SMART KEY SYSTEM

PRECAUTION

NOTICE:
When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

System Name	See procedure
SFI System	IN-43

1. PRECAUTIONS FOR PUSH-BUTTON START FUNCTION:

(a) Before starting the HV control system on (READY), firmly depress the brake pedal until the indicator in the power switch turns green.

(b) The power source mode (off, on (ACC), on (IG)) is always retained in memory by the vehicle. If the battery is disconnected, the power source mode that was present before disconnection will be restored after the battery is reconnected. Be sure to turn the power switch off before disconnecting the cable from the negative battery terminal. Be careful if the power source mode of a vehicle with a discharged battery is not known.

(c) After the battery is reconnected, be sure to wait 10 seconds or more before attempting to start the HV control system. The engine may not start immediately after the battery is reconnected.

(d) If the electrical key is held near the power switch to start the HV control system when the electrical key battery is depleted, the following warnings will sound:

(1) Driver's door open → closed

- An exit warning will sound if the shift lever is in a position other than P and the power source is in a mode other than off.
- An exit warning will sound if the shift lever is in the P position and the power source is in a mode other than off.

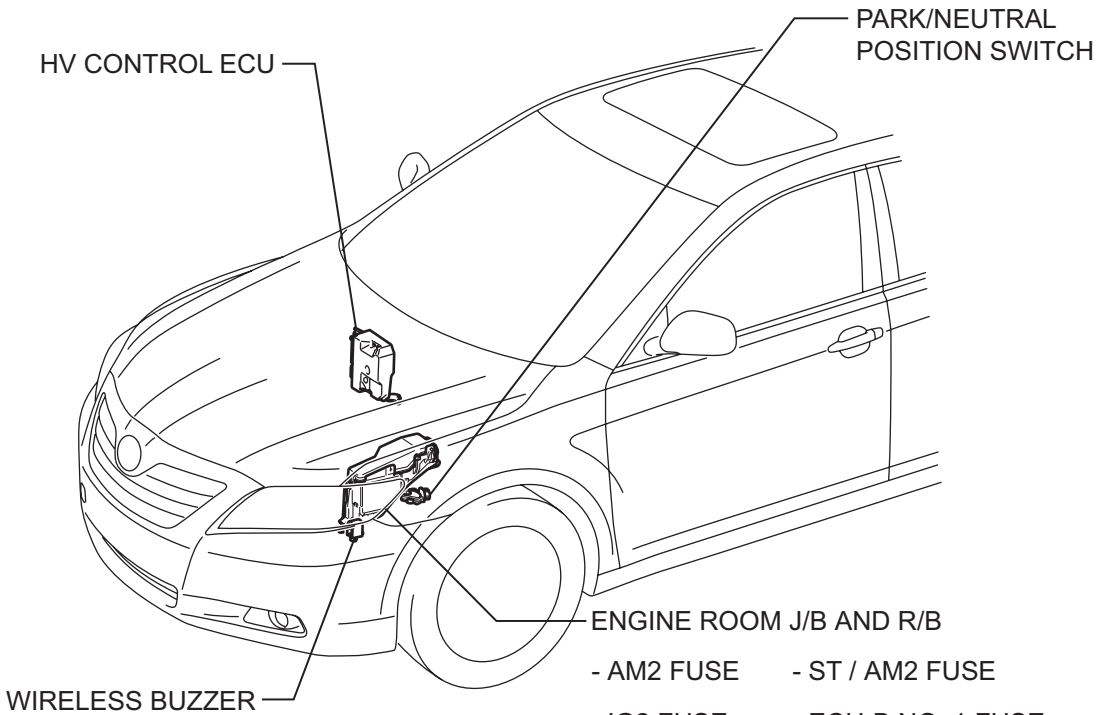
(2) Doors other than the driver door open → closed

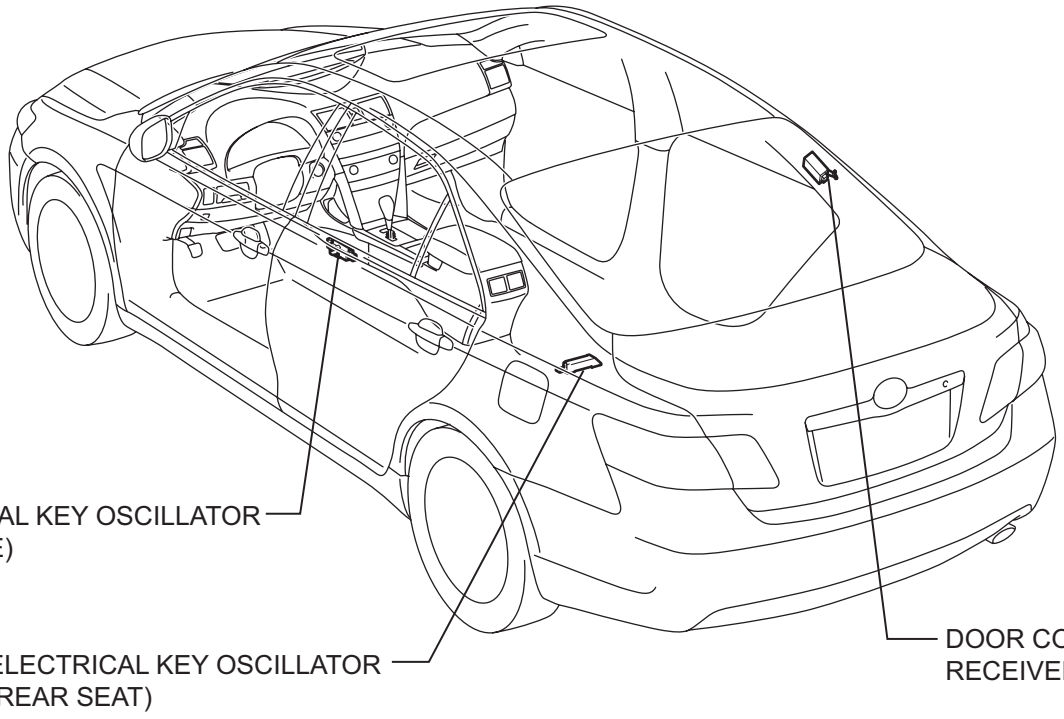
- A warning will sound to indicate that the electrical key has been taken out of the vehicle.

These warnings will sound because it is not possible for the vehicle to determine if the key is present in the vehicle (due to the depleted key battery). These warnings do not indicate system malfunctions.

ST

PARTS LOCATION





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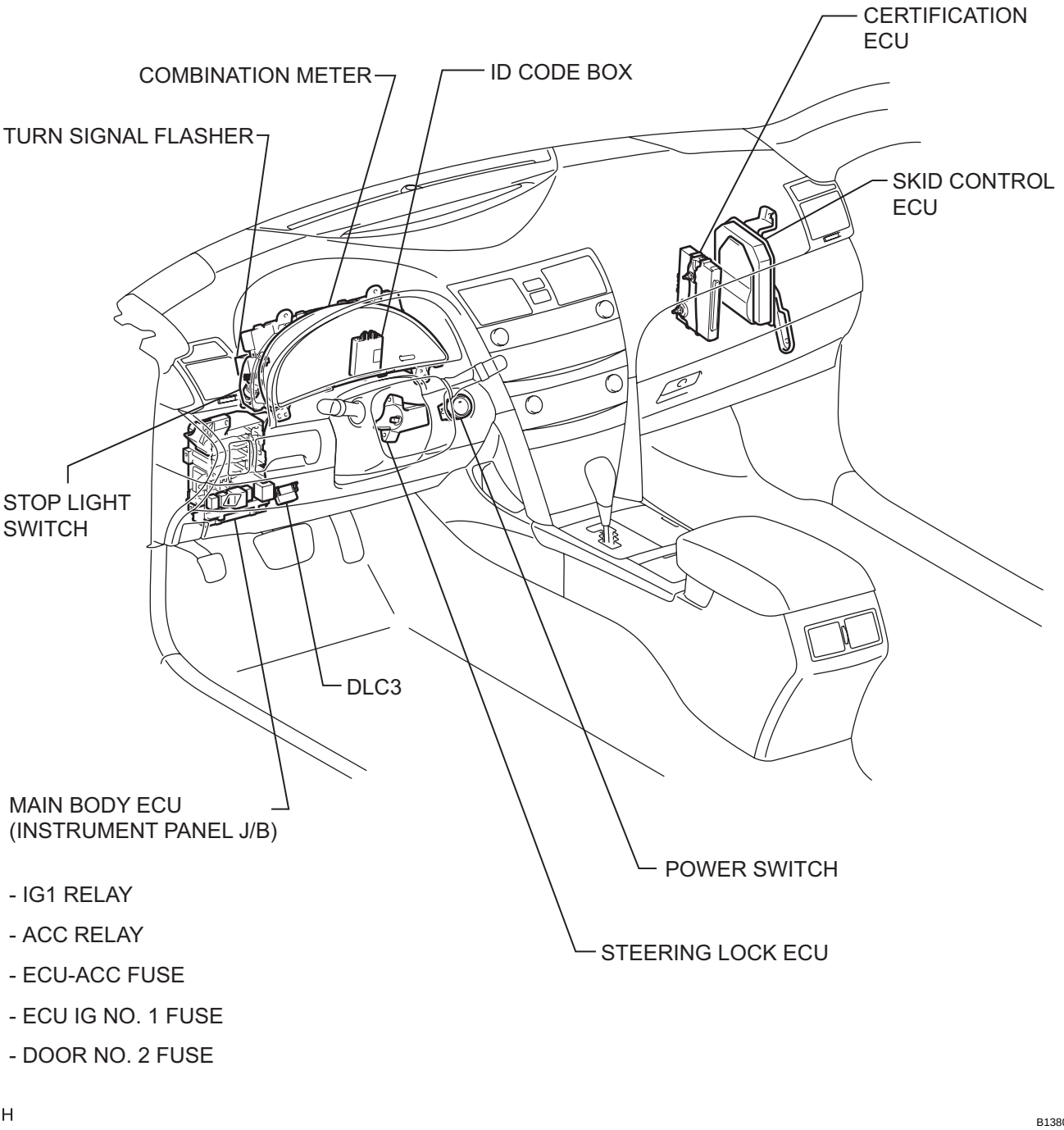
CERTIFICATION ECU
COMBINATION METER
ID CODE BOX
TURN SIGNAL FLASHER
SKID CONTROL ECU
STOP LIGHT SWITCH
DLC3
MAIN BODY ECU (INSTRUMENT PANEL J/B)
- IG1 RELAY
- ACC RELAY
- ECU-ACC FUSE
- ECU IG NO. 1 FUSE
- DOOR NO. 2 FUSE
POWER SWITCH
STEERING LOCK ECU
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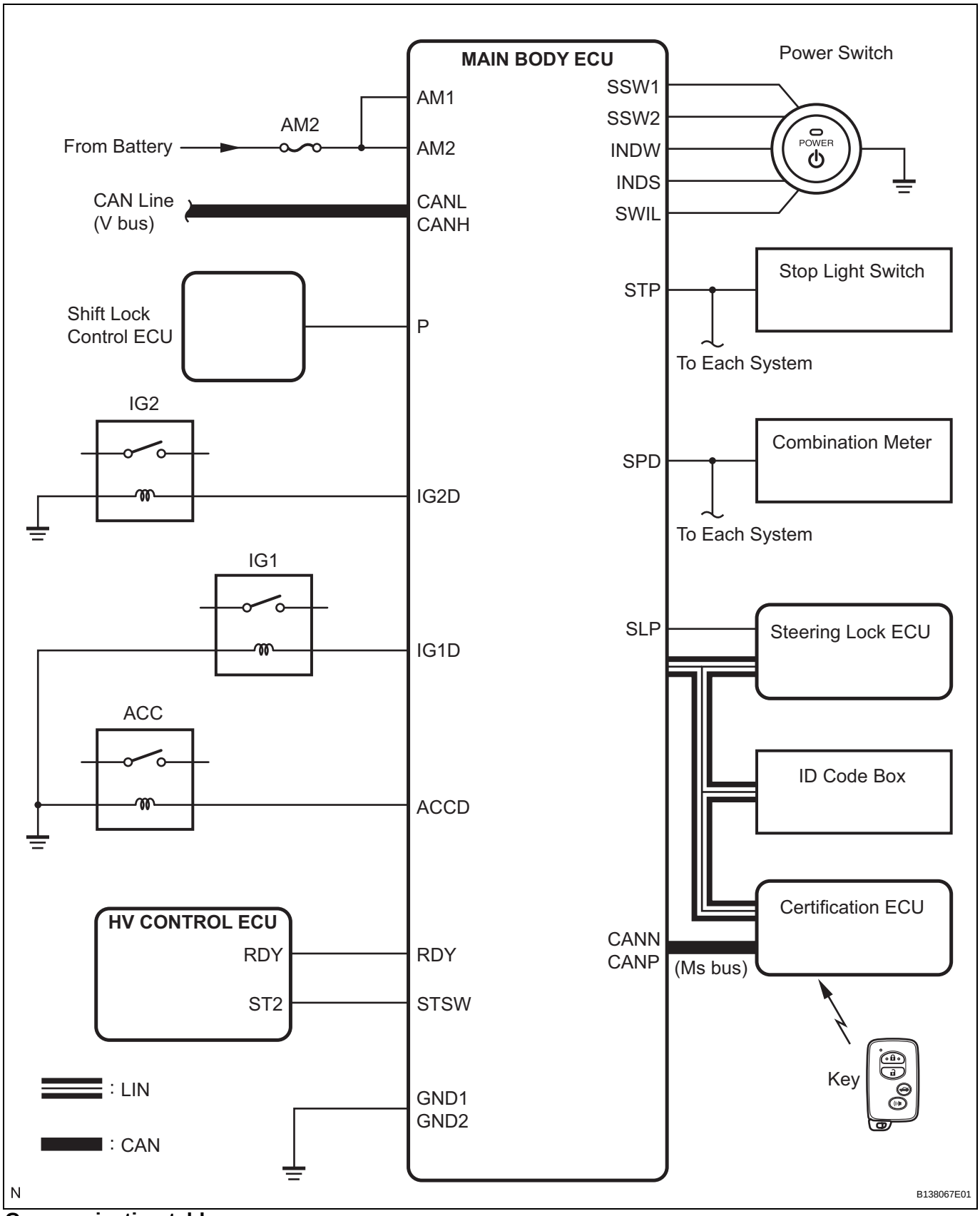
SYSTEM DIAGRAM



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Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
Combination meter	Main body ECU	Vehicle speed signal	CAN/Local communication

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
Steering lock ECU	Main body ECU	Steering lock/unlock signal	LIN/Local communication
HV control ECU	Main body ECU	READY signal	CAN
		READY inhibition signal	
		Shift position signal	
		Stop light switch signal	
Main body ECU	Certification ECU	Engine switch position signal	CAN
		Courtesy light switch signal	
		Wireless door lock buzzer request signal	
Main body ECU	Combination meter	Entry start key signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
Certification ECU	Main body ECU	Light answer back signal	CAN
Certification ECU	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Key loss warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU/Main body ECU	Vehicle speed signal	CAN
Shift lock control ECU	Main body ECU	Shift position signal	Local communication
Certification ECU	Main body ECU	Key ID matching request signal	LIN
Main body ECU	Certification ECU	ID required signal	LIN

ST

SYSTEM DESCRIPTION

1. PUSH-BUTTON START FUNCTION DESCRIPTION

(a) The push-button start function uses a push-type power switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the main body ECU, power switch, ID code box, steering lock ECU, electrical key, ACC relay, IG1 relay, IG2 relay and certification ECU. The main body ECU controls the function. This function operates in cooperation with the smart key system.

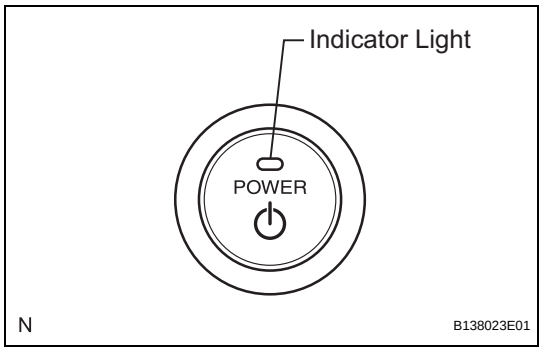
2. FUNCTION OF COMPONENT

Component	Function
Power Switch • Transponder Key Amplifier	• Transmits power switch signal to main body ECU. • Informs driver of power source mode or system abnormality with illumination of indicator light. • Receives ID code and transmits it to certification ECU when key battery is low.
Electrical Key	Receives signals from oscillators and returns ID code to door control receiver.
Electrical Key Oscillator • Console and Rear Seat	Receives request signals from certification ECU and forms detection area in vehicle interior.
Steering Lock ECU	Receives lock/unlock request signals from certification ECU and main body ECU.
Door Control Receiver	Receives ID code from electrical key and transmits it to certification ECU.
Main body ECU	• Changes power source mode in 4 stages (off, on (ACC), on (IG), on (READY)) in accordance with shift position and state of stop light switch. • Controls push-button start function in accordance with signals received from switches and certification ECU and HV control ECU.
Certification ECU	Certifies ID code received from door control receiver and transmits certification results to main body ECU.
Stop Light Switch	Outputs state of brake pedal to main body ECU.
ID Code Box	Receives steering unlock or engine immobiliser unset signals from certification ECU, certifies them, and transmits each unset signal to steering lock ECU or HV control ECU.
HV control ECU	Receives signal from ID code box and main body ECU and performs HV control system is on (READY).

3. SYSTEM FUNCTION

The electric controls of the push-button start function are described below:

Control	Outline
Power switch control	• When driver operates power switch with electrical key in driver's possession, certification ECU starts indoor electrical key oscillator, which transmits request signal to electrical key. Upon receiving this signal, the electrical key transmits ID code signal to door control receiver. • Certification ECU verifies check results received from door control receiver and sends them to main body ECU. Based on these results, main body ECU authorizes operation of power switch.
Diagnosis	When main body ECU detects malfunction, main body ECU diagnoses and memorizes failed section.



4. CONSTRUCTION AND OPERATION

(a) Power Switch

The power switch consists of a momentary type switch, 3 color (amber, green, greenish white) LEDs, and a transponder key amplifier.

- The greenish white LED is for illumination.
- The amber and green LEDs are for the indicator lights. The driver can check the present power source mode and whether the HV control system can start in accordance with the illumination state of the indicator light.
- When the main body ECU detects an abnormality in the push-button start function, it makes the amber indicator light flash. If the HV control system stopped in this state, it may not be possible to restart it.

(b) Indicator Light Condition

Power switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P
off	OFF	ON (Green) (when key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

(c) Main body ECU

The main body ECU consists of the IG1 and IG2 relay actuation circuits and CPU.

HINT:

Before removing the battery, make sure to turn the power switch off. The main body ECU constantly stores the present power source mode in its memory. Therefore, if the main body ECU is interrupted by disconnecting the battery, the main body ECU restores the power source mode after the battery is reconnected. For this reason, if the battery is disconnected when the power switch is not off, the power will be restored to the vehicle at the same time the power is restored to the main body ECU (by reconnecting the battery).

5. PUSH-BUTTON START FUNCTION OPERATION

(a) This system has different power source mode patterns depending on the brake pedal condition and shift lever position.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P position	When the power switch is pushed once. • off → HV control system on (READY) • on (ACC) → HV control system on (READY) • on (IG) → HV control system on (READY)

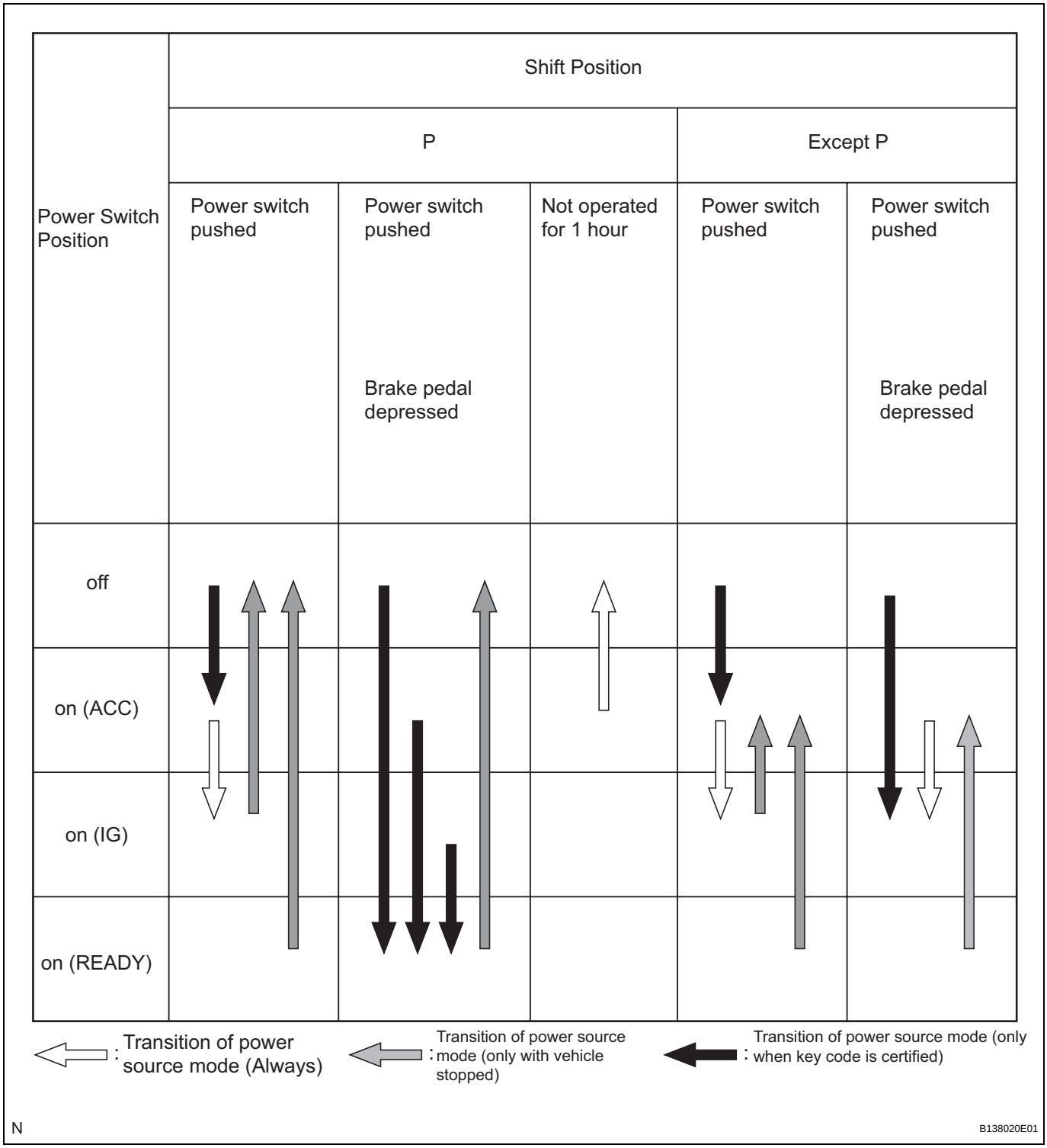
ST

Brake Pedal	Shift Lever	Power Source Mode Pattern
Not depressed	P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → off
	Except P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → off
-	Except P position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → on (ACC)

When the battery of the key is low, the push-button start function can be operated by holding the key against the power switch.

- After approximately 1 hour has passed with the power switch on (ACC) and the shift position in P, the main body ECU will automatically cut the power supply (the power source mode changes to off).

- The illustration below shows the transition of power source modes.
  Transition of power source mode:



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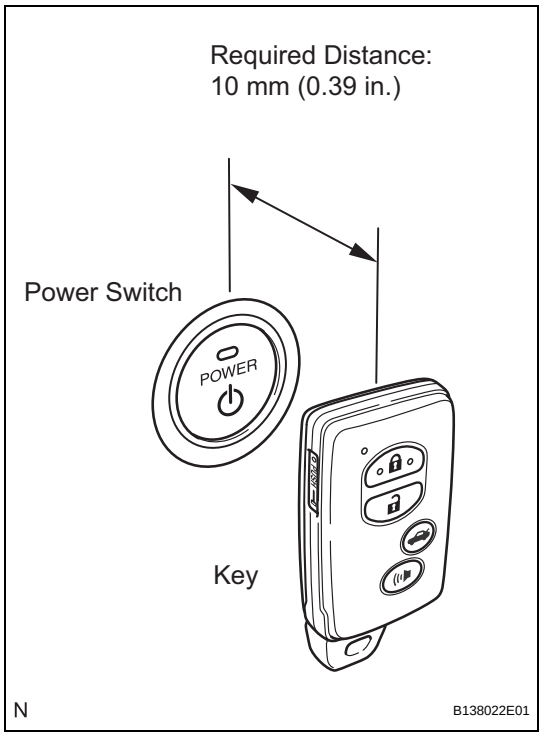
HINT:
While the vehicle is being driven normally, operation of the power switch is disabled. However, if the HV control system must be stopped in an emergency while the vehicle is being driven, pressing the power switch for 3 seconds or more stops the HV control system. Power source mode changes from on (READY) to on (ACC).



6. WHEN KEY BATTERY IS LOW

(a) To operate the push-button start function when the key battery is low, hold the key close to the power switch with the brake pedal depressed.
(b) The main body ECU transmits a key verification request signal from the stop light switch to the certification ECU.
(c) The certification ECU does not receive an ID code response from the entry door control receiver, so it actuates the transponder key amplifier built into the power switch.
(d) The transponder key amplifier outputs an engine immobiliser radio wave to the key.
(e) The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
(f) The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU.
(g) The certification ECU judges and verifies the ID code, and transmits a key verification OK signal to the main body ECU. The buzzer in the combination meter sounds at the same time.
(h) After the buzzer sounds, if the power switch is pressed within 5 seconds with the brake pedal not depressed, the power source mode changes to on (ACC) or on (IG), the same as in the normal condition.

7. DIAGNOSIS

The main body ECU can detect malfunctions in the push-button start function when the power source mode is on (IG). When the ECU detects a malfunction, the amber indicator light of the power switch flashes to warn the driver. At the same time, the ECU stores a 5-digit DTC (Diagnostic Trouble Code) in the memory.

- The indicator light warning continues for 15 seconds even after the power source mode is changed to off.
- The DTC can be read by connecting the intelligent tester to the DLC3.
- The push-button start function cannot be operated if a malfunction occurs.

ST

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the push-button start function.
- The intelligent tester should be used in steps 4, 5 and 8.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

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

NEXT

4	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally (See page CA-7).

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM**

A

5 CHECK FOR DTC

(a) Check for DTCs and note any codes that are output (See page ST-21).
(b) Delete DTCs.
(c) Recheck for DTCs.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B → **GO TO DIAGNOSTIC TROUBLE CODE CHART**

A

ST

6 INSPECT BASIC OPERATION

(a) Turn the power switch on (READY) and check that the HV control system starts normally. Make sure the brake pedal is depressed and the shift position is P at this time.
(b) Check that the power switch mode can be changed by pushing the power switch.
HINT:
Without depressing the brake pedal, push the power switch repeatedly. Power switch mode should turn from off to on (ACC) to on (IG) and back to off.
With the brake pedal depressed, push the power switch repeatedly. Power switch mode should turn to on (READY) from any status.
OK:
HV control system can be on (READY) normally.

NEXT

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in the problem symptoms table	A
Fault is listed in the problem symptoms table	B

B → Go to step 9

A

8	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page ST-14)
(b) DATA LIST/ACTIVE TEST (See page ST-22)

NEXT

9	REPAIR OR REPLACE

NEXT

10	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The items in the table below can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

SMART:

Display (Item)	Default	Contents	Setting
IGNITION AREA (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start HV control system and cancel the steering lock.	FRONT / ALL

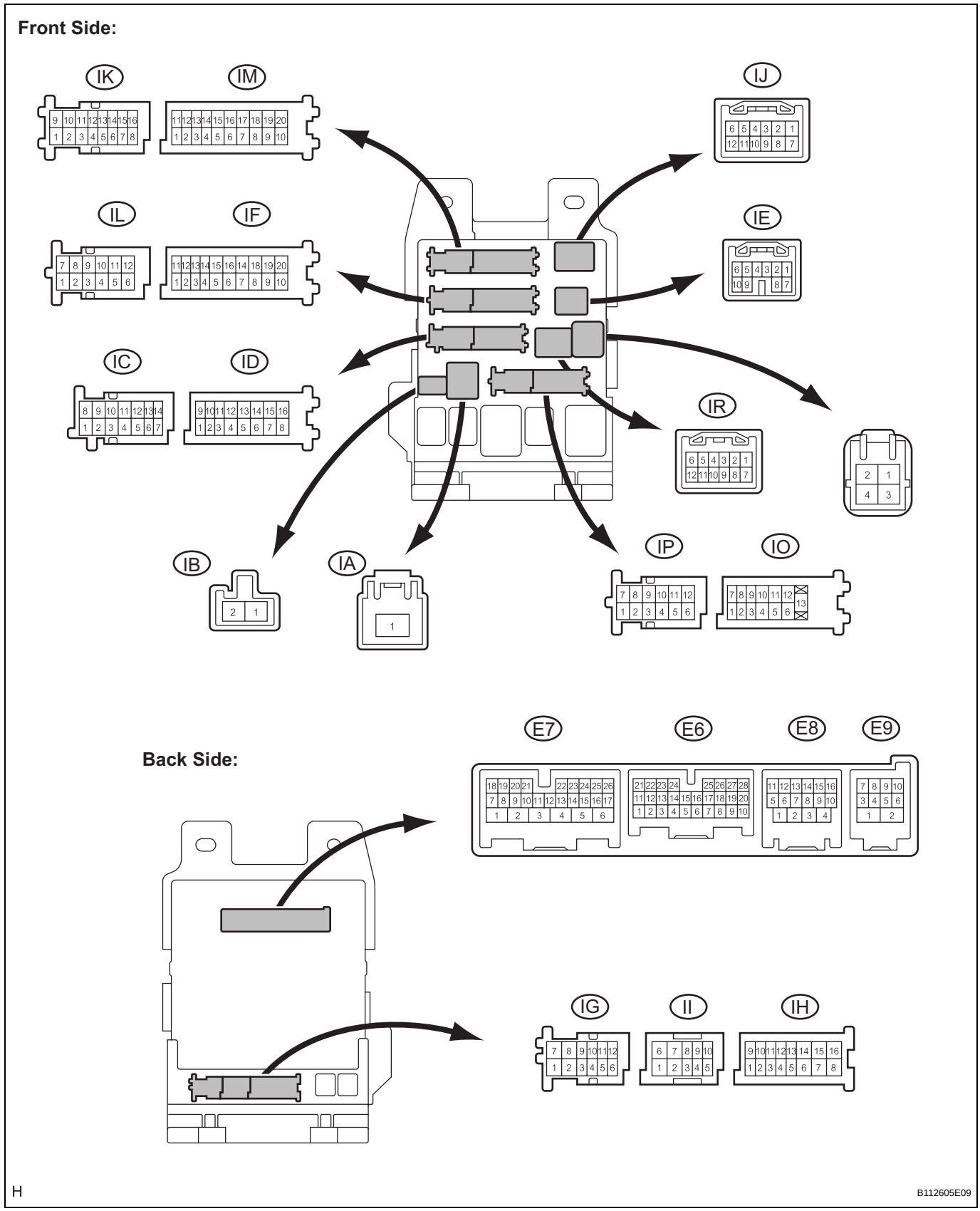
PROBLEM SYMPTOMS TABLE

PUSH-BUTTON START FUNCTION:

Symptom	Suspected Area	See page
Power mode does not change (neither ACC nor IG is possible).	1. AM2 Fuse	ST-91
	2. Power Switch	-
	3. Wire Harness or Connector	-
	4. Main Body ECU (Instrument Panel J/B)	-
	5. Certification ECU	-
	6. Smart Key System (Entry Function)	-
Power is not turned on (only ACC is not turned on).	1. AM2 Fuse	ST-108
	2. Wire Harness or Connector	-
	3. Main Body ECU (Instrument Panel J/B)	-
Power is not turned on (only IG is not turned on).	1. AM2 Fuse	ST-99
	2. IG1 Relay	-
	3. IG2 Relay	-
	4. Wire Harness or Connector	-
	5. Main Body ECU (Instrument Panel J/B)	-
Power is not turned on (READY).	1. Power Switch	ST-116
	2. Certification ECU	-
	3. Shift Lock Control ECU	-
	4. ID Code Box	-
	5. STOP Fuse	-
	6. Stop Light Switch	-
	7. Electrical Steering Lock Function	-
	8. HV Control System	-
	9. Engine Immobiliser System	-
	10. Main Body ECU (Instrument Panel J/B)	-
	11. Smart Key System (Entry Function)	-
	12. Wire Harness or Connector	-
Power switch indicator light does not come on.	Power Switch Indicator Light Circuit	ST-87

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)



(a) Disconnect the IR, IA, IK, ID, IF, IM E6, E7 and E8 ECU connectors.

(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
SSW1 (E7-17) - Body ground	L - Body ground	Power switch signal	Power switch pushed	Below 1 Ω
SSW1 (E7-17) - Body ground	L - Body ground	Power switch signal	Power switch not pushed	10 kΩ or higher
SSW2 (E7-16) - Body ground	V - Body ground	Power switch signal	Power switch pushed	Below 1 Ω
SSW2 (E7-16) - Body ground	V - Body ground	Power switch signal	Power switch not pushed	10 kΩ or higher
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LIN1 (IR-9) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
BATB (IA-1) - Body ground	B - Body ground	+B Power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
CANN (E8-15) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
CANP (E8-16) - Body ground	B - Body ground	CAN Line	Always	10 kΩ or higher
CANH (E8-5) - Body ground	B - Body ground	CAN Line	Always	10 kΩ or higher
CANL (E8-6) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the ECU connectors.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACC (IF-2) - Body ground	L - Body ground	ACC power supply	Power switch on (ACC)	10 to 14 V
IG (IF-11) - Body ground	B - Body ground	IG power supply	Power switch on (IG)	10 to 14 V
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Power switch on (ACC)	Output voltage at terminal AM1 or AM2 is -2 V or more.
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Power switch off	Below 1 V
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Power switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Power switch on (ACC)	Below 1 V
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Power switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Power switch on (ACC)	Below 1 V
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal depressed	Output voltage at terminal AM1 or AM2 is -2 V or more.
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal released	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor operating	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor does not operate	Output voltage at terminal AM1 or AM2 is -2 V or more.
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is locked	Pulse generation (See waveform 3)
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is released	Pulse generation (See waveform 3)
SPD (E8-9) - GND3 (E8-1)	V - W-B	Vehicle speed signal	Power switch on (IG), rotate rear wheel slowly	Pulse generation (See waveform 1)
RDY (E8-8) - GND3 (E8-1)	SB - W-B	Power switch on (READY) signal	Power switch on (READY)	Pulse generation (See waveform 2)

ST

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever P position	Below 1 V
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever not P position	Output voltage at terminal AM1 or AM2 is -2 V or more.
STSW (E9-4) - GND3 (E8-1)	GR - W-B	HV control system activation request signal	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.
INDS (E7-15) - GND3 (E8-1)	LG - W-B	Vehicle condition signal	Brake pedal depressed, shift lever P position.	Output voltage at terminal AM1 or AM2 is -3 V or more.
INDW (E7-14) - GND3 (E8-1)	P - W-B	Warning signal	Power switch on (ACC, IG)	Output voltage at terminal AM1 or AM2 is -3 V or more.
SWIL (E7-25) - GND3 (E8-1)	O - W-B	Illumination signal	Light control switch TAIL or HEAD	Output voltage at terminal AM1 or AM2 is -2 V or more.

If the result is not as specified, the ECU may have a malfunction.

(e) Using an oscilloscope, check the signal waveform of the ECU.

(1) Waveform 1

Waveform 1 (Reference):

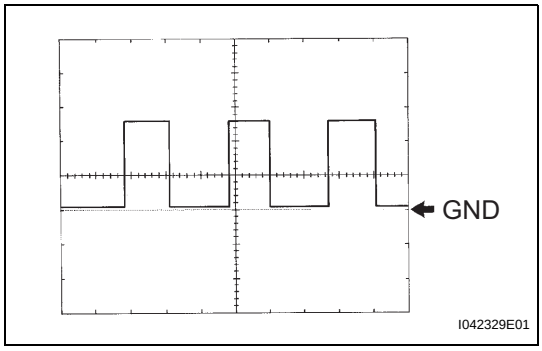
Terminal No.	SPD (E8-9) - GND3 (E8-1)
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Driving at approx. 20 km/h (12 mph)

HINT:
As the vehicle speed increases, the wavelength shortens.

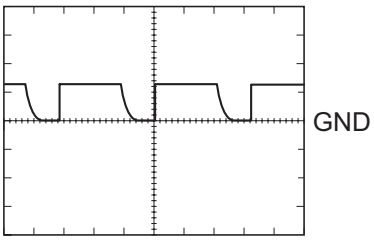
(2) Waveform 2

Waveform 2 (Reference):

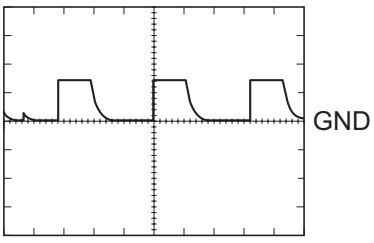
Terminal No.	RDY (E8-8) - GND3 (E8-1)
Tool Setting	10 V/DIV., 10 ms./DIV.
Vehicle Condition	Power switch on (IG) or on (READY)



Waveform:

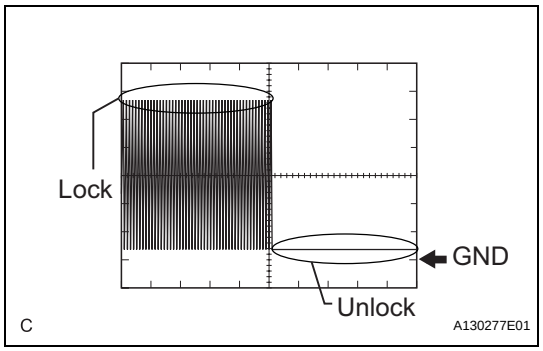


Power switch ON (IG)



Power switch ON (READY)

C A111591E05

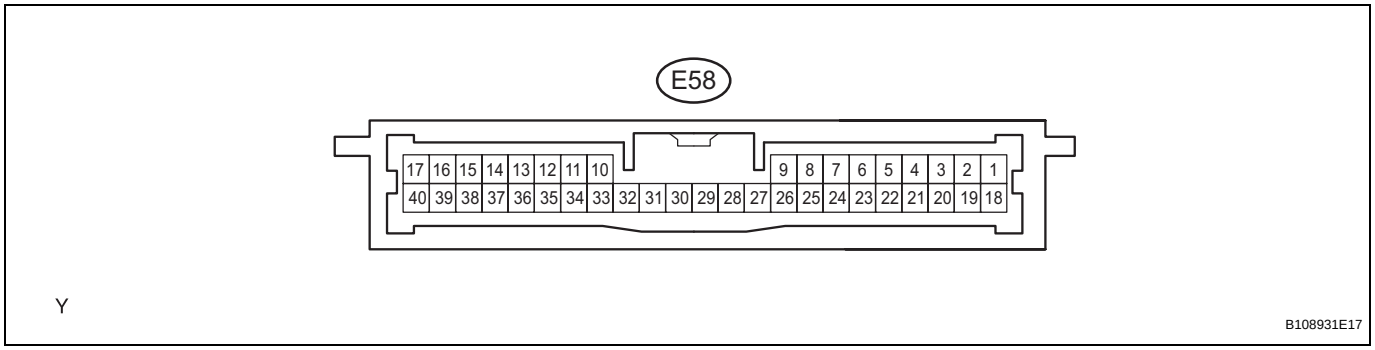


(3) Waveform 3

Waveform 3 (Reference):

Terminal No.	SLP (E7-18) - GND3 (E8-1)
Tool Setting	2 V/DIV., 100 ms./DIV.
Vehicle Condition	Steering lock/unlock

2. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
LIN (E58-10) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E58 ECU connector.
(d) Measure the voltage of the connector.

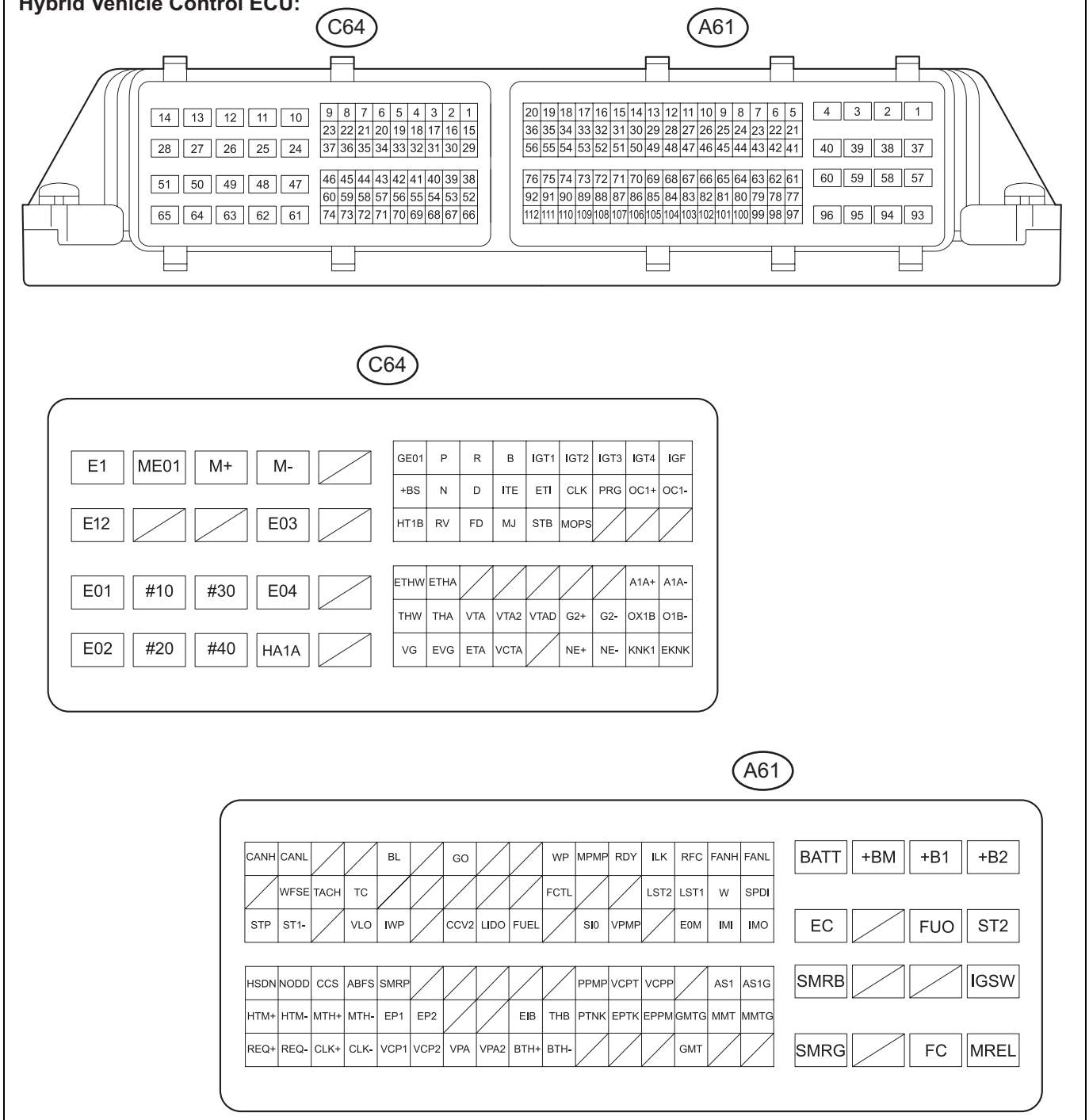
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch off	Below 1 V

If the result is not as specified, the main body ECU may have malfunction.

ST

3. CHECK HV CONTROL ECU

Hybrid Vehicle Control ECU:



C

A142563E02

(a) Disconnect the A61 and C64 ECM connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (A61-2) - Body ground	Y - Body ground	Power source of ECU	Power switch on (IG)	10 to 14 V
+B2 (A61-1) - Body ground	Y - Body ground	Power source of ECU	Power switch on (IG)	10 to 14 V
IGSW (A61-57) - Body ground	Y - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
E01 (C64-51) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C64-65) - Body ground	B-W - Body ground	Ground	Always	Below 1 Ω

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E03 (C64-25) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C64-48) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E1 (C64-14) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ME01 (C64-13) - Body ground	B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the ECU connectors.

(d) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RDY (A61-9) - E1 (C64-14)	V - W-B	HV control system on (READY) signal (output)	Power switch on (READY)	Pulse generation (see waveform 1)
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch signal (input)	Brake pedal depressed	7.5 to 14 V
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch signal (input)	Brake pedal released	Below 1.5 V
ST2 (A61-37) - E1 (C64-14)	R - W-B	HV control system activation request signal	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.

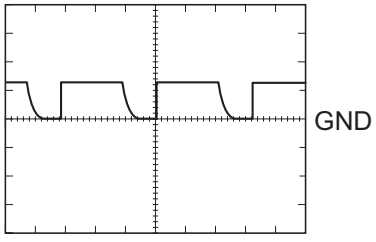
If the result is not as specified, the ECU may have a malfunction.

(e) Using an oscilloscope, check the signal waveform of the ECU.

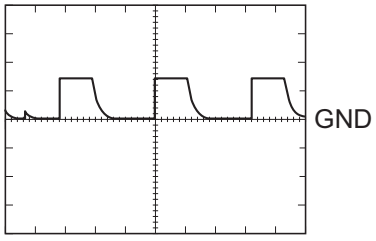
Waveform 1 (Reference):

Terminal No.	RDY (A61-9) - E1 (C64-14)
Tool Setting	10 V/DIV., 10 ms./DIV.
Vehicle Condition	Power switch on (IG) or on (READY)

Waveform:



Power switch ON (IG)

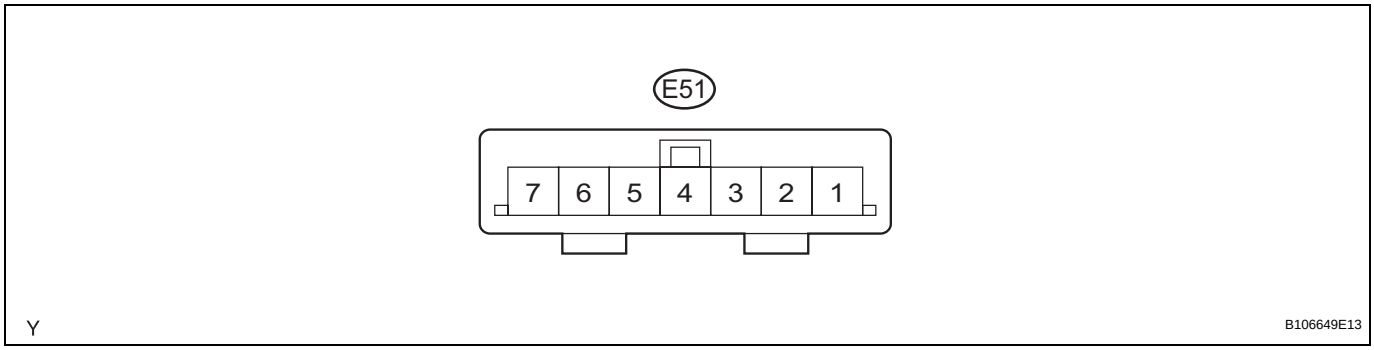


Power switch ON (READY)

C A111591E05

ST

4. CHECK STEERING LOCK ECU



(a) Disconnect the E51 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Power switch off	Below 1 V
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E51 ECU connector.
(d) Measure the voltage of the connector.

ST

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is locked	10 to 14 V
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is released	Below 1 V

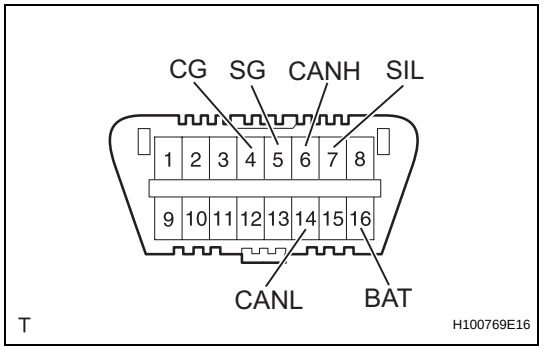
If the result is not as specified, the ECU may have a malfunction.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Push-button start function data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the function seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



HINT:

The ECU uses ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

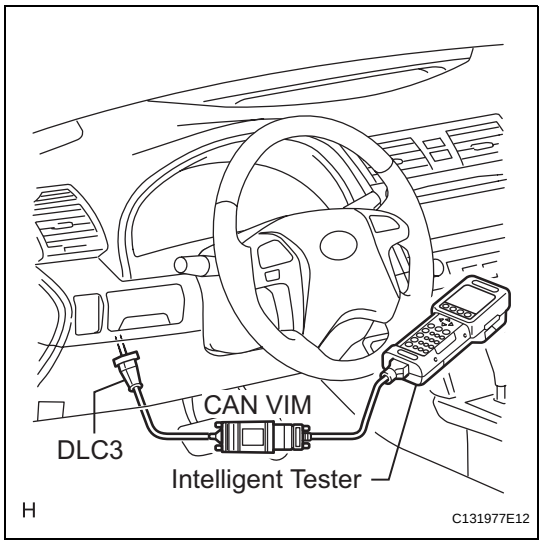
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power Switch OFF*	56 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Power Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Power Switch OFF*	6 kΩ or more

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

ST



HINT:
Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

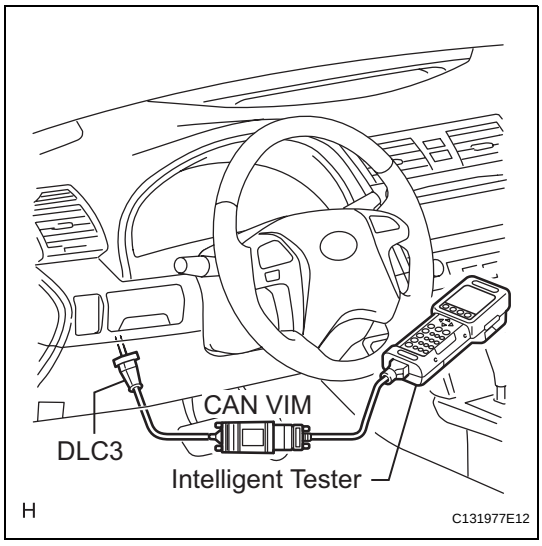
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

ST

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 or less second intervals until communication between the tester and vehicle starts.

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

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / DATA LIST.

(d) Read the DATA LIST.

MAIN BODY:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ACC SW	Power switch on (ACC) / ON or OFF	ON: Power switch on (ACC) OFF: Power switch off	-
IG SW	Power switch on (IG) / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
SHIFT P SIG	Shift P position signal / ON or OFF	ON: Shift position is P OFF: Shift position is not P	-
STR UNLOCK SW	Steering lock condition / ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STSW1	Start switch 1 / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start switch 2 / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
RATCH CIRCUIT	Ratch circuit / ON or OFF	ON: Power switch on (IG) or on (READY) OFF: Power switch off, or on (ACC)	-
IG1 RELAY MON1	IG1 outer relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG1 RELAY MON2	IG1 inner relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG2 RELAY MON1	IG2 outer relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG2 RELAY MON2	IG2 inner relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
READY SIG	HV control system on (READY) request signal monitor / ON or OFF	ON: System (READY) is ON OFF: System (READY) is OFF	Power switch pressed and held with shift lever in P or N
ACC RELAY MON	ACC relay monitor / ON or OFF	ON: Power switch on (ACC) OFF: Power switch off	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
VEHICLE SPD SIG	Vehicle speed signal / STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-
PWR COND	Power supply condition / ALL, ACC ON, IG1 IG2, ST ON	ALL: All relays are OFF ACC ON: ACC relay is ON IG1: IG1 relay is ON IG2: IG2 relay is ON ST ON: ST request signal is ON	-
COM ENTRY&STRT	Communication for certification ECU / OK or STOP	OK: Communication STOP: No communication	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows the relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

Tester Display	Test Part	Control Range	Diagnostic Note
LIGHTING IND	Indicator for lighting	ON / OFF	-
IND CONDITION	Power switch indicator	Green / Amber / No Sig	-
STR LOCK PWR	Power supply for steering lock ECU	ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

PUSH-BUTTON START FUNCTION:

DTC Code	Detection Item	Trouble Area	See page
B2271	Ignition Hold Monitor Malfunction	1. AM2 fuse 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-26
B2272	Ignition 1 Monitor Malfunction	1. IG1 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-28
B2273	Ignition 2 Monitor Malfunction	1. IG2 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-33
B2274	ACC Monitor Malfunction	1. ACC relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-37
B2275	STSW Monitor Malfunction	1. HV control ECU 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-42
B2277	Detecting Vehicle Submersion	Main body ECU (Instrument panel J/B)	ST-45
B2278	Power Switch Circuit Malfunction	1. Power switch 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-46
B2281	"P" Signal Malfunction	1. Main body ECU (Instrument panel J/B) 2. Shift lock control ECU 3. Wire harness or connector	ST-51
B2282	Vehicle Speed Signal Malfunction	1. CAN communication system 2. Combination meter system 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-54
B2283	Vehicle Speed Sensor Malfunction	1. DTC B2282 detection area 2. Combination meter 3. Speed sensor 4. Skid control ECU 5. Main body ECU (Instrument panel J/B) 6. Wire harness or connector	ST-60
B2284	Brake Signal Malfunction	1. Stop light switch 2. CAN communication system 3. HV control ECU 4. Main body ECU (Instrument panel J/B) 5. Wire harness or connector	ST-65
B2285	Steering Lock Position Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-70
B2286	Runnable Signal Malfunction	1. CAN communication system 2. HV control ECU 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-74
B2287	LIN Communication Master Malfunction	1. Main body ECU (Instrument panel J/B) 2. Certification ECU 3. Wire harness or connector	ST-77

DTC Code	Detection Item	Trouble Area	See page
B2288	Steering Lock Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-80
B2289	Key Collation Waiting Time Over	1. Main body ECU (Instrument panel J/B) 2. Engine immobiliser system 3. Wire harness or connector 4. Certification ECU	ST-83

ON-VEHICLE INSPECTION

1. CHECK POWER SOURCE MODE CHANGE FUNCTION

(a) Check the function of the power switch.

(1) Check that power source mode changes in accordance with the conditions of the shift position and brake pedal.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P Position	When the power switch is pushed once. • off → HV control system on (READY) • on (ACC) → HV control system on (READY) • on (IG) → HV control system on (READY)
Not depressed	P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → off
	Except P Position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P Position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → off
-	Except P Position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → on (ACC)

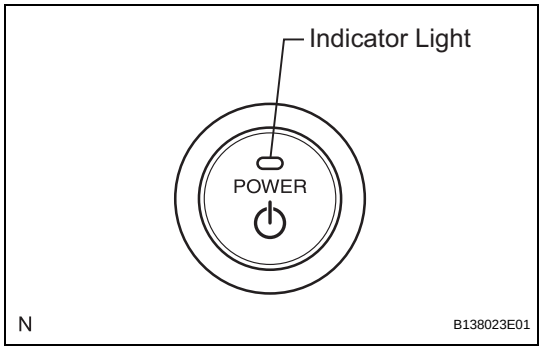
(b) Check if power source mode changes without pressing the power switch.

(1) With power source mode on (ACC) and the shift position in P, wait for at least 1 hour. Check that power source mode changes from on (ACC) to off automatically.

2. CHECK INDICATOR CONDITION

(a) Check the indicator on the power switch.

(1) Check that the power switch indicator turns on and changes color according to the table below.



Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

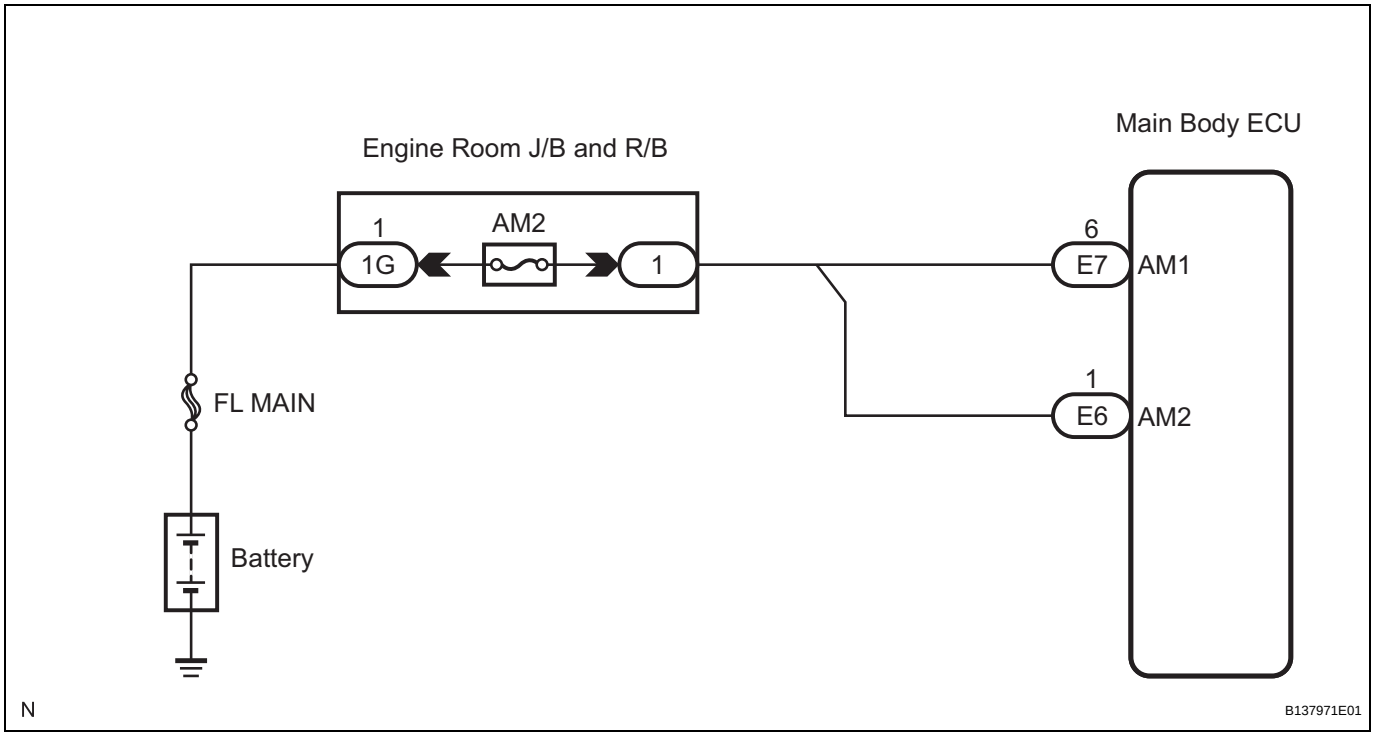
DTC	B2271	Ignition Hold Monitor Malfunction

DESCRIPTION

This DTC is output when a problem such as an open in the AM2 fuse, an open or short in the wire harness between the fuse and main body ECU, a short in the IG output circuit inside the main body ECU, a short between the main body ECU and relay, and a short in the relay is detected.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2271	Hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside main body ECU is open or shorted	• AM2 fuse • Main body ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, check if the trouble occurs again 6 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → Go to step 2

OK

CHECK INTERMITTENT PROBLEMS

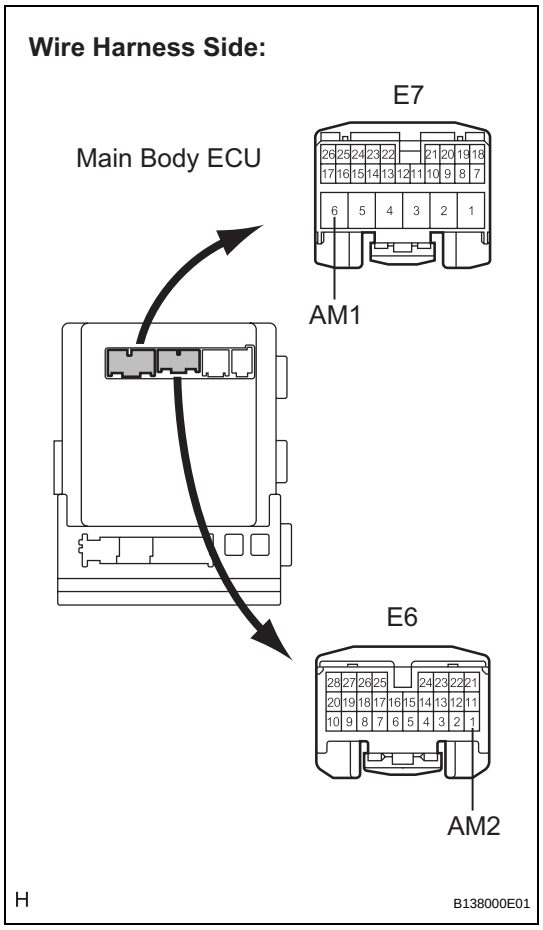
2 INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3 CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

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

OK

REPLACE MAIN BODY ECU

ST

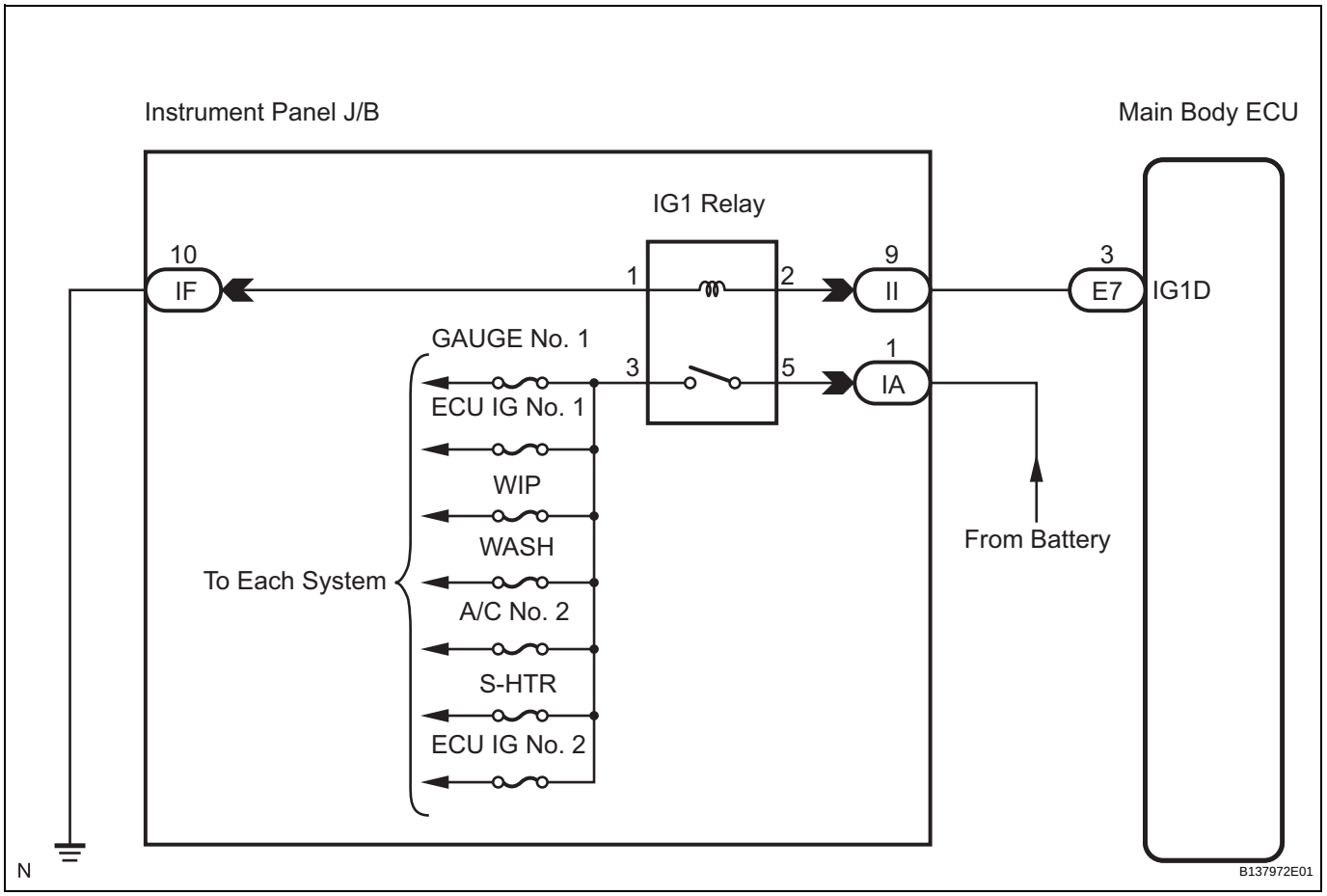
DTC	B2272	Ignition 1 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG1D output circuit, which is from the inside of the main body ECU to the IG1 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2272	IG1 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG1 relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the Data List, and read the display on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG1 RELAY MON1	Status of IG1 relay monitor (outer) / ON or OFF	ON: Power switch on (IG) (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 3**

OK

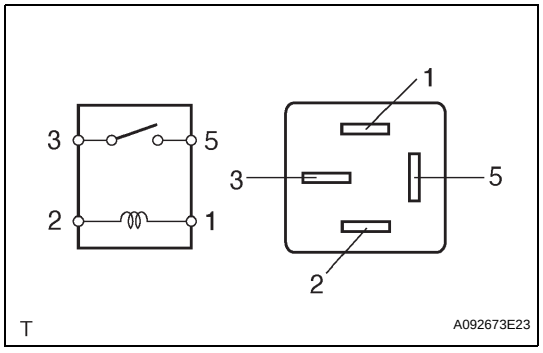
2 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).

NG → **GO TO OTHER PROBLEM**

OK

3 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

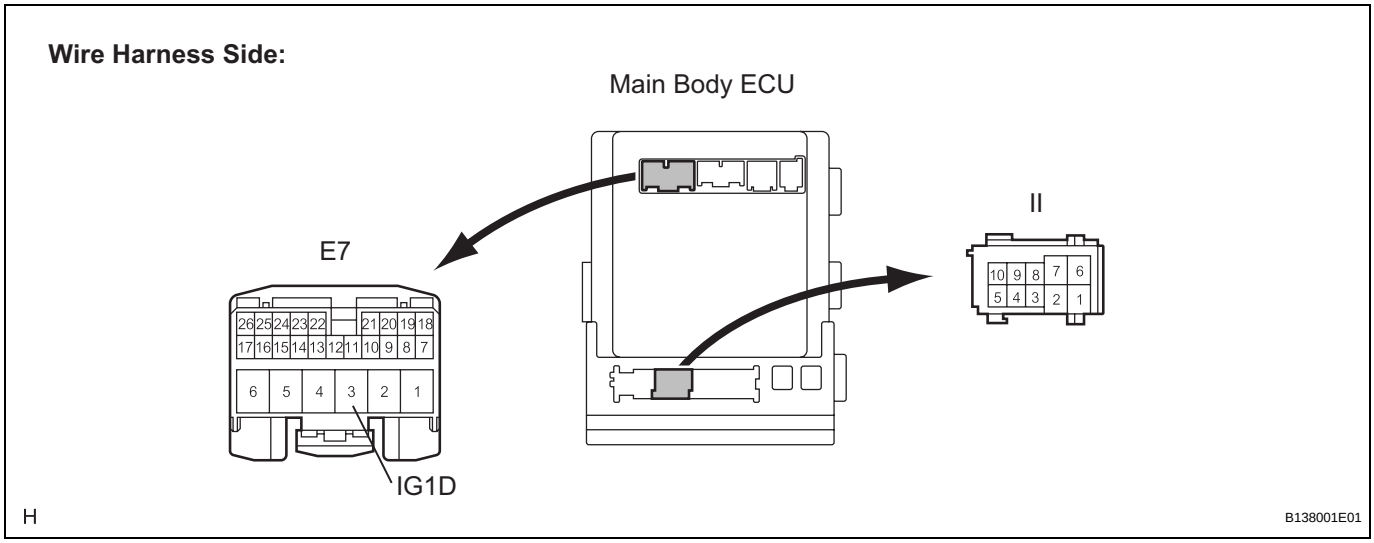
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

4	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

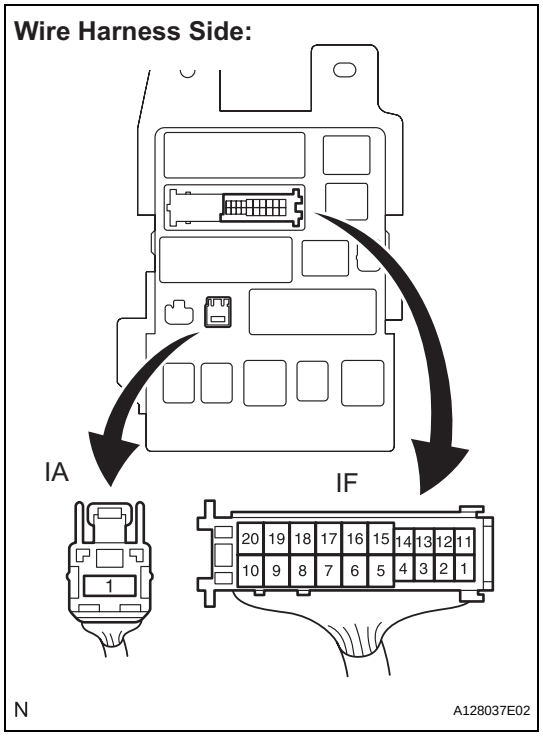
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified value
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

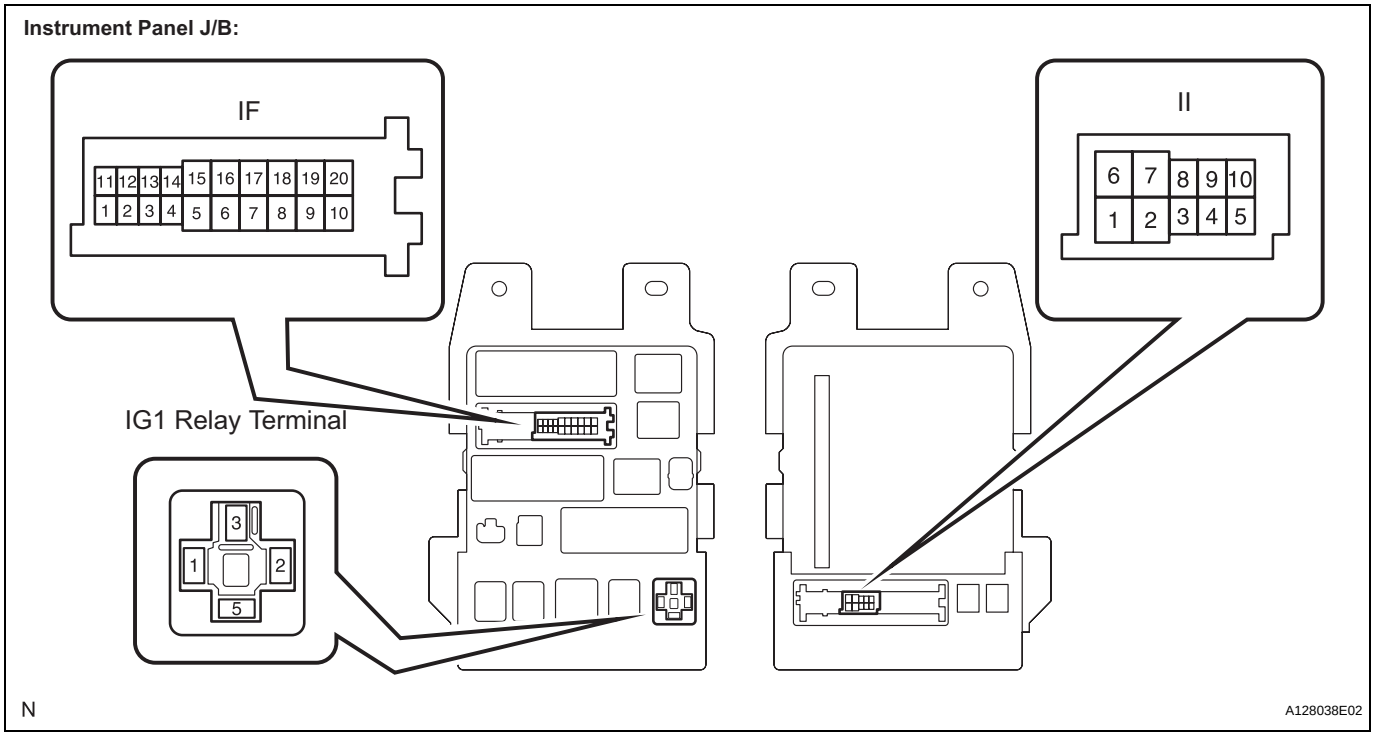
Terminal No.	Condition	Specified value
IA-1 - Body ground	Always	10 to 14 V

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

OK

6 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Value
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → **REPLACE INSTRUMENT PANEL J/B**

OK

REPLACE MAIN BODY ECU

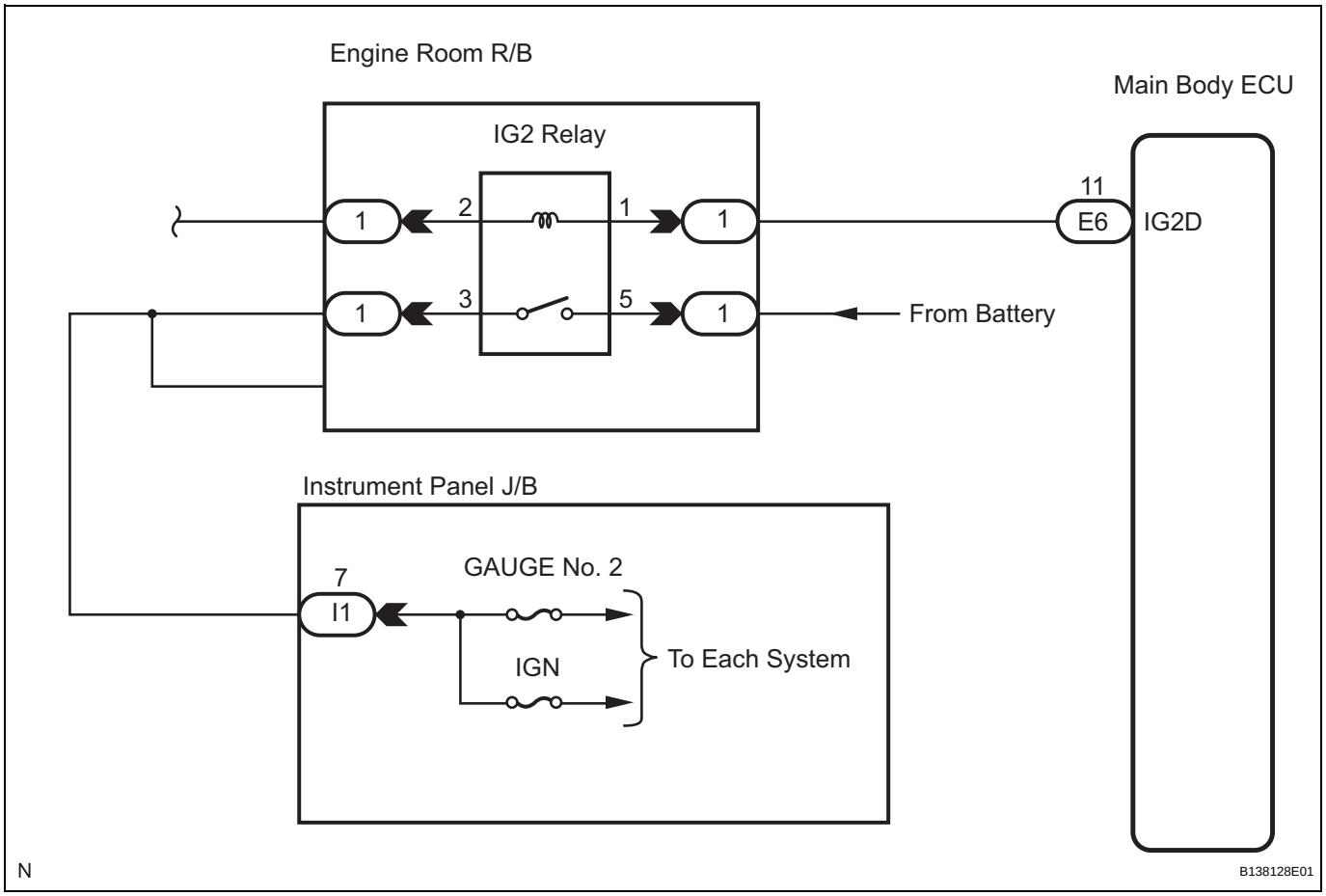
DTC	B2273	Ignition 2 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG2D output circuit, which is from the inside of the main body ECU to the IG2 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2273	IG2 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG2 relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG2 RELAY MON1	Status of IG2 relay monitor (outer) / ON or OFF	ON: Power switch on (IG) (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 3**

OK

2 CHECK POWER SWITCH CONDITION

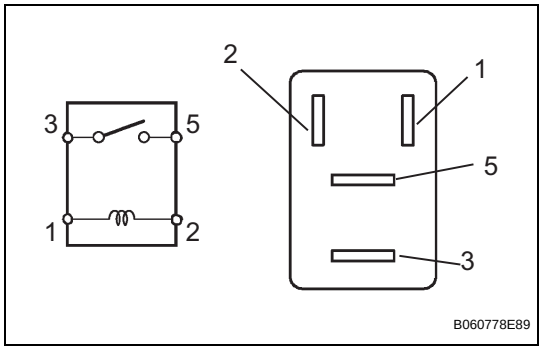
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → **GO TO OTHER PROBLEM**

OK

ST

3	INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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)

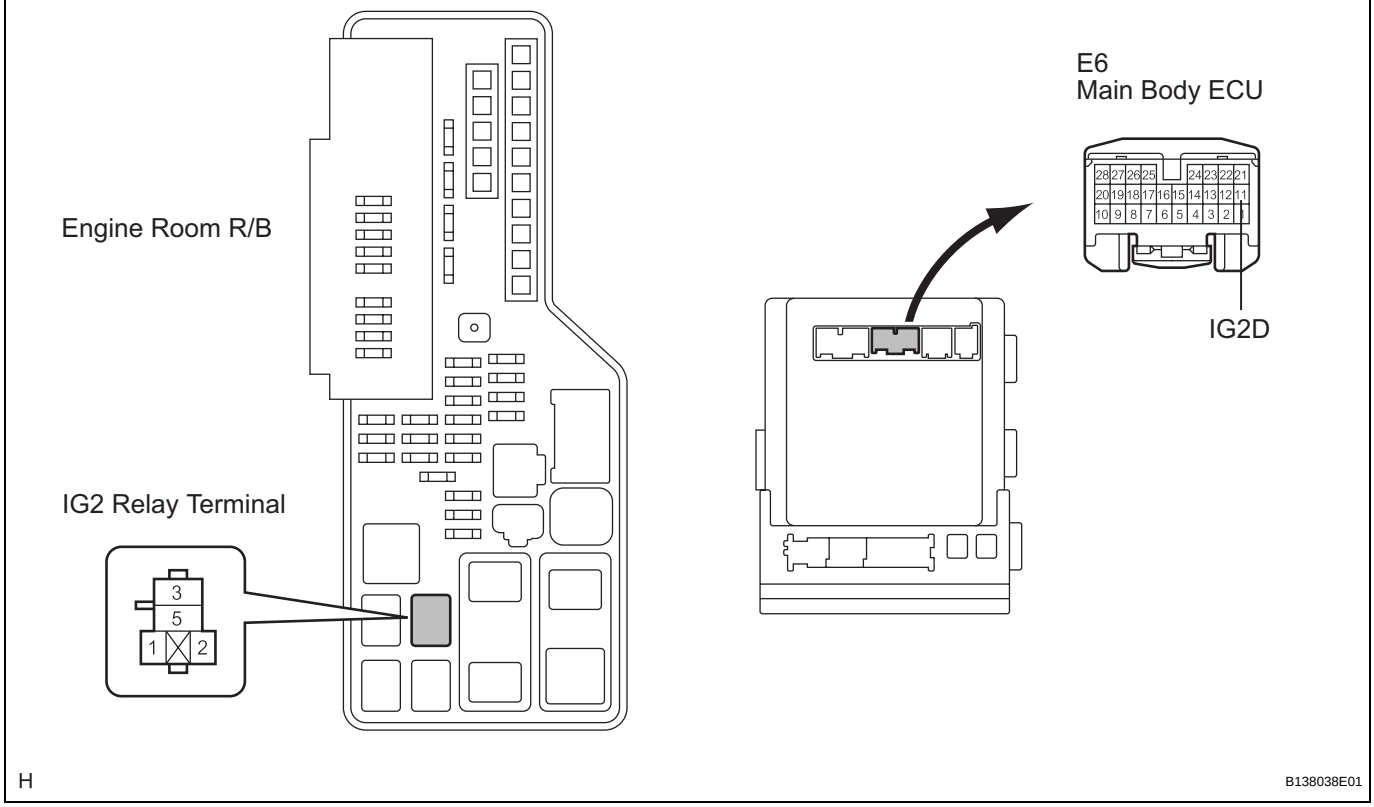
NG → REPLACE RELAY

OK

4	CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

Wire Harness Side:



(b) Disconnect the E6 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

ST

Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
Engine Room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Always	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Always	Below 1 Ω
E6-11 (IG2D) - Body ground	Always	10 kΩ or higher

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

OK

REPLACE MAIN BODY ECU

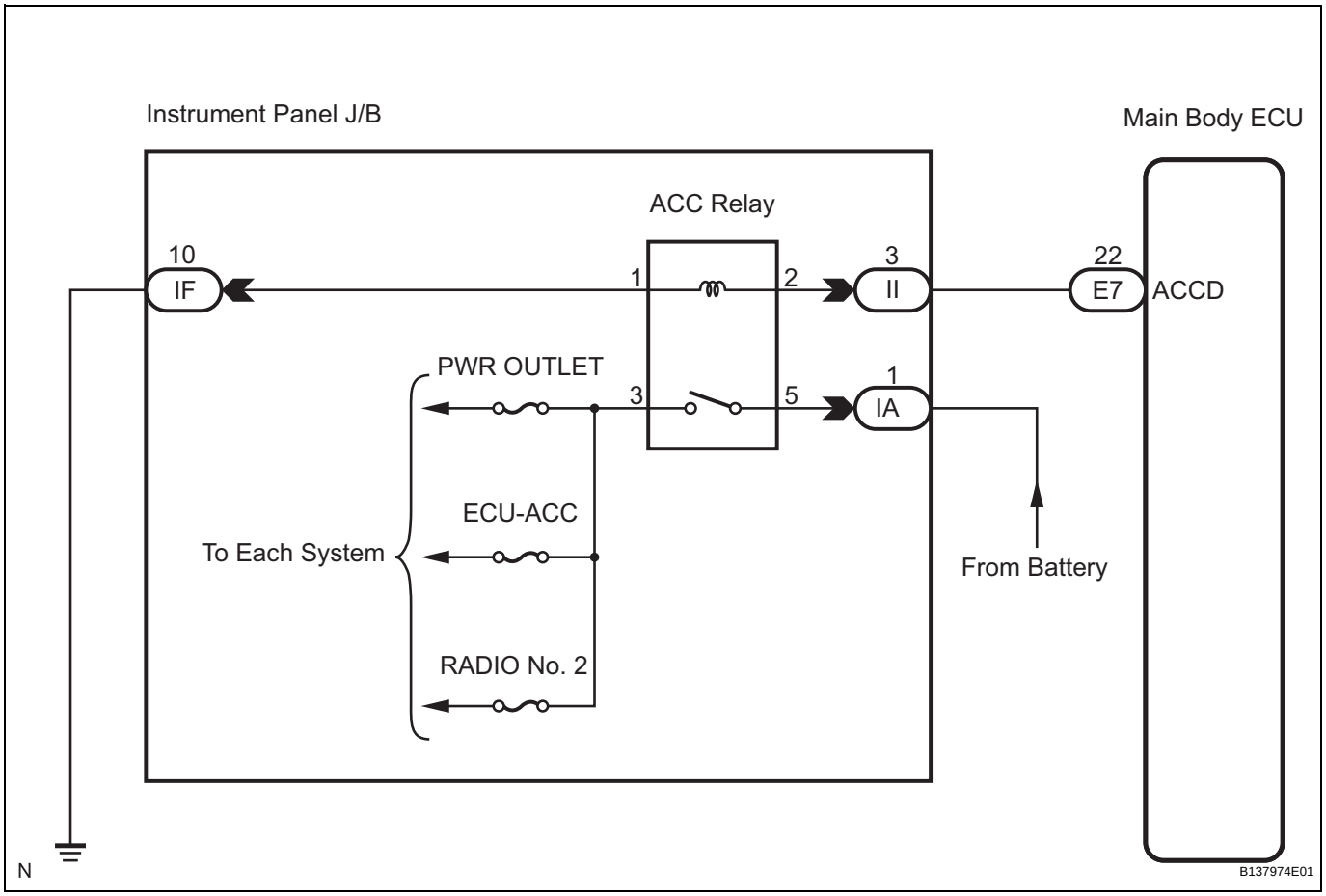
DTC	B2274	ACC Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the ACCD output circuit, which is from the inside of the main body ECU to the ACC relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2274	ACC relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ACC relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC RELAY MON	Status of ACC Relay Monitor / ON or OFF	ON: Power switch on (IG) (ACC) OFF: Power switch off	-

OK:
"ON" (Power switch on (ACC)) appears on the screen.

NG → **Go to step 3**

OK

2 CHECK POWER SWITCH CONDITION

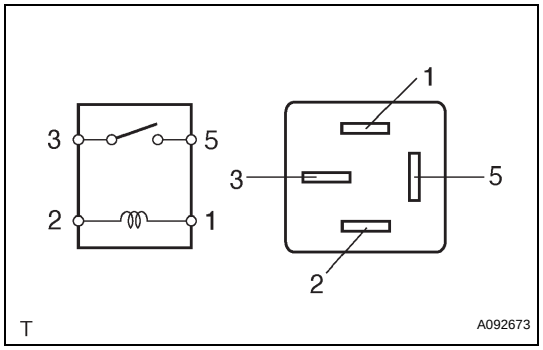
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → **GO TO OTHER PROBLEM**

OK

ST

3 INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

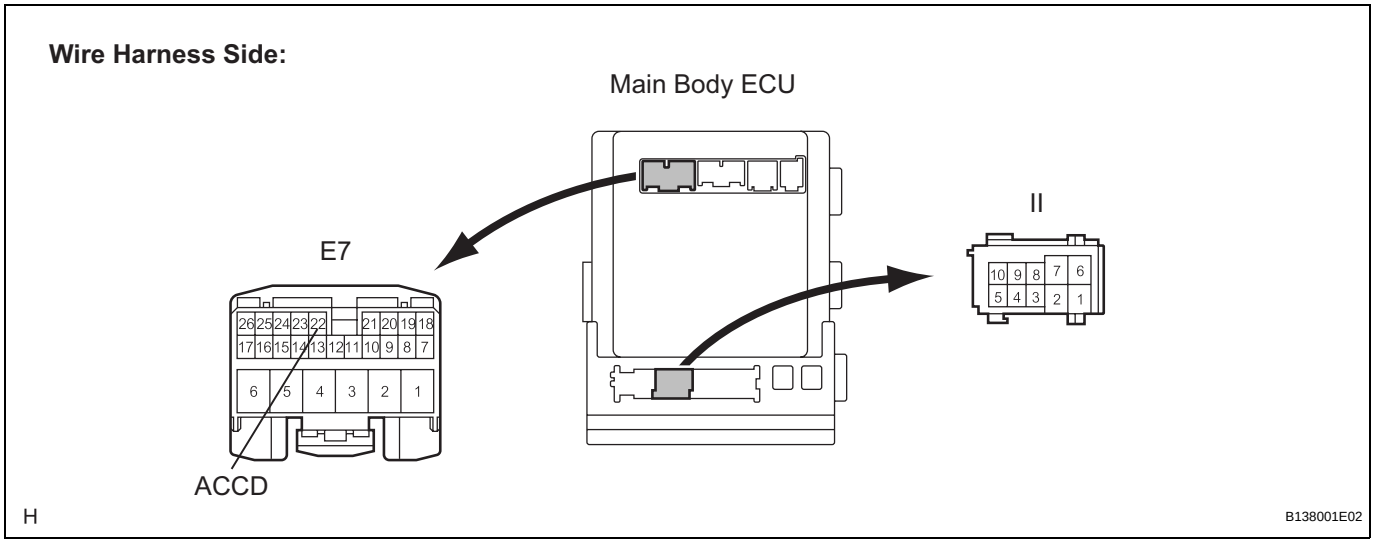
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE RELAY

OK

4 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.



(b) Disconnect the II J/B connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

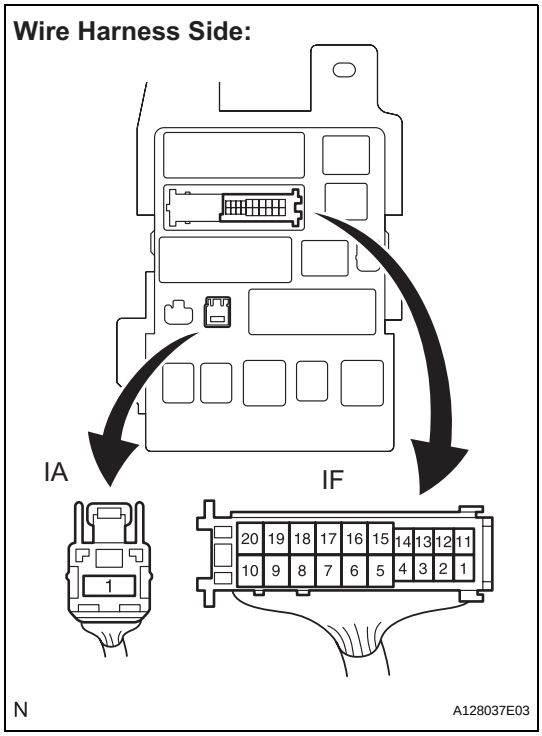
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

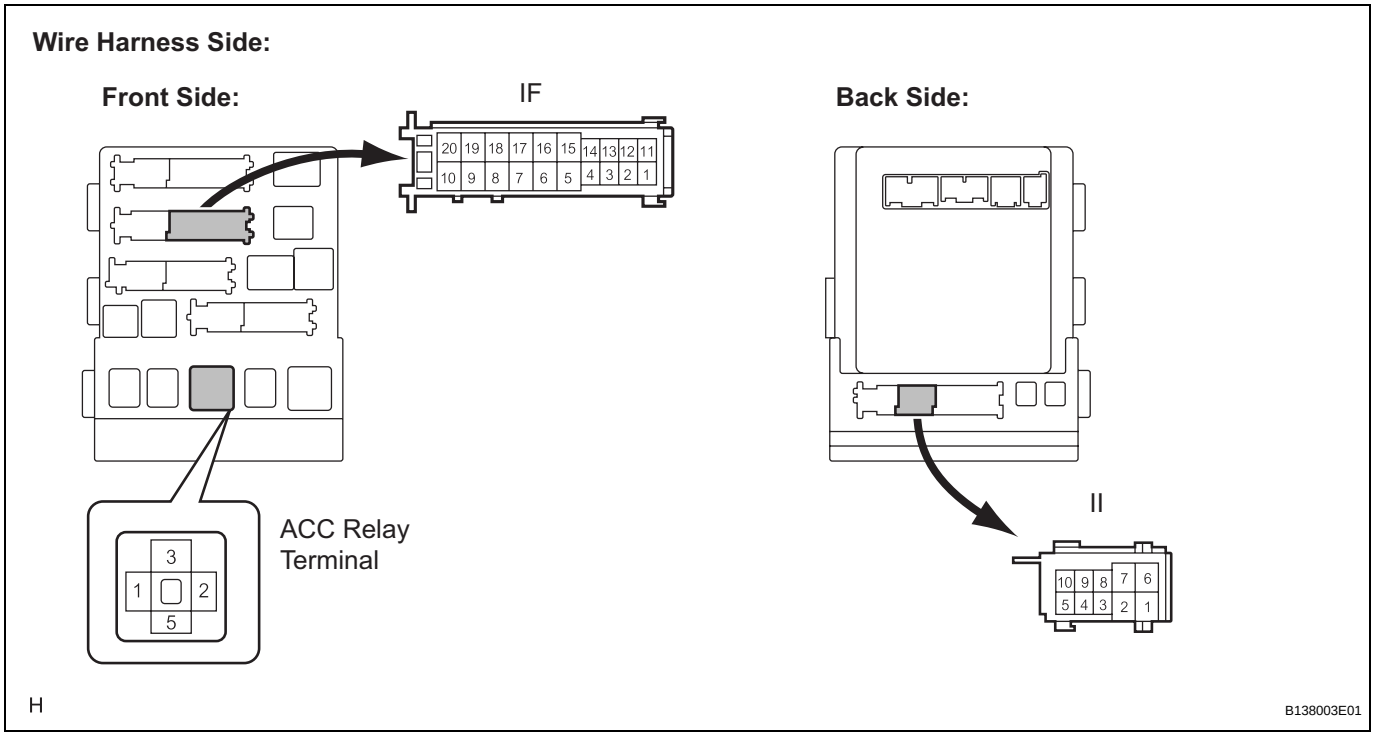
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

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

OK

6	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

DTC	B2275	STSW Monitor Malfunction

DESCRIPTION

This DTC is output when there is an open, short, or any other problem in the HV control system on (READY) request output circuit inside the main body ECU or in the external circuit.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2275	STSW output circuit (HV control system activation request signal circuit) inside main body ECU or other related circuit is malfunctioning	• Main body ECU • HV control ECU • Wire harness or connector

WIRING DIAGRAM

ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, turn the power switch on (IG) and depress the brake pedal. After 15 seconds have elapsed, check if the trouble occurs again.
(b) Check for DTCs again.
OK:
No DTC is output.

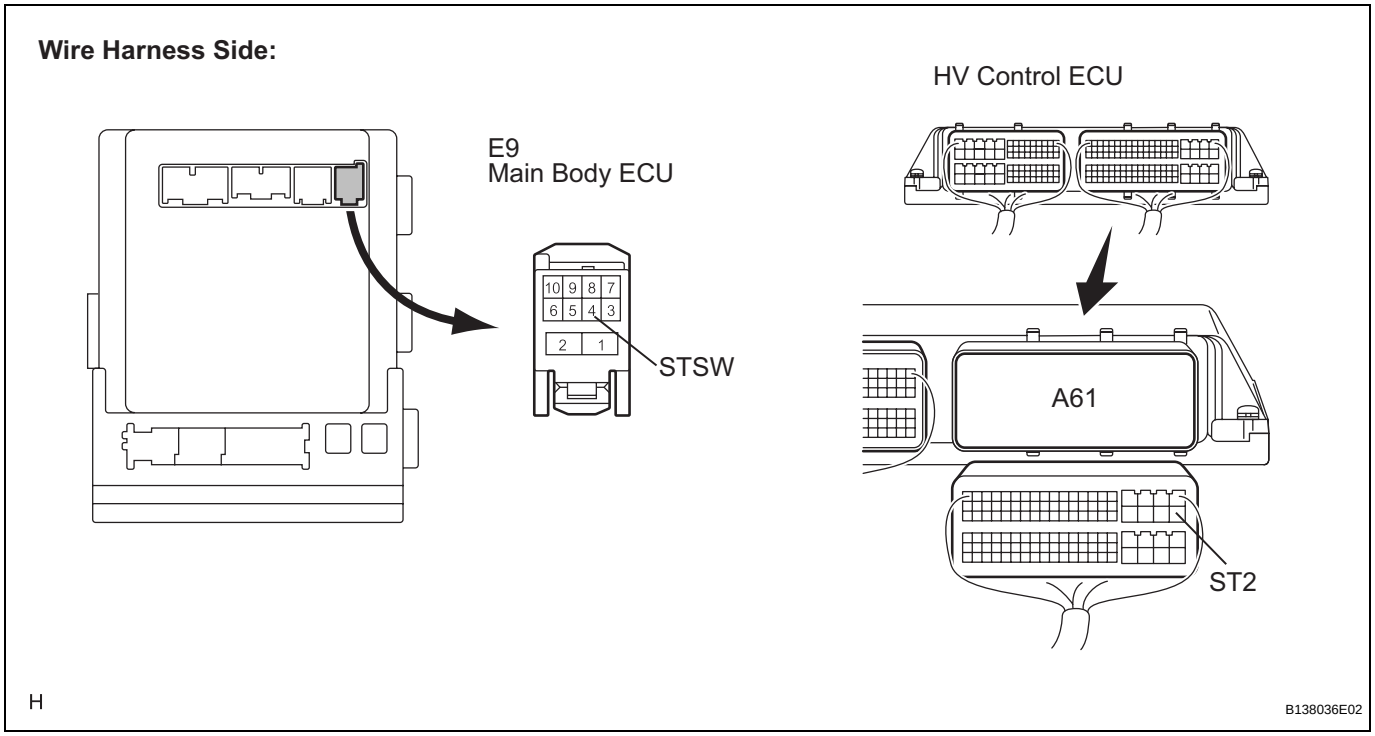
NG	Go to step 2

OK

CHECK INTERMITTENT PROBLEMS

2	CHECK WIRE HARNESS (MAIN BODY ECU - HV CONTROL ECU)

(a) Disconnect the E9 ECU connector.



(b) Disconnect the A61 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

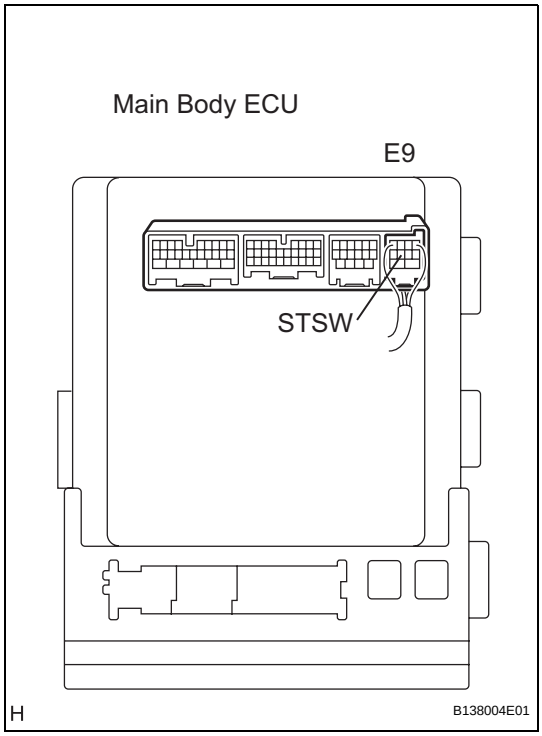
Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - A61-37 (ST2)	Always	Below 1 Ω
E9-4 (STSW) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

3	INSPECT MAIN BODY ECU



(a) Reconnect the connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.

NG → **REPLACE MAIN BODY ECU**

OK

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change to on (READY).

OK:

Power switch on (READY).

HINT:
If power mode does not change to ON (READY) (See page ST-116).

NG → **GO TO OTHER PROBLEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2277	Detecting Vehicle Submersion

DESCRIPTION

This DTC is output when the submersion circuit monitor inside the main body ECU detects that the vehicle is submerged in water.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2277	Submersion circuit monitor inside main body ECU detects that vehicle is submerged in water	Main body ECU

INSPECTION PROCEDURE

1 CHECK FOR WATER DAMAGE

(a) Check the main body ECU, peripheral components, and wire harnesses for traces of water.
OK:
There are no traces of water.

NG → **TAKE APPROPRIATE MEASURES AGAINST CAUSE OF WATER DAMAGE AND REPLACE MAIN BODY ECU**

OK ↓

2 CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, check if the trouble occurs again 30 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → **REPLACE MAIN BODY ECU**

OK ↓

END

ST

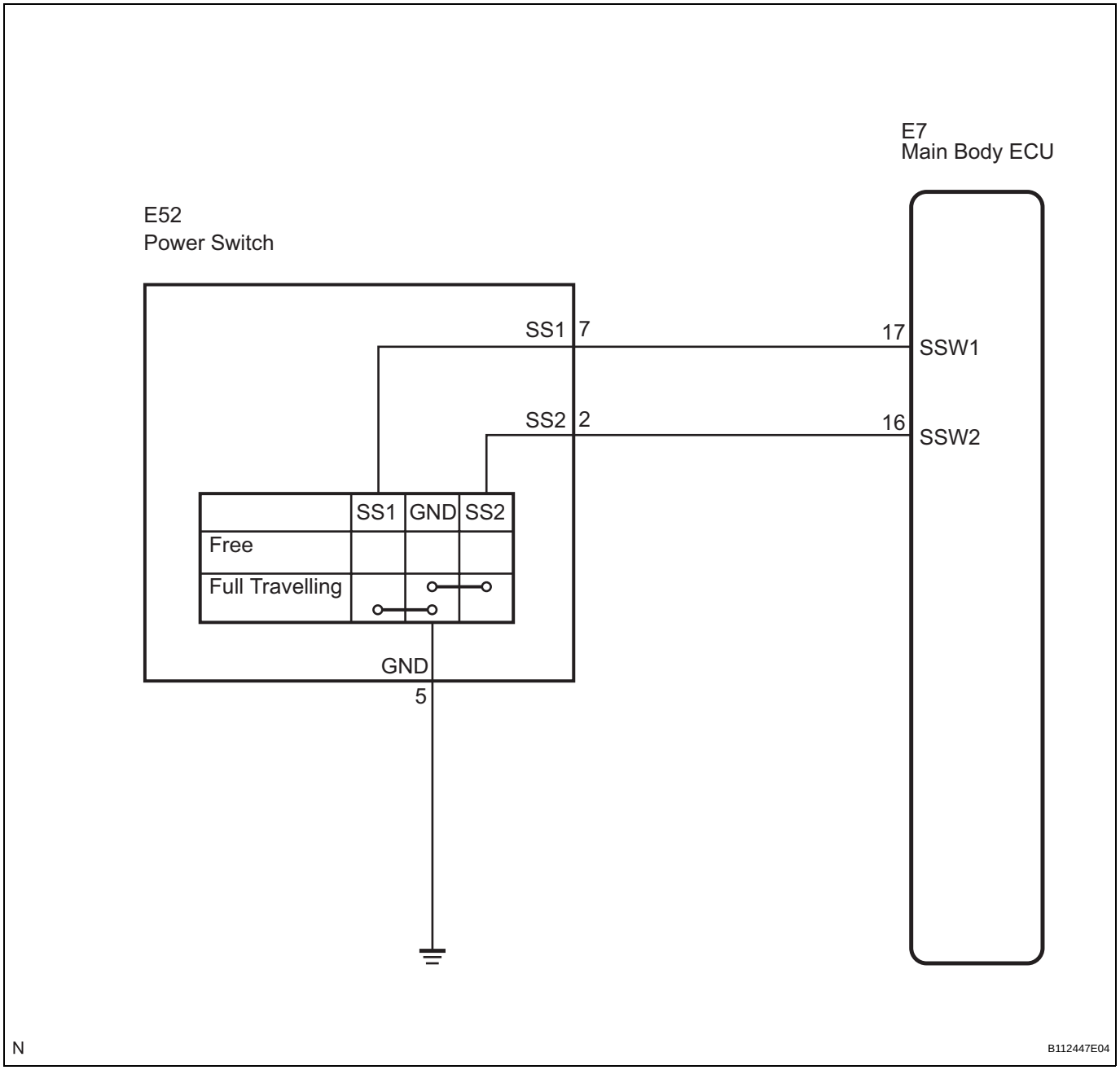
DTC	B2278	Power Switch Circuit Malfunction

DESCRIPTION

This DTC is output when 1) a malfunction is detected between the main body ECU and the power switch; or 2) either of the switches inside the power switch is malfunctioning.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2278	Communication is abnormal between the main body ECU and power switch or the power switch is defective	• Power switch • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Check the DATA LIST for proper functioning of the start switch.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

ST

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start Switch 2/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-

OK:
"ON" (Power switch on (IG)) and "OFF" (Power switch off) appear on the screen.

NG → **Go to step 3**

OK

2 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

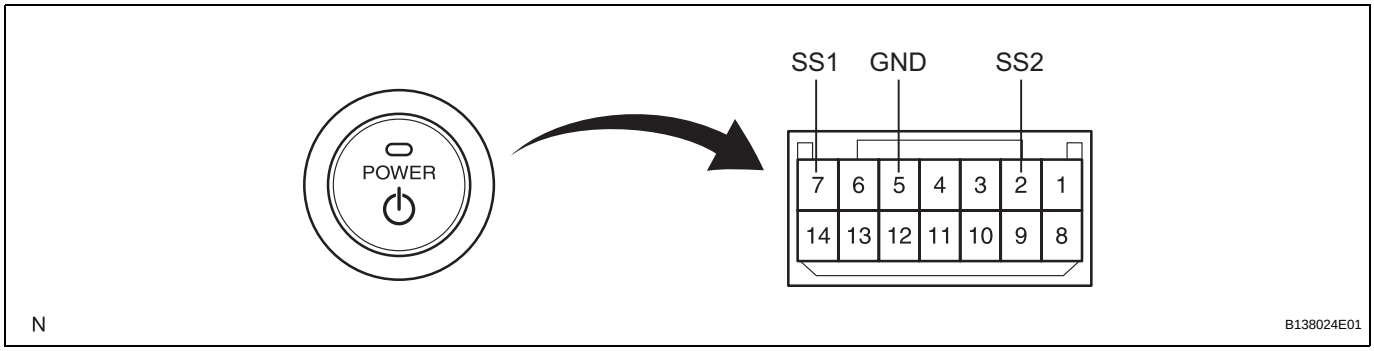
NG → **GO TO OTHER PROBLEM**

OK

END

3 INSPECT POWER SWITCH

(a) Remove the power switch.



(b) Disconnect the switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

HINT:
This switch is a momentary type switch.

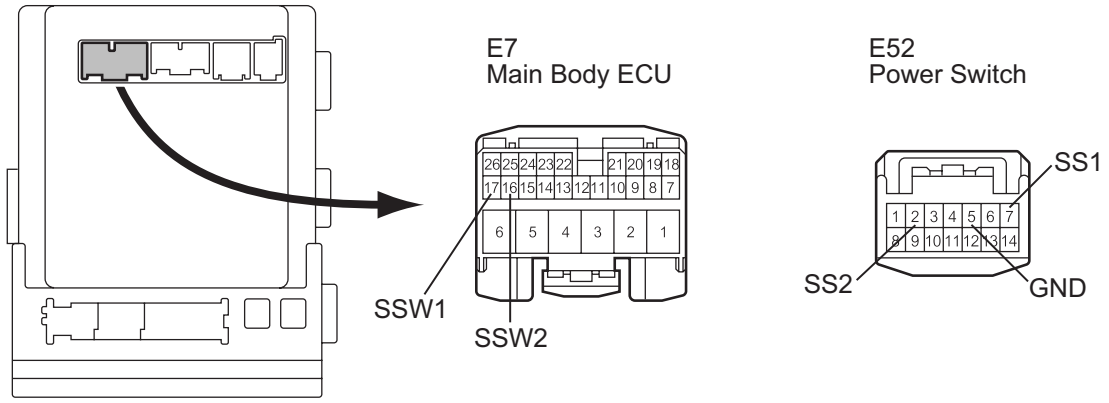
NG → **REPLACE POWER SWITCH**

OK

4 CHECK WIRE HARNESS (POWER SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E7 ECU connector.

Wire Harness Side:



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(b) Disconnect the E52 switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

ST

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MAIN BODY ECU

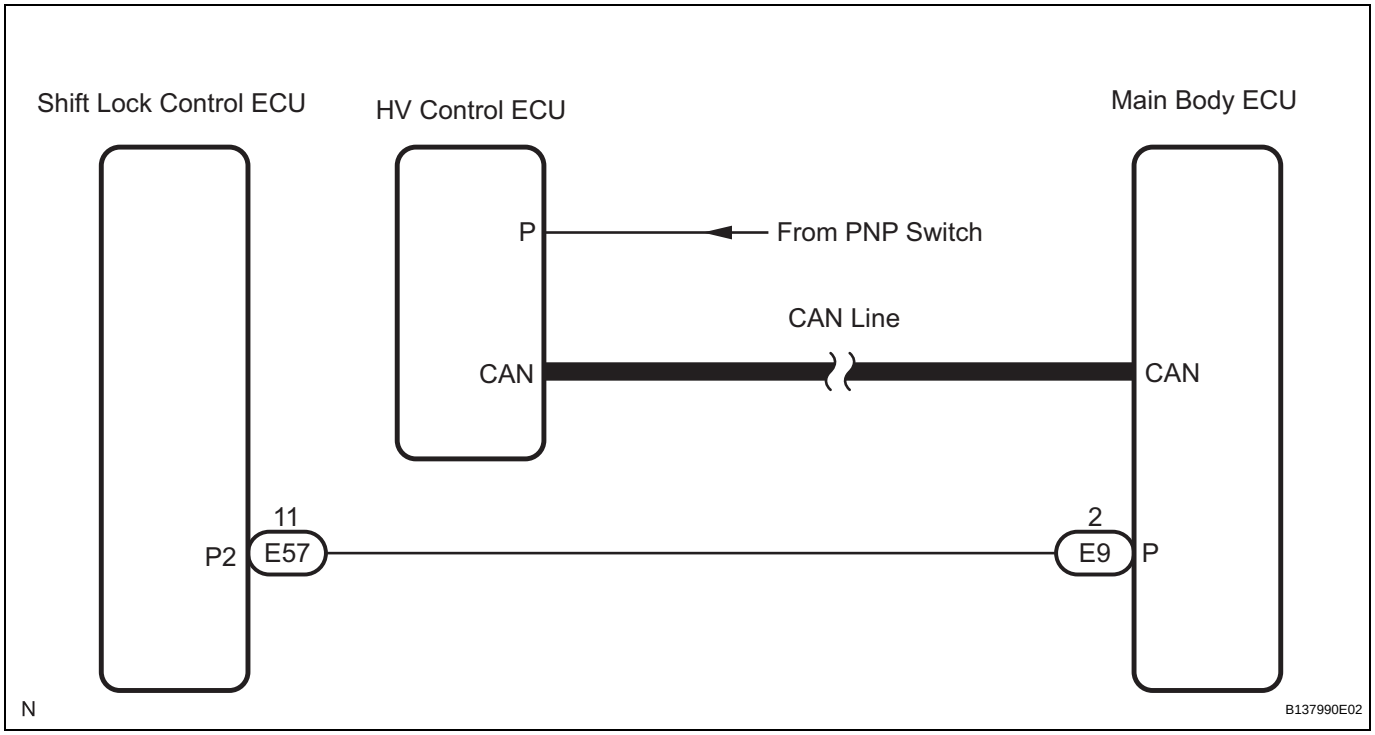
DTC	B2281	"P" Signal Malfunction

DESCRIPTION

The HV control ECU and the shift lock control ECU are connected by a cable and the CAN. If the cable information and CAN information are inconsistent, this DTC will be output.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2281	Cable information and CAN information between main body ECU and shift lock control ECU are inconsistent	• Main body ECU • Shift lock control ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the DATA LIST according to the displays on the tester.

MAIN BODY:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P Signal / ON or OFF	ON: Shift P signal ON (Shift position is P) OFF: Shift P signal OFF (Shift position is not P)	-

OK:
"ON" (P signal is ON) and "OFF" (P signal is OFF) appear on the screen.

HINT:
If the result is not as specified, there may be a malfunction with the shift lock control ECU (See page SR-32).

NG	Go to step 2

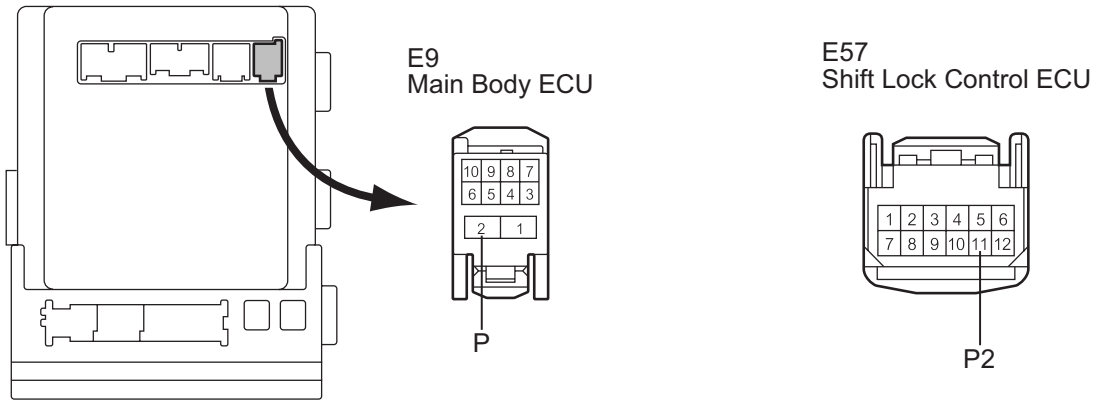
OK

GO TO SHIFT LOCK CONTROL SWITCH

2 CHECK WIRE HARNESS (MAIN BODY ECU - SHIFT LOCK CONTROL ECU)

(a) Disconnect the E9 and E57 ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
E9-2 (P) - E57-11 (P2)	Always	Below 1 Ω
E9-2 (P) - Body ground	Always	10 kΩ or higher

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).
OK:
Power switch on (READY).
HINT:
If power mode does not change to ON (READY) (See page ST-116).

NG → **GO TO OTHER PROBLEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2282	Vehicle Speed Signal Malfunction

DESCRIPTION

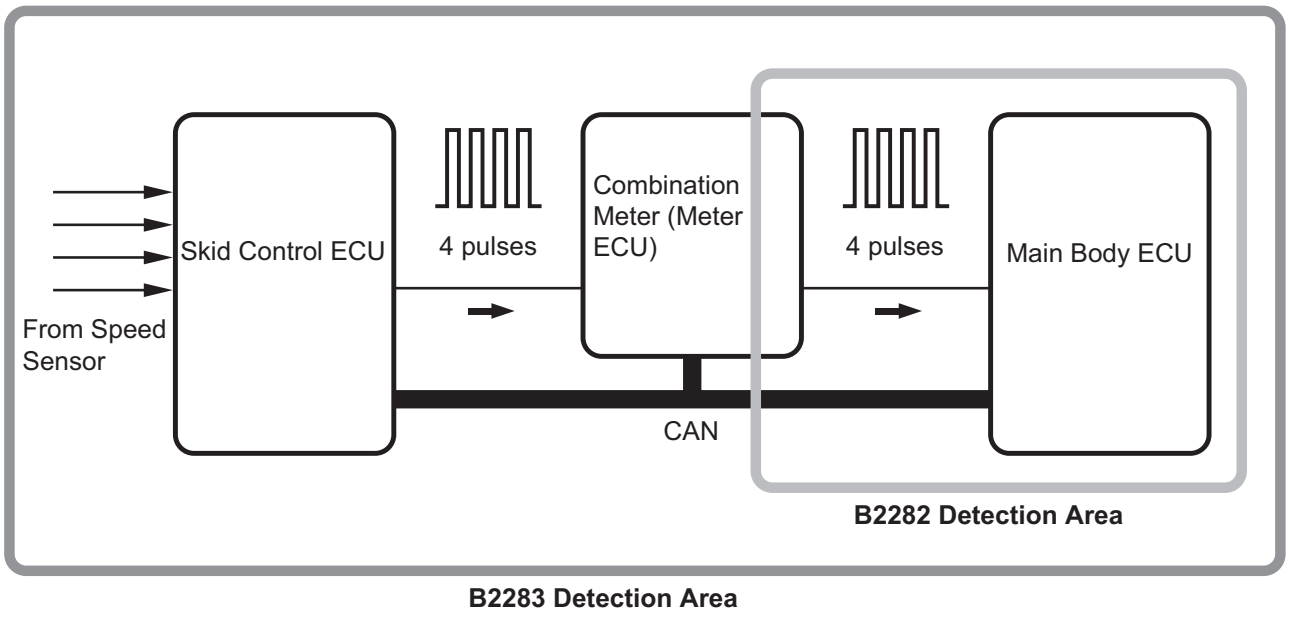
The main body ECU and the combination meter are connected by a cable and the CAN. DTC B2282 is output when: 1) the cable information and CAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and combination meter.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2282	When both conditions below are met: • Cable information and CAN information between the main body ECU and the combination meter are inconsistent • Malfunction is detected between the vehicle speed sensor and the combination meter	• CAN communication system • Combination meter system • Main body ECU • Wire harness or connector



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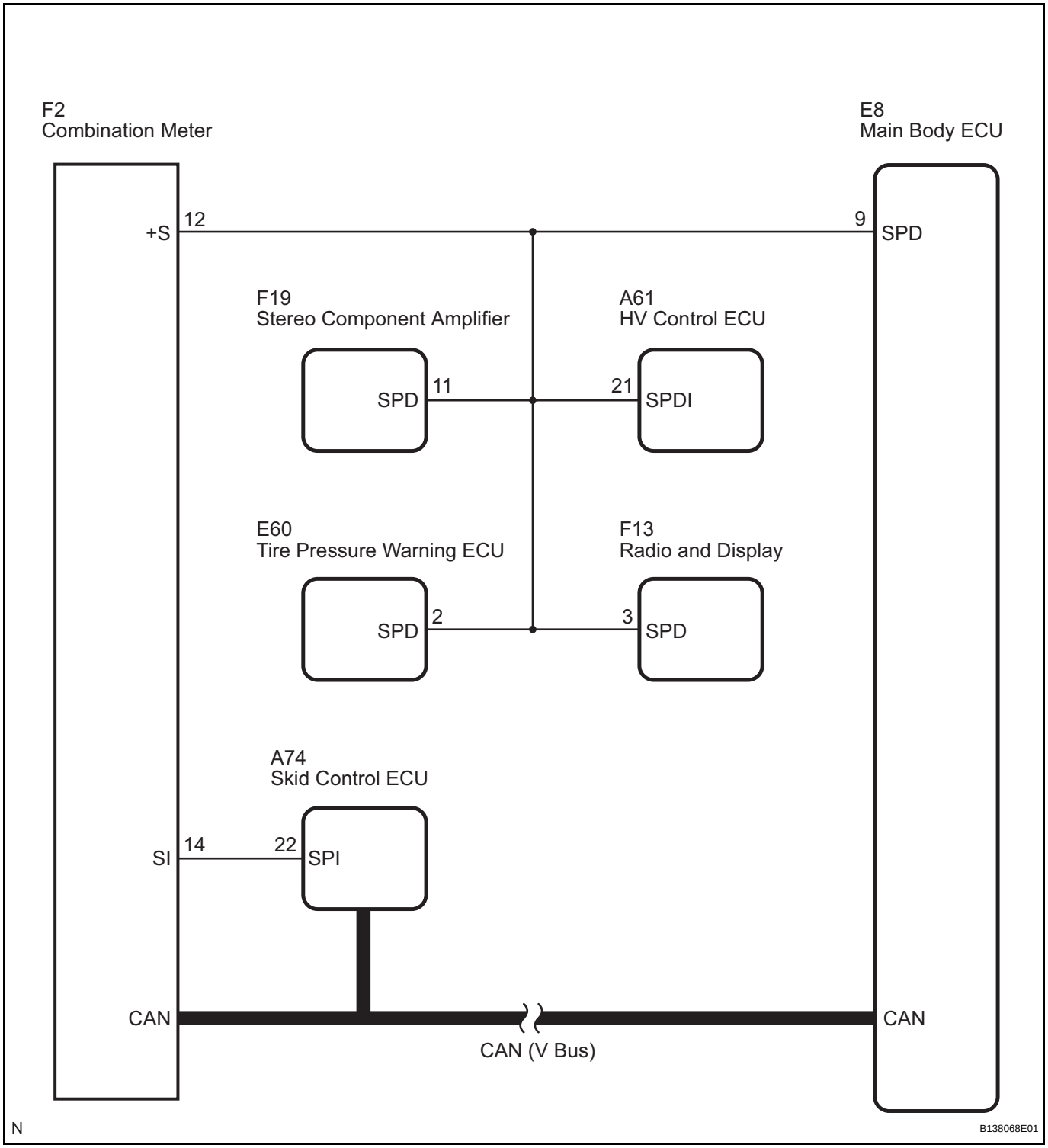
ST

WIRING DIAGRAM



HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

ST

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.
- The meter CPU receives vehicle speed signals from the skid control ECU via the CAN communication lines. The vehicle speed sensor detects the voltage that varies according to the vehicle speed. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

OK → **Go to step 3**

NG

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for CAN communication system DTCs (See page CA-7).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-22).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

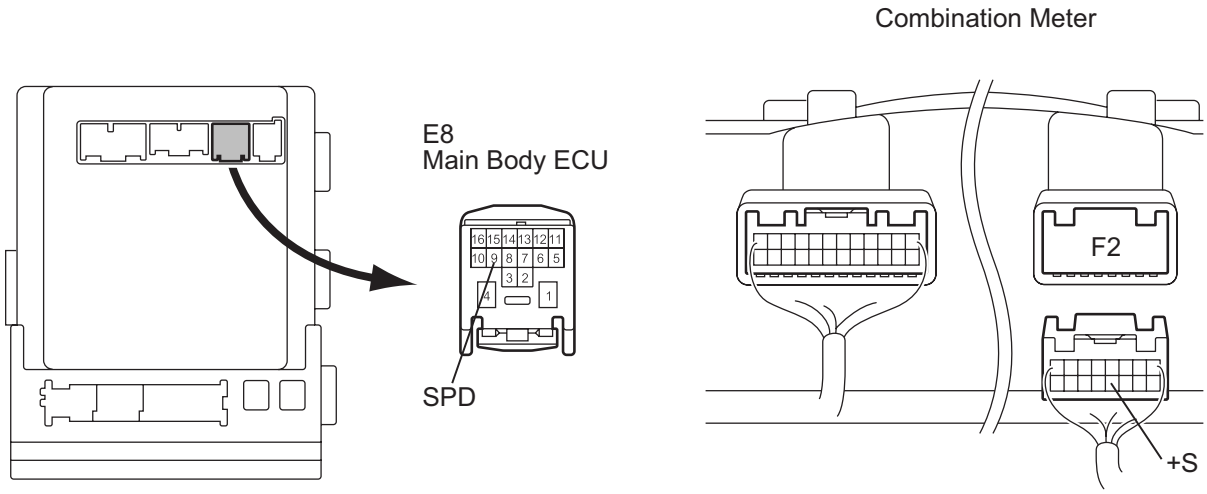
OK

GO TO COMBINATION METER SYSTEM

3	CHECK WIRE HARNESS (MAIN BODY ECU - COMBINATION METER)

(a) Disconnect the E8 ECU connector.

Wire Harness Side:



(b) Disconnect the F2 meter connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

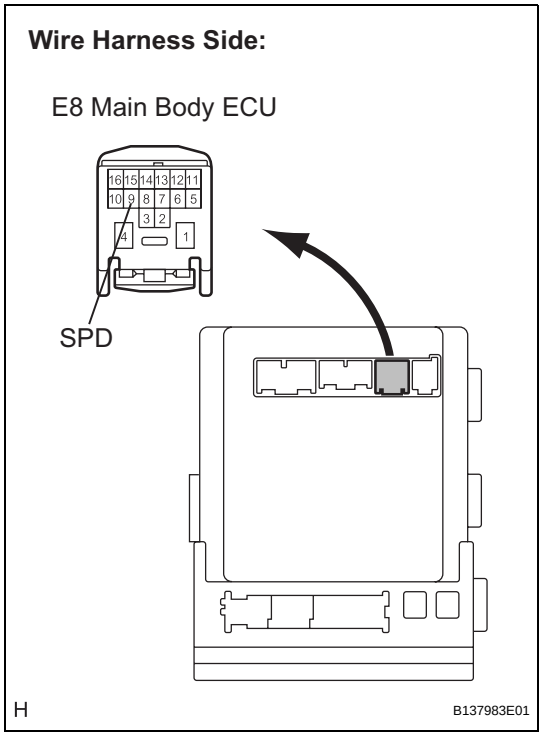
Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - F2-12 (+S) - Body ground	Always	Below 1 Ω

ST

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

OK

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - Body ground	Always	10 kΩ or higher

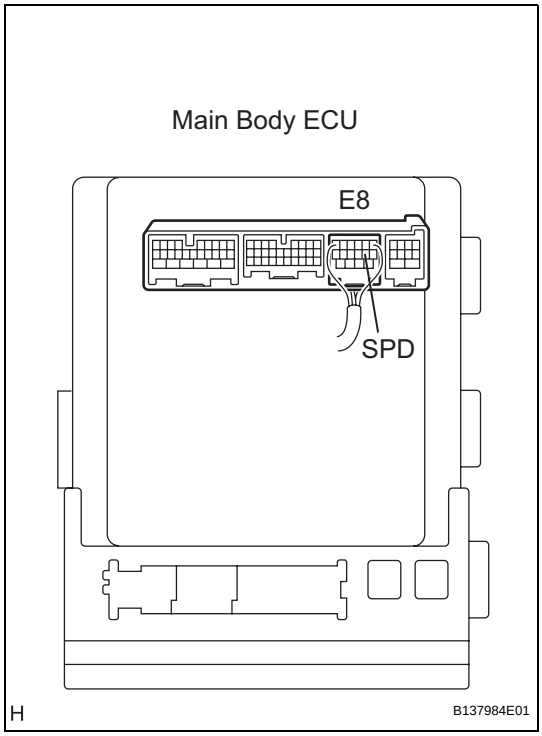
HINT:
If the result of the inspection for a short circuit is not as specified, there may be a short in the ECU.

NG → **REPAIR OR REPLACE HARNESS, CONNECTOR OR EACH ECU**

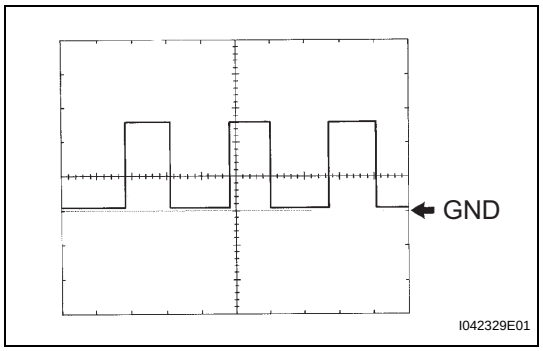
OK

ST

5 INSPECT MAIN BODY ECU (SPEED SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the connectors.
(2) Remove the combination meter assembly with the connector(s) still connected.
(3) Connect an oscilloscope to terminal E8-9 (SPD) and body ground.
(4) Turn the power switch on (IG).
(5) Turn the wheel slowly.



(6) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV., 10 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

OK:

The waveform is displayed as shown in the illustration.

HINT:

As the vehicle speed increases, the cycle of the signal waveform narrows.

NG → **REPLACE COMBINATION METER**

OK

REPLACE MAIN BODY ECU

ST

DTC	B2283	Vehicle Speed Sensor Malfunction

DESCRIPTION

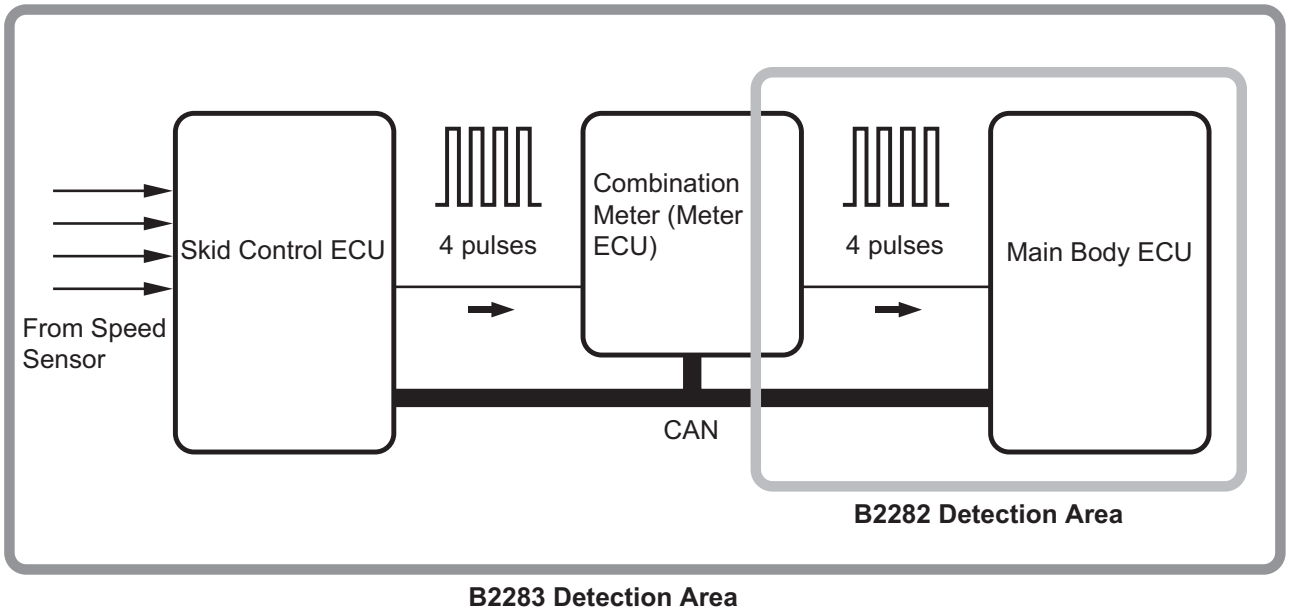
The skid control ECU converts these signals into 4-pulse signals and sends them to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the main body ECU. The main body ECU determines the vehicle speed based on the frequency of these pulse signals.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2283	When both conditions below are met: • Over-deceleration in vehicle speed • Vehicle speed and engine speed or HV motor speed do not match	• DTC B2282 detection area • Combination meter • Speed sensor • Skid control ECU • Main body ECU • Wire harness or connector

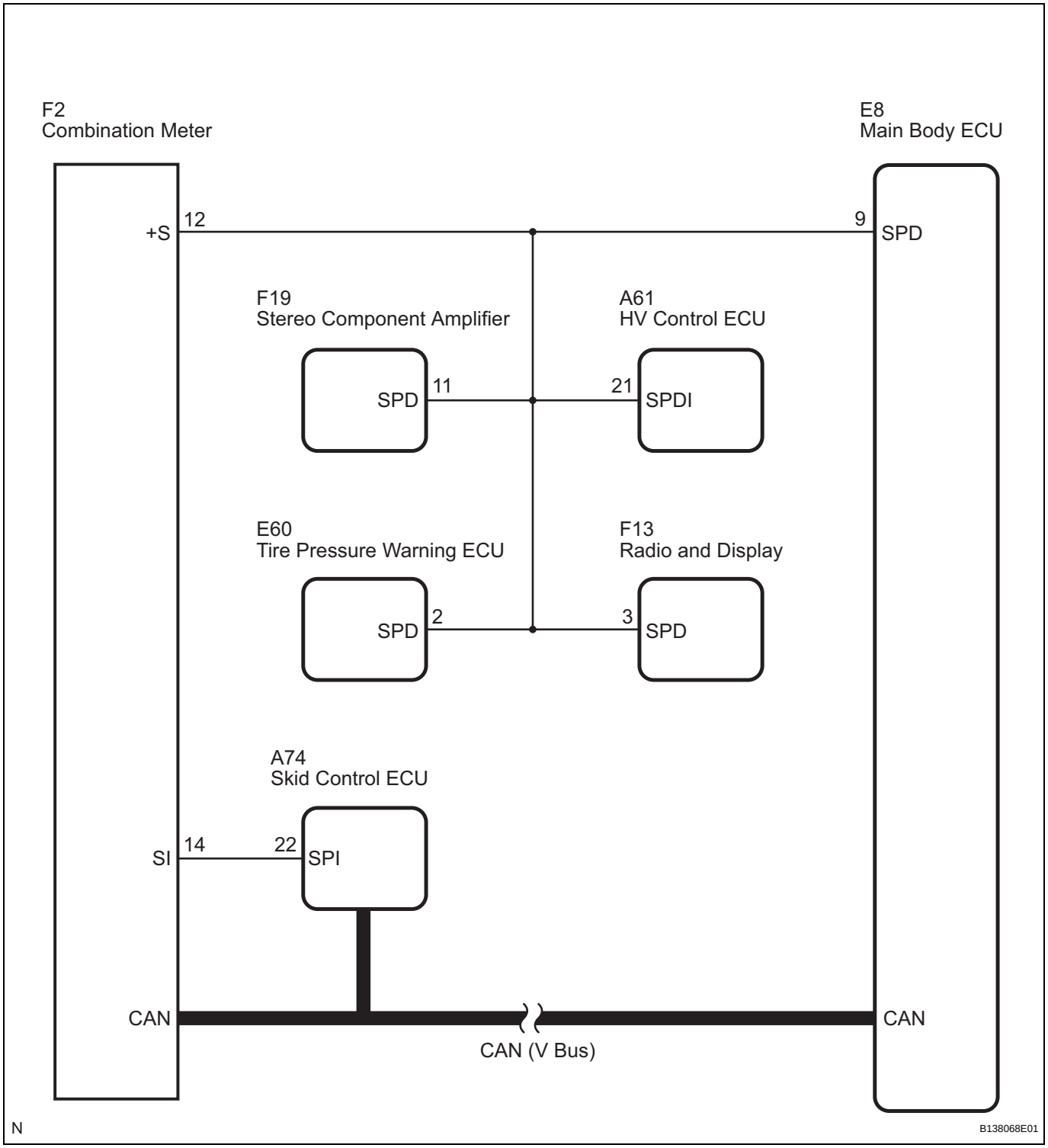


N

B138069E01

ST

WIRING DIAGRAM



HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT (SMART KEY SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) After all DTCs are cleared, check if the trouble occurs again 320 seconds after the power switch is turned on (IG).
(c) Check for DTC B2282 and DTC B2283.

Result

Display (DTC output)	Proceed to
"DTC B2283" only	A
"DTC B2283" and "DTC B2282"	B
No DTC	C

HINT:
If DTC B2282 and DTC B2283 are output, perform troubleshooting for DTC B2282 first (See page ST-54).

B → **GO TO DTC B2282**

C → **CHECK INTERMITTENT PROBLEMS**

A

ST

2	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.
- The meter CPU receives vehicle speed signals from the skid control ECU via the CAN communication lines. The vehicle speed sensor detects the voltage that varies according to the vehicle speed. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

OK → **Go to step 4**

NG

3	CHECK DTC OUTPUT (BRAKE CONTROL)

(a) Delete the DTCs (See page ST-21).
(b) Check for DTCs.
OK:
No DTC is output.

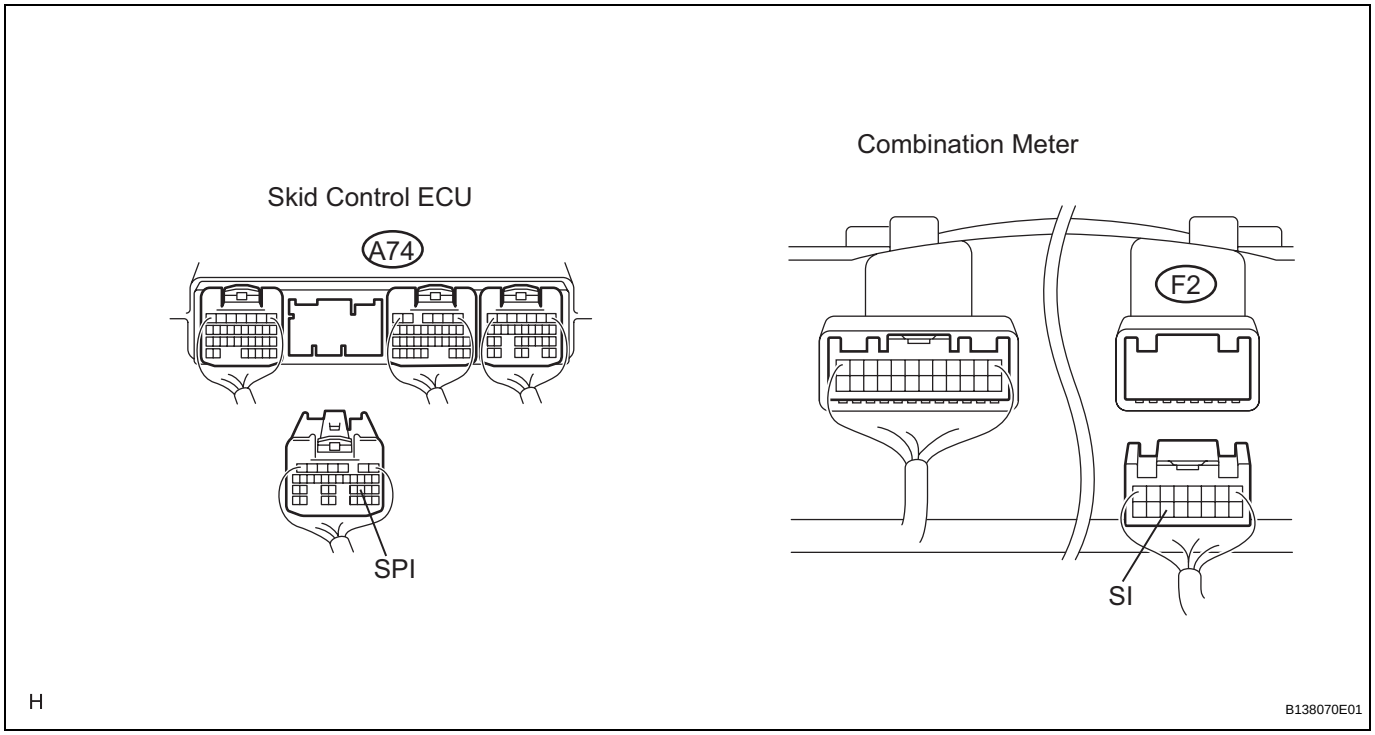
NG → GO TO BRAKE CONTROL SYSTEM

OK

REPLACE MAIN BODY ECU

4	CHECK WIRE HARNESS (SKID CONTROL ECU - COMBINATION METER)

(a) Disconnect the F2 meter connector.



(b) Disconnect the A74 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

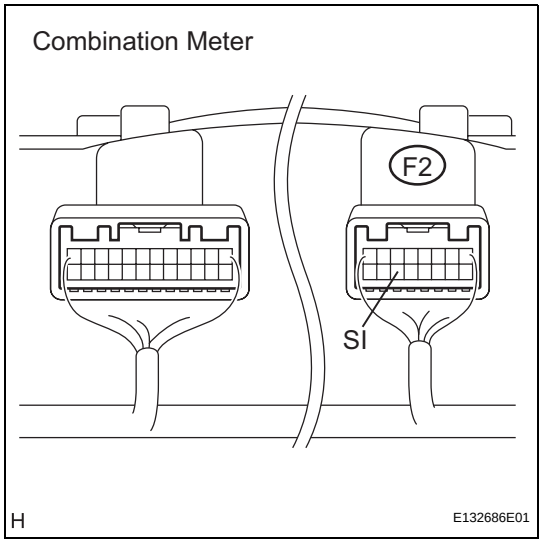
Tester Connection (Symbols)	Condition	Specified Condition
A74-22 (SPI) - F2-14 (SI)	Always	Below 1 Ω
A74-22 (SPI) or F2-14 (SI) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

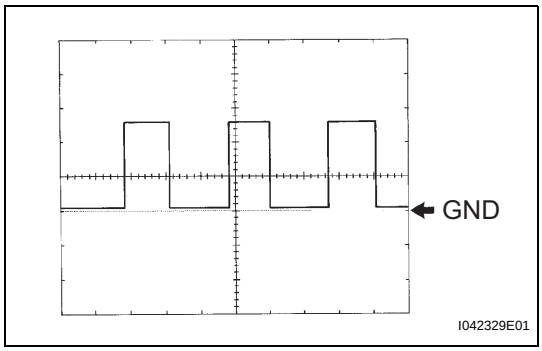
OK

ST

5	INSPECT MAIN BODY ECU (SPEED SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the connectors.
(2) Remove the combination meter assembly with the connector(s) still connected.
(3) Connect an oscilloscope to terminal F2-14 (SI) and body ground.
(4) Turn the power switch on (IG).
(5) Turn the wheel slowly.



(6) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV., 10 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

OK:
The waveform is displayed as shown in the illustration.
HINT:
As the vehicle speed increases, the cycle of the signal waveform narrows.

NG → **REPLACE SKID CONTROL ECU**

OK

REPLACE COMBINATION METER

ST

DTC	B2284	Brake Signal Malfunction

DESCRIPTION

This DTC is output when: 1) the brake signal circuit between the main body ECU and the stop light switch is malfunctioning; and 2) the CAN information is inconsistent.

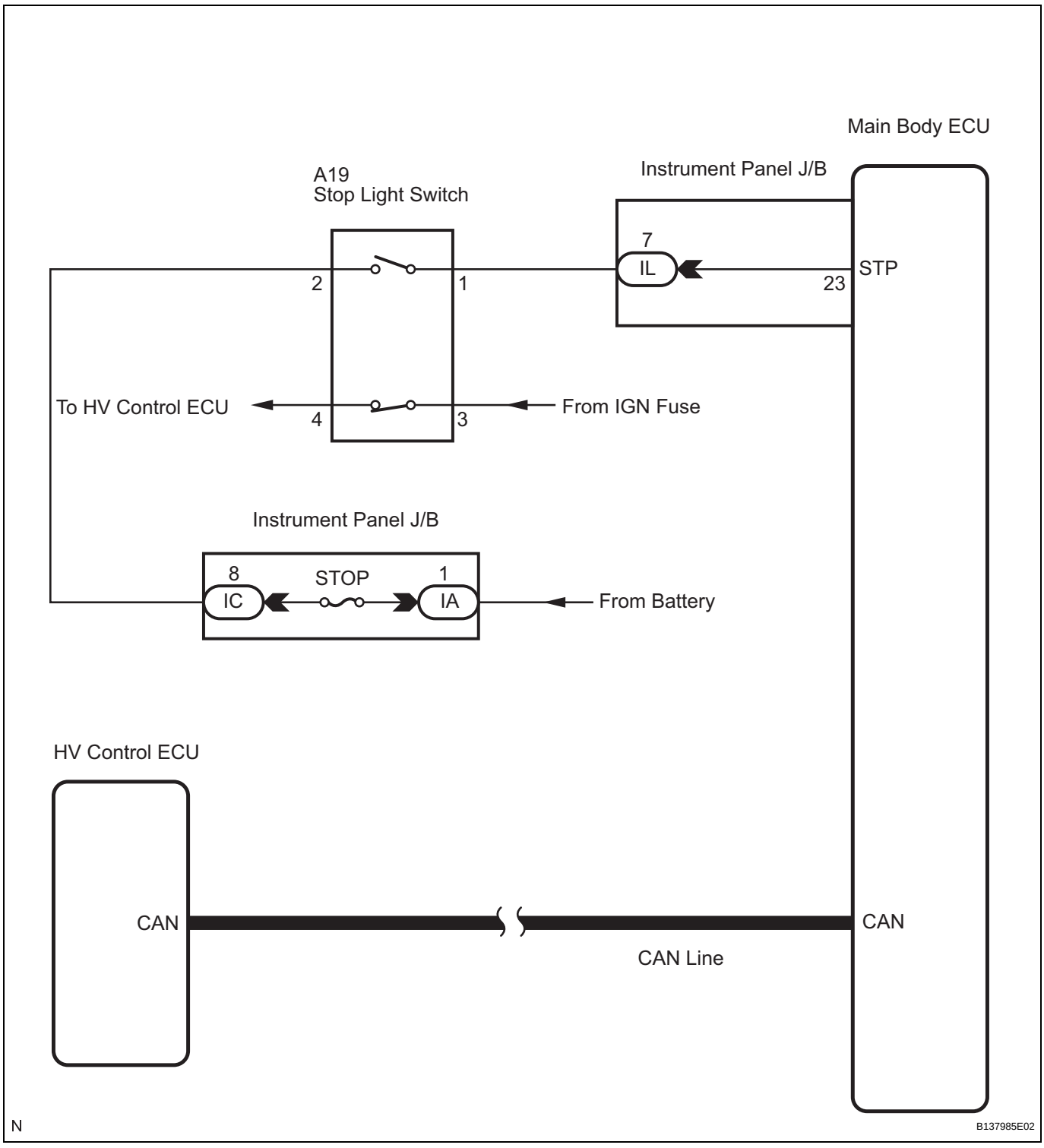
HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2284	Communication or communication line is abnormal between the main body ECU and the stop light switch	• Stop light switch • CAN communication system • HV control ECU • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Before performing the inspection, depress the brake pedal and check that the stop lights come on. If the stop lights do not come on when the brake pedal is depressed, refer to the page shown in the brackets (See page LI-12).

1	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.

NG → **Go to step 4**

OK ↓

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for CAN communication system DTCs (See page CA-7).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-22).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK ↓

3	CHECK DTC OUTPUT (HYBRID CONTROL SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for hybrid control system DTCs (See page HV-46).
OK:
No DTC is output.

NG → **GO TO HYBRID CONTROL SYSTEM**

OK ↓

REPLACE MAIN BODY ECU

ST

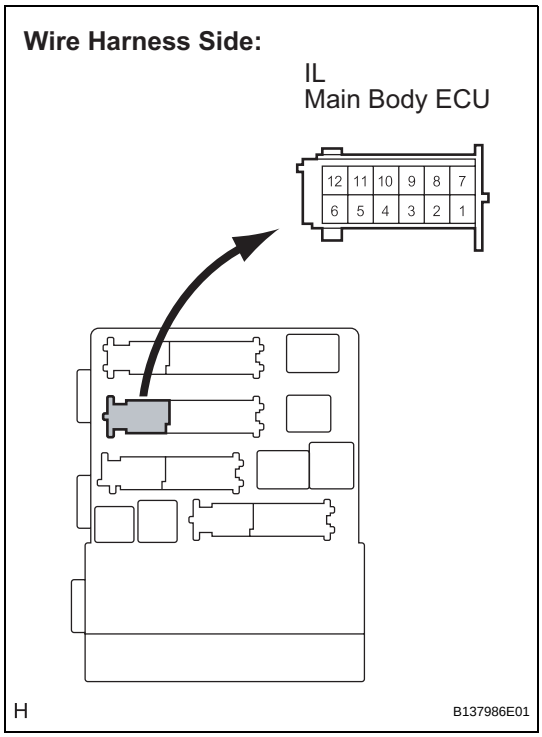
4	INSPECT FUSE (STOP)

(a) Remove the STOP fuse from the instrument panel J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

5	CHECK WIRE HARNESS (BATTERY - MAIN BODY ECU)



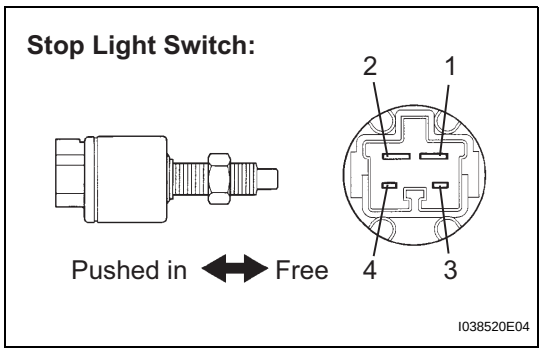
(a) Disconnect the IL ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
IL-7 - Body ground	Brake pedal released	Below 1 V
IL-7 - Body ground	Brake pedal depressed	10 to 14 V

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

NG

6	INSPECT STOP LIGHT SWITCH



(a) Remove the switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
3 - 4	Switch pin free	10 kΩ or higher
1 - 2	Switch pin pushed in	10 kΩ or higher
3 - 4	Switch pin pushed in	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH**

ST

OK

REPLACE MAIN BODY ECU

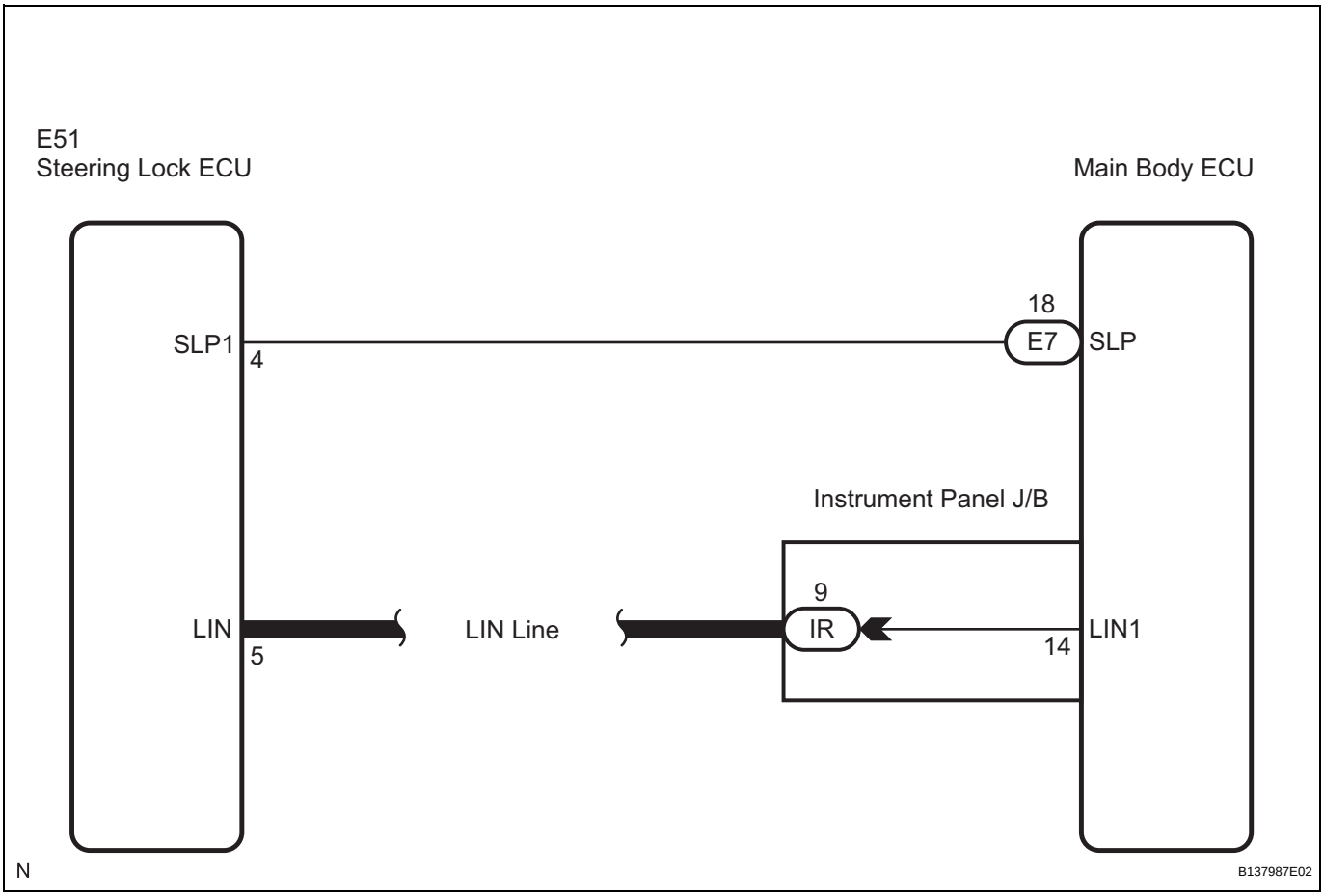
DTC	B2285	Steering Lock Position Signal Circuit Malfunction

DESCRIPTION

This DTC is output when serial communication signals and LIN communication signals in the circuit between the main body ECU and steering lock actuator (steering lock ECU) are inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU or steering lock ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2285	Cable and LIN information between the main body ECU and the steering lock ECU are inconsistent	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Check the DATA LIST for proper functioning of the steering lock function.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-

OK:
"ON "(Steering is unlocked) and "OFF" (Steering is locked) appear on the screen.

NG → **Go to step 3**

OK

2 CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2285, DTC B2287 and DTC B2785.

Result

Display (DTC output)	Proceed to
"DTC B2285" only	A
"DTC B2287" and/or "DTC B2785"	B
No DTC	C

HINT:
- If DTC B2287 is output (See page ST-77).
- If DTC B2785 is output (See page EI-30).

B → **GO TO DTC CHART**

C → **CHECK INTERMITTENT PROBLEMS**

A

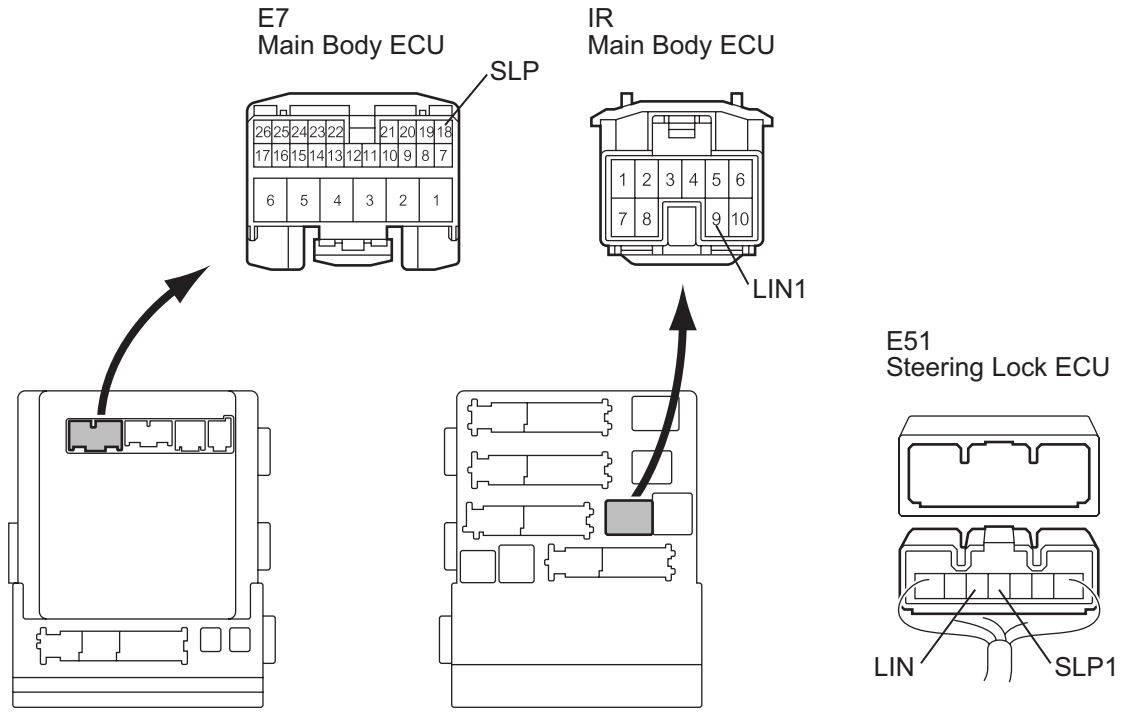
REPLACE MAIN BODY ECU

3 CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the IR, E7 and E51 ECU connectors.

ST

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
IR-9 (LIN1) - E51-5 (LIN)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher
IR-9 (LIN1) or E51-5 (LIN) - Body ground	Always	10 kΩ or higher

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

OK

ST

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
  (1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).
  OK:
  Power switch on (READY).

NG → **REPLACE STEERING LOCK ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

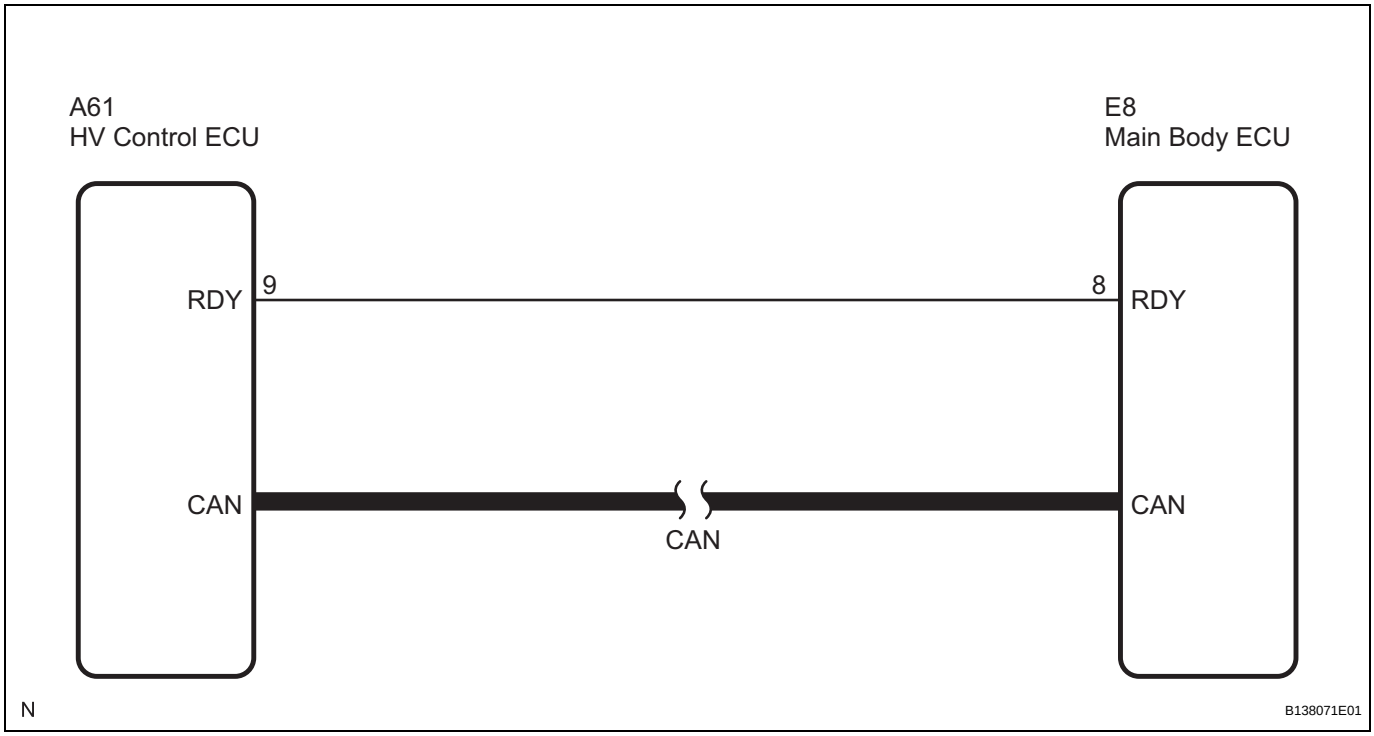
DTC	B2286	Runnable Signal Malfunction

DESCRIPTION

This DTC is output when serial communication signals and CAN communication signals in the circuit between the main body ECU and HV control ECU are inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2286	Serial communication signals and CAN communication signals in the circuit between the main body ECU and HV control ECU are inconsistent.	• CAN communication system • HV control ECU • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for the CAN communication system DTC U0146.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-7).

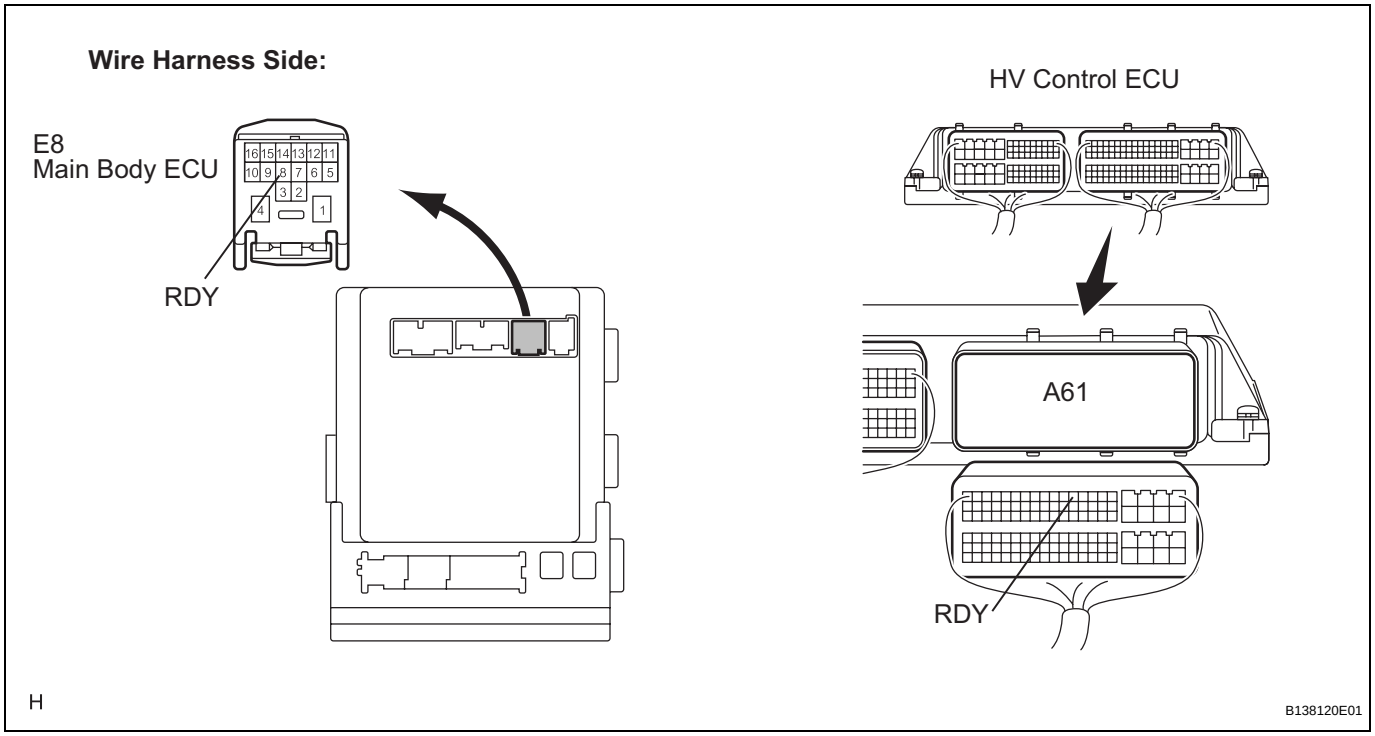
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

2 CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the A61 ECU connector.



(b) Disconnect the E8 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (RDY) - A61-9 (RDY)	Always	Below 1 Ω
E8-8 (RDY) or A61-9 (RDY) - Body ground	Always	10 kΩ or higher

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

OK

3 READ VALUE OF INTELLIGENT TESTER

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Check the DATA LIST for proper functioning of the HV control system on (READY).

ST

HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
READY SIG	HV control system on (READY)/ ON or OFF	ON: System is on (READY) OFF: System is off	-

OK:
OFF (system is off) and ON (system is on (READY)) appear on the screen.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU**

OK

REPLACE MAIN BODY ECU

DTC	B2287	LIN Communication Master Malfunction

DESCRIPTION

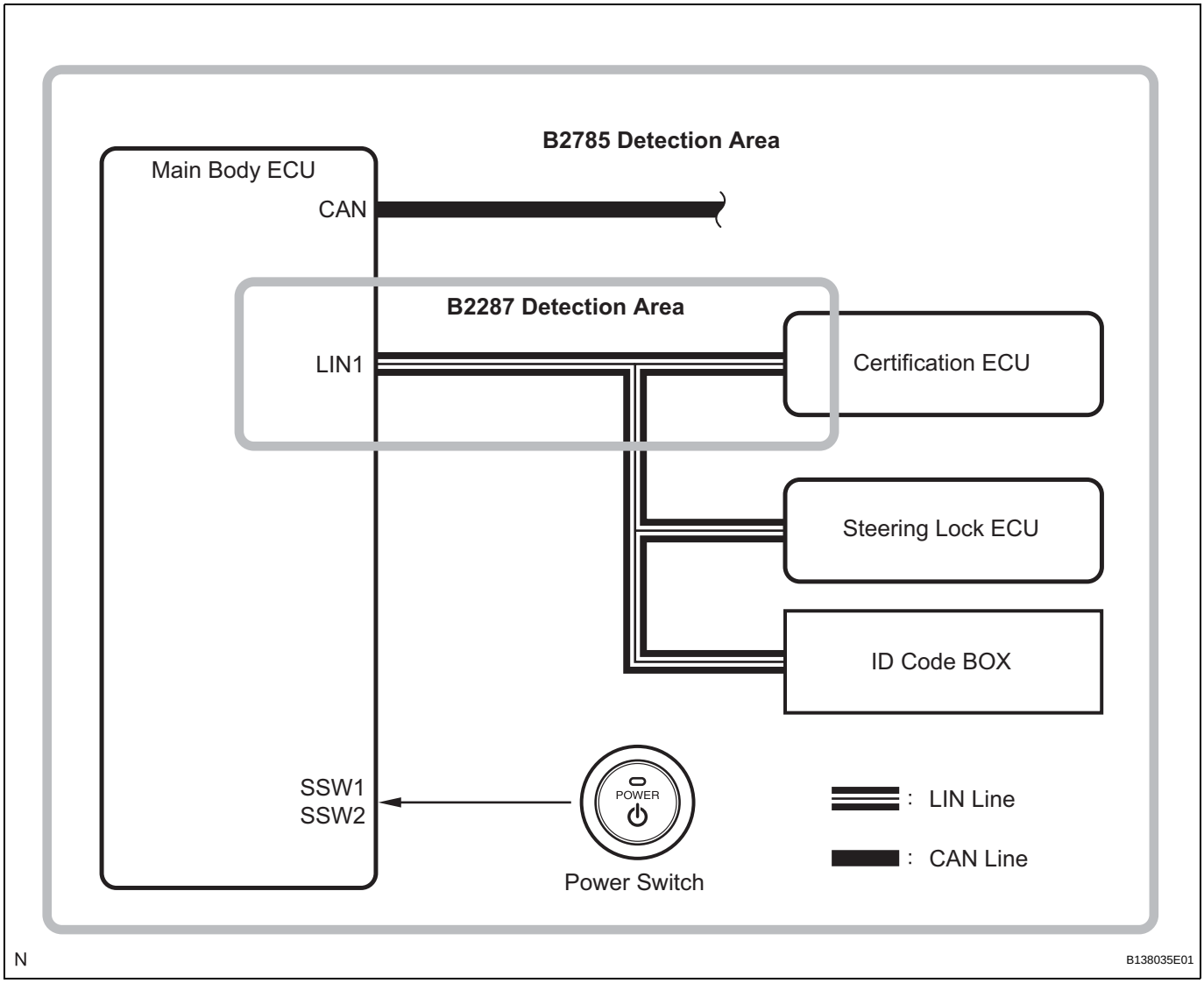
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

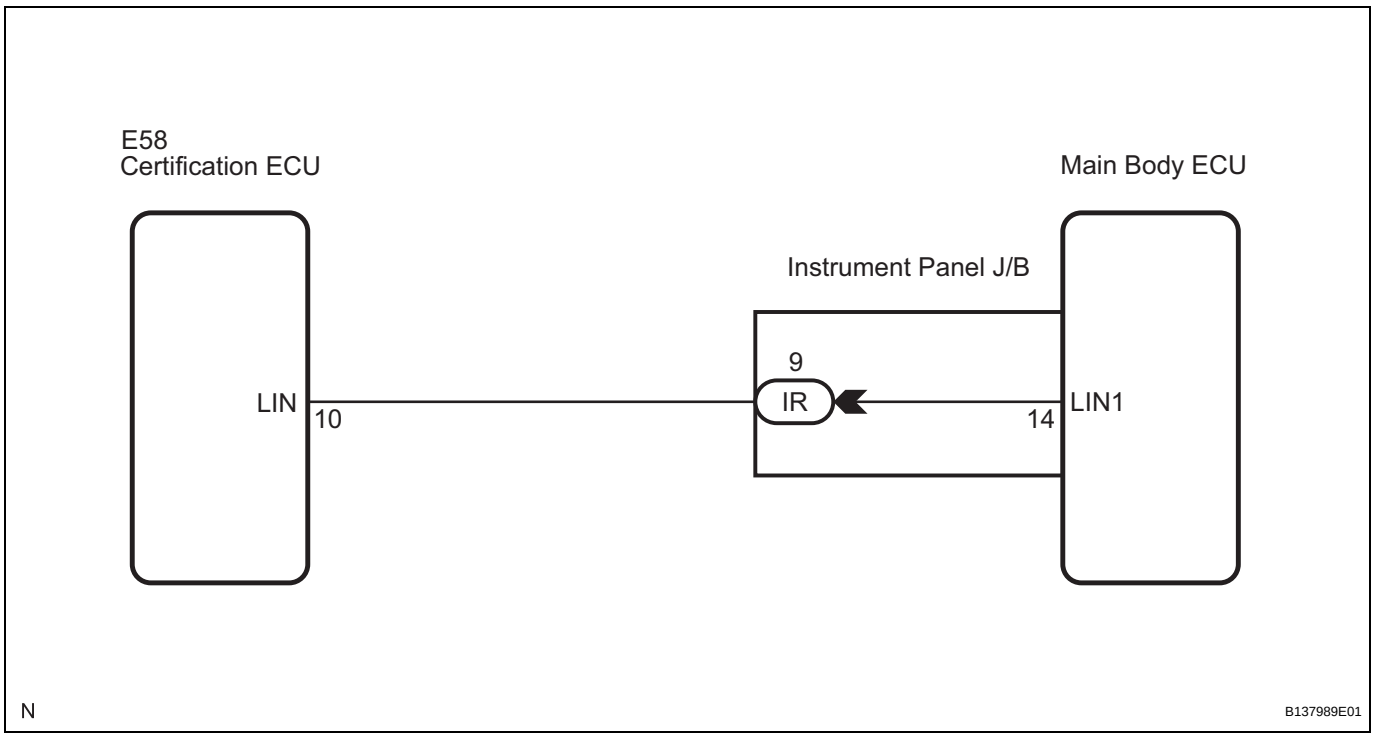
After the main body ECU or certification ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2287	Communication or communication line is abnormal between the main body ECU and the certification ECU	• Main body ECU • Certification ECU • Wire harness or connector



ST

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2287 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2287" only	A
"DTC B2287" and "DTC B2785"	B
No DTC	C

HINT:
If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-30).

B → GO TO DTC B2785

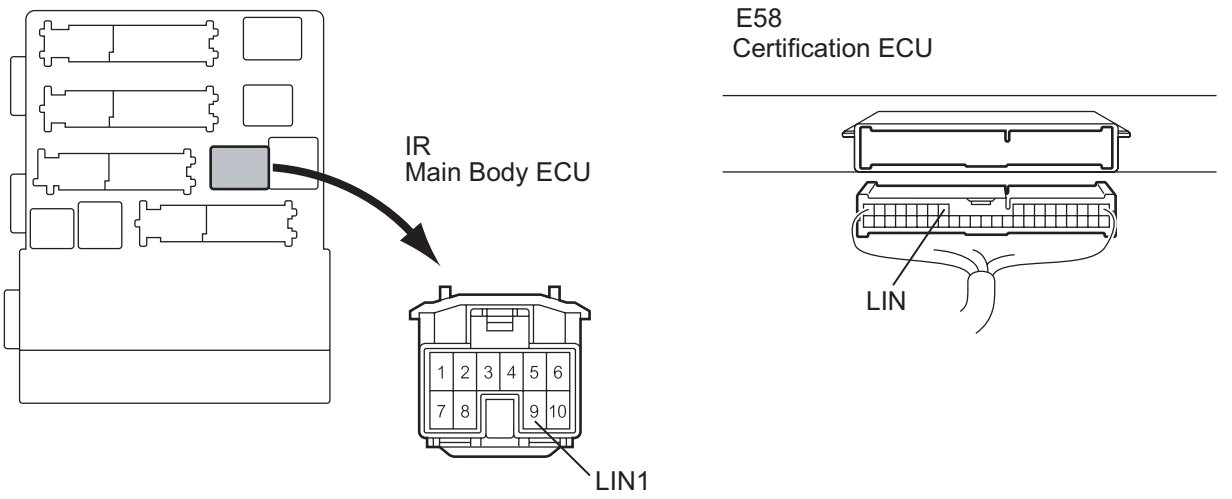
C → CHECK INTERMITTENT PROBLEMS

A

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

ST

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

OK

3 CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.

(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).

OK:

Power switch on (READY).

NG → **REPLACE CERTIFICATION ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

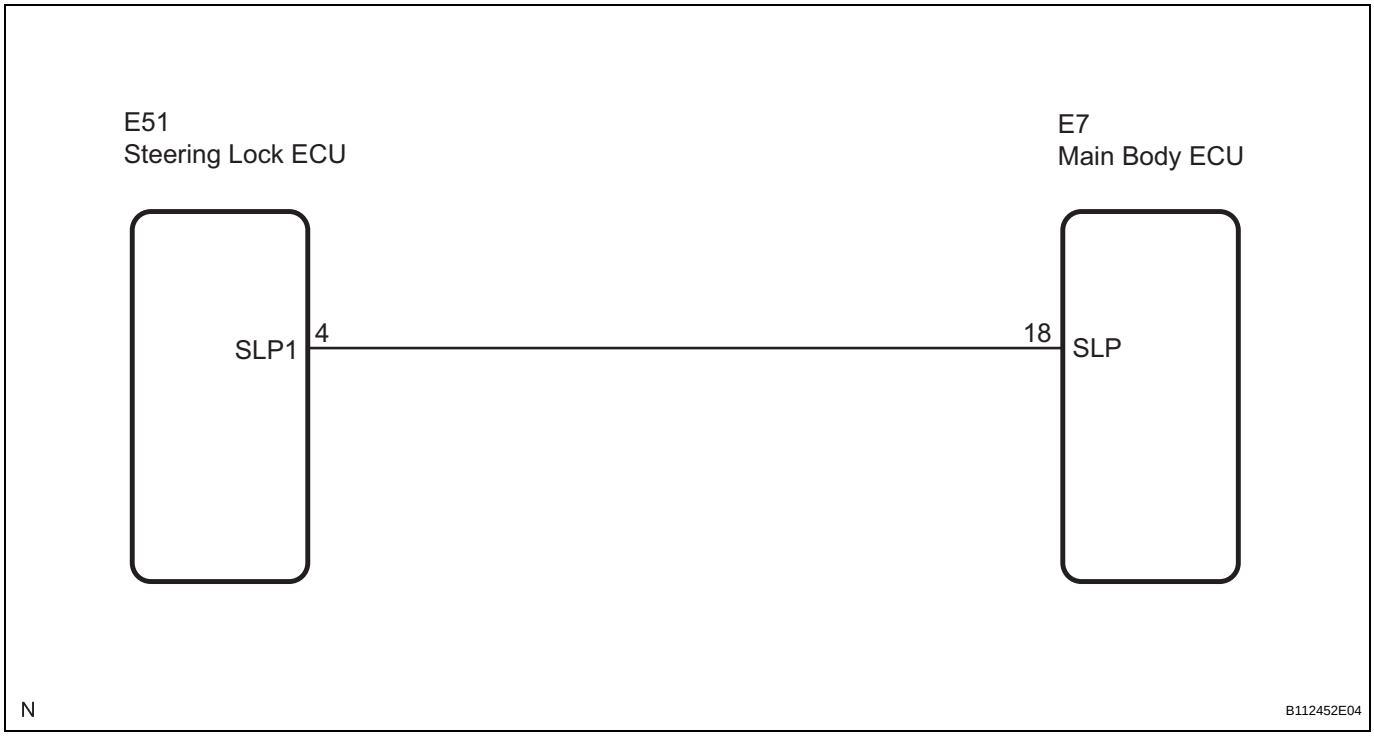
DTC	B2288	Steering Lock Signal Circuit Malfunction

DESCRIPTION

This DTC is output when the main body ECU cannot detect the unlock condition of the steering lock within a specified time.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2288	After turning power switch from off to on (IG), the steering wheel does not unlock for a certain period of time (ECU unlocks steering wheel only when it receives an unlock signal from LIN communication and cable)	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) After all DTCs are cleared, check if the trouble occurs again 5 seconds after the power switch is turned on (IG).
(c) Check for DTCs again.
OK:
DTC B2287, DTC B2781 and DTC B2785 are not output.

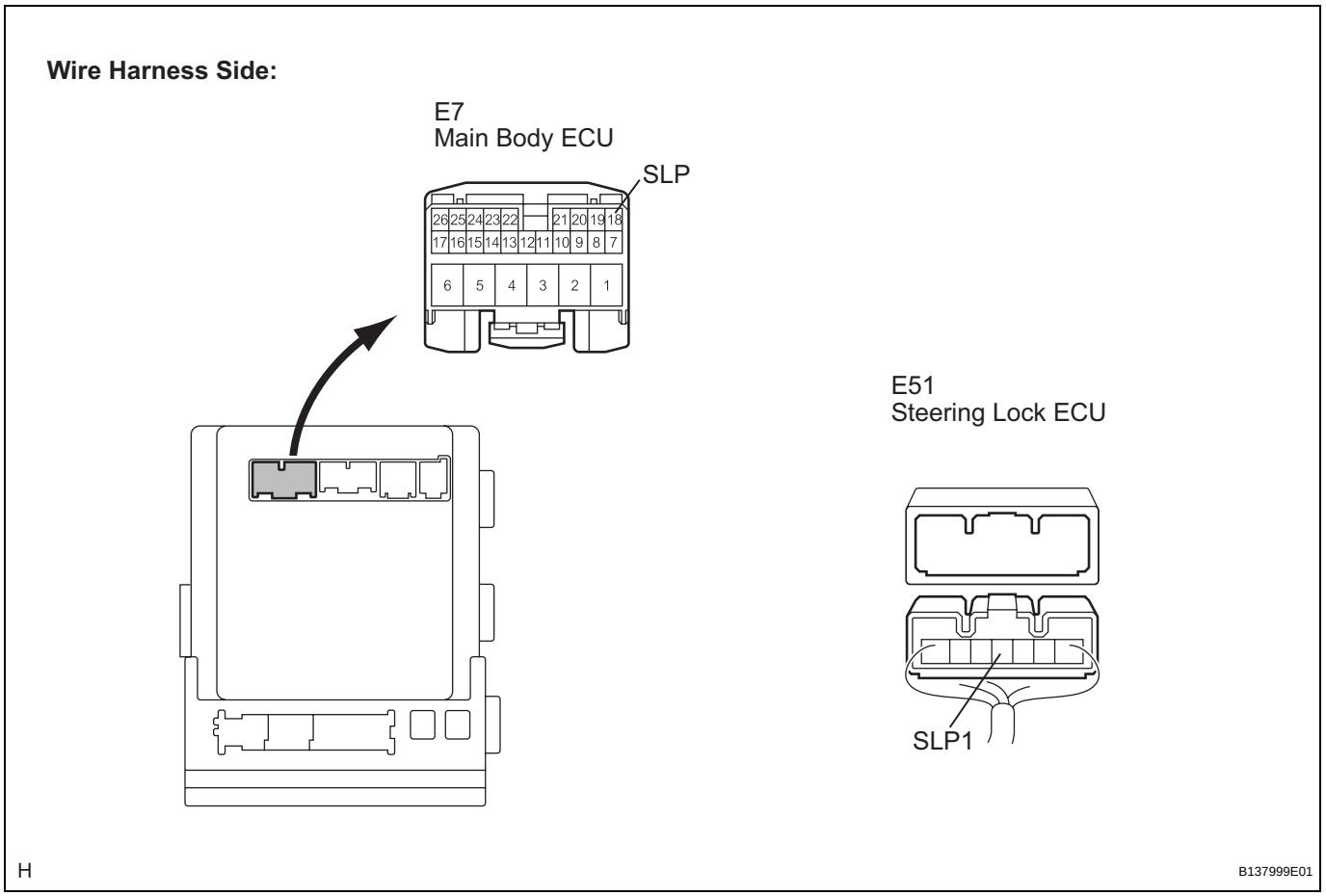
HINT:
- If DTC B2271 is output (See page ST-26).
- If DTC B2287 is output (See page ST-77).
- If DTC B2785 is output (See page EI-30).

NG → **GO TO DTC CHART**

OK

2 CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the E7 and E51 ECU connectors



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher

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

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the steering lock/unlock function operates normally.
OK:
Steering lock/unlock function operates normally.
HINT:
If steering lock/unlock function does not operate, refer to PROBLEM SYMPTOMS TABLE of the electrical steering lock (steering wheel cannot be unlocked) (See page SR-10).

NG → **GO TO ELECTRIC STEERING LOCK**

OK

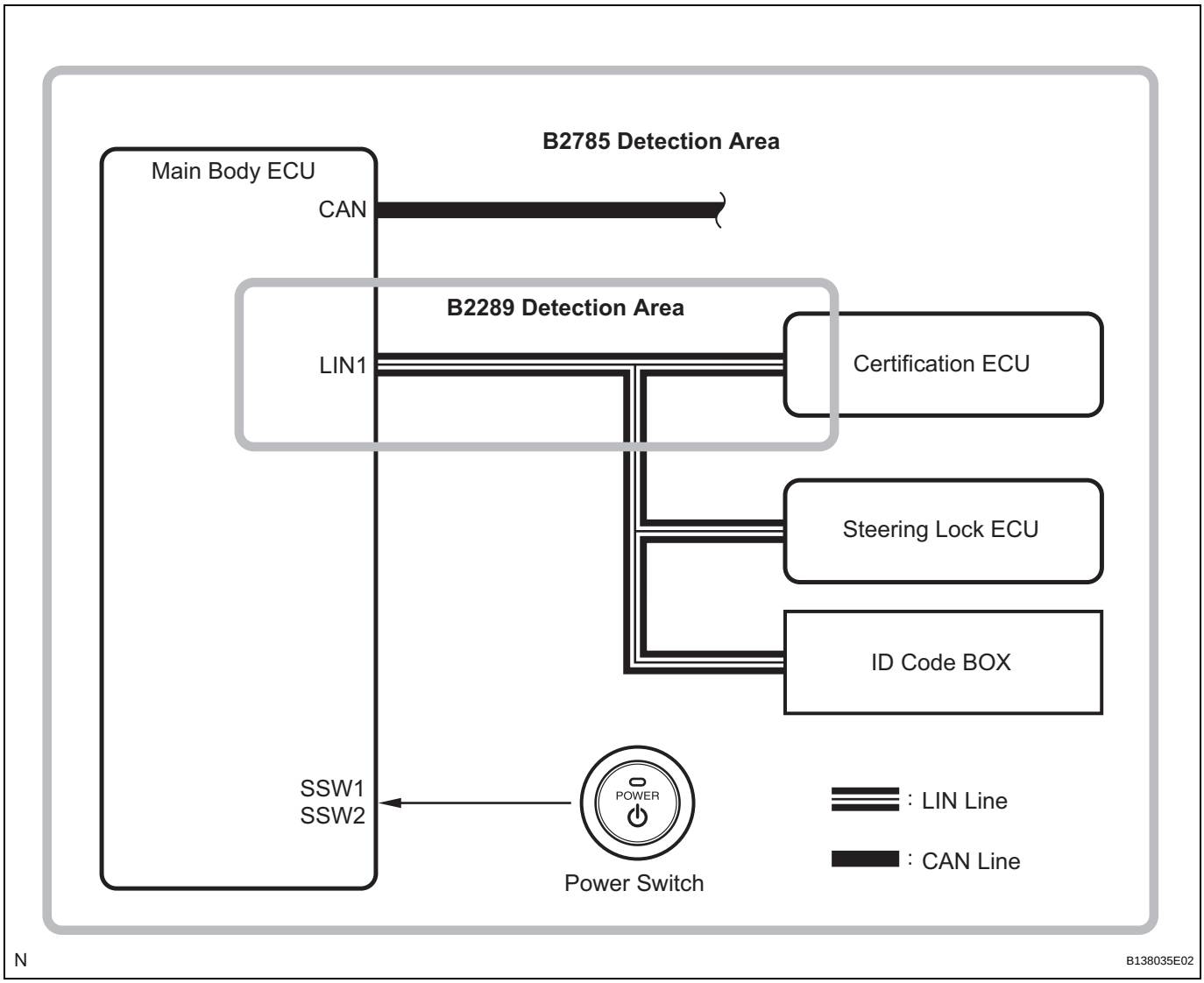
END (MAIN BODY ECU DEFECTIVE)

DTC	B2289	Key Collation Waiting Time Over

DESCRIPTION

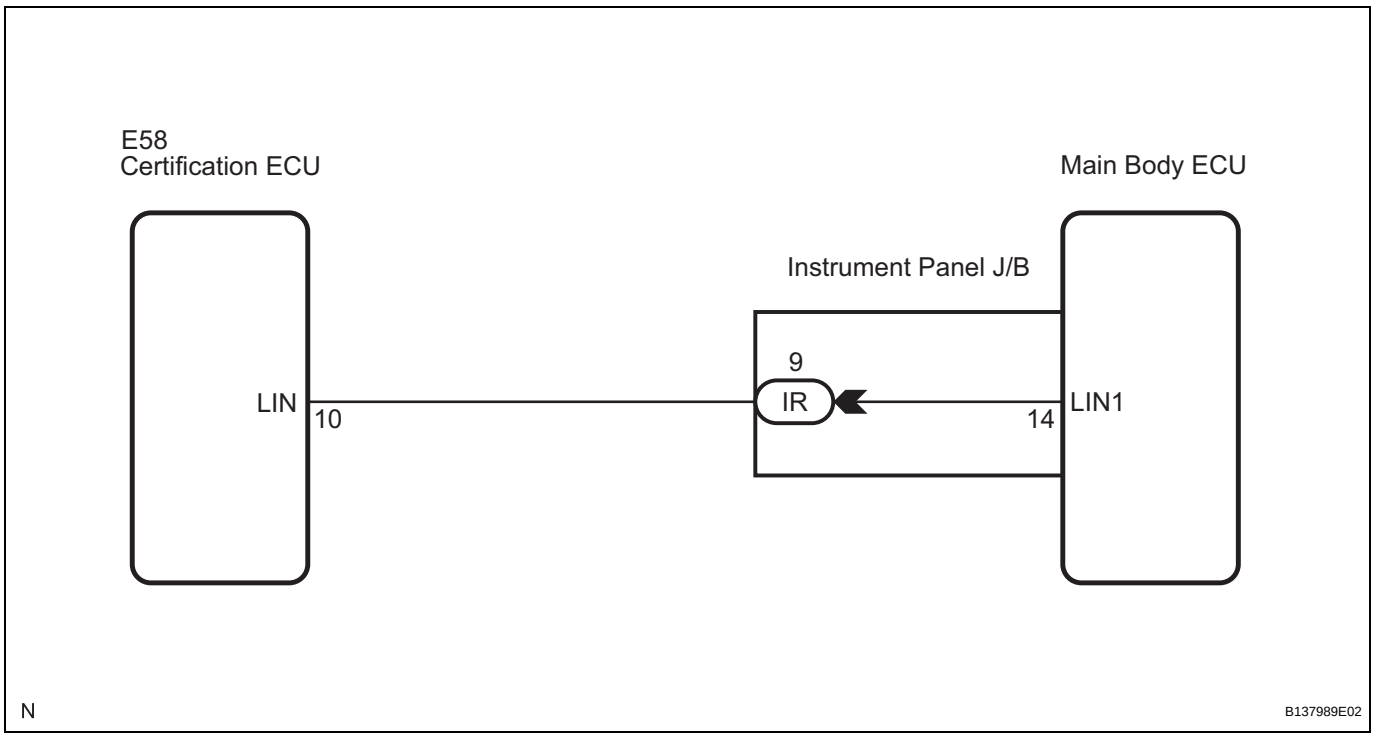
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU or when there is a problem in the engine immobiliser system.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2289	Either condition below is met: • Cable and CAN are abnormal between the main body ECU and the engine immobiliser system • The engine immobiliser system is malfunctioning	• Main body ECU • Engine immobiliser system • Wire harness or connector • Certification ECU



ST

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2289 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2289" only	A
"DTC B2785" only	B
No DTC	C

HINT:
If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-30).

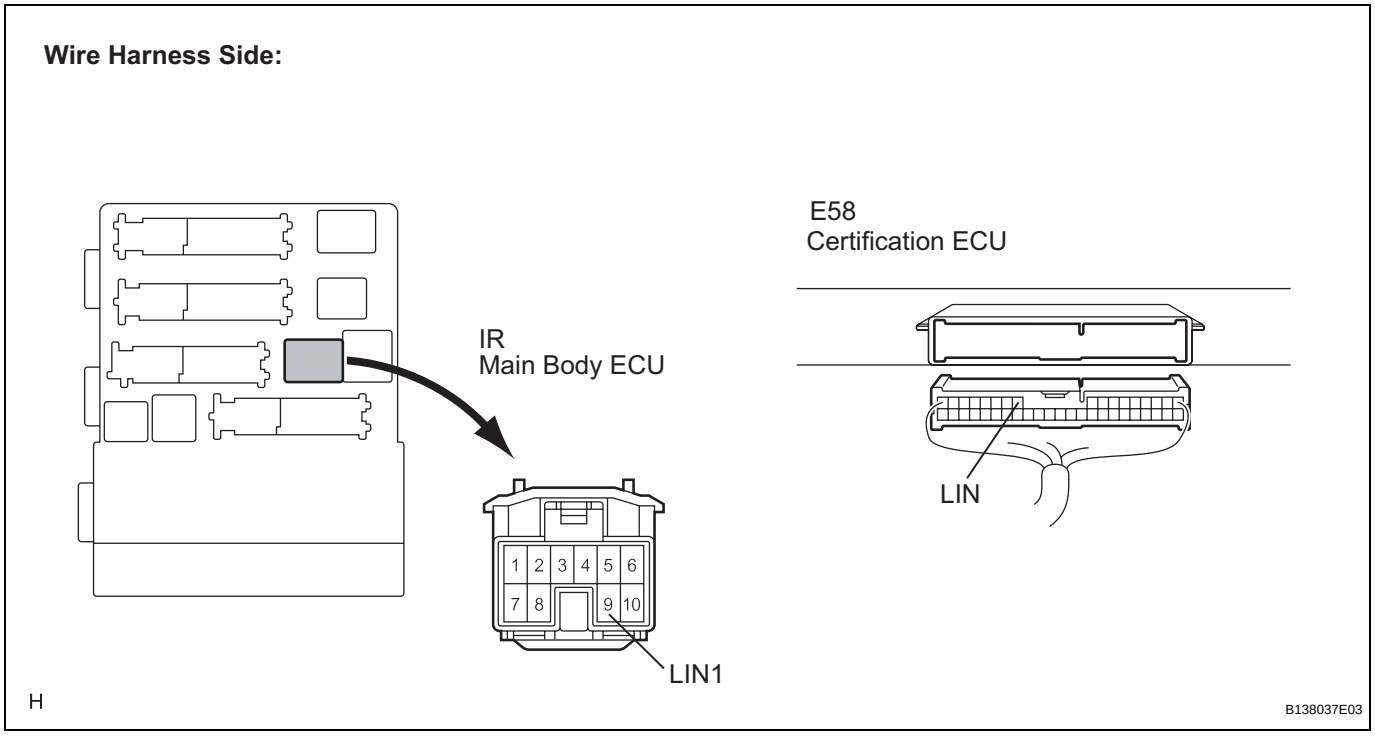
B → **GO TO DTC B2785**

C → **CHECK INTERMITTENT PROBLEMS**

A

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

ST

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

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the power source mode to change on (READY).

OK:

Power switch on (READY).

HINT:

If power mode change to on (READY), refer to PROBLEM SYMPTOMS TABLE of the smart key system (entry) (matching for the inside of the cabin cannot be performed) (See page DL-121).

NG → **GO TO SMART KEY SYSTEM (ENTRY)**

OK

END (MAIN BODY ECU DEFECTIVE)

Power Switch Indicator Circuit

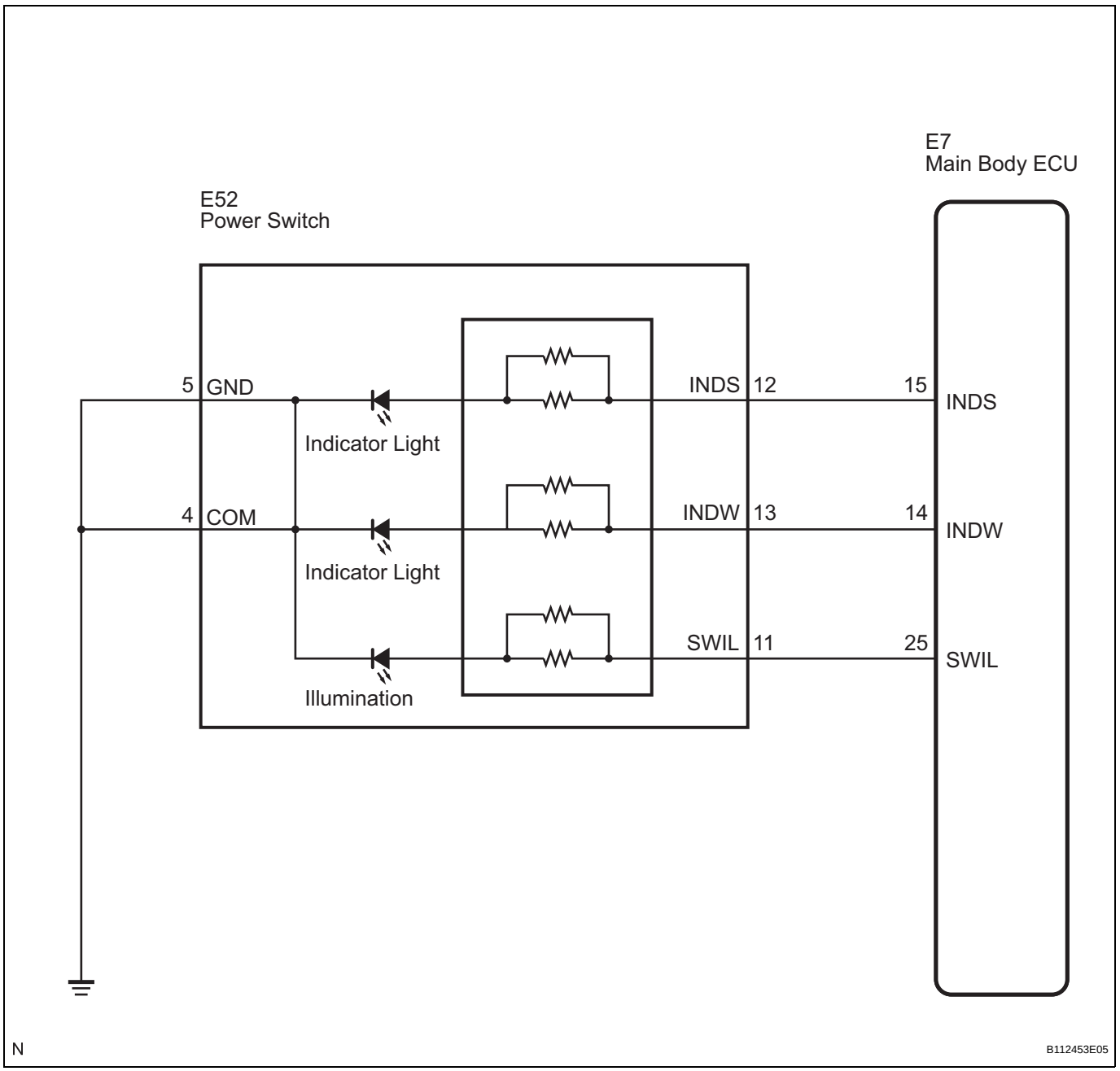
DESCRIPTION

HV control system on (READY) conditions or system malfunctions can be checked by the status of the power switch indicator light.

Power switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	**Brake pedal depressed, shift lever in P**
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

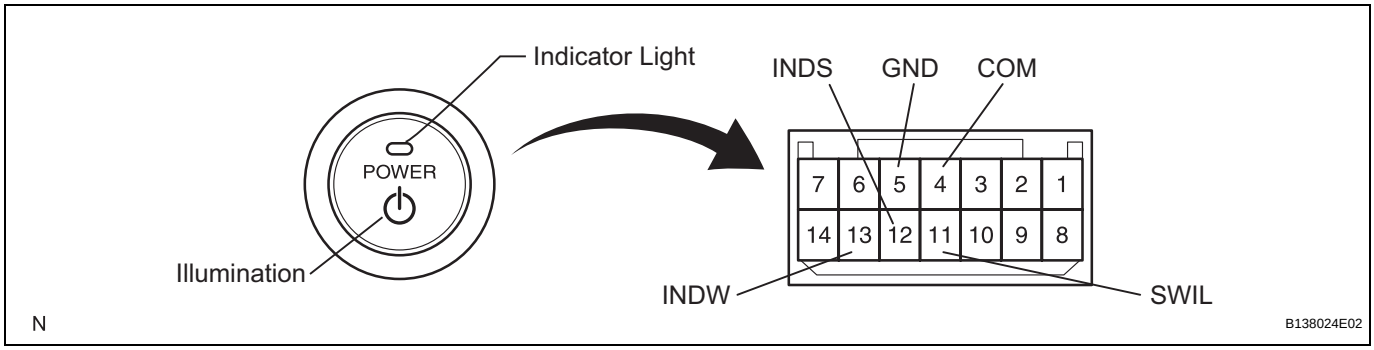
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT POWER SWITCH**

(a) Remove the power switch.



(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

NOTICE:

- **If the positive (+) lead and the negative (-) lead are incorrectly connected, the power switch indicator will not illuminate.**
- **If the voltage is too low, the indicator will not illuminate.**

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 12 (INDS) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 13 (INDW) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates

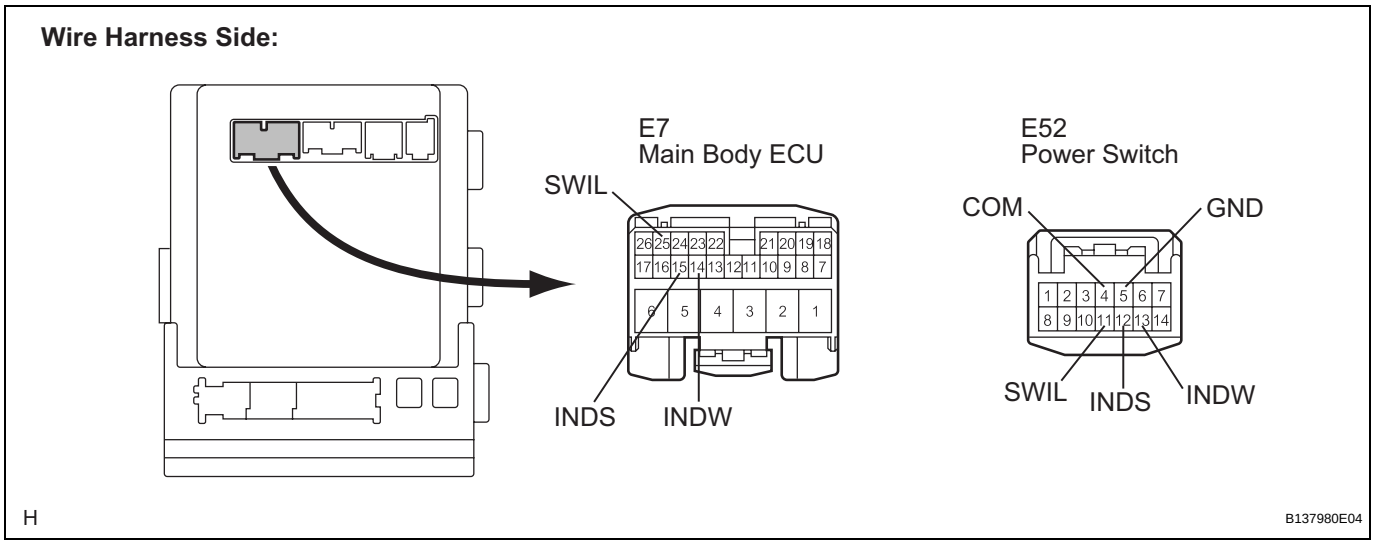
ST

NG → **REPLACE POWER SWITCH**

OK

2	CHECK WIRE HARNESS (POWER SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E52 switch connector.



(b) Disconnect the E7 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E52-11 (SWIL) - E7-25 (SWIL)	Always	Below 1 Ω
E52-12 (INDS) - E7-15 (INDS)	Always	Below 1 Ω
E52-13 (INDW) - E7-14 (INDW)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-4 (COM) - Body ground	Always	Below 1 Ω
E52-11 (SWIL) or E7-25 (SWIL) - Body ground	Always	10 kΩ or higher
E52-12 (INDS) or E7-15 (INDS) - Body ground	Always	10 kΩ or higher
E52-13 (INDW) or E7-14 (INDW) - Body ground	Always	10 kΩ or higher

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

OK

REPLACE MAIN BODY ECU

Power Source Mode does not Change to ON (IG and ACC)

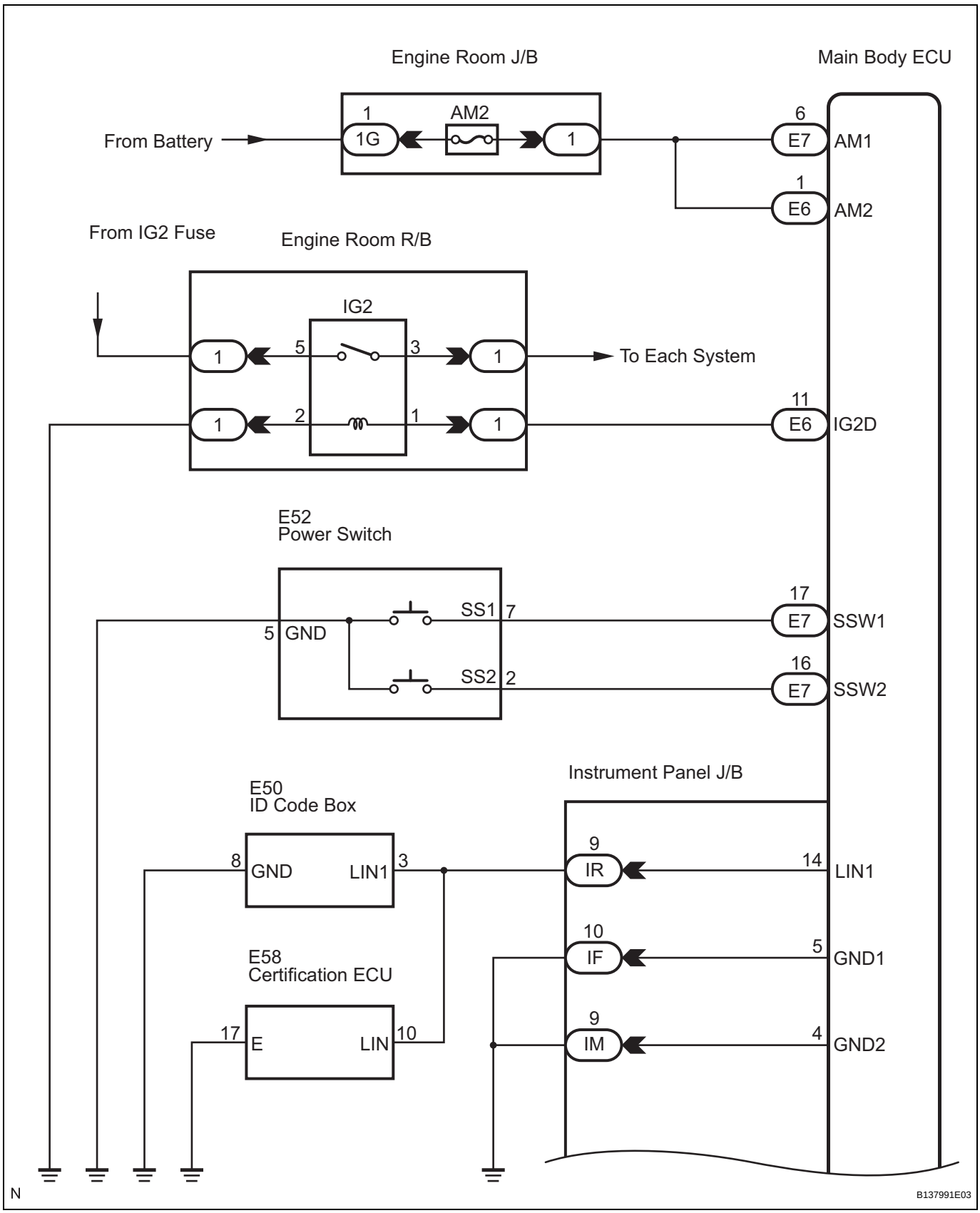
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

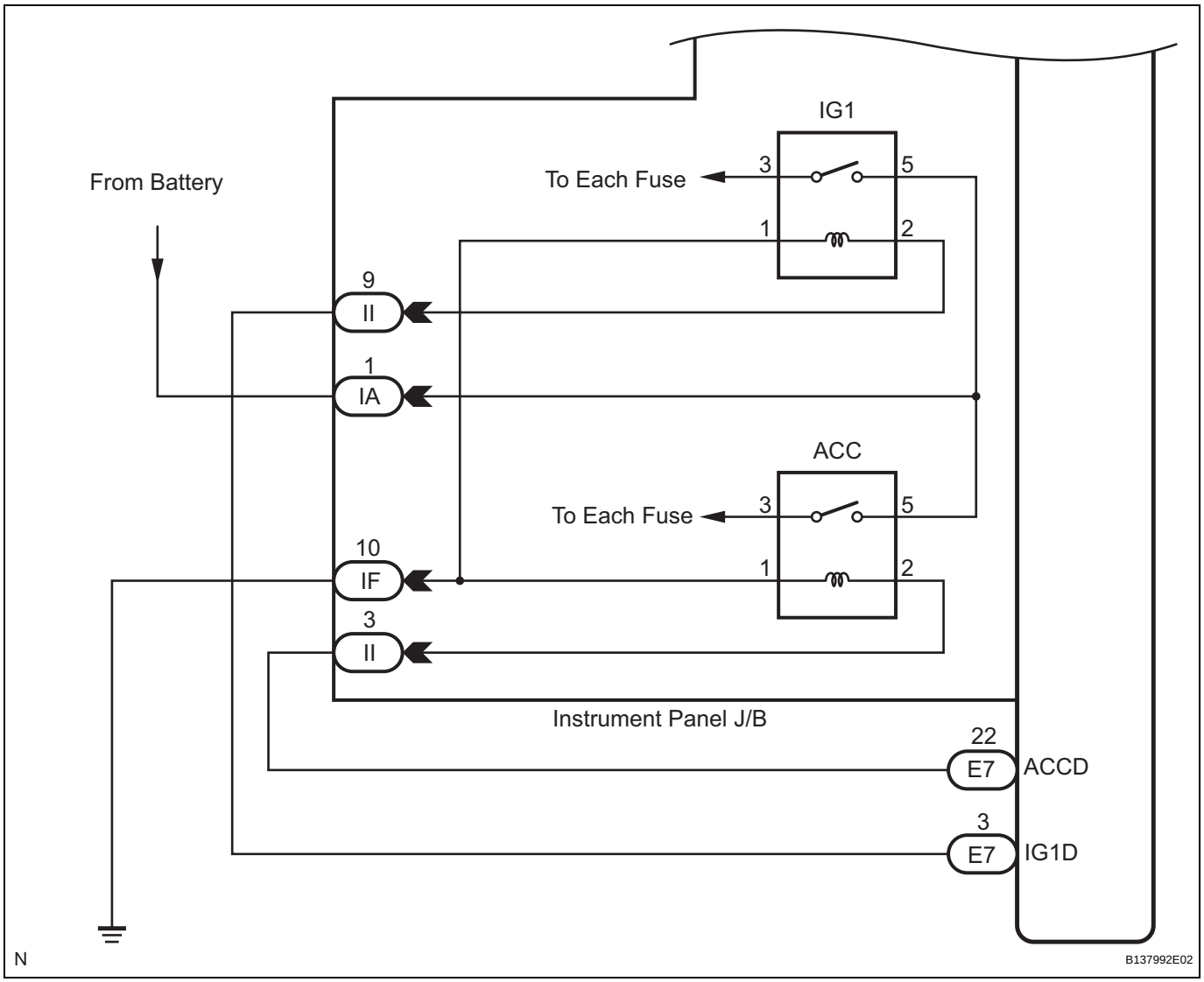
HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM

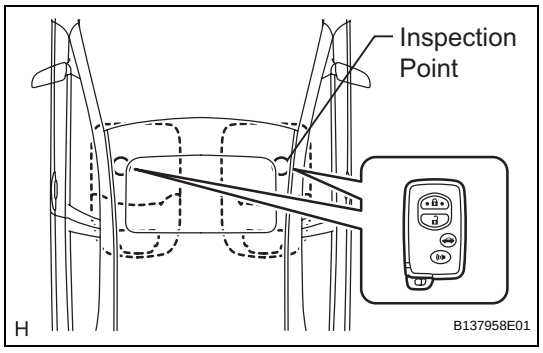


ST



INSPECTION PROCEDURE

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.

(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and brake pedal is depressed, check that the power switch indicator illuminates in green.

OK:

Power switch illuminates in green.

HINT:

- If the power switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE of the smart key system (start) (power switch indicator light does not come on) (See page ST-13) and the smart key system (entry) (matching for inside of the cabin cannot be performed) (See page DL-121).

ST

NG → GO TO OTHER PROBLEM

OK

2	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → REPLACE FUSE

OK

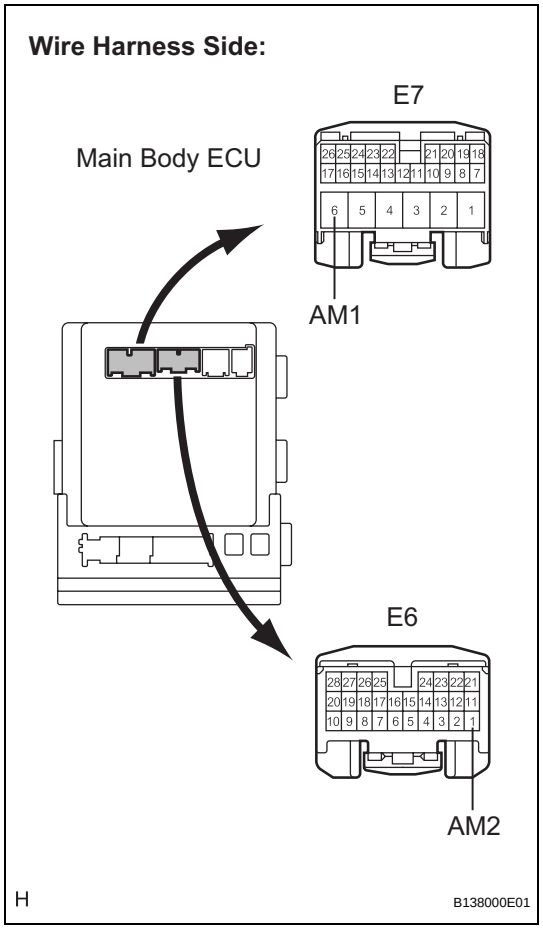
3	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → REPAIR OR REPLACE CONNECTORS

OK

4	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

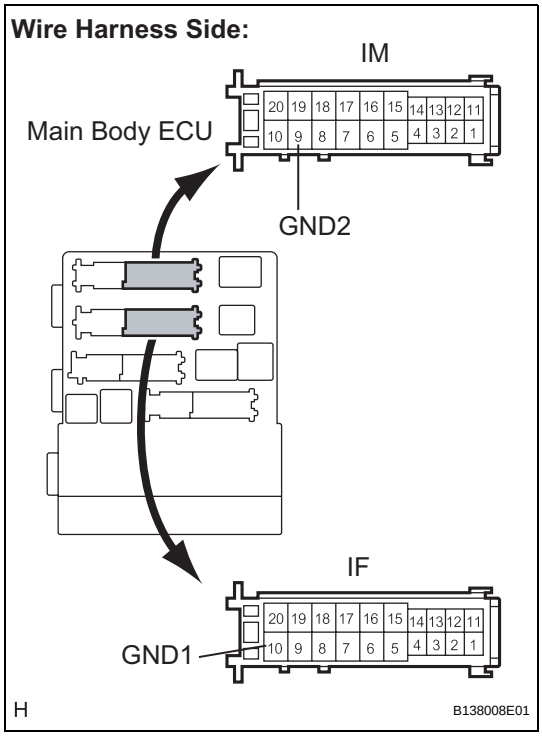
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

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

OK

ST

5 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

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

OK

6 CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
HINT:
After all the DTCs are cleared, check if the trouble occurs again 5 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
HINT:
If the DTCs for the smart key system malfunction are output, inspect those DTCs first (See page ST-23).
OK:
No DTC is output.

NG → **GO TO DTC CHART**

OK

7 READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the start switches 1 and 2.

HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start Switch 2/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-

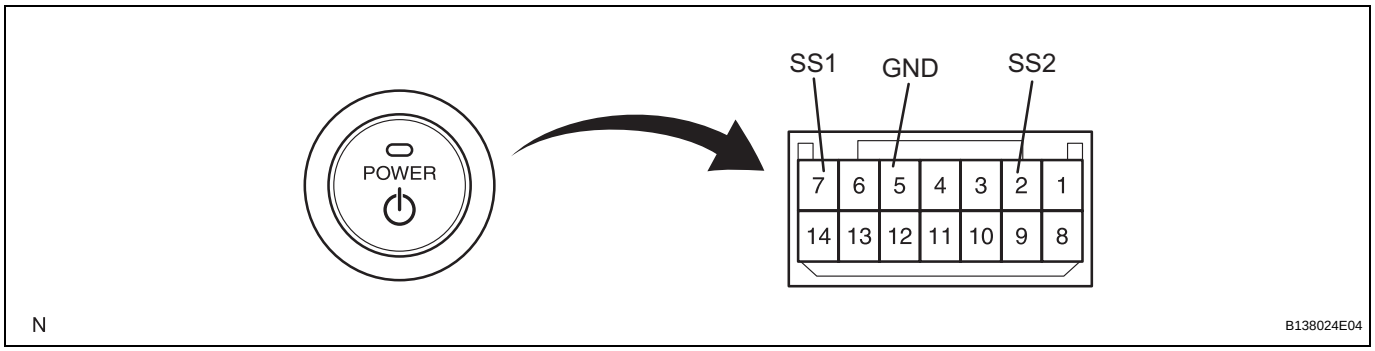
OK:
"ON" (Power switch on (IG)) and "OFF" (Power switch off) appear on the screen.

OK → **REPLACE MAIN BODY ECU**

NG

8 INSPECT POWER SWITCH

(a) Remove the power switch.



(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

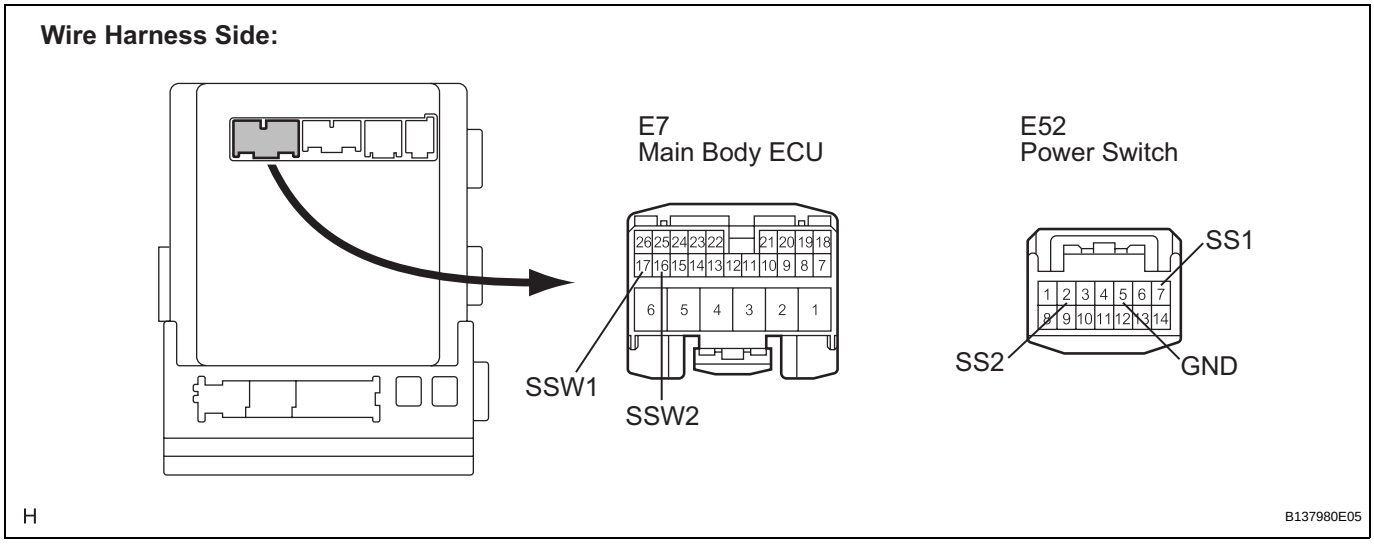
NG → **REPLACE POWER SWITCH**

OK

9 CHECK WIRE HARNESS (MAIN BODY ECU AND BODY GROUND - POWER SWITCH)

(a) Disconnect the E7 ECU connector.

ST



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

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

OK

REPLACE MAIN BODY ECU

ST

Power Source Mode does not Change to ON (IG)

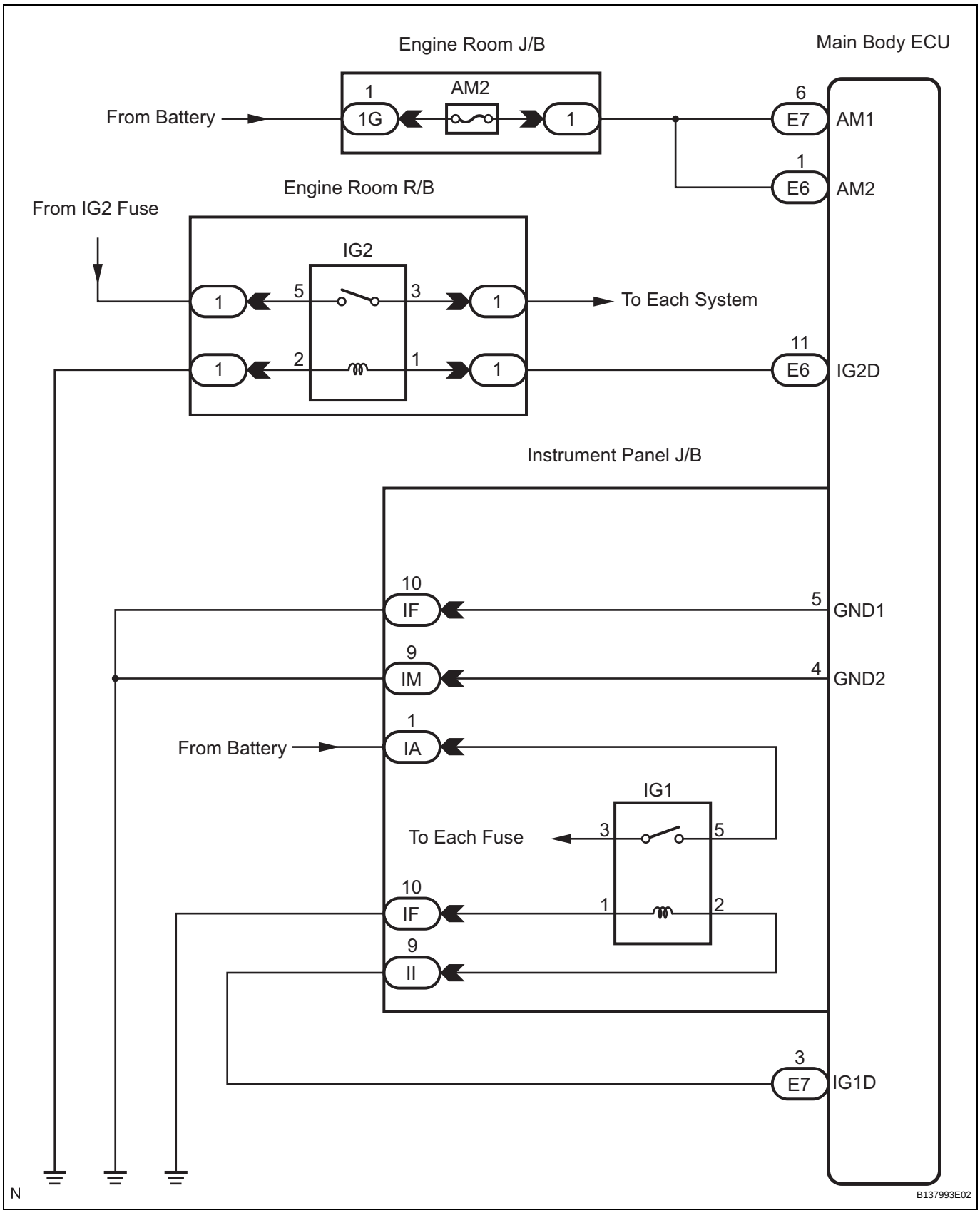
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

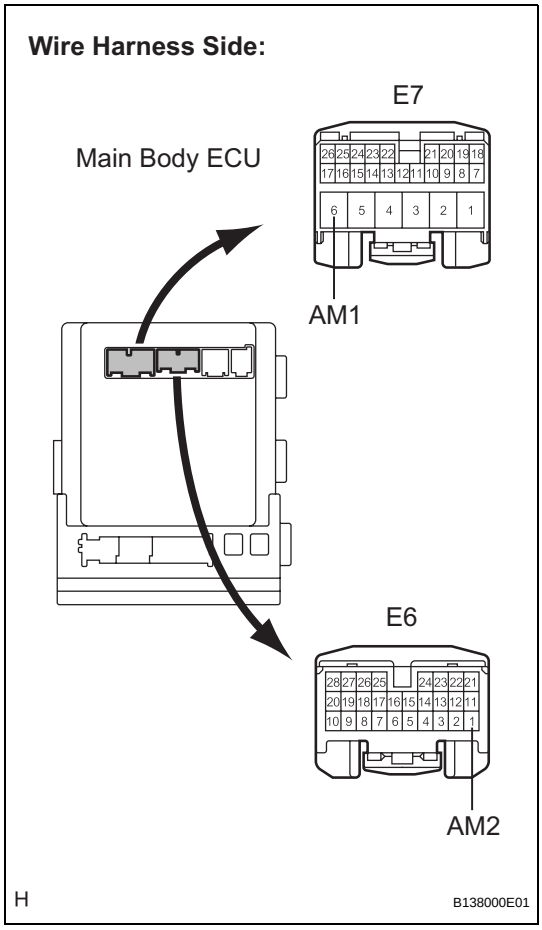
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

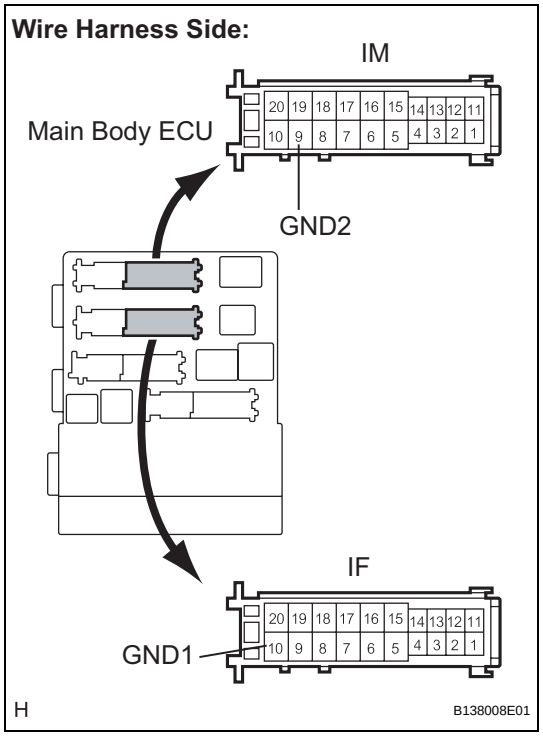
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

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

OK

ST

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

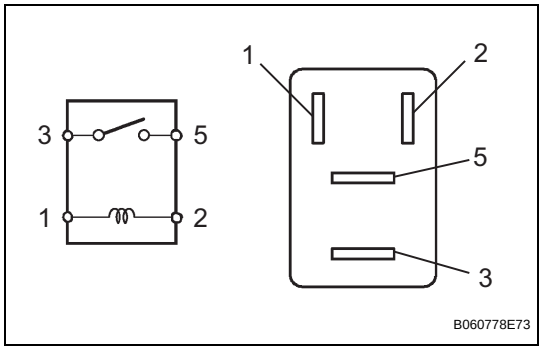
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

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

OK

5 INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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**

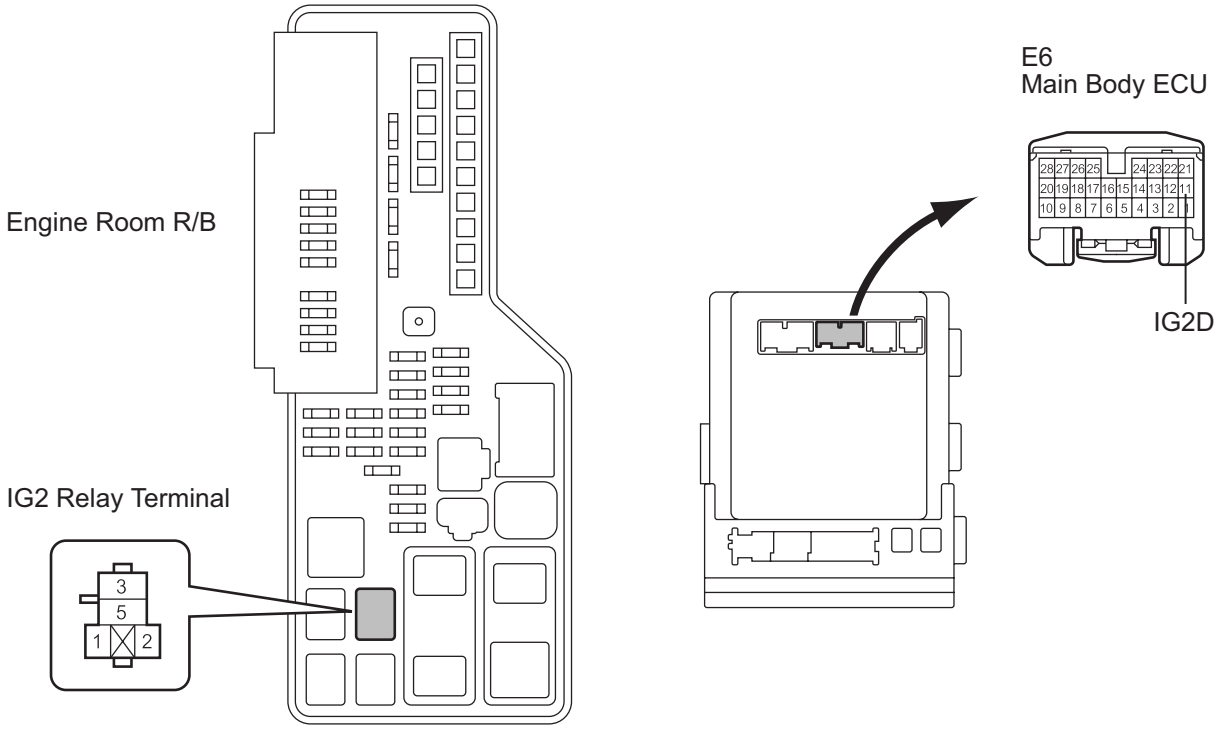
OK

6 CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

ST

Wire Harness Side:



ST

(b) Disconnect the E6 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

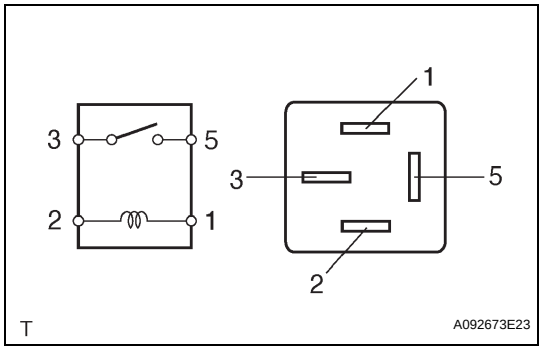
Standard resistance

Terminal No. (Symbol)	Specified Condition
Engine Room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Below 1 Ω
E6-11 (IG2D) - Body ground	10 kΩ or higher

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

OK

7 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

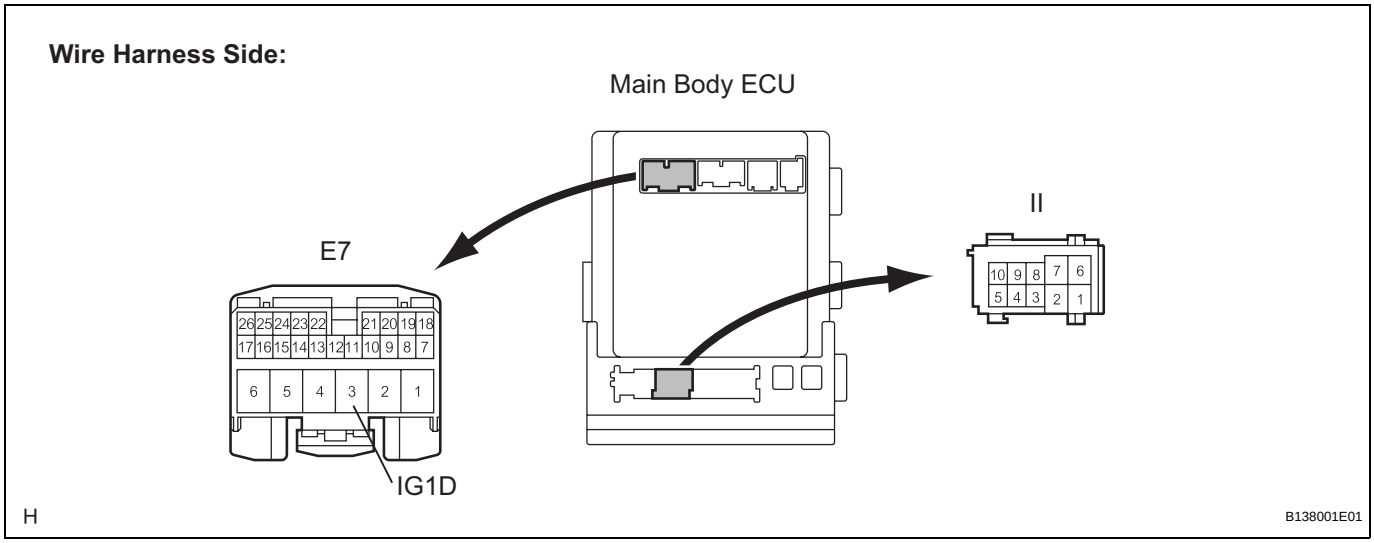
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

8 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

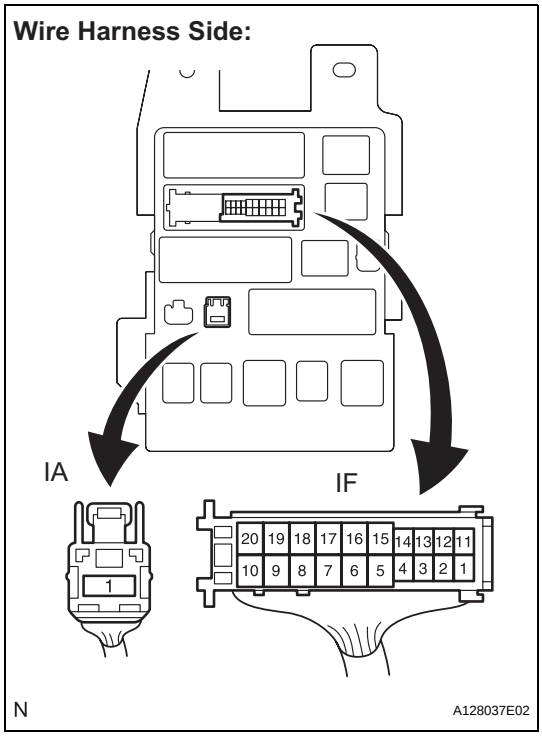
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

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

OK

ST

9	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

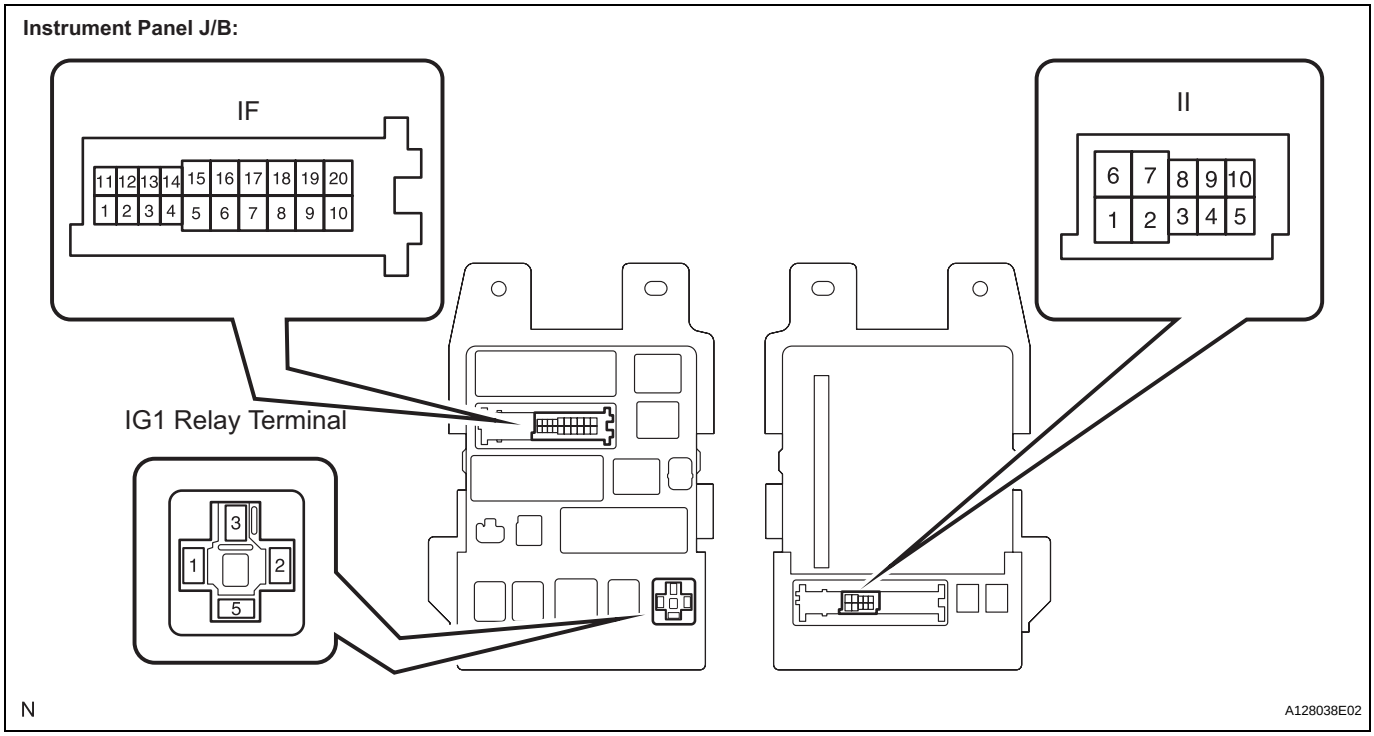
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

10	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

OK → REPLACE MAIN BODY ECU

NG

REPLACE INSTRUMENT PANEL J/B

ST

Power Source Mode does not Change to ON (ACC)

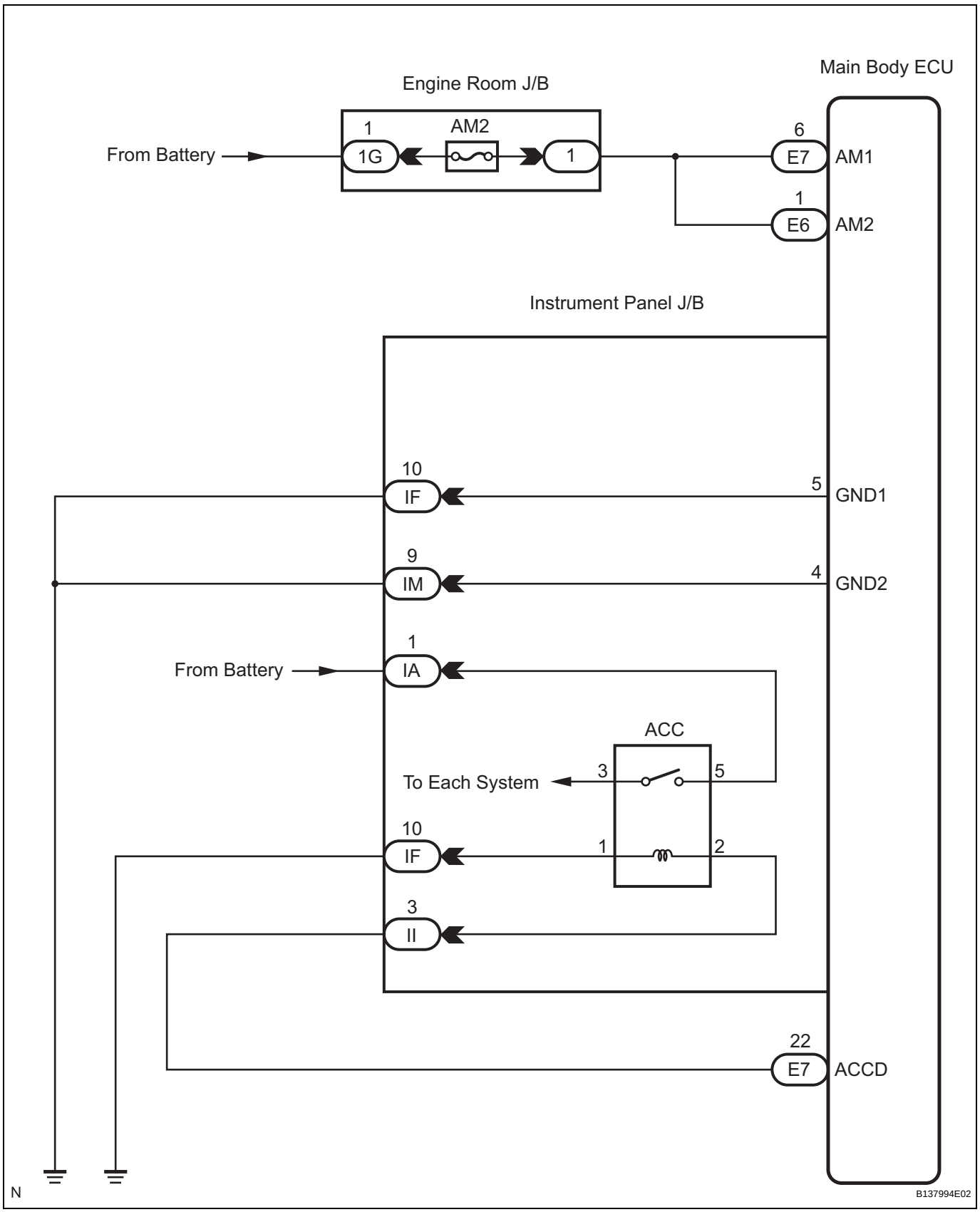
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

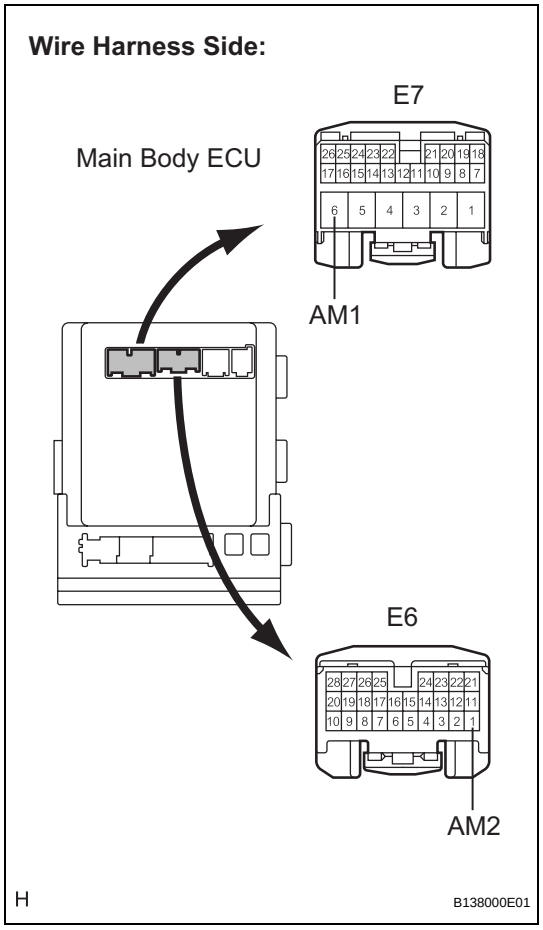
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

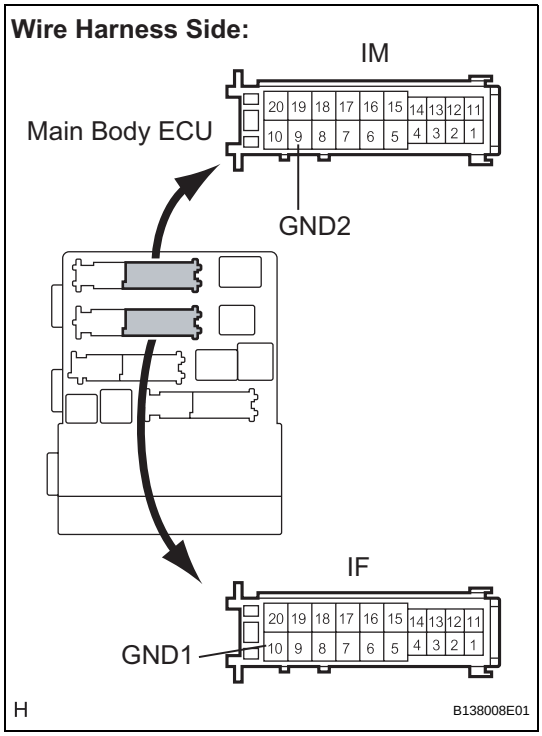
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

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

OK

ST

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

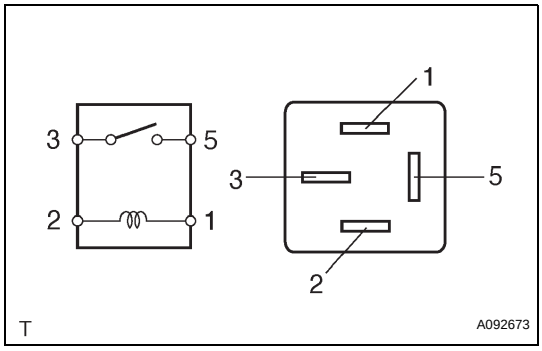
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

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

OK

5 INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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**

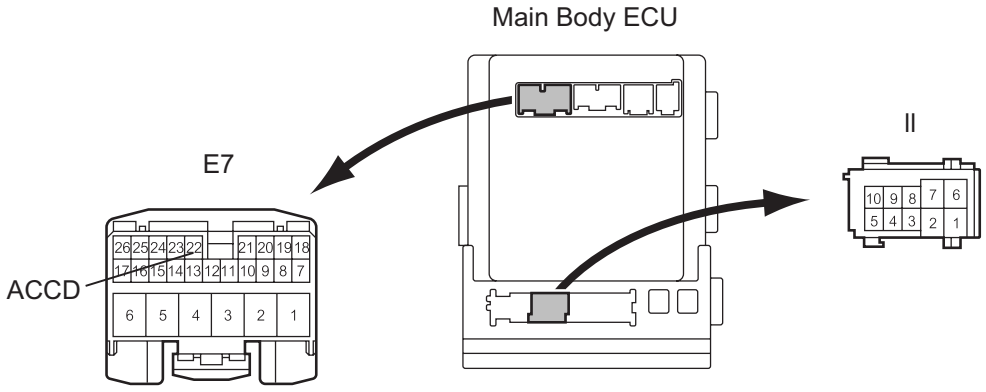
OK

6 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.

ST

Wire Harness Side:



(b) Disconnect the II J/B connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

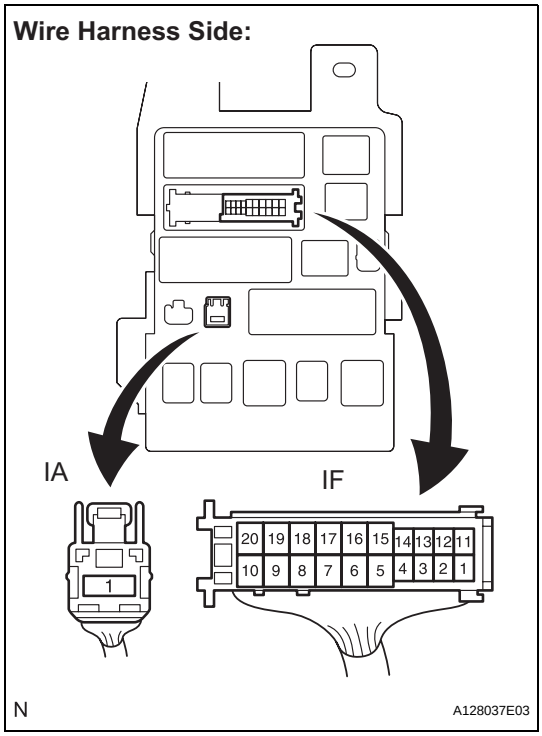
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

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

OK

ST

7	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

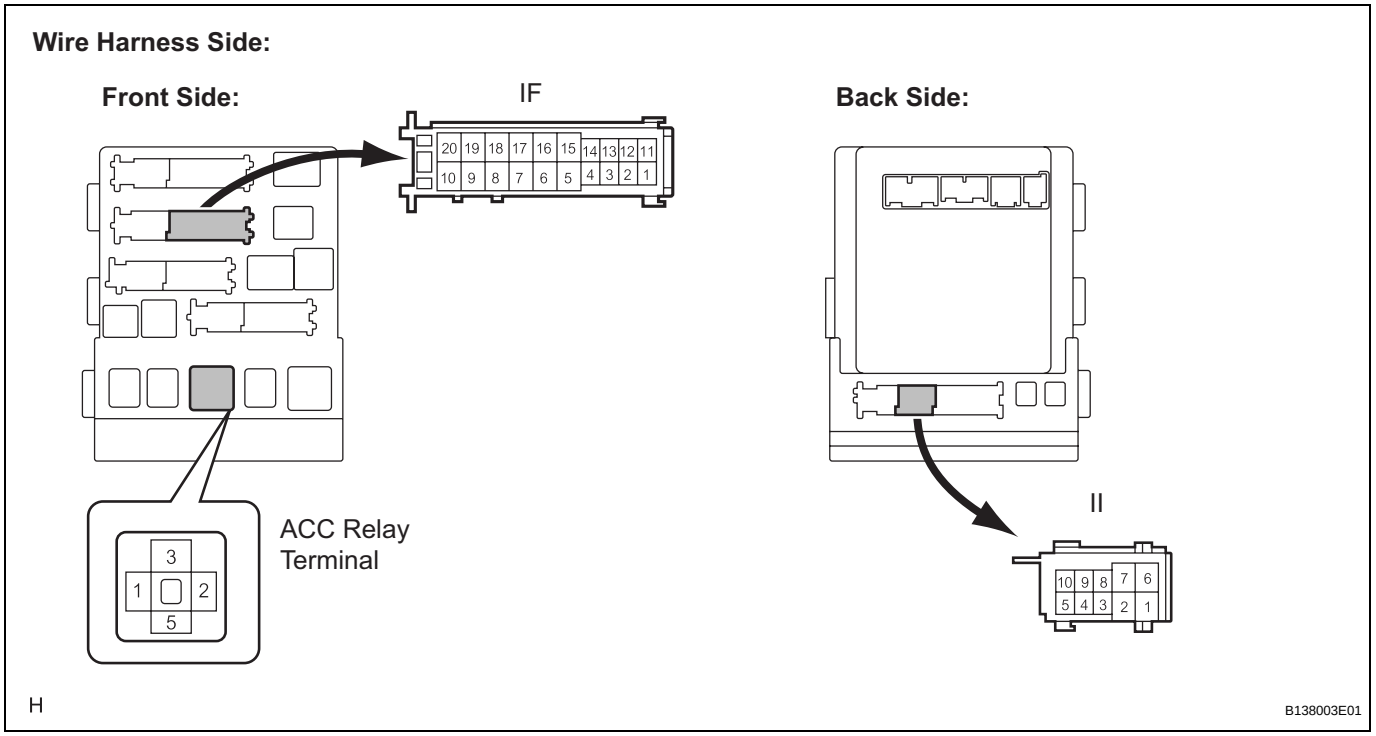
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

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

OK

8	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

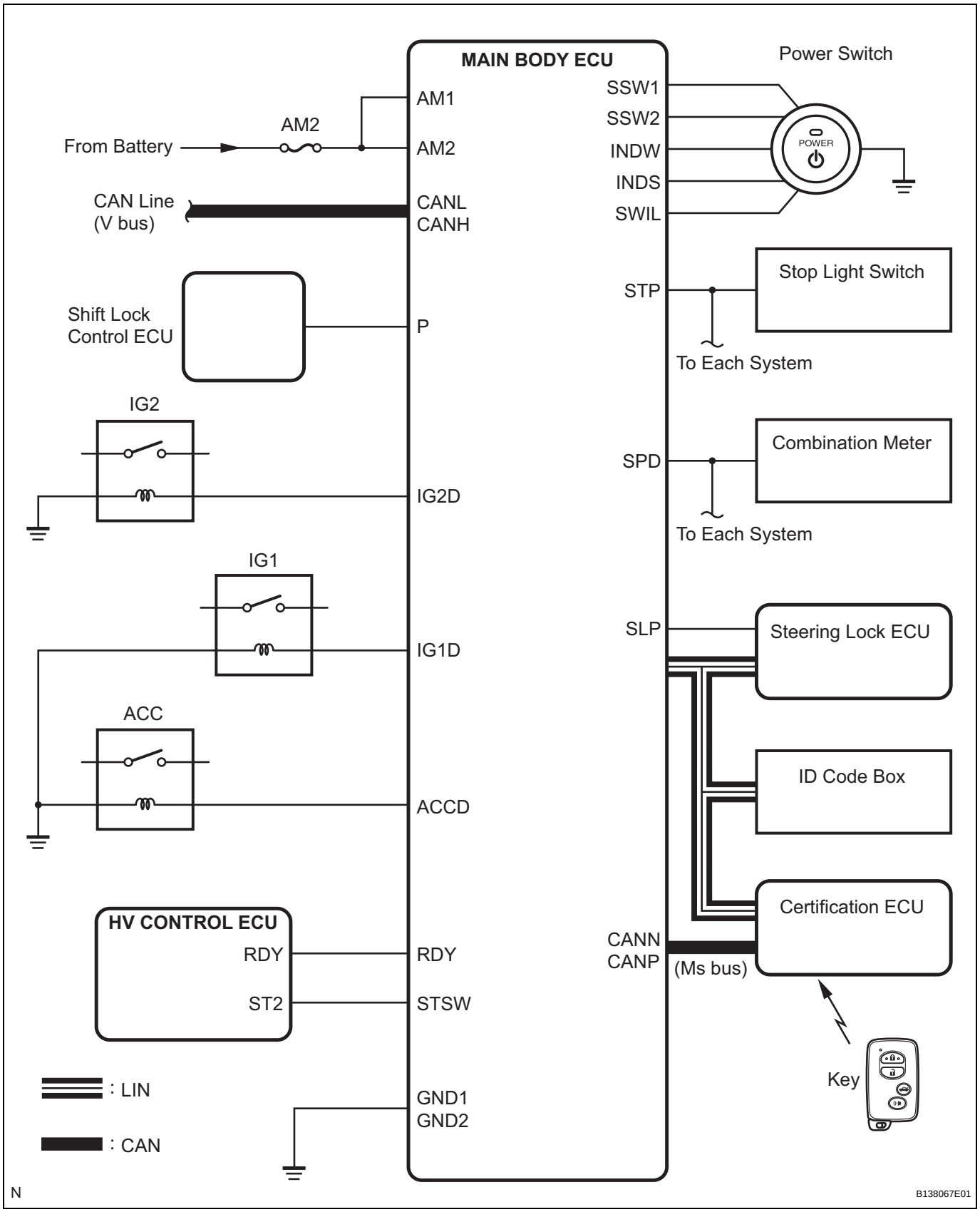
Power Source Mode does not Change to ON (READY)

DESCRIPTION

1. POWER SWITCH ON (READY) FUNCTION

(a) If the power switch is pressed with the shift lever in the P position and the brake pedal depressed, the main body ECU determines that it is a HV control system on (READY) request.
(b) The certification ECU and other ECUs perform key verification via the LIN communication line.
(c) The main body ECU activates the ACC relay.
(d) The main body ECU activates the IG1 and IG2 relays.
(e) The certification ECU outputs a steering UNLOCK signal. The signal is sent to the main body ECU via the steering lock ECU.
(f) The main body ECU sends an on (READY) request signal to the HV control ECU.
(g) When HV control system on (READY) requests signal, the main body ECU determines that the HV control system has been on (READY).
The ECU reactivates turns off the power switch indicator light.

Symbols of main body ECU	Signals
STP	Stop light switch ON signal
SSW1/SSW2	Power switch ON signal
ACCD	ACC relay operation signal
IG1D	IG1 relay operation signal
SLP	Steering lock position signal
IG2D	IG2 relay operation signal
P	Park/neutral position switch signal
RDY	HV control system on (READY) detection signal
STSW	HV control system on (READY) request signal

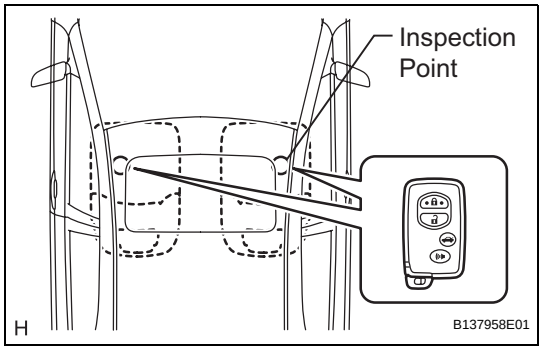


INSPECTION PROCEDURE

HINT:

After the main body ECU, certification ECU, steering lock ECU, ID code box and/or HV control ECU are/is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.
(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and the brake pedal is depressed, check that the power switch indicator illuminates in green.
OK:
Power switch illuminates in green.
HINT:
If the power switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE of the smart key system (starting function) (power switch indicator light does not come on) (See page ST-13) and the smart key system (entry door lock function) (matching for the inside of the cabin cannot be performed) (See page DL-121).

NG → **GO TO OTHER PROBLEM**

OK

2	CHECK IF POWER SWITCH ON (READY) (INITIALIZE STEERING LOCK)

(a) Make sure that the shift lever is in the P position.
(b) Open and close the driver's door with the power switch off. Check if the HV control system can be started.
OK:
HV control system can be started.
HINT:
After the battery is discharged and then recharged, the HV control system may not start unless the steering lock is initialized using the above procedure (See page SR-9).

OK → **END**

NG

3	CHECK FOR DTC

(a) Delete the DTCs (See page ST-21).
(b) Check for DTCs again.
OK:
No DTC is output.
HINT:
- If smart key system (starting function) DTCs are output (See page ST-23).
- If smart key system (entry door lock function) DTCs are output (See page DL-133).

ST

- If electrical steering lock DTCs are output (See page SR-16).
- If engine immobiliser system DTCs are output (See page EI-27).
- If HV control system DTCs are output (See page HV-46).

NG → GO TO DTC CHART

OK

4 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → GO TO OTHER PROBLEM

OK

5 READ VALUE OF INTELLIGENT TESTER (P SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DATA LIST according to the displays on the tester screen.

MAIN BODY:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P signal/ON or OFF	ON: Shift position is P (Power switch on (ACC)) OFF: Shift position is not P (Power switch off)	-

OK:
ON (P signal is ON) and OFF (P signal is OFF) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2281 first (See page ST-51).

NG → GO TO DTC B2281

OK

6	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light Switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2284 first (See page ST-65).

NG → **GO TO DTC B2284**

OK

7	READ VALUE OF INTELLIGENT TESTER (STEERING LOCK)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-

OK:
ON (steering is unlocked) and OFF (steering is locked) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTCs B2285 and B2288 first (See page ST-23).

NG → **GO TO DTC B2285 AND B2288**

OK

8	CHECK STEERING LOCK

(a) Check if the steering lock is released when turning the power switch on (ACC).
OK:
The steering lock is released.

ST

NG → GO TO STEERING LOCK SYSTEM

OK

9	READ VALUE OF INTELLIGENT TESTER (L CODE)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
HINT:
When using intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(c) Turn the power switch on (IG).

SMART KEY (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
L CODE CHK	L code check/ON or NG	OK: Normal NG: Malfunction	Electrical key in the cabin

OK:
OK is displayed on the screen.
HINT:
If the result is not as specified, there may be a malfunction with the steering lock ECU or the ID code box.

NG → GO TO ENGINE IMMOBILISER SYSTEM

OK

10	READ VALUE OF INTELLIGENT TESTER (ON (READY))

(a) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(b) Turn the power switch on (IG).

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
READY SIG	HV control system on (READY) response/ON or OFF	ON: System is on (READY) OFF: System is off	-

OK:
ON and OFF appear on the screen.

NG → REPLACE CERTIFICATION ECU

OK

11	READ VALUE OF INTELLIGENT TESTER (S CODE)

(a) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(b) Turn the power switch on (IG).

SMART KEY (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
S CODE CHK	S code check/OK or NG	OK: Normal NG: Malfunction	-

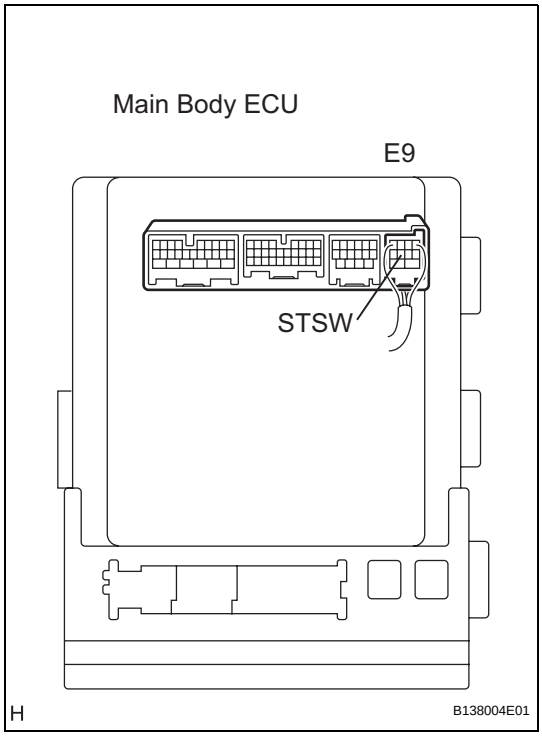
OK:
OK is displayed on the screen.
HINT:
If the result is not as specified, there may be a malfunction with the certification ECU or the ID code box.

NG → **GO TO ENGINE IMMOBILISER SYSTEM**

OK

ST

12	INSPECT MAIN BODY ECU (STSW VOLTAGE)



(a) Disconnect the A61 HV control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

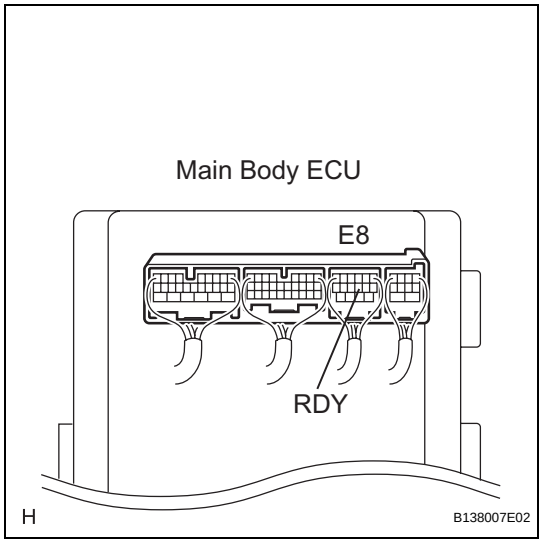
Tester Connection (Symbols)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is - 2 V or more.

HINT:
If the result is not as specified, perform troubleshooting for DTC B2275 first (See page ST-42).

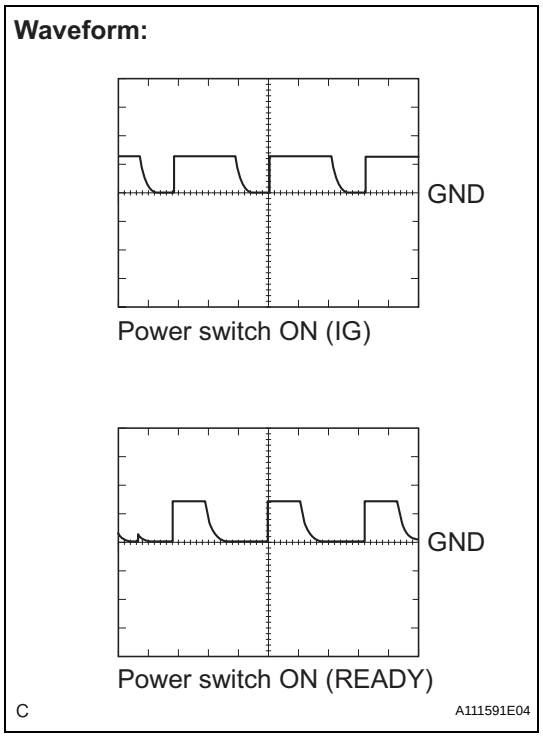
NG → **GO TO DTC B2275**

OK

13 INSPECT HYBRID VEHICLE CONTROL ECU (RDY SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the HV control ECU connector.
(2) Connect an oscilloscope to terminal E8-8 (RDY) and body ground.
(3) Turn the power switch on (IG).



(4) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	10 V/DIV., 10 ms./DIV.
Vehicle condition	Power switch on (IG) or on (READY)

OK:
The waveform is displayed as shown in the illustration.
HINT:
As the vehicle speed increases, the cycle of the signal waveform narrows.

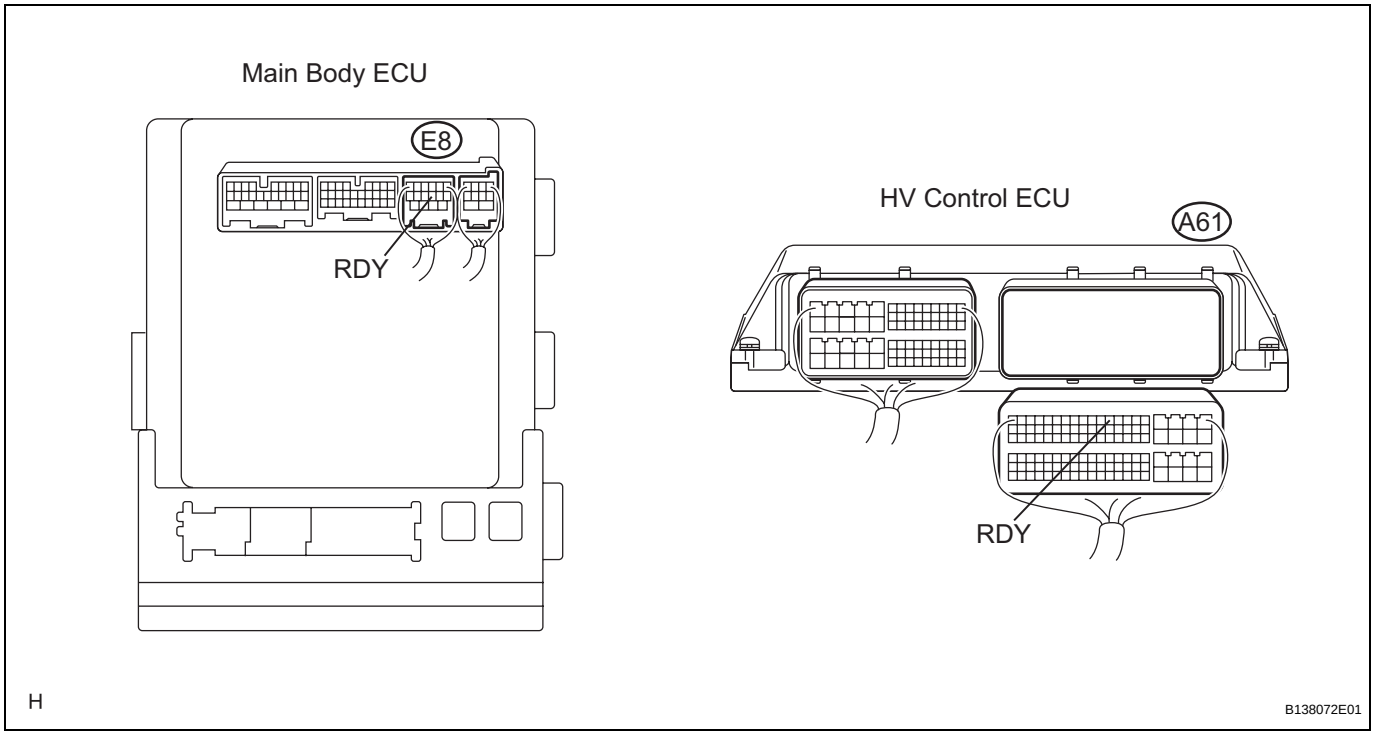
OK	Go to step 15

NG

14 CHECK WIRE HARNESS (MAIN BODY ECU - HV CONTROL ECU)

(a) Disconnect the E8 and A61 ECU connectors.

ST



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (RDY) - A61-9 (RDY)	Always	Below 1 Ω
E8-8 (RDY) or A61-9 (RDY) - Body ground	Always	10 kΩ or higher

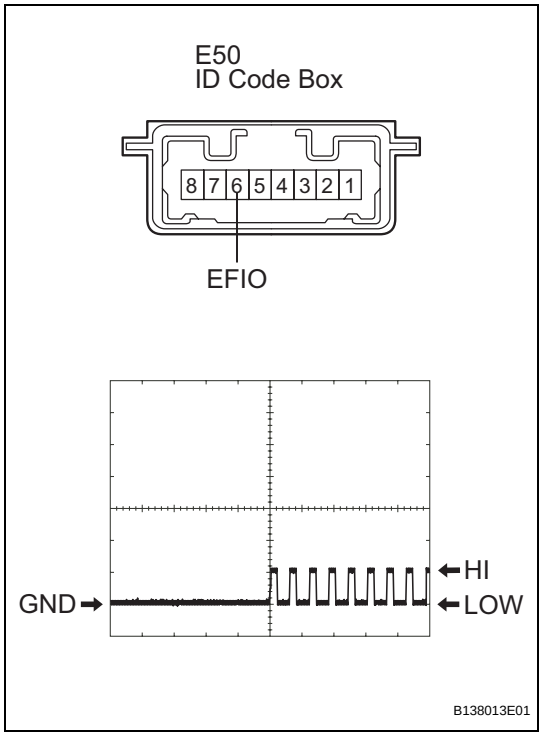
ST

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

OK

REPLACE HYBRID VEHICLE CONTROL ECU

15	INSPECT ID CODE BOX



(a) Check the input signal waveform.
  (1) Connect an oscilloscope to terminal E50-6 (EFIO) and body ground.
  (2) Turn the power switch on (IG).
  (3) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	10 V/DIV., 100 ms./DIV.
Vehicle condition	Power switch on (IG)

NG → **REPLACE ID CODE BOX**

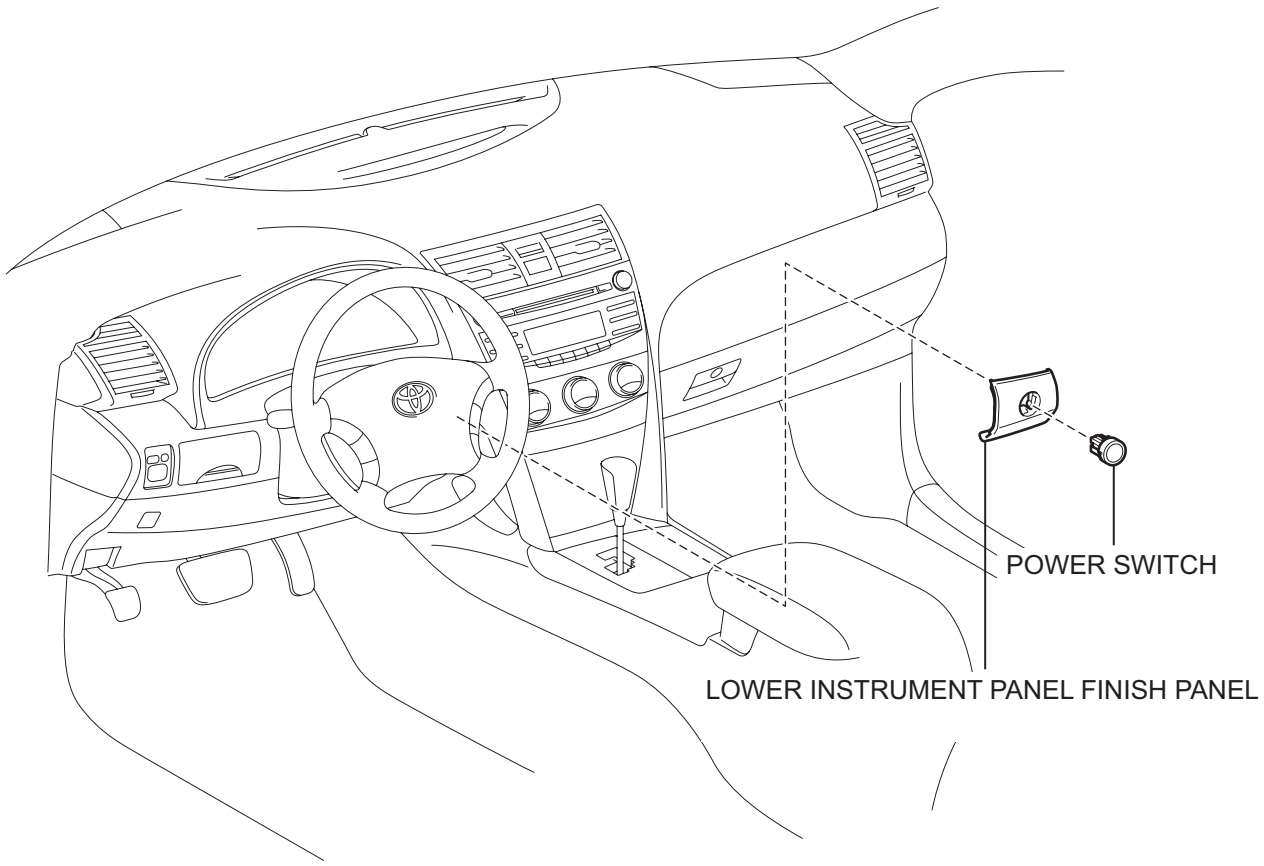
OK

REPLACE MAIN BODY ECU

ST

POWER SWITCH

COMPONENTS



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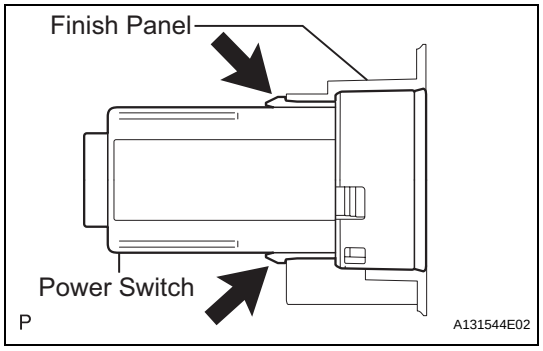
REMOVAL

1. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)**

2. **REMOVE POWER SWITCH**
   (a) Detach the 2 claws and remove the power switch from the finish panel.

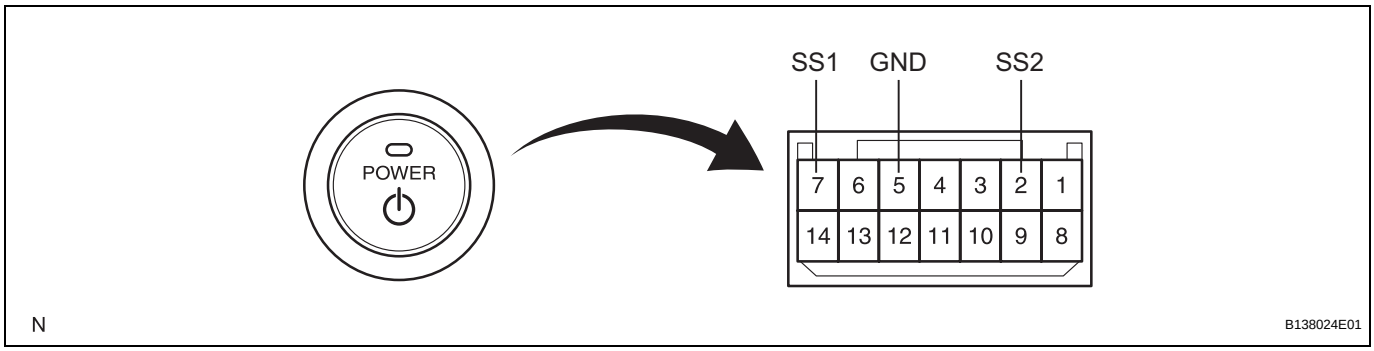


ST

INSPECTION

1. INSPECT POWER SWITCH

(a) Measure the resistance according to the value(s) in the table below.



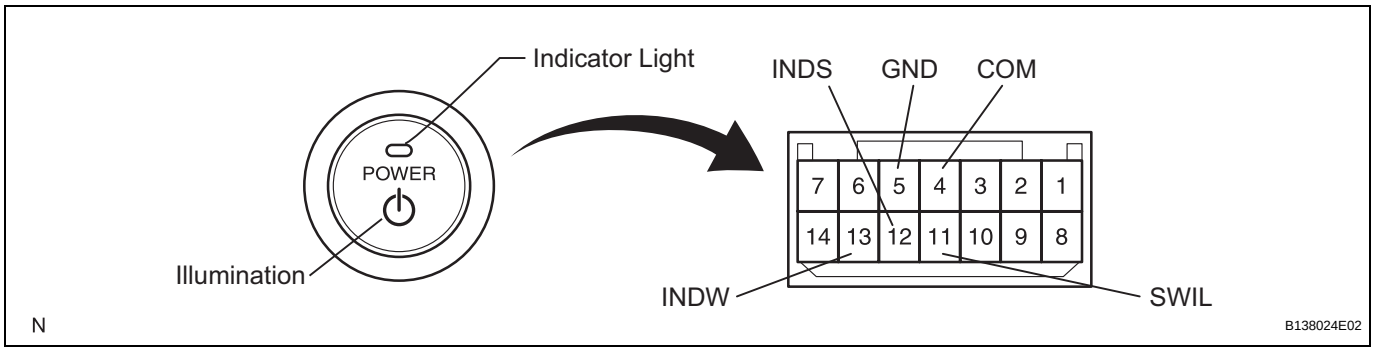
Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

If the result is not as specified, replace the power switch.

(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

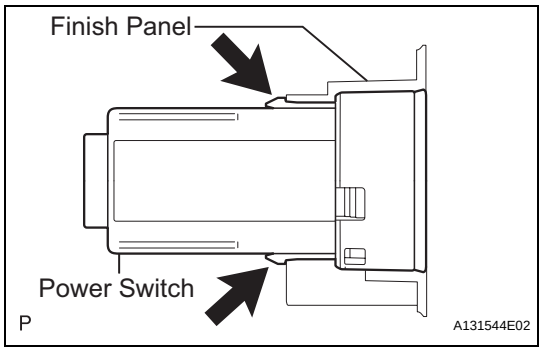
ST



Standard resistance

Measurement Condition	Specified Condition
Battery positive (+) →Terminal 11 (SWIL) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) →Terminal 12 (INDS) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) →Terminal 13 (INDW) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates

If the result is not as specified, replace the power switch.



INSTALLATION

1. **INSTALL POWER SWITCH**
   (a) Attach the 2 claws to install the power switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)**