
DTC	B1805	SHORT IN P SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1805 is recorded when a short circuit is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1805	• When the airbag Airbag ECU assy receives a line short signal 5 times in the P squib circuit during primary check. • P squib malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

(a) Check that the instrument panel wire No.2 connectors (on the front passenger airbag assy side) are not damaged.

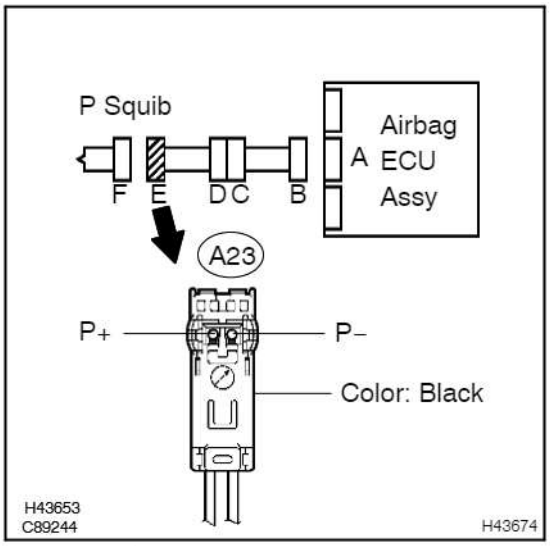
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

2	CHECK P SQUIB CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



(a) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

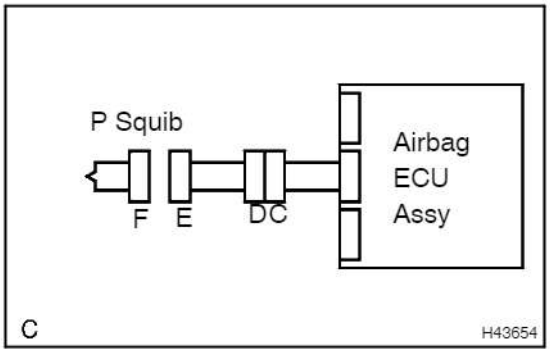
Tester connection	Condition	Specified condition
A23–1 (P+) – A23–2 (P–)	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1805 is not output.

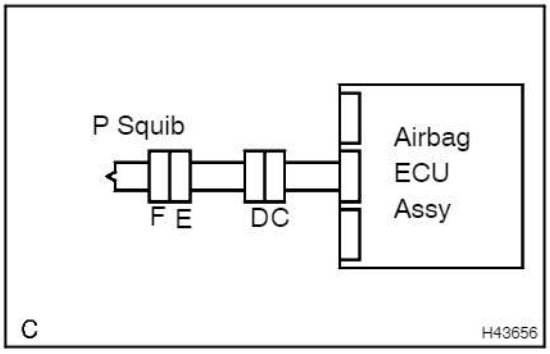
HINT:
Codes other than code B1805 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the front passenger airbag assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05–1170).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (see page 05–1170).
OK:
DTC B1805 is not output.

HINT:
Codes other than code B1805 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

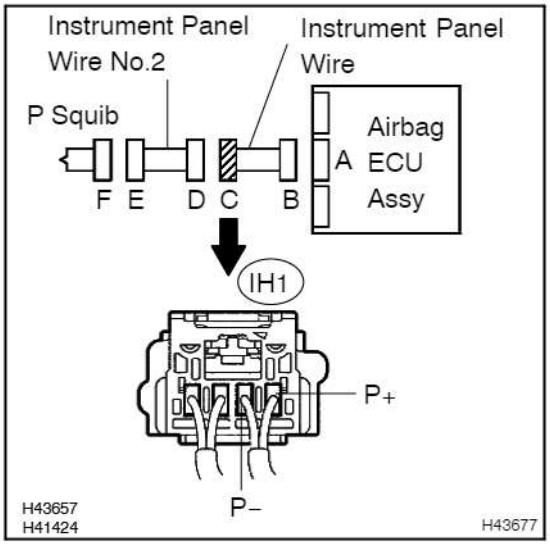
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

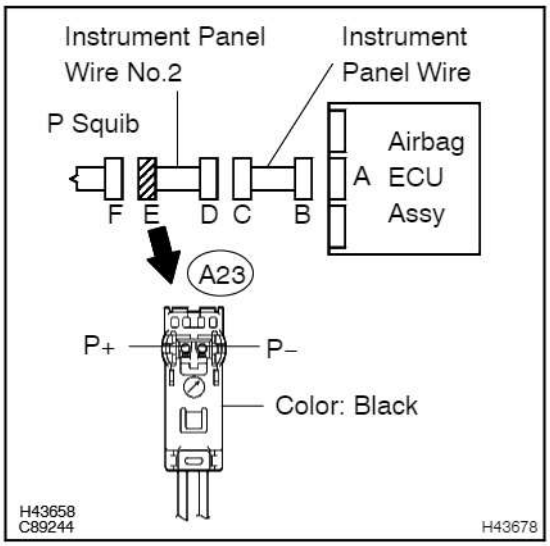
Standard:

Tester connection	Condition	Specified condition
IH1–1 (P+) – IH1–2 (P–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK INSTRUMENT PANEL WIRE NO.2



(a) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
A23–1 (P+) – A23–2 (P–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1806	OPEN IN P SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1806 is recorded when an open circuit is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1806	• When the airbag ECU assy receives an open signal in the P squib circuit for 2 seconds. • P squib malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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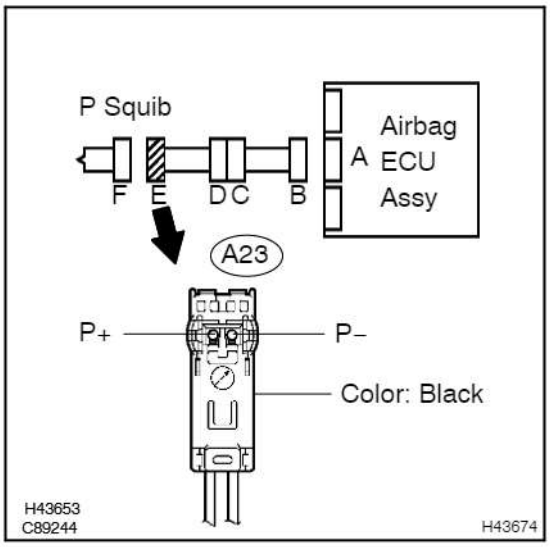
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



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

Standard:

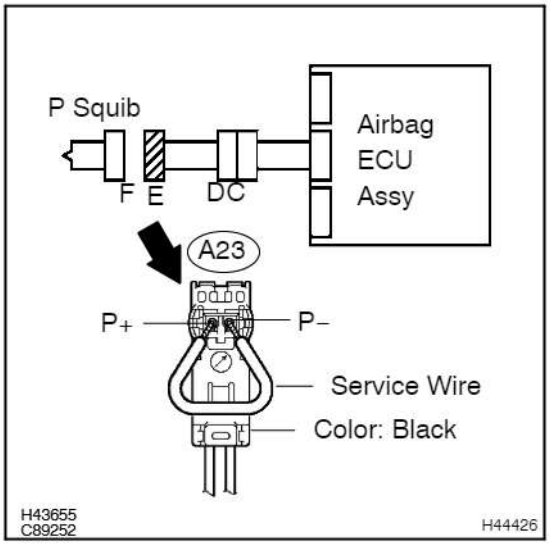
Tester connection	Condition	Specified condition
A23–1 (P+) – A23–2 (P–)	Always	Below 1 Ω

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect A23–1 (P+) and A23–2 (P–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1806 is not output.

HINT:

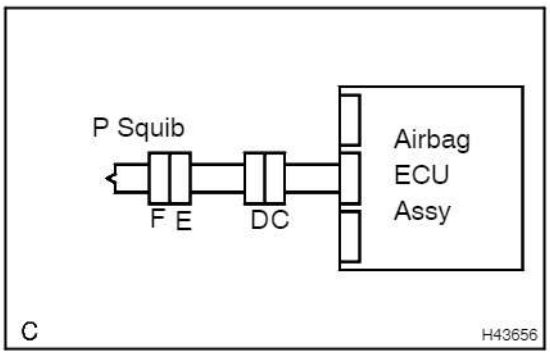
Codes other than code B1806 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1806 is not output.

HINT:
Codes other than code B1806 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

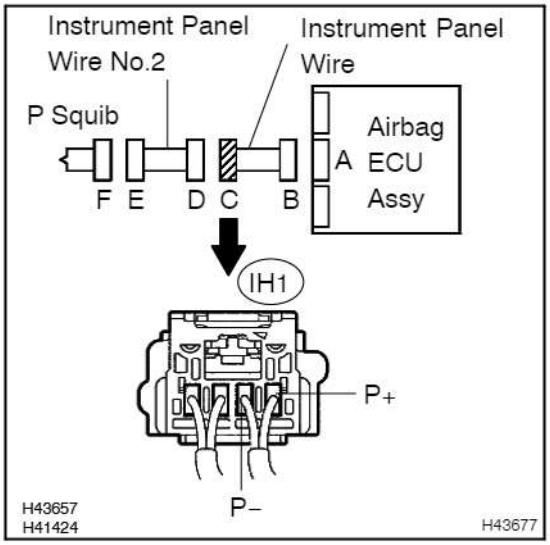
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

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

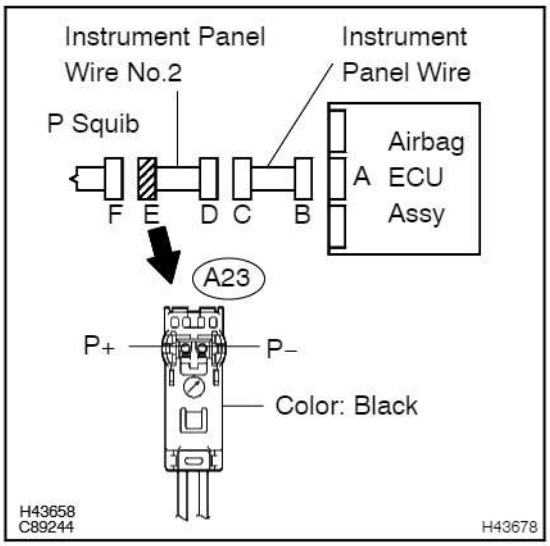
Standard:

Tester connection	Condition	Specified condition
IH1–1 (P+) – IH1–2 (P–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



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

Standard:

Tester connection	Condition	Specified condition
A23–1 (P+) – A23–2 (P–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1807	SHORT IN P SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1807 is recorded when a short to ground is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1807	• When the Airbag ECU assy receives a short to ground signal in the P squib circuit for 0.5 seconds. • P squib malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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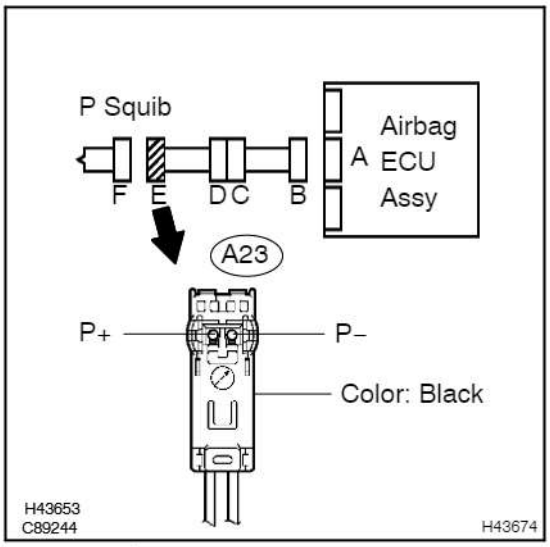
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



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

Standard:

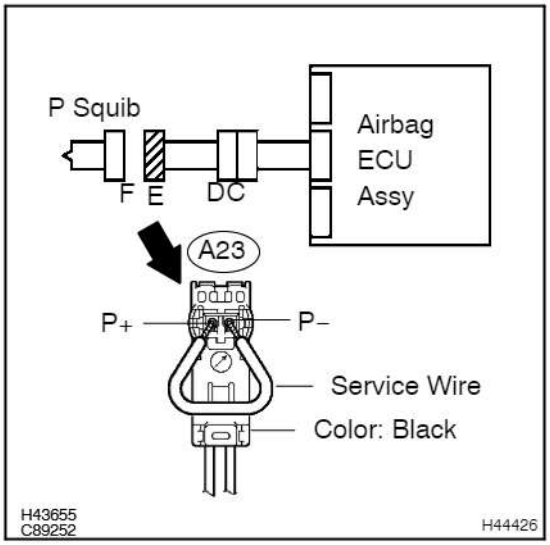
Tester connection	Condition	Specified condition
A23–1 (P+) – Body ground	Always	1 MΩ or Higher
A23–2 (P–) – Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect A23–1 (P+) and A23–2 (P–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1807 is not output.

HINT:

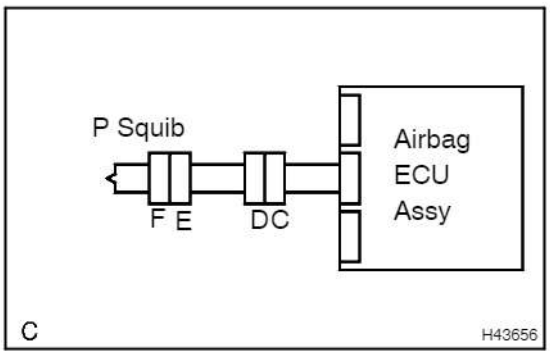
Codes other than code B1807 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1807 is not output.

HINT:
Codes other than code B1807 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

OK

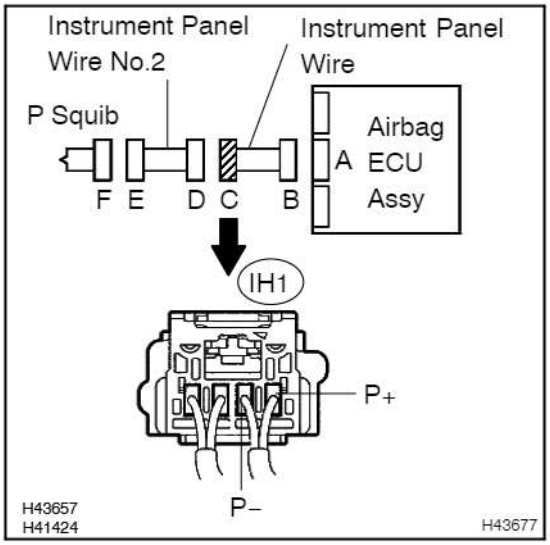
USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

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

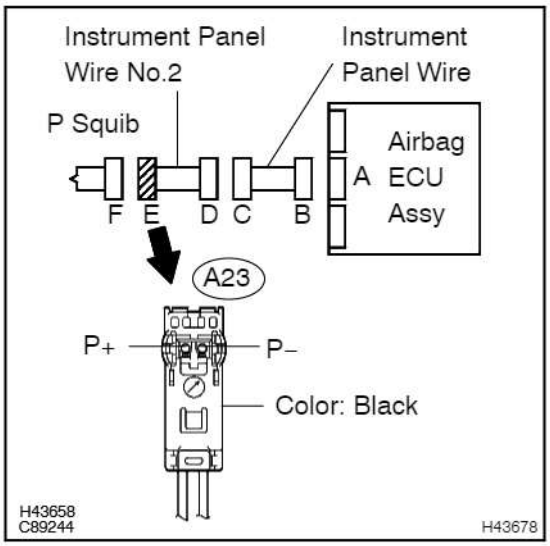
Standard:

Tester connection	Condition	Specified condition
IH1–1 (P+) – Body ground	Always	1 MΩ or Higher
IH1–2 (P–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



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

Standard:

Tester connection	Condition	Specified condition
A23–1 (P+) – Body ground	Always	1 MΩ or Higher
A23–2 (P–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1808	SHORT IN P SQUIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1808 is recorded when a short to B+ is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1808	• When the airbag ECU assy receives a B+ short signal in the P squib circuit for 0.5 seconds. • P squib malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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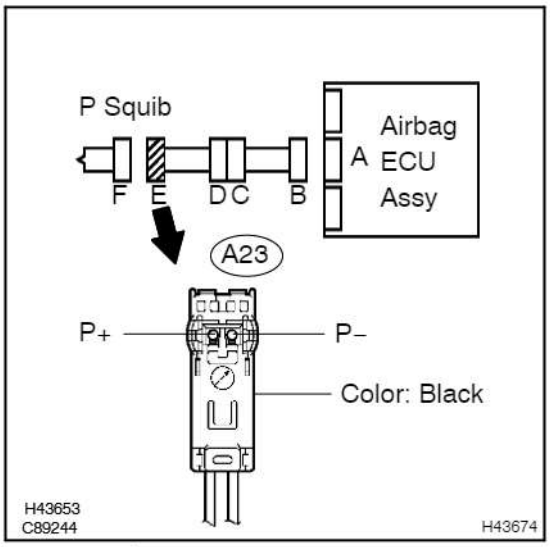
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard:

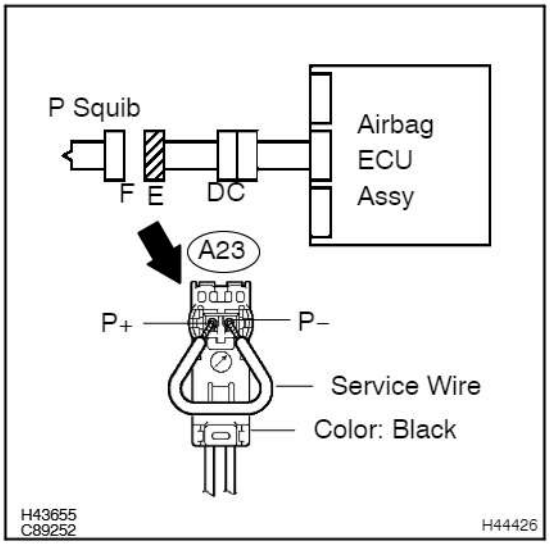
Tester connection	Condition	Specified condition
A23–1 (P+) – Body ground	Power switch is on (IG)	Below 1 V
A23–2 (P–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) Using a service wire, connect A23–1 (P+) and A23–2 (P–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

OK:

DTC B1808 is not output.

HINT:

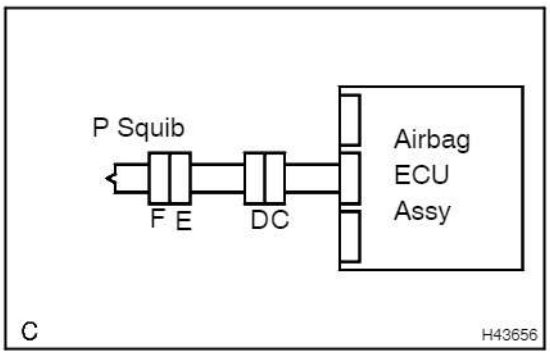
Codes other than code B1808 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1808 is not output.

HINT:
Codes other than code B1808 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

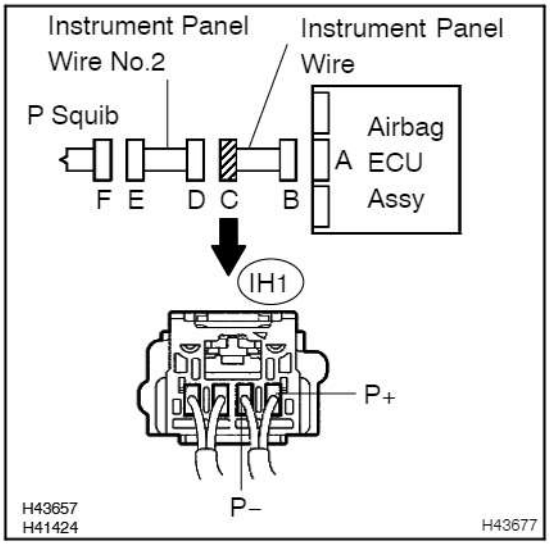
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the instrument panel wire No.2.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

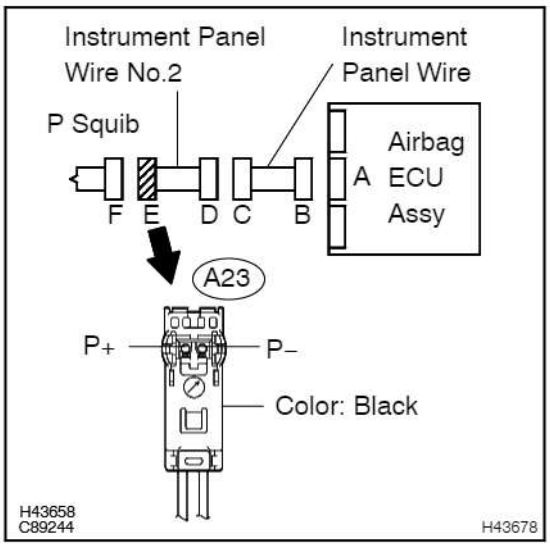
Standard:

Tester connection	Condition	Specified condition
IH1–1 (P+) – Body ground	Power switch is on (IG)	Below 1 V
IH1–2 (P–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



(a) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
A23–1 (P+) – Body ground	Power switch is on (IG)	Below 1 V
A23–2 (P–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1810	SHORT IN D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The D squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1810 is recorded when a short circuit is detected in the D squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1810	• When the airbag ECU assy receives a line short signal 5 times in the D squib (Dual stage – 2nd step) circuit during primary check. • D squib (Dual stage – 2nd step) malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

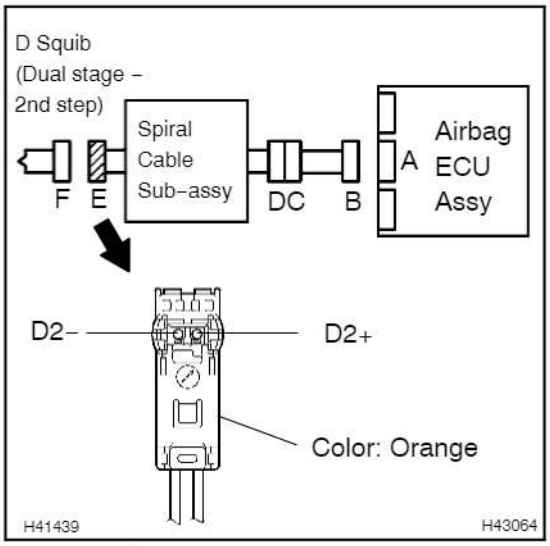
1	CHECK CONNECTOR

(a) Check that the spiral cable sub–assy connectors (on the horn button assy side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

2	CHECK D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



(a) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(b) Measure the resistance according to the value(s) in the table below.
Standard:

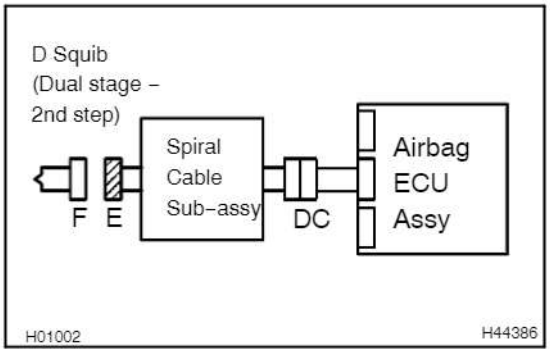
Tester connection	Condition	Specified condition
D2+ – D2–	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1810 is not output.

HINT:

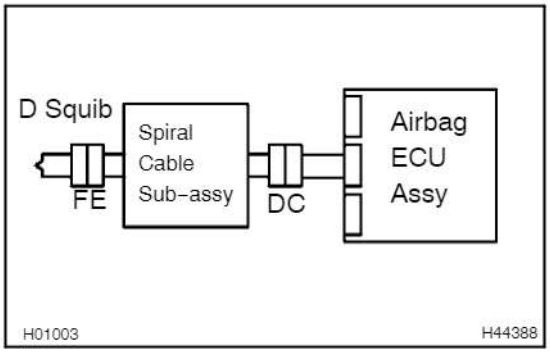
Codes other than code B1810 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4	CHECK HORN BUTTON ASSY(D SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the horn button assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05–1170).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (see page 05–1170).
OK:
DTC B1810 is not output.

HINT:
Codes other than code B1810 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

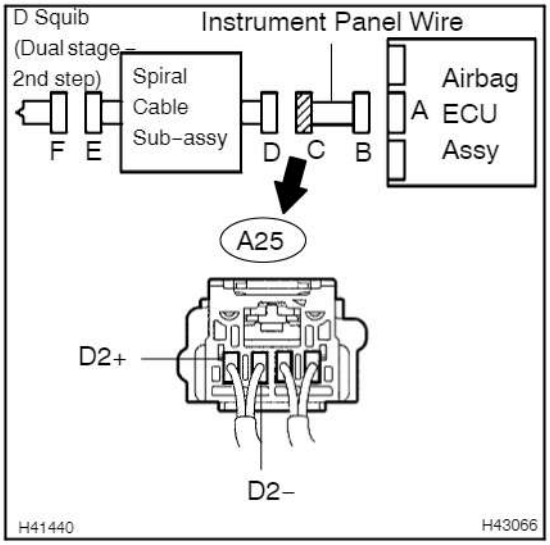
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

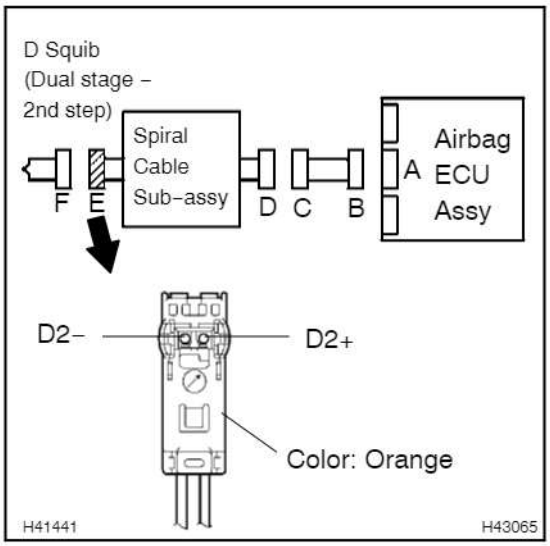
Standard:

Tester connection	Condition	Specified condition
A25–4 (D2+) – A25–3 (D2–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB–ASSY



(a) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
D2+ – D2–	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1811	OPEN IN D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The D squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1811 is recorded when an open circuit is detected in the D squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1811	• When the airbag ECU assy receives an open signal circuit in the D squib (Dual stage – 2nd step) circuit for 2 seconds. • D squib (Dual stage – 2nd step) malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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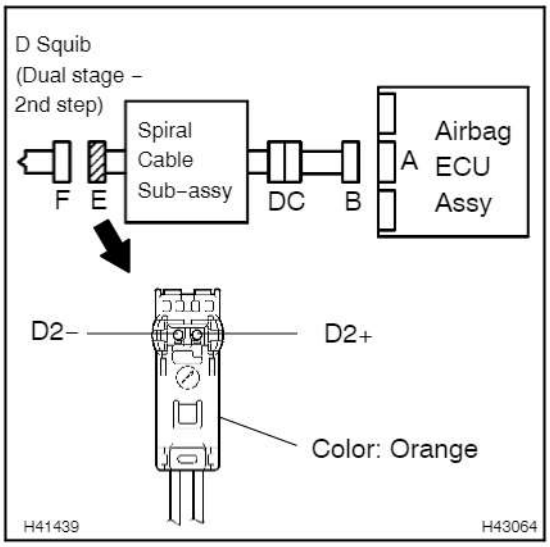
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



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

Standard:

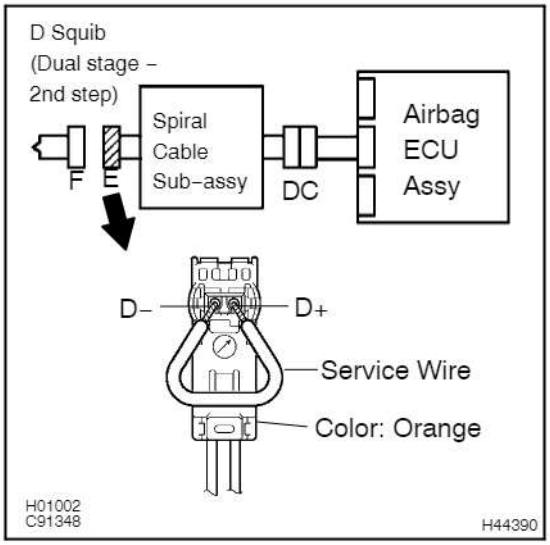
Tester connection	Condition	Specified condition
D2+ – D2–	Always	Below 1 Ω

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect D2+ and D2– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1811 is not output.

HINT:

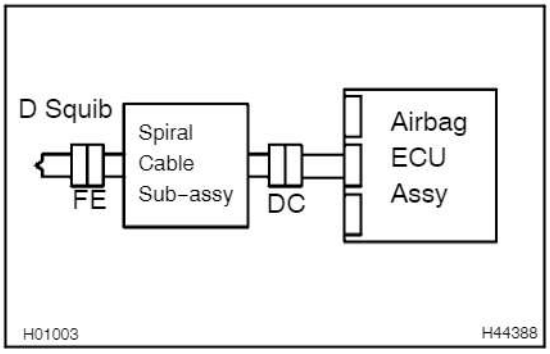
Codes other than code B1811 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3	CHECK HORN BUTTON ASSY(D SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1811 is not output.

HINT:
Codes other than code B1811 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

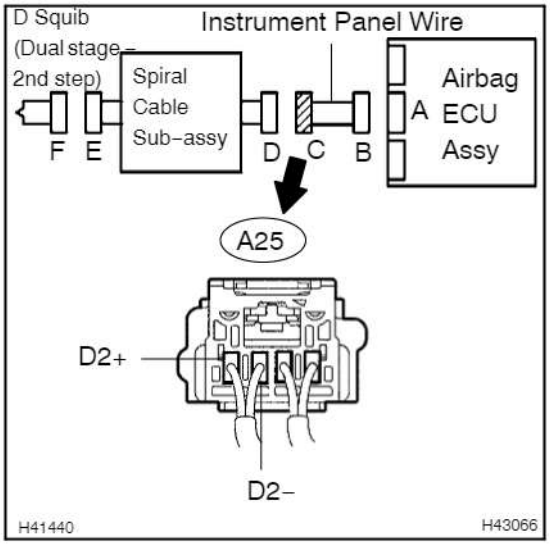
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

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

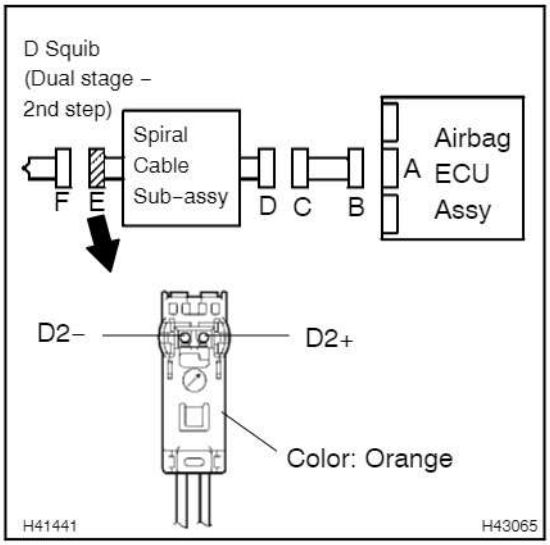
Standard:

Tester connection	Condition	Specified condition
A25–4 (D2+) – A25–3 (D2–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



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

Standard:

Tester connection	Condition	Specified condition
D2+ – D2–	Always	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1812	SHORT IN D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The D squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1812 is recorded when a short to ground is detected in the D squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1812	• When the airbag ECU assy receives a short to ground signal in the D squib (Dual stage – 2nd step) circuit for the 0.5 seconds. • D squib (Dual stage – 2nd step) malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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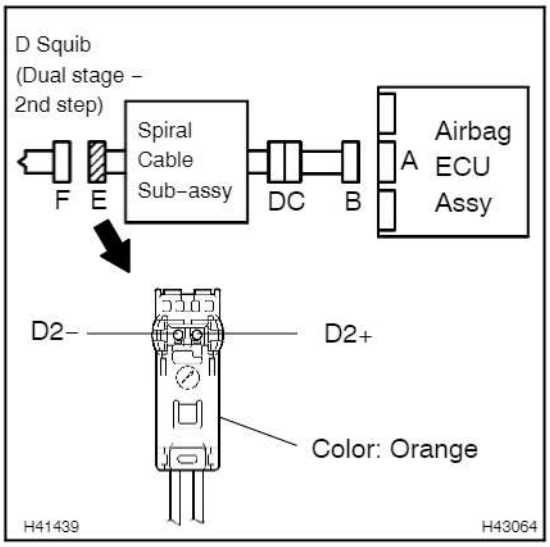
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



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

Standard:

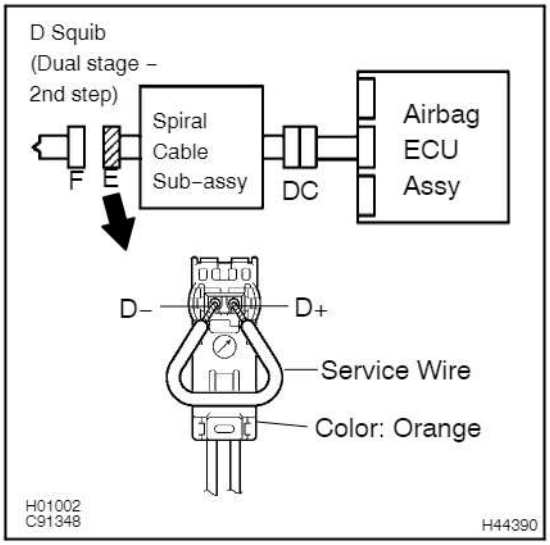
Tester connection	Condition	Specified condition
D2+ – Body ground	Always	1 MΩ or Higher
D2– – Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect D2+ and D2– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).
OK:
DTC B1812 is not output.

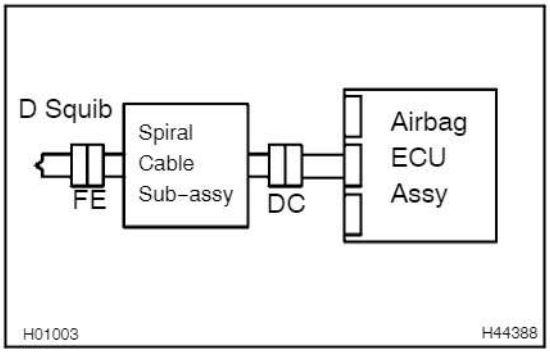
HINT:
Codes other than code B1812 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK HORN BUTTON ASSY(D SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1812 is not output.

HINT:
Codes other than code B1812 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

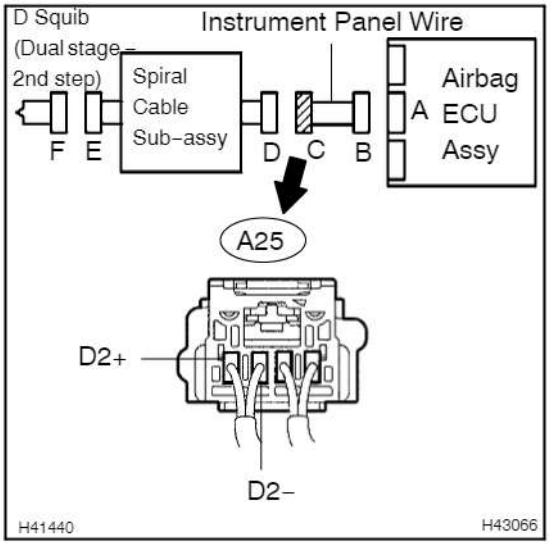
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable sub–assy.

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

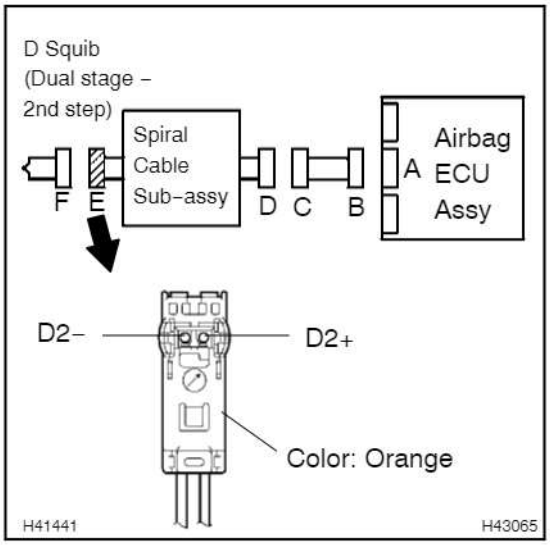
Standard:

Tester connection	Condition	Specified condition
A25–4 (D2+) – Body ground	Always	1 MΩ or Higher
A25–3 (D2–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



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

Standard:

Tester connection	Condition	Specified condition
D2+ – Body ground	Always	1 MΩ or Higher
D2– – Body ground	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1813	SHORT IN D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The D squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy, the spiral cable sub–assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1813 is recorded when a short to B+ is detected in the D squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1813	• When the airbag ECU assy receives a B+ short signal in the D squib (Dual stage – 2nd step) circuit for 0.5 seconds. • D squib (Dual stage – 2nd step) malfunction • Spiral cable sub–assy malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Spiral cable sub–assy • Horn button assy (D squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1239.

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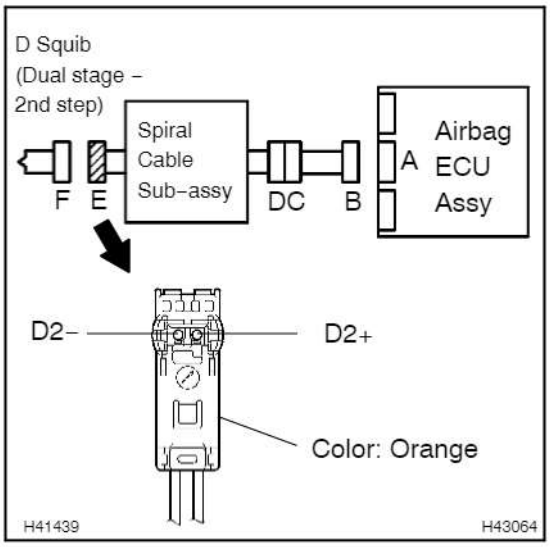
CIRCUIT INSPECTION

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK D SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – HORN BUTTON ASSY)



(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard:

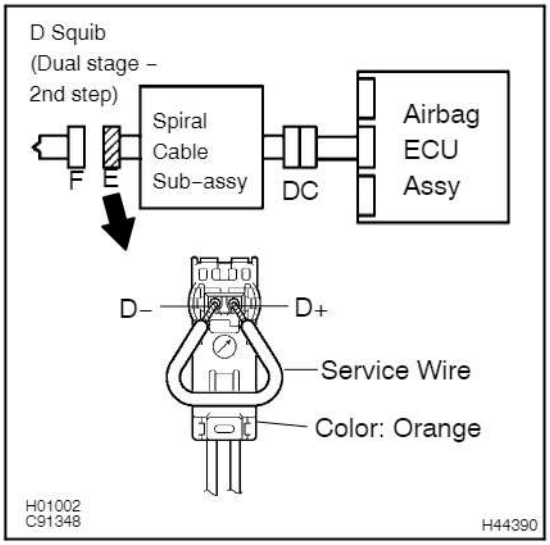
Tester connection	Condition	Specified condition
D2+ – Body ground	Power switch is on (IG)	Below 1 V
D2– – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) Using a service wire, connect D2+ and D2– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1813 is not output.

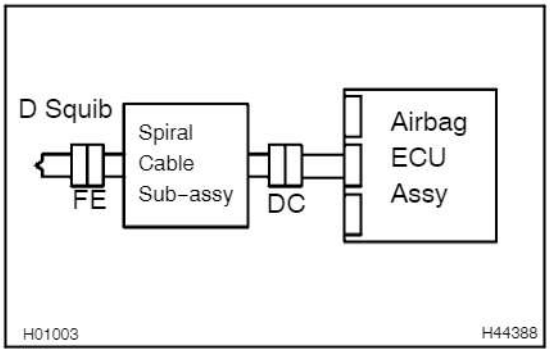
HINT:
Codes other than code B1813 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK HORN BUTTON ASSY(D SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1813 is not output.

HINT:
Codes other than code B1813 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60–20)**

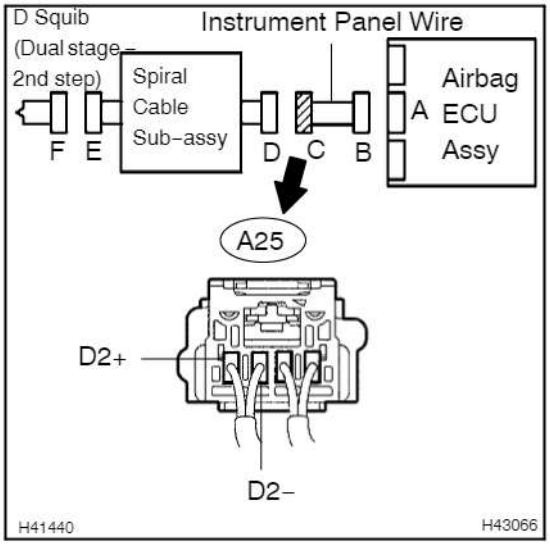
OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the spiral cable sub–assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

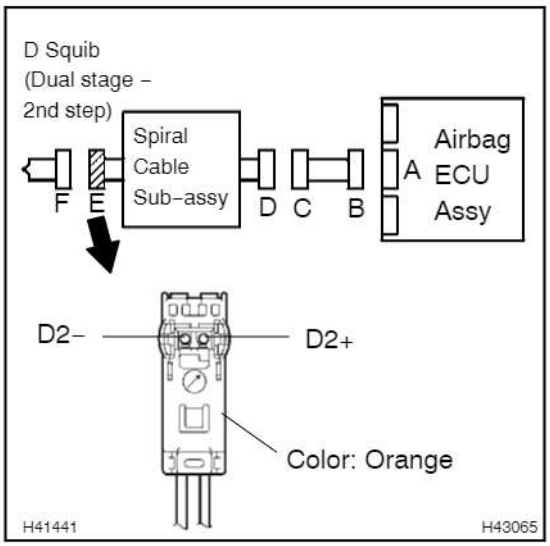
Standard:

Tester connection	Condition	Specified condition
A25–4 (D2+) – Body ground	Power switch is on (IG)	Below 1 V
A25–3 (D2–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB–ASSY



(a) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
D2+ – Body ground	Power switch is on (IG)	Below 1 V
D2– – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB–ASSY (SEE PAGE 60–29)**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1815	SHORT IN P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The P squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1815 is recorded when a short circuit is detected in the P squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1815	• When the airbag ECU assy receives a line short signal 5 times in the P squib (Dual stage – 2nd step) circuit during primary check. • P squib (Dual stage – 2nd step) malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

(a) Check that the instrument panel wire No.2 connectors (on the front passenger airbag assy side) are not damaged.

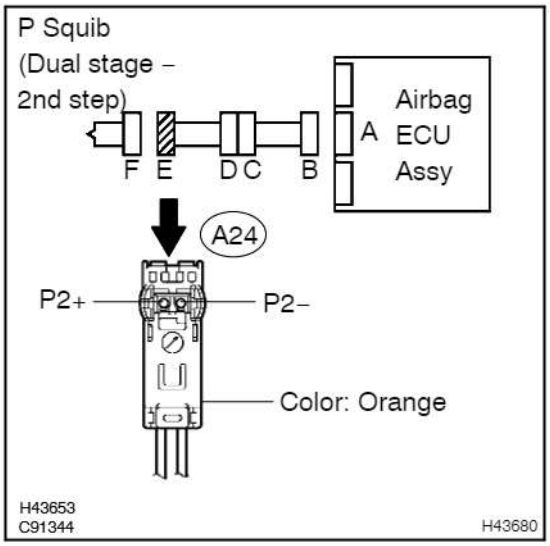
OK:

The lock button is not disengaged, or the claw of the lock is not damaged or deformed.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

2	CHECK P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



(a) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

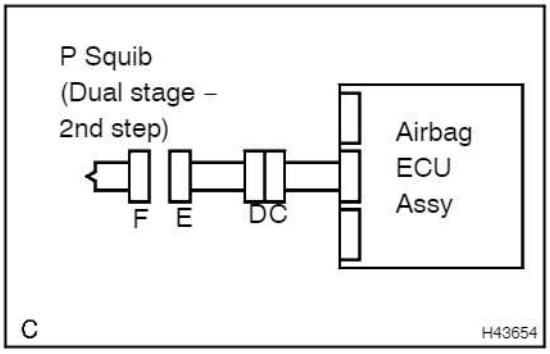
Tester connection	Condition	Specified condition
A24–1 (P2+) – A24–2 (P2–)	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1815 is not output.

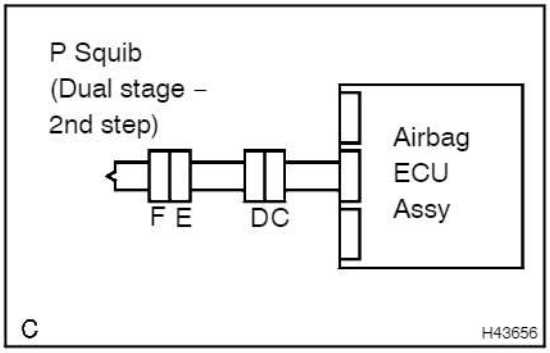
HINT:
Codes other than code B1815 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1815 is not output.

HINT:
Codes other than code B1815 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

OK →

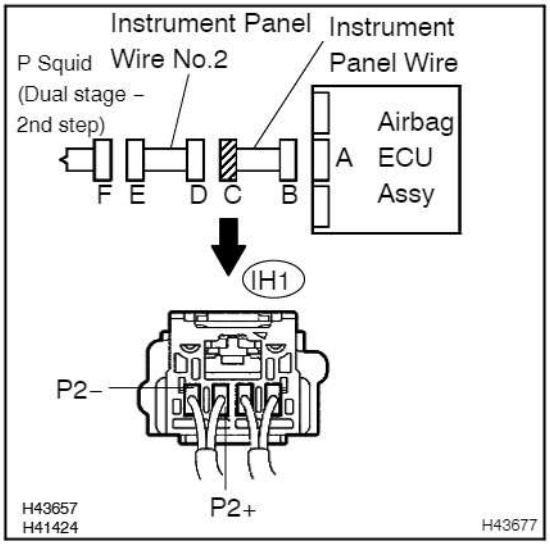
USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

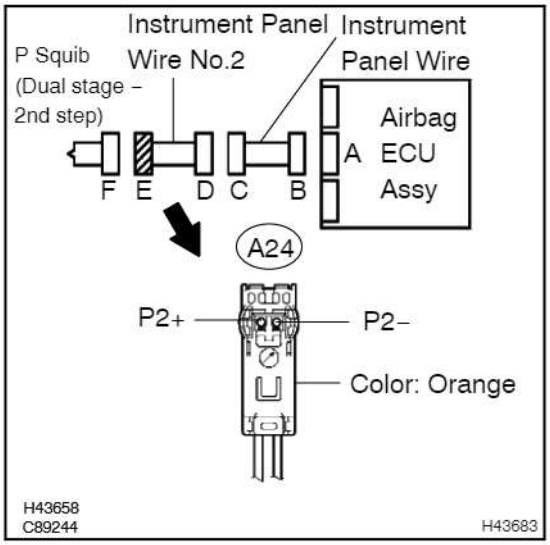
Standard:

Tester connection	Condition	Specified condition
IH1–3 (P2+) – IH1–4 (P2–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK INSTRUMENT PANEL WIRE NO.2



(a) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
A24–1 (P2+) – A24–2 (P2–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1816	OPEN IN P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The P squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1816 is recorded when an open circuit is detected in the P squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1816	• When the airbag ECU assy receives an open signal in the P squib (Dual stage – 2nd step) circuit for 2 seconds. • P squib (Dual stage – 2nd step) malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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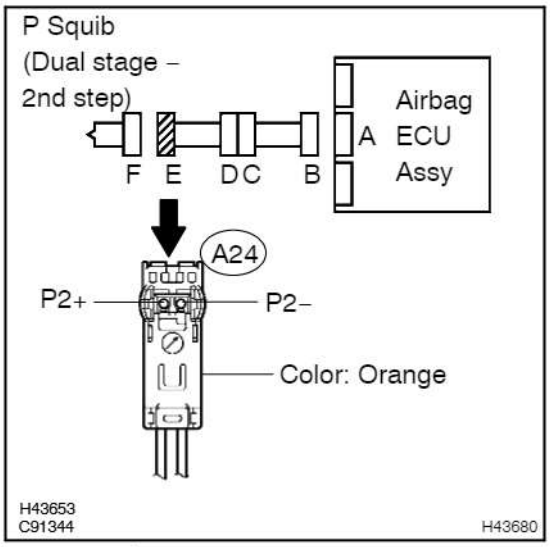
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



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

Standard:

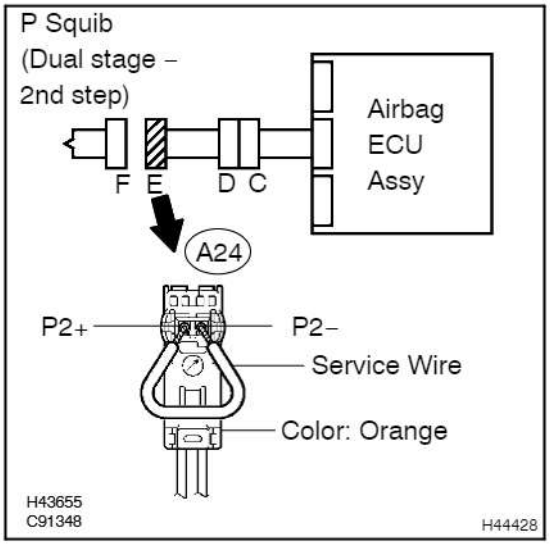
Tester connection	Condition	Specified condition
A24–1 (P2+) – A24–2 (P2–)	Always	Below 1 Ω

OK

NG → **Go to step 4**

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect A24–1 (P2+) and A24–2 (P2–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).
OK:
DTC B1816 is not output.

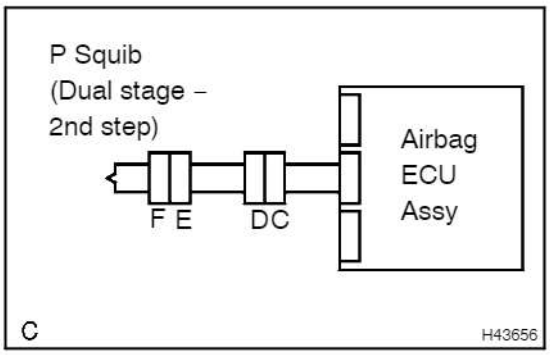
HINT:
Codes other than code B1816 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1816 is not output.

HINT:
Codes other than code B1816 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

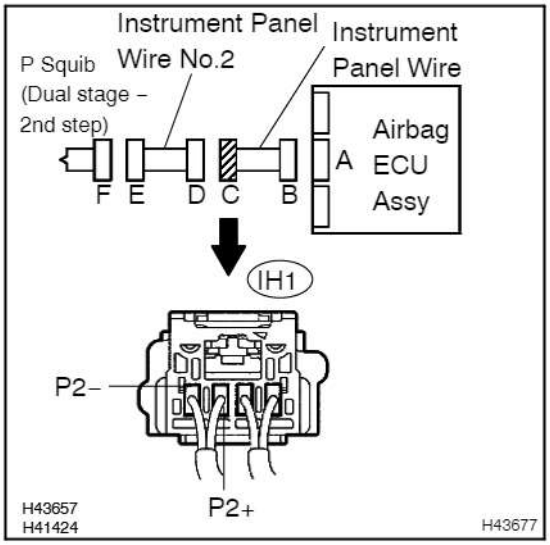
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

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

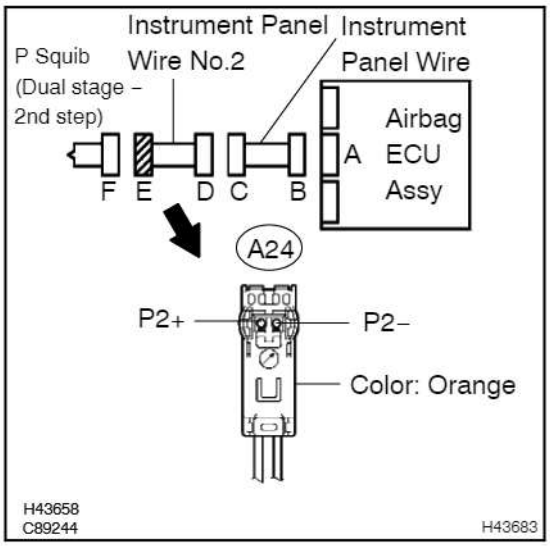
Standard:

Tester connection	Condition	Specified condition
IH1–3 (P2+) – IH1–4 (P2–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



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

Standard:

Tester connection	Condition	Specified condition
A24–1 (P2+) – A24–2 (P2–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1817	SHORT IN P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1817 is recorded when a short to ground is detected in the P squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1817	• When the airbag ECU assy receives a short to ground signal in the P squib (Dual stage – 2nd step) circuit for 0.5 seconds. • P squib (Dual stage – 2nd step) malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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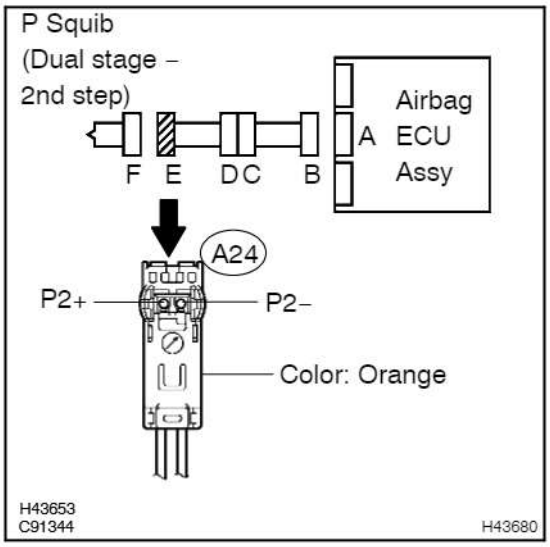
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



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

Standard:

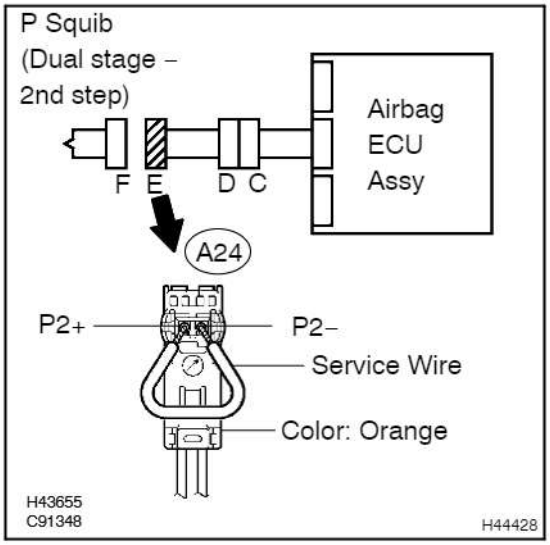
Tester connection	Condition	Specified condition
A24–1 (P2+) – Body ground	Always	1 MΩ or Higher
A24–2 (P2–) – Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Using a service wire, connect A24–1 (P2+) and A24–2 (P2–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05–1170).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (see page 05–1170).

OK:

DTC B1817 is not output.

HINT:

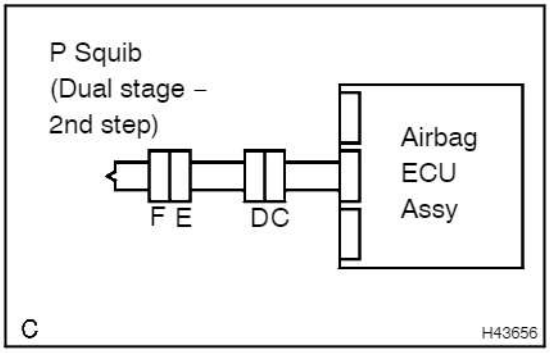
Codes other than code B1817 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1817 is not output.

HINT:
Codes other than code B1817 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

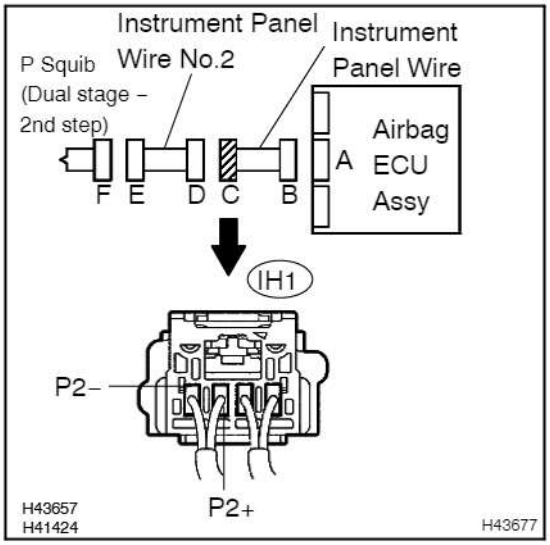
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the instrument panel wire No.2.

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

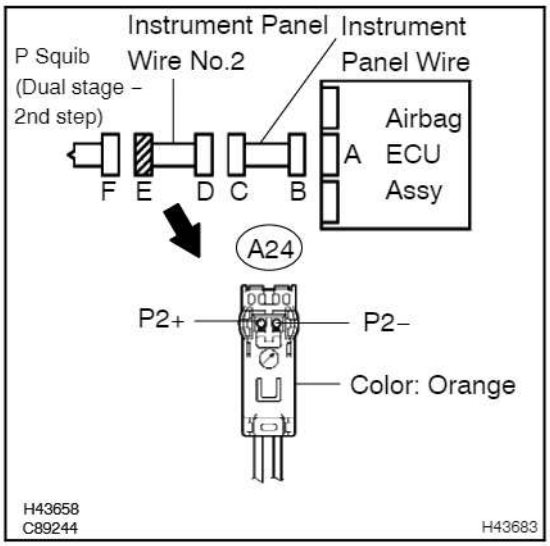
Standard:

Tester connection	Condition	Specified condition
IH1–3 (P2+) – Body ground	Always	1 MΩ or Higher
IH1–4 (P2–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



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

Standard:

Tester connection	Condition	Specified condition
A24–1 (P2+) – Body ground	Always	1 MΩ or Higher
A24–2 (P2–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1818	SHORT IN P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P squib (Dual stage – 2nd step) circuit consists of the airbag ECU assy and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1818 is recorded when a short to B+ is detected in the P squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1818	• When the airbag ECU assy receives a B+ short signal in the P squib (Dual stage – 2nd step) circuit for 0.5 seconds. • P squib (Dual stage – 2nd step) malfunction • Airbag ECU assy malfunction	• Instrument panel wire • Instrument panel wire No.2 • Front passenger airbag assy (P squib, Dual stage – 2nd step) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1259.

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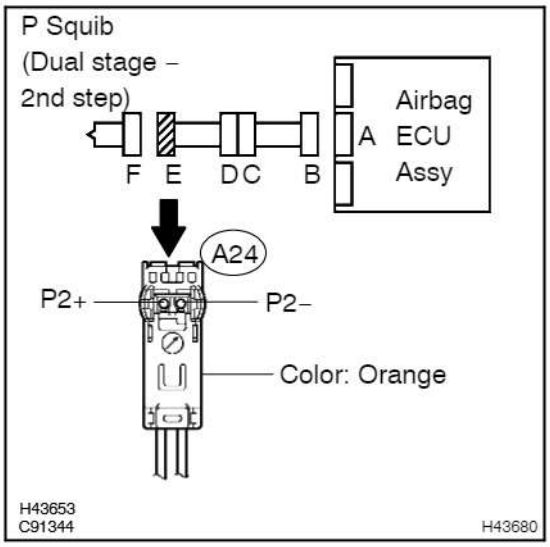
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK P SQUIB (DUAL STAGE – 2ND STEP) CIRCUIT(AIRBAG ECU ASSY – FRONT PASSENGER AIRAG ASSY)



(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard:

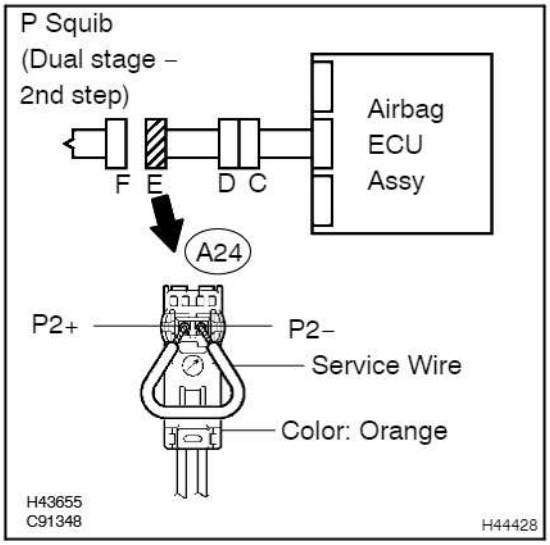
Tester connection	Condition	Specified condition
A24–1 (P2+) – Body ground	Power switch is on (IG)	Below 1 V
A24–2 (P2–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) Using a service wire, connect A24–1 (P2+) and A24–2 (P2–) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

OK:

DTC B1818 is not output.

HINT:

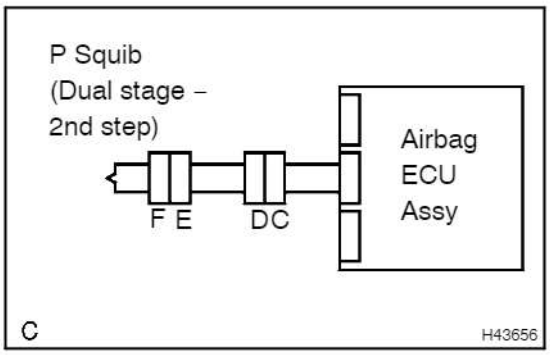
Codes other than code B1818 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB (DUAL STAGE – 2ND STEP))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the front passenger airbag assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1818 is not output.

HINT:
Codes other than code B1818 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60–32)**

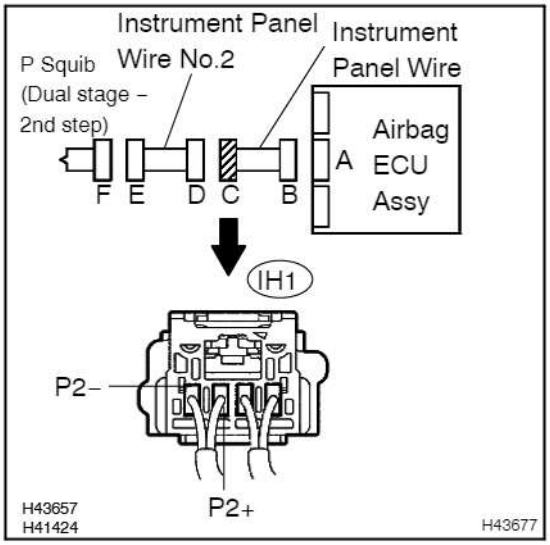
OK →

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK INSTRUMENT PANEL WIRE



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the instrument panel wire No.2.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

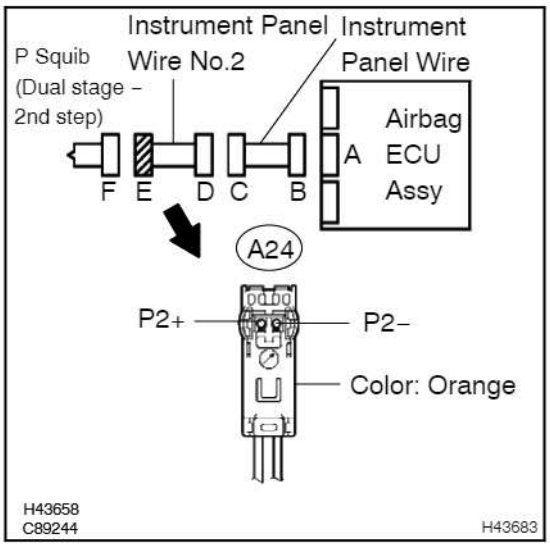
Standard:

Tester connection	Condition	Specified condition
IH1–3 (P2+) – Body ground	Power switch is on (IG)	Below 1 V
IH1–4 (P2–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK INSTRUMENT PANEL WIRE NO.2



(a) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
A24–1 (P2+) – Body ground	Power switch is on (IG)	Below 1 V
A24–2 (P2–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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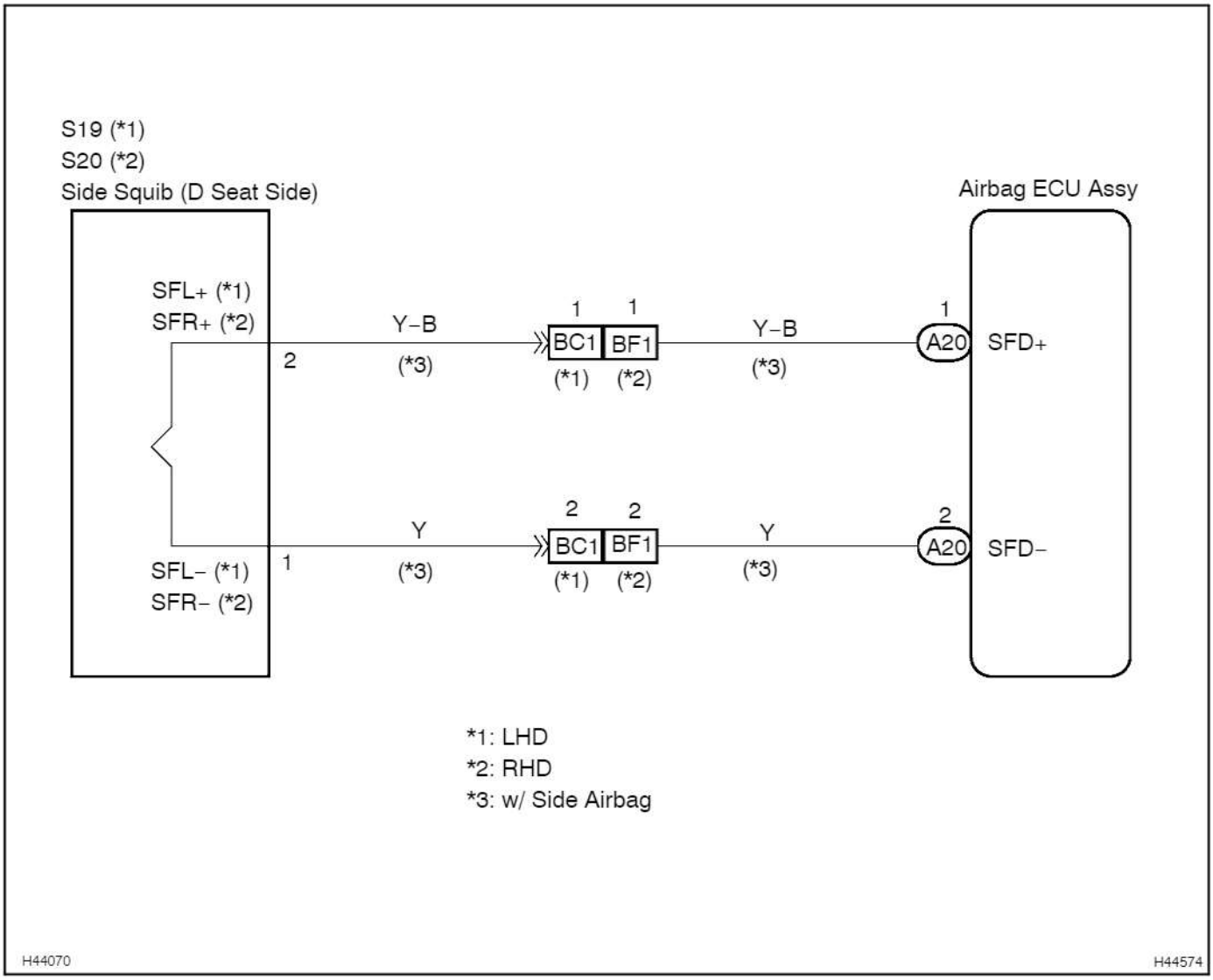
DTC	B1820	SHORT IN SIDE SQUIB (D SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The side squib (D seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy LH (LHD) or front seat w/ adjuster frame assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1820 is recorded when a short circuit is detected in the side squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1820	• When the airbag ECU assy receives a line short signal 5 times in the side squib (D seat side) circuit during primary check. • Side squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Seat airbag No.1 wire • Front seat w/ adjuster frame assy LH (LHD) (Side squib (D seat side)) • Front seat w/ adjuster frame assy RH (RHD) (Side squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM



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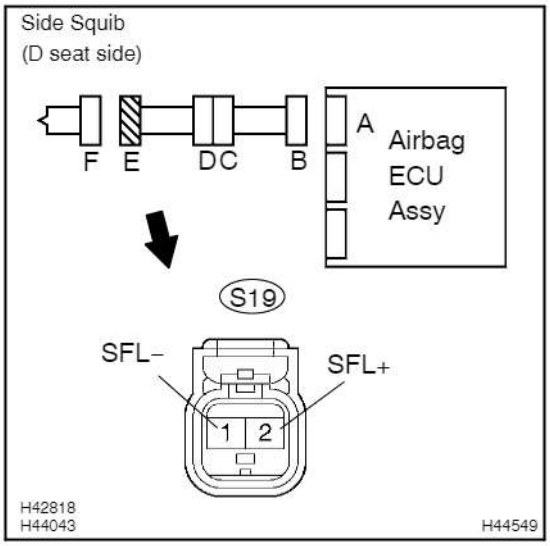
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

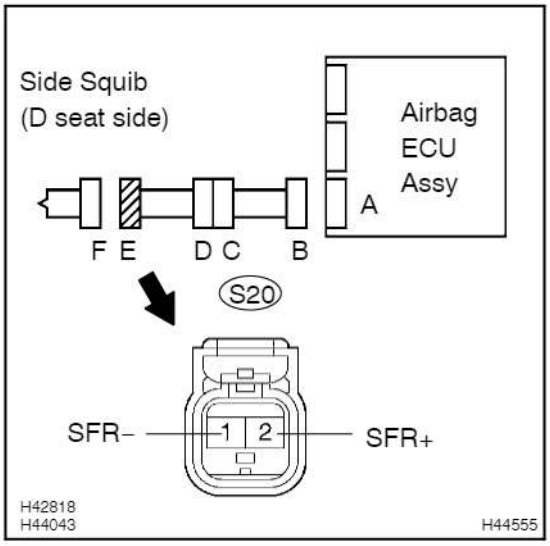
1	CHECK SIDE SQUIB (D SEAT SIDE) CIRCUIT



(a) LHD:
(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	1 MΩ or Higher



(b) RHD:
(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(2) Measure the resistance according to the value(s) in the table below.

Standard:

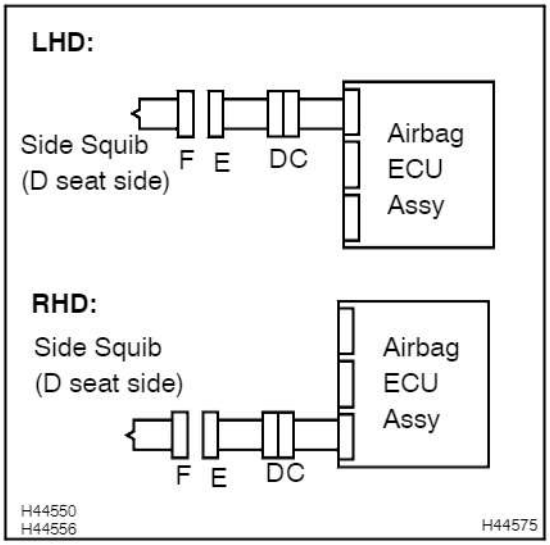
Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1820 is not output.

HINT:

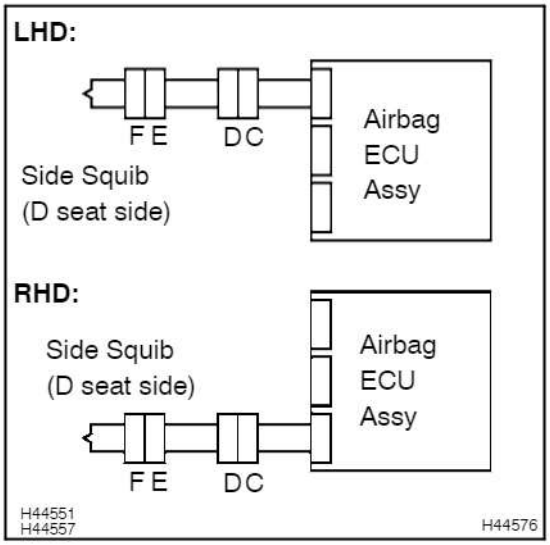
Codes other than code B1820 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(SIDE SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (D seat side)).
(d) RHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (D seat side)).
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

Result:

DTC B1820 is not output.	A
DTC B1820 is output (LHD).	B
DTC B1820 is output (RHD).	C

HINT:
Codes other than code B1820 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

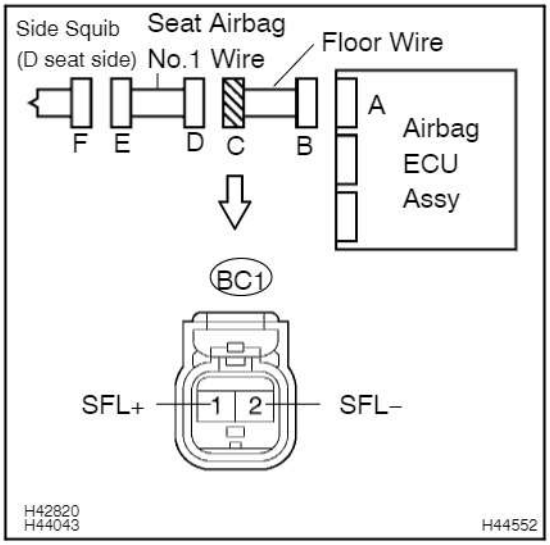
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE



(a) LHD:

(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

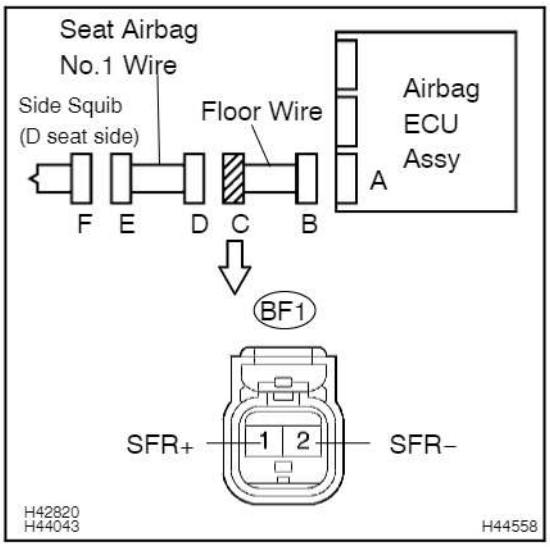
HINT:

The activation prevention mechanism of connector "B" has already been released.

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

Standard:

Tester connection	Condition	Specified condition
BC1–1 (SFL+) – BC1–2 (SFL–)	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

Standard:

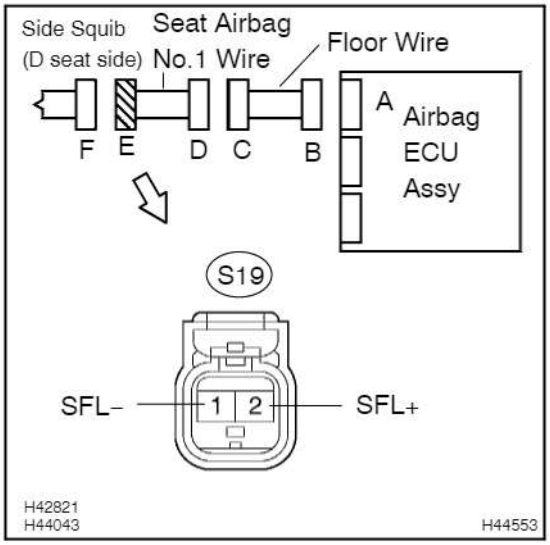
Tester connection	Condition	Specified condition
BF1–1 (SFR+) – BF1–2 (SFR–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5 CHECK SEAT AIRBAG NO.1 WIRE



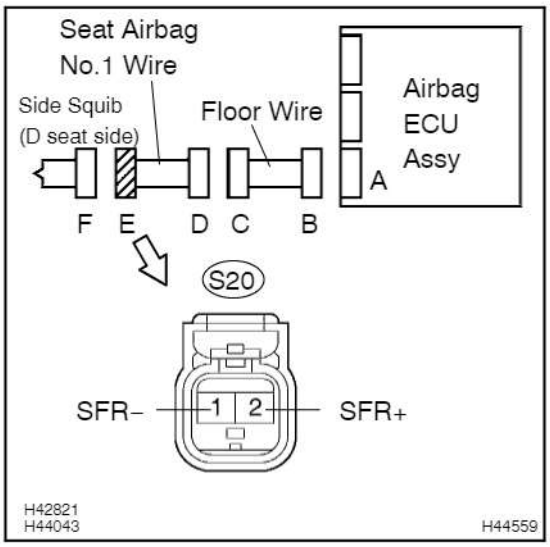
(a) LHD:

(1) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.1 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1821	OPEN IN SIDE SQUIB (D SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The side squib (D seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy LH (LHD) or front seat w/ adjuster frame assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1821 is recorded when an open circuit is detected in the side squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1821	• When the airbag ECU assy receives an open signal in the side squib (D seat side) circuit for 2 seconds. • Side squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Seat airbag No.1 wire • Front seat w/ adjuster frame assy LH (LHD) (Side squib (D seat side)) • Front seat w/ adjuster frame assy RH (RHD) (Side squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1319.

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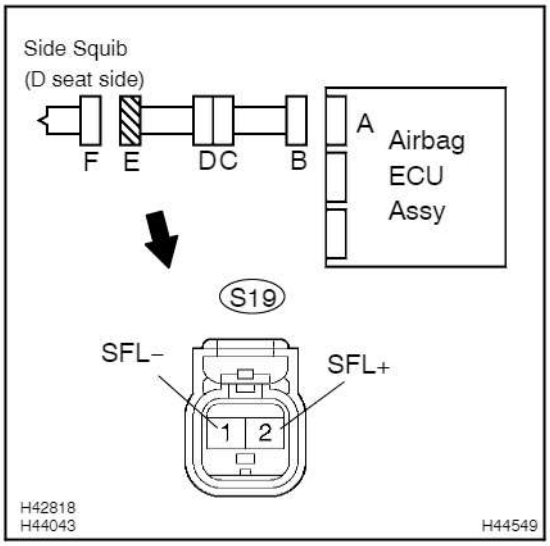
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

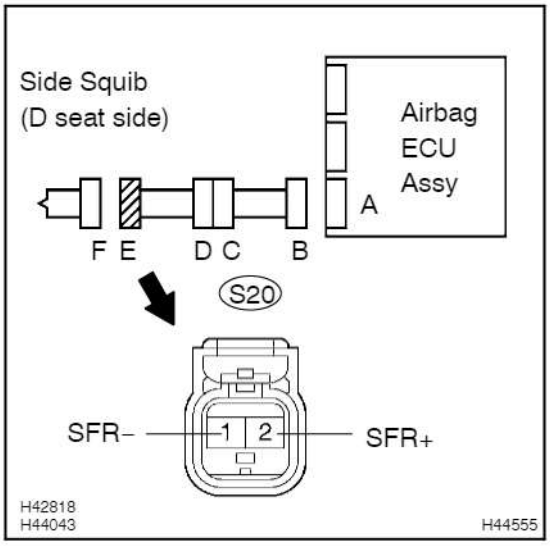
1	CHECK SIDE SQUIB (D SEAT SIDE) CIRCUIT



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	Below 1 Ω



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

Standard:

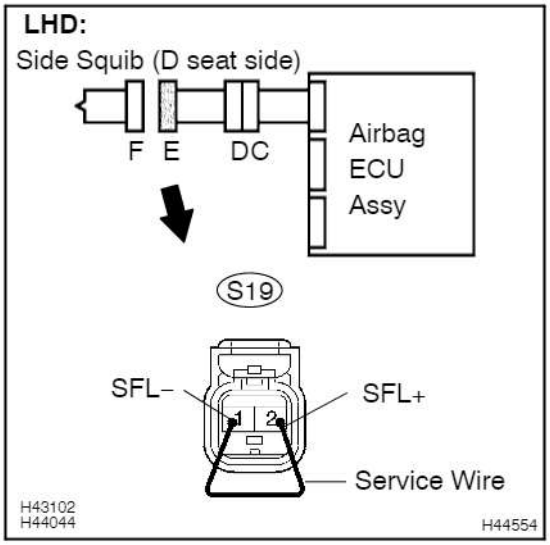
Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	Below 1 Ω

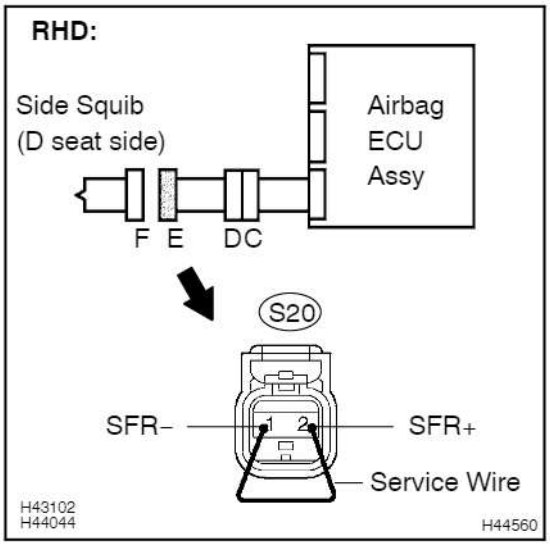
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".

(c) RHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1821 is not output.

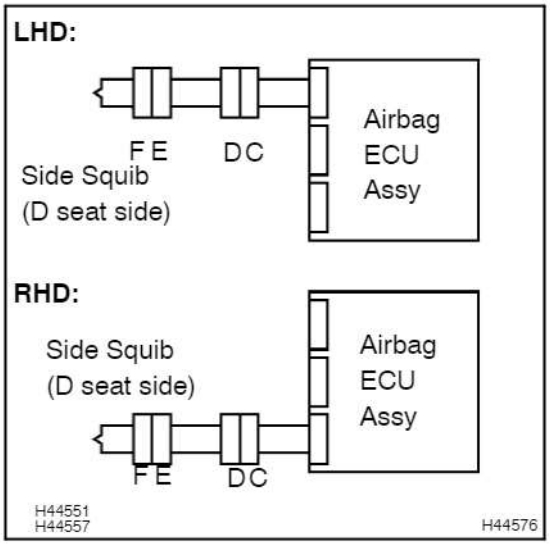
HINT:
Codes other than code B1821 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK DTC(SIDE SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (D seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (D seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1821 is not output.	A
DTC B1821 is output (LHD).	B
DTC B1821 is output (RHD).	C

HINT:
Codes other than code B1821 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

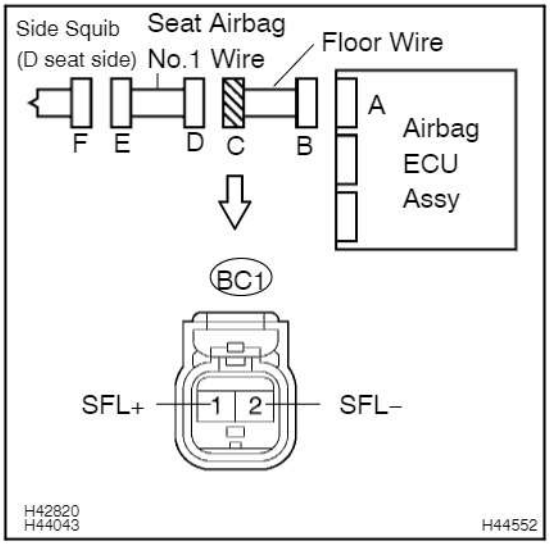
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE

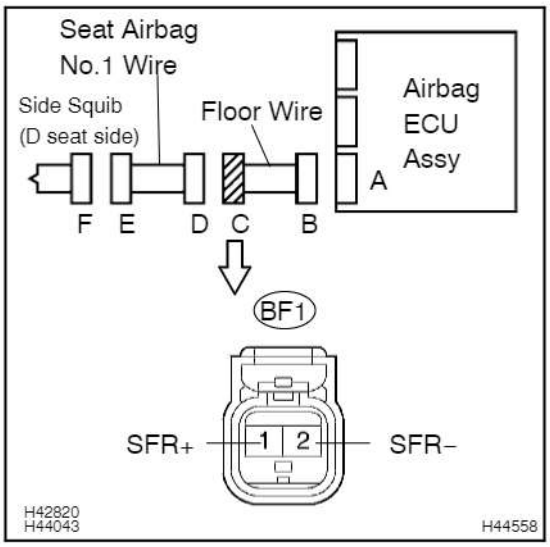


(a) LHD:
(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

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

Standard:

Tester connection	Condition	Specified condition
BC1–1 (SFL+) – BC1–2 (SFL–)	Always	Below 1 Ω



(c) RHD:
(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

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

Standard:

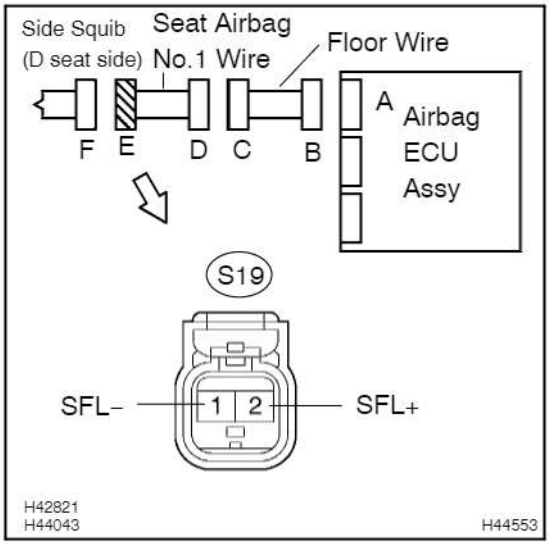
Tester connection	Condition	Specified condition
BF1–1 (SFR+) – BF1–2 (SFR–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5 CHECK SEAT AIRBAG NO.1 WIRE

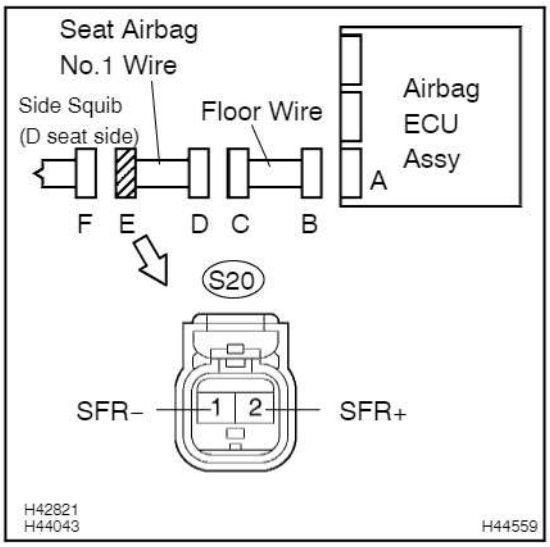


(a) LHD:

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	Below 1 Ω



(b) RHD:

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.1 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1822	SHORT IN SIDE SQUIB (D SEAT SIDE) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The side squib (D seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy LH (LHD) or front seat w/ adjuster frame assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1822 is recorded when a short to ground circuit is detected in the side squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1822	• When the airbag ECU assy receives a short to ground signal in the side squib (D seat side) circuit for 0.5 seconds. • Side squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Seat airbag No.1 wire • Front seat w/ adjuster frame assy LH (LHD) (Side squib (D seat side)) • Front seat w/ adjuster frame assy RH (RHD) (Side squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1319.

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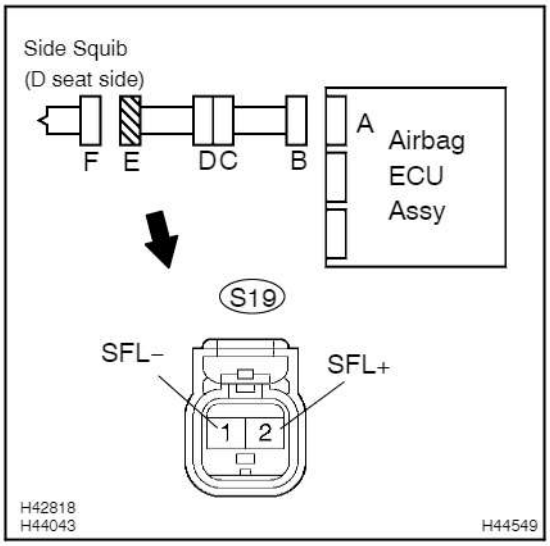
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

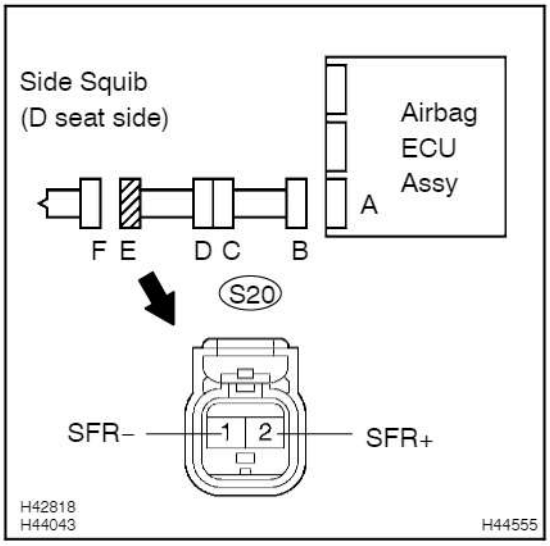
1	CHECK SIDE SQUIB (D SEAT SIDE) CIRCUIT



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Always	1 MΩ or Higher
S19–1 (SFL–) – Body ground	Always	1 MΩ or Higher



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

Standard:

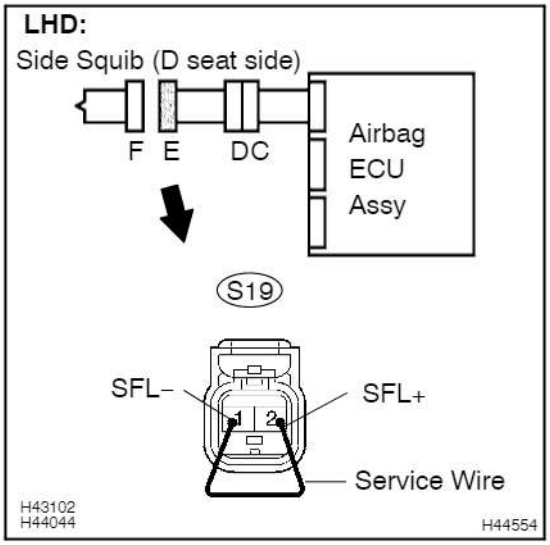
Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Always	1 MΩ or Higher
S20–1 (SFR–) – Body ground	Always	1 MΩ or Higher

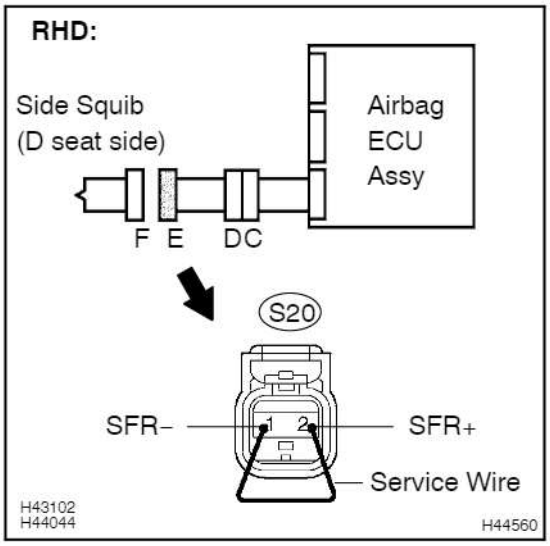
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".

(c) RHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1822 is not output.

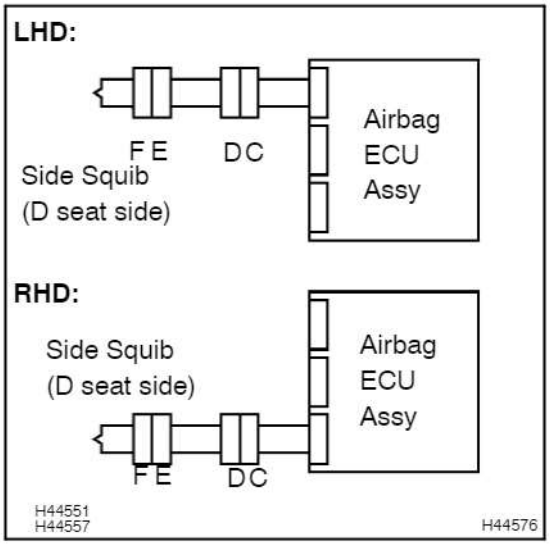
HINT:
Codes other than code B1822 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(SIDE SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (D seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (D seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1822 is not output.	A
DTC B1822 is output (LHD).	B
DTC B1822 is output (RHD).	C

HINT:
Codes other than code B1822 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

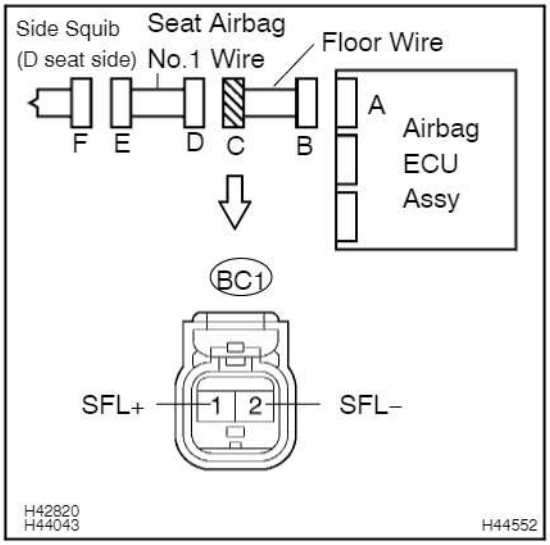
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE



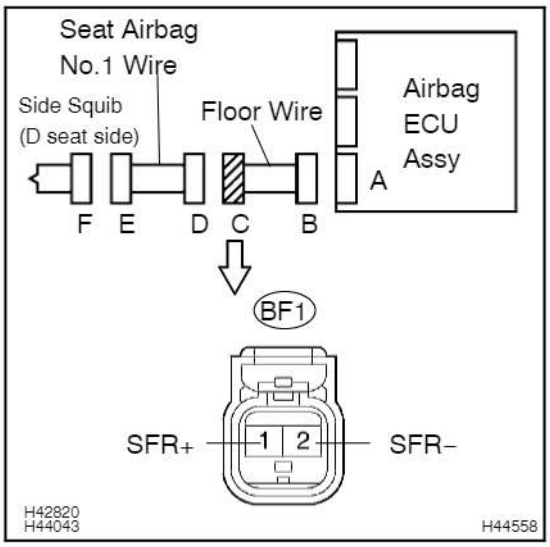
(a) LHD:

(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

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

Standard:

Tester connection	Condition	Specified condition
BC1–1 (SFL+) – Body ground	Always	1 MΩ or Higher
BC1–2 (SFL–) – Body ground	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the floor wire connector from the seat airbag No.1 wire.

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

Standard:

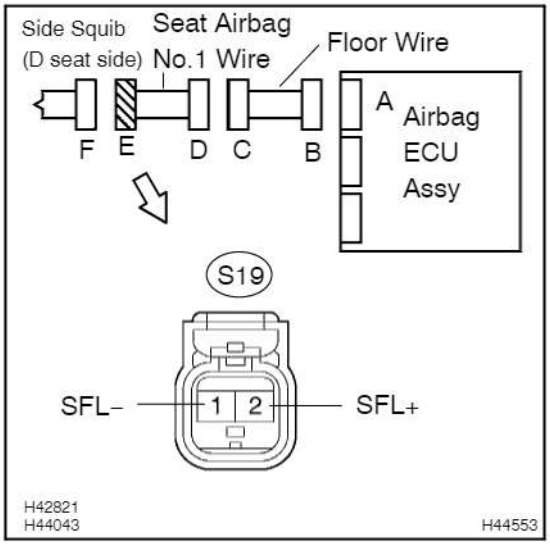
Tester connection	Condition	Specified condition
BF1–1 (SFR+) – Body ground	Always	1 MΩ or Higher
BF1–2 (SFR–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5 CHECK SEAT AIRBAG NO.1 WIRE

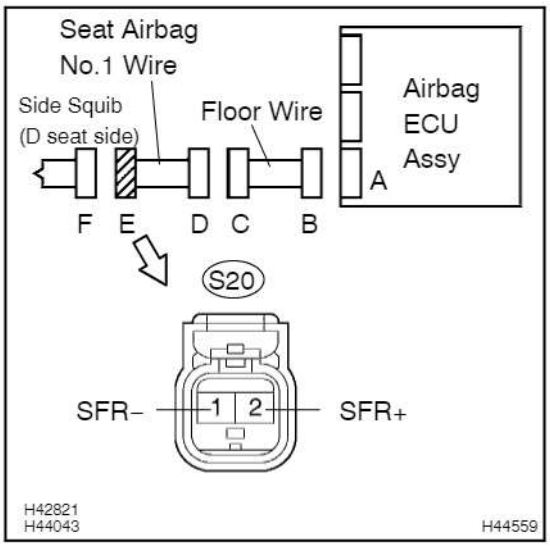


(a) LHD:

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Always	1 MΩ or Higher
S19–1 (SFL–) – Body ground	Always	1 MΩ or Higher



(b) RHD:

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Always	1 MΩ or Higher
S20–1 (SFR–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.1 WIRE**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1823	SHORT IN SIDE SQUIB (D SEAT SIDE) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The side squib (D seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy LH (LHD) or front seat w/ adjuster frame assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1823 is recorded when a short to B+ circuit is detected in the side squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1823	• When the airbag ECU assy receives a B+ short signal in the side squib (D seat side) circuit for 0.5 seconds. • Side squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Seat airbag No.1 wire • Front seat w/ adjuster frame assy LH (LHD) (Side squib (D seat side)) • Front seat w/ adjuster frame assy LH (LHD) (Side squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1319.

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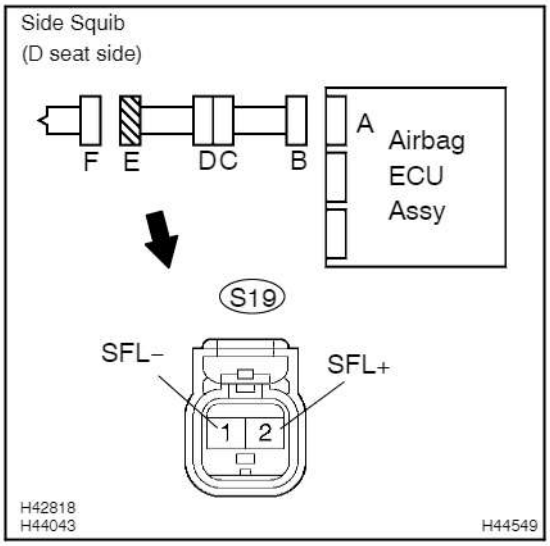
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

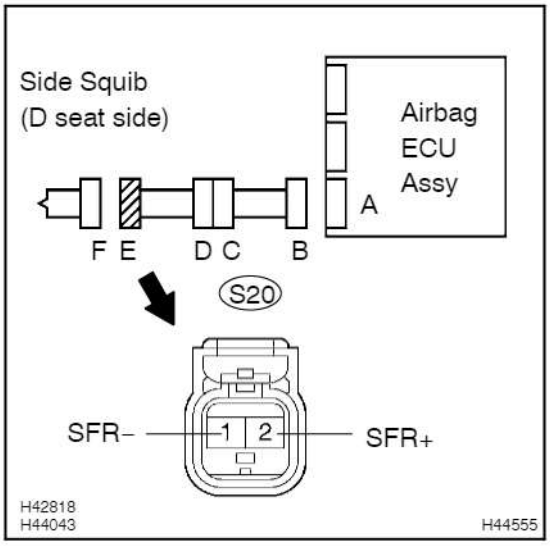
1	CHECK SIDE SQUIB (D SEAT SIDE) CIRCUIT



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
S19–1 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

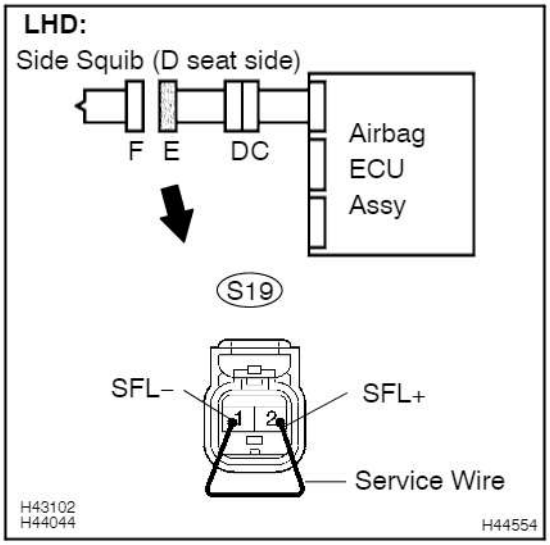
Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
S20–1 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V

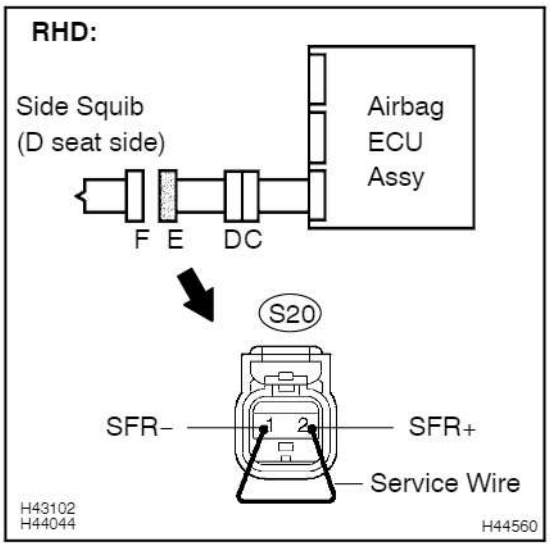
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) LHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".
(e) RHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1823 is not output.

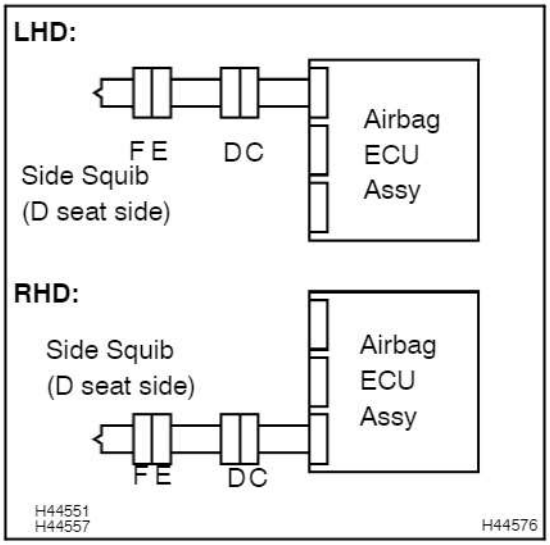
HINT:
Codes other than code B1823 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(SIDE SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (D seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (D seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1823 is not output.	A
DTC B1823 is output (LHD).	B
DTC B1823 is output (RHD).	C

HINT:
Codes other than code B1823 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

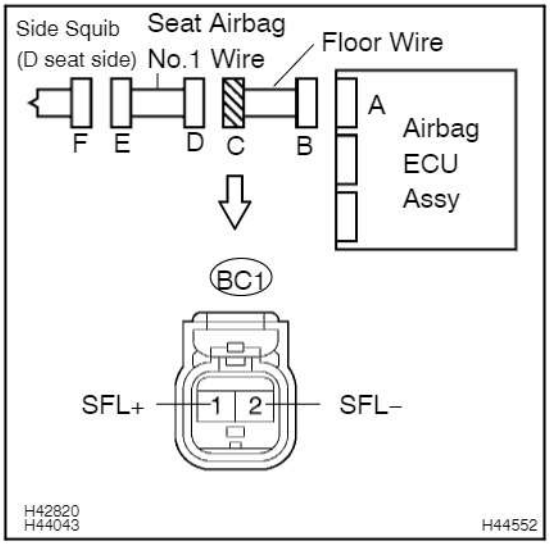
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE



(a) LHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(3) Disconnect the floor wire connector from the seat airbag No.1 wire.

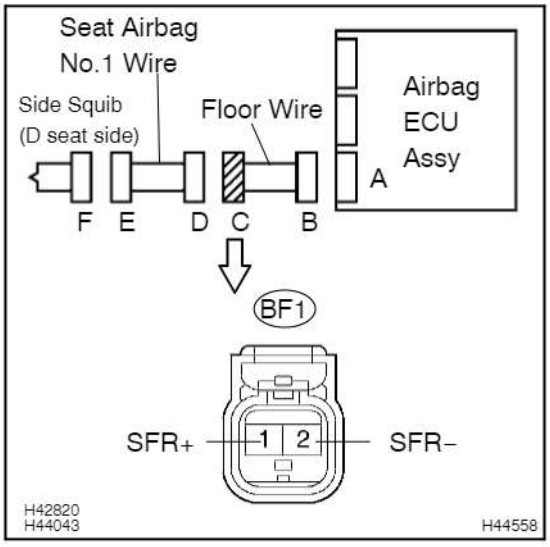
(4) Conect the negative (–) terminal calbe to the battery, and wait for at least 2 seconds.

(5) Turn the power switch on (IG).

(6) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
BC1–1 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
BC1–2 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(3) Disconnect the floor wire connector from the seat airbag No.1 wire.

(4) Conect the negative (–) terminal calbe to the battery, and wait for at least 2 seconds.

(5) Turn the power switch on (IG).

(6) Measure the voltage according to the value(s) in the table below.

Standard:

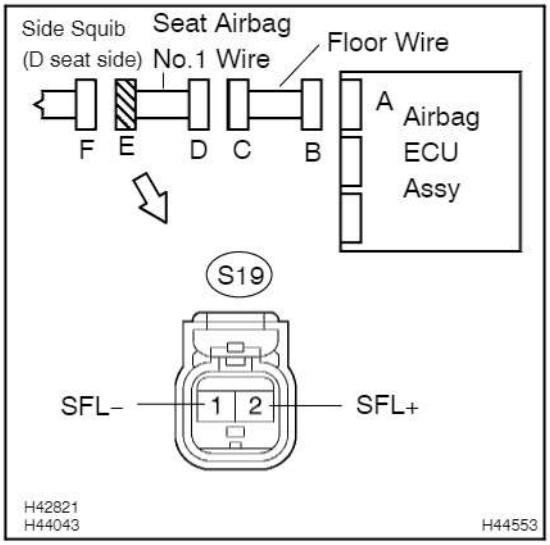
Tester connection	Condition	Specified condition
BF1–1 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
BF1–2 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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5 CHECK SEAT AIRBAG NO.1 WIRE

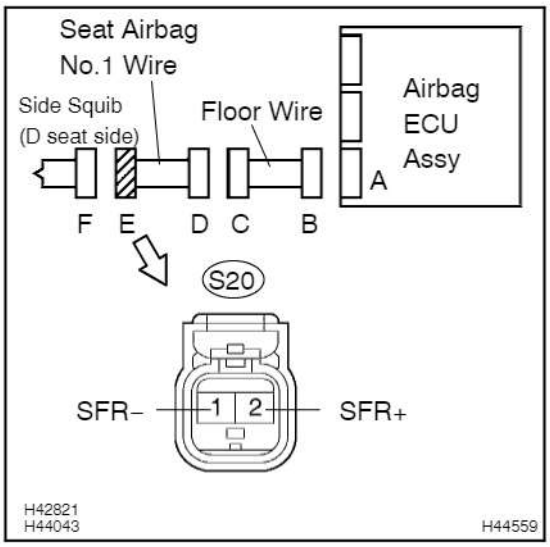


(a) LHD:

(1) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
S19–1 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
S20–1 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.1 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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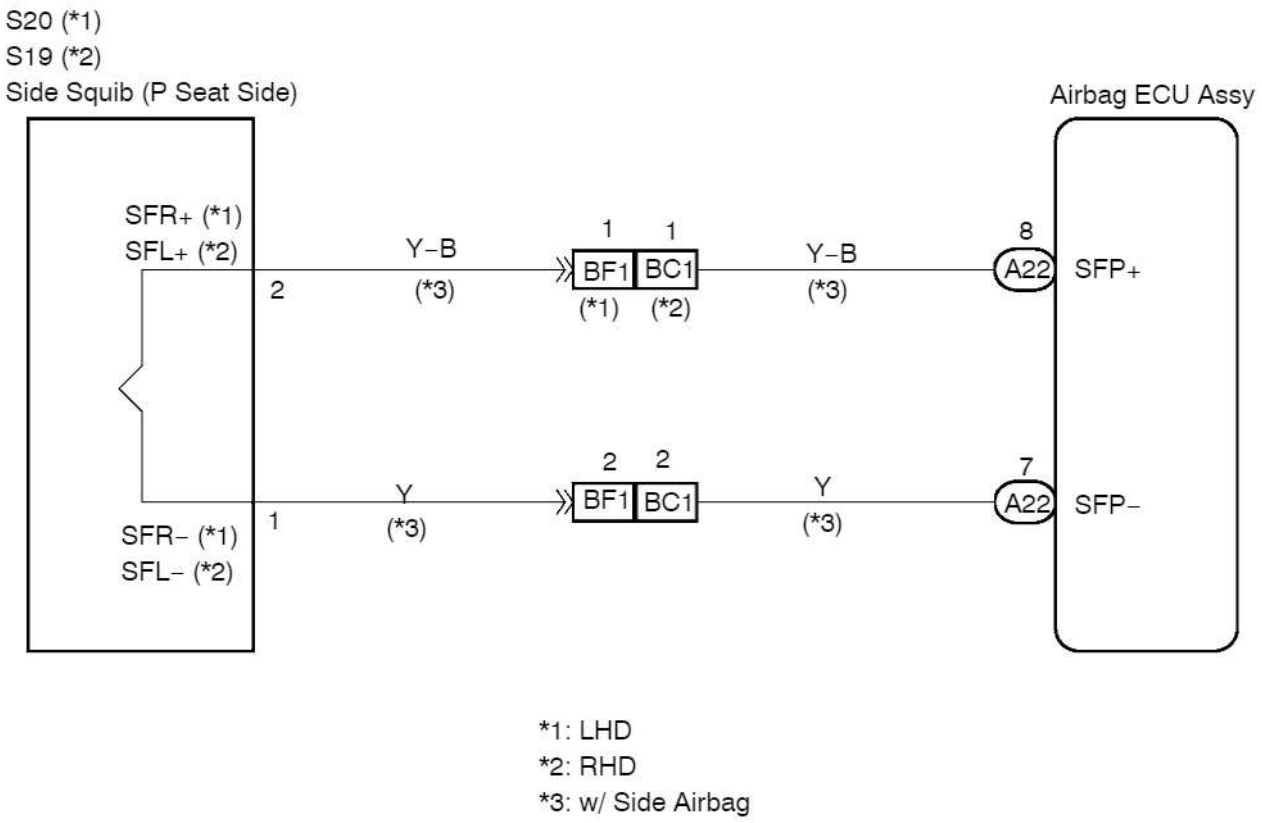
DTC	B1825	SHORT IN SIDE SQUIB (P SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The side squib (P seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy RH (LHD) or front seat w/ adjuster frame assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1825 is recorded when a short circuit is detected in the side squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1825	• When the Airbag ECU assy receives a line short signal 5 times in the side squib (P seat side) circuit during primary check. • Side squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Seat airbag No.2 wire • Front seat w/ adjuster frame assy RH (LHD) (Side squib (P seat side)) • Front seat w/ adjuster frame assy LH (RHD) (Side squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM



*1: LHD
*2: RHD
*3: w/ Side Airbag

H44070 H44574

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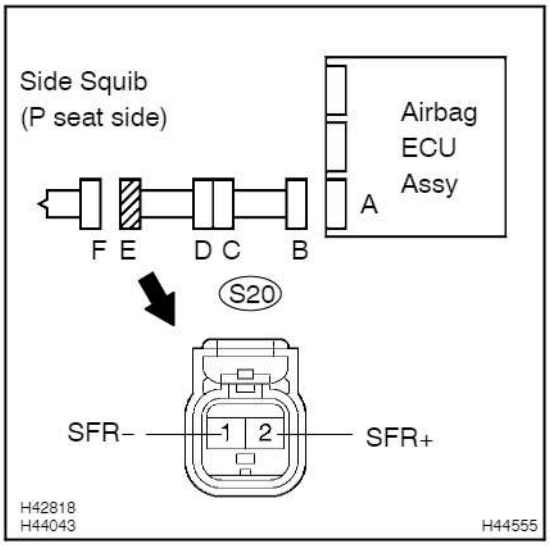
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

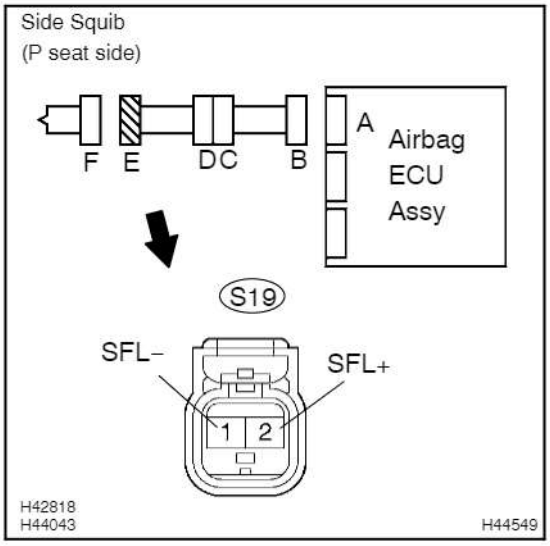
1	CHECK SIDE SQUIB (P SEAT SIDE) CIRCUIT



(a) LHD:
(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(2) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	1 MΩ or Higher



(b) RHD:
(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).
(2) Measure the resistance according to the value(s) in the table below.

Standard:

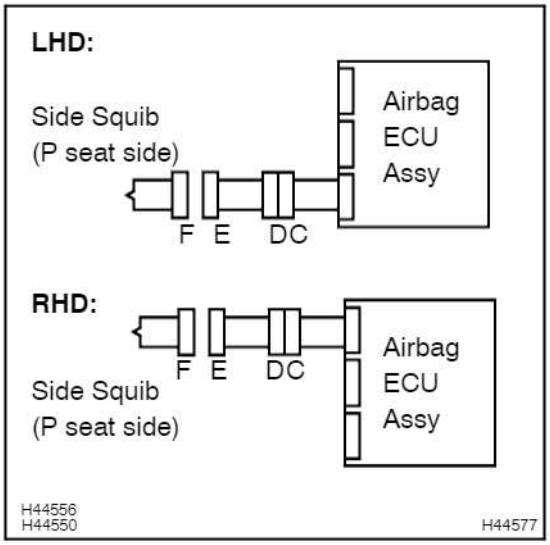
Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

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2	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).

OK:

DTC B1825 is not output.

HINT:

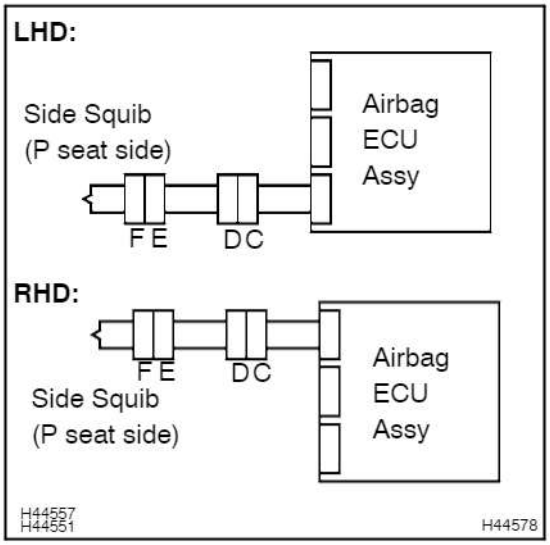
Codes other than code B1825 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK DTC(SIDE SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (P seat side)).
(d) RHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (P seat side)).
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).
OK:
DTC B1825 is not output.
Result:

DTC B1825 is not output.	A
DTC B1825 is output (LHD).	B
DTC B1825 is output (RHD).	C

HINT:
Codes other than code B1825 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

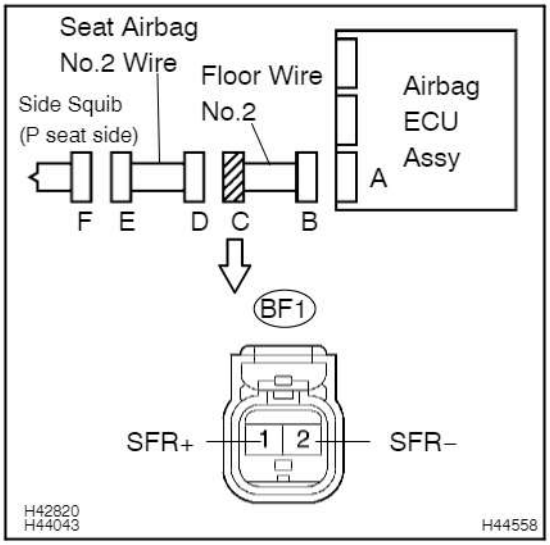
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE NO.2



(a) LHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

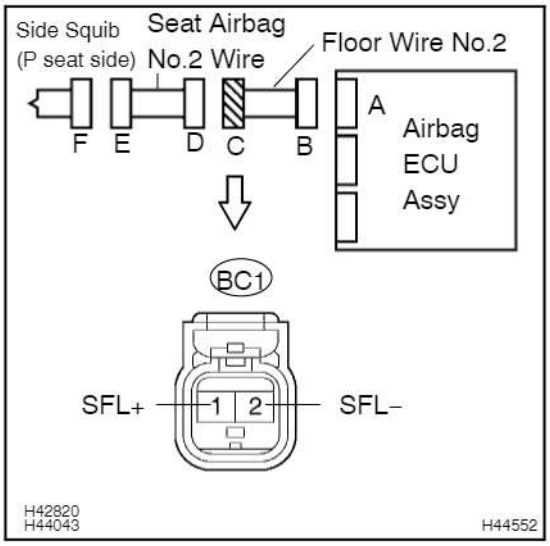
HINT:

The activation prevention mechanism of connector "B" has already been released.

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

Standard:

Tester connection	Condition	Specified condition
BF1–1 (SFR+) – BF1–2 (SFR–)	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

HINT:

The activation prevention mechanism of connector "B" has already been released.

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

Standard:

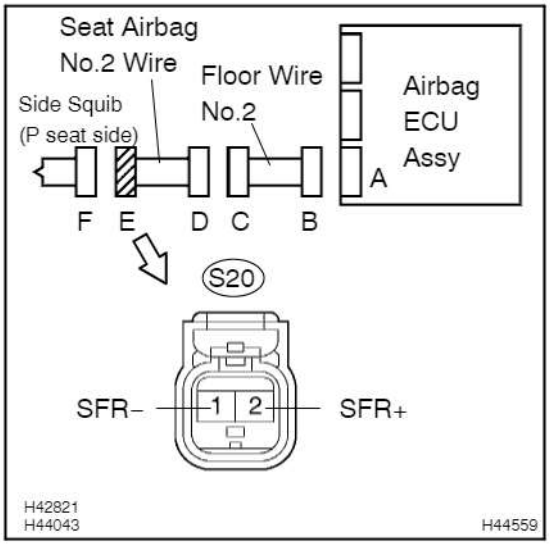
Tester connection	Condition	Specified condition
BC1–1 (SFL+) – BC1–2 (SFL–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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5 CHECK SEAT AIRBAG NO.2 WIRE



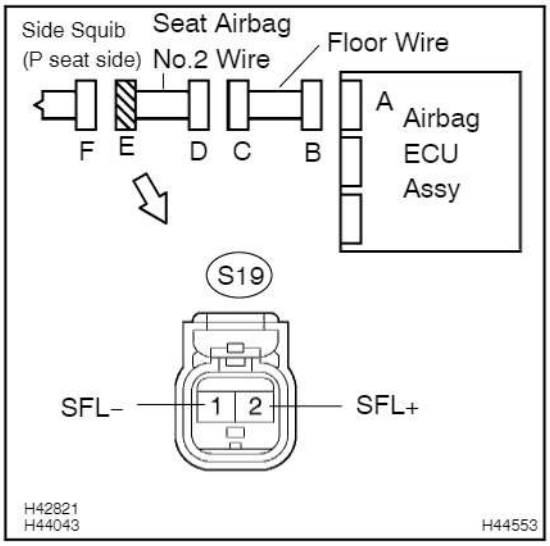
(a) LHD:

(1) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "D" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.2 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1826	OPEN IN SIDE SQUIB (P SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The side squib (P seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy RH (LHD) or front seat w/ adjuster frame assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1826 is recorded when an open circuit is detected in the side squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1826	• When the airbag ECU assy receives an open signal in the side squib (P seat side) circuit for 2 seconds. • Side squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Seat airbag No.2 wire • Front seat w/ adjuster frame assy RH (LHD) (Side squib (P seat side)) • Front seat w/ adjuster frame assy LH (RHD) (Side squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1343.

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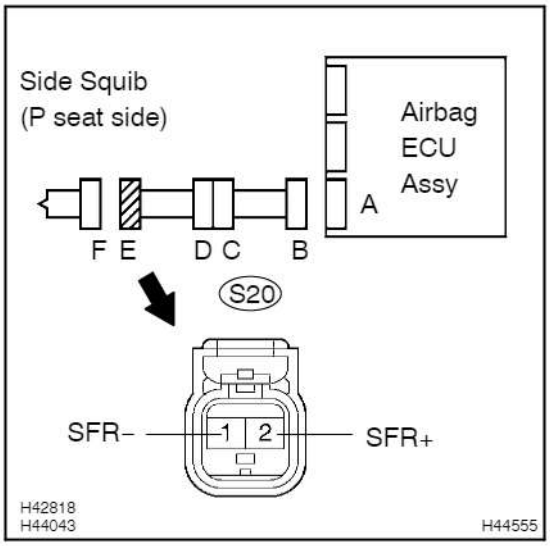
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

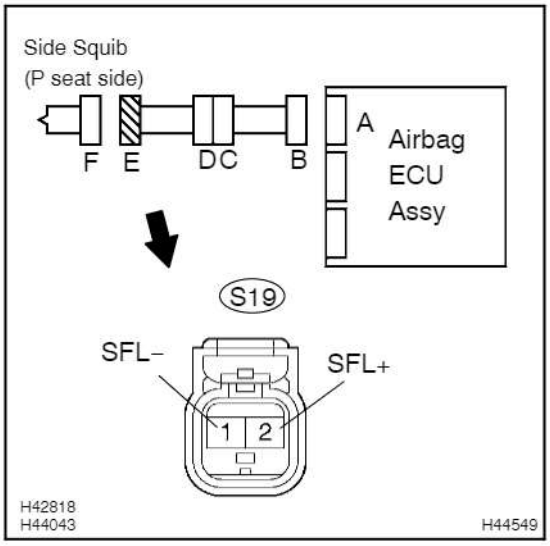
1	CHECK SIDE SQUIB (P SEAT SIDE) CIRCUIT



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	Below 1 Ω



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

Standard:

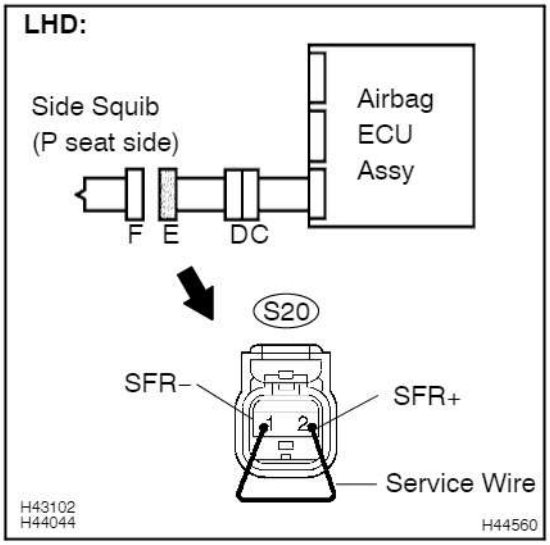
Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	Below 1 Ω

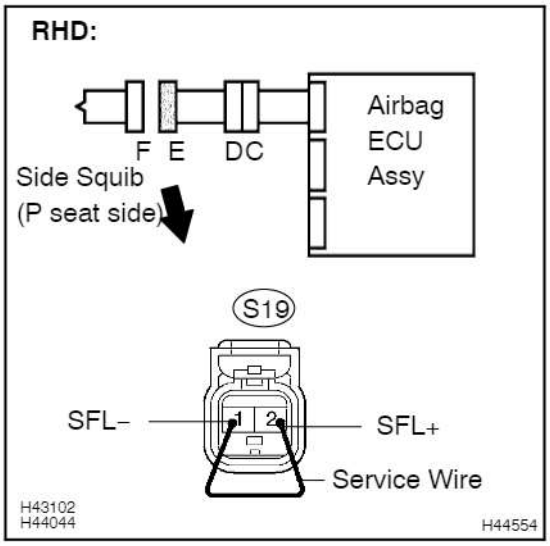
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".

(c) RHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1826 is not output.

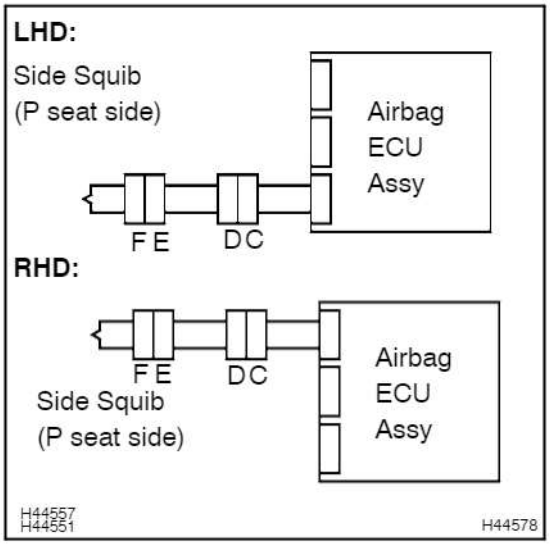
HINT:
Codes other than code B1826 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(SIDE SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (P seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (P seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1826 is not output.	A
DTC B1826 is output (LHD).	B
DTC B1826 is output (RHD).	C

HINT:
Codes other than code B1826 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

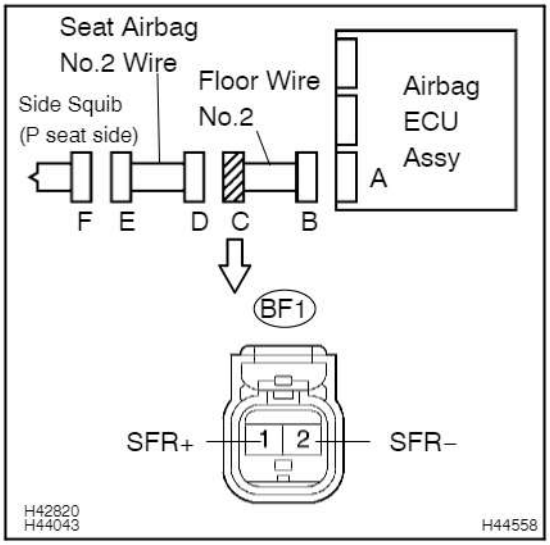
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE NO.2



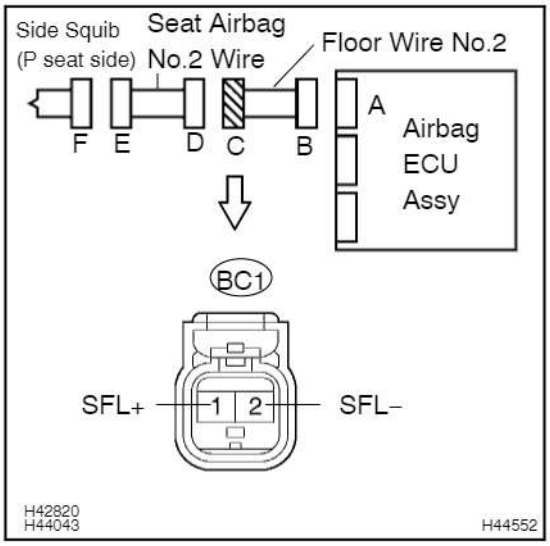
(a) LHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

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

Standard:

Tester connection	Condition	Specified condition
BF1–1 (SFR+) – BF1–2 (SFR–)	Always	Below 1 Ω



(b) RHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

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

Standard:

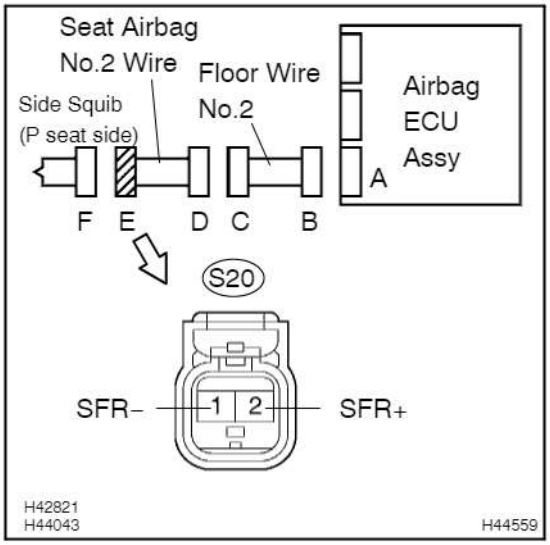
Tester connection	Condition	Specified condition
BC1–1 (SFL+) – BC1–2 (SFL–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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5 CHECK SEAT AIRBAG NO.2 WIRE

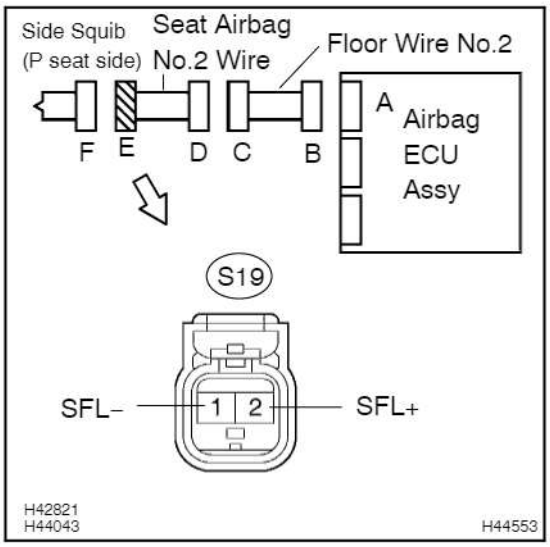


(a) LHD:

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – S20–1 (SFR–)	Always	Below 1 Ω



(b) RHD:

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – S19–1 (SFL–)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.2 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1827	SHORT IN SIDE SQUIB (P SEAT SIDE) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The side squib (P seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy RH (LHD) or front seat w/ adjuster frame assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1827 is recorded when a short to ground is detected in the side squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1827	• When the airbag ECU assy receives a short to ground signal in the side squib (P seat side) circuit for 0.5 seconds. • Side squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Seat airbag No.2 wire • Front seat w/ adjuster frame assy RH (LHD) (Side squib (P seat side)) • Front seat w/ adjuster frame assy LH (RHD) (Side squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1343.

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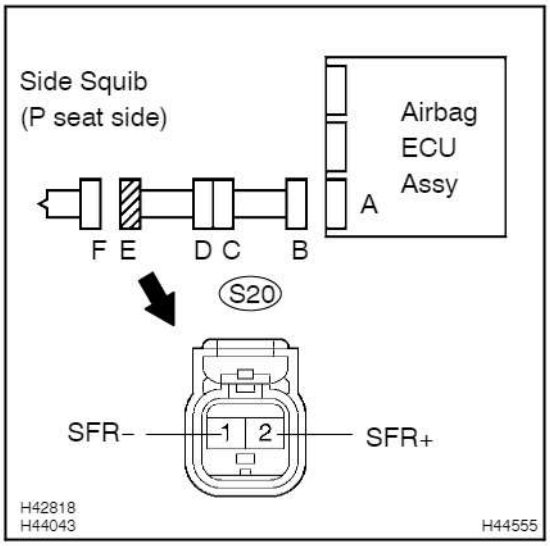
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

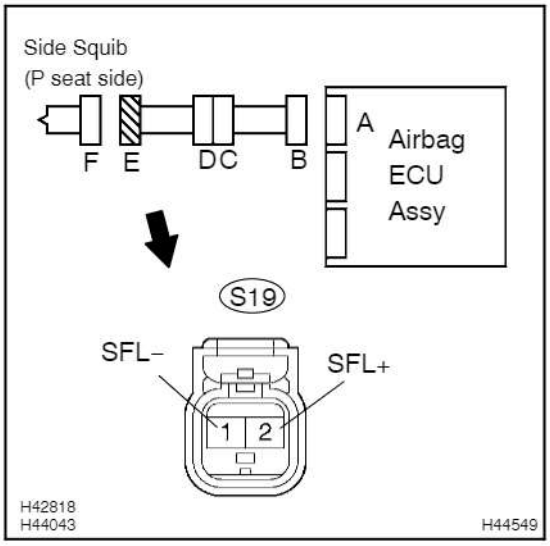
1	CHECK SIDE SQUIB (P SEAT SIDE) CIRCUIT



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Always	1 MΩ or Higher
S20–1 (SFR–) – Body ground	Always	1 MΩ or Higher



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

Standard:

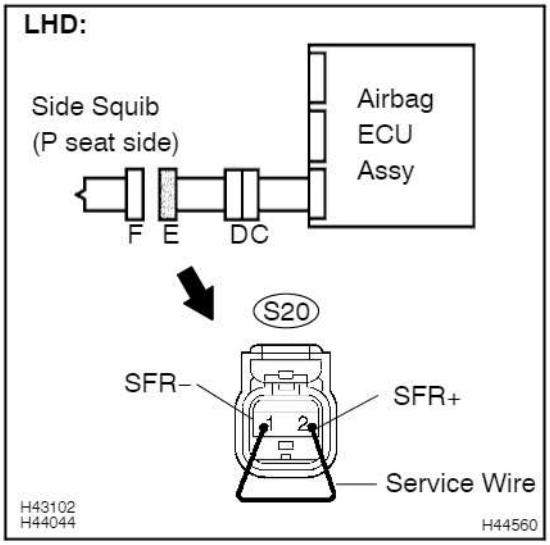
Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Always	1 MΩ or Higher
S19–1 (SFL–) – Body ground	Always	1 MΩ or Higher

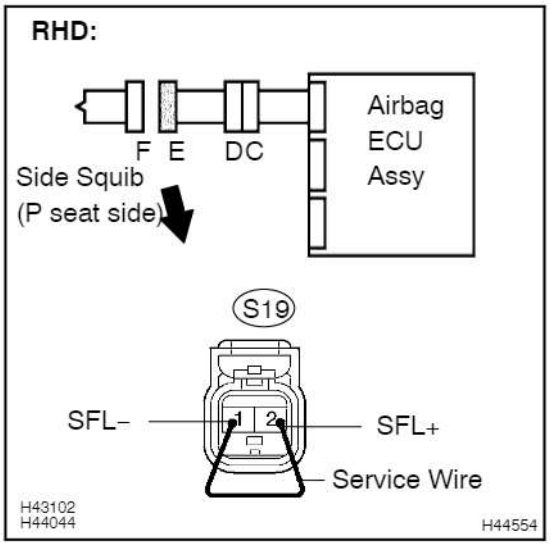
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".

(c) RHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1827 is not output.

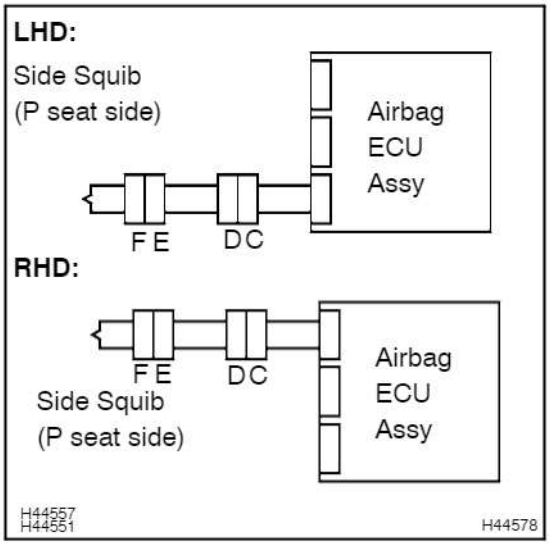
HINT:
Codes other than code B1827 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(SIDE SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (P seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (P seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1827 is not output.	A
DTC B1827 is output (LHD).	B
DTC B1827 is output (RHD).	C

HINT:
Codes other than code B1827 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

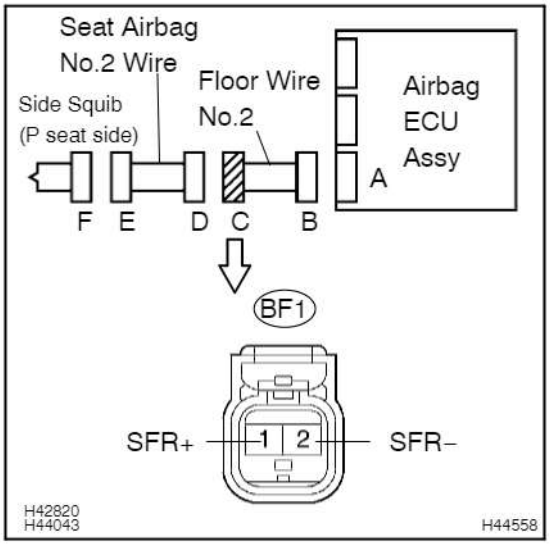
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE NO.2



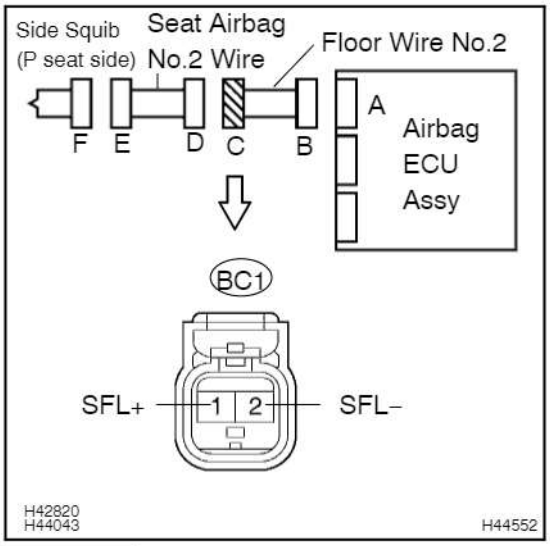
(a) LHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

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

Standard:

Tester connection	Condition	Specified condition
BG1–1 (SFR+) – Body ground	Always	1 MΩ or Higher
BG1–2 (SFR–) – Body ground	Always	1 MΩ or Higher



(b) RHD:

(1) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

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

Standard:

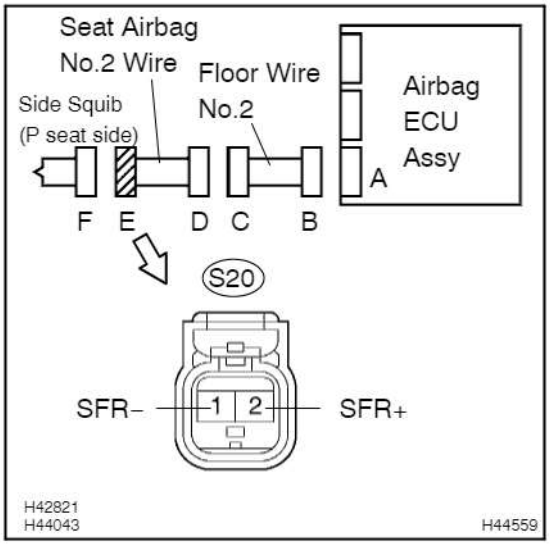
Tester connection	Condition	Specified condition
BC1–1 (SFL+) – BC1–2 (SFL–)	Always	Below 1 Ω

OK

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

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5 CHECK SEAT AIRBAG NO.2 WIRE

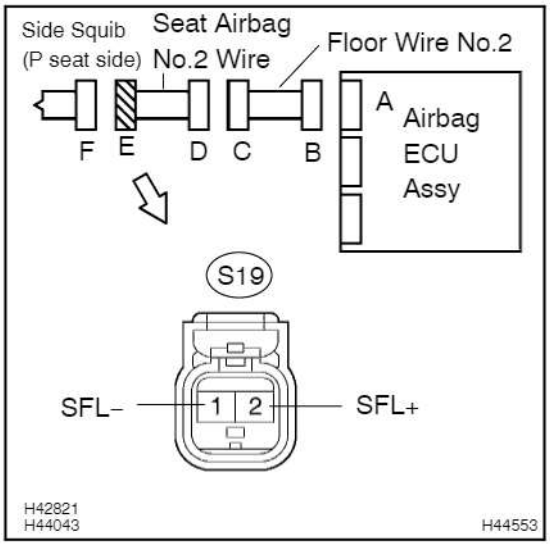


(a) LHD:

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

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Always	1 MΩ or Higher
S20–1 (SFR–) – Body ground	Always	1 MΩ or Higher



(b) RHD:

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

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Always	1 MΩ or Higher
S19–1 (SFL–) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.2 WIRE**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1828	SHORT IN SIDE SQUIB (P SEAT SIDE) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The side squib (P seat side) circuit consists of the airbag ECU assy and the front seat w/ adjuster frame assy RH (LHD) or front seat w/ adjuster frame assy LH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1828 is recorded when a short to B+ is detected in the side squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1828	• When the airbag ECU assy receives a B+ short signal in the side squib (P seat side) circuit for 0.5 seconds. • Side squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Seat airbag No.2 wire • Front seat w/ adjuster frame assy RH (LHD) (Side squib (P seat side)) • Front seat w/ adjuster frame assy LH (RHD) (Side squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1343.

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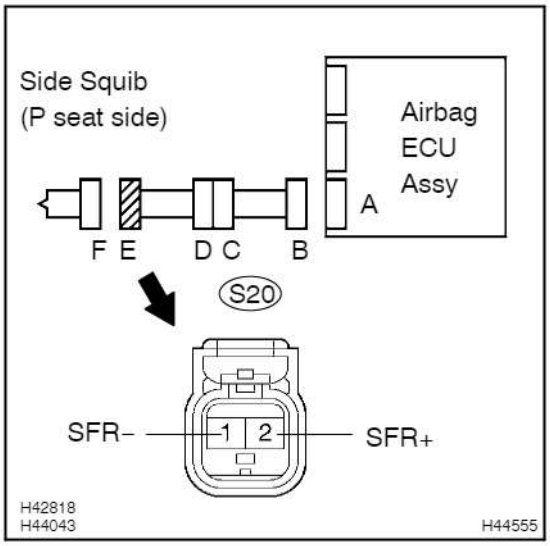
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

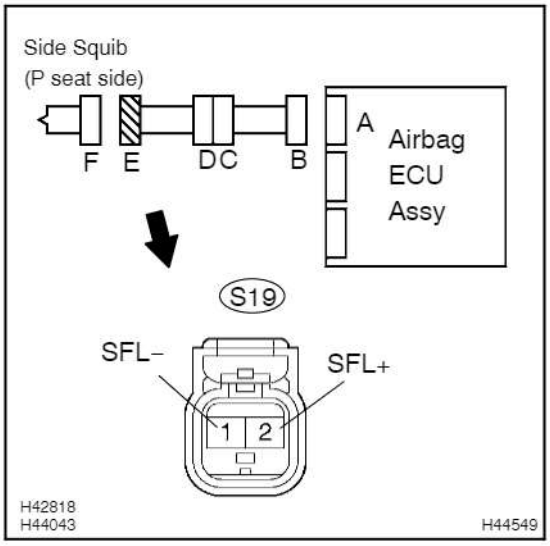
1	CHECK SIDE SQUIB (P SEAT SIDE) CIRCUIT



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
S20–1 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

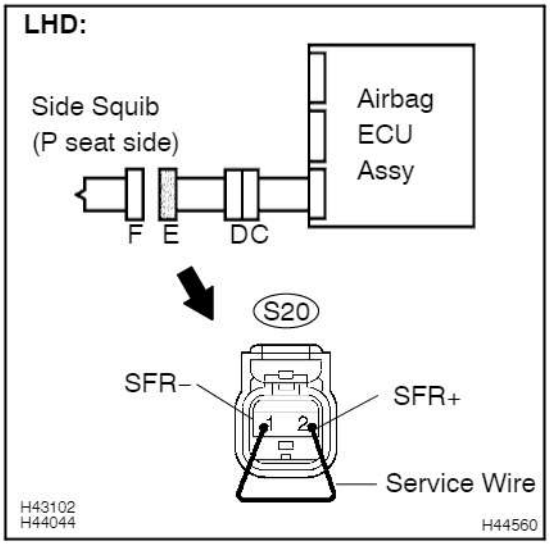
Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
S19–1 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V

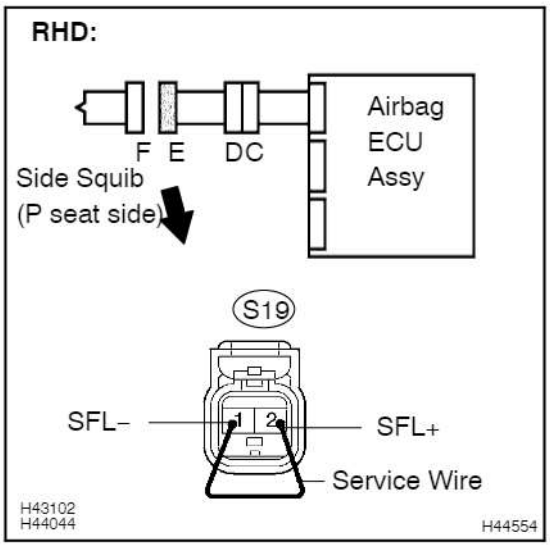
NG → **Go to step 4**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) LHD:
Using a service wire, connect S20–2 (SFR+) and S20–1 (SFR–) of connector "E".
(e) RHD:
Using a service wire, connect S19–2 (SFL+) and S19–1 (SFL–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1828 is not output.

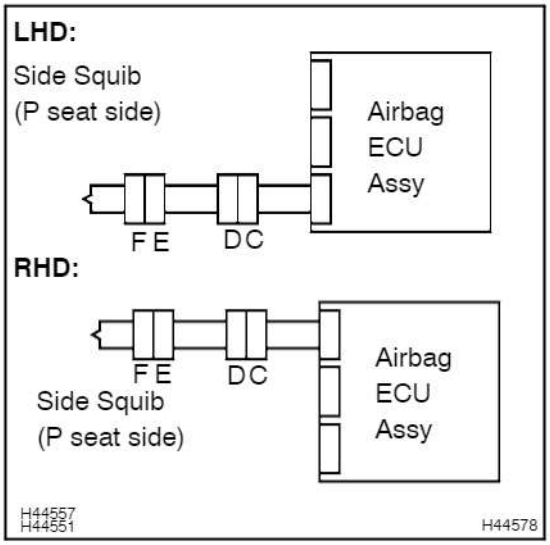
HINT:
Codes other than code B1828 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3 CHECK CHECK DTC(SIDE SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) LHD:
Connect the connector to the front seat w/ adjuster frame assy RH (side squib (P seat side)).
(e) RHD:
Connect the connector to the front seat w/ adjuster frame assy LH (side squib (P seat side)).
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1828 is not output.	A
DTC B1828 is output (LHD).	B
DTC B1828 is output (RHD).	C

HINT:
Codes other than code B1828 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY RH (SEE PAGE 72–2)**

C → **REPLACE FRONT SEAT W/ADJUSTER FRAME ASSY LH (SEE PAGE 72–2)**

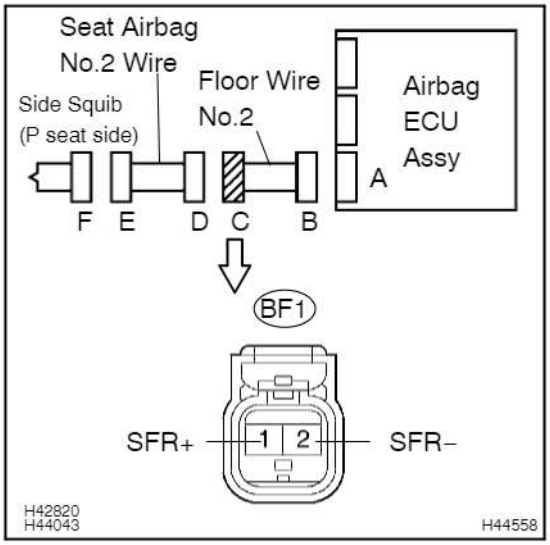
A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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4 CHECK FLOOR WIRE NO.2



(a) LHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(3) Disconnect the floor wire connector from the seat airbag No.2 wire.

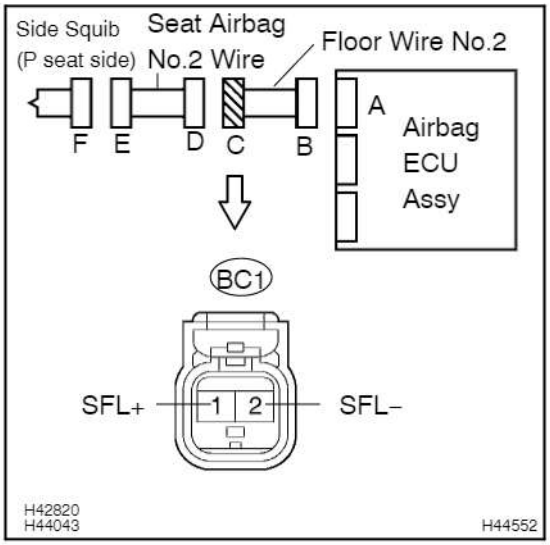
(4) Conect the negative (–) terminal calbe to the battery, and wait for at least 2 seconds.

(5) Turn the power switch on (IG).

(6) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
BF1–1 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
BF1–2 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Turn the power switch off.

(2) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(3) Disconnect the floor wire No.2 connector from the seat airbag No.2 wire.

(4) Conect the negative (–) terminal calbe to the battery, and wait for at least 2 seconds.

(5) Turn the power switch on (IG).

(6) Measure the voltage according to the value(s) in the table below.

Standard:

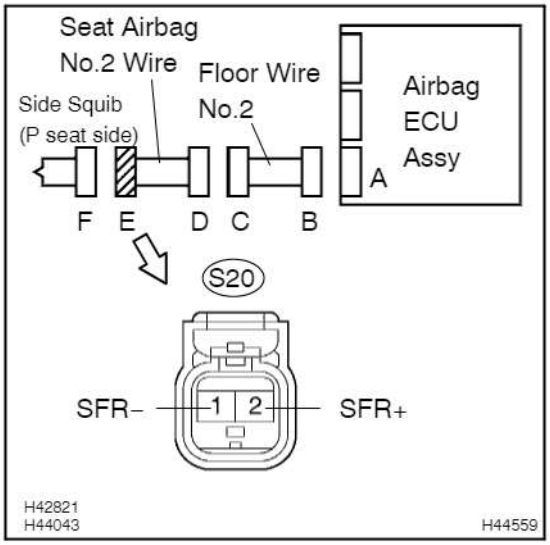
Tester connection	Condition	Specified condition
BC1–1 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
BC1–2 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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5 CHECK SEAT AIRBAG NO.2 WIRE

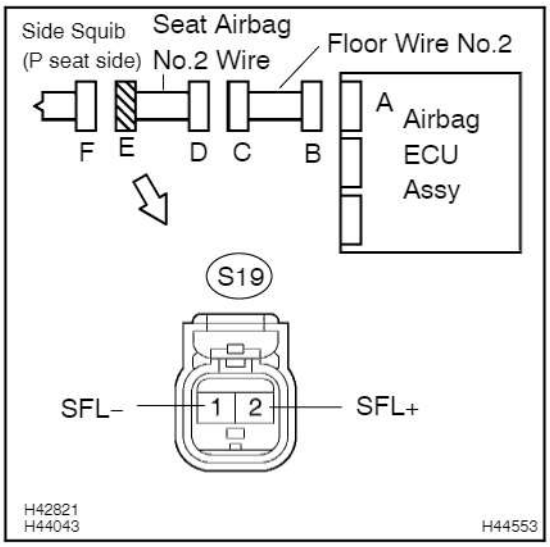


(a) LHD:

(1) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
S20–2 (SFR+) – Body ground	Power switch is on (IG)	Below 1 V
S20–1 (SFR–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:

(1) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard:

Tester connection	Condition	Specified condition
S19–2 (SFL+) – Body ground	Power switch is on (IG)	Below 1 V
S19–1 (SFL–) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE SEAT AIRBAG NO.2 WIRE**

OK

USE SIMULATION METHOD TO CHECK(SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05–1171).

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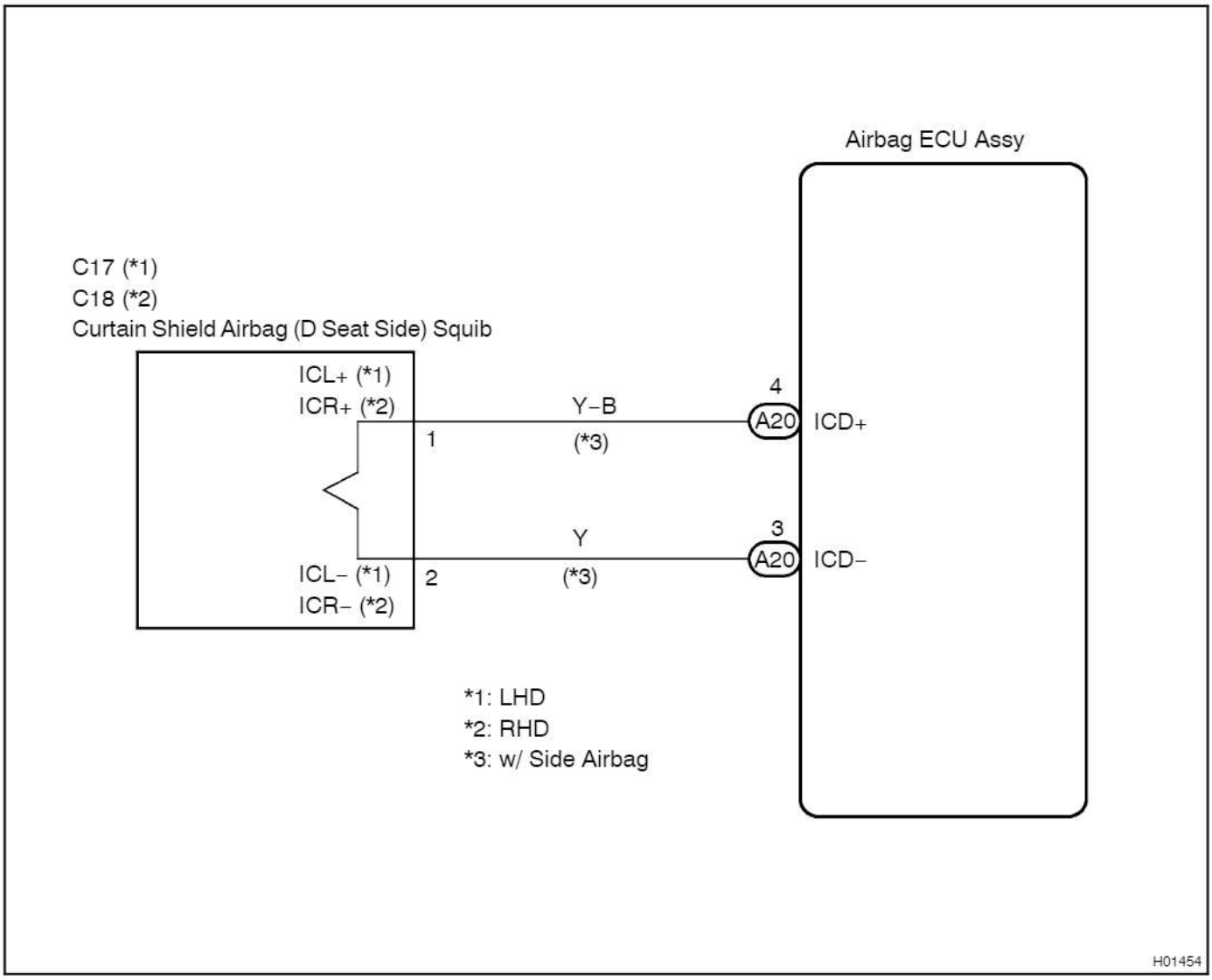
DTC	B1830	SHORT IN CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield airbag (D seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy LH (LHD) or curtain shield airbag assy RH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1830 is recorded when a short circuit is detected in the curtain shield airbag (D seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1830	• When the airbag ECU assy receives a line short signal 5 times in the curtain shield airbag (D seat side) squib circuit during primary check. • Curtain shield airbag (D seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire • Curtain shield airbag assy LH (LHD) (Curtain shield airbag (D seat side) squib) • Curtain shield airbag assy RH (RHD) (Curtain shield airbag (D seat side) squib) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

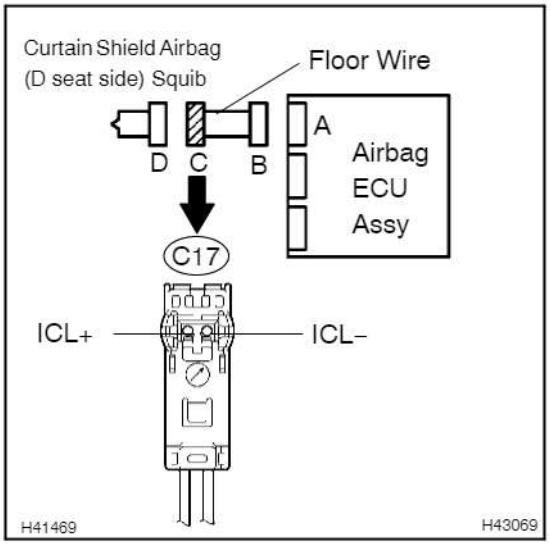
(a) Check that the floor wire connector (on the curtain shield airbag assy side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2 CHECK FLOOR WIRE(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT)



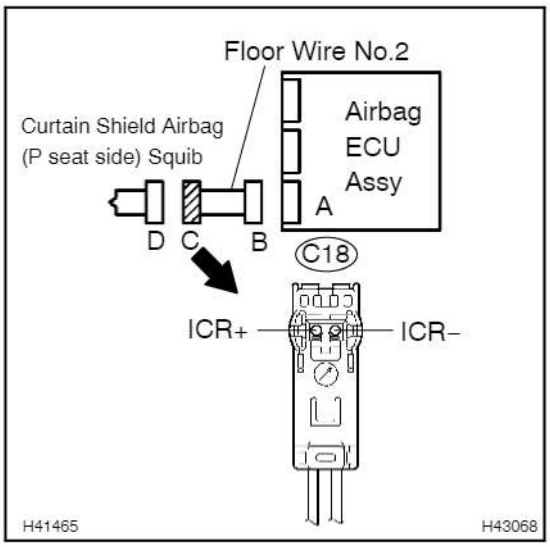
(a) LHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
C17–1 (ICL+) – C17–2 (ICL–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

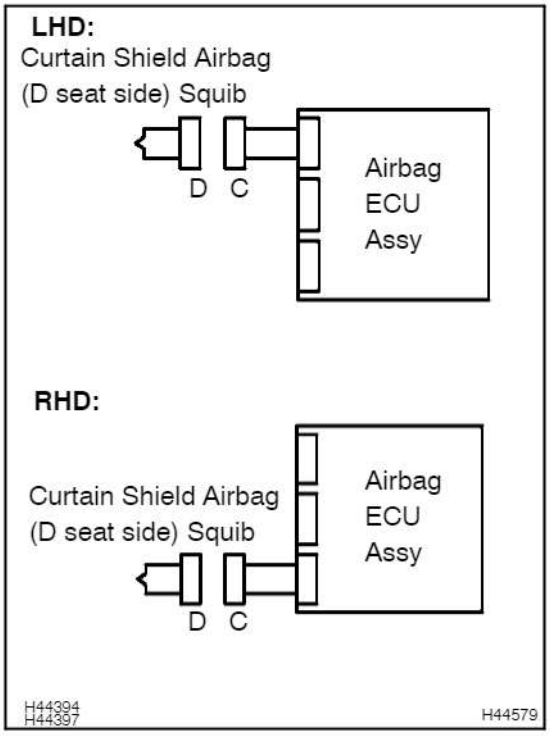
Tester connection	Condition	Specified condition
C18–1 (ICR+) – C18–2 (ICR–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1830 is not output.

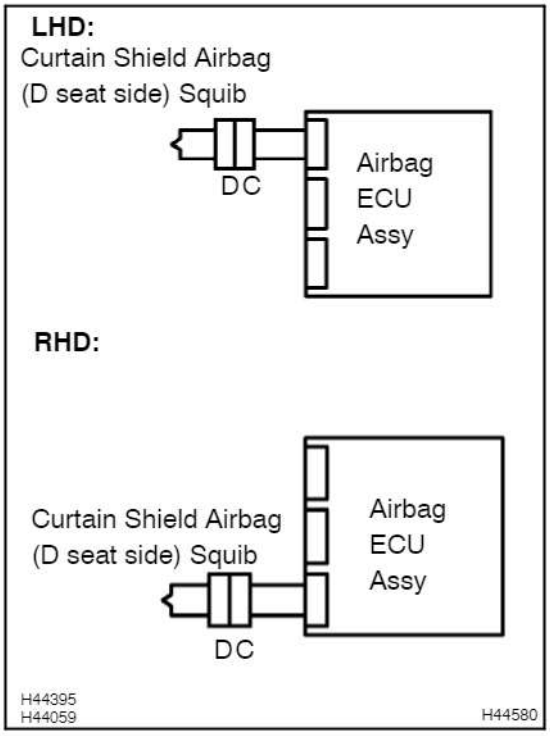
HINT:
Codes other than code B1830 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4 CHECK DTC(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the curtain shield airbag assy LH.
(d) RHD:
Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

Result:

DTC B1830 is not output.	A
DTC B1830 is output (LHD).	B
DTC B1830 is output (RHD).	C

HINT:
Codes other than code B1830 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1831	OPEN IN CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield airbag (D seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy LH (LHD) or curtain shield airbag assy RH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1831 is recorded when an open circuit is detected in the curtain shield airbag (D seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1831	• When the airbag ECU assy receives an open signal in the curtain shield airbag (D seat side) squib circuit for 2 seconds. • Curtain shield airbag (D seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire • Curtain shield airbag assy LH (LHD) (Curtain shield airbag (D seat side) squib) • Curtain shield airbag assy RH (RHD) (Curtain shield airbag (D seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1367.

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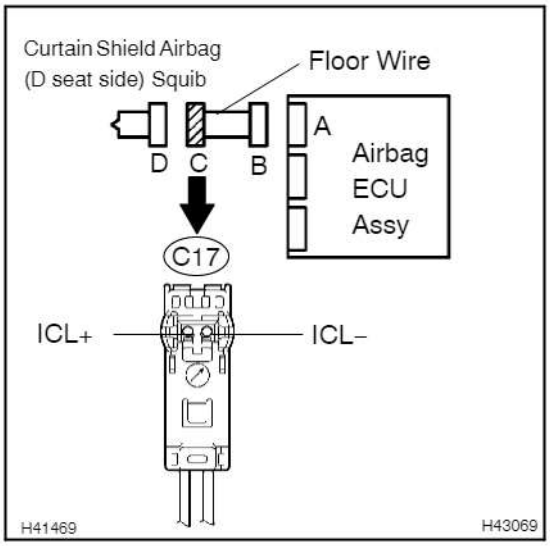
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

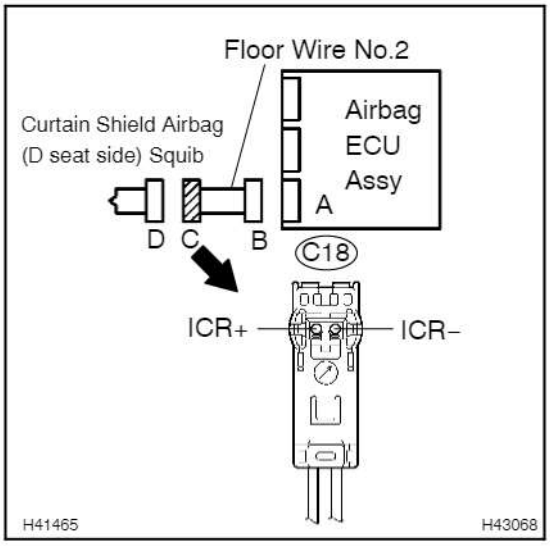
1	CHECK FLOOR WIRE(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C17–1 (ICL+) – C17–2 (ICL–)	Always	Below 1 Ω



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

Standard:

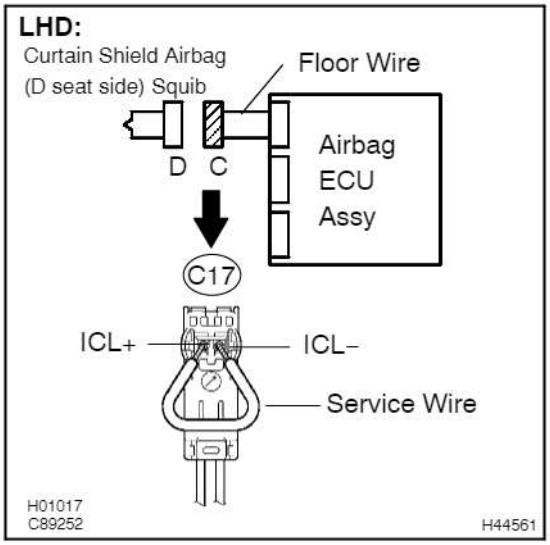
Tester connection	Condition	Specified condition
C18–1 (ICR+) – C18–2 (ICR–)	Always	Below 1 Ω

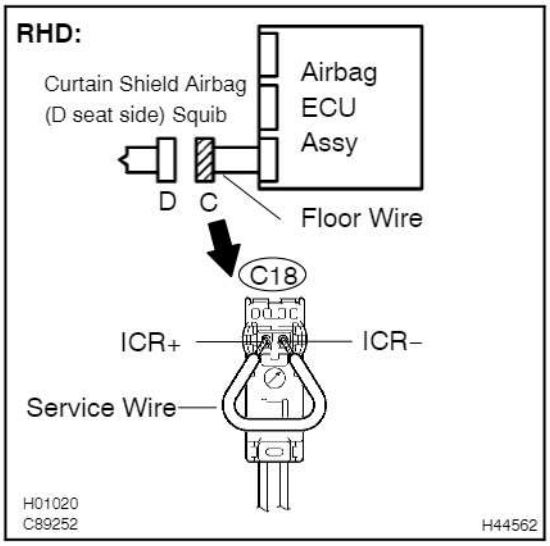
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".

(c) RHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1831 is not output.

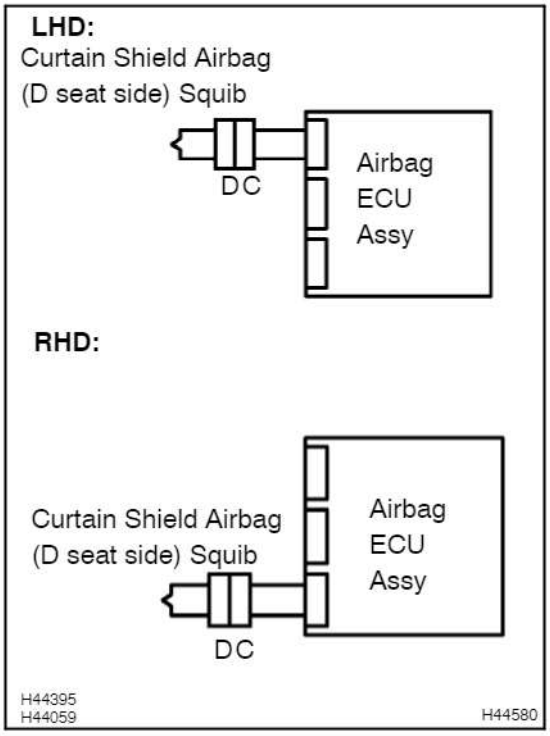
HINT:
Codes other than code B1831 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy LH.
(e) RHD:
Connect the connector to the curtain shield airbag assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1831 is not output.	A
DTC B1831 is output (LHD).	B
DTC B1831 is output (RHD).	C

HINT:
Codes other than code B1831 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1832	SHORT IN CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The curtain shield airbag (D seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy LH (LHD) or curtain shield airbag assy RH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1832 is recorded when a short to ground circuit is detected in the curtain shield airbag (D seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1832	• When the airbag ECU assy receives a short to ground signal in the curtain shield airbag (D seat side) squib circuit for 0.5 seconds. • Curtain shield airbag (D seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire • Curtain shield airbag assy LH (LHD) (Curtain shield airbag (D seat side) squib) • Curtain shield airbag assy RH (RHD) (Curtain shield airbag (D seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1367.

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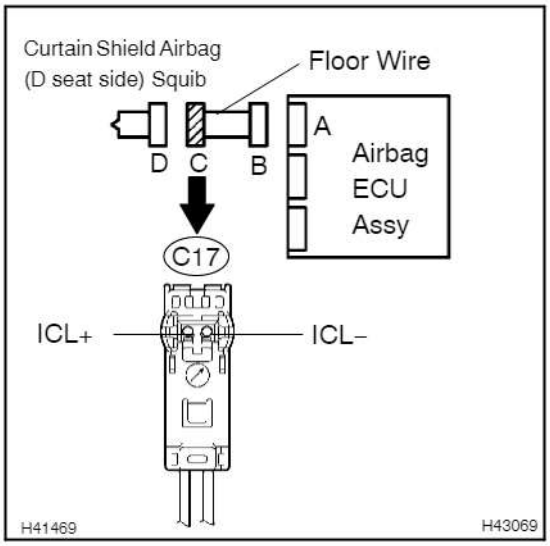
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

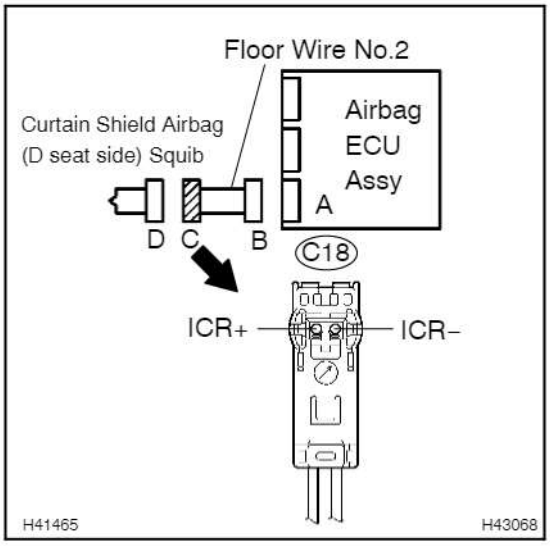
1	CHECK FLOOR WIRE(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C17–1 (ICL+) – Body ground	Always	1 MΩ or Higher
C17–2 (ICL–) – Body ground	Always	1 MΩ or Higher



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

Standard:

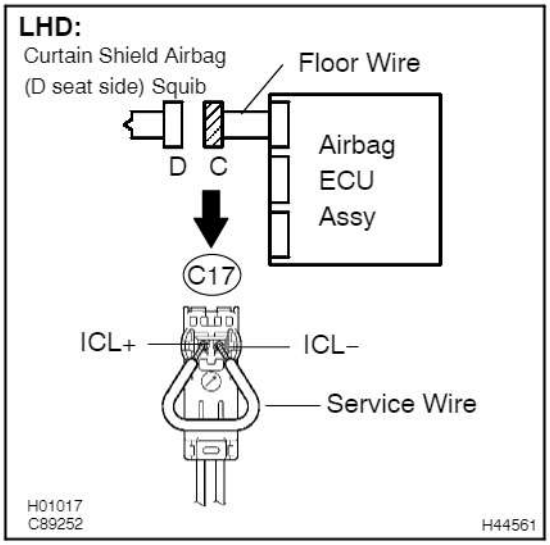
Tester connection	Condition	Specified condition
C18–1 (ICR+) – Body ground	Always	1 MΩ or Higher
C18–2 (ICR) – Body ground	Always	1 MΩ or Higher

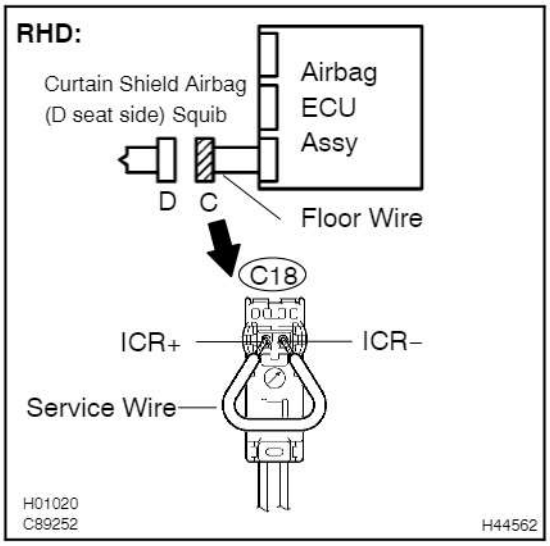
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2	CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".

(c) RHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1832 is not output.

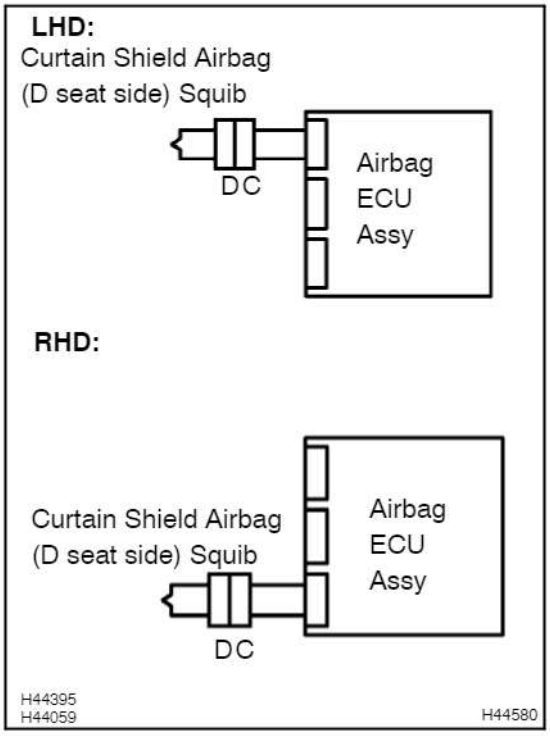
HINT:
Codes other than code B1832 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy LH.
(e) RHD:
Connect the connector to the curtain shield airbag assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1832 is not output.	A
DTC B1832 is output (LHD).	B
DTC B1832 is output (RHD).	C

HINT:
Codes other than code B1832 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1833	SHORT IN CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The curtain shield airbag (D seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy LH (LHD) or curtain shield airbag assy RH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1833 is recorded when a short to B+ circuit is detected in the curtain shield airbag (D seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1833	• When the Airbag ECU assy receives a B+ short signal in the curtain shield airbag (D seat side) squib circuit for 0.5 seconds. • Curtain shield airbag (D seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire • Curtain shield airbag assy LH (LHD) (Curtain shield airbag (D seat side) squib) • Curtain shield airbag assy RH (RHD) (Curtain shield airbag (D seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1367.

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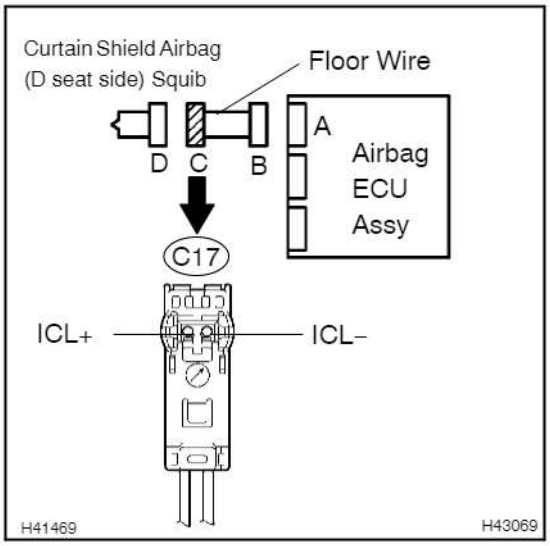
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

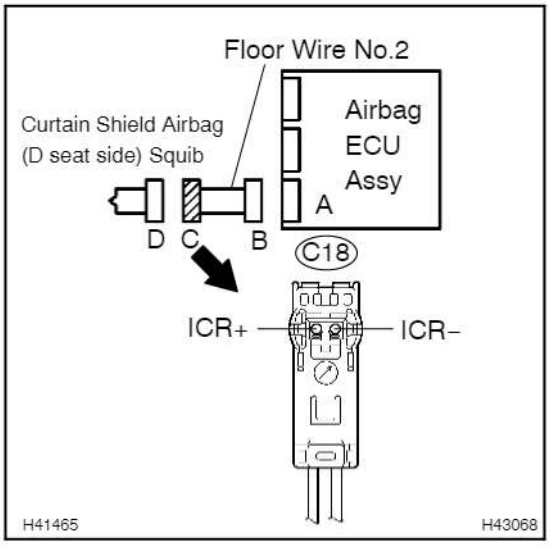
1	CHECK FLOOR WIRE(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C17–1 (ICL+) – Body ground	Power switch is on (IG)	Below 1 V
C17–2 (ICL–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

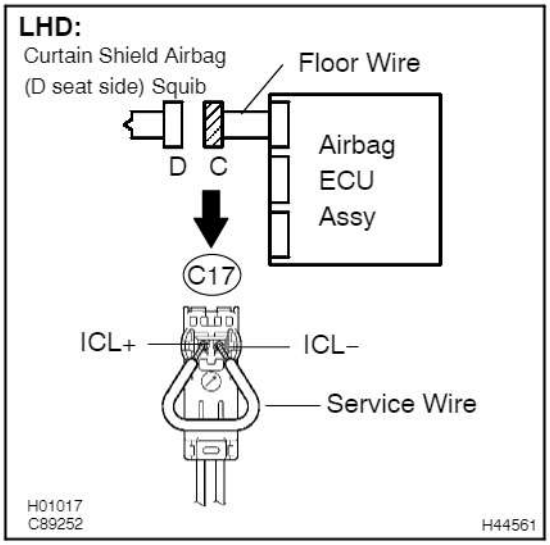
Tester connection	Condition	Specified condition
C18–1 (ICR+) – Body ground	Power switch is on (IG)	Below 1 V
C18–2 (ICR–) – Body ground	Power switch is on (IG)	Below 1 V

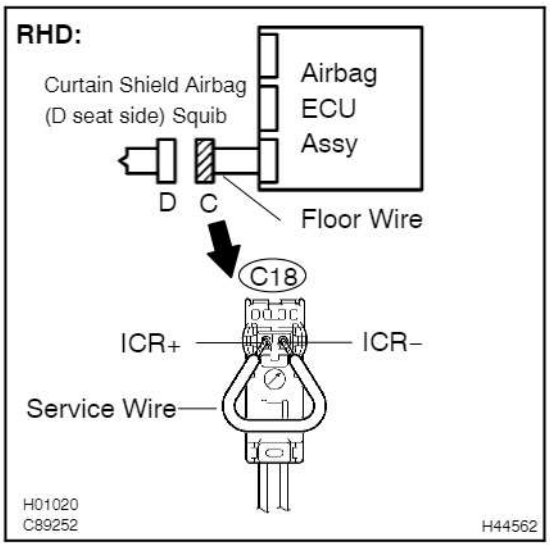
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2	CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag ECU assy.
(d) LHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".
(e) RHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1833 is not output.

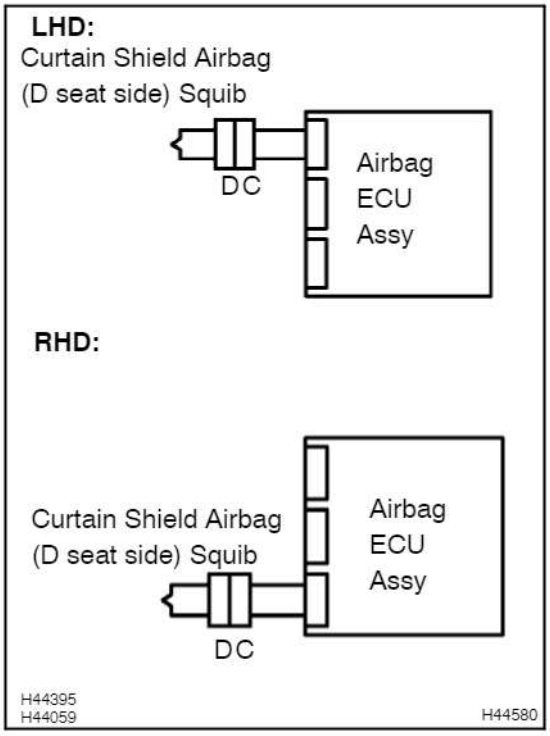
HINT:
Codes other than code B1833 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (D SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy LH.
(e) RHD:
Connect the connector to the curtain shield airbag assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1833 is not output.	A
DTC B1833 is output (LHD).	B
DTC B1833 is output (RHD).	C

HINT:
Codes other than code B1833 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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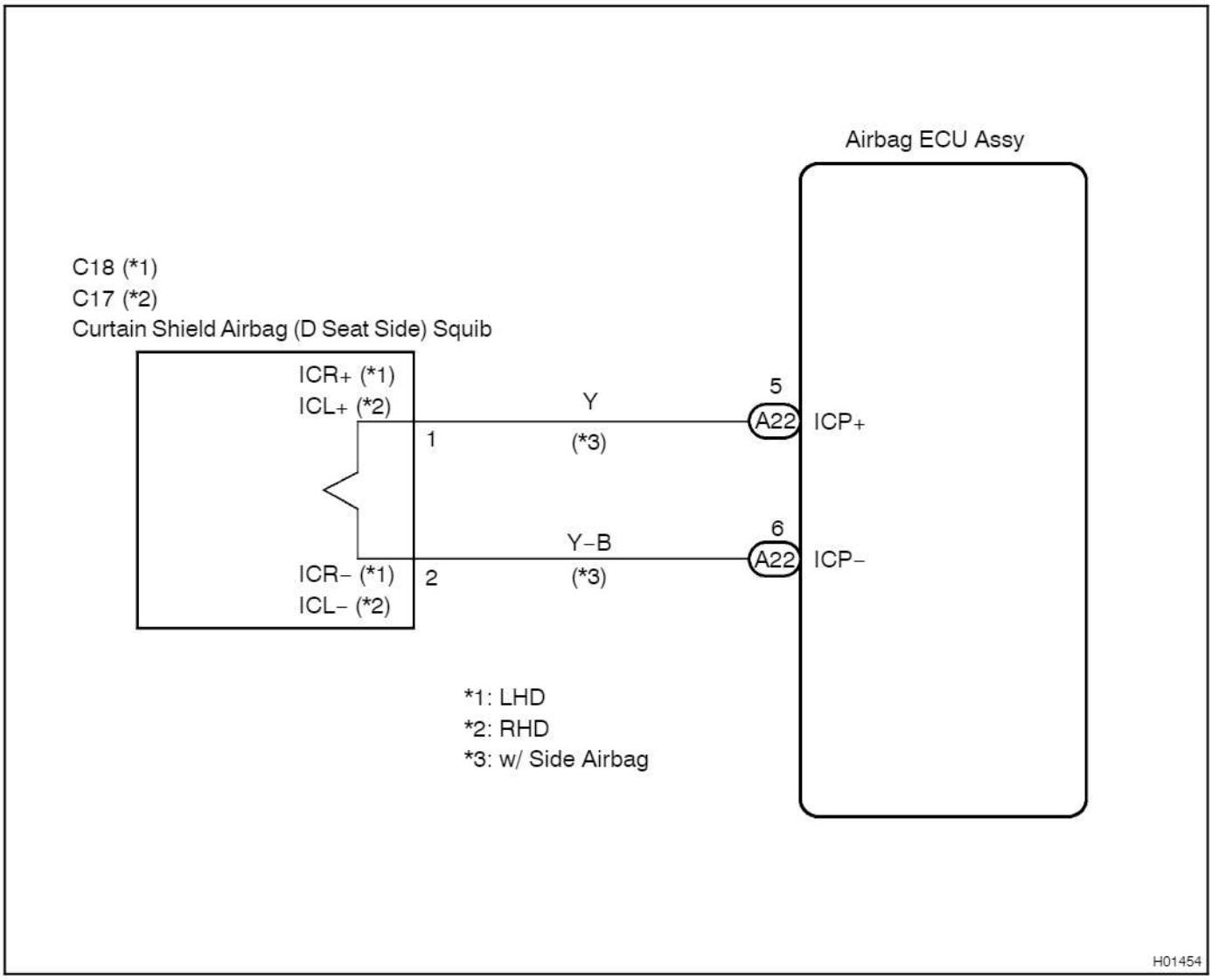
DTC	B1835	SHORT IN CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield airbag (P seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy RH (LHD) or curtain shield airbag assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1835 is recorded when a short circuit is detected in the curtain shield airbag (P seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1835	• When the airbag ECU assy receives a line short signal 5 times in the curtain shield airbag (P seat side) squib circuit during primary check. • Curtain shield airbag (P seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Curtain shield airbag assy RH (LHD) (Curtain shield airbag (P seat side) squib) • Curtain shield airbag assy LH (RHD) (Curtain shield airbag (P seat side) squib) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

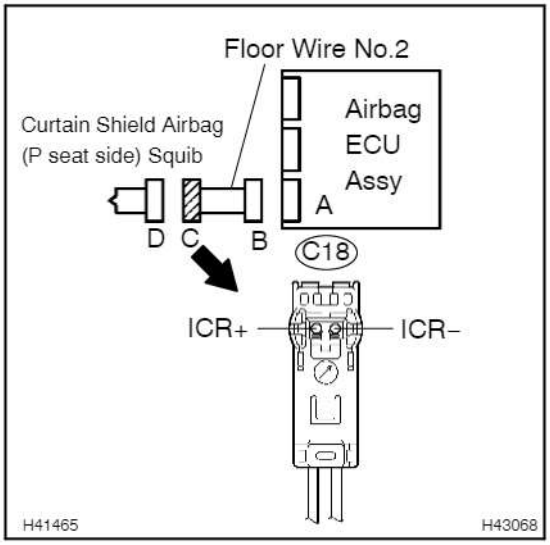
(a) Check that the floor wire No.2 connector (on the curtain shield airbag assy side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT)



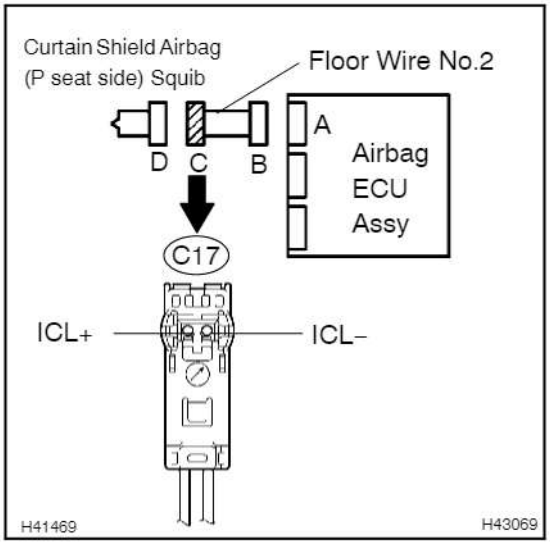
(a) LHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
C18–1 (ICR+) – C18–2 (ICR–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

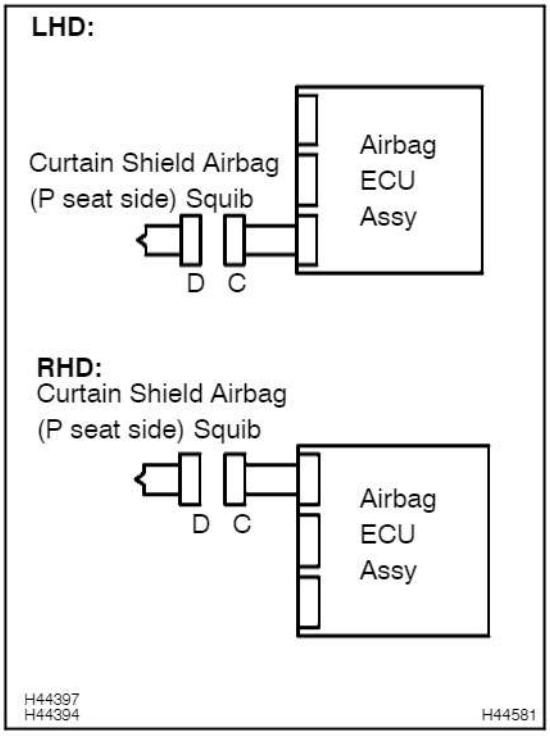
Tester connection	Condition	Specified condition
C17–1 (ICL+) – C17–2 (ICL–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1835 is not output.

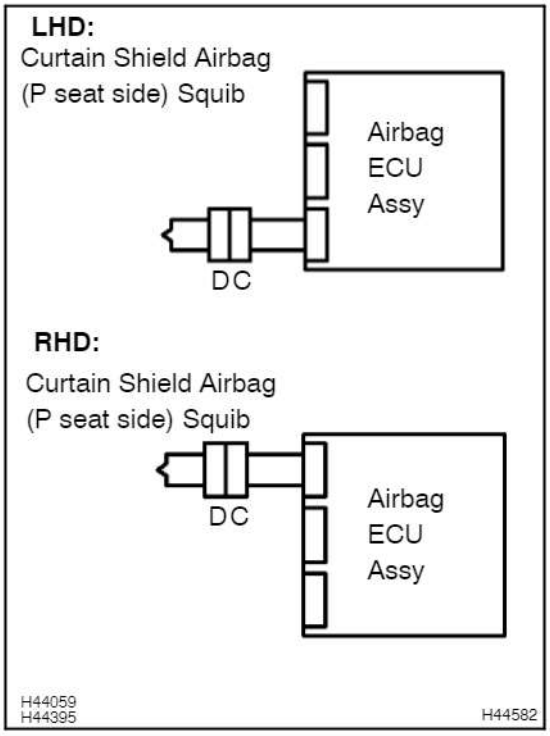
HINT:
Codes other than code B1835 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4 CHECK DTC(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the curtain shield airbag assy RH.
(d) RHD:
Connect the connector to the curtain shield airbag assy LH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

Result:

DTC B1835 is not output.	A
DTC B1835 is output (LHD).	B
DTC B1835 is output (RHD).	C

HINT:
Codes other than code B1835 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1836	OPEN IN CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield airbag (P seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy RH (LHD) or curtain shield airbag assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1836 is recorded when an open circuit is detected in the curtain shield airbag (P seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1836	• When the airbag ECU assy receives an open signal in the curtain shield airbag (P seat side) squib circuit for 2 seconds. • Curtain shield airbag (P seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Curtain shield airbag assy RH (LHD) (Curtain shield airbag (P seat side) squib) • Curtain shield airbag assy LH (RHD) (Curtain shield airbag (P seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1384.

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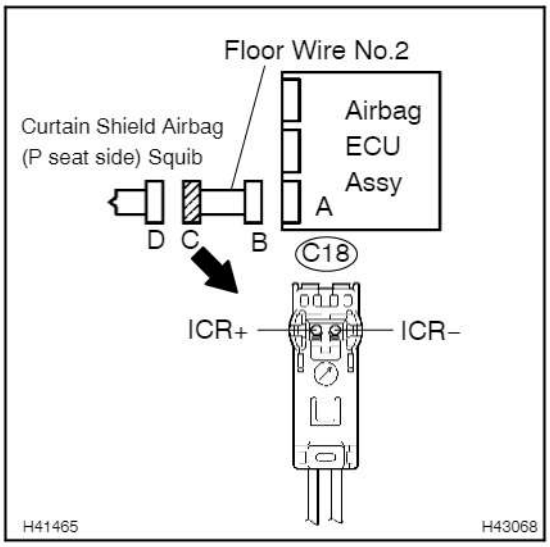
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

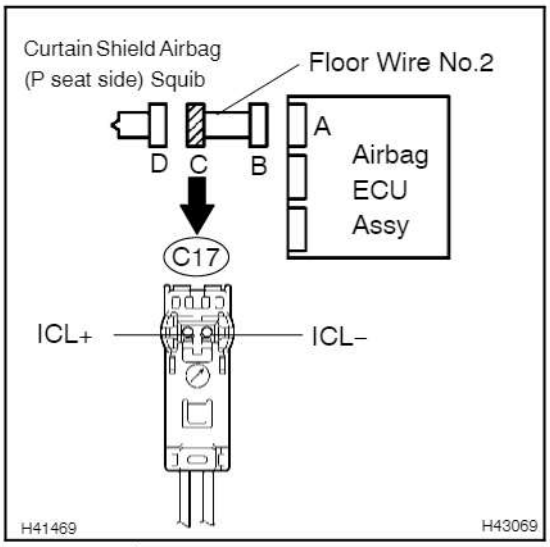
1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C18–1 (ICR+) – C18–2 (ICR–)	Always	Below 1 Ω



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

Standard:

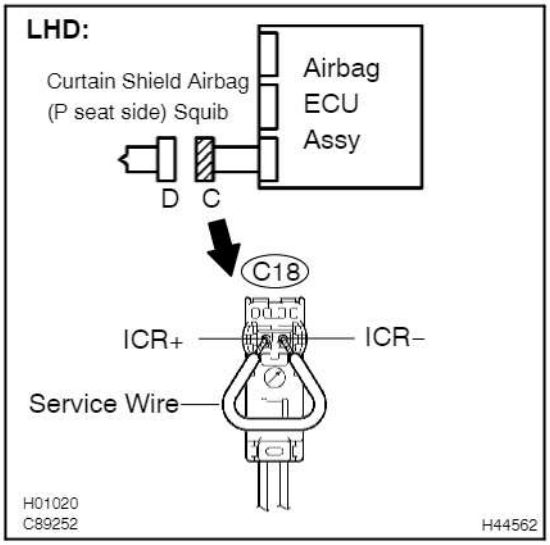
Tester connection	Condition	Specified condition
C17–1 (ICL+) – C17–2 (ICL–)	Always	Below 1 Ω

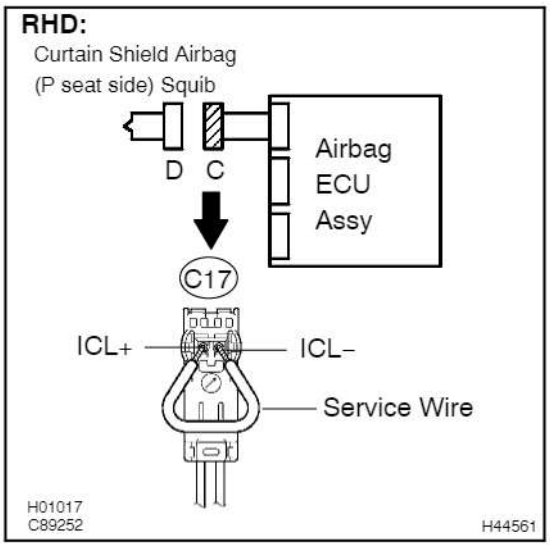
OK

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".

(c) RHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1836 is not output.

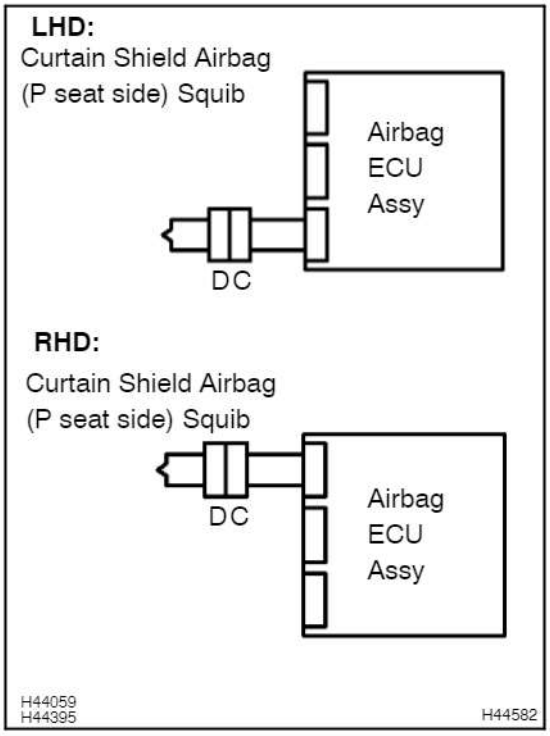
HINT:
Codes other than code B1836 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy RH.
(e) RHD:
Connect the connector to the curtain shield airbag assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1836 is not output.	A
DTC B1836 is output (LHD).	B
DTC B1836 is output (RHD).	C

HINT:
Codes other than code B1836 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1837	SHORT IN CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The curtain shield airbag (P seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy RH (LHD) or curtain shield airbag assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1837 is recorded when a short to ground circuit is detected in the curtain shield airbag (P seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1837	• When the airbag ECU assy receives a short to ground signal in the curtain shield airbag (P seat side) squib circuit for 0.5 seconds. • Curtain shield airbag (P seat side) squib malfunction • Airbag sensor assy malfunction	• Floor wire No.2 • Curtain shield airbag assy RH (LHD) (Curtain shield airbag (P seat side) squib) • Curtain shield airbag assy LH (RHD) (Curtain shield airbag (P seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1384.

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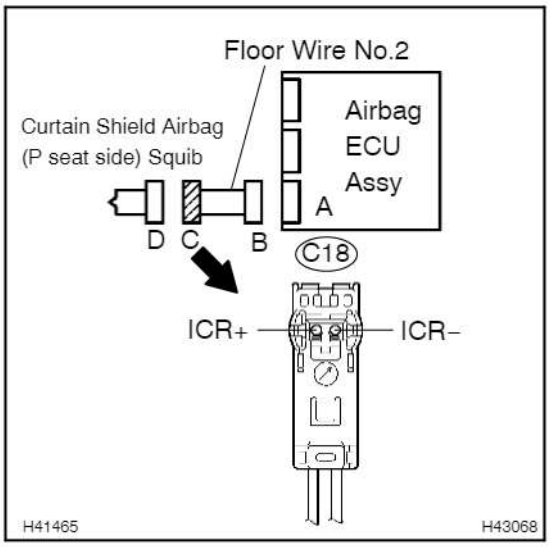
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

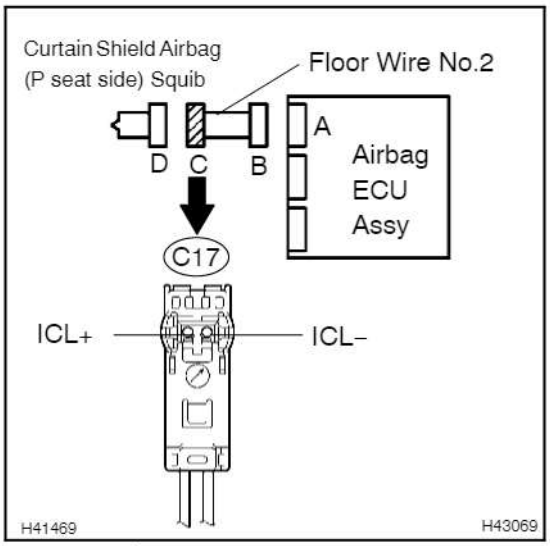
1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C18–1 (ICR+) – Body ground	Always	1 MΩ or Higher
C18–2 (ICR–) – Body ground	Always	1 MΩ or Higher



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

Standard:

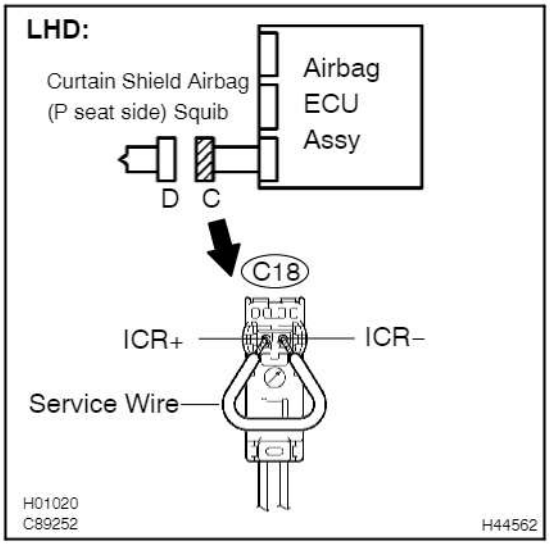
Tester connection	Condition	Specified condition
C17–1 (ICL+) – Body ground	Always	1 MΩ or Higher
C17–2 (ICL–) – Body ground	Always	1 MΩ or Higher

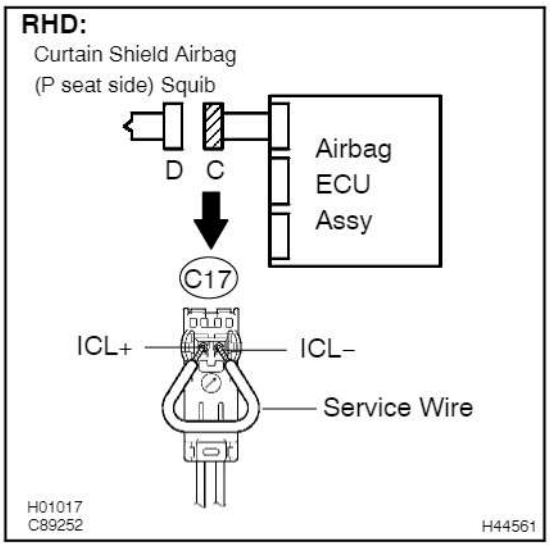
NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".

(c) RHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1837 is not output.

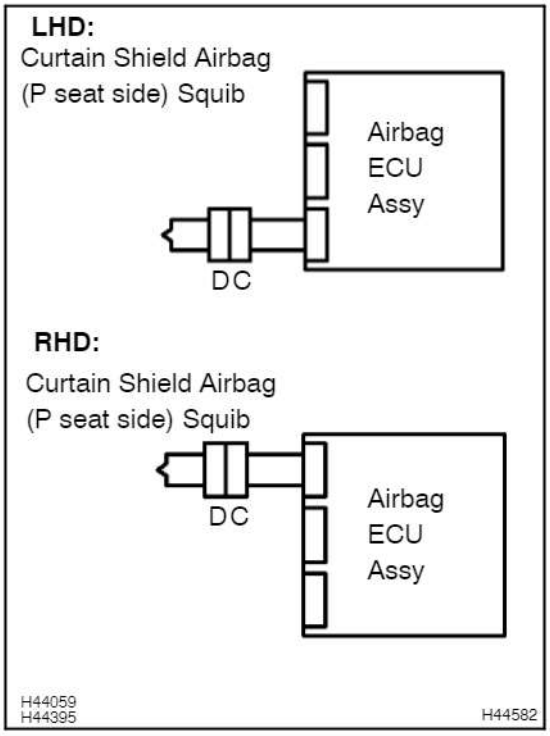
HINT:
Codes other than code B1837 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy RH.
(e) RHD:
Connect the connector to the curtain shield airbag assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1837 is not output.	A
DTC B1837 is output (LHD).	B
DTC B1837 is output (RHD).	C

HINT:
Codes other than code B1837 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1838	SHORT IN CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The curtain shield airbag (P seat side) squib circuit consists of the airbag ECU assy and the curtain shield airbag assy RH (LHD) or curtain shield airbag assy LH (RHD).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1838 is recorded when a short B+ circuit is detected in the curtain shield airbag (P seat side) squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1838	• When the airbag ECU assy receives a B+ short signal in the curtain shield airbag (P seat side) squib circuit for 0.5 seconds. • Curtain shield airbag (P seat side) squib malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Curtain shield airbag assy RH (LHD) (Curtain shield airbag (P seat side) squib) • Curtain shield airbag assy LH (RHD) (Curtain shield airbag (P seat side) squib) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1384.

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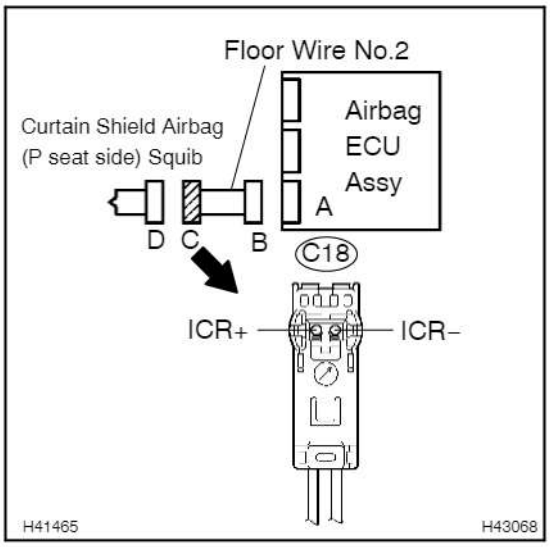
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

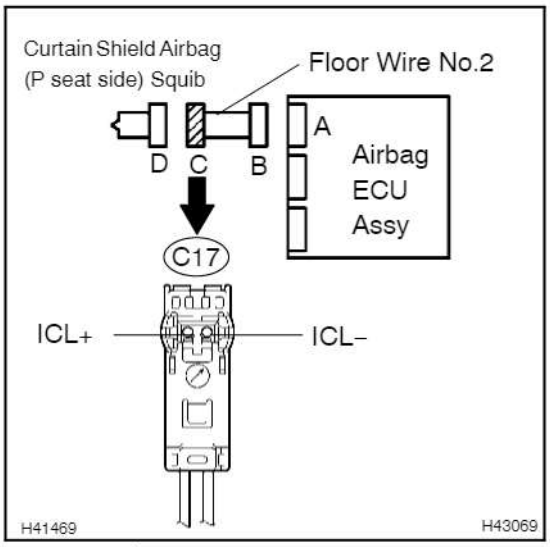
1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB CIRCUIT)



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C18–1 (ICR+) – Body ground	Power switch is on (IG)	Below 1 V
C18–2 (ICR–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

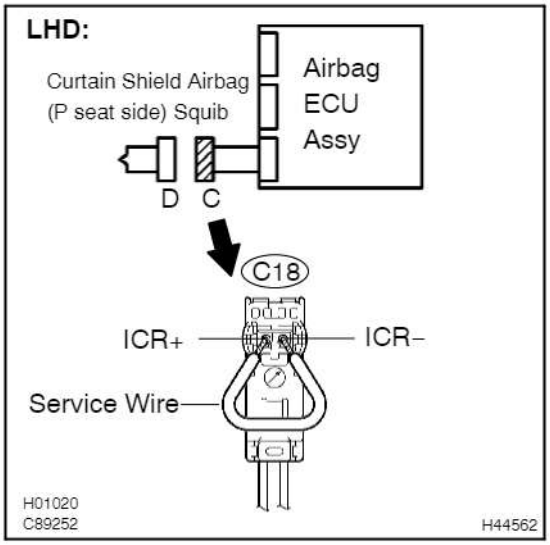
Tester connection	Condition	Specified condition
C17–1 (ICL+) – Body ground	Power switch is on (IG)	Below 1 V
C17–2 (ICL–) – Body ground	Power switch is on (IG)	Below 1 V

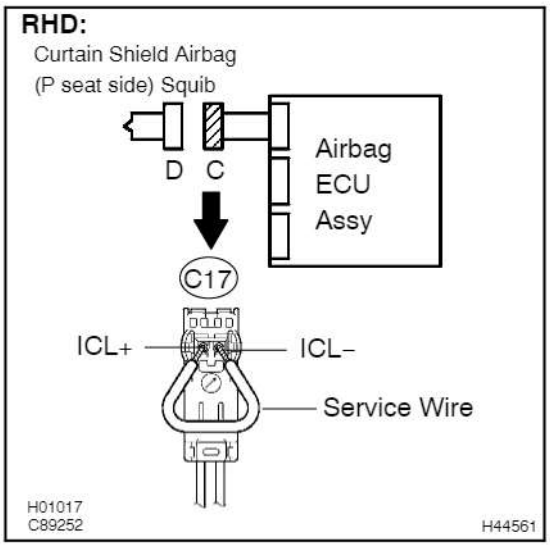
NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) LHD:
Using a service wire, connect C18–1 (ICR+) and C18–2 (ICR–) of connector "C".
(e) RHD:
Using a service wire, connect C17–1 (ICL+) and C17–2 (ICL–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1838 is not output.

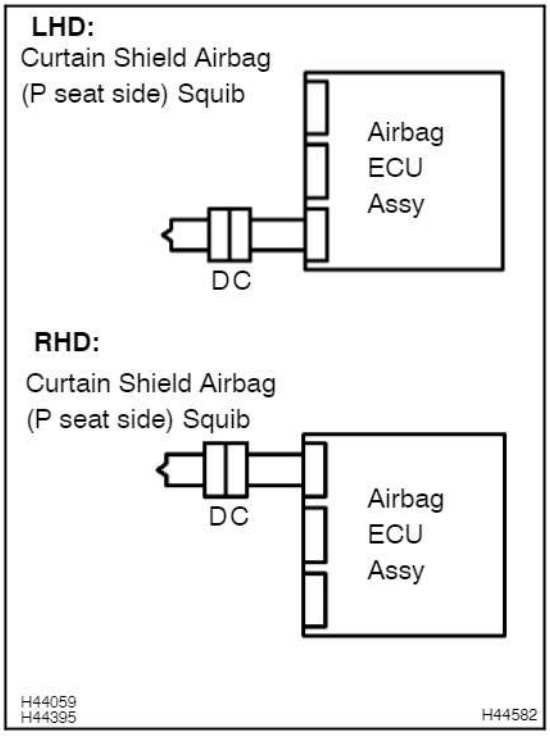
HINT:
Codes other than code B1838 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(CURTAIN SHIELD AIRBAG (P SEAT SIDE) SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the curtain shield airbag assy RH.
(e) RHD:
Connect the connector to the curtain shield airbag assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1838 is not output.	A
DTC B1838 is output (LHD).	B
DTC B1838 is output (RHD).	C

HINT:
Codes other than code B1838 may be output at this time, but they are not related to this check.

B → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60–41)**

C → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60–41)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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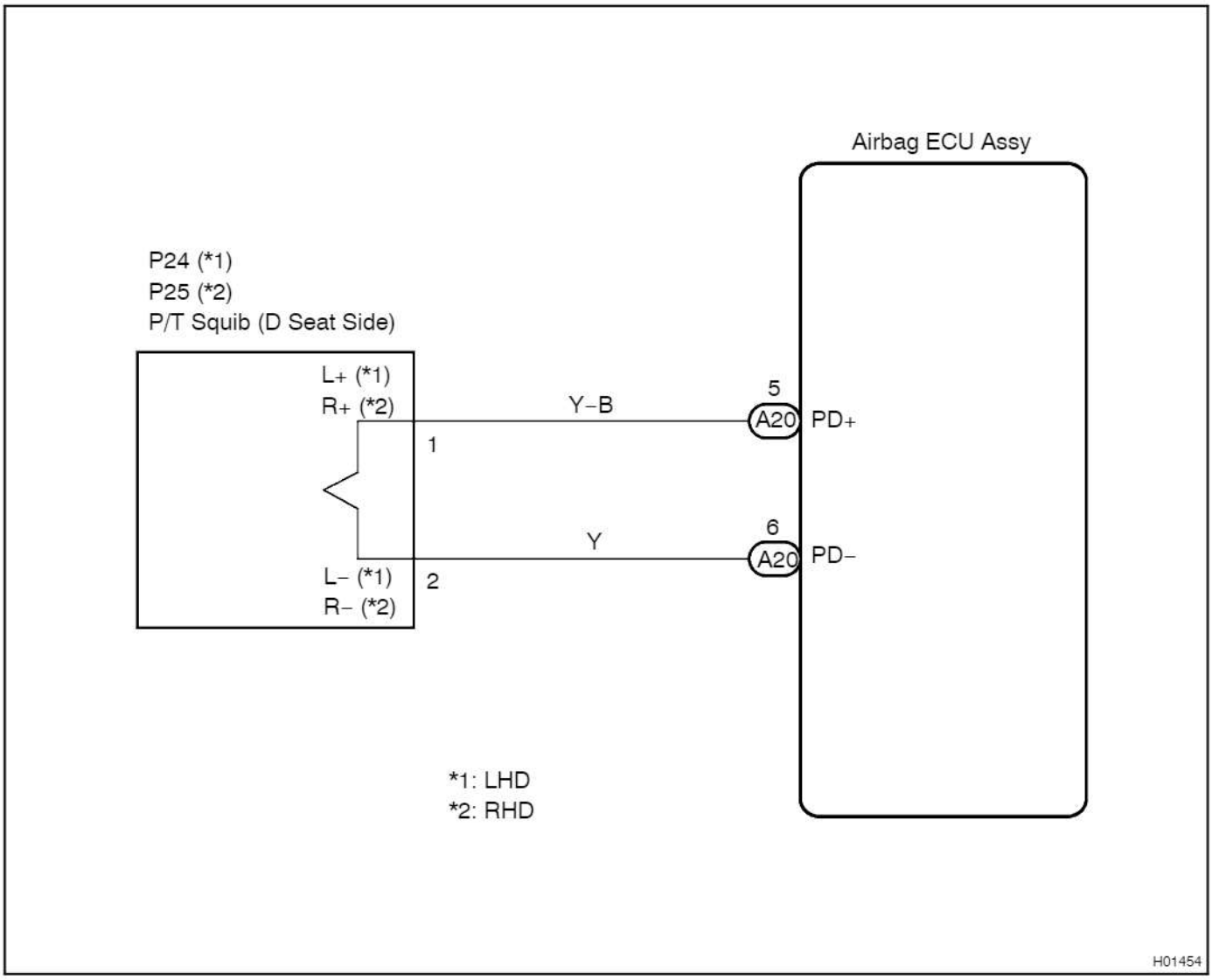
DTC	B1900	SHORT IN P/T SQUIB (D SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib (D seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy LH (LHD) or front seat outer belt assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1900 is recorded when a short circuit is detected in the P/T squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1900	• When the airbag ECU assy receives a line short signal 5 times in the P/T squib (D seat side) circuit during primary check. • P/T squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Front seat outer belt assy LH (LHD) (P/T squib (D seat side)) • Front seat outer belt assy RH (RHD) (P/T squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

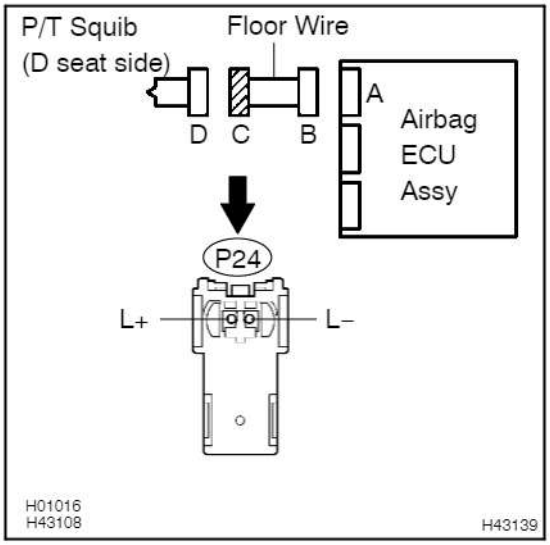
(a) Check that the floor wire connector (on the front seat outer belt assy side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2 CHECK FLOOR WIRE(P/T SQUIB (D SEAT SIDE) CIRCUIT)



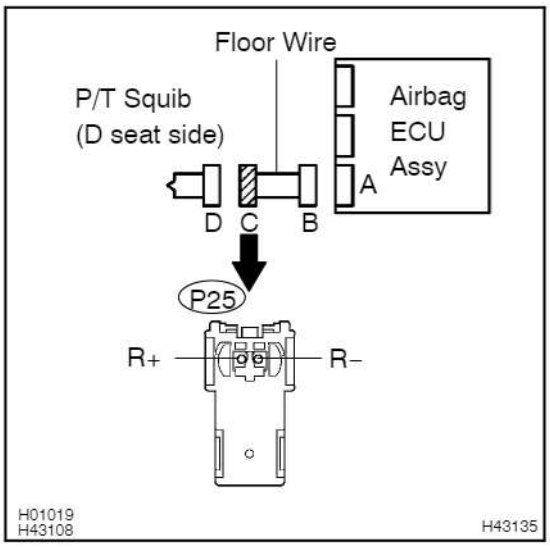
(a) LHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
P24–1 (L+) – P24–2 (L–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

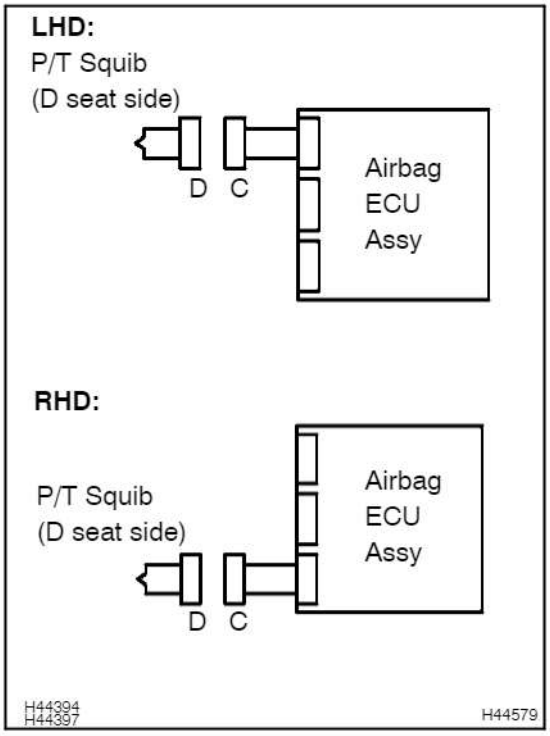
Tester connection	Condition	Specified condition
P25–1 (R+) – P25–2 (R–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1900 is not output.

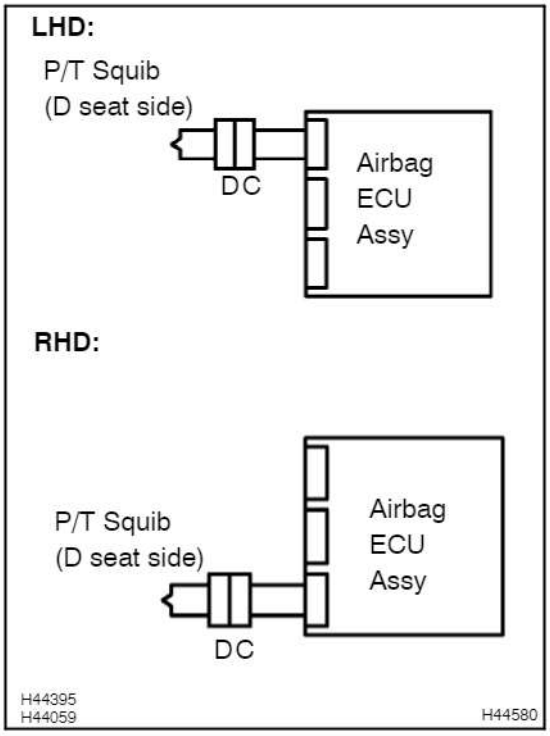
HINT:
Codes other than code B1900 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4 CHECK DTC(P/T SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the front seat outer belt assy LH.
(d) RHD:
Connect the connector to the front seat outer belt assy RH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

Result:

DTC B1900 is not output.	A
DTC B1900 is output (LHD).	B
DTC B1900 is output (RHD).	C

HINT:
Codes other than code B1900 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:

- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1901	OPEN IN P/T SQUIB (D SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib (D seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy LH (LHD) or front seat outer belt assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1901 is recorded when an open circuit is detected in the P/T squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1901	• When the airbag ECU assy receives an open signal in the P/T squib (D seat side) circuit for 2 seconds. • P/T squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Front seat outer belt assy LH (LHD) (P/T squib (D seat side)) • Front seat outer belt assy RH (RHD) (P/T squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1401.

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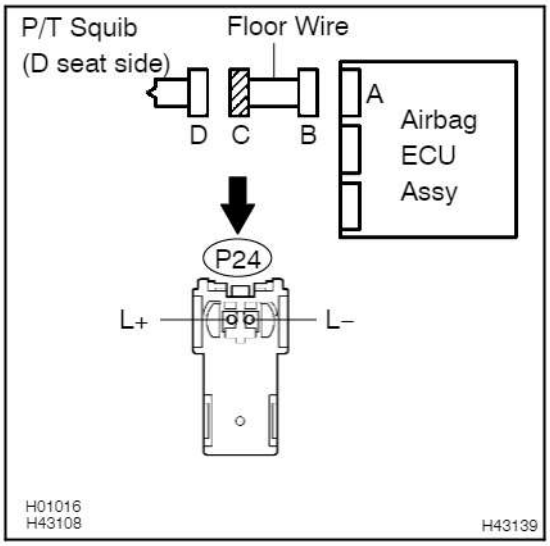
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

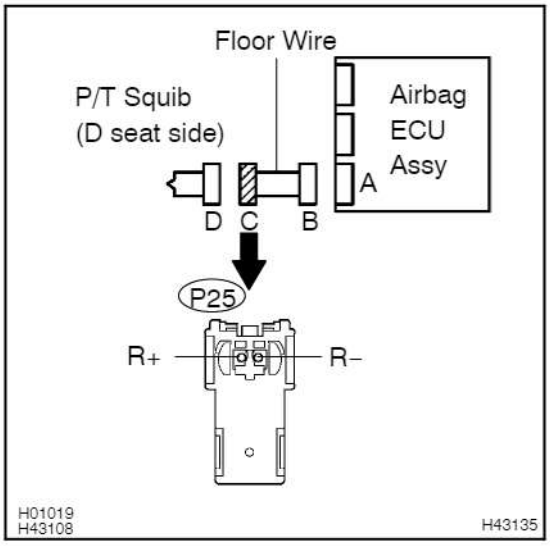
1	CHECK FLOOR WIRE(P/T SQUIB (D SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P24–1 (L+) – P24–2 (L–)	Always	Below 1 Ω



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

Standard:

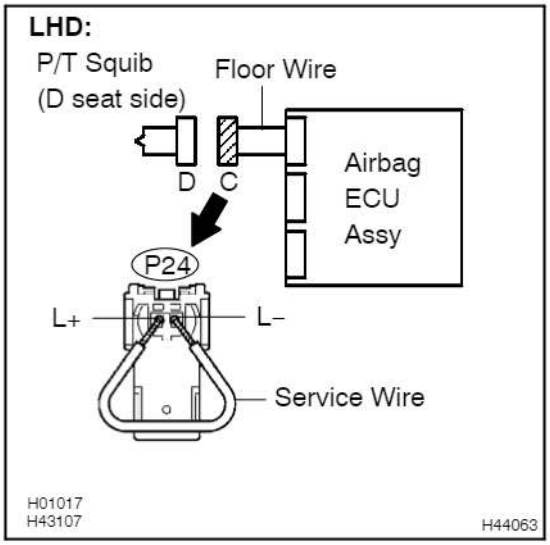
Tester connection	Condition	Specified condition
P25–1 (R+) – P25–2 (R–)	Always	Below 1 Ω

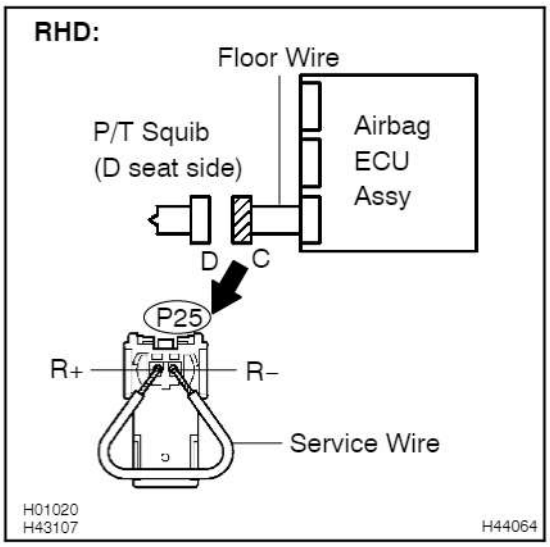
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

(c) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1901 is not output.

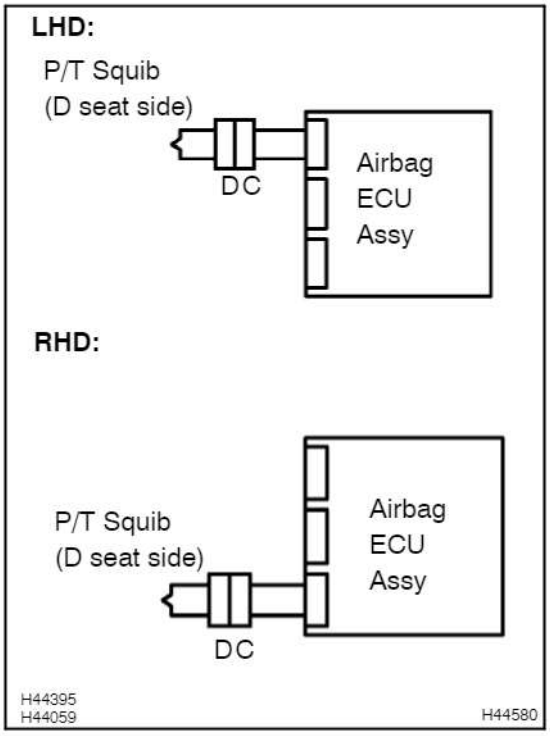
HINT:
Codes other than code B1901 may be output at this time, but they are not related to this check.

NG	**REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(P/T SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy LH.
(e) RHD:
Connect the connector to the front seat outer belt assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1901 is not output.	A
DTC B1901 is output (LHD).	B
DTC B1901 is output (RHD).	C

HINT:
Codes other than code B1901 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1902	SHORT IN P/T SQUIB (D SEAT SIDE) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P/T squib (D seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy LH (LHD) or front seat outer belt assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1902 is recorded when a short to ground circuit is detected in the P/T squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1902	• When the airbag ECU assy receives a short to ground signal in the P/T squib (D seat side) circuit for 0.5 seconds. • P/T squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Front seat outer belt assy LH (LHD) (P/T squib (D seat side)) • Front seat outer belt assy RH (RHD) (P/T squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1401.

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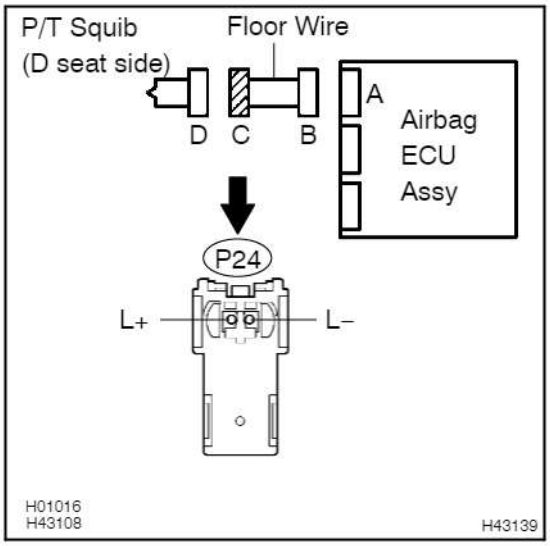
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

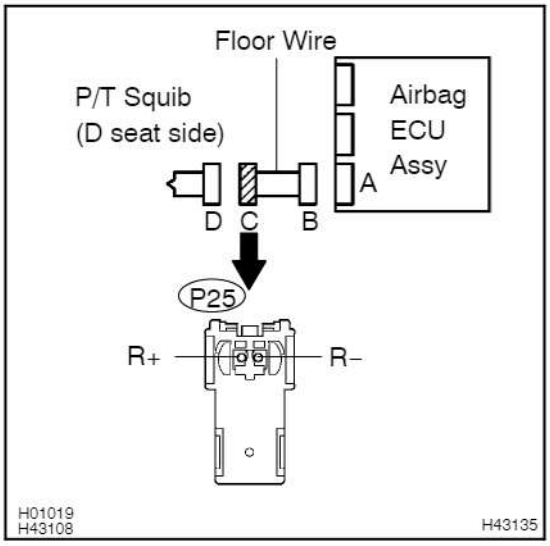
1	CHECK FLOOR WIRE(P/T SQUIB (D SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P24–1 (L+) – Body ground	Always	1 MΩ or Higher
P24–2 (L–) – Body ground	Always	1 MΩ or Higher



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

Standard:

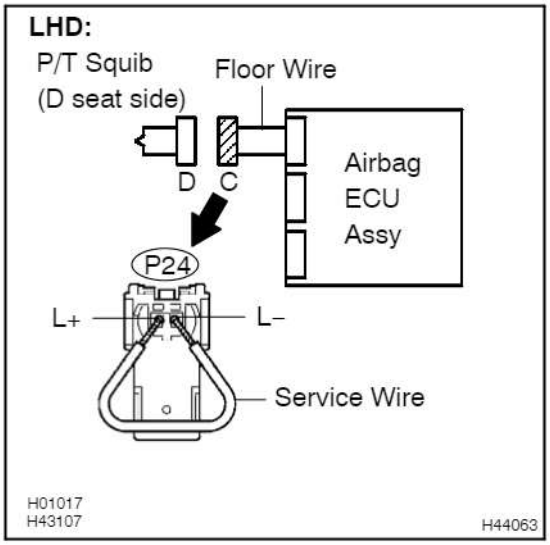
Tester connection	Condition	Specified condition
P25–1 (R+) – Body ground	Always	1 MΩ or Higher
P25–2 (R–) – Body ground	Always	1 MΩ or Higher

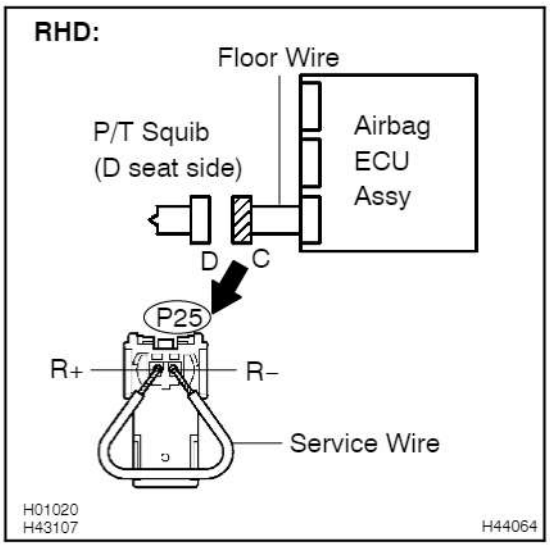
OK

NG → **REPAIR OR REPLACE FLOOR WIRE**

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

(c) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1902 is not output.

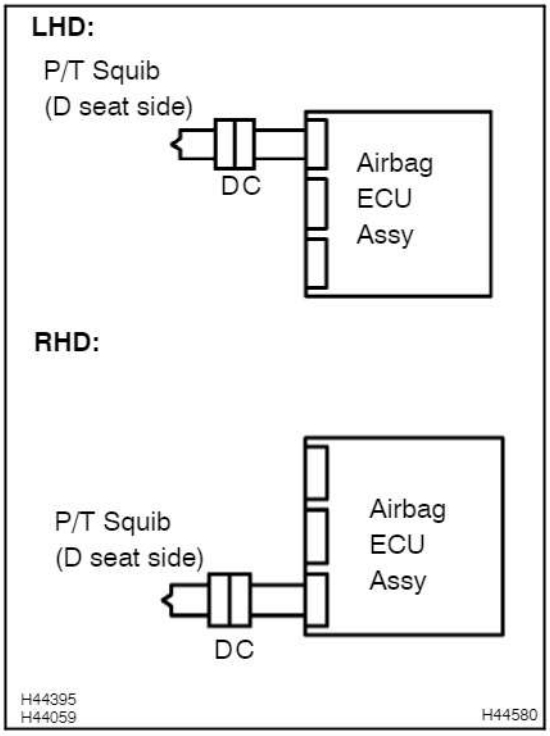
HINT:
Codes other than code B1902 may be output at this time, but they are not related to this check.

NG	**REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(P/T SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy LH.
(e) RHD:
Connect the connector to the front seat outer belt assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1902 is not output.	A
DTC B1902 is output (LHD).	B
DTC B1902 is output (RHD).	C

HINT:
Codes other than code B1902 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1903	SHORT IN P/T SQUIB (D SEAT SIDE) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P/T squib (D seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy LH (LHD) or front seat outer belt assy RH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1903 is recorded when a short to B+ circuit is detected in the P/T squib (D seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1903	• When the airbag ECU assy receives a B+ short signal in the P/T squib (D seat side) circuit for 0.5 seconds. • P/T squib (D seat side) malfunction • Airbag ECU assy malfunction	• Floor wire • Front seat outer belt assy LH (LHD) (P/T squib (D seat side)) • Front seat outer belt assy RH (RHD) (P/T squib (D seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1401.

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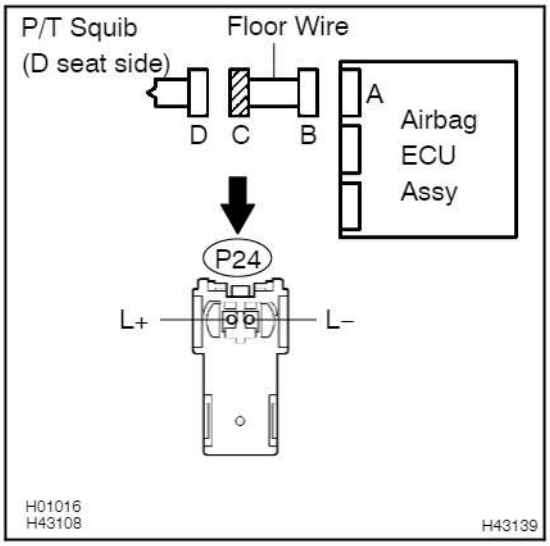
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

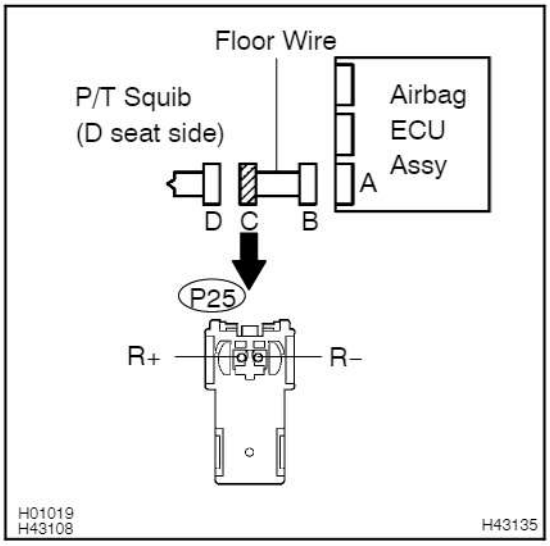
1	CHECK FLOOR WIRE(P/T SQUIB (D SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P24–1 (L+) – Body ground	Power switch is on (IG)	Below 1 V
P24–2 (L–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

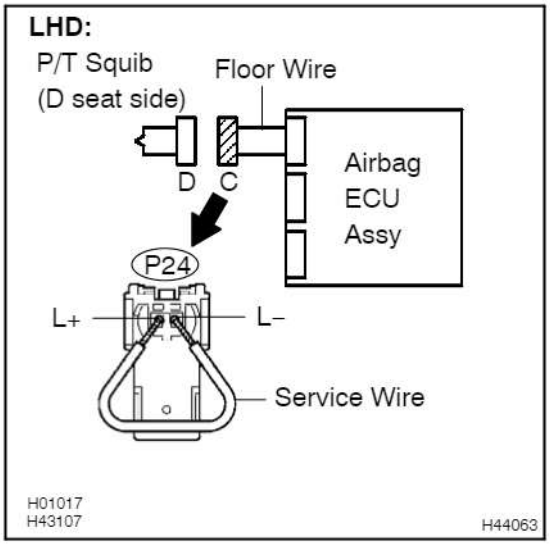
Tester connection	Condition	Specified condition
P25–1 (R+) – Body ground	Power switch is on (IG)	Below 1 V
P25–2 (R–) – Body ground	Power switch is on (IG)	Below 1 V

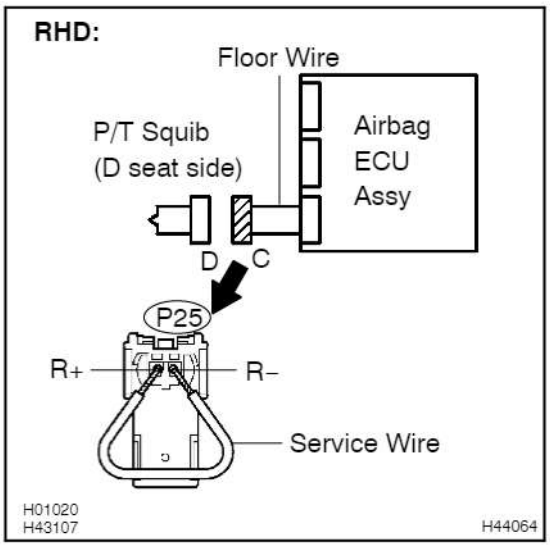
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

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2	CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag ECU assy.

(d) LHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

(e) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(g) Turn the power switch on (IG), and wait for at least 60 seconds.

(h) Clear the DTCs stored in memory (see page 05–1170).

(i) Turn the power switch off.

(j) Turn the power switch on (IG), and wait for at least 60 seconds.

(k) Check the DTCs (see page 05–1170).
OK:
DTC B1903 is not output.

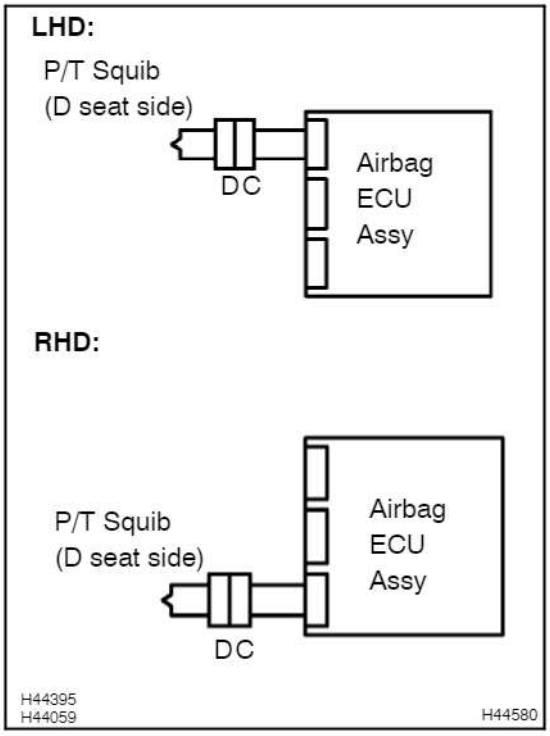
HINT:
Codes other than code B1903 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK DTC(P/T SQUIB (D SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy LH.
(e) RHD:
Connect the connector to the front seat outer belt assy RH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1903 is not output.	A
DTC B1903 is output (LHD).	B
DTC B1903 is output (RHD).	C

HINT:
Codes other than code B1903 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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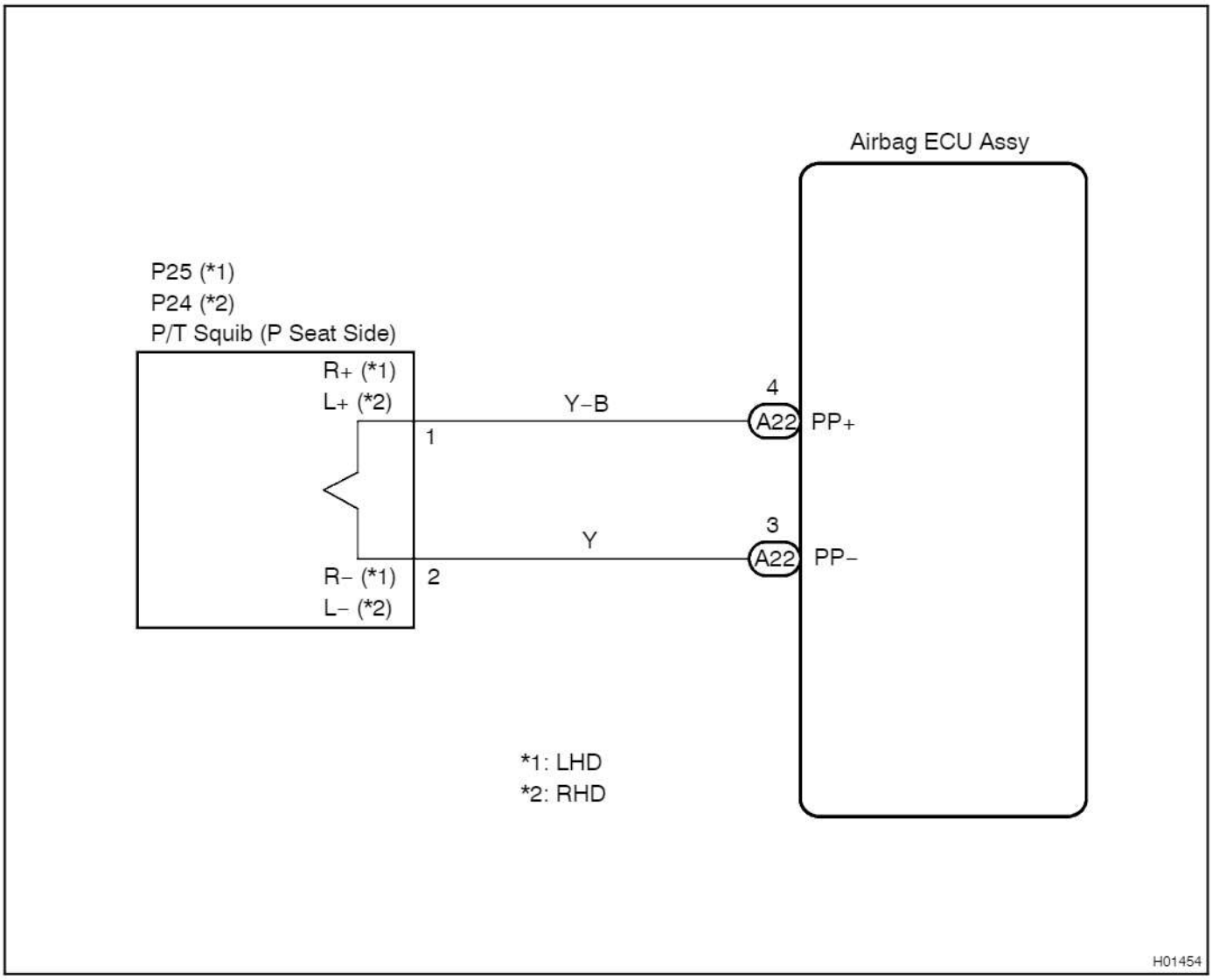
DTC	B1905	SHORT IN P/T SQUIB (P SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib (P seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy RH (RHD) or front seat outer belt assy LH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1905 is recorded when a short circuit is detected in the P/T squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1905	• When the airbag ECU assy receives a line short signal 5 times in the P/T squib (P seat side) circuit during primary check. • P/T squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Front seat outer belt assy RH (LHD) (P/T squib (P seat side)) • Front seat outer belt assy LH (RHD) (P/T squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK CONNECTOR

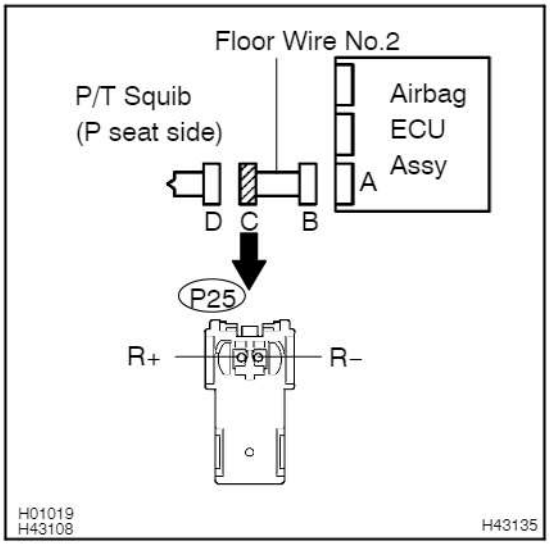
(a) Check that the floor wire No.2 connector (on the front seat outer belt assy side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2	CHECK FLOOR WIRE NO.2(P/T SQUIB (P SEAT SIDE) CIRCUIT)



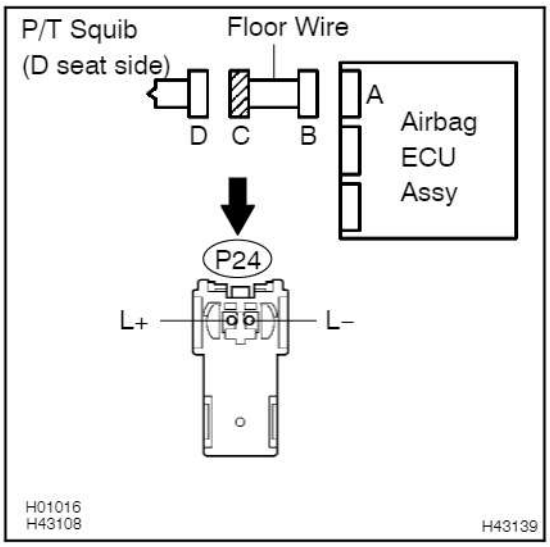
(a) LHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

Tester connection	Condition	Specified condition
P25–1 (R+) – P25–2 (R–)	Always	1 MΩ or Higher



(b) RHD:

(1) Release the activation prevention mechanism built into connector "B" (see page 05–1165).

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

Standard:

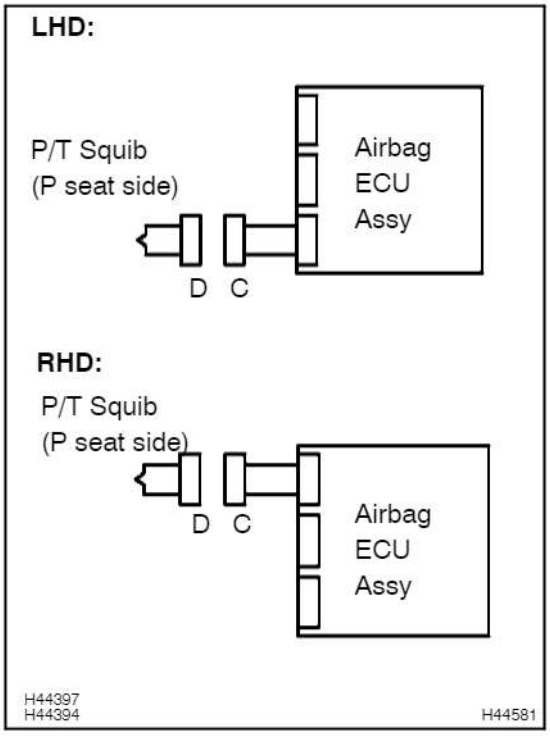
Tester connection	Condition	Specified condition
P24–1 (L+) – P24–2 (L–)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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3	CHECK AIR BAG ECU ASSY



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05–1170).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (see page 05–1170).
OK:
DTC B1905 is not output.

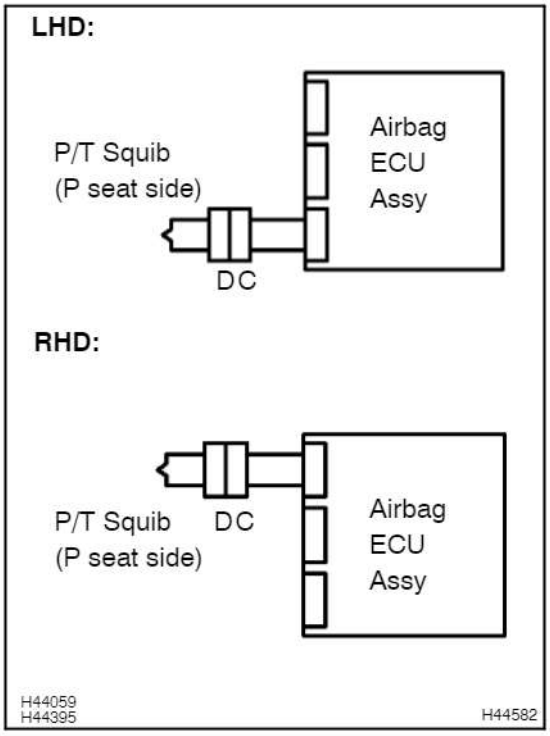
HINT:
Codes other than code B1905 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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4 CHECK DTC(P/T SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) LHD:
Connect the connector to the front seat outer belt assy RH.
(d) RHD:
Connect the connector to the front seat outer belt assy LH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05–1170).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (see page 05–1170).

Result:

DTC B1905 is not output.	A
DTC B1905 is output (LHD).	B
DTC B1905 is output (RHD).	C

HINT:
Codes other than code B1905 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1906	OPEN IN P/T SQUIB (P SEAT SIDE) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib (P seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy RH (LHD) or front seat outer belt assy LH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1906 is recorded when an open circuit is detected in the P/T squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1906	• When the airbag ECU assy receives an open signal in the P/T squib (P seat side) circuit for 2 seconds. • P/T squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Front seat outer belt assy RH (LHD) (P/T squib (P seat side)) • Front seat outer belt assy LH (RHD) (P/T squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1418.

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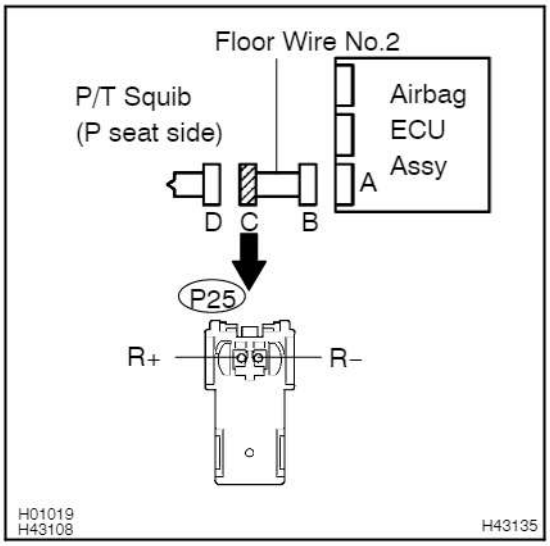
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

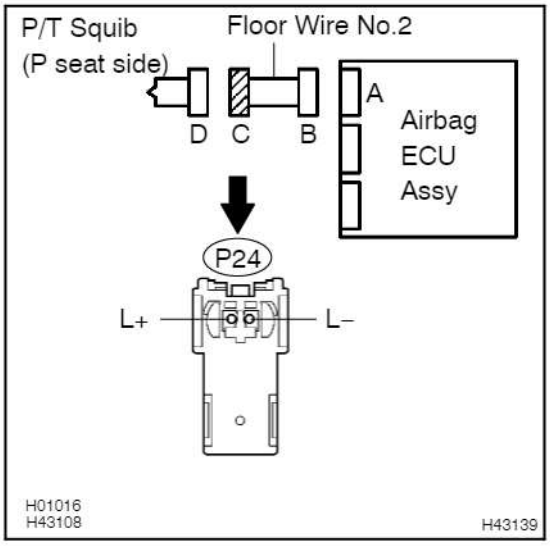
1	CHECK FLOOR WIRE NO.2(P/T SQUIB (P SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P25–1 (R+) – P25–2 (R–)	Always	Below 1 Ω



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

Standard:

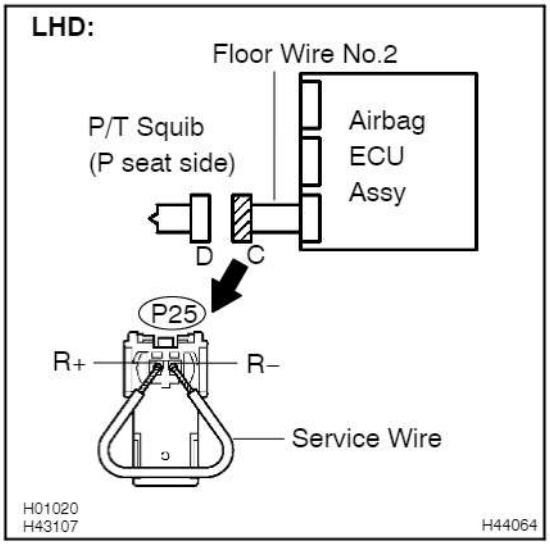
Tester connection	Condition	Specified condition
P24–1 (L+) – P24–2 (L–)	Always	Below 1 Ω

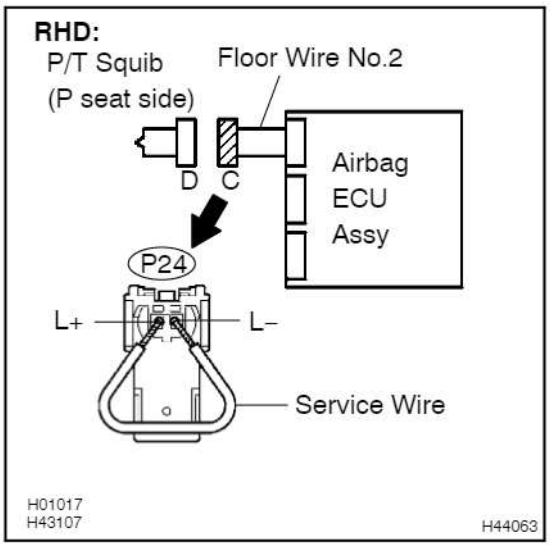
NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connectors to the airbag ECU assy.

(b) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".

(c) RHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1906 is not output.

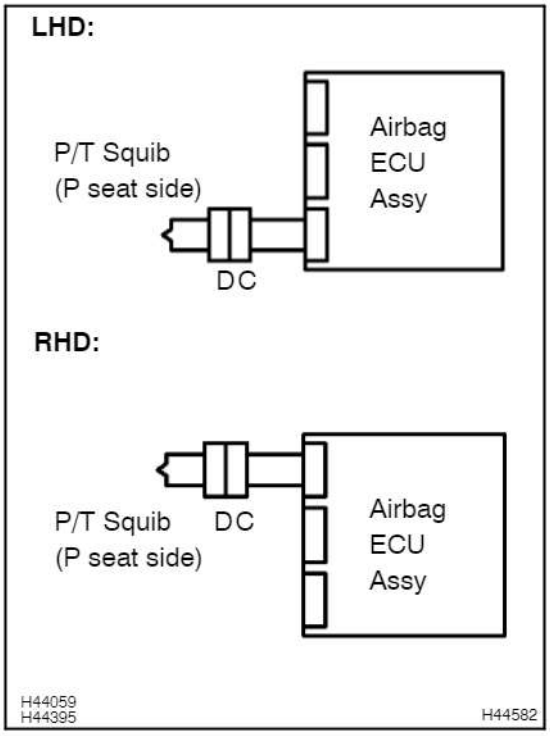
HINT:
Codes other than code B1906 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3 CHECK DTC(P/T SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy RH.
(e) RHD:
Connect the connector to the front seat outer belt assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1906 is not output.	A
DTC B1906 is output (LHD).	B
DTC B1906 is output (RHD).	C

HINT:
Codes other than code B1906 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1907	SHORT IN P/T SQUIB (P SEAT SIDE) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P/T squib (P seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy RH (LHD) or front seat outer belt assy LH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1907 is recorded when a short to ground circuit is detected in the P/T squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1907	• When the airbag ECU assy receives a short to ground signal in the P/T squib (P seat side) circuit for 0.5 seconds. • P/T squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Front seat outer belt assy RH (LHD) (P/T squib (P seat side)) • Front seat outer belt assy LH (RHD) (P/T squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1418.

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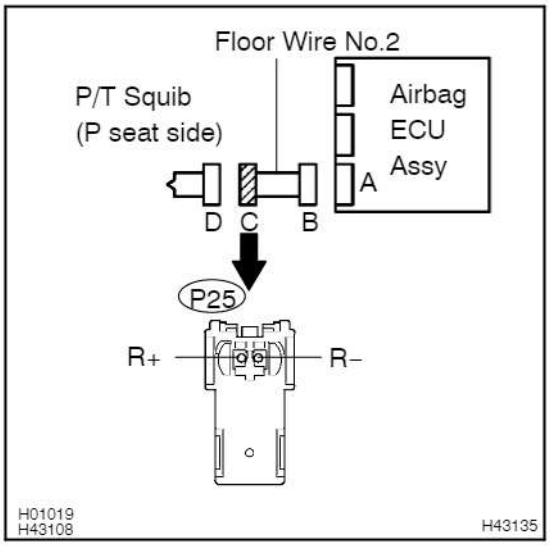
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

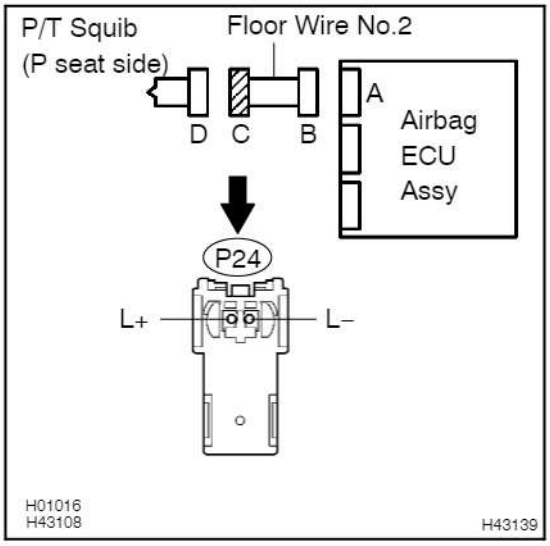
1	CHECK FLOOR WIRE NO.2(P/T SQUIB (P SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P25–1 (R+) – Body ground	Always	1 MΩ or Higher
P25–2 (R–) – Body ground	Always	1 MΩ or Higher



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

Standard:

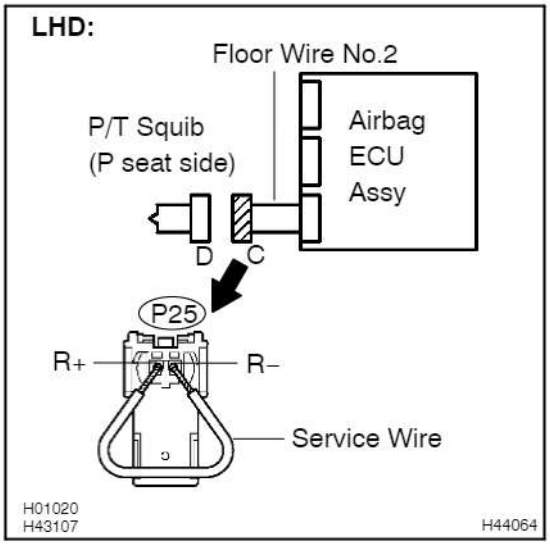
Tester connection	Condition	Specified condition
P24–1 (L+) – Body ground	Always	1 MΩ or Higher
P24–2 (L–) – Body ground	Always	1 MΩ or Higher

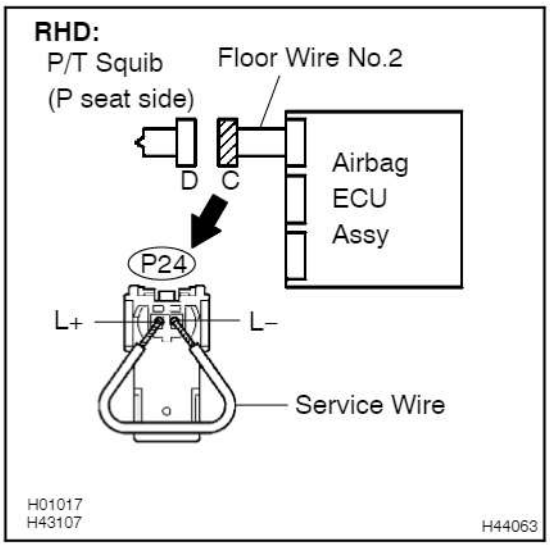
NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Connect the connector to the airbag ECU assy.

(b) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".

(c) RHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch on (IG), and wait for at least 60 seconds.

(f) Clear the DTCs stored in memory (see page 05–1170).

(g) Turn the power switch off.

(h) Turn the power switch on (IG), and wait for at least 60 seconds.

(i) Check the DTCs (see page 05–1170).
OK:
DTC B1907 is not output.

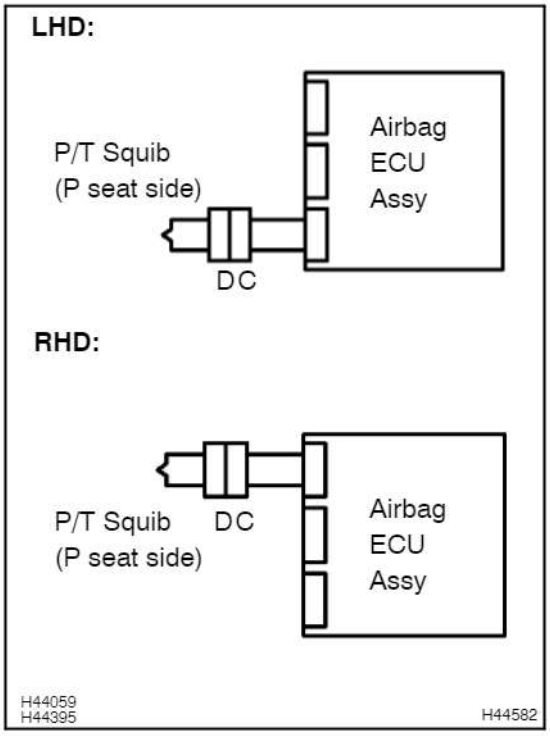
HINT:
Codes other than code B1907 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK DTC(P/T SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy RH.
(e) RHD:
Connect the connector to the front seat outer belt assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1907 is not output.	A
DTC B1907 is output (LHD).	B
DTC B1907 is output (RHD).	C

HINT:
Codes other than code B1907 may be output at this time, but they are not related to this check.

NG	**REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**
C	**REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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DTC	B1908	SHORT IN P/T SQUIB (P SEAT SIDE) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P/T squib (P seat side) circuit consists of the airbag ECU assy and the front seat outer belt assy RH (LHD) or front seat outer belt assy LH (RHD).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1908 is recorded when a short to B+ circuit is detected in the P/T squib (P seat side) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1908	• When the airbag sensor assy center receives a B+ short signal in the P/T squib (P seat side) circuit for 0.5 seconds. • P/T squib (P seat side) malfunction • Airbag ECU assy malfunction	• Floor wire No.2 • Front seat outer belt assy RH (LHD) (P/T squib (P seat side)) • Front seat outer belt assy LH (RHD) (P/T squib (P seat side)) • Airbag ECU assy

WIRING DIAGRAM

See page 05–1418.

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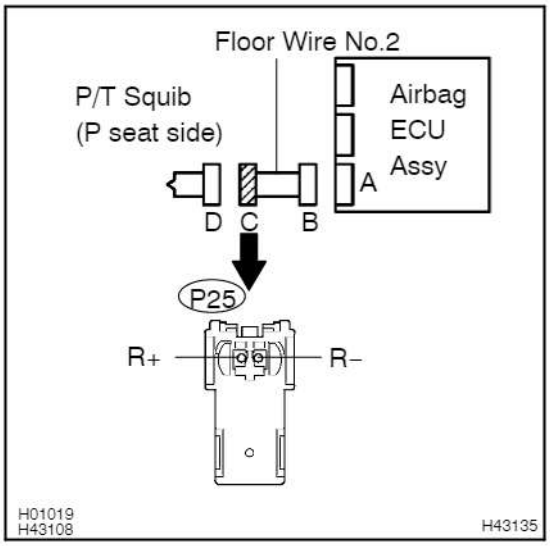
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

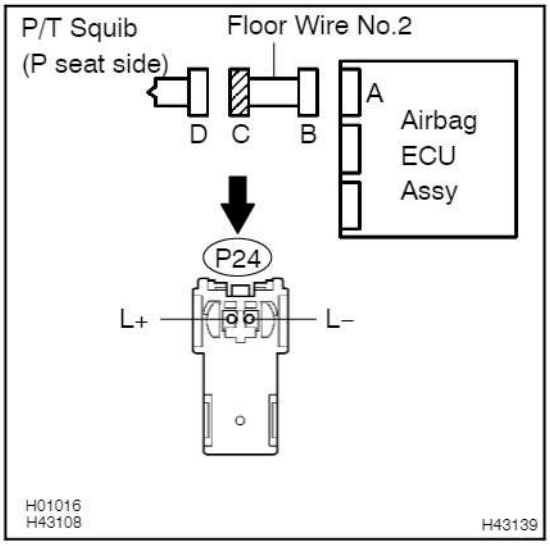
1	CHECK FLOOR WIRE NO.2(P/T SQUIB (P SEAT SIDE) CIRCUIT)



(a) LHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P25–1 (R+) – Body ground	Power switch is on (IG)	Below 1 V
P25–2 (R–) – Body ground	Power switch is on (IG)	Below 1 V



(b) RHD:
(1) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the power switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard:

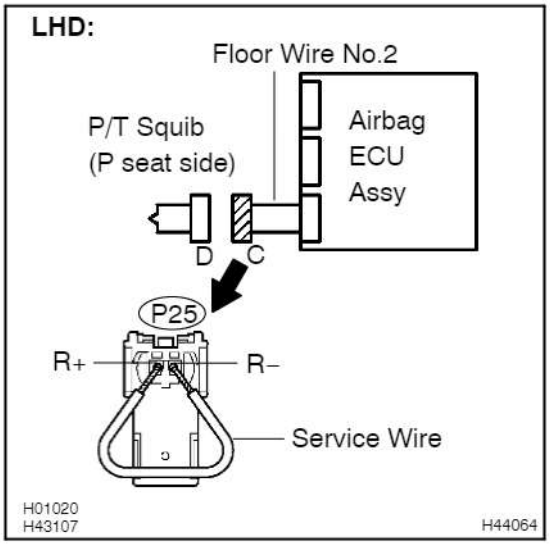
Tester connection	Condition	Specified condition
P24–1 (L+) – Body ground	Power switch is on (IG)	Below 1 V
P24–2 (L–) – Body ground	Power switch is on (IG)	Below 1 V

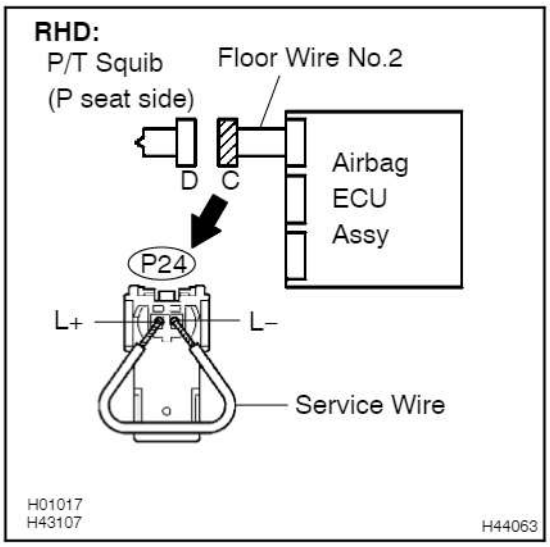
NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

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2 CHECK AIR BAG ECU ASSY





(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag ECU assy.
(d) LHD:
Using a service wire, connect P25–1 (R+) and P25–2 (R–) of connector "C".
(e) RHD:
Using a service wire, connect P24–1 (L+) and P24–2 (L–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).
OK:
DTC B1908 is not output.

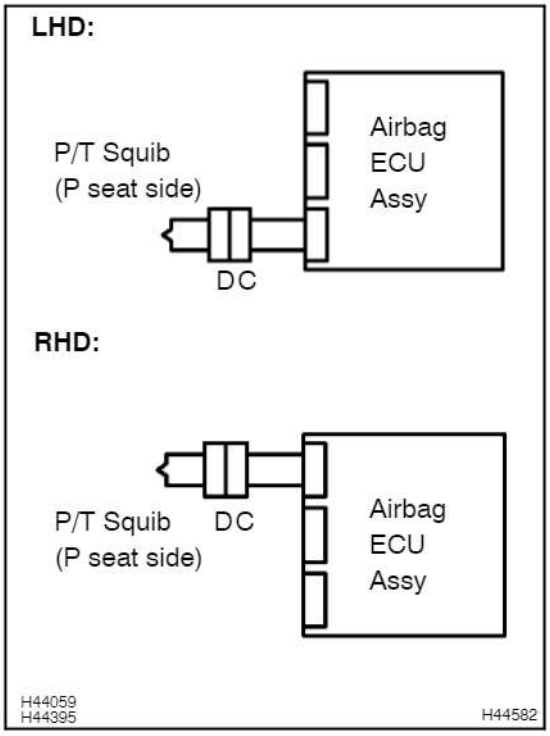
HINT:
Codes other than code B1908 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)**

OK

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3	CHECK DTC(P/T SQUIB (P SEAT SIDE))



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) LHD:
Connect the connector to the front seat outer belt assy RH.
(e) RHD:
Connect the connector to the front seat outer belt assy LH.
(f) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Clear the DTCs stored in memory (see page 05–1170).
(i) Turn the power switch off.
(j) Turn the power switch on (IG), and wait for at least 60 seconds.
(k) Check the DTCs (see page 05–1170).

Result:

DTC B1908 is not output.	A
DTC B1908 is output (LHD).	B
DTC B1908 is output (RHD).	C

HINT:
Codes other than code B1908 may be output at this time, but they are not related to this check.

B → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61–10)**

C → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61–10)**

A

USE SIMULATION METHOD TO CHECK (SEE PAGE 05–1165)

HINT:
- Perform the simulation method by selecting the check mode with the intelligent tester II (see page 05–1171).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05–1171).

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SOURCE VOLTAGE DROP

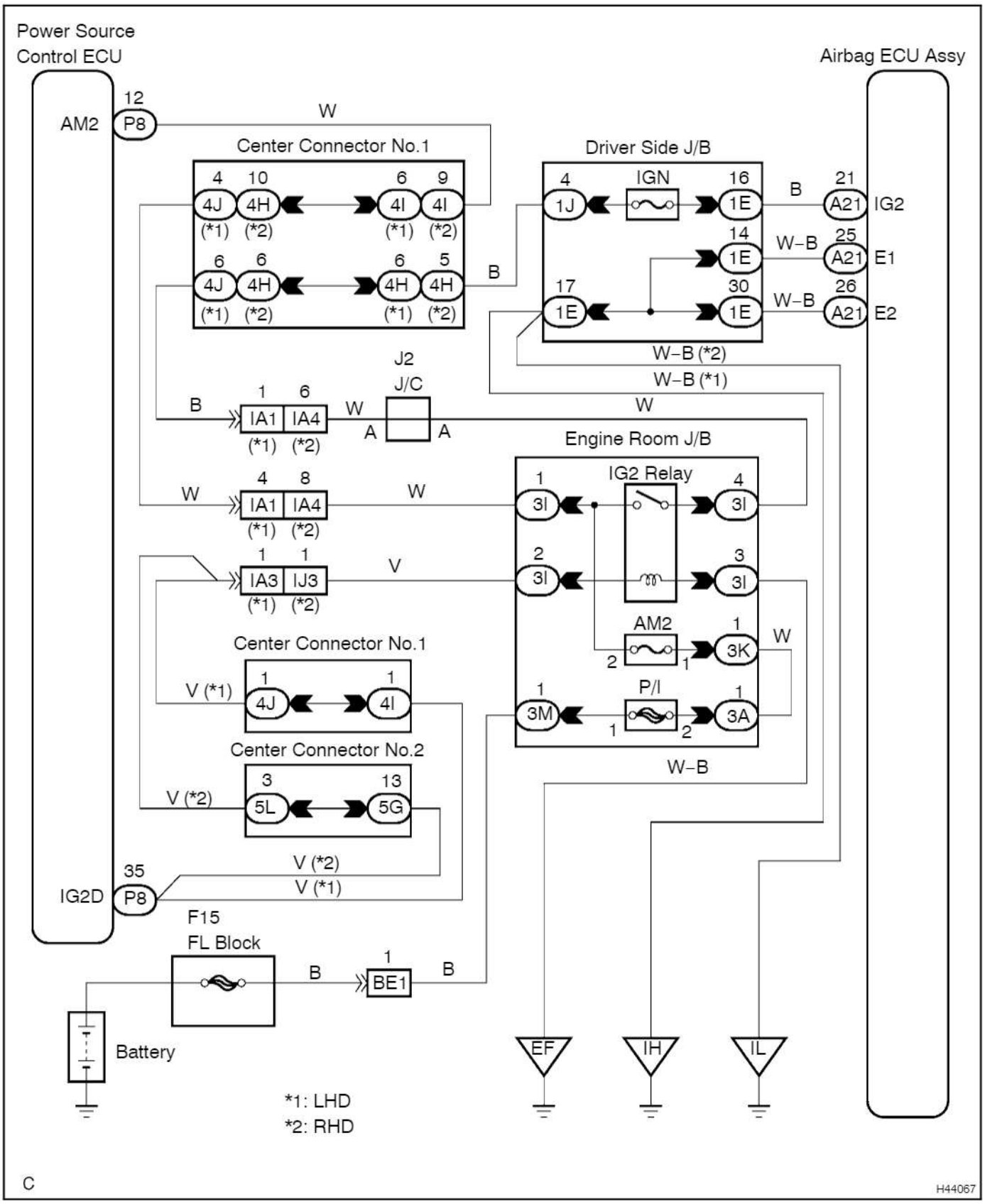
CIRCUIT DESCRIPTION

The SRS is equipped with a voltage–increase circuit (DC–DC converter) in the airbag ECU assy 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.
A malfunction in this circuit is displayed differently from other codes. The source voltage drop is indicated when the SRS warning light comes on without showing any DTCs.
A malfunction in this circuit is not recorded in the airbag ECU assy. The SRS warning light automatically goes off when the source voltage returns to normal.

DTC No.	Diagnosis
(Normal)	Source voltage drop

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WIRING DIAGRAM



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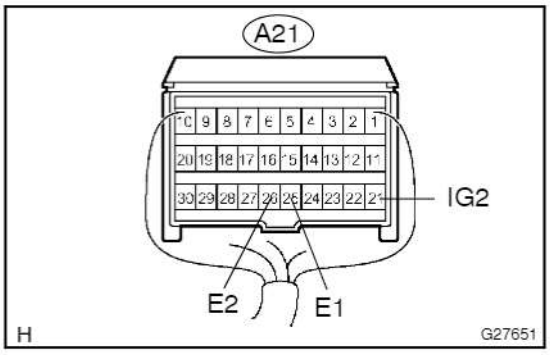
INSPECTION PROCEDURE

1	PREPARE FOR INSPECTION

CAUTION:
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

2	CHECK SOURCE VOLTAGE



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Measure the voltage or resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A21–21 (IG2) – Body ground	Power switch is on (IG)	10 to 14 V
A21–25 (E1) – Body ground	Always	Below 1 Ω
A21–26 (E2) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS BETWEEN BATTERY AND AIRBAG SENSOR ASSY CENTER, AND CHARGING SYSTEM**

OK

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3	CHECK SRS WARNING LIGHT TURN OFF

(a) Connect the connectors to the airbag ECU assy.
(b) Connect the connectors to the horn button assy.
(c) Connect the connectors to the front passenger airbag assy.
(d) Connect the connector to the front seat airbag assy LH.
(e) Connect the connector to the front seat airbag assy RH.
(f) Connect the connector to the curtain shield airbag assy LH.
(g) Connect the connector to the curtain shield airbag assy RH.
(h) Connect the connector to the front seat outer belt assy LH.
(i) Connect the connector tot he front seat outer belt assy RH.
(j) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(k) Turn the power switch on (IG), and wait for at least 6 seconds.
(l) Operate all components of the electrical system (defogger, wiper, headlamp, heater blower, etc.) and check that the SRS warning light operation.

OK:

When the ignition switch is turned to the ON position, the SRS warning light comes on for approximately 6 seconds and then it goes off.

NG	REPLACE AIRBAG ECU ASSY (SEE PAGE 60–54)

OK

END

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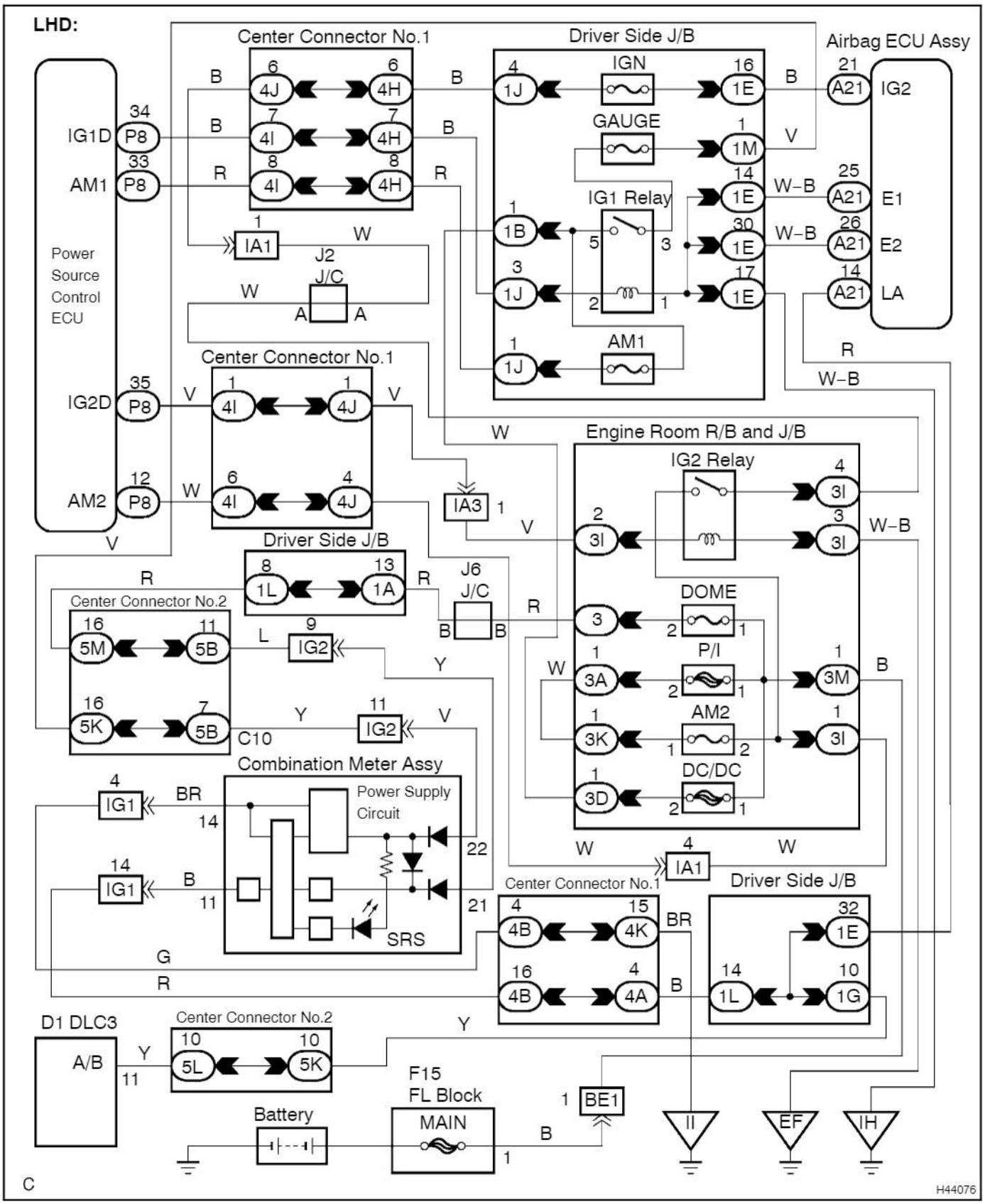
SRS WARNING LIGHT CIRCUIT MALFUNCTION (REMAINS ON WHEN DTC IS NOT OUTPUT.)

CIRCUIT DESCRIPTION

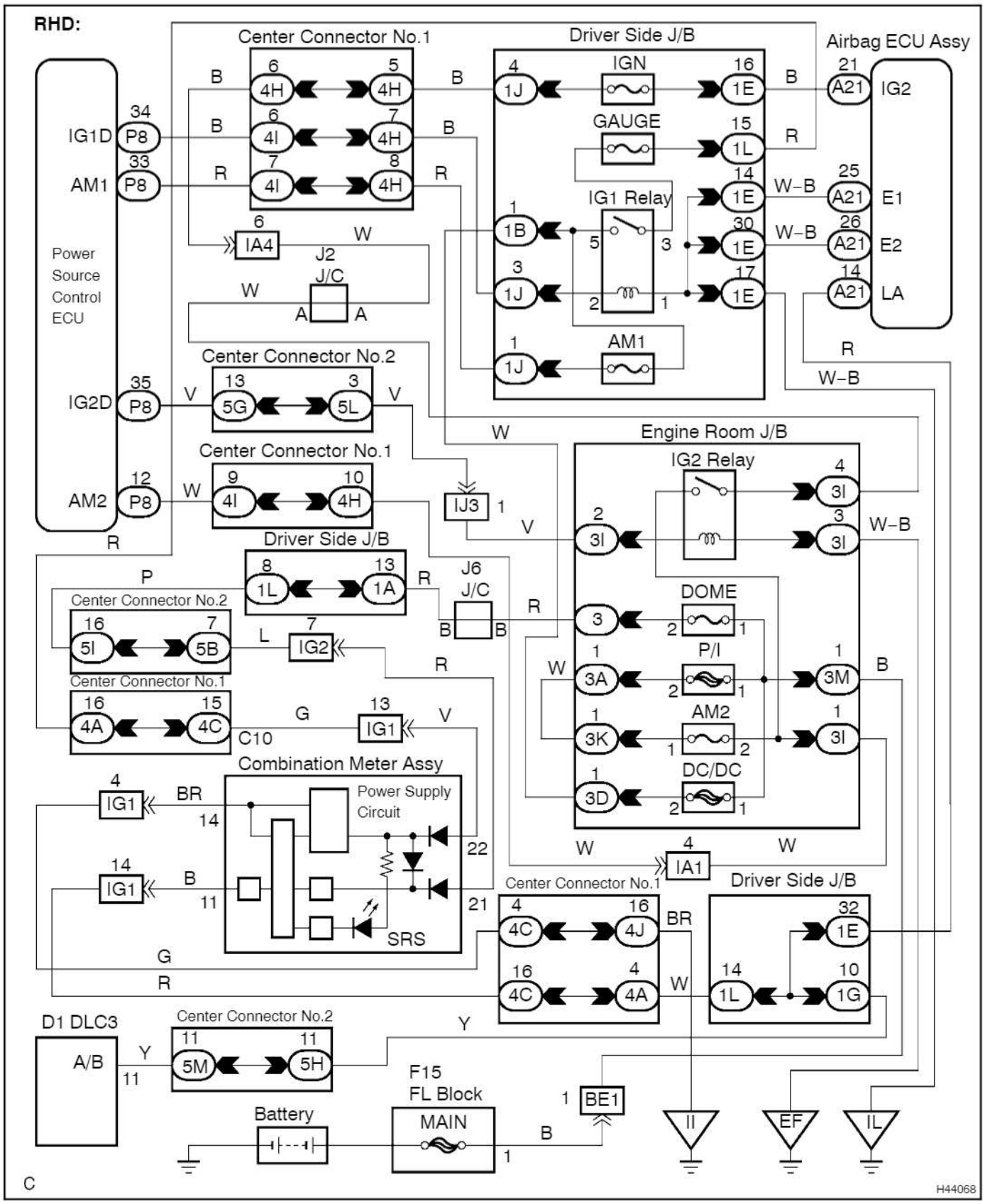
The SRS warning light is located on the combination meter assy.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the power switch is turned from off to on (IG), and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

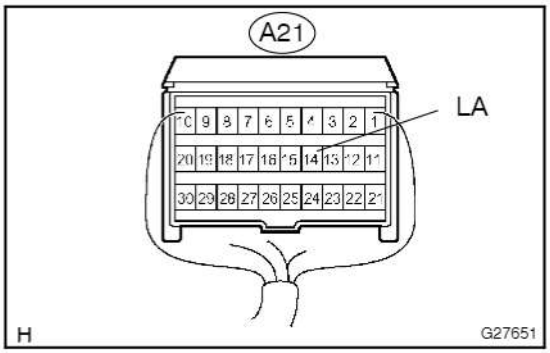
1	CHECK SOURCE VOLTAGE

(a) Measure the voltage of the battery.
Standard: 11 to 14 V

NG → **REPAIR OR REPLACE HARNESS BETWEEN BATTERY AND AIRBAG SENSOR ASSY CENTER, AND CHARGING SYSTEM**

OK

2	CHECK WIRE HARNESS (AIRBAG ECU ASSY – BODY GROUND)



(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard:

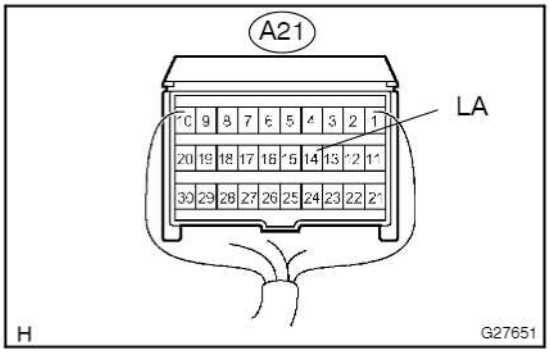
Tester connection	Condition	Specified condition
A21–14 (LA) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

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3 CHECK WIRE HARNESS (AIRBAG ECU ASSY – BODY GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

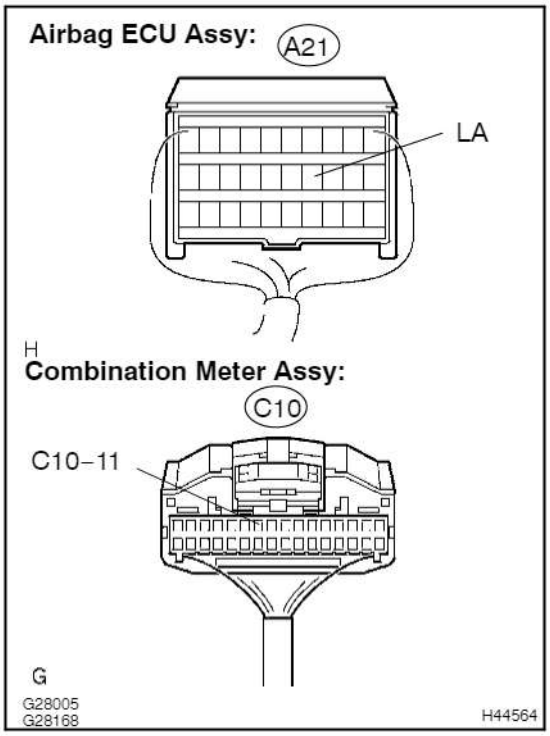
Standard:

Tester connection	Condition	Specified condition
A21–14 (LA) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4 CHECK WIRE HARNESS (AIRBAG ECU ASSY – COMBINATION METER ASSY)



(a) Disconnect the connector from the combination meter assy.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

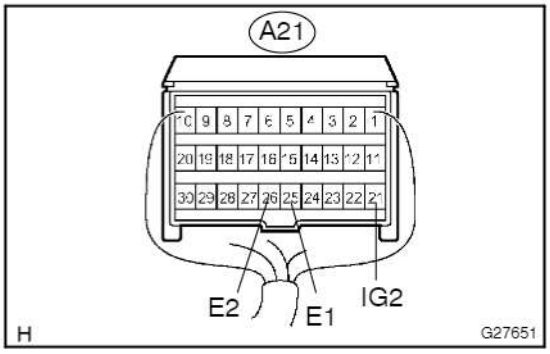
Tester connection	Condition	Specified condition
A21–14 (LA) – C10–11	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

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5 CHECK WIRE HARNESS



(a) Connect the connectors to the airbag ECU assy.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconeds.
(c) Turn the power switch on (IG).
(d) Measure the voltage and resistance according to the value(s) in the table below.

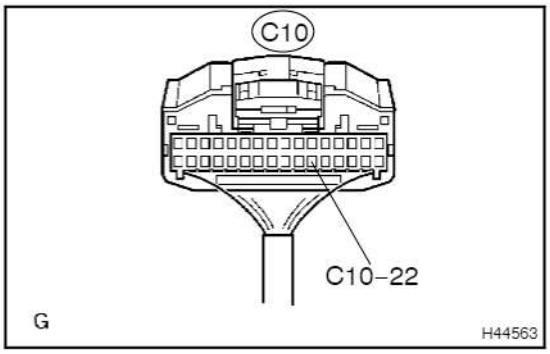
Standard:

Tester connection	Condition	Specified condition
A21–21 (IG2) – Body ground	Power switch is on (IG)	10 to 14 V
A21–25 (E1) – Body ground	Always	Below 1 Ω
A21–26 (E2) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

6 CHECK COMBINATION METER ASSY



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Connect the connector to the combination meter assy.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch of (IG).
(g) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C10–11 – Body ground	Power switch is on (IG)	8 to 14 V

NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05–1673)**

OK

REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

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SRS WARNING LIGHT CIRCUIT MALFUNCTION (DOES NOT COME ON WHEN THE POWER SWITCH IS TURNED ON (IG))

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter assy.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the power switch is turned from off to on (IG), and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.

WIRING DIAGRAM

See page 05–1439.

INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard: 11 to 14 V

NG → REPLACE BATTERY

OK

2	CHECK COMBINATION METER ASSY

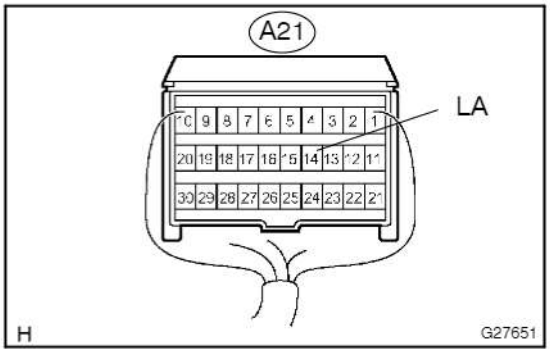
(a) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(b) Disconnect the connectors from the airbag ECU assy.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG).
(e) Check the SRS warning light operation.
OK:
The SRS warning light does not come on.

NG → REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

OK

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3	CHECK WIRE HARNESS (AIRBAG ECU ASSY – COMBINATION METER ASSY)



(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the combination meter assy.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A21–14 (LA) – Body ground	Power switch is on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

REPLACE COMBINATION METER ASSY (SEE PAGE 71–7)

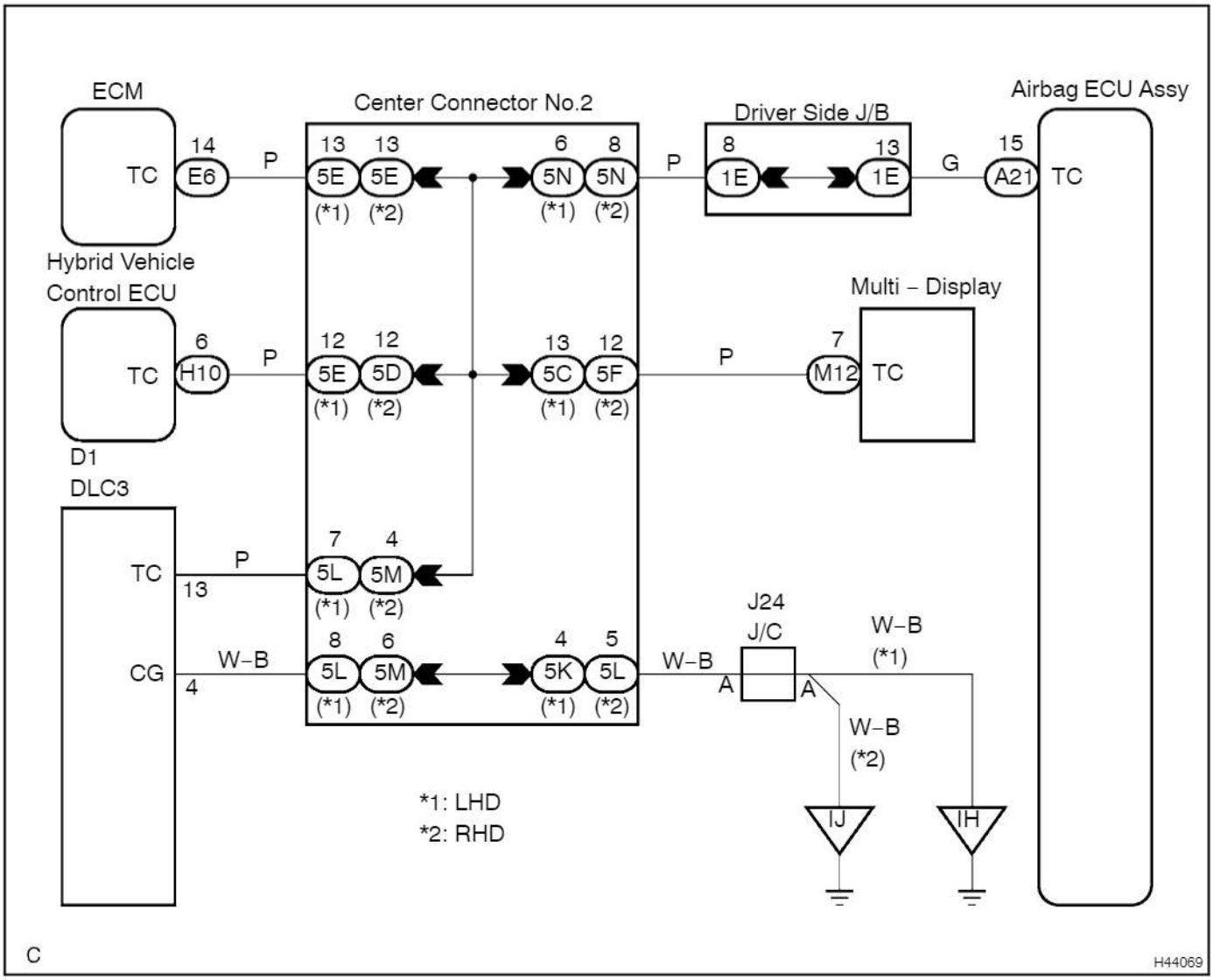
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TC TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
The DTCs are displayed by blinking the SRS warning light.

WIRING DIAGRAM



HINT:
When each warning light keeps blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.

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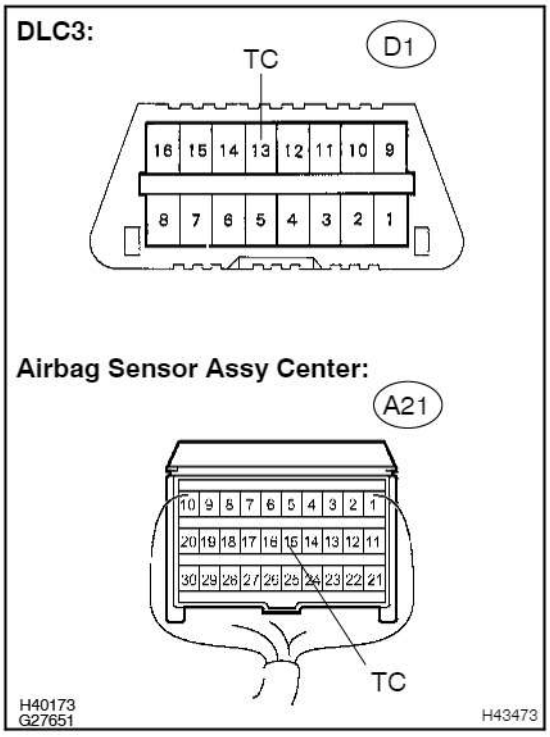
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the power switch off.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag ECU assy.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH.
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH.
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

1	CHECK WIRE HARNESS(DLC3 – AIRBAG ECU ASSY)



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

Standard:

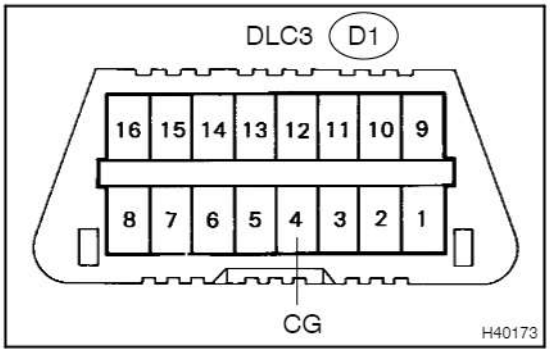
Tester connection	Condition	Specified condition
D1–13 (TC) – A21–15 (TC)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (TC of DLC3 – TC of AIRBAG ECU ASSY)**

OK

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2 CHECK WIRE HARNESS(CG of DLC3 – BODY GROUND)



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

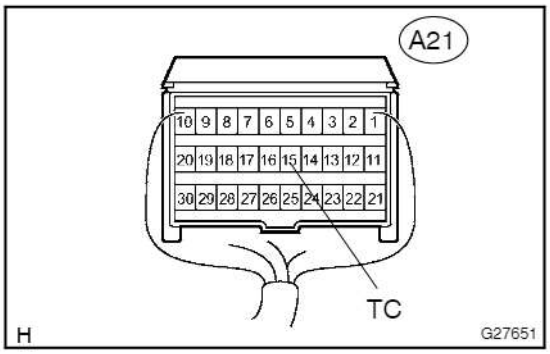
Standard:

Tester connection	Condition	Specified condition
D1–4 (CG) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (CG of DLC3 – BODY GROUND)**

OK

3 CHECK WIRE HARNESS(TC of AIRBAG ECU ASSY – BODY GROUND)



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

Standard:

Tester connection	Condition	Specified condition
A21–15 (TC) – Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS OR EACH ECU**

OK

REPLACE AIR BAG ECU ASSY (SEE PAGE 60–54)

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AUDIO SYSTEM

PRECAUTION

05D1B–02

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Power Window Control System	01–29

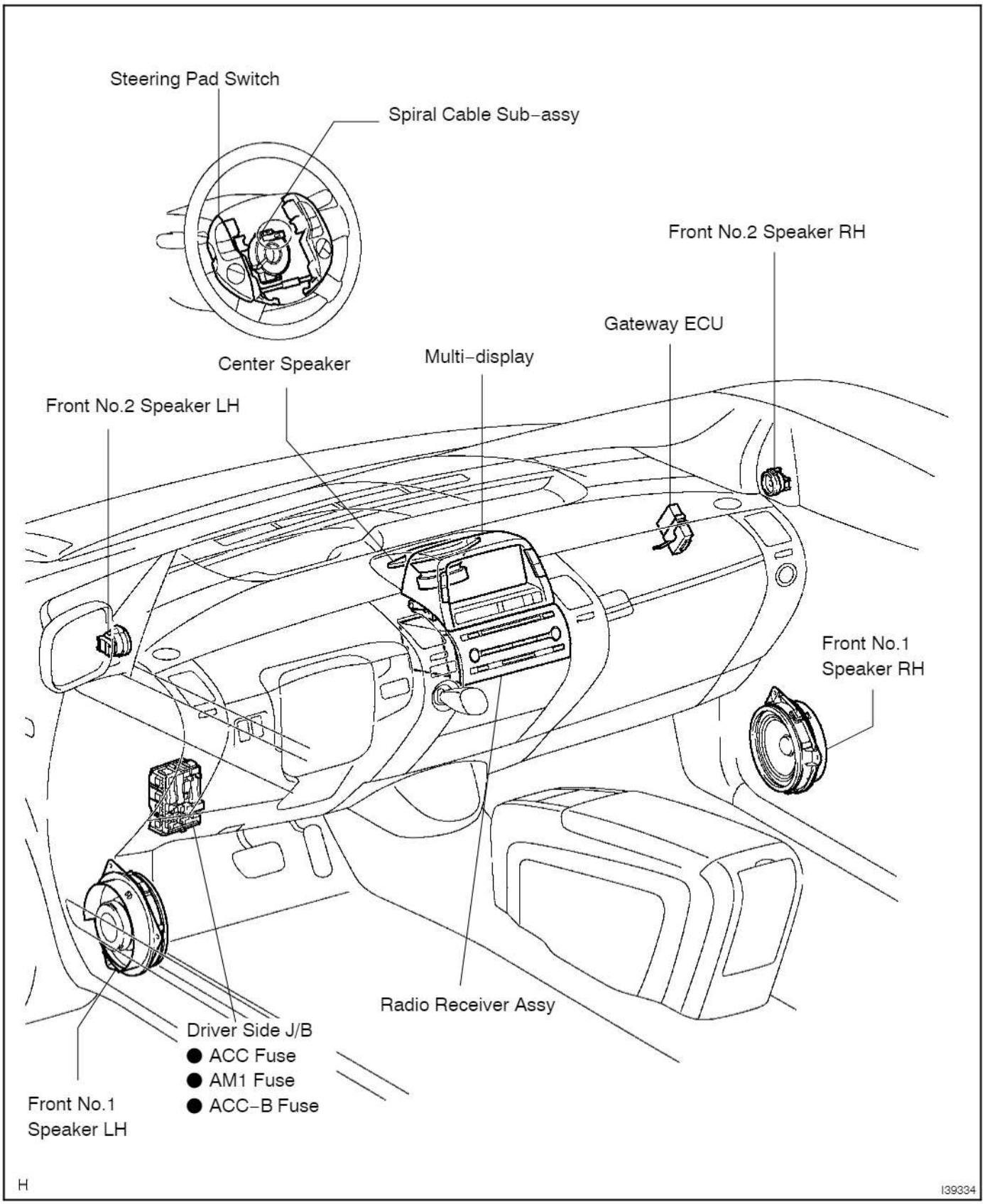
NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

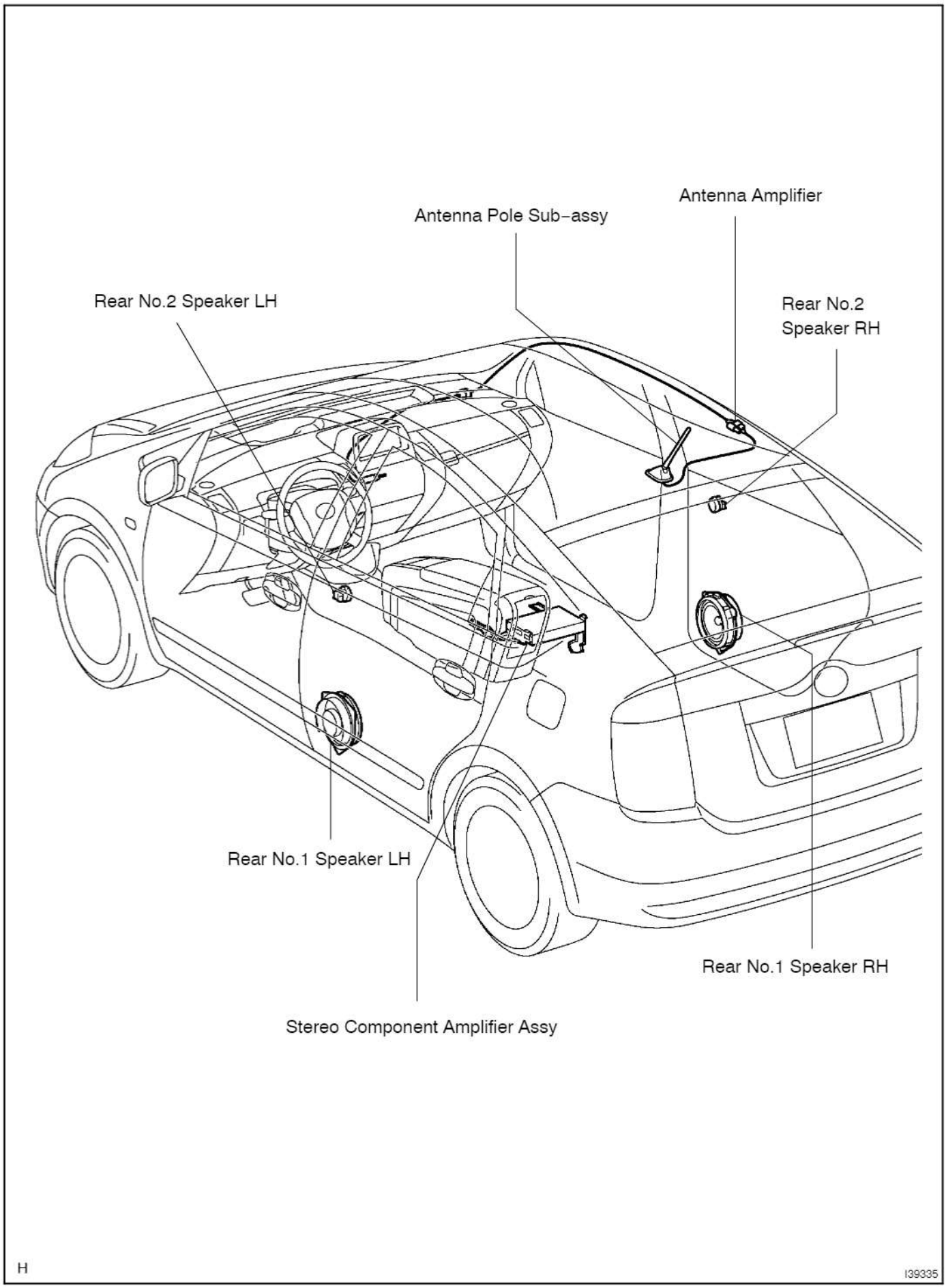
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05HH3–01

LOCATION



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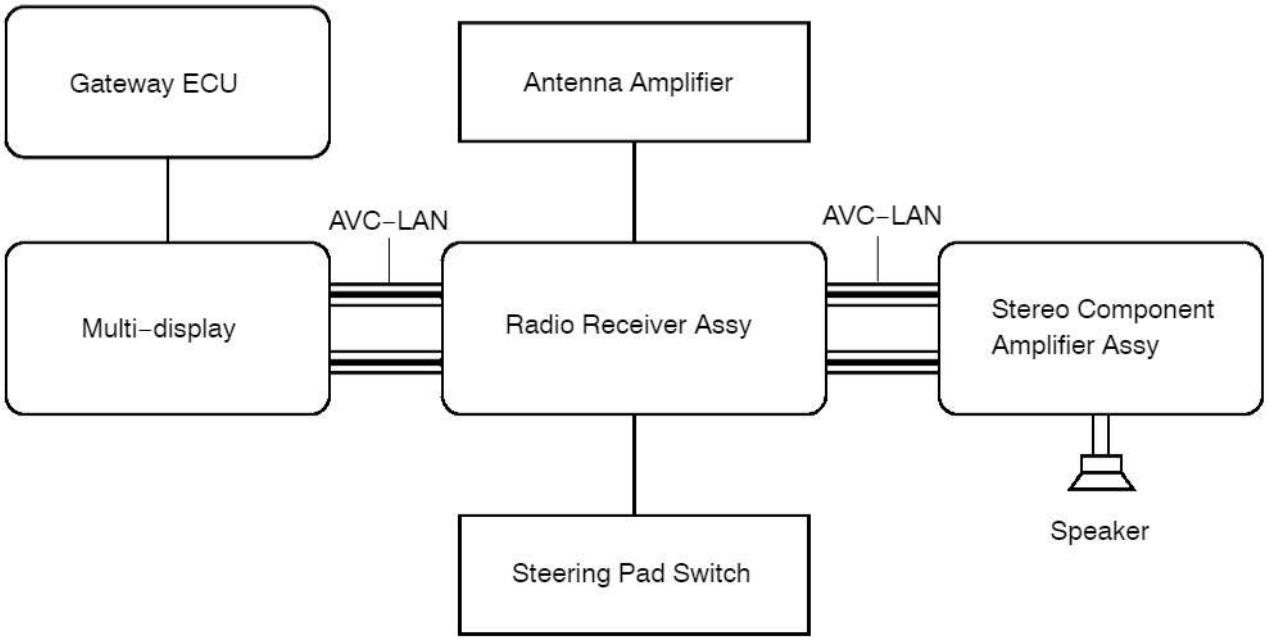


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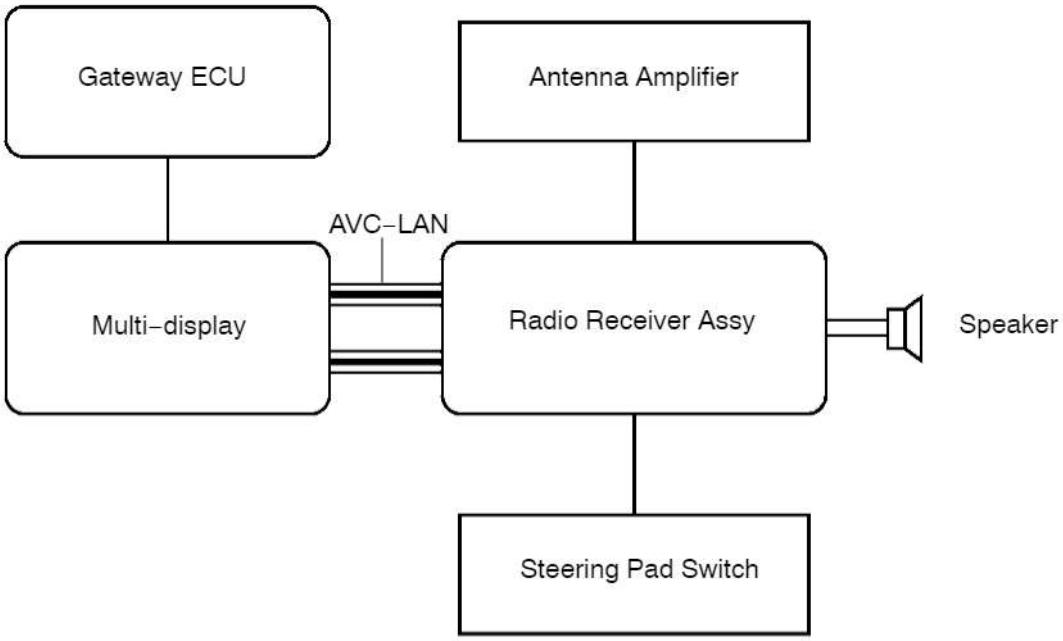
05HH4–01

SYSTEM DIAGRAM

Separate Type Amplifier:



Built–in Type Amplifier:



N

I39347

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05HH5–01

SYSTEM DESCRIPTION

1. COMPACT DISC PLAYER

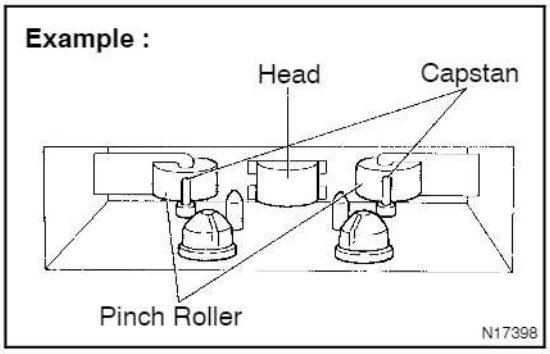
(a) Compact Disc Players (hereafter called "CD") use a laser beam pick–up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. 4.7 in. (12 cm) discs are available for the CD player.

HINT:

Never disassemble or apply oil to any part of the player unit. Do not insert any object other than a disc into the CD player.

NOTICE:

CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.

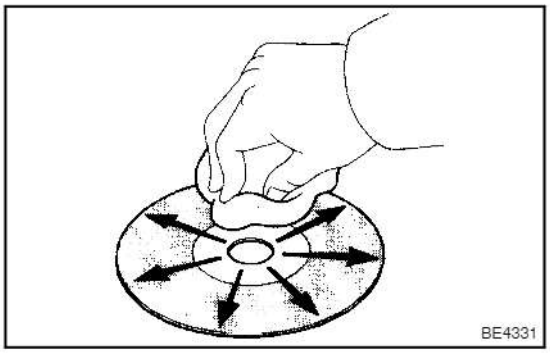


2. MAINTENANCE

Tape Player / Head Cleaning:

(a) Raise the cassette door with your finger.
Using a pencil or similar object, push in the guide.

(b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



3. MAINTENANCE

CD Player / Disc Cleaning:

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

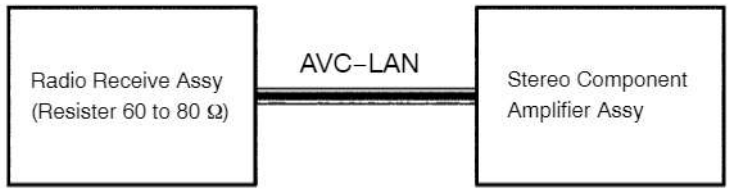
Do not use a conventional record cleaner or anti–static preservative.

4. OUTLINE OF AVC–LAN

(a) What is AVC–LAN?
AVC–LAN is the abbreviation for Audio Visual Communication–Local Area Network. This is an unified standard co–developed by 6 audio manufacturers associated with Toyota Motor Corporation.
The unified standard includes signals, such as audio, visual and signals for switch indication and communication.

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Example:



P I39082

(b) Objectives

Recently, development in car audio systems has been rapid and functions have been changed drastically. The conventional system has been switched to the multi–media type such as a navigation system. At the same time, customers wants to upgrade their audio systems. This is the factor that lies behind this standardization.

The concrete objectives are explained below.

(1) When products by different manufacturers were combined together, malfunctions such as sound failure occurred. This problem can be solved by standardization of signals.

(2) Various types of after market products are available.

(3) Because of the above (2), each manufacturer has been able to concentrate on developing products in their strongest field. This has enabled the development of inexpensive products.

(4) In general, a new product developed by a particular manufacturer could not be used due to a lack of compatibility with other manufacturer's products. By developing this new standard, users can enjoy a range of compatible products from different manufacturers.

(c) The above stated are the reasons for the introduction of AVC–LAN. Under this standardization, development of new products no longer causes systematic errors.

HINT:

- When +B short or GND short is detected in the AVC–LAN circuit, communication stops, and the audio system does not function normally.
- The radio receiver assy is equipped with a resistor (60 to 80 Ω) for communication.
- The car audio system using AVC–LAN circuit has a diagnostic function.

5. COMMUNICATION SYSTEM

(a) Components in the audio system communicate each other through AVC–LAN.

(b) The master component of AVC–LAN is the multi–display. The radio receiver assy has a resistor (60 to 80 Ω), which is necessary for communication.

HINT:

For the AVC–LAN circuit with the navigation system, see page 05–1665, "NAVIGATION SYSTEM".

(c) When a short circuit or circuit breakdown occurs in the AVC–LAN circuit, the audio system does not operate normally due to the communication cutoff.

6. DIAGNOSTIC FUNCTION

(a) The audio system has diagnostic function (the diagnostic result is displayed on the LCD of the radio receiver assy).

(b) The components on the AVC–LAN have a three–digit identification number (physical address). The two–digit numbers (logical address) are also allocated to each function. These codes are referred to as "DTC (Diagnosis Trouble Code)." For details of DTC, see page 05–1484.

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0549G–11

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORK SHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–1458)

(a) Ask the customer about and identify the problem.
  (1) Identify the problem occurrence conditions.

3	BASIC INSPECTION

(a) Basic inspection.
  (1) Check the battery voltage.
  Standard: 11 to 14 V
(b) Check the power supply to the multi–display.
  (1) Turn the power switch on (ACC).
  (2) Check if the screen appears on the multi–display.

SCREEN DOES NOT APPEAR	SCREEN DOES NOT APPEAR (PROCEED TO PROBLEM SYMPTOMS TABLE "BLACK SCREEN" (MULTI–DISPLAY)" (SEE PAGE 05–1570)
DISPLAY APPEARS	DISPLAY APPEARS (GO TO STEP 4)

4	BODY MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Check if a DTC is output.

HINT:

This system is connected to the multiplex communication system (BEAN). Therefore, check for a malfunction in the multiplex communication system before troubleshooting.

DTC IS OUTPUT	DTC IS OUTPUT (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")
DTC IS NOT OUTPUT	DTC IS NOT OUTPUT (GO TO STEP 8)

5	DTC CHECK AND CLEAR (OTHER THAN MULTIPLEX DTC) (SEE PAGE 05–1450)

6	DTC CHECK (OTHER THAN MULTIPLEX DTC) (SEE PAGE 05–1461)

DTC IS OUTPUT	DTC IS OUTPUT (GO TO STEP 12)
DTC IS NOT OUTPUT	DTC IS NOT OUTPUT (GO TO STEP 8)

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7	DTC CHART (SEE PAGE 05–1484)

GO TO STEP 9

8	PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1482)

9	CIRCUIT INSPECTION AND PART INSPECTION (SEE PAGE 05–1492 – 05–1537)

10	IDENTIFICATION OF PROBLEM

11	REPAIR OR REPLACE

12	CONFIRMATION TEST

END

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05D0T–02

CUSTOMER PROBLEM ANALYSIS CHECK

AUDIO SYSTEM CHECK SHEET

Inspector's Name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Brought–in Date	/ /	**Odometer Reading**	**km** **mile**

Problem Occurrence Condition	Date malfunction occurred	
	Frequency malfunction occurs	☐ Always ☐ Intermittently (Times per day)
	Vehicle speed when the malfunction occurs	**km (mile)**

Malfunction Area	☐ **Switch**
	☐ **Radio**
	☐ **CD**
	☐ **Noise**

	Parts name	**DTC (1st time)**	**DTC (2nd time)**
DTC Confirmation	Radio receiver assy		
	Stereo component amplifier assy		
	Multi–display		
	Gateway ECU		

I32867

I40672

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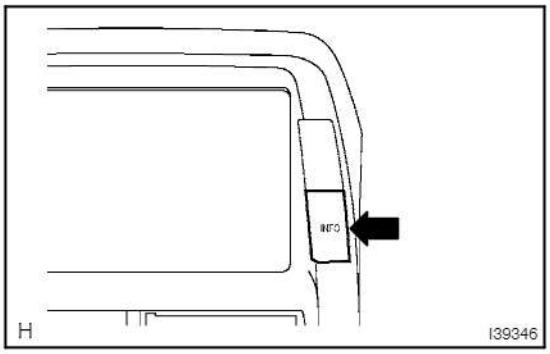
05HH6-01

DIAGNOSTIC START–UP/FINISH

HINT:

- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- After the power switch is ON (ACC), check that the display is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. There are 2 methods to start diagnostic mode. Start the mode by using one of them.

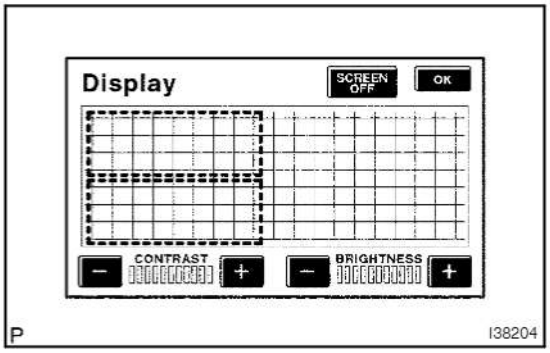


2. Method 1

(a) Start the HV system.

(b) While pressing and holding "INFO" switch, operate light control switch, OFF → TAIL → OFF → TAIL → OFF → TAIL → OFF.

(c) The diagnostic mode starts and the service check screen ("System Check Mode") will be displayed. Service inspection starts automatically and the result will be displayed.



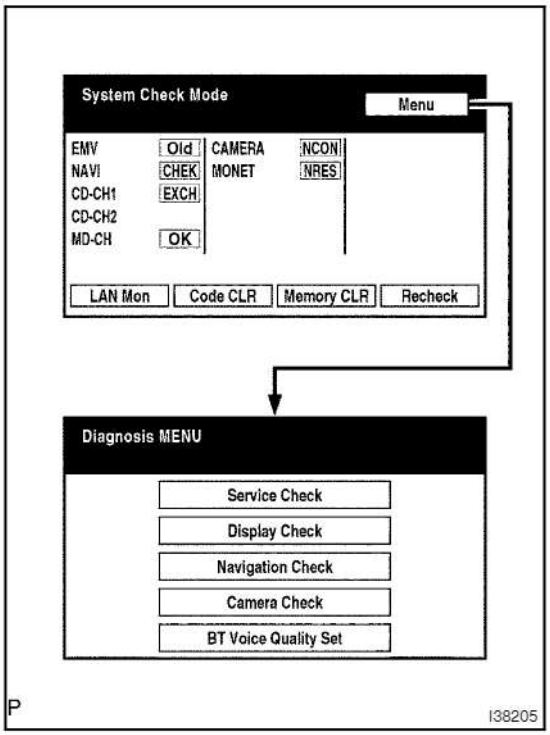
3. Method 2

(a) Start the HV system.

(b) Switch to the "Display Check" screen.

(c) From the display adjustment screen, touch the corners of the screen in the following order: upper left → lower left →upper left → lower left → upper left → lower left.

(d) The diagnostic mode starts and "Service Check" screen will be displayed. Service inspection starts automatically and the result will be displayed.



4. Diagnosis MENU

(a) Diagnostic screen will be displayed by pressing the menu switch on the service check screen.

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5. There are 2 methods to exit. Use one of them.

(a) Turn the power switch off.

(b) Press the "INFO" switch for 3 seconds.

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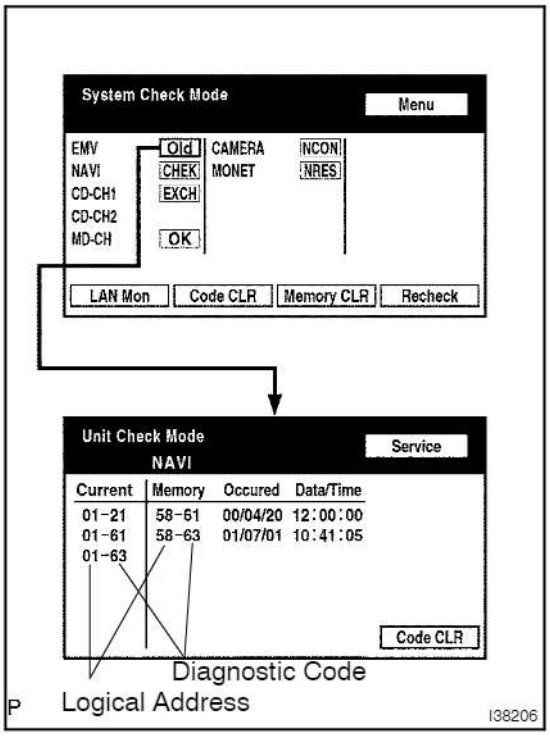
05HH7–01

SYSTEM CHECK MODE (DTC CHECK)

HINT:

The illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Start the diagnostic mode (see page 05–1459).

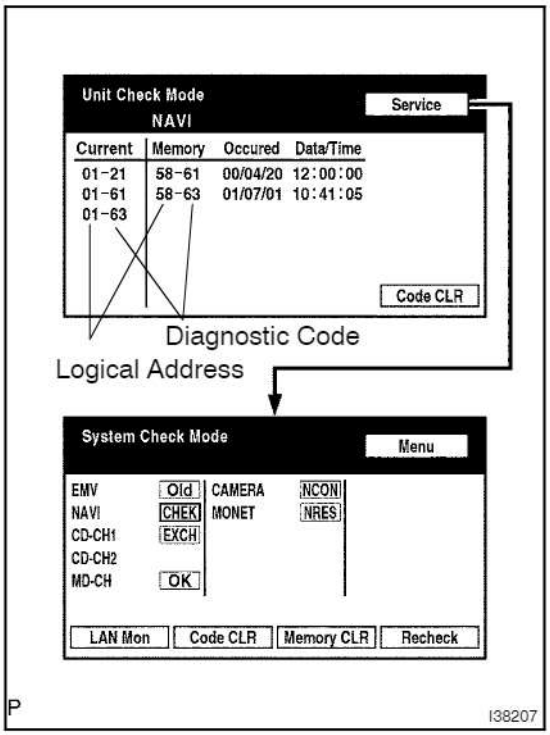


2. Read the service check result.

(a) If all check results of other devices are "EXCH," "CHEK" or "Old," touch the display to check the contents on the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.

HINT:

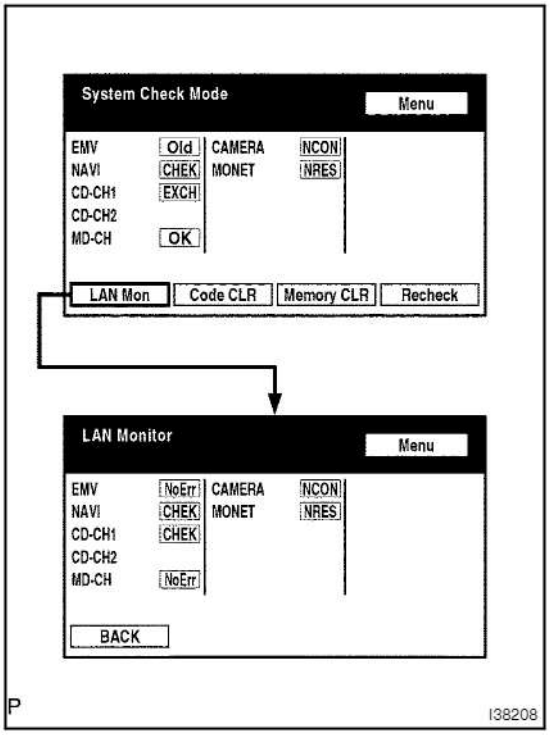
- If all check results are "OK," go to communication DTC check (go to step 3).
- If a device name is not known, its physical address is displayed.



HINT:

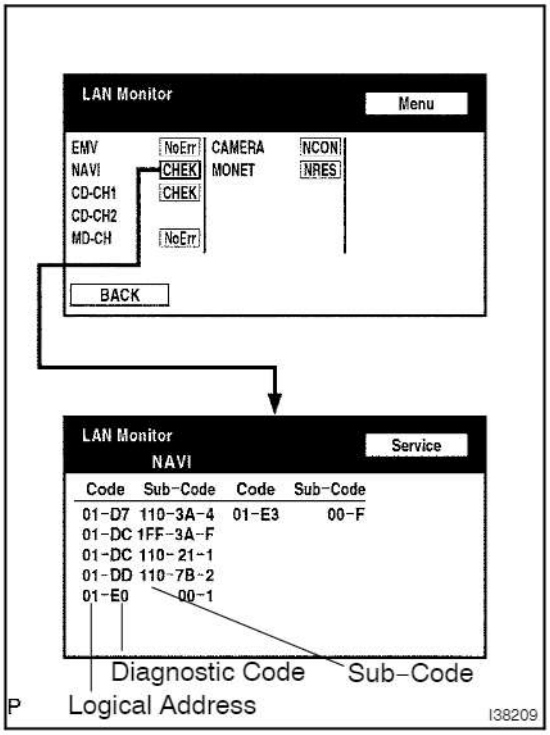
If "EXCH", "CHEK" and "Old" as well as "OK" exist, press the service switch to return to the "System Check Mode". Then, check the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.

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3. Read the communication diagnostic check result.

(a) Return to the "System Check Mode", and press "LAN Mon" switch to enter the LAN monitor screen.

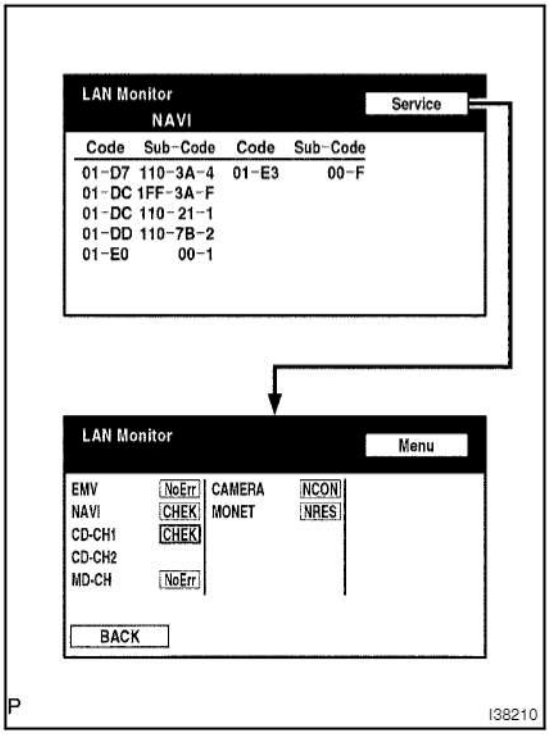


(b) If the result is "CHEK" or "Old," touch the result switch to check the contents on the individual communication diagnostic screen and record them on the customer problem analysis check sheet.

HINT:

- If all check results are "No Err," the system judges that no DTC exists.
- The sub–code (relevant device) will be indicated by its physical address.

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HINT:

If check results of other devices are "CHEK," press the "Service" switch to return to the original "LAN Monitor" screen. Then, check the individual communication diagnostic screen for the next device and record the result on the customer problem analysis check sheet.

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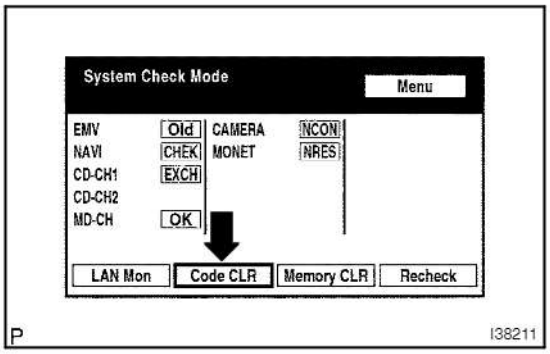
05HH6-01

SYSTEM CHECK MODE (DTC CLEAR/RECHECK)

HINT:

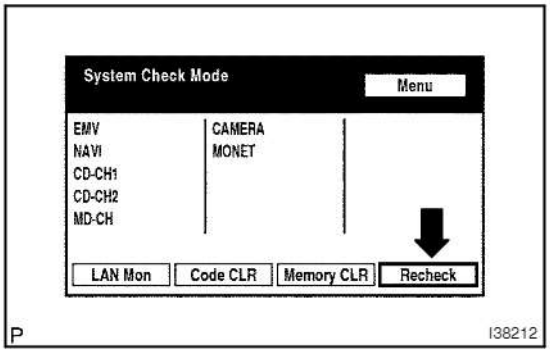
The illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Enter diagnostic mode (see page 05-1578).



2. Clear DTC

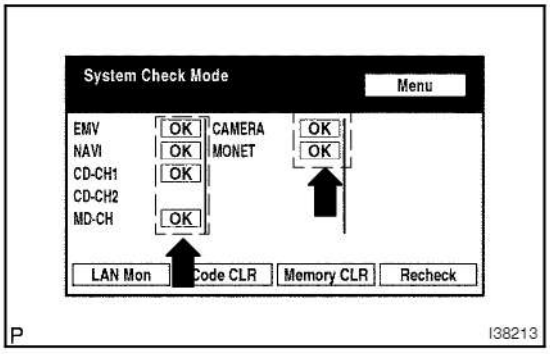
(a) Press the "Code CLR" switch for 3 seconds.



(b) Check result is cleared.

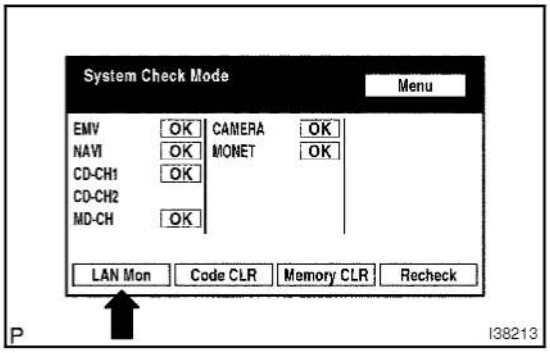
3. Recheck

(a) Press the "Recheck" switch.



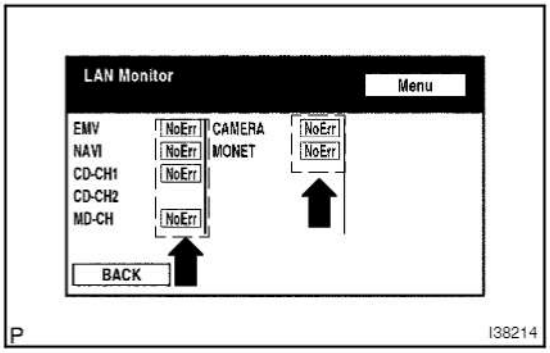
(b) Confirm that all diagnostic codes are "OK" when the check results are displayed.

If a code other than "OK" is displayed, troubleshoot again.



(c) Press the "LAN Mon" switch to change to "LAN Monitor" mode.

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(d) Confirm that all diagnostic codes are "No Err".
If a code other than "No Err" is displayed, troubleshoot again.

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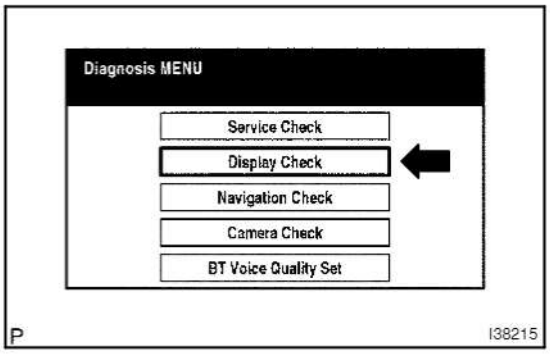
05HH8-01

DISPLAY CHECK MODE (COLOR BAR CHECK)

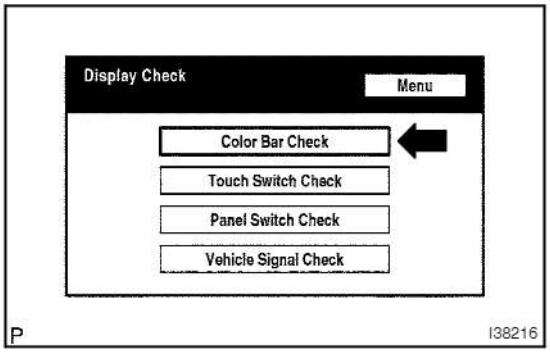
HINT:

- This mode checks the color display on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

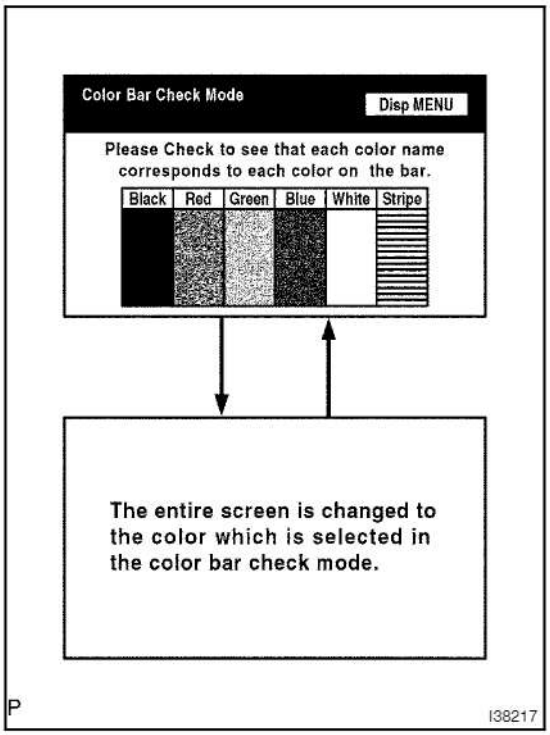
1. **Enter diagnostic mode (see page 05–1459).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Color Bar Check" from the "Display Check" screen.**



4. **Select a color bar from the "Color Bar Check Mode" screen.**

HINT:

- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

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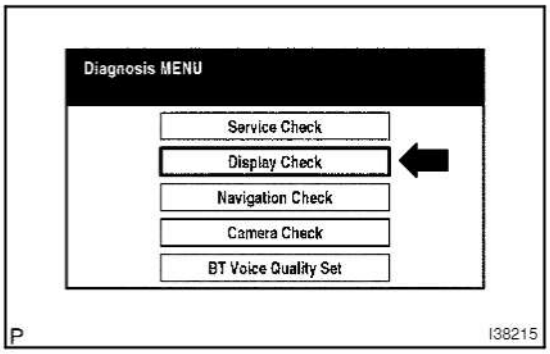
05HHA-01

DISPLAY CHECK MODE (TOUCH SWITCH CHECK)

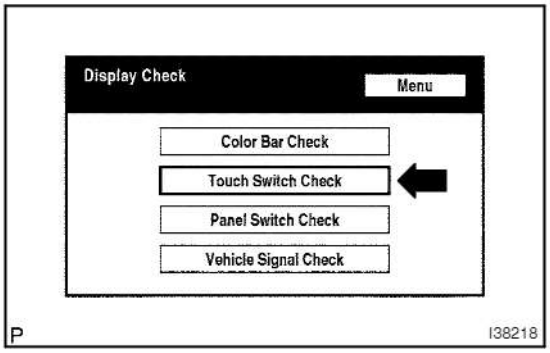
HINT:

- This mode checks the touch switch operation condition on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

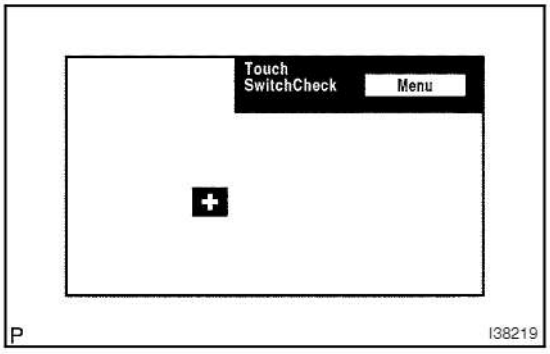
1. **Enter diagnostic mode (see page 05–1459).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Touch Switch Check" from the "Display Check" screen.**



4. **Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.**

HINT:

- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.

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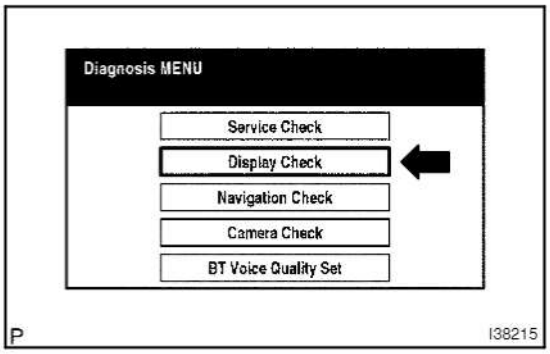
05HHB-01

DISPLAY CHECK MODE (PANEL SWITCH CHECK)

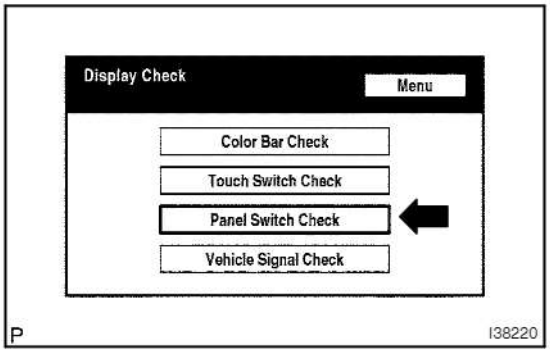
HINT:

- This mode checks the panel switch operation response on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

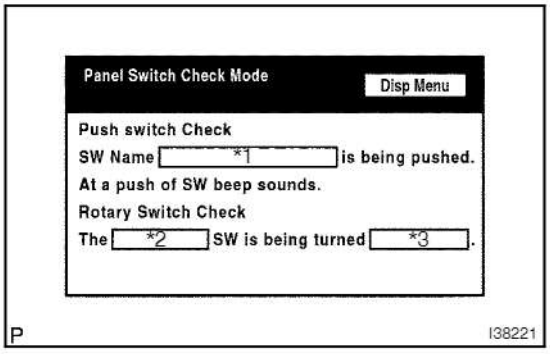
1. **Enter diagnostic mode (see page 05–1459).**



2. **Select "Display Check" from the "Diagnosis Menu" screen.**



3. **Select "Panel Switch Check" from the "Diagnosis MENU ("Display Check")" display.**



4. **Operate each switch and check that the switch name and condition are correctly displayed.**

HINT:

- Pressing the "INFO" switch for 3 seconds will exit the diagnostic mode.

Display	Contents
Push switch name/*1	• Name of the pressed switch is displayed. • If more than one switch is pressed, "MULTIPLE" is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is rotated.

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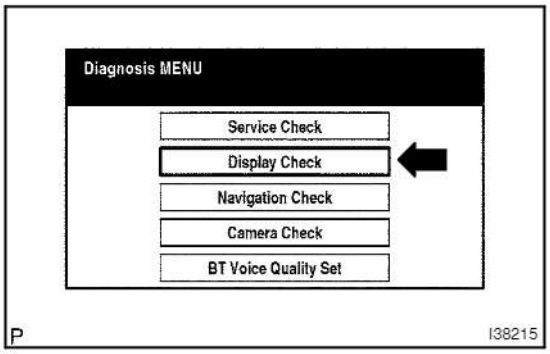
05HHC–01

DISPLAY CHECK MODE (VEHICLE SIGNAL CHECK)

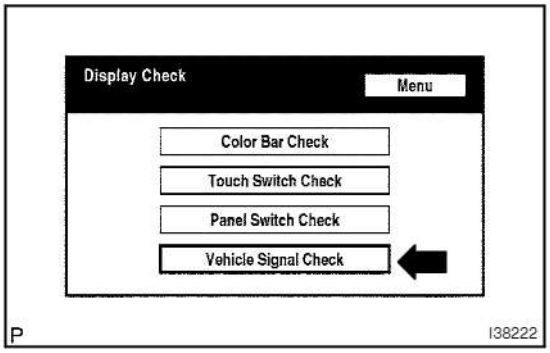
HINT:

- This mode checks the vehicle signal status input to the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

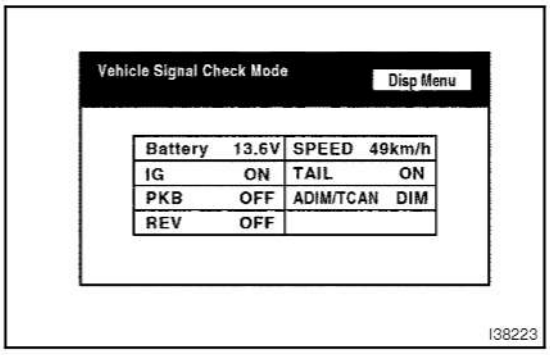
1. **Enter diagnostic mode (see page 05–1459).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Vehicle Signal Check" from the "Diagnosis MENU" screen.**



4. **When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.**

HINT:

- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

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05HHD–01

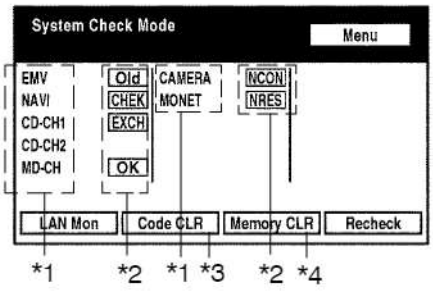
DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- This section contains a detailed description of displays within diagnostic mode.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Service Check (System Check)

(a) System Check Mode Display



P

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Device Names and hardware Address/*1

HINT:

- Registered device names are displayed below.
- If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G–BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA–C	1B0	Rr–TV
1C0	Rr–CONT	1C2	TV–TUNER2
1C2	PANEL	1C6	G/W
1C8	FM–M–LCD	1D8	CONT–SW
1EC	Body	1F0	RADIO TUNER
1F1	XM	1F2	SIRIUS
230	TV–TUNER	240	CD–CH2
250	DVD–CH	280	CAMERA
360	CD–CH1	3A0	MD–CH
17D	TEL	440	DSP–AMP
530	ETC	5C8	MAYDAY
1A0	DVD–P	1D6	CLOCK
1F4	RSA	1F6	RSE
480	AMP	–	–

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Check Result/*2

HINT:

Result codes for all devices are shown below.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC–LAN)	–
EXCH	The device responds with a "replace"–type DTC	Look up the DTC in "Unit Check Mode" and replace the device.
CHEK	The device responds with a "check"–type DTC	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responds with an "old"–type DTC	Look up the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

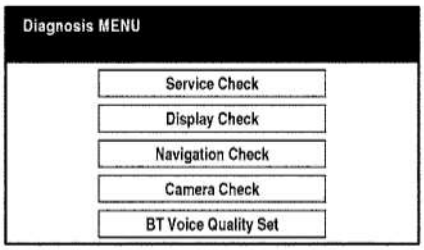
Code Clear/*3

Present DTCs are cleared.

Memory Clear/*4

Present and past DTCs and registered connected device names are cleared.

(b) Diagnosis MENU Display



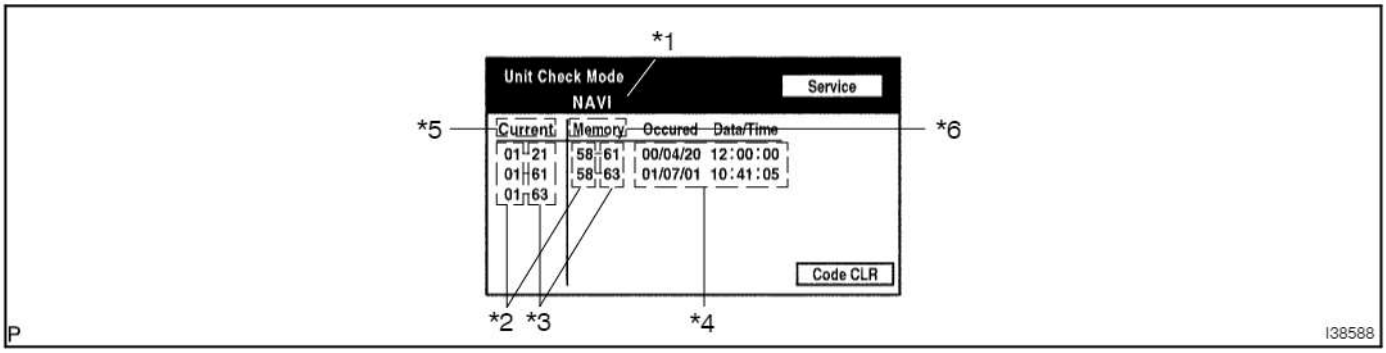
P I38666

HINT:

Each item is grayed out or not displayed based on the device settings.

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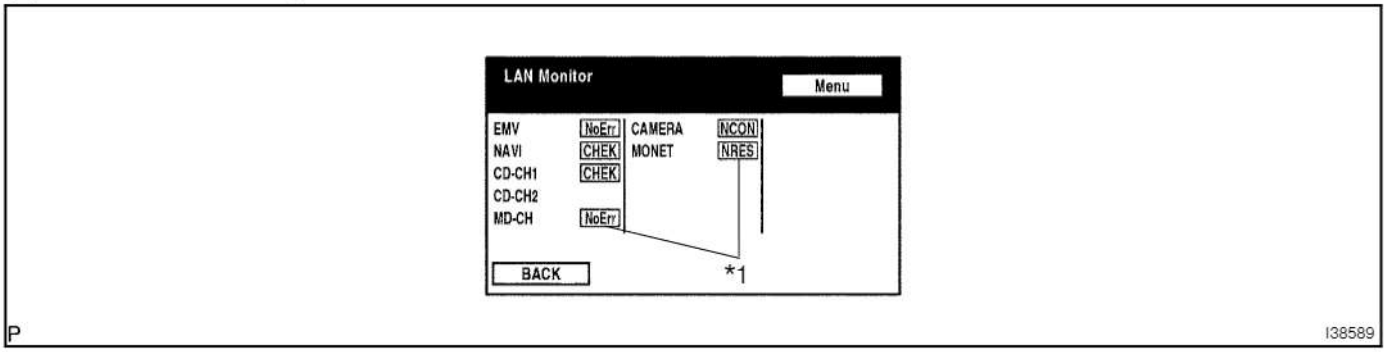
(c) Unit Check Mode Screen



Screen Description

Display	Contents
Device name/*1	Target Device
Segment/*2	Target Device Logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Time stamp/*4	The time and date of past DTCs are displayed. (The year is displayed in 2 digit format.)
Present Code/*5	The DTC output at the service check is displayed.
Past Code/*6	Diagnostic memory results and recorded DTCs are displayed.

(d) LAN Monitor Original Screen



Check result

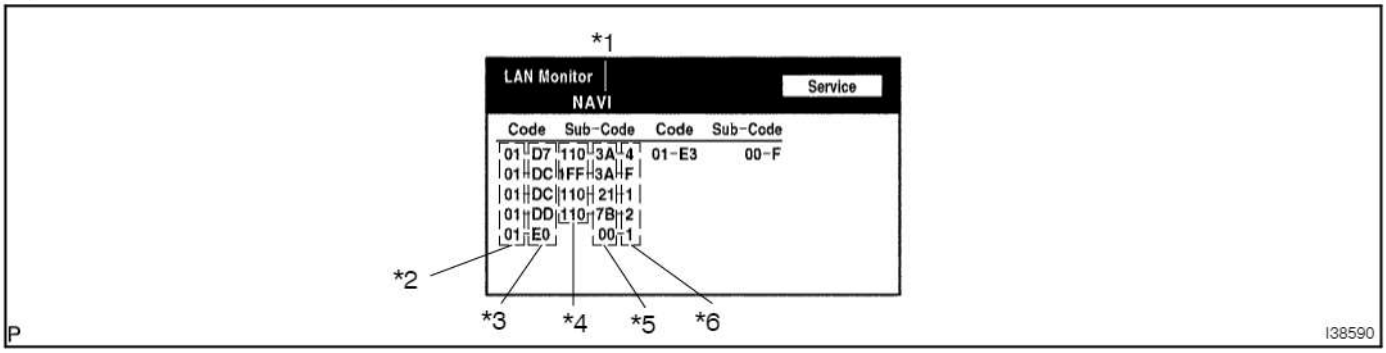
HINT:

Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	–
CHEK	The device responds with a "check"–type DTC.	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responded with an old–type DTC.	Look up the DTC in "Unit Check Mode".
NRES	Device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

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(e) LAN Monitor (Individual) Screen

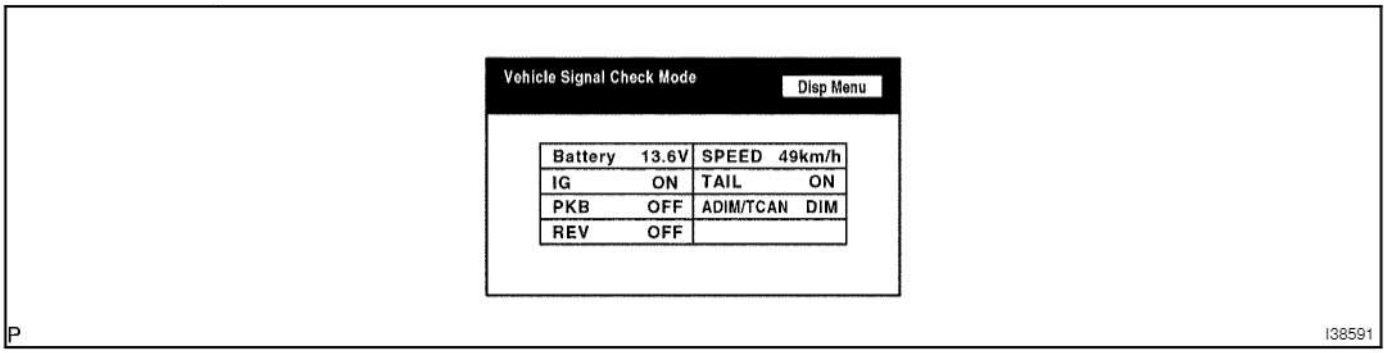


Screen Description

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub-Code (device address)/*4	Physical address stored with DTC. (If there is no address, nothing is displayed.)
Connection check No./*5	Connection check number stored with DTC.
DTC occurrence/*6	Number of times the same DTC has been recorded.

2. DISPLAY CHECK

(a) Vehicle Signal Check Mode Screen



Screen Description

Name	Contents
Battery	Battery voltage is displayed.
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
IG	IG switch ON/OFF state is displayed.
ADIM/TCAN	Brightness state DIM (with)/ BRIGHT (without) is displayed.
SPEED	The vehicle speed, displayed in Km/h.
TAIL	TAIL signal (Head lamp dimmer switch) ON/OFF state is displayed.

HINT:

- Only items sending a vehicle signal will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

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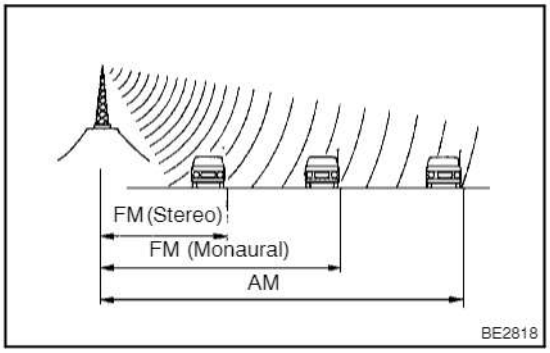
IDENTIFICATION OF NOISE SOURCE

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows.

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency

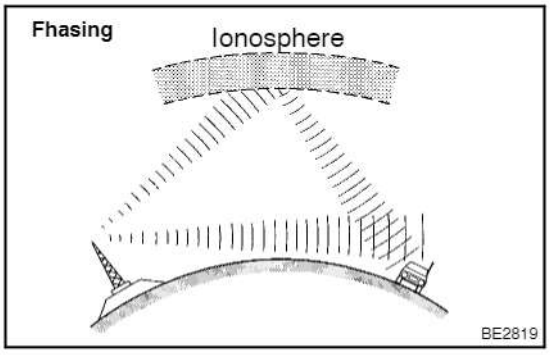


2. SERVICE AREA

(a) There is a great difference in the size of the service areas for AM and FM broadcasting. Sometimes an FM stereo broadcast cannot be received even though AM can be received very clearly.
FM stereo has the smaller service area, it also picks up static and other types of interference (”noise”) easily.

3. RECEPTION PROBLEMS

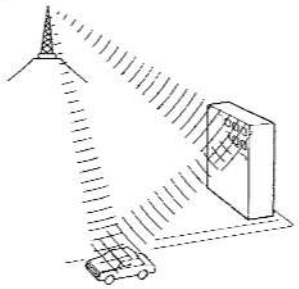
HINT:
Besides the problem of static, there are other problems called ”fhasing”, ”multipath” and ”fade out”. These problems are caused not by electrical noise but by the nature of the radio waves themselves.



(a) Fhasing
Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals that reach the vehicle’s antenna directly from the same transmitter. This type of interference is called ”fhasing”.

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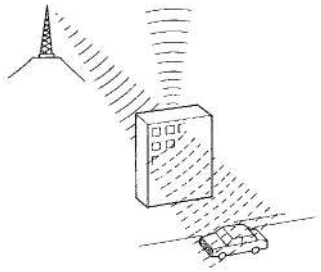
Multipath



BE2820

(b) Multipath
Interference caused by reflection of radio waves against obstructions is called "Multipath". Multipath occurs when radio signals emitted from the broadcast transmitter antenna are reflected against tall buildings or mountains and interferes with other signals which are to be received directly.

Fade Out



BE2821

(c) Fade Out
FM radio wave tends to be reflected against obstructions such as tall buildings or mountains because FM frequency is higher than that of AM. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind those obstructions. This phenomenon is called "fade out".

4. NOISE PROBLEMS

(a) It is very important for technicians to understand a customer's claim about noise clearly. Use the following table to diagnose the phenomena.

Radio wave	Condition in which noise occurs	Probable cause
AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	The same program may be broadcasted from some local stations. If the program is the same, one of those may be tuned in.
FM	Noise occurs only at night.	Strong possibility of beat from a distant broadcasting.
	Noise occurs at a specific place during driving.	Strong possibility of multipath noise and fhasing noise caused by changes of FM frequency.

HINT:
If the condition when the noise occurs does not meet any of the above, find out the cause based on "Reception Problems". Refer to the description about Multipath and Fhasing mentioned previously.

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5. IDENTIFICATION OF NOISE SOURCE

(a) Identify the condition in which the noise occurs, and check the noise filter on the related part.

Condition in which noise occurs	Noise Source
Depressing the acceleration pedal increases the noise, and stopping the engine erases the noise immediately.	Generator
Noise occurs during A/C or the heater operation.	Blower motor
Rapid acceleration while driving on the unpaved road or after the ignition switch is turned on makes noise.	Fuel pump
Pressing and then releasing the horn switch, and keeping pressing the horn switch makes unusual noise.	Horn
Stopping the engine erases small noise that has been heard.	Ignition
Noise occurs synchronously with the turn signal flash.	Flasher
Noise occurs during window washer operation.	Washer
Noise occurs during the engine running, and it continues even after the engine stops.	Engine coolant temperature sensor
Noise occurs during the wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others.	Static electricity stored on the vehicle

(b) Reference:

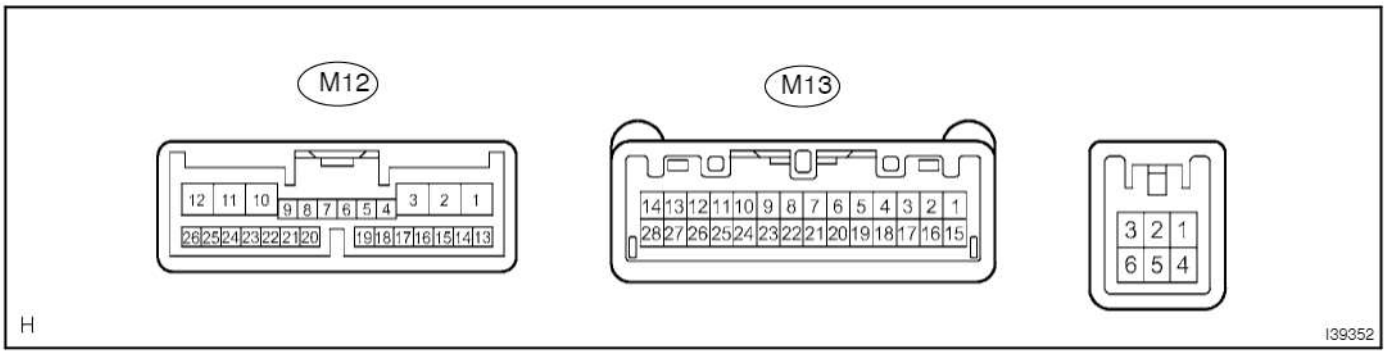
- Make sure first that there is no noise from outside. Failing to do so makes the noise source detection difficult and leads to misunderstanding.
- The noise should be removed in descending order of loudness.
- Setting the radio unturned makes noise noticeable, making the recognition of the phenomenon easier.

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05HHF-01

TERMINALS OF ECU

1. MULTI–DISPLAY



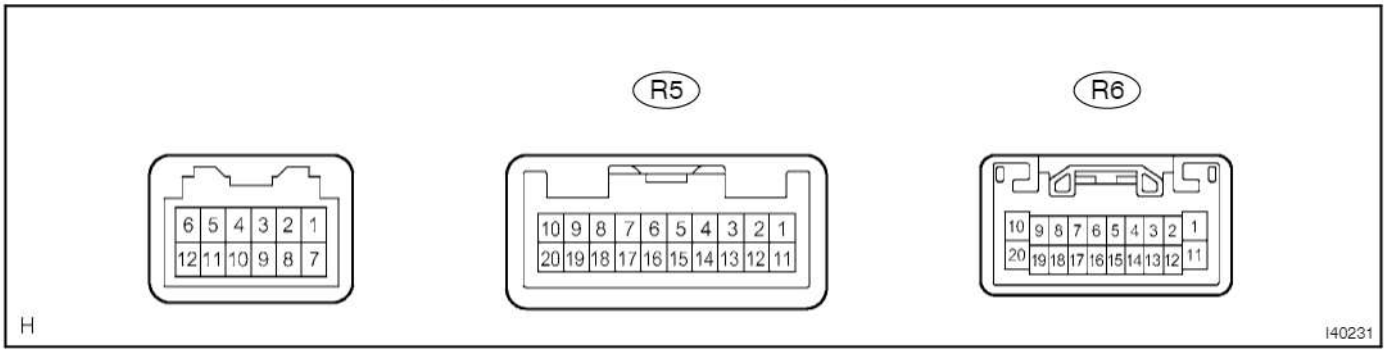
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
ILL+ (M12–1) – GND1 (M12–3)	G – BR	Illumination (rheostat) signal	Power switch OFF → ON (IG)	Below 1 V → 10 to 14 V
GND1 (M12–3) – Body ground	BR – Body ground	Ground	Always	Below 1 Ω
TX1+ (M12–4) – GND1 (M12–3)	B – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TX1– (M12–5) – GND1 (M12–3)	W – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TC (M12–7) – GND1 (M12–3)	P – BR	Diagnosis ON signal	Power switch OFF → ON (IG)	Below 1 V → 10 to 14 V
IG (M12–10) – GND1 (M12–3)	B – BR	Power switch IG	Power switch OFF → ON (IG)	Below 1 V → 10 to 14 V
ACC (M12–11) – GND1 (M12–3)	GR – BR	Power switch ACC	Power switch OFF → ON (ACC)	Below 1 V → 10 to 14 V
+B1 (M12–12) – GND1 (M12–3)	Y – BR	Battery	Always	10 to 14 V
PKB (M12–16) – GND1 (M12–3)	R – BR	Parking brake signal	Turn parking brake switch ON → OFF	Below 1 V → 10 to 14 V
DR (M12–17) – GND1 (M12–3)	B – BR	Dimmer signal	Light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
TX2+ (M12–18) – GND1 (M12–3)	P (*1), LG (*2) – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TX2– (M12–19) – GND1 (M12–3)	W (*1), P (*2) – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
SPD (M12–25) – GND1 (M12–3)	V – BR	Speed signal from combination meter	See "vehicle signal check mode"	–

*1: LHD, RHD (Built–in Type Amplifier)

*2: RHD (Separate Type Amplifier)

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2. RADIO RECEIVER ASSY (SEPARATE TYPE AMPLIFIER)

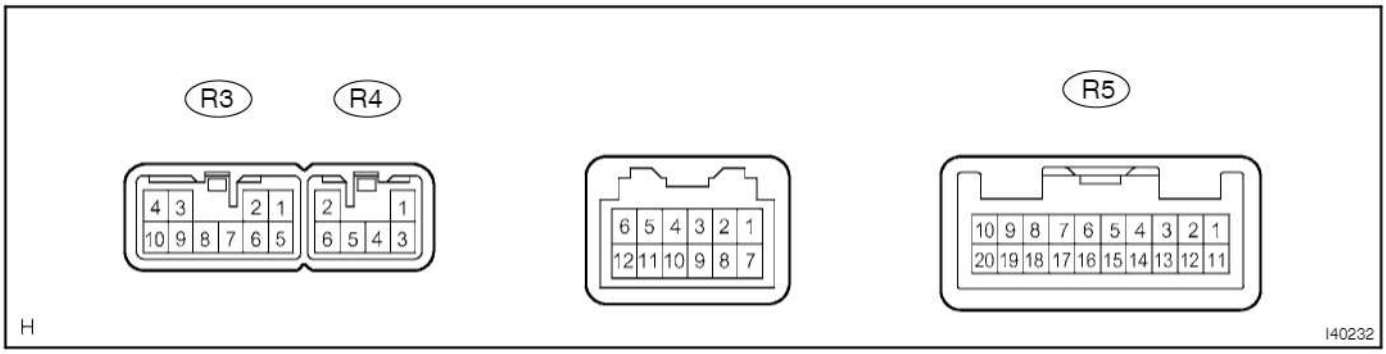


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
GND (R5–6) – Body ground	R – Body ground	Steering pad switch ground	Always	Below 1 Ω
SW1 (R5–7) – GND (R6–20)	B – BR	Steering pad switch signal	Steering pad switch not operating. → SEEK+ switch push → SEEK– switch push → VOL+ switch push → VOL– switch push	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (R5–8) – GND (R6–20)	W – BR	Steering pad switch signal	Steering pad switch not operating. → MODE switch push	4 V or more → Below 2.5 V
TX+ (R5–9) – GND (R6–20)	P (*1), LG (*2) – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TX– (R5–10) – GND (R6–20)	W (*1), P (*2) – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
+B (R6–1) – GND (R6–20)	SB – BR	Battery	Always	10 to 14 V
ILL+ (R6–2) – GND (R6–20)	G – BR	Illumination (rheostat) signal	Power switch OFF → ON Light control switch TAIL or HEAD	Below 1V → 10 to 14V
TX+ (R6–5) – GND (R6–20)	P – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
MUTE (R6–7) – GND (R6–5)	W – BR	Mute signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
R+ (R6–8) – GND (R6–5)	R – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L+ (R6–9) – GND (R6–5)	W – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
SLD (R6–10) – Body ground	Shield – Body ground	Shielded ground	Always	Below 1 Ω
ACC (R6–11) – GND (R6–20)	GR – BR	Power switch ACC	Power switch OFF → ON (ACC)	Below 1 V → 10 to 14 V
ANT+ (R6–13) – GND (R6–20)	O – BR	Power source of antenna	Radio power switch ON and AM or FM	10 to 14 V
TX– (R6–15) – GND (R6–20)	O – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
R– (R6–18) – GND (R6–20)	G – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L– (R6–19) – GND (R6–20)	B – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (R6–20) – Body ground	BR – Body ground	Ground	Always	Below 1 Ω

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*1: LHD
*2: RHD

3. RADIO RECEIVER ASSY (BUILT–IN TYPE AMPLIFIER)

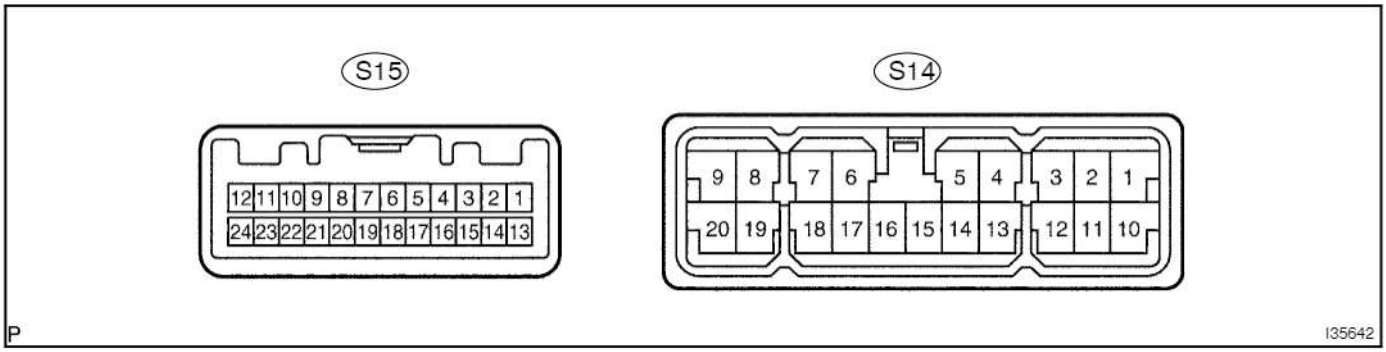


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
GND (R5–6) – Body ground	R – Body ground	Steering pad switch ground	Always	Below 1 Ω
SW1 (R5–7) – GND (R3–7)	B – BR	Steering pad switch signal	Steering pad switch not operating. → SEEK+ switch push → SEEK– switch push → VOL+ switch push → VOL– switch push	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (R5–8) – GND (R3–7)	W – BR	Steering pad switch signal	Steering pad switch not operating. → MODE switch push	4 V or more → Below 2.5V
TX1+ (R5–9) – GND (R6–20)	P – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TX1– (R5–10) – GND (R6–20)	W – BR	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
FR+ (R3–1) – GND (R3–7)	LG – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (R3–2) – GND (R3–7)	P – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
ACC (R3–3) – GND (R3–7)	GR – BR	Power switch ACC	Power switch OFF → ON (ACC)	Below 1 V → 10 to 14 V
+B (R3–4) – GND (R3–7)	SB – BR	Battery	Always	10 to 14 V
FR– (R3–5) – GND (R3–7)	L – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
FL– (R3–6) – GND (R3–7)	V – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (R3–7) – Body ground	BR – Body ground	Ground	Always	Below 1 Ω
ANT+ (R3–8) – GND (R3–7)	O – BR	Power source of antenna	Radio power switch ON and AM or FM	10 to 14 V
ILL+ (R3–10) – GND (R3–7)	G – BR	Illumination (rheostat) signal	Power switch OFF → ON Light control switch TAIL or HEAD	Below 1V → 10 to 14V
RR+ (R4–1) – GND (R3–7)	R – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (R4–2) – GND (R3–7)	B – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output

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RR– (R4–3) – GND (R3–7)	W – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
RL– (R4–6) – GND (R3–7)	Y – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output

4. STEREO COMPONENT AMPLIFIER ASSY



Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
+B (S14–1) – GND (S14–16)	SB – W–B (*1) SB – BR (*2)	Battery	Always	10 to 14 V
CTR+ (S14–3) – GND (S14–16)	R – W–B (*1) R – BR (*2)	Sound signal (Center)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (S14–4) – GND (S14–16)	B – W–B (*1) B – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
RR+ (S14–5) – GND (S14–16)	R – W–B (*1) R – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (S14–6) – GND (S14–16)	P – W–B (*1) P – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
FR+ (S14–7) – GND (S14–16)	LG – W–B (*1) LG – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
WF2+ (S14–8) – GND (S14–16)	P – W–B (*1) P – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
WF1+ (S14–9) – GND (S14–16)	LG – W–B (*1) LG – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
+B2 (S14–10) – GND (S14–16)	SB – W–B (*1) SB – BR (*2)	Battery	Always	10 to 14 V
CTR– (S14–12) – GND (S14–16)	W – W–B (*1) W – BR (*2)	Sound signal (Center)	Audio system is playing	A waveform synchronized with sounds is output
RL– (S14–13) – GND (S14–16)	Y – W–B (*1) Y – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
RR– (S14–14) – GND (S14–16)	W – W–B (*1) W – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
GND2 (S14–15) – Body ground	W–B (*1), BR (*1) – Body ground	Ground	Always	Below 1 Ω
GND (S14–16) – Body ground	W–B (*1), BR (*1) – Body ground	Ground	Always	Below 1 Ω

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FL– (S14–17) – GND (S14–16)	V – W–B (*1) V – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
FR– (S14–18) – GND (S14–16)	L – W–B (*1) L – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
WF2– (S14–19) – GND (S14–16)	V – W–B (*1) V – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
WF1– (S14–20) – GND (S14–16)	L – W–B (*1) L – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
MUTE (S15–1) – GND (R6–5)	W – BR (*1) W – BR (*2)	Mute signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
L– (S15–2) – GND (S14–16)	B – W–B (*1) B – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
L+ (S15–3) – GND (S14–16)	W – W–B (*1) W – BR (*2)	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
R– (S15–4) – GND (S14–16)	G – W–B (*1) G – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
R+ (S15–5) – GND (S14–16)	R – W–B (*1) R – BR (*2)	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
SLD (S15–6) – Body ground	Shield – Body ground	Shielded ground	Always	Below 1 Ω
TX– (S15–7) – GND (S14–16)	O – BR (*1) O – BR (*2)	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
TX+ (S15–8) – GND (S14–16)	P – BR (*1) P – BR (*2)	AVC–LAN communication signal	See "system check mode" → Power switch ON (IG)	– → 2 to 3 V
ACC (S15–12) – GND (R6–20)	GR – BR (*1) GR – BR (*2)	Power switch ACC	Power switch OFF → ON (ACC)	Below 1 V → 10 to 14 V
(*3) N–MU (S15–21) – GND (R6–5)	W – BR (*1) W – BR (*2)	Mute signal	Audio system is playing → Changing	Below 3.5 V → Below 1 V

*1: LHD

*2: RHD

*3: w/ Navigation system

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0549M–13

PROBLEM SYMPTOMS TABLE

HINT:

Before performing verification listed in the table below, check the fuse and relay.

RADIO RECEIVER ASSY

Symptom	Suspected Area	See page
Pressing PWR switch does not turn on system.	1. Power source circuit (radio receiver assy) 2. Power source circuit (multi–display) 3. AVC–LAN circuit (radio receiver assy – EMV) 4. Radio receiver assy 5. Multi–display	05–1492 05–1630 05–1523 67–5 67–7
The audio system does not function.	1. Steering pad switch circuit 2. Radio receiver assy	05–1498 67–5
No sound can be heard. (separate type amplifier)	1. Power source circuit (stereo component amplifier assy) 2. AMP sound signal circuit 3. Speaker circuit 4. AVC–LAN circuit (radio receiver assy – AMP) 5. AMP mute signal circuit (from radio receiver assy) 6. Stereo component amplifier assy	05–1495 05–1519 05–1512 05–1521 05–1506 67–25
No sound can be heard. (built–in type amplifier)	1. Power source circuit (radio receiver assy) 2. Speaker circuit 3. Radio receiver assy	05–1492 05–1512 67–5
Sound cannot be heard from the front driver side speaker (low volume). (separate type amplifier)	1. AMP mute signal circuit (from navigation ECU) 2. Stereo component amplifier assy	05–1509 67–25
Poor sound quality in all modes (low volume). (separate type amplifier)	1. Power source circuit (radio receiver assy) 2. Power source circuit (stereo component amplifier assy) 3. Speaker circuit 4. AMP sound signal circuit (radio receiver assy – AMP) 5. Sound quality is bad in all modes (volume is too low)	05–1492 05–1495 05–1512 05–1451 05–1525
Poor sound quality in all modes (low volume). (built–in type amplifier)	1. Power source circuit (radio receiver assy) 2. Speaker circuit 3. Sound quality is bad in all modes (volume is too low)	05–1492 05–1512 05–1525
Abnormal noise occurs.	–	05–1526
Radio broadcast cannot be received (poor reception).	–	05–1527
CD cannot be inserted/played or CD is ejected right after insertion.	1. Power source circuit (radio receiver assy) 2. CD cannot be inserted or is ejected right after insertion	05–1492 05–1529
CD cannot be ejected.	1. Power source circuit (radio receiver assy) 2. CD cannot be ejected	05–1492 05–1531
CD sound is poor (low volume).	–	05–1525
CD sound skips.	–	05–1533
Cassette tape cannot be inserted or cannot be played.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be inserted or played	05–1492 05–1534
Cassette tape cannot be ejected.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be ejected	05–1492 05–1535
Poor sound quality when playing cassette tape.	–	05–1536
The tape is tangled due to unsuitable tape speed or auto–reverse malfunction.	–	05–1537

STEERING PAD SWITCH

Symptom	Suspected Area	See page
Audio system is not operated using a steering pad switch.	1. Steering pad switch circuit 2. Radio receiver assy	05–1498 67–5

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OTHERS

Symptom	Suspected Area	See page
Radio receiver or multi–display illumination does not illuminate at night (when the light control switch is turned to TAIL or HEAD).	1. Illumination circuit 2. Radio receiver assy 3. Multi–display	05–1503 67–5 67–7

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0546U–14

DIAGNOSTIC TROUBLE CODE CHART

Terms	Description
Physical address	3–digit hexadecimal code assigned to all components connected to the AVC–LAN. Individual symbols are specified based on function. Units whose names are unknown or relevant units are displayed with physical address.
Logical address	2–digit hexadecimal code assigned to all the functions in the AVC–LAN system.

HINT:

- Titles for each unit are stated in the following order: component name, (physical address) [DTC displayed name].
- For the DTC of a vehicle with a navigation system, refer to "NAVIGATION SYSTEM" (see page 05–1585).

1. MULTI–DISPLAY (PHYSICAL ADDRESS: 110) [EMV]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
21	ROM error	Abnormal condition of ROM is detected.	Replace multi–display	67–7
22	RAM error	Abnormal condition of RAM is detected.	Replace multi–display	67–7

DTC	Name	Diagnosis	Verification
D5	Registered component is missed	Component in which this code is recorded is or was disconnected from the system when power switch is in ACC (ON).	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
D8	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after engine start.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
D9	Last mode error	The device (for audio visual system) that had functioned before the engine stopped is (was) disconnected from the system when the power switch is (was) in the ACC or ON state.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DA	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DB	Mode status error	This code detects a dual alarm.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DC	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DE	Slave reset	This code is stored when a slave device has been disconnected after engine start.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.

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(b) Logical address: 21 (SW unit): 23 (SW with name unit): 24 (SW converting unit): 25 (command SW unit)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Panel SW failure	Panel SW detection circuit failure	Replace multi–display	67–7

2. RADIO RECEIVER ASSY (PHYSICAL ADDRESS: 190) [AUDIO H/U]

(a) Logical address: 01 (Communication control)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6	Absence of master unit	Component in which this code is recorded was disconnected from system or master component with ignition switch in ACC or ON.	1. Power source circuit (multi–display) 2. Power source circuit (radio receiver assy) 3. AVC–LAN circuit (multi–display – radio receiver assy) 4. Replace multi–display 5. Replace radio receiver assy	05–1630 05–1492 05–1523 67–7 67–5
D7	Connection check error	Component in which this code is recorded is (was) disconnected from system after engine start. Either that, or radio receiver assy was disconnected when this code was recorded.	1. Power source circuit (multi–display) 2. Power source circuit (radio receiver assy) 3. AVC–LAN circuit (multi–display – radio receiver assy) 4. Replace multi–display 5. Replace radio receiver assy	05–1630 05–1492 05–1523 67–7 67–5
DC	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	1. Inspection of components indicated by sub–codes. 2. Refer to the table for inspection of components indicated by sub–code.	– –
DD	Master reset	After the power switch ON (READY), master component was disconnected from system.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
DF	Master error	Due to defective cognition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
E0	Registration complete indication error	"Registration complete" command from the master device cannot be received. NOTE: This DTC may not be directly related to the problem.	–	–

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E1	Voice processing device ON error	The AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
E2	ON/OFF indication parameter error	The command for ON/OFF control from the master device has a problem.	Replace multi–display	67–7
E3	Registration demand transmission	The registration demand command from the slave device is output, or the registration demand command is output by receiving connection confirmation command from the sub master device. NOTE: This DTC may not be directly related to the problem.	–	–
E4	Multiple frame incomplete	The multiple frame transmission ends incomplete. NOTE: This DTC may not be directly related to the problem.	–	–

DTC	Name	Diagnosis	Verification
D5	Registered component is missed	Component in which this code is recorded is or was disconnected from the system when power switch is in ACC (ON).	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
D8	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after engine start.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
D9	Last mode error	The device (for audio visual system) that had functioned before the engine stopped is (was) disconnected from the system when the power switch is (was) in the ACC or ON state.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DA	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DB	Mode status error	This code detects a dual alarm.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.
DE	Slave reset	This code is stored when a slave device has been disconnected after engine start.	• Inspection of components indicated by sub–codes. • Refer to the table for inspection of components indicated by sub–code.

(b) Logical address: 60 (Radio unit)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	AM turner PLL does not lock	The PULL circuit in the AM tuner is abnormal.	1. After clearing the DTC, check the antenna wiring. 2. If the same code is detected again, replace the radio receiver assy.	05–1464 67–5

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11	FM tuner PLL does not lock	The PULL circuit in the FM tuner is abnormal.	1. After clearing the DTC, check the antenna wiring. 2. If the same code is detected again, replace the radio receiver assy.	05–1464 67–5
40	Antenna not connected	Antenna is disconnected.	1. After clearing the DTC, check the antenna wiring. 2. If the same code is detected again, replace the radio receiver assy.	05–1464 67–5
41	Antenna power source error	A malfunction is detected in the antenna power supply system.	1. After clearing the DTC, check the antenna wiring. 2. If the same code is detected again, replace the radio receiver assy.	05–1464 67–5
42	Tuner power source error	The power source of the tuner is abnormal.	1. Power source circuit (radio receiver assy) 2. Replace radio receiver assy	05–1492 67–5
43	AM tuner error	The AM tuner is abnormal.	Replace radio receiver assy	67–5
44	FM tuner error	The FM tuner is abnormal.	Replace radio receiver assy	67–5
45	SW tuner error	The SW tuner is abnormal.	Replace radio receiver assy	67–5

(c) Logical address: 62 (CD unit): 63 (CD changer unit)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	CD player mechanical error	A mechanical error in the CD player is detected while the CD is not being inserted or ejected.	Replace radio receiver assy	67–5
11	CD insertion & eject error	CD insertion or ejection is failed.	Replace radio receiver assy	67–5
12	CD reading abnormal	CD read problem occurs.	Replace radio receiver assy	67–5
40	No disc	No disc is inserted.	1. Check if a CD is inserted. If a CD is inserted, check if it can be ejected. If it cannot be ejected, replace the radio receiver assy. 2. Inspect CD 3. If the same code is detected again, replace the radio receiver assy.	05–1529 05–1454 67–5
41	Wrong disc	An unsuitable disc is inserted.	1. Inspect CD 2. If the same code is detected again, replace the radio receiver assy.	05–1454 67–5
42	Disc cannot be read	The disc cannot be read.	1. Inspect CD 2. If the same code is detected again, replace the radio receiver assy.	05–1454 67–5
43	CD–ROM abnormal	CD–ROM operation is abnormal.	Replace radio receiver assy	67–5

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45	EJECT error	The magazine cannot be ejected.	1. Eject the magazine, check the inserting direction, and check the symptom. 2. If the same code is detected again, replace the radio receiver assy.	– 67–5
44	CD abnormal	Operation error in the CD mechanism (except for code 10).	1. After clearing the DTC, check the malfunction symptom. 2. If the same code is detected again, replace the radio receiver assy.	– 67–5
46	CD has scratches or upside down	CD has dirt or scratches on the surface or is upside down.	1. Inspect CD 2. If the same code is detected again, replace the radio receiver assy.	05–1454 67–5
47	CD temperature is high	The sensor detects that the CD unit temperature is high.	1. Park the vehicle in a cool place. Turn the engine off. After checking that the temperature of the radio receiver assy becomes sufficiently low, turn the engine on in order to verify the malfunction symptom. 2. If the same code is detected again, replace the radio receiver assy.	– 67–5
48	Over–current detection	Over–current flows in to the CD changer.	Replace radio receiver assy	67–5
50	Tray insertion/ejection error	The tray insertion/ejection error occurs in the CD changer.	1. Foreign matter is found. 2. Replace radio receiver assy	– 67–5
51	Elevator error	Elevator error occurs in the CD changer.	Replace radio receiver assy	67–5
52	Clamp error	Clamp error occurs in the CD changer.	Replace radio receiver assy	67–5

(d) Logical address: 61 (Cassette unit)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Belt cut	The inside belt is cut or come off.	Replace radio receiver assy	67–5
40	Mechanical error of media	A malfunction due to mechanical problem, cassette tape is cut or entangled.	1. Replace the cassette tape and recheck the symptom. 2. If the same code is detected again, replace the radio receiver assy.	– 67–5
41	EJECT error	A malfunction due to mechanical problem.	Replace radio receiver assy	67–5
42	Tape tangling	Cassette tape is tangled	Replace radio receiver assy	67–5

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43	Head dirt	Head is dirty	1. Clean the head and recheck the symptom. 2. If the same code is detected again, replace the radio receiver assy.	– 67–5
44	Device power supply problem	A short or open in the power circuit	1. Power source circuit (radio receiver assy) 2. Replace radio receiver assy	05–1492 67–5

3. GATEWAY ECU (PHYSICAL ADDRESS: 1C6) [G/W]

(a) Logical address: 01 (Communication control)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D4	Regulator communication error	The device whose code is recorded is separated when the power switch is in ON (or ACC) position. When the code is recorded, the multi–display is disconnected.	1. Power source circuit (multi–display) 2. Power source circuit (gateway ECU) 3. AVC–LAN circuit (multi–display – gateway ECU) 4. Replace multi–display 5. replace gateway ECU	05–1630 – 05–1523 67–7 67–5

4. STEREO COMPONENT AMPLIFIER ASSY (PHYSICAL ADDRESS: 440) [DSP AMP]

(a) Logical address: 01 (Communication control)

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6	Absence of master unit	Component in which this code is recorded was disconnected from system or master component with ignition switch in ACC or ON.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (stereo component amplifier assy) 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 5. Replace multi–display 6. Replace stereo component amplifier assy	05–1630 05–1523 05–1495 05–1519 67–7 67–25
D7	Connection check error	Component in which this code is recorded is (was) disconnected from system after engine start. Either that, or radio receiver assy was disconnected when this code was recorded.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (stereo component amplifier assy) 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 5. Replace multi–display 6. Replace stereo component amplifier assy	05–1630 05–1523 05–1495 05–1519 67–7 67–25

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DC	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (stereo component amplifier assy) 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 5. Replace multi–display 6. Replace stereo component amplifier assy	05–1630 05–1523 05–1495 05–1519 67–7 67–25
DD	Master reset	After the power switch ON (READY), master component was disconnected from system.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
DF	Master error	Due to defective cognition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
E0	Registration complete indication error	"Registration complete" command from the master device cannot be received. NOTE: This DTC may not be directly related to the problem.	–	–
E1	Voice processing device ON error	The AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (radio receiver assy) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace radio receiver assy	05–1492 05–1523 67–5
E2	ON/OFF indication parameter error	The command for ON/OFF control from the master device has a problem.	Replace multi–display	67–7
E3	Registration demand transmission	The registration demand command from the slave device is output, or the registration demand command is output by receiving connection confirmation command from the sub master device. NOTE: This DTC may not be directly related to the problem.	–	–
E4	Multiple frame incomplete	The multiple frame transmission ends incomplete. NOTE: This DTC may not be directly related to the problem.	–	–

5. COMPONENT CHECK TABLE INDICATED BY SUB CODES

HINT:

The numbers used to verify the cause of the problem are listed in order of probability in the verification column.

Sub code address	Verification	See page
110 (Multi–display)	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1523 67–7
190 (Radio Receiver Assy)	1. Power source circuit (radio receiver assy) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace radio receiver assy	05–1492 05–1523 67–5

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Sub code address	Verification	See page
1C6 (Gateway ECU)	1. Power source circuit (gateway ECU) 2. AVC–LAN circuit (multi–display – gateway ECU) 3. Replace gateway ECU	– 05–1669 67–26
440 (Stereo Component Amplifier Assy)	1. Power source circuit (stereo component amplifier assy) 2. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 3. Replace stereo component amplifier assy	05–1495 05–1521 67–25

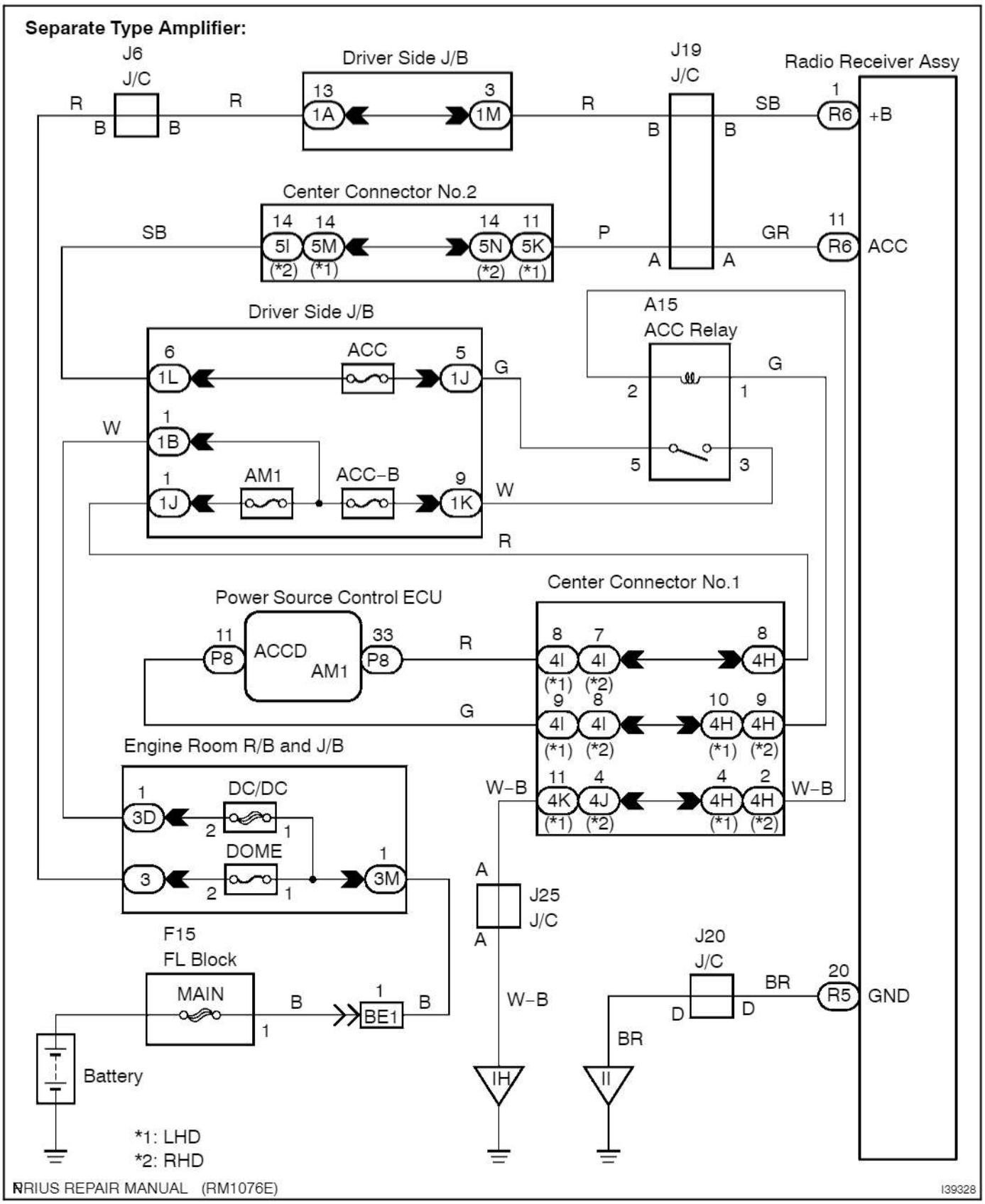
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POWER SOURCE CIRCUIT (RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

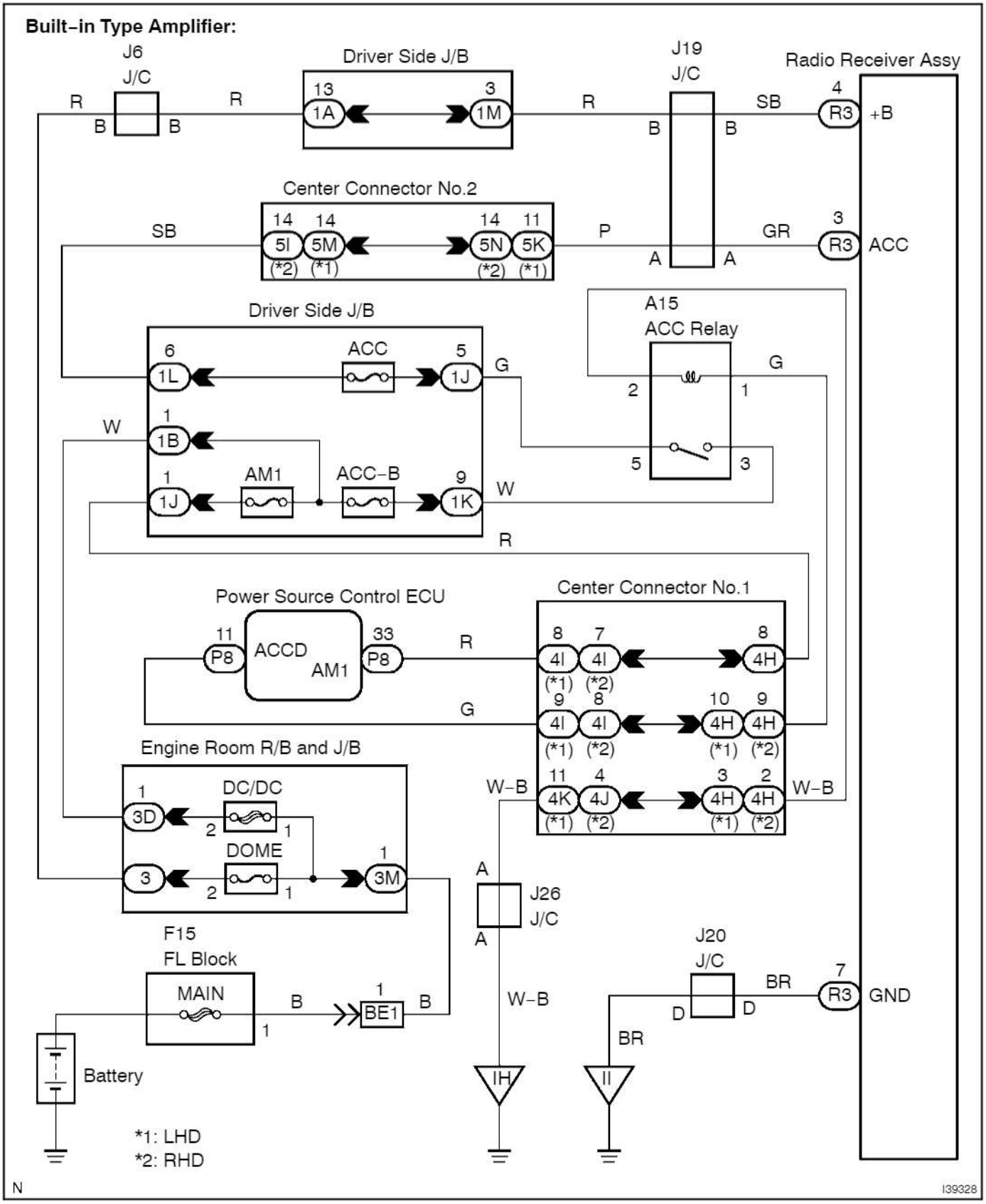
This circuit provides power to the radio receiver assy.

WIRING DIAGRAM



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Built–in Type Amplifier:

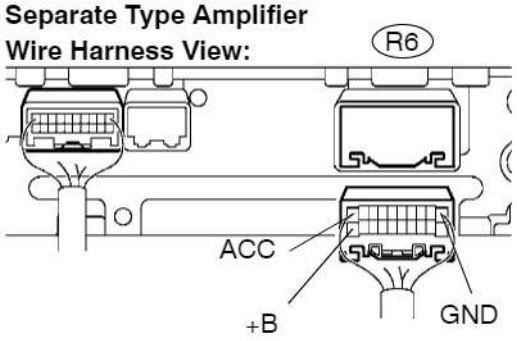


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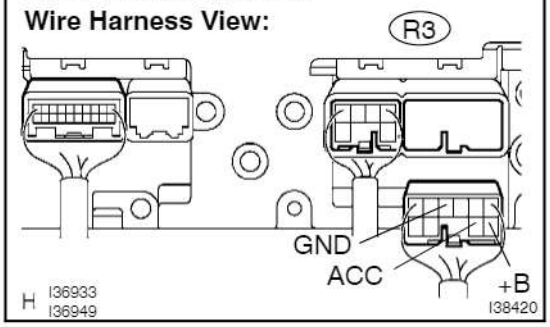
INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



(a) Disconnect the radio receiver assy R6 or R3 connector.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND (R6–20) – Body ground *1	Always	Below 1 Ω
GND (R3–7) – Body ground *2	Always	Below 1 Ω

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B (R6–1) – GND (R6–20) *1	Always	10 to 14 V
+B (R3–4) – GND (R3–7) *2	Always	10 to 14 V
ACC (R6–11) – GND (R6–20) *1	Power switch ON (ACC)	10 to 14 V
ACC (R3–3) – GND (R3–7) *2	Power switch ON (ACC)	10 to 14 V

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (RADIO RECEIVER ASSY – BATTERY OR BODY GROUND)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1482, 05–1484)

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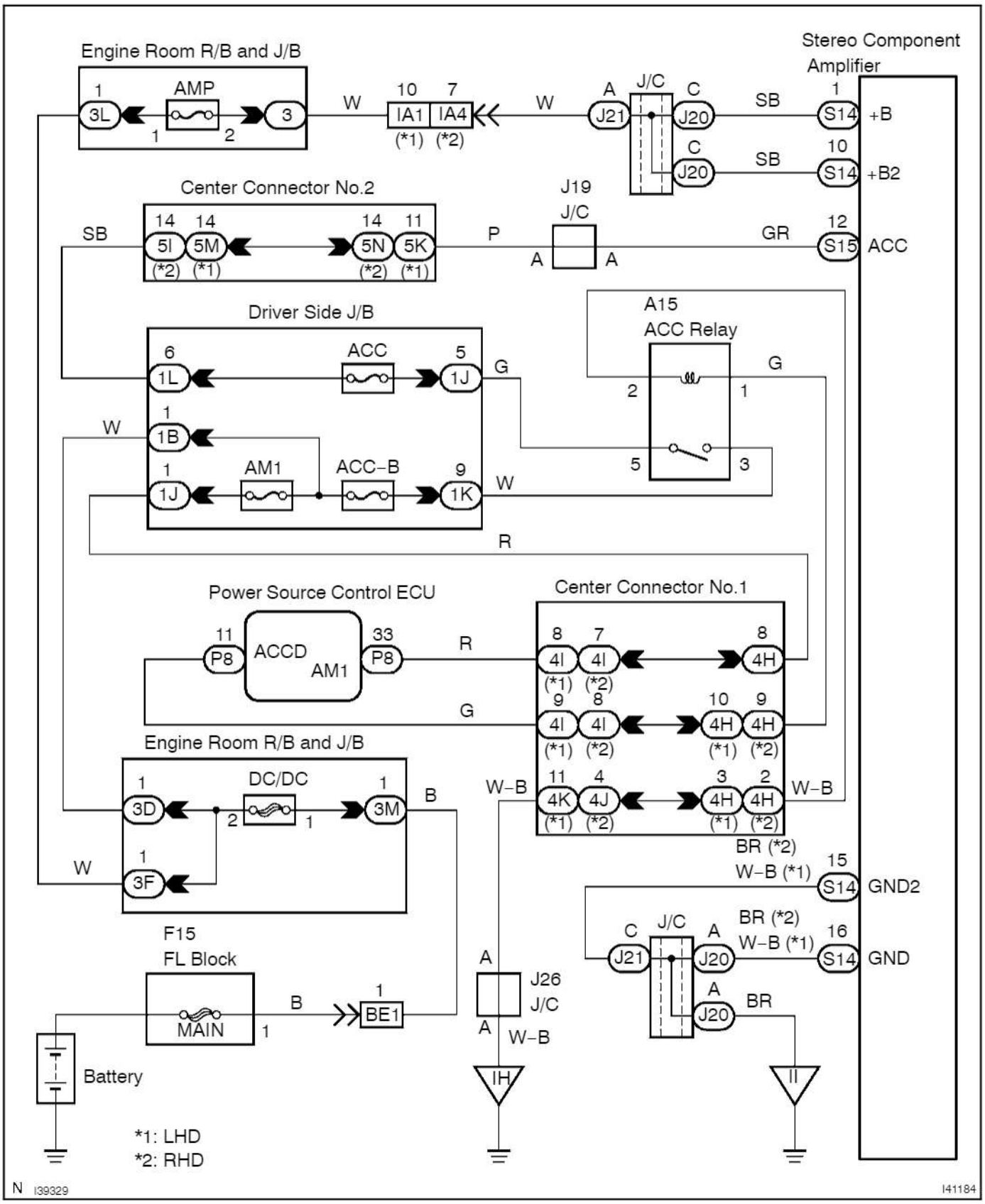
POWER SOURCE CIRCUIT (STEREO COMPONENT AMPLIFIER ASSY)

CIRCUIT DESCRIPTION

This circuit provides the power to the stereo component amplifier assy.

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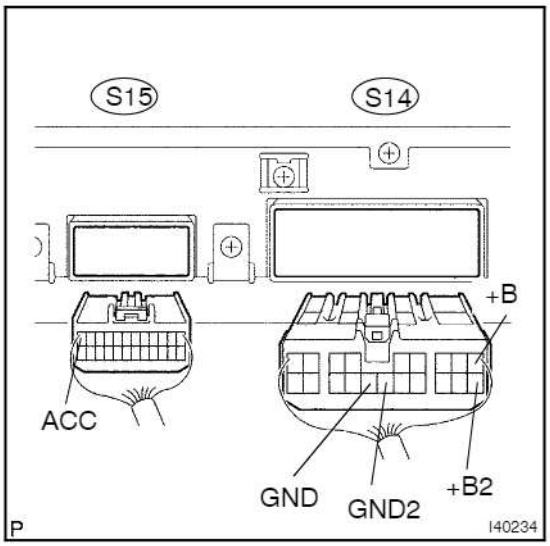
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER ASSY



(a) Disconnect the stereo component amplifier assy S14 connector.

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

Standard:

Tester connection	Condition	Specified condition
GND (S14–16) – Body ground	Always	Below 1 Ω
GND2 (S14–15) – Body ground	Always	Below 1 Ω

(c) Disconnect the stereo component amplifier assy S15 connector.

(d) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B (S14–1) – GND (S14–16)	Always	10 to 14 V
+B2 (S14–10) – GND (S14–16)	Always	10 to 14 V
ACC (S15–12) – GND (S14–16)	Power switch ON (ACC)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STEREO COMPONENT AMPLIFIER ASSY – BATTERY OR BODY GROUND)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1482, 05–1484)

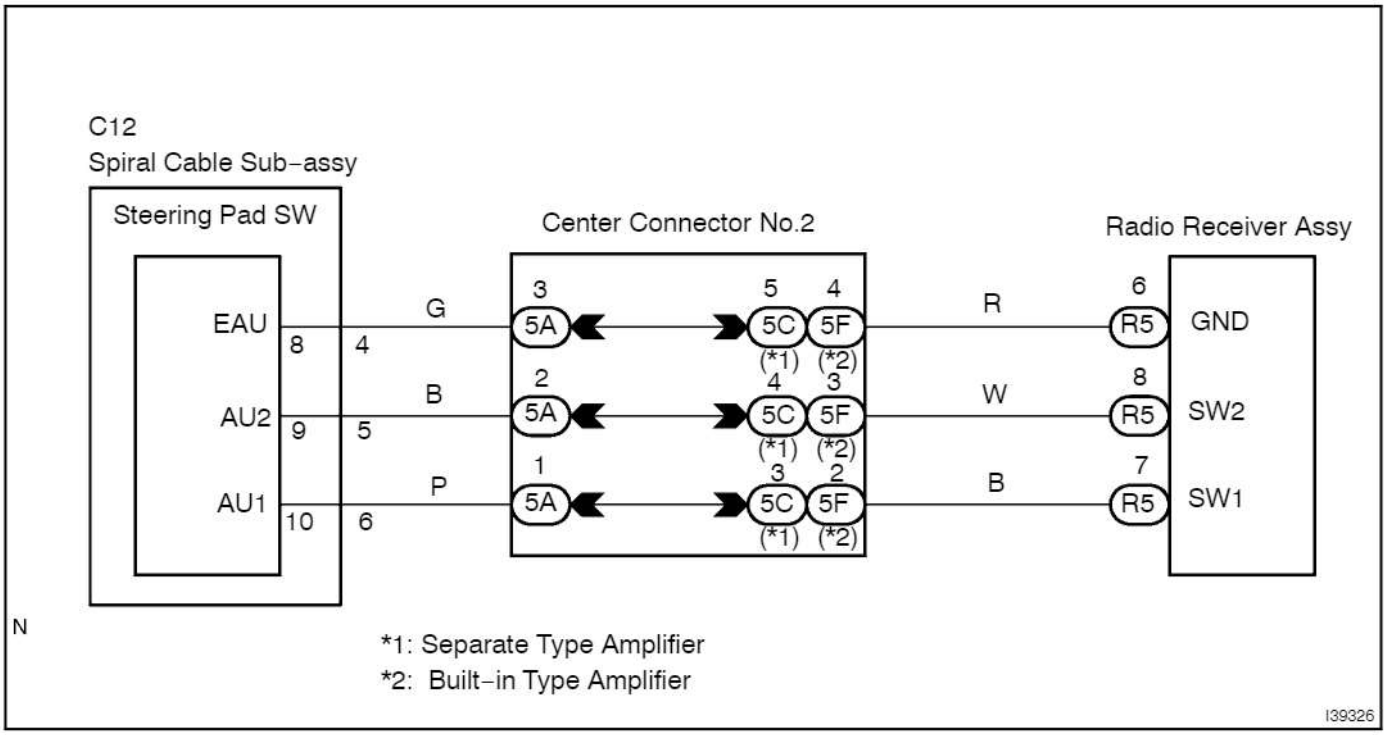
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STEERING PAD SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This circuit sends an operation signal from the steering pad switch to the radio receiver assy.
If there is an open in the circuit, the audio system cannot be operated by the steering pad switch.
If there is a short in the circuit, the same condition as that when the switch is continuously depressed occurs.
Therefore, the radio receiver assy cannot be operated by the steering pad switch, and also the radio receiver assy itself does not function.

WIRING DIAGRAM

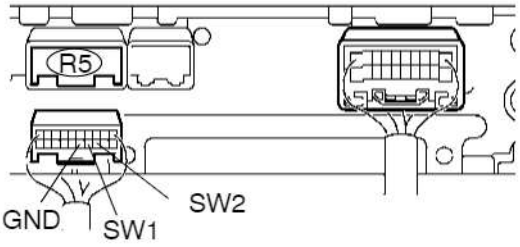


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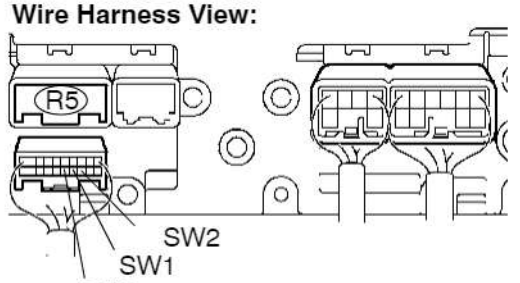
INSPECTION PROCEDURE

1	INSPECT STEERING PAD SWITCH ASSY

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



I36935
I36952
I39524

(a) Disconnect the radio receiver assy R5 connector.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
SW1 (R5–7) – GND (R5–6)	Do not switch position	Approx. 100 kΩ
SW1 (R5–7) – GND (R5–6)	SEEK+ switch: push	Below 2.5 Ω
SW1 (R5–7) – GND (R5–6)	SEEK– switch: push	Approx. 0.3 kΩ
SW1 (R5–7) – GND (R5–6)	VOL+ switch: push	Approx. 1 kΩ
SW1 (R5–7) – GND (R5–6)	VOL– switch: push	Approx. 3.2 kΩ
SW2 (R5–8) – GND (R5–6)	Do not switch position	Approx. 100 kΩ
SW2 (R5–8) – GND (R5–6)	MODE switch: push	Below 2.5 Ω

NG → **Go to step 2**

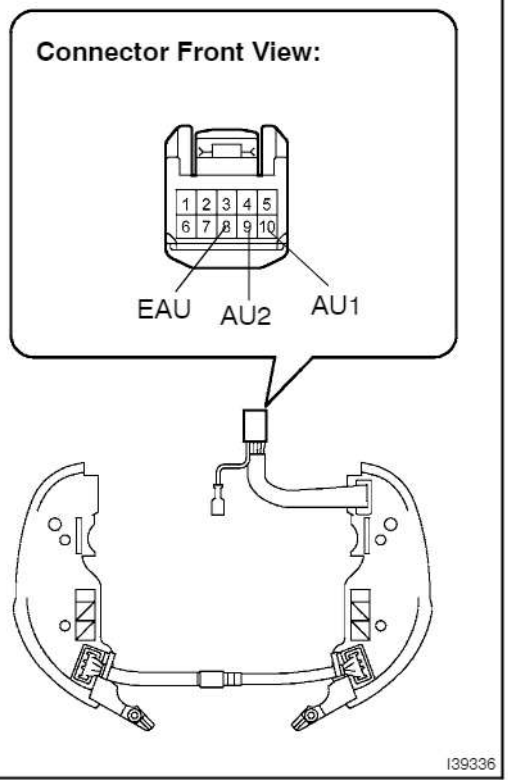
OK

INSPECT PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

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2 INSPECT STEERING PAD SWITCH ASSY

Steering Pad Switch Assy:



(a) Disconnect the steering pad switch assy connector.
(b) Measure the resistance according to the values in the table below.

Standard:

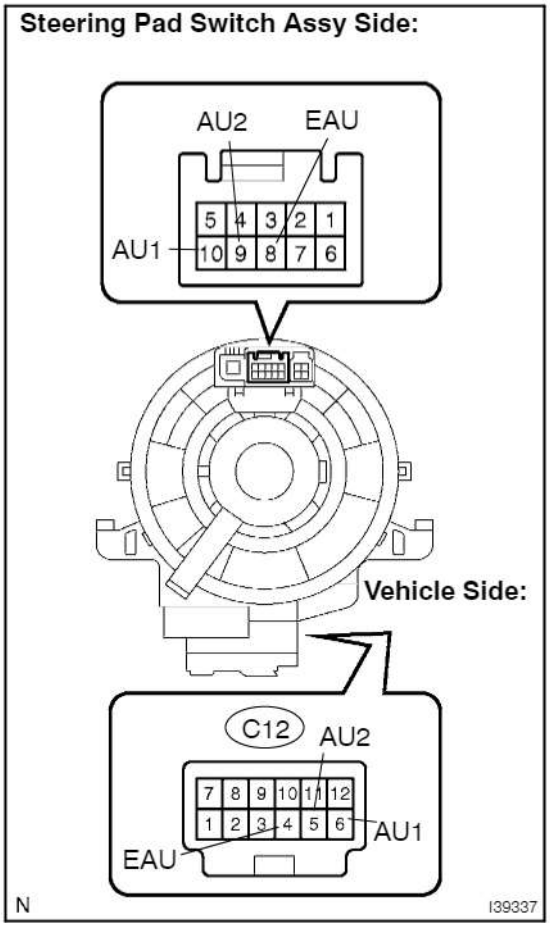
Tester connection	Condition	Specified condition
AU1 (10) – EAU (8)	Do not switch position	Approx. 100 kΩ
AU1 (10) – EAU (8)	SEEK+ switch: push	Approx. 2.5 Ω
AU1 (10) – EAU (8)	SEEK– switch: push	Approx. 0.3 kΩ
AU1 (10) – EAU (8)	VOL+ switch: push	Approx. 1 kΩ
AU1 (10) – EAU (8)	VOL– switch: push	Approx. 3.2 kΩ
AU1 (10) – EAU (8)	Do not switch position	Approx. 100 kΩ
AU2 (9) – EAU (8)	MODE switch: push	Below 2.5 Ω

NG → **REPLACE STEERING PAD SWITCH ASSY** (SEE PAGE 67–28)

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3 INSPECT SPIRAL CABLE SUB–ASSY



(a) Disconnect the connectors from the spiral cable sub–assy.

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

Standard:

Tester connection	Specified condition
EAU (C12–4) – EAU (8)	Below 1 Ω
AU1 (C12–6) – AU1 (10)	Below 1 Ω
AU2 (C12–5) – AU2 (9)	Below 1 Ω

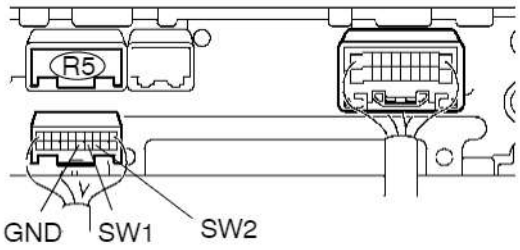
NG → **REPLACE SPIRAL CABLE SUB–ASSY** (SEE PAGE 60–29)

OK

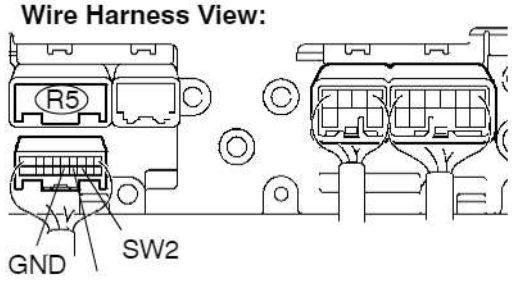
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4	CHECK HARNESS AND CONNECTOR(SPIRAL CABLE SUB–ASSY – RADIO RECEIVER ASSY)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



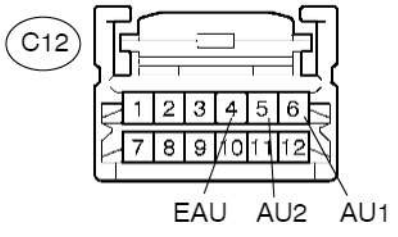
I36935
I36952
I39524

(a) Disconnect the spiral cable sub–assy connector.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
SW1 (R5–7) – AU1 (C12–6)	Below 1 Ω
SW2 (R5–8) – AU2 (C12–5)	Below 1 Ω
GND (R5–6) – EAU (C12–4)	Below 1 Ω
SW1 (R5–7) – Body ground	10 kΩ or higher
SW2 (R5–8) – Body ground	10 kΩ or higher
GND (R5–6) – Body ground	10 kΩ or higher

Spiral Cable Side
Connector Front View:



N
I39295

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

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ILLUMINATION CIRCUIT

CIRCUIT DESCRIPTION

w/o Daytime Running Light:

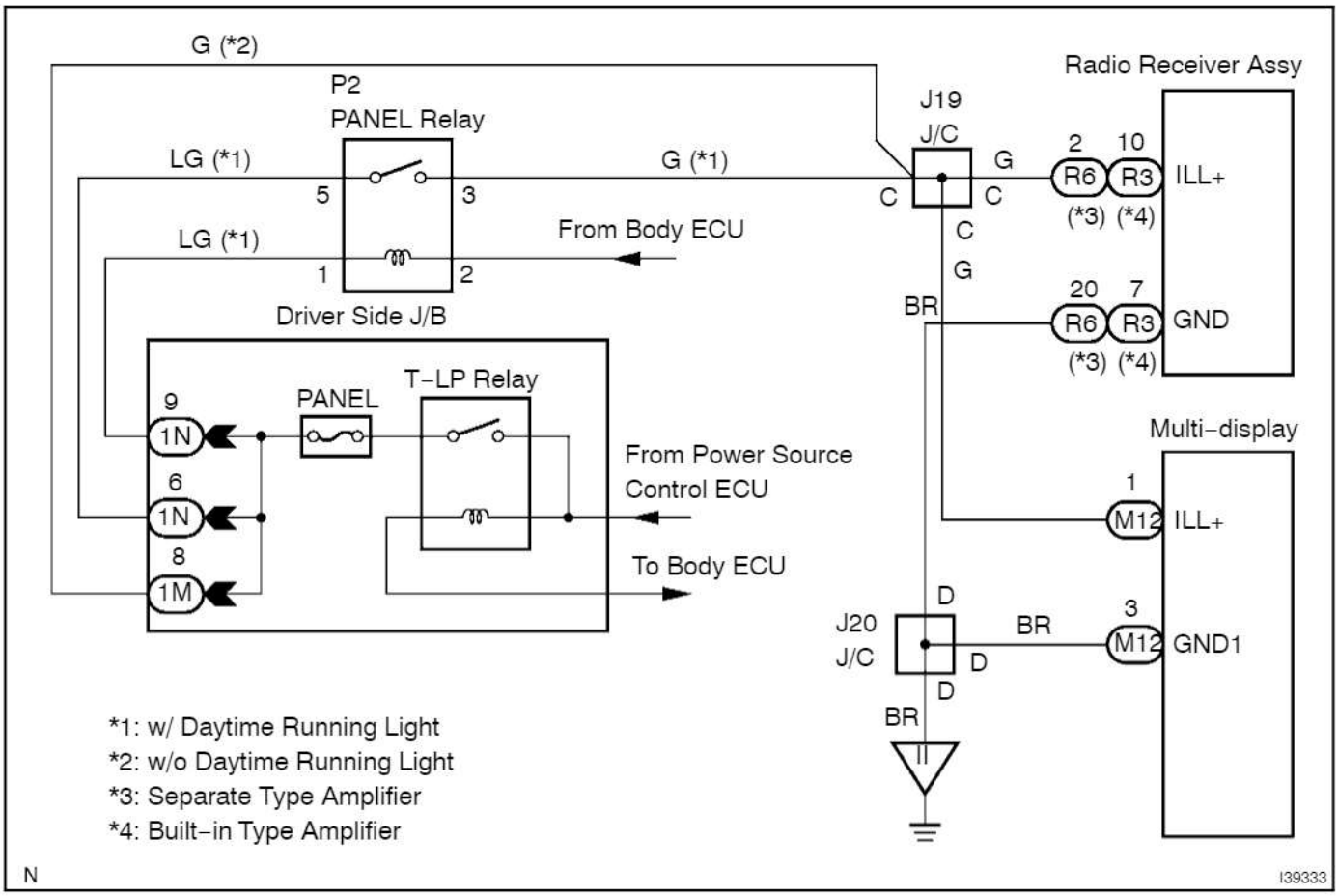
When the light control switch is turned to TAIL or HEAD position, power is supplied to the radio receiver assy and multi–display panel illuminations.

w/ Daytime Running Light:

When the light control switch is turned to TAIL or HEAD position, power is supplied to the radio receiver assy and multi–display panel illuminations.

While the daytime running light is in control, the power supply is cut by the panel relay.

WIRING DIAGRAM

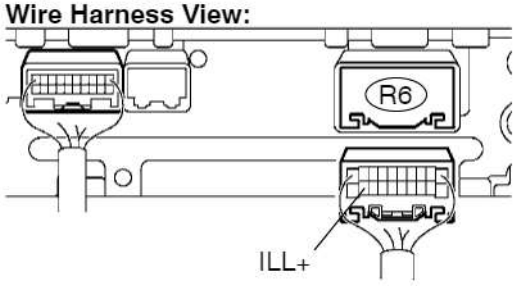


cardiagn.com

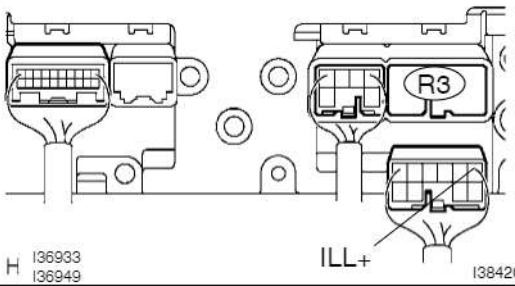
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (COMPONENTS WITH MALFUNCTION – BATTERY)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



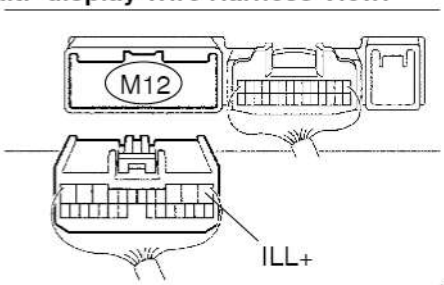
(a) RADIO RECEIVER ASSY
(1) Disconnect the radio receiver assy R6 or R3 connector.
(2) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL+ (R6–2) – Body ground *1	Light control switch TAIL or HEAD	10 to 14 V
ILL+ (R3–10) – Body ground *2	Light control switch TAIL or HEAD	10 to 14 V

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

Multi–display Wire Harness View:



(b) MULTI–DISPLAY
(1) Disconnect the multi–display M12 connector.
(2) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL+ (M12–1) – Body ground	Light control switch TAIL or HEAD	10 to 14 V

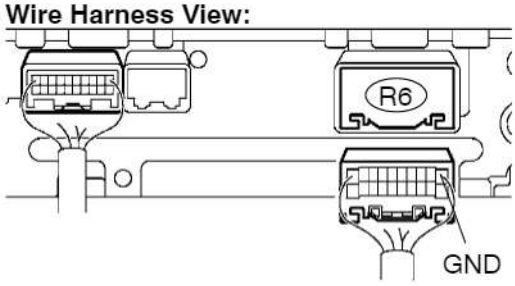
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

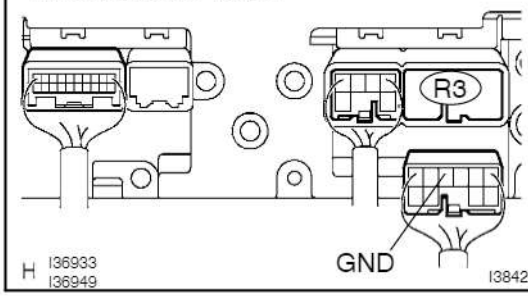
cardiagn.com

2	CHECK HARNESS AND CONNECTOR (COMPONENTS WITH MALFUNCTION – BODY GROUND)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



(a) RADIO RECEIVER ASSY

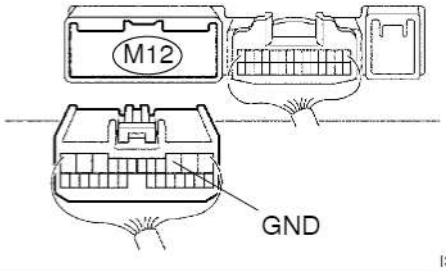
(1) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND (R6–20) – Body ground *1	Always	Below 1 Ω
GND (R3–7) – Body ground *2	Always	Below 1 Ω

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

Multi–display Wire Harness View:



(b) MULTI–DISPLAY

(1) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND (M12–3) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

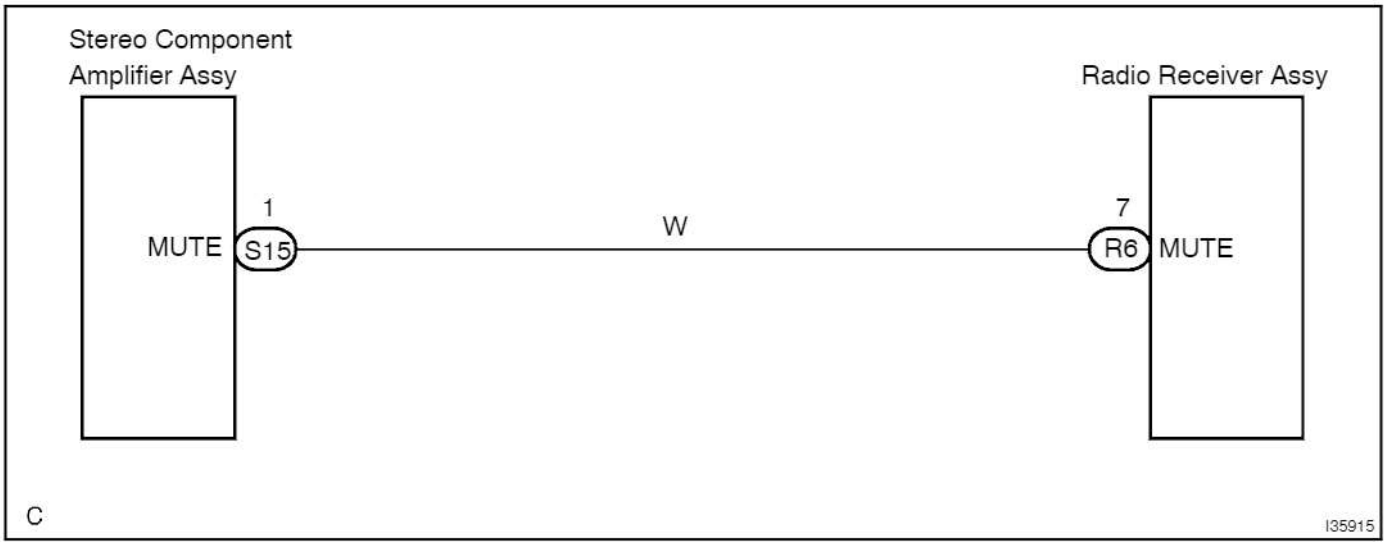
cardiagn.com

AMP MUTE SIGNAL CIRCUIT (FROM RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

This circuit sends the signal to the stereo component amplifier to mute the noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speaker when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only extremely small sound can be produced.

WIRING DIAGRAM

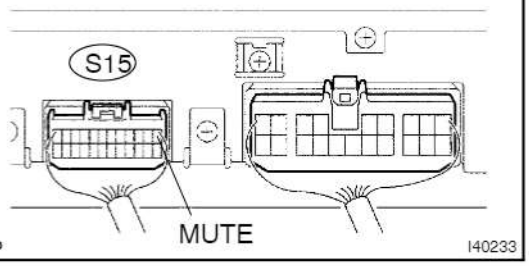


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INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER ASSY

Wire Harness View:



(a) Measure the voltage according to the value in the table below.

Standard:

Tester connection	Condition	Specification
MUTE (S15–1) – Body ground	Power switch ON (ACC), Audio system is playing → Changing	Above 3.5 V → Below 1 V

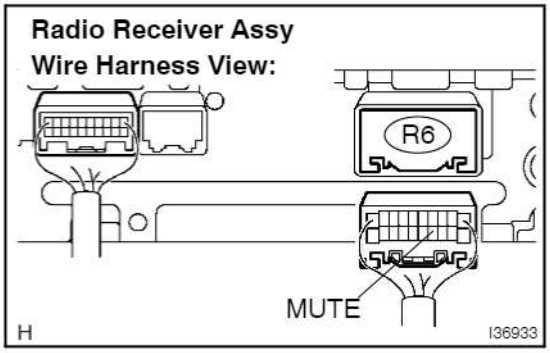
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

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2 CHECK HARNESS AND CONNECTOR (RADIO RECEIVER ASSY – STEREO COMPONENT AMPLIFIER ASSY)

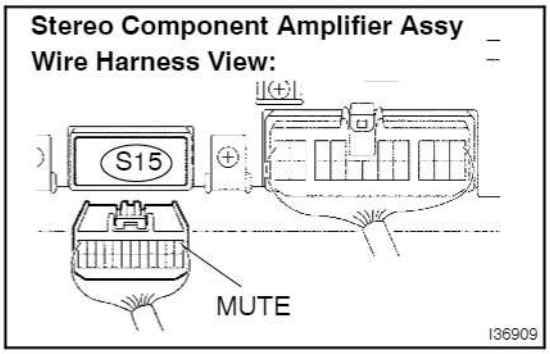


(a) Disconnect the radio receiver assy R6 connector and stereo component amplifier assy S15 connector.

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

Standard:

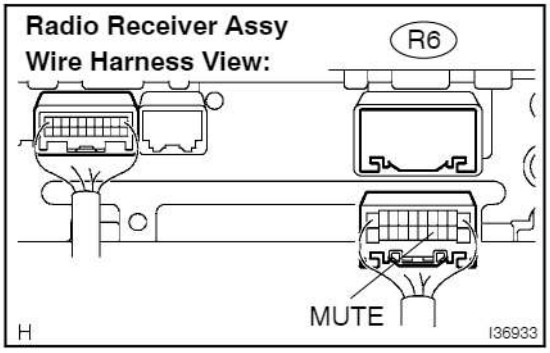
Tester connection	Condition	Specified condition
MUTE (R6–7) – MUTE (S15–1)	Always	Below 1 Ω
MUTE (R6–7) – Body ground	Always	10 kΩ or higher



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT RADIO RECEIVER ASSY



(a) Reconnect the stereo component amplifier assy connector.

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

Standard:

Tester connection	Condition	Specification
MUTE (R6–7) – Body ground	Power switch ON (ACC)	Above 3.5 V

NG → **REPLACE STEREO COMPONENT AMPLIFIER ASSY (SEE PAGE 67–25)**

OK

REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

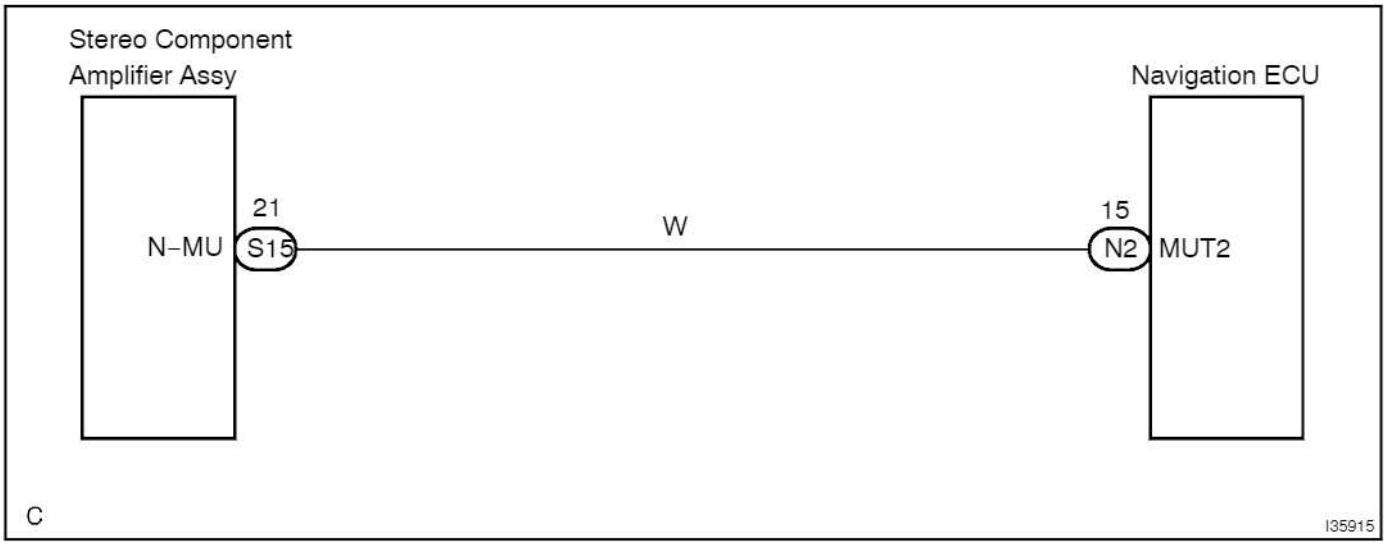
cardiagn.com

AMP MUTE SIGNAL CIRCUIT (FROM NAVIGATION ECU)

CIRCUIT DESCRIPTION

This circuit sends the signal to the stereo component amplifier to mute the noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speaker when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only extremely small sound can be produced.

WIRING DIAGRAM

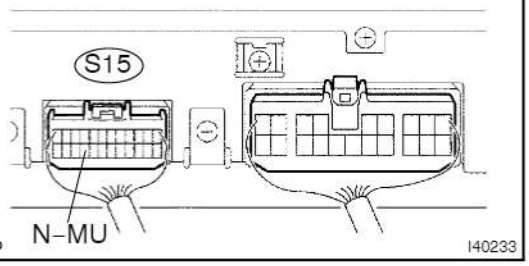


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INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER ASSY

Wire Harness View:



(a) Measure the voltage according to the value in the table below.

Standard:

Tester connection	Condition	Specification
N–MU (S15–21) – Body ground	Power switch ON (ACC), Audio system is playing → Changing	Above 3.5 V → Below 1 V

NG → **Go to step 2**

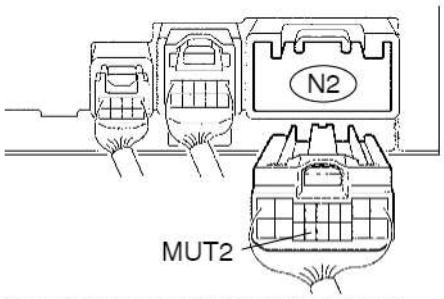
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

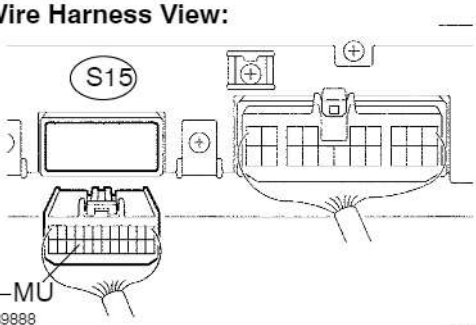
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2 CHECK HARNESS AND CONNECTOR (NAVIGATION ECU – STEREO COMPONENT AMPLIFIER ASSY)

Navigation ECU Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



I39888
I36909
I40258

(a) Disconnect the navigation ECU N2 connector and stereo component amplifier assy S15 connector.

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

Standard:

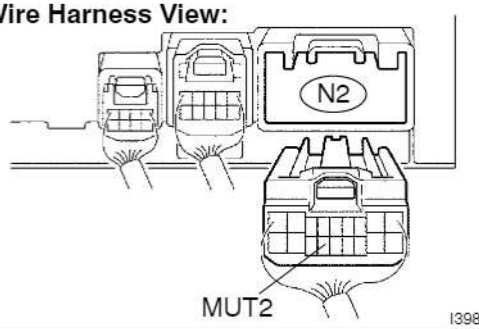
Tester connection	Condition	Specified condition
N–MU (S15–21) – MUT2 (N2–15)	Always	Below 1 Ω
N–MU (S15–21) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT NAVIGATION ECU

Wire Harness View:



I39888

(a) Reconnect the stereo component amplifier assy connector.

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

Standard:

Tester connection	Condition	Specification
MUT2 (N2–15) – Body ground	Power switch ON (ACC)	Above 3.5 V

NG → **REPLACE STEREO COMPONENT AMPLIFIER ASSY (SEE PAGE 67–25)**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

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SPEAKER CIRCUIT

CIRCUIT DESCRIPTION

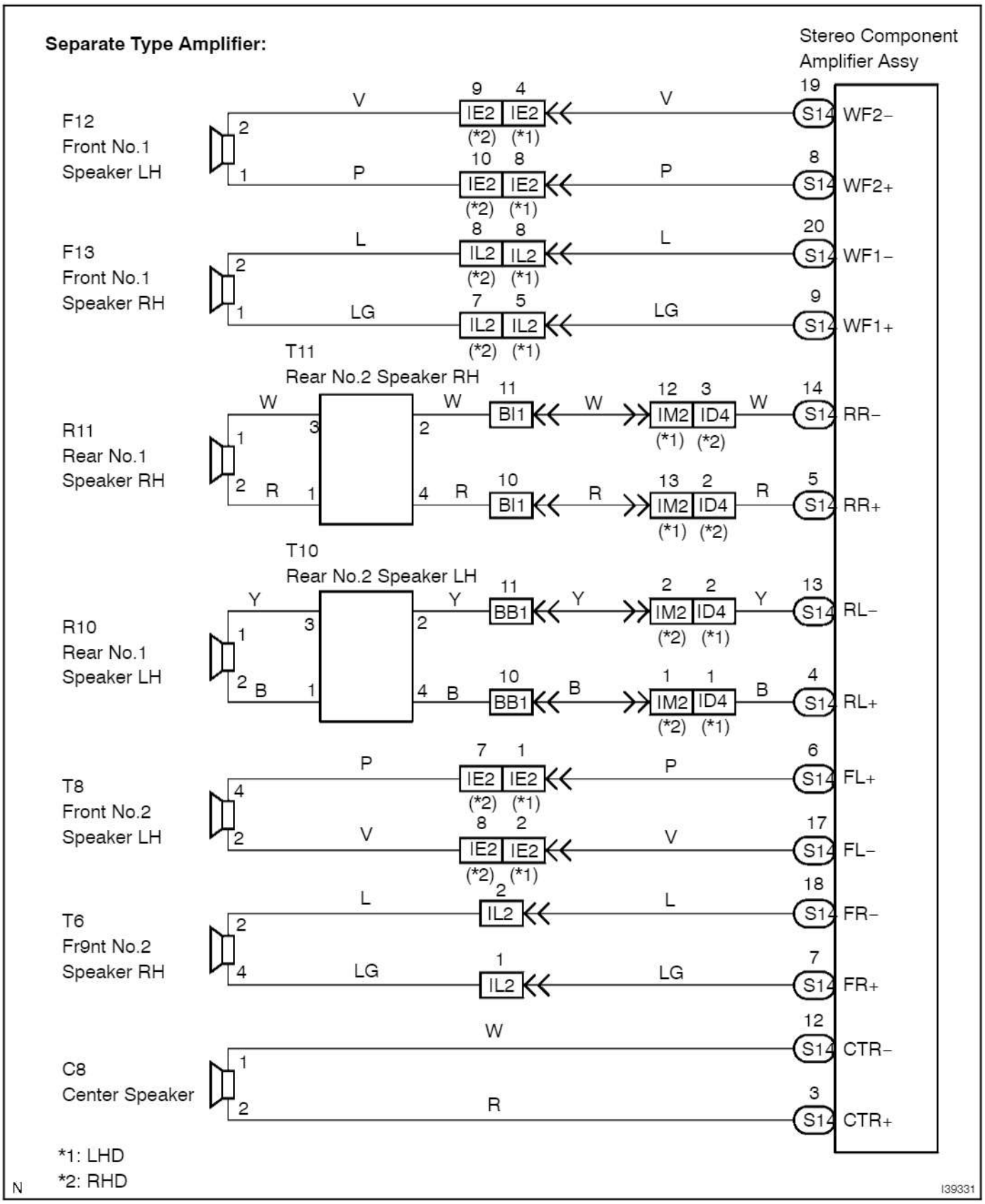
The sound signal that has been amplified by the stereo component amplifier is sent to the speaker from the stereo component amplifier through this circuit.
As for the vehicle with a navigation system, the sound signal on the driver's side is sent to the navigation ECU from the stereo component amplifier.
If there is a short in this circuit, the stereo component amplifier assy detects it and stops output to the speaker. Thus sound can not be heard from the speaker even if there is no malfunction in the stereo component amplifier assy or speaker.
Built–in type amplifier:
There are two circuits that detect a short circuit.

- When a short in the woofer speaker circuit is detected, sound output from only the woofer speaker circuit stops.
- When a short in the other circuits is detected, sound output from the circuits other than the woofer speaker circuit is stopped.

Separate type amplifier:
When a short in the speaker circuit is detected, all sound output is stopped.

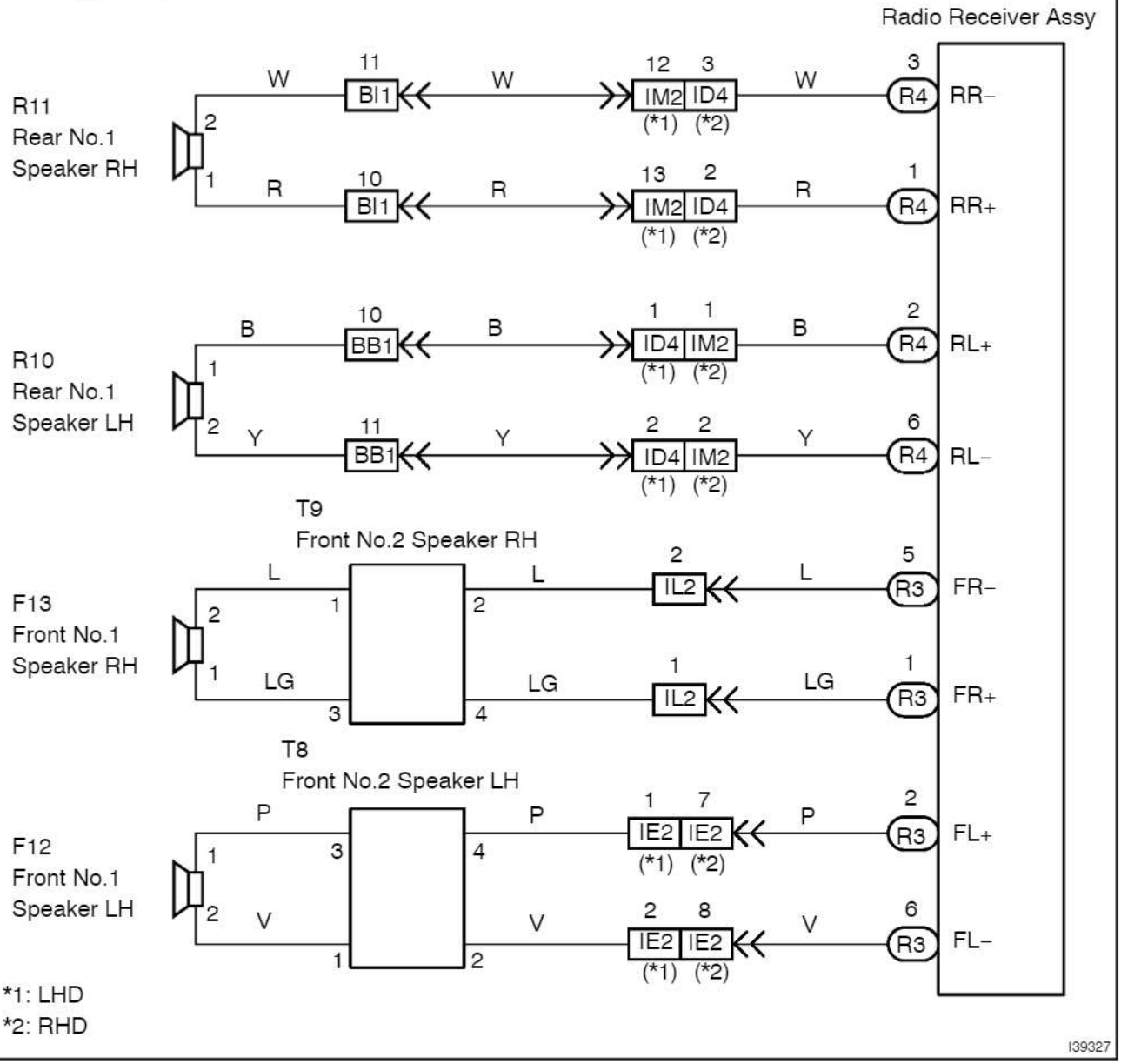
cardiagn.com

WIRING DIAGRAM



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Built–in Type Amplifier:



*1: LHD
*2: RHD

N

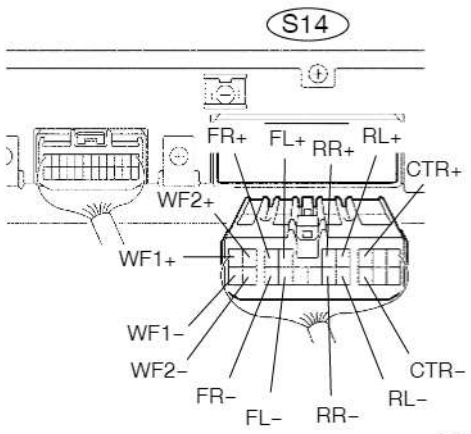
I39327

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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

Stereo Component Amplifier Assy (Separate Type Amplifier) Wire Harness View:



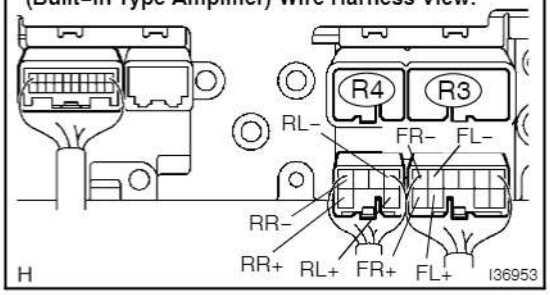
(a) Disconnect the connectors shown in the illustration on the left from the stereo component amplifier assy and speakers.

(b) Measure the resistance between the speaker and the stereo component amplifier assy or the radio receiver assy to check for an open circuit in the wire harness.

Standard:

Below 1 Ω

Radio Receiver Assy (Built–in Type Amplifier) Wire Harness View:



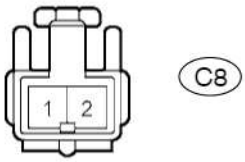
(c) Measure the resistance between the speaker and body ground to check for a short circuit in the wire harness.

Standard:

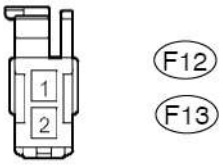
10 kΩ or higher

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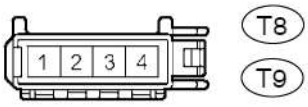
Center Speaker Assy (Wire Harness Side)
Connector Front View:



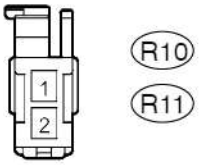
Front No.1 Speaker Assy (Wire Harness Side)
Connector Front View:



Front No.2 Speaker Assy (Wire Harness Side)
Connector Front View:



Rear No.1 Speaker Assy (Wire Harness Side)
Connector Front View:



Rear No.2 Speaker Assy (Wire Harness Side)
Connector Front View:



H

I39338

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT FRONT NO.1 SPEAKER ASSY

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard:
Separate Type Amplifier: 1.8 to 2.6 Ω
Built–in Type Amplifier: APPROX. 4 Ω

NG → **REPLACE FRONT NO.1 SPEAKER ASSY (SEE PAGE 67–8)**

OK

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3	INSPECT FRONT NO.2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in good condition is installed.
OK: Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is detective, inspect by interchanging the right one and the left one.

NG → **REPLACE FRONT NO.2 SPEAKER ASSY** (SEE PAGE 67–10)

OK

4	INSPECT REAR NO.1 SPEAKER ASSY

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard:
Separate Type Amplifier: APPROX. 2.6 Ω
Built–in Type Amplifier: APPROX. 4 Ω

NG → **REPLACE REAR NO.1 SPEAKER ASSY** (SEE PAGE 67–12)

OK

5	CONFIRM MODEL

Result:

Separate Type Amplifier	A
Built–in Type Amplifier	B

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE** (SEE PAGE 05–1482)

A

6	INSPECT REAR NO.2 SPEAKER ASSY

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard: APPROX. 4 Ω

NG → **REPLACE REAR NO.2 SPEAKER ASSY** (SEE PAGE 67–14)

OK

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7	INSPECT CENTER SPEAKER

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard: 1.2 to 2.2 Ω

NG → **REPLACE CENTER SPEAKER (SEE PAGE 67–11)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1482)

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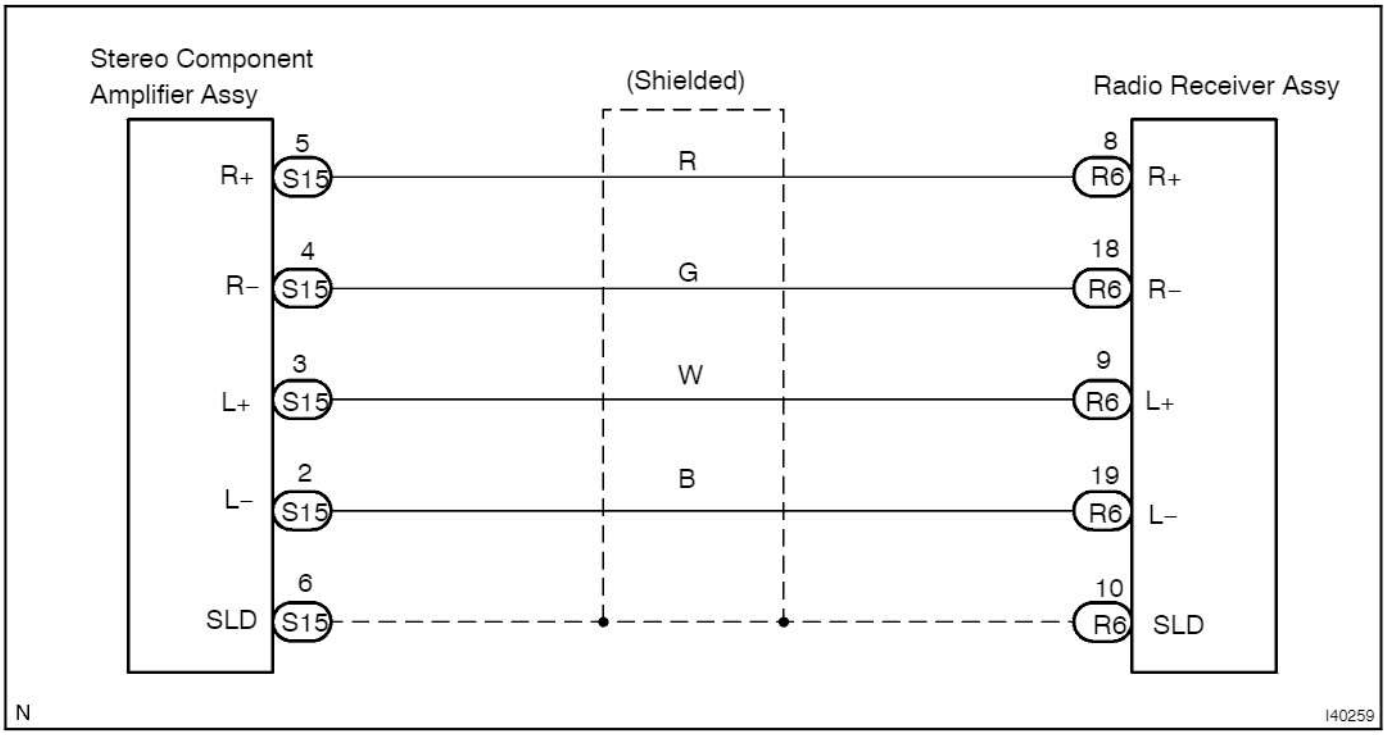
S3AMP SOUND SIGNAL CIRCUIT (RADIO RECEIVER ASSY – AMP)

CIRCUIT DESCRIPTION

The radio receiver assy sends a sound signal to the stereo component amplifier assy through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier assy, and then sent to the speaker.

If there is an open or short in the circuit, sound can not be heard from the speaker even if there is no malfunction in the stereo component amplifier assy or speaker.

WIRING DIAGRAM

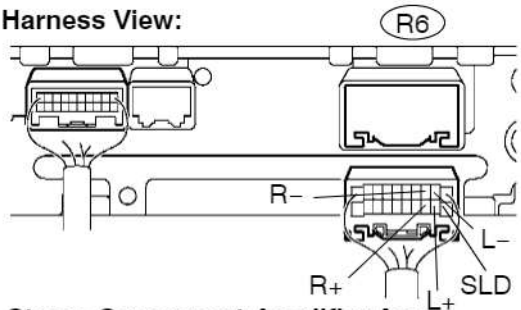


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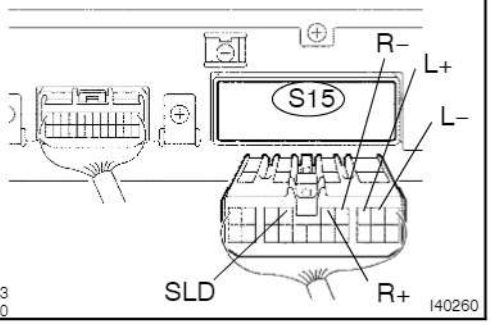
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER ASSY – STEREO COMPONENT AMPLIFIER ASSY)

Radio Receiver Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



I36933
I36910
I40260

(a) Disconnect the radio receiver assy R6 connector and stereo component amplifier assy S15 connector.

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

Standard:

Tester connection	Specified condition
L+ (S15–3) – L+ (R6–9)	Below 1 Ω
L– (S15–2) – L– (R6–19)	Below 1 Ω
R+ (S15–5) – R+ (R6–8)	Below 1 Ω
R– (S15–4) – R– (R6–18)	Below 1 Ω
L+ (S15–3) – Body ground	10 kΩ or higher
L– (S15–2) – Body ground	10 kΩ or higher
R+ (S15–5) – Body ground	10 kΩ or higher
R– (S15–4) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1482)

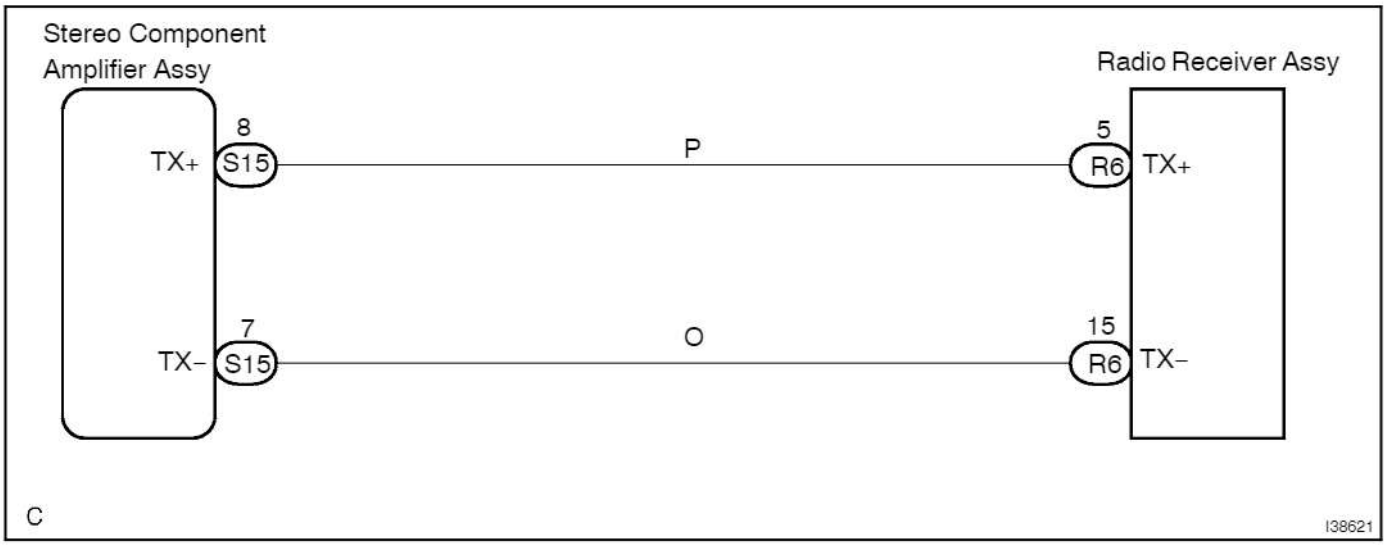
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AVC–LAN CIRCUIT (RADIO RECEIVER ASSY – AMP)

CIRCUIT DESCRIPTION

Each unit of audio system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When +B short and GND short occur in this AVC– LAN, audio system will not function normally as communication is discontinued.
In this AVC–LAN, the radio receiver assy becomes the master of the communication, and the radio receiver assy has resistance necessary for transmitting the communication.

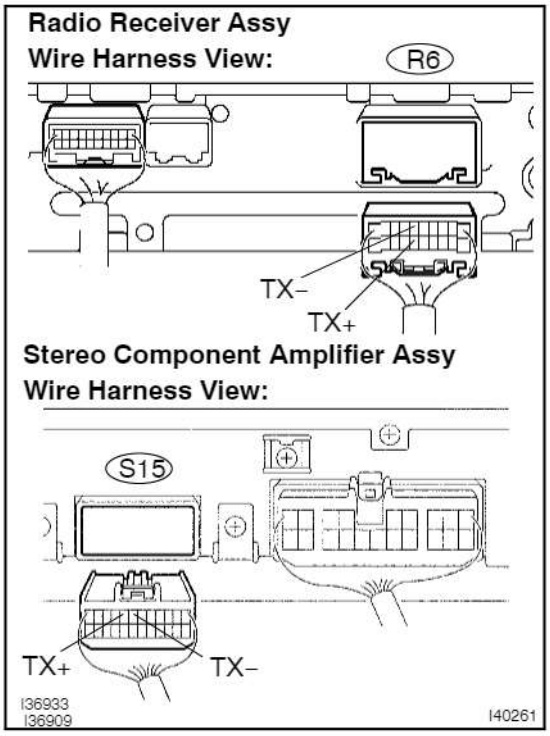
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER ASSY – STEREO COMPONENT AMPLIFIER ASSY)



(a) Disconnect the radio receiver assy R6 connector and stereo component amplifier assy S15 connector.

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

Standard:

Tester connection	Specified condition
TX+ (S15–8) – TX+ (R6–5)	Below 1 Ω
TX– (S15–7) – TX– (R6–15)	Below 1 Ω
TX+ (S15–8) – Body ground	10 kΩ or higher
TX– (S15–7) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1482)

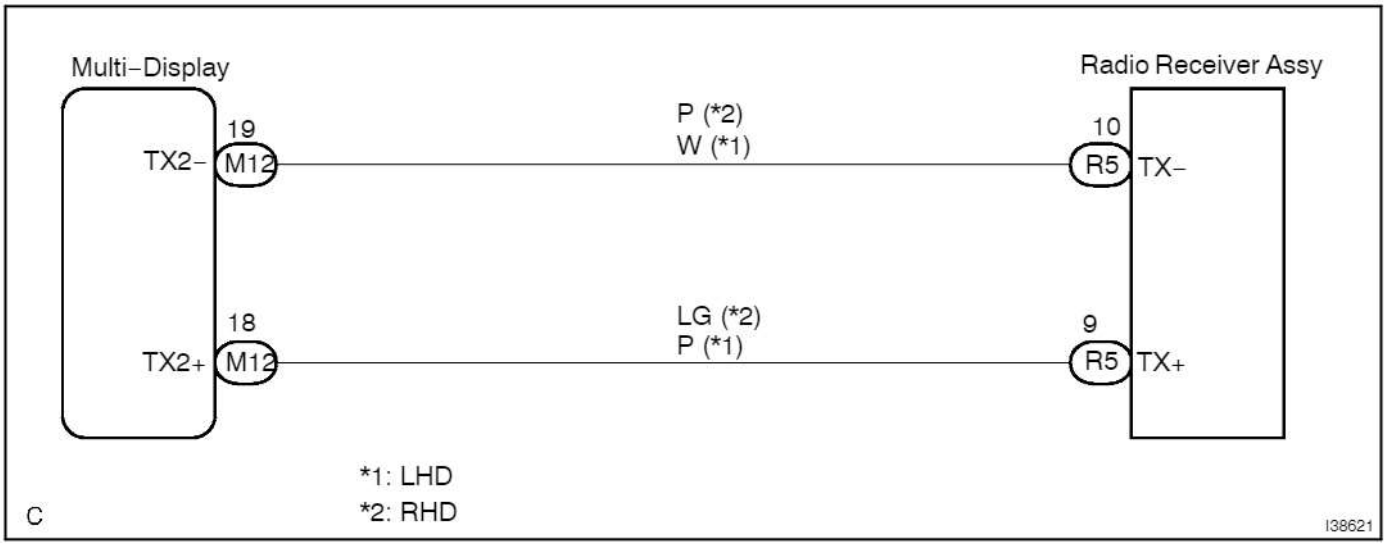
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AVC–LAN CIRCUIT (MULTI–DISPLAY ASSY – RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

Each unit of audio system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When +B short and GND short occur in this AVC– LAN, audio system will not function normally as communication is discontinued.
In this AVC–LAN, the radio receiver assy becomes the master of the communication, and the radio receiver assy has resistance necessary for transmitting the communication.

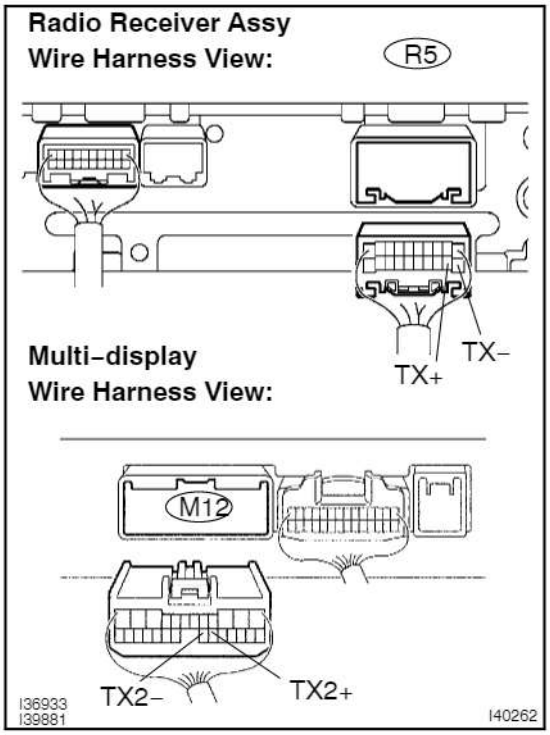
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER ASSY – MULTI–DISPLAY)



(a) Disconnect the radio receiver assy R5 connector and multi–display M12 connector.

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

Standard:

Tester connection	Specified condition
TX+ (R5–9) – TX2+ (M12–18)	Below 1 Ω
TX– (R5–10) – TX2– (M12–19)	Below 1 Ω
TX+ (R5–9) – Body ground	10 kΩ or higher
TX– (R5–10) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1482)

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SOUND QUALITY IS BAD IN ALL MODES (VOLUME IS TOO LOW)

INSPECTION PROCEDURE

1	ADJUST SOUND QUALITY

(a) Adjust the sound quality.
(1) Operate the radio receiver assy to adjust the sound quality.
OK: Malfunction disappears.
Reference:
Check if the sound quality is the same with the same model of another vehicle.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

SYSTEM OK

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NOISE OCCURS

INSPECTION PROCEDURE

1	CHECK OF SPEAKER INSTALLATION

(a) Check the speaker installation condition.
  (1) Check that each speaker is securely installed.
  OK: Malfunction disappears.

HINT:
The radio is equipped with a noise prevention system that blocks only excessively loud noise. If loud noise occurs, check whether or not the ground on the antenna installation part and the proper noise–prevention equipment are all installed, and whether or not there is improper wiring.

Condition in which noise occurs	Noise type
Depressing the acceleration pedal increases the noise, and stopping the engine stops the noise immediately.	Alternator noise
Noise occurs during A/C or the heater operation.	Blower motor noise
Rapid acceleration during the drive on an unpaved road or after the ignition switch is turned on makes noise.	Fuel pump noise
Pressing and then releasing the horn switch, and keeping pressing the horn switch makes noise.	Horn noise
Quiet noise is heard while the engine is running, but stops with the engine.	Ignition noise
Noise occurs in turn with the blink of the turn signal flash.	Flasher noise
Noise occurs during window washer operation.	Washer noise
Noise occurs while the engine is running, and it continues even after the engine is stopped.	Water temperature sensor noise
Noise occurs during wiper operation.	Wiper noise
Noise occurs when the brake pedal is depressed.	Stop light switch noise
Others.	Static electricity on the vehicle

HINT:
- Identify the condition in which the noise occurs, and check the noise filter on the related part.
- Make sure first that there is no noise from outside. Failing to do so makes the noise occurrence source detection difficult and leads to misdiagnosis.
- The noise should be removed in descending order of loudness.

NG → **INSTALL IT PROPERLY**

OK

IDENTIFICATION OF NOISE SOURCE (SEE PAGE 05–1474)

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RADIO BROADCAST CANNOT BE RECEIVED(BAD RECEPTION)

INSPECTION PROCEDURE

1	CHECK IF RADIO AUTO–SEARCH FUNCTIONS PROPERLY

(a) Check if the radio auto–search functions properly.
(1) Perform the auto–search of the radio and check that it functions normally.
OK: The radio auto–search functions properly.

OK → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

NG

2	CHECK OPTIONAL COMPONENT

(a) Check optional component (sun shade film, telephone antenna etc.).
(1) Check whether or not any optional component such as the sunshade film and the telephone antenna is installed.
OK: Optional component is installed.

OK → EFFECT FROM OPTIONAL COMPONENT

NG

3	CHECK ANTENNA FOR NOISE PRODUCTION

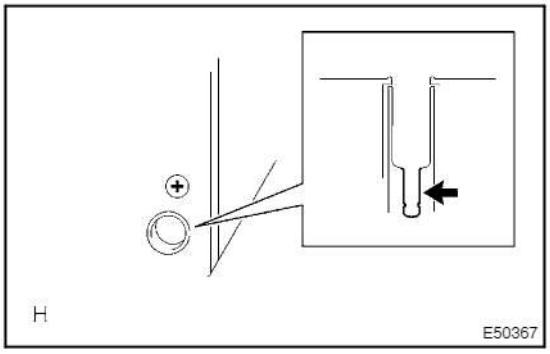
(a) Noise Check with Antenna
(1) With the power switch in the ACC position, turn on the radio and choose the AM mode.
(2) Place the tip of a screwdriver on the antenna of the antenna pole sub–assy, and check that the noise is heard from the speaker.
OK: Noise occurs.

OK → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

NG

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4	INSPECT RADIO RECEIVER ASSY(ANTENNA)



(a) Preparation for Check
  (1) Remove the antenna plug of the radio receiver assembly.

(b) Noise Check
  (1) With the radio receiver assy connector connected, turn the ignition switch to the ACC position.
  (2) Turn on the radio and choose the AM mode.
  (3) Place a flat–head screwdriver or a piece of metal such as thin wire on an antenna jack of the radio receiver assy and check that the noise is heard from the speaker.

OK: Noise occurs.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)**

OK →

REPLACE ANTENNA CORD SUB–ASSY (SEE PAGE 67–15)

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CD CANNOT BE INSERTED OR IS EJECTED RIGHT AFTER INSERTION

INSPECTION PROCEDURE

1	CHECK IF A NORMAL CD IS INSERTED

(a) Check if a normal CD is inserted.
  (1) Make sure that the CD is a normal audio CD, and that there is no deformation, flaw, stain, burr or other defects on the CD.

OK: Normal audio CD is installed.

HINT:
- Translucent or oddly–shaped CD cannot be played.
- Computer CD–ROMs (even those with music) and CD–R discs cannot be played.
- Playing an 8–cm CD does not require an adapter.

NG → **CD IS FAULTY**

OK

2	CHECK IF A CD IS INSERTED PROPERLY

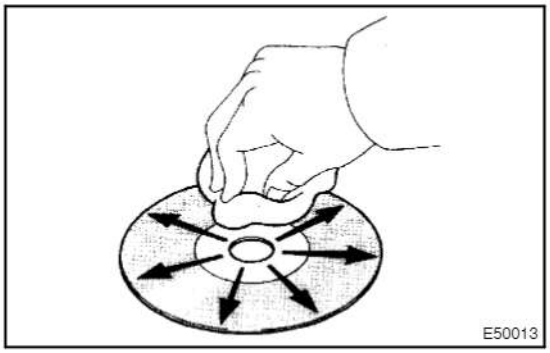
(a) Check if a CD is inserted properly.
  (1) Check whether or not the CD is inserted upside down.

OK: Not upside down.

NG → **SET DISC CORRECTLY**

OK

3	DISC CLEANING



(a) Disc cleaning
  (1) If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:
Do not use a conventional record cleaner or anti–static preservative.

OK: Malfunction disappears.

OK → **DISC IS DIRTY**

NG

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4	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
(1) Replace the CD with another normal one to see if the same trouble occurs again.
OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

CD IS FAULTY

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CD CANNOT BE EJECTED

INSPECTION PROCEDURE

1	PRESS "EJECT" AND CHECK OPERATION

(a) Press "EJECT"and check the operation.
  (1) Press the CD EJECT switch of the radio receiver assembly for 2 seconds or more to see if the CD is ejected.
  OK: CD is ejected.

HINT:
If the CD is not ejected, bring the vehicle in for repair.
Do not attempt to remove it by force.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

2	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
  (1) Check the installation condition of the radio receiver assembly.
  OK: Installed properly.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

CD IS FAULTY

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SOUND QUALITY IS BAD ONLY WHEN CD IS PLAYED (VOLUME IS TOO LOW)

INSPECTION PROCEDURE

1	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another one and recheck.
  (1) Check the installation condition of the radio receiver assembly.
  OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

CD IS FAULTY

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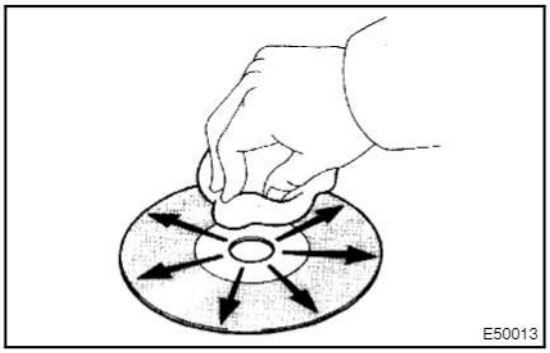
CD SOUND SKIPS

HINT:

- The sound may skip when driving on an unpaved road.
- Sudden temperature changes in the cabin will cause condensation inside the CD player and prevent it from playing.

INSPECTION PROCEDURE

1	DISC CLEANING



(a) Disc cleaning
  (1) If the disc gets dirty, clean the disc by wiping the surface from the center to outside in a radial direction a with a soft cloth.

NOTICE:
Do not use a conventional record cleaner or anti–static preservative.

OK: Malfunction disappears.

OK	DISC IS DIRTY

NG

2	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
  (1) Replace the CD with another normal one to see if the same trouble occurs again.

OK: Malfunction disappears.

OK	CD IS FAULTY

NG

3	CHECK OF RADIO RECEIVER ASSEMBLY INSTALLATION

(a) Check the radio receiver assembly installation condition.
  (1) Check that the radio receiver assembly is installed properly.

OK: Installed properly.

NG	INSTALL THE RADIO RECEIVER ASSEMBLY PROPERLY

OK

CONDENSATION DUE TO TEMPERATURE CHANGE (LEAVE IT AS IT IS FOR A WHILE BEFORE USING)

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CASSETTE TAPE CANNOT BE INSERTED OR PLAYED

INSPECTION PROCEDURE

1	CHECK FOR ANY FOREIGN OBJECT

(a) Check for any foreign objects.
  (1) Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assembly.

OK: No foreign objects or defects are detected.

NG → **REMOVE FOREIGN OBJECT**

OK

2	CHECK CASSETTE TAPE

(a) Check the cassette tape.
  (1) Check that the cassette tape is a normal tape with music or voice recorded.

OK: Proper cassette tape with music or voice recorded.

NG → **CASSETTE TAPE IS FAULTY**

OK

3	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another one and recheck.
  (1) Replace the cassette tape with another normal one to see if the same trouble occurs again.

OK: The function returns to be normal.

NG → **REPLACE RADIO RECEIVER ASSY** (SEE PAGE 67–5)

OK

CASSETTE TAPE IS FAULTY

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CASSETTE TAPE CANNOT BE EJECTED

INSPECTION PROCEDURE

1	PRESS "EJECT" AND CHECK OPERATION

(a) Press "EJECT" and check the operation.
  (1) Press the cassette tape EJECT switch of the radio receiver assembly for 2 seconds or more and check that the cassette tape is ejected.

OK: The cassette tape is ejected.

NG → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

OK

2	CHECK CASSETTE TAPE

(a) Check the cassette tape.
  (1) Check that the ejected cassette tape does not have a peeled label, a cassette body deformation or any other defect.

OK: No fault on the cassette tape.

NG → CASSETTE TAPE IS FAULTY

OK

3	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another and recheck.
  (1) Replace the cassette tape with another normal one to see if the same trouble occurs again.

OK: Malfunction disappears.

NG → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

OK

CASSETTE TAPE IS FAULTY

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SOUND QUALITY IS BAD ONLY WHEN PLAYING TAPE

INSPECTION PROCEDURE

1	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another one and recheck.
(1) Replace the cassette tape with another normal one to see if the same trouble occurs again.
OK: Malfunction disappears.

OK → CASSETTE TAPE IS FAULTY

NG

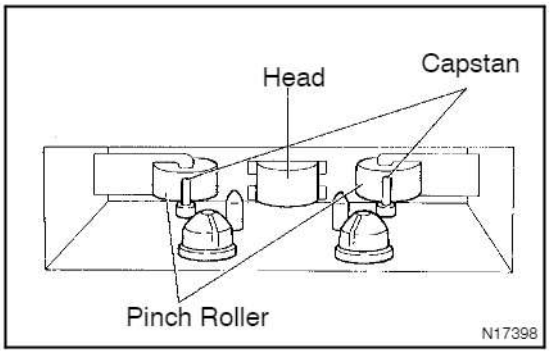
2	CHECK FOR ANY FOREIGN OBJECT

(a) Check for foreign objects.
(1) Check that no foreign objects or defects are detected in the cassette tape player.
OK: No foreign objects or defects are detected.

NG → REMOVE FOREIGN OBJECT

OK

3	CLEAN HEAD AND CHECK OPERATION



(a) Head cleaning
(1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.
(2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
(3) Check if the same trouble occurs again.
OK: Malfunction disappears.

NG → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

OK

HEAD IS DIRTY

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TAPE IS TANGLED DUE TO INCORRECT TAPE SPEED OR AUTO–REVERSE MALFUNCTION

INSPECTION PROCEDURE

1	CHECK FOR ANY FOREIGN OBJECT

(a) Check for any foreign objects.
  (1) Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assy.

OK: No foreign objects or defects are detected.

NG → REMOVE FOREIGN OBJECT

OK

2	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK(BELOW 90 MIN.)

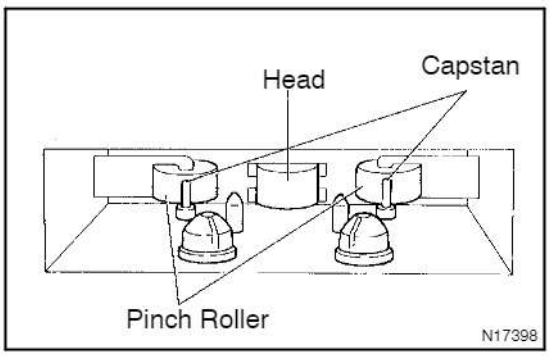
(a) Replace the cassette tape with another one and recheck.
  (1) Replace the cassette tape with another normal one (90 minutes. or less) to see if the same trouble occurs again.

OK: Malfunction disappears.

OK → CASSETTE TAPE IS FAULTY

NG

3	CLEAN HEAD AND CHECK OPERATION



(a) Head cleaning
  (1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.
  (2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
  (3) Check if the same trouble occurs again.

OK: Malfunction disappears.

NG → REPLACE RADIO RECEIVER ASSY (SEE PAGE 67–5)

OK

HEAD IS DIRTY

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NAVIGATION SYSTEM

05CWB–02

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See page
Power Window Control System	01–29

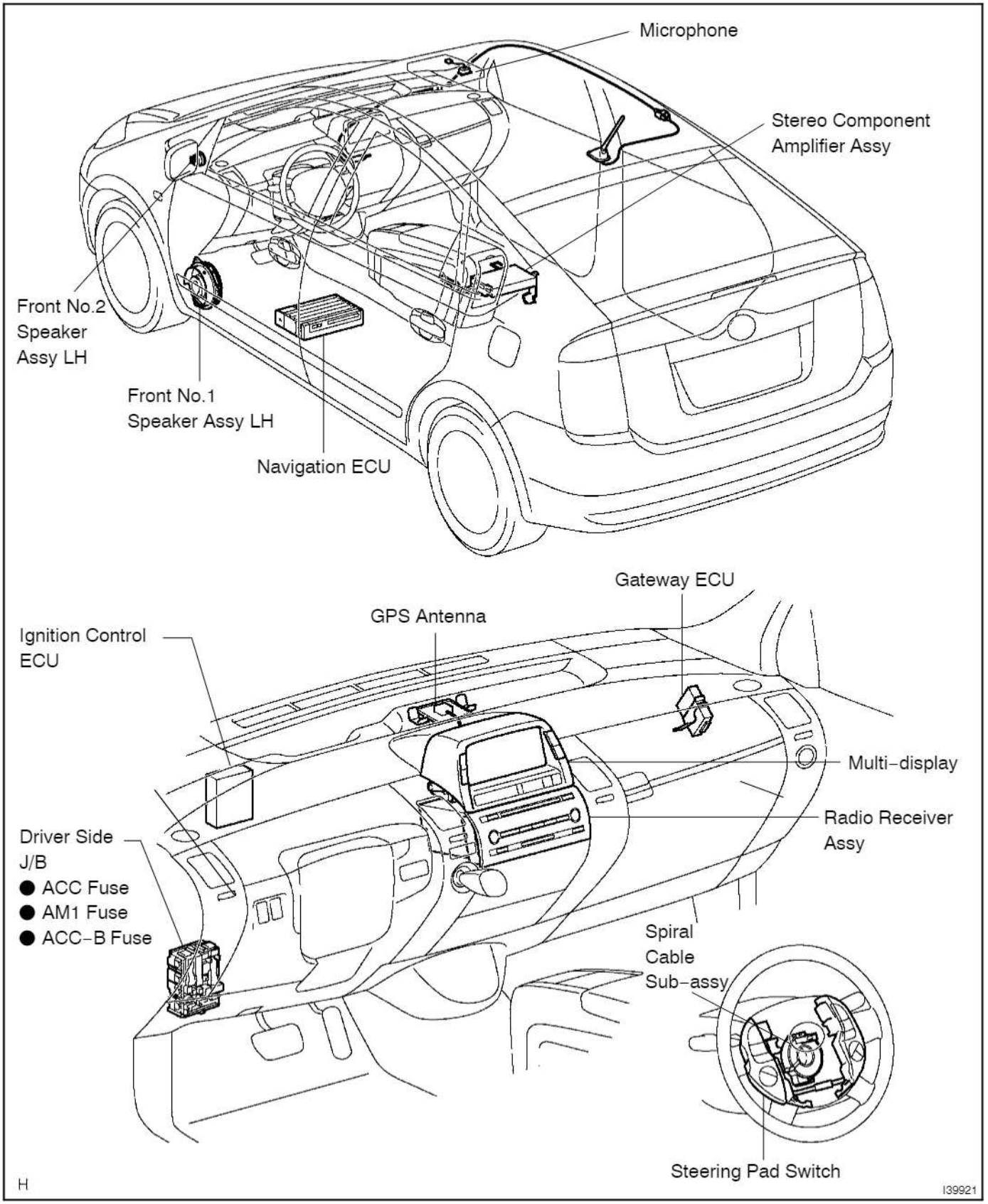
NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

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05HB7–01

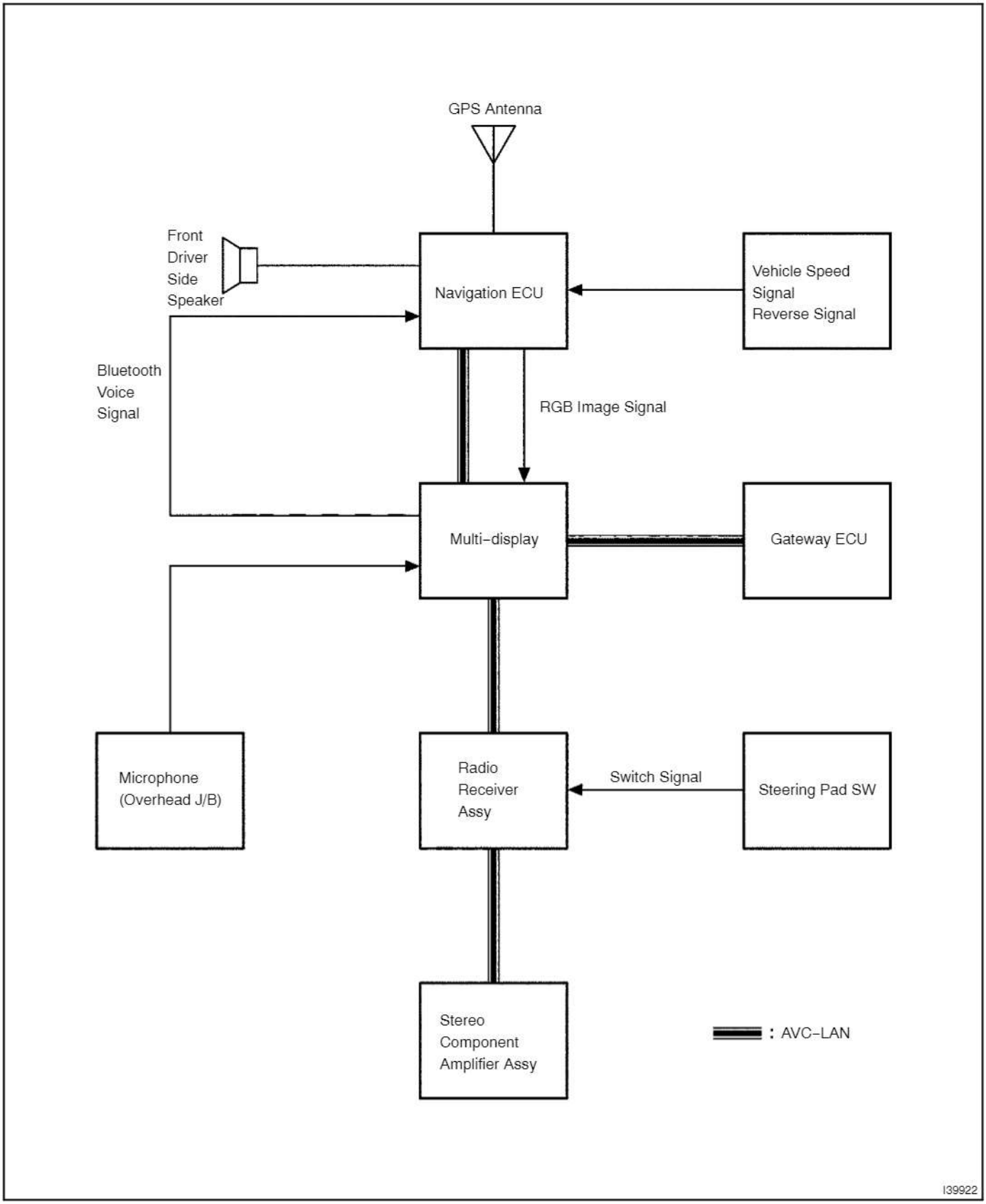
LOCATION



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05HB6-01

SYSTEM DIAGRAM



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05HB9-01

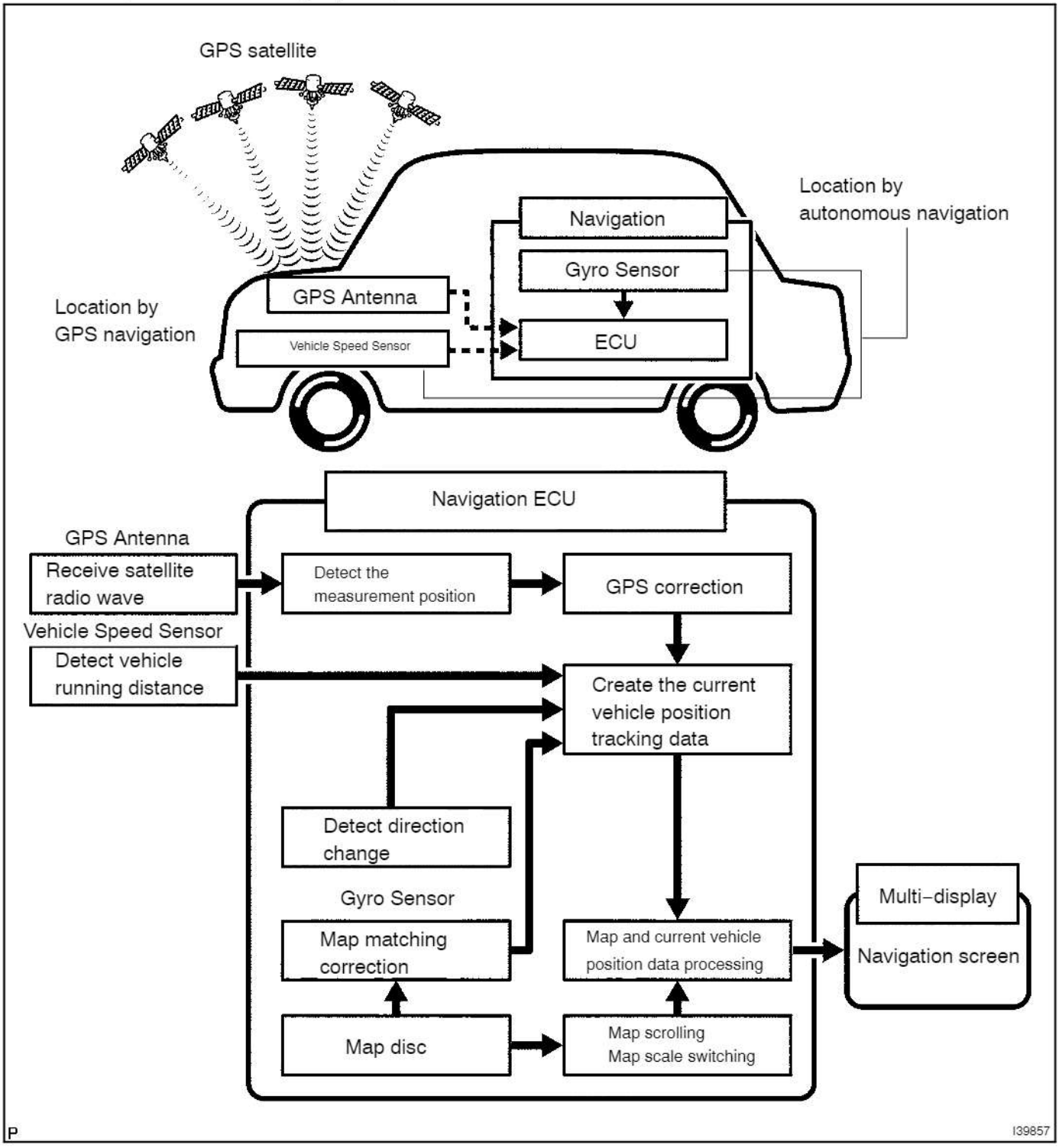
SYSTEM DESCRIPTION

1. Navigation system outline

(a) Vehicle position tracking methods

It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.

*GPS (Global Positioning System)



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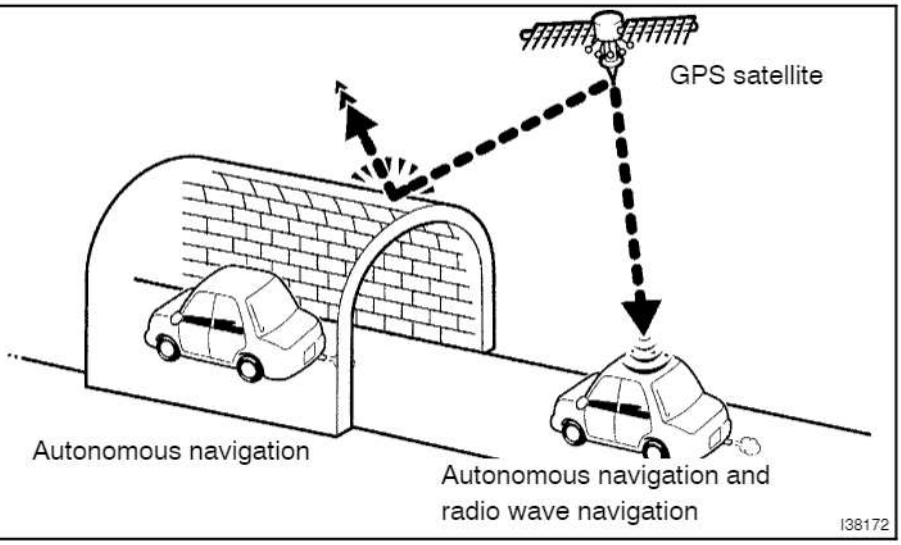
Operation	Description
Vehicle Position Calculation	The navigation ECU calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and the running distance signal from the vehicle speed sensor and creates the driving route.
Map Display processing	The navigation ECU displays the vehicle track on the map by processing the vehicle position data, vehicle running track, and map data from the map disc.
Map Matching	The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road.
GPS Correction	The vehicle position is matched to the position measured by GPS. Then, the measurement position data from the GPS unit is compared with the vehicle position and running track data. If the position is widely different, the GPS measurement position is used.
Distance Correction	The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The navigation ECU automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated.

HINT:

The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS radio wave cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decline.

Navigation performed even where the GPS radio wave does not reach.

- In a tunnel
- In an indoor parking lot
- Between tall buildings
- Under an overpass
- On a forest or tree–lined path



P I38172

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(b) Autonomous navigation

This method determines the relative vehicle position based on the running track determined by the gyro and vehicle speed sensors located in the navigation ECU.

(1) Gyro sensor

Calculates the direction by detecting angular velocity. It is located in the radio and navigation assy.

(2) Vehicle speed sensor

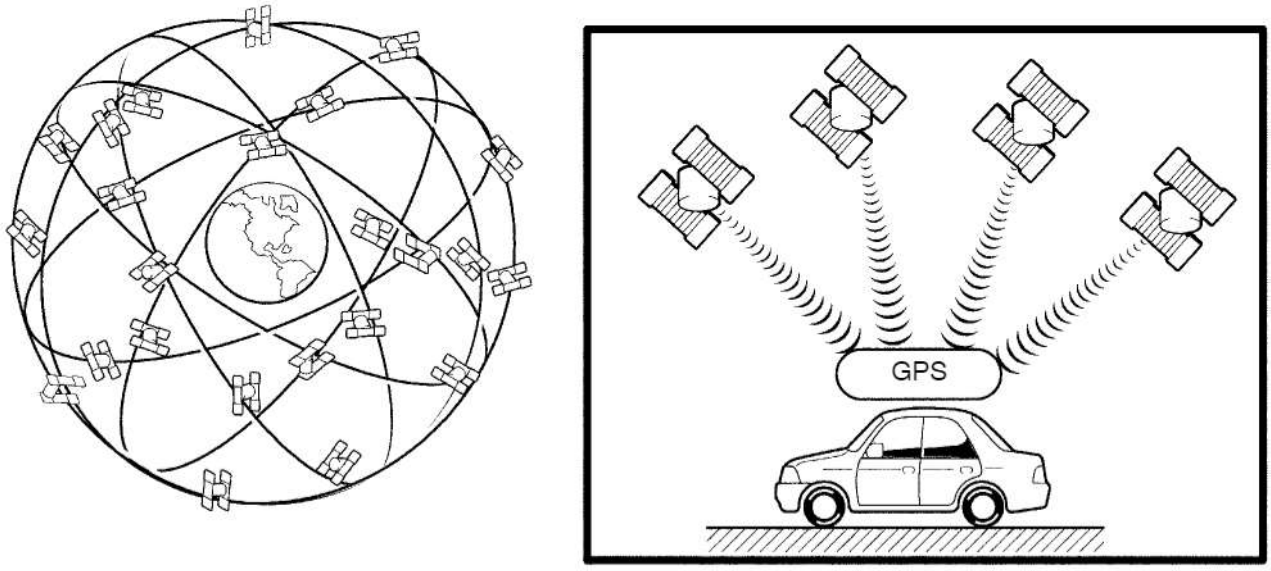
Used to calculate the vehicle running distance.

(c) GPS navigation (Satellite navigation)

This method detects the absolute vehicle position using radio wave from a GPS satellite.

* GPS satellites were launched by the U.S. Department of Defence for military purposes.

Current longitude/latitude/altitude is determined using the radio wave arrival time from four satellites.

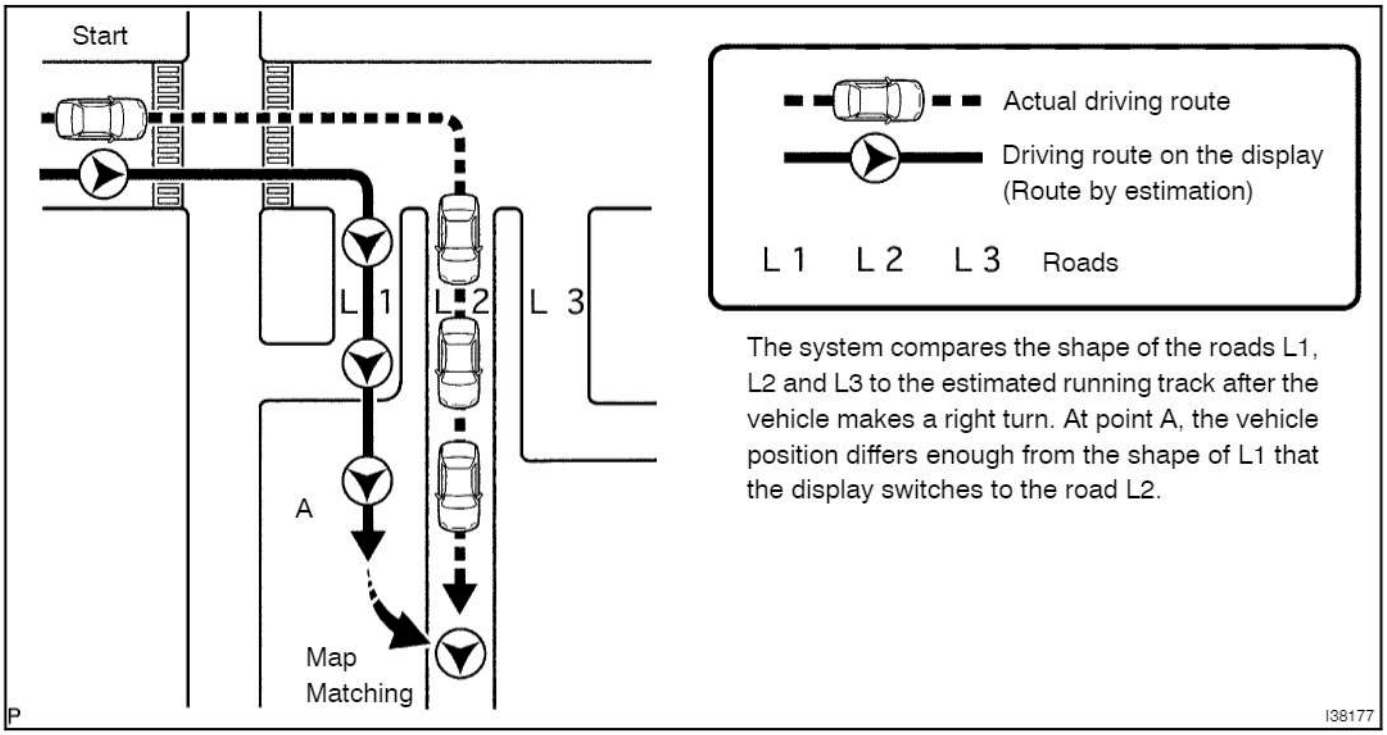


Number of satellites	Measurement	Description
2 or less	Measurement impossible	Vehicle position cannot be obtained because the number of satellites is not enough.
3	2–dimensional measurement is possible	Vehicle position is obtained based on the current longitude and latitude. (This is less precise than 3–dimensional measurement)
4	3–dimensional measurement is possible	Vehicle position is obtained based on the current longitude, latitude and altitude.

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(d) Map matching

The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.



2. DVD (Digital Versatile Disc) player outline (for navigation map)

(a) The navigation ECU uses a laser pickup to read the digital signals recorded on a DVD.

HINT:

- Do not disassemble any part of the navigation ECU.
- Do not apply oil to the navigation ECU.
- Do not insert anything but a DVD into the navigation ECU.

CAUTION:

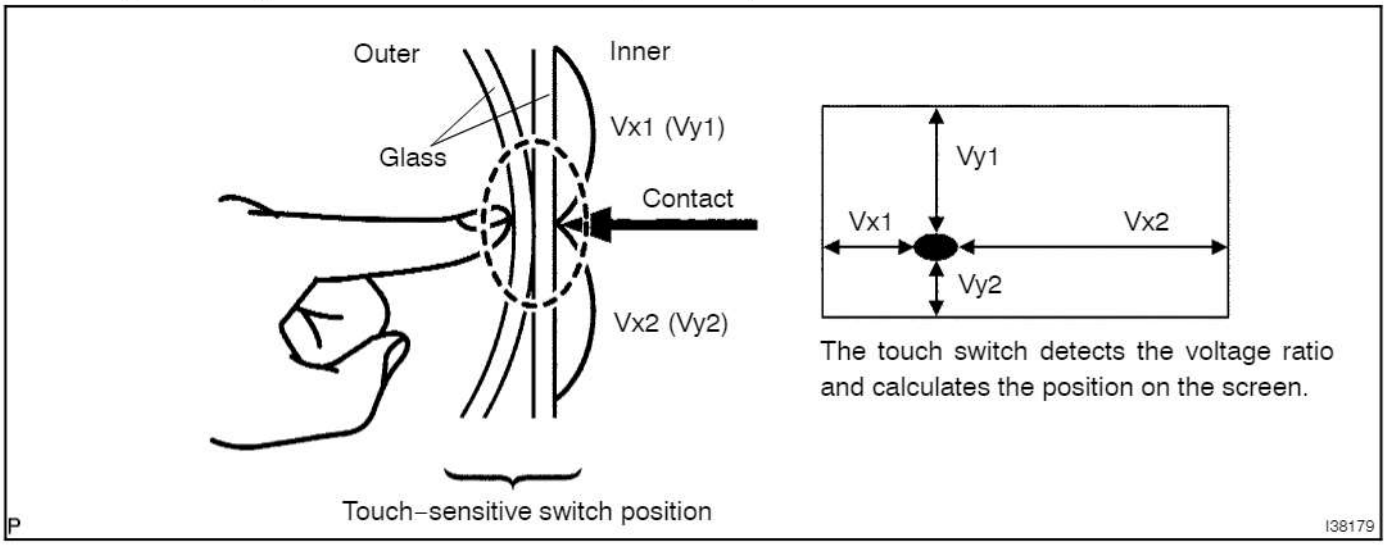
Because the navigation system uses an invisible laser beam, do not look directly at the laser pickup. Be sure to only operate the navigation as instructed.

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3. Multi–display outline

(a) Touch switch

Touch switches are touch–sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.



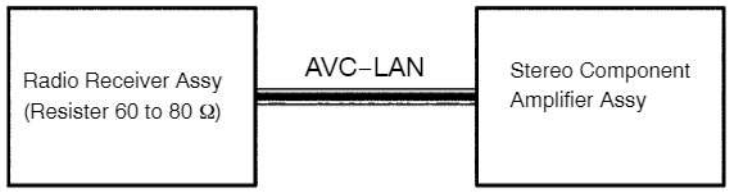
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4. AVC–LAN Description

(a) What is AVC–LAN?

AVC–LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a unified standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

Example:



(b) Purpose:

Recently, car audio systems have rapidly developed and the functions vastly changed. The conventional car audio system is being integrated with multi–media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows.

(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.

(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

HINT:

- If a +B or GND short is detected in the AVC–LAN circuit, communication is interrupted and the audio system will stop functioning.
- If an audio system is equipped with a navigation system, the multi–display unit acts as the master unit. If the navigation system is not equipped, the audio head unit acts as the master unit instead. If the radio and navigation assy is equipped, it is the master unit.
- The radio receiver assy provides resistance to make communication possible.
- The car audio system with an AVC–LAN circuit has a diagnostic function.
- Each component has a specified number (3–digit) called a physical address. Each function has a number (2–digit) called a logical address.

5. Communication system outline

(a) Components of the navigation system communicate with each other via the AVC–LAN.

(b) Radio receiver assy has enough resistance (60 to 80 Ω) necessary for transmitting the communication. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC–LAN circuit, communication is interrupted and the audio system will stop functioning.

6. Diagnostic function outline

(a) The navigation system has a diagnostic function (the result is indicated on the master unit).

(b) A 3–digit hexadecimal component code (physical address) is allocated to each component on the AVC–LAN. Using this code, the component in the diagnostic function can be displayed.

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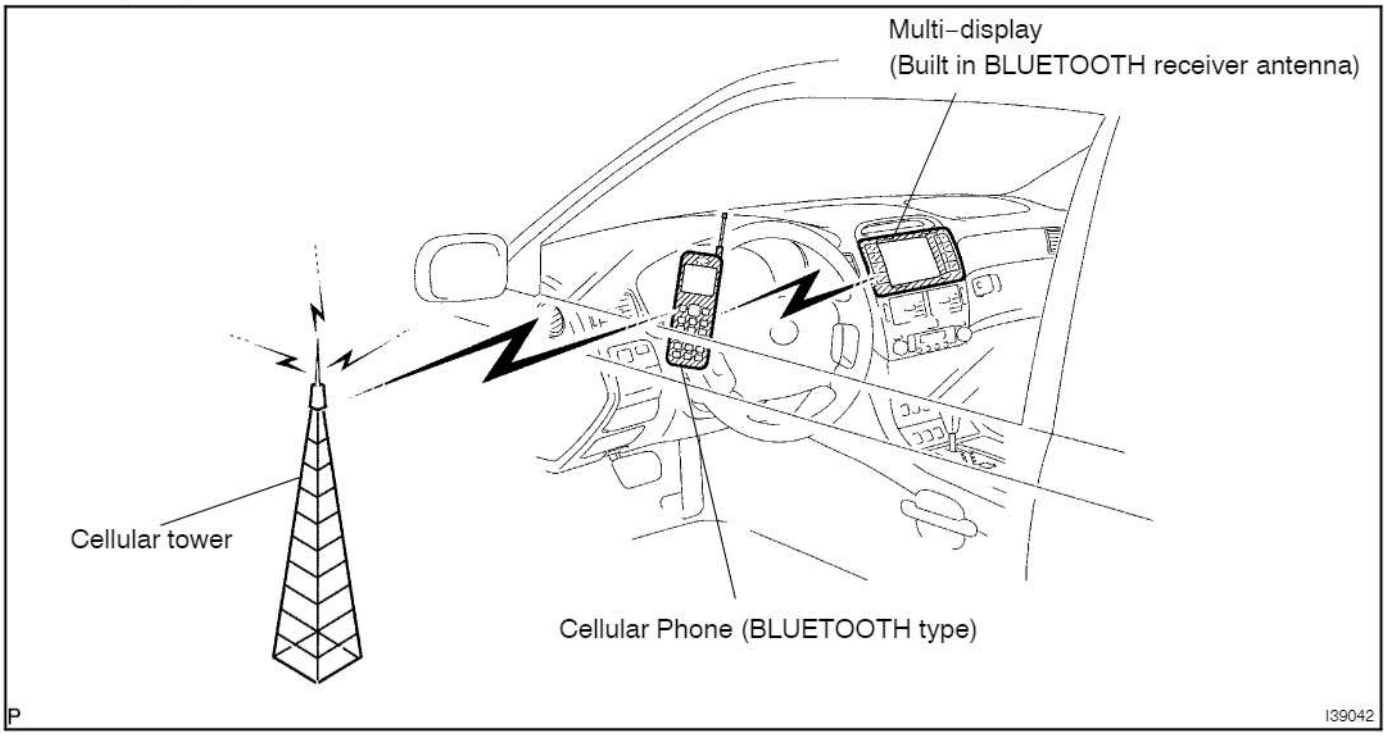
7. Bluetooth outline

(a) BLUETOOTH is a new wireless connection technology that uses the 2.4 GHz frequency band. This makes it possible to connect a cellular phone (BLUETOOTH capable phone*1) to the multi–display (BLUETOOTH system is built in), and use a hands–free function with the cellular phone in a pocket or bag. As a result, it is not necessary to use a connector for the cellular phone.

*1: Some versions of BLUETOOTH capable cellular phone may not function.

HINT:

The communication performance of BLUETOOTH may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity, or antenna capacity.



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05HCV–01

HOW TO PROCEED WITH TROUBLESHOOTING

1	**Vehicle brought into a workshop**

2	**Diagnostic questioning and symptom confirmation (see page 05–1550)**

Ask the customer about symptoms and confirm malfunctions. Fill out the Customer Problem Analysis check sheet.

- **The screen displays nothing (go to step 6, proceed to "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION/AUDIO SCREEN)")**
- **Other symptoms (go to step 3)**

3	**Confirm the system normal condition (see page 05–1567)**

- **Applicable (This is not a malfunction.)**
- **Not applicable (go to step 4)**

4	**Check the diagnostic trouble codes (see page 05–1578)**

HINT:

- If the system cannot enter the diagnosis mode, inspect each AVC–LAN communication signal and repair or replace problem parts (see page 05–1665 – 05–1669).
- Even if the malfunction symptom is not confirmed, check the diagnostic trouble codes. This is because the system stores past diagnostic trouble codes.
- Refer to the detailed description on the diagnostic screen as necessary (see page 05–1560).
- Check and clear the past diagnostic trouble code. Check the diagnostic trouble code and inspect the area the code indicates.

- **A code is output (go to step 5)**
- **A code is not output (go to step 6)**

5	**Diagnostic trouble code chart (see page 05–1585)**

Find the output code on the diagnostic trouble code chart.

- **Output the diagnostic trouble code (go to step 8)**

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6	**Problem symptoms table (see page 05–1570)**

Find the applicable symptom code in the problem symptoms table.
HINT:
If the symptom does not recur and no code is output, perform the symptom reproduction method (see page 01–36).

There is an applicable symptom code in the table (go to step 8)

There is no applicable symptom code in the table (go to step 7)

7	**Check the ECU terminal arrangement based on the malfunction symptom (see page 05–1573)**

8	**Check the circuit**

Adjust, repair or replace as necessary.

9	**Recheck the diagnostic trouble code (see page 05–1583)**

HINT:
After deleting the DTC, recheck the diagnostic trouble code.

10	**Perform confirmation test**

END

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05HBA-01

CUSTOMER PROBLEM ANALYSIS CHECK

NAVIGATION SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		VIN	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	Odometer Reading	km mile

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Always ☐ Intermittently (Times a day)

DTC Check

1st time trouble code.

Unit Check Mode				LAN Monitor			
Current	Memory	Occured	Data/Time	Code	Sub-Code	Code	Sub-Code

2nd time trouble code.

Unit Check Mode				LAN Monitor			
Current	Memory	Occured	Data/Time	Code	Sub-Code	Code	Sub-Code

Problem Symptom

I38696 I39529

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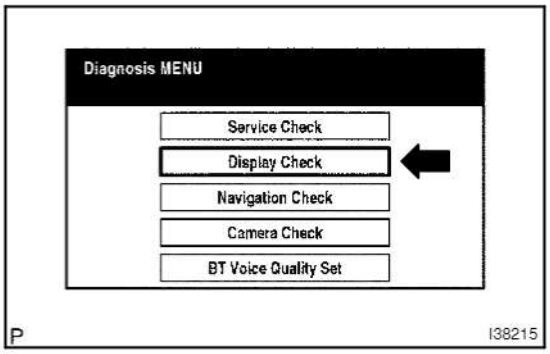
05HBB-01

DISPLAY CHECK MODE (COLOR BAR CHECK)

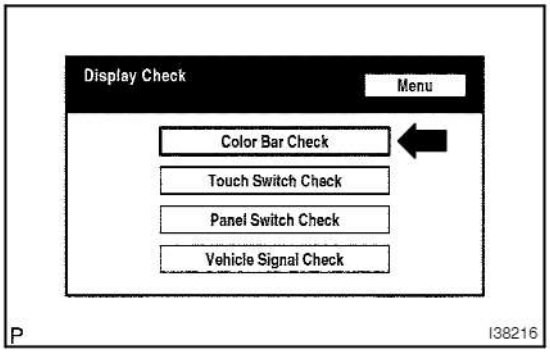
HINT:

- This mode checks the color display on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

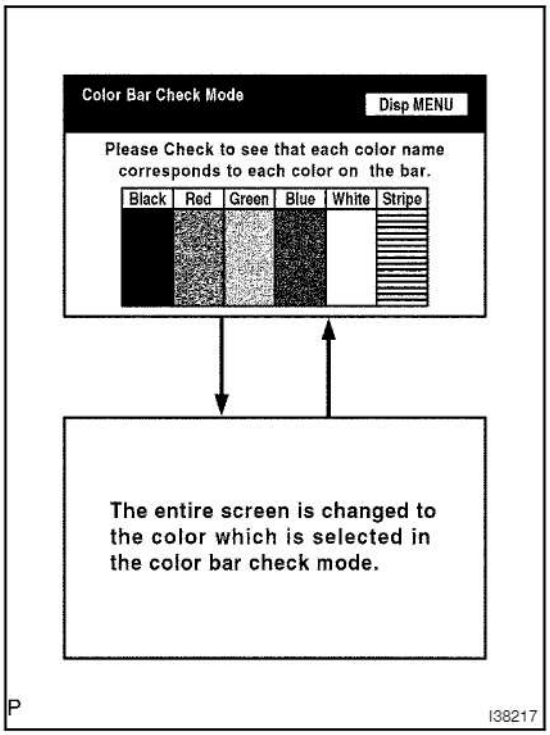
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Color Bar Check" from the "Display Check" screen.**



4. **Select a color bar from the "Color Bar Check Mode" screen.**

HINT:

- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

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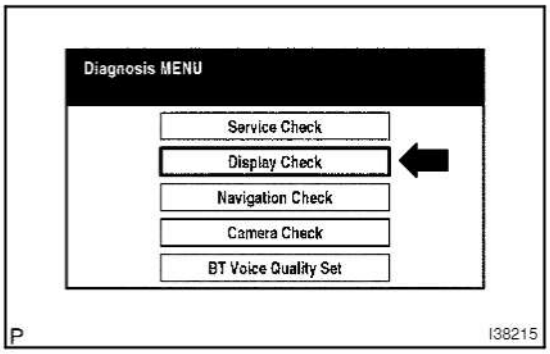
05HBC-01

DISPLAY CHECK MODE (TOUCH SWITCH CHECK)

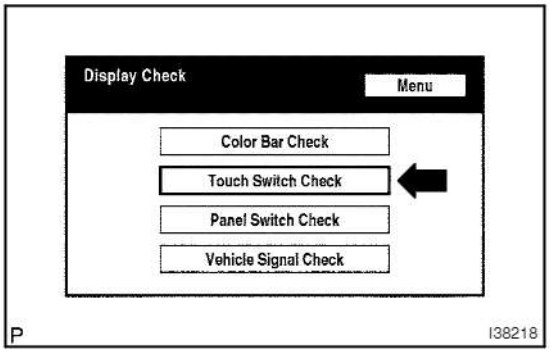
HINT:

- This mode checks the touch switch operation condition on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

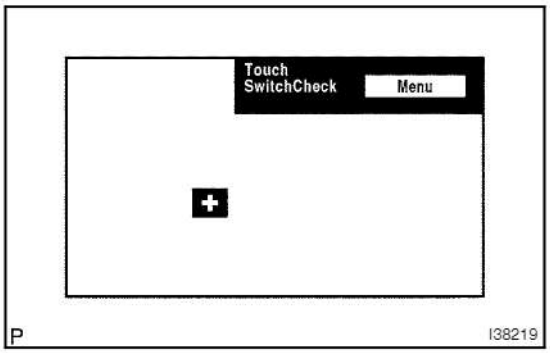
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Touch Switch Check" from the "Display Check" screen.**



4. **Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.**

HINT:

- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.

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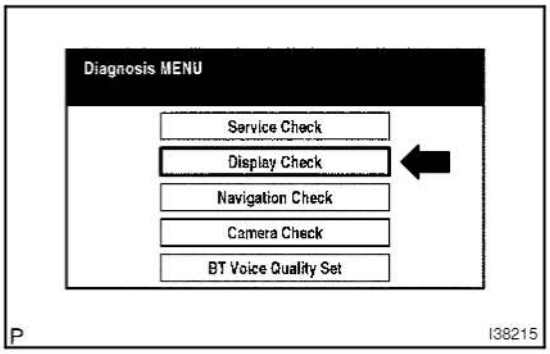
05HBD-01

DISPLAY CHECK MODE (PANEL SWITCH CHECK)

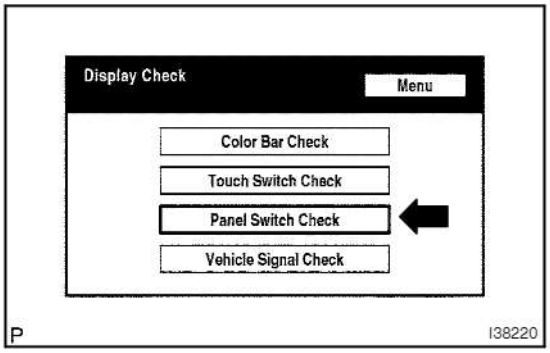
HINT:

- This mode checks the panel switch operation response on the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

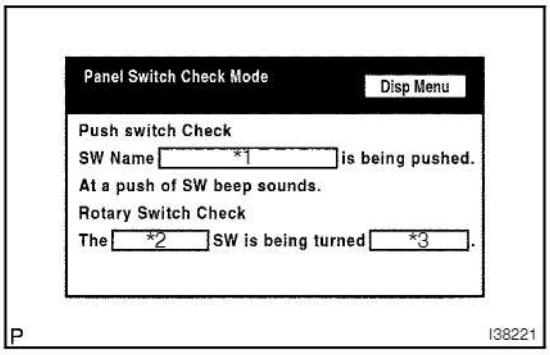
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Display Check" from the "Diagnosis Menu" screen.**



3. **Select "Panel Switch Check" from the "Display Check" screen.**



4. **Operate each switch and check that the switch name and condition are correctly displayed.**

HINT:

- Pressing the "DISPLAY" switch for 3 seconds will exit the diagnostic mode.

Display	Contents
Push switch name/*1	• Name of the pressed switch is displayed. • If more than one switch is pressed, "MULTIPLE" is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is rotated.

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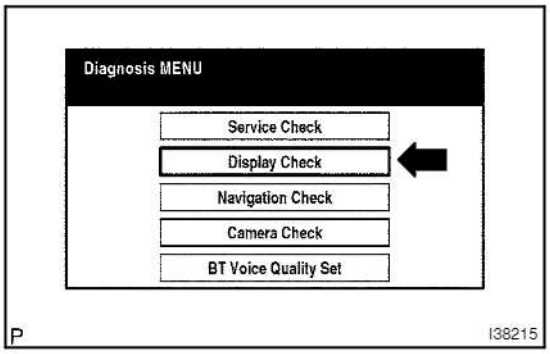
05HBE-01

DISPLAY CHECK MODE (VEHICLE SIGNAL CHECK)

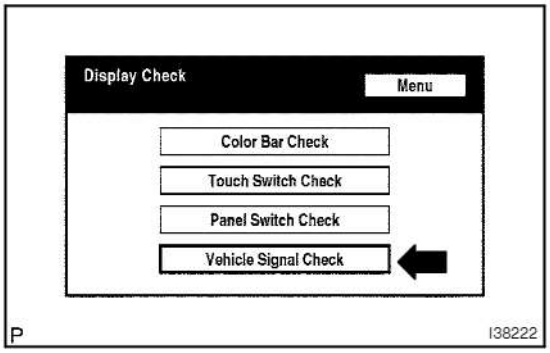
HINT:

- This mode checks the vehicle signal status input to the multi–display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

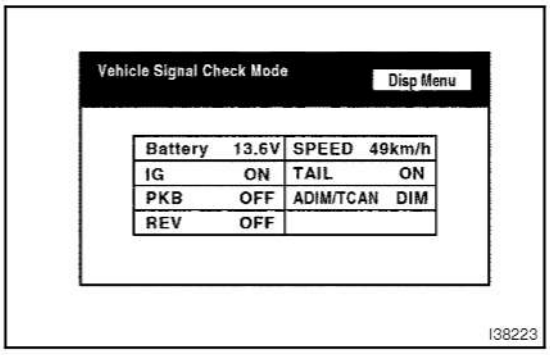
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Display Check" from the "Diagnosis MENU" screen.**



3. **Select "Vehicle Signal Check" from the "Display Check" screen.**



4. **When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.**

HINT:

- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

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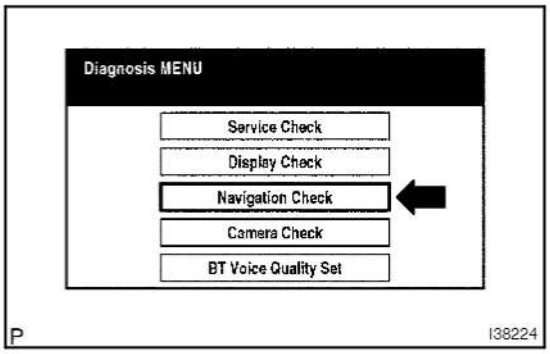
05HBF-01

NAVIGATION CHECK MODE (GPS INFORMATION)

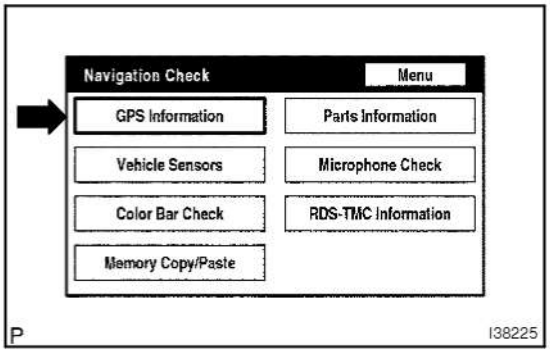
HINT:

- This mode displays GPS satellite information.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

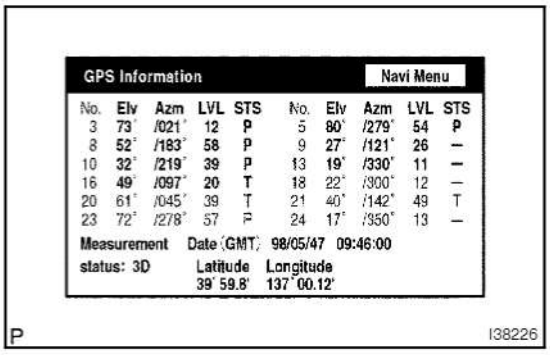
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Navigation Check" from the "Diagnosis MENU" screen.**



3. **Select "GPS Information" from the "Navigation Check" screen.**



4. **When GPS information is displayed, check the GPS conditions.**

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

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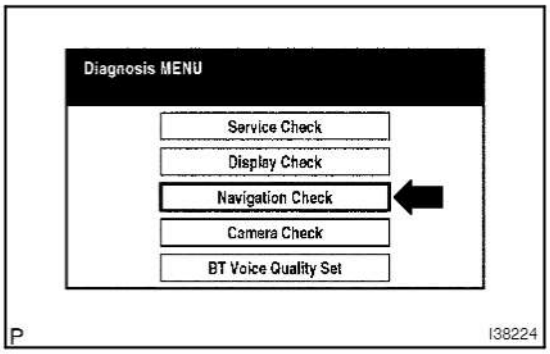
05HBG–01

NAVIGATION CHECK MODE (VEHICLE SENSORS)

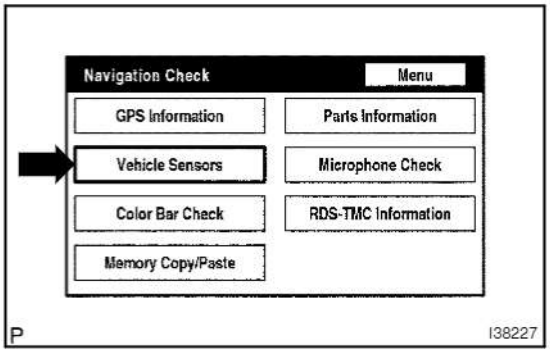
HINT:

- This mode checks the vehicle signal status to the navigation ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

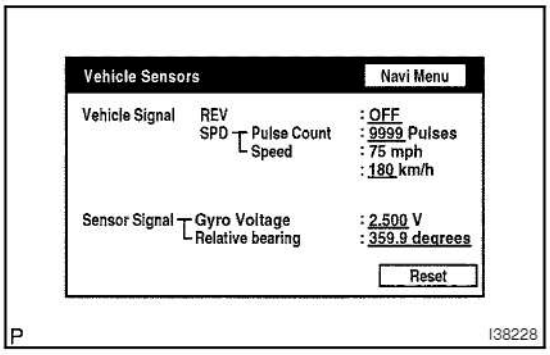
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Navigation Check" from the "Diagnosis MENU" screen.**



3. **Select "Vehicle Sensors" from the "Navigation Check" screen.**



4. **Check all the signals and sensors when vehicle signal information is displayed.**

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

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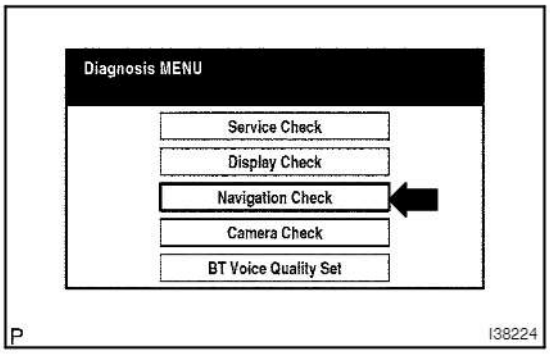
05HBH-01

NAVIGATION CHECK MODE (NAVI COLOR BAR CHECK)

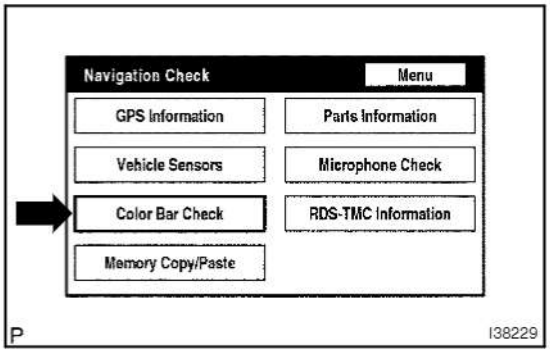
HINT:

- This mode checks the color display on the navigation ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

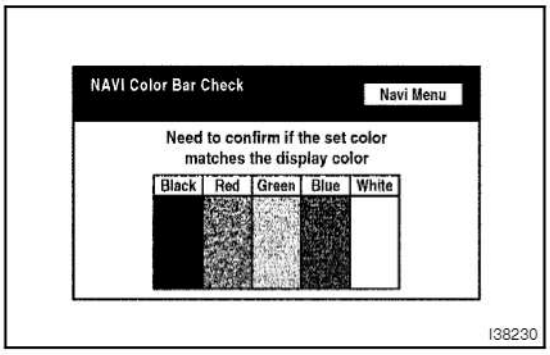
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Navigation Check" from the "Diagnosis MENU" screen.**



3. **Select "Color Bar Check" from the "Navigation Check" screen.**



4. **Check each color of the color bar when the "NAVI Color Bar Check" screen is displayed.**

HINT:

Colors will not be displayed full–screen as in "Display Check Mode".

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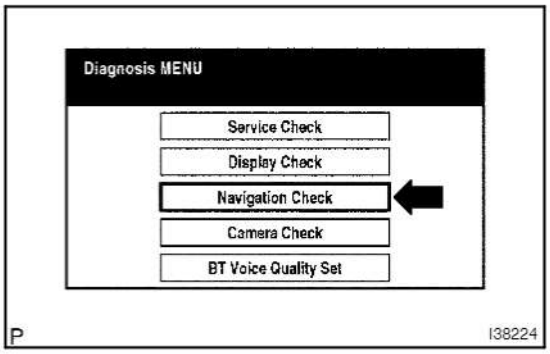
05HBI-01

NAVIGATION CHECK MODE (PARTS INFORMATION)

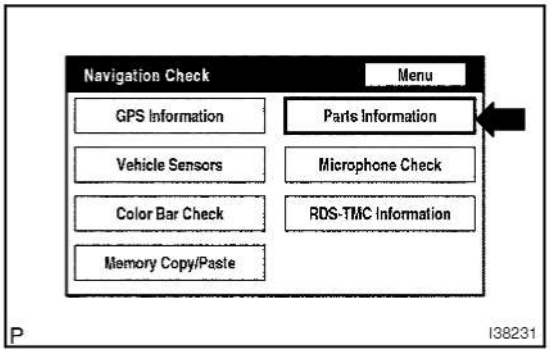
HINT:

- This mode displays product information on the navigation systems and discs.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

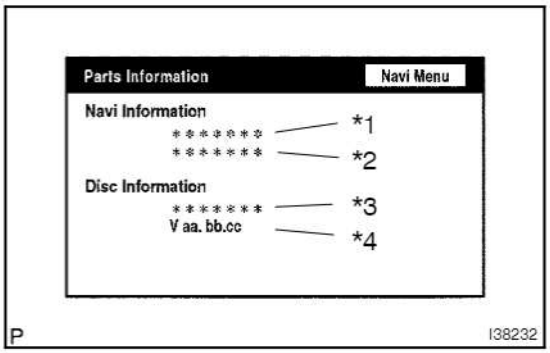
1. **Enter diagnostic mode (see page 05–1578).**



2. **Select "Navigation Check" from the "Diagnosis MENU" screen.**



3. **Select "Parts Information" from the "Navigation Check" screen.**



4. **Check the navigation and disc information when the "Parts Information" screen is displayed.**

Display	Contents
Navigation Manufacturer/*1	Navigation ECU manufacturer name is displayed.
Navigation Version/*2	Navigation ECU version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version/*4	Map disc version is displayed.

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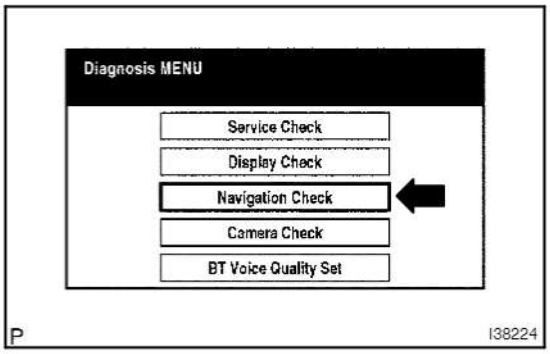
05HBJ–01

NAVIGATION CHECK MODE (MICROPHONE CHECK)

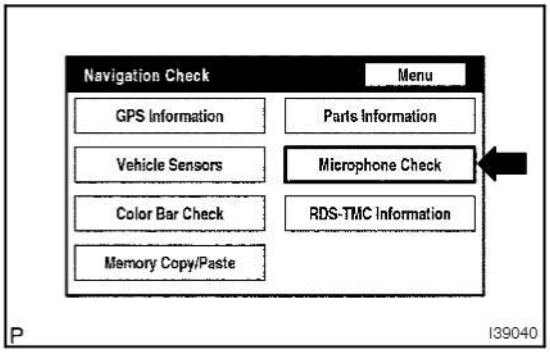
HINT:

- The microphone is checked in the "Navigation Check (Microphone Check)" mode.
- Illustrations may differ from the actual vehicle depending on vehicle specifications.

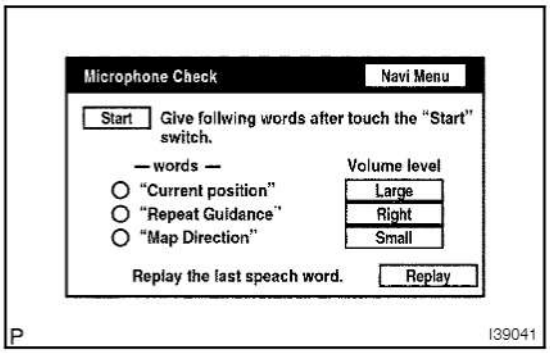
1. **Start the diagnostic mode (see page 05–1578)**



2. **Select "Navigation Check" from "Diagnosis MENU".**



3. **Select "Microphone Check" from "Navigation Check".**



4. **Perform the microphone check by following the directions on the "Microphone Check" screen.**

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05HCW–01

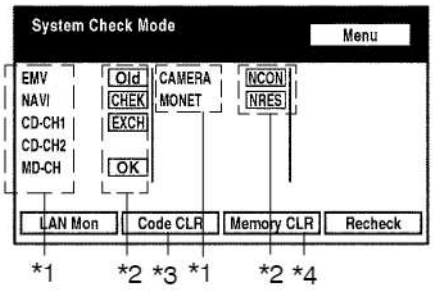
DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- This section contains a detailed description of displays within diagnostic mode.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. System Check

(a) System Check Mode Display



P

I38587

Device Names and Hardware Address/*1

HINT:

- Registered device names are displayed below.
- If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G–BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA–C	1B0	Rr–TV
1C0	Rr–CONT	1C2	TV–TUNER2
1C4	PANEL	1C6	G/W
1C8	FM–M–LCD	1D8	CONT–SW
1EC	Body	1F0	RADIO TUNER
1F1	XM	1F2	SIRIUS
230	TV–TUNER	240	CD–CH2
250	DVD–CH	280	CAMERA
360	CD–CH1	3A0	MD–CH
17D	TEL	440	DSP–AMP
530	ETC	5C8	MAYDAY
1A0	DVD–P	1C6	CLOCK
1F4	RSA	1F6	RSE
480	AMP	–	–

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Check Result/*2

HINT:

Result codes for all devices are shown below.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC–LAN).	–
EXCH	The device responds with a "replace"–type DTC.	Look up the DTC in "Unit Check Mode" and replace the device.
CHEK	The device responds with a "check"–type DTC.	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responds with an "old"–type DTC.	Look up the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

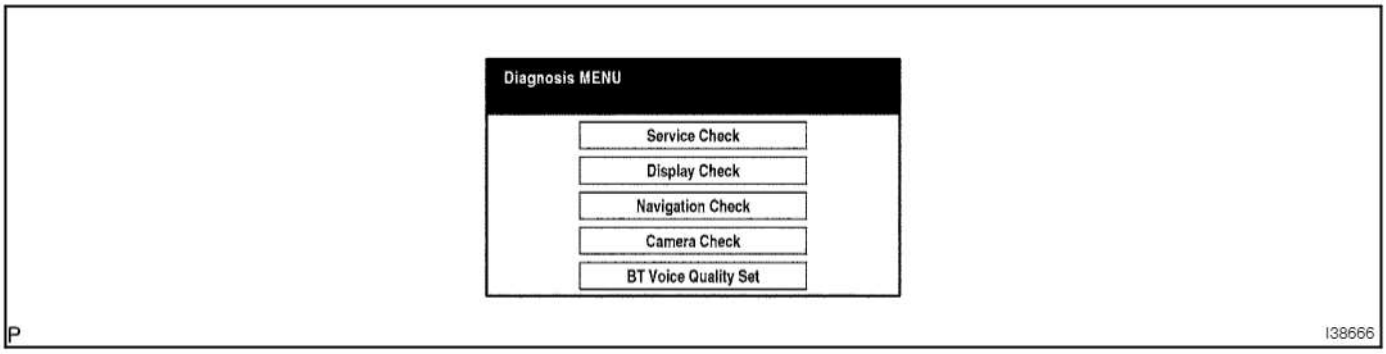
Code Clear/*3

Present DTCs are cleared.

Memory Clear/*4

Present and past DTCs and registered connected device names are cleared.

(b) Diagnosis MENU Display

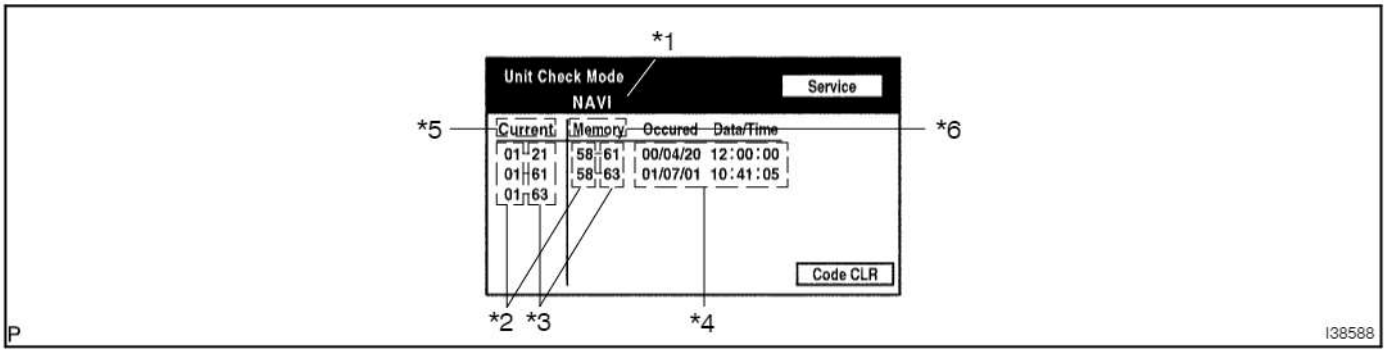


HINT:

Each item is grayed out or not displayed based on the device settings.

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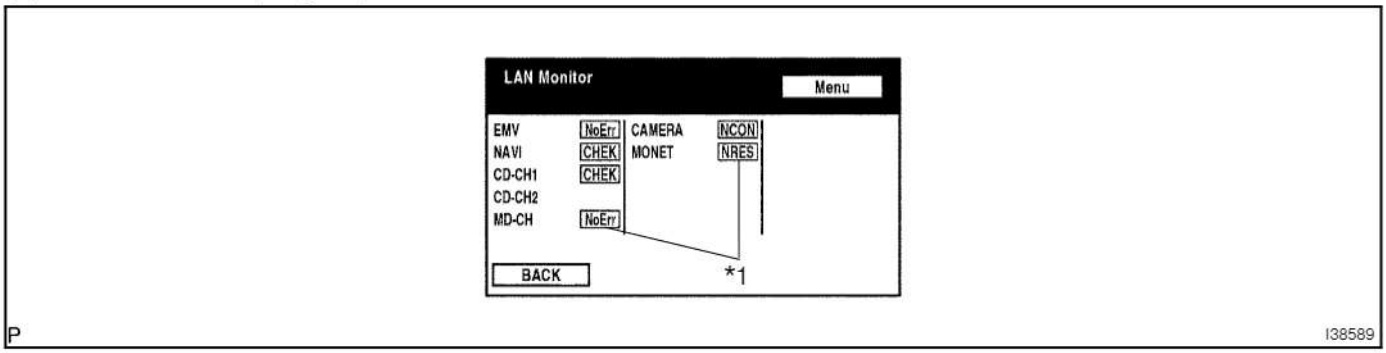
(c) Unit Check Mode Screen



Screen Description

Display	Contents
Device name/*1	Target Device
Segment/*2	Target Device Logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Timestamp/*4	The time and date of past DTCs displayed. (The year is displayed in 2 digit format.)
Present Code/*5	The DTC output at the service check is displayed.
Past Code/*6	Diagnostic memory results and recorded DTCs are displayed.

(d) LAN Monitor (Original) Screen



Check result

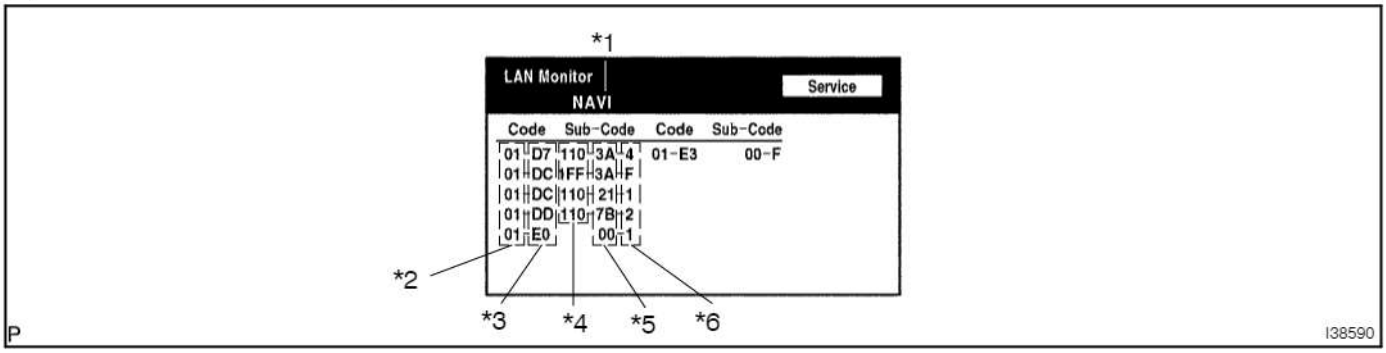
HINT:

Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	–
CHEK	The device responds with a "check"–type DTC.	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responded with an old–type DTC.	Look up the DTC in "Unit Check Mode".
NRES	Device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

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(e) LAN Monitor (Individual) Screen

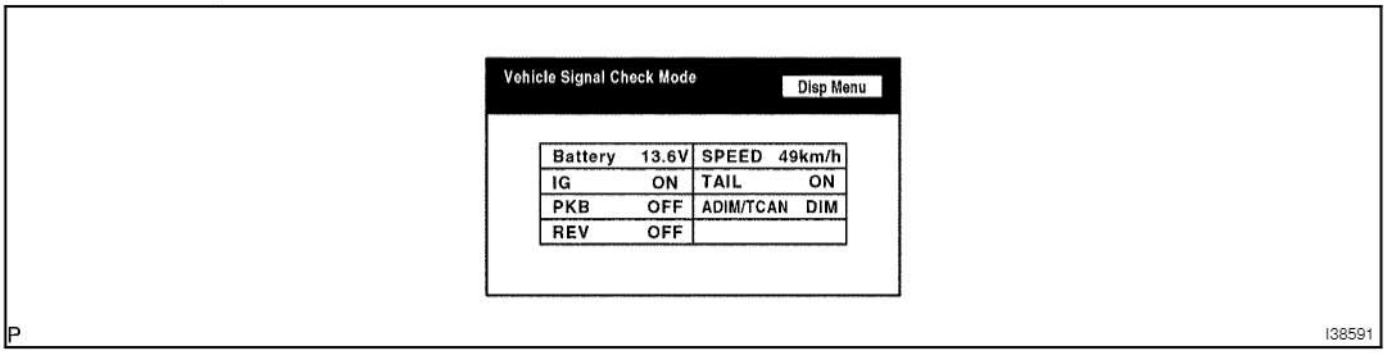


Screen Description

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub-Code (device address)/*4	Physical address stored with DTC. (If there is no address, nothing is displayed.)
Connection check No./*5	Connection check number stored with DTC.
DTC occurrence/*6	Number of times the same DTC has been recorded.

2. DISPLAY CHECK

(a) Vehicle Signal Check Mode Screen



Screen Description

Name	Contents
Battery	Battery voltage is displayed.
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
IG	Power switch ON/OFF state is displayed.
ADIM/TCAN	Brightness state DIM (with)/ BRIGHT (without) is displayed.
SPEED	The vehicle speed, displayed in km/h.
TAIL	TAIL signal (Head lamp dimmer switch) ON/OFF state is displayed.

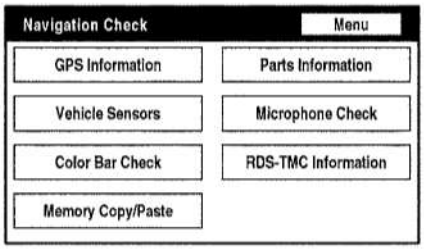
HINT:

- Only items sending a vehicle signal will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

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3. NAVIGATION CHECK

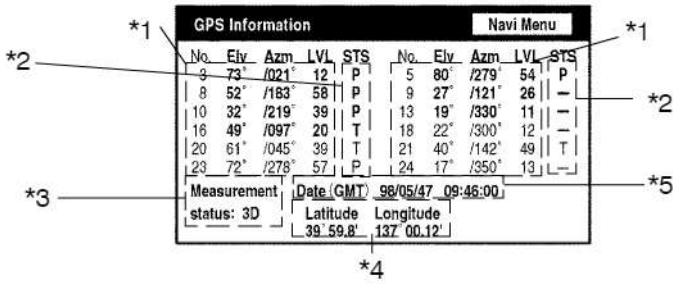
(a) Navigation Check MENU Screen



P I38667

HINT:
Each item is grayed out or not displayed based on the device settings.

(b) GPS information Screen



P I38592

Satellite information/*1

Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction and signal level.

Receiving condition/*2

(DENSO model)

Display	Contents
T	The system is receiving a GPS signal, but is not using it for location.
P	The system is using the GPS signal for location.
–	The system cannot receive a GPS signal.

(AISIN AW Model)

Display	Contents
01H	The system cannot receive a GPS signal.
02H	The system is tracing a satellite.
03H	The system is receiving a GPS signal, but is not using it for location.
04H	The system is using the GPS signal for location.

Measurement information/*3

Display	Contents
2D	2–dimensional location method is being used.
3D	3–dimensional location method is being used.
NG	Location data cannot be used.
Error	Reception error has occurred.
–	Any other state.

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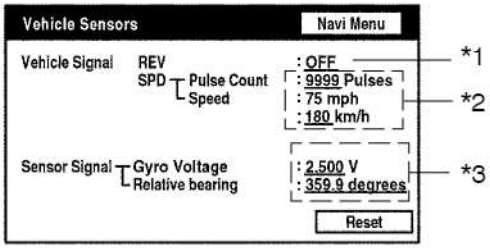
Position information/*4

Display	Contents
Position	Latitude and longitude information on the current position is displayed.

Date information/*5

Display	Contents
Date	The date/time information obtained from GPS signal is displayed in Greenwich mean time (GMT). The last 4 digits are displayed.

(c) Vehicle Signal Check Screen



P I38593

Vehicle signal

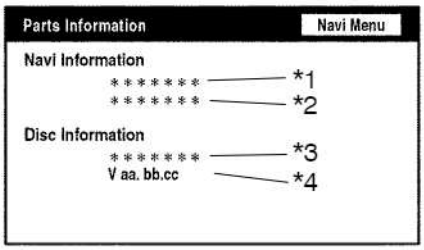
Display	Contents
REV/*1	REV signal ON/OFF state is displayed.
SPD/*2	SPD signal condition is displayed.

Sensor signal

Display	Contents
Gyro sensor/*3	Gyro sensor output condition is displayed (when the vehicle runs straight or is stationary, the voltage is approximately 2.5 V).

HINT:
Signals are updated once per second only when vehicle sensor signals are changed.

(d) Parts Information Screen



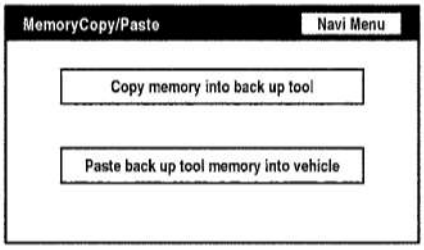
P I38594

Screen description

Display	Contents
Navigation Manufacturer/*1	Navigation ECU manufacturer is displayed.
Navigation Version No./*2	Navigation ECU version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version No./*4	Map disc version is displayed.

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(e) Memory Copy/Paste Screen



P I38595

HINT:
This function cannot be used.

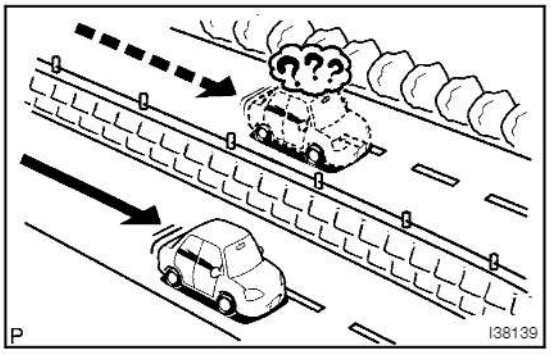
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05HBK-01

SYSTEM NORMAL CONDITION CHECK

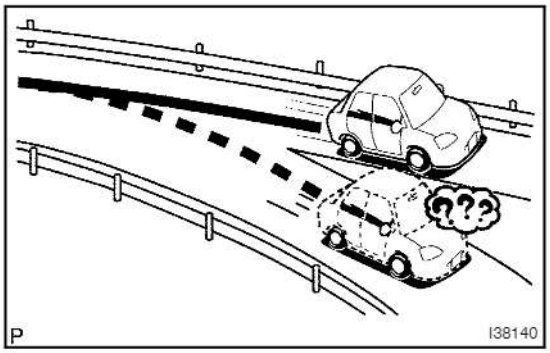
(f) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

Symptom	Answer
A longer route than expected is chosen.	Depending on the road conditions, the navigation ECU may determine that a longer route is quicker.
Even when distance priority is high, the shortest route is not shown.	Some paths may not be advised due to safety concerns.
When the vehicle is put into motion immediately after the engine starts, the navigation system deviates from the actual position.	If the vehicle starts before the navigation system activates, the system may not react.
When running on certain types of roads, especially new roads, the vehicle position deviates from the actual position.	When the vehicle is driving on new roads not available on the map disc, the system attempts to match it to another nearby road, causing the position mark to deviate.

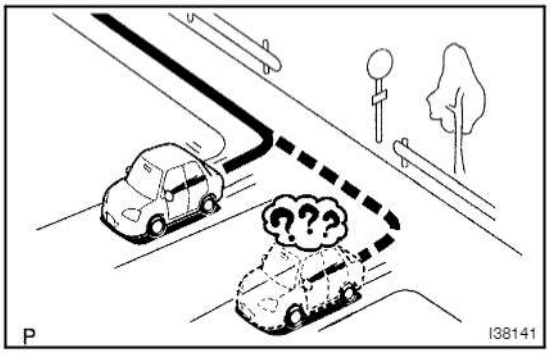


(g) The following symptoms are not a malfunction, but are caused by errors inherent in the GPS, gyro sensor, speed sensor, and navigation ECU.

(1) The current position mark may be displayed on a nearby parallel road the vehicle actually runs on.

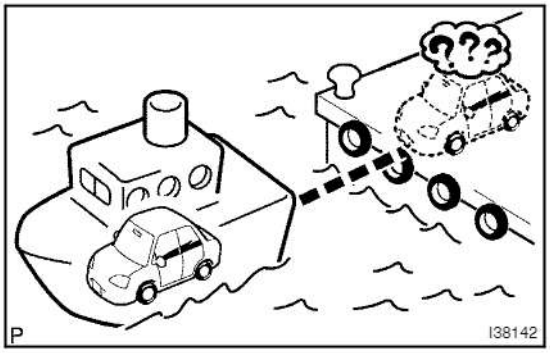


(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.

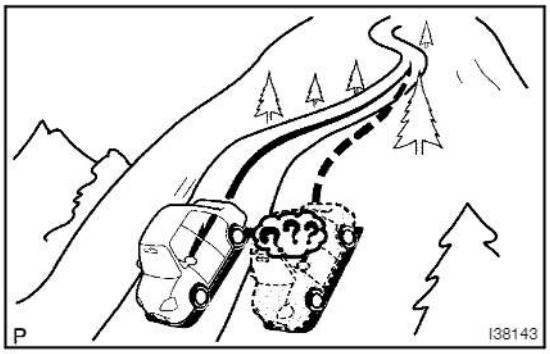


(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.

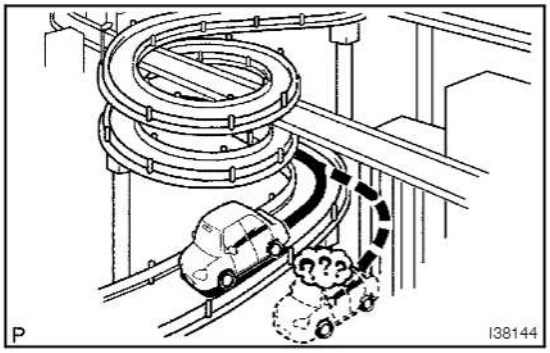
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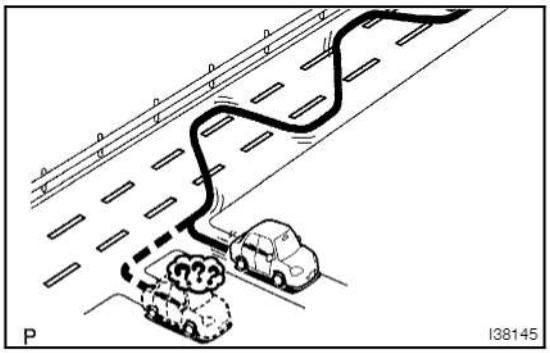
(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



(5) When the vehicle runs on a steep hill, the current vehicle position mark may deviate from the correct position.

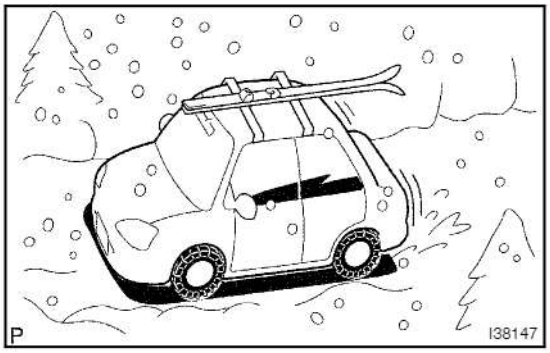


(6) When the vehicle makes a continuous turn of 360, 720, 1,080, etc. degrees, the current vehicle position mark may deviate from the correct position.



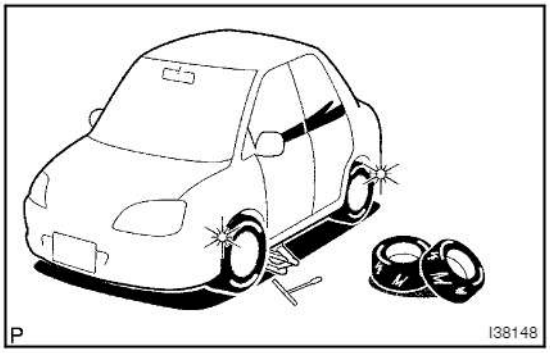
(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.

(8) When the power switch is put into the ACC/OFF position on a turn table before parking, the current vehicle position mark may not point in the correct direction. The same will occur when the vehicle comes out of parking.



(9) When the vehicle runs on the snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.

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(10) When a tire is changed, the current vehicle position mark may deviate from the correct position.

HINT:

- Diameter of the tire may change, causing a speed sensor error.
- Performing the "tire change" in calibration mode will allow the system to correct the current vehicle position faster.

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05HSL–01

PROBLEM SYMPTOMS TABLE

HINT:

- Before performing verification listed in the table below, check the fuse and relay.
- Methods used to verify the cause of the problem are listed in order of probability in the verification column.

Display function

Symptom	Verification	See page
Black screen (No image appears on navigation/audio screen).	1. "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION AND AUDIO SCREEN)" 2. Illumination circuit 3. Power source circuit (multi–display) 4. Replace multi–display	05–1596 05–1657 05–1630 67–7
Illumination for panel switch does not come on with TAIL switch on.	1. "ILLUMINATION FOR PANEL SWITCH DOES NOT COME ON WITH TAIL SWITCH ON" 2. Illumination circuit 3. Replace multi–display	05–1597 05–1657 67–7
Display does not dim (Night Screen) with TAIL switch on.	1. "DISPLAY DOES NOT DIM (NIGHT SCREEN) WITH TAIL SWITCH ON" 2. Illumination circuit 3. Replace multi–display	05–1598 05–1657 67–7
Power does not turn off (The screen remains on).	1. Power source circuit (multi–display) 2. Replace multi–display	05–1630 67–7
Panel switch does not function.	1. "PANEL SWITCH DOES NOT FUNCTION" 2. Steering pad switch circuit 3. Power source circuit (multi–display) 4. Replace multi–display	05–1599 05–1660 05–1630 67–7
Touch panel switch does not function.	1. "TOUCH PANEL SWITCH DOES NOT FUNCTION" 2. Steering pad switch circuit 3. Power source circuit (multi–display) 4. Replace multi–display	05–1600 05–1660 05–1630 67–7
Screen is distorted.	1. Display signal circuit (navigation ECU – multi–display) 2. Replace navigation ECU 3. Replace multi–display	05–1649 67–23 67–7
Screen flicker or color distortion.	1. "SCREEN FLICKER OR COLOR DISTORTION" 2. Display signal circuit (navigation ECU – multi–display) 3. Replace navigation ECU 4. Replace multi–display	05–1601 05–1649 67–23 67–7
No switches function while vehicle is running	1. Speed signal circuit (multi–display – combination meter assy)	05–1637

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Navigation function

Symptom	Verification	See page
Map disc cannot be inserted.	1. "MAP DISC CANNOT BE INSERTED" 2. Power source circuit (navigation ECU) 3. Replace navigation ECU	05–1603 05–1632 67–23
Map disc cannot be ejected.	1. Power source circuit (navigation ECU) 2. Replace navigation ECU	05–1632 67–23
Vehicle position mark deviates greatly.	1. "VEHICLE POSITION MARK DEVIATES GREATLY" 2. Replace GPS antenna assy 3. Replace navigation ECU	05–1604 67–22 67–23
Cursor or map rotates when vehicle is stopped.	1. "CURSOR OR MAP ROTATES WHEN VEHICLE IS STOPPED" 2. Replace navigation ECU	05–1606 67–23
Vehicle position mark is not updated.	1. "VEHICLE POSITION MARK IS NOT UPDATED" 2. Replace map disc 3. Replace navigation ECU	05–1607 – 67–23
Current position display does not appear.	1. "CURRENT POSITION DISPLAY DOES NOT APPEAR" 2. Replace map disc 3. Replace navigation ECU	05–1608 – 67–23
GPS mark is not displayed.	1. "GPS MARK IS NOT DISPLAYED" 2. Replace GPS antenna assy 3. Replace navigation ECU	05–1609 67–22 67–23
Voice guidance does not function.	1. "VOICE GUIDANCE DOES NOT FUNCTION" 2. Mute signal circuit (stereo component amplifier assy – navigation ECU) 3. Speaker circuit (navigation voice) 4. Replace map disc 5. Replace stereo component amplifier assy 6. Replace navigation ECU	05–1611 05–1671 05–1644 – 67–25 67–23
Map display incomplete	1. "MAP DISPLAY INCOMPLETE" 2. Replace map disc 3. Replace navigation ECU	05–1614 – 67–23
Route cannot be calculated.	1. "ROUTE CANNOT BE CALCULATED" 2. Replace map disc 3. Replace navigation ECU	05–1615 – 67–23
Voice recognition difficulty	1. "VOICE RECOGNITION DIFFICULTY" 2. Replace navigation ECU	05–1619 67–23
Voice is not recognized.	1. "VOICE IS NOT RECOGNIZED" 2. Microphone circuit (overhead J/B – multi–display) 3. Microphone circuit (multi–display – navigation ECU) 4. Replace microphone 5. Replace microphone amplifier 6. Replace navigation ECU 7. Replace multi–display	05–1621 05–1653 05–1655 – – 67–23 67–7

Steering pad function

Symptom	Verification	See page
Voice navigation cannot be operated with steering pad switch.	1. Steering pad switch circuit 2. Replace steering pad switch LH RH 3. Replace navigation ECU	05–1660 67–28 67–29 67–23

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Bluetooth function

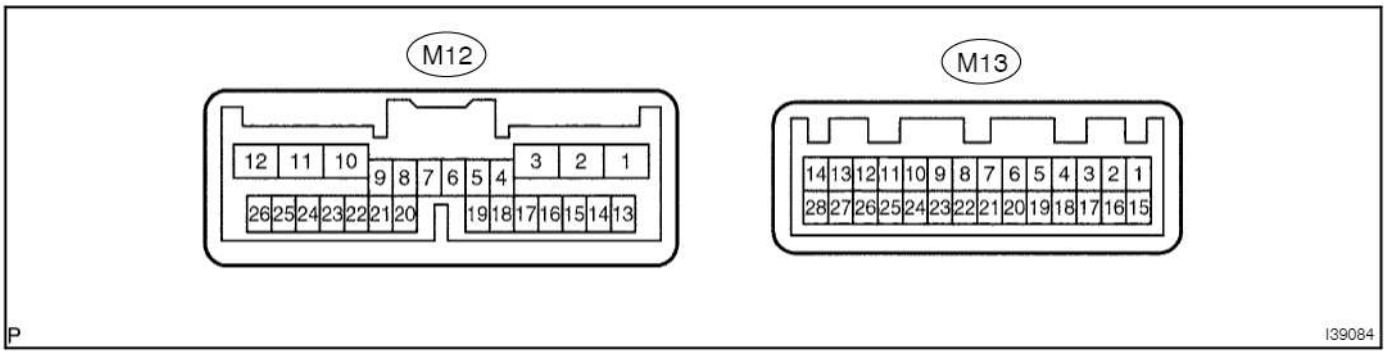
Symptom	Verification	See page
Cellular phone registration failure, phone directory transfer failure	1. "CELLULAR PHONE REGISTRATION FAILURE, PHONE DIRECTORY TRANSFER FAILURE"	05–1622
The cellular phone cannot send/receive.	1. "THE CELLULAR PHONE CANNOT SEND/RECEIVE" 2. "OWN VOICE CANNOT BE HEARD, TOO QUIET OR DISTORTED" 3. Cellular phone voice circuit (multi–display – navigation ECU) 4. Replace navigation ECU 5. Replace multi–display	05–1624 05–1628 05–1651 67–23 67–7
Cannot call in a certain place.	1. "CANNOT CALL IN A CERTAIN PLACE"	05–1626
Voice on phone cannot be heard, too quiet, or distorted.	1. "VOICE ON PHONE CANNOT BE HEARD, TOO QUIET OR DISTORTED" 2. Cellular phone voice circuit (multi–display – navigation ECU) 3. Replace navigation ECU 4. Replace multi–display	05–1628 05–1651 67–23 67–7
Own voice cannot be heard, too quiet or distorted.	1. "OWN VOICE CANNOT BE HEARD, TOO QUIET OR DISTORTED"	05–1628

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05HBM-01

TERMINALS OF ECU

1. MULTI–DISPLAY ASSY:

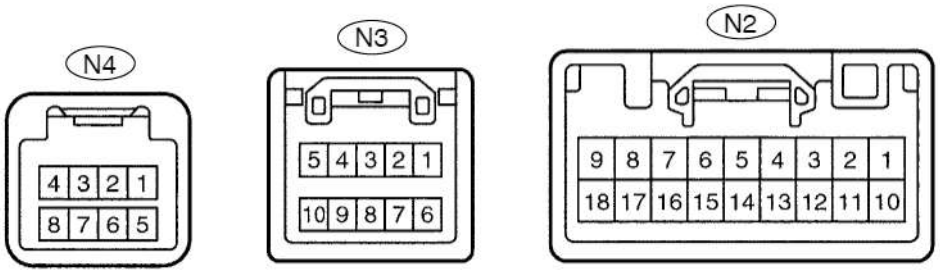


Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
SGND (M13–3) – Body ground	BR – Body ground	Ground	Always	Below 1 V
MIN+ (M13–4) – GND1 (M12–3)	G – BR	Microphone voice signal	See "microphone check"	–
MIN– (M13–5) – Body ground	R – Body ground	Microphone voice signal	See "microphone check"	–
MACC (M13–6) – GND1 (M12–3)	BR – BR	Microphone Accessory	Power Switch OFF → ON (IG)	Below 1 V → 5 V
SLD (M13–20) – Body ground	Shielded – Body ground	Shielded ground	Always	Below 1 V
MCO+ (M13–18) – GND1 (M12–3)	R – BR	Microphone voice signal	See "microphone check"	–
MCO– (M13–19) – GND1 (M12–3)	G – BR	Microphone voice signal	See "microphone check"	–
SLD (M13–20) – Body ground	Shielded – Body ground	Shielded ground	Always	Below 1 V
IVO+ (M13–21) – GND1 (M12–3)	B – BR	Telephone voice signal (bluetooth)	See "microphone check"	–
IVO– (M13–22) – GND1 (M12–3)	W – BR	Telephone voice signal (bluetooth)	See "microphone check"	–
VR (M13–23) – GND1 (M12–3)	Y – BR	Video return signal	Power Switch OFF	Below 1 V
R (M13–24) – GND1 (M12–3)	B – BR	Display signal (red)	Navigation display is on	–
G (M13–25) – GND1 (M12–3)	W – BR	Display signal (green)	Navigation display is on	–
B (M13–26) – GND1 (M12–3)	R – BR	Display signal (blue)	Navigation display is on	–
SYNC (M13–27) – GND1 (M12–3)	G – BR	Display signal (synchronize)	Navigation display is on	–
VG (M13–28) – Body ground	Shielded – Body ground	Shielded ground	Always	Below 1 V
ILL+ (M12–1) – GND1 (M12–3)	G – BR	Illumination (rheostat) signal	Power Switch OFF → ON (IG)	Below 1 V → 10 to 14 V
ILL– (M12–2) – Body ground	W–B – Body ground	Illumination (rheostat) signal	Power Switch OFF → ON (IG)	Below 1 V → 10 to 14 V
GND1 (M12–3) – Body ground	BR – Body ground	Ground	Always	Below 1 V
TC (M12–7) – GND1 (M12–3)	P – BR	Diagnosis ON signal	Power Switch ON (IG)	9 to 14 V
IG (M12–10) – GND1 (M12–3)	B – BR	Ignition (ON)	Power Switch OFF → ON (IG)	Below 1 V → 10 to 14 V

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ACC (M12–11) – GND1 (M12–3)	GR – BR	Accessory (ON)	Power Switch OFF → ON (ACC) or ON (IG)	Below 1 V → 10 to 14 V
+B1 (M12–12) – GND1 (M12–3)	Y – BR	Battery	Always	10 to 14 V
PKB (M12–16) – GND1 (M12–3)	R – BR	Parking brake signal	Turn parking brake switch ON → OFF	Below 1 V → 10 to 14 V
TX2+ (M12–18) – GND1 (M12–3)	P – BR	AVC–LAN communication signal	Power Switch ON (IG)	2 to 3 V
TX2– (M12–19) – GND1 (M12–3)	W – BR	AVC–LAN communication signal	Power Switch ON (IG)	2 to 3 V
SPD (M12–25) – GND1 (M12–3)	V – BR	Speed signal from combination meter	See "vehicle signal check mode"	–

2. NAVIGATION ECU:

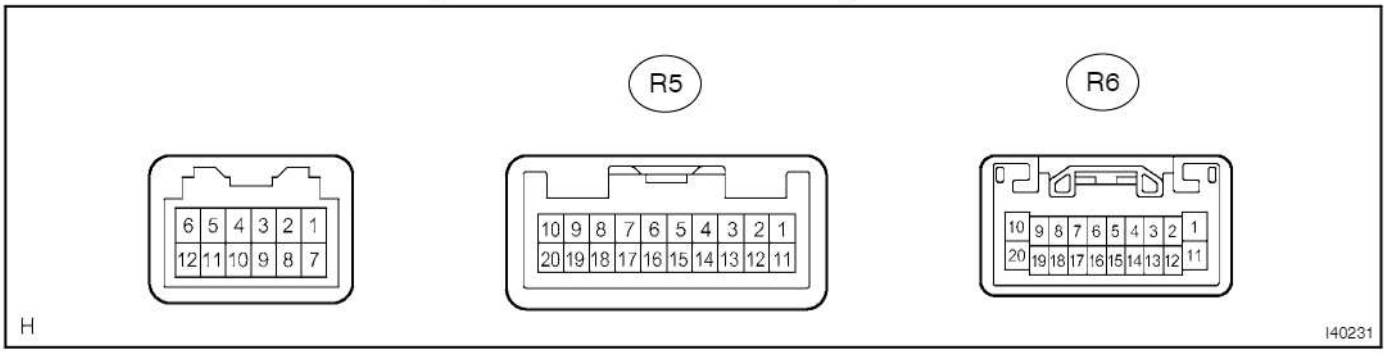


Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
AUI+ (N2–1) – GND1 (N2–17)	P – W–B	Sound signal (input)	Audio system is playing	–
AUO+ (N2–2) – GND1 (N2–17)	P – W–B	Sound signal (output)	Audio system is playing	–
SLD1 (N2–3) – Body ground	BR – Body ground	Shielded ground	Always	Below 1.0 V
SPD (N2–5) – GND1 (N2–17)	V – W–B	Speed signal from combination meter	See "Vehicle Signal Check Mode" (see page 05–1554)	–
+B (N2–9) – GND1 (N2–17)	SB – W–B	Battery	Always	10 to 14 V
AUI– (N2–10) – GND1 (N2–17)	V – W–B	Sound signal (input)	Audio system is playing	–
AUO– (N2–11) – GND1 (N2–17)	V – W–B	Sound signal (output)	Audio system is playing	–
VOI+ (N2–12) – SLD1 (N2–3)	B – Body ground	Telephone voice signal (bluetooth)	See "microphone check"	–
VOI– (N2–13) – SLD1 (N2–3)	W – Body ground	Telephone voice signal (bluetooth)	See "microphone check"	–
REV (N2–14) – GND1 (N2–17)	R – W–B	Reverse signal from combination meter	See "Vehicle Signal Check Mode" (see page 05–1554)	–
MUT2 (N2–15) – GND1 (N2–17)	W – W–B	Mute signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
GND1 (N2–17) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
ACC (N2–18) – GND1 (N2–17)	GR – W–B	Accessory (ON)	Power Switch OFF → ON (ACC) or ON (IG)	Below 1 V → 10 – 14 V
VR (N3–1) – GND1 (N2–17)	Y – W–B	Video return signal	Power Switch OFF	Below 1 V
R (N3–2) – GND1 (N2–17)	B – W–B	Display signal (red)	Navigation display is on	–
B (N3–3) – GND1 (N2–17)	G – W–B	Display signal (blue)	Navigation display is on	–

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TX+ (N3–5) – GND1 (N2–17)	W – W–B	AVC–LAN communication signal	Power Switch ON (IG)	2 to 3 V
VG (N3–6) – Body ground	Shielded – Body ground	Shielded ground	Always	Below 1 V
G (N3–7) – GND1 (N2–17)	W – W–B	Display signal (green)	Navigation display is on	–
SYNC (N3–8) – GND1 (N2–17)	G – W–B	Display signal (synchronize)	Navigation display is on	–
TX– (N3–10) – GND1 (N2–17)	P – W–B	AVC–LAN communication signal	Power Switch ON (IG)	2 to 3 V
MIC+ (N4–3) – GND1 (N2–17)	R – W–B	Microphone voice signal	See "microphone check"	–
MIC– (N4–5) – GND1 (N2–17)	G – W–B	Microphone voice signal	See "microphone check"	–
SNSE (N4–7) – Body ground	W–B – Body ground	Ground	Always	Below 1 V

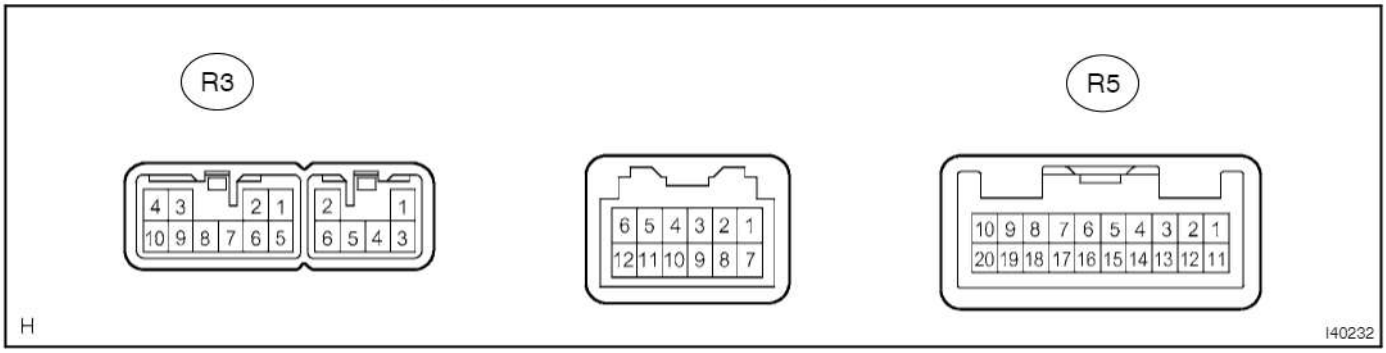
3. RADIO RECEIVER ASSY (SEPARATE TYPE AMPLIFIER):



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
TX+ (R5–9) – GND (R6–20)	P – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
TX– (R5–10) – GND (R6–20)	W – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
TX+ (R6–5) – GND (R6–20)	P – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
TX– (R6–15) – GND (R6–20)	O – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
GND (R6–20) – Body ground	BR – Body ground	Ground	Always	Below 1 Ω

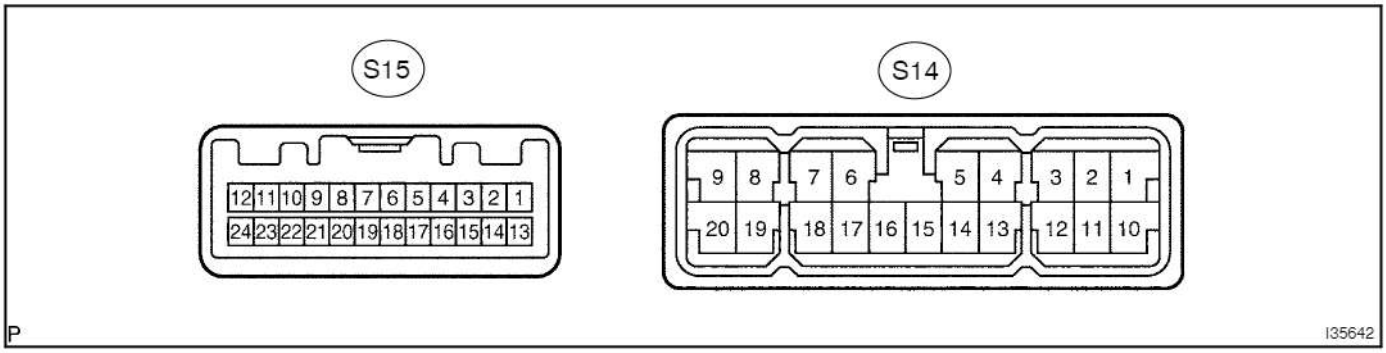
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4. RADIO RECEIVER ASSY (BUILT–IN TYPE AMPLIFIER):



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
TX1+ (R5–9) – GND (R3–7)	P – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
TX1– (R5–10) – GND (R3–7)	W – BR	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
GND (R3–7) – Body ground	BR – Body ground	Ground	Always	Below 1 Ω

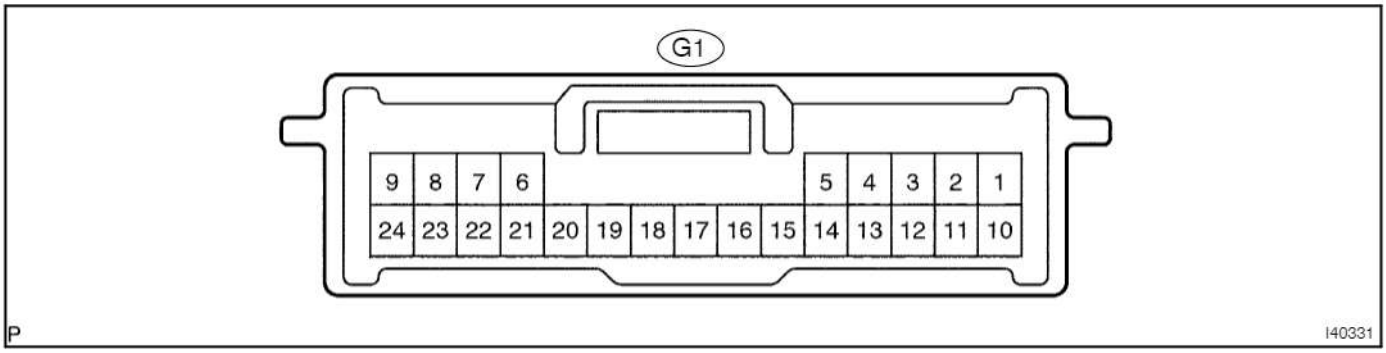
5. STEREO COMPONENT AMPLIFIER ASSY:



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
GND (S14–16) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω
TX– (S15–7) – GND (S14–16)	O – W–B	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
TX+ (S15–8) – GND (S14–16)	P – W–B	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V

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6. GATEWAY ECU:



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
GTX+ (G1–6) – GND (G1–24)	B – W–B	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
GTX– (G1–21) – GND (G1–24)	W – W–B	AVC–LAN communication signal	Power Switch ON (ACC)	2 to 3 V
GND (G1–24) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω

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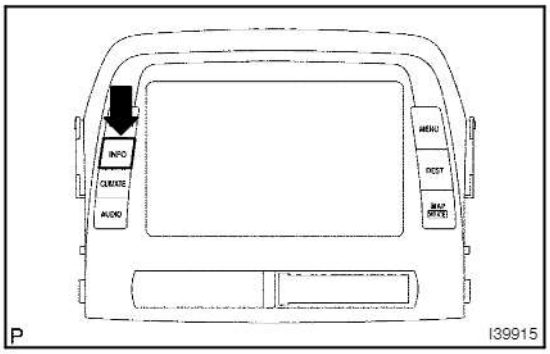
05HBN–01

DIAGNOSTIC START–UP/FINISH

HINT:

- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- After the power switch is ON (ACC), check that the map is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. There are 2 methods to start diagnostic mode. Start the mode by using one of them.

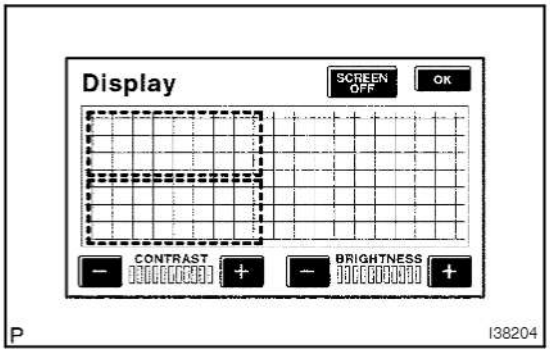


2. Method 1

(a) Start the HV system.

(b) While pressing and holding "INFO" switch, operate light control switch, OFF → TAIL → OFF → TAIL → OFF → TAIL → OFF.

(c) The diagnostic mode starts and the service check screen ("System Check Mode") will be displayed. Service inspection starts automatically and the result will be displayed.



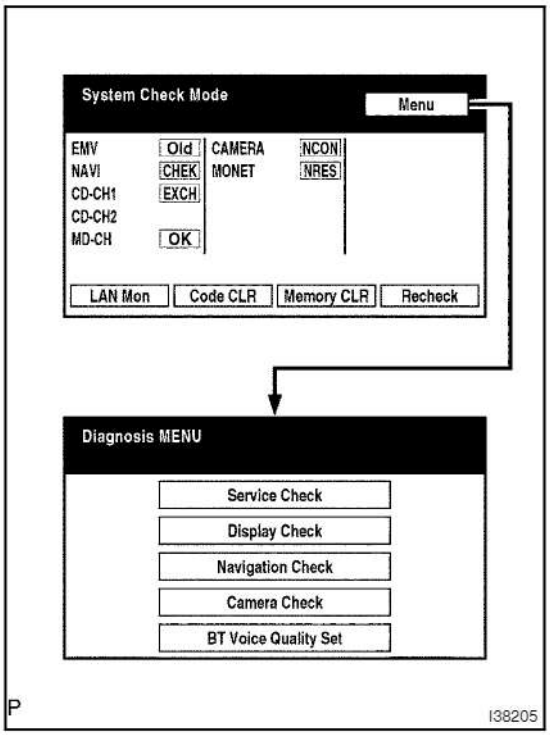
3. Method 2

(a) Start the HV system.

(b) Switch to the "Display Check" screen.

(c) From the display adjustment screen, touch the corners of the screen in the following order: upper left → lower left →upper left → lower left → upper left → lower left.

(d) The diagnostic mode starts and "Service Check" screen will be displayed. Service inspection starts automatically and the result will be displayed.



4. Diagnosis MENU

(a) Diagnostic screen will be displayed by pressing the menu switch on the service check screen.

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5. There are 2 methods to exit. Use one of them.

(a) Turn the power switch off.

(b) Press the "DISPLAY" switch for 3 seconds.

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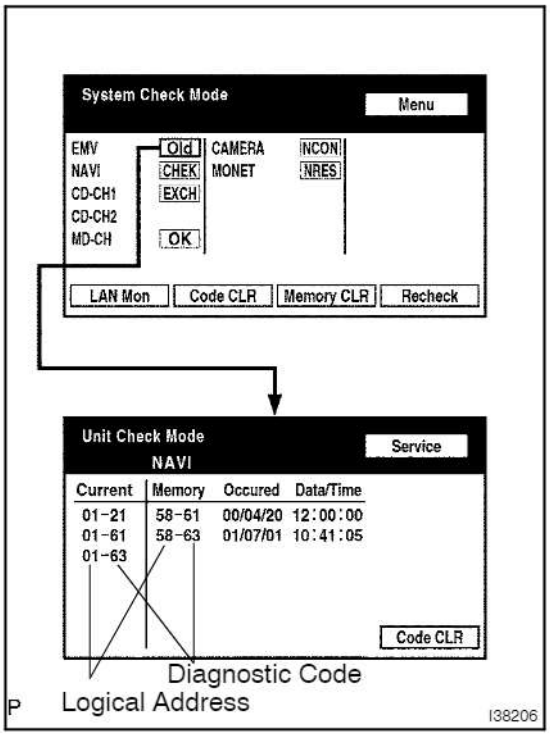
05HBC–01

SYSTEM CHECK MODE (DTC CHECK)

HINT:

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Start the diagnostic mode (see page 05–1578).

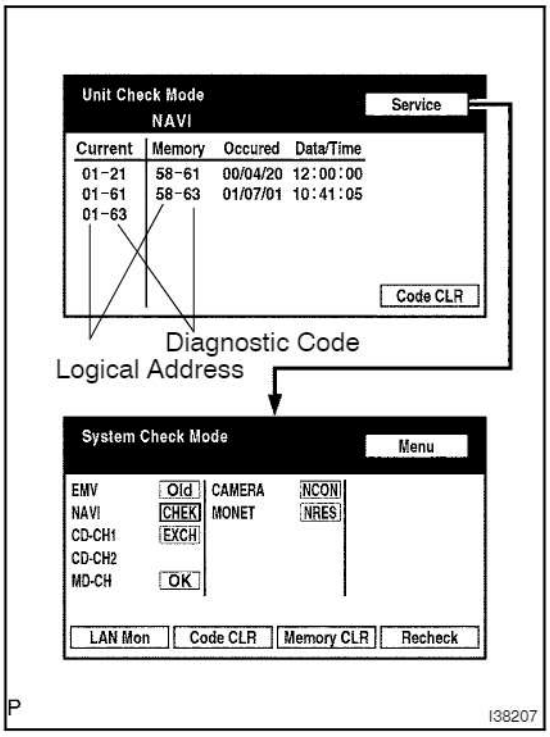


2. Read the system check result.

(a) If all check results of other devices are "EXCH," "CHEK" or "Old," touch the display to check the contents on the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.

HINT:

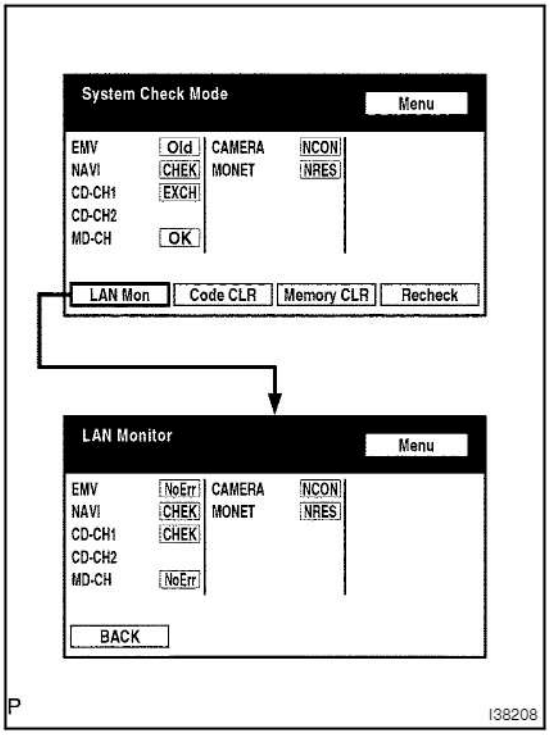
- If all check results are "OK," go to communication DTC check (go to step 3).
- If a device name is not known, its physical address is displayed.



HINT:

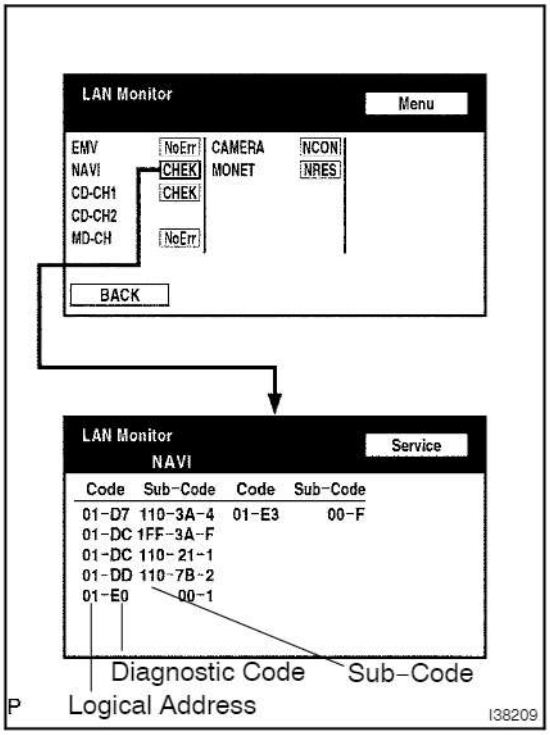
If "EXCH", "CHEK" and "Old" as well as "OK" exist, press the service switch to return to the "System Check Mode". Then, check the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.

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3. Read the communication diagnostic check result.

(a) Return to the "System Check Mode", and press "LAN Mon" switch to enter the LAN monitor screen.

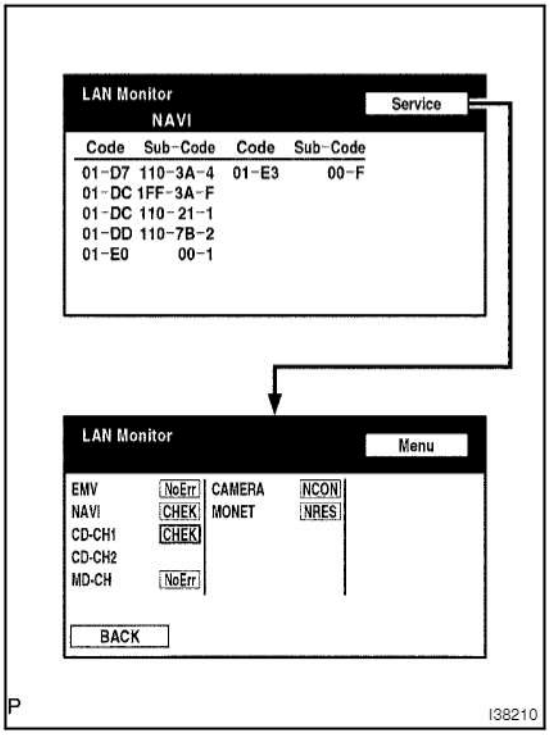


(b) If the result is "CHEK" or "Old," touch the result switch to check the contents on the individual communication diagnostic screen and record them on the customer problem analysis check sheet.

HINT:

- If all check results are "No Err," the system judges that no DTC exists.
- The sub–code (relevant device) will be indicated by its physical address.

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HINT:

If check results of other devices are "CHEK," press the "Service" switch to return to the original "LAN Monitor" screen. Then, check the individual communication diagnostic screen for the next device and record the result on the customer problem analysis check sheet.

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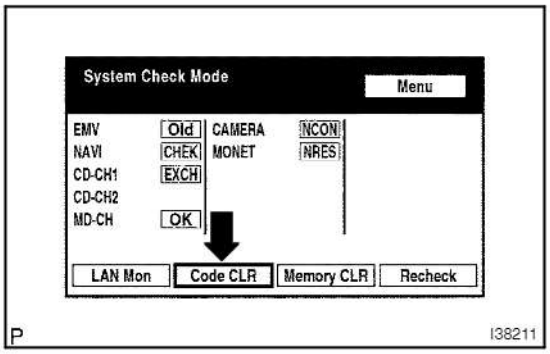
05HBP-01

SYSTEM CHECK MODE (DTC CLEAR/RECHECK)

HINT:

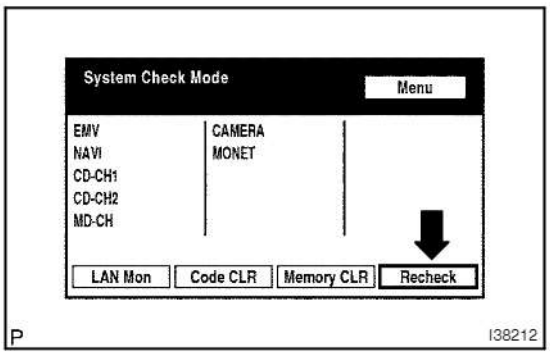
Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Enter the diagnostic mode (see page 05–1578).



2. Clear DTC

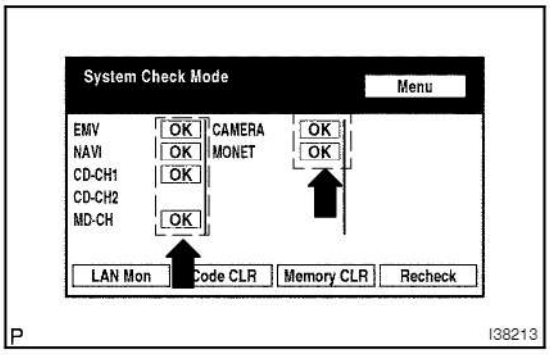
(a) Press the "Code CLR" switch for 3 seconds.



(b) Check result is cleared.

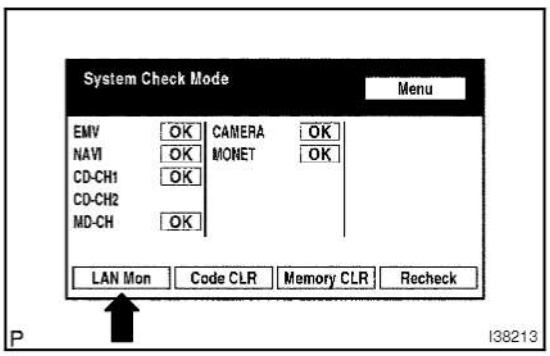
3. Recheck

(a) Press the "Recheck" switch.



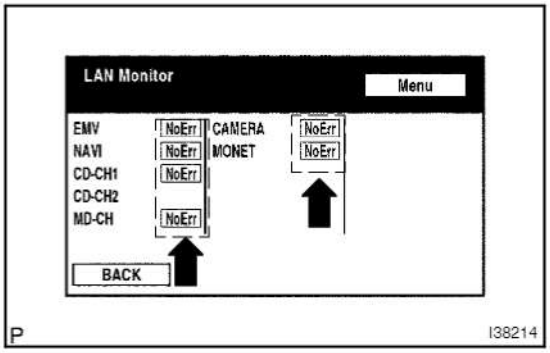
(b) Confirm that all diagnostic codes are "OK" when the check results are displayed.

If a code other than "OK" is displayed, troubleshoot again.



(c) Press the "LAN Mon" switch to change to "LAN Monitor" mode.

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(d) Confirm that all diagnostic codes are "No Err".
If a code other than "No Err" is displayed, troubleshoot again.

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05HBG–01

DIAGNOSTIC TROUBLE CODE CHART

Terms	Description
Physical address	3–digit, hexadecimal code assigned to all components connected to the AVC–LAN. Individual symbols are specified based on function. Units whose names are unknown or relevant units are displayed with physical addresses.
Logical address	2–digit, hexadecimal code assigned to all the functions in the AVC–LAN system.

HINT:

Titles for each unit are stated in the following order: parts name (physical address) [Name indicated by DTC]

1. MULTI–DISPLAY (physical address: 110) [EMV]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D5	Absence of registration unit	A device that the sub code shows is (was) disconnected from the system when turning the power switch to the ON (ACC) or ON (ON) position. The communication condition with the device that the code shows cannot be obtained when the system starts.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
D8	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after system start.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
D9	Last mode error	The device (for audio visual system) that had functioned before the system stopped is (was) disconnected from the system when the power switch is (was) in the ON (ACC) or ON (ON) position.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DA	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DB	Mode status error	This code detects a dual alarm.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DC	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DE	Slave reset	This code is stored when a slave device has been disconnected after system start.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
21	ROM error	This code is output when a malfunction exists in ROM.	Replace multi–display	67–7
22	RAM error	This code is output when a malfunction exists in RAM.	Replace multi–display	67–7

(b) Logical address: 21 (SW): 23 (SW with name): 24 (SW converting): 25 (command SW)

DTC	Name	Diagnosis	Verification	See page
10	Panel switch error	The panel SW detection circuit has a failure.	Replace multi–display	67–23

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2. NAVIGATION ECU (Physical address: 178) [NAVI]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6	No master	When either the following condition meets. • The device that stores (stored) the code has (had) been disconnected when the power switch is (was) in ON (ACC) or ON (ON) position. • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (navigation ECU–multi–display) 3. Power source circuit (navigation ECU) 4. Replace multi–display 5. Replace navigation ECU	05–1630 05–1665 05–1632 67–7 67–23
D7	Connection check error	When either the following condition meets. • The device that stored this code has (had) been disconnected after the system starts (started). • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (navigation ECU–multi–display) 3. Power source circuit (navigation ECU) 4. Replace multi–display 5. Replace navigation ECU	05–1630 05–1665 05–1632 67–7 67–23
DC	Transmission error	The device stores the fact that transmission to the device indicated by the sub code has failed.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DD	Master reset	When the device that should be the master has been disconnected after system starts.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (navigation ECU–multi–display) 3. Replace multi–display	05–1630 05–1665 67–7
DF	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (navigation ECU–multi–display) 3. Replace multi–display	05–1630 05–1665 67–7
E0	Registration complete indication error	When "Registration complete" command from the master device cannot be received.	This code is detected when signal receiving time is delayed	–
E1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (navigation ECU–multi–display) 3. Replace multi–display	05–1630 05–1665 67–7
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi–display	67–7
E3	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	–	–
E4	Multiple frame incomplete	When the multiple frame transmission ends incompletely.	–	–

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(b) Logical address: 58 (Navigation): 80 (GPS)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Gyro error	Ground short, power supply short, or open circuit in the gyro signal, gyro failure.	1. Inspect the gyro error 2. Replace GPS antenna 3. Replace navigation ECU	05–1616 67–22 67–23
11	GPS receiver error	RTC, ROM, and RAM of the GPS receiver and TCXO errors. GPS receiver is failed.	Replace navigation ECU	67–23
40	GPS antenna error	GPS antenna error	1. Replace GPS antenna 2. Replace navigation ECU	67–22 67–23
41	GPS antenna power source error	Error of the power source to the GPS antenna	1. Replace GPS antenna 2. Replace navigation ECU	67–22 67–23
42	Map disc read error	Player error. A scratch or dirt on the disc. Access to an invalid address due to software error.	1. Inspect map disc read error 2. Replace map disc 3. Replace navigation ECU	05–1617 – 67–23
43	SPD signal error	The difference between the GPS speed and SPD pulse is detected.	1. Inspect speed signal error 2. Speed signal circuit 3. Replace navigation ECU	05–1618 05–1634 67–23

3. RADIO RECEIVER ASSY (Physical address: 190) [AUDIO H/U]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6	No master	When either the following condition meets. • The device that stores (stored) the code has (had) been disconnected when the power switch is (was) in ON (ACC) or ON (ON) position. • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (radio receiver assy) 4. Replace multi–display 5. Replace radio receiver assy	05–1630 05–1669 05–1492 67–7 67–5
D7	Connection check error	When either the following condition meets. • The device that stored this code has (had) been disconnected after the system starts (started). • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (radio receiver assy) 4. Replace multi–display 5. Replace radio receiver assy	05–1630 05–1669 05–1492 67–7 67–5
DC	Transmission error	The device stores the fact that transmission to the device indicated by the sub code has failed.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DD	Master reset	When the device that should be the master has been disconnected after system starts.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
DF	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7

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E0	Registration complete indication error	When "Registration complete" command from the master device cannot be received.	This code is detected when signal receiving time is delayed.	–
E1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi–display	67–7
E3	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	–	–
E4	Multiple frame incomplete	When the multiple frame transmission ends incompletely	–	–

(b) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D5	Absence of registration unit	A device that the sub code shows is (was) disconnected from the system when turning the power switch to the ON (ACC) or ON (ON) position. The communication condition with the device that the code shows cannot be obtained when the system starts.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
D8	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after system start	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
D9	Last mode error	The device (for audio visual system) that had functioned before the system stopped is (was) disconnected from the system when the power switch is (was) in the ON (ACC) or ON (ON) position.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DA	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DB	Mode status error	This code detects a dual alarm.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DC	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DE	Slave reset	This code is stored when a slave device has been disconnected after system start.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6

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(c) Logical address: 60 (Radio)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	AM tuner PLL does not lock	The PLL circuit in the AM tuner is abnormal.	1. After clearing the DTC, check the antenna wiring 2. If the same code is detected, replace the radio receiver assy	– 67–5
11	FM tuner PLL does not lock	The PLL circuit in the FM tuner is abnormal.	1. After clearing the DTC, check the antenna wiring 2. If the same code is detected, replace the radio receiver assy	– 67–5
40	Antenna is not connected	The antenna is disconnected.	1. After clearing the DTC, check the antenna wiring 2. If the same code is detected, replace the radio receiver assy	– 67–5
41	Antenna power source error	The power source system of the antenna is abnormal.	1. After clearing the DTC, check the antenna wiring 2. If the same code is detected, replace the radio receiver assy	– 67–5
42	Tuner power source error	The power source of the tuner is abnormal.	1. Power source circuit (radio receiver assy) 2. Replace radio receiver assy	05–1492 67–5
43	AM tuner error	The AM tuner is abnormal.	Replace radio receiver assy	67–5
44	FM tuner error	The FM tuner is abnormal.	Replace radio receiver assy	67–5
45	SW tuner error	The SW tuner is abnormal.	Replace radio receiver assy	67–5

(d) Logical address: 62 (CD): 63 (CD changer)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	CD player mechanical error	A mechanical error in the CD player is detected while the CD is not being inserted or ejected.	Replace radio receiver assy	67–5
11	CD insertion & eject error	CD insertion or ejection is failed.	Replace radio receiver assy	67–5
12	CD reading abnormal	CD reading problem occurs.	Replace radio receiver assy	67–5
40	No disc	No disc is inserted.	1. Check whether the CD is inserted or not. If the CD is inserted, check whether it can be ejected or not. If it cannot be ejected, replace radio receiver assy. 2. Inspect CD 3. If the same code is detected, replace the radio receiver assy	67–5 05–1533 67–5
41	Wrong disc	An unsuitable disc is inserted.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05–1533 67–5
42	Disc cannot be read	The disc cannot be read.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05–1533 67–5
43	CD–ROM abnormal	CD–ROM operation is abnormal.	Replace radio receiver assy	67–5

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44	CD abnormal	Operation error in the CD mechanism (except for code 10).	1. After clearing the DTC, check the malfunction symptom. 2. If the same code is detected, replace the radio receiver assy	– 67–5
45	EJECT error	Magazine cannot be ejected.	Replace radio receiver assy	67–5
46	Disc has scratches in the reverse surface	CD has a dirt or scratches in the reverse side.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05–1533 67–5
47	CD temperature is high	The sensor detects that the CD unit temperature is high.	1. Park the vehicle in a cool place. Turn the system off. After checking that the temperature of the radio and navigation assy becomes sufficiently low, turn the system on in order to verify the malfunction symptom. 2. If the same code is detected, replace the radio receiver assy	– 67–5
48	Excess current	Excess current is applied to the disc player changer.	Replace radio receiver assy	67–5
50	Tray insertion/ejection error	Malfunction in insertion/ejection system	Replace radio receiver assy	67–5
51	Elevator error	Mechanical error occurred during elevator operation	Replace radio receiver assy	67–5
52	Clamp error	Clamp unusually generating	Replace radio receiver assy	67–5

(e) Logical address: 61 (Cassette)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Belt cut	The inside belt is cut or came off.	Replace radio receiver assy	67–5
40	Mechanical error of media	A malfunction due to mechanical problem, cassette tape is cut or entangled.	1. Replace the cassette tape and recheck the symptom 2. If the same code is detected, replace the radio receiver assy	– 67–5
41	EJECT error	A malfunction due to mechanical problem.	Replace radio receiver assy	67–5
42	Tape tangling	Cassette tape is tangled.	Replace radio receiver assy	67–5
43	Head dirt	Head is dirty.	1. Clean the head and recheck the symptom 2. If the same code is detected, replace the radio receiver assy	– 67–5
44	Device power supply problem	A short or open in the power circuit.	1. Power source circuit (radio receiver assy) 2. Replace radio receiver assy	05–1492 67–5

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4. GATEWAY ECU (Physical address: 1C6) [G/W]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D4	Regular Communication Error	Component in which this code is recorded has been disconnected from system with power in the ACC or ON position. Either that, or the multi–display was disconnected when this code was recorded.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – gateway ECU) 3. Replace multi–display 4. Replace gateway ECU	05–1630 05–1667 67–7 –

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5. STEREO COMPONENT AMPLIFIER ASSY (Physical address: 440) [DSP AMP]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6	No master	When either the following condition meets. • The device that stores (stored) the code has (had) been disconnected when the power switch is (was) in ON (ACC) or ON (ON) position. • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (stereo component amplifier assy) 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 5. Replace multi–display 6. Replace stereo component amplifier assy	05–1630 05–1669 05–1495 05–1521 67–7 67–25
D7	Connection check error	When either the following condition meets. • The device that stored this code has (had) been disconnected after the system starts (started). • The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Power source circuit (stereo component amplifier assy) 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier assy) 5. Replace multi–display 6. Replace stereo component amplifier assy	05–1630 05–1669 05–1495 05–1521 67–7 67–25
DC	Transmission error	The device stores the fact that transmission to the device indicated by the sub code has failed.	Inspect the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DD	Master reset	When the device that should be the master has been disconnected after system starts.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
DF	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
E0	Registration complete indication error	When "Registration complete" command from the master device cannot be received.	This code is detected when signal receiving time is delayed.	–
E1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi–display	67–7

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E3	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	–	–
E4	Multiple frame incomplete	When the multiple frame transmission ends incompletely	–	–

6. THE INSPECTION LIST FOR THE DEVICE INDICATED BY THE SUB CODE

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

Sub code address (Device name)	Verification	See page
110 (Multi–display)	1. Power source circuit (multi–display) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace multi–display	05–1630 05–1669 67–7
178 (Navigation ECU)	1. Power source circuit (navigation ECU) 2. AVC–LAN circuit (multi–display – navigation ECU) 3. Replace navigation ECU	05–1632 05–1665 67–23
190 (Radio receiver assy)	1. Power source circuit (radio receiver assy) 2. AVC–LAN circuit (multi–display – radio receiver assy) 3. Replace radio receiver assy	05–1492 05–1669 67–5
1C6 (Gateway ECU)	1. AVC–LAN circuit (multi–display – gateway ECU) 2. Replace gateway ECU	05–1667 –
440 (Stereo Component Amplifier Assy)	1. Power source circuit (stereo component amplifier assy) 2. AVC–LAN circuit (radio receiver assy–stereo component amplifier assy) 3. Replace stereo component amplifier assy	05–1495 05–1521 67–25

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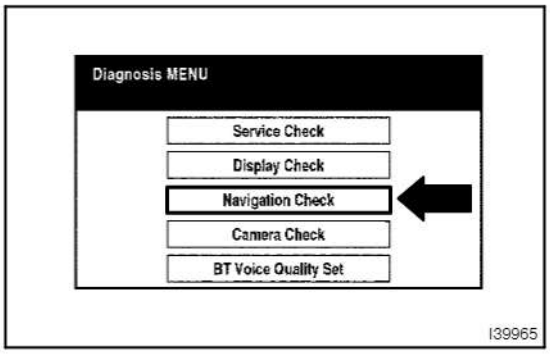
05HBR–01

SCREEN NOISE AUTOMATIC ADJUSTMENT

HINT:

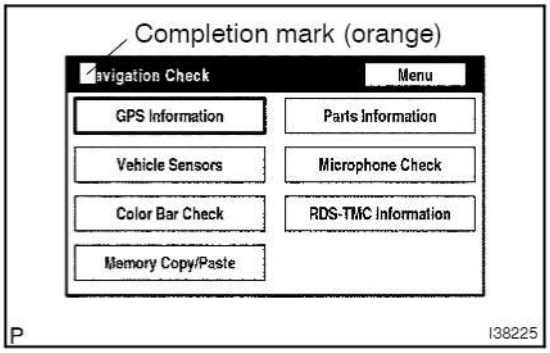
- This adjustment is performed to reduce noise when screen noise occurs upon replacing the multi–display, the navigation ECU or the television camera ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- Perform both procedures below when the multi–display is replaced.

1. When either the multi–display or the navigation ECU is replaced:



(a) Turn the power switch to the ON (ACC) position and wait for at least 6 seconds to activate the diagnostic mode (see page 05–1578).

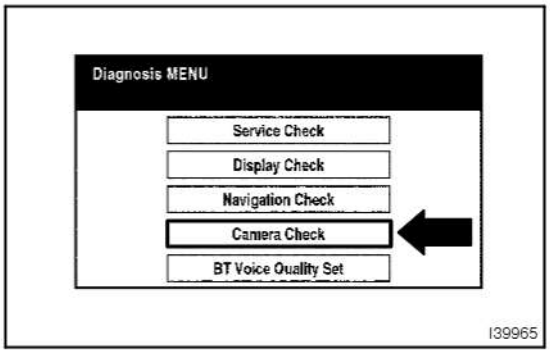
(b) Select "Navigation Check" from the "Diagnosis MENU" screen.



(c) The screen enters "Navigation Check" with a beeping sound. Adjustment is completed when the completion mark is displayed.

(d) Cancel the diagnostic mode (see page 05–1578).

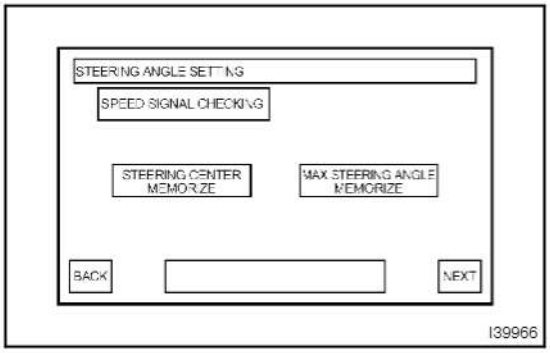
2. When either the multi–display or the television camera ECU is replaced:



(a) Turn the power switch to the ON (ACC) position and wait for at least 6 seconds to activate the diagnostic mode (see page 05–1578).

(b) Select "Camera Check" from the "Diagnosis MENU" screen.

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(c) Adjustment is completed when the steering angle setting screen is displayed.

(d) Cancel the diagnostic mode (see page 05–1578).

HINT:

- If the automatic adjustment is not performed (only step 1) only upon replacing the multi–display, a beeping sound can be heard for 3 seconds (while the initial screen is displayed) after turning the power switch to the ON (ACC) position.
- Perform the automatic adjustment again if a beeping sound can be heard within 3 seconds.

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BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION AND AUDIO SCREEN)

INSPECTION PROCEDURE

1	CHECK DISPLAY SETTING

(a) Check that the display is not in "Screen OFF" mode.
OK: The display setting is not in "Screen OFF" mode.

NG → CHANGE SCREEN TO "SCREEN ON" MODE

OK

2	CHECK IMAGE QUALITY SETTING

(a) Check if screen color quality can be set.
OK: Switching is possible.

OK → PRESS PANEL SWITCH "DISPLAY" AND SET SCREEN COLOR QUALITY TO NORMAL

NG

3	CHECK CABIN

(a) Check if condensation is likely to occur, or the temperature is high or low (extremely cold) in the cabin.
HINT:
This problem occurs when the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.
OK: The above condition is not observed.

NG → SET CABIN TEMPERATURE TO APPROPRIATE DEGREES

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

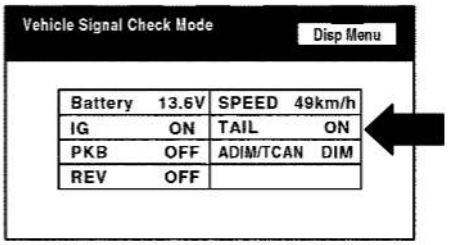
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ILLUMINATION FOR PANEL SWITCH DOES NOT COME ON WITH TAIL SWITCH ON

INSPECTION PROCEDURE

1	DISPLAY CHECK MODE(VEHICLE SIGNAL CHECK MODE)

(a) Enter the "Display Check" mode (Vehicle Signal Check Mode) (see page 05–1554).



(b) Turn the light control switch to the TAIL, HEAD or OFF position.

Standard:

TAIL Switch	Display
TAIL or ON	ON
OFF	OFF

HINT:

This display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

OK → **REPLACE MULTI–DISPLAY (SEE PAGE 67–7)**

NG

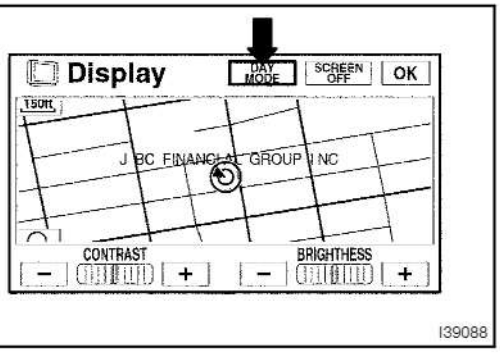
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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DISPLAY DOES NOT DIM (NIGHT SCREEN) WITH TAIL SWITCH ON

INSPECTION PROCEDURE

1 CHECK IMAGE QUALITY SETTING



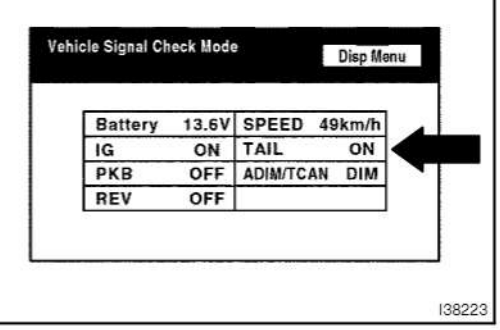
(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.
(b) Turn the light control switch to the TAIL position.
(c) Check if "DAY MODE" on the display adjustment is ON.
OK: "DAY MODE" is ON.

OK → **TURN FORCED "DAY MODE" SETTING OFF**

NG

2 DISPLAY CHECK MODE(VEHICLE SIGNAL CHECK MODE)

(a) Enter the "Display Check" mode (Vehicle Signal Check Mode) (see page 05–1554).



(b) Turn the light control switch to the TAIL, HEAD or OFF position.
Standard:

TAIL switch	Display
TAIL or ON	ON
OFF	OFF

HINT:
The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

OK → **REPLACE MULTI–DISPLAY (SEE PAGE 05–1570)**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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PANEL SWITCH DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK THE PANEL SWITCH

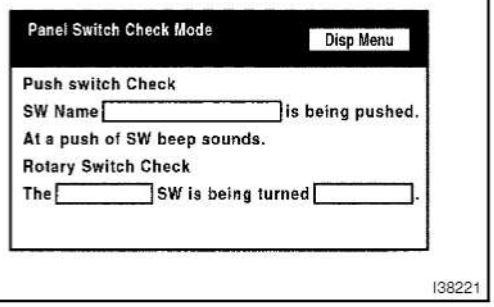
(a) Check for foreign matter around the switch that might prevent operation.
OK: No foreign matter is found.

NG → **REMOVE ANY FOREIGN MATTER FOUND**

OK

2	DISPLAY CHECK MODE(PANEL SWITCH CHECK MODE)

(a) Enter the "Display Check" mode (Panel Switch Check Mode) (see page 05–1553).



(b) Operate the abnormal switch and check if the switch name and status are correctly displayed.
OK: The switch name and status are correctly displayed as operated.

OK → **REPLACE MULTI–DISPLAY (SEE PAGE 05–1570)**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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TOUCH PANEL SWITCH DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK TOUCH PANEL

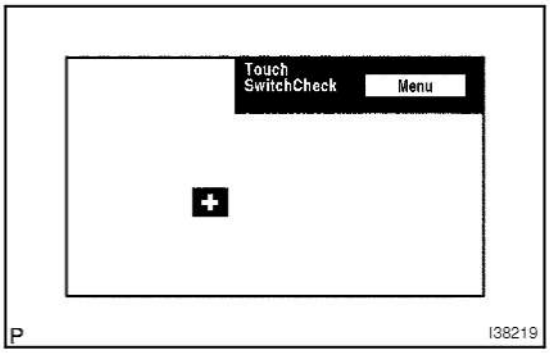
(a) Check for dirt on the display surface.
OK: The display surface is clean.

NG → REMOVE ANY DIRT FOUND AND RECHECK TOUCH PANEL

OK

2	DISPLAY CHECK MODE(TOUCH SWITCH CHECK)

(a) Enter the "Display Check" mode (Touch Switch Check) (see page 05–1552).



(b) Touch the display in the area where the abnormal switch occurs.
OK: A "+" mark appears at the touched position.

OK → REPLACE MULTI–DISPLAY (SEE PAGE 05–1570)

NG

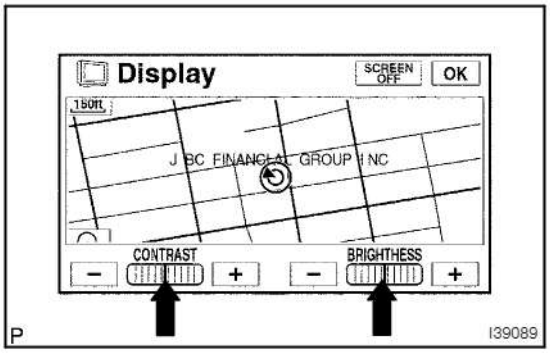
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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SCREEN FLICKER OR COLOR DISTORTION

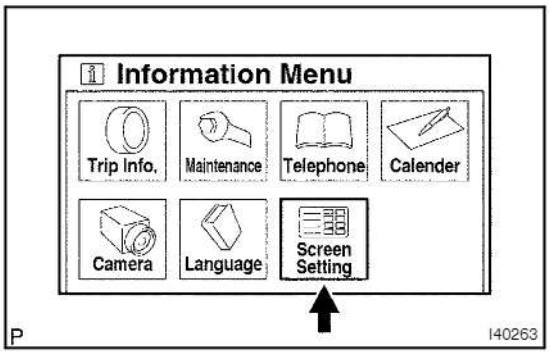
INSPECTION PROCEDURE

1 CHECK DISPLAY SETTING

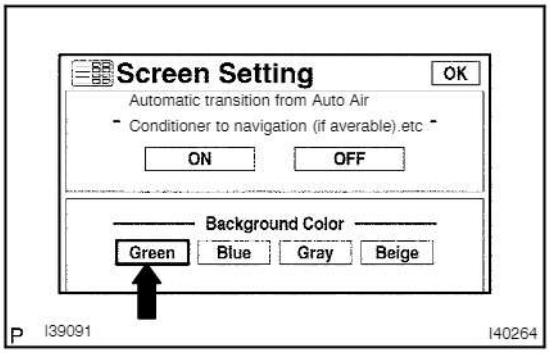


(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.

(b) Reset display settings (contrast, brightness) and check if the screen appears normal.



(c) Press the "INFO" switch and then the "Screen Setting" switch.



(d) Set the "Background Color" to "Green" (initial setting) and check if it is normal.
OK: Returns to normal.

OK → END

NG

2 CHECK CABIN

(a) Check if the cabin temperature is –20°C (–4.0°F) or less.
OK: Cabin is warmer than –20°C (–4.0°F).

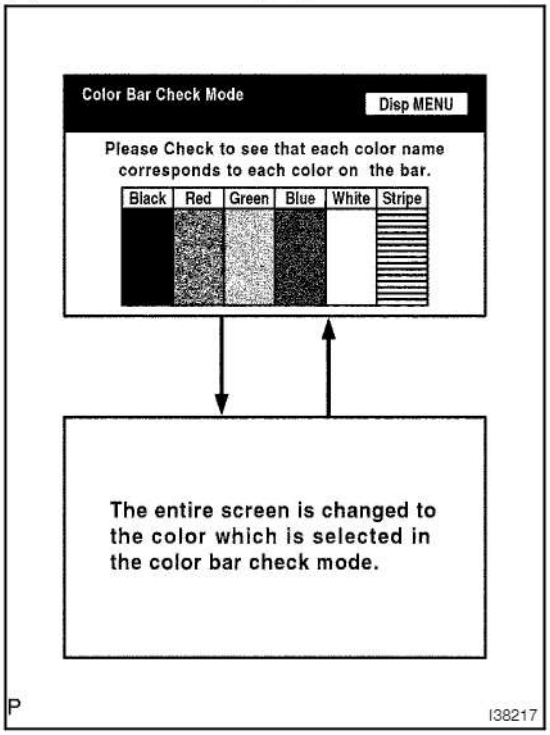
NG → HEAT THE CABIN AND RECHECK THE TEMPERATURE

OK

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3 DISPLAY CHECK MODE(COLOR BAR CHECK MODE)

(a) Enter the "Display Check" mode (Color Bar Check Mode) (see page 05–1551).



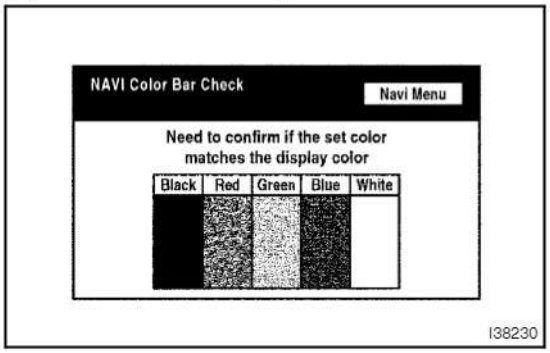
(b) Check that color bars match the displayed names.
OK: Color bars match the displayed names.

NG → **REPLACE MULTI–DISPLAY (SEE PAGE 05–1570)**

OK

4 NAVIGATION CHECK MODE(NAVI COLOR BAR CHECK)

(a) Enter the "Navigation Check" mode (NAVI Color Bar Check) (see page 05–1557).



(b) Check that color bars match the displayed names.
OK: Color bars match the displayed names.

OK → **REPLACE MULTI–DISPLAY (SEE PAGE 05–1570)**

NG

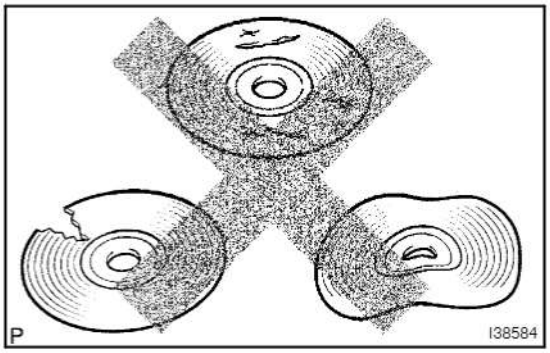
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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MAP DISC CANNOT BE INSERTED

INSPECTION PROCEDURE

1	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	CHECK NAVIGATION ECU

(a) Check if the "PUSH" indicator near the disc slot comes on.
OK: It does not come on.

NG → **PRESS THE EJECT SWITCH TO EJECT THE DISC**

OK

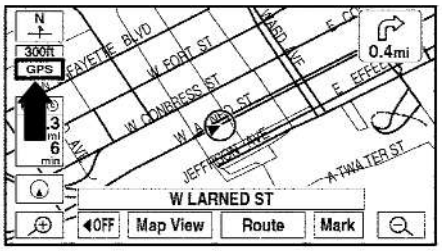
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

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VEHICLE POSITION MARK DEVIATES GREATLY

INSPECTION PROCEDURE

1 CHECK THE GPS MARK



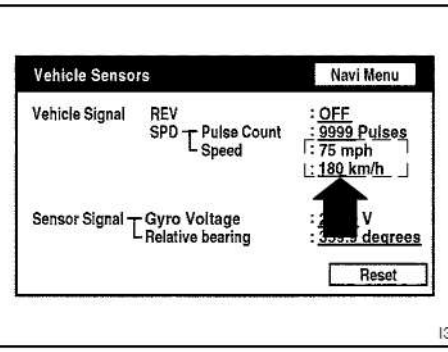
(a) Check that the GPS mark is displayed.
OK: The GPS mark is displayed.

NG → **GO TO "GPS MARK IS NOT DISPLAYED" IN THE FLOW CHART (SEE PAGE 05–1570)**

OK

2 NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (see page 05–1556).



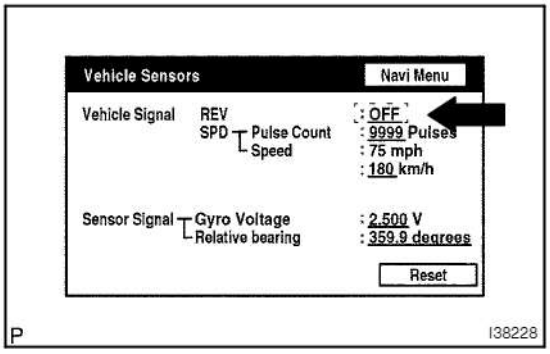
(b) While driving, compare the "SPEED" indicator to the reading on the speedometer. Check that these readings are almost the same.
OK: The readings are almost the same.

NG → **GO TO "SPEED SIGNAL CIRCUIT (NAVIGATION ECU – COMBINATION METER ASSY)" IN THE FLOW CHART (SEE PAGE 05–1570)**

OK

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3 NAVIGATION CHECK MODE(VEHICLE SENSORS)



(a) Move the shift position to the R or P range.

Standard:

Shift lever	Display
P	OFF
R	ON

HINT:

The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

NG → **GO TO "REVERSE SIGNAL CIRCUIT" IN THE FLOW CHART (SEE PAGE 05–1570)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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CURSOR OR MAP ROTATES WHEN VEHICLE IS STOPPED

INSPECTION PROCEDURE

1	CHECK CONDITION

(a) Check with the customer if the vehicle has been turned by a turn–table at parking.
OK: The vehicle has not been turned by a turntable.

HINT:
If the power switch is turned to the ACC or ON position while the vehicle is being turned by a turntable, the system may store the angular velocity at this time. For this reason, the vehicle position cursor could deviate.

NG → **TURN IGNITION SWITCH TO ON POSITION WHEN VEHICLE IS COMPLETELY STOPPED**

OK

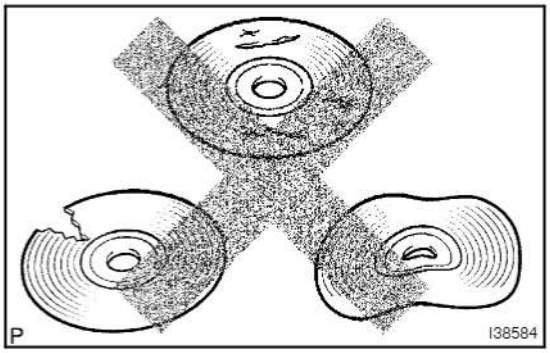
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

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VEHICLE POSITION MARK IS NOT UPDATED

INSPECTION PROCEDURE

1 CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2 CHECK THE MAP DISPLAY

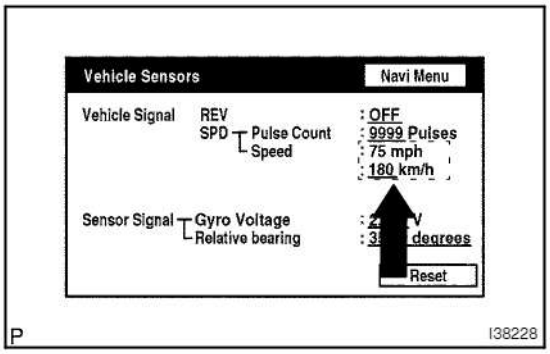
(a) Check if a touch scroll can be performed on the map display.
OK: Touch scroll can be performed.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)**

OK

3 NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (see page 05–1556).



(b) While driving, compare the "SPEED" indicator to the reading on the speedometer. Check if these readings are almost the same.
OK: The readings are almost the same.

NG → **GO TO "SPEED SIGNAL CIRCUIT" IN THE FLOW CHART (SEE PAGE 05–1570)**

OK

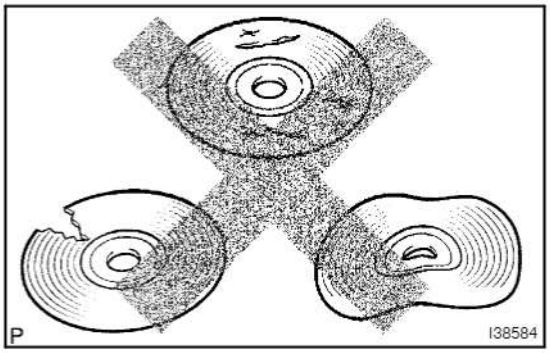
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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CURRENT POSITION DISPLAY DOES NOT APPEAR

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

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GPS MARK IS NOT DISPLAYED

INSPECTION PROCEDURE

1	CHECK CABIN

(a) Check the cabin for any object that might interrupt radio reception on the instrument panel. If such an object exists, remove it and check if the GPS mark reappears.

HINT:

GPS works using extremely weak radio waves originating from satellites. If the signal is interrupted by obstructions or another radio wave, the GPS system may not be able to properly receive the signal.

OK: Mark appears.

OK → **NORMAL OPERATION**

NG

2	CHECK SURROUNDINGS

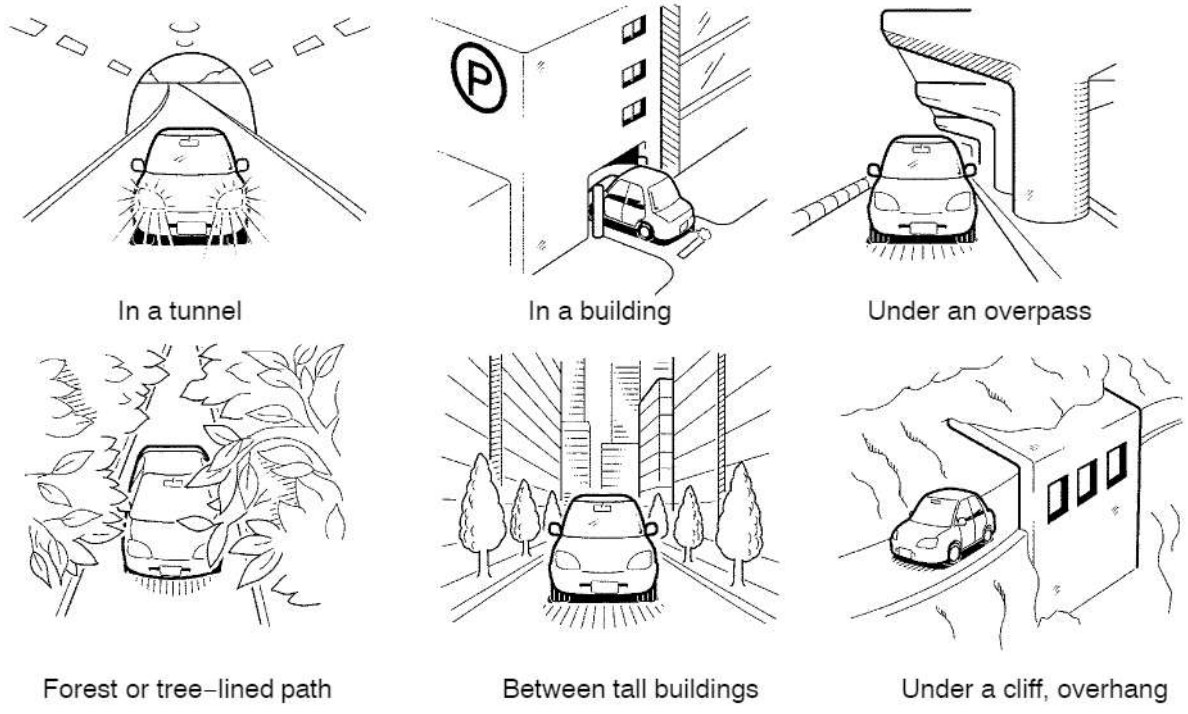
(a) Check if the vehicle is in a location where GPS signal reception is bad. If the vehicle is in such a place, move it elsewhere and check if the GPS mark reappears.

HINT:

- GPS uses 24 satellites in 6 orbits so that at any time 5 satellites will be in line–of–sight of your vehicle.
- GPS signals may not be received, however, based on surroundings, vehicle direction, and time.

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- The following illustrations show some conditions where it may be difficult to receive GPS signals.



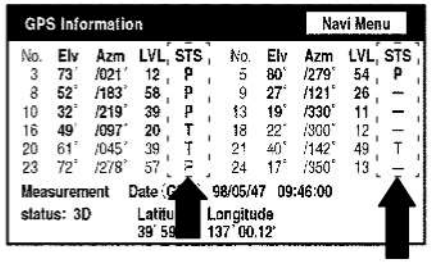
OK: GPS mark is displayed.

OK	RETURNS TO NORMAL

NG

3	NAVIGATION CHECK MODE(GPS IMFORMATION)

(a) Enter the "Navigation Check" mode (GPS information) (see page 05–1555).



(b) Check how many of the following codes occur in the "STS" column.

For DENSO Models: T, P
For AISIN AW Models: 04H, 08H
OK: At least 3 codes occur.

OK	REPLACE NAVIGATION ECU (SEE PAGE 05–1570)

NG

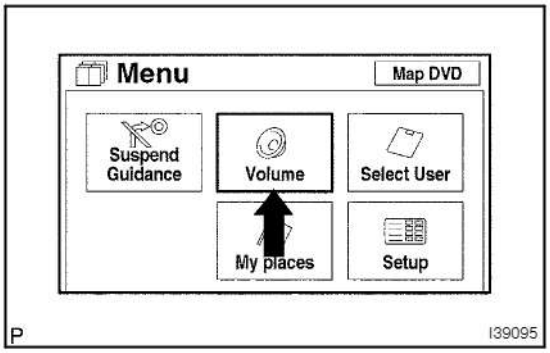
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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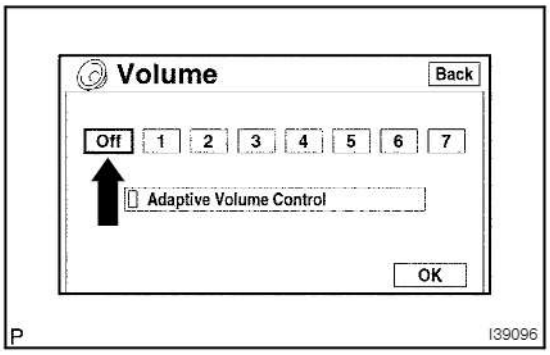
VOICE GUIDANCE DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK NAVIGATION SYSTEM SETTING



(a) Enter the "MENU" screen by pressing the "MENU" switch.
(b) Enter the volume adjustment screen by pressing the "Volume" switch.



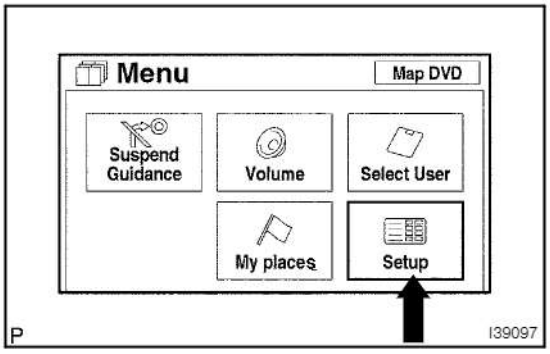
(c) Check that "OFF" is not selected.
OK: OFF is not selected.

NG → **TURN VOICE GUIDANCE VOLUME UP TO 4 USING VOICE ADJUSTMENT SWITCHES**

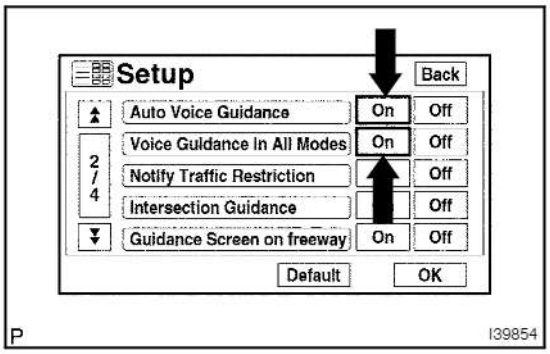
OK

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2 CHECK NAVIGATION SETTING



(a) Enter the "MENU" screen by pressing the "MENU" switch.
(b) Enter the "Setup" screen by pressing the "Setup" switch.

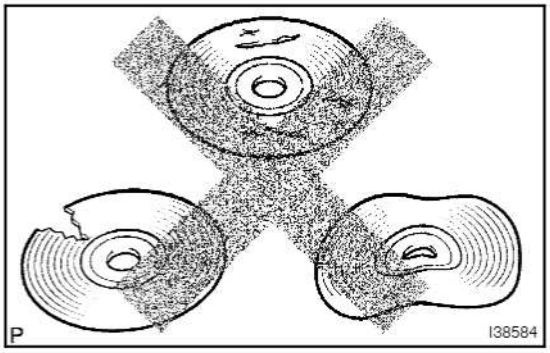


(c) Check that "Auto Voice Guidance" is not OFF.
OK: Auto voice guidance is not OFF.
(d) Check if "Voice Guidance in All Modes" is ON.
OK: Voice guidance in all modes is ON.

NG → **TURN AUTO VOICE GUIDANCE TO "ON"**

OK

3 CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

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4	CHECK RADIO RECEIVER ASSY

(a) Check if audio sound can be heard from the driver's side speaker.
OK: Audio sound can be heard.

NG → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

OK

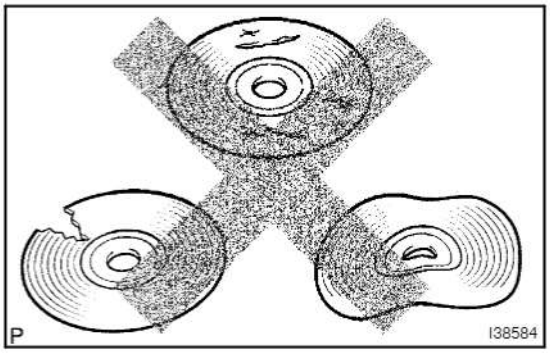
REPLACE NAVIGATION ECU (SEE PAGE 67–23)

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MAP DISPLAY INCOMPLETE

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	CHECK THE DISPLAY

(a) Check that displays other than the navigation display are complete.
OK: No other incomplete displays are found.

OK → **REPLACE NAVIGATION ECU (SEE PAGE 05–1570)**

NG

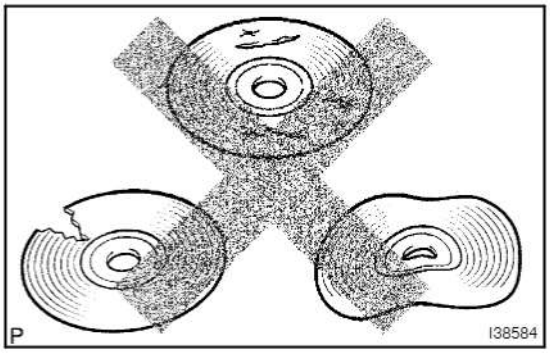
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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ROUTE CANNOT BE CALCULATED

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	SET DESTINATION

(a) Set another destination and check if the system can calculate the route correctly.
OK: Route can be correctly calculated.

OK → **NORMAL OPERATION**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

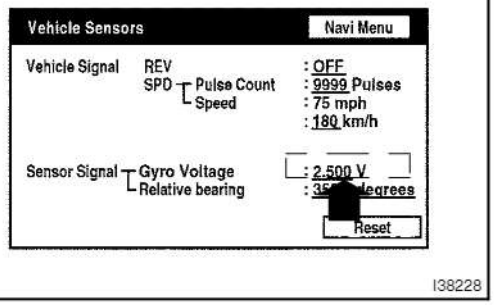
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GYRO ERROR

INSPECTION PROCEDURE

1	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (see page 05–1556).



(b) Check the gyro voltage.
Standard: 0.1 to 4.5 V

NG → **REPLACE NAVIGATION ECU (SEE PAGE 05–1585)**

OK

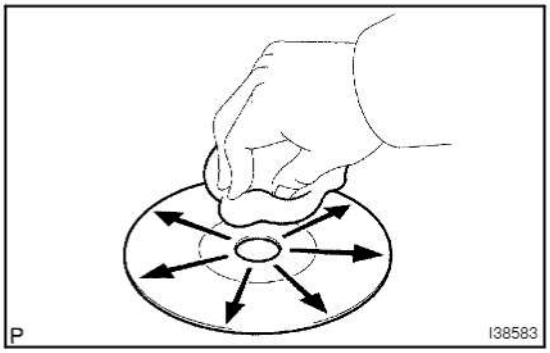
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1585)

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MAP DISC READ ERROR

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check for dirt on the map disc surface.
OK: No dirt is on the map disc surface.

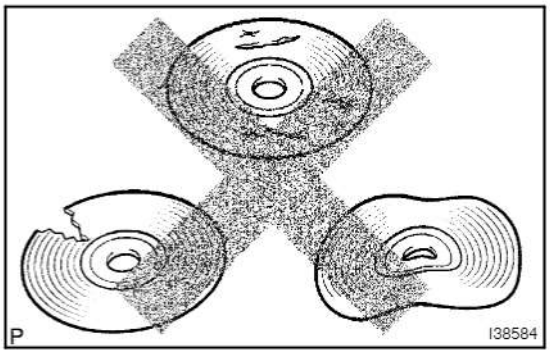
HINT:
If dirt is on the map disc surface, wipe it with a soft cloth from inside to outside in a radial direction.

NOTICE:
Do not use conventional record cleaner or anti–static preservative.

NG → **CLEAN THE MAP DISC**

OK

2	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1585)

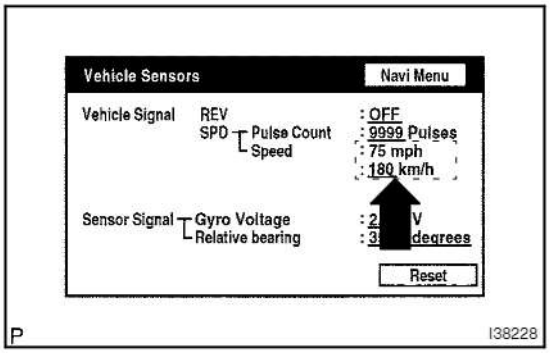
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SPEED SIGNAL ERROR

INSPECTION PROCEDURE

1	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (see page 05–1556).



(b) While driving, compare the "SPD" indicator to the reading on the speedometer. Check if these readings are almost the same.

OK: The readings are almost the same.

OK → **REPLACE NAVIGATION ECU (SEE PAGE 05–1585)**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1585)

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VOICE RECOGNITION DIFFICULTY

INSPECTION PROCEDURE

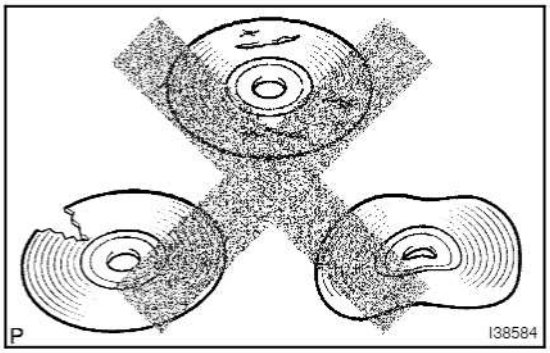
1	CHECK CONDITION

(a) Check if the system's voice recognition level is low with only one particular voice.
OK: The system's voice recognition level is low with any voice.

NG → **SYSTEMS VOICE RECOGNITION LEVEL VARIES DEPENDING ON VOICE AND PRONUNCIATION. THIS IS NOT A MALFUNCTION**

OK

2	CHECK MAP DISC

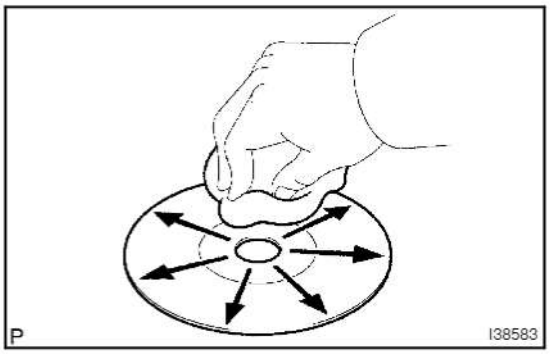


(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE MAP DISC**

OK

3	CHECK MAP DISC



(a) Check for dirt on the map disc surface.
OK: No dirt is on the map disc surface.

HINT:
If dirt is on the map disc surface, wipe it with a soft cloth from inside to outside in a radial direction.

NOTICE:
Do not use conventional record cleaner or anti–static preservative.

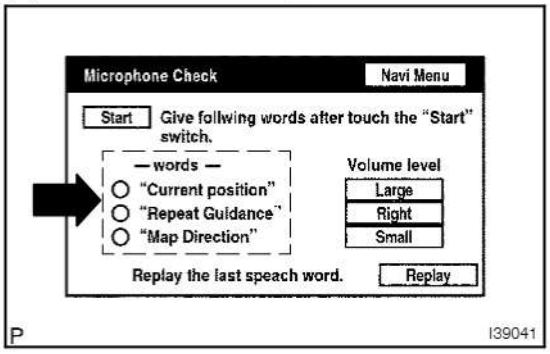
NG → **CLEAN THE MAP DISC**

OK

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4	NAVIGATION CHECK MODE(MICROPHONE CHECK)

(a) Enter the "Microphone Check" mode (see page 05–1559).



(b) Follow the directions on the screen. Check if the word recognition indicator is displayed in green in each item.
OK: All check items are recognized.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)**

OK

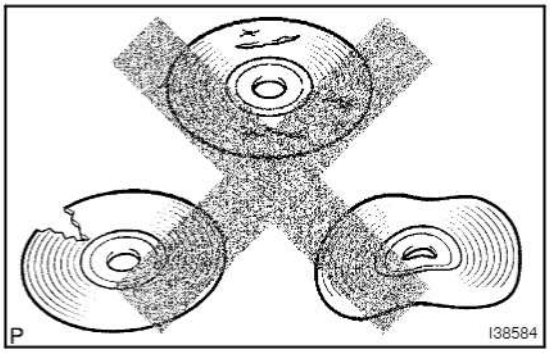
NORMAL OPERATION

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VOICE IS NOT RECOGNIZED

INSPECTION PROCEDURE

1 CHECK MAP DISC

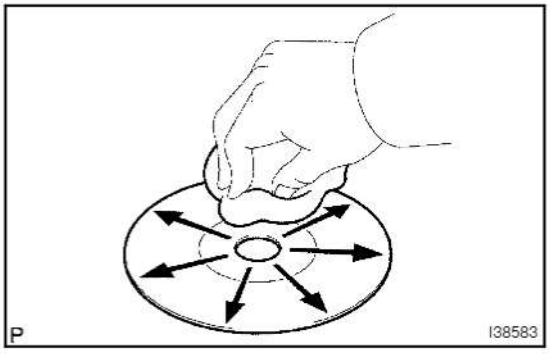


(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE MAP DISC**

OK

2 CHECK MAP DISC



(a) Check for dirt on the map disc surface.
OK: No dirt is on the map disc surface.

HINT:
If dirt is on the map disc surface, wipe it with a soft cloth from inside to outside in a radial direction.

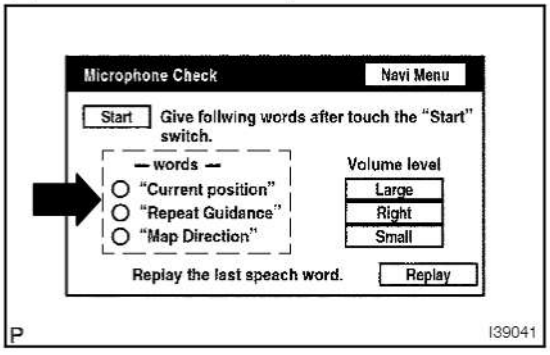
NOTICE:
Do not use conventional record cleaner or anti–static preservative.

NG → **CLEAN THE MAP DISC**

OK

3 NAVIGATION CHECK MODE(MICROPHONE CHECK)

(a) Enter the "Microphone Check" mode (see page 05–1559).



(b) Follow the directions on the screen. Check if the word recognition indicator is displayed in green in each item.
OK: All check items are recognized.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

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CELLULAR PHONE REGISTRATION FAILURE, PHONE DIRECTORY TRANSFER FAILURE

INSPECTION PROCEDURE

1	CHECK CELLULAR PHONE

(a) Check by following the conditions below.

Conditions	See page
Another BLUETOOTH capable cellular phone is present.	A
Another BLUETOOTH capable vehicle is present.	B
None of the above	C

B → **Go to step 3**

C → **Go to step 4**

A

2	CHECK USING ANOTHER CELLULAR PHONE

(a) Check if the system functions using another BLUETOOTH capable cellular phone.
OK: The system functions.

NG → **Go to step 4**

OK

USE A CAPABLE BLUETOOTH CELLULAR PHONE (DEPENDING ON THE VERSION)

3	CHECK USING ANOTHER BLUETOOTH CAPABLE VEHICLE

(a) Check if the cellular phone is BLUETOOTH capable.
OK: The system functions.

OK → **REPLACE MULTI–DISPLAY (SEE PAGE 67–7)**

NG

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4	CHECK CELLULAR PHONE

(a) Check if the cellular phone is BLUETOOTH capable.

HINT:

Some version of BLUETOOTH capable cellular phone may not function.

OK: The phone is BLUETOOTH capable.

NG → **USE A BLUETOOTH CAPABLE CELLULAR PHONE**

OK

5	CHECK CELLULAR PHONE

(a) Check if the cellular phone can call.

HINT:

When the battery charge is low, registration or directory transfer cannot be performed.

OK: The cellular phone can call.

NG → **REPLACE THE CELLULAR PHONE**

OK

REPLACE MULTI–DISPLAY (SEE PAGE 67–7)

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THE CELLULAR PHONE CANNOT SEND/RECEIVE

INSPECTION PROCEDURE

1	CHECK THE BLUETOOTH SETTINGS

(a) Check if the BLUETOOTH settings are correct.
OK: BLUETOOTH settings are correct.

NG → **SET SETTINGS CORRECTLY**

OK

2	CHECK CELLULAR PHONE

(a) Check if the cellular phone is BLUETOOTH capable.
HINT:
Some versions of BLUETOOTH capable cellular phone may not be compatible.
OK: The phone is BLUETOOTH capable.

NG → **END (ONLY A BLUETOOTH CAPABLE CELLULAR PHONE CAN BE USED)**

OK

3	CHECK SETTINGS

(a) Check if the cellular phone functions.
HINT:
- The cellular phone is unable to call under any of the following conditions.
- The cellular phone is locked.
- The directory is being transferred.
- The line is crossed.
- Transmission is regulated.
- The power is off.
- An emergency call is being made (LEXUS LINK SYSTEM is in operation).
- The cellular phone is not connected to BLUETOOTH ("BT" is displayed while a connection is present).

OK: None of the above conditions exists.

NG → **SET SETTINGS CORRECTLY**

OK

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4	CHECK CELLULAR PHONE

(a) Check if the cellular phone can call.

HINT:

When the battery charge is low, calls cannot be made or received.

OK: The cellular phone can call.

NG → **REPLACE THE CELLULAR PHONE**

OK

5	CHECK RECEPTION

(a) Put a cellular phone into a receiving state.
(b) Place the cellular phone close to the multi–display.
(c) Check if the cellular phone has reception according to the multi–display.

OK: The cellular phone has reception.

NG → **REPLACE MULTI–DISPLAY** (SEE PAGE 67–7)

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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CANNOT CALL IN A CERTAIN PLACE

INSPECTION PROCEDURE

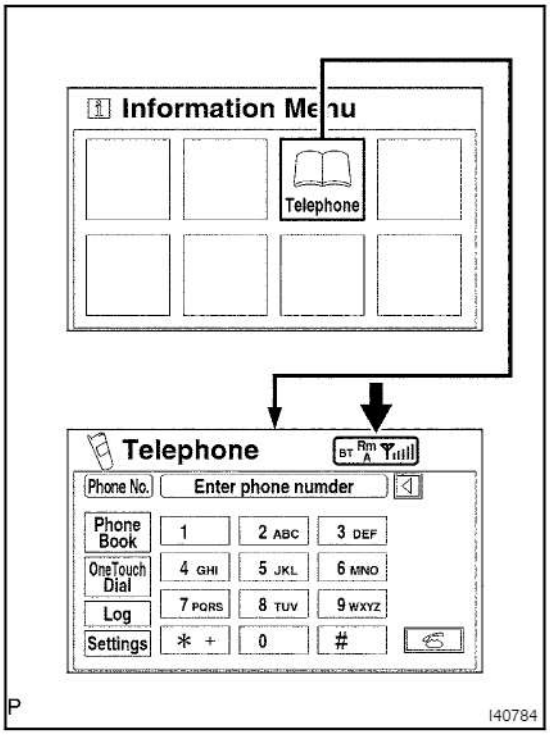
1	CHECK SURROUNDING CONDITIONS

(a) Check if a cellular phone can make calls in a certain place.
OK: It can make calls.

NG → **END (CELLULAR PHONES CAN ONLY FUNCTION IN CELLULAR SERVICE AREAS)**

OK

2	CHECK RECEPTION



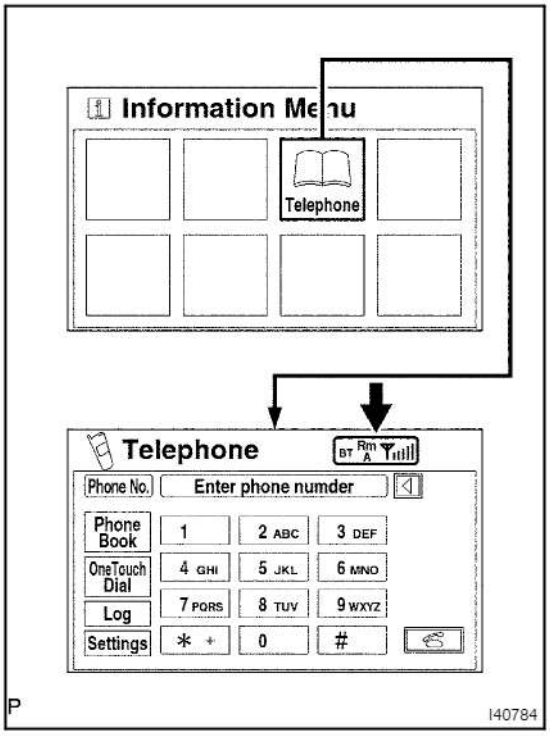
(a) Check if the reception level is the same on a cellular phone and the multi–display.
OK: The reception level is different.

NG → **REPLACE MULTI–DISPLAY (SEE PAGE 67–7)**

OK

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3	CHECK RECEPTION



(a) Place a cellular phone close to the multi–display.
(b) Check if the reception level becomes the same on the cellular phone and the multi–display.
OK: The reception level does not become the same.

NG → **REPLACE MULTI–DISPLAY (SEE PAGE 67–7)**

OK →

END (MULTI–DISPLAY RECEIVES THE DIFFERENT STRENGTH OF RADIO WAVE DEPENDING ON THE RADIO WAVES STRENGTH TRANSMITTED BY CELLULAR PHONE)

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VOICE ON PHONE CANNOT BE HEARD, TOO QUIET, OR DISTORTED

INSPECTION PROCEDURE

1	CHECK CELLULAR PHONE

(a) Check if the voice on the other side can be heard using a cellular phone.
OK: Voice can be heard.

NG → **REPLACE THE CELLULAR PHONE**

OK

2	CHECK SETTINGS

(a) Check if the volume is set to the minimum or maximum setting.

HINT:

When the volume is set to the minimum or maximum setting, the sound may be distorted.

(b) Check if the MUTE switch is set to ON.
OK: MUTE switch is not set to ON.

NG → **SET MUTE SWITCH CORRECTLY**

OK

3	CHECK VOICE

(a) Check if the navigation voice can be heard.
OK: The voice can be heard.

NG → **GO TO "VOICE GUIDANCE DOES NOT FUNCTION" (SEE PAGE 05–1611)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

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OWN VOICE CANNOT BE HEARD, TOO QUIET OR DISTORTED

INSPECTION PROCEDURE

1	CHECK CELLULAR PHONE

(a) Check if the other side can hear your voice properly.
OK: Your voice can be heard correctly.

NG → REPLACE THE CELLULAR PHONE

OK

2	CHECK SETTINGS

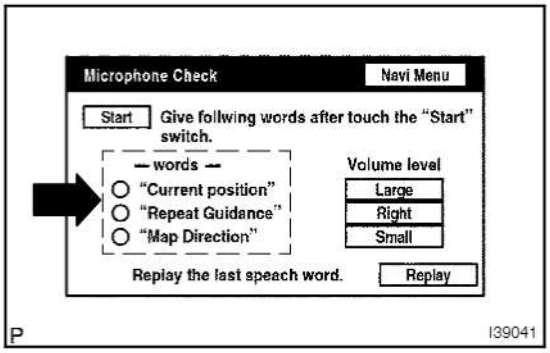
(a) Check if the mute switch is set to ON.
OK: MUTE switch is not set to ON.

NG → TURN THE MUTE SWITCH OFF

OK

3	NAVIGATION CHECK MODE(MICROPHONE CHECK)

(a) Enter the "Microphone Check" mode (see page 05–1559).



(b) Follow the directions on the screen. Check if the word recognition indicator is displayed in green in each item.
OK: All check items are recognized.

NG → GO TO "VOICE IS NOT RECOGNIZED" (SEE PAGE 05–1621)

OK

REPLACE MULTI–DISPLAY (SEE PAGE 67–7)

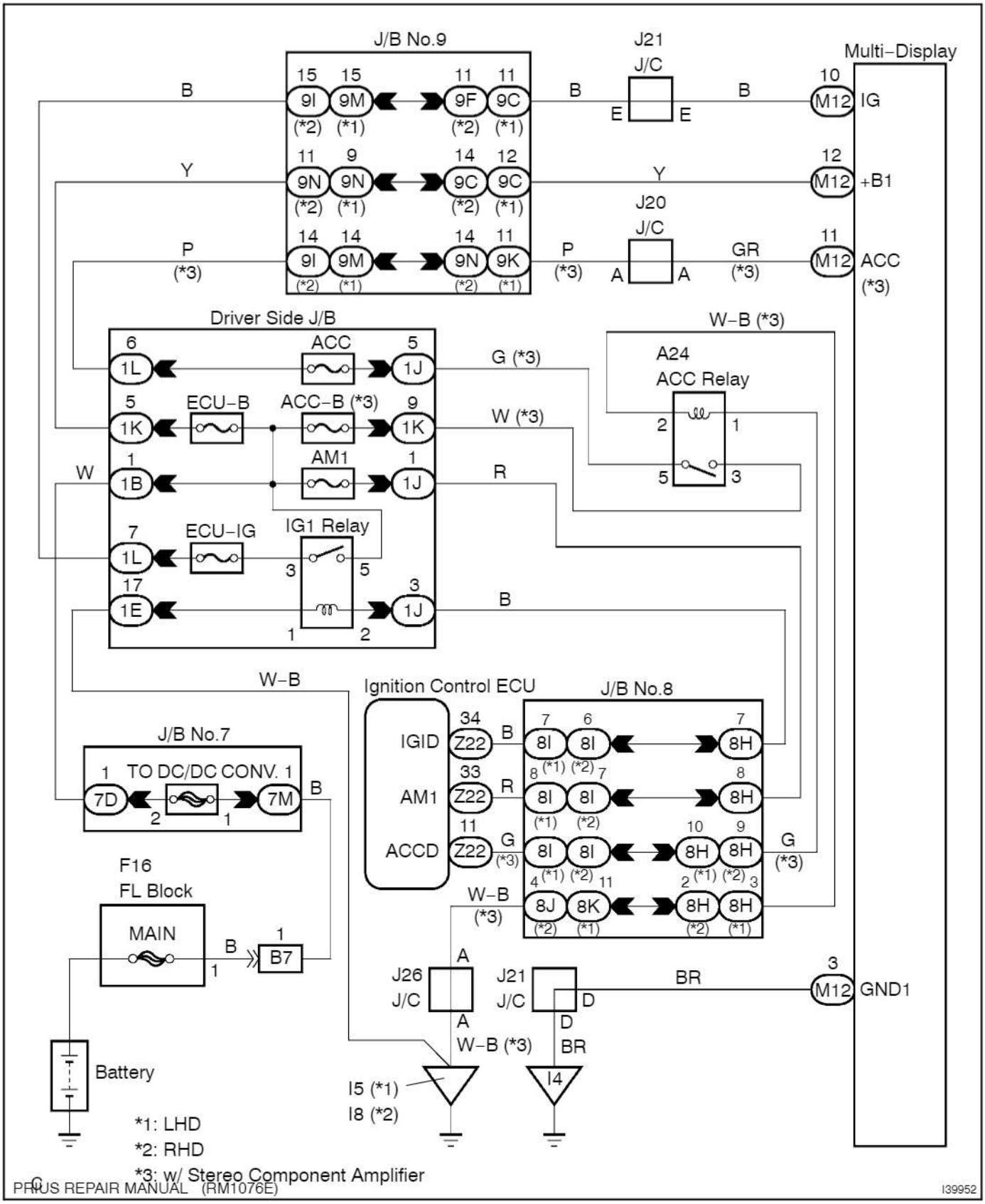
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POWER SOURCE CIRCUIT (MULTI–DISPLAY)

CIRCUIT DESCRIPTION

This circuit provides the power to the multi–display.

WIRING DIAGRAM

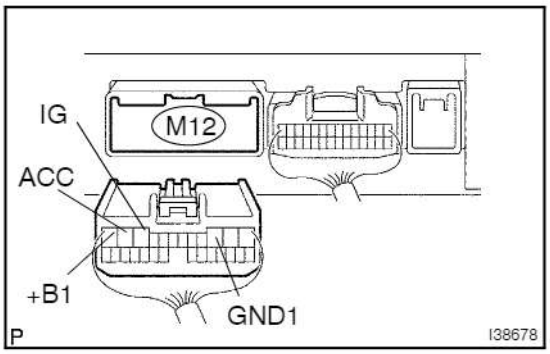


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INSPECTION PROCEDURE

1	INSPECT MULTI–DISPLAY(+B1, ACC, IG, GND1)



(a) Disconnect the multi–display connector M12.

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

Standard:

Tester connection	Condition	Specified condition
GND1 – Body ground	Always	Below 1 Ω

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

Standard:

Tester connection	Condition	Specified condition
+B1 – GND1	Always	10 to 14 V
ACC – GND1	Power switch ON (ACC)	10 to 14 V
IG – GND1	Power switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570 or 05–1585)

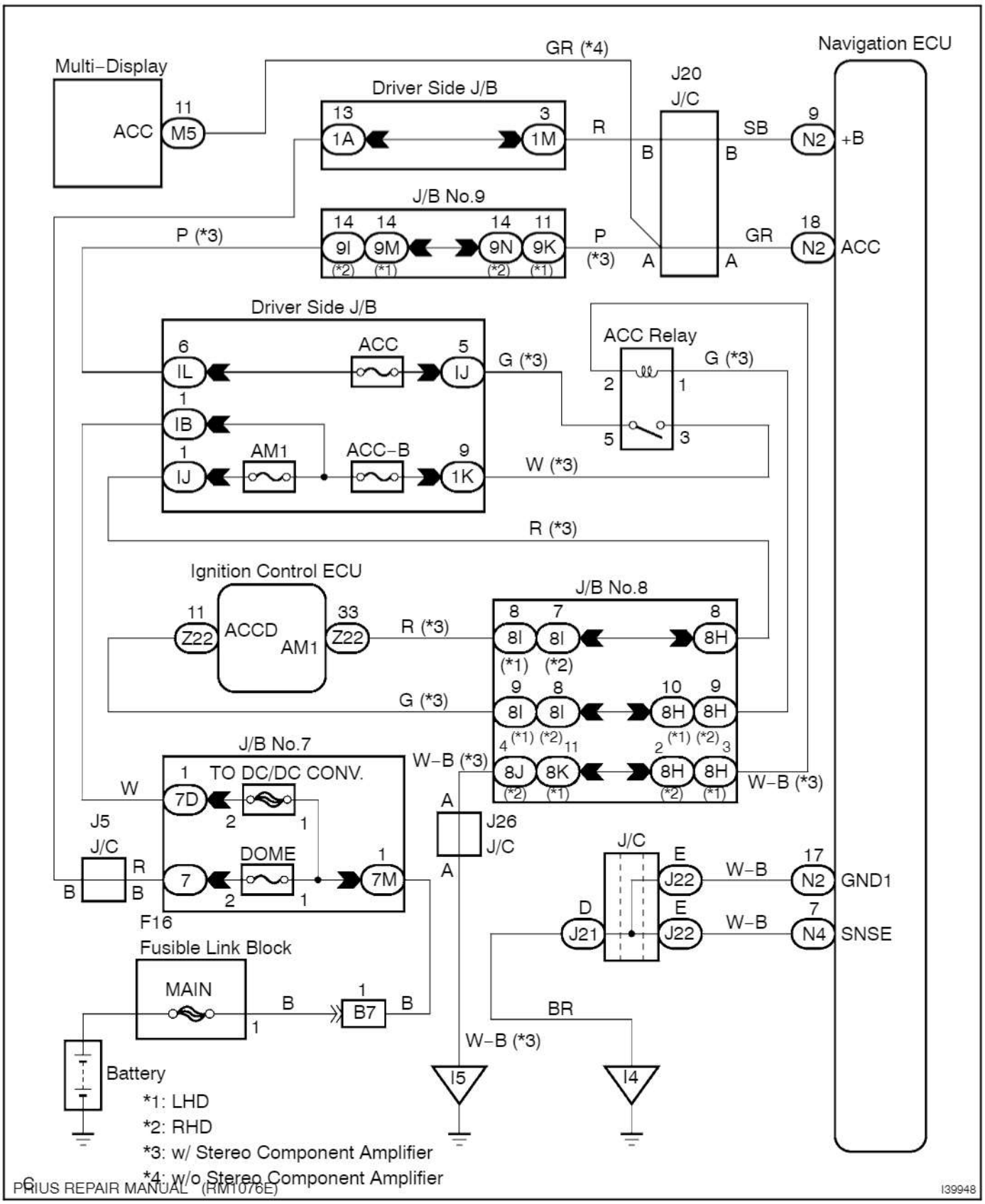
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POWER SOURCE CIRCUIT (NAVIGATION ECU)

CIRCUIT DESCRIPTION

This circuit provides the power to the navigation ECU.

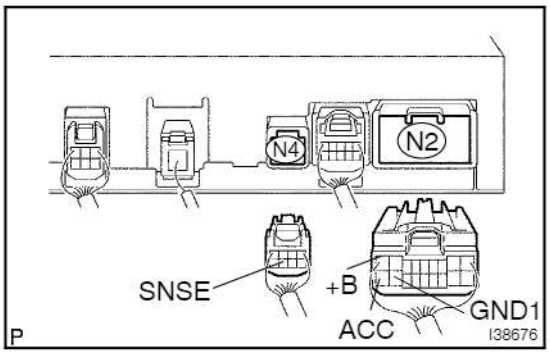
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT NAVIGATION ECU(+B, ACC, GND1, SNSE)



(a) Disconnect the navigation ECU connector N4, N2.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND1 – Body ground	Always	Below 1 Ω
SNSE – Body ground	Always	Below 1 Ω

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

Standard:

Tester connection	Condition	Specified condition
+B – GND1	Always	10 to 14 V
ACC – GND1	Power switch ON (ACC)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570 or 05–1585)

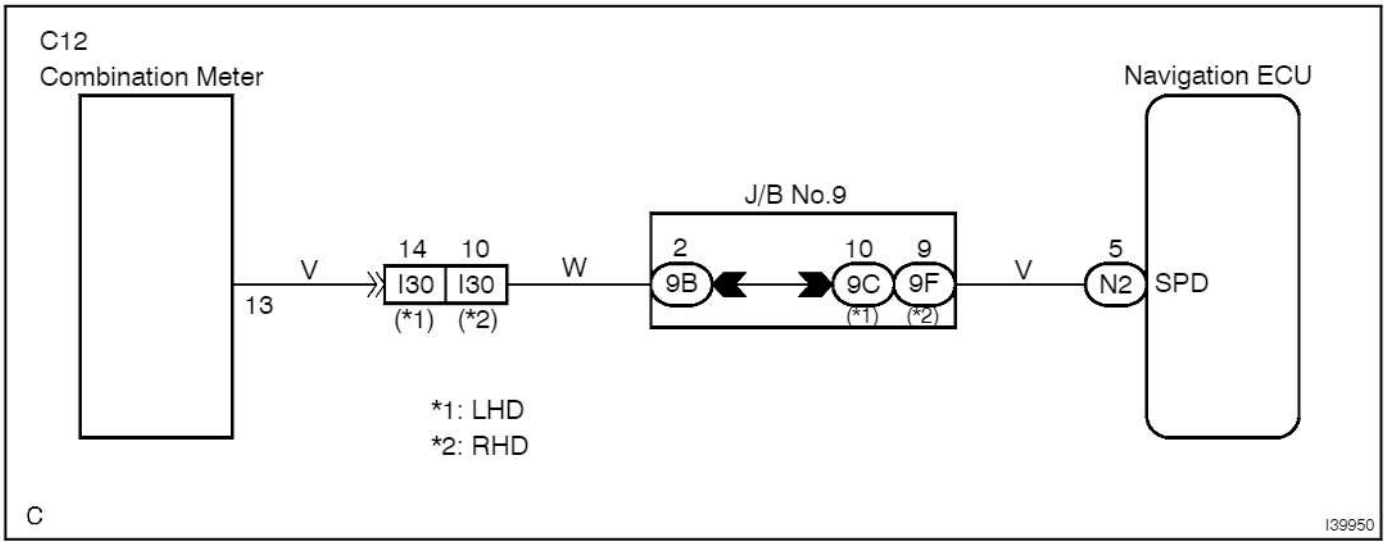
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SPEED SIGNAL CIRCUIT (NAVIGATION ECU – COMBINATION METER ASSY)

CIRCUIT DESCRIPTION

The navigation ECU receives the vehicle speed signal and information about the GPS antenna, and then adjusts the vehicle position.

WIRING DIAGRAM

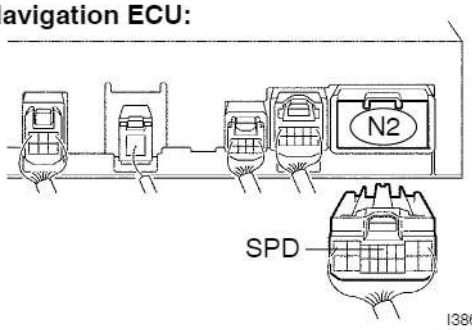


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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY – NAVIGATION ECU)

Navigation ECU:



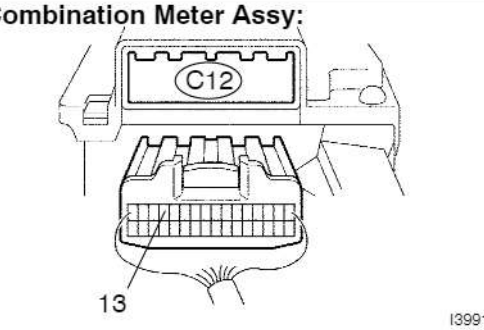
(a) Disconnect the connector from the navigation ECU N2 and combination meter assy C12.

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

Standard:

Tester connection	Condition	Specified condition
SPD – C12–13	Always	Below 1 Ω
SPD – Body ground	Always	10 kΩ or higher

Combination Meter Assy:



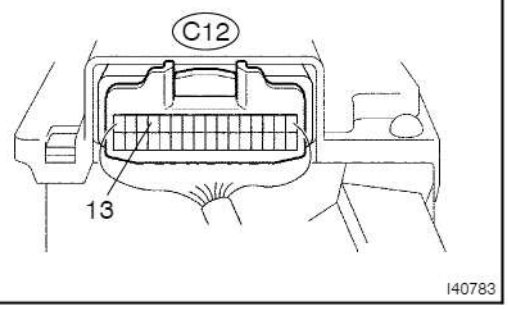
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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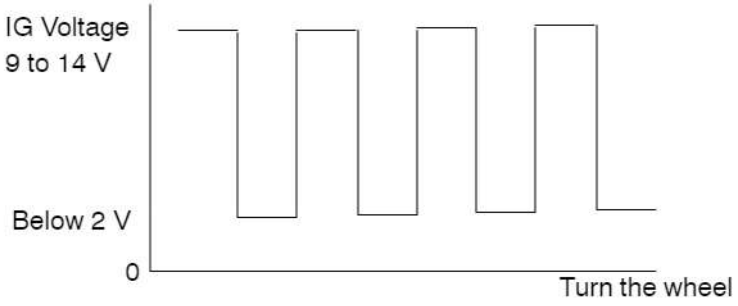
2	INSPECT COMBINATION METER ASSY

Combination Meter Assy:



(a) Connect the combination meter assy connector C12.
(b) Measure voltage.
  (1) Adjust the shift lever to the neutral position.
  (2) Jack up either one of the front wheels.
  (3) Turn power switch to the ON (IG) position.
  (4) Measure the voltage between terminal 13 and body ground of combination meter assy when the front wheels are turned slowly.

OK: Voltage is pulsed as shown below.



NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05–1673)**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

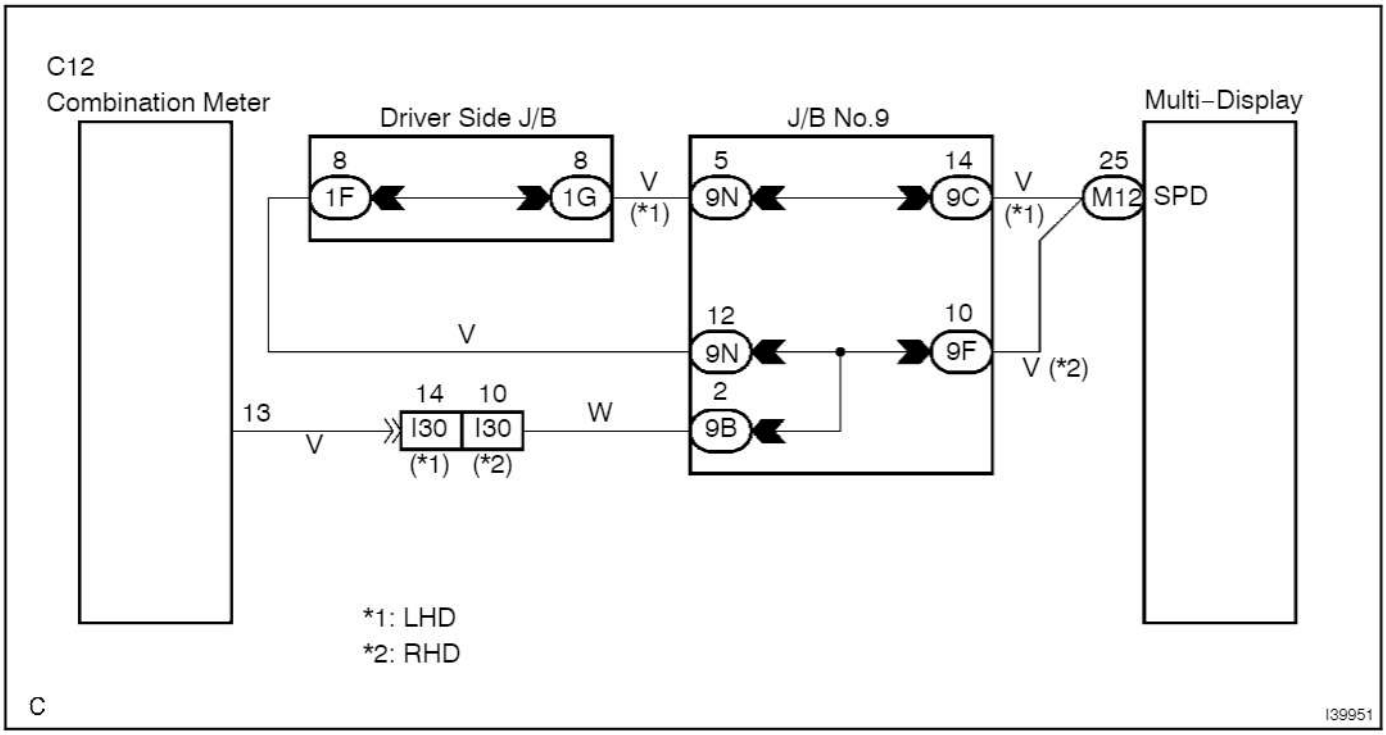
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SPEED SIGNAL CIRCUIT (MULTI–DISPLAY – COMBINATION METER ASSY

CIRCUIT DESCRIPTION

The multi–display performs the switch operation control during running by receiving the vehicle speed signal from the combination meter assy.

WIRING DIAGRAM

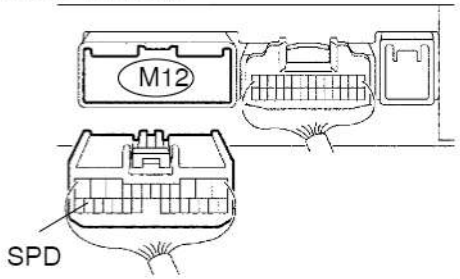


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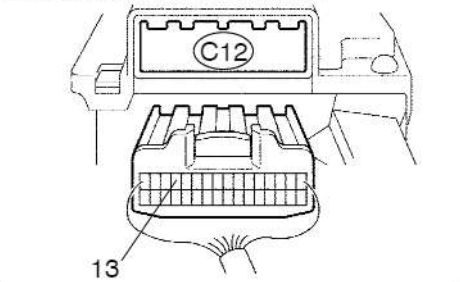
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY – MULTI–DISPLAY)

Multi–Display:



Combination Meter Assy:



(a) Disconnect the connector from the multi–display M12 and combination meter assy C12.

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

Standard:

Tester connection	Condition	Specified condition
SPD – C12–13	Always	Below 1 Ω
SPD – Body ground	Always	10 kΩ or higher

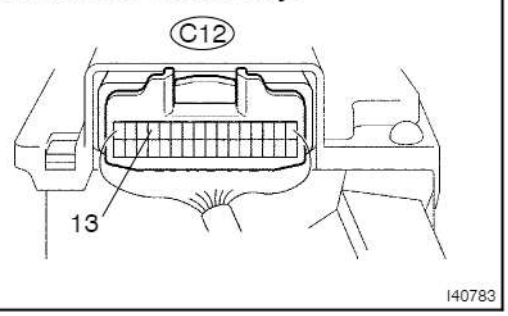
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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2	INSPECT COMBINATION METER ASSY

Combination Meter Assy:



(a) Connect the combination meter assy connector C12.

(b) Measure voltage.

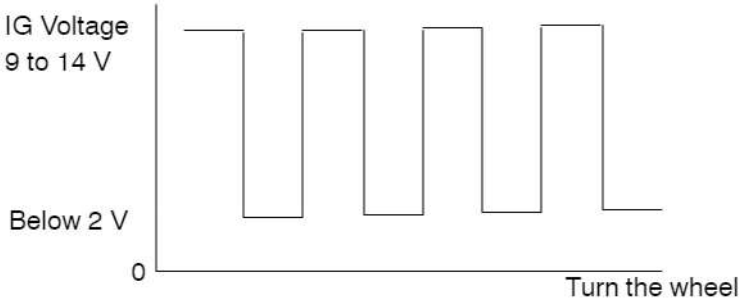
(1) Adjust the shift lever to the neutral position.

(2) Jack up either one of the front wheels.

(3) Turn power switch to the ON (IG) position.

(4) Measure the voltage between terminal 13 and body ground of combination meter assy when the front wheels are turned slowly.

OK: Voltage is pulsed as shown below.



NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05–1673)**

OK

REPLACE MULTI–DISPLAY (SEE PAGE 67–7)

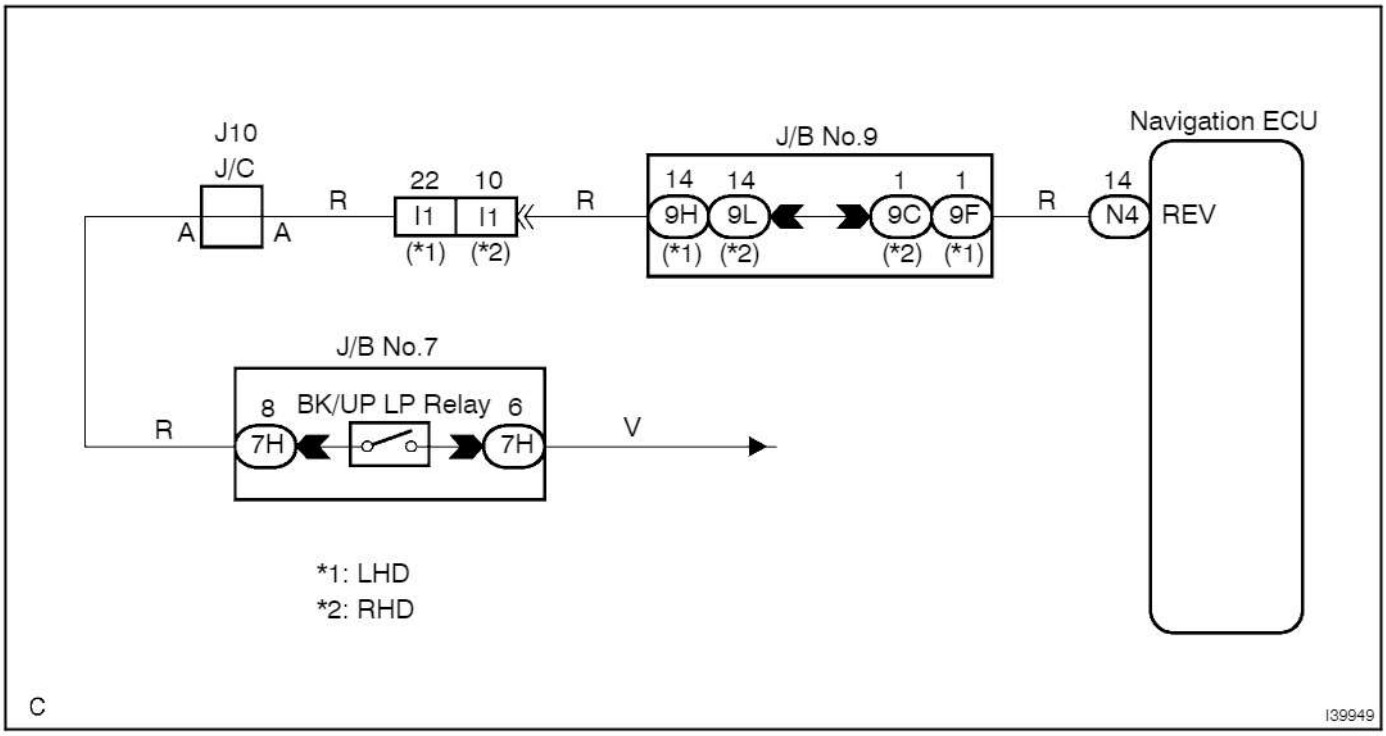
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REVERSE SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

The navigation ECU receives the reverse signal from the BK/UP LP relay and information about the GPS antenna, and then adjusts the vehicle position.

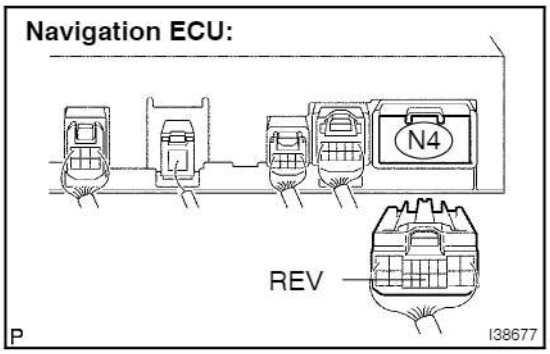
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT NAVIGATION ECU



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

Standard:

Tester connection	Condition	Specified condition
REV – Body ground	Shift lever is moved to R position.	10 to 14 V
REV – Body ground	Shift lever is moved to except R position.	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

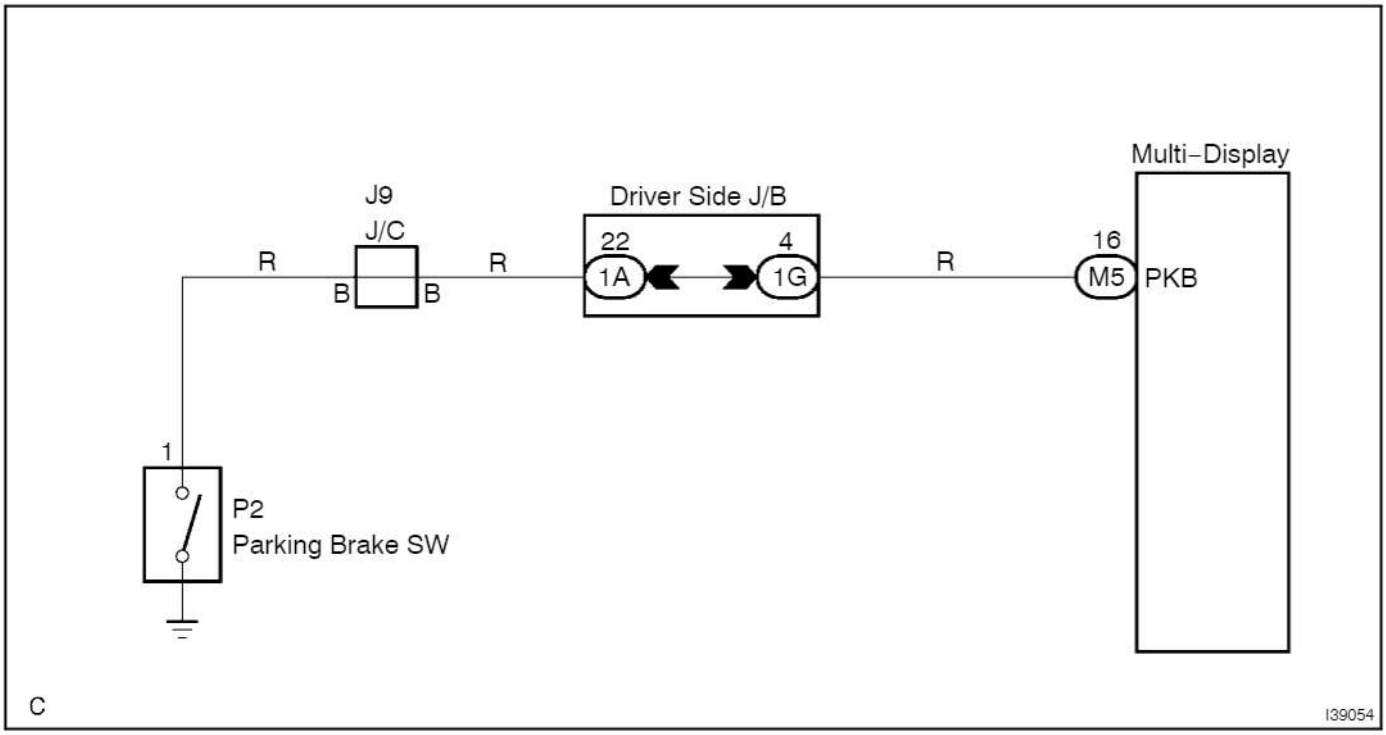
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PARKING BRAKE SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This is circuit from the parking brake switch to the multi–display.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK BRAKE WARNING LIGHT

(a) Check that the brake warning light comes on when parking brake pedal is depressed, and goes off when the parking brake pedal is released.

OK ⟩ **Go to step 3**

NG

2	INSPECT PARKING BRAKE SWITCH ASSY

(a) Disconnect the parking brake switch assy.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

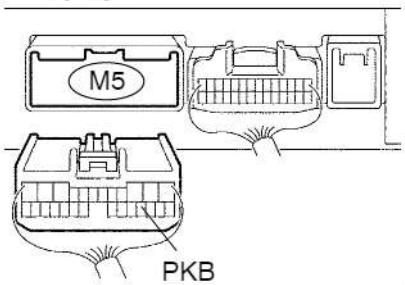
Tester connection	Condition	Specified condition
Switch connector – Switch body	Switch pin free	Below 1Ω
Switch connector – Switch body	Switch pin pushed in	10 kΩ or higher

NG ⟩ **REPLACE PARKING BRAKE SWITCH ASSY**

OK

3	CHECK HARNESS AND CONNECTOR(PARKING BRAKE SWITCH ASSY – MULTI–DISPLAY)

Multi–Display:



(a) Disconnect the connector from multi–display M5.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
PKB – P2–1	Always	Below 1 Ω
PKB – Body ground	Always	10 kΩ or higher

NG ⟩ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

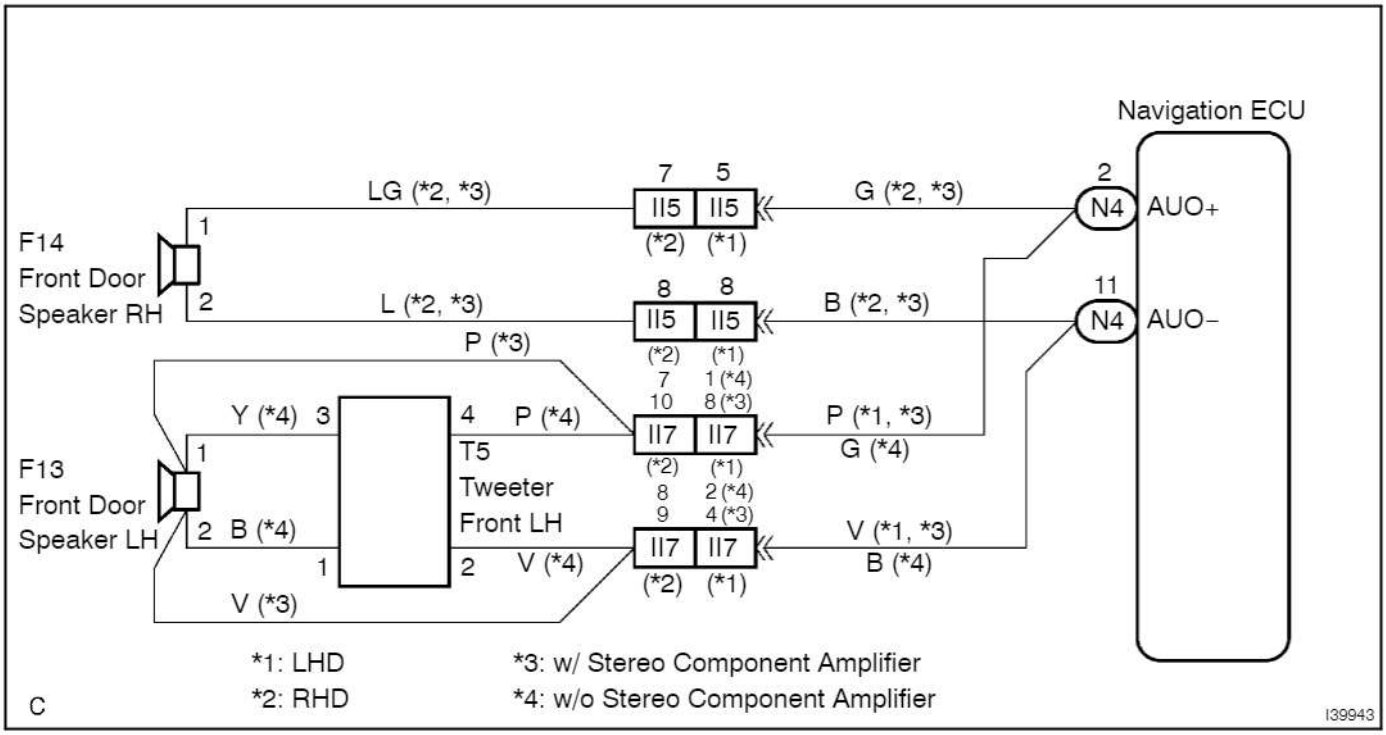
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SPEAKER CIRCUIT (NAVIGATION VOICE)

CIRCUIT DESCRIPTION

This circuit is used when the voice guidance in the navigation system is on.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT FRONT NO. 1 SPEAKER ASSY

(a) Disconnect the speaker connector.
(b) Resistance check.
  (1) Measure the resistance between the terminals of the speaker.

NOTICE:
The speaker should not be removed for checking.

Standard Models: 4 Ω
JBL Models: 2.6 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER ASSY (SEE PAGE 67–8)**

OK

2	CONFIRM THE DESIGNATION INFORMATION

Spec	Go to step
Except LHD, w/o stereo component amplifier assy	A
LHD, w/o stereo component amplifier assy	B

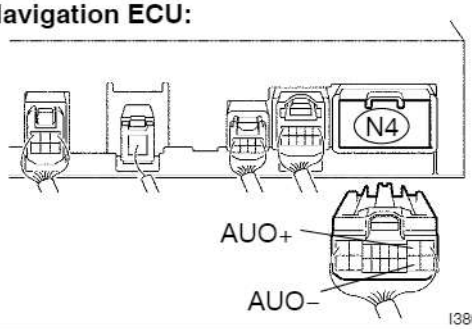
B → **Go to step 4**

A

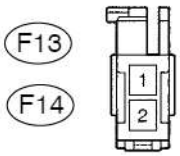
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3	CHECK HARNESS AND CONNECTOR(FRONT NO. 1 SPEAKER ASSY – NAVIGATION ECU)

Navigation ECU:



Connector Front View (Front No.1 Speaker Assy):



(a) Disconnect the connector from navigation ECU N4 and front No.1 speaker assy F13, F14.

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

Standard:

Tester connection	Condition	Specified condition
F13–1 or F14–1 – AUO+	Always	Below 1 Ω
F13–2 or F14–2 – AUO–	Always	Below 1 Ω
F13–1 or F14–1 – Body ground	Always	10 kΩ or higher
F13–2 or F14–2 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

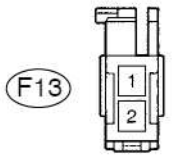
OK →

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

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4	CHECK HARNESS AND CONNECTOR (FRONT NO.1 SPEAKER ASSY – FRONT NO.2 SPEAKER ASSY

Wire Harness Side:
(Front No.1 Speaker Assy)

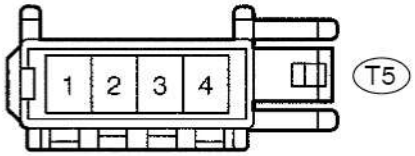


I38233

(a) Disconnect the connectors from the front No.1 speaker assy F13 and front No.2 speaker assy T5.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
F13–1 – T5–3	Always	Below 1 Ω
F13–2 – T5–1	Always	Below 1 Ω
F13–1 – Body ground	Always	10 kΩ or higher
F13–2 – Body ground	Always	10 kΩ or higher

Wire Harness Side:
(Front No.2 Speaker Assy)



P

I40785

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	INSPECT FRONT NO.2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in a good condition is installed.
Standard: Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

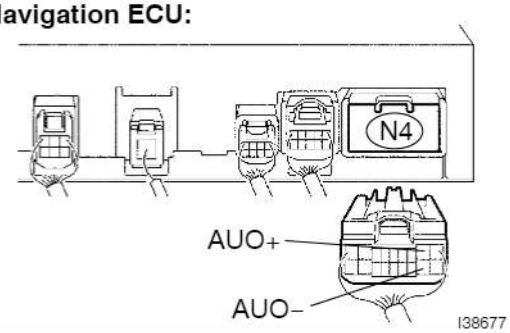
OK → **REPLACE FRONT NO.2 SPEAKER ASSY (SEE PAGE 67–10)**

NG

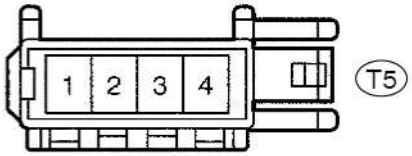
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6	CHECK HARNESS AND CONNECTOR (FRONT NO.2 SPEAKER ASSY – NAVIGATION ECU)

Navigation ECU:



Connector Front View
(Front No.2 Speaker Assy):



(a) Disconnect the connector from navigation ECU N4 and front No.2 speaker assy T5.

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

Standard:

Tester connection	Condition	Specified condition
T5–4 – AUO+	Always	Below 1 Ω
T5–2 – AUO–	Always	Below 1 Ω
T5–4 – Body ground	Always	10 kΩ or higher
T5–2 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67–23)

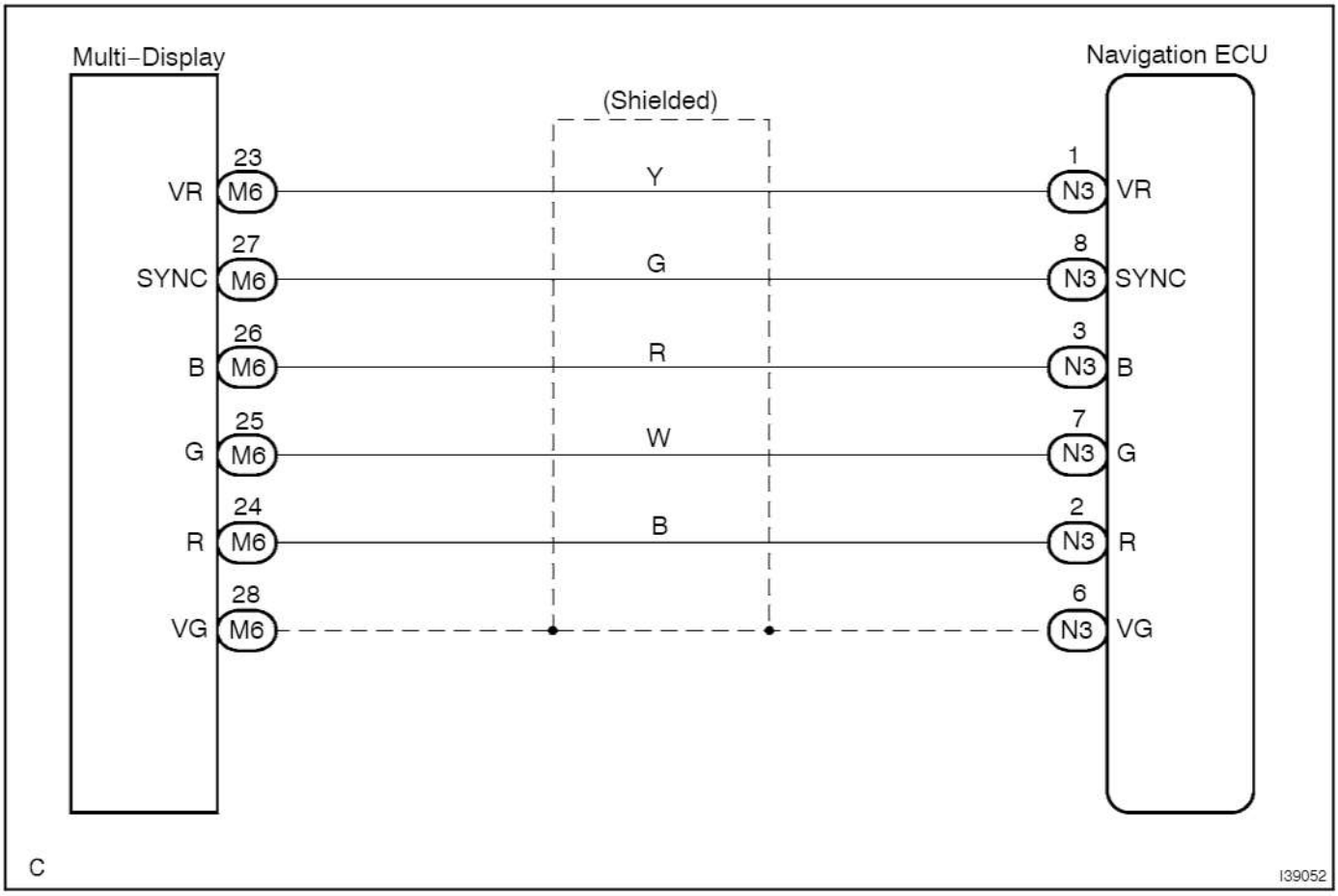
cardiagn.com

DISPLAY SIGNAL CIRCUIT (NAVIGATION ECU – MULTI–DISPLAY)

CIRCUIT DESCRIPTION

This is the display signal circuit from the navigation ECU to the multi–display.

WIRING DIAGRAM

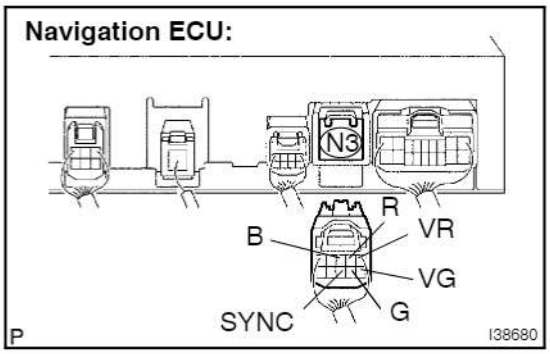


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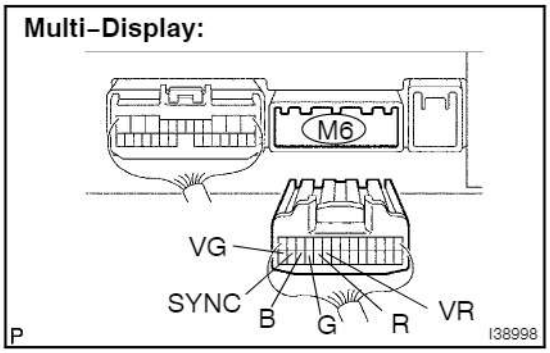
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU – MULTI–DISPLAY)

Navigation ECU:



Multi–Display:



(a) Disconnect the connector from navigation ECU N3 and multi–display M6.

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

Standard:

Tester connection	Condition	Specified condition
R (N3) – R (M6)	Always	Below 1 Ω
G (N3) – G (M6)	Always	Below 1 Ω
B (N3) – B (M6)	Always	Below 1 Ω
SYNC (N3) – SYNC (M6)	Always	Below 1 Ω
VR (N3) – VR (M6)	Always	Below 1 Ω
VG (N3) – VG (M6)	Always	Below 1 Ω
R (N3 or M6) – Body ground	Always	10 kΩ or higher
G (N3 or M6) – Body ground	Always	10 kΩ or higher
B (N3 or M6) – Body ground	Always	10 kΩ or higher
SYNC (N3 or M6) – Body ground	Always	10 kΩ or higher
VR (N3 or M6) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

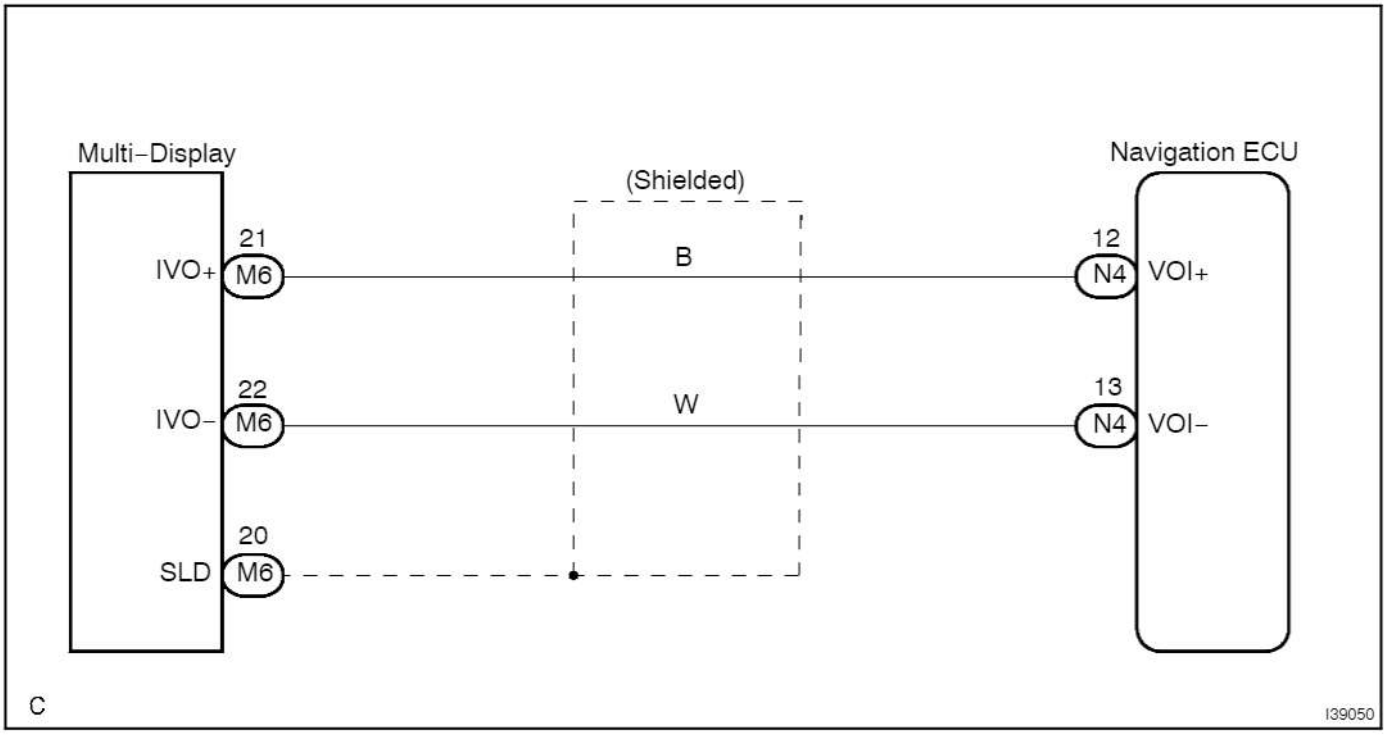
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CELLULAR PHONE VOICE CIRCUIT (MULTI–DISPLAY – NAVIGATION ECU)

CIRCUIT DESCRIPTION

This circuit sends a voice signal of the cellular phone from the multi–display to the navigation ECU.

WIRING DIAGRAM

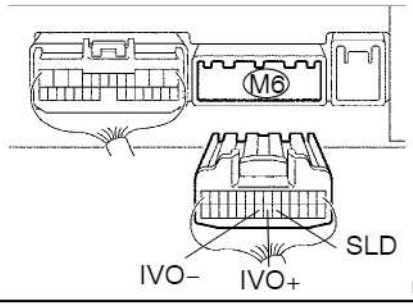


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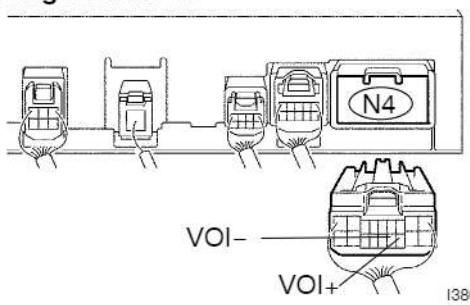
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU – MULTI–DISPLAY)

Multi–display:



Navigation ECU:



(a) Disconnect the connector from the navigation ECU N4 and multi–display M6.

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

Standard:

Tester connection	Condition	Specified condition
IVO+ – VOI+	Always	Below 1 Ω
IVO– – VOI–	Always	Below 1 Ω
IVO+ – Body ground	Always	10 kΩ or higher
IVO– – Body ground	Always	10 kΩ or higher
SLD – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

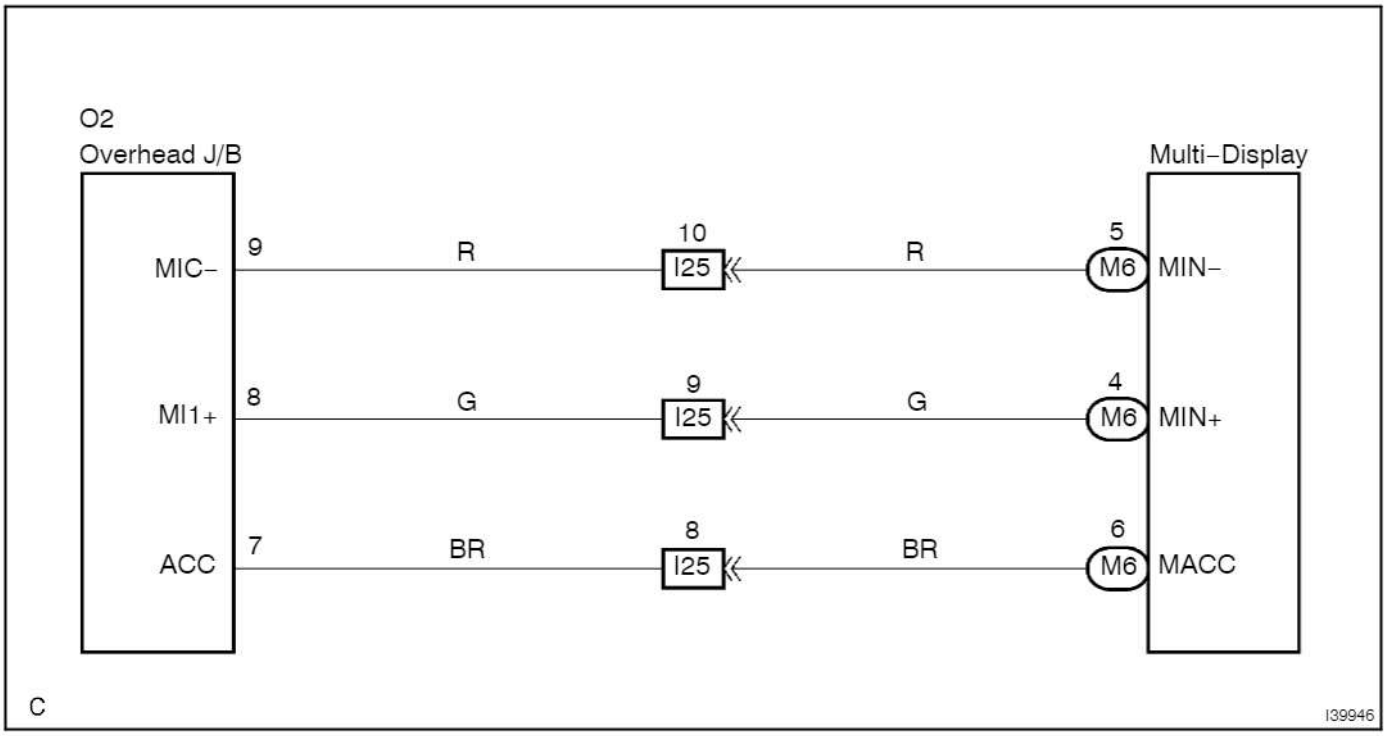
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MICROPHONE CIRCUIT (OVERHEAD J/B – MULTI–DISPLAY)

CIRCUIT DESCRIPTION

This circuit sends a microphone signal from the overhead J/B to the multi–display. It also supplies power from the multi–display to the overhead J/B.

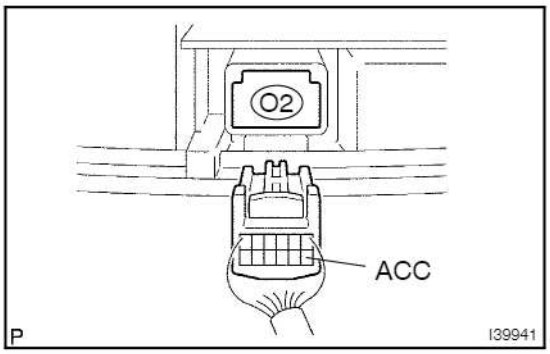
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT MICROPHONE(OVERHEAD J/B)



(a) Disconnect the overhead J/B O2.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

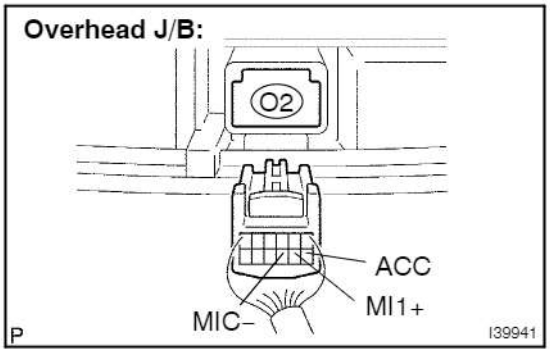
Tester connection	Condition	Specified Condition
ACC – Body ground	Power switch ACC	10 to 14 V

OK → **REPLACE OVERHEAD J/B**

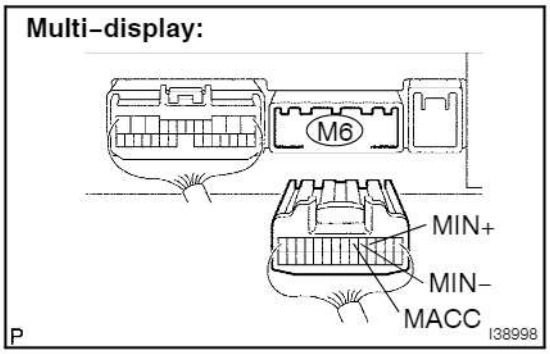
NG

2 CHECK HARNESS AND CONNECTOR(OVERHEAD J/B – MULTI–DISPLAY)

Overhead J/B:



Multi–display:



(a) Disconnect the connector from the overhead J/B O2 and multi–display M6.
(b) Measure the resistance according to the value(s) in the table below.

Tester connection	Condition	Specified Condition
ACC – MACC	Always	Below 1 Ω
MI1+ – MIN+	Always	Below 1 Ω
MIC– – MIN–	Always	Below 1 Ω
ACC – Body ground	Always	10 kΩ or higher
MI1+ – Body ground	Always	10 kΩ or higher
MIC– – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570)

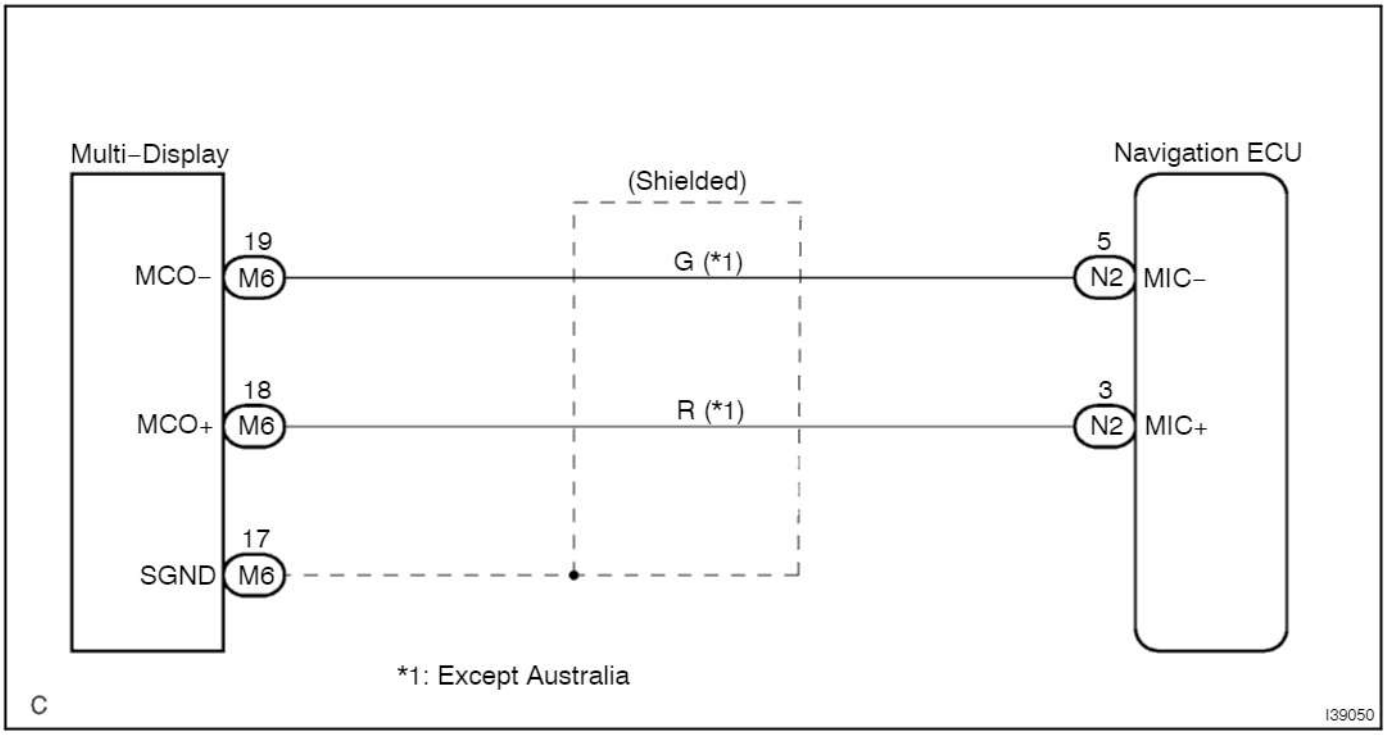
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MICROPHONE CIRCUIT (MULTI–DISPLAY – NAVIGATION ECU)

CIRCUIT DESCRIPTION

This circuit sends a microphone signal from the multi–display to the navigation ECU.

WIRING DIAGRAM

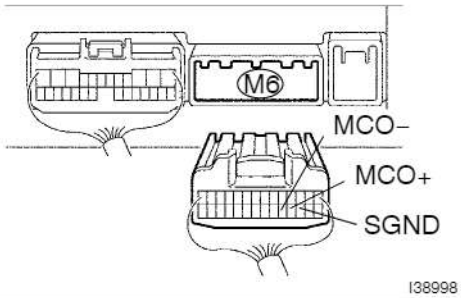


cardiagn.com

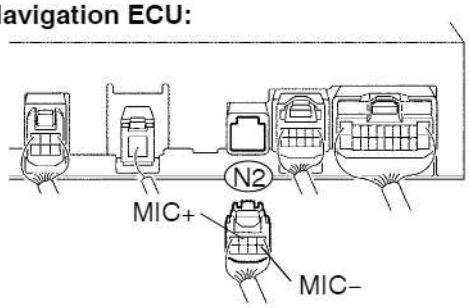
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI–DISPLAY – NAVIGATION ECU)

Multi–Display:



Navigation ECU:



(a) Disconnect the connector from the multi–display M6 and navigation ECU N2.

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

Standard:

Tester connection	Condition	Specified condition
MCO+ – MIC+	Always	Below 1 Ω
MCO– – MIC–	Always	Below 1 Ω
MCO+ – Body ground	Always	10 kΩ or higher
MCO– – Body ground	Always	10 kΩ or higher
SGND – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

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ILLUMINATION CIRCUIT

CIRCUIT DESCRIPTION

w/o Daytime Running Light:

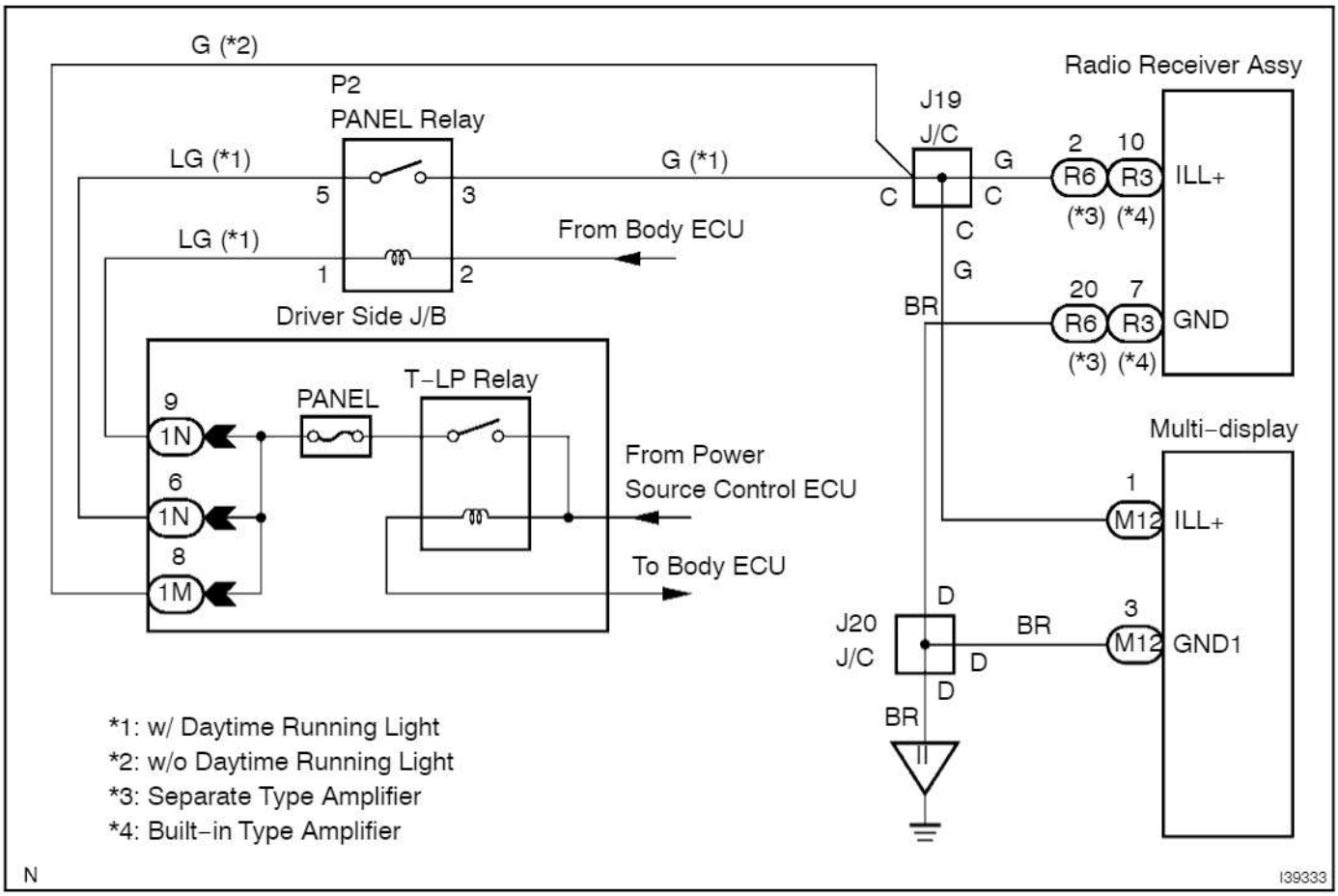
When the light control switch is turned to TAIL or HEAD position, power is supplied to the radio receiver assy and multi–display panel illuminations.

w/ Daytime Running Light:

When the light control switch is turned to TAIL or HEAD position, power is supplied to the radio receiver assy and multi–display panel illuminations.

While the daytime running light is in control, the power supply is cut by the panel relay.

WIRING DIAGRAM

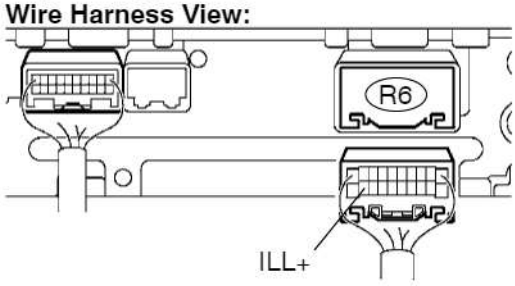


cardiagn.com

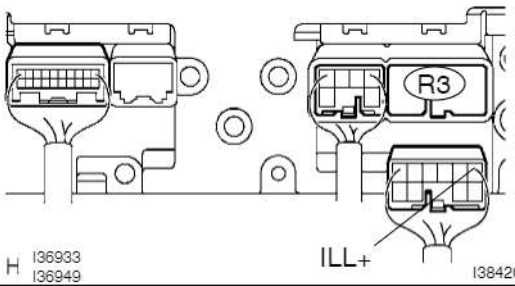
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (COMPONENTS WITH MALFUNCTION – BATTERY)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



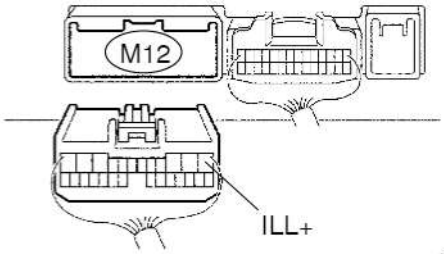
(a) RADIO RECEIVER ASSY
(1) Disconnect the radio receiver assy R6 or R3 connector.
(2) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL+ (R6–2) – Body ground *1	Light control switch TAIL or HEAD	10 to 14 V
ILL+ (R3–10) – Body ground *2	Light control switch TAIL or HEAD	10 to 14 V

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

Multi–display Wire Harness View:



(b) MULTI–DISPLAY
(1) Disconnect the multi–display M12 connector.
(2) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL+ (M12–1) – Body ground	Light control switch TAIL or HEAD	10 to 14 V

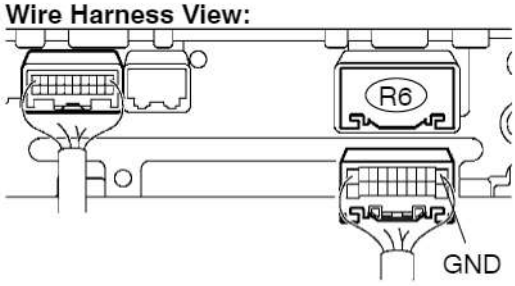
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

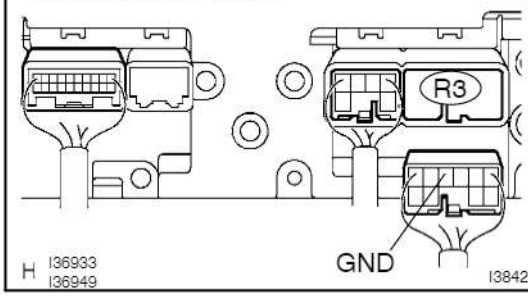
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2	CHECK HARNESS AND CONNECTOR (COMPONENTS WITH MALFUNCTION – BODY GROUND)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



(a) RADIO RECEIVER ASSY

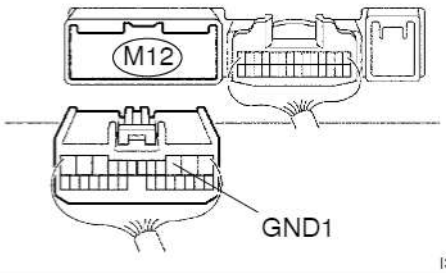
(1) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND (R6–20) – Body ground *1	Always	Below 1 Ω
GND (R3–7) – Body ground *2	Always	Below 1 Ω

*1: Separate Type Amplifier
*2: Built–in Type Amplifier

Multi–display Wire Harness View:



(b) MULTI–DISPLAY

(1) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND1 (M12–3) – Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

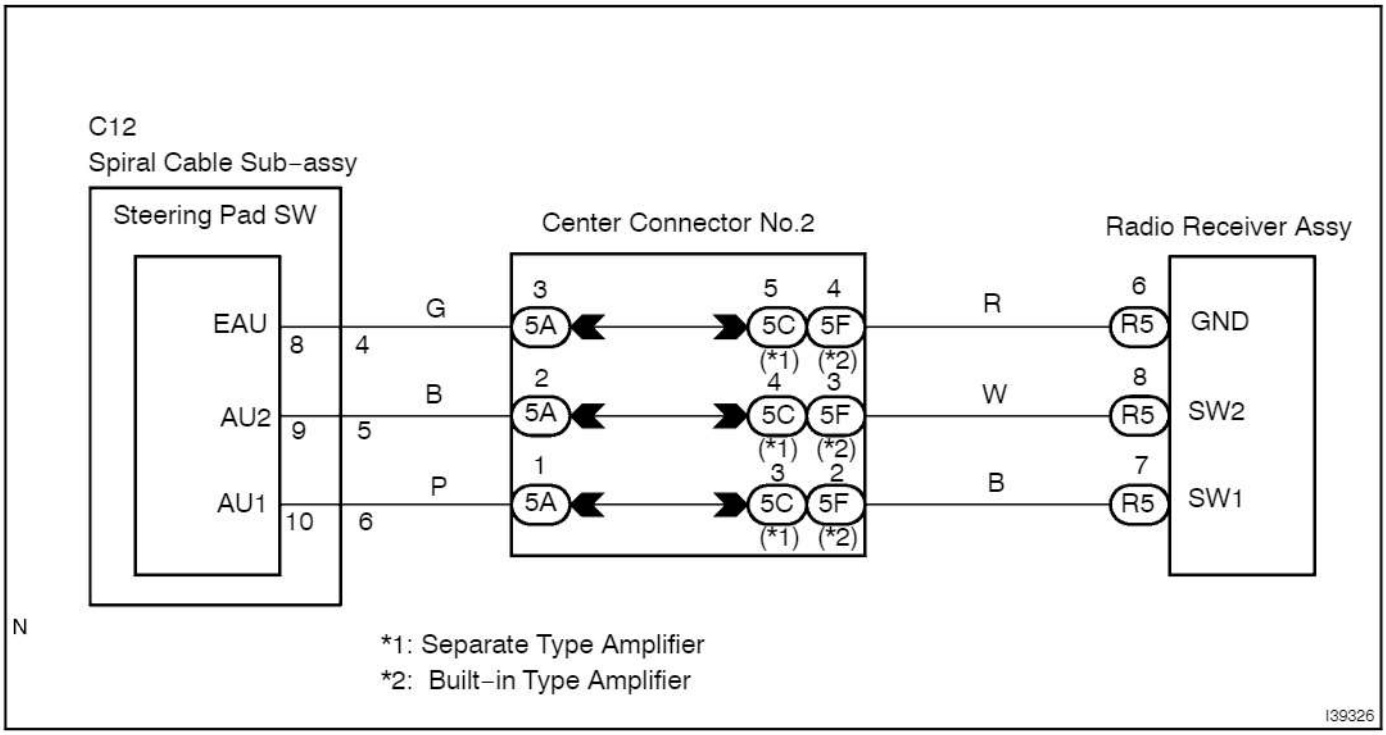
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STEERING PAD SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This circuit sends an operation signal from the steering pad switch to the radio receiver assy.
If there is an open in the circuit, the audio system cannot be operated by the steering pad switch.
If there is a short in the circuit, the same condition as that when the switch is continuously depressed occurs.
Therefore, the radio receiver assy cannot be operated by the steering pad switch, and also the radio receiver assy itself does not function.

WIRING DIAGRAM

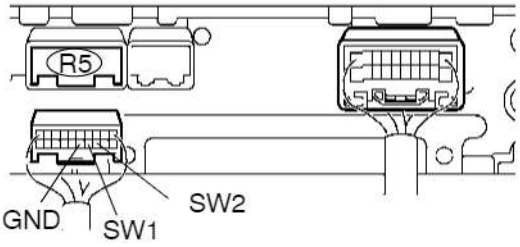


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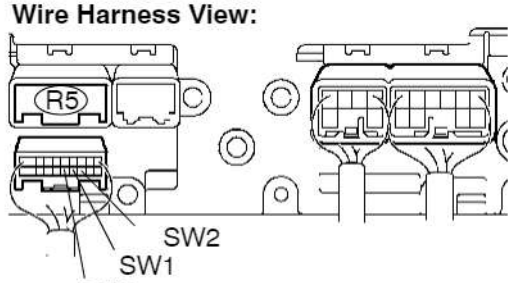
INSPECTION PROCEDURE

1	INSPECT STEERING PAD SWITCH ASSY

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



I36935
I36952
I39524

(a) Disconnect the radio receiver assy R5 connector.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
SW1 (R5–7) – GND (R5–6)	Do not switch position	Approx. 100 kΩ
SW1 (R5–7) – GND (R5–6)	SEEK+ switch: push	Below 2.5 Ω
SW1 (R5–7) – GND (R5–6)	SEEK– switch: push	Approx. 0.3 kΩ
SW1 (R5–7) – GND (R5–6)	VOL+ switch: push	Approx. 1 kΩ
SW1 (R5–7) – GND (R5–6)	VOL– switch: push	Approx. 3.2 kΩ
SW2 (R5–8) – GND (R5–6)	Do not switch position	Approx. 100 kΩ
SW2 (R5–8) – GND (R5–6)	MODE switch: push	Below 2.5 Ω

NG → **Go to step 2**

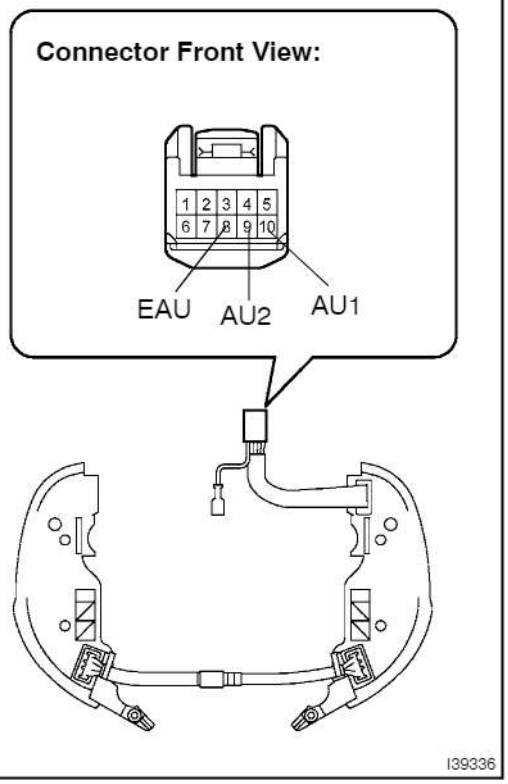
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

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2 INSPECT STEERING PAD SWITCH ASSY

Steering Pad Switch Assy:



(a) Disconnect the steering pad switch assy connector.
(b) Measure the resistance according to the values in the table below.

Standard:

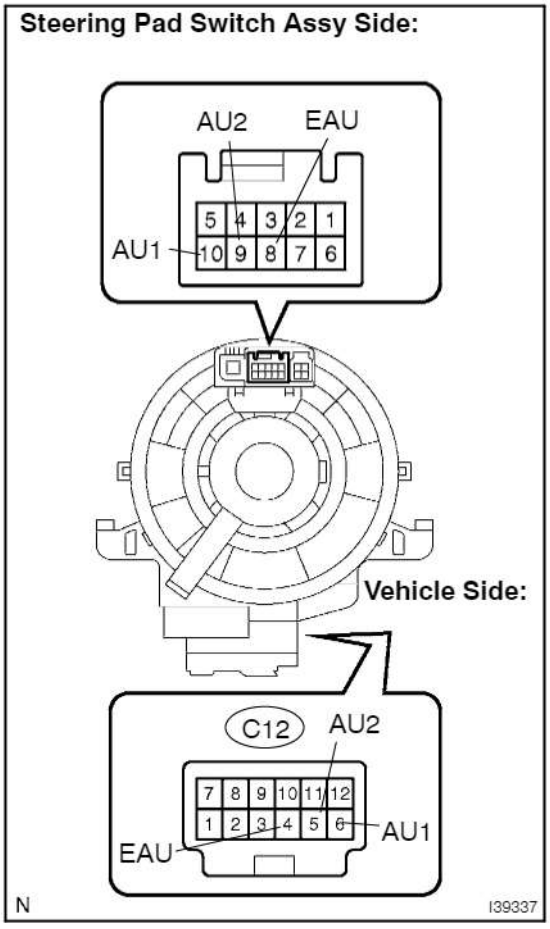
Tester connection	Condition	Specified condition
AU1 (10) – EAU (8)	Do not switch position	Approx. 100 kΩ
AU1 (10) – EAU (8)	SEEK+ switch: push	Approx. 2.5 Ω
AU1 (10) – EAU (8)	SEEK– switch: push	Approx. 0.3 kΩ
AU1 (10) – EAU (8)	VOL+ switch: push	Approx. 1 kΩ
AU1 (10) – EAU (8)	VOL– switch: push	Approx. 3.2 kΩ
AU1 (10) – EAU (8)	Do not switch position	Approx. 100 kΩ
AU2 (9) – EAU (8)	MODE switch: push	Below 2.5 Ω

NG → **REPLACE STEERING PAD SWITCH ASSY** (SEE PAGE 67–28)

OK

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3 INSPECT SPIRAL CABLE SUB–ASSY



(a) Disconnect the connectors from the spiral cable sub–assy.

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

Standard:

Tester connection	Specified condition
EAU (C12–4) – EAU (8)	Below 1 Ω
AU1 (C12–6) – AU1 (10)	Below 1 Ω
AU2 (C12–5) – AU2 (9)	Below 1 Ω

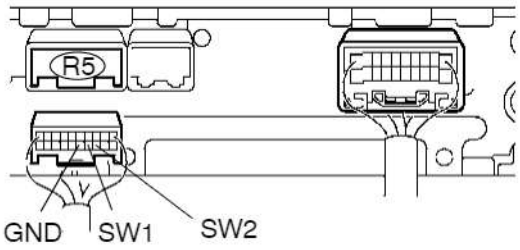
NG → **REPLACE SPIRAL CABLE SUB–ASSY** (SEE PAGE 60–29)

OK

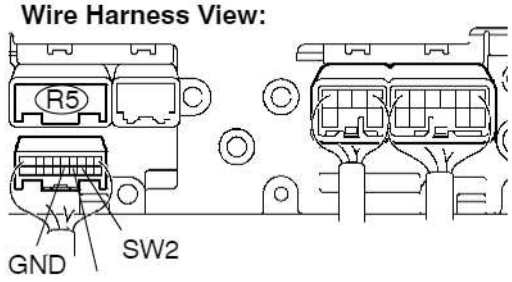
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4	CHECK HARNESS AND CONNECTOR(SPIRAL CABLE SUB–ASSY – RADIO RECEIVER ASSY)

Separate Type Amplifier
Wire Harness View:



Built–in Type Amplifier
Wire Harness View:



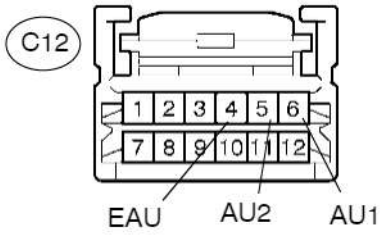
I36935
I36952
I39524

(a) Disconnect the spiral cable sub–assy connector.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
SW1 (R5–7) – AU1 (C12–6)	Below 1 Ω
SW2 (R5–8) – AU2 (C12–5)	Below 1 Ω
GND (R5–6) – EAU (C12–4)	Below 1 Ω
SW1 (R5–7) – Body ground	10 kΩ or higher
SW2 (R5–8) – Body ground	10 kΩ or higher
GND (R5–6) – Body ground	10 kΩ or higher

Spiral Cable Side
Connector Front View:



N
I39295

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–1570)

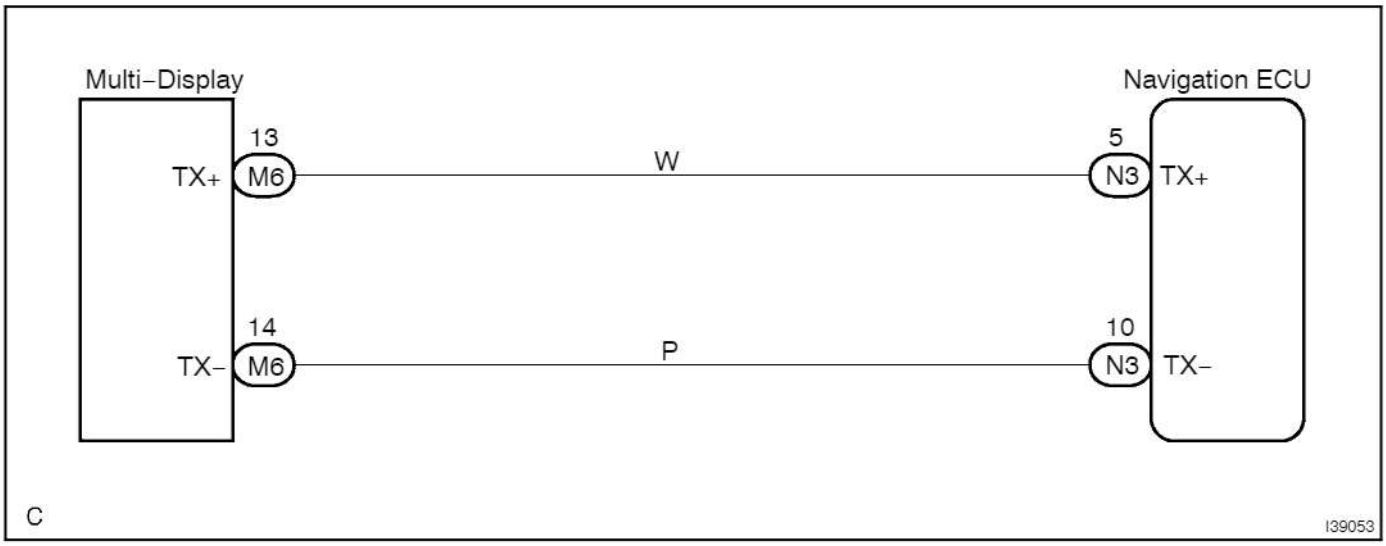
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AVC–LAN CIRCUIT (NAVIGATION ECU – MULTI–DISPLAY)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC–LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC–LAN, navigation system will not function normally as communication is discontinued.
In AVC–LAN, multi–display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

WIRING DIAGRAM

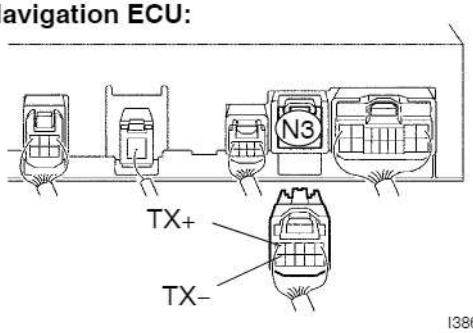


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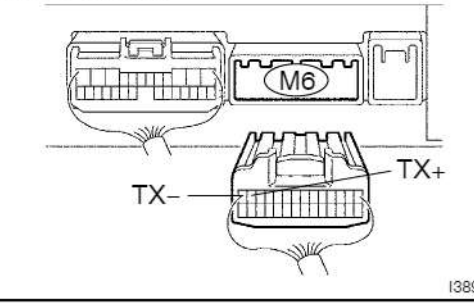
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU – MULTI–DISPLAY)

Navigation ECU:



Multi–Display:



(a) Disconnect the connector from the navigation ECU N3 and multi–display M6.

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

Standard:

Tester connection	Condition	Specified condition
TX+ (N3) – TX+ (M6)	Always	Below 1 Ω
TX– (N3) – TX– (M6)	Always	Below 1 Ω
TX+ (N3 or M6) – Body ground	Always	10 kΩ or higher
TX– (N3 or M6) – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570)

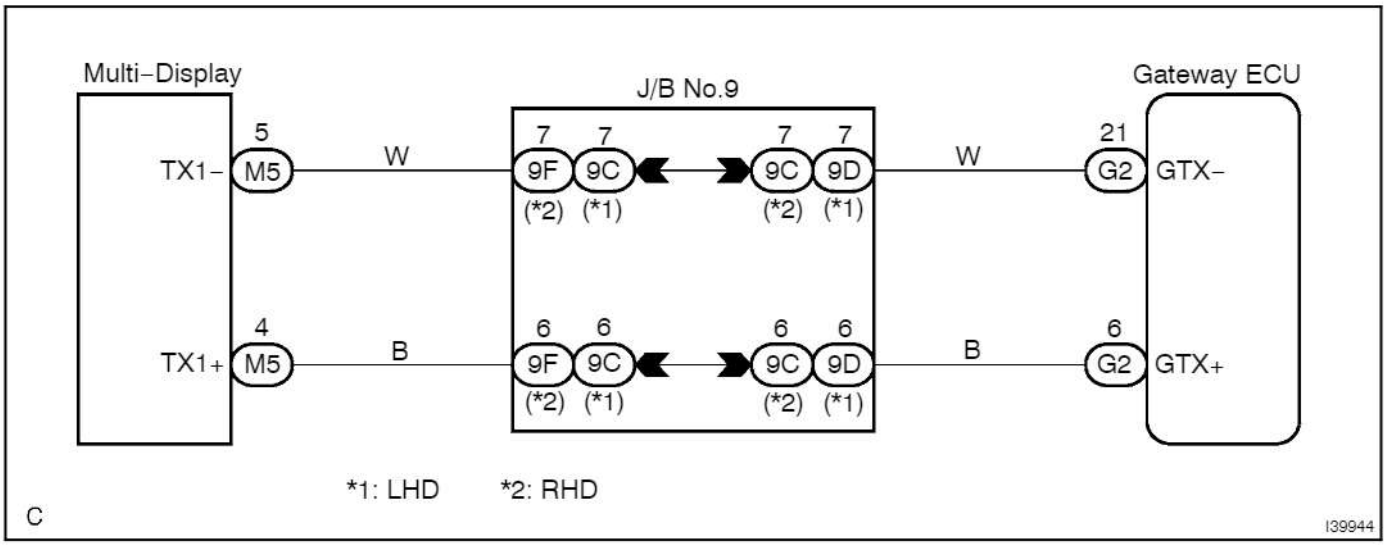
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AVC–LAN CIRCUIT (MULTI–DISPLAY – GATEWAY ECU)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC–LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC–LAN, navigation system will not function normally as communication is discontinued.
In AVC–LAN, multi–display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

WIRING DIAGRAM

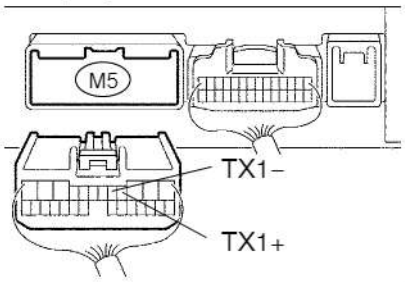


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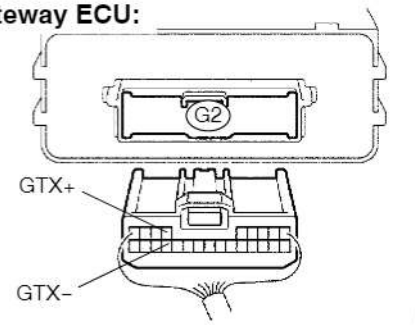
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI–DISPLAY – GATEWAY ECU)

Multi–Display:



Gateway ECU:



(a) Disconnect the connector from the multi–display M5 and gateway ECU G2.

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

Standard:

Tester connection	Condition	Specified condition
TX1+ – GTX+	Always	Below 1 Ω
TX1– – GTX–	Always	Below 1 Ω
TX1+ – Body ground	Always	10 kΩ or higher
TX1– – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570)

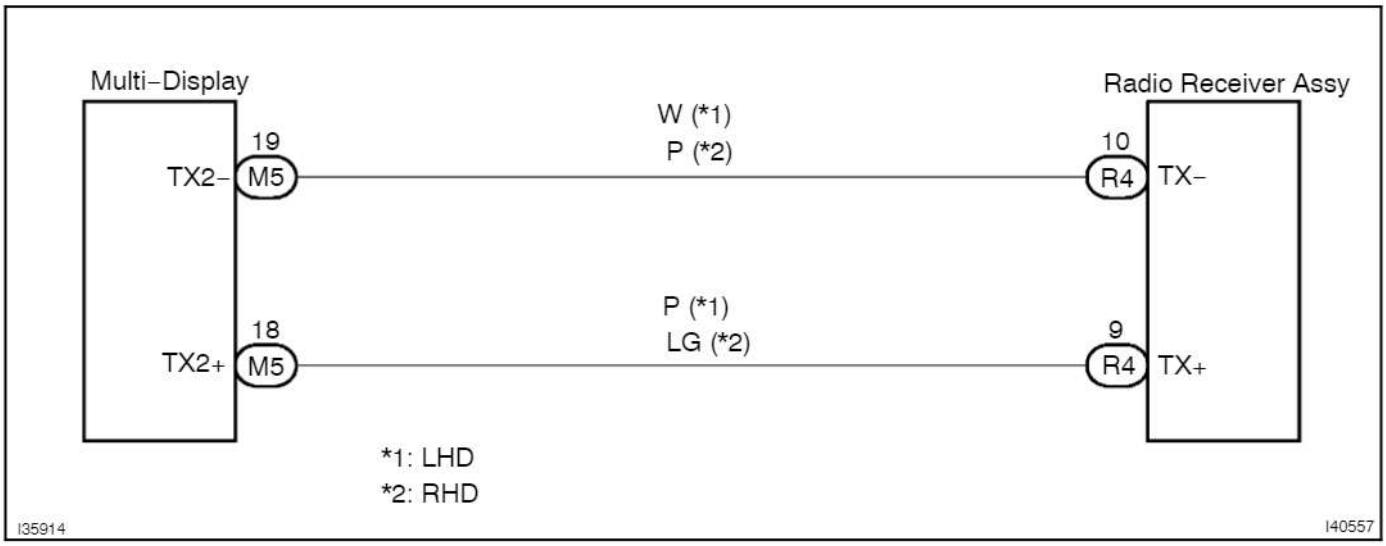
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AVC–LAN CIRCUIT (RADIO RECEIVER ASSY – MULTI–DISPLAY)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC–LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC–LAN, navigation system will not function normally as communication is discontinued.
In AVC–LAN, multi–display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

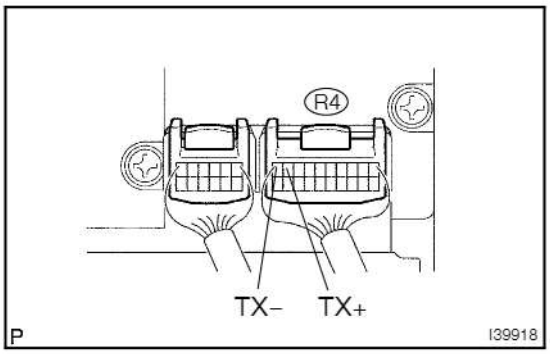
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT RADIO RECEIVER ASSY



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

Standard:

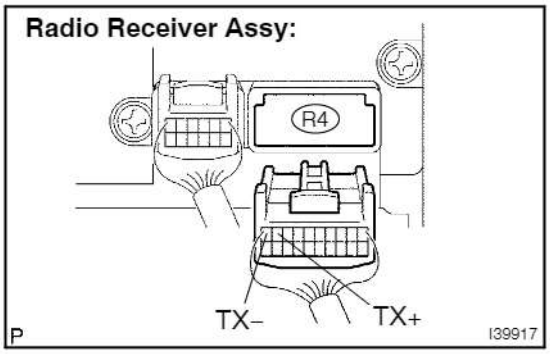
Tester connection	Condition	Specified condition
TX+ – TX–	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER ASSY**

OK

2 CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY – MULTI–DISPLAY)

Radio Receiver Assy:



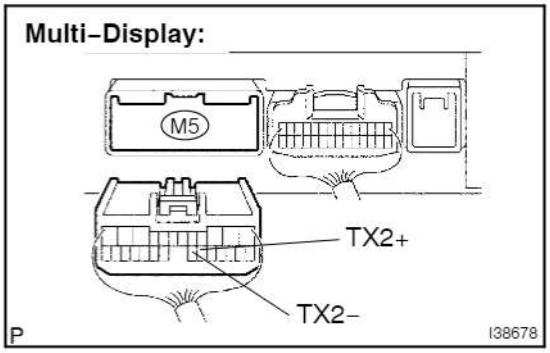
(a) Disconnect the connector from the radio receiver assy R4 and stereo multi–display M5.

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

Standard:

Tester connection	Condition	Specified condition
TX+ – TX2+	Always	Below 1 Ω
TX– – TX2–	Always	Below 1 Ω
TX+ – Body ground	Always	10 kΩ or higher
TX– – Body ground	Always	10 kΩ or higher

Multi–Display:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05–1570)

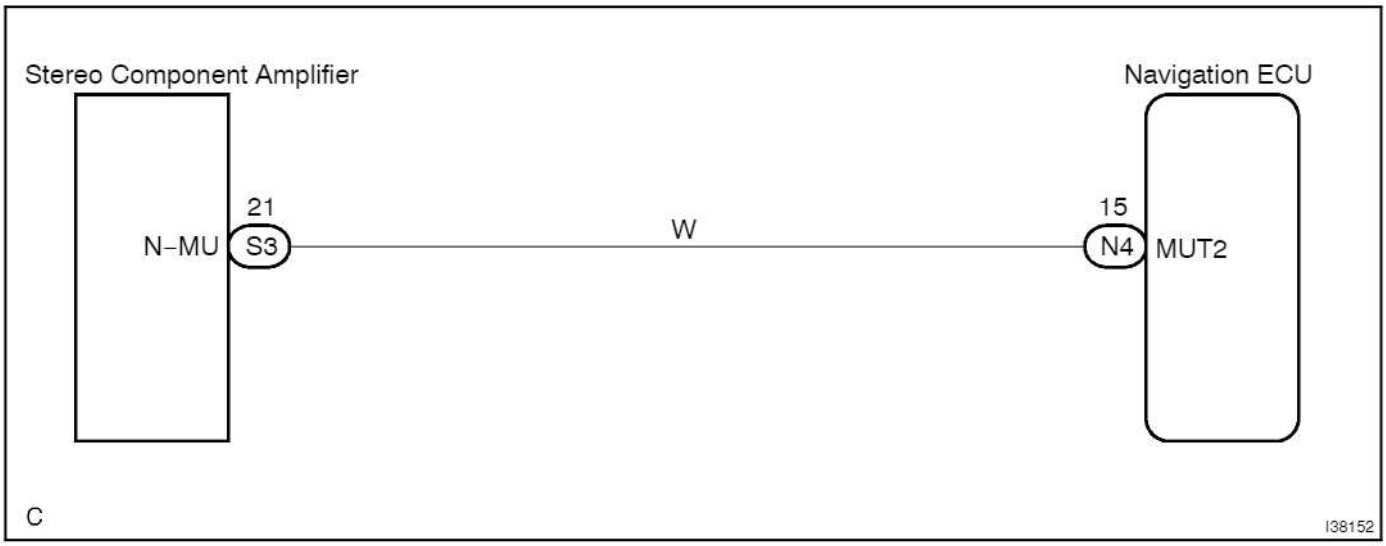
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MUTE SIGNAL CIRCUIT (STEREO COMPONENT AMPLIFIER ASSY – NAVIGATION ECU)

CIRCUIT DESCRIPTION

This circuit sends the signal to the stereo component amplifier to mute the noise. Because of that, the noise produced by changing the sound source ceases.
In addition, this circuit is used to mute the sound when the navigation system performs voice guide.
If there is an open in the circuit, noise can be heard from the speaker when changing the sound source.
When the vehicle is equipped with the navigation system, audio sound keeps coming out from the speaker on the driver's side while the voice navigation is in operation.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only extremely small sound can be produced.

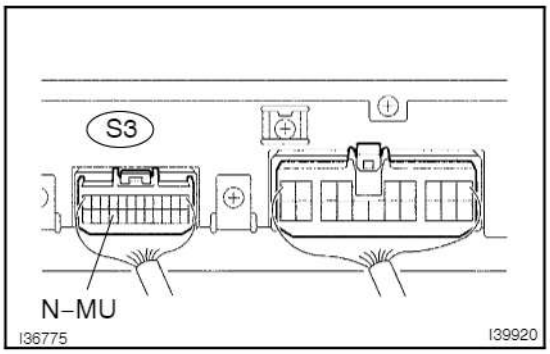
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT STEREO COMPONENT AMPLIFIER ASSY



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
N–MU – Body ground	Turn power switch to ON (ACC), Audio system is playing → Changing	Above 3.5 V → Below 1 V

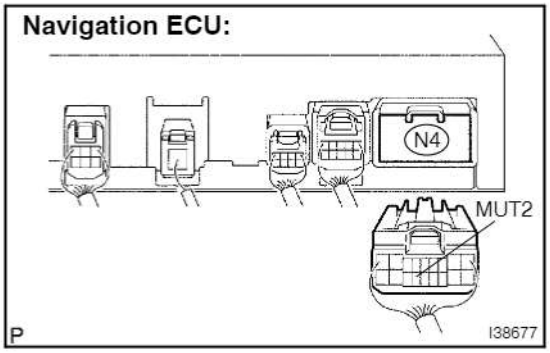
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–1570)

2 CHECK HARNESS AND CONNECTOR(NAVIGATION ECU – STEREO COMPONENT AMPLIFIER ASSY)

Navigation ECU:



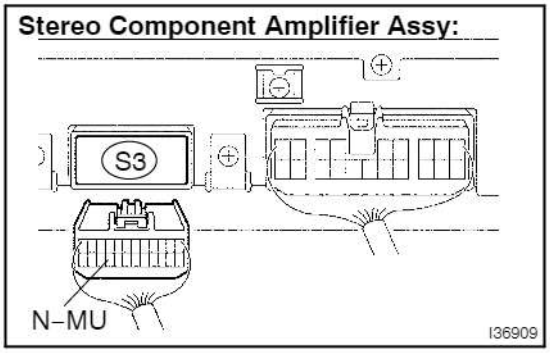
(a) Disconnect the connectors from the stereo component amplifier assy S29 and navigation ECU N4.

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

Standard:

Tester connection	Condition	Specified condition
MUT2 – N–MU	Always	Below 1 Ω
MUT2 – Body ground	Always	10 kΩ or higher

Stereo Component Amplifier Assy:

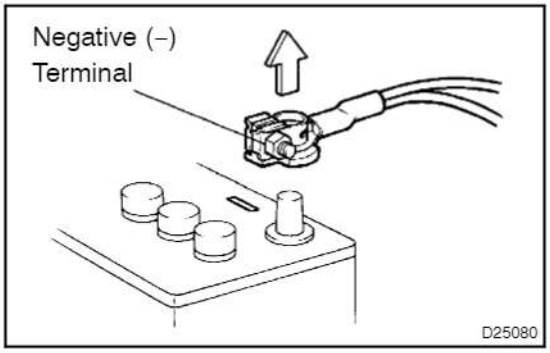


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEREO COMPONENT AMPLIFIER ASSY (SEE PAGE 67–25)

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COMBINATION METER

05IA5–01

PRECAUTION

REMOVAL AND INSTALLATION OF BATTERY TERMINAL

(a) Before performing electronic work, disconnect the battery negative (–) terminal cable in order to prevent it from shorting and burning out.

(b) When disconnecting and reconnecting the battery cable, turn the power switch and lighting switch off and loosen the terminal nut completely. Perform operations without twisting or prying on the terminal.

(c) When the battery terminal cable is removed, the memories of the clock, radio, DTCs, etc. are erased. So before removing it, check and make a note of them.

NOTICE:

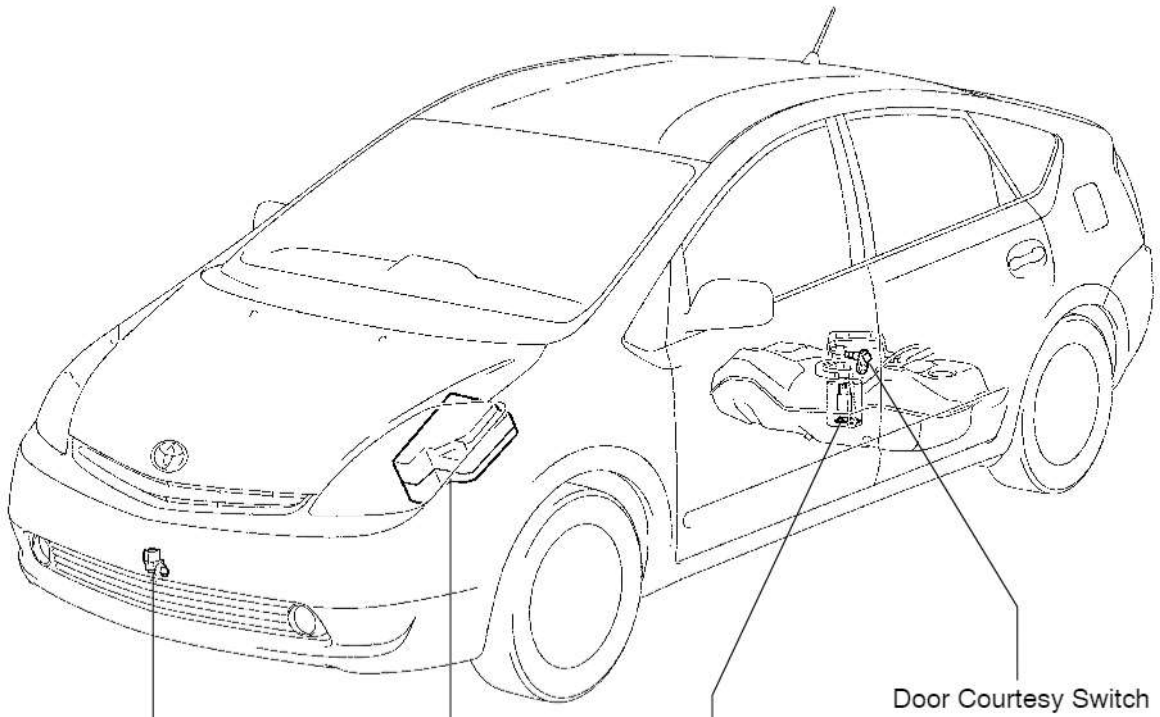
When disconnecting the battery negative (–) terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Power Window Control System	01–29

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05IA8-01

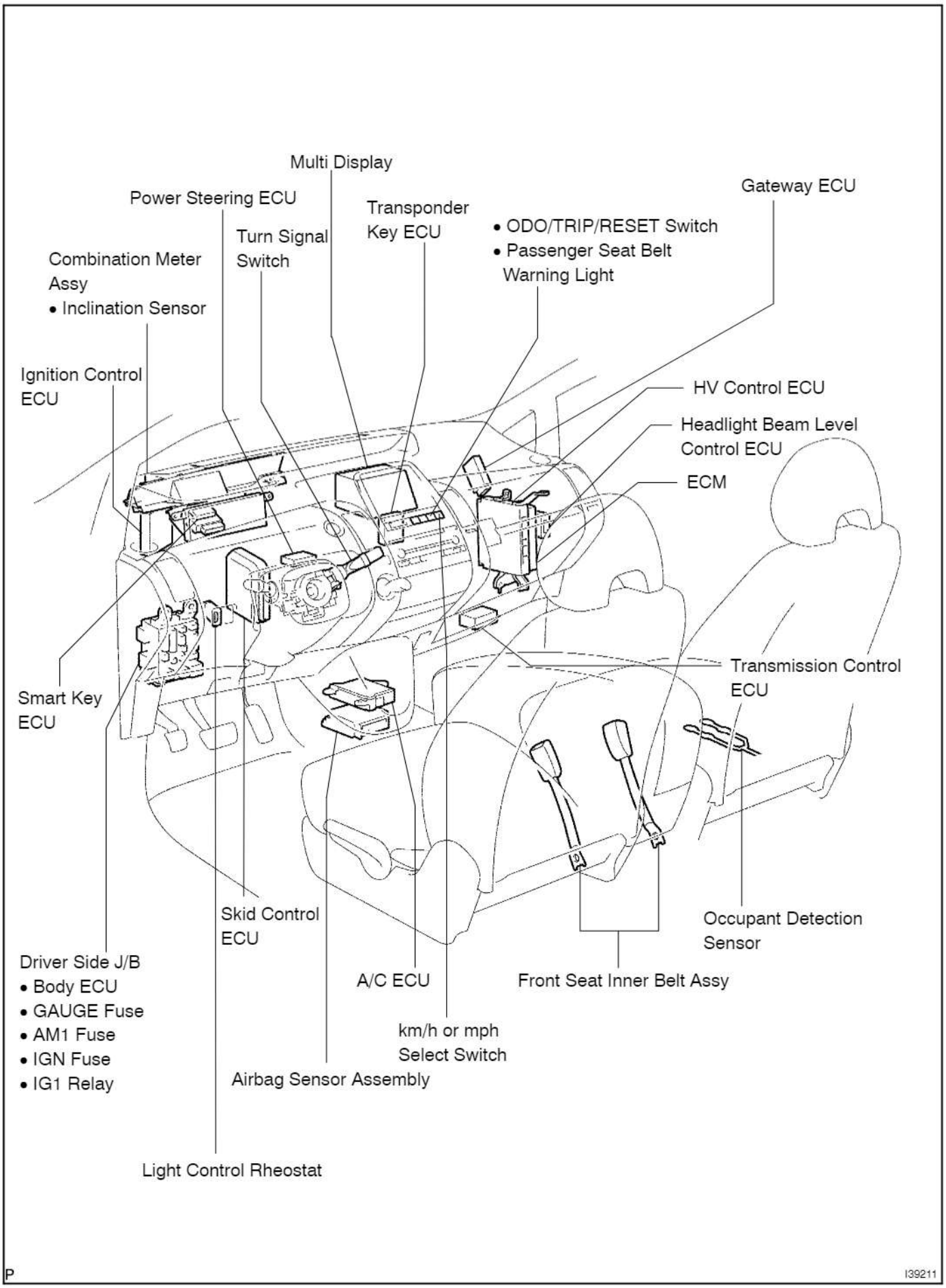
LOCATION



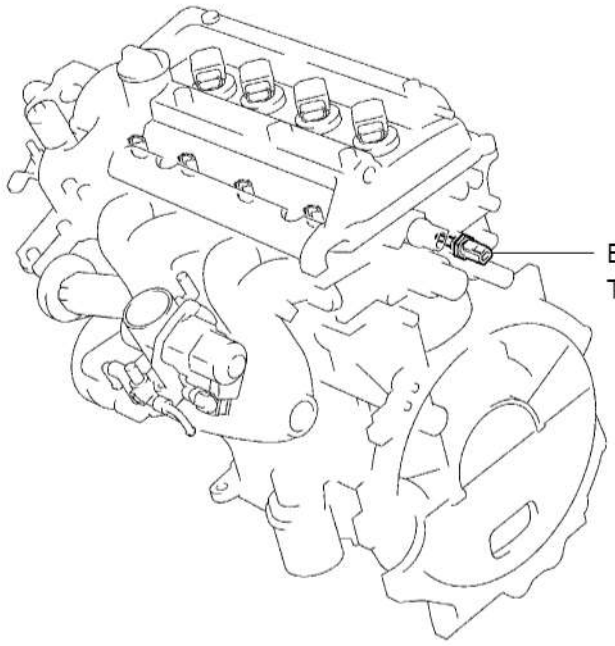
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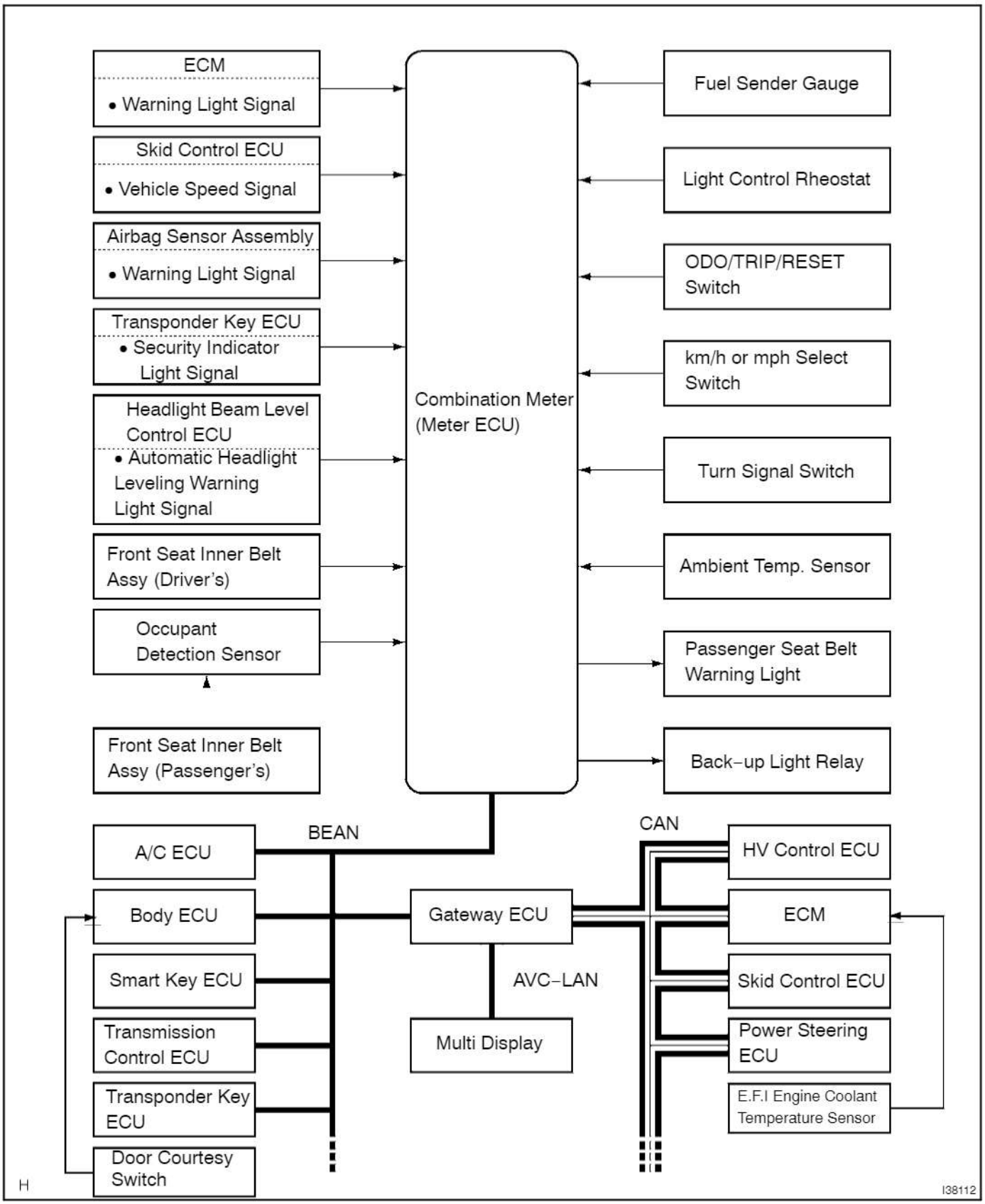
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05IAA-01

SYSTEM DIAGRAM



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GATEWAY:

ECU	Signals from/to Combination meter (Meter ECU)
GATEWAY ECU	• Receives ODO METER information signal

BEAN:

ECU	Signals from/to Combination Meter (Meter ECU)
A/C ECU	• Transmits ambient temperature signal (for low ambient temperature warning light) • Transmits indicator light (A/C AUTO, RECIRCULATE, Front DEF, Rear DEF) ON demand signal • Receives vehicle speed signal
Body ECU	• Receives vehicle speed signal • Receives tail cancel signal • Transmits D seat door courtesy SW signal (for headlamp reminder control) • ACC switch signal • Transmits D seat door courtesy SW signal • Transmits warning ON signal (HEAD and TAIL) • Transmits headlight ON signal (HI–BEAM) • Transmits front fog light ON signal (FOG indicator light) • Transmits meter illumination light dimmer demand signal • Transmits warning ON signal (all door courtesy switch)
Smart Key ECU	• Receives vehicle speed signal • Transmits inside cabin key detection signal (Smart Key System) • Transmits buzzer sounding demand signal
Transmission Control ECU	• Transmits P state signal • Transmits master warning light (P control malfunction) ON demand signal • Transmits shift position (N, P) signal
Transponder Key ECU	• Transmits master warning light (shift warning) ON demand signal • Transmits buzzer sounding demand signal • Receives vehicle speed signal
Steering Lock ECU	• Transmits buzzer sounding demand signal • Transmits meter display signal

CAN:

ECU	Signals from/to Combination Meter (Meter ECU)
HV ECU	• Transmits shift position signal (P, R, N, D, B) (for shift position indicator light) • Transmits cruise indicator light ON demand signal • Transmits master warning light (HV system, main battery, NDB warning, Motor inverter, CHARGE) ON demand signal • Transmits READY indicator ON/blink & buzzer sounding signal • Transmits starter ON signal • Transmits EV indicator ON/blink & buzzer sounding signal
ECM	• Receives fuel tank level signal • Transmits engine coolant temperature signal (for master warning light [engine coolant temperature warning]) • Transmits engine speed signal (for trip information operation) • Transmits fuel injection volume signal (for trip information operation) • Transmits test mode signal • Transmits master warning light (OIL. P) ON signal
Skid Control ECU	• Transmits warning signal (ABS, VSC, BRAKE, ECB) ON/blink demand signal • Transmits diagnosis signal (ABS, VSC, ECB) ON/blink demand signal • Transmits SLIP indicator light ON/blink demand signal
Power Steering ECU	• Transmits EPS warning light ON/blink demand signal

AVC–LAN:

ECU	Signals from/to Combination Meter (Meter ECU)
Multi–display	• Transmits trip information operation signal • Receives warning (fuel level, headlight leveling, EPS) display signal • Receives trip information display signal • Receives km/h (mph) selector switch signal • Receives taillight cancel switch signal

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SYSTEM DESCRIPTION

1. METER GAUGE AND WARNING/INDICATOR

GAUGE:

Item	Signal Description
Speedometer	Based on a signal received from the wheel speed sensor, the skid control ECU calculates vehicle speed and transmits the data to the meter .
Fuel	Displays a fuel level receiving a signal from the fuel sender gauge (Direct line).

WARNING / INDICATOR:

Item	Signal Description
TURN	Turn signal switch is ON.
BEAM	Displays receiving a signal from the body ECU (Direct line).
CHARGE	Receives the malfunction signal from the alternator.
CHECK ENGINE	Receives the malfunction signal from the ECM.
DOOR	Open door indicator comes on receiving a signal from the body ECU (Direct line).
SEAT BELT	Driver's seat belt buckle switch is OFF (Unfastened).
BRAKE	Displays when the parking brake switch is ON or the brake fluid level warning switch is ON.
CRUISE	Receives the malfunction signal from the ECM.
AIRBAG	Receives the malfunction signal from the airbag ECU.
FUEL	Receives the fuel empty signal from the fuel sender gauge.
A/T P	Receives the P signal from the hybrid vehicle control ECU (BEAN).
A/T R	Receives the R signal from the hybrid vehicle control ECU (BEAN).
A/T N	Receives the N signal from the hybrid vehicle control ECU (BEAN).
A/T D	Receives the D signal from the hybrid vehicle control ECU (BEAN).
A/T B	Receives the B signal from the hybrid vehicle control ECU (BEAN).
SLIP	Receives the malfunction signal from the skid control ECU.
VSC	Receives the malfunction signal from the skid control ECU.
ABS	Receives the malfunction signal from the skid control ECU.
ECB	Receives the malfunction signal from the skid control ECU.
LOW AMBIENT TEMP.	Receives the LOW AMBIENT TEMP. signal from A/C ECM (BEAN).
A/C AUTO	Receives the A/C AUTO signal from A/C ECM (BEAN).
RECIRCULATE	Receives the RECIRCULATE signal from A/C ECM (BEAN).
Rr DEF	Receives the Rr DEF signal from A/C ECM (BEAN).
Fr DEF	Receives the Fr DEF signal from A/C ECM (BEAN).
SECURITY	Receives the SECURITY signal from Security ECU (BEAN).
SMART	Receives the SMART signal from Smart key ECU (BEAN).

2. GENERAL

- The combination meter is digital display type.
- The meter ECU and buzzer are installed in the combination meter. The meter ECU maintains communication with other ECUs through the BEAN. It also maintains communication with the ECUs (or components) that compose the CAN and AVC–LAN through the gateway ECU.
- The "READY" light comes on to inform the driver that the vehicle is ready to be driven.
- The low ambient temperature indicator light comes on to inform the driver that the ambient temperature is low (below 3°C).
- The master warning light comes on with buzzer sounding if there is a malfunction in each system (see page 05–1684).

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3. LOW AMBIENT TEMPERATURE INDICATOR LIGHT

- When turning the power switch on, the meter ECU turns on the low ambient temperature warning light for 3 seconds for the bulb check.
- The meter ECU determines the ambient temperature with the ambient temperature sensor signal from the air conditioning system. The meter ECU turns on the warning light, which blinks for 3 seconds and then remains on when it determines that the ambient temperature is below 3°C. The meter ECU turns off the warning light once the ambient temperature increases above 5°C.

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05IAF-01

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–1682)

3	PROBLEM SYMPTOM CONFIRMATION (SEE PAGE 05–1684)

4	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Check for DTC outputs.

MULTIPLEX DTC OUTPUTS (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")	
NO MULTIPLEX DTC (GO TO STEP 5)	

5	CIRCUIT INSPECTION (SEE PAGE 05–1696 – 05–1711)

6	REPAIR OR REPLACE

7	CONFIRMATION TEST

END

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05IAH–01

CUSTOMER PROBLEM ANALYSIS CHECK

COMBINATION METER SYSTEM Check Sheet

Inspector's name:

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date of Vehicle Brought In	/ /	**Odometer Reading**	**km** **mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constantly ☐ Sometimes (Times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outside temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Problem Symptom	**Gauge**	☐ Malfunction in speedometer
		☐ Malfunction in fuel receiver gauge
	Others	☐ Entire combination meter does not operate
		☐ Operating light control rheostat does not change light brightness
		☐ Malfunction in ODO/TRIP SW
		☐ Seat belt warning lamp for driver's seat does not operate
		☐ Seat belt warning lamp for passenger's seat does not operate
		☐
		☐
		☐
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05IAJ–01

CUSTOMIZE PARAMETERS

1. BUZZER CANCEL SETTING

(a) Check that the ODO display is on, and turn the power switch off and then on. If other display is on, change it to the ODO display.

(b) Within 6 seconds, push and hold the ODO/TRIP switch for 10 seconds or more.

(c) Following the table below, set the buzzer cancel setting.

Buzzer	Operation
Seat belt buzzers for driver's seat	Driver's seat buckle switch OFF → ON (Seat belt unfastened → fastened)
Seat belt buzzer for passenger seat	Passenger seat buckle switch OFF → ON (Seat belt unfastened → fastened)

HINT:

The ODO/TRIP display changes from "b–on" to "b–off", entering the cancel mode.

(d) During the cancel mode, each time the ODO/TRIP switch is pushed, the setting is switched between*1 b–on and *2 b–off.

HINT:

*1 b–on: Cancel is invalid

*2 b–off: Cancel is valid

(e) After the setting, the mode will be canceled by either not operating the switch for 10 seconds or more, or turning the power switch from on to off.

HINT:

The setting can be reset when reconnecting the battery connector or removing/installing the meter connector(Buzzer on).

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PROBLEM SYMPTOMS TABLE

HINT:

- Inspect the related "Fuse" and "Relay" before confirming the suspected area as shown in the charts below.
- The upper panel (instrument panel) must be removed to inspect the meter connector. The prius has a sub wire harness connector installed in a different position from the meter connector to shorten labor time. Work on the combination meter can also be done through this sub wire harness connector (see page 05–1687).

MALFUNCTION SYSTEM:

Symptom	Suspected Area	See page
Entire combination meter does not operate.	1. Refer to troubleshooting	05–1696
Malfunction in ODO/TRIP	1. Refer to troubleshooting	05–1707
Operating light control rheostat does not change light brightness.	1. Refer to troubleshooting	05–1705

METER GAUGES:

Symptom	Suspected Area	See page
Malfunction in speedometer	1. Refer to troubleshooting	05–1699
Malfunction in fuel receiver gauge	1. Refer to troubleshooting	05–1702

WARNING LIGHTS:

Symptom	Suspected Area	See page
Check Engine warning light does not come on.	1. ECM 2. Wire Harness or Connector 3. Combination Meter Assy	05–10 – 71–19
Brake Control warning light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–715 – 71–19
ABS warning light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–715 – 71–19
SRS warning light does not come on.	1. Airbag Sensor Assy Center 2. Wire Harness or Connector 3. Combination Meter Assy	05–1159 – 71–19
Open door warning light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1776 – 71–19
VSC warning light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–715 – 71–19
Seat belt warning lamp for driver's seat does not operate	1. Refer to troubleshooting	05–1709
Seat belt warning lamp for passenger's seat does not operate	1. Refer to troubleshooting	05–1711

INDICATOR LIGHTS:

Symptom	Suspected Area	See page
Turn indicator light does not come on.	1. Turn Signal and Hazard Warning System 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
High beam indicator light does not come on.	1. Headlight Dimmer Switch 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
A/C AUTO indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1030 – 71–19
Rr DEF indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1030 – 71–19

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Fr DEF indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1030 – 71–19
RECIRCULATE indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1030 – 71–19
LOW AMBIENT TEMP. indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1030 – 71–19
TAIL indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
Rr FOG indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
SMART indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1943 – 71–19
SECURITY indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–2205 – 71–19
SLIP indicator light does not come on.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–715 – 71–19
CRUISE indicator light does not come on.	1. ECM 2. Wire Harness or Connector 3. Combination Meter Assy	05–10 – 71–19
All buzzers (key reminder, tail cancel, seat belt) do not operate.	1. Refer to troubleshooting 2. Combination Meter Assy	05–1683 71–19

DISPLAY WARNING BUZZER:

Symptom	Suspected Area	See page
Malfunction in HV system, Low battery (Main), Charge, and Shift reject.	1. Hybrid Vehicle Control ECU 2. Combination Meter Assy	05–229 71–19
Malfunction in Hi water temperature.	1. ECM 2. Combination Meter Assy	05–10 71–19
Malfunction in Transmission control system.	1. Transmission Control ECU 2. Combination Meter Assy	05–229 71–19
Malfunction in Engine oil pressure.	1. Engine Oil Pressure Switch 2. Combination Meter Assy	05–10 71–19
Malfunction in EPS system.	1. Power Steering ECU 2. Combination Meter Assy	05–978 71–19
Malfunction in Headlight leveling control.	1. Headlight control ECU 2. Combination Meter Assy	65–20 71–19

BUZZER:

Symptom	Suspect Area	See page
Key reminder warning buzzer does not sound.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–2031 – 71–19
Light reminder warning buzzer does not sound.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
Seat belt warning buzzer does not sound.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1683 – 71–19

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Headlight automatic leveling warning buzzer does not sound.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	65–20 – 71–19
Warning buzzer does not sound (READY, A/T R, N/D warning, HV system, Main battery, Charge, Shift reject) .	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–229 – 71–19
Warning buzzer does not sound (Hi water temperature, Oil pressure).	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–229 – 71–19
Warning buzzer does not sound (Smart key system) .	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–1943 – 71–19
Steering lock warning buzzer does not sound.	1. Refer to troubleshooting 2. Wire Harness or Connector 3. Combination Meter Assy	05–978 – 71–19

HINT:

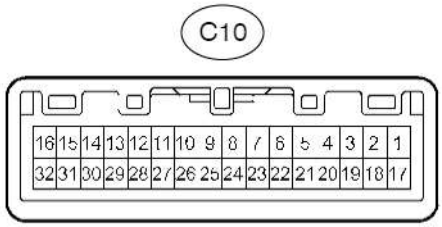
Refer to On–vehicle inspection in combination meter (see page 05–1715).

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05IAR–01

TERMINALS OF ECU

COMBINATION METER ASSY:



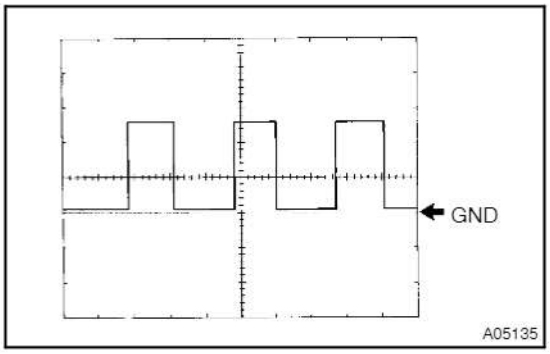
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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
km/h or mph (C10–1) – Body ground	L – Body ground	km/h or mph signal	Power switch ON (ACC or IG) and km/h or mph switch ON → OFF	Below 1 V → 4 to 5.5 V
TRIP EARTH(C10–2) – Body ground	B – Body ground	GND signal FOR ODO/ TRIP SWITCH	Always	Below 1 Ω
ODO/TRIP/RESET (C10–3) – Body ground	R – Body ground	ODO/TRIP/RESET signal	ODO/TRIP/RESET switch ON → OFF	Below 1 V → 4 to 5.5 V
IG2 (C10–4) – Body ground	O – Body ground	Power switch signal	Power switch OFF → ON	10 to 14 V
D–BELT SW (C10–6) – Body ground	LG – Body ground	Driver seat belt condition	D–BELT indicator light ON → OFF	Below 1 V → 10 to 14 V
P–BELT SW (C10–7) – Body ground	R – Body ground	Passenger seat belt condition	P–BELT indicator light ON → OFF	Below 1 V → 10 to 14 V
SECURITY (C10–8) – Body ground	R – Body ground	SECURITY signal	Key is inserted → Not inserted	Below 1 V ⇔ 10 to 14 V → Below 1 V
SPEED IN (C10–9) – Body ground	V – Body ground	Speed signal (Input)	Power switch ON (ACC or IG) and turn the wheel slowly	Pulse generation (See waveform 1)
AUTO LVL (C10–10) – Body ground	L – Body ground	Headlight automatic leveling signal	Malfunction in headlight leveling System is normally → Malfunction	Below 1 V → 10 to 14 V
AIRBAG (C10–11) – Body ground	B – Body ground	AIRBAG signal	AIRBAG indicator light ON → OFF	Below 1 V → 8 to 14 V
4P OUT (C10–13) – Body ground	V – Body ground	Tachometer signal (Output)	Power switch ON (ACC or IG) and turn the wheel slowly	Pulse generation (See waveform 2)
SIGNAL EARTH (C10–14) – Body ground	BR – Body ground	GND signal	Always	Below 1 Ω
FUEL IN (C10–15) – Body ground	B – Body ground	Fuel signal	Power switch ON (ACC or IG) and fuel level is FULL → EMPTY	4.0 Ω → 110 Ω
TURN R (C10–18) – Body ground	G – Body ground	Turn signal right	Turn signal RH indicator light OFF → ON	Below 1 V → 10 to 14 V
TURN L (C10–19) – Body ground	Y – Body ground	Turn signal left	Turn signal LH indicator light OFF → ON	Below 1 V → 10 to 14 V
+B (C10–21) – Body ground	Y – Body ground	Power switch signal	Always	10 to 14 V
IG2 (C10–22) – Body ground	V – Body ground	Power switch signal	Power switch OFF → ON	Below 1 V → 10 to 14 V
BACK–UP LP (C10–23) – Body ground	P – Body ground	BACK–UP light signal	Power switch ON (ACC or IG) and Shift is except R position → Shift is R position	Below 1 V → 10 to 14 V
MPX+ (C10–24) – Body ground	B	Communication signal	Communication circuit	–
MPX– (C10–25) – Body ground	GR	Communication signal	Communication circuit	–

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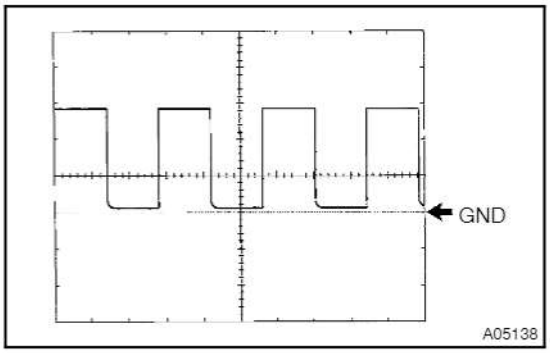
CHECK E/G (C10–26) – Body ground	G – Body ground	CHECK ENGINE signal	Power switch ON (ACC or IG) and CHECK ENGINE warning light ON → OFF	Below 1 V → 10 to 14 V
P–BELT LP (C10–30) – Body ground	Y – Body ground	Passenger seat belt signal	Power switch ON (ACC or IG) and sit on the passenger seat, seat belt unfastened → fastened	Below 1 V → 10 to 14 V
FUEL EARTH (C10–31) – Body ground	BR – Body ground	GND for fuel sender gauge	Always	Below 1 Ω
*1 Rr FOG (C10–32) – Body ground	BR – Body ground	FOG light signal	Power switch ON (ACC or IG) and Rr fog light OFF → Rr fog light ON	Below 1 V → 10 to 14 V

*1: Europe models



Waveform 1 (Reference):

Item	Contents
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h (12 mph)

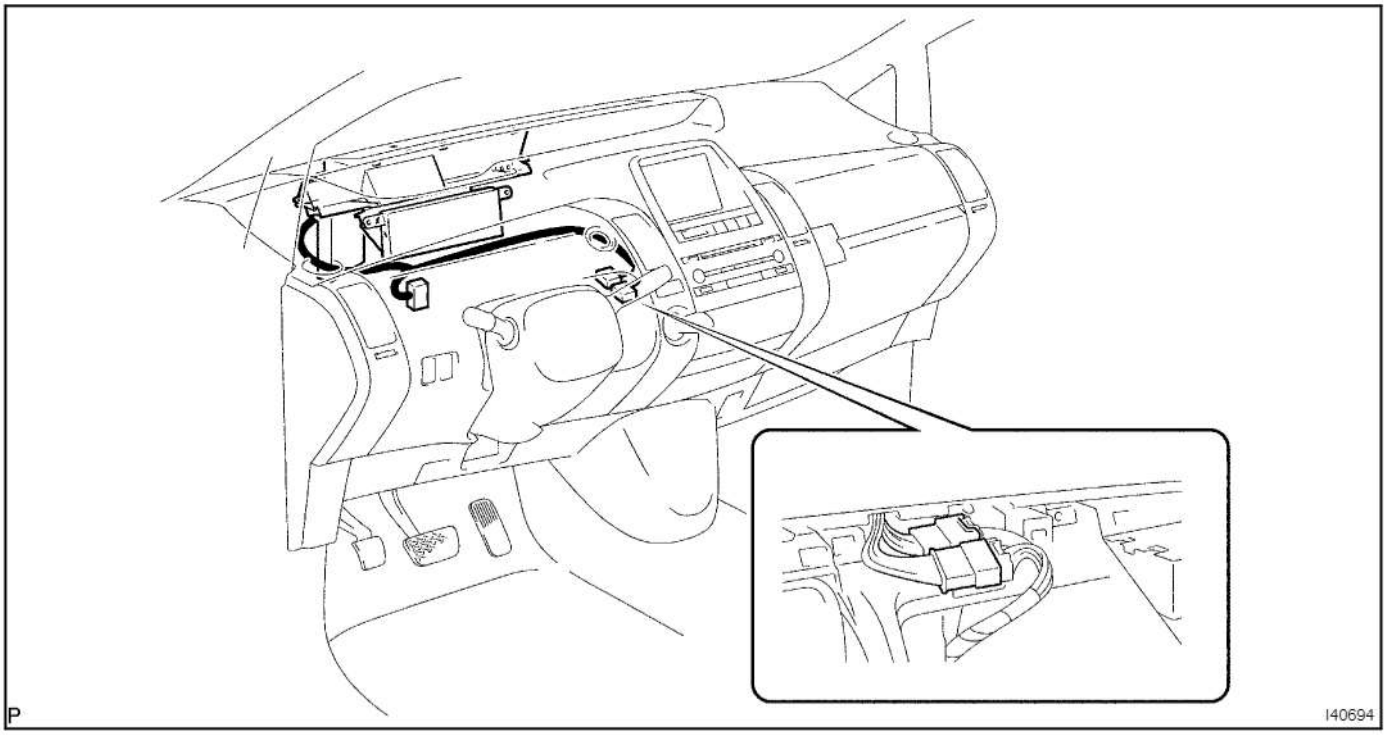


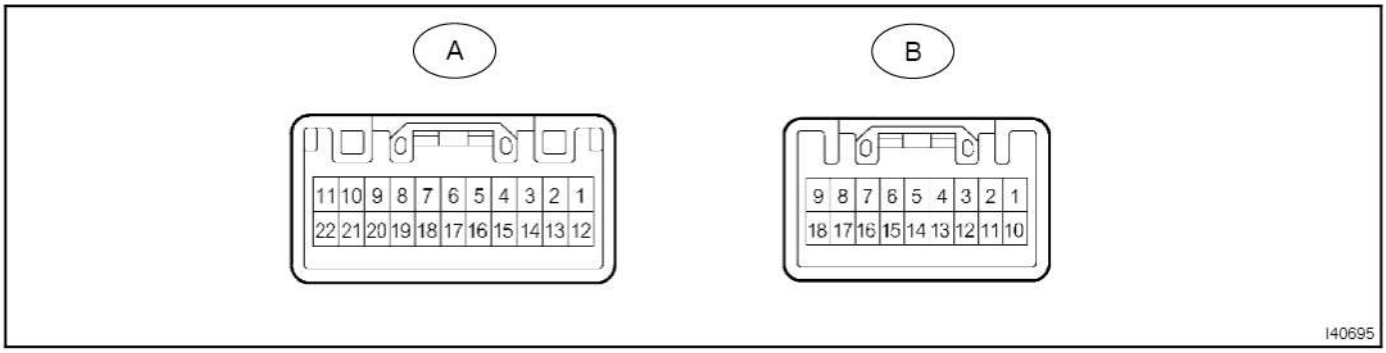
Waveform 2 (Reference):

Item	Contents
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Engine idle speed

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SUB WIRE HARNESS CONNECTOR:





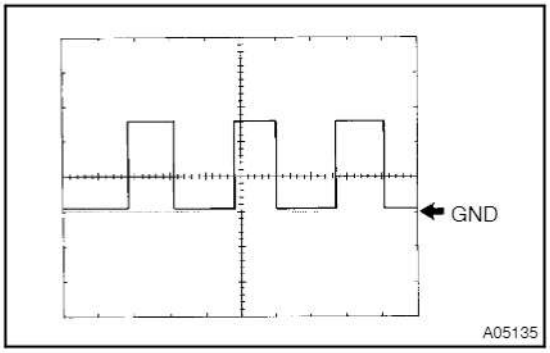
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SECURITY (A–1) – Body ground	R – Body ground	SECURITY signal	Key is inserted → Not inserted	Below 1 V ⇔ 10 to 14 V → Below 1 V
MPX+ (A–2) – Body ground	B	Communication signal	Communication circuit	–
D–BELT SW (A–3) – Body ground	LG – Body ground	Driver seat belt condition	D–BELT indicator light ON → OFF	Below 1 V → 10 to 14 V
SIGNAL EARTH (A–4) – Body ground	BR – Body ground	GND signal	Always	Below 1 Ω
TRIP EARTH(A–5) – Body ground	B – Body ground	GND signal FOR ODO/ TRIP SWITCH	Always	Below 1 Ω
km/h or mph (A–6) – Body ground	L – Body ground	km/h or mph signal	Power switch ON (ACC or IG) and km/h or mph switch ON → OFF	Below 1 V → 4 to 5.5 V
IG2 (A–7) – Body ground	O – Body ground	Power switch signal	Power switch OFF → ON	10 to 14 V
ODO/TRIP/RESET (A–8) – Body ground	R – Body ground	ODO/TRIP/RESET signal	ODO/TRIP/RESET switch ON → OFF	Below 1 V → 4 to 5.5 V
SPEED IN (A–9) – Body ground	V – Body ground	Speed signal (Input)	Power switch ON (ACC or IG) and turn the wheel slowly	Pulse generation (See waveform 1)

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CHECK E/G (A–10) – Body ground	G – Body ground	CHECK ENGINE signal	Power switch ON (ACC or IG) and CHECK ENGINE warning light ON → OFF	Below 1 V → 10 to 14 V
TURN L (A–11) – Body ground	Y – Body ground	Turn signal left	Turn signal LH indicator light OFF → ON	Below 1 V → 10 to 14 V
TURN R (A–12) – Body ground	G – Body ground	Turn signal right	Turn signal RH indicator light OFF → ON	Below 1 V → 10 to 14 V
*1 IG2 (A–13) – Body ground	V – Body ground	Power switch signal	Power switch OFF → ON	Below 1 V → 10 to 14 V
*2 BACK–UP LP (A–13) – Body ground	P – Body ground	BACK–UP light signal	Power switch ON (ACC or IG) and Shift is except R position → Shift is R position	Below 1 V → 10 to 14 V
AIRBAG (A–14) – Body ground	B – Body ground	AIRBAG signal	AIRBAG indicator light ON → OFF	Below 1 V → 8 to 14 V
*1 MPX– (B–1) – Body ground	GR	Communication signal	Communication circuit	–
*1 P–BELT SW (B–2) – Body ground	R – Body ground	Passenger seat belt condition	P–BELT indicator light ON → OFF	Below 1 V → 10 to 14 V
*2 MPX– (B–3) – Body ground	GR	Communication signal	Communication circuit	–
*1 AUTO LVL (B–3) – Body ground	L – Body ground	Headlight automatic leveling signal	Malfunction in headlight leveling System is normally → Malfunction	Below 1 V → 10 to 14 V
*2 P–BELT SW (B–4) – Body ground	R – Body ground	Passenger seat belt condition	P–BELT indicator light ON → OFF	Below 1 V → 10 to 14 V
*2 AUTO LVL (B–5) – Body ground	L – Body ground	Headlight automatic leveling signal	Malfunction in headlight leveling System is normally → Malfunction	Below 1 V → 10 to 14 V
*1 +B (B–7) – Body ground	Y – Body ground	Power switch signal	Always	10 to 14 V
*1 FUEL IN (B–8) – Body ground	B – Body ground	Fuel signal	Power switch ON (ACC or IG) and fuel level is FULL → EMPTY	4.0 Ω → 110 Ω
*2 +B (B–9) – Body ground	Y – Body ground	Power switch signal	Always	10 to 14 V
*1 FUEL EARTH (B–9) – Body ground	BR – Body ground	GND for fuel sender gauge	Always	Below 1 Ω
*1 4P OUT (B–10) – Body ground	V – Body ground	Tachometer signal (Output)	Power switch ON (ACC or IG) and turn the wheel slowly	Pulse generation (See waveform 2)
*1 BACK–UP LP (B–11) – Body ground	P – Body ground	BACK–UP light signal	Power switch ON (ACC or IG) and Shift is except R position → Shift is R position	Below 1 V → 10 to 14 V
*3 Rr FOG (B–12) – Body ground	BR – Body ground	FOG light signal	Power switch ON (ACC or IG) and Rr fog light OFF → Rr fog light ON	Below 1 V → 10 to 14 V
*2 FUEL IN (B–12) – Body ground	B – Body ground	Fuel signal	Power switch ON (ACC or IG) and fuel level is FULL → EMPTY	4.0 Ω → 110 Ω
*2 FUEL EARTH (B–13) – Body ground	BR – Body ground	GND for fuel sender gauge	Always	Below 1 Ω
*2 4P OUT (B–14) – Body ground	V – Body ground	Tachometer signal (Output)	Power switch ON (ACC or IG) and turn the wheel slowly	Pulse generation (See waveform 2)

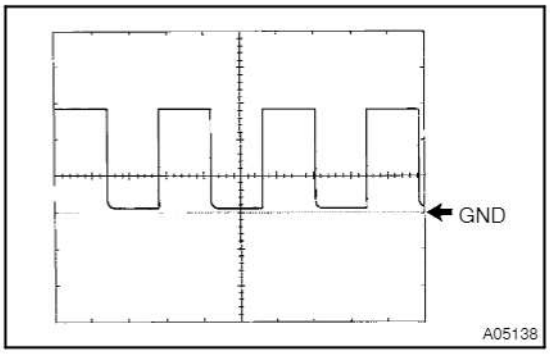
*1: RHD models
*2: LHD models
*3: Europe models

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Waveform 1 (Reference):

Item	Contents
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h (12 mph)

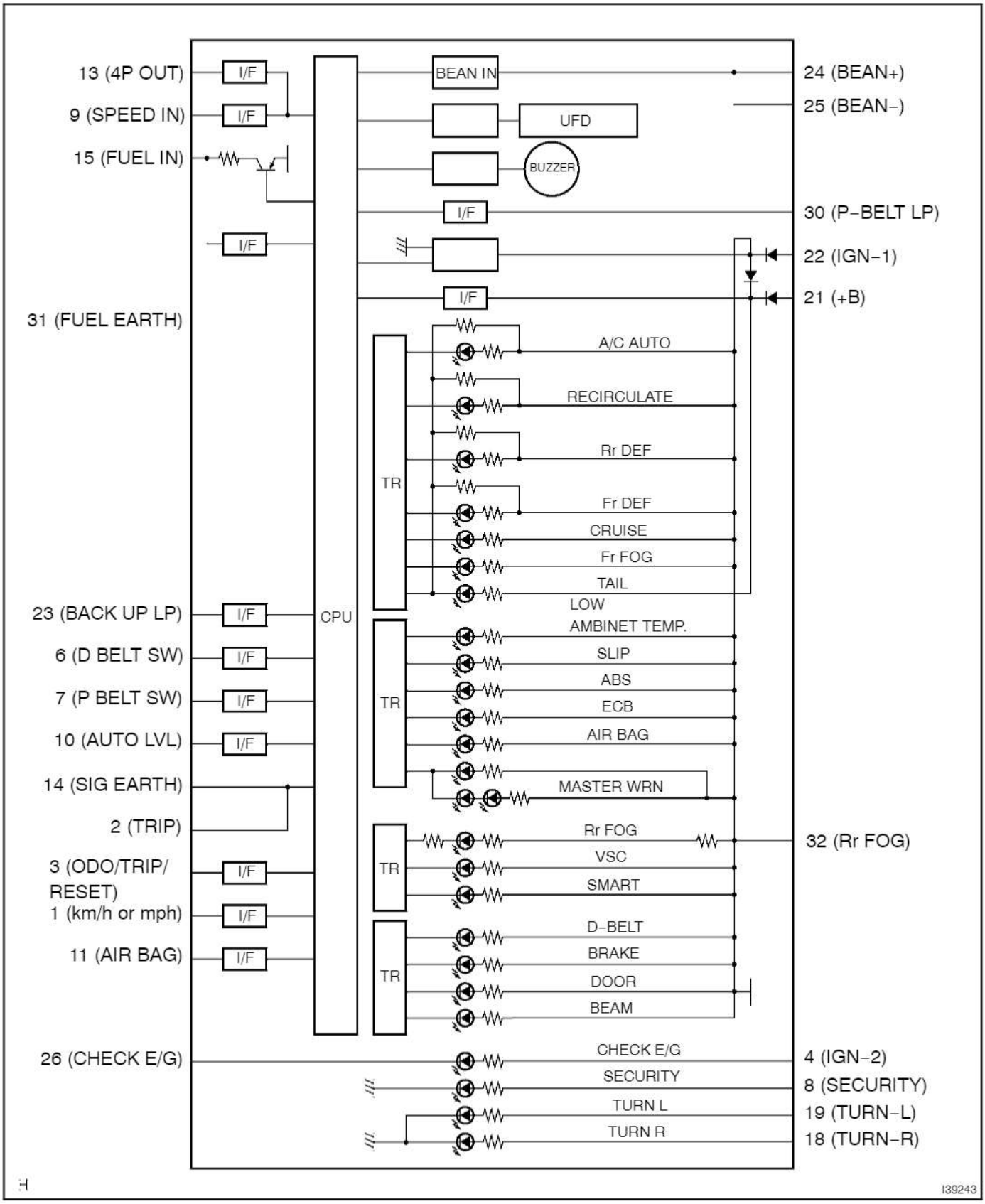


Waveform 2 (Reference):

Item	Contents
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Engine idle speed

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COMBINATION METER INNER CIRCUIT

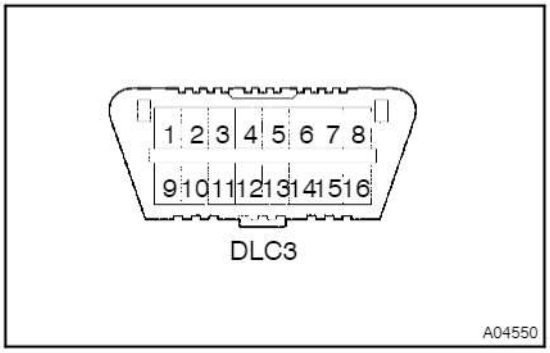


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Terminal No.		Wire harness side
C10	1	ODO/TRIP Switch
	2	ODO/TRIP Switch
	3	ODO/TRIP Switch
	4	IGN Fuse
	5	–
	6	Front Seat Inner Belt Assy LH
	7	Front Seat Inner Belt Assy RH
	8	Security ECU
	9	Skid Control ECU
	10	Headlight Beam Level Control ECU
	11	Airbag Control Assy Center
	12	–
	13	4P OUT
	14	GND
	15	Fuel Sender Gauge Assy
	16	–
	17	–
	18	Flasher Relay
	19	Flasher Relay
	20	–
	21	DOME Fuse
	22	GAUGE Fuse
	23	Back–up Light Relay
	24	Smart Key ECU
	25	Ignition Control ECU
	26	ECM
	27	–
	28	–
	29	–
	30	Passenger Seat Belt Warning Light
	31	Fuel Sender Gauge Assy
	32	*1 Rr Fog Relay

*1: Europe models

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05IAS–01

DIAGNOSIS SYSTEM

INSPECT THE DLC3

(a) The vehicle's c mbination meter (ECU) uses CAN and the ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 9141–2/ISO 14230 format.

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

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the intelligent tester II to the DLC3, turned the power switch ON (ACC or IG) position and operated the scan tool, there is a problem either on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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05IAT-01

DATA LIST/ACTIVE TEST

1. DATA LIST

DATA LIST

According to the DATA LIST displayed by the intelligent tester II, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten work time.

(a) Warm up the engine.
(b) Turn the power switch to OFF.
(c) Connect the intelligent tester II to DLC3.
(d) Turn the power switch to ON (IG).
(e) Operate the intelligent tester II according to the steps on the display and select "DATA LIST".

ECM:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
VEHICLE SPEED	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost the same as the actual vehicle speed (When driving)	–
ENGINE SPD	Engine speed / Min.: 0 rpm, Max.: 16,383 rpm	Almost the same as the actual engine speed (When engine is running)	–
COOLANT TEMP	Coolant temperature / Min.: –40°C (–40°F), Max.: 140°C (284°F)	After warming up: 80 to 95°C (176 to 203°F)	If the value is "–40°C (–40°F)" or "140°C (284°F)", sensor circuit is open or shorted.

ABS:

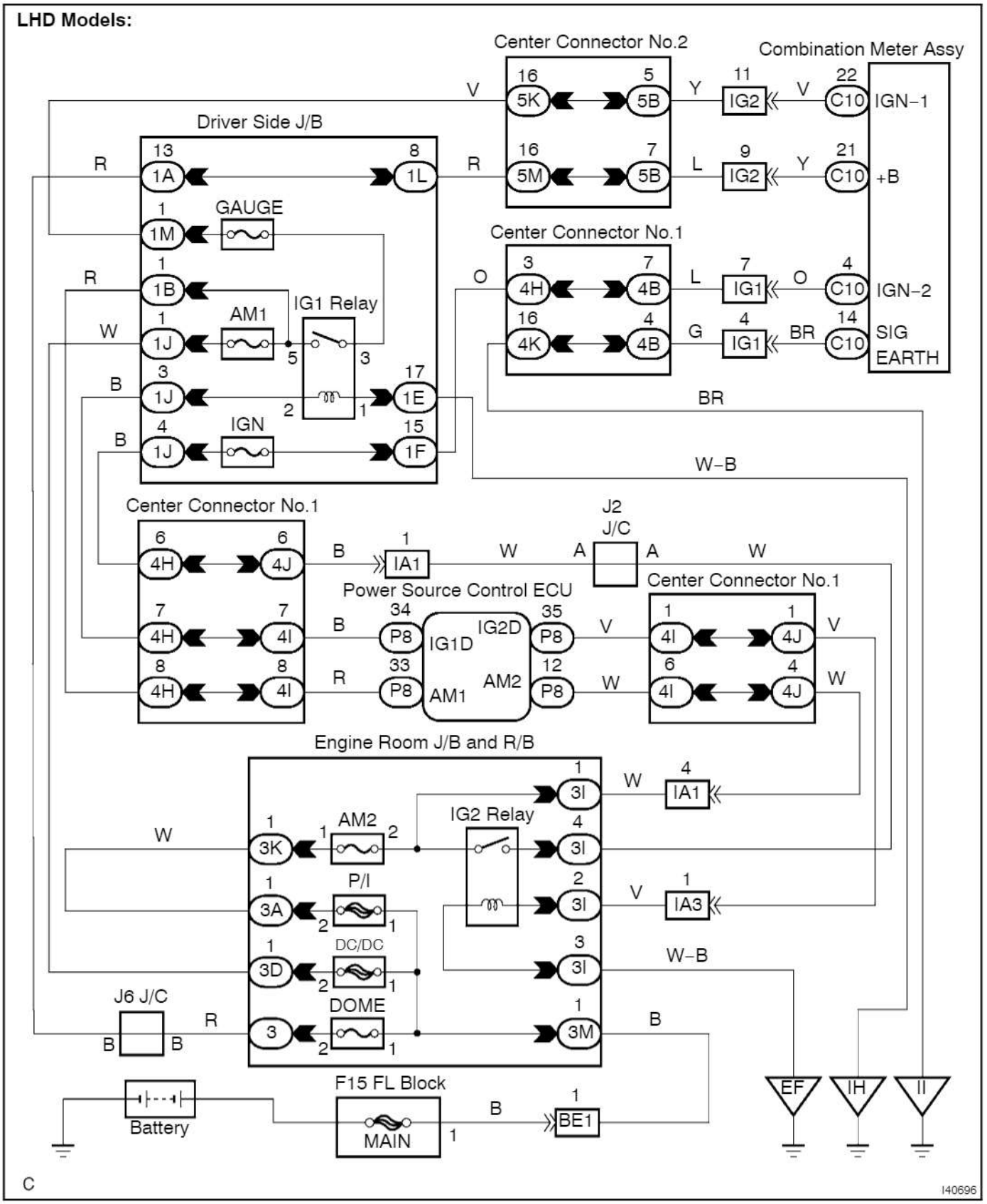
Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
(FR/FL/RR/RL) SPD	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual speed (When driving)	–

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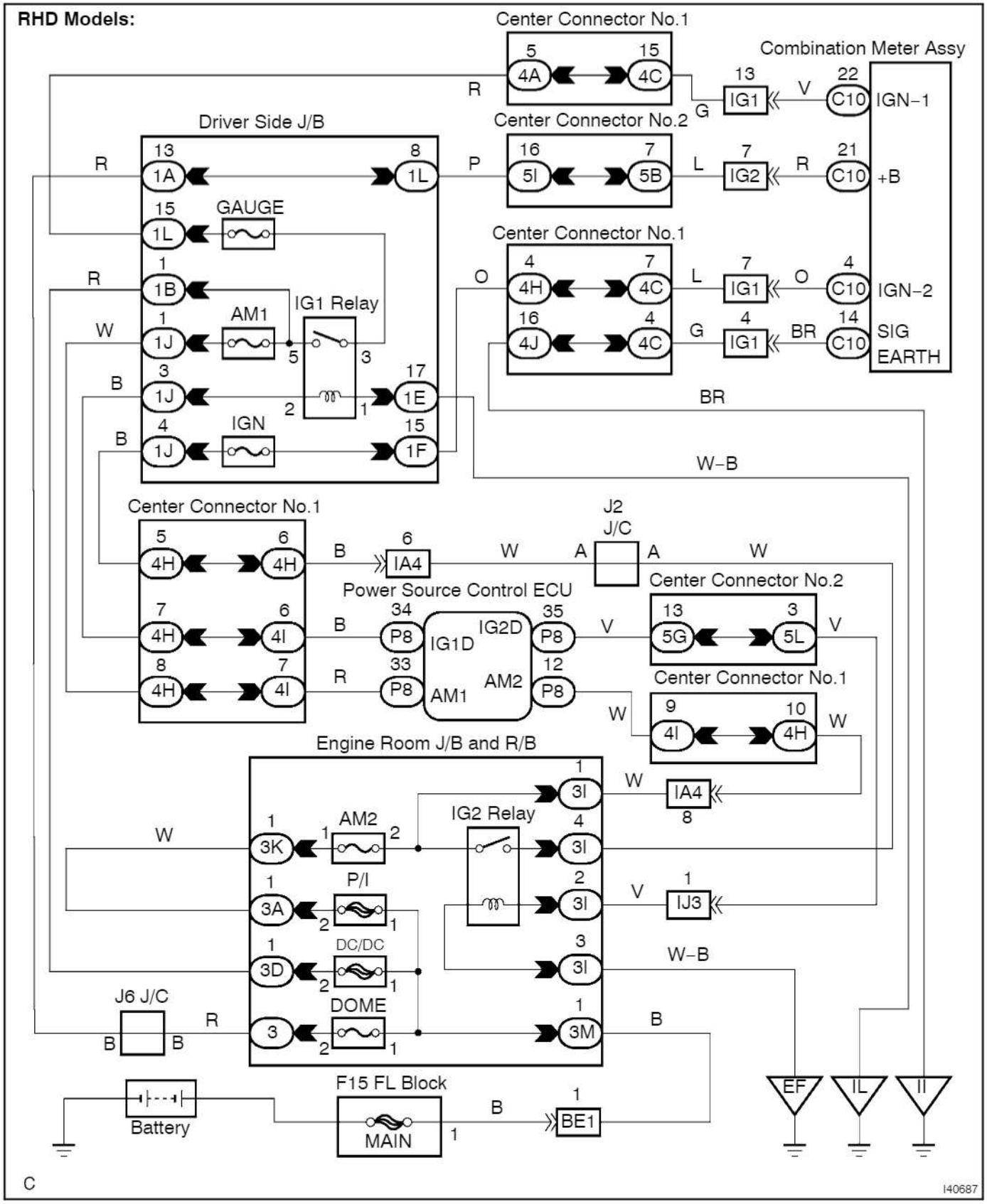
ENTIRE COMBINATION METER DOES NOT OPERATE

WIRING DIAGRAM

LHD Models:



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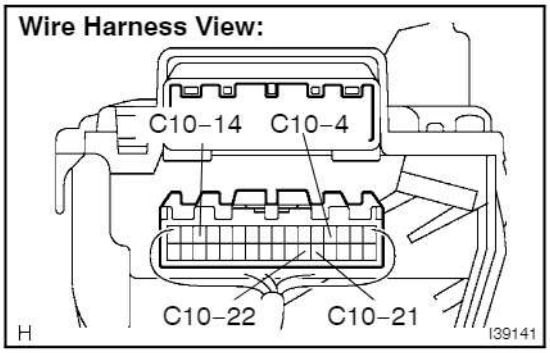


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INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSY

Wire Harness View:



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

Standard:

Terminal No	Condition	Specified condition
C10–14 – Body ground	Always	Below 1 Ω

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

Standard:

Terminal No	Condition	Specified condition
C10–21 – Body ground	Always	10 to 14 V
C10–4, 22 – Body ground	Power switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

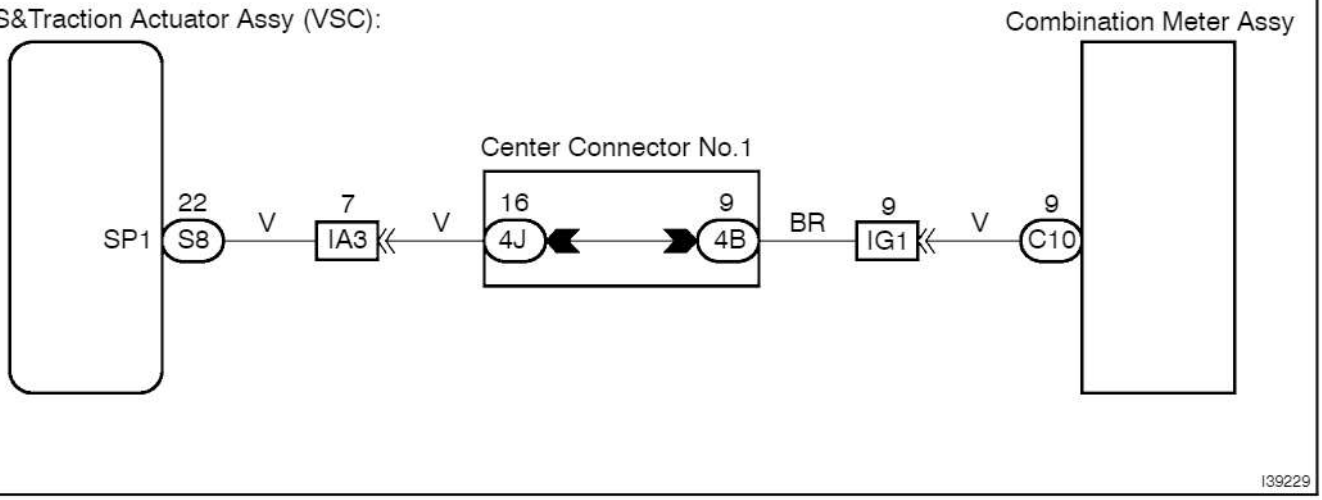
REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

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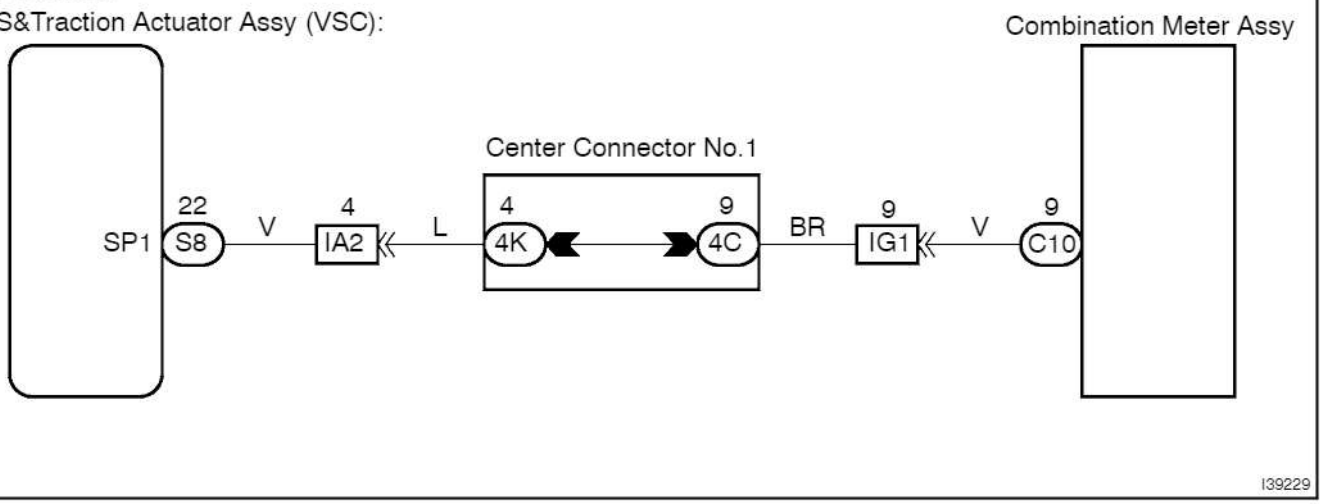
MALFUNCTION IN SPEEDOMETER

WIRING DIAGRAM

LHD Models:



RHD Models:



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II(VEHICLE SPEED SIGNAL)

(a) Operate the intelligent tester II according to the steps on the display and select the "DATA LIST".

ABS:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
(FR/FL/RR/RL) SPD	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual speed (When driving)	–

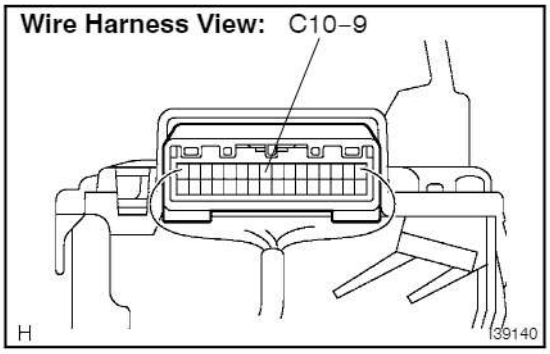
OK:

Vehicle speed displayed on the tester is almost the same as the actual vehicle speed.

NG → **GO TO BRAKE CONTROL SYSTEM (SEE PAGE 05–715)**

OK

2	INSPECT COMBINATION METER ASSY

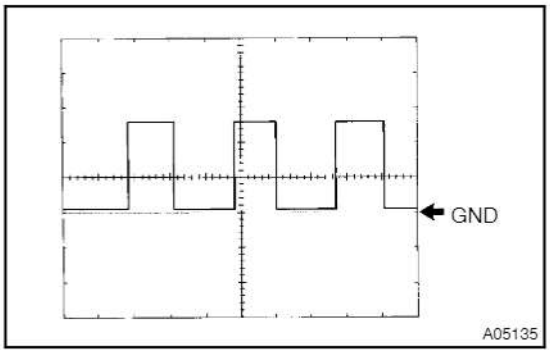


INSPECTION USING OSCILLOSCOPE

(a) Check the input signal waveform.

(1) Remove the combination meter assy.

(2) Connect the oscilloscope to the terminals C10–9 and body ground.



(3) Check the signal waveform according to the condition (s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h (12 mph)

OK:

As shown in the illustration

HINT:

As vehicle speed increases, the cycle of the signal waveform narrows.

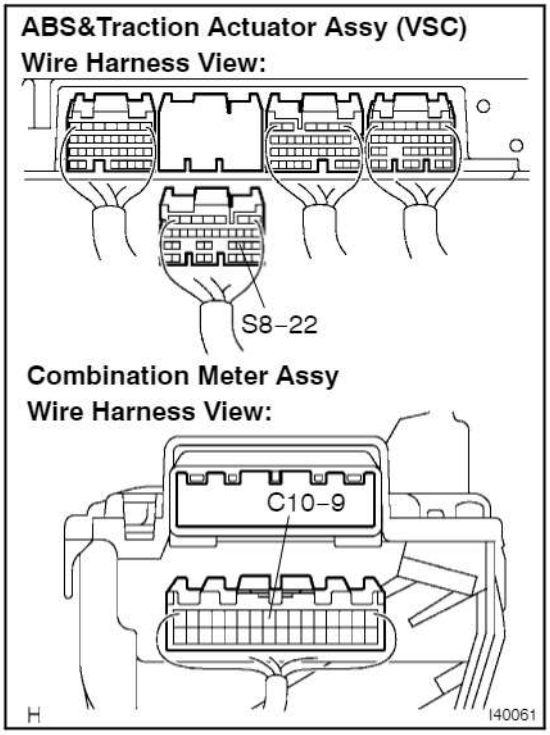
NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

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3	CHECK HARNESS AND CONNECTOR(ABS&TRACTION ACTUATOR ASSY(VSC) – COMBINATION METER ASSY)(SEE PAGE 01–36)



(a) Disconnect the C10 and S8 connectors.
(b) Measure the resistance according to the value(s) in the table below.

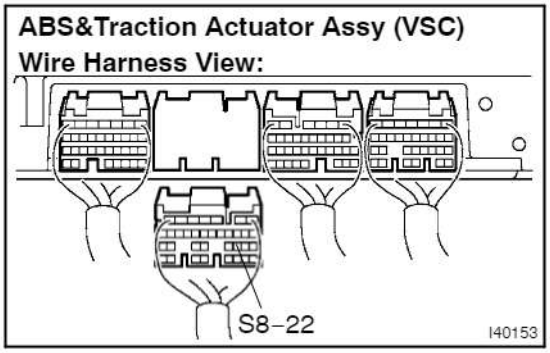
Standard:

Tester Connection	Condition	Specified Condition
C10–9 – S8–22	Always	Below 1 Ω
C10–9 – Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4	INSPECT ABS&TRACTION ACTUATOR ASSY(VSC)



(a) Disconnect the S8 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
S8–22 – Body ground	Power switch ON (IG)	10 to 14 V

NG → REPLACE COMBINATION METER ASSY (SEE PAGE 71–19)

OK

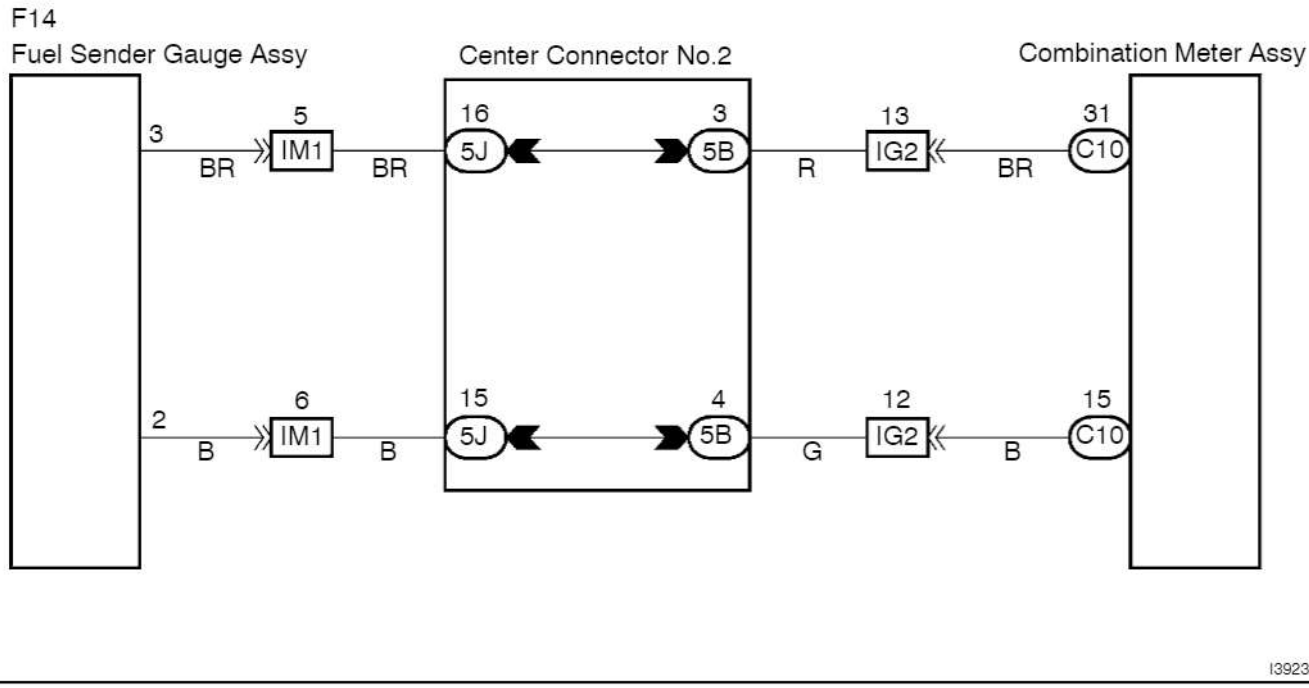
GO TO BRAKE CONTROL SYSTEM(SEE PAGE 05–715)

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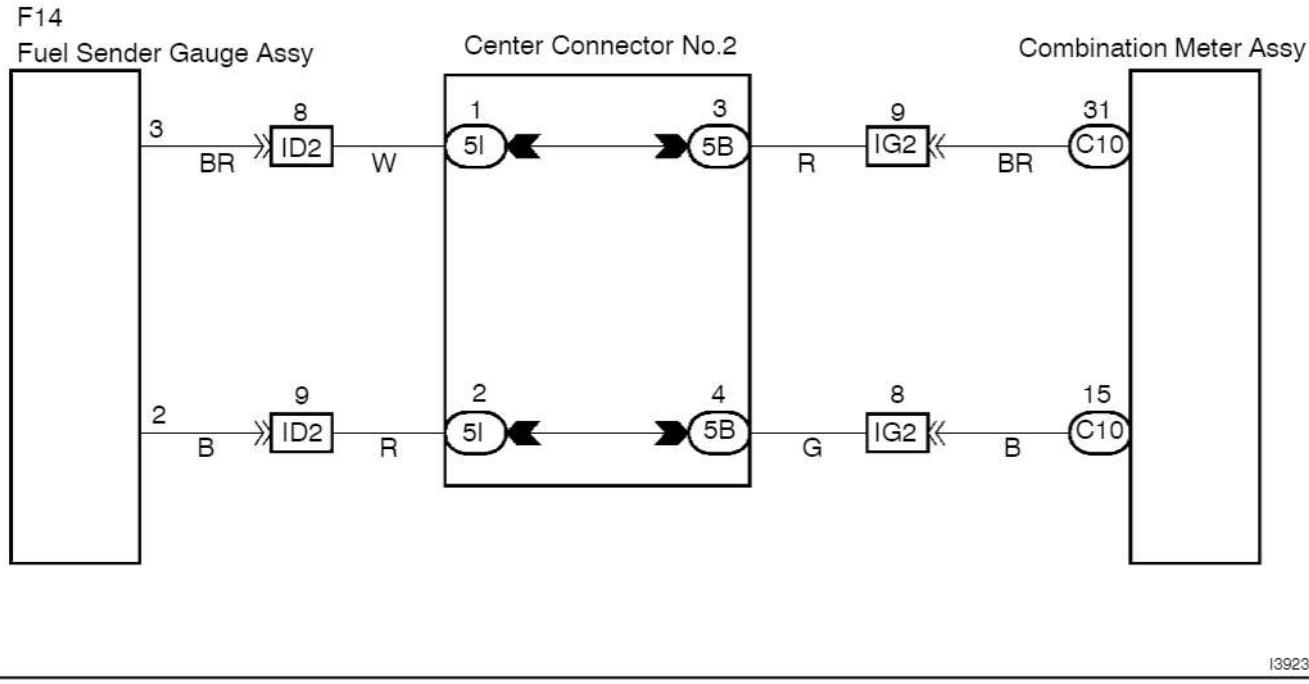
MALFUNCTION IN FUEL RECEIVER GAUGE

WIRING DIAGRAM

LHD Models:



RHD Models:

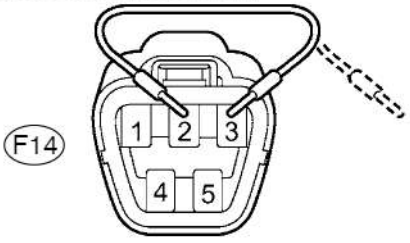


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INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR

Fuel Sender Gauge
Connector Front View:



(a) Disconnect the fuel sender gauge connector.
(b) Check the needle indications according to the table below.

Standard:

Wire Connection	Condition	Specified Condition
2 to 3	Short circuit (Power switch ON (ACC or IG))	Fuel gauge indicates "F"
2 to 3	Open circuit (Power switch ON (ACC or IG))	Fuel gauge indicates "EMPTY"

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

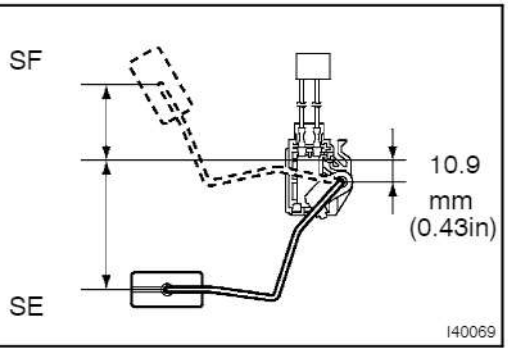
Standard:

Tester Connection	Condition	Specified Condition
F14–2 – Body ground	Power switch ON (IG)	4 to 7 V

NG → **Go to step 3**

OK

2 INSPECT FUEL SENDER GAUGE

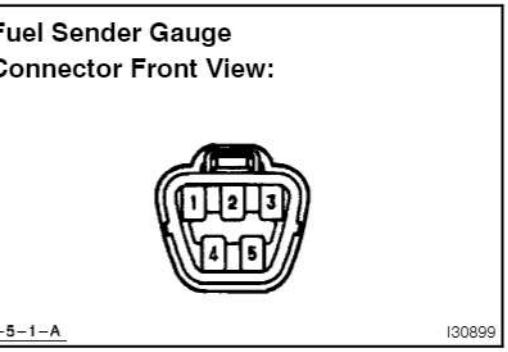


(a) Remove the fuel sender gauge assy.
(b) Check that the float position is between E and F.
(c) Measure the voltage between teminals 2 and 3 of the connector according to the value(s) in the table below.

Standard:

Float level	Float position mm (in.)	Resistance (Ω)
SF	38.7 (1.52) ± 2.5 (0.10)	4.0 ± 1
SE	69.6 (2.74) ± 2.5 (0.10)	110.0 ± 2.5

Fuel Sender Gauge
Connector Front View:



NG → **REPLACE FUEL SENDER GAUGE**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

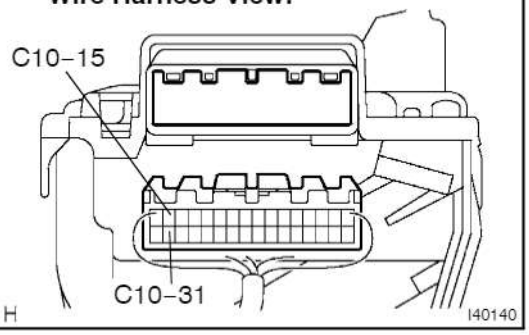
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3	CHECK HARNESS AND CONNECTOR(BETWEEN FUEL SENDER GAUGE ASSY AND COMBIATION METER ASSY)(SEE PAGE 01–36)

Fuel Sender Gauge Wire Harness View:



Combination Meter Assy Wire Harness View:



(a) Disconnect the C10 and F14 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–31 – F14–3	Always	Below 1 Ω
C10–15 – F14–2	Always	Below 1 Ω
C10–15 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

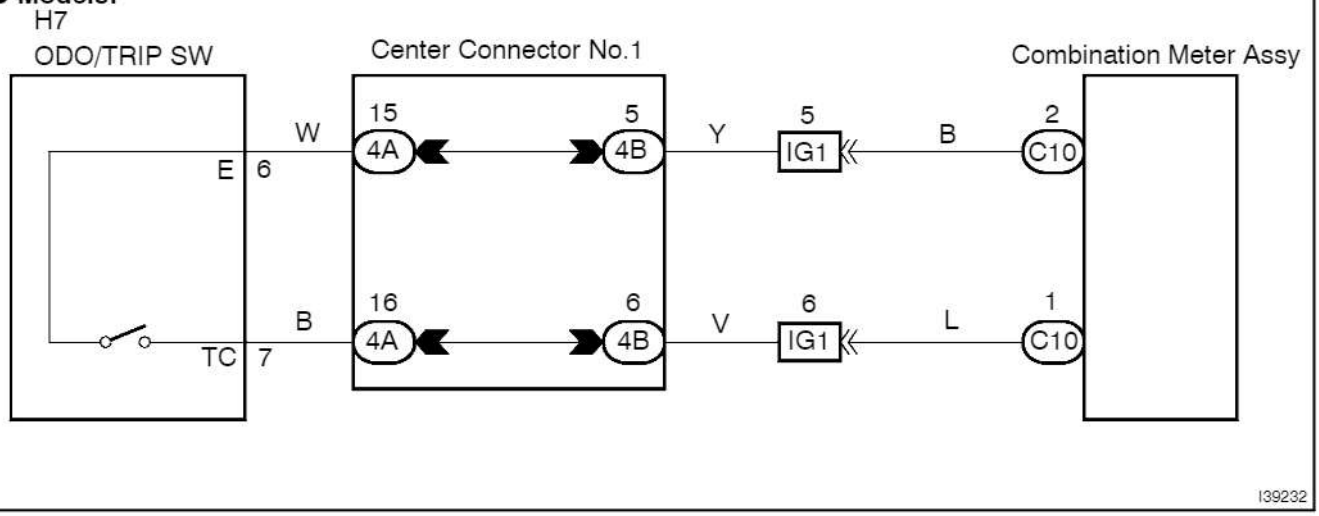
REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

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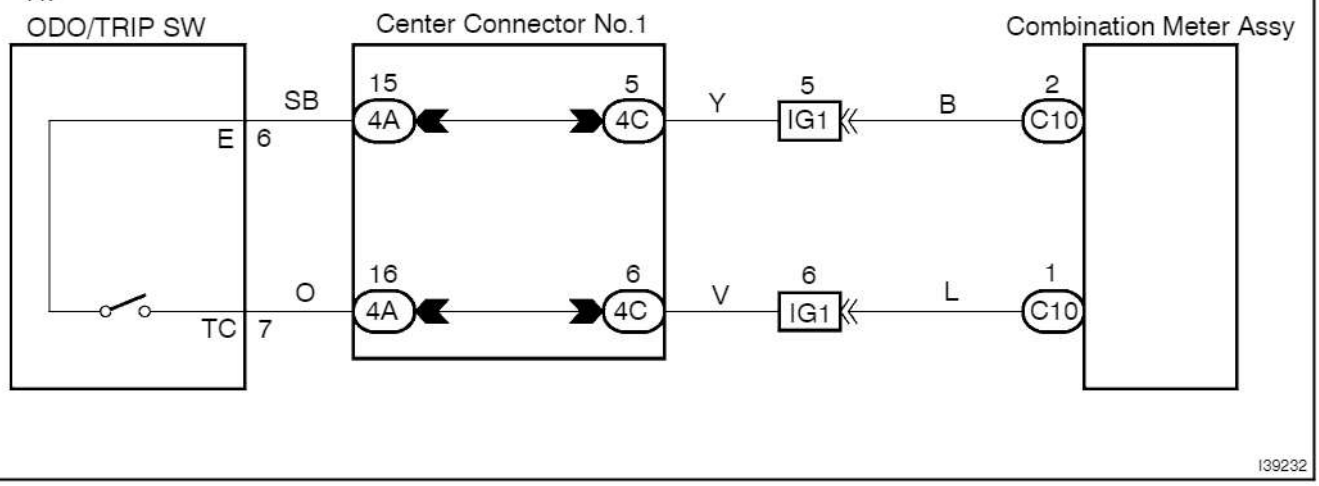
OPERATING LIGHT CONTROL RHEOSTAT DOES NOT CHANGE LIGHT BRIGHTNESS

WIRING DIAGRAM

LHD Models:



RHD Models:

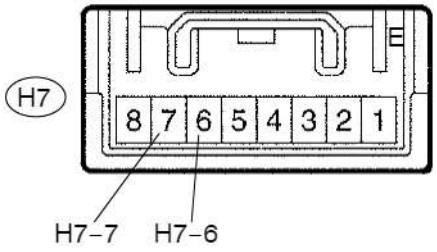


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INSPECTION PROCEDURE

1	INSPECT ODO/TRIP SWITCH

ODO/TRIP Switch
Connector Front View:



(a) Disconnect the H7 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

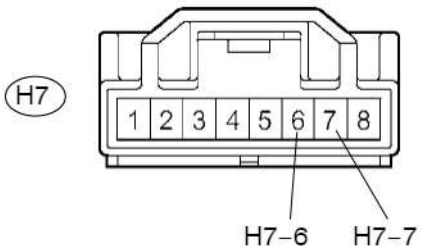
Terminal No	Condition	Specified condition
6 – 7	Push light control rheostat SW	Below 1 Ω
6 – 7	Release light control rheostat SW	10 Ω or higher

NG → **REPLACE ODO/TRIP SWITCH**

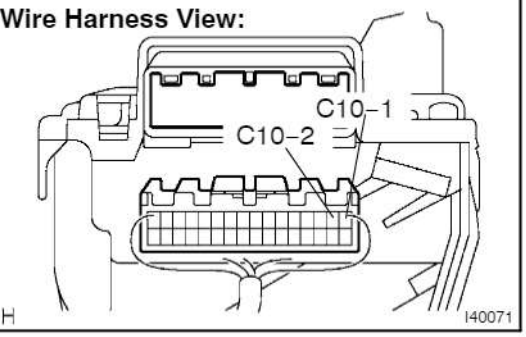
OK

2	CHECK HARNESS AND CONNECTOR(ODO/TRIP SWITCH – COMBIATION METER ASSY)(SEE PAGE 01–36)

ODO/TRIP Switch Wire Harness View:



Combination Meter Assy Wire Harness View:



(a) Disconnect the C10 and H7 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–2 – H7–6	Always	Below 1 Ω
C10–1 – H7–7	Always	Below 1 Ω
C10–1 – Body ground	Always	10 kΩ or higher
C10–2 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

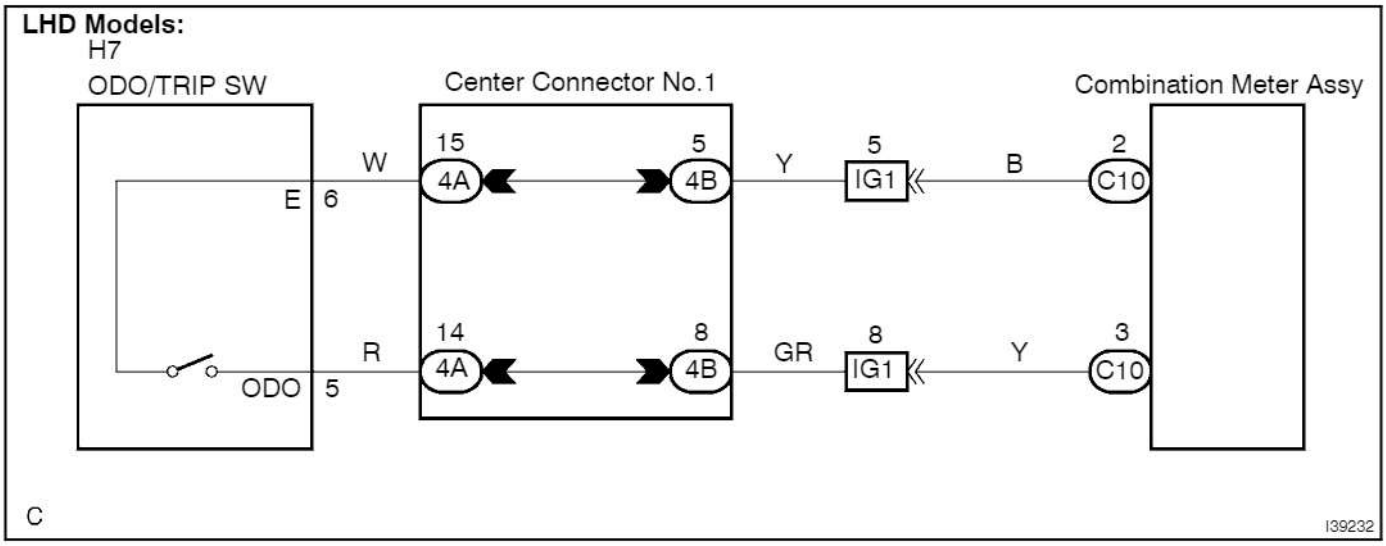
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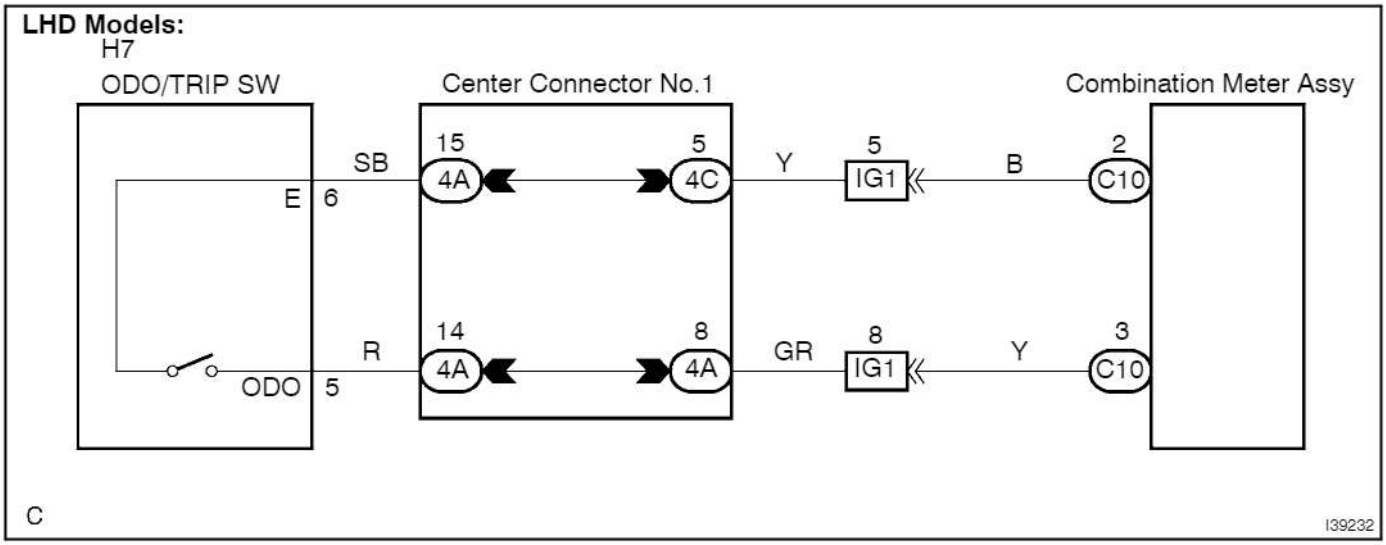
REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

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MALFUNCTION IN ODO/TRIP SW

WIRING DIAGRAM



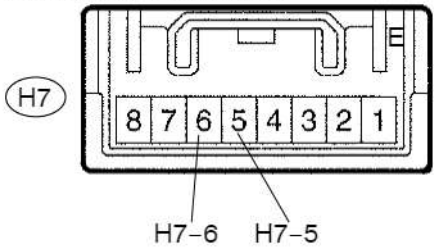


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INSPECTION PROCEDURE

1	INSPECT ODO/TRIP SWITCH

ODO/TRIP Switch
Connector Front View:



(a) Disconnect the H7 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

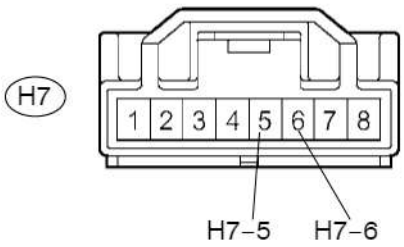
Terminal No	Condition	Specified condition
5 – 6	Push ODO/TRIP SW	Below 1 Ω
5 – 6	Release ODO/TRIP SW	10 Ω or higher

NG → **REPLACE ODO/TRIP SWITCH**

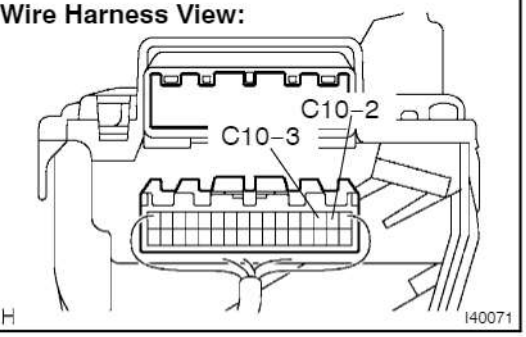
OK

2	CHECK HARNESS AND CONNECTOR(ODO/TRIP SWITCH – COMBIATION METER ASSY)(SEE PAGE 01–36)

ODO/TRIP Switch Wire Harness View:



Combination Meter Assy Wire Harness View:



(a) Disconnect the C10 and H7 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–2 – H7–6	Always	Below 1 Ω
C10–3 – H7–5	Always	Below 1 Ω
C10–2 – Body ground	Always	10 kΩ or higher
C10–3 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

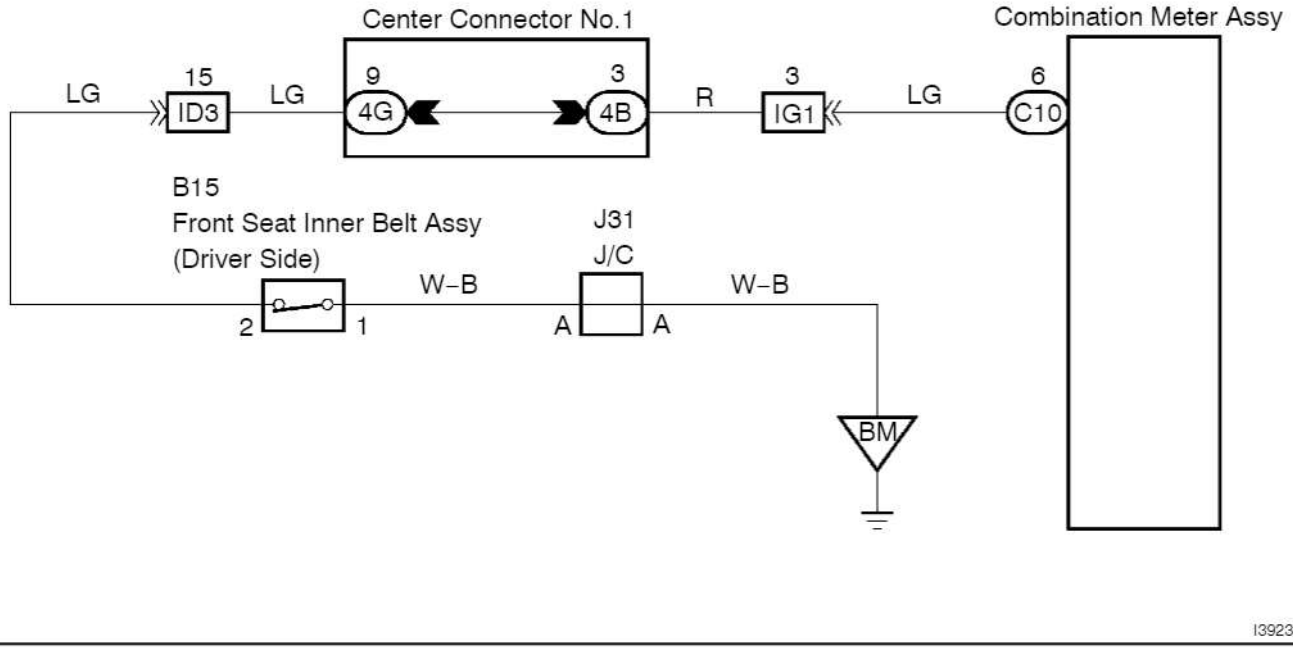
REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

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SEAT BELT WARNING LAMP FOR DRIVER'S SEAT DOES NOT OPERATE

WIRING DIAGRAM

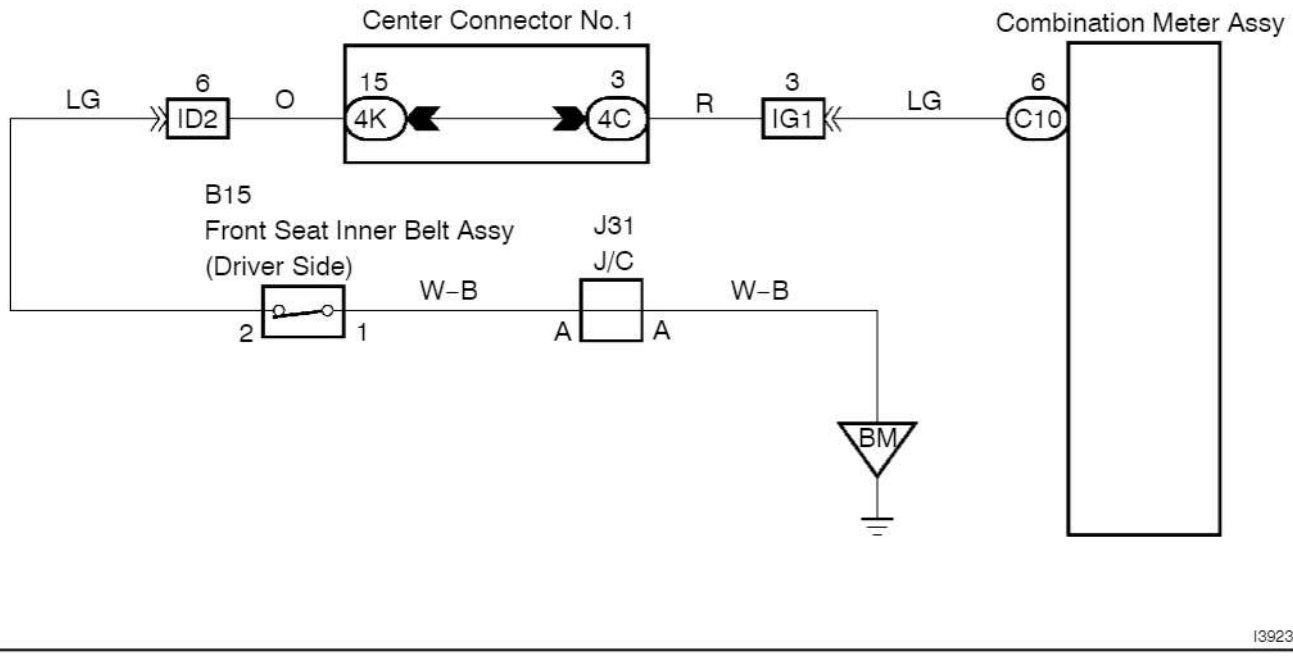
LHD Models:



C

I39234

RHD Models:



C

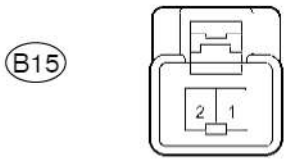
I39234

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INSPECTION PROCEDURE

1	INSPECT FRONT SEAT INNER BELT ASSY(DRIVER SIDE)

Front Seat Inner Belt Assy (Driver Side)
Conector Front View:



I40072

(a) Disconnect the connector from the front seat inner belt assy (Driver Side).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

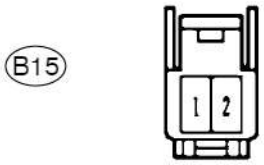
Terminal No	Condition	Specified condition
B15–1 – B15–2	Seat belt is fastened	10 kΩ or higher
B15–1 – B15–2	Seat belt is unfastened	Below 1 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSY (DRIVER SIDE)**

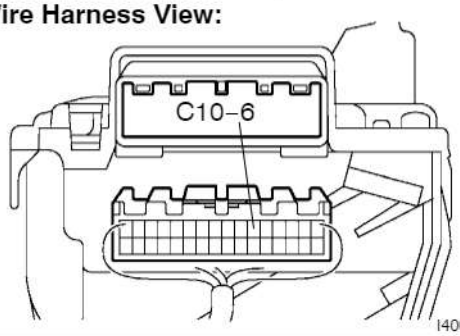
OK

2	CHECK HARNESS AND CONNECTOR(FRONT SEAT INNER BELT ASSY – COMBIATION METER ASSY)(SEE PAGE 01–36)

Front Seat Inner Belt Assy (Driver Side)
Wire Harness View:



Combination Meter Assy
Wire Harness View:



I40074

(a) Disconnect the C10 and B15 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–6 – B15–2	Always	Below 1 Ω
B15–1 – Body ground	Always	Below 1 Ω
C10–6 – Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

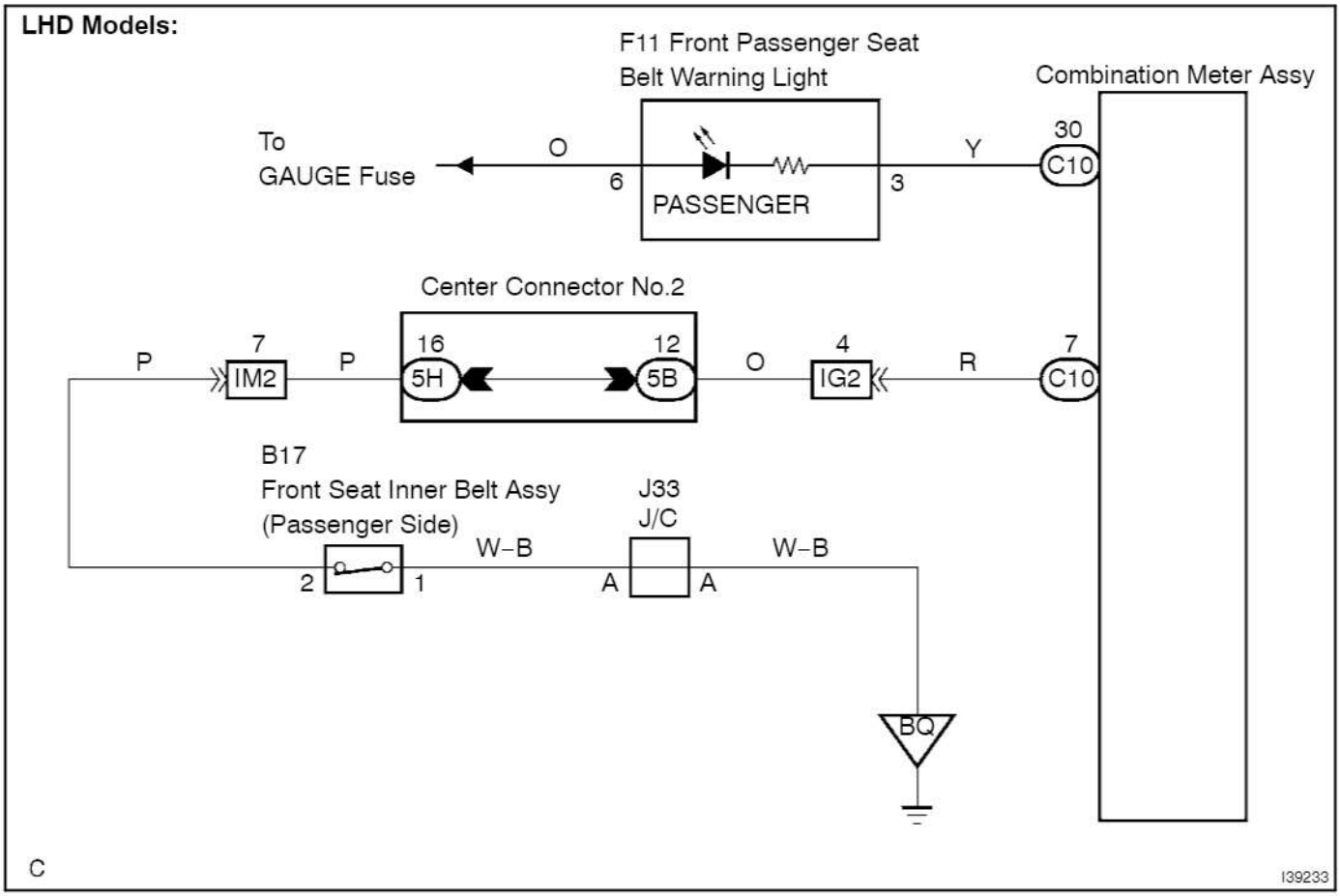
OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

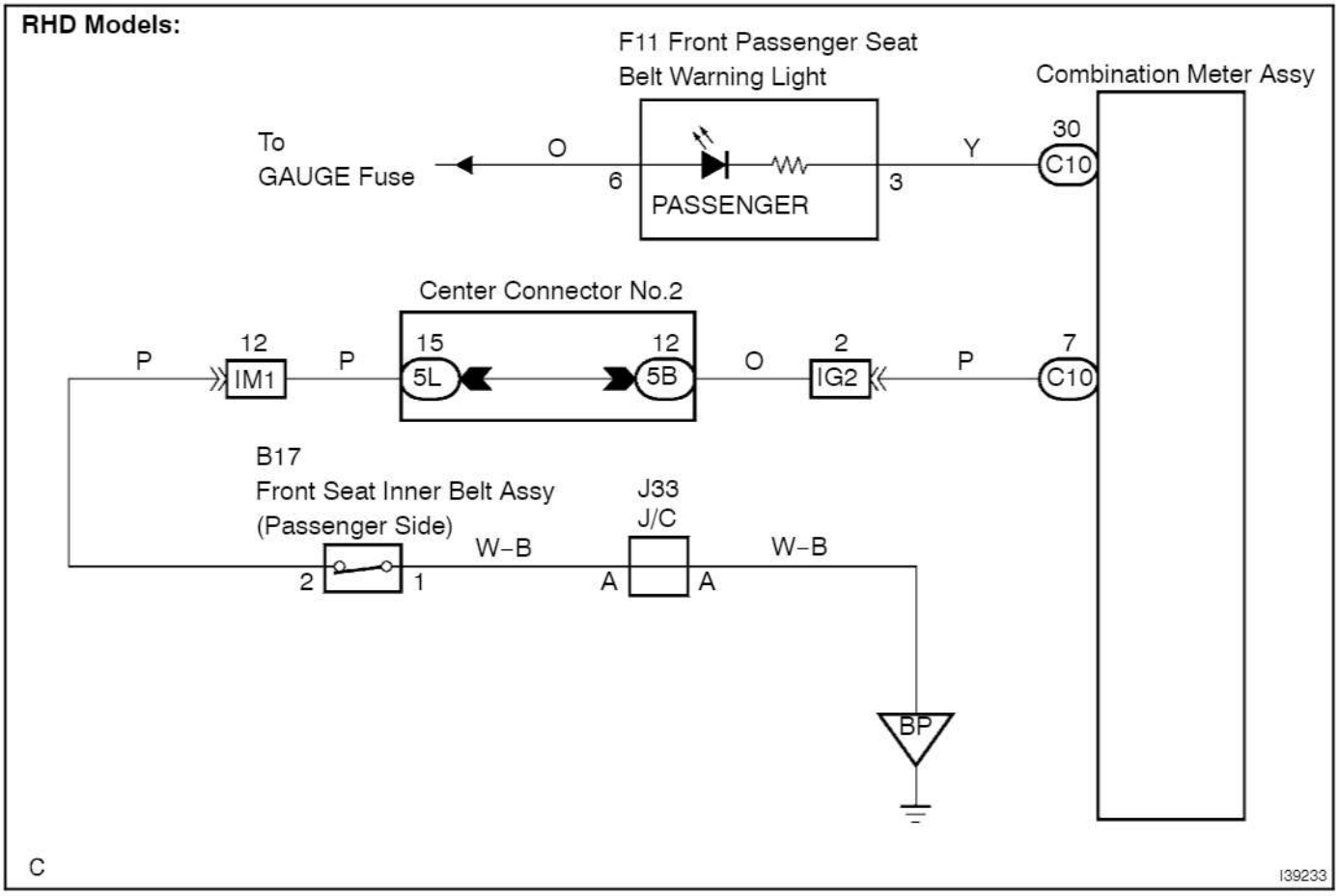
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SEAT BELT WARNING LAMP FOR PASSENGER'S SEAT DOES NOT OPERATE

WIRING DIAGRAM

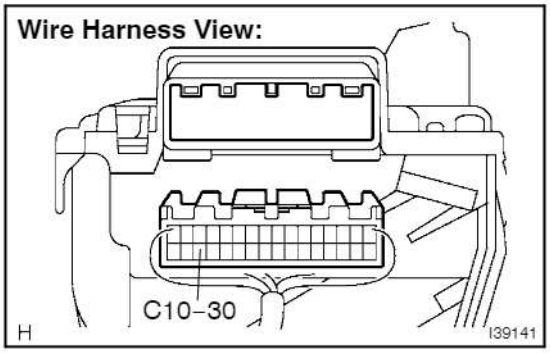


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INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSY



(a) Disconnect the C10 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–30 – Body ground	Power switch OFF → Power switch ON (ACC or IG)	Below 1 V → 10 to 14 V

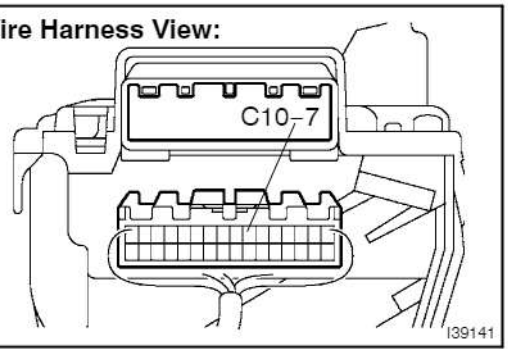
NG → **Go to step 5**

OK

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2 INSPECT COMBINATION METER ASSY

Wire Harness View:



(a) Disconnect the C10 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C10–7 – Body ground	Seat belt is unfastened	Below 1 Ω
C10–7 – Body ground	Seat belt is fastened	10 kΩ or higher

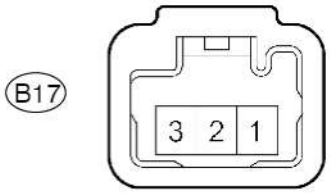
NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71–19)

3 INSPECT FRONT SEAT INNER BELT ASSY(PASSENGER SIDE)

Front Seat Inner Belt Assy (Passenger Side) Connector Front View:



(a) Disconnect the connector from the front seat inner belt assy (FR Passenger Side).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

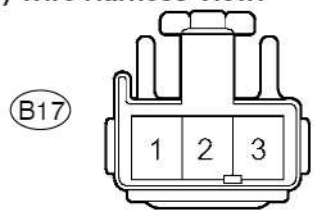
Terminal No	Condition	Specified condition
B17–1 – B17–2	Seat belt is fastened	10 kΩ or higher
B17–1 – B17–2	Seat belt is unfastened	Below 1 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSY (PASSENGER SIDE)**

OK

4 CHECK HARNESS AND CONNECTOR(FRONT SEAT INNER BELT ASSY – BODY GROUND)(SEE PAGE 01–36)

Front Seat Inner Belt Assy (Passenger Side) Wire Harness View:



(a) Disconnect the front seat inner belt assy connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Terminal No	Condition	Specified condition
B17–1 – Body groung	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR(FRONT SEAT INNER BELT ASSY – BODY GROUND)**

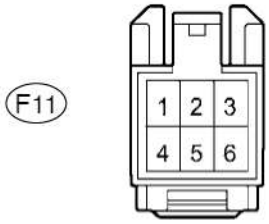
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR(FRONT SEAT INNER BELT ASSY – COMBINATION METER ASSY)

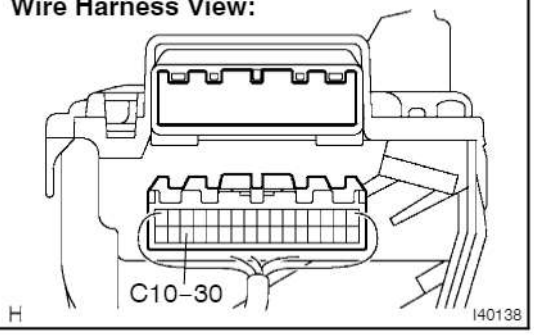
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5	CHECK HARNESS AND CONNECTOR(FRONT PASSENGER SEAT BELT WARNING – COMBINATION METER ASSY)(SEE PAGE 01–36)

Front Passenger Seat Belt Warning Wire Harness View:



Combination Meter Assy Wire Harness View:



(a) Disconnect the C10 and F11 connectors.

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

Standard:

Tester Connection	Condition	Specified Condition
C10–30 – F11–3	Always	Below 1 Ω
C10–30 – Body ground	Always	10 kΩ or higher

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

Standard:

Tester Connection	Condition	Specified Condition
F11–6 – Body ground	Power switch OFF → Power switch ON (ACC or IG)	Below 1 V → 10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE FRONT PASSENGER SEAT BELT WARNING LIGHT(SEE PAGE 61–7)

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05IC0–01

ON–VEHICLE INSPECTION

1. INSPECT SPEEDOMETER

(a) Check the operation.

(1) Using a speedometer tester, inspect the speedometer for acceptable indication error and check the operation of the odometer.

Reference: km/h

Standard indication	Acceptable range (*1)	Acceptable range (*2)
20 km/h	18.0 to 22.0 km/h	21.0 to 25.0 km/h
40 km/h	38.0 to 42.0 km/h	42.0 to 46.0 km/h
60 km/h	58.0 to 62.0 km/h	63.0 to 67.0 km/h
80 km/h	78.0 to 82.0 km/h	84.0 to 88.0 km/h
100 km/h	97.0 to 103.0 km/h	104.0 to 109.0 km/h
120 km/h	117.0 to 123.0 km/h	125.0 to 130.0 km/h
140 km/h	138.0 to 143.0 km/h	146.0 to 151.0 km/h
160 km/h	157.0 to 163.0 km/h	167.0 to 173.0 km/h

*1: General countries, Australia

*2: Except Europe RHD models

Reference: mph (Europe RHD models)

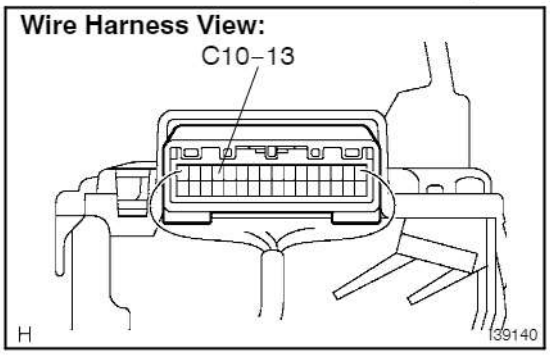
Standard indication	Acceptable range
20 mph	21.0 to 24.0 mph
40 mph	42.0 to 45.0 mph
60 mph	63.0 to 66.0 mph
80 mph	83.0 to 87.0 mph
100 mph	104.0 to 108.0 mph
120 mph	125.0 to 129.0 mph

NOTICE:

Tire wear and over or under tire pressure will affect indication error.

(1) Check the deflection width of the speedometer indicator.

Reference: Below 0.5 km/h (0.3 mph)



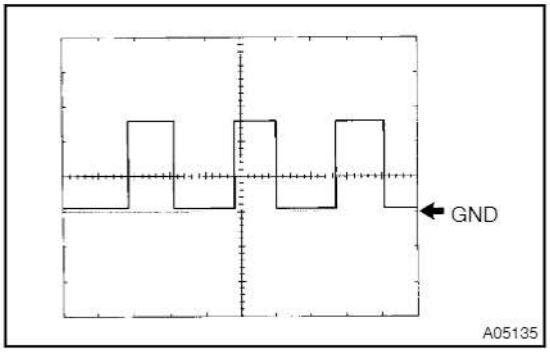
2. INSPECT OUTPUT SIGNAL OF VEHICLE SPEED

(a) Check the output signal waveform.

(1) Remove the combination meter assy.

(2) Connect the oscilloscope to the terminals C10–3 and body ground.

(3) Start the engine.



(4) Check the signal waveform according to the condition (s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h (12 mph)

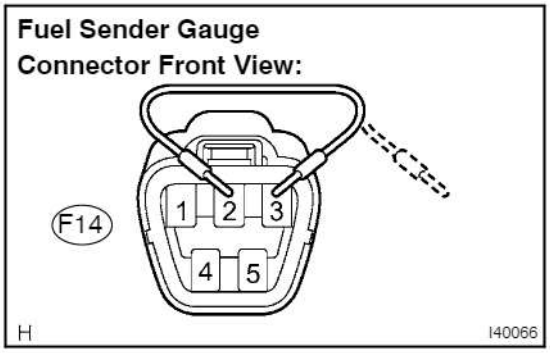
OK:

As shown in the illustration

HINT:

As vehicle speed increases, the cycle of the signal waveform narrows.

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3. INSPECT FUEL RECEIVER GAUGE

(a) Disconnect the connector from the sender gauge.

(b) Turn the power switch ON (IG) position, then check the position of the receiver gauge needle.

Standard:

Needle position is on (EMPTY).

(c) Connect terminals 2 and 3 on the wire harness side connector of the fuel sender gauge.

(d) Turn the power switch to the ON position, then check the position of the receiver gauge needle.

Standard:

Needle position is on (FULL).

4. INSPECT FUEL LEVEL WARNING

(a) Disconnect the connector from the sender gauge.

(b) Turn the power switch ON (IG) position, then check that the fuel level indicates EMPTY and the fuel level warning light comes on.

Standard:

EMPTY (The No.1 segment blinks).

5. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the low oil pressure switch.

(b) Turn the power switch ON (IG) position.

(c) Ground the terminal of the wire harness side connector, then check the master warning light.

Standard:

Master warning light comes on.

6. INSPECT BRAKE WARNING LIGHT

(a) Inspect the parking brake warning light.

(1) Disconnect the connector from the parking brake switch.

(2) Turn the power switch ON (IG) position.

(3) Ground the terminal of the wire harness side connector, then check the parking brake warning light.

Standard:

Brake warning light comes on.

(b) Inspect the brake fluid level warning light.

(1) Disconnect the connector from the brake fluid level warning switch.

(2) Turn the power switch ON (ACC or IG) position.

(3) Connect a terminal to the other terminal of the wire harness side connector, then check the brake fluid level warning switch.

Standard:

Brake warning light comes on.

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7. INSPECT BRAKE FLUID LEVEL WARNING SWITCH

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the connector.
(c) Measure the resistance between the terminals.
Standard:
Float up (switch off): 10 kΩ or higher
(d) Use a syphon, etc. to take fluid out of the reservoir tank.
(e) Measure the resistance between the terminals.
Standard:
Float down (switch on): Below 1 Ω
(f) Pour the fluid back in the reservoir tank.
(g) Reconnect the connector.

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POWER WINDOW CONTROL SYSTEM

05ICX–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

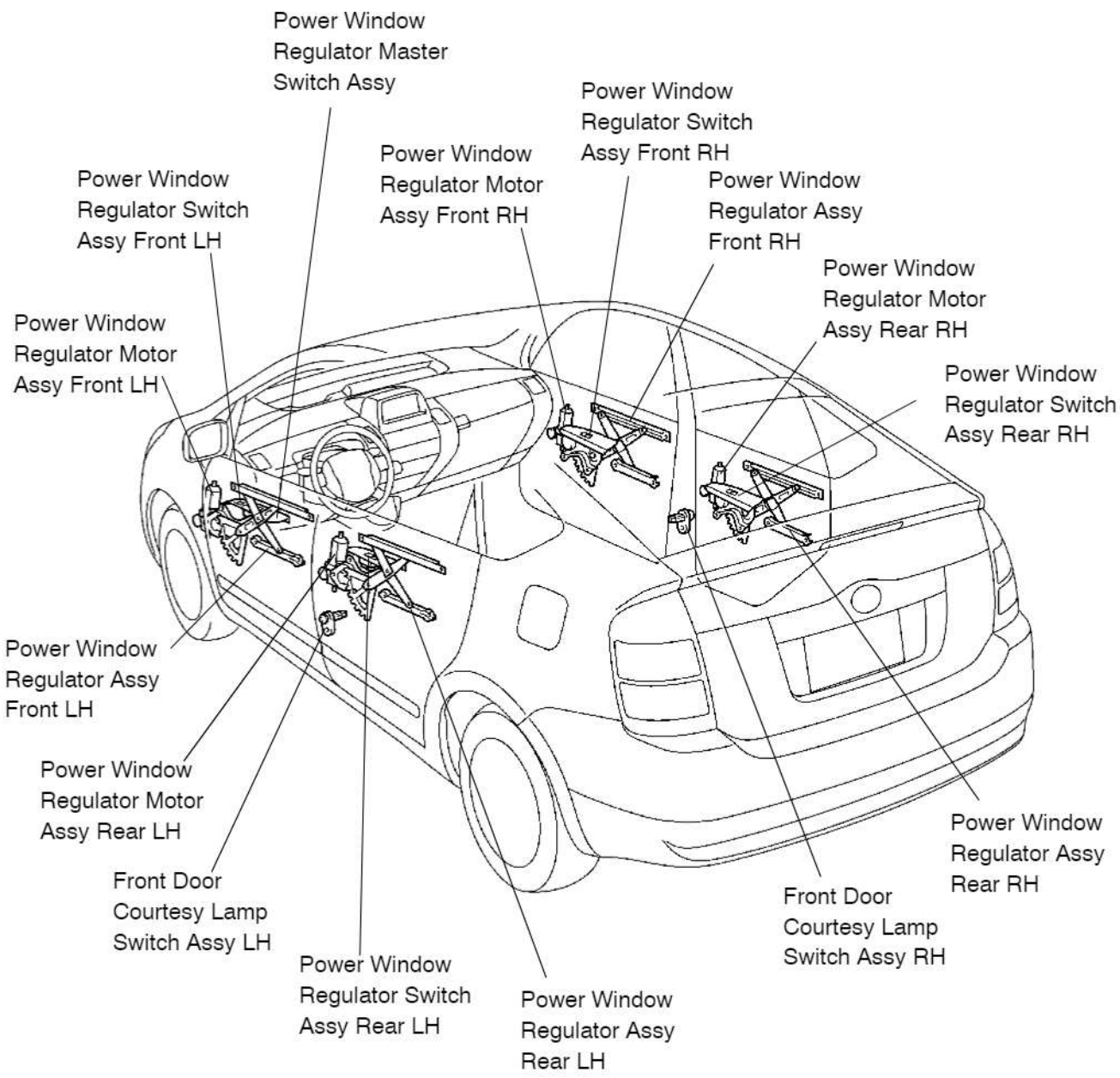
NOTICE FOR HYBRID SYSTEM ACTIVATION

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**

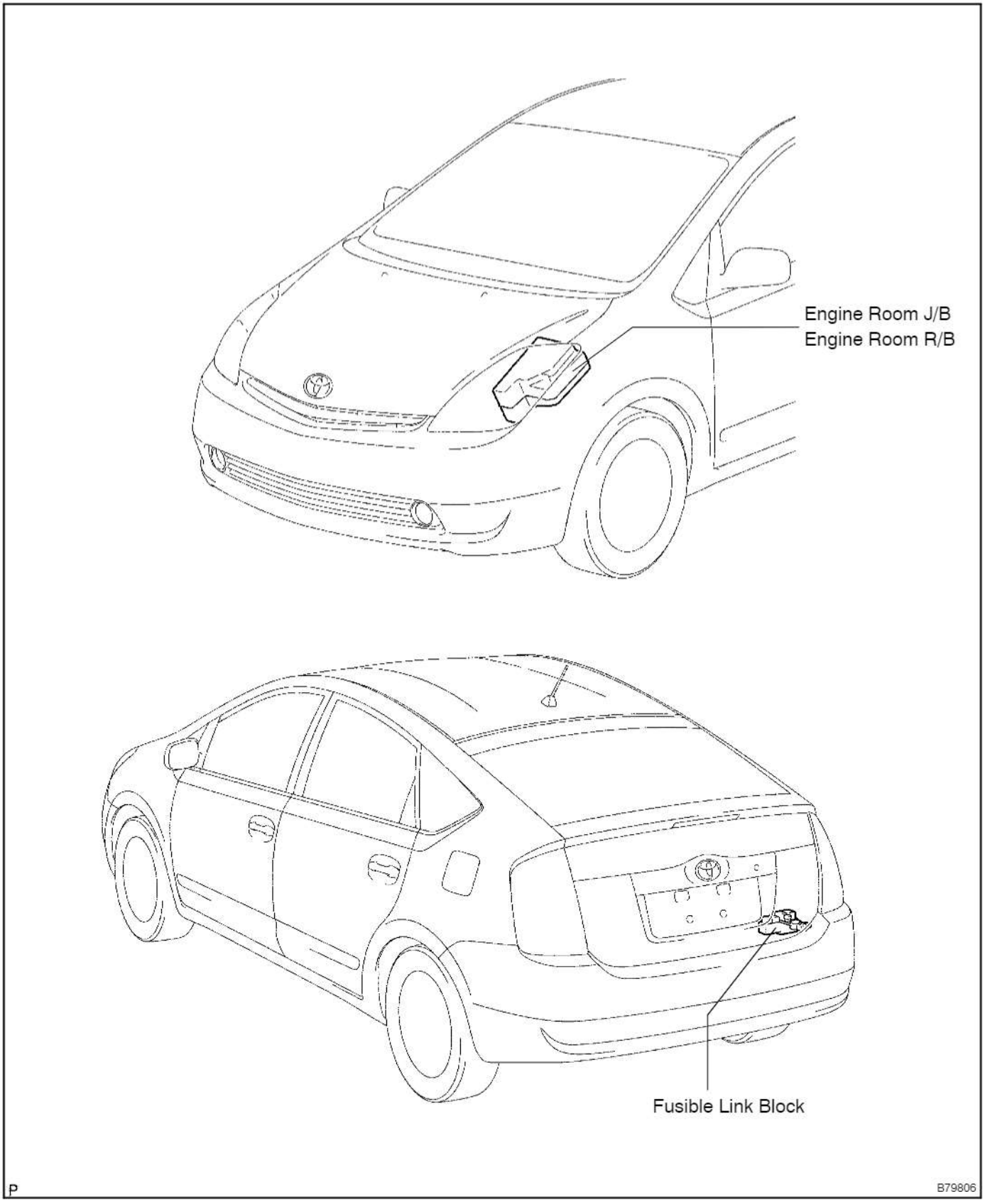
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05ICZ-01

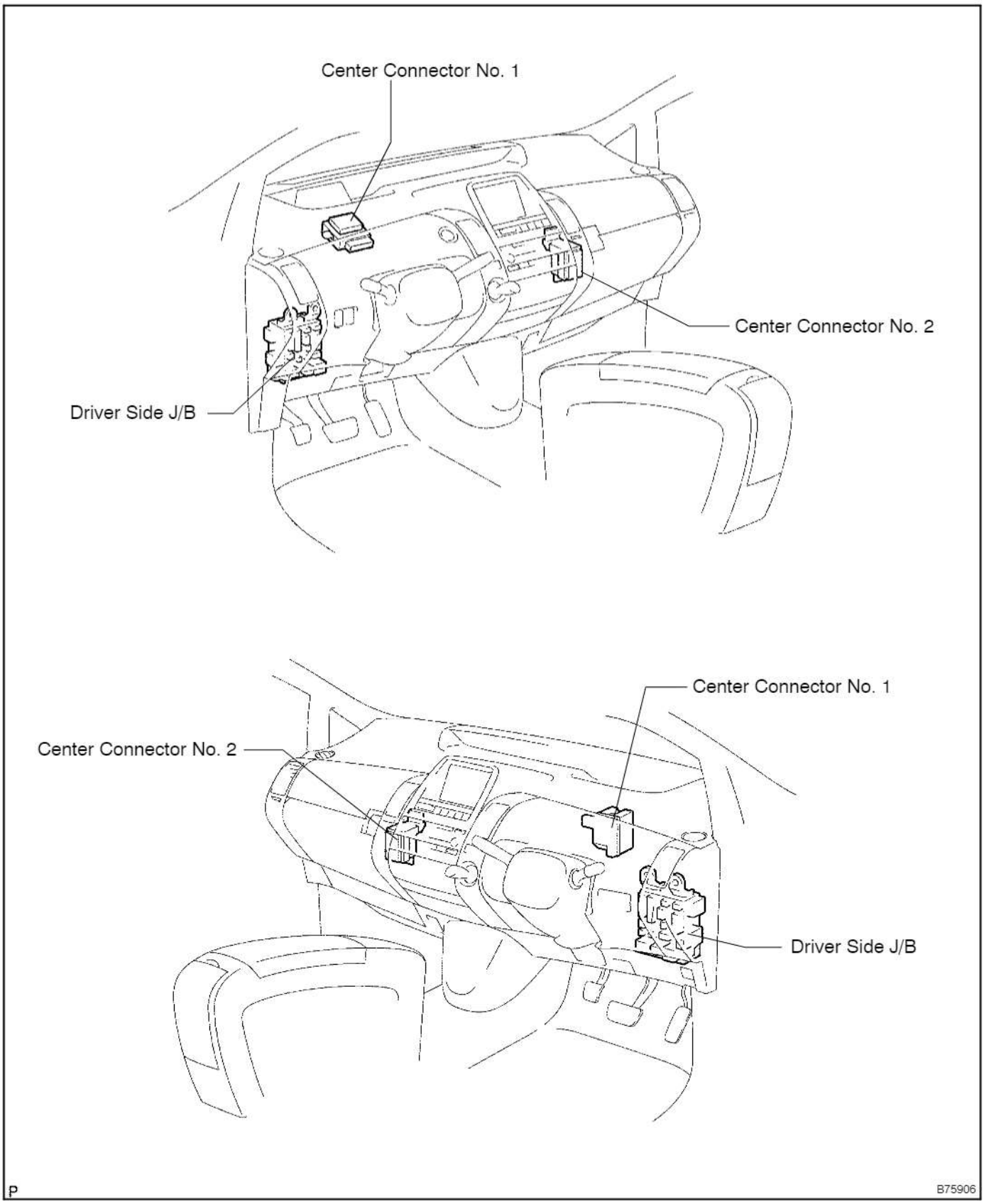
LOCATION



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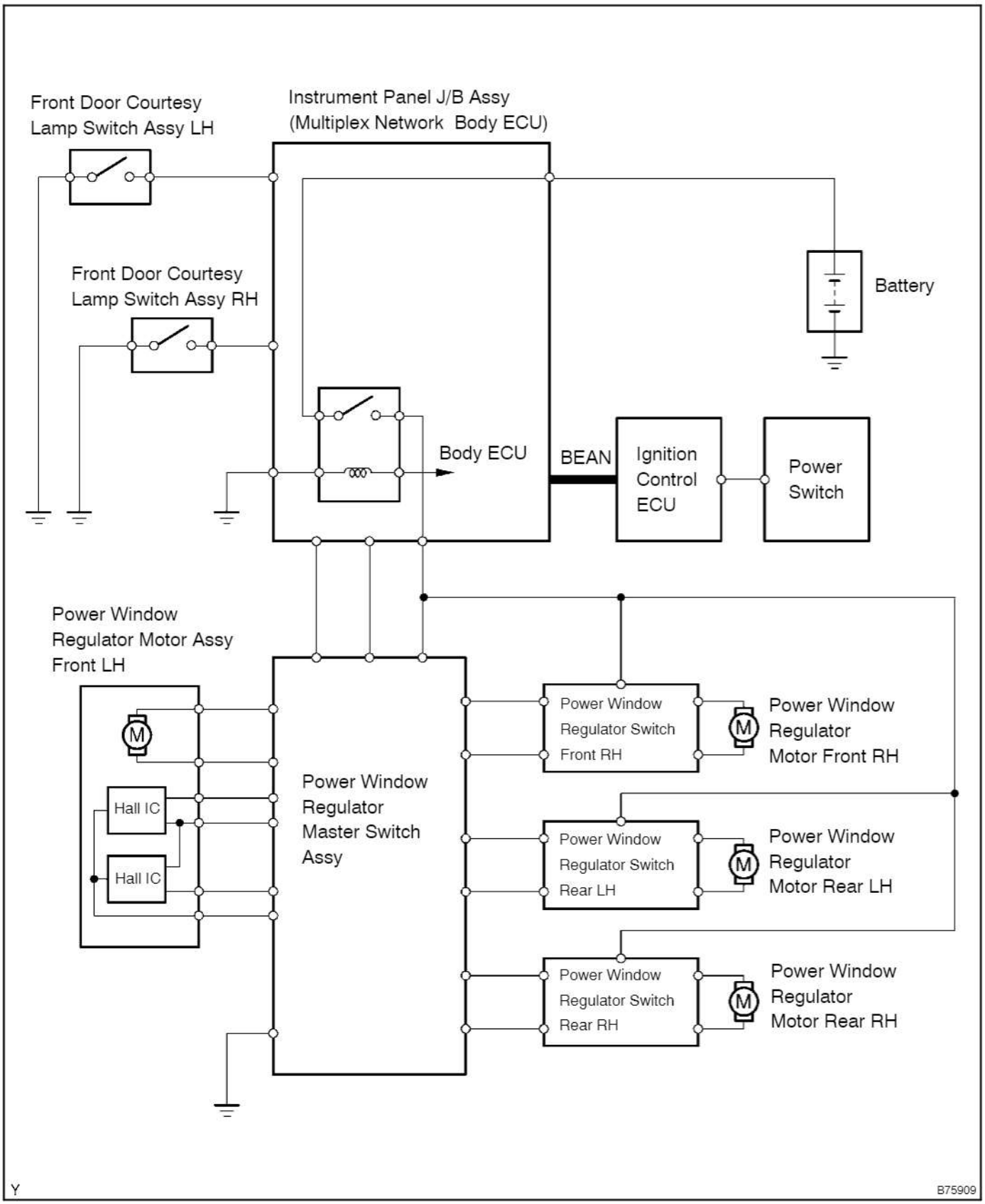
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05ID1-01

SYSTEM DIAGRAM



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05ID3–01

SYSTEM DESCRIPTION

1. POWER WINDOW CONTROL SYSTEM DESCRIPTION

The power window control system controls the power windows' UP/DOWN function using the regulator motors.

The main controls of this system are: the power window regulator master switch assembly, which is built into the driver side door, and the power window regulator switches, which are built into the passenger side door and rear doors. Pressing each regulator switch or any of the switches on the master switch assembly transmits an UP/DOWN signal to the corresponding power window regulator motor.

The jammed window detection mechanism consists of a magnet on the worm gear of the power window motor assy and the two Hall ICs on the connector.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Power Window Regulator Master Switch Assy	Controls window operations for all windows. Also, when window lock switch is set to lock position, window operation will only be possible for driver side power window.
Power Window Regulator Switch Assy	Located on passenger side door and rear doors. Each regulator switch assy controls window operations for its respective window.
Power Window Regulator Motor Assy	Receives switch signals and changes signals into motor activation. As a result, window position changes. Also, driver side regulator motor assy uses pulse sensors to detect window position.

3. SYSTEM FUNCTION

The power window control system has the following functions.

Function	Outline
Manual UP/DOWN function	Driver side power window: function that raises window while power window switch is pulled halfway up and lowers it while switch is pushed halfway down. Window stops as soon as the switch is released. Other power windows: function that raises windows while power window switch is pulled up and lowers it while switch is pushed down. Window stops as soon as the switch is released.
AUTO UP/DOWN function	Function that enables window of driver side door to be fully opened or fully closed by one full push downward of power window switch or one full pull. AUTO UP/DOWN function is only available on driver side power window.
Jam protection function	Function that automatically stops driver side power window and moves it downward if object is jammed in driver side power window during AUTO UP operation. During key–off operation function, jam protection function works for manual UP and AUTO UP operation. Jam protection function is only available on driver side power window.
Remote control function	Function that allows power window master switch assy to control manual UP/DOWN operations of passenger door power window and rear door power windows.
Key–off operation function	Function that makes it possible to operate power window for approx. 43 seconds after power switch's power mode is changed to ON (ACC) or OFF when either front door is closed.
Window lock function	Function where passenger door and rear door power windows' operations are disabled when window lock switch of the master switch assy is pressed. Passenger door and rear door power windows can be operated when window lock switch is pressed again.
Diagnosis	Function where power window switch can detect malfunctions in power window system and make diagnoses. Power window switch light illuminates or starts blinking to inform driver.
Fail–safe	Function that disables driver side power window AUTO UP/DOWN function if pulse sensor (Hall IC) in power window regulator motor has malfunction. Manual operation is possible through power switches.

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05ID5–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the power window control system.
- The intelligent tester II should be used in step 3, 4 and 6.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

3	CHECK COMMUNICATION FUNCTION OF LARGE–SCALE BODY MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) Without code outputs, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SYSTEM (See page 05–1726)

A

4	PROBLEM SYMPTOMS TABLE (See page 05–1728)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 6

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(b) On–vehicle Inspection (see page 05–1763).
(c) Inspection (see page 05–1766).
(d) Terminals of ECU (see page 05–1729).

6	ADJUST, REPAIR OR REPLACE

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7	CONFIRMATION TEST

END

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05ID7-01

CUSTOMER PROBLEM ANALYSIS CHECK

POWER WINDOW CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		License Plate 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 (°C [°F])

Malfunction Symptoms	☐ AUTO UP/DOWN function does not operate	
	☐ Remote UP/DOWN function does not operate	
	☐ Driver side door window glass lowers during AUTO UP operation	
	☐ Manual UP/DOWN function does not operate	
	☐ All ☐ Driver side ☐ Passenger side ☐ Rear LH ☐ Rear RH	
	☐ Window cannot be operated after power switch's power mode is changed to OFF	
Condition When Returned to Normal		☐ Power switch's power mode ON (IG) ☐ Hybrid vehicle control system started ☐ ( ) Switch operated
Condition When Problem Occurred	Yes ▪ No	☐ Power switch's power mode OFF ▪ ON (IG) ☐ ( ) Switch operated ☐ Others ( )

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INITIALIZATION

1. RESET (INITIALIZE) POWER WINDOW REGULATOR MOTOR (DRIVER SIDE)

NOTICE:

- **Resetting the power window regulator motor (initializing the pulse sensor) is necessary if: 1) the battery terminal cable is disconnected; 2) the power window regulator master switch assembly, wire harness, power window regulator switch, power window regulator assembly and power window regulator motor are replaced or removed/installed; or 3) the POWER, FR Door, GAUGE and ECU–IG fuses are replaced. If resetting is not performed, the master switch assembly will not be able to operate the AUTO operation function, jam protection function and remote operation function.**

(a) Change the power switch's power mode to ON (IG) by pushing the power switch.
(b) Open the power window halfway by pressing the power window switch.
(c) Fully pull up the switch until the power window is fully closed and continue to hold the switch for at least 1 second.
(d) Check that the AUTO UP/DOWN function operates normally.

If the AUTO UP/DOWN function operates normally, reset operations are complete. If abnormal, follow steps (e) to (g) below.

(e) Disconnect the negative battery terminal cable for 10 seconds.
(f) Connect the battery terminal cable.
(g) Perform the above steps (a) to (d) again.

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PROBLEM SYMPTOMS TABLE

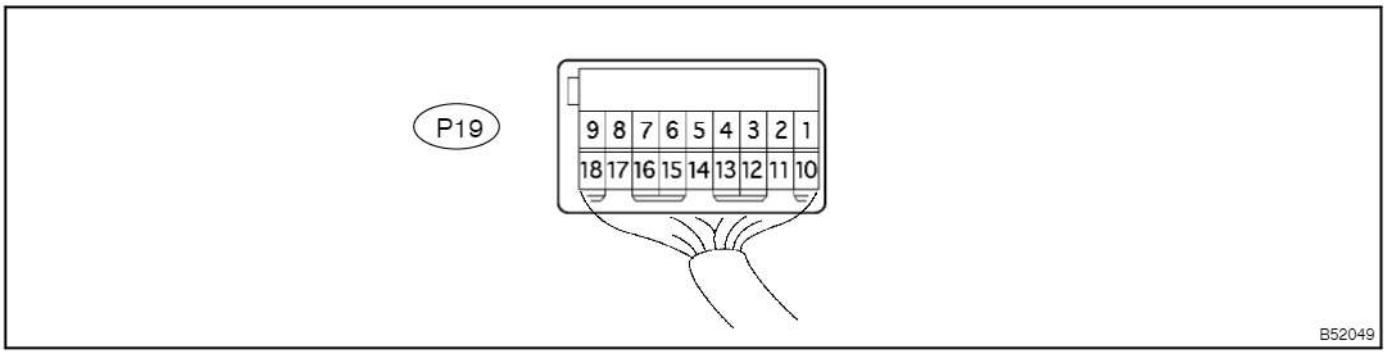
Symptoms	Suspected Area	See Page
AUTO UP/DOWN function does not operate	1. Power window regulator motor assy (driver side) 2. Wire harness 3. Power window regulator master switch assy	05–1734
Remote UP/DOWN function does not operate	1. Power window regulator master switch assy 2. Wire harness	05–1737
Manual UP/DOWN function does not operate on driver side	1. FR DOOR fuse 2. Power window regulator master switch assy 3. Power window regulator motor assy (driver side) 4. Wire harness	05–1740
Manual UP/DOWN function does not operate on passenger side only	1. Power window regulator switch assy (passenger side) 2. Power window regulator motor assy (passenger side) 3. Wire harness	05–1743
Manual UP/DOWN function does not operate on rear LH side	1. Power window regulator switch assy (rear LH) 2. Power window regulator motor assy (rear LH) 3. Wire harness	05–1746
Manual UP/DOWN function does not operate on rear RH side	1. Power window regulator switch assy (rear RH) 2. Power window regulator motor assy (rear RH) 3. Wire harness	05–1749
Jam protection function does not operate	1. Power window regulator master switch assy	05–1762
Power windows do not operate at all	1. AM1 fuse 2. GAUGE fuse 3. POWER fuse 4. ECU–IG fuse 5. FR DOOR fuse 6. PWR relay 7. IG1 relay 8. Power window regulator master switch assy 9. Wire harness 10. Instrument panel J/B assy (Multiplex network body ECU)	05–1752
Power window can be operated after power switch's power mode is changed to OFF even when certain conditions are not met	1. Power window regulator master switch assy 2. Front door courtesy lamp switch 3. Wire harness 4. Multiplex network body ECU	05–1756
AUTO UP operation does not fully close power window (jam protection function is activated)	1. Front door window regulator assy 2. Power window regulator motor assy (driver side) 3. Power window regulator master switch assy	05–1760

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05DD–01

TERMINALS OF ECU

1. CHECK POWER WINDOW REGULATOR MASTER SWITCH



(a) Disconnect the P19 switch connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (P19–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
BW (P19–7) – E (P19–1)	W – W–B	Regulator motor power supply	Constant	10 to 14 V
B (P19–6) – E (P19–1)	L – W–B	Master switch power supply	Power switch OFF → ON (IG)	0 V → 10 to 14 V
BDR (P19–11) – E (P19–1)	V – W–B	Master switch power supply	Power switch OFF → ON (IG)	0 V → 10 to 14 V
DU (P19–4) – DD (P19–9)	Y – G	• Power window motor UP output • Power window motor DOWN output	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the P19 switch connector.

(d) Reset the power window motor (see page 05–1727).

(e) Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
DU (P19–4) – E (P19–1)	Y – W–B	Power window motor UP output	Power switch ON (IG), driver side power window switch OFF → UP (manual operation)	0 V → 10 to 14 V
DU (P19–4) – E (P19–1)	Y – W–B	Power window motor UP output	Power switch ON (IG), driver side power window fully open → driver side power window switch UP (AUTO operation) → driver side power window fully closed	0 V → 10 to 14 V → 0 V
DD (P19–9) – E (P19–1)	G – W–B	Power window motor DOWN output	Power switch ON (IG), driver side power window switch OFF → DOWN (manual operation)	0 V → 10 to 14 V
DD (P19–9) – E (P19–1)	G – W–B	Power window motor DOWN output	Power switch ON (IG), driver side power window fully closed → driver side power window switch DOWN (AUTO operation) → driver side power window fully open	0 V → 10 to 14 V → 0 V
VCC (P19–3) – GND (P19–2)	G – O	Power window motor power source	Constant	10 to 14 V

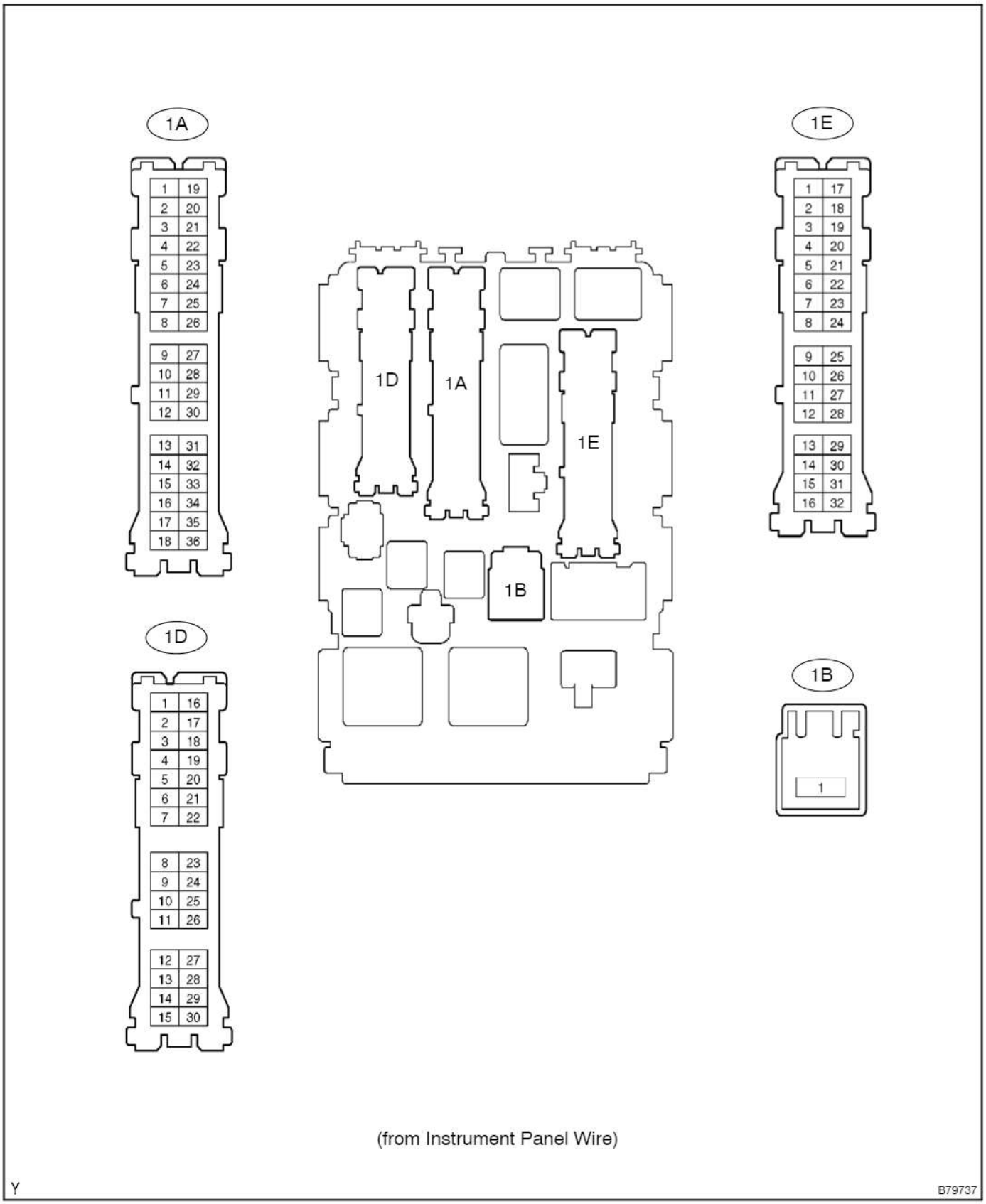
If the result is not as specified, the master switch may have a malfunction.

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(f) Check that the AUTO lamp illuminates.

(1) When turn the power switch ON (IG), check that the AUTO lamp illuminates (green).

2. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



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(a) Disconnect the 1A,1B,1D and 1E J/B connectors.
(b) Measure the voltage and resistance between each terminal of the wire harness side connectors and body ground.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
ALTB (1B–1) – Body ground	W – Body ground	+B (power system, generator system) power supply	Constant	10 to 14 V
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
DCTY (1D–21) – Body ground	V – Body ground	Driver side courtesy switch input	Driver side door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
PCTY (1D–24) – Body ground	BR – Body ground	Passenger side courtesy switch input	Passenger side door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
GND (1E–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the 1A, 1B,1D and 1E J/B connectors.
(d) Measure the voltage between each terminal of the connectors and body ground.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 to 14 V → 0 V

If the result is not as specified, the J/B assy (body ECU) may have a malfunction.

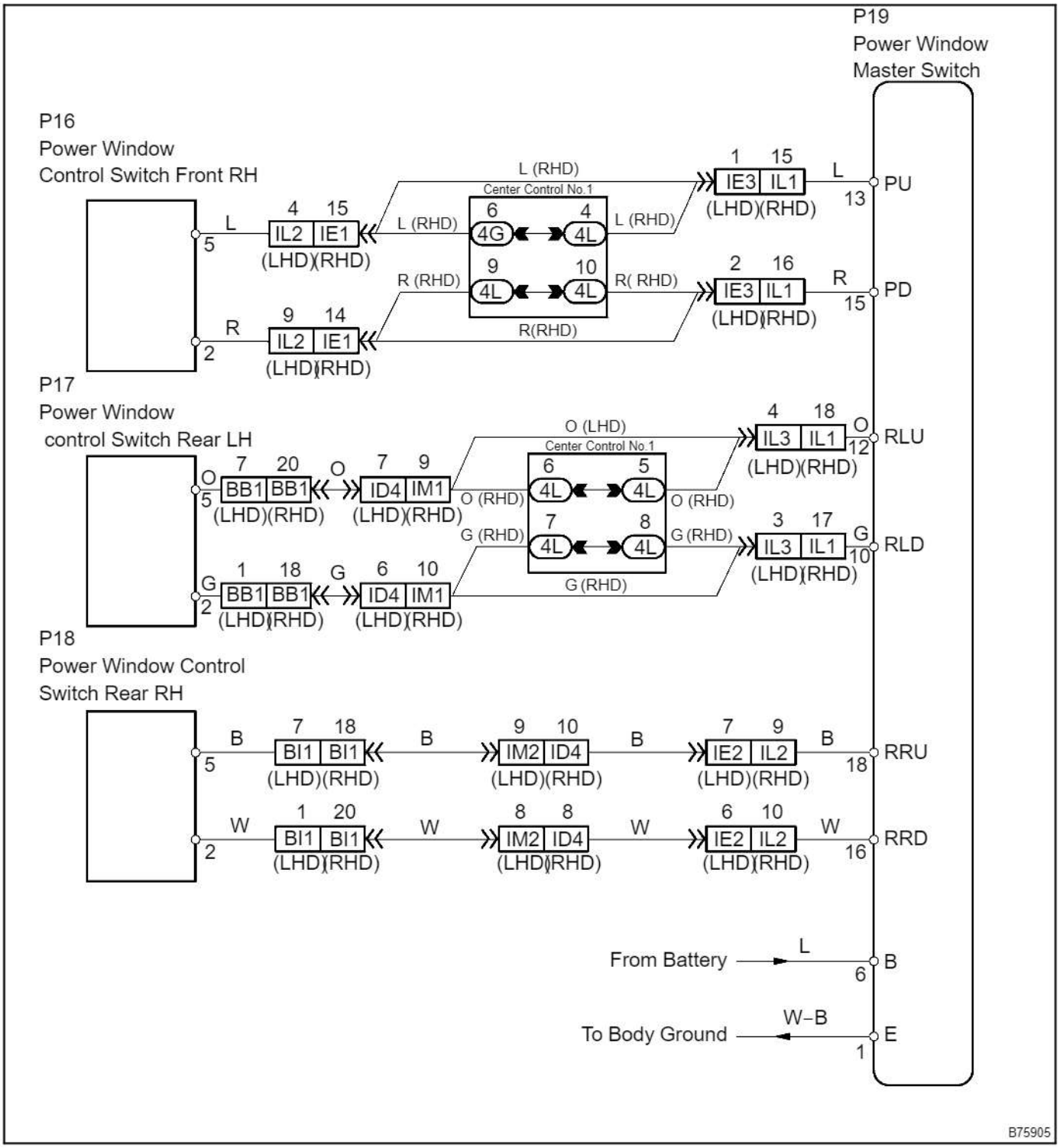
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REMOTE UP/DOWN FUNCTION DOES NOT OPERATE

CIRCUIT DESCRIPTION

With the power switch's power mode at ON (IG), the power window regulator master switch assembly transmits remote switch signals to the regulator switches of the passenger door power window and rear door power windows. Then, the regulator switches drive the power window regulator motors.

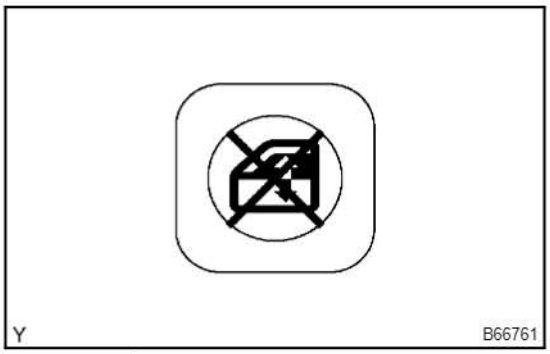
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK POWER WINDOW LOCK SWITCH



(a) Turn the window lock switch OFF and operate the passenger door switch and rear door switches on the master switch assembly. Check that the remote UP/DOWN function operates normally.
OK: Remote UP/DOWN function operates normally.

NG → **Go to step 2**

OK

END

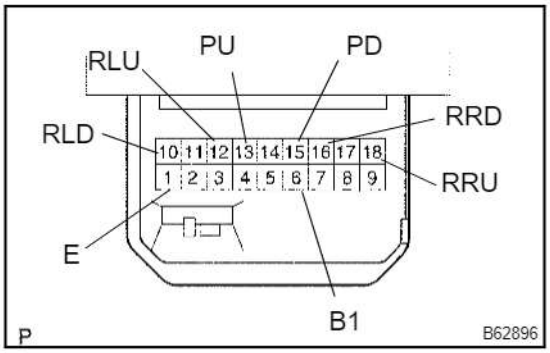
2	CHECK MANUAL UP/DOWN FUNCTION

(a) Check that the passenger door and rear door power windows' manual UP/DOWN functions operate normally.
OK: Manual UP/DOWN functions operate normally.

NG → **OTHER PROBLEM (See page 05–1728)**

OK

3	INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY



(a) Inspect the passenger door switch and rear door switches on the master switch assy.
(1) Remove the master switch assy.
(2) Disconnect the P19 master switch connector.
(3) Measure the resistance between the terminals of the connector when the switch is operated.

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Standard:

Passenger side switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF (Normal)	UP	P19–1 (E) – P19–15 (PD) P19–6 (B) – P19–13 (PU)	Below 1 Ω Below 1 Ω
OFF (Normal)	OFF	P19–1 (E) – P19–13 (PU) P19–1 (E) – P19–15 (PD)	Below 1 Ω Below 1 Ω
OFF (Normal)	DOWN	P19–1 (E) – P19–13 (PU) P19–6 (B) – P19–15 (PD)	Below 1 Ω Below 1 Ω
ON (Lock)	UP	P19–1 (E) – P19–15 (PD) P19–6 (B) – P19–13 (PU)	10 kΩ or higher Below 1 Ω
ON (Lock)	OFF	P19–13 (PU) – P19–15 (PD)	Below 1 Ω
ON (Lock)	DOWN	P19–1 (E) – P19–13 (PU) P19–6 (B) – P19–15 (PD)	10 kΩ or higher Below 1 Ω

Rear LH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF (Normal)	UP	P19–1 (E) – P19–10 (RLD) P19–6 (B) – P19–12 (RLU)	Below 1 Ω Below 1 Ω
OFF (Normal)	OFF	P19–1 (E) – P19–10 (RLD) P19–1 (E) – P19–12 (RLU)	Below 1 Ω Below 1 Ω
OFF (Normal)	DOWN	P19–1 (E) – P19–12 (RLU) P19–6 (B) – P19–10 (RLD)	Below 1 Ω Below 1 Ω
ON (Lock)	UP	P19–1 (E) – P19–10 (RLD) P19–6 (B) – P19–12 (RLU)	10 kΩ or higher Below 1 Ω
ON (Lock)	OFF	P19–10 (RLD) – P19–12 (RLU)	Below 1 Ω
ON (Lock)	DOWN	P19–1 (E) – P19–12 (RLU) P19–6 (B) – P19–10 (RLD)	10 kΩ or higher Below 1 Ω

Rear RH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF (Normal)	UP	P19–1 (E) – P19–16 (RRD) P19–6 (B) – P19–18 (RRU)	Below 1 Ω Below 1 Ω
OFF (Normal)	OFF	P19–1 (E) – P19–16 (RRD) P19–1 (E) – P19–18 (RRU)	Below 1 Ω Below 1 Ω
OFF (Normal)	DOWN	P19–1 (E) – P19–18 (RRU) P19–6 (B) – P19–16 (RRD)	Below 1 Ω Below 1 Ω
ON (Lock)	UP	P19–1 (E) – P19–16 (RRD) P19–6 (B) – P19–18 (RRU)	10 kΩ or higher Below 1 Ω
ON (Lock)	OFF	P19–16 (RRD) – P19–18 (RRU)	Below 1 Ω
ON (Lock)	DOWN	P19–1 (E) – P19–18 (RRU) P19–6 (B) – P19–16 (RRD)	10 kΩ or higher Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MASTER SWITCH ASSY – POWER WINDOW REGULATOR SWITCH ASSY)

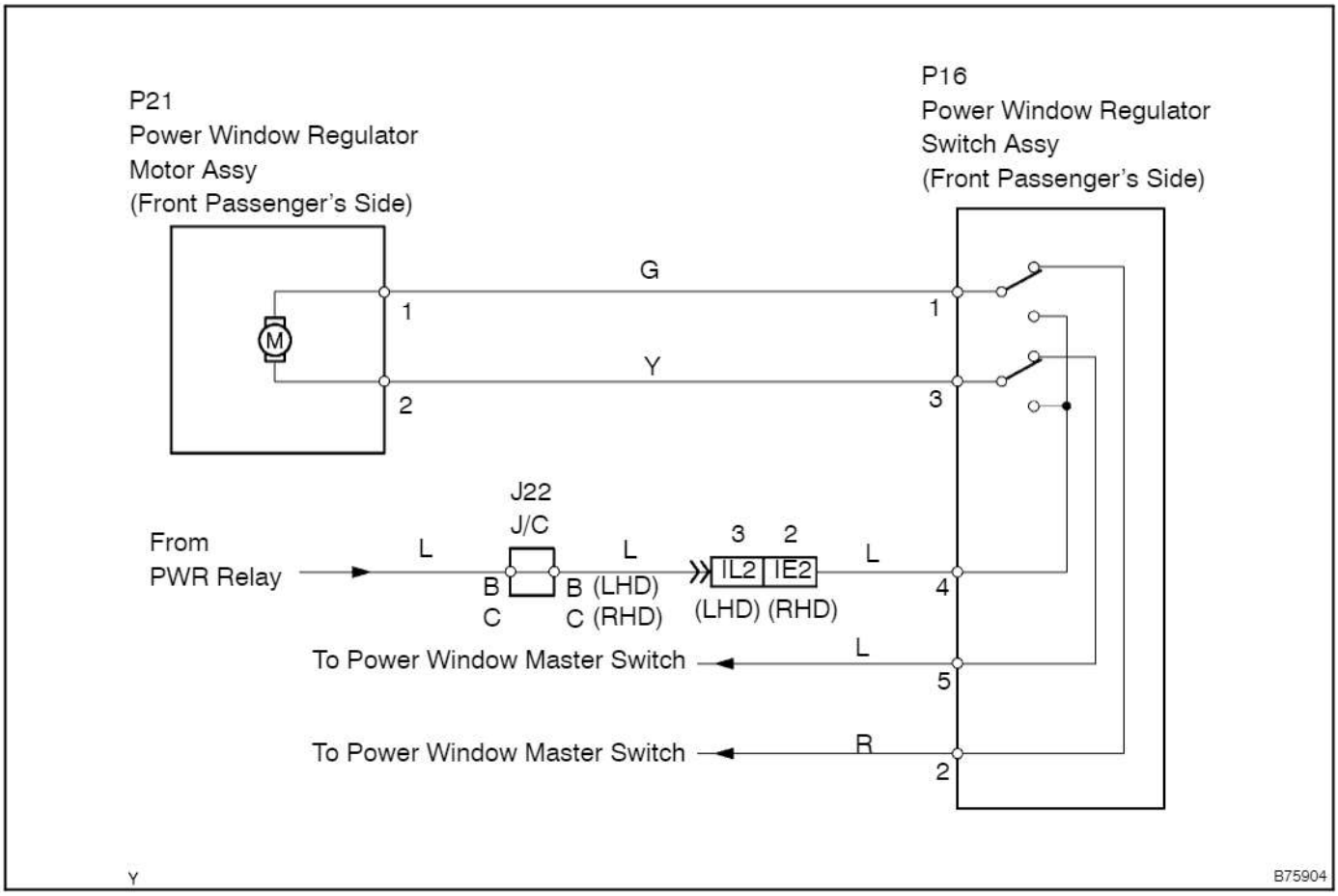
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MANUAL UP/DOWN FUNCTION DOES NOT OPERATE ON PASSENGER SIDE ONLY

CIRCUIT DESCRIPTION

If the passenger side manual UP/DOWN function does not operate, a malfunction may be present in the power window regulator motor assembly front passenger's side, the power window regulator switch assembly or the wire harness may be malfunctioning.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK POWER WINDOW REGULATOR SWITCH ASSY ON FRONT PASSENGER SIDE (B VOLTAGE)

Wire Harness Side
P16
Power Window Regulator
Switch Assy (Front Passenger's Side)



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(a) Disconnect the P16 regulator switch connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between terminal 4 of the wire harness side connector and body ground.

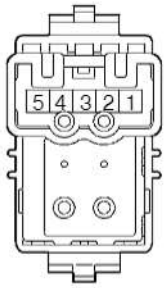
Standard:

Tester Connection	Condition	Specified Condition
P16–4 – Body ground	Power switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSY – POWER WINDOW REGULATOR SWITCH)**

OK

2	INSPECT POWER WINDOW REGULATOR SWITCH ASSY ON FRONT PASSENGER SIDE (SWITCH OPERATION)



Y

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(a) Remove the regulator switch.
(b) Disconnect the P16 switch connector.
(c) Measure the resistance between the terminals of the connector when the switch is operated.

Standard:

Tester Connection	Regulator Switch	Specified Condition
P16–1 – P16–2 P16–3 – P16–4	UP	Below 1 Ω
P16–1 – P16–2 P16–3 – P16–5	OFF	Below 1 Ω
P16–1 – P16–4 P16–3 – P16–5	DOWN	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR SWITCH ASSY**

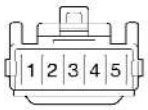
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3	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH ASSY ON FRONT PASSENGER SIDE – POWER WINDOW REGULATOR MOTOR ASSY ON FRONT PASSENGER SIDE AND BODY GROUND)

Wire Harness Side

P16
Power Window Regulator
Switch Assy (Front Passenger's Side)



P21
Power Window Regulator
Motor Assy (Front Passenger's Side)



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(a) Disconnect the P16 switch connector.
(b) Disconnect the P21 motor connector.
(c) Measure the resistance of the wire harness side connectors.

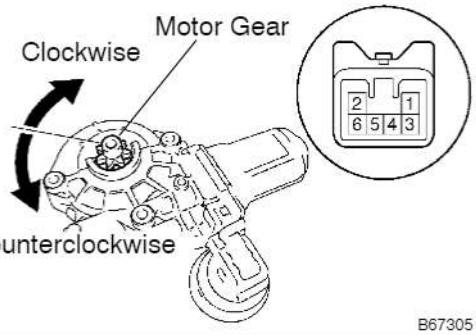
Standard:

Tester Connection	Specified Condition
P16–1 – P21–1	Below 1 Ω
P16–3 – P21–2	Below 1 Ω
P16–1 – Body ground	10 kΩ or higher
P16–3 – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	INSPECT POWER WINDOW REGULATOR MOTOR ASSY ON FRONT PASSENGER SIDE



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(a) Remove the motor (see page 75–9).
(b) Apply battery voltage to connector terminals 1 and 2.
(c) Check that the motor smoothly rotates.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.

OK:

Terminal No.	Specified Condition
Battery positive (+) → 1 Battery negative (–) → 2	Motor gear rotates clockwise
Battery positive (+) → 2 Battery negative (–) → 1	Motor gear rotates counterclockwise

NG → **REPLACE POWER WINDOW REGULATOR MOTOR ASSY FRONT ON PASSENGER SIDE**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MASTER SWITCH ASSY – POWER WINDOW REGULATOR SWITCH ASSY ON FRONT PASSENGER SIDE)

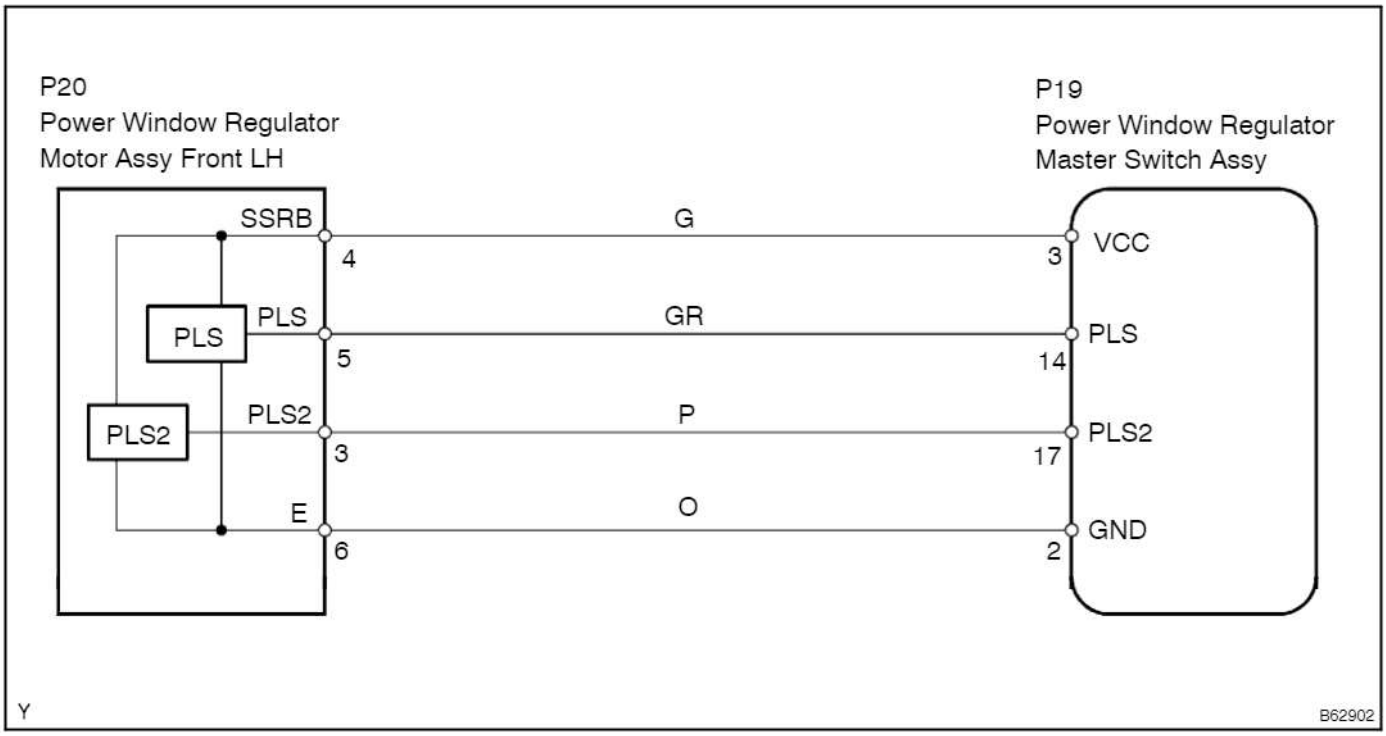
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AUTO UP OPERATION DOES NOT FULLY CLOSE POWER WINDOW (JAM PROTECTION FUNCTION IS ACTIVATED)

CIRCUIT DESCRIPTION

If the door glass or the power window regulator motor does not operate smoothly, the jam protection function may trigger automatically, resulting in the AUTO UP function being unable to fully close the window.
HINT:
The jam protection function is only available on the driver side power window.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	RESET POWER WINDOW REGULATOR MOTOR

(a) Reset the power window regulator motor (see page 05–1727).
(b) Check if the power window AUTO UP/DOWN function operates normally.
OK: AUTO UP/DOWN function operates normally.

NG → **Go to step 2**

OK

END

2	CHECK FRONT DOOR WINDOW REGULATOR ASSY (DRIVER'S SIDE)

(a) Remove the door glass (see page 70–2).
(b) Operate the front door window regulator assembly using the switch.
(c) Check if the power window regulator assembly operates smoothly.
OK: Power window regulator assembly operates smoothly.

NG → **REPLACE FRONT DOOR WINDOW REGULATOR ASSY (DRIVER'S SIDE)**

OK

REPLACE DOOR GLASS RUN

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JAM PROTECTION FUNCTION DOES NOT OPERATE

CIRCUIT DESCRIPTION

The power window regulator master switch assembly controls the driver side power window regulator motor. The jam protection function only operates within a specified range during AUTO UP operation or key–off manual UP operation.

HINT:

The jam protection function is only available on the driver side power window.

INSPECTION PROCEDURE

1	RESET POWER WINDOW REGULATOR MOTOR

(a) Reset the power window regulator motor (see page 05–1727).

(b) Check if the power window AUTO UP/DOWN function operates normally.

OK: AUTO UP/DOWN function operates normally.

NG → **OTHER PROBLEM (See page 05–1728)**

OK

2	CHECK JAM PROTECTION FUNCTION OPERATING RANGE

(a) Check that the jam protection function operates normally (see page 05–1763).

HINT:

The jam protection function does not operate from the fully closed position of the door glass to 4 mm (0.16 in.) below that.

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY**

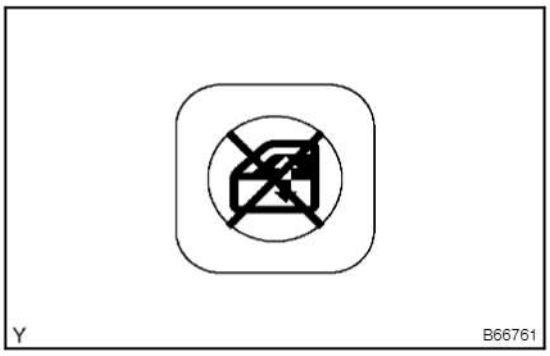
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05IDY-01

ON–VEHICLE INSPECTION



1. CHECK WINDOW LOCK SWITCH

(a) Check that the passenger door and rear doors power windows operations are disabled when the window lock switch of the power window regulator master switch assembly is pressed.

(b) Check that the passenger door and rear doors power windows can be operated when the window lock switch is pressed again.

2. CHECK MANUAL UP/DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
Power switch ON (IG)	Driver side	Pulled halfway up	UP (closed)
Power switch ON (IG)	Driver side	Pushed halfway down	DOWN (open)

(b) Check that the front passenger side power window operates as follows:

OK:

Condition	Regulator Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Front Passenger side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Front Passenger side	Pushed down	DOWN (open)

(c) Check that the rear LH side power window operates as follows:

OK:

Condition	Regulator Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Rear LH side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Rear LH side	Pushed down	DOWN (open)

(d) Check that the rear RH side power window operates as follows:

OK:

Condition	Regulator Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Rear RH side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Rear RH side	Pushed down	DOWN (open)

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3. CHECK AUTO UP/DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
Power switch ON (IG)	Driver side	Pulled fully up	AUTO UP (fully closed)
Power switch ON (IG)	Driver side	Pushed fully down	AUTO DOWN (fully open)

4. CHECK REMOTE UP/DOWN FUNCTION

(a) Check that the front passenger side power window operates as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Front passenger side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Front passenger side	Pushed down	DOWN (open)

(b) Check that the rear LH side power window operates as follows:

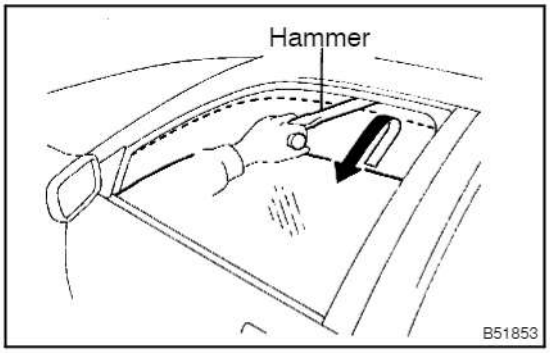
OK:

Condition	Master Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Rear LH side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Rear LH side	Pushed down	DOWN (open)

(c) Check that the rear RH side power window operates as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
• Power switch ON (IG) • Window lock switch OFF	Rear RH side	Pulled up	UP (closed)
• Power switch ON (IG) • Window lock switch OFF	Rear RH side	Pushed down	DOWN (open)



5. CHECK JAM PROTECTION FUNCTION

HINT:

- The jam protection function prevents any part of your body from getting caught by accident between the door frame and the door glass during power window operation.
- The jam protection function is only available on the driver side power window.

NOTICE:

If the power window motor has just been reset, raise and lower the door glass several times manually before performing the check.

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(a) Check that the door glass lowers by approximately 50 mm (1.97 in.) when something is caught between the door frame and door glass during power window operation. However, when the opening between the door frame and the door glass is less than 200 mm (7.87 in.), the door glass continues to lower and does not stop until an opening of 200 mm (7.87 in.) is achieved.
Operative conditions:
- AUTO UP
- AUTO UP function after the power switch's power mode's power mode is changed to OFF
- MANUAL UP function after the power switch's power mode's power mode is changed to OFF

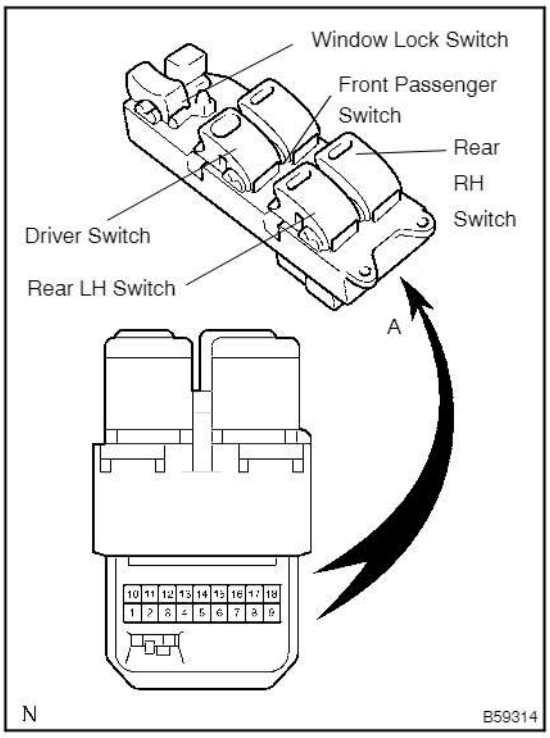
6. CHECK POWER WINDOW FAIL–SAFE FUNCTION

(a) The power window regulator motor's pulse sensors detect when an object has been jammed in the window. If a pulse sensor has a malfunction, the fail–safe function starts operating and the AUTO UP/DOWN function will be disabled.

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05IDZ-01

INSPECTION



1. INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY

(a) Remove the master switch assembly(see page 75–9).

(b) Measure the resistance between the terminals of the connector when the switch is operated.

Standard:

Driver switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
Constant (ON/OFF)	UP	1 – 9 4 – 7	Below 1 Ω
Constant (ON/OFF)	AUTO UP	1 – 9 4 – 7	Below 1 Ω
Constant (ON/OFF)	OFF	1 – 4 1 – 9	Below 1 Ω
Constant (ON/OFF)	DOWN	1 – 4 7 – 9	Below 1 Ω
Constant (ON/OFF)	AUTO DOWN	1 – 4 7 – 9	Below 1 Ω

Passenger switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 – 15 6 – 13	Below 1 Ω
OFF	OFF	1 – 13 1 – 15	Below 1 Ω
OFF	DOWN	1 – 13 6 – 15	Below 1 Ω
ON	UP	6 – 13	Below 1 Ω
ON	OFF	13 – 15	Below 1 Ω
ON	DOWN	6 – 15	Below 1 Ω

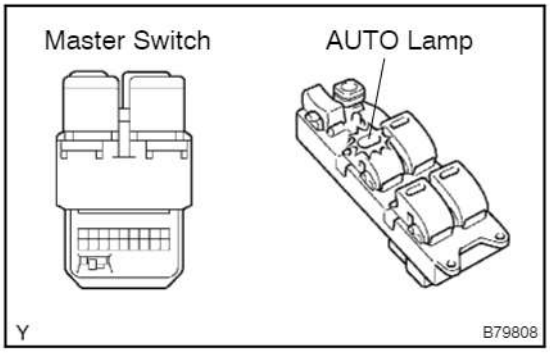
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Rear LH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 – 10 6 – 12	Below 1 Ω
OFF	OFF	1 – 12 1 – 10	Below 1 Ω
OFF	DOWN	1 – 12 6 – 10	Below 1 Ω
ON	UP	6 – 12	Below 1 Ω
ON	OFF	12 – 10	Below 1 Ω
ON	DOWN	6 – 10	Below 1 Ω

Rear RH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 – 16 6 – 18	Below 1 Ω
OFF	OFF	1 – 18 1 – 16	Below 1 Ω
OFF	DOWN	1 – 18 6 – 16	Below 1 Ω
ON	UP	6 – 18	Below 1 Ω
ON	OFF	18 – 16	Below 1 Ω
ON	DOWN	6 – 16	Below 1 Ω

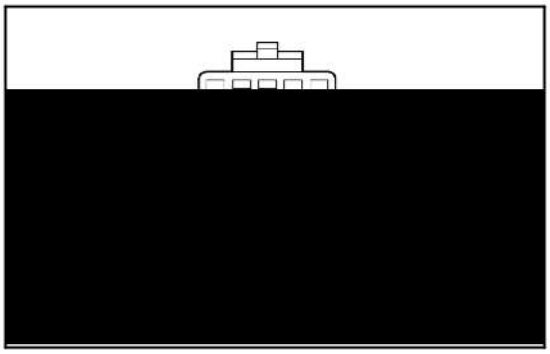


(c) Check the master switch assembly AUTO lamp.

Standard:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 Battery negative (–) → Terminal 1	AUTO lamp illuminates

If the result is not as specified, replace the master switch assembly.



2. INSPECT POWER WINDOW REGULATOR SWITCH ASSY

(a) Remove the power window regulator switch (see page 75–9).

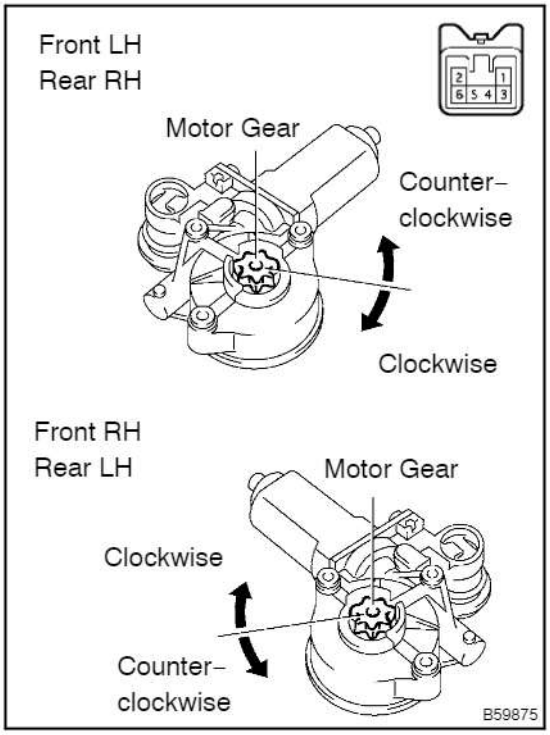
(b) Measure the resistance between the terminals of the connector when the switch is operated.

Standard:

Switch Condition	Tester Connection	Specified Condition
UP	1–2 3–4	Below 1 Ω
OFF	1–2 3–5	Below 1 Ω
DOWN	1–4 3–5	Below 1 Ω

If the result is not as specified, replace the regulator switch.

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3. INSPECT POWER WINDOW REGULATOR MOTOR ASSY

(a) Check operation of the regulator motor.

HINT:

- The front passenger side and rear RH regulator motors should be inspected using the same procedure.
- The front passenger side and rear LH regulator motors should be inspected using the same procedure.

(1) Remove the power window regulator motor (see page 75–9).

(2) Apply battery voltage to the motor terminals.

(3) Check that the motor operates smoothly.

NOTICE:

Do not apply voltage to the terminals except 1 and 2.

OK:

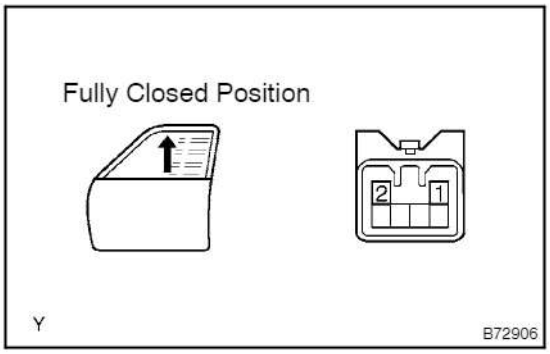
Front Passenger and Rear RH

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Motor gear rotates counterclockwise

Front Passenger and Rear LH

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Motor gear rotates counterclockwise

If the result is not as specified, replace the motor assy.



(b) Check the PTC operation inside the regulator motor.

NOTICE:

The work must be performed with the power window regulator and door glass installed in the vehicle.

(1) Disconnect the driver side power window regulator motor.

(2) Connect the ammeter's positive (+) lead to terminal 2 of the wire harness side connector and the negative (–) lead to battery's negative terminal.

(3) Connect the battery's positive (+) lead to terminal 1 of the wire harness side connector, and raise the window to the fully closed position.

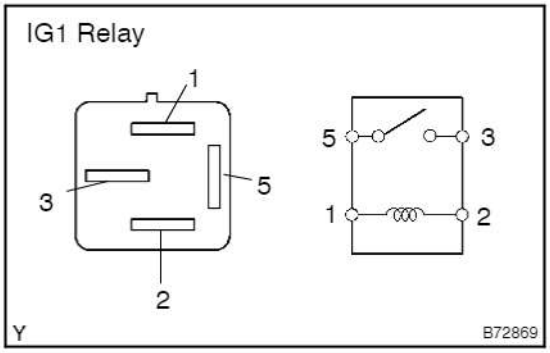
(4) Continue to apply voltage, and check that the current changes to less than 1A within 4 to 90 seconds.

(5) Disconnect the leads from the terminals.

(6) Approximately 60 seconds later, connect the battery's positive (+) lead to terminal 2 and the negative (–) lead to terminal 1, and check that the window begins to lower.

If the result is not as specified, replace the motor assy.

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4. INSPECT RELAY (IG1)

(a) Remove the IG1 relay from the instrument panel J/B.

(b) Measure the resistance.

Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

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POWER DOOR LOCK CONTROL SYSTEM

05IF3–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICES FOR HYBRID SYSTEM ACTIVATION:

When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

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05IFA-01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the power door lock control system.
- The intelligent tester II should be used in steps 3, 4 and 6.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

3	CHECK COMMUNICATION FUNCTION OF LARGE–SCALE BODY MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) Without code outputs, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SYSTEM (See page 05–2261)

A

4	DTC CHECK (See page 05–1789)

(a) Check for DTC and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B	Go to step 6

A

5	PROBLEM SYMPTOMS TABLE (See page 05–1779)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 7

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–1787)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(b) Terminals of ECU (see page 05–1780).
(c) On–vehicle inspection (see page 05–1844).
(d) Inspection (see page 05–1846).

7	ADJUST, REPAIR OR REPLACE

8	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

POWER DOOR LOCK CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		License Plate 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. °C (°F))

Problem Symptoms

☐ Malfunction in door lock/unlock operation using door lock control switch	☐ Driver side door control switch	☐ Driver side door ☐ Passenger side door ☐ Rear left door ☐ Rear right door ☐ Luggage compartment door
☐ Malfunction in door lock/unlock operation using key	☐ Driver side door key lock and unlock control switch	☐ Driver side door ☐ Passenger side door ☐ Rear left door ☐ Rear right door ☐ Luggage compartment door
☐ Malfunction in key lock–in prevention function		
☐ w/ Double lock: Malfunction in double lock system		
☐ Other		

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05IFD-01

PROBLEM SYMPTOMS TABLE

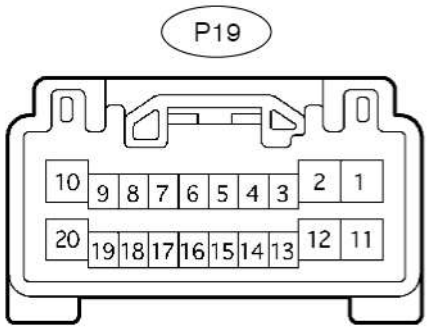
Symptom	Suspected Area	See Page
All doors lock/unlock functions do not operate via master switch	1. DOOR fuse 2. DOME fuse 3. Power window regulator master switch assy 4. Wire harness 5. Instrument panel J/B assy (Multiplex network body ECU)	05–1795
All doors lock/unlock functions do not operate via driver side door key cylinder	1. Driver door lock assy 2. Wire harness 3. Instrument panel J/B assy (Multiplex network body ECU)	05–1798
Only driver door lock/unlock functions do not operate	1. Driver door lock assy 2. Wire harness 3. Instrument panel J/B assy (Multiplex network body ECU)	05–1802
Only passenger door lock/unlock functions do not operate	1. Passenger door lock assy 2. Wire harness 3. Instrument panel J/B assy (Multiplex network body ECU)	05–1807
Only rear LH door lock/unlock functions do not operate	1. Rear door lock assy LH 2. Wire harness 3. Instrument panel J/B assy (Multiplex network body ECU)	05–1812
Only rear RH door lock/unlock functions do not operate	1. Rear door lock assy RH 2. Wire harness 3. Instrument panel J/B assy (Multiplex network body ECU)	05–1818
Only luggage door lock/unlock functions do not operate	1. Luggage compartment door lock assy 2. Luggage compartment door opener switch (w/o smart key system) 3. Luggage electrical key switch (w/ smart key system) 4. Wire harness 5. Instrument panel J/B assy (Multiplex network body ECU)	05–1824
Key lock–in prevention function does not work properly (manual operation and key–linked lock are activated)	1. Key slot 2. Front door courtesy lamp switch assy (Driver side) 3. Wire harness 4. Instrument panel J/B assy (Multiplex network body ECU)	05–1830
w/ Double lock system: Double lock function does not operate properly	1. DOOR fuse 2. Driver door lock assy 3. Passenger door lock assy 4. Rear door lock assy LH 5. Rear door lock assy RH 6. Wire harness 7. Instrument panel J/B assy (Multiplex network body ECU)	05–1835

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05IFF-01

TERMINALS OF ECU

1. CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY



B58840

B69873

(a) Disconnect the P19 switch connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

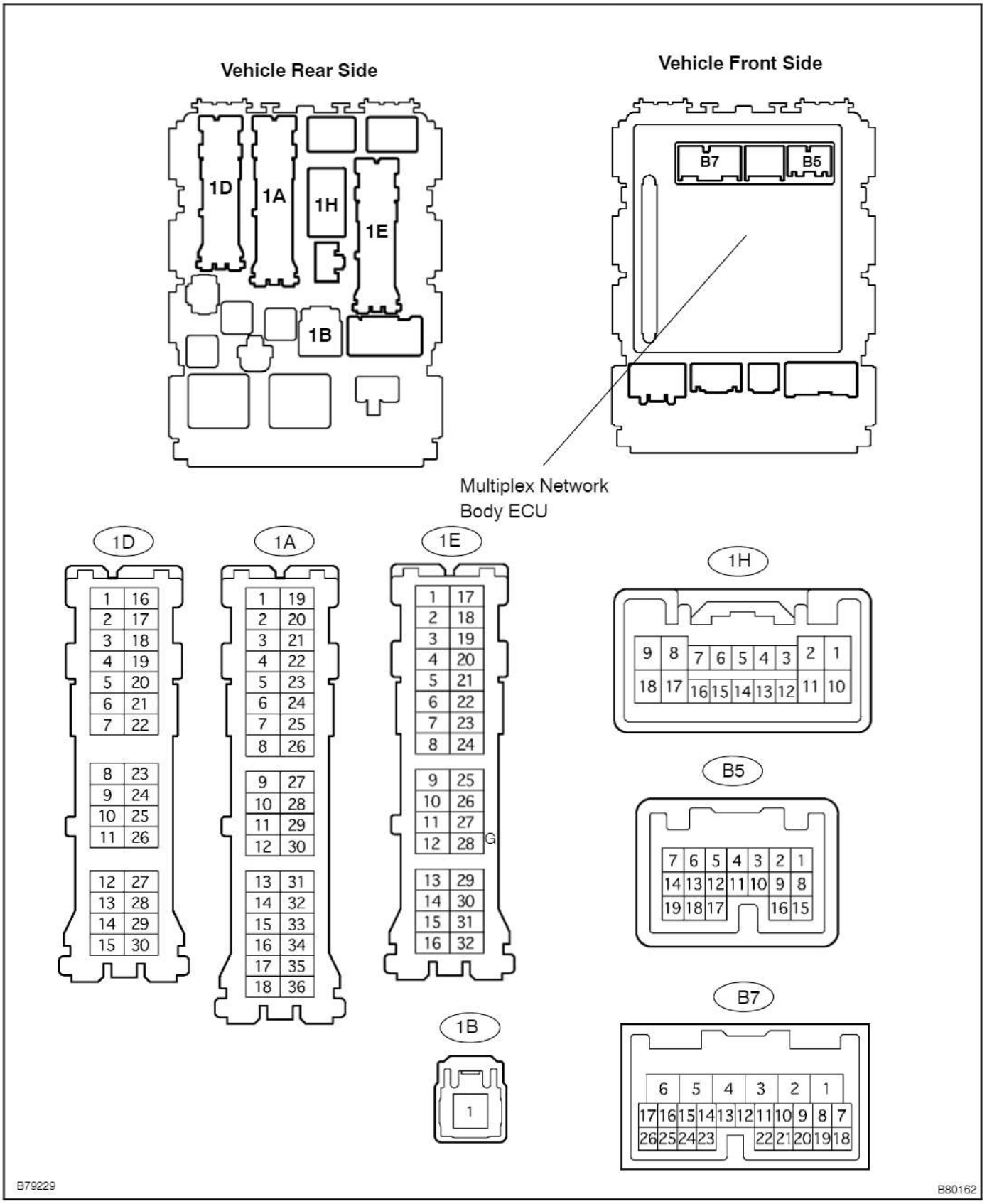
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BDR (P19–11) – Body ground	V – Body ground	+B (BDR) power supply	Constant	10 to 14 V
BW (P19–7) – Body ground	W – Body ground	+B (BW) power supply	Power switch 1: OFF → 2: ON (IG)	1: Below 1 V → 2: 10 to 14 V
E (P19–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
L (P19–5) – Body ground	LG – Body ground	Door control switch door lock input	Door control switch 1: OFF → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
UL (P19–8) – Body ground	BR – Body ground	Door control switch door unlock input	Door control switch 1: OFF → 2: UNLOCK	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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2. CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)



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(a) Disconnect the 1A, 1B, 1D, 1E and 1H J/B connectors.
(b) Disconnect the B7 and B5 ECU connectors.
(c) Measure the voltage and resistance of each terminal of the wire harness side connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ALT (1B–1) – Body ground	W – Body ground	+B (power system, generator system) power supply	Constant	10 to 14 V
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
GND (1E–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	1: No key in key slot → 2: Key inserted	1: 10 kΩ or higher → 2: Below 1 Ω
L1 (1H–4) – Body ground	LG – Body ground	Door control switch lock input	Door control switch 1: OFF → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
UL1 (1H–5) – Body ground	BR – Body ground	Door control switch unlock input	Door control switch 1: OFF → 2: UNLOCK	1: 10 kΩ or higher → 2: Below 1 Ω
L2 (1H–16) – Body ground	L – Body ground	Driver side door key–linked door lock input	Driver side door key cylinder 1: OFF → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
UL2*1 (IH–15) – Body ground	P – Body ground	Driver side door key–linked door unlock input	Driver side door key cylinder 1: OFF → 2: UNLOCK	1: 10 kΩ or higher → 2: Below 1 Ω
LSWD (B7–25) – Body ground	LG – Body ground	Driver side door lock position switch input	Driver door 1: UNLOCK → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
LSWP (B7–10) – Body ground	Y – Body ground	Passenger side door lock position switch input	Passenger door 1: UNLOCK → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
LSWR*1 (B5–10) – Body ground	O – Body ground	Rear doors lock position switch input	Rear doors 1: UNLOCK → 2: LOCK	1: 10 kΩ or higher → 2: Below 1 Ω
DCTY (1D–21) – Body ground	V – Body ground	Driver side courtesy switch input	Driver side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
PCTY (1D–24) – Body ground	BR – Body ground	Passenger side courtesy switch input	Passenger side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
RCTY*2 (1D–5) – Body ground	R – Body ground	Rear LH side courtesy switch input	Rear LH side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
RCTY*2 (1D–20) – Body ground	R – Body ground	Rear RH side courtesy switch input	Rear RH side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
RCTY*3 (1D–20) – Body ground	R – Body ground	Rear LH side courtesy switch input	Rear LH side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
RCTY*3 (1D–5) – Body ground	R – Body ground	Rear RH side courtesy switch input	Rear RH side door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
BCTY (1D–7) – Body ground	R – Body ground	Luggage compartment door courtesy switch input	Luggage compartment door 1: Close → 2: Open	1: 10 kΩ or higher → 2: Below 1 Ω
BDSU (B7–12) – Body ground	P – Body ground	Luggage compartment door opener switch input	Luggage compartment door opener switch 1: OFF → 2: ON	1: 10 kΩ or higher → 2: Below 1 Ω
DLPD*4 (B7–18) – Body ground	Y – Body ground	Driver door double lock position switch input	1: Double lock UNSET → 2: SET	1: 10 kΩ or higher → 2: Below 1 Ω
DLPP*4 (B7–7) – Body ground	L – Body ground	Passenger door double lock position switch input	1: Double lock UNSET → 2: SET	1: 10 kΩ or higher → 2: Below 1 Ω
DLRL*4 (B7–19) – Body ground	GR – Body ground	Rear left door double lock position switch input	1: Double lock UNSET → 2: SET	1: 10 kΩ or higher → 2: Below 1 Ω
DLRR*4 (B7–5) – Body ground	G – Body ground	Rear right door double lock position switch input	1: Double lock UNSET → 2: SET	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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*1: RHD Except Australia, Singapore and Hong Kong
*2: LHD models
*3: RHD models
*4: w/ Double lock system

(d) Reconnect the 1A, 1B, 1D, 1E and 1H J/B connectors.
(e) Reconnect the B5 and B7 ECU connectors.
(f) Measure the voltage between each terminal of the connectors and body ground.

Standard:

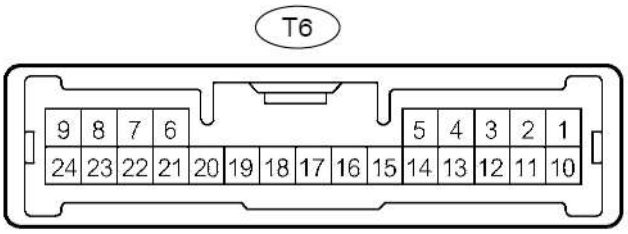
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACT+ (1H–8) – Body ground	Y – Body ground	Door lock motor LOCK drive output (driver door)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACT+ (1H–17) – Body ground	Y – Body ground	Door lock motor LOCK drive output (passenger door)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACT+ (1D–3) – Body ground	Y – Body ground	Door lock motor LOCK drive output (rear LH and RH doors)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACT– (1H–18) – Body ground	G – Body ground	Door lock motor UNLOCK drive output (driver door)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACT– (1H–9) – Body ground	G – Body ground	Door lock motor UNLOCK drive output (passenger door)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACT– (1D–4) – Body ground	G – Body ground	Door lock motor UNLOCK drive output (rear LH and RH doors)	Door control switch or driver door key cylinder 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
BACT (B7–1) – Body ground	Y – Body ground	Luggage compartment door lock motor OPEN drive output	Transmitter switch (luggage compartment door) 1: OFF → 2: LOCK → 3: OFF	1: Below 1 V → 2: 10 to 14 V → 3: Below 1 V
ACTS* (B7–6) – Body ground	O – Body ground	All door double lock motor set on output	1: Double lock UNSET → 2: SET	1: Below 1 V → 2: 10 to 14 V
ACTR* (B7–4) – Body ground	R – Body ground	All door double lock motor set off output	1: Double lock SET → 2: UNSET	1: Below 1 V → 2: 10 to 14 V

If the result is not as specified, the ECU may have a malfunction.

*: w/ Double lock system

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3. CHECK TRANSPONDER KEY ECU ASSY



(a) Disconnect the T6 ECU connector.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – Body ground	L – Body ground	+B power supply	Constant	10 to 14 V
IG (T6–4) – Body ground	O – Body ground	Ignition power supply	Power switch 1: OFF → 2: ON (IG)	1: Below 1 V → 2: 10 to 14 V
ACC (T6–12) – Body ground	P – Body ground	Ignition power supply	Power switch 1: OFF → 2: ON (IG)	1: Below 1 V → 2: 10 to 14 V
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
CUWS (T6–5) – Body ground	B – Body ground	Halfway switch input	1: No key in key slot → 2: Key inserted	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

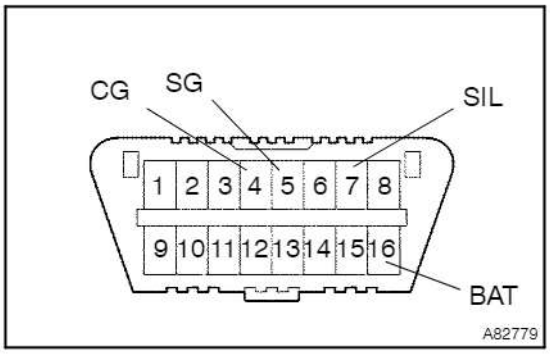
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05IFH-01

DIAGNOSIS SYSTEM

1. DESCRIPTION

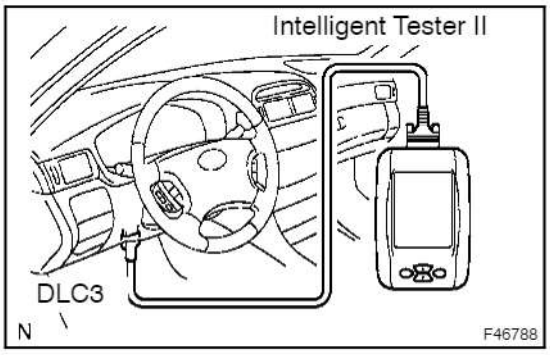
The multiplex network body ECU controls the function of the power door lock control system on the vehicle. Data of the power door lock control system and the Diagnostic Trouble Code (DTC) can be read in the Data Link Connector 3 (DLC3) of the vehicle.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the intelligent tester II to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If communication is normal when the intelligent tester II is connected to another vehicle, inspect the DLC3 on the original vehicle.

If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

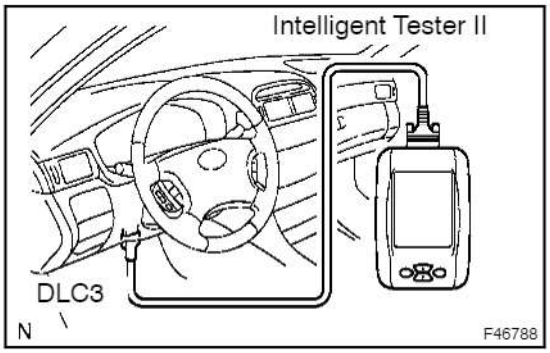
STANDARD: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

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05IFK–01

DTC CHECK/CLEAR



1. DTC CHECK

(a) Checking DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch to ON (IG).
  (3) Read the DTCs following the prompts on the tester screen.

HINT:
Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Clearing the DTCs.
(b) Connect the intelligent tester II to the DLC3.
  (1) Turn the power switch to ON (IG).
  (2) Operate the intelligent tester II to clear the codes.

HINT:
Refer to the intelligent tester II operator's manual for further details.

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05IFU-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the tester to the DLC3.

(b) Turn the power switch to ON (IG).

(c) Read the DATA LIST according to the display on the tester.

Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Back Dor Open	Luggage compartment door open judgment /PROHIBT or PERMIT	PROHIBT: Luggage compartment door opening is impossible PERMIT: Luggage compartment door opening is possible	–
D Dor Cty SW	Driver side door courtesy switch signal /ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	–
P Lock Pos SW	Passenger side door lock position switch signal /ON or OFF	ON: Passenger side door lock is in unlock position OFF: Passenger side door lock is in lock position	–
Rr Dor Cty SW	Rear door courtesy switch signal /ON or OFF	ON: Either right or left rear door is open OFF: Both right and left rear doors are closed	–
P Lock Pos SW	Passenger side door lock position switch signal /ON or OFF	ON: Passenger side door lock is in unlock position OFF: Passenger side door lock is in lock position	–
Rr Lock Pos SW	Rear door lock position switch signal /ON or OFF	ON: Rear door lock is in unlock position OFF: Rear door lock is in lock position	–
B Dor Open SW	Luggage compartment door opener switch signal /ON or OFF	ON: Luggage compartment door opener switch is pushed OFF: Luggage compartment door opener switch is not pushed	–
D Lock Pos SW	Driver side door lock position switch signal /ON or OFF	ON: Driver side door lock is in unlock position OFF: Driver side door lock is in lock position	–
D/L SW–Lock	Door control switch lock signal /ON or OFF	ON: Door control switch is in lock position OFF: Door control switch is not in lock position	–
D/L SW–Unlock	Door control switch unlock signal /ON or OFF	ON: Door control switch is in unlock position OFF: Door control switch is not in unlock position	–
Dor Key SW–Lock*	Driver door lock/unlock switch lock signal (key–linked–lock switch) /ON or OFF	ON: Driver side door key cylinder is turned to lock position OFF: Driver side door key cylinder is not turned to lock position	–
D Dor Key SW–UN*	Driver door lock/unlock switch unlock signal (key–linked–unlock switch) /ON or OFF	ON: Driver side door key cylinder is turned to unlock position OFF: Driver side door key cylinder is not turned to unlock position	–

*: Driver door only

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2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch to ON (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

Multiplex network body ECU:

Item	Test Details	Diagnostic Note
Door Lock	Operate door lock motor for all doors LOCK/UNLOCK	All doors are closed

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05IFM–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 page given for that circuit.

DTC No. (See Page)	Detection Item	Trouble Area
B1241 (05–1790)	Door Control Switch Circuit Diagnosis	• Power window regulator master switch assy (Door control switch) • Wire harness • Instrument panel J/B assy (Multiplex network body ECU)

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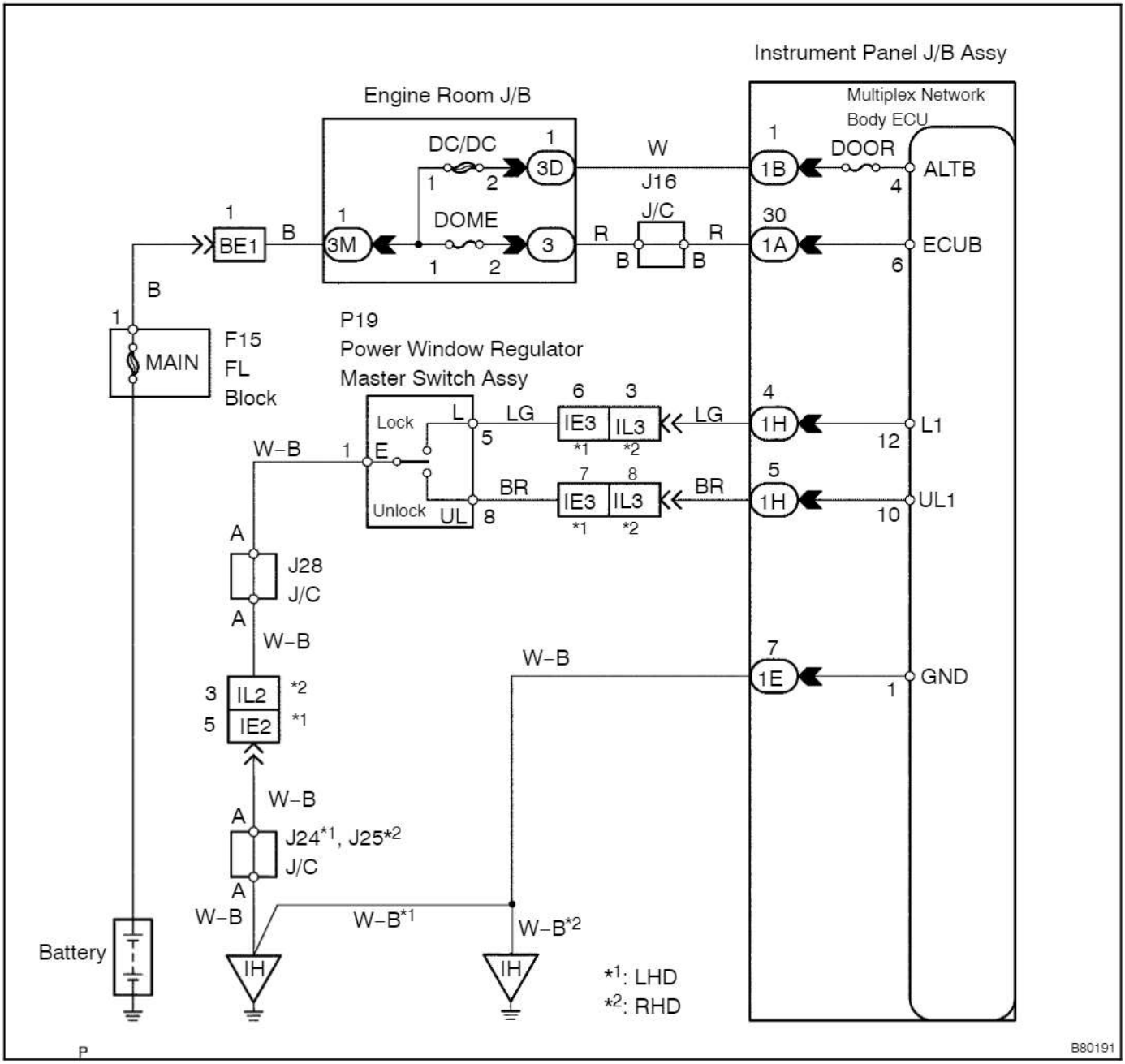
DTC B1241 BODY ECU SWITCH CIRCUIT DIAGNOSIS

CIRCUIT DESCRIPTION

This DTC shows how the switch works as follows:
If the DTC is not output when operating the switch, switch contact has failed. If a DTC is output when not operating the switch, it means the switch is ON (OFF) or stuck. When something wrong is found by this diagnosis, inspect each switch. Replace the switch if there is a problem or check the body ECU and wire harness.

DTC No.	DTC Detecting Condition	Trouble Area
B1241	Door control switch on master switch assembly is in lock/unlock position (ON) or stuck	• Power window regulator master switch assy • Instrument panel J/B assy (Multiplex network body ECU) • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT FUSE (DOOR)

(a) Remove the DOOR fuse from the instrument panel J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	READ VALUE OF INTELLIGENT TESTER II (DOOR CONTROL SWITCH)

(a) Check the DATA LIST for proper functioning of the door control switch.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D/L SW–Lock	Door control switch lock signal /ON or OFF	ON: Door control switch is in the LOCK position OFF: Door control switch is not in the LOCK position	–
D/L SW–Unlock	Door control switch unlock signal /ON or OFF	ON: Door control switch is in the UNLOCK position OFF: Door control switch is not in the UNLOCK position	–

OK: "ON" (door is locked/unlocked) appears on the screen.

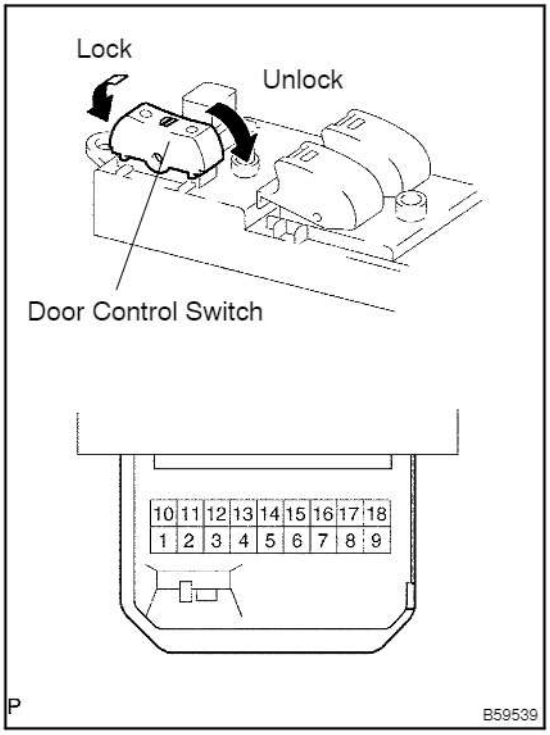
NG → **Go to step 3**

OK

Go to step 5

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3	INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR CONTROL SWITCH)



(a) Measure the resistance of the door control switch.

Standard:

Tester Connection	Door Lock Condition	Specified Condition
1 – 5	Lock	Below 1 Ω
1 – 5 1 – 8	OFF	10 kΩ or higher
1 – 8	Unlock	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY**

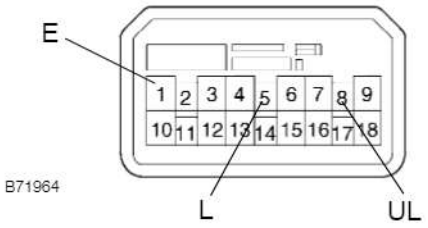
OK

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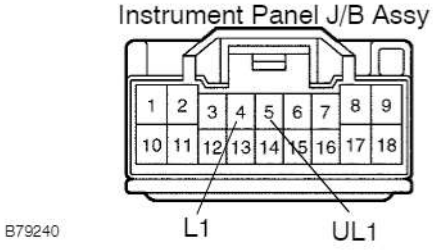
4	CHECK WIRE HARNESS (POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR CONTROL SWITCH) – INSTRUMENT PANEL J/B ASSY AND BODY GROUND)

Wire Harness Side

P19
Power Window Regulator
Master Switch Assy



1H
Instrument Panel J/B Assy



B79546

(a) Disconnect the P19 switch and 1H J/B connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P19–5 (L) – 1H–4 (L1)	Below 1 Ω
P19–8 (UL) – 1H–5 (UL1)	Below 1 Ω
P19–1 (E) – Body ground	Below 1 Ω

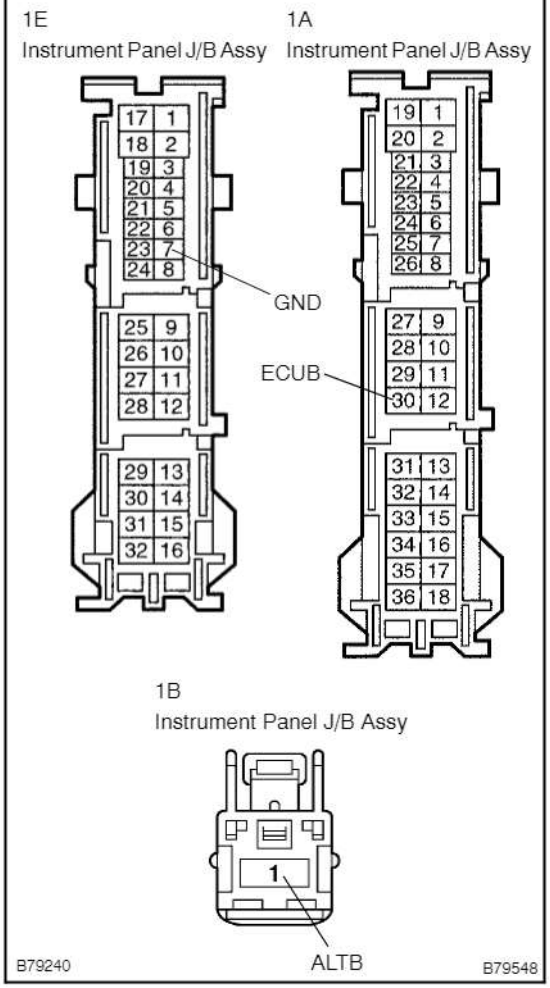
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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5	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B ASSY – BODY GROUND)

Wire Harness Side



(a) Disconnect the 1A, 1B and 1E J/B connectors.

(b) Measure the resistance and voltage of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
1B–1 (ALTB) – Body ground	10 to 14 V
1A–30 (ECUB) – Body ground	10 to 14 V
1E–7 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

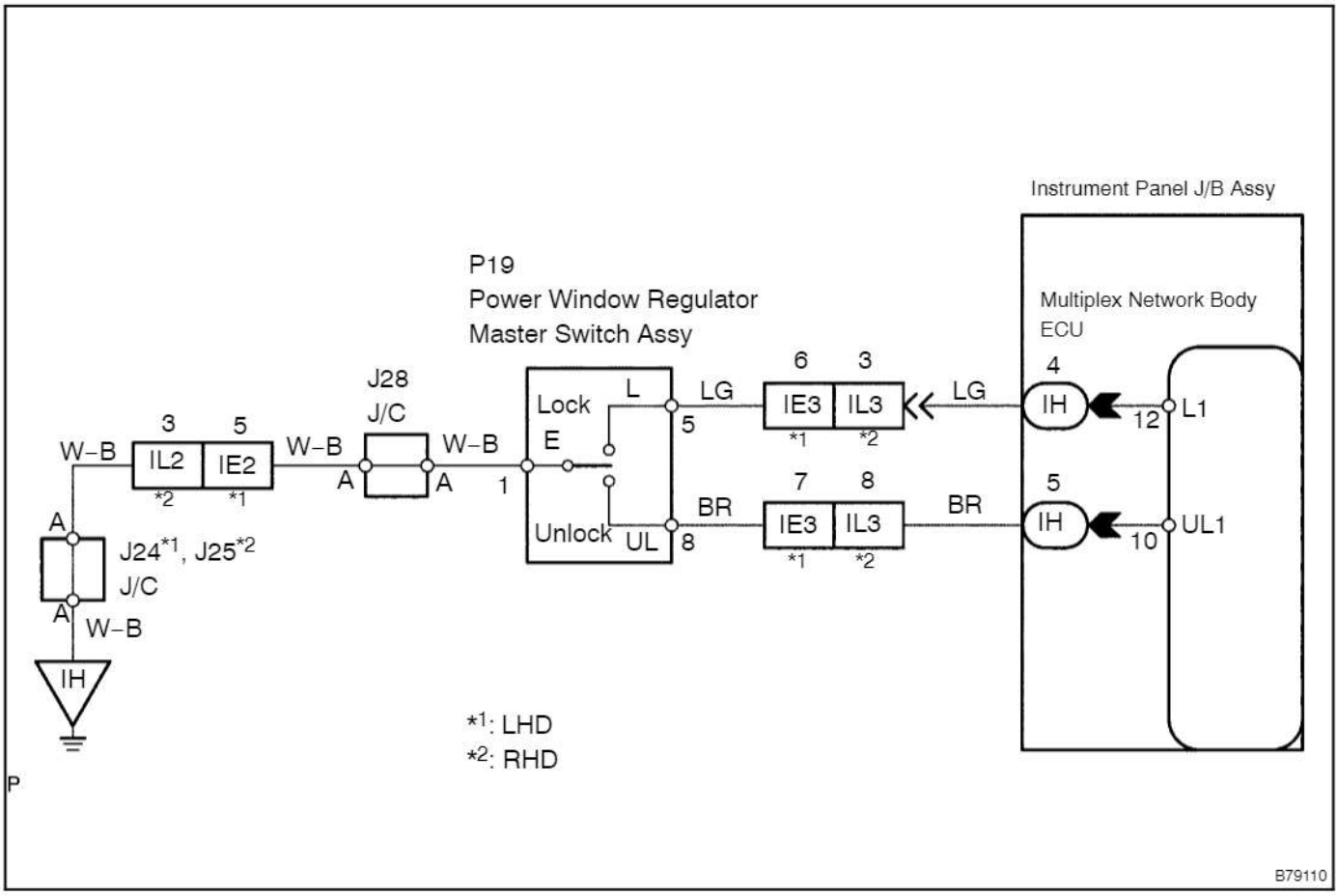
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ALL DOORS LOCK/UNLOCK FUNCTIONS DO NOT OPERATE VIA MASTER SWITCH

CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives switch signals from the power window regulator master switch assy and activates the door lock motors on each door according to the signals.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II (DOOR CONTROL SWITCH)

(a) Check the DATA LIST for proper functioning of the door control switch.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D/L SW–Lock	Door control switch lock signal /ON or OFF	ON: Door control switch is in the LOCK position OFF: Door control switch is not in the LOCK position	–
D/L SW–Unlock	Door control switch unlock signal /ON or OFF	ON: Door control switch is in the UNLOCK position OFF: Door control switch is not in the UNLOCK position	–

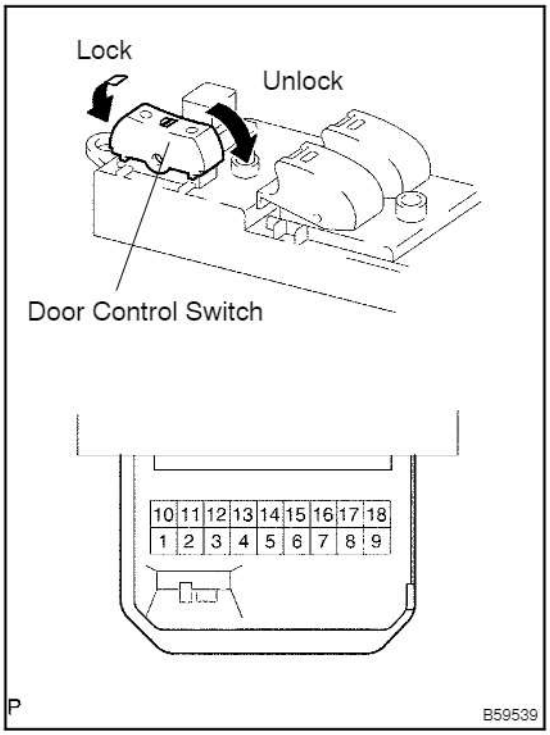
OK: "ON" (door is locked/unlocked) appears on the screen.

NG → **Go to step 2**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

2	INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR CONTROL SWITCH)



(a) Measure the resistance of the door control switch.
Standard:

Tester Connection	Door Lock Condition	Specified Condition
1 – 5	Lock	Below 1 Ω
1 – 5 1 – 8	OFF	10 kΩ or higher
1 – 8	Unlock	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY**

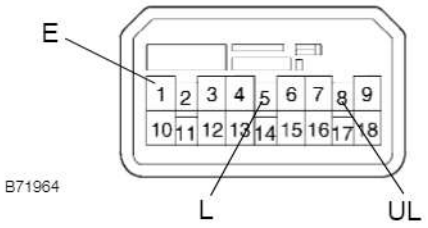
OK

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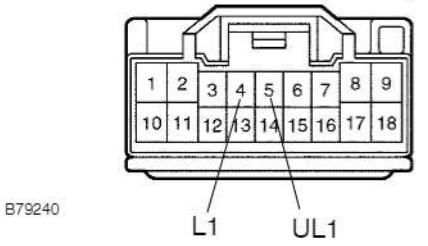
3	CHECK WIRE HARNESS (POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR CONTROL SWITCH) – INSTRUMENT PANEL J/B ASSY AND BODY GROUND)

Wire Harness Side

P19
Power Window Regulator
Master Switch Assy



1H
Instrument Panel J/B Assy



B79546

(a) Disconnect the P19 switch and 1H J/B connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P19–5 (L) – 1H–4 (L1)	Below 1 Ω
P19–8 (UL) – 1H–5 (UL1)	Below 1 Ω
P19–1 (E) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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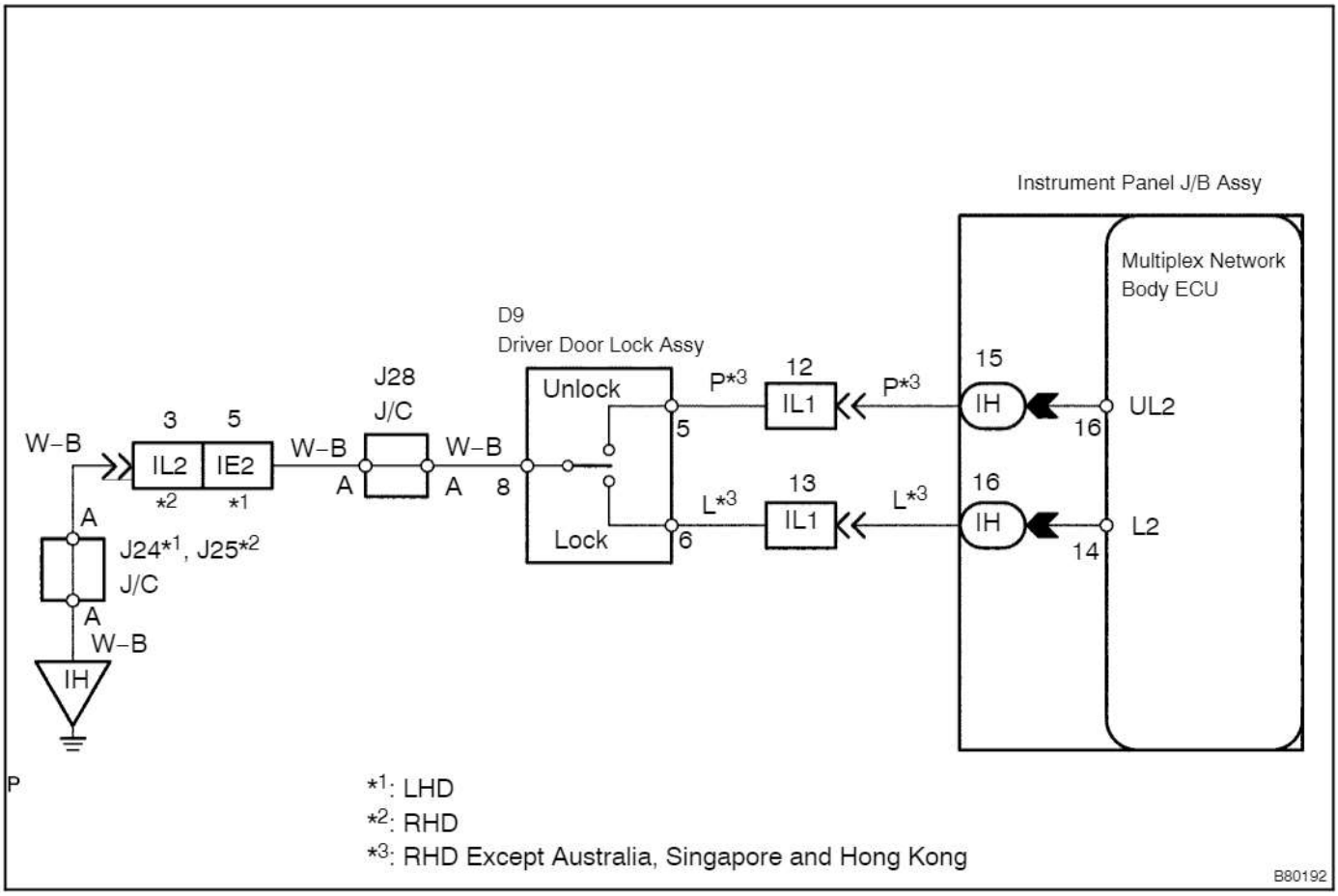
ALL DOORS LOCK/UNLOCK FUNCTIONS DO NOT OPERATE VIA DRIVER SIDE DOOR KEY CYLINDER*

*: RHD models except Australia, Singapore and Hong Kong

CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives switch signals from the door–key–linked lock/unlock switch and activates the door lock motor according to the signals.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II (KEY–LINKED–LOCK/UNLOCK SWITCH)

(a) Check the DATA LIST for proper functioning of the key–linked–lock/unlock switch.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Dor Key SW–Lock	Driver door lock/unlock switch lock signal (key–linked–lock switch) /ON or OFF	ON: Driver side door key cylinder is turned to lock position OFF: Driver side door key cylinder is not turned to lock position	–
D Dor Key SW–UN	Driver door lock/unlock switch unlock signal (key–linked–unlock switch) /ON or OFF	ON: Driver side door key cylinder is turned to unlock position OFF: Driver side door key cylinder is not turned to unlock position	–

OK: "ON" (door is locked/unlocked) appears on the screen.

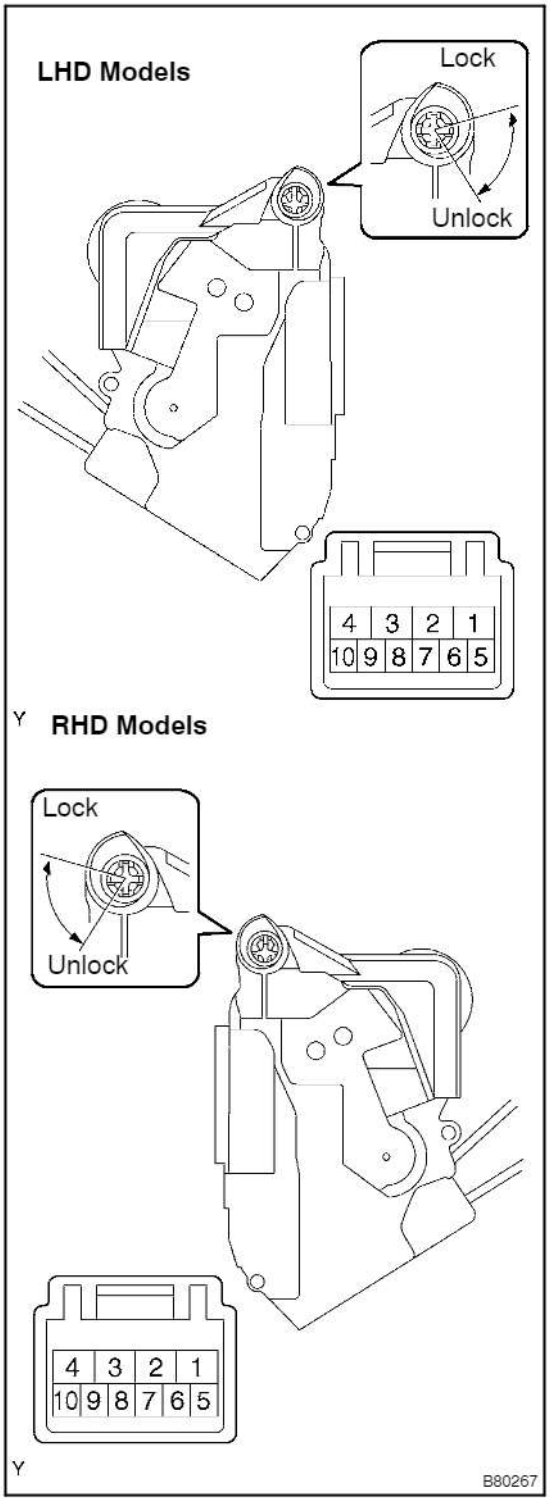
NG → **Go to step 2**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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2 INSPECT DRIVER DOOR LOCK ASSY (DOOR LOCK AND UNLOCK SWITCH)



(a) Measure the resistance of the door lock and unlock switch.

Standard:

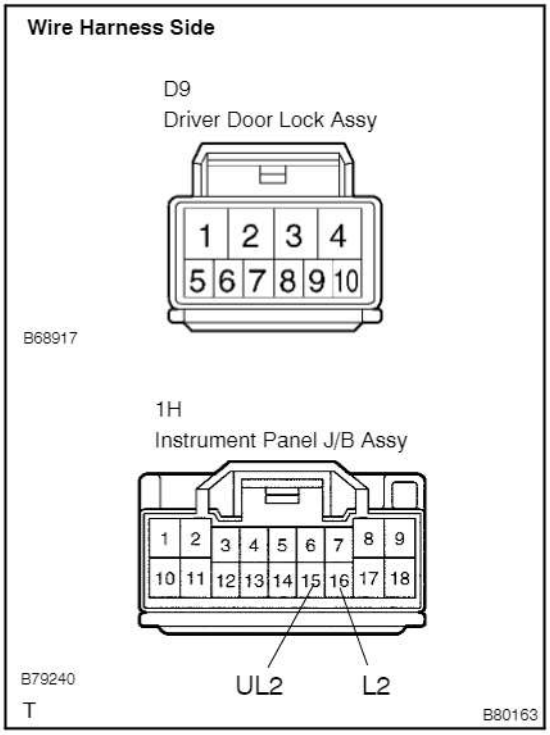
Tester Connection	Switch Condition	Specified Condition
6 – 8	Lock	Below 1 Ω
5 – 8 6 – 8	OFF	10 kΩ or higher
5 – 8	Unlock	Below 1 Ω

NG → **REPLACE DRIVER DOOR LOCK ASSY**

OK

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3	CHECK WIRE HARNESS (DRIVER DOOR LOCK ASSY – INSTRUMENT PANEL J/B ASSY AND BODY GROUND)



(a) Disconnect the D9 lock and 1H J/B connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
D9–6 – 1H–16 (L2)	Below 1 Ω
D9–5 – 1H–15 (UL2)	Below 1 Ω
D9–8 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

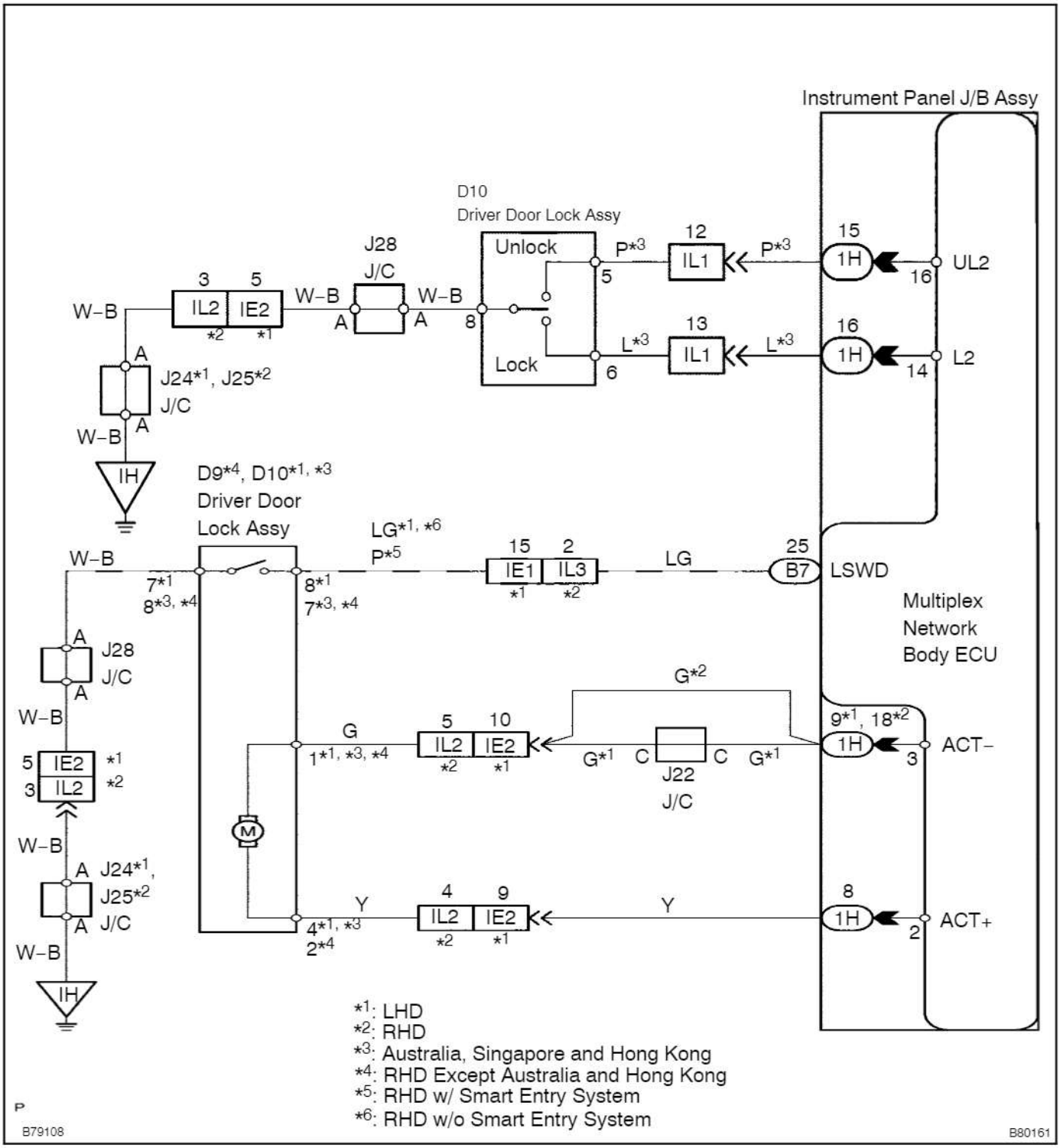
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ONLY DRIVER DOOR LOCK/UNLOCK FUNCTIONS DO NOT OPERATE

CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives lock/unlock switch signals and activates the door lock motor according to the signals.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the power door lock operates.

Multiplex network body ECU:

Item	Test Details	Diagnostic Note
Door Lock	Operate door lock motor for all doors LOCK/UNLOCK	All doors are closed

OK: Door can lock/unlock.

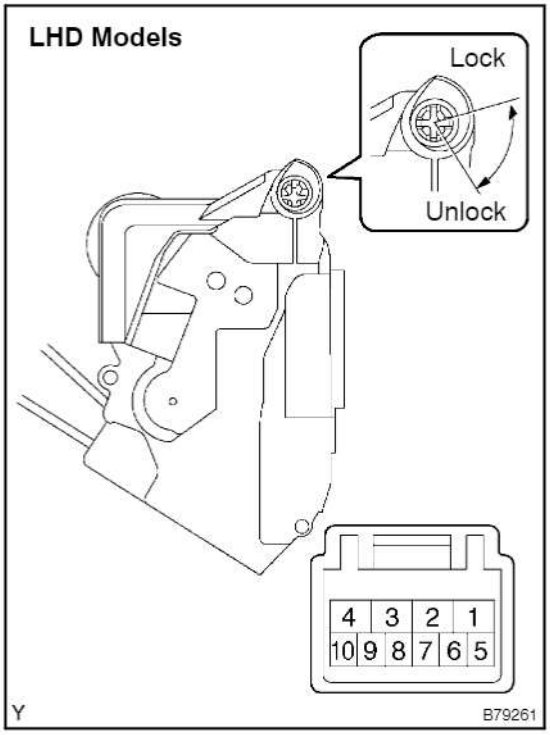
NG → **Go to step 2**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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2	INSPECT DRIVER DOOR LOCK ASSY (DOOR LOCK AND UNLOCK SWITCH AND POSITION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and position switch.

Standard:

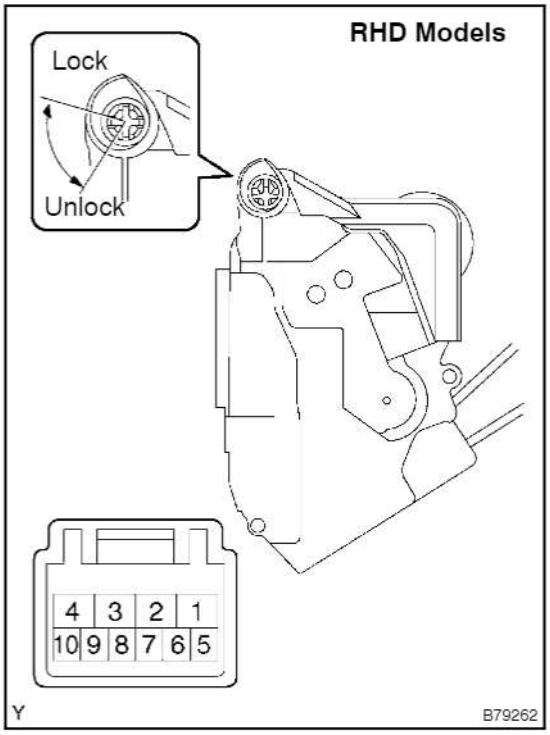
Door lock and unlock switch

(RHD models except Australia, Singapore and Hong Kong)

Tester Connection	Switch Condition	Specified Condition
6 – 8	Lock	Below 1 Ω
5 – 8 6 – 8	OFF	10 kΩ or higher
5 – 8	Unlock	Below 1 Ω

Position Switch

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

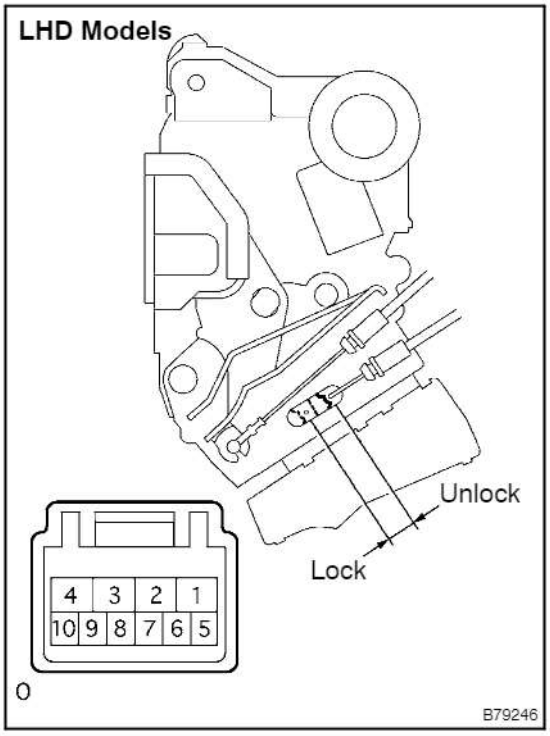


NG → REPLACE DRIVER DOOR LOCK ASSY

OK

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3 INSPECT DRIVER DOOR LOCK ASSY (DOOR LOCK MOTOR)



(a) Apply battery voltage to the door lock and check operation of the door lock motor.

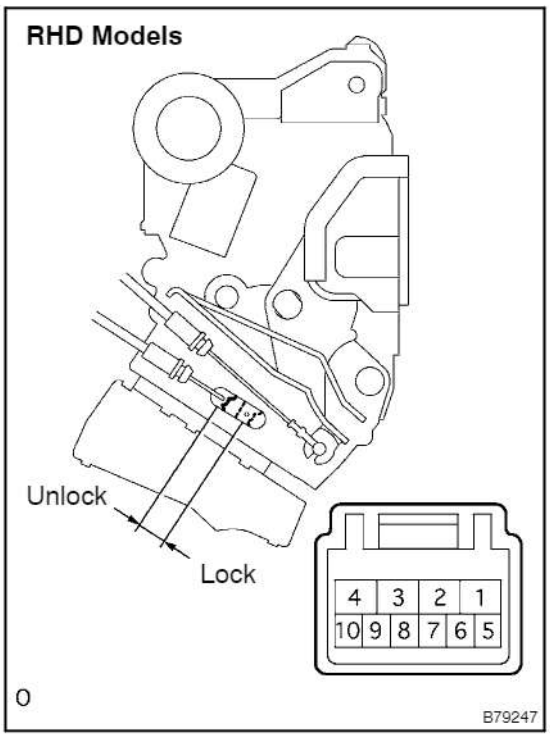
OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

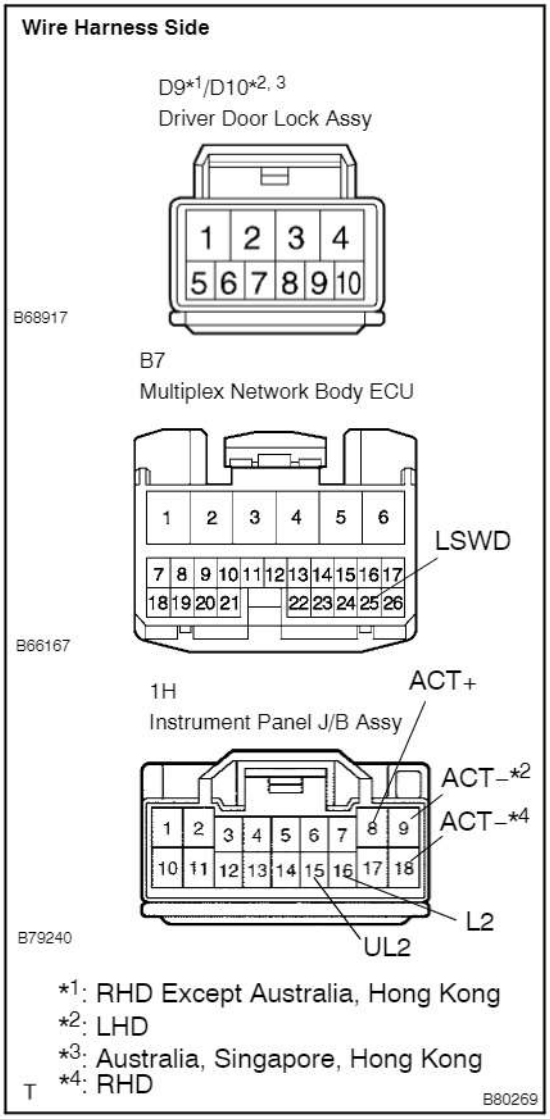


NG → REPLACE DRIVER DOOR LOCK ASSY

OK

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4	CHECK WIRE HARNESS (DRIVER DOOR LOCK ASSY – MULTIPLEX NETWORK BODY ECU, INSTRUMENT PANEL J/B ASSY AND BODY GROUND)



(a) Disconnect the D9/D10 lock, B7 ECU and 1H J/B connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

(LHD models)

Tester Connection	Specified Condition
D10–4 – 1H–8 (ACT+)	Below 1 Ω
D10–1 – 1H–9 (ACT–)	Below 1 Ω
D10–8 – B7–25 (LSWD)	Below 1 Ω
D10–7 – Body ground	Below 1 Ω

(Australia, Singapore and Hong Kong models)

Tester Connection	Specified Condition
D10–4 – 1H–8 (ACT+)	Below 1 Ω
D10–1 – 1H–18 (ACT–)	Below 1 Ω
D10–7 – B7–25 (LSWD)	Below 1 Ω
D10–6 – 1H–16 (L2)	Below 1 Ω
D10–5 – 1H–15 (UL2)	Below 1 Ω
D10–8 – Body ground	Below 1 Ω

(RHD models except Australia, Singapore and Hong Kong)

Tester Connection	Specified Condition
D9–2 – 1H–8 (ACT+)	Below 1 Ω
D9–1 – 1H–18 (ACT–)	Below 1 Ω
D9–7 – B7–25 (LSWD)	Below 1 Ω
D9–6 – 1H–16 (L2)	Below 1 Ω
D9–8 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

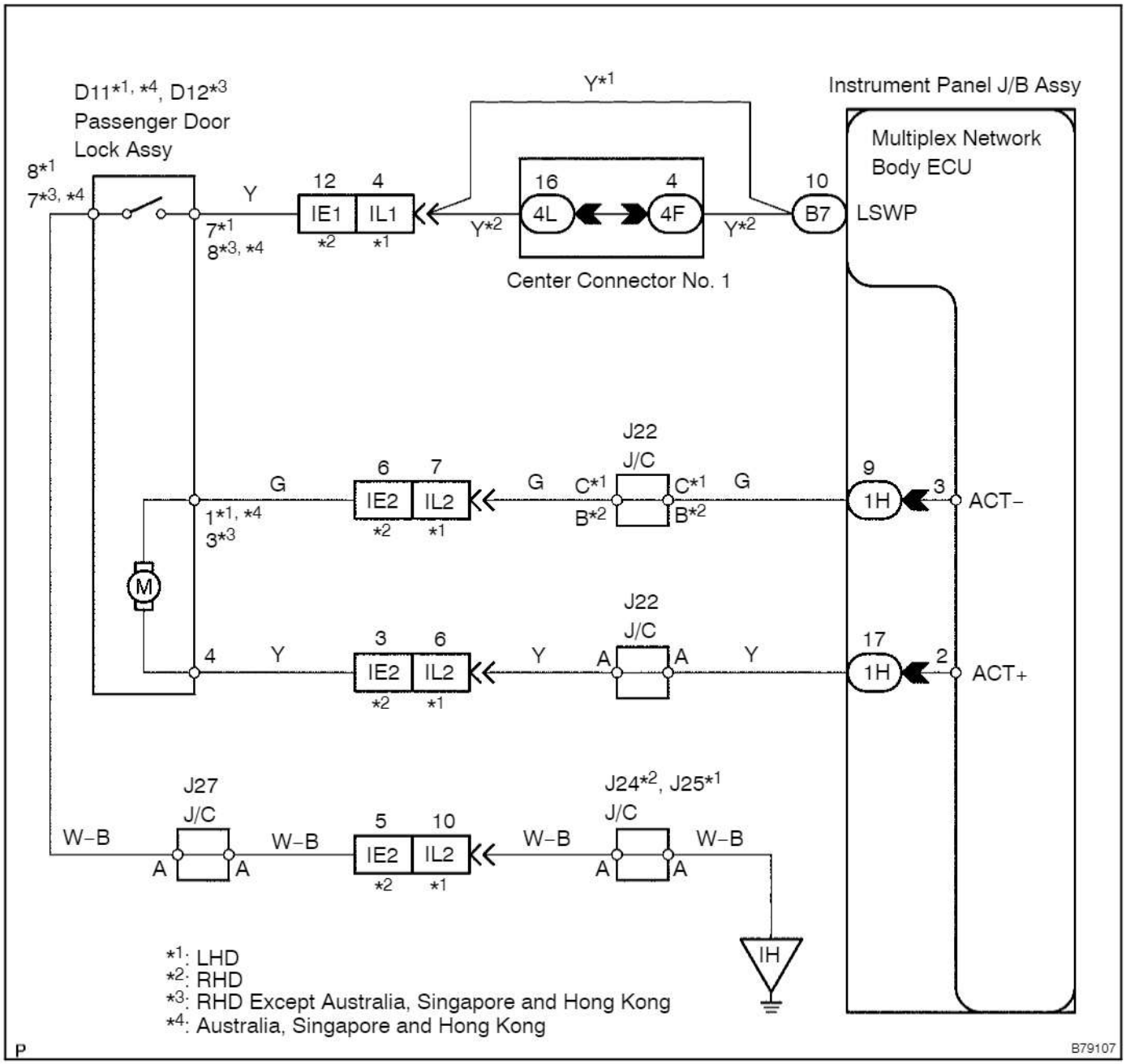
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ONLY PASSENGER DOOR LOCK/UNLOCK FUNCTIONS DO NOT OPERATE

CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives lock/unlock switch signals and activates the door lock motor according to the signals.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the power door lock operates.

Multiplex network body ECU:

Item	Test Details	Diagnostic Note
Door Lock	Operate door lock motor for all doors LOCK/UNLOCK	All doors are closed

OK: Door can lock/unlock.

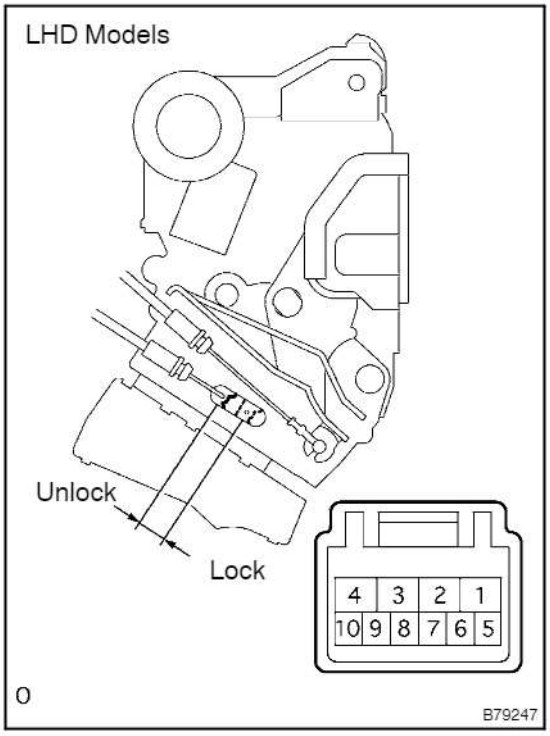
NG → **Go to step 2**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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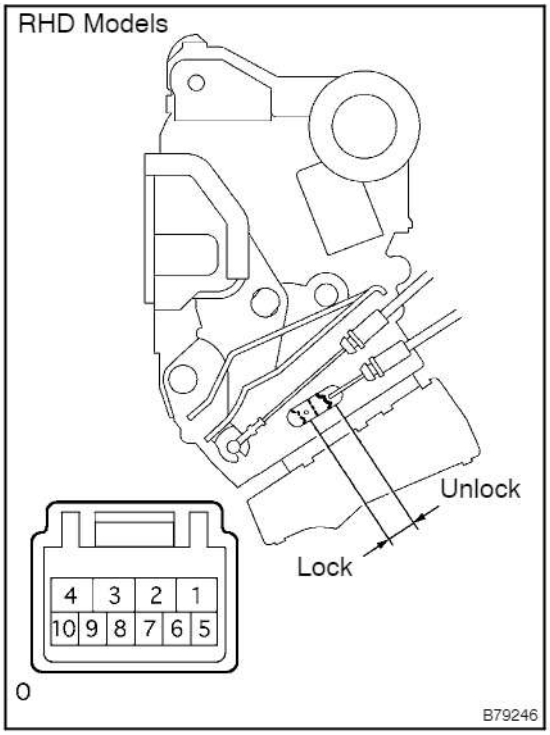
2 INSPECT PASSENGER DOOR LOCK ASSY (POSITION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and position switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

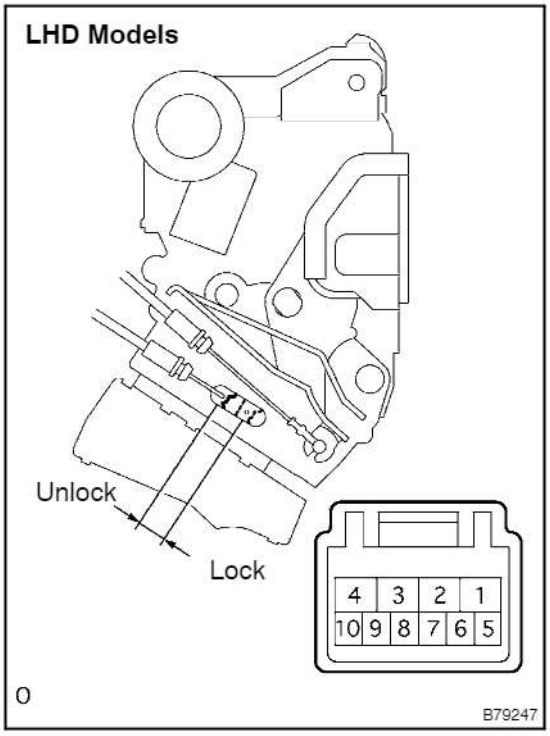


NG → **REPLACE PASSENGER DOOR LOCK ASSY**

OK

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3 INSPECT PASSENGER DOOR LOCK ASSY (DOOR LOCK MOTOR)



(a) Apply battery voltage to the door lock and check operation of the door lock motor.

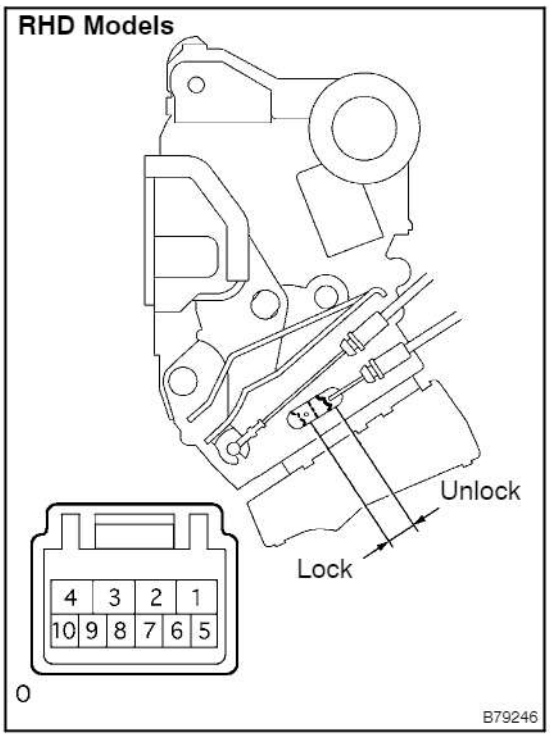
OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

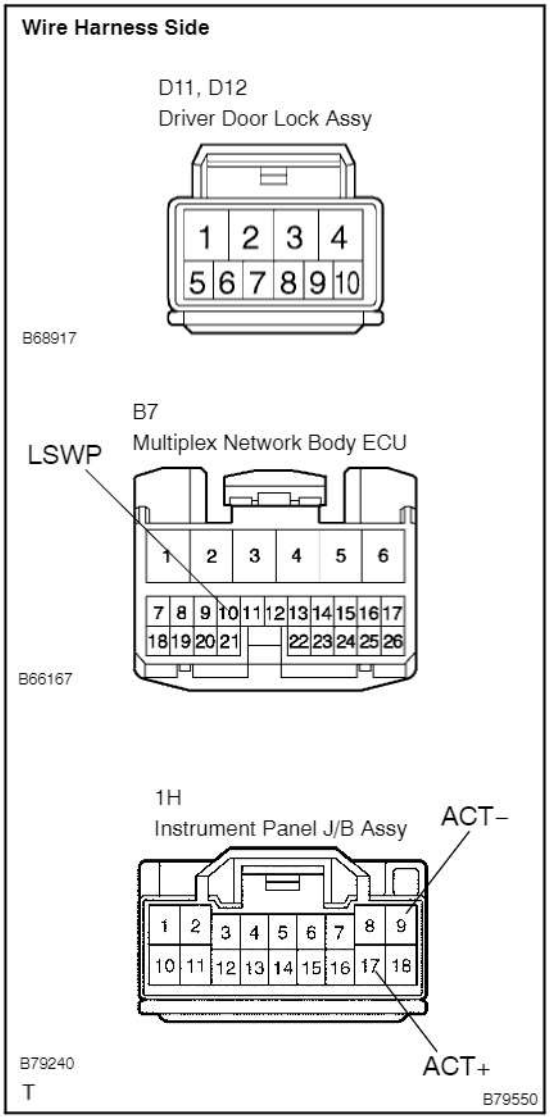


NG → REPLACE PASSENGER DOOR LOCK ASSY

OK

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4	CHECK WIRE HARNESS (PASSENGER DOOR LOCK ASSY – MULTIPLEX NETWORK BODY ECU, INSTRUMENT PANEL J/B ASSY AND BODY GROUND)



(a) Disconnect the D11*1, *2 or D12*3 lock, B7 ECU and 1H J/B connectors.

HINT:
*1: LHD
*2: Australia, Singapore and HongKong
*3: RHD Except Australia, Singapore and Hong Kong

(b) Measure the resistance of the wire harness side connectors.

Standard:

LHD models

Tester Connection	Specified Condition
D11–4 – 1H–17 (ACT+)	Below 1 Ω
D11–1 – 1H–9 (ACT–)	Below 1 Ω
D11–7 – B7–10 (LSWP)	Below 1 Ω
D11–8 – Body ground	Below 1 Ω

Australia, Singapore and Hong Kong models

Tester Connection	Specified Condition
D11–4 – 1H–17 (ACT+)	Below 1 Ω
D11–1 – 1H–9 (ACT–)	Below 1 Ω
D11–8 – B7–10 (LSWP)	Below 1 Ω
D11–7 – Body ground	Below 1 Ω

RHD models except Australia, Singapore and Hong Kong

Tester Connection	Specified Condition
D12–4 – 1H–17 (ACT+)	Below 1 Ω
D12–3 – 1H–9 (ACT–)	Below 1 Ω
D12–8 – B7–10 (LSWP)	Below 1 Ω
D12–7 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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ONLY REAR LH DOOR LOCK/UNLOCK FUNCTIONS DO NOT OPERATE

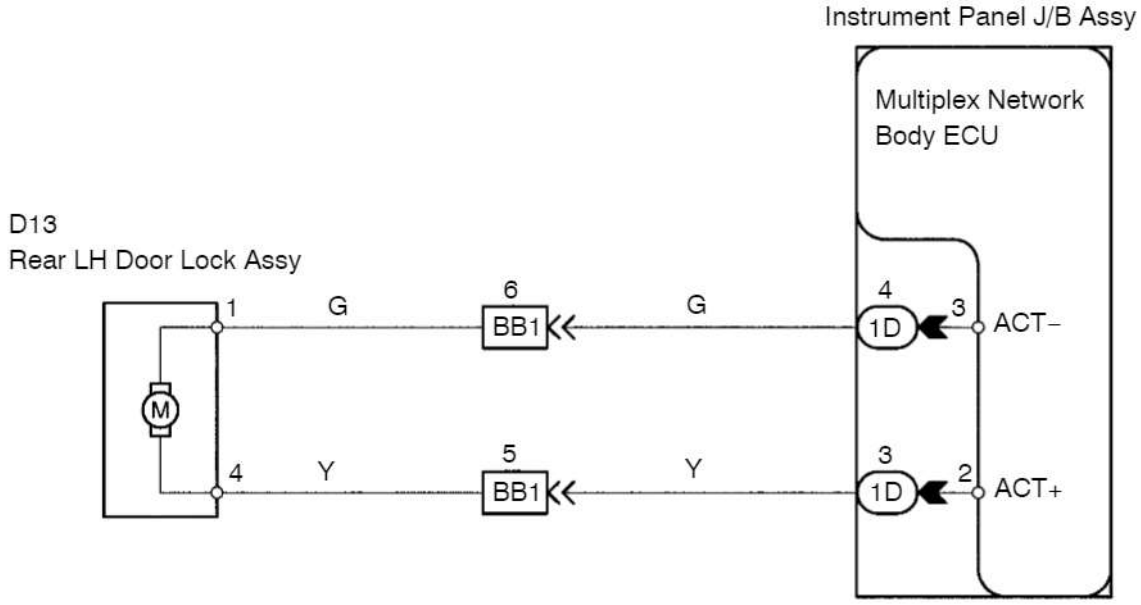
CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives lock/unlock switch signals and activates the door lock motor according to the signals.

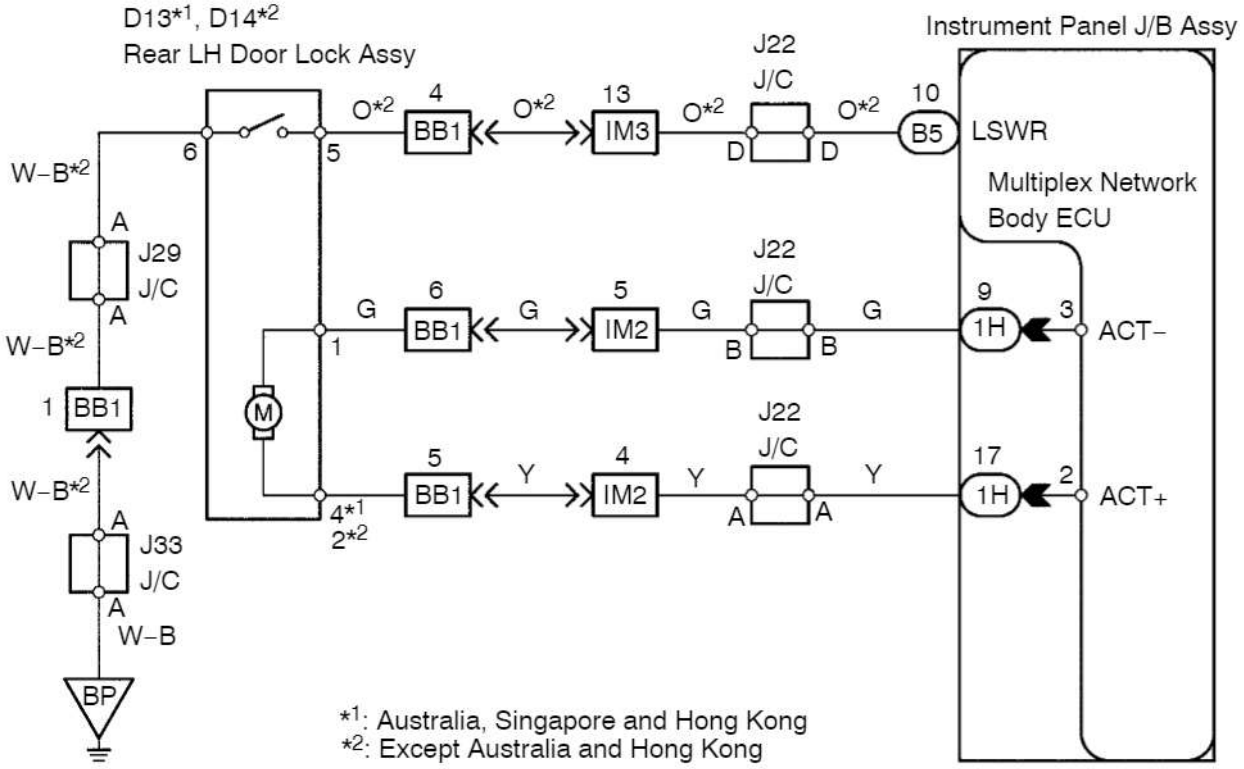
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WIRING DIAGRAM

LHD models:



RHD models:



P

B79106

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INSPECTION PROCEDURE

1 PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the power door lock operates.

Multiplex network body ECU:

Item	Test Details	Diagnostic Note
Door Lock	Operate door lock motor for all doors LOCK/UNLOCK	All doors are closed

OK: Door can lock/unlock.

NG → **Go to step 2*1**

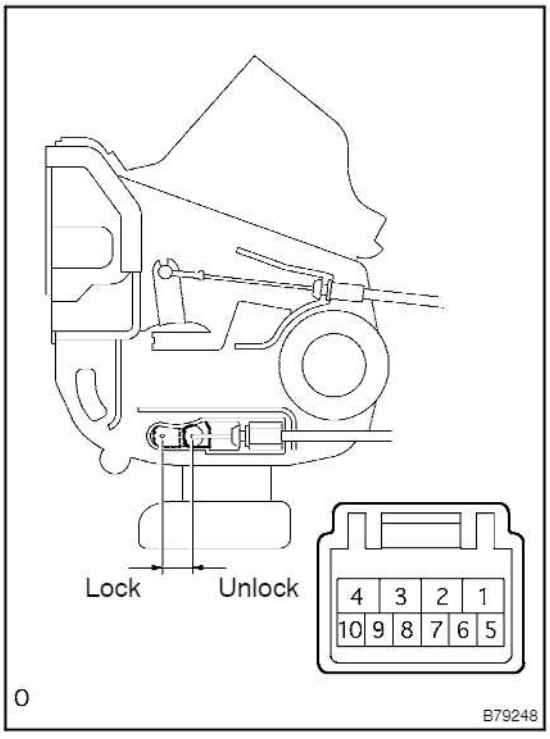
NG → **Go to step 3*2**

HINT:
*1: Except *2
*2: RHD models except Australis, Singapore and Hong Kong

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

2 INSPECT REAR DOOR LOCK ASSY LH (POSITION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and position switch.

Standard:

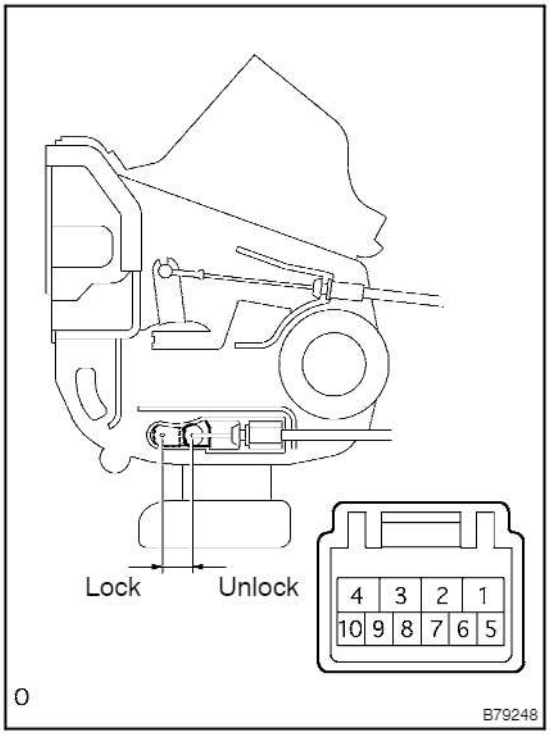
Tester Connection	Switch Condition	Specified Condition
5 – 6	Lock	10 kΩ or higher
5 – 6	Unlock	Below 1 Ω

NG → **REPLACE REAR DOOR LOCK ASSY LH**

OK

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3 INSPECT REAR DOOR LOCK ASSY LH (DOOR LOCK MOTOR)



(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

NG → **REPLACE REAR DOOR LOCK ASSY LH**

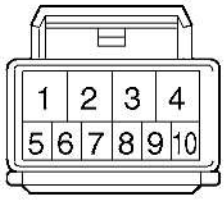
OK

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4	CHECK WIRE HARNESS (REAR DOOR LOCK ASSY LH – MULTIPLEX NETWORK BODY ECU, INSTRUMENT PANEL J/B ASSY AND BODY GROUND)

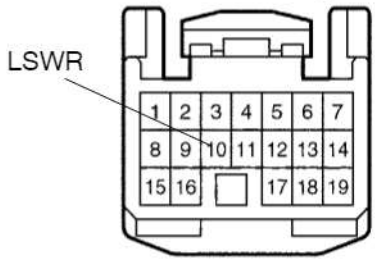
Wire Harness Side

D13/D14
Rear Door Lock Assy LH



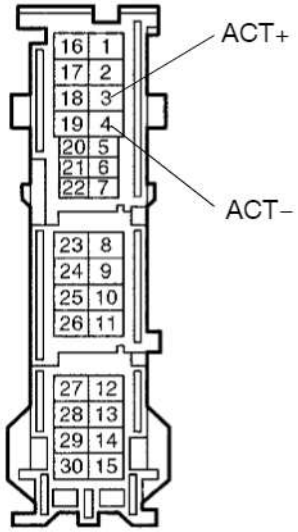
B68917

B5
Multiplex Network Body ECU



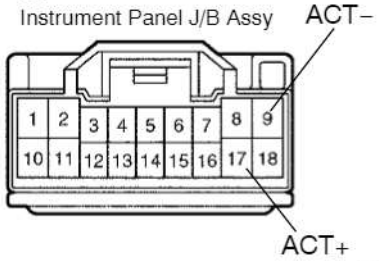
B79240

1D
Instrument Panel J/B Assy



B79240

1H
Instrument Panel J/B Assy



B79240

B80164

(a) Disconnect the D13*1/D14*2 lock, B5 ECU and 1D or 1H J/B connectors.

HINT:
*1: Australia, Singapore, Hong Kong
*2: Except Australia, Hong Kong

(b) Measure the resistance of the wire harness side connectors.

Standard:

LHD models

Tester Connection	Specified Condition
D13–4 – 1D–3 (ACT+)	Below 1 Ω
D13–1 – 1D–4 (ACT–)	Below 1 Ω
D13–6 – Body ground	Below 1 Ω

Australia, Singapore and Hong Kong models

Tester Connection	Specified Condition
D13–4 – 1H–17 (ACT+)	Below 1 Ω
D13–1 – 1H–9 (ACT–)	Below 1 Ω
D13–6 – Body ground	Below 1 Ω

RHD models except Australia, Singapore and Hong Kong

Tester Connection	Specified Condition
D14–2 – 1H–17 (ACT+)	Below 1 Ω
D14–1 – 1H–9 (ACT–)	Below 1 Ω
D14–5 – B5–10 (LSWR)	Below 1 Ω
D14–6 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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ONLY REAR RH DOOR LOCK/UNLOCK FUNCTIONS DO NOT OPERATE

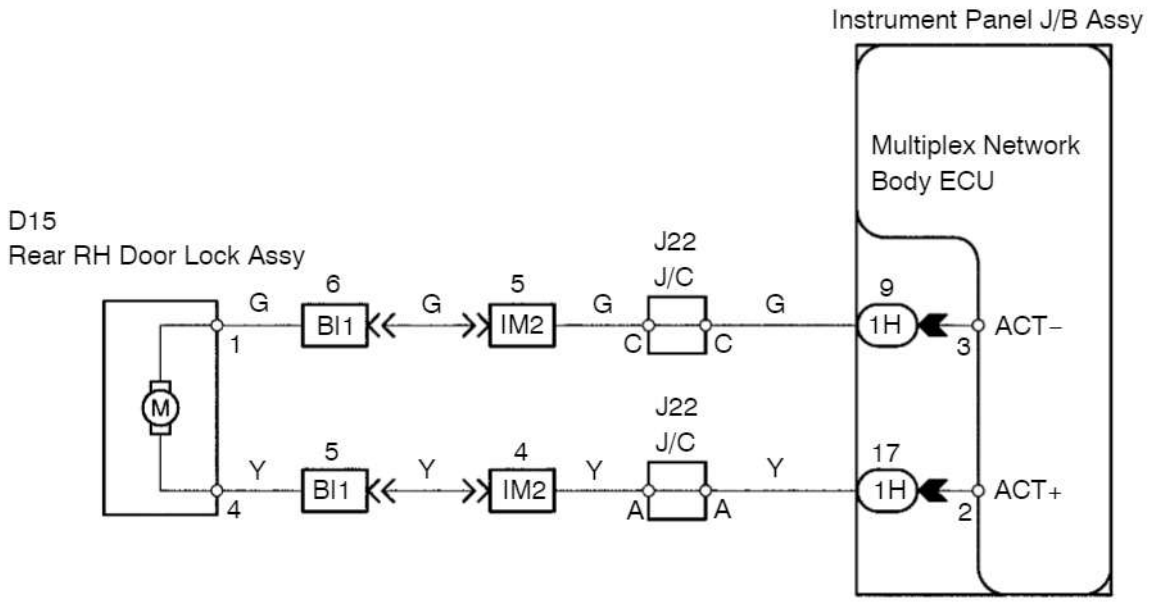
CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives lock/unlock switch signals and activates the door lock motor according to the signals.

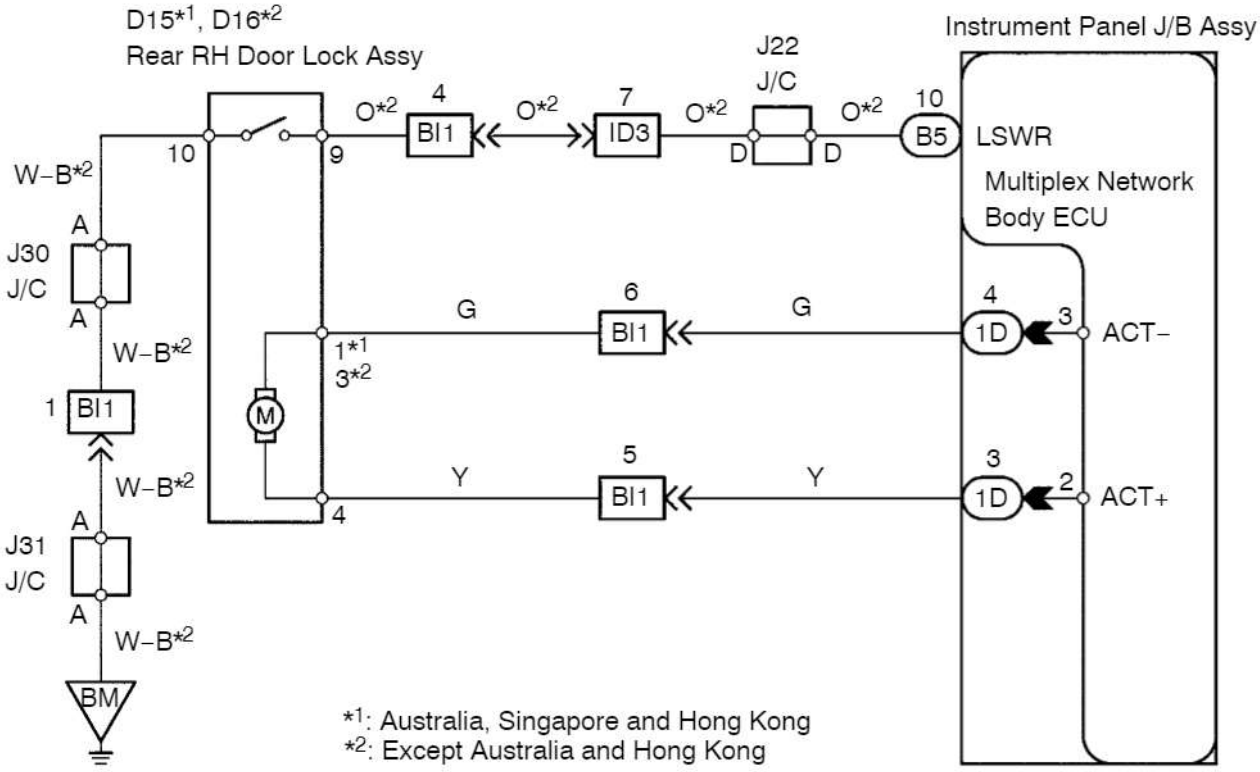
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WIRING DIAGRAM

LHD models



RHD models



P B79105

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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the power door lock operates.

Multiplex network body ECU (Driver door ECU):

Item	Test Details	Diagnostic Note
Door Lock	Operate door lock motor for all doors LOCK/UNLOCK	All doors are closed

OK: Door can lock/unlock.

NG → **Go to step 2*1**

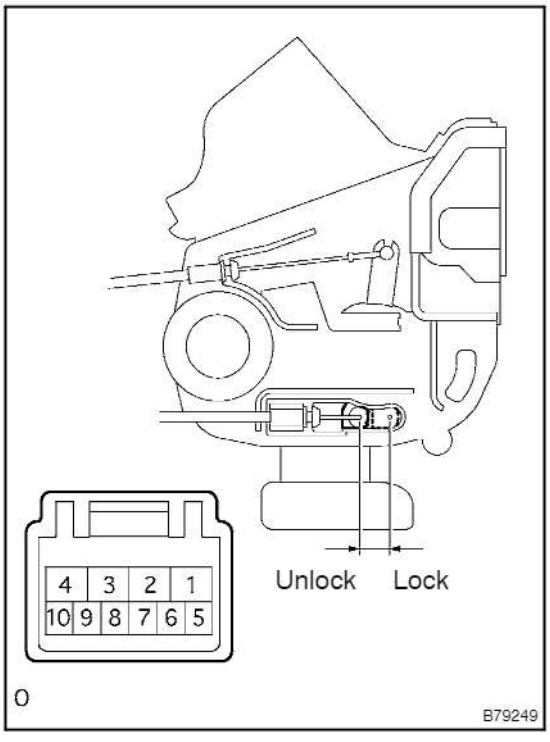
NG → **Go to step 3*2**

HINT:
*1: Except *2
*2: RHD models except Australis, Singapore and Hong Kong

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

2	INSPECT REAR DOOR LOCK ASSY RH (POSITION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and position switch.

Standard

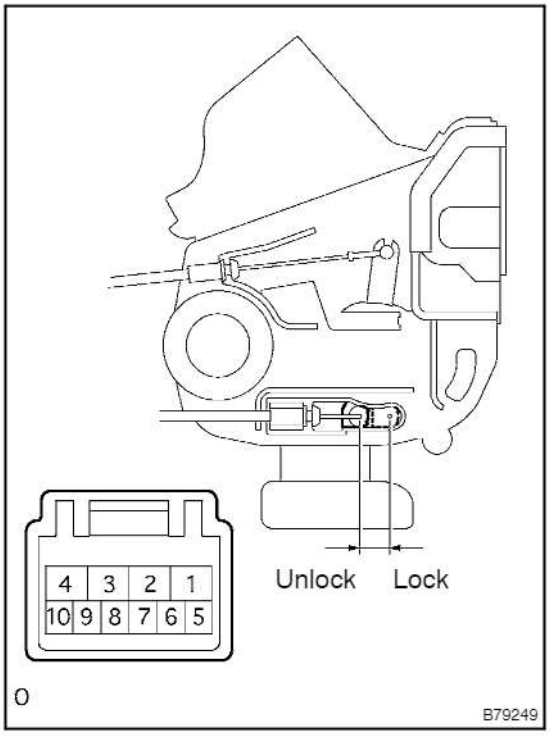
Tester Connection	Switch Condition	Specified Condition
9 – 10	Lock	10 kΩ or higher
9 – 10	Unlock	Below 1 Ω

NG → **REPLACE REAR DOOR LOCK ASSY RH**

OK

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3 INSPECT REAR DOOR LOCK ASSY RH (DOOR LOCK MOTOR)



(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

NG → **REPLACE REAR DOOR LOCK ASSY RH**

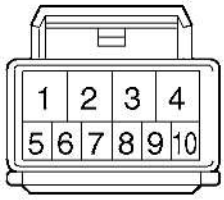
OK

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4	CHECK WIRE HARNESS (REAR DOOR LOCK ASSY RH – MULTIPLEX NETWORK BODY ECU, INSTRUMENT PANEL J/B ASSY AND BODY GROUND)

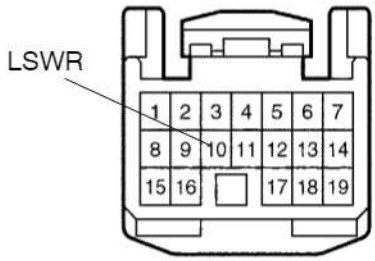
Wire Harness Side

D15, D16
Rear Door Lock Assy RH



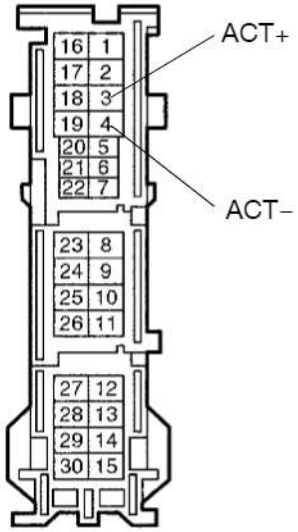
B68917

B5
Multiplex Network Body ECU



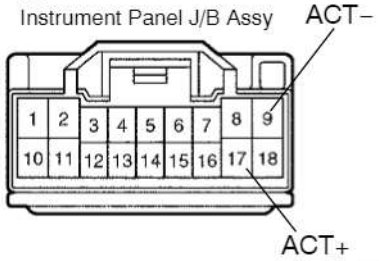
B79240

1D
Instrument Panel J/B Assy



B79240

1H
Instrument Panel J/B Assy



B79240

B80164

(a) Disconnect the D15*1,2 or D16*3 lock, B5 ECU and 1D or 1H J/B connectors.

HINT:
*1: LHD
*2: RHD Ausyralia, Singapore, Hong Kong
*3: RHD Except Australia, Hong Kong

(b) Measure the resistance of the wire harness side connectors.

Standard:

LHD models

Tester Connection	Specified Condition
D15–4 – 1H–17 (ACT+)	Below 1 Ω
D15–1 – 1H–9 (ACT–)	Below 1 Ω
D15–10 – Body ground	Below 1 Ω

Australia, Singapore and Hong Kong models

Tester Connection	Specified Condition
D15–4 – 1D–3 (ACT+)	Below 1 Ω
D15–1 – 1D–4 (ACT–)	Below 1 Ω
D15–10 – Body ground	Below 1 Ω

RHD models except Australia, Singapore and Hong Kong

Tester Connection	Specified Condition
D16–4 – 1D–3 (ACT+)	Below 1 Ω
D16–3 – 1D–4 (ACT–)	Below 1 Ω
D16–9 – B5–10 (LSWR)	Below 1 Ω
D16–10 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

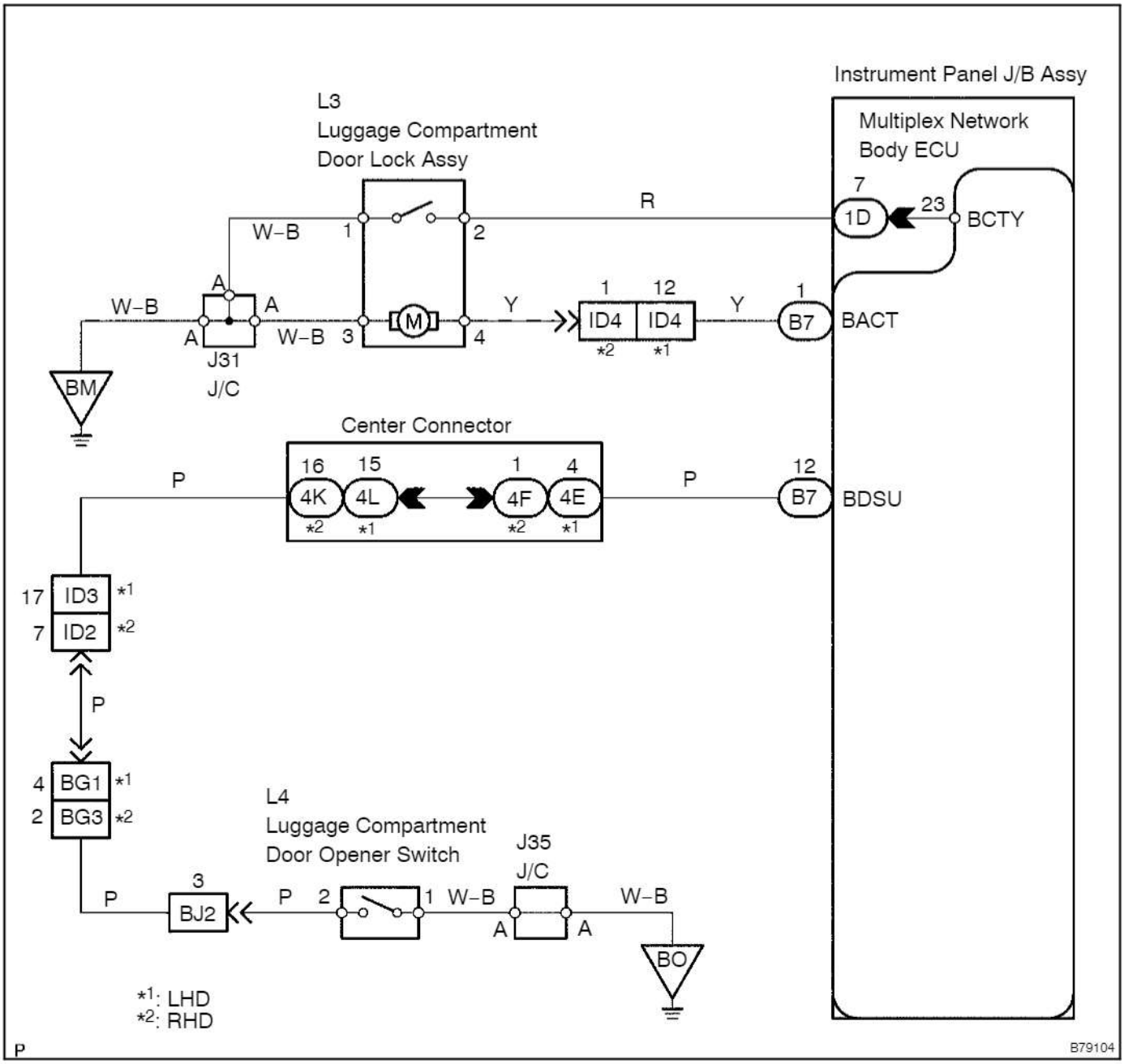
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ONLY LUGGAGE DOOR LOCK/UNLOCK FUNCTIONS DO NOT OPERATE

CIRCUIT DESCRIPTION

The instrument panel J/B assy (multiplex network body ECU) receives switch signals from the power window regulator master switch assy and activates the luggage compartment door lock motor according to the signals.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II (LUGGAGE COMPARTMENT DOOR OPENER SWITCH AND DOOR OPEN JUDGMENT)

(a) Check the DATA LIST for proper functioning of the luggage compartment door opener switch.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
B Dor Open SW	Luggage compartment door opener switch signal /ON or OFF	ON: Luggage compartment door opener switch is pushed OFF: Luggage compartment door opener switch is not pushed	–

OK: "ON" (luggage compartment door opener switch is pushed) appears on the screen.

NG → **Go to step 2**

(b) Check the DATA LIST for proper functioning of the luggage compartment door open judgment.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Back Dor Open	Luggage compartment door open judgment /PROHIBT or PERMIT	PROHIBT: Luggage compartment door opening is impossible PERMIT: Luggage compartment door opening is possible	–

OK: "PERMIT" (luggage compartment door can be opened) appears on the screen.

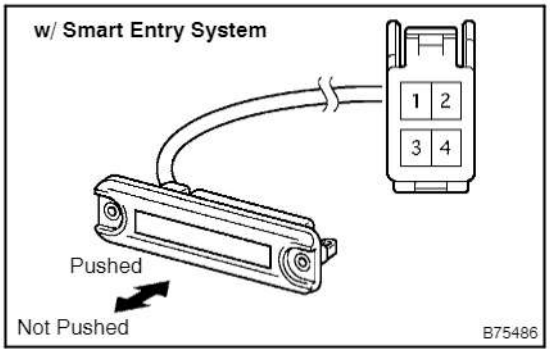
NG → **Go to step 4**

OK

Go to step 5

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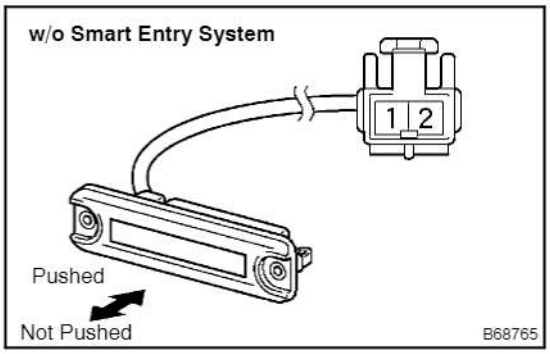
2 INSPECT LUGGAGE COMPARTMENT DOOR OPENER SWITCH ASSY



(a) Remove the opener switch.
(b) Measure the resistance of the switch.

Standard:

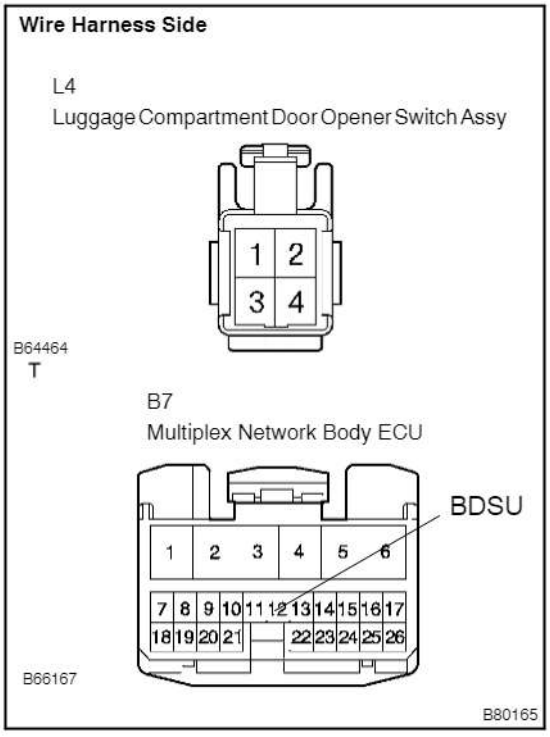
Tester Connection	Switch Condition	Specified Condition
1 – 2	Pushed (ON)	Below 1 Ω
1 – 2	Not pushed (OFF)	10 kΩ or higher



NG → REPLACE LUGGAGE COMPARTMENT DOOR OPENER SWITCH ASSY

OK

3 CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR OPENER SWITCH ASSY – MULTIPLEX NETWORK BODY ECU AND BODY GROUND)



(a) Disconnect the B7 ECU and L4 switch connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

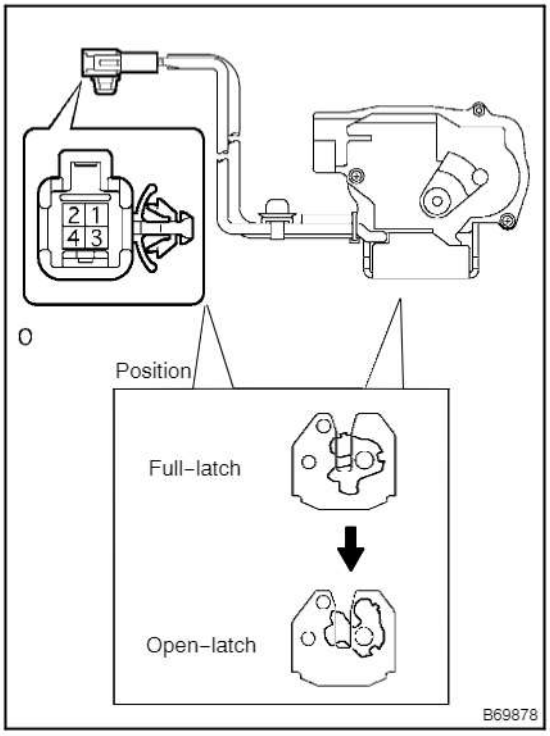
Tester Connection	Specified Condition
L4–2 – B7–12 (BDSU)	Below 1 Ω
L4–1 – Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

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4	INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSY (DOOR LOCK MOTOR)



(a) Check operation of the door lock.
  (1) Using a screwdriver, move the latch to the full–latch position.
  (2) Apply battery voltage to the door lock and check operation the latch.

OK:

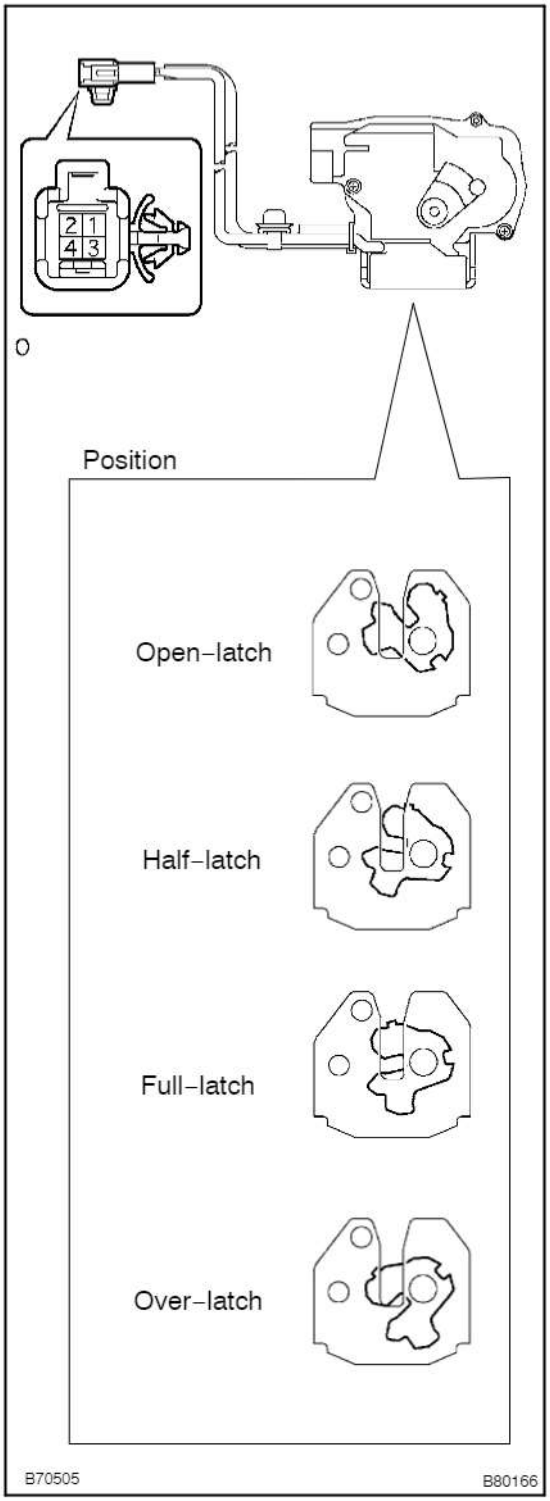
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Latch turns to open–latch position

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSY**

OK

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5	INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSY (SWITCH)



(a) Check the resistance of the courtesy switch.

Standard:

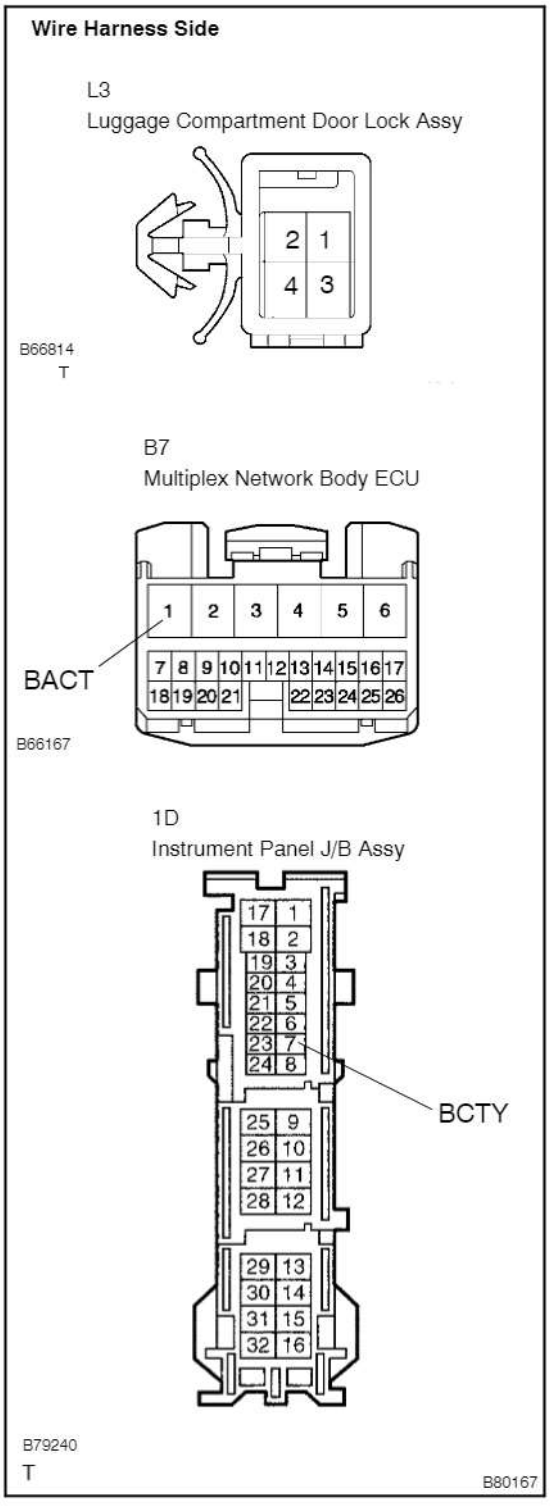
Tester Connection	Switch Condition	Specified Condition
1 – 2	Open–latch	Below 1 Ω
1 – 2	Half–latch	Below 1 Ω
1 – 2	Full–latch	10 kΩ or higher
1 – 2	Over–latch	10 kΩ or higher

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSY**

OK

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6	CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR LOCK ASSY – MULTIPLEX NETWORK BODY ECU, INSTRUMENT PANEL J/B ASSY AND BODY GROUND)



(a) Disconnect the L3 lock connector.
(b) Disconnect the B7 ECU and 1D J/B connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
L3–2 – 1D–7 (BCTY)	Below 1 Ω
L3–4 – B7–1 (BACT)	Below 1 Ω
L3–1 – Body ground	Below 1 Ω
L3–3 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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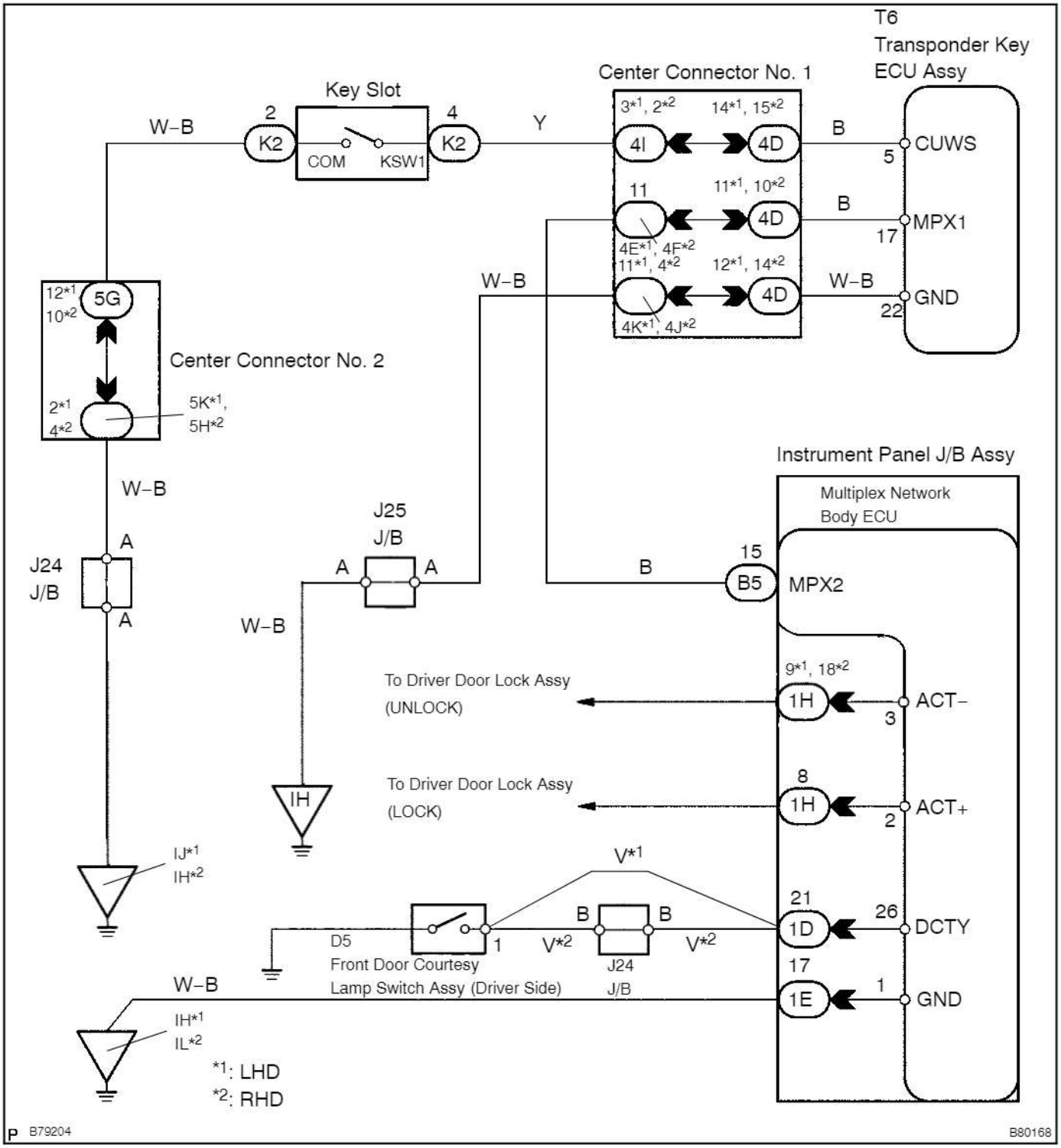
KEY LOCK–IN PREVENTION FUNCTION DOES NOT WORK PROPERLY (MANUAL OPERATION AND KEY–LINKED LOCK ARE ACTIVATED)

CIRCUIT DESCRIPTION

To prevent the key from being locked in the vehicle, the door control relay assembly prevents doors from being locked by monitoring two switches: 1) the unlock warning switch, which turns ON when the key is inserted into ignition key cylinder; and 2) the driver side courtesy lamp switch, which turns ON when thee driver side door is opened.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the hand–held tester to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) Without DTC B1200, B1214, B1215 or B1294 outputs, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) With DTC B1200, B1214, B1215 or B1294 outputs, proceed to B.

B → **Go to MULTIPLEX COMMUNICATION SYSTEM** (See page 05–2261)

A

2	READ VALUE OF INTELLIGENT TESTER II (DOOR COURTESY SWITCH)

(a) Check the DATA LIST for proper function of the driver side door courtesy switch.
Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D Dor Cty SW	Driver side door courtesy switch signal /ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	–

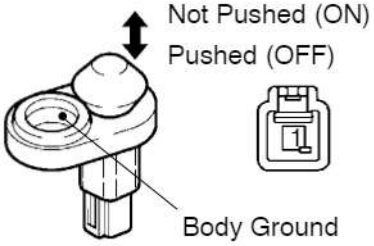
OK: "ON"(driver side door is open) appears on the screen.

NG → **Go to step 3**

OK

Go to step 5

3	INSPECT FRONT DOOR COURTESY LAMP SWITCH ASSY (DRIVER SIDE)



(a) Remove the switch.
(b) Measure the switch resistance.
Standard:

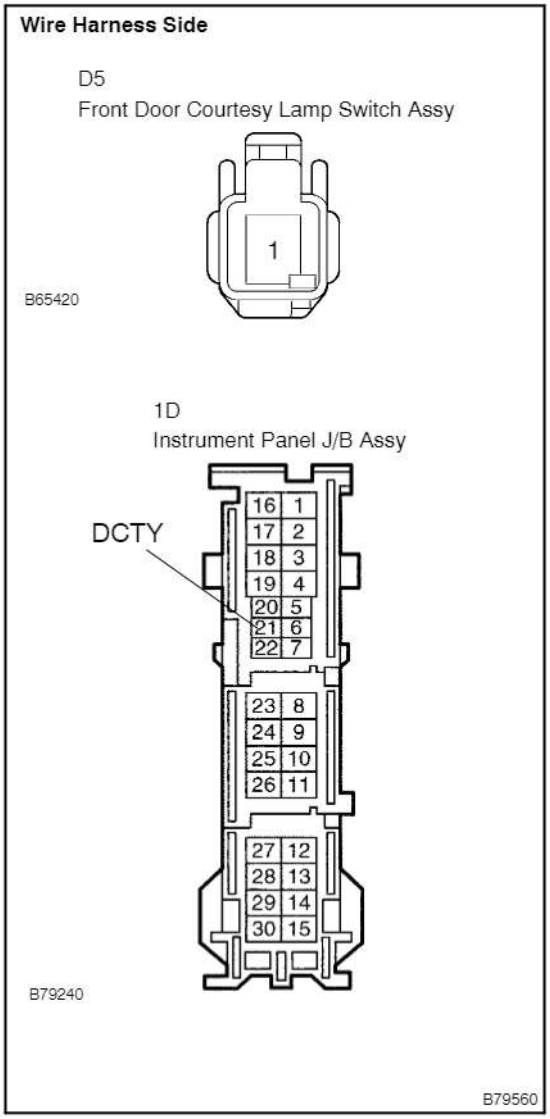
Tester Connection	Switch Condition	Specified Condition
1 – Body ground	Not pushed (ON)	Below 1 Ω
1 – Body ground	Pushed (OFF)	10 kΩ or higher

NG → **REPLACE FRONT DOOR COURTESY LAMP SWITCH ASSY**

OK

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4	CHECK WIRE HARNESS (FRONT DOOR COURTESY LAMP SWITCH ASSY (DRIVER SIDE) – INSTRUMENT PANEL J/B ASSY)



(a) Disconnect the D5 switch and 1D J/B connectors.
(b) Measure the resistance of the wire harness side connectors.

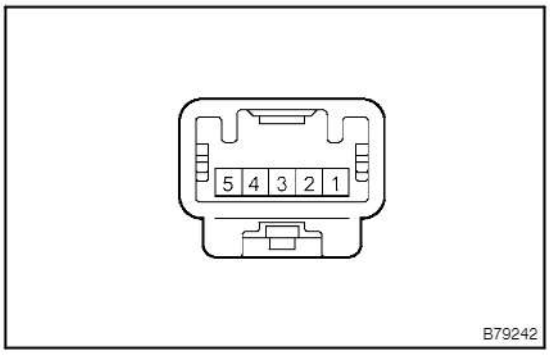
Standard:

Tester Connection	Specified Condition
D5–1 – 1D–21 (DCTY)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	INSPECT KEY SLOT



(a) Remove the switch.
(b) Measure the switch resistance.

Standard:

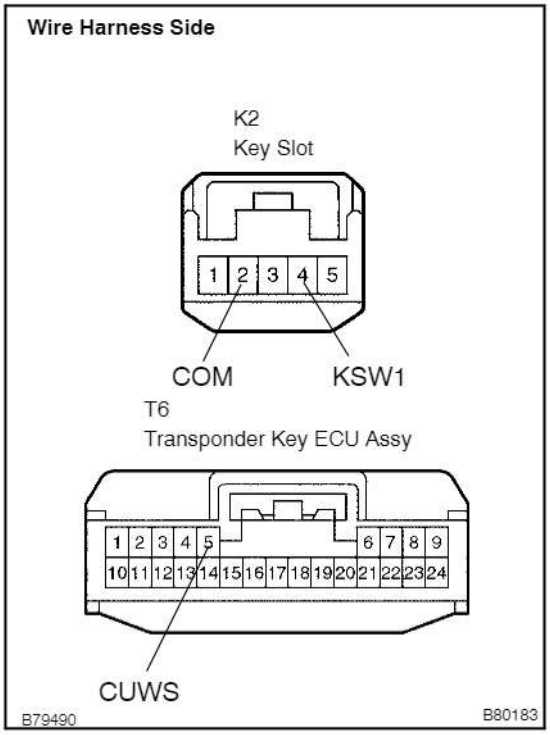
Tester Connection	Switch Condition	Specified Condition
2 – 4	Key in key slot	Below 1 Ω
2 – 4	No key in key slot	10 kΩ or higher

NG → **REPLACE KEY SLOT**

OK

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6	CHECK WIRE HARNESS (KEY SLOT – TRANSPONDER KEY ECU AND BODY GROUND)



(a) Disconnect the K2 key slot and T6 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
K2–4 (KSW1) – T6–5 (CUWS)	Below 1 Ω
K2–2 (COM) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY ECU ASSY

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DOUBLE LOCK FUNCTION DOES NOT OPERATE PROPERLY*

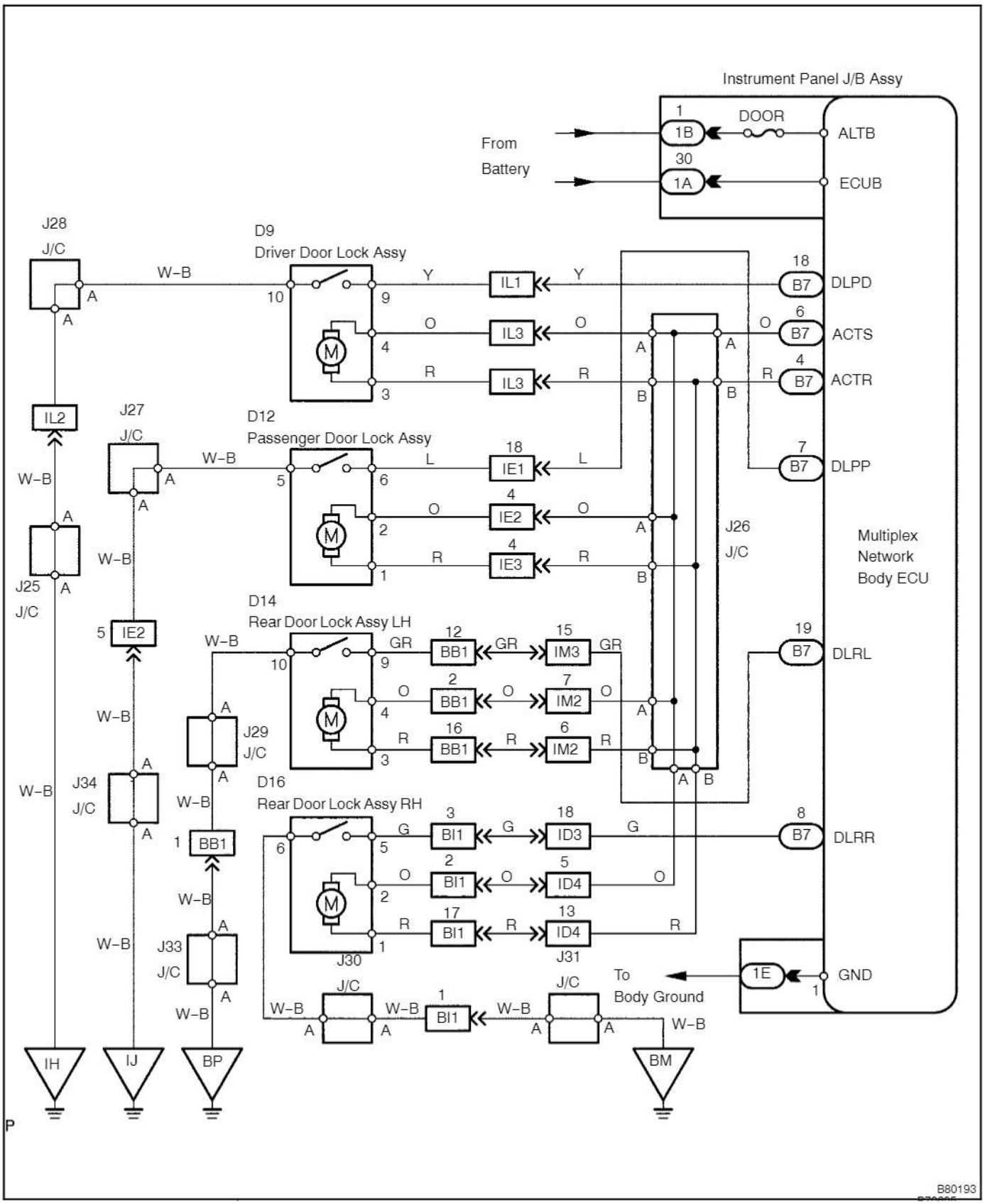
HINT:
*: w/ Double lock system

CIRCUIT DESCRIPTION

All the doors except the luggage compartment door use the double lock system. The multiplex network body ECU controls this system. When the body ECU receives a request signal that indicates to set or unset the double lock system from the transmitter, it activates the double lock motor in each door lock assembly to set or unset the double lock system, according to the request and the conditions of all the double lock position switches.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT WIRELESS DOOR LOCK OPERATION

(a) Check that the doors can be locked and unlocked normally by the wireless operation.
OK: Doors can be locked and unlocked wireless operation.

NG → **Go to WIRELESS DOOR CONTROL SYSTEM** (See page 05–1953 or 05–2001)

OK

2	INSPECT FUSE (DOOR)

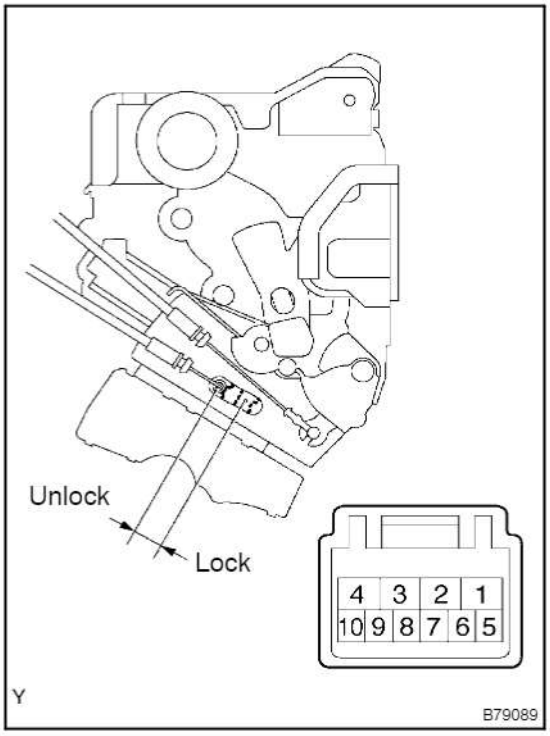
(a) Remove the DOOR fuse from the instrument panel J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

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3 INSPECT DRIVER DOOR LOCK ASSY (DOUBLE LOCK MOTOR)



(a) Check operation of the double lock motor.

(1) Apply battery voltage to the door lock and set the door lock motor to the lock position.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

(2) Apply battery voltage to the door lock and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Double lock system is set
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

NG → **REPLACE DRIVER DOOR LOCK ASSY**

OK

4 INSPECT DRIVER DOOR LOCK ASSY (DOUBLE LOCK POSITION SWITCH)

(a) Measure the resistance of the double lock position switch.

Standard:

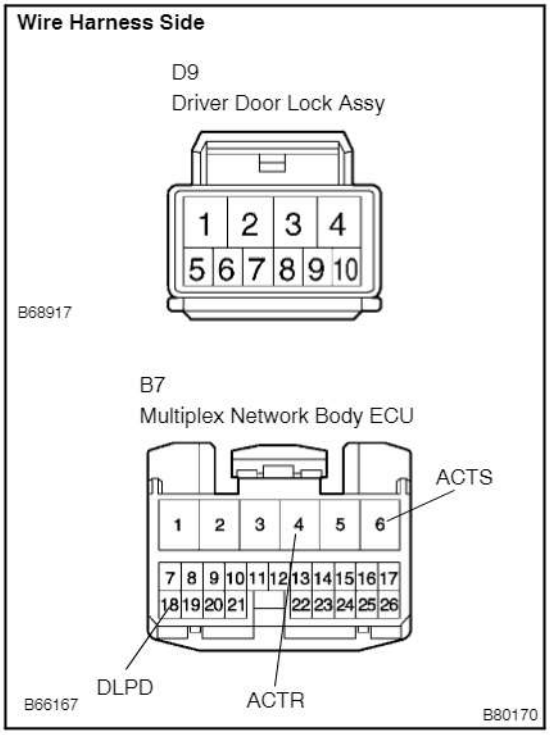
Tester Connection	Double Lock Condition	Specified Condition
9 – 10	Set	Below 1 Ω
9 – 10	Unset	10 kΩ or higher

NG → **REPLACE DRIVER DOOR LOCK ASSY**

OK

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5 CHECK WIRE HARNESS (DRIVER DOOR LOCK ASSY – MULTIPLEX NETWORK BODY ECU)



(a) Disconnect the D9 lock and B7 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

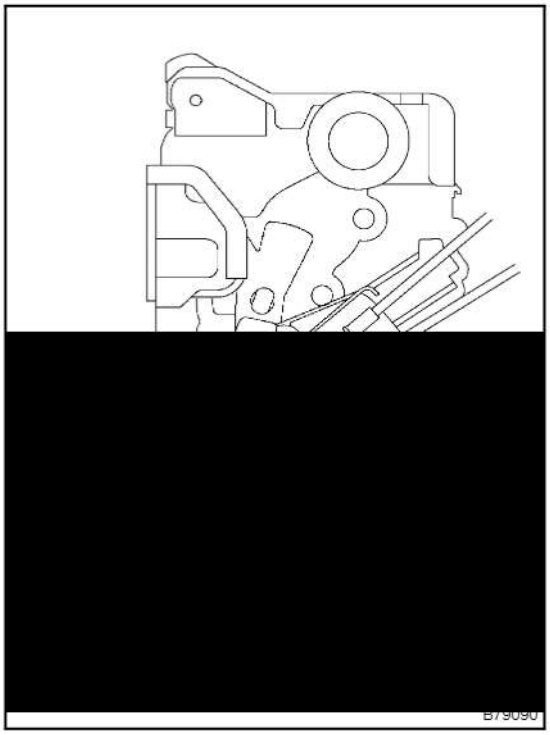
Standard:

Tester Connection	Specified Condition
D9–4 – B7–6 (ACTS)	Below 1 Ω
D9–3 – B7–4 (ACTR)	Below 1 Ω
D9–9 – B7–18 (DLPD)	Below 1 Ω
D9–10 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 INSPECT PASSENGER DOOR LOCK ASSY (DOUBLE LOCK MOTOR)



(a) Check operation of the double lock motor.

(1) Apply battery voltage to the door lock and set the door lock motor to the lock position.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock

(2) Apply battery voltage and inspect operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Double lock system is set
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

NG → **REPLACE PASSENGER DOOR LOCK ASSY**

OK

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7	INSPECT PASSENGER DOOR LOCK ASSY (DOUBLE LOCK POSITION SWITCH)

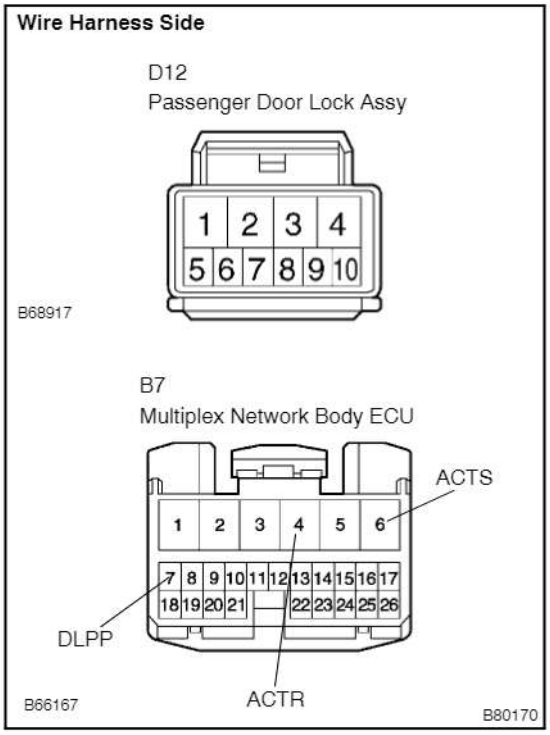
(a) Measure the resistance of the double lock position switch.
Standard:

Tester Connection	Double Lock Condition	Specified Condition
5 – 6	Set	Below 1 Ω
5 – 6	Unset	10 kΩ or higher

NG → **REPLACE PASSENGER DOOR LOCK ASSY**

OK

8	CHECK WIRE HARNESS (PASSENGER DOOR LOCK ASSY – MULTIPLEX NETWORK BODY ECU)



(a) Disconnect the D12 lock and B7 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard:

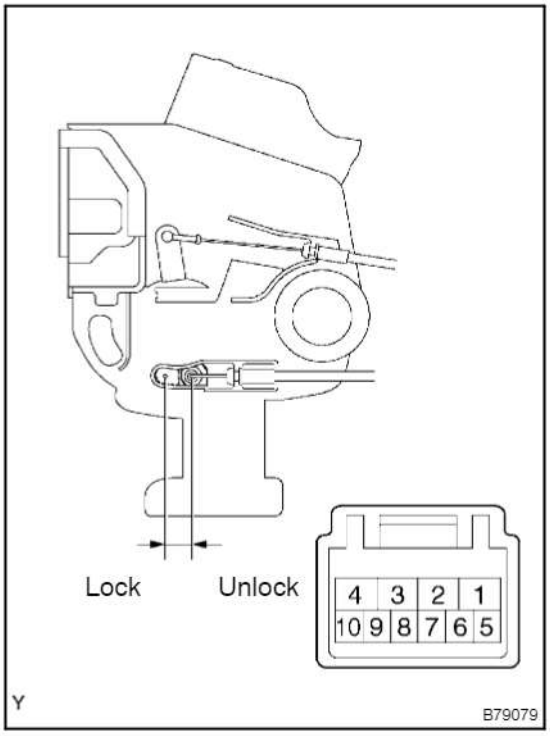
Tester Connection	Specified Condition
D12–2 – B7–6 (ACTS)	Below 1 Ω
D12–1 – B7–4 (ACTR)	Below 1 Ω
D12–6 – B7–7 (DLPP)	Below 1 Ω
D12–5 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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9 INSPECT REAR DOOR LOCK ASSY LH (DOUBLE LOCK MOTOR)



(a) Check operation of the double lock motor.

(1) Apply battery voltage to the door lock and set the door lock motor to the lock position.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock

(2) Apply battery voltage to the door lock and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Double lock system is set
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

NG → **REPLACE REAR DOOR LOCK ASSY LH**

OK

10 INSPECT REAR DOOR LOCK ASSY LH (DOUBLE LOCK POSITION SWITCH)

(a) Measure the resistance of the double lock position switch.

Standard:

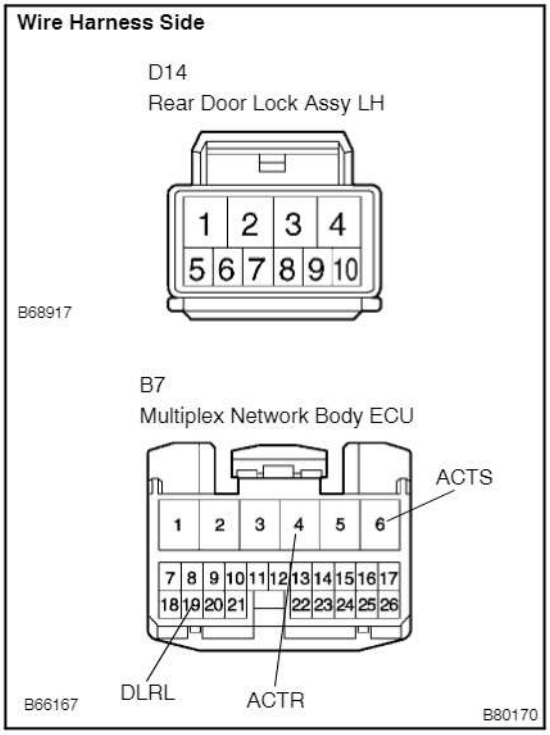
Tester Connection	Double Lock Condition	Specified Condition
9 – 10	Set	Below 1 Ω
9 – 10	Unset	10 kΩ or higher

NG → **REPLACE REAR DOOR LOCK ASSY LH**

OK

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11 CHECK WIRE HARNESS (REAR DOOR LOCK ASSY LH – MULTIPLEX NETWORK BODY ECU)



(a) Disconnect the D14 door lock and B7 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

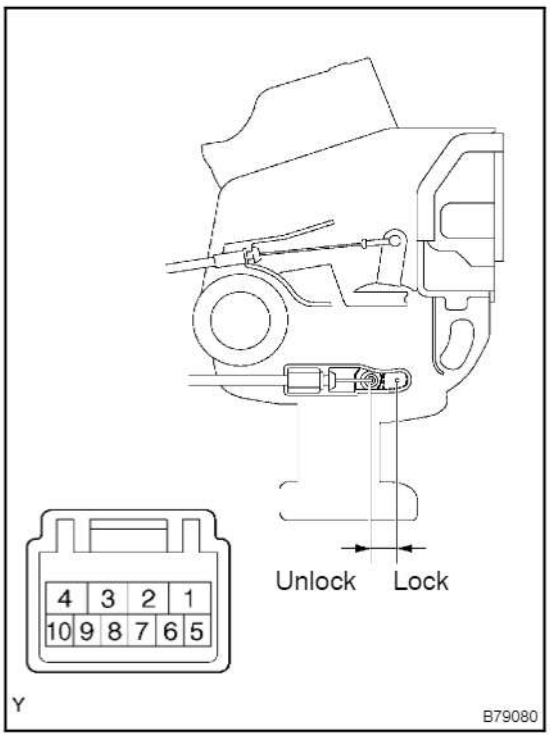
Standard:

Tester Connection	Specified Condition
D14–4 – B7–6 (ACTS)	Below 1 Ω
D14–3 – B7–4 (ACTR)	Below 1 Ω
D14–9 – B7–19 (DLRL)	Below 1 Ω
D14–6 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

12 INSPECT REAR DOOR LOCK ASSY RH (DOUBLE LOCK MOTOR)



(a) Check operation of the double lock motor.

(1) Apply battery voltage to the door lock and set the door lock motor to the lock position.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock

(2) Apply battery voltage to the door lock and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Double lock system is set
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

NG → **REPLACE REAR DOOR LOCK ASSY RH**

OK

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13 INSPECT REAR DOOR LOCK ASSY RH (DOUBLE LOCK POSITION SWITCH)

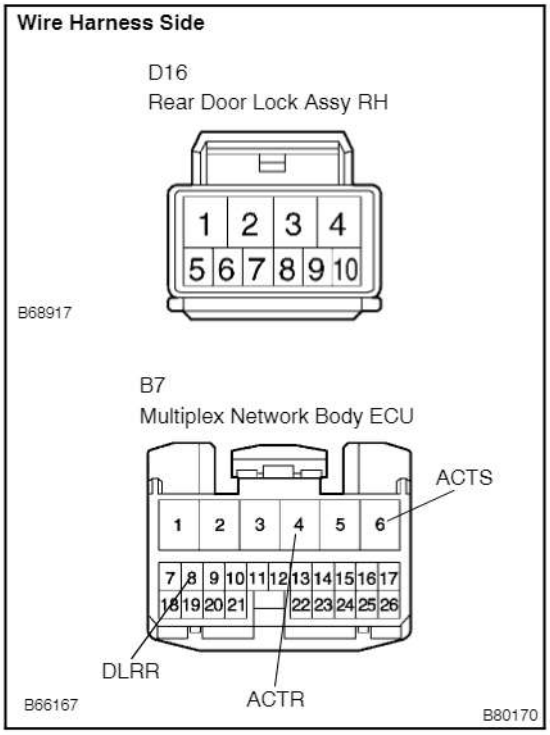
(a) Measure the resistance of the double lock position switch.
Standard:

Tester Connection	Double Lock Condition	Specified Condition
5 – 6	Set	Below 1 Ω
5 – 6	Unset	10 kΩ or higher

NG → **REPLACE REAR DOOR LOCK ASSY RH**

OK

14 CHECK WIRE HARNESS (REAR DOOR LOCK ASSY RH – MULTIPLEX NETWORK BODY ECU)



(a) Disconnect the D16 lock and B7 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
D16–2 – B7–6 (ACTS)	Below 1 Ω
D16–1 – B7–4 (ACTR)	Below 1 Ω
D16–5 – B7–8 (DLRR)	Below 1 Ω
D16–6 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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05IG1-01

ON–VEHICLE INSPECTION

1. CHECK ELECTRICAL DOOR LOCK OPERATION

(a) Check the basic function.
  (1) For the door control switch (manual operation): 1) pushing LOCK causes all the doors to lock and 2) pushing UNLOCK causes all the doors to unlock.
  (2) For the driver side key cylinder lock function: turning the driver side door lock key cylinder to LOCK causes all the doors to lock.

(b) Check the key lock–in prevention function.

NOTICE:

To prevent the key from being locked in the vehicle, the following inspection should be made with the driver side door window open.

  (1) Have the key inserted into the key slot.
  (2) With the driver side door open, turn the driver side door lock knob to the LOCK position and check that all the doors unlock immediately.
  (3) With the driver side door open, push the LOCK switch on the door control switch (manual operation) and check that all the doors unlock immediately.
  (4) With the driver side door open, turn the driver side door lock knob to the LOCK position, hold it for at least 2 seconds and then close the driver side door. Check that all the doors unlock.

(c) Check the security function.
  (1) Close all the doors and leave the driver side door window open so that the door control switch can be operated from outside the vehicle.
  (2) Pull out the key, open the driver side door and then close and lock the door without using the key. Check that pushing the UNLOCK switch on the door control switch (manual operation) from outside the vehicle does not unlock the doors.
  (3) Pull out the key, close and lock the driver side door by key operation. Check that pushing UNLOCK switch on the door control switch (manual operation) from outside the vehicle does not unlock the doors.
  (4) Pull out the key, close the driver side door and lock the door by wireless door lock operation. Check that the pushing the UNLOCK switch on the door control switch (manual operation) from outside the vehicle does not unlock the doors.

HINT:

Check that the security function is canceled when any of the following conditions is met:

- Turn the power switch ON (IG).
- The driver side door is unlocked using the key.
- The UNLOCK switch on the door control switch (for manual operation) is pushed after the door control knob is turned to the UNLOCK position manually.
- The doors are unlocked with wireless or smart unlock operation.

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2. w/ Double locking system:

CHECK DOUBLE LOCKING FUNCTION SYSTEM

CAUTION:

Never activate the double locking system when someone is inside the vehicle. The doors cannot be opened from the inside of the vehicle. If the doors are locked by accident, press the transmitter's "UNLOCK" switch.

(a) Check that the double locking system is set.
  (1) Open all the windows.
  (2) Change the power switch's power mode to ON (IG) by pushing the power switch
  (3) Open and close the driver side door, and make sure that all doors including the luggage compartment door are closed securely.
  (4) Push the transmitter's LOCK switch twice within 5 seconds, and check that the hazard warning lights flash once at this time to show that the system is set.
  (5) Try to unlock all doors by the inside handle of the vehicle, and check that none of the doors unlock.

NOTICE:

- **The double locking system cannot be set without using the wireless transmitter.**
- **The double locking system is not applicable to the luggage compartment door.**

(b) Check that the double locking system is canceled.
  (1) Push the transmitter's UNLOCK switch while the double locking system is set, and check that the hazard warning lights flash twice at this time to show that the system is canceled.
  (2) Check that the doors can be opened both by the inside handle and the outside handle.

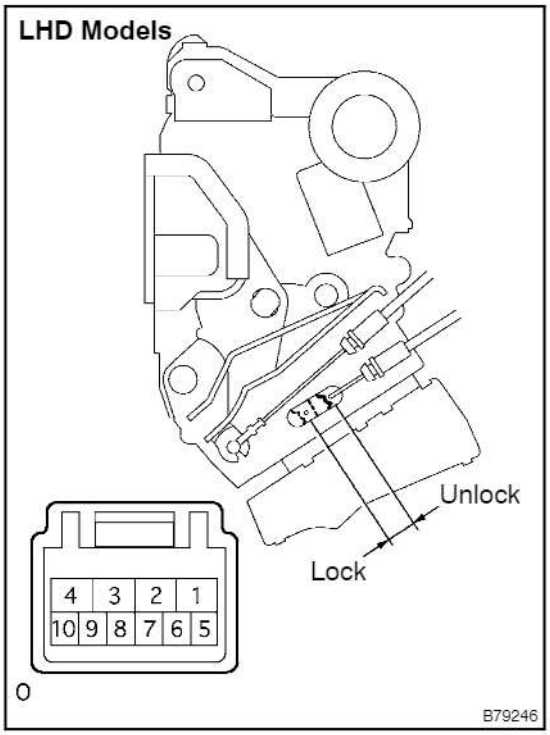
NOTICE:

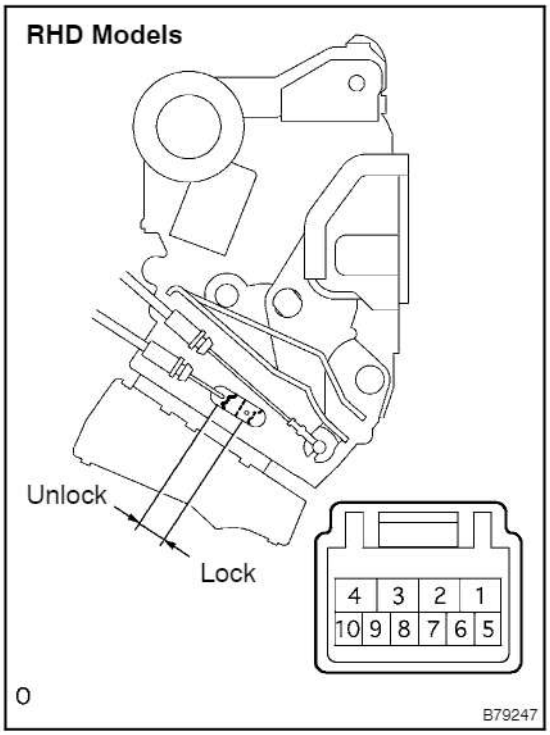
If the battery of the wireless transmitter is depleted, only the driver side door can be opened using the key. However, the theft deterrent system still remains on. The theft alarm will sound when the door is opened without using the wireless transmitter.

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05IG3-01

INSPECTION





1. INSPECT DRIVER DOOR LOCK ASSY

(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

If the result is not as specified, replace the door lock assy.

(b) Measure the resistance of the position switch.

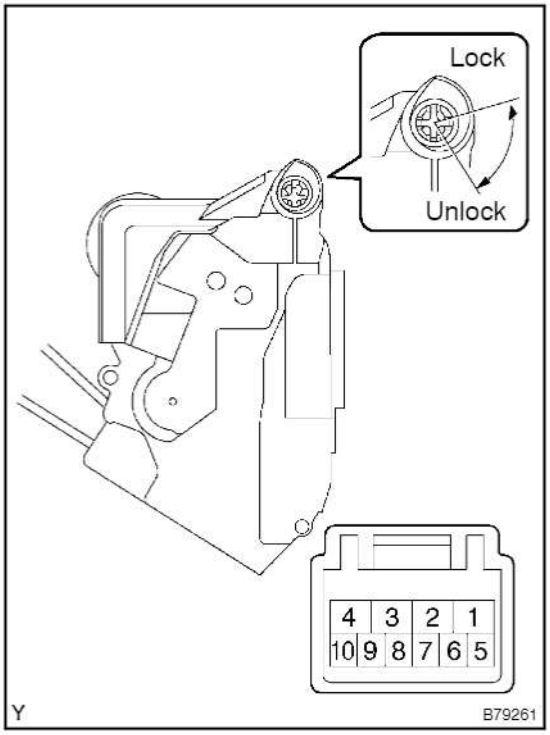
Standard:

Position Switch

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

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(c) Measure the resistance of the door lock and unlock switch.

Standard:

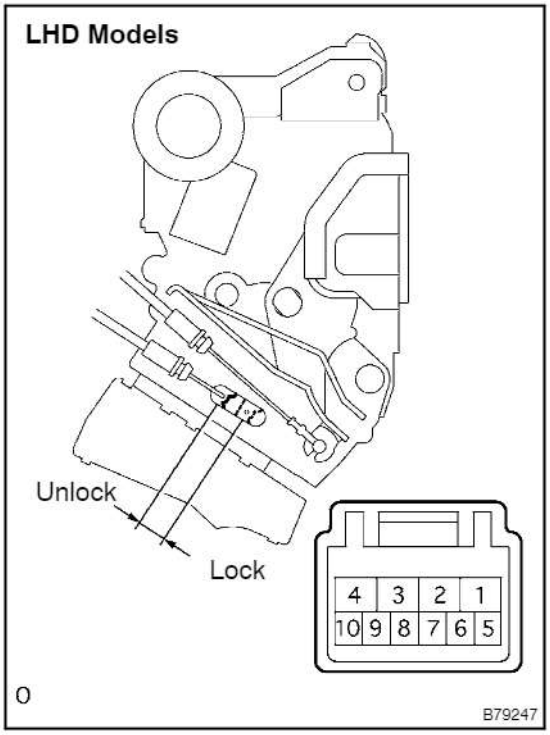
Door lock and unlock switch

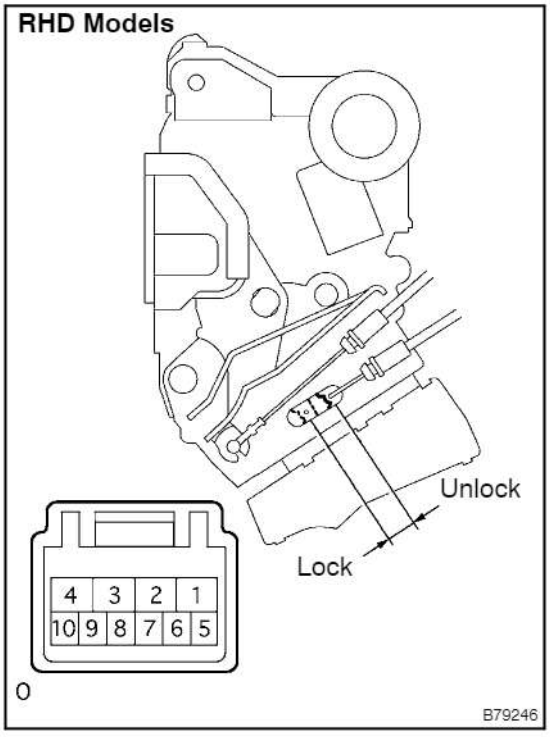
(RHD models except Australia, Singapore and Hong Kong)

Tester Connection	Switch Condition	Specified Condition
6 – 8	Lock	Below 1 Ω
5 – 8 6 – 8	OFF	10 kΩ or higher
5 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

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2. INSPECT PASSENGER DOOR LOCK ASSY

(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

If the result is not as specified, replace the door lock assy.

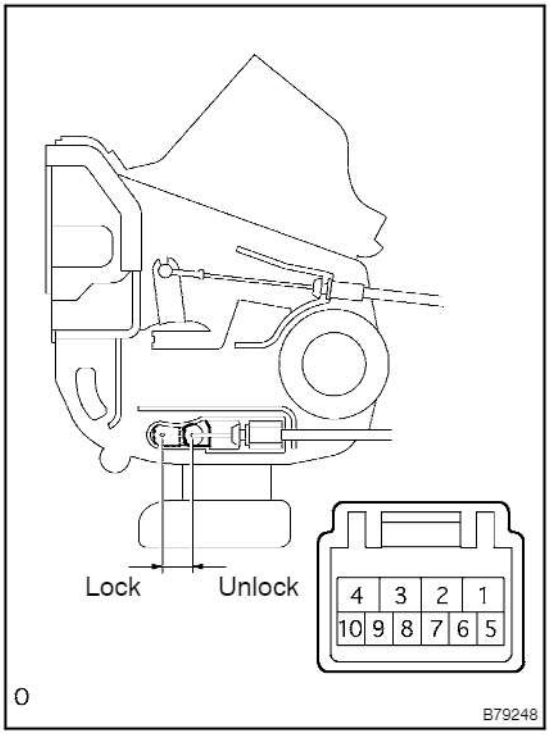
(b) Measure the resistance of the position switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

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3. INSPECT REAR DOOR LOCK ASSY LH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

If the result is not as specified, replace the door lock assy.

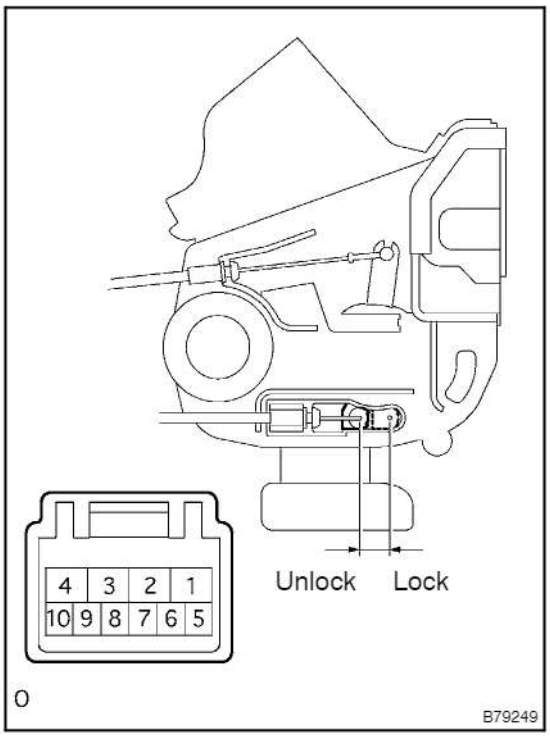
(b) Measure the resistance of the position switch.

Standard:

RHD models except Australia, Singapore and Hong Kong

Tester Connection	Switch Condition	Specified Condition
5 – 6	Lock	10 kΩ or higher
5 – 6	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.



4. INSPECT REAR DOOR LOCK ASSY RH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK:

LHD and Australia, Singapore and Hong Kong models

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 4	Unlock

RHD models except Australia, Singapore and Hong Kong

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

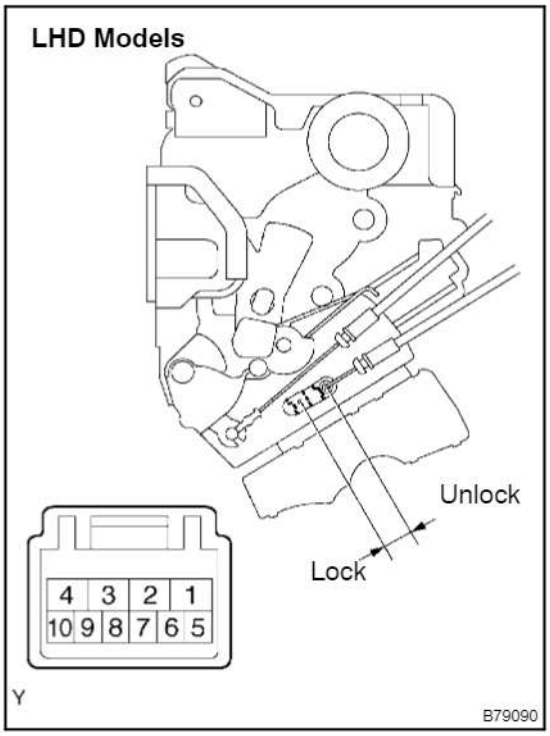
If the result is not as specified, replace the door lock assy.

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(b) Measure the resistance of the position switch.
Standard:
RHD models except Australia, Singapore and Hong Kong

Tester Connection	Switch Condition	Specified Condition
9 – 10	Lock	10 kΩ or higher
9 – 10	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.



5. INSPECT DRIVER DOOR LOCK ASSY (W/ DOUBLE LOCK)

(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK:

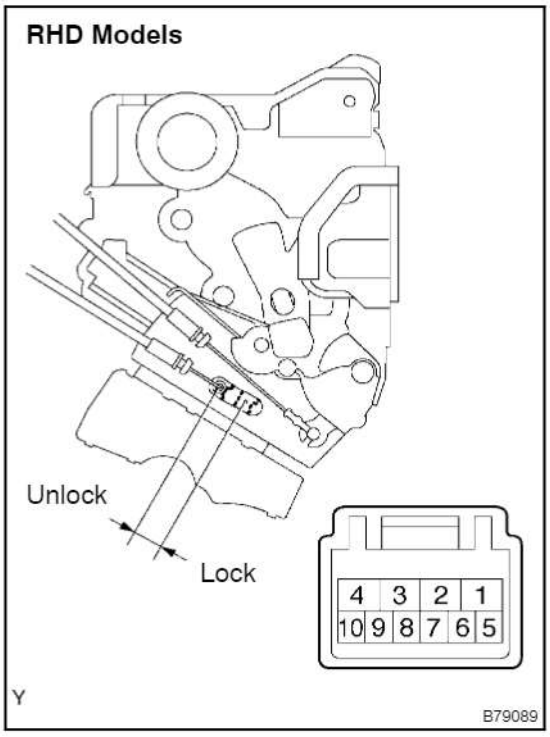
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

If the result is not as specified, replace the door lock assy.

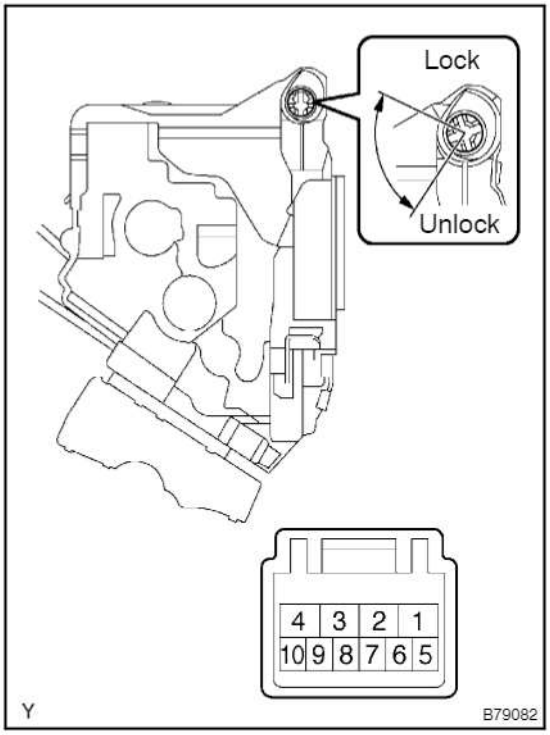
(b) Measure the resistance of the position switch.
Standard:
Position Switch

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.



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(c) Measure the resistance of the door lock and unlock switch.

Standard:

Door lock and unlock switch

Tester Connection	Switch Condition	Specified Condition
6 – 8	Lock	Below 1 Ω
5 – 8 6 – 8	OFF	10 kΩ or higher
5 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

(d) Check operation of the double lock motor.

(1) Apply battery voltage and set the door lock motor to the LOCK position.

(2) Apply battery voltage and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Double lock system is set
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Double lock system is unset

If the result is not as specified, replace the door lock assy.

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

If the result is not as specified, replace the door lock assy.

(e) Measure the resistance of the double lock position switch.

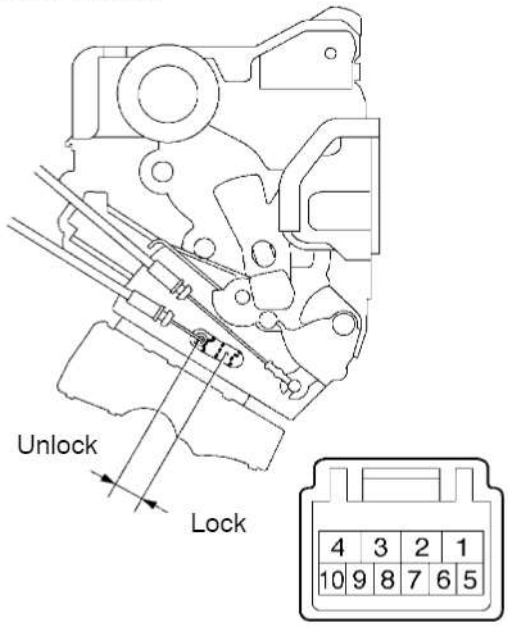
Standard:

Tester Connection	Double Lock Condition	Specified Condition
9 – 10	SET	Below 1 Ω
9 – 10	UNSET	10 kΩ or higher

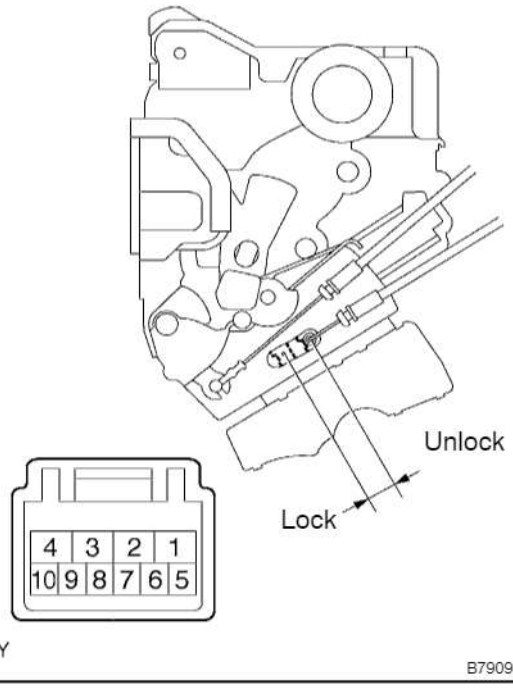
If the result is not as specified, replace the door lock assy.

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LHD Models



RHD Models



6. INSPECT PASSENGER DOOR LOCK ASSY (W/ DOUBLE LOCK)

(a) Apply battery voltage and check operation of the door lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

If the result is not as specified, replace the door lock assy.

(b) Measure the resistance of the position switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
7 – 8	Lock	10 kΩ or higher
7 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

(c) Check operation of the double lock motor.

(1) Apply battery voltage and set the door lock motor to the LOCK position.

(2) Apply battery voltage and operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Double lock system is set
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Double lock system is unset

If the result is not as specified, replace the door lock assy.

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

If the result is not as specified, replace the door lock assy.

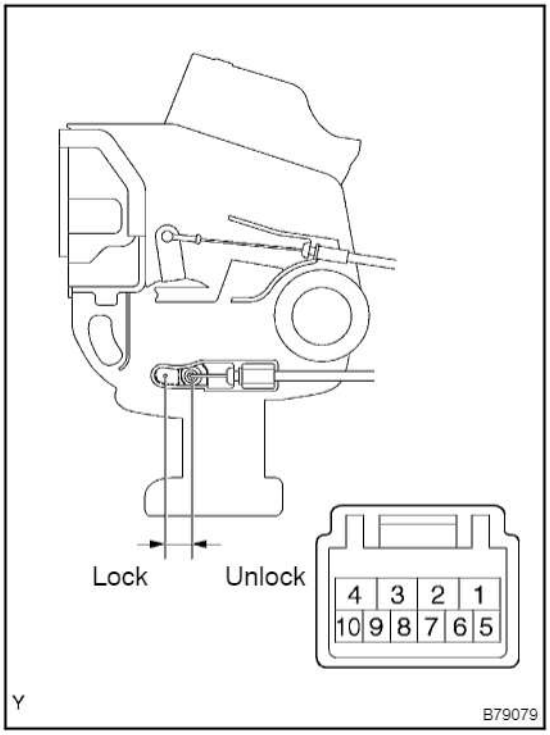
(d) Measure the resistance of the double lock position switch.

Standard:

Tester Connection	Double Lock Condition	Specified Condition
5 – 6	SET	Below 1 Ω
5 – 6	UNSET	10 kΩ or higher

If the result is not as specified, replace the door lock assy.

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7. INSPECT REAR DOOR LOCK ASSY LH (W/ DOUBLE LOCK)

(a) Apply battery voltage and check operation of the door lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Unlock

If the result is not as specified, replace the door lock assy.

(b) Measure the resistance of the position switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
5 – 6	Lock	10 kΩ or higher
5 – 6	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

(c) Check operation of the double lock motor.

(1) Apply battery voltage and set the door lock motor to the LOCK position.

(2) Apply battery voltage and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Double lock system is set
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

If the result is not as specified, replace the door lock assy.

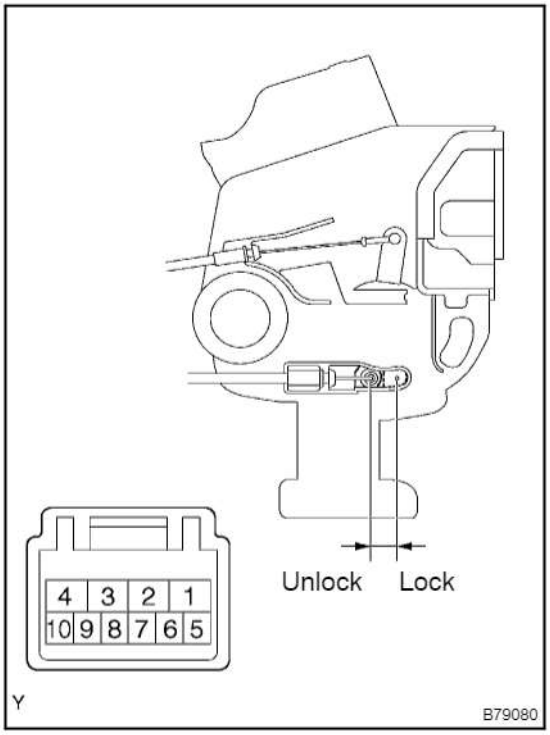
(d) Measure the resistance of the double lock position switch.

Standard:

Tester Connection	Double Lock Condition	Specified Condition
9 – 10	SET	Below 1 Ω
9 – 10	UNSET	10 kΩ or higher

If the result is not as specified, replace the door lock assy.

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8. INSPECT REAR DOOR LOCK ASSY RH (W/ DOUBLE LOCK)

(a) Apply battery voltage and check operation of the door lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (–) → Terminal 4	Unlock

If the result is not as specified, replace the door lock assy.

(b) Measure the resistance of the position switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
9 – 10	Lock	10 kΩ or higher
9 – 10	Unlock	Below 1 Ω

If the result is not as specified, replace the door lock assy.

(c) Check operation of the double lock motor.

(1) Apply battery voltage and set the door lock motor to the LOCK position.

(2) Apply battery voltage and check operation of the double lock motor.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (–) → Terminal 1	Double lock system is set
Battery positive (+) → Terminal 1 Battery negative (–) → Terminal 2	Double lock system is unset

(3) While the double lock system is set, check that the doors cannot be unlocked by operating the control cable.

If the result is not as specified, replace the door lock assy.

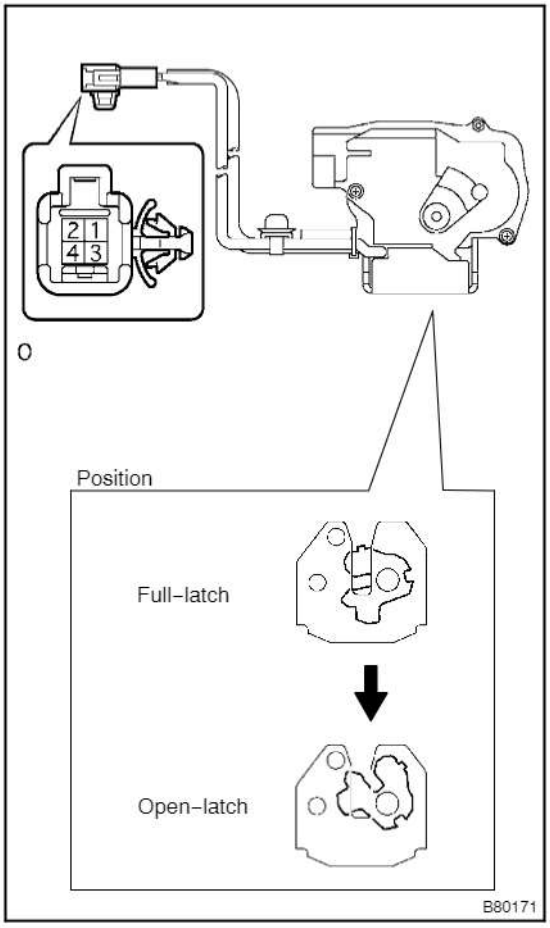
(d) Measure the resistance of the double lock position switch.

Standard:

Tester Connection	Double Lock Condition	Specified Condition
5 – 6	SET	Below 1 Ω
5 – 6	UNSET	10 kΩ or higher

If the result is not as specified, replace the door lock assy.

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9. INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSY

(a) Check operation of the door lock.

(1) Using a screwdriver, move the latch to the full–latch position.

(2) Apply battery voltage to the door lock and check operation of the latch.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (–) → Terminal 1	Latch turns to open–latch position

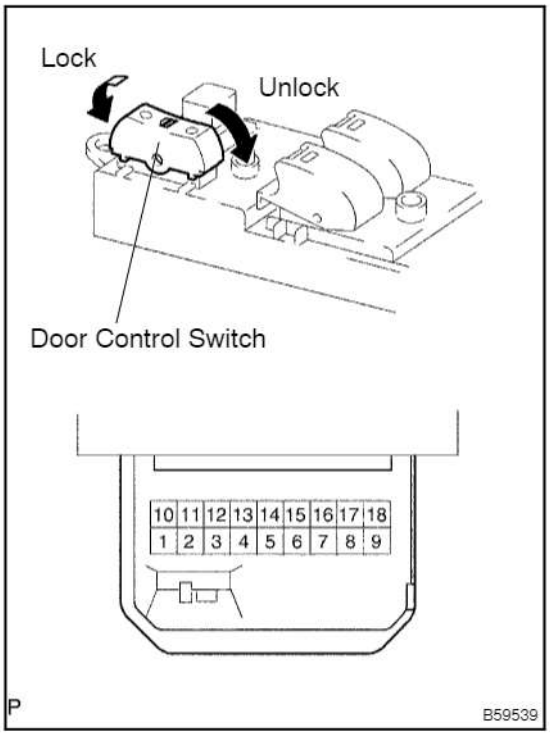
If the result is not as specified, replace the door lock assy.

(b) Measure the courtesy switch resistance.

Standard:

Tester Connection	Switch Position	Specified Condition
1 – 2	Open (ON)	Below 1 Ω
1 – 2	Full (OFF)	10 kΩ or higher

If the result is not as specified, replace the door lock assy.



10. INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY

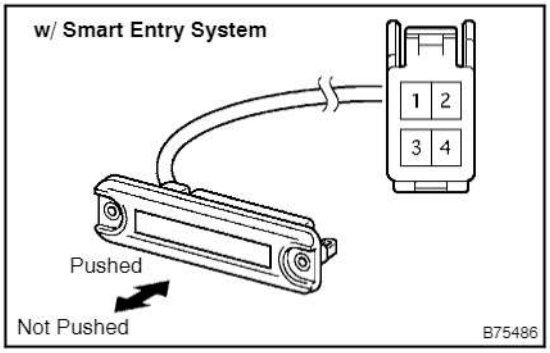
(a) Measure the resistance of the door control switch.

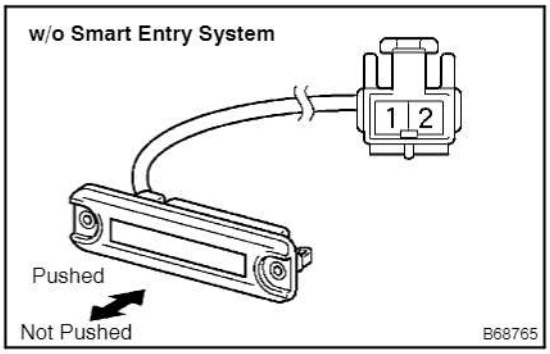
Standard:

Tester Connection	Switch Condition	Specified Condition
1 – 5	Lock	Below 1 Ω
1 – 5, 1 – 8	OFF	10 kΩ or higher
1 – 8	Unlock	Below 1 Ω

If the result is not as specified, replace the switch assy.

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11. INSPECT LUGGAGE COMPARTMENT DOOR OPENER SWITCH ASSY

(a) Measure the resistance of the switch.

Standard:

Tester Connection	Switch Condition	Specified Condition
1 – 2	Pushed (ON)	Below 1 Ω
1 – 2	Not pushed (OFF)	10 kΩ or higher

If the result is not as specified, replace the switch assy.

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SMART ENTRY SYSTEM

PRECAUTION

05IAX-01

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICE FOR HYBRID SYSTEM ACTIVATION:

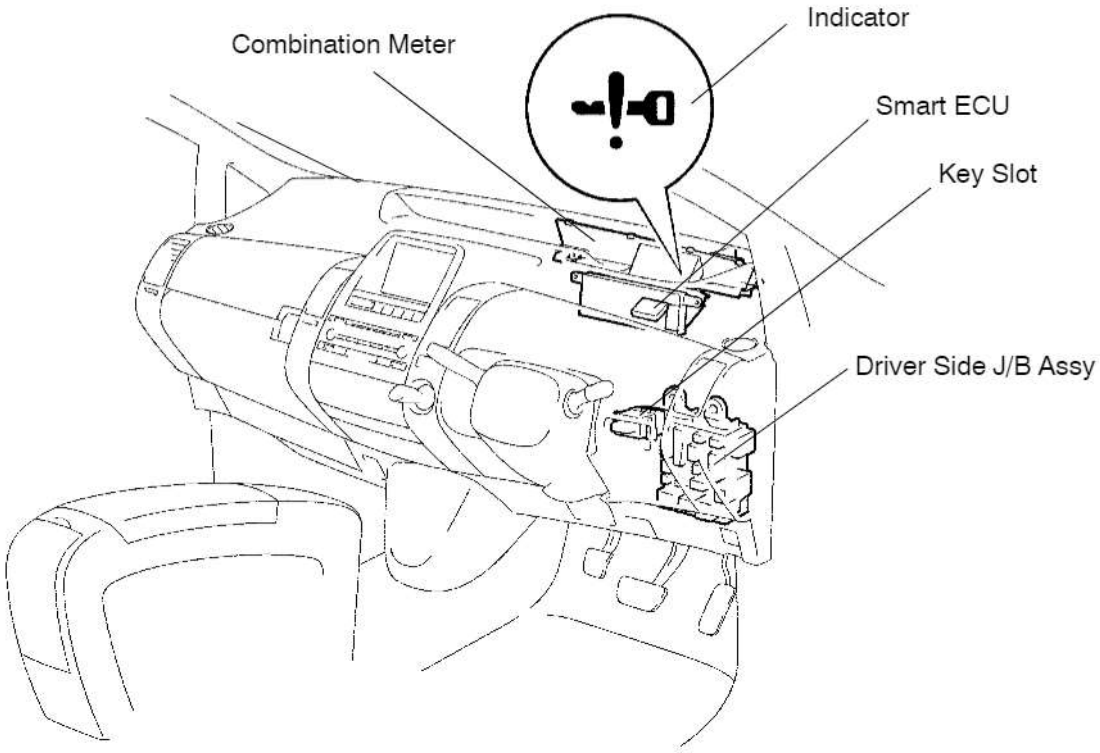
When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

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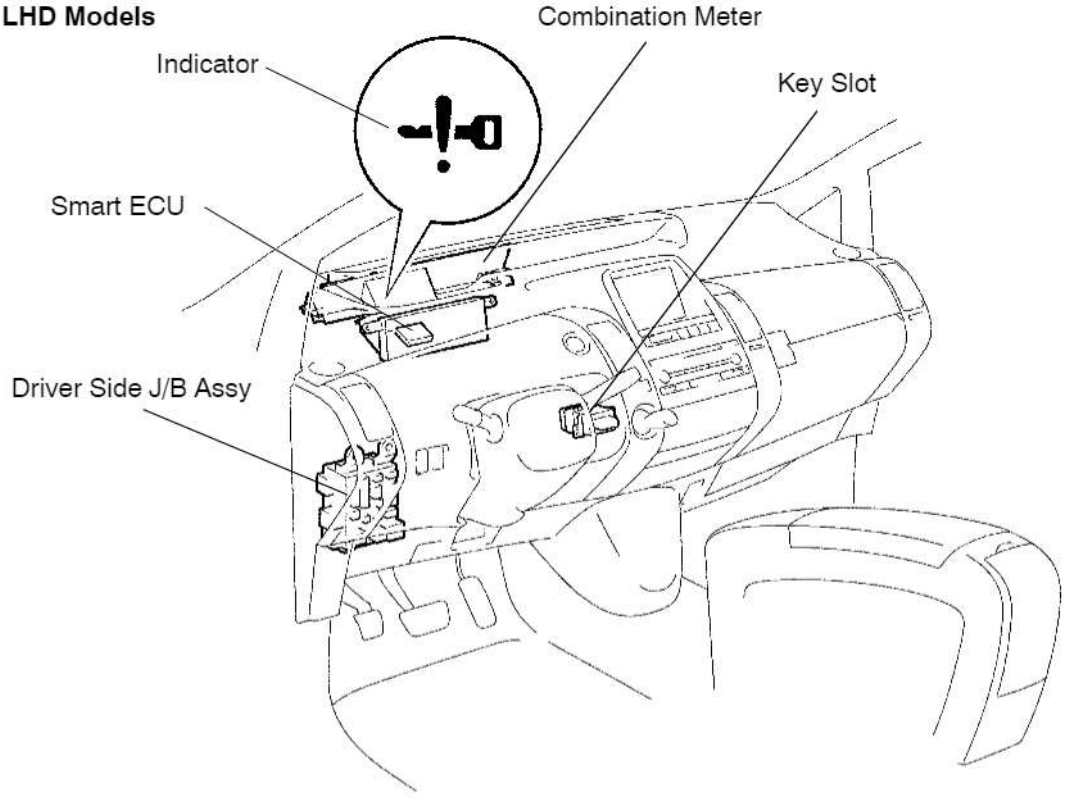
05IB0-01

LOCATION

RHD Models



LHD Models

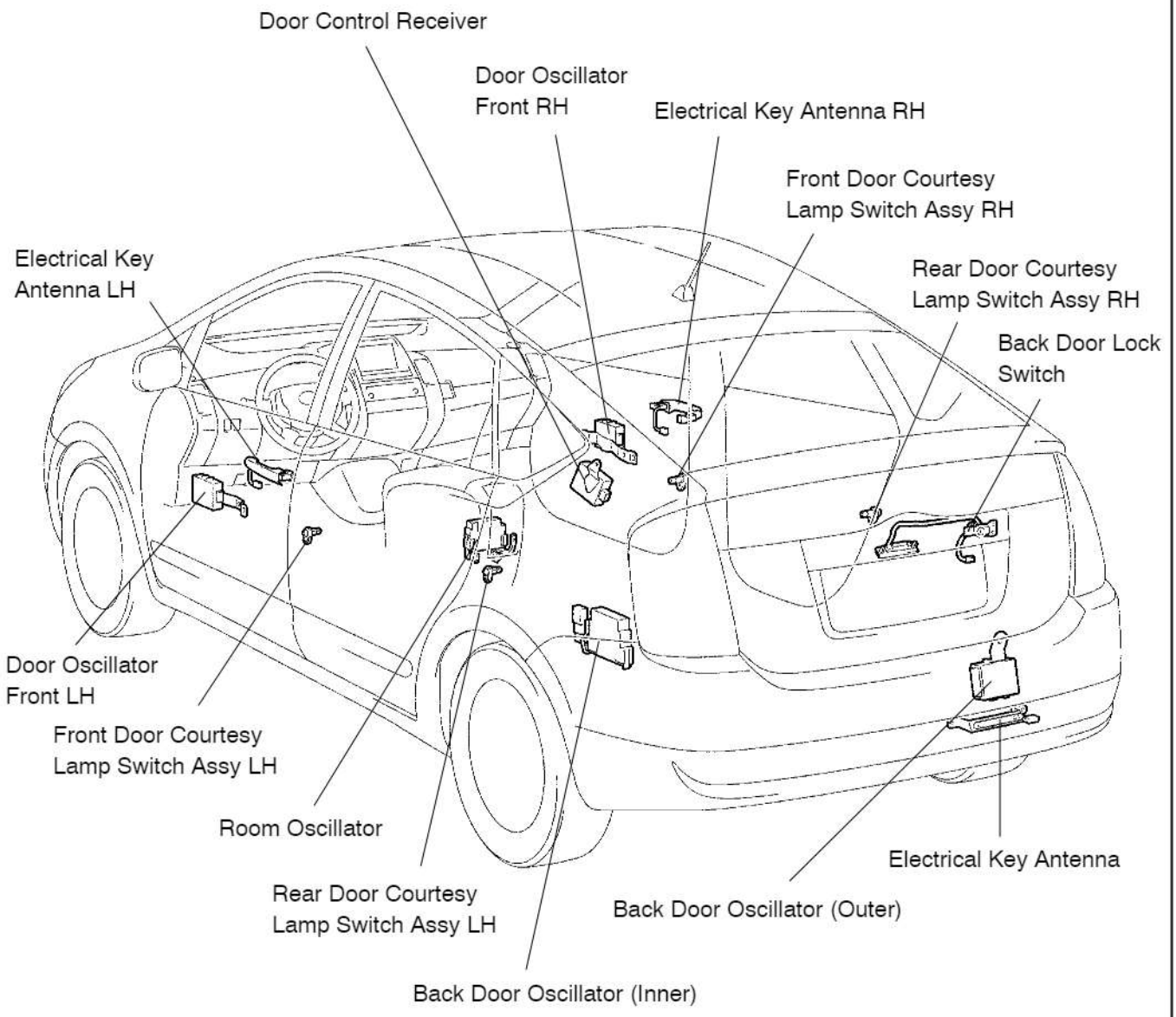


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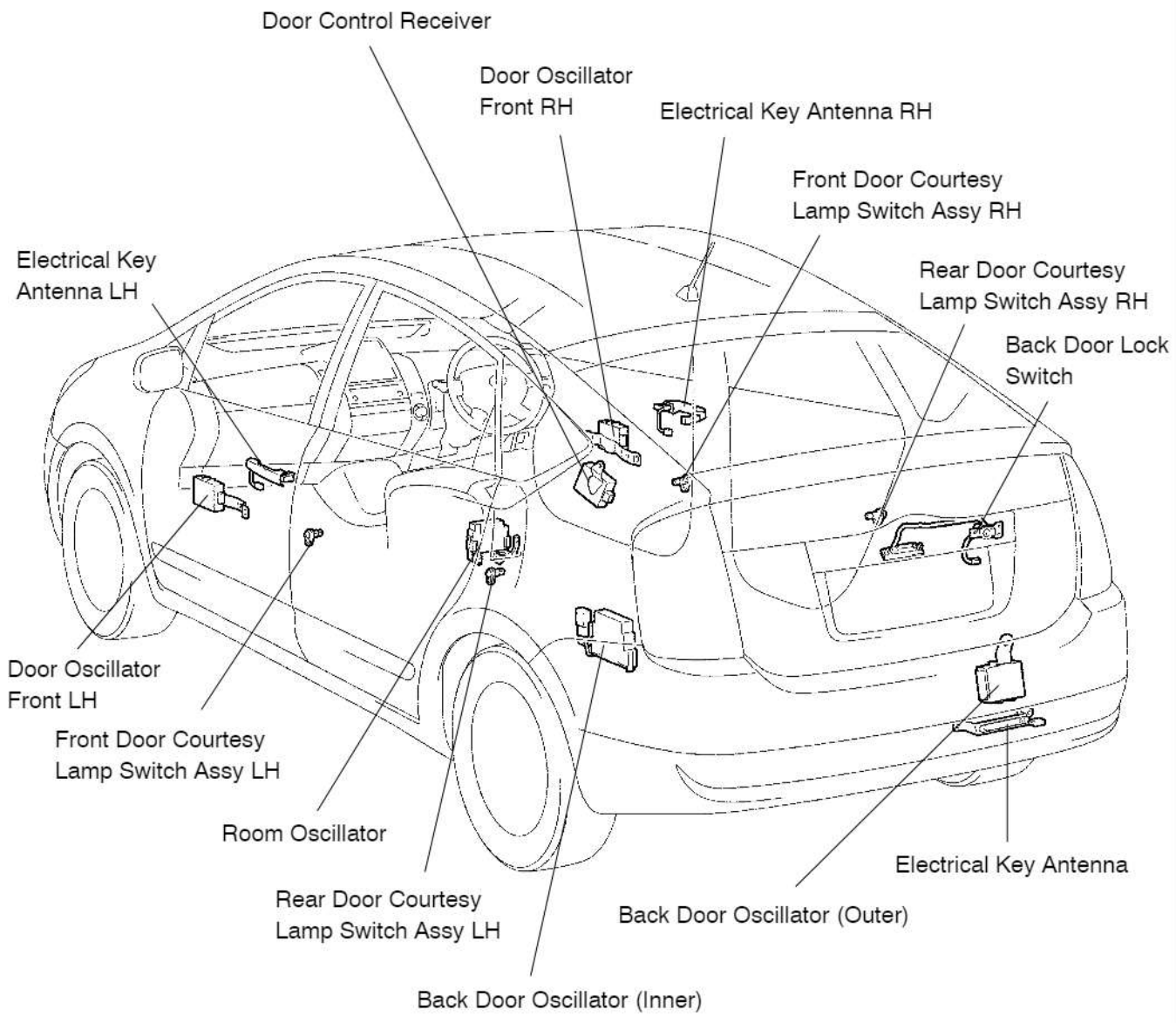
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LHD Models



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RHD Models

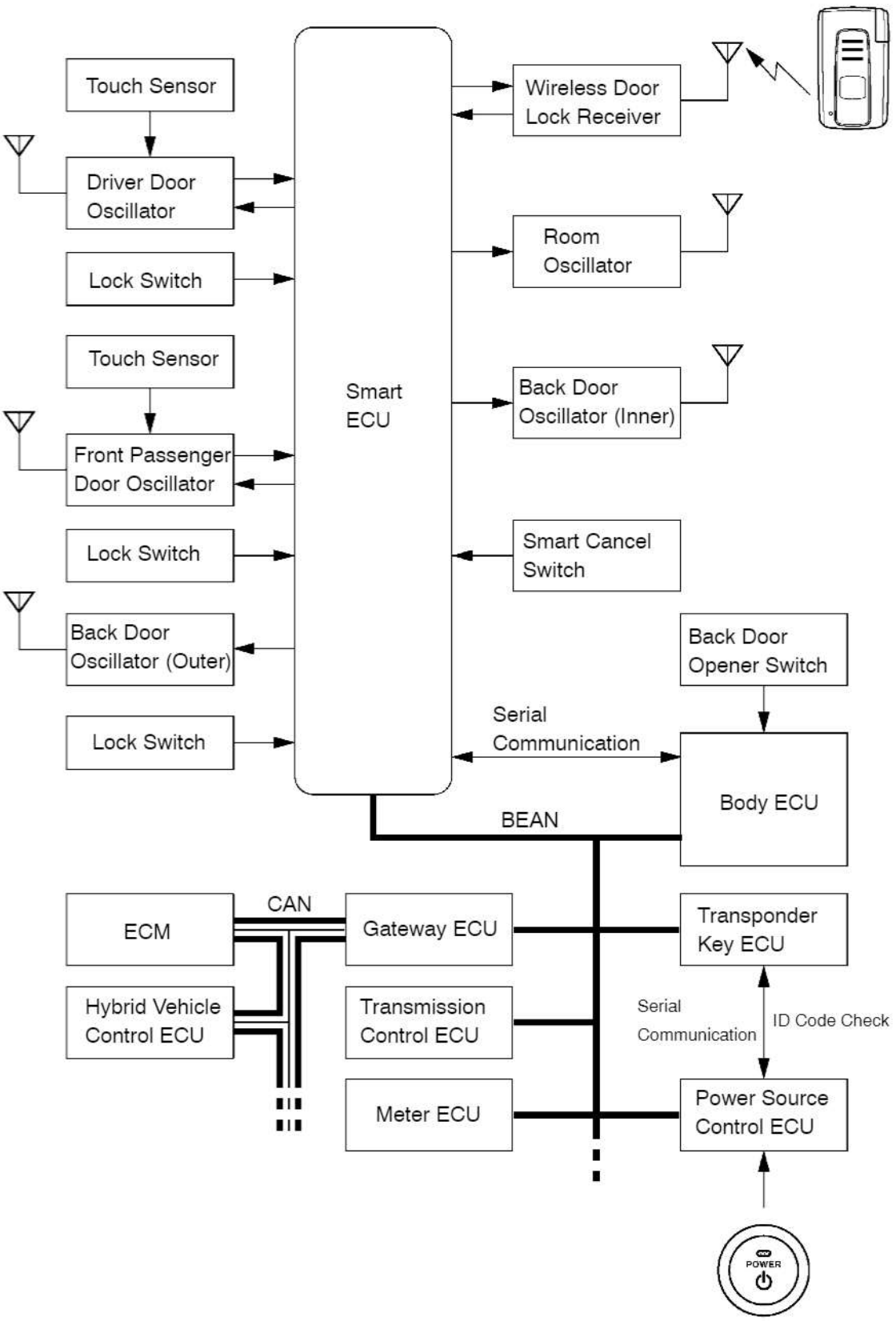


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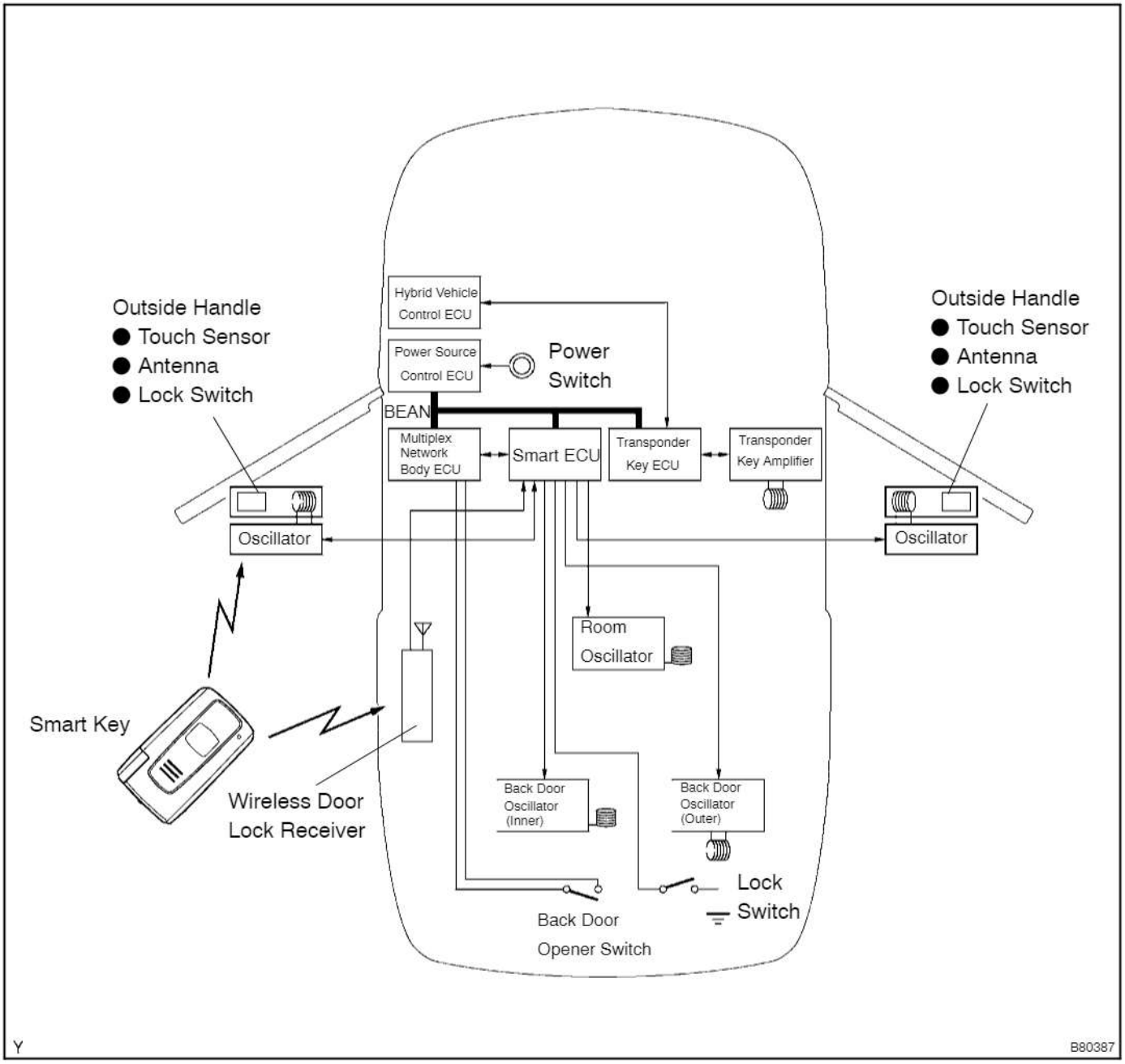
SYSTEM DIAGRAM

1. Overview of Parts Layout



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Sender	Receiver	Signal	Line
Hybrid Vehicle Control ECU	Smart ECU	• Shift position signal	BEAN
Multiplex Network Body ECU	Smart ECU	• Driver door key–linked lock/unlock signal (smart lock/unlock control) • DTC erasure signal • Door lock position signal (D, P, rear doors) (smart lock/unlock control) • Electric back door status signal (smart back door control) • Courtesy switch signal (D, P, rear doors) (smart lock, unlock, warning control) • Vehicle specification signal (smart control change) • IG switch signal (entire smart control) • ACC switch signal (smart warning control) • Halfway switch signal (smart ignition control) • Back door switch signal (smart back door control) • All doors courtesy switch signal (smart lock, unlock, warning control)	BEAN
Transponder key ECU	Smart ECU	• Smart control ON signal (smart ignition control) • Steering lock release activation signal (smart ignition control)	BEAN
Power Source Control ECU	Smart ECU	• Immobilizer ID verification request signal (smart ignition control) • Key slot status (w/ or w/o key) signal (smart ignition control) • Key code verification signal (wireless control)	BEAN
Smart ECU	Transponder Key ECU	• Smart control ON signal (smart ignition control) • Steering lock release activation signal (smart ignition control)	BEAN

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05IB5-01

SYSTEM DESCRIPTION

1. SMART ENTRY SYSTEM DESCRIPTION

- In addition to the mechanical key function and the wireless door lock remote control function, this system provides the smart key with a bi–directional communication function. This function enables the smart ECU to recognize the presence of the smart key within several detection areas. The system can lock or unlock the doors, or start the hybrid system without key operation, as long as the smart key is in the user's possession.
- This system consists of a smart key ECU, power source control ECU, transponder key ECU, body ECU, smart key, 5 oscillators, 5 antennas, 2 touch sensors, 3 lock switches, and a wireless door lock receiver. The smart ECU controls the system.
- The smart entry system operates in cooperation with the push button start system, the immobilizer system and the wireless door lock remote control system.

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2. FUNCTION OF MAIN COMPONENTS

Components	Function
Smart Key	Receives signals from oscillators and returns ID code to wireless door lock receiver.
Door Oscillator (driver and front passenger doors)	Intermittently transmits key detection signals within detection area around each door upon receiving transmission request signal from smart ECU.
Room Oscillator	Transmits key detection signals within detection area in vehicle interior upon receiving transmission request signal from smart ECU.
Back Door Oscillator (inner)	Transmits key detection signals within detection area in luggage room upon receiving transmission request signal from smart ECU.
Back Door Oscillator (outer)	Transmits key detection signals within detection area around back door upon receiving transmission request signal from smart ECU.
Luggage Antenna	Transmits back door oscillator signal.
Door Outside Handle (driver and front passenger) (Touch Sensor)	Transmits door unlock request signal to smart ECU when inside of door outside handle is touched.
Door Outside Handle (driver and front passenger) (Antenna)	Transmits door oscillator signal.
Door Outside Handle (Driver and Front Passenger) (Lock Switch)	Transmits door lock request signal to smart ECU.
Back Door Lock Switch	Transmits door lock request signal to smart ECU.
Back Door Opener Switch	Transmits back door open request signal to smart ECU via body ECU.
Wireless Door Lock Receiver	Receives ID code from smart key and transmits it to smart ECU.
Power Switch	Switches vehicle power modes between four stages (OFF, ON (ACC), ON (IG), and ON (READY) in accordance with shift lever position, state of stoplight switch and check results of smart key.
Smart Key Cancel Switch	Turns smart entry system ON/OFF.
Stop Light Switch	Outputs state of brake pedal to power source control ECU.
Combination Meter (Smart Entry System Warning Light)	Smart ECU illuminates smart entry system warning light to prevent these conditions from occurring: Smart key is moved out of vehicle while hybrid system is in operation, door locks are operated, or smart key is left in vehicle.
Combination Meter (Buzzer)	Smart ECU sounds buzzer to prevent these conditions from occurring: Smart key is moved out of vehicle while hybrid system is in operation, door locks are operated, or smart key is left in vehicle.
Wireless Door Lock Buzzer	Smart ECU sounds wireless door lock buzzer to prevent these conditions from occurring: Smart key is moved out of vehicle while hybrid system is in operation, door locks are operated, or smart key is left in vehicle.
Smart ECU	• Identifies and checks ID codes from wireless door lock receiver, then transmits signals to ECUs if ID codes match. • Upon receiving signals from switches, smart ECU transmits intermittent transmission request signals to door oscillators and transmission request signals to other oscillators in accordance with conditions.
Power Source Control ECU	Main control of push button start system. It receives results of ID code check of smart key provided by smart ECU via transponder key ECU. When check results reveal that ID code is legitimate, power source control ECU authorizes transition of power modes through operation of power switch.
Transponder Key ECU	• Main control of immobilizer system. It transmits results of ID code check of smart key provided by smart ECU to power source control ECU. • Transmits hybrid system start authorization signal to hybrid vehicle control ECU.
Transmission Control ECU	• Actuates parking lock actuator upon receiving power switch OFF signal from power source control ECU. • Transmits state of parking lock operation (whether shift position is in P or some other position) to power source control ECU.

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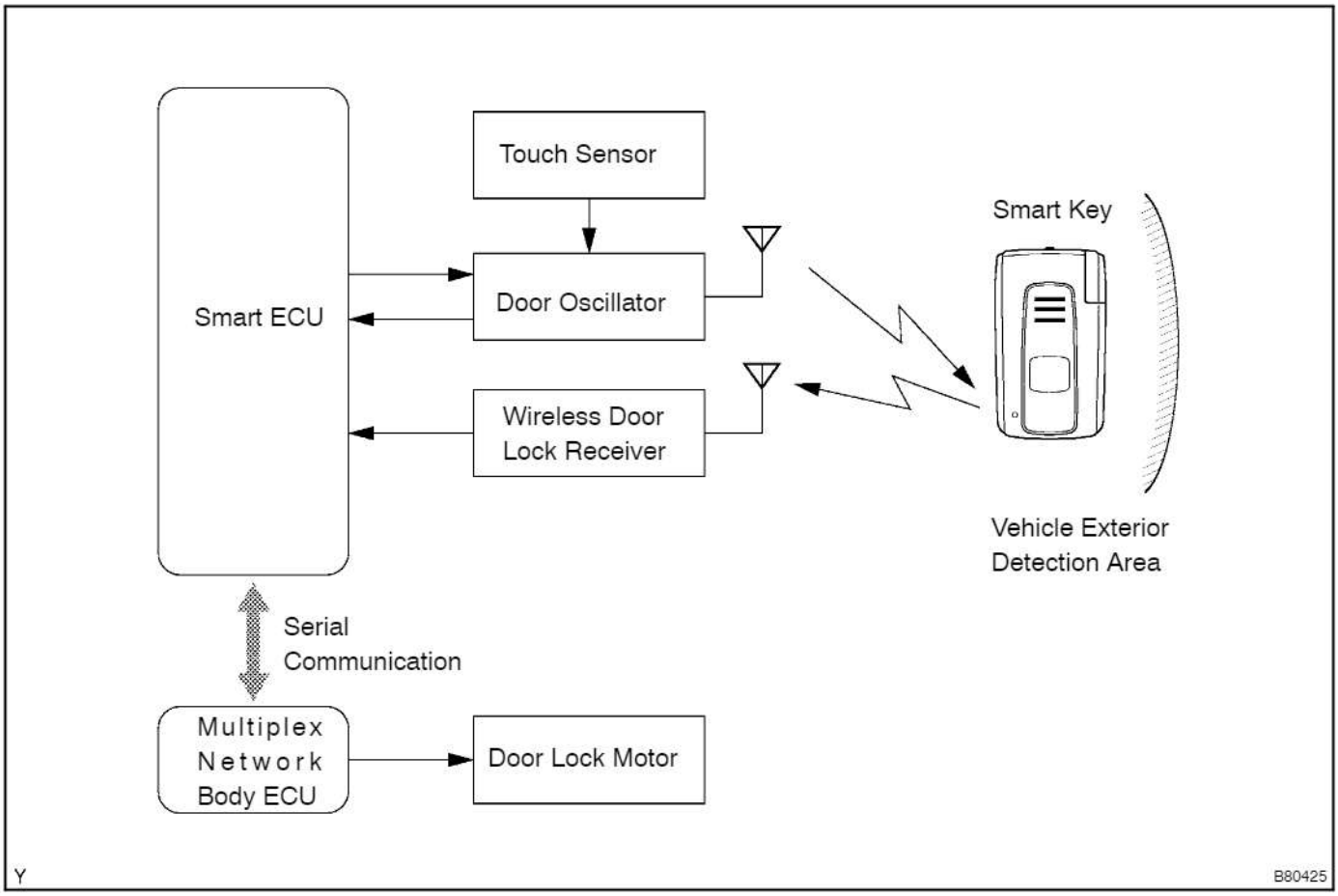
Components	Function
Hybrid Vehicle Control ECU	• Starts hybrid system upon receiving system start signal from power source control ECU (READY ON). • Receives hybrid system start authorization signal from transponder key ECU.
Multiplex Network Body ECU	• Transmits body control system signals (courtesy switch, door key lock/unlock switch, door lock position switch, halfway switch signals, etc.) to smart ECU via BEAN • Receives door lock/unlock request signal from smart ECU via dedicated serial communication line (with local protocol), which is used between body ECU, smart ECU and wireless door lock receiver.

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3. SYSTEM FUNCTION

(a) Smart unlock

- For the system to be able to detect the location of the smart key, the vehicle doors must be locked. The door oscillators transmit key detection signals at prescribed intervals in order to form vehicle exterior detection areas (approximately 0.7 to 1.0 m (2.3 to 3.3 feet) around each front outside door handle).
- When the smart key is brought into a detection area, the system automatically checks the key's ID code. When this is completed, the door that has detected the smart key assumes the unlock standby condition. In this condition, if a person touches the touch sensor on the outside door handle, all doors becomes unlocked.

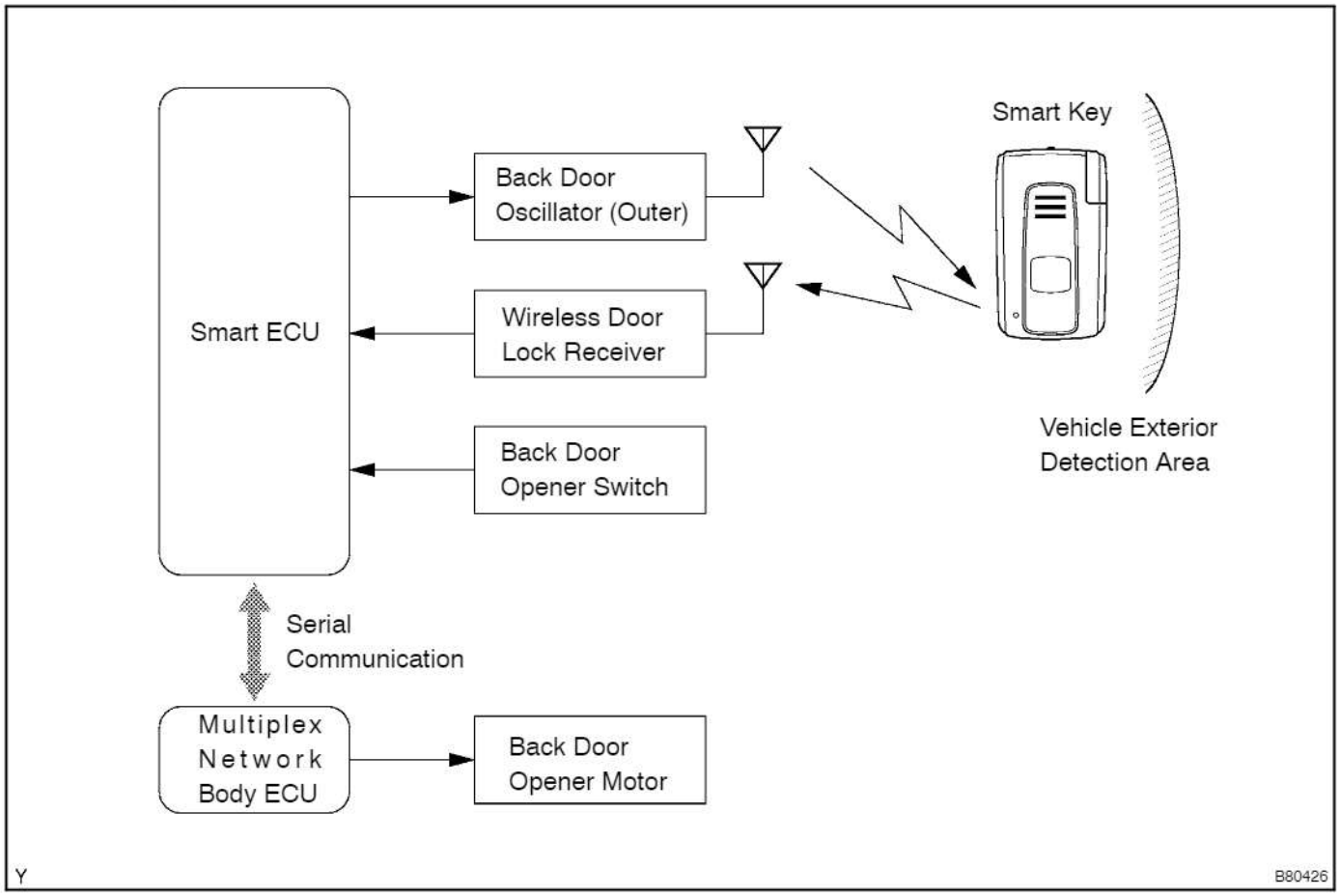


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(b) Smart back door unlock

- With all doors locked, if the back door opener switch is pressed with the smart key in the user's possession, the back door oscillator (outer) outputs a smart key detection signal and the smart ECU checks the ID code. After the check is completed, the smart ECU unlocks* the back door via the body ECU. At this time, if the user continues to press the back door opener switch, the back door lock latch will be released.

*: If smart unlock is set to individual door unlock mode, only the back door will be unlocked. If set to all door unlock mode, all doors will be unlocked.



NOTICE: Handling Precaution for Smart Back Door Unlock

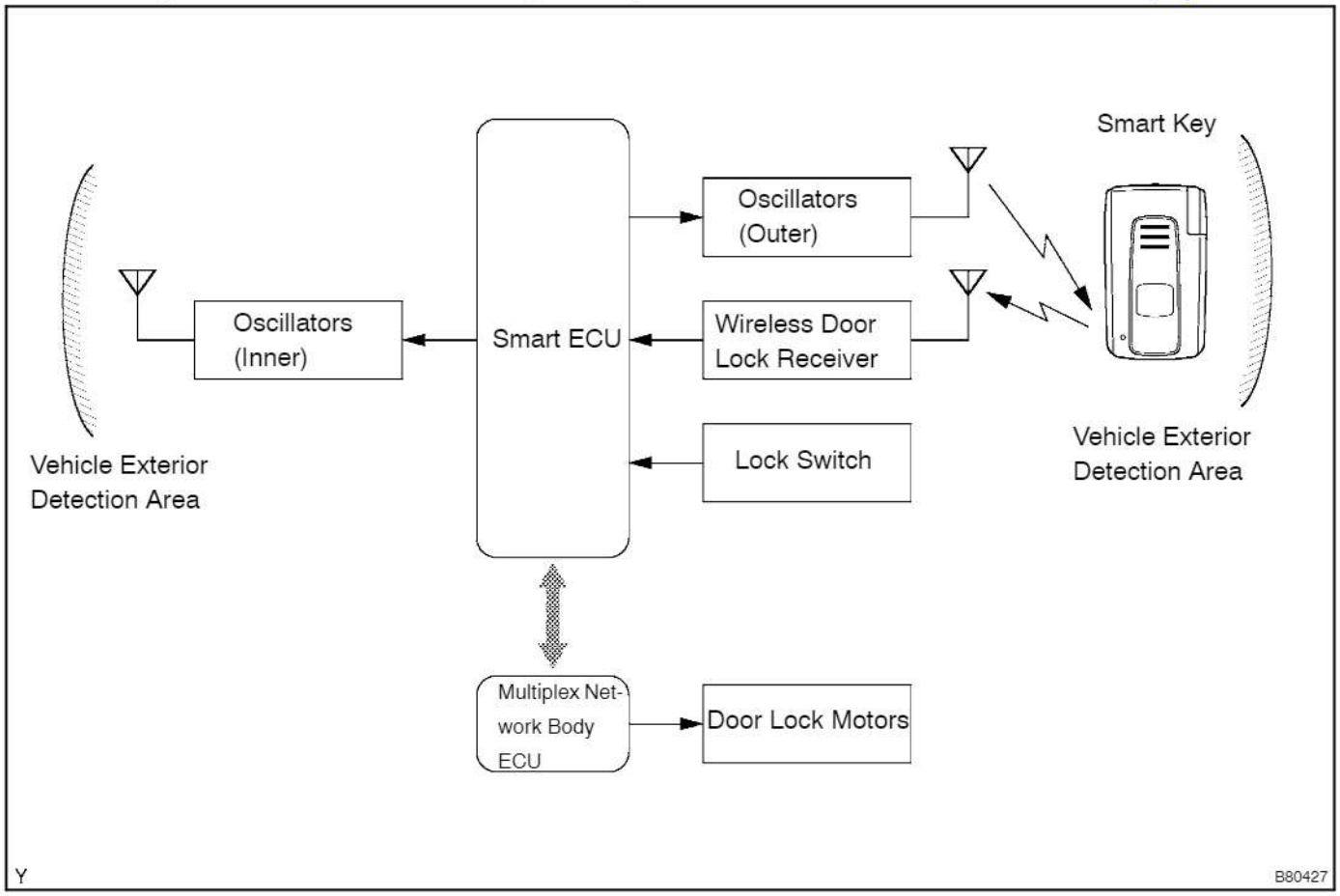
Smart back door unlock function may not operate if the smart key is placed near the center of the rear bumper.

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(c) Smart lock

- When the smart key is located outside of the vehicle and all the doors are closed, if the user presses the lock switch on the outside door handle or the lock switch on the back door, the smart ECU will actuate all oscillators and start checking for the ID code of a smart key.
- At this time, if an oscillator outside of the vehicle (driver's/front passenger's door oscillator or back door outer oscillator) determines that the ID code of the smart key is legitimate, the smart ECU determines that the smart key has been taken outside the vehicle and locks the doors via the body ECU.
- A smart unlock operation will not be authorized for approximately 3 seconds* after the doors have been locked.

*: The setting of this duration can be changed using the customize function. For details, see page 05–1880.

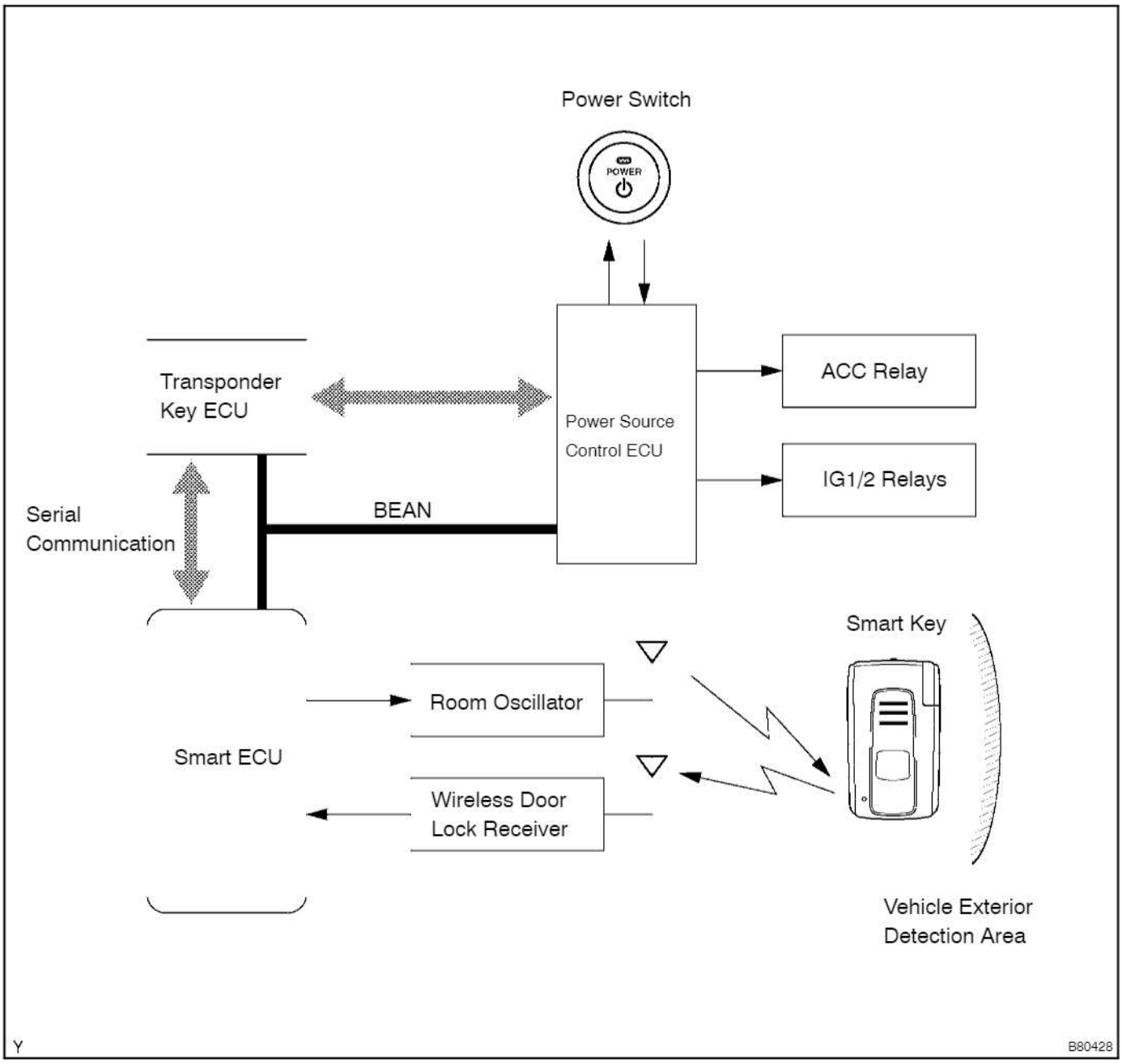


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(d) Smart ignition

OFF → ON (ACC) → ON (IG)

- If the driver presses the power switch once without depressing the brake pedal, the room oscillator, in accordance with the request signal received from the smart ECU, forms a smart key detection area inside the vehicle by emitting smart key detection signals. Accordingly, the smart key sends an ID code signal to the smart ECU via the wireless door lock receiver. The smart ECU checks the ID code of the smart key and transmits the check results to the transponder key ECU.
- The transponder key ECU transmits the check results to the power source control ECU. If the check results reveal that the ID code is legitimate, the power source control ECU will turn on the ACC relay and start the ACC power supply. At this time, the power source control ECU illuminates a green indicator light on the power switch in order to inform the driver of the ON (ACC) power mode.
- After the transition to the ON (ACC) power mode, if the driver presses the power switch again, the power source control ECU will turn on the IG1 and IG2 relays and start the IG power supply. At this time, the power source control ECU illuminates an amber indicator light on the power switch in order to inform the driver of the ON (IG) power mode.

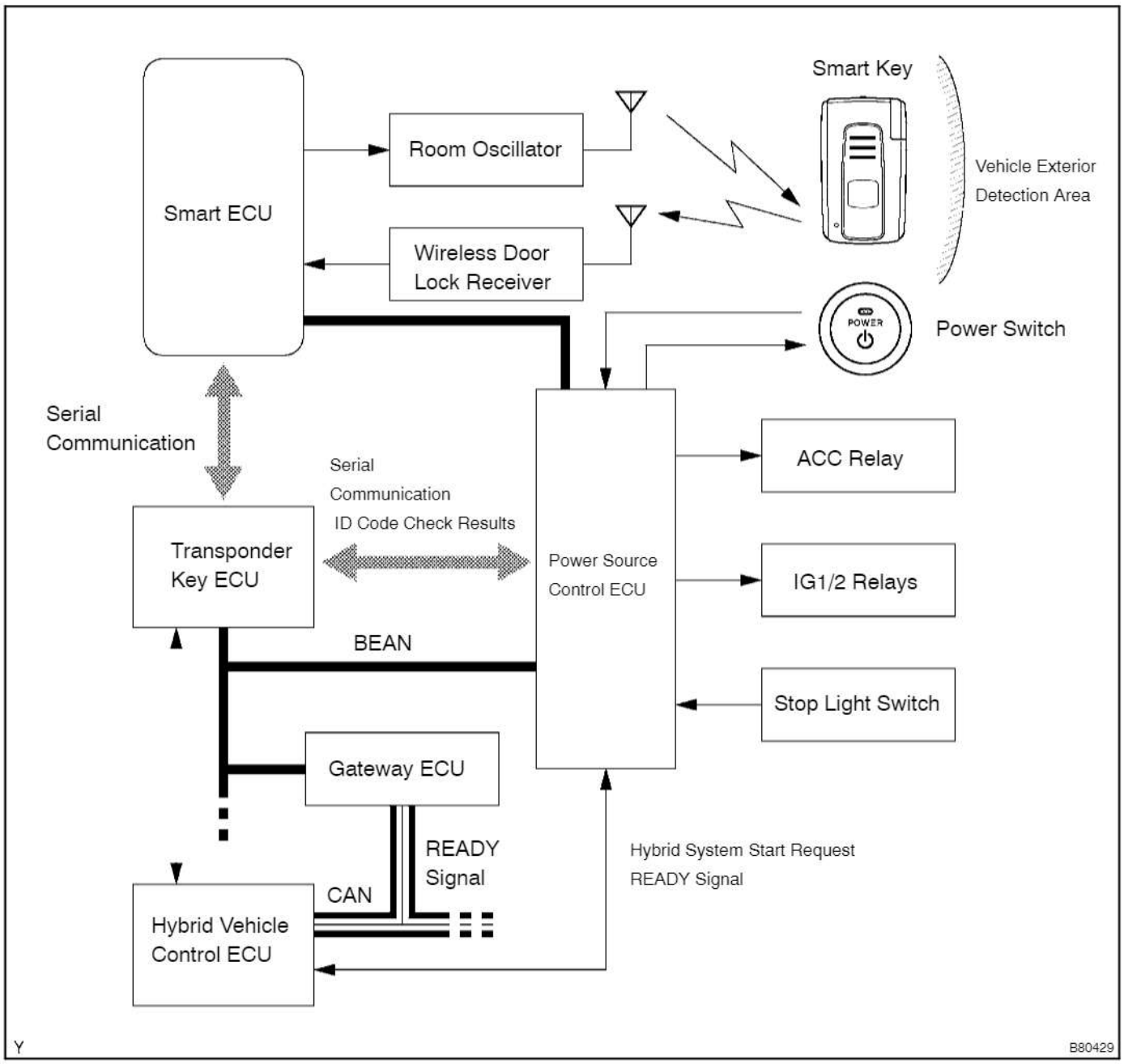


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OFF → ON (READY)

- If the driver presses the power switch once while depressing the brake pedal, the room oscillator, in accordance with the request signal received from the smart ECU, forms a smart key detection area inside the vehicle by emitting smart key detection signals. Accordingly, the smart key sends an ID code signal to the smart ECU via the wireless door lock receiver.
- The smart ECU checks the ID code of the smart key and transmits the check results to the transponder key ECU.
- The transponder key ECU transmits the check results to the power source control ECU. If the check results reveal that the ID code is legitimate, the power source control ECU will turn on the ACC, IG1 and IG2 relays and start the ACC and IG power supply.
- At this time, the power source control ECU illuminates an amber indicator light on the power switch in order to inform the driver of the ON (IG) power mode.
- After the indicator light has illuminated, the power source control ECU transmits a hybrid system start request signal to the hybrid vehicle control ECU.
- Upon receiving this signal, the hybrid vehicle control ECU verifies the check results of the smart key ID code provided by the transponder key ECU.
- If the check results reveal that the ID code is legitimate, the hybrid vehicle control ECU starts the hybrid system.
- At this time, the power source control ECU will turn off the indicator light on the power switch in order to inform the driver of the ON (READY) mode.

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(e) Warning function

• General

The smart key system is equipped with a warning function to prevent problems resulting from errors in smart key usage. The smart key system works without any requirements from the driver other than having the key in one's possession. The driver, as a result, may become unaware of the presence or location of the key and make errors (listed below) that could lead to serious problems.

Examples:

1. The driver is unaware that the key has been taken out of the vehicle by a passenger.
2. The driver exits the vehicle with the hybrid system running.
3. The driver exits the vehicle with the shift position in a position other than P.

If the above situations occur, the hybrid system may be unable to be started once it has been turned off, the vehicle may be stolen, or other problems may follow. Warning function descriptions for several smart key usage errors are below.

- Warning against the driver taking the smart key outside the vehicle with its shift position in P.
- Warning against the driver taking the smart key outside the vehicle while the shift position is in a position other than P.
- Warning against a passenger taking the smart key outside the vehicle.
- Warning against operating the smart lock while the hybrid system is in operation.
- Warning against operating the door lock while the smart key remains inside the vehicle.
- Warning against low battery of the smart key.
- Warning against operating the smart ignition outside the detection area of the room oscillator.
- Warning against operating the door lock while any of the doors is open.

Warning against the driver taking the smart key outside the vehicle with its shift position in P:

Possible results without warning	Vehicle theft or inability to restart hybrid system
Detection conditions	If all conditions listed below are met and smart key ID code check result by room oscillator fails, warning will be issued: • Shift position is in P position • Power switch is OFF • Driver door is opened and closed
Warning (smart entry system warning light)	Illuminates upon detection and turns OFF if power switch is turned OFF or smart key ID code check result by room oscillator passes
Warning (buzzer (combination meter))	Sounds once upon detection. Sounds a second time if vehicle driven in this state
Warning (wireless door lock buzzer)*	Sounds 3 times upon detection and stops if power switch is turned OFF or smart key ID code check result by room oscillator passes

Warning against the driver taking the smart key outside the vehicle while the shift position is in a position other than P:

Possible results without warning	Vehicle theft or inability to restart hybrid system
Detection conditions	If all conditions listed below are met and smart key ID code check result by room oscillator fails, warning will be issued: • Shift position is in P position • Power switch is in ON (ACC), ON (IG) or ON (READY) position • Driver door is opened and closed
Warning (smart entry system warning light)	• Illuminates upon detection and turns OFF if power switch is turned OFF or smart key ID code check result by room oscillator passes • Warning message is displayed on multi–display
Warning (buzzer (combination meter))	Sounds continuously upon detection and stops if power switch is turned OFF, shift position is changed to P, or smart key ID code check result by room oscillator passes
Warning (wireless door lock buzzer)*	Sounds continuously upon detection and stops if power switch is turned OFF, shift position is changed to P, or smart key ID code check result by room oscillator passes

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Warning against a passenger taking the smart key outside the vehicle:

Possible results without warning	Vehicle theft or inability to restart hybrid system
Detection conditions	If all conditions listed below are met and smart key ID code check result by room oscillator fails, warning will be issued: • Power switch is not OFF • Door other than driver door is opened and closed
Warning (smart entry system warning light)	Illuminates upon detection and turns OFF if power switch is turned OFF or smart key ID code check result by room oscillator passes
Warning (buzzer (combination meter))	Sounds once upon detection. Sounds a second time if vehicle is driven in this state
Warning (wireless door lock buzzer)*	Sounds 3 times upon detection and stops if power switch is turned OFF or smart key ID code check result by room oscillator passes

Warning against operating the smart lock while the hybrid system is in operation:

Possible results without warning	Vehicle theft or inability to restart hybrid system
Detection conditions	If all conditions listed below are met, smart key ID code check result by room oscillator fails, and smart key ID code check by door oscillator passes, warning will be issued: • Shift lever is in P position • Power switch is not OFF • All door are closed • Lock switch on outside door handle is ON
Warning (smart entry system warning light)	Illuminates upon detection and turns OFF if power switch is turned OFF or smart key ID code check result by room oscillator passes
Warning (buzzer (combination meter))	–
Warning (wireless door lock buzzer)*	Sounds for 2 seconds

Warning against operating the door lock while the smart key remains in the vehicle:

Possible results without warning	Vehicle theft
Detection conditions	If all conditions listed below are met and smart key ID code check result by room oscillator fails, warning will be issued: • Power switch is in OFF • All door are closed • Lock switch on outside door handle is ON
Warning (smart entry system warning light)	–
Warning (buzzer (combination meter))	–
Warning (wireless door lock buzzer)*	Sounds for 2 seconds

Warning against low battery of the smart key:

Possible results without warning	Smart control is suddenly disabled
Detection conditions	If condition listed below is met, and smart ECU receives code indicating voltage drop of smart key battery while room oscillator checks smart key ID code: • The power switch has been turned OFF after 20 or more minutes have elapsed after hybrid system has been started.
Warning (smart entry system warning light)	–
Warning (buzzer (combination meter))	Sounds once upon detecting
Warning (wireless door lock buzzer)*	–

Warning against operating the smart ignition outside the detection area of the room oscillator:

Possible results without warning	User is confused
Detection conditions	If condition listed below is met and smart key ID code check result by room oscillator fails, warning will be issued: • Power switch is pushed
Warning (smart entry system warning light)	Illuminates for 5 seconds upon detection
Warning (buzzer (combination meter))	Sounds once upon detecting
Warning (wireless door lock buzzer)*	–

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Warning against operating the door lock while any of the doors is open:

Possible results without warning	Vehicle theft
Detection conditions	If all conditions listed below are met, warning will be issued: • Power switch is OFF • Any door is open • Lock switch on outside door handle is ON
Warning (smart entry system warning light)	–
Warning (buzzer (combination meter))	–
Warning (wireless door lock buzzer)*	Sounds for 10 seconds and stops when 10 seconds have passed or if any door is closed

*: Australia only.

(f) Power saving function

- When the doors are locked, the door oscillators emit signals to the outside of the vehicle at default intervals of 300 msec. If the vehicle remains parked for a long time or if the smart key remains in the vehicle exterior detection area for a long time, the auxiliary battery could be depleted.
- If the smart key is constantly located within the vehicle exterior detection area, the system saves battery power by deactivating smart entry system. If the vehicle remains parked in the state for a long time, the system first extends door oscillator signal intervals to 600 msec. after 5 days without a response from the smart key. If 14 days elapse since the last smart key response, the system deactivates the smart entry system.

To prevent the smart key's battery and the auxiliary battery from being depleted in the conditions indicated above, the smart entry system performs controls listed in the table below.

Condition	Control	Reinstatement Condition
Vehicle remains parked for a long time. • No response from smart key for more than 5 days	Signal transmission interval is extended from 300 msec. to 600 msec.	• Wireless door lock remote control signal (lock or unlock) is input and ID code matches • Lock switch signal is input • Door is locked or unlocked in unison with movement of mechanical key
Vehicle remains parked for a long time. • No response from smart key for more than 14 days	Automatically deactivates smart entry system	• Wireless door lock remote control signal (lock or unlock) is input and ID code matches • Lock switch signal is input • Door is locked or unlocked in unison with movement of mechanical key
Vehicle remains parked for a long time. • Smart key is located in vehicle exterior detection area for longer than 10 minutes	Automatically deactivates smart entry system	• Wireless door lock remote control signal (lock or unlock) is input and ID code matches • Lock switch signal is input • Door is locked or unlocked in unison with movement of mechanical key

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4. SMART ENTRY SYSTEM OPERATION PRECAUTIONS

(a) Smart functions in general

(1) Functions and operating ranges:

The functions will not operate if the smart key is not present within the detection areas described below. Furthermore, the functions may not operate or their operating range may decrease if the battery is depleted or in the presence of strong radiowaves or noise. There are also areas in which the functions may not operate properly due to the shape of the vehicle body.

- Smart lock and smart unlock:
  Applicable within approximately 0.7 to 1.0 m (2.3 to 3.3 feet) radius of each front door handle. However, this function may not operate near the windows or door handles.
- Smart ignition:
  Applicable within vehicle interior. This function may not operate if the smart key is placed on the instrument panel, on the rear tray, in the glove box, or on the floor. If the smart key is placed outside of the vehicle, this function may not operate if the smart key is placed near a window.
- Smart back door unlock:
  Applicable within approximately 0.7 to 1.0 m (2.3 to 3.3 feet) radius of the back door opener switch. However, this function may not operate if the smart key is placed near the center of the rear bumper.

(2) The smart entry system uses very weak radiowaves:

The smart functions and the wireless door lock remote control functions may not operate properly (unable to operate the smart lock, unlock, ignition, and back door unlock functions, or a false alarm is issued) in the situations described below. In this case, use the enclosed mechanical key to lock or unlock the driver's door and insert the smart key to start the hybrid system.

- The presence of a facility that generates strong radiowaves nearby, such as a TV tower, electric power plant, or broadcasting station.
- The user has a wireless communication device such as a wireless transmitter or portable telephone along with the smart key.
- The smart key is covered with a metal object or is placed near a metal object.
- A radiowave type wireless door lock remote control is being used in the vicinity.
- When placing the smart key near electrical appliances.

(b) Smart entry system inoperative conditions:

The smart function will not operate under the conditions listed below.

- The smart cancel switch provided below the driver's side instrument panel is turned on.
- The smart key is inserted into the key slot.
- The smart key has no battery (the indicator light does not flash even if the buttons on the smart key are pressed).

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HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the smart entry system.
- The intelligent tester II should be used in steps 3 and 5.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–1879)

3	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication stop, communication line malfunctioning)
  Without code outputs, proceed to A.
  (2) (ECU unconnected, communication stop, communication line malfunctioning)
  With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SECTION (See page 05–2261)

A

4	PROBLEM SYMPTOMS TABLE (See page 05–1882)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 6

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) On vehicle inspection (see page 05–1932)
(b) DATA LIST/ACTIVE TEST (see page 05–1889)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(c) Terminals of ECU (see page 05–1883)

6	ADJUST, REPAIR OR REPLACEMENT

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7	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

SMART ENTRY SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		License Plate 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 (°C [°F])

Malfunction Symptoms	☐ Smart lock and unlock functions do not operate on all doors	
	☐ Smart lock function does not operate	
	☐ Smart unlock function does not operate	
	☐ Smart lock and unlock functions do not operate	
	☐ All ☐ Driver side ☐ Passenger side	
	☐ Smart ignition function does not start hybrid control system	
	☐ Smart back door lock function does not operate	
	☐ Smart key back door lock–in prevention function does not operate	
Condition When Returned to Normal		☐ Power switch ON (IG) ☐ Hybrid vehicle control system started ☐ ( ) Switch operated
Condition When Problem Occurred	Yes • No	☐ Power switch OFF/ON (IG) ☐ ( ) Switch operated ☐ Other ( )

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CUSTOMIZE PARAMETERS

HINT:

The items in the table on the next page can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

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SMART ENTRY SYSTEM

Display (Item)	Default	Contents	Setting
SMART WARN 1 (Warn key is taken from D–door with P position)	ON	Function that warns driver that key is taken out from driver's door when shift position is in P and power switch is not OFF	ON/OFF
SMART WARN 2 (Warn key is taken from D–door without P position)	ON	Function that warns driver that key is taken out from driver's door when shift position is not in P and power switch is not OFF	ON/OFF
SMART WARN 3 (Warn key is taken out by other passengers)	ON	Function that warns driver that key is taken out from any door except driver's door by passenger when power switch is not OFF	ON/OFF
SMART BUZ NUM (Setting number of warning buzzer sounds)	3 TIMES	Function that sets number of warning buzzer sounds when key is taken out of vehicle	OFF/ 3TIMES/5TIMES/7TIMES
SMART WARN 4 (Warn locking door when Engine is idling)	2s	Function that sets warning time for locking doors while engine is idling	OFF/1s/2s
SMART WARN 5 (Warn when key is left in vehicle)	2s	Function that sets warning time for locking doors while key is inside vehicle	OFF/1s/2s
SMART WARN 6 (Warn starting E/G when key is out of detection range)	ON	Function that warns driver that smart ignition control is being attempted to be activated while key is out of detection range	ON/OFF
KEY LOW–BATT WRN (Warn when key battery becomes weak)	ON	Function that warns driver that key's battery power is low	ON/OFF
TRANSMIT INTVAL (Transmission interval)	300ms	Function that sets smart signal transmission intervals when vehicle is stopped and key is outside vehicle	150ms/300ms/450ms/ 600ms
PARK WAIT TIME (Wait time to permit opening door after locking)	3.0s*	Function that sets waiting time to permit opening door after door is locked with smart lock function	0.5s/1.5s/2.5s/5s
SMART BACK DOOR (Backdoor opening operation when vehicle is locked)	LONG	Function that enables back door to open when key is inside luggage compartment	LONG/TWICE/OFF

*: For vehicles with double lock system, the default setting is 5.5s.

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PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the table below for each malfunction symptom and troubleshoot each circuit.

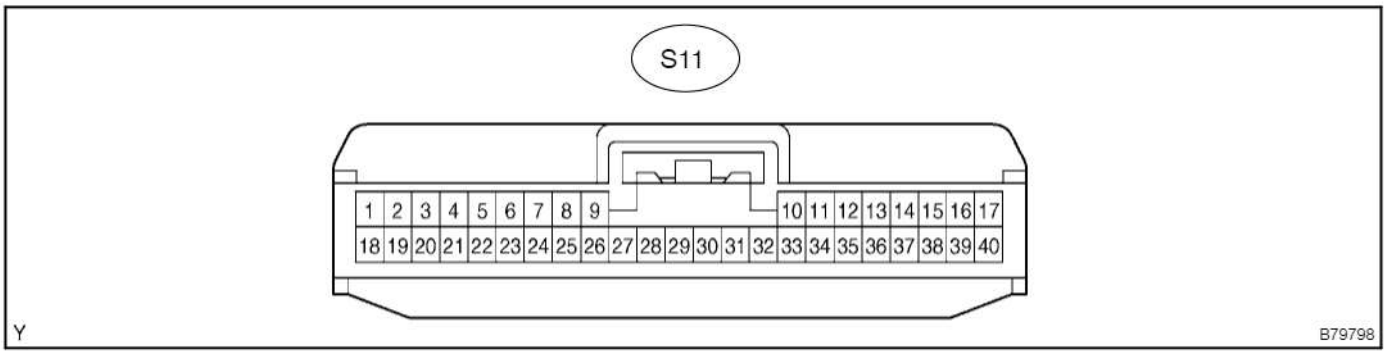
Symptoms	Suspected Area	See Page
Smart functions do not operate at all	1. Wireless door lock control system 2. Smart cancel switch 3. Smart ECU 4. Wire harness	05–1891
Smart cancel switch does not operate	1. Wireless door lock control system 2. Smart cancel switch 3. Smart ECU 4. Wire harness	05–1891
Smart cancel switch does not operate	1. Smart cancel switch 2. Smart ECU 3. Wire harness	05–1894
Smart unlock function does not operate on driver door	1. Power door lock control system 2. Door oscillator LH 3. Front door outside handle assy 4. Smart ECU 5. Wire harness	05–1903
Smart unlock function does not operate on passenger door	1. Power door lock control system 2. Door oscillator RH 3. Front door outside handle assy 4. Smart ECU 5. Wire harness	05–1908
Smart lock and unlock functions do not operate on driver door	1. Power door lock control system 2. Door oscillator LH 3. Smart ECU 4. Wire harness	05–1897
Smart lock and unlock functions do not operate on passenger door	1. Power door lock control system 2. Door oscillator RH 3. Smart ECU 4. Wire harness	05–1900
Smart lock function does not operate on driver door	1. Power door lock control system 2. Front door outside handle assy 3. Smart ECU 4. Wire harness	05–1913
Smart lock function does not operate on passenger door	1. Power door lock control system 2. Front door outside handle assy 3. Smart ECU 4. Wire harness	05–1916
Hybrid control system does not start using smart ignition function (starts when key is inserted)	1. Room oscillator 2. Smart ECU 3. Smart key 4. Wire harness	05–1919
Smart back door unlock function does not operate when key is outside back door	1. Back door oscillator (outer) 2. Back door opener switch 3. Luggage antenna 4. Smart ECU 5. Wire harness	05–1923
Smart key luggage compartment lock–in prevention function does not operate	1. Back door oscillator (inner) 2. Smart ECU 3. Wire harness	05–1929

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TERMINALS OF ECU

1. CHECK SMART ECU



(a) Disconnect the S11 ECU connector.

(b) Measure the resistance and voltage between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (S11–1) – Body ground	R – Body ground	+B power supply	Constant	10 to 14 V
IG (S11–18) – Body ground	B – Body ground	Ignition power supply	Power switch OFF → ON (IG)	0 V → 10 to 14 V
E (S11–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
TSW1 (S11–5) – Body ground	B – Body ground	Outside door handle LH lock switch signal	Lock switch OFF → ON	10 kΩ or higher → Below 1 Ω
TSW2 (S11–6) – Body ground	R – Body ground	Outside door handle RH lock switch signal	Lock switch OFF → ON	10 kΩ or higher → Below 1 Ω
TSW6 (S11–8) – Body ground	B – Body ground	Back door lock switch signal	Back door lock switch OFF → ON	10 kΩ or higher → Below 1 Ω
CNSL (S11–25) – Body ground	W–B – Body ground	Smart entry system cancel switch signal	Cancel switch OFF → ON	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the S11 ECU connector.

(d) Measure the voltage and frequency of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CLG1 (S11–13) – E (S11–17)	P – W–B	Driver door oscillator sensor signal	All doors locked by wireless operation from outside vehicle and power switch OFF → ON (IG)	Some Hz → 0 Hz
CLG2 (S11–14) – E (S11–17)	R – W–B	Passenger door oscillator sensor signal	All doors locked by wireless operation from outside vehicle and power switch OFF → ON (IG)	Some Hz → 0 Hz
CLG5 (S11–36) – E (S11–17)	G – W–B	Room oscillator sensor signal	30 seconds after driver side door opened and closed, power switch OFF → ON (IG)	Some Hz → 0 Hz
CLG7 (S11–38) – E (S11–17)	BR – W–B	Luggage oscillator inner sensor signal	30 seconds after driver side door opened and closed, power switch OFF → ON (IG)	Some Hz → 0 Hz
CLG8 (S11–39) – E (S11–17)	O – W–B	Luggage oscillator outer sensor signal	Back door opener switch OFF → ON	Some Hz → 0 Hz

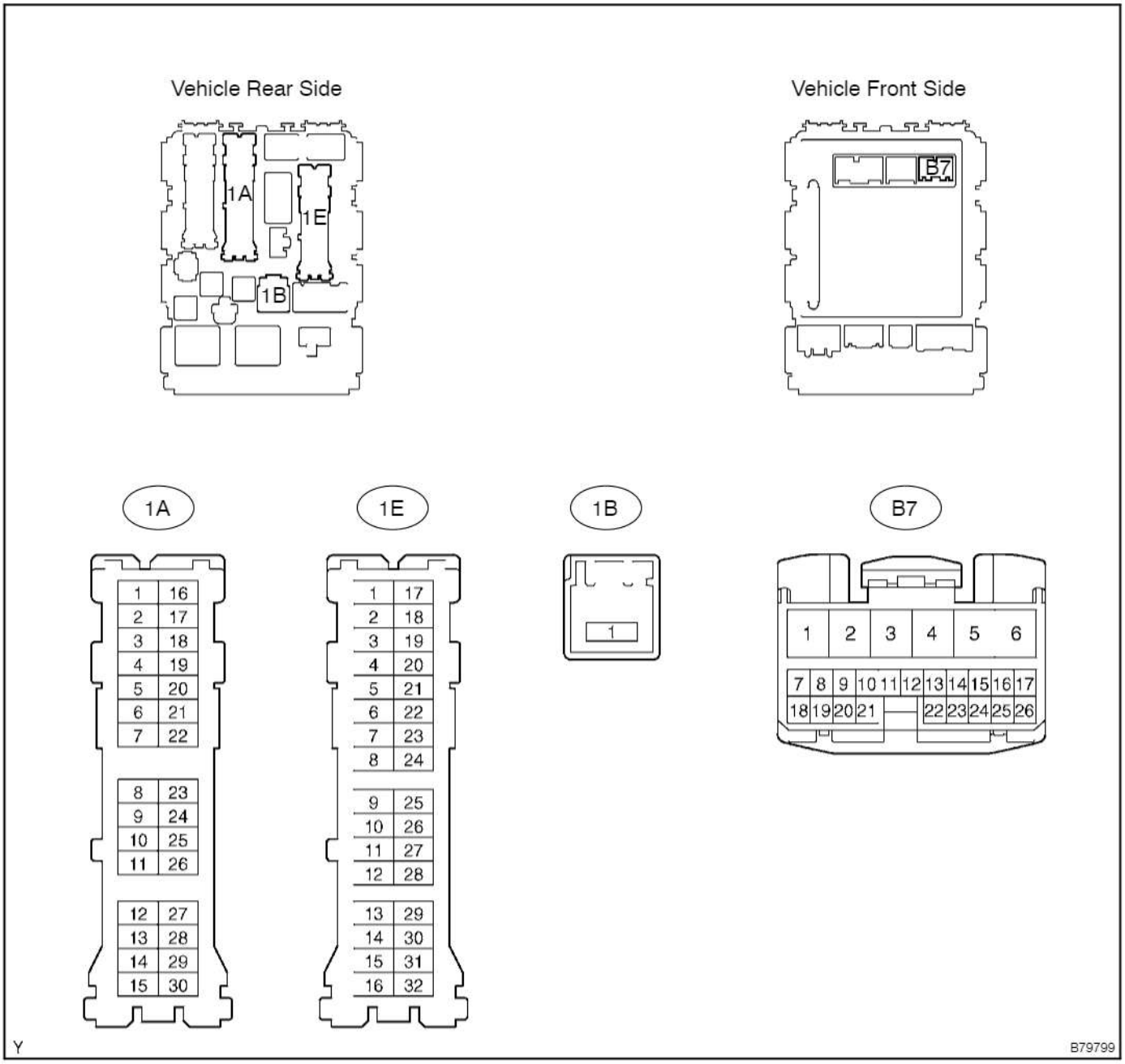
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Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SEL1 (S11–23) – E (S11–17)	Y – W–B	Sensor detection signal	Smart key at least 3 m away from door → near outside door handle LH	10 to 14 V → 0 V
SEL2 (S11–24) – E (S11–17)	B – W–B	Sensor detection signal	Smart key at least 3 m away from door → near outside door handle RH	10 to 14 V → 0 V
SEN1 (S11–21) – E (S11–17)	R – W–B	Lock switch detection signal	Outside door handle LH touched → not touched	10 to 14 V → 0 V
SEN2 (S11–22) – E (S11–17)	W – W–B	Lock switch detection signal	Outside door handle RH touched → not touched	10 to 14 V → 0 V
RDA3 (S11–29) – E (S11–17)	L – W–B	Door control receiver input signal	With power switch OFF, no smart key and all doors closed, turn smart key switch OFF → ON	Below 1 V → Approx. 6 to 7 V
PRG (S11–28) – E (S11–17)	B – W–B	Door control receiver output signal	With power switch OFF, no smart key and all doors closed, turn smart key switch OFF → ON	Below 1 V → Approx. 6 to 7 V
RCO (S11–12) – E (S11–17)	L – W–B	Power source	With power switch OFF, no smart key and doors closed, turn smart key switch OFF → ON	0 to 5 V → 5 V
RSSI (S11–11) – E (S11–17)	V – W–B	Door control receiver output signal	Power switch OFF, all doors closed and smart key switch OFF → ON	0 to 5 V → Below 1 V
RDA (S11–10) – E (S11–17)	GR – W–B	Door control receiver input signal	With power switch OFF, no smart key and all doors closed, turn smart key switch OFF → ON	Below 1 V → Approx. 6 to 7 V
KSW (S11–4) – E (S11–17)	Y – W–B	Key unlock warning switch input signal	No key in key slot → Key inserted	10 to 14 V → 0 V

If the result is not as specified, the ECU may have a malfunction.

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2. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



(a) Disconnect the 1A, 1B and 1E J/B connectors.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
ALTB (1B–1) – Body ground	W – Body ground	+B (power system, generator system) power supply	Constant	10 to 14 V
GND (1E–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

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If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the 1A, 1B and 1E J/B ECU connectors.

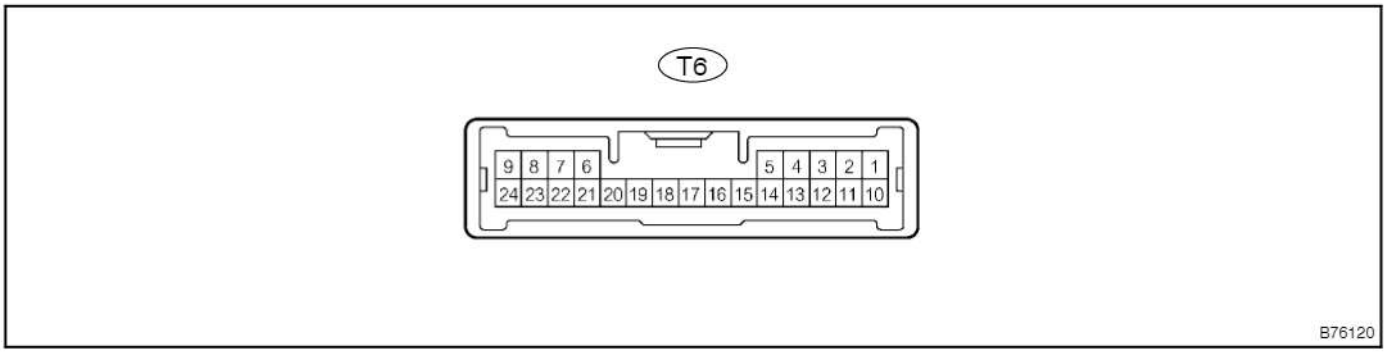
(d) Measure the voltage between each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PRG (B7–24) – GND (1E–17)	B – W–B	Door control receiver output signal	With power switch OFF, no smart key and all doors closed, turn smart key switch OFF → ON	0 to 5 V → 0 V
RDA (B7–23) – GND (1E–17)	L – W–B	Door control receiver input signal	With power switch OFF, no smart key and all doors closed, turn smart key switch OFF → ON	Below 1 V → Approx. 6 to 7 V

If the result is not as specified, the J/B assy (body ECU) may have a malfunction.

3. CHECK TRANSPONDER KEY ECU



(a) Disconnect the T6 ECU connector.

(b) Measure the resistance and voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – GND (T6–22)	L – W–B	Battery	Constant	10 to 14 V
IG (T6–4) – GND (T6–22)	O – W–B	Power switch (IG)	Power switch OFF → ON (IG)	0 V → 10 to 14 V
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
AGND (T6–7) – GND (T6–22)	P – W–B	Ground	Constant	Below 1 Ω
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the T6 ECU connector.

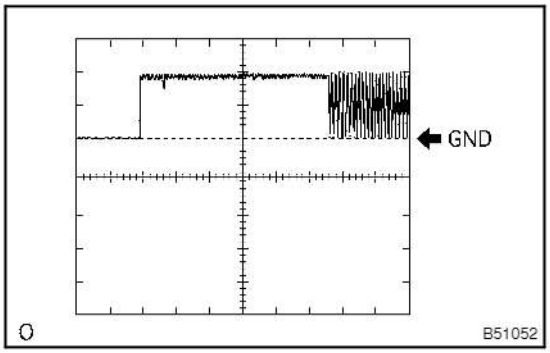
(d) Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 to 14 V → Below 1 V
VC5 (T6–20) – GND (T6–22)	Y – W–B	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (T6–21) – AGND (T6–7)	L – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (T6–6) – AGND (T6–7)	LG – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
HEV0 (T6–19) – GND (T6–22)	W – W–B	Hybrid vehicle control ECU output signal	No key in key slot → Key inserted	Pulse generation (see waveform 3)
HEV1 (T6–18) – GND (T6–22)	R – W–B	Hybrid vehicle control ECU input signal	Constant	Pulse generation (see waveform 4)

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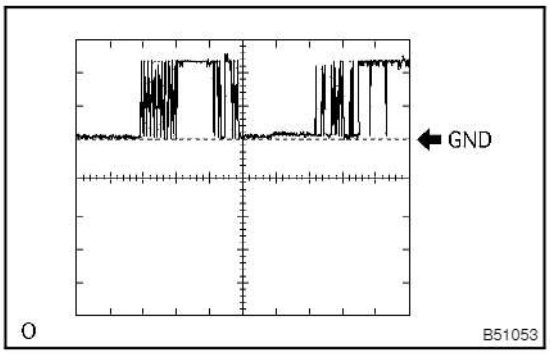
If the result is not as specified, the ECU may have a malfunction.



(e) Inspect using an oscilloscope.

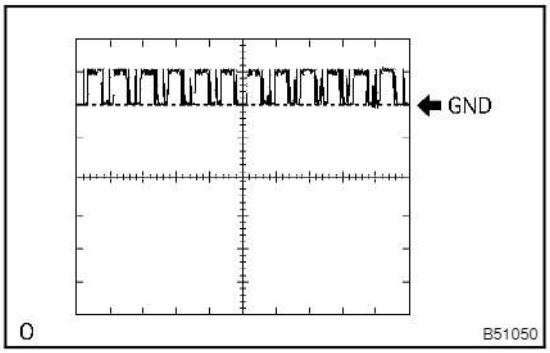
Waveform 1 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted



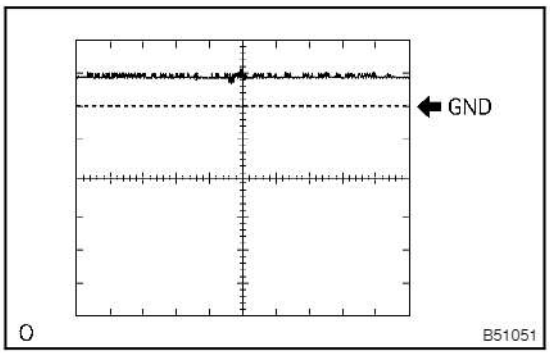
Waveform 2 (Reference):

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted



Waveform 3 (Reference):

Terminal	HEV0 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted



Waveform 4 (Reference):

Terminal	HEV1 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Constant

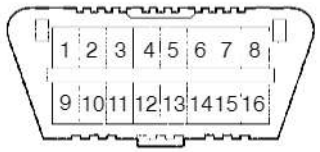
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05IBH–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The smart ECU controls the function of the smart entry system on the vehicle. Data of the smart entry system and the Diagnostic Trouble Code (DTC) can be read in the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester II to check for a malfunction and perform repairs.



DLC3

B50154

2. CHECK DLC3

HINT:

The vehicle uses ISO 9141–2 for communication. The terminal arrangement of the 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 ground	Constant	Below 1Ω
5 (Signal ground) – Body ground	Constant	Below 1Ω
16 (B+) – Body ground	Constant	10 to 14V

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester II to the DLC3, turn the power switch ON (IG) and attempt to use the intelligent tester II. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. CHECK BATTERY VOLTAGE

Standard: 11 to 14 V

If the voltage is below 11 V, replace the battery before proceeding.

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05IBJ–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON (IG).

(c) Read the DATA LIST according to the display on the tester.

Smart ECU :

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
D Touch Sensor	D–door touch sensor/ ON or OFF	ON: Touch the touch sensor OFF: Do not touch the touch sensor	–
P Touch Sensor	P–door touch sensor/ ON or OFF	ON: Touch the touch sensor OFF: Do not touch the touch sensor	–
D Trigger SW	D–door trigger switch/ ON or OFF	ON: Trigger switch is pushed OFF: Trigger switch is not pushed	–
P Trigger SW	P–door trigger switch/ ON or OFF	ON: Trigger switch is pushed OFF: Trigger switch is not pushed	–
Tr/B–Door Lock	Trunk/Back–door lock switch/ ON or OFF	ON: Back door lock switch is pushed OFF: Back door lock switch is not pushed	–
Smart Cancel SW	Smart cancel switch/ ON or OFF	ON: Smart cancel switch is ON OFF: Smart cancel switch is OFF	–
Key Unlk Wrn SW	Key unlock warning switch/ ON or OFF	ON: Key is in key slot OFF: No key is in key slot	–
IG SW	Power switch/ ON or OFF	ON: Power switch is ON (IG) OFF: Power switch is OFF	–

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2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator and other items to be operated without parts removal. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.

(c) Perform the ACTIVE TEST according to the display on the tester.

Smart ECU :

Item	Test Details	Diagnostic Note
D Transmitter	Driver Side Transmitter ON/OFF	–
P Transmitter	Passenger Side Transmitter ON/OFF	–
Fr Transmitter	Front Transmitter ON/OFF	–
In Bdr Trnsmttr	Back Door Inner Transmitter ON/OFF	–
Bdoor Trnsmttr	Back Door Outer Transmitter ON/OFF	–
D Select Sig	Driver Side Select ON/OFF	–
P Select Sig	Passenger Side Select ON/OFF	–

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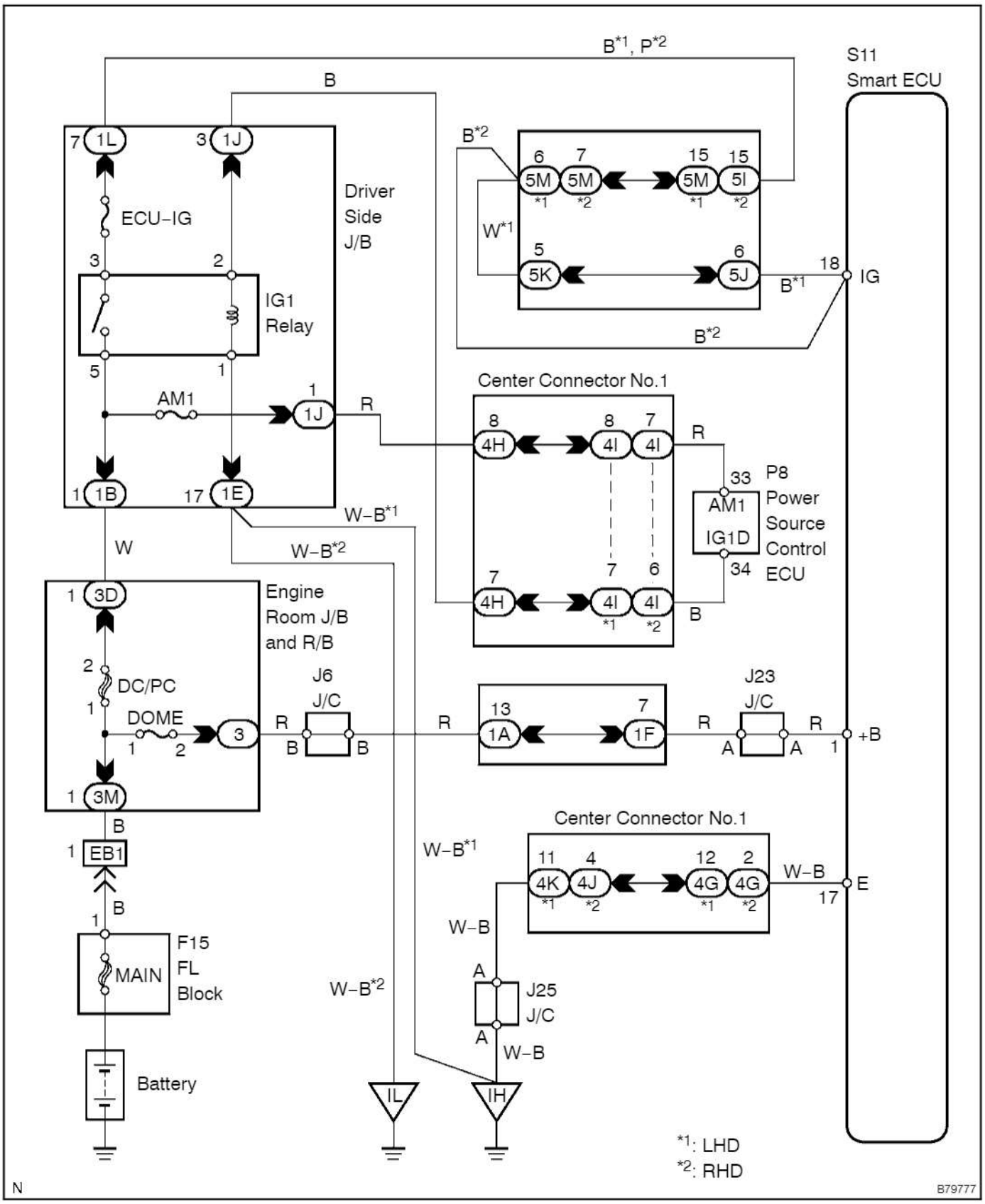
SMART FUNCTIONS DO NOT OPERATE AT ALL

CIRCUIT DESCRIPTION

When the smart functions do not operate at all, it is possible that the smart ECU is malfunctioning or that the wire harness leading to the smart ECU is short–circuited.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

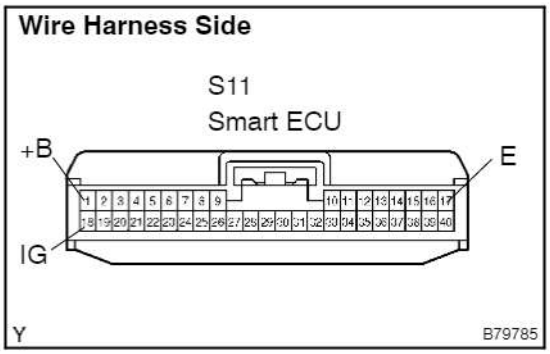
1	INSPECT FUSE (DOME)

(a) Remove the DOME fuse from the engine room J/B and engine room R/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (SMART ECU – BODY GROUND)



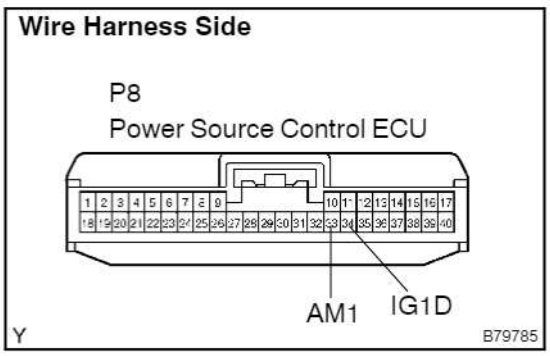
(a) Disconnect the S11 ECU connector.
(b) Measure the voltage and resistance between the wire harness side connector and body ground.
Standard:

Tester Connection	Condition	Specified Condition
S11–18 (IG) – Body ground	Power switch OFF → ON (IG)	0 V → 10 to 14 V
S11–1 (+B) – Body ground	Constant	10 to 14 V
S11–17 (E) – Body ground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the P8 ECU connector.
(b) Measure the voltage and resistance between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
P8–33 (AM1) – Body ground	10 to 14 V
P8–34 (IG1D) – Body ground	Below 1 Ω

NG → **GO TO PUSH BUTTON START SYSTEM**

OK

REPLACE SMART ECU

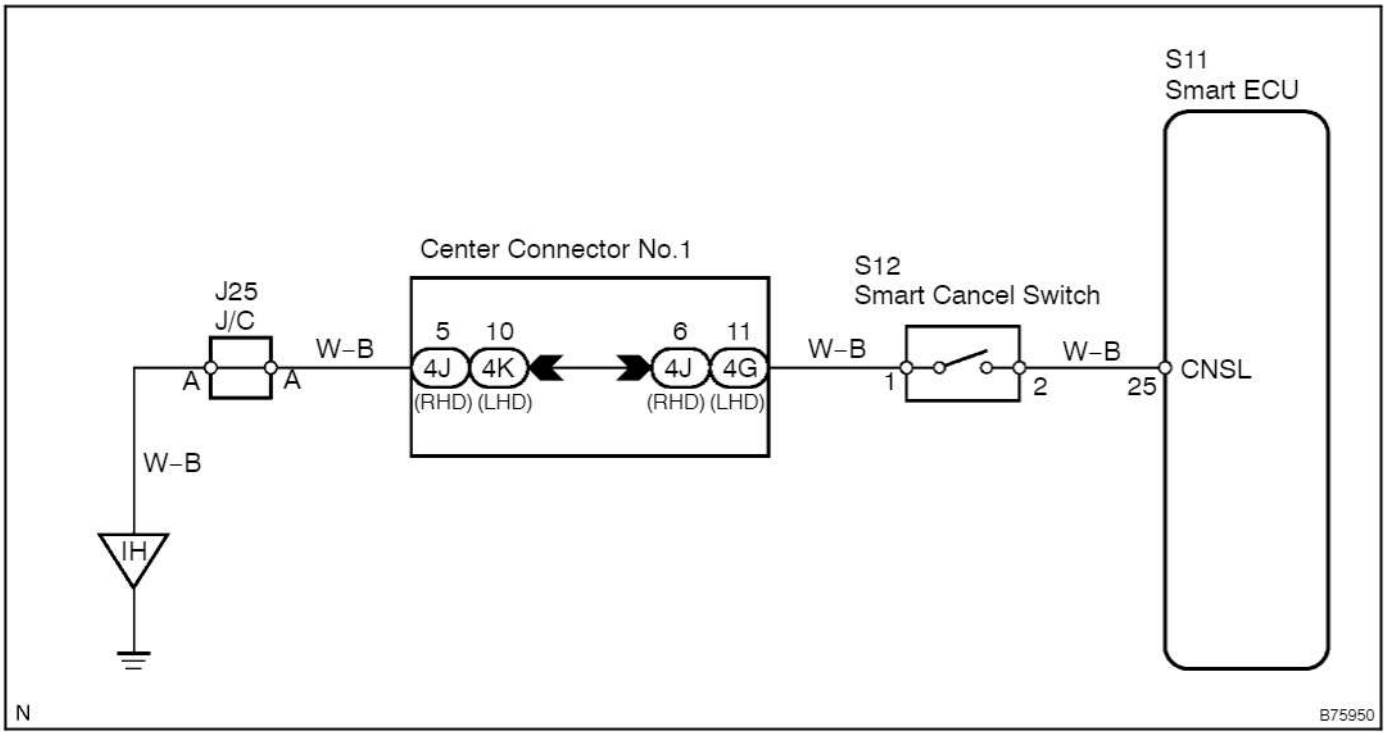
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SMART CANCEL SWITCH DOES NOT OPERATE

CIRCUIT DESCRIPTION

Smart unlock function:
When an outside oscillator receives a smart key output ID code and the smart ECU confirms the ID code, the smart ECU outputs a SEL signal (Lo when output) to the outside oscillator to change the touch sensor inside the door outside handle to unlock standby condition. When the touch sensor is touched, the outside oscillator outputs a SENS signal (Lo when output) to the smart ECU. Then, the smart ECU sends unlock signals to the door lock assemblies on all doors through the driver side junction block (body ECU).
Smart lock function:
When the lock switch on the outside door handle is pressed, the smart ECU sends a request signal to an outside oscillator. The smart key receives this request and transmits its ID code. Upon receiving the ID code, the smart ECU determines that the smart key is outside the vehicle and sends lock signals to the door lock assemblies on all doors through the driver side junction block (body ECU).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRELESS DOOR LOCK OPERATION

(a) Check that the wireless door lock function operates normally.
OK: Wireless door lock function operates normally.

NG → **Go to WIRELESS DOOR LOCK CONTROL SYSTEM (w/ SMART ENTRY SYSTEM) (See page 05–1943)**

OK

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2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch from OFF to ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST and read the displays on the intelligent tester II.
SMART ECU:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
Smart Cancel SW	Smart cancel switch/ ON or OFF	ON: Smart cancel switch is ON OFF: Smart cancel switch is OFF	–

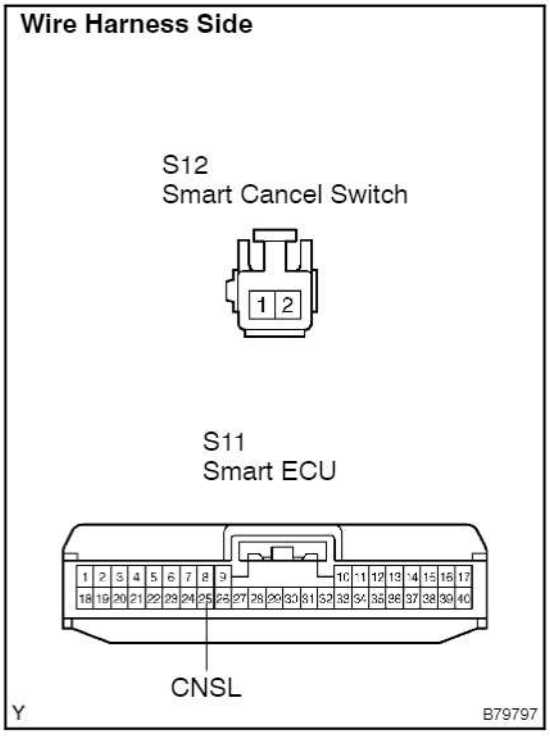
OK: "OFF" (smart cancel switch is turned off) appears on the screen.

NG → **Go to step 3**

OK

REPLACE SMART ECU

3	CHECK WIRE HARNESS (SMART CANCEL SWITCH – SMART ECU AND BODY GROUND)



(a) Disconnect S12 switch connector.
(b) Disconnect S11 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.
Standard:

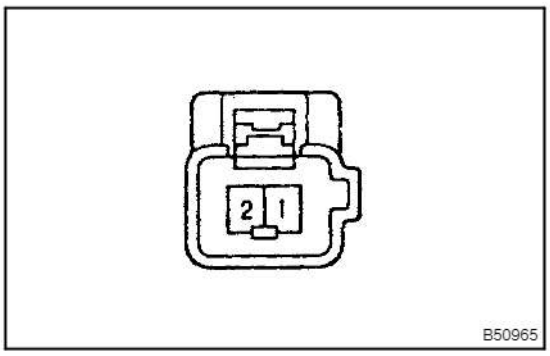
Tester Connection	Specified Condition
S12–2 – S11–25 (CNSL)	Below 1 Ω
S12–1 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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4	INSPECT SMART CANCEL SWITCH



(a) Remove the smart cancel switch.
(b) Measure the switch resistance.

Standard:

Tester Connection	Condition	Specified Condition
S12–1 – S12–2	Not pushed (OFF)	10 kΩ or higher
S12–1 – S12–2	Pushed (ON)	Below 1Ω

NG → **REPLACE SMART CANCEL SWITCH**

OK

REPLACE SMART ECU

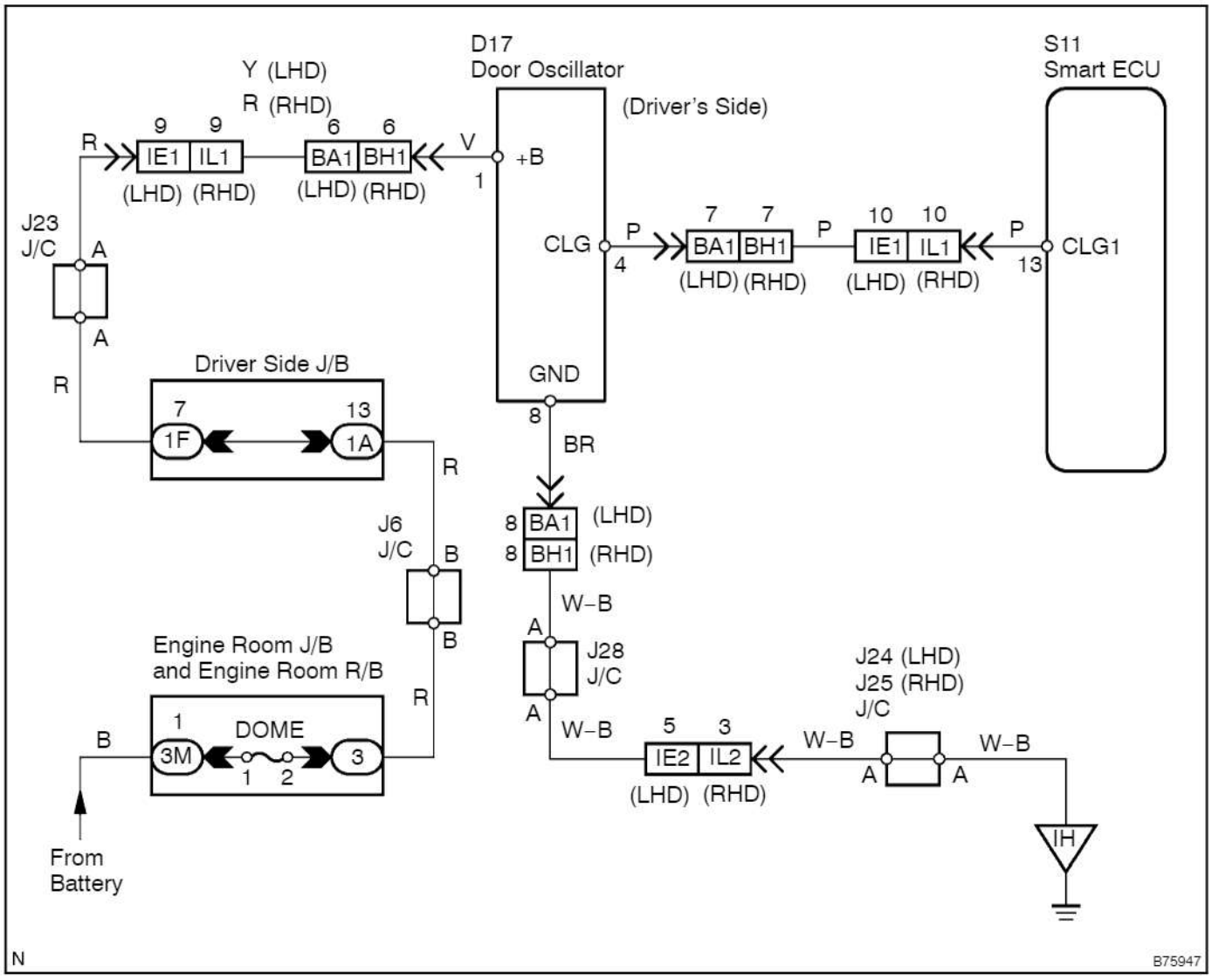
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SMART LOCK AND UNLOCK FUNCTIONS DO NOT OPERATE ON DRIVER DOOR

CIRCUIT DESCRIPTION

Both the smart lock and unlock functions do not operate when: 1) nothing is output from the driver door outside oscillator, 2) the smart entry system is disabled through customization, or 3) the entire power door lock control system is malfunctioning.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK MANUAL DOOR LOCK AND UNLOCK OPERATION

(a) Check that the manual door lock and unlock function operates normally.
OK: Manual door lock and unlock function operates normally.

NG → **Go to POWER DOOR LOCK CONTROL SYSTEM** (See page 05–1776)

OK

2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the ACTIVE TEST and then check that the oscillator operates.
Smart ECU:

Item	Test Details	Diagnostic Note
D Transmitter	Driver Side Transmitter ON/OFF	–

OK: "ON" (Driver Side Transmitter) appears on the screen.
When the smart key is brought close to the door, the oscillator is turned ON and the indicator illuminates.

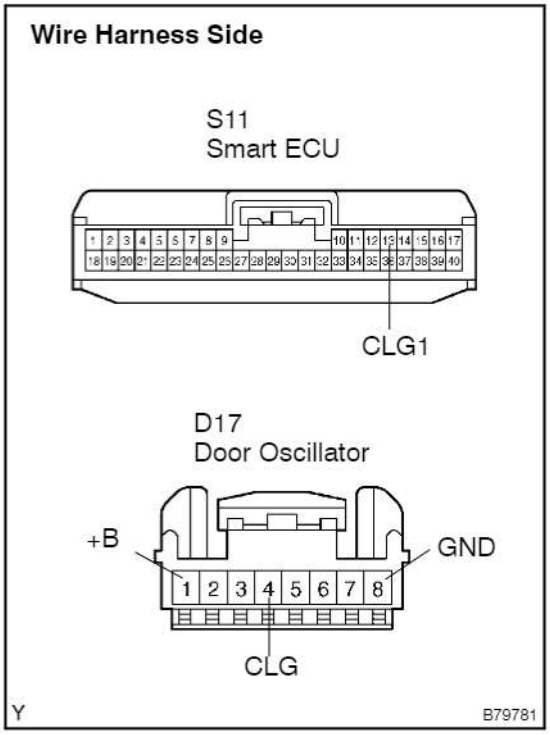
NG → **Go to step 3**

OK

REPLACE SMART ECU

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3	CHECK WIRE HARNESS (DOOR OSCILLATOR FRONT ON DRIVER SIDE – SMART ECU AND BODY GROUND)



(a) Disconnect the D17 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance and voltage between the wire harness side connectors and body ground.

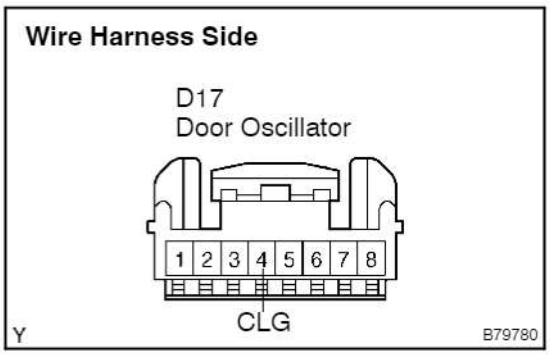
Standard:

Tester Connection	Condition	Specified Condition
D17–4 (CLG) – S11–13 (CLG1)	Constant	Below 1 Ω
D17–4 (CLG) – Body ground	Constant	10 kΩ or higher
D17–8 (GND) – Body ground	Constant	Below 1 Ω
D17–1 (+B) – Body ground	Constant	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	INSPECT DOOR OSCILLATOR ON DRIVER SIDE



(a) Measure the frequency between the terminals of the connector when the power switch is operated.

Standard:

Tester Connection	Condition	Specified Condition
D17–4 (CLG) – Body ground	Power switch OFF → ON (IG)	Some Hz → 0 Hz

NG → **REPLACE DOOR OSCILLATOR ON DRIVER SIDE**

OK

REPLACE SMART ECU

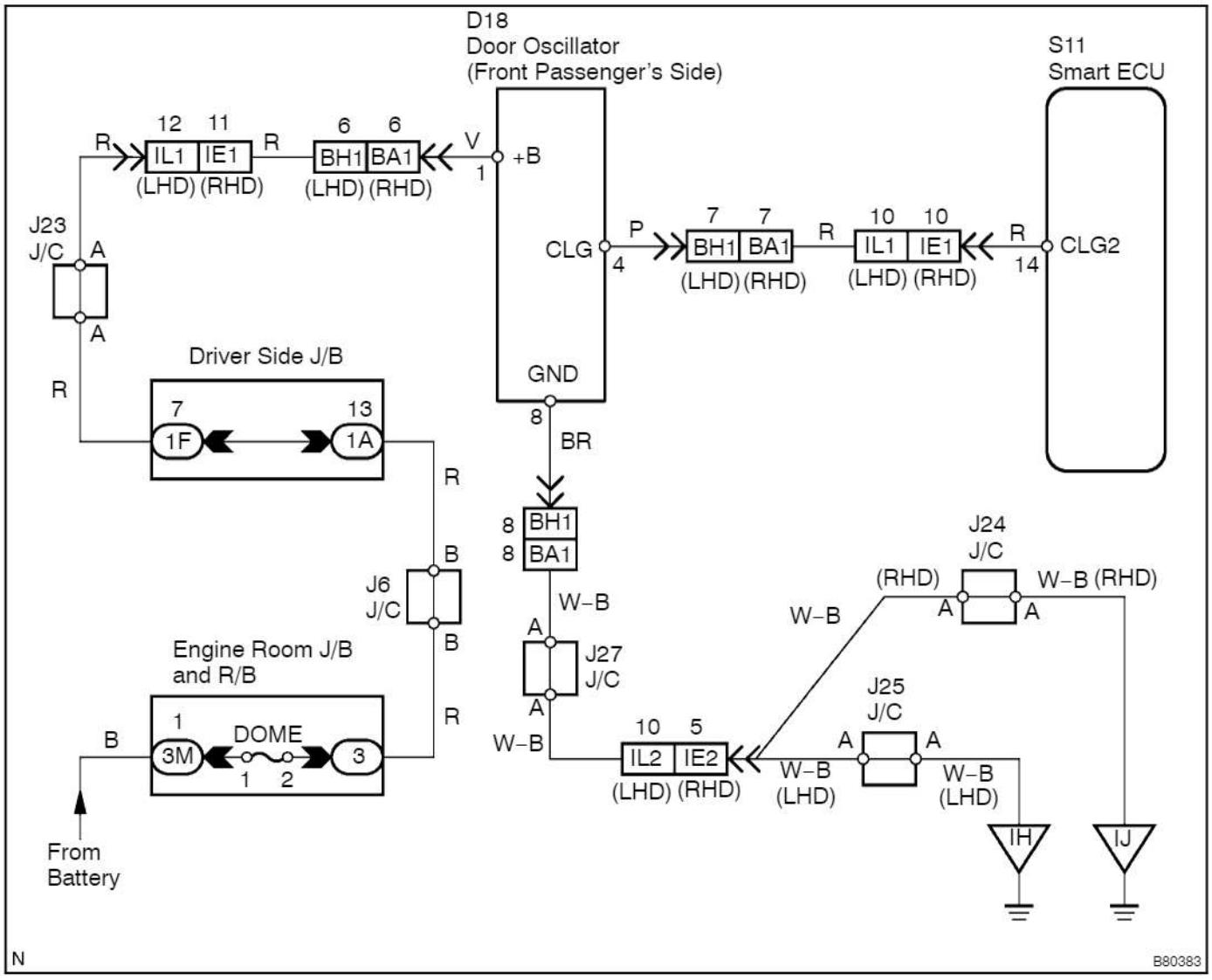
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SMART LOCK AND UNLOCK FUNCTIONS DO NOT OPERATE ON PASSENGER DOOR

CIRCUIT DESCRIPTION

Both the smart lock and unlock functions do not operate when: 1) nothing is output from the passenger door outside oscillator, 2) the smart entry system is disabled through customization, or 3) the entire power door lock control system is malfunctioning.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK MANUAL DOOR LOCK AND UNLOCK OPERATION

(a) Check that the manual door lock and unlock function operates normally.
OK: Manual door lock and unlock function operates normally.

NG → **Go to POWER DOOR LOCK CONTROL SYSTEM (See page 05–1776)**

OK

2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the ACTIVE TEST and then check that the oscillator operates.
Smart ECU:

Item	Test Details	Diagnostic Notes
P Transmitter	Passenger Side Transmitter ON/OFF	–

OK:"OFF" (Passenger Side Transmitter) appears on the screen.
When the smart key is brought close to the door, the oscillator is turned ON and the indicator illuminates.

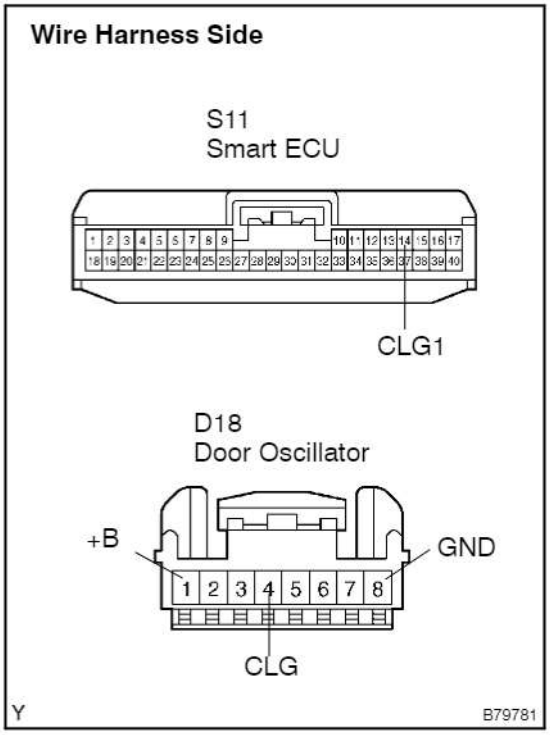
NG → **Go to step 3**

OK

REPLACE SMART ECU

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3	CHECK WIRE HARNESS (DOOR OSCILLATOR FRONT RH – SMART ECU AND BODY GROUND)



(a) Disconnect the D18 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance and voltage between the wire harness side connectors and body ground.

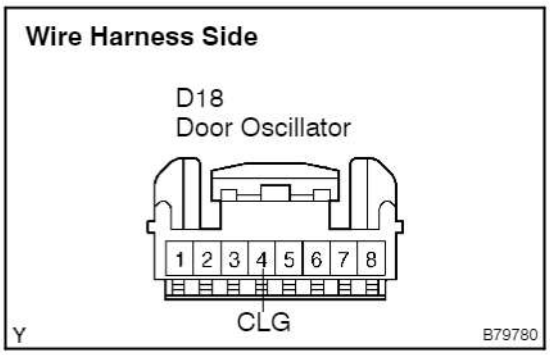
Standard:

Tester Connection	Condition	Specified Condition
D18–4 (CLG) – S11–14 (CLG2)	Constant	Below 1 Ω
D18–4 (CLG) – Body ground	Constant	10 kΩ or higher
D18–8 (GND) – Body ground	Constant	Below 1 Ω
D18–1 (+B) – Body ground	Constant	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	INSPECT DOOR OSCILLATOR ON FRONT PASSENGER SIDE



(a) Measure the frequency between the terminals of the connector when the power switch is operated.

Standard:

Tester Connection	Condition	Specified Condition
D18–4 (CLG) – Body ground	Power switch OFF → ON (IG)	Some Hz → 0 Hz

NG → **REPLACE DOOR OSCILLATOR ON FRONT PASSENGER SIDE**

OK

REPLACE SMART ECU

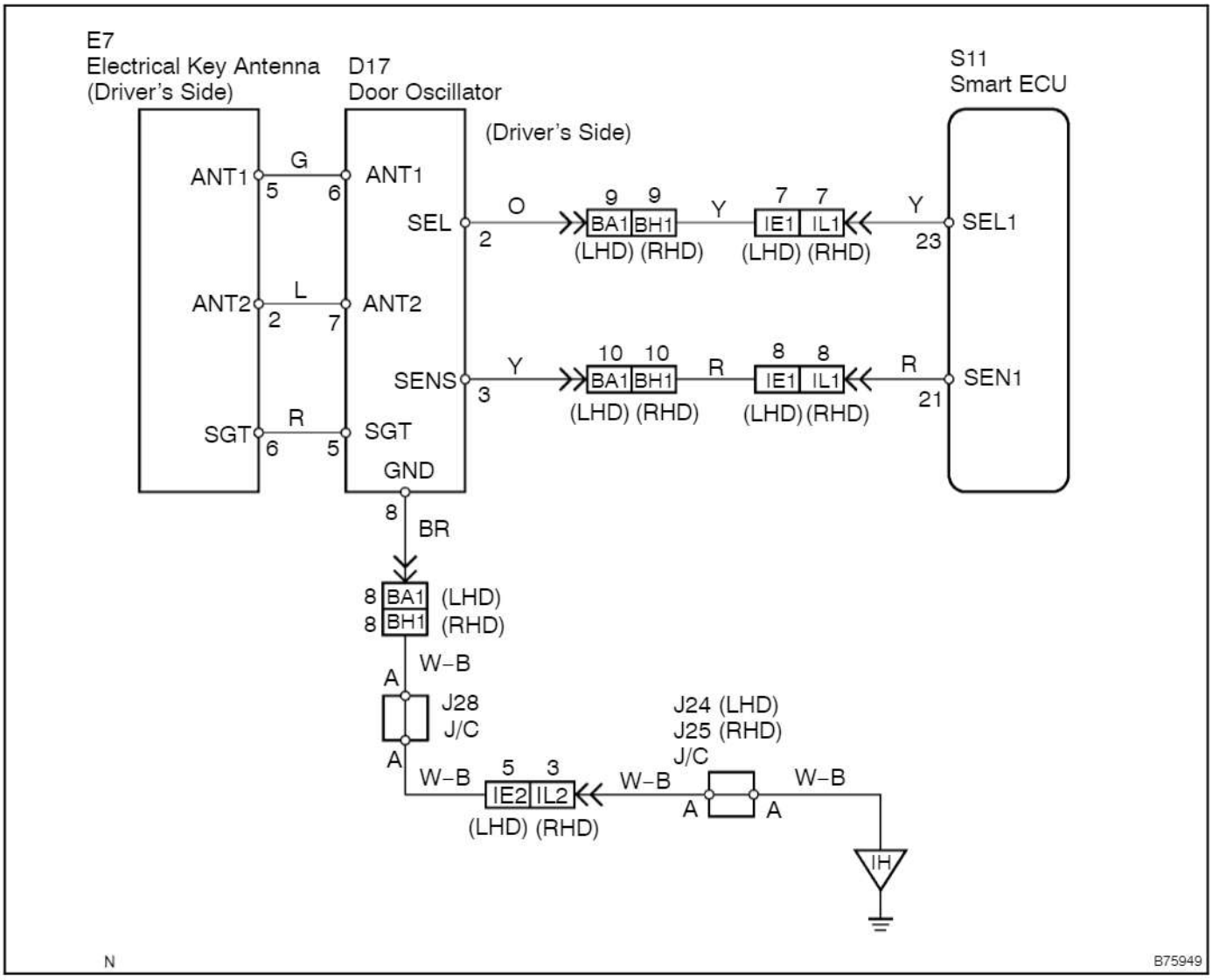
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SMART UNLOCK FUNCTION DOES NOT OPERATE ON DRIVER DOOR

CIRCUIT DESCRIPTION

When an ID code from the driver door outside oscillator matches an ID code from the smart key, the smart ECU outputs a SEL signal (Lo when output) to the driver door outside oscillator, activates the touch sensor inside the outside handle, and enters unlock standby condition. When the touch sensor is touched, the outside oscillator sends SENS signal (Lo when output) to the smart ECU and the smart ECU sends unlock signals to the door lock assemblies on all doors.

WIRING DIAGRAM



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INSPECTION PROCEDURE

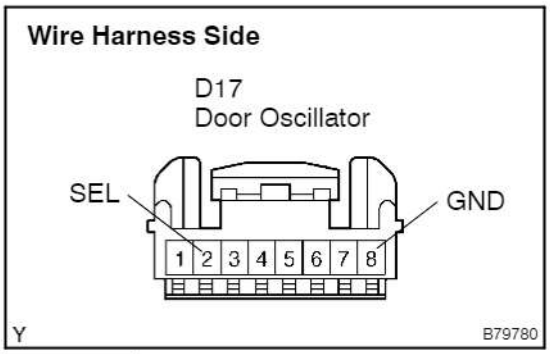
1	CHECK MANUAL DOOR UNLOCK OPERATION

(a) Check that the manual door unlock function operates normally.
OK: Manual door unlock function operates normally.

NG → **Go to POWER DOOR LOCK CONTROL SYSTEM (See page 05–1776)**

OK

2	INSPECT DOOR OSCILLATOR ON DRIVER SIDE



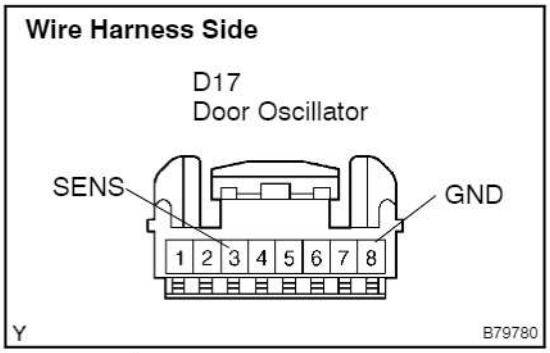
(a) Measure the voltage between the terminals of the connector when the smart key is operated.
Standard:

Tester Connection	Condition	Specified Condition
D17–2 (SEL) – D17–8 (GND)	Smart key at 5 m away from door → near door	10 to 14 V → Below 1 Ω

NG → **Go to step 7**

OK

3	INSPECT DOOR OSCILLATOR ON DRIVER SIDE



(a) Measure the voltage between the terminals of the connector when the outside door handle is touched.
Standard:

Tester Connection	Condition	Specified Condition
D17–3 (SENS) – D17–8 (GND)	Outside door handle not touched → touched	10 to 14 V → Below 1 Ω

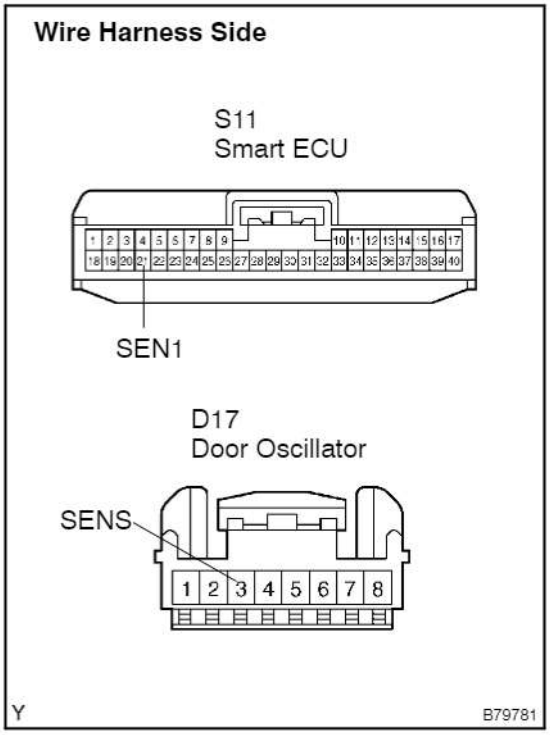
NG → **Go to step 4**

OK

Go to step 5

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4	CHECK WIRE HARNESS (DOOR OSCILLATOR ON DRIVER SIDE – SMART ECU AND BODY GROUND)



(a) Disconnect the D17 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D17–3 (SENS) – S11–21 (SEN1)	Below 1 Ω
D17–3 (SENS) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK OPERATION OF DOOR OSCILLATOR ON DRIVER SIDE

(a) After replacing the door oscillator on the driver's side with a new one, check that the smart unlock function operates normally.

OK: Smart unlock function operates normally.

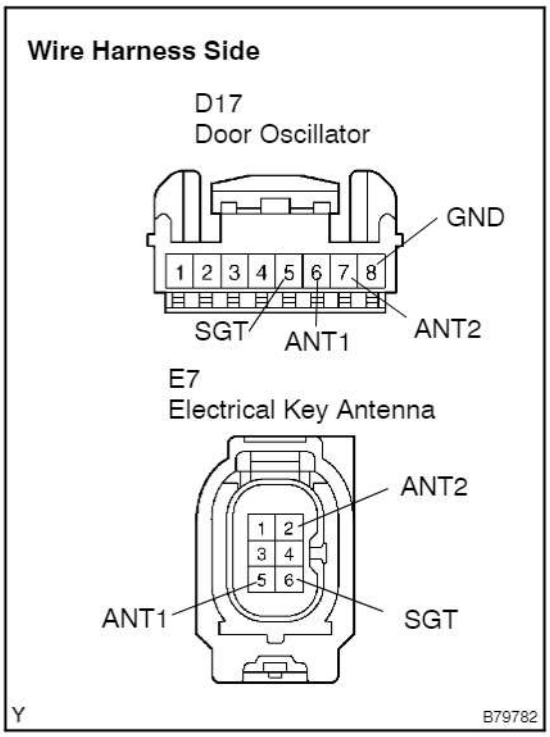
NG → **Go to step 6**

OK

REPLACE DOOR OSCILLATOR ON DRIVER SIDE

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6	CHECK WIRE HARNESS (DOOR OSCILLATOR ON DRIVER SIDE – ELECTRICAL KEY ANTENNA AND BODY GROUND)



(a) Disconnect the D17 oscillator connector.
(b) Disconnect the E7 antenna connector.
(c) Measure the resistance of the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D17–6 (ANT1) – E7–5 (ANT1)	Below 1 Ω
D17–7 (ANT2) – E7–2 (ANT2)	Below 1 Ω
D17–5 (SGT) – E7–6 (SGT)	Below 1 Ω
D17–8 (GND) – Body ground	Below 1 Ω
D17–6 (ANT1) – Body ground	10 kΩ or higher
D17–7 (ANT2) – Body ground	10 kΩ or higher
D17–5 (SGT) – Body ground	10 kΩ or higher

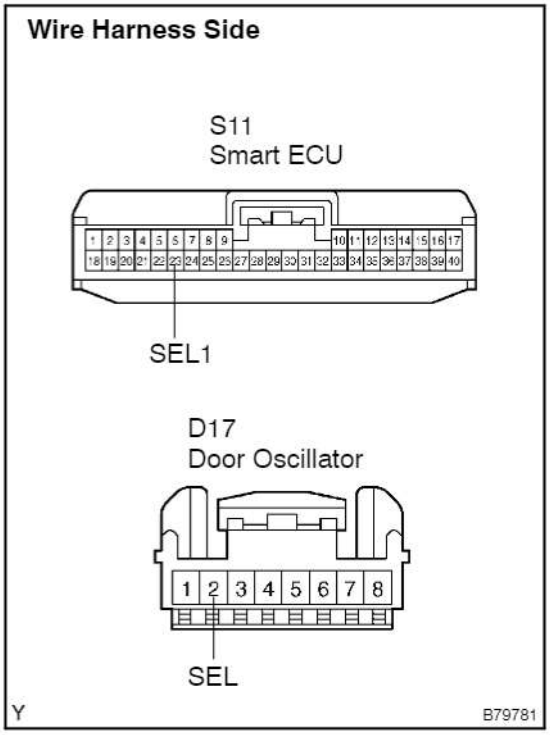
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ELECTRICAL KEY ANTENNA

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7	CHECK WIRE HARNESS (DOOR OSCILLATOR ON DRIVER SIDE – SMART ECU AND BODY GROUND)



(a) Disconnect the D17 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D17–2 (SEL) – S11–23 (SEL1)	Below 1 Ω
D17–2 (SEL) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE SMART ECU

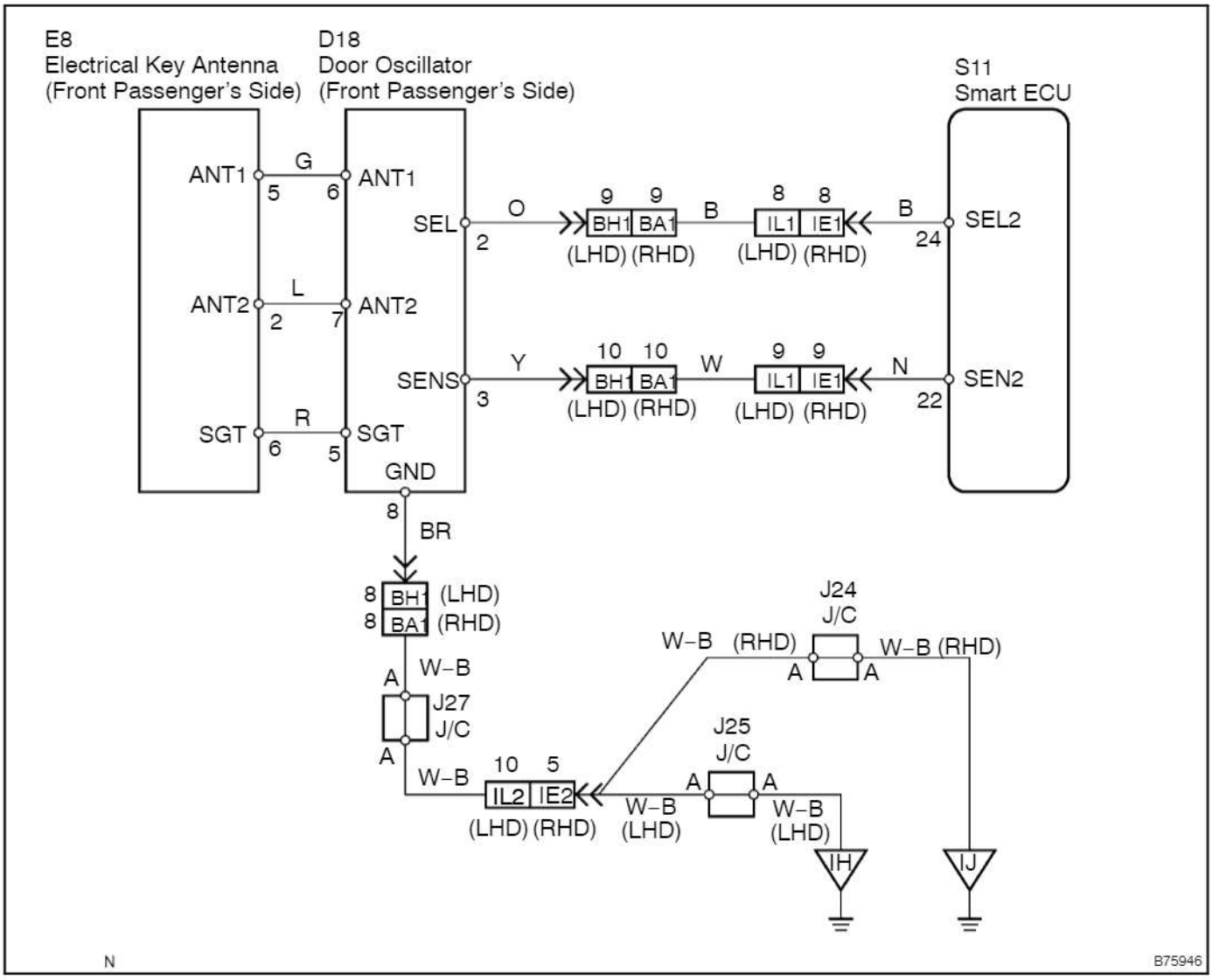
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SMART UNLOCK FUNCTION DOES NOT OPERATE ON PASSENGER DOOR

CIRCUIT DESCRIPTION

When an ID code from the passenger door outside oscillator matches an ID code from the smart key, the smart ECU outputs a SEL signal (Lo when output) to the front passenger door outside oscillator, activates the touch sensor inside the outside handle, and enters unlock standby condition. When the touch sensor is touched, the outside oscillator sends a SENS signal (Lo when output) to the smart ECU and the smart ECU sends unlock signals to the door lock assemblies on all doors.

WIRING DIAGRAM



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INSPECTION PROCEDURE

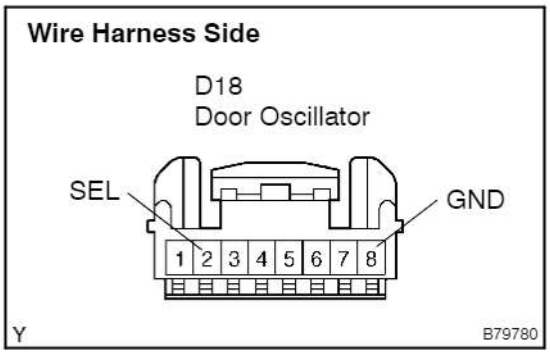
1	CHECK MANUAL DOOR UNLOCK OPERATION

(a) Check that the manual door unlock function operates normally.
OK: Manual door unlock function operates normally.

NG → **Go to POWER DOOR LOCK CONTROL SYSTEM (See page 05–1776)**

OK

2	INSPECT DOOR OSCILLATOR ON FRONT PASSENGER SIDE



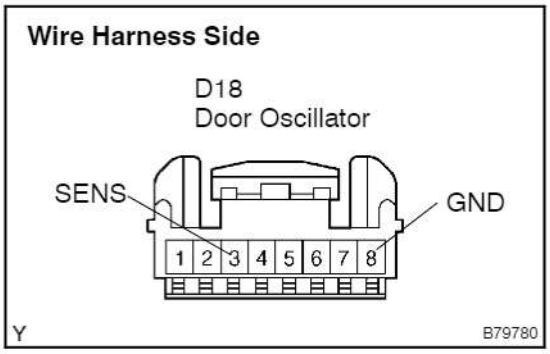
(a) Measure the voltage between the terminals of the connector when the smart key is operated.
Standard:

Tester Connection	Condition	Specified Condition
D18–2 (SEL) – D18–8 (GND)	Smart key at least 5 m away from door → near door	10 to 14 V → Below 1 Ω

NG → **Go to step 7**

OK

3	INSPECT DOOR OSCILLATOR ON FRONT PASSENGER SIDE



(a) Measure the voltage between the terminals of the connector when the outside door handle is touched.
Standard:

Tester Connection	Condition	Specified Condition
D18–3 (SENS) – D18–8 (GND)	Outside door handle not touched → touched	10 to 14 V → Below 1 Ω

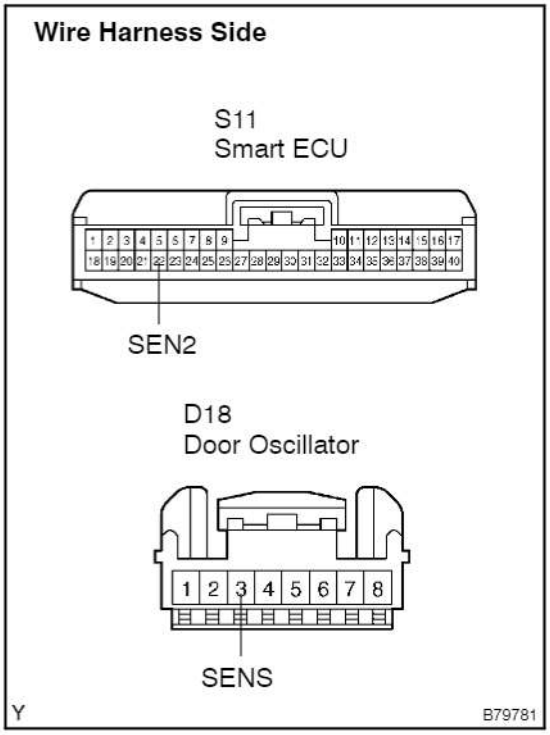
NG → **Go to step 4**

OK

Go to step 5

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4	CHECK WIRE HARNESS (DOOR OSCILLATOR FRONT ON PASSENGER SIDE – SMART ECU AND BODY GROUND)



(a) Disconnect the D18 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D18–3 (SENS) – S11–22 (SEN2)	Below 1 Ω
D18–3 (SENS) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK OPERATION OF DOOR OSCILLATOR ON FRONT PASSENGER SIDE

(a) After replacing the door oscillator on the front passenger side with a new one, check that the smart unlock function operates normally.

OK: Smart unlock function operates normally.

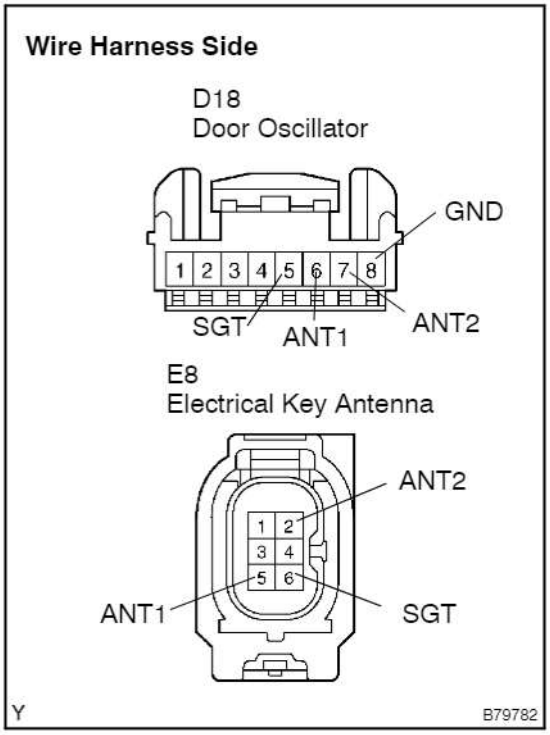
NG → **Go to step 6**

OK

REPLACE DOOR OSCILLATOR FRONT PASSENGER SIDE

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6	CHECK WIRE HARNESS (DOOR OSCILLATOR FRONT PASSENGER SIDE – ELECTRICAL KEY ANTENNA AND BODY GROUND)



(a) Disconnect the D18 oscillator connector.
(b) Disconnect the E8 antenna connector.
(c) Measure the resistance of the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D18–6 (ANT1) – E8–5 (ANT1)	Below 1 Ω
D18–7 (ANT2) – E8–2 (ANT2)	Below 1 Ω
D18–5 (SGT) – E8–6 (SGT)	Below 1 Ω
D18–8 (GND) – Body ground	Below 1 Ω
D18–6 (ANT1) – Body ground	10 kΩ or higher
D18–7 (ANT2) – Body ground	10 kΩ or higher
D18–5 (SGT) – Body ground	10 kΩ or higher

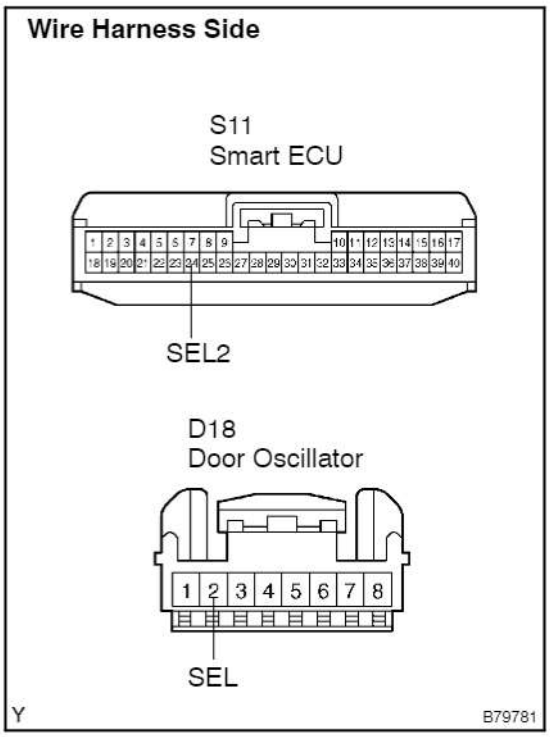
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ELECTRICAL KEY ANTENNA

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7	CHECK WIRE HARNESS (DOOR OSCILLATOR FRONT ON PASSENGER SIDE – SMART ECU AND BODY GROUND)



(a) Disconnect the D18 oscillator connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
D18–2 (SEL) – S11–24 (SEL2)	Below 1 Ω
D18–2 (SEL) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE SMART ECU

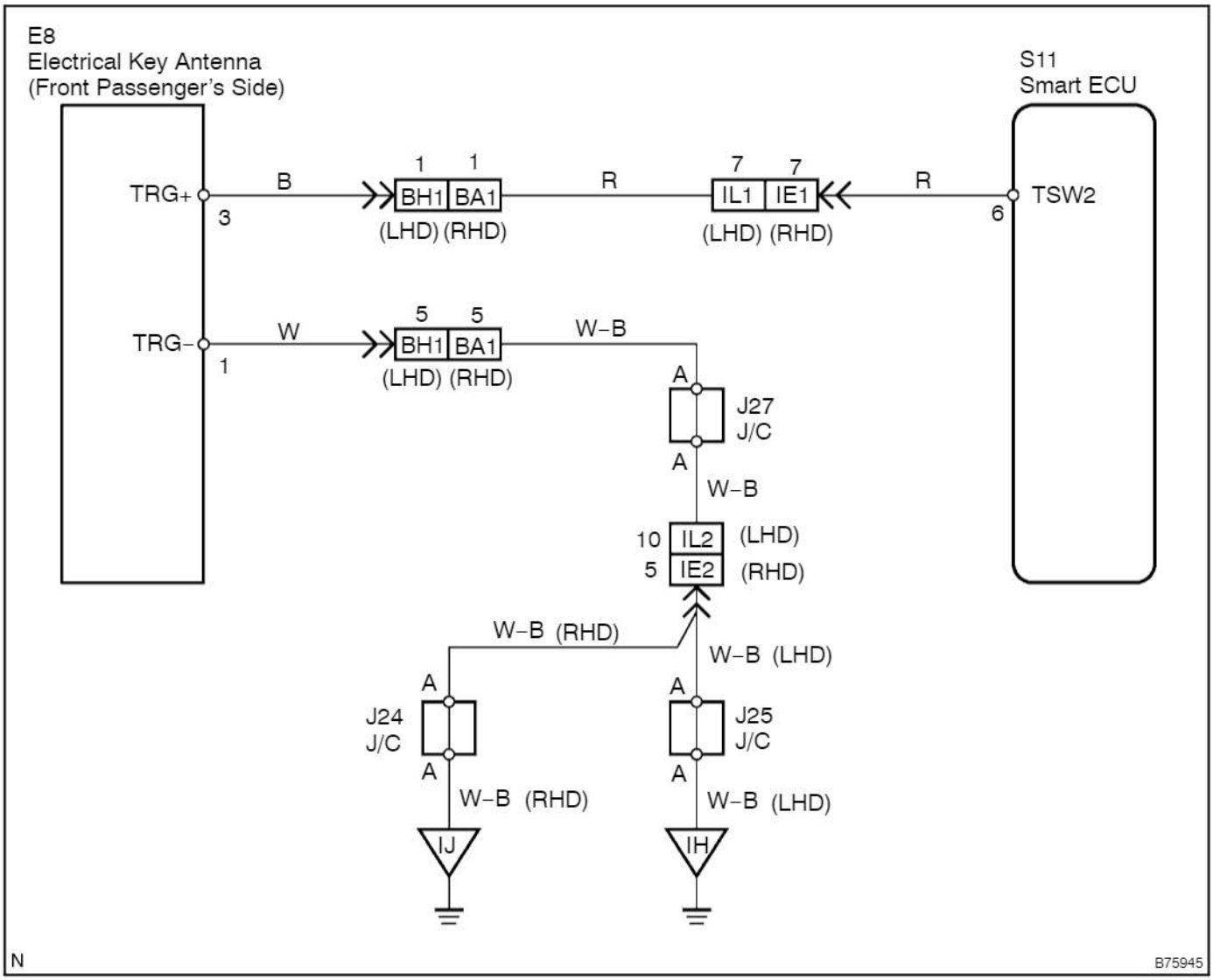
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SMART LOCK FUNCTION DOES NOT OPERATE ON PASSENGER DOOR

CIRCUIT DESCRIPTION

When the touch sensor inside the front passenger door outside handle is touched, the smart ECU sends a request signal to the passenger door outside oscillator. The smart key receives this request and transmits its ID code. Upon receiving the feedback, the smart ECU determines that the smart key is outside the vehicle and sends lock signals to the door lock assemblies on all doors through the instrument panel J/B (multiplex network body ECU).

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK MANUAL DOOR LOCK OPERATION

(a) Check that the manual door lock function operates normally.
OK: Manual door lock function operates normally.

NG → **Go to POWER DOOR LOCK CONTROL SYSTEM** (See page 05–1776)

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST and read the displays on the intelligent tester II.
SMART ECU:

Item		Normal Condition	Diagnostic Note
P Trigger SW	P–door trigger switch/ ON or OFF	ON: Trigger switch is pushed OFF: Trigger switch is not pushed	–

OK:"ON" (P–door trigger switch) appears on the screen.
When the lock switch is pushed, the door is locked and the indicator illuminates.

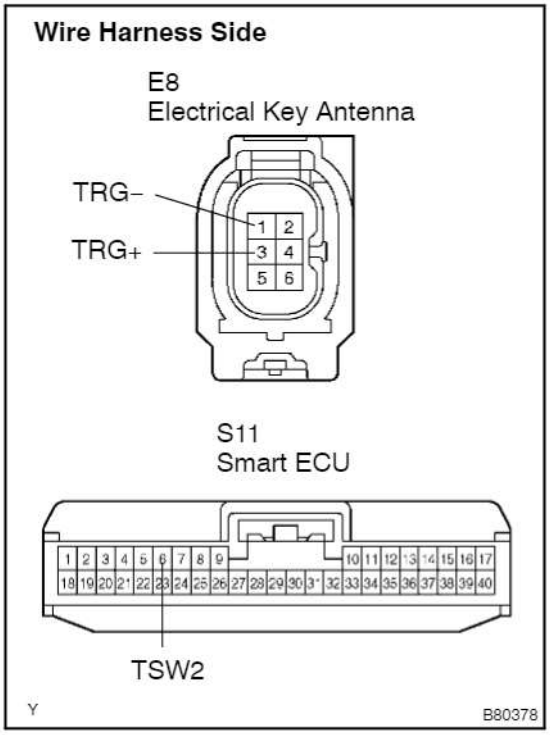
NG → **Go to step 3**

OK

REPLACE SMART ECU

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3	CHECK WIRE HARNESS (ELECTRICAL KEY ANTENNA – SMART ECU AND BODY GROUND)



(a) Disconnect E8 antenna connector.
(b) Disconnect S11 ECU connector.
(c) Measure the resistance of the wire harness side connectors and body ground.

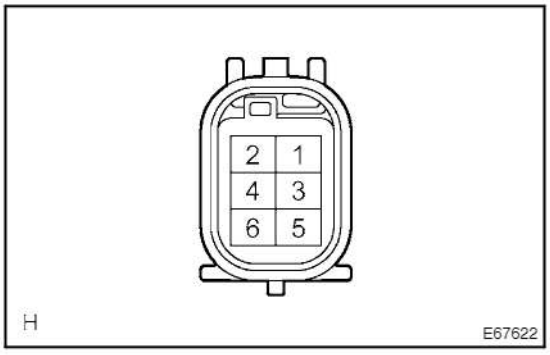
Standard:

Tester Connection	Specified Condition
E8–3 (TRG+) – S11–6 (TSW2)	Below 1 Ω
E8–1 (TRG–) – Body ground	Below 1 Ω
E8–3 (TRG+) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	INSPECT ELECTRICAL KEY ANTENNA



(a) Remove the electrical key antenna.
(b) Measure the antenna resistance.

Standard:

Tester Connection	Condition	Specified Condition
1 – 3	Switch pushed	10 kΩ or higher
1 – 3	Switch not pushed	Below 1 Ω

NG → **REPLACE ELECTRICAL KEY ANTENNA**

OK

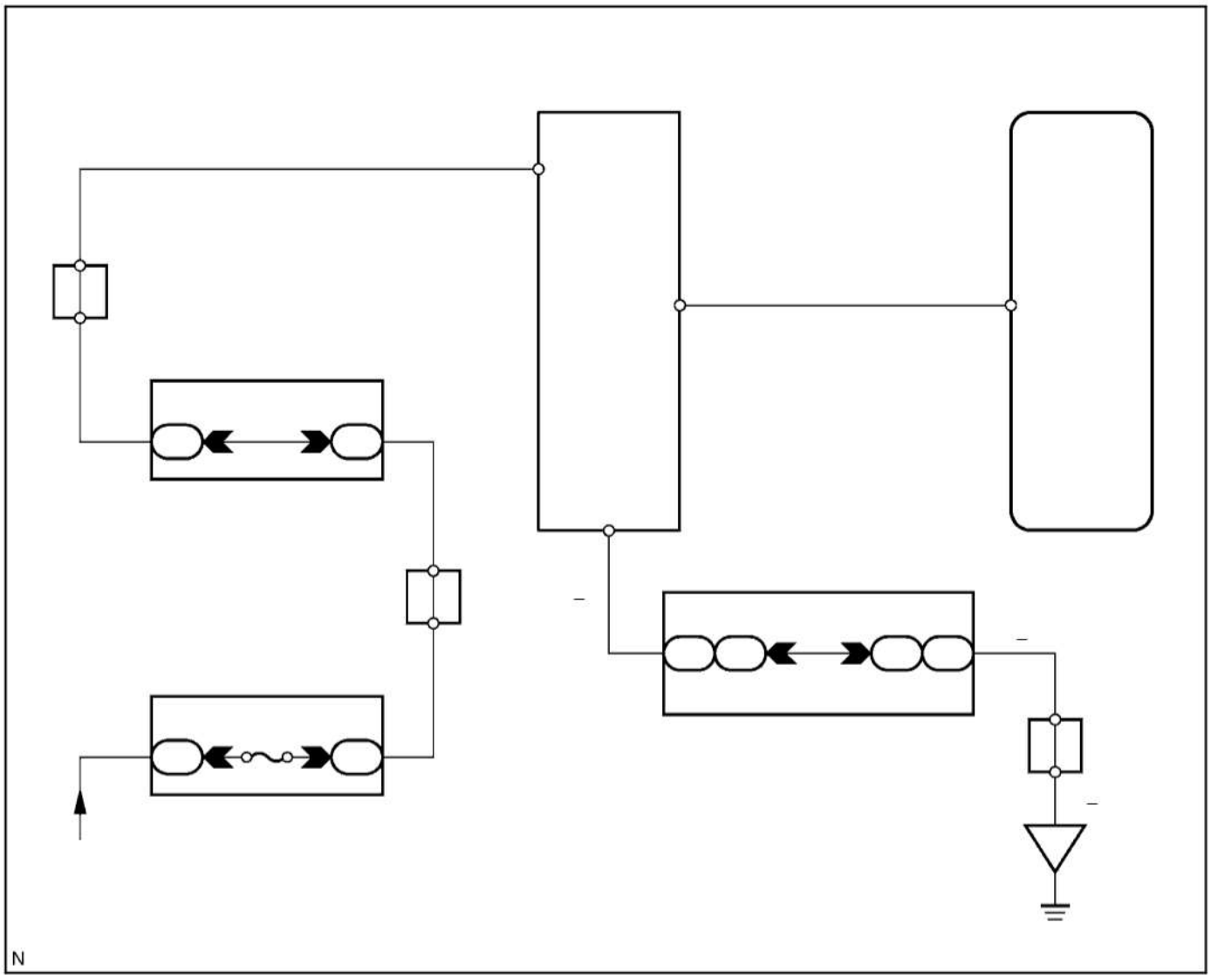
REPLACE SMART ECU

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HYBRID VEHICLE CONTROL SYSTEM DOES NOT START USING SMART IGNITION FUNCTION (STARTS WHEN KEY IS INSERTED)

CIRCUIT DESCRIPTION

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK SMART LOCK AND UNLOCK OPERATION

OK: Smart lock and unlock function operates normally.

NG → OTHER PROBLEM (See page 05–1882)

OK

2	READ VALUE OF INTELLIGENT TESTER II

SMART ECU:

			–

OK: ”ON” (Key is in key slot) appears on the screen.

NG → Go to PUSH BUTTON START SYSTEM (See page 05–2131)

OK

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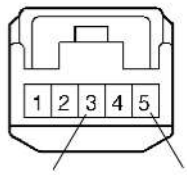
3	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

SMART ECU:

		–

OK: ”ON” (Front Transmitter) appears on the screen
When the smart key is brought close to the the room oscillator, the oscillator is turned ON and the indicator on the smart key illuminates.

Wire Harness Side



Y

Standard:

– – –		

NG → **Go to step 4**

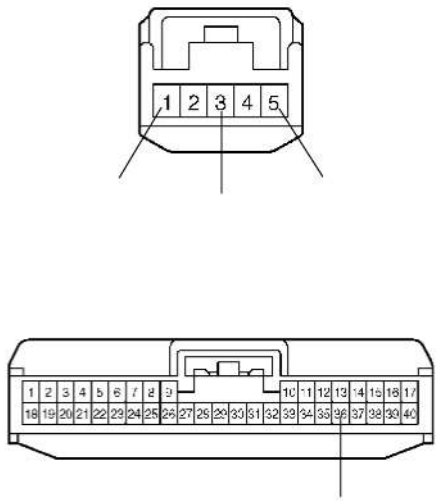
OK

REPLACE ROOM OSCILLATOR

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4	CHECK WIRE HARNESS (ROOM OSCILLATOR – SMART ECU AND BODY GROUND)

Wire Harness Side



Y

Standard:

– –	
– –	Ω
– – –	Ω
– – –	Ω

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK →

REPLACE SMART ECU

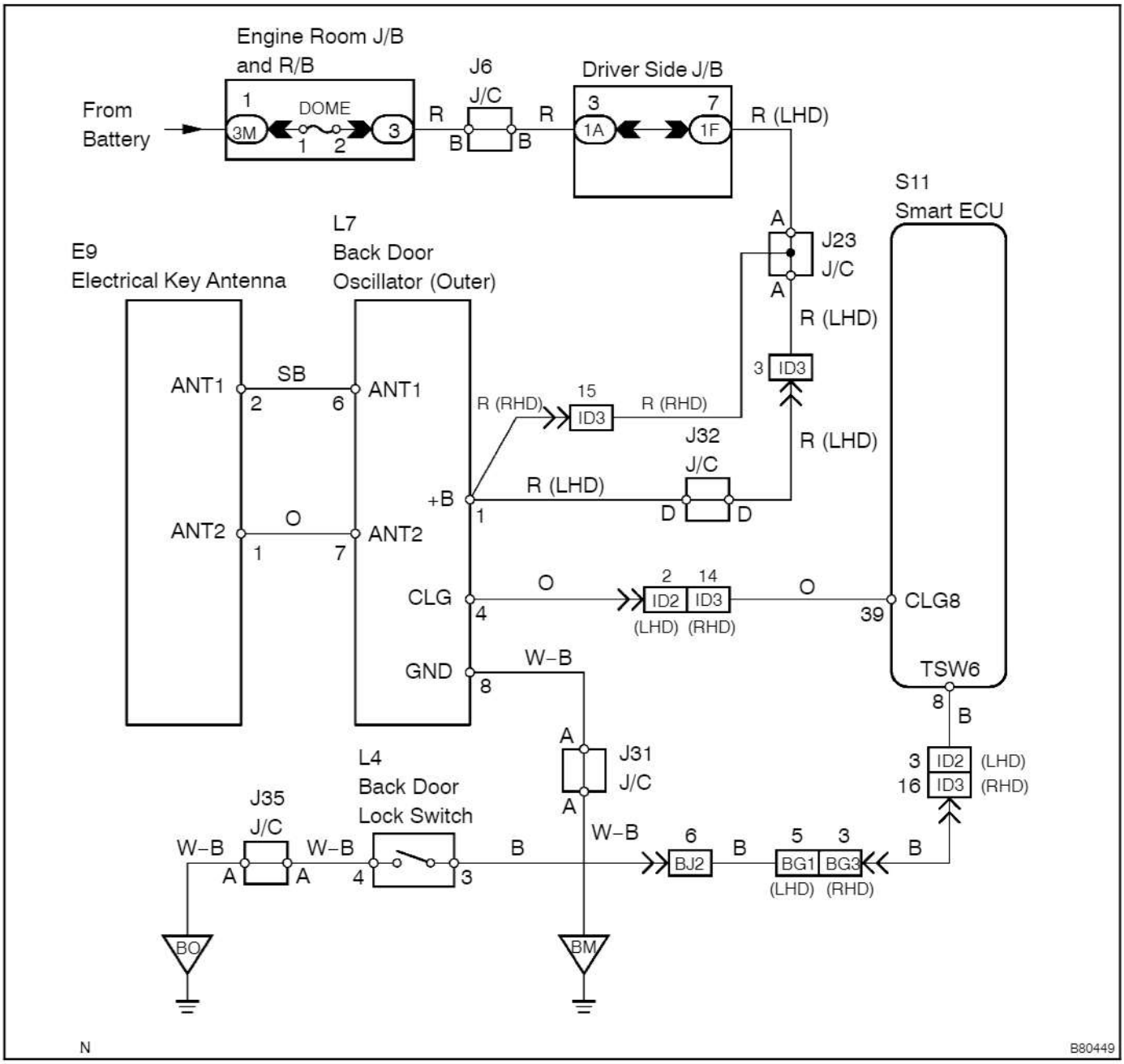
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SMART BACK DOOR UNLOCK FUNCTION DOES NOT OPERATE WHEN SMART KEY IS OUTSIDE BACK DOOR

CIRCUIT DESCRIPTION

When the back door opener switch is turned ON, the smart ECU uses the back door oscillator (outer) and antenna to output a request signal to the outside of the vehicle for a distance of approximately 1.0 m from the back door. A smart key near the back door detects this request and transmits its ID code. The wireless door lock receiver receives the ID code and sends this ID code to the smart ECU. The smart ECU checks if the ID code is valid. If the ID code is verified, the smart ECU sends a back door open signal to the driver side junction block assy (body ECU) using the multiplex communication line and stops outputting request signals. The driver side junction block assy (body ECU) then unlocks the back door.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK SMART DOOR LOCK AND UNLOCK OPERATION

(a) Check that the smart door lock and unlock function operates normally.
OK: Smart door lock and unlock function operates normally.

NG → **OTHER PROBLEM (See page 05–1882)**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch from OFF to ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST and read the displays on the intelligent tester II.
SMART ECU:

Item	Measurement / Display (Range)	Normal Condition	Diagnostic Note
Tr/B–Door Lock	Trunk/Back–door lock switch/ ON or OFF	ON: Back door lock switch is pushed OFF: Back door lock switch is not pushed	–

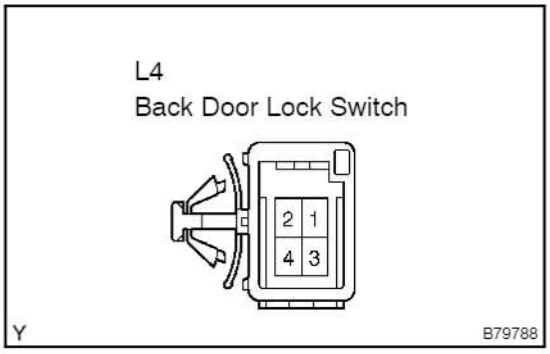
OK: "ON" (Back–door lock switch is pushed) appears on the screen.

NG → **Go to step 3**

OK

Go to step 5

3	INSPECT BACK DOOR LOCK SWITCH



(a) Disconnect the L4 switch connector.
(b) Measure the resistance of the wire harness side connector.
Standard:

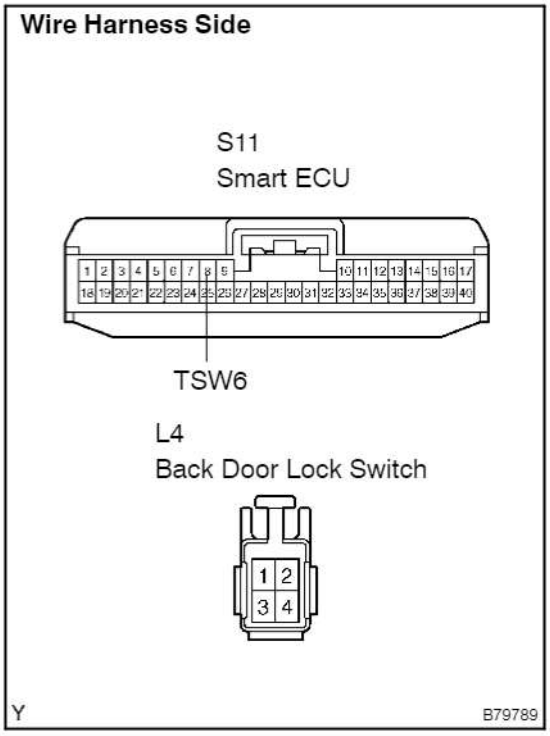
Tester Connection	Condition	Specified Condition
L4–3 – L4–4	Not pushed (OFF)	10 kΩ or higher
L4–3 – L4–4	Pushed (ON)	Below 1 Ω

NG → **REPLACE BACK DOOR LOCK SWITCH**

OK

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4 CHECK WIRE HARNESS (SMART ECU – BACK DOOR LOCK SWITCH)



(a) Disconnect the S11 ECU connector.
(b) Disconnect the L4 switch connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

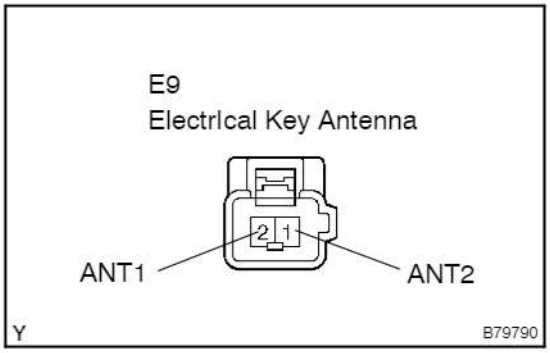
Standard:

Tester Connection	Specified Condition
S11–8 (TSW6) – L4–3	Below 1 Ω
L4–4 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 INSPECT ELECTRICAL KEY ANTENNA



(a) Disconnect the E9 antenna connector.
(b) Measure the resistance between the wire harness side connector.

Standard:

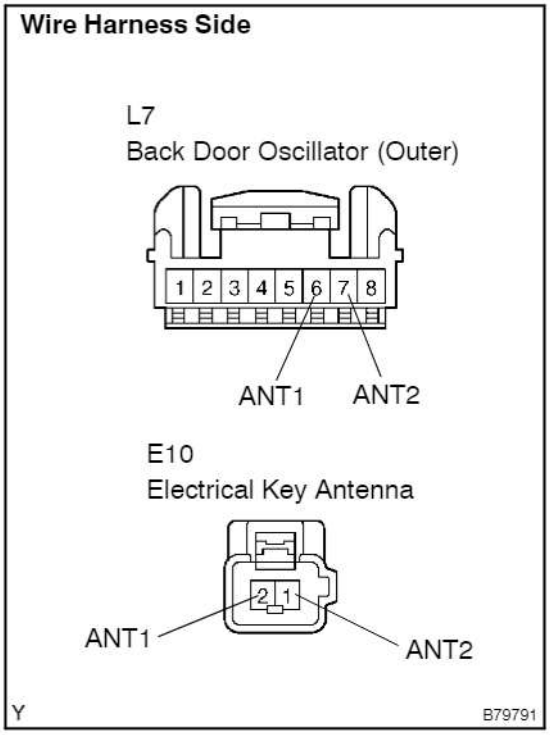
Tester Connection	Specified Condition
E9–2 (ANT1) – E9–1 (ANT2)	Below 1 Ω

NG → **REPLACE ELECTRICAL KEY ANTENNA**

OK

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6	CHECK WIRE HARNESS (BACK DOOR OSCILLATOR (OUTER) – ELECTRICAL KEY ANTENNA)



(a) Disconnect the L7 and E9 ECU connectors.
(b) Measure the resistance between the wire harness side connectors.

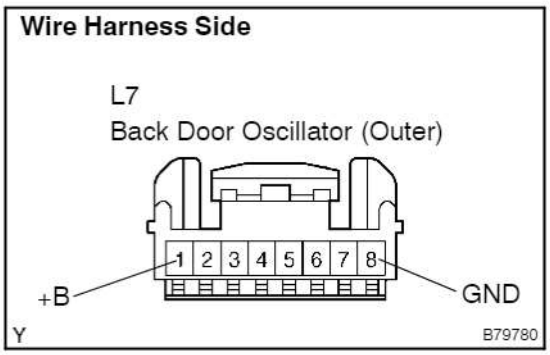
Standard:

Tester Connection	Specified Condition
L7–6 (ANT1) – E9–2 (ANT1)	Below 1 Ω
L7–7 (ANT2) – E9–1 (ANT2)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7	CHECK WIRE HARNESS (BACK DOOR OSCILLATOR (OUTER) – BODY GROUND)



(a) Disconnect the L7 oscillator connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
L7–1 (+B) – Body ground	10 to 14 V
L7–8 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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8	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch from OFF to ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the ACTIVE TEST and then check that the oscillator (outer) operates.
SMART KEY ECU:

Item	Test Details	Diagnostic Note
Bdoor Trnsmttr	Back Door Outer Transmitter ON/OFF	–

OK: "OFF" (Back Door Outer Transmitter) appears on the screen
When the smart key is brought close to the back door, the oscillator (outer) is turned ON and the indicator on the smart key illuminates.

NG → **Go to step 9**

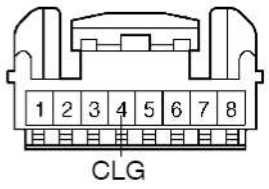
OK

REPLACE SMART ECU

9	INSPECT BACK DOOR OSCILLATOR (OUTER)

Wire Harness Side

L7
Back Door Oscillator (Outer)



(a) Remove the L7 oscillator.
(b) Measure the frequency between the terminals of the connector and body ground.
Standard:

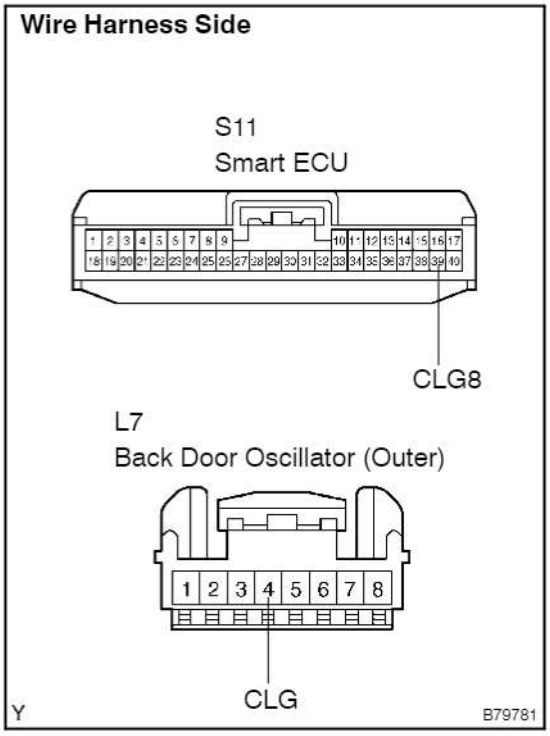
Tester Connection	Condition	Specified Condition
L7–4 (CLG) – Body ground	Back door lock switch OFF → ON	0 Hz → Some Hz

NG → **REPLACE BACK DOOR OSCILLATOR (OUTER)**

OK

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10	CHECK WIRE HARNESS (SMART ECU – BACK DOOR OSCILLATOR (OUTER))



(a) Disconnect the S11 ECU connector.
(b) Disconnect the L7 oscillator connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S11–39 (CLG8) – L7–4 (CLG)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE SMART ECU

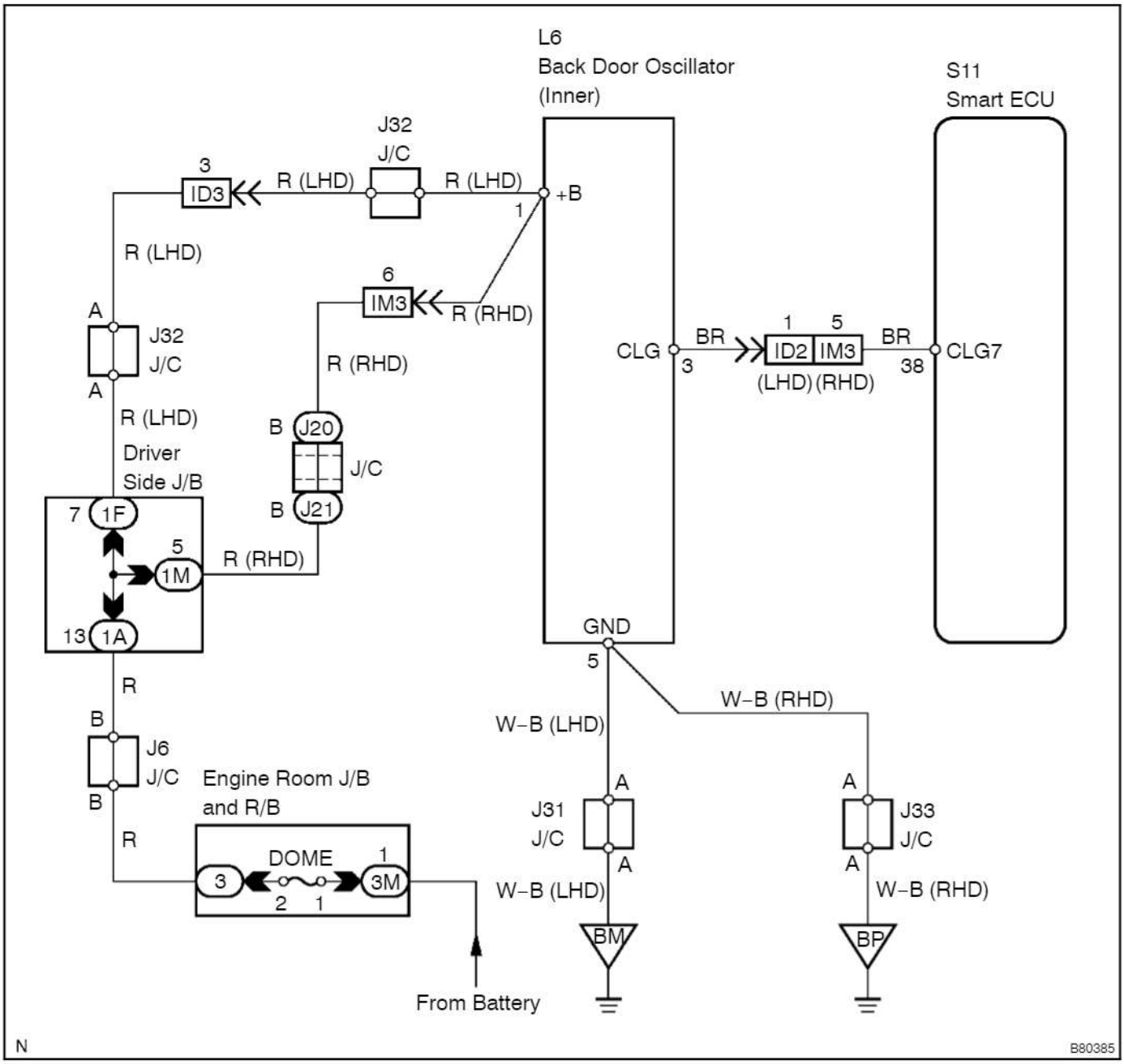
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SMART KEY LUGGAGE COMPARTMENT LOCK–IN PREVENTION FUNCTION DOES NOT OPERATE

CIRCUIT DESCRIPTION

With the smart key inside the luggage compartment, press the back door opener switch. The smart ECU uses the back door oscillators (outer and inner) to output a request signal. The back door outer oscillator cannot verify an ID code in this situation. The smart key receives the request and transmits its ID code to the antenna. The ID code is then sent to the smart ECU through the back door inner oscillator in order to be confirmed by the smart ECU. If the ID code is verified, the smart ECU sends a back door open signal to the driver side junction block assy (body ECU) using the multiplex communication line and stops outputting request signals. The back door then can be opened.

WIRING DIAGRAM



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INSPECTION PROCEDURE

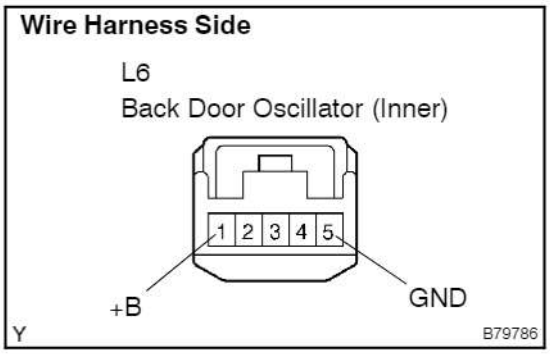
1	CHECK SMART BACK DOOR UNLOCK FUNCTION OPERATES

(a) Check that the smart back door unlock function operates normally.
OK: Smart back door unlock function operates normally.

NG → **OTHER PROBLEM (See page 05–1882)**

NG

2	CHECK WIRE HARNESS (BACK DOOR OSCILLATOR (INNER) – BODY GROUND)



(a) Disconnect the L6 connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
L6–1 (+B) – Body ground	10 to 14 V
L6–5 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch from OFF to ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the ACTIVE TEST, and then check that the oscillator (inner) operates.
SMART KEY ECU:

Item	Test Details	Diagnostic Note
In Bdr Trnsmttr	Back Door Inner Transmitter ON/OFF	–

OK: "OFF" (Back Door Inner Transmitter) appears on the screen.
When the smart key is not in the luggage room, the oscillator (inner) is turned OFF.

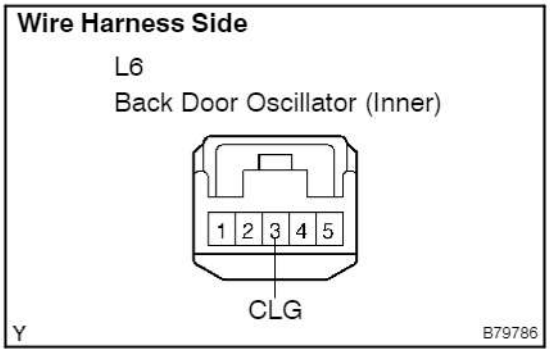
NG → **Go to step 4**

OK

REPLACE SMART ECU

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4 INSPECT BACK DOOR OSCILLATOR (INNER)



(a) Disconnect the L6 oscillator connector.
(b) Measure the frequency between the terminals of the connector and body ground.

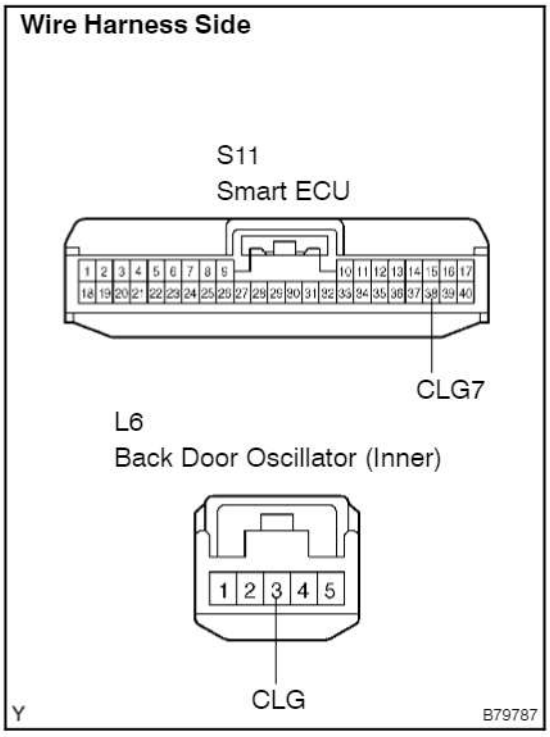
Standard:

Tester Connection	Condition	Specified Condition
L6–3 (CLG) – Body ground	Back door lock switch OFF → ON	0 Hz → Some Hz

NG → **REPLACE BACK DOOR OSCILLATOR (INNER)**

OK

5 CHECK WIRE HARNESS (SMART ECU – BACK DOOR OSCILLATOR (INNER))



(a) Disconnect the S11 ECU connector.
(b) Disconnect the L6 connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
S11–38 (CLG7) – L6–3 (CLG)	Below 1 Ω
S11–38 (CLG7) – L6–3 (CLG) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE SMART ECU

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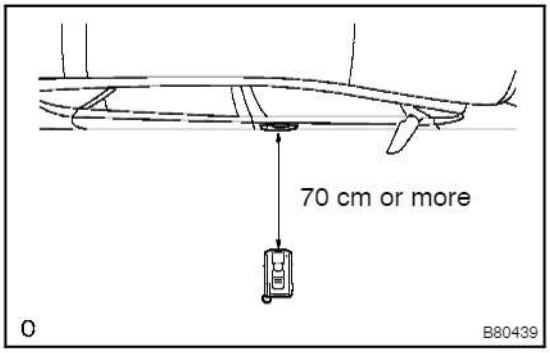
05IC5-01

ON-VEHICLE INSPECTION

1. Smart Entry System Operation Inspection

(a) Inspect the smart door unlock function.

(1) Use the wireless lock operation to lock front doors. With the smart key in your possession, touch a door's outside handle (touch sensor) and check that all doors unlock.



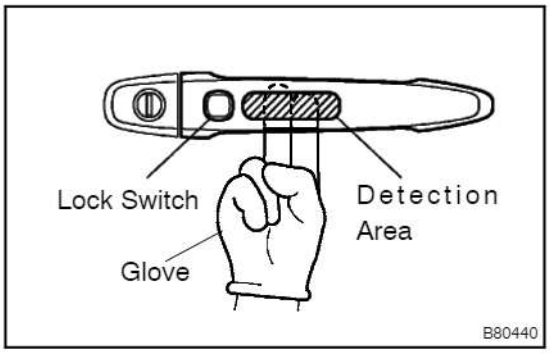
(2) Inspect the smart door unlock operation's detection area. Hold the smart key at the same height as the door's outside handle (approximately 80 cm). Pay attention to the direction of the smart key in the illustration on the left. Check that when the smart key is brought within 70 to 100 cm (2.3 to 3.3 feet) of the vehicle, the system enters unlock standby mode. Unlock standby mode is signified by the smart key's red LED illuminating.

(3) Once the system enters unlock standby mode, touch the outside handle's sensor within 3 seconds. Check that the door unlocks.

NOTICE:

The smart key cannot communicate with the system within a 20 cm radius of each outside handle.

(4) Repeat steps (2) and (3) for the remaining doors.



(5) Inspect the door oscillator's response sensitivity. Wear protective gloves, set the system to unlock standby mode, and check that touching the highlighted area in the illustration with your index finger causes the door to unlock.

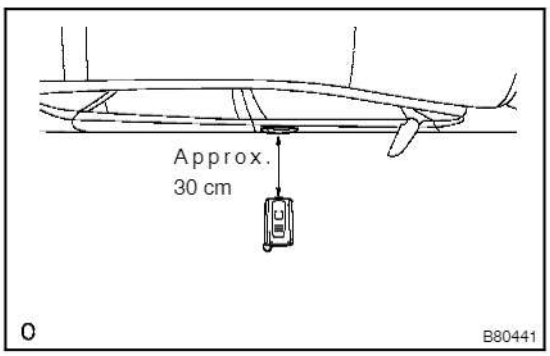
NOTICE:

When touching the highlighted area, tapping too quickly or having extended contact may not trigger the sensor. In such a case, the door will not unlock.

(6) Repeat step (5) for the remaining doors.

(b) Inspect the smart door lock function.

(1) Close all of the vehicle's doors and set the system to unlock standby mode. With the smart key in your possession outside of the vehicle, check that pressing the lock switch locks front doors.



(2) Inspect the smart door lock operation's detection area and the vehicle interior's wireless door lock receiver for wave leaks. Hold the smart key at the same height of 1 m (10 cm above the lower edge of the window frame). Pay attention to the direction and position of the smart key in the illustration on the left. Check that when the smart key is approximately 30 cm (0.9 feet) from the vehicle and the lock switch is pressed, the front doors lock and the warn-

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ing buzzer (for when the key is forgotten) does not sound.

NOTICE:

If the warning buzzer sounds, the vehicle interior's wireless door lock receiver may have a wave leak.

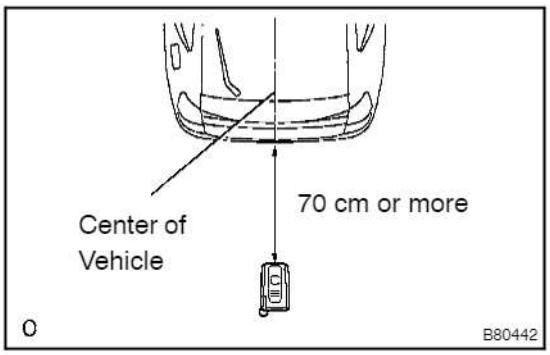
HINT:

Due to the smart key being unable to communicate with the system within a 20 cm distance from the outside handle, do not press the lock switch with the same hand that is holding the smart key. The doors will not lock.

(3) Repeat steps (1) and (2) for the remaining doors.

(c) Inspect the smart trunk open function.

(1) Close the back door. With the smart key in your possession, check that pressing the luggage electrical key switch (trunk switch) opens the back door.



(2) Inspect the smart trunk open operation's detection area. Hold the smart key at the same height as the luggage electrical key switch (trunk switch) (approximately 80 cm) and aligned with the center of the rear of the vehicle. Pay attention to the direction of the smart key in the illustration on the left. Check that when the smart key is brought within 70 to 100 cm (2.3 to 3.3 feet) of the vehicle, pressing the luggage electrical key switch (trunk switch) opens the back door.

(d) Inspect the smart ignition function.

(1) With the smart key in your possession, check that pressing the power switch will release the steering wheel lock. Then, check that turning the power switch from ON (ACC) to ON (IG) to starts the hybrid control system.

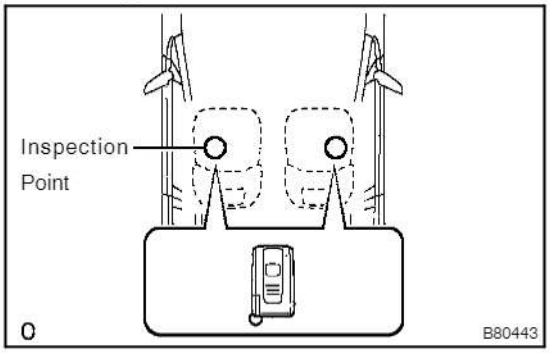
HINT:

The engine can be started only when the smart indicator is illuminated.

(2) With the smart key in your possession, check that turning the power switch from ON (ACC) to ON (IG) to OFF stops the hybrid control system.

HINT:

The shift position must be in P to be able to turn the power switch from ON (ACC) to OFF.



(3) Inspect the smart ignition operation's detection area. Pay attention to the direction of the smart key in the illustration on the left. When the smart key is in either of the two locations in the illustration, check that the engine can start.

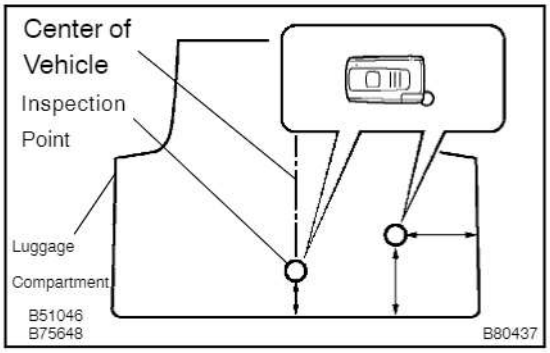
NOTICE:

The engine cannot be started when the smart key is on the instrument panel or package tray, or in the glove box.

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(e) Inspect the smart key lock–in prevention function.

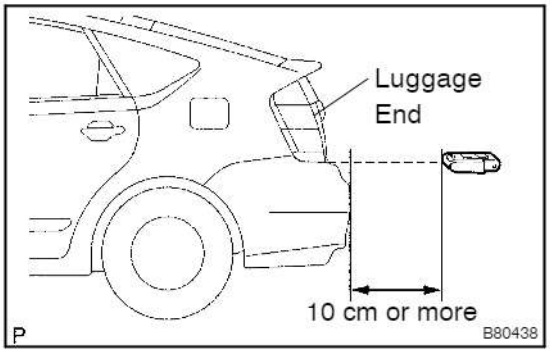
(1) Place the smart key in the trunk. Check that: 1) closing the back door triggers the smart key's wireless buzzer (which lasts approximately 10 seconds), and 2) pressing the luggage electrical key switch (trunk switch) opens the back door.



(2) Inspect the smart key lock–in prevention's detection area. Pay attention to the direction of the smart key in the illustration on the left. When the smart key is in either of the two locations in the illustration, check that: 1) closing the back door sounds the smart key's wireless buzzer, and 2) pressing the luggage electrical key switch (trunk switch) opens the back door.

NOTICE:

If the smart key in inside a metal briefcase, metal box or any other metal storage item, the smart key will not be able to be detected by the system.



(3) Inspect the smart key lock–in prevention's detection area and the trunk interior's wireless door lock receiver for wave leaks. Hold the smart key at the same height as the lower edge of the back door and aligned with the center of the rear of the vehicle. Pay attention to the direction and position of the smart key in the illustration on the left. Check that when the smart key is over 10 cm (0.6 feet) from the vehicle's rear bumper, the smart key's wireless buzzer does not sound.

HINT:

If the warning buzzer sounds, the trunk interior's wireless door lock receiver may have a wave leak.

(f) Inspect the smart key cancel function.

(1) While the power switch is ON (IG), check that the smart trunk open switch is the only switch in the smart key system that can be operated.

(2) While the keyless entry cancel switch (smart system cancel switch) is ON, check that all switches in the smart key system cannot be operated.

(g) Inspect the smart indicator function.

Condition	Indicator
Power switch is in ON (IG) mode and vehicle interior check is OK.	Illuminated
Power switch is in OFF mode and one of the doors is open.	Blinking
Power switch is in ON (ACC) / ON (IG) mode and all doors are locked.	Off

HINT:

In case where an illuminated condition and a blinking condition are both satisfied, the indicator will illuminated.

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(h) Inspect the answer–back function (hazard warning lamp flashing and buzzer sounding).

Smart Operation	Hazard Warning Lamp	Buzzer
Smart Door Lock	flashes once	sounds once*
Smart Door Unlock	flashes twice	sounds twice*
Smart Trunk Open	does not flash	sounds once*

*: Only Australia.

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05IC6–01

INSPECTION



H

E67622

1. INSPECT OUTSIDE DOOR HANDLE

(a) Remove the outside door handle (see page 75–9).

(b) Check the resistance between the terminals of the connector when the switch is operated.

Standard:

Switch Condition	Tester Connection	Specified Condition
Switch pushed	1 – 3	Below 1 Ω
Switch not pushed	1 – 3	10 kΩ or higher

If the result is not as specified, replace the outside door handle.

Smart Key Cancel Switch



B50965

2. INSPECT SMART KEY CANCEL SWITCH

(a) Remove the outside door handle.

(b) Check the resistance between the terminals of the connector when the switch is operated.

Standard:

Switch Condition	Tester Connection	Specified Condition
Switch pushed	1 – 2	Below 1 Ω
Switch not pushed	1 – 2	10 kΩ or higher

If the result is not as specified, replace the smart system cancel switch.

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WIRELESS DOOR LOCK CONTROL SYSTEM (W/ SMART ENTRY SYSTEM)

05IAU-01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICE FOR HYBRID SYSTEM ACTIVATION:

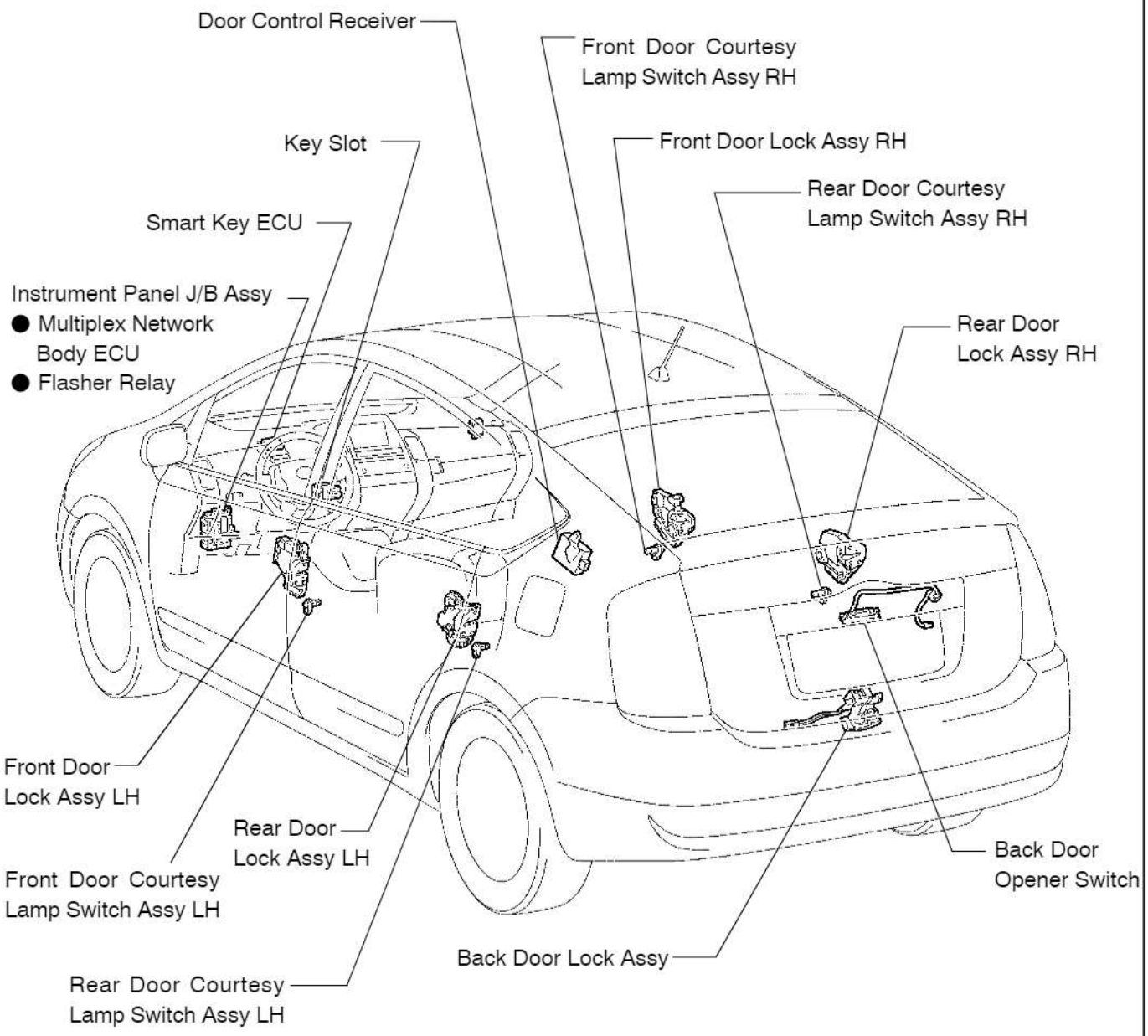
When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

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05IAV-01

LOCATION

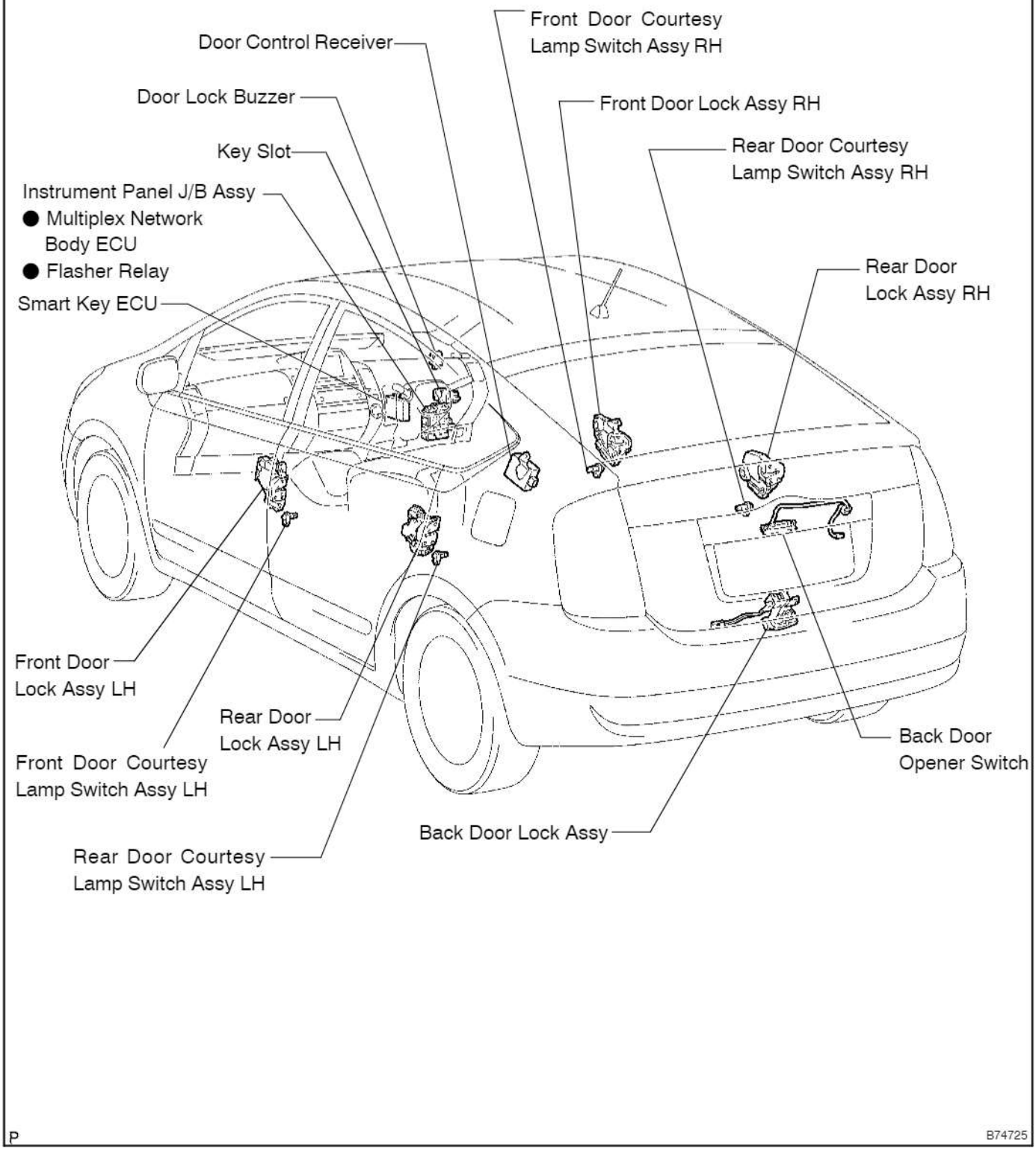
LHD Models



P B74744

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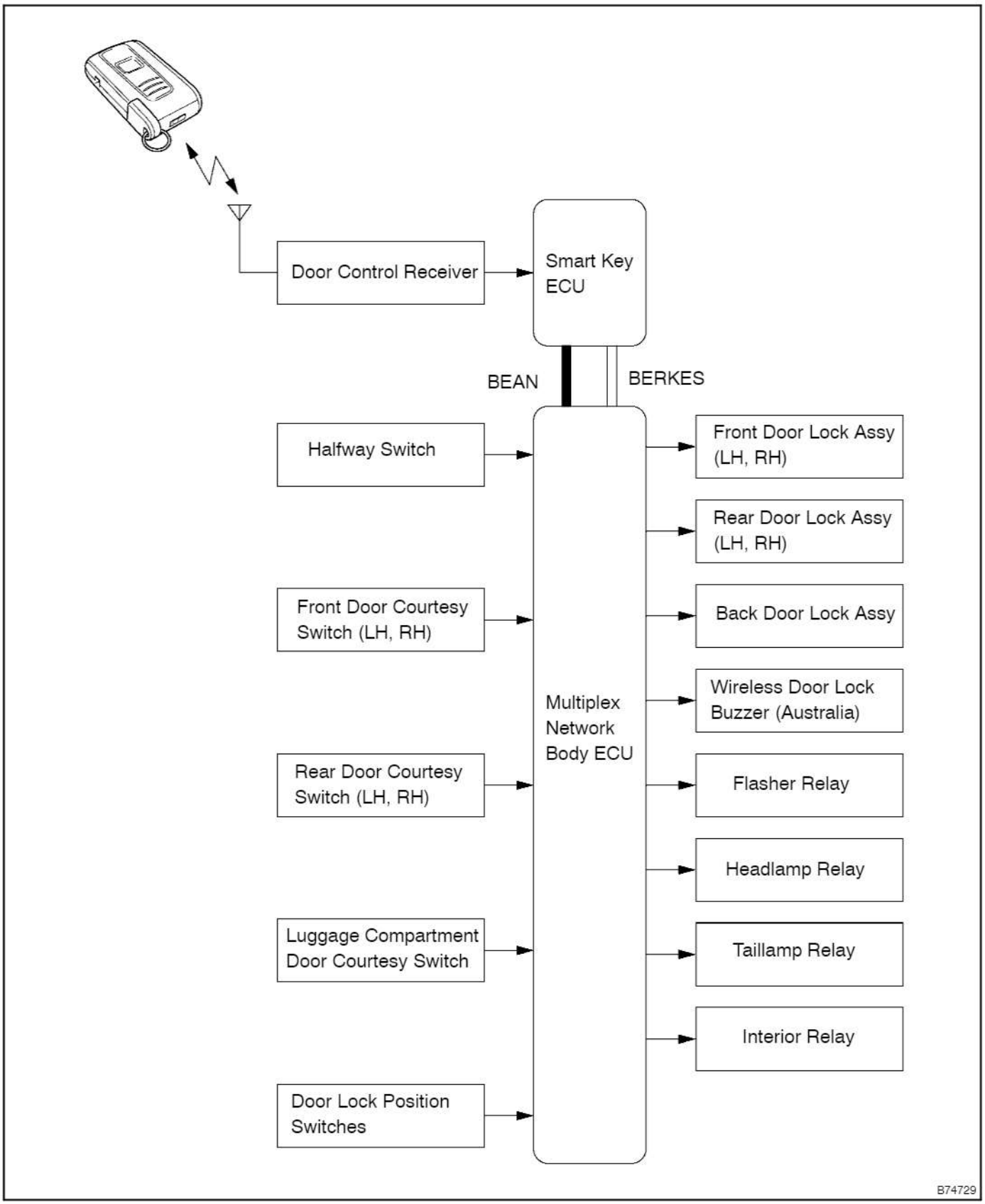
RHD Models



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05IAW–01

SYSTEM DIAGRAM



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05IAZ–01

SYSTEM DESCRIPTION

1. WIRELESS DOOR CONTROL SYSTEM DESCRIPTION

(a) This system is a convenient system for locking and unlocking all the doors from a distance. The wireless control system has the following features:

- The door control receiver performs the code identification process and the multiples network body ECU operates the door lock control. A serial data link is provided for communication between the door control receiver and multiplex network body ECU.
- A key–integrated type transmitter is used and it contains the following 2 switches: the door lock switch and door unlock switch.
- An LED (Light Emitting Diode) is mounted on the transmitter to show if the battery is depleted.

2. FUNCTION OF MAIN COMPONENTS

Components	Functions
Door control transmitter	• Contains LOCK ans UNLOCK switches. • Transmits weak electric waves (recognition codes and function codes) to door control receiver. • Illuminates indicator lamp (LED) during transmission.
Door control receiver	Receives weak electric waves (recognition codes and function codes) and outputs them as code data to multiplex network body ECU.
Halfway switch (inside key slot)	Detects if key slot has key inserted or not.
Front door courtesy lamp switch assy Rear door courtesy lamp switch assy Luggage compartment door courtesy lamp switch assy	Turns on when door is open and off when door is closed. Outputs door status (open or closed) to multiplex network body ECU.
Door lock position switch	Transmits door lock positions of each door to multiplex network body ECU.

3. SYSTEM FUNCTION

(a) Door lock/unlock function:

With no key in the key slot (key switch is off) and all door courtesy lamp switches off, pressing the door control transmitter's LOCK/UNLOCK switch causes the transmitter to output weak electric waves which are then input to the door control receiver. The door control receiver reforms these waves into code data in its internal high frequency circuit and outputs to the code data to the multiplex network body ECU. The door control receiver and smart key ECU judges the code data (recognition codes and function codes) and outputs its judgment results to the multiplex network body ECU. Upon receiving a door lock/unlock request signal, the multiplex network body ECU outputs a door lock/unlock control signal to each door lock assy. Each door lock assy then locks/unlocks its door and turns on/off its door lock position switch according to the signal.

(b) Answer–back function (Australia):

The multiplex network body ECU receives the door unlock detection switch's on/off signals that change according to door control signals and uses these signals to confirm if door control operation has completed. The multiplex network body ECU then outputs the hazard warning lamp's output control signals to flash the hazard warning lamp as an answer–back and wireless door lock buzzer signals to cause the wireless door lock buzzer to sound as an answer–back.

(c) Answer–back function (Except Australia):

The multiplex network body ECU receives door unlock detection switch's on/off signals and uses these signals to confirm if door control operation has completed. The multiplex network body ECU then outputs the hazard warning lamp's output control signals to flash the hazard warning lamp as an answer–back.

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(d) The wireless door lock control system has the following functions.

Function	Outline
All door unlock operation	Pressing LOCK switch locks all doors.
Answer – back operation	• Hazard lamps flash once when doors are locked, and flashes twice when doors are unlocked to inform that operation has been completed. • Wireless door lock buzzer sounds once when doors are locked and sounds twice when doors are unlocked to inform that operation has been completed. (Australia Only)
Automatic lock function	If none of doors are opened within 30 seconds after they are unlocked by wireless door lock remote control, all doors will lock again automatically.
Repeat function	If door is not locked in response to locking operation of transmitter, multiplex network body ECU will output a lock signal after 1 second.
Illuminated entry function	With all doors locked, pressing door unlock switch causes room lamp to illuminate simultaneously with unlocking operation.
Security function	Sends signal as rolling code.
Transmitter recognition code registration function	Enables 4 modes for registering (writing and storing) transmitter recognition codes in EERPOM, which is built into multiplex network body ECU.
Self–diagnosis	If system has malfunction, multiplex network body ECU sets DTC in its memory.

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HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the wireless door lock control system.
- The intelligent tester II should be used in steps 3, 4 and 6.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–1945)

3	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication stop, communication line malfunctioning)
  Without code outputs, proceed to A.
  (2) (ECU unconnected, communication stop, communication line malfunctioning)
  With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SECTION (See page 05–2261)

A

4	CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B	Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05–1953)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 7

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–1959)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(b) Terminals of ECU (see page 05–1954)
(c) On–vehicle inspection (see page 05–1979)

7	ADJUST, REPAIR OR REPLACEMENT

8	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**VIN**	
		Production Date	/ /
		License Plate 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. °C (°F))
	Place	☐ Everywhere ☐ Specific Locality ( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptoms	☐ Entire wireless door lock control system does not operate.
	☐ Only door unlock function does not operate.
	☐ Only door lock function does not operate.
	☐ Doors can be locked by wireless door lock operation even though door(s) are open.
	☐ Wireless door lock functions abnormally.
	☐ Other
DTC No.	☐ B1242

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05JGJ–01

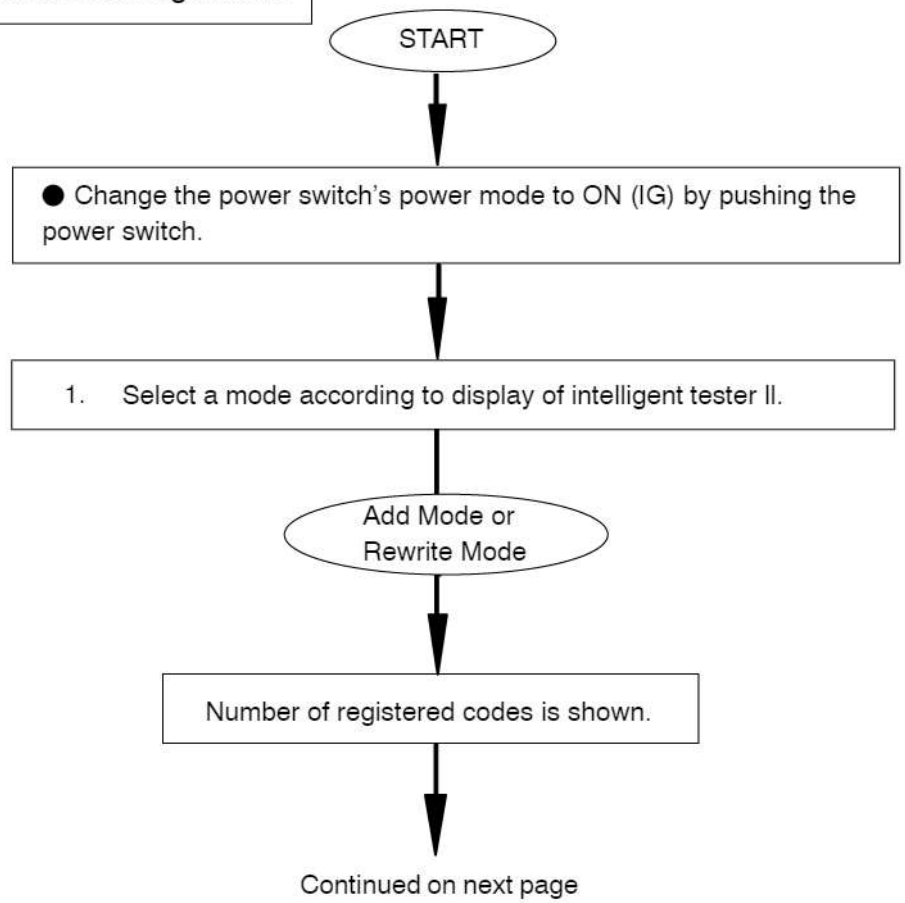
REGISTRATION

HINT:

- Register the recognition code when replacing the door control transmitter or the door control receiver.
- The add mode is used to register new recognition codes while still retaining codes already registered. This mode is used when a new transmitter is added. If the number of registered codes exceeds 4, the previously registered codes will be erased in order, starting from the first registered code.
- The rewrite mode is used to erase all the previously registered recognition codes in order to register new recognition codes. This mode is used when the transmitter or the door control receiver is exchanged for anew one.
- The confirmation mode is used to confirm how many recognition codes have already been registered before an additional registration of a recognition codes.
- The prohibition mode is used to erase all the registered codes and disables the wireless door lock function. This mode is used when the transmitter is lost.
- All of the following registration procedures must be performed in order continuously.

1. REGISTER RECOGNITION CODE

Flow Chart of Recognition Code Registration



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Continued from previous page

2. Press LOCK and UNLOCK switch on transmitter once simultaneously.

Within 3 seconds

3. Press either switch.

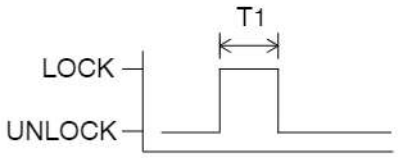
Within 30 seconds

Response to registration completion:

Body ECU automatically performs power door LOCK–UNLOCK operation to show which mode has been selected.

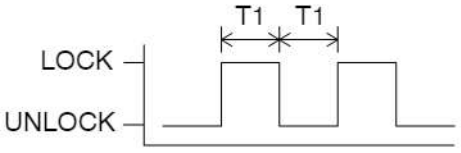
LOCK–UNLOCK Occurs Once

Registration of recognition code has been completed.



LOCK–UNLOCK Occurs Twice

Registration of recognition code has failed.



T1: Approx. 1 second

HINT:
If LOCK–UNLOCK operation is performed twice, registration of recognition code has failed. Perform registration procedures by beginning once again.

Within 40 seconds

If other transmitter is to be registered.
HINT:
4 recognition codes can be registered at once.

Proceed to flow chart to finish registration.

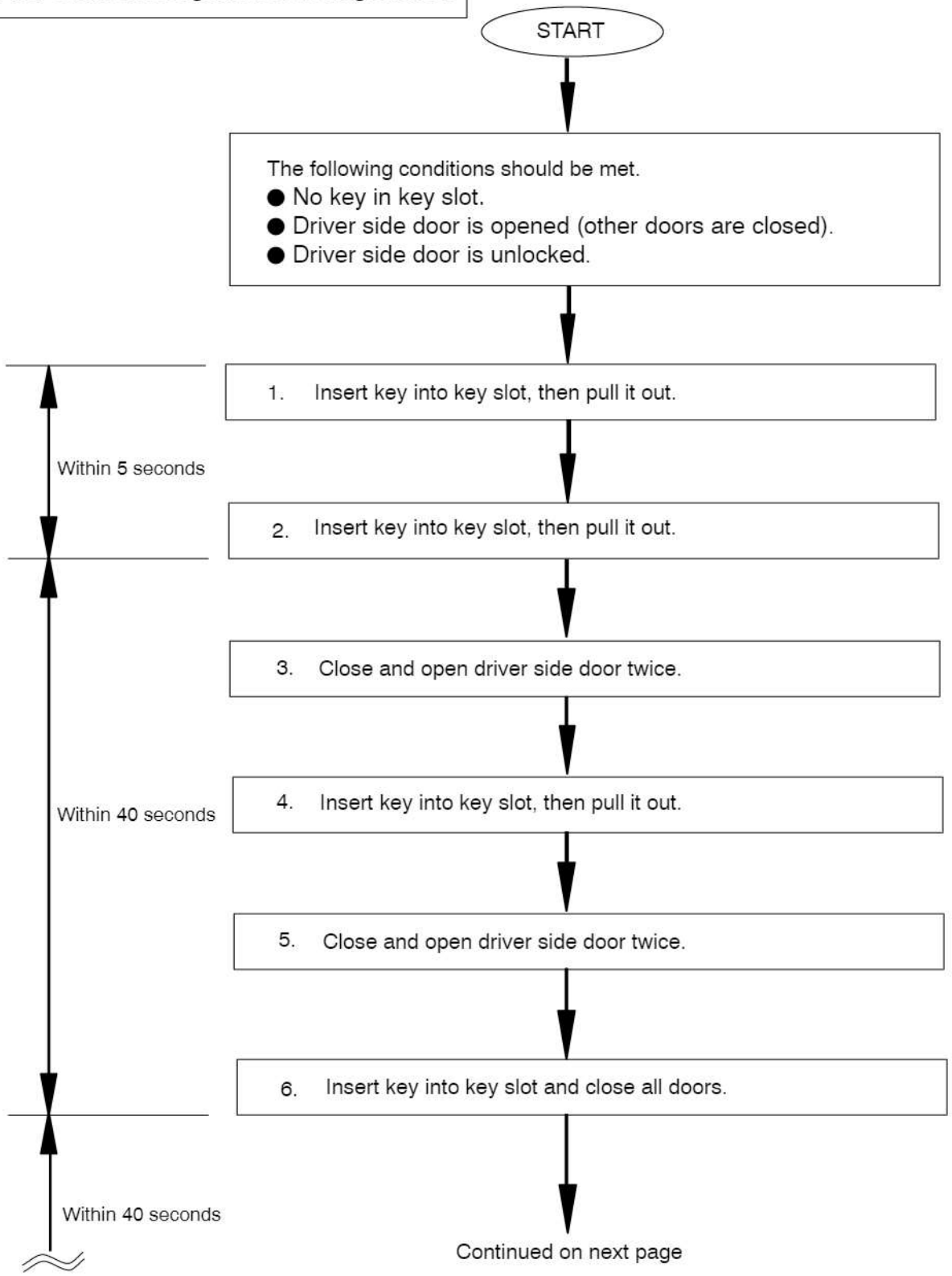
Perform either of the following.
- Use intelligent tester II to order completion.
- Disconnect intelligent tester II.

Registration of recognition codes (add mode and rewrite mode) is completed.

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2. REGISTER RECOGNITION CODE

Flow Chart of Recognition Code Registration



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Continued from previous page

Mode Selection:

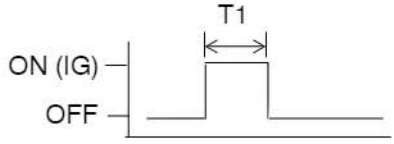
7. Change the power switch's power mode between ON (IG) and OFF repeatedly once within 1 seconds by pushing the power switch.

Number of ON(IG)–OFF operations of power switch:

Add Mode

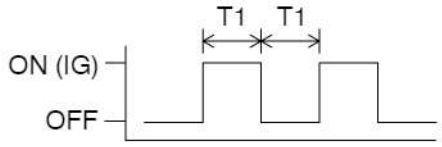
ON (IG)–OFF operation: 1 time

T1: Approx. 1 second



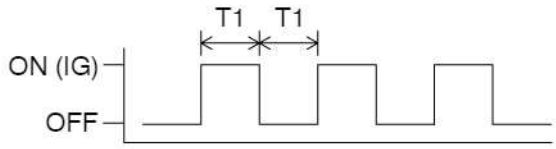
Rewrite Mode

ON (IG)–OFF operation: 2 times



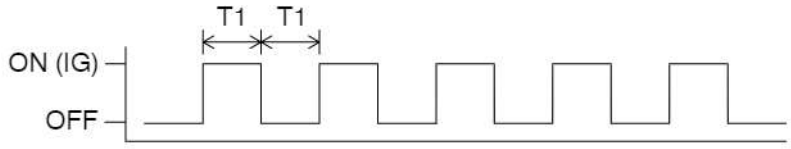
Confirmation Mode

ON (IG)–OFF operation: 3 times



Prohibition Mode

ON (IG)–OFF operation: 5 times



If the number of the ON (IG)–OFF operations of changing the power switch's power mode is 0, 4 or 6 or more, there will be no response (power door lock and unlock operation) to show which mode has been selected.

Within 40 seconds

8. Remove key from key slot.

Within 5 seconds

Continued on next page

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Within 5 seconds

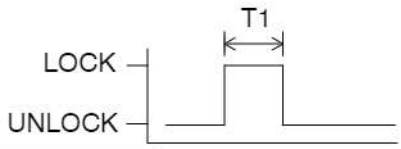
Response to selected mode (Power door lock operation):

Body ECU automatically performs power door LOCK–UNLOCK operation to inform which mode has been selected.

Add Mode

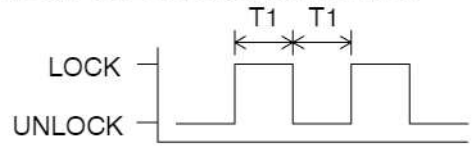
LOCK–UNLOCK operation: 1 time

T1: Approx. 1 second
T2: Approx. 2 seconds



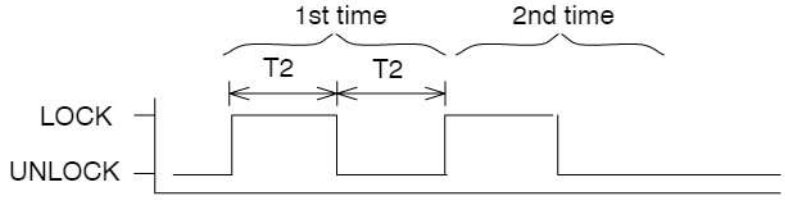
Rewrite Mode

LOCK–UNLOCK operation: 2 times



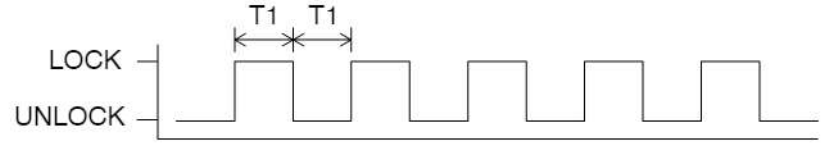
Confirmation Mode

LOCK–UNLOCK operation: The number of registered codes (1 – 5 times)



Prohibition Mode

LOCK–UNLOCK operation: 5 times



HINT:

- In confirmation mode, when LOCK/UNLOCK operation is performed twice, the number of registered recognition codes is 2.
- In confirmation mode, when 0 codes are registered, LOCK/UNLOCK operation is automatically performed 5 times.

Within 40 seconds

Add Mode or Rewrite Mode

Continued on next page

Confirmation Mode and Prohibition Mode

Registration procedures are completed.

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Continued from previous page

Within 40 seconds

9. Press LOCK and UNLOCK switch on transmitter once simultaneously.

Within 3 seconds

10. Press a single switch (LOCK or UNLOCK).

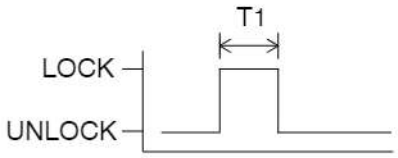
Within 5 seconds

Response to registration completion:

Body ECU automatically performs power door LOCK–UNLOCK operation to show whether registration has been completed correctly or not.

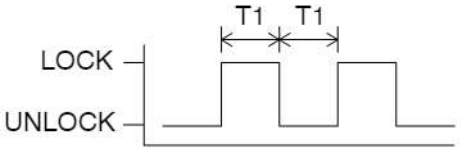
LOCK–UNLOCK Occurs Once

Registration of recognition code has been completed.



LOCK–UNLOCK Occurs Twice

Registration of recognition code has failed.



T1: Approx. 1 second

HINT:
If LOCK–UNLOCK operation is performed twice, registration of recognition code has failed. Perform registration procedures by beginning once again.

Within 40 seconds

If other transmitter is to be registered.

HINT:
4 recognition codes can be registered at once.

Proceed to flow chart to finish registration.

Perform either of the following.
- Open a door.
- Insert key into key slot.

Registration of recognition codes (add mode and rewrite mode) is completed.

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CUSTOMIZE PARAMETERS

HINT:

The following item can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK:

Display (item)	Default	Contents	Setting
Open Door Warn (Open door warning)	ON	If door is not completely closed and transmitter LOCK switch is pressed, this function makes buzzer sound for 10 seconds.	ON/OFF
Wirls Buzz Oper* (Buzzer answer–back of wireless)	ON	Function that makes wireless buzzer sound for answer–back when transmitter lock/unlock switch is pressed.	ON/OFF
Wireless Oper (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF.	ON/OFF
Auto Lock Delay (Auto lock time)	30s	This function controls amount of time from unlocking doors to automatic re–locking function.	30s/60s
Hazard Ans Back (Hazard answer–back of wireless)	ON	When lock switch on transmitter is pressed, this function illuminates all hazard warning lamps once. When unlock switch is pressed, all hazard warning lamps illuminate twice.	ON/OFF

*: Australia only

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05IB8-01

PROBLEM SYMPTOMS TABLE

Problem Symptom	Suspected Area	See Page
Only wireless control function is inoperative	1. Transmitter battery 2. Door control transmitter 3. Door control receiver 4. Key slot 5. Wire harness 6. Multiplex network body ECU 7. Instrument panel J/B assy 8. Smart key ECU 9. Wireless door lock buzzer 10. Lighting system	05–1964
No answer–back*1 (hazard warning lamp and wireless door lock buzzer)	1. Wireless door lock buzzer 2. Lighting system 3. Wire harness 4. Multiplex network body ECU	05–1972
No answer–back*2 (hazard warning lamp)	1. Lighting system 2. Wire harness 3. Multiplex network body ECU	05–1976

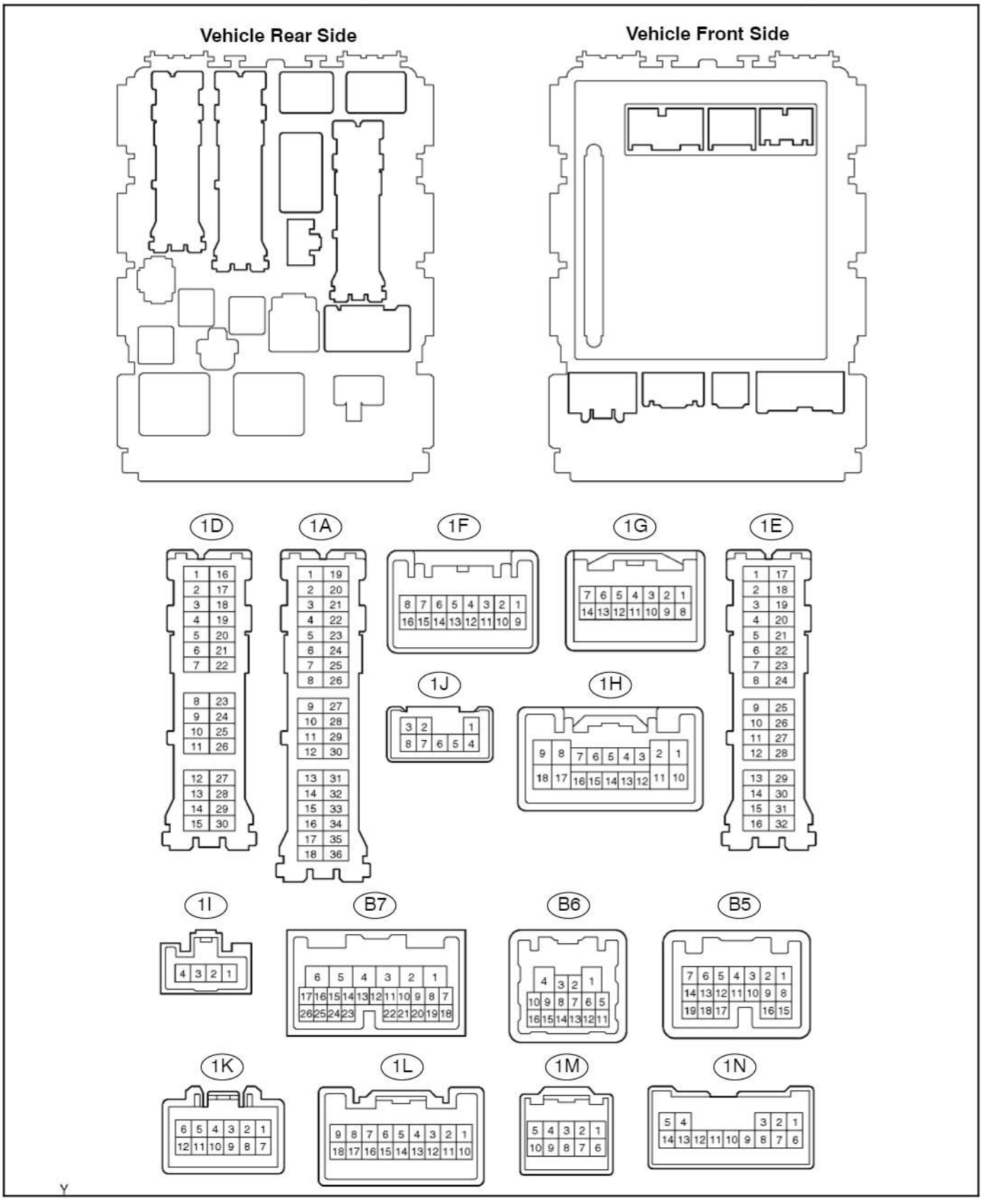
*1: Australia *2: Except Australia

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05IBD-01

TERMINALS OF ECU

1. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



Y

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(a) Disconnect the 1A, 1D, 1E, 1J and 1L J/B connectors.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SIG (1L–7) – Body ground	B*1 – Body ground P*2 – Body ground	Ignition power supply	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V
ACC (1J–5) – Body ground	G – Body ground	Ignition power supply	Power switch's power mode OFF → ON (ACC)	0 V → 10 to 14 V
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
DCTY (1D–24) – Body ground	V – Body ground	Driver side door courtesy switch input	Driver side door closed → Open	10 kΩ or higher → Below 1 Ω
PCTY (1D–24) – Body ground	BR – Body ground	Passenger side door courtesy switch input	Passenger side door closed → Open	10 kΩ or higher → Below 1 Ω
BCTY (1D–7) – Body ground	R – Body ground	Back door courtesy switch input	Back door closed → Open	10 kΩ or higher → Below 1 Ω
GND (1E–17) – Body ground	W–B – Body ground	Ground	Ground	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.

*1: LHD *2: RHD

(c) Reconnect the 1A, 1B, 1D, 1E and 1J J/B connectors.

(d) Measure the voltage and resistance between each terminal of the connector and body ground.

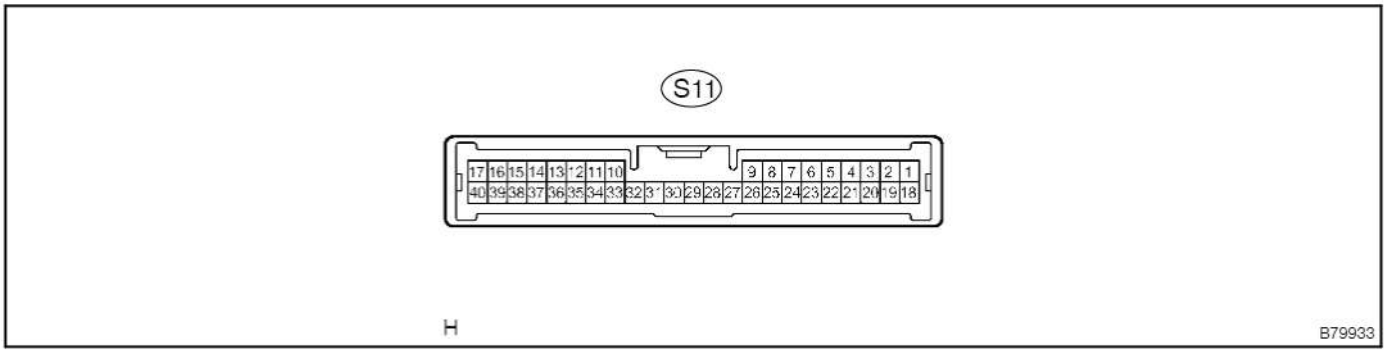
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
HAZ (1L–17) – Body ground	Y – Body ground	Hazard lamp drive	Answer–back OFF → ON	10 to 14 V → Pulse generation
RDA (B7–23) – Body ground	W – Body ground	Door control receiver input	Power switch's power mode OFF, all doors closed and transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → Below 1 Ω

If the result is not as specified, the J/B assy (body ECU) may have a malfunction.

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2. CHECK SMART KEY ECU



(a) Disconnect the S11 ECU connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (S11–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
+B1 (S11–1) – E (S11–17)	R – W–B	Battery power supply	Constant	10 to 14 V
IG (S11–18) – E (S11–17)	B – W–B	Ignition power supply	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V

If the result is not as specified, the wire harness side may have a malfunction.

(c) Reconnect the S11 ECU connector.

(d) Measure the voltage and resistance between each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RSSI (S11–28) – E (S11–17)	B – W–B	Door control receiver output signal	Power switch's power mode OFF, all doors closed and transmitter switch OFF → ON (IG)	5 to 0 V → Below 1 V
RDA (S11–29) – E (S11–17)	L – W–B	Door control receiver input signal	Power switch's power mode OFF, all doors closed and transmitter switch OFF → ON (IG)	Below 1 V → Approx. 6 to 7 V → Below 1 V
CLG1 (S11–13) – E (S11–17)	P – W–B	Driver door oscillator sensor signal	All doors open with smart key from outside vehicle and power switch's power mode OFF → ON (IG)	Pulse generation → No pulse
SEL1 (S11–23) – E (S11–17)	Y – W–B	Driver door oscillator sensor signal	Smart key placed at least 3 m apart from driver door → Placed close to front door outside handle assy RH	10 to 14 V → 0

If the result is not as specified, the smart key ECU may have a malfunction.

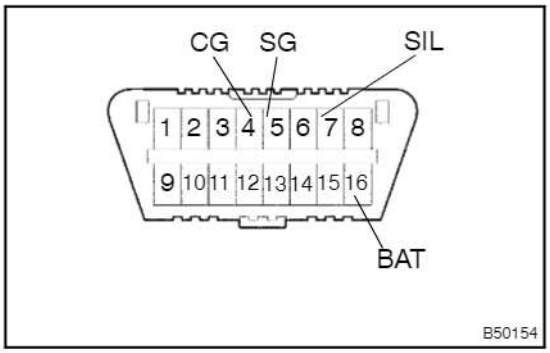
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05IBG–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Wireless door lock control system data and the Diagnosis Trouble Codes (DTCs) can be read in the Data Link Connector 3 (DLC3) of the vehicle . When the system seems to be malfunctioning, use the intelligent tester II to check for malfunctions and perform repairs.

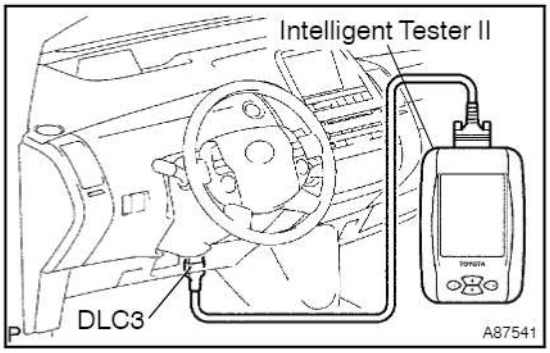


2. CHECK DLC3

The vehicle uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Constant
SG	5	Signal ground	Body ground	1 Ω or less	Constant
BAT	16	Battery positive	Body ground	9 to 14 V	Constant

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



HINT:

Connect the cable of the intelligent tester II to the DLC3, change the power switch's power mode to ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem may be on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. CHECK BATTERY VOLTAGE

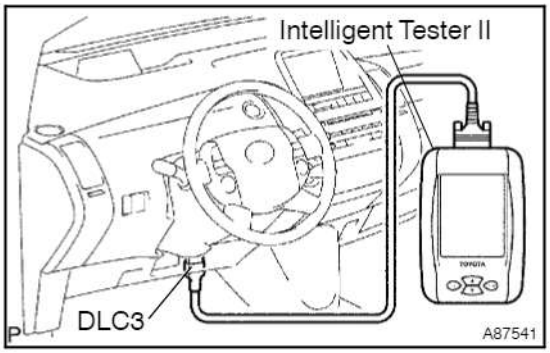
Standard: 11 to 14 V

If the voltage is below 11 V, replace the battery before proceeding.

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05IBI-01

DTC CHECK/CLEAR



1. CHECK DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

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05IBL-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DATA LIST according to the display on the tester.

Multiplex network body ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
D Dor Cty SW	Driver side door courtesy switch signal/ON or OFF	ON: Driver side door is open. OFF: Driver side door is open.	–
P Dor Cty SW	Passenger side door courtesy switch signal/ON or OFF	ON: Passenger side door is open. OFF: Passenger side door is open.	–
Rr Dor Cty SW	Rear door courtesy switch signal/ ON or OFF	ON: Either right or left door is open. OFF: Both right and left doors are closed.	–
D Lock Pos SW	Driver side door lock position switch signal/ON or OFF	ON: Driver side door lock is in unlock position. OFF: Driver side door lock is in lock position.	–
P Lock Pos SW	Passenger side door lock position switch signal/ON or OFF	ON: Passenger side door lock is in unlock position. OFF: Passenger side door lock is in lock position.	–
Rr Lock Pos SW	Rear door lock position switch signal/ON or OFF	ON: Rear door lock is in unlock position. OFF:: Rear door lock is in lock position.	–
Regist ID Code	Number of registered ID / Min. 0, Max. 4	Number of registered ID code.	–

Transponder key ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Key Unlk Wrn SW	Halfway switch signal/ON or OFF	ON: Key is in key slot. OFF: No key is in key slot.	–

2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator, and other times to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU:

Item	Normal Condition	Diagnostic Note
Hazard	Turns turn signal flasher relay ON/OFF	–
Trunk/Bdor Open	Operate back door motor ON/OFF	–
Door Lock	Operate door lock motor for all doors OFF/LOCK/UNLOCK	All doors are closed

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05IBN–01

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See Page)	Detection Item	Trouble Area
B1242 (05–1961)	Wireless door lock tuner circuit malfunction	• Wire harness • Door control receiver • Smart key ECU • Multiplex network body ECU

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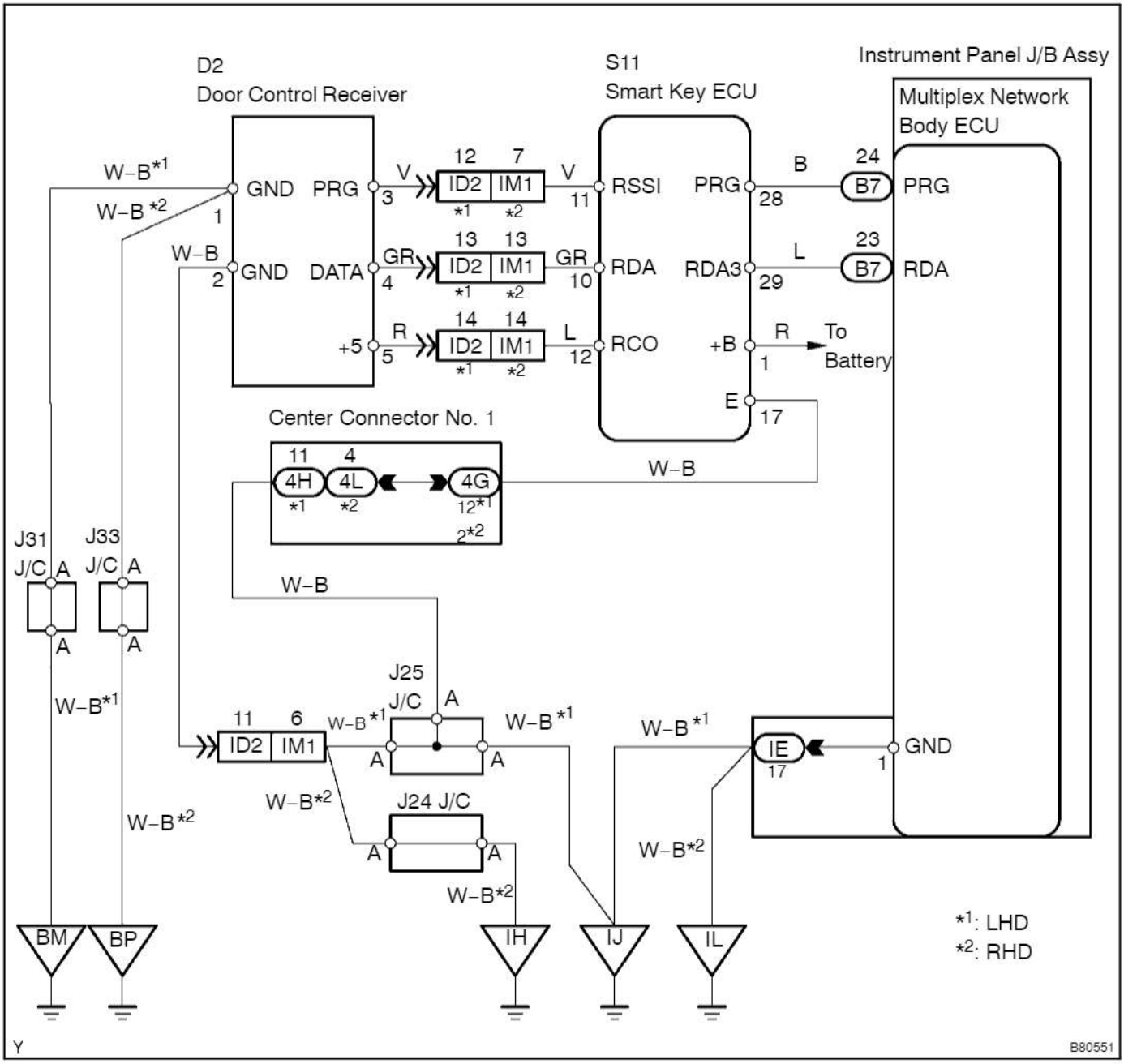
DTC	B1242	WIRELESS DOOR LOCK TUNER CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is detected when a RDA signal is not input to the door control receiver through the smart key ECU within 1 second after the multiplex network body ECU outputs a PRG signal.

DTC No.	DTC Detection Condition	Trouble Area
B1242	Within 1 second after PRG signal is output from multiplex network body ECU during self–diagnostic mode, corresponding RDA signal is not input.	• Door control receiver • Wire harness • Smart key ECU • Multiplex network body ECU

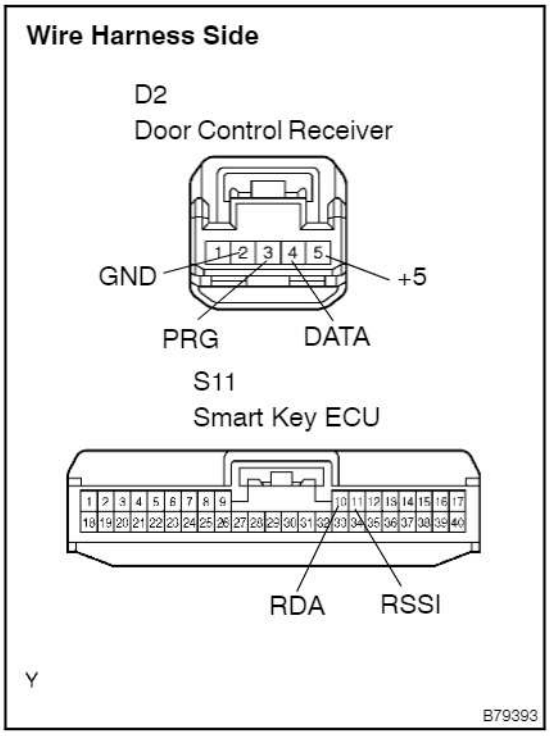
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – SMART KEY ECU) (DOOR CONTROL RECEIVER OR SMART KEY ECU – BODY GROUND)



(a) Disconnect the S11 ECU connector.
(b) Disconnect the D2 receiver connector.
(c) Measure the voltage and resistance of the wire harness side connectors.

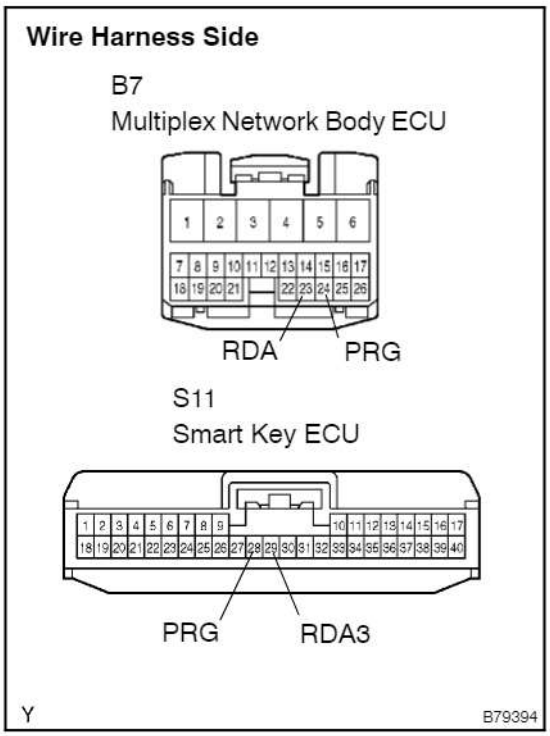
Standard:

Tester Connection	Specified Condition
D2–4 (DATA) – S11–10 (RDA)	Below 1 Ω
D2–3 (PRG) – S11–11 (RSSI)	Below 1 Ω
D2–5 (+5) – S11–12 (RCO)	Below 1 Ω
D2–5 (+5) – Body ground	4.6 to 5.4 V
D2–2 (GND) – Body ground	Below 1 Ω
D2–4 (DATA) or S11–10 (RDA) – Body ground	10 kΩ or higher
D2–3 (PRG) or S11–11 (RSSI) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

2	CHECK WIRE HARNESS (SMART KEY ECU – MULTIPLEX NETWORK BODY ECU) (SMART KEY ECU OR MULTIPLEX NETWORK BODY ECU – BODY GROUND)



(a) Disconnect the S11 ECU connector.
(b) Disconnect the B7 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S11–29 (RDA3) – B7–23 (RDA)	Below 1 Ω
S11–28 (PRG) – B7–24 (PRG)	Below 1 Ω
S11–29 (RDA3) or B7–23 (RDA) – Body ground	10 kΩ or higher
S11–28 (PRG) or B7–24 (PRG) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

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3	REPLACE DOOR CONTROL RECEIVER

(a) Check that no DTC is DTC is output.
OK: DTC is not output.

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

REPLACE SMART KEY ECU

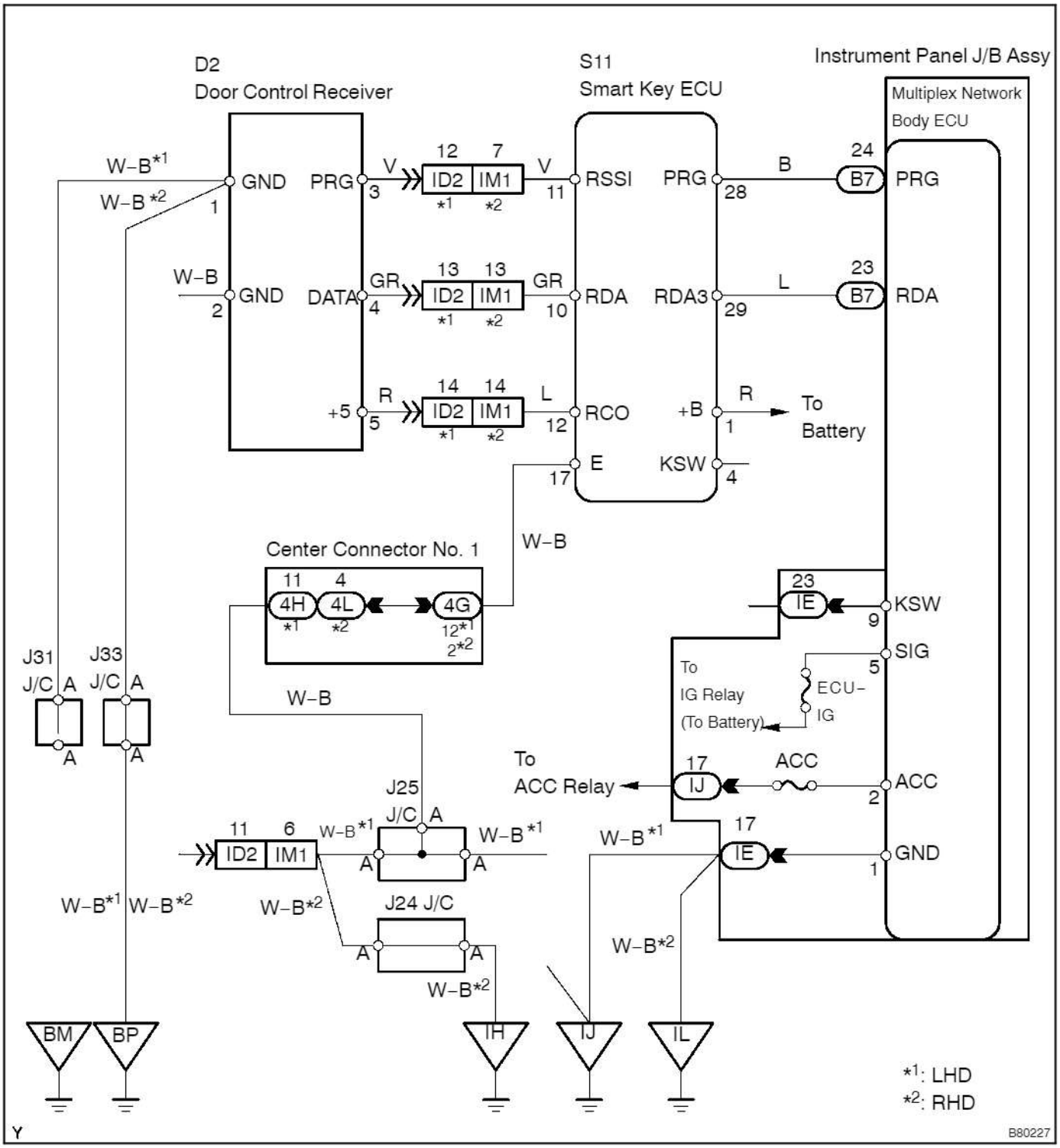
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ONLY WIRELESS CONTROL FUNCTION IS INOPERATIVE

CIRCUIT DESCRIPTION

The door control receiver receives signals from the transmitter and sends these signals to the multiplex network body ECU through the smart key ECU. The multiplex network body ECU then controls all doors by sending LOCK/UNLOCK signals to each door lock actuator.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS (See page 05–1979)

NG → Go to step 2

OK

NORMAL

2	CHECK THAT TRANSMITTER LED LIGHTS UP

(a) Check that the transmitter LED lights up 3 times when the switch is pressed 3 times.
OK: Transmitter LED lights up 3 times when the switch is pressed 3 times.

NG → Go to step 4

OK

3	CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS (STANDARD OPERATION)

(a) Check standard UNLOCK/LOCK switch operation.

NOTICE:

Standardized test procedure: press the transmitter switch for 1 second, directing the beam to the driver side door outside handle from a distance of 1 m (39.4 in.). The transmitter should be pointed directly at the handle, i.e. at a 90° angle to the vehicle body.

NG → Go to step 5

OK

REPLACE DOOR CONTROL TRANSMITTER

4	REPLACE TRANSMITTER BATTERY

(a) After replacing the transmitter battery, check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → REPLACE DOOR CONTROL TRANSMITTER

OK

END

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5 SWITCH TO SELF–DIAGNOSTIC MODE

(a) Switch self–diagnosis mode on the intelligent tester II.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Change the power switch's power mode to ON (IG) by pushing the power switch and push the hand–held test main switch ON.
  (3) Please refer to the intelligent tester II operator's manual for further details.

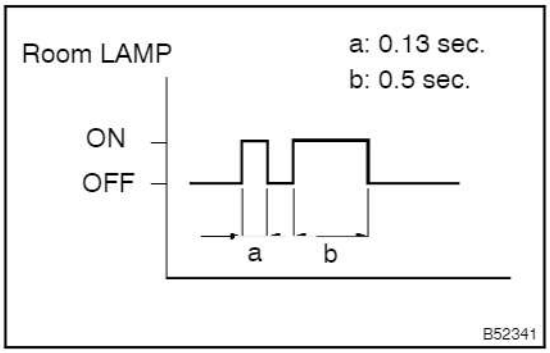
(b) Switch self–diagnosis mode by operating the key slot.
  (1) Put the vehicle under the vehicle's initial condition (see page 05–1979), insert the key into the key slot and remove it.
  (2) Within 5 seconds after the key is removed (step 1), insert the key into the key slot. Then change the power switch's power mode to ON (IG) and OFF by pushing the power switch.
  (3) Within 30 seconds after the power switch is to OFF again (step 2), perform the following 9 times: Change the power switch's power mode to ON (IG) and OFF by pushing the power switch (step 3).

NOTICE:

If the change to–self–diagnostic mode has failed, the system will return to normal mode.

HINT:

- Changing the power switch's power mode to ON (IG) by pushing the power switch after step 3 has been completed will end self–diagnostic mode.
- Do not lock or unlock doors during the self–diagnostic mode.



(c) Check that the system has switched to self–diagnostic mode by checking the flashes of the room lamp (dome lamp or key slot light) or buzzer outputs. Compare the flash patterns of the room lamp and output patterns of the buzzer to the timing chart on the left.

OK: The flash patterns of the room lamp and output patterns of the buzzer should be the same as that shown in the timing chart on the left.

NG	Go to step 11

OK

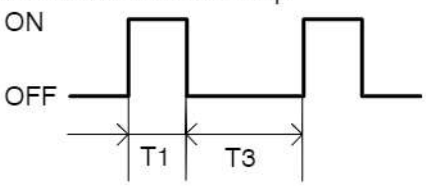
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6 CHECK BY SELF–DIAGNOSTIC MODE

(a) Inspect the diagnosis outputs when the door control transmitter switch is held down. The diagnosis outputs can be checked by the flash patterns of the room lamp and output patterns of the buzzer.

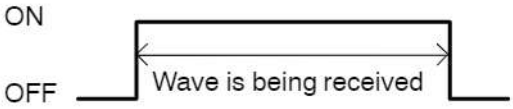
Normal wave of LOCK switch

Flash Pattern of Room Lamp



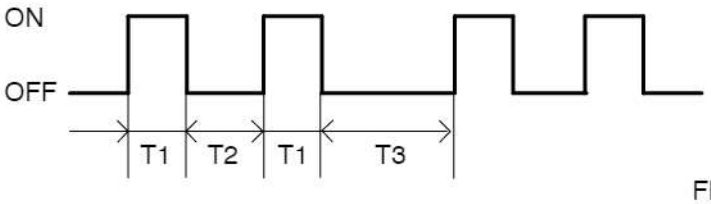
Unmatched recognition code

Flash Pattern of Room Lamp



Normal wave of UNLOCK switch

Flash Pattern of Room Lamp



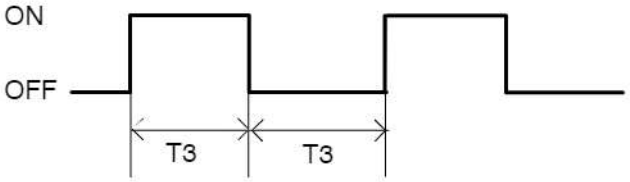
No diagnosis outputs

Flash Pattern of Room Lamp



Normal wave of TRUNK OPEN switch

Flash Pattern of Room Lamp



T1: 0.13 sec.
T2: 0.25 sec.
T3: 0.5 sec.

Result	Proceed to
When unmatched recognition code is output.	A
When normal waves (patterns of room lamp and output patterns of buzzer) for LOCK and UNLOCK are output.	B
When no diagnosis outputs are present.	C

B → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY**

C → **Go to step 12**

A

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7	REGISTER RECOGNITION CODE

(a) Check that the system can switch to rewrite mode or add mode, and that a recognition code can be registered.
OK:
System can switch to rewrite mode or add mode, and that a recognition code can be registered.

NG → **Go to step 8**

OK

END

8	REPLACE DOOR CONTROL RECEIVER

(a) After replacing the door control receiver, check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

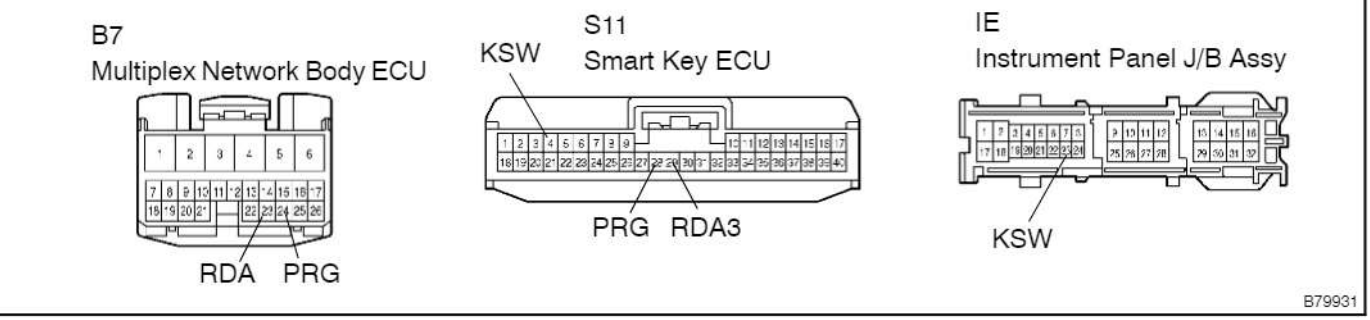
NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

END

9	CHECK WIRE HARNESS (SMART KEY ECU – MULTIPLEX NETWORK BODY ECU)

Wire Harness Side



(a) Disconnect the S11 and B7 ECU connectors.
(b) Disconnect the 1E J/B connector.
(c) Measure the resistance of wire harness side connector.
Standard:

Tester Connection	Specified Condition
B7–23 (RDA) – S11–29 (RDA3)	Below 1 Ω
B7–24 (PRG) – S11–28 (PRG)	Below 1 Ω
1E–23 (KSW) – S11–4 (KSW)	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

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10	REPLACE SMART KEY ECU ASSY

(a) After replacing the smart key ECU, check that the door can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

END

11	CONFIRM INPUT METHOD OF SELF–DIAGNOSTIC MODE

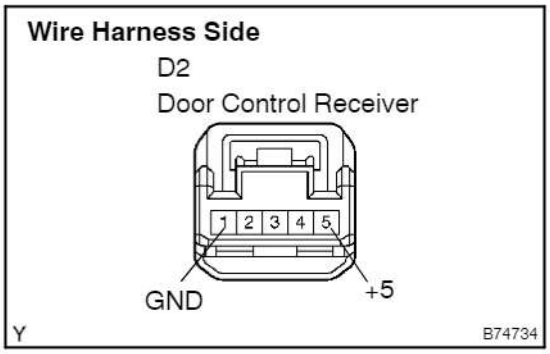
Result	Proceed to
When the method for changing the system self–diagnostic mode works.	A
When the method for changing the system self–diagnostic mode does not works.	B

A → **Go to step 5**

B

Go to step 9

12	CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – BODY GROUND)



(a) Disconnect the D2 receiver connector.
(b) Measure the voltage and resistance between the wire harness side connector and body ground.
Standard:

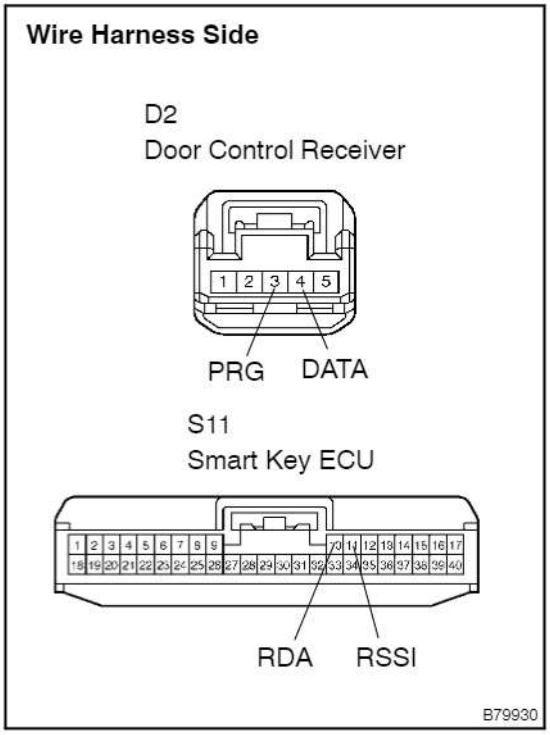
Tester Connection	Specified Condition
D2–5 (+5) – Body ground	4.6 to 5.4 V
D2–2 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

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13 CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – SMART KEY ECU) (DOOR CONTROL RECEIVER OR SMART KEY ECU – BODY GROUND)



(a) Disconnect the D2 receiver connector.
(b) Disconnect the S11 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

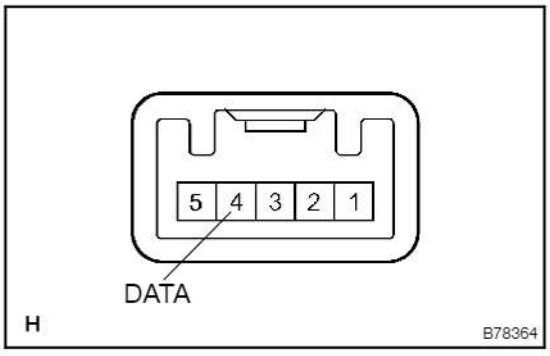
Standard:

Tester Connection	Specified Condition
D2–4 (DATA) – S11–10 (RDA)	Below 1 Ω
D2–3 (PRG) – S11–11 (RSSI)	Below 1 Ω
D2–4 (DATA) or S11–10 (RDA) – Body ground	10 kΩ or higher
D2–3 (PRG) or S11–11 (RSSI) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

14 CHECK DOOR CONTROL RECEIVER (OUTPUT)



(a) Reconnect the D2 receiver connector and Measure the voltage between the terminal and body ground.

Standard:

Tester Connection	Condition	Specified Condition
D2–2 (RDA) – Body ground	No key in key slot, all doors closed and each transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → below 1 V

NG → **Go to step 15**

OK

Go to step 9

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15	REPLACE DOOR CONTROL TRANSMITTER

(a) Check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → **REPLACE DOOR CONTROL RECEIVER**

OK

END

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NO ANSWER–BACK (HAZARD WARNING LAMP AND WIRELESS DOOR LOCK BUZZER)

HINT:
Australia only.

CIRCUIT DESCRIPTION

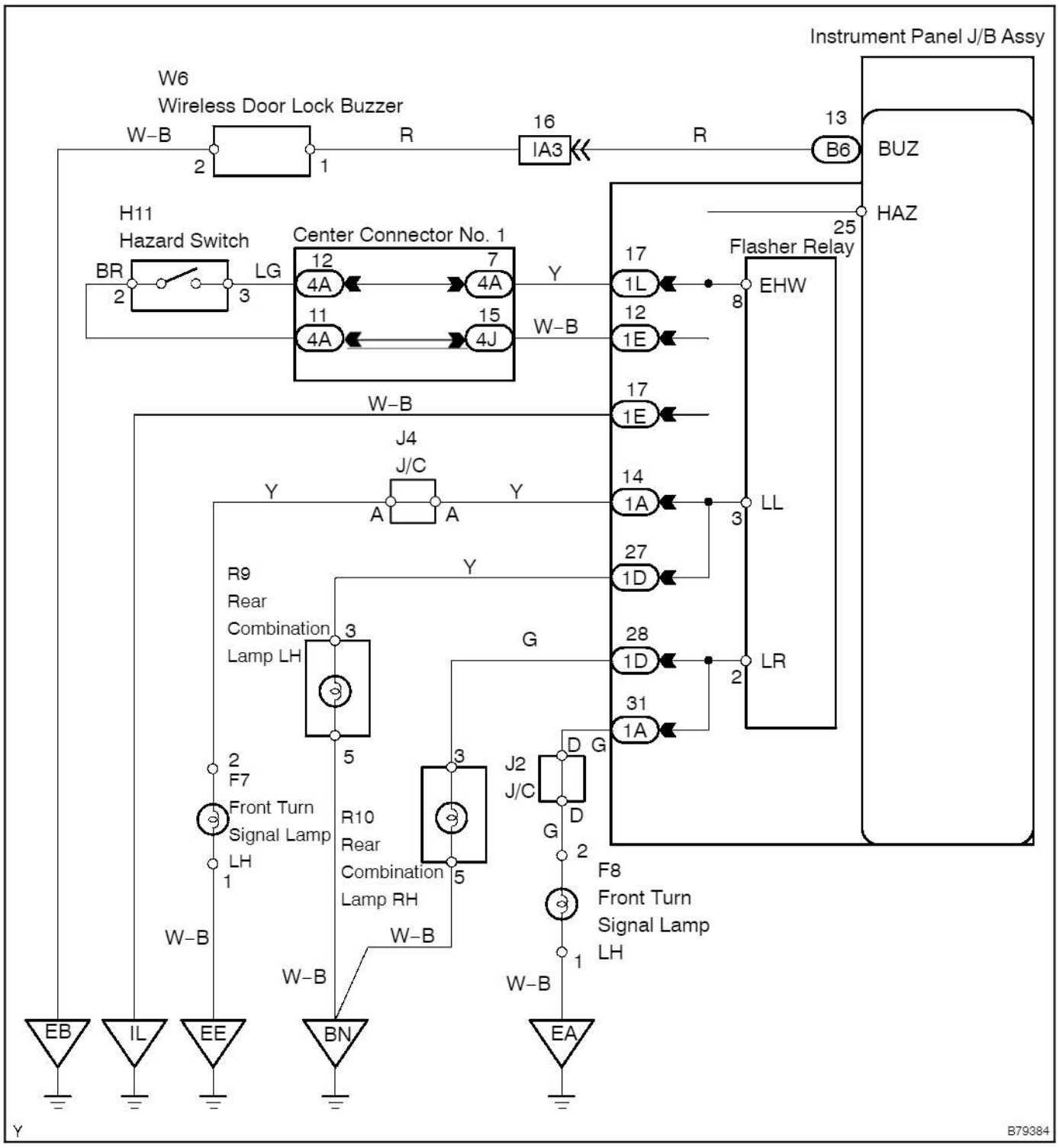
In some cases, wireless control functions are normal but the hazard warning lamp and wireless door lock buzzer answer–back functions are not. In such case, the multiplex network body ECU's hazard warning lamp and wireless door lock buzzer signal outputs may be malfunctioning.

NOTICE:

Troubleshooting should be started after confirming that the answer–back function has been switched ON.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS

(a) Check the wireless door lock functions by operating the transmitter switch.

Result	Proceed To
Wireless door lock functions but hazard warning lamp answer–back does not occur.	A
Wireless door lock functions but wireless door lock buzzer answer–back does not occur.	B
Wireless door lock functions but hazard warning lamp answer–back and wireless door lock buzzer answer–back do not occur.	C

B → **Go to step 4**

C → **Go to FLOW CHART (See page 05–1964)**

A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the hazard lamps flash.

OK: Signal flasher relay turns ON/OFF

Item	Test Detail	Diagnostic Note
Hazard	Turn signal flasher relay ON/OFF	–

NG → **Go to step 3**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

3 CHECK HAZARD WARING LAMPS

(a) Check that the hazard warning lamps flash continuously when the hazard warning signal switch is pressed.

OK: Hazard warning lamps flash continuously.

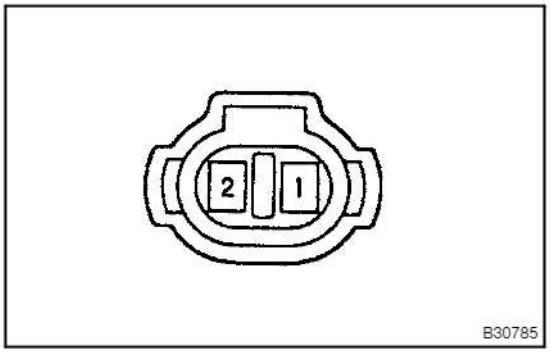
NG → **Go to LIGHTING SYSTEM (See page 65–1)**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

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4 INSPECT WIRELESS DOOR LOCK BUZZER



(a) Measure the buzzer resistance.

NOTICE:

- **The buzzer circuit is built into the body ECU, not into buzzer itself.**
- **When battery voltage is directly applied to the buzzer, the buzzer does not sound.**

(1) Measure the resistance between the terminals of the buzzer.

Standard:

Tester Connection	Specified Condition
1 – 2	Approx. 1 kΩ

NG → **REPLACE WIRELESS DOOR LOCK BUZZER**

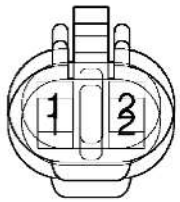
OK

5 CHECK WIRE HARNESS (WIRELESS DOOR LOCK BUZZER – MULTIPLEX NETWORK BODY ECU)

Wire Harness Side

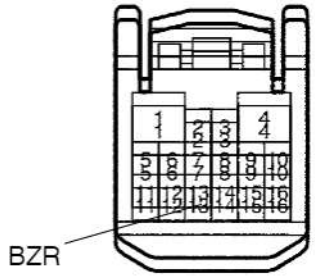
W6

Wireless Door Lock Buzzer



B6

Multiplex Network Body ECU



(a) Disconnect the B6 ECU connector.

(b) Disconnect the W6 buzzer connector.

(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
W6–1 – B6–13 (BUZ)	Below 1 Ω
W6–2 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE WIRELESS AND CONNECTOR**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

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NO ANSWER–BACK (HAZARD WARNING LAMP)

HINT:
Except Australia

CIRCUIT DESCRIPTION

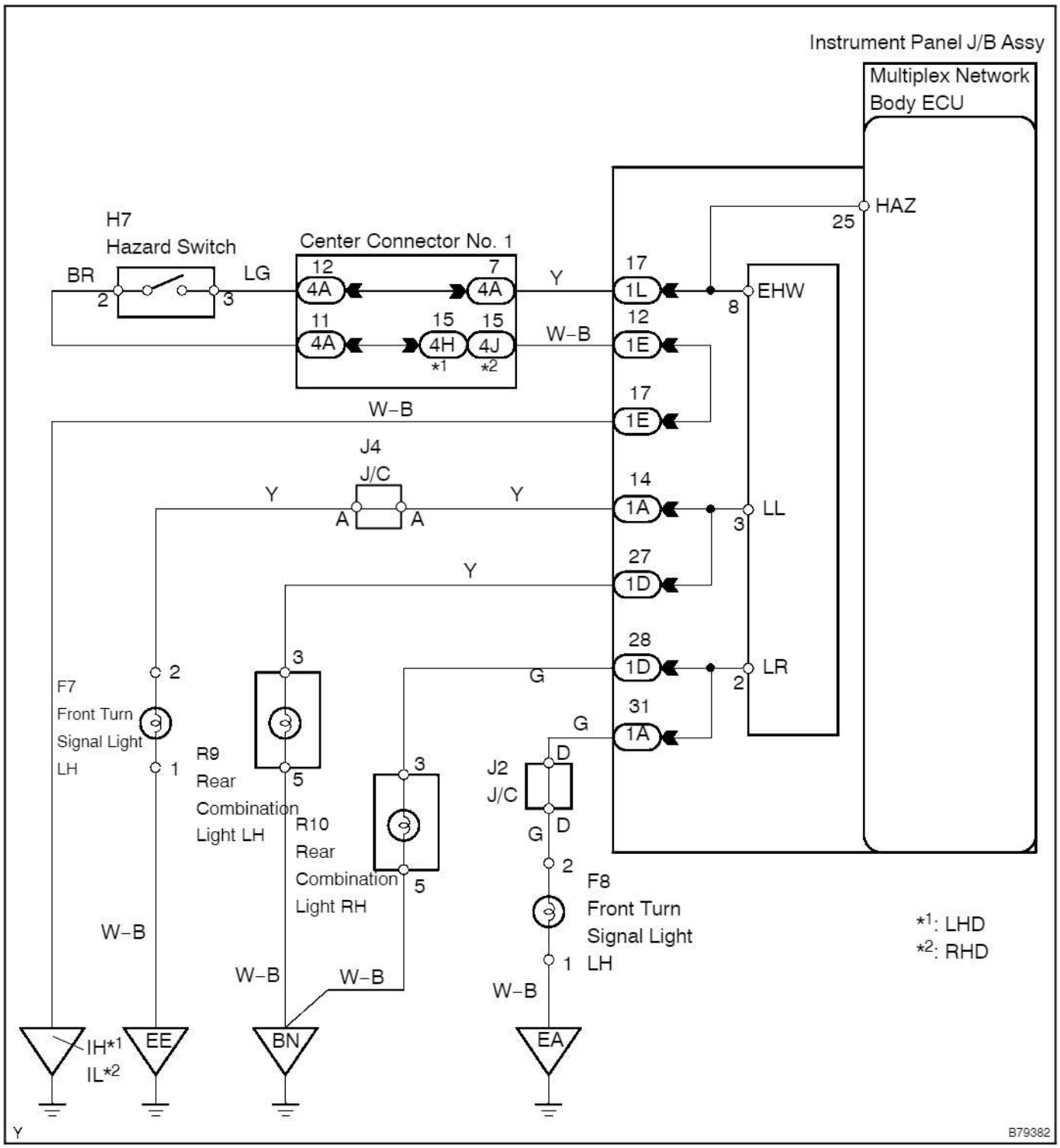
In some cases, wireless control functions are normal but the hazard warning lamp is not. In such case, the multiplex network body ECU's hazard warning lamp signal outputs may be malfunctioning.

NOTICE:

Troubleshooting should be started after confirming that the answer–back function has been switched ON.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK WIRELESS DOOR LOCK FUNCTION

(a) Check the wireless door lock functions by operating the transmitter switch.

Result	Proceed to
Wireless door lock functions but hazard warning lamp answer–back does not occur.	A
Wireless door lock control functions do not operate.	B

B → **GO to FLOW CHART (See page 05–1964)**

A

2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the hazard lamps flash.

OK: Signal flasher relay turns ON/OFF

Item	Test Detail	Diagnostic Note
Hazard	Turn signal flasher relay ON/OFF	–

NG → **Go to step 3**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

3	CHECK HAZARD WARING LAMPS

(a) Check that the hazard warning lamps flash continuously when the hazard warning signal switch is pressed.

OK: Hazard warning lamps flash continuously.

NG → **Go to LIGHTING SYSTEM (See page 65–1)**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

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05IBY-01

ON–VEHICLE INSPECTION

1. NOTES WHEN CHECKING

(a) Power door LOCK/UNLOCK function:
This wireless door lock control operates only when the following 3 conditions are met.
(1) No key is inserted into the key slot.
(2) All the doors are closed.
(3) The power door lock system is functioning normally.
(4) Key is not within the smart key detection area.

HINT:
The UNLOCK function operates even when one of the doors is open.

(b) The wireless transmitter operational range differs depending on the situation.
(1) The operating area differs depending on the user, the way the transmitter is held and the location.
(2) In certain areas, the operating area will be reduced due to the vehicle body shape and the influence of the surrounding environment.
(3) Since the transmitter uses weak electric waves, the operating area might be shortened if noise or strong electric waves occur in the area where the transmitter is used. Or, the transmitter may weak function.
(4) When the battery weakens, the operating are is reduced or the transmitter may not function.

HINT:
If the transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, the battery may weaken or other problems may occur.

2. WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:
- The switches described below transmit signals and are built into the door control transmitter.
- The operational range must be taken into account while checks are being made.

(a) Put the vehicle in conditions that allow the wireless control function to be operated (see page 05–1979).

(b) Check basic functions.
(1) Check that the LED of the transmitter lights 3 times when each switch is pressed 3 times.

HINT:
If the LED does not light up when the switch has been pressed 3 times or more, it may have a dead battery.
(2) Check that all the doors including the back door lock when the LOCK switch is pressed.
(3) Check that only the driver side door unlocks when the UNLOCK switch is pressed once, and that the remaining doors unlock when the UNLOCK switch is pressed again within 3 seconds.

(c) Check the chattering prevention function.
(1) Check that pressing a switch will result in the switch's operation occurring only once; and when the switch is held down, the operation is not repeated continuously. Also, make sure that when the switch is pressed in approximately 1 second intervals, the switch's operation will occur each time.

(d) Check the automatic locking function.
(1) Check that if all of the doors are unlocked with the UNLOCK switch and none of the doors are opened or locked within approximately 30 seconds, the door automatically relock.
(2) Check that if all of the doors are unlocked with the UNLOCK switch and a door is opened or locked within approximately 30 seconds, the automatic locking function does not operate.

(e) Check the switch operation fail–safe function.
(1) Check that the doors cannot be locked by a switch while the key is in the key slot. However, this does not apply when the system is in recognition code registration mode.

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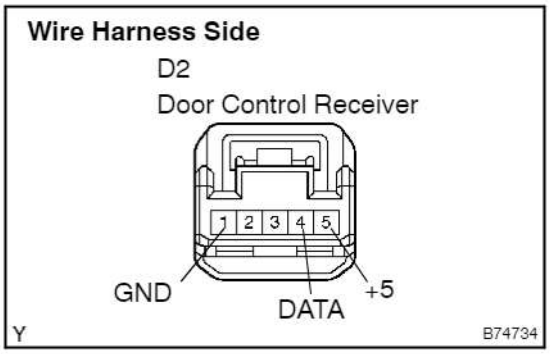
(f) Check the operation stop function when a door is open or not completely closed.
  (1) Check that if a door is open or not completely closed, the doors cannot be locked by the LOCK switch.

(g) Check the repeat function.
  (1) Check that if the LOCK switch is pressed while the movement of the driver side door control knob (in the unlocked state) is restricted, the repeat function attempts to lock all of the doors again 2 seconds later.

(h) Check the answer–back function. (Australia)
  (1) When the LOCK switch is pressed, check that the lamps flash once and the buzzer sounds once simultaneously with the locking of all the doors.
  (2) When the UNLOCK switch is pressed once, check that the lamps flash twice and the buzzer sounds twice simultaneously with the unlocking of the driver side door.
  (3) When the UNLOCK switch is pressed again within 3 seconds, check that the lamps flash twice and the buzzer sounds twice simultaneously with the unlocking of all the doors.

(i) Check the answer–back function. (Except Australia)
  (1) When the LOCK switch is pressed, check that the lamps flash once simultaneously with the locking of all the doors.
  (2) When the UNLOCK switch is pressed once, check that the lamps flash twice simultaneously with the unlocking of the driver side door.
  (3) When the UNLOCK switch is pressed again within 3 seconds, check that the lamps flash twice simultaneously with the unlocking of all the doors.

(j) Check the illuminated entry function.
  (1) When all the doors are locked, pressing the UNLOCK switch causes the room lamp (when the lamp switch is in the DOOR position) to illuminate simultaneously with the unlock operation.
  (2) Check that the room lamp turns off in approximately 15 seconds if doors have not been opened.



3. CHECK DOOR CONTROL RECEIVER

(a) Disconnect the D2 receiver connector.

(b) Measure the voltage and resistance between the terminals of the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
D2–5 (+5) – Body ground	4.6 to 5.4 V
D2–1 – Body ground	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the D2 receiver connector.

(d) Measure the voltage between the terminal and body ground.

Standard:

Tester Connection	Condition	Specified Condition
D2–4 (RDA) – Body ground	No key in key slot, all doors closed and each transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → Below 1 V

If the result is not as specified, the receiver may have a malfunction.

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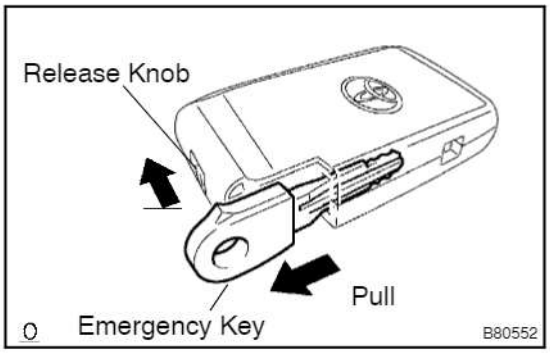
05IC2-01

REPLACEMENT

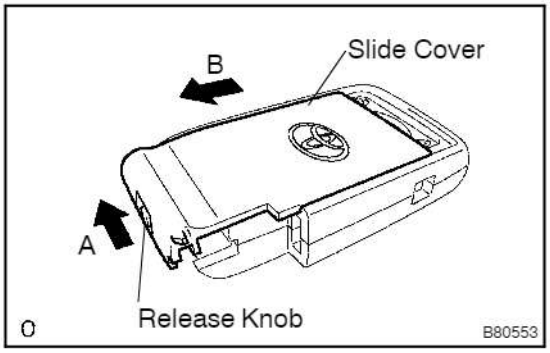
1. REMOVE TRANSMITTER BATTERY

NOTICE:

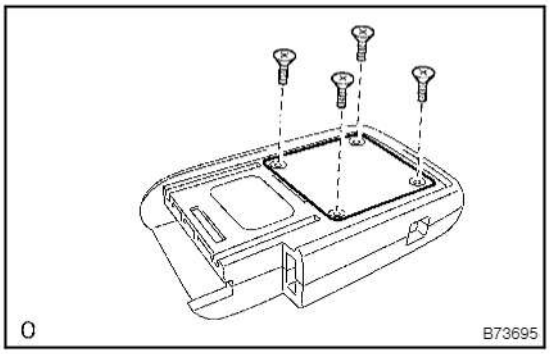
Take extra care when handling these precision electronic components.



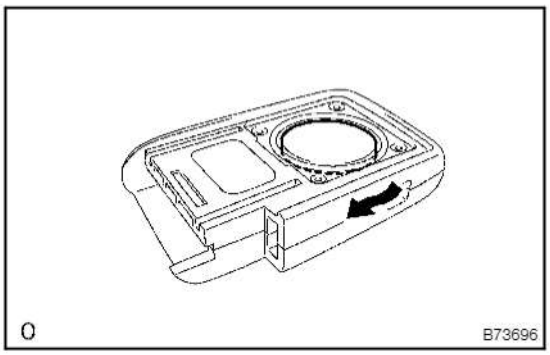
(a) Push and hold the release knob in the direction indicated by the arrow in the illustration. Take the emergency key out of the key.



(b) Push and hold the release knob in the direction indicated by the arrow labeled A in the illustration. Push out the slide cover in the direction indicated by the arrow labeled B in the illustration and remove the slide cover.



(c) Remove the 4 screws and cover using a screwdriver, as shown in the illustration.

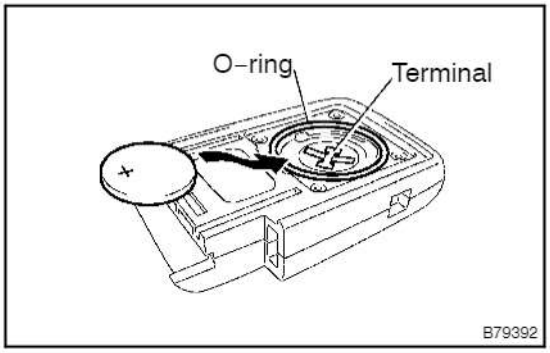


(d) Remove the transmitter's battery from the key , as shown in the illustration.

NOTICE:

- **Do not push the terminals with your finger.**
- **Do not forcibly pry up the battery (lithium battery). The terminals may become damaged.**
- **Do not touch the battery with wet hands. Water may cause rust.**
- **Do not touch or move any components inside the transmitter, as it may cease to work.**

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2. INSTALL TRANSMITTER BATTERY

(a) Install a new battery (lithium battery) with the positive (+) side up, as shown in the illustration.

NOTICE:

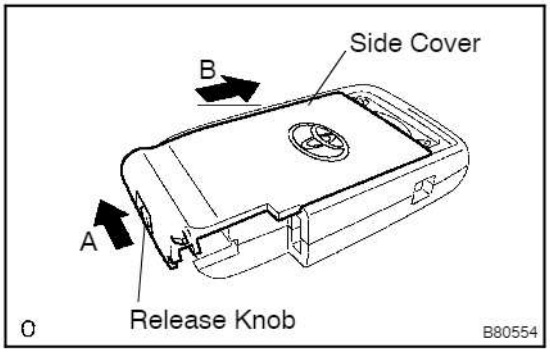
- **Be sure that the positive side and the negative side of the transmitter battery are matched up correctly.**
- **Be careful not to bend the transmitter battery electrode during insertion.**
- **Keep the transmitter case interior free of dust and oil.**

(b) Check that the O–ring is not distorted or slipped off, and install the cover.

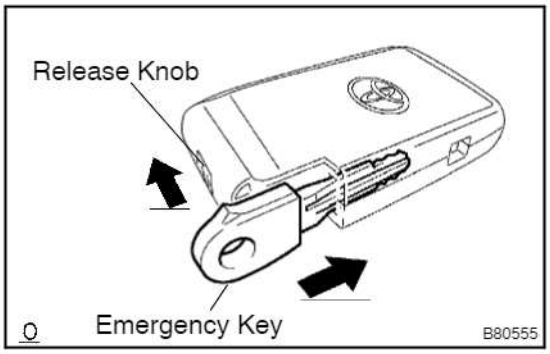
(c) Using a screwdriver, tighten the 4 screws.

NOTICE:

Incomplete installation of the cover will cause defective contact between the battery (lithium battery) and terminal.



(d) Push and hold the release knob in the direction indicated by the arrow labeled A in the illustration. Push in the slide cover in the direction indicated by the arrow labeled B in the illustration and install the slide cover.



(e) Push and hold the release knob in the direction indicated by the arrow in the illustration. Insert the emergency key into the key.

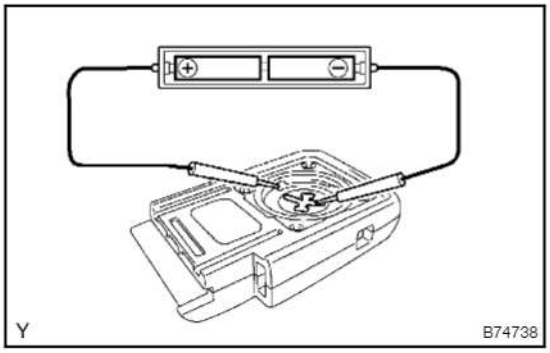
HINT:

After installation, press any of the transmitter's switches. Check that the LED illuminates.

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05IC4-01

INSPECTION



1. INSPECT DOOR CONTROL TRANSMITTER

(a) Inspect operation of the transmitter.

(1) Remove the battery (lithium battery) from the transmitter (see page 05–1981).

(2) Install a new or non–depleted battery (lithium battery).

HINT:

When a new or non–depleted transmitter battery is not available, connect 2 new 1.5 V batteries in series. Then connect lead to the batteries and use the leads to apply 3 V voltage to the transmitter, as shown in the illustration.

(3) From outside the vehicle, approximately 1 m (3.28 ft) from the driver side outside door handle, test the transmitter by pointing its keyplate at the vehicle and pressing a transmitter switch.

Standard:

The door lock can be operated via the transmitter.

HINT:

- The operating range differs depending on the user, the way the transmitter is held and the location.
- Since the transmitter uses weak electric waves, the operating range might be shortened if noise or strong electric waves occur in the area where the transmitter is used. Or, the transmitter may not function.

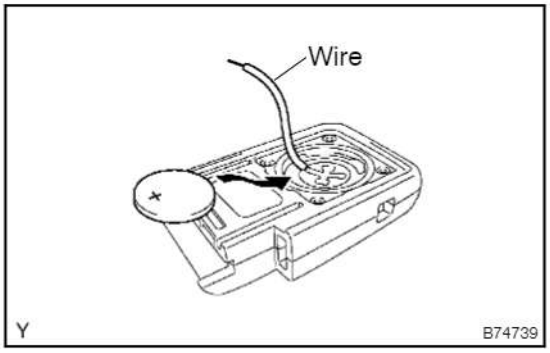
(4) Install the battery (lithium battery).

(b) Inspect the battery capacity.

HINT:

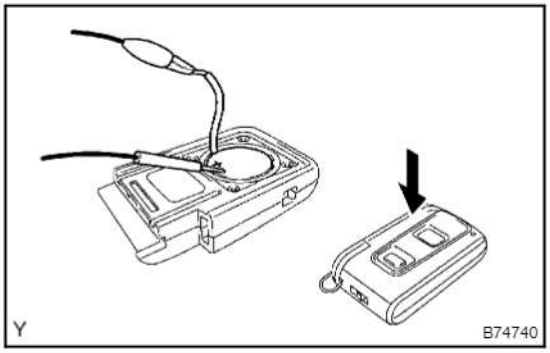
- When checking the amount of energy left in the battery (lithium battery), the battery must be checked while it is installed in the transmitter (a resistance of 1.2 kΩ is applied to the battery). When the battery energy is checked by itself (uninstalled), the voltage reading will be more than 2.5 V until the energy is depleted.
- If the transmitter is malfunctioning, the voltage reading of the energy left in the battery may be inaccurate.

(1) Remove the battery (lithium battery) from the transmitter (see page 05–1981).



(2) Connect a wire to the negative (–) terminal of the transmitter and install the battery.

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(3) Connect the tester's positive (+) lead to the (+) battery (lithium battery) and the negative (–) lead to the wire respectively.
(4) Press one of the transmitter switches for approximately 1 second.
(5) Press the transmitter switch again to check the voltage.

Standard: 2.2 V or higher

HINT:

- When the temperature of the battery is low, the inspection cannot be made correctly.
  When the outcome of the test is less than 2.2 V, conduct the test again after leaving the battery in a place with a temperature 18°C (64°F) for more than 30 minutes.
- Read the voltage immediately after the switch is pressed.
  When 0.8 seconds have passed after the switch is pressed, the automatic power–off function starts and resistance applied to the battery will cease. The voltage of the battery will be 2.5 V or more.
- Press the switch at least 3 times before reading the voltage.
  If the battery has just been returned to 18°C (64°F), the voltage may be unusually high for the first or second voltage reading.

(6) Disconnect the lead.
(7) Set the battery (lithium battery) in the transmitter.

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WIRELESS DOOR LOCK CONTROL SYSTEM (W/O SMART ENTRY SYSTEM)

05ICT-01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICE FOR HYBRID SYSTEM ACTIVATION:

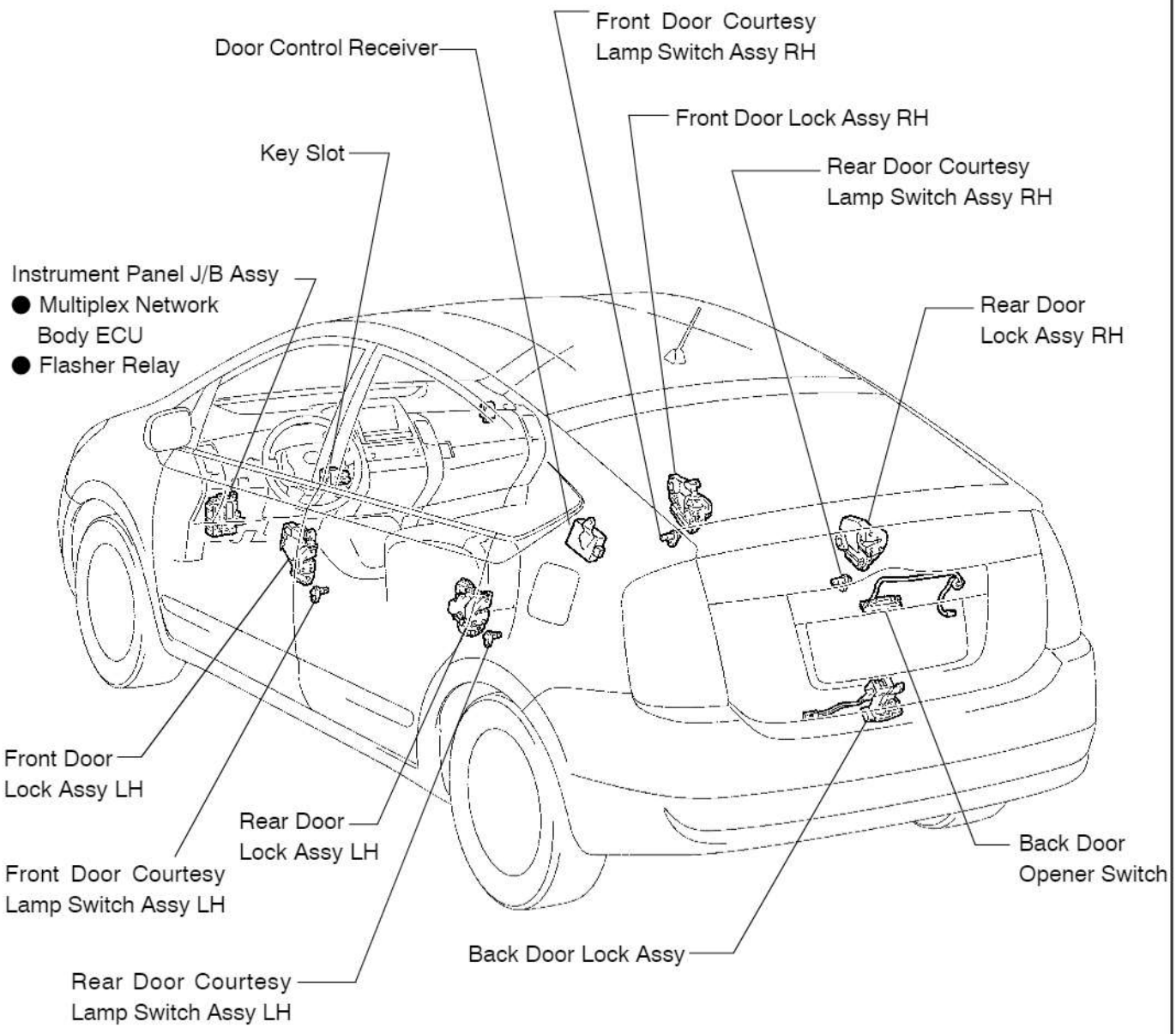
When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

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05ICU–01

LOCATION

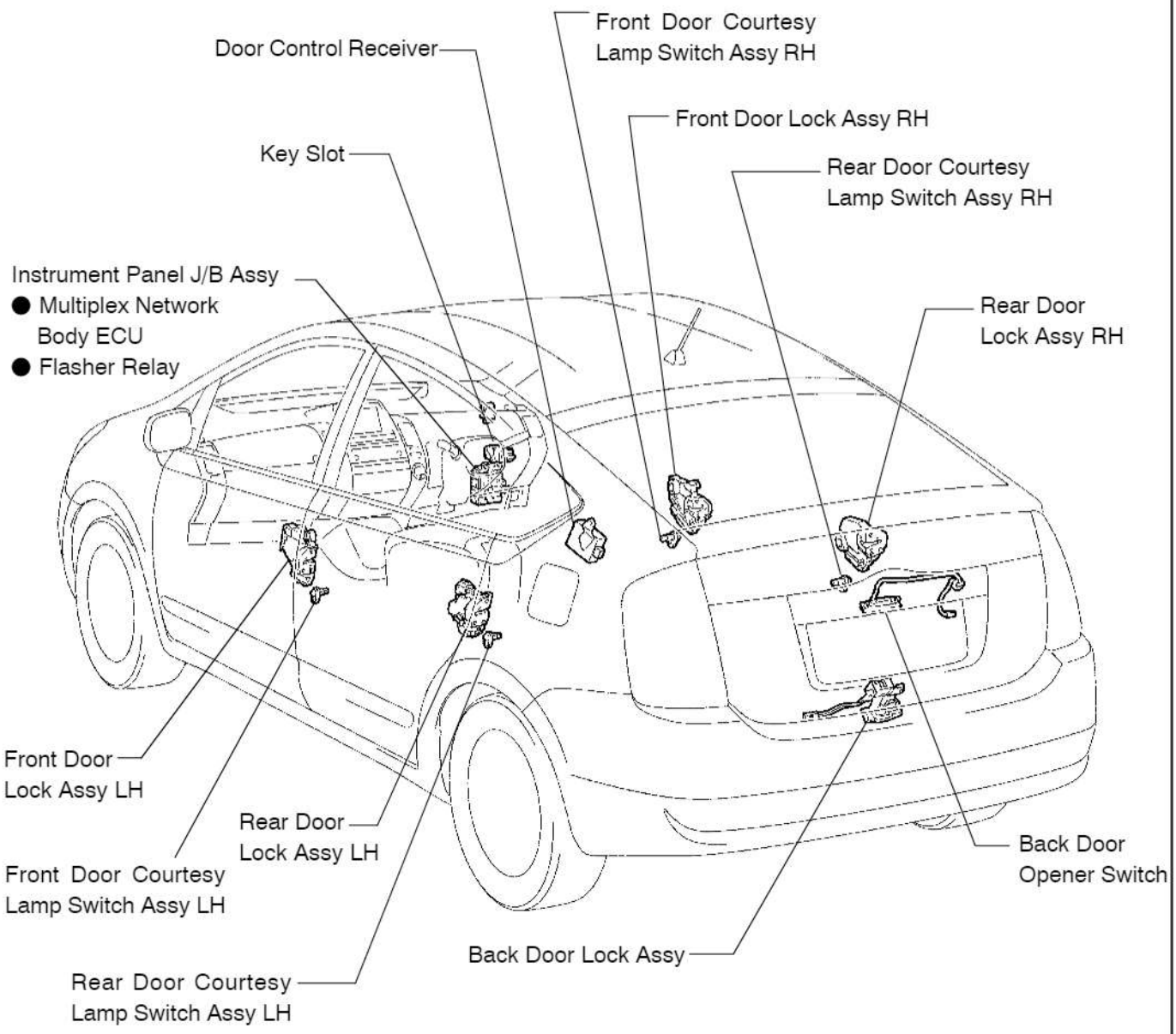
LHD Models



P B74743

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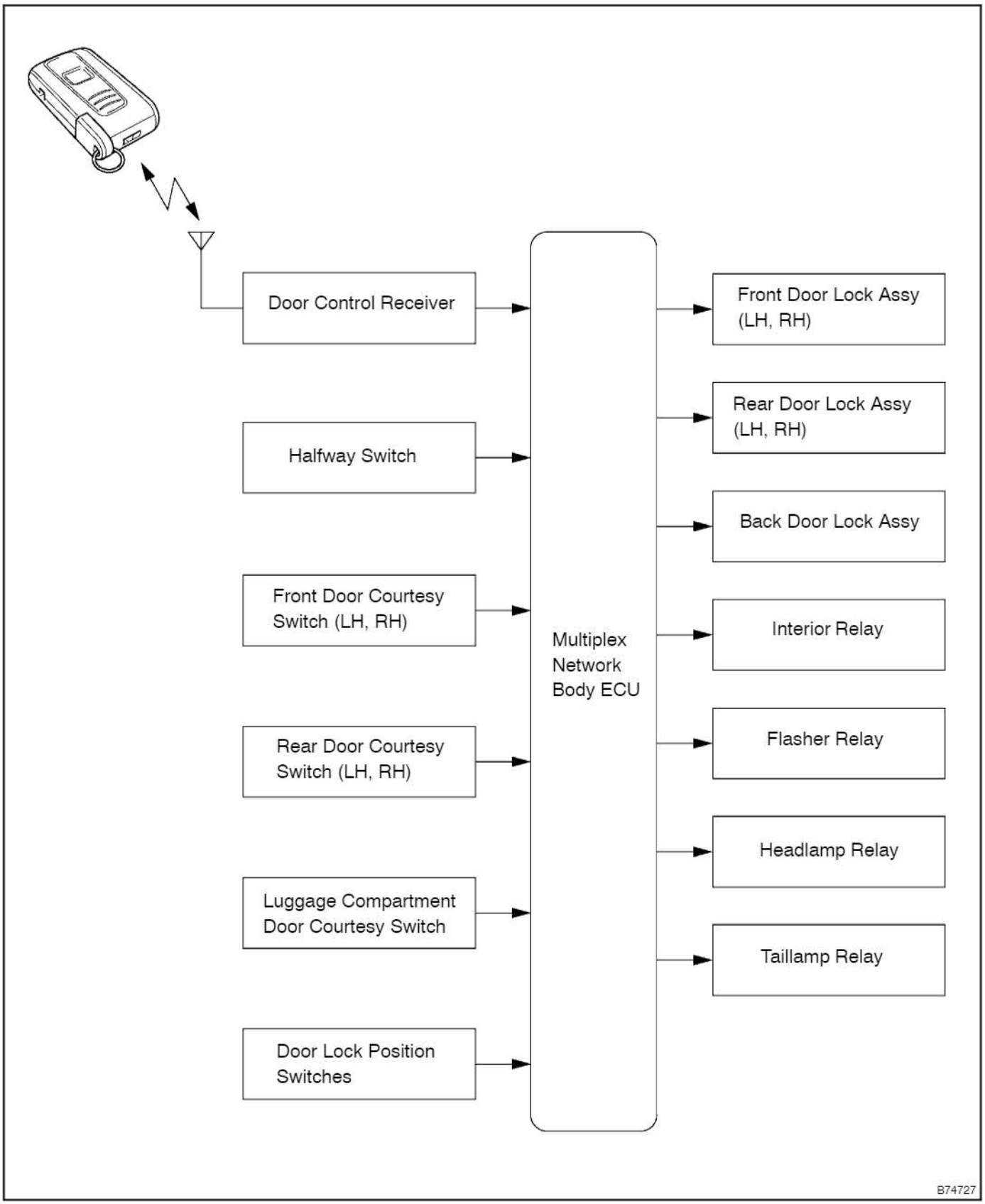
RHD Models



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05ICV-01

SYSTEM DIAGRAM



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05ICW–01

SYSTEM DESCRIPTION

1. WIRELESS DOOR CONTROL SYSTEM DESCRIPTION

(a) This system is a convenient system for locking and unlocking all the doors from a distance. The wireless control system has the following features:

- The door control receiver performs the code identification process and the multiples network body ECU operates the door lock control. A serial data link is provided for communication between the door control receiver and multiplex network body ECU.
- A key–integrated type transmitter is used and it contains the following 2 switches: the door lock switch and door unlock switch.
- An LED (Light Emitting Diode) is mounted on the transmitter to show if the battery is depleted.

2. FUNCTION OF MAIN COMPONENTS

Components	Functions
Door control transmitter	• Contains LOCK and UNLOCK switches. • Transmits weak electric waves (recognition codes and function codes) to door control receiver. • Illuminates indicator lamp (LED) during transmission.
Door control receiver	Receives weak electric waves (recognition codes and function codes) and outputs them as code data to multiplex network body ECU.
Halfway switch (inside key slot)	Detects if key slot has key inserted or not.
Front door courtesy lamp switch assy Rear door courtesy lamp switch assy Luggage compartment door courtesy lamp switch assy	Turns on when door is open and off when door is closed. Outputs door status (open or closed) to multiplex network body ECU.
Door lock position switch	Transmits door lock positions of each door to multiplex network body ECU.

3. SYSTEM FUNCTION

(a) Door lock/unlock function:

With no key in the key slot (key switch is off) and all door courtesy lamp switches off, pressing the door control transmitter's LOCK/UNLOCK switch causes the transmitter to output weak electric waves which are then input to the door control receiver. The door control receiver reforms these waves into code data in its internal high frequency circuit and outputs to the code data (recognition codes and function codes) and outputs its judgment results to the multiplex network body ECU. Upon receiving a door lock/unlock request signal, the multiplex network body ECU outputs a door lock/unlock control signal to each door lock assy. Each door lock assy then locks/unlocks its door and turns on/off its door lock position switch according to the signal.

(b) Answer–back function:

The multiplex network body ECU receives the door unlock detection switch's on/off signals and uses these signals to confirm if door control operation has completed. The multiplex network body ECU then outputs hazard warning lamp's output the control signals to flash the hazard warning lamp as an answer–back.

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(c) The wireless door lock control system has the following functions.

Function	Outline
All door unlock operation	Pressing LOCK switch locks all doors.
Answer–back operation	Hazard lamps flash once when doors are locked,and flashes twice when doors are unlocked to inform that operation has been completed.
Automatic lock function	If none of doors are opened within 30 seconds after they are unlocked by wireless door lock remote control, all doors will lock again automatically.
Repeat function	If door is not locked in response to locking operation of transmitter, multiplex network body ECU will output a lock signal after 1 second.
Illuminated entry function	With all doors locked, pressing door unlock switch causes room lamp to illuminate simultaneously with unlocking operation.
Security function	Sends signal as rolling code.
Transmitter recognition code registration function	Enables 4 modes for registering (writing and storing) transmitter recognition codes in EERPOM, which is built into multiplex network body ECU.
Self–diagnosis	If system has malfunction, multiplex network body ECU sets DTC in its memory.

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05ICY–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the wireless door lock control system.
- The intelligent tester II should be used in steps 3, 4 and 6.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–1993)

3	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication stop, communication line malfunctioning)
  Without code outputs, proceed to A.
  (2) (ECU unconnected, communication stop, communication line malfunctioning)
  With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SECTION (See page 05–2261)

A

4	CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B	Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05–2001)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 7

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–2006)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(b) Terminals of ECU (see page 05–2002)
(c) On–vehicle inspection (see page 05–2020)

7	ADJUST, REPAIR OR REPLACEMENT

8	CONFIRMATION TEST

END

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05IDO–01

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**VIN**	
		Production Date	/ /
		License Plate 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. °C (°F))
	Place	☐ Everywhere ☐ Specific Locality ( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptoms	☐ Entire wireless door lock control system does not operate.
	☐ Only door unlock function does not operate.
	☐ Only door lock function does not operate.
	☐ Doors can be locked by wireless door lock operation even though door(s) are open.
	☐ Wireless door lock functions abnormally.
	☐ Other
DTC No.	☐ B1242

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05ID2-01

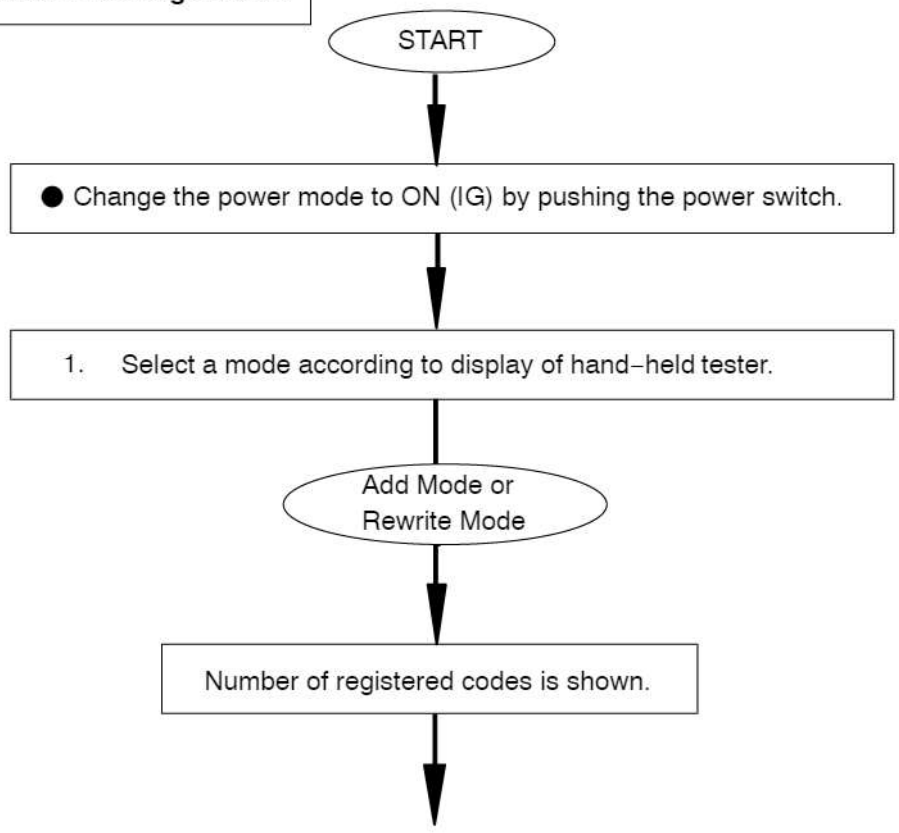
REGISTRATION

HINT:

- Register a recognition code to the multiplex network body ECU when the door control transmitter or the door control receiver.
- The add mode is used to register new recognition codes while still retaining codes already registered. This mode is used when a new transmitter is added. If the number of registered codes exceeds 4, the previously registered codes will be erased in order, starting from the first registered code.
- The rewrite mode is used to erase all the previously registered recognition codes in order to register new recognition codes. This mode is used when the transmitter or the door control receiver is exchanged for a new one.
- The confirmation mode is used to confirm how many recognition codes have already been registered before an additional registration of a recognition codes.
- The prohibition mode is used to erase all the registered codes and disables the wireless door lock function. This mode is used when the transmitter is lost.
- All of the following registration procedures must be performed in order continuously.

1. REGISTER RECOGNITION CODE

Flow Chart of Recognition Code Registration



Continued on next page

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Continued from previous page

2. Press LOCK and UNLOCK switch on transmitter simultaneously.

Within 3 seconds

3. Press either switch.

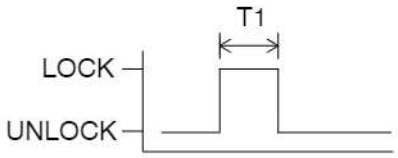
Within 30 seconds

Response to registration completion:

Body ECU automatically performs power door LOCK–UNLOCK operation to show which mode has been selected.

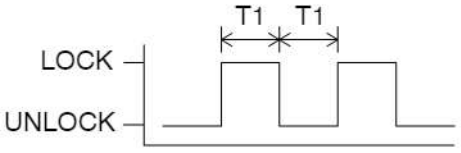
LOCK–UNLOCK Occurs Once

Registration of recognition code has been completed.



LOCK–UNLOCK Occurs Twice

Registration of recognition code has failed.



T1: Approx. 1 second

HINT:
If LOCK–UNLOCK operation is performed twice, registration of recognition code has failed. Perform registration procedures by beginning once again.

Within 40 seconds

If other transmitter is to be registered.
HINT:
4 recognition codes can be registered at once.

Proceed to flow chart to finish registration.

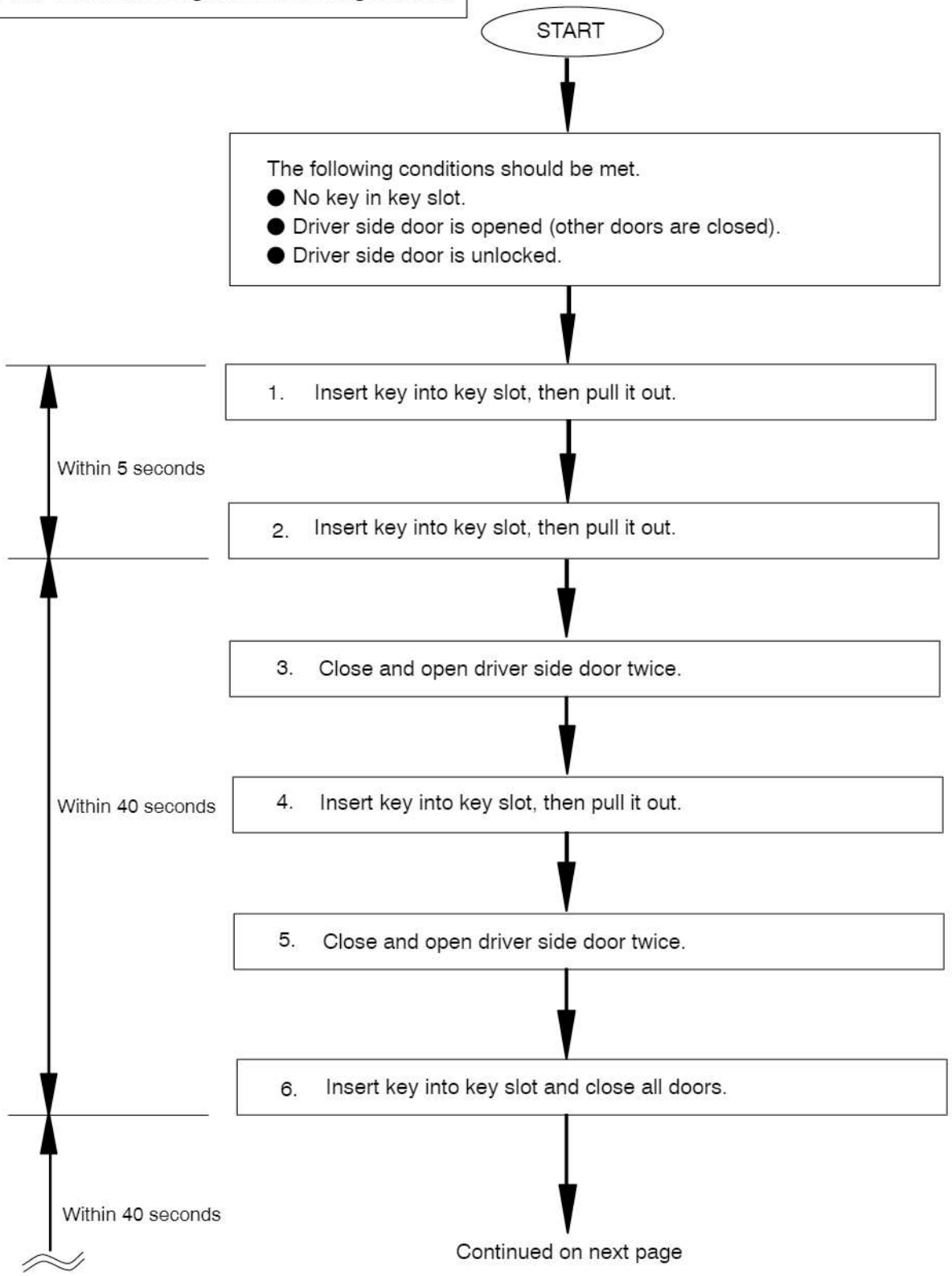
Perform either of the following.
- Use hand–held tester to order completion.
- Disconnect hand–held tester.

Registration of recognition codes (add mode and rewrite mode) is completed.

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2. REGISTER RECOGNITION CODE

Flow Chart of Recognition Code Registration



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Continued from previous page

Mode Selection:

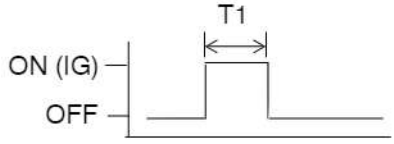
7. Change the power switch's power mode between ON (IG) and OFF repeatedly once within 1 seconds by pushing the power switch.

Number of ON (IG)–OFF operations of power switch:

Add Mode

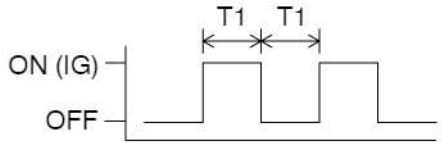
ON (IG)–OFF operation: 1 time

T1: Approx. 1 second



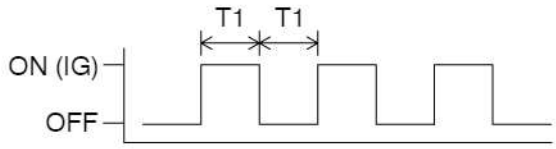
Rewrite Mode

ON (IG)–OFF operation: 2 times



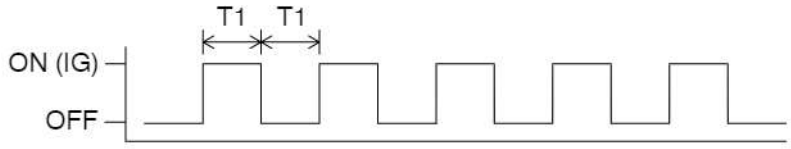
Confirmation Mode

ON (IG)–OFF operation: 3 times



Prohibition Mode

ON (IG)–OFF operation: 5 times



If the number of the ON (IG)–OFF operations of changing the power switch's power mode is 0, 4 or 6 or more, there will be no response (power door lock and unlock operation) to show which mode has been selected.

Within 40 seconds

8. Remove key from key slot.

Within 5 seconds

Continued on next page

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Within 5 seconds

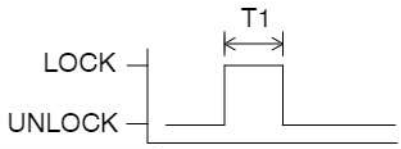
Response to selected mode (Power door lock operation):

Body ECU automatically performs power door LOCK–UNLOCK operation to inform which mode has been selected.

Add Mode

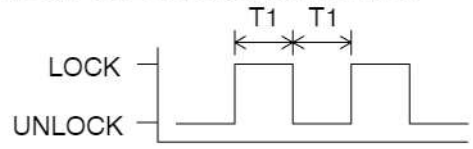
LOCK–UNLOCK operation: 1 time

T1: Approx. 1 second
T2: Approx. 2 seconds



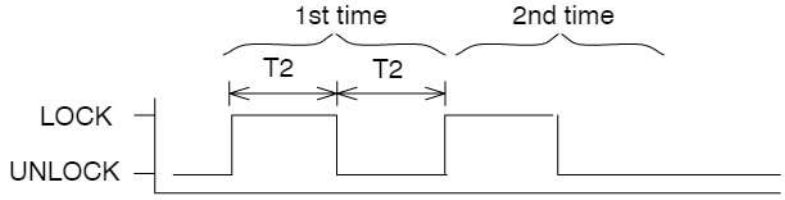
Rewrite Mode

LOCK–UNLOCK operation: 2 times



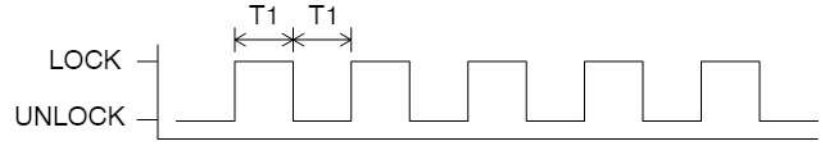
Confirmation Mode

LOCK–UNLOCK operation: The number of registered codes (1 to 5 times)



Prohibition Mode

LOCK–UNLOCK operation: 5 times



HINT:

- In confirmation mode, when LOCK/UNLOCK operation is performed twice, the number of registered recognition codes is 2.
- In confirmation mode, when 0 codes are registered, LOCK/UNLOCK operation is automatically performed 5 times.

Within 40 seconds

Add Mode or Rewrite Mode

Continued on next page

Confirmation Mode and Prohibition Mode

Registration procedures are completed.

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Continued from previous page

Within 40 seconds

9. Press LOCK and UNLOCK switch on transmitter simultaneously.

Within 3 seconds

10. Press a single switch (LOCK or UNLOCK).

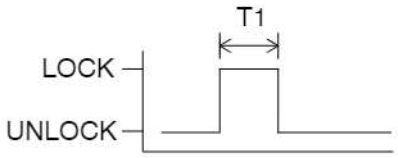
Within 5 seconds

Response to registration completion:

Body ECU automatically performs power door LOCK–UNLOCK operation to show whether registration has been completed correctly or not.

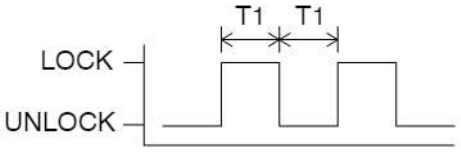
LOCK–UNLOCK Occurs Once

Registration of recognition code has been completed.



LOCK–UNLOCK Occurs Twice

Registration of recognition code has failed.



T1: Approx. 1 second

HINT:
If LOCK–UNLOCK operation is performed twice, registration of recognition code has failed. Perform registration procedures by beginning once again.

Within 40 seconds

If other transmitter is to be registered.

HINT:
4 recognition codes can be registered at once.

Proceed to flow chart to finish registration.

Perform either of the following.
- Open a door.
- Insert key into key slot.

Registration of recognition codes (add mode and rewrite mode) is completed.

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05ID4–01

CUSTOMIZE PARAMETERS

HINT:

The following item can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK:

Display (item)	Default	Contents	Setting
Open Door Warn (Open door warning)	ON	If door is not completely closed and transmitter LOCK switch is pressed, this function makes buzzer sound for 10 seconds.	ON/OFF
Wireless Oper (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF.	ON/OFF
Auto Lock Delay (Auto lock time)	30s	This function controls amount of time from unlocking doors to automatic re–locking function.	30s/60s
Hazard Ans Back (Hazard answer–back of wireless)	ON	When lock switch on transmitter is pressed, this function illuminates all hazard warning lamps once. When unlock switch is pressed, all hazard warning lamps illuminate twice.	ON/OFF

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05ID6-01

PROBLEM SYMPTOMS TABLE

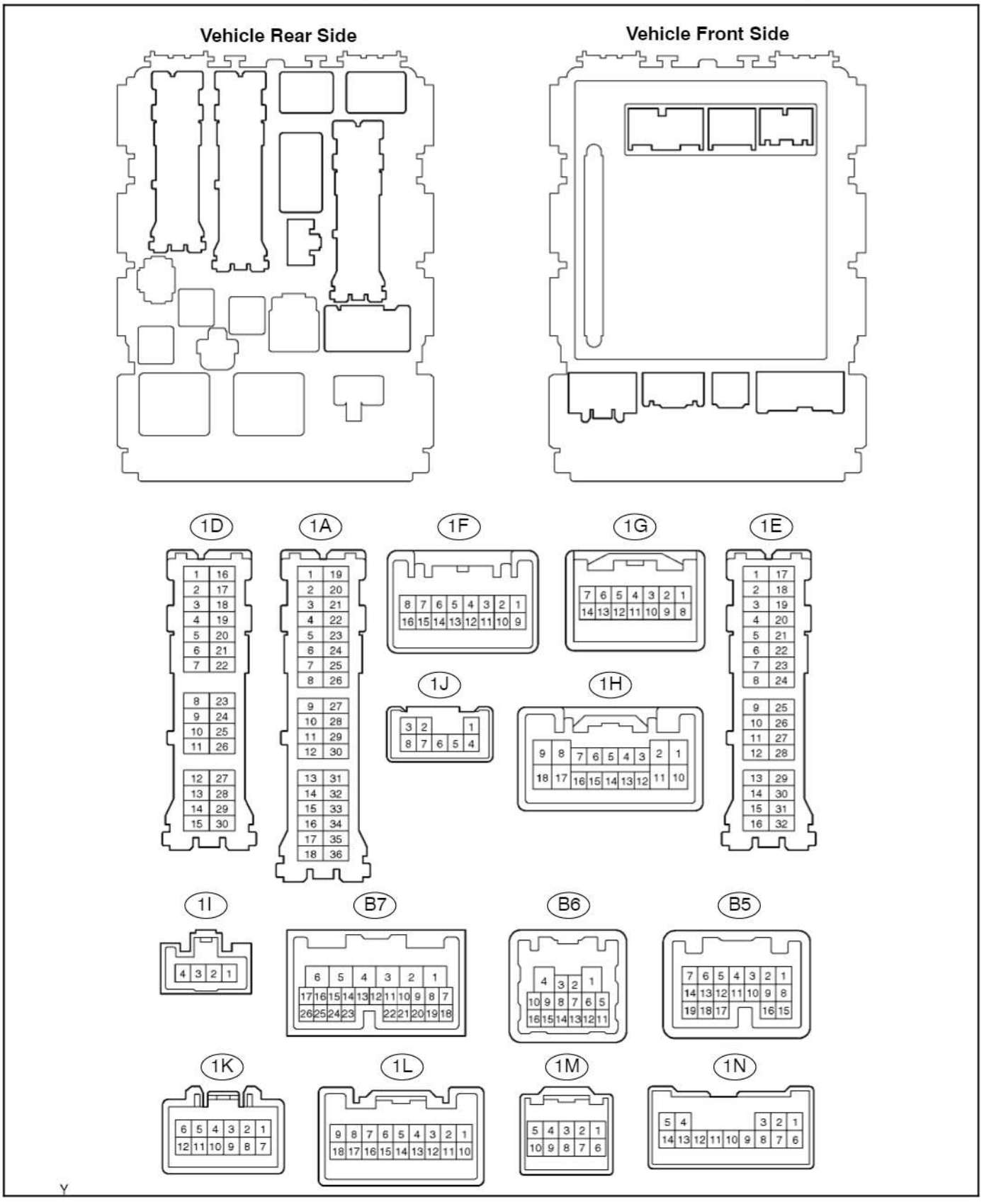
Problem Symptom	Suspected Area	See Page
Only wireless control function is inoperative	1. Transmitter battery 2. Door control transmitter 3. Door control receiver 4. Key slot 5. Wire harness 6. Multiplex network body ECU 7. Instrument panel J/B assy 8. Wireless door lock buzzer 9. Lighting system	05–2010
No answer–back (hazard warning lamp)	1. Lighting system 2. Wire harness 3. Multiplex network body ECU	05–2018

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05ID8–01

TERMINALS OF ECU

1. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



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(a) Disconnect the 1A, 1D, 1E, 1J and 1L J/B connectors.

(b) Measure the resistance and voltage between each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SIG (1L–7) – Body ground	B*1 – Body ground P*2 – Body ground	Ignition power supply	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V
ACC (1J–5) – Body ground	G – Body ground	Ignition power supply	Power switch's power mode OFF → ON (ACC)	0 V → 10 to 14 V
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
DCTY (1D–24) – Body ground	V – Body ground	Driver side door courtesy switch input	Driver side door closed → Open	10 kΩ or higher → Below 1 Ω
PCTY (1D–24) – Body ground	BR – Body ground	Passenger side door courtesy switch input	Passenger side door closed → Open	10 kΩ or higher → Below 1 Ω
BCTY (1D–7) – Body ground	R – Body ground	Back door courtesy switch input	Back door closed → Open	10 kΩ or higher → Below 1 Ω
GND (1E–17) – Body ground	W–B – Body ground	Ground	Ground	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.

*1: LHD *2: RHD

(c) Reconnect the 1A, 1B, 1D, 1E and 1J J/B connectors.

(d) Measure the resistance and voltage between each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
HAZ (1L–17) – Body ground	Y – Body ground	Hazard lamp drive	Answer–back OFF → ON	10 to 14 V → Pulse generation
RDA (B7–23) – Body ground	W – Body ground	Door control receiver input	Power switch's power mode OFF, all doors closed and transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → Below 1 Ω

If the result is not as specified, the J/B assy (body ECU) may have a malfunction.

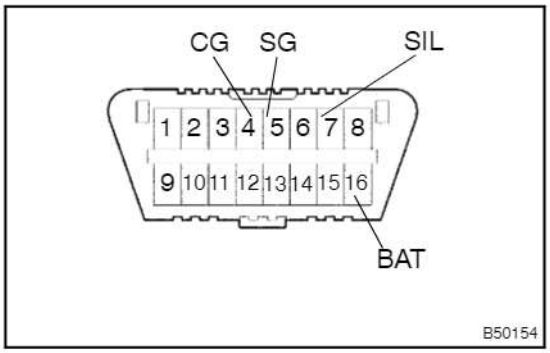
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05IDA–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Wireless door lock control system data and the Diagnosis Trouble Codes (DTCs) can be read in the Data Link Connector 3 (DLC3) of the vehicle . When the system seems to be malfunctioning, use the intelligent tester II to check for malfunctions and perform repairs.

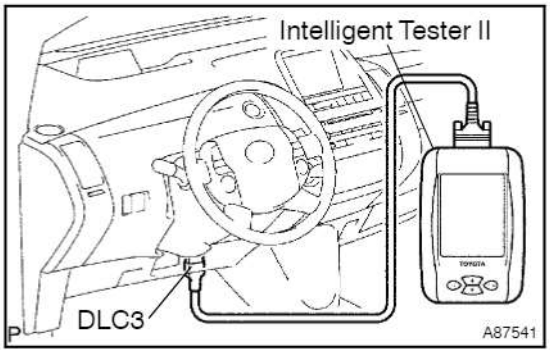


2. CHECK DLC3

The vehicle uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Constant
SG	5	Signal ground	Body ground	1 Ω or less	Constant
BAT	16	Battery positive	Body ground	9 to 14 V	Constant

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



HINT:

Connect the cable of the intelligent tester II to the DLC3, change the power switch's power mode to ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem may be on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. CHECK BATTERY VOLTAGE

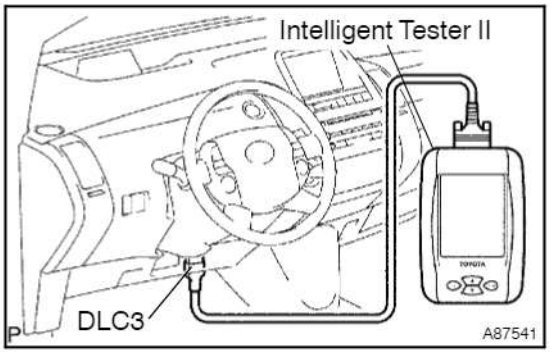
Standard: 11 to 14 V

If the voltage is below 11 V, replace the battery before proceeding.

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05IDC-01

DTC CHECK/CLEAR



1. CHECK DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

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05IDE-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DATA LIST according to the display on the tester.

Multiplex network body ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
D Dor Cty SW	Driver side door courtesy switch signal/ON or OFF	ON: Driver side door is open. OFF: Driver side door is open.	–
P Dor Cty SW	Passenger side door courtesy switch signal/ON or OFF	ON: Passenger side door is open. OFF: Passenger side door is open.	–
Rr Dor Cty SW	Rear door courtesy switch signal/ ON or OFF	ON: Either right or left door is open. OFF: Both right and left doors are closed.	–
D Lock Pos SW	Driver side door lock position switch signal/ON or OFF	ON: Driver side door lock is in unlock position. OFF: Driver side door lock is in lock position.	–
P Lock Pos SW	Passenger side door lock position switch signal/ON or OFF	ON: Passenger side door lock is in unlock position. OFF: Passenger side door lock is in lock position.	–
Rr Lock Pos SW	Rear door lock position switch signal/ON or OFF	ON: Rear door lock is in unlock position. OFF:: Rear door lock is in lock position.	–
Regist ID Code	Number of registered ID / Min. 0, Max. 4	Number of registered ID code.	–

Transponder key ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Key Unlk Wrn SW	Halfway switch signal/ON or OFF	ON: Key is in key slot. OFF: No key is in key slot.	–

2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator, and other times to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU:

Item	Normal Condition	Diagnostic Note
Hazard	Turns turn signal flasher relay ON/OFF	–
Trunk/Bdor Open	Operate back door motor ON/OFF	–
Door Lock	Operate door lock motor for all doors OFF/LOCK/UNLOCK	All doors are closed

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05IDG-01

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See Page)	Detection Item	Trouble Area
B1242 (05–2008)	Wireless Door Lock Tuner Circuit Malfunction	• Wire harness • Door control receiver • Multiplex network body ECU

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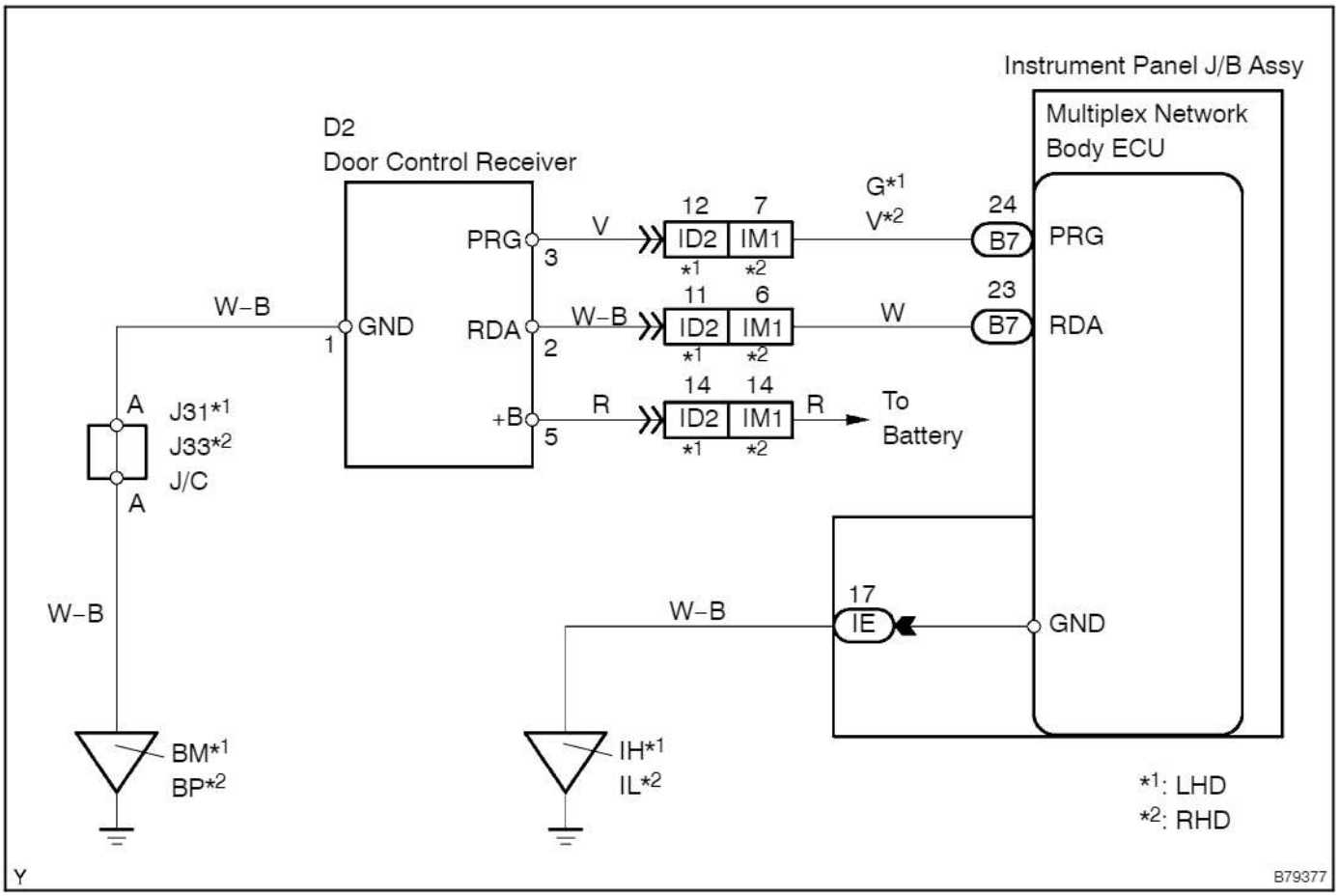
DTC	B1242	WIRELESS DOOR LOCK TUNER CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is detected when a RDA signal is not input to the door control receiver within 1 second after the multiplex network body ECU outputs a PRG signal.

DTC No.	DTC Detection Condition	Trouble Area
B1242	Within 1 second after PRG signal is output from multiplex network body ECU during self–diagnostic mode, corresponding RDA signal is not input.	• Door control receiver • Wire harness • Multiplex network body ECU

WIRING DIAGRAM



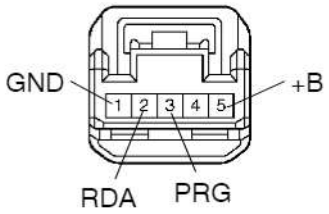
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INSPECTION PROCEDURE

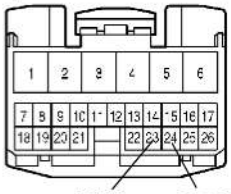
1	CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – MULTIPLEX NETWORK BODY ECU) (DOOR CONTROL RECEIVER OR MULTIPLEX NETWORK BODY ECU – BODY GROUND)

Wire Harness Side

D2
Door Control Receiver



B7
Multiplex Network Body ECU



B74735

(a) Disconnect the B7 ECU connector.
(b) Disconnect the D2 receiver connector.
(c) Measure the voltage and resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
D2–2 (RDA) – B7–24 (RDA)	Below 1 Ω
D2–3 (PRG) – B7–23 (PRG)	Below 1 Ω
D2–5 (+B) – Body ground	10 to 14 V
D2–1 (GND) – Body ground	Below 1 Ω
D2–2 (RDA) or B7–23 (RDA) – Body ground	10 kΩ or higher
D2–3 (PRG) or B7–24 (PRG) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

2	REPLACE DOOR CONTROL RECEIVER

(a) Check that no DTC is DTC is output.
OK: DTC is not output.

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

END

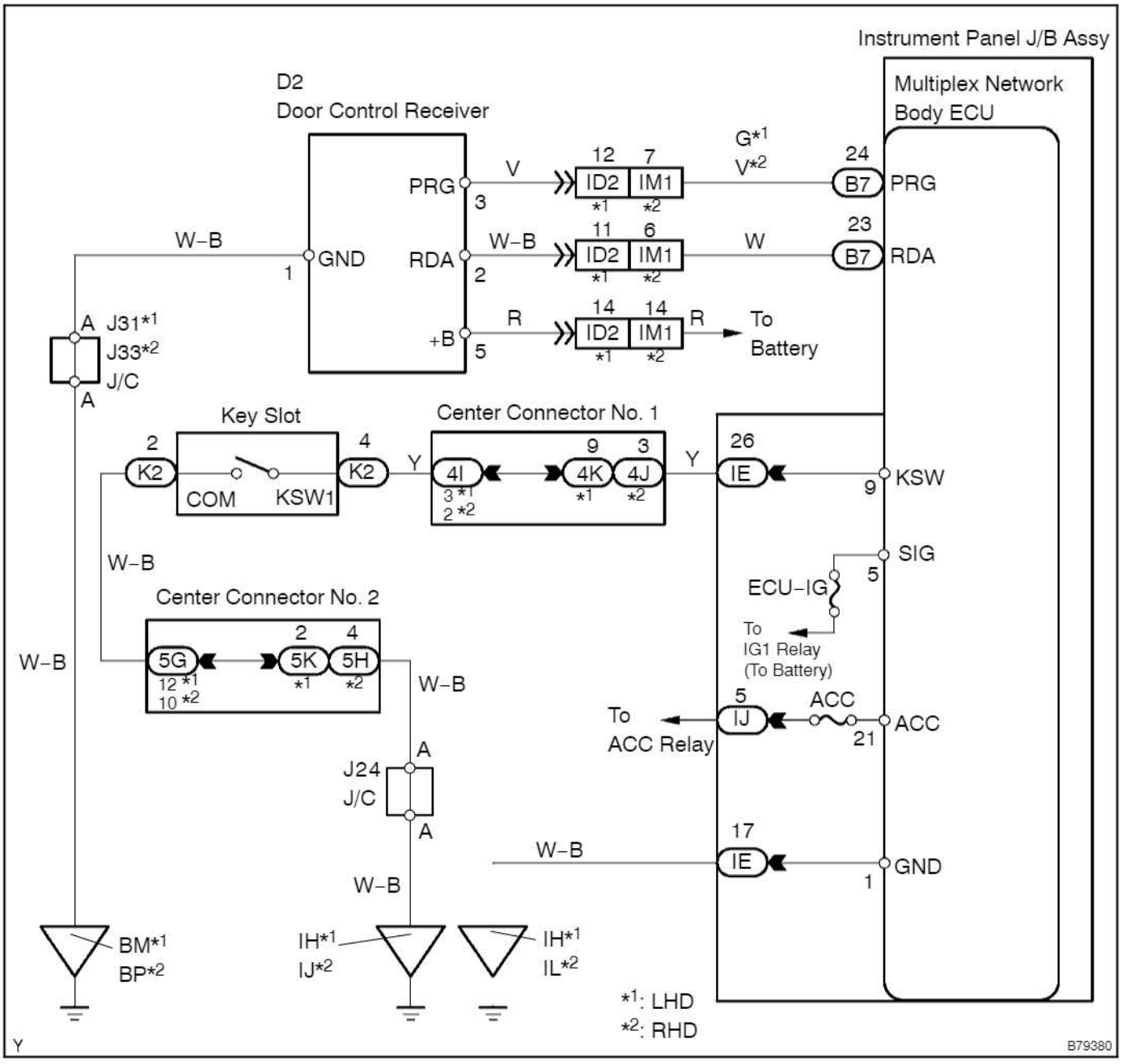
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ONLY WIRELESS CONTROL FUNCTION IS INOPERATIVE

CIRCUIT DESCRIPTION

The door control receiver receives signals from the transmitter and sends these signals to the multiplex network body ECU. The multiplex network body ECU then controls all doors by sending LOCK/UNLOCK signals to each door lock actuator.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS (See page 05–2020)

NG → Go to step 2

OK

NORMAL

2	CHECK THAT TRANSMITTER LED LIGHTS UP

(a) Check that the transmitter LED lights up 3 times when the switch is pressed 3 times.
OK: Transmitter LED lights up 3 times when the switch is pressed 3 times.

NG → Go to step 4

OK

3	CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS (STANDARD OPERATION)

(a) Check standard UNLOCK/LOCK switch operation.

NOTICE:

Standardized test procedure: press the transmitter switch for 1 second, directing the beam to the driver side door outside handle from a distance of 1 m (39.4 in.). The transmitter should be pointed directly at the handle, i.e. at a 90° angle to the vehicle body.

NG → Go to step 5

OK

REPLACE DOOR CONTROL TRANSMITTER

4	REPLACE TRANSMITTER BATTERY

(a) After replacing the transmitter battery, check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → REPLACE DOOR CONTROL TRANSMITTER

OK

END

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5	SWITCH TO SELF–DIAGNOSTIC MODE

(a) Switch self–diagnosis mode on the intelligent tester II.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Change the power switch's power mode to ON (IG) by pushing the power switch and push the hand–held test main switch ON.
  (3) Please refer to the intelligent tester II operator's manual for further details.

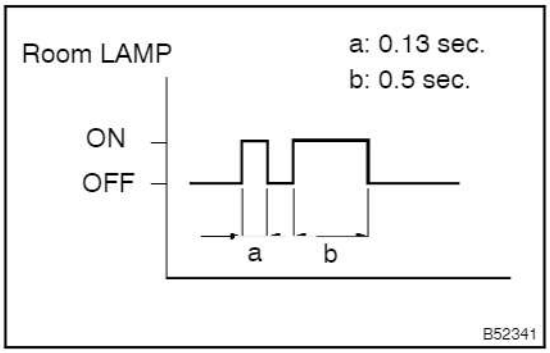
(b) Switch self–diagnosis mode by operating the key slot.
  (1) Put the vehicle under the vehicle's initial condition (see page 05–2020), insert the key into the key slot and remove it.
  (2) Within 5 seconds after the key is removed (step 1), insert the key into the key slot. Then change the power switch's power mode to ON (IG) and OFF by pushing the power switch.
  (3) Within 30 seconds after the power switch's power mode OFF again (step 2), perform the following 9 times: Change the power switch's power mode to ON (IG) and OFF by pushing the power switch.

NOTICE:

If the change to–self–diagnostic mode has failed, the system will return to normal mode.

HINT:

- Changing the power switch's power mode to ON (IG) by pushing the power switch after step 3 has been completed will end self–diagnostic mode.
- Do not lock or unlock doors during the self–diagnostic mode.



(c) Check that the system has switched to self–diagnostic mode by checking the flashes of the room lamp (dome lamp or key slot light) or buzzer outputs. Compare the flash patterns of the room lamp and output patterns of the buzzer to the timing chart on the left.

OK: The flash patterns of the room lamp and output patterns of the buzzer should be the same as that shown in the timing chart on the left.

NG	Go to step 9

OK

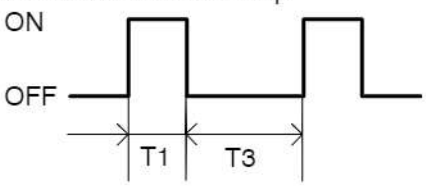
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6 CHECK BY SELF–DIAGNOSTIC MODE

(a) Inspect the diagnosis outputs when the door control transmitter switch is held down. The diagnosis outputs can be checked by the flash patterns of the room lamp and output patterns of the buzzer.

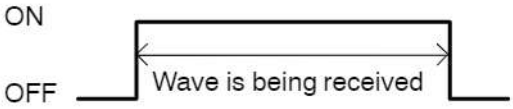
Normal wave of LOCK switch

Flash Pattern of Room Lamp



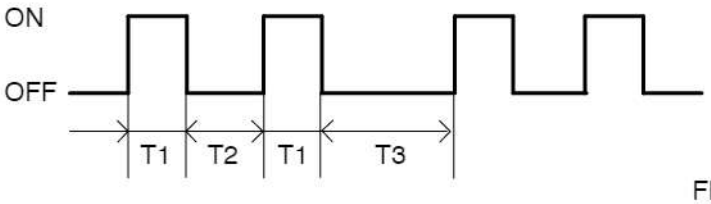
Unmatched recognition code

Flash Pattern of Room Lamp



Normal wave of UNLOCK switch

Flash Pattern of Room Lamp



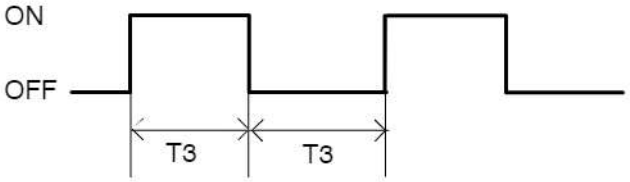
No diagnosis outputs

Flash Pattern of Room Lamp



Normal wave of TRUNK OPEN switch

Flash Pattern of Room Lamp



T1: 0.13 sec.
T2: 0.25 sec.
T3: 0.5 sec.

Result	Proceed to
When unmatched recognition code is output.	A
When normal waves (patterns of room lamp and output patterns of buzzer) for LOCK and UNLOCK switches are output.	B
When no diagnosis outputs are present.	C

B → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY**

C → **Go to step 12**

A

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7	REGISTER RECOGNITION CODE

(a) Check that the system can switch to rewrite mode or add mode, and that a recognition code can be registered.
OK:
System can switch to rewrite mode or add mode, and that a recognition code can be registered.

NG → **Go to step 8**

OK

END

8	REPLACE DOOR CONTROL RECEIVER

(a) After replacing the door control receiver, check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

END

OK

END

9	CONFIRM INPUT METHOD OF SELF–DIAGNOSTIC MODE

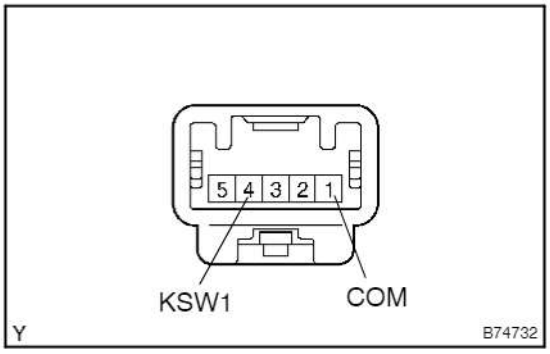
Result	Proceed to
When the method for changing the system self–diagnostic mode works.	A
When the method for changing the system self–diagnostic mode does not works.	B

B → **Go to step 5**

A

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10 INSPECT KEY SLOT



(a) Measure the resistance of the halfway switch.

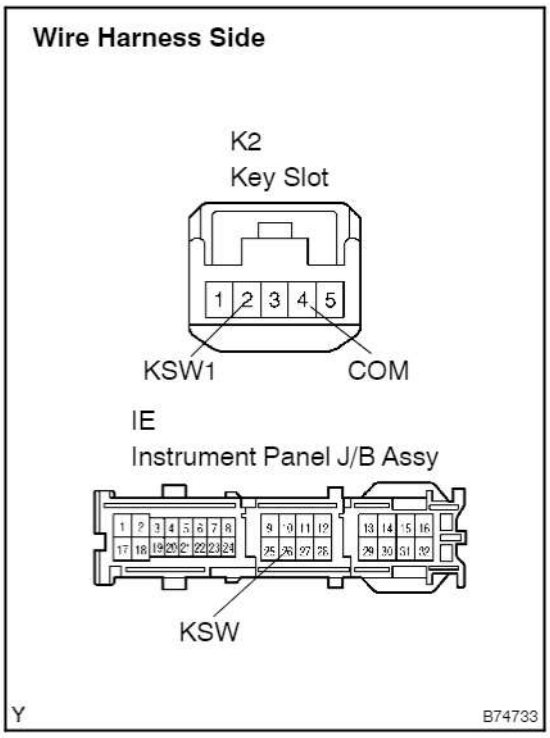
Standard:

Tester Connection	Condition	Specified Condition
K2–4 (KSW1) – K2–2 (COM)	No key is in key slot	10 kΩ or higher
K2–4 (KSW1) – K2–2 (COM)	Key is in key slot	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

11 CHECK WIRE HARNESS (KEY SLOT – INSTRUMENT PANEL JUNCTION BLOCK ASSY AND BODY GROUND)



(a) Disconnect the K2 slot connector.

(b) Disconnect the IE J/B connector.

(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
K2–4 (KSW1) – IE–26 (KSW)	Below 1 Ω
K2–2 (COM) – Body ground	Below 1 Ω

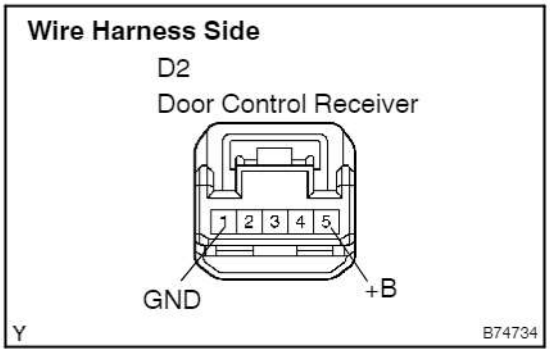
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

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12 CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – BODY GROUND)



(a) Disconnect the D2 receiver connector.
(b) Measure the voltage and resistance between the wire harness side connector and body ground.

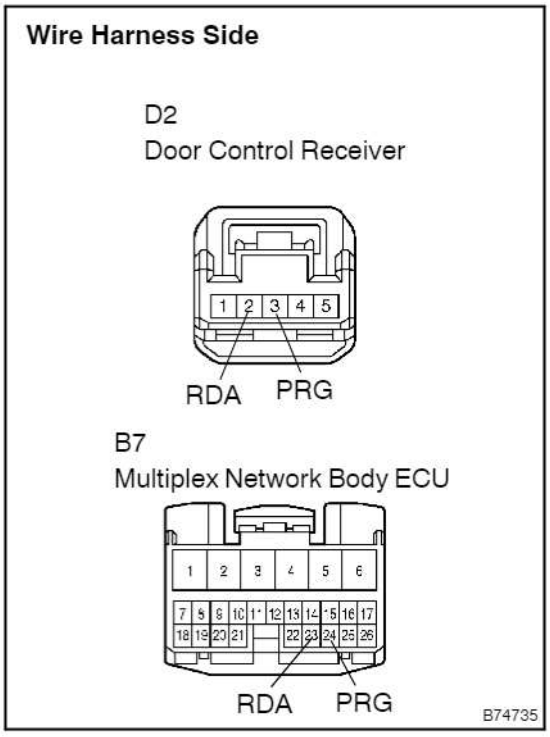
Standard:

Tester Connection	Specified Condition
D2–5 (+B) – Body ground	4.6 to 5.4 V
D2–1 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

13 CHECK WIRE HARNESS (DOOR CONTROL RECEIVER – MULTIPLEX NETWORK BODY ECU) (DOOR CONTROL RECEIVER OR MULTIPLEX NETWORK BODY ECU – BODY GROUND)



(a) Disconnect the D2 receiver connector.
(b) Disconnect the B7 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

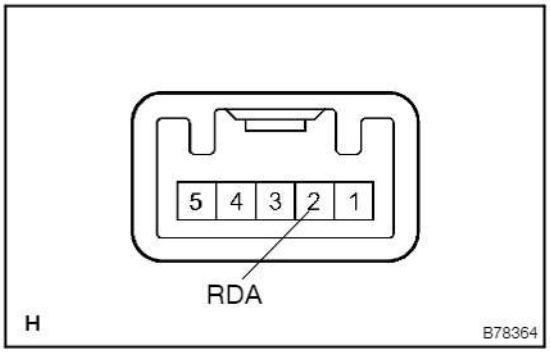
Tester Connection	Specified Condition
D2–2 (RDA) – B7–23 (RDA)	Below 1 Ω
D2–3 (PRG) – B7–24 (PRG)	Below 1 Ω
D2–2 (RDA) or B7–23 (RDA) – Body ground	10 kΩ or higher
D2–3 (PRG) or B7–24 (PRG) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

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14 CHECK DOOR CONTROL RECEIVER (OUTPUT)



(a) Reconnect the D2 receiver connector.
(b) Measure the voltage between the terminal and body ground.
Standard:

Tester Connection	Condition	Specified Condition
D2–2 (RDA) – Body ground	No key in key slot, all doors closed and each transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → below 1 V

NG → **Go to step 15**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

15 REPLACE DOOR CONTROL TRANSMITTER

(a) Check that the doors can be locked and unlocked by using the transmitter LOCK/UNLOCK switch.
OK: Doors can be locked and unlocked with transmitter.

NG → **REPLACE DOOR CONTROL RECEIVER**

OK

END

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NO ANSWER–BACK (HAZARD WARNING LAMP)

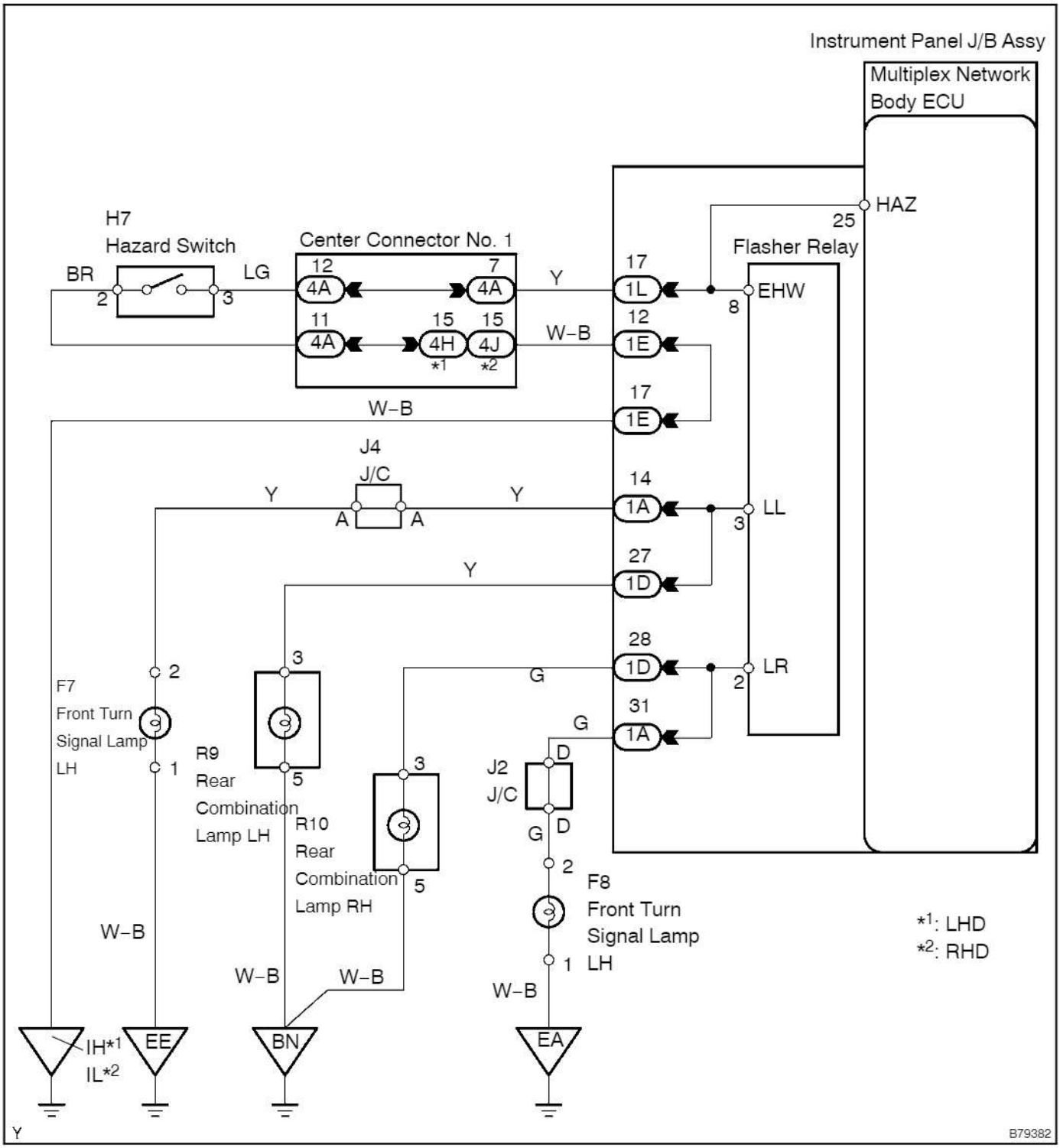
CIRCUIT DESCRIPTION

In some cases, wireless control functions are normal but the hazard warning lamp is not. In such case, the multiplex network body ECU's hazard warning lamp signal outputs may be malfunctioning.

NOTICE:

Troubleshooting should be started after confirming that the answer–back function has been switched ON.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK WIRELESS DOOR LOCK FUNCTION

(a) Check the wireless door lock functions by operating the transmitter switch.

Result	Proceed To
Wireless door lock functions but hazard warning lamp answer–back does not occur.	A
Wireless door lock control functions do not operate.	B

B → **Go to FLOW CHART (See page 05–2010)**

A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Select the ACTIVE TEST, use the intelligent tester II to generate a control command, and then check that the hazard lamps flash.

OK: Signal flasher relay turns ON/OFF

Item	Test Detail	Diagnostic Note
Hazard	Turn signal flasher relay ON/OFF	–

NG → **Go to step 3**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

3 CHECK HAZARD WARING LAMPS

(a) Check that the hazard warning lamps flash continuously when the hazard warning signal switch is pressed.

OK: Hazard warning lamps flash continuously.

NG → **Go to LIGHTING SYSTEM (See page 65–1)**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

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05IDP-01

ON–VEHICLE INSPECTION

1. NOTES WHEN CHECKING

(a) Power door LOCK/UNLOCK function:
This wireless door lock control operates only when the following 3 conditions are met.
(1) No key is inserted into the key slot.
(2) All the doors are closed.
(3) The power door lock system is functioning normally.

HINT:
The UNLOCK function operates even when one of the doors is open.
The key can be inserted. However the power switch's power mode is OFF.

(b) The wireless transmitter operating range differs depending on the situation.
(1) The operating range differs depending on the user, the way the transmitter is held and the location.
(2) In certain areas, the operating range will be reduced due to the vehicle body shape and the influence of the surrounding environment.
(3) Since the transmitter uses weak electric waves, the operating range might be shortened if noise or strong electric waves occur in the area where the transmitter is used. Or, the transmitter may weak function.
(4) When the battery weakens, the operating range is reduced or the transmitter may not function.

HINT:
If the transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, the battery may weaken or other problems may occur.

2. WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:
- The switches described below transmit signals and are built into the door control transmitter.
- The operating range must be taken into account while checks are being made.

(a) Put the vehicle in conditions that allow the wireless control function to be operated (see page 05–2020).

(b) Check basic functions.
(1) Check that the LED of the transmitter lights 3 times when each switch is pressed 3 times.

HINT:
If the LED does not light up when the switch has been pressed 3 times or more, it may have a dead battery.

(2) Check that all the doors including the back door lock when the LOCK switch is pressed.
(3) Check that only the driver side door unlocks when the UNLOCK switch is pressed once, and that the remaining doors unlock when the UNLOCK switch is pressed again within 3 seconds.

(c) Check the chattering prevention function.
(1) Check that pressing a switch will result in the switch's operation occurring only once; and when the switch is held down, the operation is not repeated continuously. Also, make sure that when the switch is pressed in approximately 1 second intervals, the switch's operation will occur each time.

(d) Check the automatic locking function.
(1) Check that if all of the doors are unlocked with the UNLOCK switch and none of the doors are opened or locked within approximately 30 seconds, the door automatically relock.
(2) Check that if all of the doors are unlocked with the UNLOCK switch and a door is opened or locked within approximately 30 seconds, the automatic locking function does not operate.

(e) Check the switch operation fail–safe function.
(1) Check that the doors cannot be locked by a switch while the key is in the key slot. However, this does not apply when the system is in recognition code registration mode.

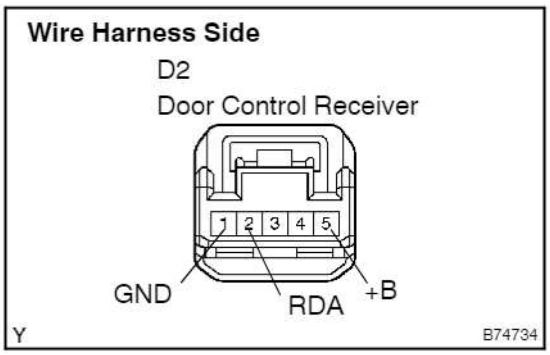
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(f) Check the operation stop function when a door is open or not completely closed.
  (1) Check that if a door is open or not completely closed, the doors cannot be locked by the LOCK switch.

(g) Check the repeat function.
  (1) Check that if the LOCK switch is pressed while the movement of the driver side door control knob (in the unlocked state) is restricted, the repeat function attempts to lock all of the doors again 1 seconds later.

(h) Check the answer–back function.
  (1) When the LOCK switch is pressed, check that the lamps flash once simultaneously with the locking of all the doors.
  (2) When the UNLOCK switch is pressed once, check that the lamps flash twice simultaneously with the unlocking of all the doors.

(i) Check the illuminated entry function.
  (1) When all the doors are locked, pressing the UNLOCK switch causes the room lamp (when the lamp switch is in the DOOR position) to illuminate simultaneously with the unlock operation.
  (2) Check that the room lamp turns off in approximately 15 seconds if doors have not been opened.



3. CHECK DOOR CONTROL RECEIVER

(a) Disconnect the D2 receiver connector.

(b) Measure the voltage and resistance between the terminals of the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
D2–5 (+B) – Body ground	4.6 to 5.4 V
D2–1 – Body ground	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the D2 receiver connector.

(d) Measure the voltage between the terminal and body ground.

Standard:

Tester Connection	Condition	Specified Condition
D2–2 (RDA) – Body ground	No key in key slot, all doors closed and each transmitter switch OFF → ON	Below 1 V → Approx. 6 to 7 V → Below 1 V

If the result is not as specified, the receiver may have a malfunction.

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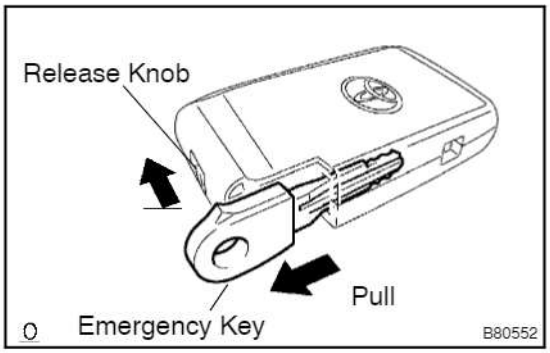
05IDR-01

REPLACEMENT

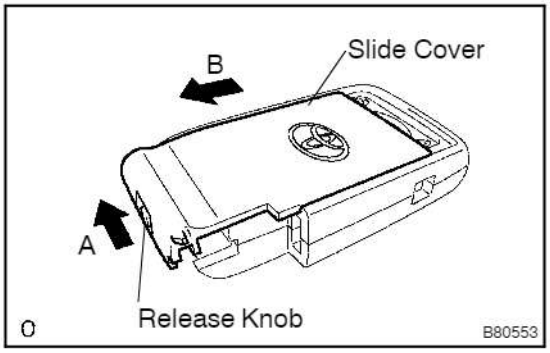
1. REMOVE TRANSMITTER BATTERY

NOTICE:

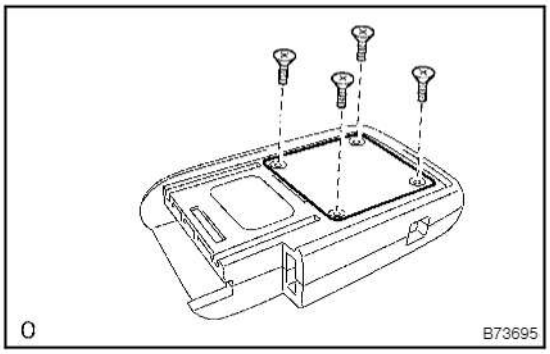
Take extra care when handling these precision electronic components.



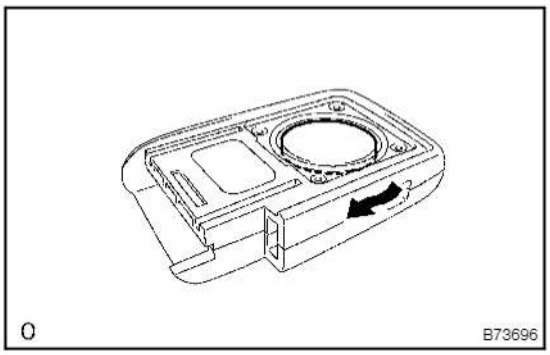
(a) Push and hold the release knob in the direction indicated by the arrow in the illustration. Take the emergency key out of the key.



(b) Push and hold the release knob in the direction indicated by the arrow labeled A in the illustration. Push out the slide cover in the direction indicated by the arrow labeled B in the illustration and remove the slide cover.



(c) Remove the 4 screws and cover using a screwdriver, as shown in the illustration.

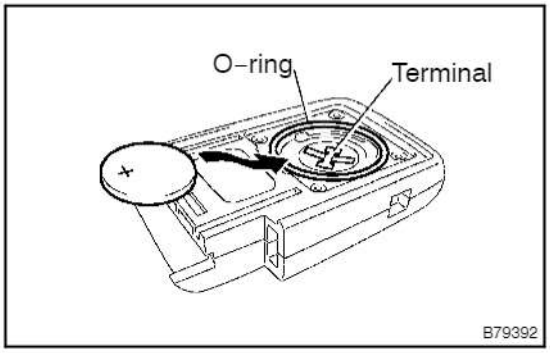


(d) Remove the transmitter's battery from the key , as shown in the illustration.

NOTICE:

- **Do not push the terminals with your finger.**
- **Do not forcibly pry up the battery (lithium battery). The terminals may become damaged.**
- **Do not touch the battery with wet hands. Water may cause rust.**
- **Do not touch or move any components inside the transmitter, as it may cease to work.**

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2. INSTALL TRANSMITTER BATTERY

(a) Install a new battery (lithium battery) with the positive (+) side up, as shown in the illustration.

NOTICE:

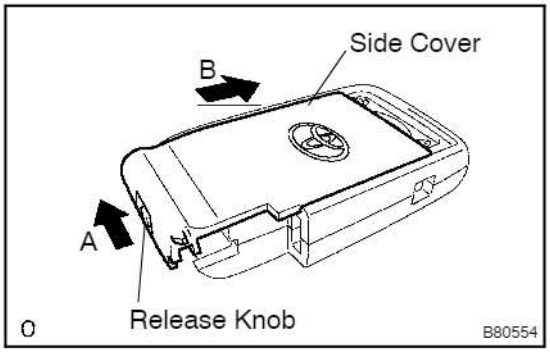
- **Be sure that the positive side and the negative side of the transmitter battery are matched up correctly.**
- **Be careful not to bend the transmitter battery electrode during insertion.**
- **Keep the transmitter case interior free of dust and oil.**

(b) Check that the O–ring is not distorted or slipped off, and install the cover.

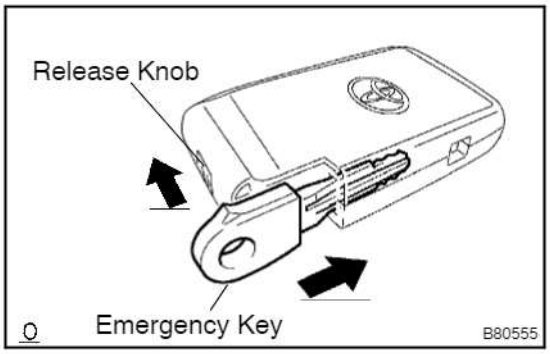
(c) Using a screwdriver, tighten the 4 screws.

NOTICE:

Incomplete installation of the cover will cause defective contact between the battery (lithium battery) and terminal.



(d) Push and hold the release knob in the direction indicated by the arrow labeled A in the illustration. Push in the slide cover in the direction indicated by the arrow labeled B in the illustration and install the slide cover.



(e) Push and hold the release knob in the direction indicated by the arrow in the illustration. Insert the emergency key into the key.

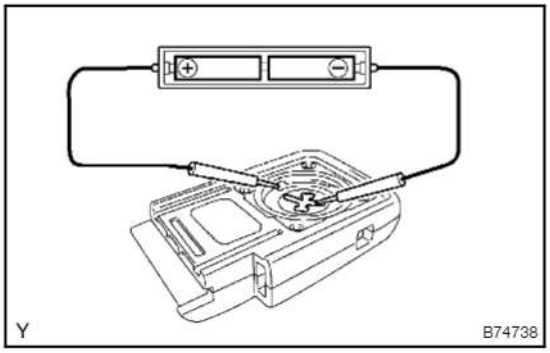
HINT:

After installation, press any of the transmitter's switches. Check that the LED illuminates.

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INSPECTION



1. INSPECT DOOR CONTROL TRANSMITTER

(a) Inspect operation of the transmitter.

(1) Remove the battery (lithium battery) from the transmitter (see page 05–2022).

(2) Install a new or non–depleted battery (lithium battery).

HINT:

When a new or non–depleted transmitter battery is not available, connect 2 new 1.5 V batteries in series. Then connect lead to the batteries and use the leads to apply 3 V voltage to the transmitter, as shown in the illustration.

(3) From outside the vehicle, approximately 1 m (3.28 ft) from the driver side outside door handle, test the transmitter by pointing its keyplate at the vehicle and pressing a transmitter switch.

Standard:

The door lock can be operated via the transmitter.

HINT:

- The operating range differs depending on the user, the way the transmitter is held and the location.
- Since the transmitter uses weak electric waves, the operating range might be shortened if noise or strong electric waves occur in the area where the transmitter is used. Or, the transmitter may not function.

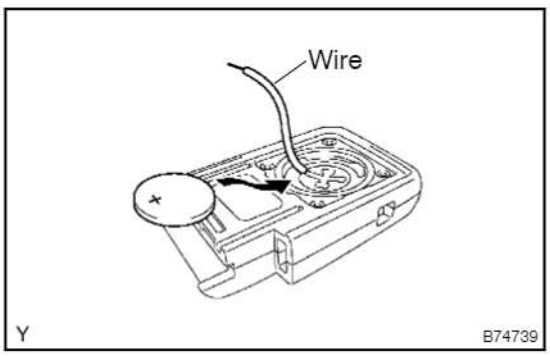
(4) Install the battery (lithium battery).

(b) Inspect the battery capacity.

HINT:

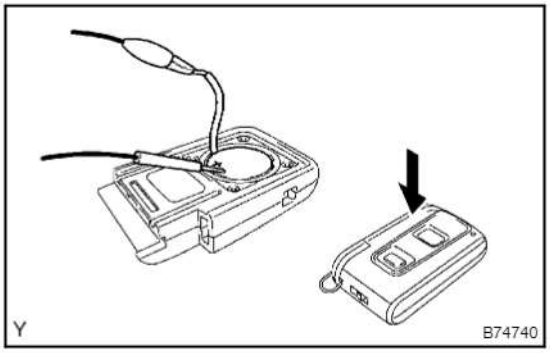
- When checking the amount of energy left in the battery (lithium battery), the battery must be checked while it is installed in the transmitter (a resistance of 1.2 kΩ is applied to the battery). When the battery energy is checked by itself (uninstalled), the voltage reading will be more than 2.5 V until the energy is depleted.
- If the transmitter is malfunctioning, the voltage reading of the energy left in the battery may be inaccurate.

(1) Remove the battery (lithium battery) from the transmitter (see page 05–2022).



(2) Connect a wire to the negative (–) terminal of the transmitter and install the battery.

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(3) Connect the tester's positive (+) lead to the (+) battery (lithium battery) and the negative (–) lead to the wire respectively.

(4) Press one of the transmitter switches for approximately 1 second.

(5) Press the transmitter switch again to check the voltage.

Standard: 2.2 V or higher

HINT:

- When the temperature of the battery is low, the inspection cannot be made correctly.
  When the outcome of the test is less than 2.2 V, conduct the test again after leaving the battery in a place with a temperature 18°C (64°F) for more than 30 minutes.
- Read the voltage immediately after the switch is pressed. When 0.8 seconds have passed after the switch is pressed, the automatic power–off function starts and resistance applied to the battery will cease. The voltage of the battery will be 2.5 V or more.
- Press the switch at least 3 times before reading the voltage.
  If the battery has just been returned to 18°C (64°F), the voltage may be unusually high for the first or second voltage reading.

(6) Disconnect the lead.

(7) Set the battery (lithium battery) in the transmitter.

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KEY REMINDER WARNING SYSTEM

PRECAUTION

05IIC-01

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICES FOR HYBRID SYSTEM ACTIVATION:

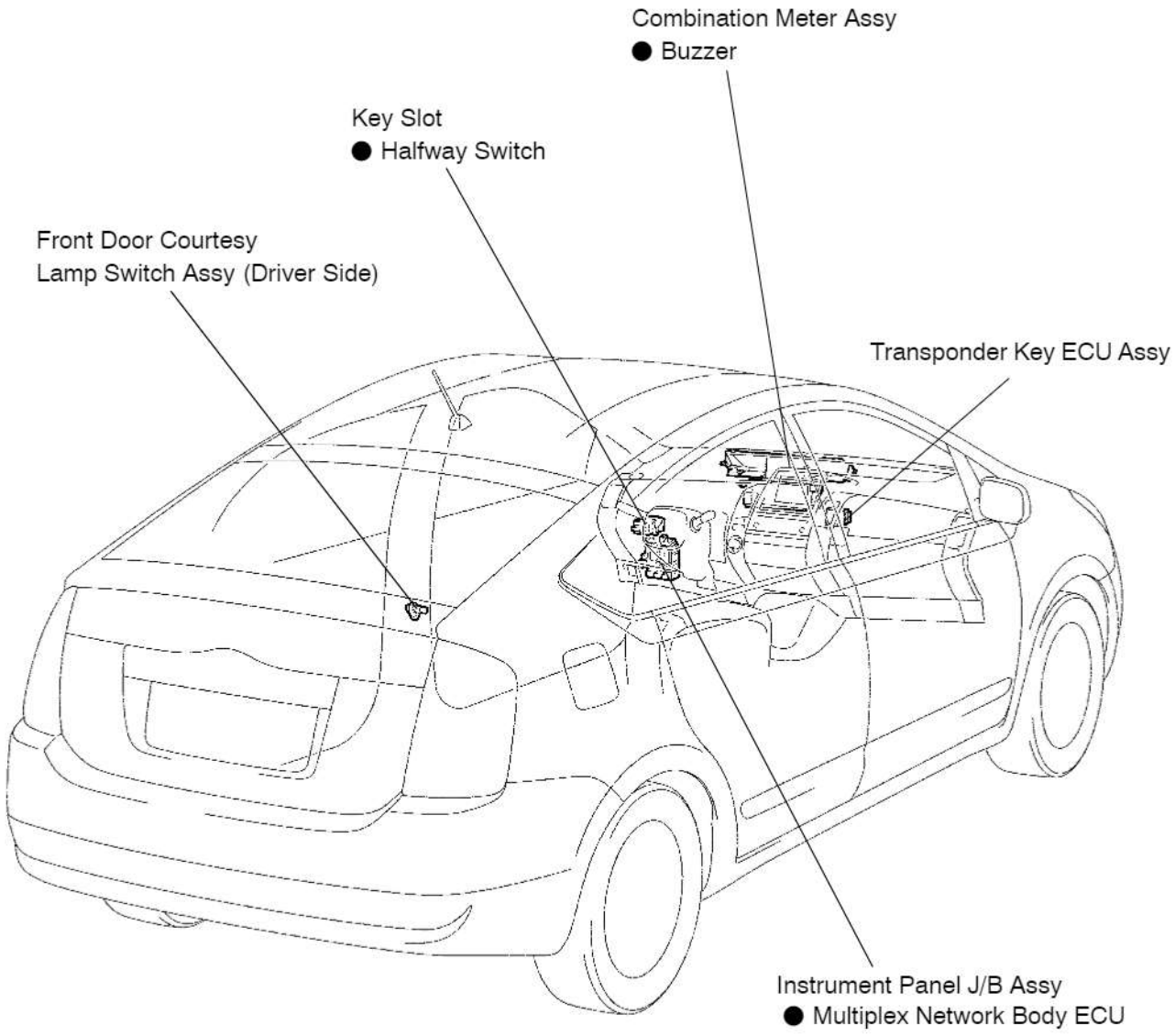
When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

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05IID-01

LOCATION

LHD models

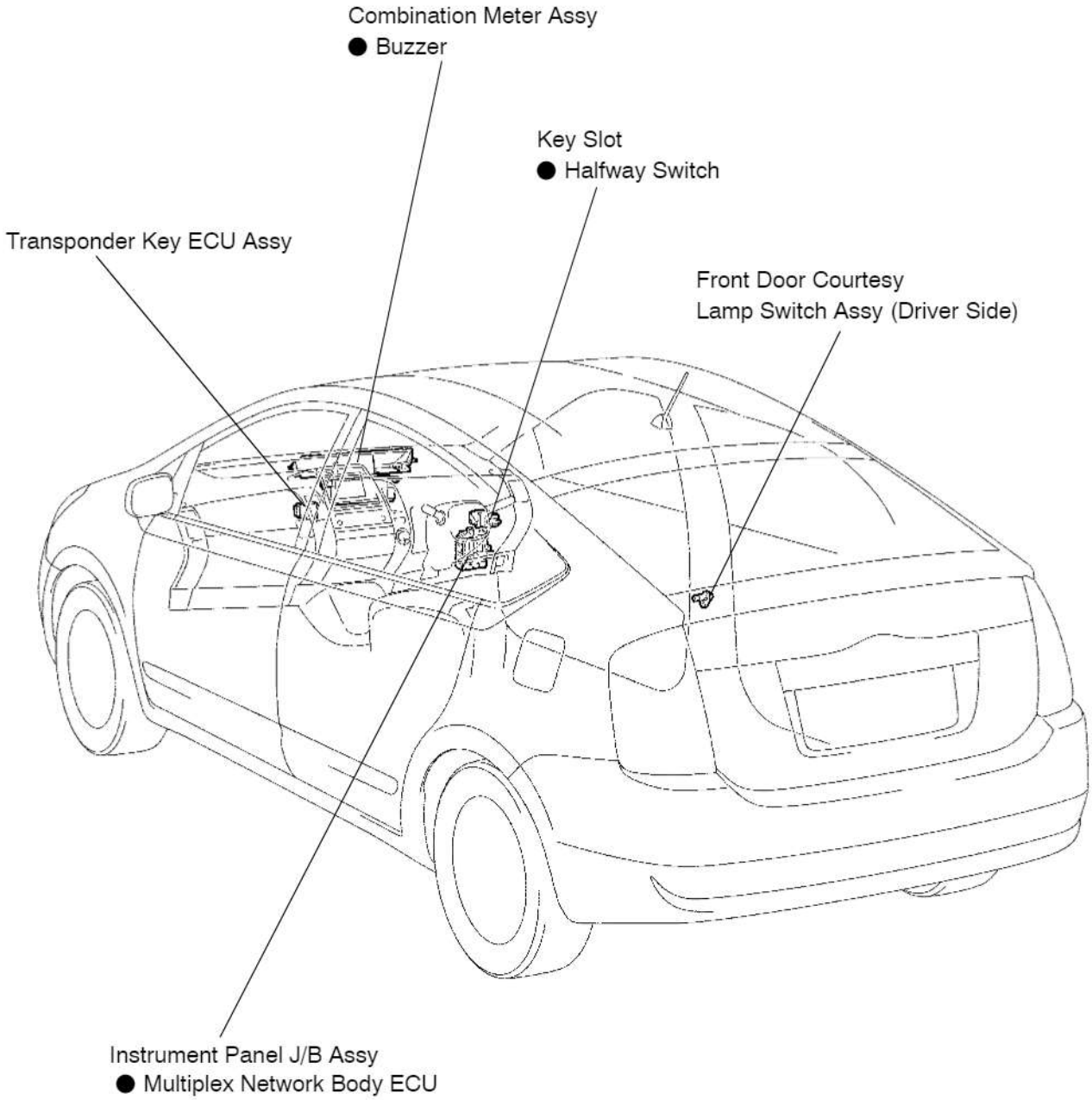


P

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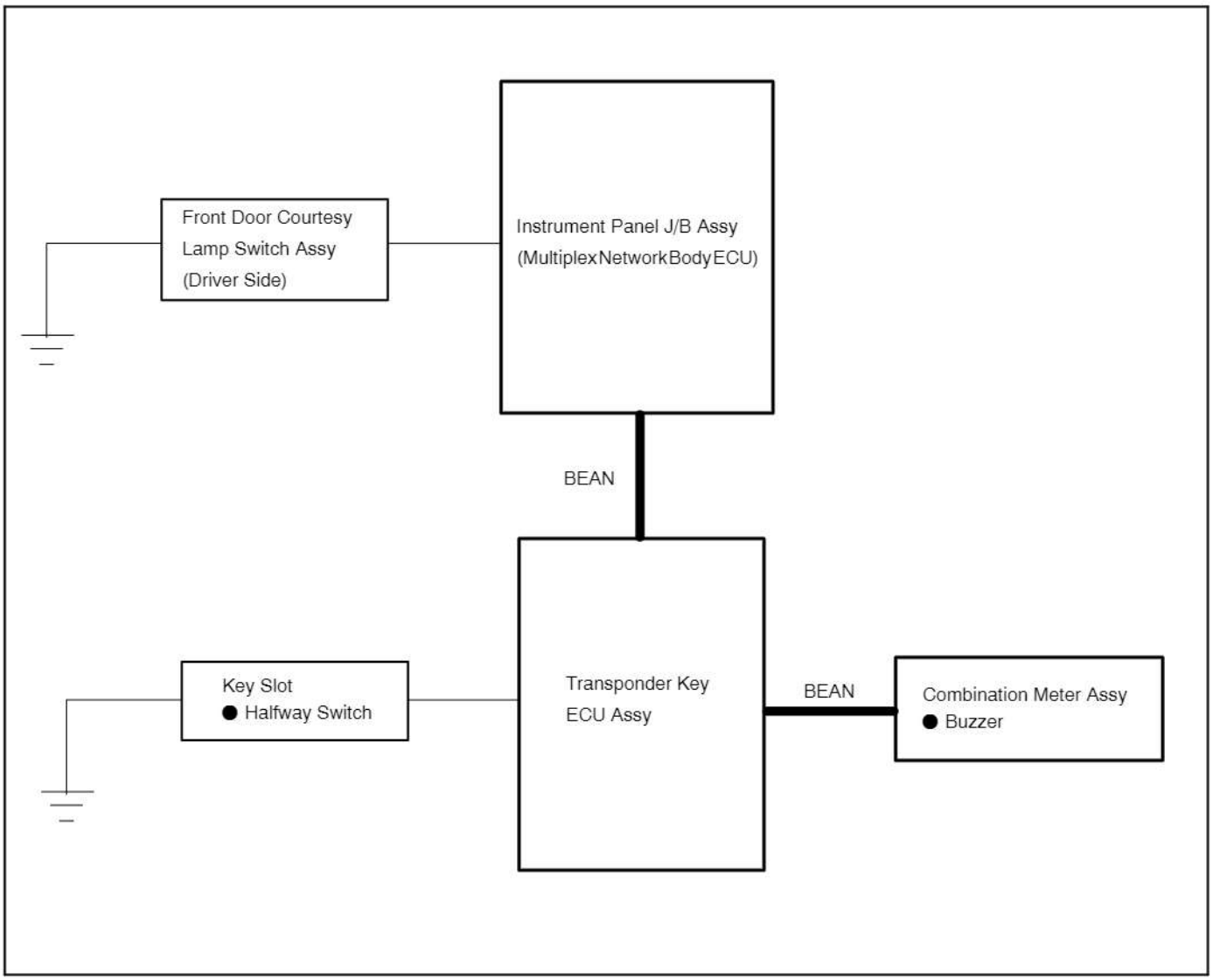
RHD models



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05IIE-01

SYSTEM DIAGRAM



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05IIG–01

SYSTEM DESCRIPTION

1. KEY REMINDER WARNING SYSTEM DESCRIPTION

(a) The key reminder warning system sounds the combination meter buzzer as a warning when: 1) the power switch's power mode is set to OFF or ON (ACC), 2) the key is inserted into the key slot, and 3) the driver side door is opened.

2. FUNCTION OF MAIN COMPONENTS

Components	Function
Front door courtesy lamp switch assy	Detects if driver side door is open or closed and outputs data to multiplex network body ECU
Halfway switch	Detects if key is/isn't in key slot and outputs data to transponder key ECU
Combination meter assy	Receives buzzer request signal from transponder key ECU (after transponder key ECU receives halfway switch signal from key slot and front door courtesy lamp switch signal from front door courtesy lamp switch via multiplex body ECU). Then combination meter assy actuates driver circuit to sound built–in multi–buzzer intermittently.

3. FUNCTION OF DESCRIPTION

(a) The key slot transmits a halfway switch status signal to the transponder key ECU. The front door courtesy lamp switch transmits a driver side door courtesy status signal to the multiplex network body ECU. With the power switch OFF or ON (ACC), 2 conditions are required to activate the key reminder warning system: 1) the transponder key ECU receives a signal indicating that the key is in the key slot, and 2) the transponder key ECU receives a driver side door open signal via the multiplex body ECU. If both conditions are satisfied, a buzzer request signal is transmitted from the transponder key ECU to the combination meter assy via the BEAN. The combination meter assy then actuates the driver circuit to sound a built–in multi–buzzer intermittently.

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05IIH–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the key reminder warning system.
- The intelligent tester II should be used in steps 3 and 5.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

3	CHECK COMMUNICATION FUNCTION OF LARGE–SCALE BODY MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) Without code outputs, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SYSTEM (See page 05–2261)

A

4	PROBLEM SYMPTOMS TABLE (See page 05–2034)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 7

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–2038)
  (1) Inspection with the intelligent tester II (DATA LIST).
(b) Terminals of ECU (see page 05–2035).
(c) On–vehicle inspection (see page 05–2043).
(d) Inspection (see page 05–2044).

6	ADJUST, REPAIR OR REPLACE

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7	CONFIRMATION TEST

END

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05IIJ–01

CUSTOMER PROBLEM ANALYSIS CHECK

KEY REMINDER WARNING SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	/ /
		License Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day) ☐ Only once
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F))

Problem Symptoms	☐ Key reminder buzzer does not sound
	☐ Other

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05IIU–01

PROBLEM SYMPTOMS TABLE

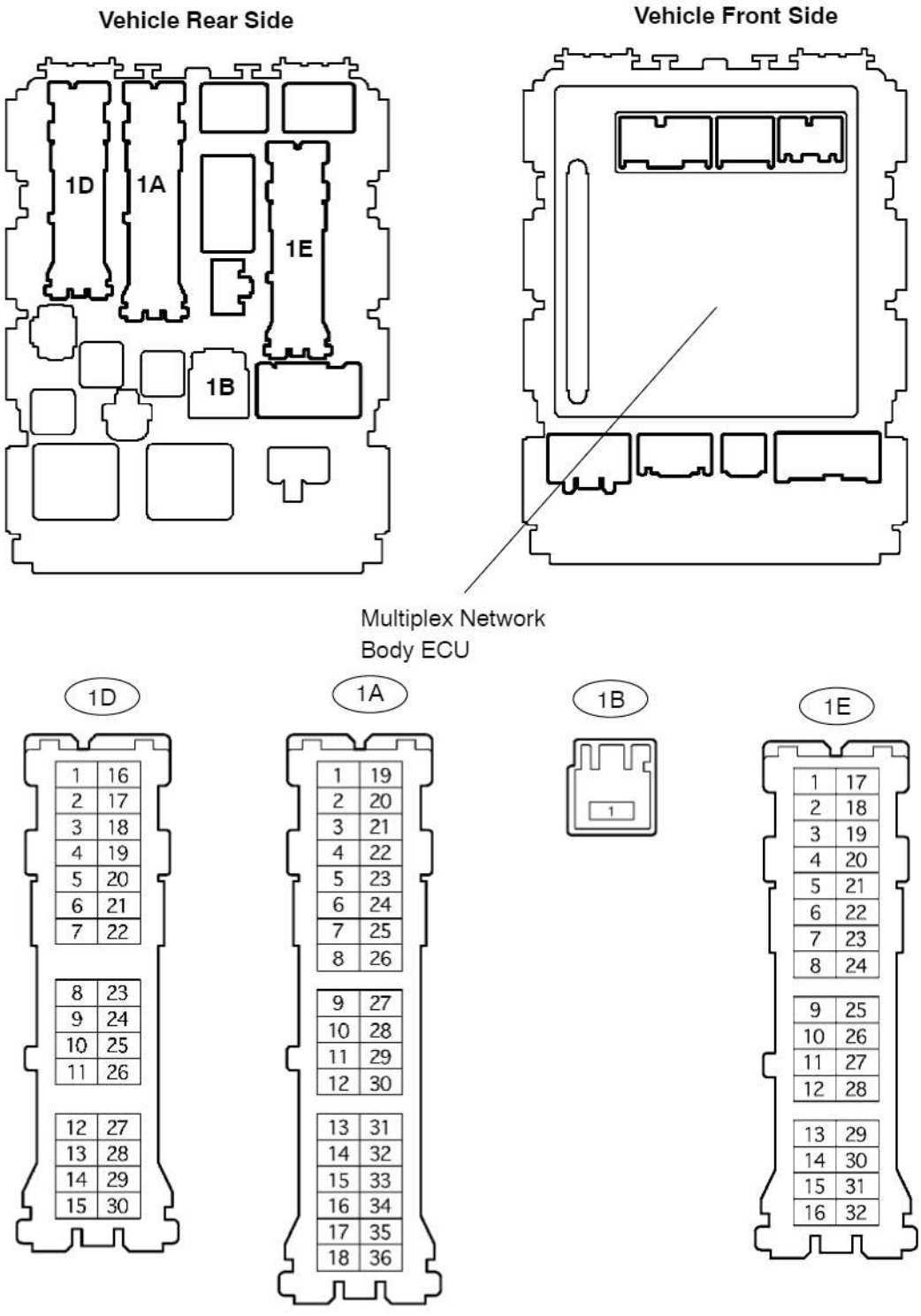
Symptom	Suspected Area	See Page
Key reminder buzzer does not sound.	1. Front door courtesy lamp switch assy (driver side) 2. Combination meter 3. Wire harness 4. Instrument panel J/B assy (Multiplex network body ECU) 5. Key slot 6. Wire harness 7. Transponder key ECU assy	05–2039

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05IIK–01

TERMINALS OF ECU

1. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



B69008
B78202
B75483

B80155

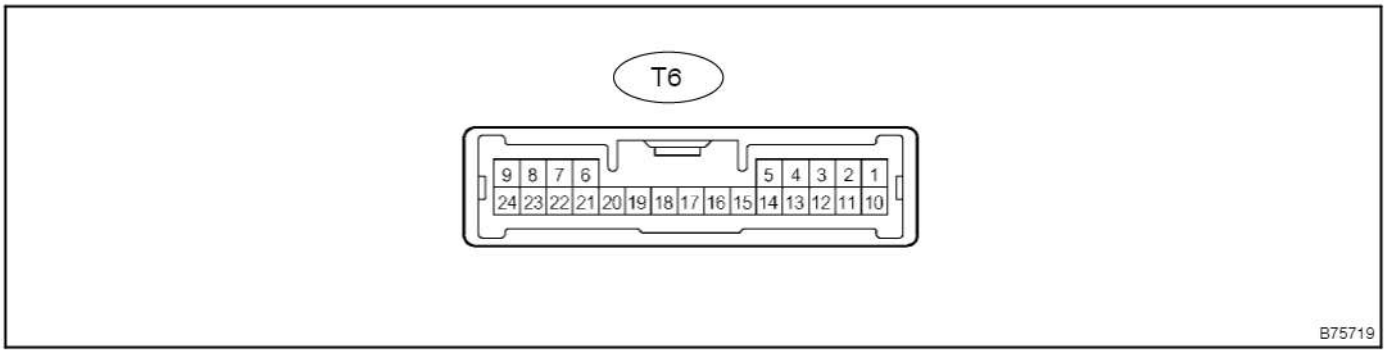
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(a) Disconnect the 1A, 1B, 1D and 1E J/B connectors.
(b) Measure the resistance and voltage of each terminal of the wire harness side connectors.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A–30) – Body ground	R – Body ground	+B power supply	Constant	10 to 14 V
SIG (1B–1) – Body ground	W – Body ground	Ignition power supply	1: Power switch OFF → 2: ON (IG)	1: 10 kΩ or higher → 2: Below 1 Ω
GND (1E–17) – Body ground	W – B Body ground	Ground	Ground	Below 1 Ω
KSW (1E–26) – Body ground	Y – Body ground	Halfway switch input	1: No key in key slot → 2: Key imputed	1: 10 kΩ or higher → 2: Below 1 Ω
DTCY (1D–21) – Body ground	V – Body ground	Door courtesy switch input	1: Driver side door CLOSED → 2: OPEN	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is as specified, the wire harness side may have a malfunction.

2. CHECK TRANSPONDER KEY ECU



(a) Disconnect the T6 ECU connector.
(b) Measure the resistance and voltage of each terminal of the wire harness side connector and body ground.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – Body ground	L – Body ground	+B (CPUB) power supply	Constant	10 to 14 V
IG (T6–4) – Body ground	O – Body ground	IG power supply	1: Power switch OFF → 2: ON (IG)	1: 10 to 14 V → 2: 0 V
ACC (T6–12) – Body ground	P – Body ground	ACC power supply	1: Power switch OFF → 2: ON (ACC)	1: 10 to 14 V → 2: 0 V
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
CUWS (T6–5) – Body ground	B – Body ground	Halfway switch input	1: No key in key slot → 2: Key inserted	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

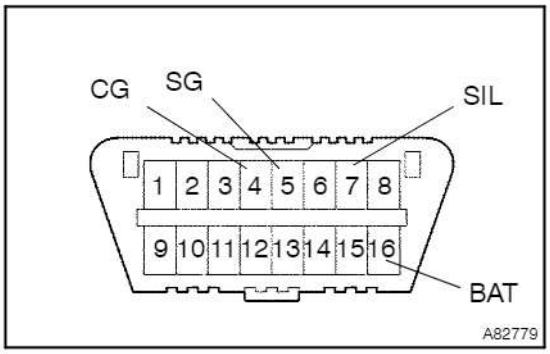
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05IIM–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

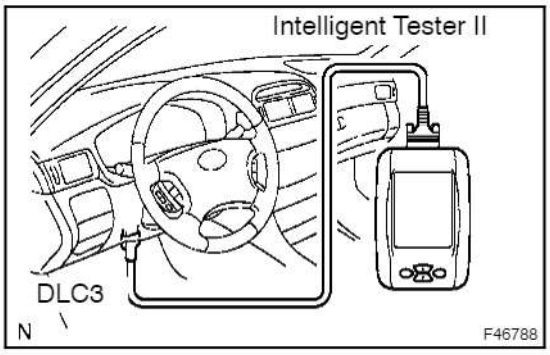
The multiplex network body ECU controls the function of the key reminder warning system on the vehicle.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the intelligent tester II to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If communication is normal when the intelligent tester II is connected to another vehicle, inspect the DLC3 on the original vehicle.

If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard : 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

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05IIN–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Read the DATA LIST according to display on the tester.

Transponder key ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Key Unlk Wrn SW	Halfway switch signal /ON or OFF	ON: Key is in key slot. OFF: No key is in key slot.	–

Multiplex network body ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D Dor Cty SW	Driver side door courtesy switch signal /ON or OFF	ON: Driver side door is open. OFF: Driver side door is closed.	–

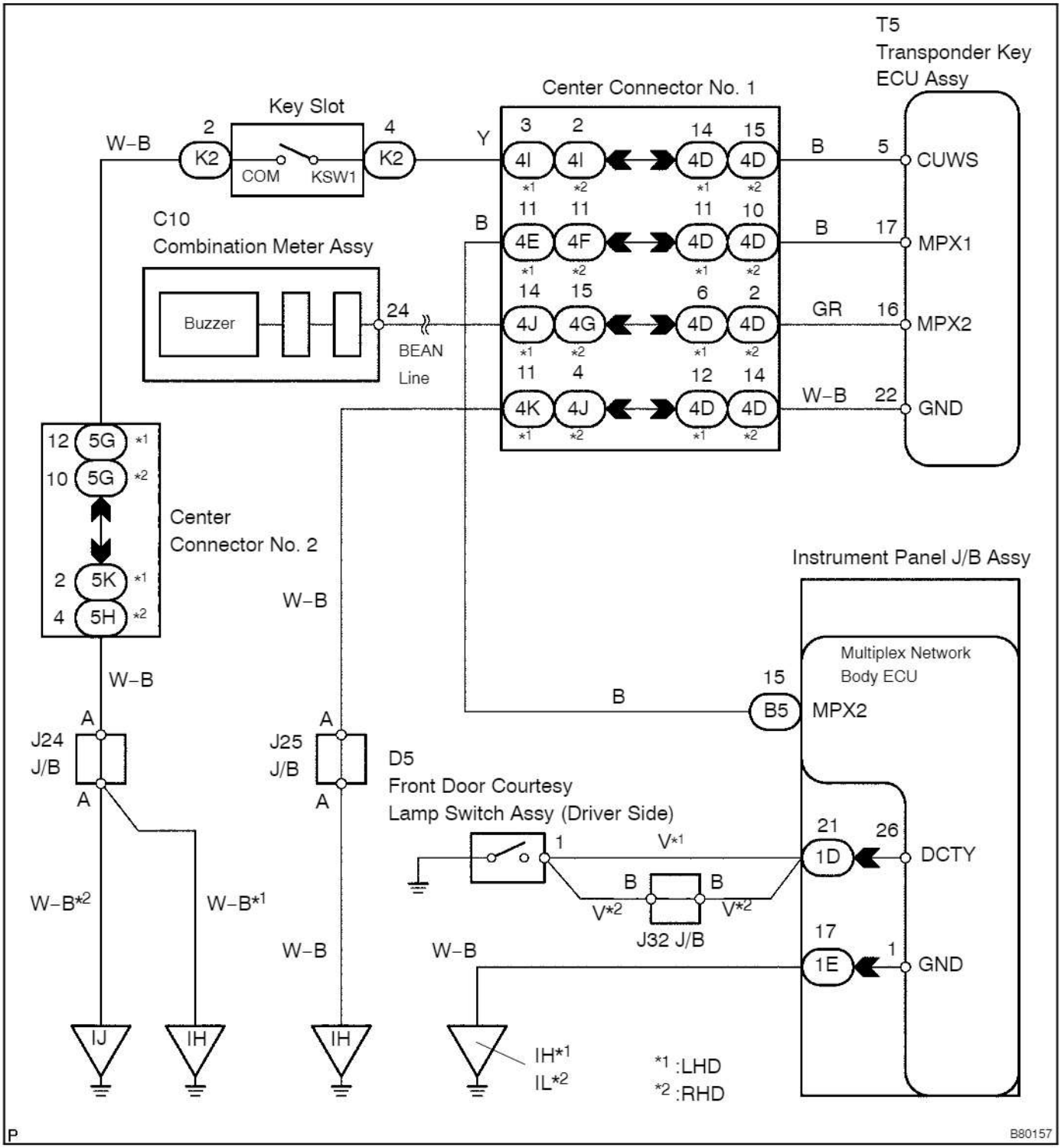
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KEY REMINDER BUZZER DOES NOT SOUND

CIRCUIT DESCRIPTION

When the power switch's power mode is OFF, the key is in the key slot and the driver side door is opened, the transponder key ECU transmits a halfway switch signal and multiplex network body ECU transmits driver side courtesy switch signal to the combination meter, which causes the buzzer to emit a sound.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Check the DATA LIST for proper functioning of the driver side door courtesy switch.
Multiplex network body ECU:

Item	Measure Item/Display (Range)	Normal Condition	Diagnostic Note
D Dor Cty SW	Driver side door courtesy switch signal /ON or OFF	ON: Driver side door is open. OFF: Driver side door is closed.	–

OK: "ON" (drive side door is open) appears on the screen.

NG → **Go to step 3**

(b) Check the DATA LIST for proper functioning of the key slot.
Transponder key ECU:

Item	Measure Item/Display (Range)	Normal Condition	Diagnostic Note
Key Unlk Wrn SW	Halfway switch signal /ON or OFF	ON: Key is in key slot. OFF: No key is in key slot.	–

OK: "ON"(key is in slot) appears on the screen.

NG → **Go to step 5**

OK

2	CHECK BUZZER (COMBINATION METER)

(a) Check the warning buzzer built into the combination meter (see page 05–1684).
OK: Warning buzzer sounds.

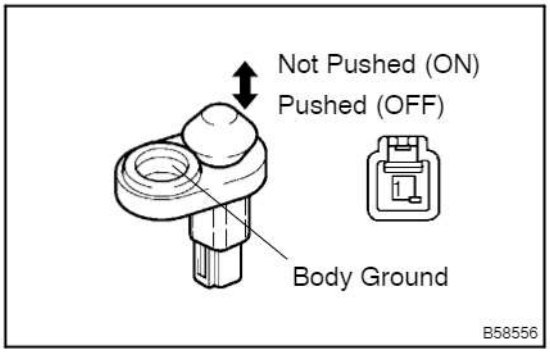
NG → **REPLACE COMBINATION METER ASSY**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

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3 INSPECT FRONT DOOR COURTESY LAMP SWITCH ASSY (DRIVER SIDE)



(a) Remove the courtesy lamp switch.
(b) Measure the switch resistance.

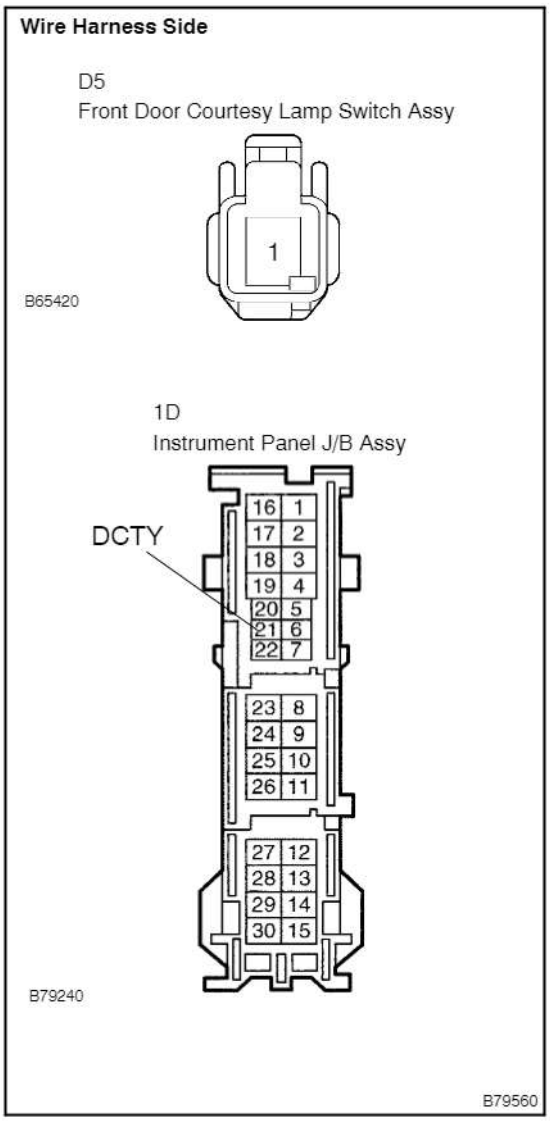
Standard:

Tester Condition	Switch Condition	Specified Condition
1 – Body ground	Not Pushed	Below 1 Ω
1 – Body ground	Pushed	10 kΩ or higher

OK → **REPLACE FRONT DOOR COURTESY LAMP SWITCH ASSY**

OK

4 CHECK WIRE HARNESS (FRONT DOOR COURTESY LAMP SWITCH ASSY (DRIVER SIDE) – INSTRUMENT PANEL J/B ASSY)



(a) Disconnect the D5 switch and 1D J/B connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
D5–1 – 1D–21 (DCTY)	Below 1 Ω

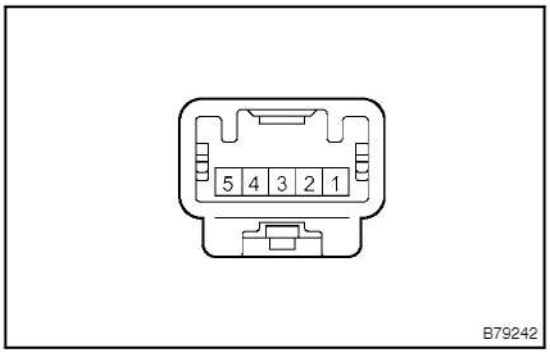
NG → **REPLACE FRONT DOOR COURTESY LAMP SWITCH ASSY**

OK

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REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY (MULTIPLEX NETWORK BODY ECU)

5 INSPECT KEY SLOT



(a) Remove the key slot.
(b) Measure the key slot resistance.

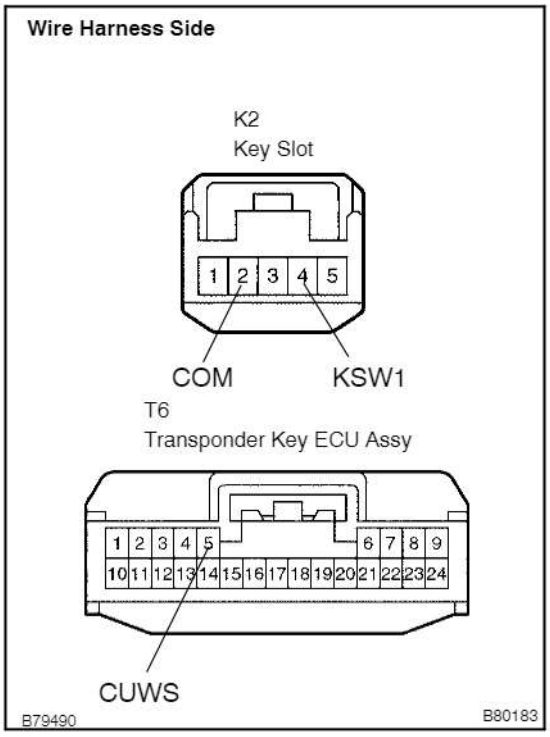
Standard:

Tester Condition	Key Slot Condition	Specified Condition
2 – 4	Key in key slot	Below 1 Ω
2 – 4	No key in key slot	10 kΩ or higher

NG → **REPLACE KEY SLOT**

OK

6 CHECK WIRE HARNESS (KEY SLOT – INSTRUMENT PANEL J/B ASSY AND BODY GROUND)



(a) Disconnect the K2 key slot and T6 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
K2–4 (KSW1) – T6–5 (CUWS)	Below 1 Ω
K2–2 (COM) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY ECU ASSY

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05IIT–01

ON–VEHICLE INSPECTION

1. CHECK FUNCTION

(a) Check the key reminder warning buzzer sound function.
  (1) Close the driver side door, insert the key into the key slot and change the power switch's power mode to OFF by pressing the power switch.
  (2) Open the driver side door. Check that the key reminder warning buzzer emits sounds intermittently.

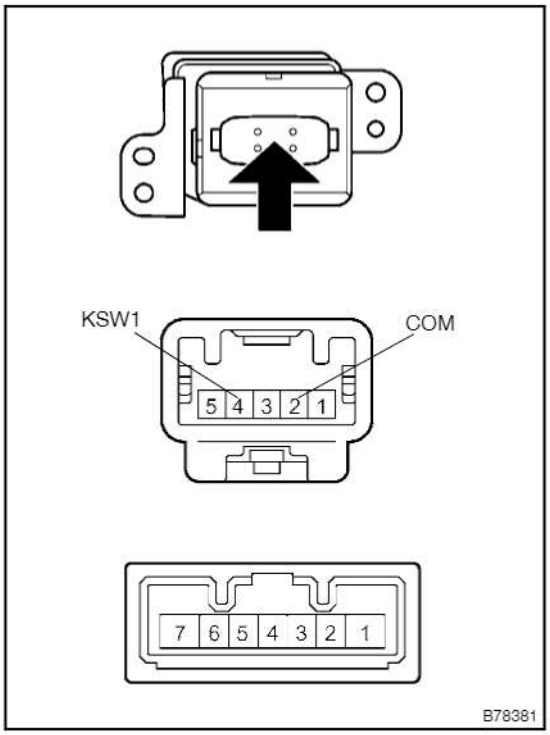
(b) Check that the key reminder warning buzzer stops.
  (1) While the buzzer is sounding, perform one of the following operations:
  - Close the driver side door (front door courtesy lamp switch is turned off).
  - Change the power switch's power mode to ON (IG) by pressing the power switch.
  - Pull out the key from the key slot.

  (2) Check that the key reminder warning buzzer stops sounding.

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05IIR–01

INSPECTION



1. INSPECT KEY SLOT ASSY

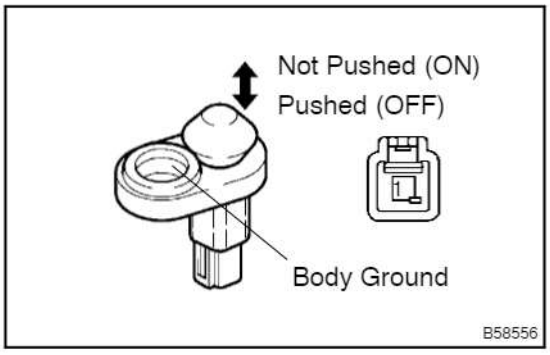
(a) Remove the key slot assy.

(b) Measure the resistance of the slot.

Standard:

Tester Connection	Key Slot Condition	Specified Condition
4 (KSW1) – 2 (COM)	Key is in key slot	Below 1 Ω
4 (KSW1) – 2 (COM)	No key in is slot	10 kΩ or higher

If the result is not as specified, replace the slot assy.



2. INSPECT FRONT DOOR COURTESY LAMP SWITCH ASSY (DRIVER SIDE)

(a) Remove the courtesy lamp switch.

(b) Measure the switch resistance.

Standard:

Tester Condition	Switch Condition	Specified Condition
1 – Body ground	Not Pushed	Below 1 Ω
1 – Body ground	Pushed	10 kΩ or higher

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ENGINE IMMOBILIZER SYSTEM (W/ SMART ENTRY SYSTEM)

05I98-01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICE FOR HYBRID SYSTEM ACTIVATION:

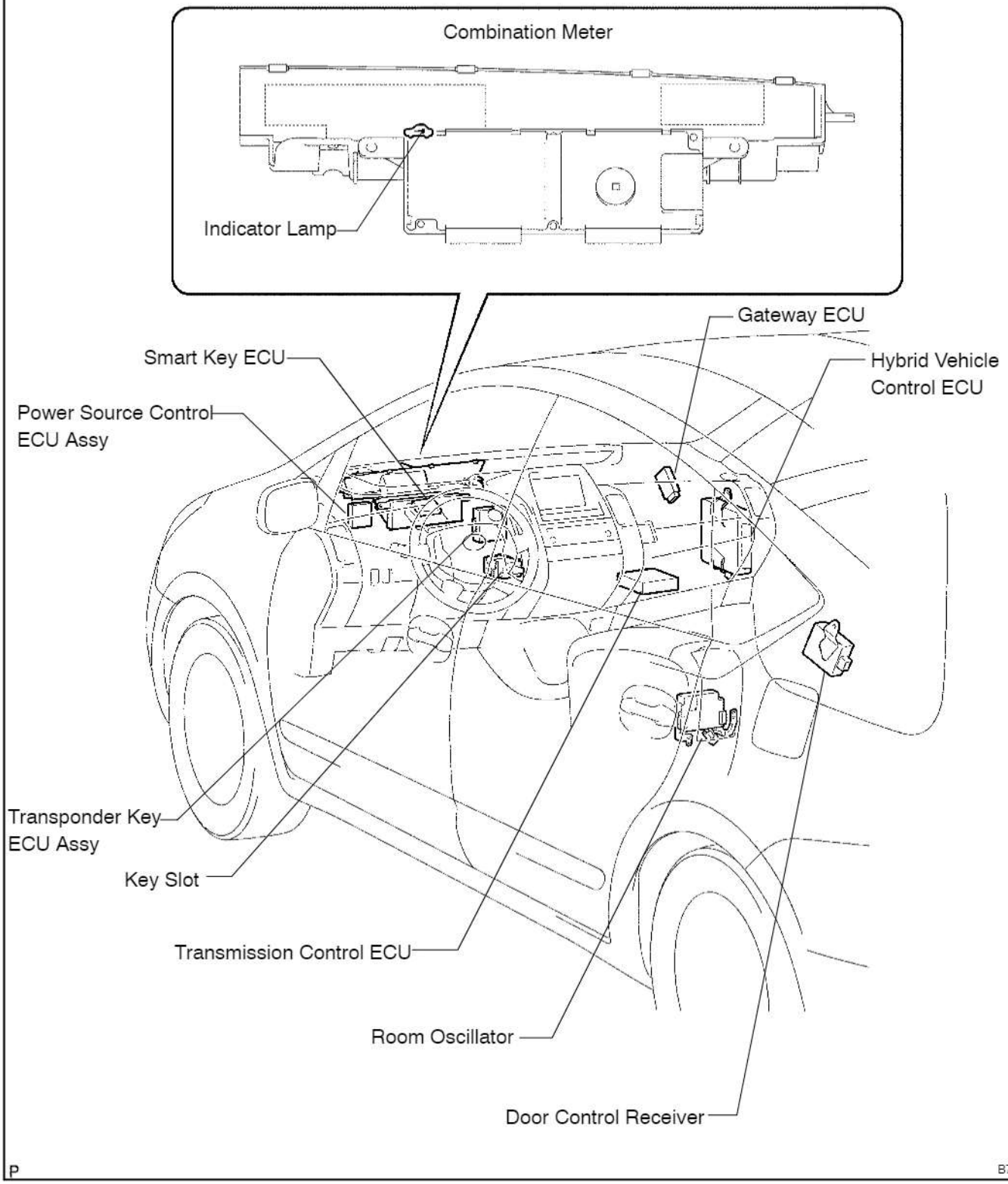
- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **If the power switch's power mode is to ON (IG), the battery is disconnected, and the key is not in the key slot or not within the smart key detection area during reconnection, DTC B2799 may be output.**

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05I99-01

LOCATION

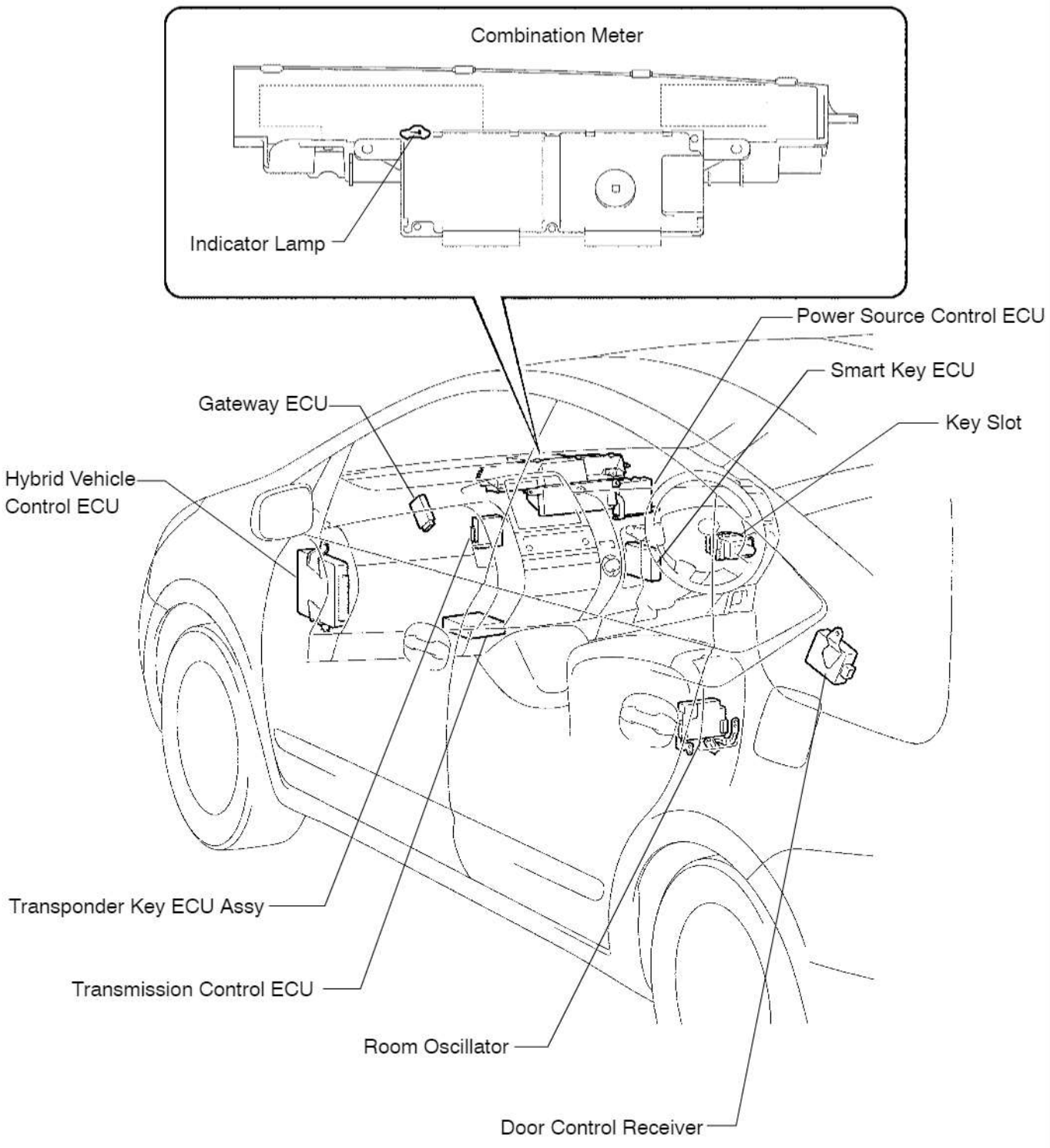
LHD Models



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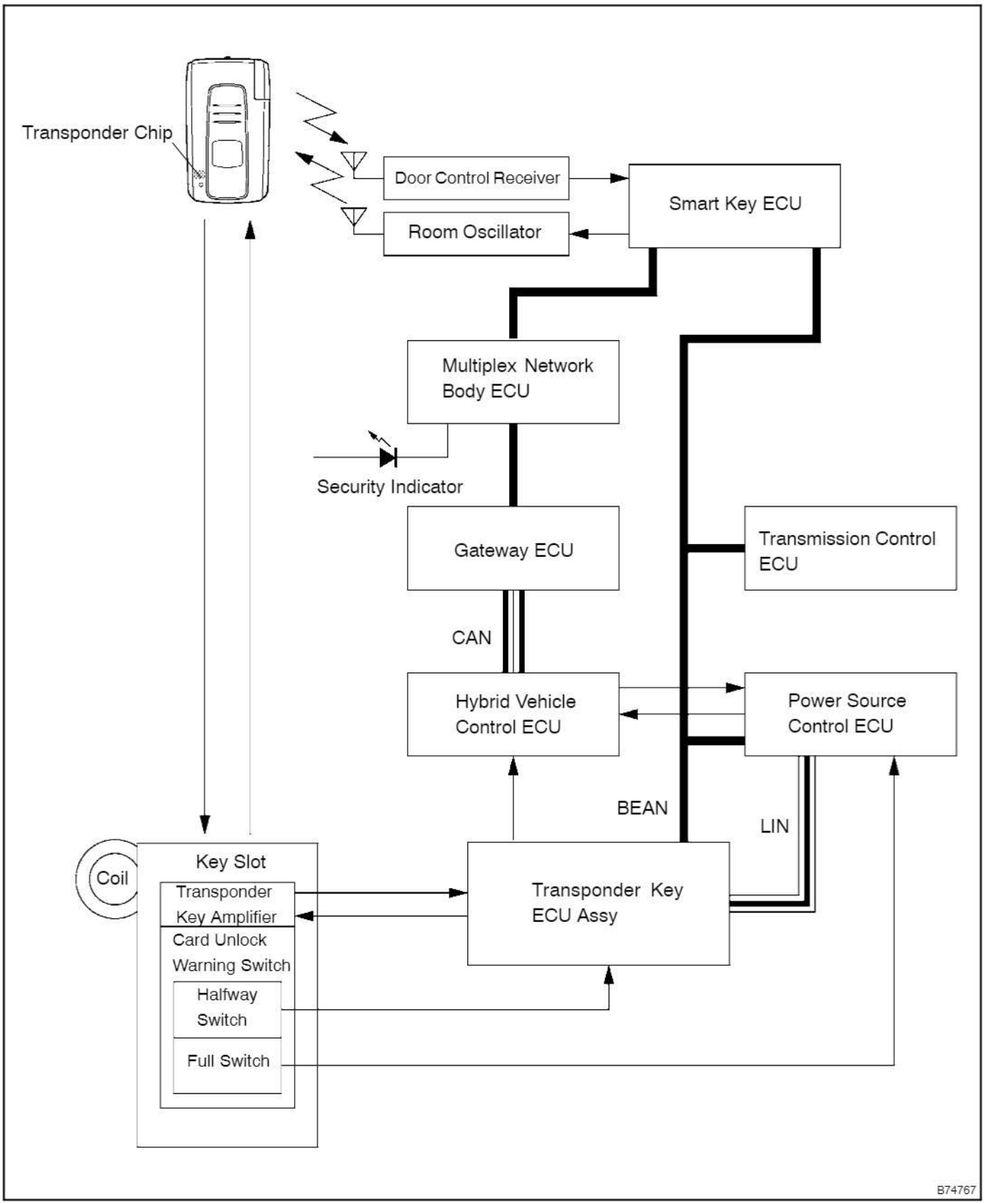
RHD Models



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05I9A-01

SYSTEM DIAGRAM



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05I9T–01

SYSTEM DESCRIPTION

1. ENGINE IMMOBILIZER SYSTEM DESCRIPTION

(a) The immobilizer system is a theft deterrent system that determines whether or not to disable starting of the TOYOTA Hybrid System II (THS II) depending on a comparison of the key's ID code and the vehicle's pre–registered code.

The immobilizer system compares the vehicle transponder key ECU's pre–registered ID code with the key–embedded transponder chip's ID code. If the ID codes do not match, the immobilizer system activates and the THS II cannot be started. The transponder key ECU manages communication with the hybrid vehicle control ECU and power source control ECU. When the ID codes of the transponder chip and transponder key ECU match, the transponder key ECU authorizes the starting of the THS II and the changing between the power switch's power modes.

2. FUNCTION OF MAIN COMPONENTS

Components	Outline
Transponder key coil/amplifier	Receives key ID code, amplifies ID code and outputs it to transponder key ECU. Key ID code is received when key is inserted into key slot.
Halfway switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to transponder key ECU.
Full switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to power source control ECU.
Room oscillator	Transmits key detection signals within detection area in vehicle interior upon receiving transmission request signal from smart key ECU. Smart key ECU request signal is activated when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Door control receiver	Transmits ID code to smart key ECU. Key ID code is received when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Security indicator	Illuminates or starts blinking. Illumination is controlled by multiplex network body ECU.

3. SYSTEM FUNCTION

(a) Starting hybrid control system with smart key inserted into the key slot

(1) When the transponder key ECU detects that the halfway switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key receives the faint electric wave. Upon receiving the faint electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the transponder key amplifier amplifies it, and then the signal is transmitted to the transponder key ECU.

The transponder key ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU. If the ID code match, then when the power switch is pushed, the code match results are set to the power source control ECU via the transponder key ECU. When the check results reveal that the ID codes is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is sent to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. The hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

The ECU transmits a security indicator signal that communicates "indicator off" to the multiplex network body ECU. Then, the multiplex network body ECU turns off the security indicator lamp.

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(b) Starting hybrid control system without inserting the smart key into key slot

(1) If a user operates the power switch while the key is in the user's possession, the smart key ECU outputs a request signal to the room oscillator. The room oscillator emits signals in order to form a smart key detection area in the vehicle interior. The key then sends its ID code signal to the smart key ECU via the door control receiver.

The smart key ECU matches the key's ID code with the vehicle's ID code, and then the code match results are sent to the power source control ECU via the transponder key ECU. When the check results reveal that the ID code is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is set to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. THe hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

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05I9E-01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the engine immobilizer system.
- The intelligent tester II should be used in steps 4, 5 and 7.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–2053)

3	START HYBRID CONTROL SYSTEM

(a) If the power switch's power mode cannot be changed to ON (ACC) or when the hybrid control system can be started, proceed to A.

(b) If the power switch's power mode can be changed to ON (ACC) and the hybrid control system cannot be started, proceed to B.

B → Go to HYBRID CONTROL SYSTEM (See page 05–268)

A

4	CHECK FOR ENGINE IMMOBILIZER SYSTEM DTCS

(a) Check for DTCs and note any codes that are output.

(b) Delete the DTC.

(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.

(1) If the DTC does not reoccur, proceed to A.

(2) If the DTC reoccurs, proceed to B.

B → Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05–2054)

(a) If the fault is not listed on the problem symptoms table, proceed to A.

(b) If the fault is listed on the problem symptoms table, proceed to B.

B → Go to step 7

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–2062)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).

(b) Terminals of ECU (see page 05–2055)

7	ADJUST, REPAIR OR REPLACEMENT

8	CONFIRMATION TEST

END

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05I9C-01

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILIZER SYSTEM Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		License Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day) ☐ Only once
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F))
Conditions When Problem Frequently Occurred	☐ Immediately after hybrid control system is started.	
	☐ When hybrid control system is restarted after a few hours driving (hours).	
	☐ Other	
Symptoms	☐ None of registered keys starts hybrid control system.	
	☐ Security indicator does not turn off.	☐ Key inserted into key slot. ☐ Power mode set to ON (IG).
	☐ Vehicle is not cranked normally.	
	☐ Several keys are connected together.	
	☐ Additional key registration is not possible.	
	☐ Immobilizer DTC ( )	
	☐ EFI DTC ( )	
	☐ DTC history ( )	
	☐ Other	

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05I9E-01

PROBLEM SYMPTOMS TABLE

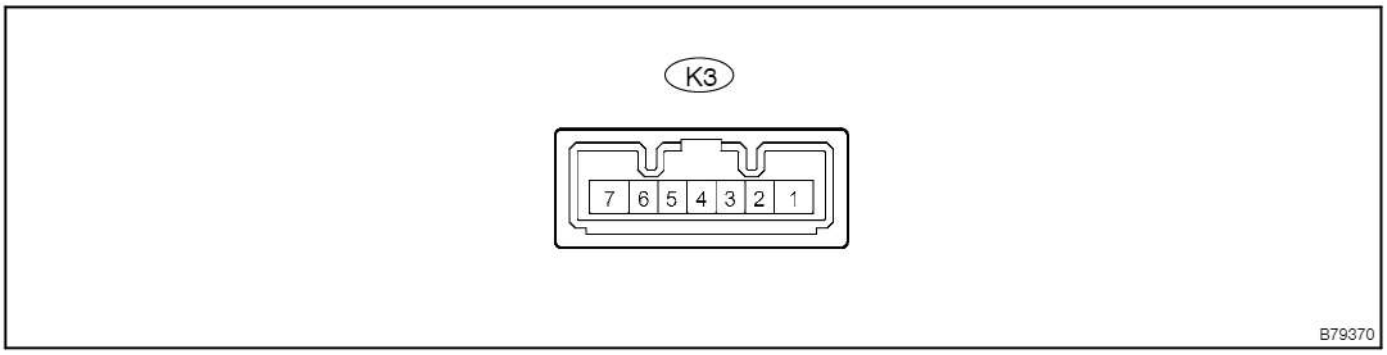
Problem Symptom	Suspected Area	See Page
Hybrid control system does not start	1. ECU power source circuit	05–2081
	2. Transponder key ECU assy	05–2081
	3. Push button start system	05–2121

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05I9F-01

TERMINALS OF ECU

1. CHECK KEY SLOT



(a) Disconnect the K3 key slot connector.

(b) Measure the resistance of the terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (K3–7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.

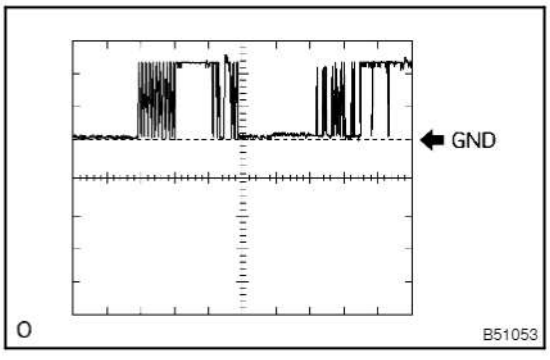
(c) Reconnect the K3 key slot connector.

(d) Measure the resistance and voltage of each terminal of wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (K3–1) – GND (K3–7)	Y – P	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (K3–4) – GND (K3–7)	L – P	Demodulated signal of key code data	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (K3–5) – GND (K3–7)	LG – P	Key code output signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
GND (K3–7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the key slot (amplifier) may have a malfunction.

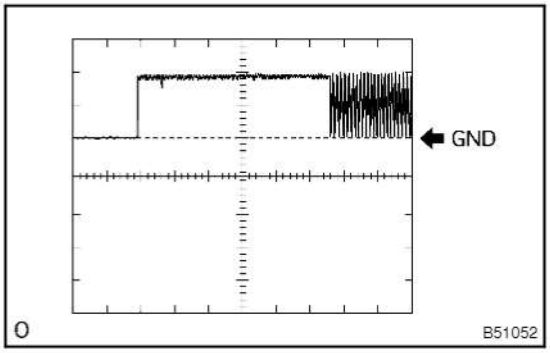


(e) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted

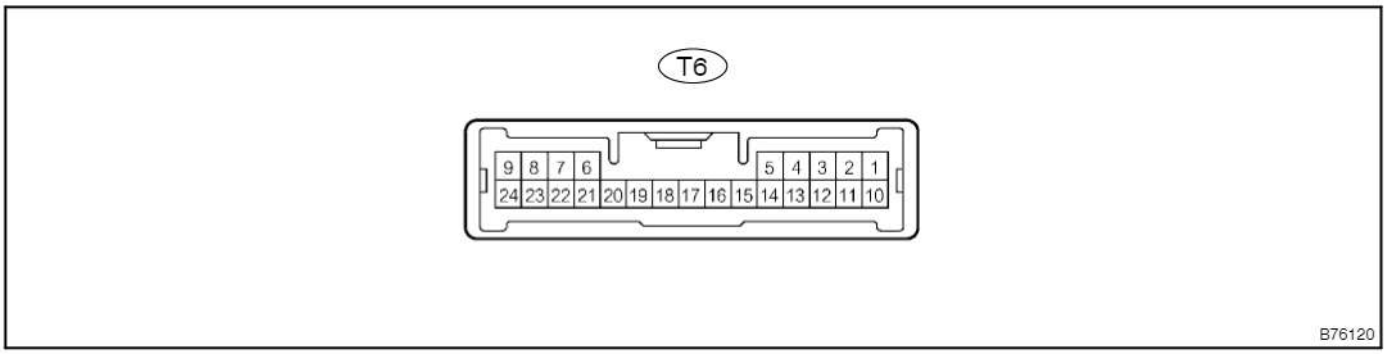
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Waveform 2 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted

2. CHECK TRANSPONDER KEY ECU



(a) Disconnect the T6 ECU connector.

(b) Measure the resistance and voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – GND (T6–22)	L – W–B	Battery	Constant	10 to 14 V
IG (T6–4) – GND (T6–22)	O – W–B	Power switch (IG)	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
AGND (T6–7) – GND (T6–22)	P – W–B	Ground	Constant	Below 1 Ω
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the T6 ECU connector.

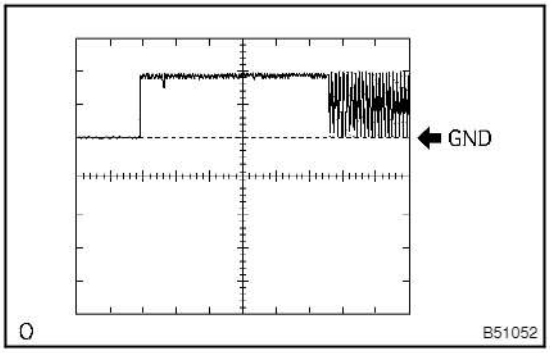
(d) Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 to 14 V → Below 1 V
VC5 (T6–20) – GND (T6–22)	Y – W–B	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (T6–21) – AGND (T6–7)	L – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (T6–6) – AGND (T6–7)	LG – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
HEV0 (T6–19) – GND (T6–22)	W – W–B	Hybrid vehicle control ECU output signal	No key in key slot → Key inserted	Pulse generation (see waveform 3)
HEV1 (T6–18) – GND (T6–22)	R – W–B	Hybrid vehicle control ECU input signal	Constant	Pulse generation (see waveform 4)

If the result is not as specified, the ECU may have a malfunction.

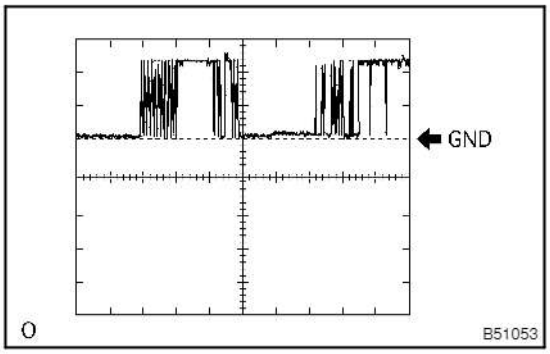
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(e) Inspect using an oscilloscope.

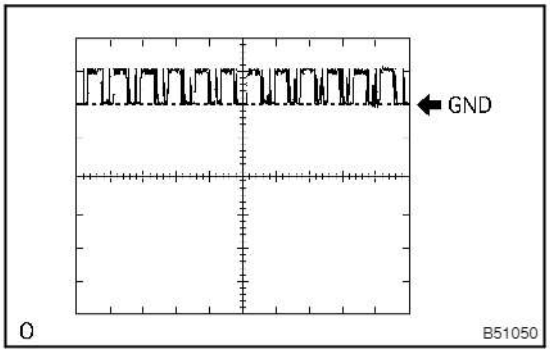
Waveform 1 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted



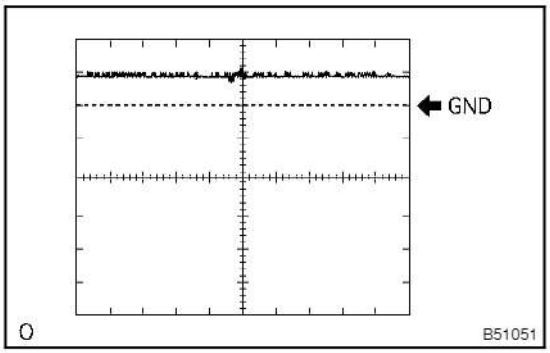
Waveform 2 (Reference):

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted



Waveform 3 (Reference):

Terminal	HEV0 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted

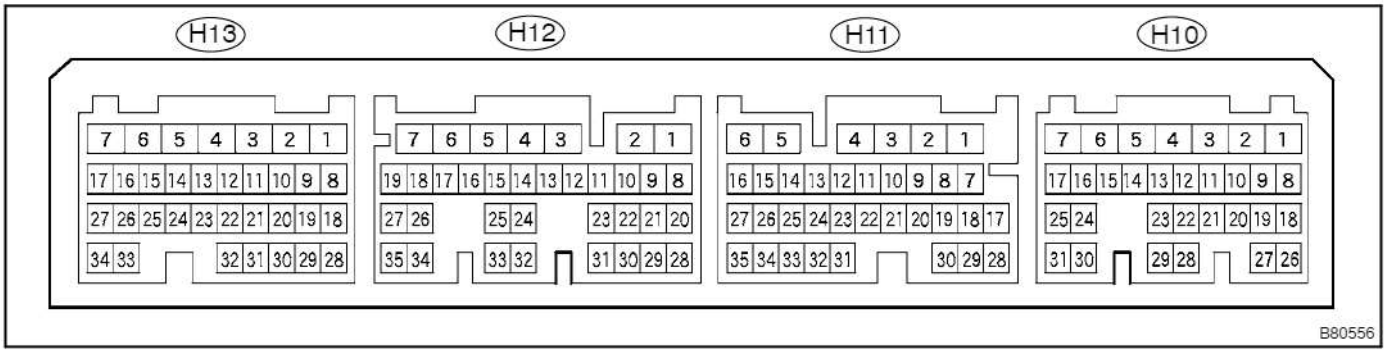


Waveform 4 (Reference):

Terminal	HEV1 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Constant

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3. CHECK HYBRID VEHICLE CONTROL ECU

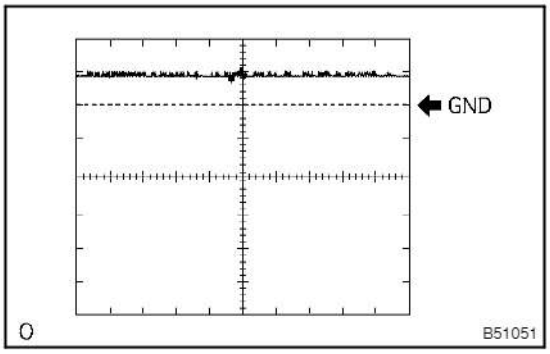


(a) Measure the resistance and voltage of each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ST2 (H10–5) – GND1 (H10–1)	Y – W–B	Ignition start control signal input	Hybrid control system stopped and power switch's power mode ON (READY)	10 to14 V
IGSW (H10–7) – GND1 (H10–1)	O – W–B	Ignition ready control signal input	Hybrid control system stopped and power switch's power mode ON (IG)	10 to14 V
BATT (H11–6) – GND1 (H10–1)	Y – W–B	Battery	Constant	10 to14 V
+B1 (H12–7) – GND1 (H10–1)	L – W–B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
+B2 (H12–6) – GND1 (H10–1)	L – W–B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
IMI (H10–6) – GND2 (H10–4)	W – W–B	Transponder key ECU input signal	Power switch's power mode ON (IG)	Pulse generation (see waveform 1)
IMO (H10–26) – GND2 (H10–4)	R – W–B	Transponder key ECU input signal	No key in key slot → Key insert	Pulse generation (see waveform 2)
GND1 (H10–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
GND2 (H10–4) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the ECU may have a malfunction.

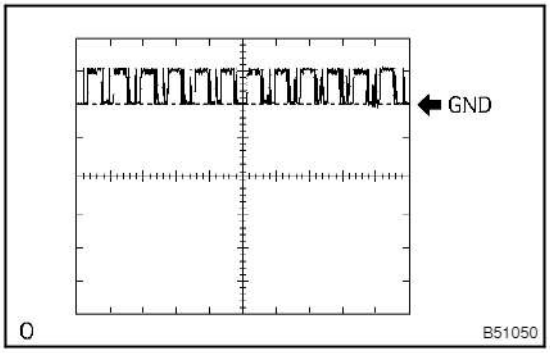


(b) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	IMI – GND1
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Power switch's power mode ON (IG)

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Waveform 2 (Reference):

Terminal	IMO – GND2
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted

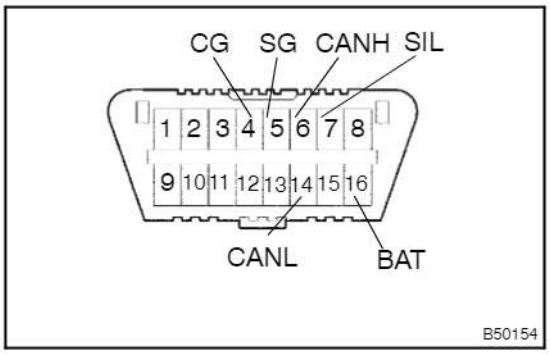
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05I9G–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The ECM controls the vehicle's immobilizer system functions. Immobilizer system data and the Diagnostic Trouble Code (DTCs) can be read through the vehicle's Data Link Connector 3 (DLC3). In some cases, a malfunction may be occurring in the immobilizer system even though the security indicator lamp is not illuminated. When the system seems to be malfunctioning, use the intelligent tester II to check for malfunctions and perform repairs.

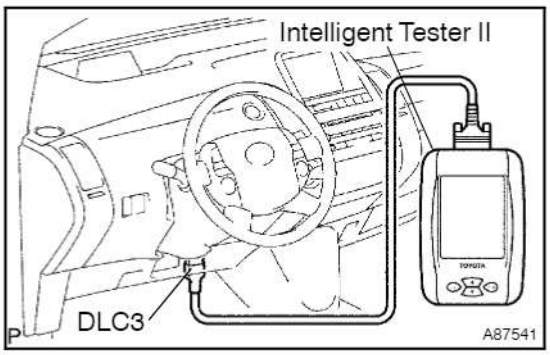


2. CHECK DLC3

The vehicle uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Constant
SG	5	Signal ground	Body ground	1 Ω or less	Constant
BAT	16	Battery positive	Body ground	9 to 14 V	Constant
CANH	6	HIGH–level CAN bus line	CANL	54 to 69 Ω	Power switch's power mode OFF
CANH	6	HIGH–level CAN bus line	Battery positive	1 MΩ or higher	Power switch's power mode OFF
CANH	6	HIGH–level CAN bus line	CG	1 kΩ or higher	Power switch's power mode OFF
CANL	14	LOW–level CAN bus line	Battery positive	1 MΩ or higher	Power switch's power mode OFF

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



HINT:

Connect the cable of the intelligent tester II to the DLC3, change the power switch's power mode to ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem may be on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. CHECK BATTERY VOLTAGE

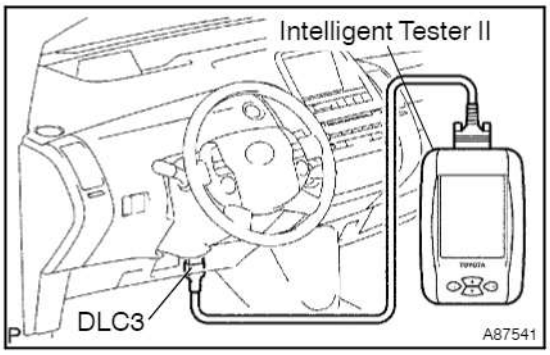
Standard: 11 to 14 V

If the voltage is below 11 V, replace the battery before proceeding.

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05I9H-01

DTC CHECK/CLEAR



1. CHECK DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

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05I9I–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DATA LIST according to the display on the tester.

Transponder key ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Key SW	Unlock warning switch signal/ ON or OFF	OFF: Key is in key slot ON: No key is in key slot	–
Shift Pos	Shift position P signal/ ON or OFF	ON: Shift position is P OFF: Shift position is not P	–
+B	–	NORMAL: Battery supply is normal BREAK: Battery supply is malfunctioning (break)	–
Antenna Coil	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	–
Immobiliser	Immobilizer system status/ SET or UNSET	SET: Power switch's power mode ON (IG) UNSET: Without key	–
Check (Security)	Verification with smart key ECU/ NORMAL or ABNORML	NORMAL: Verified with smart key ECU ABNORML: Not verified with smart key ECU	–
Permit (START)	Hybrid control system starting control/OK or NG	NG: Hybrid control system starting is not permitted OK: Hybrid control system starting is permitted	–
G–code Support	–	NOT SUP: G–code is not supported SUPPORT: G–code is supported	–
Master Key	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Master key code is sent	–
Regist Mas Code	Number of registered master key/ min. 0, max. 5	Number of registered master key	–
Regist Sub Code	Number of registered sub–key/ min. 0, max. 5	Number of registered sub–key	–

2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator, and other times to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU:

Item	Normal Condition	Diagnostic Note
Not P– Pos Warn	Shift p–pos warning is ON/OFF	–
Meter Chime	Meter chime is ON/OFF	–

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Item	Normal Condition	Diagnostic Note
Meter Buz	Meter buzzer is ON/OFF	–
Security Indic	Turn security indicator ON/OFF	–

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05I9J–01

DIAGNOSTIC TROUBLE CODE CHART

1. TRANSPONDER KEY ECU DTC CHART

DTC No. (See Page)	Detection Item	Trouble Area
B2784 (05–2065)	Antenna Coil Open/short	• Wire harness • Key slot • Transponder key ECU assy
B2785 (05–2067)	Ignition Switch ON Malfunction	• Wire harness • Transponder key ECU assy • Power source control ECU
B2793 (05–2069)	Transponder Chip Malfunction	Smart key (Door control transmitter)
B2794 (05–2070)	Unmatched Encryption Code	Smart key (Door control transmitter)
B2795 (05–2071)	Unmatched Key Code	Smart key (Door control transmitter)
B2796 (05–2072)	No Communication in Immobiliser System	• Smart key (Door control transmitter) • Key slot • Transponder key amplifier • Wire harness
B2797 (05–2075)	Communication Malfunction No. 1	• Smart key (Door control transmitter) • Wire harness • Key slot • Transponder key amplifier
B2798 (05–2072)	Communication Malfunction No. 2	Smart key (Door control transmitter)

2. HYBRID VEHICLE CONTROL ECU DTC CHART

NOTICE:

The DTCs for the immobilizer system are specified above. If the other codes are output, check the DTCs chart for the hybrid control system.

DTC No. (See Page)	Detection Item	Trouble Area
B2799–539 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–540 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–541 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–542 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–543 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–544 (05–2078)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU

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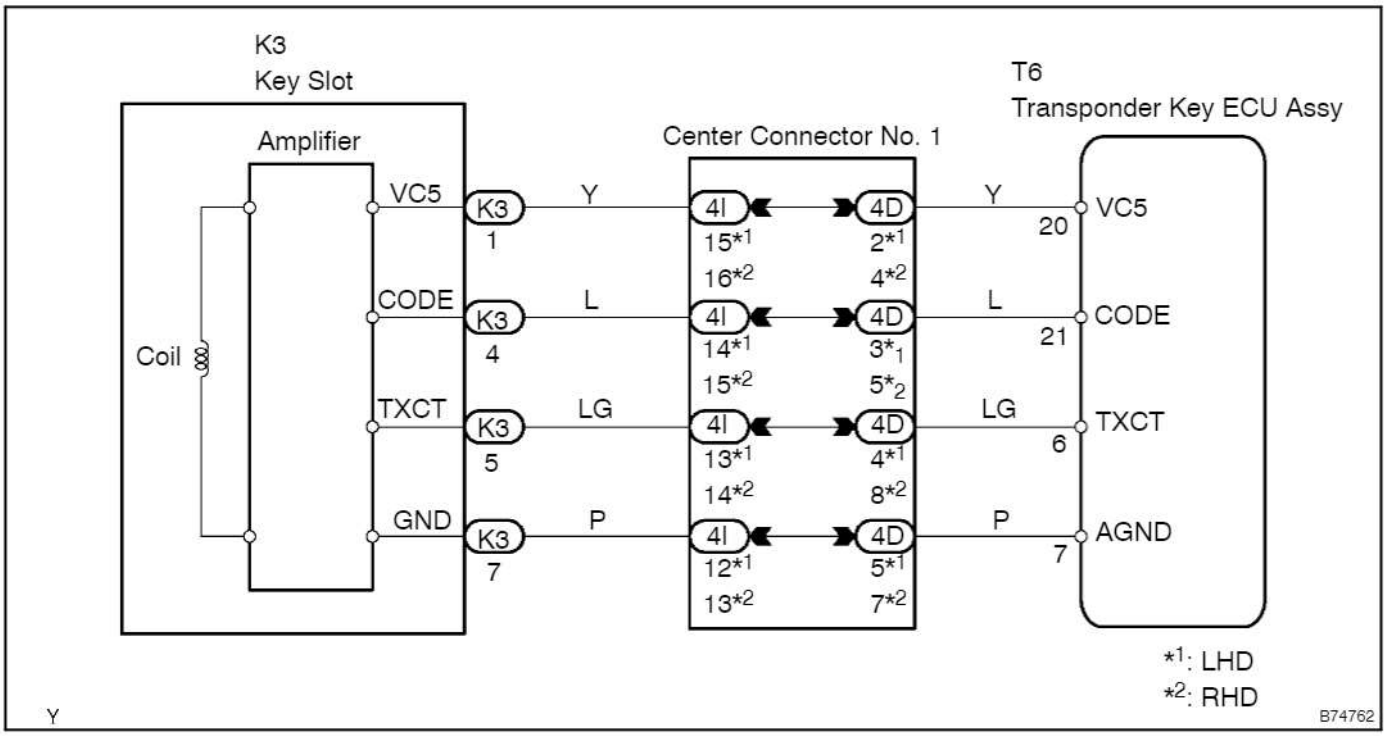
DTC	B2784	ANTENNA COIL OPEN/SHORT

CIRCUIT DESCRIPTION

This DTC detected when an antenna coil is open/short.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	• Wire harness • Key slot • Transponder key ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "NORMAL" (antenna coil is normal) appears on the screen.

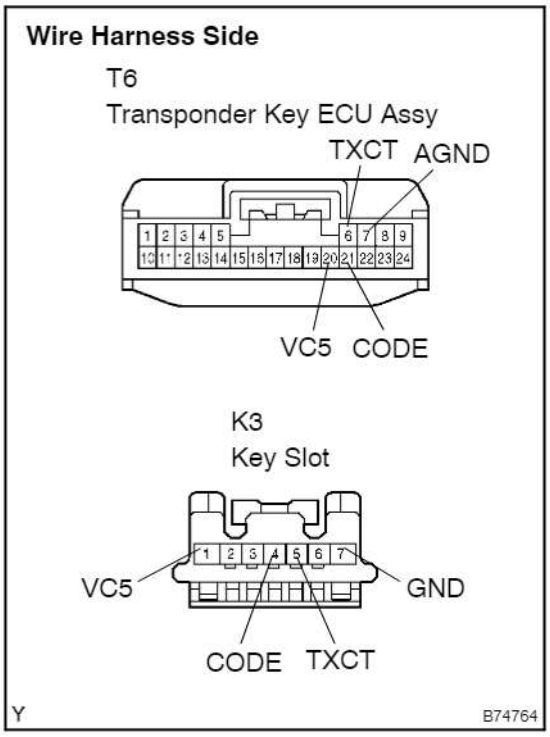
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Antenna Coil	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	–

NG → **Go to step 2**

OK

REPLACE TRANSPONDER KEY ECU ASSY

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T6–20 (VC5) – K3–1 (VC5)	Below 1 Ω
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω
T6–6 (TXCT) – K3–5 (TXCT)	Below 1 Ω
T6–7 (AGND) – K3–7 (GND)	Below 1 Ω
T6–20 (VC5) or K3–1 (VC5) – Body ground	10 kΩ or higher
T6–21 (CODE) or K3–4 (CODE) – Body ground	10 kΩ or higher
T6–6 (TXCT) or K3–5 (TXCT) – Body ground	10 kΩ or higher
T6–7 (AGND) or K3–7 (GND) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY ECU ASSY

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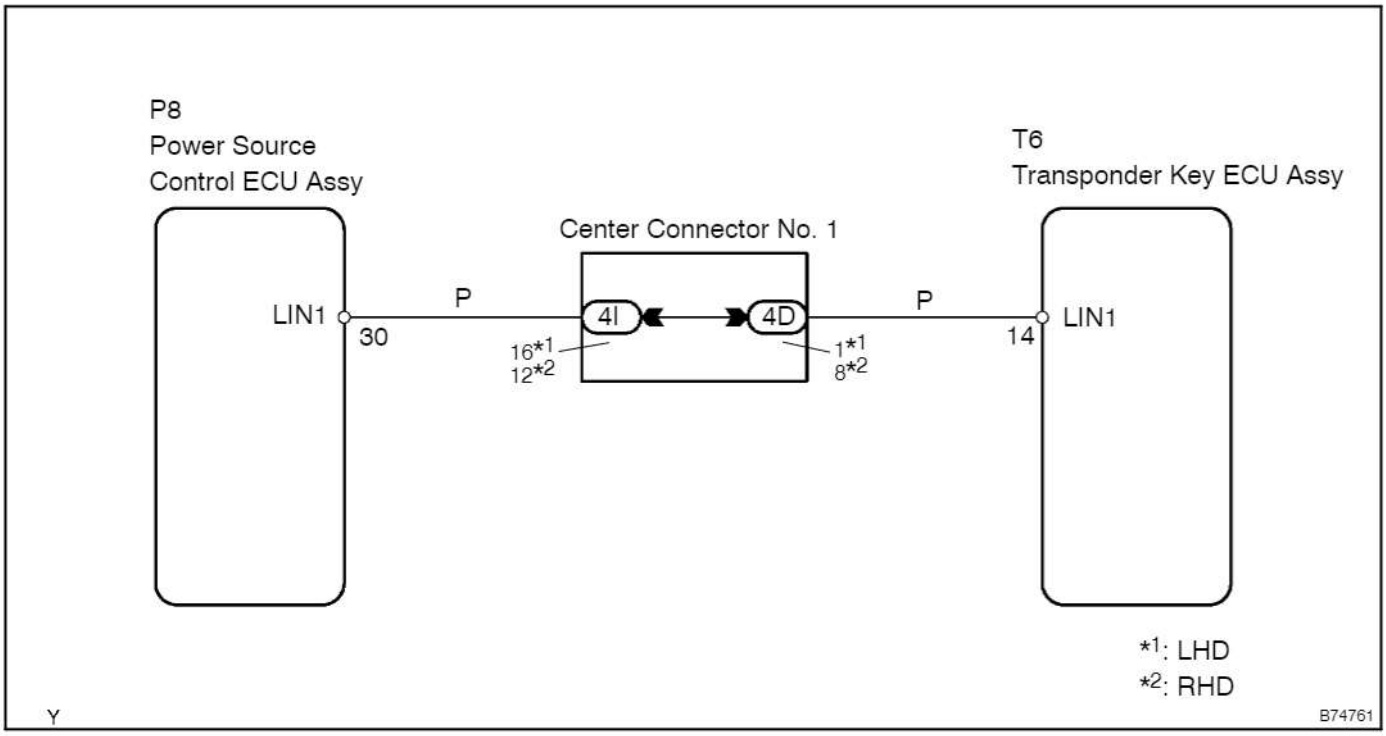
DTC	B2785	IGNITION SWITCH ON MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output if communication between the transponder key ECU and power source control ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2785	Communication between the transponder key ECU and power source control ECU is not possible	• Wire harness • Power source control ECU assy • Transponder key ECU assy

WIRING DIAGRAM



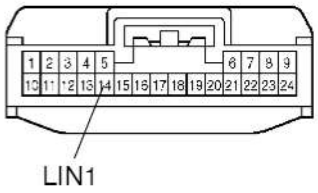
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INSPECTION PROCEDURE

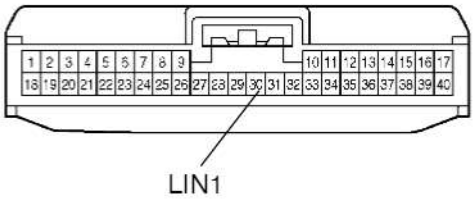
1	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY)

Wire Harness Side

T6
Transponder Key ECU Assy



P8
Power Source Control ECU Assy



Y B74763

(a) Reconnect the T6 and P8 ECU connector.
(b) Measure the resistance of each terminal of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–14 (LIN1) – P8–30 (LIN1)	Below 1 Ω
T6–14 (LIN1) or P8–30 (LIN1) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

2	CHECK OPERATION OF TRANSPONDER KEY ECU

(a) After replacing the transponder key ECU assy with a normally functioning ECU, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG → **REPLACE POWER SOURCE CONTROL ECU ASSY**

OK

END (REPLACE TRANSPONDER KEY ECU ASSY)

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DTC B2793 TRANSPONDER CHIP MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when: 1) during key code registration, a key malfunction occurs; or 2) the key code was unable to be registered properly. Follow the inspection procedure below.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Smart key (Door control transmitter)

INSPECTION PROCEDURE

1	RE–REGISTER KEY

(a) Delete the DTC (see page 05–2061).

(b) Re–register the key and insert this key into the key slot. Check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG → **REPLACE KEY**

OK

END

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DTC	B2794	UNMATCHED ENCRYPTION CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with an incomplete key code is inserted into the key slot.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Key with incomplete key code is inserted	Smart key (Door control transmitter)

INSPECTION PROCEDURE

REPLACE KEY

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DTC	B2795	UNMATCHED KEY CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the key slot.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered code is inserted	Smart key (Door control transmitter)

INSPECTION PROCEDURE

1	DELETE DTC AND INSERT ALL PRESENTLY AVAILABLE KEYS INTO KEY SLOT TO CHECK WHETHER HYBRID CONTROL SYSTEM STARTS OR NOT

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM

OK

END

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DTC	B2796	NO COMMUNICATION IN IMMOBILISER SYSTEM

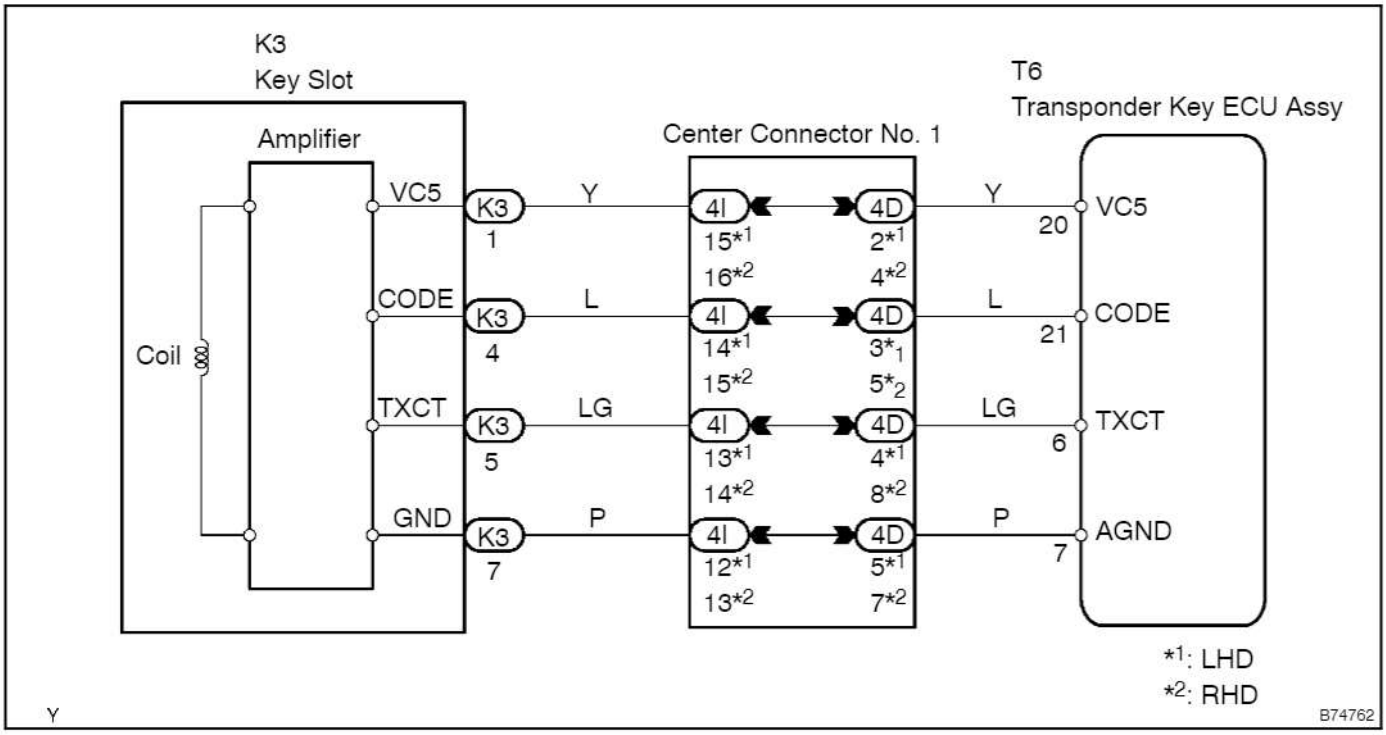
DTC	B2798	COMMUNICATION MALFUNCTION NO.2

CIRCUIT DESCRIPTION

This DTC is output when a key that does not have a transponder chip is inserted into the key slot or if communication between the key and transponder key ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	• Key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU assy
B2798	Communication error	Key (Door control transmitter)

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "SET" (power switch's power mode ON (IG)) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Immobiliser	Immobilizer system status/ SET or UNSET	UNSET: Without key SET: Power switch's power mode ON (IG)	–

NG → **Go to step 2**

OK

REPLACE TRANSPONDER KEY ECU ASSY

2	CHECK WHETHER HYBRID CONTROL SYSTEM STARTS WITH OTHER KEYS

(a) Insert the key that cannot the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
OK:
Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → **Go to step 3**

OK

RE–REGISTER OR REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM

3	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "NORMAL" (antenna coil is normal) appears on the screen.

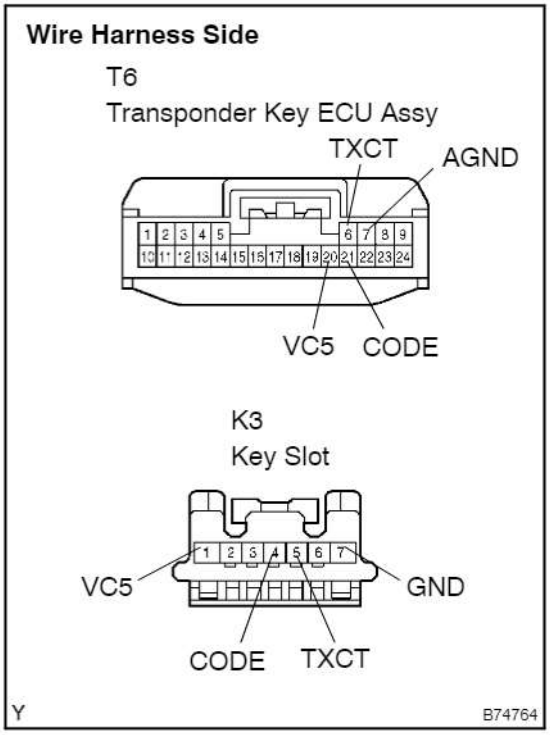
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Antenna Coil	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	–

NG → **REPLACE KEY SLOT**

OK

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4	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–20 (VC5) – K3–1 (VC5)	Below 1 Ω
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω
T6–6 (TXCT) – K3–5 (TXCT)	Below 1 Ω
T6–7 (AGND) – K3–7 (GND)	Below 1 Ω
T6–20 (VC5) or K3–1 (VC5) – Body ground	10 kΩ or higher
T6–21 (CODE) or K3–4 (CODE) – Body ground	10 kΩ or higher
T6–6 (TXCT) or K3–5 (TXCT) – Body ground	10 kΩ or higher
T6–7 (AGND) or K3–7 (GND) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

5	CHECK OPERATION OF KEY SLOT

(a) After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → **REPLACE TRANSPONDER KEY ECU ASSY**

OK

END (REPLACE KEY SLOT)

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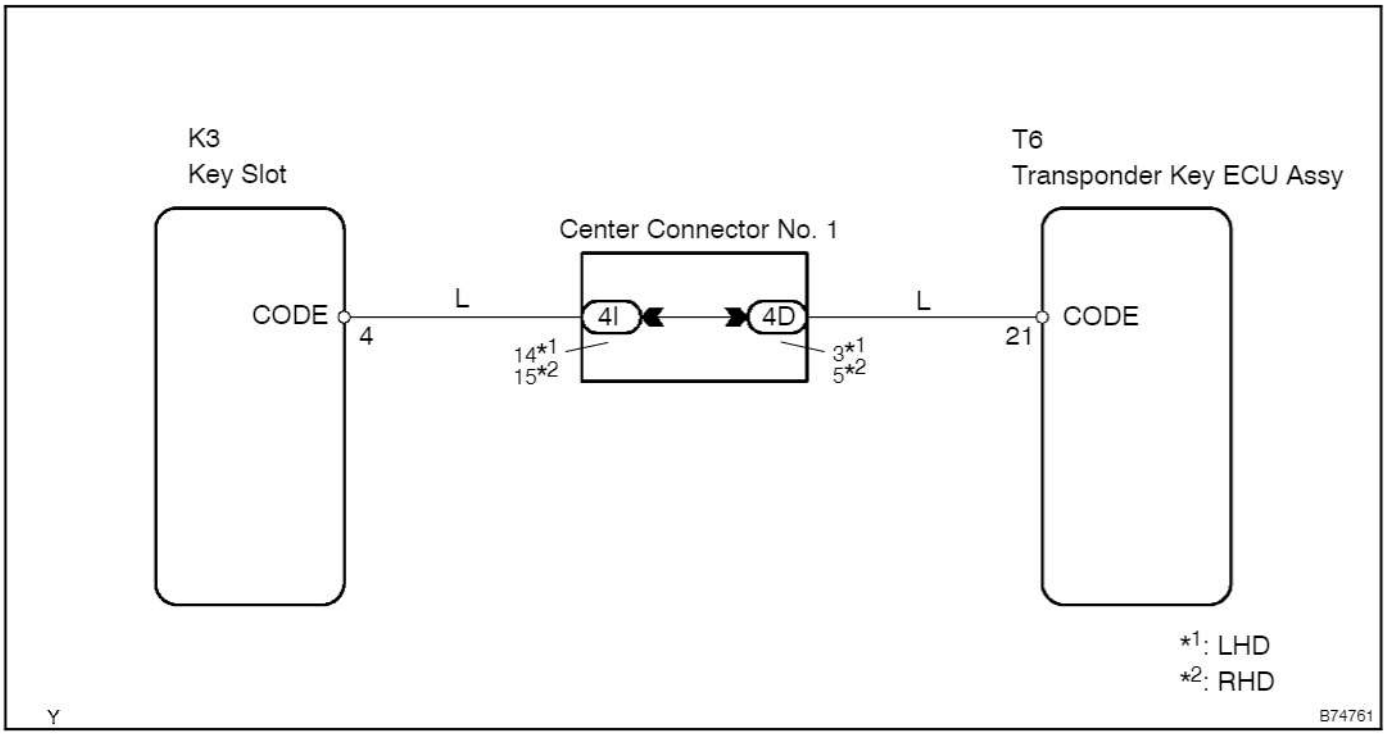
DTC	B2797	COMMUNICATION MALFUNCTION NO.1

CIRCUIT DESCRIPTION

This DTC is output when a communication error occurs between the transponder key amplifier and transponder key ECU. A possible reason for the communication error is that noise is occurring on the communication line. Following the inspection procedure below.

DTC No.	DTC Detection Condition	Trouble Area
B2797	Key has noise occurring on communication line	• Smart key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU assy

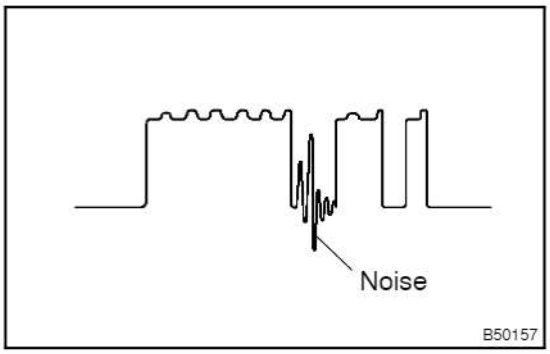
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK TRANSPONDER KEY ECU ASSY



(a) Using an oscilloscope or the hand–held tester, check that the waveform between the terminals of the K3 key slot and T6 ECU connector. The waveform should be similar to the illustration on the left.

Standard:

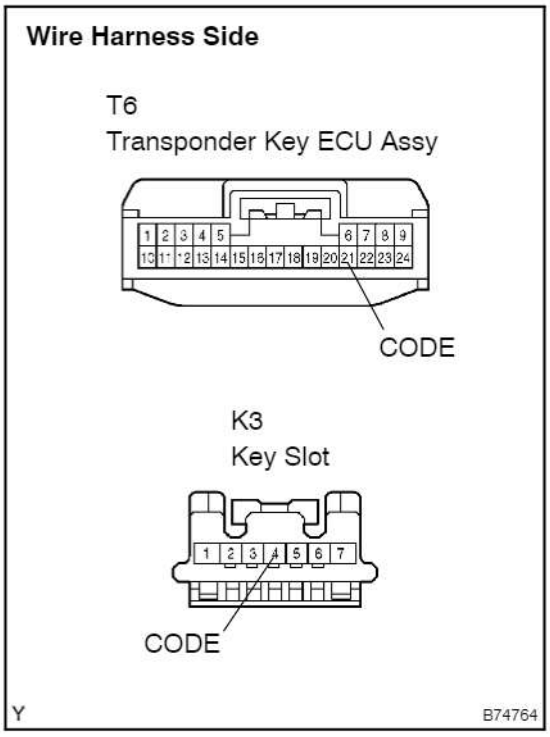
Tester Connection	Specified Condition
T6–21 (CODE) – K3–4 (CODE)	No noise is present

Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	Power switch's power mode OFF → ON (IG)

NG → **FIND CAUSE OF NOISE AND REMOVE IT**

OK

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

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3	CHECK OPERATION OF KEY SLOT

(a) After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.
OK:
Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → **REPLACE TRANSPONDER KEY ECU ASSY**

OK

END (REPLACE KEY SLOT)

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DTC	B2799–539	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–540	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–541	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–542	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–543	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–544	ENGINE IMMOBILISER SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

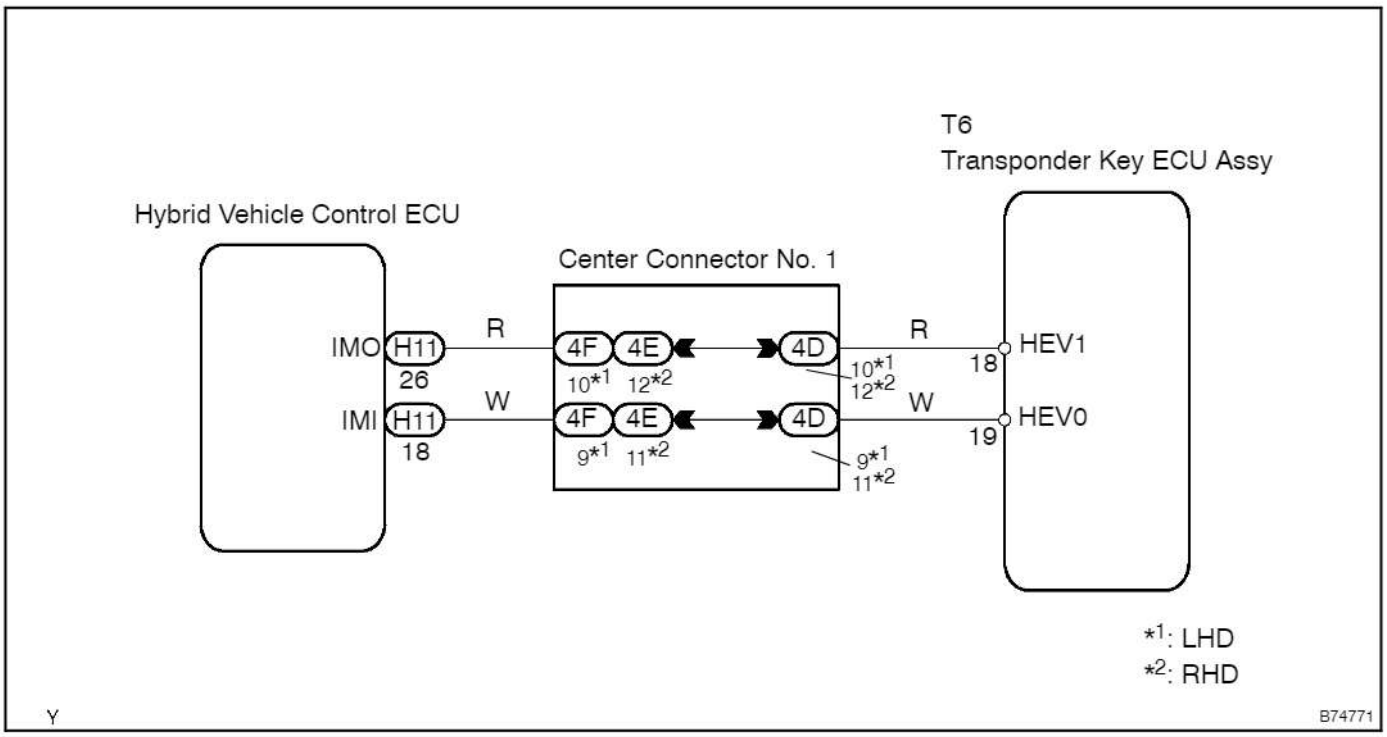
These DTCs are detected when: 1) the wire harness between the transponder key ECU and hybrid vehicle control ECU is open or short circuited, 2) the ECU communication IDs of the hybrid vehicle control ECU and transponder key ECU are different, 3) the start (ON (READY) signal delayed, or 4) the key codes are unmatched.

Before troubleshooting for the this DTC, make sure no transponder key ECU DTCs are present. If present, troubleshoot the transponder key ECU DTCs or hybrid vehicle control ECUs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799–539 B2799–540 B2799–541 B2799–542 B2799–543 B2799–544	When any of the following conditions are met: • wire harness between transponder key ECU and hybrid vehicle control ECU is open or short • ECU communication IDs of hybrid vehicle control ECU and transponder key ECU are different • ON (READY) signal is delayed more than 10 seconds from when power switch is set to ON (READY) • Key codes are unmatched.	• Wire harness • Hybrid vehicle control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTC (see page 05–2061).
(b) Check that no DTC is output.
OK: DTC is not output.

NG → **Go to step 2**

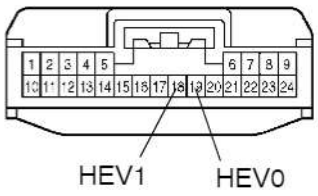
OK

END

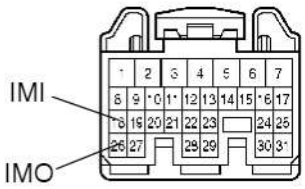
2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – HYBRID VEHICLE CONTROL ECU) (TRANSPONDER KEY ECU ASSY OR HYBRID VEHICLE CONTROL ECU – BODY GROUND)

Wire Harness Side

T6
Transponder Key ECU Assy



H11
Hybrid Vehicle Control ECU



Y B74765

(a) Disconnect the T6 and H11 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T6–19 (HEV0) – H11–18 (IMI)	Below 1 Ω
T6–18 (HEV1) – H11–26 (IMO)	Below 1 Ω
T6–19 (HEV0) or H11–18 (IMI) – Body ground	10 kΩ or higher
T6–18 (HEV1) or H11–26 (IMO) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

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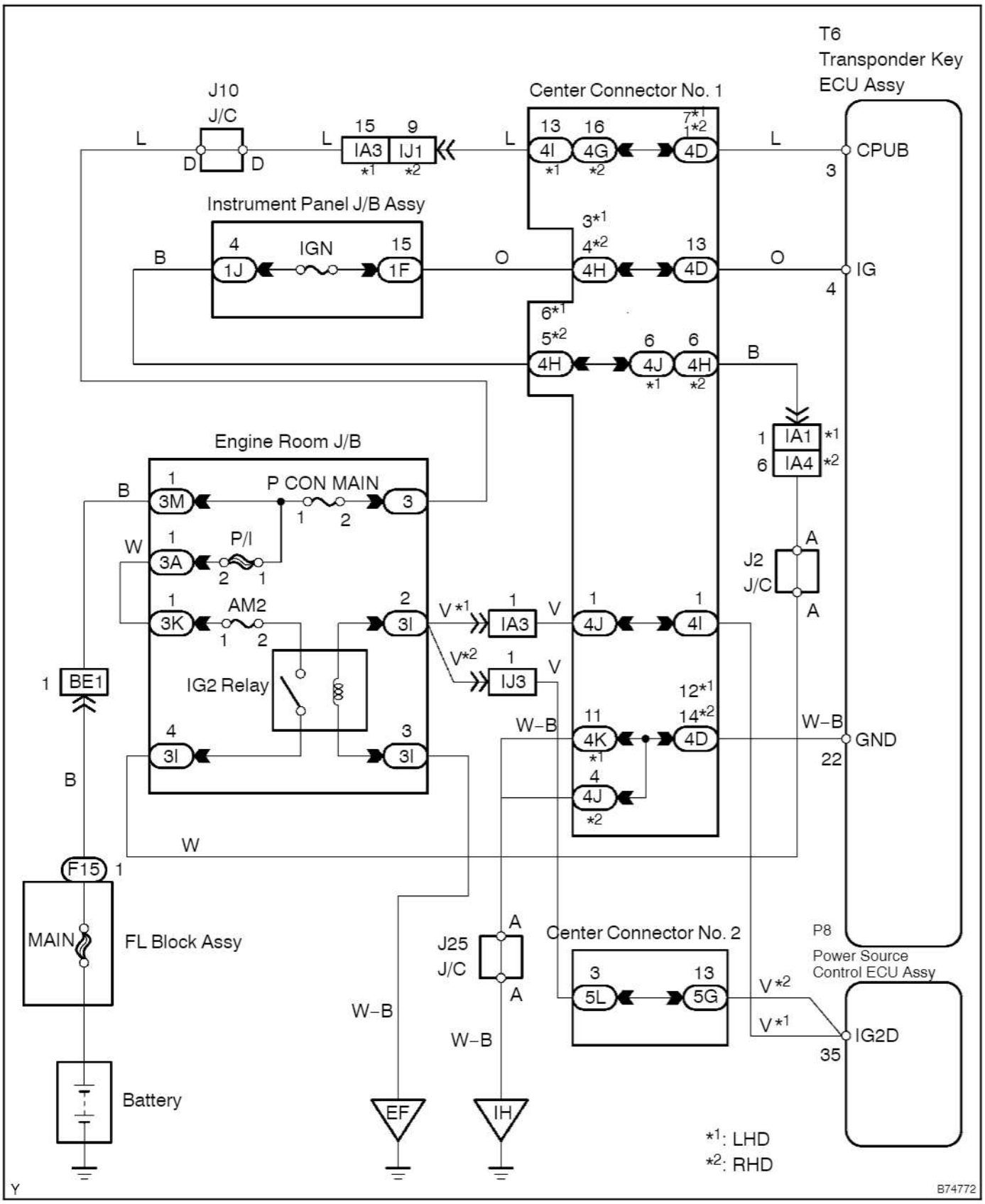
POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit provides power to operate the transponder key ECU assy.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

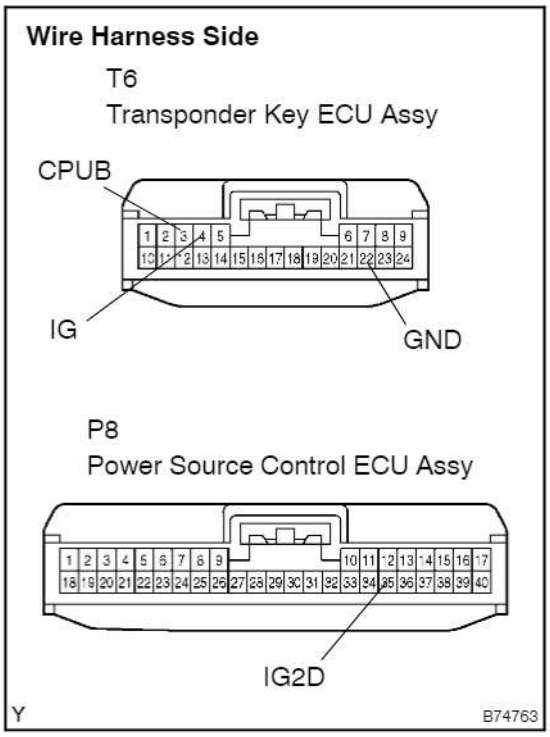
1	INSPECT FUSE (IGN, P CON MAIN, AM2)

(a) Remove the IGN fuse from the instrument panel J/B assy.
(b) Remove the P CON MAIN and AM2 fuses from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY AND BODY GROUND)



(a) Disconnect the T6 and P8 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connectors.
Standard:

Tester Connection	Condition	Specified Condition
T6– 4 (IG) – Body ground	Power switch OFF → ON (IG)	0 V → 10 to 14 V
P8–35 (IG2D) – Body ground	Constant	Below 1 Ω
T6– 3 (CPUB) – Body ground	Constant	10 to 14 V
T6– 22 (GND) – Body ground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

PROCEED TO PUSH BUTTON START SYSTEM (See page 05–2121)

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ENGINE IMMOBILIZER SYSTEM (W/O SMART ENTRY SYSTEM)

05JE8–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICE FOR HYBRID SYSTEM ACTIVATION:

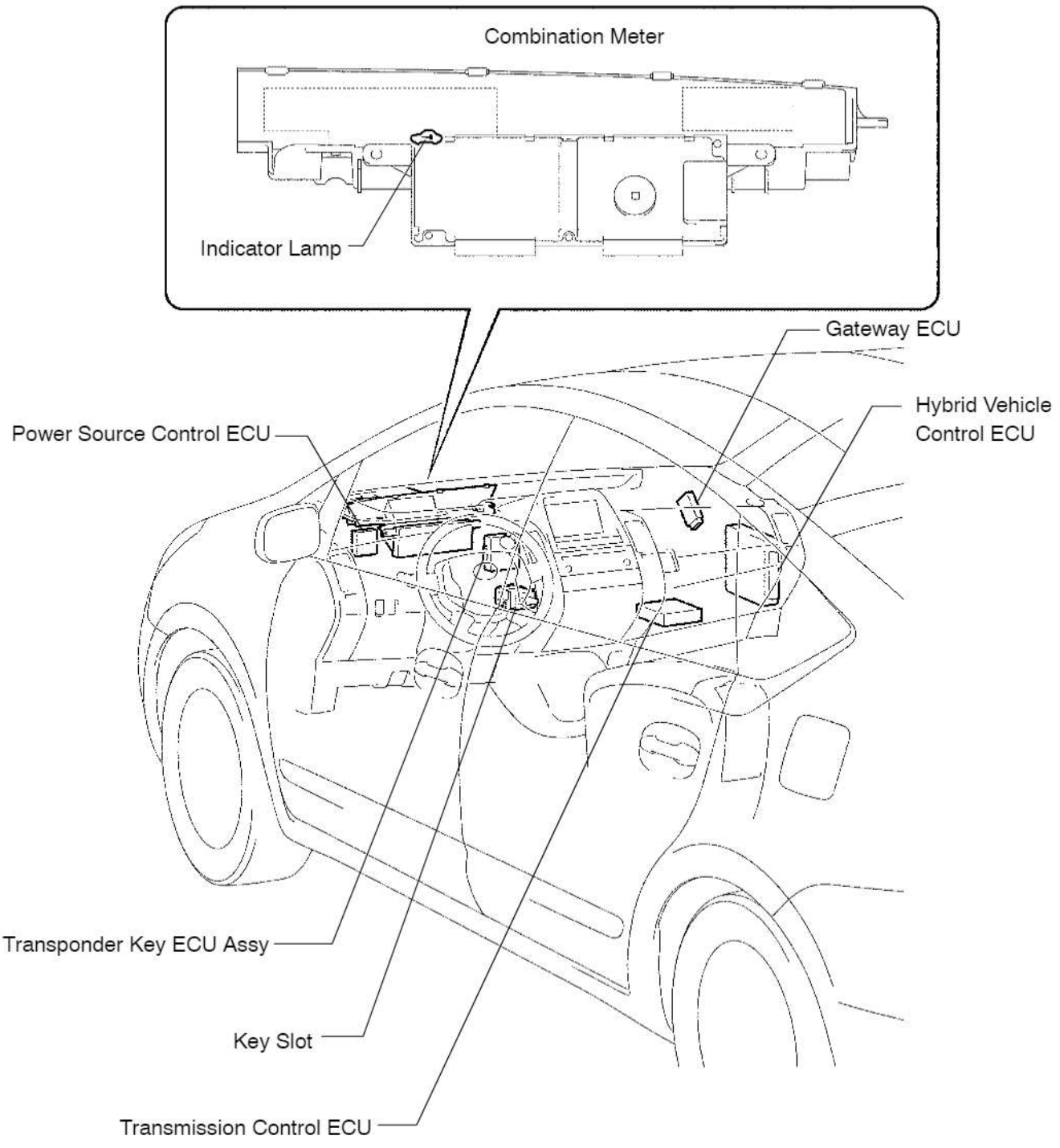
- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **If the power switch's power mode is to ON (IG), the battery is disconnected, and the key is not in the key slot during reconnection, DTC B2799 may be output.**

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05JE9-01

LOCATION

LHD Models

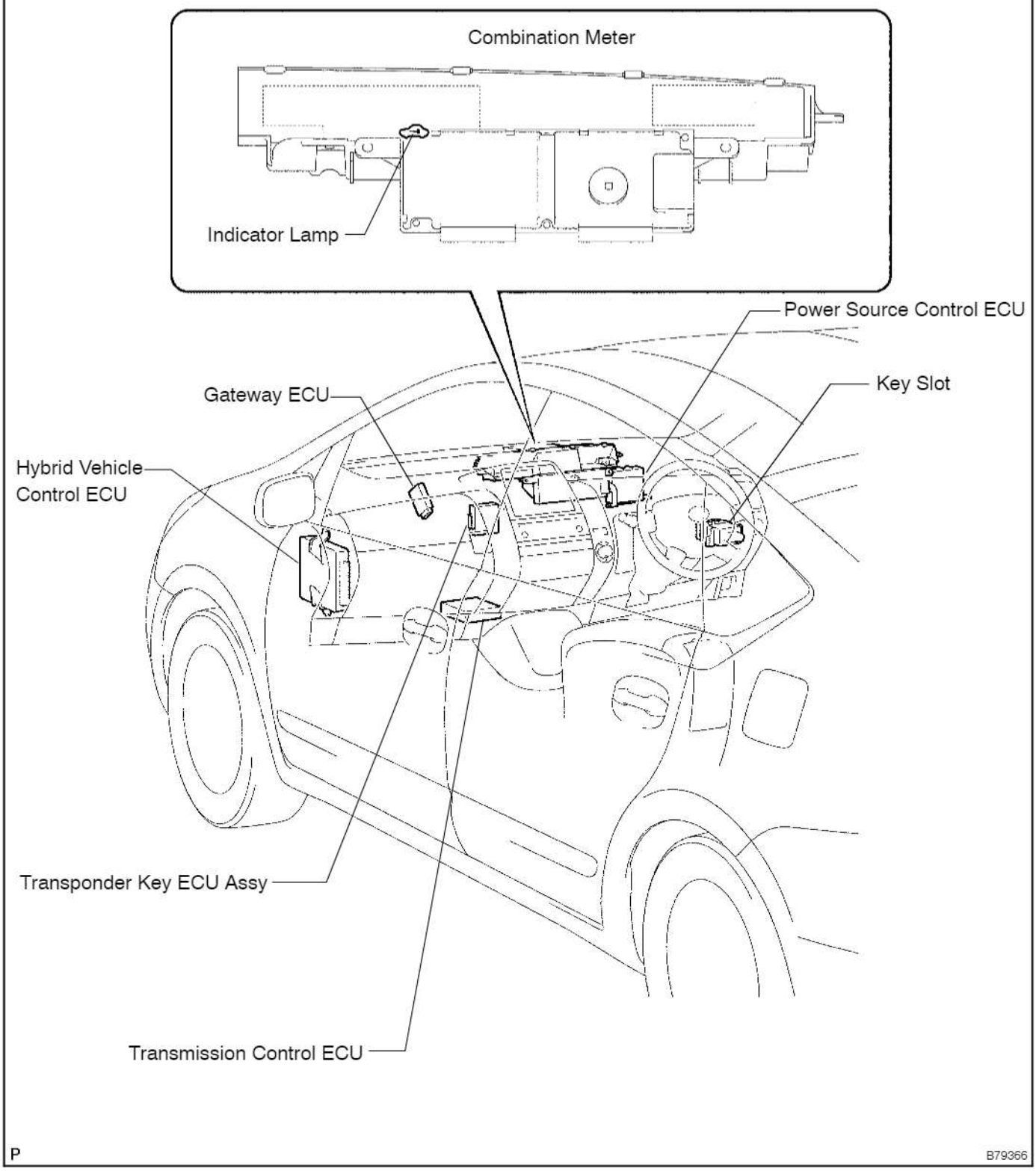


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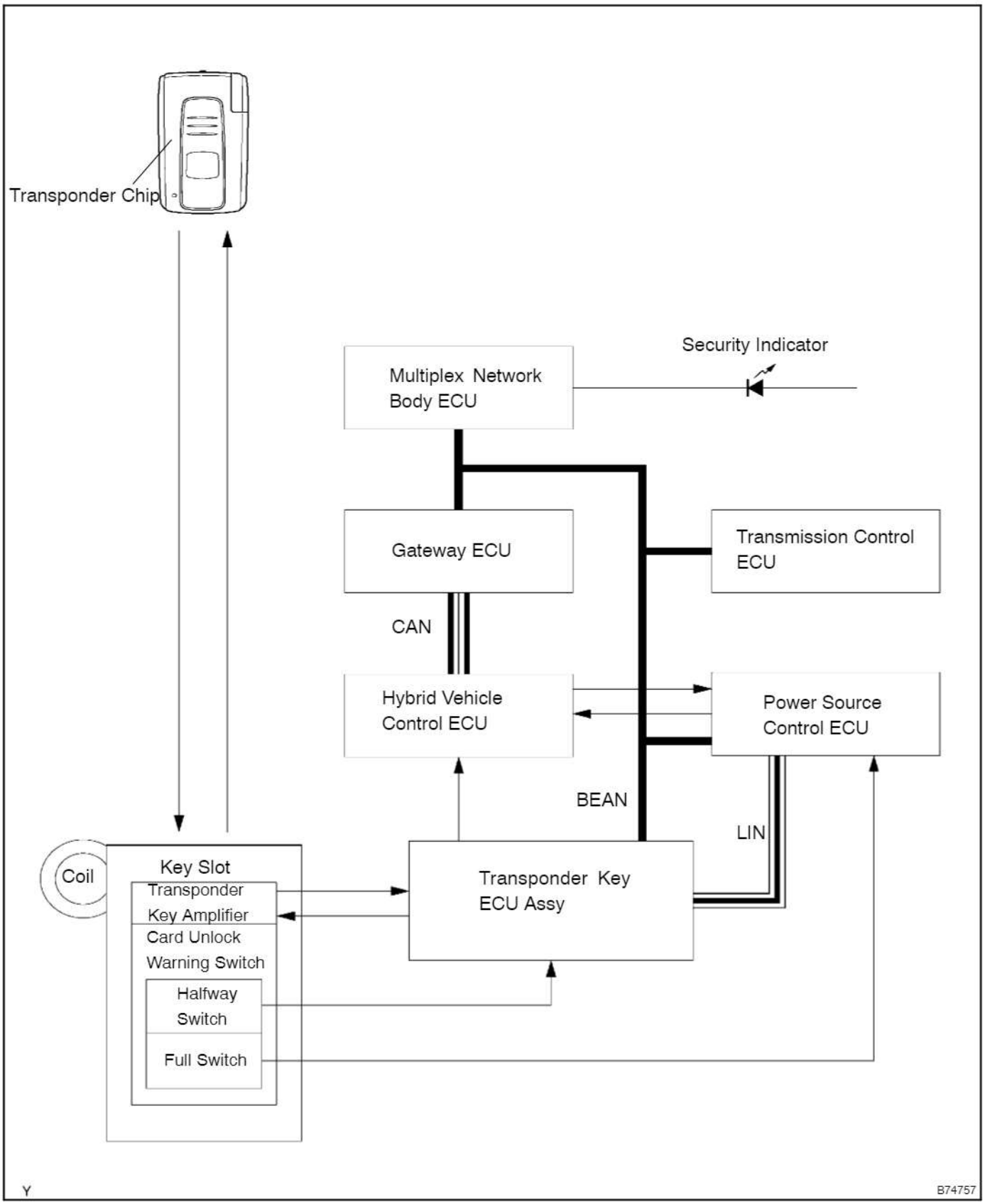
RHD Models



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05JEA-01

SYSTEM DIAGRAM



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05JEB–01

SYSTEM DESCRIPTION

1. ENGINE IMMOBILIZER SYSTEM DESCRIPTION

(a) The immobilizer system is a theft deterrent system that determines whether or not to disable starting of the TOYOTA Hybrid System II (THS II) depending on a comparison of the key's ID code and the vehicle's pre–registered code.

The immobilizer system compares the vehicle transponder key ECU's pre–registered ID code with the key–embedded transponder chip's ID code. If the ID codes do not match, the immobilizer system activates and the THS II cannot be started. The transponder key ECU manages communication with the hybrid vehicle control ECU and power source control ECU. When the ID codes of the transponder chip and transponder key ECU match, the transponder key ECU authorizes the starting of the THS II and the changing between the power switch's power modes.

2. FUNCTION OF MAIN COMPONENTS

Components	Outline
Transponder key coil/amplifier	Receives key ID code, amplifies ID code and outputs it to transponder key ECU. Key ID code is received when key is inserted into key slot.
Halfway switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to transponder key ECU.
Full switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to power source control ECU.
Security indicator	Illuminates or starts blinking. Illumination is controlled by multiplex network body ECU.

3. SYSTEM FUNCTION

(a) When the transponder key ECU detects that the halfway switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key receives the faint electric wave. Upon receiving the faint electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the transponder key amplifier amplifies it, and then the signal is transmitted to the transponder key ECU.

The transponder key ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU. If the ID codes match, then when the power switch is pushed, the code match results are sent to the power source control ECU via the transponder key ECU. When the check results reveal that the ID code is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is set to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. The hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

The ECU transmits a security indicator signal that communicates "indicator off" to the multiplex network body ECU. Then, the multiplex network body ECU turns off the security indicator lamp.

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05JEC-01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the engine immobilizer system.
- The intelligent tester II should be used in steps 4, 5 and 7.

1 VEHICLE BROUGHT TO WORKSHOP

2 CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–2091)

3 START HYBRID CONTROL SYSTEM

(a) If the power switch's power mode cannot be changed to ON (ACC) or when the hybrid control system can be started, proceed to A.

(b) If the power switch's power mode can be changed to ON (ACC) and the hybrid control system cannot be started, proceed to B.

B → **Go to HYBRID CONTROL SYSTEM (See page 05–268)**

A

4 CHECK FOR ENGINE IMMOBILIZER SYSTEM DTCS

(a) Check for DTCs and note any codes that are output.

(b) Delete the DTC.

(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.

(1) If the DTC does not reoccur, proceed to A.

(2) If the DTC reoccurs, proceed to B.

B → **Go to step 7**

A

5 PROBLEM SYMPTOMS TABLE (See page 05–2092)

(a) If the fault is not listed on the problem symptoms table, proceed to A.

(b) If the fault is listed on the problem symptoms table, proceed to B.

B → **Go to step 7**

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–2100)
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).

(b) Terminals of ECU (see page 05–2093)

7	ADJUST, REPAIR OR REPLACEMENT

8	CONFIRMATION TEST

END

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05JED–01

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILIZER SYSTEM Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		License Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day) ☐ Only once
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F))
Conditions When Problem Frequently Occurred	☐ Immediately after hybrid control system is started.	
	☐ When hybrid control system is restarted after a few hours driving (hours).	
	☐ Other	
Symptoms	☐ None of registered keys starts hybrid control system.	
	☐ Security indicator does not turn off.	☐ Key inserted into key slot. ☐ Power mode set to ON (IG).
	☐ Vehicle is not cranked normally.	
	☐ Several keys are connected together.	
	☐ Additional key registration is not possible.	
	☐ Immobilizer DTC ( )	
	☐ EFI DTC ( )	
	☐ DTC history ( )	
	☐ Other	

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05JEE-01

PROBLEM SYMPTOMS TABLE

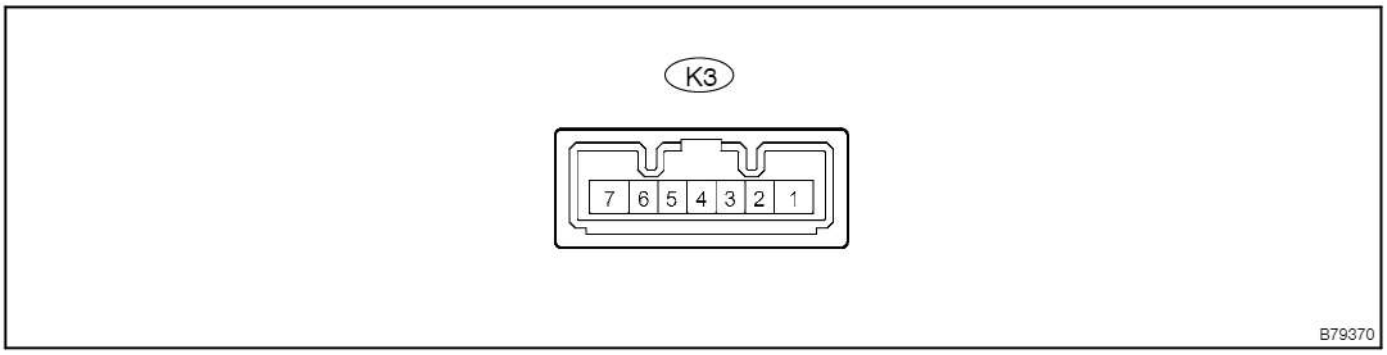
Problem Symptom	Suspected Area	See Page
Hybrid control system does not start	1. ECU power source circuit	05–2118
	2. Transponder key ECU assy	05–2118
	3. Push button start system	05–2121

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05JEF-01

TERMINALS OF ECU

1. CHECK KEY SLOT



(a) Disconnect the K3 key slot connector.

(b) Measure the resistance of the terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (K3–7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.

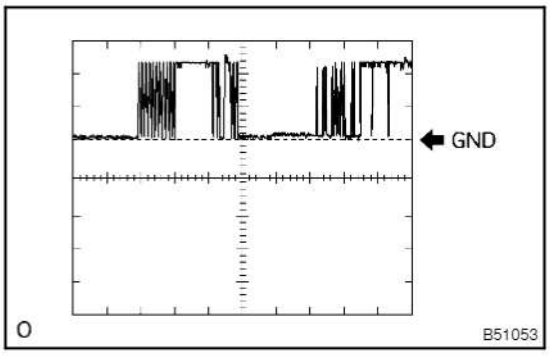
(c) Reconnect the K3 key slot connector.

(d) Measure the voltage and resistance of each terminal of wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (K3–1) – GND (K3–7)	Y – P	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (K3–4) – GND (K3–7)	L – P	Demodulated signal of key code data	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (K3–5) – GND (K3–7)	LG – P	Key code output signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
GND (K3–7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the key slot (amplifier) may have a malfunction.

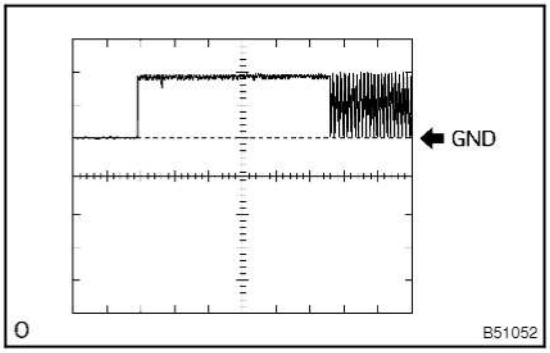


(e) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted

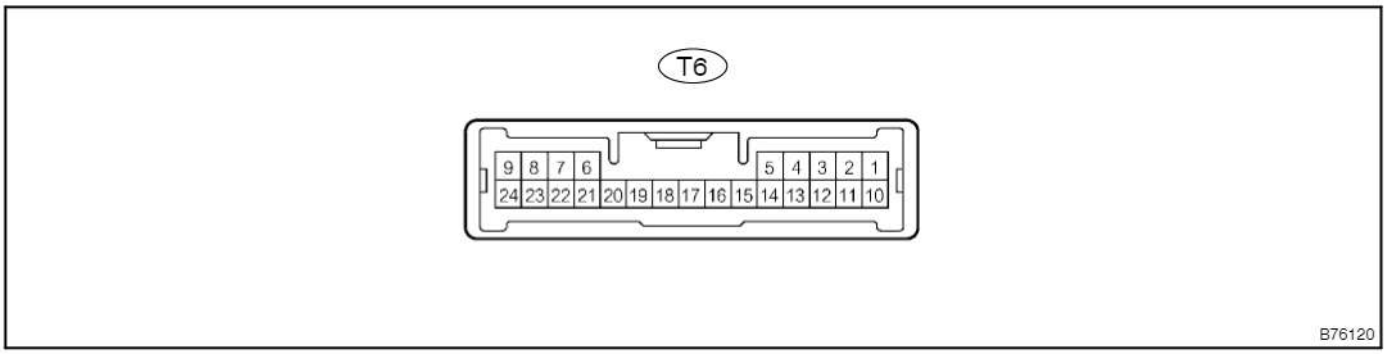
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Waveform 2 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted

2. CHECK TRANSPONDER KEY ECU



(a) Disconnect the T6 ECU connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – GND (T6–22)	L – W–B	Battery	Constant	10 to 14 V
IG (T6–4) – GND (T6–22)	O – W–B	Power switch (IG)	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
AGND (T6–7) – GND (T6–22)	P – W–B	Ground	Constant	Below 1 Ω
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the T6 ECU connector.

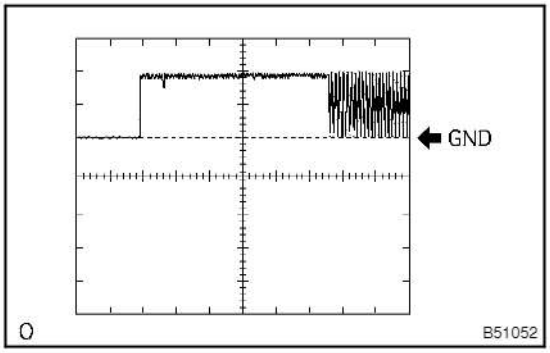
(d) Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CUWS (T6–5) –GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 to 14 V → Below 1 V
VC5 (T6–20) – GND (T6–22)	Y – W–B	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (T6–21) – AGND (T6–7)	L – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (T6–6) – AGND (T6–7)	LG – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
HEV0 (T6–19) – GND (T6–22)	W – W–B	Hybrid vehicle control ECU output signal	No key in key slot → Key inserted	Pulse generation (see waveform 3)
HEV1 (T6–18) – GND (T6–22)	R – W–B	Hybrid vehicle control ECU input signal	Constant	Pulse generation (see waveform 4)

If the result is not as specified, the ECU may have a malfunction.

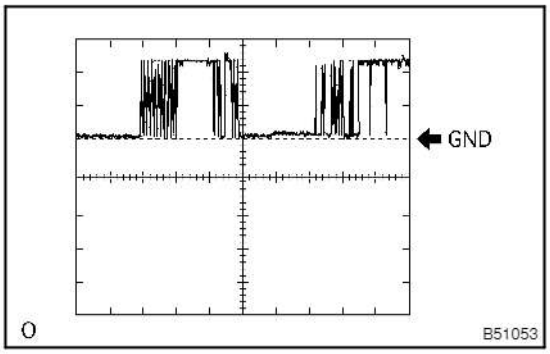
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(e) Inspect using an oscilloscope.

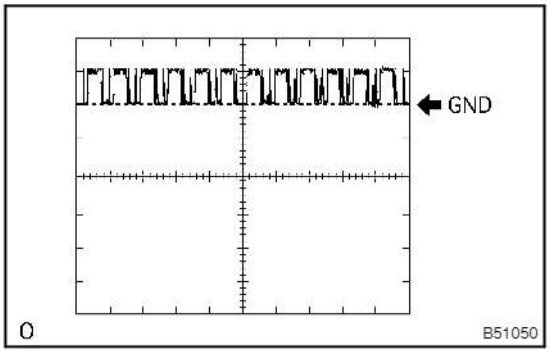
Waveform 1 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted



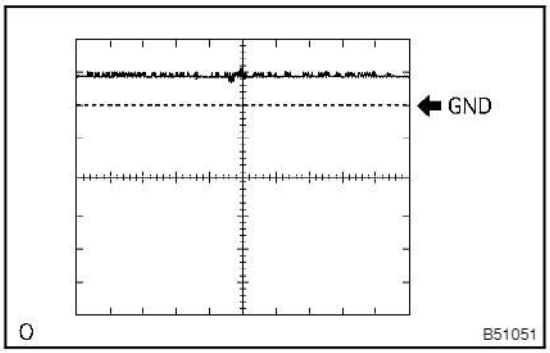
Waveform 2 (Reference):

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted



Waveform 3 (Reference):

Terminal	HEV0 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted

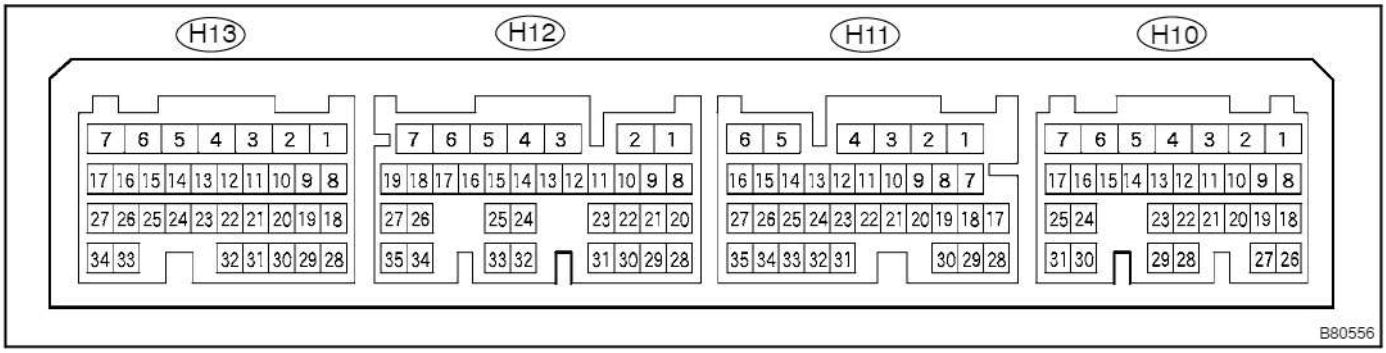


Waveform 4 (Reference):

Terminal	HEV1 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Constant

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3. CHECK HYBRID VEHICLE CONTROL ECU

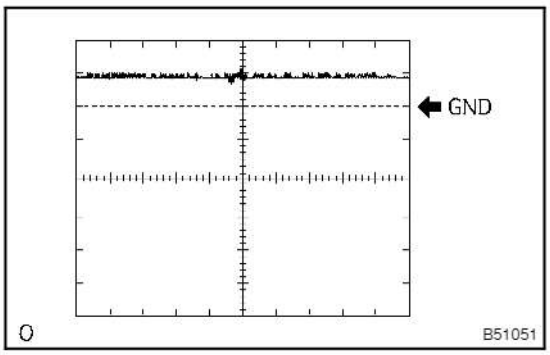


(a) Measure the voltage and resistance of each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ST2 (H10–5) – GND1 (H10–1)	Y – W–B	Ignition start control signal input	Hybrid control system stopped and power switch's power mode ON (READY)	10 to14 V
IGSW (H10–7) – GND1 (H10–1)	O – W–B	Ignition ready control signal input	Hybrid control system stopped and power switch's power mode ON (IG)	10 to14 V
BATT (H11–6) – GND1 (H10–1)	Y – W–B	Battery	Constant	10 to14 V
+B1 (H12–7) – GND1 (H10–1)	L – W–B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
+B2 (H12–6) – GND1 (H10–1)	L – W–B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
IMI (H10–6) – GND2 (H10–4)	W – W–B	Transponder key ECU input signal	Power switch's power mode ON (IG)	Pulse generation (see waveform 1)
IMO (H10–26) – GND2 (H10–4)	R – W–B	Transponder key ECU input signal	No key in key slot → Key insert	Pulse generation (see waveform 2)
GND1 (H10–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
GND2 (H10–4) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the ECU may have a malfunction.

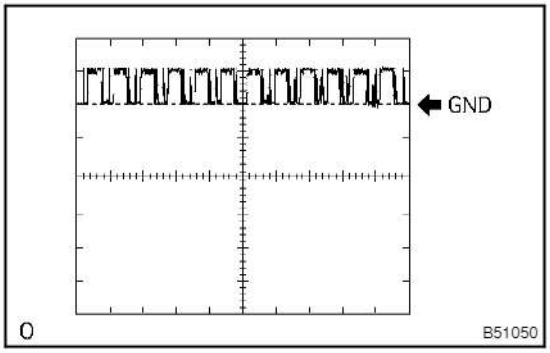


(b) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	IMI – GND1
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Power switch's power mode ON (IG)

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Waveform 2 (Reference):

Terminal	IMO – GND2
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted

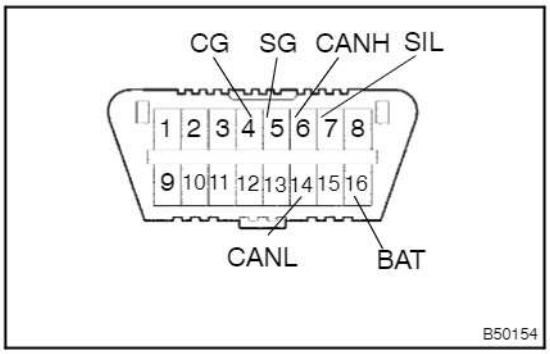
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05JEG–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The ECM controls the vehicle's immobilizer system functions. Immobilizer system data and the Diagnostic Trouble Code (DTCs) can be read through the vehicle's Data Link Connector 3 (DLC3). In some cases, a malfunction may be occurring in the immobilizer system even though the security indicator lamp is not illuminated. When the system seems to be malfunctioning, use the intelligent tester II to check for malfunctions and perform repairs.

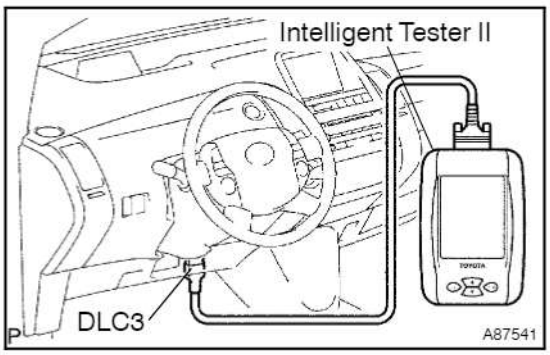


2. CHECK DLC3

The vehicle uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Constant
SG	5	Signal ground	Body ground	1 Ω or less	Constant
BAT	16	Battery positive	Body ground	9 to 14 V	Constant
CANH	6	HIGH–level CAN bus line	CANL	54 to 69 Ω	Power switch's power mode OFF
CANH	6	HIGH–level CAN bus line	Battery positive	1 MΩ or higher	Power switch's power mode OFF
CANH	6	HIGH–level CAN bus line	CG	1 kΩ or higher	Power switch's power mode OFF
CANL	14	LOW–level CAN bus line	Battery positive	1 MΩ or higher	Power switch's power mode OFF

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



HINT:

Connect the cable of the intelligent tester II to the DLC3, change the power switch's power mode to ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem may be on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. CHECK BATTERY VOLTAGE

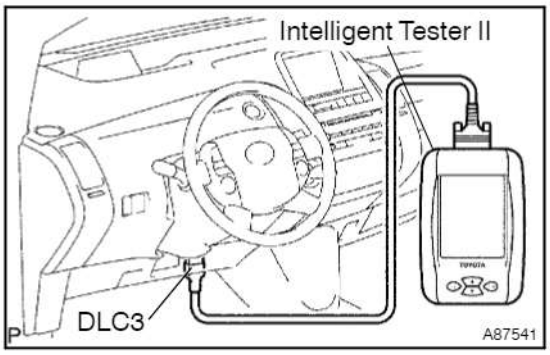
Standard: 11 to 14 V

If the voltage is below 11 V, replace the battery before proceeding.

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05JEH-01

DTC CHECK/CLEAR



1. CHECK DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester II operator's manual for further details.

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05JEI–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Read the DATA LIST according to the display on the tester.

Transponder key ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Key SW	Unlock warning switch signal/ ON or OFF	OFF: Key is in key slot ON: No key is in key slot	–
Shift Pos	Shift position P signal/ ON or OFF	ON: Shift position is P OFF: Shift position is not P	–
+B	–	NORMAL: Battery supply is normal BREAK: Battery supply is malfunctioning (break)	–
Antenna Coil	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	–
Immobiliser	Immobilizer system status/ SET or UNSET	SET: Power switch's power mode ON (IG) UNSET: Without key	–
Permit (START)	Hybrid control system starting control/OK or NG	NG: Hybrid control system starting is not permitted OK: Hybrid control system starting is permitted	–
G–code Support	–	NOT SUP: G–code is not supported SUPPORT: G–code is supported	–
Master Key	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Master key code is sent	–
Regist Mas Code	Number of registered master key/ min. 0, max. 5	Number of registered master key	–
Regist Sub Code	Number of registered sub–key/ min. 0, max. 5	Number of registered sub–key	–

2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator, and other times to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Change the power switch's power mode to ON (IG) by pushing the power switch.

(c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU:

Item	Normal Condition	Diagnostic Note
Not P– Pos Warn	Shift p–pos warning is ON/OFF	–
Meter Chime	Meter chime is ON/OFF	–
Meter Buz	Meter buzzer is ON/OFF	–
Security Indic	Turn security indicator ON/OFF	–

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05JEJ–01

DIAGNOSTIC TROUBLE CODE CHART

1. TRANSPONDER KEY ECU DTC CHART

DTC No. (See Page)	Detection Item	Trouble Area
B2784 (05–2102)	Antenna Coil Open/Short	• Wire harness • Key slot • Transponder key ECU assy
B2785 (05–2104)	Ignition Switch ON Malfunction	• Wire harness • Transponder key ECU assy • Power source control ECU
B2793 (05–2106)	Transponder Chip Malfunction	Key (Door control transmitter)
B2794 (05–2107)	Unmatched Encryption Code	Key (Door control transmitter)
B2795 (05–2108)	Unmatched Key Code	Key (Door control transmitter)
B2796 (05–2109)	No Communication in Immobiliser System	• Key (Door control transmitter) • Key slot • Transponder key amplifier • Wire harness
B2797 (05–2112)	Communication Malfunction No. 1	• Key (Door control transmitter) • Wire harness • Key slot • Transponder key amplifier
B2798 (05–2109)	Communication Malfunction No. 2	Key (Door control transmitter)

2. HYBRID VEHICLE CONTROL ECU DTC CHART

NOTICE:

The DTCs for the immobilizer system are specified above. If the other codes are output, check the DTCs chart for the hybrid control system.

DTC No. (See Page)	Detection Item	Trouble Area
B2799–539 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–540 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–541 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–542 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–543 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799–544 (05–2115)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU

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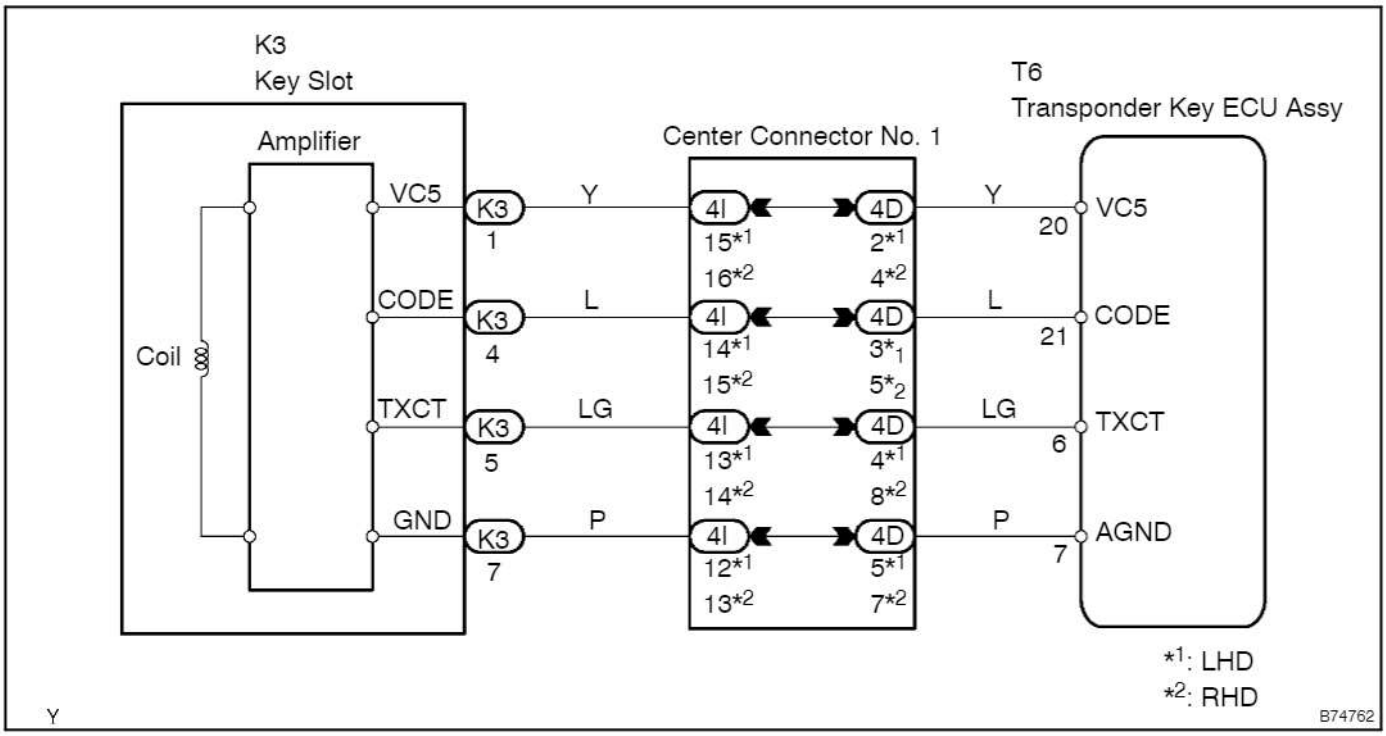
DTC B2784 ANTENNA COIL OPEN/SHORT

CIRCUIT DESCRIPTION

This DTC detected when an antenna coil is open/short.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	• Wire harness • Key slot • Transponder key ECU assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "NORMAL" (antenna coil is normal) appears on the screen.

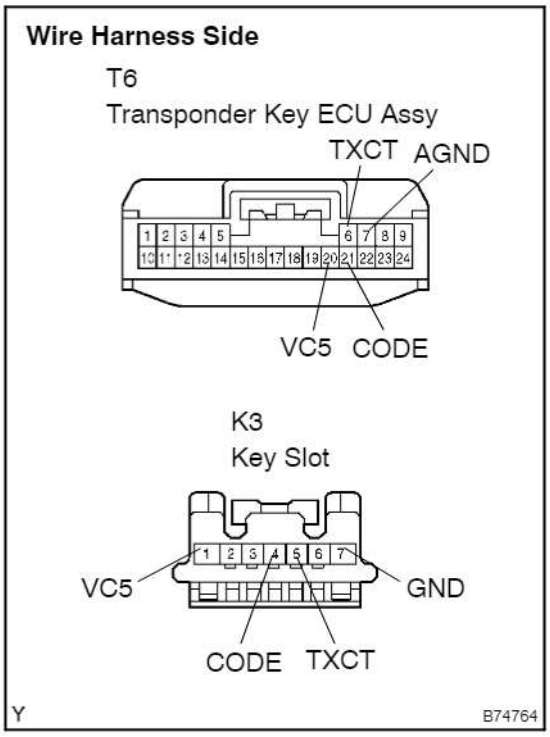
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Antenna Coil	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	–

NG → **Go to step 2**

OK

REPLACE TRANSPONDER KEY ECU ASSY

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T6–20 (VC5) – K3–1 (VC5)	Below 1 Ω
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω
T6–6 (TXCT) – K3–5 (TXCT)	Below 1 Ω
T6–7 (AGND) – K3–7 (GND)	Below 1 Ω
T6–20 (VC5) or K3–1 (VC5) – Body ground	10 kΩ or higher
T6–21 (CODE) or K3–4 (CODE) – Body ground	10 kΩ or higher
T6–6 (TXCT) or K3–5 (TXCT) – Body ground	10 kΩ or higher
T6–7 (AGND) or K3–7 (GND) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY ECU ASSY

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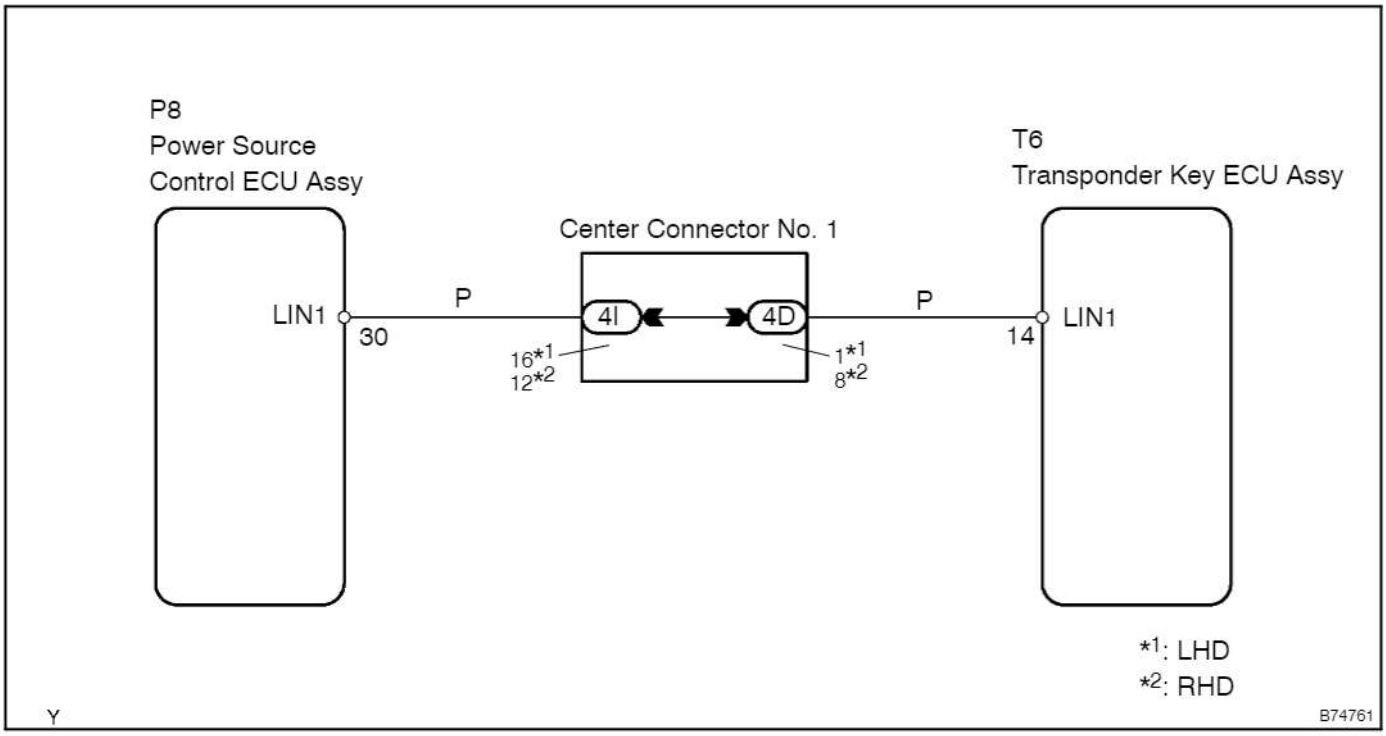
DTC	B2785	IGNITION SWITCH ON MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output if communication between the transponder key ECU and power source control ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2785	Communication between the transponder key ECU and power source control ECU is not possible	• Wire harness • Power source control ECU assy • Transponder key ECU assy

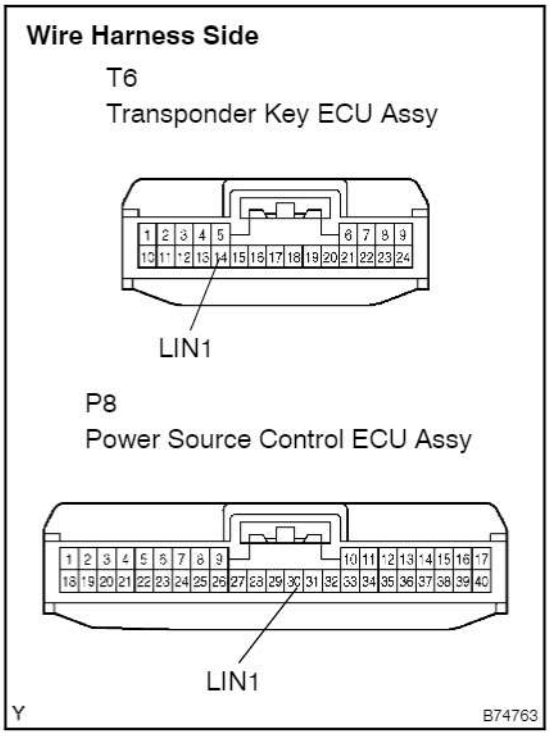
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY)



(a) Reconnect the T6 and P8 ECU connector.

(b) Measure the resistance of each terminal of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–14 (LIN1) – P8–30 (LIN1)	Below 1 Ω
T6–14 (LIN1) or P8–30 (LIN1) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

2	CHECK OPERATION OF TRANSPONDER KEY ECU

(a) After replacing the transponder key ECU assy with a normally functioning ECU, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG → **REPLACE POWER SOURCE CONTROL ECU ASSY**

OK

END (REPLACE TRANSPONDER KEY ECU ASSY)

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DTC B2793 TRANSPONDER CHIP MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when: 1) during key code registration, a key malfunction occurs; or 2) the key code was unable to be registered properly. Follow the inspection procedure below.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Key (Door control transmitter)

INSPECTION PROCEDURE

1	RE–REGISTER KEY

(a) Delete the DTC (see page 05–2099).

(b) Re–register the key and insert this key into the key slot. Check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG → **REPLACE KEY**

OK

END

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DTC	B2794	UNMATCHED ENCRYPTION CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with an incomplete key code is inserted into the key slot.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Key with incomplete key code is inserted	Key (Door control transmitter)

INSPECTION PROCEDURE

REPLACE KEY

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DTC	B2795	UNMATCHED KEY CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the key slot.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered code is inserted	Key (Door control transmitter)

INSPECTION PROCEDURE

1	DELETE DTC AND INSERT ALL PRESENTLY AVAILABLE KEYS INTO KEY SLOT TO CHECK WHETHER HYBRID CONTROL SYSTEM STARTS OR NOT

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM

OK

END

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DTC	B2796	NO COMMUNICATION IN IMMOBILISER SYSTEM

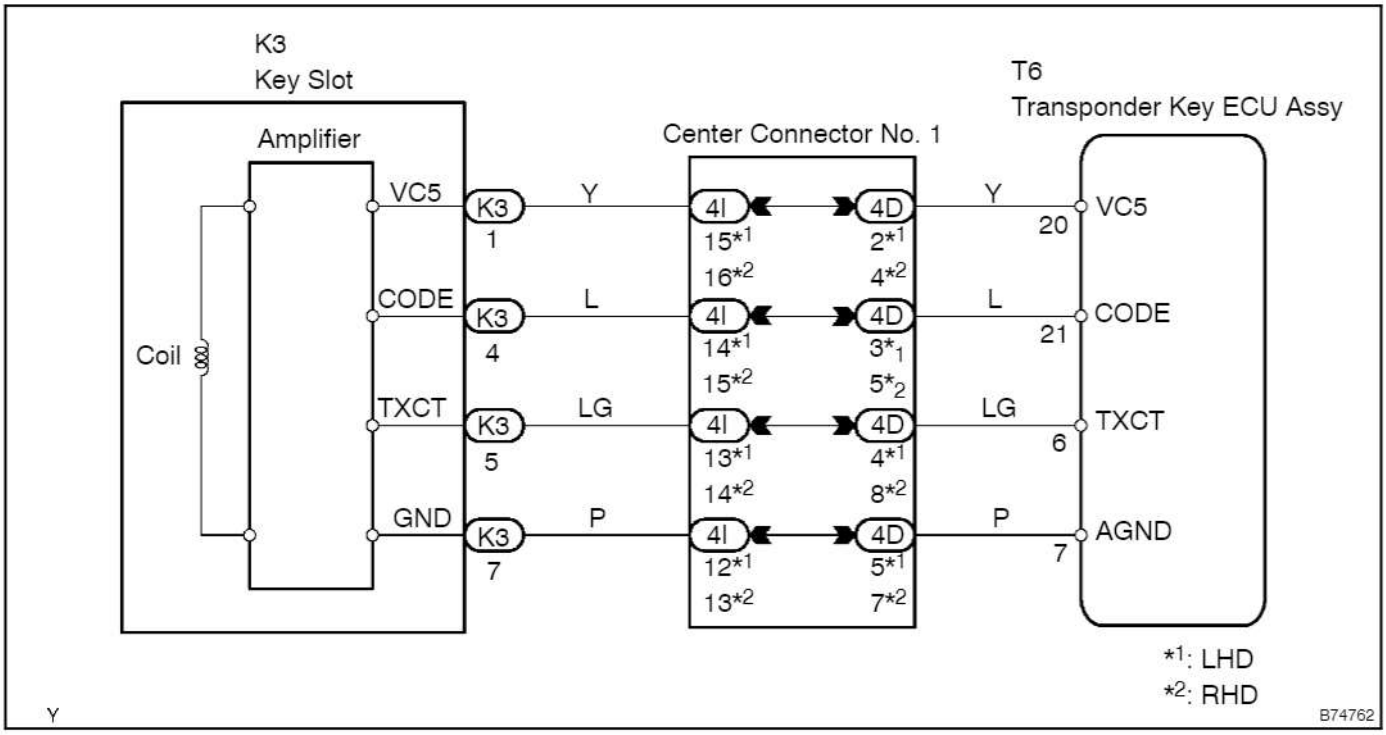
DTC	B2798	COMMUNICATION MALFUNCTION NO.2

CIRCUIT DESCRIPTION

This DTC is output when a key that does not have a transponder chip is inserted into the key slot or if communication between the key and transponder key ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	• Key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU assy
B2798	Communication error	Key (Door control transmitter)

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "SET" (power switch's power mode ON (IG)) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Immobiliser	Immobilizer system status/ SET or UNSET	UNSET: Without key SET: Power switch's power mode ON (IG)	–

NG → **Go to step 2**

OK

REPLACE TRANSPONDER KEY ECU ASSY

2	CHECK WHETHER HYBRID CONTROL SYSTEM STARTS WITH OTHER KEYS

(a) Insert the key that cannot the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
OK:
Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → **Go to step 3**

OK

RE–REGISTER OR REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM

3	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
(c) Read the DATA LIST according to the display on the tester.
OK: "NORMAL" (antenna coil is normal) appears on the screen.

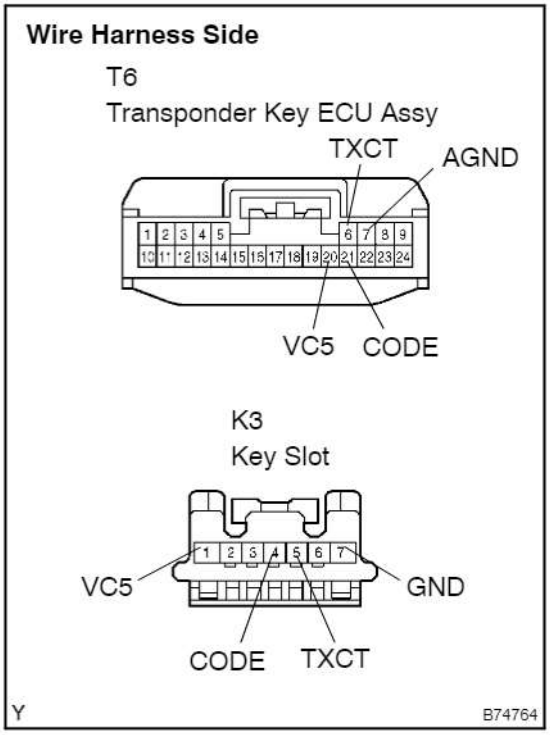
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Antenna Coil	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	–

NG → **REPLACE KEY SLOT**

OK

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4	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–20 (VC5) – K3–1 (VC5)	Below 1 Ω
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω
T6–6 (TXCT) – K3–5 (TXCT)	Below 1 Ω
T6–7 (AGND) – K3–7 (GND)	Below 1 Ω
T6–20 (VC5) or K3–1 (VC5) – Body ground	10 kΩ or higher
T6–21 (CODE) or K3–4 (CODE) – Body ground	10 kΩ or higher
T6–6 (TXCT) or K3–5 (TXCT) – Body ground	10 kΩ or higher
T6–7 (AGND) or K3–7 (GND) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

5	CHECK OPERATION OF KEY SLOT

(a) After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → **REPLACE TRANSPONDER KEY ECU ASSY**

OK

END (REPLACE KEY SLOT)

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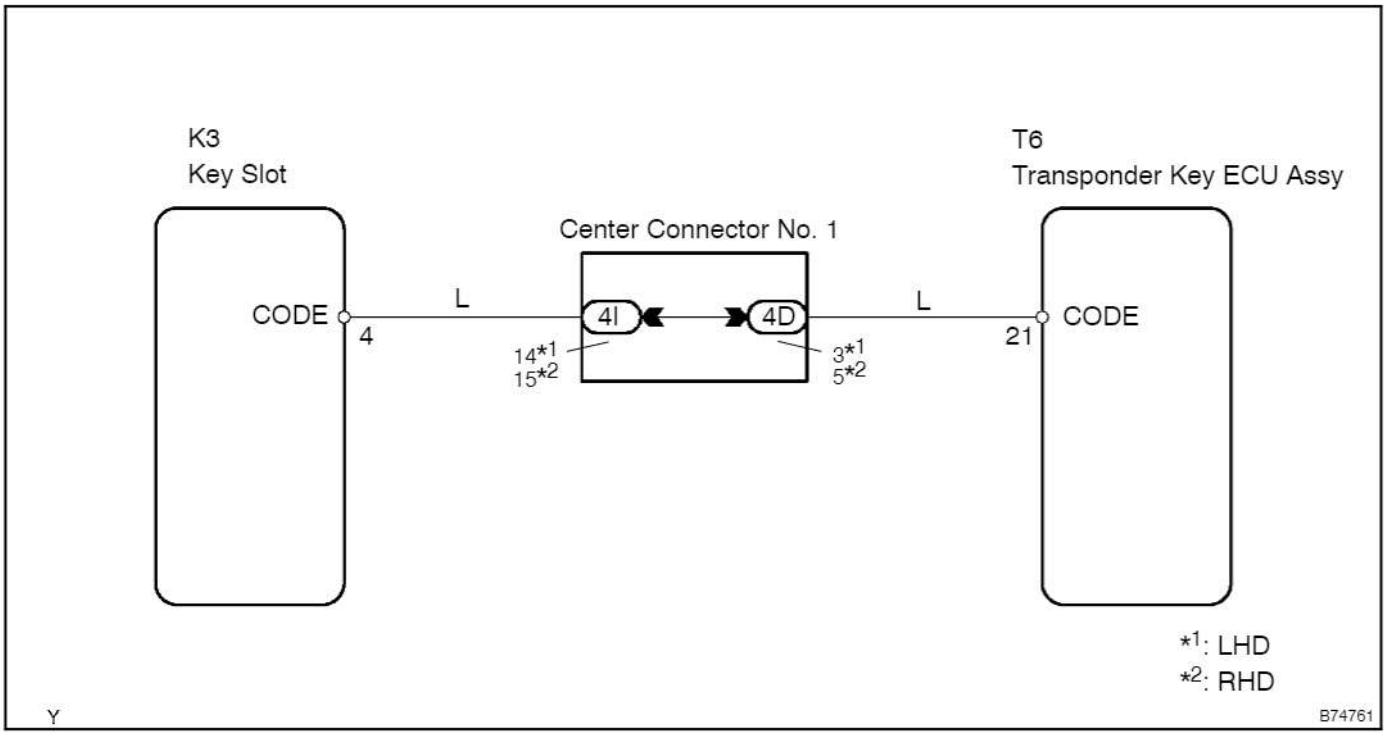
DTC	B2797	COMMUNICATION MALFUNCTION NO.1

CIRCUIT DESCRIPTION

This DTC is output when a communication error occurs between the transponder key amplifier and transponder key ECU. A possible reason for the communication error is that noise is occurring on the communication line. Following the inspection procedure below.

DTC No.	DTC Detection Condition	Trouble Area
B2797	Key has noise occurring on communication line	• Key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU assy

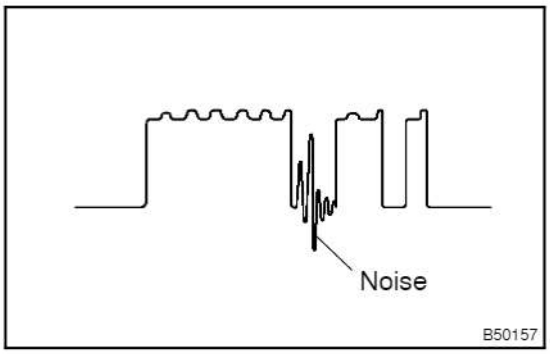
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK TRANSPONDER KEY ECU ASSY



(a) Using an oscilloscope or the hand–held tester, check that the waveform between the terminals of the K3 key slot and T6 ECU connector. The waveform should be similar to the illustration on the left.

Standard:

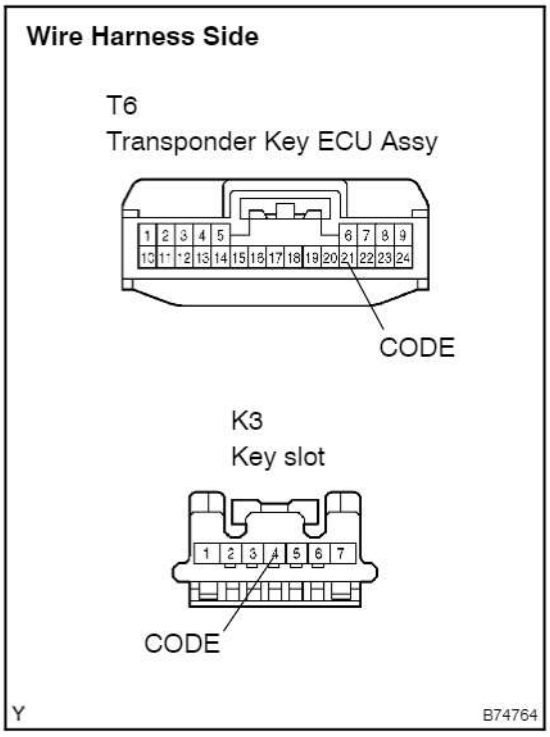
Tester Connection	Specified Condition
T6–21 (CODE) – K3–4 (CODE)	No noise is present

Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	Power switch's power mode OFF → ON (IG)

NG → FIND CAUSE OF NOISE AND REMOVE IT

OK

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT)



(a) Disconnect the T6 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–21 (CODE) – K3–4 (CODE)	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

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3	CHECK OPERATION OF KEY SLOT

(a) After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.
OK:
Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG → REPLACE TRANSPONDER KEY ECU ASSY

OK

END (REPLACE KEY SLOT)

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DTC	B2799–539	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–540	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–541	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–542	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–543	ENGINE IMMOBILISER SYSTEM MALFUNCTION

DTC	B2799–544	ENGINE IMMOBILISER SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

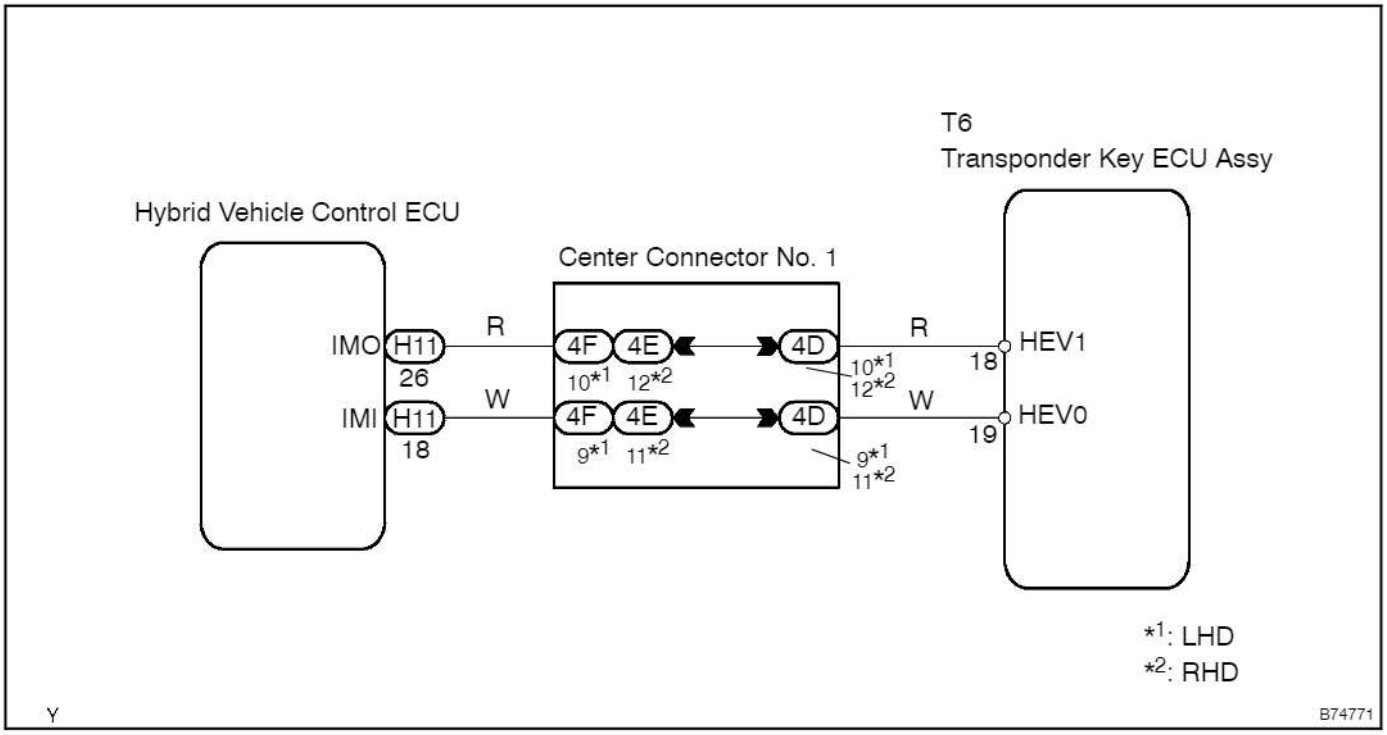
These DTCs are detected when: 1) the wire harness between the transponder key ECU and hybrid vehicle control ECU is open or short circuited, 2) the ECU communication IDs of the hybrid vehicle control ECU and transponder key ECU are different, 3) the start (ON (READY) signal delayed, or 4) the key codes are unmatched.

Before troubleshooting for the this DTC, make sure no transponder key ECU DTCs are present. If present, troubleshoot the transponder key ECU DTCs or hybrid vehicle control ECUs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799–539 B2799–540 B2799–541 B2799–542 B2799–543 B2799–544	When any of the following conditions are met: • wire harness between transponder key ECU and hybrid vehicle control ECU is open or short • ECU communication IDs of hybrid vehicle control ECU and transponder key ECU are different • ON (READY) signal is delayed more than 10 seconds from when power switch is set to ON (READY) • Key codes are unmatched.	• Wire harness • Hybrid vehicle control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK FOR DTCS

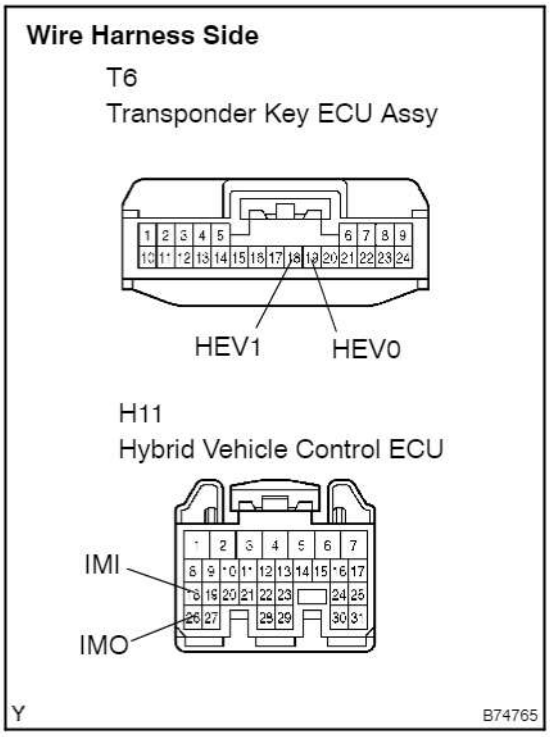
(a) Delete the DTC (see page 05–2061).
(b) Check that no DTC is output.
OK: DTC is not output.

NG → **Go to step 2**

OK

END

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – HYBRID VEHICLE CONTROL ECU) (TRANSPONDER KEY ECU ASSY OR HYBRID VEHICLE CONTROL ECU – BODY GROUND)



(a) Disconnect the T6 and H11 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T6–19 (HEV0) – H11–18 (IMI)	Below 1 Ω
T6–18 (HEV1) – H11–26 (IMO)	Below 1 Ω
T6–19 (HEV0) or H11–18 (IMI) – Body ground	10 kΩ or higher
T6–18 (HEV1) or H11–26 (IMO) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

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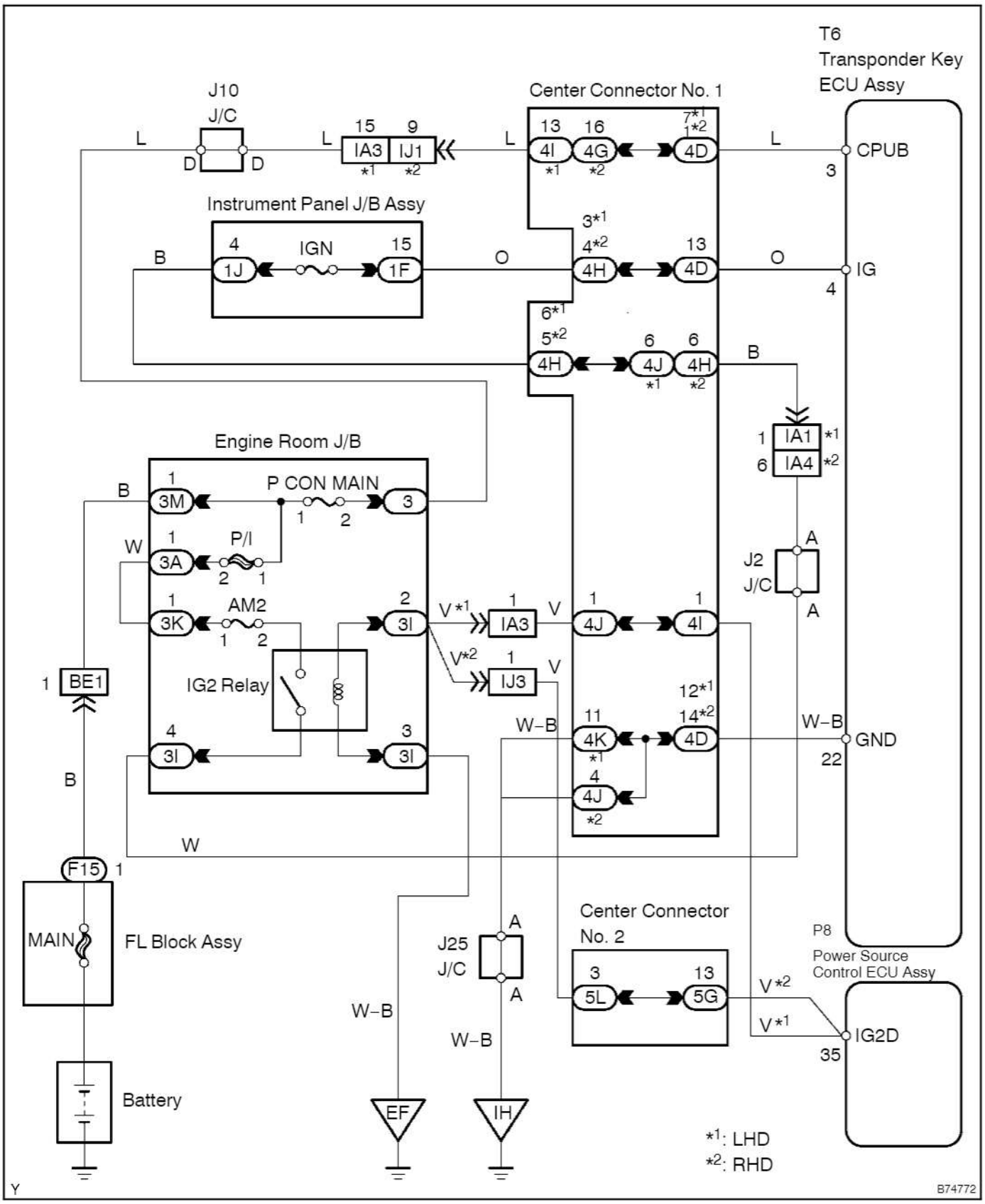
POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit provides power to operate the transponder key ECU assy.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

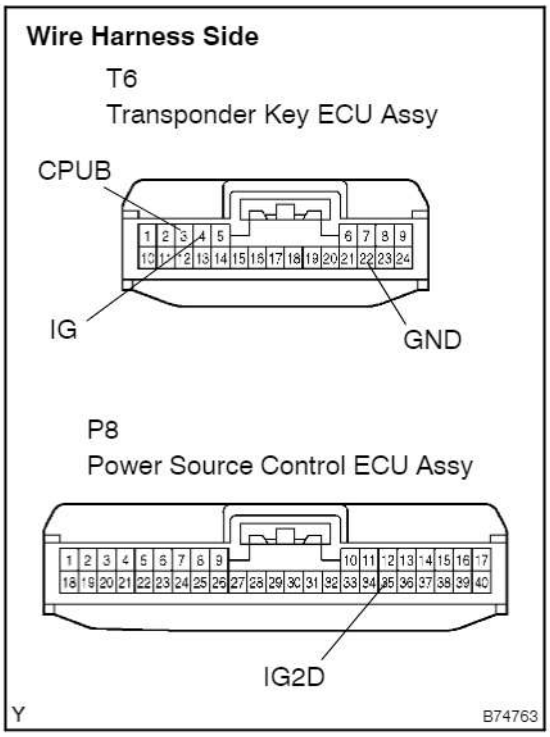
1	INSPECT FUSE (IGN, P CON MAIN, AM2)

(a) Remove the IGN fuse from the instrument panel J/B assy.
(b) Remove the P CON MAIN and AM2 fuses from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY AND BODY GROUND)



(a) Disconnect the T6 and P8 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connectors.
Standard:

Tester Connection	Condition	Specified Condition
T6– 4 (IG) – Body ground	Power switch OFF → ON (IG)	0 V → 10 to 14 V
P8–35 (IG2D) – Body ground	Constant	Below 1 Ω
T6– 3 (CPUB) – Body ground	Constant	10 to 14 V
T6– 22 (GND) – Body ground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR**

OK

PROCEED TO PUSH BUTTON START SYSTEM (See page 05–2121)

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PUSH BUTTON START SYSTEM

05IE0–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

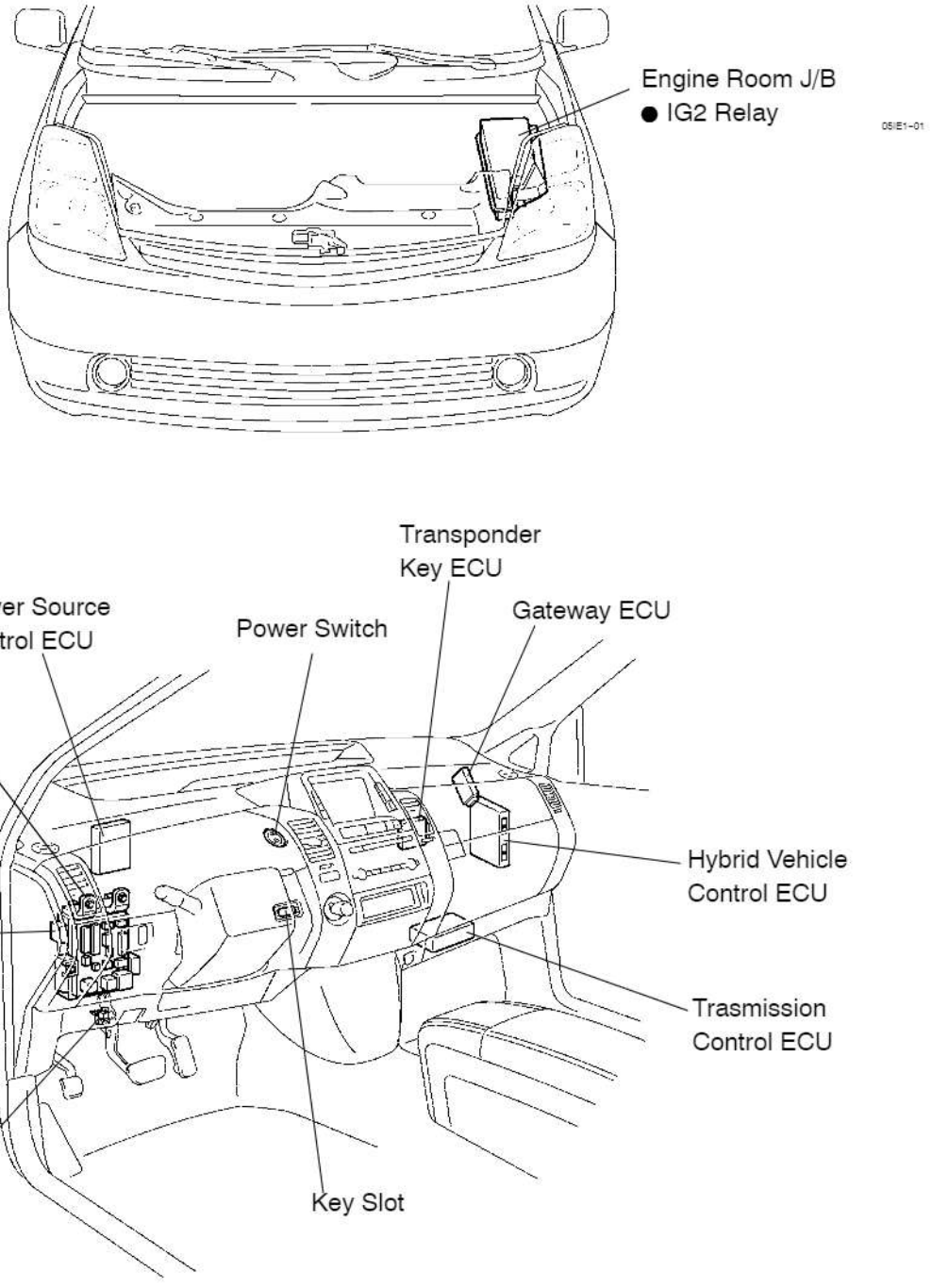
NOTICE FOR HYBRID SYSTEM ACTIVATION

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **When the power source control ECU is replaced with a new ECU and the battery's negative terminal is reconnected, the power switch automatically turns ON (IG). However, when the power source control ECU is removed and then reinstalled, the power switch remains in the same mode as when the ECU was removed.**

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LOCATION

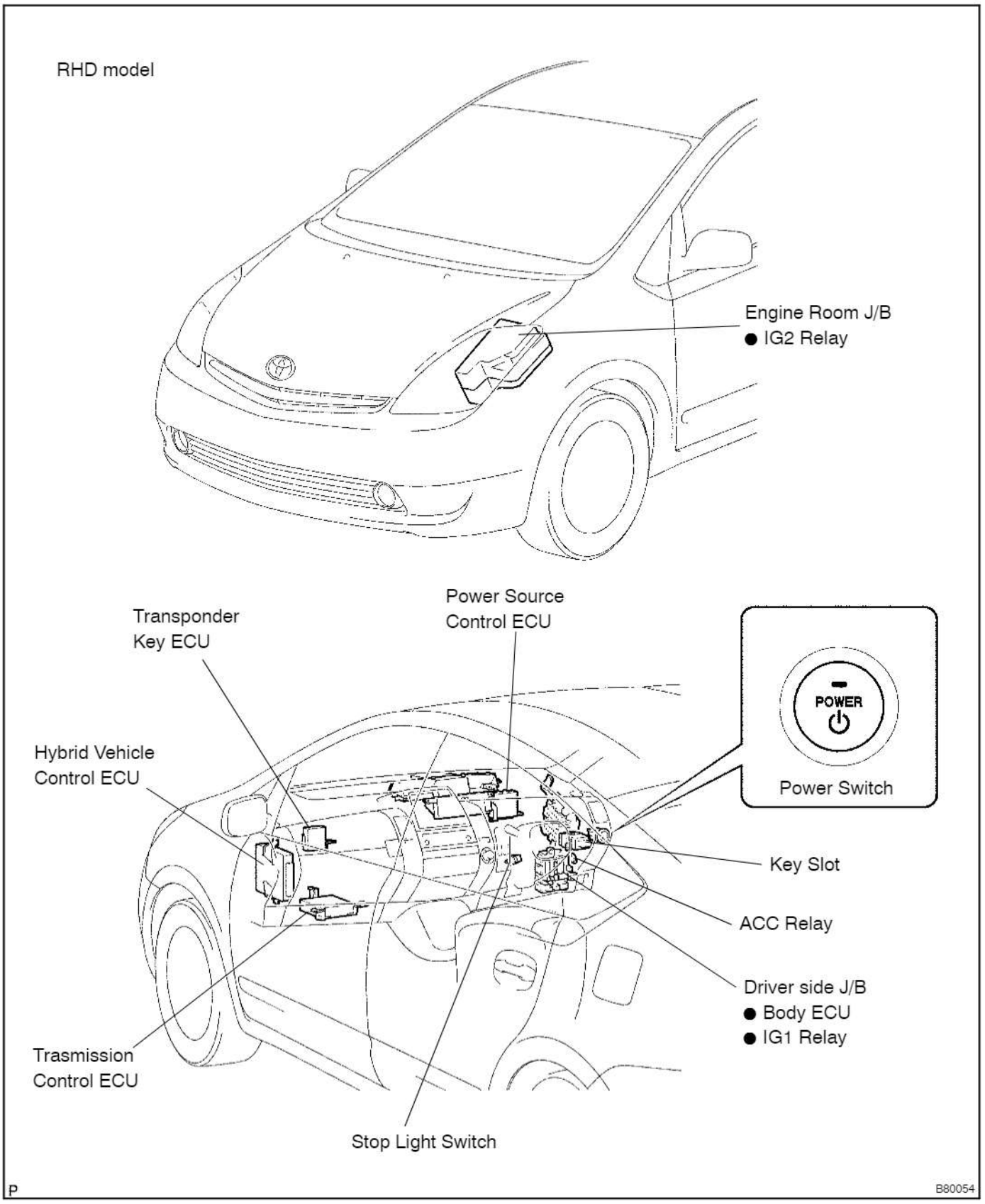
LHD model



Y

B80055

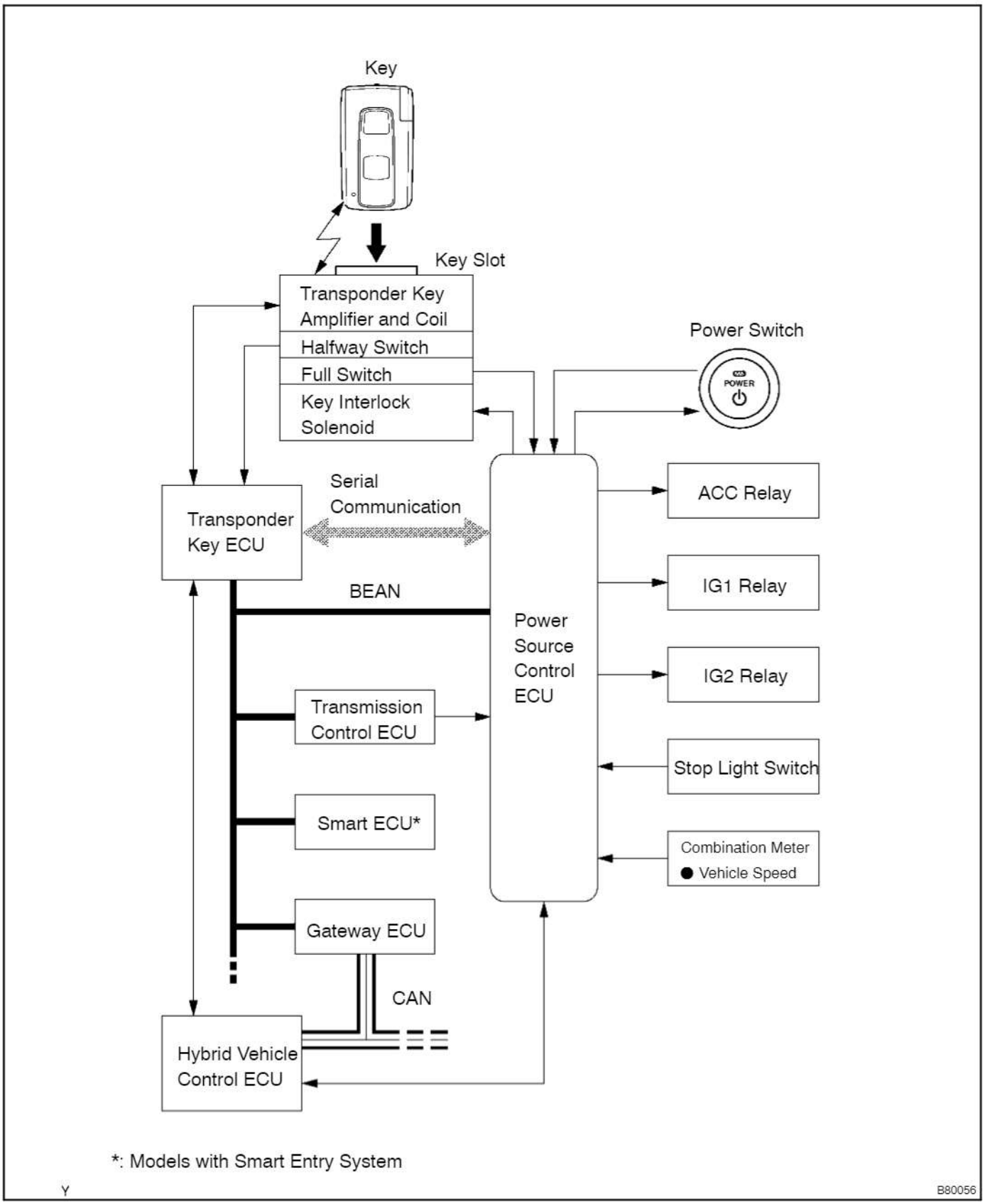
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05IE2-01

SYSTEM DIAGRAM



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Sender	Receiver	Signal	Lile
Hybrid vehicle control ECU	Power source control ECU	• Shift position signal (power source control) • Drive OK signal (power stop control) • Stop switch signal (power source control)	Bean
Meter	Power source control ECU	Vehicle speed signal (power source control)	Bean
Body ECU	Power source control ECU	• Diagnosis erasure • Diagnostic tool request • Door lock position signal (driver, passenger and rear doors) (power switch illumination control) • Courtesy switch signal (driver, passenger and rear doors) (power switch illumination control) • Vehicle model signal (power source control switch) • IG switch signal (power source control) • ACC switch signal (power source control) • Key switch signal (key lock control) • Fading dome lamp illumination request signal (power switch illumination control) • Taillamp illumination signal (power switch illumination control) • All doors courtesy switch signal (power switch illumination control	Bean
Steering lock ECU	Power source control ECU	Immobilizer information signal (power source control)	Bean
Power source control ECU	Body ECU	Power switch signal (for security cancel)	Bean
Power source control ECU	Steering lock ECU	• Immobilizer ID match request signal (ID match start at power on) • Key insertion status signal (for immobilizer control)	Bean
Transmission control ECU	Power source control ECU	• P status signal (key interlock control) • P control ECU malfunctioning status signal (power source control, key lock control) • Auto P cancel signal (power source control, key lock control • NP status signal (power source control, key lock control) • Auto P OK signal (power source control, key lock control)	Bean
Smart ECU	Power source control ECU	• Immobilizer ID match request signal (smart ignition control) • Key insertion status signal (smart ignition control) • Key code confirmation signal (wireless control)	Bean
Theft warning ECU	Power source control ECU	Power switch signal (for security set and cancel)	Bean
Power source control ECU	Transmission control ECU	Power source OFF ready signal (power source AUTO OFF control)	Bean

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05IE3-01

SYSTEM DESCRIPTION

1. CHECK PUSH BUTTON START SYSTEM DESCRIPTION

(a) The push button start system uses a push-type power switch, which the driver operates by inserting a key into the key slot or by merely carrying the key*. This system consists primarily of a power source control ECU, power switch, key slot, key, ACC relay, IG1 relay, IG2 relay and transponder key ECU. The power source control ECU controls the system. This system operates in cooperation with the engine immobilizer system and the smart entry system*.

The table below shows the transition of the power switch, which depends on whether the brake pedal is depressed or released.

*: w/ Smart entry system

Brake Pedal	Power Switch Operation
Released	Power mode changes OFF, ON (ACC), ON (IG) and OFF, every time power switch is pressed
Depressed	Power mode changes to ON (READY) from any power mode

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2. FUNCTION OF COMPONENT

Components	Function
Key	• When driver inserts key into key slot, built–in transponder chip transmits ID code signal to transponder key amplifier, which is provided in key slot. • For models with smart entry system, if driver operates power switch with key in driver's possession, key receives signals from oscillators and transmits ID code to wireless door lock receiver.
Key slot	• Halfway switch: Detects whether key is inserted and outputs signal to transponder key ECU. • Full switch: Detects whether key is inserted and outputs signal to power source control ECU. • Transponder key amplifier and coil: Receives ID code signal from transponder chip, which is built into key, and outputs it to transponder key ECU. • Key interlock solenoid: Power source control ECU operates this solenoid in accordance with power switch mode and shift position to keep key locked in key slot.
Power switch	• In accordance with shift position and stop light switch's condition, changes power modes in 4 stages as follows: OFF, ON (ACC), ON (IG) and ON (READY). • Power mode or abnormal condition of push button start system can be discerned from illuminating condition of indicator on power switch.
● IG1 relay ● IG2 relay ● ACC relay	Operates in accordance with power source control ECU to supply power to respective system.
Stop light switch	Outputs brake pedal's state to power source control ECU.
Parking lock actuator	• Operates in accordance with signals from transmission control ECU to actuate parking lock mechanism. • Detects actuation state of parking lock (whether shift position is in P or other position) and outputs it to transmission control ECU.
Power source control ECU	Controls push button start system in accordance with signals received from switches and ECUs.
Transponder key ECU	• Controls engine immobilizer system by recognizing key ID code transmitted by transponder key amplifier. • Receives ID code check results from smart ECU*. • Transmits key ID code check results to power source control ECU. • Transmits hybrid control system start authorization signal to hybrid vehicle control ECU.
Transmission control ECU	• Actuates parking lock actuator upon receiving power switch OFF signal from power source control ECU. • Transmits actuation state of parking lock (whether shift position is in P or other position) to power source control ECU.
Hybrid vehicle control ECU	• Starts hybrid control system in accordance with system start signal received from power source control ECU. • Receives hybrid control system start authorization signal from transponder key ECU.
Smart ECU*	Checks ID code received from wireless door lock receiver and transmits check results to transponder key ECU.

*: w/ Smart entry system

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3. SYSTEM FUNCTION

The electric controls of the push button start system are described below:

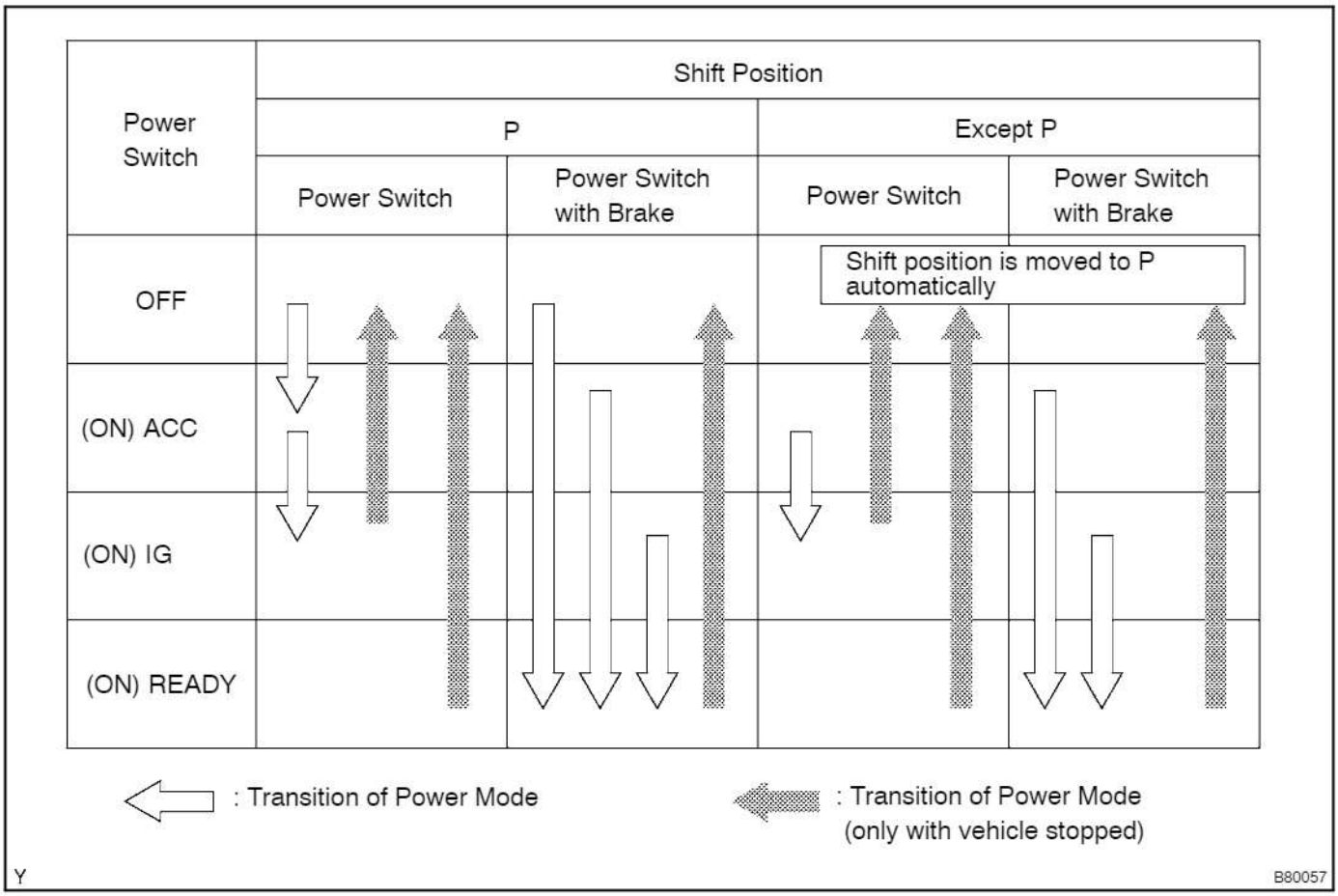
Control	Outline
Power switch control (w/o smart entry system)	Transponder key ECU checks ID code when key is inserted into key slot. Power source control ECU verifies check results and authorizes operation of switch.
Power switch control (w/ smart entry system)	• When driver operates power switch with key in driver's possession, power source control ECU starts room oscillator, which transmits request signal to key. Upon receiving this signal, key transmits ID code signal to smart ECU. • Transponder key ECU verifies check results received from smart ECU via BEAN and sends them to power source control ECU. Based on these results, power source control ECU authorizes operation of power switch.
Auto P control	If power switch is set to OFF when shift position is other than P, transmission control ECU activates parking lock actuator on command from hybrid vehicle control ECU in order to change shift position to P.
Diagnosis	When power source control ECU detects malfunction, power source control ECU diagnoses and memorizes failed section.

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4. POWER SWITCH CONTROL (WITH KEY)

- When a key is inserted into the key slot and the transponder key ECU recognizes the ID code of the key, the power source control ECU authorizes operation of the power switch. As a result, the power mode changes to the mode selected by power switch operation.
- Every time the power switch is pushed, power modes change in 3 stages as follows: OFF, ON (ACC), ON (IG) and OFF. If the driver pushes the power switch while depressing the brake pedal (the stop light switch turns ON), power mode will change to ON (READY) regardless of the previous power mode.
- After approximately 1 hour has passed with the power switch at ON (ACC) and the shift position in P, the power source control ECU will automatically turns off the power (the power mode changes to OFF).
- The illustration below shows the transition of power modes:

Transition of power mode:



NOTE:

While the vehicle is being driven normally, operation of the power switch is disabled. However, if the hybrid control system must be stopped in an emergency while the vehicle is being driven, pressing the power switch for at least 3 seconds can stop the hybrid control system. Power mode changes from ON (READY) to ON (ACC).

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5. Diagnosis

If a malfunction occurs in the IG circuit, the power source control ECU will perform the controls listed in the table below and record a DTC.

IG Circuit Malfunction	Details
Malfunction occurs during ON (IG) mode	• Hold circuit in power source control ECU continues to supply power to IG1 and IG2 relays. At this time, power source control ECU continuously flashes amber–colored indicator on power switch. • After power switch is set to OFF, power source control ECU continues flashing indicator on power switch for 15 seconds. • Hybrid system cannot be restarted.
Malfunction occurs during ON (ACC) or OFF mode	• When power switch is set to ON (IG) and malfunction is detected, power switch automatically turns OFF. • If same malfunction is detected as above continuously 3 times, power source control ECU continuously flashes amber–colored indicator on power switch for 15 seconds. • Hybrid system cannot be restarted.

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05IE4–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the push button start system.
- The intelligent tester II should be used in step 3.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–2133)

3	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) Without code outputs, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) With code outputs, proceed to B.

B → Go to MULTIPLEX COMMUNICATION SECTION (See page 05–2250)

A

4	DTC CHECK (See page 05–2143)

(a) Check for DTC and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B → Go to step 6

A

5	PROBLEM SYMPTOMS TABLE (See page 05–2134)

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B → Go to step 7

A

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6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (see page 05–2141).
  (1) Inspection with the intelligent tester II (DATA LIST).
  (2) Inspection with the intelligent tester II (ACTIVE TEST).
(b) On–vehicle inspection (see page 05–2197).
(c) Terminal of ECU (see page 05–2135).

7	ADJUST, REPAIR OR REPLACE

8	CONFIRMATION TEST

END

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05IE5-01

CUSTOMER PROBLEM ANALYSIS CHECK

PUSH BUTTON START SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		License Plate 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 (°C [°F])
Malfunction Symptoms	☐ Power mode does not change	
	☐ Transmitter holding function does not operate	
DTC	**1st time**	☐ Normal Code ☐ Malfunction Code
	2st time	☐ Normal Code ☐ Malfunction Code

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05IE6-01

PROBLEM SYMPTOMS TABLE

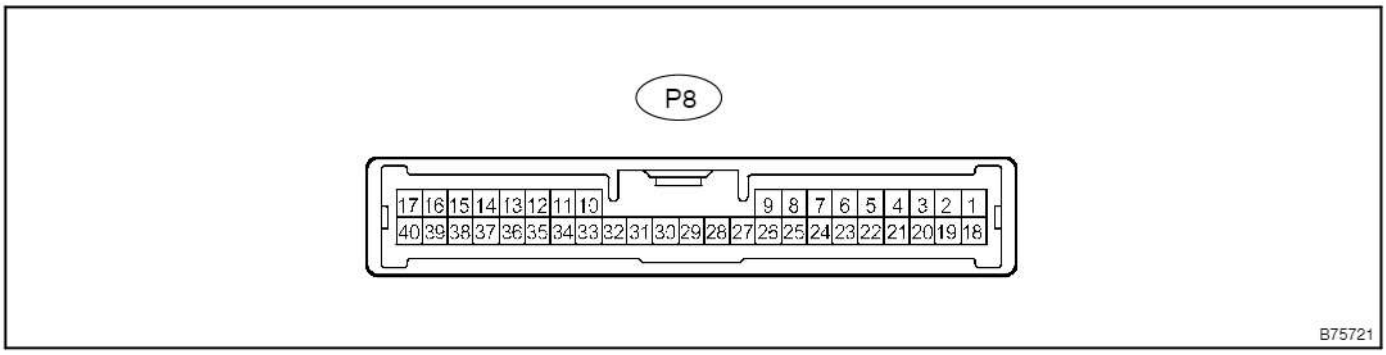
Symptoms	Suspected Area	See Page
Power mode does not change to ON (IG and ACC)	• Power source control ECU • AM1 fuse • AM2 fuse • Power switch • Key slot • Wire harness	05–2175
Power mode does not change to ON (ACC)	• Power source control ECU • AM1 fuse • AM2 fuse • ACC Relay • Wire harness	05–2182
Power mode does not change to ON (IG)	• Power source control ECU • AM1 fuse • AM2 fuse • IG1 relay • IG2 relay • Wire harness	05–2187
Power mode does not change to ON (READY)	• Power source control ECU • Stop lamp switch assy • Wire harness	05–2193

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05IE7-01

TERMINALS OF ECU

1. CHECK POWER SOURCE CONTROL ECU



(a) Disconnect the P8 ECU connector.

(b) Measure the resistance and voltage of each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (P8–33) – Body ground	R – Body ground	+B power supply	Constant	10 to 14 V
AM2 (P8–12) – Body ground	W – Body ground	+B power supply	Constant	10 to 14 V
CDSW (P8–25) – Body ground	L – Body ground	Key condition	No key in key slot → Key inserted	Below 1 Ω → 10 kΩ or higher
SSW1 (P8–14) – Body ground	B – Body ground	Power switch signal	Power switch pushed → Not pushed	Below 1 Ω → 10 kΩ or higher
SSW2 (P8–37) – Body ground	Y – Body ground	Power switch signal	Power switch pushed → Not pushed	Below 1 Ω → 10 kΩ or higher
GND2 (P8–6) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

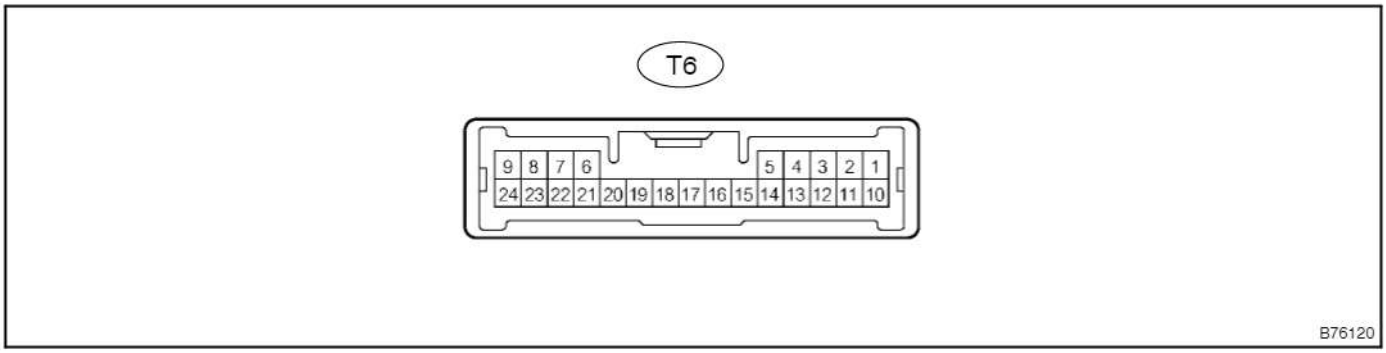
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(c) Reconnect the P8 ECU connector.
(d) Measure the resistance and voltage of each terminal of the connector.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SOL1 (P8–3) – GND (P8–6)	P – W–B	Power switch signal	Power switch ON and brake pedal is not pushed, Power switch ON (ACC) → Power switch ON (IG)	0 V → 10 to 14 V
SOL2 (P8–20) – GND (P8–6)	GR – W–B	+B power supply	Constant	Below 1 Ω
ACCD (P8–11) – GND (P8–6)	G – W–B	ACC signal	Power switch OFF → Power switch ON (ACC)	0 V → 10 to 14 V
IG1D (P8–34) – GND (P8–6)	B – W–B	IG1 signal	Power switch ON (ACC) → Power switch ON (IG)	0 V → 10 to 14 V
IG2D (P8–35) – GND (P8–6)	V – W–B	IG2 signal	Power switch ON (ACC) → Power switch ON (IG)	0 V → 10 to 14 V
STP (P8–1) – GND (P8–6)	L*1 – W–B Y*2 – W–B	Stop lamp signal	Brake pedal depressed → released	10 to 14 V → 0 V

HINT:
*1: LHD, *2: RHD
If the result is not as specified, the ECU may have a malfunction.

2. CHECK TRANSPONDER KEY ECU ASSY



(a) Disconnect the T6 ECU connector.
(b) Measure the resistance and voltage between each terminal of the wire harness side connector and body ground.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T6–3) – GND (T6–22)	L – W–B	Battery	Constant	10 to 14 V
IG (T6–4) – GND (T6–22)	O – W–B	Power switch (IG)	Power switch OFF → ON (IG)	0 V → 10 to 14 V
ACC (T6–12) – GND (T6–22)	P – W–B	Power switch (ACC)	Power switch OFF → ON (ACC)	0 V → 10 to 14 V
CUWS (T6–5) – GND (T6–22)	B – W–B	Unlock warning switch	Constant	10 kΩ or higher → Below 1 Ω
AGND (T6–7) – GND (T6–22)	P – W–B	Ground	Constant	Below 1 Ω
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

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If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the T6 ECU connector.

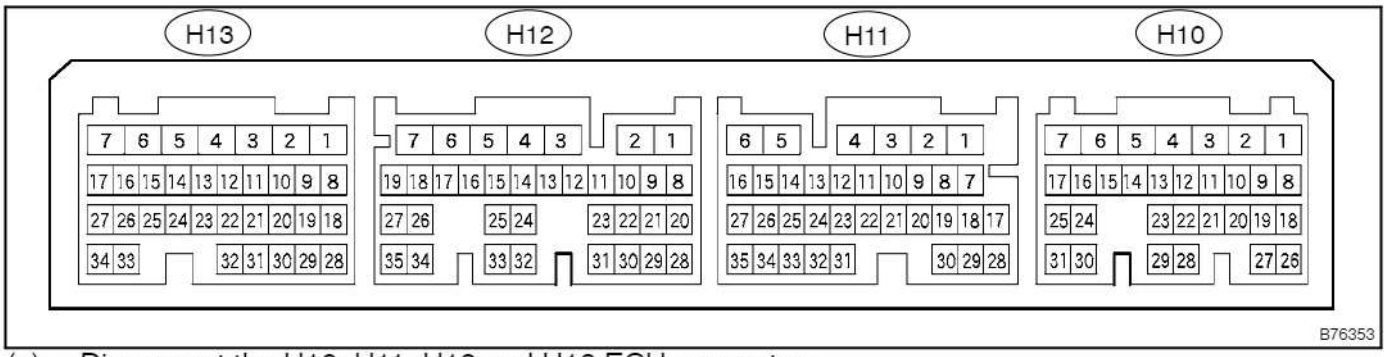
(d) Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CUWS (T6–5) – GND (T6–22)	B – W–B	Unlock warning switch	No key in key slot → Key inserted	10 to 14 V → Below 1 Ω
VC5 (T6–20) – GND (T6–22)	Y – W–B	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V

If the result is not as specified, the ECU may have a malfunction.

3. CHECK HYBRID VEHICLE CONTROL ECU



(a) Disconnect the H10, H11, H12 and H13 ECU connectors.

(b) Measure the resistance and voltage between each terminal of the connectors abd body ground.

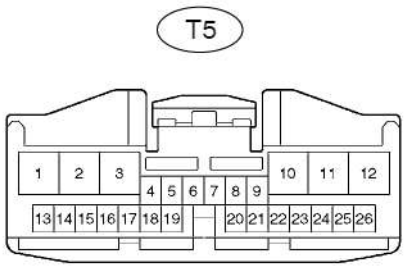
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ST2 (H10–5) – GND1 (H10–1)	Y–W–B	Ignition start control signal input	Power switch (READY)	10 to 14 V
IGSW (H10–7) – GND1 (H10–1)	O–W–B	Ignition ready control signal input	Power switch ON (IG)	10 to 14 V
BATT (H11–6) – GND1 (H10–1)	Y–W–B	Battery	Constant	10 to 14 V
+B1 (H12–7) – GND1 (H10–1)	L–W–B	Ignition power supply	Power switch ON (IG)	10 to 14 V
+B2 (H12–7) – GND1 (H10–1)	L–W–B	Ignition power supply	Power switch ON (IG)	10 to 14 V
GND1 (H10–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
GND2 (H10–4) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the ECU may have a malfunction.

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4. CHECK TRANSMISSION CONTROL ECU



(a) Disconnect the T5 ECU connector.

(b) Measure the resistance and voltage between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (T5–13) – Body ground	L – Body ground	+B power supply	Constant	10 to 14 V
+B (T5–1) – Body ground	L – Body ground	Ignition power supply	Power switch ON (IG)	10 to 14 V
E1 (T5–15) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
E01 (T5–3) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω
E02 (T5–2) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, the ECU may have a malfunction.

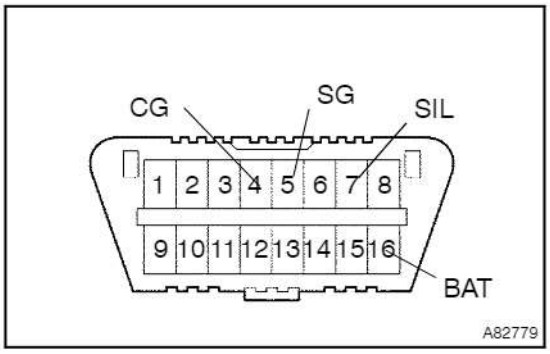
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05IE8–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

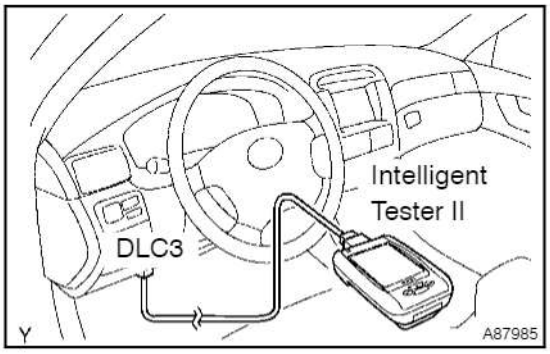
(a) Push button start system data and its Diagnostic Trouble Code (DTCs) can be read in the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester II to check for malufunctions and perform repairs.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the intelligent tester II to the DLC3, turn the power switch ON (IG) and attempt to use the intelligent tester II. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

3. CHECK BATTERY VOLTAGE

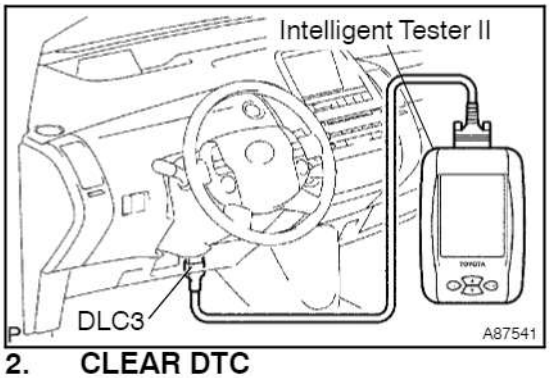
Standard: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

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05IE9–01

DTC CHECK/CLEAR



1. CHECK DTC

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Read the DTCs by following the directions on the tester's screen.

HINT:
Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Erase the DTCs by following the directions on the tester's screen.

HINT:
Refer to the intelligent tester II operator's manual for further details.

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05IEA-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Read the DATA LIST according to the display on the tester.

Power Source Control ECU:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
Str Unlock SW	States of the Steering Unlock Switch / ON or OFF	ON: Key is in key slot OFF* No key is in key slot	–
Ready Sig	States of the Ready signal / ON or OFF	ON: Power switch ON (Ready) OFF Power switch OFF or ON (IG) or ON (ACC)	–
Vehicle Spd Sig	States of the Vehicle Speed Signal / Stop or Run	Stop: Vehicle condition is "Stop" Run: Vehicle condition is "Run"	–
Shift P Sig	States of the Shift P Signal / ON or OFF	ON: Shift P signal ON (Shift position is "P") OFF: Shift P signal OFF (Shift position is except "P" position)"	–
St relay Mon	State of the Sterter Relay Monitor	ON: Sterter relay signal ON OFF Sterter relay signal OFF	–
ACC Cut Sig	State of the Relay Monitor	ON: ACC relay signal ON OFF ACC relay signal OFF	–
E/G Cond	States of the Engine Condition / Stop or Run	Stop: Engine is stop Run: Engine does not running	–
Shift P Pulse	States of the shift P Signal Pluse/ Unkown, Error2, Normal2, Error1, Normal3, Error3 or Normal1	111: Unkown 101: Error2 001: Normal2 100: Error1 010: Normal3 110: Error 3 000: Normal1	–
Card H–Ins SW	States of the Card Half–Insert Detection SW/ ON or OFF	ON: Key is half–insert position OFF: Key is not half–insert position	–
Card F–Ins SW	States of the Card Full–Insert Detection SW/ ON or OFF	ON: Key is full–insert position OFF: Key is not full–insert position	–
Stop Lamp SW1	States of the Stop Lamp Switch 1/ ON or OFF	ON: Brake pedal pressed OFF: Brake pedal released	–
Stop Lamp SW2	States of the Stop Lamp Switch 2/ ON or OFF	ON: Brake pedal pressed OFF: Brake pedal released	–
St SW1	States of the Start Switch 1/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–
St SW2	States of the Start Switch 2/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–
Ratch Circuit	States of the Ratch Circuit/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF or ON (ACC) or ON (READY)	–
IG1 Relay Mon 1	States of the IG1 Outer Relay Monitor/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–
IG1 Relay Mon 2	States of the IG1 Inner Relay Monitor/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–

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Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
IG2 Relay Mon 1	States of the IG2 Outer Relay Monitor/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–
IG2 Relay Mon 2	States of the IG2 Inner Relay Monitor/ ON or OFF	ON: Power switch ON (IG) OFF: Power switch OFF	–
ACC Relay Mon	States of the ACC Relay Monitor/ ON or OFF	ON: Power switch ON (ACC) OFF: Power switch OFF	–
Pwr Cond	States of the Power Supply Condition/ IG2 ON, ST ON, All OFF, IG1 ON or ACC ON	01110000: IG2 ON 11110000: ST ON 00000000: All OFF 00110000: IG1 ON 00010000: ACC ON	–

2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

Power Source Control ECU :

Item	Test Details	Diagnostic Note
Key Lock	Key Lock (IG OFF during the test, Turn the power switch ON (IG) again after the test.) ON/OFF	–
Lighting Ind	Indicator for Lighting ON/OFF	–
Ind Condition	Indicator Green/Red/No Sig	–

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05IEB-01

DIAGNOSTIC TROUBLE CODE CHART

1. DTC CHECK

If a malfunction code is displayed during the DTC check, check the suspected area listed for that code in the table below, and proceed to the appropriate page.

DTC No. (See Page)	Circuit Inspection	Trouble Area
B2271 (05–2144)	Ignition hold monitor malfunction	• Power source control ECU • AM1 fuse • AM2 fuse • Wire harness
B2272 (05–2146)	Ignition 1 monitor malfunction	• Power source control ECU • IG1 relay • Wire harness
B2273 (05–2150)	Ignition 2 monitor malfunction	• Power source control ECU • IG2 relay • Wire harness
B2274 (05–2153)	ACC monitor malfunction	• Power source control ECU • ACC relay • Wire harness
B2275 (05–2156)	STSW monitor malfunction	• Power source control ECU • Hybid vehicle control ECU • Wire harness
B2277 (05–2158)	Detection vehicle submersion	• Power source control ECU
B2278 (05–2159)	Main switch (power switch) malfunction (starter switch 1 signal does not match to starter switch 2 signal)	• Power source control ECU • Power switch • Wire harness
B2281 (05–2161)	P signal malfunction (cable information does not match BEAN information)	• Power source control ECU • Transmission control ECU • Wire harness
B2282 (05–2164)	Vehicle speed signal malfunction (cable information does not match BEAN information)	• Power source control ECU • Combination meter • Wire harness
B2284 (05–2167)	Brake signal malfunction (cable information does not match BEAN information)	• Power source control ECU • Stop light switch • Wire harness
B2286 (05–2170)	READY signal malfunction	• Power source control ECU • Hybid vehicle control ECU • Wire harness
B2287 (05–2173)	LIN communication master malfunction	• Power source control ECU • Transponder key ECU • Wire harness
B2289 (05–2173)	Key collation waiting time over	• Power source control ECU • Engine immobilizer system • Wire harness

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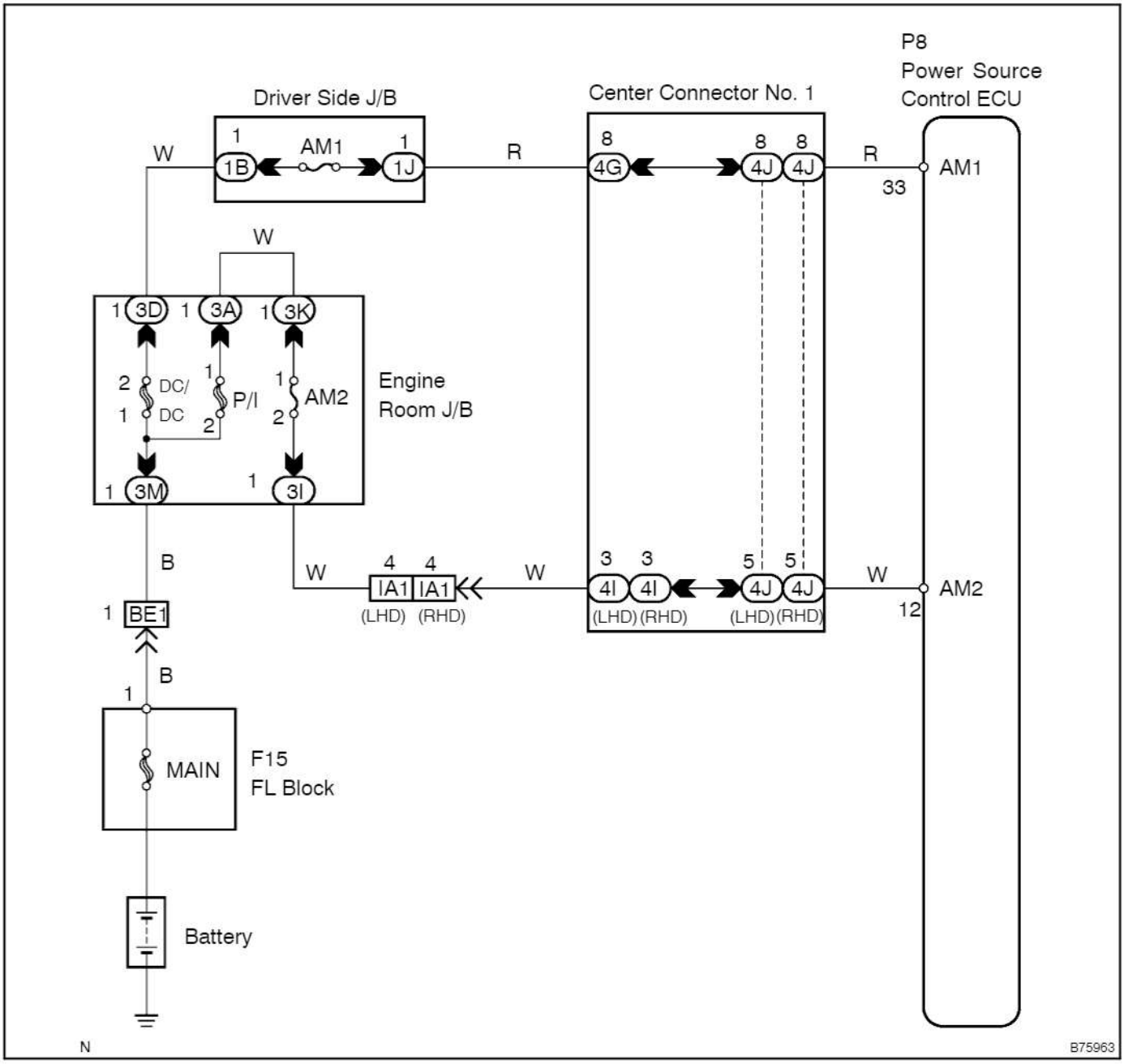
DTC	B2271	IGNITION HOLD MONITOR MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the IG output circuits inside the power source control ECU are open or short.

DTC No.	DTC detecting condition	Trouble area
B2271	Hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside power source control ECU	• Power source control ECU • AM1 fuse • AM2 fuse • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTC (see page 05–2140).
(b) Check for DTCs again.
OK: No DTC is output.

NG → **Go to step 2**

OK

END

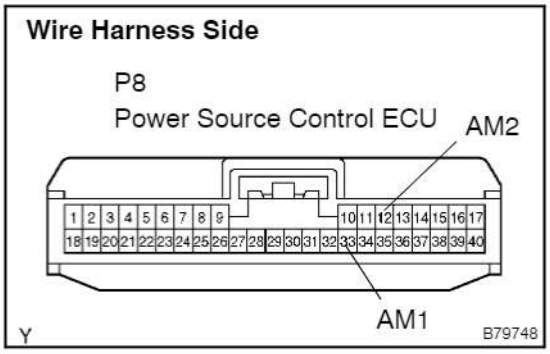
2	INSPECT FUSE (AM1, AM2)

(a) Remove the AM1 fuse from the driver side J/B.
(b) Remove the AM2 fuse from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

3	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



(a) Disconnect the P8 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard:

Tester Connection	Specified Condition
P8–33 (AM1) – Body ground	10 to 14 V
P8–12 (AM2) – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER SOURCE CONTROL ECU

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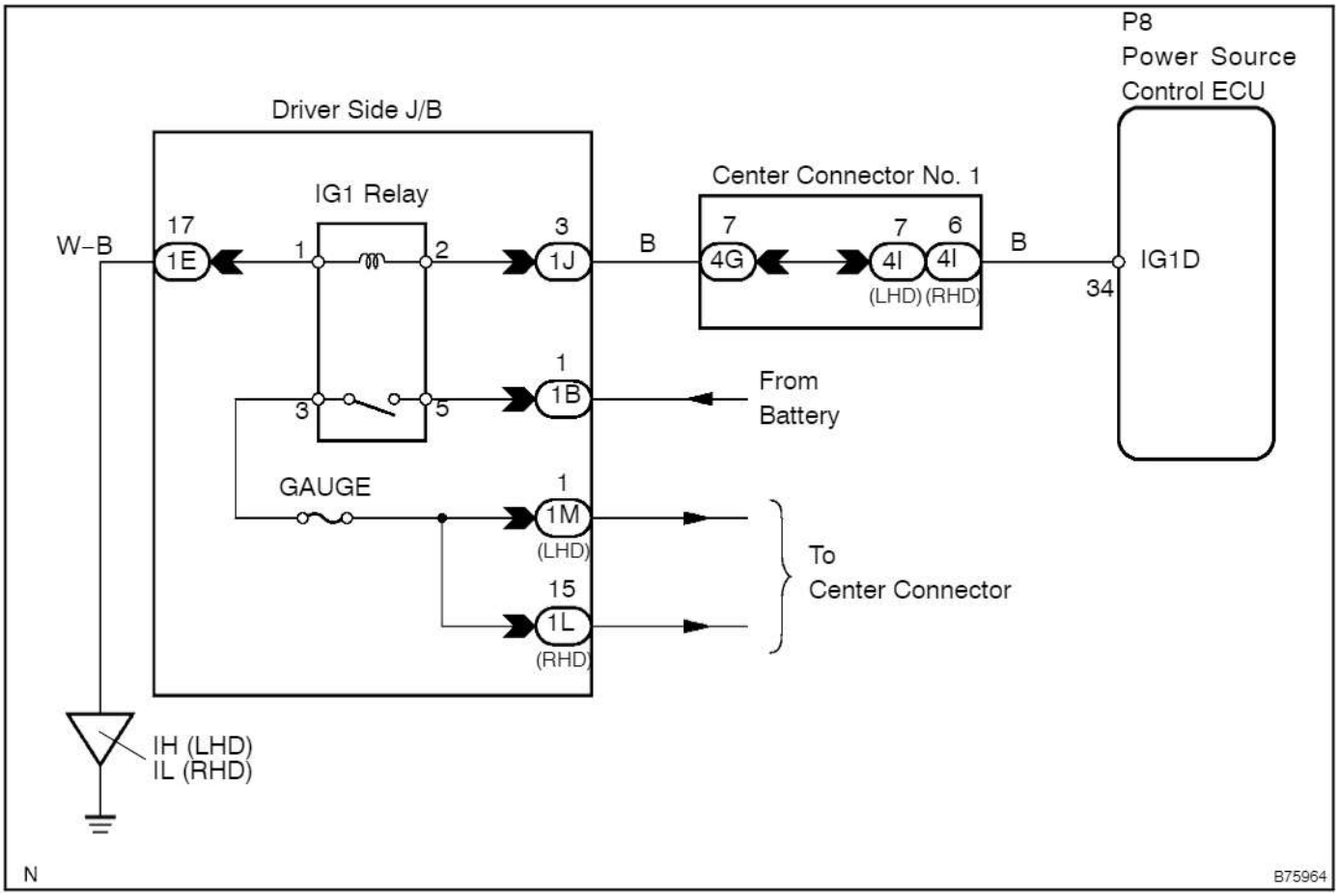
DTC B2272 IGNITION 1 MONITOR MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the IG output circuit from the inside of the power source control ECU to the IG1 relay is malfunctioning.

DTC No.	DTC detecting condition	Trouble area
B2272	IG1 relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	• Power source control ECU • IG1 relay • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the tester.
Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG1 Relay Mon 1	States of the IG1 Relay Monitor / ON or OFF	ON: Power switch ON (IG1 relay is ON)) OFF: Power switch OFF (IG1 relay is OFF)	–

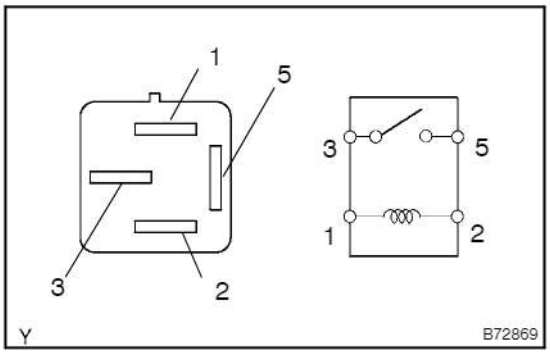
OK: "ON" (Power switch ON (IG)) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	INSPECT RELAY (IG1)



(a) Remove the IG1 relay from the driver side J/B.
(b) Measure the resistance.
Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

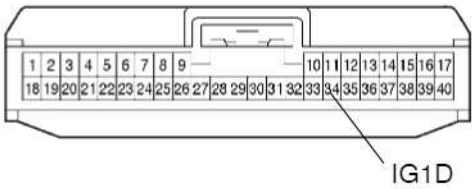
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3	CHECK WIRE HARNESS (DRIVER SIDE J/B – POWER SOURCE CONTROL ECU AND BODY GROUND)

Wire Harness Side

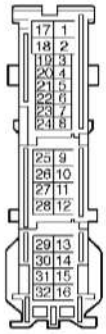
P8

Power source control ECU



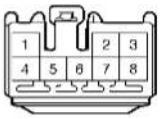
1J

Driver Side J/B



1E

Driver Side J/B



Y

B79834

(a) Disconnect the 1J and 1E driver side J/B connector.

(b) Disconnect the P8 ECU connector.

(c) Measure the resistance of the wire harness side connectors.

Standard:

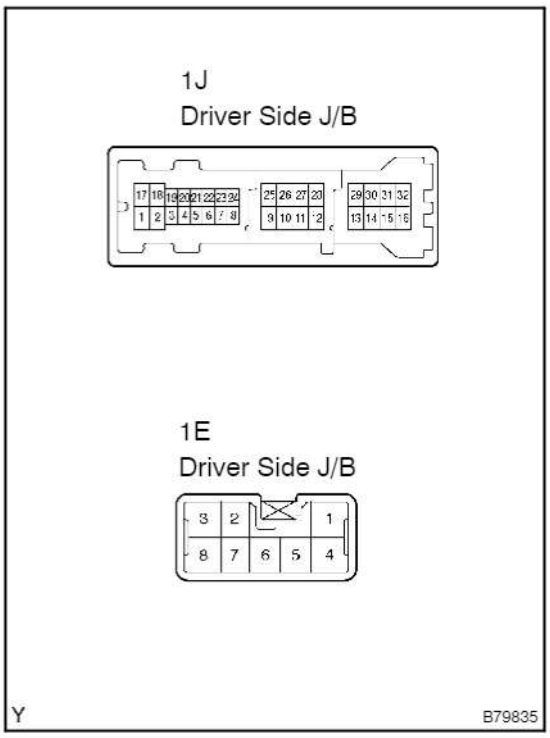
Tester Connection	Specified Condition
1J–3 – P8–34 (IG1D)	Below 1 Ω
1J–3 or P8–34 – Body ground	10 kΩ or higher
1E–17 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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4	CHECK DRIVER SIDE J/B



(a) Remove the IG1 relay from driver side J/B.
(b) Disconnect the 1J and 1E driver side J/B connector.
(c) Measure the resistance of driver side J/B.

Standard:

Tester Connection	Specified Condition
1J–3 – Driver side J/B IG1 relay terminal 2	Below 1 Ω
1J–3 – Driver side J/B IG1 relay terminal 2	10 kΩ or higher
1J–17 – Driver side J/B IG1 relay terminal 1	10 kΩ or higher

NG → **REPLACE DRIVER SIDE J/B**

OK

REPLACE POWER SOURCE CONTROL ECU

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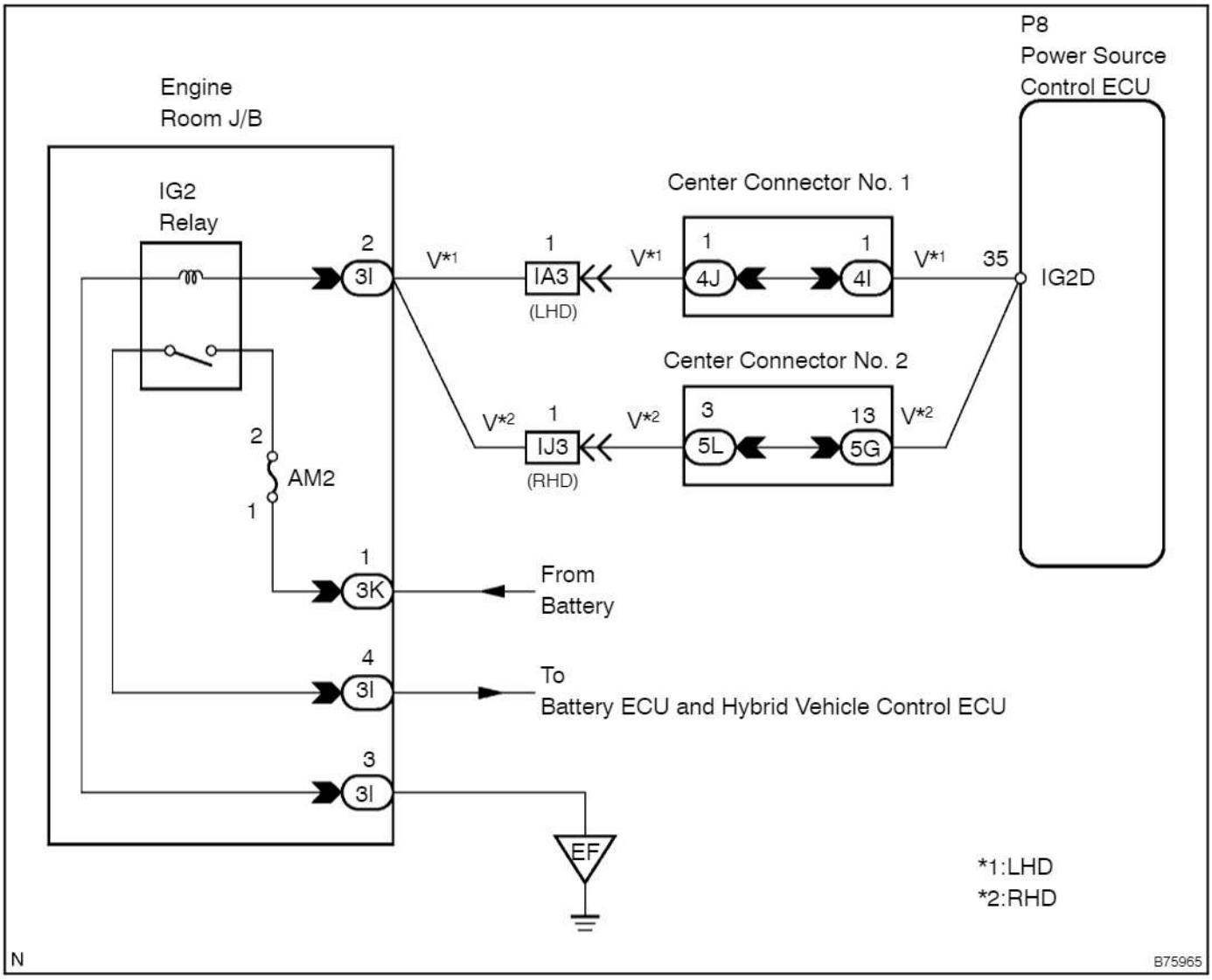
DTC	B2273	IGNITION 2 MONITOR MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the IG output circuit from the inside of the power source control ECU to the IG2 relay is malfunctioning.

DTC No.	DTC detection condition	Trouble area
B2273	IG2 relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	• Power source control ECU • IG2 relay • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG1 Relay Mon 2	States of the IG2 Inner Relay Monitor / ON or OFF	ON: Power switch ON (IG2 relay is ON) OFF: Power switch OFF (IG2 relay is OFF)	–

OK: "ON" (Power switch ON (IG)) appears on the screen.

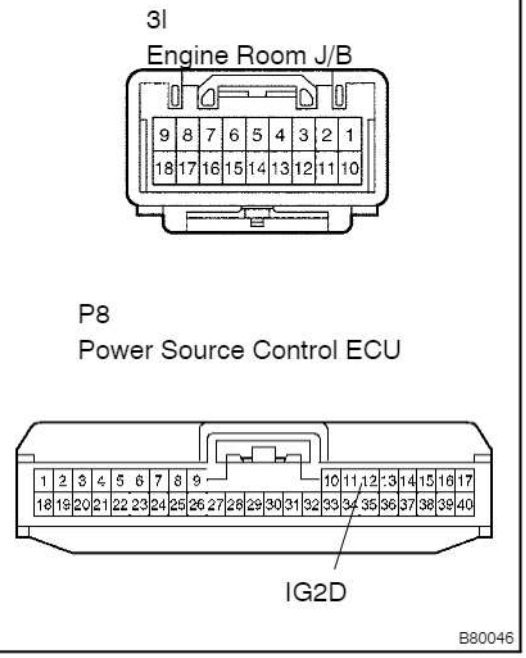
NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	CHECK WIRE HARNESS (ENGINE ROOM J/B – POWER SOURCE CONTROL ECU AND BODY GROUND)

Wire Harness Side



(a) Disconnect the 3I J/B connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

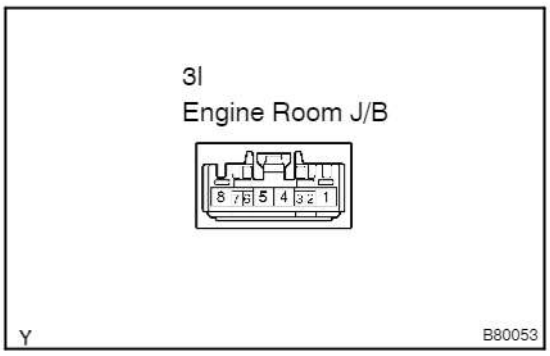
Tester Connection	Specified Condition
3I–2 – P8–35 (IG2D)	Below 1 Ω
3I–3 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3	CHECK ENGINE ROOM J/B



(a) Disconnect the 3I and 3K engine room J/B connector.
(b) Measure the resistance of engine room J/B.

Standard:

Tester Connection	Condition	Specified Condition
3K–1 – 3I–1	When battery voltage is not applied to terminals 3I–2 and 3I–3	10 kΩ or higher
3K–1 – 3I–1	When battery voltage is applied to terminals 3I–2 and 3I–3	Below 1 Ω

NG → **REPLACE ENGINE ROOM J/B**

OK

REPLACE POWER SOURCE CONTROL ECU

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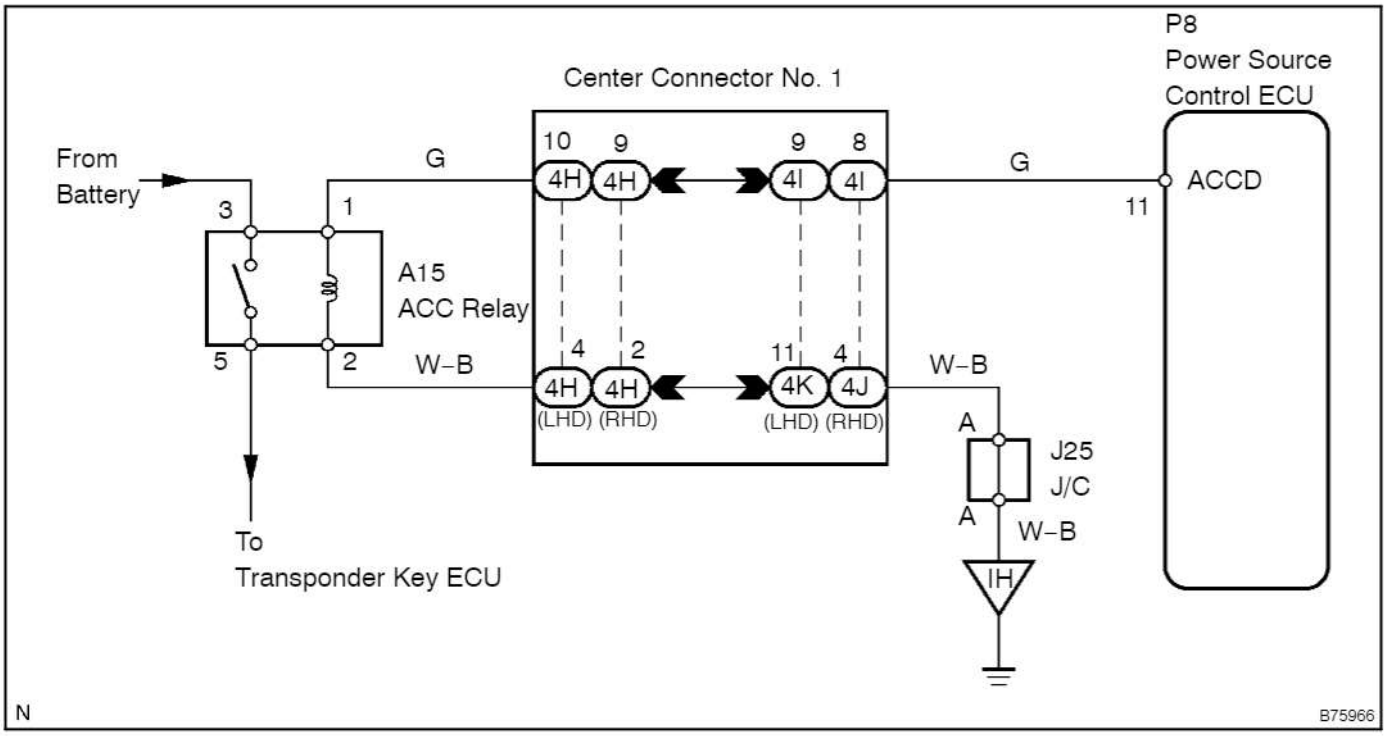
DTC B2274 ACC MONITOR MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the ACC output circuit from the inside of the power source control ECU to the ACC relay is malfunctioning.

DTC No.	DTC detection condition	Trouble area
B2274	ACC relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	• Power source control ECU • ACC relay • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC Relay Mon	States of the ACC Relay Monitor/ ON or OFF	ON: Power switch ON (ACC) OFF: Power switch OFF	–

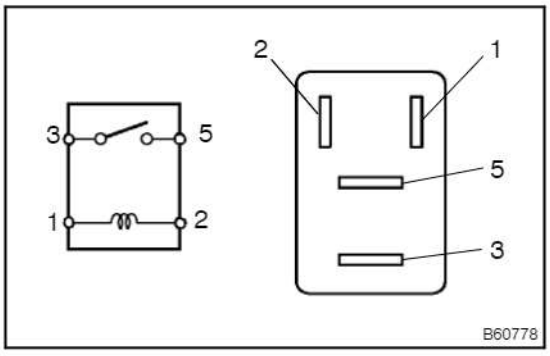
OK: "ON" (Power switch ON (ACC)) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	INSPECT RELAY (ACC)



(a) Remove the A15 ACC relay.
(b) Measure the resistance.

Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

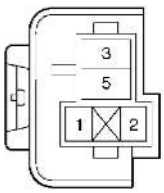
OK

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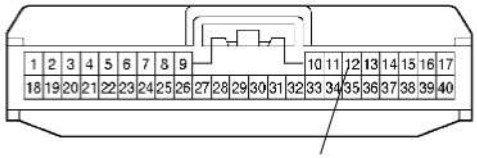
3	CHECK WIRE HARNESS (ACC RELAY – POWER SOURCE CONTROL ECU AND BODY GROUND)

Wire Harness Side

A15
ACC relay



P8
Power Source Control ECU



ACCD

Y B79831

(a) Remove the A15 ACC relay.
(b) Disconnect the P8 connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
A15–1 – P8–11 (ACCD)	Below 1 Ω
A15–2 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER SOURCE CONTROL ECU

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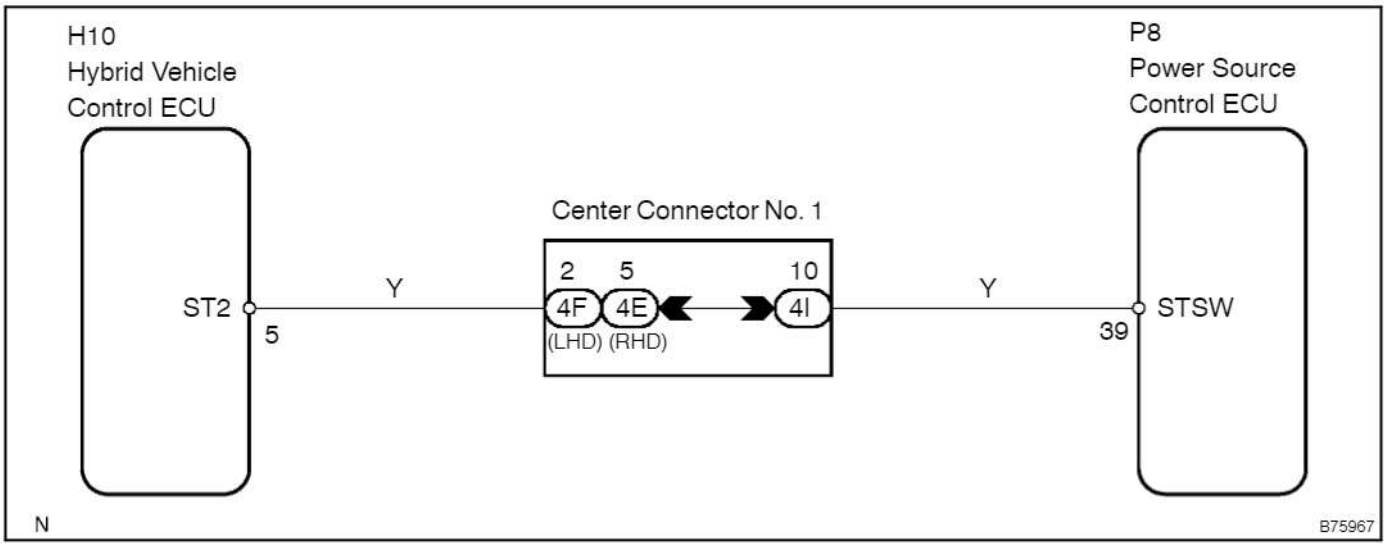
DTC	B2275	STSW MONITOR MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the ST output circuits inside the power source control ECU is open or short.

DTC No.	DTC detection condition	Trouble area
B2275	ST output circuit inside power source control ECU or other related circuit is malfunctioning	• Power source control ECU • Hybrid vehicle control ECU • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTC (see page 05–2140)
(b) Check for DTCs again.
OK: No DTC is output.

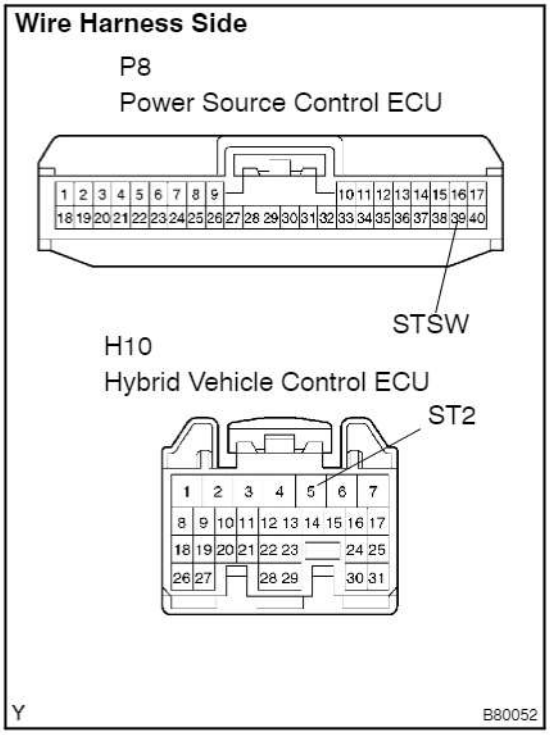
NG → **Go to step 2**

OK

END

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2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – HYBRID VEHICLE CONTROL ECU AND BODY GROUND)



(a) Disconnect the P8 and H10 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–39 (STSW) – H10–5 (ST2)	Below 1 Ω
P8–39 (STSW) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the hybrid control system can start normally.

OK: Hybrid control system can start normally.

NG → **Go to HYBRID CONTROL SYSTEM (See page 05–268)**

OK

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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DTC B2277 DETECTING VEHICLE SUBMERSION

CIRCUIT DESCRIPTION

This DTC is output when the submersion circuit monitor inside the power source control ECU detects that the vehicle is submerged in water.

DTC No.	DTC detection condition	Trouble area
B2277	Submersion circuit monitor inside power source control ECU detects that vehicle is submerged in water	Power source control ECU

INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTC (see page 05–2140)
(b) Check for DTCs again.
OK: No DTC is output.

NG → **REPLACE POWER SOURCE CONTROL ECU**

OK

END

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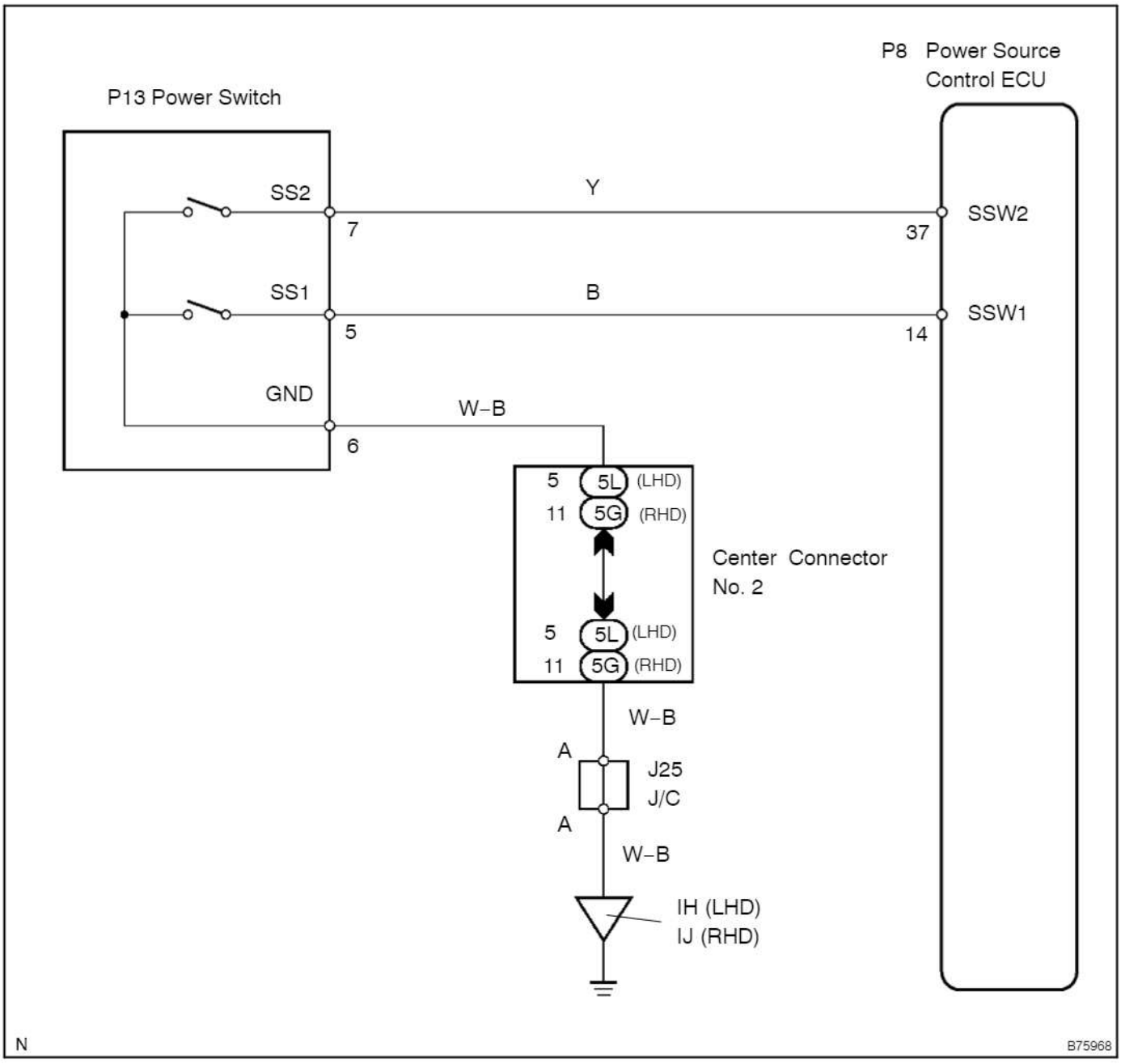
DTC	B2278	MAIN SWITCH (POWER SWITCH) MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when 1) a malfunction is detected between the power source control ECU and the power switch; or 2) either of the switches inside the power switch is malfunctioning.

DTC No.	DTC detection condition	Trouble area
B2278	Communication is abnormal between power source control ECU and power switch; or power switch is defective	• Power source control ECU • Power switch • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
POWER SWITCH 1	Power switch / ON or OFF	ON: Power switch 1 is ON OFF: Power switch 1 is OFF	–
POWER SWITCH 2	Power switch / ON or OFF	ON: Power switch 2 is ON OFF: Power switch 2 is OFF	–

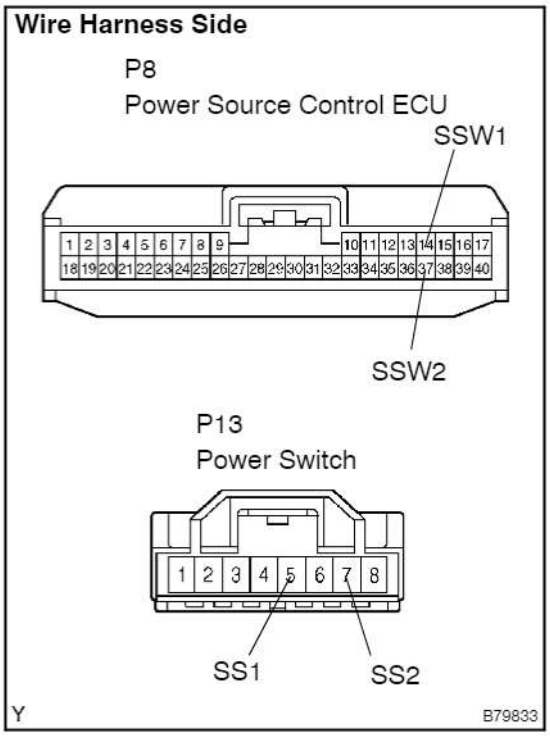
OK: "ON" (power switches 1 and 2 are ON) appears on the screen

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	CHECK WIRE HARNESS (POWER SWITCH – POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Disconnect the P13 power switch connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P13–5 (SS1) – P8–14 (SSW1)	Below 1 Ω
P13–7 (SS2) – P8–37 (SSW2)	Below 1 Ω
P13–6 – Body ground	Below 1 Ω
P13–5 (SS2) or P8–14 (SSW1) – Body ground	10 kΩ higher
P13–7 (SS2) or P8–37 (SSW2) – Body ground	10 kΩ higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER SOURCE CONTROL ECU

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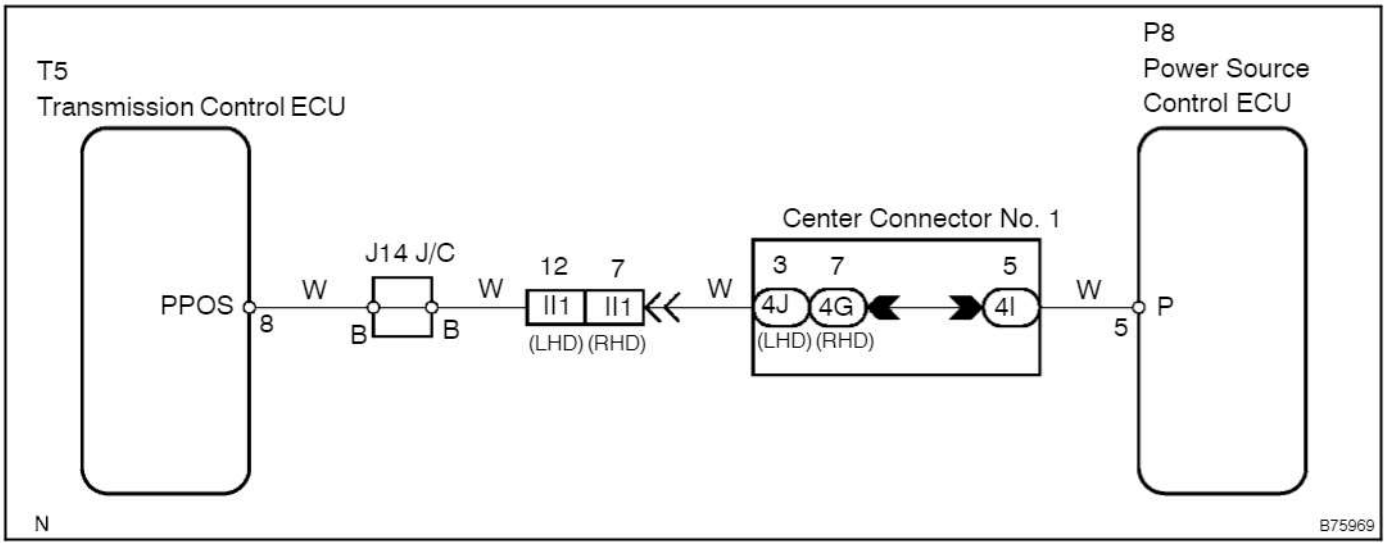
DTC	B2281	P SIGNAL MALFUNCTION (CABLE–INFORMATION DOES NOT MATCH TO BEAN–INFORMATION)

CIRCUIT DESCRIPTION

The power source control ECU and the transmission control ECU are connected by a cable and BEAN. If the cable information and BEAN information are inconsistent, this DTC will be output.

DTC No.	DTC detection condition	Trouble area
B2281	Cable and BEAN between power source control ECU and transmission control ECU are inconsistent	• Power source control ECU • Transmission control ECU • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Shift P Sig	Shift P Signal /OFF or ON	ON: P signal is ON OFF: P signal is OFF	–

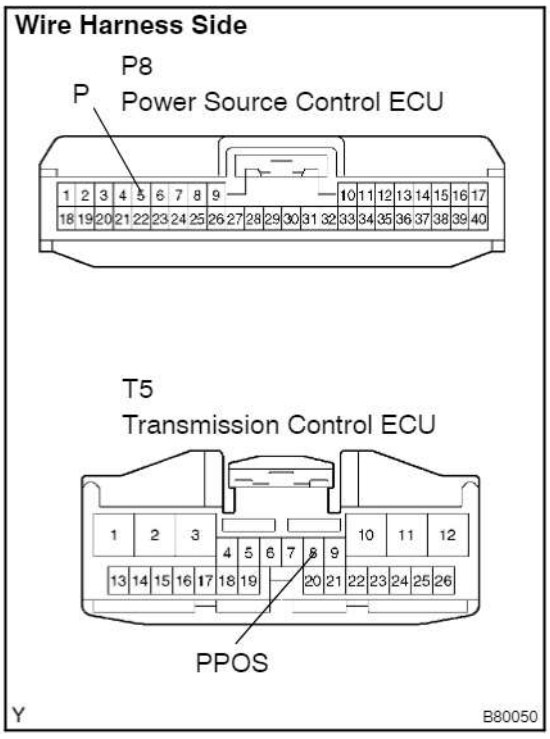
OK: "ON" (P signal is ON) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – TRANSMISSION CONTROL ECU AND BODY GROUND)



(a) Disconnect the P8 and T5 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–5 (P) – T5–8 (PPOS)	Below 1 Ω
P8–5 (P) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3	CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the hybrid control system can start normally.
OK: Hybrid control system can start normally.

NG	Go to SHIFT CONTROL SYSTEM (See page 05–920)

OK

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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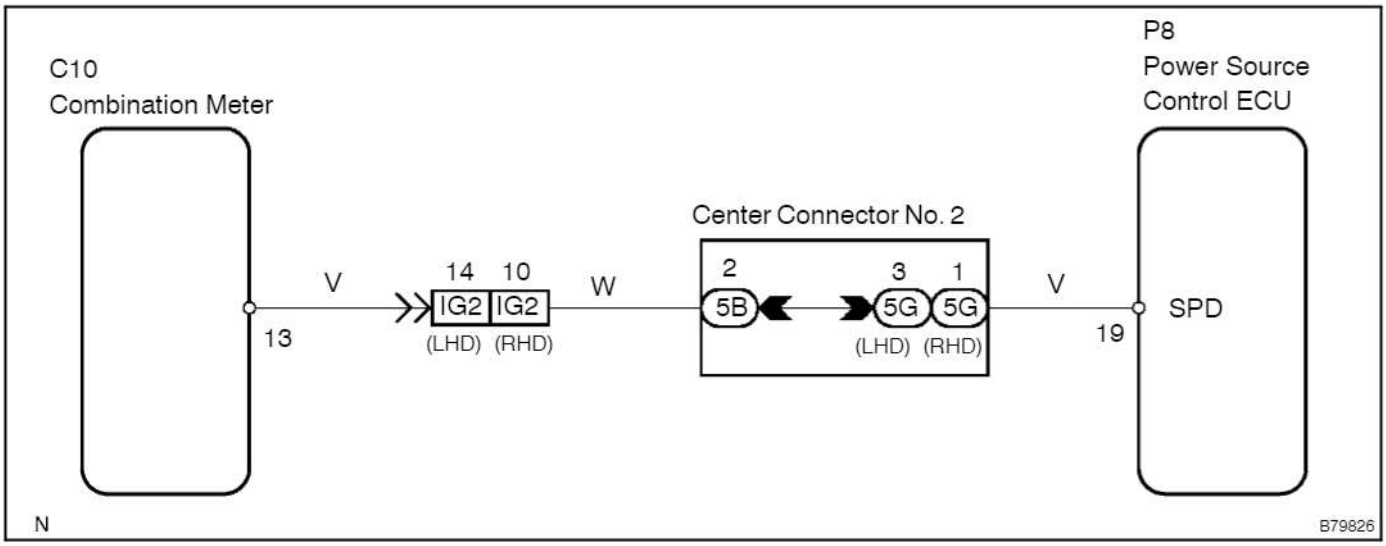
DTC	B2282	VEHICLE SPEED SIGNAL MALFUNCTION (CABLE–INFORMATION DOES NOT MATCH TO BEAN–INFORMATION)

CIRCUIT DESCRIPTION

The power source control ECU and the combination meter are connected by a cable and BEAN. This DTC is output when: 1) the cable information and BEAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and the combination meter.

DTC No.	DTC detection condition	Trouble area
B2282	Cable and BEAN infomation between power source control ECU and combination meter are inconsistent	• Power source control ECU • Combination meter • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Vehicle Spd Sig	States of Vehicle Speed Signal / Stop or Run	Stop: Vehicle condition is stop Run: Vehicle condition is run	–

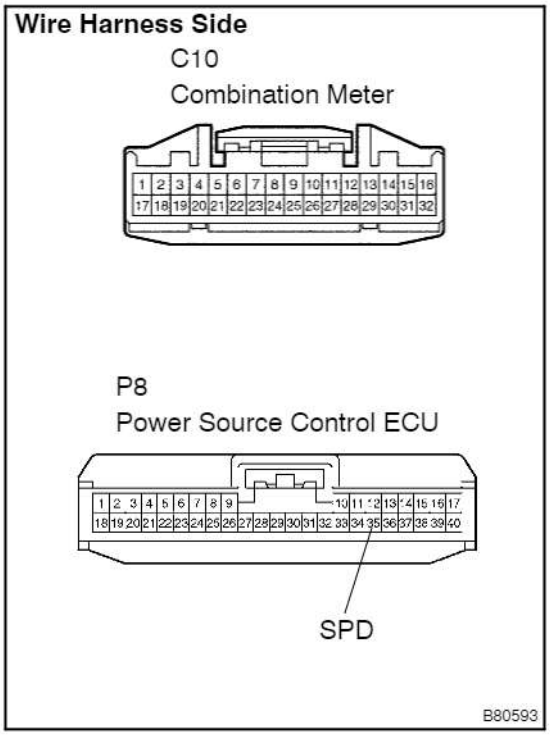
OK: "STOP" (vehicle condition is stop) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – IG2 CONNECTOR)



(a) Disconnect the P8 connector.
(b) Disconnect the C10 connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–19 (SPD) – C10–13	Below 1 Ω
P8–19 (SPD) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3	CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the hybrid control system can start normally.
OK: Hybrid control system can start normally.

NG → **Go to COMBINATION METER SYSTEM (See page 05–1684)**

OK

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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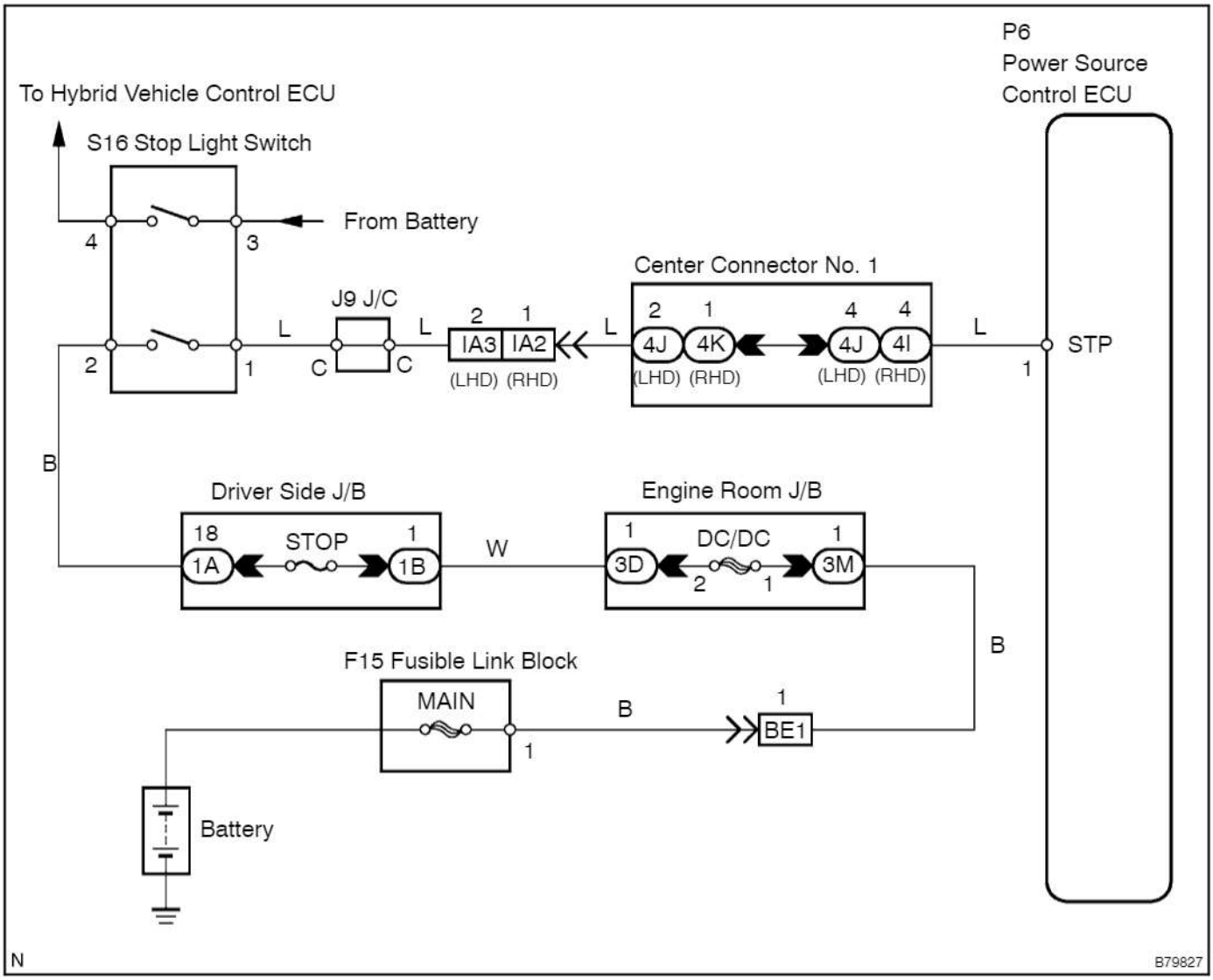
DTC	B2284	BRAKE SIGNAL MALFUNCTION (CABLE–INFORMATION DOES NOT MATCH TO BEAN–INFORMATION)

CIRCUIT DESCRIPTION

This DTC is output when :1) the brake signal circuit between the power source control ECU and the stop light switch is malfunctioning; and 2) the BEAN information is inconsistent.

DTC No.	DTC detection condition	Trouble area
B2284	Communication or communication line is abnormal between power source control ECU and stop light switch	• Power source control ECU • Stop light switch • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Stop lamp SW1	Stop lamp switch signal/ ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–

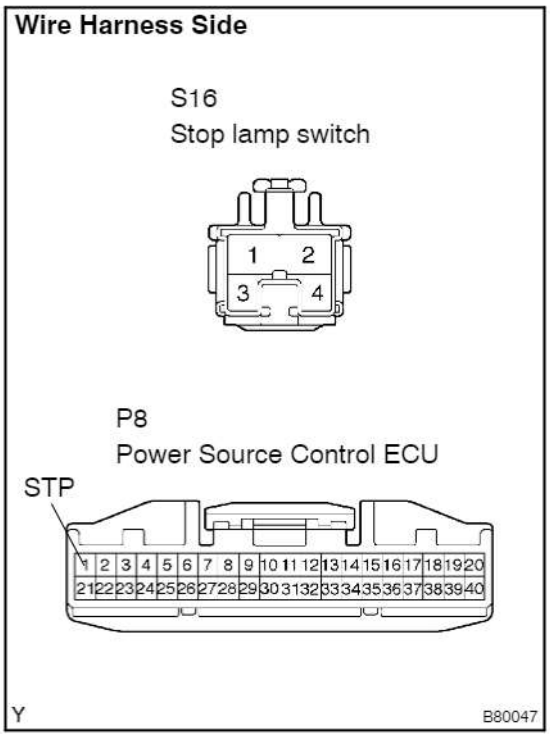
OK: "ON" (Brake pedal depressed) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	CHECK WIRE HARNESS (STOP LAMP SWITCH ASSY – POWER SOURCE CONTROL ECU)



(a) Disconnect the S16 connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance of the wire harness.

Standard:

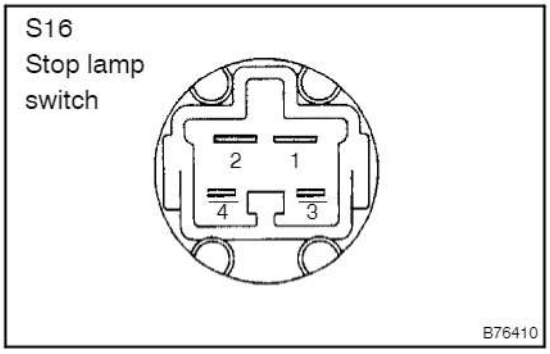
Tester Connection	Specified Condition
S16–1 – P8–1 (STP)	Below 1 Ω
S16–2 – Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3	CHECK STOP LAMP SWITCH ASSY



(a) Remove the stop lamp switch assy.
(b) Measure the switch resistance when the shaft is operated.

Standard:

Tester Connection	Condition	Specified Condition
S16–1 – S16–2	Pressed	Below 1 Ω
S16–1 – S16–2	Released	10 kΩ or higher
S16–3 – S16–4	Pressed	10 kΩ or higher
S16–3 – S16–4	Released	Below 1 Ω

NG → REPLACE STOP LAMP SWITCH ASSY

OK

REPLACE POWER SOURCE CONTROL ECU

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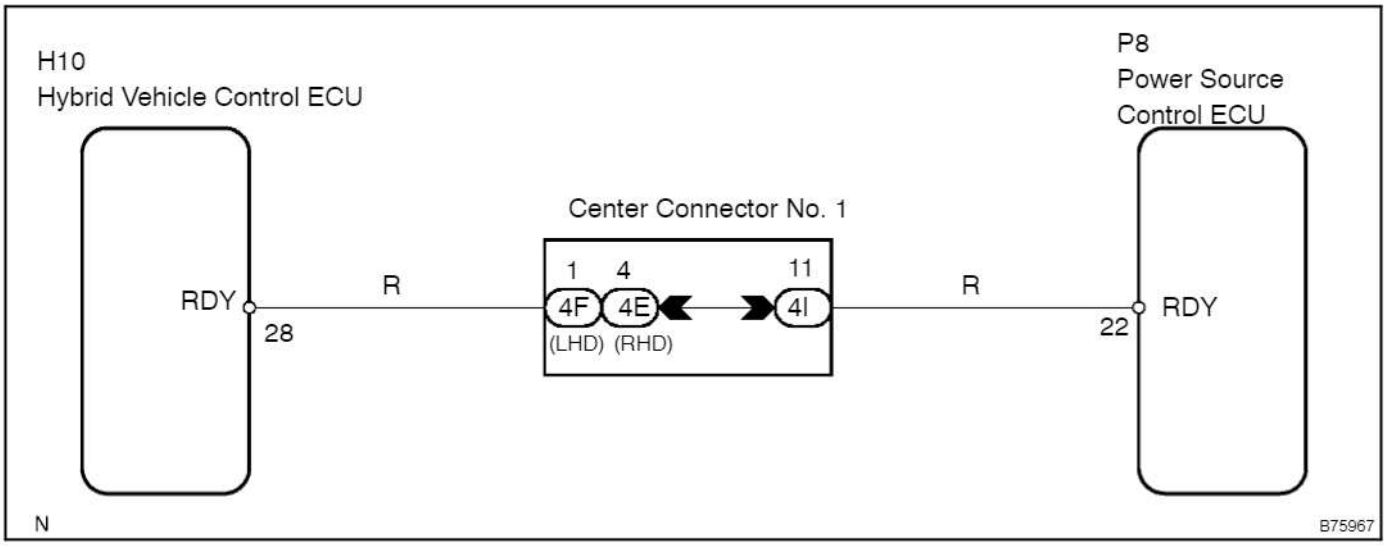
DTC B2286 READY SIGNAL MALFUNCTION

CIRCUIT DESCRIPTION

The power source control ECU and the hybrid vehicle control ECU are connected by the cable and BEAN. If the cable information and BEAN information are inconsistent, this DTC will be output.

DTC No.	DTC detection condition	Trouble area
B2286	Cable and BEAN information between power source control ECU and Hybrid vehicle control ECU are inconsistent	• Power source control ECU • Hybrid vehicle control ECU • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Ready Sig	States of Ready Signal / ON or OFF	ON: Power switch is ON (READY) OFF: Power switch is OFF or ON (IG) or ON (ACC)	–

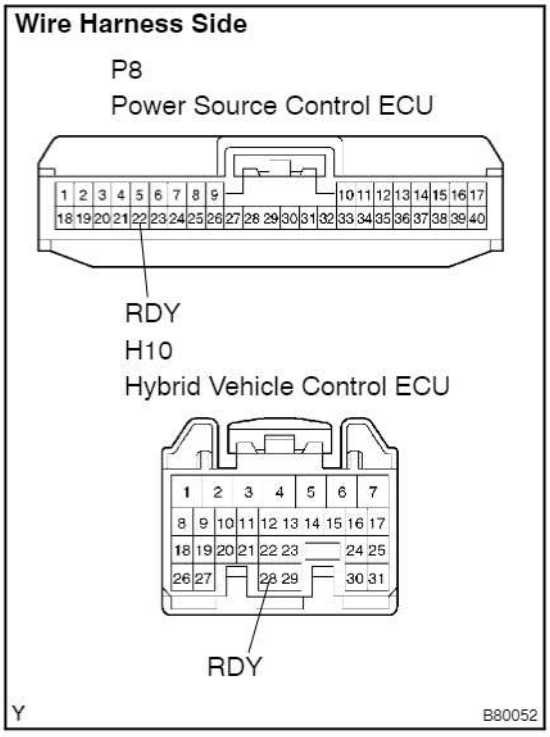
OK: "ON" (Power switch is ON) appears on the screen.

NG → **Go to step 2**

OK

REPLACE POWER SOURCE CONTROL ECU

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the P8 and H10 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–22 (RDY) – H10–28 (RDY)	Below 1 Ω
P8–22 (RDY) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3	CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the hybrid vehicle control system can start normally.
OK: Hybrid vehicle control system is can start normally.

NG	Go to HYBRID CONTROL SYSTEM (See page 05–268)

OK

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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DTC	B2287	LIN COMMUNICATION MASTER MALFUNCTION

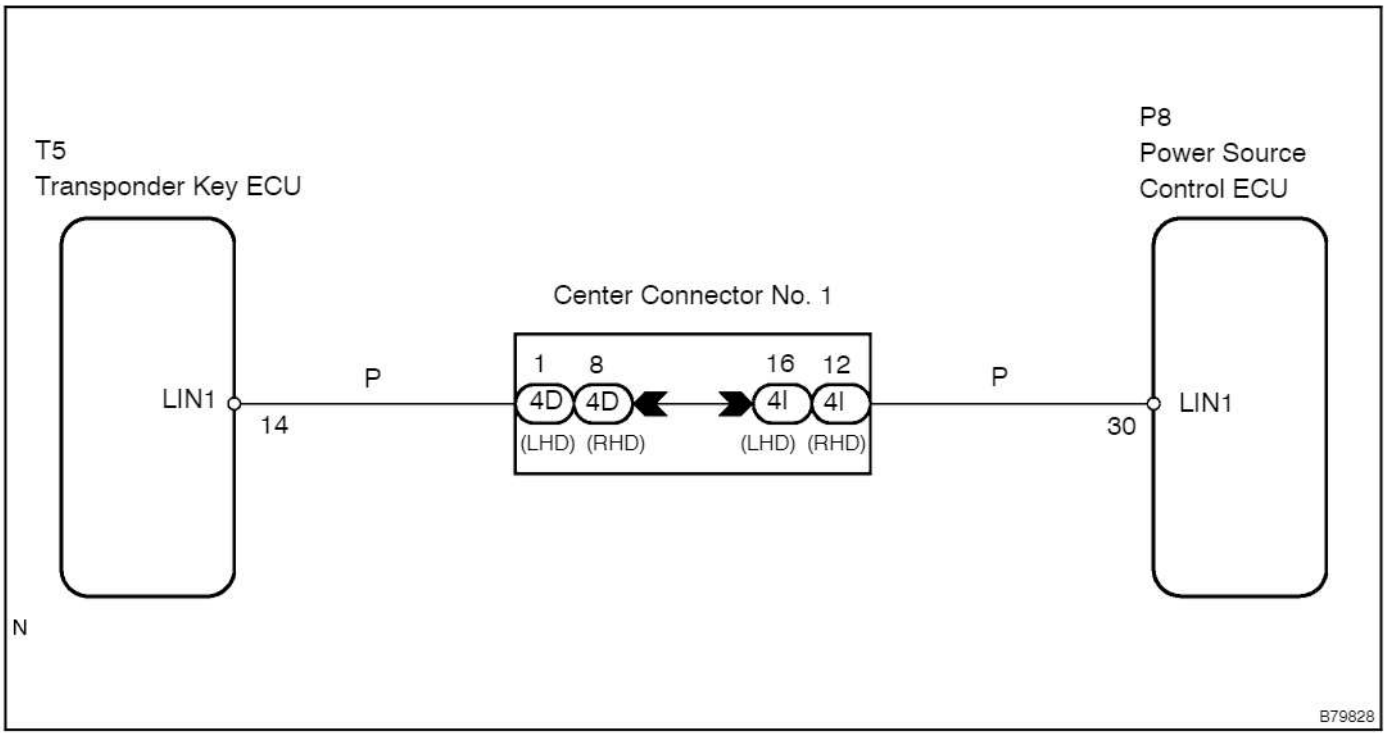
DTC	B2289	KEY COLLATION WAITING TIME OVER

CIRCUIT DESCRIPTION

This DTC is output when :1) any other DTC is set in the power source control ECU: or 2) the wire harness between the power source control ECU and the transponder key ECU is open or short.

DTC No.	DTC detection condition	Trouble area
B2287	Communication or communication line is abnormal between power source control ECU and transponder key ECU	• Power source control ECU • Transponder key ECU • Wire harness
B2289	Cable and BEAN are abnormal between power source control ECU and immobilizer system; or immobilizer system is malfunctioning	• Power source control ECU • Engine immobilizer system • Wire harness

WIRING DIAGRAM



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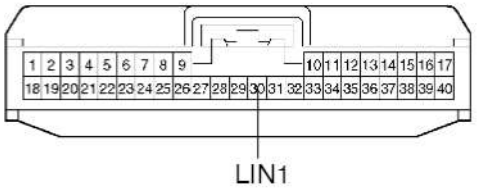
INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – TRANSPONDER KEY ECU)

Wire Harness Side

P8

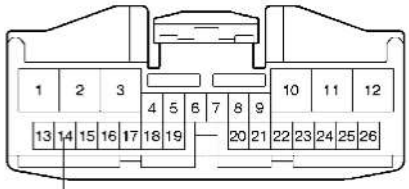
Power Source Control ECU



LIN1

T6

Transponder KeyECU



LIN1

Y B80050

(a) Disconnect the P8 and T6 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–30 (LIN1) – T6–14 (LIN1)	Below 1 Ω
P8–30 (LIN1) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing power source control ECU with a normally functioning ECU, check that the hybrid control system can start normally.

Result	Proceed to
Hybrid system can start normally	A
Hybrid system cannot start (w/ smart entry system)	B
Hybrid system cannot start (w/o smart entry system)	C

OK: Hybrid vehicle control system can start normally.

B → **Go to ENGINE IMMOBILIZER SYSTEM (w/ SMART ENTRY SYSTEM) (See page 05–2054)**

C → **Go to ENGINE IMMOBILIZER SYSTEM (w/o SMART ENTRY SYSTEM) (See page 05–2092)**

A

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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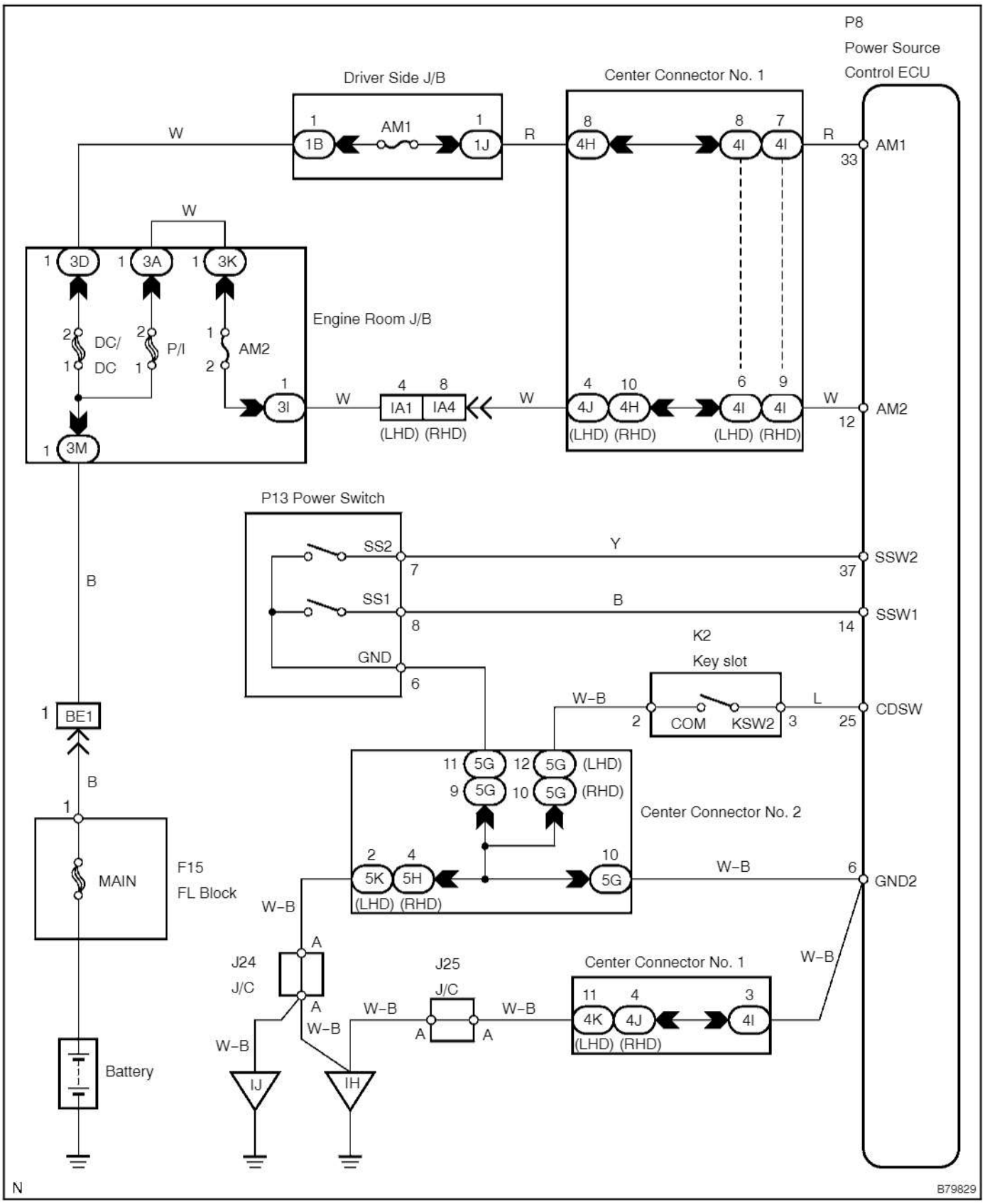
POWER MODE DOES NOT CHANGE TO ON (IG AND ACC)

CIRCUIT DESCRIPTION

When the key is inserted into the key slot and the power switch is pressed, signals are input to the power source control ECU and power switch mode changes to OFF, ON(IG) or ON (ACC) according to the inputs.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

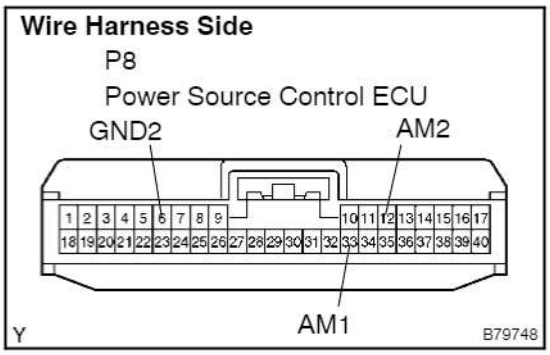
1	INSPECT FUSE (AM1, AM2)

(a) Remove the AM1 fuse from the driver side J/B.
(b) Remove the AM2 fuse from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



(a) Disconnect the P8 ECU connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
P8–33 (AM1) – Body ground	10 to 14 V
P8–12 (AM2) – Body ground	10 to 14 V
P8–6 (GND2) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK FOR DTCS (POWER SOURCE CONTROL ECU)

(a) Check for DTCs of power source control ECU.
OK: DTCs of power source control ECU are not output.

NG → **Go to DIAGNOSIS TROUBLE CODE CHART** (See page 05–2143)

OK

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4 CHECK FOR DTCS (TRANSPONDER KEY ECU)

(a) Check for DTCs of the transponder key ECU.

Result	Proceed to
DTCs of transponder key ECU are not output	A
DTCs of transponder key ECU are output (w/ smart entry system)	B
DTCs of transponder key ECU are output (w/o smart entry system)	C

OK: DTCs of the transponder key ECU are not output.

B → **Go to ENGINE IMMOBILIZER SYSTEM (w/ SMART ENTRY SYSTEM) (See page 05–2054)**

C → **Go to ENGINE IMMOBILIZER SYSTEM (w/o SMART ENTRY SYSTEM) (See page 05–2092)**

A

5 READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Str Unlock SW	States of steering Unlock Switch / ON or OFF	ON: Key is in key slot OFF: No key is in key slot	–

OK: "ON" (key is in key slot) appears on the screen.

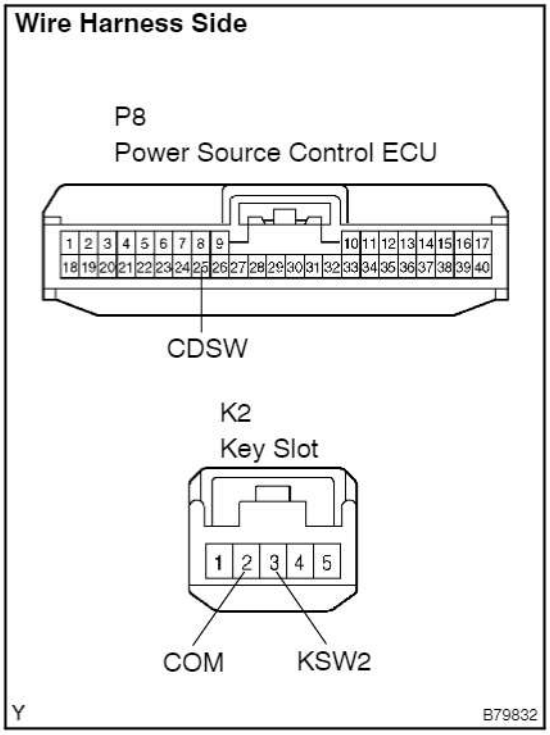
NG → **Go to step 6**

OK

Go to step 8

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6 CHECK WIRE HARNESS (KEY SLOT – POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Disconnect the K2 key slot connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance and voltage between the wire harness side connectors and body ground.

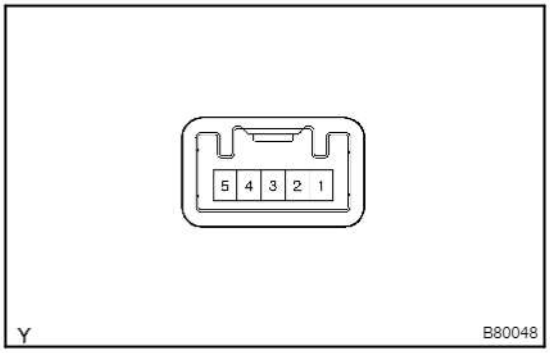
Standard:

Tester Connection	Specified Condition
K2–3 (KSW2) – P8–25 (CDSW)	Below 1 Ω
K2–2 (COM) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 INSPECT KEY SLOT



(a) Remove the K2 key slot.
(b) Measure the resistance between the terminal of the connector.

Standard:

Tester Connection	Condition	Specified Condition
K2–3 (KSW2) – K2–2 (COM)	Key is in key slot	10 kΩ or higher

NG → **REPLACE ENGINE KEY SLOT**

OK

REPLACE POWER SOURCE CONTROL ECU

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8	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the displays on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
St SW1	States of the Start Switch 1 / ON or OFF	ON: Power switch ON (IG) (Push power switch) OFF: Power switch OFF (Release power switch)	–
St SW2	States of the Start Switch2 / ON or OFF	ON: Power switch ON (IG) (Push power switch) OFF: Power switch OFF (Release power switch)	–

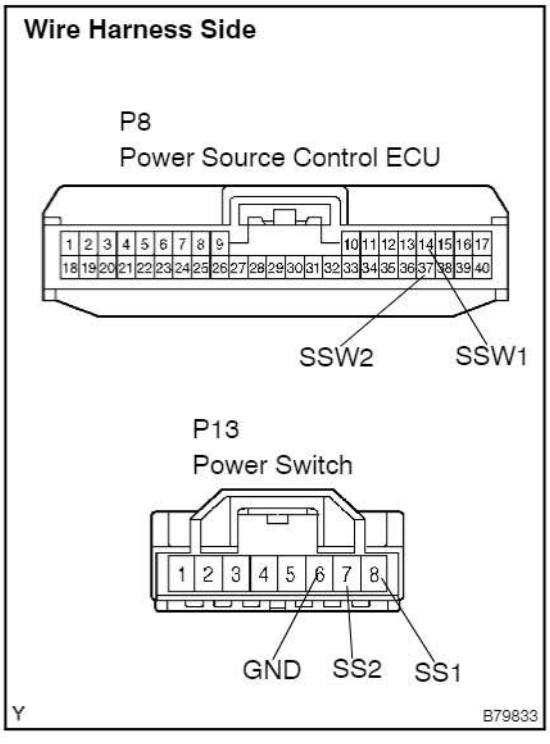
OK: "ON" (power switch ON) appears on the screen.

NG → **Go to step 9**

OK

REPLACE POWER SOURCE CONTROL ECU

9	CHECK WIRE HARNESS (POWER SWITCH – POWER SOURCE CONTROL ECU)



(a) DIsconnect the P13 power switch connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

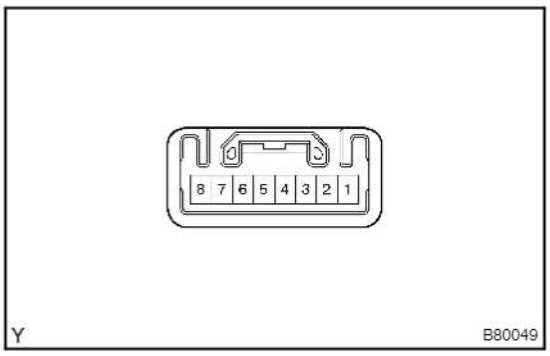
Tester Connection	Specified Condition
P13–8 (SS1) – P8–14 (SSW1)	Below 1 Ω
P13–7 (SS2) – P8–37 (SSW2)	Below 1 Ω
P13–6 (GND) – Body ground	Below 1 Ω
P13–8 (SS1) or P8–14 (SSW1) – Body ground	10 κΩ or higher
P13–7 (SS2) or P8–37 (SSW2) – Body ground	10 κΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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10	INSPECT POWER SWITCH



(a) Remove the P13 power switch.
(b) Measure the resistance between the terminals of the connectors.

Standard:

Tester Connection	Switch Condition	Specified Condition
P13–7 (SSW2) – P13–6 (GND)	Pushed	Below 1 Ω
P13–8 (SSW1) – P13–6 (GND)	Pushed	Below 1 Ω
P13–7 (SSW2) – P13–6 (GND)	Release	10 kΩ or higher
P13–8 (SSW1) – P13–6 (GND)	Release	10 kΩ or higher

NG → **REPLACE POWER SWITCH**

OK

REPLACE POWER SOURCE CONTROL ECU

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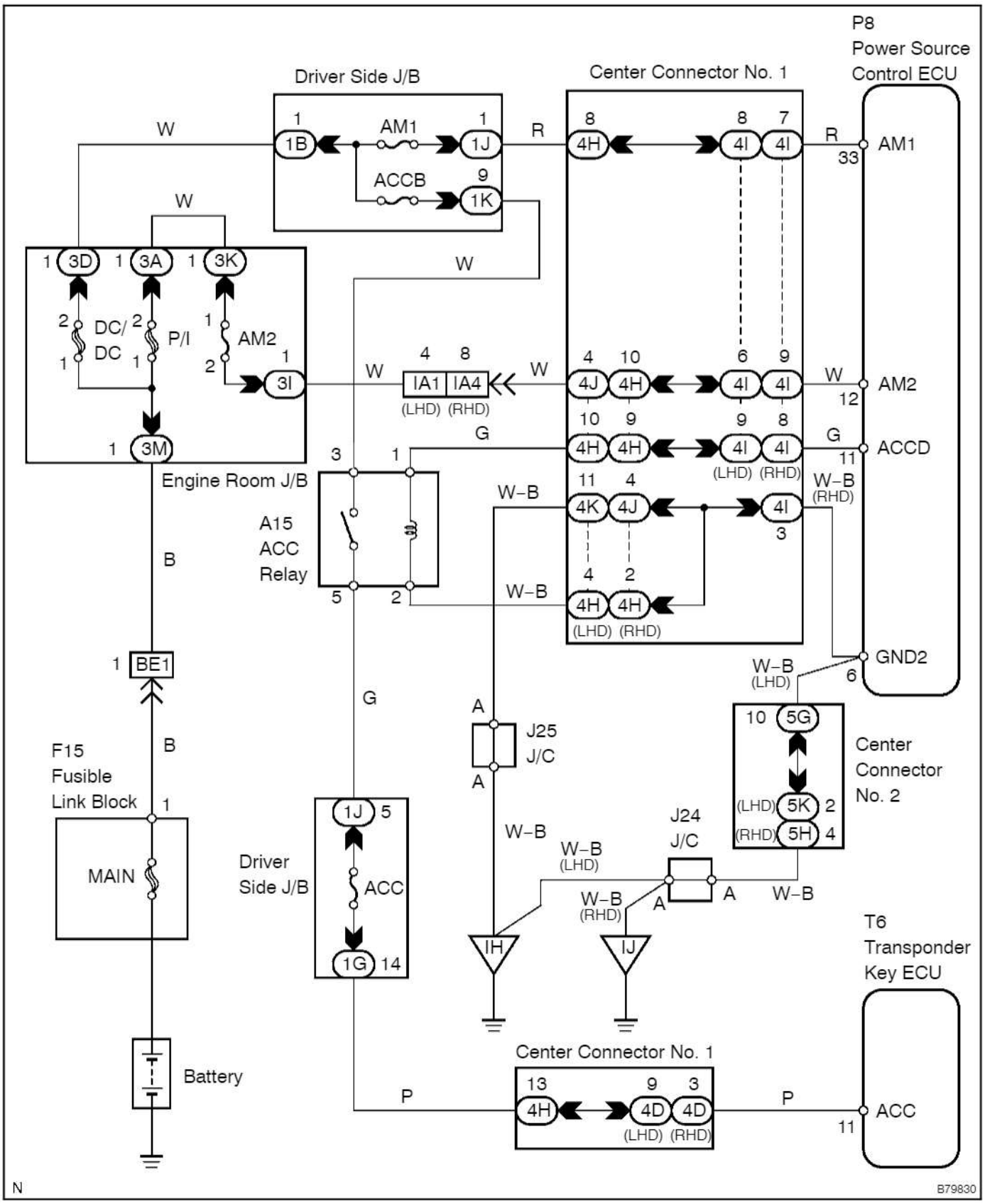
POWER MODE DOES NOT CHANGE TO ON (ACC)

CIRCUIT DESCRIPTION

When the key is inserted into the key slot and the power switch is pressed, signals are input to the power source control ECU and power switch mode changes to OFF, ON(IG) or ON (ACC) according to the inputs.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

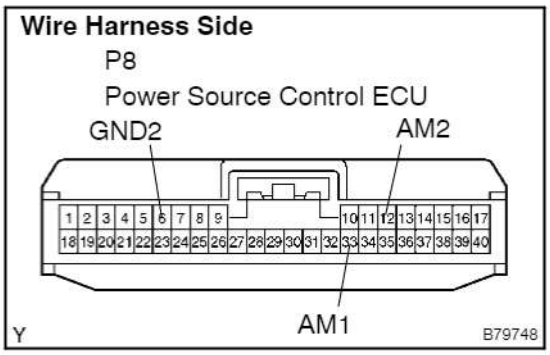
1	INSPECT FUSE (AM1, AM2)

(a) Remove the the AM1 fuse from the driver sidel J/B.
(b) Remove the the AM2 fuse from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



(a) Disconnect the P8 ECU connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
P8–33 (AM1) – Body ground	10 to 14 V
P8–12 (AM2) – Body ground	10 to 14 V
P8–6 (GND2) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK FOR DTCS

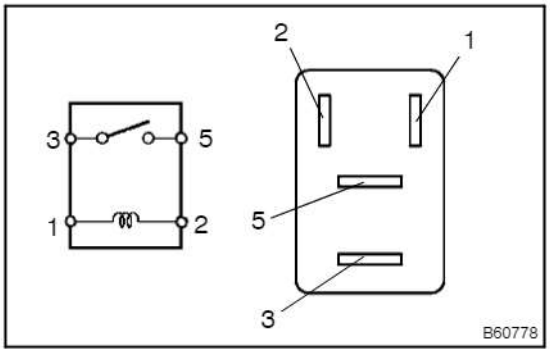
(a) Check for DTCs of power source control ECU.
OK: DTCs of power source control ECU are not output.

NG → **Go to DIAGNOSIS TROUBLE CODE CHART (See page 05–2143)**

OK

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4 INSPECT RELAY (ACC)



(a) Remove the A15 ACC relay.
(b) Measure the resistance.

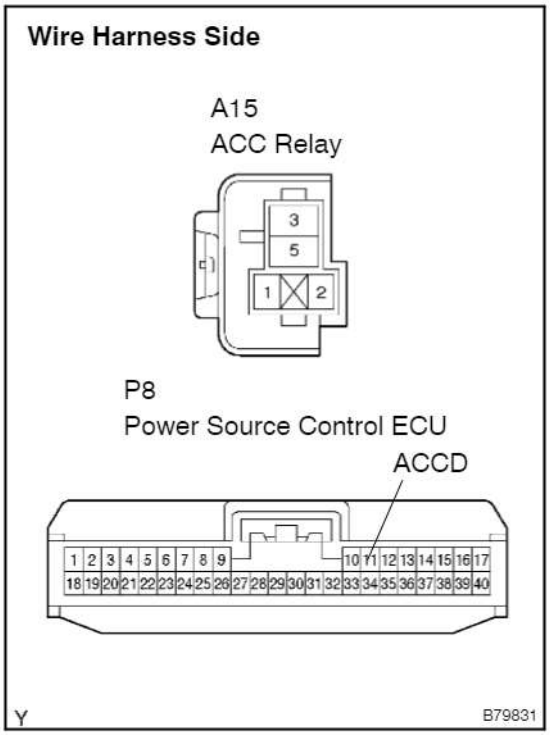
Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (ACC RELAY – POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Remove the A15 ACC relay.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

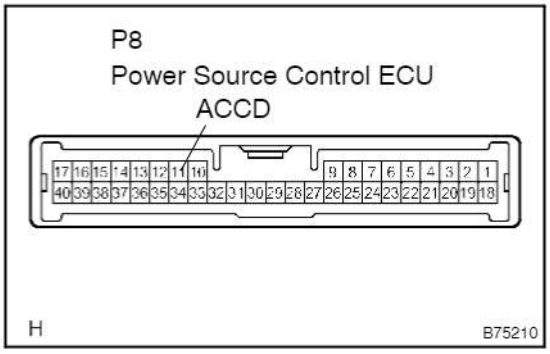
Tester Connection	Specified Condition
A15–1 – P8–11 (ACCD)	Below 1 Ω
A15–2 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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6 INSPECT POWER SOURCE CONTROL ECU



(a) Remove the P8 ECU.

(b) Measure the voltage between the terminal of the connector and body ground.

Standard:

Tester Connection	Condition	Specified Condition
P8–11 (ACCD) – Body ground	Power switch ON (ACC)	10 to 14 V
P8–11 (ACCD) – Body ground	Power switch OFF	0 V

NG → **REPLACE POWER SOURCE CONTROL ECU**

OK

7 CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the power switch can be set to ON (ACC).

Result	Proceed to
Power switch can be set to ON (ACC)	A
Power switch cannot be set to ON (ACC) (w/ smart entry system).	B
Power switch cannot be set to ON (ACC) (w/o smart entry system).	C

B → **Go to ENGINE IMMOBILIZER SYSTEM (w/ SMART ENTRY SYSTEM) (See page 05-2045)**

C → **Go to ENGINE IMMOBILIZER SYSTEM (w/o SMART ENTRY SYSTEM) (See page 05-2084)**

A

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

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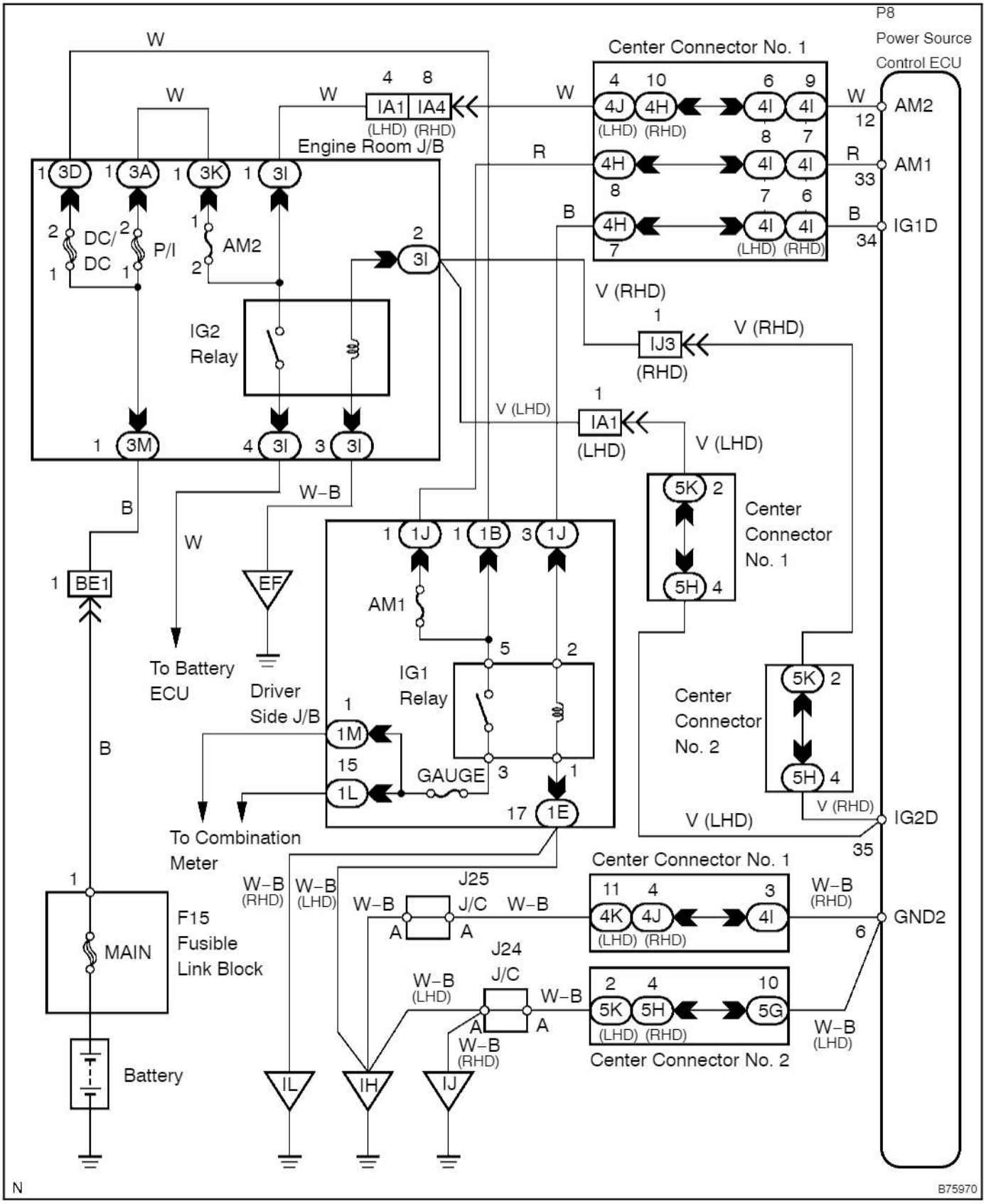
POWER MODE DOES NOT CHANGE TO ON (IG)

CIRCUIT DESCRIPTION

When the key is inserted into the key slot and the power switch is pressed, signals are input to the power source control ECU and power switch mode changes to OFF, ON(IG) or ON (ACC) according to the inputs.

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WIRING DIAGRAM



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INSPECTION PROCEDURE

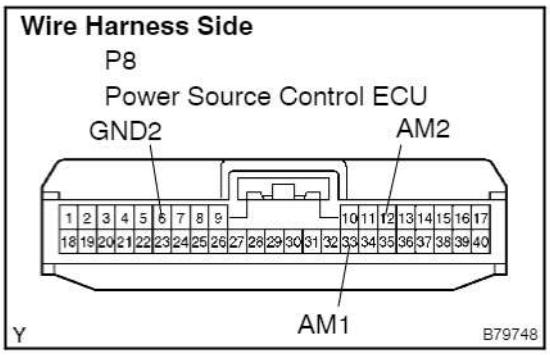
1	INSPECT FUSE (AM1, AM2)

(a) Remove the the AM1 fuse from the driver side J/B.
(b) Remove the the AM2 fuse from the engine room J/B.
(c) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



(a) Disconnect the P8 ECU connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
P8–33 (AM1) – Body ground	10 to 14 V
P8–12 (AM2) – Body ground	10 to 14 V
P8–6 (GND2) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK FOR DTCS

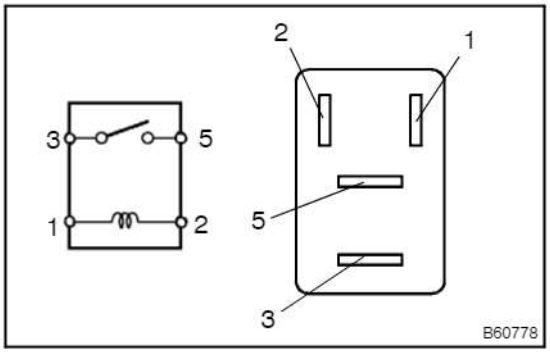
(a) Check for DTCs of power source control ECU.
OK: DTCs of power source control ECU are not output.

NG → **Go to DIAGNOSIS TROUBLE CODE CHART** (See page 05–2143)

OK

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4 INSPECT RELAY (IG1)



(a) Remove the IG1 relay from the driver side J/B.
(b) Measure the resistance.

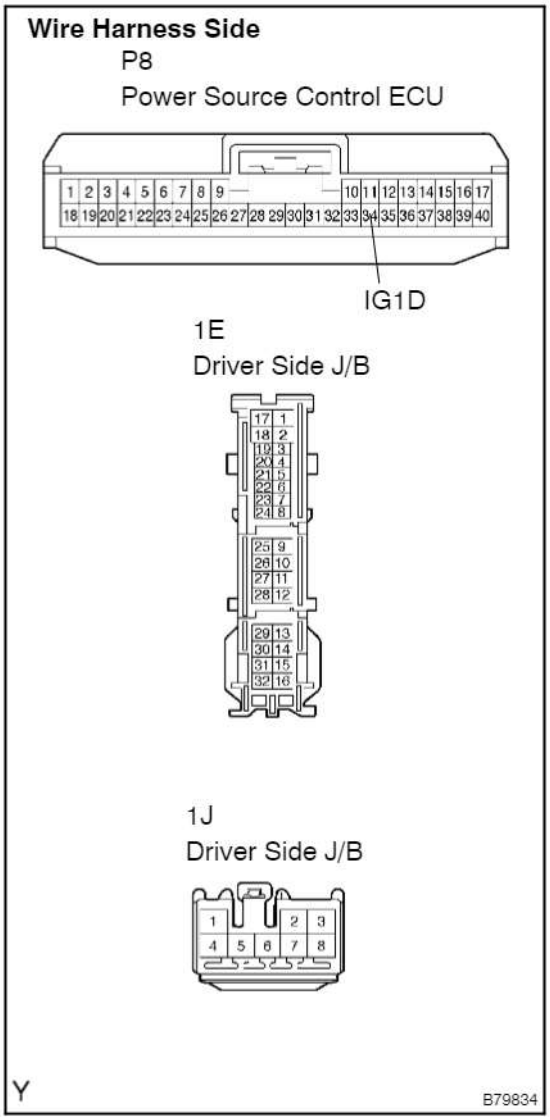
Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (DRIVER SIDE J/B ASSY – POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Disconnect the 1J and 1E J/B connectors.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

Tester Connection	Specified Condition
1J–3 – P8–34 (IG1D)	Below 1 Ω
1E–17 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

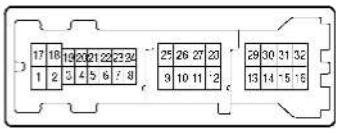
OK

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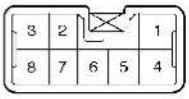
6 CHECK DRIVER SIDE J/B

Wire Harness Side

1E
Driver Side J/B



1J
Driver Side J/B



Y B79835

(a) Disconnect the 1J and 1E driver side J/B connector.
(b) Remove IG1 relay from driver side J/B.

Standard:

Tester Connection	Specified Condition
1J–3 –Driver side J/B IG1 relay terminal 2	Below 1 Ω
Body ground – Driver side J/B IG1 relay terminal 2	10 kΩ or higher
1E–7 – Driver side J/B IG1 relay terminal 1	Below 1 Ω

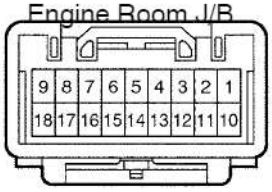
NG → **REPLACE DRIVER SIDE J/B**

OK

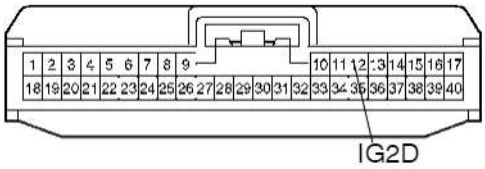
7 CHECK WIRE HARNESS (ENGINE ROOM J/B ASSY – POWER SOURCE CONTROL ECU AND BODY GROUND)

Wire Harness Side

3I
Engine Room J/B



P8
Power Source Control ECU



B80046

(a) Disconnect the 3I J/B connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors and body ground.

Standard:

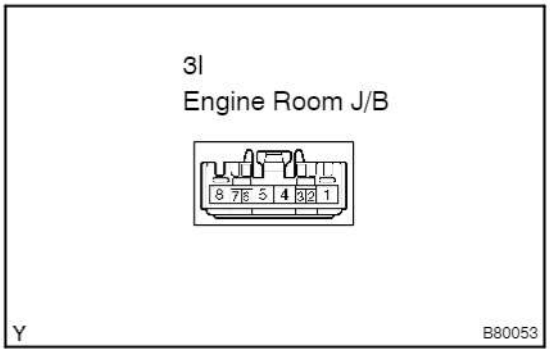
Tester Connection	Specified Condition
3I–2 – P8–35 (IG2D)	Below 1 Ω
3I–3 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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8 CHECK ENGINE ROOM J/B



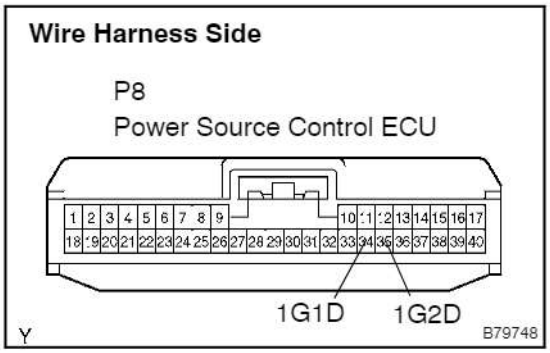
(a) Disconnect the 3I J/B connector.
(b) Measure the resistance engine room J/B
Standard:

Tester Connection	Specified Condition
3I–2 – 3I–3	Continuity

NG → **REPLACE ENGINE ROOM J/B**

OK

9 CHECK POWER SOURCE CONTROL ECU



(a) Measure the voltage when the power switch is pushed.
Standard:

Tester Connection	Switch Condition	Specified Condition
P8–34 (IG1D) – Body ground	ON (ACC)	0 V
P8–35 (IG2D) – Body ground	ON (ACC)	0 V
P8–34 (IG1D) – Body ground	ON (IG)	10 to 14 V
P8–35 (IG2D) – Body ground	ON (IG)	10 to 14 V

NG → **REPLACE POWER SOURCE CONTROL ECU**

OK

10 CHECK OPERATION OF POWER SOURCE CONTROL ECU

(a) After replacing the power source control ECU with a normally functioning ECU, check that the the power switch can be set to ON (IG).

Result	Proceed to
Power switch cannot be set to ON (IG) (w/ smart entry system).	A
Power switch cannot be set to ON (IG) (w/o smart entry system).	B

B → **Go to HYBRID CONTROL SYSTEM (See page 05–268)**

A

NORMAL (POWER SOURCE CONTROL ECU DEFECTIVE)

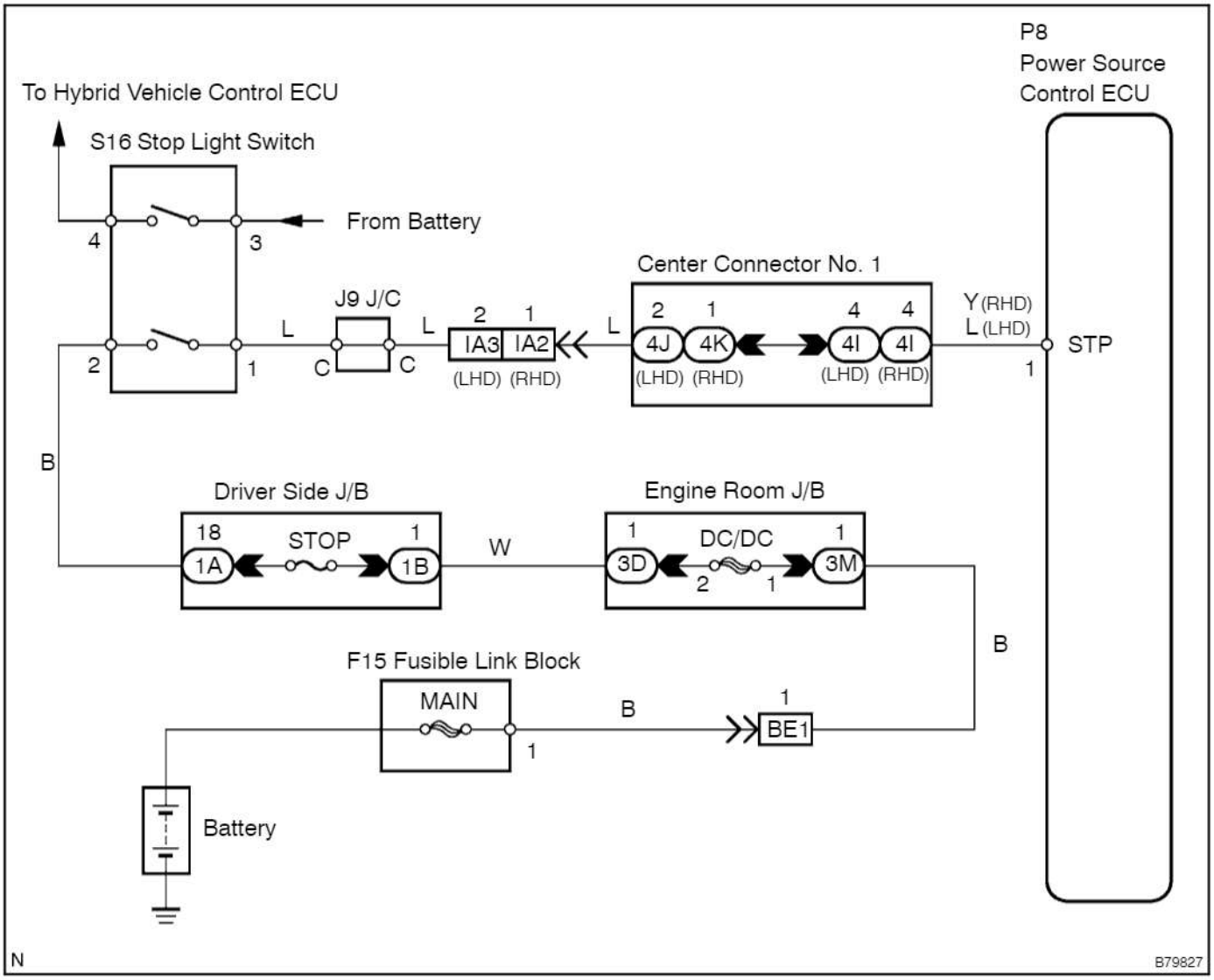
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POWER MODE DOES NOT CHANGE TO ON (READY)

CIRCUIT DESCRIPTION

When the key is inserted into the key slot and the power switch is pressed, signals are input to the power source control ECU and power switch mode changes to OFF, ON (IG) or ON (ACC) or according to the inputs. When the shift position is P, the brake pedal is depressed and held, and the power switch is pressed, the power switch mode changes to ON (READY), signifying that the hybrid system starts operating.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT BASIC OPERATION

(a) Check that the shift position switch is ON.
(b) Turn the power switch ON (Ready) and check that the hybrid vehicle control system starts normally. Make sure the brake pedal should not be depressed at this time.
OK: Hybrid vehicle control system starts normally (power switch can be set to ON (READY)).

NG → **Go to step 2**

OK

END

2	CHECK OPERATION OF POWER SWITCH

(a) Check that the power mode can be changed by pushing the power switch.
HINT:
Without depressing the brake pedal, push the power switch repeatedly. Power mode should change as follows: OFF, ON (ACC), ON (IG) and OFF.
With the brake pedal depressed, push the power switch repeatedly. Power mode should change as follows: OFF, ON (ACC), ON (IG), ON (READY) and OFF.

NG → **OTHER PROBLEM (See page 05–2134)**

OK

3	CHECK FOR DTCS

(a) Check for DTCs of the power source control ECU.
OK: DTCs of the power source control ECU are not out put

NG → **Go to DIAGNOSIS TROUBLE CODE CHART (See page 05–2143)**

OK

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4 READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester II main switch ON.
(c) Read the DATA LIST according to the display on the tester.

Standard (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
Stop lamp SW1	Stop lamp switch signal / ON or OFF	ON: Brake pedal pressed OFF: Brake pedal released	–
Stop lamp SW2	Stop lamp switch signal / ON or OFF	ON: Brake pedal pressed OFF: Brake pedal released	–

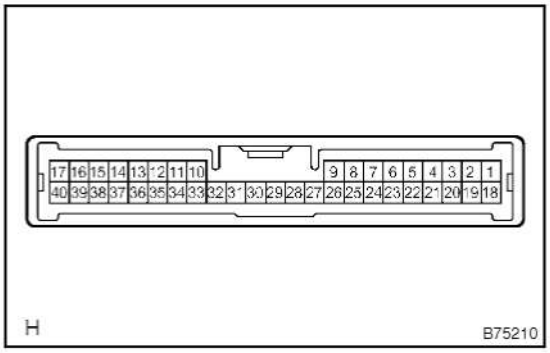
OK: "ON" (stop lamp switch ON) appears on the screen.

NG → **Go to step 5**

OK

Go to step 8

5 CHECK POWER SOURCE CONTROL ECU



(a) Measure the voltage when the brake pedal is operated.

Standard:

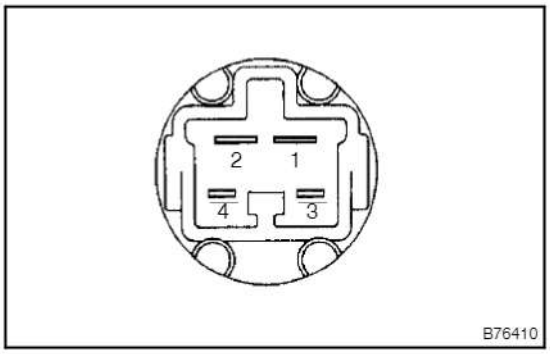
Tester Connection	Condition	Specified Condition
S8–1 (STP) – Body ground	Depressed	10 to 14 V
S8–1 (STP) – Body ground	Not depressed	0 V

NG → **GO TO STEP 6**

OK

REPLACE POWER SOURCE CONTROL ECU

6 CHECK STOP LAMP SWITCH ASSY



(a) Remove the stop lamp assy.
(b) Measure the switch resistance when the shaft is operated.

Standard:

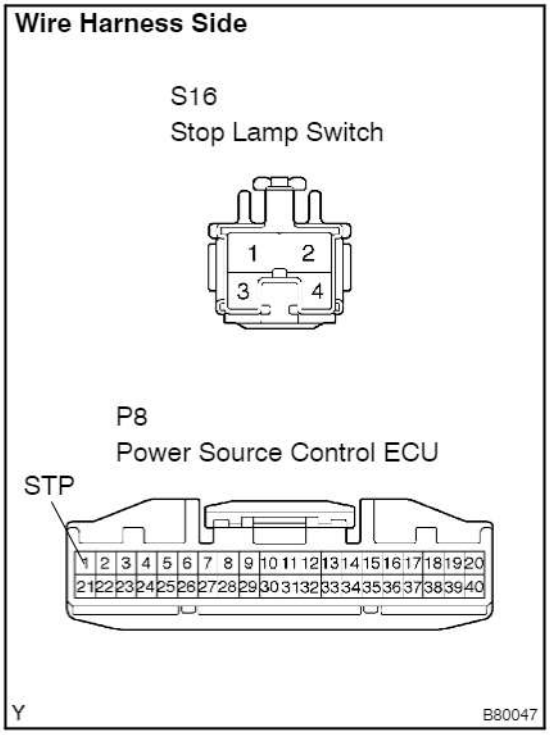
Tester Connection	Condition	Specified Condition
S16–1 – S16–2	Pressed	Below 1Ω
S16–1 – S16–2	Not pressed	10 kΩ or higher
S16–3 – S16–4	Pressed	10 kΩ or higher
S16–3 – S16–4	Not pressed	Below 1Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

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7	CHECK WIRE HARNESS (STOP LAMP SWITCH ASSY – POWER SOURCE CONTROL ECU)



(a) Disconnect the S16 switch connector.
(b) Disconnect the P8 ECU connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S16–1 – P8–1 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE POWER SOURCE CONTROL ECU

8	CHECK FOR DTCS

(a) Check for DTCs of hybrid vehicle control ECU.

OK: DTCs of hybrid control ECU are not output

NG → **Go to HYBRID CONTROL SYSTEM (See page 05–268)**

OK →

REPLACE POWER SOURCE CONTROL ECU

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05IES-01

ON–VEHICLE INSPECTION

1. CHECK POWER SWITCH MODE CHANGE FUNCTION

(a) Check the function of the power switch.

(1) Check that power switch mode changes in accordance with the conditions of the shift position and brake pedal.

HINT:

For the vehicles with the smart entry system, the power switch functions not only when the key is inserted in to the key slot but also when the driver carries the key.

Shift Position	Brake Pedal	Change of Power Switch Mode (Arrow "→" means 1 press of power switch)
P	Released	OFF → ON (ACC) → ON (IG) → OFF (Repeated)
P	Depressed	OFF → Hybrid system starts
P	Depressed	ON (ACC) → Hybrid system starts
P	Depressed	ON (IG) → Hybrid system starts
P	Depressed	Hybrid system operating → OFF
P	Released	Hybrid system operating → OFF
Any position other than P	Released	ON (ACC) → ON (IG)
Any position other than P	Depressed	ON (ACC) → ON (IG)
Any position other than P	Released	ON (IG) → OFF after shift position switched to P (shift–linked–OFF function)
Any position other than P	Released	Hybrid system operating → OFF after shift position switched to P (Auto P control function)
Any position other than P	Depressed	Hybrid system operating → OFF after shift position switched to P (Auto P control function)

(b) Check if power switch mode changes without pressing the power switch.

(1) With power switch mode ON (ACC) and the shift position in P, pull out the key. Check that power switch mode changes from ON (ACC) to OFF automatically.

(2) With power switch mode ON (ACC) and the shift position in P, wait for at least 1 hour. Check that power switch mode changes from ON (ACC) to OFF automatically.

2. CHECK THE KEY INTERLOCK FUNCTION

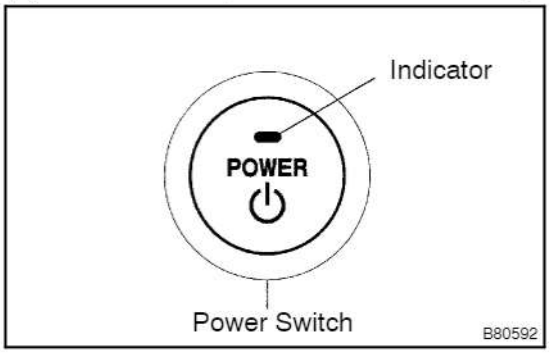
(a) Insert the key into key slot, and change power switch modes and shift position according to the table below. Check whether or not the key is locked in the key slot.

Power Switch Mode	Shift Position	Key Status
OFF	P	Not locked in
OFF	Any position except P	–
ON (ACC)	P	Not locked in
ON (ACC)	Any position except P	Locked in
ON (IG)	P	Locked in
ON (IG)	Any position except P	Locked in
READY (hybrid system ON)	P	Locked in
READY (hybrid system ON)	Any position except P	Locked in

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3. CHECK THE INDICATOR LIGHT CONDITION

(a) Check the power indicator on the power switch.



(1) Check that the power indicator illuminates and changes its color according to the table below.

Power Switch Mode	Indicator Status
OFF	OFF
ACC	Green illumination
IG (ON)	Amber illumination
Hybrid System ON	OFF
Push button start system malfuning	Flashes continuously in amber

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THEFT DETERRENT SYSTEM

05ICA–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

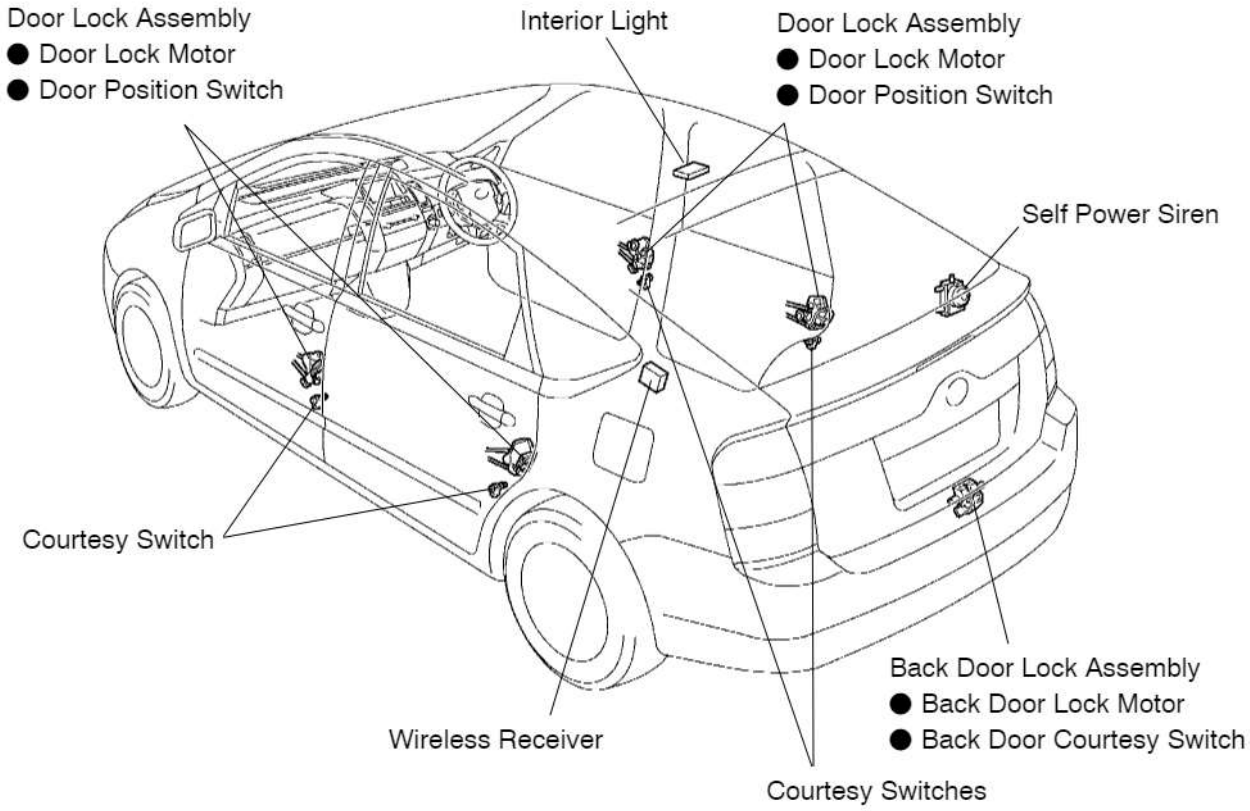
NOTICES FOR HYBRID SYSTEM ACTIVATION:

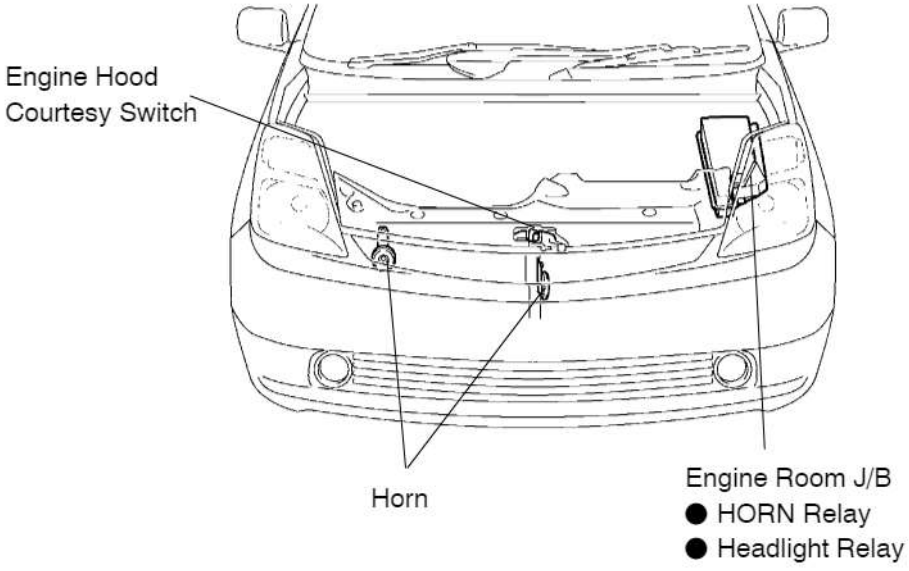
The power switch may not function at once when the warning lamp illuminates or after the battery is disconnected. In this case, repress the power switch. The hybrid system should function.

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05ICB-01

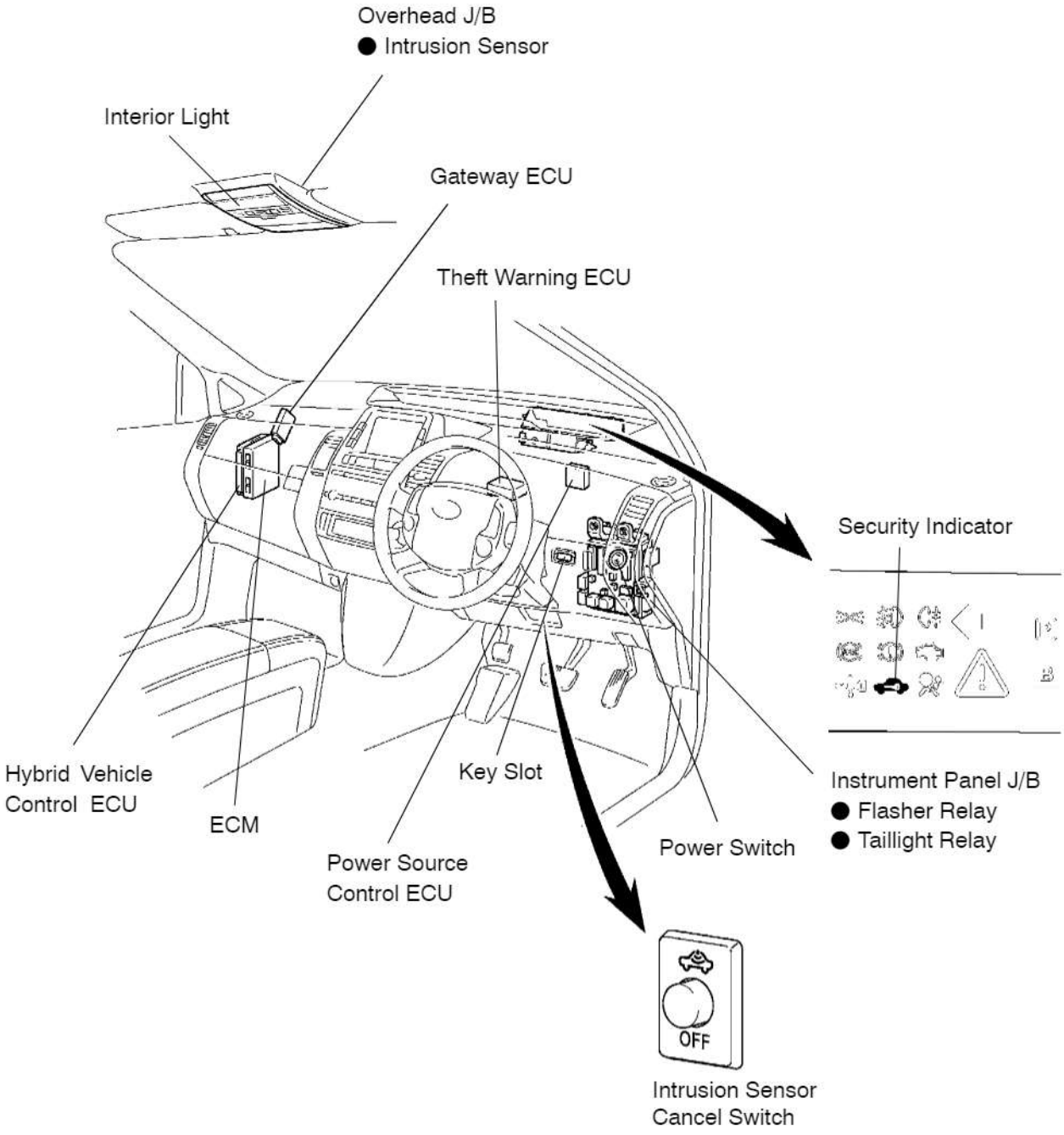
LOCATION





Y

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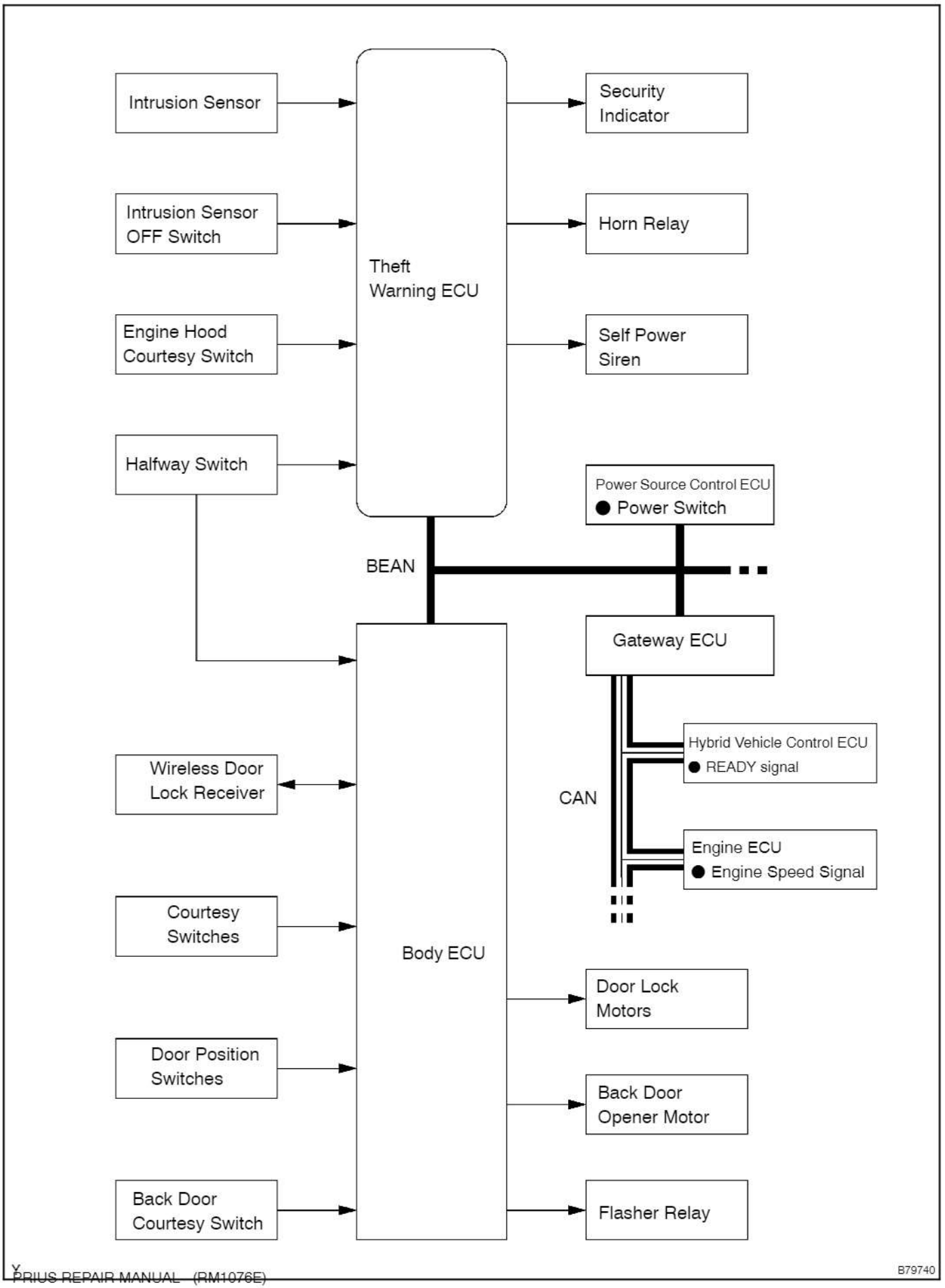
Y

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SYSTEM DIAGRAM



B79740

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Communication Table:

Sender	Receiver	Signal	Line
Body ECU	Theft Warning ECU	• Door lock system signal (smart and wireless operation) • Driver door key–linked switch signal (lock and unlock operation) • Diagnosis erasure signal • Diagnosis tool request • Door status signal (door lock, courtesy switch) • Vehicle specification signal • Wireless signal • IG and ACC switch signal • All doors courtesy switch signal	BEAN
Theft Warning ECU	Body ECU	Security signal (door lock and unlock, head lamp, hazard lamp, horn, dome lamp and tail lamp)	BEAN
Theft Warning ECU	Power Source Control ECU	Power switch signal	BEAN
Theft Warning ECU	ECM	Engine switch signal	BEAN/CAN
Theft Warning ECU	Hybrid Vehicle Control ECU	Drive OK display signal	BEAN/CAN

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05ICD–01

SYSTEM DESCRIPTION

- This system has been provided as standard equipment on RHD models.*
- The theft deterrent system uses the power door lock control system and wireless door lock remote control system parts. The theft deterrent system will activate when somebody attempts to forcibly enter the vehicle, open the engine hood, or when the battery terminals are disconnected and reconnected.
- The theft warning ECU controls this system.
- An intrusion sensor has been added. This sensor improves system performance in case an attempt is made to enter the vehicle by breaking a window.
- The warning specifications of this system are listed below.

▶Warning Specifications◀

Model		RHD*
Warning Method	Interior Lamp	Illuminating
	Hazard Warning Lamp	Flashing
	Vehicle Horn	Sounding (at approx. 0.4 second intervals)
	Self power Siren	Sounding (at the cycle of the self power siren)
	Door Lock Motor	Locks doors
Warning Time		27.5 sec.

*: Except Australia, Singapore and Hong Kong.

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05ICE-01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use intelligent tester II procedures to troubleshoot the theft deterrent system.
- The intelligent tester II should be used in step 3 and 5.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05–2207)

3	INSPECT COMMUNICATION FUNCTION OF LARGE–SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Use the intelligent tester II to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication stop, communication line malfunctioning)
  Without code outputs, proceed to A.
  (2) (ECU unconnected, communication stop, communication line malfunctioning)
  With code outputs, proceed to B.

B	Go to MULTIPLEX COMMUNICATION SECTION (See page 05–2250)

A

4	PROBLEM SYMPTOMS TABLE (See page 05–2209)

(a) If the fault is not listed on the problem systems table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B	Go to step 6

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST / ACTIVE TEST (see page 05–2214).
  (1) Inspection with the intelligent tester (DATA LIST).
  (2) Inspection with the intelligent tester (ACTIVE TEST).
(b) Terminals of ECU (see page 05–2210).

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6	ADJUST, REPAIR OR REPLACE

7	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		License Plate 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. °C (°F))

Problem Symptom

☐ Theft deterrent system cannot be set		
☐ Security indicator is not flashing when theft deterrent system is set (It stays ON or does not light up at all)		
☐ Theft deterrent system does not operate	☐ When door is opened ☐ When engine hood is opened	Malfunction ☐ Horns ☐ Door lock operation ☐ Hazard warning lamp ☐ Room lamp ☐ Self power siren ☐ Intrusion sensor
☐ Theft deterrent system cannot be canceled once set	☐ When door is unlocked using wireless door lock control system	
☐ Theft deterrent system cannot be canceled during warning operation	☐ When door is unlocked using wireless door lock control system ☐ Depress accelerator pedal and rev engine for more than 10 seconds (idling)	
☐ Warning operation does not start when theft deterrent system is set and door is opened with key		
☐ Other		

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05IOG–01

CUSTOMIZE PARAMETERS

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

Theft Deterrent System

Item	Default	Contents	Setting
Intrusion Sen (Intrusion sensor)	ON	Function that turns intrusion sensor ON/OFF. This function is only available for vehicles with intrusion sensor.	ON/OFF

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PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the table below for each malfunction symptom and troubleshoot each circuit.

HINT:

The theft deterrent system is based on the premise that the power door lock control system and the wireless door lock control system are operating normally. Check these systems first before troubleshooting the theft deterrent system.

Symptom	Suspected Area	See Page
Theft deterrent system cannot be set*	1. Theft warning sensor cancel switch circuit 2. Security indicator circuit 3. ECU power source circuit 4. Unlock warning switch circuit 5. Door key lock and unlock switch 6. Door courtesy switch circuit 7. Back door courtesy switch circuit 8. Engine hood courtesy switch circuit 9. Theft warning ECU	05–2224 05–2221 05–2216 05–2039 05–1779 05–1779 05–1779 05–2232 –
Security indicator does not blink when theft deterrent system is set*	1. Security indicator circuit 2. Theft warning ECU	05–2221 05–2216
Alarm sounding state cannot be canceled even when key is inserted into key slot, hybrid system is started and acceleration pedal is pushed for 10 seconds	1. Ignition circuit 2. Unlock warning switch circuit 3. Theft warning ECU	05–2218 05–2034 –
Theft deterrent system can be set even when door is open	1. Door courtesy switch circuit 2. Theft warning ECU	05–1779 –
Horns (low pitched, high pitched) do not sound while theft deterrent system is in warning operation	1. Horn (low pitched, high pitched) circuit 2. Horn assy 3. Theft warning ECU	05–2235 77–4 –
Hazard warning lamps do not flash while theft deterrent system is in warning operation	1. Hazard warning circuit 2. Theft warning ECU	65–12 –
Room lamp does not illuminate while theft deterrent system is in warning operation	1. Room lamp circuit 2. Theft warning ECU	65–12 –
Self–power siren does not sound while theft deterrent system is in warning operation	1. Theft warning siren circuit 2. Theft warning ECU	05–2229 –
Hazard warning lamps flash even when theft deterrent system is not set	1. Hazard warning switch circuit 2. Theft warning ECU	65–12 –
Room lamp illuminates even when theft deterrent system is not set	1. Room lamp circuit 2. Theft warning ECU	65–12 –
Intrusion sensor operates even when theft deterrent system is not set*	1. Intrusion sensor circuit 2. Theft warning ECU	05–2224 –
Theft deterrent system operates when intrusion sensor cancel switch is OFF	1. Intrusion sensor cancel switch circuit 2. Theft warning ECU	05–2227 –
Intrusion sensor does not operate while theft deterrent system is in warning operation*	1. Intrusion sensor circuit 2. Theft warning ECU	05–2224 –

HINT:

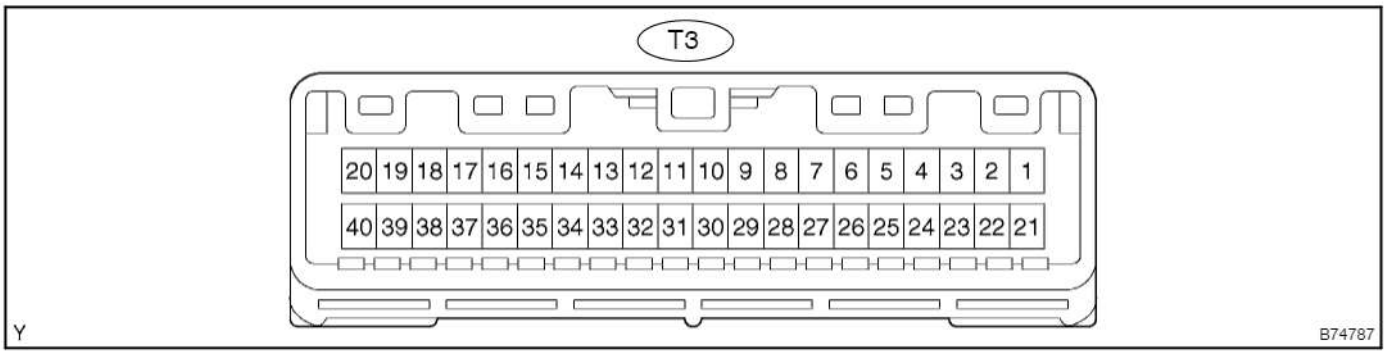
*: For these symptoms, if the suspected areas are found to be functioning normally, replace the instrument panel J/B.

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05IDI-01

TERMINALS OF ECU

1. CHECK THEFT WARNING ECU



(a) Disconnect the T3 ECU connector.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (T13–2) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
IG (T3–10) – Body ground	B – Body ground	Ignition power supply	Power switch's power mode OFF→ON (IG)	0 V → 10 to 14 V
KSW (T3–12) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
DSWH (T3–34) – Body ground	P – Body ground	Engine hood courtesy switch	Engine hood CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
SSWI (T3–13) – Body ground	L – Body ground	Theft warning sensor switch input	Sensor switch OFF→ON	10 kΩ or higher → Below 1 Ω
E (T3–29) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the T3 ECU connector.

(d) Measure the voltage between each terminal of the connector.

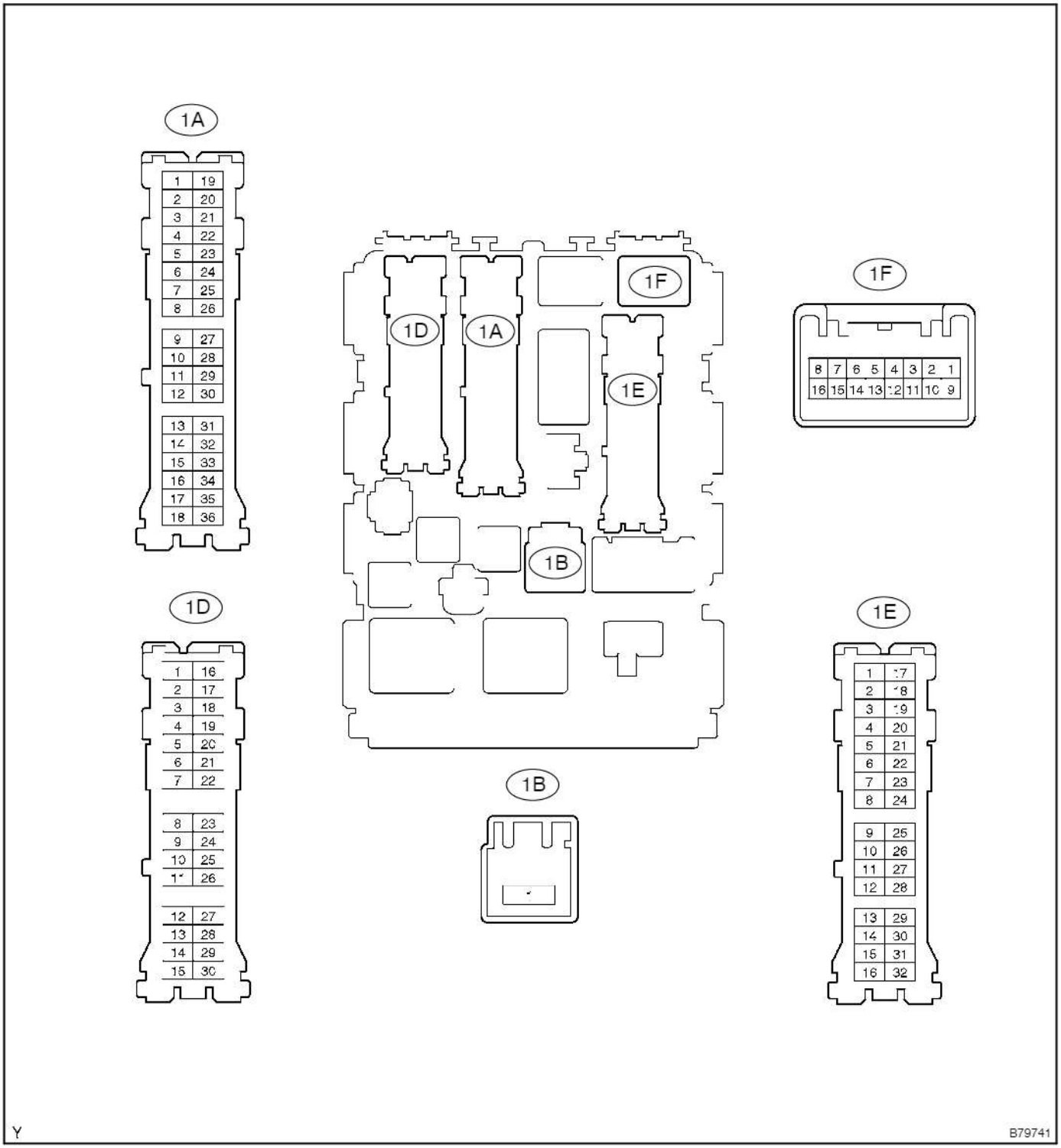
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IND (T3–25) – Body ground	R – Body ground	Security indicator	Security indicator illuminates (it illuminates only for 30 seconds in alarm sounding state or it flashes when immobilizer system is operating)	3 to 6 V
CLTS (T3–27) – Body ground	B – Body ground	Theft warning siren	Security power siren is sounding (theft warning system is in alarm sounding state)	Pulse generation
S+B (T3–24) – Body ground	P – Body ground	Theft warning sensor input	Arming preparation state or armed slate → Disarmed state	10 to 14V → Below 1V
IOUT (T3–26) – Body ground	LG – Body ground	Theft warning sensor output	No moving object detected by sensor	10 to 14 V
IOUT (T3–26) – Body ground	LG – Body ground	Theft warning sensor output	Moving object by sensor during arming preparation state or armed state	Pulse generation
HORN (T3–5) – Body ground	Y – Body ground	Vehicle horn (low pitched and high pitched)	Armed state → Alarm sounding state	0V →10 to 14 V

If the result is not as specified, the theft deterrent ECU may have a malfunction.

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2. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



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(a) Disconnect the 1A, 1B, 1D 1E and 1F J/B connectors.
(b) Measure the voltage and resistance between each terminal of the wire harness side connectors.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
ALTB (1B–1) – Body ground	W – Body ground	+B (power system, generator system) power supply	Constant	10 to 14 V
KSW (1E–26) – Body ground	Y – Body ground	Key unlock warning switch input	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
DCTY (1D–21) – Body ground	V – Body ground	Driver side courtesy switch input	Driver side door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
PCTY (1D–24) – Body ground	BR – Body ground	Passenger side courtesy switch input	Passenger side door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
RCTY (1D–5) – Body ground	R – Body ground	Rear LH side (LHD) or Rear RH side (RHD) courtesy switch input	Rear LH side door (LHD) or Rear RH side door (RHD) CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
RCTY (1D–20) – Body ground	R – Body ground	Rear RH side (LHD) or Rear LH side (RHD) courtesy switch input	Rear RH side door (LHD) or Rear LH side door (RHD) CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
GND (1E–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the 1A, 1B, 1D 1E and 1F J/B connectors.
(d) Measure the resistance between each terminal of the wire connectors.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BCTY (1D–7) – Body ground	R – Body ground	Back door courtesy switch	Back door CLOSED → OPEN	0 V → 10 to 14 V
HAZ (1L–17) – Body ground	Y – Body ground	Hazard lamp drive	Answer–back OFF → Answer–back ON	Pulse generation

If the result is not as specified, the J/B assy (body ECU) may have a malfunction.

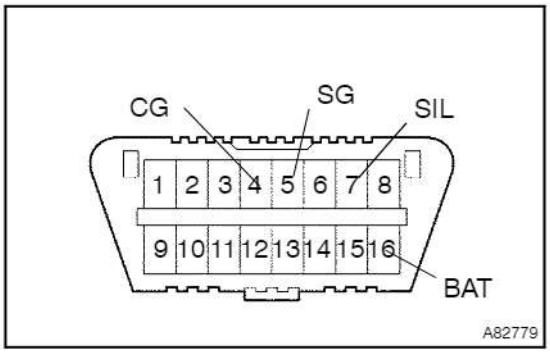
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05ICJ–01

DIAGNOSIS SYSTEM

1. DESCRIPTION

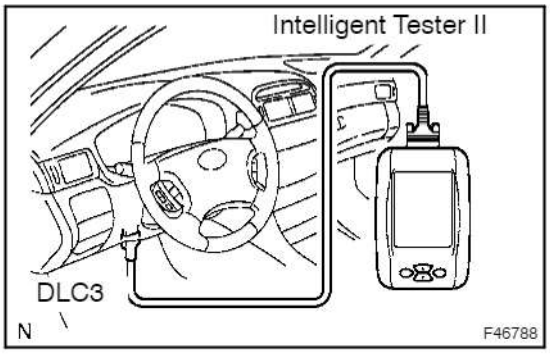
Theft deterrent system data and the Diagnostic Trouble Codes (DTCs) can be read in the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester II to check for malfunction and perform repairs.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the intelligent tester II to the DLC3, Turn the power switch ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If communication is normal when the intelligent tester II is connected to another vehicle, inspect the DLC3 on the original vehicle.

If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard : 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

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05ICK–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II DATA LIST allows switch, sensor, actuator and other item value to be read without removing any parts. Reading the DATA LIST early on troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Read the DATA LIST according to the display on the tester.

Multiplex Network Body ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Key Unlk Wrn SW	Key unlock warning switch signal / ON or OFF	ON: Key is in key slot OFF: No key is in key slot	–
D Dor Cty SW	Driver door courtesy switch signal / ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	–
P Dor Cty SW	Passenger door courtesy switch signal / ON or OFF	ON: Passenger side door is open OFF: Passenger side door is closed	–
Rr Dor Cty SW	Rear door courtesy switch signal / ON or OFF	ON: Either right or left rear door is open OFF: Both right or left rear doors are closed	–
B Dor Open SW	Back door open switch signal / ON or OFF	ON: Back door is open OFF: Back door is closed	–
Rr Lock Pos SW	Rear door lock position switch signal / ON or OFF	ON: Rear door lock is in unlock position OFF: Rear door lock is in lock position	–
P Lock Pos SW	Passenger door lock position switch signal / ON or OFF	ON: Passenger door lock is in unlock position OFF: Passenger door lock is in lock position	–
D Lock Pos SW	Driver door lock position switch signal / ON or OFF	ON: Driver door lock is in unlock position OFF: Driver door lock is in lock position	–
IG SW	Power switch signal / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	–

Theft Warning ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Hood Courtsy SW	Engine hood courtesy switch signal / ON or OFF	ON: Engine hood is open OFF: Engine hood is close	–
Intrs Detect	Intrusion sensor detection signal / ON or OFF	ON: Intrusion is detected OFF: Intrusion is not detected	–
Intrs Sen Off SW	Intrusion sensor cancel switch signal / ON or OFF	ON: Intrusion sensor cancel switch ON OFF: Intrusion sensor cancel switch OFF	–
Key Unlk Wrn SW	Key unlock warning switch signal / ON or OFF	ON: Key is in key slot OFF: Key is not in key slot	–
IG SW	Power switch signal / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	–

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2. ACTIVE TEST

HINT:

Performing the intelligent tester II ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch ON (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

Theft Warning ECU:

Item	Tester Detail	Diagnostic Note
Security Indic	Security indicator ON/OFF	–
Security Horn	Security horn ON/OFF	–
Security Horn 2	Vehicle horn ON/OFF	–

Multiplex network body ECU:

Item	Tester Detail	Diagnostic Note
Security Indic	Security Indicator ON/OFF	–
Hazard	Hazard lamp ON/OFF	–
Trunk/Bdor Open	Back door open ON/OFF	–
Door Lock	Door lock LOCK/UNLOCK	–

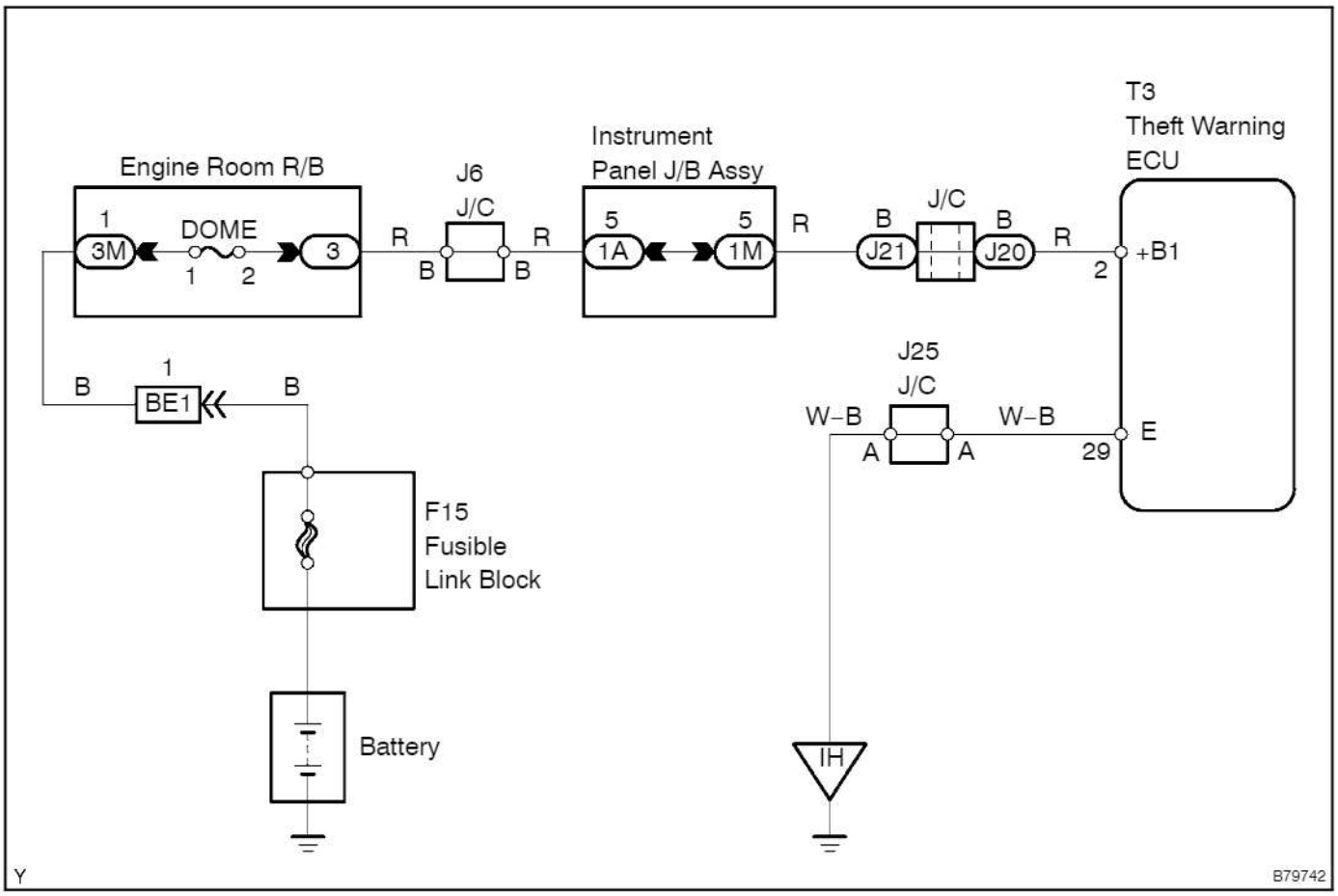
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ECU POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit provides power to operate the theft warning ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (DOME)

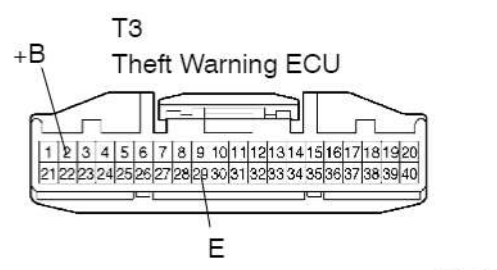
(a) Remove the DOME fuse from the engine room R/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

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2	CHECK WIRE HARNESS



(a) Disconnect the T3 ECU connector.

(b) Measure the voltage and resistance of the wire harness side connector.

Standard:

Tester Connection	Specified Condition
T3–2 (+B1) – Body ground	10 to 14 V
T3–29 (E) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

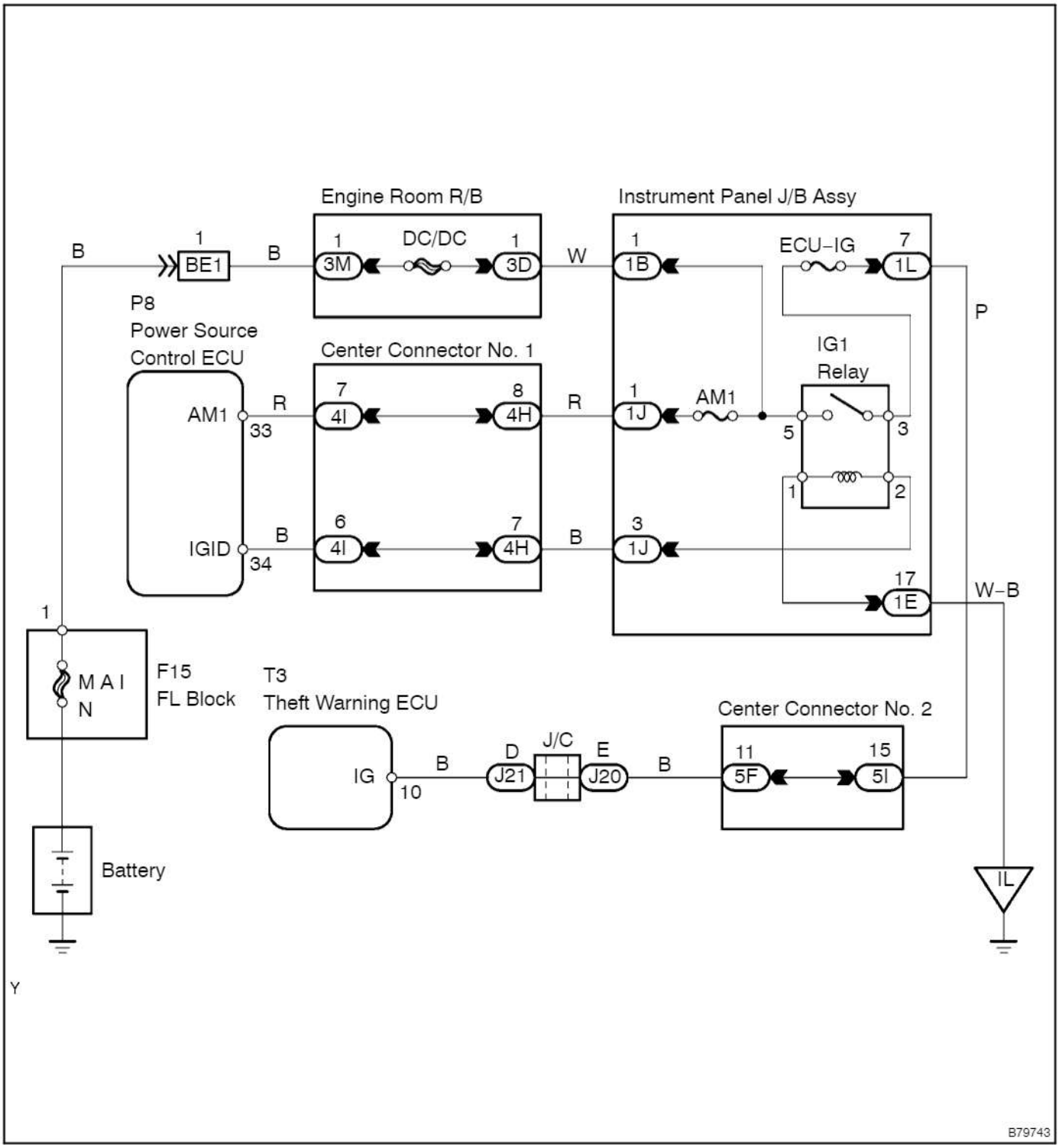
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IGNITION CIRCUIT

CIRCUIT DESCRIPTION

When the power switch is set to ON (IG), the battery positive voltage is applied to terminal IG of the theft warning ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

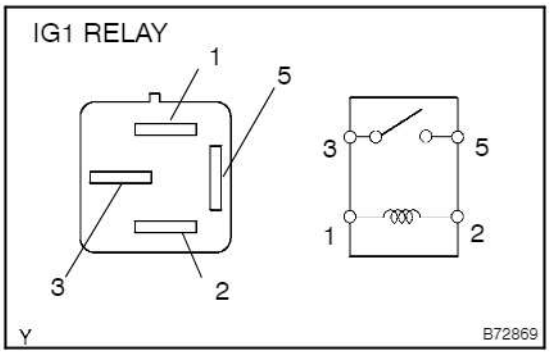
1 INSPECT FUSE (ECU–IG, AM1)

(a) Remove the ECU–IG and AM1 fuses from the instrument panel J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2 INSPECT RELAY (IG1)



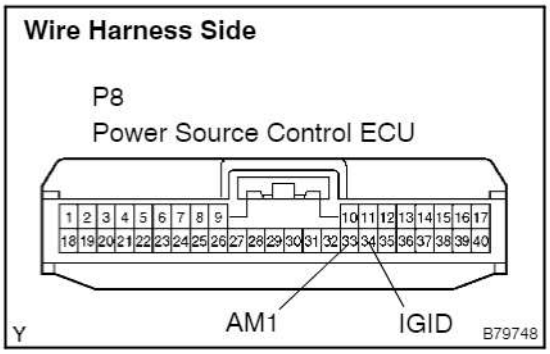
(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance.
Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 INSPECT POWER SOURCE CONTROL ECU



(a) Measure the resistance.

Tester Connection	Power Switch Condition	Specified Condition
P8–33 (AM1) – T8–34 (IGID)	ON (IG)	Below 1 Ω

NG → **PROCEED TO PUSH BUTTON START SYSTEM** (see page 05–2131)

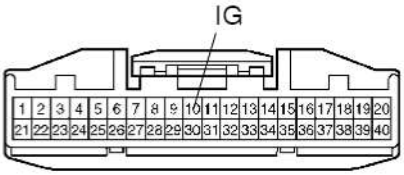
OK

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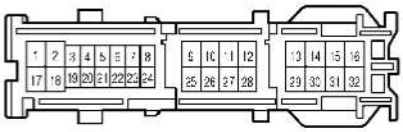
4 CHECK WIRE HARNESS

Wire Harness Side

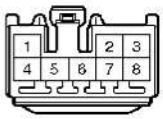
T3
Theft Warning ECU



1E
Instrument Panel J/B Assy



1J
Instrument Panel J/B Assy



Y

B79749

(a) Disconnect the T3 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Standard:

Tester Connection	Condition	Specified Condition
T3–10 (IG) – Body ground	Power switch ON (IG)	10 to 14 V
1E–17 – Body ground	Constant	Below 1 Ω
1J–1 – Body ground	Constant	10 to 14 V
1J–3 – Body ground	Power switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (see page 05–2209)

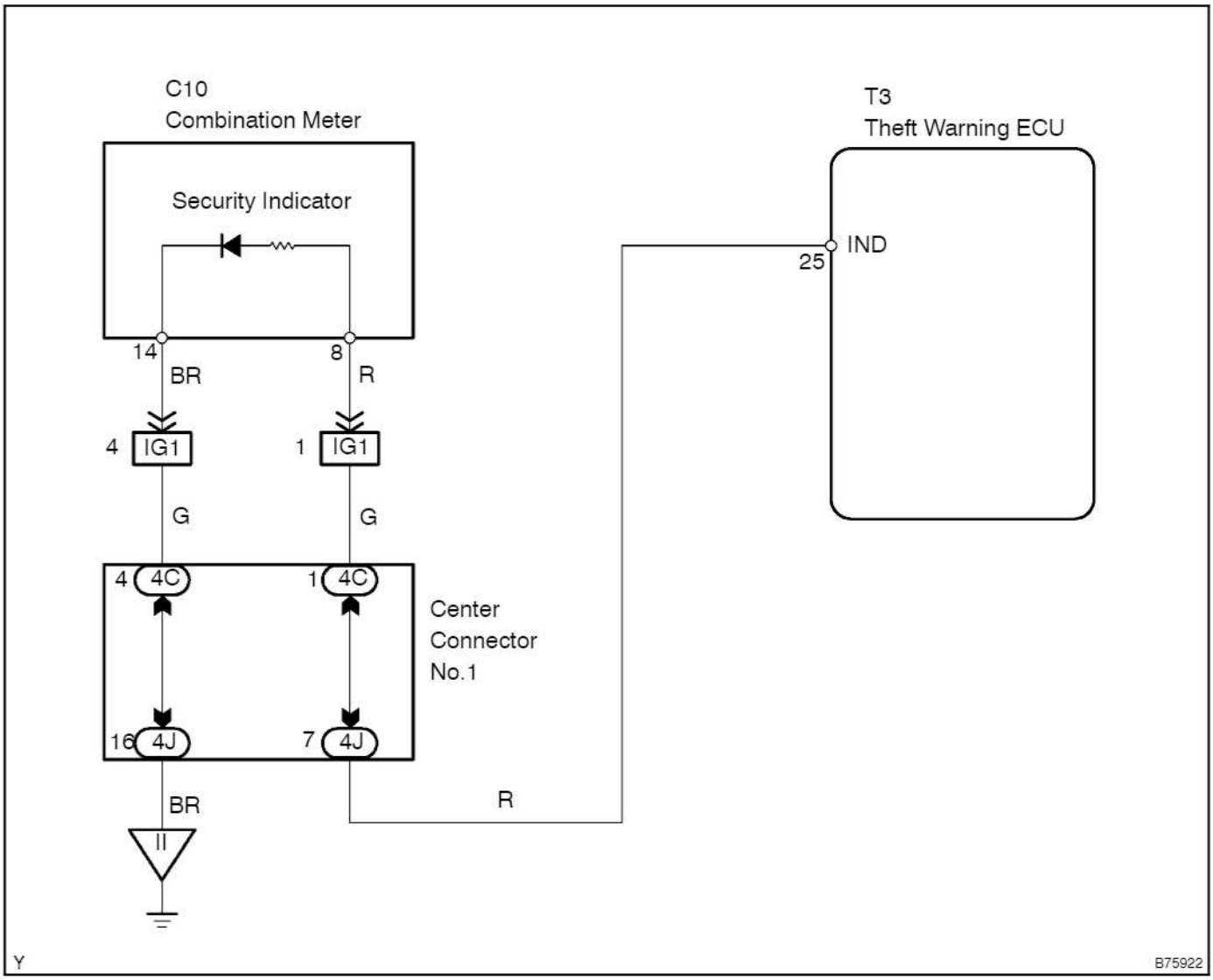
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SECURITY INDICATOR CIRCUIT

CIRCUIT DESCRIPTION

When the theft deterrent system is in the disarmed state, the security indicator will flash continuously if the immobilizer system is set, or not illuminate if the immobilizer system is not set.
When the theft deterrent system is in the armed state, the immobilizer system is automatically set and the security indicator will flash continuously.
When the theft deterrent system is in the arming preparation state and alarm sounding state, the multiplex network body ECU causes the security indicator to be illuminated.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the item below in the ACTIVE TEST and then check that the indicator operates.
Multiplex Network Body ECU:

Item	Test Details	Diagnostic Note
Security indicator	Illuminated / Not illuminated	–

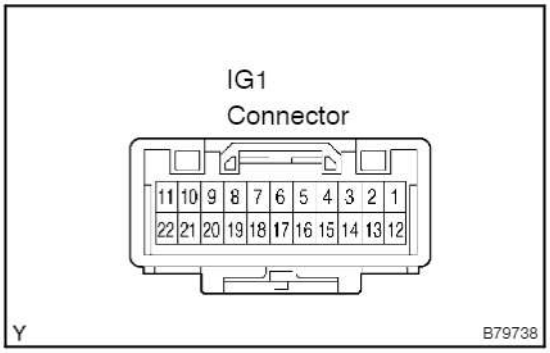
OK: Security indicator operates normally.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

2	CHECK WIRE HARNESS (IG1 CONNECTOR – BODY GROUND)



(a) Disconnect the IG1 connector.
(b) Measure the resistance between the wire harness side connector and body ground.
Standard:

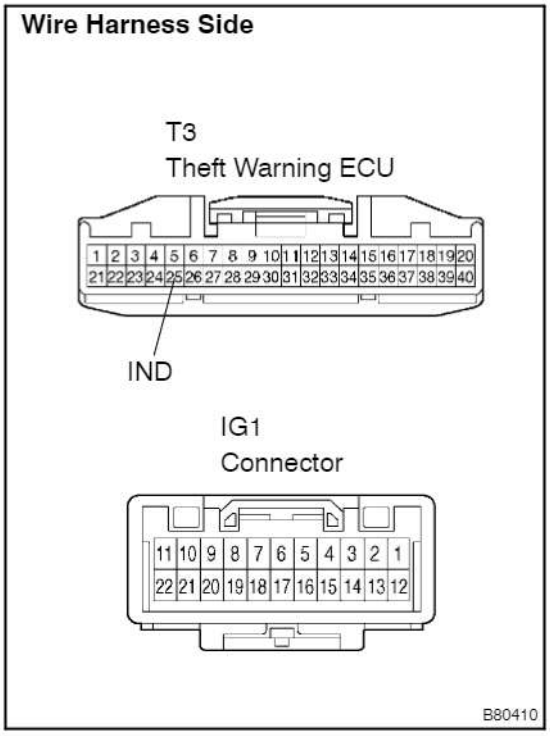
Tester Connection	Specified Condition
IG1–4 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK WIRE HARNESS (THEFT WARNING ECU – IG1 CONNECTOR)



(a) Disconnect the T3 ECU connector.
(b) Disconnect the IG1 meter connector.
(c) Measure the resistance between the wire harness side connectors.

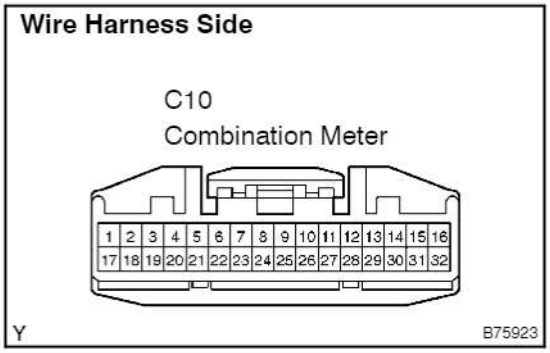
Standard:

Tester Connection	Specified Condition
T3–25 (IND) – IG1–1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 INSPECT COMBINATION METER ASSY (SECURITY INDICATOR LIGHT OPERATION)



(a) Remove the combination meter assembly.
(b) Apply 12 V positive voltage to the terminals of the combination meter assembly. Check that the security indicator illuminates.

OK:

Measurement Condition	Specified Condition
Body positive (+) → Terminal 8 Body negative(–) → Terminal 14	Illuminates

NOTICE:

- **If the positive (+) lead and the negative (–) lead are incorrectly connected, the security indicator does not illuminates.**
- **Voltage of more than 12 V will damage the security indicator.**
- **If the voltage is too low, the security indicator will not illuminates.**

NG → **REPLACE COMBINATION METER ASSY**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

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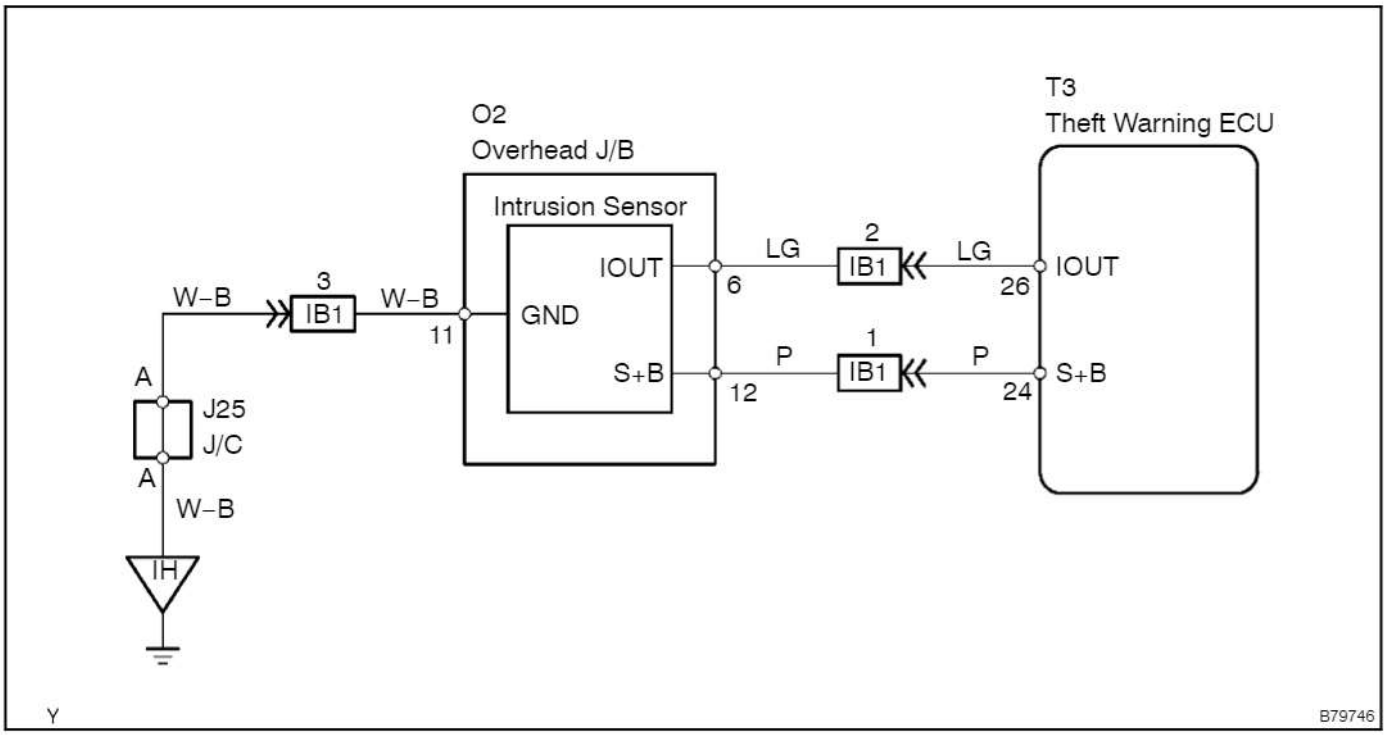
INTRUSION SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The intrusion sensor (theft warning sensor) detects moving objects by using ultrasonic waves. If a moving object is detected, it outputs signals to inform the theft warning ECU of an intrusion and the theft deterrent system sets off the alarm.

When the theft deterrent system is switched to the arming preparation state, the theft warning ECU supplies power to the intrusion sensor through the S+B. In such a situation where a window glass is broken, the intrusion sensor can output a signal and the theft deterrent system can set off an alarm.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK INTRUSION SENSOR OPERATION

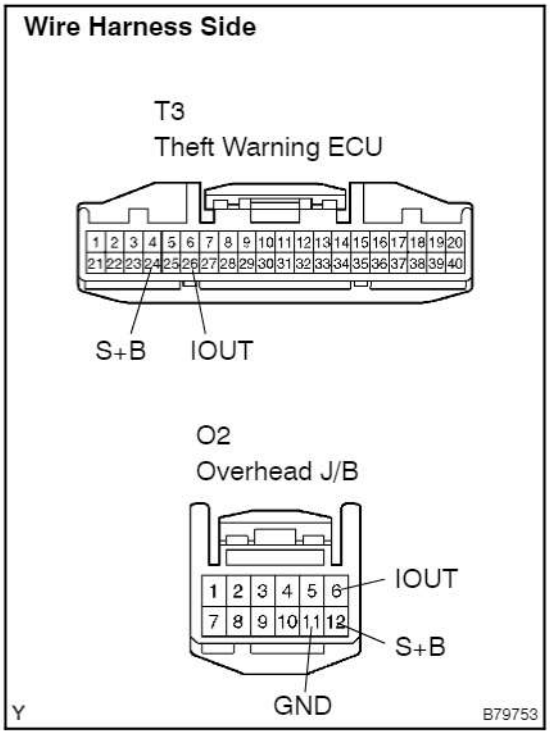
(a) Open a window. Then activate the theft deterrent system. After 30 seconds, insert your hand through the window and shake it near the sensor to check if the alarm is triggered.
OK: Alarm is triggered.

NG → **Go to step 2**

OK

END

2	CHECK WIRE HARNESS (OVERHEAD J/B (INTRUSION SENSOR) – THEFT WARNING ECU AND BODY GROUND)



(a) Disconnect the T3 ECU connector.
(b) Disconnect the O2 J/B connector.
(c) Measure the resistance between the wire harness side connectors and body ground.
Standard:

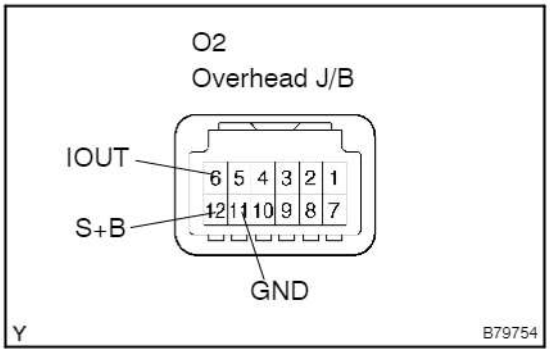
Tester Connection	Specified Condition
O2 – 6 (IOUT) – T3 – 26 (IOUT)	Below 1 Ω
O2 – 12 (S+B) – T3 – 24 (S+B)	Below 1 Ω
O2 – 11 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK INTRUSION SENSOR (OVERHEAD J/B)

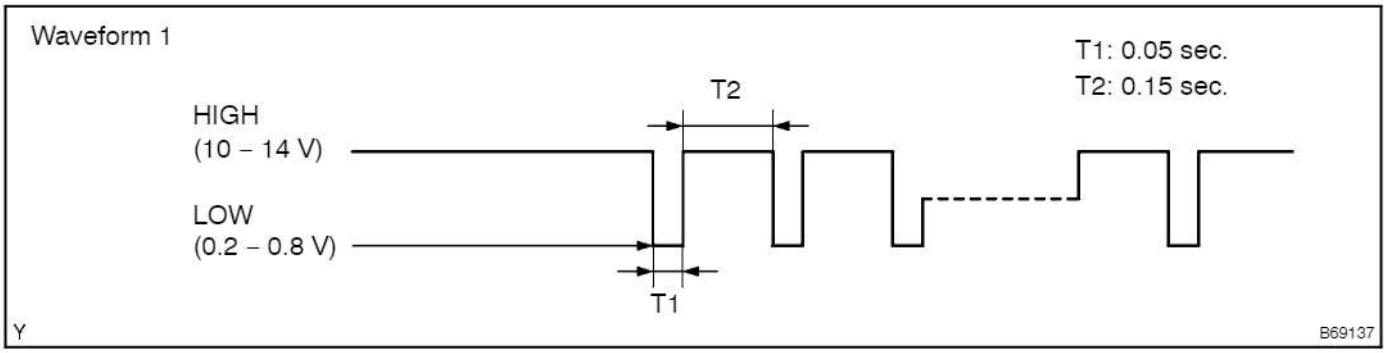


(a) Measure the voltage or resistance.

Standard:

Tester Connection	Condition	Specified Condition
O2–12 (S+B) – Body ground	Arming preparation state or armed state	10 to 14 V
O2–12 (S+B) – Body ground	Disarmed state	Below 1 V
O2–6 (IOUT) – Body ground	No moving object detected by sensor	10 to 14 V
O2–6 (IOUT) – Body ground	Moving object detected by sensor during arming preparation state or armed state	Pulse generation (see waveform 1)
O2–11 (GND) – Body ground	Constant	Below 1 V

Wave Pattern:



NG → **REPLACE OVERHEAD J/B**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

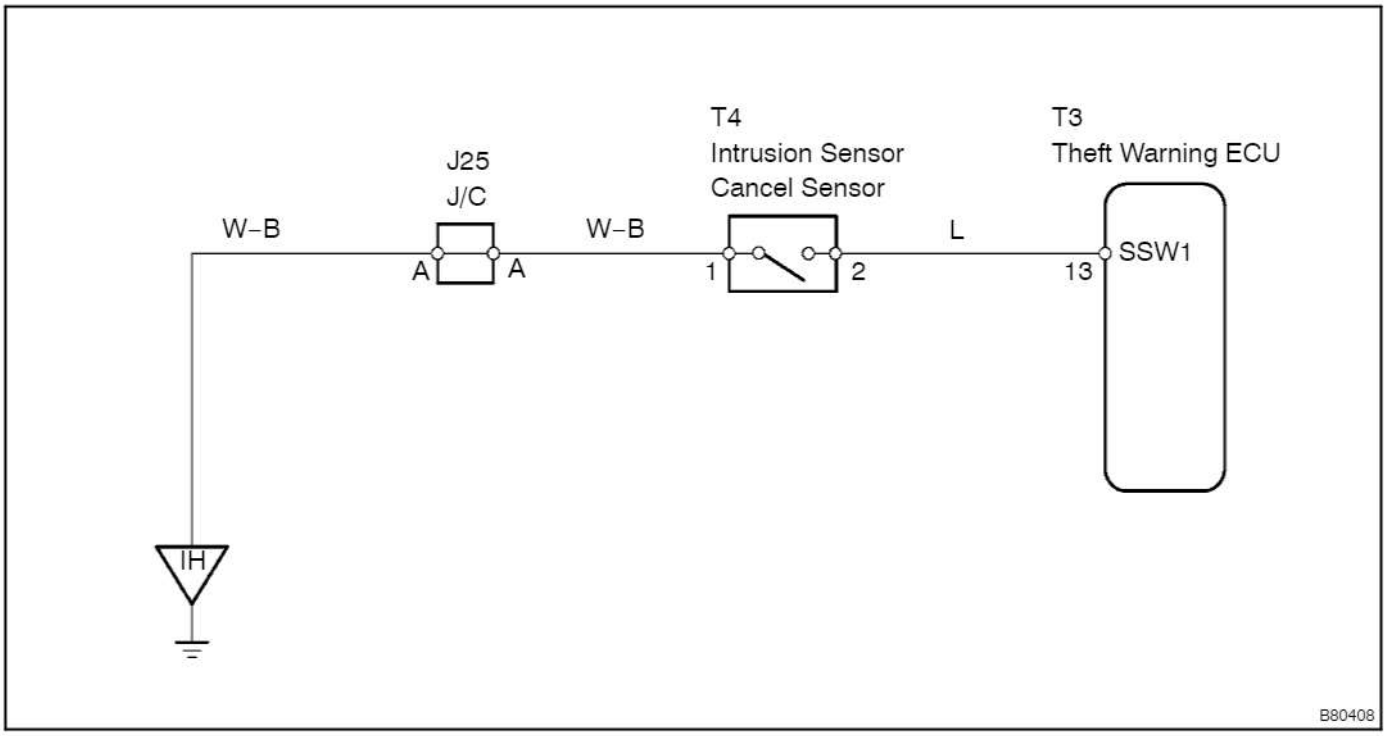
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INTRUSION SENSOR CANCEL SWITCH

CIRCUIT DESCRIPTION

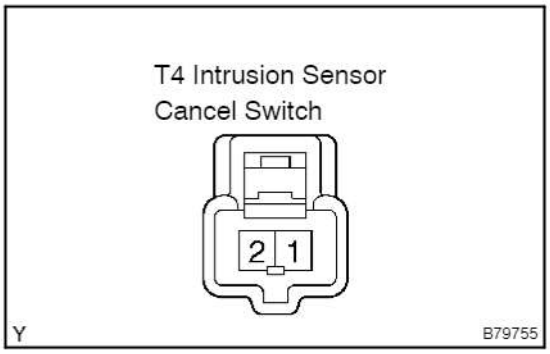
If the intrusion sensor (theft warning sensor) cannot be canceled or the intrusion sensor cancel switch does not operate, there may be a malfunction in the circuit below.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT INTRUSION SENSOR CANCEL SWITCH



(a) Remove the intrusion sensor cancel switch.
(b) Measure the switch resistance.

Standard:

Tester Connection	Switch Condition	Specified Condition
1 – 2	ON	Below 1 Ω
1 – 2	OFF	10 kΩ or higher

NG → **REPLACE INTRUSION SENSOR CANCEL SWITCH**

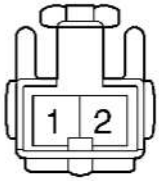
OK

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2	CHECK WIRE HARNESS (INTRUSION SENSOR CANCEL SWITCH – BODY GROUND)

Wire Harness Side

T4 Intrusion Sensor Cancel Switch



B80409

(a) Disconnect the T4 switch connector.
(b) Measure the resistance between the wire harness side connector and body ground.

Standard:

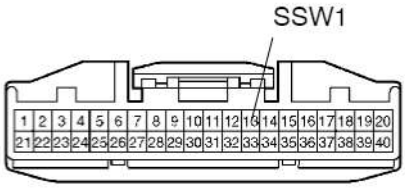
Tester Connection	Specified Condition
T4–1 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

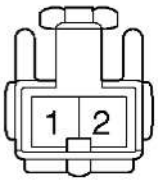
3	CHECK WIRE HARNESS (THEFT WARNING ECU – INTRUSION SENSOR CANCEL SWITCH)

Wire Harness Side

T3
Theft Warning ECU



T4
Intrusion Sensor Cancel Switch



Y

B79772

(a) Disconnect the T3 ECU connector.
(b) Disconnect the T4 switch connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T3–13 (SSWI) – T4–2	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

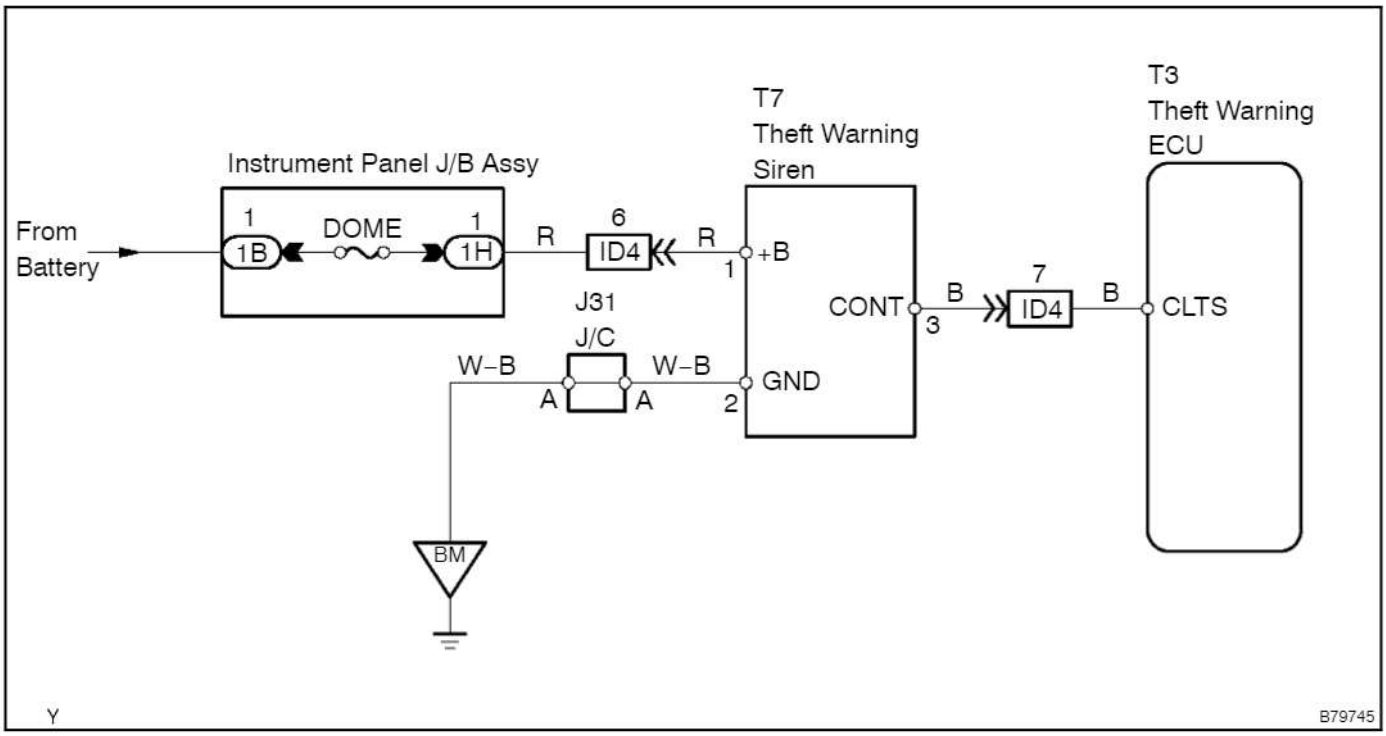
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THEFT WARNING SIREN CIRCUIT

CIRCUIT DESCRIPTION

The theft warning siren (self power siren) has an internal battery. If any of the vehicle's battery or communication line is opened, the theft warning siren detects it and sounds by itself. Although the theft warning siren usually sounds by receiving a signal from the theft warning ECU, the theft warning siren can sound with its internal battery in case that the vehicle's battery is disconnected.
The theft warning ECU sends an arming signal to the theft warning siren while switching to the armed state, and it also sends a disarming signal to the siren while switching to the disarmed state. Also, the theft warning ECU can cause the theft warning siren to sound by sending an alarm signal during the alarm sounding state.

WIRING DIAGRAM



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INSPECTION PROCEDURE

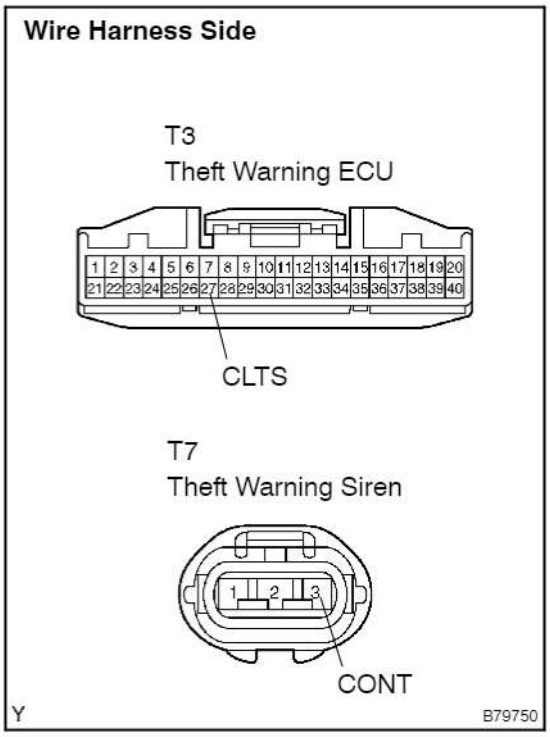
1	INSPECT FUSE (DOME)

(a) Remove the DOME fuse from instrument panel J/B.
(b) Measure the resistance.
OK: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (THEFT WARNING SIREN – THEFT WARNING ECU AND BODY GROUND)



(a) Disconnect the T3 ECU connector.
(b) Disconnect the T7 siren connector.
(c) Measure the resistance between the wire harness side connectors.
Standard:

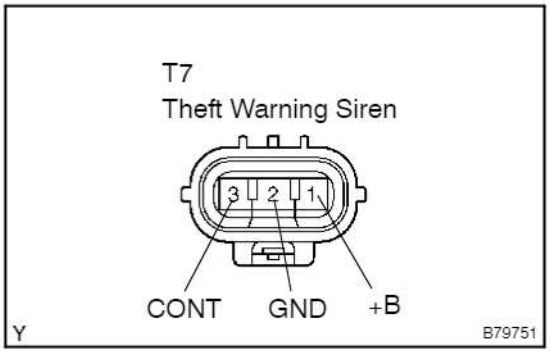
Tester Connection	Specified Condition
T3–27 (CLTS) – T7–3 (CONT)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK THEFT WARNING SIREN

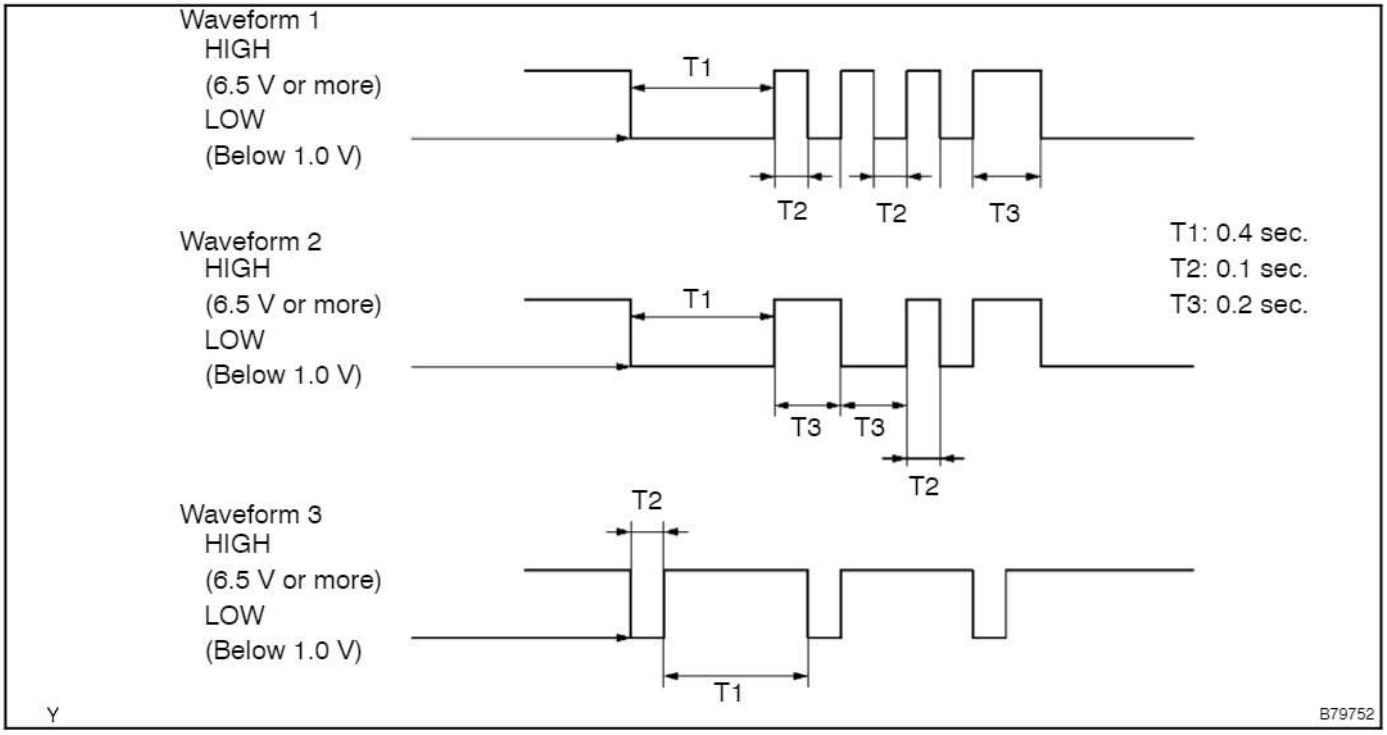


(a) Measure the voltage.

Standard:

Tester Connection	Condition	Specified Condition
T7–1 (+B1) – Body ground	Constant	10 to 14 V
T7–2 (GND) – Body ground	Constant	Below 1 V
T7–3 (CONT) – Body ground	When switched from armed state or arming preparation state to disarmed state (1)	Pulse generation (see waveform 1)
T7–3 (CONT) – Body ground	When switched from arming preparation state to armed state (2)	Pulse generation (see waveform 2)
T7–3 (CONT) – Body ground	Normal condition (except (1) and (2))	Pulse generation (see waveform 3)

Wave Pattern:



NG → **REPLACE THEFT WARNING SIREN**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

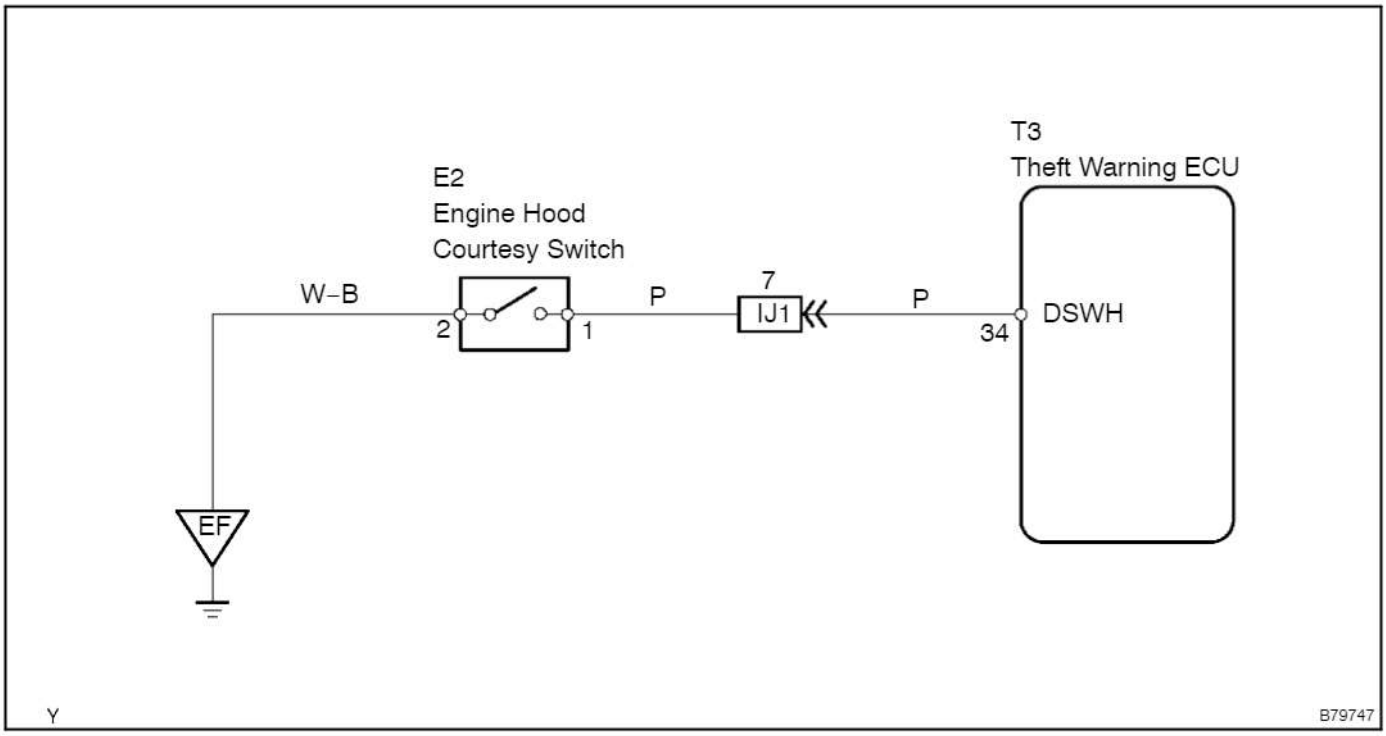
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ENGINE HOOD COURTESY SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The engine hood courtesy switch is installed into the hood lock. This switch turns on when the engine hood is opened and turns off when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG), and press the intelligent tester II main witch ON.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester II.

Theft Warning ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Hood Courtesy SW	Engine Hood Courtesy switch signal / ON or OFF	ON: Engine hood is open OFF: Engine hood is close	–

OK: "ON" (Engine hood is open) appears on the screen.

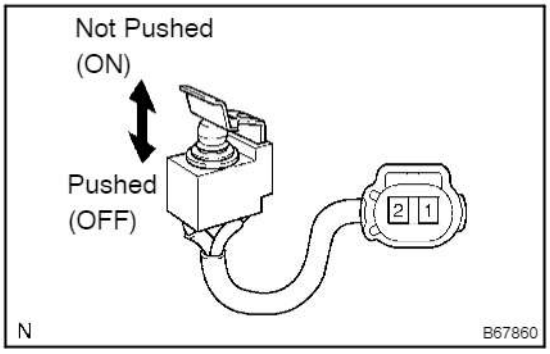
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209

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2 INSPECT ENGINE HOOD COURTESY SWITCH



(a) Remove the courtesy switch from the hood lock.
(b) Measure the switch resistance.

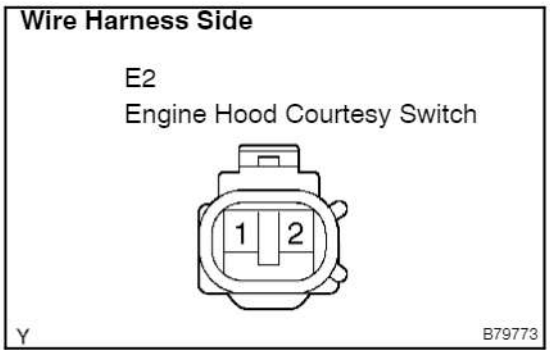
Standard:

Tester Connection	Switch Condition	Specified Condition
1 – 2	Pushed (OFF)	10 kΩ or higher
1 – 2	Not pushed (ON)	Below 1 Ω

NG → **REPLACE ENGINE HOOD COURTESY SWITCH**

OK

3 CHECK WIRE HARNESS



(a) Disconnect the E2 switch connector.
(b) Measure the resistance between the wire harness side connector and body ground.

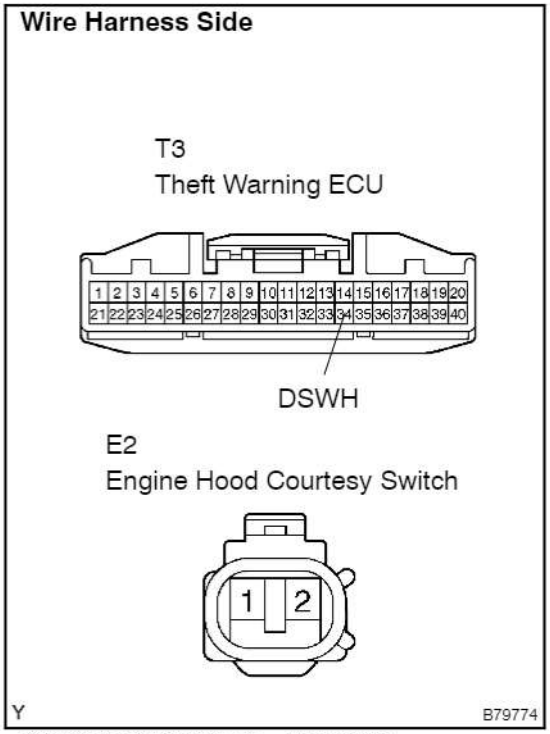
Standard:

Tester Connection	Specified Condition
E2–2 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK WIRE HARNESS



(a) Disconnect the T3 ECU connector.
(b) Disconnect the E2 switch connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T3–34 (DSWH) – E2–1	Below 1 Ω

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NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–2209)

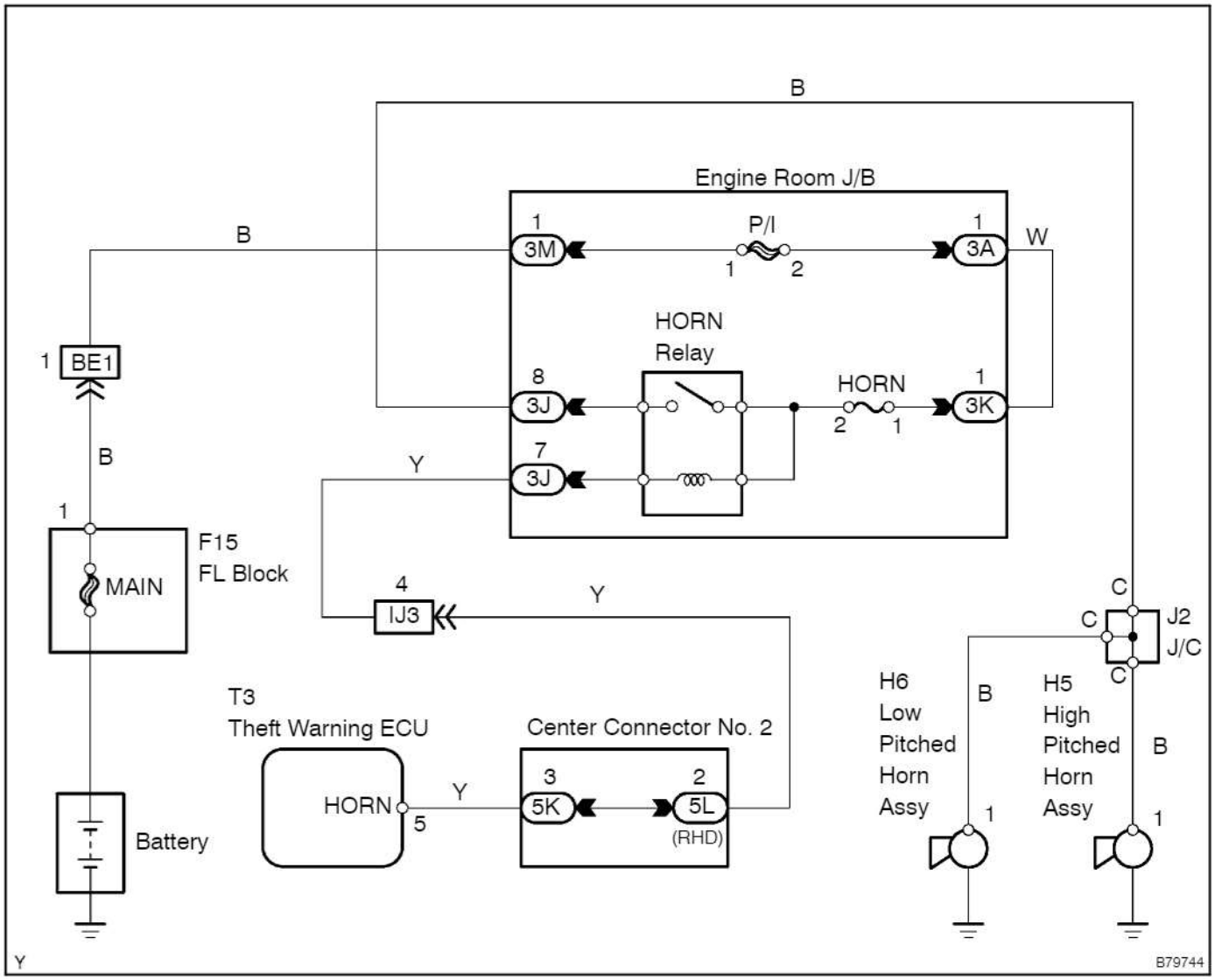
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HORN CIRCUIT

CIRCUIT DESCRIPTION

When the theft deterrent system is switched from the armed state to the alarm sounding state, the multiplex network body ECU turns on the HORN relay, causing the horn to sound at intervals of 0.4 seconds.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG) and press the intelligent tester II main switch ON.
(c) Select the item below in the ACTIVE TEST and then check that the horn operates.
Theft warning ECU:

Item	Test Details	Diagnostic Note
Security horn 2	Sounds / Stops	–

OK: Vehicle horn sounds normally.

NG → **Go to step 2**

OK

REPLACE THEFT WARNING ECU

2	INSPECT FUSE (HORN)

(a) Remove the HORN fuse from the engine room J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

3	CHECK HORN ASSY

(a) Press the horn switch and check that the horn sounds.
(1) If the horn sounds, proceed to A.
(2) If the horn does not sound, proceed to B.

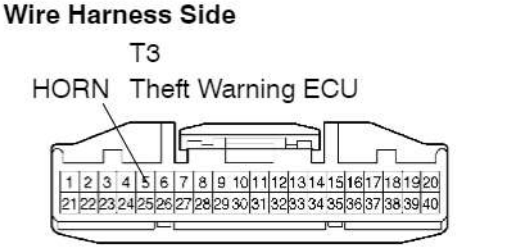
B → **Go to step 4**

A

REPLACE THEFT WARNING ECU

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4 CHECK WIRE HARNESS (POWER SOURCE)



(a) Disconnect the T3 ECU connector.
(b) Measure the voltage between the wire harness side connector and body ground.

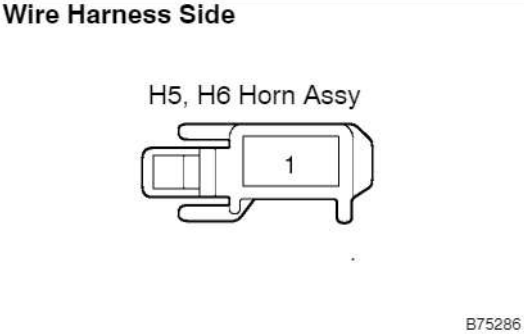
Standard:

Tester Connection	Condition	Specified Condition
T3 – 5 (HORN) – Body ground	Constant	10 to 14 V

NG → **REPLACE OR REPLACE HARNESS AND CONNECTOR**

OK

5 CHECK WIRE HARNESS



(a) Disconnect the H5 and H6 connectors.
(b) Measure the voltage between the wire harness side connector and body ground.

Standard:

Tester Connection	Switch Condition	Specified Condition
H5–1 – Body ground	Horn switch pressed	10 to 14 V
H6–1 – Body ground	Horn switch not pressed	10 to 14 V

NG → **REPLACE OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE HORN ASSY

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MULTIPLEX COMMUNICATION SYSTEM

05IJ4–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–1727

NOTICES FOR HYBRID SYSTEM ACTIVATION:

The power switch may not function at once when the warning lamp illuminates or after the battery is disconnected. In this case, repress the power switch. The hybrid system should function.

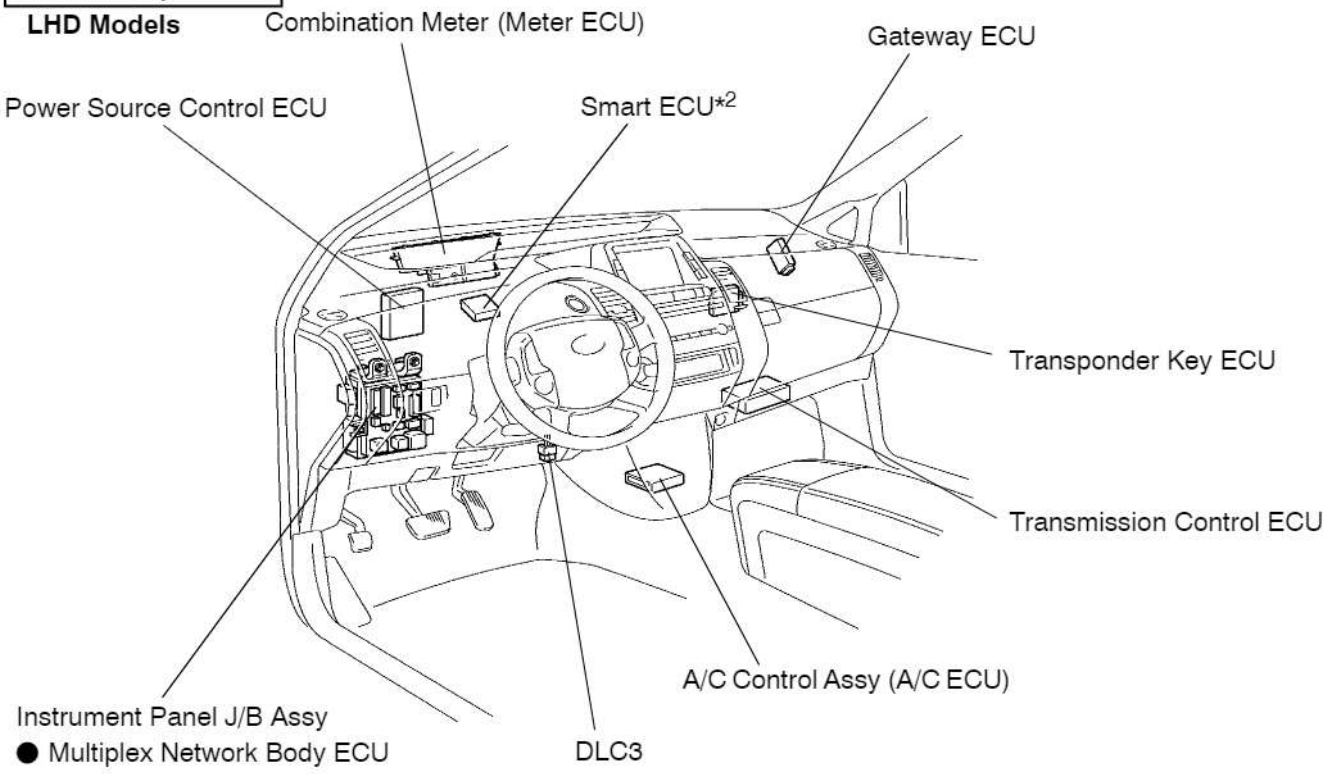
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05IJ5–01

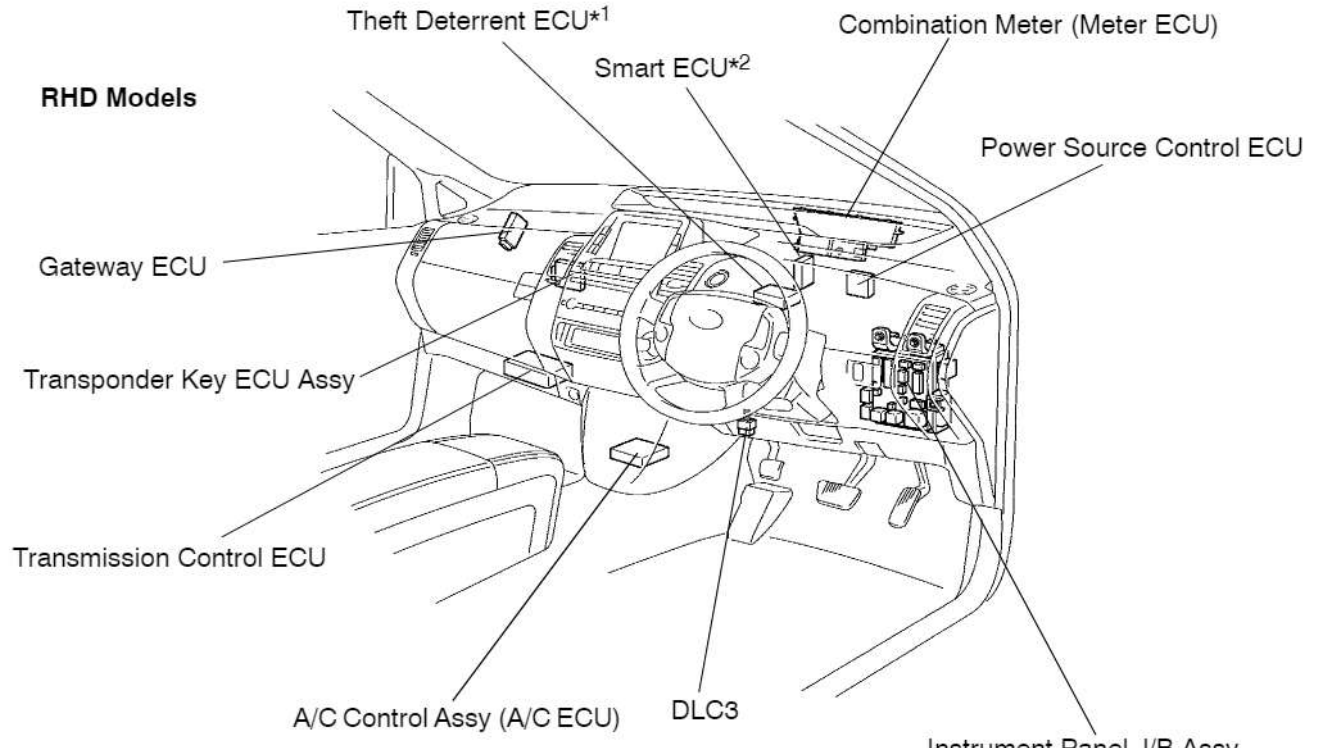
LOCATION

BEAN Component

LHD Models



RHD Models



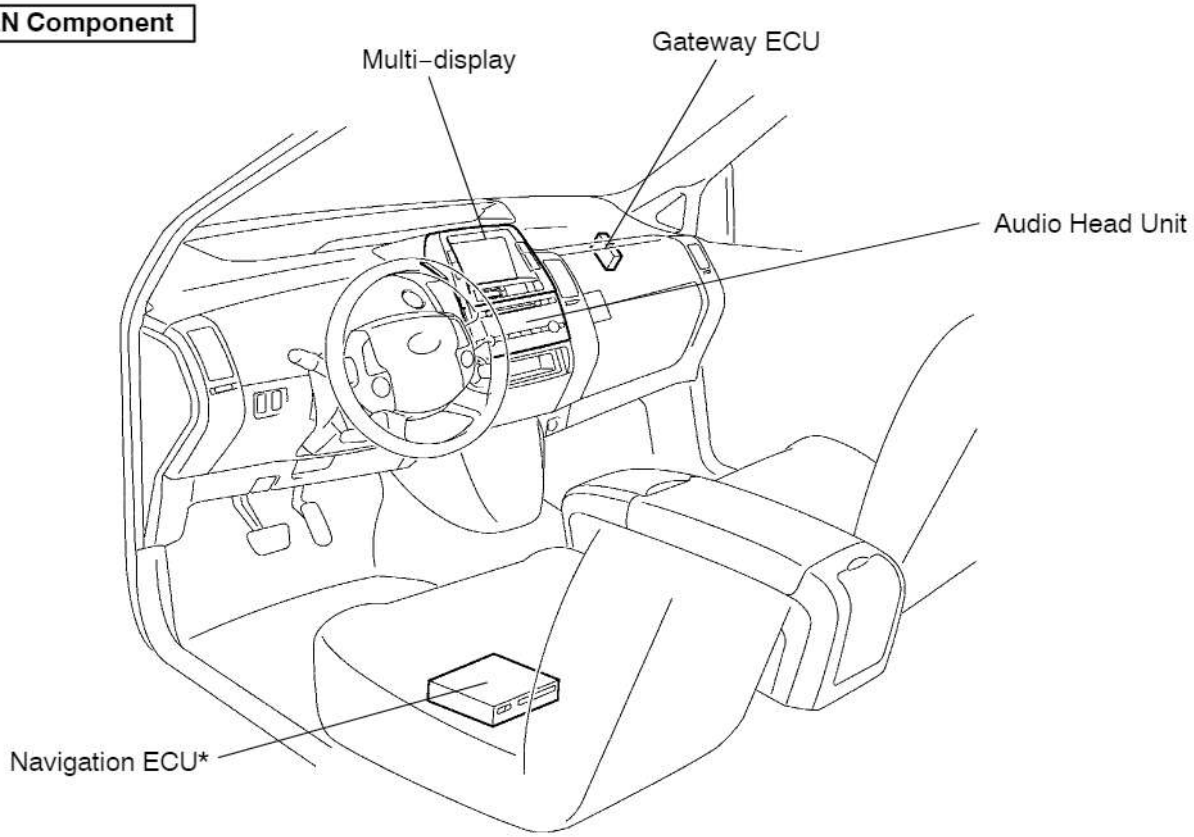
*1: Standard Equipment Only for European RHD Models
*2: w/ Smart Entry System

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AVC–LAN Component



*: Optional Equipment

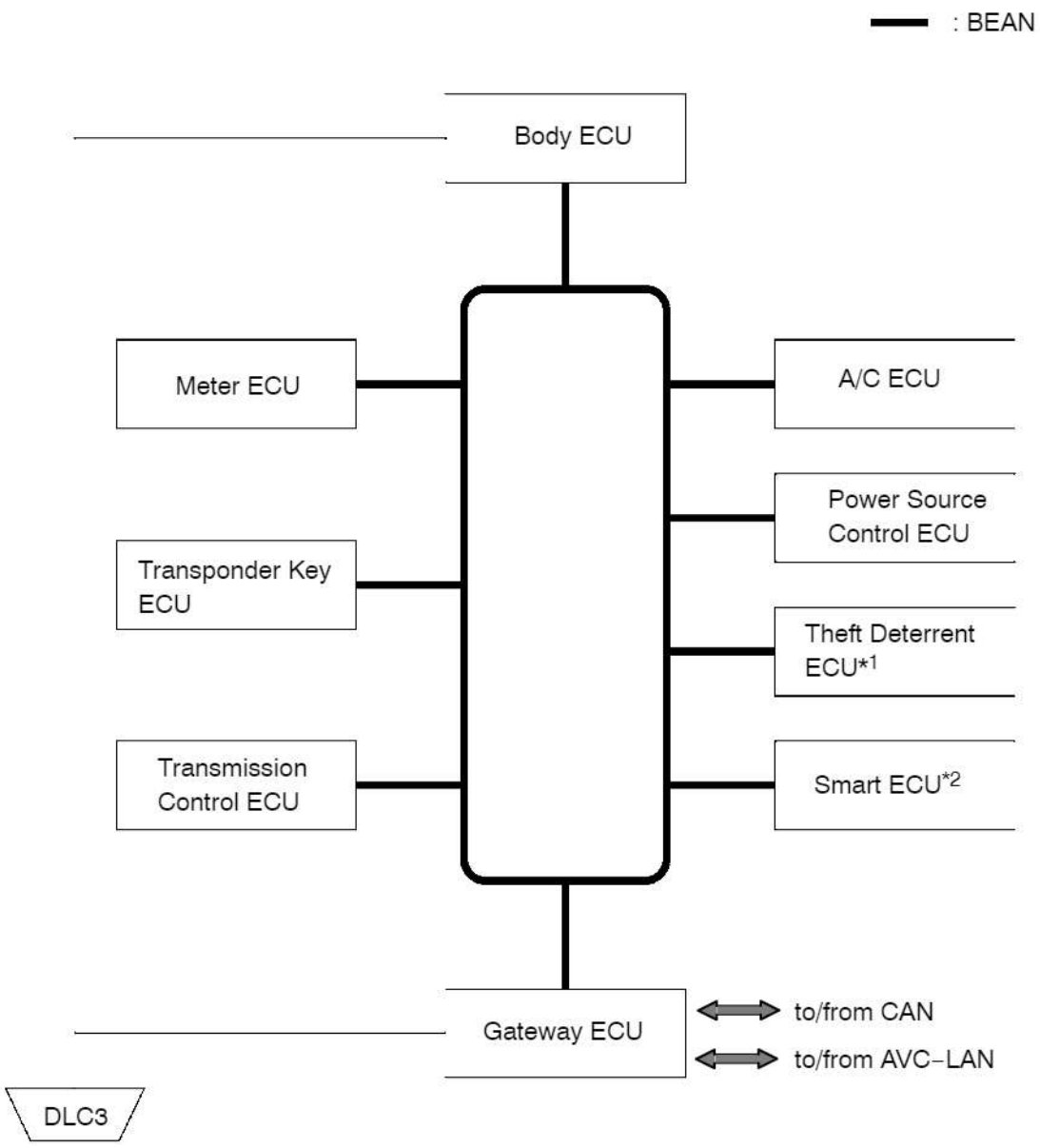
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SYSTEM DIAGRAM

BEAN System Diagram



*1: Standard Equipment Only for European RHD Models

*2: w/ Smart Entry System

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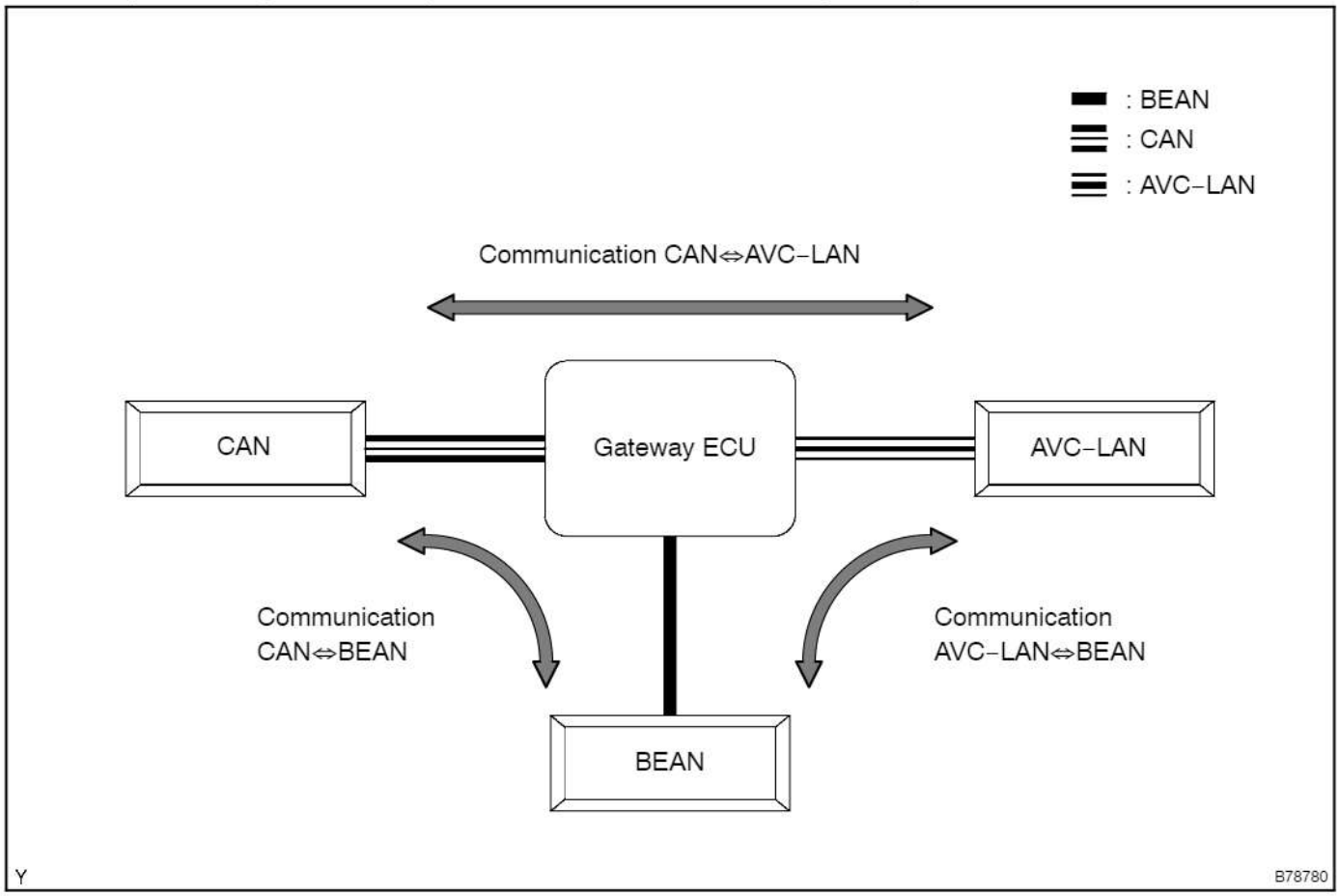
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SYSTEM DESCRIPTION

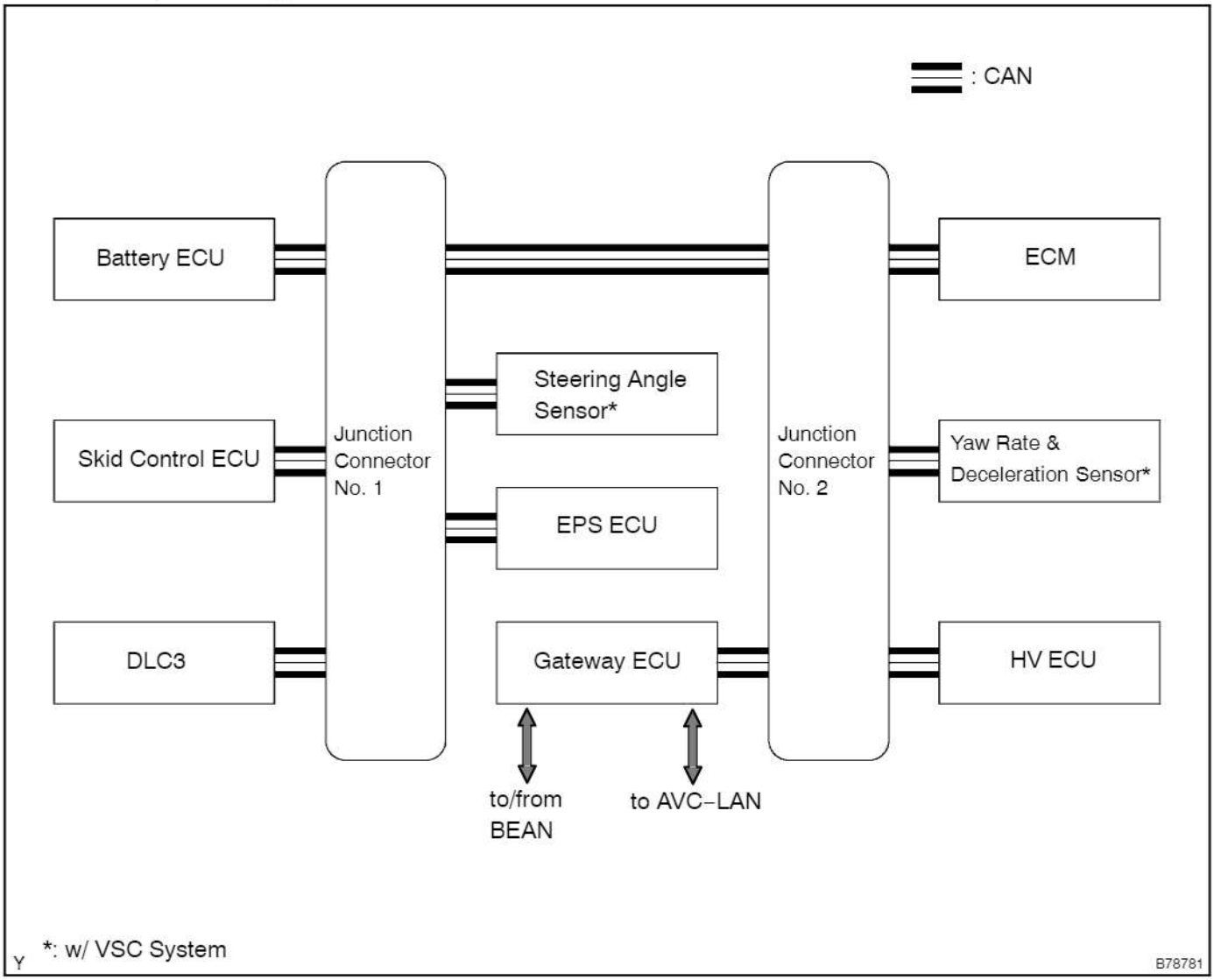
- The PRIUS primarily uses the 3 types of multiplex communication systems described below.
  - The Controller Area Network (CAN) is a network of the vehicle control systems (engine electrical, chassis electrical, and hybrid system) and maintains communication between the ECUs.
  - The Body Electronics Area Network (BEAN) is a network of the ECUs of the body electric system control and maintains communication between the ECUs.
  - The Audio Visual Communication–Local Area Network (AVC–LAN) is a network of the ECUs of the audio visual system and the audio visual devices, and maintains communication between the devices and the ECUs.
- These 3 types of multiplex communication systems are connected to the gateway ECU. The gateway ECU, which is provided with communication circuits that support the 3 types of multiplex communication systems, enables communication among the multiplex communication systems that are connected to the gateway ECU.
  For example, to enable air conditioning control, the air conditioning ECU receives the engine coolant temperature signal that is input into the ECM via the CAN, gateway ECU and BEAN.



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- The CAN in the PRIUS is established among the Hybrid Vehicle Control ECU (HV ECU), battery ECU, EPS ECU, ECM, skid control ECU, steering angle sensor*, yaw rate & deceleration sensor*, gateway ECU and DLC3.

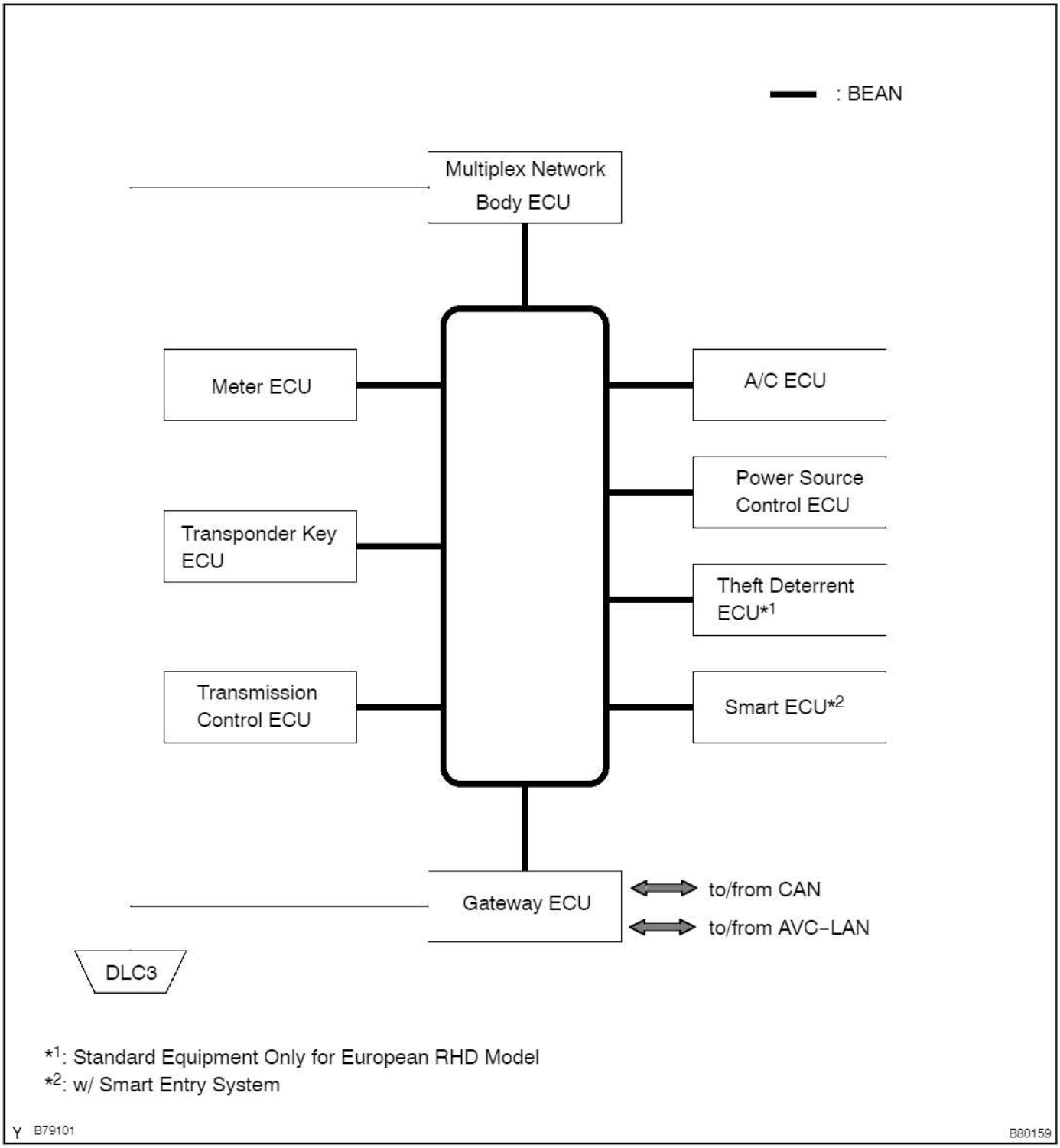
CAN System Diagram



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- The BEAN in the PRIUS is established among the body ECU, meter ECU, A/C ECU, transponder key ECU, power source control ECU, transmission control ECU, theft deterrent ECU*1 smart ECU*2 and gateway ECU.

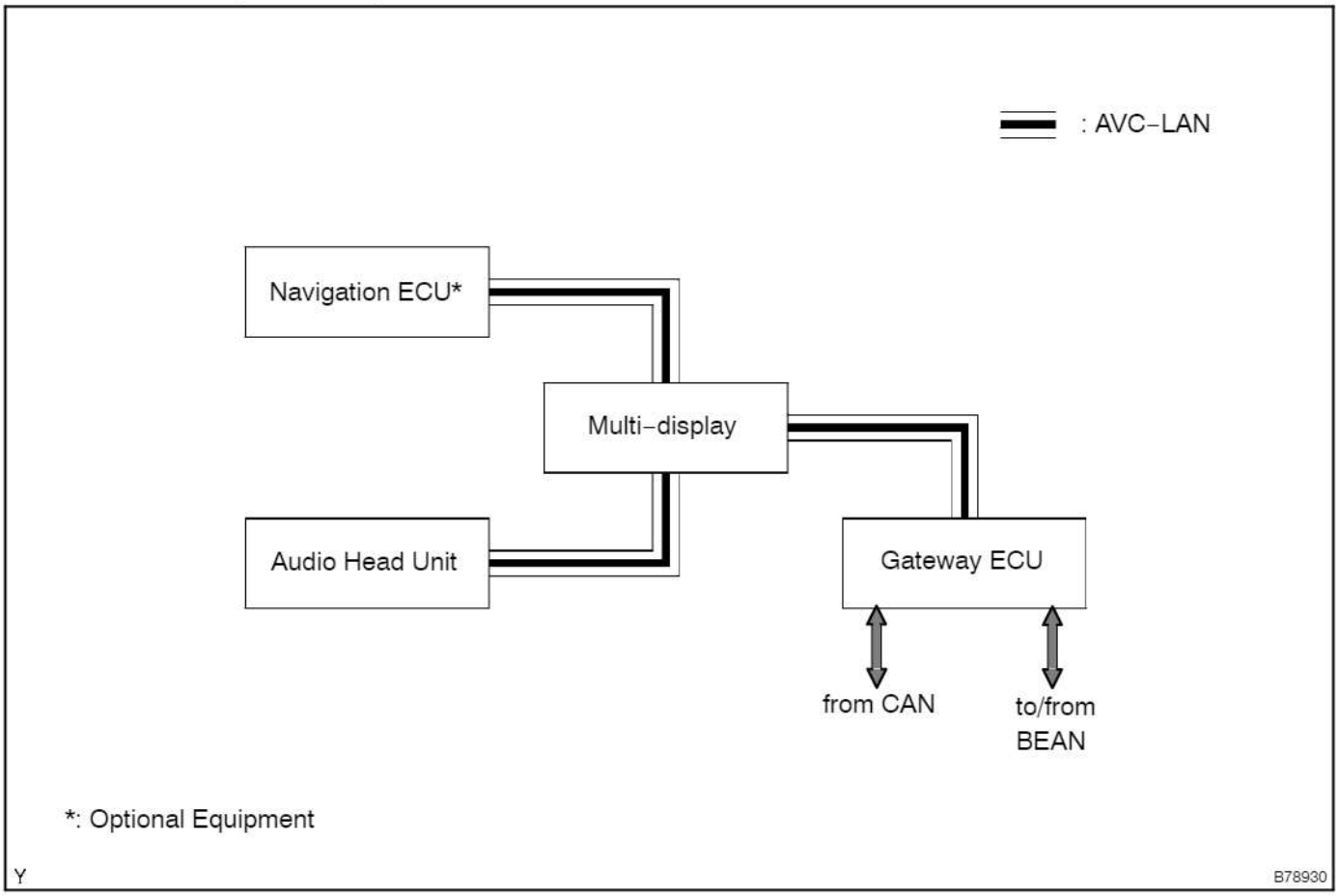
BEAN System Diagram



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- The AVC–LAN is established among the multi–display, audio head unit, navigation ECU* and gateway ECU.

AVC–LAN System Diagram



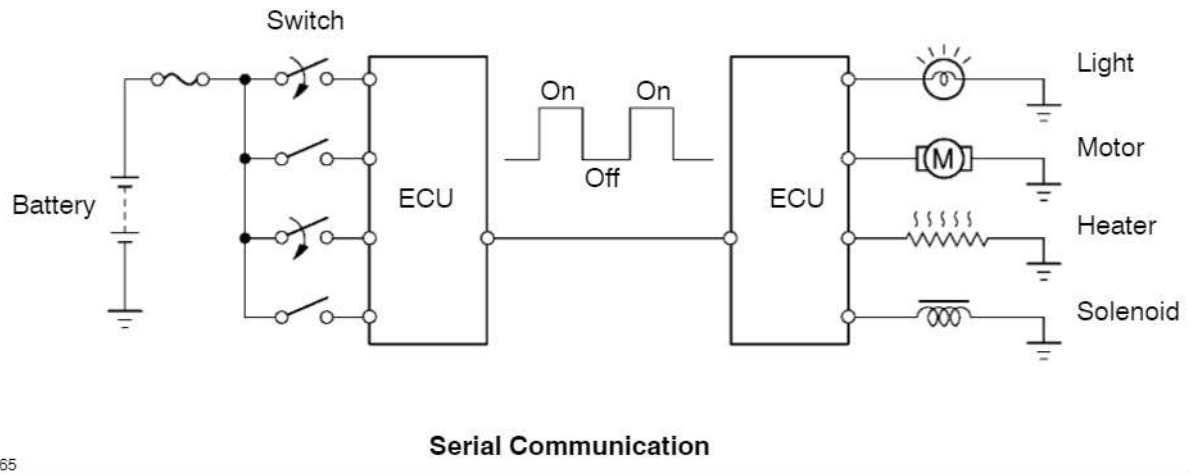
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BASIC OF MPX (Multiplex Communication)

1. GENERAL

The PRIUS multiplex communication system uses serial communication, which converts multiple pieces of information into serial communication data. As a result, they can be transmitted through a single communication wire.

Conceptual Drawing



Y B78765 **Serial Communication** B79348

- Serial communication data consists of bits and frames. A bit is the basic unit that represents the amount of information. A bit is represented by binary values "0" or "1". A frame is a body of data that is transmitted together. A frame contains a "header" that indicates the beginning of the data and an "end" message that indicates the end of the data.



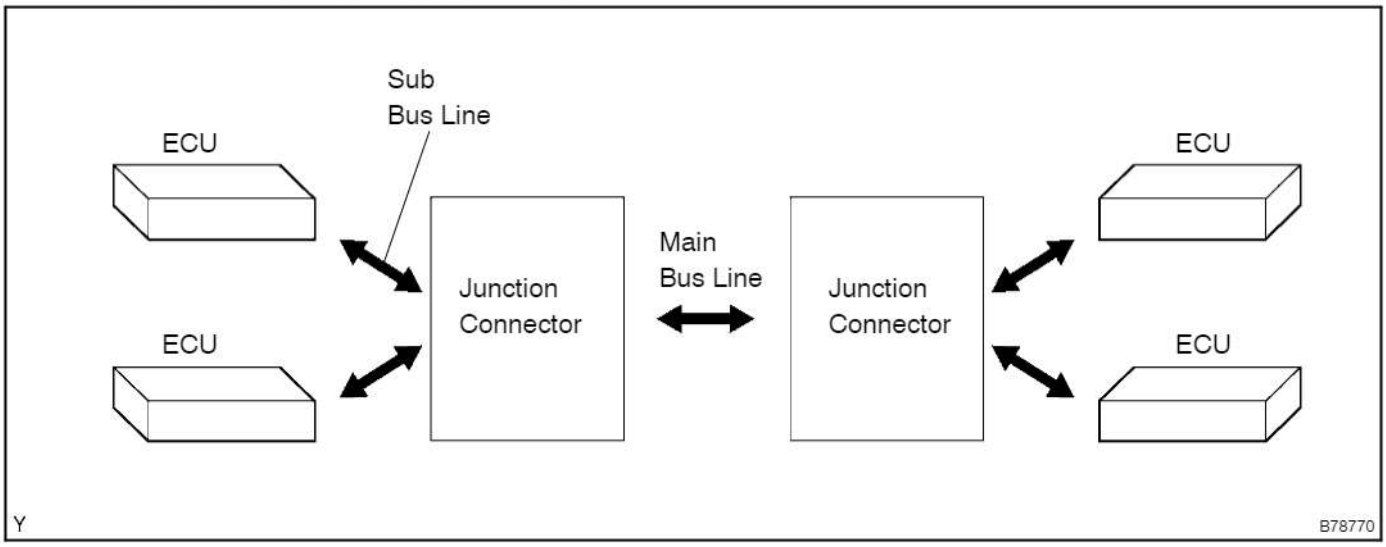
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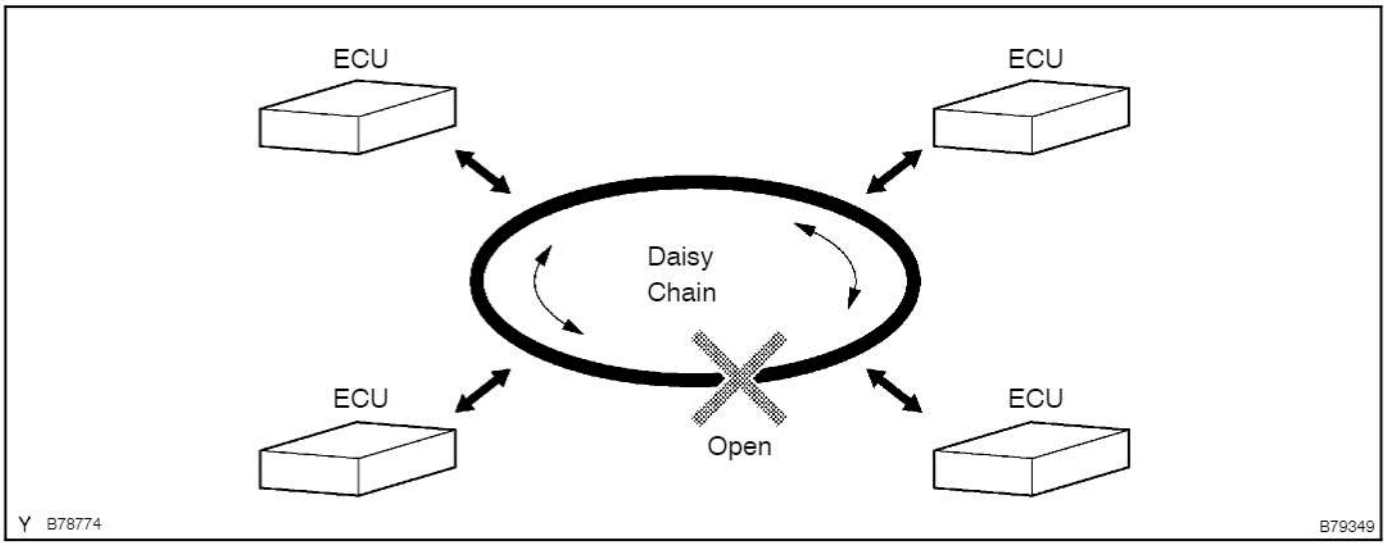
2. NETWORK STYLE

Based on serial communication, various ECUs are connected on a network to exchange various pieces of information. Such a system is called a multiplex communication system.

- The CAN communication on the PRIUS uses the multi star style bus connection. In this style of network, the ECUs are connected in a star shape. The ECUs cannot establish communication with other ECUs without passing through the master ECUs. For the Prius, the 2 junction connectors are the master ECUs and they are connected with main bus lines. Each of the junction connectors extends sub bus lines and communicates between all the connected ECUs.

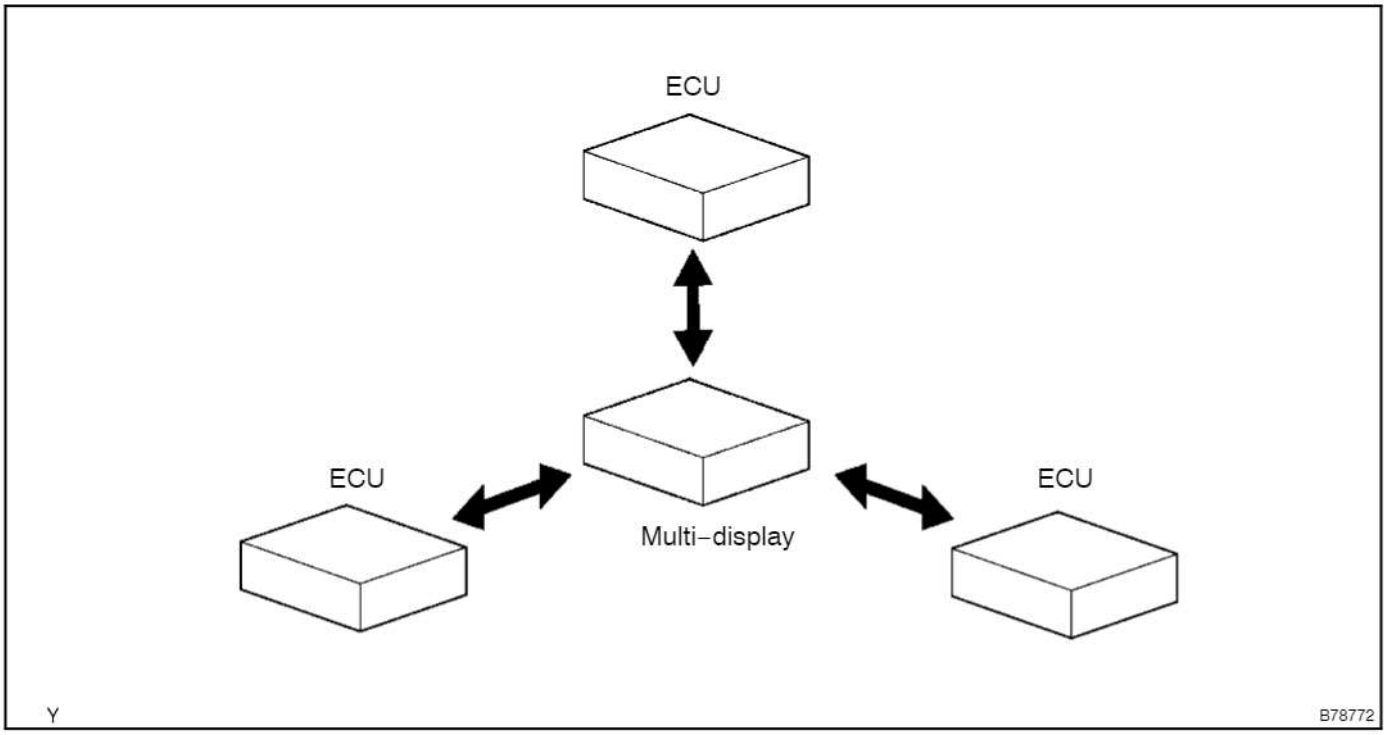


- The BEAN on the PRIUS uses the ring and bus styles of networks to connect ECUs. The connection method is called a daisy chain. In a daisy chain, communication can be maintained even if there is an area that has an open circuit. The ECUs are connected in a ring form, which enables a signal that is output by a transmitting ECU to circle the ring and return to its original ECU. This ring also functions as a single common communication wire. The transmitting ECUs output signals through a common communication wire and the receiving ECUs input data through a common communication wire.



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- The AVC–LAN in the PRIUS uses a star style. This style is centered on a master ECU, which holds a central control function. The ECUs are connected in a star shape. The ECUs cannot establish communication with other ECUs without passing through the master ECU. For the Prius, the multi–display or audio head unit functions as a master ECU.



3. DIFFERENCE OF CAN, BEAN AND AVC–LAN

Data for respective protocols (CAN, BEAN and AVC–LAN) are arranged differently. Therefore, it is not possible to exchange data between different protocols. For this reason, data arrangement must be converted before transferring data to communication bus (CAN, BEAN and AVC–LAN). This conversion is called gateway function, which is performed by the gateway ECU.

Control	Chassis Electrical System Control	Body Electrical System Control	Body Electrical System Control
Protocol	CAN (ISO Standard)	BEAN (TOYOTA Original)	AVC–LAN (TOYOTA Original)
Communication Speed	500 k bps (Max. 1 M bps)	Max. 10 k bps	Max. 17.8 k bps
Communication Wire	Twisted–pair Wire	AV Single Wire	Twisted–pair Wire
Drive Type	Differential Voltage Drive	Single Wire Voltage Drive	Differential Voltage Drive
Data Length	1 – 8 Byte (Variable)	1 – 11 Byte (Variable)	0 – 32 Byte (variable)

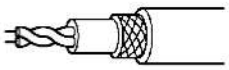
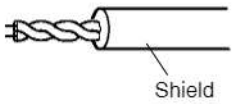
*: "bps" stands for bit per second.

Although BEAN and AVC–LAN communicate at almost the same speed, the CAN communication speed is much faster than BEAN or AVC–LAN. When the vehicle control system uses BEAN or AVC–LAN, which have a slower communication speed than CAN, it means that the system control could be delayed by the slow speed. For this reason, the vehicle control system uses CAN, which can send and receive a large volume of data at one time, in addition to being able to transmit at a faster speed.

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4. COMMUNICATION WIRE

A single, automobile vinyl (AV) wire is used for BEAN communication. A twisted–pair wire is used for CAN and AVC–LAN communication.

Function	Outline
AV Single Wire 	Lightweight single communication wire that consists of single core line surrounded by insulation. Voltage is applied to this line in order to drive communication. This system is called "single wire voltage drive".
Twisted–pair Wire for AVC–LAN 	Pair of lines is twisted together and covered with insulation. Communication is driven by applying positive (+) and negative (–) voltage to two lines in order to send single signal. This system, which is called "differential voltage drive", can reduce noise.
Twisted–pair Wire for CAN 	Pair of lines is twisted. Communication is driven by applying 1.5 to 2.5 V and 2.5 to 3.5 V of voltage to two lines in order to send single signal. This system, which is called "differential voltage drive", can reduce noise.

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HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the multiplex communication system.
- The intelligent tester II should be used in step 2.

1	VEHICLE BROUGHT TO WORKSHOP

2	DTC CHECK (See page 05–2260)

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B → Go to step 4

A

3	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page 05–2251)

4	ADJUST, REPAIR OR REPLACE

5	CONFIRMATION TEST

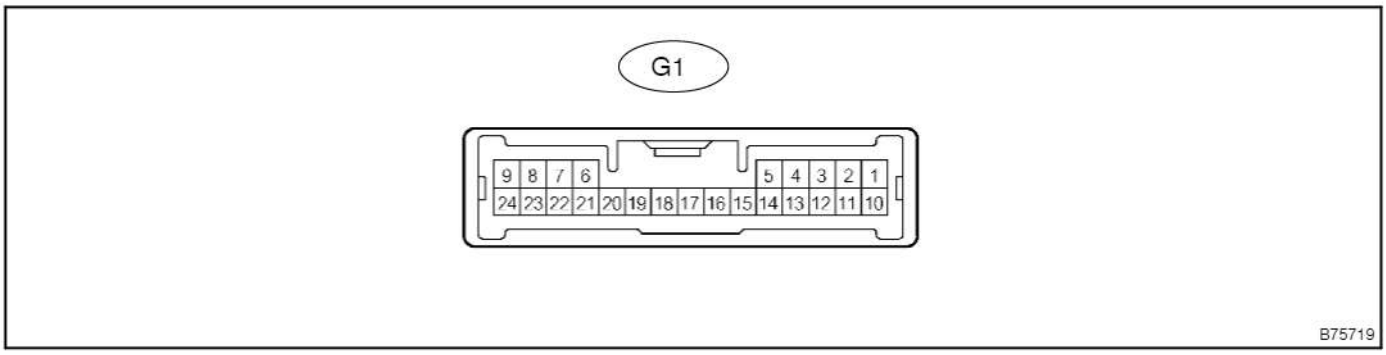
END

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TERMINALS OF ECU

1. CHECK GATEWAY ECU



(a) Disconnect the G1 ECU connector.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (G1–10) – Body ground	Y – Body ground	+B (BATT) power supply	Constant	10 to 14 V
IG (G1–1) – Body ground	B – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
ACC (G1–2) – Body ground	P – Body ground	ACC power supply	Ignition switch ACC	10 to 14 V
SIL (G1–7) – Body ground	W – Body ground	Bus "+" line	During transmission	Pulse generation
MPD1 (G1–3) – Body ground	GR*1 – Body ground B*2 – Body ground	MPX line	Constant	10 kΩ or higher
MPD2 (G1–12) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GTX+ (G1–6) – Body ground	B – Body ground	AVC–LAN line	Constant	10 kΩ or higher
GTX– (G1–21) – Body ground	W – Body ground	AVC–LAN line	Constant	10 kΩ or higher
GND (G1–24) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

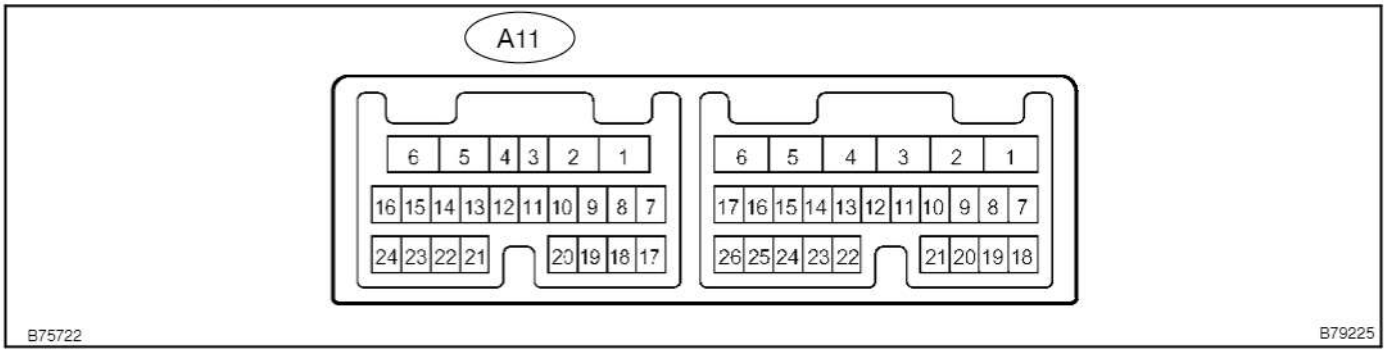
*1: LHD

*2: RHD

If the result is not as specified, there may be a malfunction on the wire harness side.

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2. CHECK A/C ECU



(a) Disconnect the A11 ECU connector.

(b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

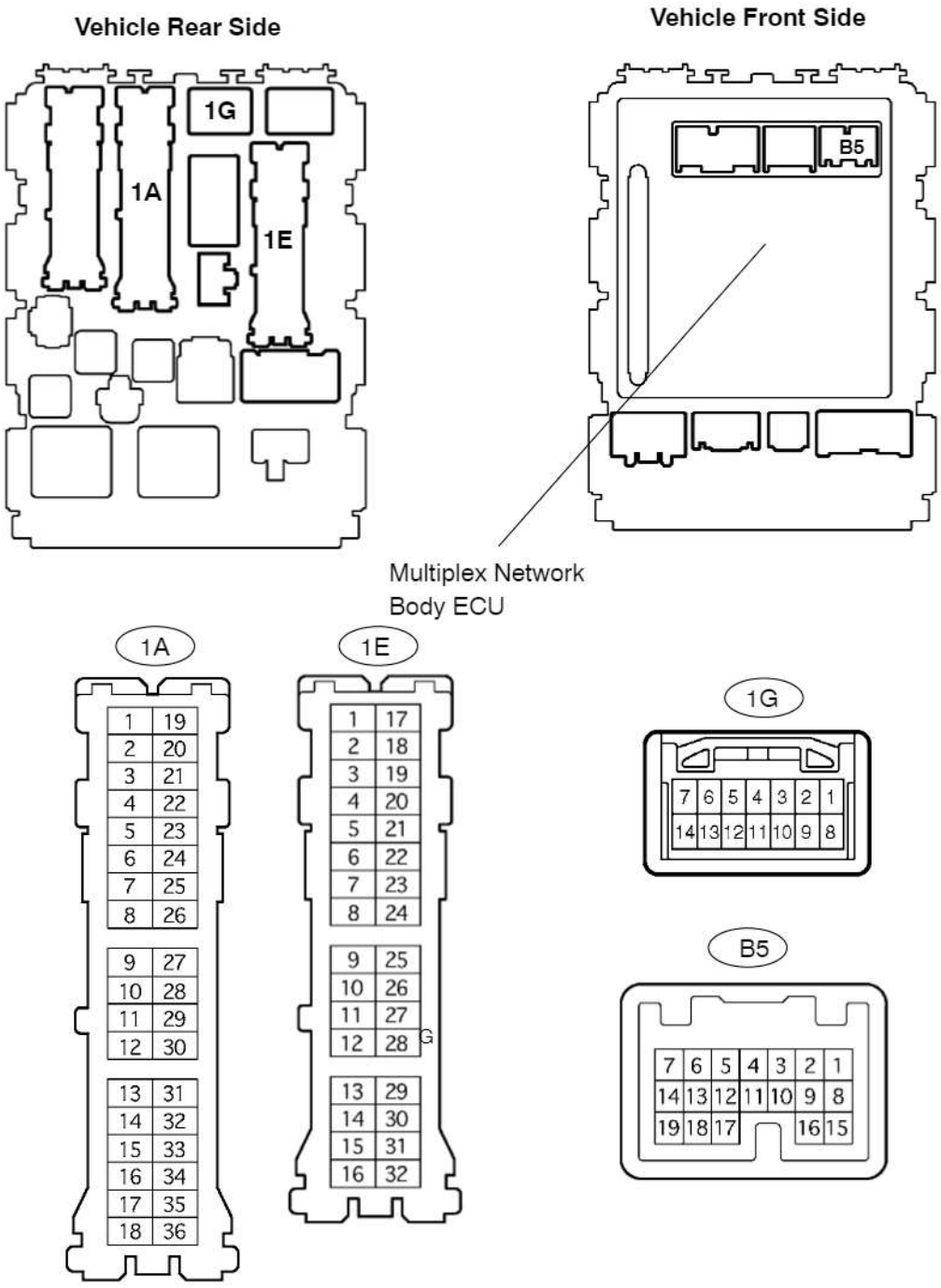
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (A11–6) – Body ground	Y – Body ground	+B power supply	Constant	10 to 14 V
MPX+ (A11–3) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (A11–11) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GND (A11–1) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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3. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



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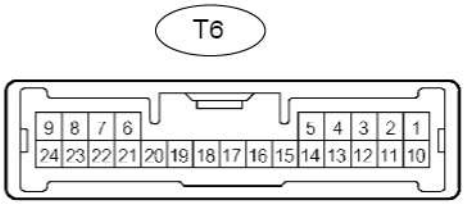
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(a) Disconnect the B5 ECU connector.
(b) Disconnect the 1A, 1E and 1G J/B connectors.
(c) Measure the voltage and resistance of each terminal of the wire harness side connector.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A–30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
MPX1 (1G–9) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (B5–15) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GND (1E–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

4. CHECK TRANSPONDER KEY ECU



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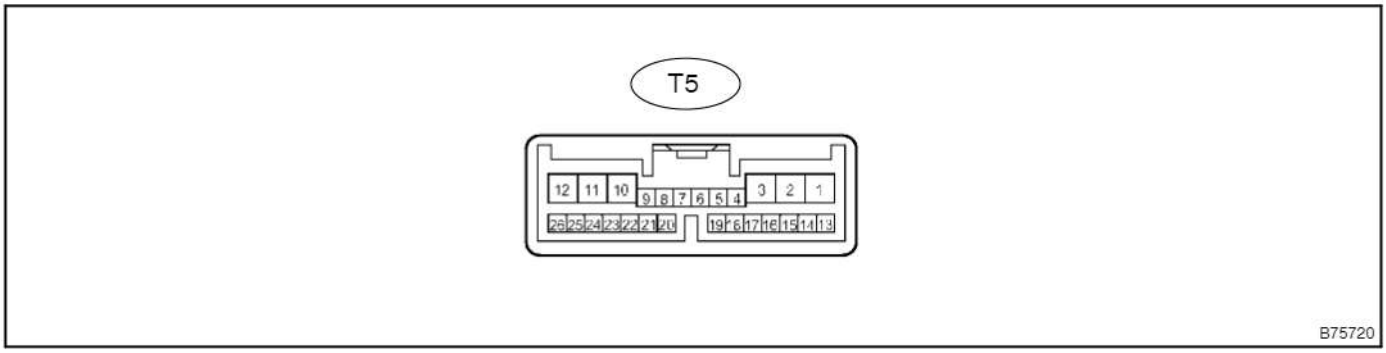
(a) Disconnect the T6 ECU connector.
(b) Measure the voltage and resistance of each terminal of the wire harness side connector.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (T6–4) – Body ground	R – Body ground	+B (IG) power supply	Constant	10 to 14 V
MPX1 (T6–17) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (T6–16) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GND (T6–22) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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5. CHECK TRANSMISSION CONTROL ECU

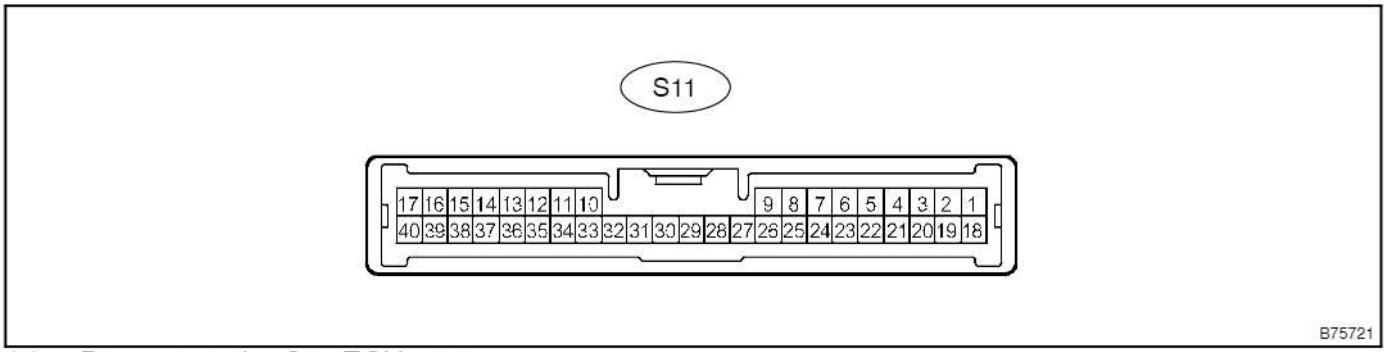


(a) Disconnect the T5 ECU connector.
(b) Measure the voltage and resistance of each terminal of the wire harness side connector.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (T5–1) – Body ground	L – Body ground	+B (+B) power supply	Constant	10 to 14 V
MPX1 (T5–19) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (T5–18) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
E1 (T5–15) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

6. w/ Smart Entry System: CHECK SMART ECU



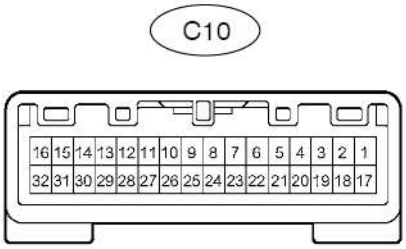
(a) Disconnect the S11 ECU connector.
(b) Measure the voltage and resistance of each terminal of the wire harness side connector.
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (S11–1) – Body ground	Y – Body ground	+B (+B1) power supply	Constant	10 to 14 V
MPX1 (S11–31) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (S11–32) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
E (S11–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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7. CHECK METER ECU (COMBINATION METER)



(a) Disconnect the C10 ECU connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
C10–21 – Body ground	Y*1 – Body ground R*2 – Body ground	+B power supply	Constant	10 to 14 V
MPX+ (C10–24) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX– (C10–25) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
C10–14 – Body ground	BR – Body ground	Ground	Constant	Below 1 Ω

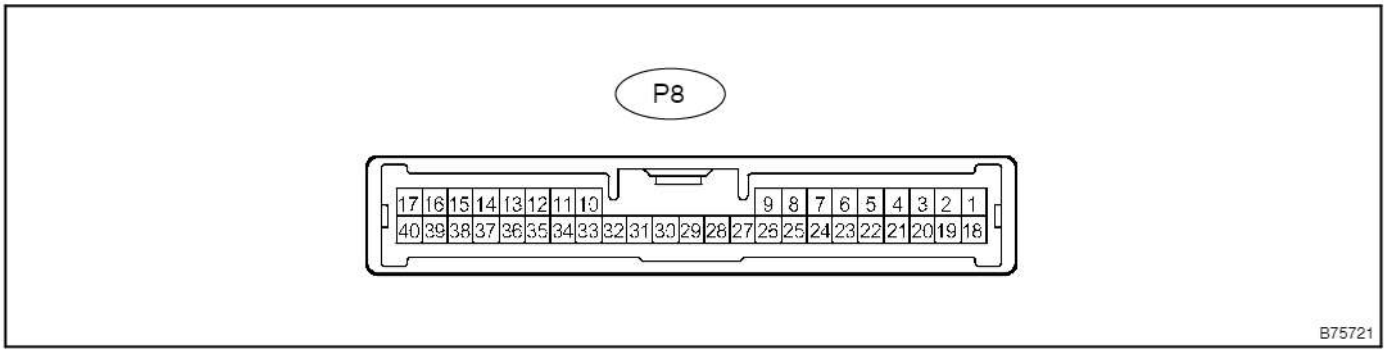
If the result is not as specified, there may be a malfunction on the wire harness side.

*1: LHD

*2: RHD

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8. CHECK POWER SOURCE CONTROL ECU



(a) Disconnect the P8 ECU connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

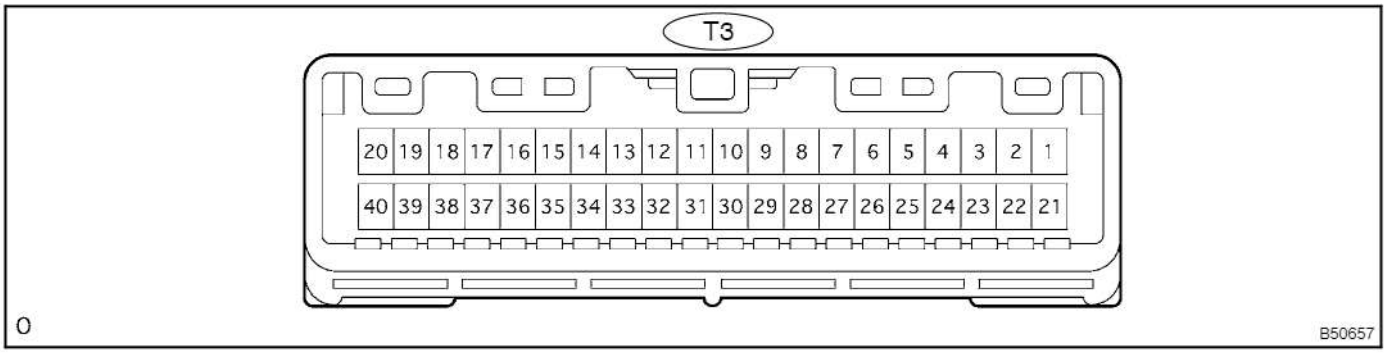
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (P8–33) – Body ground	R – Body ground	+B (AM1) power supply	Constant	10 to 14 V
MPX1 (P8–7) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (P8–24) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
GND2 (P8–6) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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9. RHD Except Australia, Singapore, Hong Kong: CHECK THEFT DETERRENT ECU



(a) Disconnect the T3 ECU connector.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (T3–2) – Body ground	R – Body ground	+B (+B1) power supply	Constant	10 to 14 V
MPX1 (T3–31) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (T3–32) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
E (T3–29) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

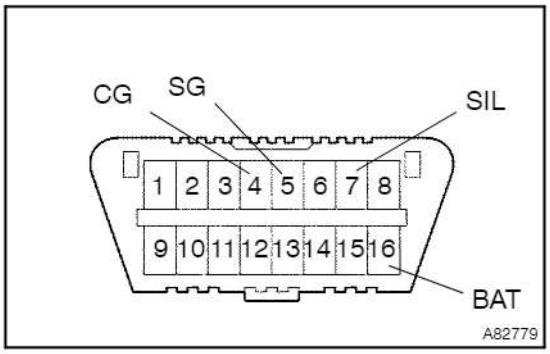
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DIAGNOSIS SYSTEM

1. DESCRIPTION

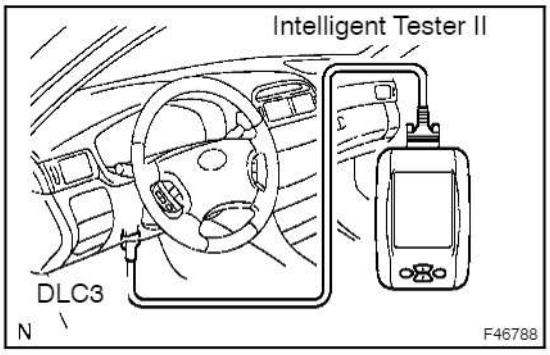
The gateway ECU controls the function of the multiplex communication system on the vehicle. Data of the multiplex communication system and the Diagnostic Trouble Code (DTC) can be read in the Data Link Connector 3 (DLC3) of the vehicle.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 15765–4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the intelligent tester II to the DLC3, Turn the power switch ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If communication is normal when the intelligent tester II is connected to another vehicle, inspect the DLC3 on the original vehicle.

If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

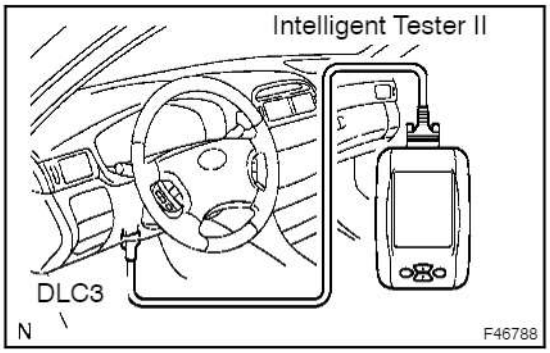
Standard : 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

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05JUL–01

DTC CHECK/CLEAR



1. DTC CHECK

(a) Checking DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch ON (IG).
  (3) Read the DTCs following the prompts on the tester screen.

HINT:
Refer to the intelligent tester II operator's manual for further details.

2. CLEAR DTC

(a) Clearing the DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch ON (IG).
  (3) Operate the intelligent tester II to clear the codes.

HINT:
Refer to the intelligent tester II operator's manual for further details.

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05IJH–01

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during DTC check, check the circuit corresponding to the code in the table below. Proceed to the page given for the circuit.

DTC No. (See Page)	Detection Item	Trouble Area
B1200 (05–2262)	Body ECU communication stop	• Wire harness • Body ECU
B1207*1 (05–2266)	Smart ECU communication stop	• Wire harness • Smart ECU
B1210 (05–2270)	Power source control ECU communication stop	• Wire harness • Power source control ECU
B1214, B1215 (05–2274)	• Door system communication bus malfunction (+B short) • Door system communication bus malfunction (GND short)	• Wire harness • ECU (Door system bus)
B1248 (05–2282)	AVC–LAN communication impossible	• Wire harness • ECUs (AVC–LAN system bus)
B1260 (05–2284)	Transmission control ECU communication stop	• Wire harness • Transmission control ECU
B1262 (05–2288)	A/C ECU communication stop	• Wire harness • A/C ECU
B1269*2 (05–2292)	Theft deterrent ECU communication stop	• Wire harness • Theft deterrent ECU
B1271 (05–2296)	Combination meter ECU communication stop	• Wire harness • Combination meter ECU
B1294 (05–2300)	Immobilizer ECU communication stop	• Wire harness • Transponder key ECU

*1: w/ Smart entry system

*2: w/ Theft deterrent system

HINT:

When "+B or GND short malfunction of communication bus" DTCs (B1214, B1215, etc.) are detected at the same time as "communication stop" DTCs (B1211, B1212, etc.), please repair the "+B or GND short malfunction of communication bus" DTCs first.

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DTC	B1200	BODY ECU COMMUNICATION STOP

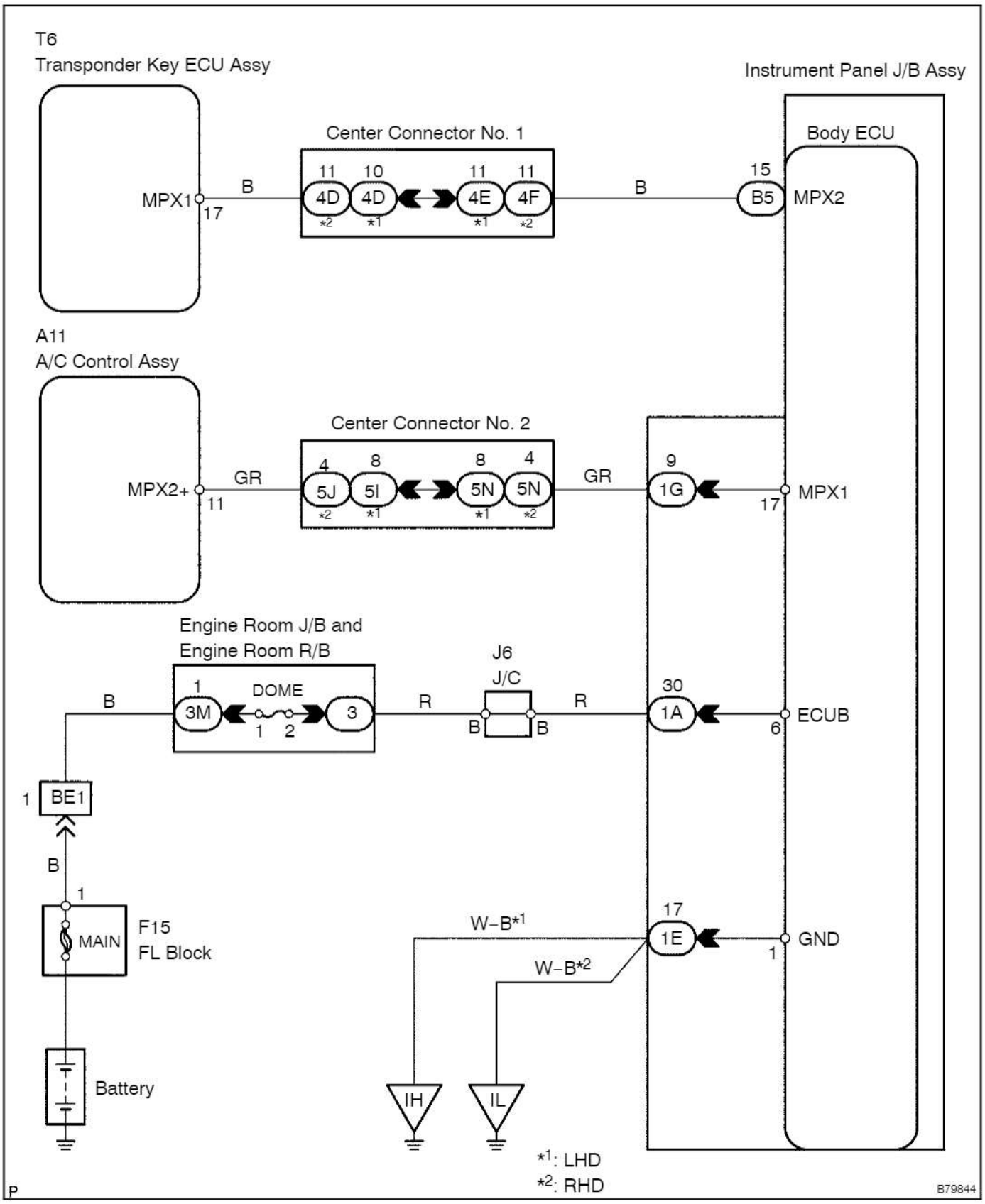
CIRCUIT DESCRIPTION

This DTC is detected when communication between the multiplex network body ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1200	Body ECU communication stops	• Instrument panel J/B assy (Body ECU) • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

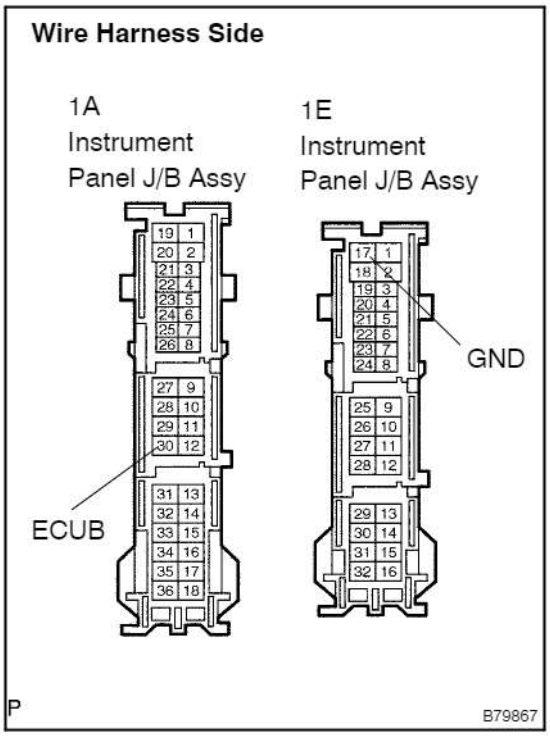
1	INSPECT FUSE (DOME)

(a) Remove the DOME fuse from engine room J/B and engine room R/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B ASSY – BODY GROUND)



(a) Disconnect the 1A and 1E J/B connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.
Standard:

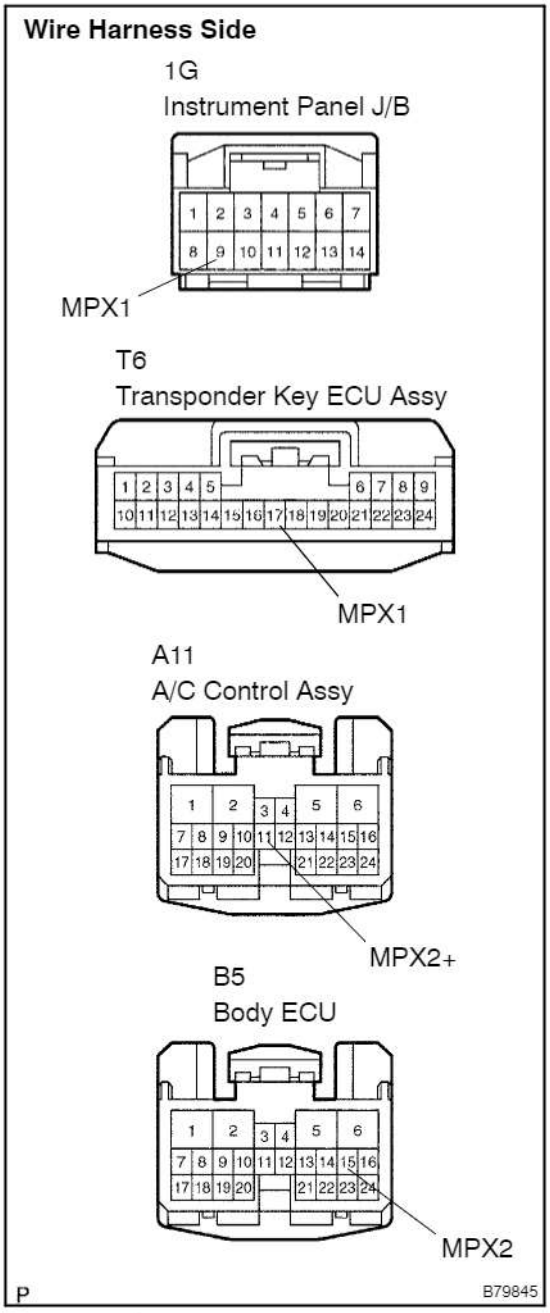
Tester Connection	Specified Condition
1A–30 – Body ground	10 to 14 V
1E–17 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the 1G J/B connector.
(b) Disconnect the T6, A11 and B5 ECU connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–17 (MPX1) – B5–15 (MPX2)	Below 1 Ω
A11–11 (MPX2+) – 1G–9 (MPX1)	Below 1 Ω

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

A

REPLACE INSTRUMENT PANEL J/B ASSY

B → **REPLACE INSTRUMENT PANEL J/B ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

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DTC	B1207	SMART ECU COMMUNICATION STOP

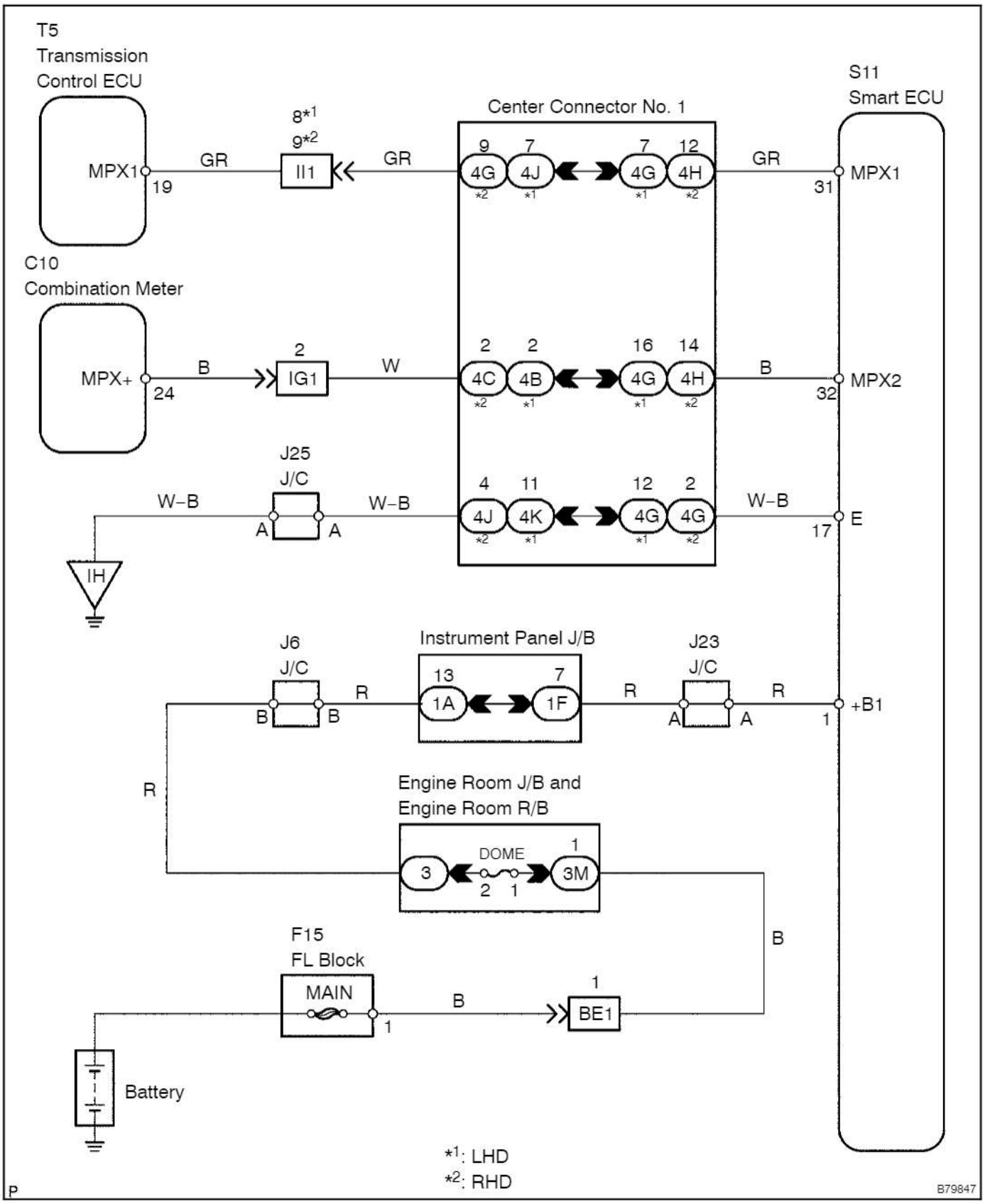
CIRCUIT DESCRIPTION

This DTC is detected when communication between the smart ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1207	Smart ECU communication stops	• Smart ECU • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

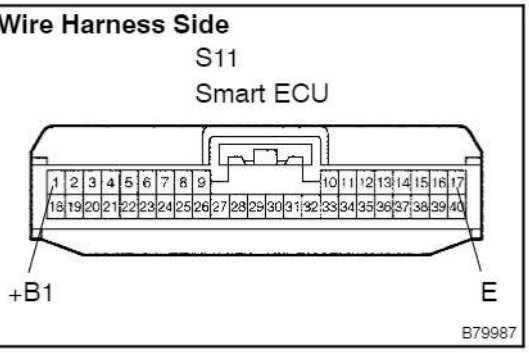
1	CHECK OPERATION

(a) With the smart key in your possession, push the lock button on the door outside handle (smart door lock operation). Check that the smart indicator illuminates or starts blinking.
With the smart key in your possession, touch the inside of the door outside handle (smart door unlock operation). Check that the smart indicator illuminates or starts blinking.
OK: Smart indicator illuminates or starts blinking.

NG → **Go to step 3**

OK

2	CHECK WIRE HARNESS (SMART ECU – BODY GROUND)



(a) Disconnect the S11 ECU connector.
(b) Measure the resistance and voltage between the wire harness side connector and body ground.
Standard:

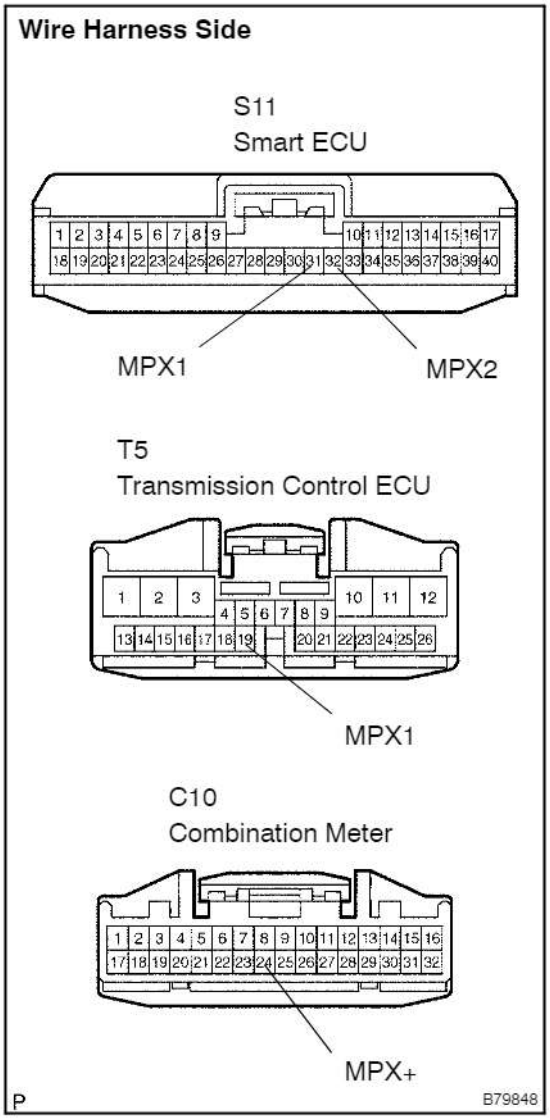
Tester Connection	Specified Condition
S11–1 (+B1) – Body ground	10 to 14 V
S11–17 (E) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the S11 and T5 ECU connectors.
(b) Disconnect the C10 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S11–31 (MPX1) – T5–19 (MPX1)	Below 1 Ω
S11–32 (MPX2) – C10–24 (MPX+)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B → **REPLACE SMART ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE SMART ECU

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DTC	B1210	POWER SOURCE CONTROL ECU COMMUNICATION STOP

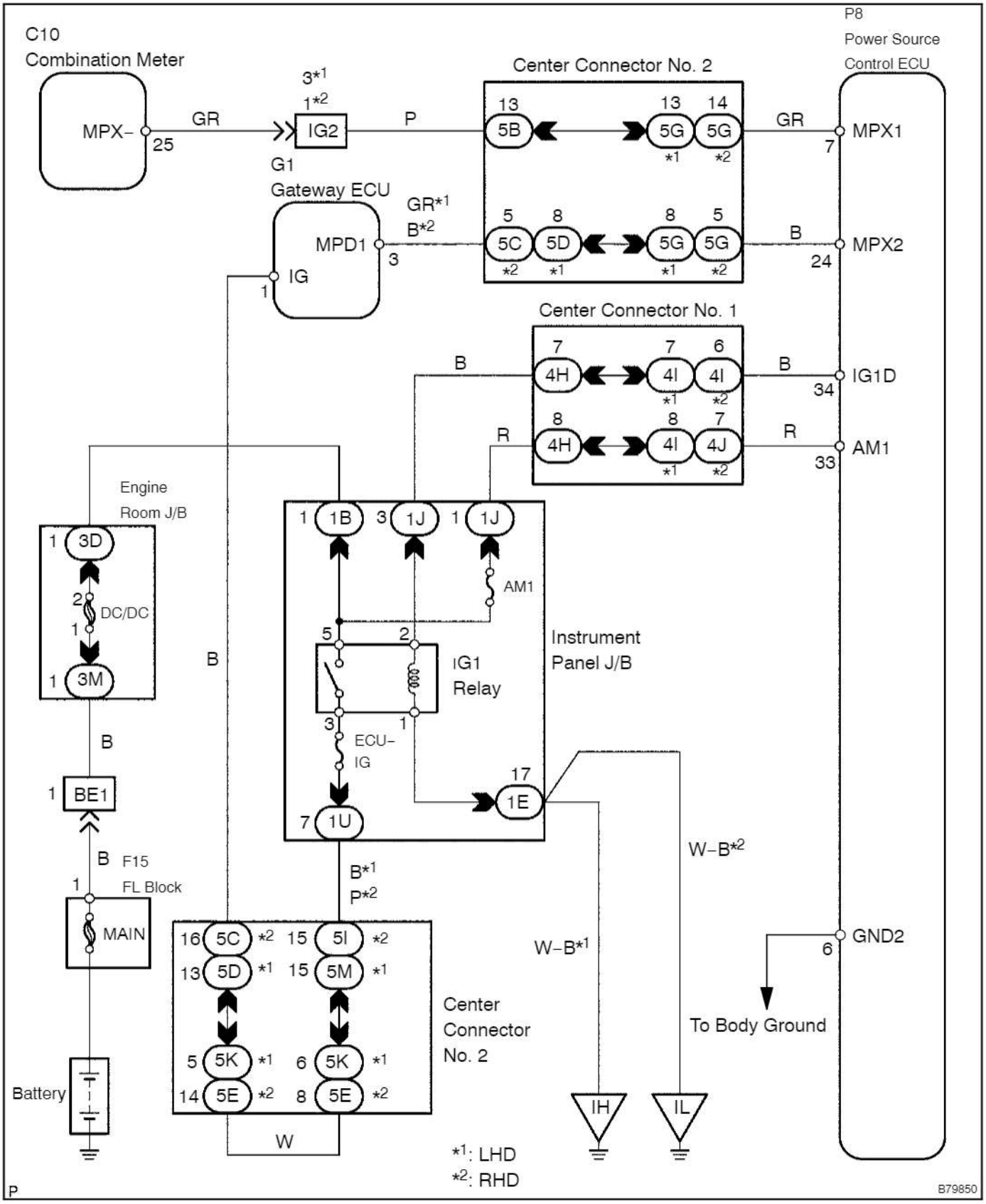
CIRCUIT DESCRIPTION

This DTC is detected when communication between the power source control ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1210	Power source control ECU communication stops	• Power source control ECU • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

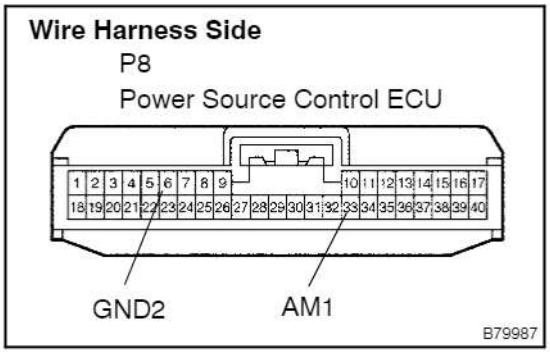
1	CHECK OPERATION

(a) Without depressing the brake pedal, push the power switch repeatedly. Check that the power modes change between OFF, ON (ACC) and ON (IG) alternately.
OK: Smart indicator illuminates or starts blinking according to power modes.

NG → **Go to PUSH BUTTON START SYSTEM (See page 05–2131)**

OK

2	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



(a) Disconnect the P8 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connector.
Standard:

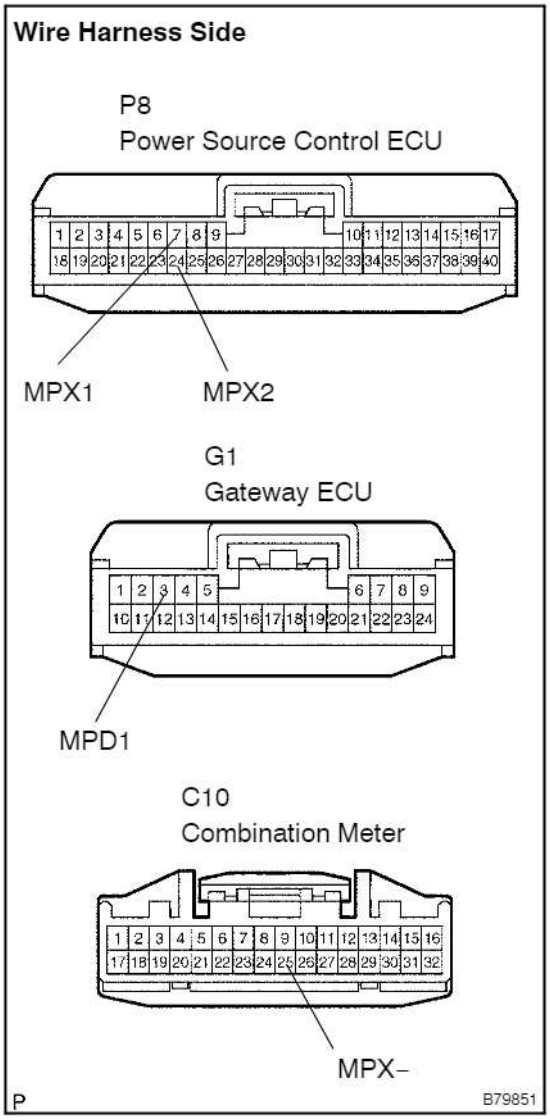
Tester Connection	Condition	Specified Condition
P8–33 (AM1) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14V
P8–6 (GND2) – Body ground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the P8 and G1 ECU connectors.
(b) Disconnect the C10 meter connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P8–7 (MPX1) – C10–25 (MPX–)	Below 1 Ω
P8–24 (MPX2) – G1–3 (MPD1)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B → **REPLACE POWER SOURCE CONTROL ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE POWER SOURCE CONTROL ECU

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DTC	B1214	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (+B SHORT)

DTC	B1215	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (GND SHORT)

CIRCUIT DESCRIPTION

DTCs B1214 and B1215 are detected when +B and body ground is short–circuited on the door system communication bus. Detecting this condition will disable the door system communication bus (BEAN) and output some diagnosis codes.

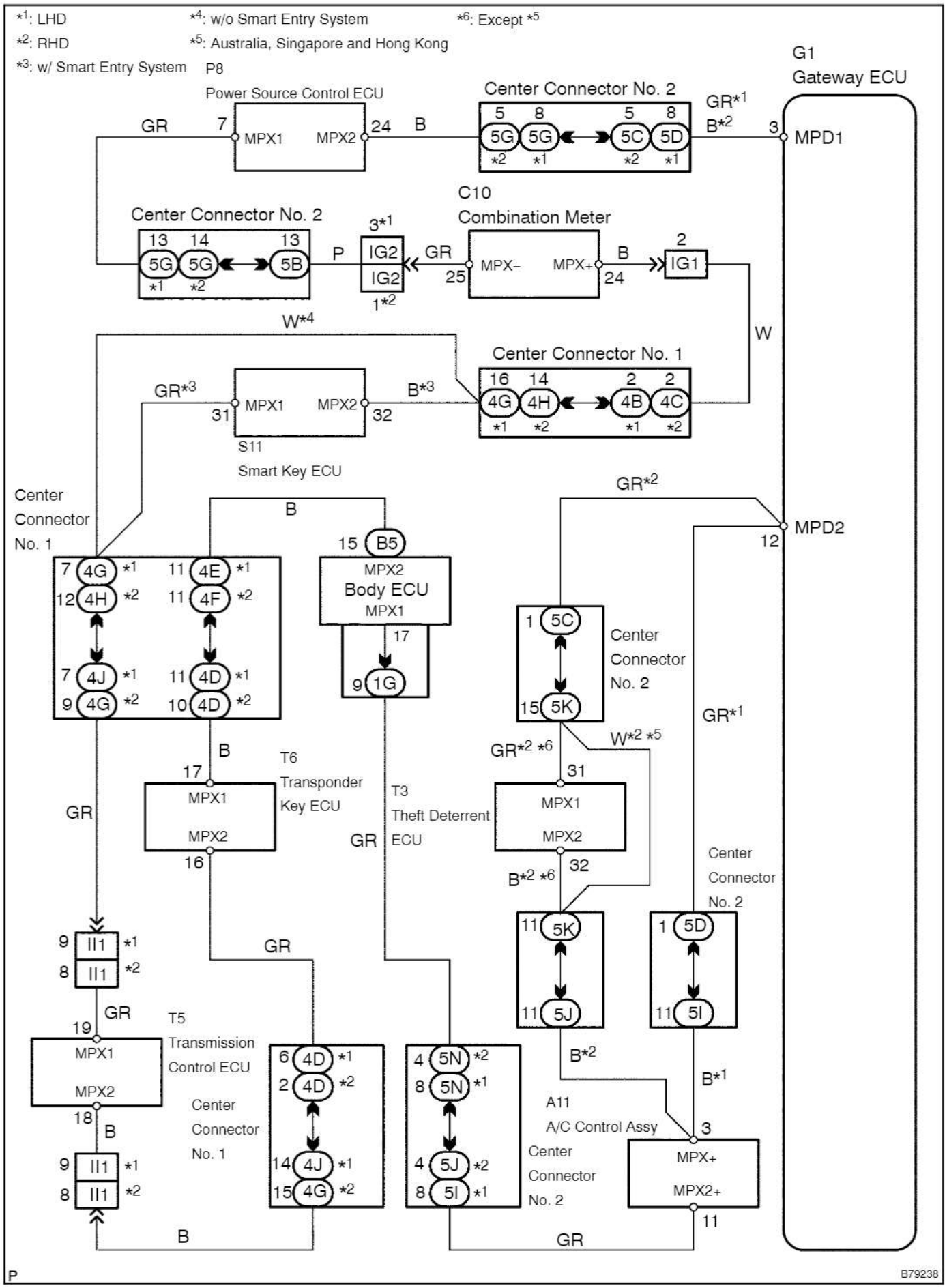
DTC NO.	DTC Detection Condition	Trouble Area
B1214	Door system communication circuit and +B battery system short	• Body ECU • Smart ECU* • Power source control ECU • Transmission control ECU • A/C ECU • Theft warning ECU • Combination meter • Theft warning ECU • Transponder key ECU (Immobilizer ECU) • Wire harness
B1215	Door system communication circuit and body ground short	• Body ECU • Smart ECU* • Power source control ECU • Transmission control ECU • A/C ECU • Theft warning ECU • Combination meter • Theft warning ECU • Transponder key ECU (Immobilizer ECU) • Wire harness

*: Smart Entry System

WIRING DIAGRAM

The wiring diagram is shown on the next page.

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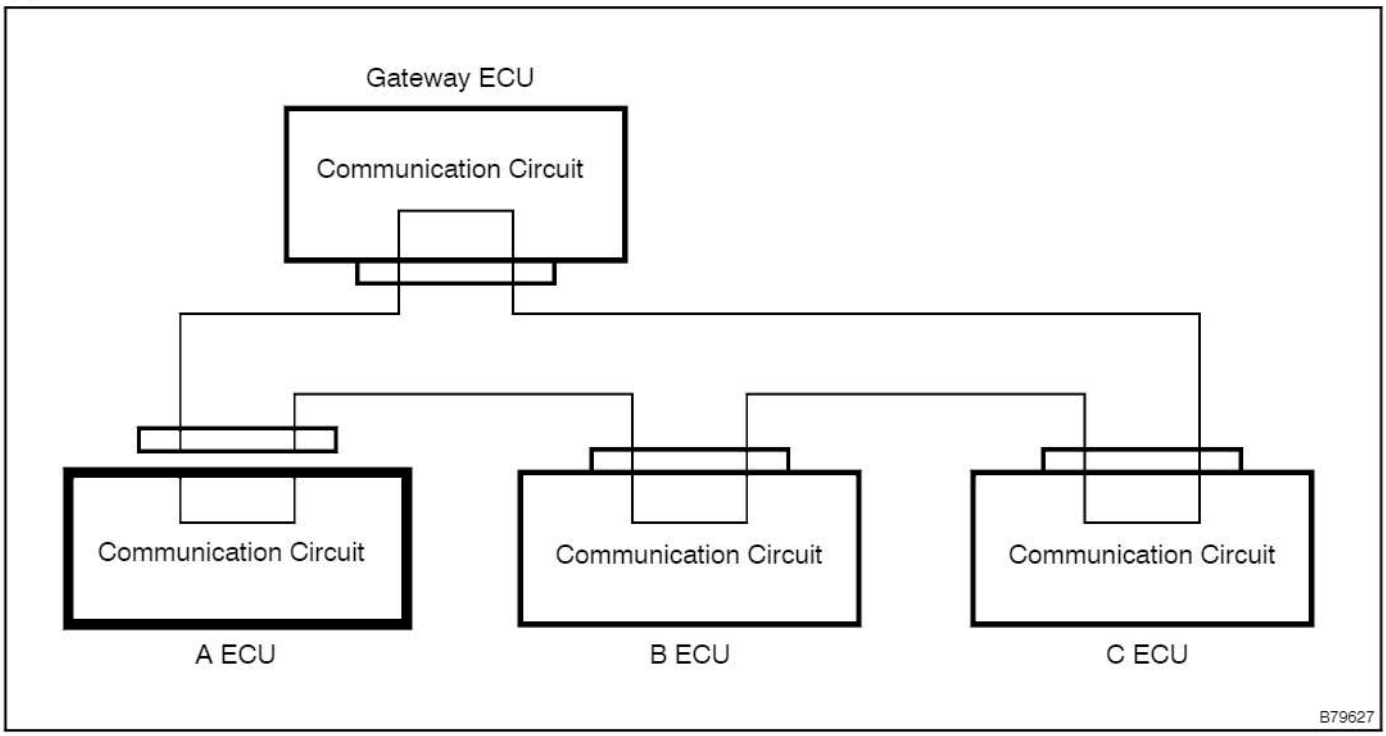


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INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE (A ECU)

(a) Disconnect the A ECU connector and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

- The A ECU in the door system bus represents the power source control ECU.
- If the result is as specified, the disconnected A ECU (power source control ECU) is malfunctioning.

NG → **Go to step 2**

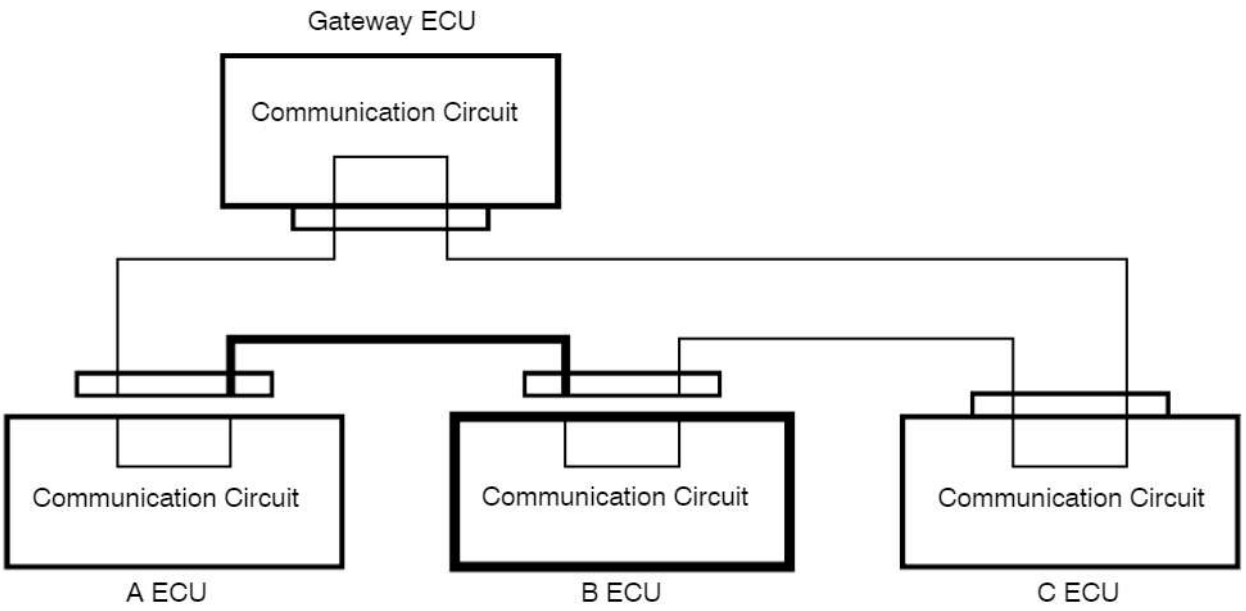
OK

REPLACE A ECU

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2	CHECK DIAGNOSTIC TROUBLE CODE (B ECU)

(a) Disconnect the A ECU and B ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

- The B ECU in door system bus represents one of the following: combination meter, smart ECU*1, transmission control ECU, transponder key ECU, body ECU, A/C control assy*2, *3 or theft deterrent ECU*4.
- If the result is as specified, the disconnected B ECU (one of the ECUs from the above list) or the wire harness between the A ECU and B ECU is malfunctioning.

*1: w/ Smart Entry System
*2: LHD models
*3: RHD models Australia, Singapore and Hong Kong
*4: Except*3

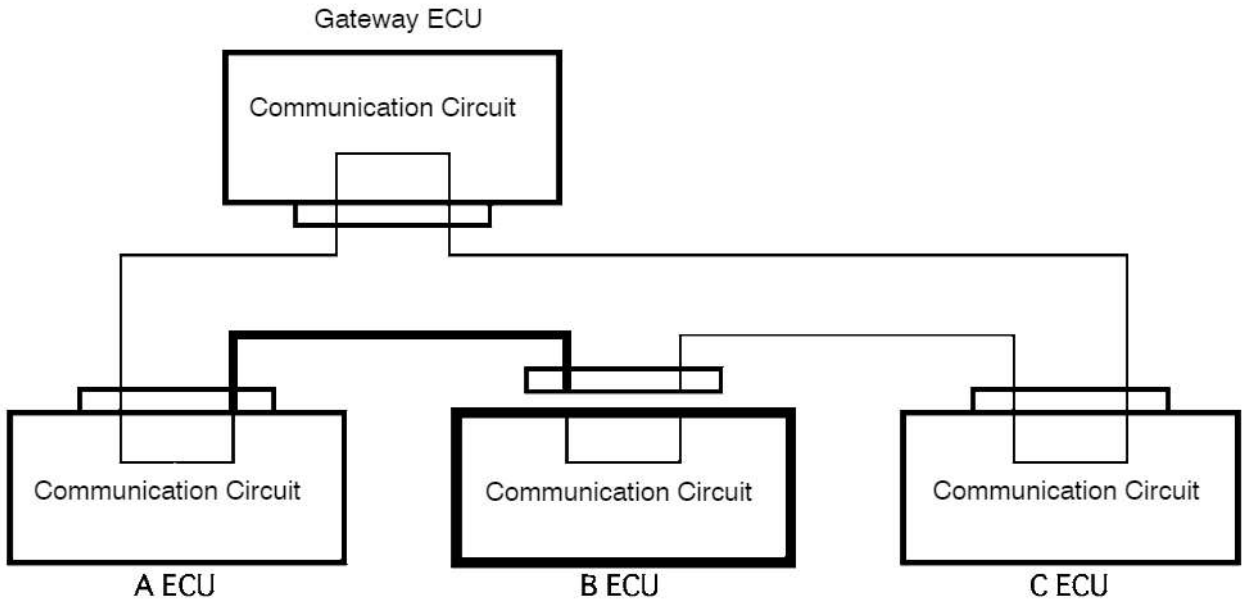
NG	Go to step 4

OK

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3	CHECK WIRE HARNESS BETWEEN A ECU AND B ECU

(a) Disconnect the B ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

If the result is as specified, the wire harness between the A ECU and B ECU is functioning normally but the disconnected B ECU is malfunctioning.

NG → **REPAIR OR REPLACE BETWEEN WIRE HARNESS OF A ECU AND B ECU**

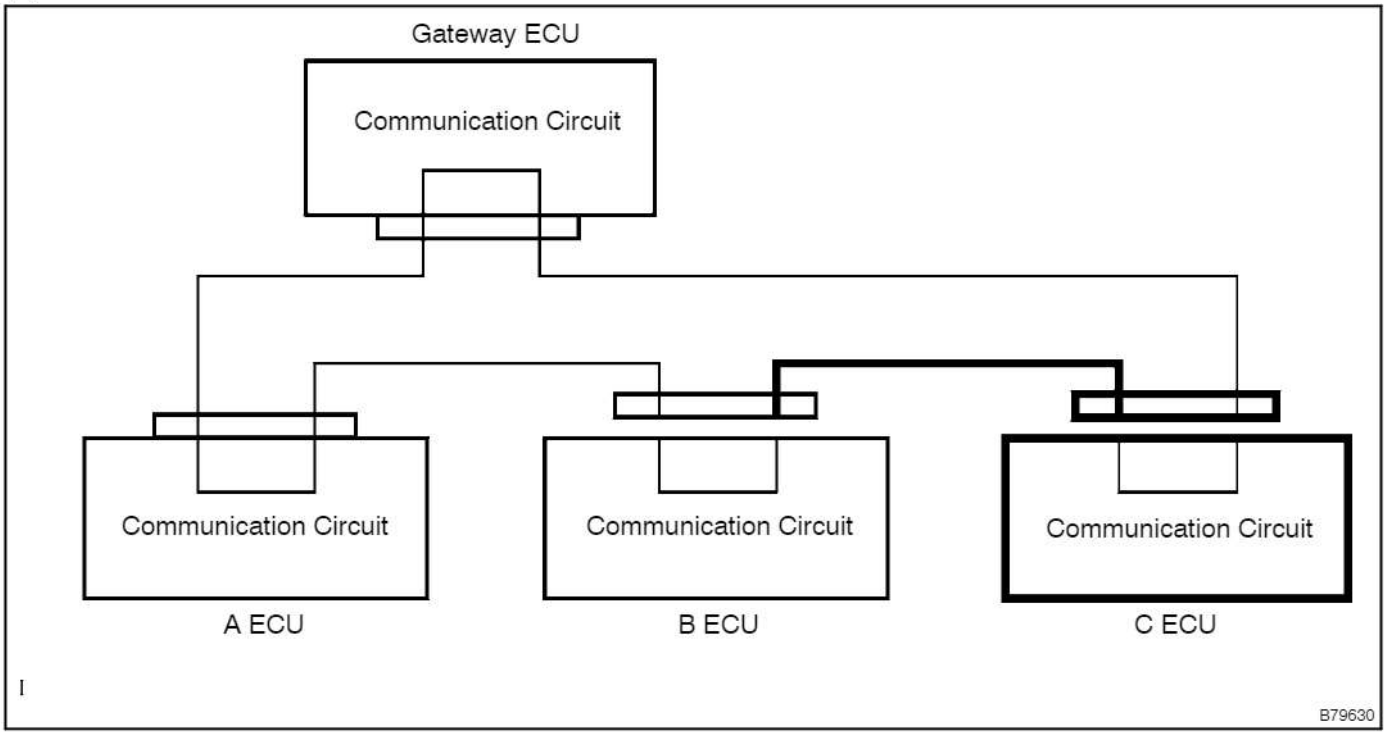
OK

REPLACE B ECU

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4	CHECK DIAGNOSTIC TROUBLE CODE (C ECU)

(a) Disconnect the B ECU and C ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

- The C ECU in the door system bus represents the A/C control assy*1, *2 or theft deterrent ECU*3.
- If the result is as specified, the disconnected C ECU (A/C control assy*1, *2 or theft deterrent ECU*3) or the wire harness between the B ECU and C ECU is malfunctioning.

*1: LHD models

*2: RHD models Australia, Singapore and Hong Kong

*3: Except*2

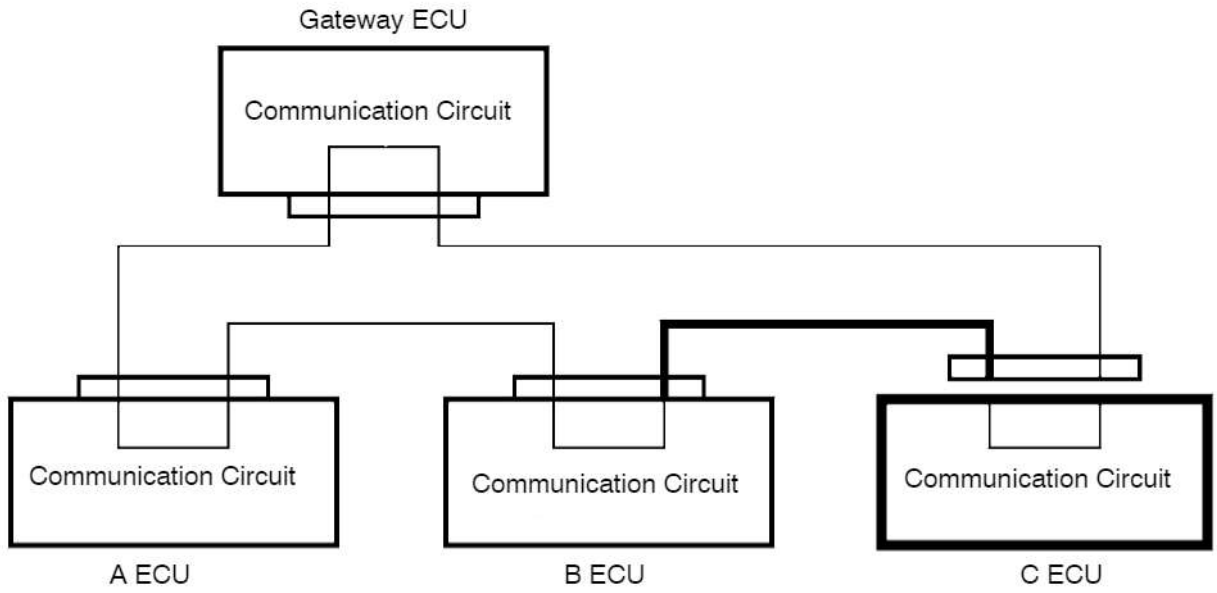
NG	Go to step 6

OK

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5	CHECK WIRE HARNESS BETWEEN B ECU AND C ECU

(a) Disconnect the C ECU connector and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

If the result is as specified, the wire harness between the B ECU and C ECU is functioning normally but the disconnected C ECU malfunctioning.

NG → **REPAIR OR REPLACE BETWEEN WIRE HARNESS OF B ECU AND C ECU**

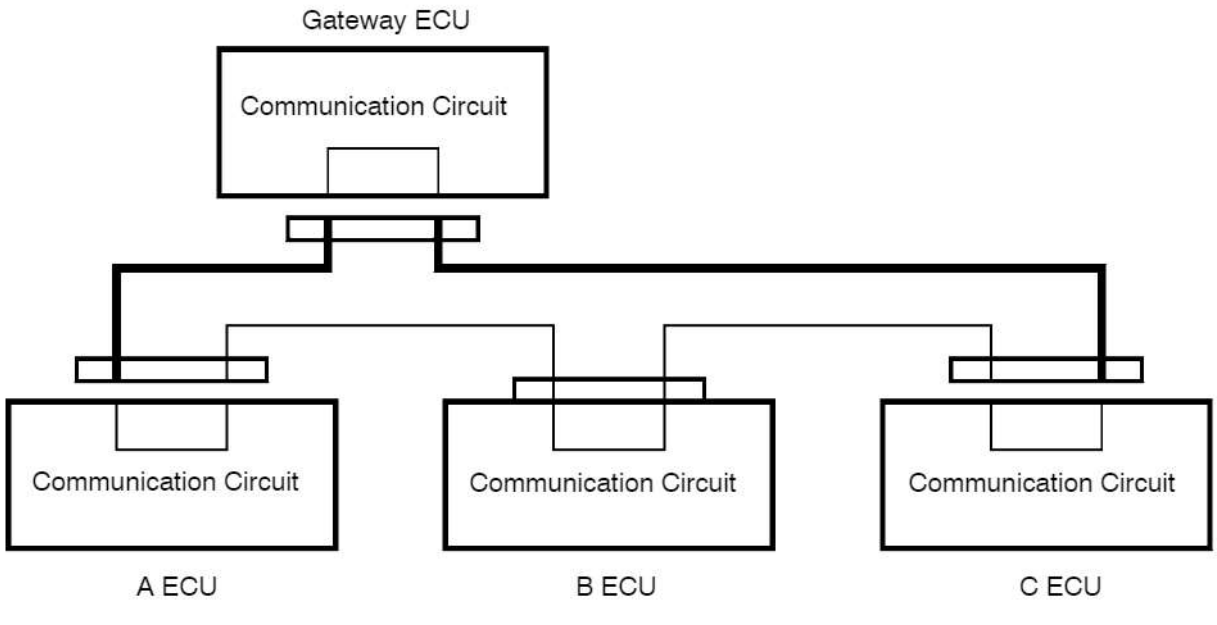
OK

REPLACE C ECU

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6	CHECK WIRE HARNESS BETWEEN GATEWAY ECU AND A ECU OR C ECU

(a) Check for a short–circuit in +B or body ground.



(1) Disconnect the A ECU, C ECU and gateway ECU connectors.
(2) Measure the voltage and resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A ECU connector/gateway ECU connector – body ground	0 V
C ECU connector/gateway ECU connector – body ground	0 V
A ECU connector/gateway ECU connector – body ground	10 kΩ or higher
C ECU connector/gateway ECU connector – body ground	10 kΩ or higher

HINT:

- The A ECU in the door system bus represents the power source control ECU.
- The C ECU in the door system bus represents the A/C control assy*1, *2 or theft deterrent ECU*3.

*1: LHD models
*2: RHD models Australia, Singapore and Hong Kong
*3: Except*2

NG → **REPAIR OR REPLACE BETWEEN WIRE HARNESS OF GATEWAY ECU AND A ECU OR C ECU**

OK

REPLACE GATEWAY ECU

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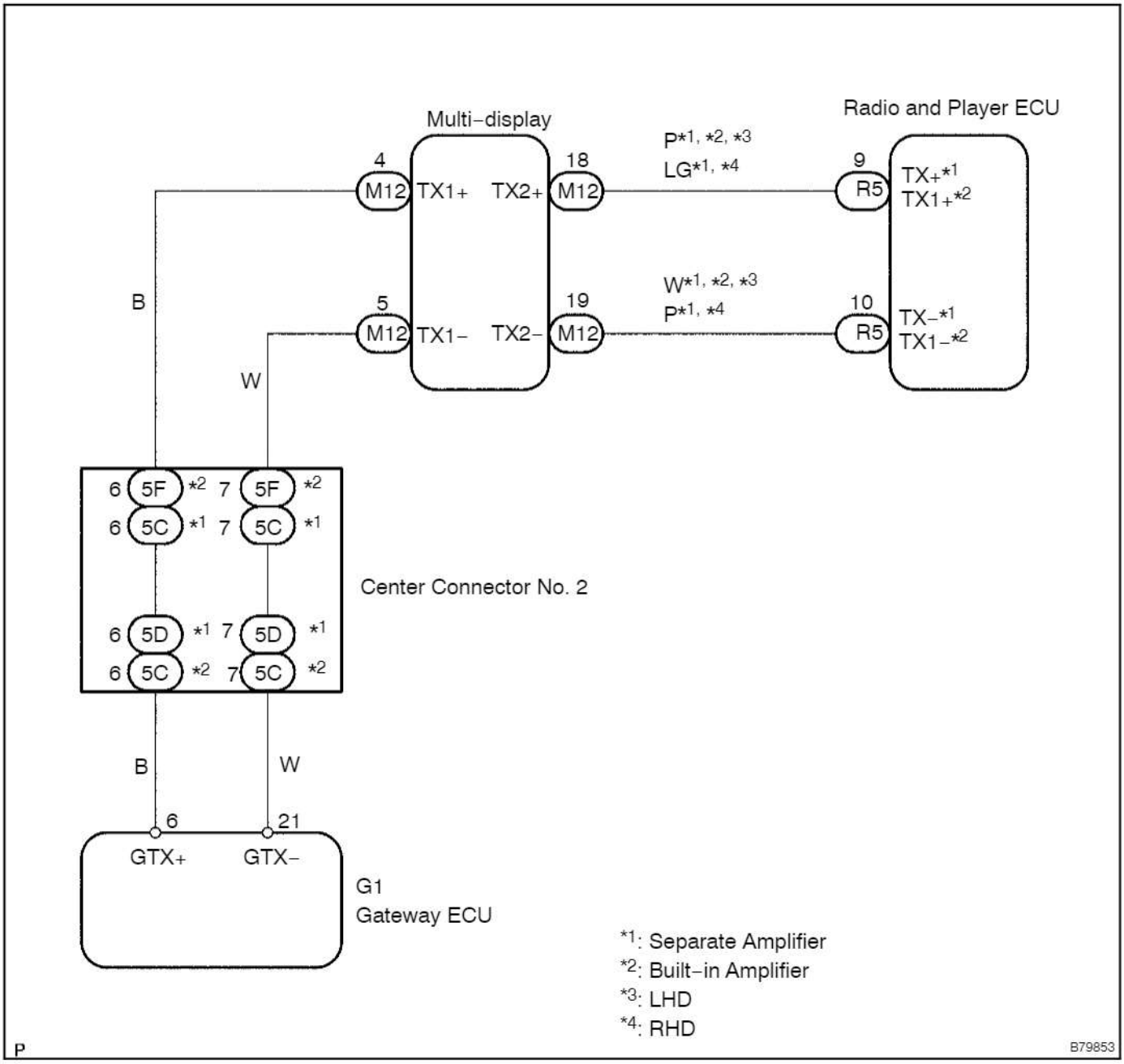
DTC B1248 AVC–LAN COMMUNICATION IMPOSSIBLE

CIRCUIT DESCRIPTION

This DTC is detected when communication is impossible between the radio and player ECU and gateway ECU.

DTC No.	DTC Detection Condition	Trouble Area
B1248	AVC–LAN communication is impossible	• Radio and player ECU • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

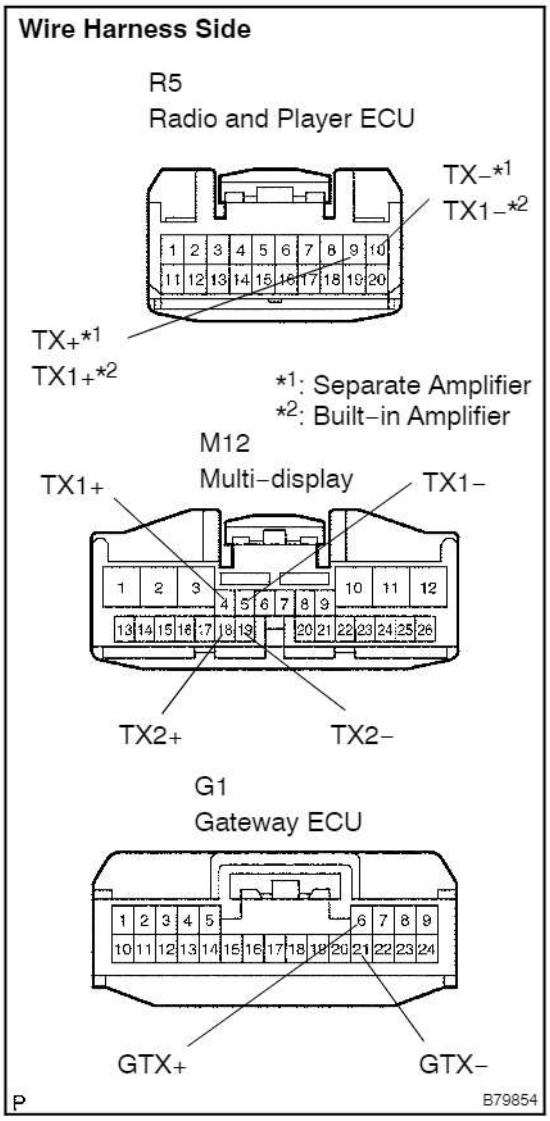
1 CHECK OPERATION

(a) Check that the radio and player switch can operate the tilt and telescopic steering column normally.
OK: Radio and player switch can operate the audio system normally.

NG → **Go to AUDIO SYSTEM (See page 05–1456)**

OK

2 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the R5, M12 and G1 ECU connectors.
(b) Measure the resistance between the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
R5–9 (TX+*1 or TX1+*2) – M12–18 (TX2+)	Below 1 Ω
R5–10 (TX–*1 or TX1–*2) – M12–19 (TX2–)	Below 1 Ω
M12–4 (TX1+) – G1–6 (GTX+)	Below 1 Ω
M12–5 (TX1–) – G1–21 (GTX–)	Below 1 Ω

*1: Separate Amplifier
*2: Built–in Amplifier

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE RADIO AND PLAYER ECU

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DTC	B1260	TRANSMISSION CONTROL ECU COMMUNICATION STOP

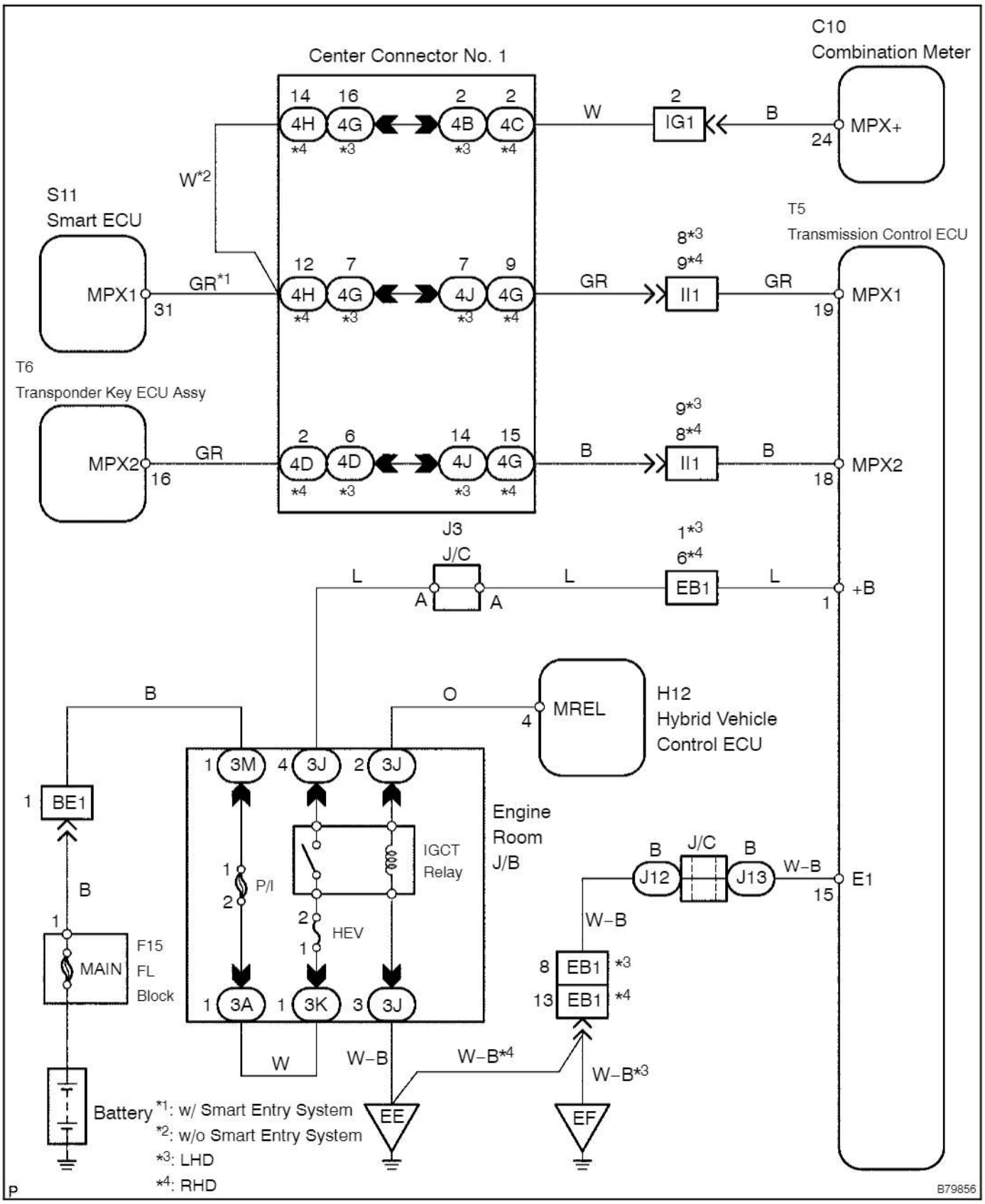
CIRCUIT DESCRIPTION

This DTC is detected when communication between the transmission control ECU and gateway ECU stops for more than10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1260	Transmission control ECU communication stops	• Transmission control ECU • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

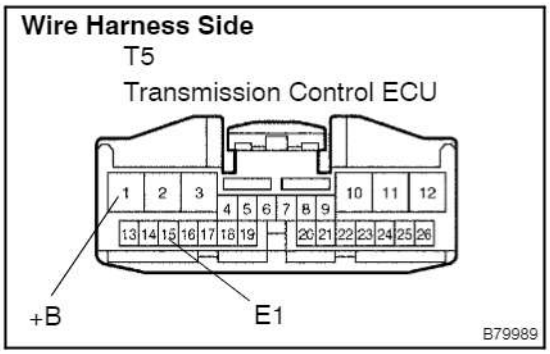
1	INSPECT FUSE (HEV)

(a) Remove the HEV fuse from the engine room J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (TRANSMISSION CONTROL ECU – BODY GROUND)



(a) Disconnect the T5 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.
Standard:

Tester Connection	Condition	Specified Condition
T5–1 (+B) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14V
T5–15 (E1) – Bodyground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

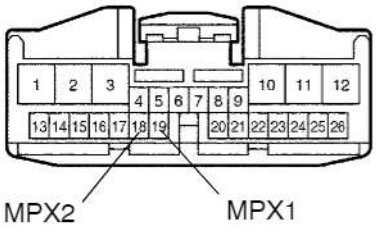
OK

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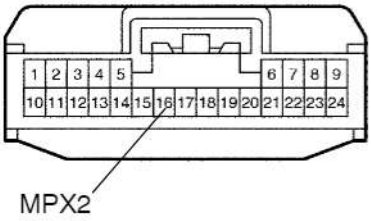
3 CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side

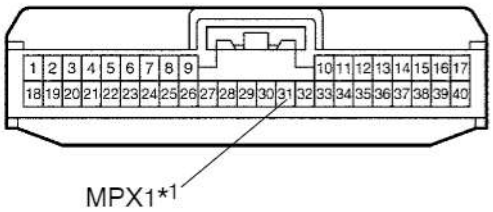
T5
Transmission Control ECU



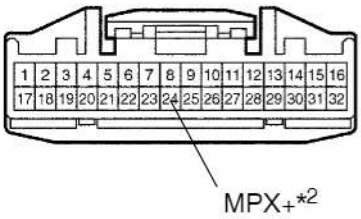
T6
Transponder Key ECU Assy



S11
Smart Key ECU



C10
Combination Meter



B79994

(a) Disconnect the T5 and T6 ECU connectors.
(b) Disconnect the S11 ECU connector or C10 combination meter assy connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5–19 (MPX1) – S11–31 (MPX1)*1	Below 1 Ω
T5–19 (MPX1) – C10–24 (MPX+)*2	Below 1 Ω
T5–18 (MPX2) – T6–16 (MPX2)	Below 1 Ω

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

*1: w/ smart entry system
*2: w/o smart entry system

B → **REPLACE TRANSMISSION CONTROL ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE TRANSMISSION CONTROL ECU

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DTC	B1262	A/C ECU COMMUNICATION STOP

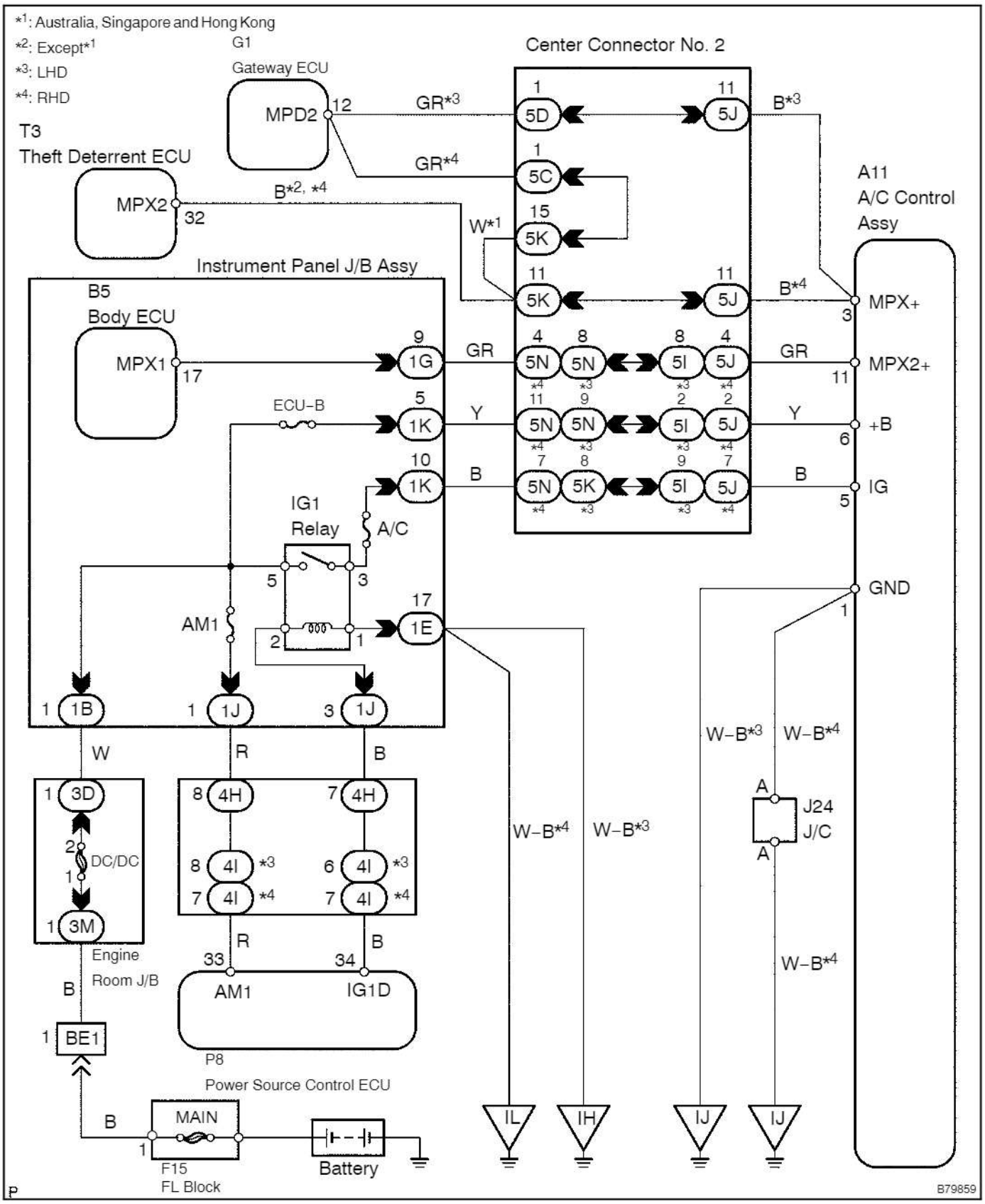
CIRCUIT DESCRIPTION

This DTC is detected when communication between the A/C control assy (A/C ECU) and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1262	A/C ECU communication stops	• A/C control assy • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OPERATION

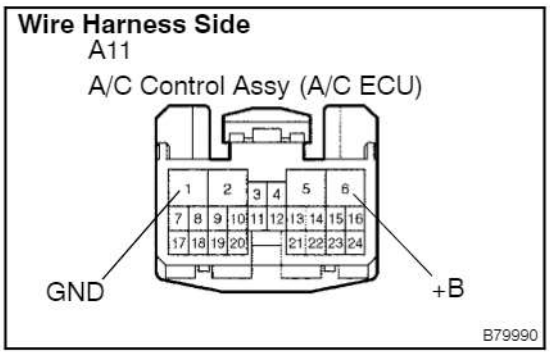
(a) Check that the A/C switch can operate the air conditioner normally.
OK: A/C switch can operate the air conditioner normally.

NG → **Go to step 2**

OK

REPLACE A/C CONTROL ASSY

2	CHECK WIRE HARNESS (A/C CONTROL ASSY – BODY GROUND)



(a) Disconnect the A11 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connector.
Standard:

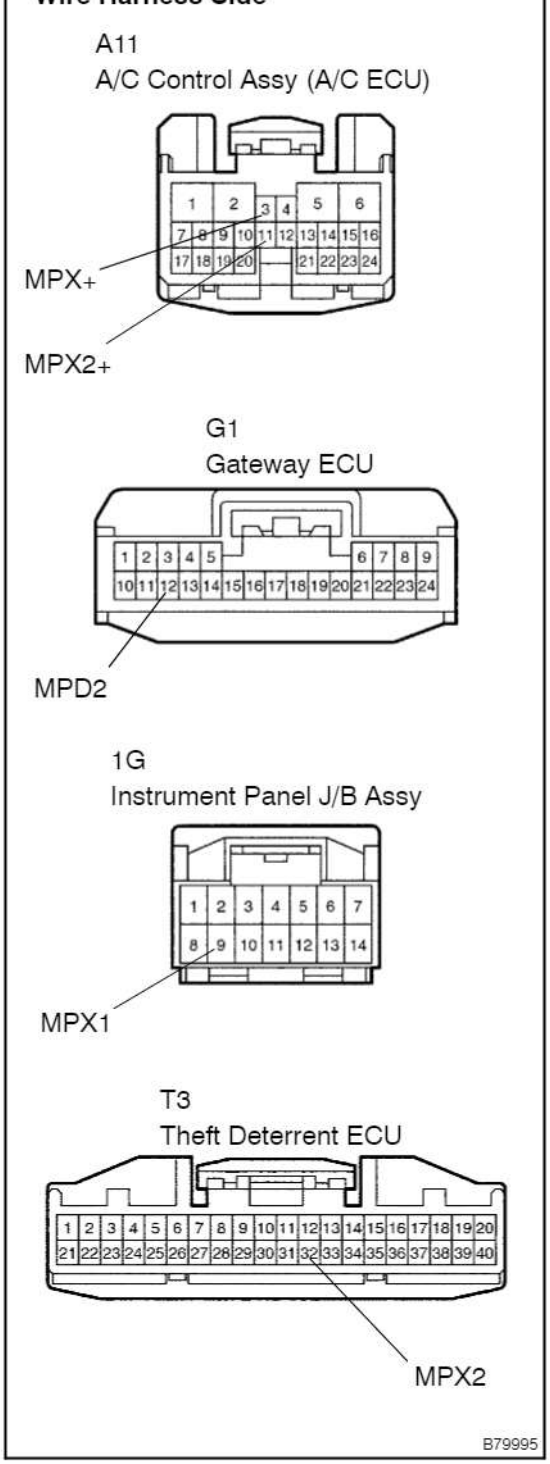
Tester Connection	Condition	Specified Condition
A11–6 (+B) – Body ground	Constant	10 to 14 V
A11–1 (GND) – Body ground	Constant	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the A11 ECU connectors.
(b) Disconnect the 1G J/B connector.
(c) Disconnect the G1 or T3 ECU connector.
(d) Measure the resistance of the wire harness side connectors.

Standard:

RHD*1 and LHD

Tester Connection	Specified Condition
A11–3 (MPX+) – G1–12 (MPD2)	Below 1 Ω
A11–11 (MPX2+) – 1G–9 (MPX1)	Below 1 Ω

RHD*2

Tester Connection	Specified Condition
A11–3 (MPX+) – T3–32 (MPX2)	Below 1 Ω
A11–11 (MPX2+) – 1G–9 (MPX1)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

*1: Australia, Singapore, Hong Kong
*2: Except *1

B → **REPLACE A/C CONTROL ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE A/C CONTROL ASSY

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DTC	B1269	THEFT DETERRENT ECU COMMUNICATION STOP

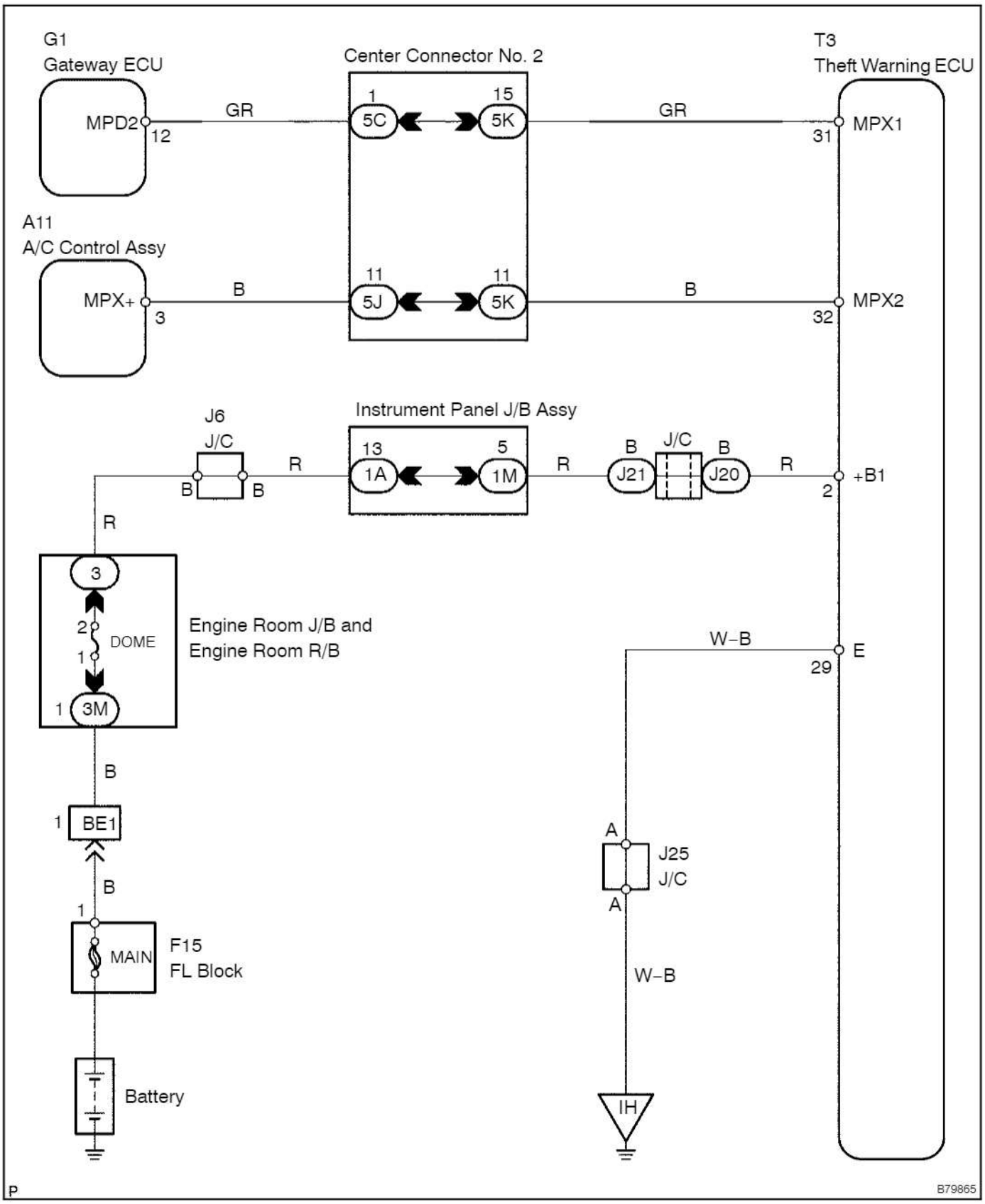
CIRCUIT DESCRIPTION

This DTC is detected when communication between the theft warning ECU (theft deterrent ECU) and gateway ECU stops for more 10 seconds. This DTC is available only for RHD vehicles.

DTC No.	DTC Detection Condition	Trouble Area
B1269	Theft warning ECU communication stops	• Theft warning ECU • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

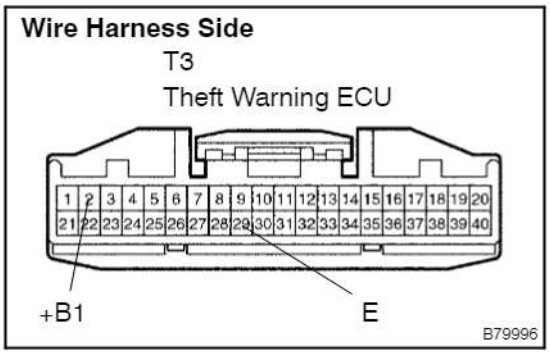
1	INSPECT FUSE (DOME)

(a) Remove the DOME fuse from the engine room J/B and engine room R/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (THEFT WARNING ECU –BODY GROUND)



(a) Disconnect the T3 connector.
(b) Measure the voltage and resistance of the wire harness side connectors.
Standard:

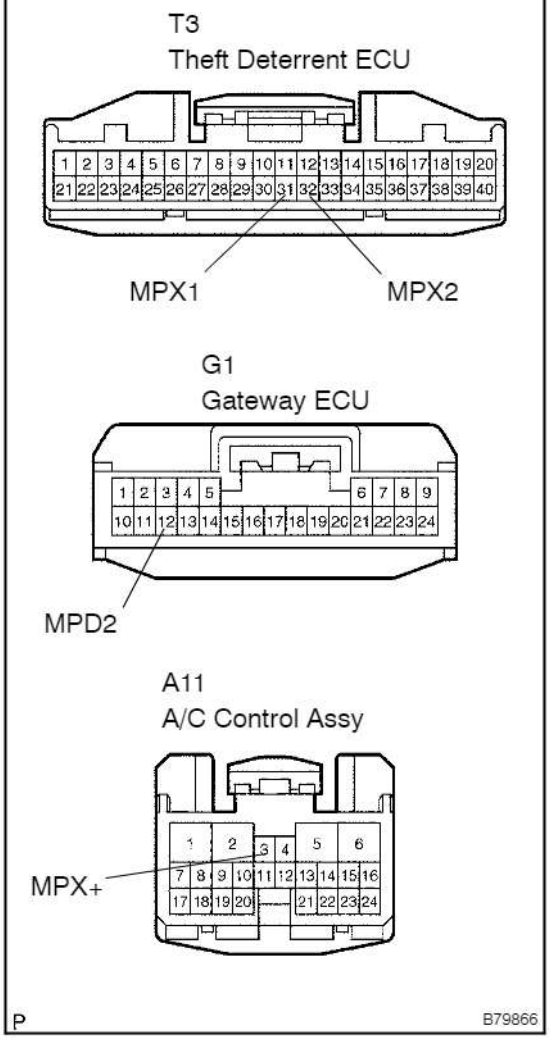
Tester Connection	Specified Condition
T3–2 (+B1) – Body ground	10 to 14 V
T3–29 (GND) – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the T3, G1 and A11 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T3–31 (MPX1) – G1–12 (MPD2)	Below 1 Ω
T3–32 (MPX2) – A11–3 (MPX+)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

A

REPLACE THEFT WARNING ECU ASSY

B

REPLACE POWER TILT AND POWER TELESCOPIC ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

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DTC	B1271	COMBINATION METER ECU COMMUNICATION STOP

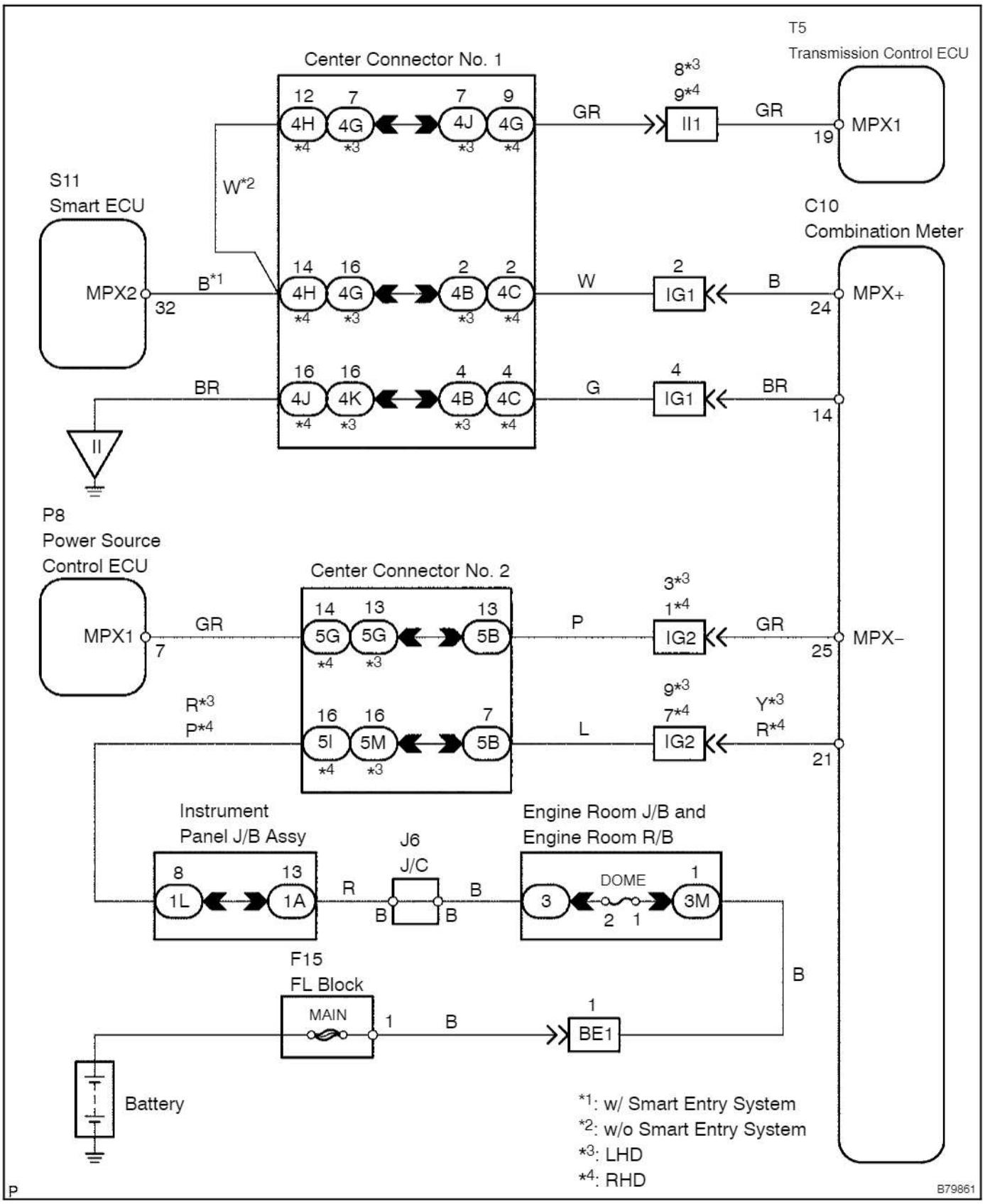
CIRCUIT DESCRIPTION

This DTC is detected when communication between the combination meter assy (meter ECU) and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1271	Combination meter ECU communication stops	• Combination meter assy • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OPERATION

(a) Check that the indicator (READY) on the combination meter illuminates when the hybrid vehicle control system is operating (power switch ON (READY)).
OK: Indicator can operate properly.

NG → **Go to step 2**

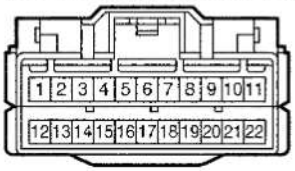
OK

REPLACE COMBINATION METER ASSY

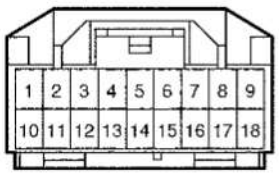
2	CHECK WIRE HARNESS (COMBINATION METER ASSY – BODY GROUND)

Wire Harness Side

IG1
(C10 Combination Meter)



IG2
(C10 Combination Meter)



B80254 B80259

(a) Disconnect the IG1 and IG2 meter connectors.
(b) Measure the resistance and voltage of the wire harness side connectors.
Standard:
LHD models

Tester Connection	Specified Condition
IG2–9 – Body ground	10 to 14 V
IG1–4 – Body ground	Below 1 Ω

RHD models

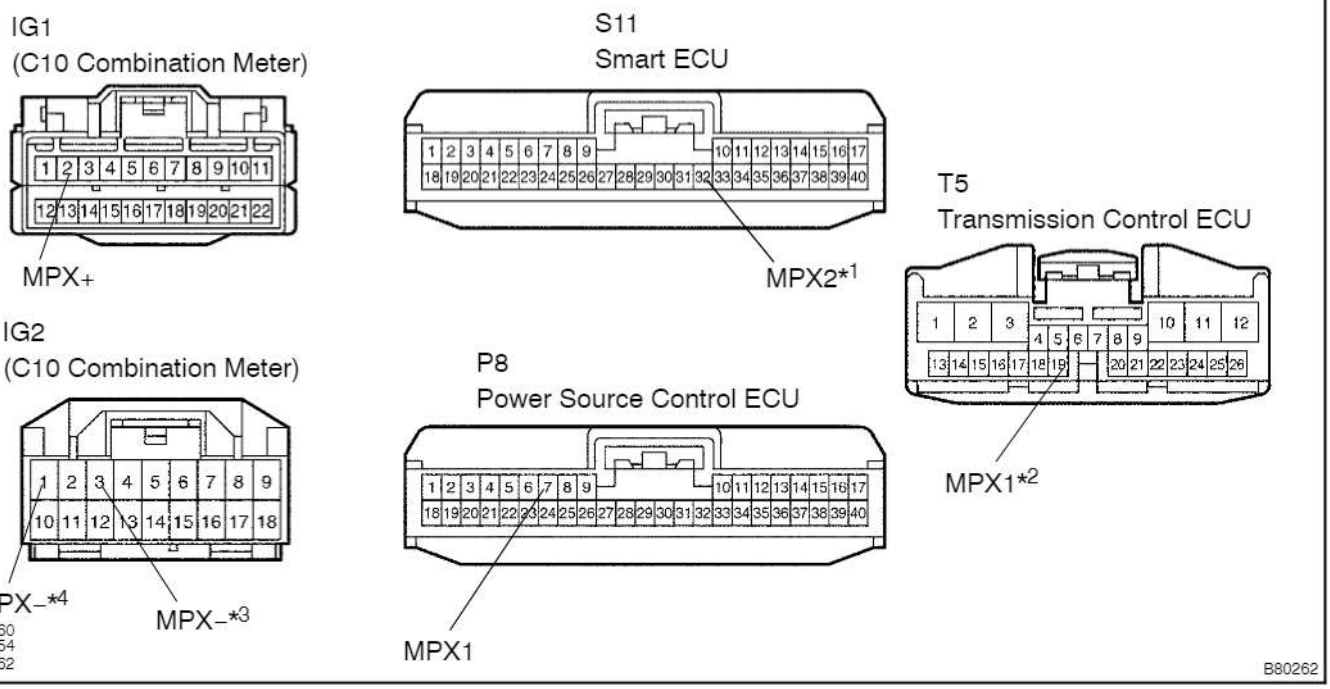
Tester Connection	Specified Condition
IG2–7 – Body ground	10 to 14 V
IG1–4 – Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE



(a) Disconnect the IG1 and IG2 meter connectors.
(b) Disconnect the P8, S11 and T5 ECU connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
IG1–2 (MPX+) – S11–32 (MPX2)*1	Below 1 Ω
IG1–2 (MPX+) – T5–19 (MPX1)*2	Below 1 Ω
IG2–3 (MPX–)*3 – P8–7 (MPX1)	Below 1 Ω
IG2–1 (MPX–)*4 – P8–7 (MPX1)	Below 1 Ω

*1: w/ Smart entry system
*2: w/o Smart entry system
*3: LHD
*4: RHD

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

B → **REPLACE COMBINATION METER ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE COMBINATION METER ASSY

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DTC	B1294	STEERING LOCK ECU/IMMOBILISER ECU COMMUNICATION STOP

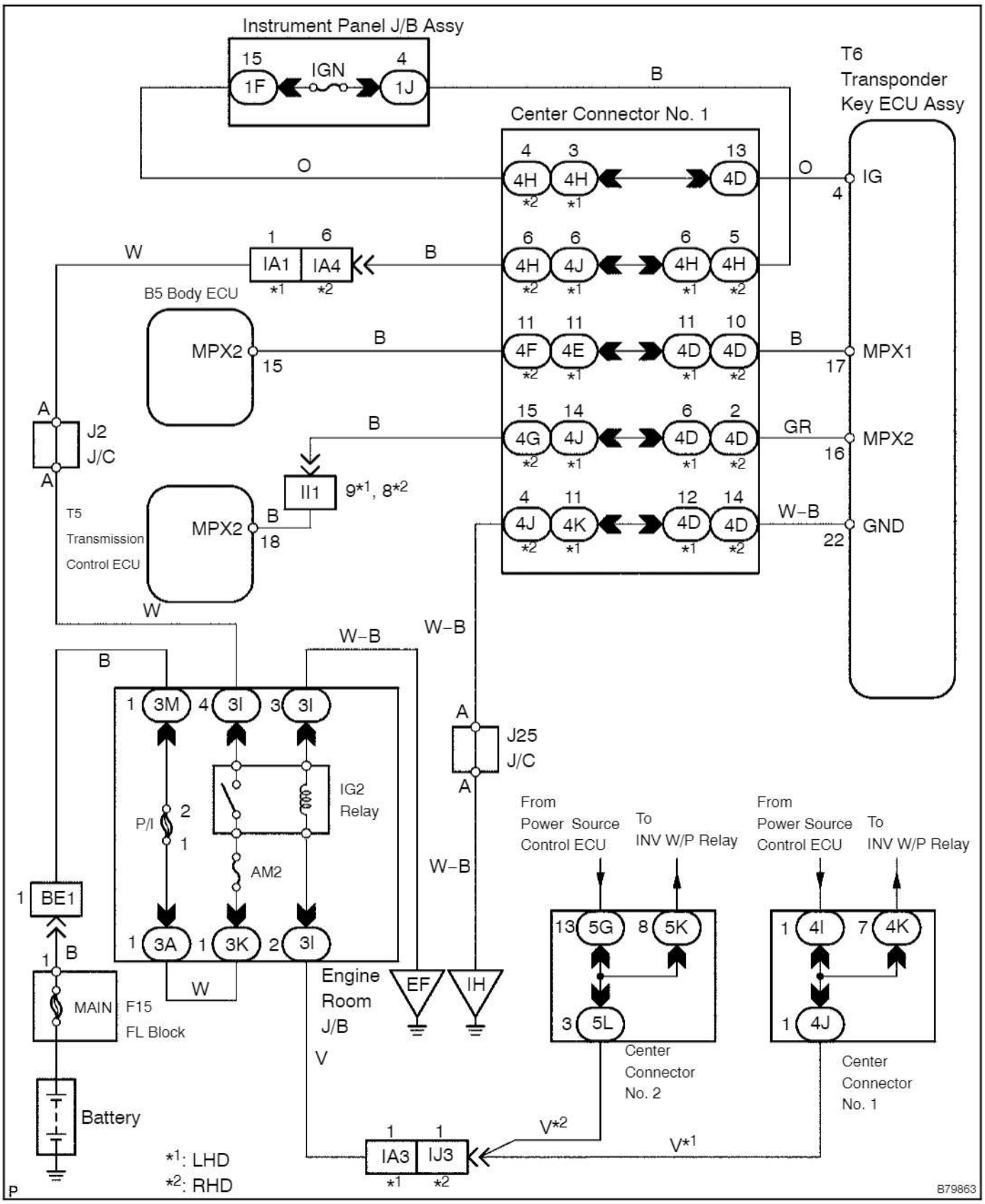
CIRCUIT DESCRIPTION

This DTC is detected when communication between the transponder key ECU (immobilizer ECU) and gateway ECU stops more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1294	Transponder key ECU communication stops	• Transponder key ECU • Wire harness

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WIRING DIAGRAM



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INSPECTION PROCEDURE

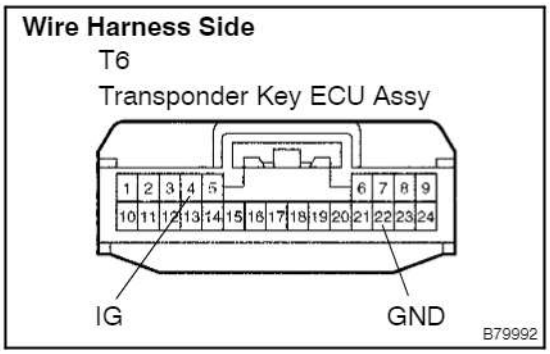
1	INSPECT FUSE (IGN)

(a) Remove the IGN fuse from the instrument panel J/B
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – BODY GROUND)



(a) Disconnect the T6 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connectors.
Standard:

Tester Connection	Condition	Specified Condition
T6–4 (IG) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14V
T6–22 (GND) – Body ground	Constant	Below 1 Ω

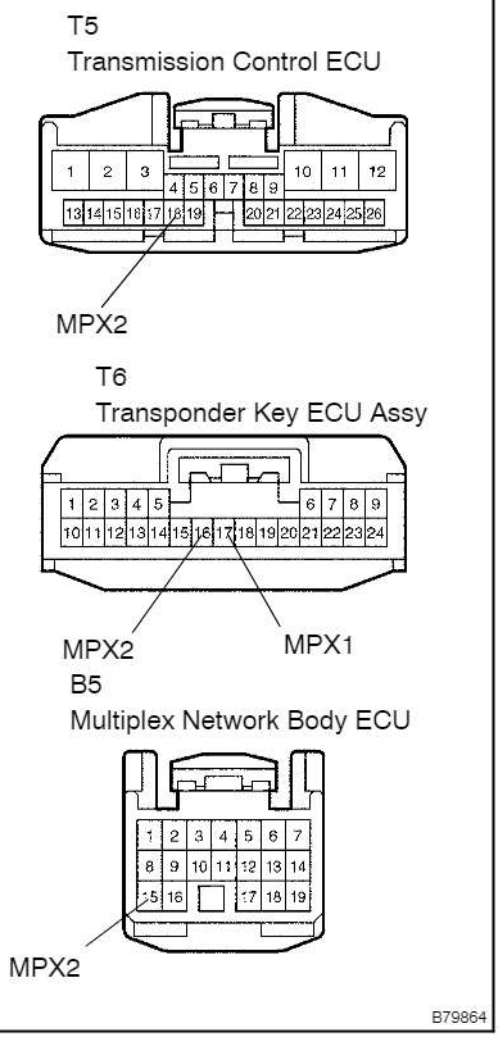
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

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3 CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side



(a) Disconnect the T5, T6 and B5 ECU connectors.

(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T6–17 (MPX1) – B5–15 (MPX2)	Below 1 Ω
T6–16 (MPX2) – T5–18 (MPX2)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B → **REPLACE TRANSPONDER KEY ECU ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

REPLACE TRANSPONDER KEY ECU ASSY

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CAN COMMUNICATION SYSTEM

PRECAUTION

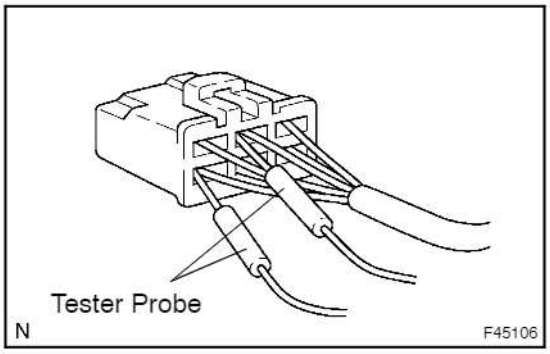
05I6J–01

1. STEERING SYSTEM HANDLING PRECAUTIONS

(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazardous driving.

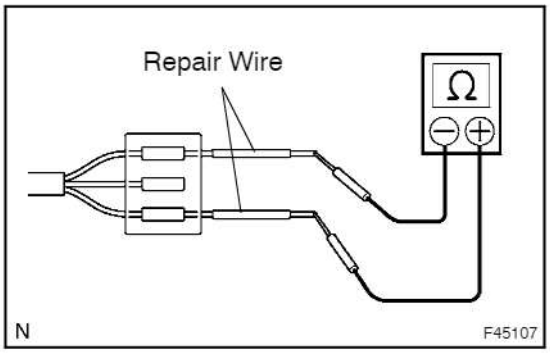
2. SRS AIRBAG SYSTEM HANDLING PRECAUTIONS

(a) The PRIUS is equipped with an SRS (Supplemental Restraint System) such as the driver's airbag and front passenger airbag. Failure to carry out service operations in correct sequence could cause unexpected SRS deployment during servicing and may lead to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notice for the supplemental restraint system (see page 60–1).



3. CONNECTOR HANDLING

(a) When inserting tester probes into a connector, insert them from the rear of the connector.



(b) Use a repair wire to check the connector if it is impossible to check continuity from the rear of the connector.

4. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the negative (–) battery terminal, initialize the following system after the terminal is reconnected.

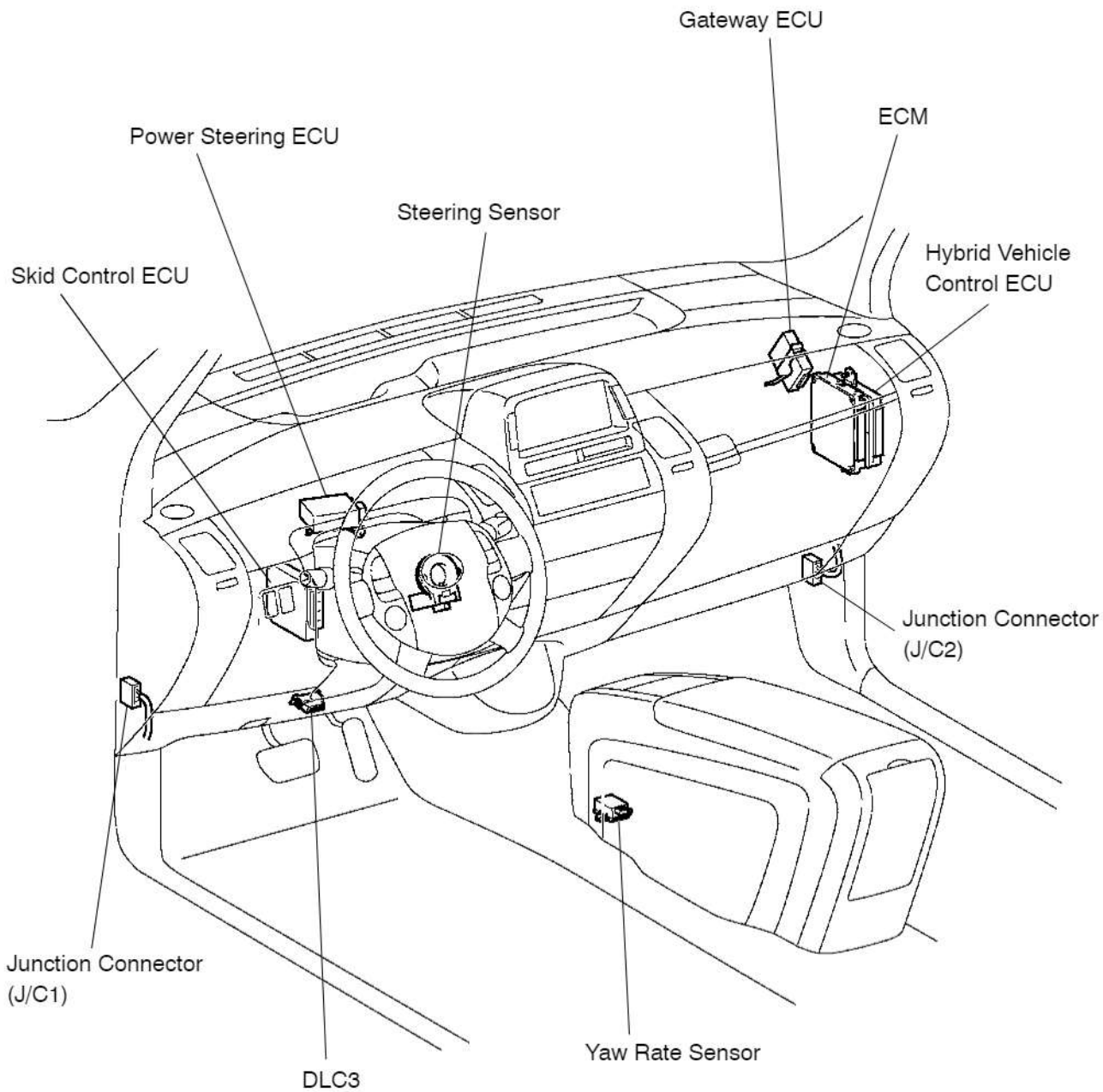
System Name	See page
Power Window Control System	01–29

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05I8K–01

LOCATION

LHD:

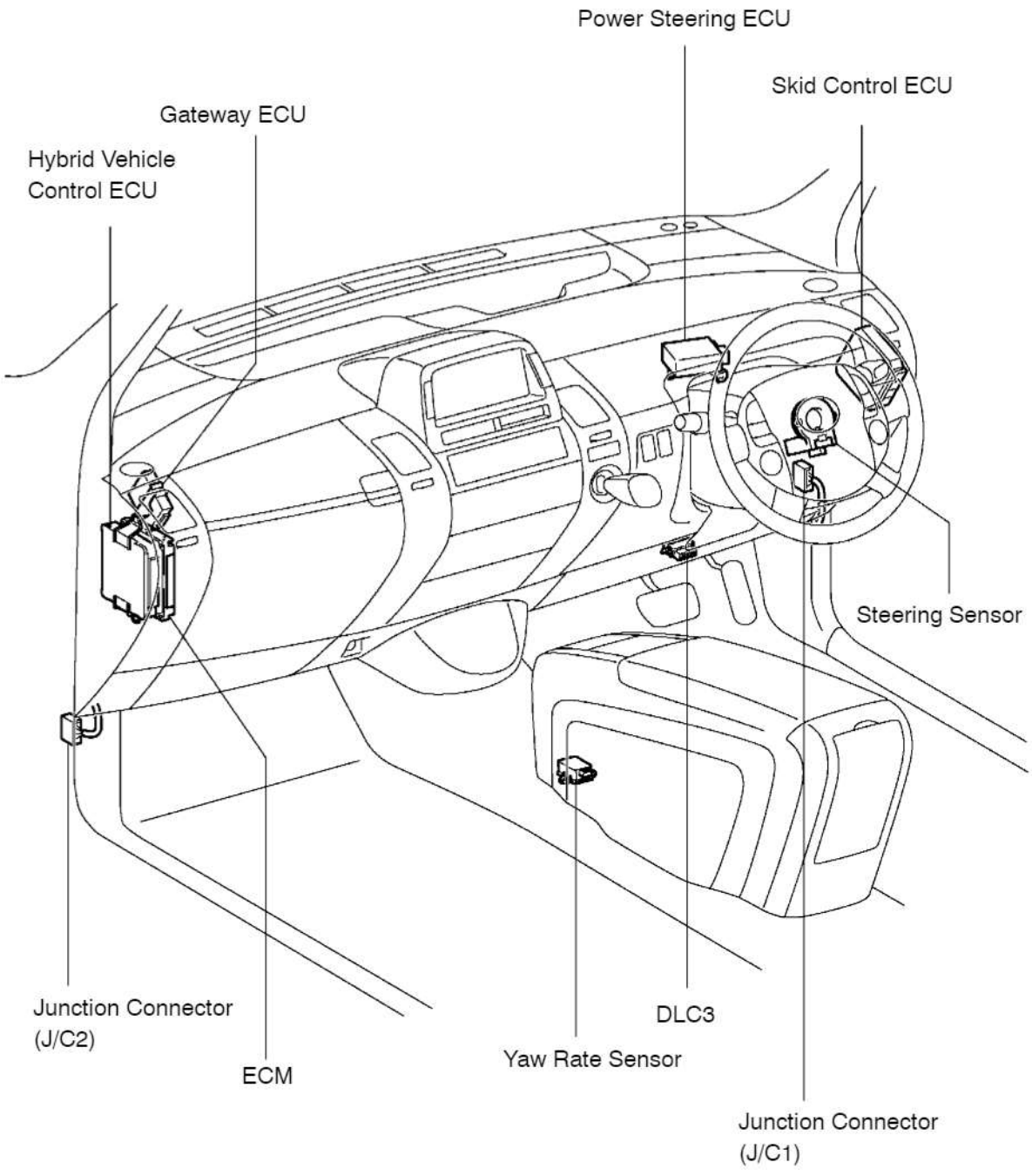


H

G30244

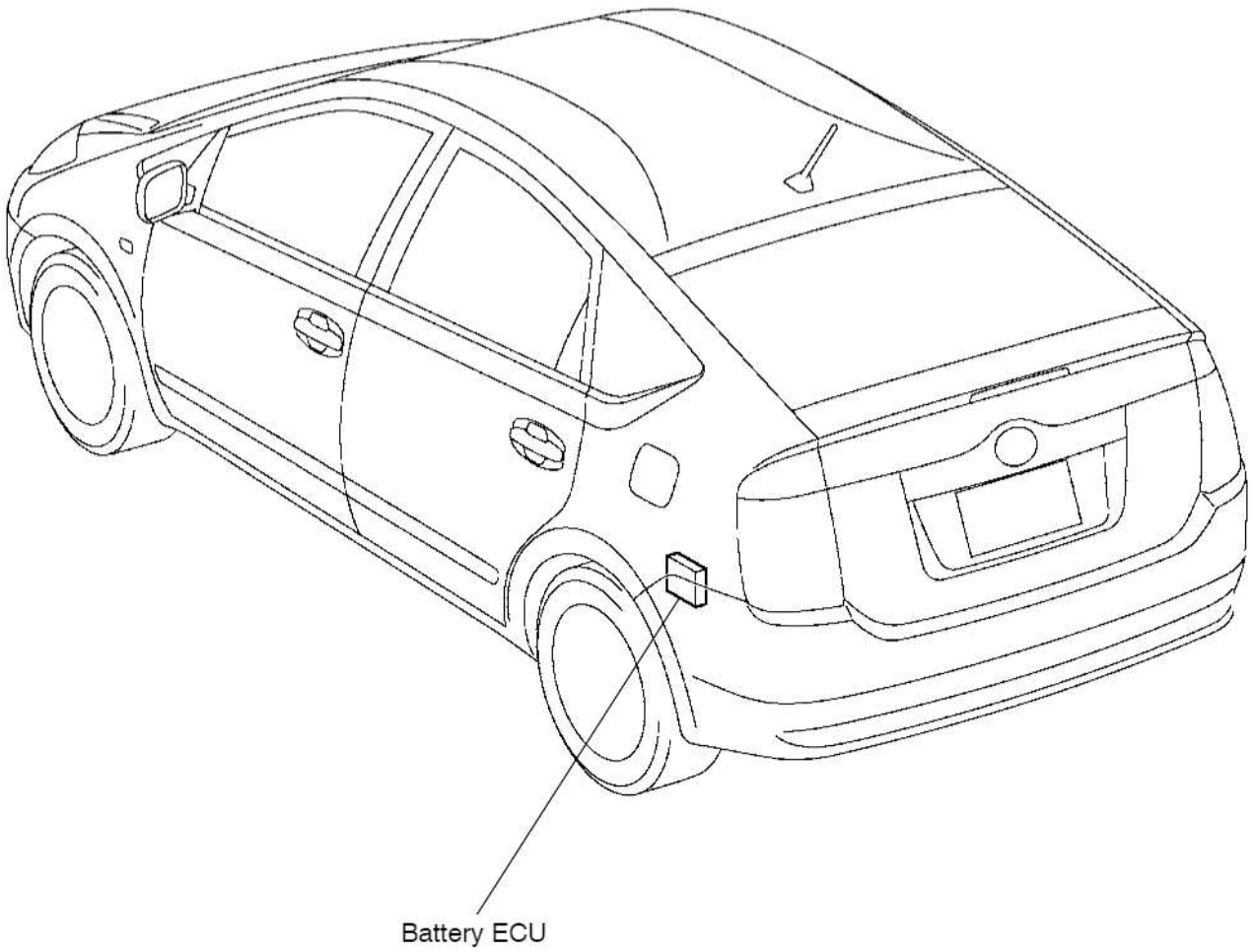
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RHD:



H G28997 G31472

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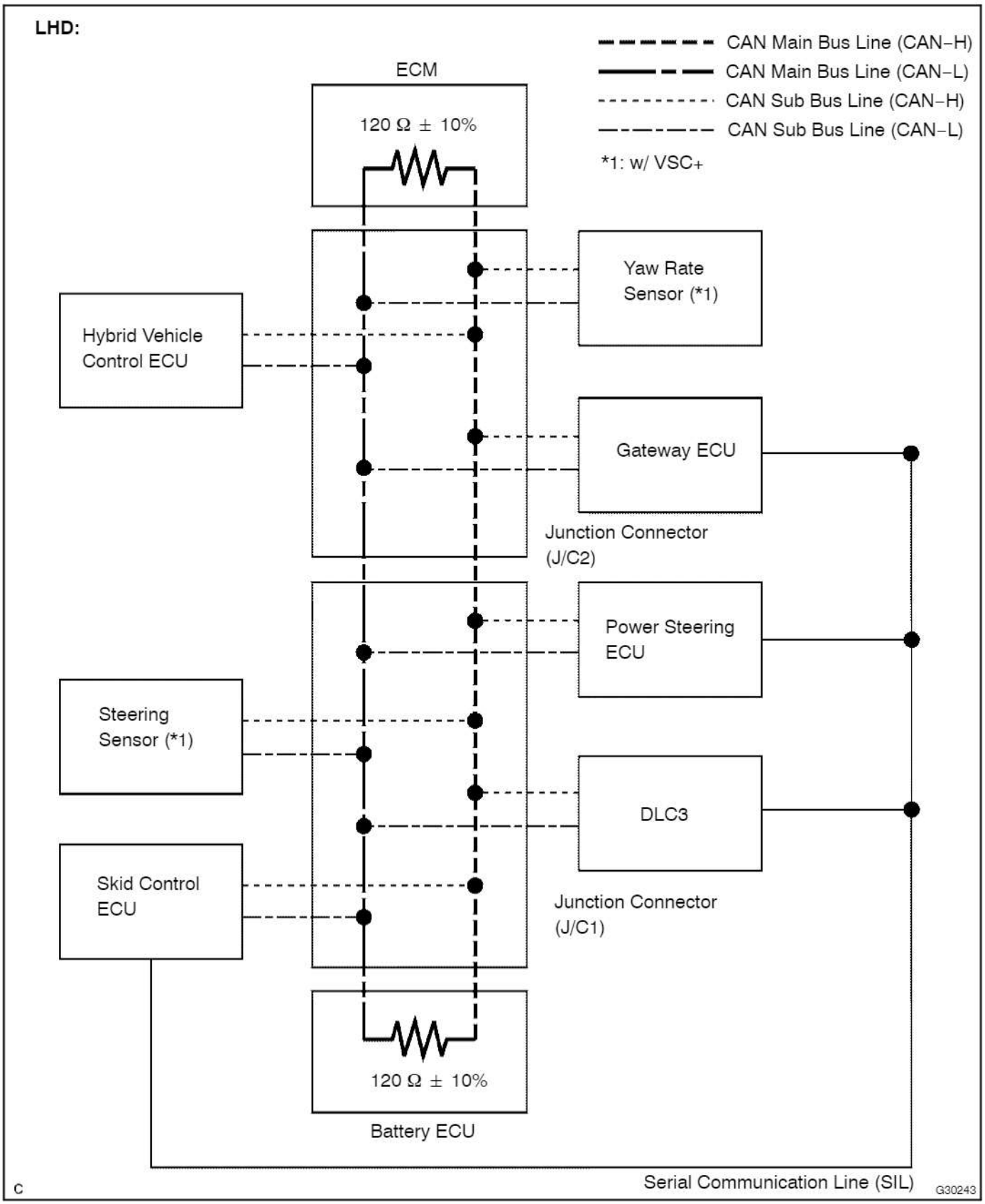
H

G30140

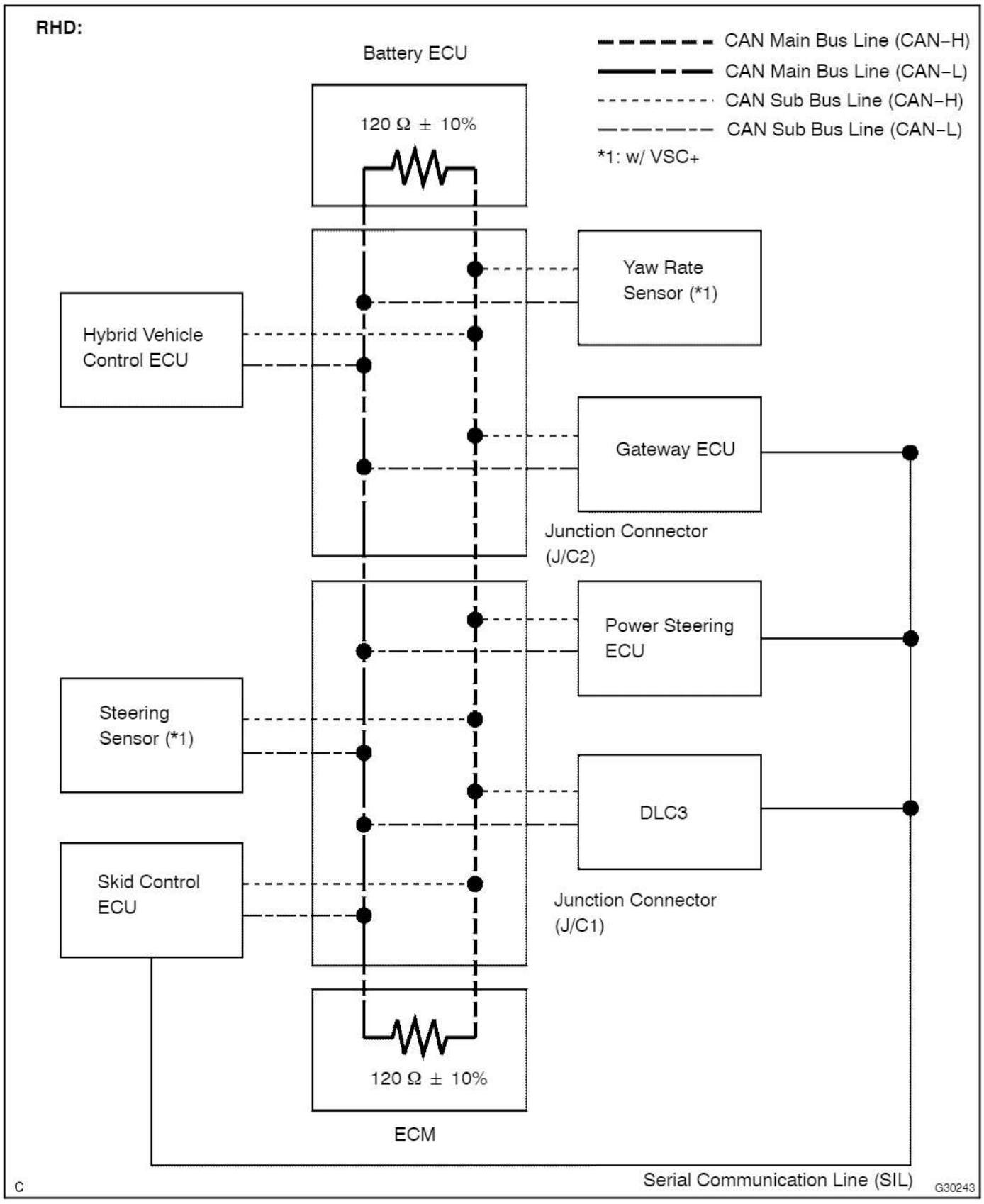
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05I6L–01

SYSTEM DIAGRAM



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HINT:

- The skid control ECU detects and stores steering sensor and yaw rate sensor DTCs and performs DTC communication by receiving information from the steering sensor and yaw rate sensor.
- The ECM, hybrid vehicle control ECU, and battery ECU use the CAN communication system to perform DTC communication instead of the conventional communication line (SIL).

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05I6M–01

SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) The CAN (Controller Area Network) is a serial data communication system for real time application. It is a multiplex communication system equipped for a vehicle and has a high communication speed (500 kbps) and the function to detect malfunctions.

(b) By pairing the CANH and CANL bus lines, the CAN performs communication based on differential voltage.

(c) The many ECUs (sensors) installed on the vehicle operate by sharing information and communicating with each other.

(d) The CAN has two resistors of 120 Ω which are necessary to communicate with the main bus line.

2. DEFINITION OF TERMS

(a) Main bus line

(1) The main bus line is the wire harness between the two terminus circuits on the bus (communication line). This is the main bus in the CAN communication system.

(b) Sub bus line

(1) The sub bus line is the wire harness which diverges from the main bus line to the ECU or sensor.

(c) Terminus circuit

(1) The terminus circuit is a circuit which is placed to convert communication current of the CAN communication into bus voltage. It consists of a resistor and condenser. Two terminus circuits are necessary on a bus.

3. ECUs OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) Hybrid Vehicle Control ECU

(b) Battery ECU

(c) ECM

(d) Skid Control ECU

(e) Steering Sensor

(f) Yaw Rate Sensor

(g) Power Steering ECU

(h) Gateway ECU

4. DIAGNOSTIC CODE FOR CAN COMMUNICATION SYSTEM

(a) DTCs for the CAN communication system are as follows:
U0123, U0124, U0126, U0293, U0100, U0073, U0111, U0129, U0131, U0146, P3108–594

NOTICE:

- **P3108–594, output by the hibrid vehicle control ECU, is a DTC in the CAN communication system. However, it is not displayed on the intelligent tester II "Communication Mulfunction DTC" screen (see page 05–2328).**
- **If U0146 or P3108–594 is output, the multiplex communication system may be malfunctioning.**

5. REMARK FOR TROUBLESHOOTING

(a) Trouble in the CAN bus (communication line) can be checked from the DLC3 (except when there is a wire break other than in the sub bus line of the DLC3).

NOTICE:

Do not insert the tester directly into the DLC3 connector. Be sure to use a service wire.

(b) DTCs regarding the CAN communication system can be checked using the intelligent tester II.

(c) The CAN communication system cannot detect trouble on the sub bus line of the DLC3 even though the DLC3 is also connected to the CAN communication system.

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05I8N–01

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

- **Refer to troubleshooting of each system if DTCs regarding the CAN communication system are not output.**
- **If U0100–211 or U0111–208 is output separately by the hybrid vehicle control ECU, refer to "HYBRID CONTROL SYSTEM" (see page 05–634).**

1	CHECK AND CLEAR DTCs

HINT:

- See page 05–2328 for checking DTCs regarding the CAN communication system.
- See page 05–246 for DTCs regarding the hybrid control system.

2	CHECK FOR INSTALLED SYSTEMS (ECUS & SENSORS) THAT ADOPT CAN COMMUNICATION)

(a) Check if VSC+ is installed (see page 05–2328).

3	CHECK CAN BUS LINE (SEE PAGE 05–2333)

4	CHECK INTELLIGENT TESTER II

(a) Select "Communication Bus Check" (see page 05–2328).

Standard: All ECUs and sensors connected to the CAN communication system are displayed.

NOTICE:

- **See "MULTIPLEX COMMUNICATION SYSTEM" (page 05–2250) if U0146 (Lost Communication with Gateway "A") and P3108–594 (Lost Communication with A/C System Control Module) are output and "Body/Gateway" appears on the "Communication Bus Check" screen of the intelligent tester II.**
- **The systems (ECUs, sensors) that adopt CAN communication vary depending on the vehicle and option settings. Check which systems (ECUs, sensors) are installed on the vehicle (see page 05–2328).**
- **Non–installed ECUs or sensors are not displayed. Do not mistake them for being in the communication stop mode.**

NO → **COMMUNICATION STOP MODE TABLE (SEE PAGE 05–2315)**

YES

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5	**DTC COMBINATION TABLE (SEE PAGE 05–2315)**

(a) Confirm trouble according to the combination of output DTCs regarding the CAN communication system.

HINT:

Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs and sensors connected to the CAN communication system are displayed on the intelligent tester II's "Communication Bus Check" screen.

6	**CIRCUIT INSPECTION**

7	**IDENTIFICATION OF PROBLEM**

8	**REPAIR OR REPLACE**

9	**CONFIRMATION TEST**

END

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05I8O–01

CUSTOMER PROBLEM ANALYSIS CHECK

CAN Communication System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

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

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

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05I8P-01

PROBLEM SYMPTOMS TABLE

1. COMMUNICATION STOP MODE TABLE

(a) Check that there is no open circuit in the CAN main bus line, short between the lines, or short to +B in the "CHECK CAN BUS LINE" (see page 05–2333). Select "Communication Bus Check" on the intelligent tester II (see page 05–2328).

(b) Check the communication stop mode of the ECUs or sensors not displayed among the following: "Engine", "ABS/VSC/TRC", "Steering Angle Sensor", "Yaw Rate/Deceleration Sensor", "EPS", "Body/Gateway", "Hybrid Control" or "HV Battery".

NOTICE:

- **Systems using the CAN communication system differ according to optional settings. Check which ECUs or sensors are installed on the vehicle.**
- **Non–installed ECUs or sensors are not displayed. Be careful not to consider that they are in communication stop mode.**
- **If 2 or more ECUs or sensors are not displayed on the intelligent tester II, perform troubleshooting for communication stop mode for each undisplayed ECU or sensor. (Either side of the CAN bus lines may be open.)**

Symptom	Inspection Item	Customization	See Page
"Hybrid Control" is not displayed on the intelligent tester II.	HYBRID VEHICLE CONTROL ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2338
"ABS/VSC/TRC" is not displayed on the intelligent tester II.	SKID CONTROL ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2341
"Steering Angle Sensor" is not displayed on the intelligent tester II.	STEERING SENSOR COMMUNICATION STOP MODE	Vehicle with VSC+ (VSC warning lamp is installed in the combination meter)	05–2350
"Yaw rate/Deceleration Sensor" is not displayed on the intelligent tester II.	YAW RATE SENSOR COMMUNICATION STOP MODE	Vehicle with VSC+ (VSC warning lamp is installed in the combination meter)	05–2353
"EPS" is not displayed on the intelligent tester II.	POWER STEERING ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2344
"Body/Gateway" is not displayed on the intelligent tester II.	GATEWAY ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2347
"Engine" is not displayed on the intelligent tester II.	ECM ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2356
"HV Battery" is not displayed on the intelligent tester II.	BATTERY ECU COMMUNICATION STOP MODE	Applicable to all vehicles	05–2359

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2. DTC COMBINATION TABLE

(a) Perform troubleshooting according to the combination of DTCs output.

DTC		Trouble Mode							
Output from	Output DTC	HYBRID VIHICLE CONTROL ECU COMMUNICATION STOP MODE	ECM COMMUNICATION STOP MODE	BATTERY ECU COMMUNICATION STOP MODE	SKID CONTROL ECU COMMUNICAT ON STOP MODE	STEERING SENSOR COMMUN CATION STOP MODE	YAW RATE SENSOR COMMUNICATION STOP MODE	POWER STEERING ECU COMMUNICATION STOP MODE	GATEWAY ECU COMMUNICATION STOP MODE
Hybrid Control ECU	U0100	–	○	×	×	×	×	×	×
	U0111	–	×	○	×	×	×	×	×
	U0129	–	×	×	○	×	×	×	×
	U0146	–	×	×	×	×	×	×	○
	P3108 -594	–	×	×	×	×	×	×	○
ECM	U0293	○	–	×	×	×	×	×	×
Battery ECU	U0100	×	○	–	×	×	×	×	×
	U0293	○	×	–	×	×	×	×	×
Skid Control ECU	U0123	×	×	×	–	×	○	×	×
	U0124	×	×	×	–	×	○	×	×
	U0126	×	×	×	–	○	×	×	×
	U0293	○	×	×	–	×	×	×	×
Power Steering ECU	U0121	×	×	×	○	×	×	–	×

○ Outputs
× Not output
– Undetectable

H

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NOTICE:

- **If U0146 or P3108–594 is output, check the "MULTIPLEX COMMUNICATION SYSTEM" before proceeding to "GATEWAY ECU COMMUNICATION STOP MODE" (see page 05–2250).**
- **If U0100–211 or U0111–208 is output separately by the hybrid control ECU, refer to "HYBRID CONTROL SYSTEM" (see page 05–634).**

HINT:

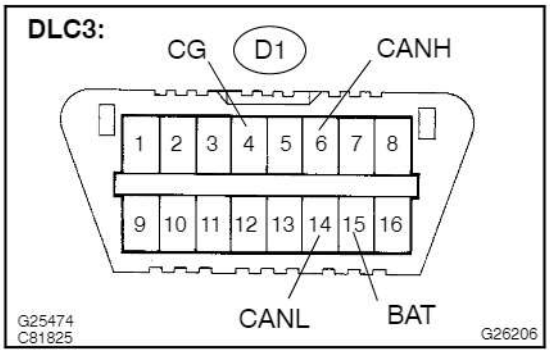
- HYBRID VEHICLE CONTROL ECU COMMUNICATION STOP MODE: see page 05–2338.
- ECM COMMUNICATION STOP MODE: see page 05–2356.
- BATTERY ECU COMMUNICATION STOP MODE: see page 05–2359.
- SKID CONTROL ECU COMMUNICATION STOP MODE: see page 05–2341.
- STEERING SENSOR COMMUNICATION STOP MODE: see page 05–2350.
- YAW RATE SENSOR COMMUNICATION STOP MODE: see page 05–2353.
- POWER STEERING ECU COMMUNICATION STOP MODE: see page 05–2344.
- GATEWAY ECU COMMUNICATION STOP MODE: see page 05–2347.

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05I8Q–01

TERMINALS OF ECU

HINT:
This section describes the standard CAN values for all CAN related components.

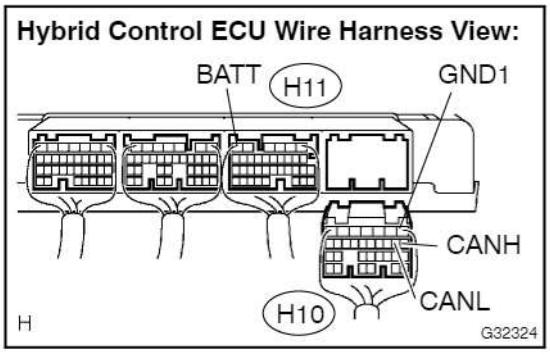


1. DLC3

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

Standard:

Terminals	Wiring Color	Condition	Specified Condition
D1–6 (CANH) – D1–14 (CANL)	B – W	Power Switch OFF	54 to 69 Ω
D1–6 (CANH) – D1–4 (CG)	B – W–B	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	W – W–B	Power Switch OFF	1 kΩ or more
D1–6 (CANH) – D1–16 (BAT)	B – G	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	W – G	Power Switch OFF	1 MΩ or more



2. HYBRID VEHICLE CONTROL ECU

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

Standard:

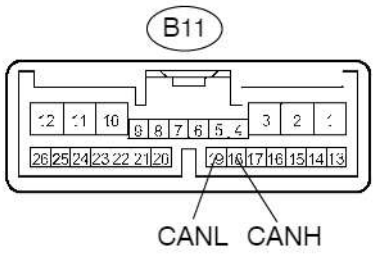
Terminals	Wiring Color	Condition	Specified Condition
H10–8 (CANH) – H10–9 (CANL)	B – W	Power Switch OFF	54 to 69 Ω
H10–8 (CANH) – H10–1 (GND1)	B – W–B	Power Switch OFF	1 kΩ or more
H10–9 (CANL) – H10–1 (GND1)	W – W–B	Power Switch OFF	1 kΩ or more
H10–8 (CANH) – H11–6 (BATT)	B – Y	Power Switch OFF	1 MΩ or more
H10–9 (CANL) – H11–6 (BATT)	W – Y	Power Switch OFF	1 MΩ or more

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3. BATTERY ECU

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

Battery ECU:

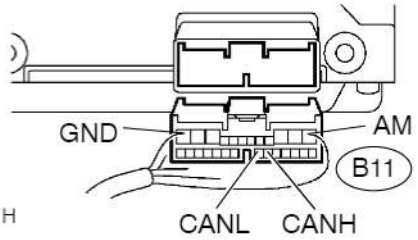


G29001 G32325

Standard:

Terminals	Condition	Specified Condition
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	108 to 132 Ω

Battery ECU Wire Harness View:



G32326

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

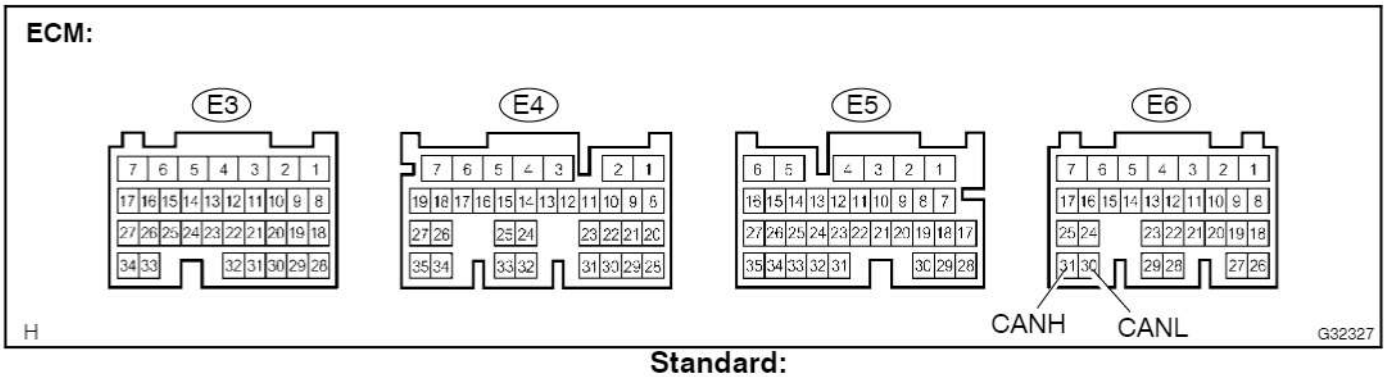
Standard:

Terminals	Wiring Color	Condition	Specified Condition
B11–18 (CANH) – B11–19 (CANL)	B – W	Power Switch OFF	108 to 132 Ω
B11–18 (CANH) – B11–12 (GND)	B – W–B	Power Switch OFF	1 kΩ or more
B11–19 (CANL) – B11–12 (GND)	W – W–B	Power Switch OFF	1 kΩ or more
B11–18 (CANH) – B11–1 (AM)	B – G	Power Switch OFF	1 MΩ or more
B11–19 (CANL) – B11–1 (AM)	W – G	Power Switch OFF	1 MΩ or more

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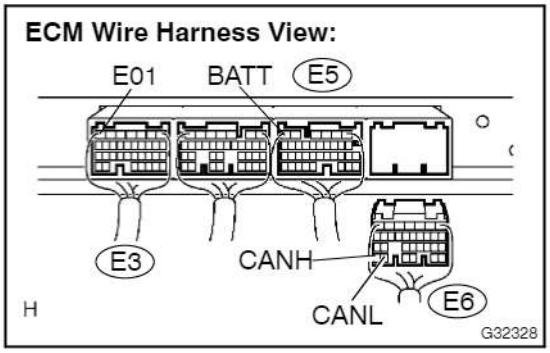
4. ECM

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



Standard:

Terminals	Condition	Specified Condition
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	108 to 132 Ω



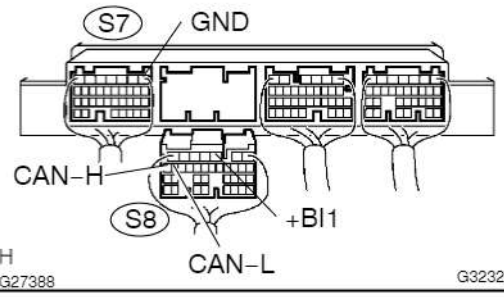
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Condition
E6–31 (CANH) – E6–30 (CANL)	B – W	Power Switch OFF	108 to 132 Ω
E6–31 (CANH) – E3–7 (E01)	B – BR	Power Switch OFF	1 kΩ or more
E6–30 (CANL) – E3–7 (E01)	W – BR	Power Switch OFF	1 kΩ or more
E6–31 (CANH) – E5–6 (BATT)	B – R	Power Switch OFF	1 MΩ or more
E6–30 (CANL) – E5–6 (BATT)	W – R	Power Switch OFF	1 MΩ or more

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Skid Control ECU Wire Harness View:



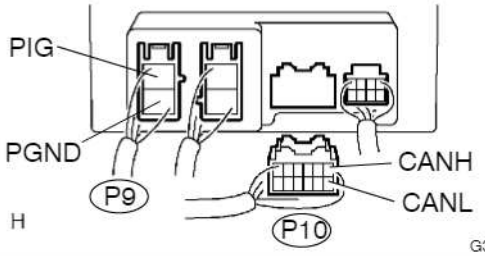
5. SKID CONTROL ECU

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

Standard:

Terminals	Wiring Color	Condition	Specified Condition
S8–19 (CAN–H) – S8–18 (CAN–L)	B – W	Power Switch OFF	54 to 69 Ω
S8–19 (CAN–H) – S7–1 (GND)	B – W (LHD) B – W–B (RHD)	Power Switch OFF	1 kΩ or more
S8–18 (CAN–L) – S7–1 (GND)	W – W (LHD) W – W–B (RHD)	Power Switch OFF	1 kΩ or more
S8–19 (CAN–H) – S8–3 (+BI1)	B – B	Power Switch OFF	1 MΩ or more
S8–18 (CAN–L) – S8–3 (+BI1)	W – B	Power Switch OFF	1 MΩ or more

Power Steering ECU Wire Harness View:



6. POWER STEERING ECU

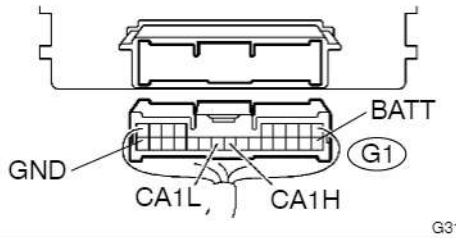
(a) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Condition
P10–1 (CANH) – P10–7 (CANL)	B – W	Power Switch OFF	54 to 69 Ω
P10–1 (CANH) – P9–2 (PGND)	B – W–B	Power Switch OFF	1 kΩ or more
P10–7 (CANL) – P9–2 (PGND)	W – W–B	Power Switch OFF	1 kΩ or more
P10–1 (CANH) – P9–1 (PIG)	B – W	Power Switch OFF	1 MΩ or more
P10–7 (CANL) – P9–1 (PIG)	W – W	Power Switch OFF	1 MΩ or more

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Gateway ECU Wire Harness View:



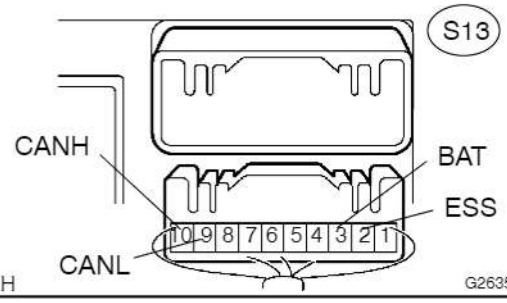
7. GATEWAY ECU

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

Standard:

Terminals	Wiring Color	Condition	Specified Condition
G1–17 (CA1H) – G1–18 (CA1L)	B – W	Power Switch OFF	54 to 69 Ω
G1–17 (CA1H) – G1–24 (GND)	B – W–B	Power Switch OFF	1 kΩ or more
G1–18 (CA1L) – G1–24 (GND)	W – W–B	Power Switch OFF	1 kΩ or more
G1–17 (CA1H) – G1–10 (BATT)	B – Y	Power Switch OFF	1 MΩ or more
G1–18 (CA1L) – G1–10 (BATT)	W – Y	Power Switch OFF	1 MΩ or more

Steering Sensor Wire Harness View:



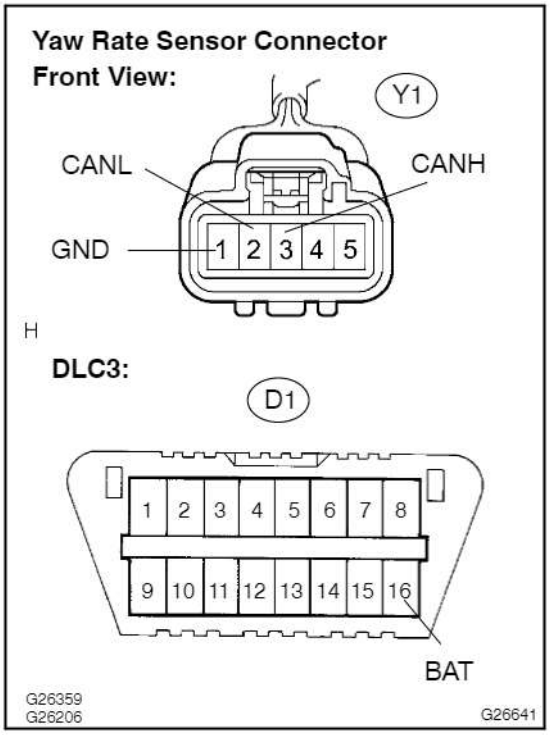
8. STEERING SENSOR

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

Standard:

Terminals	Wiring Color	Condition	Specified Condition
S13–10 (CANH) – S13–9 (CANL)	B – W	Power Switch OFF	54 to 69 Ω
S13–10 (CANH) – S13–2 (ESS)	B – W–B	Power Switch OFF	1 kΩ or more
S13–9 (CANL) – S13–2 (ESS)	W – W–B	Power Switch OFF	1 kΩ or more
S13–10 (CANH) – S13–3 (BAT)	B – R	Power Switch OFF	1 MΩ or more
S13–9 (CANL) – S13–3 (BAT)	W – R	Power Switch OFF	1 MΩ or more

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9. YAW RATE SENSOR

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

Standard:

Terminals	Wiring Color	Condition	Specified Condition
Y1–3 (CANH) – Y1–2 (CANL)	B – W	Power Switch OFF	54 to 69 Ω
Y1–3 (CANH) – Y1–1 (GND)	B – W–B	Power Switch OFF	1 kΩ or more
Y1–2 (CANL) – Y1–1 (GND)	W – W–B	Power Switch OFF	1 kΩ or more
Y1–3 (CANH) – D1–16 (BAT)	B – G	Power Switch OFF	1 MΩ or more
Y1–2 (CANL) – D1–16 (BAT)	W – G	Power Switch OFF	1 MΩ or more

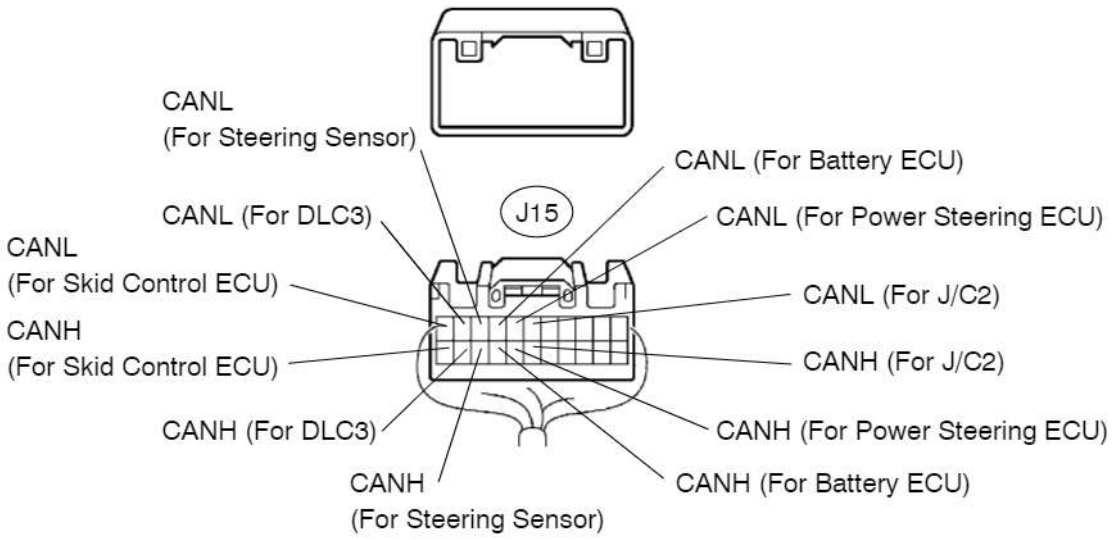
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10. JUNCTION CONNECTOR (J/C1)

(a) Terminal arrangement and connection (LHD)

Terminals	Connects to
J15–6 (CANL)	J/C2 (CANL)
J15–17 (CANH)	J/C2 (CANH)
J15–7 (CANL)	Power Steering ECU (CANL)
J15–18 (CANH)	Power Steering ECU (CANH)
J15–8 (CANL)	Battery ECU (CANL)
J15–19 (CANH)	Battery ECU (CANH)
J15–9 (CANL)	Steering Sensor (CANL)
J15–20 (CANH)	Steering Sensor (CANH)
J15–10 (CANL)	DLC3 (CANL)
J15–21 (CANH)	DLC3 (CANH)
J15–11 (CANL)	Skid Control ECU (CANL)
J15–22 (CANH)	Skid Control ECU (CANH)

Junction Connector (J/C1) Wire Harness View, LHD:

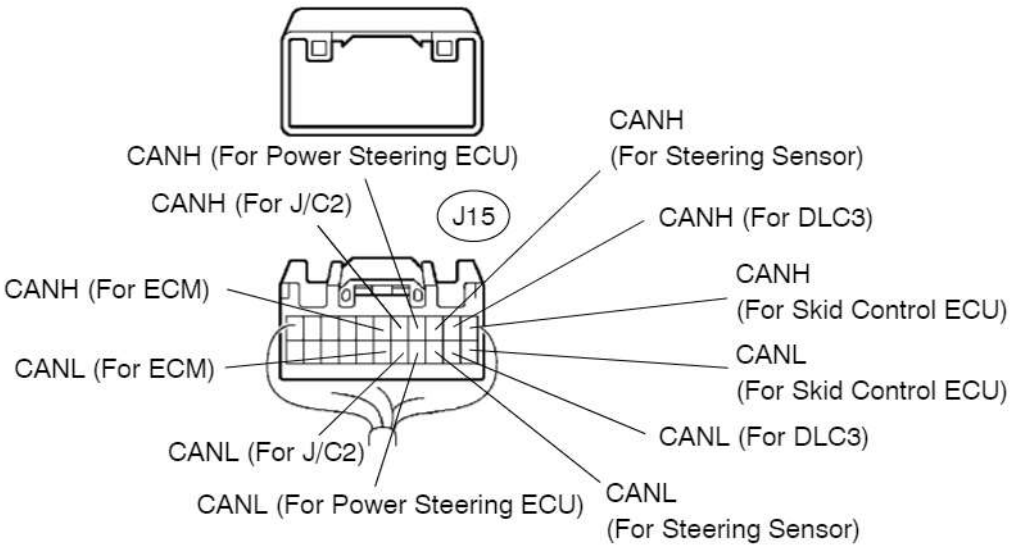


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(b) Terminal arrangement and connection (RHD)

Terminals	Connects to
J15–1 (CANH)	Skid Control ECU (CANH)
J15–12 (CANL)	Skid Control ECU (CANL)
J15–2 (CANH)	DLC3 (CANH)
J15–13 (CANL)	DLC3 (CANL)
J15–3 (CANH)	Steering Sensor (CANH)
J15–14 (CANL)	Steering Sensor (CANL)
J15–4 (CANH)	Power Steering ECU (CANH)
J15–15 (CANL)	Power Steering ECU (CANL)
J15–5 (CANH)	J/C2 (CANH)
J15–16 (CANL)	J/C2 (CANL)
J15–6 (CANH)	ECM (CANH)
J15–17 (CANL)	ECM (CANL)

Junction Connector (J/C1) Wire Harness View, RHD:



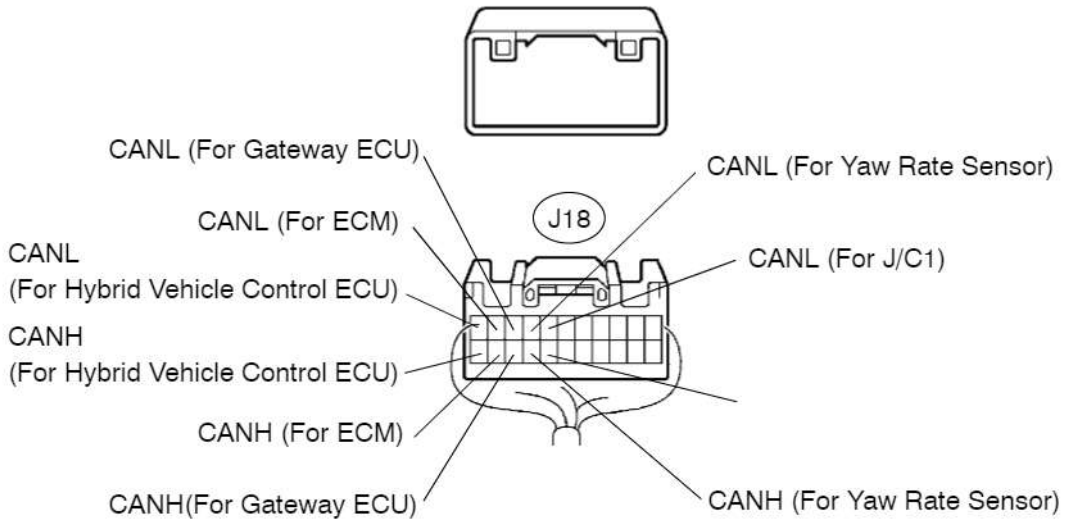
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11. JUNCTION CONNECTOR (J/C2)

(a) Terminal arrangement and connection (LHD)

Terminals	Connects to
J18–7 (CANL)	J/C1 (CANL)
J18–18 (CANH)	J/C1 (CANH)
J18–8 (CANL)	Yaw Rate Sensor (CANL)
J18–19 (CANH)	Yaw Rate Sensor (CANH)
J18–9 (CANL)	Gateway ECU (CANL)
J18–20 (CANH)	Gateway ECU (CANH)
J18–10 (CANL)	ECM (CANL)
J18–21 (CANH)	ECM (CANH)
J18–11 (CANL)	Hybrid Vehicle Control ECU (CANL)
J18–22 (CANH)	Hybrid Vehicle Control ECU (CANH)

Junction Connector (J/C2) Wire Harness View, LHD:

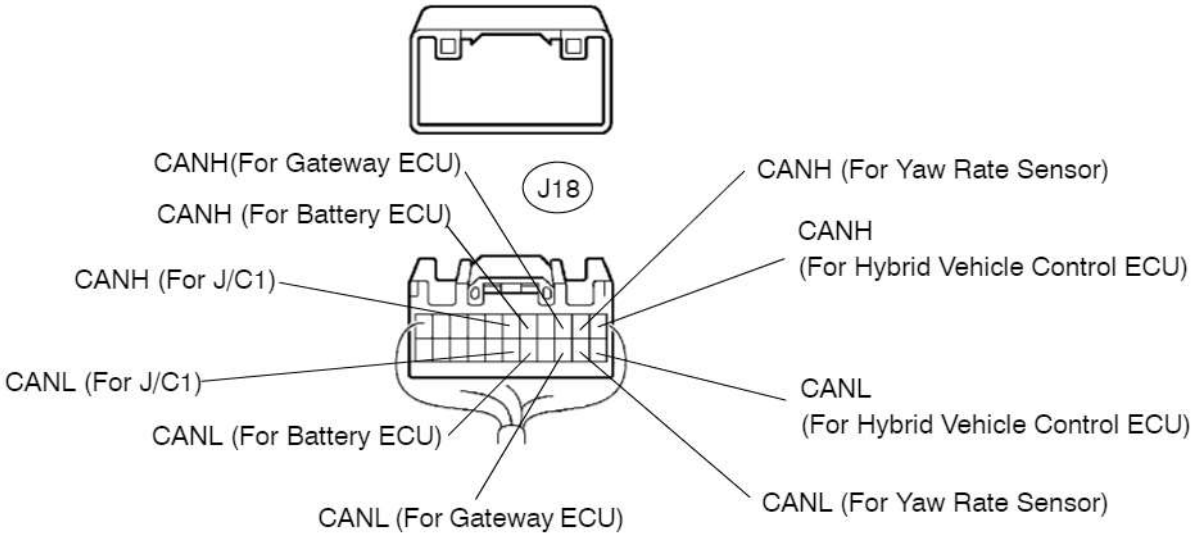


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(b) Terminal arrangement and connection (RHD)

Terminals	Connects to
J18–1 (CANH)	Hybrid Vehicle Control ECU (CANH)
J18–12 (CANL)	Hybrid Vehicle Control ECU (CANL)
J18–2 (CANH)	Yaw Rate Sensor (CANH)
J18–13 (CANL)	Yaw Rate Sensor (CANL)
J18–3 (CANH)	Gateway ECU (CANH)
J18–14 (CANL)	Gateway ECU (CANL)
J18–5 (CANH)	Battery ECU (CANH)
J18–16 (CANL)	Battery ECU (CANL)
J18–6 (CANH)	J/C1 (CANH)
J18–17 (CANL)	J/C1 (CANL)

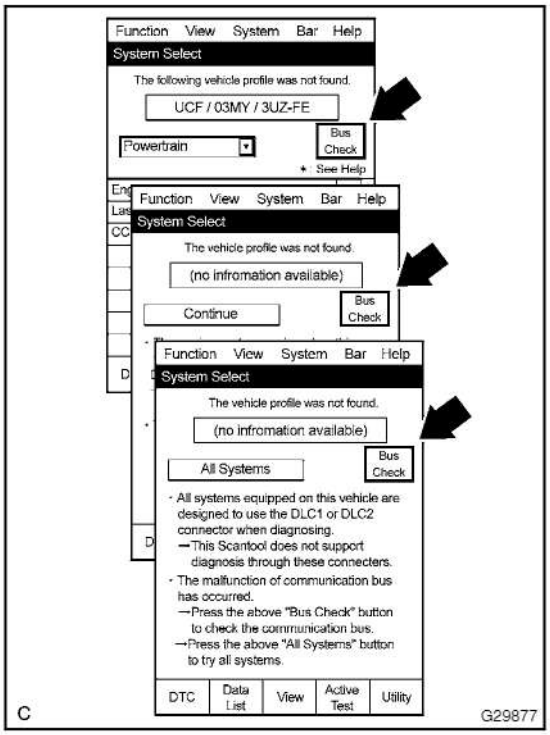
Junction Connector (J/C2) Wire Harness View, RHD:



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DIAGNOSIS SYSTEM

05I6R-01

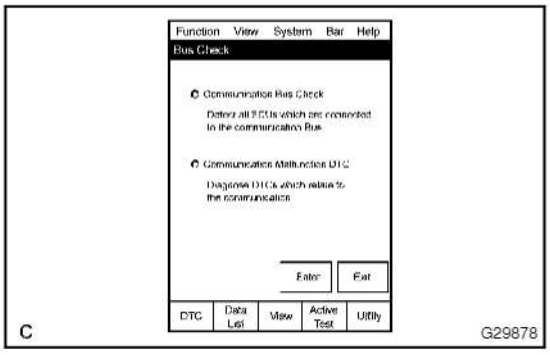


1. BUS CHECK (COMMUNICATION MALFUNCTION DTC)

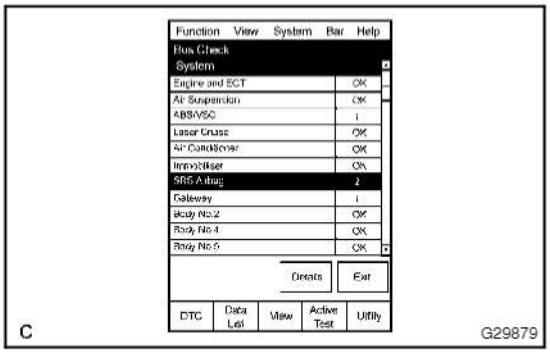
HINT:

Only CAN communication system DTCs for each ECU can be displayed on the intelligent tester II.

(a) Select "Bus Check" from the "System select" screen on the intelligent tester II.

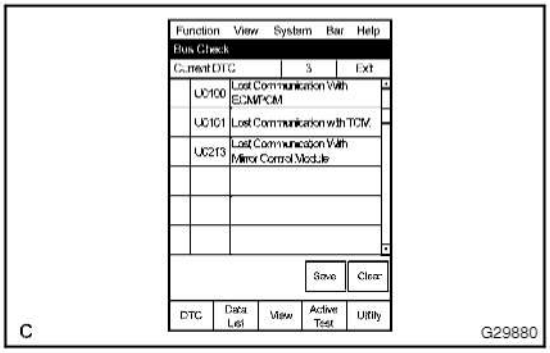


(b) Select "Communication Malfunction DTC" from the "Bus Check" screen, and then select "Enter".

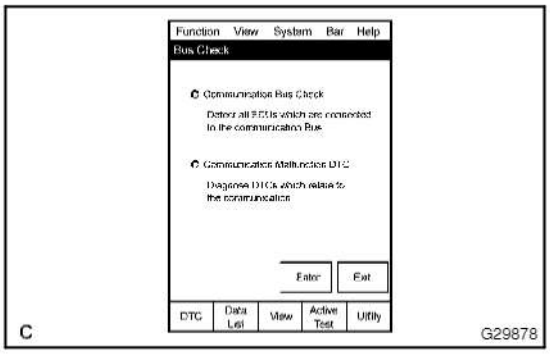


(c) Select the system of the DTC to be checked and select "Details".

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(d) CAN communication system DTC(s) is/are displayed.

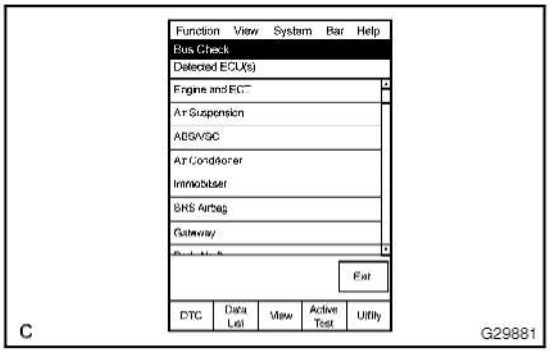


2. BUS CHECK (COMMUNICATION BUS CHECK)

HINT:

The ECUs and sensors that are properly connected to the CAN communication system can be displayed using the intelligent tester II.

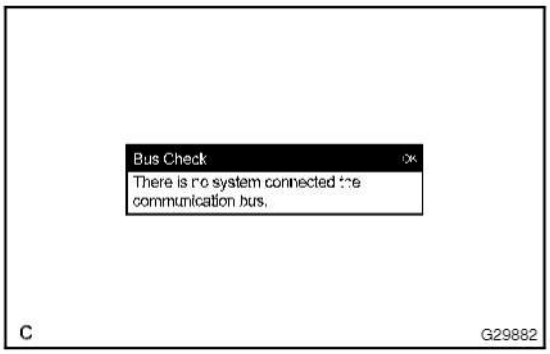
(a) Select "Communication Bus Check" from the "Bus Check" screen.



(b) The screen displays the ECUs and sensors that are properly connected to the CAN communication system.

HINT:

There is a communication stop in the system of any properly connected ECUs or sensors that are not displayed (see page 05–2315).



(c) "There is no system connected to the communication bus" is displayed if there are no ECUs or sensors connected to the CAN bus.

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3. CHECK FOR INSTALLED SYSTEMS (ECUS & SENSORS) THAT ADOPT CAN COMMUNICATION

(a) The systems (ECUs, sensors) that adopt CAN communication vary depending on the vehicle's optional settings. Check which systems (ECUs, sensors) are installed on the vehicle.

ECU/Sensor name	Check method
Hybrid Vehicle Control ECU	Installed on all vehicles
Battery ECU	Installed on all vehicles
ECM	Installed on all vehicles
Skid Control ECU	Installed on all vehicles
Power Steering ECU	Installed on all vehicles
Gateway ECU	Installed on all vehicles
Steering Sensor *1	Vehicle with VSC+ (VSC warning lamp is installed in the combination meter)
Yaw Rate Sensor *1	Vehicle with VSC+ (VSC warning lamp is installed in the combination meter)

HINT:

*1: If VSC+ is not installed, neither the yaw rate sensor nor the steering sensor is adopted.

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05I6S–01

FAIL–SAFE CHART

1. FAIL–SAFE FUNCTION

(a) The fail–safe function starts if any bus (communication line) fails due to a short or other type of circuit failure. The fail–safe function differs in each system and ensures the minimum required function for each system.

(b) Effects on each system when communication is impossible. (For further details, see the pages for each system.)

Function	Hybrid Vehicle Control ECU	ECM	Battery ECU	Skid Control ECU	Steering Sensor	Yaw Rate Sensor	Power Steering ECU	Gateway ECU	Action when unable to communicate	DTC detection (Driver detectable)
TOYOTA hybrid system control (Optimum mix of the electric motor and gas engine)	●	○	○						Restricted driving	Detectable (Lamp comes on)
Regenerative braking (Drives the motor as a generator using the electricity produced by the wheel's rotation. The electricity is stored in the HV battery)	○			●					Prohibits regeneration	Detectable (Lamp comes on)
VSC+ control (Controls braking force when enhanced VSC is in operation)	○			●	○	○			Stops VSC+	Detectable (Lamp comes on)
Electric power steering (Calculates assist current according to the torque sensor value and vehicle speed, then sends the data to the motor)	○			○			●		Maintains control through power assist, as during regular driving at 70 km/h.	Detectable (Lamp comes on)
Display (Operating condition, shift position, DTC)	○	○		○			○	● Meter	Lamp does not come on or remains on	Detectable by illumination malfunction
A/C control	○	○						● A/C	Control of A/C to level set not possible	Detectable (Lamp does not come on)

HINT:

- ●: Control master
- ○: System related

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05I6T–01

DIAGNOSTIC TROUBLE CODE CHART

1. DTC TABLE BY ECU

HINT:

- If CAN communication system DTCs are output, trouble cannot be determined only by the DTCs. Perform troubleshooting according to "HOW TO PROCEED WITH TROUBLESHOOTING" (see page 05–2312).

(a) HYBRID VEHICLE CONTROL ECU

HINT:

DTC communication uses the CAN communication system.

DTC No.	INF Code	Detection Item
U0100	211, 212, 530	Lost Communication With ECM/PCM "A"
U0111	208, 531	Lost Communication With Battery Energy Control Module "A"
U0129	220, 222, 528, 529	Lost Communication With Brake System Control Module
U0131	433, 434	Lost Communication With Power Steering Control Module
U0146	435	Lost Communication With Gateway "A"
P3108	594	Lost Communication With A/C System Control Module

(b) BATTERY ECU

HINT:

DTC communication uses the CAN communication system.

DTC No.	Detection Item
U0100	Lost Communication With ECM/PCM "A"
U0293	Lost Communication With Hybrid Vehicle Control System

(c) ECM

HINT:

DTC communication uses the CAN communication system.

DTC No.	Detection Item
U0293	Lost Communication With Hybrid Vehicle Control System

(d) SKID CONTROL ECU

HINT:

DTC communication uses the SIL line.

DTC No.	INF Code	Detection Item
U0293	152, 153, 154	Lost Communication With Hybrid Vehicle Control System
U0073	360	Control Module Communication Bus Off
U0123 *1	—	Lost Communication With Yaw Rate Sensor Module
U0124 *1	—	Lost Communication With Lateral Acceleration Sensor Module
U0126 *1	—	Lost Communication With Steering Angle Sensor Module

*1: w/ VSC+

(e) GATEWAY ECU

HINT:

The gateway ECU is connected to the CAN communication system but CAN communication system DTCs are not output.

(f) POWER STEERING ECU

HINT:

DTC communication uses the SIL line.

DTC No.	Detection Item
U0073	Control Module Communication Bus Off
U0121	Lost Communication With Anti–Lock Brake System (ABS) Control Module

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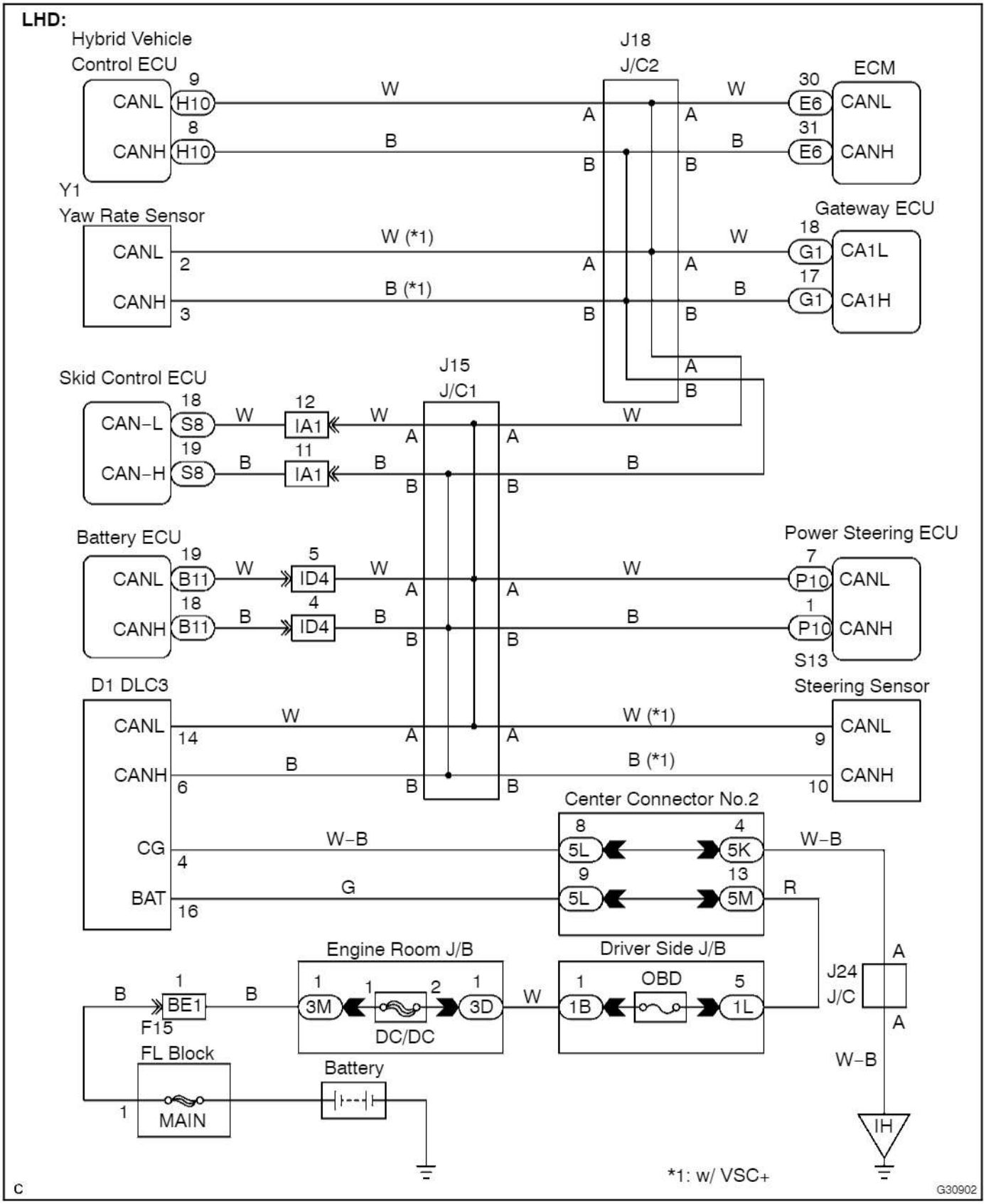
CHECK CAN BUS LINE

CIRCUIT DESCRIPTION

When any DTC for the CAN communication system is output, first measure the resistance between the terminals of the DLC3 to specify the trouble area, and check that there is no short in the CAN main bus line, between the CAN bus lines, to +B, or to GND.

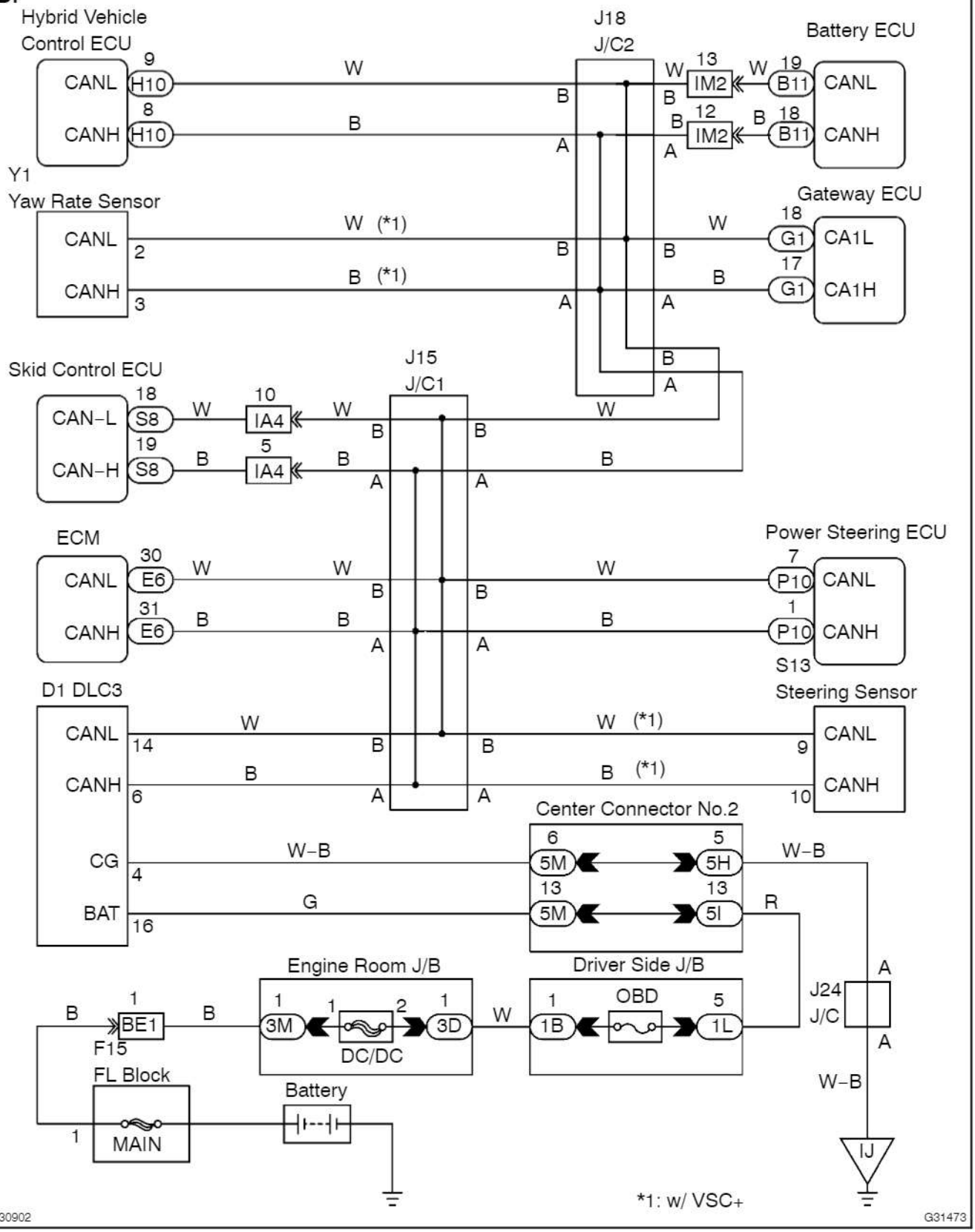
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WIRING DIAGRAM



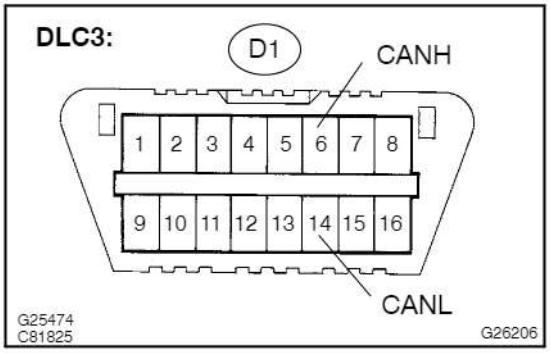
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RHD:



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1	CHECK CAN BUS LINE(MAIN BUS LINE FOR DISCONNECTION, BUS LINES FOR SHORT CIRCUIT)



(a) Turn the power switch off.

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

Standard:

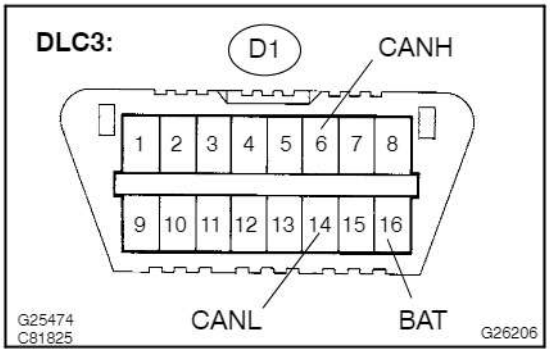
Tester connection	Condition	Specified value	Result
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω	OK
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	69 Ω or more (LHD)	NG–A
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	69 Ω or more (RHD)	NG–B
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 Ω or less (LHD)	NG–C
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 Ω or less (RHD)	NG–D

NG–A	CHECK CAN MAIN BUS LINE FOR DISCONNECTION (LHD) (SEE PAGE 05–2362)
NG–B	CHECK CAN MAIN BUS LINE FOR DISCONNECTION (RHD) (SEE PAGE 05–2401)
NG–C	CHECK CAN BUS LINES FOR SHORT CIRCUIT (LHD) (SEE PAGE 05–2367)
NG–D	CHECK CAN BUS LINES FOR SHORT CIRCUIT (RHD) (SEE PAGE 05–2406)

OK

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2 CHECK CAN BUS LINE FOR SHORT TO +B



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

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power switch OFF	1 MΩ or more

HINT:

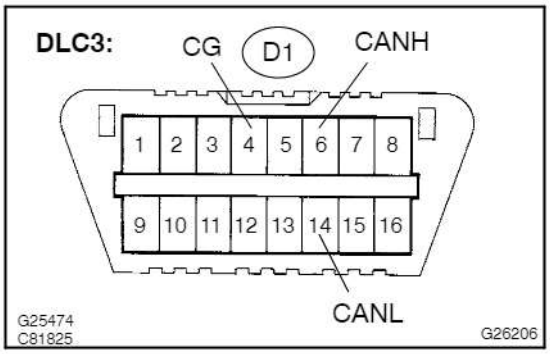
- NG–A: LHD
- NG–B: LHD

NG–A → **CHECK CAN BUS LINE FOR SHORT TO +B (LHD) (SEE PAGE 05–2378)**

NG–B → **CHECK CAN BUS LINE FOR SHORT TO +B (RHD) (SEE PAGE 05–2417)**

OK

3 CHECK CAN BUS LINE FOR SHORT TO GND



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

Standard:

Tester connection	Condition	Specified value
D1–4 (CG) – D1–6 (CANH)	Power switch OFF	1 kΩ or more
D1–4 (CG) – D1–14 (CANL)	Power switch OFF	1 kΩ or more

HINT:

- NG–A: LHD
- NG–B: LHD

NG–A → **CHECK CAN BUS LINE FOR SHORT TO GND (LHD) (SEE PAGE 05–2390)**

NG–B → **CHECK CAN BUS LINE FOR SHORT TO GND (RHD) (SEE PAGE 05–2429)**

OK

HOW TO PROCEED WITH TROUBLESHOOTING (SEE PAGE 05–2312)

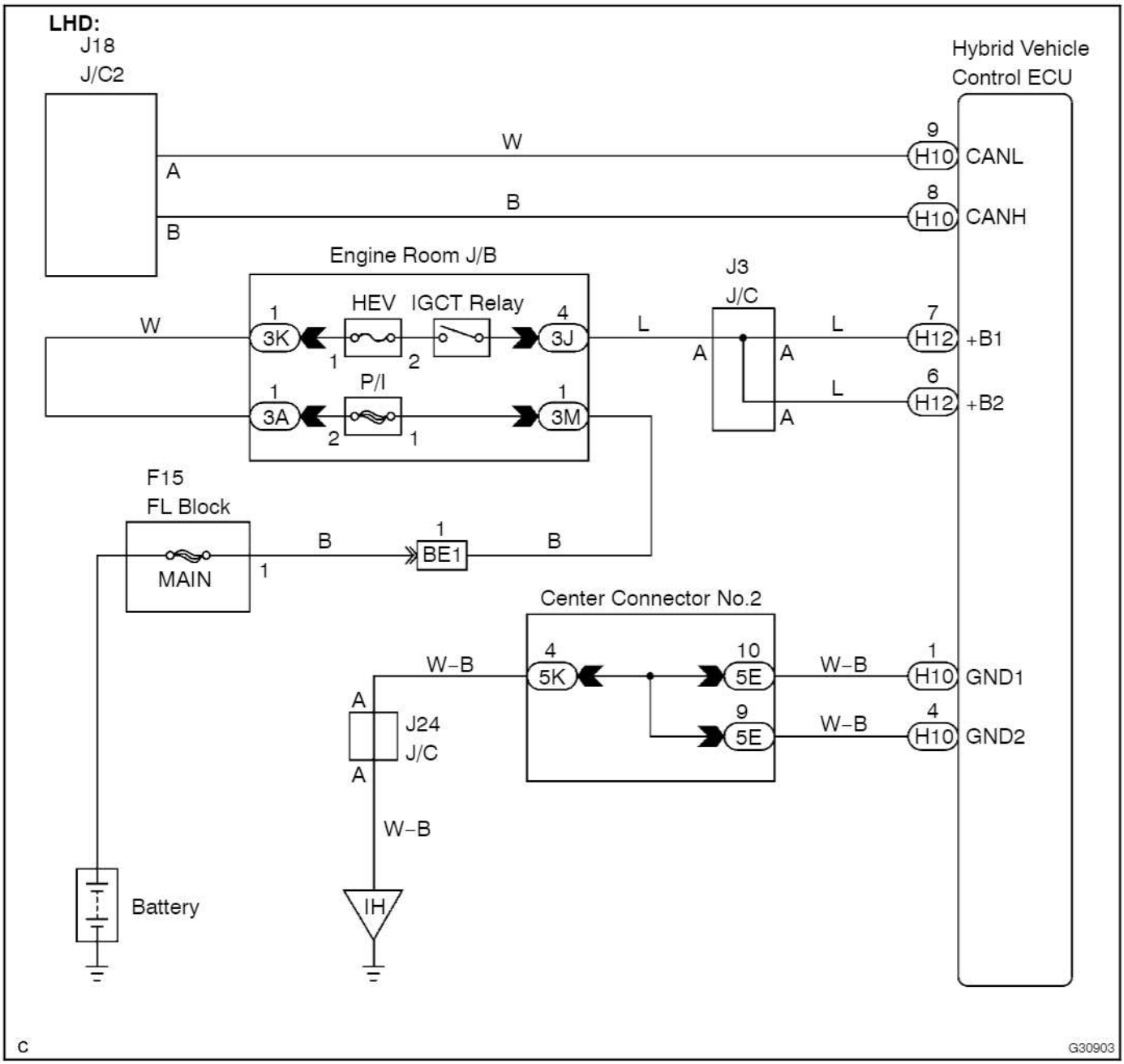
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HYBRID VEHICLE CONTROL ECU COMMUNICATION STOP MODE

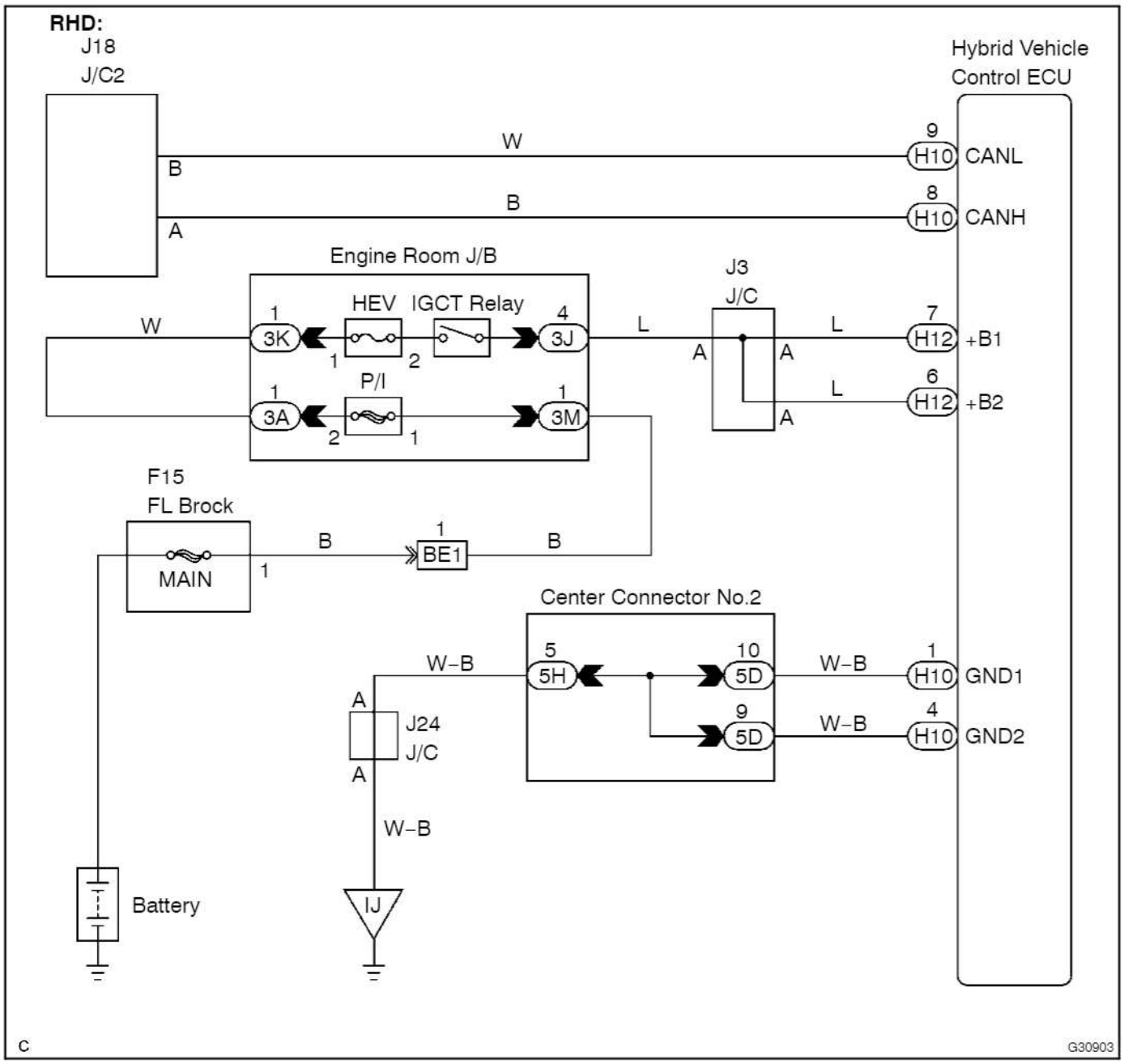
MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
HYBRID VEHICLE CONTROL ECU COMMUNICATION STOP MODE	• "Hybrid Control" is not displayed on the " Communication Bus Check" screen of the intelliget tester II. • Applies to "HYBRID VEHICLE CONTROL ECU COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05-2315).	• Power source or inside the hybrid vehicle control ECU • Hybrid vehicle control ECU sub bus line or connector

WIRING DIAGRAM



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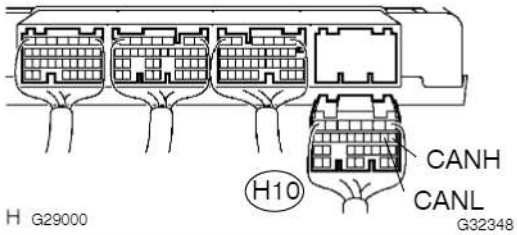


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INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)

Hybrid Vehicle Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the hybrid vehicle control ECU connector (H10).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

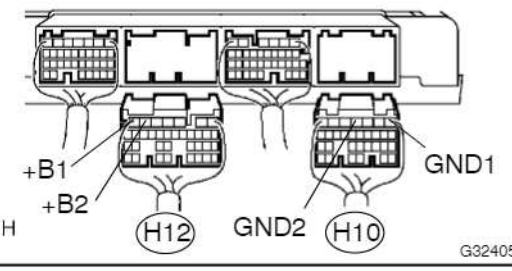
Tester connection	Condition	Specified value
H14–8 (CANH) – H14–9 (CANL)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CHECK WIRE HARNESS

Hybrid Vehicle Control ECU Wire Harness View:



(a) Disconnect the hybrid vehicle control ECU connector (H12).
(b) Measure the resistance according to the value(s) in the table below.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
H10–1 (GND1) – Body ground	Always	Below 1 Ω
H10–4 (GND2) – Body ground	Always	Below 1 Ω
H12–7 (+B1) – Body ground	Power Switch ON (IG)	10 to 14 V
H12–6 (+B2) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

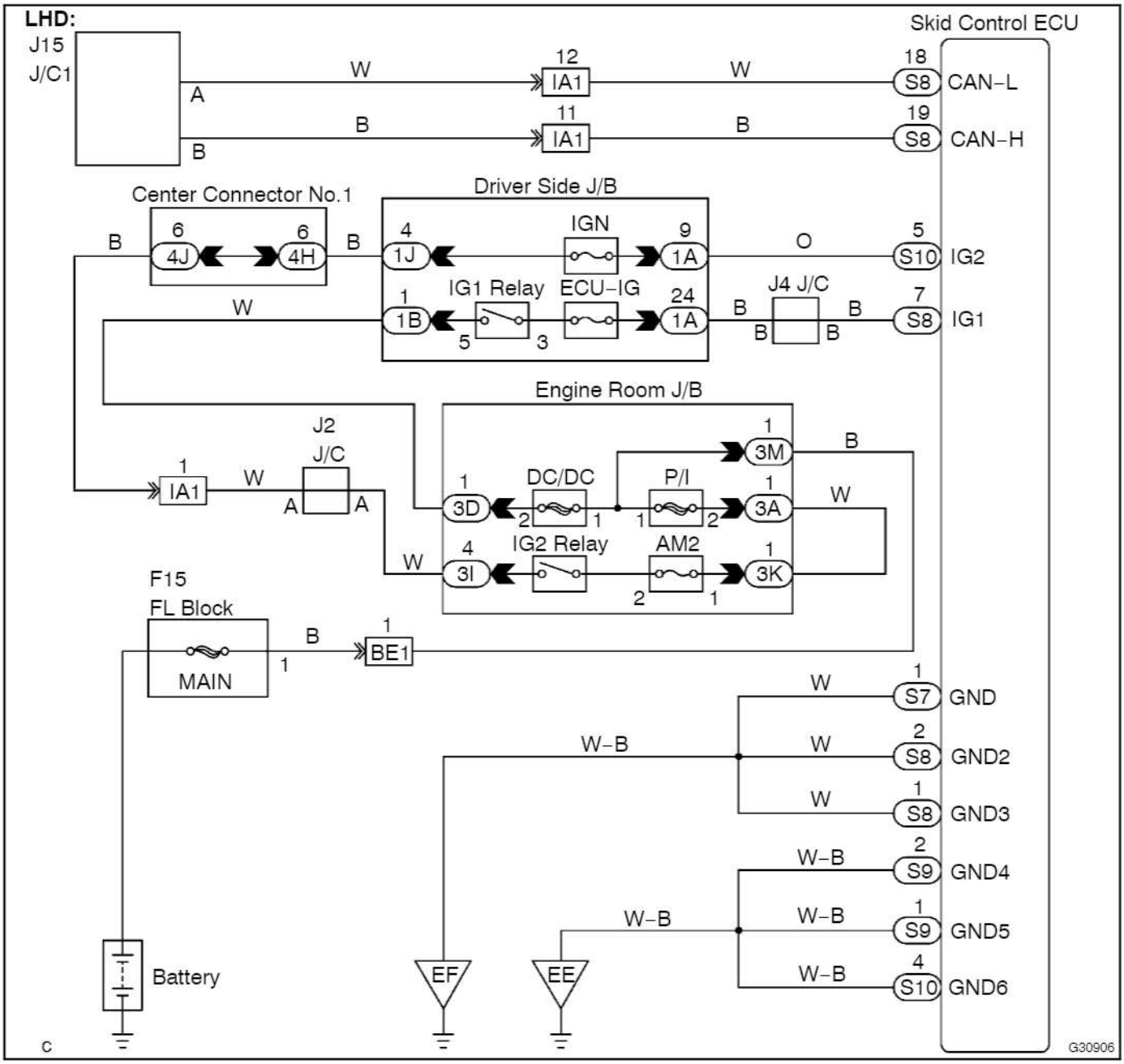
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SKID CONTROL ECU COMMUNICATION STOP MODE

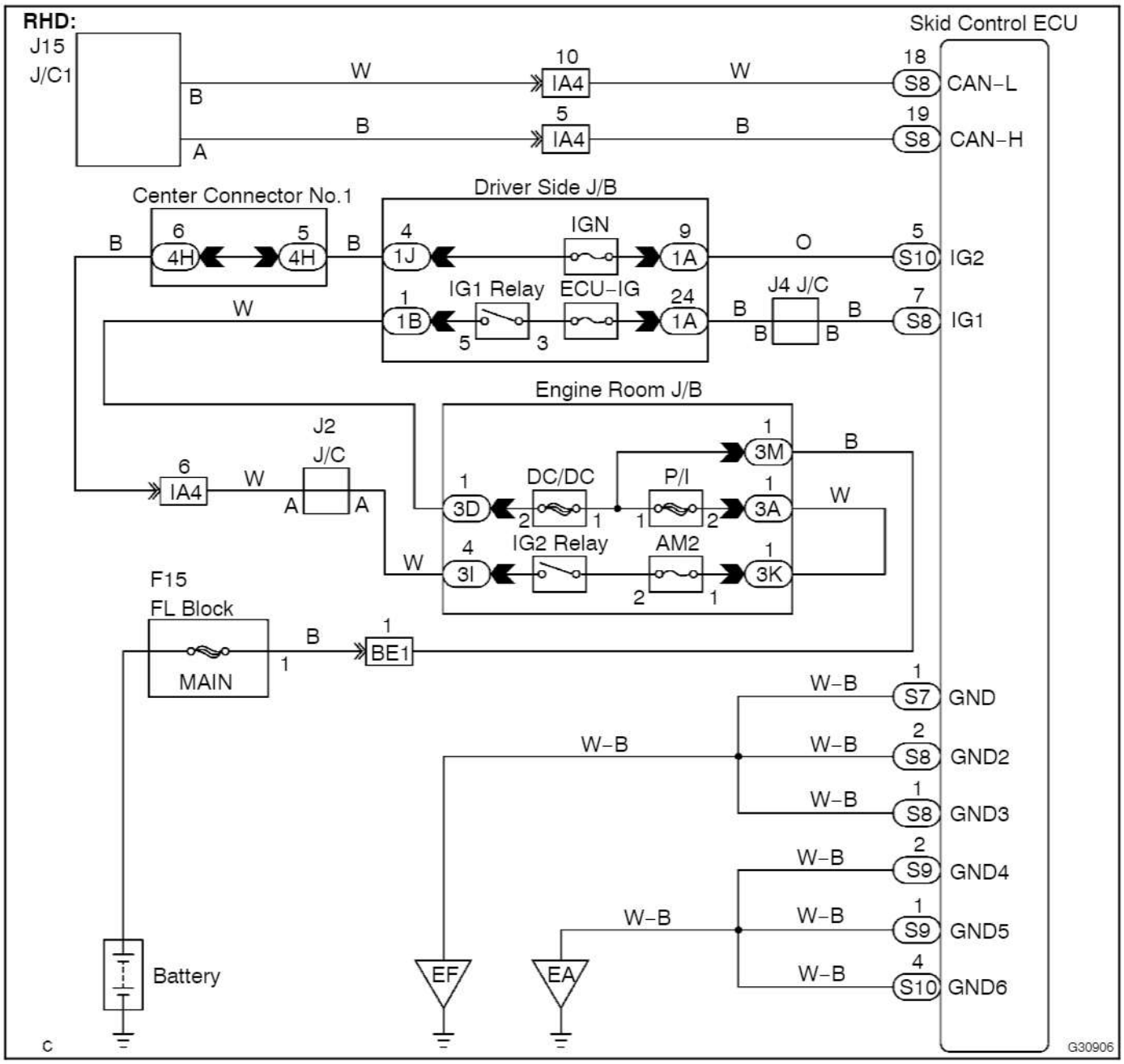
MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
SKID CONTROL ECU COMMUNICATION STOP MODE	• "ABS & VSC & TRC" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "SKID CONTROL ECU COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	• Power source or inside the skid control ECU • Skid control ECU sub bus line or connector

WIRING DIAGRAM



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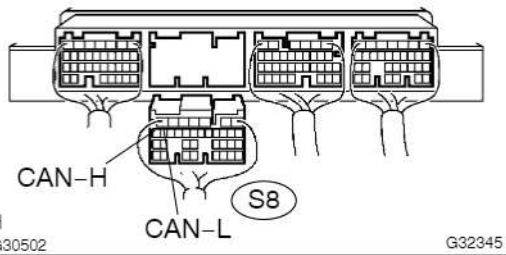


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INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(SKID CONTROL ECU SUB BUS LINE)

Skid Control ECU
Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the skid control ECU connector (S8).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

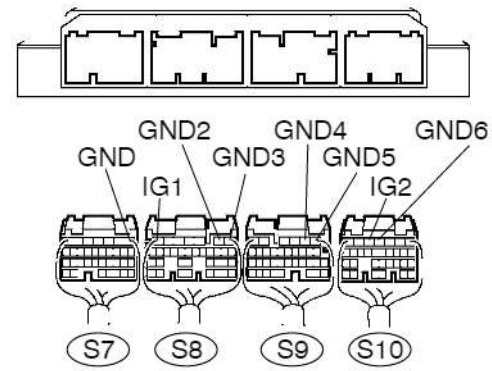
Tester connection	Condition	Specified value
S8–19 (GAN–H) – S8–18 (CAN–L)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CHECK WIRE HARNESS(IG1,IG2,GND,GND2,GND3,GND4,GND5,GND6)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connectors (S7), (S9), and (S10).
(b) Measure the resistance according to the value(s) in the table below.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S7–1 (GND) – Body ground	Always	Below 1 Ω
S8–1 (GND3) – Body ground	Always	Below 1 Ω
S8–2 (GND2) – Body ground	Always	Below 1 Ω
S9–1 (GND5) – Body ground	Always	Below 1 Ω
S9–2 (GND4) – Body ground	Always	Below 1 Ω
S10–4 (GND6) – Body ground	Always	Below 1 Ω
S8–7 (IG1) – Body ground	Power Switch ON (IG)	10 to 14 V
S10–5 (IG2) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)

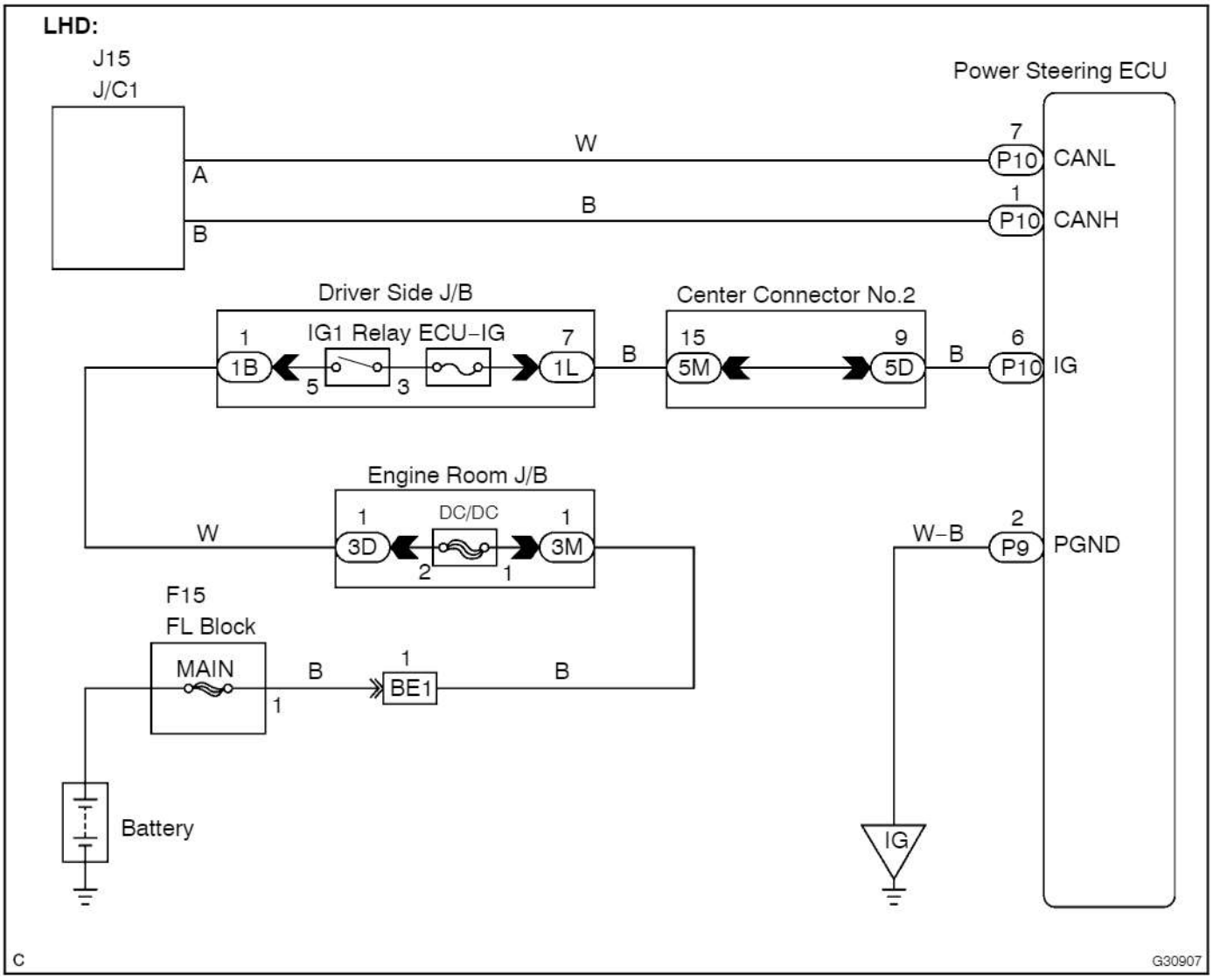
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POWER STEERING ECU COMMUNICATION STOP MODE

MODE DESCRIPTION

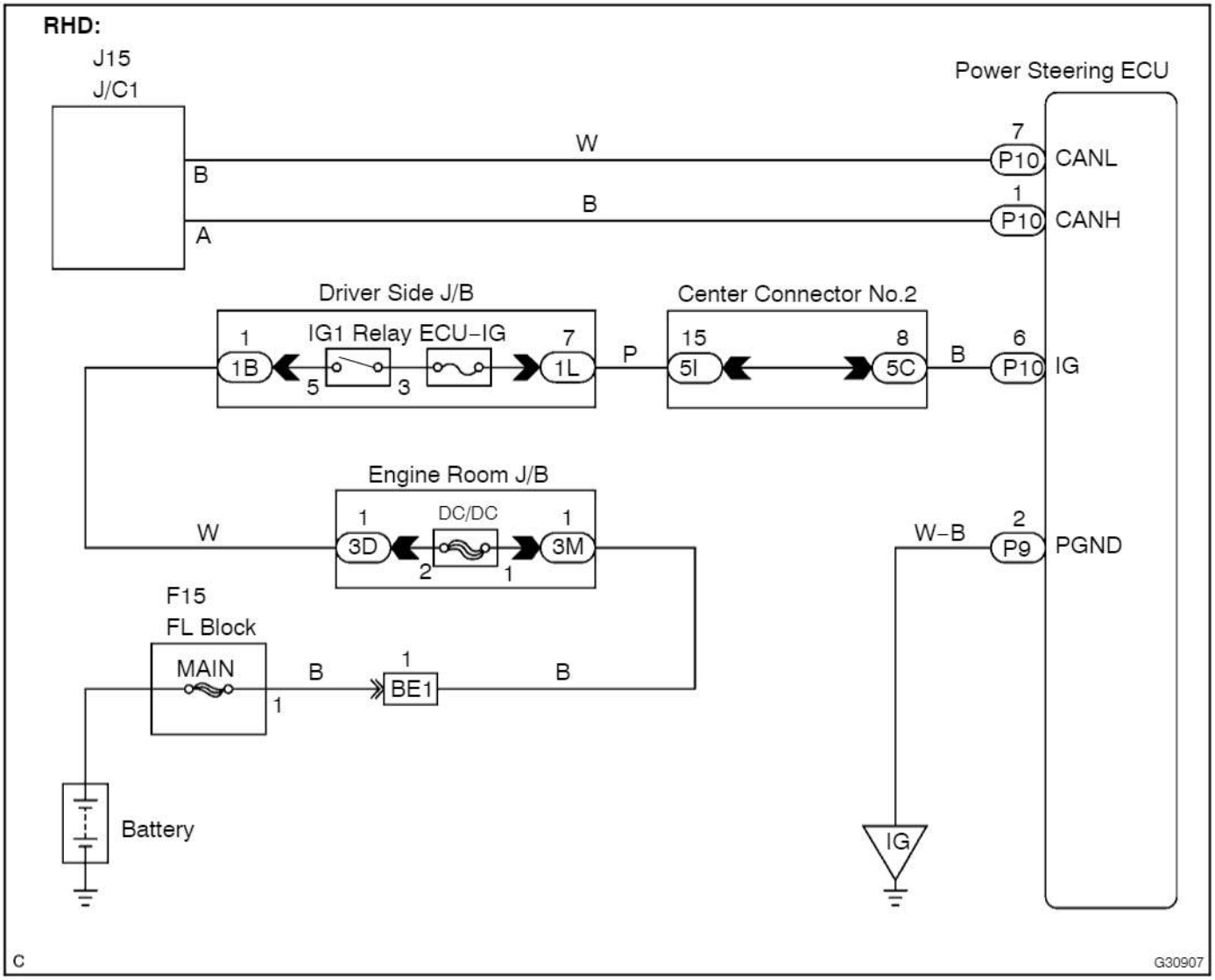
Detection Item	Symptom	Trouble Area
POWER STEERING ECU COMMUNICATION STOP MODE	• "EPS" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "POWER STEERING ECU COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	• Power source or inside the power steering ECU • Power steering ECU sub bus line or connector

WIRING DIAGRAM



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RHD:

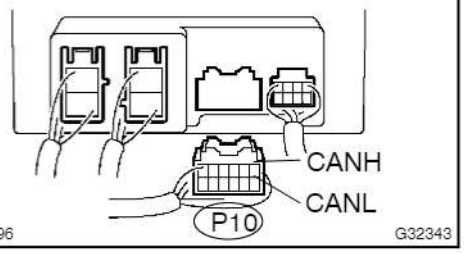


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INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(POWER STEERING ECU SUB BUS LINE)

Power Steering ECU
Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the power steering ECU connector (P10).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

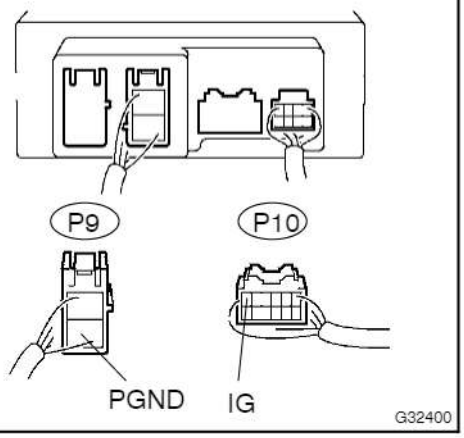
Tester connection	Condition	Specified value
P10–1 (CANH) – P10–7 (CANL)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CHECK WIRE HARNESS(IG,PGND)

Power Steering ECU
Wire Harness View:



(a) Disconnect the power steering ECU connector (P9).
(b) Measure the resistance according to the value(s) in the table below.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P9–2 (PGND) – Body ground	Always	Below 1 Ω
P10–6 (IG) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)

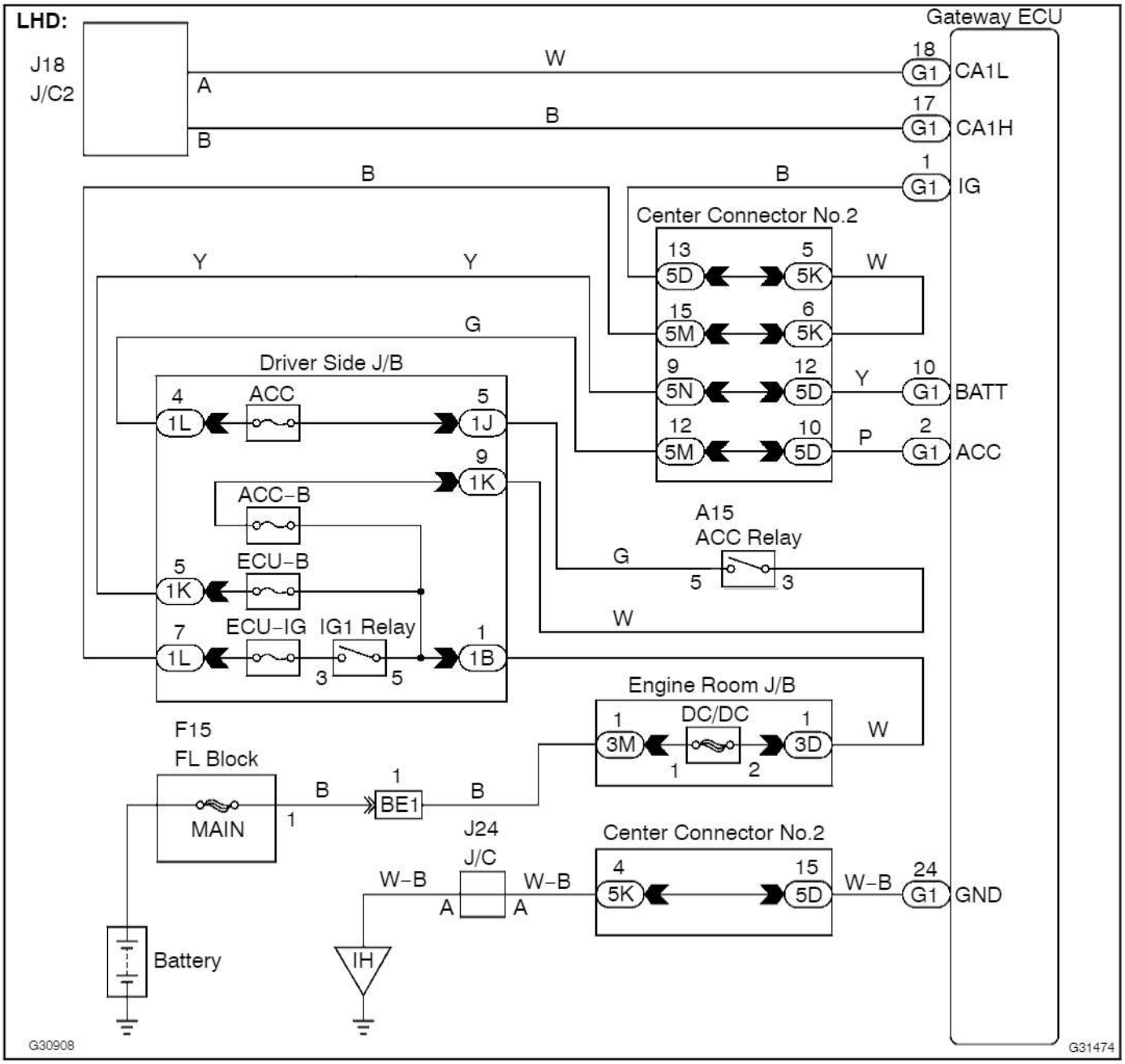
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GATEWAY ECU COMMUNICATION STOP MODE

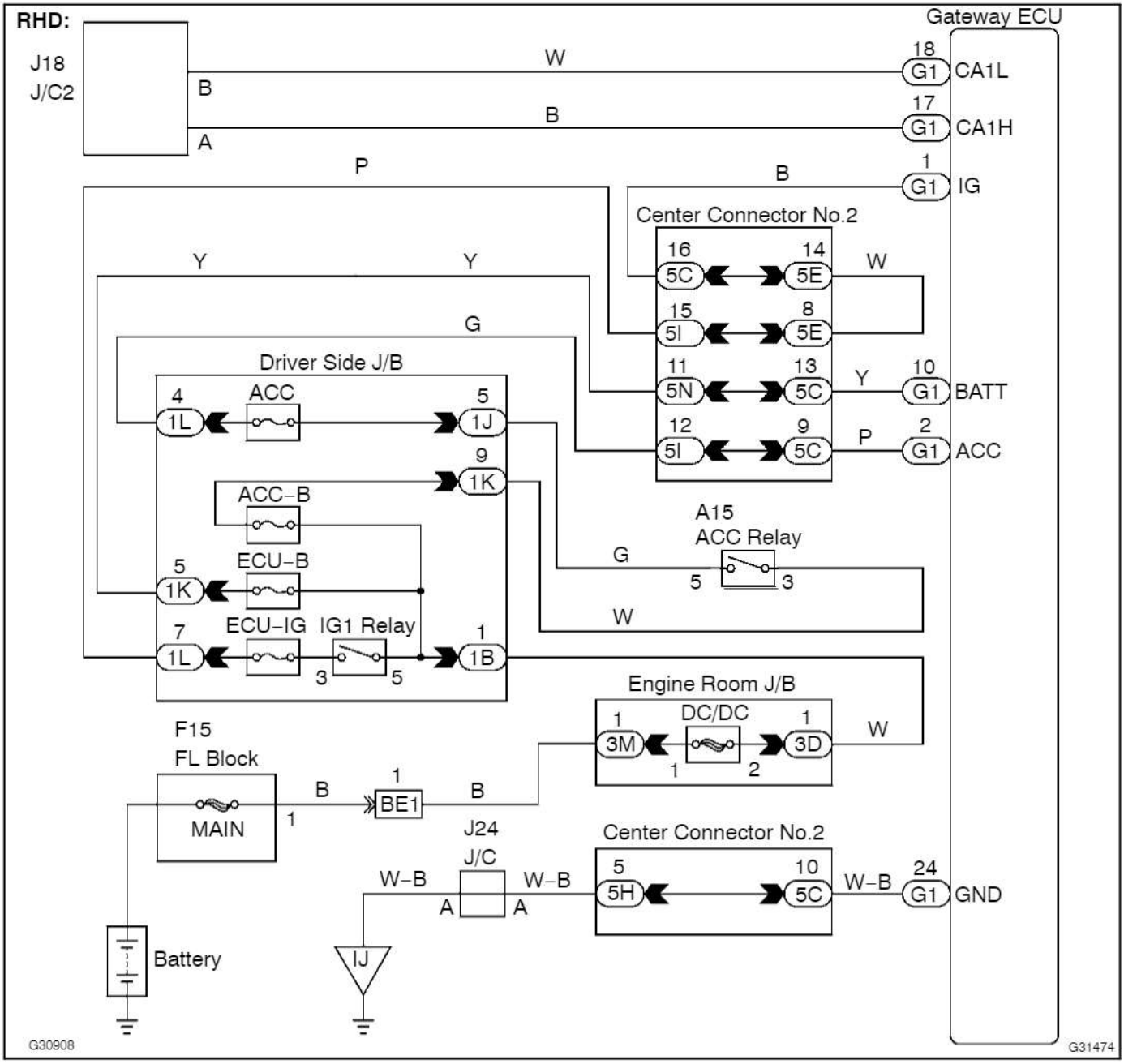
MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
GATEWAY ECU COMMUNICATION STOP MODE	• "Body/Gateway" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "GATEWAY ECU COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	• Power source or inside the gateway ECU • Gateway ECU sub bus line or connector

WIRING DIAGRAM



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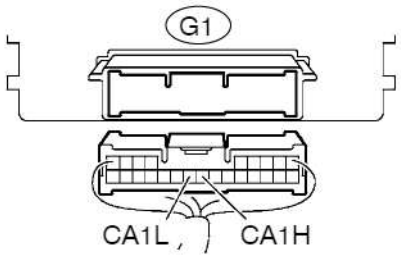


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INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR DISCONNECTION(GATEWAY ECU SUB BUS LINE)

Gateway ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the gateway ECU connector (G1).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

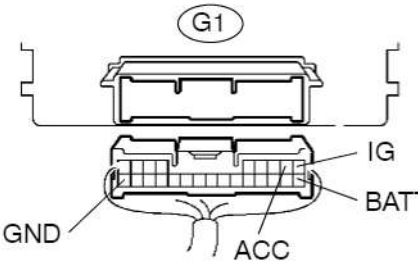
Tester connection	Condition	Specified value
G1–17 (CA1H) – G1–18 (CA1L)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2 CHECK WIRE HARNESS(BATT,ACC,IG,GND)

Gateway ECU Wire Harness View:



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

Standard:

Tester connection	Condition	Specified condition
G1–24 (GND) – Body ground	Always	Below 1 Ω
G1–10 (BATT) – Body ground	Always	10 to 14 V
G1–2 (ACC) – Body ground	Power Switch ON (ACC)	10 to 14 V
G1–1 (IG) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE GATEWAY ECU (SEE PAGE 67–26)

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STEERING SENSOR COMMUNICATION STOP MODE

MODE DESCRIPTION

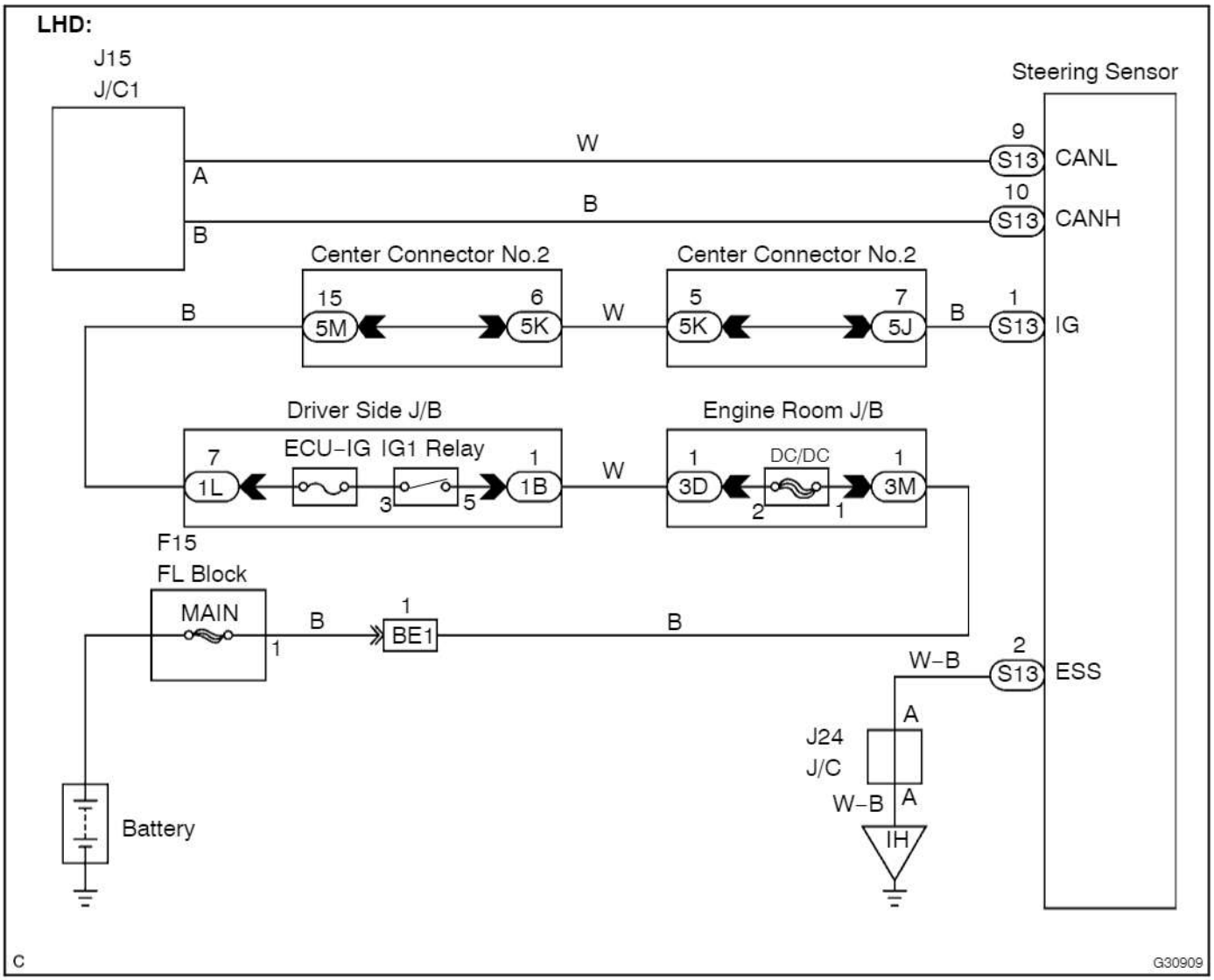
Detection Item	Symptom	Trouble Area
STEERING SENSOR COMMUNICATION STOP MODE	• "Steering Angle Sensor" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "STEERING SENSOR COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	• Power source or inside the steering sensor • Steering sensor sub bus line or connector

NOTICE:

This is not applicable to a vehicle without VSC+.

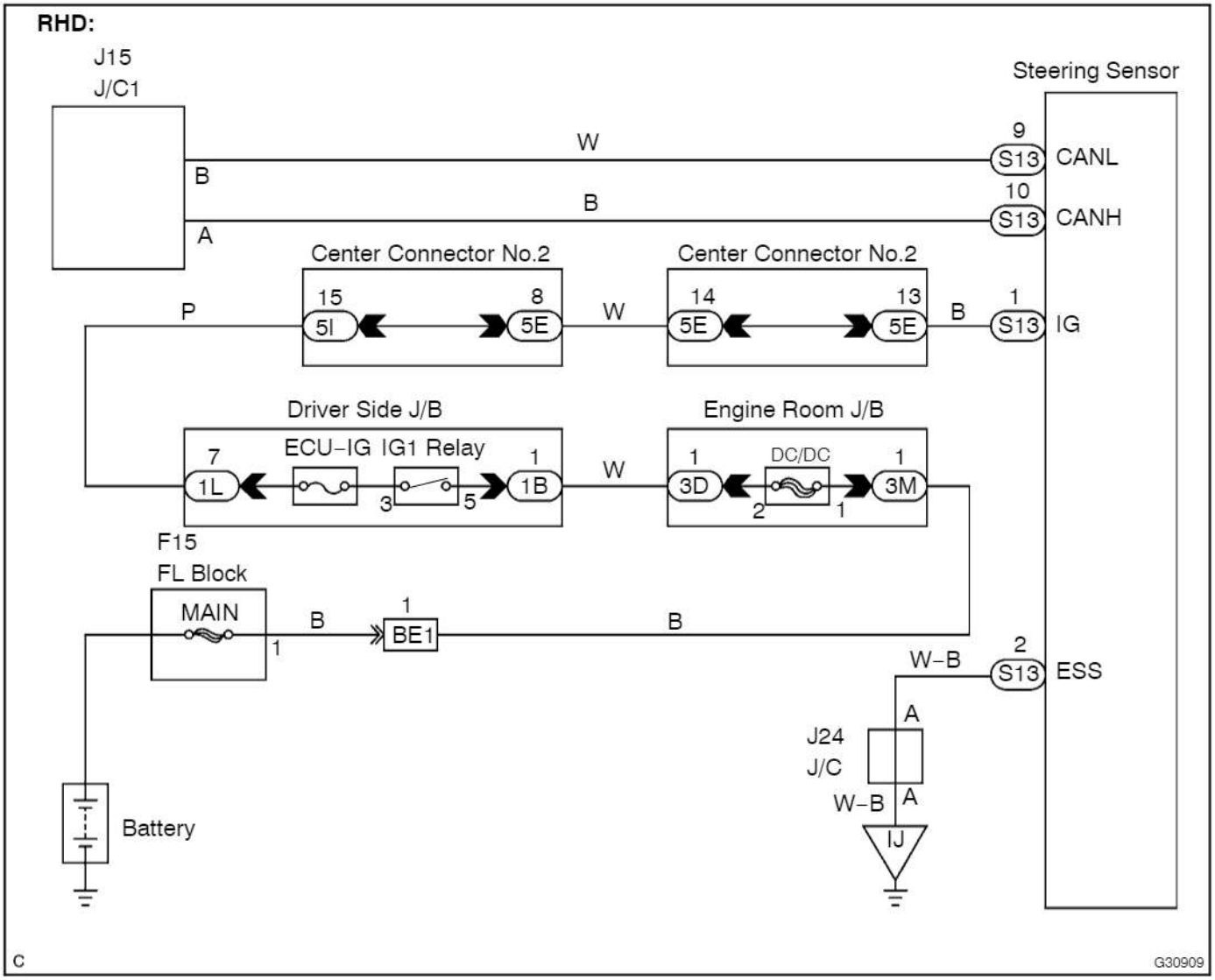
WIRING DIAGRAM

LHD:



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RHD:

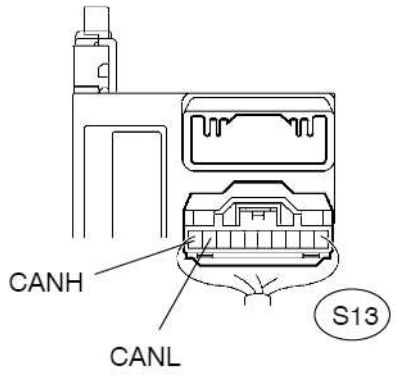


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INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(STEERING SENSOR SUB BUS LINE)

Steering Sensor
Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the steering sensor connector (S13).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

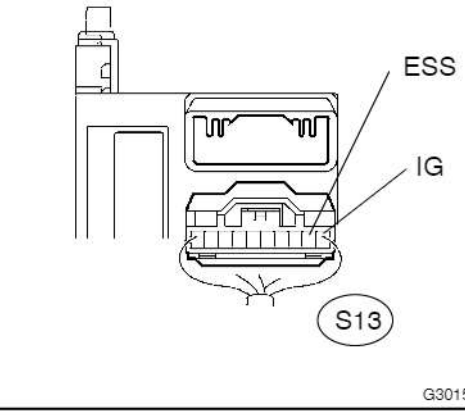
Tester connection	Condition	Specified value
S13–10 (CANH) – S13–9 (CANL)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CHECK WIRE HARNESS(IG1,ESS)

Steering Sensor
Wire Harness View:



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

Standard:

Tester connection	Condition	Specified condition
S13–2 (ESS) – Body ground	Always	Below 1 Ω
S13–1 (IG) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE STEERING SENSOR (SEE PAGE 32–85)

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YAW RATE SENSOR COMMUNICATION STOP MODE

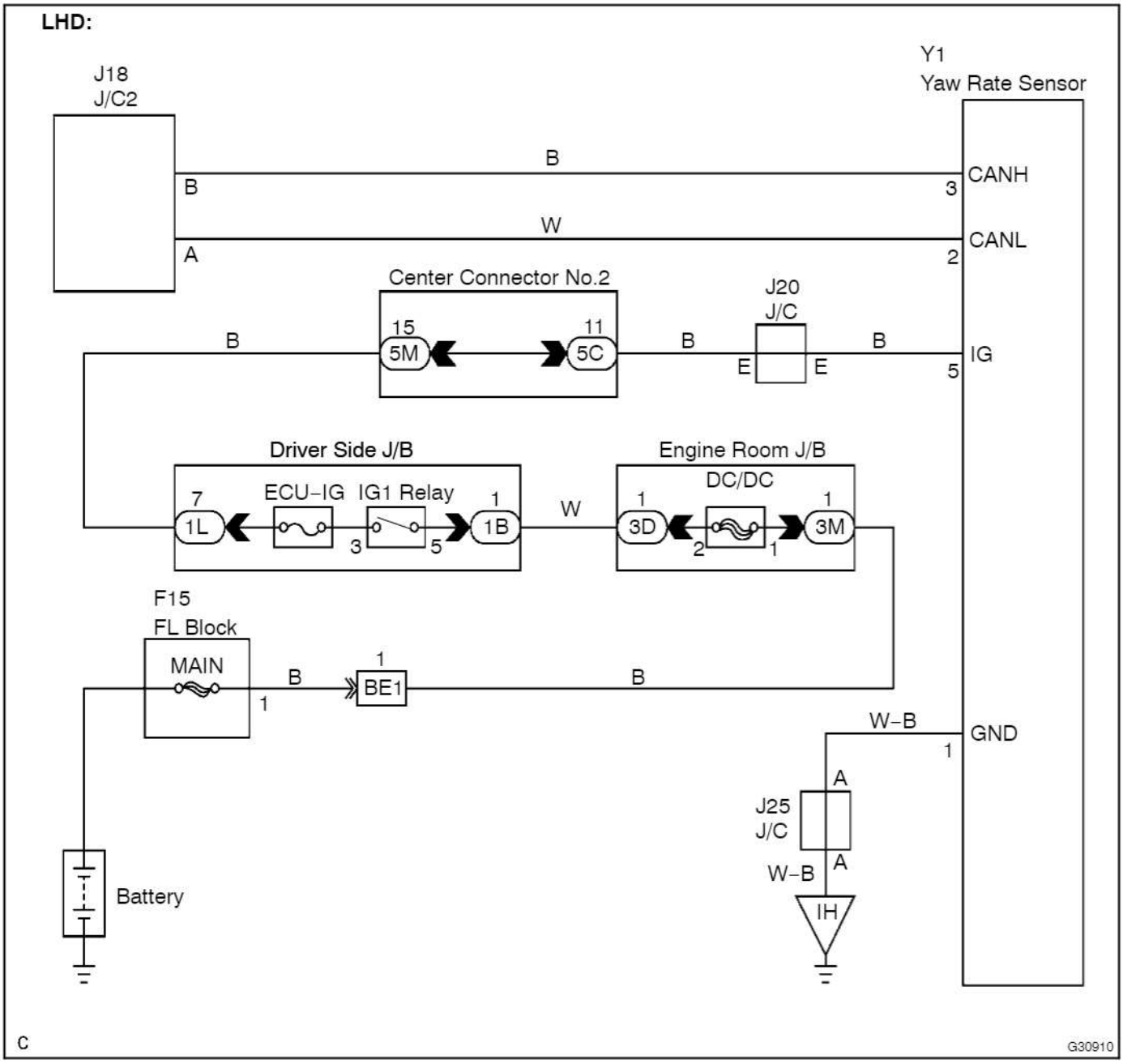
MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
YAW RATE SENSOR COMMUNICATION STOP MODE	• "Yaw Rate/Deceleration Sensor" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "YAW RATE SENSOR COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	• Power source or inside the yaw rate sensor • Yaw rate sensor sub bus line or connector

NOTICE:

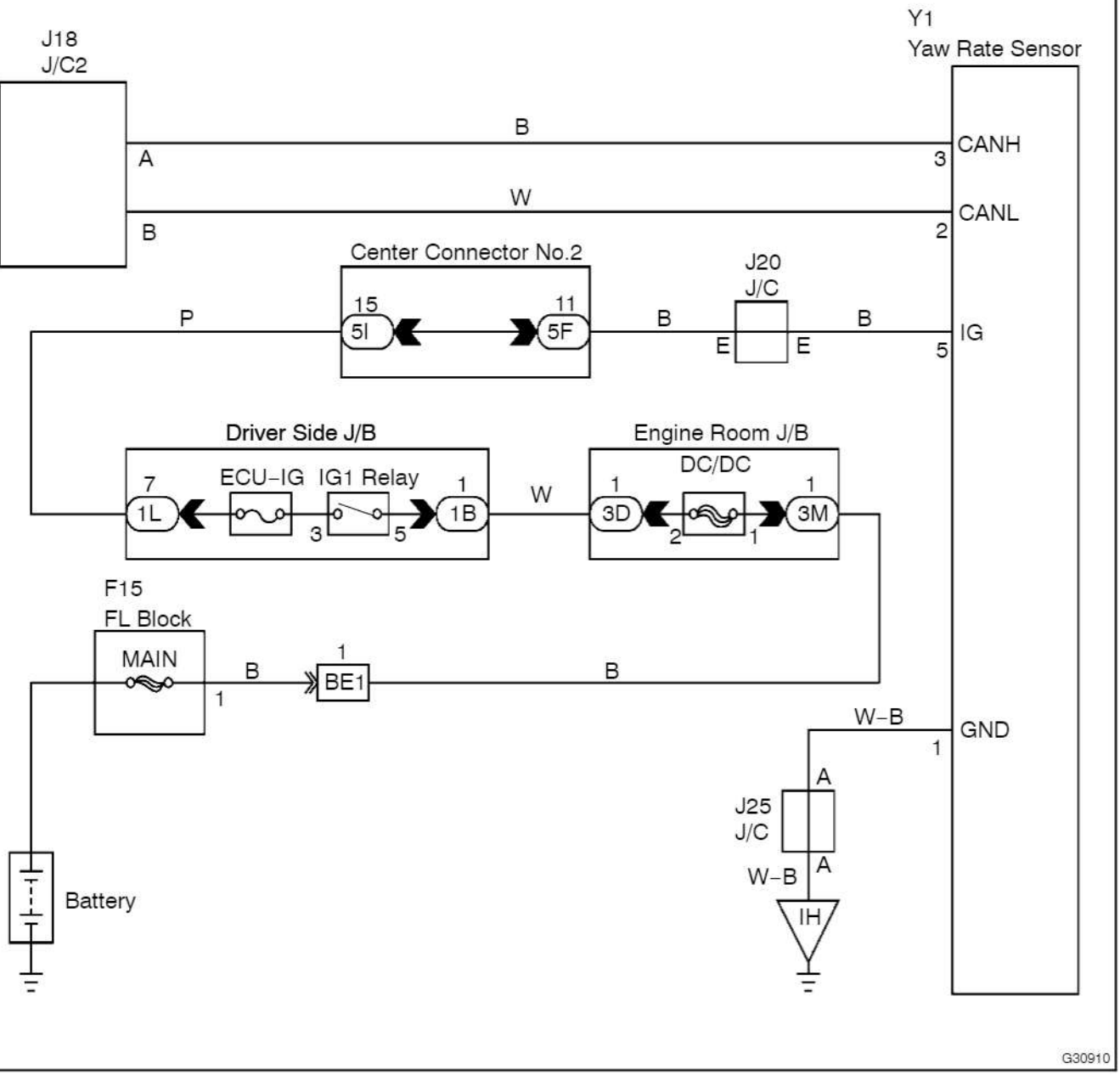
This is not applicable to a vehicle without VSC+.

WIRING DIAGRAM



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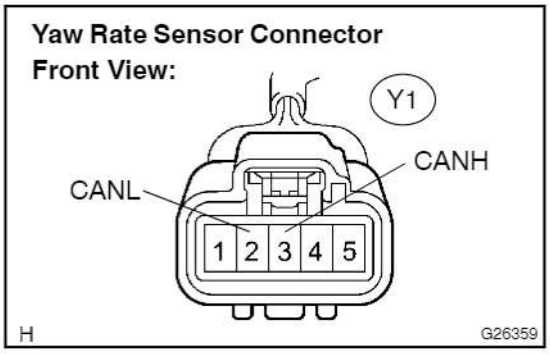
RHD:



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INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(YAW RATE SENSOR SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the yaw rate sensor connector (Y1).
(c) Measure the resistance according to the value(s) in the table below.

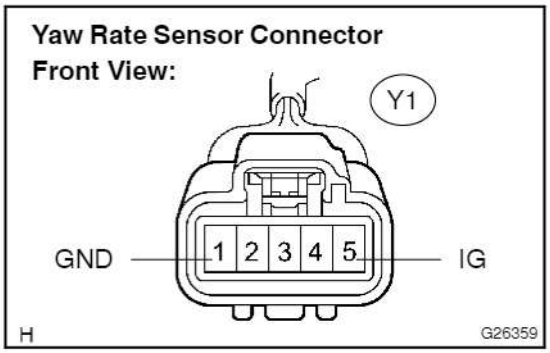
Standard:

Tester connection	Condition	Specified value
Y1–2 (CANL) – Y1–3 (CANH)	Power Switch OFF	54 to 69 Ω

NG → **REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CHECK WIRE HARNESS(IG,GND)



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

Standard:

Tester connection	Condition	Specified condition
Y1–1 (GND) – Body ground	Always	Below 1 Ω
Y1–5 (IG) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE YAW RATE SENSOR (SEE PAGE 32–84)

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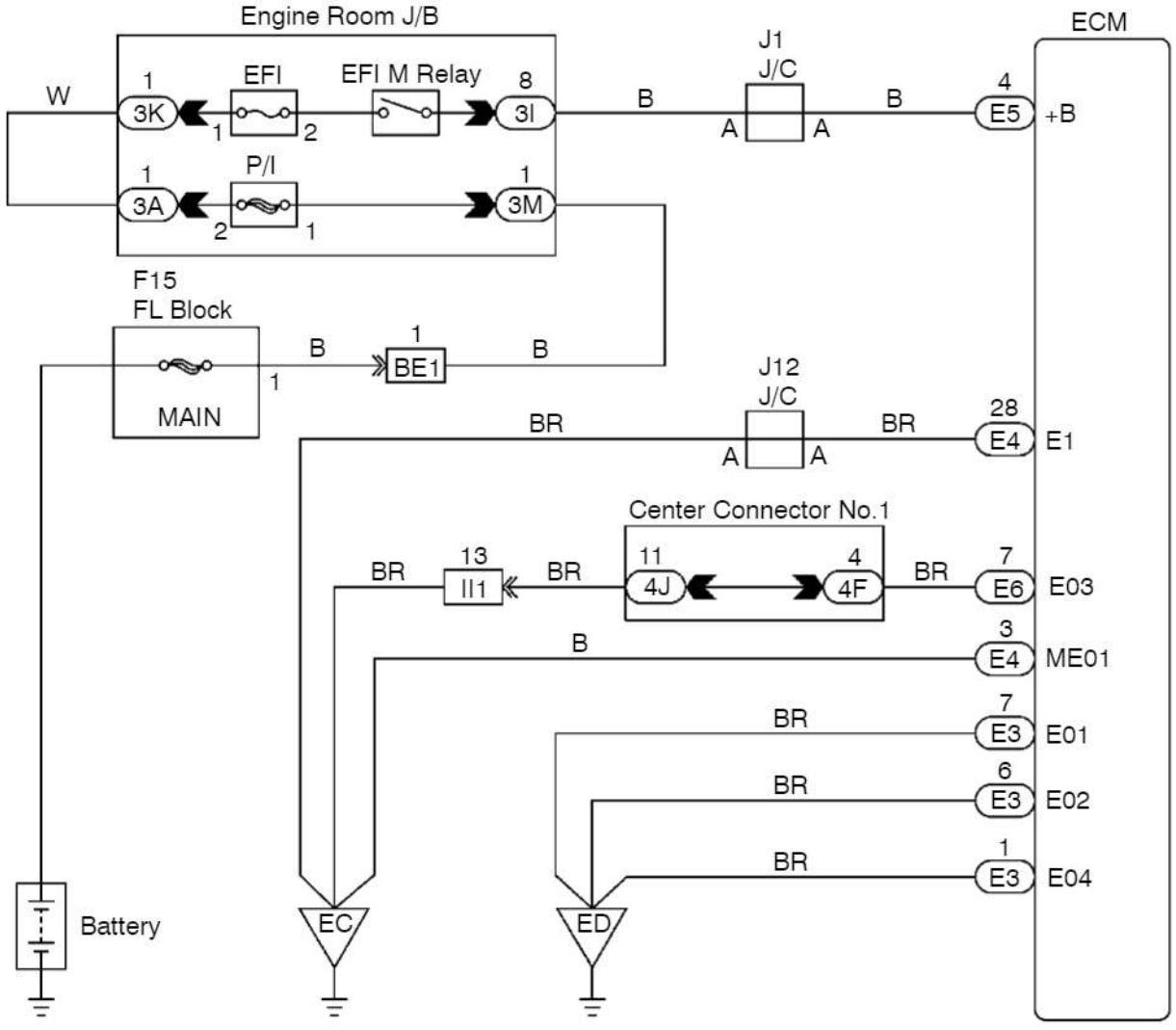
ECM COMMUNICATION STOP MODE

MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
ECM COMMUNICATION STOP MODE	• "Engine" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "ECM COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	Power source or inside the ECM

WIRING DIAGRAM

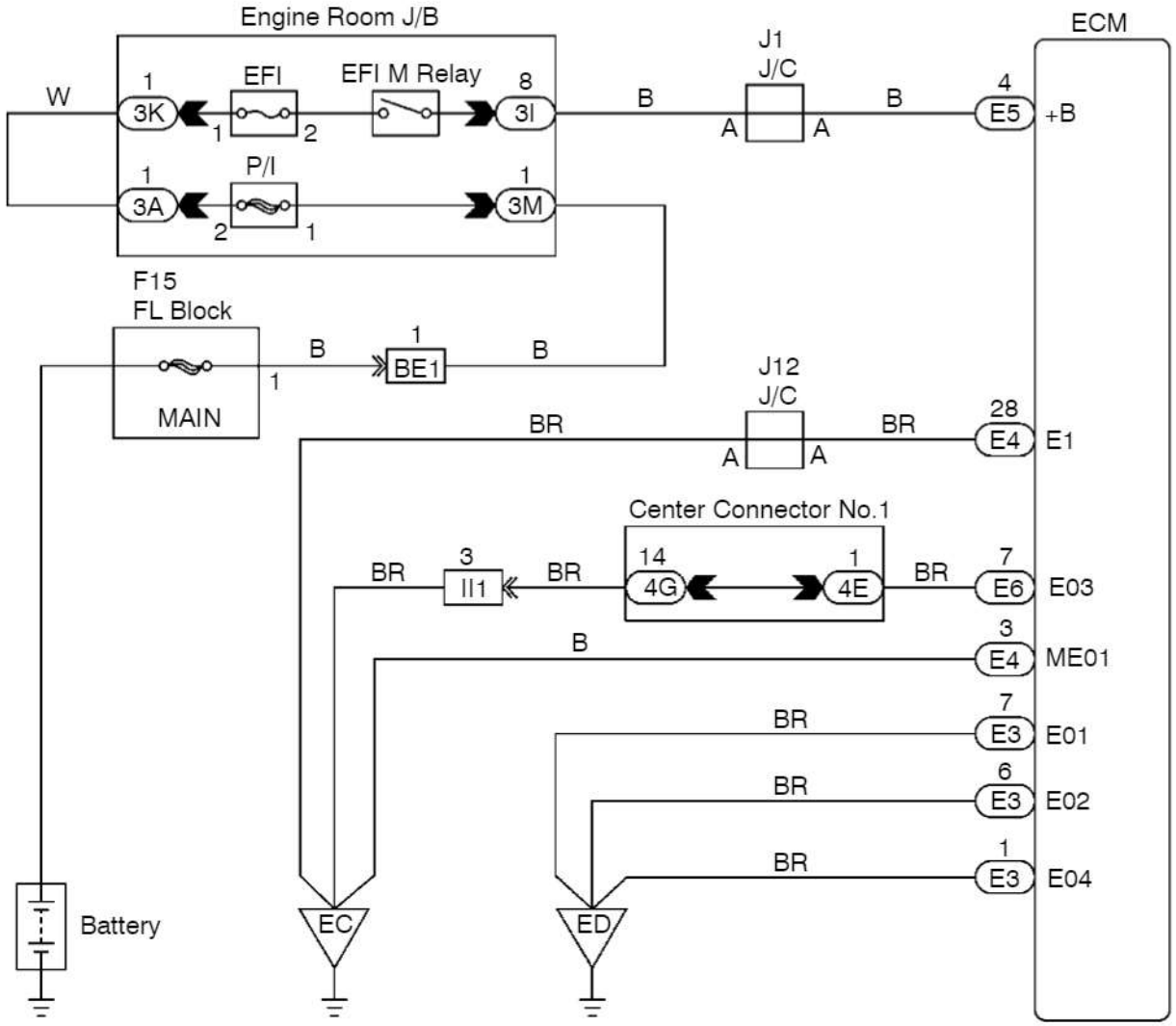
LHD:



C G30905

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RHD:



C

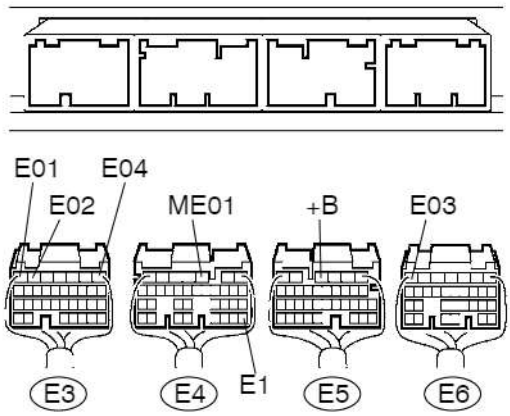
G30905

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INSPECTION PROCEDURE

1	CHECK WIRE HARNESS(+B,E1,E03,ME01,E01,E02,E04)

ECM Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the ECM connectors (E3), (E4), (E5), and (E6).
(c) Measure the resistance according to the value(s) in the table below.
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E3–1 (E04) – Body ground	Always	Below 1 Ω
E3–6 (E02) – Body ground	Always	Below 1 Ω
E3–7 (E01) – Body ground	Always	Below 1 Ω
E4–3 (ME01) – Body ground	Always	Below 1 Ω
E4–28 (E1) – Body ground	Always	Below 1 Ω
E6–7 (E03) – Body ground	Always	Below 1 Ω
E5–4 (+B) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE ECM (SEE PAGE 10–24)

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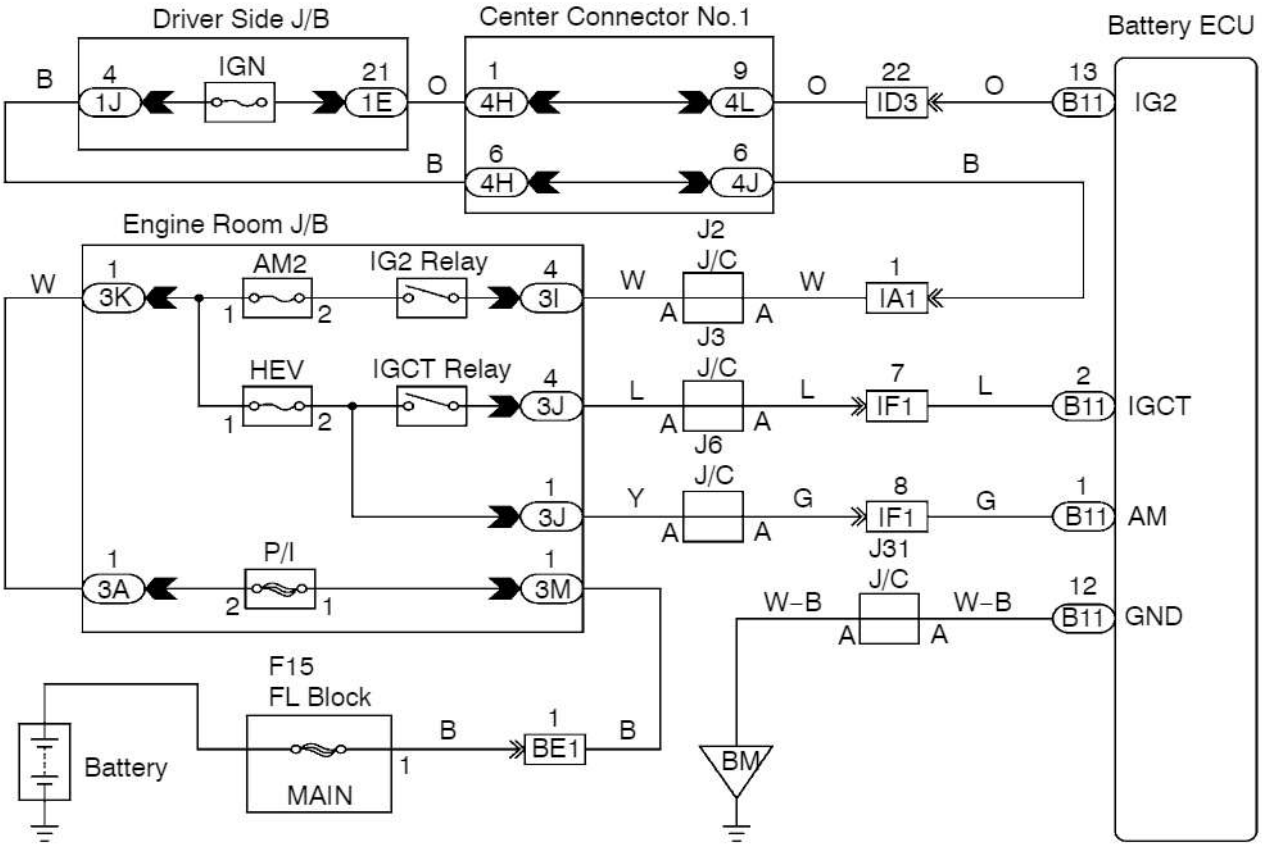
BATTERY ECU COMMUNICATION STOP MODE

MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
BATTERY ECU COMMUNICATION STOP MODE	• "HV Battery" is not displayed on the "Communication Bus Check" screen of the intelligent tester II. • Applies to "BATTERY ECU COMMUNICATION STOP MODE" in the "DTC COMBINATION TABLE" (see page 05–2315).	Power source or inside the battery ECU

WIRING DIAGRAM

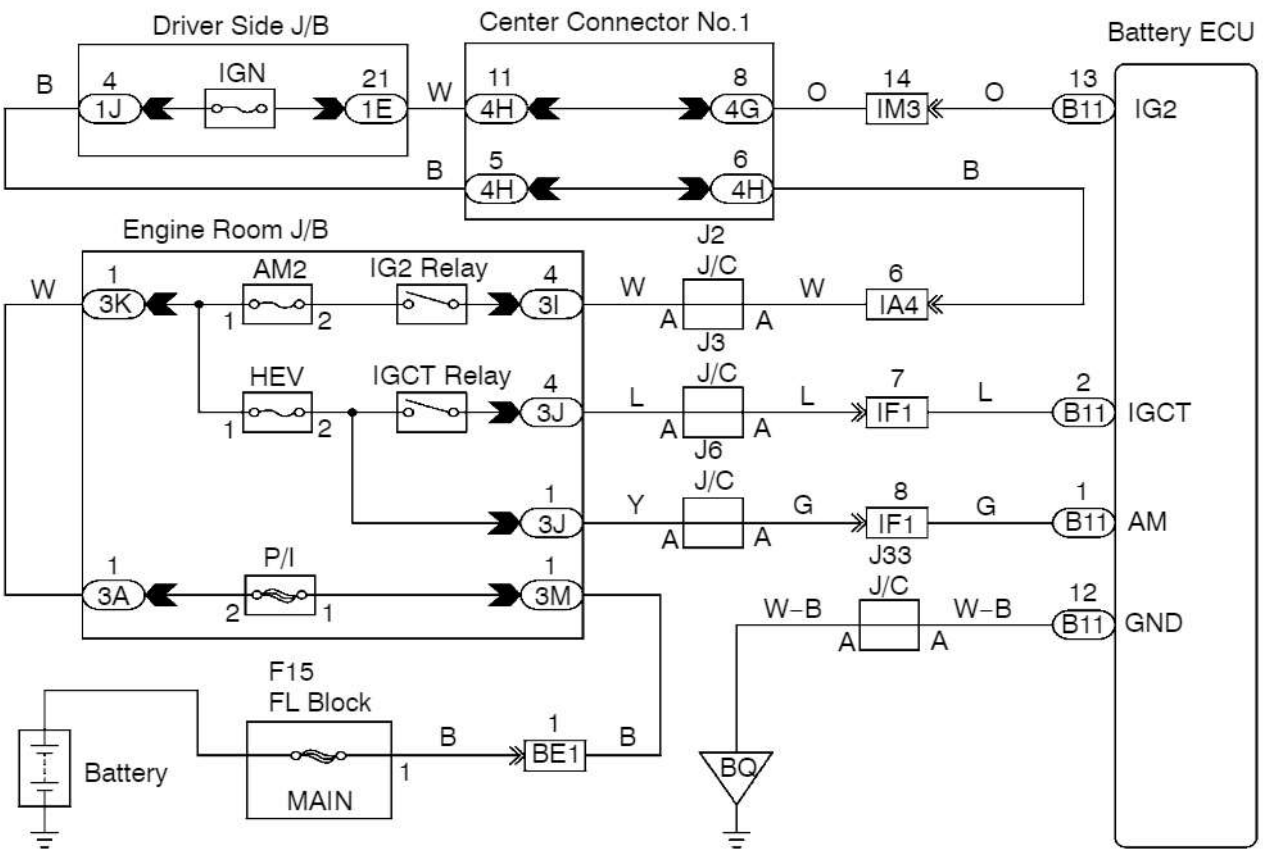
LHD:



G30904

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RHD:

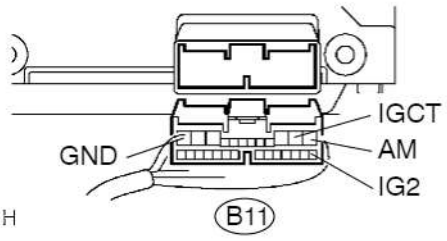


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INSPECTION PROCEDURE

1	CHECK WIRE HARNESS(AM,IGCT,IG2,GND)

Battery ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the battery ECU connector (B11).
(c) Measure the resistance according to the value(s) in the table below.
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
B11–12 (GND) – Body ground	Always	Below 1 Ω
B11–1 (AM) – Body ground	Always	10 to 14 V
B11–2 (IGCT) – Body ground	Power Switch ON (IG)	10 to 14 V
B11–13 (IG2) – Body ground	Power Switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)

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CHECK CAN MAIN BUS LINE FOR DISCONNECTION (LHD)

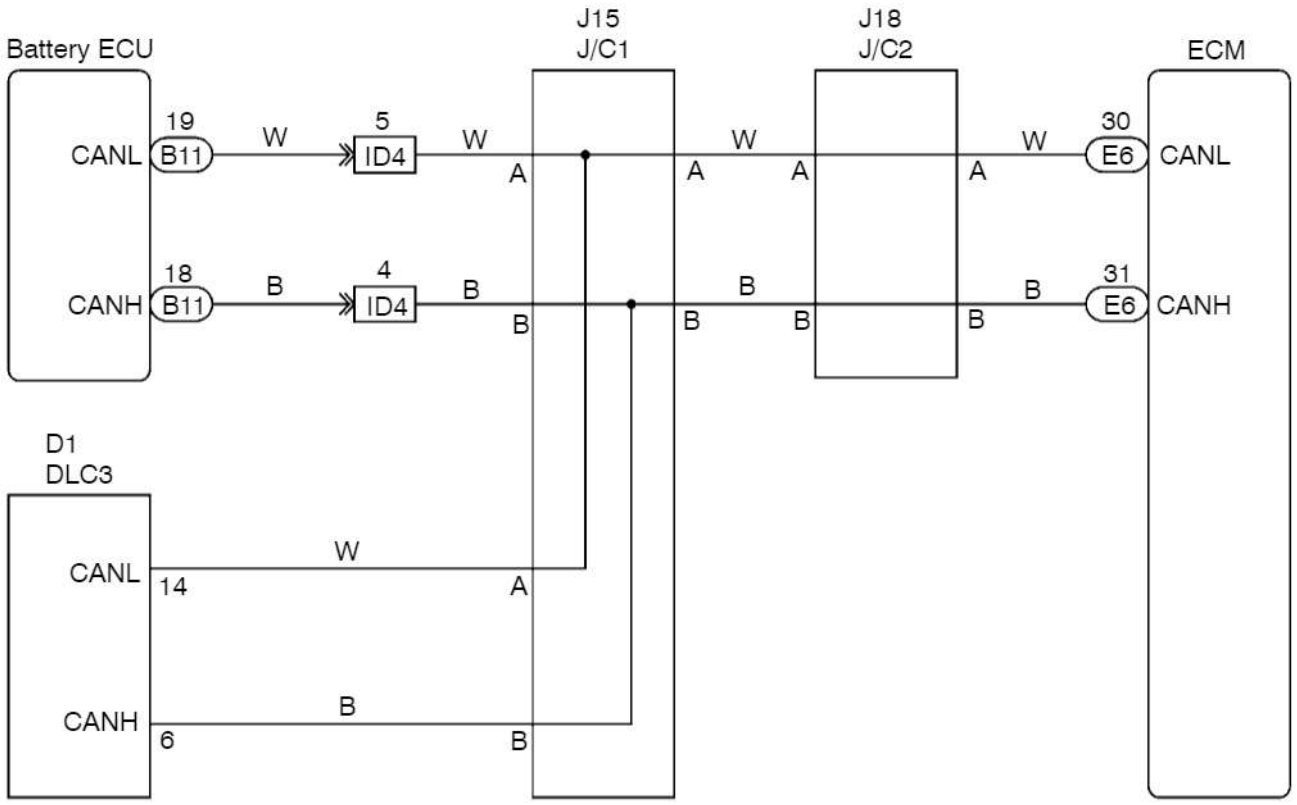
CIRCUIT DESCRIPTION

There may be an open circuit in the CAN bus main line and/or the DLC3 sub bus line when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.	• CAN main bus line or connector • Junction connector (J/C1) • Junction connector (J/C2) • DLC3 sub bus line or connector • ECM • Battery ECU

WIRING DIAGRAM

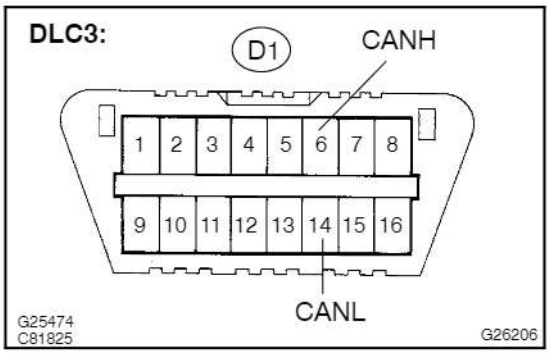
LHD:



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INSPECTION PROCEDURE

1	CHECK DLC3



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Result:

Tester connection	Condition	Specified value	Result
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω	A
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	132 Ω or more	B

NOTICE:

When the measured value is 132 Ω or more and the CAN communication system diagnostic code is output, there may be a fault besides disconnection of the DLC3 sub bus line. For that reason, troubleshooting should be performed again from "HOW TO PROCEED WITH TROUBLESHOOTING" (see page 05–2312) after repairing the trouble area.

B → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

A

2	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BUS CHECK)

(a) Perform "Communication Bus Check" using the intelligent tester II (see page 05–2328).

Result:

Specified Value	Result
Only "Engine" is not displayed	A
Only "HV Battery" is not displayed	B
Other	C

B → **Go to step 4**

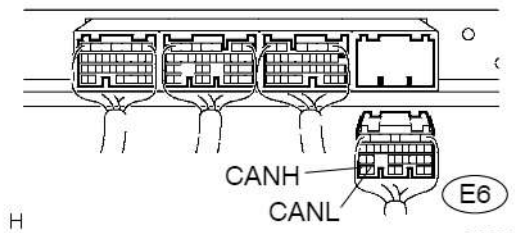
C → **Go to step 5**

A

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3 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(ECM – J/C2)

ECM Wire Harness View:



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	108 to 132 Ω

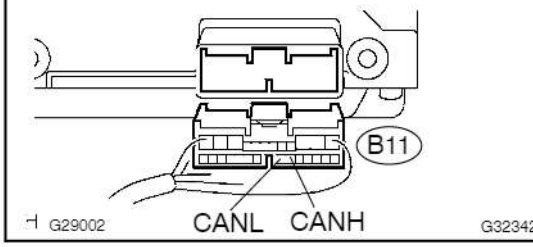
NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)**

OK

REPLACE ECM (SEE PAGE 10–24)

4 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BATTERY ECU – J/C1)

BATTERY ECU Wire Harness View:



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C1)**

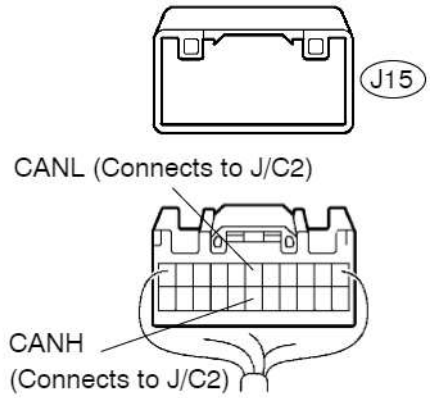
OK

REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)

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5 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(J/C1 – ECM)

Junction Connector (J/C1)
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J15–17 (CANH) – J15–6 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **Go to step 8**

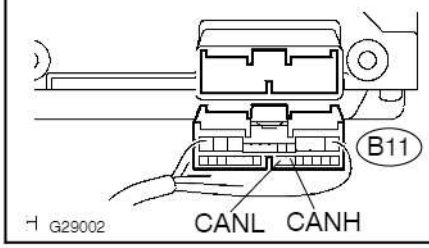
OK

6 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

7 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BATTERY ECU – J/C1)

BATTERY ECU Wire Harness View:



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C1)**

OK

REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)

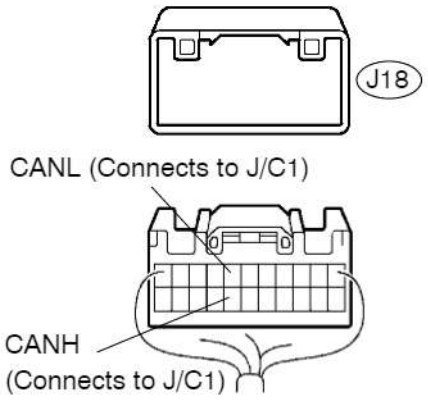
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8	CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

9	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(J/C2 – J/C1)

Junction Connector (J/C2)
Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J18–18 (CANH) – J18–7 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C2 – J/C1)**

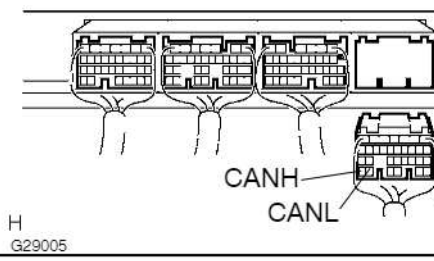
OK

10	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

11	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(ECM – J/C2)

ECM Wire Harness View:



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)**

OK

REPLACE ECM (SEE PAGE 10–24)

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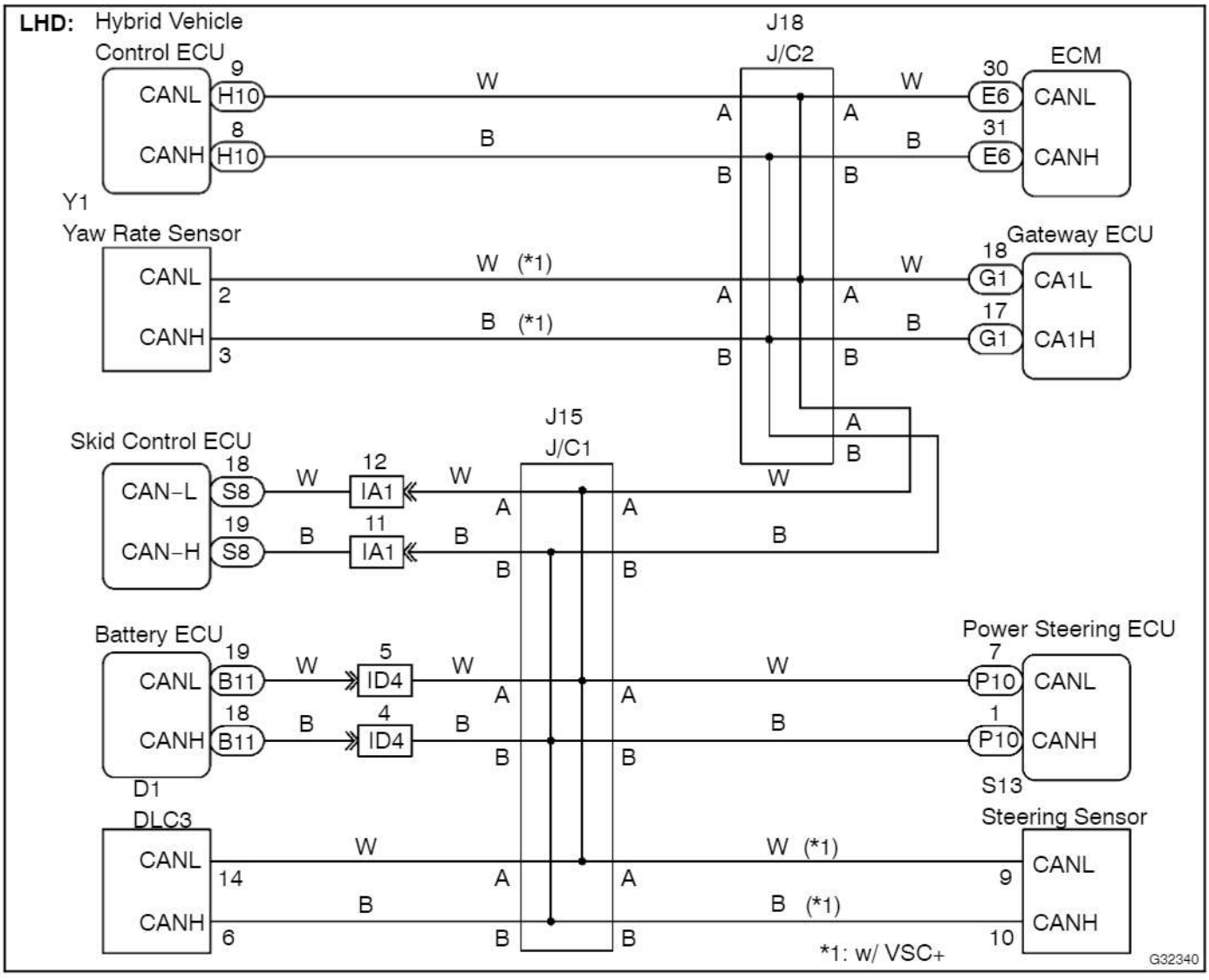
CHECK CAN BUS LINES FOR SHORT CIRCUIT (LHD)

CIRCUIT DESCRIPTION

There may be a short circuit between the CAN bus lines when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.	• Short between CAN bus lines • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU • Gateway ECU • Junction connector (J/C1) • Junction connector (J/C2)

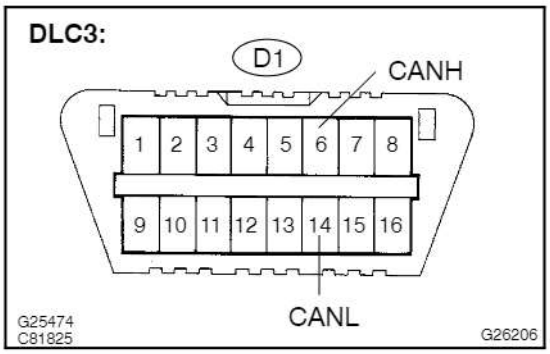
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK CAN BUS LINES FOR SHORT CIRCUIT(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	1 MΩ or more

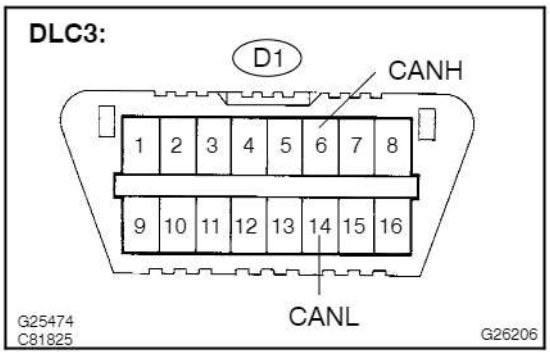
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CONNECT CONNECTOR

(a) Reconnect the J/C 1 connector (J15).

3	CHECK CAN BUS LINES FOR SHORT CIRCUIT(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

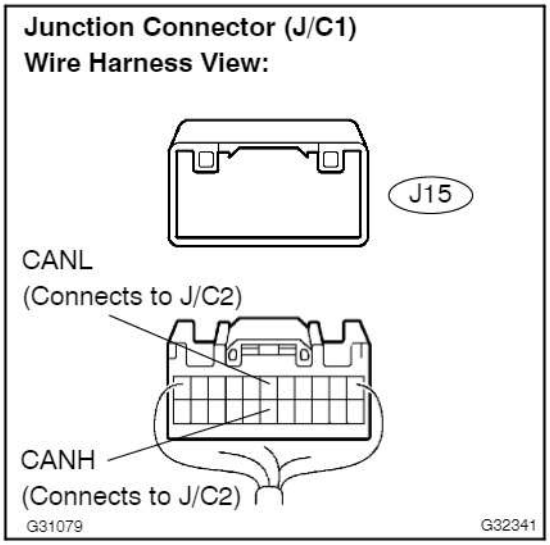
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

OK → **Go to step 17**

NG

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4 CHECK CAN BUS LINES FOR SHORT CIRCUIT(J/C1 – J/C2)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J15–17 (CANH) – J15–6 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the J/C2 connector (J18) disconnected.

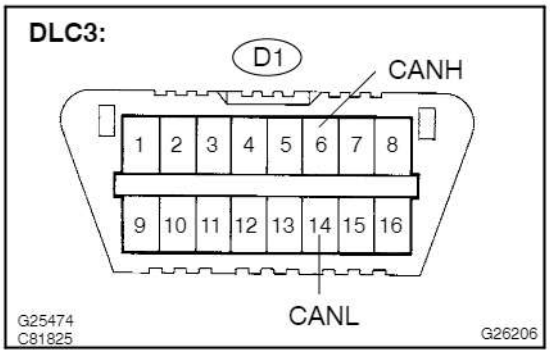
NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C1 – J/C2)**

OK

5 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15) and J/C2 connector (J18).

6 CHECK CAN BUS LINES FOR SHORT CIRCUIT(BATTERY ECU)



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

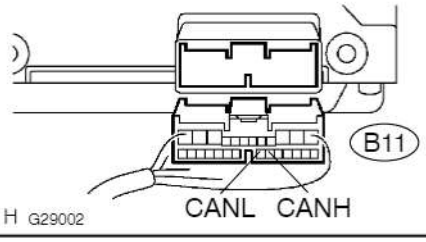
OK → **REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)**

NG

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7 CHECK CAN BUS LINES FOR SHORT CIRCUIT(BATTERY ECU – J/C1)

Battery ECU Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C1)**

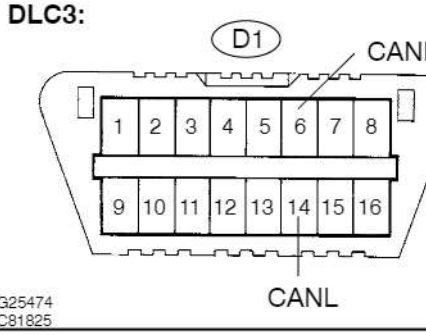
OK

8 CONNECT CONNECTOR

Reconnect the battery ECU connector (B11) and J/C1 connector (J15).

9 CHECK CAN BUS LINES FOR SHORT CIRCUIT(POWER STEERING ECU)

DLC3:



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

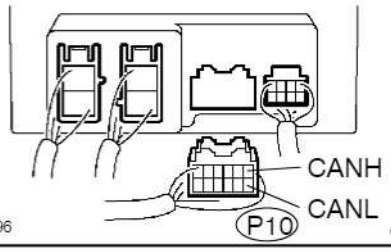
OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

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10	CHECK CAN BUS LINES FOR SHORT CIRCUIT(POWER STEERING ECU SUB BUS LINE)

Power Steering ECU
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P10–7 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (P10) disconnected.

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

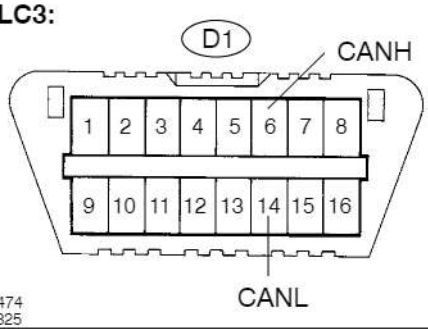
OK

11	CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P10) and J/C1 connector (J15).

12	CHECK CAN BUS LINES FOR SHORT CIRCUIT(STEERING SENSOR)

DLC3:



NOTICE:
For vehicles without VSC+, go to step 15.

(a) Disconnect the steering sensor connector (S13).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

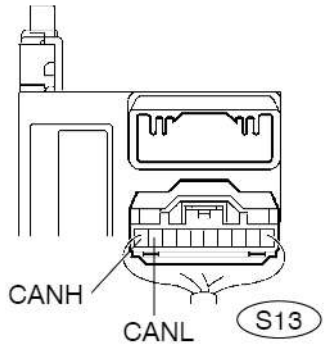
OK → **REPLACE STEERING SENSOR (SEE PAGE 32–85)**

NG

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13 CHECK CAN BUS LINES FOR SHORT CIRCUIT(STEERING SENSOR SUB BUS LINE)

Steering Sensor Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–9 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

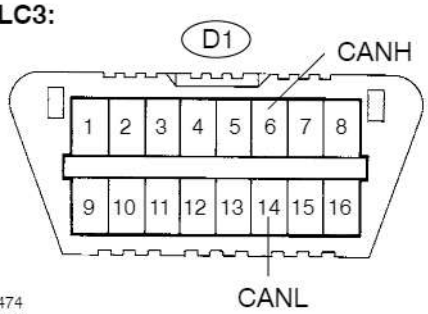
OK

14 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

15 CHECK CAN BUS LINES FOR SHORT CIRCUIT(SKID CONTROL ECU)

DLC3:



(a) Disconnect the skid control ECU connector (S8).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

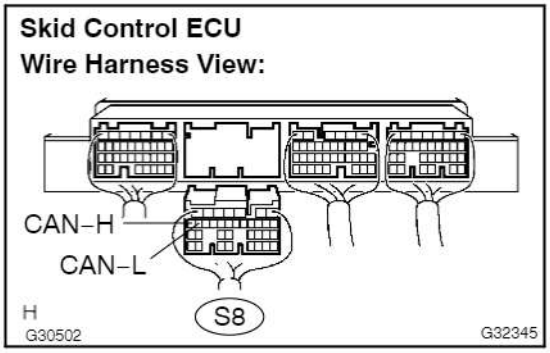
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)**

NG

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16	CHECK CAN BUS LINES FOR SHORT CIRCUIT(SKID CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S8–18 (CAN–L)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

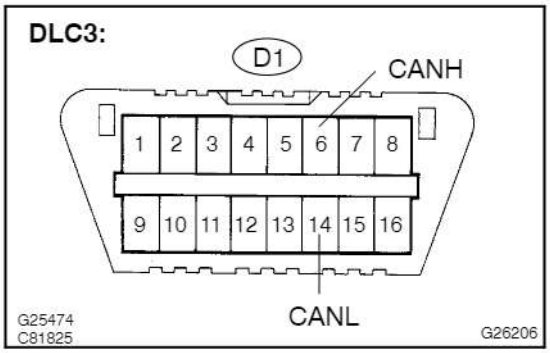
OK

REPLACE JUNCTION CONNECTOR (J/C1)

17	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

18	CHECK CAN BUS LINES FOR SHORT CIRCUIT(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

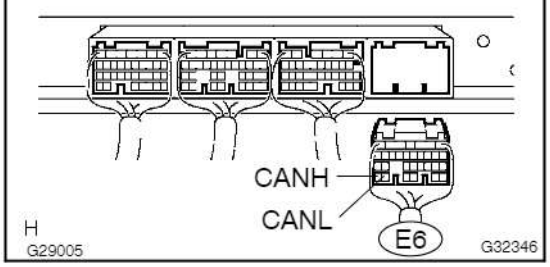
OK → **REPLACE ECM (SEE PAGE 10–24)**

NG

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19 CHECK CAN BUS LINES FOR SHORT CIRCUIT(ECM – J/C2)

ECM Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with ECM the connector (E6) disconnected.

NG	**REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)**

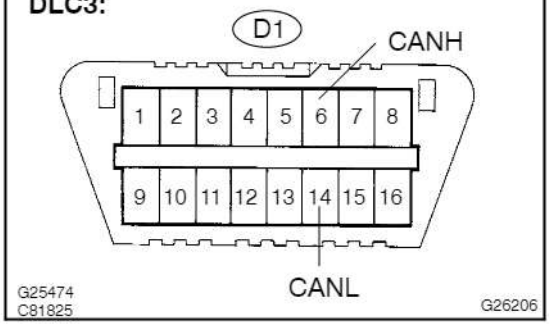
OK

20 CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C2 connector (J18).

21 CHECK CAN BUS LINES FOR SHORT CIRCUIT(YAW RATE SENSOR)

DLC3:



NOTICE:
For vehicles without VSC+, go to step 24.

(a) Disconnect the yaw rate sensor connector (Y1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

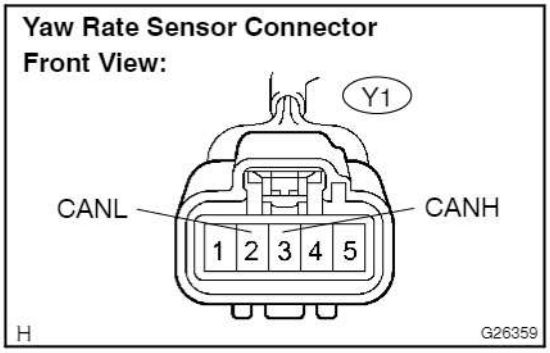
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

OK	**REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

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22	CHECK CAN BUS LINES FOR SHORT CIRCUIT(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – Y1–2 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

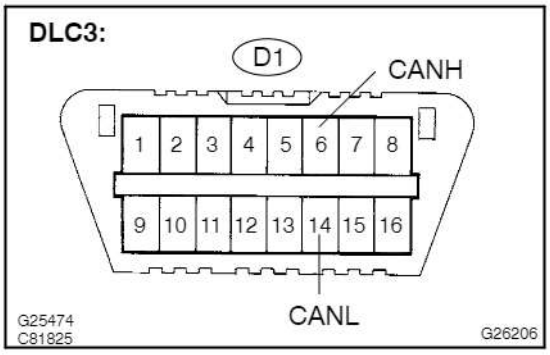
NG	REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

OK

23	CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connecter (J18).

24	CHECK CAN BUS LINES FOR SHORT CIRCUIT(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

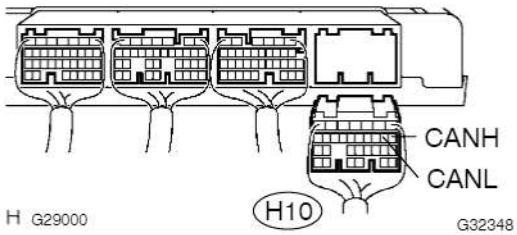
OK	REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

NG

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25	CHECK CAN BUS LINES FOR SHORT CIRCUIT(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)

Hybrid Vehicle Control ECU Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H10–9 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

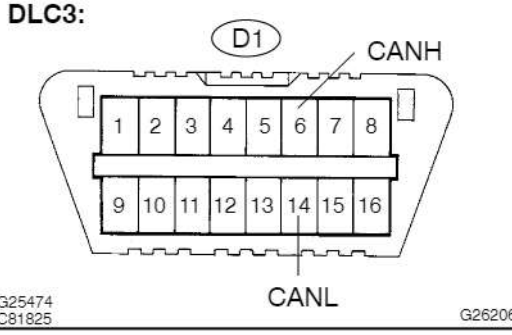
OK

26	CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

27	CHECK CAN BUS LINES FOR SHORT CIRCUIT(GATEWAY ECU)

DLC3:



(a) Disconnect the gateway ECU connector (G1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

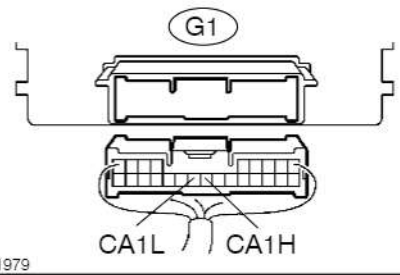
OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

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28	CHECK CAN BUS LINES FOR SHORT CIRCUIT(GATEWAY ECU SUB BUS LINE)

Gateway ECU Wire Harness View:



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
G1–17 (CA1H) – G1–18 (CA1L)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the gateway ECU connector (G1) disconnected.

NG → **REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR**

OK

REPLACE JUNCTION CONNECTOR (J/C2)

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CHECK CAN BUS LINE FOR SHORT TO +B (LHD)

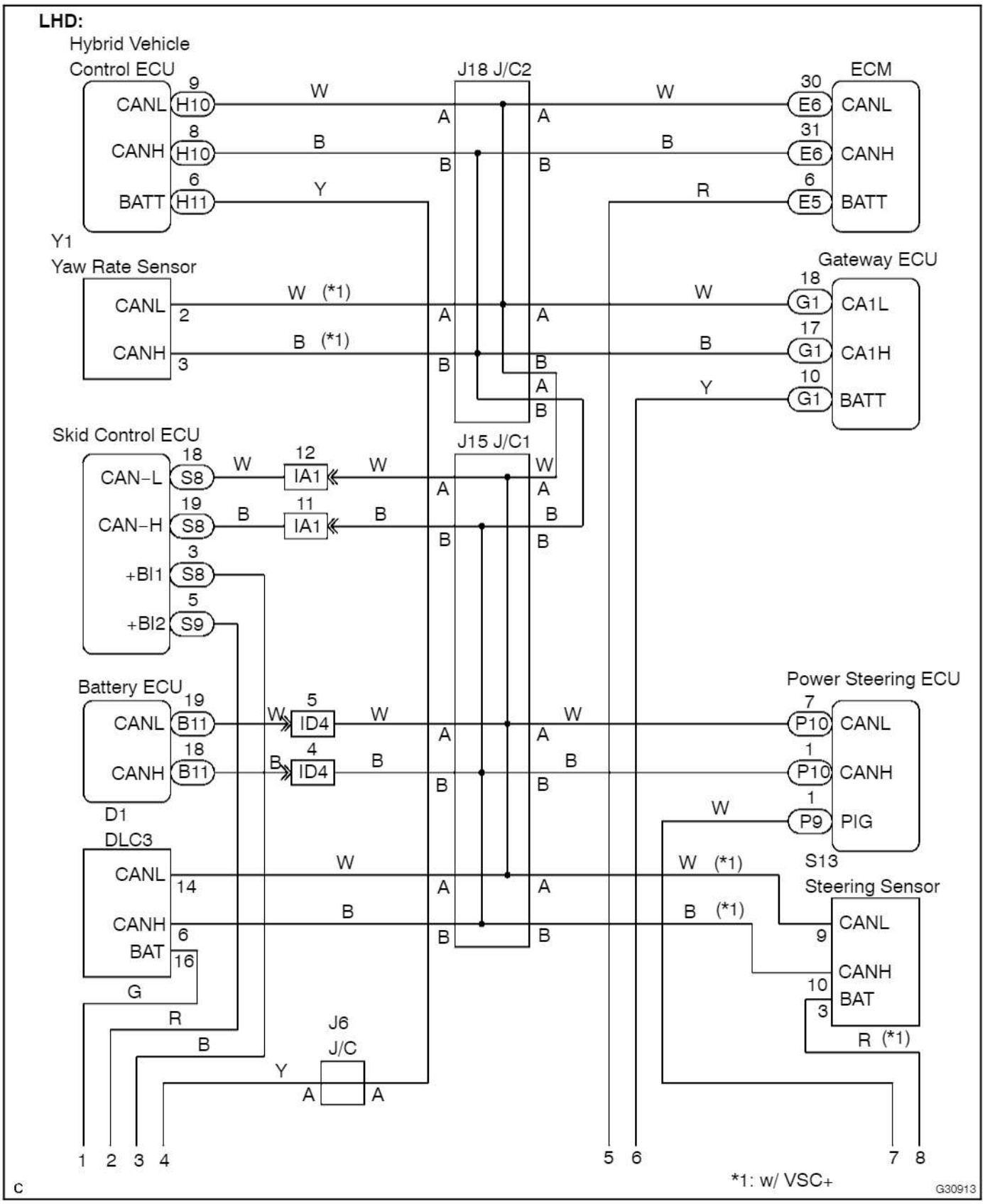
CIRCUIT DESCRIPTION

There may be a short circuit between the CAN bus line and +B when there is resistance between terminals 6 (CANH) and 16 (BAT) or terminals 14 (CANL) and 16 (BAT) of the DLC3.

Symptom	Trouble Area
There is resistance between terminals 6 (CANH) and 16 (BAT) or terminals 14 (CANL) and 16 (BAT) of the DLC3.	• Short to +B • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU

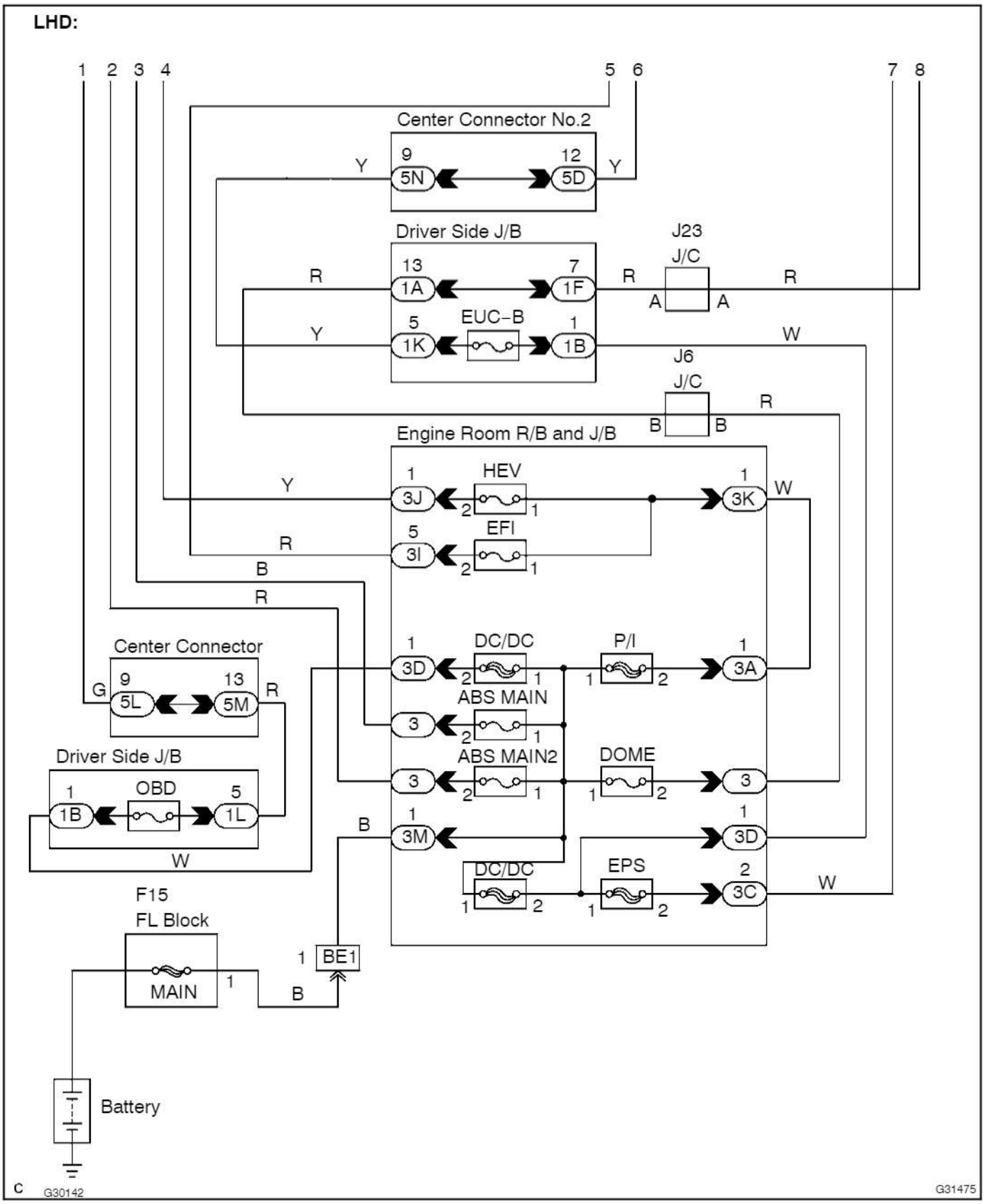
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WIRING DIAGRAM



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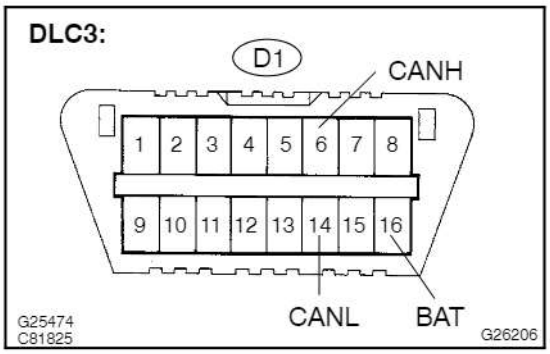
LHD:



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INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO +B(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

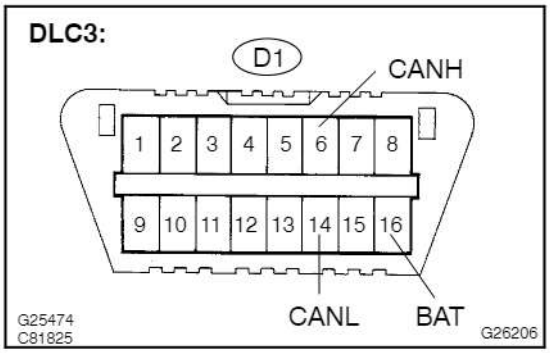
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

3 CHECK CAN BUS LINE FOR SHORT TO +B(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **Go to step 16**

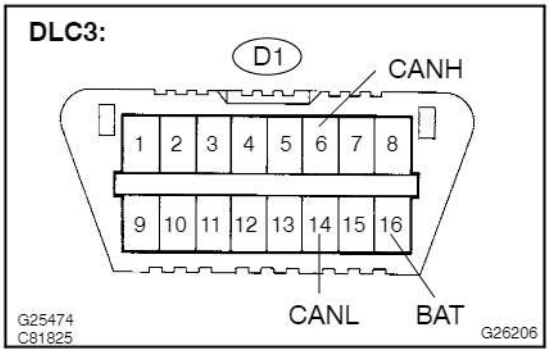
NG

4 CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

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5 CHECK CAN BUS LINE FOR SHORT TO +B(BATTERY ECU)



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

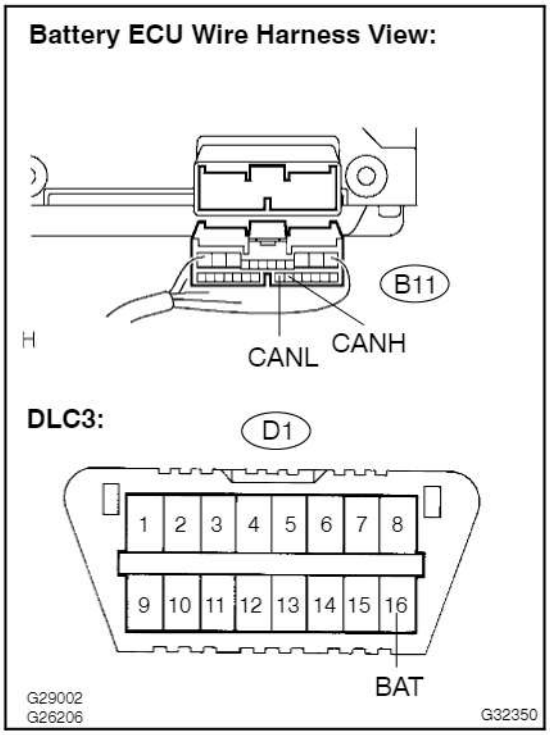
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)**

NG

6 CHECK CAN BUS LINE FOR SHORT TO +B(BATTERY ECU – J/C1)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
B11–19 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

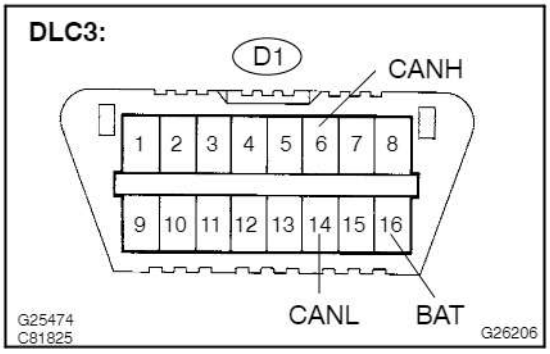
OK

7 CONNECT CONNECTOR

(a) Reconnect the battery ECU connector (B11) and J/C1 connector (J15).

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8 CHECK CAN BUS LINE FOR SHORT TO +B(POWER STEERING ECU)



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

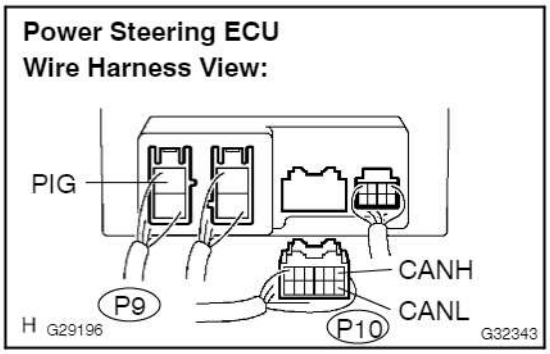
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

9 CHECK CAN BUS LINE FOR SHORT TO +B(POWER STEERING ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P9–1 (PIG)	Power Switch OFF	1 MΩ or more
P10–7 (CANL) – P9–1 (PIG)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (S10) disconnected.

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

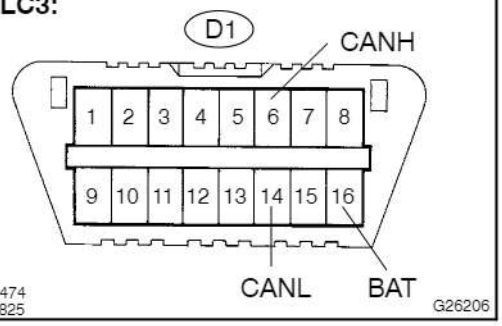
10 CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P10) and J/C1 connector (J15).

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11 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR)

DLC3:



NOTICE:

For vehicles without VSC+, go to step 14.

(a) Disconnect the steering sensor connector (S13).

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

Standard:

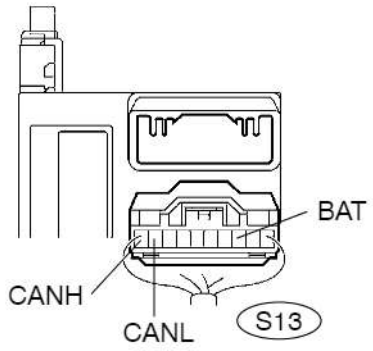
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32–85)**

NG

12 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR SUB BUS LINE)

Steering Sensor
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).

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

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–3 (BAT)	Power Switch OFF	1 MΩ or more
S13–9 (CANL) – S13–3 (BAT)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

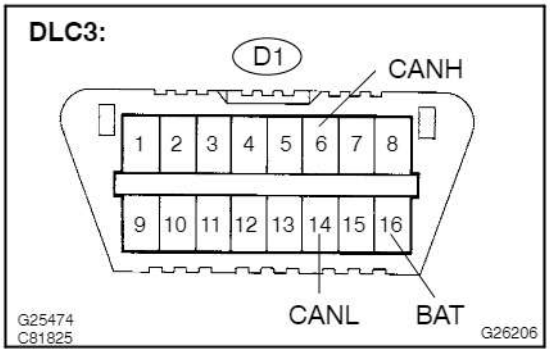
OK

13 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

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14 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector (A8).
(b) Measure the resistance according to the value(s) in the table below.

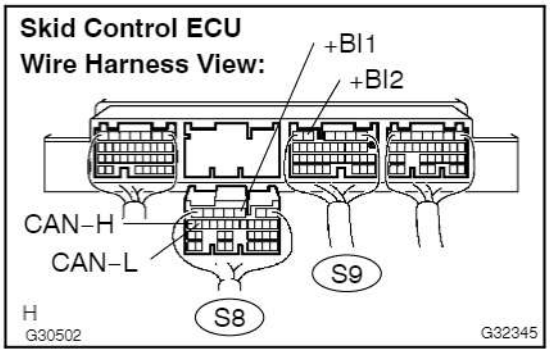
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)**

NG

15 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S8–3 (+BI1), S9–5 (+BI2)	Power Switch OFF	1 MΩ or more
S8–18 (CAN–L) – S8–3 (+BI1), S9–5 (+BI2)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

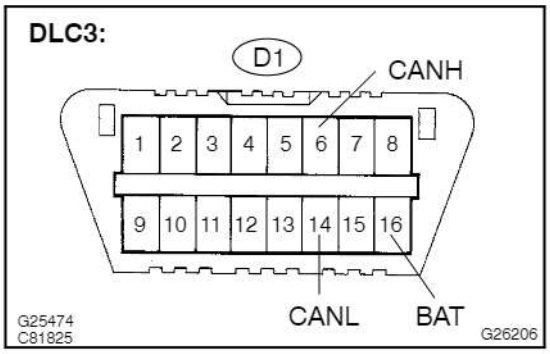
REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C1 – J/C2)

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16	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

17	CHECK CAN BUS LINE FOR SHORT TO +B(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

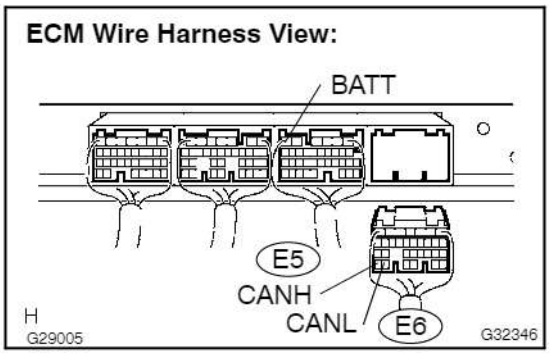
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK: REPLACE ECM (SEE PAGE 10–24)

NG

18	CHECK CAN BUS LINE FOR SHORT TO +B(ECM – J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E5–6 (BATT)	Power Switch OFF	1 MΩ or more
E6–30 (CANL) – E5–6 (BATT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the ECM connector (E6) disconnected.

NG: REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)

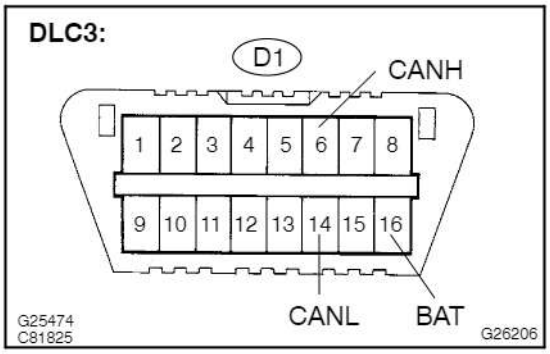
OK

19	CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C2 connector (J18).

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20 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR)



NOTICE:

For vehicles without VSC+, go to step 23.

(a) Disconnect the yaw rate sensor connector (Y1).

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

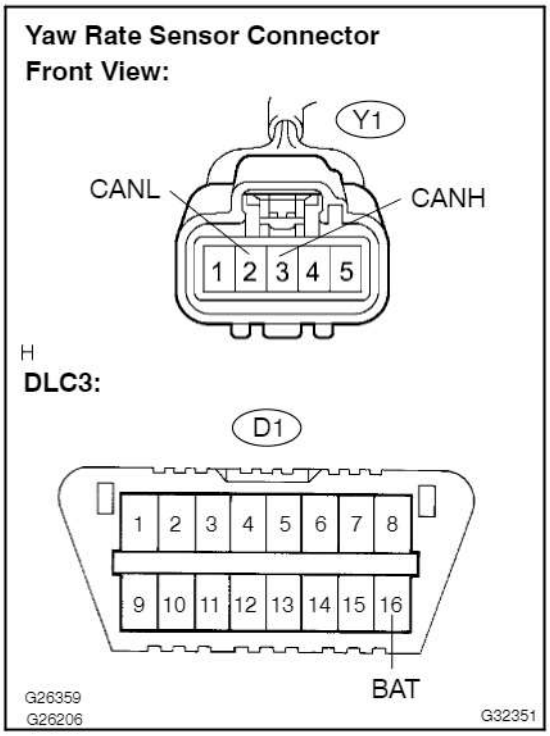
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

21 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
Y1–2 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

NG → **REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

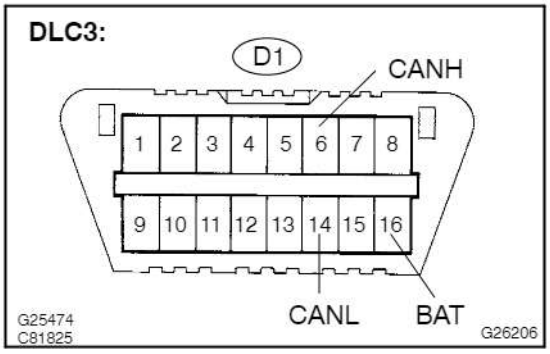
OK

22 CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connector (J18).

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23 CHECK CAN BUS LINE FOR SHORT TO +B(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).

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

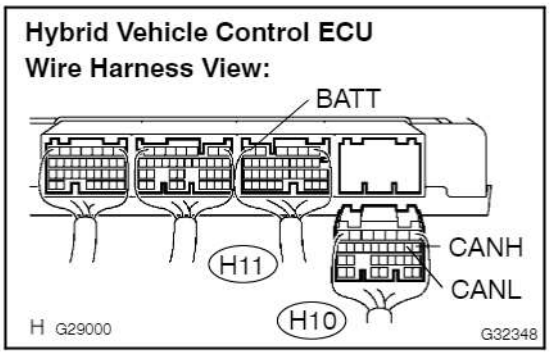
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE HYBRID VEHICLE CONTROL ECU (SEEF PAGE 21–128)**

NG

24 CHECK CAN BUS LINE FOR SHORT TO +B(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H11–6 (BATT)	Power Switch OFF	1 MΩ or more
H10–9 (CANL) – H11–6 (BATT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU connector (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

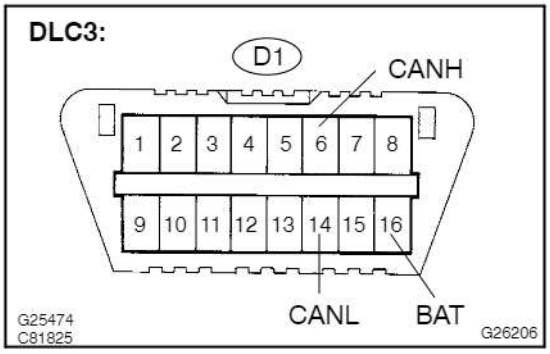
OK

25 CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

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26	CHECK CAN BUS LINE FOR SHORT TO +B(GATEWAY ECU)



(a) Disconnect the gateway ECU connector (G1).

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

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

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CHECK CAN BUS LINE FOR SHORT TO GND (LHD)

CIRCUIT DESCRIPTION

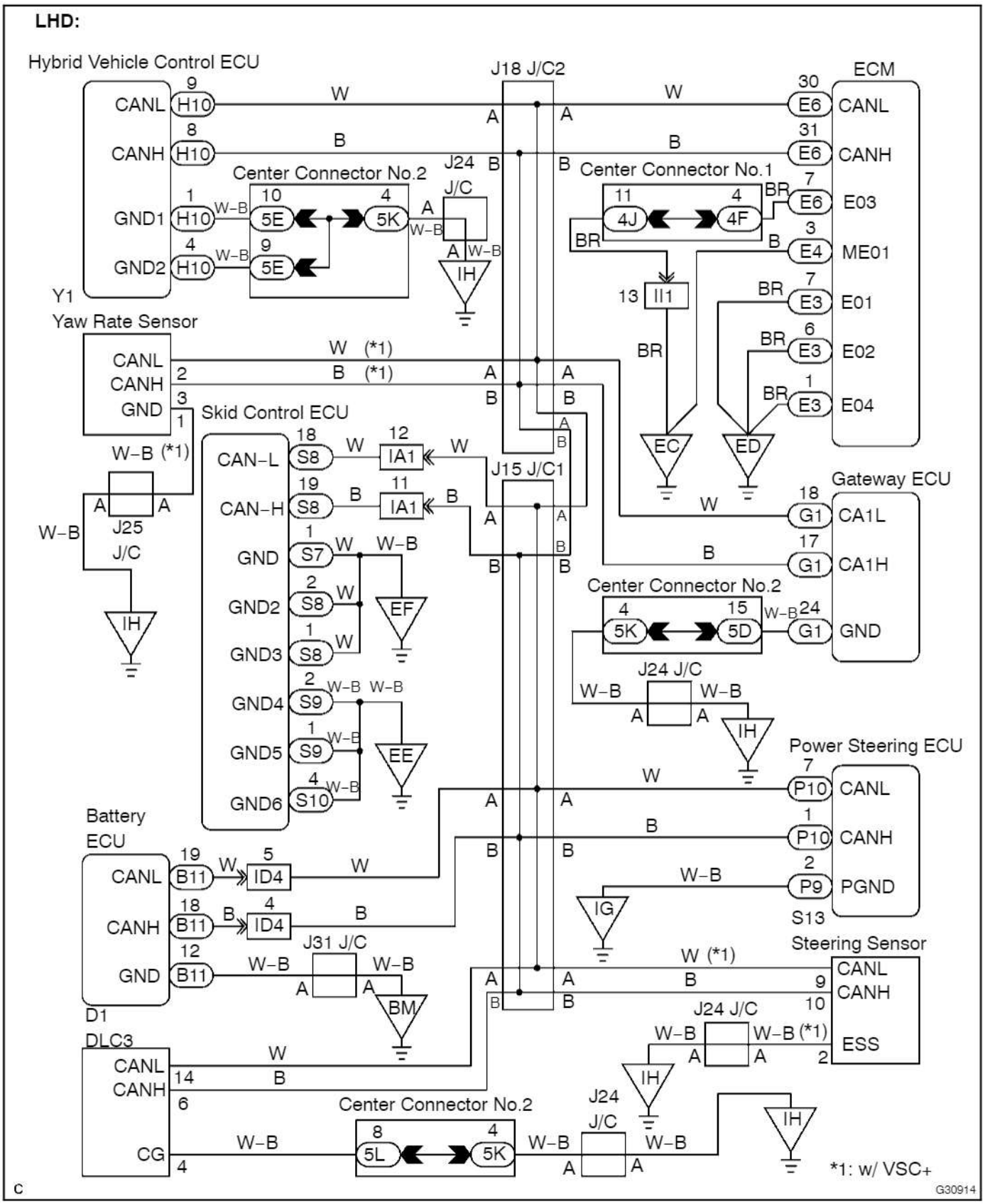
There may be a short circuit between the CAN bus line and GND when there is resistance between terminals 6 (CANH) and 4 (CG) or terminals 14 (CANL) and 4 (CG) of the DLC3.

Symptom	Trouble Area
There is resistance between terminals 6 (CANH) and 4 (CG) or terminals 14 (CANL) and 4 (CG) of the DLC3.	• Short to GND • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU

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WIRING DIAGRAM

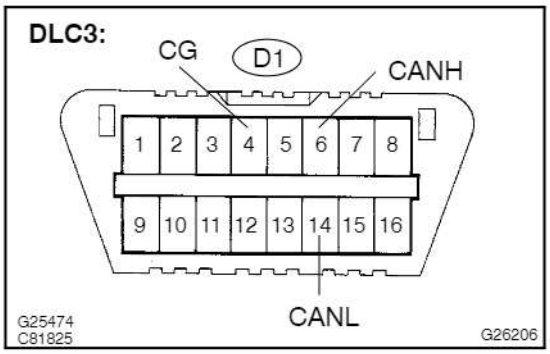
LHD:



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INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO GND(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 MΩ or more

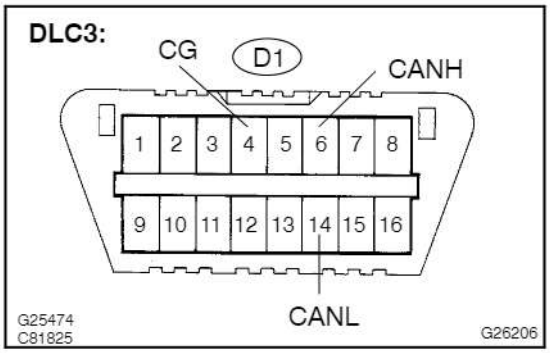
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

3 CHECK CAN BUS LINE FOR SHORT TO GND(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **Go to step 16**

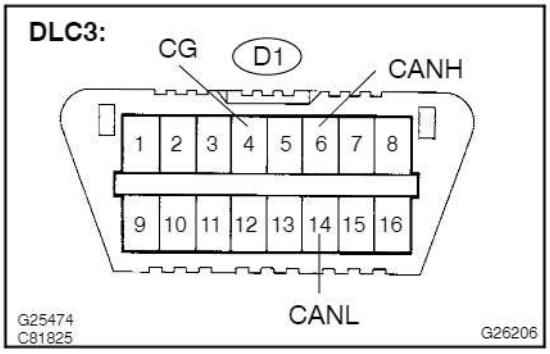
NG

4 CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

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5 CHECK CAN BUS LINE FOR SHORT TO GND(BATTERY ECU)



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

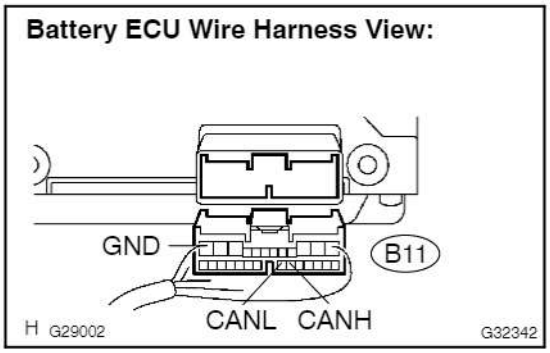
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)**

NG

6 CHECK CAN BUS LINE FOR SHORT TO GND(BATTERY ECU – J/C1)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–12 (GND)	Power Switch OFF	1 MΩ or more
B11–19 (CANL) – B11–12 (GND)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C1)**

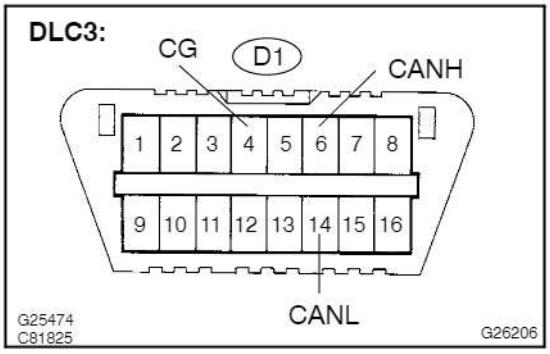
OK

7 CONNECT CONNECTOR

(a) Reconnect the battery ECU connector (B11) and J/C1 connector (J15).

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8 CHECK CAN BUS LINE FOR SHORT TO GND(POWER STEERING ECU)



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

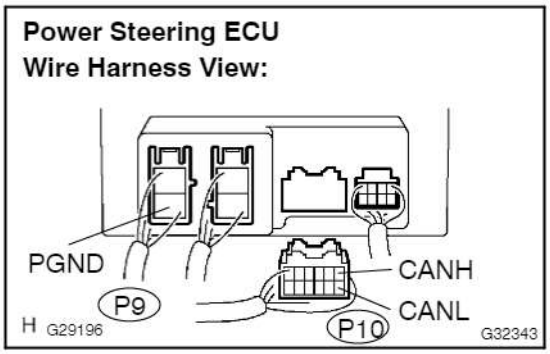
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

9 CHECK CAN BUS LINE FOR SHORT TO GND(POWER STEERING ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P9–2 (PGND)	Power Switch OFF	1 MΩ or more
P10–7 (CANL) – P9–2 (PGND)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (P10) disconnected.

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

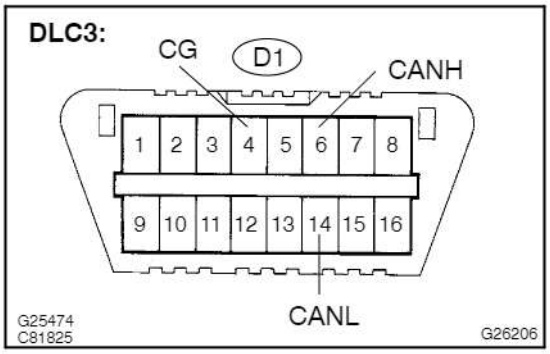
OK

10 CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P8) and J/C1 connector (J15).

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11 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR)



NOTICE:

For vehicles without VSC+, go to step 14.

(a) Disconnect the steering sensor connector (S13).

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

Standard:

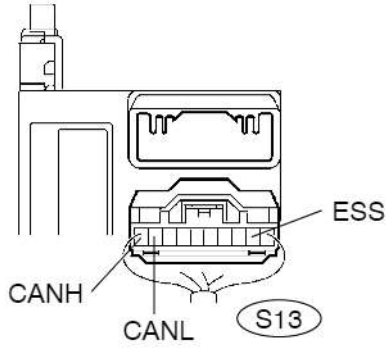
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32–85)**

NG

12 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR SUB BUS LINE)

Steering Sensor
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).

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

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–2 (ESS)	Power Switch OFF	1 MΩ or more
S13–9 (CANL) – S13–2 (ESS)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

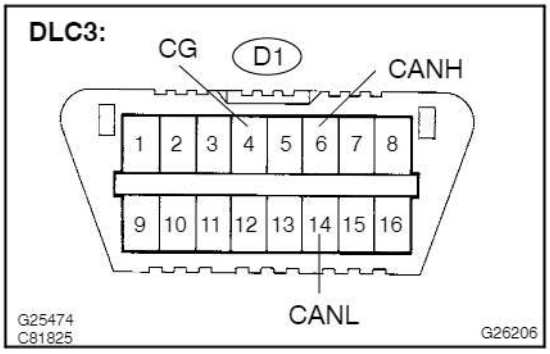
OK

13 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

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14 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector (S8).
(b) Measure the resistance according to the value(s) in the table below.

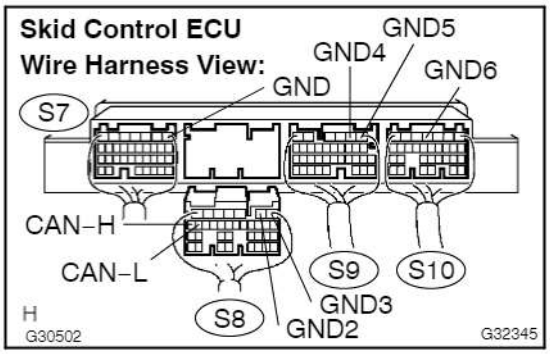
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)**

NG

15 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S7–1 (GND), S8–2 (GND2) S8–1 (GND3), S9–2 (GND4) S9–1 (GND5), S10–4 (GND6)	Power Switch OFF	1 MΩ or more
S8–18 (CAN–L) – S7–1 (GND), S8–2 (GND2) S8–1 (GND3), S9–2 (GND4) S9–1 (GND5), S10–4 (GND6)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

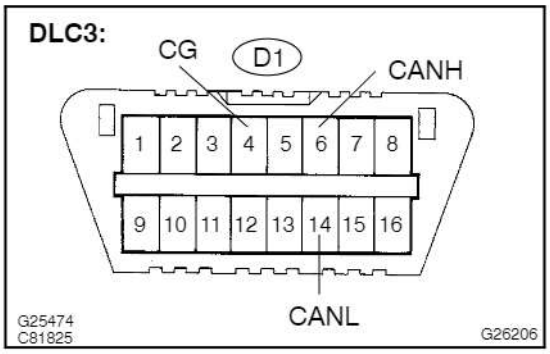
REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C1 – J/C2)

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16	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

17	CHECK CAN BUS LINE FOR SHORT TO GND(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

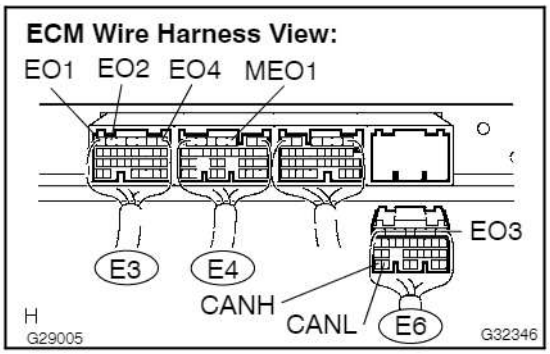
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE ECM (SEE PAGE 10–24)**

NG

18	CHECK CAN BUS LINE FOR SHORT TO GND(ECM – J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E3–7 (EO1), E3–6 (EO2) E6–7 (EO3), E3–1 (EO4) E4–3 (MEO1)	Power Switch OFF	1 MΩ or more
E6–30 (CANL) – E3–7 (EO1), E3–6 (EO2) E6–7 (EO3), E3–1 (EO4) E4–3 (MEO1)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the ECM connector (E6) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)**

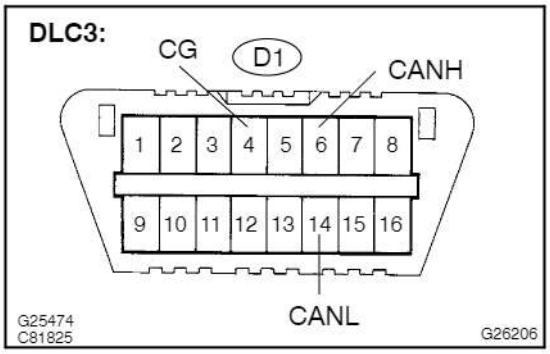
OK

19	CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C2 connector (J18).

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20 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SENSOR)



NOTICE:

For vehicles without VSC+, go to step 23.

(a) Disconnect the yaw rate sensor connector (Y1).

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

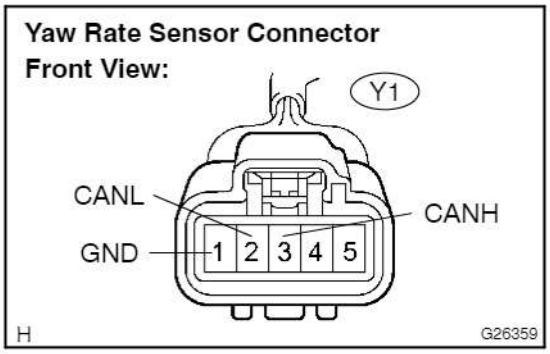
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

21 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – Y1–1 (GND)	Power Switch OFF	1 MΩ or more
Y1–2 (CANL) – Y1–1 (GND)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

NG → **REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

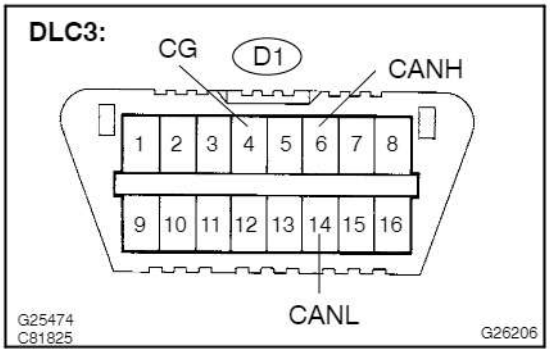
OK

22 CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connector (J18).

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23 CHECK CAN BUS LINE FOR SHORT TO GND(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).

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

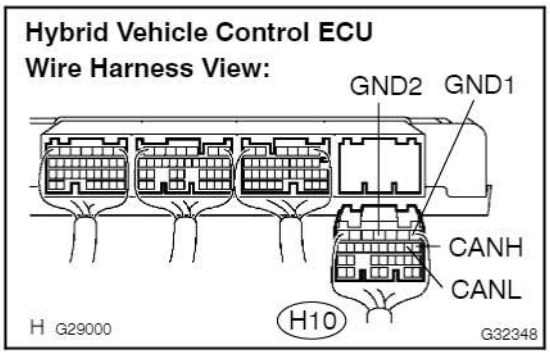
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)**

NG

24 CHECK CAN BUS LINE FOR SHORT TO GND(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H10–1 (GND1), H10–4 (GND2)	Power Switch OFF	1 MΩ or more
H10–9 (CANL) – H10–1 (GND1), H10–4 (GND2)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

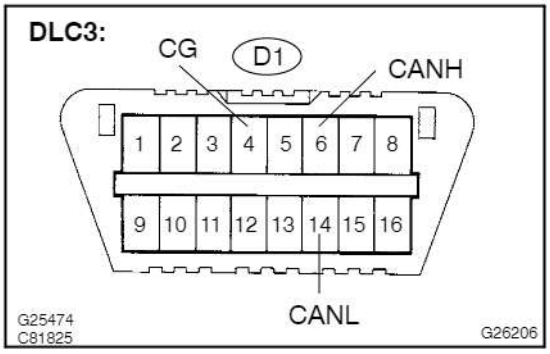
OK

25 CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

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26	CHECK CAN BUS LINE FOR SHORT TO GND(GATEWAY ECU)



(a) Disconnect the gateway ECU connector (G1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR(CAN–H, CAN–L)

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CHECK CAN MAIN BUS LINE FOR DISCONNECTION (RHD)

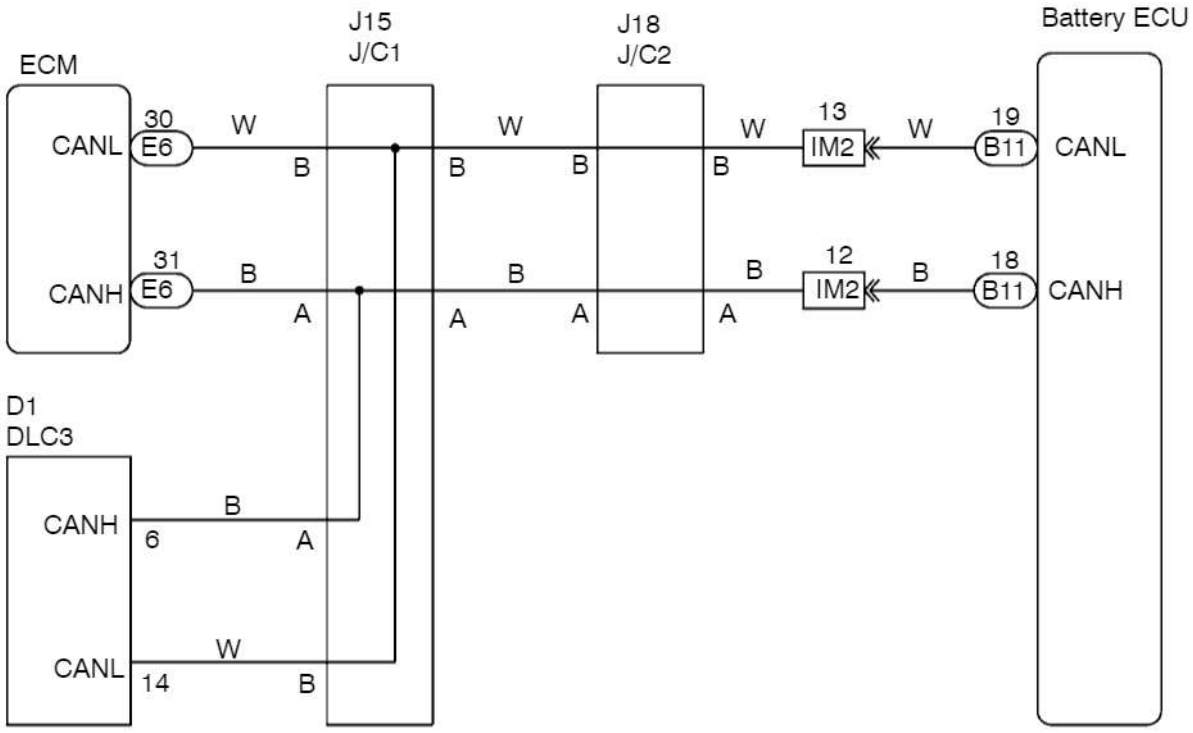
CIRCUIT DESCRIPTION

There may be an open circuit in the CAN bus main line and/or the DLC3 sub bus line when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.	• CAN main bus line or connector • Junction connector (J/C1) • Junction connector (J/C2) • DLC3 sub bus line or connector • ECM • Battery ECU

WIRING DIAGRAM

RHD:



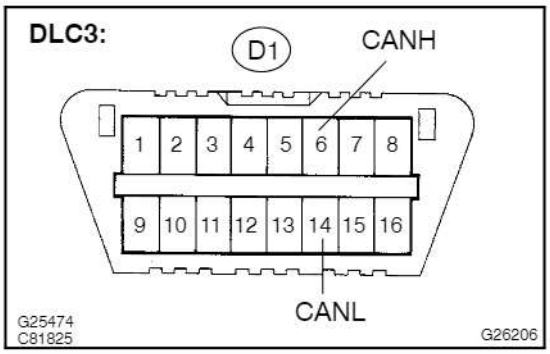
C

G31467

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INSPECTION PROCEDURE

1	CHECK DLC3



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Result:

Tester connection	Condition	Specified value	Result
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω	A
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	132 Ω or more	B

NOTICE:

When the measured value is 132 Ω or more and the CAN communication system diagnostic code is output, there may be a fault besides disconnection of the DLC3 sub bus line. For that reason, troubleshooting should be performed again from "HOW TO PROCEED WITH TROUBLESHOOTING" (see page 05–2312) after repairing the trouble area.

B → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

A

2	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BUS CHECK)

(a) Perform "Communication Bus Check" using the intelligent tester II (see page 05–2328).

Result:

Specified Value	Result
Only "Engine" is not displayed	A
Only "HV Battery" is not displayed	B
Other	C

B → **Go to step 4**

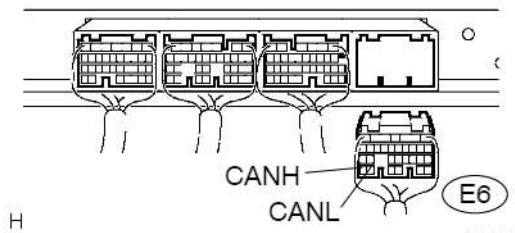
C → **Go to step 5**

A

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3 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(ECM – J/C1)

ECM Wire Harness View:



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	108 to 132 Ω

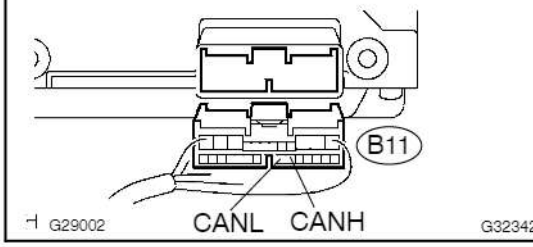
NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C1)**

OK

REPLACE ECM (SEE PAGE 10–24)

4 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BATTERY ECU – J/C2)

BATTERY ECU Wire Harness View:



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C2)**

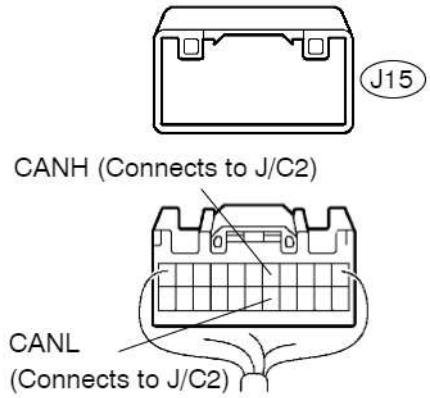
OK

REPLACE BATTERY ECU ASSY (SEE PAGE 21–128)

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5 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(J/C1 – BATTERY ECU)

Junction Connector (J/C1)
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J15–5 (CANH) – J15–16 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **Go to step 8**

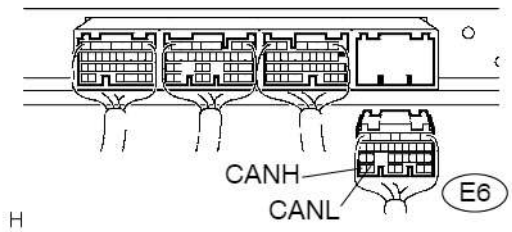
OK

6 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

7 CHECK CAN MAIN BUS LINE FOR DISCONNECTION(ECM – J/C1)

ECM Wire Harness View:



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C1)**

OK

REPLACE ECM (SEE PAGE 10–24)

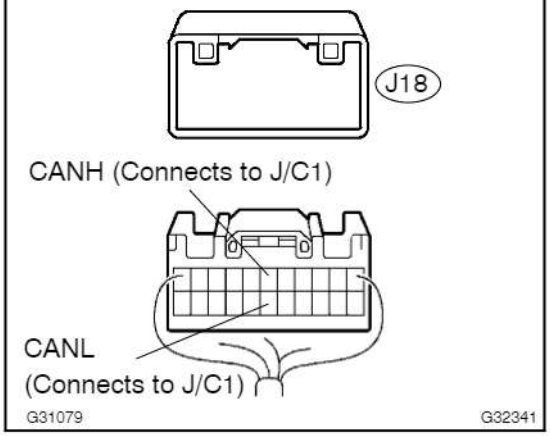
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8	CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

9	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(J/C2 – J/C1)

Junction Connector (J/C2)
Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J18–6 (CANH) – J18–17 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C2 – J/C1)**

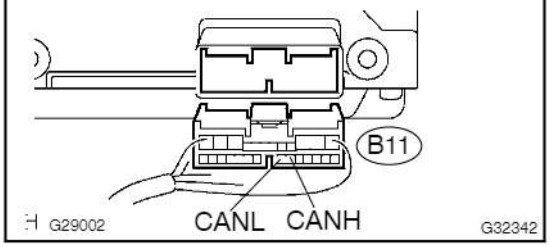
OK

10	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

11	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(BATTERY ECU – J/C2)

BATTERY ECU Wire Harness View:



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	108 to 132 Ω

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C2)**

OK

REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)

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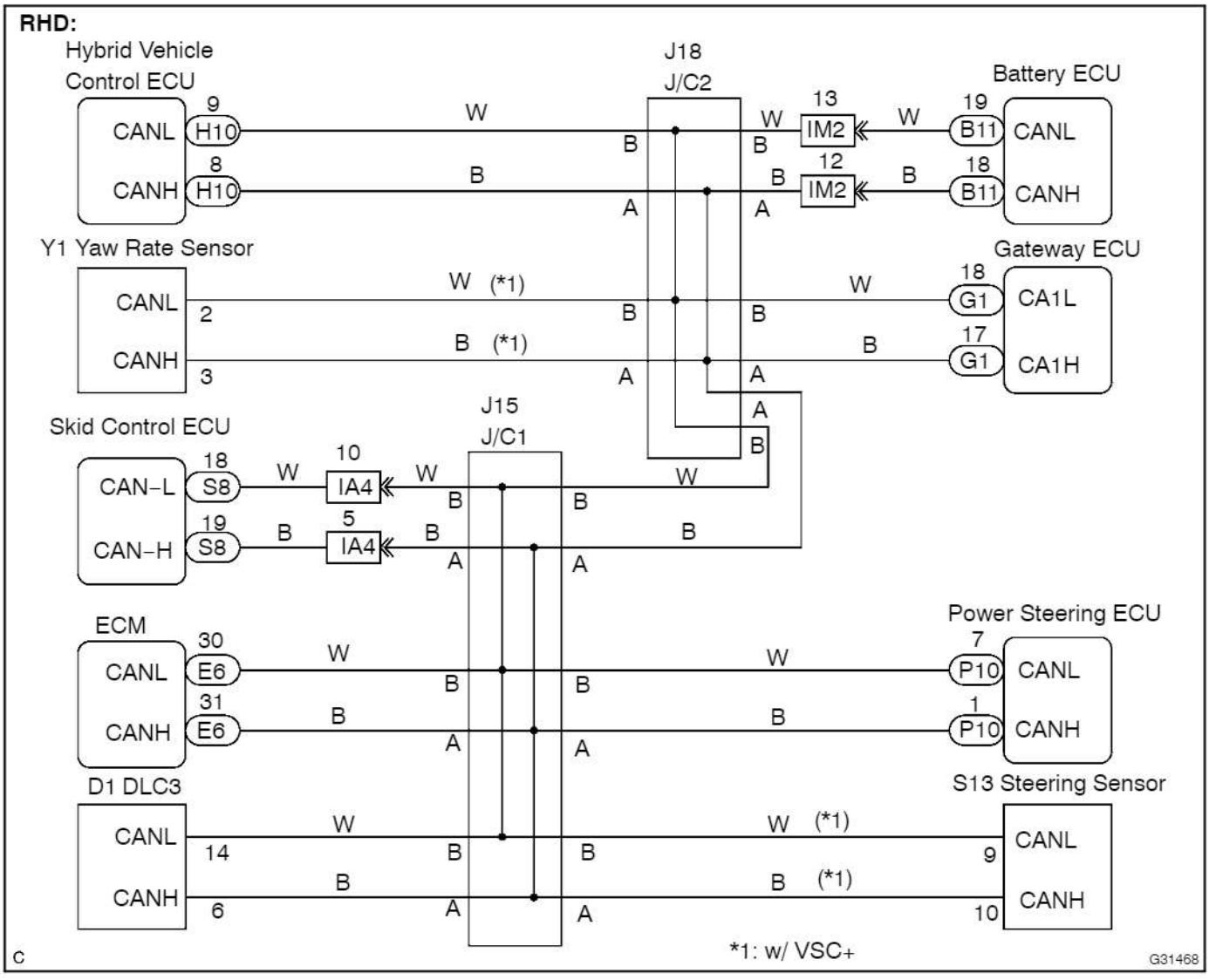
CHECK CAN BUS LINES FOR SHORT CIRCUIT (RHD)

CIRCUIT DESCRIPTION

There may be a short circuit between the CAN bus lines when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.	• Short between CAN bus lines • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU • Gateway ECU • Junction connector (J/C1) • Junction connector (J/C2)

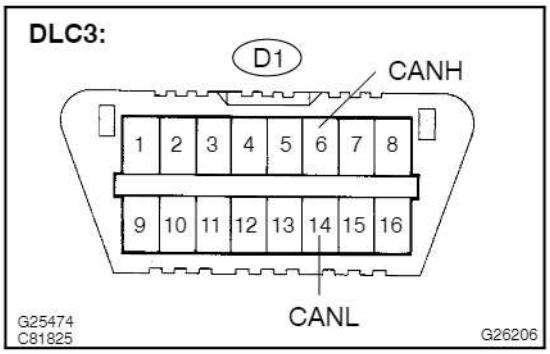
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK CAN BUS LINES FOR SHORT CIRCUIT(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	1 MΩ or more

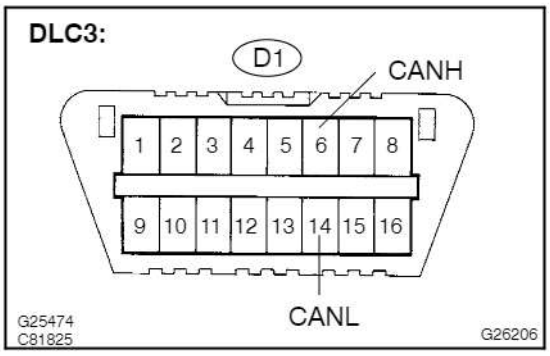
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2	CONNECT CONNECTOR

(a) Reconnect the J/C 1 connector (J15).

3	CHECK CAN BUS LINES FOR SHORT CIRCUIT(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

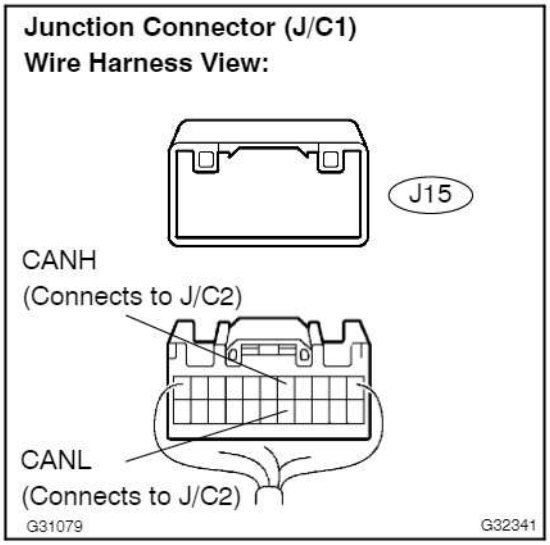
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

OK → **Go to step 17**

NG

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4 CHECK CAN BUS LINES FOR SHORT CIRCUIT(J/C1 – J/C2)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
J15–5 (CANH) – J15–16 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the J/C2 connector (J18) disconnected.

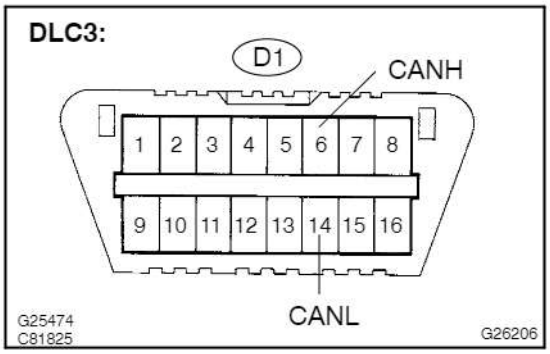
NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C1 – J/C2)**

OK

5 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15) and J/C2 connector (J18).

6 CHECK CAN BUS LINES FOR SHORT CIRCUIT(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

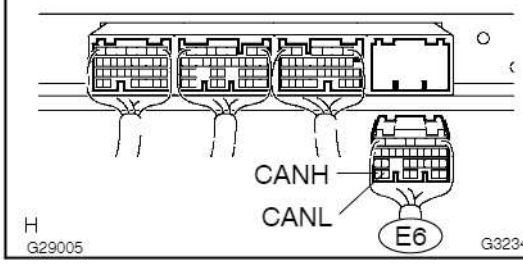
OK → **REPLACE ECM (SEE PAGE 10–24)**

NG

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7 CHECK CAN BUS LINES FOR SHORT CIRCUIT(ECM – J/C1)

ECM Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E6–30 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the ECM connector (E6) disconnected.

NG	**REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C1)**

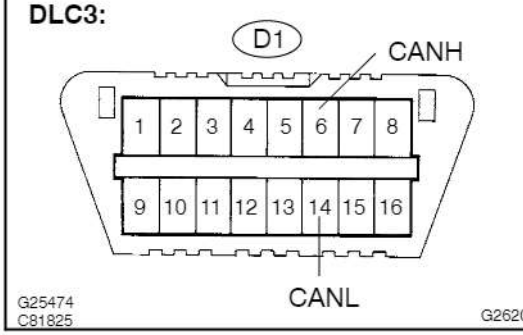
OK

8 CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C1 connector (J15).

9 CHECK CAN BUS LINES FOR SHORT CIRCUIT(POWER STEERING ECU)

DLC3:



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

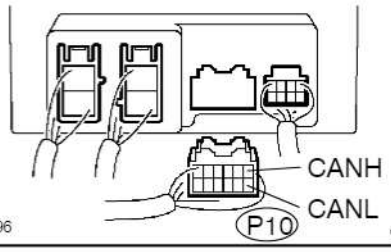
OK	**REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

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10	CHECK CAN BUS LINES FOR SHORT CIRCUIT(POWER STEERING ECU SUB BUS LINE)

Power Steering ECU
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P10–7 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (P10) disconnected.

NG	REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

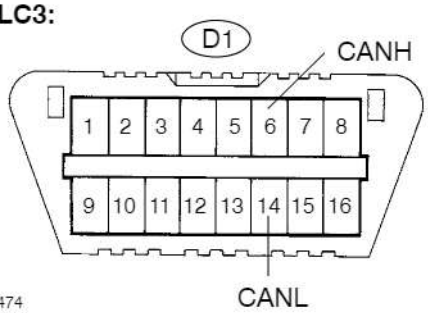
OK

11	CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P10) and J/C1 connector (J15).

12	CHECK CAN BUS LINES FOR SHORT CIRCUIT(STEERING SENSOR)

DLC3:



NOTICE:
For vehicles without VSC+, go to step 15.
(a) Disconnect the steering sensor connector (S13).
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

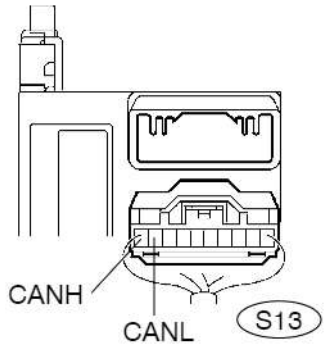
OK	REPLACE STEERING SENSOR (SEE PAGE 32–85)

NG

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13 CHECK CAN BUS LINES FOR SHORT CIRCUIT(STEERING SENSOR SUB BUS LINE)

Steering Sensor Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–9 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CANL)**

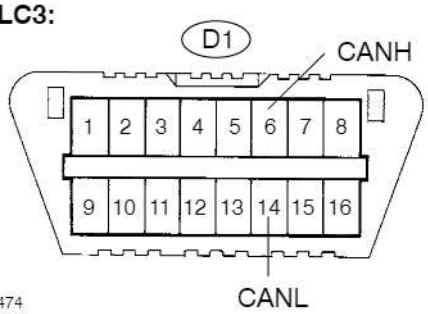
OK

14 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

15 CHECK CAN BUS LINES FOR SHORT CIRCUIT(SKID CONTROL ECU)

DLC3:



(a) Disconnect the skid control ECU connector (S8).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

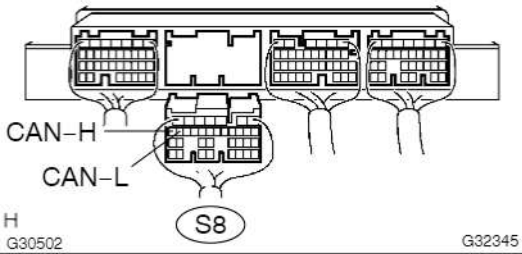
OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)**

NG

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16	CHECK CAN BUS LINES FOR SHORT CIRCUIT(SKID CONTROL ECU SUB BUS LINE)

Skid Control ECU
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S8–18 (CAN–L)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG	REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

OK

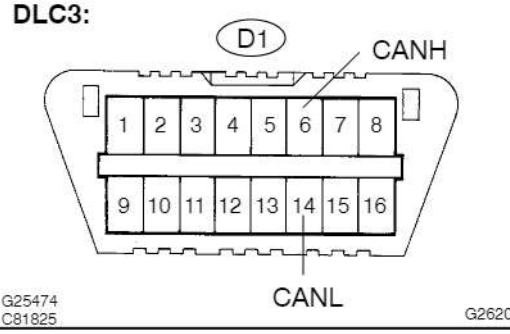
REPLACE JUNCTION CONNECTOR (J/C1)

17	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

18	CHECK CAN BUS LINES FOR SHORT CIRCUIT(BATTERY ECU)

DLC3:



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	108 to 132 Ω

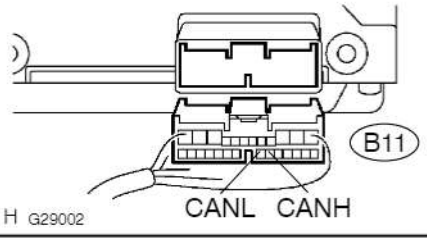
OK	REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)

NG

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19 CHECK CAN BUS LINES FOR SHORT CIRCUIT(BATTERY ECU – J/C2)

Battery ECU Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–19 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG	**REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C2)**

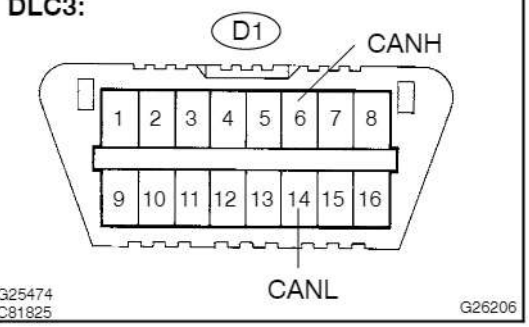
OK

20 CONNECT CONNECTOR

Reconnect the battery ECU connector (B11) and J/C2 connector (J18).

21 CHECK CAN BUS LINES FOR SHORT CIRCUIT(YAW RATE SENSOR)

DLC3:



NOTICE:
For vehicles without VSC+, go to step 24.

(a) Disconnect the yaw rate sensor connector (Y1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

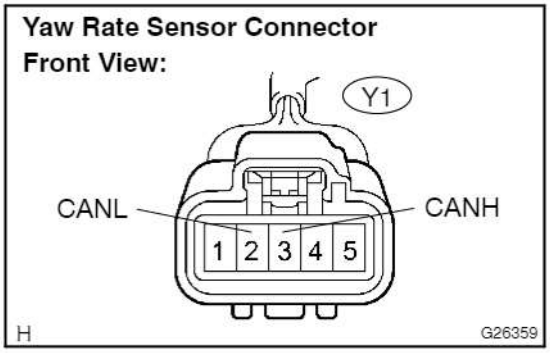
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

OK	**REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

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22	CHECK CAN BUS LINES FOR SHORT CIRCUIT(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – Y1–2 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

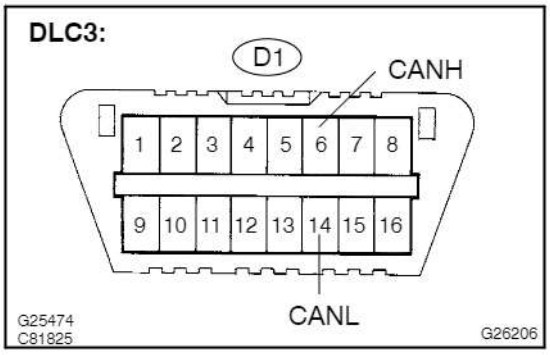
NG	REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

OK

23	CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connecter (J18).

24	CHECK CAN BUS LINES FOR SHORT CIRCUIT(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

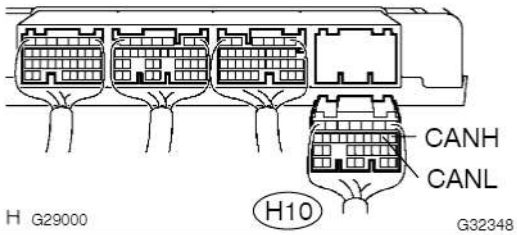
OK	REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

NG

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25	CHECK CAN BUS LINES FOR SHORT CIRCUIT(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)

Hybrid Vehicle Control ECU Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H10–9 (CANL)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

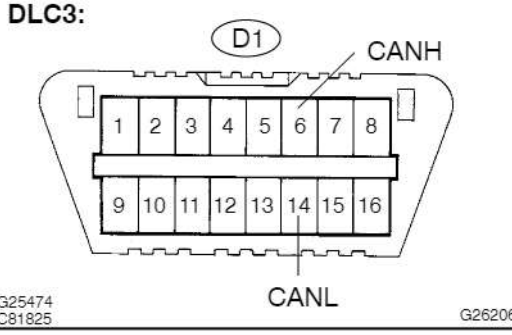
OK

26	CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

27	CHECK CAN BUS LINES FOR SHORT CIRCUIT(GATEWAY ECU)

DLC3:



(a) Disconnect the gateway ECU connector (G1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–14 (CANL)	Power Switch OFF	54 to 69 Ω

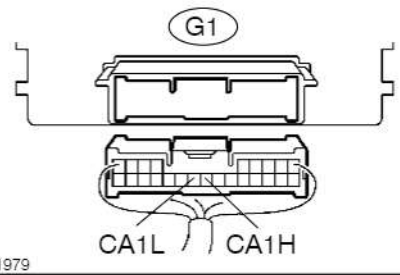
OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

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28	CHECK CAN BUS LINES FOR SHORT CIRCUIT(GATEWAY ECU SUB BUS LINE)

Gateway ECU Wire Harness View:



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
G1–17 (CA1H) – G1–18 (CA1L)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the gateway ECU connector (G1) disconnected.

NG → **REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

REPLACE JUNCTION CONNECTOR (J/C2)

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CHECK CAN BUS LINE FOR SHORT TO +B (RHD)

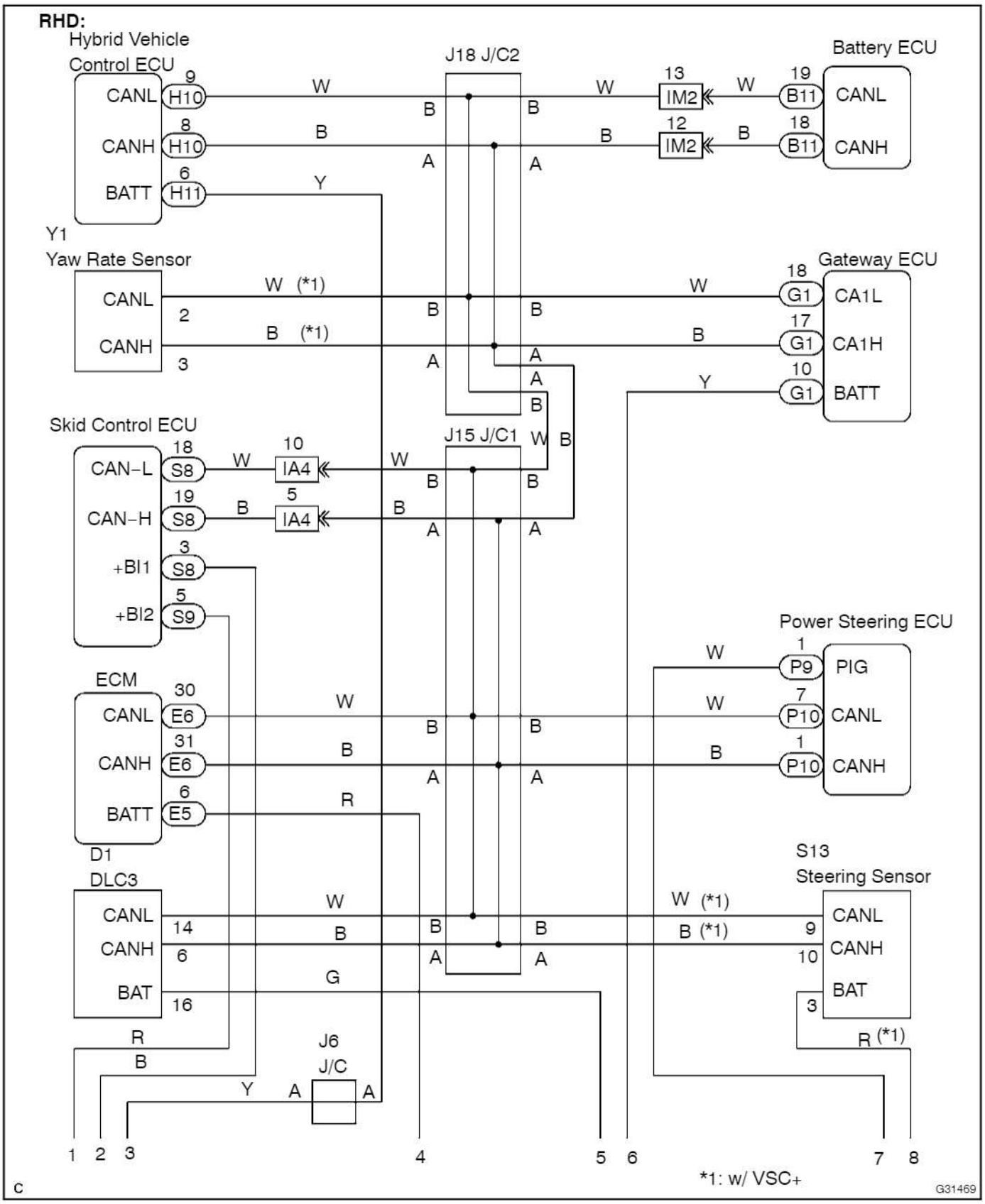
CIRCUIT DESCRIPTION

There may be a short circuit between the CAN bus line and +B when there is resistance between terminals 6 (CANH) and 16 (BAT) or terminals 14 (CANL) and 16 (BAT) of the DLC3.

Symptom	Trouble Area
There is resistance between terminals 6 (CANH) and 16 (BAT) or terminals 14 (CANL) and 16 (BAT) of the DLC3.	• Short to +B • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU

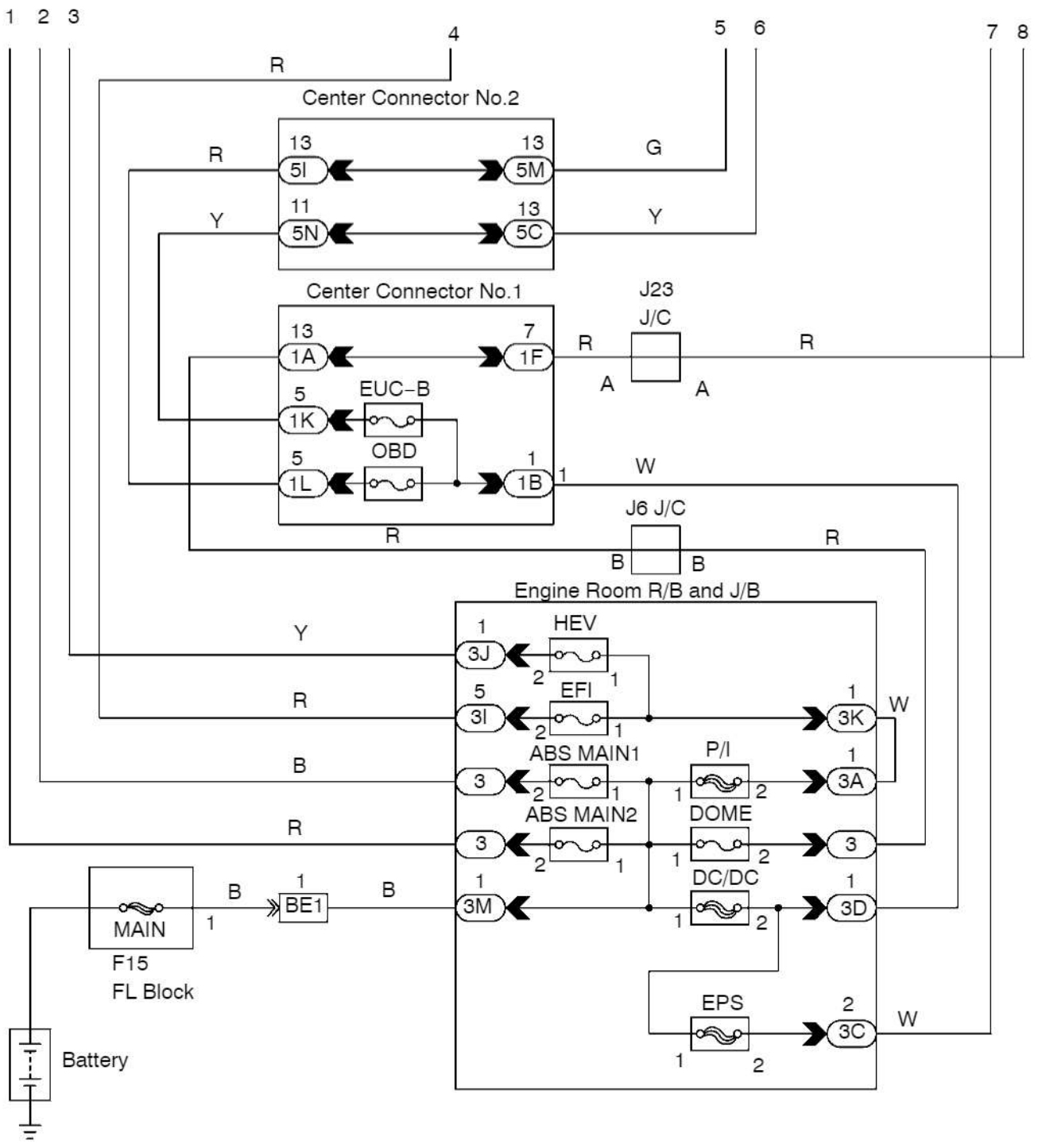
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WIRING DIAGRAM



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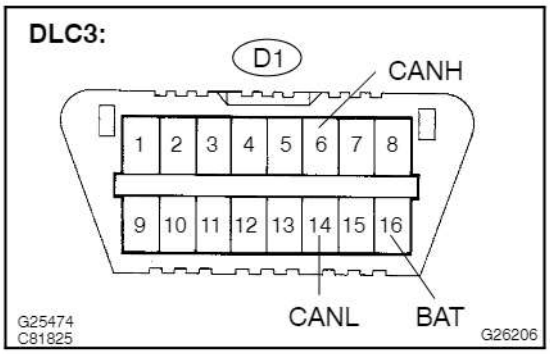
RHD:



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INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO +B(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

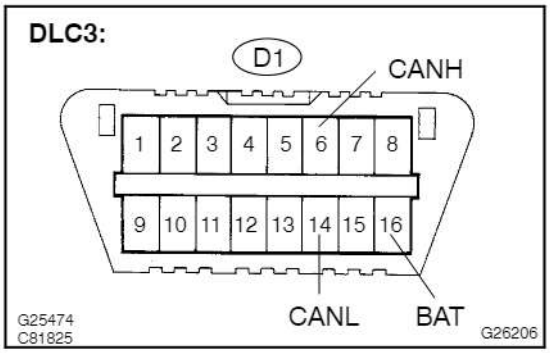
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

3 CHECK CAN BUS LINE FOR SHORT TO +B(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **Go to step 16**

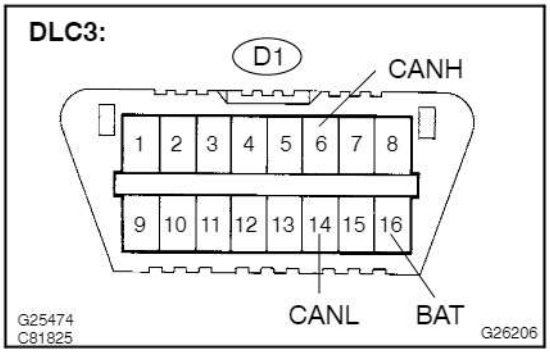
NG

4 CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

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5 CHECK CAN BUS LINE FOR SHORT TO +B(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

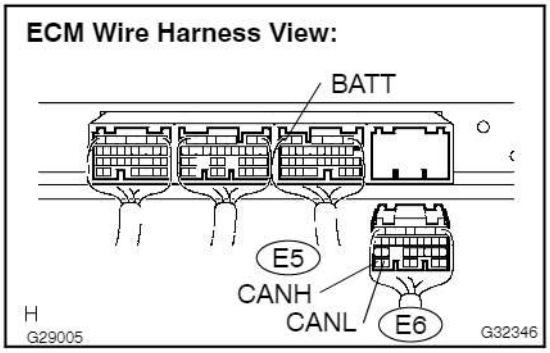
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE ECM (SEE PAGE 10–24)**

NG

6 CHECK CAN BUS LINE FOR SHORT TO +B(ECM – J/C1)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E5–6 (BATT)	Power Switch OFF	1 MΩ or more
E6–30 (CANL) – E5–6 (BATT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the ECM connector (E6) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C2)**

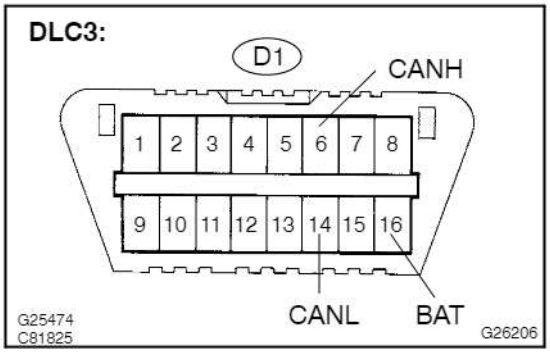
OK

7 CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C1 connector (J15).

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8 CHECK CAN BUS LINE FOR SHORT TO +B(POWER STEERING ECU)



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

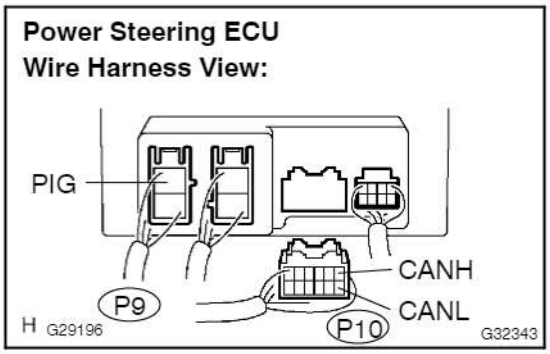
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

9 CHECK CAN BUS LINE FOR SHORT TO +B(POWER STEERING ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P9–1 (PIG)	Power Switch OFF	1 MΩ or more
P10–7 (CANL) – P9–1 (PIG)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (S10) disconnected.

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

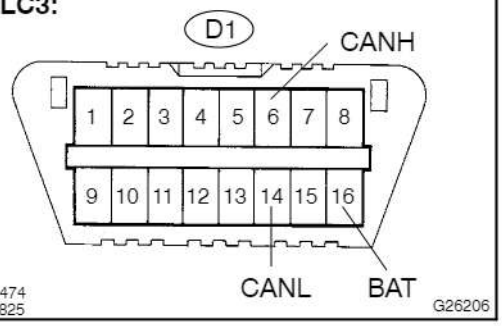
10 CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P10) and J/C1 connector (J15).

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11 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR)

DLC3:



NOTICE:

For vehicles without VSC+, go to step 14.

(a) Disconnect the steering sensor connector (S13).

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

Standard:

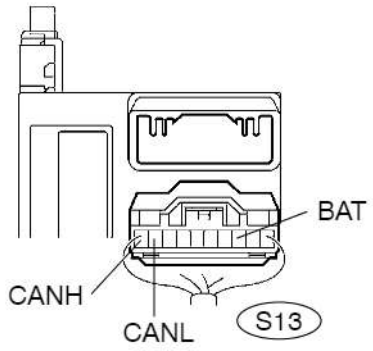
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32–85)**

NG

12 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR SUB BUS LINE)

Steering Sensor
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).

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

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–3 (BAT)	Power Switch OFF	1 MΩ or more
S13–9 (CANL) – S13–3 (BAT)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR**

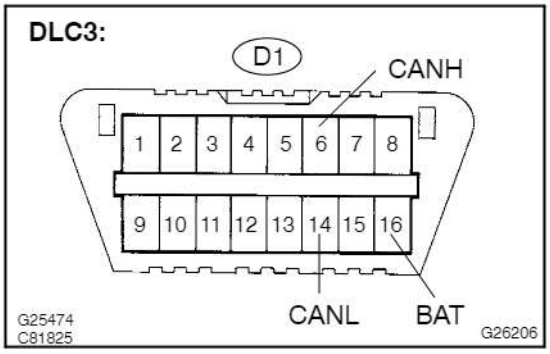
OK

13 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

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14 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector (A8).
(b) Measure the resistance according to the value(s) in the table below.

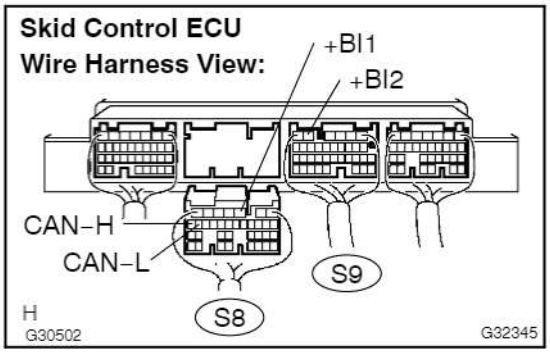
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81 OR 32–82)**

NG

15 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S8–3 (+BI1), S9–5 (+BI2)	Power Switch OFF	1 MΩ or more
S8–18 (CAN–L) – S8–3 (+BI1), S9–5 (+BI2)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CANL)**

OK

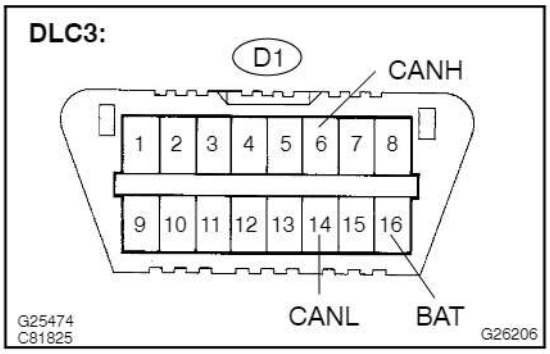
REPLACE CAN MAIN BUS LINE OR CONNECTOR (J/C1 – J/C2)

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16	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

17	CHECK CAN BUS LINE FOR SHORT TO +B(BATTERY ECU)



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

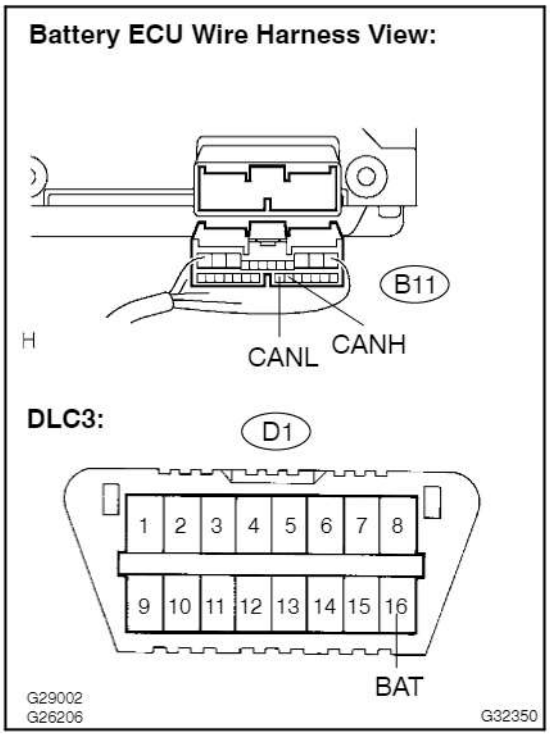
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)**

NG

18	CHECK CAN BUS LINE FOR SHORT TO +B(BATTERY ECU – J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
B11–19 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C2)**

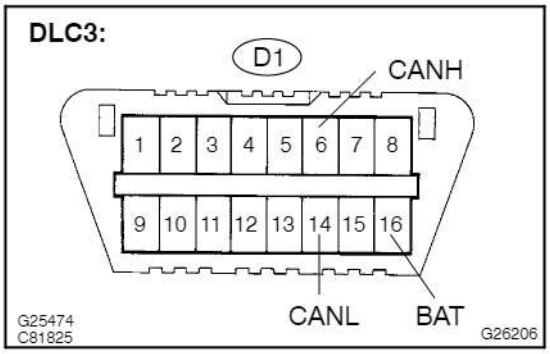
OK

19	CONNECT CONNECTOR

(a) Reconnect the battery ECU connector (B11) and J/C2 connector (J18).

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20 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR)



NOTICE:

For vehicles without VSC+, go to step 23.

(a) Disconnect the yaw rate sensor connector (Y1).

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

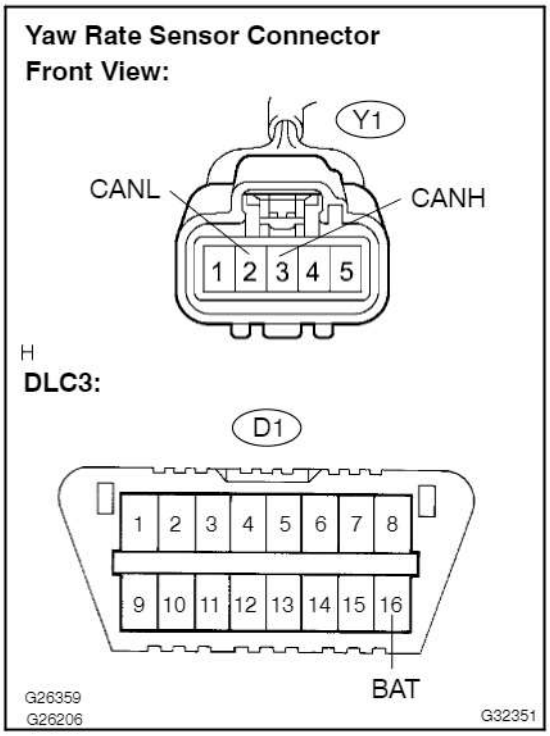
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

21 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
Y1–2 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

NG → **REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

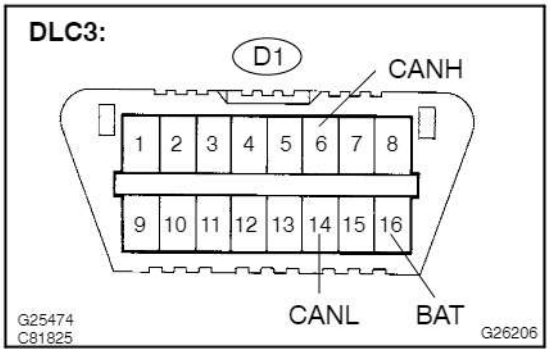
OK

22 CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connector (J18).

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23 CHECK CAN BUS LINE FOR SHORT TO +B(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).

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

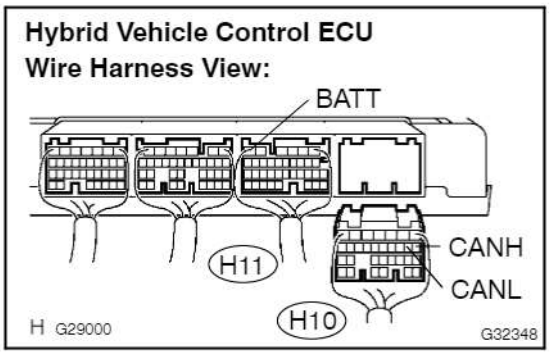
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)**

NG

24 CHECK CAN BUS LINE FOR SHORT TO +B(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H11–6 (BATT)	Power Switch OFF	1 MΩ or more
H10–9 (CANL) – H11–6 (BATT)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU connector (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

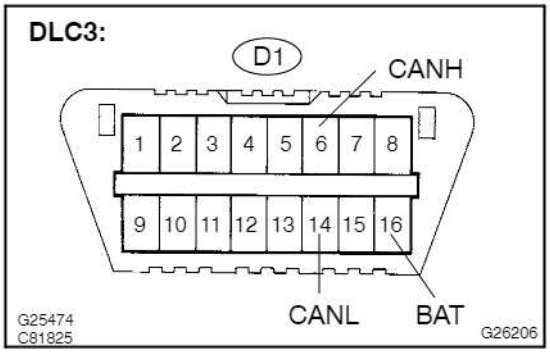
OK

25 CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

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26	CHECK CAN BUS LINE FOR SHORT TO +B(GATEWAY ECU)



(a) Disconnect the gateway ECU connector (G1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–16 (BAT)	Power Switch OFF	1 MΩ or more

OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

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CHECK CAN BUS LINE FOR SHORT TO GND (RHD)

CIRCUIT DESCRIPTION

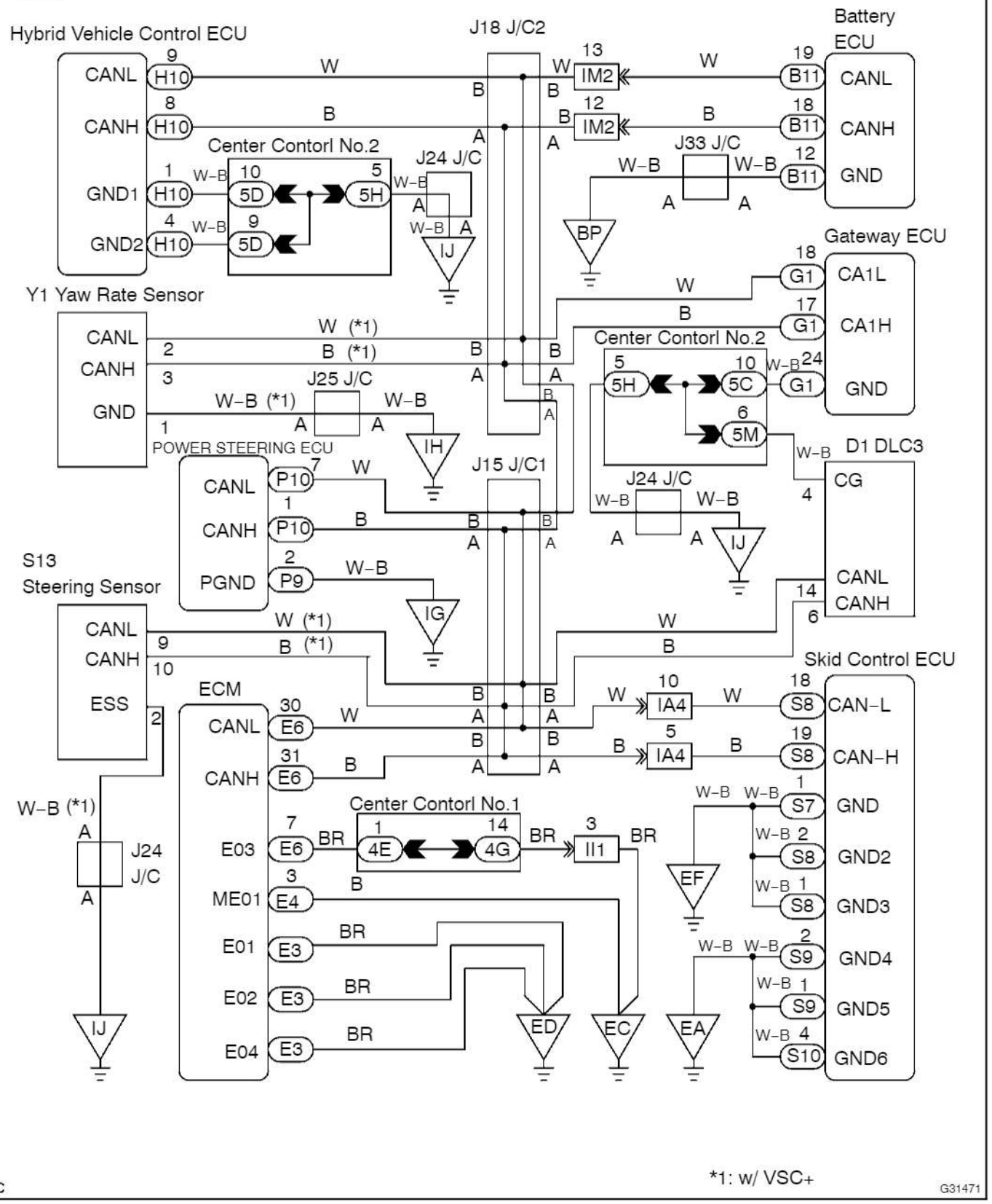
There may be a short circuit between the CAN bus line and GND when there is resistance between terminals 6 (CANH) and 4 (CG) or terminals 14 (CANL) and 4 (CG) of the DLC3.

Symptom	Trouble Area
There is resistance between terminals 6 (CANH) and 4 (CG) or terminals 14 (CANL) and 4 (CG) of the DLC3.	• Short to GND • Hybrid vehicle control ECU • Battery ECU • ECM • Skid control ECU • Steering sensor • Yaw rate sensor • Power steering ECU

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WIRING DIAGRAM

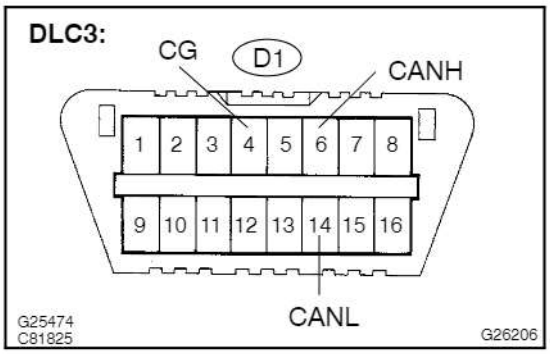
RHD:



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INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO GND(DLC3 SUB BUS LINE)



(a) Turn the power switch off.
(b) Disconnect the J/C1 connector (J15).
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 MΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 MΩ or more

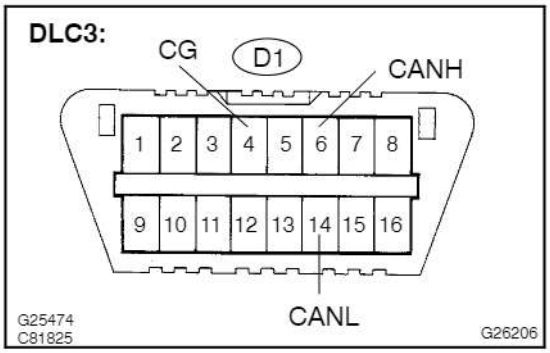
NG → **REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

2 CONNECT CONNECTOR

(a) Reconnect the J/C1 connector (J15).

3 CHECK CAN BUS LINE FOR SHORT TO GND(CAN BUSES TO J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **Go to step 16**

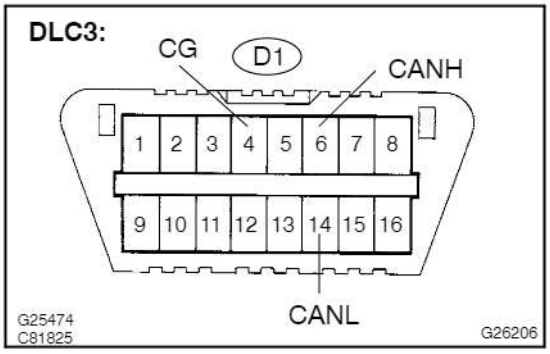
NG

4 CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

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5 CHECK CAN BUS LINE FOR SHORT TO GND(ECM)



(a) Disconnect the ECM connector (E6).
(b) Measure the resistance according to the value(s) in the table below.

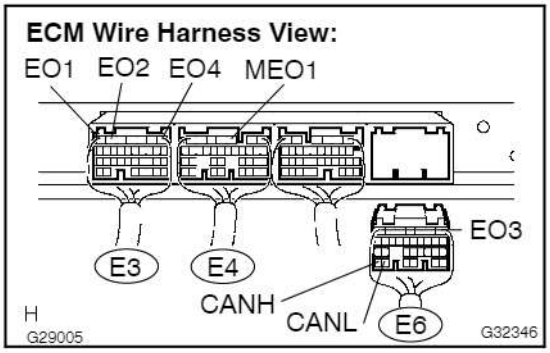
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE ECM (SEE PAGE 10–24)**

NG

6 CHECK CAN BUS LINE FOR SHORT TO GND(ECM – J/C1)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
E6–31 (CANH) – E3–7 (EO1), E3–6 (EO2) E6–7 (EO3), E3–1 (EO4) E4–3 (MEO1)	Power Switch OFF	1 MΩ or more
E6–30 (CANL) – E3–7 (EO1), E3–6 (EO2) E6–7 (EO3), E3–1 (EO4) E4–3 (MEO1)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the ECM connector (E6) disconnected.

NG → **REPLACE CAN MAIN BUS LINE OR CONNECTOR (ECM – J/C1)**

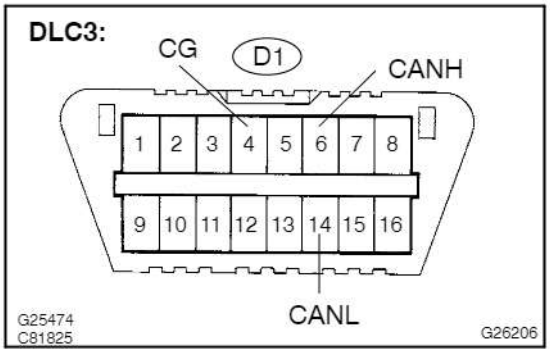
OK

7 CONNECT CONNECTOR

(a) Reconnect the ECM connector (E6) and J/C1 connector (J15).

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8 CHECK CAN BUS LINE FOR SHORT TO GND(POWER STEERING ECU)



(a) Disconnect the power steering ECU connector (P10).
(b) Measure the resistance according to the value(s) in the table below.

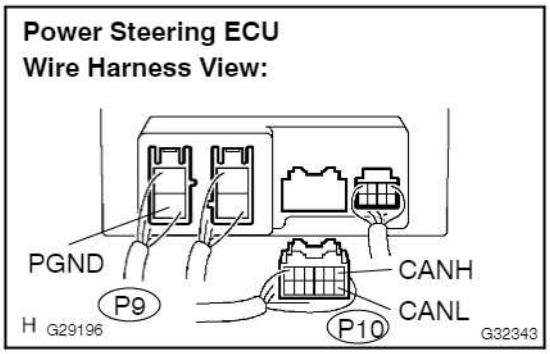
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE POWER STEERING ECU ASSY (SEE PAGE 50–17)**

NG

9 CHECK CAN BUS LINE FOR SHORT TO GND(POWER STEERING ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
P10–1 (CANH) – P9–2 (PGND)	Power Switch OFF	1 MΩ or more
P10–7 (CANL) – P9–2 (PGND)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the power steering ECU connector (P10) disconnected.

NG → **REPLACE POWER STEERING ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

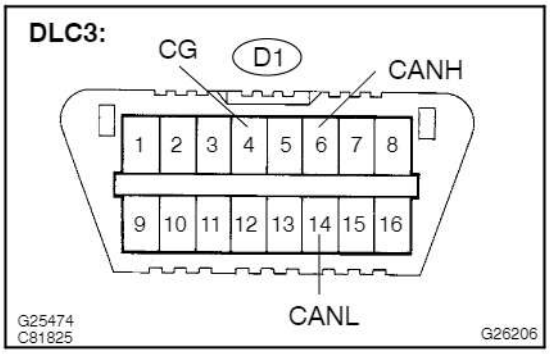
OK

10 CONNECT CONNECTOR

(a) Reconnect the power steering ECU connector (P8) and J/C1 connector (J15).

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11 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR)



NOTICE:

For vehicles without VSC+, go to step 14.

(a) Disconnect the steering sensor connector (S13).

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

Standard:

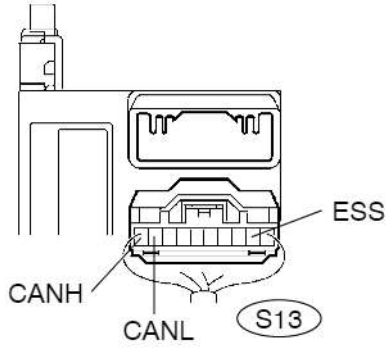
Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32–85)**

NG

12 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR SUB BUS LINE)

Steering Sensor
Wire Harness View:



(a) Disconnect the J/C1 connector (J15).

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

Standard:

Tester connection	Condition	Specified value
S13–10 (CANH) – S13–2 (ESS)	Power Switch OFF	1 MΩ or more
S13–9 (CANL) – S13–2 (ESS)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the steering sensor connector (S13) disconnected.

NG → **REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

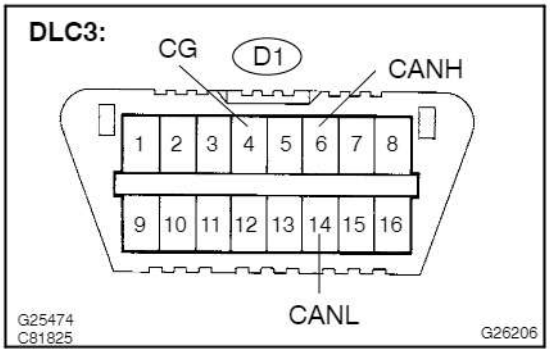
OK

13 CONNECT CONNECTOR

(a) Reconnect the steering sensor connector (S13) and J/C1 connector (J15).

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14 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector (S8).
(b) Measure the resistance according to the value(s) in the table below.

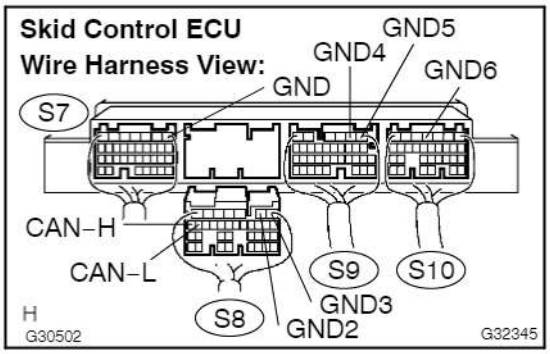
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE SKID CONTROL ECU ASSY (SEE PAGE 32–81)**

NG

15 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C1 connector (J15).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S8–19 (CAN–H) – S7–1 (GND), S8–2 (GND2) S8–1 (GND3), S9–2 (GND4) S9–1 (GND5), S10–4 (GND6)	Power Switch OFF	1 MΩ or more
S8–18 (CAN–L) – S7–1 (GND), S8–2 (GND2) S8–1 (GND3), S9–2 (GND4) S9–1 (GND5), S10–4 (GND6)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the skid control ECU connector (S8) disconnected.

NG → **REPLACE SKID CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

OK

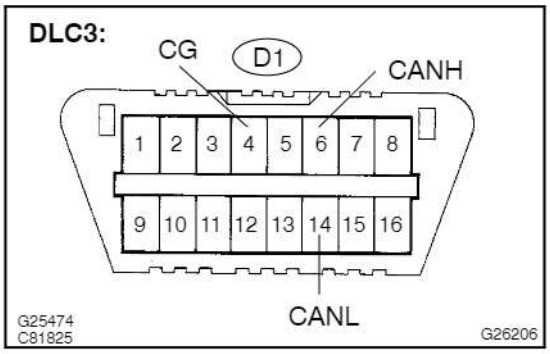
REPLACE CAN MAIN BUS LINE OR CONNECTOR(J/C1 – J/C2)

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16	CONNECT CONNECTOR

(a) Reconnect the J/C2 connector (J18).

17	CHECK CAN BUS LINE FOR SHORT TO GND(BATTERY ECU)



(a) Disconnect the battery ECU connector (B11).
(b) Measure the resistance according to the value(s) in the table below.

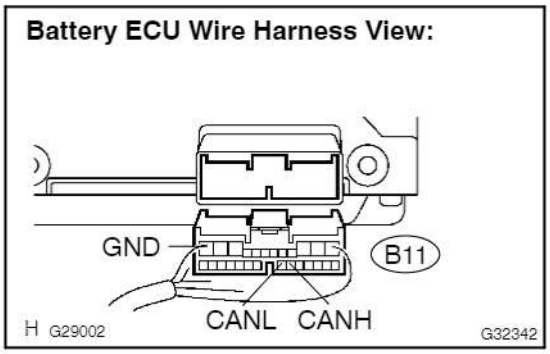
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK: **REPLACE BATTERY ECU ASSY (SEE PAGE 21–100)**

NG

18	CHECK CAN BUS LINE FOR SHORT TO GND(BATTERY ECU – J/C2)



(a) Disconnect the J/C2 connector (J18).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
B11–18 (CANH) – B11–12 (GND)	Power Switch OFF	1 MΩ or more
B11–19 (CANL) – B11–12 (GND)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the battery ECU connector (B11) disconnected.

NG: **REPLACE CAN MAIN BUS LINE OR CONNECTOR (BATTERY ECU – J/C2)**

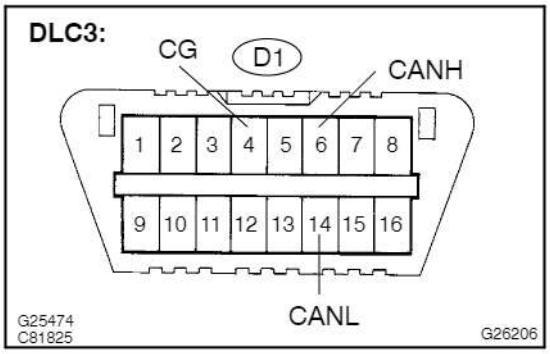
OK

19	CONNECT CONNECTOR

(a) Reconnect the battery ECU connector (B11) and J/C2 connector (J18).

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20 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SENSOR)



NOTICE:

For vehicles without VSC+, go to step 23.

(a) Disconnect the yaw rate sensor connector (Y1).

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

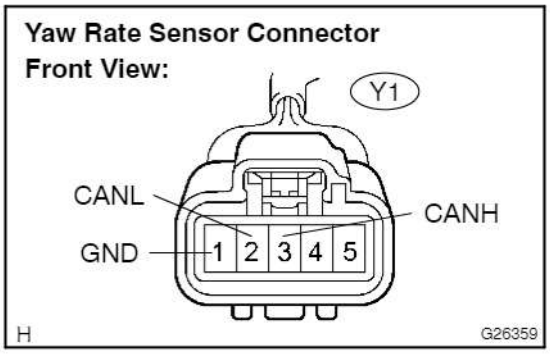
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32–84)**

NG

21 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
Y1–3 (CANH) – Y1–1 (GND)	Power Switch OFF	1 MΩ or more
Y1–2 (CANL) – Y1–1 (GND)	Power Switch OFF	1 MΩ or more

HINT:

Measure the resistance with the yaw rate sensor connector (Y1) disconnected.

NG → **REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

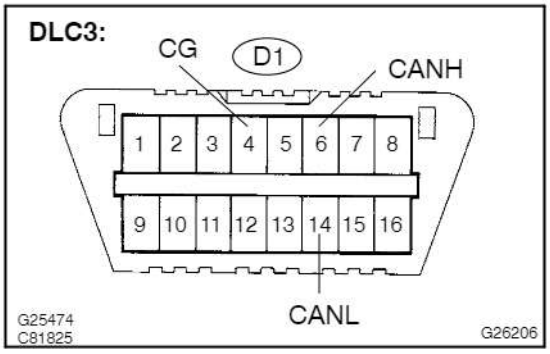
OK

22 CONNECT CONNECTOR

(a) Reconnect the yaw rate sensor connector (Y1) and J/C2 connector (J18).

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23	CHECK CAN BUS LINE FOR SHORT TO GND(HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the hybrid vehicle control ECU connector (H10).

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

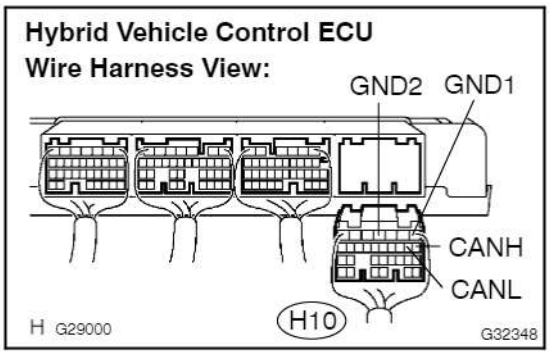
Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)**

NG

24	CHECK CAN BUS LINE FOR SHORT TO GND(HYBRID VEHICLE CONTROL ECU SUB BUS LINE)



(a) Disconnect the J/C2 connector (J18).

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

Standard:

Tester connection	Condition	Specified value
H10–8 (CANH) – H10–1 (GND1), H10–4 (GND2)	Power Switch OFF	1 MΩ or more
H10–9 (CANL) – H10–1 (GND1), H10–4 (GND2)	Power Switch OFF	1 MΩ or more

HINT:
Measure the resistance with the hybrid vehicle control ECU (H10) disconnected.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)**

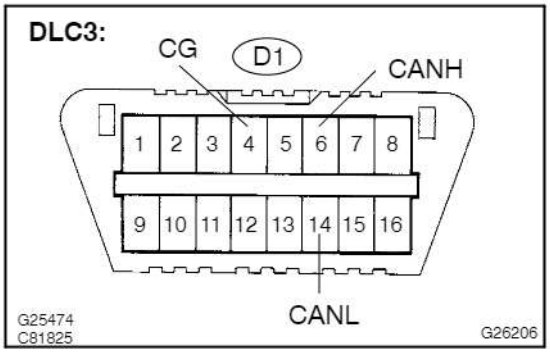
OK

25	CONNECT CONNECTOR

(a) Reconnect the hybrid vehicle control ECU connector (H10) and J/C2 connector (J18).

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26	CHECK CAN BUS LINE FOR SHORT TO GND(GATEWAY ECU)



(a) Disconnect the gateway ECU connector (G1).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D1–6 (CANH) – D1–4 (CG)	Power Switch OFF	1 kΩ or more
D1–14 (CANL) – D1–4 (CG)	Power Switch OFF	1 kΩ or more

OK → **REPLACE GATEWAY ECU (SEE PAGE 67–26)**

NG

REPLACE GATEWAY ECU SUB BUS LINE OR CONNECTOR (CAN–H, CAN–L)

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CRUISE CONTROL SYSTEM

05HHP–01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See page
Power Window Control System	01–29

NOTICES FOR HYBRID SYSTEM ACTIVATION:

- **When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.**
- **With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.**

NOTICE:

Push the cruise control main switch ON–OFF button "off" and reset the cruise control if the CRUISE main indicator light blinks while driving with cruise control. When the cruise control cannot be set by this procedure or cancelled immediately after setting, there may be a problem in the cruise control system.

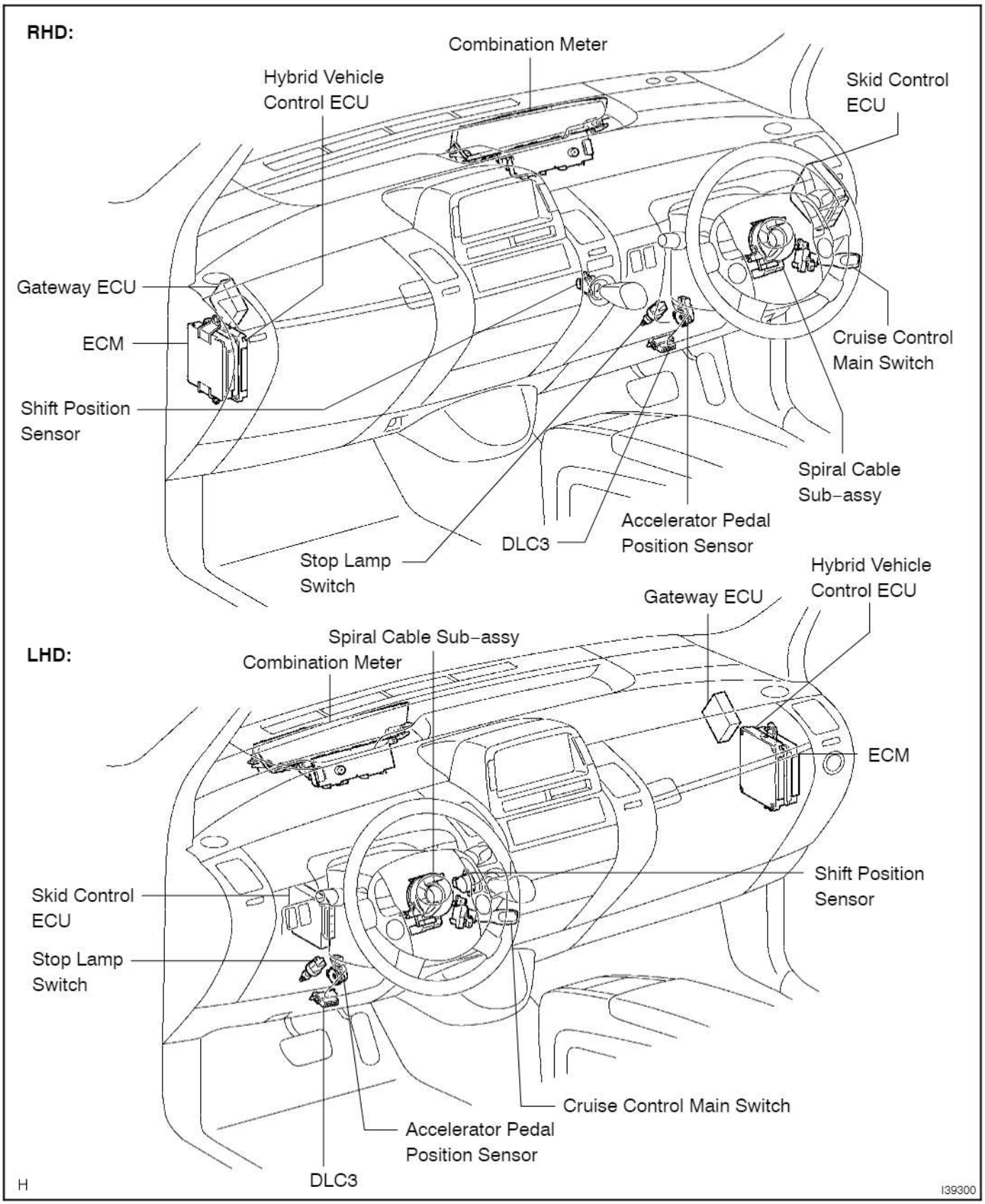
Do not inspect the cruise control system under the following road conditions:

- Heavy traffic
- Steep downhill
- Sharp turns
- Icy or snowy roads
- Slippery roads

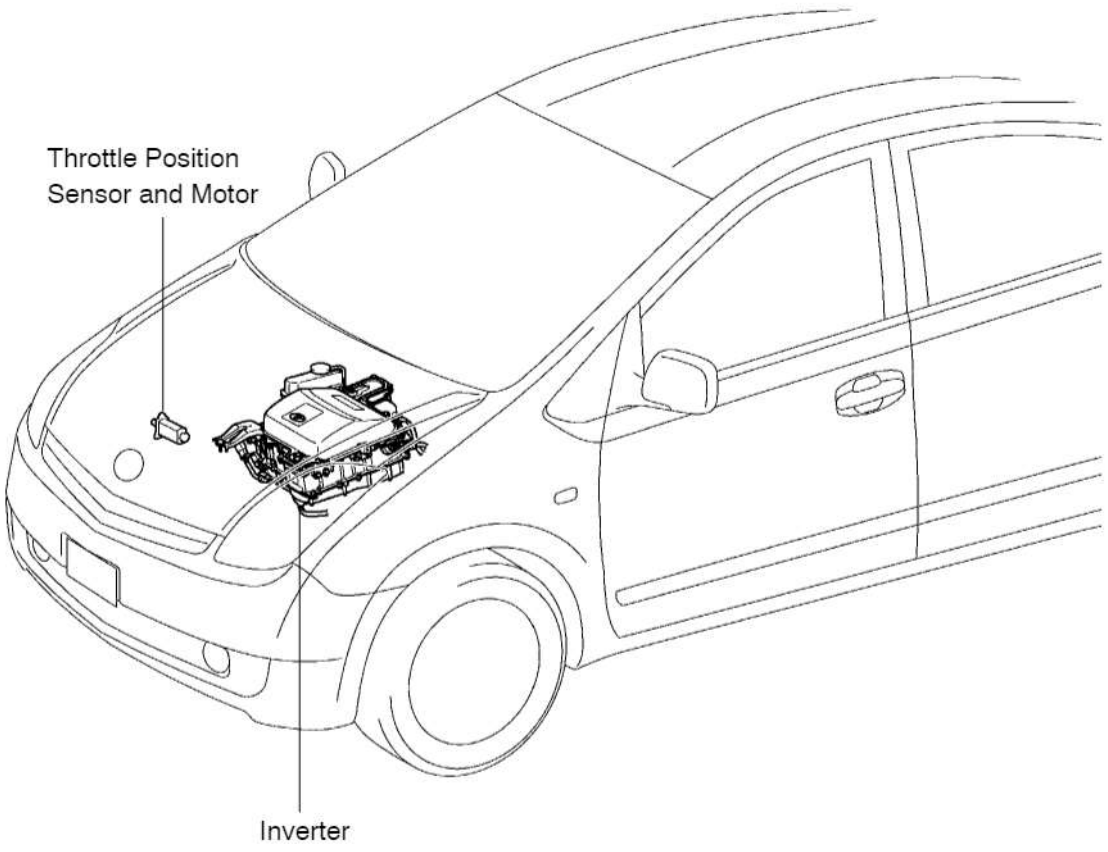
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05HHG–01

LOCATION



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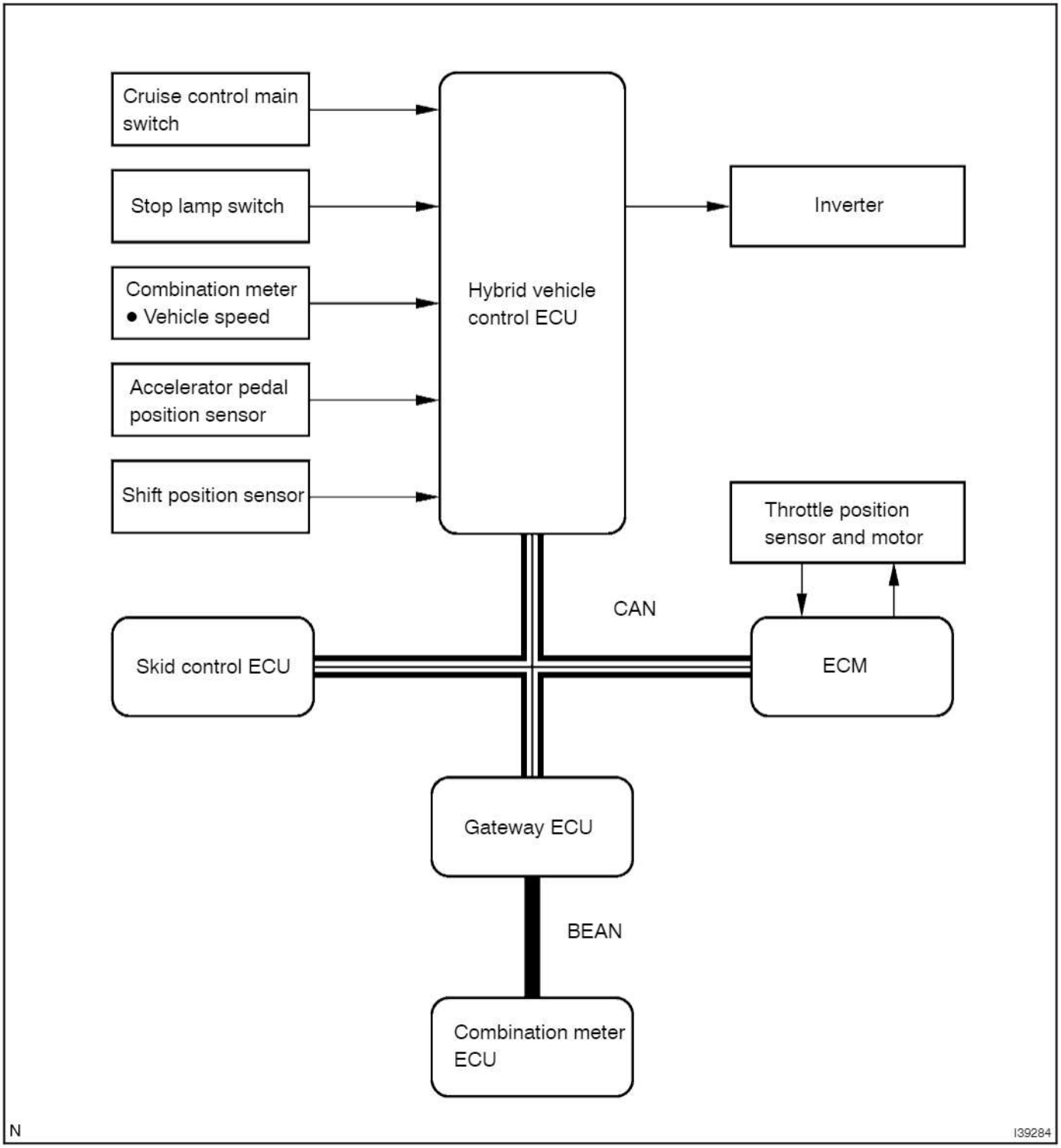
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05HHR-01

SYSTEM DIAGRAM



Transmitting ECU (transmitter)	Receiveing ECU	Signals	Communication Method
Hybrid Vehicle Control ECU	ECM	• Engine torque demand signal	• CAN
Hybrid Vehicle Control ECU	Combination Meter ECU	• CRUISE main indicator signal • Cruise control warning signal	• CAN • BEAN
Skid Control ECU	Hybrid Vehicle Control ECU	• Cruise control cancel signal	• CAN

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05HHS–01

SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM DESCRIPTION

The cruise control system controls constant speed driving. It enables the driver to adjust vehicle speed by operating the cruise control main switch without using the accelerator pedal.

Receiving signals from each switch and sensor, the hybrid vehicle control ECU controls constant speed driving by optimizing the use of the engine and motor driving force.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving speed is below the low speed limit. Constant speed control will be automatically cancelled and the stored vehicle speed will be erased when the vehicle speed goes below the low speed limit while the constant speed control is in operation.

(b) High speed limit

The highest possible limit of the speed setting range is set at approximately 180 km/h (112 mph). The cruise control system cannot be set when the driving speed is over the high speed limit. Speed up using RESUME/+ with the cruise control main switch assy also cannot be set beyond the high speed limit.

3. CRUISE CONTROL OPERATION

(a) Cruise control main switch

The cruise control main switch operates seven functions: SET, COAST, TAP–DOWN, RESUME, ACCEL, TAP–UP and CANCEL. The SET, TAP–DOWN and COAST functions, and the RESUME, TAP–UP and ACCEL functions share the same switch. Each function can be controlled by moving the switch in the directions of the arrows on the cruise control main switch assy. The switch will return automatically after being released.

(b) Set control

Vehicle speed is stored and constant speed control is maintained when pushing the switch to –/SET while driving with the cruise control main switch ON–OFF button "on" (CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(c) COAST control

The hybrid vehicle control ECU decreaes the cruise control demand speed and controls the engine and motor driving force to decelerate the vehicle when –/SET on the cruise control main switch is pressed and held while the cruise control system is in operation.

Vehicle speed, when the cruise control main switch is released from –/SET, is stored and constant speed control is maintained.

(d) Tap–down control

When tapping down on the cruise control main switch to –/SET (for approx. 0.5 second) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1.0 mph).

However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approx. 3.1 mph), the vehicle speed, when the cruise control main switch is released from –/SET, will be stored and constant speed control is maintained.

(e) Acceleration control

The hybrid vehicle control ECU increases the cruise control demand speed and controls the engine and motor driving force to accelerate the vehicle when +/RES on the cruise control main switch is pressed and held while the cruise control system is in operation.

Vehicle speed, when the cruise control main switch is released from +/RES, is stored and constant speed control is maintained.

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(f) Tap–up control
When tapping up on the cruise control main switch to +/RES (for approx. 0.5 second) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approx. 3.1 mph), the stored vehicle speed will not be changed.

(g) Resume control
If constant speed control was cancelled with the stop lamp switch or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to –/RES restores vehicle speed memorized at the time of cancellation, and restarts constant speed control.

(h) Manual cancel control
Doing any of the following cancels the cruise control system while in operation. (The stored vehicle speed in the hybrid vehicle ECU is maintained.)

- Depressing the brake pedal
- Shifting into any position except D
- Pushing the cruise control main switch to CANCEL
- Pushing the cruise control main switch ON–OFF button "off" (The stored vehicle speed in the hybrid vehicle control ECU is not maintained.)
- Push the EV button: (EV DRIVE MODE is available when vehicle speed is below approximately 45 km/h (28 mph).)

(i) Auto cancel (fail–safe)
This system has an automatic cancellation function (fail–safe) (for details, see page 05–2456).

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05HHU–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The intelligent tester II can be used at steps 4, 5, 6, 7, and 12.

1	VEHICLE BROUGHT TO WORK SHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05–2448)

3	PROBLEM SYMPTOM CONFIRMATION

4	CHECK BODY MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05–2250)

(a) Check for body multiplex communication system DTC output.
HINT:
The hybrid vehicle control ECU is connected to the multiplex communication system (BEAN) via the CAN communication system. Therefore before troubleshooting, make sure that there is no trouble in the multiplex communication system.

MULTIPLEX SYSTEM DTC IS OUTPUT (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")	
MULTIPLEX SYSTEM DTC IS NOT OUTPUT (GO TO STEP 5)	

5	CHECK CAN COMMUNICATION SYSTEM (SEE PAGE 05–2312)

(a) Check for CAN communication system DTC output.
HINT:
The hybrid vehicle control ECU is connected to the CAN communication system. Therefore before troubleshooting, make sure that there is no trouble in the CAN communication system.

CAN SYSTEM DTC IS OUTPUT (PROCEED TO "CAN COMMUNICATION SYSTEM")	
CAN SYSTEM DTC IS NOT OUTPUT (GO TO STEP 6)	

6	CHECK AND CLEAR DTC (EXCEPT MULTIPLEX SYSTEM DTC) (SEE PAGE 05–2455)

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7	DTC CHECK (EXCEPT MULTIPLEX SYSTEM DTC) (SEE PAGE 05–2455)

→ TROUBLE CODE (GO TO STEP 8)

→ NORMAL SYSTEM CODE (GO TO STEP 9)

8	DTC CHART (SEE PAGE 05–2459)

GO TO STEP 12

9	PROBLEM SYMPTOM SIMULATION

→ SYMPTOM DOES NOT OCCUR (GO TO STEP 10)

→ SYMPTOM OCCURS (GO TO STEP 11)

10	SYMPTOM SIMULATION (SEE PAGE 01–46)

11	PROBLEM SYMPTOMS TABLE (SEE PAGE 05–2451)

12	CIRCUIT INSPECTION (SEE PAGES 05–2460 – 05–2477)

13	TERMINALS OF ECU (SEE PAGE 05–2452)

14	PROBLEM IDENTIFICATION

15	REPAIR OR REPLACE

16	CONFIRMATION TEST

END

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CUSTOMER PROBLEM ANALYSIS CHECK

05HHV-01

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in		**Odometer Reading**	**km mile**

Condition of Problem Occurrence	Date Problem Occurred	
	Frequency Problem occurs	☐ Continuous ☐ Intermittent (times a day)
	Vehicle Speed When Problem Occurred	km (mile)

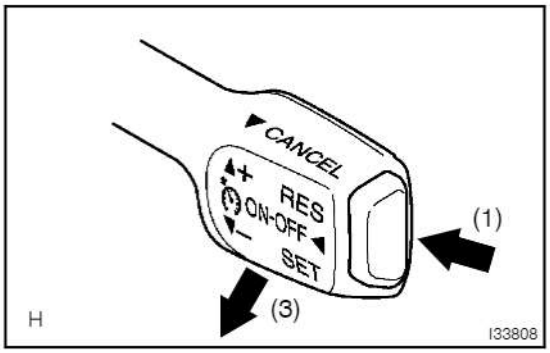
Symptoms	☐ Cancel occurs while driving with cruise control	● Driving condition ☐ Urban road ☐ Freeway ☐ Uphill ☐ Downhill ● Is it possible to restart cruise control? ☐ Yes ☐ No
	☐ Unable to cancel cruise control	☐ Depressing brake pedal ☐ Shifting into any position except D ☐ Pushing cruise control main switch to CANCEL
	☐ Cruise control malfunction	☐ No acceleration ☐ No deceleration ☐ Hunting occurs ☐ No downshift ☐ No upshift after downshift
	☐ Cruise control main switch malfunction	☐ SET ☐ + ☐ – ☐ RES ☐ CANCEL
	☐ CRUISE main indicator light malfunction	☐ Remains on ☐ Does not come on ☐ Blinks

DTC check	First Time	☐ Normal System Code ☐ Trouble Code (Code)
	Second Time	☐ Normal System Code ☐ Trouble Code (Code)

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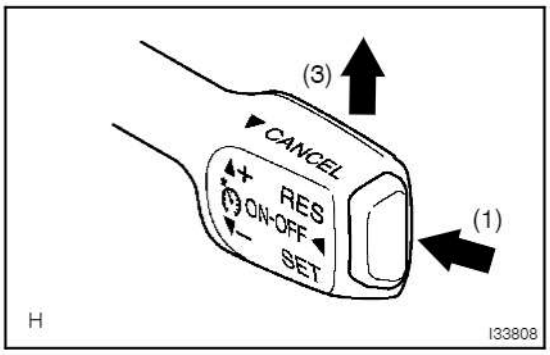
05HHX–01

ROAD TEST

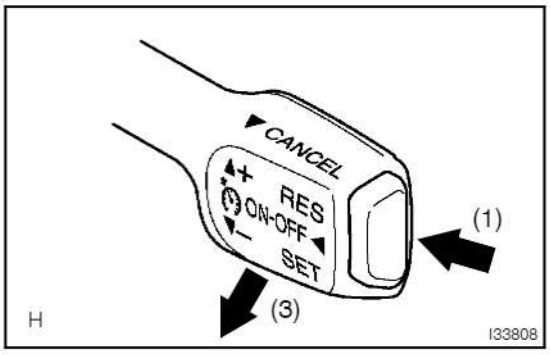


1. PROBLEM SYMPTOM CONFIRMATION

(a) Inspect the SET function.
- (1) Push the ON–OFF button "on".
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to –/SET.
- (4) Check that the vehicle cruises at the set speed after releasing the switch.

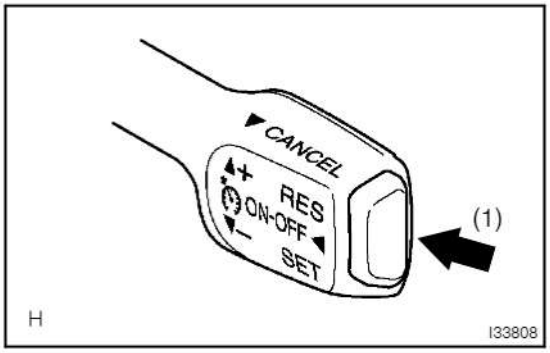


(b) Inspect the "+ (ACCEL)" function.
- (1) Push the ON–OFF button "on".
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to –/SET.
- (4) Check that vehicle speed increases while the cruise control main switch is pushed to +/RES, and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Momentarily push the cruise control main switch to +/RES and then immediately release it. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph). (Tap–up function)

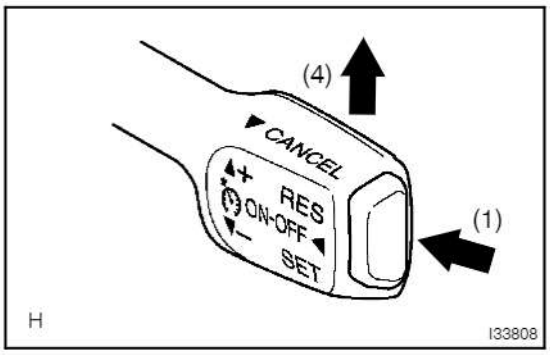


(c) Inspect the "– (COAST)" function.
- (1) Push the ON–OFF button "on".
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to –/SET.
- (4) Check that vehicle speed decreases while the cruise control main switch is pushed to –/SET, and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Momentarily push the cruise control main switch to –/SET and then immediately release it. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph). (Tap–down function)

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(d) Inspect the CANCEL function.
(1) Push the ON–OFF button "on".
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to –/SET.
(4) When doing one or more of the following, check that the cruise control system is cancelled and that the normal driving mode is reset:
- Depressing the brake pedal
- Shifting into any position except D
- Pushing the ON–OFF button "off"
- Pulling the cruise control main switch to CANCEL



(e) Inspect the RES (RESUME) function.
(1) Push the ON–OFF button "on".
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to –/SET.
(4) When doing one or more of the following, check that the cruise control system is cancelled and that the normal driving mode is reset:
- Depressing the brake pedal
- Shifting into any position except D
- Pulling the cruise control main switch to CANCEL

(5) After pushing the cruise control main switch to +/RES at a driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed which was maintained before cancellation.

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05HI9–01

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but a problem still occurs, check each circuit and component for the problem symptom in the order shown in the table below.

HINT:

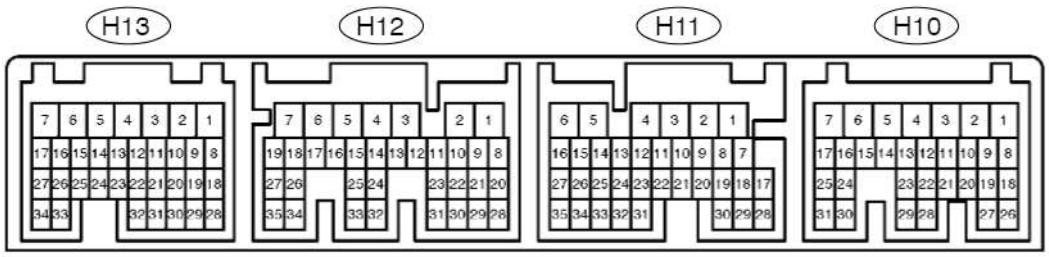
Inspect the fuses and relays before confirming the suspected areas which are shown in the chart below. Inspect the relevant circuits and component in numerical order. If the problem still exists even after inspecting all the circuits and components and confirming that they are all normal, replace the hybrid vehicle control ECU.

Symptom	Suspected Area	See page
ON–OFF button cannot be pushed on. (CRUISE main indicator light on the combination meter does not come on.)	1. Cruise control switch circuit 2. CRUISE main indicator light circuit 3. Combination meter 4. Hybrid vehicle control ECU	05–2470 05–2477 71–19 21–128
Vehicle speed cannot be set. (Indicator light on the combination meter comes on when ON–OFF button is pushed on, but it goes off when vehicle speed is set.)	1. Cruise control switch circuit 2. Hybrid vehicle control ECU	05–2470 21–128
Setting cannot be done. (Indicator light on the combination meter comes on when ON–OFF button is pushed on, and it remains on while setting.)	1. Cruise control switch circuit 2. Stop lamp switch circuit (DTC P0571) 3. Shift position sensor circuit (DTC P0705) 4. Combination meter 5. Hybrid vehicle control ECU	05–2470 05–2464 05–295 71–19 21–128
Cruise control is cancelled while driving. (CRUISE main indicator light remains on.)	1. Cruise control switch circuit 2. Vehicle speed sensor circuit (DTC P0500) 3. Stop lamp switch circuit (DTC P0571) 4. CRUISE main indicator light circuit 5. Hybrid vehicle control ECU	05–2470 05–2460 05–2464 05–2477 21–128
Hunting occurs. (Speed is not constant.)	1. Vehicle speed sensor circuit (DTC P0500) 2. Hybrid vehicle control ECU	05–2460 21–128
Setting cannot be cancelled (when functions such as COAST, ACCEL, RESUME, set speed change are operated with control switch).	1. Cruise control switch circuit 2. Hybrid vehicle control ECU	05–2470 21–128

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05HI8–01

TERMINALS OF ECU



N

I39285

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Value
ST1– – GND1 (H11–2 – H10–1)	G – W–B	Stop lamp signal	Power switch is on (IG) Depress brake pedal → Release brake pedal	Below 1 V → 10 to 14 V
STP – GND1 (H11–3 – H10–1)	L – W–B	Stop lamp signal	Power switch is on (IG) Depress brake pedal → Release brake pedal	10 to 14 V → Below 1 V
CCS – GND1 (H10–13 – H10–1)	V – W–B	Cruise control main switch circuit	Power switch is on (IG) → CANCEL switch is held on → –/SET switch is held on → +/RES switch is held on → ON–OFF button is pushed on	10 to 14 V → 6.6 to 10.1 V → 4.5 to 7.1 V → 2.3 to 4.0 V → Below 1 V
SPDI – GND1 (H10–19 – H10–1)	V – W–B	Vehicle speed input signal	Power switch is on (IG) Slowly turn wheels	Below 1 V to above 5 V

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05HHZ–01

DIAGNOSIS SYSTEM

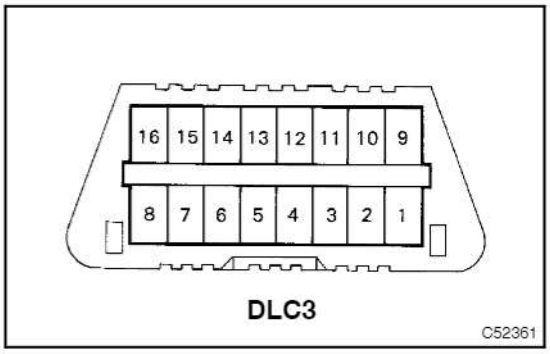
1. DESCRIPTION

The hybrid vehicle control ECU controls the cruise control function of the vehicle.

The DTCs and data stored in the cruise control system can be read from the DLC3 of the vehicle.

After checking for DTCs, if the CRUISE main indicator light does not come on, there may be a problem in the cruise control system.

Use the intelligent tester II to check and solve the problem.



2. CHECK THE DLC3

(a) The hybrid vehicle control ECU of the vehicle uses ISO 9141–2 (Eure–OBD)/ISO 14230(M–OBD)for communication. The terminal arrangement of the DLC3 complies with ISO 15031–03 and matches the ISO 9141–2/ ISO 14230 format.

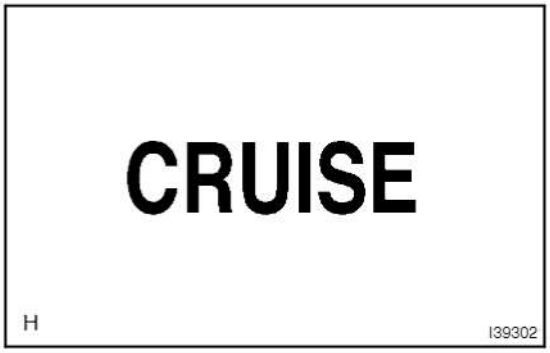
Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Power switch is off	54 to 67 Ω
CANH (6) – Battery positive	HIGH–level CAN bus line	Power switch is off	1 MΩ or higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Power switch is off	3 kΩ or higher
CANL (14) – Battery positive	LOW–level CAN bus line	Power switch is off	1 MΩ or higher
CANL (14) – CG (4)	LOW–level CAN bus line	Power switch is off	3 kΩ or higher

HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" after connecting the intelligent tester II to the DLC3 and turning the power switch on (IG), there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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3. CHECK THE INDICATOR

(a) Turn the power switch on (IG).

(b) Check that the CRUISE main indicator light comes on when the cruise control main switch ON–OFF button is pushed on, and that the indicator light goes off when the ON–OFF button is pushed off.

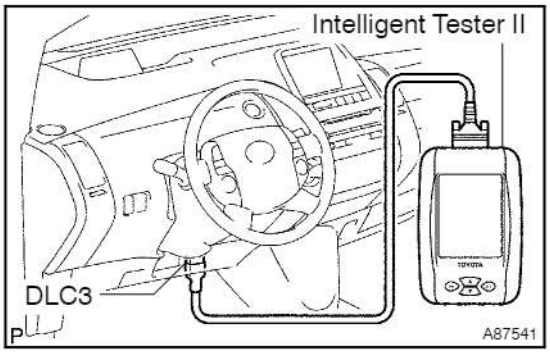
HINT:

- If there is a problem with the indicator light, inspect the cruise main indicator light circuit (see page 05–2477).
- If a malfunction occurs in the vehicle speed sensor, stop lamp switch assy or other related parts while driving with cruise control, and the hybrid vehicle control ECU activates AUTO CANCEL of the cruise control and then the CRUISE main indicator light starts to blink, informing the driver of the malfunction. At the same time, data of the malfunction is stored as a DTC.

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05HIH–01

DTC CHECK/CLEAR



1. CHECK FOR DTCs

(a) Using the intelligent tester II, check for DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch on (IG).
  (3) Read the DTCs on the tester screen.

HINT:
The intelligent tester II has a "Snapshot" function which records the monitored data.
Refer to the intelligent tester II operator's manual for further details.

2. CLEAR THE DTCs

(a) Using the intelligent tester II, clear the DTCs.
  (1) Connect the intelligent tester II to the DLC3.
  (2) Turn the power switch on (IG).
  (3) Clear the DTCs by following the prompts on the tester screen.

HINT:
Refer to the intelligent tester II operator's manual for further details.

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05HI6–01

FAIL–SAFE CHART

1. If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the hybrid vehicle control ECU and cancels the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re–operation Condition
CRUISE main indicator light blinks.	• There is an open or short in the stop lamp switch circuit. • Vehicle speed signal changes suddenly.	• Push the cruise control main switch ON–OFF button "on" again.
CRUISE main indicator light blinks.	• There is a problem with the input circuit of the stop lamp switch circuit.	• The indicator light blinks until the cruise control main switch ON–OFF button is pushed on again. • Constant speed control is prohibited until the power switch is turned off.
CRUISE main indicator light goes off.	• Vehicle speed is below the low speed limit (approx. 40 km/h (approx. 25 mph)) while driving with the cruise control on. • Vehicle speed is lower than the stored speed by 16 km/h (approx. 9.9 mph) or more while driving with the cruise control on.	• Push the cruise control main switch to –/RES.

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05HI7–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester II, the values of the components such as switches, sensors, and actuators can be read without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

The CRUISE CONTROL data list is displayed while the intelligent tester II is connected to the DLC3 with the power switch on (IG). Access the data list by following the prompts on the tester screen.

(a) Connect the intelligent tester II to the DLC3.

(b) Turn the power switch on (IG).

(c) Read the DATA LIST according to the display on the tester.

HYBRID VEHICLE CONTROL ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
CCS Vehicle Spd	Cruise control vehicle speed/ min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed is displayed	–
CCS Mem Vehicle Spd	Cruise control memorized speed/ min.: 1 km/h (0.6 mph), max.: 255 km/h (158 mph)	Actual stored vehicle speed is displayed	–
Throttle Opening Angle	Request opening angle/ min.: 0%, max.: 125%	Actual throttle opening angle is displayed	–
Cruise Control	Cruise control system active condition/ON or OFF	ON: Cruise control is activated OFF: Cruise control is deactivated	–
Main Switch M–CPU	Cruise main switch signal (Main CPU)/ON or OFF	ON: Cruise control main switch ON–OFF button is pushed on OFF: Cruise control main switch ON–OFF button is pushed off	"3"
Main Switch S–CPU	Cruise main switch signal (Sub CPU)/ON or OFF	ON: Cruise control main switch ON–OFF button is pushed on OFF: Cruise control main switch ON–OFF button is pushed off	"3"
CCS Ready S–CPU	Cruise control system standby condition (Sub CPU)/ON or OFF	ON ⇔ OFF: Switching each time ON–OFF button is pushed	"1"
CCS Ready M–CPU	Cruise control system standby condition (Main CPU)/ON or OFF	ON ⇔ OFF: Switching each time ON–OFF button is pushed	"1"
CCS Indicator M–CPU	Cruise indicator signal (Main CPU)/ON or OFF	ON: CRUISE main indicator light is on OFF: CRUISE main indicator light is off	"2"
CCS Indicator S–CPU	Cruise indicator signal (Sub CPU)/ON or OFF	ON: CRUISE main indicator light is on OFF: CRUISE main indicator light is off	"2"
CANCEL Switch	CANCEL switch signal/ON or OFF	ON: Cruise control main switch is pulled to CANCEL OFF: Cruise control main switch is not pulled to CANCEL	–
SET/COAST Switch	–/SET switch signal/ON or OFF	ON: Cruise control main switch is pushed to –/SET OFF: Cruise control main switch is not pushed to –/SET	–

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RES/ACC Switch	+/RES switch signal/ON or OFF	ON: Cruise control main switch is pushed to +/RES OFF: Cruise control main switch is not pushed to +/RES	–
Stp Light SW M–CPU	Stop lamp switch signal (Main CPU)/ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal is released	–
Stp Light SW S2–CPU	Stop lamp switch signal (Sub CPU)/ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal is released	–
Stp Light SW S1–CPU	Stop lamp switch signal (Sub CPU)/ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal is released	–
Shift D Position	Shift lever position sensor signal (D position)/ON or OFF	ON: Shift position is D OFF: Shift position is except D	–
Vehicle Spd Change	Vehicle speed sudden change/ ON or OFF	ON: Change OFF: Not change	–

HINT:
"3" is OK but "1" is NG. → Hybrid vehicle control ECU failure
"1" is OK but "2" is NG. → DTC output or hybrid vehicle control ECU failure
"3" is OK but the CRUISE main indicator light does not come on. → CRUISE main indicator, wire harness, or hybrid vehicle control ECU failure

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05HIA–01

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See page" under the respective "DTC No." in the DTC chart.

DTC No. (See page)	Circuit Inspection	Trouble Area
P0500 (05–2460)	Vehicle Speed Sensor "A"	• Vehicle speed sensor • Vehicle speed sensor circuit • Combination meter • Hybrid vehicle control ECU
P0571 (05–2464)	Brake Switch "A" Circuit	• Stop lamp switch • Stop lamp switch circuit • Hybrid vehicle control ECU
P0607 (*1) (05–2469)	Control Module Performance	• Hybrid vehicle control ECU

HINT:

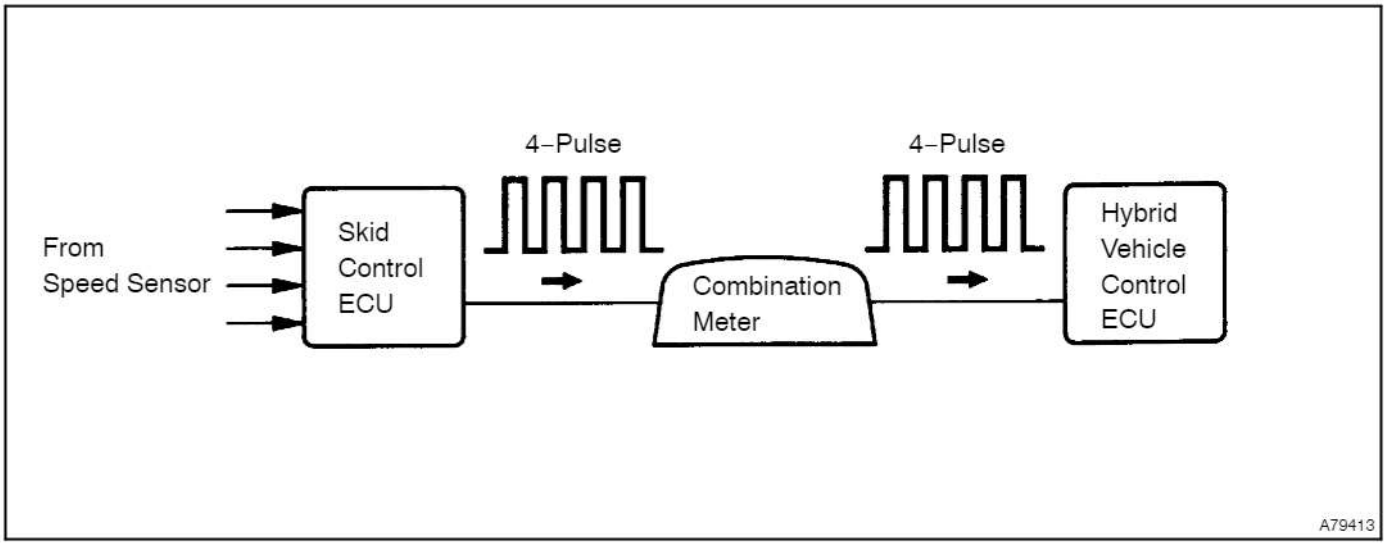
*1: DTC P0607 indicates an internal abnormality of the hybrid vehicle control ECU. If this DTC is output, replace the hybrid vehicle control ECU.

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DTC	P0500	VEHICLE SPEED SENSOR "A"

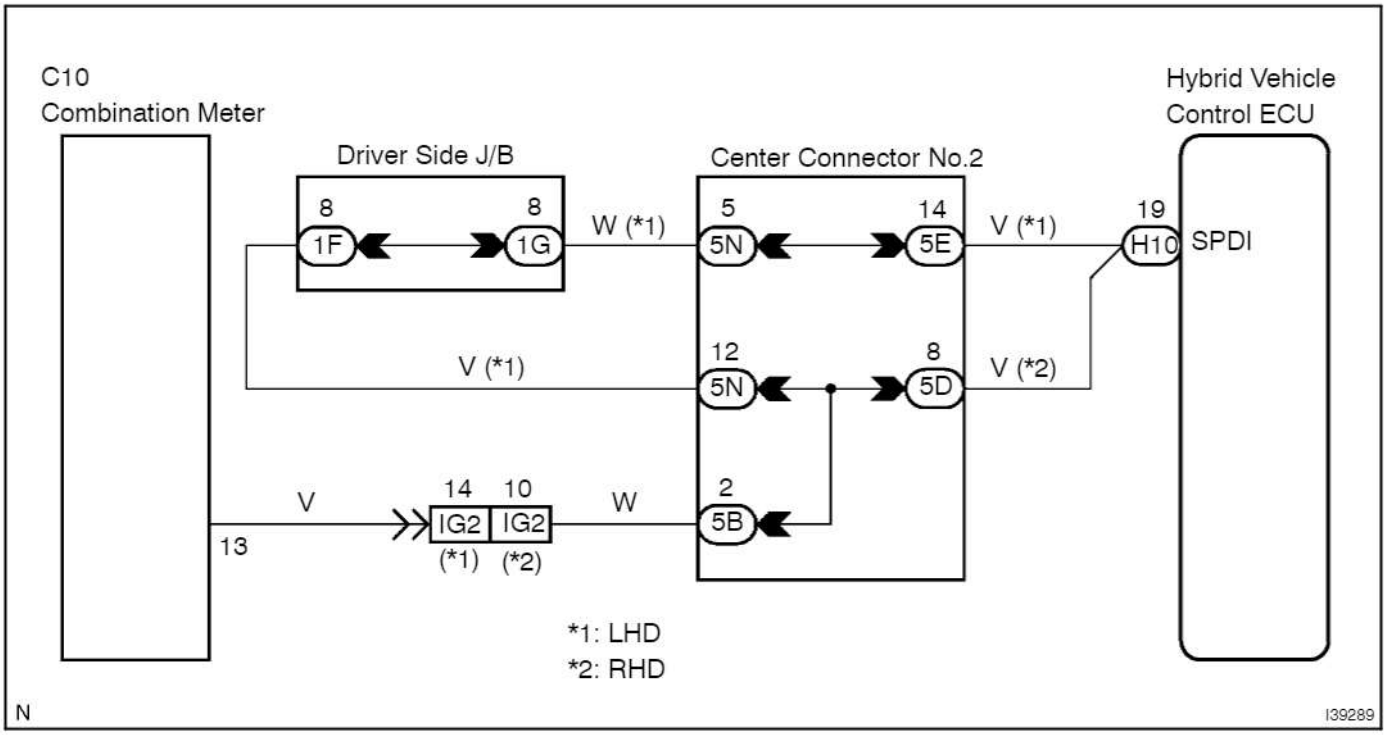
CIRCUIT DESCRIPTION

The speed sensor for the skid control ECU detects wheel speed and sends appropriate signals to the skid control ECU.
The skid control ECU converts these wheel speed signals into 4–pulse signals and outputs them to the hybrid vehicle control ECU via the combination meter.
The hybrid vehicle control ECU determines vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	This trouble code is output when a signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	• Vehicle speed sensor • Vehicle speed sensor circuit • Combination meter • Hybrid vehicle control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.

HINT:
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **CHECK SPEEDOMETER CIRCUIT (SEE PAGE 05–1699)**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the item "CCS Vehicle Spd" in the DATA LIST and check that the speed displayed on the tester screen is the same as the one indicated on the combination meter.

HYBRID VEHICLE CONTROL ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
CCS Vehicle Spd	Cruise control vehicle speed/ min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Actual vehicle speed is displayed	–

OK:
The speed displayed on the tester screen is almost the same as the speed the one indicated on the combination meter.

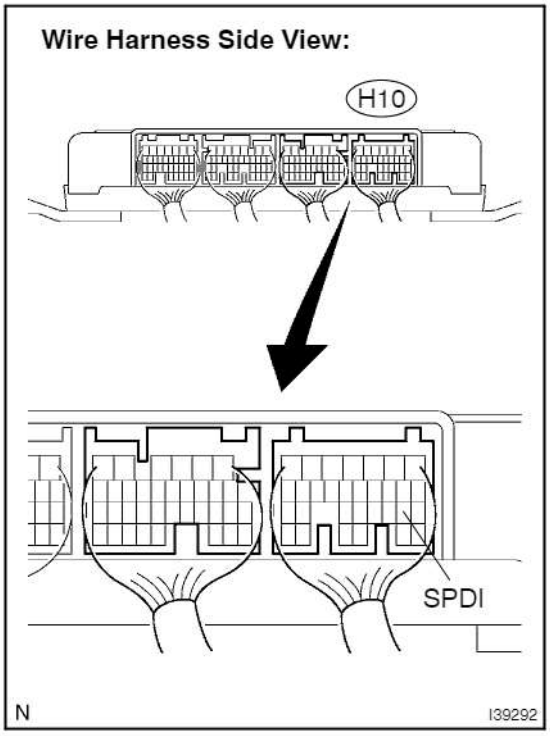
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (SEE PAGE 05–2451)

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3 INSPECT HYBRID VEHICLE CONTROL ECU (SPD VOLTAGE)

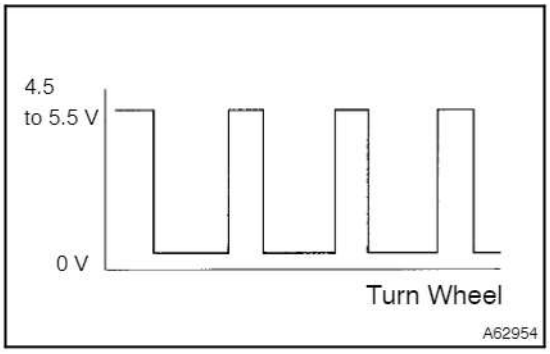


(a) Turn the power switch on (IG).
(b) Move the shift lever to neutral.
(c) Jack up the vehicle.
(d) Measure the voltage between terminal SPDI of the hybrid vehicle control ECU and body ground.

Standard:

Symbol (Tester Connection)	Specified Condition
SPDI (H10–19) – Body ground	Waveform appears

HINT:
The output voltage fluctuates up and down, similarly to the diagram on the left, when the wheel is turned slowly.



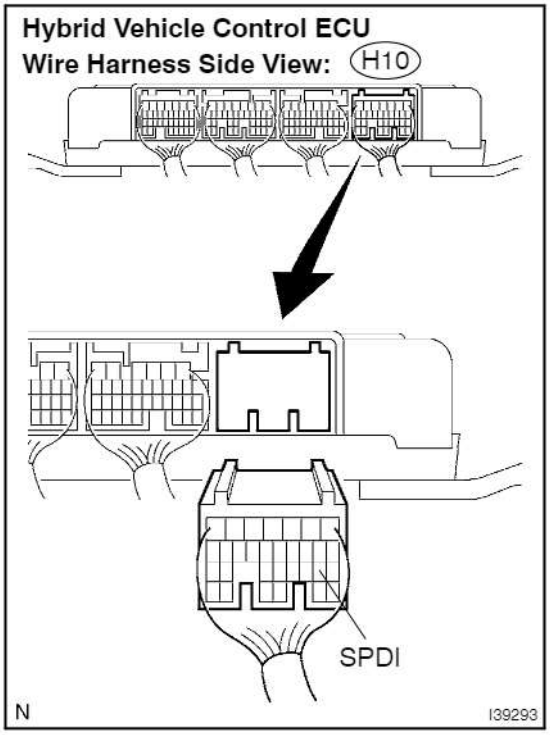
NG → **Go to step 4**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

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4	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU – COMBINATION METER)

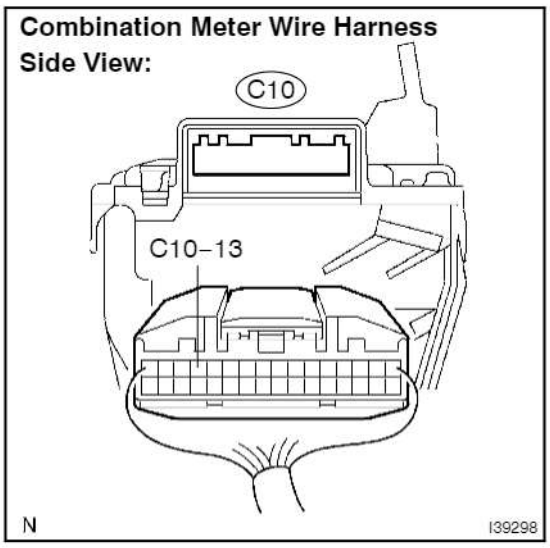


(a) Disconnect the H10 connector of the hybrid vehicle control ECU and the combination meter connector.

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

Standard:

Symbol (Terminal Connection)	Condition	Specified Value
SPDI (H10–19) – C10–13	Always	Below 1 Ω
SPDI (H10–19) – Body ground	Always	10 kΩ or higher



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE COMBINATION METER ECU (SEE PAGE 71–19)

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DTC	P0571	BRAKE SWITCH "A" CIRCUIT

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop lamp switch sends a signal to the hybrid vehicle control ECU. Receiving the signal, the hybrid vehicle control ECU cancels the cruise control. Even if there is a malfunction in the stop lamp signal circuit while the cruise control is in operation, normal driving is maintained due to fail–safe function.

Cruise control is cancelled when positive battery voltage is applied to terminal STP.

When the brake pedal is depressed, positive voltage is applied to terminal STP of the hybrid vehicle control ECU through the STOP fuse and the stop lamp switch, and the hybrid vehicle control ECU cancels the cruise control.

When the brake pedal is released, positive voltage is applied to terminal ST1– of the hybrid vehicle control ECU through the IGN fuse and the stop lamp switch, and the hybrid vehicle control ECU operates the cruise control.

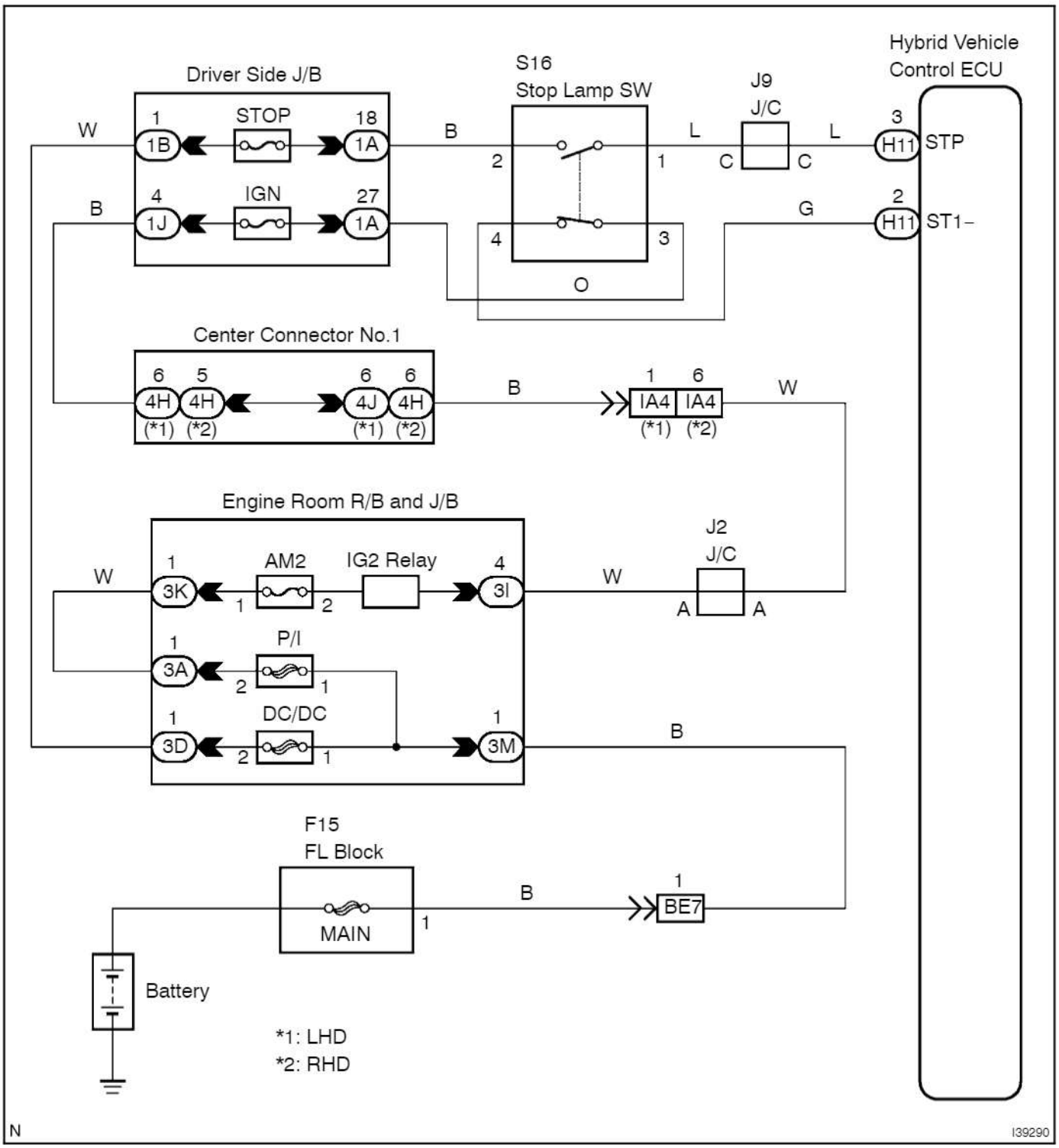
HINT:

Inspect the fuses and relays before confirming the suspected areas which are shown in the table below.

DTC No.	DTC Detecting Condition	Trouble Area
P0571	The trouble code is output when voltages of terminals ST1– and STP of the hybrid vehicle control ECU are both below 1 V for 0.5 sec. or more.	• Stop lamp switch • Stop lamp switch circuit • Hybrid vehicle control ECU

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WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT STOP LAMP SWITCH OPERATION

(a) Check that the stop lamp comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK:

The stop lamp comes on/goes off normally.

HINT:

The stop lamp uses the circuit on the terminal STP side of the hybrid vehicle control ECU.

NG → **INSPECT STOP LAMP SWITCH CIRCUIT (SEE PAGE 65–12)**

OK

2	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the items "Stp Light SW M–CPU", "Stp Light SW S2–CPU", and "Stp Light S1–CPU" in the DATA LIST, and check the display on the tester screen when the brake pedal is depressed and when it is released.

HYBRID VEHICLE CONTROL ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Stp Light SW M–CPU	Stop lamp switch signal (Main CPU)/ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal is released	–
Stp Light SW S2–CPU	Stop lamp switch signal (Sub CPU)/ ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal released	–
Stp Light SW S1–CPU	Stop lamp switch signal (Sub CPU)/ ON or OFF	ON: Brake pedal is depressed OFF: Brake pedal is released	–

OK:

When brake pedal operation is performed, the standard values will be above.

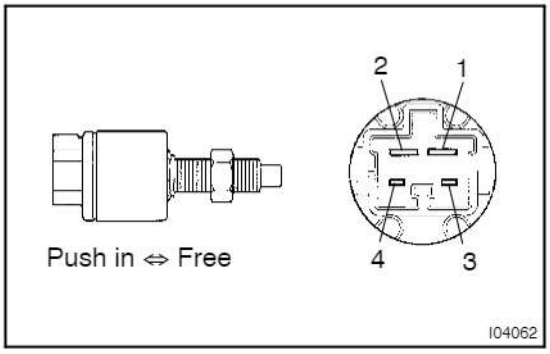
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (SEE PAGE 05–2451)

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3 INSPECT STOP LAMP SWITCH ASSY



(a) Disconnect the stop lamp switch assy connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

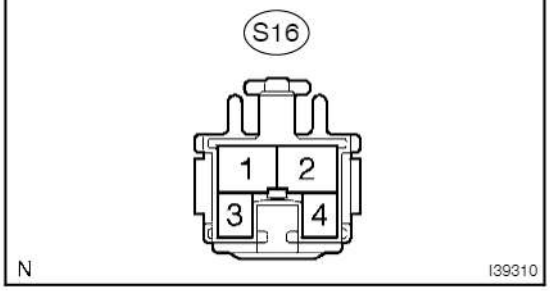
Switch Condition	Terminal Connection	Specified Value
Switch pin free	3 – 4	10 kΩ or higher
Switch pin pushed in	3 – 4	Below 1 Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

4 CHECK HARNESS AND CONNECTOR (STOP LAMP SWITCH – BATTERY)

Wire Harness Front View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

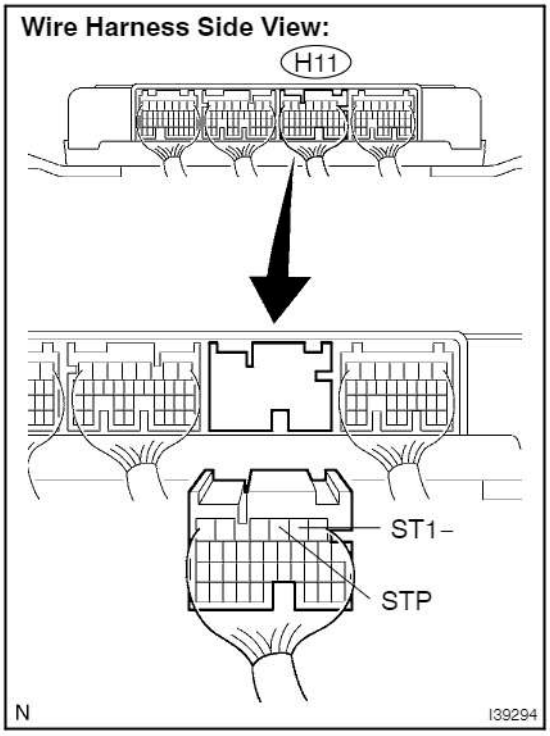
Symbol (Terminal Connection)	Condition	Specified Value
S16–3 – Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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5 INSPECT HYBRID VEHICLE CONTROL ECU



(a) Reconnect the stop lamp switch connector.
(b) Disconnect the H11 connector from the hybrid vehicle control ECU.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Symbol (Terminal Connection)	Pedal Condition	Specified Value
STP (H11–3) – Body ground	Brake pedal is depressed	10 to 14 V
STP (H11–3) – Body ground	Brake pedal is released	Below 1 V
ST1– (H11–2) – Body ground	Brake pedal is depressed	Below 1 V
ST1– (H11–2) – Body ground	Brake pedal is released	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LAMP SWITCH – HYBRID VEHICLE CONTROL ECU)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

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DTC	P0607	CONTROL MODULE PERFORMANCE

CIRCUIT DESCRIPTION

DTC 0607 is stored when an internal abnormality of the hybrid vehicle control ECU is detected.

DTC No.	DTC Detecting Condition	Trouble Area
P0607	The hybrid vehicle control ECU has a supervisory CPU and a control CPU inside. This trouble code is output when input STP signals to each CPU are different for 0.15 sec. or more.	Hybrid vehicle control ECU

HINT:

If DTC P0607 is detected while the cruise control is in operation, the system clears the stored vehicle speed in the hybrid vehicle control ECU and cancels the cruise control operation. At the same time, the CRUISE main indicator light blinks to inform the driver of the malfunction.

When this trouble code is detected, fail–safe remains on until the power switch is turned off.

INSPECTION PROCEDURE

1	REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

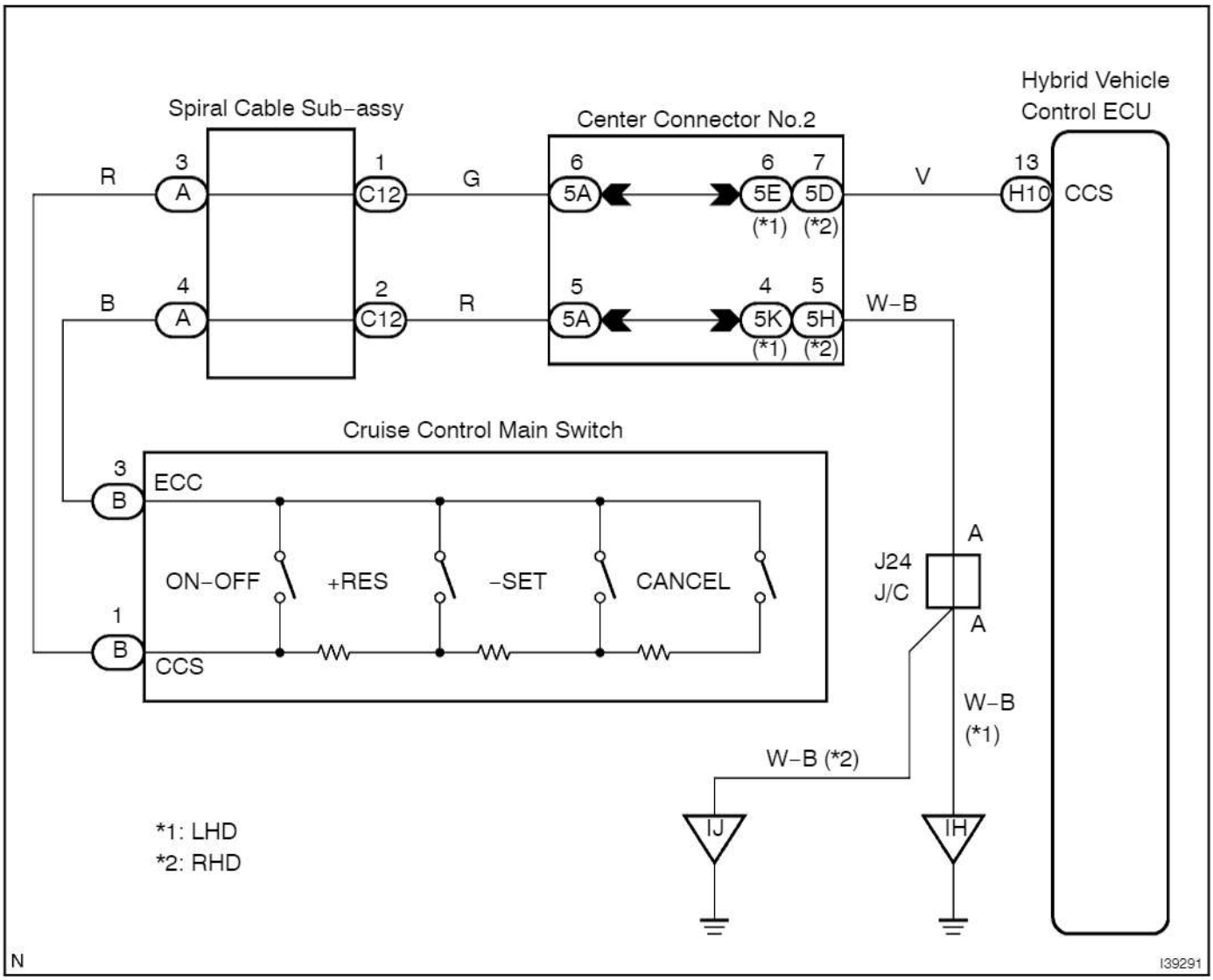
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CRUISE CONTROL SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The cruise control main switch operates seven functions: SET, COAST, TAP–DOWN, RESUME, ACCEL, TAP–UP, and CANCEL. The SET, TAP–DOWN and COAST functions, and the RESUME and, TAP–UP ACCEL functions share the same switch. Each function can be controlled by moving the switch in the directions of the arrows on the cruise control main switch assy. The switch will return automatically after being released. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the hybrid vehicle control ECU reads the voltage value which has been changed by the resistance in the switch in order to control SET, COAST, RESUME, ACCEL, and CANCEL.

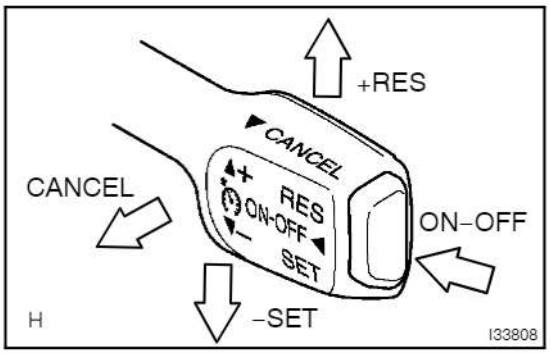
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER II



(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the items "Main SW M–CPU", Main SW S–CPU", "CANCEL Switch", "SET/COAST Switch", and "RES/ACC Switch" in the DATA LIST, and check the display on the tester screen when the cruise control main switch is operated.

HYBRID VEHICLE CONTROL ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
Main SW M–CPU	Cruise main switch signal (Main CPU)/ON or OFF	ON: Cruise control main switch ON–OFF button is pushed on OFF: Cruise control main switch ON–OFF button is pushed off	–
Main SW S–CPU	Cruise main switch signal (Sub CPU)/ON or OFF	ON: Cruise control main switch ON–OFF button is pushed on OFF: Cruise control main switch ON–OFF button is pushed off	–
CANCEL Switch	CANCEL switch signal/ON or OFF	ON: Cruise control main switch is pulled to CANCEL OFF: Cruise control main switch is not pulled to CANCEL	–
SET/COAST Switch	–/SET switch signal/ON or OFF	ON: Cruise control main switch is pushed to –/SET OFF: Cruise control main switch is not pushed to –/SET	–
RES/ACC Switch	+/RES switch signal/ON or OFF	ON: Cruise control main switch is pushed to +/RES OFF: Cruise control main switch is not pushed to +/RES	–

OK:
When cruise control main switch operation is performed, the standard values will be above.

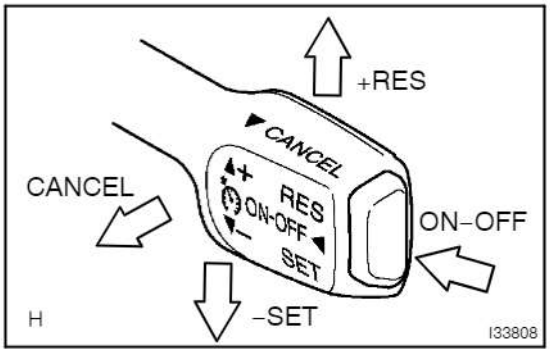
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–2451)

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2 INSPECT HYBRID VEHICLE CONTROL ECU



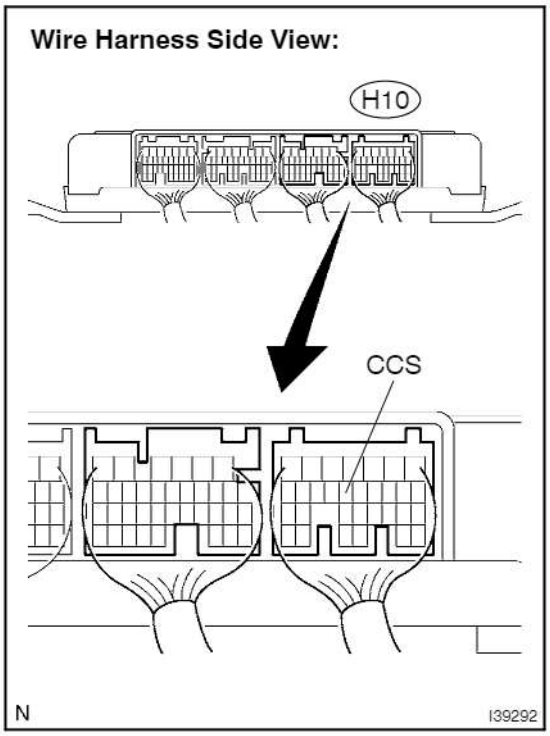
(a) Turn the power switch on (IG).

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

Standard:

Symbol (Terminal Connection)	Switch Condition	Specified Value
CCS (H10–13) – Body ground	Neutral	10 to 14 V
CCS (H10–13) – Body ground	+RES	6.6 to 10.1 V
CCS (H10–13) – Body ground	–SET	4.5 to 7.1 V
CCS (H10–13) – Body ground	CANCEL	2.3 to 4.0 V
CCS (H10–13) – Body ground	ON–OFF button is on	Below 1 V

Wire Harness Side View:



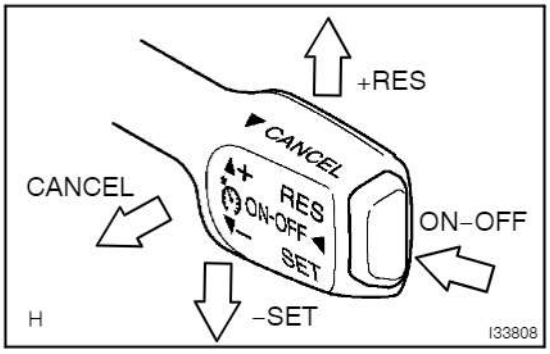
NG → **Go to step 3**

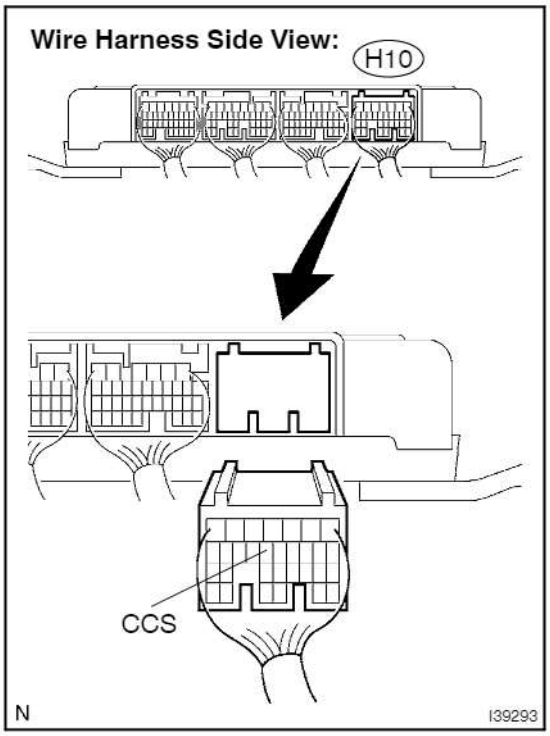
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(SEE PAGE 05–2451)

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3 INSPECT CRUISE CONTROL MAIN SWITCH





(a) Disconnect the H10 connector of the hybrid vehicle control ECU.

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

Standard:

Symbol (Terminal Connection)	Switch Condition	Specified Value
CCS (H10–13) – Body ground	Neutral	10 kΩ or higher
CCS (H10–13) – Body ground	+RES	210 to 270 Ω
CCS (H10–13) – Body ground	–SET	560 to 700 Ω
CCS (H10–13) – Body ground	CANCEL	1,380 to 1,700 Ω
CCS (H10–13) – Body ground	ON–OFF button is on	Below 1 Ω

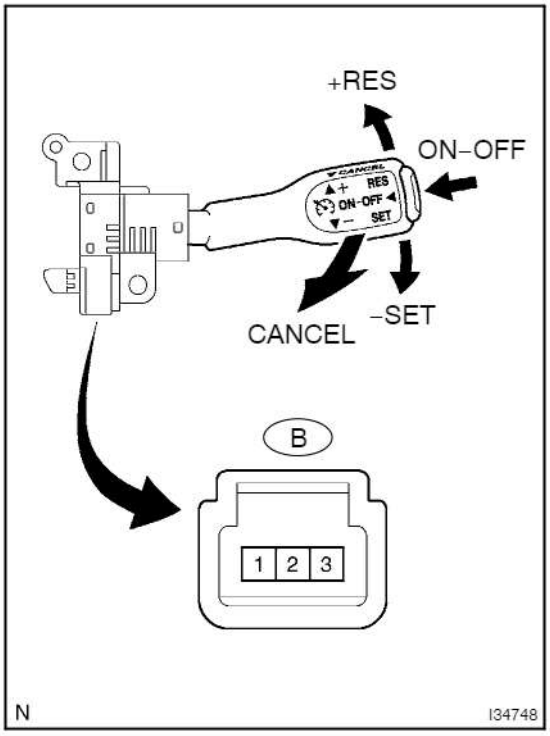
NG → **Go to step 4**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)

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4 INSPECT CRUISE CONTROL MAIN SWITCH



(a) Disconnect the cruise main control switch connector.
(b) Measure the resistance according to the value(s) in the table below.

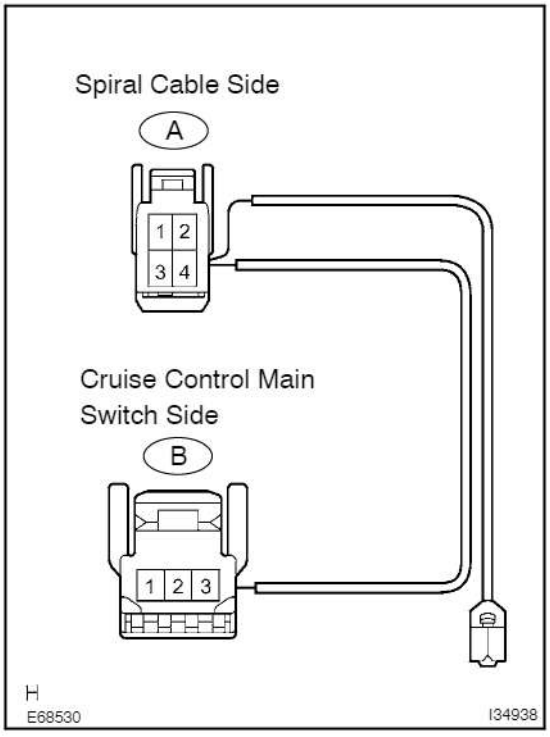
Standard:

Tester Connection	Switch Condition	Specified Value
B–1 – B–3	Neutral	10 kΩ or higher
B–1 – B–3	+RES	210 to 270 Ω
B–1 – B–3	–SET	560 to 700 Ω
B–1 – B–3	CANCEL	1,380 to 1,700 Ω
B–1 – B–3	ON–OFF button is on	Below 1 Ω

NG → **REPLACE CRUISE CONTROL MAIN SWITCH (SEE PAGE 82–1)**

OK

5 CHECK HARNESS AND CONNECTOR (CRUISE CONTROL MAIN SWITCH – SPIRAL CABLE SUB–ASSY)



(a) Disconnect the spiral cable side connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

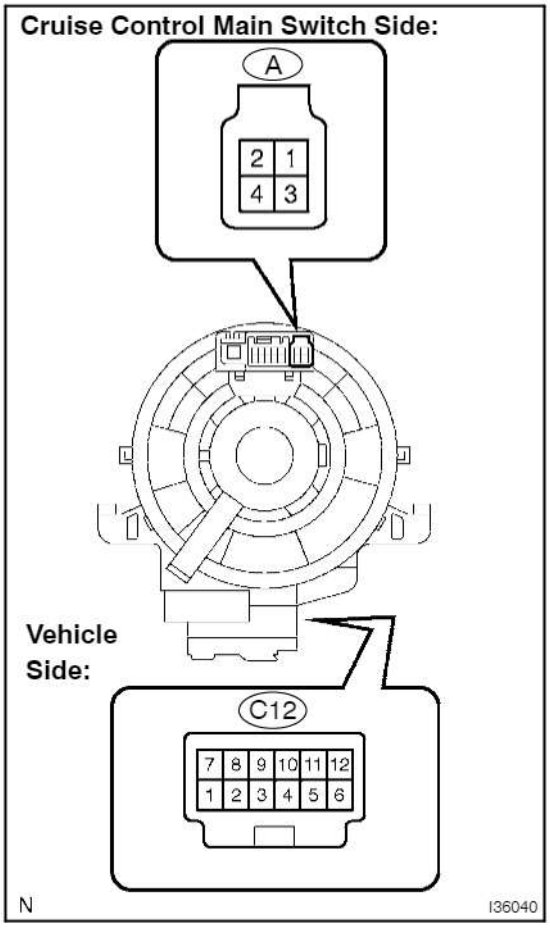
Terminal Connection	Condition	Specified Value
A–3 – B–1	Always	Below 1 Ω
A–4 – B–3	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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6 INSPECT SPIRAL CABLE SUB–ASSY



(a) Disconnect the spiral cable connector.

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

Standard:

Terminal Connection	Condition	Specified Value
A–3 – C12–1	Always	Below 1 Ω
A–4 – C12–2	Always	Below 1 Ω

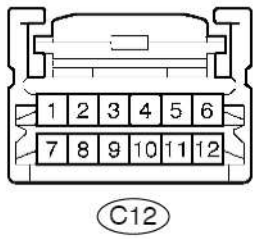
NG → **REPLACE SPIRAL CABLE SUB–ASSY** (SEE PAGE 60–29)

OK

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7	CHECK HARNESS AND CONNECTOR (SPIRAL CABLE SUB–ASSY – HYBRID VEHICLE CONTROL ECU)

Spiral Cable Sub–assy Connector Side Connector Front View:



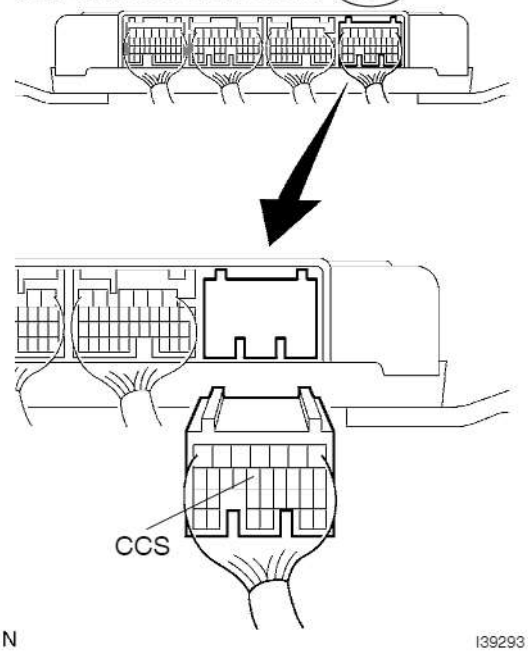
N I39295

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

Standard:

Symbol (Terminal Connection)	Condition	Specified Value
CCS (H10–13) – C12–1	Always	Below 1 Ω
CCS (H10–13) – Body ground	Always	10 kΩ or higher

Hybrid Vehicle Control ECU Wire Harness Side View: H10



N I39293

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE SUB–ASSY – HYBRID VEHICLE CONTROL ECU)**

OK →

REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE SUB–ASSY – BODY GROUND)

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CRUISE MAIN INDICATOR LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The hybrid vehicle control ECU outputs the cruise control operation status to the CRUISE main indicator light on the combination meter.
The cruise main indicator light circuit uses CAN and BEAN for communication. If there are any malfunctions in this circuit, check for DTCs in the CAN communication system and the multiplex communication system.

1	READ VALUE OF INTELLIGENT TESTER II

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the items "CCS Indicator M–CPU" and "CCS Indicator S–CPU", and check the display on the tester screen when the cruise control main switch ON–OFF button is pushed on and when it is pushed off.

CRUISE CONTROL (HYBRID VEHICLE CONTROL ECU):

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
CCS Indicator M–CPU	Cruise indicator signal (Main CPU)/ON or OFF	ON: CRUISE main indicator is on OFF: CRUISE main indicator is off	–
CCS Indicator S–CPU	Cruise indicator signal (Sub CPU)/ON or OFF	ON: CRUISE main indicator is on OFF: CRUISE main indicator is off	–

OK:
Indication on the tester switches between ON and OFF in accordance with the indicator light status.

Result:

OK	A
NG (ON/OFF switches only on the tester.)	B
NG (ON/OFF does not switch on the tester.)	C

B → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05–1681)**

C → **REPLACE HYBRID VEHICLE CONTROL ECU (SEE PAGE 21–128)**

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05–2451)

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