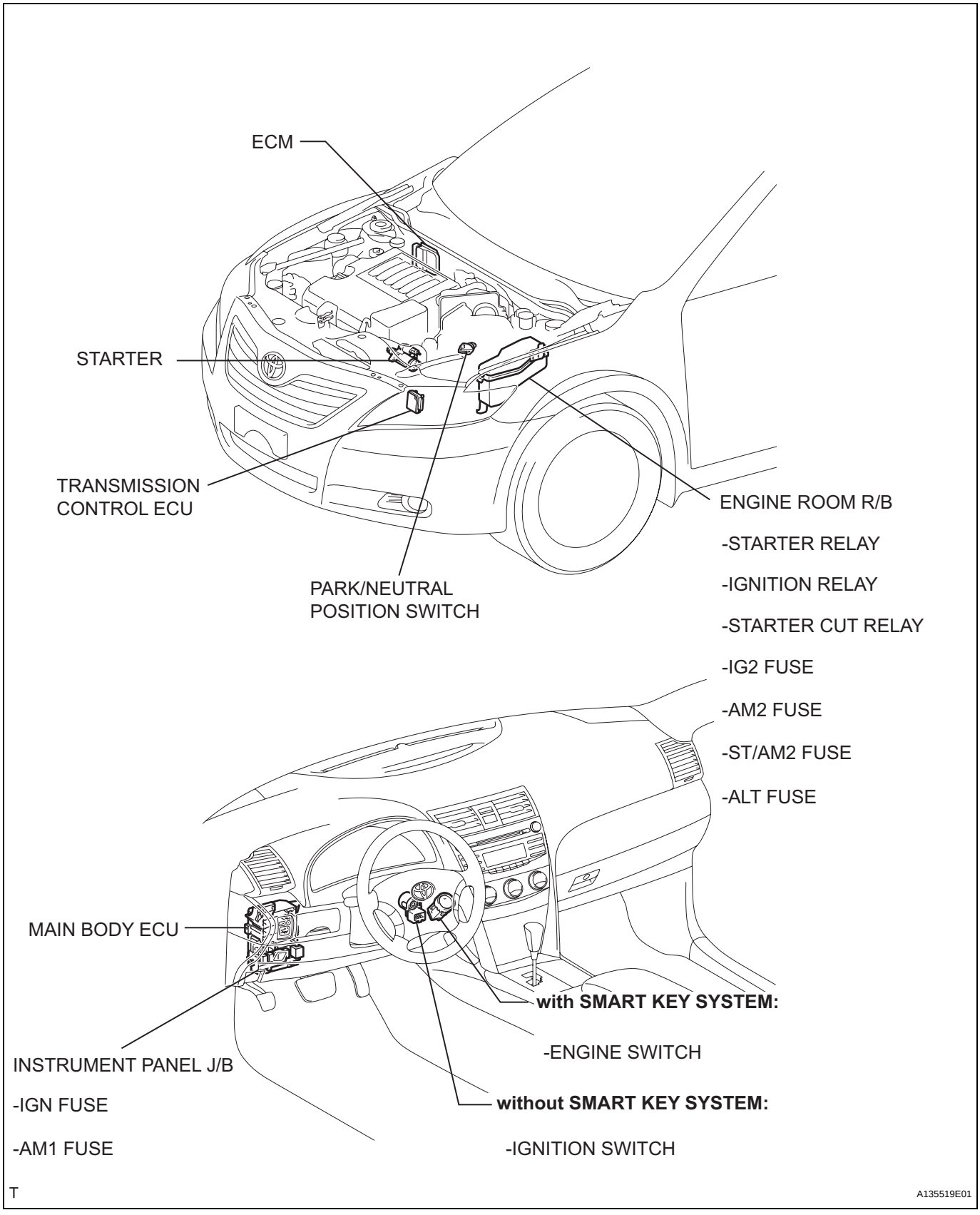
STARTING SYSTEM

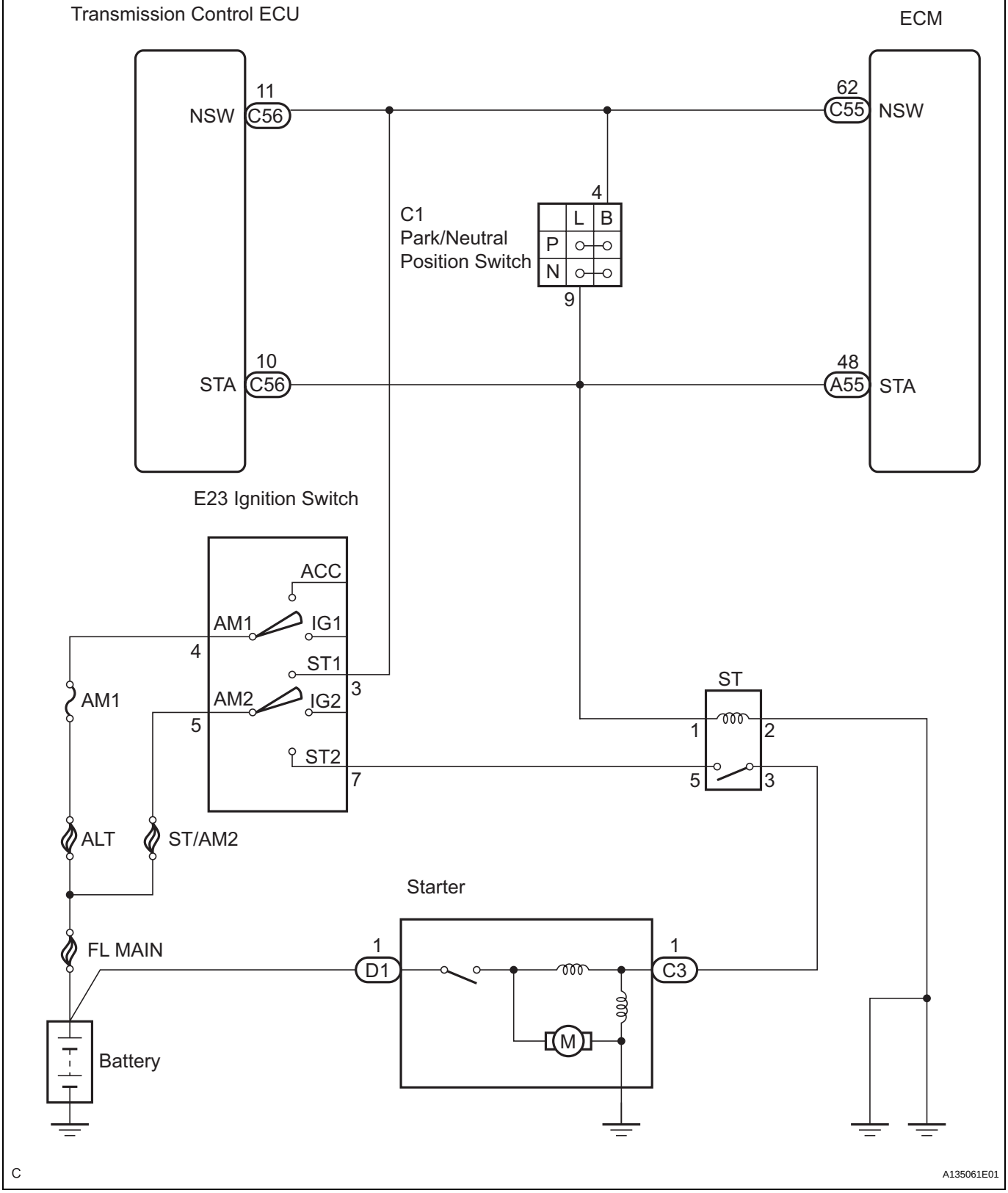
PARTS LOCATION



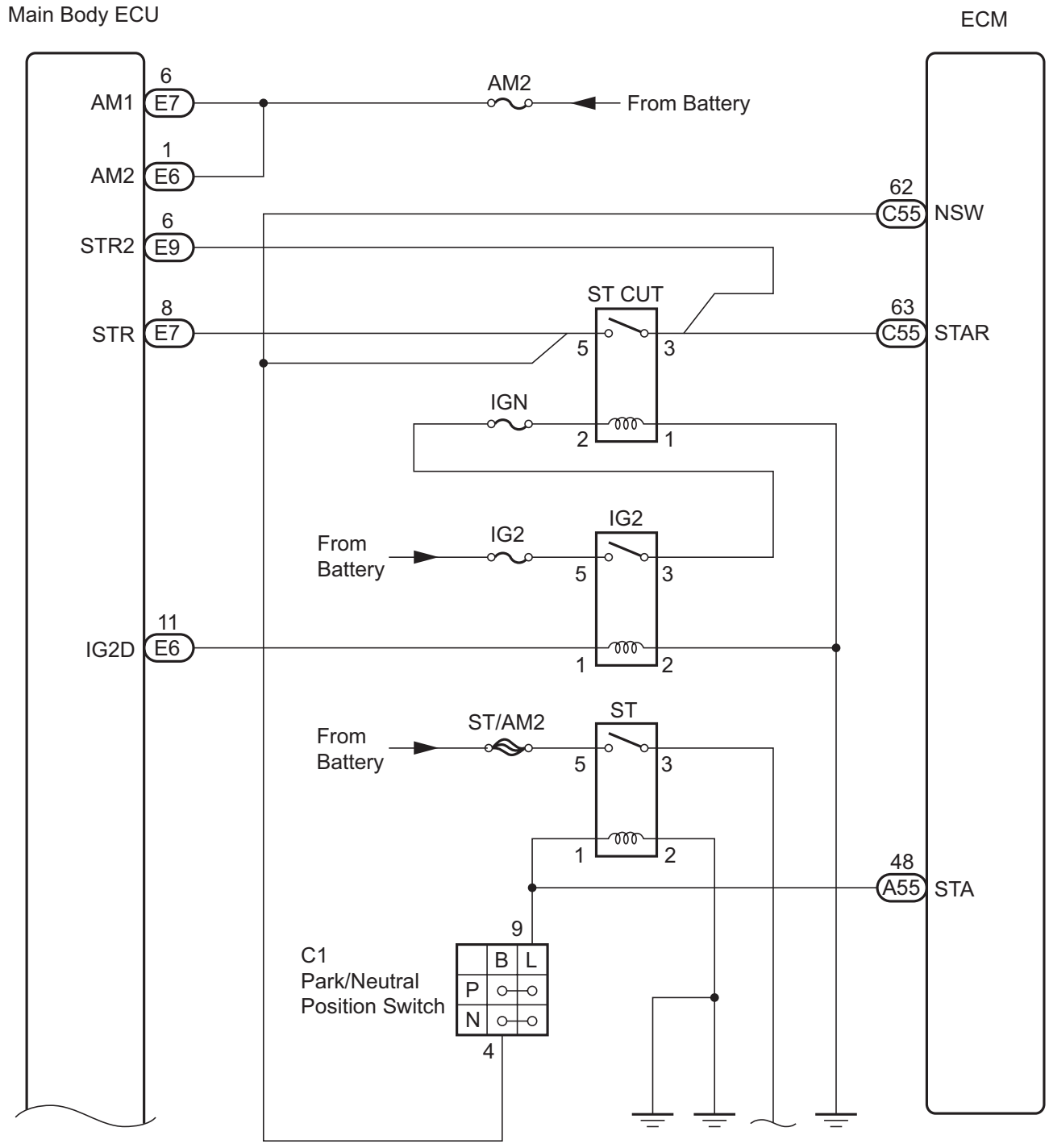
ST

SYSTEM DIAGRAM

without Smart Key System:



with Smart Key System:



C

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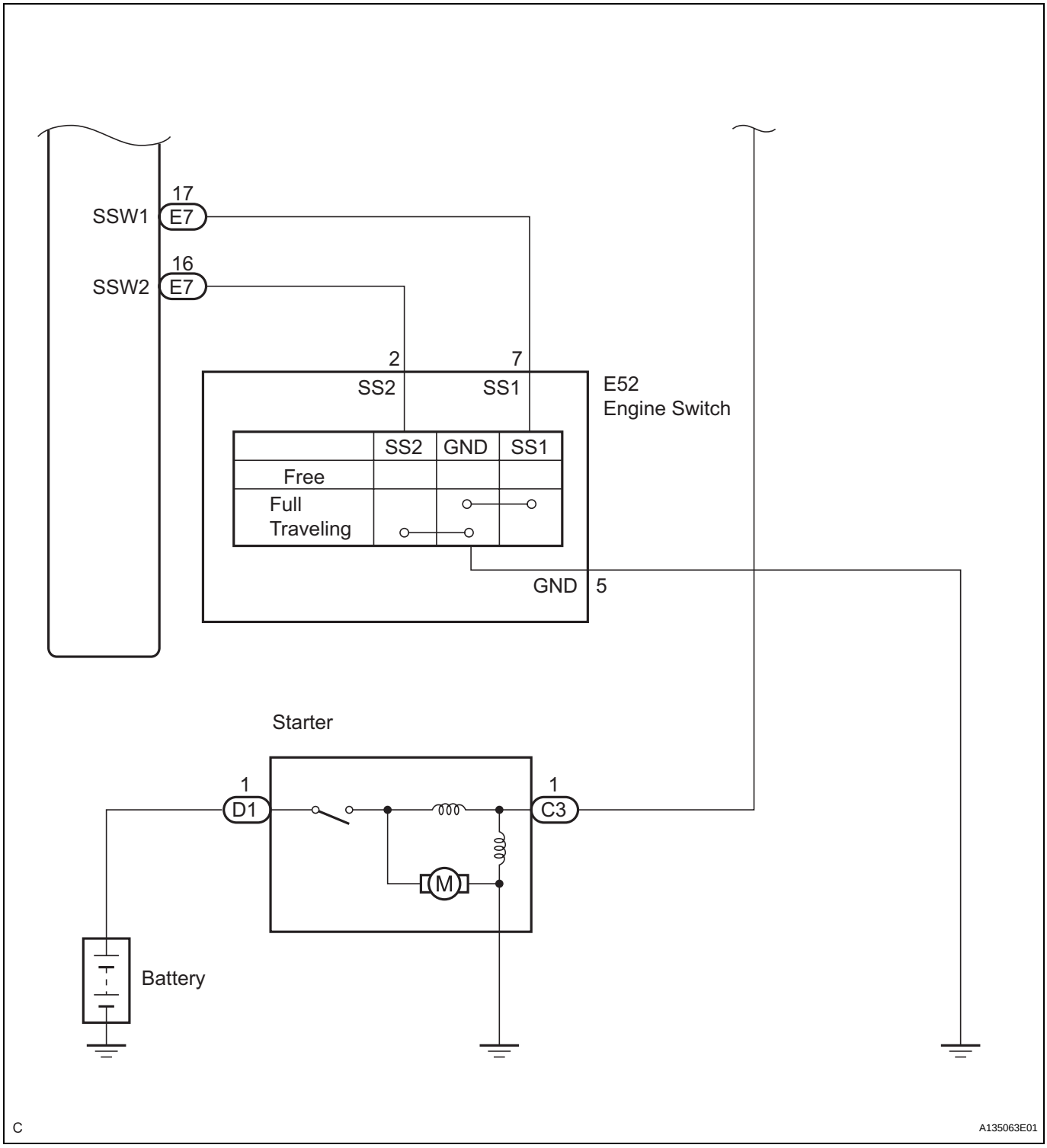
ST


17
SSW1
E7
16
SSW2
E7
2
SS2
7
SS1
E52
Engine Switch
SS2
GND
SS1
Free
Full
Traveling
GND
5
Starter
1
D1
1
C3
M
Battery
C
A135063E01

SMART KEY SYSTEM

PRECAUTION

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

2. PRECAUTIONS FOR PUSH-BUTTON START FUNCTION:

(a) Before starting the engine, firmly depress the brake pedal until the indicator in the engine 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 engine 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.

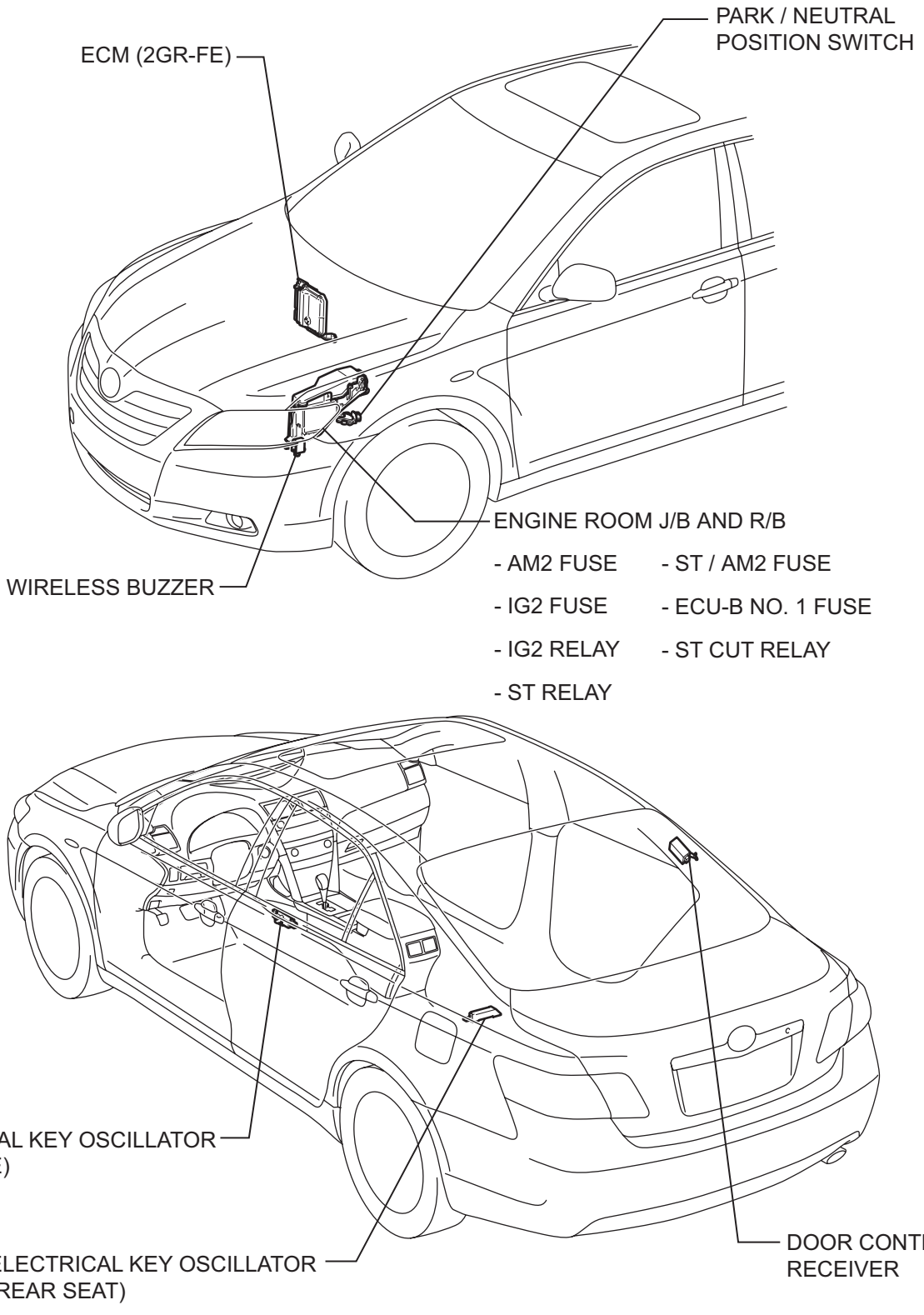
(c) After the battery is reconnected, be sure to wait 10 seconds or more before attempting to start the engine. The engine may not start immediately after the battery is reconnected.

(d) If the electrical key is held near the engine switch to start the engine 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.

PARTS LOCATION



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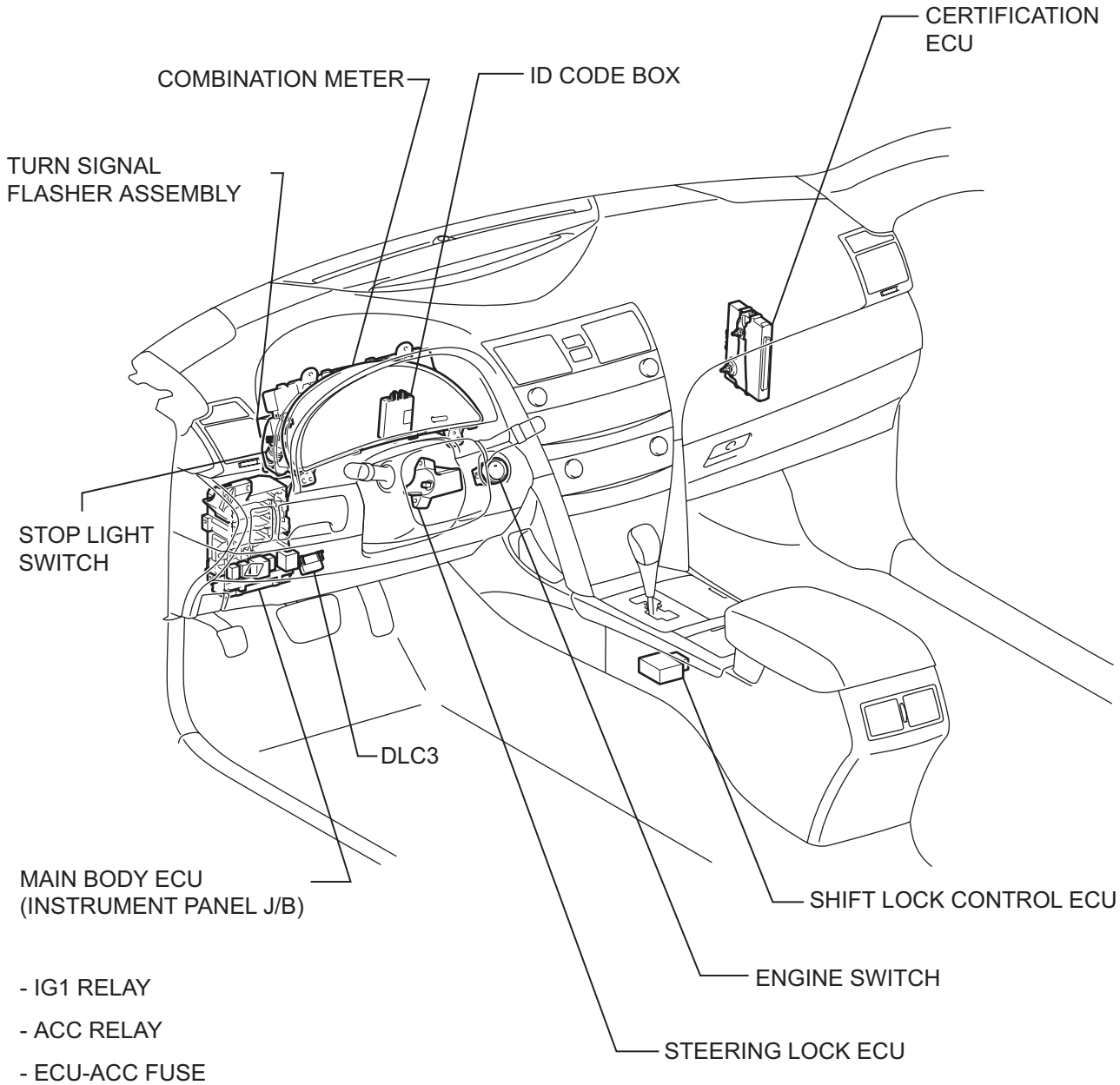
CERTIFICATION ECU
COMBINATION METER
ID CODE BOX
TURN SIGNAL FLASHER ASSEMBLY
STOP LIGHT SWITCH
DLC3
MAIN BODY ECU (INSTRUMENT PANEL J/B)
SHIFT LOCK CONTROL ECU
ENGINE SWITCH
STEERING LOCK ECU
- IG1 RELAY
- ACC RELAY
- ECU-ACC FUSE
- ECU IG NO. 1 FUSE
- DOOR NO. 2 FUSE
H
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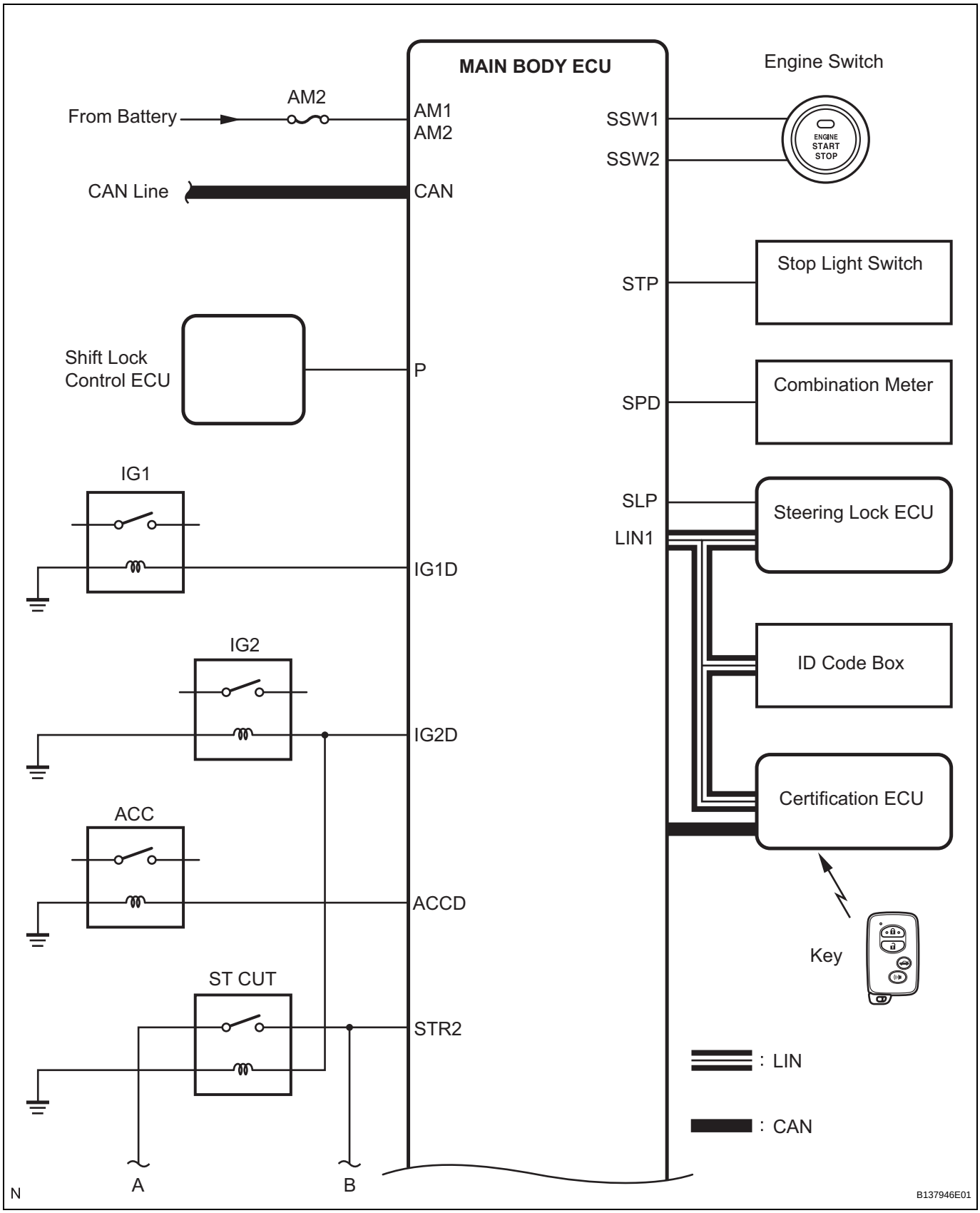
ST

SYSTEM DIAGRAM



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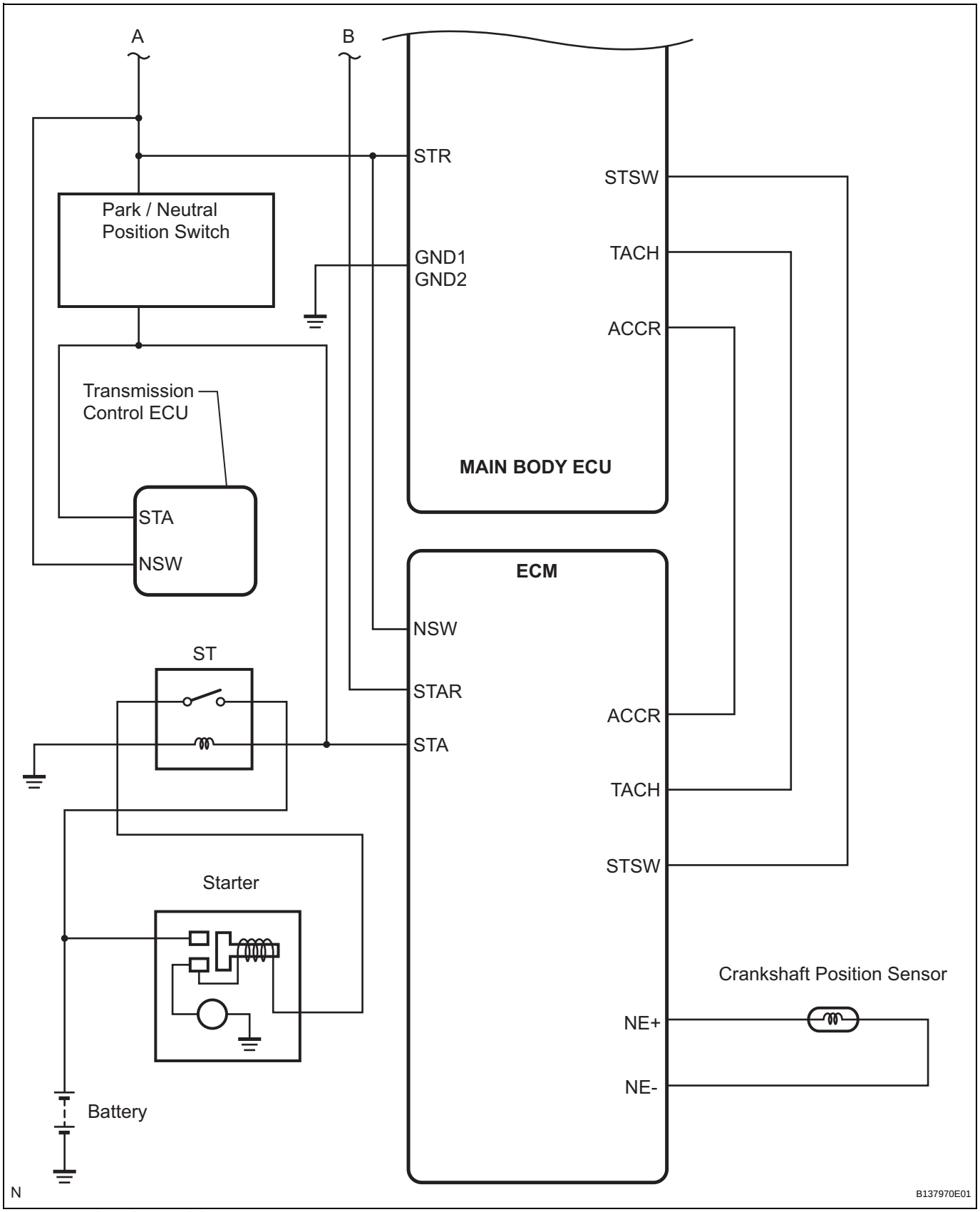


Communication table:

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

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
ECM	Main body ECU	Starter signal	CAN
		Shift position signal	
		Engine revolution speed 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
Main body ECU	Combination meter	Wireless door lock buzzer request signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
Certification ECU	Driver seat ECU	Memory call replay 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	CAN/Local communication
Certification ECU	Main body ECU	Key ID matching request signal	LIN
Main body ECU	Certification ECU	ID required signal	LIN

SYSTEM DESCRIPTION

1. PUSH-BUTTON START FUNCTION DESCRIPTION

(a) The push-button start function uses a push-type engine switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the main body ECU, engine 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.

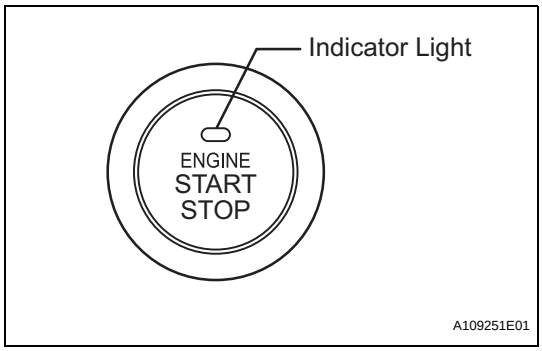
2. FUNCTION OF COMPONENT

Component	Function
Engine Switch • Transponder Key Amplifier	• Transmits engine 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 entry 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.
Entry 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), start) in accordance with shift position and state of stop light switch. • Controls push-button start function in accordance with signals received from switches and each ECU.
Certification ECU	Certifies ID code received from entry door control receiver and transmits certification results to ID code ECU and steering lock 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 ECM.
ECM	• Receives engine start request signal from main body ECU, turns ON ST relay, and starts engine. • Receives signal from ID code ECU and performs engine ignition and injection.

3. SYSTEM FUNCTION

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

Control	Outline
Engine switch control	• When driver operates engine 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 main body ECU. • ID code box verifies check results received from certification ECU via LIN and sends them to main body ECU. Based on these results, main body ECU authorizes operation of engine switch.
Diagnosis	When main body ECU detects malfunction, main body ECU diagnoses and memorizes failed section.



4. CONSTRUCTION AND OPERATION

(a) Engine Switch

The engine 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 engine 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 engine stopped in this state, it may not be possible to restart it.

(b) Indicator Light Condition

Engine switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	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 engine 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 engine 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.

ST

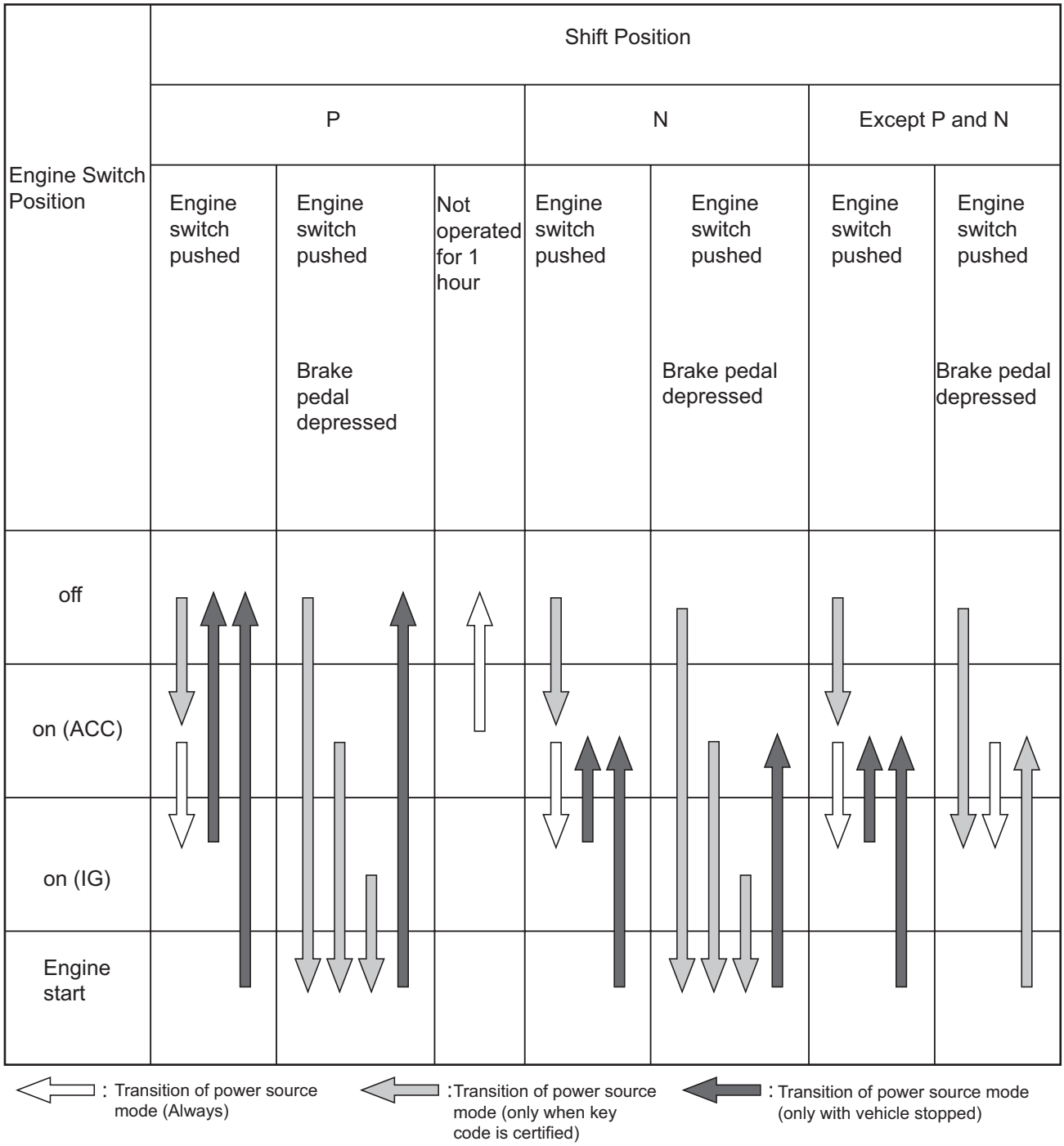
Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N position	When the engine switch is pushed once. • off → engine start • on (ACC) → engine start • on (IG) → engine start
Not depressed	P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → off
	Except P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → on (ACC)

Brake Pedal	Shift Lever	Power Source Mode Pattern
-	P position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → off
-	Except P position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → on (ACC)

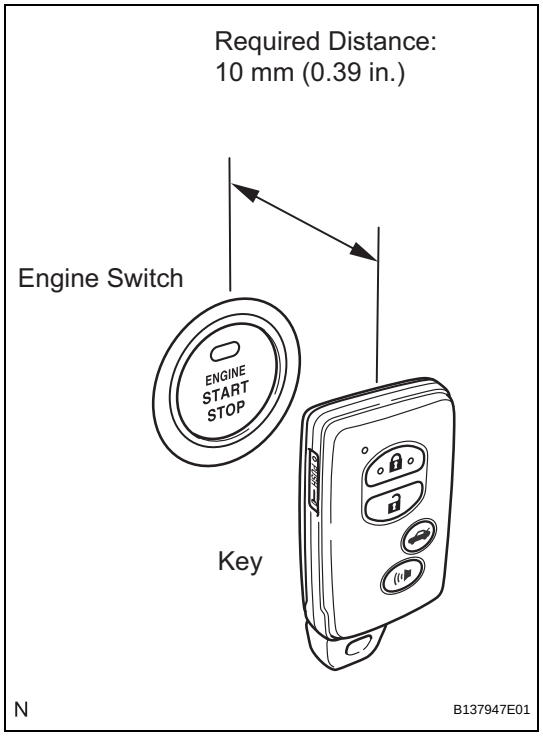
When the battery of the key is low, the push-button start function can be operated by holding the key against the engine switch.

- After approximately 1 hour has passed with the engine 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:



HINT:
While the vehicle is being driven normally, operation of the engine switch is disabled. However, if the engine must be stopped in an emergency while the vehicle is being driven, pressing the engine switch for 3 seconds or more stops the engine. Power source mode changes from start 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 engine 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 engine 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 engine 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 engine 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.

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

ST

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-8).

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-26).
(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

6 INSPECT BASIC OPERATION

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

ST

B → Go to step 9

A

8	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page ST-19)
(b) DATA LIST/ACTIVE TEST (See page ST-26)

NEXT

9	REPAIR OR REPLACE

NEXT

10	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to the system before inspecting the suspected areas below.

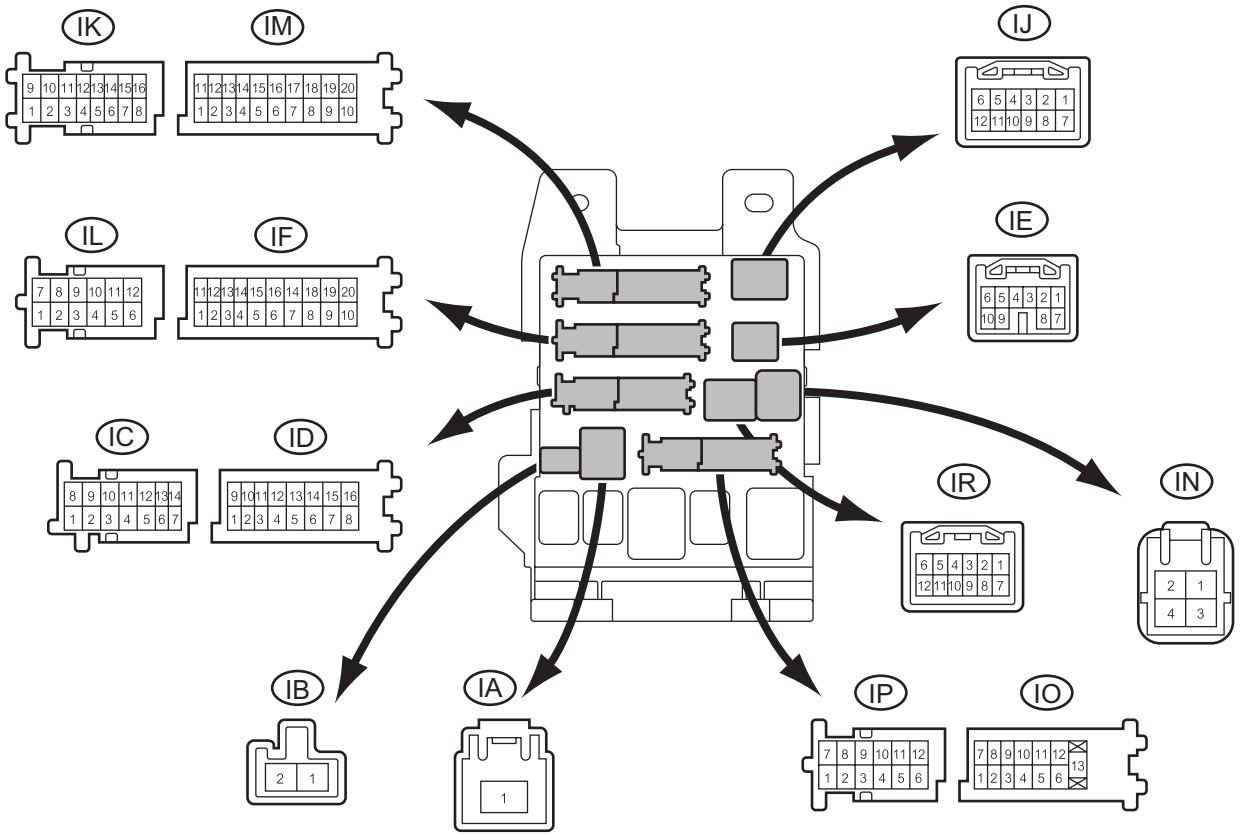
PUSH-BUTTON START FUNCTION:

Symptom	Suspected area	See page
Power does not turn on (neither ACC nor IG is possible).	1. AM2 Fuse	ST-114
	2. Engine Switch	-
	3. Wire Harness or Connector	-
	4. Main Body ECU (Instrument Panel J/B)	-
	5. Certification ECU	-
	6. ID Code Box	-
	7. Steering Lock ECU	-
	8. Smart Key System (Entry Function)	-
Power is not turned on (only ACC is not turned on).	1. AM2 Fuse	ST-131
	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-122
	2. IG1 Relay	-
	3. IG2 Relay	-
	4. Wire Harness or Connector	-
	5. Main Body ECU (Instrument Panel J/B)	-
Engine does not start.	1. Main Body ECU (Instrument Panel J/B)	ST-95
	2. Certification ECU	-
	3. Shift Lock Control ECU	-
	4. ID Code Box	-
	5. Stop SW Fuse	-
	6. Stop Light Switch	-
	7. Electrical Steering Lock Function	-
	8. Engine Control System	-
	9. Engine Immobiliser System	-
	10. Wire Harness or Connector	-
Engine switch indicator light does not come on.	Engine Switch Indicator Light Circuit	ST-110

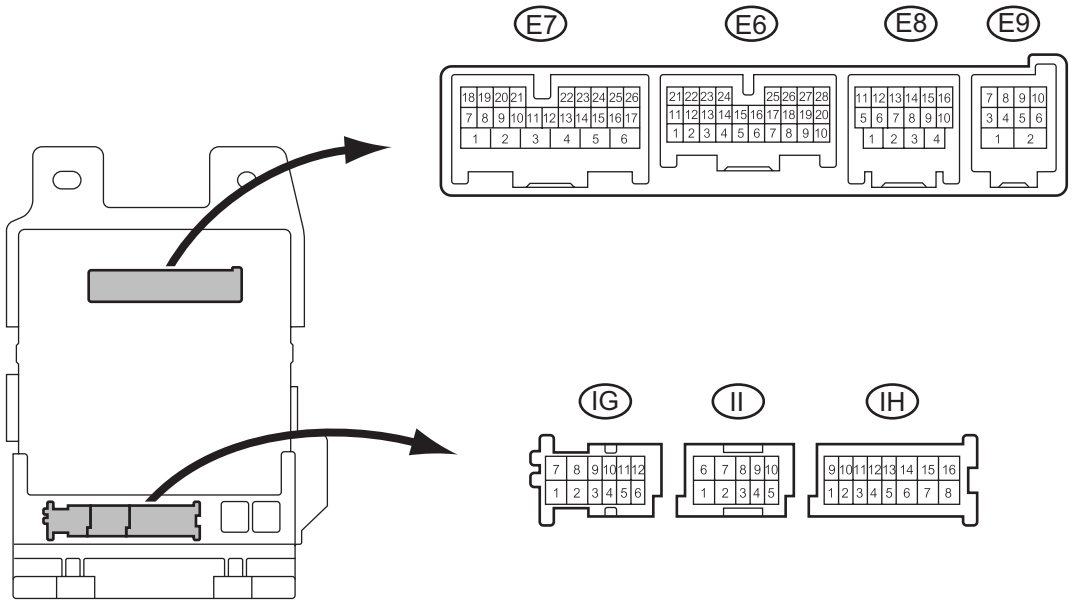
TERMINALS OF ECU

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

Front Side:



Back Side:



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

ST

(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	Engine switch signal	Engine switch pushed	Below 1 Ω
SSW1 (E7-17) - Body ground	L - Body ground	Engine switch signal	Engine switch not pushed	10 kΩ or higher
SSW2 (E7-16) - Body ground	V - Body ground	Engine switch signal	Engine switch pushed	Below 1 Ω
SSW2 (E7-16) - Body ground	V - Body ground	Engine switch signal	Engine 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	L - Body ground	CAN Line	Always	10 kΩ or higher
CANH (E8-5) - Body ground	R - Body ground	CAN Line	Always	10 kΩ or higher
CANL (E8-6) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
ACC (IA-1) - Body ground	B - Body ground	ACC power supply	Always	10 to 14 V
IG (IA-1) - Body ground	B - Body ground	IG power supply	Always	10 to 14 V

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
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Engine 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	Engine switch off	Below 1 V
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Engine 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	Engine switch on (ACC)	Below 1 V
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Engine 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	Engine 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	Engine switch on (IG), rotate rear wheel slowly	Pulse generation (See waveform 1)
TACH (E8-8) - GND3 (E8-1)	B - W-B	Tachometer signal	Engine running	Pulse generation (See waveform 2)

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	Output voltage at terminal AM1 or AM2 is -2 V or more.
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever not P position	Below 1 V
ACCR (E6-3) - GND3 (E8-1)	P - W-B	Starter assist signal	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V *1 → Output voltage at terminal AM1 or AM2 is -2 V or more.
STSW (E9-4) - GND3 (E8-1)	GR - W-B	Starter activation request signal	Brake pedal depressed, engine switch held on (ST)	Output voltage at terminal AM1 or AM2 is -2 V or more.
STR (E7-8) - GND3 (E8-1)	G - W-B	Park/neutral position switch	Shift lever P or N position	Below 1 V
STR2 (E9-6) - GND3 (E8-1)	V - W-B	Starter signal	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	Output voltage at terminal AM1 or AM2 is -3.5 V or more. *2
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	Brake pedal depressed, shift lever P position, engine 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.

HINT:

*1: Voltage is output only when the engine is cranking.

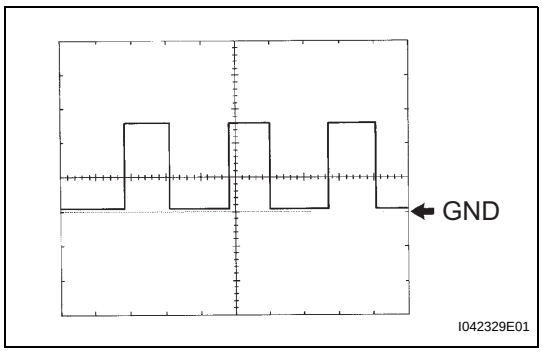
*2: Voltage is output for 0.3 seconds when the engine is cranking to start. Disconnect the C55 connector from the ECM before measuring the voltage.

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

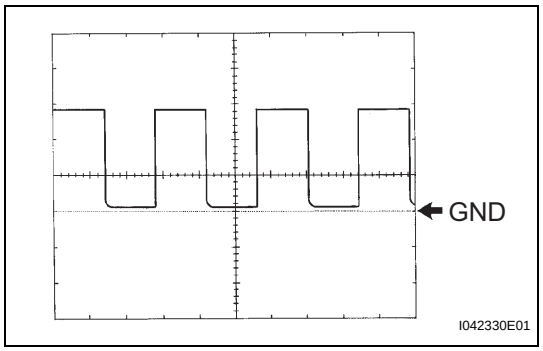
Waveform 1 (Reference):



Terminal No.	E8-9 (SPD) - Body ground
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.

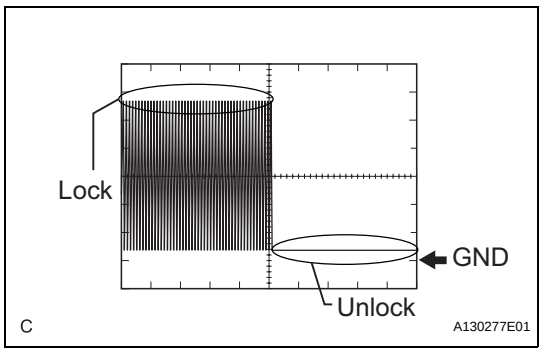


(2) Waveform 2

Waveform 2 (Reference):

Terminal No.	E8-8 (TACH) - Body ground
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

HINT:
As the engine revolution speed increases, the wavelength shortens.

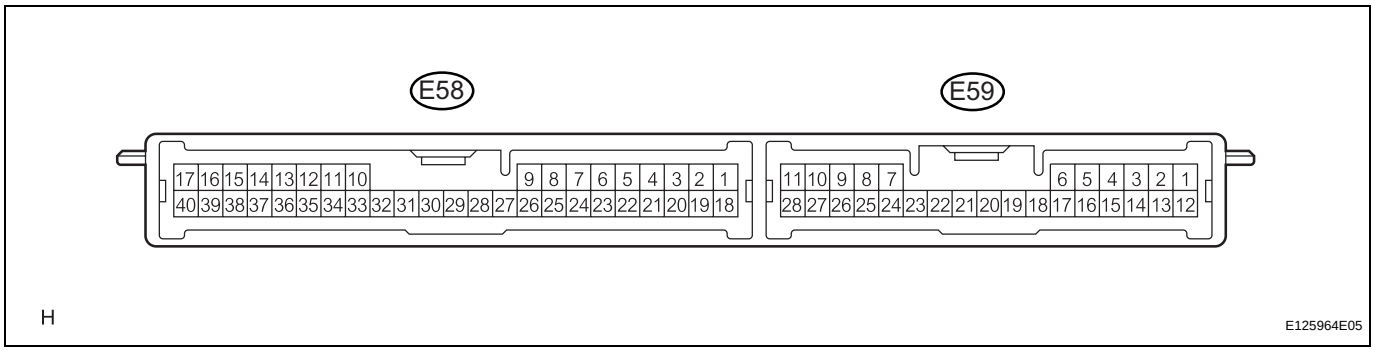


(3) Waveform 3

Waveform 3 (Reference):

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

2. CHECK CERTIFICATION ECU

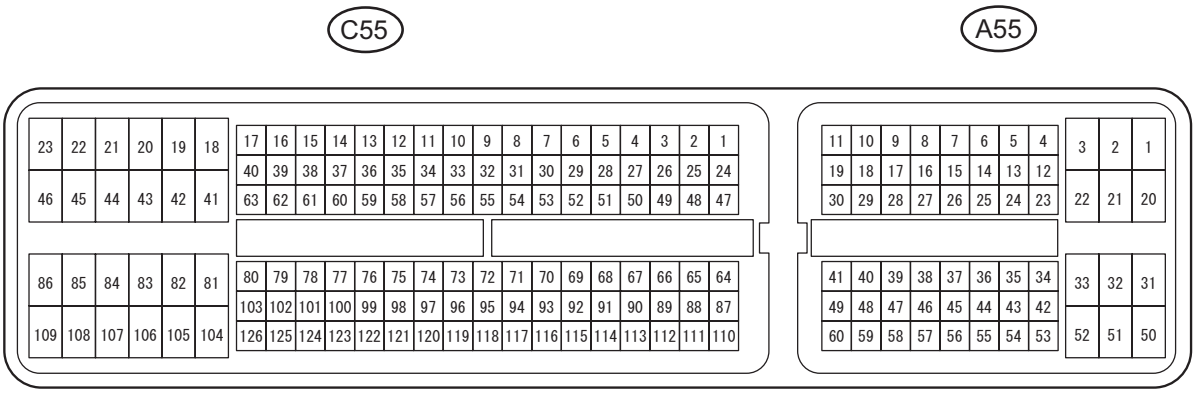


(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

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
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch on (IG)	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch off	Below 1 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.

3. CHECK ECM



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(a) Disconnect the C55 and A55 ECM connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (A55-2) - Body ground	R - Body ground	Power source of ECM	Engine switch on (IG)	10 to 14 V
+B2 (A55-1) - Body ground	R - Body ground	Power source of ECM	Engine switch on (IG)	10 to 14 V
IGSW (A55-28) - Body ground	Y - Body ground	Ignition switch signal	Engine switch on (IG)	10 to 14 V
E01 (C55-22) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C55-21) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E03 (C55-104) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C55-23) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E05 (C55-46) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E1 (C55-81) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ME01 (C55-20) - Body ground	B - Body ground	Ground	Always	Below 1 Ω

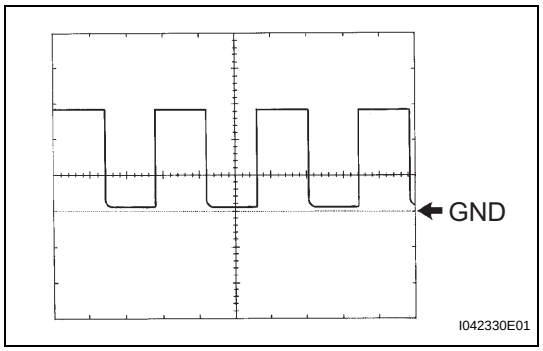
If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the ECM connectors.
(d) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STA (A55-48) - E1 (C55-81)	V - W-B	Starter relay operation signal	Cranking	10 to 14 V
ACCR (A55-13) - E1 (C55-81)	B - W-B	ACC relay cut signal (output)	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V *1 → Output voltage at terminal AM1 or AM2 is -2 V or more.
TACH (A55-15) - E1 (C55-81)	B - W-B	Engine revolution signal (output)	Idling	Pulse generation (see waveform 1)
STP (A55-36) - E1 (C55-81)	W - W-B	Stop light switch signal (input)	Brake pedal depressed	7.5 to 14 V
STP (A55-36) - E1 (C55-81)	W - W-B	Stop light switch signal (input)	Brake pedal released	Below 1.5 V
STAR (C55-63) - E1 (C55-81)	R - W-B	PNP switch signal (input)	Engine switch on (IG), shift position P or N	10 to 14 V

HINT:
*1: Voltage is output only when the engine is cranking.

ST

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



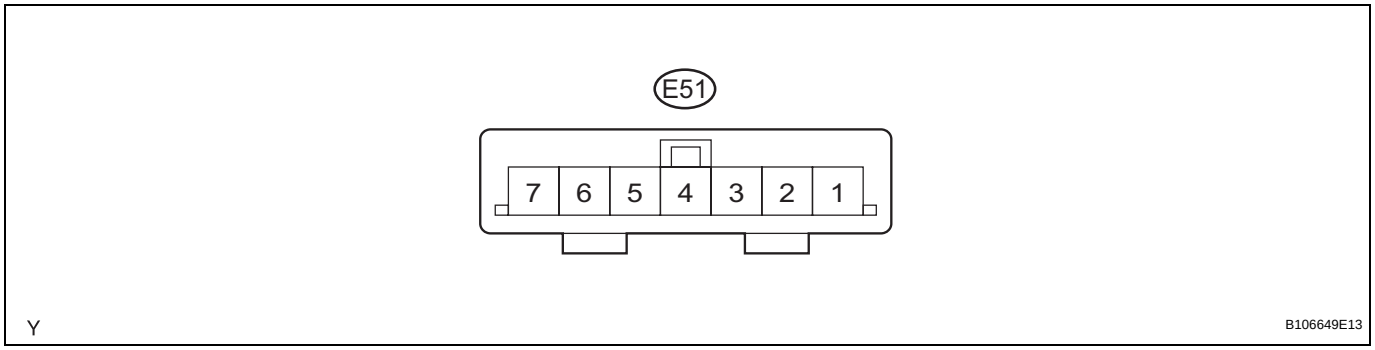
(e) Using an oscilloscope, check the signal waveform of the ECM.

Waveform 1 (Reference):

Terminal No.	A55-15 (TACH) - C55-81 (E1)
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

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

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	Engine switch on (IG)	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Engine 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.

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.

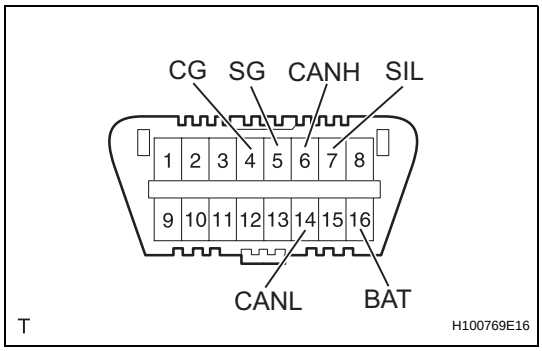
DIAGNOSIS SYSTEM

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.

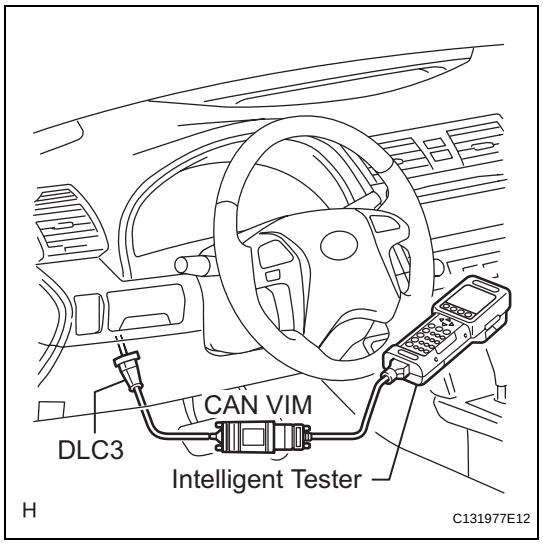
2. CHECK DLC3

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	Engine Switch OFF*	56 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Engine Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine 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 engine 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.



HINT:
Connect the cable of the intelligent tester to the DLC3, turn the engine 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.

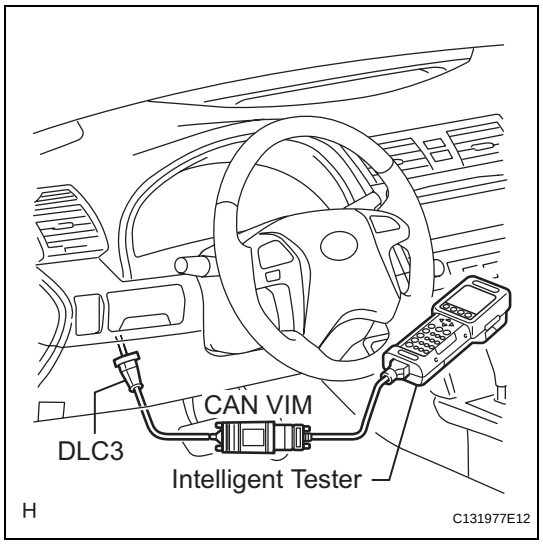
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's 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 engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / 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 engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / 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.

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 engine 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 engine switch on (IG).

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

(d) Read the DATA LIST.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC SW	Engine switch on (ACC) / ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
IG SW	Engine switch on (IG) / ON or OFF	ON: Engine switch on (IG) OFF: Engine 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 OFF: Steering is locked	-
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: Engine switch is pushed OFF: Engine switch is not pushed	-
START SW2	Start switch 2 / ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-
N SW / C SW	Neutral start switch / ON or OFF	ON: Shift position is P or N OFF: Shift position is neither P nor N	-
RATCH CIRCUIT	Ratch circuit / ON or OFF	ON: Engine switch on (IG) or engine running OFF: Engine switch off or on (ACC)	-
IG1 RELAY MON1	IG1 outer relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG1 RELAY MON2	IG1 inner relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 RELAY MON1	IG2 outer relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 RELAY MON2	IG2 inner relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
ST RELAY MON	STARTER relay monitor / ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	Engine is cranking with engine switch on (IG) and shift lever in P or N

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ST REQUEST SIG	Starter request signal monitor / ON or OFF	ON: ST relay is ON OFF: ST relay is OFF	Engine switch pressed and held with shift lever in P or N
ACC RELAY MON	ACC relay monitor / ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
ACC CUT SIG	ACC relay cut signal / ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	-
E/G COND	Engine condition / STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-
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	-
READY SIG	Ready Signal / ON or OFF or Unknown		-
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 engine switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

Item	Test Details	Diagnostic Note
LIGHTING IND	Indicator for lighting ON / OFF	-
IND CONDITION	Engine 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 No.	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-31
B2272	Ignition 1 Monitor Malfunction	1. IG1 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-34
B2273	Ignition 2 Monitor Malfunction	1. IG2 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-39
B2274	ACC Monitor Malfunction	1. ACC relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-43
B2275	STSW Monitor Malfunction	1. ECM 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-48
B2276	ACCR Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. ECM 3. Wire harness or connector	ST-51
B2277	Detecting Vehicle Submersion	Main body ECU (Instrument panel J/B)	ST-54
B2278	Engine Switch Circuit Malfunction	1. Engine switch 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-55
B2281	"P" Signal Malfunction	1. Main body ECU (Instrument panel J/B) 2. Shift lock control ECU 3. Wire harness or connector	ST-60
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-63
B2283	Vehicle Speed Sensor Malfunction	1. 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-69
B2284	Brake Signal Malfunction	1. Stop light switch 2. CAN communication system 3. ECM 4. Main body ECU (Instrument panel J/B) 5 Wire harness or connector	ST-72
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-77
B2286	Runnable Signal Malfunction	1. CAN communication system 2. ECM 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-81

DTC No.	Detection Item	Trouble Area	See page
B2287	LIN Communication Master Malfunction	1. Main body ECU (Instrument panel J/B) 2. Certification ECU 3. Wire harness or connector	ST-85
B2288	Steering Lock Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-88
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-91

ON-VEHICLE INSPECTION

1. CHECK POWER SOURCE MODE CHANGE FUNCTION

(a) Check the function of the engine 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 or N Position	When the engine switch is pushed once. • off → engine start • on (ACC) → engine start • on (IG) → engine start
Not depressed	P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → off
	Except P Position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → off
-	Except P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → on (ACC)

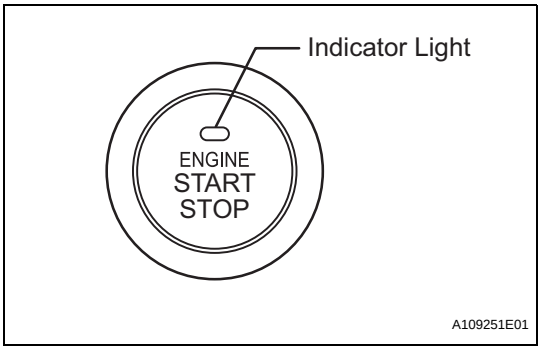
(b) Check if power source mode changes without pressing the engine switch.

(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 engine switch.

(1) Check that the engine 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 or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	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.

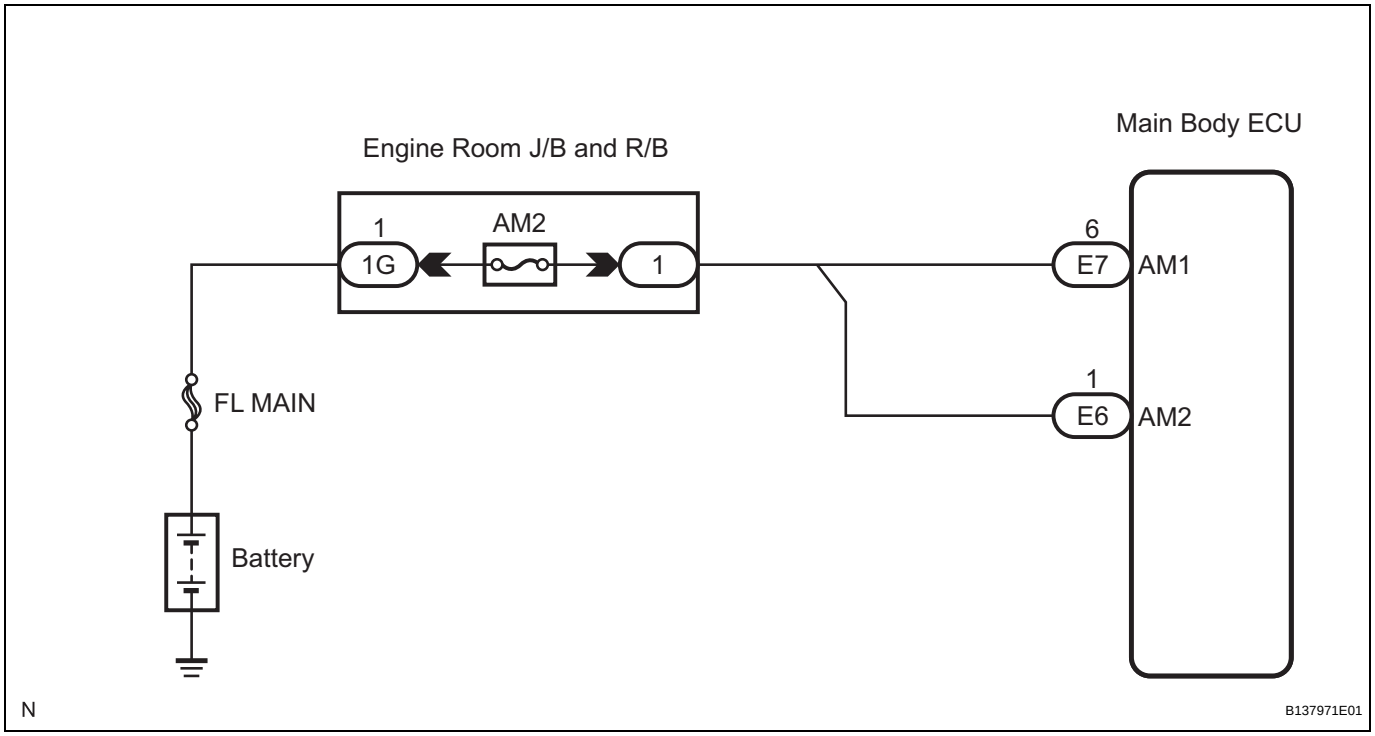
DTC	B2271	Ignition Hold Monitor Malfunction

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-8).

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



INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 6 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.

ST

OK:
No DTC is output.

NG → **Go to step 2**

OK ↓

CHECK INTERMITTENT PROBLEMS

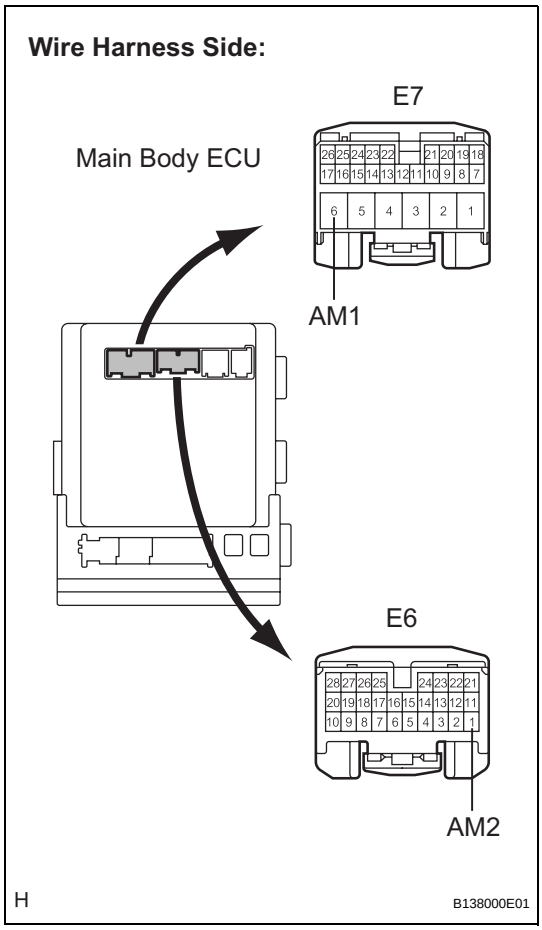
2 **INSPECT FUSE (AM2)**

(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**

ST

OK

REPLACE MAIN BODY ECU

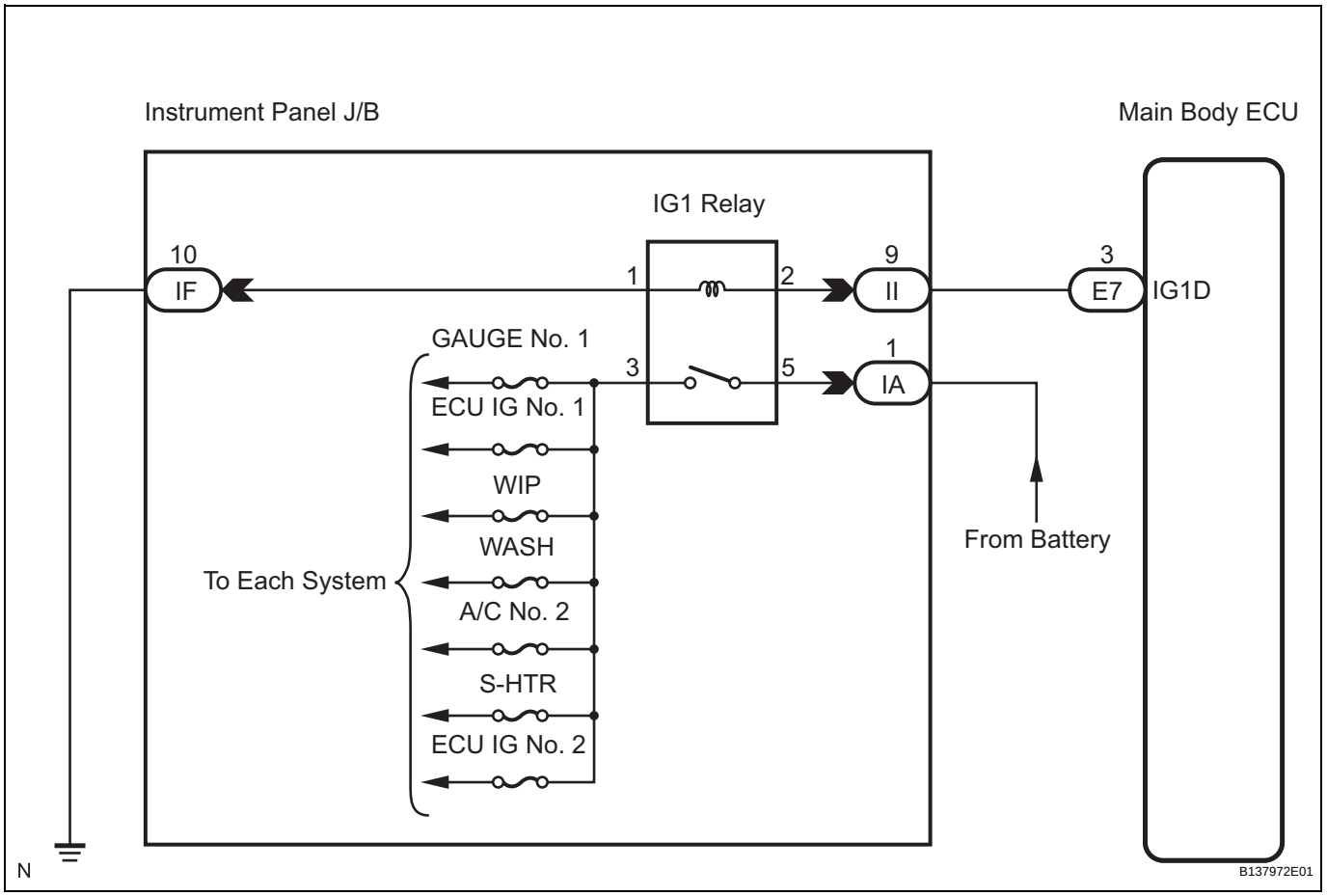
DTC	B2272	Ignition 1 Monitor Malfunction

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-8).

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



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the engine 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 engine 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: Engine switch on (IG) (IG1 relay is ON) OFF: Engine switch off (IG1 relay is OFF)	-

OK:
"OK" (engine switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK ↓

2	CHECK ENGINE SWITCH CONDITION

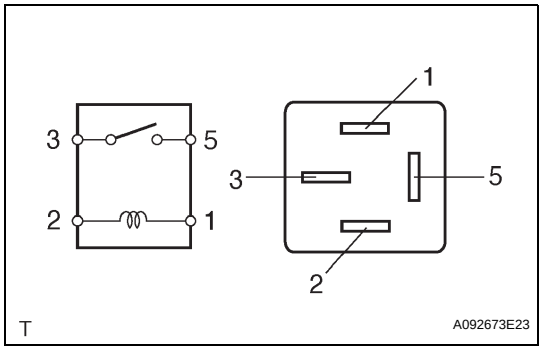
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).

NG → **GO TO OTHER PROBLEM**

OK ↓

ST

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

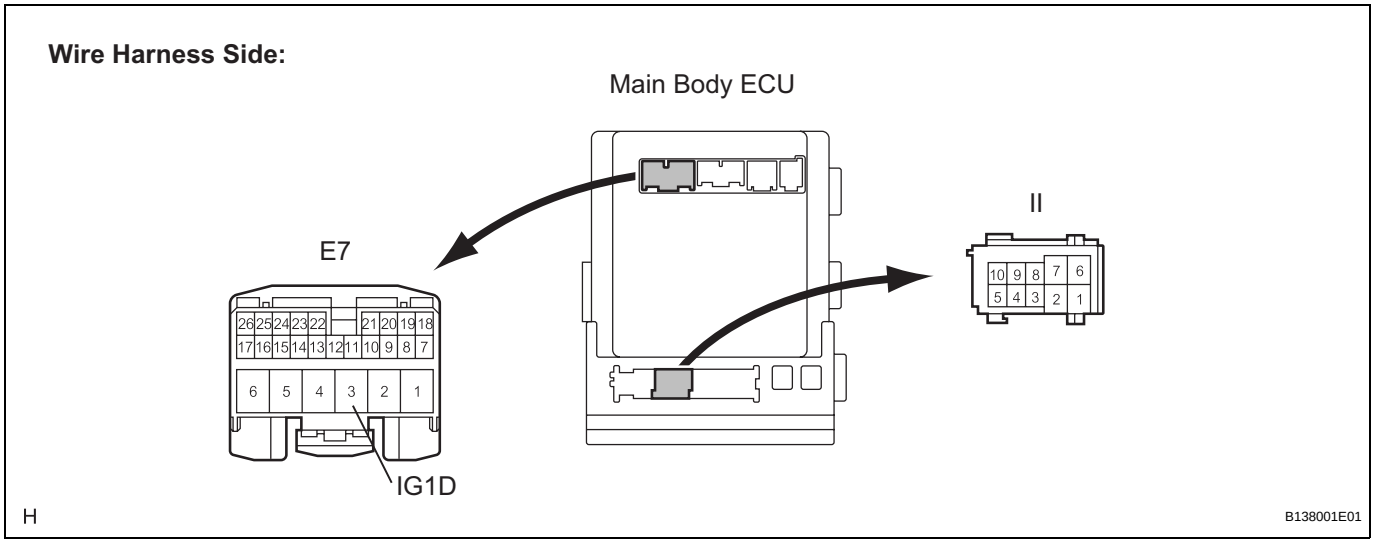
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

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

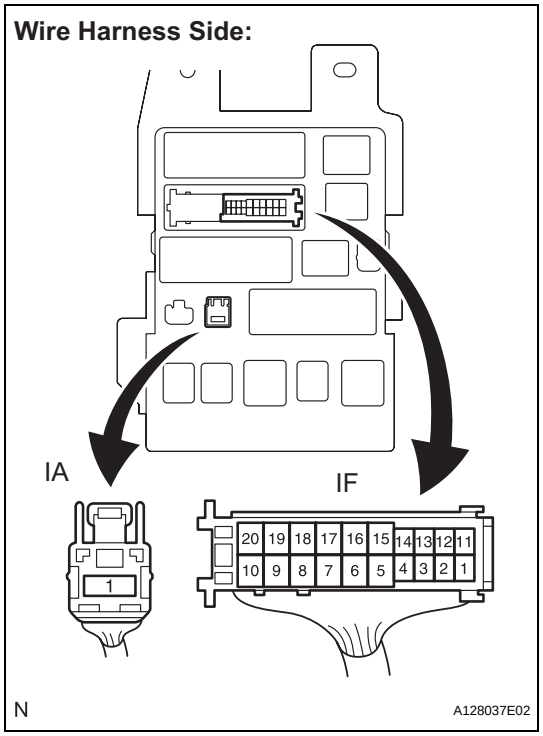
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

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

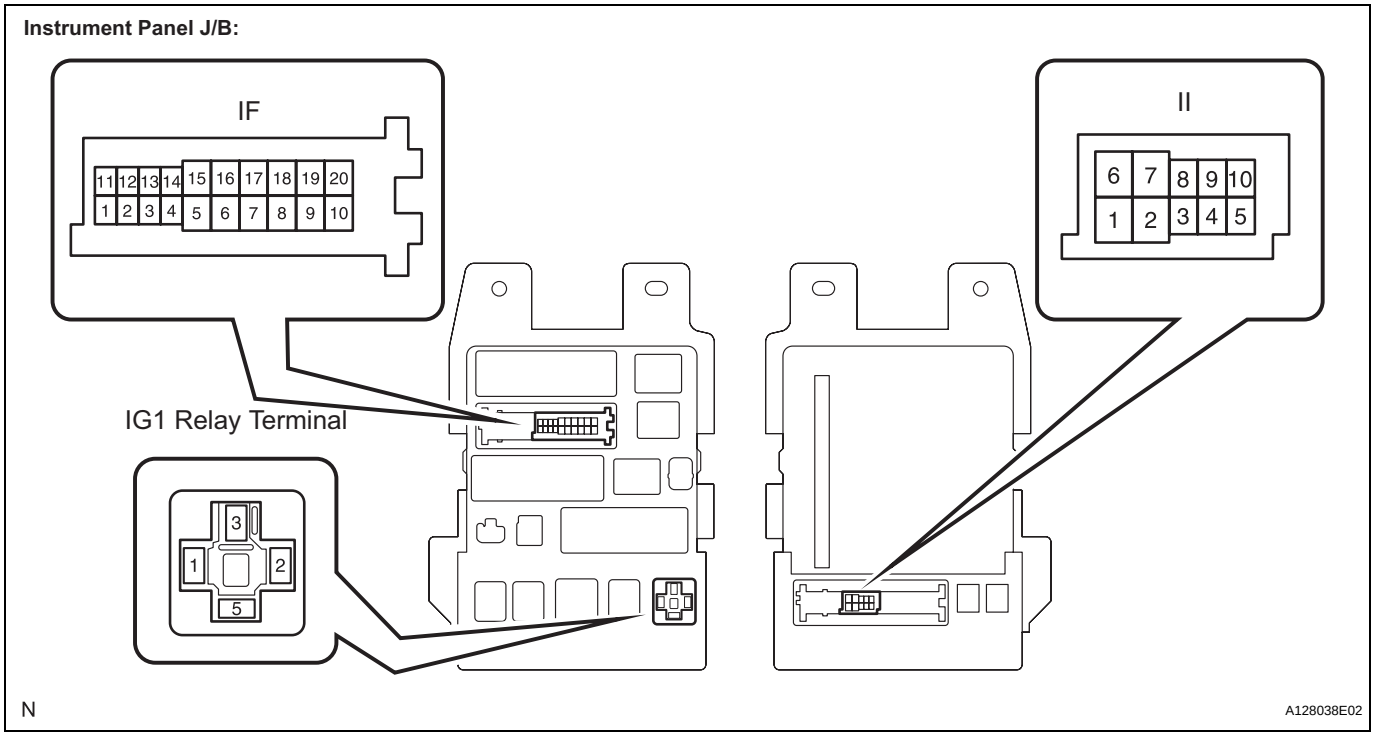
Terminal No.	Condition	Specified value
IA-1 - Body ground	Always	10 to 14 V

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.



ST

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

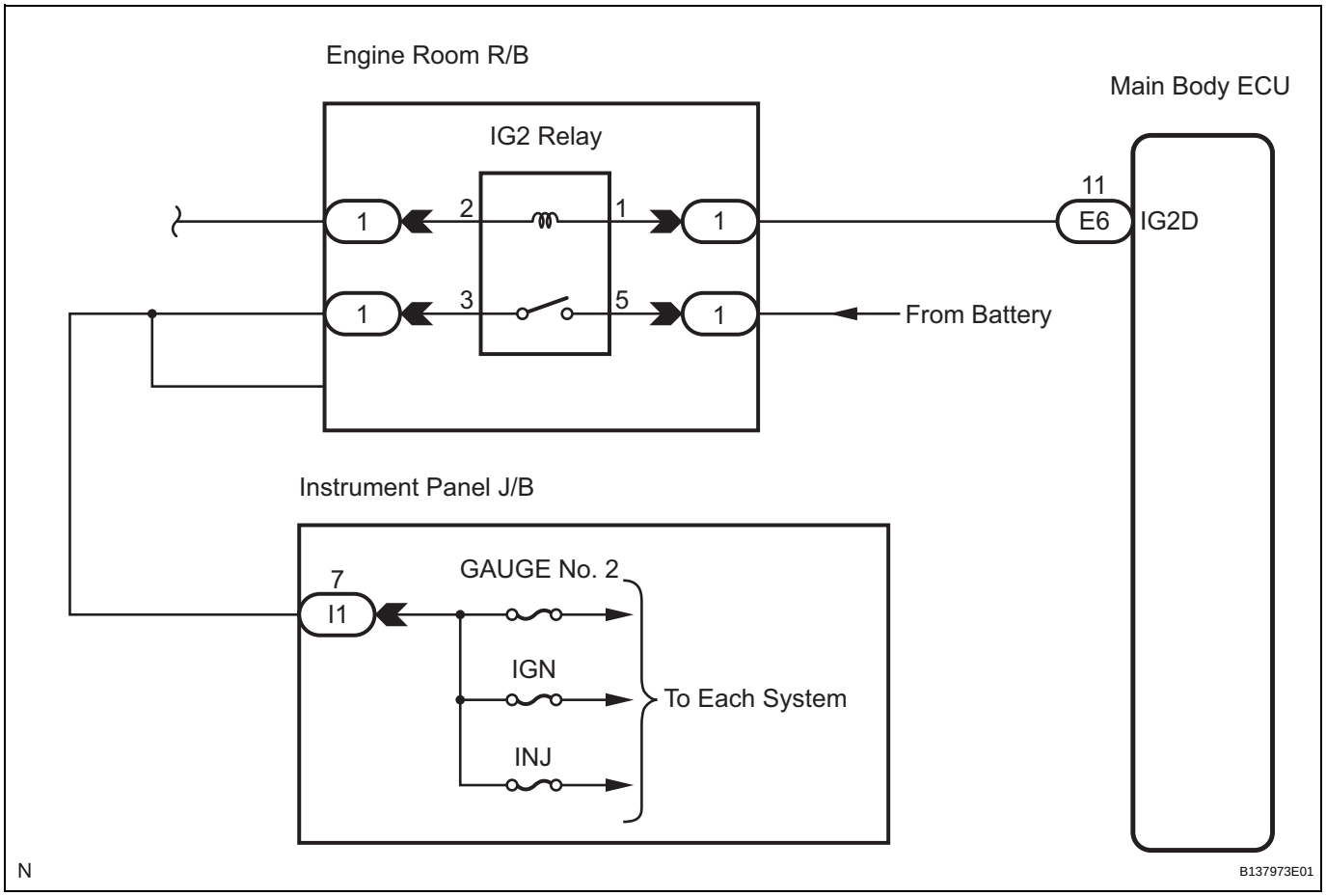
DTC	B2273	Ignition 2 Monitor Malfunction

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-8).

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.

ST

(b) Turn the engine 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 engine 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: Engine switch on (IG) (IG2 relay is ON) OFF: Engine switch off (IG2 relay is OFF)	-

OK:
"ON" (Engine switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK

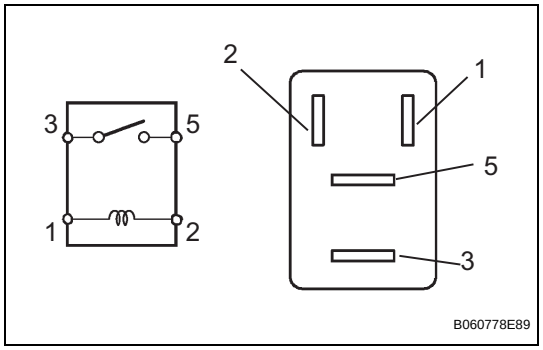
2 CHECK ENGINE SWITCH CONDITION

(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 engine 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-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK

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)

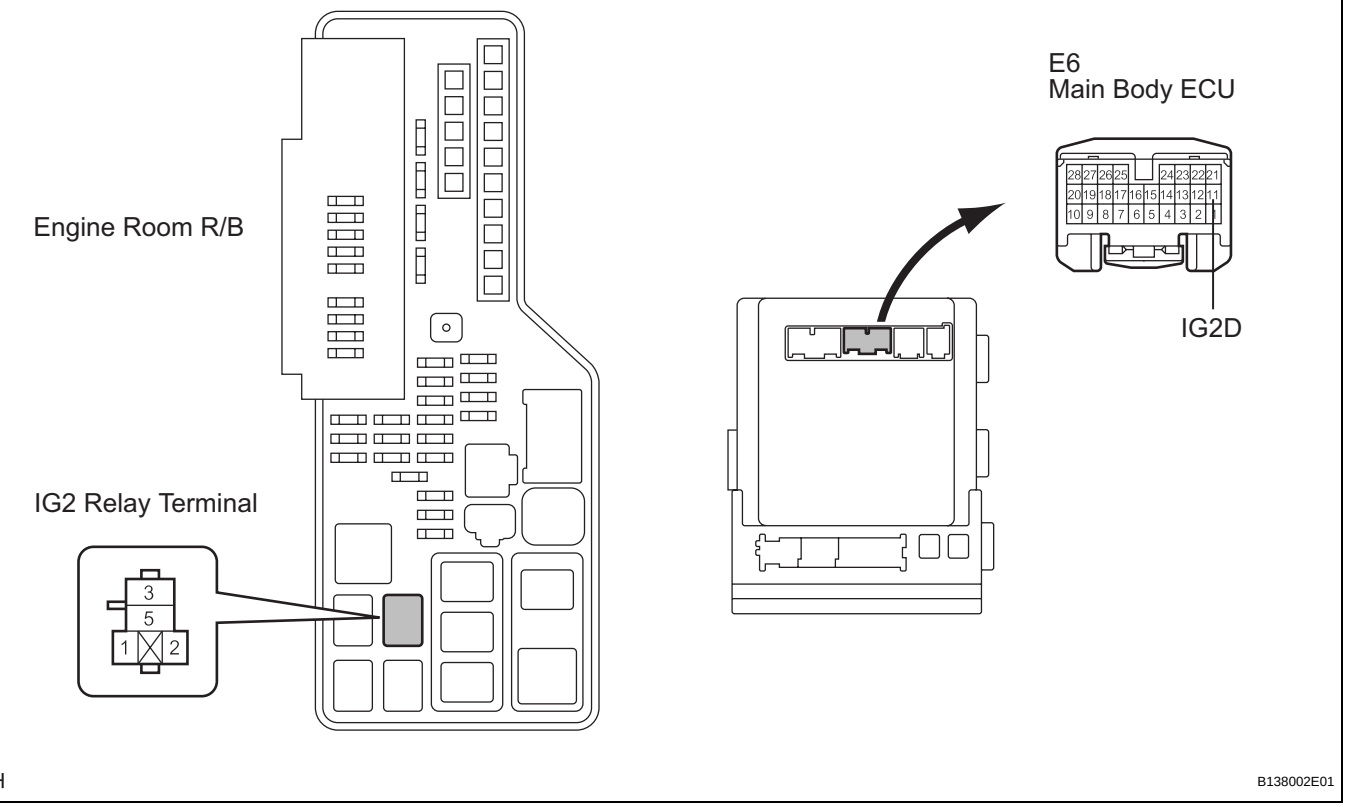
NG → REPLACE RELAY

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

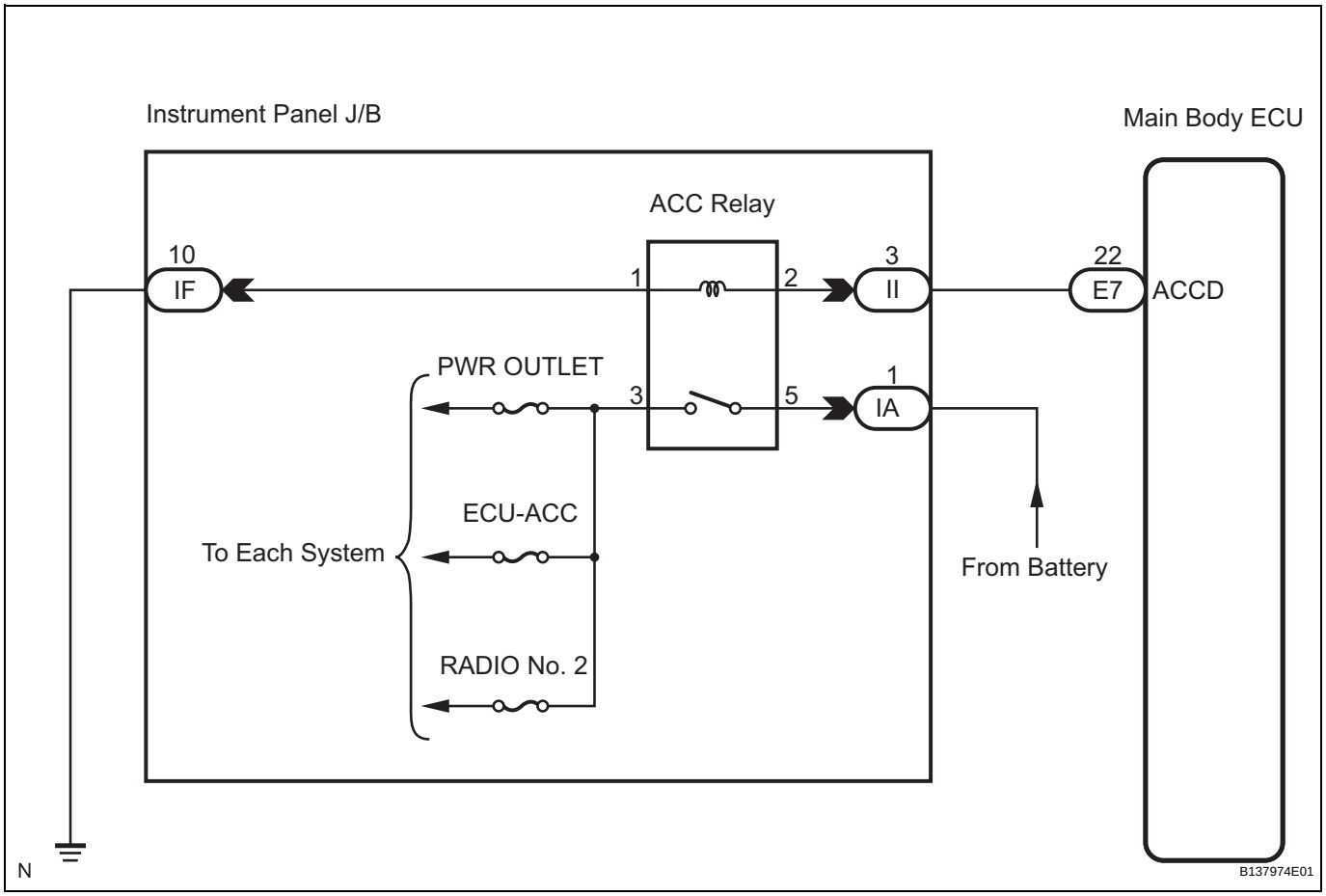
DTC	B2274	ACC Monitor Malfunction

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-8).

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.

ST

(b) Turn the engine 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 engine 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: Engine switch on (ACC) OFF: Engine switch off	-

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

NG → **Go to step 3**

OK

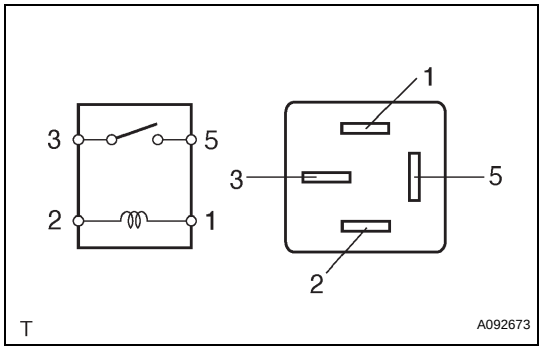
2 CHECK ENGINE SWITCH CONDITION

(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 engine 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-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK

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)

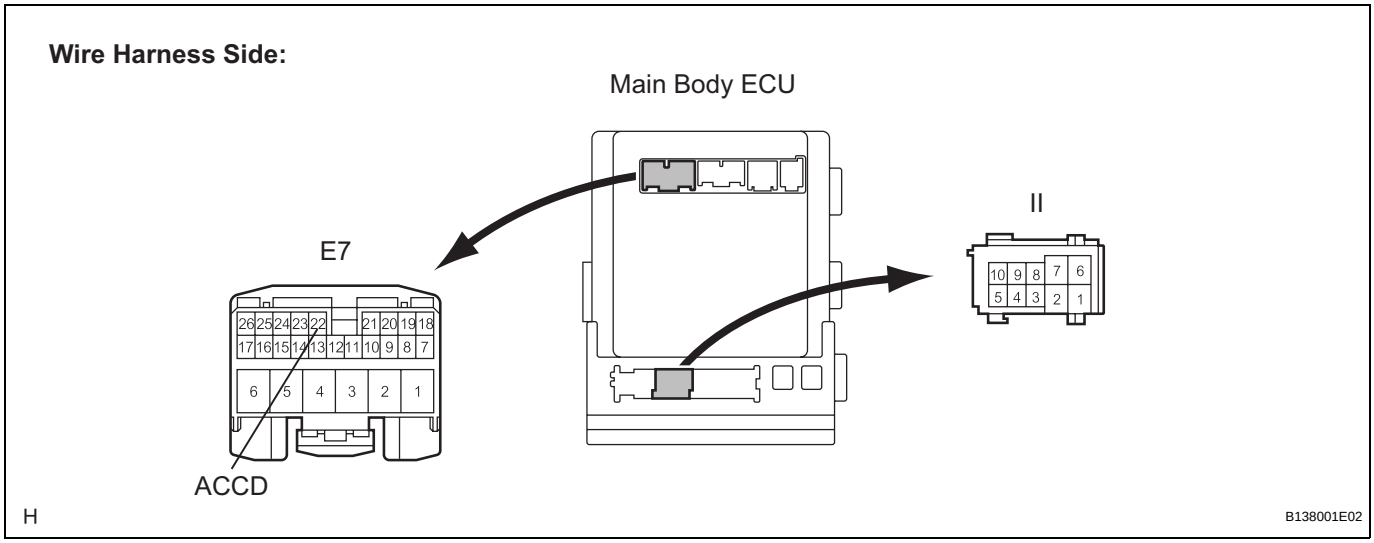
NG → REPLACE RELAY

OK

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

(a) Disconnect the E7 ECU connector.

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

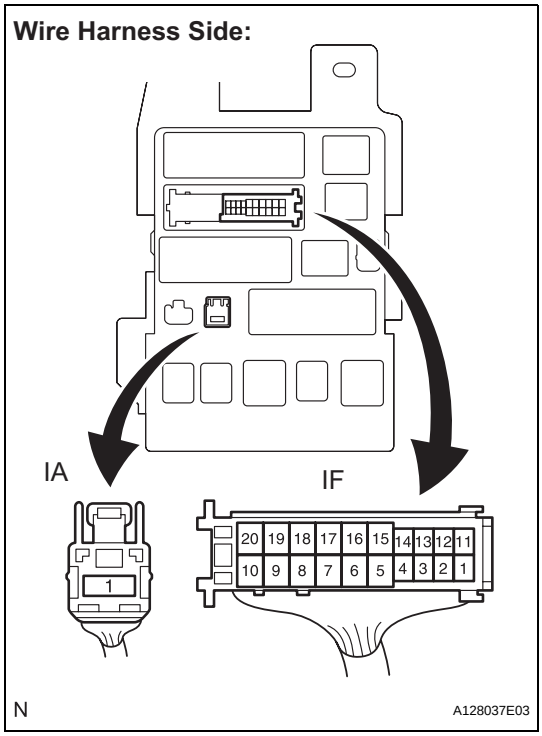
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

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

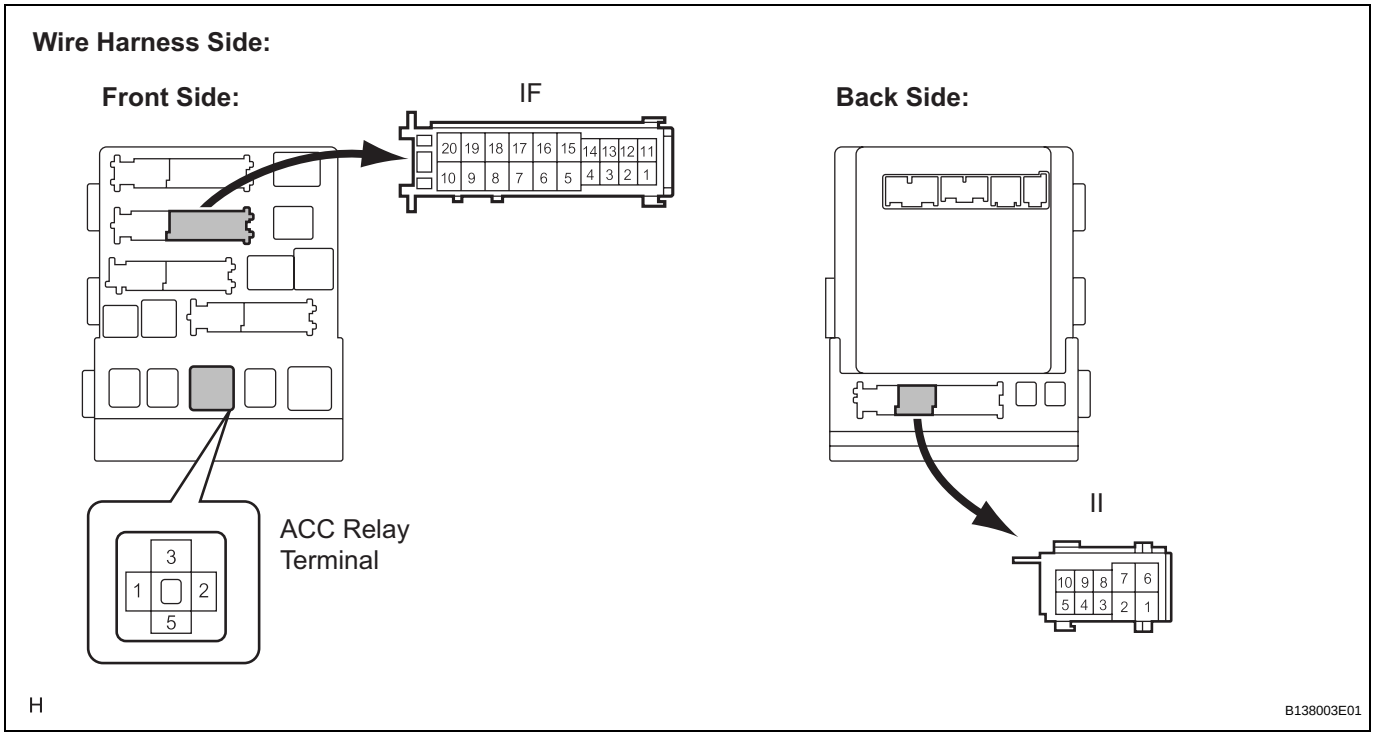
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

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.



ST

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 engine start 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-8).

DTC No.	DTC Detection Condition	Trouble Area
B2275	ST output circuit (engine starting request signal circuit) inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ECM • Wire harness or connector

WIRING DIAGRAM

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, turn the engine 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

ST

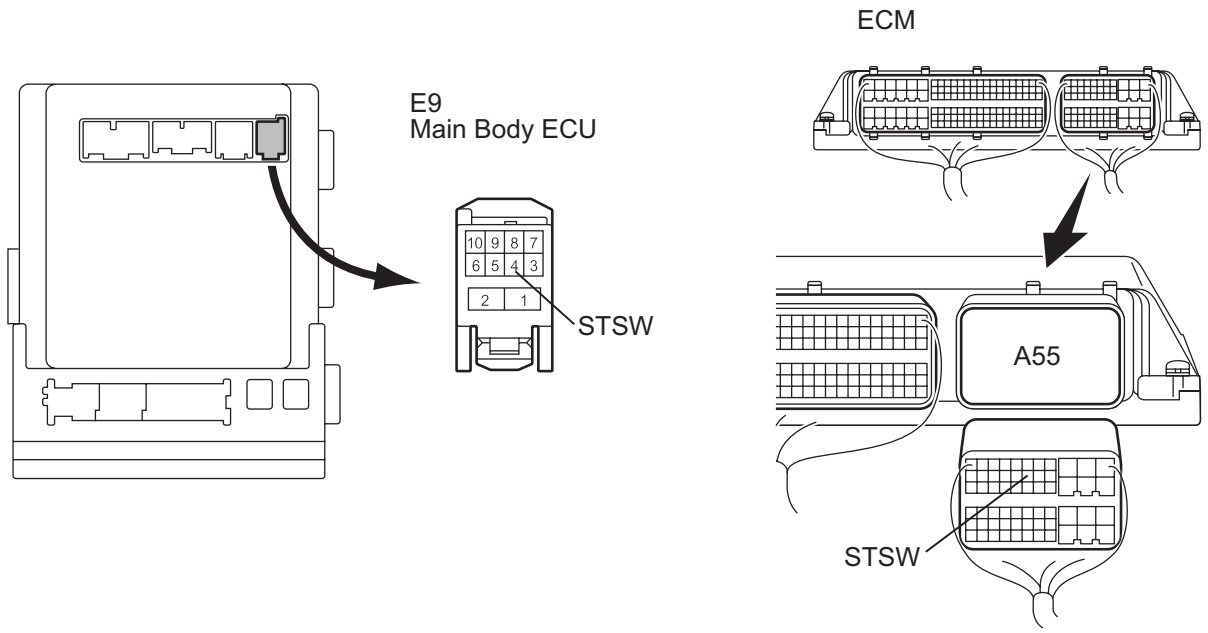
OK

CHECK INTERMITTENT PROBLEMS

2	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the E9 ECU connector.

Wire Harness Side:



(b) Disconnect the A55 ECM connector.

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

Standard resistance

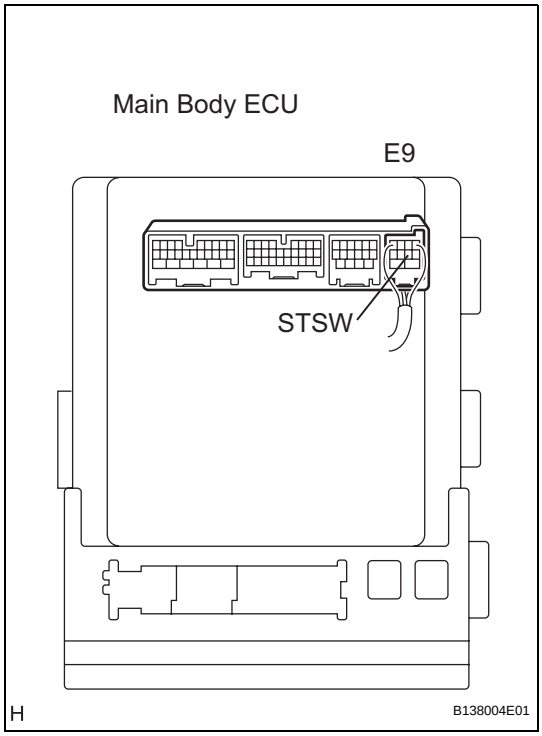
Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - A55-14 (STSW)	Always	Below 1 Ω
E9-4 (STSW) - Body ground	Always	10 kΩ or higher

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, Engine switch hold on (ST)	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 that the engine can start.

OK:

Engine can start normally.

NG → **GO TO ENGINE CONTROL SYSTEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2276	ACCR Signal Circuit Malfunction

DESCRIPTION

This DTC is output when the ACCR output circuit inside the main body ECU is open or shorted.
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-8).

DTC No.	DTC Detection Condition	Trouble Area
B2276	ACCR output circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ECM • Wire harness or connector

WIRING DIAGRAM

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 50 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC B2276 is output.

NG → **Go to step 2**

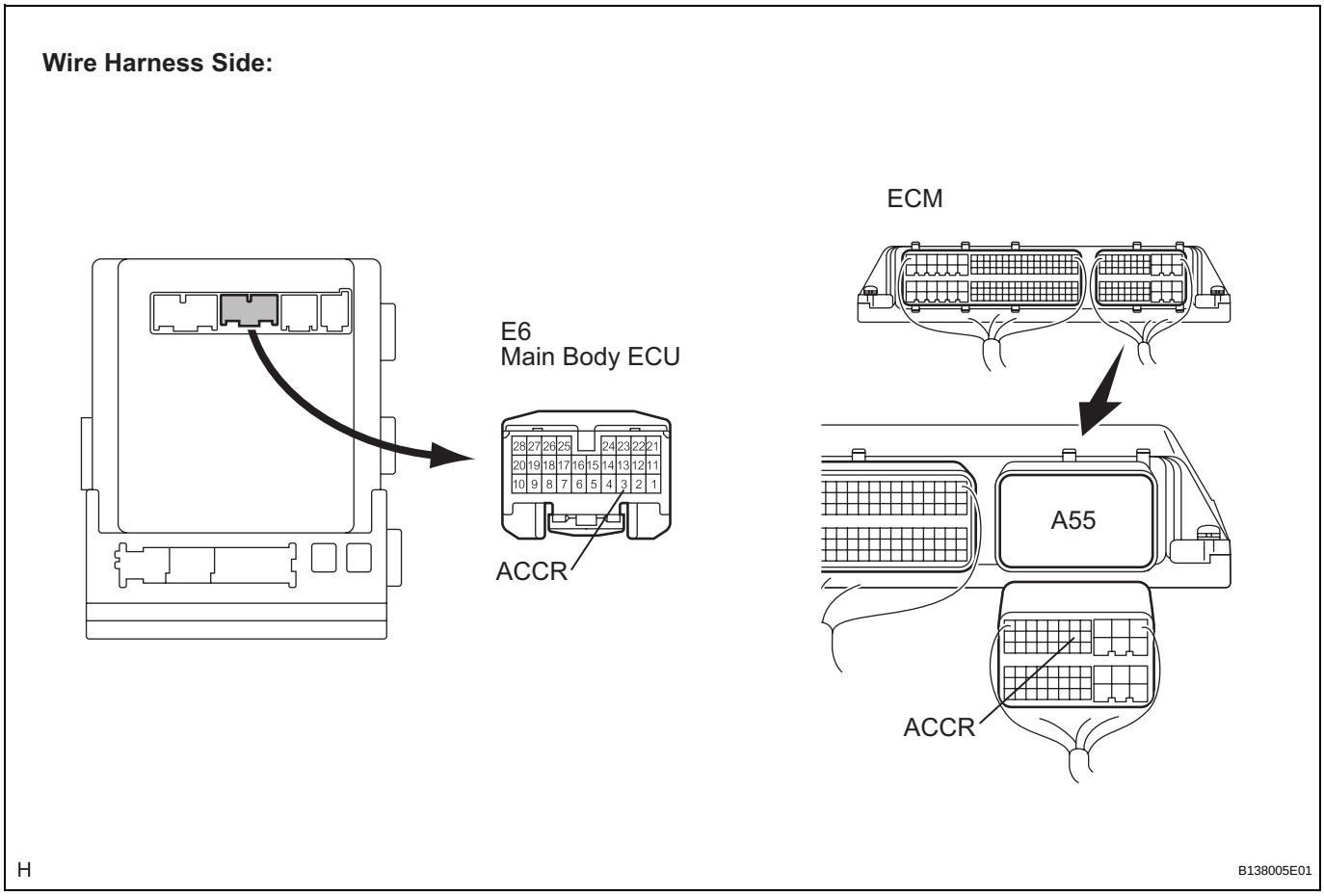
OK

CHECK INTERMITTENT PROBLEMS

ST

2	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the E6 ECU connector.



(b) Disconnect the A55 ECM connector.

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

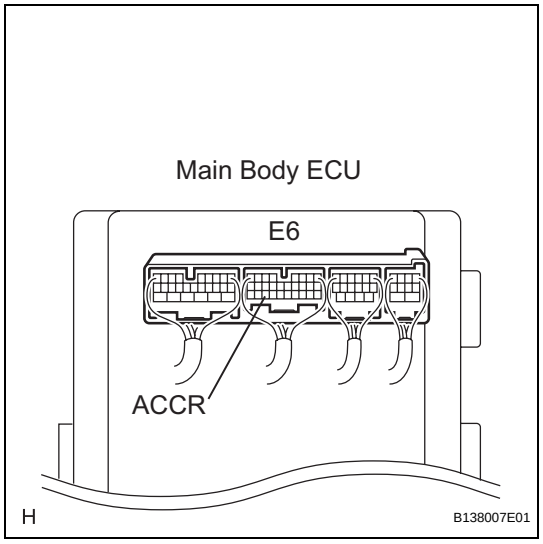
Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
E6-3 (ACCR) - A55-13 (ACCR)	Always	Below 1 Ω
E6-3 (ACCR) - Body ground	Always	10 kΩ or higher

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

OK

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
E6-3 (ACCR) - Body ground	Brake pedal depressed, shift P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V → output voltage at terminal AM1 or AM2 is -2 V or more.

HINT:
Voltage is output only when the engine is cranking.

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 that the engine starts.

OK:

Engine can start normally.

NG → **REPLACE ECM**

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-8).

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-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 30 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → **REPLACE MAIN BODY ECU**

OK ↓

END

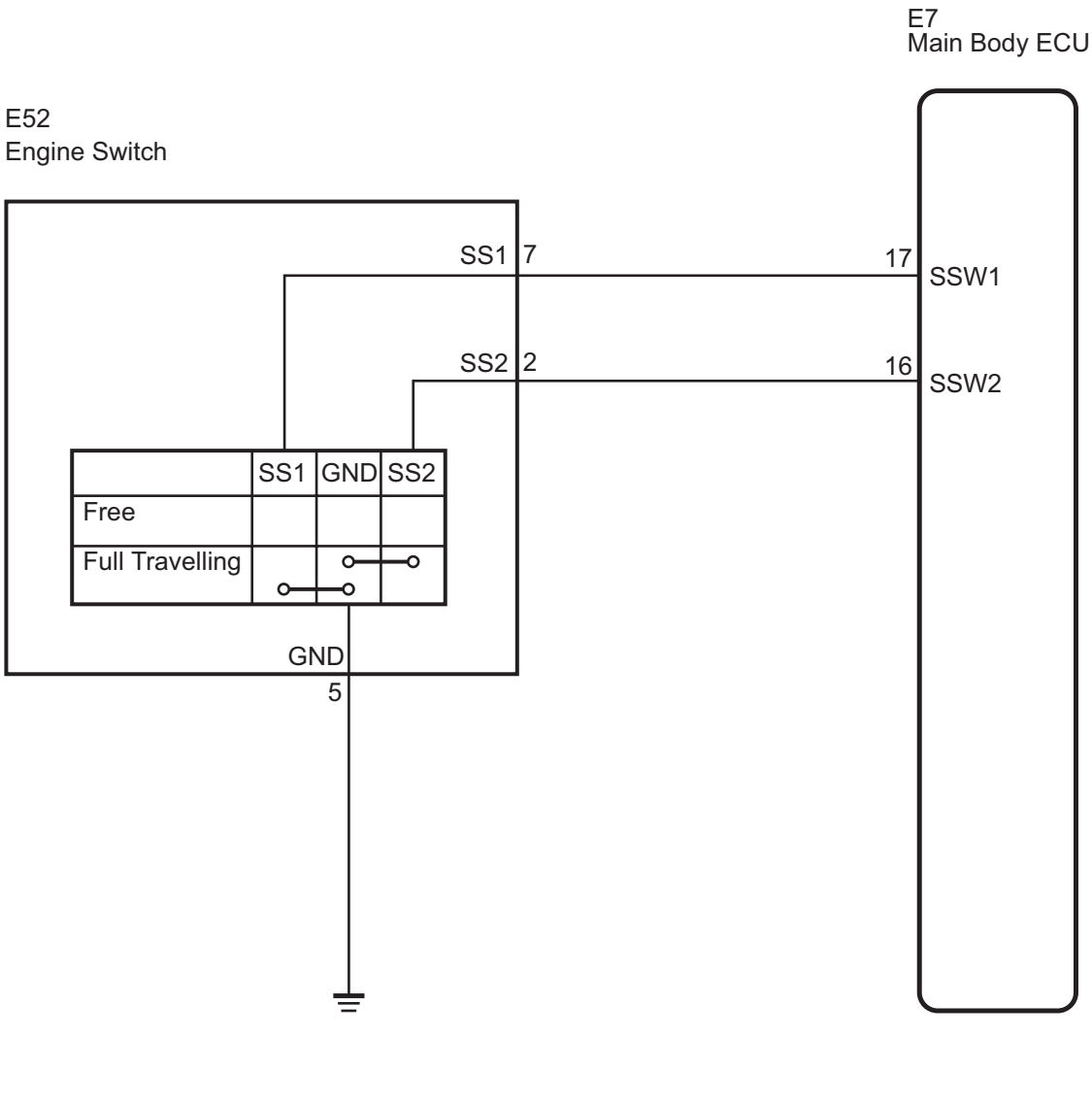
DTC	B2278	Engine Switch Circuit Malfunction

DESCRIPTION

This DTC is output when 1) a malfunction is detected between the main body ECU and the engine switch; or 2) either of the switches inside the engine 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-8).

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (START SWITCH)

ST

(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 engine 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: Engine switch on (IG) OFF: Engine switch off	-
START SW2	Start Switch 2/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-

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

OK → **Go to step 3**

NG

2 CHECK ENGINE 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 engine 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-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

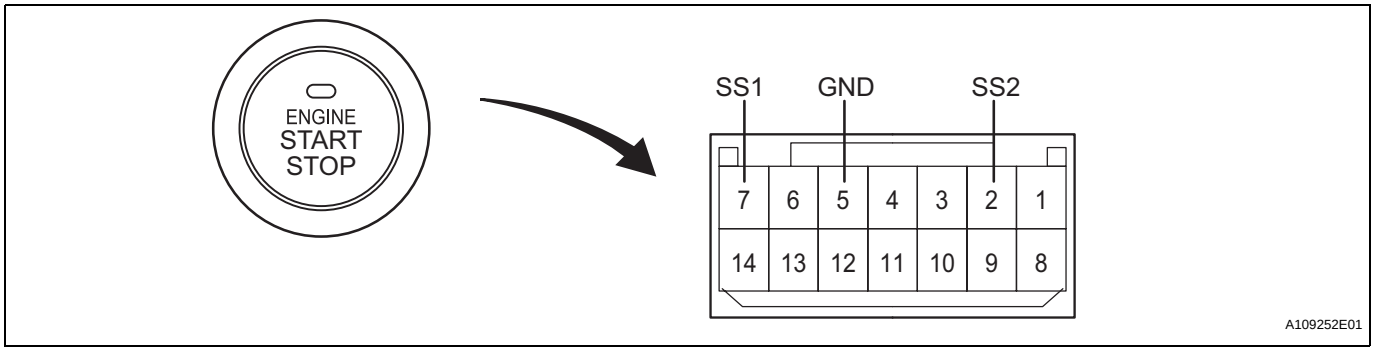
NG → **GO TO OTHER PROBLEM**

OK

END

3 INSPECT ENGINE SWITCH

(a) Remove the engine switch.



(b) Disconnect the switch connector.

ST

(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

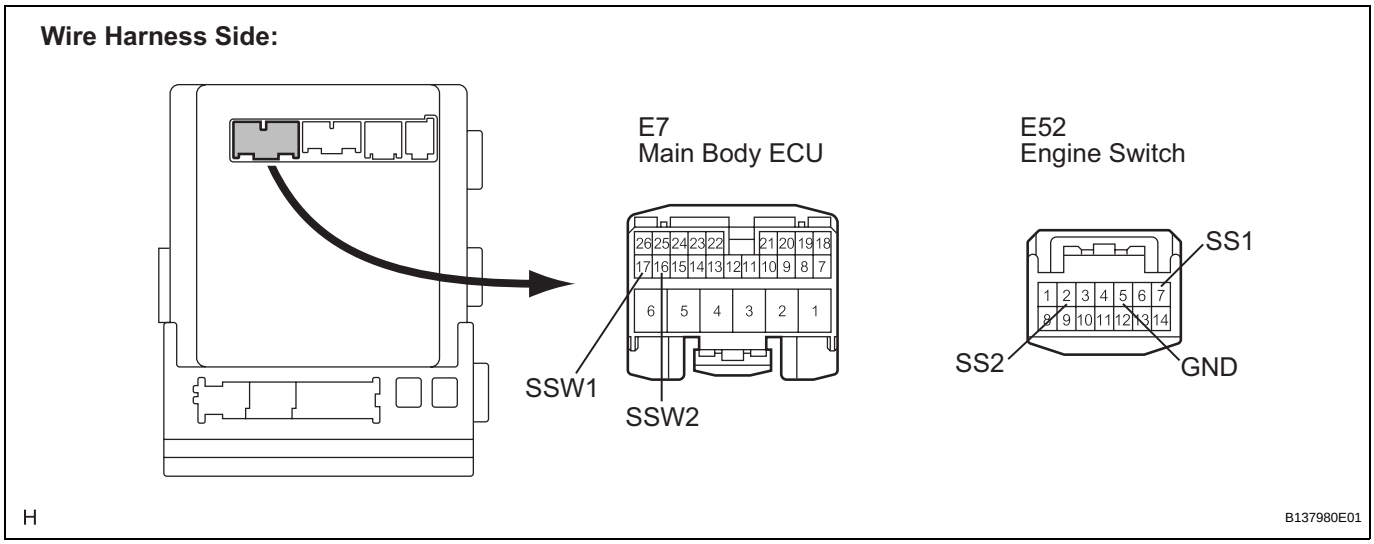
HINT:
This switch is a momentary type switch.

NG → **REPLACE ENGINE SWITCH**

OK

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

(a) Disconnect the E7 ECU connector.



(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

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

ST

OK

REPLACE MAIN BODY ECU

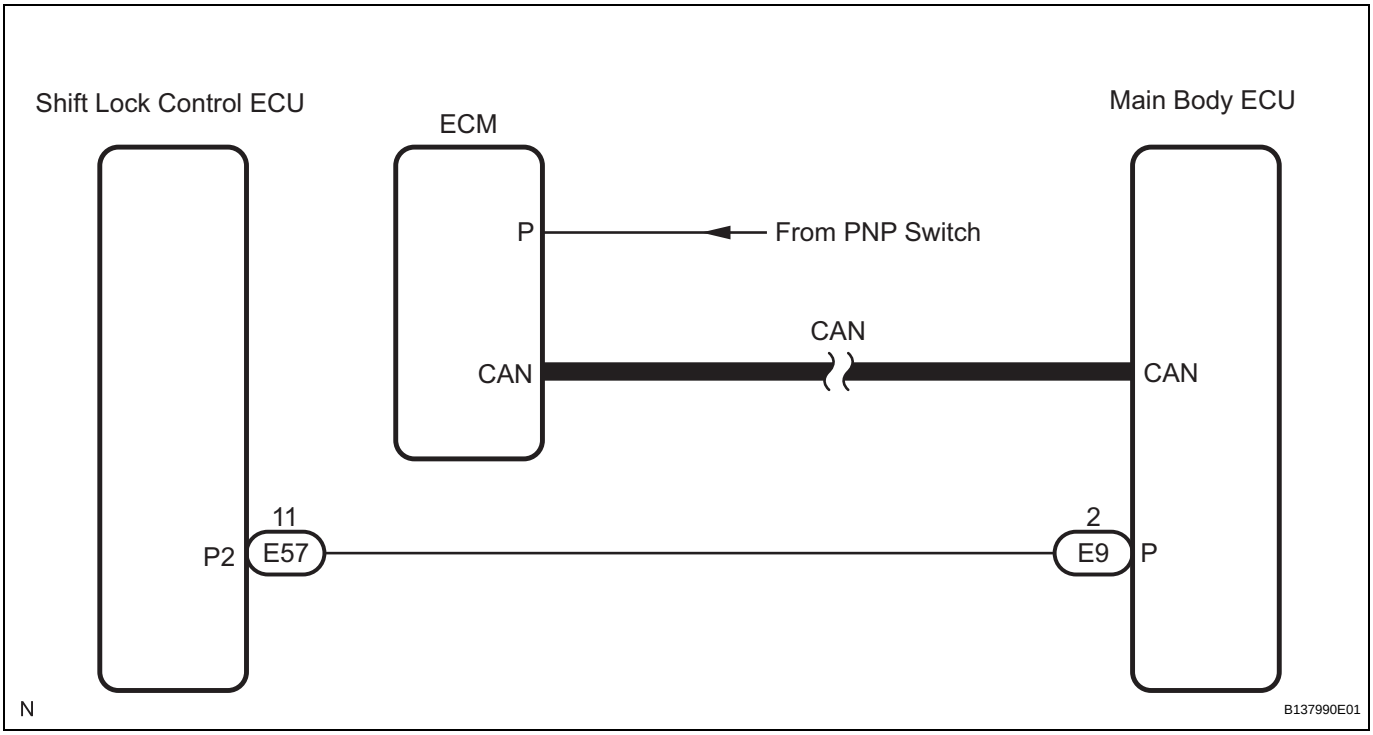
DTC	B2281	"P" Signal Malfunction

DESCRIPTION

The main body 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-8).

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 engine switch on (IG) and turn the intelligent tester main switch on.
(c) Read the DATA LIST according to the displays on the tester.

ST

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.

NG → **Go to step 2**

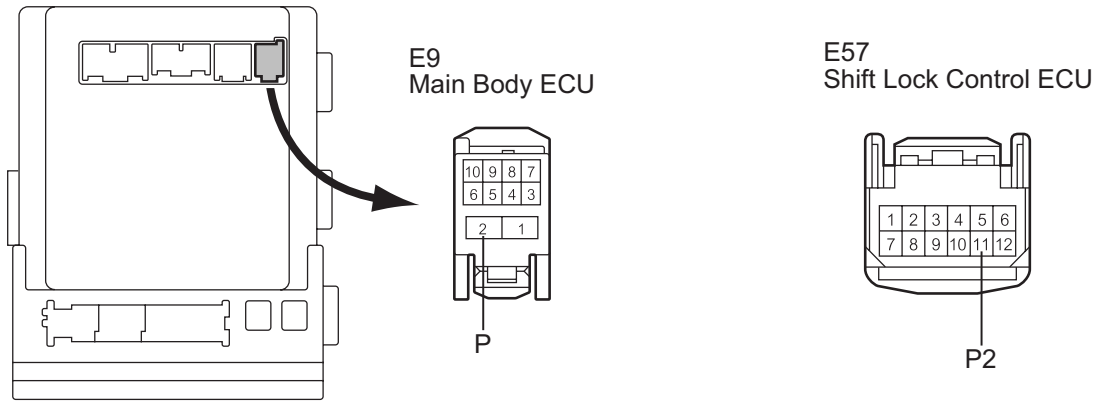
OK

GO TO SHIFT CONTROL SYSTEM

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 that the engine can start normally.

ST

OK:
Engine can start normally.

NG → **GO TO SHIFT CONTROL SYSTEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2282	Vehicle Speed Signal Malfunction

DESCRIPTION

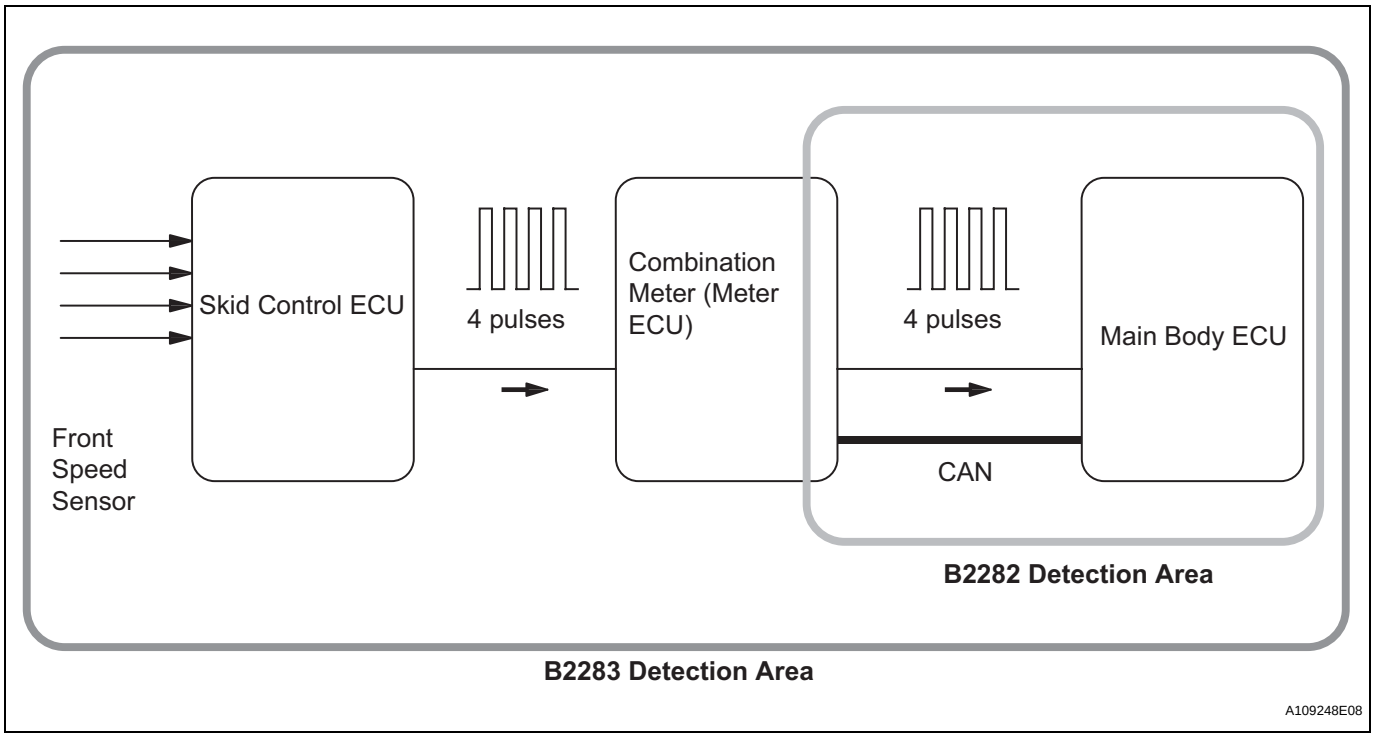
The main body ECU and the combination meter are connected by a cable and the CAN. DTC B2282 is output when: 1) the cable information and CAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and combination meter.

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.

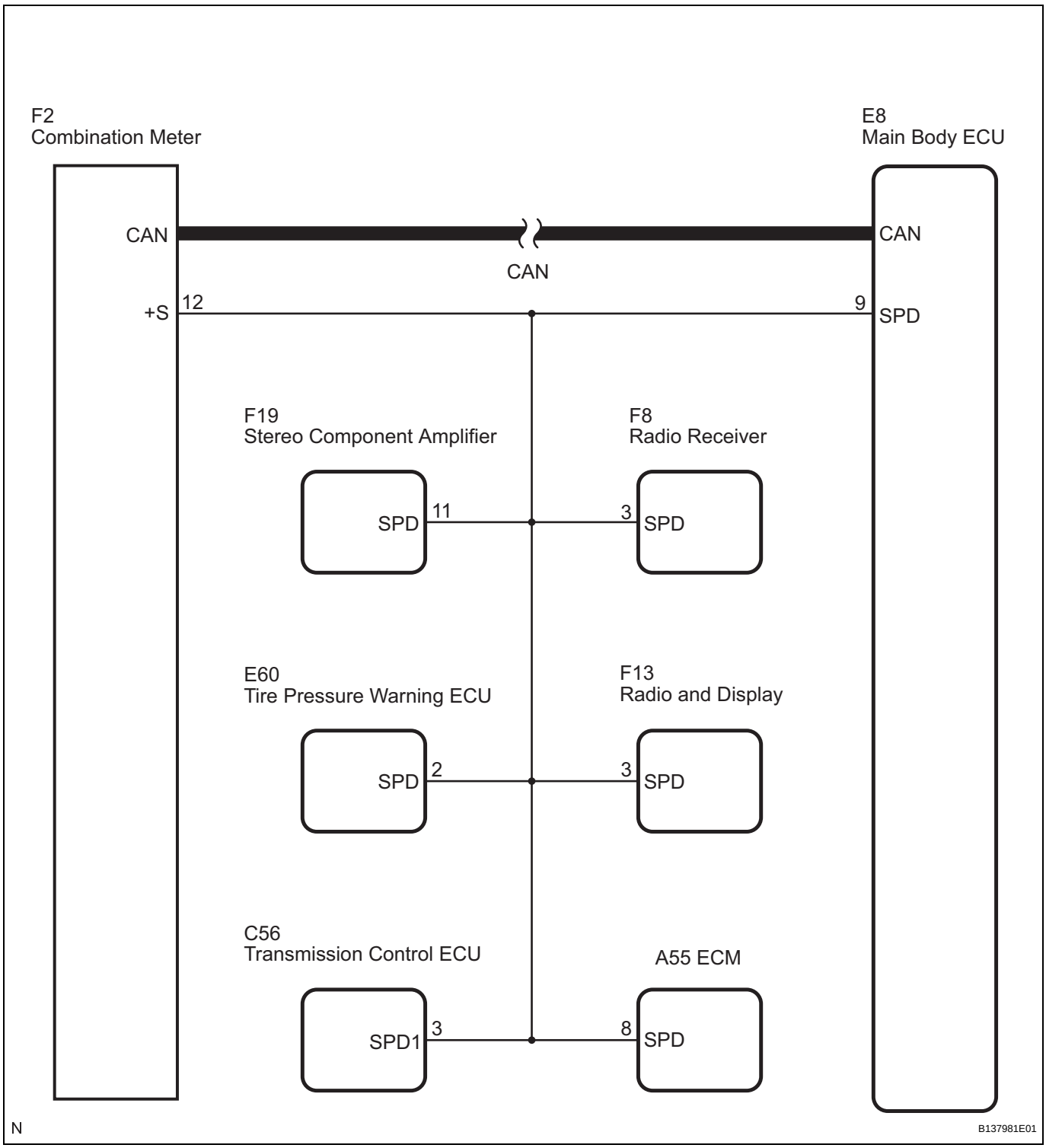
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

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



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.

NG → **GO TO COMBINATION METER SYSTEM**

OK

2 CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for CAN communication system DTCs.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

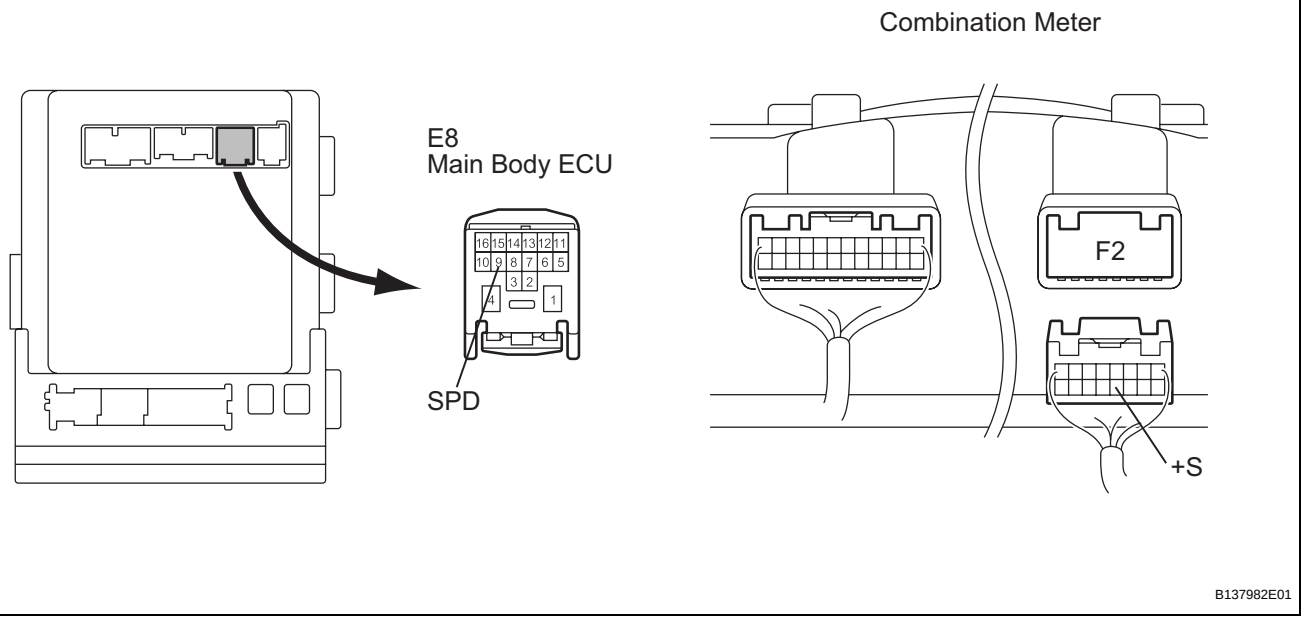
NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

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.

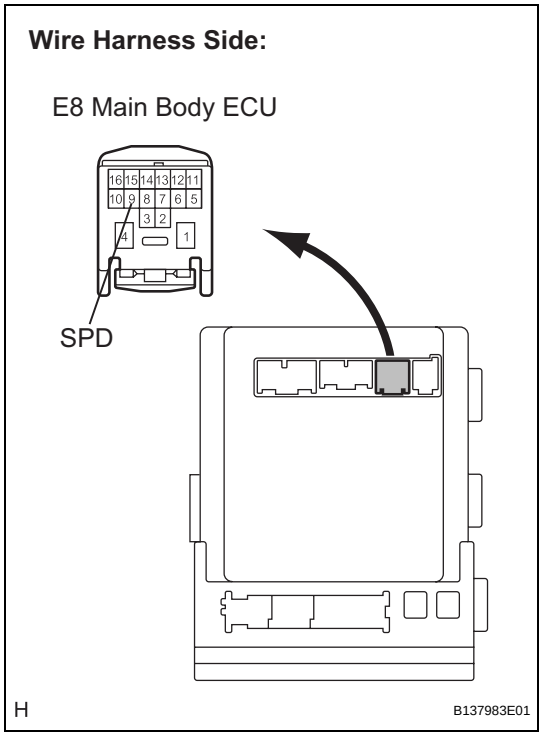
Standard resistance

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

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

5 READ VALUE OF INTELLIGENT TESTER (VEHICLE SPEED SIGNAL)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Check the DATA LIST for proper functioning of the vehicle speed signal.

MAIN BODY:

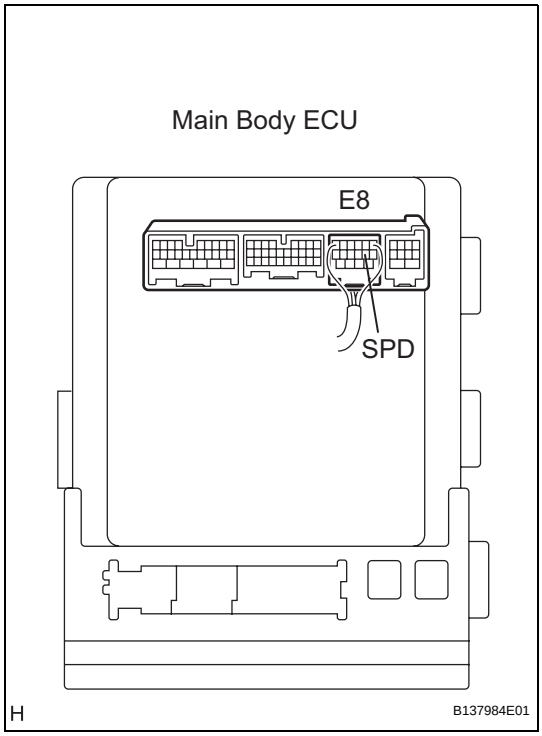
Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD SIG	Vehicle speed signal/STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-

OK:
STOP (vehicle is stopped) and RUN (vehicle is running) appear on the screen.

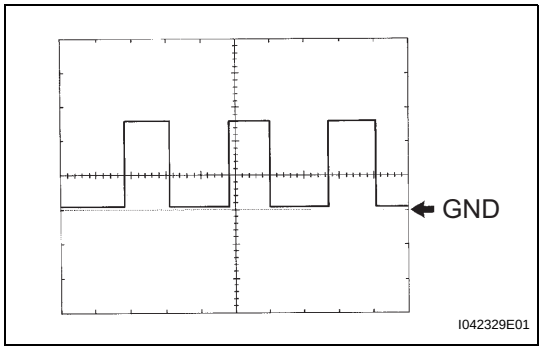
OK → **CHECK INTERMITTENT PROBLEMS**

NG

6	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 engine 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

DTC	B2283	Vehicle Speed Sensor Malfunction

DESCRIPTION

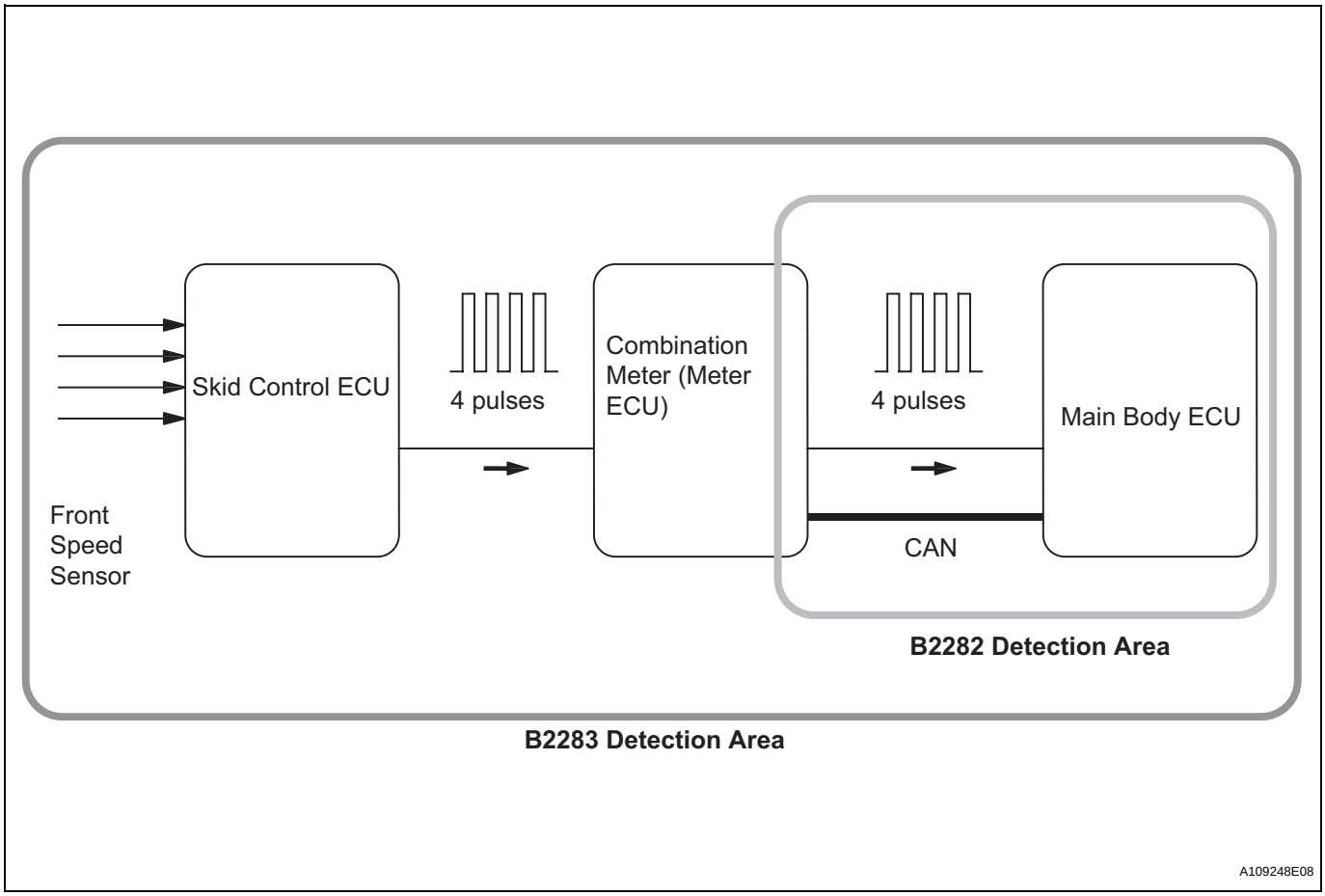
The skid control ECU converts these signals into 4-pulse signals and sends them to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the main body ECU. The main body ECU 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-8).

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



INSPECTION PROCEDURE

1 CHECK DTC OUTPUT (SMART KEY SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) After all DTCs are cleared, check if the trouble occurs again 320 seconds after the engine 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-63).

B → **GO TO DTC B2282**

C → **CHECK INTERMITTENT PROBLEMS**

A

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.

NG → **GO TO COMBINATION METER SYSTEM**

OK

3 CHECK DTC OUTPUT (BRAKE CONTROL)

(a) Delete the DTCs (See page ST-26).
(b) Check for DTCs.
(w/o VSC: See page BC-27)
(for BOSCH made w/ VSC: See page BC-311)
(for ADVICS made w/ VSC: See page BC-151)
OK:
No DTC is output.

NG → **GO TO BRAKE CONTROL SYSTEM**

ST

OK

REPLACE MAIN BODY ECU

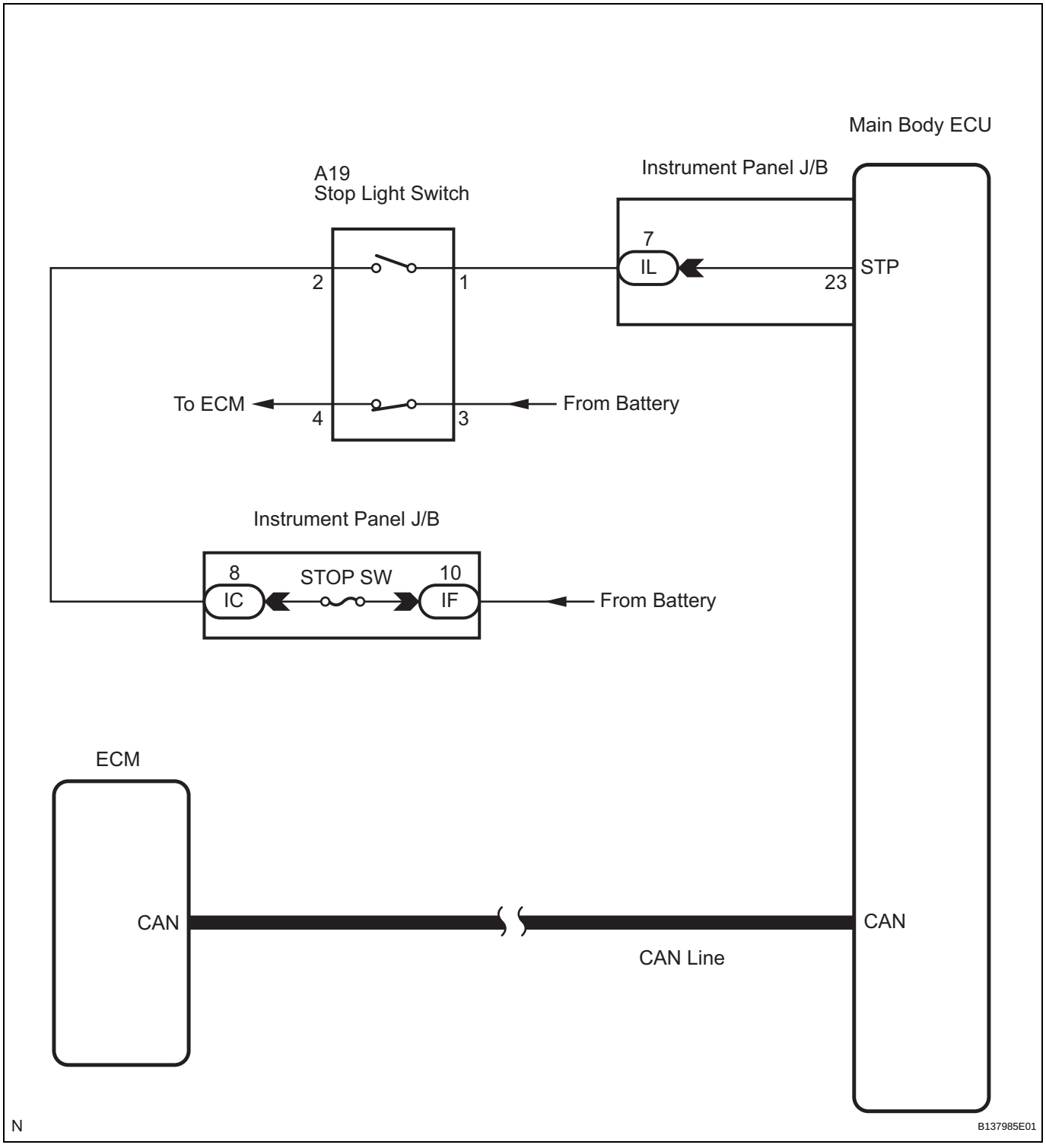
DTC	B2284	Brake Signal Malfunction

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-8).

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 • ECM • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

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 engine 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-26).
(b) Check for CAN communication system DTCs (See page CA-31).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK ↓

3	CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for DTC P0500 and P0503 (See page ES-63).
OK:
No DTC is output.

NG → **GO TO ENGINE CONTROL SYSTEM**

OK ↓

REPLACE MAIN BODY ECU

ST

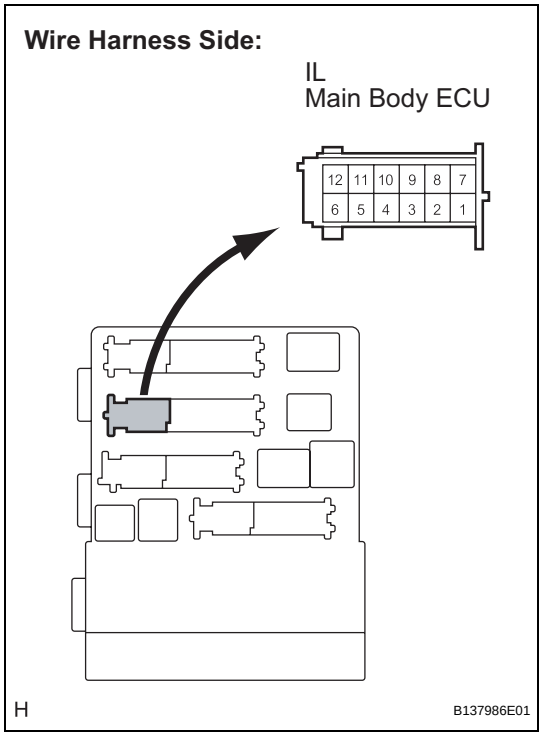
4 **INSPECT FUSE (STOP SW)**

(a) Remove the STOP SW 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)**



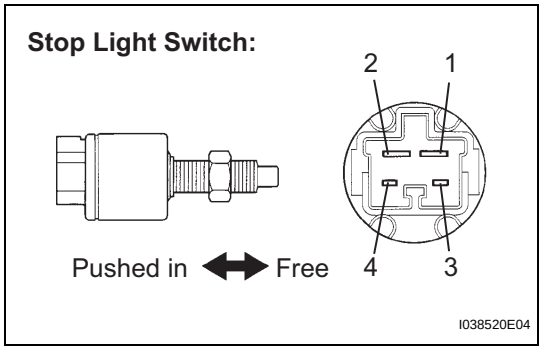
(a) Disconnect the IL ECU connector.
(b) Measure the volage according to the value(s) in the table below.
Standard voltage

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

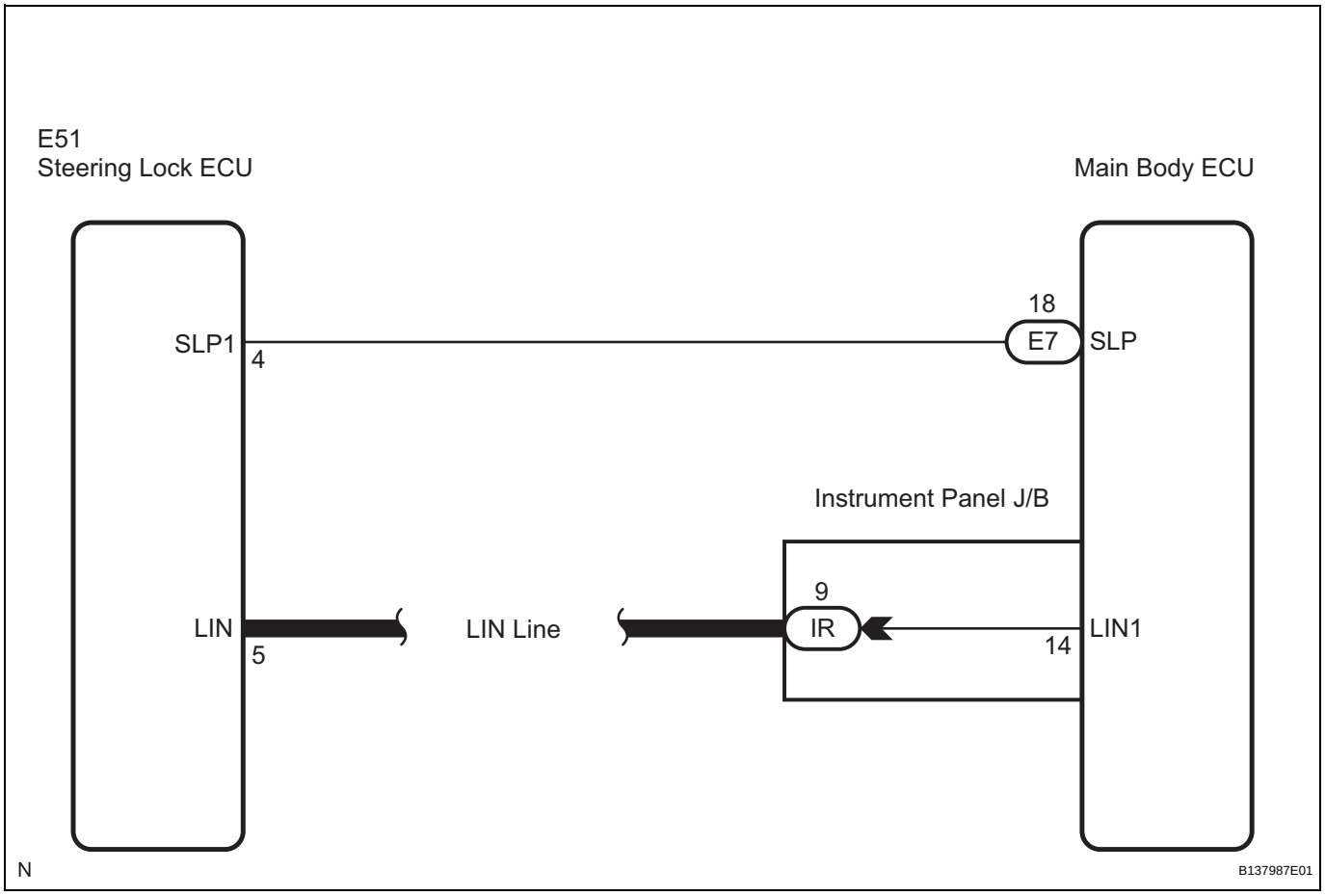
DTC	B2285	Steering Lock Position Signal Circuit Malfunction

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-8).

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.

ST

(b) Check the DATA LIST for proper functioning of the steering lock function.
HINT:
When using the intelligent tester with the engine 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 OFF: Steering is locked	-

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-26).
(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-85).
- If DTC B2785 is output (See page EI-29).

B → **GO TO DTC CHART**

C → **CHECK INTERMITTENT PROBLEMS**

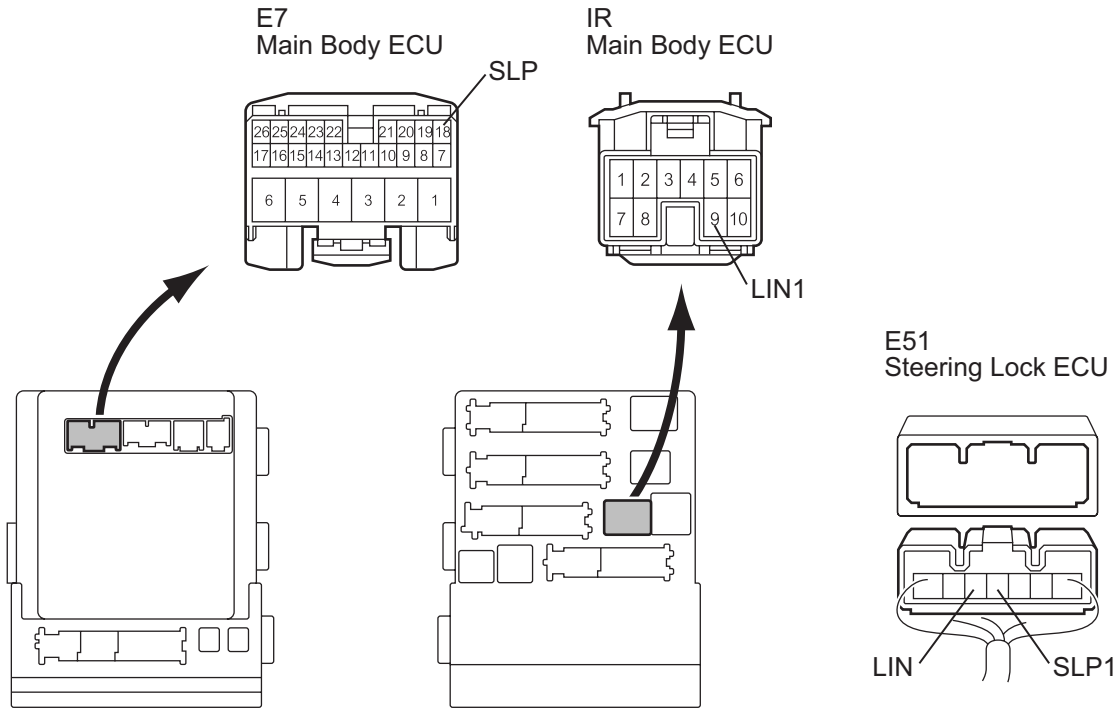
A →

REPLACE MAIN BODY ECU

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

(a) Disconnect the E7 and E51 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
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 that the engine starts (See page ST-30).
OK:
Engine can start normally.

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 ECM are inconsistent.

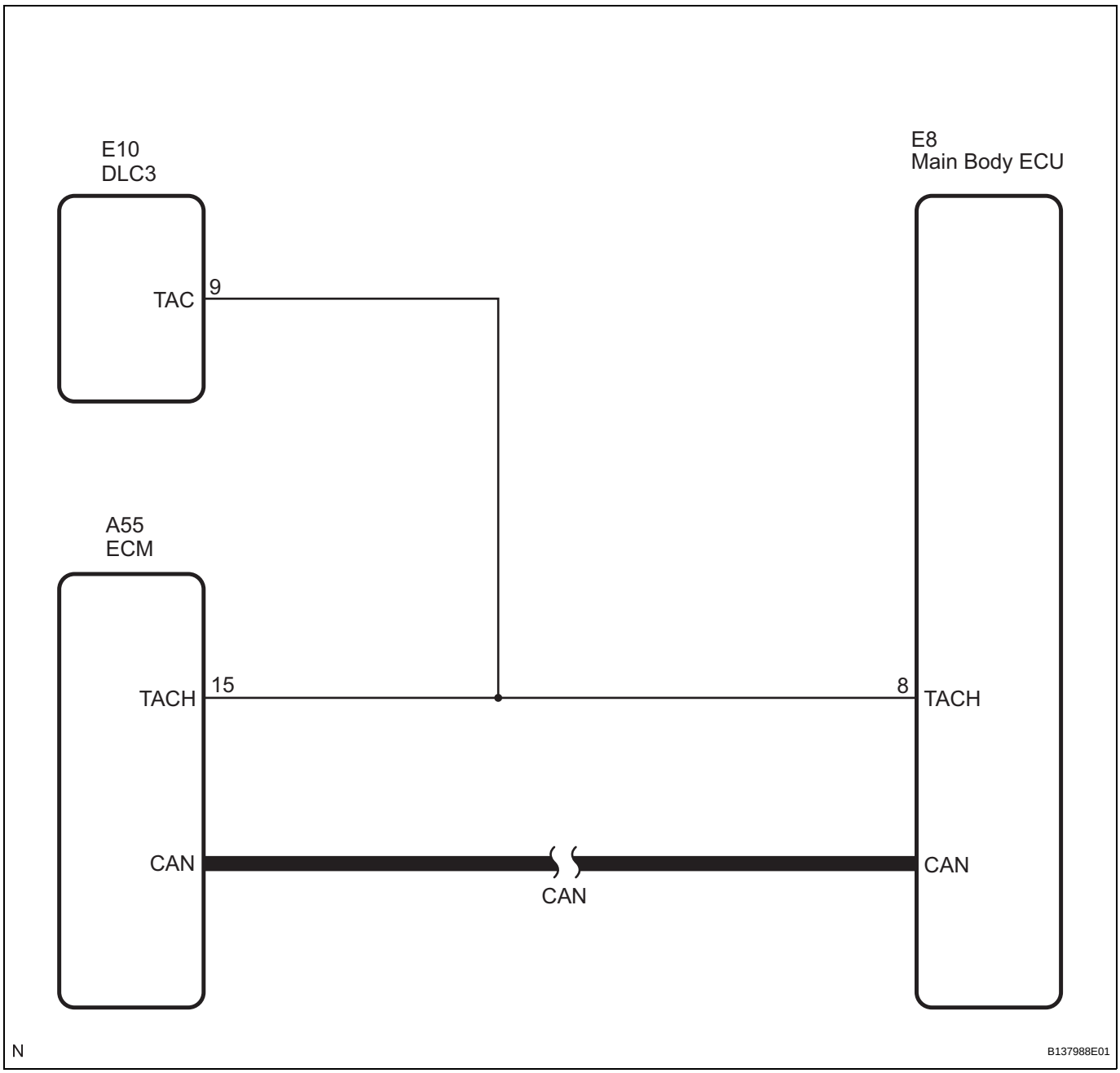
HINT:

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-8).

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OPERATION OF TACHOMETER

(a) Run the engine and check if the function of the tachometer in the combination meter is normal.
OK:
Actual engine revolution speed and the revolution indicated on the tachometer are the same.

NG	GO TO COMBINATION METER SYSTEM

ST

OK

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for CAN communication system DTC U0146.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

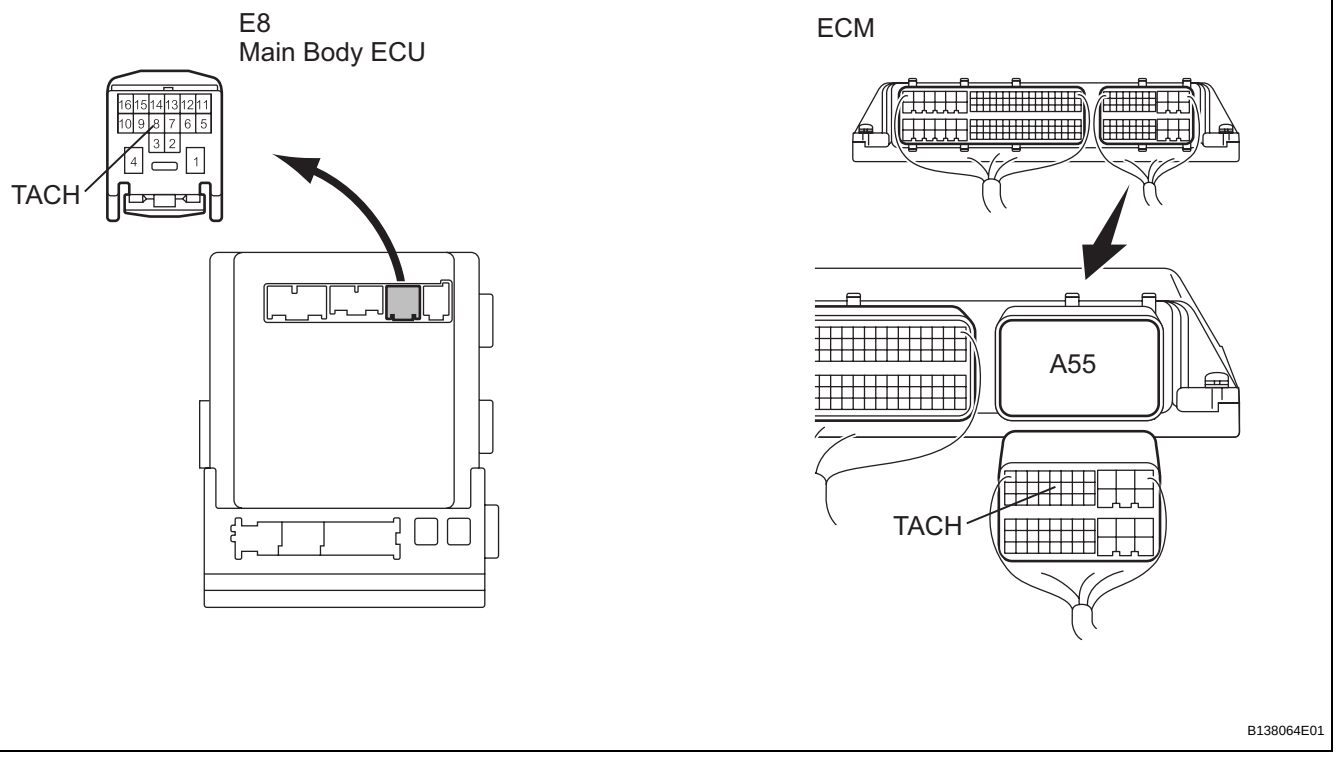
NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the A55 ECM connector.

Wire Harness Side:



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

ST

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (TACH) - A55-15 (TACH)	Always	Below 1 Ω
E8-8 (TACH) or A55-15 (TACH) - Body ground	Always	10 kΩ or higher

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

OK

4	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 engine.
HINT:
When using the intelligent tester with the engine 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
E/G COND	Engine condition/STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-

OK:
STOP (engine is stopped) and RUN (engine is running) appear on the screen.

NG → **REPLACE ECM**

OK

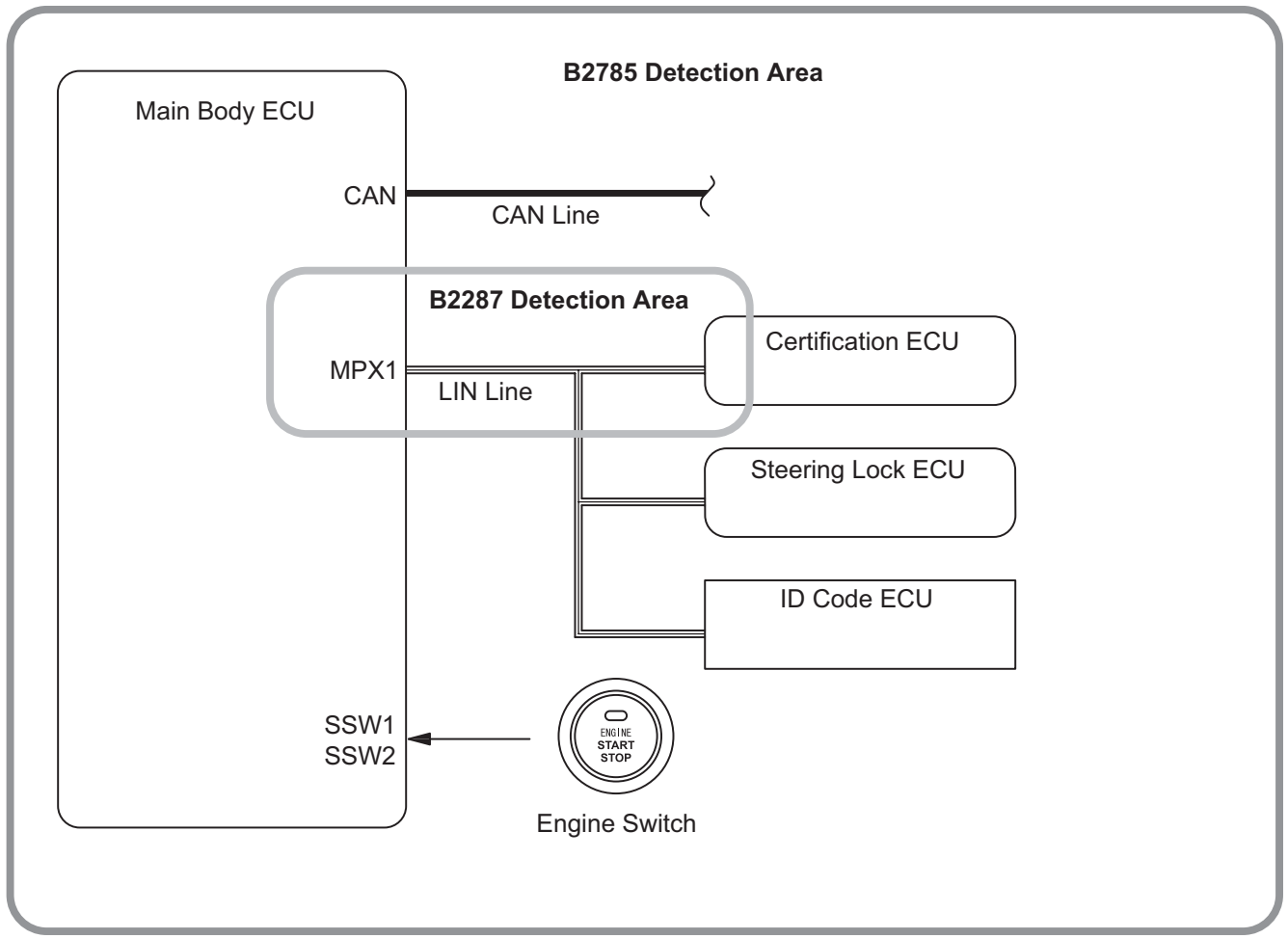
REPLACE MAIN BODY ECU

DTC	B2287	LIN Communication Master Malfunction

DESCRIPTION

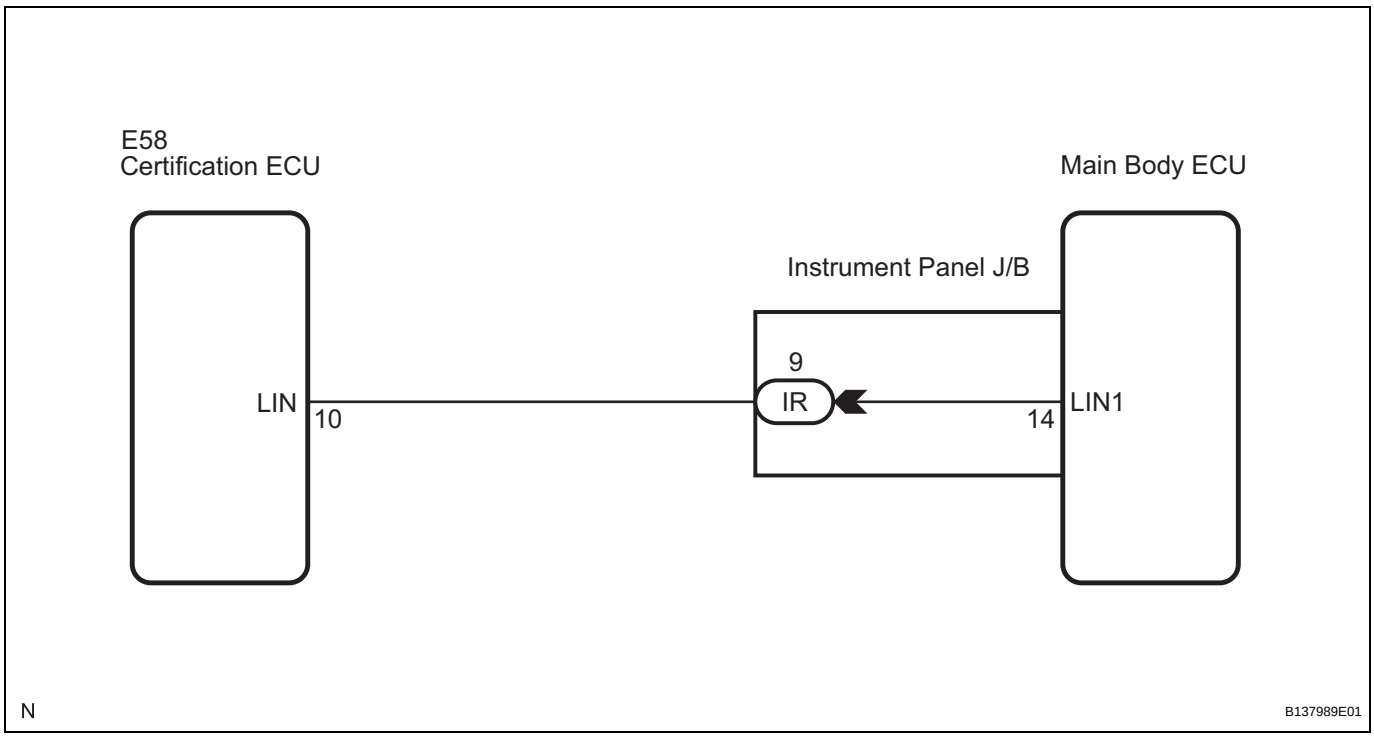
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, 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-8).

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

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(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-29).

B → GO TO DTC B2785

C → CHECK INTERMITTENT PROBLEMS

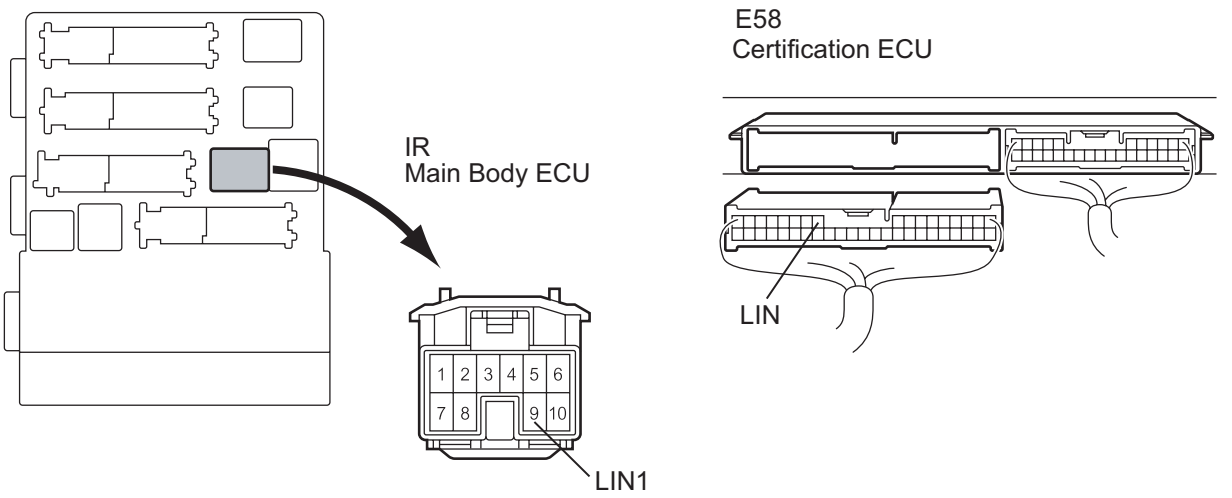
A

ST

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

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 engine starts (See page ST-30).

OK:

Engine can start normally.

NG → **REPLACE CERTIFICATION ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

ST

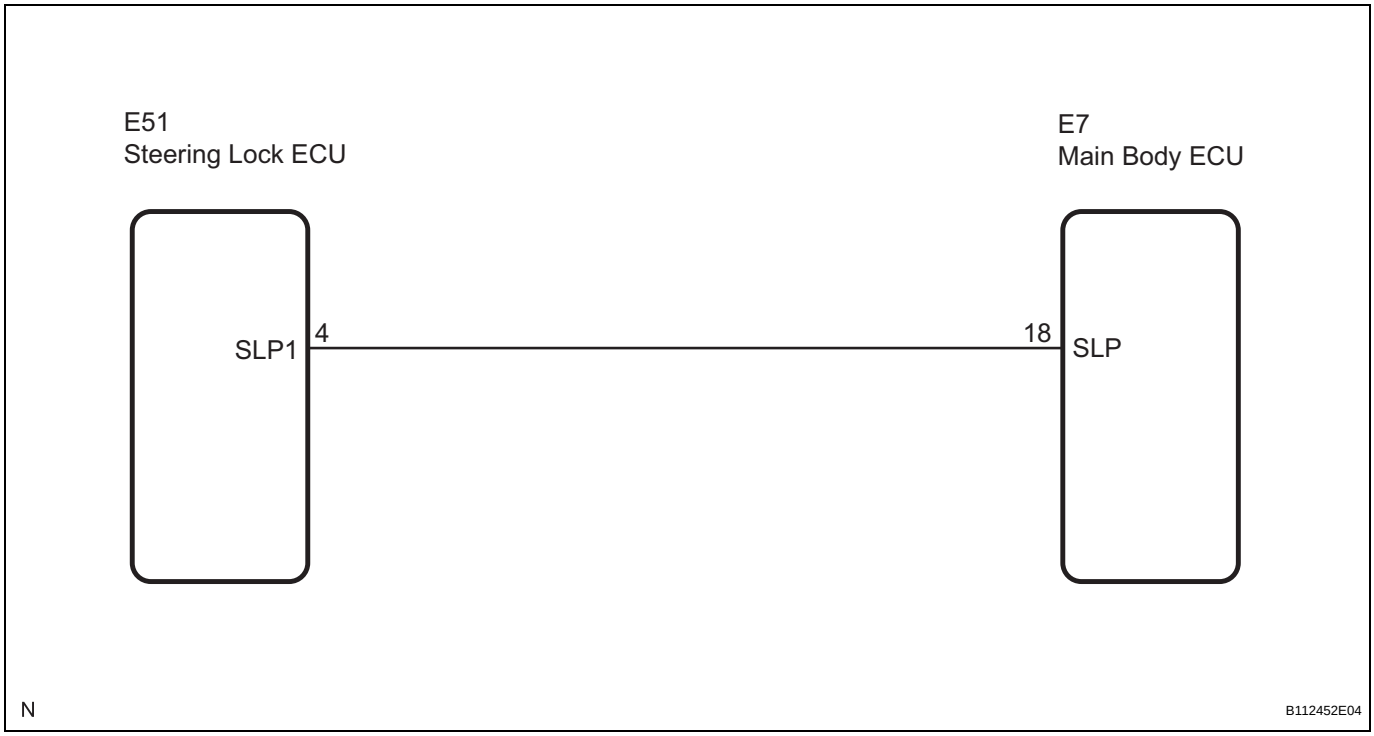
DTC	B2288	Steering Lock Signal Circuit Malfunction

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-8).

DTC No.	DTC Detection Condition	Trouble Area
B2288	After turning engine 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



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(b) After all DTCs are cleared, check if the trouble occurs again 5 seconds after the engine switch is turned on (IG).
(c) Check for DTCs again.

ST

OK:
DTC B2785, DTC B2287 and DTC B2781 are not output.

HINT:
- If DTC B2785 is output (See page EI-29).
- If DTC B2287 is output (See page ST-85).
- If DTC B2271 is output (See page ST-31).

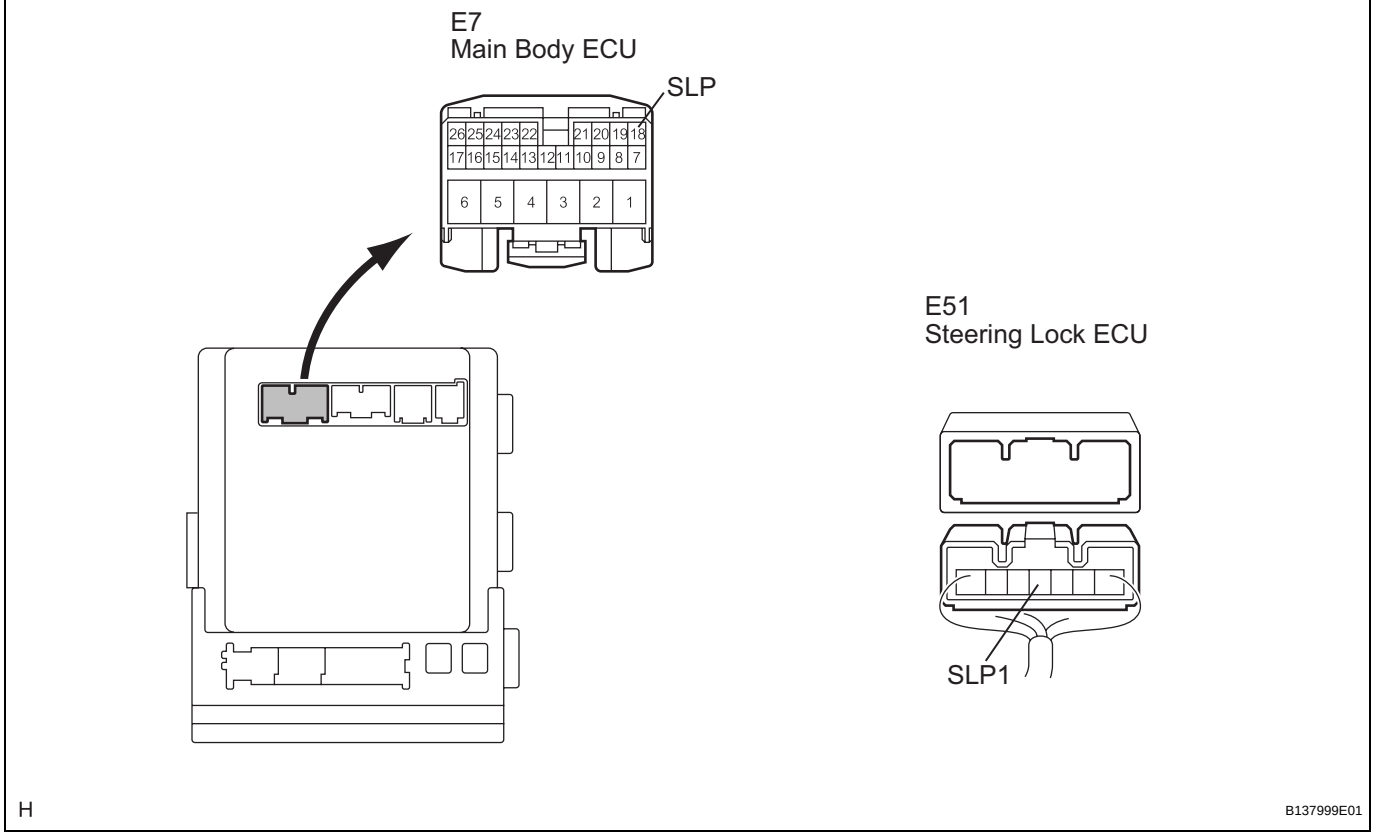
NG → **GO TO DTC CHART**

OK

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

(a) Disconnect the E7 and E51 ECU connectors

Wire Harness Side:



(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**

ST

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

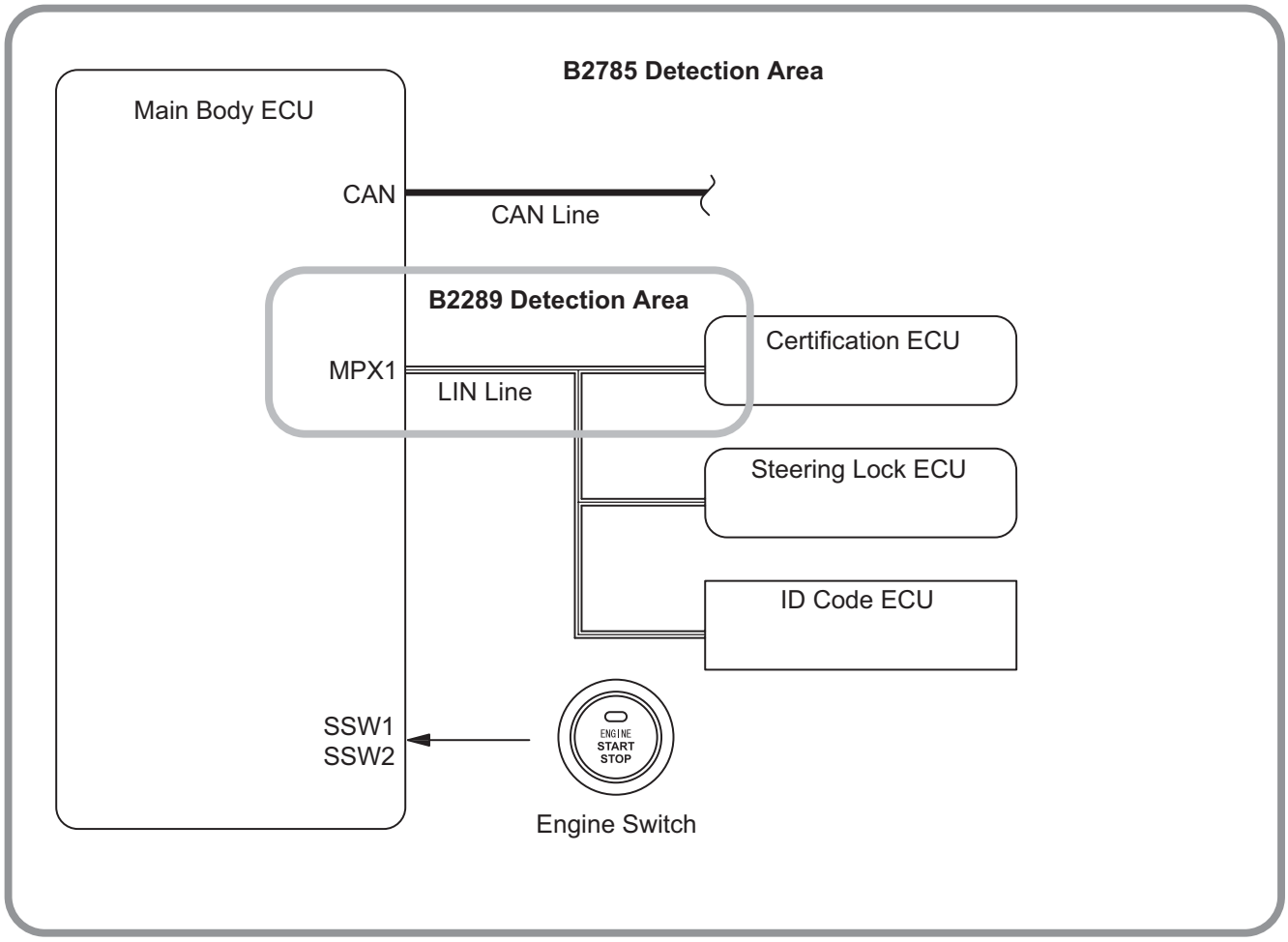
END (MAIN BODY ECU DEFECTIVE)

DTC	B2289	Key Collation Waiting Time Over

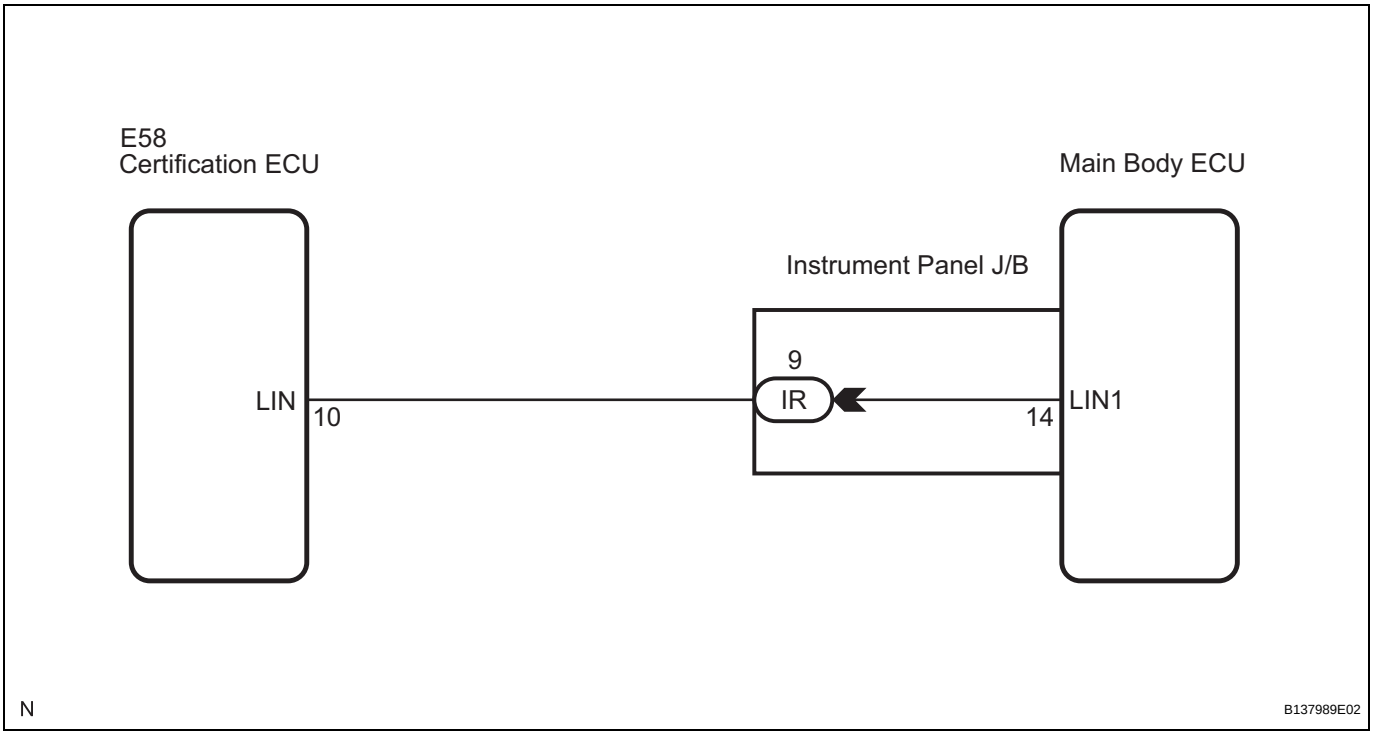
DESCRIPTION

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-8).

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



WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(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-29).

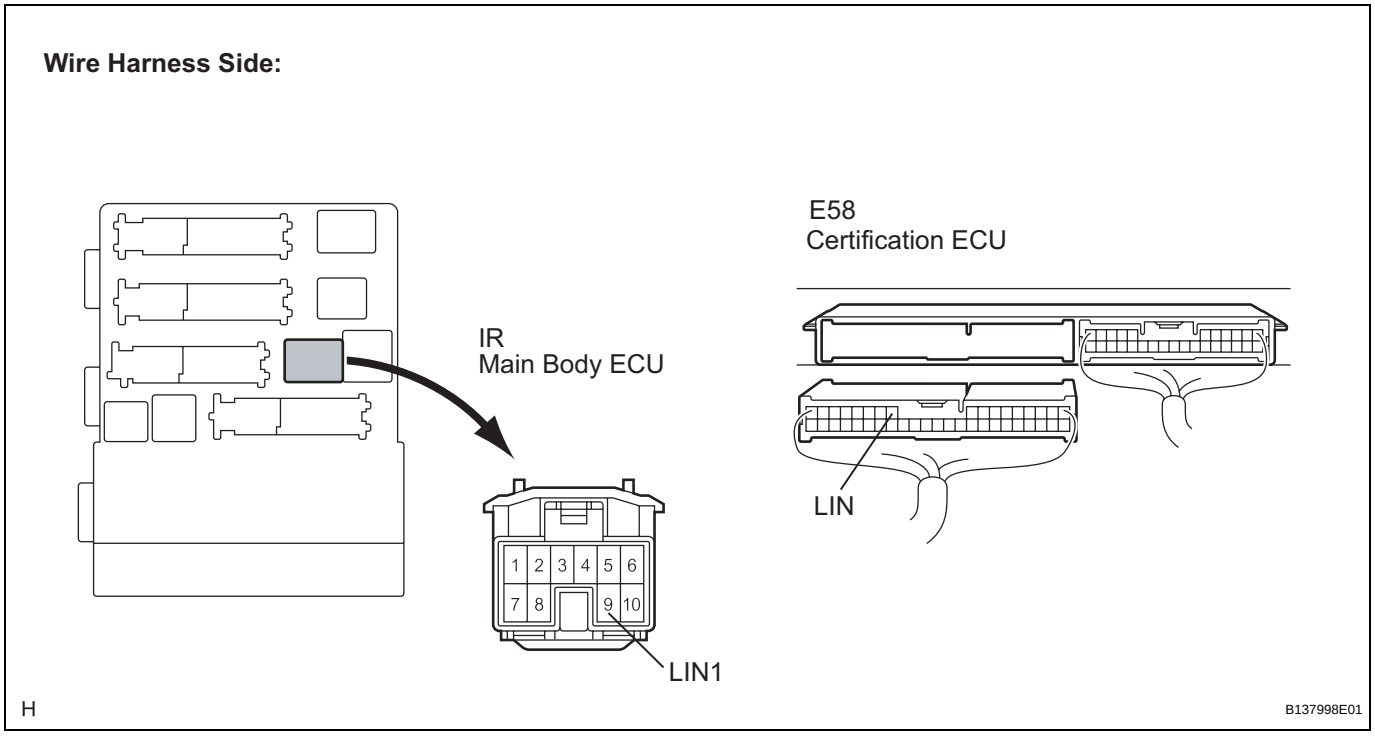
B → GO TO DTC B2785

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

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 engine starts.

OK:

Engine can start normally.

HINT:

If the engine does not start, refer to PROBLEM SYMPTOMS TABLE of the smart key system (entry) (matching for the inside of the cabin cannot be performed) (See page DL-147).

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

ST

OK

END (MAIN BODY ECU DEFECTIVE)

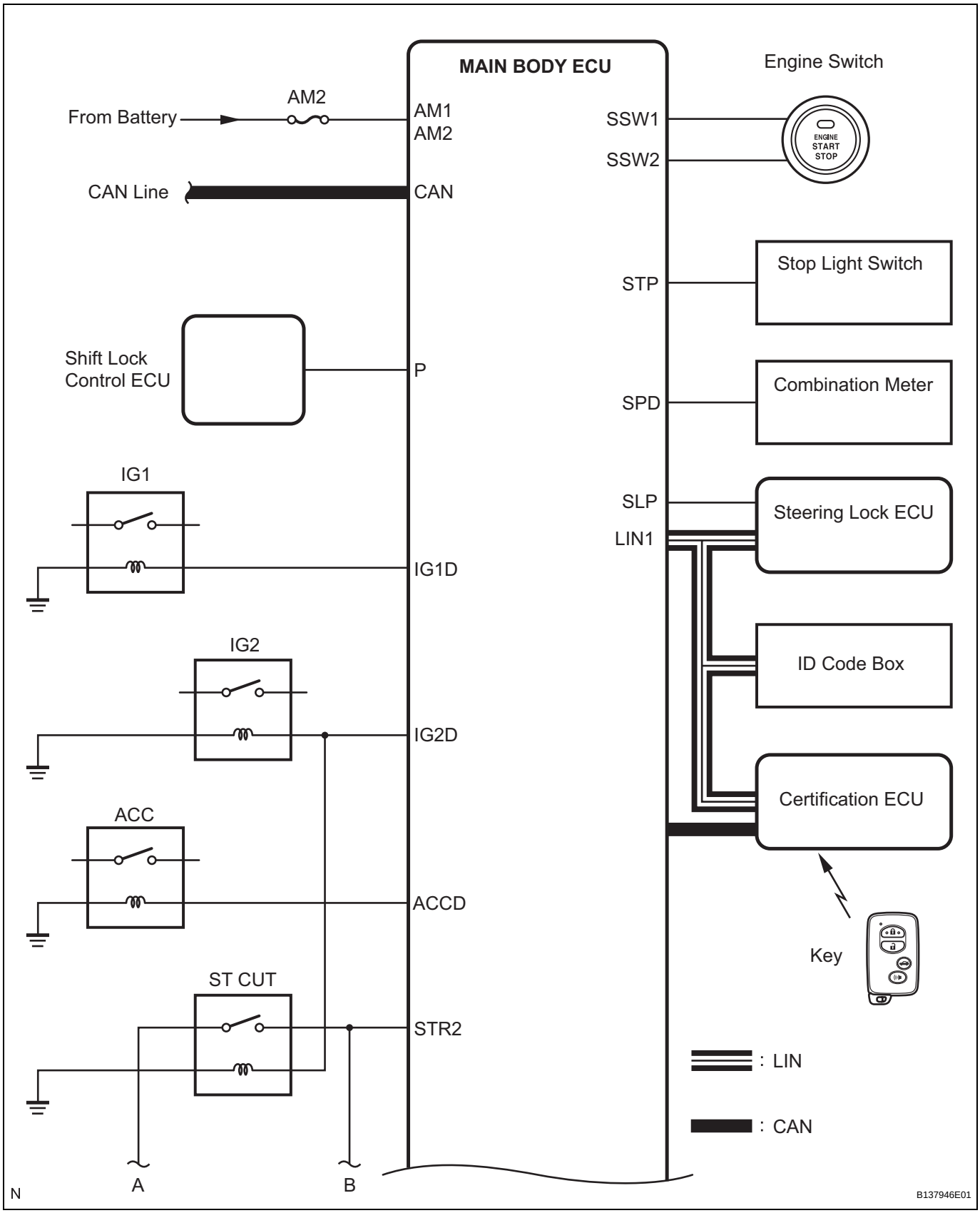
Engine does not Start

DESCRIPTION

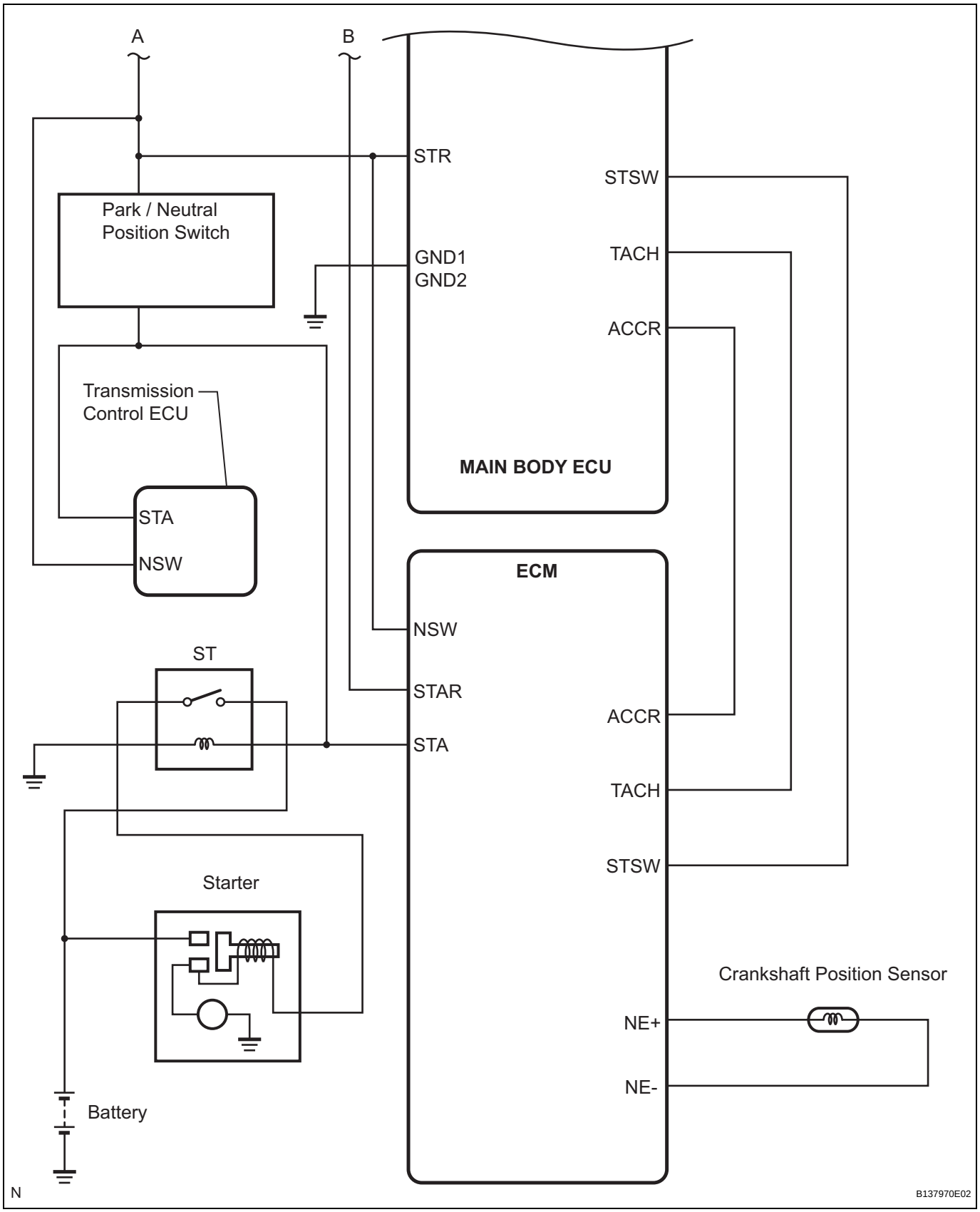
1. ENGINE START SYSTEM FUNCTION

(a) If the engine switch is pressed with the shift lever in the P or N position and the brake pedal depressed, the main body ECU determines that it is an engine start 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 engine start request signal to the ECM.
(g) The ECM sends an ACC cut request signal to the main body ECU.
(h) The ECM and main body ECU activate the ST relay.
(i) The main body ECU deactivates the ACC relay until the ECU detects an engine start.
(j) When engine revolution speed reaches 200 rpm, the main body ECU determines that the engine has been started.
The ECU reactivates the ACC relay and turns off the engine switch indicator light.

Symbols of main body ECU	Signals
STP	Stop light switch ON signal
SSW1/SSW2	Engine switch ON signal
ACCD	ACC relay operation signal
IG2D	IG2 relay operation signal
STR2	ST relay operation signal
STR	Park/neutral position switch signal
TACH	Engine start detection signal
STSW	Starter activation request signal
ACCR	ACC cut request signal


MAIN BODY ECU
Engine Switch
From Battery
AM2
AM1
AM2
SSW1
SSW2
ENGINE START STOP
CAN Line
CAN
Stop Light Switch
STP
Shift Lock Control ECU
P
Combination Meter
SPD
IG1
SLP
Steering Lock ECU
LIN1
IG1D
IG2
ID Code Box
IG2D
Certification ECU
ACC
ACCD
Key
ST CUT
STR2
: LIN
: CAN
A
B
N
B137946E01

ST



WIRING DIAGRAM

See CRANKING HOLDING FUNCTION CIRCUIT (See page ES-455).

ST

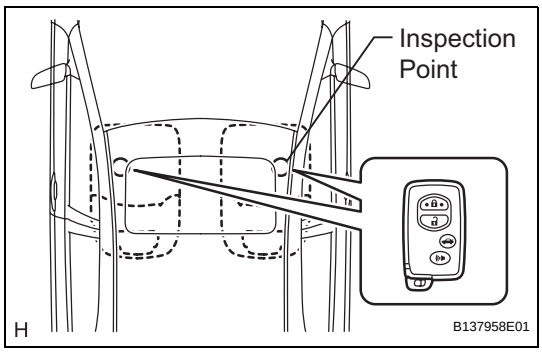
INSPECTION PROCEDURE

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

HINT:
After the main body ECU, certification ECU, steering lock ECU, ID code box and/or ECM are/is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

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 engine switch indicator illuminates in green.
OK:
Engine switch illuminates in green.
HINT:
If the engine switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE (See page ST-17).

NG → **GO TO OTHER PROBLEM**

OK ↓

2	CHECK IF ENGINE STARTS (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 engine switch off. Check if the engine can be started.
OK:
Engine can be started.
HINT:
After the battery is discharged and then recharged, the engine 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-26).
(b) Check for DTCs again.
OK:
No DTC is output.

HINT:
- If smart key system (start) DTCs are output (See page ST-28).
- If smart key system (entry) DTCs are output (See page DL-159).
- If electrical steering lock DTCs are output (See page EI-25).
- If engine immobiliser system DTCs are output (See page SR-15).
- If engine control system DTCs are output (See page ES-63).

NG → **GO TO DTC CHART**

OK ↓

4	CHECK ENGINE 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 engine 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-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK ↓

5	CHECK CRANKING FUNCTION

(a) Check the engine cranking function.
(1) When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.
OK:
Engine cranks.

OK → **Go to step 21**

NG ↓

6	READ VALUE OF INTELLIGENT TESTER (P SIGNAL)

(a) Connect the intelligent tester to the DLC3.

ST

(b) Turn the engine 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 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, perform troubleshooting for DTC B2281 first (See page ST-60).

NG → **GO TO DTC B2281**

OK

7 READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine 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-72).

NG → **GO TO DTC B2284**

OK

8 READ VALUE OF INTELLIGENT TESTER (STEERING LOCK)

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

ST

MAIN BODY:

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

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-28).

NG → GO TO DTC B2285

OK

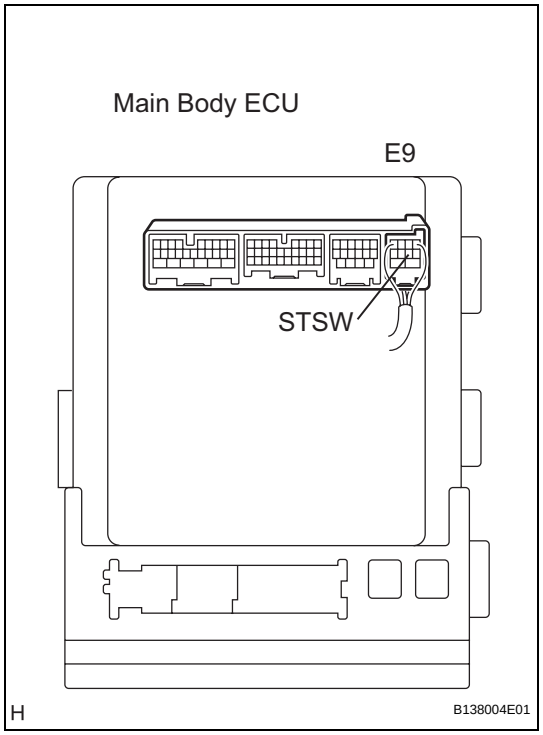
9 CHECK STEERING LOCK

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

NG → GO TO STEERING LOCK SYSTEM

OK

10 INSPECT MAIN BODY ECU (STSW VOLTAGE)



(a) Disconnect the A55 ECM 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, engine switch held on (ST)	Output voltage at terminal AM1 or AM2 is - 2 V or more.

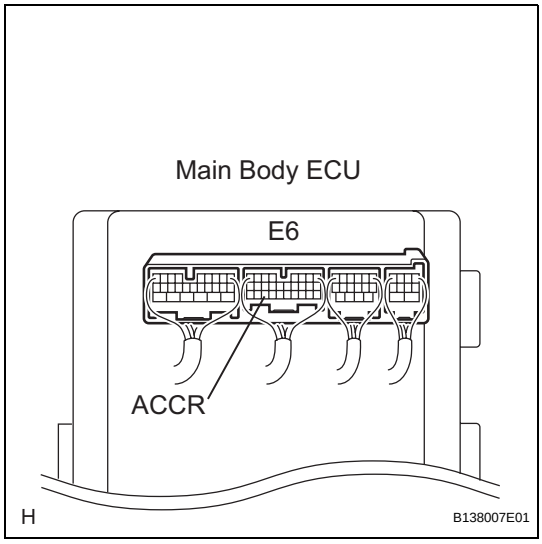
HINT:
If the result is not as specified, perform troubleshooting for DTC B2275 first (See page ST-48).

NG → GO TO DTC B2275

OK

ST

11 INSPECT ECM (ACCR VOLTAGE)



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

Standard voltage

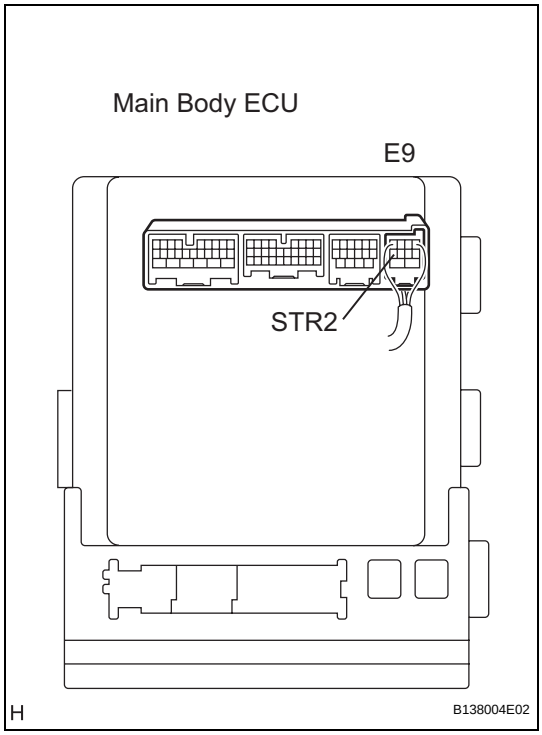
Tester Connection (Symbols)	Condition	Specified Condition
ACCR (E6-3) - GND2 (IM-9)	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V*1 → Output voltage at terminal AM1 or AM2 is -2 V or more.

*1: Voltage is output only when the engine is cranking.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2276 first (See page ST-51).

NG → **GO TO DTC B2276**

OK

12 INSPECT ECM (STR2 VOLTAGE)



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

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
STR2 (E9-6) - GND2 (IM-9)	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	Output voltage at terminal AM1 or AM2 is -3.5 V or more.*1

*1: Voltage is output for 0.3 seconds when the engine is cranking to start.

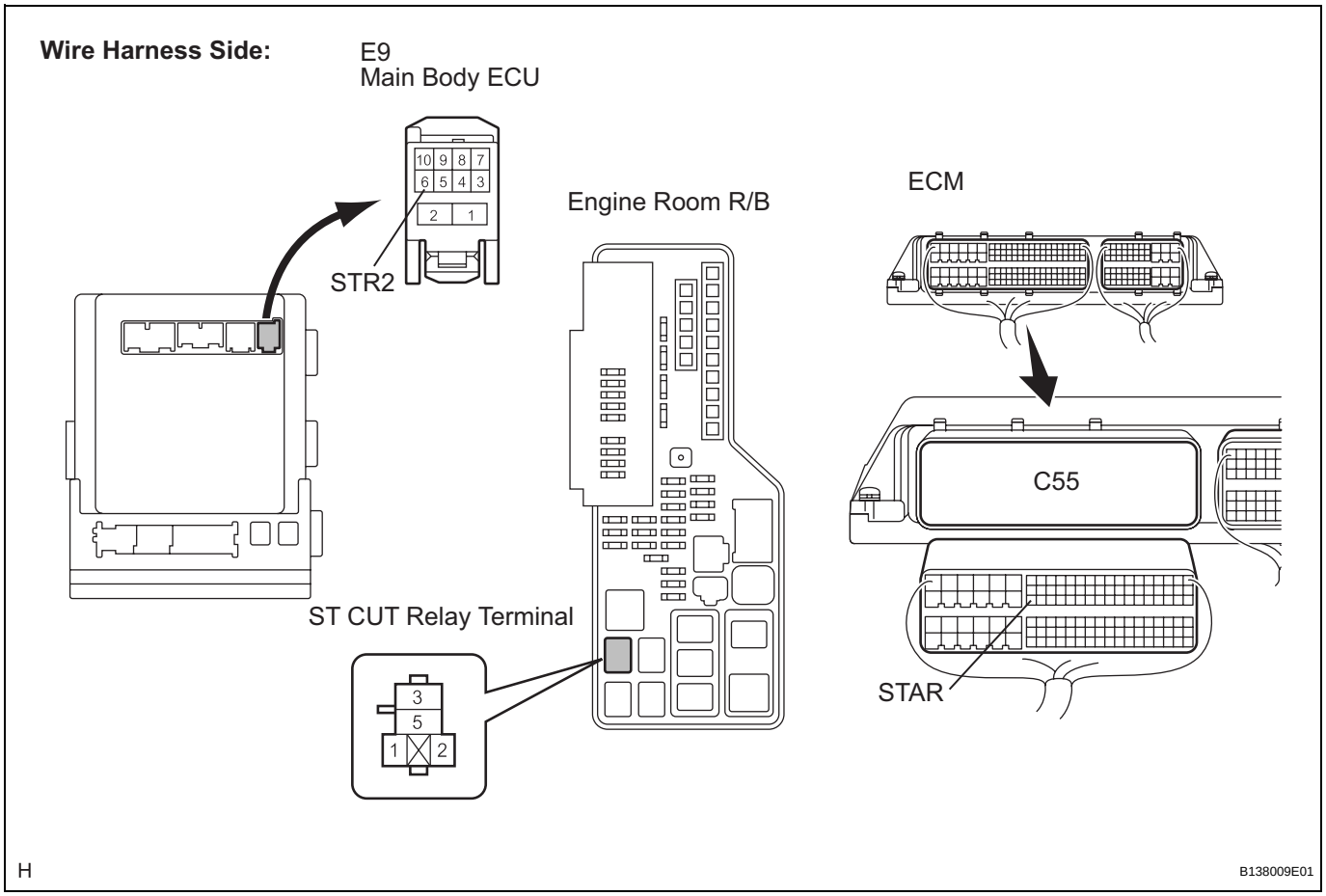
NG → **REPLACE ECM**

OK

13 CHECK WIRE HARNESS (MAIN BODY ECU -ECM - ENGINE ROOM R/B)

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

ST



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

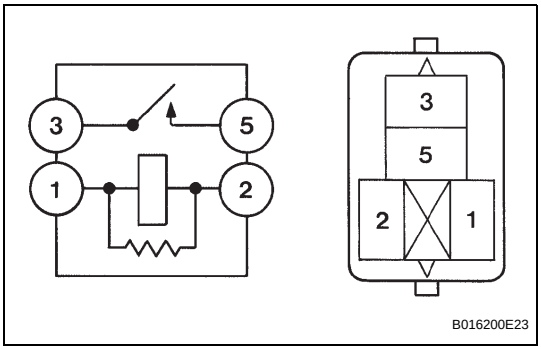
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C55-63 (STAR) - E9-6 (STR2)	Always	Below 1 Ω
C55-63 (STAR) - ST CUT relay terminal - 3	Always	Below 1 Ω
C55-63 (STAR) - Body ground	Always	10 kΩ or higher

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

OK

14 INSPECT RELAY (ST CUT)



(a) Measure the resistance of the ST CUT relay.
Standard resistance

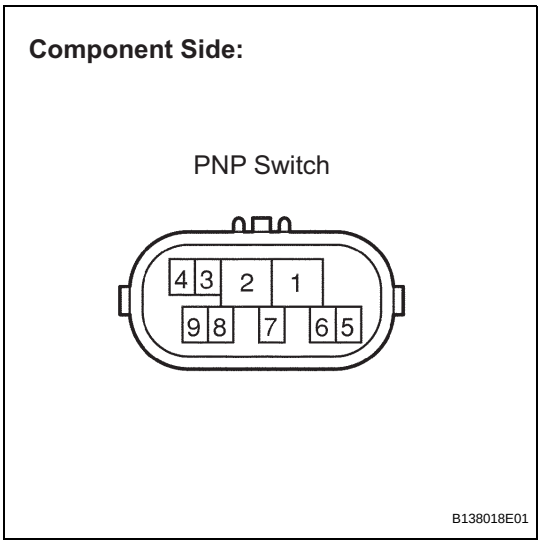
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

15 INSPECT PARK/NEUTRAL POSITION SWITCH

Component Side:



(a) Disconnect the park/neutral position (PNP) switch connector.
(b) Measure the resistance according the the value(s) in the table below.
Standard resistance

Shift Position	Tester Connection	Specified Condition
P	4 - 9	Below 1 Ω
N	4 - 9	Below 1 Ω
Except P and N	4 - 9	10 kΩ or higher

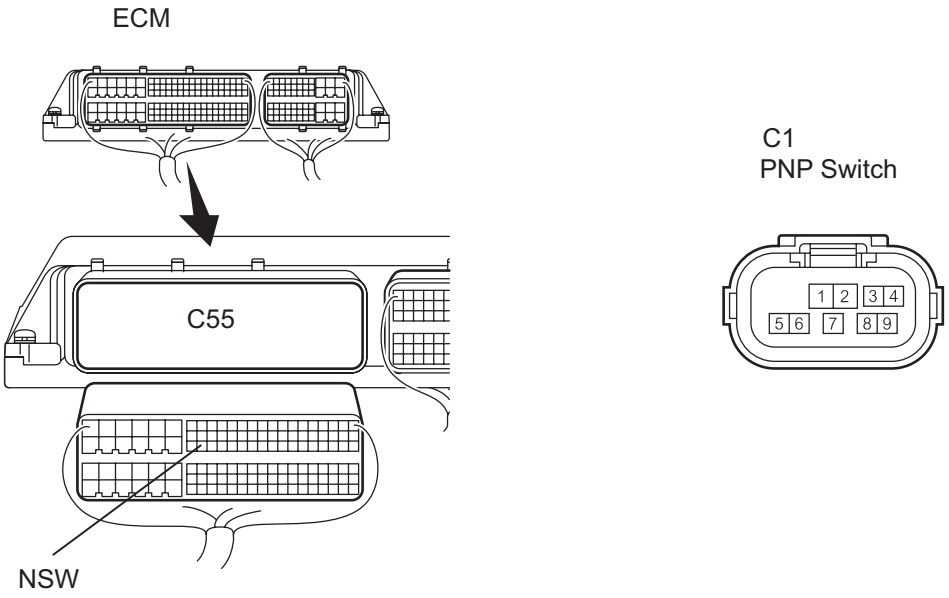
NG → **REPLACE PARK/NEUTRAL POSITION SWITCH**

OK

16 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

(a) Disconnect the C55 ECM connector.

Wire Harness Side:



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

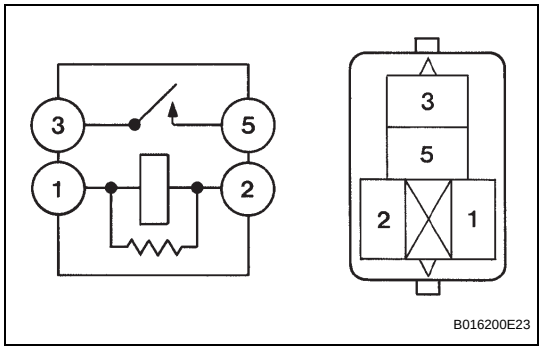
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C55-62 (NSW) - C1-4	Always	Below 1 Ω
C55-62 (NSW) - Body ground	Always	10 kΩ or higher

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

OK

17 INSPECT RELAY (ST)



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

(b) Measure the resistance of the starter relay.

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)

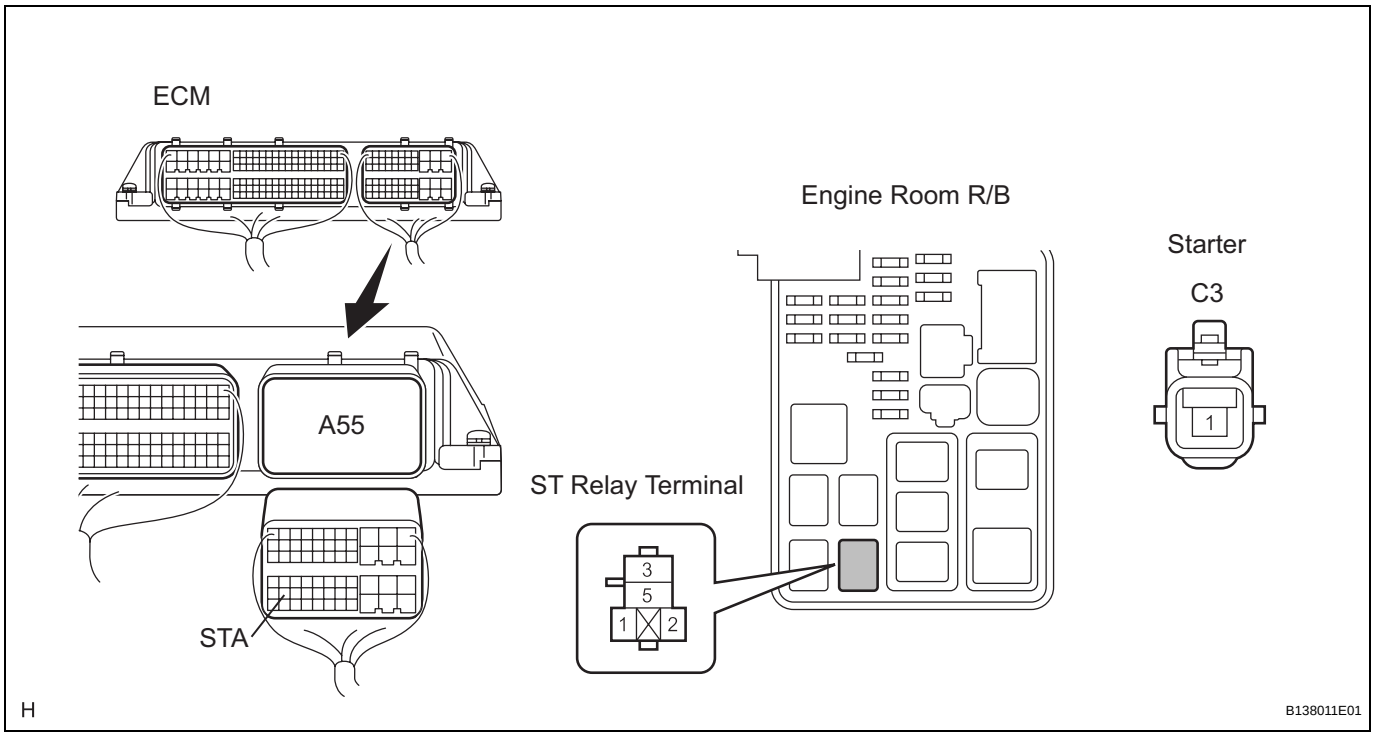
NG → **REPLACE RELAY**

OK

ST

18	CHECK HARNESS AND CONNECTOR (ECM AND STARTER - ST RELAY)

(a) Disconnect the A55 ECM connector.



(b) Disconnect the C3 starter connector.
(c) Measure the resistance according the the value(s) in the table below.

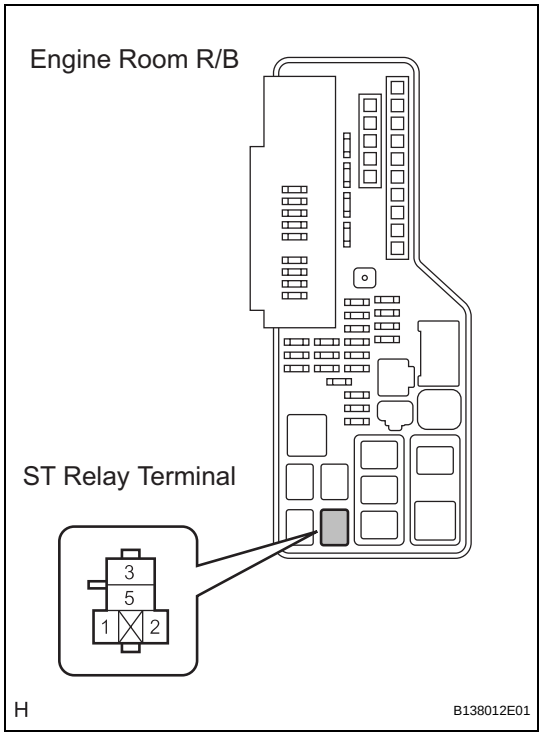
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
A55-48 (STA) - ST relay terminal - 1	Always	Below 1 Ω
A55-48 (STA) - Body ground	Always	10 kΩ or higher
C3-1 - ST relay terminal - 3	Always	Below 1 Ω
C3-1 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

19 INSPECT ENGINE ROOM RELAY BLOCK (ST RELAY VOLTAGE)



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

Standard voltage

Tester Connection	Condition	Specified Condition
ST relay terminal - 5 - Body ground	Always	9 to 14 V

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

OK

20 INSPECT STARTER ASSEMBLY

HINT:
See page ST-143.

NG → **REPAIR OR REPLACE STARTER ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (PNP SWITCH - ST RELAY, STARTER - BATTERY)

21 READ VALUE OF INTELLIGENT TESTER (L CODE)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the engine 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 engine switch on (IG).

SMART ACCESS (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

22 READ VALUE OF INTELLIGENT TESTER (ENGINE START REQUEST)

(a) Connect the intelligent tester to the DLC3.

HINT:

When using the intelligent tester with the engine 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 engine switch on (IG).

SMART ACCESS (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
START RQST	Start request signal response / OK or NG	OK: Received NG: Not received	-

OK:

OK (received) and NG (not received) appear on the screen.

NG → **REPLACE CERTIFICATION ECU**

OK

23 READ VALUE OF INTELLIGENT TESTER (S CODE)

(a) Connect the intelligent tester to the DLC3.

HINT:

When using the intelligent tester with the engine 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 engine switch on (IG).

SMART ACCESS (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.

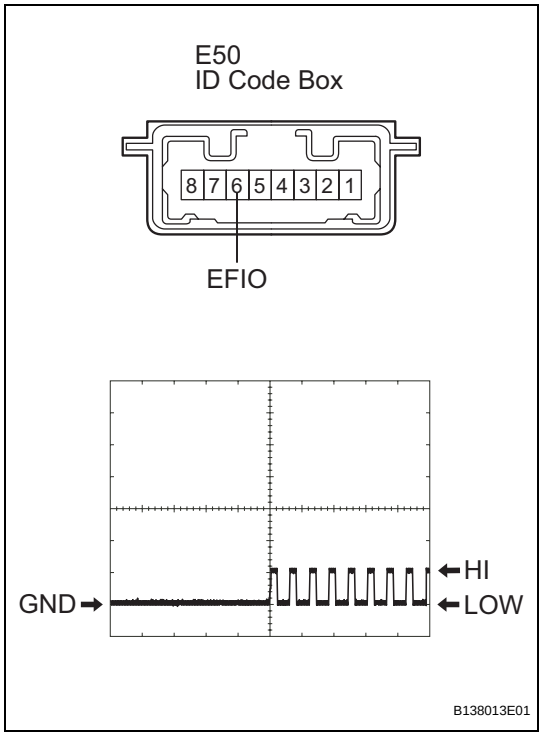
HINT:

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

24 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 engine 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	Engine switch on (IG)

NG → **REPLACE ID CODE BOX**

OK

END

ST

Engine Switch Indicator Circuit

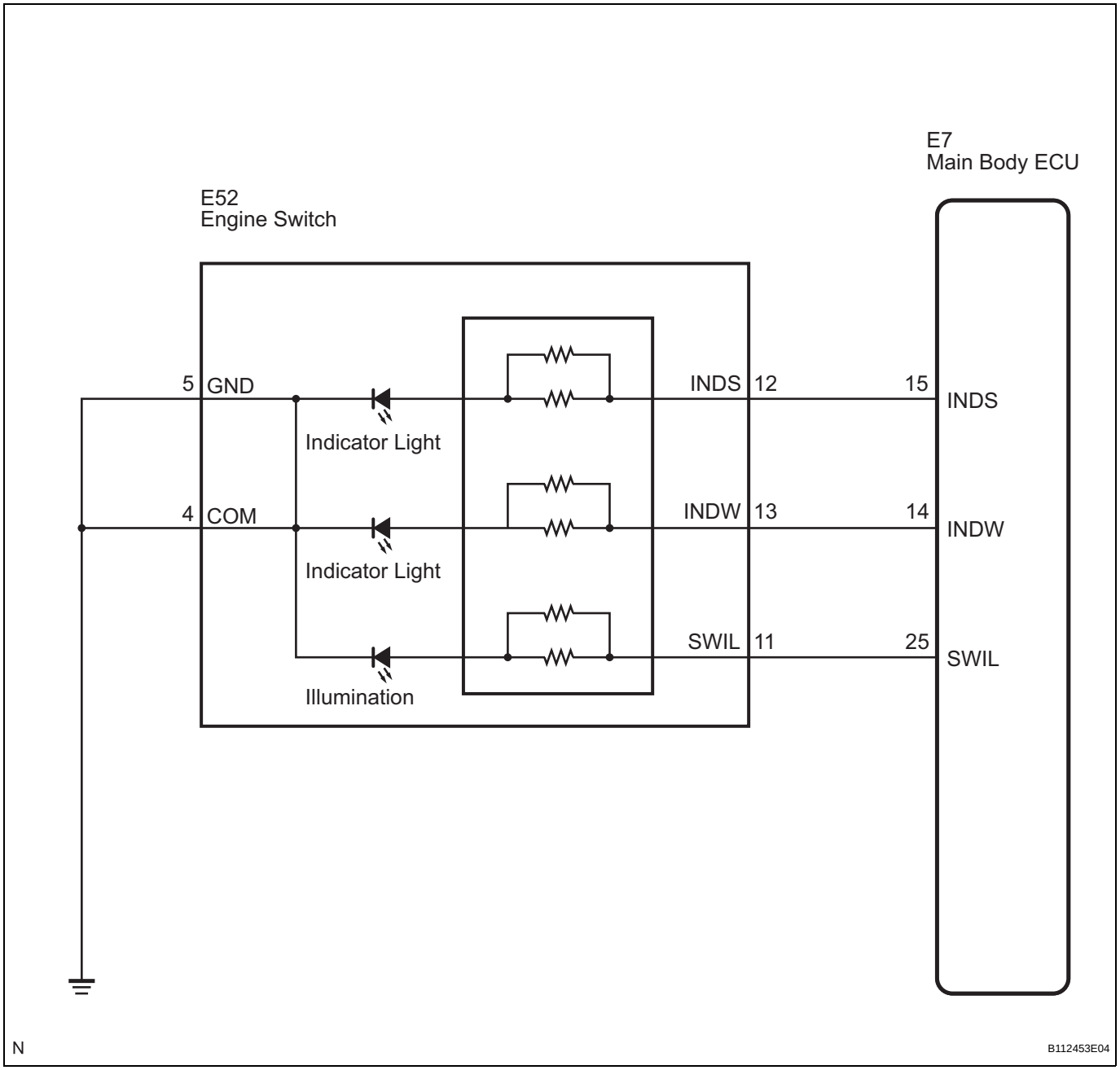
DESCRIPTION

Engine start conditions or system malfunctions can be checked by the status of the engine switch indicator light.

Engine switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	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

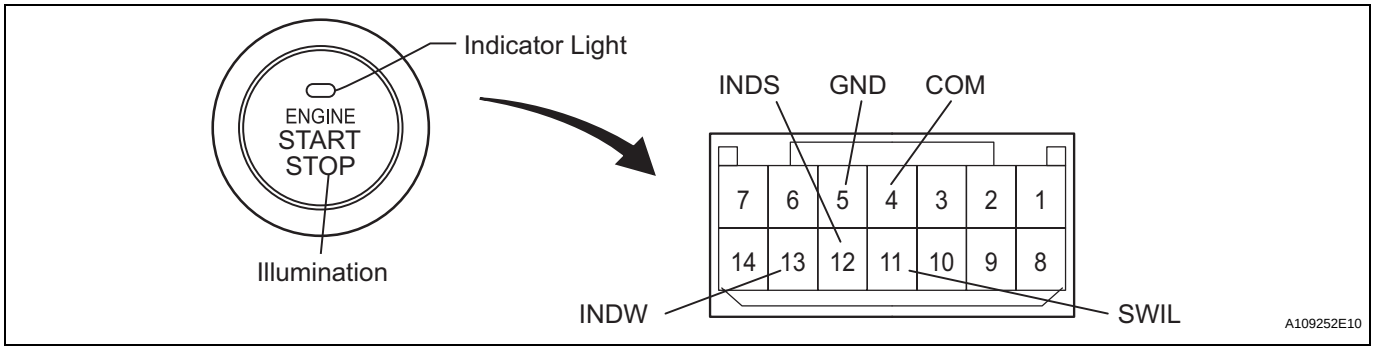


INSPECTION PROCEDURE

1	**INSPECT ENGINE SWITCH**

(a) Remove the engine switch.

ST



(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 engine switch indicator will not illuminate.**
- **If the voltage is too low, the indicator will not illuminate.**

OK

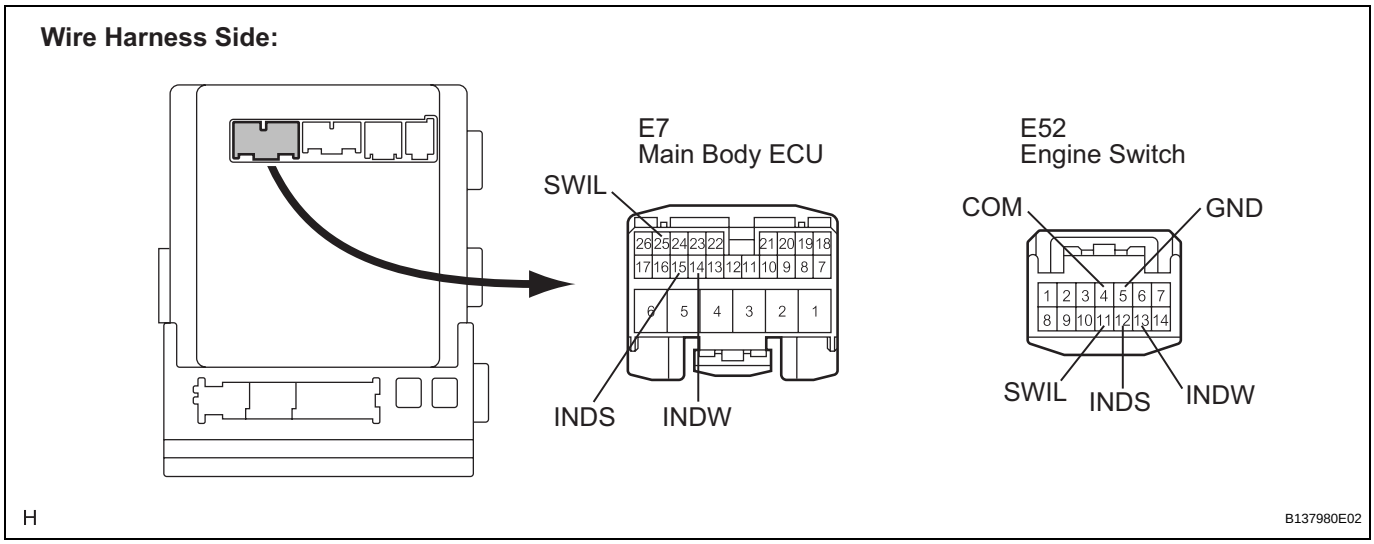
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 12 (INDS) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 13 (INDW) Battery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

NG → **REPLACE ENGINE SWITCH**

OK

2	CHECK WIRE HARNESS (ENGINE 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.

ST

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)

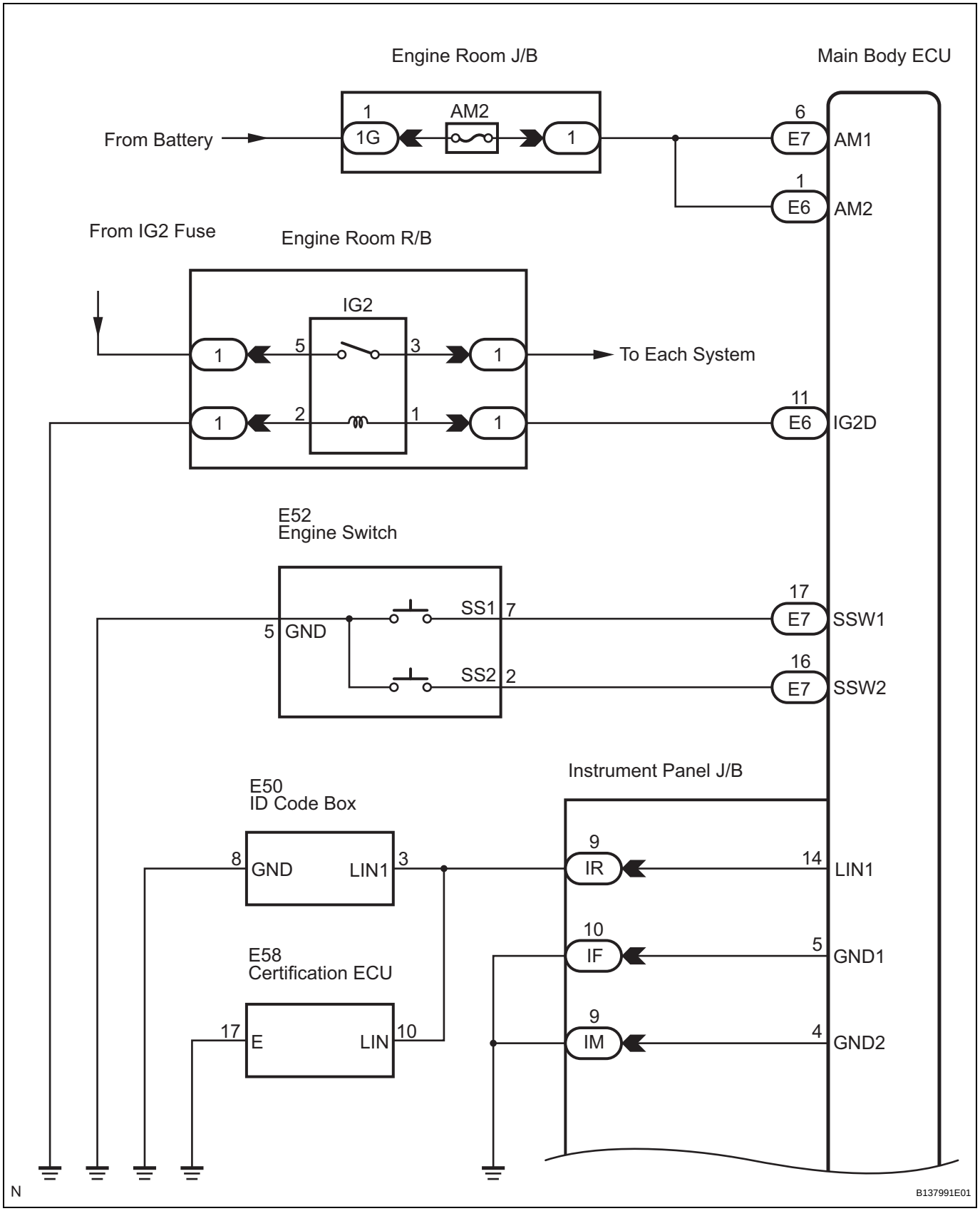
DESCRIPTION

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

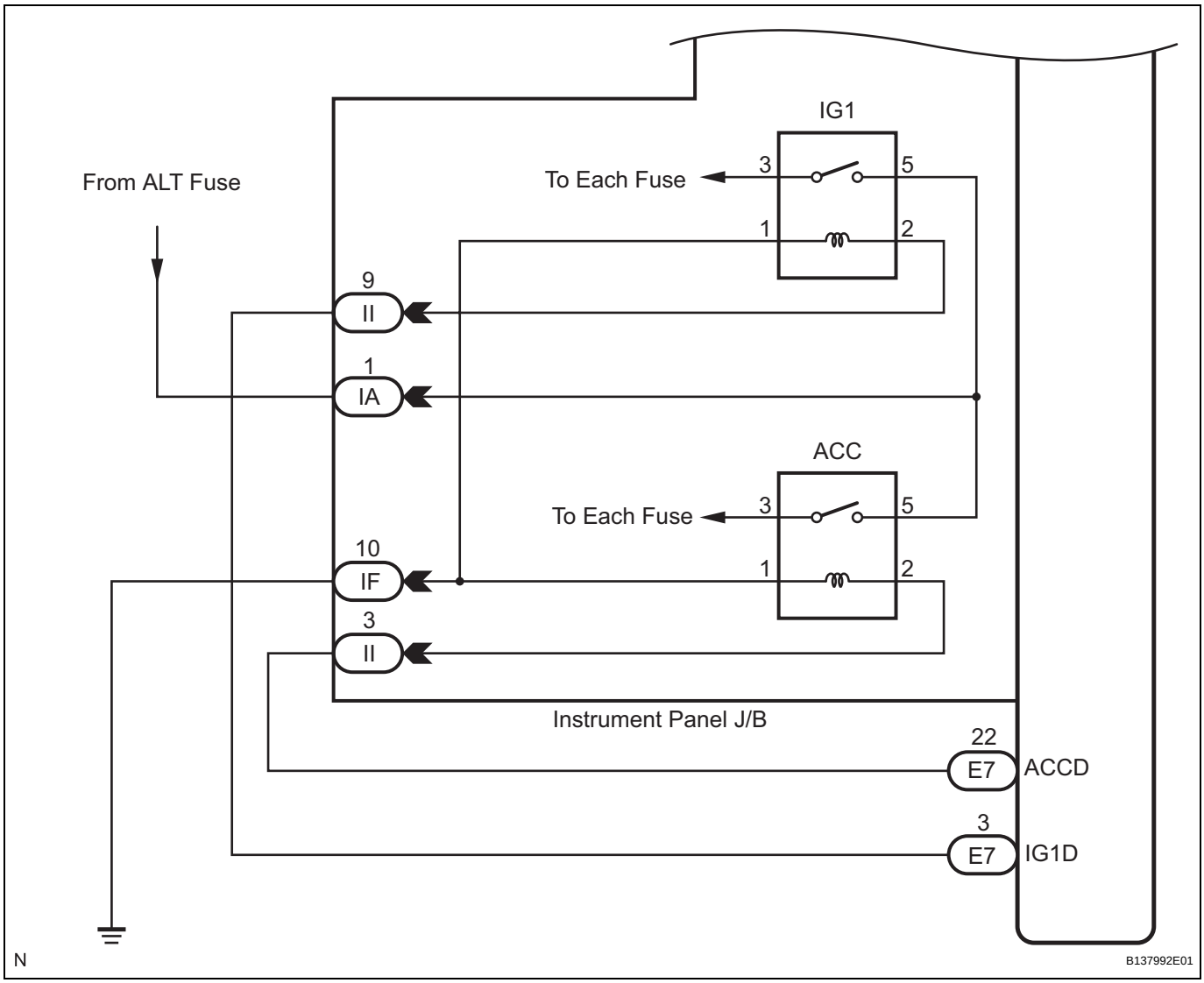
HINT:

To allow use of the intelligent tester to inspect the push-button start function when the engine 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

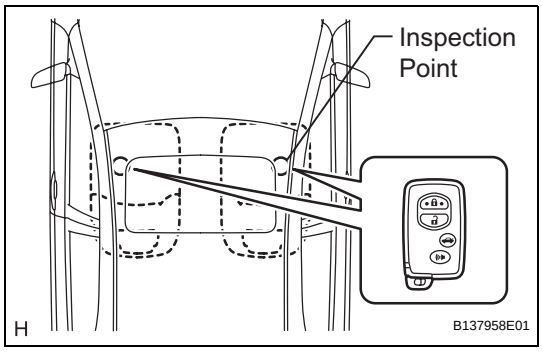


ST



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 the brake pedal is depressed, check that the engine switch indicator illuminates in green.

OK:

Engine switch illuminates in green.

HINT:

If the engine switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE (See page ST-17).

NG	GO TO OTHER PROBLEM

ST

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

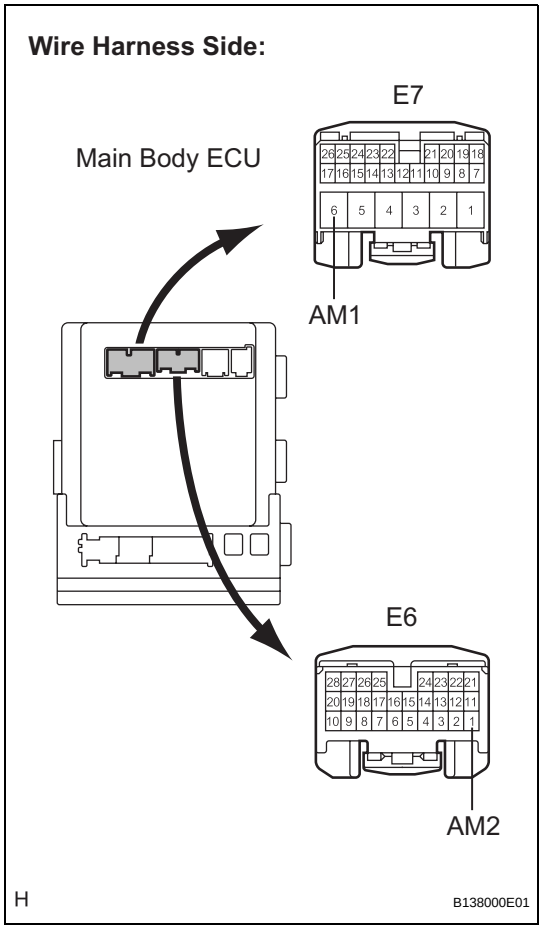
3	CHECK CONNECTORS

(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.

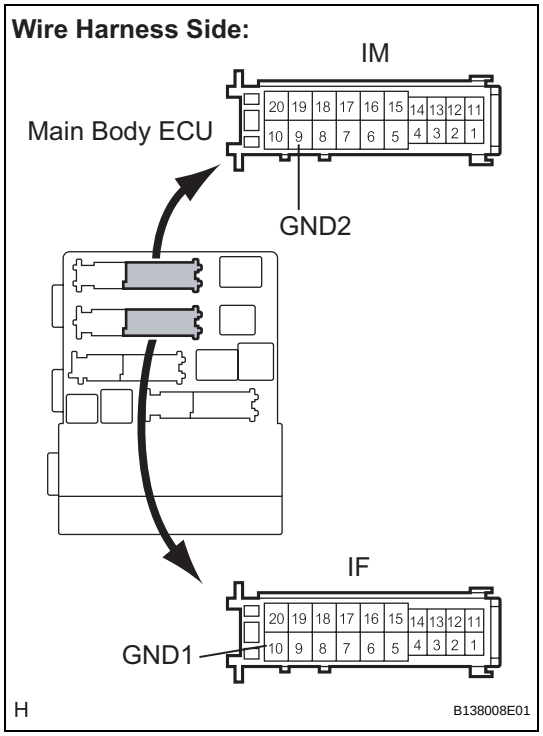
Standard voltage

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

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-26).
HINT:
After all the DTCs are cleared, check if the trouble occurs again 5 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
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 engine 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 engine 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: Engine switch on (IG) OFF: Engine switch off	-
START SW2	Start Switch 2/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-

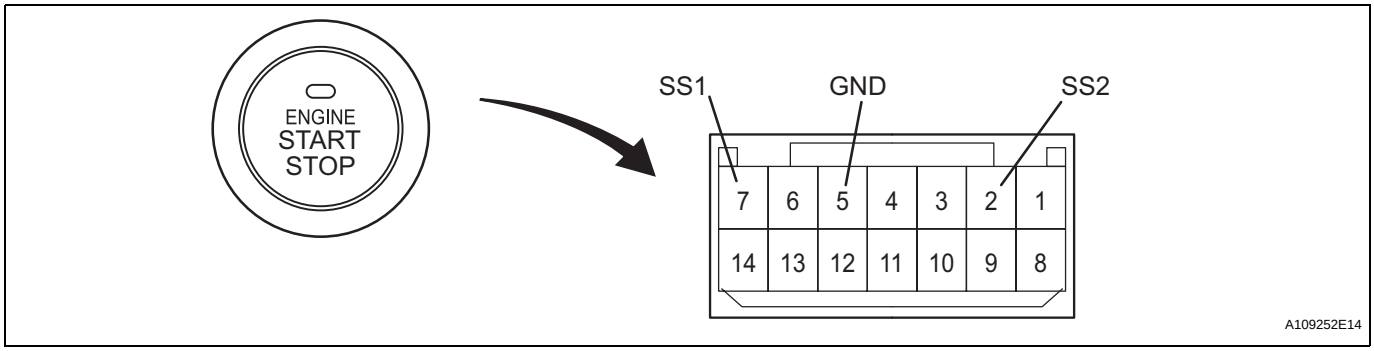
OK:
ON (engine switch on (IG)) and OFF (engine switch off) appear on the screen.

OK → **REPLACE MAIN BODY ECU**

NG

8 INSPECT ENGINE SWITCH

(a) Remove the engine 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

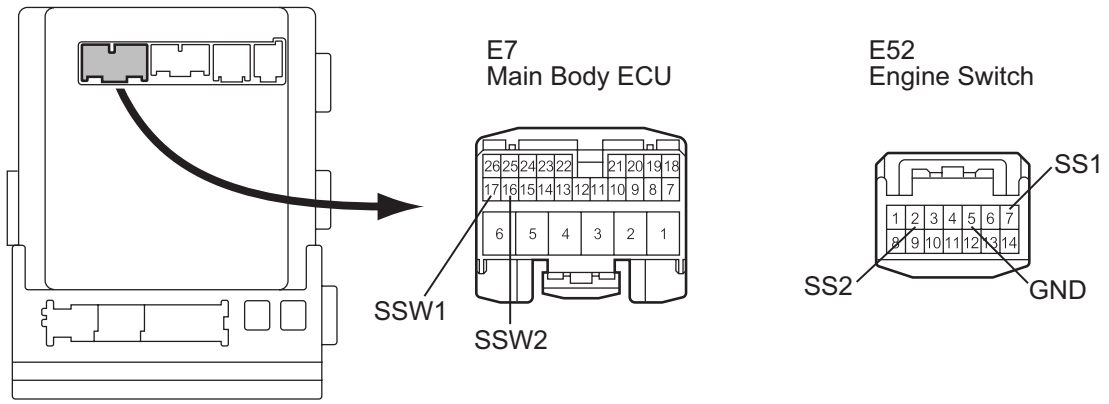
NG → **REPLACE ENGINE SWITCH**

OK

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

(a) Disconnect the E7 ECU connector.

Wire Harness Side:



H

B137980E01

(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

Power Source Mode does not Change to ON (IG)

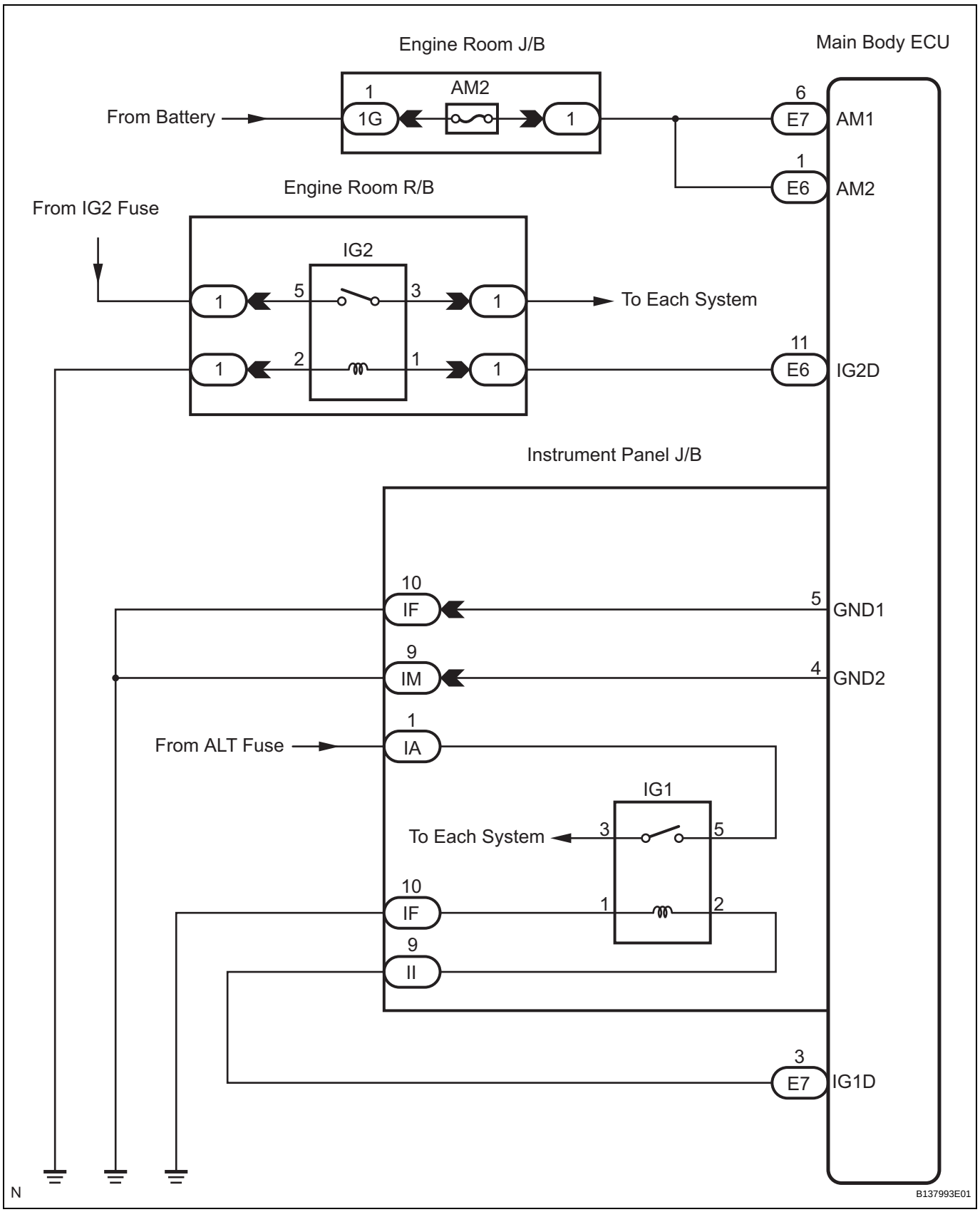
DESCRIPTION

When the engine 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 engine 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

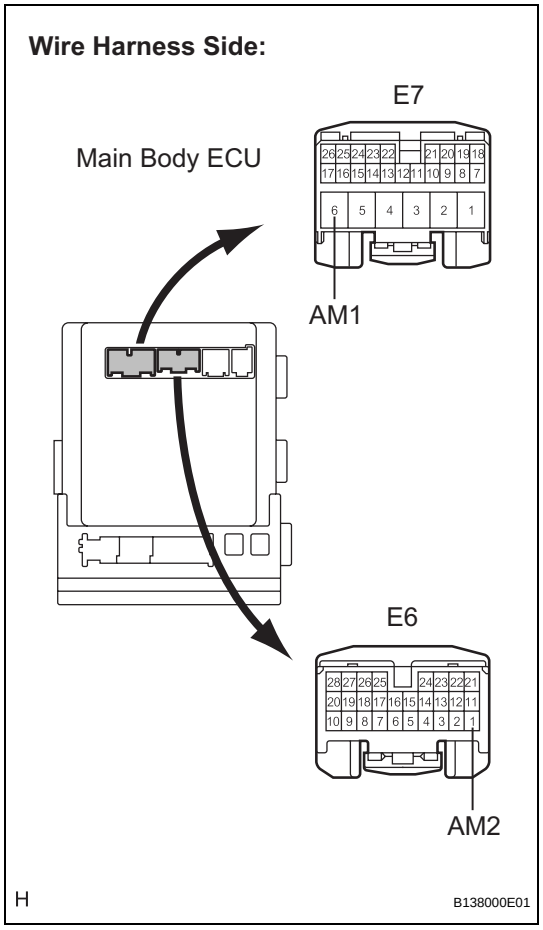
2	CHECK CONNECTORS

(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

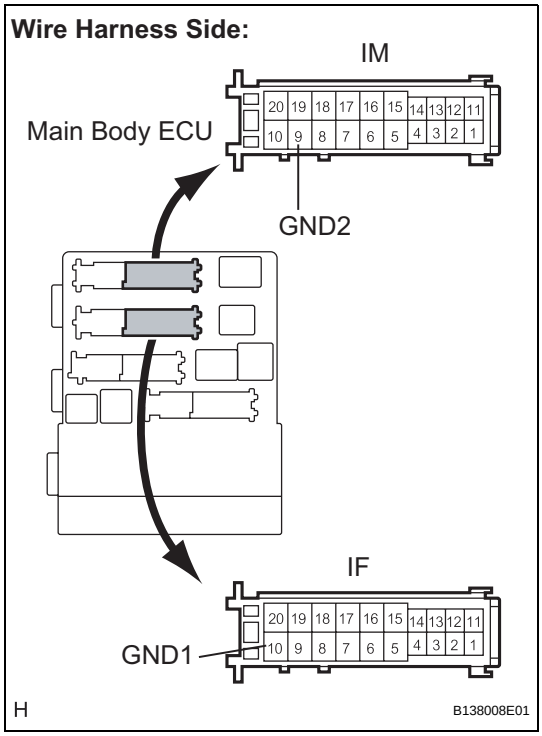
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

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.

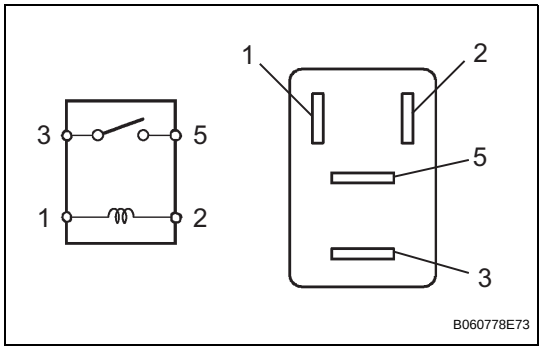
Standard resistance

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)

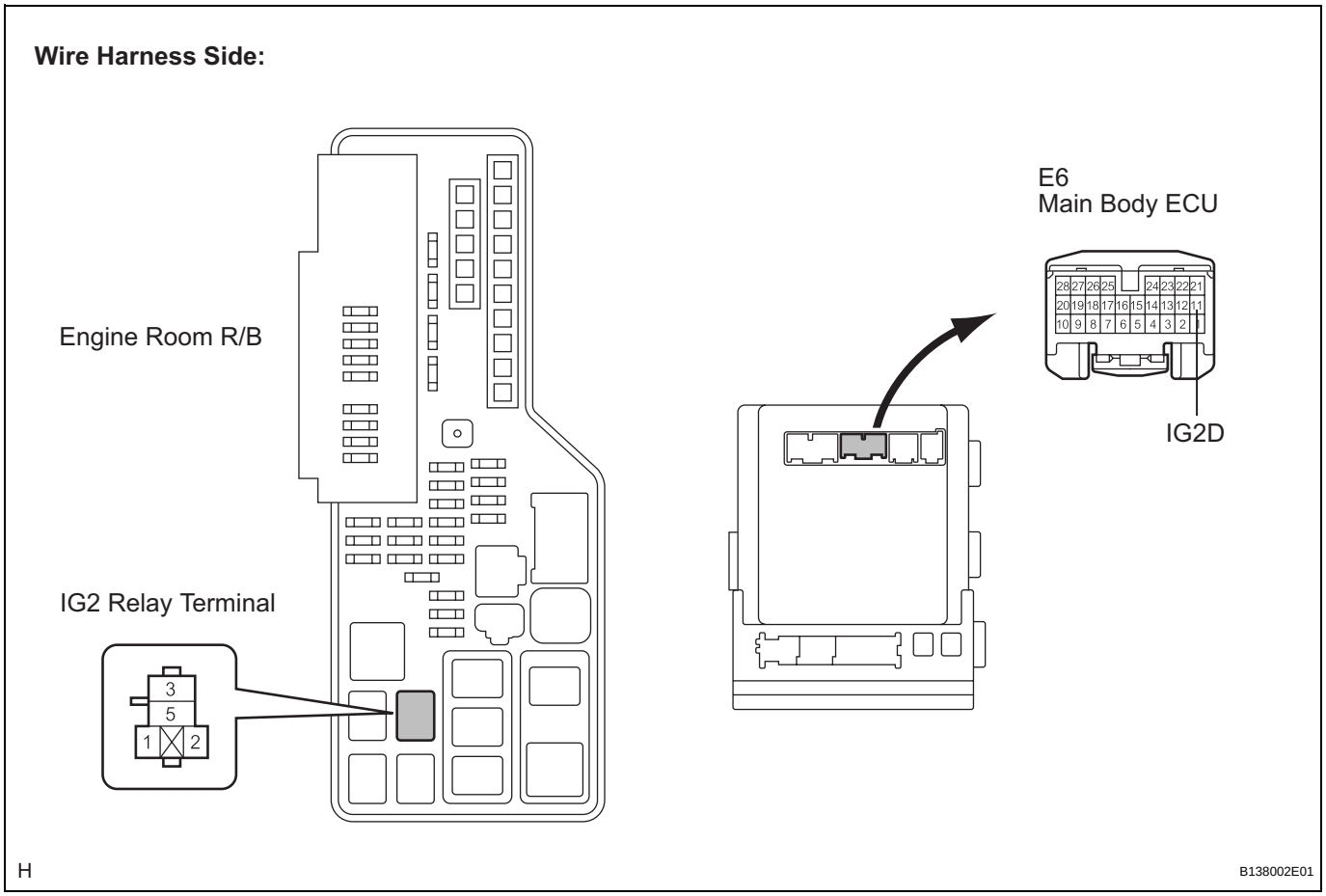
NG → **REPLACE RELAY**

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



(b) Disconnect the E6 ECU connector.

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

Standard resistance

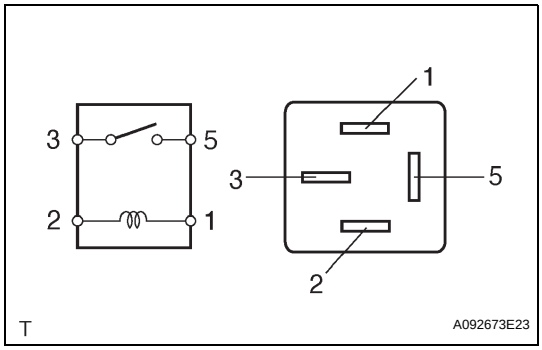
Terminal No. (Symbol)	Specified Condition
Engine room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Below 1 Ω
Engine room R/B IG2 relay terminal 2 - Body ground	Below 1 Ω
E6-11 (IG2D) - Body ground	10 kΩ or higher

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

OK

ST

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

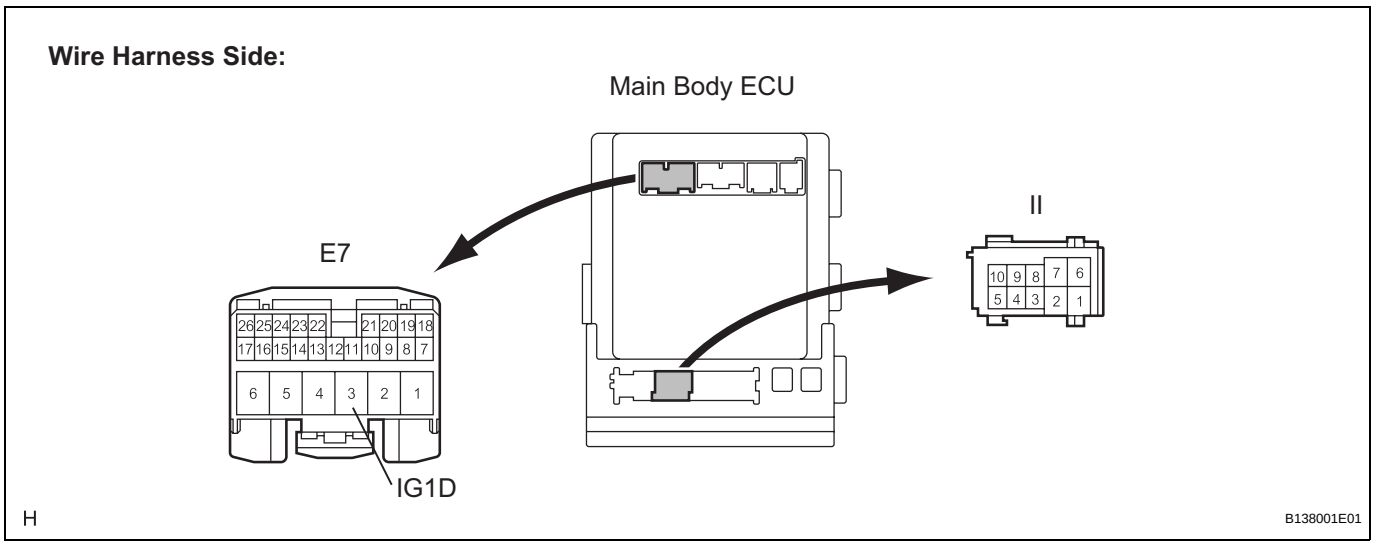
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

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

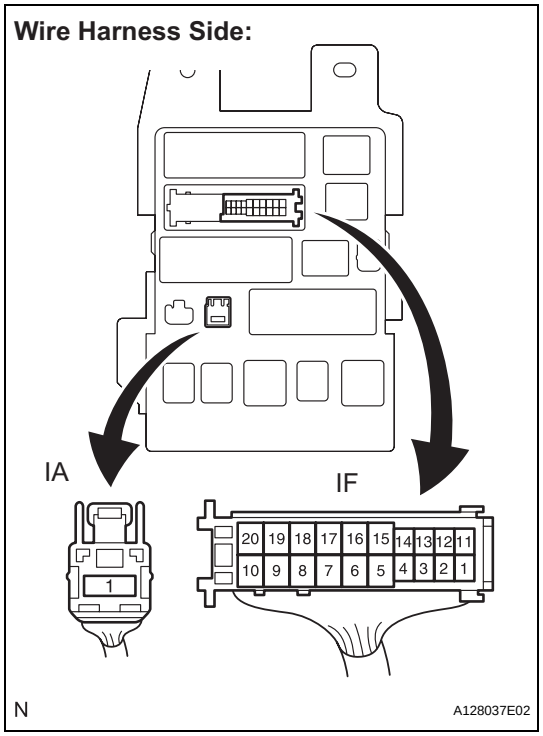
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

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

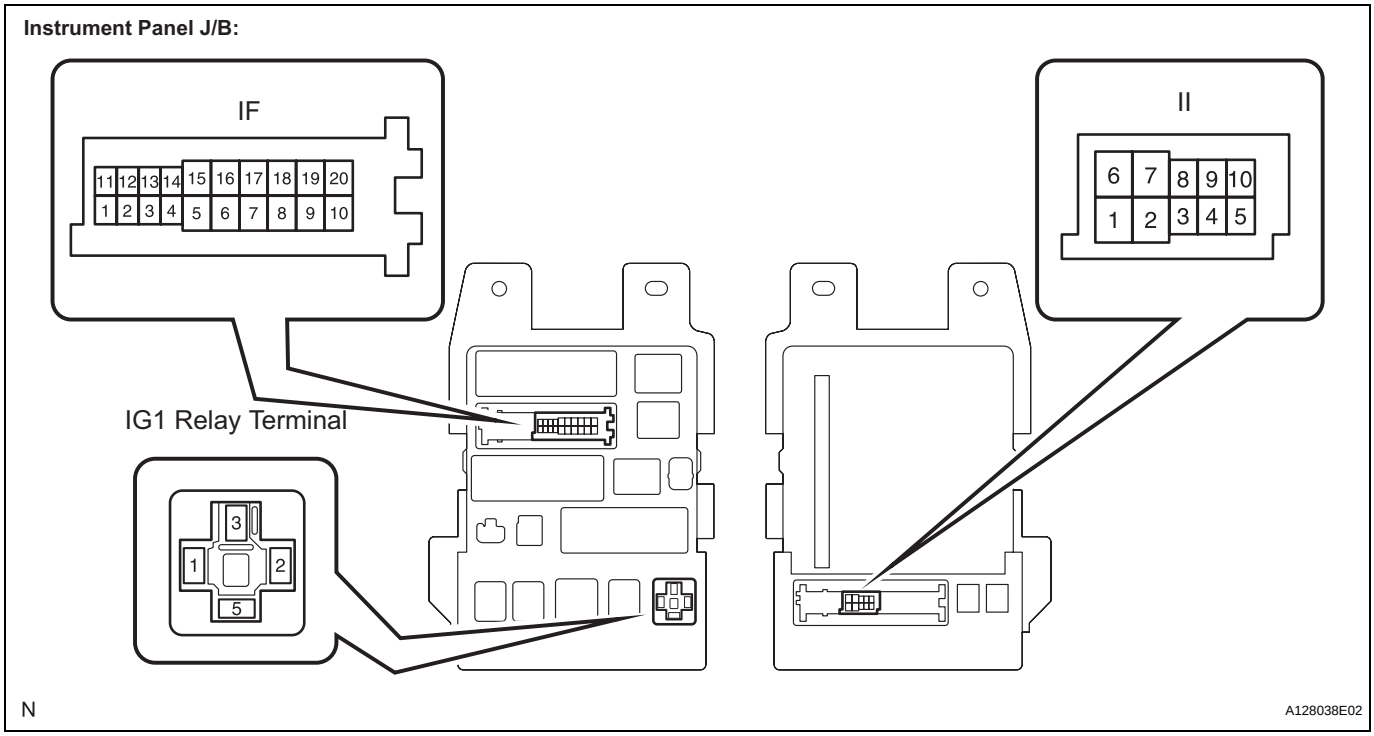
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

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

OK

10 INSPECT INSTRUMENT PANEL J/B

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



ST

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

NG → **REPLACE MAIN BODY ECU**

OK

REPLACE INSTRUMENT PANEL J/B

Power Source Mode does not Change to ON (ACC)

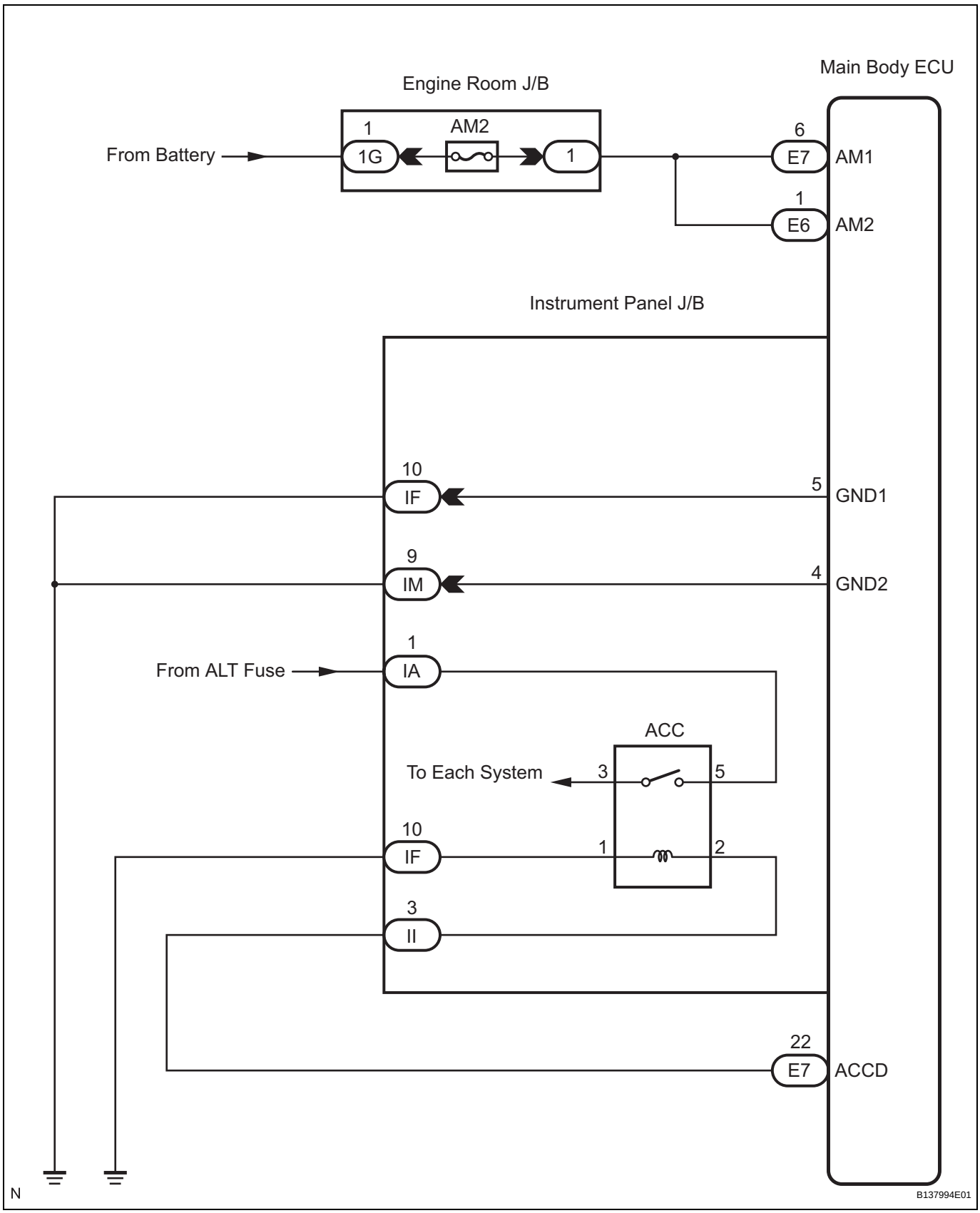
DESCRIPTION

When the engine 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 engine 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

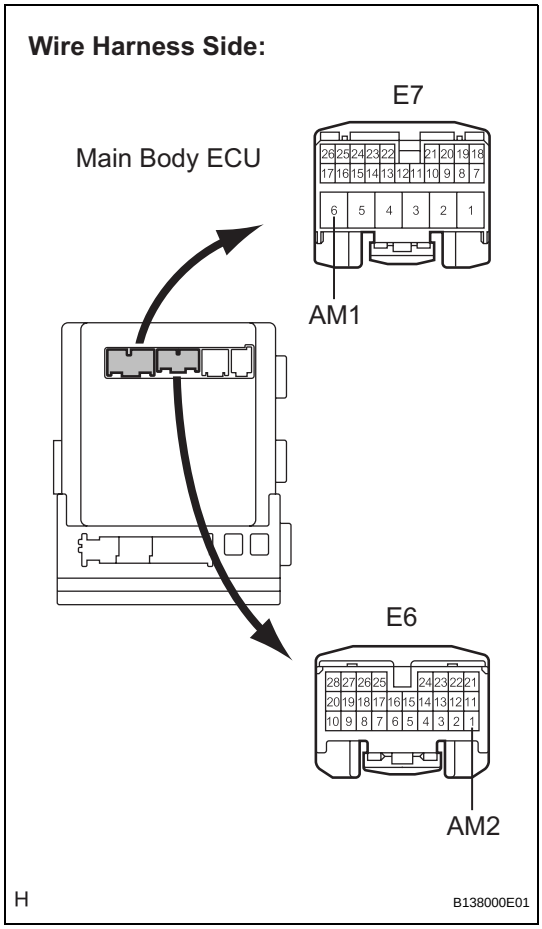
2	CHECK CONNECTORS

(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.

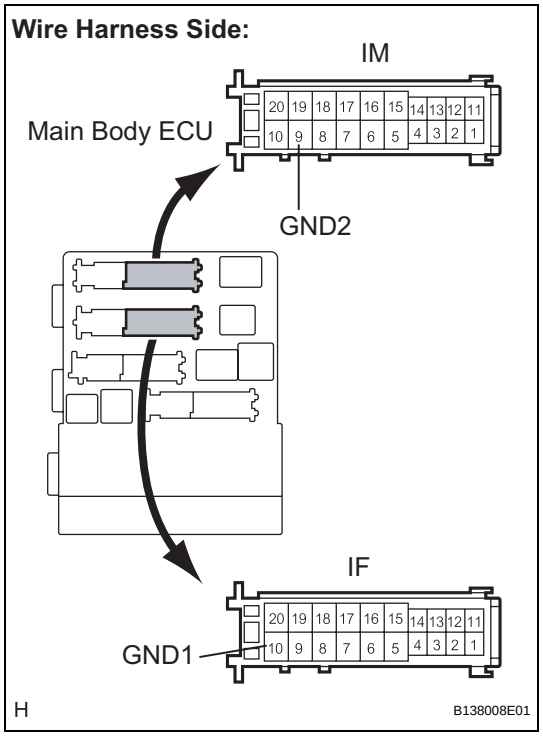
Standard voltage

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

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.

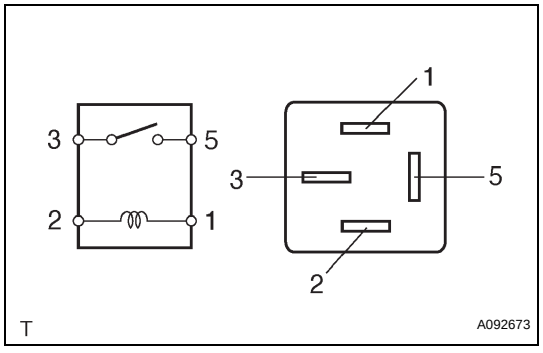
Standard resistance

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)

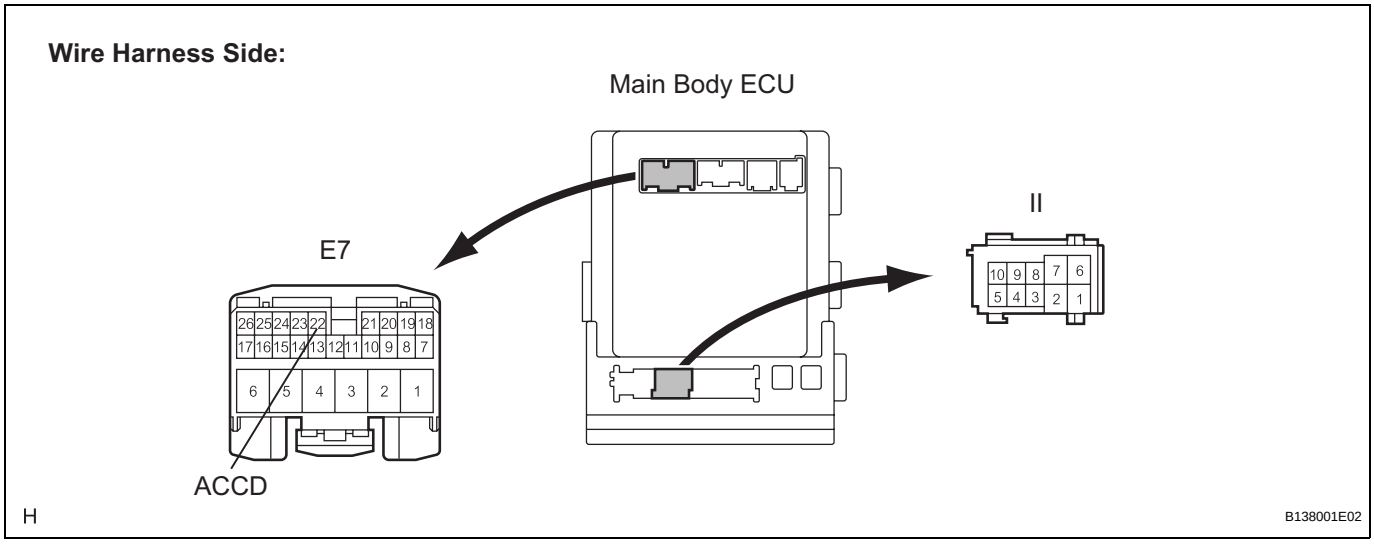
NG → **REPLACE RELAY**

OK

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

(a) Disconnect the E7 ECU connector.

ST



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

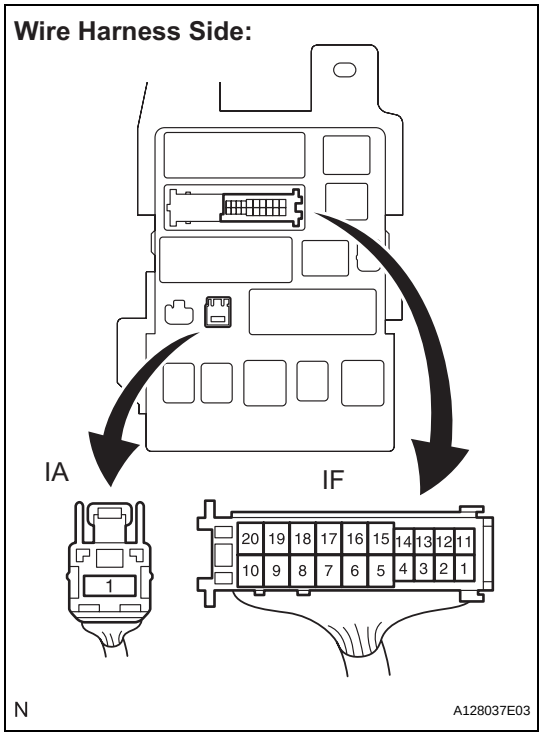
Standard resistance

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

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

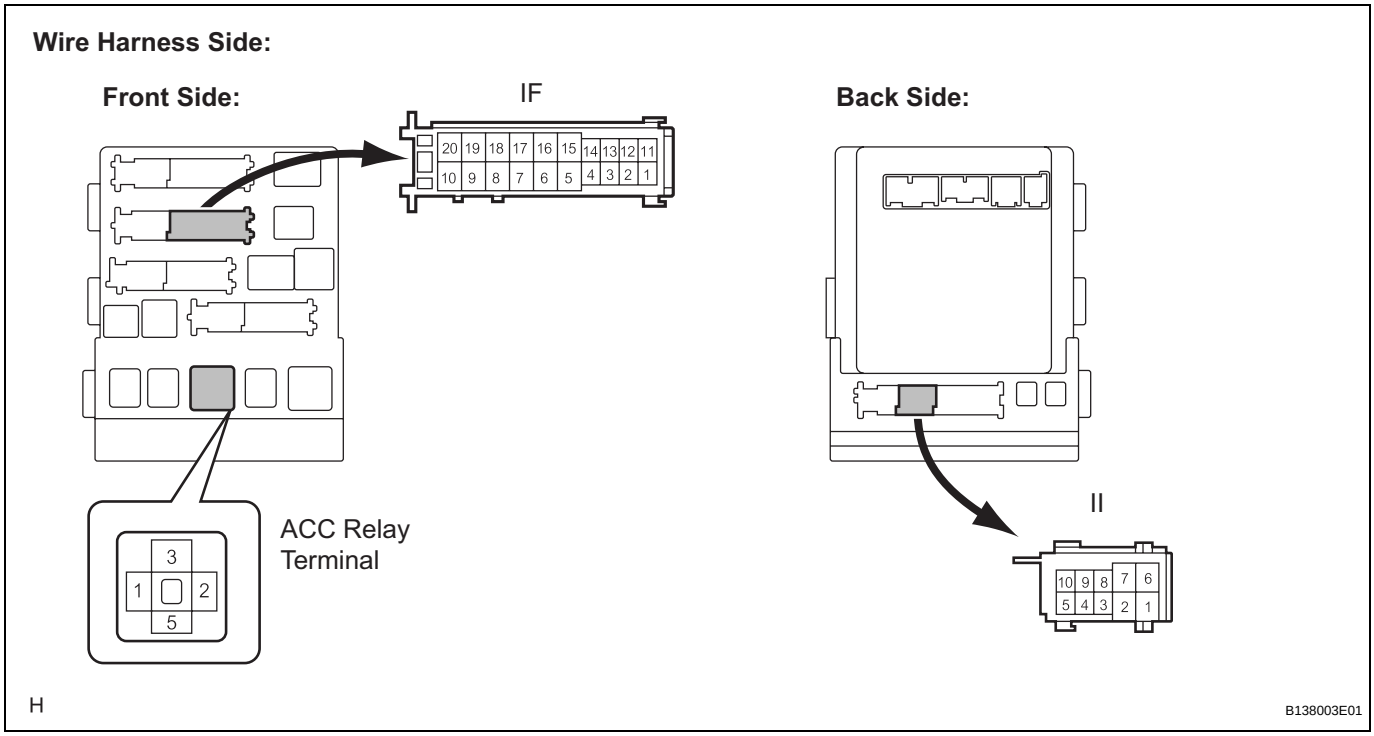
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

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.



ST

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

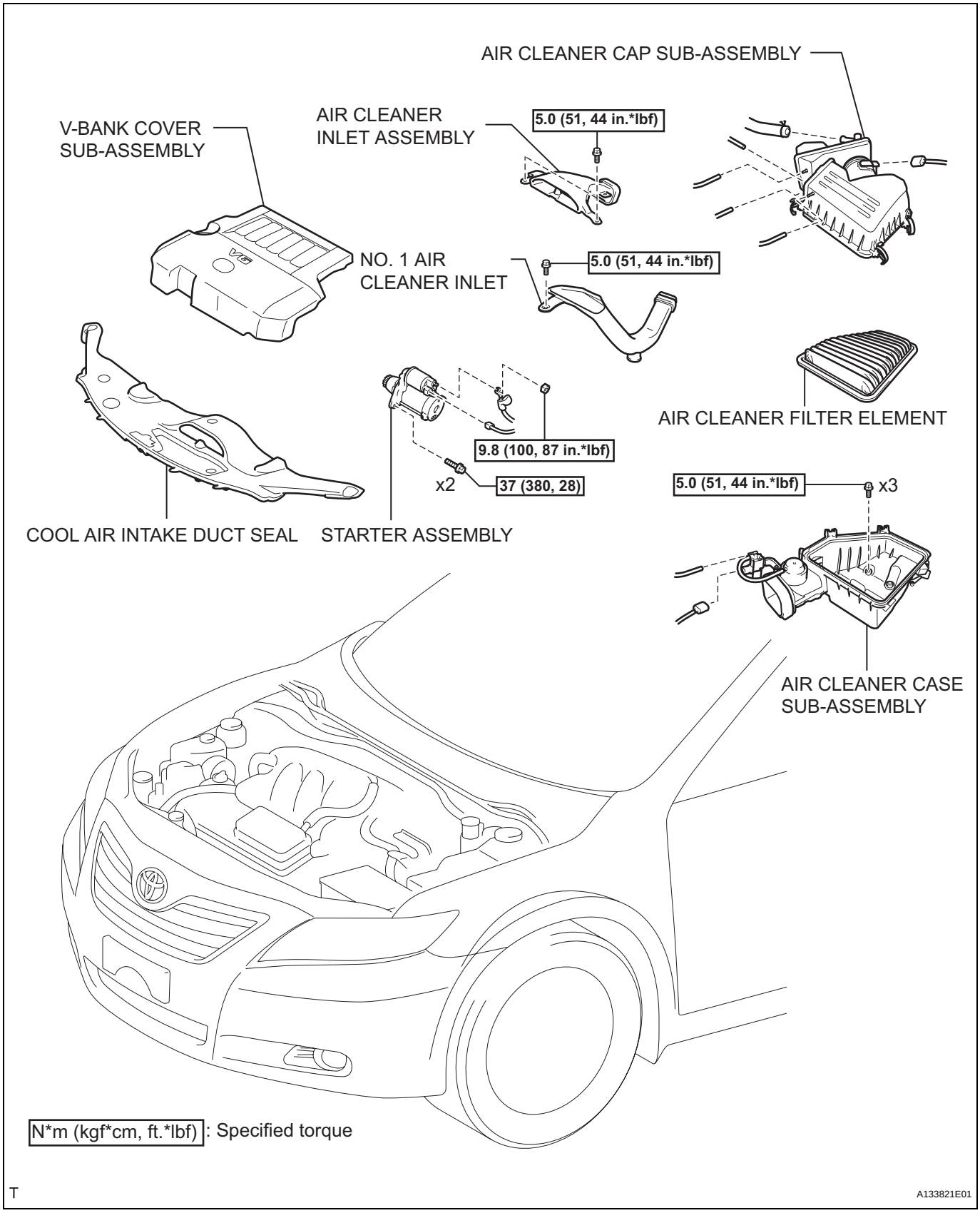
NG → REPLACE INSTRUMENT PANEL J/B

OK

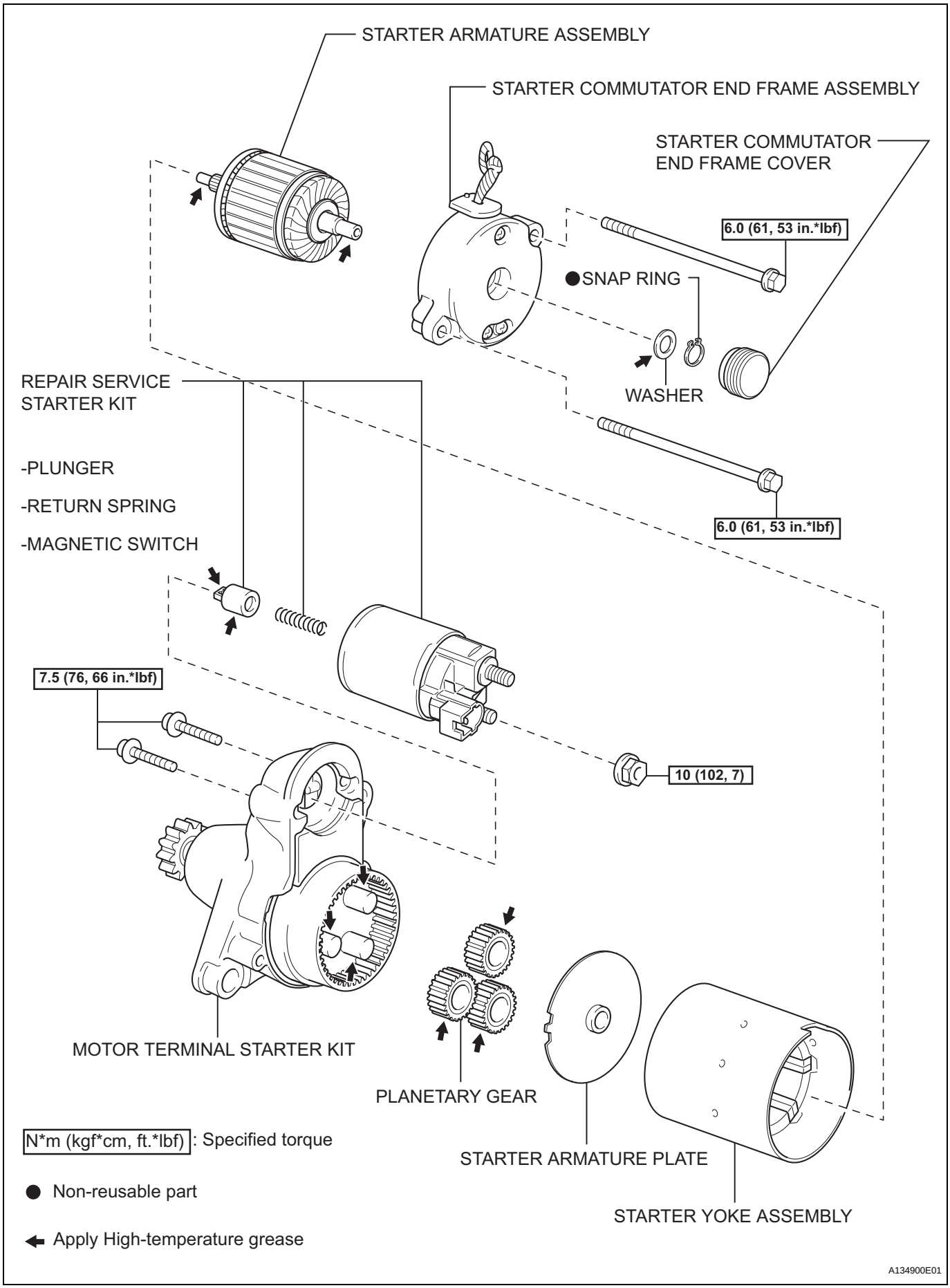
REPLACE MAIN BODY ECU

STARTER

COMPONENTS



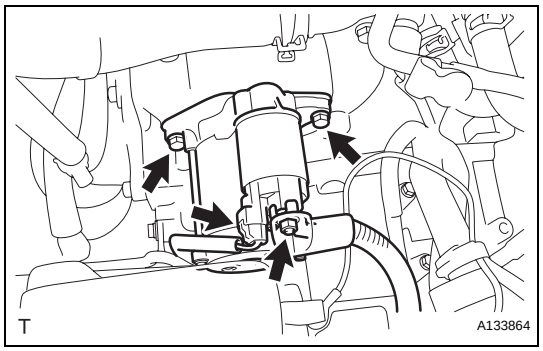
ST


STARTER ARMATURE ASSEMBLY
STARTER COMMUTATOR END FRAME ASSEMBLY
STARTER COMMUTATOR END FRAME COVER
6.0 (61, 53 in.*lbf)
●SNAP RING
WASHER
REPAIR SERVICE STARTER KIT
-PLUNGER
-RETURN SPRING
-MAGNETIC SWITCH
6.0 (61, 53 in.*lbf)
7.5 (76, 66 in.*lbf)
10 (102, 7)
MOTOR TERMINAL STARTER KIT
PLANETARY GEAR
STARTER ARMATURE PLATE
STARTER YOKE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply High-temperature grease
A134900E01

ST

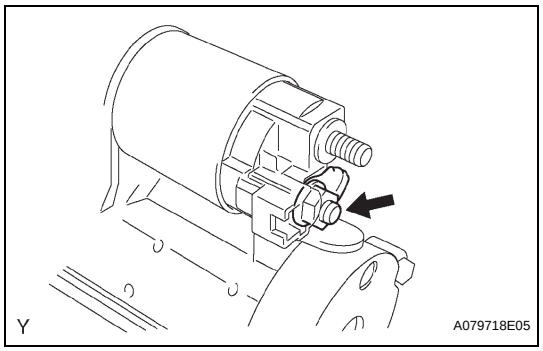
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
3. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
4. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
7. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
8. **REMOVE STARTER ASSEMBLY**
   (a) Disconnect the terminal 50 connector from the starter assembly.
   (b) Remove the nut and disconnect the wire harness from terminal 30.
   (c) Remove the 2 bolts and starter assembly.

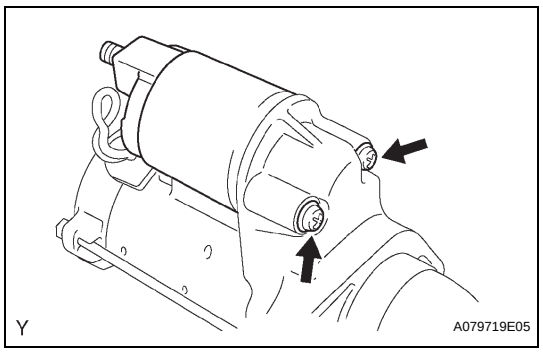


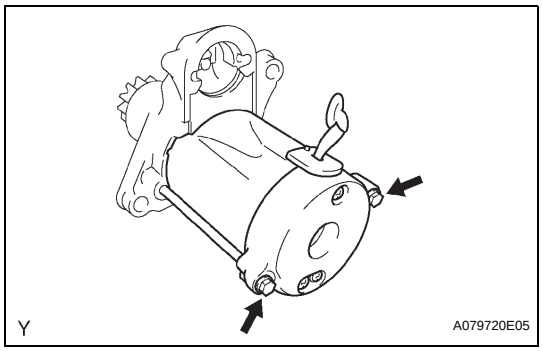
DISASSEMBLY

1. **REMOVE REPAIR SERVICE STARTER KIT**
   (a) Remove the nut and disconnect the lead wire from terminal C.



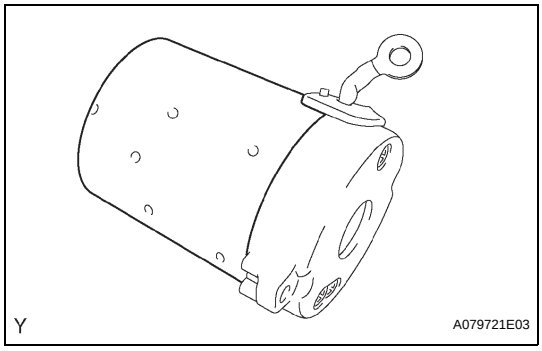
   (b) Remove the 2 screws that hold the magnetic switch to the motor terminal starter kit.
   (c) Remove the repair service starter kit.
   (d) Remove the return spring and the plunger from the repair service starter kit.



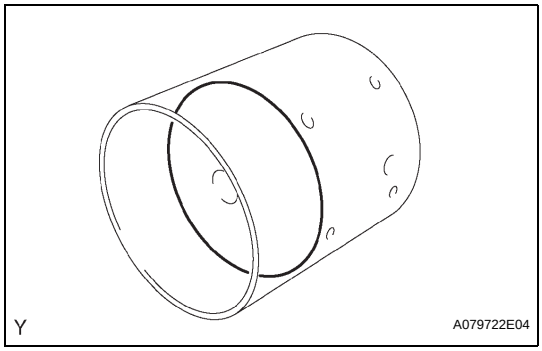


2. REMOVE STARTER YOKE ASSEMBLY

(a) Remove the 2 through bolts and pull out the starter yoke assembly together with the starter commutator end frame assembly.

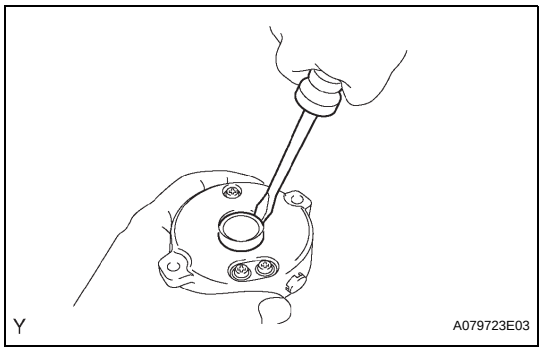


(b) Remove the starter yoke assembly from the starter commutator end frame assembly.



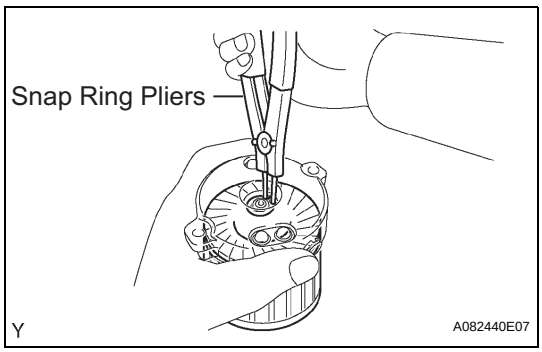
3. REMOVE STARTER ARMATURE PLATE

(a) Remove the starter armature plate from the starter yoke assembly.



4. REMOVE STARTER COMMUTATOR END FRAME COVER

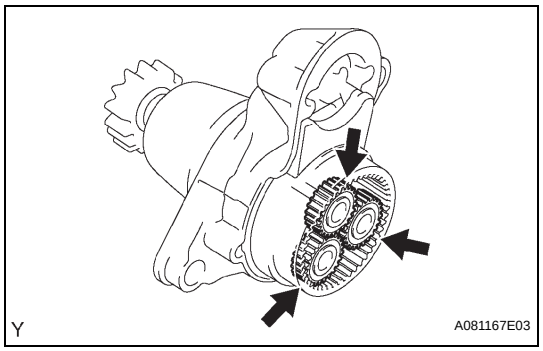
(a) Using a screwdriver, remove the starter commutator end frame cover.



5. REMOVE STARTER ARMATURE ASSEMBLY

(a) Using snap ring pliers, remove the snap ring and plate washer.

(b) Remove the starter armature assembly from the commutator end frame assembly.



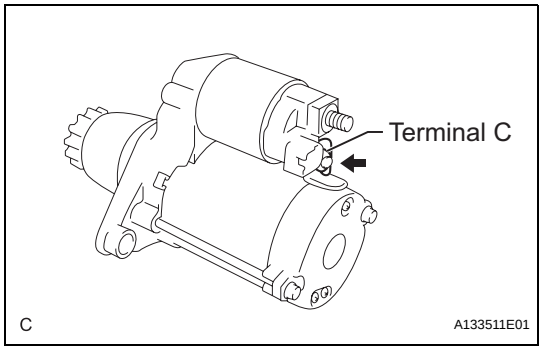
6. REMOVE PLANETARY GEAR

(a) Remove the 3 planetary gears from the motor terminal starter kit.

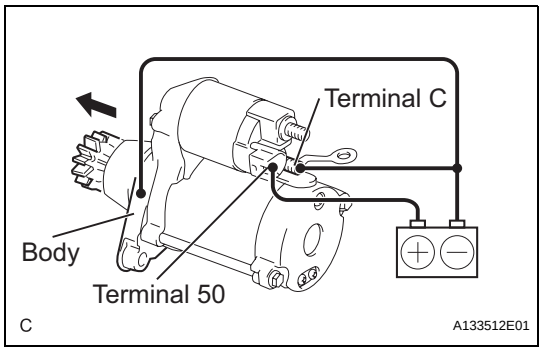
INSPECTION

1. INSPECT STARTER ASSEMBLY

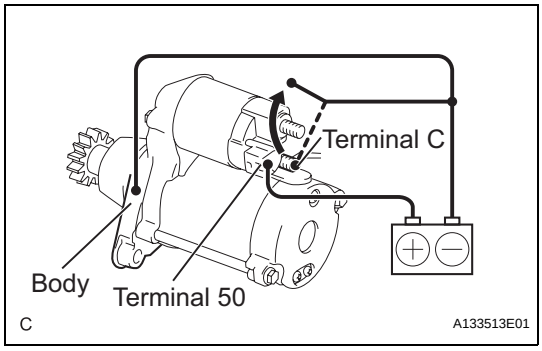
CAUTION:
Make sure to complete each of the following tests within 5 seconds to prevent the coil from burning out.



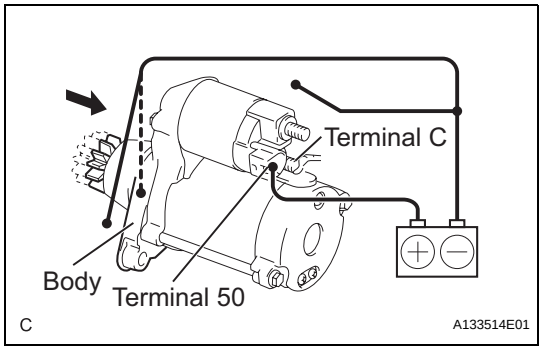
(a) Perform pull-in test:
(1) Disconnect the lead wire from terminal C.



(2) Connect the battery to the magnetic switch as shown in the illustration. Check that the clutch pinion gear moves outward.
If the clutch pinion gear does not move outward, replace the repair service starter kit.

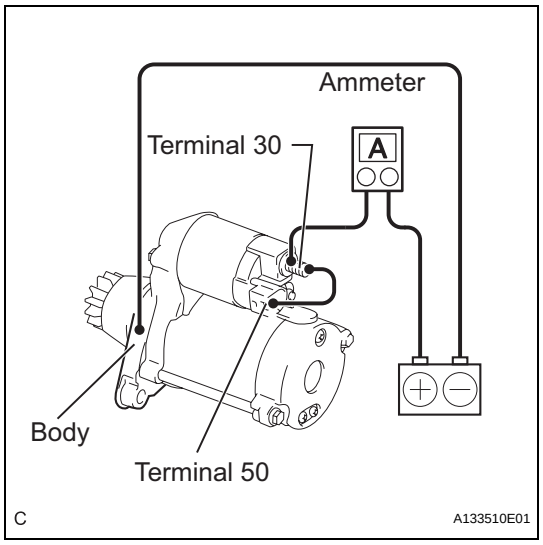


(b) Perform hold-in test:
(1) Disconnect the negative (-) terminal lead from terminal C under the conditions for pull-in test. Check that the pinion gear remains out.
If the clutch pinion gear moves inward, replace the repair service starter kit.



(c) Inspect clutch pinion gear return:
(1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear moves inward.
If the clutch pinion gear does not move inward, replace the repair service starter kit.

(d) Perform no-load performance test:
(1) Connect the field coil wire to terminal C with the nut. Make sure that the lead is not grounded.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(2) Clamp the starter in a vise.

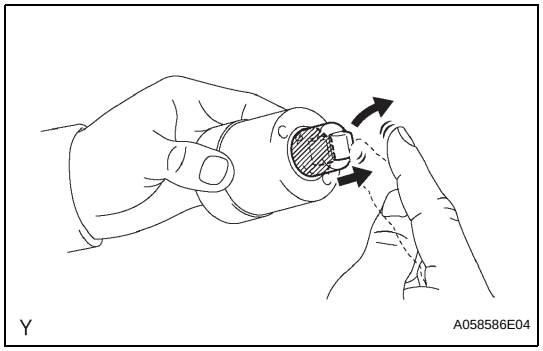


(3) Connect the battery and an ammeter to the starter as shown in the illustration.
(4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

Specified current

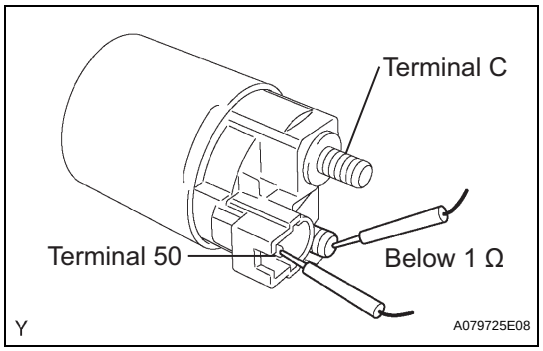
Condition	Specified condition
at 11.5 V	90 A or less

If the result is not as specified, overhaul the starter assembly.



2. INSPECT REPAIR SERVICE STARTER KIT

(a) Check the plunger.
(1) Push in the plunger and check that it returns quickly to its original position.
If necessary, replace the repair service starter kit.

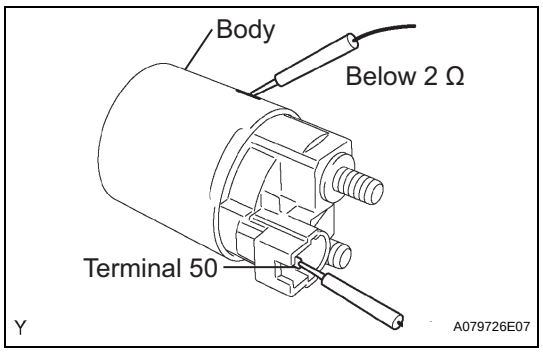


(b) Inspect the resistance of the pull-in coil.
(1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard resistance

Tester connection	Specified condition
Terminal 50 - Terminal C	Below 1 Ω

If the resistance is not as specified, replace the repair service starter kit.



(c) Inspect the resistance of the hold-in coil.
(1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

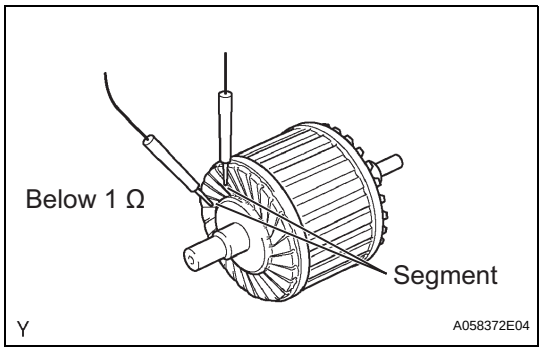
Standard resistance

Tester connection	Specified condition
Terminal 50 - Switch body	Below 2 Ω

If the resistance is not as specified, replace the repair service starter kit.

3. INSPECT STARTER ARMATURE ASSEMBLY

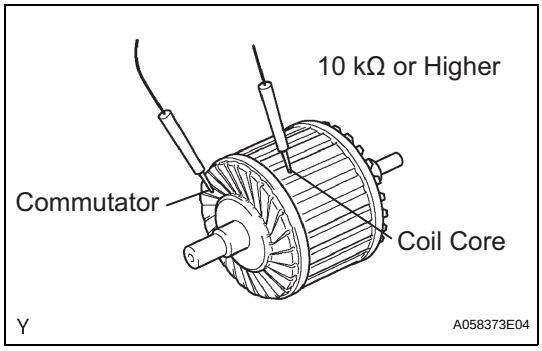
(a) Check the commutator surface for dirt or burning.
If the surface is dirty or burnt, smooth the surface with 400-grit sandpaper or leather.



(b) Inspect the resistance of the commutator.
(1) Using an ohmmeter, measure the resistance between the segments of the commutator.
Standard resistance

Tester connection	Specified condition
Segment - Segment	Below 1 Ω

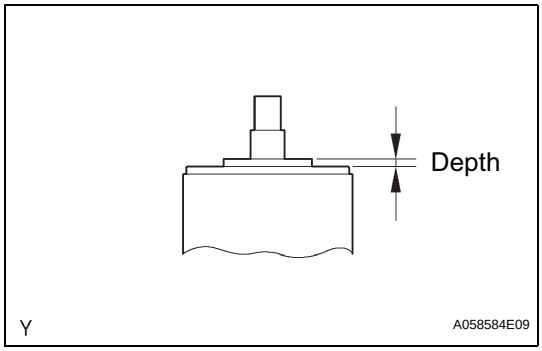
If the resistance is not as specified, replace the starter armature assembly.



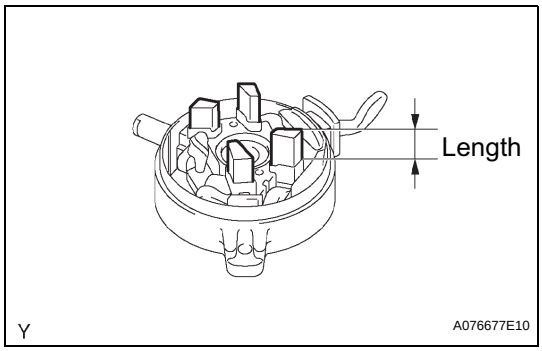
(2) Using an ohmmeter, measure the resistance between the commutator and armature coil core.
Standard resistance

Tester connection	Specified condition
Commutator - Armature coil core	10 kΩ or higher

If the resistance is not as specified, replace the starter armature assembly.

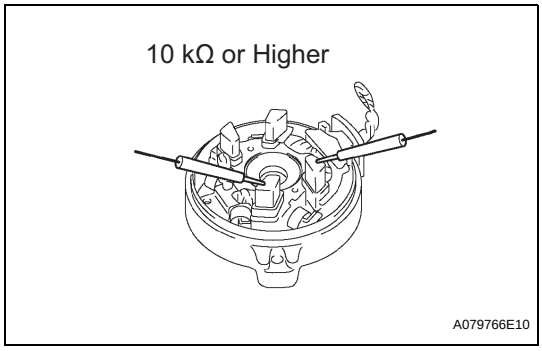


(c) Using vernier calipers, measure the commutator depth.
Specified depth:
3.1 mm (0.122 in.)
Maximum depth:
3.8 mm (0.150 in.)
If the depth is greater than the maximum, replace the starter armature assembly.



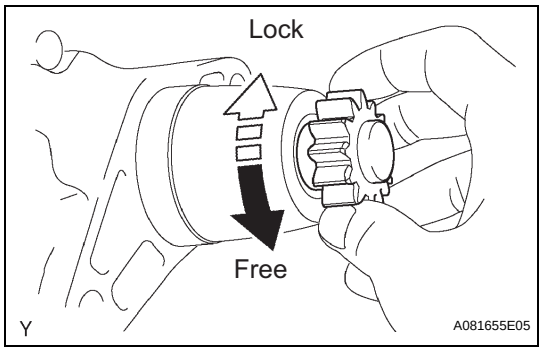
4. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Check the brush length.
(1) Using vernier calipers, measure the brush length.
Specified length:
9.0 mm (0.354 in.)
Maximum length:
4.0 mm (0.157 in.)
If the length is less than the minimum, replace the starter commutator end frame assembly.



(b) Check the resistance.
(1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brushes.
Resistance:
10 kΩ or higher
If the resistance is not as specified, repair or replace the starter commutator end frame assembly.

ST



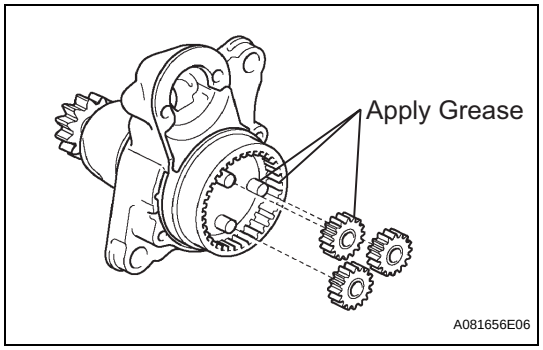
5. INSPECT MOTOR TERMINAL STARTER KIT

(a) Check the starter clutch.

(1) Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise and check that it locks.

If necessary, replace the motor terminal starter kit.

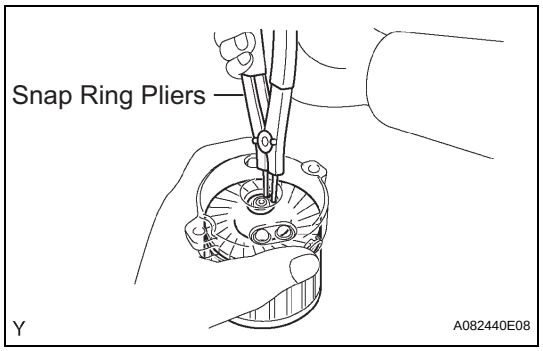
REASSEMBLY



1. INSTALL PLANETARY GEAR

(a) Apply high-temperature grease to the planetary gears and pin parts of the planetary shaft.

(b) Install the 3 planetary gears to the motor terminal starter kit.

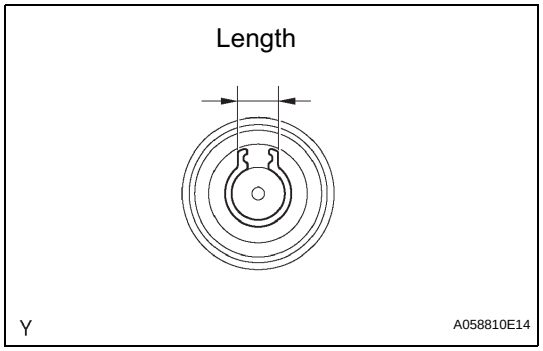


2. INSTALL STARTER ARMATURE ASSEMBLY

(a) Apply high-temperature grease to the plate washer and the armature shaft.

(b) Install the starter armature assembly to the starter commutator end frame assembly.

(c) Using snap ring pliers, install the plate washer and a new snap ring.

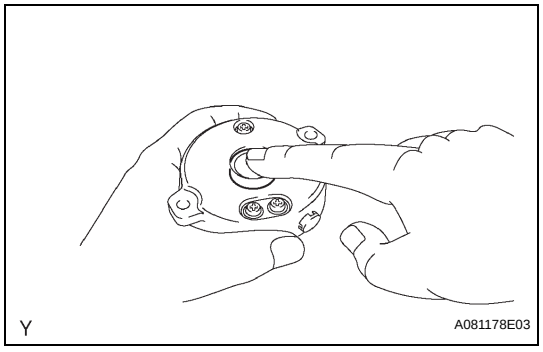


(d) Using vernier calipers, measure the snap ring.

Maximum length:

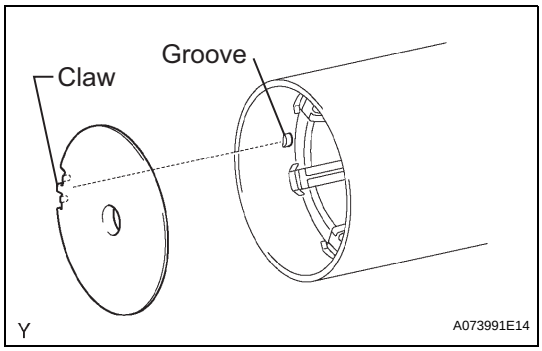
5.0 mm (0.197 in.)

If the length is greater than the maximum, replace the snap ring with a new one.



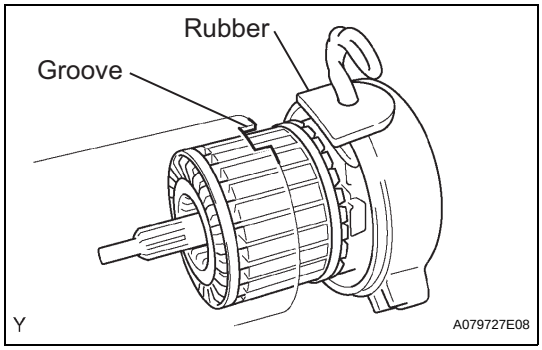
3. INSTALL STARTER COMMUTATOR END FRAME COVER

(a) Install the starter commutator end frame cover to the starter commutator end frame assembly.



4. INSTALL STARTER ARMATURE PLATE

(a) Align the claw of the armature plate with the groove inside the starter yoke assembly, and install the starter armature plate.



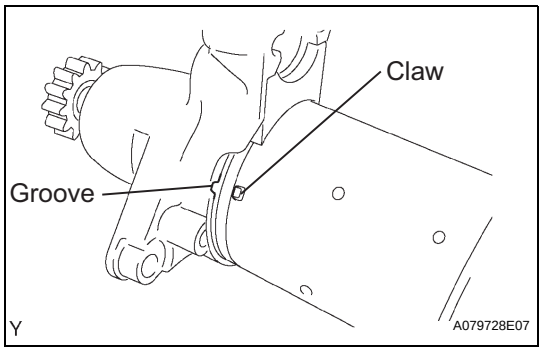
5. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Align the starter commutator end frame rubber with the groove of the starter yoke assembly.

(b) Install the starter commutator end frame assembly to the starter yoke assembly.

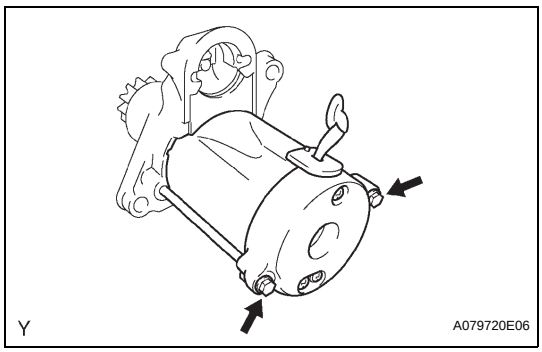
NOTICE:

The magnet of the starter yoke assembly may attract the starter armature assembly when the starter commutator end frame assembly is installed, causing the magnet to break.



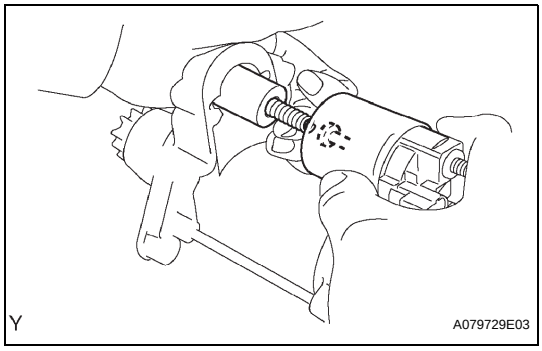
6. INSTALL STARTER YOKE ASSEMBLY

(a) Align the claw of the starter yoke with the groove inside the motor terminal starter kit.



(b) Install the starter yoke with the 2 through bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

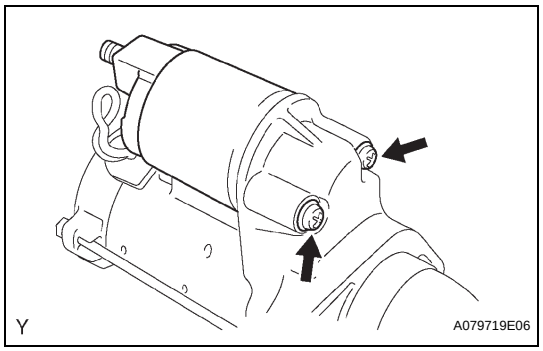


7. INSTALL REPAIR SERVICE STARTER KIT

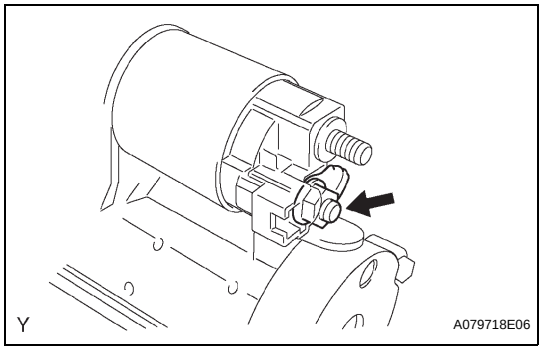
(a) Apply high-temperature grease to the plunger and the hook.

(b) Hang the plunger hook of the repair service starter kit to the drive lever hook.

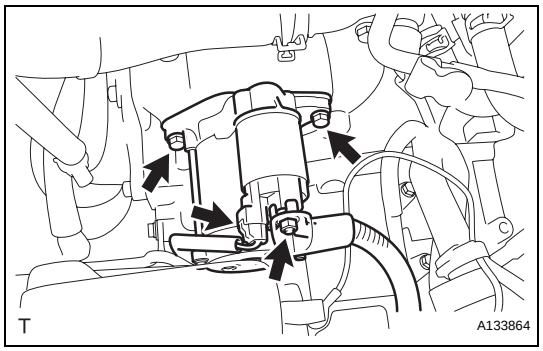
(c) Install the plunger and the return spring.



(d) Install the repair service starter kit with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

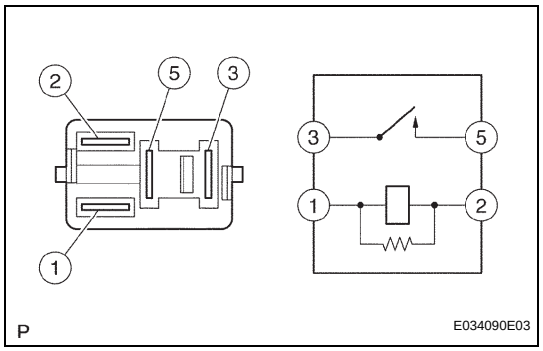


(e) Connect the lead wire to terminal C with the nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



INSTALLATION

1. **INSTALL STARTER ASSEMBLY**
   (a) Install the starter assembly with the 2 bolts.
   Torque: 37 N*m (380 kgf*cm, 28 ft.*lbf)
   (b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
   (c) Connect the terminal 50 connector to the starter assembly.
2. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
6. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
7. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**



STARTER RELAY

ON-VEHICLE INSPECTION

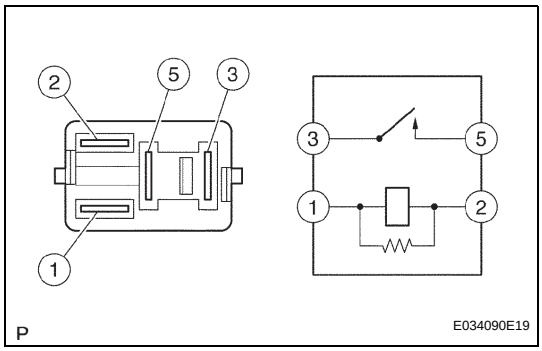
1. INSPECT STARTER RELAY ASSEMBLY

(a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

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

If the result is not as specified, replace the starter relay assembly.



STARTER CUT RELAY (w/ Smart Key System)

ON-VEHICLE INSPECTION

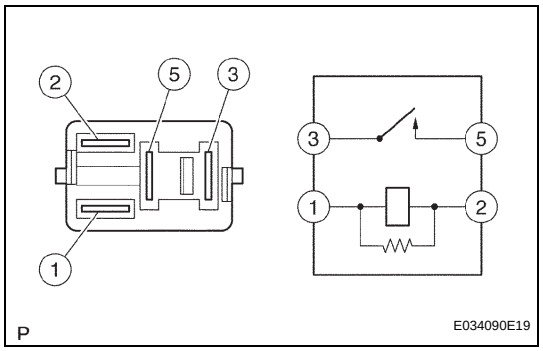
1. INSPECT STARTER CUT RELAY

(a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

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

If the result is not as specified, replace the starter cut relay.



IGNITION RELAY (w/ Smart Key System)

ON-VEHICLE INSPECTION

1. INSPECT NO. 2 IGNITION RELAY

(a) Using an ohmmeter, measure the resistance between each terminal.

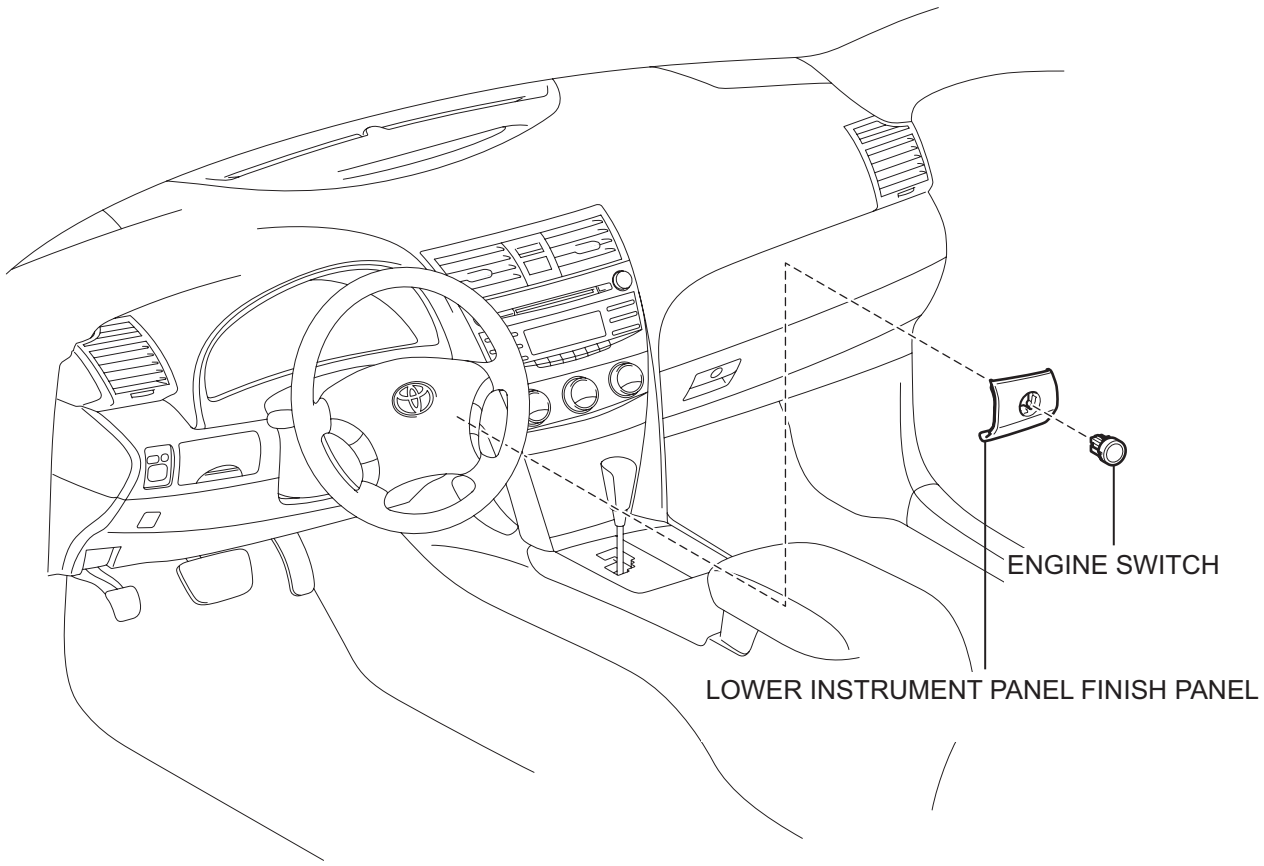
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

If the result is not as specified, replace the No. 2 ignition relay.

ENGINE SWITCH (w/ Smart Key System)

COMPONENTS



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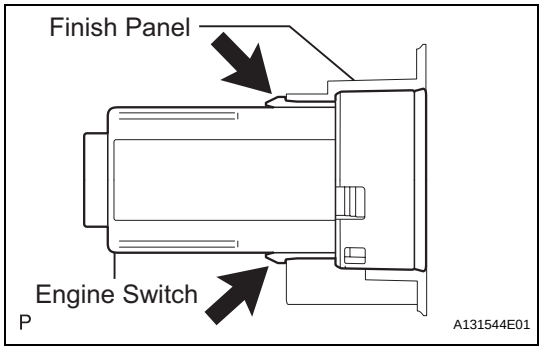
REMOVAL

1. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-22)**

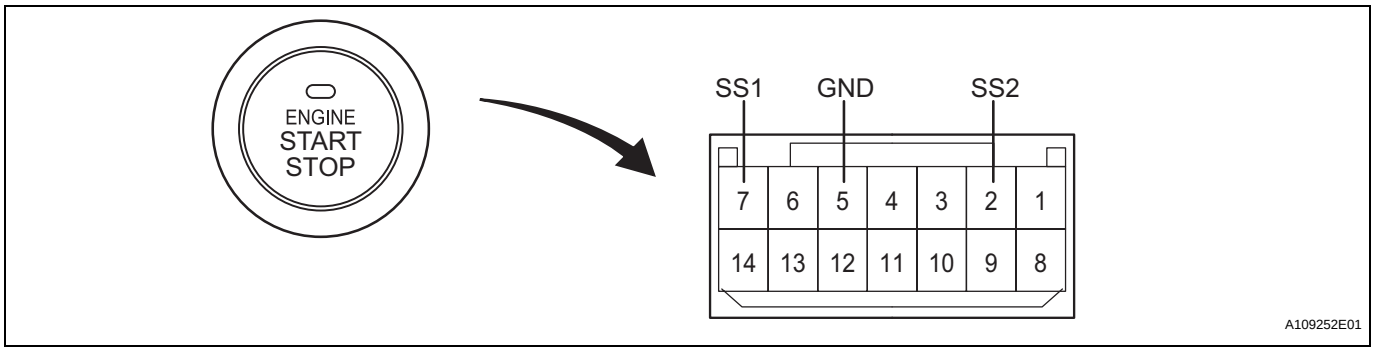
2. **REMOVE ENGINE SWITCH**
   (a) Detach the 2 claws and remove the engine switch from the finish panel.



INSPECTION

1. INSPECT ENGINE SWITCH

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

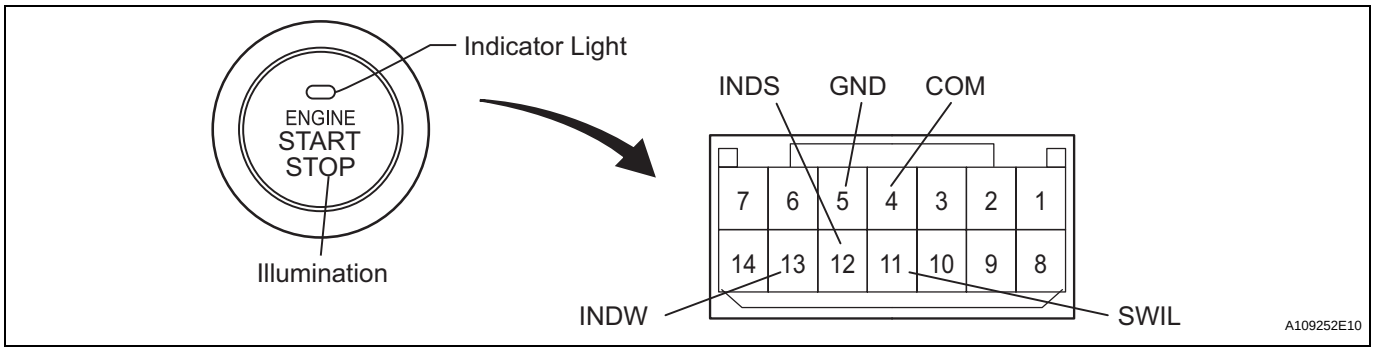


Standard resistance

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 engine switch.

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



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 engine switch.

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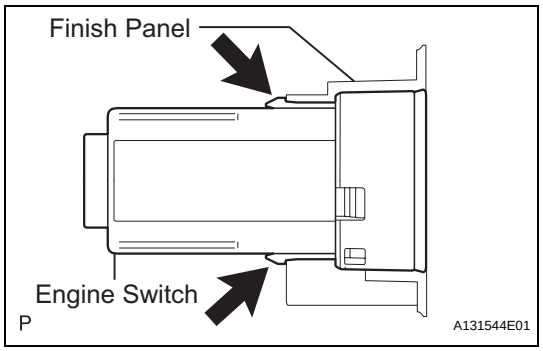
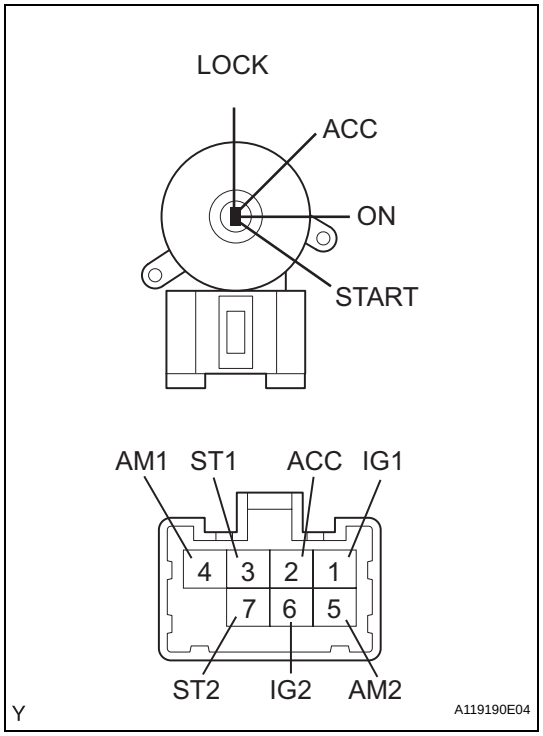


INSTALLATION

1. **INSTALL ENGINE SWITCH**
   (a) Attach the 2 claws to install the switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-57)**



IGNITION SWITCH (w/o Smart Key System)

ON-VEHICLE INSPECTION

1. INSPECT IGNITION OR STARTER SWITCH ASSEMBLY

(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

Condition	Tester Connection	Specified Condition
LOCK	Between all terminals	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	
START	1 - 3 - 4	Below 1 Ω
	5 - 6 - 7	

If the result is not as specified, replace the ignition or starter switch.