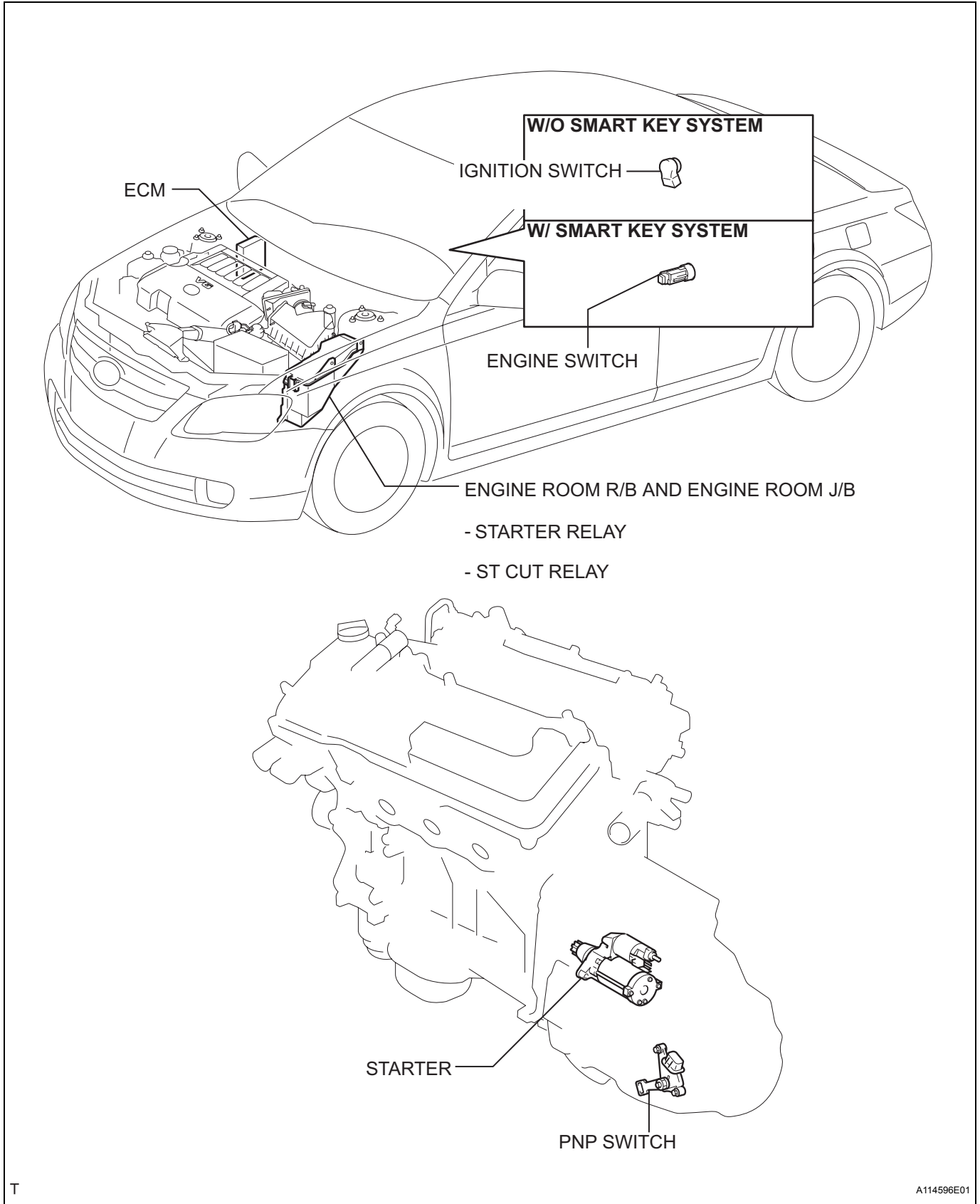


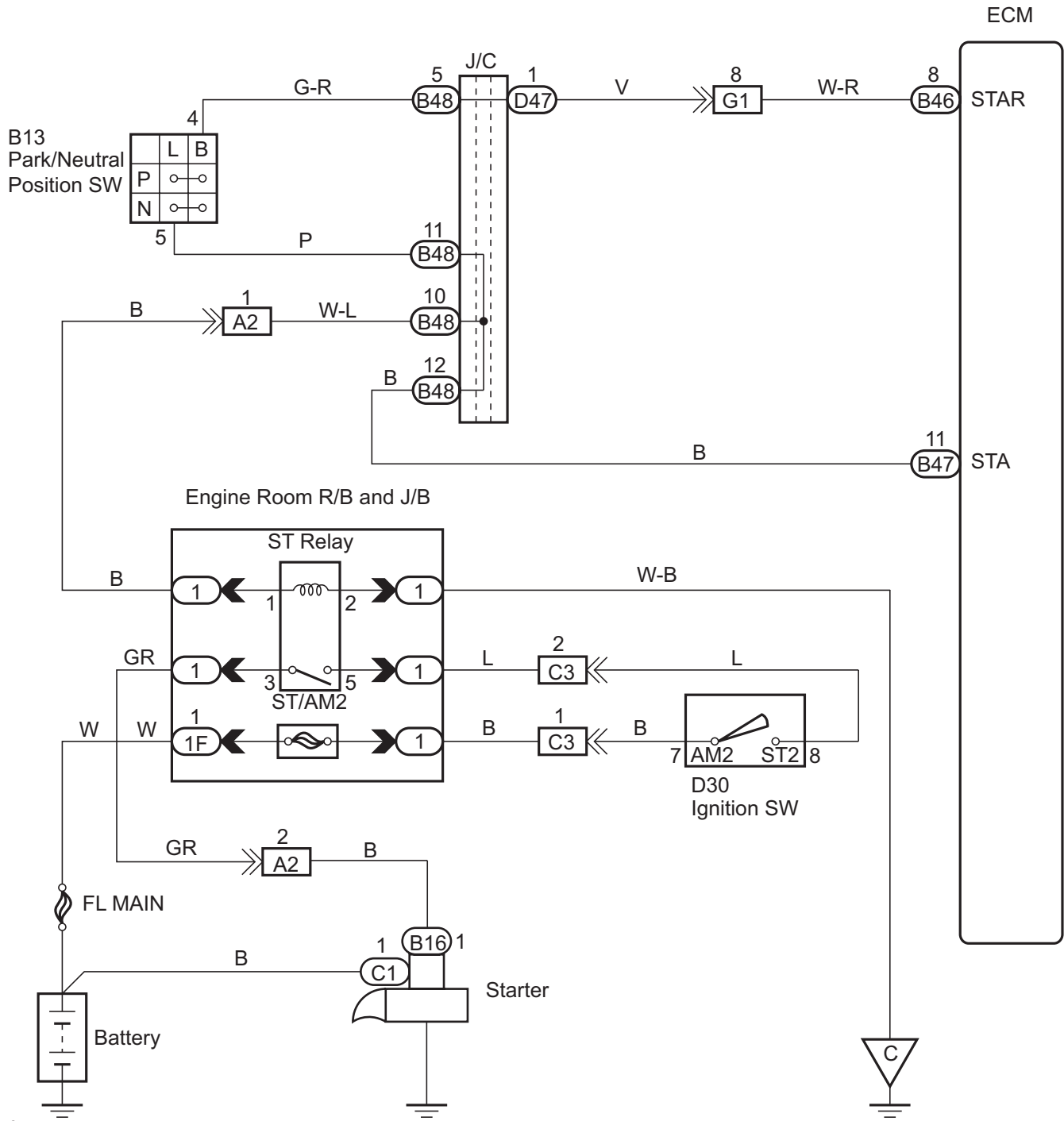
STARTING SYSTEM

PARTS LOCATION



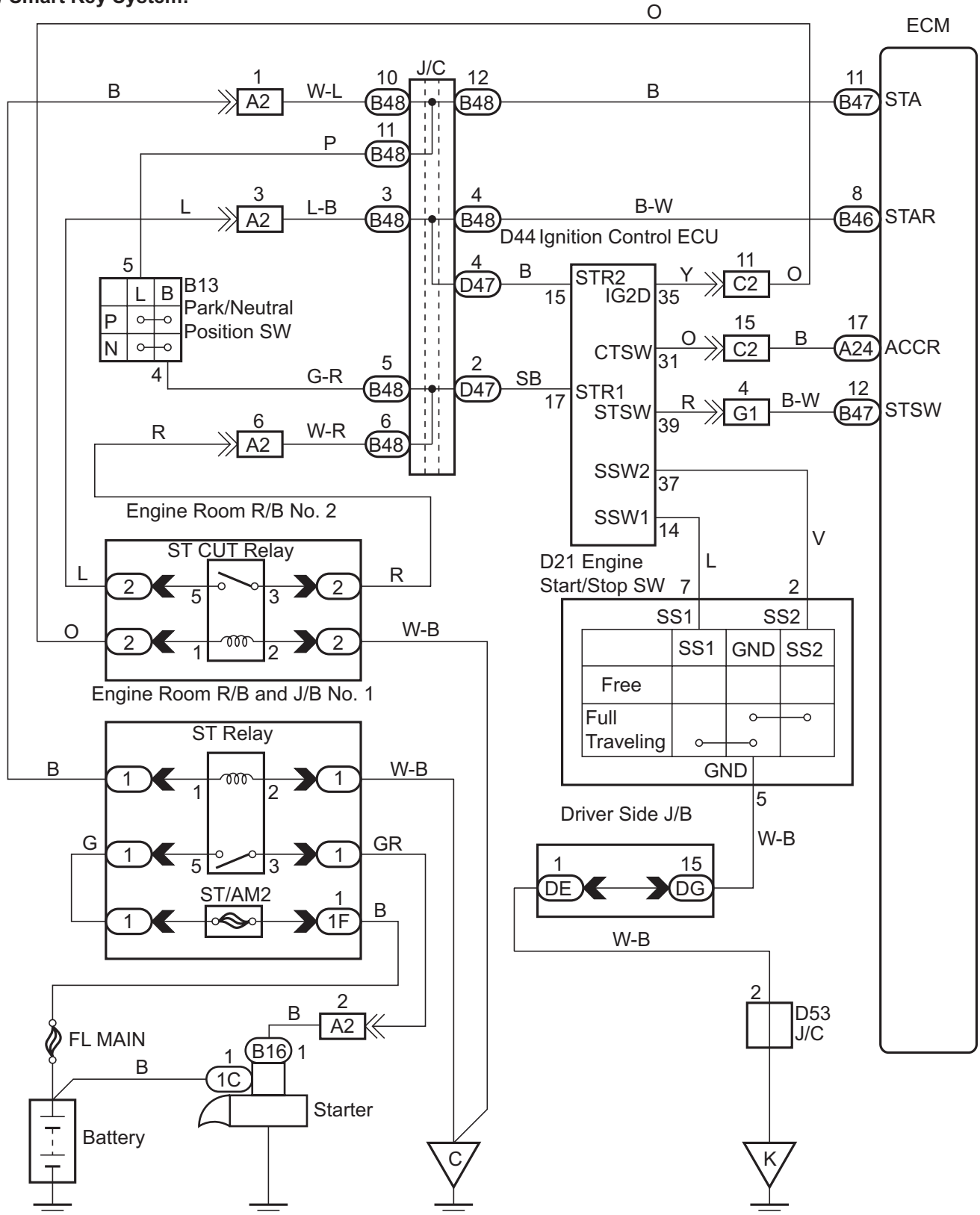
SYSTEM DIAGRAM

w/o Smart Key System:



ST

w/ Smart Key System:



C

A128021E01

ST

ENTRY AND START SYSTEM

PRECAUTION

NOTICE:

When disconnecting the negative (-) battery terminal, initialize the following system(s) after the terminal is reconnected.

System	See procedure
Power Window Control System	IN-29
Sliding Roof Control System	

1. Precautions for the push button start function:

- (a) Before starting the engine, firmly depress the brake pedal until the indicator of the engine switch lights up in green.
- (b) The power source condition (OFF, ACC, ON) is always stored in the vehicle. After the battery is removed and reinstalled, the power source condition before battery removal will be restored. Be sure to turn the engine switch off before disconnecting the cable from the battery terminal. Always be aware of the power source condition before the battery dies or is removed.
- (c) After the battery is removed and reinstalled, be sure to wait 10 seconds or more before engine start. The engine may not start immediately after the battery is reinstalled.
- (d) If the key is held over the engine switch to start the engine because the key battery has died, the following warnings will sound:
 - (1) Driver's door open → close:
 - Warning that the P position power remains on
 - Warning that any of power for the shift positions other than P remains on
 - (2) Doors other than the driver's door open → close:
 - Warning that any of the passengers is carrying the key out of the vehicle
 These warnings will sound because whether the key is in the cabin or not cannot be determined. They do not indicate system malfunctions.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the push button start function.
- The intelligent tester should be used in steps 3, 4 and 6.
- When troubleshooting the push-button function using the intelligent tester with the engine switch off, connect the intelligent tester to the vehicle and repeat turning any of the courtesy light switches on and off until communication between the tester and the vehicle begins (the interval between ON and OFF should be less than 1.5 sec.).

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

HINT:

See page [IN-36](#)

NEXT

3 INSPECT COMMUNICATION FUNCTION OF MULTIPLEX COMMUNICATION SYSTEM (BEAN)

ST

- (a) Use the intelligent tester to check for normal function of the multiplex communication system.
- (1) (ECU not connected, communication line malfunctioning) Without code outputs, proceed to A.
 - (2) (ECU not connected, communication line malfunctioning) With code outputs, proceed to B.

B

Go to MULTIPLEX COMMUNICATION SECTION

A

4 CHECK DTC

- (a) Check for DTCs and note any codes that are output.
- (b) Delete the DTC.
- HINT:
After DTCs are all cleared, check if the trouble occurs again 6 seconds after the engine switch is turned on (IG).
- (c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
- (1) If the DTC does not reoccur, proceed to A.
 - (2) If the DTC reoccurs, proceed to B.

B

DTC CHART

A

5

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 in 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

6

PROBLEM SYMPTOMS TABLE

- (a) If the fault is not listed in the problem symptoms table, proceed to A.
- (b) If the fault is listed in the problem symptoms table, proceed to B.

B

Go to step 8

A

7

OVERALL ANALYSIS AND TROUBLE SHOOTING

- (a) Data List / Active Test (See page [ST-22](#))
 - (1) Inspection with the intelligent tester (Data List)
 - (2) Inspection with the intelligent tester (Active Test)
- (b) Terminal of ECU (See page [ST-17](#))

NEXT

8

ADJUST, REPAIR OR REPLACE

NEXT

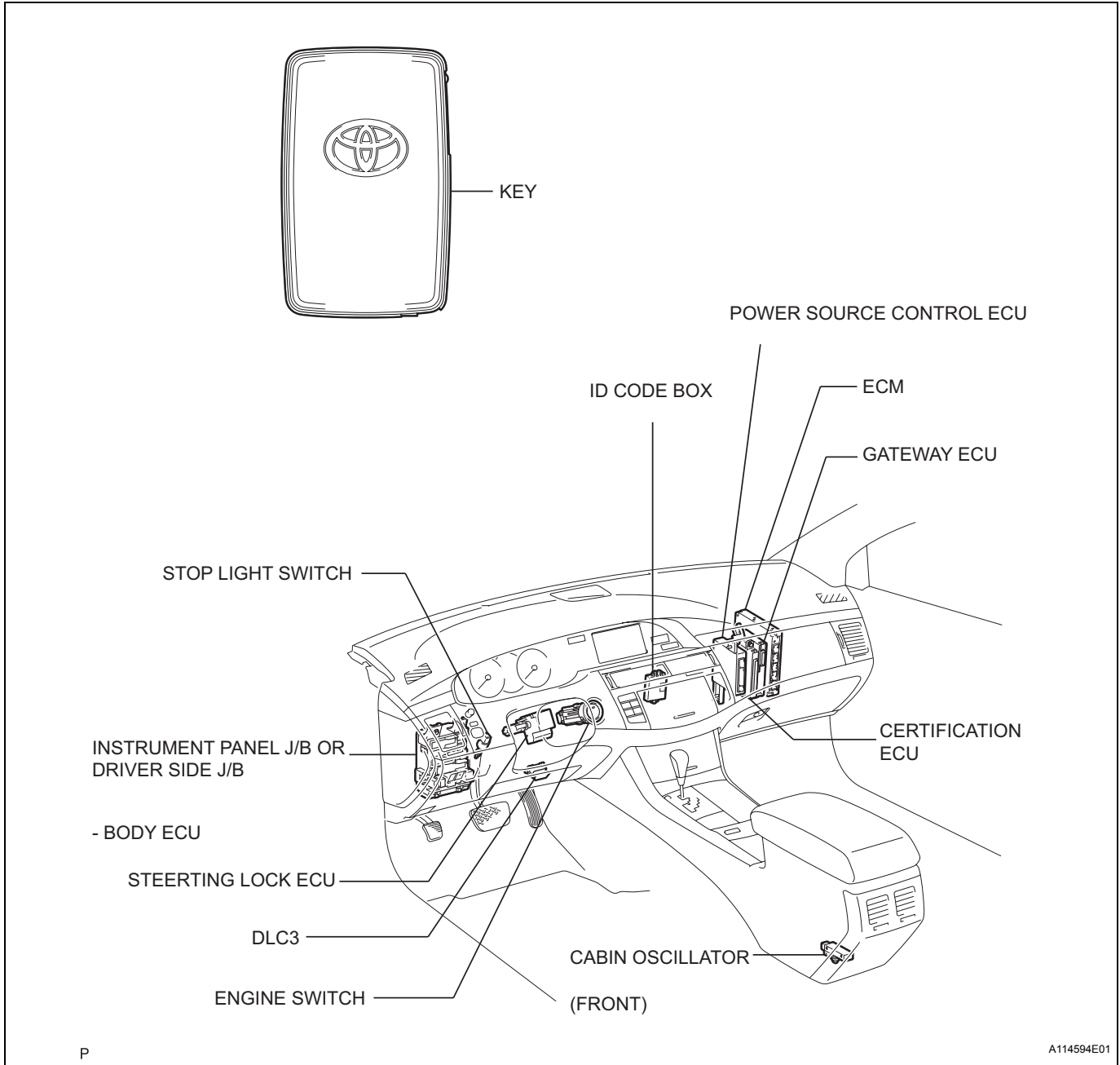
ST

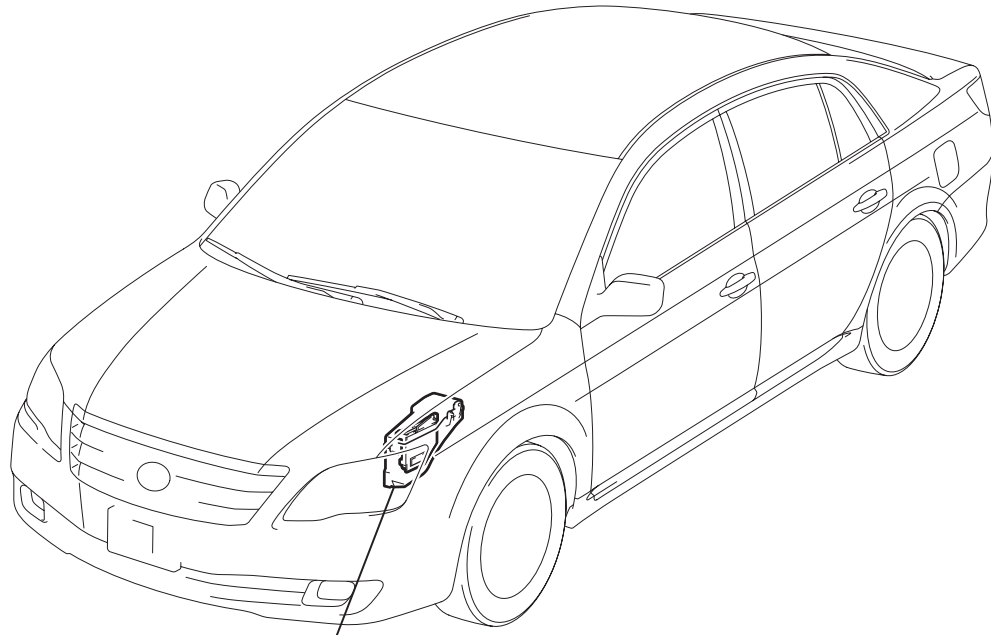
9	CONFIRMATION TEST
---	-------------------

NEXT

END

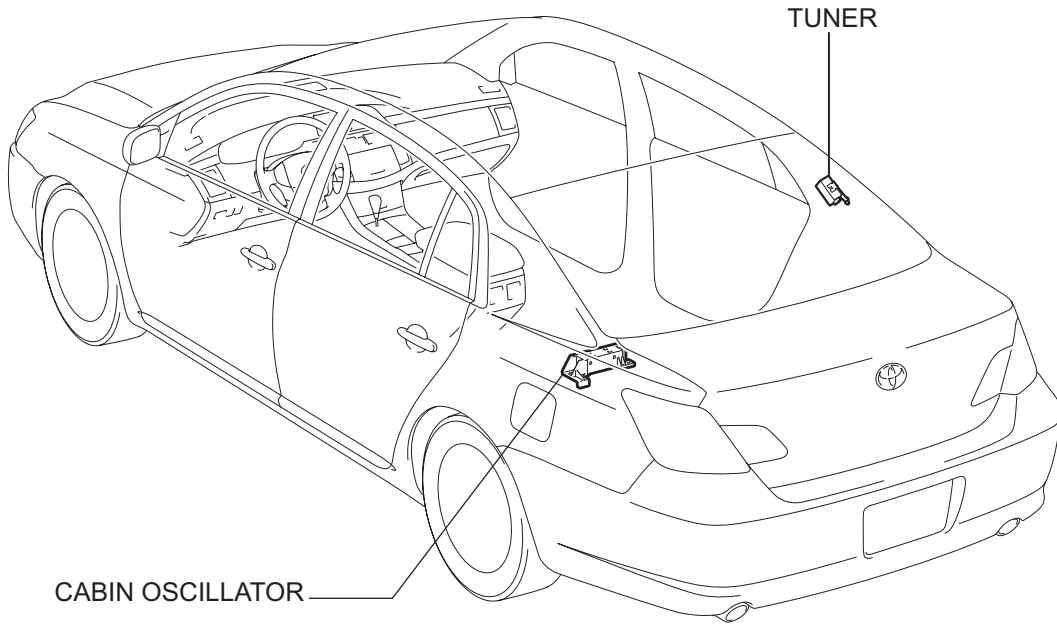
PARTS LOCATION





ENGINE ROOM R/B

- FRONT CONTROLLER



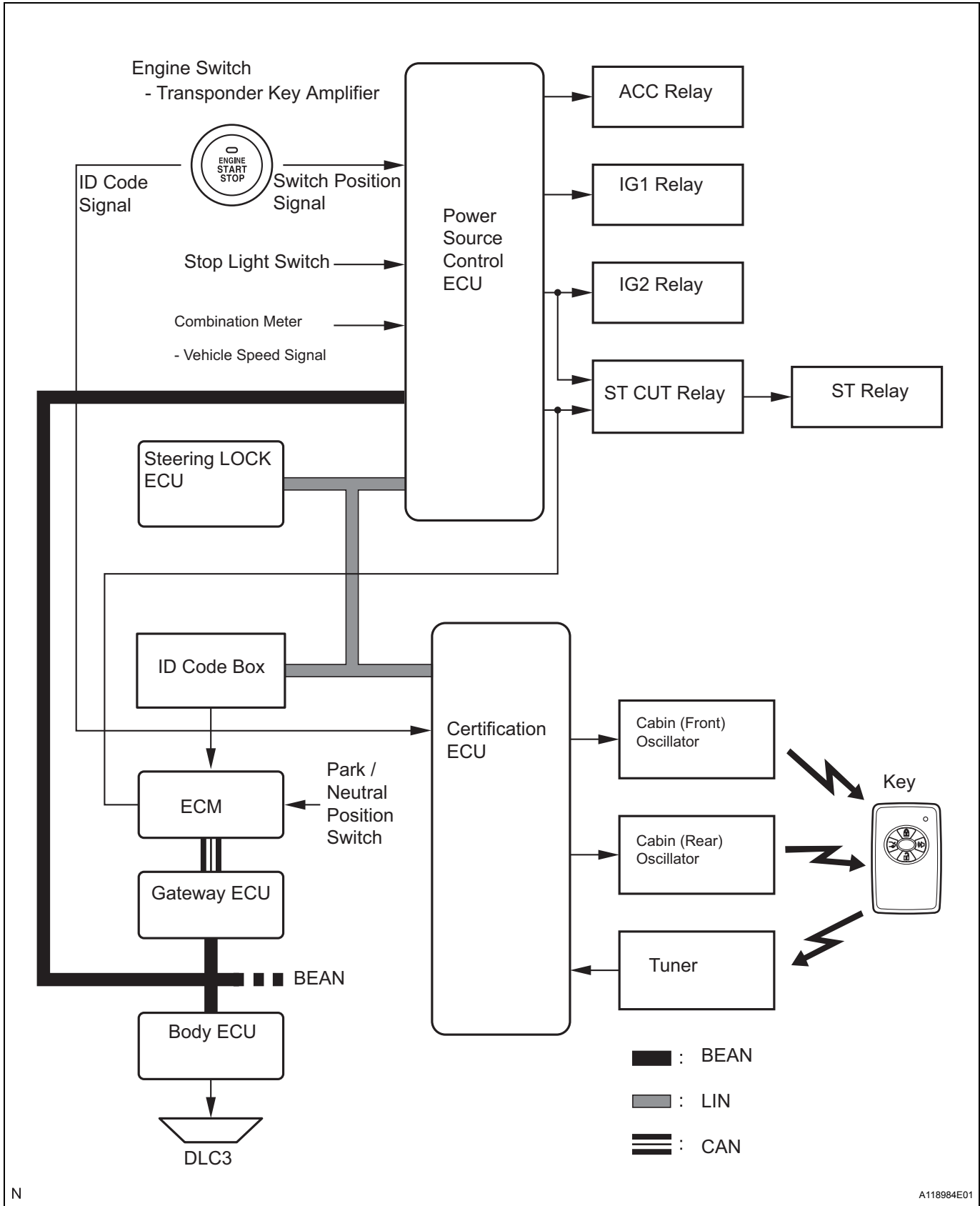
TUNER

CABIN OSCILLATOR

(REAR)

ST

SYSTEM DIAGRAM



ST

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
Combination meter	Power source control ECU	<ul style="list-style-type: none"> Vehicle speed signal Travel distance information 	BEAN
Combination meter	Multi-display	<ul style="list-style-type: none"> Door open warning signal Shift position warning signal Smart key system warning light signal 	BEAN / AVC-LAN
Power source control ECU	Body ECU	<ul style="list-style-type: none"> Security control signal 	BEAN
Body ECU	Power source control ECU	<ul style="list-style-type: none"> Engine start switch illumination signal Stop light switch signal Courtesy light switch signal DTC erase signal DTC response signal 	BEAN
ECM	Power source control ECU	<ul style="list-style-type: none"> Engine speed signal Shift P position signal 	BEAN / CAN

SYSTEM DESCRIPTION

1. PUSH BUTTON START DESCRIPTION

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

The table below shows the transition of the engine switch, which depends on whether the brake pedal is depressed or released.

(b) This system has different power source mode patterns to suit the brake pedal condition and shift lever position.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N Position	When the engine switch is pushed once. – OFF → IG ON (after the engine is started)
Not Depressed	P Position	Each time the engine switch is pushed. – OFF → ACC → IG ON → OFF
	Except P Position	Each time the engine switch is pushed. – OFF → ACC → IG ON → ACC
-	P Position	When the engine switch is pushed in the IG-ON condition. – IG ON (engine is started or not started) → OFF
-	Except P Position	When the engine switch is pushed in the IG-ON condition. – IG ON (engine is started or not started) → ACC

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

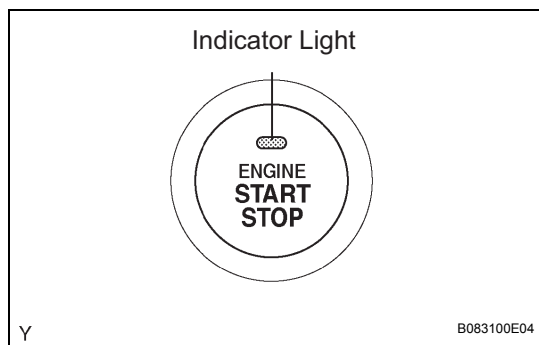
2. FUNCTION OF COMPONENT

Components	Function
Engine switch (Transponder Key Amplifier)	<ul style="list-style-type: none"> Transmits the engine switch signal to the power source control ECU. Informs the driver of a power source mode or system abnormality with the illuminate stage of the indicator light. Receives the ID code and transmits it to the certification ECU when the battery of the key is weak.
Key	Receives the signals from oscillators and returns the ID code to the tuner. For details, See page DL-135 .
Room Oscillator (Front and Rear)	Receives a request signal from the certification ECU and forms the actuation area in the vehicle interior.
Tuner	Receives the ID code from the key and transmits it to certification ECU.
Power Source Control ECU	<ul style="list-style-type: none"> Switches the power source modes in four modes (OFF, ACC, IG-ON, START) in accordance with the shift position and the state of the stop light switch. Controls the push button start system in accordance with the signals received from the switches and each ECU.
Certification ECU	Certificates the ID code received from the tuner and transmits the certification results to the ID code box and Steering Lock ECU.
Stop Light Switch	Outputs the state of the brake pedal to the power source control ECU.
ID Code Box	Receives the steering unlock or engine immobilizer unset signals from the certification ECU, certifies them, and transmits each unset signal to the steering lock ECU or ECM.
ECM	<ul style="list-style-type: none"> Receives the engine start request signal from the power source control ECU, turns ON the ST relay, and starts the engine. Receive the signal from the ID code box and performs engine ignition and injection.

3. SYSTEM FUNCTION

- (a) The electric controls of the push button start system are described below:

Control	Outline
Engine switch control	<ul style="list-style-type: none"> When driver operates engine switch key in driver's possession, power source control ECU starts room oscillator, which transmits request signal to key. Upon receiving this signal, key transmits ID code signal to power source control ECU. ID code box verifies check results received from certification ECU via LIN and sends them to power source control ECU. Based on these results, power source control ECU authorizes operation of power switch.
Diagnosis	When power source control ECU detects malfunction, power source control ECU diagnoses and memorizes failed section.



4. Construction and Operation

- (a) Engine Switch

Engine switch consists of the momentary type switch, three color (Amber, Green, Greenish White) LEDs, and 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 or not in accordance with the illumination state of the indicator light.
- When the power source control ECU detects an abnormality in the push button start system, it makes the amber indicator light flash. If the engine stopped in this state, it might not be possible to restart it.

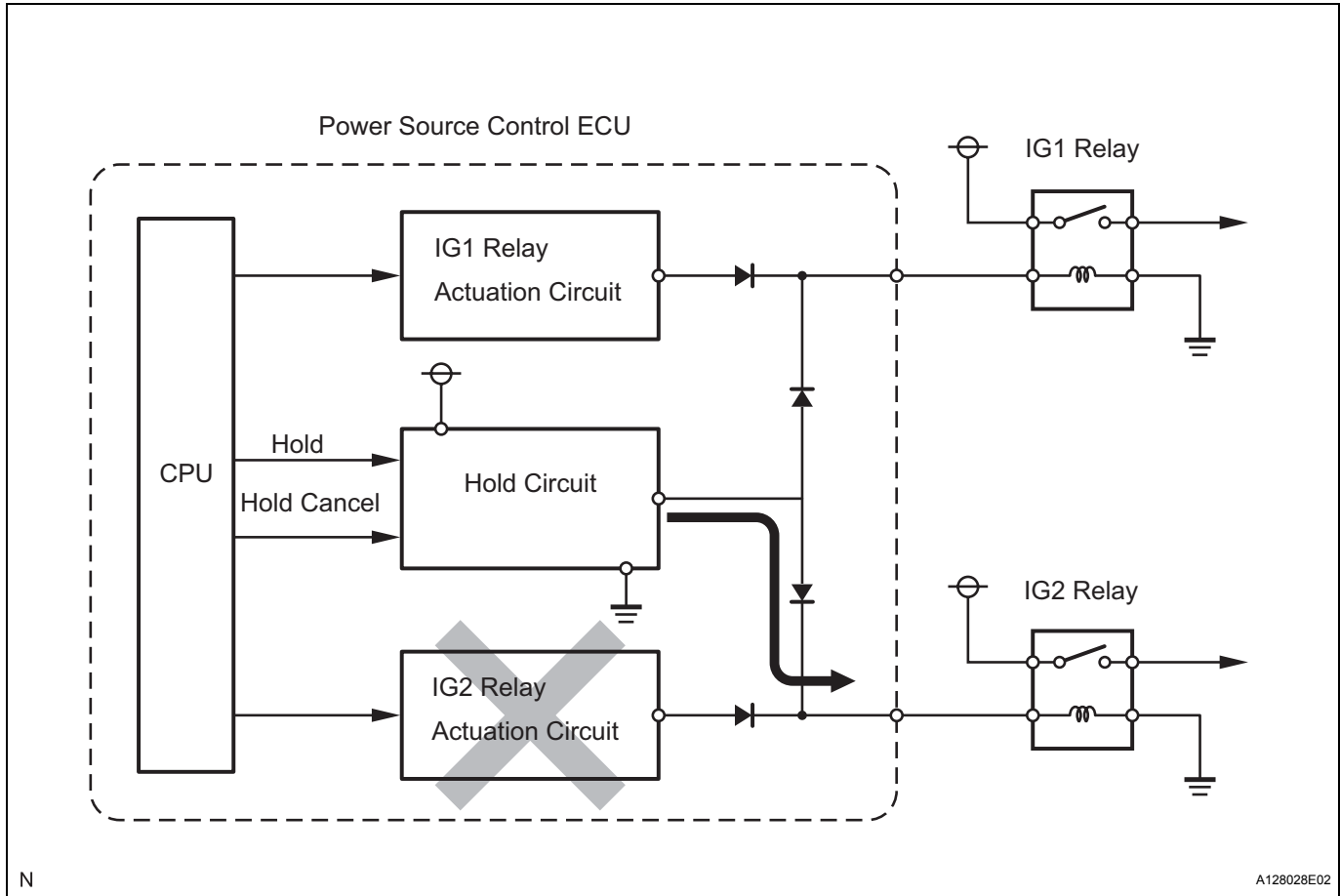
- (b) Indicator Light Condition

Power Source Mode / Condition	Indicator Light Condition	
	No brake pedal depressed	Brake pedal depressed with shift lever in "P" or "N".
OFF	Turn OFF	Turn ON (Green)
ACC, IG-ON, START	Turn ON (Amber)	Turn ON (Green)
Engine Running	Turn OFF	Turn OFF
Steering lock not unlocked	Flash (Green) for 30 seconds	Flash (Green) for 30 seconds
Push Button Start System Malfunction	Flash (Amber) for 15 seconds	Flash (Amber) for 15 seconds

(c) Power Source Control ECU

Power Source Control ECU consists of the IG1 and IG2 relay actuation circuits, CPU and hold circuit.

- (1) The hold circuit is installed to prevent the power supply to the relays from being cut off when an abnormality occurs in IG1 and / or IG2 relay actuation circuits during driving.



HINT:

Power source control ECU constantly stores the present power source mode in its memory. If the power to power source control ECU is interrupted due to the removal of the battery, power source control ECU restores the power source mode after the battery is reconnected. If the battery is removed when the engine switch is not off, the power will be restored to the vehicle at the same time the power is restored to Power Source Control ECU (by reconnecting the battery).

Therefore, before removing the battery, make sure to turn the engine switch off.

5. Push Button Start Function Operating

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

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N Position	When the engine switch is pushed once. – OFF → IG ON (after the engine is started)
Not Depressed	P Position	Each time the engine switch is pushed. – OFF → ACC → IG ON → OFF
	Except P Position	Each time the engine switch is pushed. – OFF → ACC → IG ON → ACC
-	P Position	When the engine switch is pushed in the IG-ON condition. – IG ON (engine is started or not started) → OFF
-	Except P Position	When the engine switch is pushed in the IG-ON condition. – IG ON (engine is started or not started) → ACC

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

- (1) After approximately 1 hour has passed with the engine switch on (ACC) and the shift position in P, the power source control ECU will automatically turn off the power (the engine switch mode changes to OFF).

(2) The illustration below shows the transition of engine switch modes.

Transition of engine switch mode:

Engine Switch Mode	Shift Position						
	P			N		Except P and N	
	Engine Switch Pushed	● Engine Switch Pushed ● Brake Pedal Depressed	Unoperated for an hour	Engine Switch Pushed	● Engine Switch Pushed ● Brake Pedal Depressed	Engine Switch Pushed	● Engine Switch Pushed ● Brake Pedal Depressed
OFF	↓ ↓ ↓	↓ ↓ ↓	↑	↓ ↓ ↓	↓ ↓ ↓	↓ ↓ ↓	↓ ↓ ↓
ACC	↑ ↑ ↑	↑	↑	↑ ↑ ↑	↑	↑ ↑ ↑	↑
IG	↓ ↓ ↓	↓ ↓ ↓		↓ ↓ ↓	↓ ↓ ↓	↓ ↓ ↓	↓ ↓ ↓
ENGINE START	↑	↑		↑	↑	↑	↑

← : Transition of Engine Switch Mode

← : Transition of Engine Switch Mode (only with vehicle stopped)

N

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HINT:

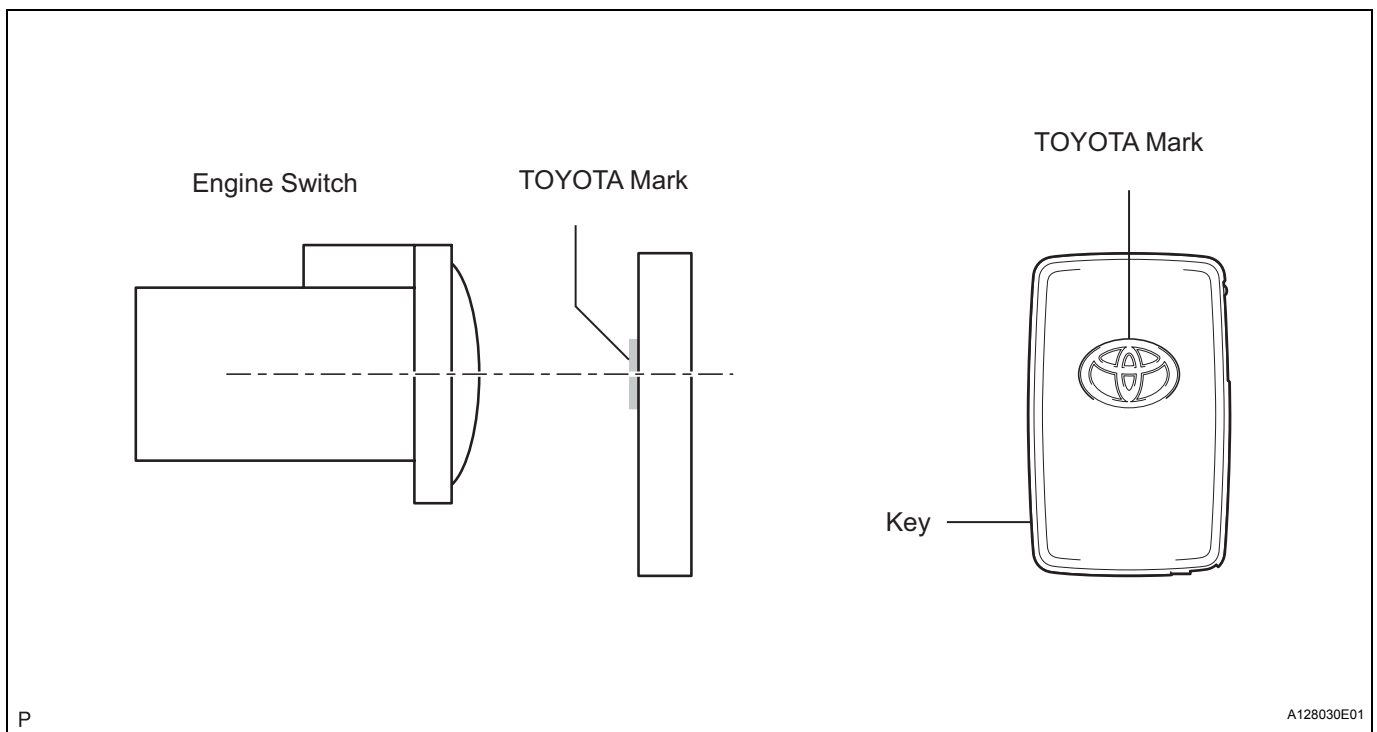
While the vehicle is being driven normally, operation of the engine switch is disabled. However, if the engine must be stopped in an emergency while the vehicle is being driven, pressing the engine switch for at least 3 seconds can stop the engine. Engine switch mode changes from ENGINE START to ACC.

6. When key battery is low

- (a) To operate the push button start system when the key battery is low, hold the TOYOTA mark of the key against the engine switch while depressing the brake pedal.

ST

- (b) The power source control ECU transmits a key verification request signal from the stop light switch signal to the certification ECU.
- (c) The certification ECU does not receive an ID code response from the smart tuner, so it actuates the transponder key amplifier built into the engine switch.
- (d) The transponder key amplifier outputs an engine immobilizer 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) Certification ECU judges and verifies the ID code, and transmits a key verification OK signal to the power source control ECU. The buzzer in the combination meter sounds at the same time.
- (h) After the buzzer sounds, if the engine switch is pressed within five seconds while the brake pedal is not depressed, the power source mode switches to ACC or IG, the same as in the normal condition.



7. DIAGNOSIS

- (a) Power source control ECU can detect malfunctions in the push button start system when the power source mode is 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 the 5-digit DTC (Diagnostic Trouble Code) in the memory.

- The indicator light warning continues for 15 seconds even when the power source mode is switched to OFF.
- The DTC can be read by connecting an intelligent tester to the DLC3.
- The push button start system cannot be operated again if a malfunction occurs.

PROBLEM SYMPTOMS TABLE

HINT:

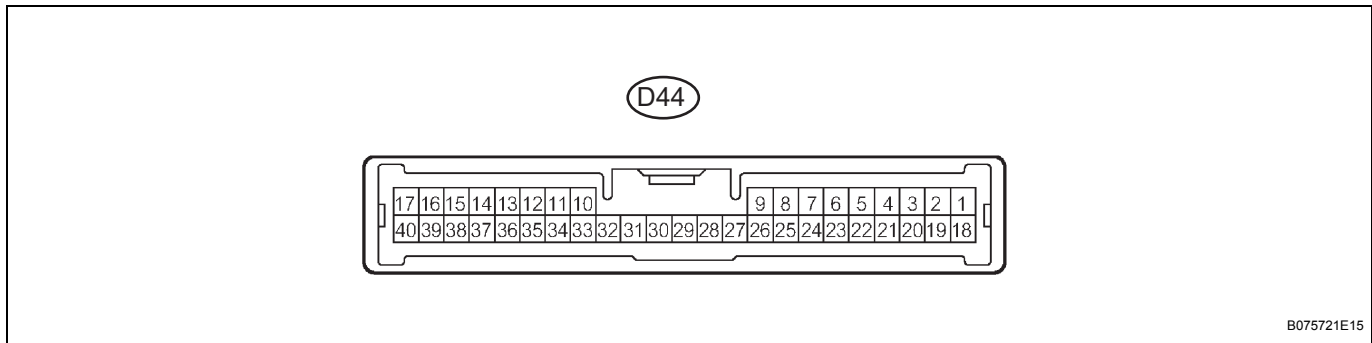
If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

ENTRY AND START SYSTEM

Symptom	Suspected area	See page
Engine switch does not turn on (IG and ACC)	1. Smart key system operation inspection (on the seat)	DL-178
	2. AM1 and AM2 circuit (B2271)	ST-25
	3. Engine switch circuit (B2278)	ST-45
	4. Ground circuit (Power source control ECU - Body ground)	ST-17
	5. Replace power source control ECU	-
Engine switch does not turn on (ACC)	1. AM1 and AM2 circuit (B2271)	ST-25
	2. ACCD circuit (B2274)	ST-35
	3. Ground circuit (Power source control ECU - Body ground)	ST-17
	4. Replace power source control ECU	-
Engine switch does not turn on (IG)	1. AM1 AM2 circuit (B2271)	ST-25
	2. IG1D circuit (B2272)	ST-27
	3. IG2D circuit (B2273)	ST-32
	4. Ground circuit (Power source control ECU - Body ground)	ST-17
	5. Replace power source control ECU	-
Engine switch does not turn on (START)	1. Stop light switch circuit (B2284)	ST-54
	2. Starter relay circuit	ST-68
	3. SFI system	ES-30
	4. Replace power source control ECU	-
Engine switch indicator light does not come on	Engine switch indicator light circuit	ST-65

TERMINALS OF ECU

1. CHECK POWER SOURCE CONTROL ECU ASSEMBLY



B075721E15

- (a) Disconnect the D44 ECU connector.
- (b) Measure the resistance and voltage of the wire harness side connector.

Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (D44-33) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
AM2 (D44-12) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
SSW1 (D44-14) - Body ground	L - Body ground	Engine switch signal	Engine switch pushed → Not pushed	Below 1 Ω → 10 kΩ or higher
SSW2 (D44-37) - Body ground	V - Body ground	Engine switch signal	Engine switch pushed → Not pushed	Below 1 Ω → 10 kΩ or higher
GND2 (D44-6) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
MPX1 (D44-7) - Body ground	B - Body ground	MPX line	Always	10 kΩ or higher
MPX2 (D44-24) - Body ground	LG - Body ground	MPX line	Always	10 kΩ or higher
LIN1 (D44-30) - Body ground	BR - Body ground	LIN line	Always	10 kΩ or higher

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

- (c) Reconnect the D44 ECU connector.
- (d) Measure the voltage of the connector.

Voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACCD (D44-11) - GND2 (D44-6)	R - W-B	ACC signal	Engine switch OFF → Engine switch ON (ACC)	Below 1 V → 10 to 14 V
IG1D (D44-34) - GND2 (D44-6)	LG - W-B	IG1 signal	Engine switch ON(ACC) → Engine switch ON (IG)	Below 1 V → 10 to 14 V
IG2D (D44-35) - GND2 (D44-6)	Y - W-B	IG2 signal	Engine switch ON(ACC) → Engine switch ON (IG)	Below 1 V → 10 to 14 V
STP (D44-1) - GND2 (D44-6)	P - W-B	Stop light signal	Brake pedal depressed → Released	10 to 14 V → Below 1 V
SLR+ (D44-32) - GND2 (D44-6)	BR - W-B	Power source for steering lock actuator	Steering lock motor operate → not operate	Below 1 V → 10 to 14 V
SLP (D44-26) - GND2 (D44-6)	GR - W-B	Steering lock actuator UNLOCK position signal	Steering is locked → released	10 to 14 V → Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SPD (D44-19) - GND2 (D44-6)	W - W-B	Vehicle speed signal	Engine switch ON (IG), Rotate driving wheel slowly	Pulse generation
TACH (D44-2) - Body ground	L - Body ground	Engine revolution speed signal	Idling	Pulse generation (see waveform 1)
P (D44-5) - Body ground	P - Body ground	Shift lock signal	Shift lever P position → D position	Below 1 V → 10 to 14 V
CTSW (D44-31) - Body ground	O - Body ground	Starter assist signal	Brake pedal depressed, Engine switch ON (START)	(*1) Below 1 V
STSW (D44-39) - Body ground	R - Body ground	Starter activation request signal	Brake pedal depressed, Engine switch ON (START)	(*2) 10 to 14 V
STR1 (D44-17) - GND2 (D44-6)	SB - W-B	Park / neutral position switch	Shift lever P or N position, Engine switch ON (START)	10 to 14 V
STR2 (D44-15) - GND2 (D44-6)	B - W-B	Starter signal	Shift lever P or N position, Engine switch ON (START)	10 to 14 V
INDS (D44-4) - Body ground	Y - Body ground	Vehicle condition signal	Brake pedal depressed, Shift lever P or N position, Engine switch ON (ACC, IG, START)	10 to 14 V
INDW (D44-13) - Body ground	GR - Body ground	Warning signal	Smart key system malfunction	Pulse generation
SWIL (D44-36) - Body ground	R - Body ground	Illumination signal	Light control switch TAIL or HEAD	10 to 14 V

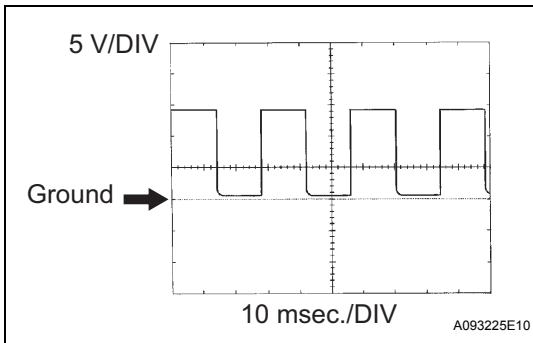
*1: Voltage is output only when the engine is cranking.

*2: Voltage is output for 0.3 seconds after engine start.

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

(1) WAVEFORM 1

Engine speed signal



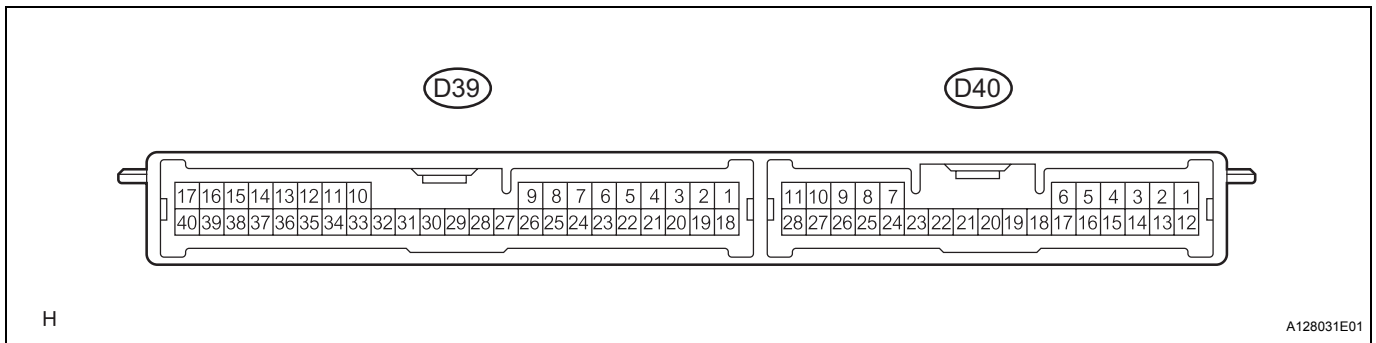
ECM Terminal Names	Between TACH and E1
Tester Ranges	5V/DIV, 10 msec./DIV
Conditions	Idling

HINT:

The wavelength becomes shorter as the engine rpm increases.

2. CHECK CERTIFICATION ECU

ST



H

A128031E01

(a) Disconnect the D39 ECU connector.

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

Resistance

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LIN (D39-10) - E (D39-17)	BR - W-B	LIN line	Always	Below 1 Ω
E (D39-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

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

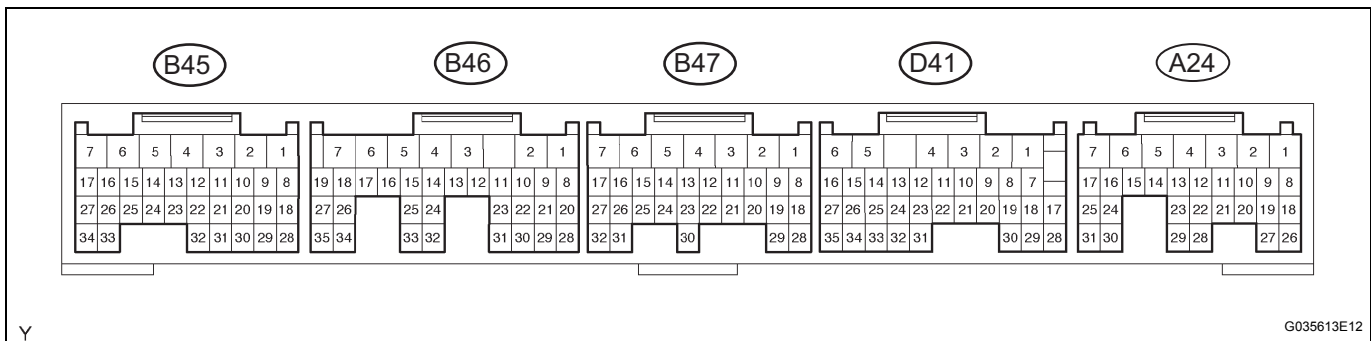
- (c) Reconnect the D39 ECU connector.
(d) Measure the voltage of the connector.

Voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (D39-1) - E (D39-17)	R - W-B	Battery	Always	10 to 14 V
IG (D39-18) - E (D39-17)	Y - W-B	Engine switch (IG)	Engine switch OFF → ON (IG)	Below 1 V → 10 to 14 V
ACC (D39-19) - E (D39-17)	SB - W-B	Engine switch (ACC)	Engine switch OFF → ON (ACC)	Below 1 V → 10 to 14 V

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

3. CHECK ECM



- (a) Disconnect the A24 and B45 ECM connectors.
(b) Measure the resistance and voltage of the connectors.

Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (A24-1) - E1 (B47-1)	L - BR	Power source of ECM	Engine switch ON (IG)	10 to 14 V
+B2 (A24-2) - E1 (B47-1)	R - BR	Power source of ECM	Engine switch ON (IG)	10 to 14 V
IGSW (A24-9) - E1 (B47-1)	Y - BR	Ignition switch signal	Engine switch ON (IG)	10 to 14 V
E01 (B45-7) - Body ground	W-B - Body ground	Earth (ground) circuit of ECM	Always	Below 1 Ω
E1 (B47-1) - Body ground	BR - Body ground	Earth (ground) circuit of ECM	Always	Below 1 Ω

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

- (c) Reconnect the A24 and B45 ECM connectors.

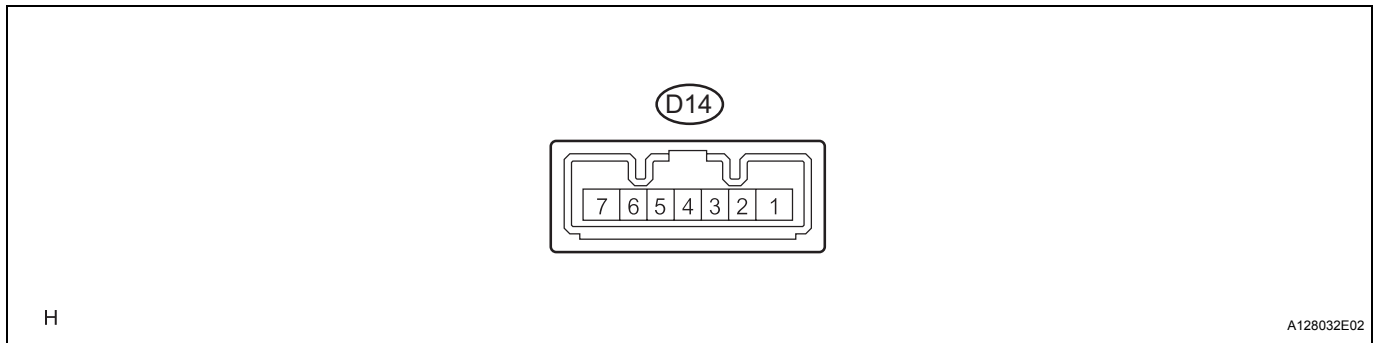
(d) Measure the voltage of the connectors.

Voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STA (B47-11) - E1 (B47-1)	B - BR	Starter relay operation signal	Cranking	10 to 14 V
ACCR (A24-17) - E1 (B47-1)	B - BR	ACC relay cut signal output	Engine switch ON (IG)	10 to 14 V
TACH (D41-1) - E1 (B47-1)	W - BR	Engine revolution start control signal output	Idling	Pulse generation
STP (B24-15) - E1 (B47-1)	W - BR	Stop light switch signal input	Brake pedal depressed → Brake pedal released	7.5 to 14 V → Below 1.5V
STAR (B46-8) - E1 (B47-1)	W - BR	PNP switch signal input	Engine switch ON	10 to 14 V

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

4. CHECK STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)



- (a) Disconnect the D14 actuator connector.
- (b) Measure the resistance and voltage of the wire harness side connector.

Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (D14-7) - Body ground	B - Body ground	+B power supply	Always	10 to 14 V
GND (D14-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
SGND (D14-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LIN (D14-5) - Body ground	R - Body ground	LIN line	Always	10 kΩ or higher

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

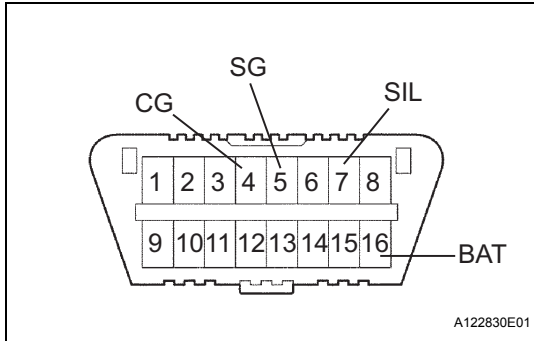
- (c) Reconnect the D14 ECU connector.
- (d) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG2 (D14-6) - Body ground	V - Body ground	Ignition power supply	Engine switch ON (IG)	10 to 14 V
SLP1 (D14-4) - GND (D14-1)	GR - W-B	Steering lock actuator UNLOCK position signal	Steering is locked → released	Below 1 V → 10 to 14 V
IGE (D14-3) - GND (D14-1)	BR - W-B	Power source for steering lock actuator	Steering lock motor operate → not operate	Below 1 V → 10 to 14 V

DIAGNOSIS SYSTEM

1. DESCRIPTION

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



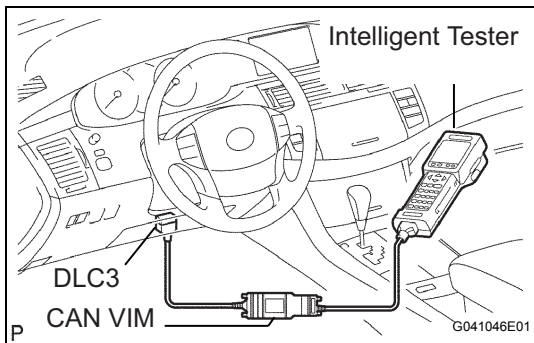
2. CHECK DLC3

- (a) Check the DLC3.

HINT:

The vehicle's ECU uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9142-2 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V



- (b) When troubleshooting the push-button function using the intelligent tester with the engine switch off, connect the intelligent tester to the vehicle and repeat turning any of the courtesy light switches on and off until communication between the tester and the vehicle begins (the interval between ON and OFF should be less than 1.5 sec.).
- (c) Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the display informs that a communication error has occurred, there is a problem either with the vehicle or with the tester.

HINT:

- If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

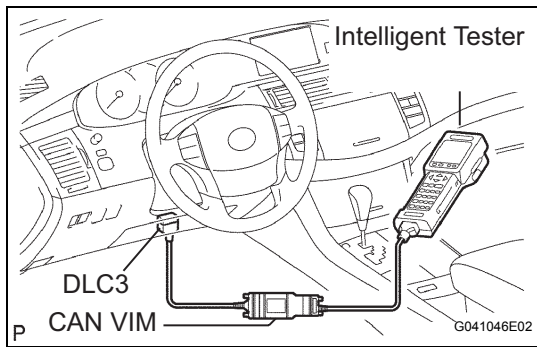
3. INSPECT BATTERY VOLTAGE

- (a) Inspect the battery voltage.

Voltage:

11 to 14 V

If voltage is below 11 V, recharge 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) Read the DTCs by following the directions on the tester's 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) Erase the DTCs by following the directions on the tester's screen.

HINT:

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

FAIL-SAFE CHART**1. POWER SOURCE CONTROL ECU**

DTC No.	Item	Fail-safe Function	Fail-safe Deactivation Condition
B2283	Vehicle speed sensor circuit	Steering does not lock	"Pass" condition is detected

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester's Data List allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the Data List early in troubleshooting is one way to save time.

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG).
- (c) Read the Data List according to the display on the tester.

PWR SOURCE CTRL (Power source control)

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Status of shift P position switch / ON or OFF	ON: Shift Lever is P position OFF: Shift lever is non-P position	-
STR UNLOCK SW	Status of steering unlock switch / ON or OFF	ON: Steering unlock switch is UNLOCK OFF: Steering unlock switch is LOCK	-
STOP LAMP SW1	Status of stop light switch1 / ON or OFF	ON: Brake pedal pressed OFF: Brake pedal depressed	-
START SW1	Status of start switch1 / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
START SW2	Status of start switch2 / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
N SW / C SW	Status of Neutral SW / ON or OFF	ON: Shift Lever is N position OFF: Shift lever is non-N position	-
RATCH CIRCUIT	Status of ratch circuit / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF or ON (ACC) or ON (START)	-
IG1 RELAY MON1	Status of IG1 relay monitor (outside) / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
IG1 RELAY MON2	Status of IG1 relay monitor (inside) / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
IG2 RELAY MON1	Status of IG2 relay monitor (outside) / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
IG2 RELAY MON2	Status of IG2 relay monitor (inside) / ON or OFF	ON: Engine switch is ON (IG) OFF: Engine switch is OFF	-
ST RELAY MON	Status of starter relay monitor / ON or OFF	ON: ST relay is ON OFF: ST relay is OFF	-
ST REQUEST SIG	Status of starter requesting signal monitor / ON or OFF	ON: ST relay is ON OFF: ST relay is OFF	-
ACC RELAY MON	Status of ACC relay monitor / ON or OFF	ON: Engine switch is ON (ACC) OFF: Engine switch is OFF	-
ACC CUT SIG	Status of ACC relay cut signal / ON or OFF	ON: Engine switch is OFF OFF: Engine switch is ON (ACC)	-
VEHICLE SPD SIG	Status of vehicle speed signal / STOP or RUN	ON: Vehicle is stopped OFF: Vehicle is running	-
E / G COND	Status of engine condition / STOP or RUN	ON: Engine is stopped OFF: Engine is running	When engine condition is rotating
PWR COND	Status of power supply condition / ALL, ACC ON, IG1, IG2, ST ON	ALL: All relay is ON ACC ON: ACC relay is ON IG1: IG1 relay is ON IG2: IG2 relay is ON ST ON: ST relay is ON	When ready signal allows to be capable driving
#CODE	Status of Number of diagnosis codes / min: 0, max: 255	-	-

ST

2. ACTIVE TEST**HINT:**

Performing the intelligent tester's Active Test allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the Active Test early in troubleshooting is one way to 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) Perform the Active Test according to the display on the tester.

PWR SOURCE CTRL (Power source control)

Item	Test Details	Diagnostic Note
LIGHTING IND	Indicator for lighting ON / OFF	-
IND CONDITION	Indicator for lighting Green / Amber / No Sig	-
STR LOCK PWR	Power supply for steering lock ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

1. DTC CHECK

If a malfunction code is displayed during the DTC check, the suspected area listed for that code in the table below, and proceed to the relevant page.

ENTRY AND START SYSTEM

DTC No.	Detection Item	Trouble Area	See page
B2271	Ignition Hold Monitor Malfunction	1. Power source control ECU 2. AM2 fuse 3. Wire harness	ST-25
B2272	Ignition 1 Monitor Malfunction	1. Power source control ECU 2. IG1 relay 3. Wire harness	ST-27
B2273	Ignition 2 Monitor Malfunction	1. Power source control ECU 2. IG2 relay 3. Wire harness	ST-32
B2274	ACC Monitor Malfunction	1. Power source control ECU 2. ACC relay 3. Wire harness	ST-35
B2275	STSW Monitor Malfunction	1. Power source control ECU 2. ECM 3. Wire harness	ST-38
B2276	ACCR Signal Circuit Malfunction	1. Power source control ECU 2. ECM 3. Wire harness	ST-41
B2277	Detecting Vehicle Submersion	Power source control ECU	ST-44
B2278	Engine Switch Circuit Malfunction	1. Power source control ECU 2. Engine switch 3. Wire harness	ST-45
B2281	"P" Signal Malfunction (Cable-Information does not Match to Bean-Information)	1. Power source control ECU 2. Shift lock control ECU 3. Wire harness	ST-48
B2282	Vehicle Speed Signal Malfunction (Cable-Information does not Match to Bean-Information)	1. Power source control ECU 2. Combination meter assembly 3. Wire harness	ST-50
B2283	Vehicle Speed Sensor Malfunction	1. Speed sensor 2. Power source control ECU 3. Combination meter assembly 4. Skid control ECU 5. Each ECU 6. Wire harness	ST-50
B2284	Brake Signal Malfunction (Cable-Information does not Match to Bean-Information)	1. Power source control ECU 2. Stop light switch 3. Wire harness	ST-54
B2285	Steering Lock Position Signal Circuit Malfunction	1. Power source control ECU 2. Steering lock actuator (steering lock ECU) 3. Wire harness	ST-57
B2286	Runnable Signal Malfunction	1. Power source control ECU 2. ECM 3. Wire harness	ST-60
B2287	LIN Communication Master Malfunction	1. Power source control ECU 2. Certification ECU 3. Wire harness	ST-63
B2288	Steering Lock Signal Circuit Malfunction	1. Power source control ECU 2. Steering lock actuator (steering lock ECU) 3. Wire harness	ST-57
B2289	Key Collation Waiting Time Over	1. Power source control ECU 2. Certification ECU 3. Wire harness	ST-63

DTC

B2271

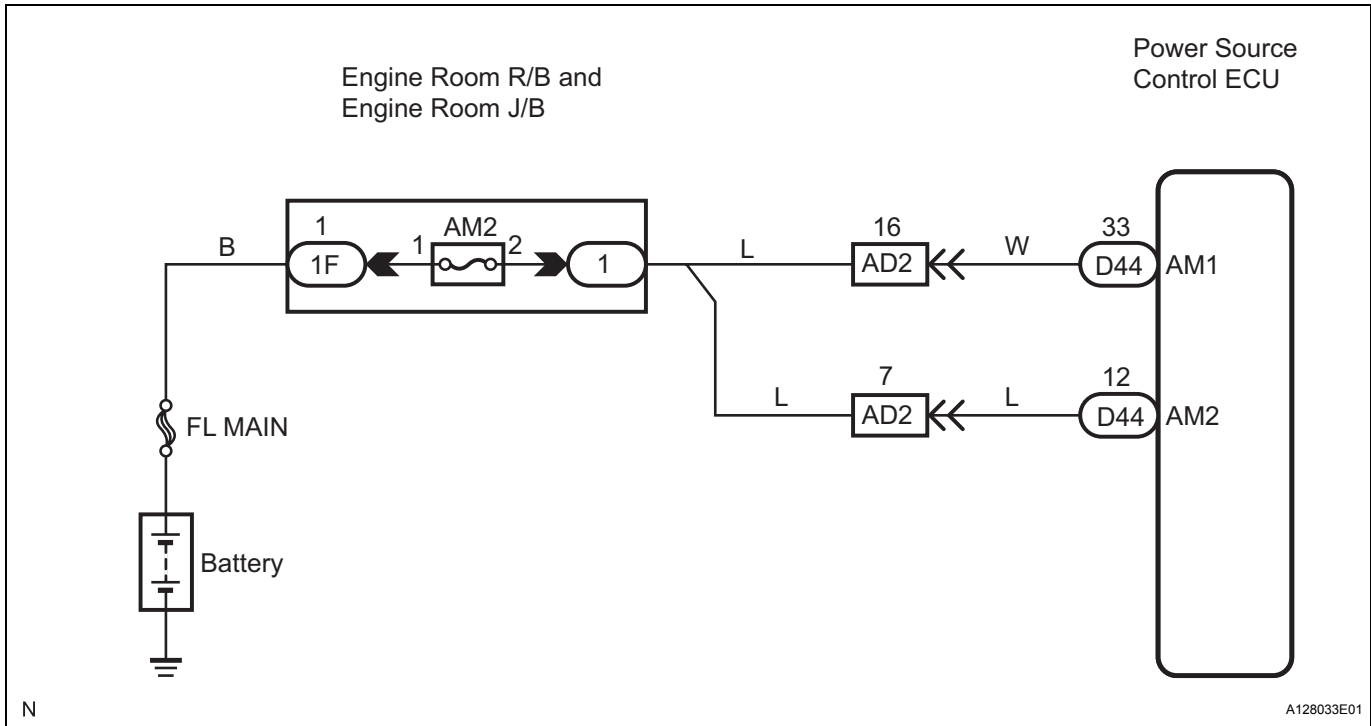
Ignition Hold Monitor Malfunction

DESCRIPTION

This DTC is output when the IG output circuits inside the power source control ECU are open or short.

DTC No.	DTC Detection Condition	Trouble Area
B2271	Hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside power source control ECU is malfunctioning	<ul style="list-style-type: none"> Power source control ECU AM2 fuse Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1

CHECK DTC OUTPUT

- (a) Delete the DTC (See page [ST-22](#)).

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.

OK:

No DTC is output.

NG

Go to step 2

OK

END

2 INSPECT FUSE (AM2)

- (a) Remove the AM2 fuse from the engine room J/B.
- (b) Measure the resistance of the fuse.

Resistance:
Below 1 Ω

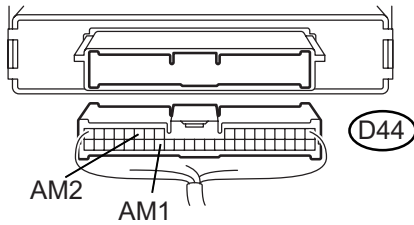
NG

REPLACE FUSE

OK

3 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - BATTERY)

Power Source Control ECU:



- (a) Disconnect the D44 ECU connector.
- (b) Measure the voltage according to the value(s) in the table below.

Voltage

Terminal No. (Symbol)	Specified Condition
D44-33 (AM1) - Body ground	10 to 14 V
D44-12 (AM2) - Body ground	10 to 14 V

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

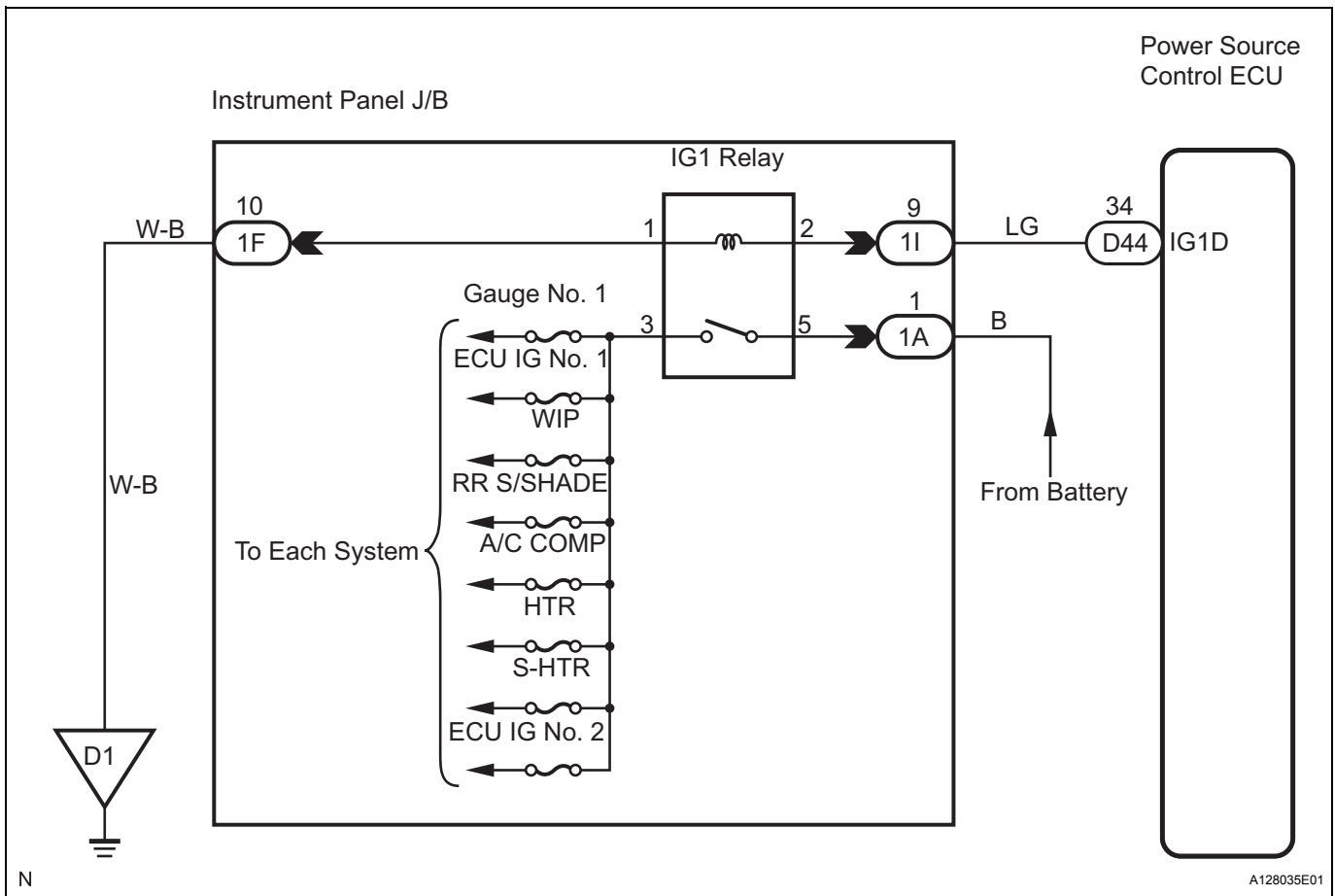
REPLACE POWER SOURCE CONTROL ECU

ST

DTC**B2272****Ignition 1 Monitor Malfunction****DESCRIPTION**

This DTC is output when the IG output circuit from the inside the power source control ECU to the IG1 relay is malfunctioning.

DTC No.	DTC Detection Condition	Trouble Area
B2272	IG1 relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	<ul style="list-style-type: none"> Power source control ECU IG1 relay Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****1****READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and press the intelligent tester main switch on.

- (c) Select the items below in the Data List, and read the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

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 (IG1 relay is ON) OFF: Engine switch OFF (IG1 relay is OFF)	-

OK:

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

Result

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

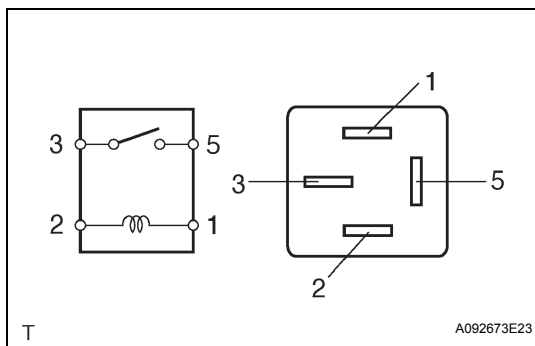
C → **Go to step 2**

A

REPLACE POWER SOURCE CONTROL ECU

ST

2 INSPECT RELAY (Marking: IG1)



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

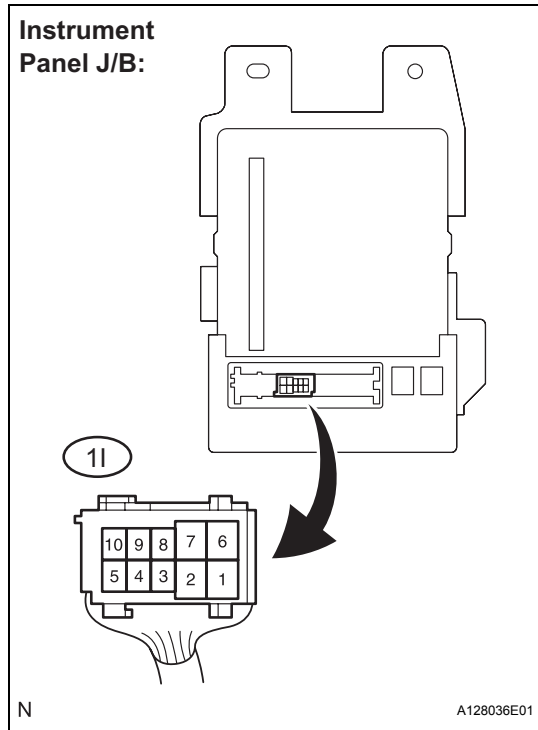
Resistance

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)

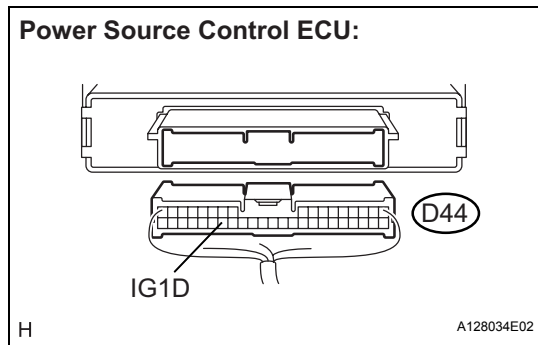
NG → **REPLACE RELAY**

OK

3 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - POWER SOURCE CONTROL ECU)



(a) Disconnect the 1I J/B connector.



(b) Disconnect the D44 ECU connector.

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

Resistance

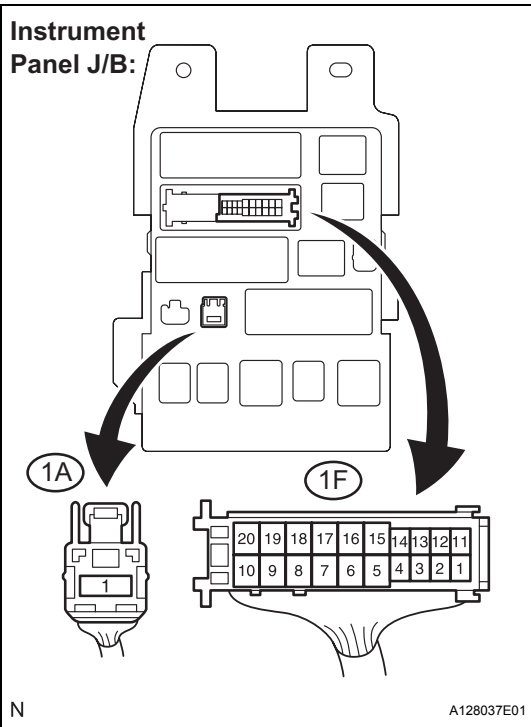
Terminal No. (symbol)	Specified Condition
1I-9 - D44-34 (IG1D)	Below 1 Ω
D44-34 - Body ground	10 kΩ or higher

NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

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



- (a) Disconnect the 1F and 1A J/B connectors.
- (b) Measure the resistance according to the value(s) in the table below.

Resistance

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

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

Voltage

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

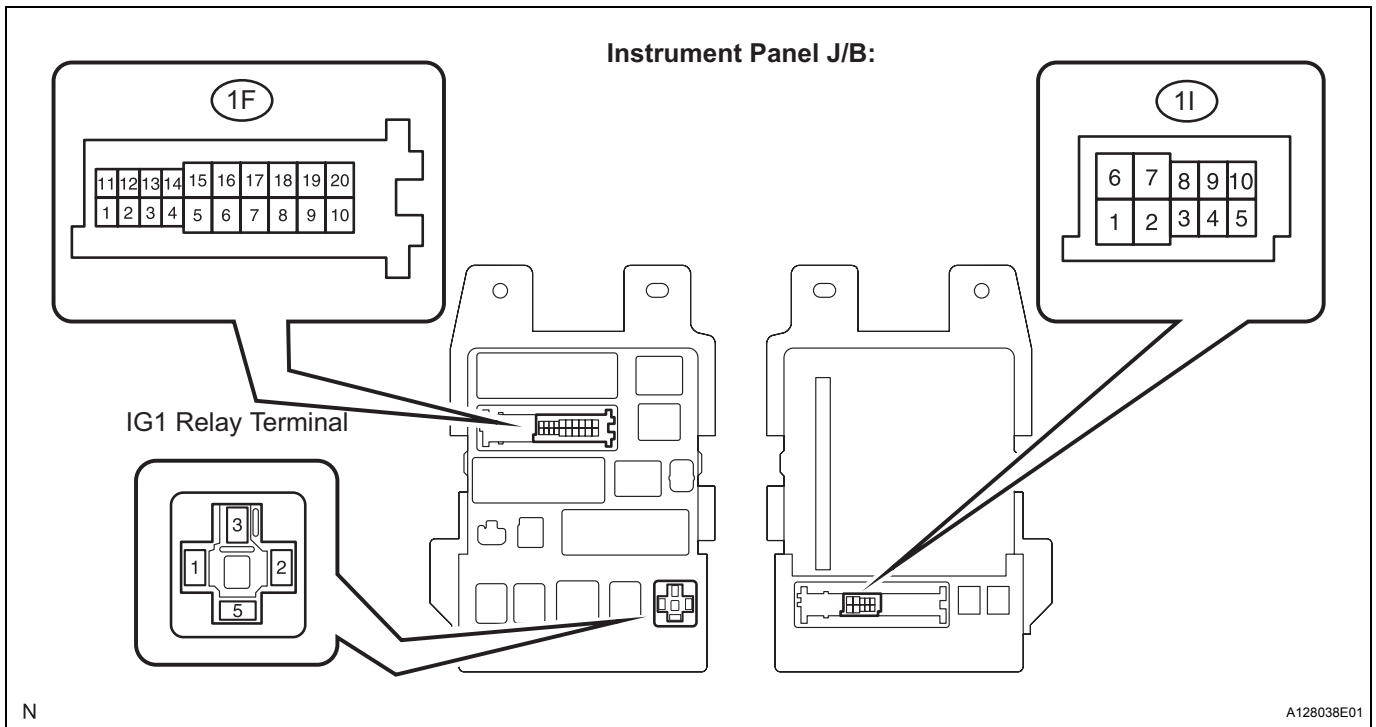
NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 INSPECT INSTRUMENT PANEL J/B

ST

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



Resistance

Terminal No.	Condition	Specified value
1F-10 - IG1 relay terminal-1	Always	Below 1 Ω
1I-9 - IG1 relay terminal-2	Always	Below 1 Ω

NG

REPLACE INSTRUMENT PANEL J/B

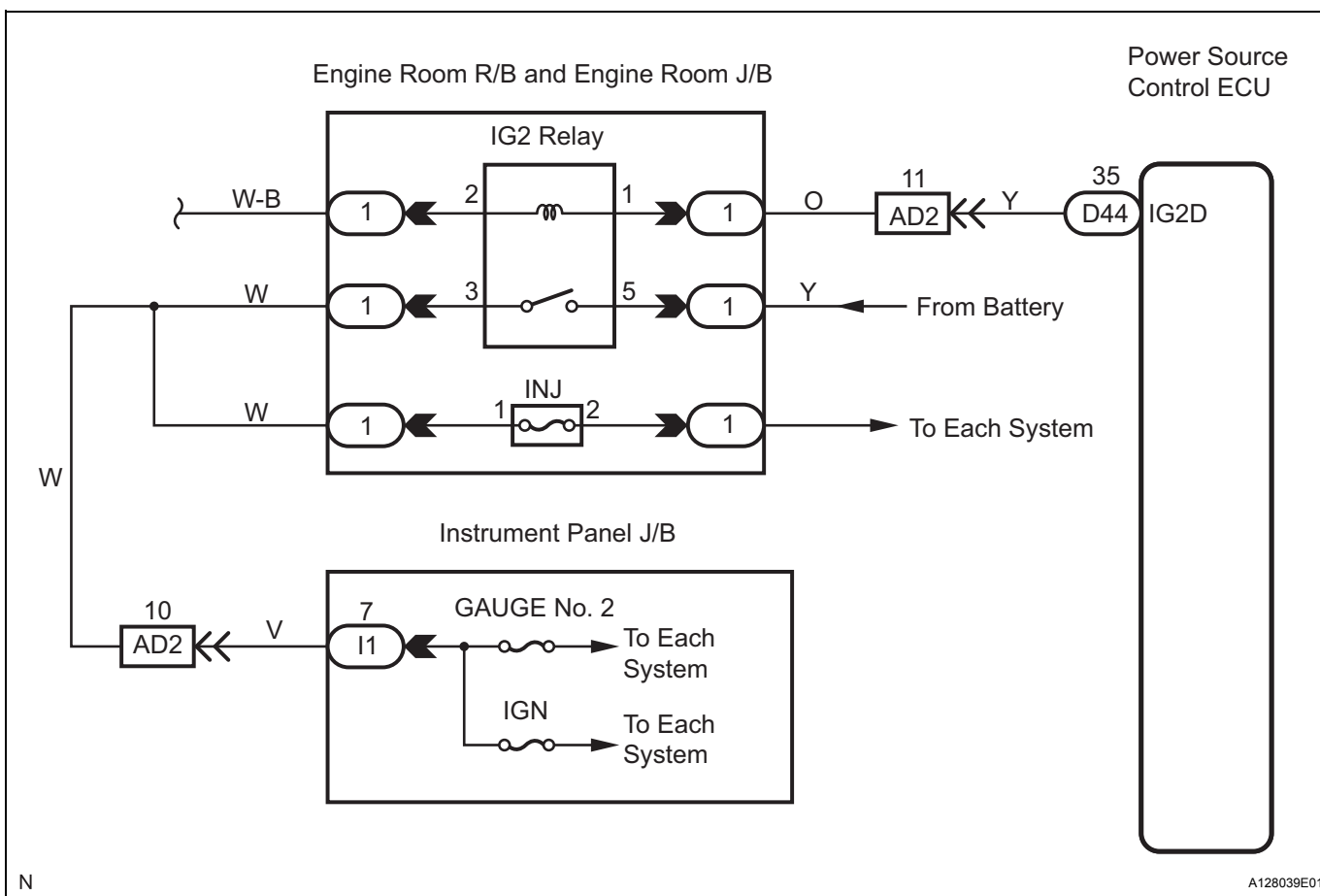
OK

REPLACE POWER SOURCE CONTROL ECU

DTC**B2273****Ignition 2 Monitor Malfunction****DESCRIPTION**

This DTC is output when the IG output circuit from the inside of the power source control ECU to the IG2 relay is malfunctioning.

DTC No.	DTC Detection Condition	Trouble Area
B2273	IG2 relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	<ul style="list-style-type: none"> Power source control ECU IG2 relay Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****1****READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and press the intelligent tester main switch on.

- (c) Read the Data List according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

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 (IG2 relay is ON) OFF: Engine switch OFF (IG2 relay is OFF)	-

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

Result

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

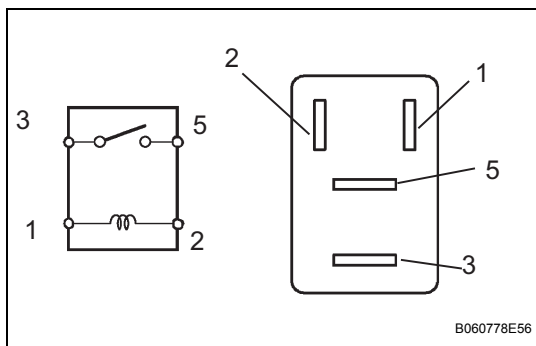
C → Go to step 2

A

REPLACE POWER SOURCE CONTROL ECU

ST

2 INSPECT RELAY (Marking: IG2)



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

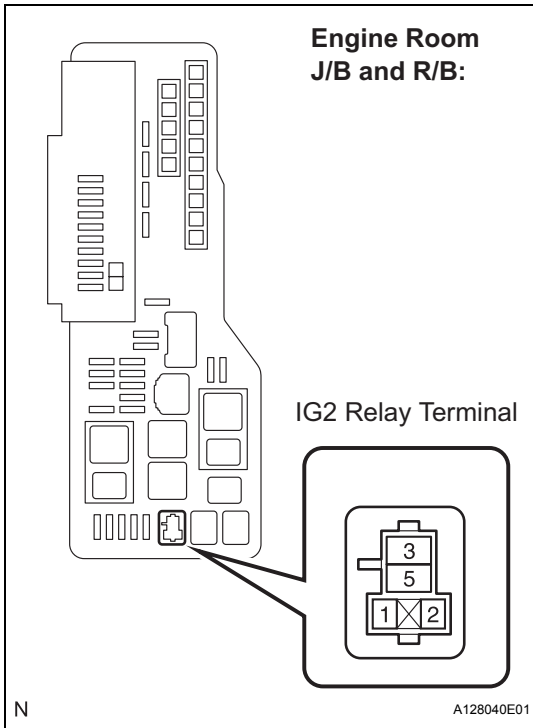
Resistance

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)

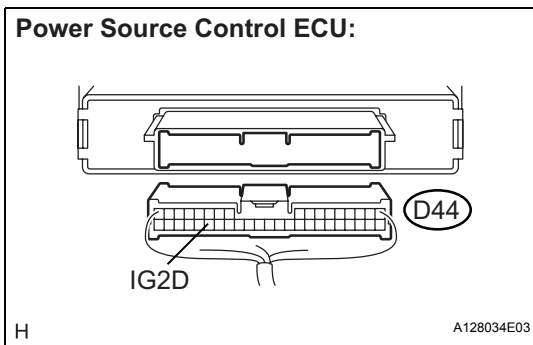
NG → REPLACE RELAY

OK

3 CHECK WIRE HARNESS (ENGINE ROOM R/B - POWER SOURCE CONTROL ECU AND BODY GROUND)



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



(b) Disconnect the D44 ECU connector.
 (c) Measure the resistance according to the value(s) in the table below.

Resistance

Terminal No. (Symbol)	Specified Condition
Engine Room R/B IG2 relay terminal 1 - D44-35 (IG2D)	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Below 1 Ω
D44-35 (IG2D) - Body ground	10 kΩ or higher

OK

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

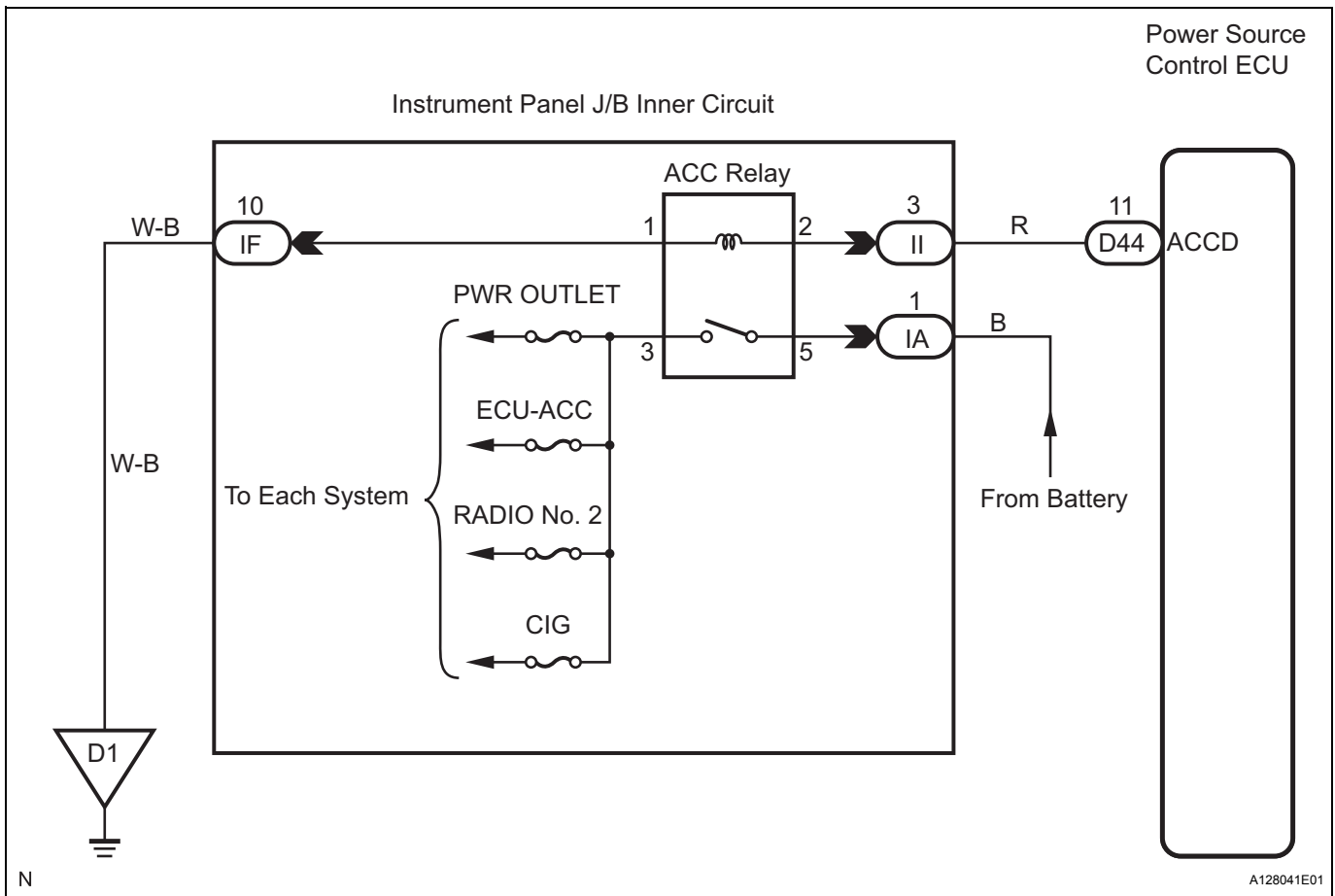
REPLACE POWER SOURCE CONTROL ECU

ST

DTC**B2274****ACC Monitor Malfunction****DESCRIPTION**

This DTC is output when the ACC output circuit from the inside the power source control ECU to the ACC relay is malfunctioning.

DTC No.	DTC Detection Condition	Trouble Area
B2274	ACC relay actuation circuit inside power source control ECU or other related circuits is malfunctioning	<ul style="list-style-type: none"> Power source control ECU ACC relay Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****1 READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and press the intelligent tester main switch on.

- (c) Read the Data List according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

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.

Result

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

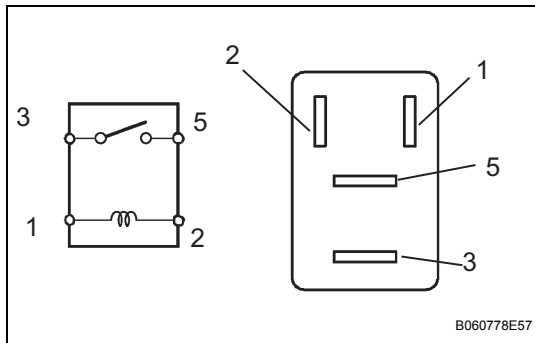
C → Go to step 2

A

REPLACE POWER SOURCE CONTROL ECU

2 INSPECT RELAY (Marking: ACC)

ST



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

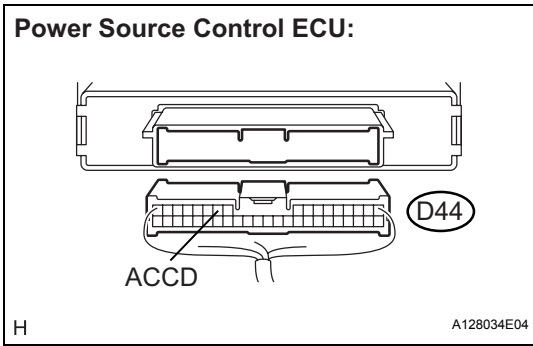
Resistance

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)

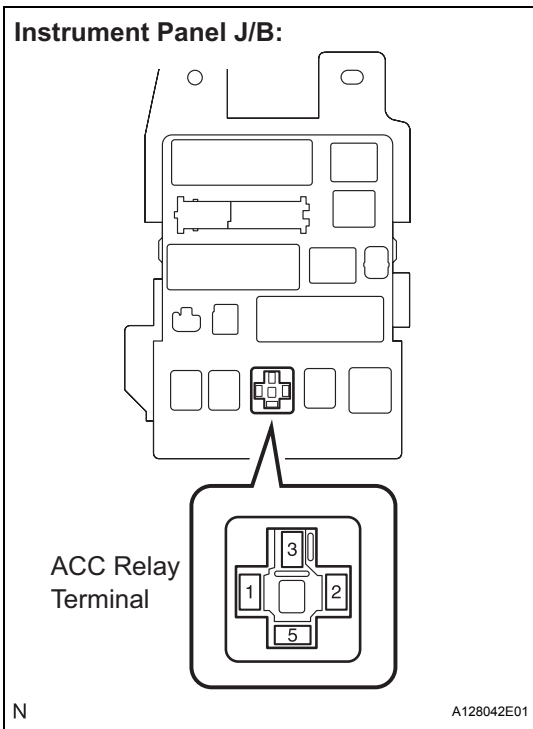
NG → REPLACE RELAY

OK

3 CHECK WIRE HARNESS (ACC RELAY - POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Disconnect the D44 ECU connector.



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

Resistance

Terminal No. (Symbol)	Specified Condition
R/B ACC relay terminal 2 - D44-11 (ACCD)	Below 1 Ω
R/B ACC relay terminal 2 - Body ground	10 kΩ or higher
R/B ACC relay terminal 1 - Body ground	Below 1 Ω

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

ST

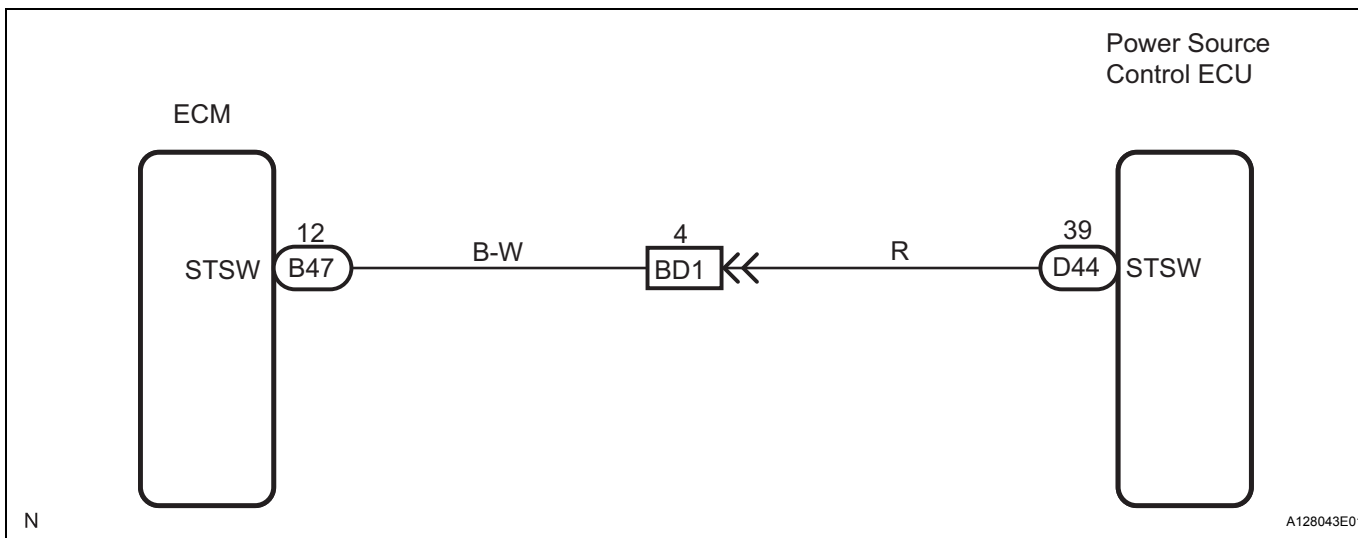
OK

REPLACE POWER SOURCE CONTROL ECU

DTC**B2275****STSW Monitor Malfunction****DESCRIPTION**

This DTC is output when the ST output circuits inside the power source control ECU is open or shorted.

DTC No.	DTC Detection Condition	Trouble Area
B2275	ST output circuit inside power source control ECU or other related circuit is malfunctioning	<ul style="list-style-type: none"> • Power source control ECU • ECM • Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****ST****1****CHECK DTC OUTPUT**

- (a) Delete the DTC (See page [ST-22](#)).
- 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.

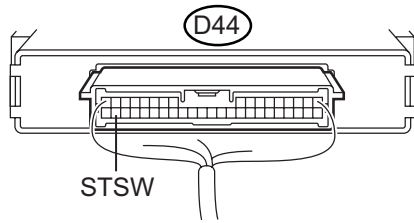
NG

Go to step 2

OK**END**

2 INSPECT POWER SOURCE CONTROL ECU

Power Source Control ECU:



H

A128044E01

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

Voltage

Terminal No. (Symbol)	Condition	Specified condition
D44-39 (STSW) - Body ground	Brake pedal depressed, Engine switch START	10 to 14 V

HINT:

Voltage is output for 0.3 seconds after engine start.

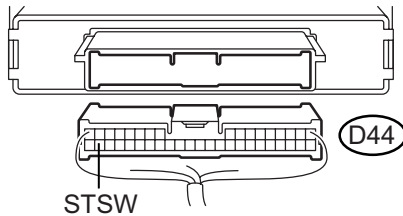
NG

REPLACE POWER SOURCE CONTROL ECU

OK

3 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - ECM)

Power Source Control ECU:

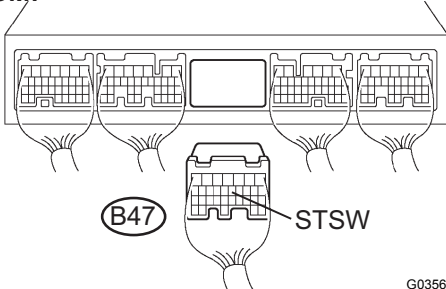


H

A128034E05

- (a) Disconnect the D44 ECU connector.

ECM:



Y

G035617E06

- (b) Disconnect the B47 ECM connector.
 (c) Measure the resistance according to the value(s) in the table below.

Resistance

Terminal No. (Symbol)	Specified Condition
D44-39 (STSW) - B47-12 (STSW)	Below 1 Ω
D44-39 (STSW) - Body ground	10 k Ω or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK POWER SOURCE CONTROL ECU OPERATION

- (a) After replacing the power source control ECU with a normally functioning ECU, check that the engine can start.

OK:

Engine can start normally.

NG

GO TO SFI SYSTEM

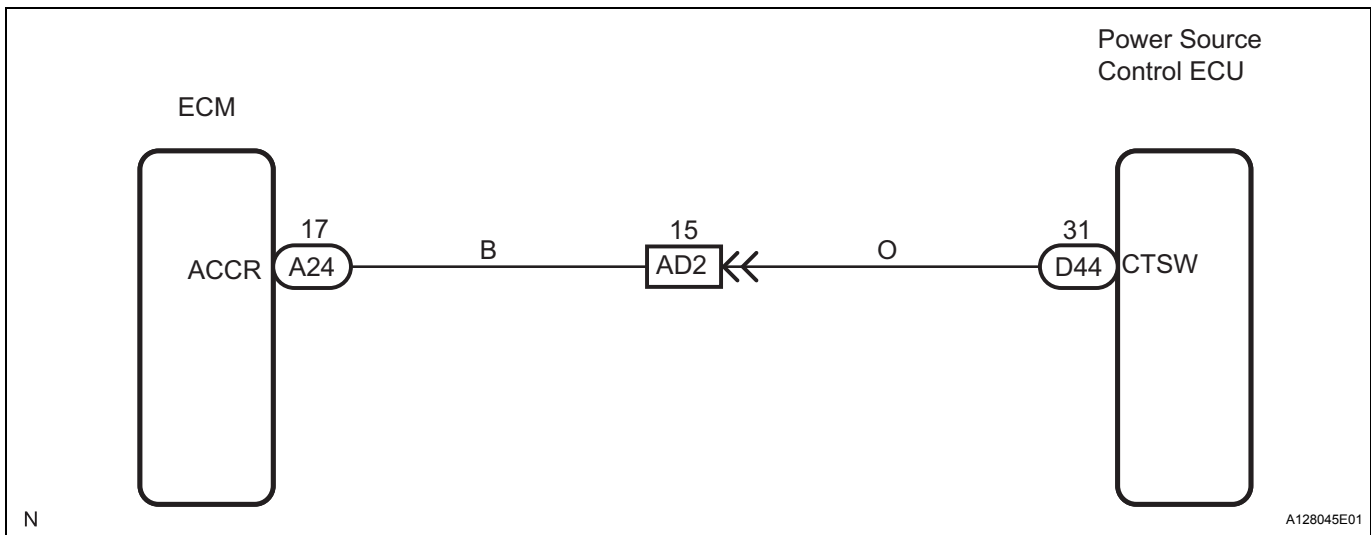
OK

END (POWER SOURCE CONTROL ECU DEFECTIVE)

DTC**B2276****ACCR Signal Circuit Malfunction****DESCRIPTION**

The power source control ECU and the ECM are connected by the cable and BEAN.
If the cable information and BEAN information are inconsistent, this DTC will be output.

DTC No.	DTC Detection Condition	Trouble Area
B2276	Cable and BEAN informations between power source control ECU and ECM are inconsistent	<ul style="list-style-type: none"> Power source control ECU ECM Wire harness

WIRING DIAGRAM**ST****INSPECTION PROCEDURE****1 CHECK DTC OUTPUT**

- (a) Delete the DTC (See page [ST-22](#)).

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 is output.

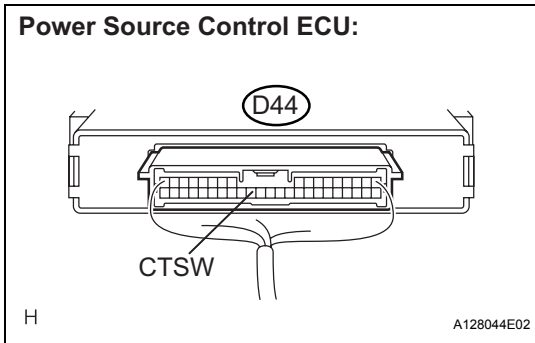
NG

Go to step 2

OK

END

2 INSPECT POWER SOURCE CONTROL ECU



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

Voltage

Terminal No. (Symbol)	Condition	Specified condition
D44-31 (CTSW) - Body ground	Brake pedal depressed, Ignition switch START	Below 1 V

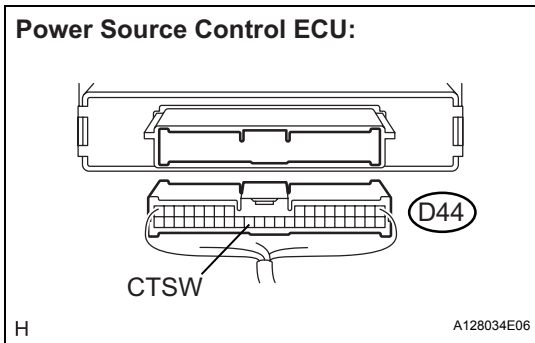
HINT:

Voltage is output only when the engine is cranking.

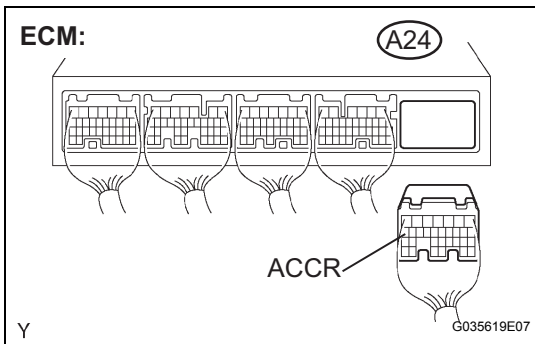
NG → **Go to step 4**

OK

3 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - ECM)



(a) Disconnect the D44 ECU connector.



(b) Disconnect the A24 ECM connector.

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

Resistance

Terminal No. (Symbol)	Specified condition
D44-31 (CTSW) - A24-17 (ACCR)	Below 1 Ω
D44-31 (CTSW) - Body ground	10 k Ω or higher

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

OK

4 CHECK POWER SOURCE CONTROL ECU OPERATION

(a) After replacing the power source control ECU with a normally functioning ECU, check that the engine starts.

OK:

Engine can start normally.

NG → **GO TO SFI SYSTEM**

OK

END (POWER SOURCE CONTROL ECU DEFECTIVE)

DTC**B2277****Detecting Vehicle Submersion****DESCRIPTION**

This DTC is output when the submersion circuit monitor inside the power source control ECU detects that the vehicle is submerged in water.

DTC No.	DTC Detection Condition	Trouble Area
B2277	Submersion circuit monitor inside power source control ECU detects that vehicle is submerged in water	Power source control ECU

INSPECTION PROCEDURE**1****CHECK DTC OUTPUT**

- (a) Delete the DTC (See page [ST-22](#)).

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 POWER SOURCE CONTROL ECU

OK 

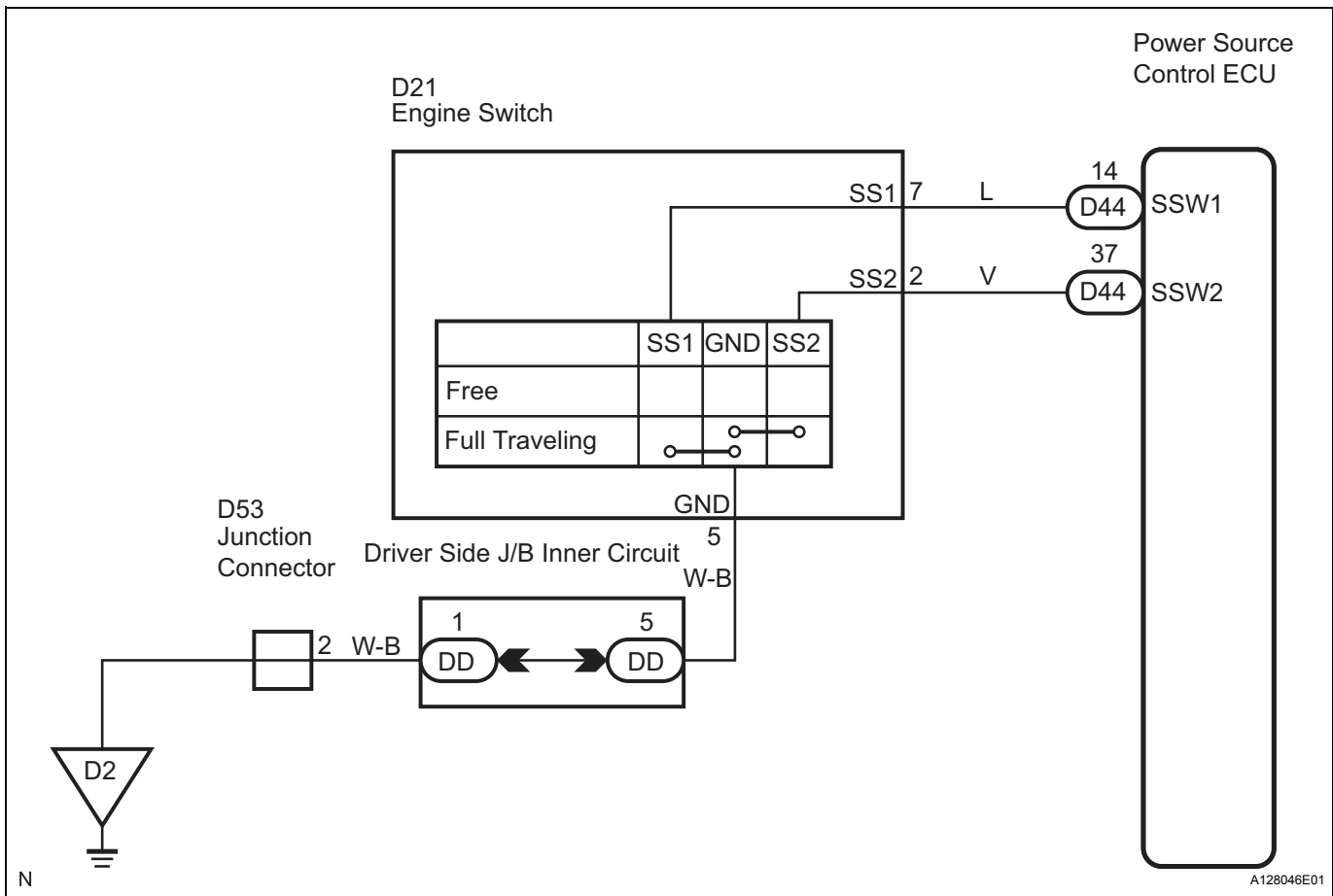
END

ST

DTC**B2278****Engine Switch Circuit Malfunction****DESCRIPTION**

This DTC is output when: 1) a malfunction is detected between the power source control ECU and the engine switch; or 2) either of the switches inside the engine switch is malfunctioning.

DTC No.	DTC Detection Condition	Trouble Area
B2278	Communication is abnormal between power source control ECU and engine switch, or engine switch is defective	<ul style="list-style-type: none"> Power source control ECU Engine switch Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****1****READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and press the intelligent tester main switch on.

- (c) Read the Data List according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
START SW1	Status of start switch 1 / ON or OFF	ON: Engine switch ON (IG) OFF: Engine switch OFF (IG)	-
START SW2	Status of start switch 2/ ON or OFF	ON: Engine switch ON (IG) OFF: Engine switch OFF (IG)	-

OK:

"ON" (engine switch on (IG)) appears on the screen

Result

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **Go to step 2**

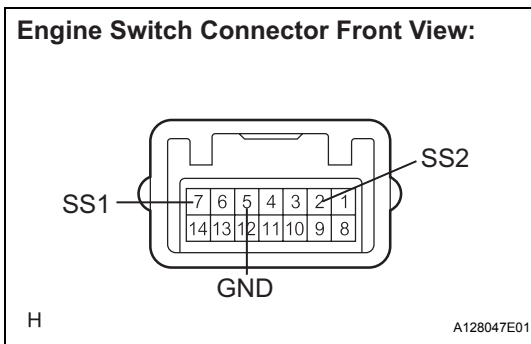
A

REPLACE POWER SOURCE CONTROL ECU

2 INSPECT ENGINE SWITCH

ST

Engine Switch Connector Front View:



- (a) Disconnect the D21 switch connector.
- (b) Measure the resistance according to the value(s) in the table below.

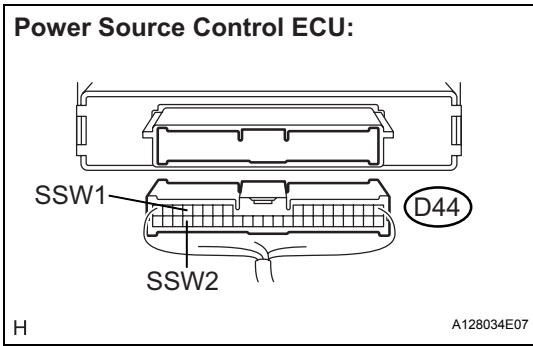
Resistance

Terminal No. (Symbol)	Switch Condition	Specified value
D21-2 (SS2) - D21-5 (GND)	Free	10 kΩ or higher
	Pushed (Hold)	Below 1 Ω
D21-7 (SS1) - D21-5 (GND)	Free	10 kΩ or higher
	Pushed (Hold)	Below 1 Ω

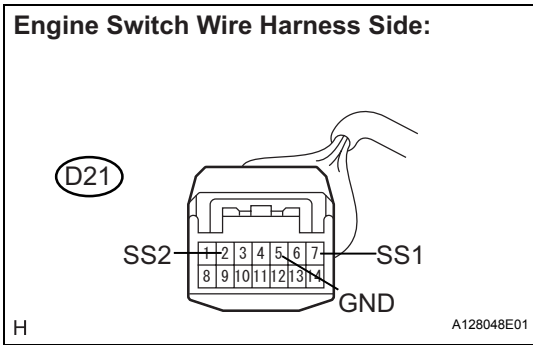
NG → **REPLACE ENGINE SWITCH**

OK

3 CHECK WIRE HARNESS (ENGINE SWITCH - POWER SOURCE CONTROL ECU AND BODY GROUND)



(a) Disconnect the D21 switch connector.



(b) Disconnect the D44 ECU connector.

(c) Measure the resistance of the wire harness side connectors.

Resistance

Terminal No. (Symbol)	Specified Condition
D21-7 (SS1) - D44-14 (SSW1)	Below 1 Ω
D21-2 (SS2) - D44-37 (SSW2)	Below 1 Ω
D21-5 (GND) - Body ground	Below 1 Ω
D21-7 (SS1) or D44-14 (SSW1) - Body ground	10 kΩ or higher
D21-2 (SS2) or D44-37 (SSW2) - Body ground	10 kΩ or higher

ST

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

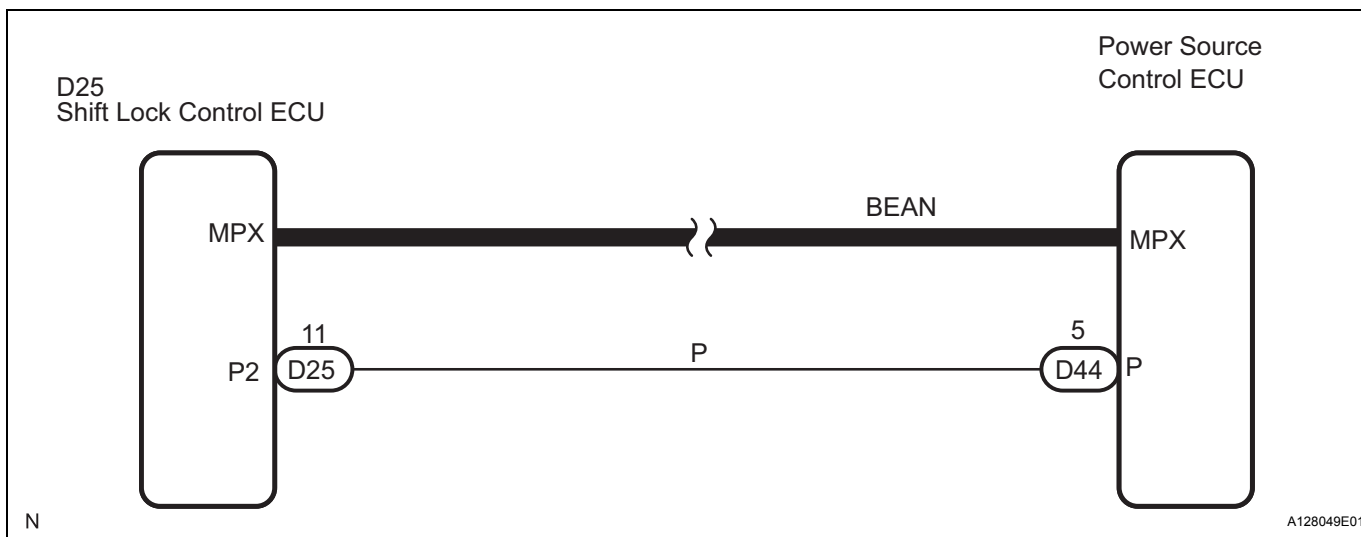
OK

REPLACE ENGINE SWITCH

DTC**B2281****"P" Signal Malfunction****DESCRIPTION**

The power source control ECU and the shift lock control ECU are connected by a cable and the BEAN. If the cable information and BEAN information are inconsistent, this DTC will be output.

DTC No.	DTC Detection Condition	Trouble Area
B2281	Cable and BEAN between power source control ECU and shift lock control ECU are inconsistent	<ul style="list-style-type: none"> Power source control ECU Shift lock control ECU Wire harness

WIRING DIAGRAM**INSPECTION PROCEDURE****1****READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and press the intelligent tester main switch on.
- Read the DATA LIST according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

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) appears on the screen.****Result**

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

ST



PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE



Go to step 2

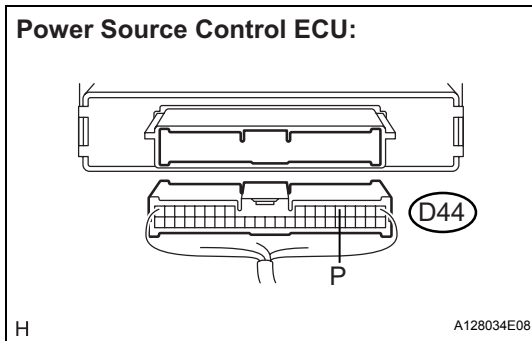


REPLACE POWER SOURCE CONTROL ECU

2

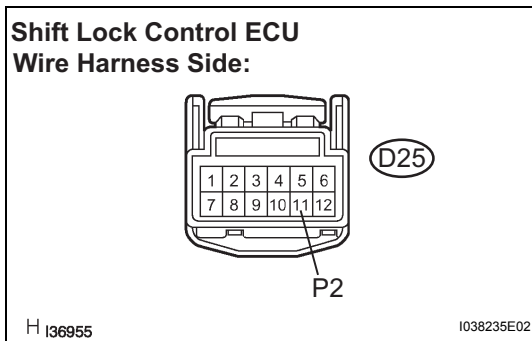
CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - SHIFT LOCK CONTROL ECU)

Power Source Control ECU:



(a) Disconnect the D44 ECU connector.

Shift Lock Control ECU Wire Harness Side:



(b) Disconnect the D25 ECU connector.

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

Resistance

Terminal No. (Symbol)	Specified Condition
D44-5 (P) - D25-11 (P2)	Below 1 Ω
D44-5 (P) - Body ground	10 k Ω or higher



REPAIR OR REPLACE HARNESS OR CONNECTOR



3

CHECK POWER SOURCE CONTROL ECU OPERATION

(a) After replacing the power source control ECU with a normally functioning ECU, check that the push button start function can start normally.

OK:

Push button start function can start normally.



GO TO SHIFT CONTROL SYSTEM

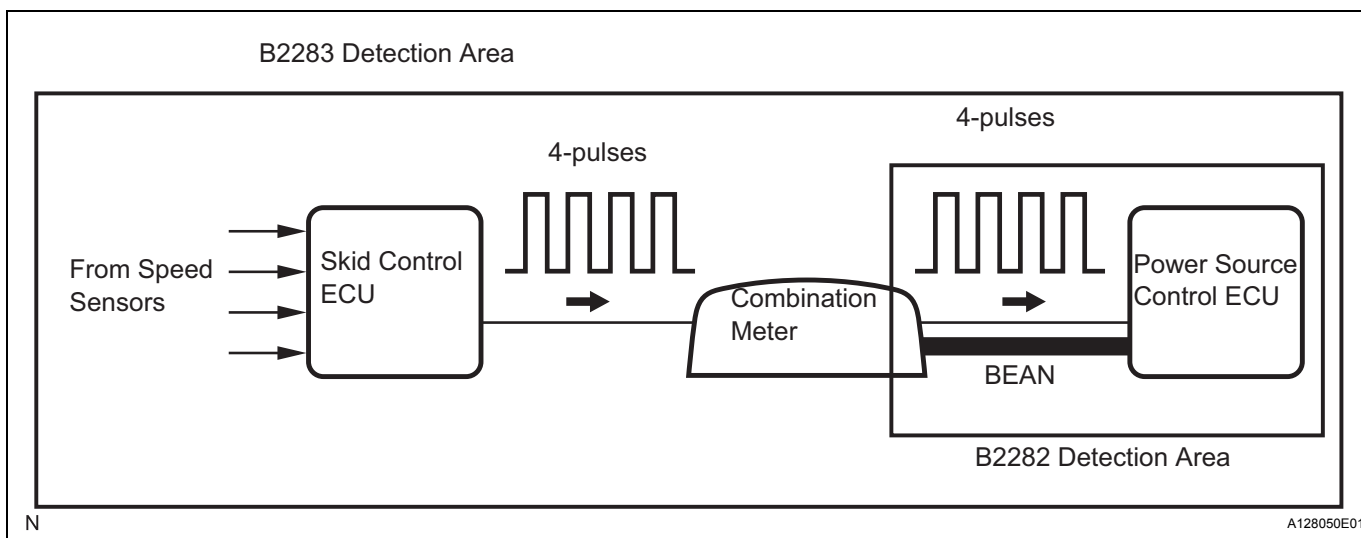


END (POWER SOURCE CONTROL ECU DEFECTIVE)

DTC	B2282	Vehicle Speed Signal Malfunction
DTC	B2283	Vehicle Speed Sensor Malfunction

DESCRIPTION

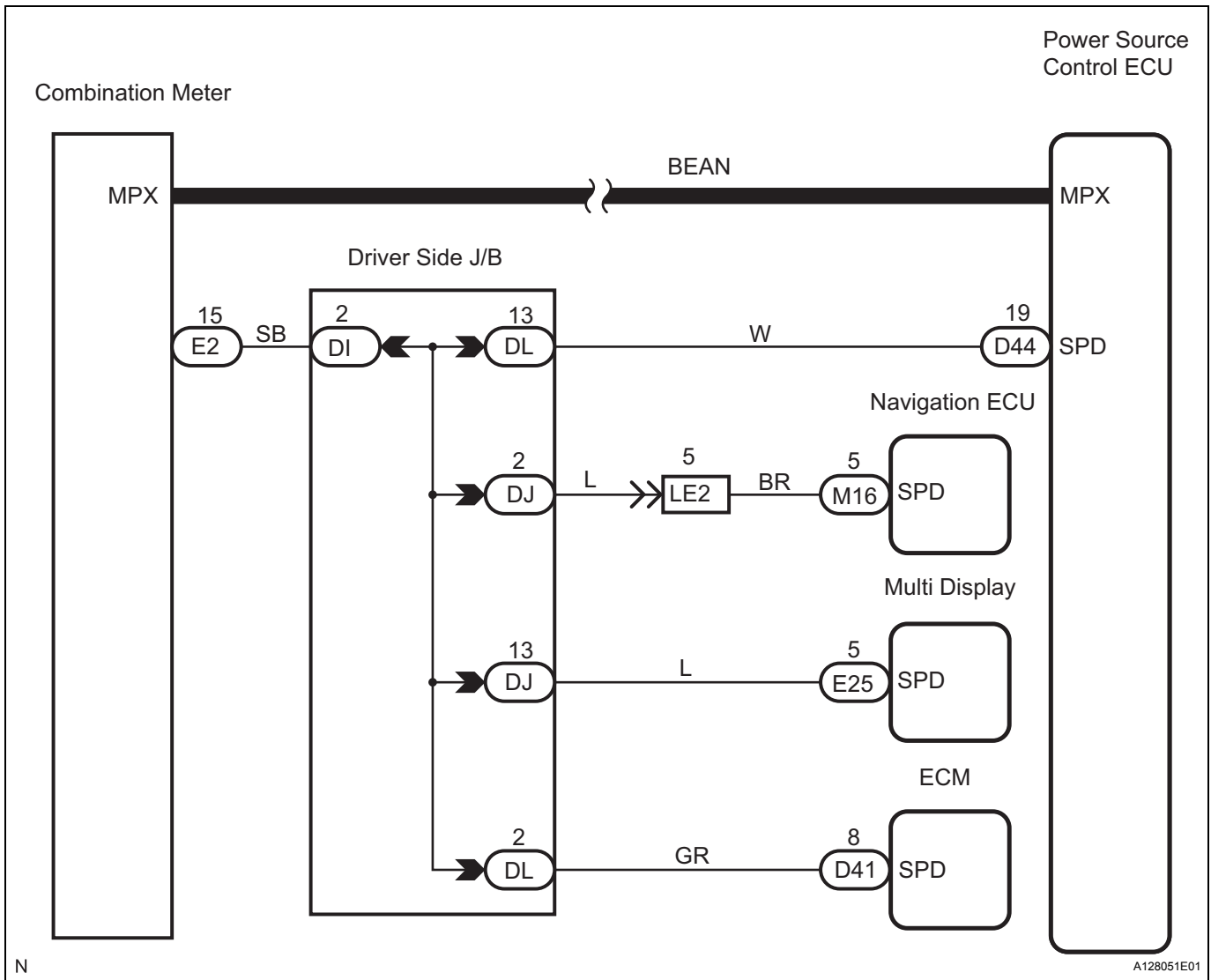
The skid control ECU converts these signals into 4-pulse signals and sends them to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the power source control ECU. The power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



The power source control ECU and the combination meter are connected by a cable and BEAN. This DTC is output when: 1) the cable information and BEAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and the combination meter.

DTC No.	DTC Detection Condition	Trouble Area
B2282	Cable and BEAN information between power source control ECU and combination meter are inconsistent	<ul style="list-style-type: none"> • Power source control ECU • Combination meter assembly • Wire harness
B2283	The ECU detects either of the following: <ul style="list-style-type: none"> – Over deceleration in vehicle speed – The vehicle speed and the engine speed do not match 	<ul style="list-style-type: none"> • Speed sensor • Power source control ECU • Combination meter assembly • Skid control ECU • Each ECU • Wire harness

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 below will not operate normally.

INSPECTION PROCEDURE

1 CHECK SPEEDOMETER OPERATION

- (a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.

OK:

Actual vehicle speed and the speed indicated on the speedometer are the same.

HINT:

The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **CHECK COMBINATION METER ASSEMBLY**

OK

2 CHECK DTC OUTPUT (PUSH BUTTON START)

- (a) Delete the DTC (See page [ST-22](#)).
HINT:
After all DTCs are cleared, check if the trouble occurs again 320 seconds after the engine switch is turned on (IG).
- (b) Check for DTCs again.

OK:
No DTC is output

OK → **END**

NG

3 CHECK DTC OUTPUT (ABS SYSTEM)

- (a) Delete the DTC (w/o VSC: See page [BC-19](#), w/ VSC: See page [BC-121](#)).
HINT:
If the DTCs for the ABS system or the vehicle speed sensor malfunction are output, inspect those DTCs first (w/o VSC: See page [BC-23](#), w/ VSC: See page [BC-128](#)).
- (b) Check for DTCs again.

OK:
No DTC is output

NG → **GO TO ABS SYSTEM**

OK

4 READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and press the intelligent tester main switch on.
- (c) Read the Data List according to the displays on the tester.

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

OK:
"STOP" (vehicle is stopped) appears on the screen.

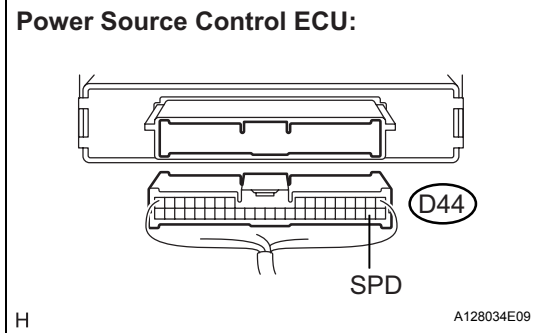
NG → **Go to step 5**

ST

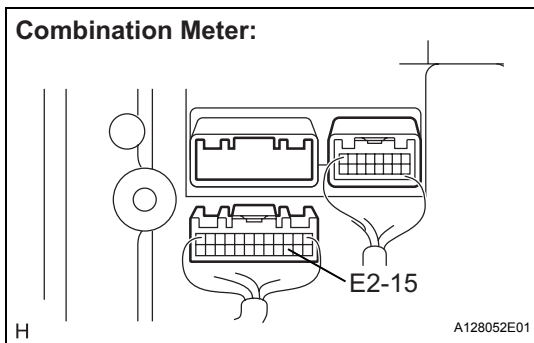
OK

REPLACE POWER SOURCE CONTROL ECU

5 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - COMBINATION METER ASSEMBLY)



(a) Disconnect the D44 ECU connector.



(b) Disconnect the E2 meter connector.

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

Resistance

Terminal No. (Symbol)	Specified Condition
D44-19 (SPD) - E2-15	Below 1 Ω
D44-19 (SPD) - Body ground	10 k Ω or higher

HINT:

If the resistance between terminal SPD and body ground is less than 10 k Ω , there may be a short in a wire harness, connector, or ECU.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR AND EACH ECU

OK

6 CHECK DTC OUTPUT (POWER SOURCE CONTROL ECU ASSEMBLY)

(a) After replacing the power source control ECU with a normally functioning ECU, check for power source control ECU DTCs.

OK:

Power source control ECU DTCs are not output.

NG

GO TO COMBINATION METER SYSTEM

OK

END (POWER SOURCE CONTROL ECU DEFECTIVE)

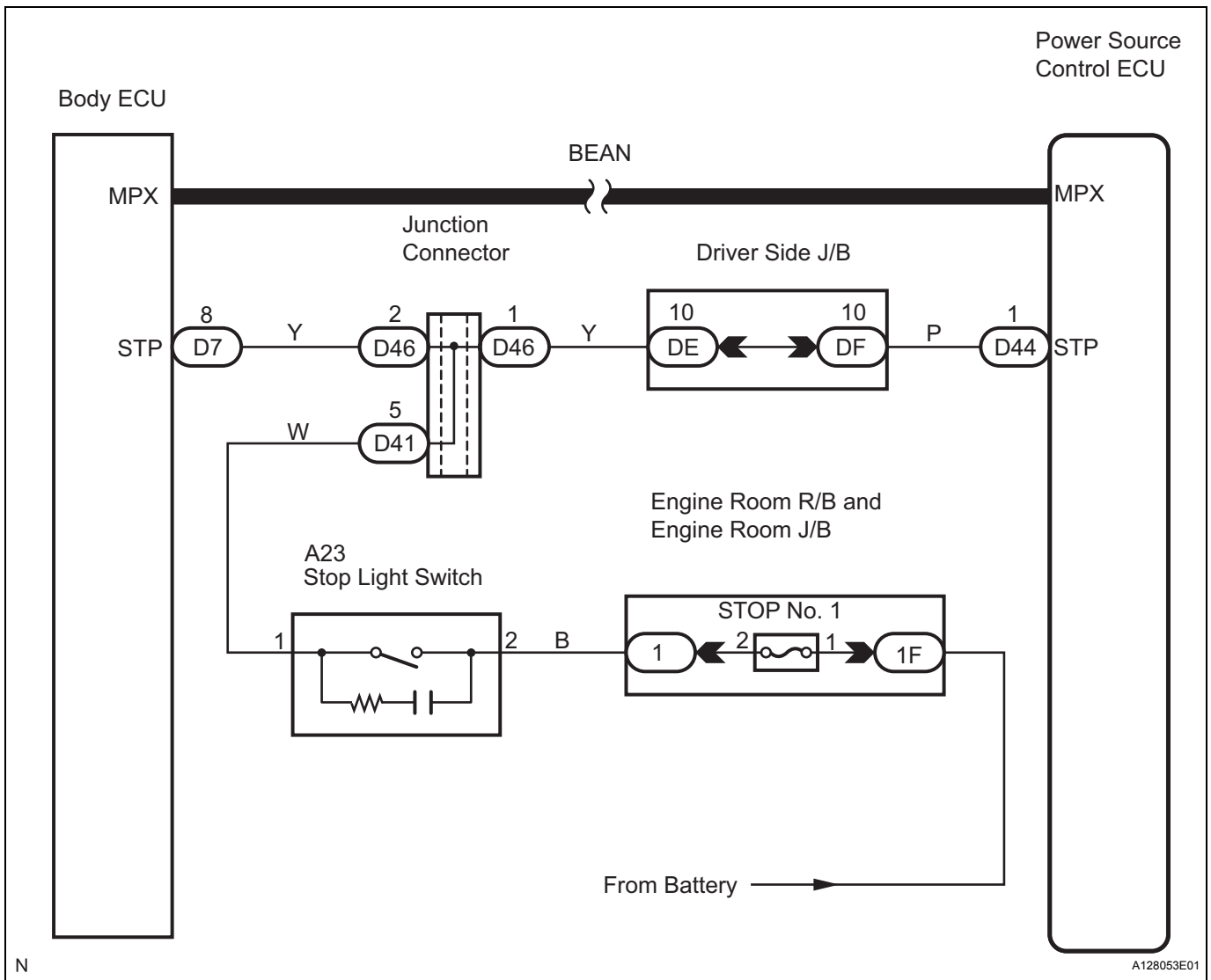
DTC	B2284	Brake Signal Malfunction
------------	--------------	---------------------------------

DESCRIPTION

This DTC is output when :1) the brake signal circuit between the power source control ECU and the stop light switch is malfunctioning; and 2) the cable and BEAN information are inconsistent.

DTC No.	DTC Detection Condition	Trouble Area
B2284	Cable and BEAN information between power source control ECU and stop light switch are inconsistent	<ul style="list-style-type: none"> Power source control ECU Stop light switch Wire harness

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

HINT:

Before performing the inspection procedure, depress the brake pedal and check that the stop lights come on. If the stop lights do not come on, See page [LI-18](#).

1 READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and press the intelligent tester main switch on.
- (c) Read the Data List according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
STOP LIGHT SW1	Stop light switch signal / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
"ON" (brake pedal depressed) appears on the screen.

Result

Condition	Proceed to
NG	C
OK (When troubleshooting according to the PROBLEM SYMPTOM TABLE)	B
OK (When troubleshooting according to the DTC chart)	A

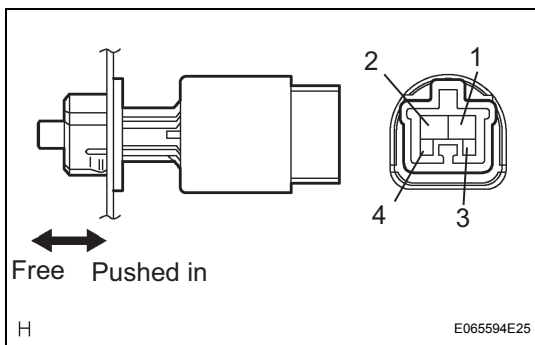
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **Go to step 2**

ST **A**

REPLACE POWER SOURCE CONTROL ECU

2 INSPECT STOP LIGHT SWITCH ASSEMBLY



- (a) Disconnect the stop light switch assembly connector.
- (b) Measure the resistance according to the value(s) in the table below.

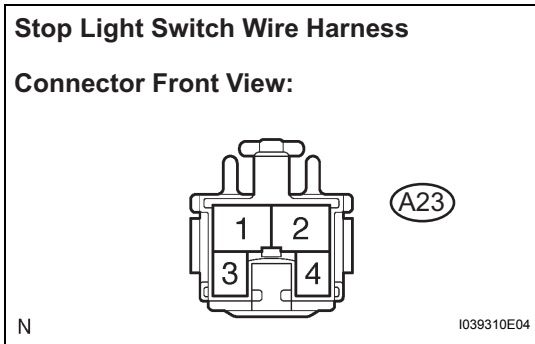
Resistance

Switch condition	Tester connection	Specified value
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

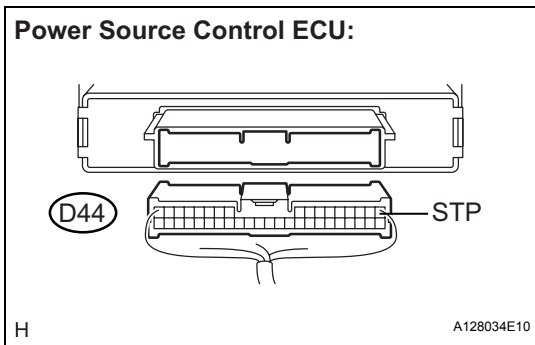
NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

3 CHECK WIRE HARNESS (STOP LIGHT SWITCH - POWER SOURCE CONTROL ECU AND BATTERY)



(a) Disconnect the A23 switch connector.



(b) Disconnect the D44 ECU connector.

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

Resistance

Terminal No. (Symbol)	Specified Condition
A23-1 - D44-1 (STP)	Below 1 Ω
A23-1 - Body ground	10 kΩ or higher

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE POWER SOURCE CONTROL ECU

DTC	B2285	Steering Lock Position Signal Circuit Malfunction
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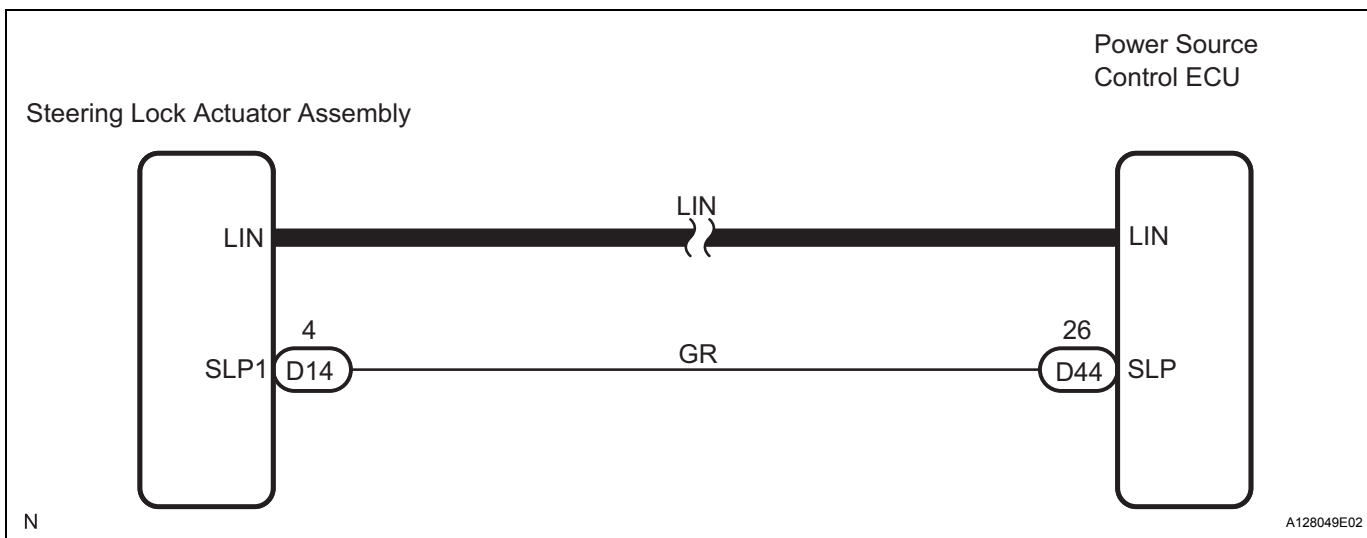
DTC	B2288	Steering Lock Signal Circuit Malfunction
------------	--------------	---

DESCRIPTION

The power source control ECU and the steering lock ECU are connected by a cable and LIN. These DTCs are output when: 1) the cable information and LIN information are inconsistent; and 2) a malfunction is detected between the power source control ECU and the steering lock ECU.

DTC No.	DTC Detection Condition	Trouble Area
B2285	Cable and LIN information between power source control ECU and steering lock actuator assembly are inconsistent	<ul style="list-style-type: none"> Power source control ECU Steering lock actuator (steering lock ECU) Wire harness
B2288	Cable and LIN are abnormal between power source control ECU and steering lock actuator, or steering lock system is malfunctioning	<ul style="list-style-type: none"> Power source control ECU Steering lock actuator (steering lock ECU) Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER
----------	--

- Connect the intelligent tester to the DLC3.
- Turn the power switch on (IG) and press the intelligent tester main switch on.
- Perform the Active Test according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

Item	Test Detail	Diagnostic Note
STR LOCK PWR	Power supply for steering lock ON / OFF	-

OK:

When ON is selected, power is supplied to the steering lock ECU.

NG → Go to step 2

OK

GO TO STEERING LOCK FUNCTION

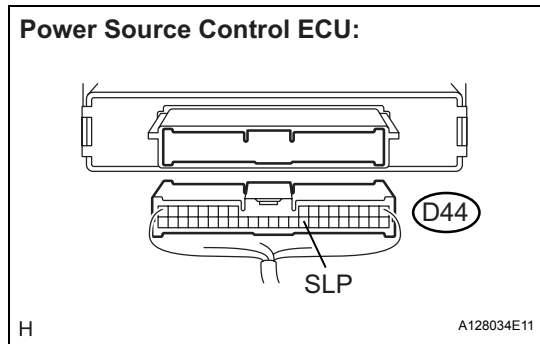
2 CHECK DTC OUTPUT

- (a) Delete the DTC (See page [ST-22](#)).
HINT:
After all 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.

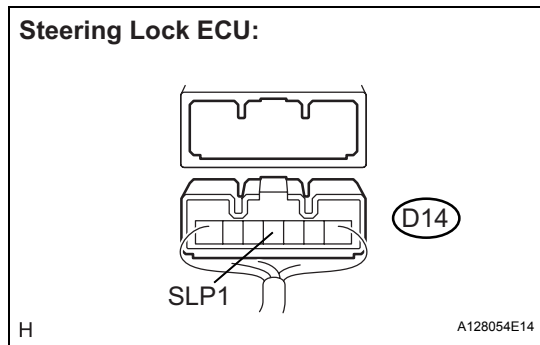
OK → END

NG

3 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - STEERING LOCK ACTUATOR ASSEMBLY)



- (a) Disconnect the D44 ECU connector.



- (b) Disconnect the D14 ECU connector.
- (c) Measure the resistance according to the value(s) in the table below.

Resistance

Terminal No. (Symbol)	Specified Condition
D44-26 (SLP) - D14-4 (SLP1)	Below 1 Ω
D44-26 (SLP) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK POWER SOURCE CONTROL ECU

- (a) After replacing the power source control ECU with a normally functioning ECU, check that the steering lock unlocks.

OK:

Steering lock unlocks.

NG 

GO TO STEERING LOCK FUNCTION

OK 

END (POWER SOURCE CONTROL ECU DEFECTIVE)

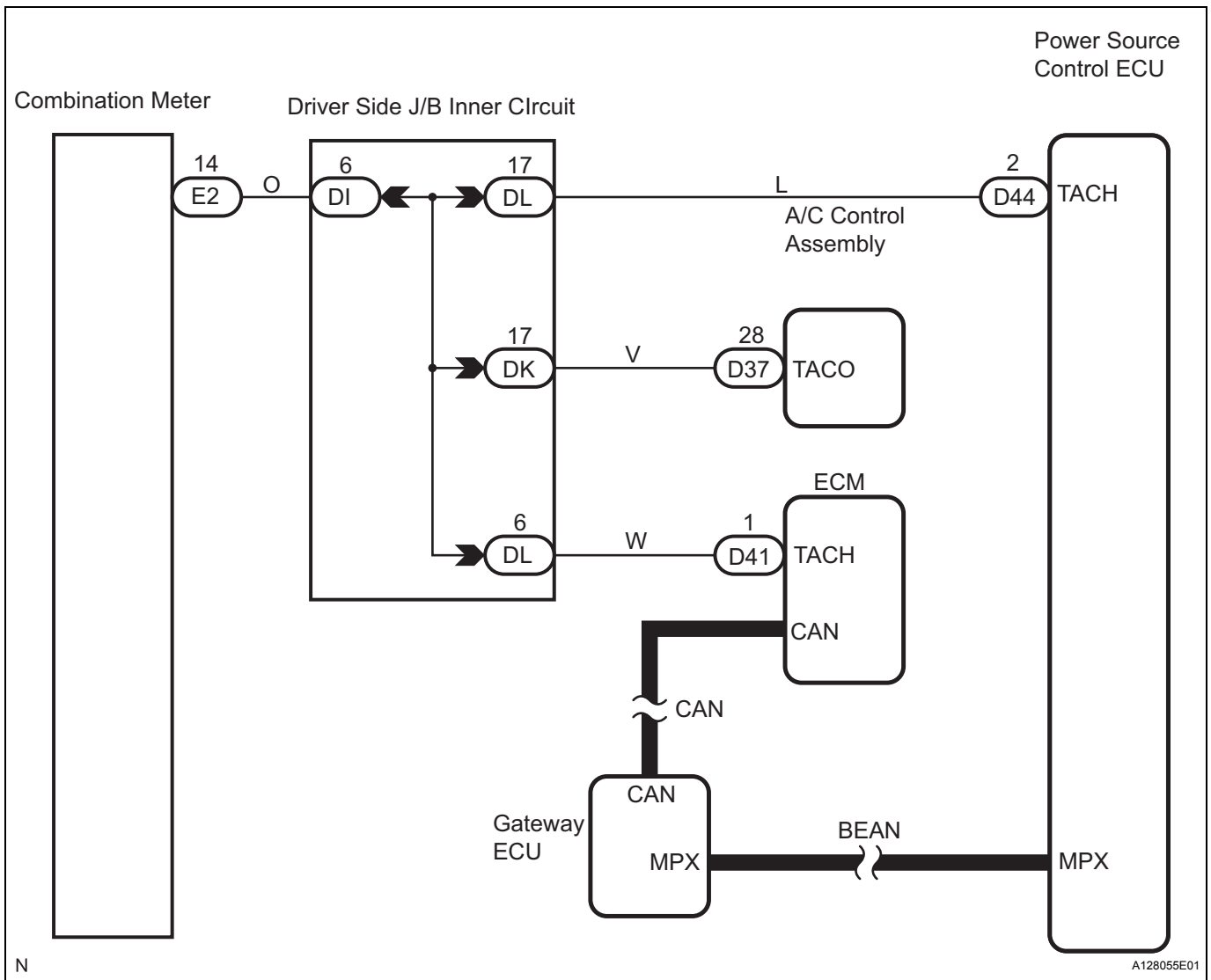
DTC	B2286	Runnable Signal Malfunction
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DESCRIPTION

The power source control ECU and the ECM are connected by the cable and BEAN. If the cable information and BEAN information are inconsistent, this DTC will be output.

DTC No.	DTC Detection Condition	Trouble Area
B2286	Cable and BEAN information between power source control ECU and ECM are inconsistent	<ul style="list-style-type: none"> • Power source control ECU • ECM • Wire harness

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER
----------	---

- (a) Connect the intelligent to the DLC3.
- (b) Turn the engine switch ON (IG) and press the intelligent tester main switch on.

- (c) Read the Data List according to the displays on the tester.

PWR SOURCE CTRL (Power source control ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
E/G COND	Engine condition / RUN or STOP	RUN: Engine switch is ON (START) STOP: Engine switch is OFF, ON (IG) or ON (ACC)	-

OK:

"RUN" (engine switch is on (START)) appears on the screen.

"STOP" (engine switch is off, on (IG) or on (ACC)) appears on the screen.

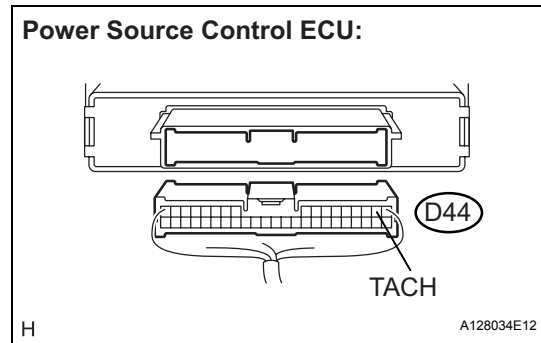
NG →

Go to step 2

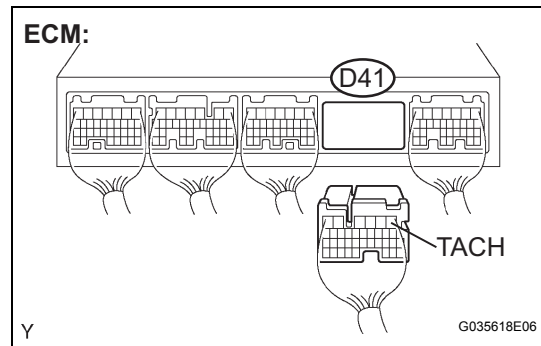
OK

GO TO SFI SYSTEM

2 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - ECM)



- (a) Disconnect the D44 ECU connector.



- (b) Disconnect the D41 ECM connector.
- (c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
D44-2 (TACH) - D41-1 (TACH)	Below 1 Ω
D44-2 (TACH) - Body ground	10 kΩ or higher

NG →

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK DTC OUTPUT

- (a) After replacing the power source control ECU with a normally functioning ECU, check for power source control ECU DTCs.

OK:

Power source control ECU DTCs are not output.

NG

GO TO SFI SYSTEM

OK

END (POWER SOURCE CONTROL ECU DEFECTIVE)

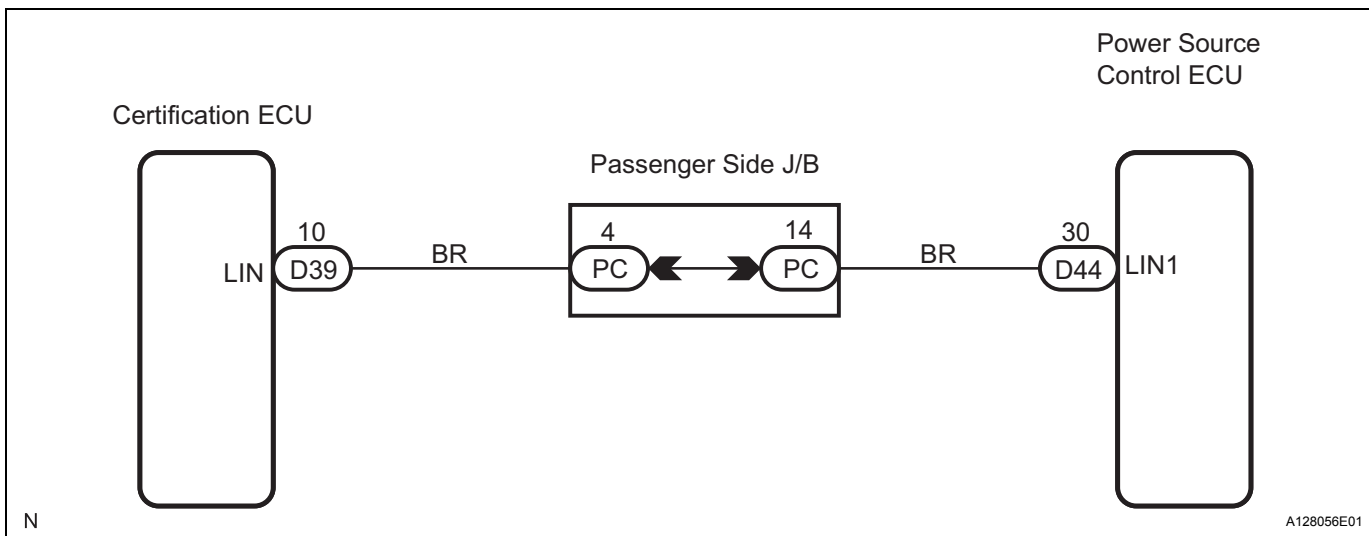
DTC	B2287	LIN Communication Master Malfunction
DTC	B2289	Key Collation Waiting Time Over

DESCRIPTION

These DTCs are output when :1) any other DTC is set in the power source control ECU: or 2) the wire harness between the power source control ECU and the certification ECU is open or short.

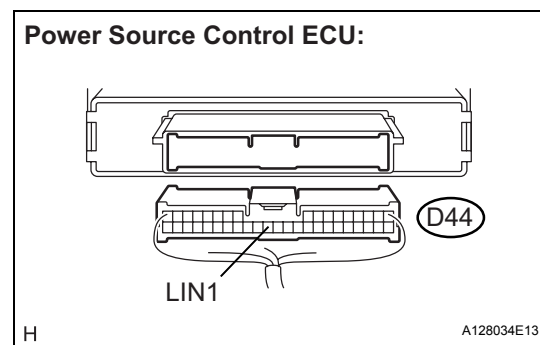
DTC No.	DTC Detection Condition	Trouble Area
B2287	Communication or communication line is abnormal between power source control ECU and certification ECU	<ul style="list-style-type: none"> Power source control ECU Certification ECU Wire harness
B2289	Cable and LIN are abnormal between power source control ECU and engine immobilizer function, or engine immobilizer function is malfunctioning	<ul style="list-style-type: none"> Power source control ECU Certification ECU Wire harness

WIRING DIAGRAM

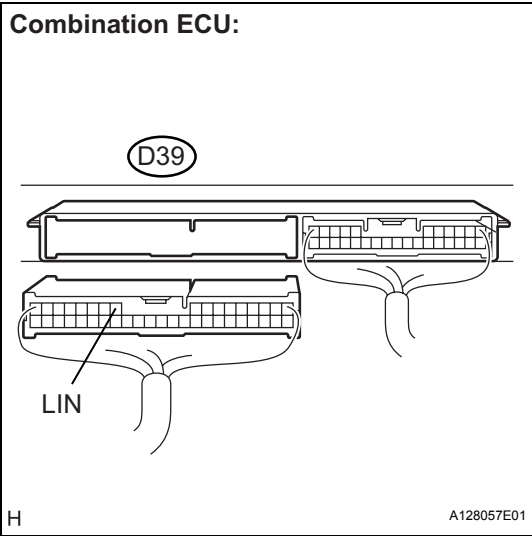


INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU - CERTIFICATION ECU)
----------	--



(a) Disconnect the D44 ECU connector.



- (b) Disconnect the D39 ECU connector.
- (c) Measure the resistance according to the value(s) in the table below.

Resistance

Terminal No. (Symbol)	Specified Condition
D44-30 (LIN1) - D39-10 (LIN)	Below 1 Ω
D44-30 (LIN1) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 CHECK POWER SOURCE CONTROL ECU OPERATION

- (a) After replacing power source control ECU with a normally functioning ECU, check that the engine starts.

OK:

Engine can start normally.

Result

Condition	Proceed to
OK	A
NG (When troubleshooting according to the DTC B2287)	B
NG (When troubleshooting according to the DTC B2289)	C

B → REPLACE CERTIFICATION ECU

C → GO TO SMART KEY SYSTEM (MATCHING FOR THE INSIDE OF THE CABIN CANNOT BE PERFORMED)

A

END (POWER SOURCE CONTROL ECU DEFECTIVE)

Engine Switch Indicator Circuit

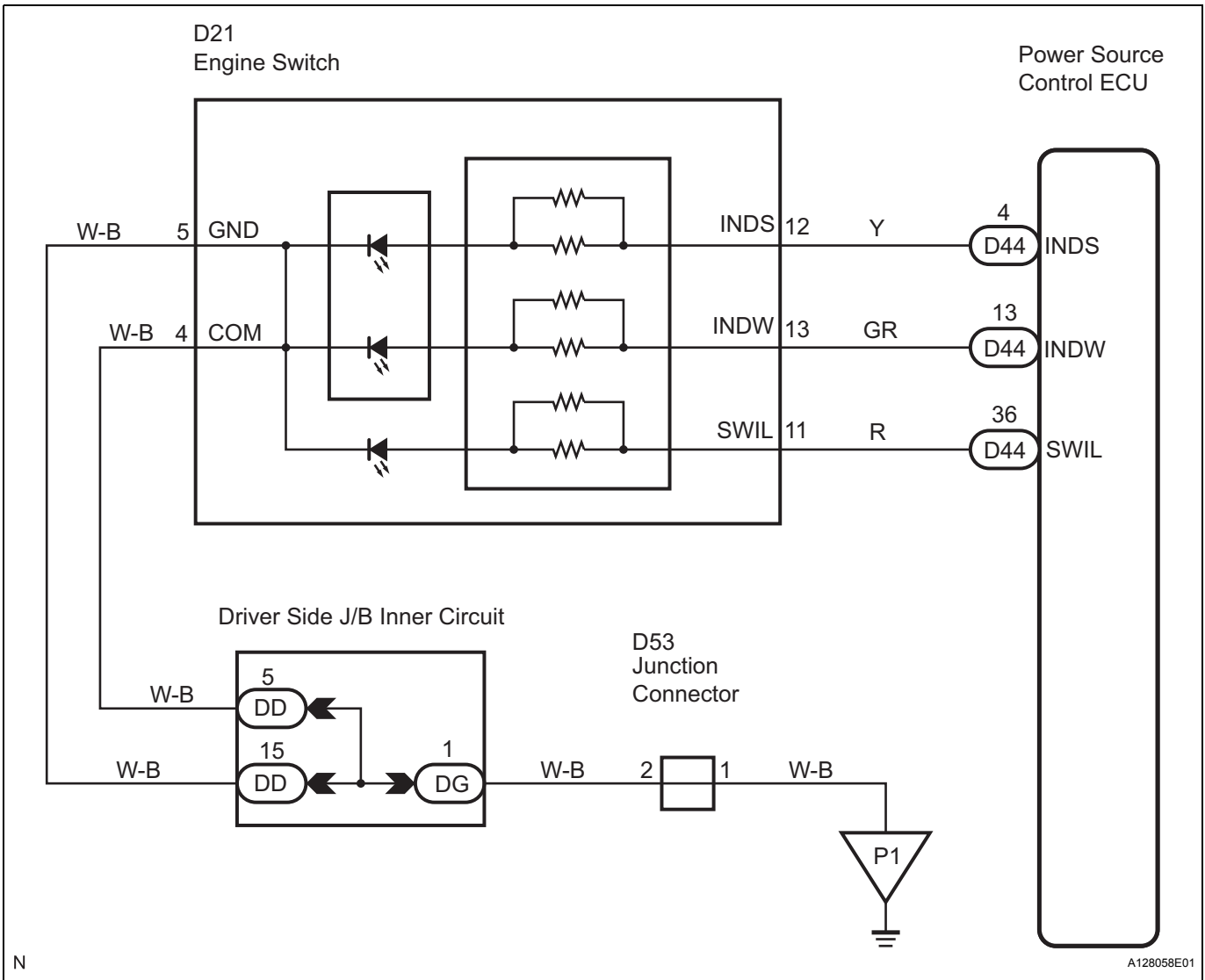
DESCRIPTION

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	
	No brake pedal depressed	Brake pedal depressed with shift lever in "P" or "N"
OFF	Turn OFF	Turn ON (Green)
ACC, IG-ON, START	Turn ON (Amber)	Turn ON (Green)
Engine Running	Turn OFF	Turn OFF
Steering lock not unlocked	Flash (Green) for 30 seconds	Flash (Green) for 30 seconds
Push Button Start System Malfunction	Flash (Amber) for 15 seconds	Flash (Amber) for 15 seconds

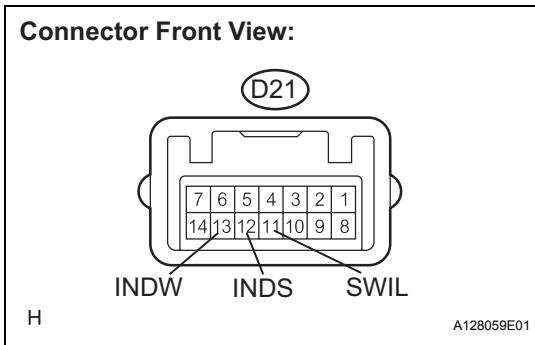
WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1 INSPECT ENGINE SWITCH



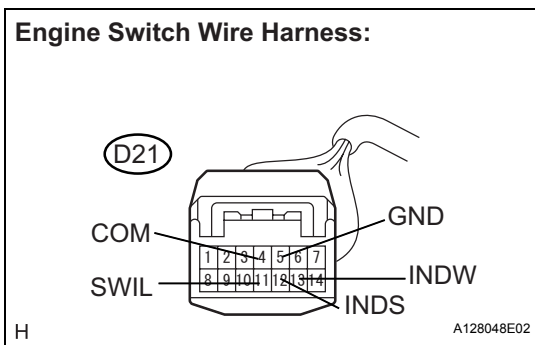
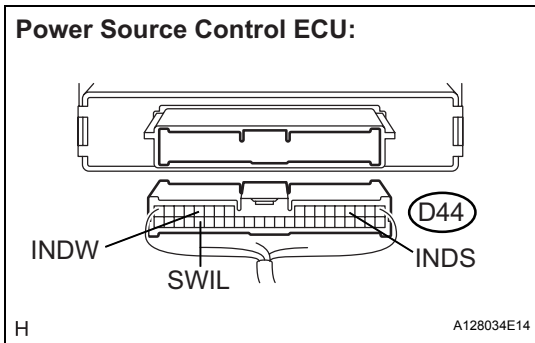
- (a) Disconnect the D21 switch connector.
 - (b) Connect the positive (+) lead to terminal "A" and the negative (-) lead to terminal "B" of the engine switch.
 - (c) Check if the illumination for the engine switch comes on.
- OK**

Positive (+) Connection (Symbols)	Negative (-) Connection (Symbols)	Illumination Condition
D21-11 (SWIL)	D21-4 (COM) or D21-5 (GND)	Comes on
D21-12 (INDS)	D21-4 (COM) or D21-5 (GND)	Comes on
D21-13 (INDW)	D21-4 (COM) or D21-5 (GND)	Comes on

OK

NG → **REPLACE ENGINE SWITCH**

2 CHECK WIRE HARNESS (ENGINE SWITCH - POWER SOURCE CONTROL ECU AND BODY GROUND)



- (a) Disconnect the D44 ECU connector.

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

Resistance

Tester Connection (Symbols)	Condition	Specified condition
D44-4 (INDS) - D21-12 (INDS)	Always	Below 1 Ω
D44-13 (INDW) - D21-13 (INDW)	Always	Below 1 Ω
D44-36 (SWIL) - D21-11 (SWIL)	Always	Below 1 Ω
D44-4 (INDS) - Body ground	Always	1 MΩ or Higher
D44-13 (INDW) - Body ground	Always	1 MΩ or Higher
D44-36 (SWIL) - Body ground	Always	1 MΩ or Higher

ST

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE POWER SOURCE CONTROL ECU

Starter Relay Circuit

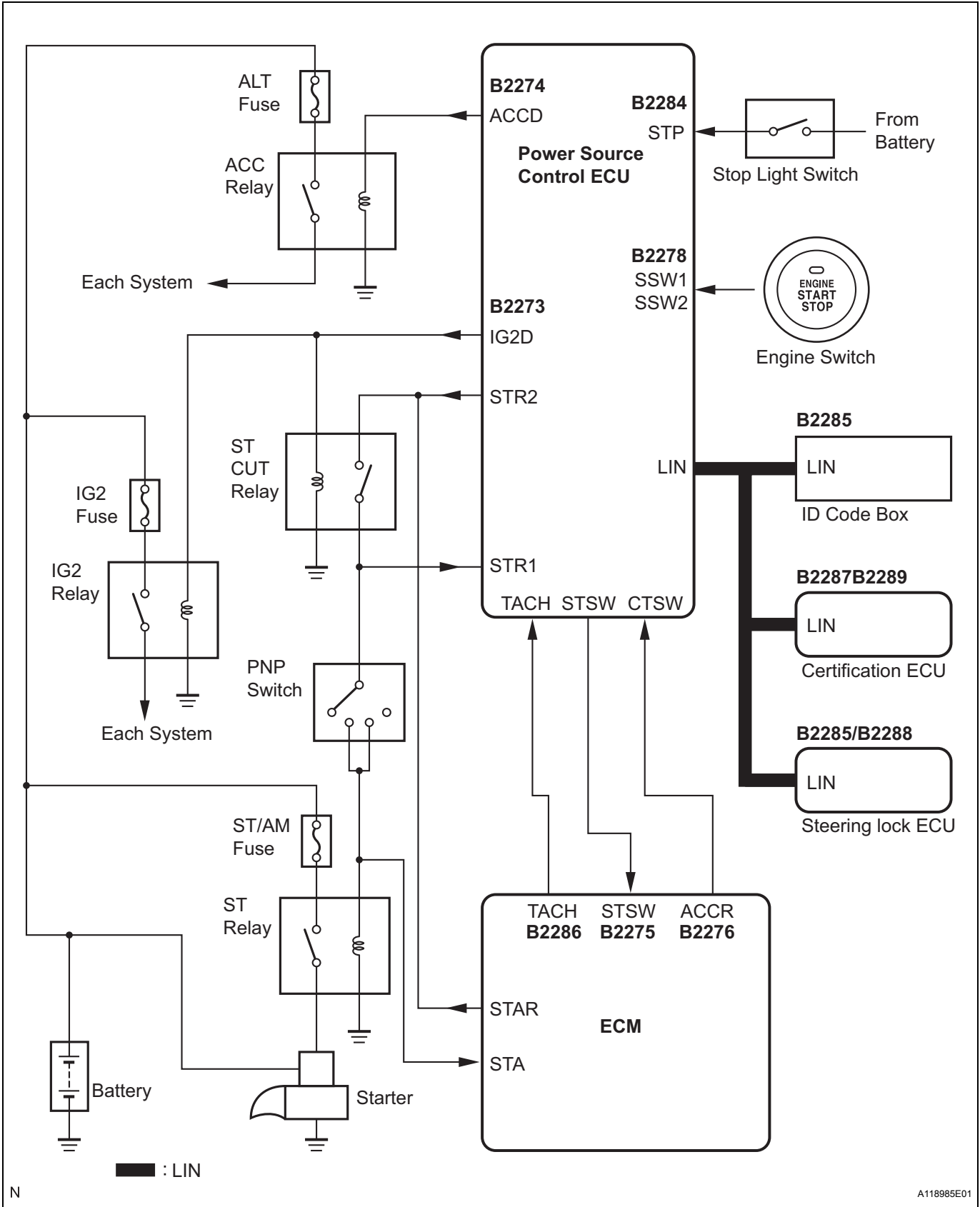
DESCRIPTION

1. Engine Start System Operation

- (a) If the brake pedal depressed and the engine switch is pressed with the shift lever in the P or N position, the power source control ECU determines it as an engine start request.
- (b) The certification ECU and other ECUs perform key verification via the LIN communication line.
- (c) The power source control ECU activates the ACC relay.
- (d) The power source control ECU activates the IG1, IG2, and ST CUT relays. The engine switch indicator light lights up in green.
- (e) The certification ECU outputs a steering UNLOCK signal. The signal is sent to the steering lock ECU via the power source control ECU.
- (f) The power source control ECU sends an engine start request signal to the ECM.
- (g) The ECM and power source control ECU activate the ST relay.
- (h) The ECM sends an ACC relay cut signal to the power source control ECU.
- (i) The power source control ECU deactivates the ACC relay until the ECU detects engine start.
- (j) When engine revolution speed reaches 800 rpm, the power source control ECU determines that the engine has been started. The ECU reactivates the ACC relay and turns off the engine switch indicator light.

Symbols of power source control 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
STR1	Park / neutral position switch signal
TACH	Engine start detection signal
STSW	Starter activation request signal
CTSW	ACC relay cut signal

SYSTEM DESCRIPTION



WIRING DIAGRAM

HINT:

See page [ES-406](#).

ST

N

A118985E01

INSPECTION PROCEDURE**1 CHECK DTC OUTPUT**

(a) Delete the DTCs (See page [ST-22](#)).

(b) Check for DTCs again.

HINT:

If the engine does not start, check for DTC B2273, B2275, B2278, B2284, B2285, B2287, B2288 and B2289. (For details, see the "DTC check and clear" See page [ST-22](#).)

OK:

No DTC is output.

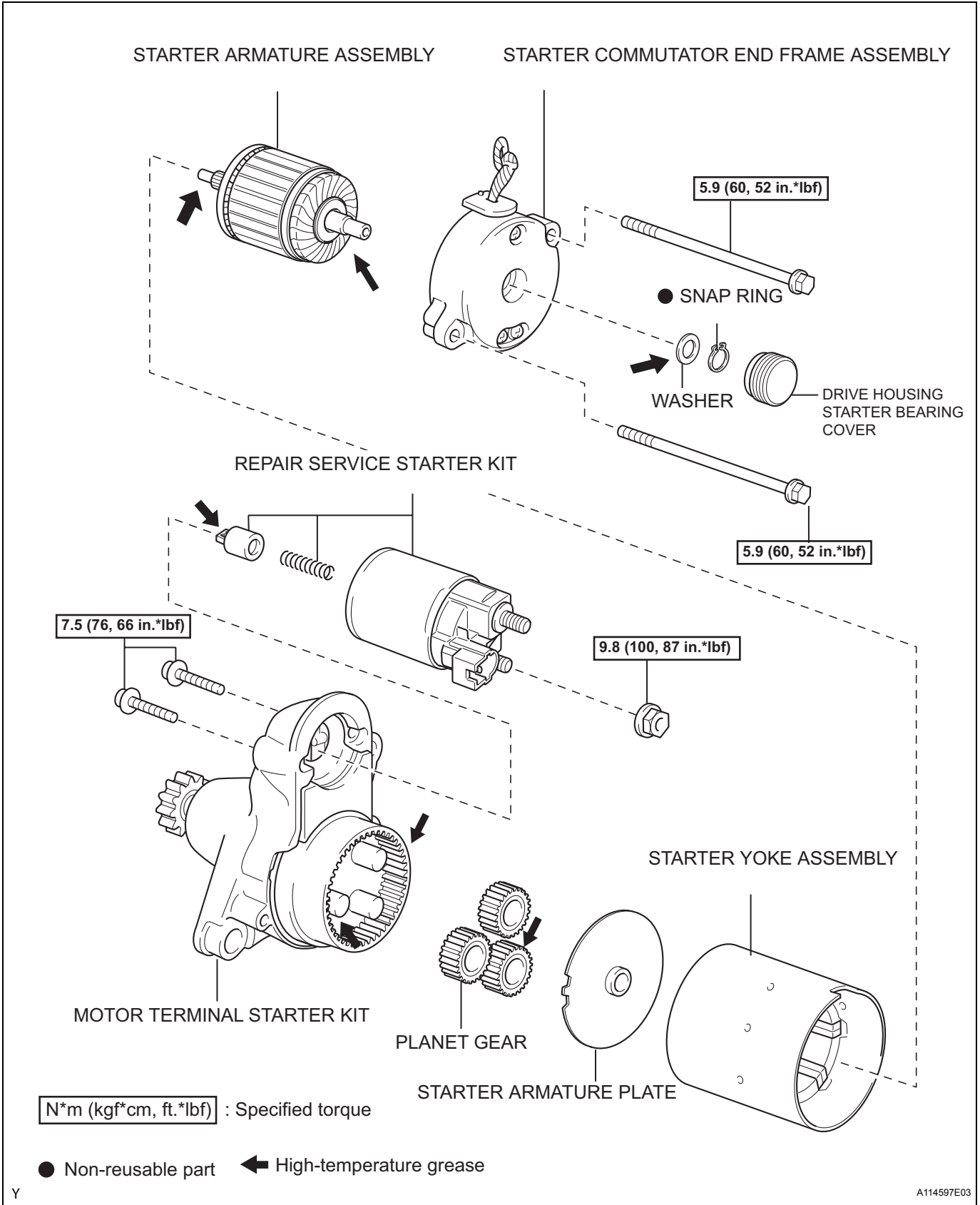
NG

GO TO DTC CHART

OK

GO TO CRANKING HOLDING FUNCTION CIRCUIT

STARTER COMPONENTS

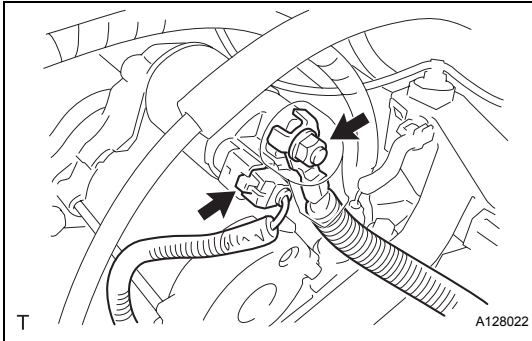


ST

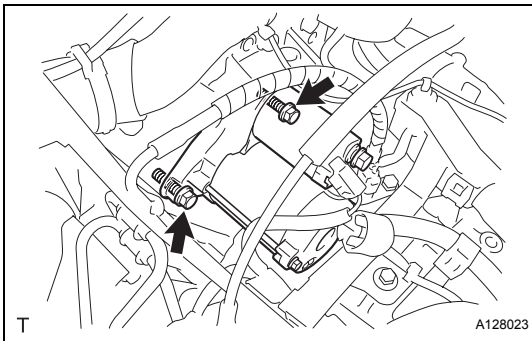
Y

REMOVAL

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. REMOVE AIR CLEANER ASSEMBLY WITH HOSE (See page EM-28)
3. REMOVE AIR CLEANER INLET NO.1 (See page EM-28)
4. REMOVE STARTER ASSEMBLY
 - (a) Disconnect terminal 50 of the connector from the starter assembly.
 - (b) Open the terminal cap, remove the nut and disconnect the wire harness from terminal 30.



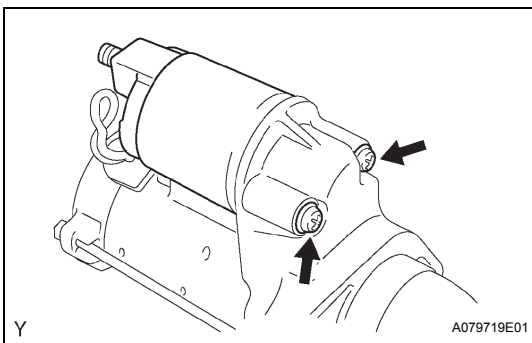
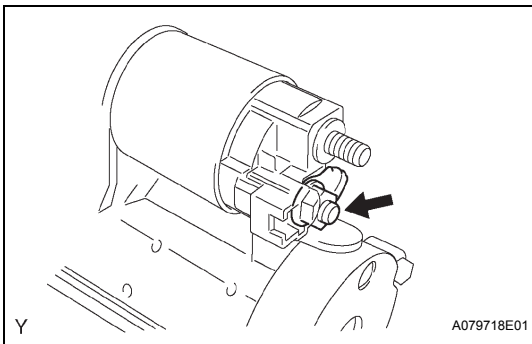
- (c) Remove the 2 bolts and the starter assembly.

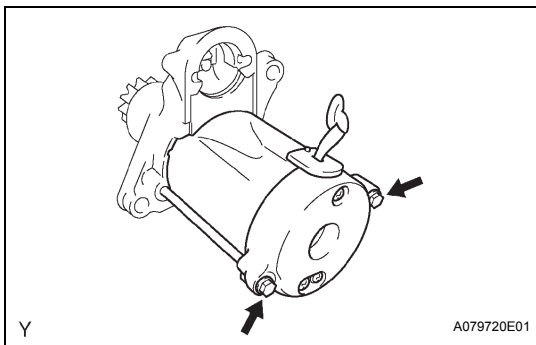


ST

DISASSEMBLY

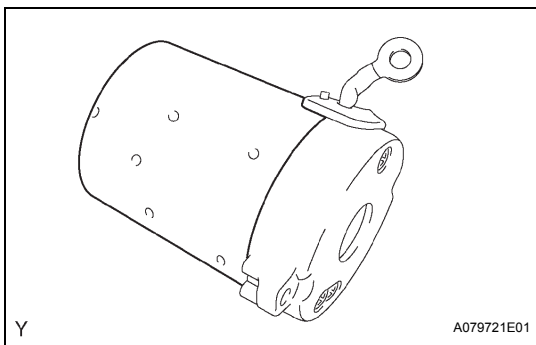
1. REMOVE REPAIR SERVICE STARTER KIT
 - (a) Remove the nut and disconnect the lead wire from the repair service starter kit.
 - (b) Remove the 2 screws which are used to secure the repair service starter kit to the repair service starter kit.
 - (c) Remove the repair service starter kit.
 - (d) Remove the return spring and the plunger from the repair service starter kit.



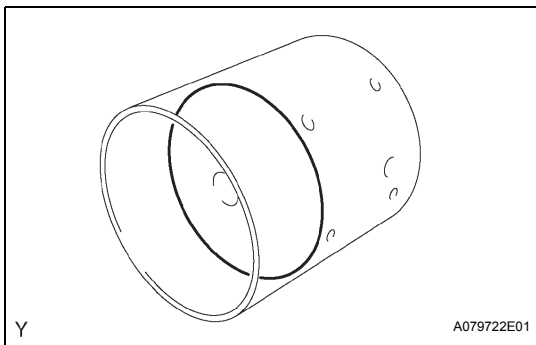


2. REMOVE STARTER YOKE ASSEMBLY

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

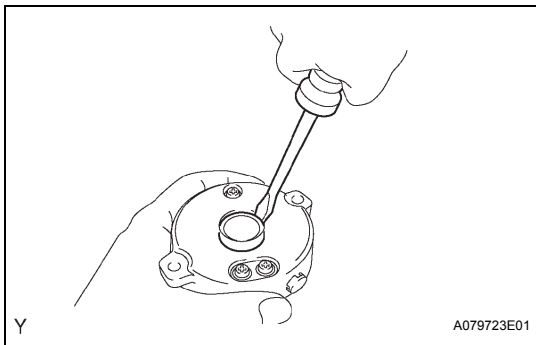


- (b) Remove the starter yoke from the starter commutator end frame.



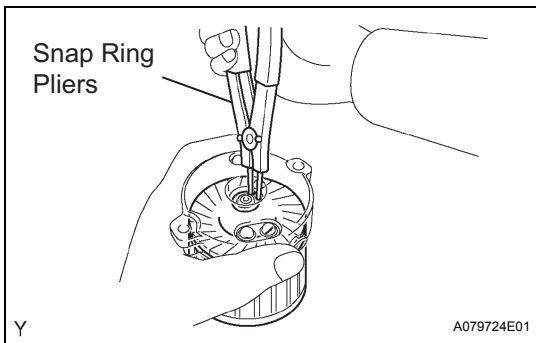
3. REMOVE STARTER ARMATURE PLATE

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



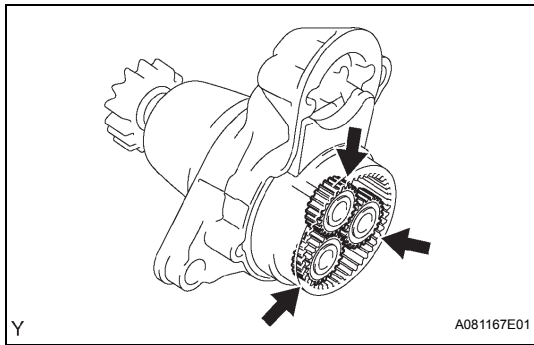
4. REMOVE DRIVE HOUSING STARTER BEARING COVER

- (a) Using a screwdriver, remove the drive housing starter bearing cover.



5. REMOVE STARTER ARMATURE ASSEMBLY

- (a) Using snap ring pliers, remove the snap ring and the plate washer.
- (b) Remove the starter armature from the commutator end frame.

**6. REMOVE PLANET GEAR**

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

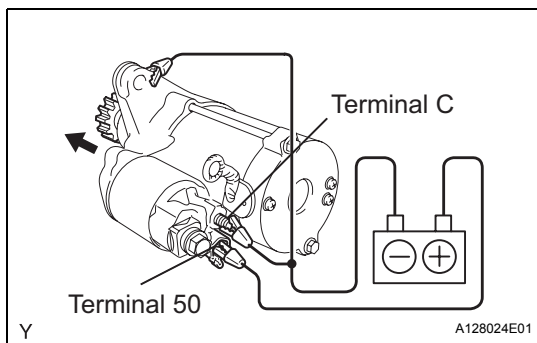
INSPECTION

1. INSPECT STARTER ASSEMBLY

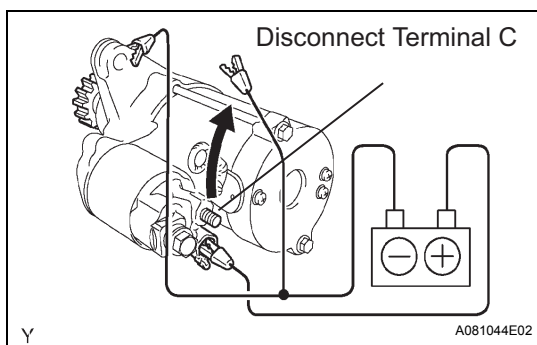
NOTICE:

These tests must be performed within 3 to 5 seconds to avoid burning out the coil.

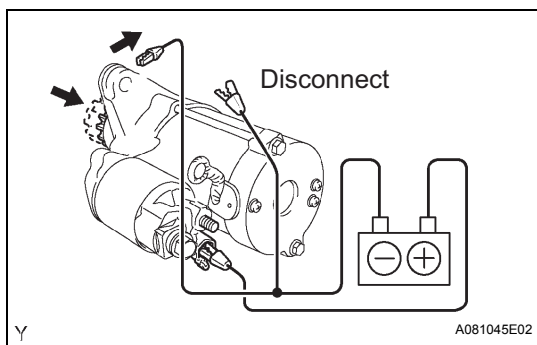
- (a) Perform the pull-in test.
- (1) Disconnect the lead wire from terminal C.
 - (2) Connect the battery to the magnetic switch as shown in the illustration on the left. Check that the clutch pinion gear extends. If the clutch pinion gear does not move, replace the magnetic switch.



- (b) Perform the hold-in test.
- (1) Maintain the battery connections in step (a), but disconnect the negative (-) lead from terminal C. Check that the pinion gear remains extended. If the clutch pinion gear returns inward, replace the magnetic switch.



- (c) Check the clutch pinion gear return.
- (1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear returns. If the clutch pinion gear does not return, replace the magnetic switch.

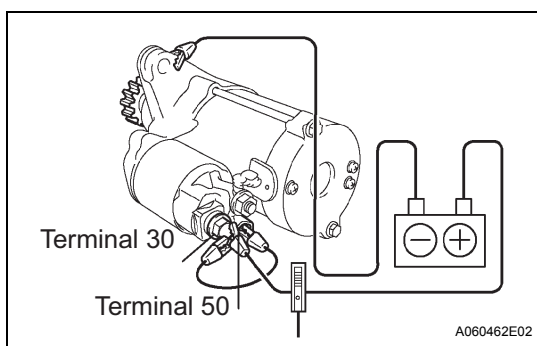


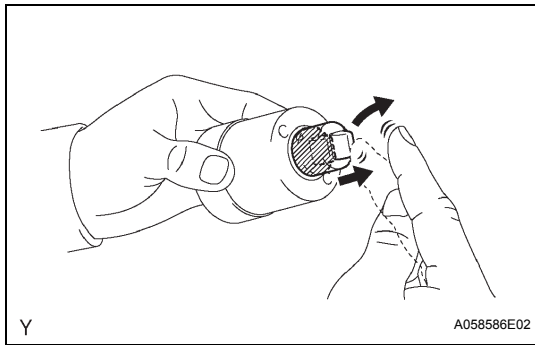
- (d) Perform the no-load performance test.
- (1) Connect the lead wire to terminal C. Make sure that the lead is not grounded.
 - (2) Clamp the starter in a vise.
 - (3) Connect the battery and an ammeter to the starter as shown in the illustration.
 - (4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

Specified current:

90 A or less at 11.5V

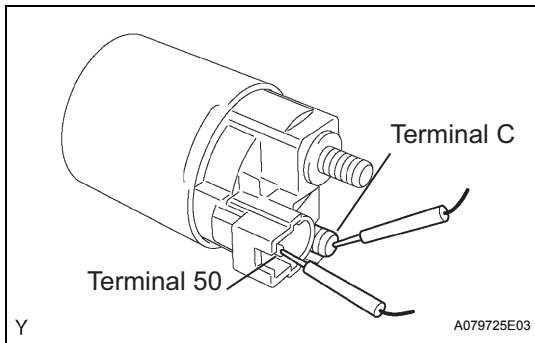
If the result is not as specified, replace the starter assembly.





2. INSPECT REPAIR SERVICE STARTER KIT

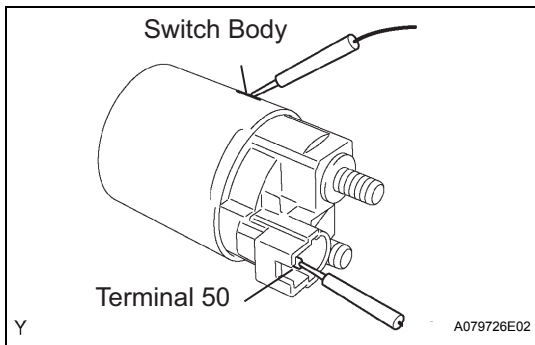
- (a) Check the plunger.
- (1) Push in the plunger and check that it returns quickly to its original position.
If necessary, replace the repair service starter kit.



- (b) Check the resistance.
- (1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Resistance:
below 1 Ω

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

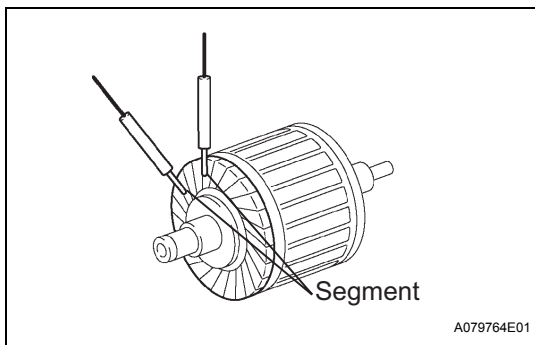


- (c) Using an ohmmeter, measure the resistance between terminal 50 and the starter kit body.

Resistance:
below 2 Ω

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

ST

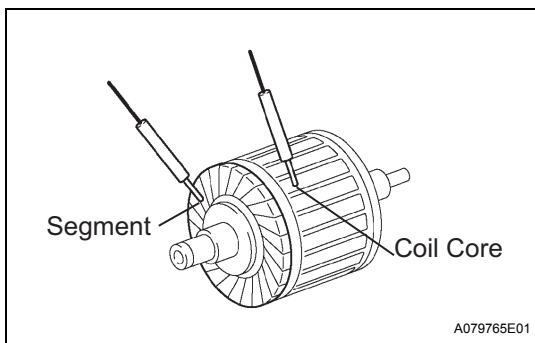


3. INSPECT STARTER ARMATURE ASSEMBLY

- (a) Check the resistance.
- (1) Using an ohmmeter, measure the resistance between the segments of the commutator.

Resistance:
below 1 Ω

If the result is not as specified, replace the starter armature.

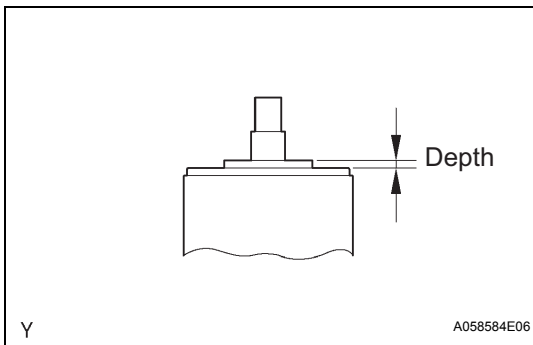


- (b) Using an ohmmeter, measure the resistance between the segment of the commutator and armature coil core.

Resistance:
10 k Ω or higher

If the result is not as specified, replace the starter armature.

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

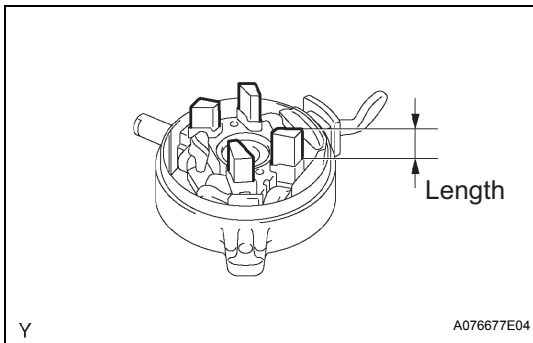


- (d) Check the commutator depth.
 (1) Using vernier calipers, measure the commutator depth.

Standard depth:
 3.1 mm (0.122 in.)

Maximum depth:
 3.8 mm (0.150 in.)

If the length is greater than the maximum, replace the starter armature assembly.



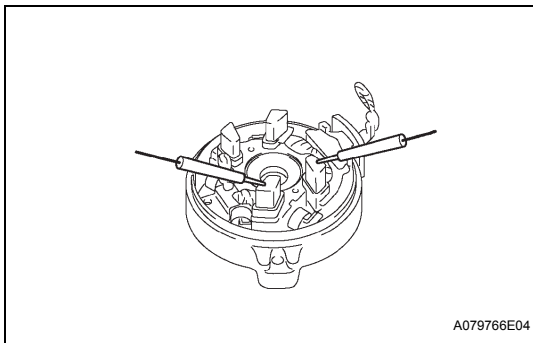
4. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

- (a) Check the brush length.
 (1) Using vernier calipers, measure the brush length.

Standard length:
 9.0 mm (0.354 in.)

Minimum length:
 4.0 mm (0.158 in.)

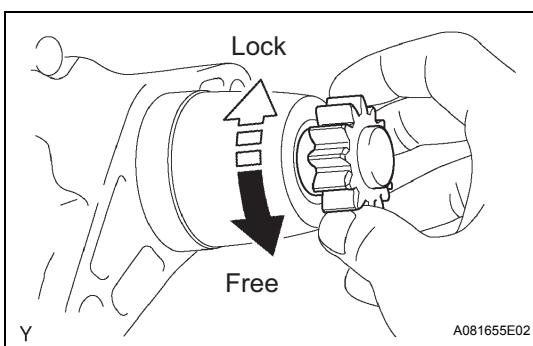
If the length is less than minimum, replace the starter commutator end frame.



- (b) Check the resistance.
 (1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brushes.

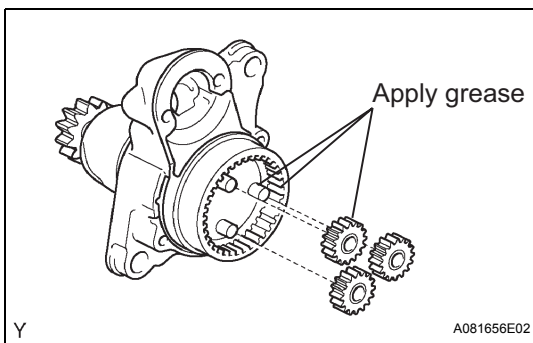
Resistance:
 10 K Ω or higher

If the resistance is not as specified, repair or replace the starter commutator end frame.



5. INSPECT MOTOR TERMINAL STARTER KIT

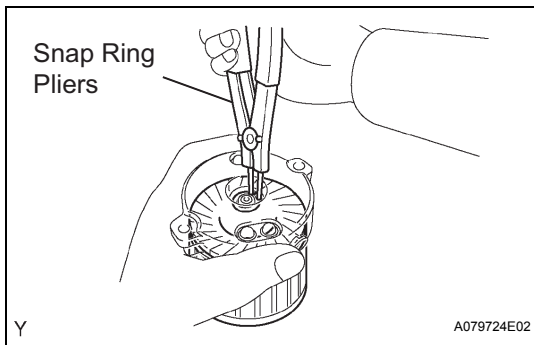
- (a) Check the starter clutch.
 (1) Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise. Check that it locks.
 If necessary, replace the motor terminal starter kit.



REASSEMBLY

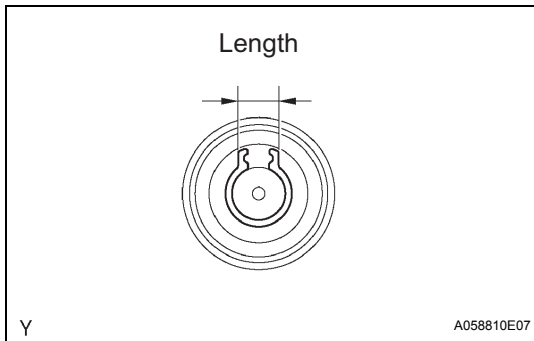
1. INSTALL PLANET GEAR

- (a) Apply high-temperature grease to the planet gears and pin parts of the planetary shaft.
 (b) Install the 3 planet 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 to the starter commutator end frame.
- (c) Using snap ring pliers, install the plate washer and a new snap ring.



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

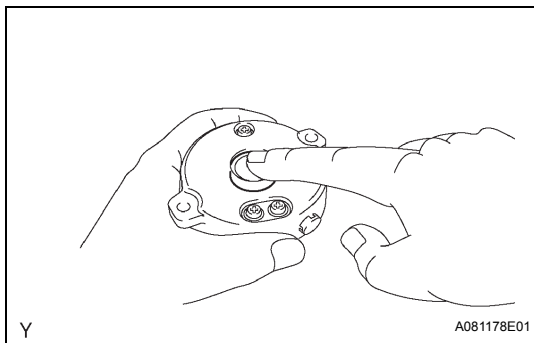
Maximum length:

5.0 mm (0.197 in.)

If the length is greater than the maximum, replace the snap ring.

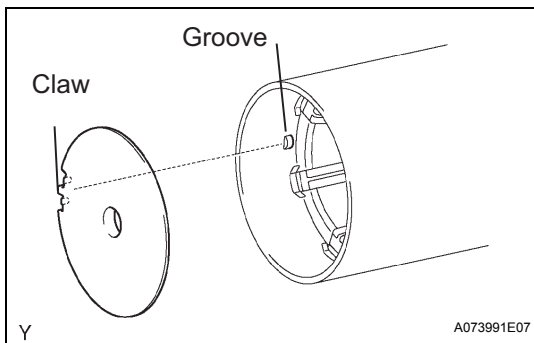
3. INSTALL DRIVE HOUSING STARTER BEARING COVER

- (a) Install the drive housing starter bearing cover to the starter commutator end frame.



4. INSTALL STARTER ARMATURE PLATE

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

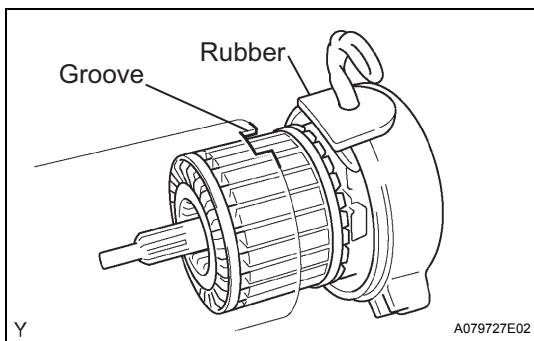


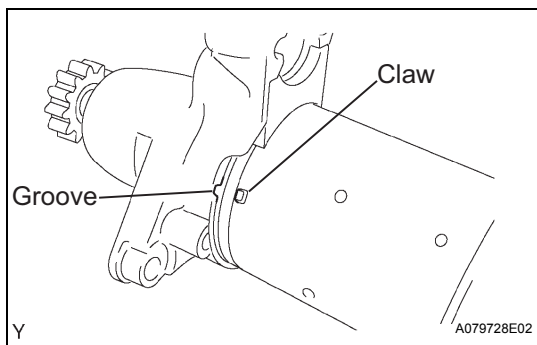
5. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY

- (a) Align the starter commutator end frame rubber with the groove of the starter yoke.
- (b) Install the starter commutator end frame to the starter yoke.

NOTICE:

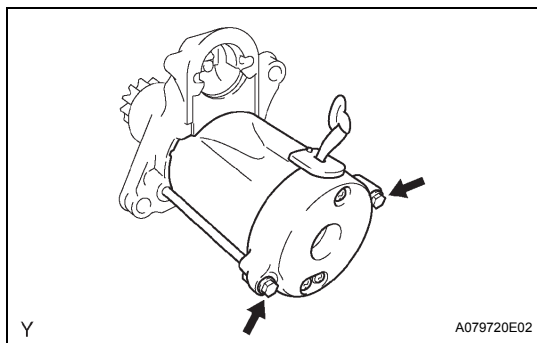
The magnet of the starter yoke may attract the starter armature when the starter commutator end frame is installed, causing the magnet to break.



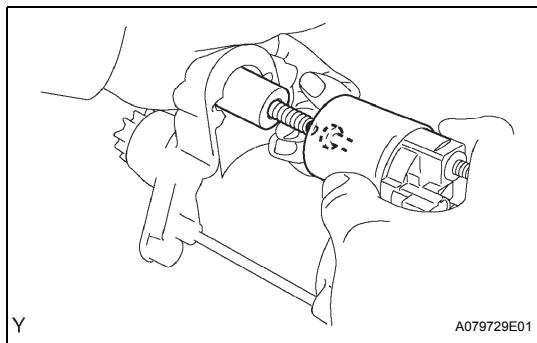


6. INSTALL STARTER YOKE ASSEMBLY

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

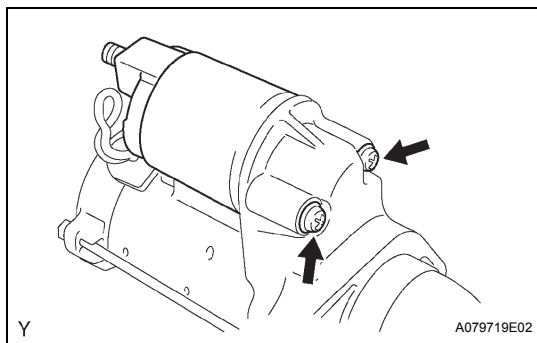


- (b) Install the starter yoke with the 2 through bolts.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)

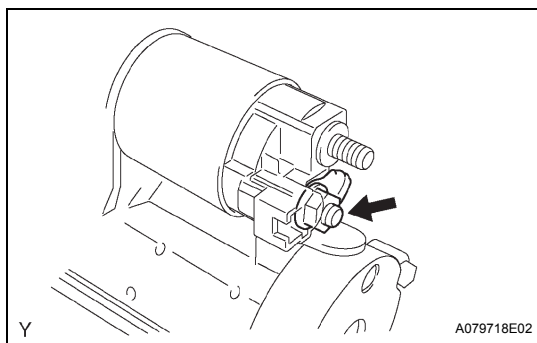


7. INSTALL REPAIR SERVICE STARTER KIT

- (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 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 the repair service starter kit with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

INSTALLATION

1. INSTALL STARTER ASSEMBLY

- (a) Install the starter assembly with the 2 bolts.
Torque: 37 N*m (380 kgf*cm, 26 ft.*lbf)
- (b) Connect the wire harness to terminal 30 and install the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
- (c) Cover the nut with the cap.
- (d) Connect terminal 50 to the starter assembly.

2. INSTALL AIR CLEANER INLET NO.1 (See page [EM-44](#))

3. INSTALL AIR CLEANER ASSEMBLY WITH HOSE (See page [EM-44](#))

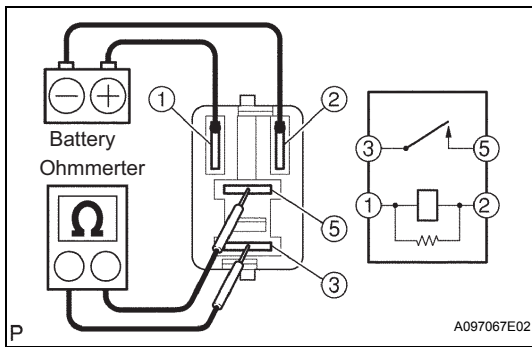
4. CONNECT BATTERY NEGATIVE TERMINAL

5. PERFORM INITIALIZATION

HINT:

See page [IN-29](#)

- (a) Some systems need initialization when disconnecting the battery terminal.



STARTER RELAY

ON-VEHICLE INSPECTION

1. INSPECT RELAY

(a) Check the resistance.

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

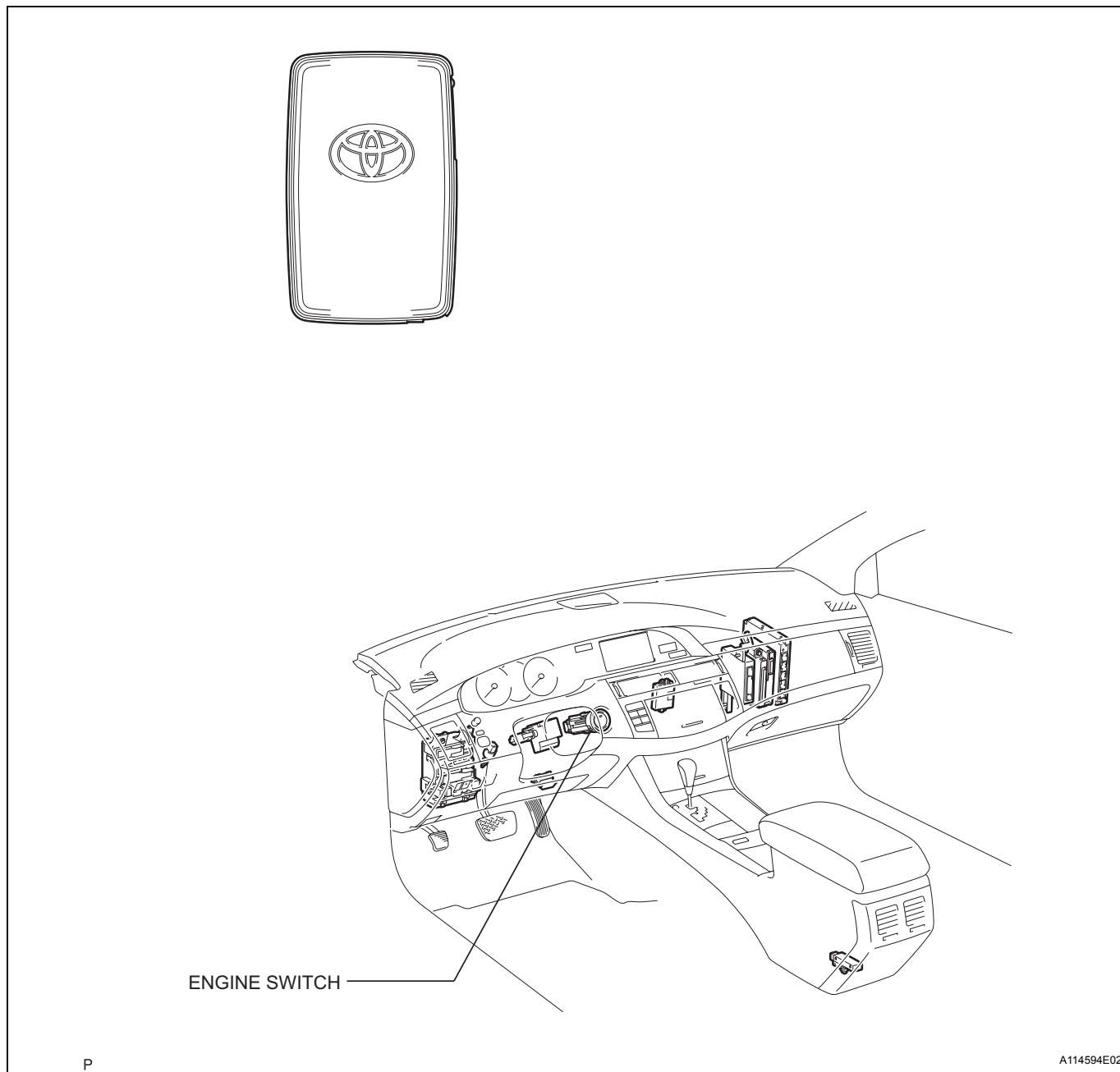
Resistance

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

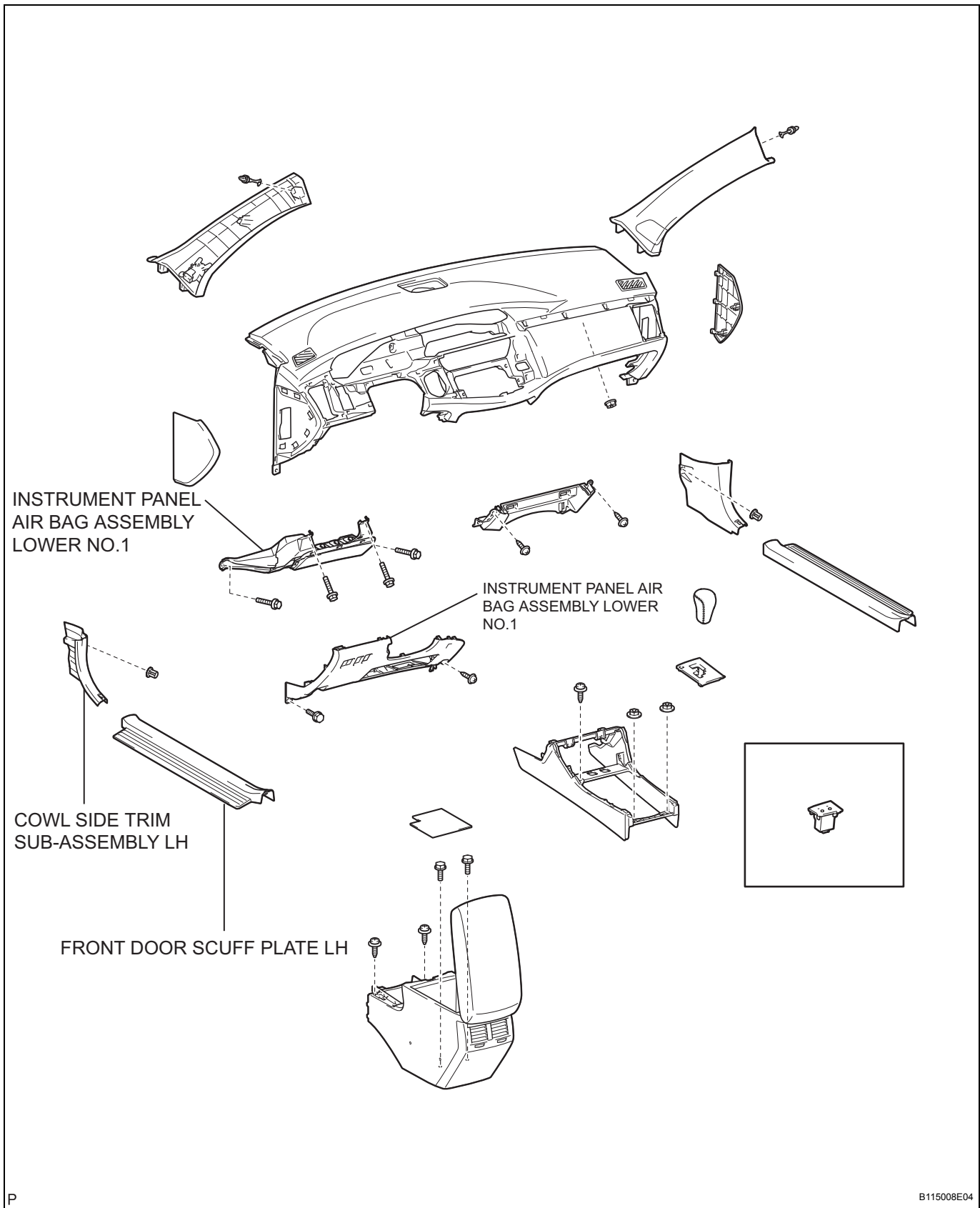
If the result is not as specified, replace the relay.

ENGINE SWITCH (w/ Smart Key System)

COMPONENTS



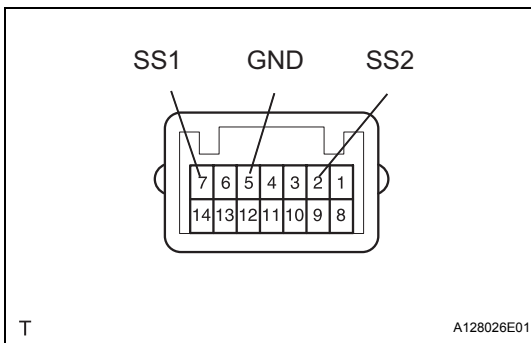
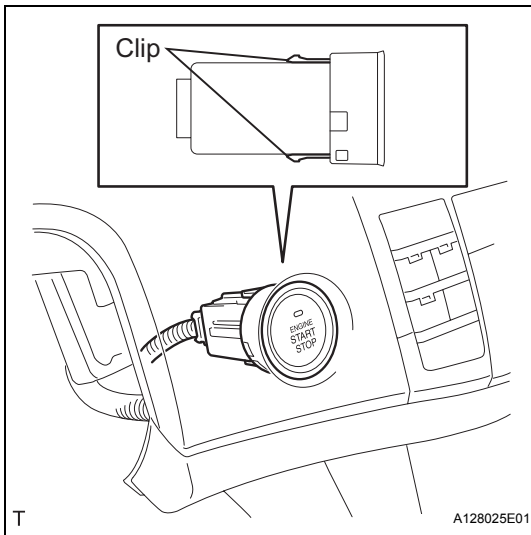
ST



ST

REMOVAL

1. **PRECAUTION**
HINT:
See page [RS-1](#)
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page [IR-12](#))**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page [IR-12](#))**
5. **REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH (See page [IP-12](#))**
6. **REMOVE INSTRUMENT PANEL AIR BAG ASSEMBLY LOWER NO.1**
7. **REMOVE ENGINE SWITCH**
 - (a) Disconnect the engine switch connector.
 - (b) Disengage the 2 clips and remove the switch.



INSPECTION

1. **ENGINE SWITCH**
 - (a) Using an ohmmeter, measure the engine switch resistance.

Resistance

Engine switch Operation	Tester Connection	Specified Condition
OFF	7 (SS1) - 5 (GND)	10 k Ω or higher
OFF	2 (SS2) - 5 (GND)	10 k Ω or higher
ON	7 (SS1) - 5 (GND)	Below 1 Ω
ON	2 (SS2) - 5 (GND)	Below 1 Ω

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

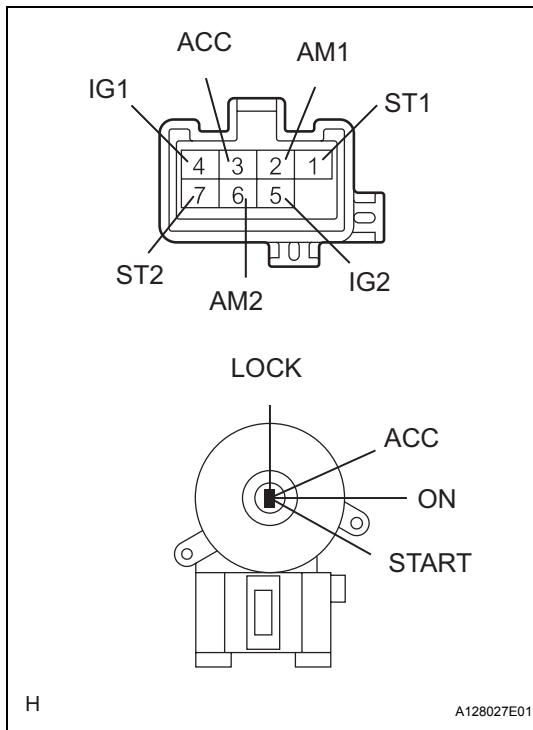
INSTALLATION

1. **INSTALL ENGINE SWITCH**
 - (a) Install the engine switch.
 - (b) Connect the engine switch connector.
2. **INSTALL INSTRUMENT PANEL AIR BAG ASSEMBLY LOWER NO.1**
3. **INSTALL INSTRUMENT PANEL FINISH LOWER PANEL LH**
4. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH**
5. **INSTALL FRONT DOOR SCUFF PLATE LH**
6. **CONNECT BATTERY NEGATIVE TERMINAL**
7. **INSPECT SRS WARNING LIGHT**

HINT:
See page [RS-28](#)
8. **PERFORM INITIALIZATION**

HINT:
See page [IN-29](#)

 - (a) Some systems need initialization when disconnecting the battery terminal.



IGNITION SWITCH (w/o Smart Key System)

INSPECTION

1. INSPECT IGNITION OR STATER SWITCH ASSEMBLY
 - (a) Measure the switch resistance.

Resistance

Switch Condition	Tester Connection	Specified Condition
LOCK	-	10 k Ω or higher
ACC	1 (ST1) - 3 (ACC)	Below 1 Ω
ON	1 (ST1) - 2 (AM1) 1 (ST1) - 3 (ACC) 5 (IG2) - 6 (AM2)	Below 1 Ω
START	1 (ST1) - 2 (AM1) 4 (IG1) - 5 (IG2) 5 (IG2) - 6 (AM2)	Below 1 Ω

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

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