2009 Toyota Highlander Limited
2009 ENGINE Starting (2GR-FE) - Highlander

2009 ENGINE

Starting (2GR-FE) - Highlander

STARTING SYSTEM (W/ SMART KEY SYSTEM)

PARTS LOCATION

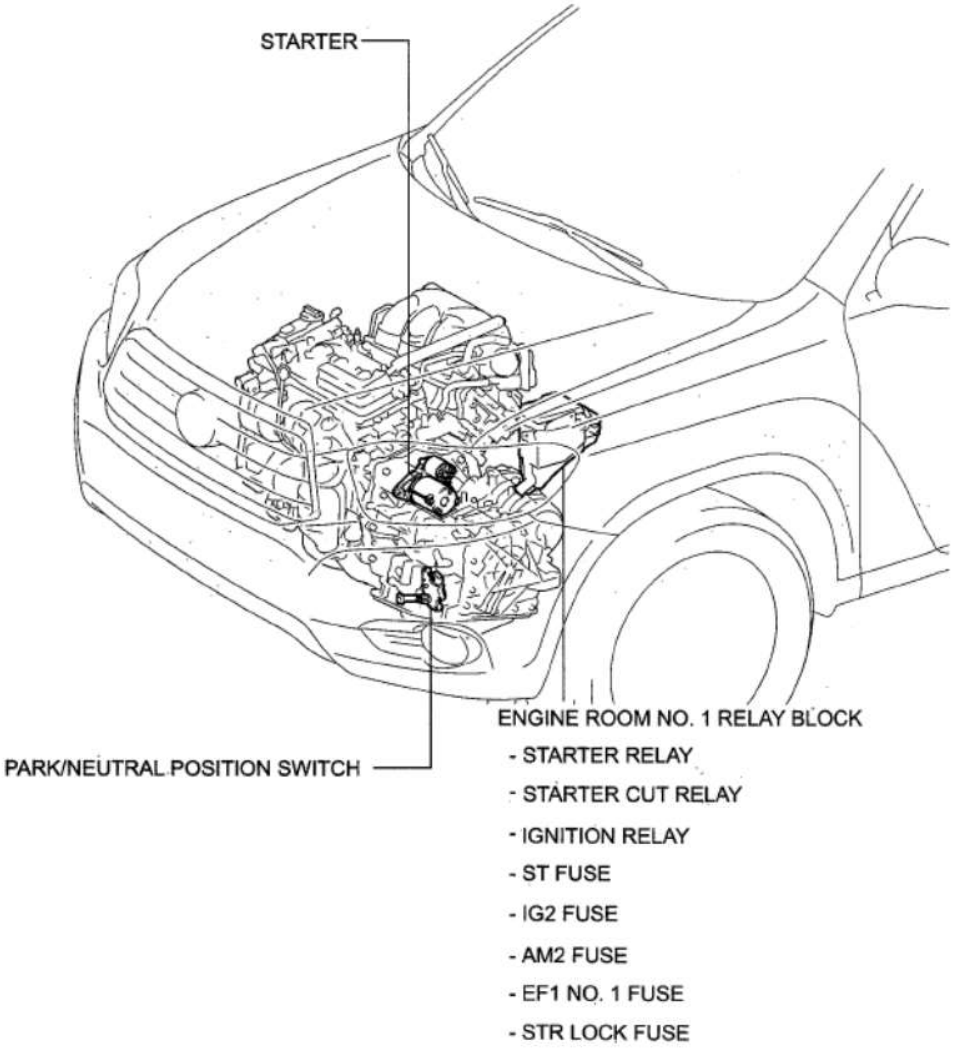


Fig. 1: Identifying Starting System Parts Location - W/ Smart Key System (1 Of 2)
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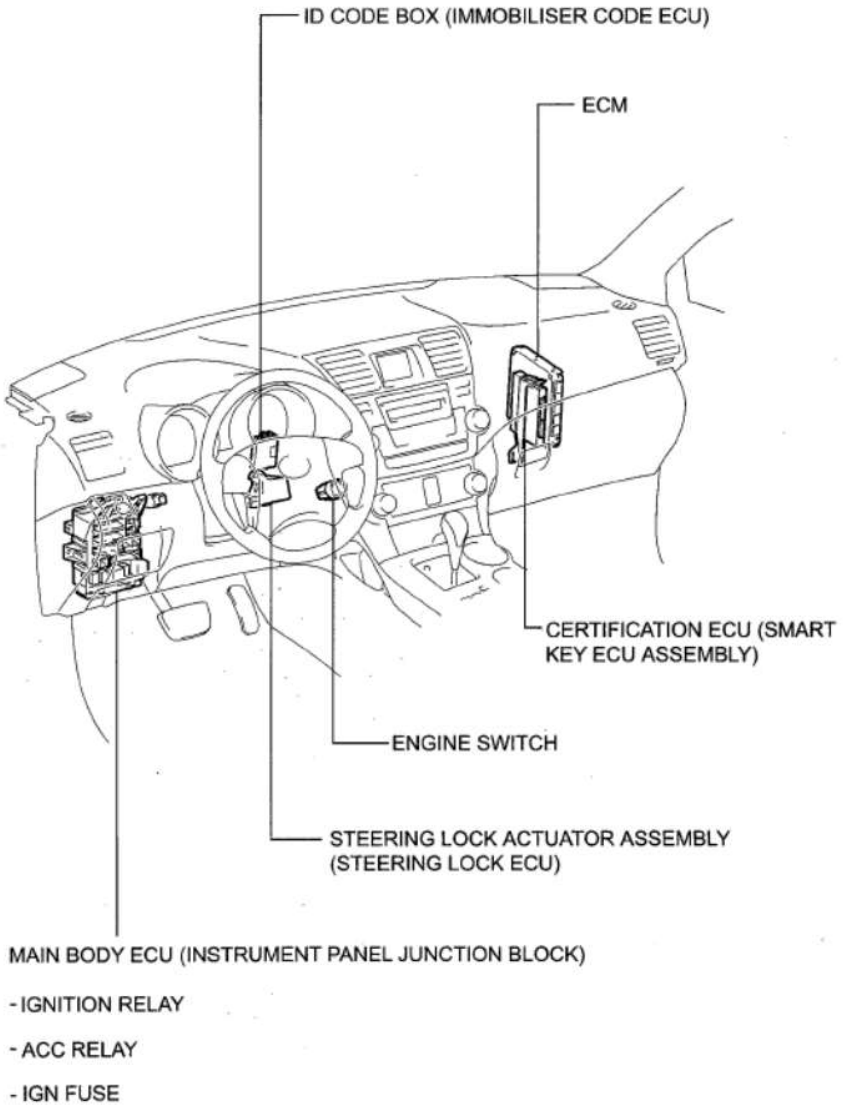


Fig. 2: Identifying Starting System Parts Location - W/ Smart Key System (2 Of 2)
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SYSTEM DIAGRAM

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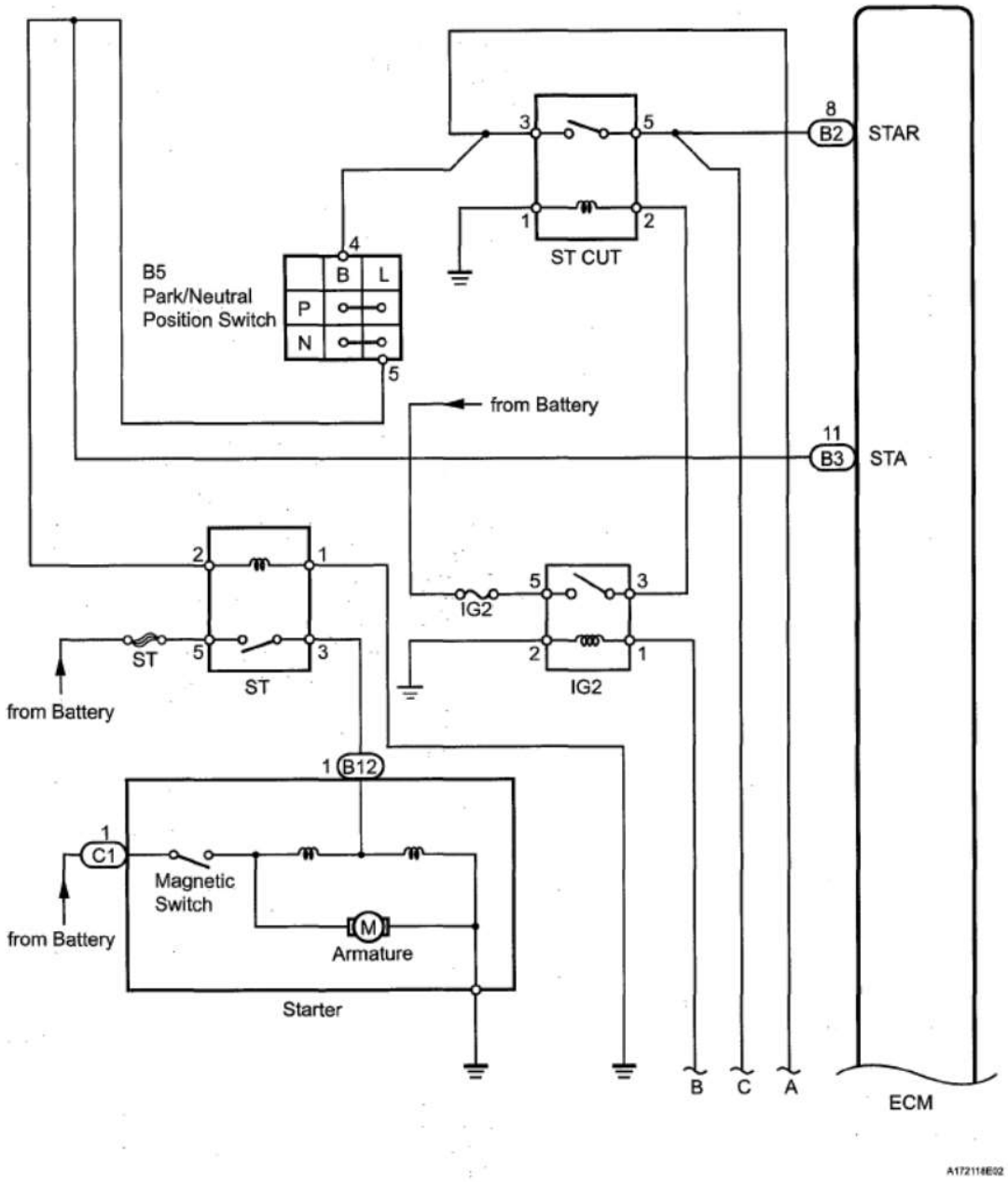


Fig. 3: Starting System Diagram - W/ Smart Key System (1 Of 3)
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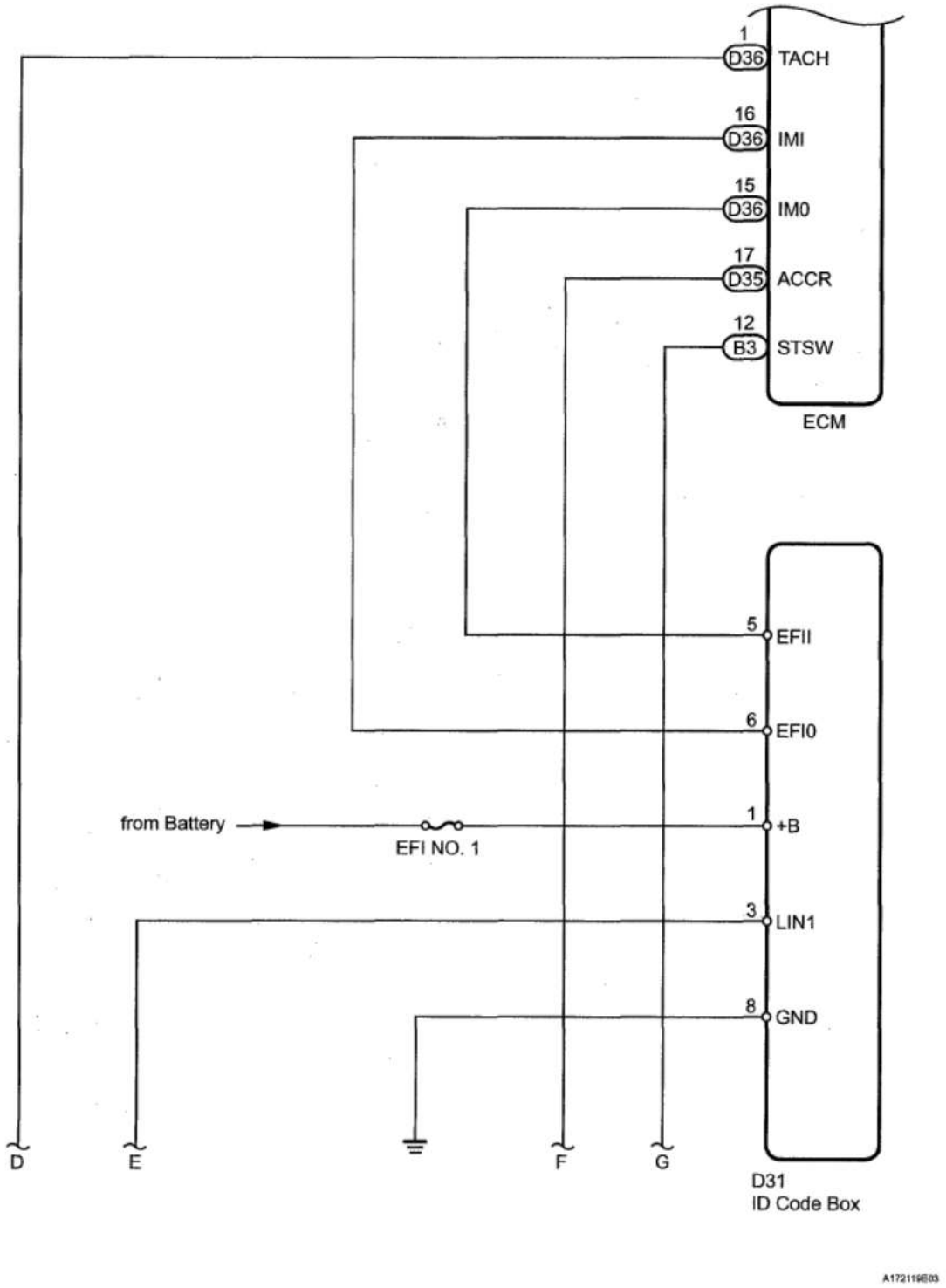


Fig. 4: Starting System Diagram - W/ Smart Key System (2 Of 3)
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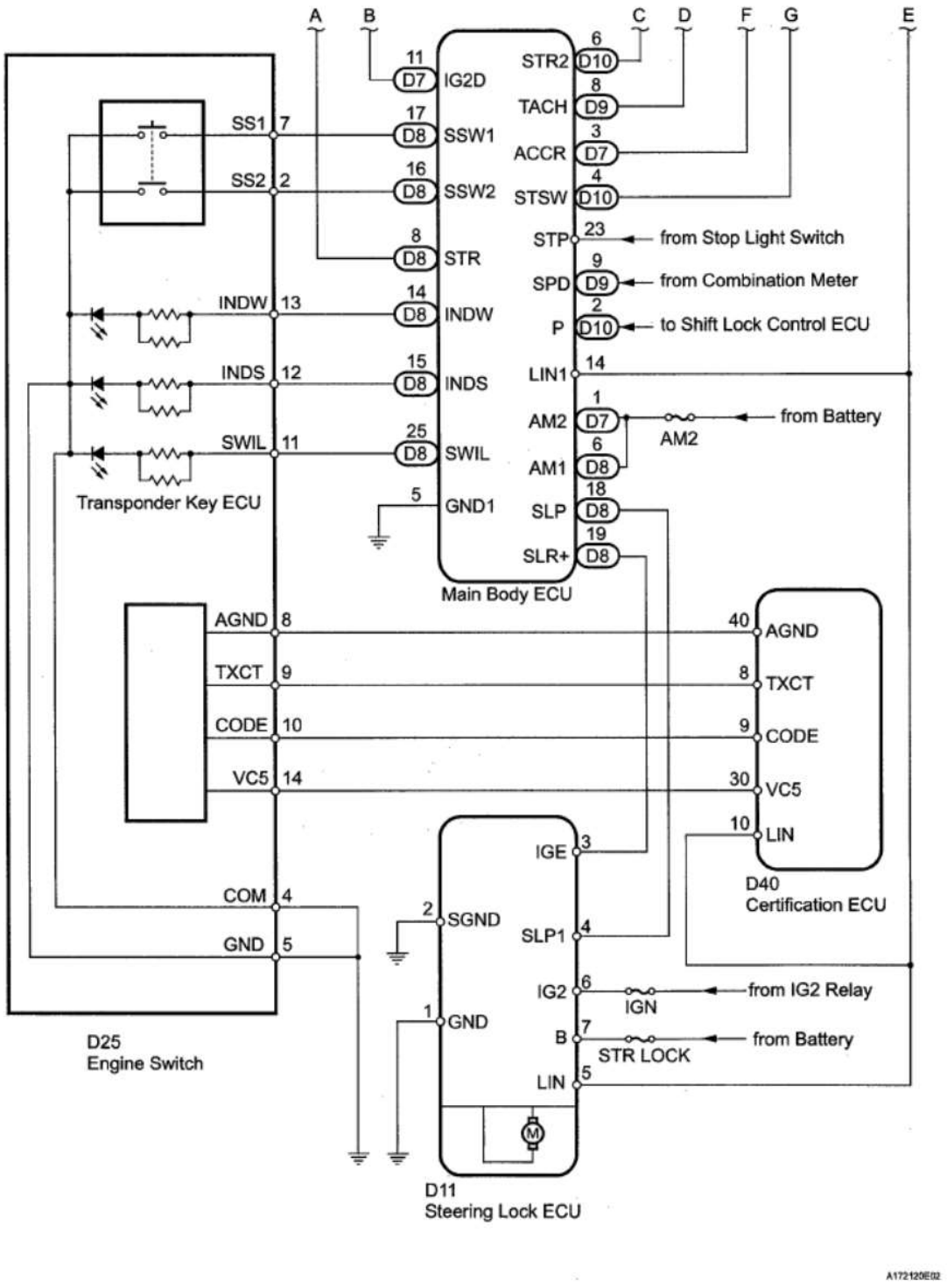


Fig. 5: Starting System Diagram - W/ Smart Key System (3 Of 3)
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STARTING SYSTEM (W/O SMART KEY SYSTEM)

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PARTS LOCATION

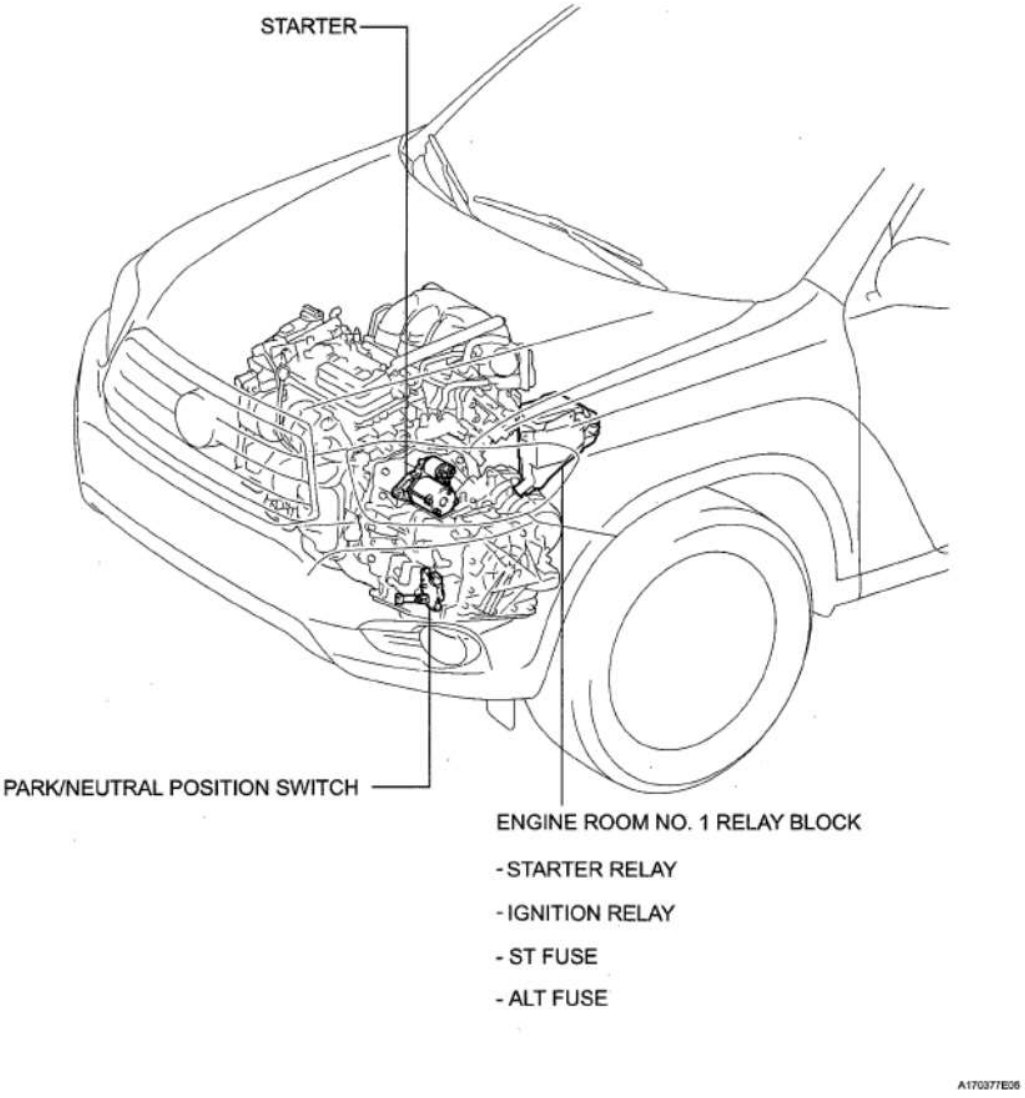


Fig. 6: Identifying Starting System Parts Location -W/O Smart Key System (1 Of 2)
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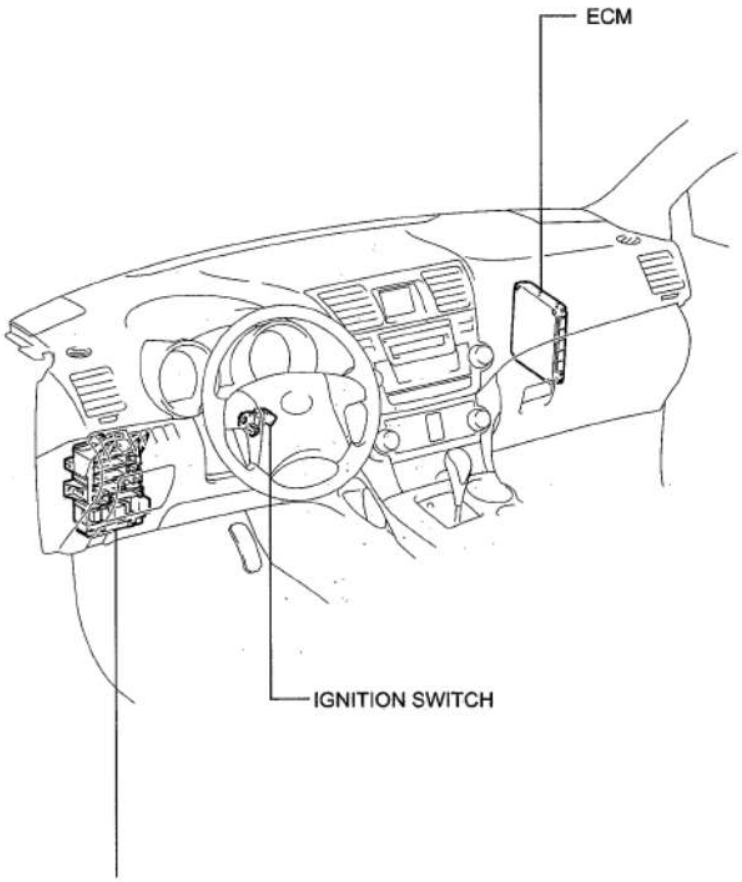


Fig. 7: Identifying Starting System Parts Location -W/O Smart Key System (2 Of 2)
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SYSTEM DIAGRAM

The starting system operates the starter motor according to the signals from the ignition switch and PNP switch.

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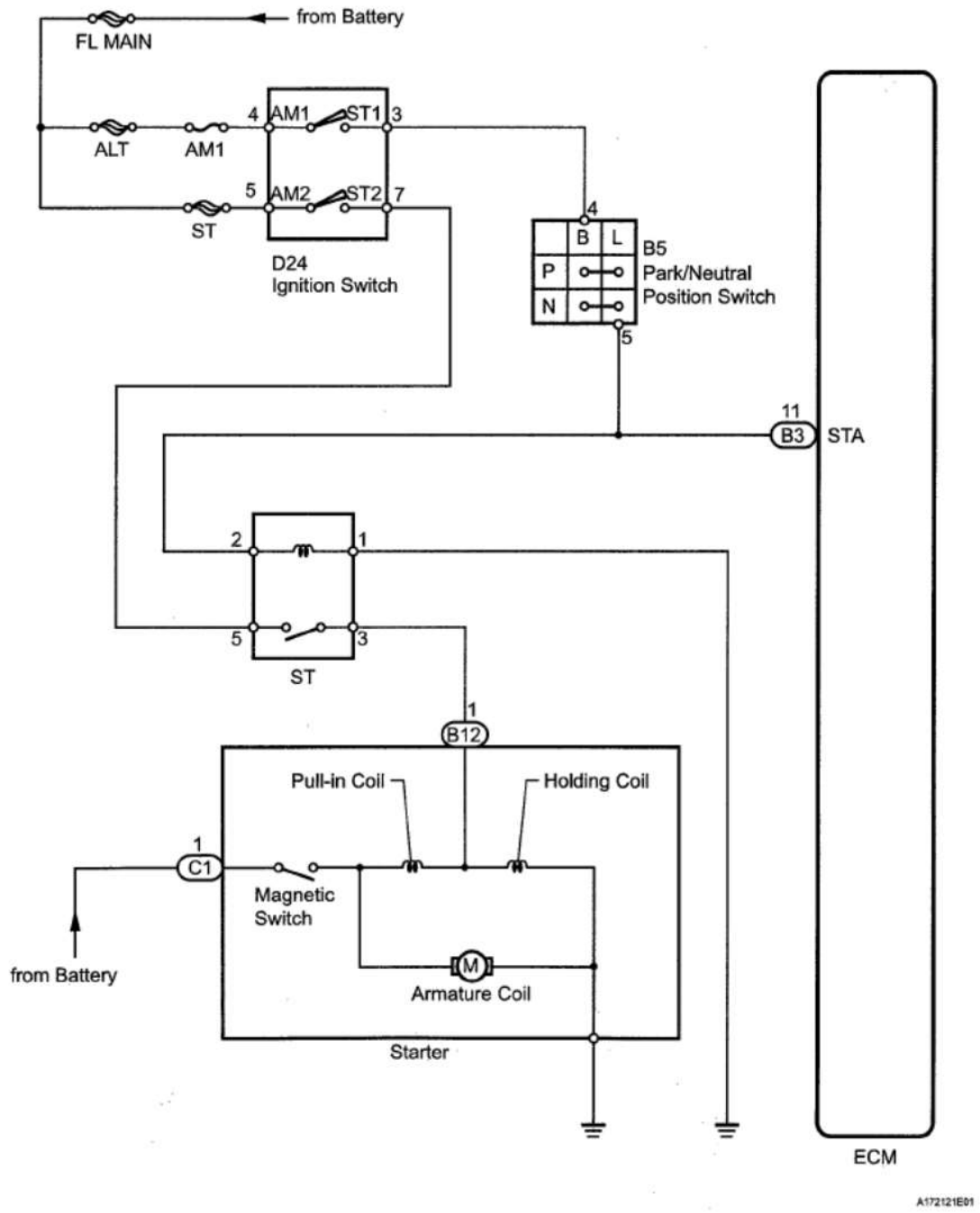


Fig. 8: Starting System Diagram -W/O Smart Key System
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SMART KEY SYSTEM

PRECAUTION

1. NOTICE FOR INITIALIZATION

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

SYSTEM REFERENCE CHART

System Name	See procedure
Power Back Door System	INITIALIZATION

2. **EMERGENCY ENGINE START CONTROL**
   a. if there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU (Instrument panel junction block). This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P or N position. To activate the starter:
      1. Turn the engine switch from off to on (ACC).
      2. Press and hold the engine switch for 15 seconds.
3. **PRECAUTIONS FOR PUSH-BUTTON START FUNCTION:**
   a. Before starting the engine, firmly depress the brake pedal until the indicator in the engine switch turns green.
   b. The power source mode (off, on (ACC), on (IG)) is always retained in memory by the vehicle. If the battery is disconnected, the power source mode that was present before disconnection will be restored after the battery is reconnected. Be sure to turn the engine switch off before disconnecting the cable from the negative battery terminal. Be careful if the power source mode of a vehicle with a discharged battery is not known.
   c. After the battery is reconnected, be sure to wait 10 seconds or more before attempting to start the engine. The engine may not start immediately after the battery is reconnected.
   d. If the electrical key is held near the engine switch to start the engine when the electrical key battery is depleted, the following warnings will sound:
      1. Driver's door open --> closed
         - An exit warning will sound if the power source is in a mode other than off.
      2. Doors other than the driver door open --> closed
         - A warning will sound to indicate that the electrical key has been taken out of the vehicle.

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

PARTS LOCATION

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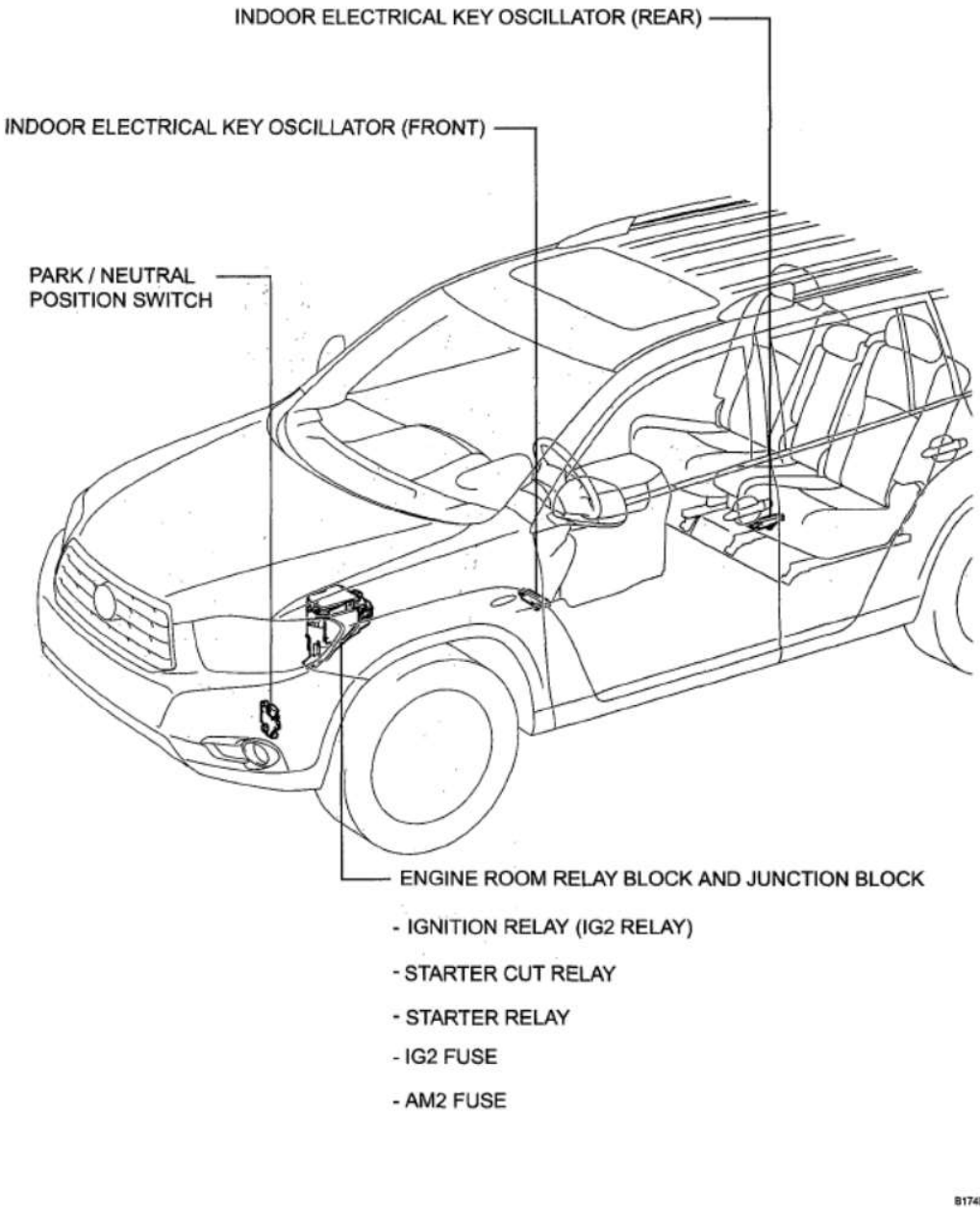


Fig. 9: Identifying Smart Key System Parts Location (1 Of 2)
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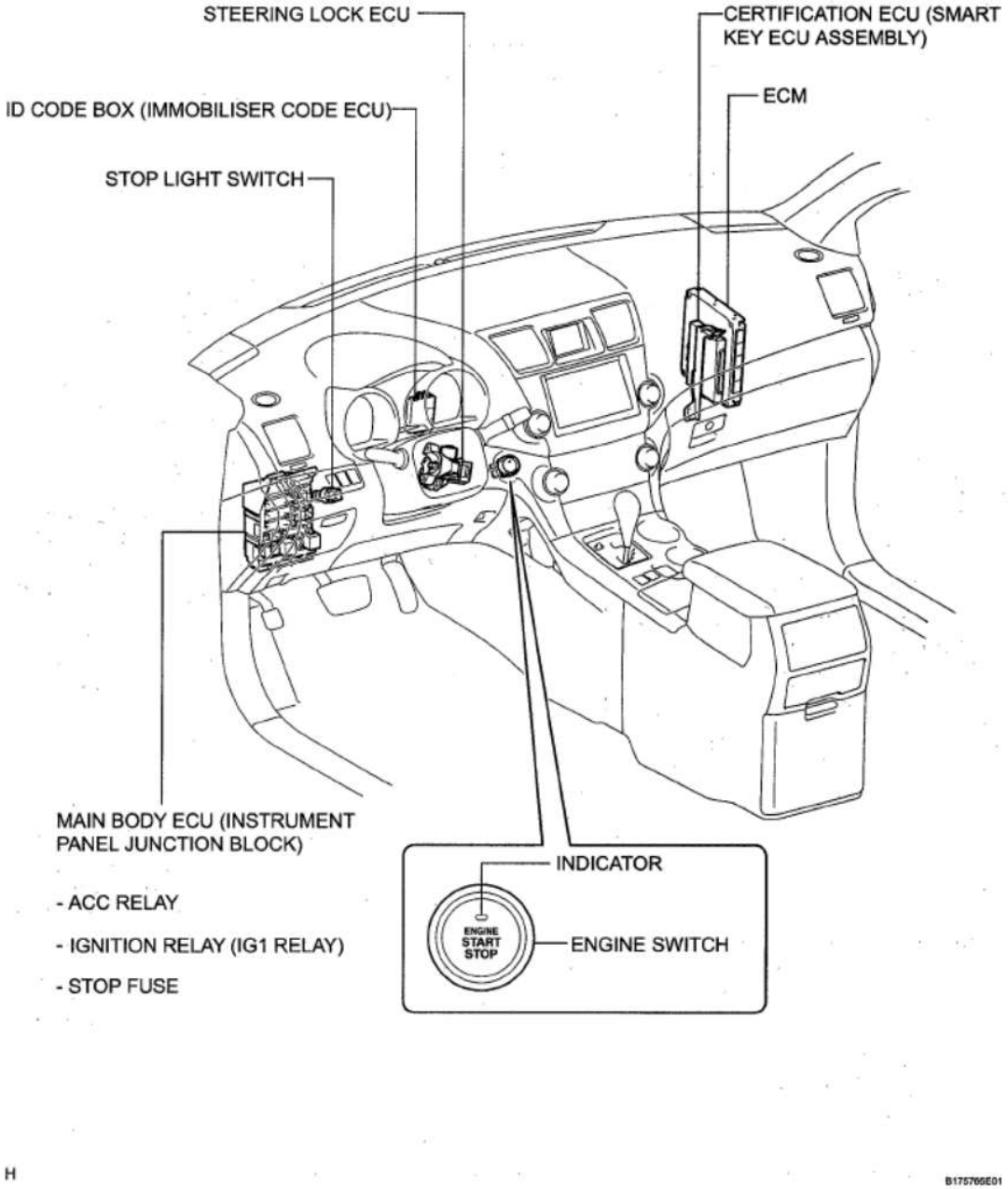


Fig. 10: Identifying Smart Key System Parts Location (2 Of 2)
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SYSTEM DIAGRAM

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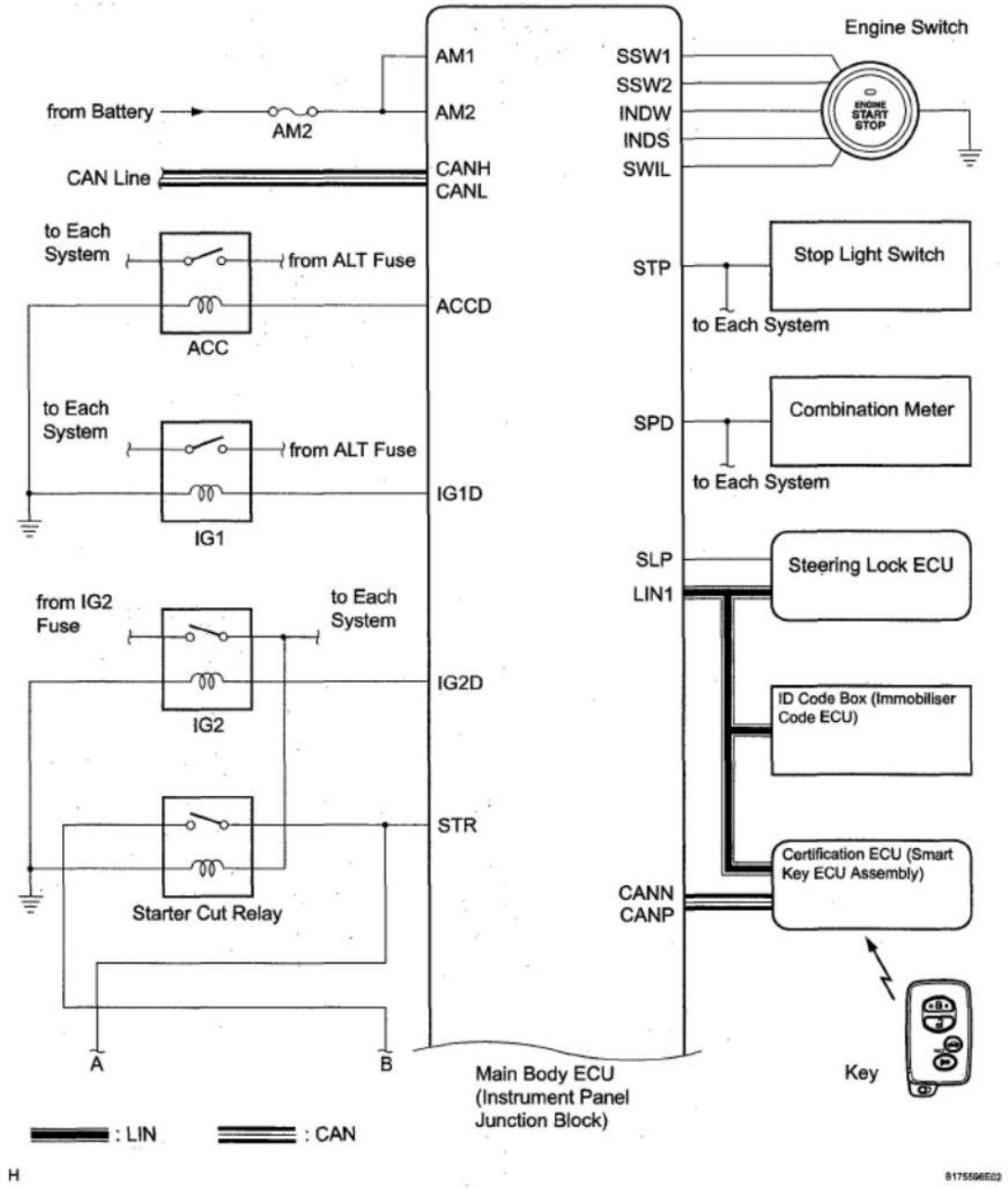


Fig. 11: Smart Key System Diagram (1 Of 2)
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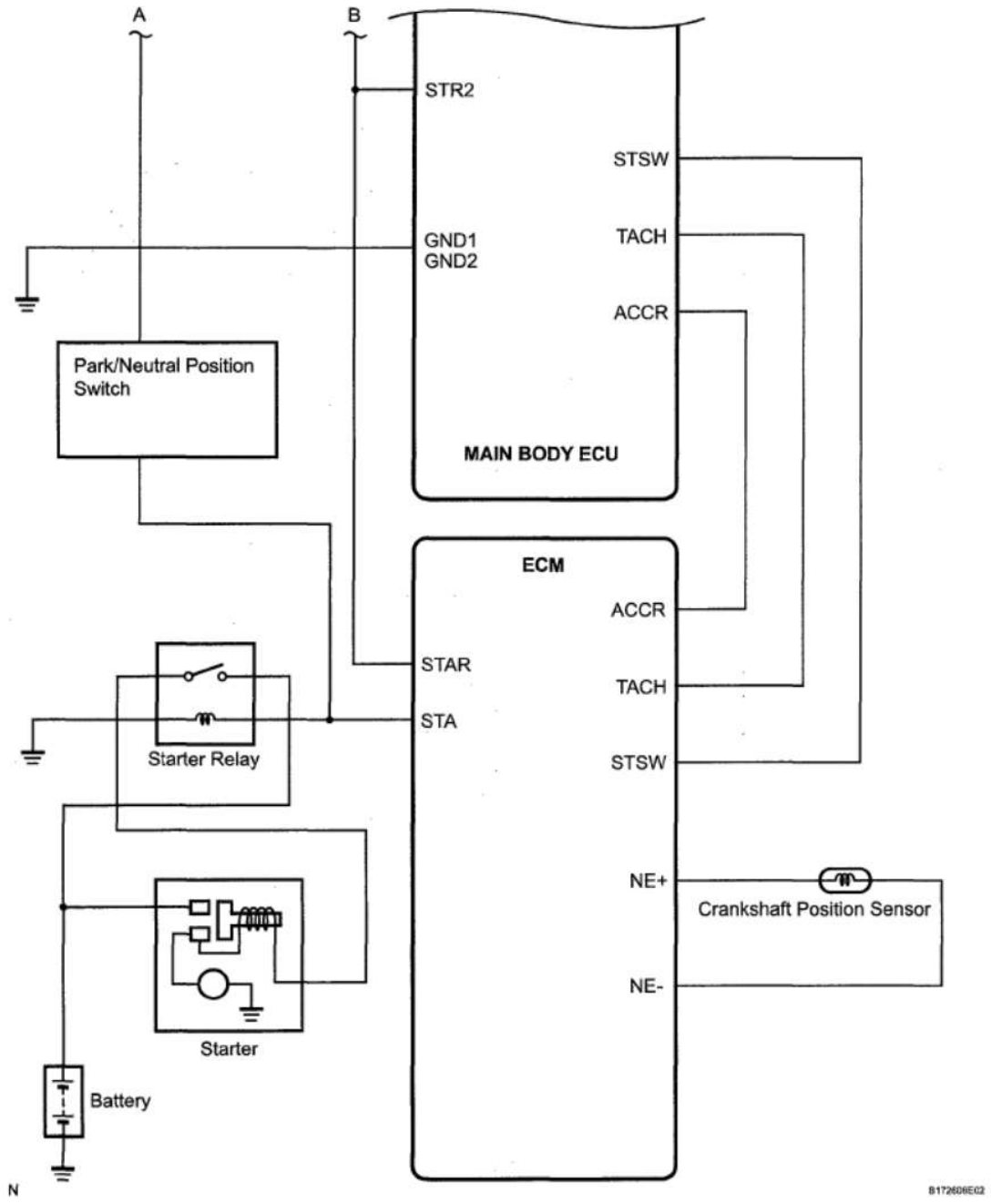


Fig. 12: Smart Key System Diagram (2 Of 2)
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Communication table:

Communication CHART

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
	Main body ECU (Instrument panel		CAN/Local

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Combination meter	junction block)	Vehicle speed signal	communication
Steering lock ECU	Main body ECU (Instrument panel junction block)	Steering lock/unlock signal	LIN/Local communication
ECM	Main body ECU (Instrument panel junction block)	Starter signal	CAN
		Shift position signal	
		Engine revolution speed signal	CAN/Local communication
Main body ECU (Instrument panel junction block)	Certification ECU (Smart key ECU assembly)	Engine switch position signal	CAN
	Courtesy light switch signal		
	Wireless door lock buzzer request signal		
Certification ECU (Smart key ECU assembly)	Main body ECU (Instrument panel junction block)	Illumination light request signal	CAN
		Light answer back signal	
Certification ECU Certification ECU (Smart key ECU assembly)	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Key loss warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU (Smart key ECU assembly/Main body ECU (Instrument panel junction block)	Vehicle speed signal	CAN
Certification ECU (Smart key ECU assembly)	Main body ECU (Instrument panel junction block)	Key ID matching request signal	LIN
Main body ECU (Instrument panel junction block)	Certification ECU (Smart key ECU assembly)	ID required signal	LIN

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ID code box (Immobiliser code ECU assembly)	Certification ECU (Smart key ECU assembly)	Matching request random number signal	LIN
		EEP ROM access malfunction	
		Model code matching signal	
		Model code mismatching signal	
		ECM code receiving status	
		Engine start permission request signal	
		Engine start permission response signal	
		S code matching result signal	
		S code registration status signal	
		S code registration mode signal	
		L code matching result signal	
		ECM communication signal	
		Registered key number response signal	
		Diagnosis mode switching signal	
		Registered key number signal	
Certification ECU (Smart key ECU assembly)	ID code box (Immobiliser code ECU assembly)	3 bit code request signal	LIN
		ID code matching result signal	
		Registered key number signal	
		Vehicle type handle signal	
Certification ECU (Smart	ID code box	L code registration mode signal	
		Diagnosis mode request signal	

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key ECU assembly) Certification ECU (Smart key ECU assembly)	ID code box (Immobiliser code ECU assembly) Steering lock ECU	DTC clear request signal	LIN
		L code registration status signal	
Steering lock ECU	Certification ECU (Smart key ECU assembly) ID code box (Immobiliser code ECU assembly)	Steering lock request signal	LIN
		Steering unlock signal	
		Steering lock confirmation signal	
		Steering unlock confirmation signal	
		Diagnosis response signal	
		Steering unlock drive relay signal	
		Steering lock drive relay signal	
		Steering lock motor operation signal	
Main body ECU (Instrument panel junction block)	Certification ECU (Smart key ECU assembly)	Shift position P signal	LIN
		Power ON operation status signal	
		Engine starting status signal	
		ACC relay operating status signal	
		IG relay operating status signal	
Main body ECU (Instrument panel junction block)	Steering lock ECU	Steering lock relay power supply status signal	LIN
Steering lock ECU	Certification ECU Certification ECU (Smart key ECU assembly) Main body ECU (Instrument panel junction block)	Steering lock catching malfunction signal	LIN
		Push button start malfunction signal	
		Engine operation signal	

SYSTEM DESCRIPTION

1. PUSH-BUTTON START FUNCTION DESCRIPTION

a. The push-button start function uses a push-type engine switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the main body ECU (instrument panel junction block), engine switch, ID code box (immobiliser code ECU), steering lock ECU, electrical key, ACC relay, IG1 relay, IG2 relay and certification ECU (smart key ECU

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assembly). The main body ECU (instrument panel junction block) controls the function. This function operates in cooperation with the smart key system.

2. **FUNCTION OF COMPONENT**

COMPONENT FUNCTION CHART

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

3. **SYSTEM FUNCTION**

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

SYSTEM FUNCTION CHART

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Control	Outline
Engine switch control	When driver operates engine switch with electrical key in driver's possession, certification ECU (smart key ECU assembly) starts indoor oscillator, which transmits request signal to electrical key. Upon receiving this signal, the electrical key transmits ID code matching result signal to main body ECU (instrument panel junction block).
Diagnosis	When main body ECU (instrument panel junction block) detects malfunction, main body ECU (instrument panel junction block) diagnoses and memorizes failed section.

4. **CONSTRUCTION AND OPERATION**

a. Engine Switch

The engine switch consists of a momentary type switch, 2 color (amber, green) LEDs, and a transponder key amplifier.

- The amber LED is for illumination.
- The amber and green LEDs are for the indicator lights. The driver can check the present power source mode and whether the engine can start in accordance with the illumination state of the indicator light.

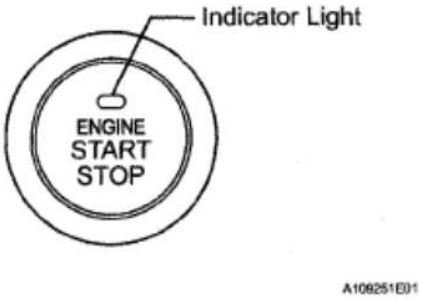


Fig. 13: Identifying Engine Switch Indicator
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- When the main body ECU (instrument panel junction block) detects an abnormality in the push-button start function, it makes the amber indicator light flash. If the engine is stopped in this state, it may not be possible to restart it.

b. Indicator Light Condition

Engine switch indicator light condition:

ENGINE SWITCH INDICATOR LIGHT CONDITION REFERENCE CHART

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

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Engine running	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

c. Main body ECU (instrument panel junction block) The main body ECU (instrument panel junction block) consists of the IG1 and IG2 relay actuation circuits and CPU.

HINT:

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

5. **PUSH-BUTTON START FUNCTION OPERATION**

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

POWER SOURCE MODE PATTERNS

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

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

- After approximately 1 hour has passed with the engine switch on (ACC) and the shift position in P, the main body ECU (instrument panel junction block) will automatically cut the power supply (the power source mode changes to off).
- The illustration below shows the transition of power source modes.

Transition of power source mode:

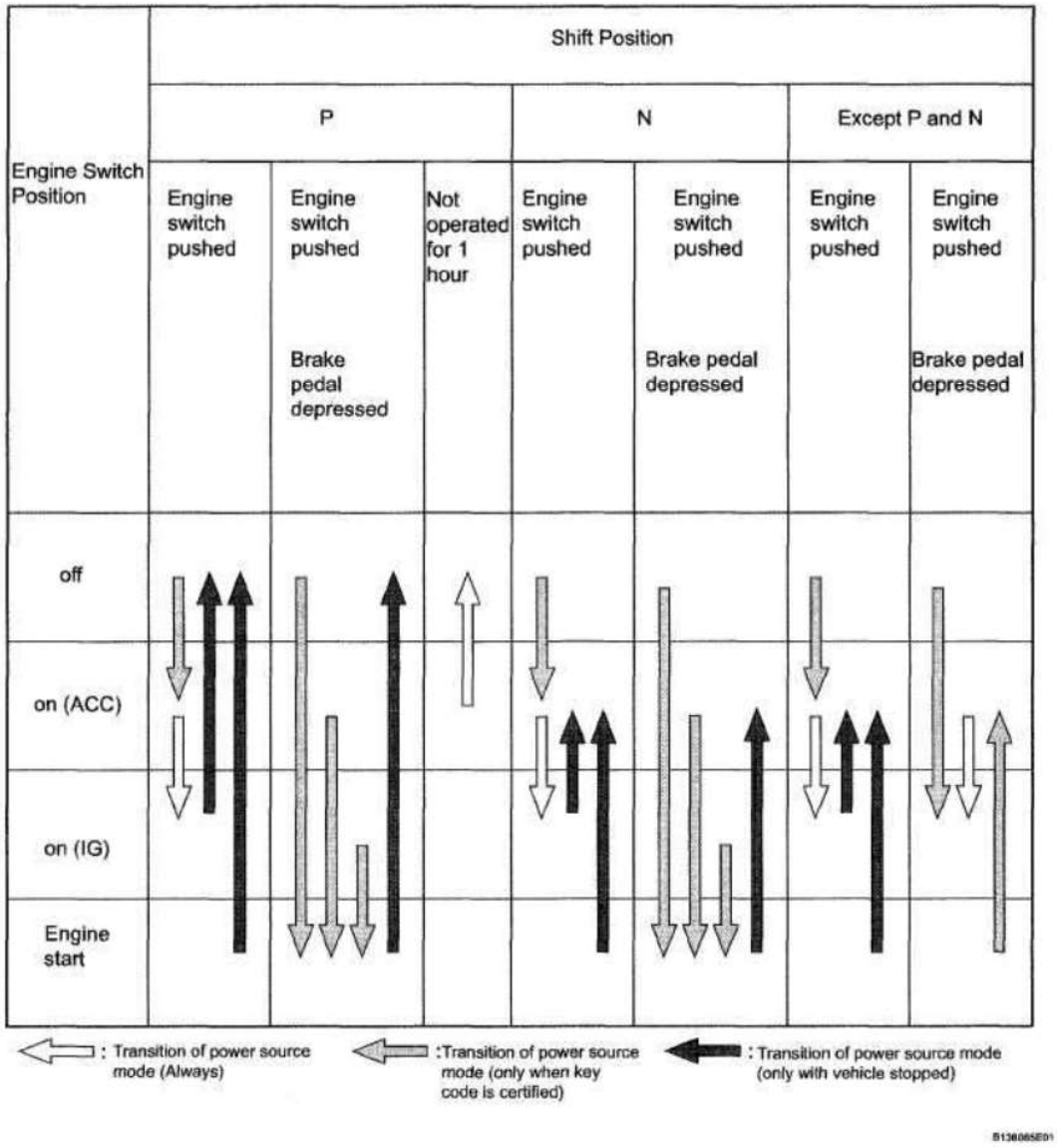


Fig. 14: Power Source Mode Transition Chart
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HINT:

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

6. **WHEN KEY BATTERY IS LOW**
   a. To operate the push-button start function when the key battery is low, hold the key close to the engine switch with the brake pedal depressed.

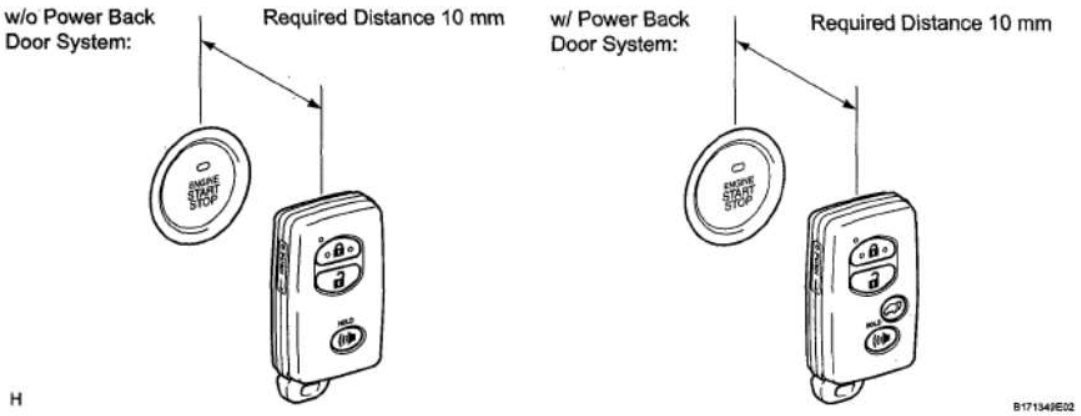


Fig. 15: Identifying Push-Button Start Function Distance - Key Battery Is Low
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   b. The main body ECU (instrument panel junction block) transmits a key verification request signal to the certification ECU (smart key ECU assembly).
   c. The certification ECU (smart key ECU assembly) does not receive an ID code response from the door control receiver, so it actuates the transponder key amplifier built into the engine switch.
   d. The transponder key amplifier outputs an engine immobiliser radio wave to the key.
   e. The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
   f. The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU (smart key ECU assembly).
   g. The certification ECU (smart key ECU assembly) judges and verifies the ID code, and transmits a key verification OK signal to the main body ECU (instrument panel junction block). The buzzer in the combination meter sounds at the same time.
   h. After the buzzer sounds, if the engine switch is pressed within 5 seconds with the brake pedal not depressed, the power source mode changes to on (ACC) or on (IG), the same as in the normal condition.

7. **DIAGNOSIS**

The main body ECU (instrument panel junction block) can detect malfunctions in the push-button start function when the power source mode is on (IG).

When the ECU detects a malfunction, the amber or green indicator light of the engine switch flashes to warn the driver. At the same time, the ECU stores a 5-digit DTC (Diagnostic Trouble Code) in the

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memory.

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

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the pushbutton start function.
- *: Use Techstream.

1. **VEHICLE BROUGHT TO WORKSHOP**
2. **CUSTOMER PROBLEM ANALYSIS CHECK**

   HINT:

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

   PROBLEM ANALYSIS IMPORTANT POINTS CHART

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

3. **INSPECT BATTERY VOLTAGE**

   Standard voltage:

   11 to 14 V

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

4. **INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM***
   a. Use Techstream to check if the CAN Communication System is functioning normally (See **HOW TO PROCEED WITH TROUBLESHOOTING**).

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Result

RESULT REFERENCE CHART

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

B: GO TO CAN COMMUNICATION SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

5. **CHECK FOR DTC***
   a. Check for DTCs and note any codes that are output (See **DTC CHECK/CLEAR**).
   b. Delete DTCs.
   c. Recheck for DTCs.

Result

RESULT REFERENCE CHART

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B: GO TO DIAGNOSTIC TROUBLE CODE CHART (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

6. **INSPECT BASIC OPERATION**
   a. Turn the engine switch on (START) and check that the engine starts normally. Make sure that the brake pedal is depressed and the shift position is P at this time.
   b. Check that the engine switch mode can be changed by pushing the engine switch.

HINT:

Without depressing the brake pedal, push the engine switch repeatedly. Engine switch mode should turn from off to on (ACC) to on (IG) and back to off.

With the brake pedal depressed, push the engine switch repeatedly. Engine switch mode should turn to ENGINE START from any status.

OK:

Engine starts normally.

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7. **PROBLEM SYMPTOMS TABLE**

Result

RESULT REFERENCE CHART

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

B: Go to step 9

A: Go to next step

8. **OVERALL ANALYSIS AND TROUBLESHOOTING***
   a. TERMINALS OF ECU (See **TERMINALS OF ECU**).
   b. DATA LIST/ACTIVE TEST (See **DTC CHECK/CLEAR**).
9. **REPAIR OR REPLACE**
10. **CONFIRMATION TEST**

NEXT: END

CUSTOMIZE PARAMETERS

1. **CUSTOMIZING FUNCTION WITH TECHSTREAM**

HINT:

The items in the table below can be customized.

NOTE:

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

HINT:

The following functions' default settings are ON. Part of these functions can be customized.

Smart Key/Access:

SMART KEY/ACCESS CUSTOMIZE PARAMETERS

Display (Item)	Default	Contents	Setting
Ignition Available Area (Entry		Function to choose the available area for electrical	

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ignition available area)	ALL	key to start E/G and cancel the steering lock.	FRONT/ALL

PROBLEM SYMPTOMS TABLE

HINT:

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

PUSH-BUTTON START FUNCTION:

PROBLEM SYMPTOMS CHART

Symptom	Suspected Area	Refer to
Power source mode does not change.	AM2 Fuse	**POWER SOURCE MODE DOES NOT CHANGE**
	Engine Switch	-
	Wire Harness or Connector	-
	Smart Key System (Entry Function)	-
	Main Body ECU (Instrument Panel Junction Block)	-
	ACC Relay	-
	IG1 Relay	-
	IG2 Relay	-
Engine does not start.	Smart Key System (Entry)	**ENGINE DOES NOT START**
	Engine Switch	-
	Park/Neutral Position Switch	-
	STOP Fuse	-
	Stop Light Switch	-
	Electrical Steering Lock Function	-
	Starter Cut Relay	-
	Starter Relay	-
	ECM	-
	Engine Immobiliser System	-
	Main Body ECU (Instrument Panel Junction Block)	-
	Wire Harness or Connector	-
Engine switch indicator light does not come on.	Engine Switch Indicator Light Circuit	**ENGINE SWITCH INDICATOR CIRCUIT**

TERMINALS OF ECU

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1. **CHECK MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)**

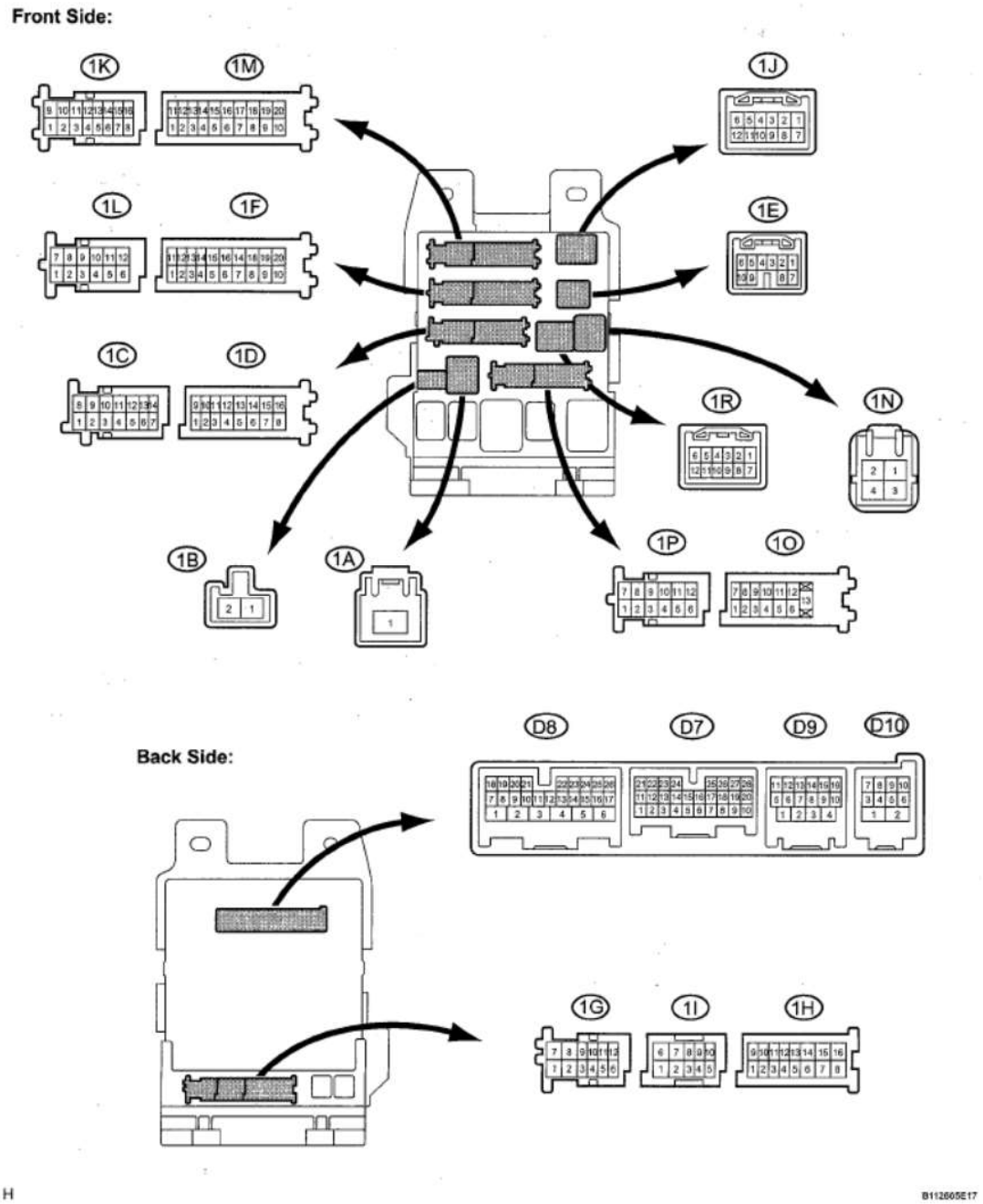


Fig. 16: Identifying Main Body ECU Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Disconnect the D7, D8, D9, 1E, 1F and 1M connectors.
b. Measure the voltage and resistance of the wire harness side connector.

MAIN BODY ECU TERMINALS REFERENCE CHART

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Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D8-6 (AM1) - Body ground	GR - Body ground	+B power supply	Always	11 to 14 V
D7-1 (AM2) - Body ground	G - Body ground	+B power supply	Always	11 to 14 V
D8-16 (SSW2) - Body ground	BR - Body ground	Engine switch signal	Engine switch pushed	Below 1 ohms
D8-16 (SSW2) - Body ground	BR - Body ground	Engine switch signal	Engine switch not pushed	10 kohms or higher
D8-17 (SSW1) - Body ground	P - Body ground	Engine switch signal	Engine switch pushed	Below 1 ohms
D8-17 (SSW1) - Body ground	P - Body ground	Engine switch signal	Engine switch not pushed	10 kohms or higher
1M-9 (GND2) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
D9-5 (CANH) - Body ground	GR - Body ground	CAN Line	Always	10 kohms or higher
D9-6 (CANL) - Body ground	W - Body ground	CAN Line	Always	10 kohms or higher
D9-15 (CANN) - Body ground*1	W - Body ground	CAN Line	Always	10 kohms or higher
D9-16 (CANP) - Body ground*1	Y - Body ground	CAN Line	Always	10 kohms or higher
1F-10 (GND1) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
1E-7 (LIN1)- Body ground	R - Body ground	LIN line	Always	10 kohms or higher
HINT: *1: w/ Power back door				

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

c. Reconnect the connectors.

d. Measure the voltage of the connector.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D7-3 (ACCR) - 1M-9 (GND2)	O - W-B	Starter assist signal (ACC cut signal)	Brake pedal depressed, shift lever P position, engine switch is pushed once --> on (IG)	0.1 to 0.8 V*1 --> Output voltage at terminal AM1 or AM2 is -2 V or more.
				Output voltage at

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D7-11 (IG2D) - 1M-9 (GND2)	Y - W-B	IG2 signal	Engine switch on (IG)	terminal AM1 or AM2 is -2 V or more.
D7-11 (IG2D) - 1M-9 (GND2)	Y - W-B	IG2 signal	Engine switch on (ACC)	Below 1 V
D8-3 (IG1D) - 1M-9 (GND2)	SB - W-B	IG1 signal	Engine switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
D8-3 (IG1D) - 1M-9 (GND2)	SB - W-B	IG1 signal	Engine switch on (ACC)	Below 1 V
D8-8 (STR) - 1M-9 (GND2)	B - W-B	Park/Neutral position switch signal	Engine switch on (IG), shift lever except P or N position --> P or N position	Below 2 V --> Pulse generation *3
D8-18 (SLP) - 1M-9 (GND2)	O - W-B	Steering lock actuator position signal	Steering lock is locked	Pulse generation (See waveform 3 3)
D8-18 (SLP) - 1M-9 (GND2)	O - W-B	Steering lock actuator position signal	Steering lock is released	Pulse generation (See waveform 3 3)
D8-19 (SLR+) - 1M-9 (GND2)	Y - W-B	Steering lock motor signal	Steering lock motor operating	Below 1 V
D8-19 (SLR+) - 1M-9 (GND2)	Y - W-B	Steering lock motor signal	Steering lock motor does not operate	Output voltage at terminal AM1 or AM2 is -2 V or more.
D8-22 (ACCD) - 1M-9 (GND2)	GR - W-B	ACC signal	Engine switch on (ACC)	Output voltage at terminal AM1 or AM2 is -2 V or more.
D8-22 (ACCD) - 1M-9 (GND2)	GR - W-B	ACC signal	Engine switch off	Below 1 V
D8-25 (SWIL) - 1M-9 (GND2)	R - W-B	Illumination signal	Light control switch TAIL or HEAD	Output voltage at terminal AM1 or AM2 is -2 V or more.
D9-8 (TACH) - 1M-9 (GND2)	BR - W-B	Tachometer signal	Engine running	Pulse generation (See waveform 2 2)
D9-9 (SPD) - 1M-9 (GND2)	R - W-B	Vehicle speed signal	Engine switch on (IG), rotate rear wheel slowly	Pulse generation (See waveform 1 1)
D10-4 (STSW) - 1M-9 (GND2)	P - W-B	Starter activation request signal	Brake pedal depressed, engine switch held on (ST)	Output voltage at terminal AM1 or AM2 is -2 V or more.
D10-6 (STR2) - 1M-9 (GND2)	LG - W-B	Starter signal (Sub)	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	Output voltage at terminal AM1 or AM2 is -3.5 V or more. *2
1F-2 (ACC) - Body ground	SB - Body ground	ACC power supply	Always	11 to 14 V

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1A-1 (IG) - Body ground	B - Body ground	IG power supply	Always	11 to 14 V
1M-7 (STP) - 1M-9 (GND2)	GR - W-B	Stop light signal	Brake pedal depressed	Output voltage at terminal AM1 or AM2 is -2 V or more.
1M-7 (STP) - 1M-9 (GND2)	GR - W-B	Stop light signal	Brake pedal released	Below 1 V
HINT: *1: Voltage is output only when the engine is cranking. *2: Voltage is output for 0.3 seconds when the engine is cranking to start. Disconnect the B3 connector from the ECM and starter cut relay before measuring the voltage. *3: Remove the starter cut relay before measuring the voltage.				

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

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

1. Waveform 1

Waveform 1 (Reference):

WAVEFORM REFERENCE CHART

Terminal No.	D9-9 (SPD) - 1M-9 (GND2)
Tool Setting	5V/DIV., 10 ms./DIV.
Vehicle Condition	Driving at approx. 20 km/h (12 mph)

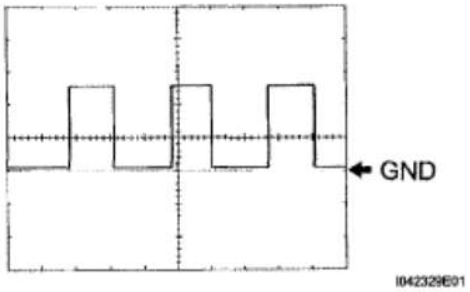


Fig. 17: Identifying Waveform 1
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

As the vehicle speed increases, the wavelength shortens.

2. Waveform 2

Waveform 2 (Reference):

WAVEFORM REFERENCE CHART

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Terminal No.	D9-8 (TACH) - 1M-9 (GND2)
Tool Setting	5V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

HINT:

As the engine revolution speed increases, the wavelength shortens.

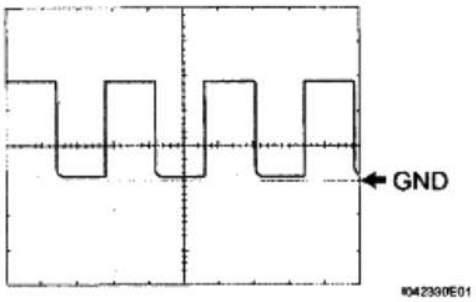


Fig. 18: Identifying Waveform 2
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Waveform 3

Waveform 3 (Reference):

WAVEFORM REFERENCE CHART

Terminal No.	D8-18 (SLP) - 1M-9 (GND2)
Tool Setting	2V/DIV., 100 ms./DIV.
Vehicle Condition	Steering lock/unlock

2. **CHECK CERTIFICATION ECU**

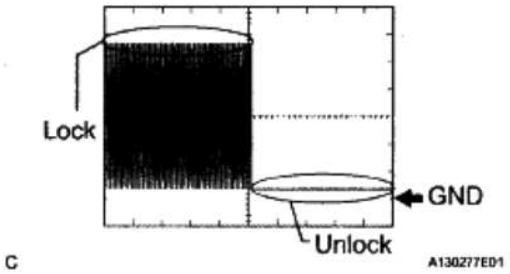


Fig. 19: Identifying Waveform 3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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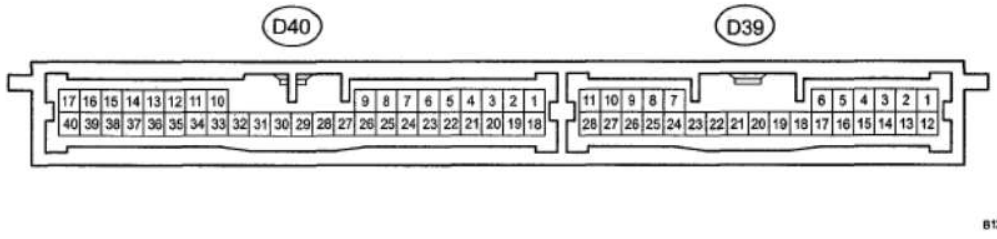


Fig. 20: Identifying Certification ECU Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Disconnect the D40 ECU connector.
b. Measure the voltage and resistance of the wire harness side connector.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D40-1 (+B) - Body ground	B - Body ground	+B power supply	Always	11 to 14 V
D40-10 (LIN) - Body ground	L - Body ground	LIN line	Always	10 kohms or higher
D40-17 (E) - Body ground	B - Body ground	Ground	Always	Below 1 ohms

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

c. Reconnect the ECU connector.
d. Measure the voltage of the connector.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D40-18 (IG) - Body ground	G - Body ground	Ignition power supply	Engine switch on (IG)	11 to 14 V
D40-18 (IG) - Body ground	G - Body ground	Ignition power supply	Engine switch off	Below 1 V

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

3. **CHECK ECM**

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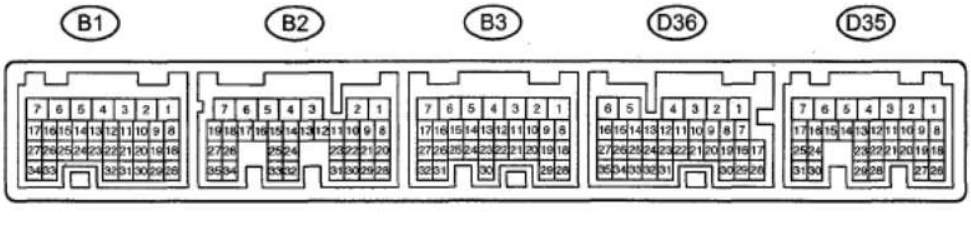


Fig. 21: Identifying ECM Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Disconnect the B1, B2, B3 and D35 ECM connectors.
b. Measure the voltage and resistance of the wire harness side connectors.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D35-2 (+B2) - Body ground	GR - Body ground	Power source of ECM	Engine switch on (IG)	11 to 14 V
D35-1 (+B) - Body ground	SB - Body ground	Power source of ECM	Engine switch on (IG)	11 to 14 V
D35-9 (IG SW) - Body ground	W - Body ground	Engine switch signal	Engine switch on (IG)	11 to 14 V
B2-3 (ME01) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B1-6 (E02) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B1-7 (E01) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B2-7 (E04) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B2-6 (E05) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B3-1 (E1) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
B2-4 (E03) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

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

c. Reconnect the ECM connectors.
d. Measure the voltage of the connectors.

TERMINAL DESCRIPTION CHART

Tester	Wiring	Terminal	Condition	Specified Condition

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Connection	Color	Description		
D35-17 (ACCR) - B3-1 (E1)	O - W-B	ACC relay cut signal (output)	Brake pedal depressed, shift lever P or N position, engine switch is pushed once --> on (IG)	0.1 to 0.8 V*1 --> Output voltage at terminal AM1 or AM2 is -2 V or more.
B3-12 (STSW) - B3-1 (E1)	P - W-B	Starter activation request signal	Brake pedal depressed, engine switch held (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
D36-1 (TACH) - B3-1 (E1)	B - W-B	Engine revolution signal (output)	Idling	Pulse generation (see waveform 1)
D35-15 (STP) - B3-1 (E1)	R - W-B	Stop light switch signal (input)	Brake pedal depressed	7.5 to 14 V
D35-15 (STP) - B3-1 (E1)	R - W-B	Stop light switch signal (input)	Brake pedal released	Below 1.5 V
B3-11 (STA) - B3-1 (E1)	B - W-B	Starter relay operation signal	Cranking	11 to 14 V
B2-8 (STAR) - B3-1 (E1)	GR - W-B	Starter signal (Main)	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	11 to 14 V
HINT: *1: Voltage is output only when the engine is cranking.				

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

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

Waveform 1 (Reference):

WAVEFORM REFERENCE CHART

Terminal No.	D36-1 (TACH) - B3-1 (E1)
Tool Setting	5V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

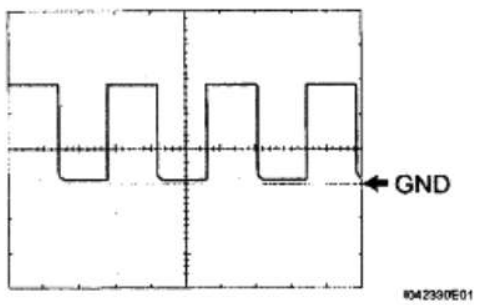


Fig. 22: Identifying Waveform 1
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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HINT:

As the vehicle speed increases, the wavelength shortens.

4. **CHECK STEERING LOCK ECU**



Fig. 23: Identifying D11 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Disconnect the D11 ECU connector.
b. Measure the voltage and resistance of the wire harness side connector.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D11-1 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
D11-2 (SGND) - Body ground	W - Body ground	Ground	Always	Below 1 ohms
D11-6 (IG2) - Body ground	V - Body ground	Ignition power supply	Engine switch on (IG)	11 to 14 V
D11-6 (IG2) - Body ground	V - Body ground	Ignition power supply	Engine switch off	Below 1 V
D11-7 (B) - Body ground	G - Body ground	+B power supply	Always	11 to 14 V

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

c. Reconnect the D11 ECU connector.
d. Measure the voltage of the connector.

TERMINAL DESCRIPTION CHART

Tester Connection	Wiring Color	Terminal Description	Condition	Specified Condition
D11-4 (SLP1) - D11-1 (GND)	O - W-B	Steering lock actuator position signal	Steering is locked	11 to 14 V
D11-4 (SLP1) - D11-1	O - W-B	Steering lock actuator	Steering is	Below 1 V

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(GND)		position signal	released	

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

DIAGNOSIS SYSTEM

1. **DESCRIPTION**
   a. Push-button start function data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the function seems to be malfunctioning, use Techstream to check for malfunctions and perform repairs.
2. **CHECK DLC3**
   a. Check the DLC3 (See **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**).
3. **INSPECT BATTERY VOLTAGE**

   Standard voltage:

   11 to 14 V

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

DTC CHECK/CLEAR

1. **CHECK DTC**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. Read the DTC by following the prompts on the tester screen.

   HINT:

   Refer to Techstream operator's manual for further details.

2. **CLEAR DTC**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. Erase the DTC by following the directions on the tester screen.

   HINT:

   Refer to Techstream operator's manual for further details.

DATA LIST/ACTIVE TEST

1. **READ DATA LIST**

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HINT:

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

a. Connect Techstream to the DLC3.

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

b. Turn the engine switch on (IG).
c. Read the DATA LIST.

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ACC SW	Engine switch on (ACC)/ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
IG SW	Engine switch on (IG)/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
St SW1	Start switch 1/ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-
St SW2	Start switch 2/ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-
Str Unlock SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Engine switch on (ACC)) OFF: Steering is locked (Engine switch off)	-
N SW/C SW	Park/Neutral position switch/ON or OFF	ON: Shift position is P or N OFF: Shift position is except P and N	-

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SHIFT P SIG	Shift P position signal/ON or OFF	ON: Shift position is P OFF: Shift position is not P	-
Vehicle Spd Sig	Vehicle speed signal/STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-
E/G Cond	Engine condition/STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-
IG1 Relay Mon1	IG1 relay monitor (outer)/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 Relay Mon1	IG2 relay monitor (outer)/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG1 Relay Mon2	IG1 relay monitor (inner)/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 Relay Mon2	IG2 relay monitor (inner)/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
ACC Relay Mon	ACC relay monitor/ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
Latch Circuit	Ratch circuit/ON or OFF	ON: Engine switch on (IG) or engine is running OFF: Engine switch off or on (ACC)	-
Start Req Sig	Starter request signal monitor/ON or OFF	ON: Starter relay is ON OFF: Starter relay is OFF	Engine switch pressed and held with shift lever in P or N
Pwr Cond	Power supply condition/ALL, ACC ON, IG1 IG2, ST ON	ALL: All relays are OFF ACC ON: ACC relay is ON IG1: IG1 relay is ON IG2: IG2 relay is ON ST ON: ST request signal is ON	-
ACC Cut Sig	ACC relay cut signal/ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	-
St Relay Mon	STARTER relay monitor/ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	Engine is cranking with engine switch on (IG) and shift lever in P or N
Comm Smrt/Wrls	Communication for certification ECU (smart key ECU assembly)/OK or STOP	OK: Communication STOP: No communication	-

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2. **PERFORM ACTIVE TEST**

HINT:

Using Techstream to perform ACTIVE TEST allows the relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing the ACTIVE TEST early in troubleshooting is one way to save diagnostic time. The DATA LIST can be displayed while performing ACTIVE TESTs.

a. Connect Techstream to the DLC3.
b. Turn the engine switch on (IG).
c. Perform the ACTIVE TEST according to the display on the tester.

Main Body:

ACTIVE TEST REFERENCE CHART

Tester Display	Test Part	Control Range	Diagnostic Note
Lighting Ind	Indicator for lighting	ON/OFF	-
Ind Condition	Engine switch indicator	Green/Amber/No Sig	-
S Lock Pwr	Power supply for steering lock ECU	ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

SMART KEY SYSTEM:

DIAGNOSTIC TROUBLE CODE CHART

DTC Code	Detection Item	Trouble Area
B2271	Ignition Hold Monitor Malfunction	1. AM2 fuse 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector
B2272	Ignition 1 Monitor Malfunction	1. IG1 relay 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector
B2273	Ignition 2 Monitor Malfunction	1. IG2 relay 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector

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B2274	ACC Monitor Malfunction	1. ACC relay 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector
B2275	STSW Monitor Malfunction	1. ECM 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector
B2276	ACCR Signal Circuit Malfunction	1. Main body ECU (Instrument panel junction block) 2. ECM 3. Wire harness or connector
B2277	Detecting Vehicle Submersion	Main body ECU (Instrument panel junction block)
B2278	Engine Switch Circuit Malfunction	1. Engine switch 2. Main body ECU (Instrument panel junction block) 3. Wire harness or connector
B2281	"P" Signal Malfunction	1. Main body ECU 2. Shift lock control ECU 3. Wire harness or connector
B2282	Vehicle Speed Signal Malfunction	1. CAN communication system 2. Combination meter system 3. Main body ECU (Instrument panel junction block) 4. Wire harness or connector
B2283	Vehicle Speed Sensor Malfunction	1. DTC B2282 detection area 2. Combination meter 3. Speed sensor 4. Skid control ECU 5. Main body ECU (instrument panel junction block) 6. Wire harness or connector
B2284	Brake Signal Malfunction	

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		1. Stop light switch 2. CAN communication system 3. ECM 4. Main body ECU (Instrument panel junction block) 5. Wire harness or connector
B2285	Steering Lock Position Signal Circuit Malfunction	1. Main body ECU (Instrument panel junction block) 2. Steering lock ECU 3. Wire harness or connector
B2286	Runnable Signal Malfunction	1. CAN communication system 2. ECM 3. Main body ECU (Instrument panel junction block) 4. Wire harness or connector
B2287	LIN Communication Master Malfunction	1. Main body ECU (Instrument panel junction block) 2. Certification ECU (smart key ECU assembly) 3. Wire harness or connector
B2288	Steering Lock Signal Circuit Malfunction	1. Main body ECU (Instrument panel junction block) 2. Steering lock ECU 3. Wire harness or connector
B2289	Key Collation Waiting Time Over	1. Main body ECU (Instrument panel junction block) 2. Smart key system 3. Wire harness or connector 4. Certification ECU (smart key ECU assembly)

ON-VEHICLE INSPECTION

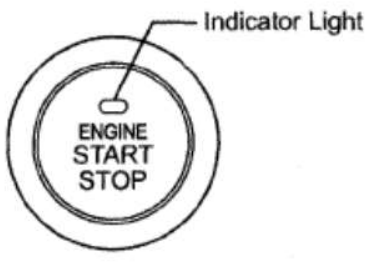
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1. **CHECK POWER SOURCE MODE CHANGE FUNCTION**
   a. Check the function of the engine switch.
      1. Check that power source mode changes in accordance with the conditions of the shift position and brake pedal.

POWER SOURCE MODE PATTERN

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N Position	When the engine switch is pushed once. • off --> engine start • on (ACC) --> engine start • on (IG) --> engine start
Not depressed	P position	Each time the engine switch is pushed. • off --> on (ACC) --> on (IG) --> off
	Except P Position	Each time the engine switch is pushed. • off --> on (ACC) --> on (IG) --> on (ACC)
-	P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) --> off
-	Except P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) --> on (ACC)

   b. Check if power source mode changes without pressing the engine switch.
      1. With power source mode on (ACC) and the shift position in P, wait for at least 1 hour. Check that power source mode changes from on (ACC) to off automatically.
2. **CHECK INDICATOR CONDITION**
   a. Check the indicator on the engine switch.
      1. Check that the engine switch indicator turns on and changes color according to the table below.



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Fig. 24: Identifying Engine Switch Indicator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ENGINE SWITCH INDICATOR REFERENCE CHART

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

DTC B2271 IGNITION HOLD MONITOR MALFUNCTION

DESCRIPTION

This DTC is output when a problem such as an open in the AM2 fuse, an open or short in the wire harness between the fuse and main body ECU (instrument panel junction block), a short in the IG output circuit inside the main body ECU (instrument panel junction block), a short between the main body ECU (instrument panel junction block) and relay, and a short in the relay is detected (See **REGISTRATION**).

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system.

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

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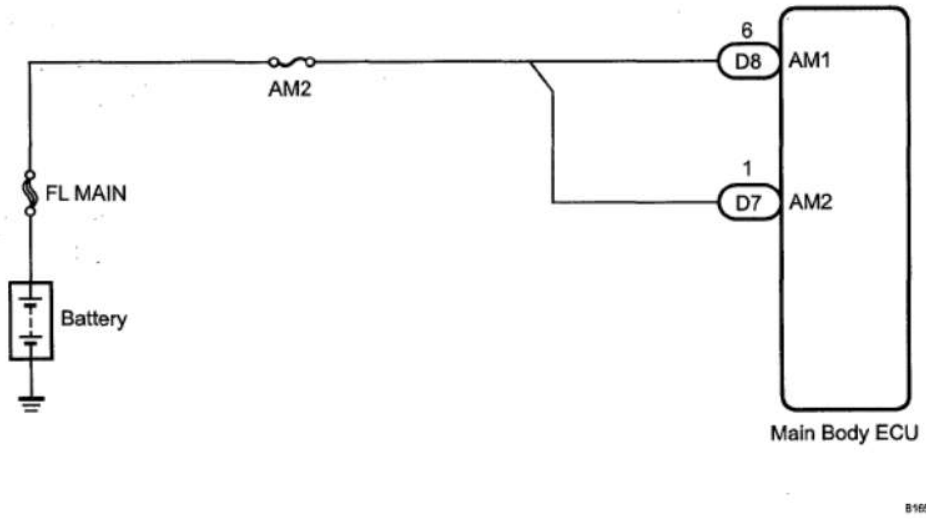


Fig. 25: Ignition Hold Monitor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).

      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: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

2. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK) - BATTERY)**
   a. Disconnect the D7 and D8 ECU connectors.
   b. Measure the voltage according to the value(s) in the table below.

   Standard voltage

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STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
D8-6 (AM1) - Body ground	Always	11 to 14 V
D7-1 (AM2) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR, OR FUSE

Front view of wire harness connector:
(to Main Body ECU)

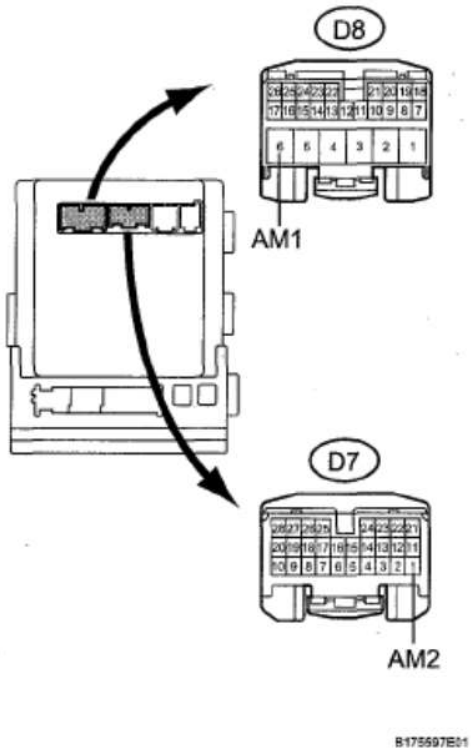


Fig. 26: Identifying D7 And D8 ECU Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2272 IGNITION 1 MONITOR MALFUNCTION

DESCRIPTION

This DTC is output when there is a problem in the IG1D output circuit, which is from the inside of the main body ECU (instrument panel junction block) to the IG1 relay.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

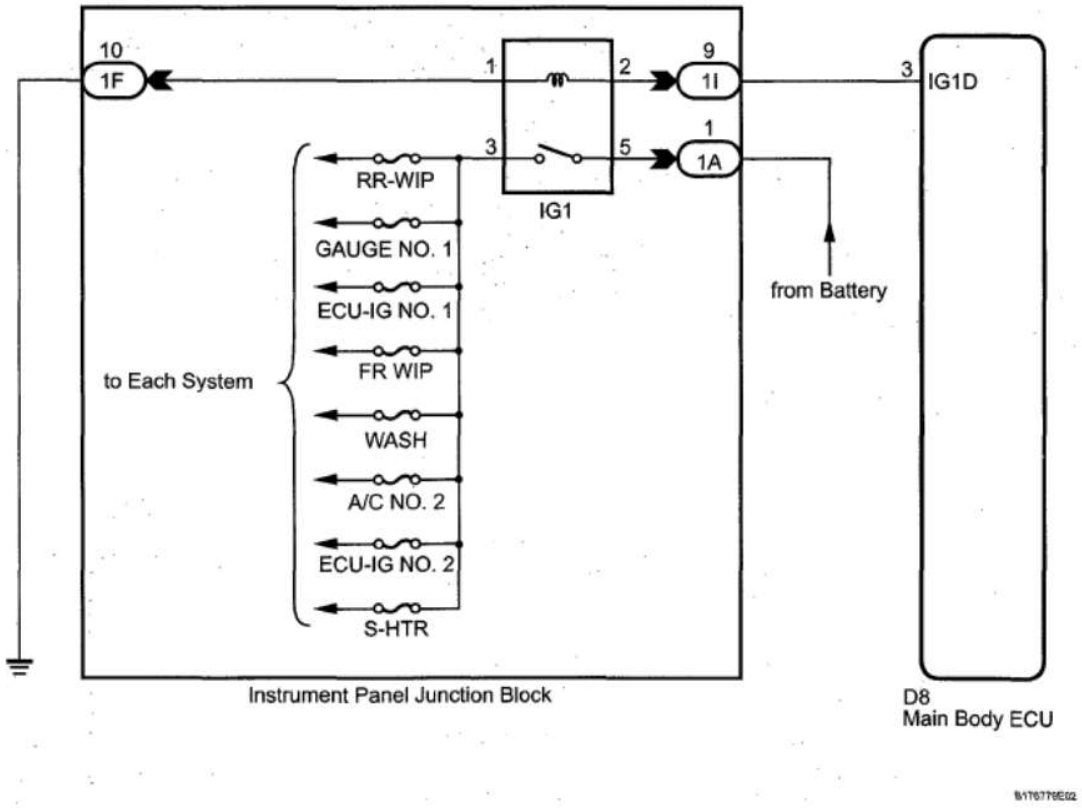


Fig. 27: Ignition 1 Monitor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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1. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG) and turn Techstream main switch on.
   c. Select the item below in the Data List, and read the display on the tester.

HINT:

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

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG1 Relay Mon1	Status of IG1 relay monitor (outer) /ON or OFF	ON: Engine switch on (IG) (IG1 relay is ON) OFF: Engine switch off (IG1 relay is OFF)	-

OK:

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

NG: Go to step 4

OK: Go to next step

2. **CHECK ENGINE SWITCH CONDITION**
   a. Check the power source mode change.
      1. When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:

OK:

off --> on (ACC) --> on (IG) --> off

NG: GO TO OTHER FLOW CHART (See **POWER SOURCE MODE DOES NOT CHANGE**)

OK: Go to next step

3. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).

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b. Check for DTCs again.

OK:

No DTC is output.

NG: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

OK: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

4. **INSPECT RELAY (IG1 RELAY)**
   a. Remove the IG1 relay from the instrument panel junction block.
   b. Measure the resistance according to the value(s) in the table below.

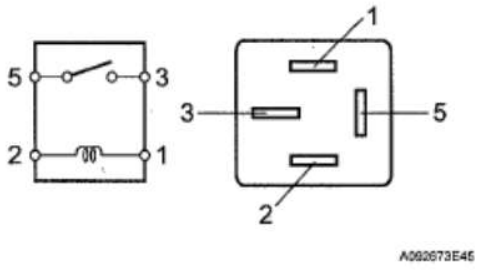


Fig. 28: Inspecting Relay (IG1 Relay)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

NG: REPLACE IG1 RELAY

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK - MAIN BODY ECU)**
   a. Disconnect the 1I junction block connector.

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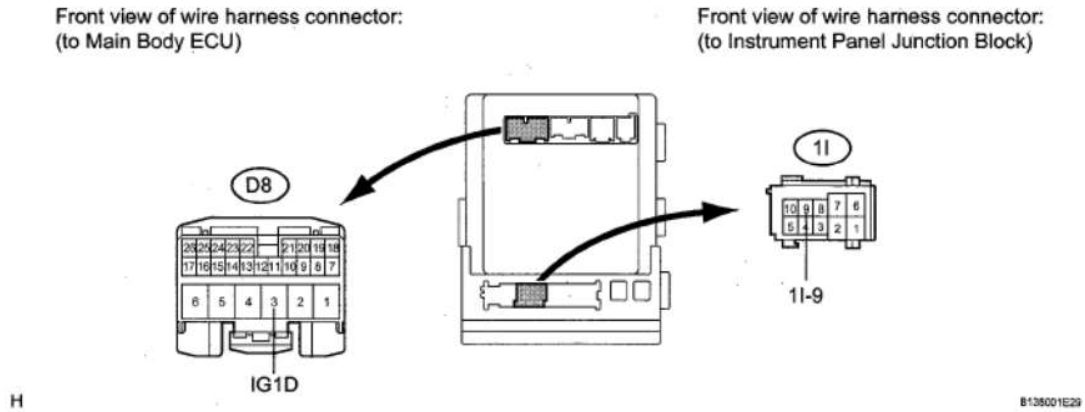


Fig. 29: Identifying 1I Junction Block Connector And D8 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Disconnect the D8 ECU connector.
c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
1I-9 - D8-3 (IG1D)	Always	Below 1 ohms
D8-3 (IG1D) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK - MAIN BODY ECU)

OK: Go to next step

6. **CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK - BATTERY AND BODY GROUND)**
   a. Disconnect the 1F and 1A junction block connectors.
   b. Measure the resistance according to the value(s) in the table below.

   Standard resistance

   STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
1F-10 - Body ground	Always	Below 1 ohms

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

   Standard voltage

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STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
1A-1 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK - BATTERY AND BODY GROUND)

Front view of wire harness connector:
(to Instrument Panel Junction Block)

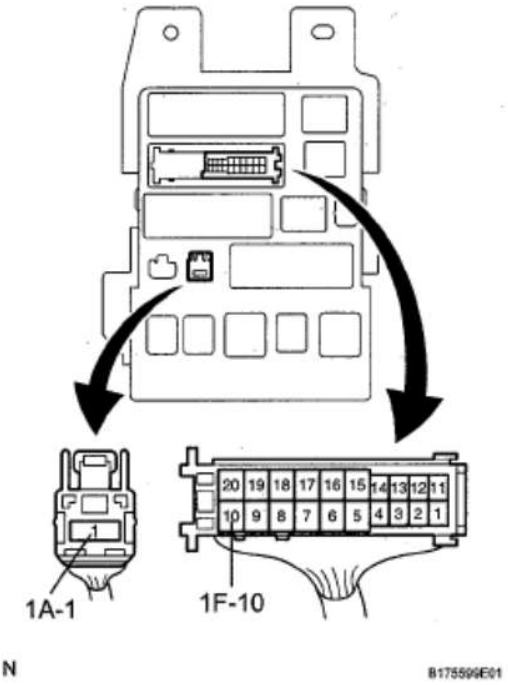


Fig. 30: Identifying 1F And 1A Junction Block Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK

DTC B2273 IGNITION 2 MONITOR MALFUNCTION

DESCRIPTION

This DTC is output when there is a problem in the IG2D output circuit, which is from the inside of the main body ECU (instrument panel junction block) to the IG2 relay.

HINT:

When the main body ECU (instrument panel junction block) is replaced with a new one and the negative (-)

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battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

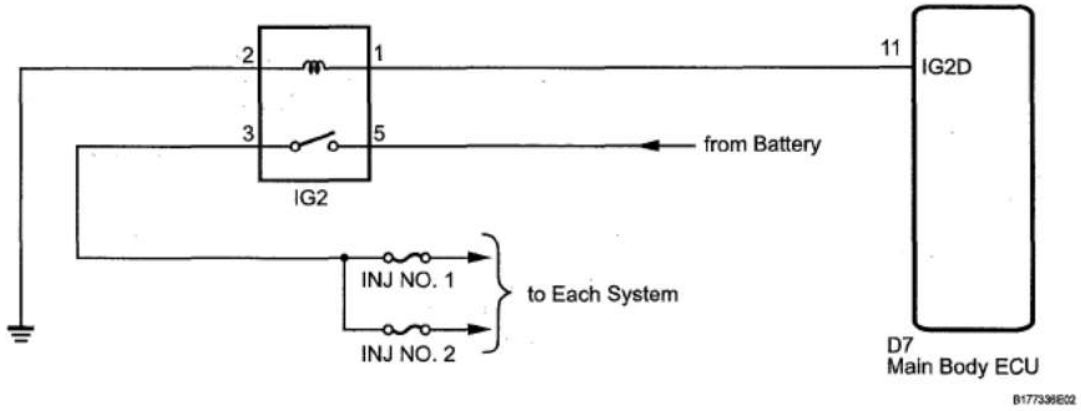


Fig. 31: Ignition 2 Monitor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG) and turn Techstream main switch on.
   c. Read the Data List according to the displays on the tester.

   HINT:

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

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Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG2 Relay Mon1	Status of IG2 relay monitor (outer)/ON or OFF	ON: Engine switch on (IG) (IG2 relay is ON) OFF: Engine switch off (IG2 relay is OFF)	-

OK:

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

NG: Go to step 4

OK: Go to next step

2. **CHECK ENGINE SWITCH CONDITION**
   a. Check the power source mode changes.
      1. When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:

OK:

off --> on (ACC) --> on (IG) --> off

NG: GO TO OTHER FLOW CHART (See **POWER SOURCE MODE DOES NOT CHANGE**)

OK: Go to next step

3. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTCs again.

OK:

No DTC is output.

NG: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK

OK: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

4. **INSPECT RELAY (IG2 RELAY)**

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

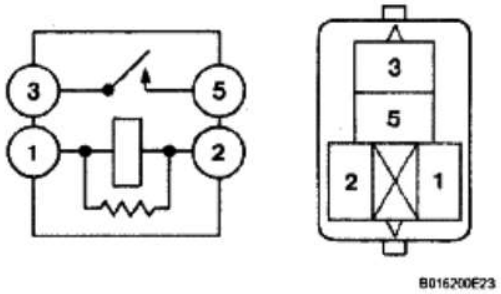


Fig. 32: Inspecting Relay (IG2 Relay)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

NG: REPLACE IG2 RELAY

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (ENGINE ROOM RELAY BLOCK - MAIN BODY ECU AND BODY GROUND)**
   a. Disconnect the D7 ECU connector.

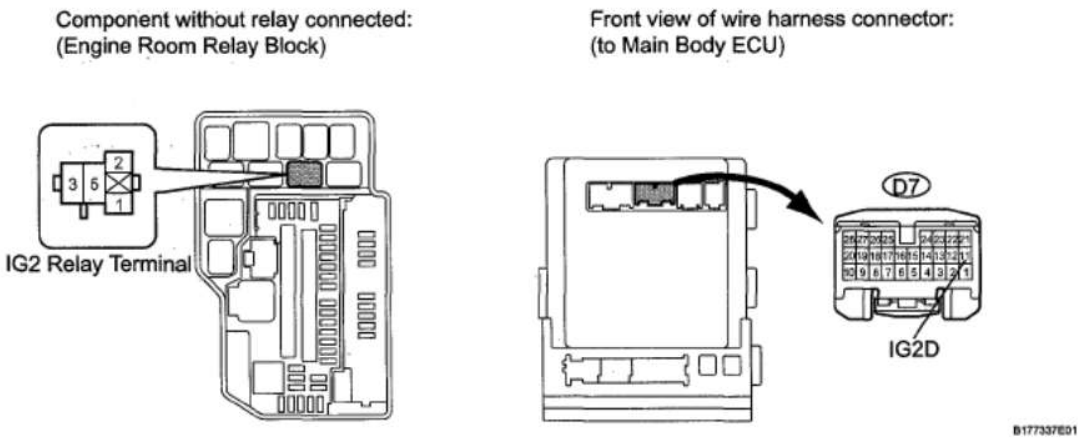


Fig. 33: Identifying D7 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block IG2 relay terminal 1 - D7-11 (IG2D)	Always	Below 1 ohms
D7-11 (IG2D) - Body ground	Always	10 kohms or higher
Engine room relay block IG2 relay terminal 2 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2274 ACC MONITOR MALFUNCTION

DESCRIPTION

This DTC is output when there is a problem in the ACCD output circuit, which is from the inside of the main body ECU (instrument panel junction block) to the ACC relay.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

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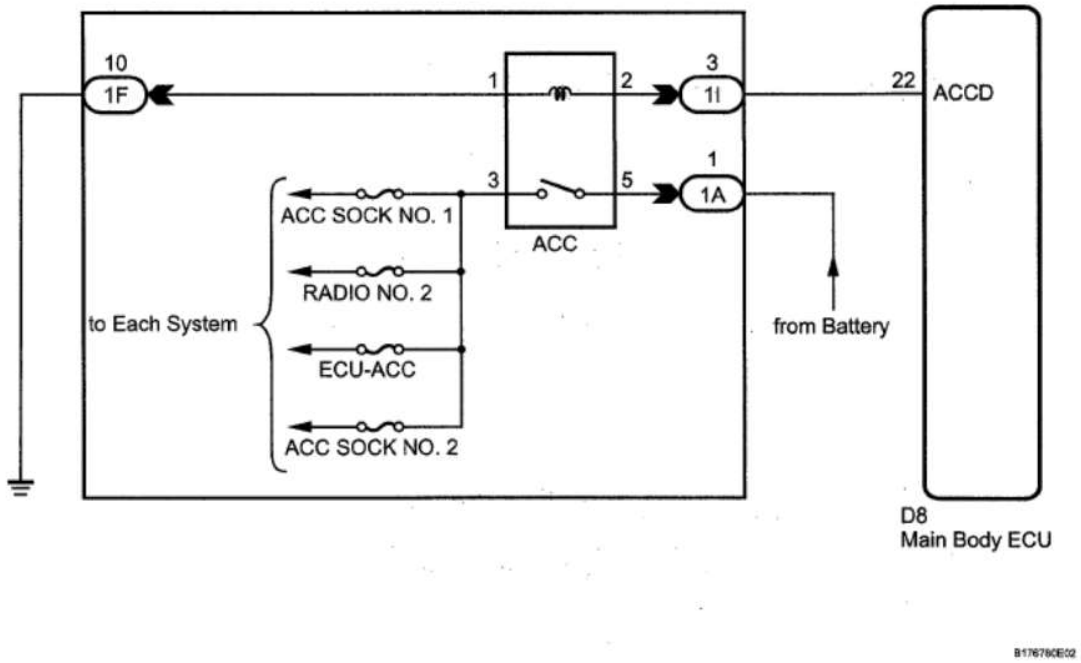


Fig. 34: ACC Monitor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG) and turn Techstream main switch on.
   c. Read the Data List according to the displays on the tester.

HINT:

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

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/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:

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

NG: Go to step 4

OK: Go to next step

2. **CHECK ENGINE SWITCH CONDITION**
   a. Check the power source mode changes.
      1. When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:

OK:

off --> on (ACC) --> on (IG) --> off

NG: GO TO OTHER FLOW CHART (See **POWER SOURCE MODE DOES NOT CHANGE**)

OK: Go to next step

3. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTCs again.

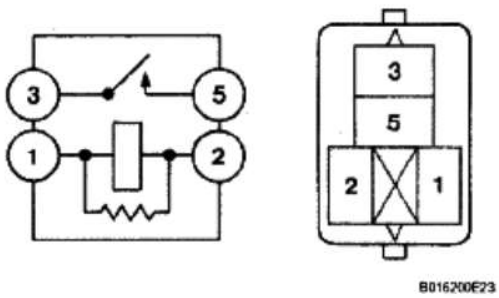
OK:

No DTC is output.

NG: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

OK: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

4. **INSPECT RELAY (ACC RELAY)**
   a. Remove the ACC relay from the instrument panel junction block
   b. Measure the resistance according to the value(s) in the table below.



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Fig. 35: Inspecting Relay (ACC Relay)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

NG: REPLACE ACC RELAY

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - INSTRUMENT PANEL JUNCTION BLOCK)**
   a. Disconnect the D8 connector from the main body ECU (instrument panel junction block).

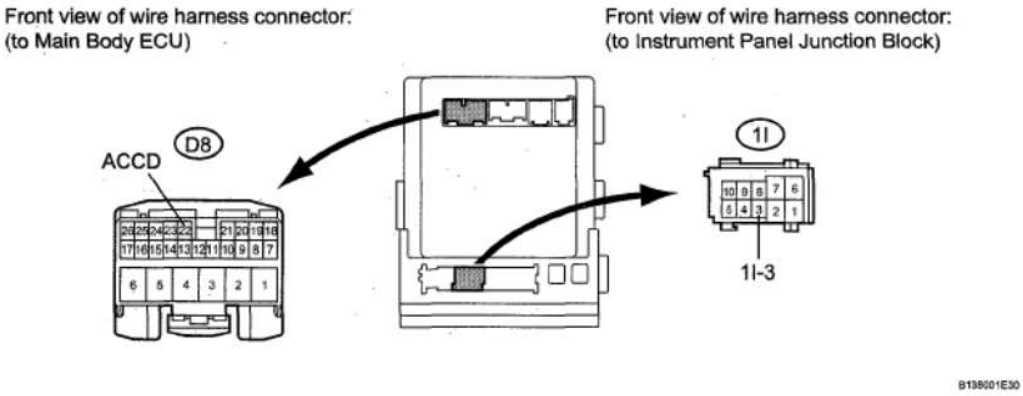


Fig. 36: Identifying D8 Connector And 1I Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the 1I connector from the instrument panel junction block.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
1I-3 - D8-22 (ACCD)	Always	Below 1 ohms
D8-22 (ACCD) or 1I-3-Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU - INSTRUMENT PANEL JUNCTION BLOCK)

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OK: Go to next step

6. **CHECK HARNESS AND CONNECTOR**
   a. Disconnect the 1A and 1F connectors from the instrument panel junction block.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
1F-10 - Body ground	Always	Below 1 ohms

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

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
1A-1 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Instrument Panel Junction Block)

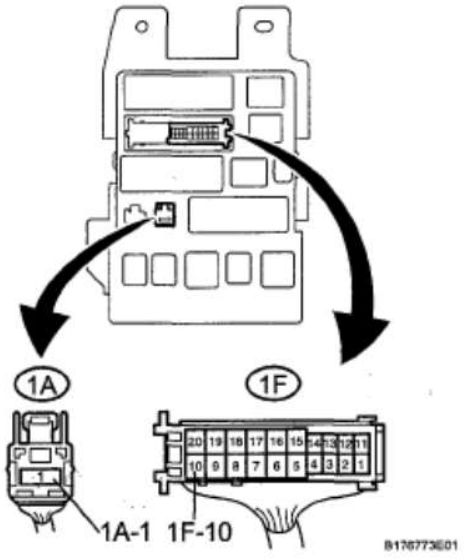


Fig. 37: Identifying 1A And 1F Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2275 STSW MONITOR MALFUNCTION

DESCRIPTION

This DTC is output when there is an open, short, or any other problem in the engine start request output circuit inside the main body ECU (instrument panel junction block) or in the external circuit.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system.

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

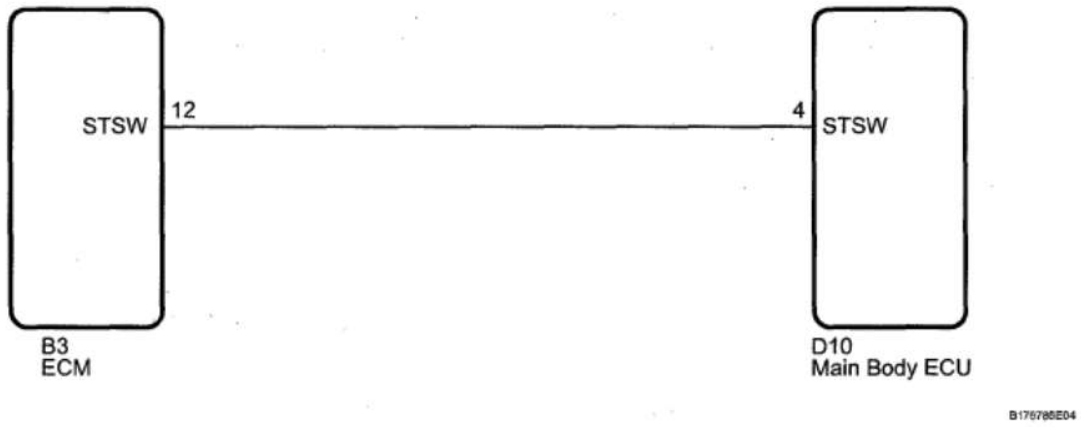


Fig. 38: STSW Monitor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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1. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).

      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: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

2. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK) - ECM)**
   a. Disconnect the D10 ECU connector.

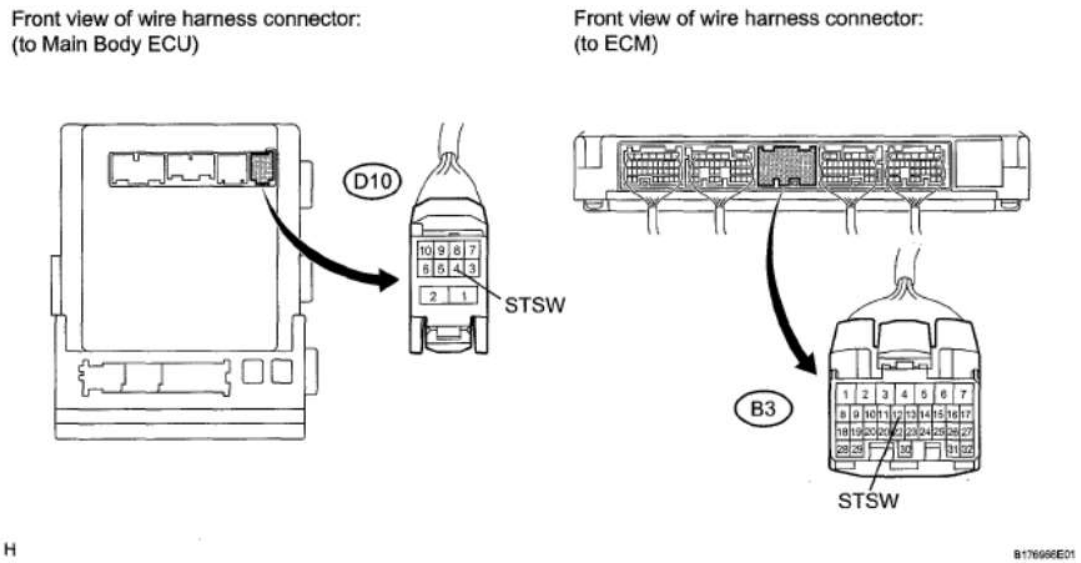


Fig. 39: Identifying D10 ECU Connector And B3 ECM Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the B3 ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

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STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D10-4 (STSW) - B3-12 (STSW)	Always	Below 1 ohms
D10-4 (STSW) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

3. **INSPECT MAIN BODY ECU**
   a. Reconnect the D10 connector.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
D10-4 (STSW) - Body ground	Brake pedal depressed, Engine switch hold on (ST)	Output voltage at terminal AM1 or AM2 is -2 V or more.

NG: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

Component with harness connected:
(Main Body ECU)

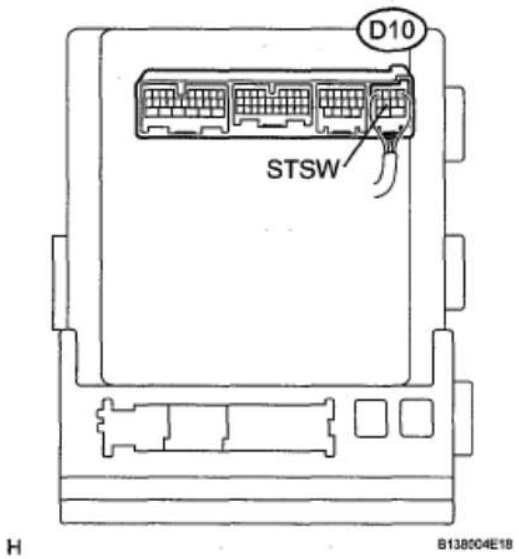


Fig. 40: Identifying D10 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: REPLACE ECM (See **REMOVAL**)

DTC B2276 ACCR SIGNAL CIRCUIT MALFUNCTION

DESCRIPTION

The main body ECU (instrument panel junction block) will set this DTC if the ACCR signal sent from the ECM is ON for 40 seconds or more.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

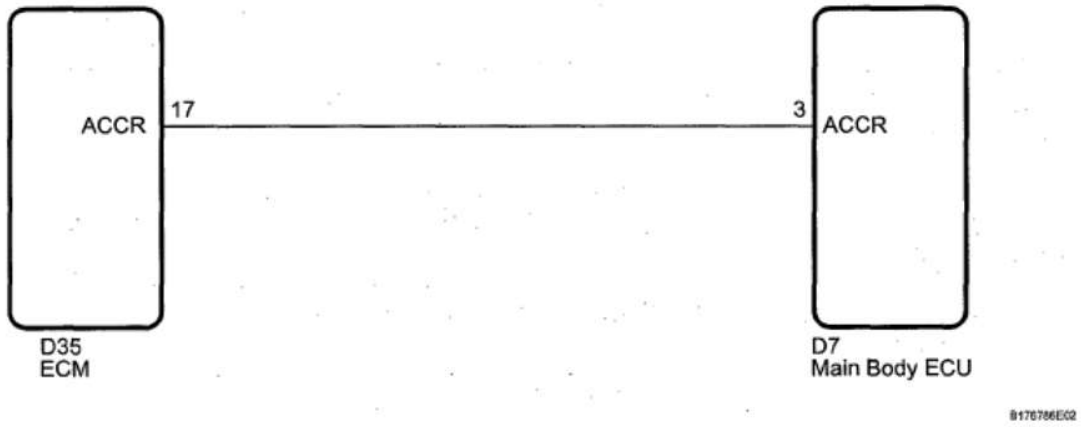


Fig. 41: ACCR Signal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK DTC OUTPUT**

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a. Delete the DTCs (See **DTC CHECK/CLEAR**).

HINT:

After all DTCs are cleared, check if the trouble occurs again 50 seconds after the engine switch is turned on (IG).

b. Check for DTCs again.

OK:

No DTC B2276 is output.

NG: Go to step 2

OK: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

2. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - ECM)**
   a. Disconnect the D7 ECU connector.

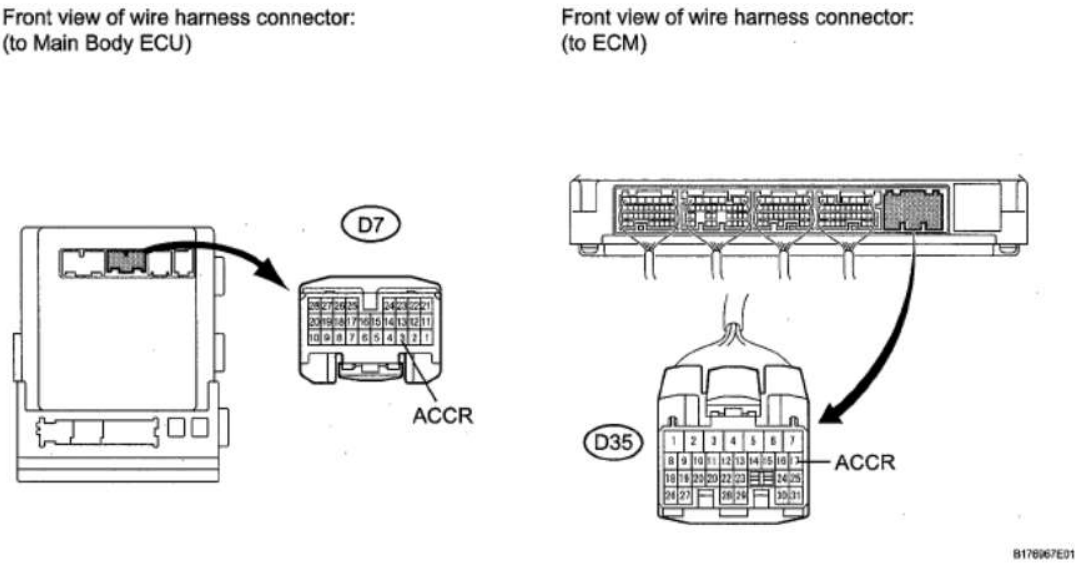


Fig. 42: Identifying D7 ECU Connector And D35 ECM Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the D35 ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

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Tester Connection	Condition	Specified Condition
D7-3 (ACCR) - D35-17 (ACCR)	Always	Below 1 ohms
D7-3 (ACCR) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

3. **INSPECT MAIN BODY ECU**
   a. Reconnect the D7 and D35 connectors.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
D7-3 (ACCR) - Body ground	Brake pedal depressed, shift P position, engine switch is pushed once --> on (IG)	0.1 to 0.8 V (*1) --> output voltage at terminal AM1 or AM2 is -2 V or more.
HINT: *1: Voltage is output only when the engine is cranking.		

NG: REPLACE ECM (See **REMOVAL**)

Component with harness connected:
(Main Body ECU)

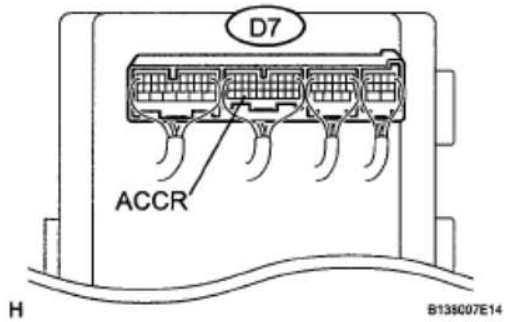


Fig. 43: Identifying D7 And D35 Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK MAIN BODY ECU OPERATION**
   a. After replacing the main body ECU (instrument panel junction block) with a normally functioning

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ECU, check that the engine starts. Make sure the brake pedal is depressed and the shift position is P at this time.

b. Check that the engine switch mode can be changed by pushing the engine switch.

HINT:

Without depressing the brake pedal, push the engine switch repeatedly. Engine switch mode should turn from off to on (ACC) to on (IG) and back to off. With the brake pedal depressed, push the engine switch repeatedly. Engine switch mode should turn to ENGINE START from any status.

OK:

Engine starts normally.

NG: REPLACE ECM (See **REMOVAL**)

OK: END (MAIN BODY ECU DEFECTIVE)

DTC B2277 DETECTING VEHICLE SUBMERSION

DESCRIPTION

This DTC is output when the submersion circuit monitor inside the main body ECU (instrument panel junction block) detects that the vehicle is submerged in water.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2277	Submersion circuit monitor inside main body ECU (instrument panel junction block) detects that vehicle is submerged in water	Main body ECU (instrument panel junction block)

INSPECTION PROCEDURE

1. **CHECK FOR WATER DAMAGE**
   a. Check the main body ECU (instrument panel junction block), peripheral components, and wire harnesses for traces of water.

OK:

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There are no traces of water.

NG: TAKE APPROPRIATE MEASURES AGAINST CAUSE OF WATER DAMAGE AND REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

OK: Go to next step

2. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).

      HINT:

      After all DTCs are cleared, check if the trouble occurs again 270 to 330 seconds after the engine switch is turned on (IG).

   b. Check for DTCs again.

OK:

No DTC is output.

NG: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

OK: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

DTC B2278 ENGINE SWITCH CIRCUIT MALFUNCTION

DESCRIPTION

This DTC is output when 1) a malfunction is detected between the main body ECU (instrument panel junction block) and the engine switch; or 2) either of the switches inside the engine switch is malfunctioning.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
		• Engine switch

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B2278	Communication is abnormal between the main body ECU (instrument panel junction block) and engine switch or the engine switch is defective	• Main body ECU (instrument panel junction block) • Wire harness or connector

WIRING DIAGRAM

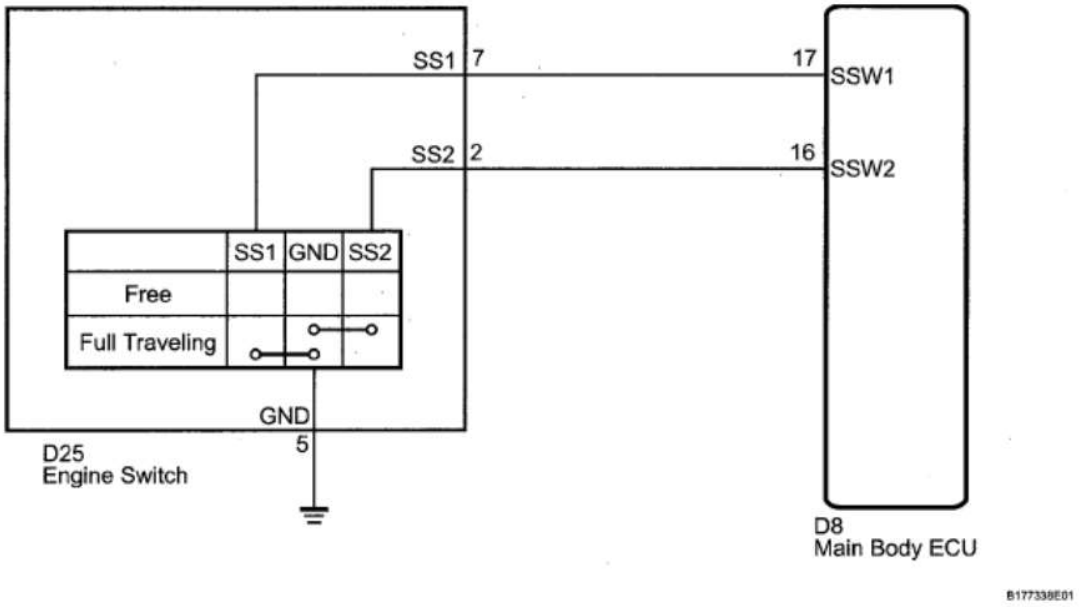


Fig. 44: Engine Switch Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM (START SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Check the DATA LIST for proper functioning of the start switch.

   HINT:

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

   Main Body:

   DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
St SW1	Start Switch 1/ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-

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St SW2	Start Switch 2/ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-

OK:

ON (engine switch is pushed) and OFF (engine switch is not pushed) appear on the screen.

NG: Go to step 2

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

2. **INSPECT ENGINE SWITCH**
   a. Remove the engine switch (See **REMOVAL**).

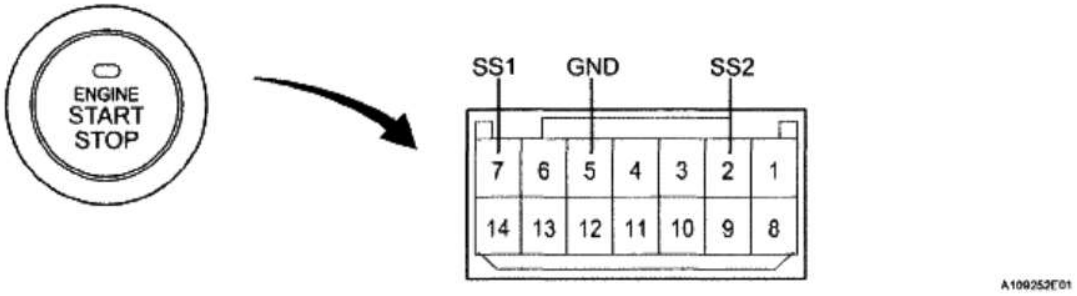


Fig. 45: Identifying Engine Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

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

HINT:

This switch is a momentary type switch.

NG: REPLACE ENGINE SWITCH (See **REMOVAL**)

OK: Go to next step

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3. **CHECK HARNESS AND CONNECTOR (ENGINE SWITCH - MAIN BODY ECU AND BODY GROUND)**
   a. Disconnect the D8 ECU connector.

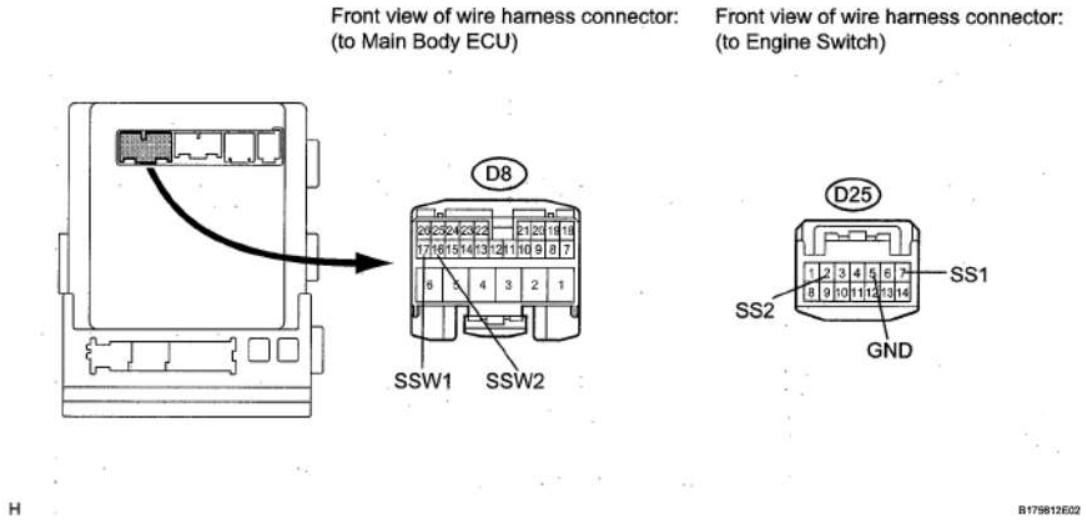


Fig. 46: Identifying D8 ECU Connector And D25 Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the D25 switch connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D25-7 (SS1) - D8-17 (SSW1)	Always	Below 1 ohms
D25-2 (SS2) - D8-16 (SSW2)	Always	Below 1 ohms
D25-5 (GND) - Body ground	Always	Below 1 ohms
D25-7 (SS1) or D8-17 (SSW1) - Body ground	Always	10 kohms or higher
D25-2 (SS2) or D8-16 (SSW2) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2281 "P" SIGNAL MALFUNCTION

DESCRIPTION

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

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HINT:

If the main body ECU (instrument panel junction block) is replaced with a new one while the negative (-) battery terminal is connected, the power source mode will be in IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored. After the main body ECU (instrument panel junction block) is replaced, perform the registration procedure for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

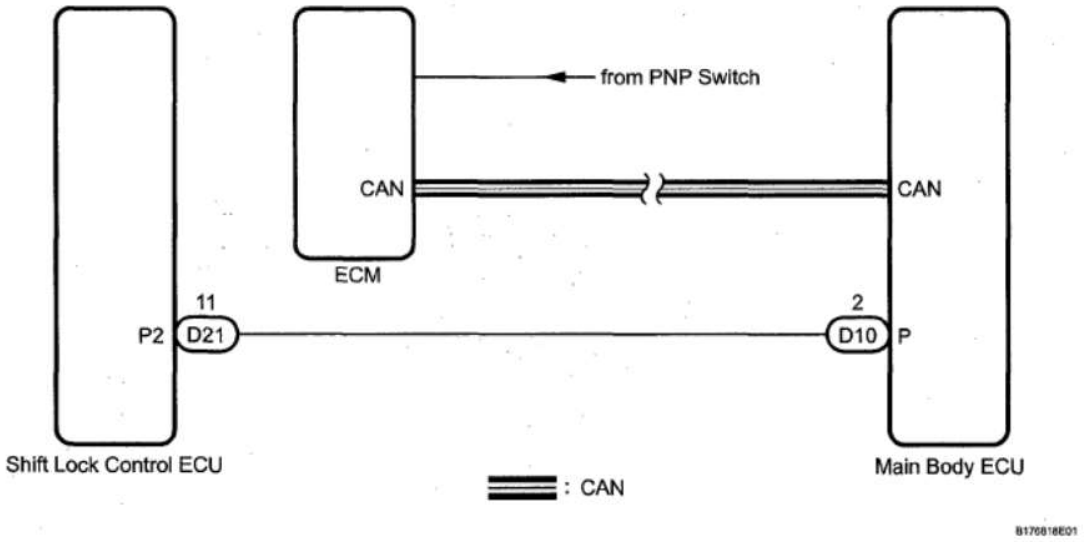


Fig. 47: P Signal - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG) and turn Techstream main switch on.
   c. Read the DATA LIST according to the displays on the tester.

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Main Body:

DATA LIST REFERENCE

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

OK:

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

NG: GO TO SHIFT CONTROL SYSTEM

OK: Go to next step

2. **CHECK WIRE HARNESS (MAIN BODY ECU - SHIFT LOCK CONTROL ECU)**
   a. Disconnect the D10 and D21 ECU connectors.

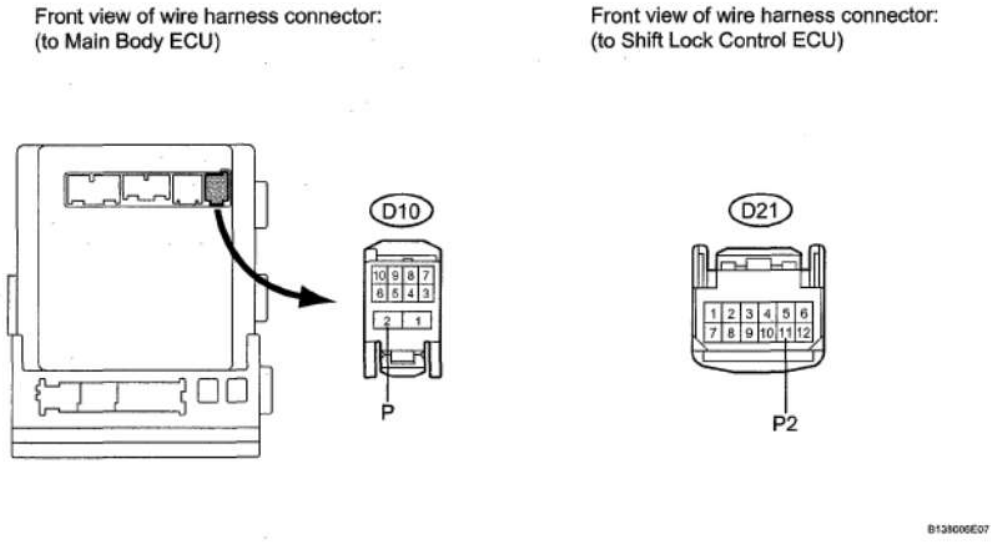


Fig. 48: Identifying D10 And D21 ECU Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Terminal No. (Symbol)	Condition	Specified Condition
D10-2 (P) - D21-11 (P2)	Always	Below 1 ohms

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D10-2 (P) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

3. **CHECK MAIN BODY ECU OPERATION**
   a. After replacing the main body ECU (instrument panel junction block) with a normally functioning ECU, check that the engine can start normally.

OK:

Engine can start normally.

NG: REPLACE SHIFT LOCK CONTROL ECU (See **DISASSEMBLY**)

OK: END (MAIN BODY 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 main body ECU (instrument panel junction block). The main body ECU (instrument panel junction block) determines the vehicle speed based on the frequency of these pulse signals.

The main body ECU (instrument panel junction block) and the combination meter are connected by a cable and the CAN. DTC B2282 is output when the cable information and CAN information are inconsistent.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
		• CAN communication system

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B2282	Cable information and CAN information between the main body ECU (instrument panel junction block) and the combination meter are inconsistent	• Combination meter system • Main body ECU (instrument panel junction block) • Wire harness or connector
B2283	When either of conditions below is met: • Over-deceleration in vehicle speed • Vehicle speed and engine speed do not match	• DTC B2282 detection area • Combination meter • Speed sensor • Skid control ECU • Main body ECU (instrument panel junction block) • Wire harness or connector

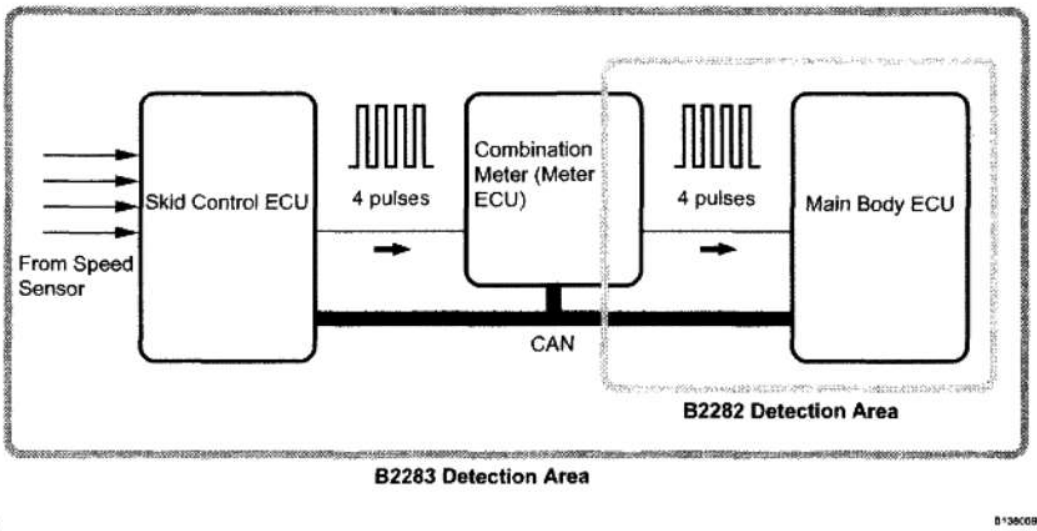


Fig. 49: Vehicle Speed Signals Flow Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

WIRING DIAGRAM

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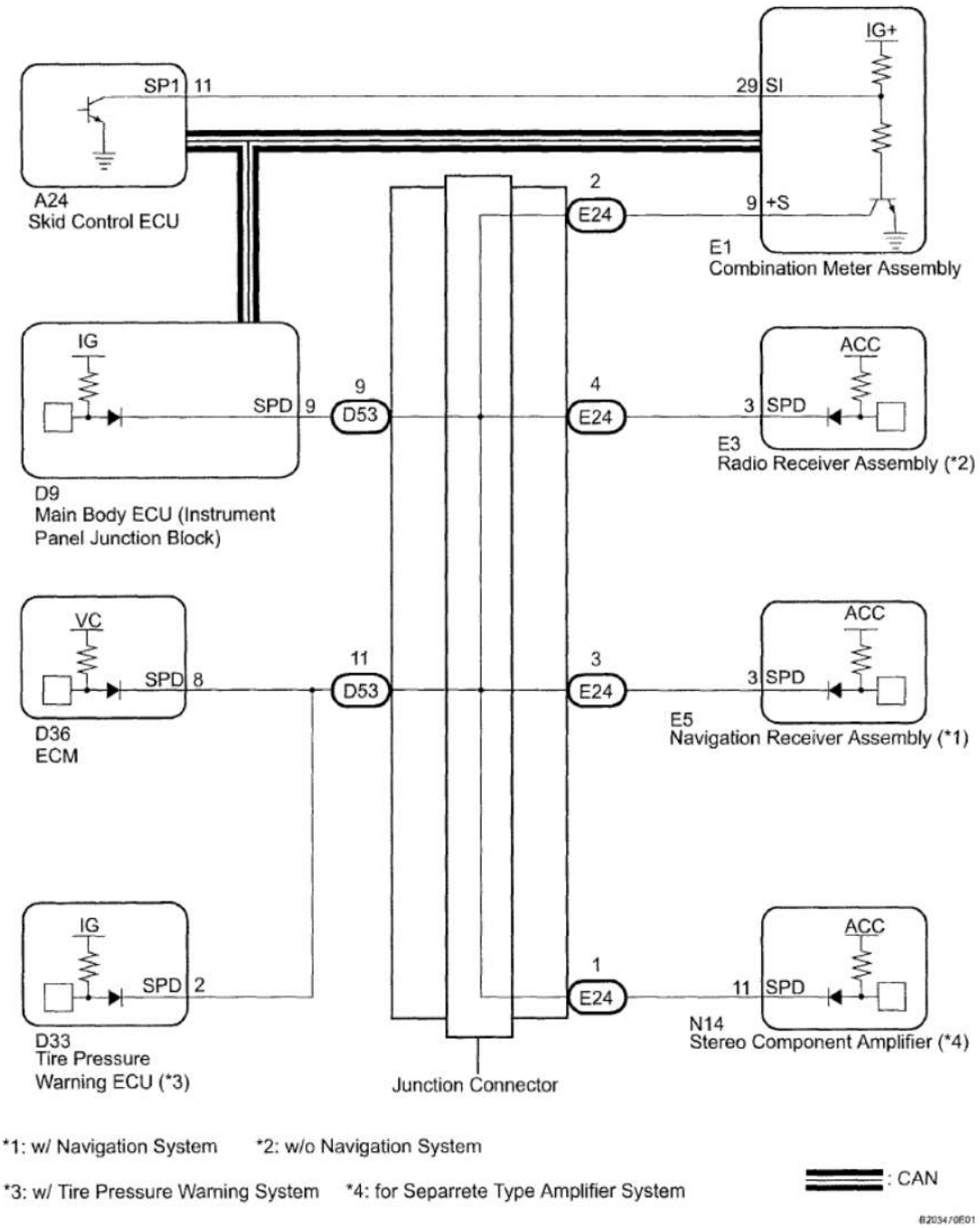


Fig. 50: Vehicle Speed Signal - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check for CAN communication system DTCs (See **HOW TO PROCEED WITH TROUBLESHOOTING**).

   HINT:

   If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first.

   Result

   RESULT REFERENCE CHART

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

   B: GO TO CAN COMMUNICATION SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

   A: Go to next step

2. **CHECK SPEEDOMETER OPERATION**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. Enter the following menus: Body Electrical/Combination Meter/Data List.
   d. Check the values by referring to the values in the table below.

   Combination Meter:

   DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Vehicle Speed Meter	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual speed (When driving)	-

   OK:

   Vehicle speed displayed on the tester is almost the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

   NG: GO TO METER/GAUGE SYSTEM (See **SPEEDOMETER MALFUNCTION**)

   OK: Go to next step

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3. **READ VALUE USING TECHSTREAM (VEHICLE SPEED SIGNAL)**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. read the DATA LIST according to the displays on the tester screen.

Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Vehicle Spd Sig	Vehicle speed signal/STOP or RUN	STOP: Vehicle is stopped Run: Vehicle is running	-

OK:

"STOP" (Vehicle is stopped) and "OFF" (Vehicle is running) appear on the screen.

NG: Go to step 4

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

4. **CHECK HARNESS AND CONNECTOR (COMBINATION METER - MAIN BODY ECU)**
   a. Disconnect the E1 meter connector.

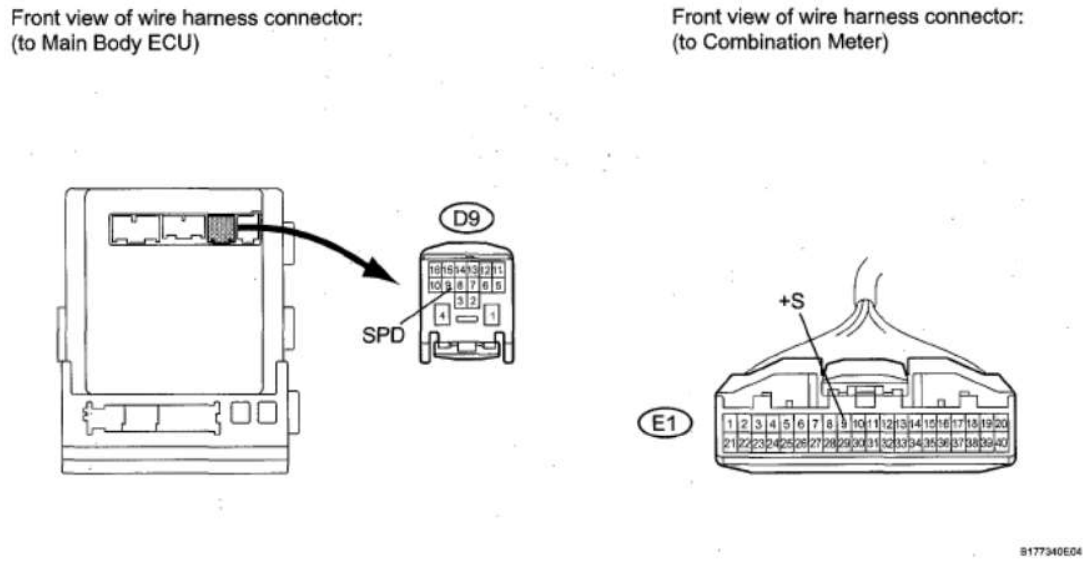


Fig. 51: Identifying E1 Meter Connector And D9 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the D9 ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

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Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D9-9 (SPD) - E1-9 (+S)	Always	Below 1 ohms

NG: Go to step 6

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Check the output waveform.
      1. Remove the combination meter with the connector(s) still connected (See **REMOVAL**).
      2. Connect the oscilloscope to terminals E1-9 (+) and body ground.
      3. Turn the engine switch on (IG).
      4. Turn the wheel slowly.
      5. Check the signal waveform according to the condition(s) in the table below.

WAVEFORM REFERENCE CHART

Item	Condition
Toot setting	5V/DIV., 20ms./DIV
Vehicle condition	Driving at approx. 20 km/h

OK:

The waveform is displayed as shown in the illustration.

HINT:

When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.

NG: GO TO METER/GAUGE SYSTEM (See **SPEED SIGNAL CIRCUIT**)

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Component with harness connected:
(Combination Meter Assembly)

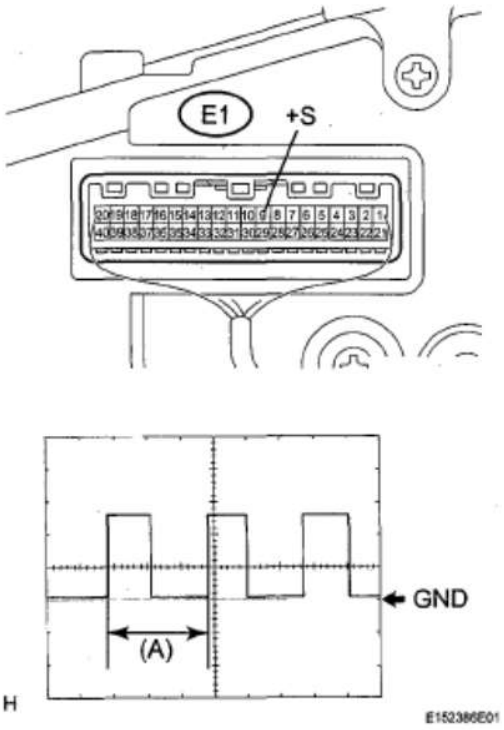


Fig. 52: Identifying Combination Meter Connector Terminals And Waveform
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

6. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - JUNCTION CONNECTOR)**
   a. Disconnect the D53 connector.

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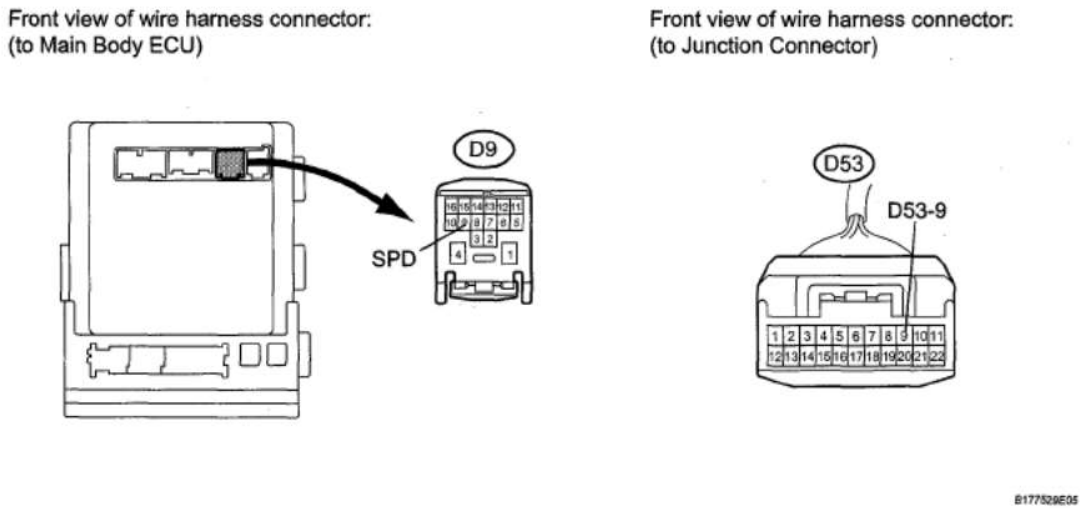


Fig. 53: Identifying D53 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D9-9 (SPD) - D53-9	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU - JUNCTION CONNECTOR)

OK: REPLACE JUNCTION CONNECTOR

DTC B2284 BRAKE SIGNAL MALFUNCTION

DESCRIPTION

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

DTC	DTC Detection Condition	Trouble Area

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No.		
B2284	The brake signal circuit between the main body ECU (instrument panel junction block) and the stop light switch is malfunctioning and the CAN information is inconsistent	• Stop light switch • CAN communication system • ECM • Main body ECU (instrument panel junction block) • Wire harness or connector

WIRING DIAGRAM

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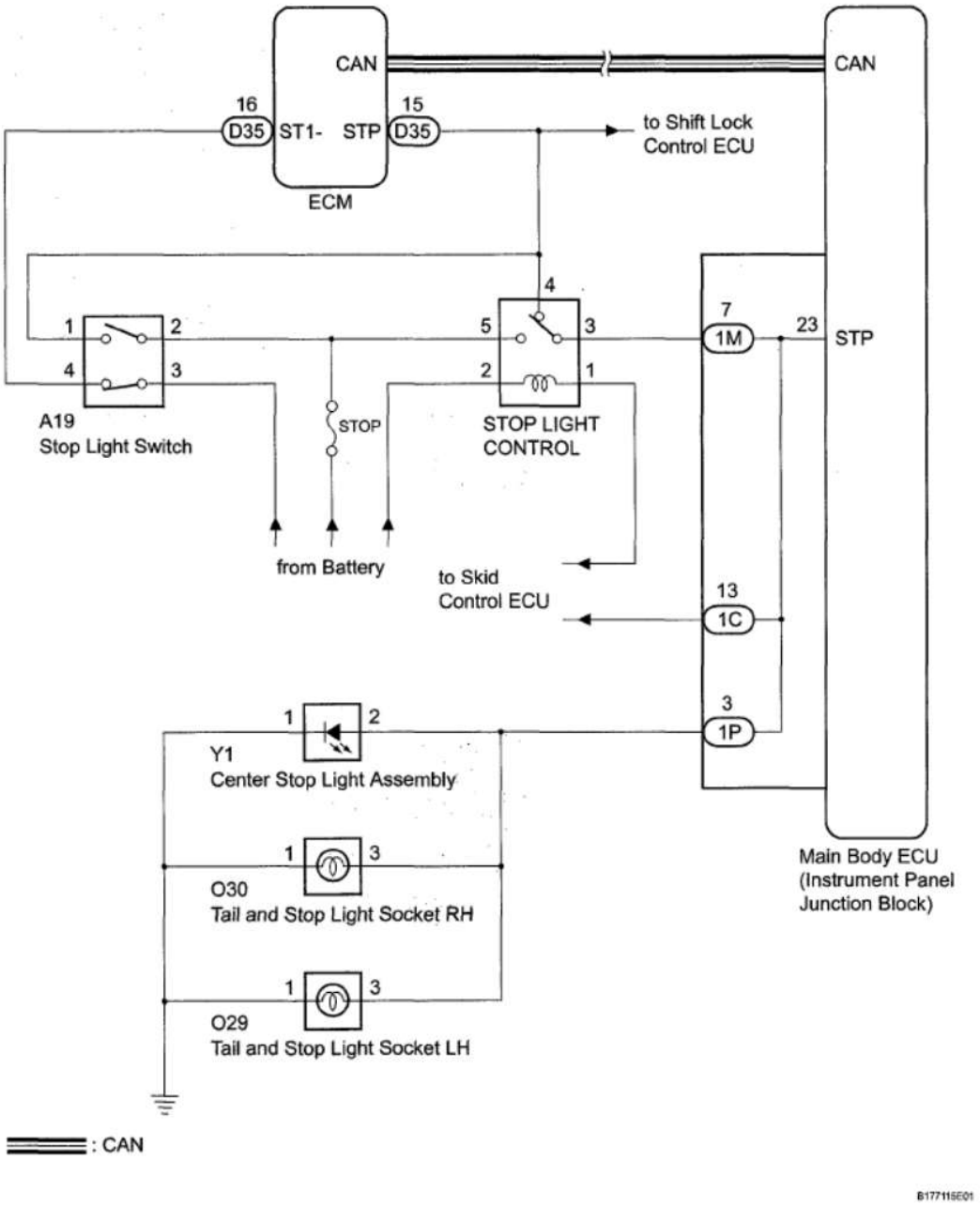


Fig. 54: Brake Signal - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **EMERGENCY ENGINE START CONTROL**
   a. If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU (instrument panel junction block). This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.

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To activate the starter:

1. Turn the engine switch from off to on (ACC).
2. Press and hold the engine switch for 15 seconds.

1. **CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for CAN communication system DTCs (See **HOW TO PROCEED WITH TROUBLESHOOTING**).

HINT:

If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See **DIAGNOSTIC TROUBLE CODE CHART**).

OK:

DTCs for CAN communication system No DTC is output.

NG: GO TO CAN COMMUNICATION SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

OK: Go to next step

2. **CHECK DTC OUTPUT**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTCs again.
   c. Proceed to the next step based on the inspection result.

Result

RESULT REFERENCE CHART

Result	Proceed to
No DTC is output	A
Engine control system DTC are output	B
Vehicle stability control system DTC are output	C

B: GO TO ENGINE CONTROL SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

C: GO TO VEHICLE STABILITY CONTROL SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

3. **READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH)**

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

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:

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

NG: Go to step 4

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

4. **CHECK OPERATION OF STOP LIGHT**
   a. Check whether the stop lights turn on and off normally when the brake pedal is depressed and released.

OK:

Stop lights turn on when brake pedal is depressed.

NG: Go to step 5

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK

5. **CHECK HARNESS AND CONNECTOR (STOP LIGHT CONTROL RELAY - INSTRUMENT PANEL JUNCTION BLOCK)**
   a. Disconnect the 1M connector from the instrument panel junction block.

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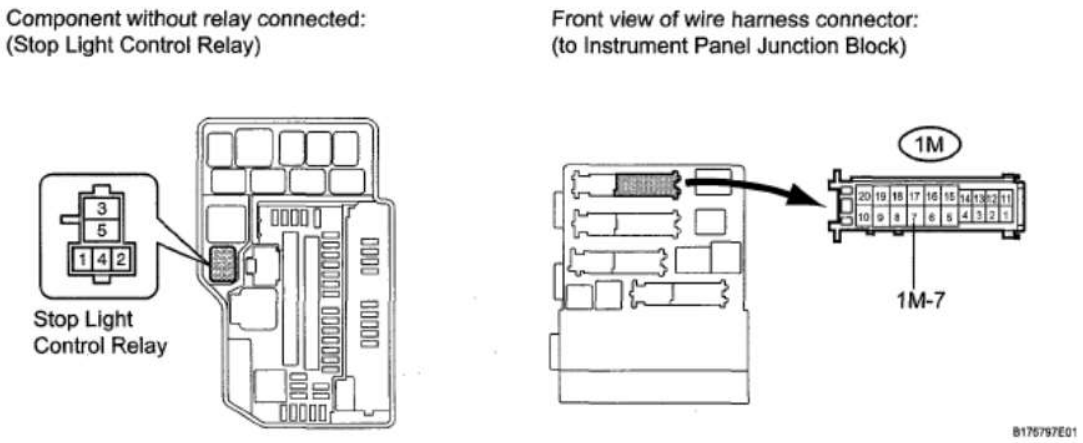


Fig. 55: Identifying Stop Light Control Relay Terminals And 1M Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the stop light control relay from the engine room relay block.
c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
IM-7 - Engine room relay block stop light control relay terminal 3	Always	Below 1 ohms
IM-7 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK

DTC B2285 STEERING LOCK POSITION SIGNAL CIRCUIT MALFUNCTION

DESCRIPTION

This DTC is output when serial communication signals and LIN communication signals in the circuit between the main body ECU (instrument panel junction block) and steering lock actuator (steering lock ECU) are inconsistent.

HINT:

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

After the main body ECU (instrument panel junction block) or steering lock ECU is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

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DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

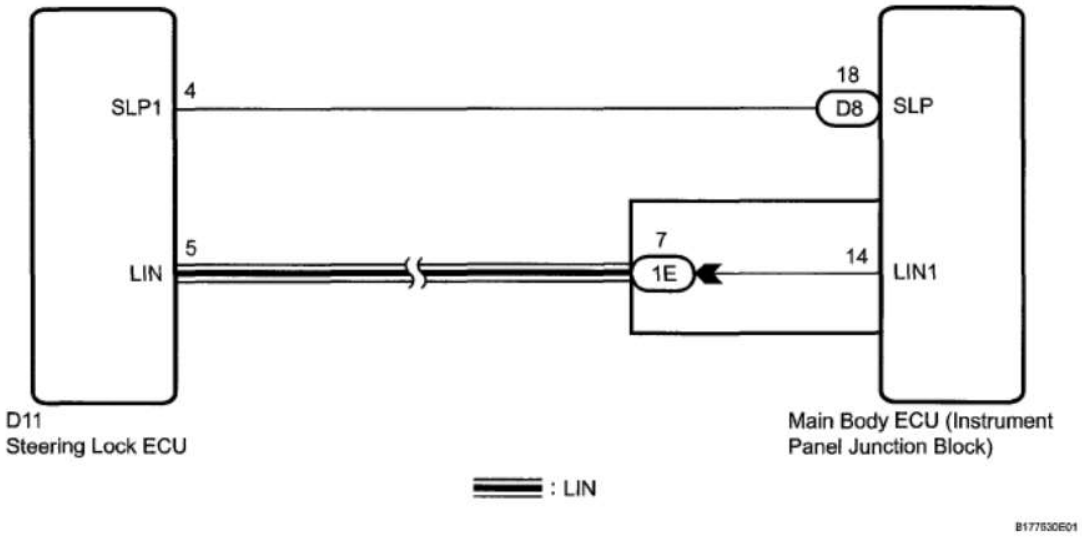


Fig. 56: Steering Lock Position Signal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Check the DATA LIST for proper functioning of the steering lock function.

   HINT:

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

   Main Body:

   DATA LIST REFERENCE

Tester			Diagnostic

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Display	Measurement Item/Range	Normal Condition	Note
Str Unlock SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Engine switch on (ACC)) OFF: Steering is locked (Engine switch off)	-

OK:

ON (steering is unlocked) and OFF (steering is locked) appear on the screen.

NG: Go to step 3

OK: Go to next step

2. **CHECK FOR DTCS**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTC B2285 (Steering lock position signal circuit malfunction), DTC B2287 (LIN communication master malfunction) and DTC B2785 (Communication malfunction between ECUs connected by LIN).

Result

RESULT REFERENCE CHART

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

HINT:

If DTC B2287 is output, perform troubleshooting for DTC B2287 first.

B: GO TO DTC CHART (See **DIAGNOSTIC TROUBLE CODE CHART**)

C: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

3. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - STEERING LOCK ECU)**
   a. Disconnect the D8, 1E and D11 connectors.

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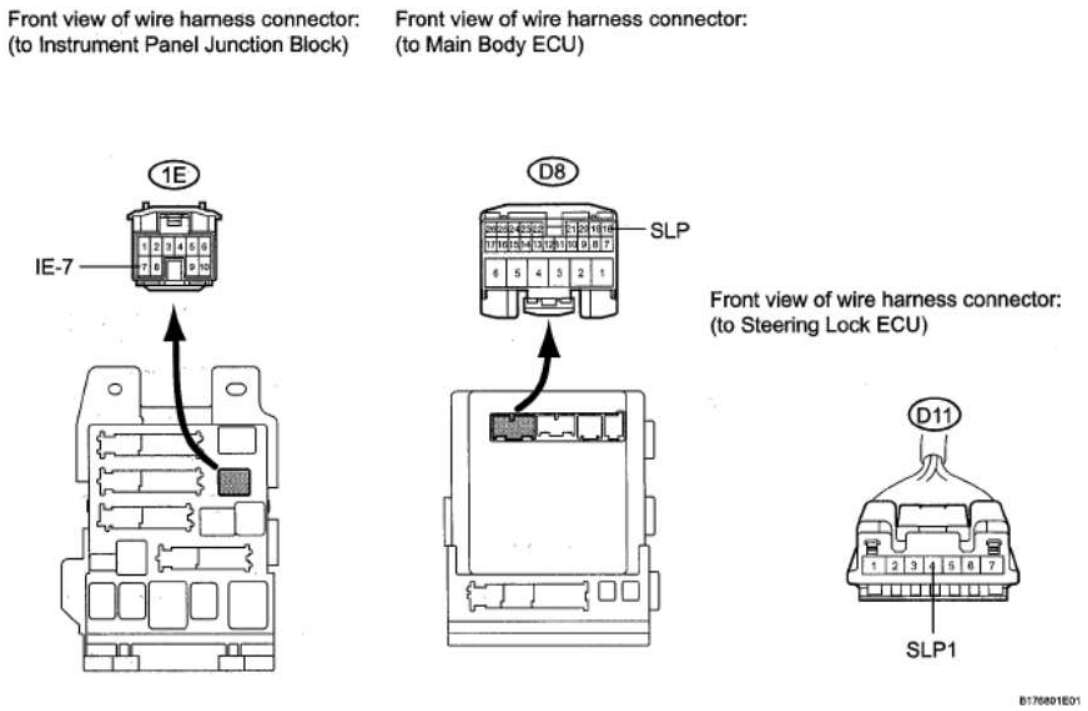


Fig. 57: Identifying D8, 1E And D11 Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D8-18 (SLP) - D11-4 (SLP1)	Always	Below 1 ohms
1E-7 (LIN1) - D11-5 (LIN)	Always	Below 1 ohms
D8-18 (SLP) or D11-4 (SLP1) - Body ground	Always	10 kohms or higher
1E-7 (LIN1) or D11-5 (LIN) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

4. **CHECK MAIN BODY ECU OPERATION**
   a. After replacing the main body ECU with a normally functioning ECU (instrument panel junction block), check that the engine starts. Make sure the brake pedal is depressed and the shift position is P at this time.
   b. Check that the engine switch mode can be changed by pushing the engine switch.

HINT:

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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 starts normally.

NG: REPLACE STEERING LOCK ECU (See **REASSEMBLY**)

OK: END (MAIN BODY ECU DEFECTIVE)

DTC B2286 RUNNABLE SIGNAL MALFUNCTION

DESCRIPTION

This DTC is output when serial communication signals and CAN communication signals in the circuit between the main body ECU (instrument panel junction block) and ECM are inconsistent.

HINT:

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

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

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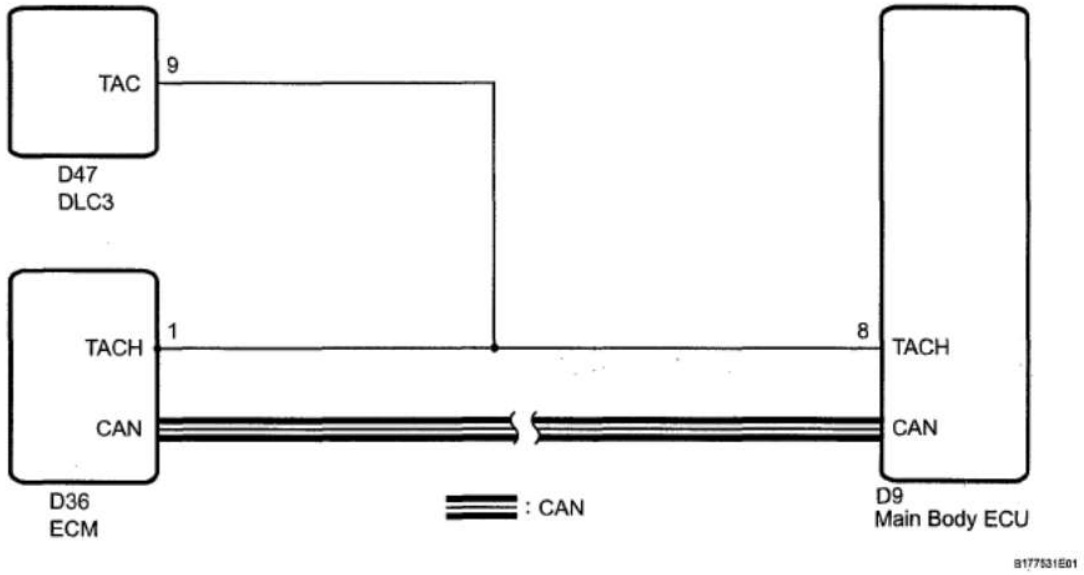


Fig. 58: Runnable Signal - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for CAN communication system (See **HOW TO PROCEED WITH TROUBLESHOOTING**).

   HINT:

   If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See **DIAGNOSTIC TROUBLE CODE CHART**).

   OK:

   No DTC is output.

   NG: GO TO CAN COMMUNICATION SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

   OK: Go to next step

2. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Check the DATA LIST for proper functioning of the engine.

   HINT:

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

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
E/G Cond	Engine condition/STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-

OK:

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

NG: Go to step 3

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

3. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - ECM)**
   a. Disconnect the D36 ECM connector.

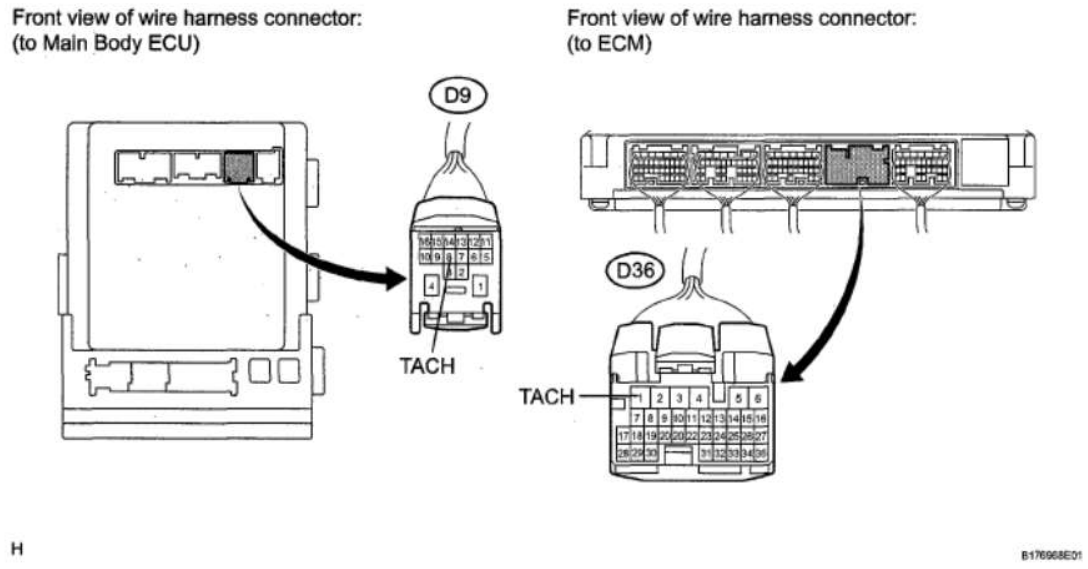


Fig. 59: Identifying D36 ECM Connector Terminals And D9 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the D9 ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

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STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D9-8 (TACH) - D36-1 (TACH)	Always	Below 1 ohms
D9-8 (TACH) or D36-1 (TACH) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2287 LIN COMMUNICATION MASTER MALFUNCTION

DESCRIPTION

Refer to DTC B2287 (See **DTC B2287 LIN COMMUNICATION MASTER MALFUNCTION**).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2287	Communication or communication line is abnormal between the main body ECU (instrument panel junction block) and the certification ECU (smart key ECU assembly)	• Main body ECU (instrument panel junction block) • Certification ECU (smart key ECU assembly) • Wire harness or connector

WIRING DIAGRAM

Refer to DTC B2287 (See **DTC B2287 LIN COMMUNICATION MASTER MALFUNCTION**).

INSPECTION PROCEDURE

Refer to DTC B2287 (See **DTC B2287 LIN COMMUNICATION MASTER MALFUNCTION**).

DTC B2288 STEERING LOCK SIGNAL CIRCUIT MALFUNCTION

DESCRIPTION

This DTC is output when the main body ECU (instrument panel junction block) cannot detect the unlock condition of the steering lock within a specified time.

HINT:

When the main body ECU (instrument panel junction block) is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed

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and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU (instrument panel junction block) is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

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

WIRING DIAGRAM

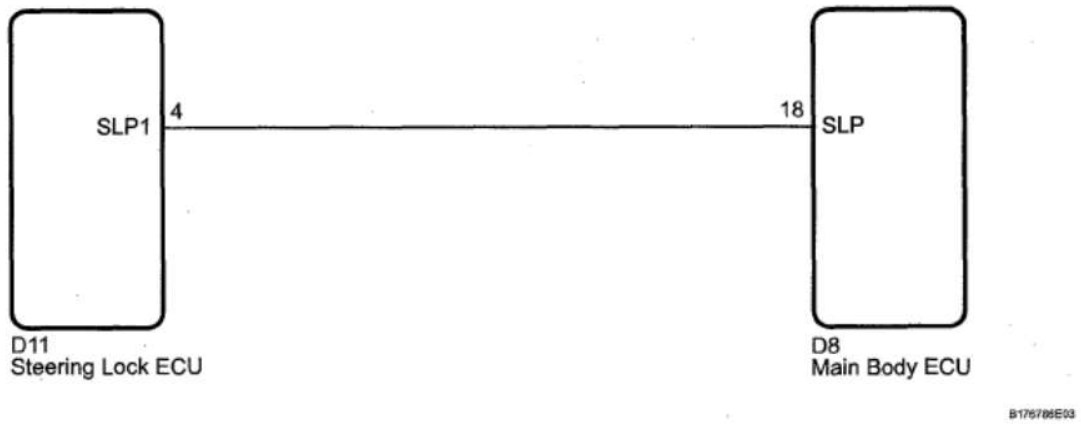


Fig. 60: Steering Lock Signal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK FOR DTCS**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. After all DTCs are cleared, check if the trouble occurs again 18 to 22 seconds after the engine switch is turned on (IG).
   c. Check for DTCs again.

   Result

   RESULT REFERENCE CHART

Result	Proceed to

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DTC B2285 (Steering lock Position Signal Circuit Malfunction) is output	A
Steering lock DTCs B2781, B2782 and/or B2788 are output	B
DTC is not output	C

A: GO TO DIAGNOSTIC TROUBLE CODE CHART (DTC B2285) (See **DIAGNOSTIC TROUBLE CODE CHART**)

B: GO TO DIAGNOSTIC TROUBLE CODE CHART (DTC B2781, B2782, B2788) (See **DTC B2781 OPEN/SHORT IN STEERING LOCK ECU**)

C: Go to next step

2. **CHECK STEERING LOCK**
   a. Check if the steering lock is released when turning the engine switch on (ACC).

OK:

The steering lock is released.

NG: GO TO STEERING LOCK SYSTEM (See **PROBLEM SYMPTOMS TABLE**)

OK: Go to next step

3. **READ VALUE USING TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Check the DATA LIST for proper functioning of the steering lock function.

HINT:

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

Main Body

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Str Unlock SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Engine switch on (ACC)) OFF: Steering is locked (Engine switch off)	-

NG: REPLACE STEERING LOCK ECU (See **REMOVAL**)

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OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

DTC B2289 KEY COLLATION WAITING TIME OVER

DESCRIPTION

This DTC is output when there is a LIN communication problem between the main body ECU (instrument panel junction block) and certification ECU (smart key ECU assembly) or when there is a problem in the entry function.

HINT:

If the main body ECU (instrument panel junction block) is replaced with a new one while the negative (-) battery terminal is connected, the power source mode will be in IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored. After the main body ECU (instrument panel junction block) is replaced, perform the registration procedure for the engine immobiliser system (See **REGISTRATION**).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2289	Either condition below is met: • LIN communication is abnormal between the main body ECU (instrument panel junction block) and the certification ECU (smart key ECU assembly) • The engine immobiliser system is malfunctioning	• Main body ECU (instrument panel junction block) • Smart key system (entry) • Wire harness or connector • Certification ECU (smart key ECU assembly)

WIRING DIAGRAM

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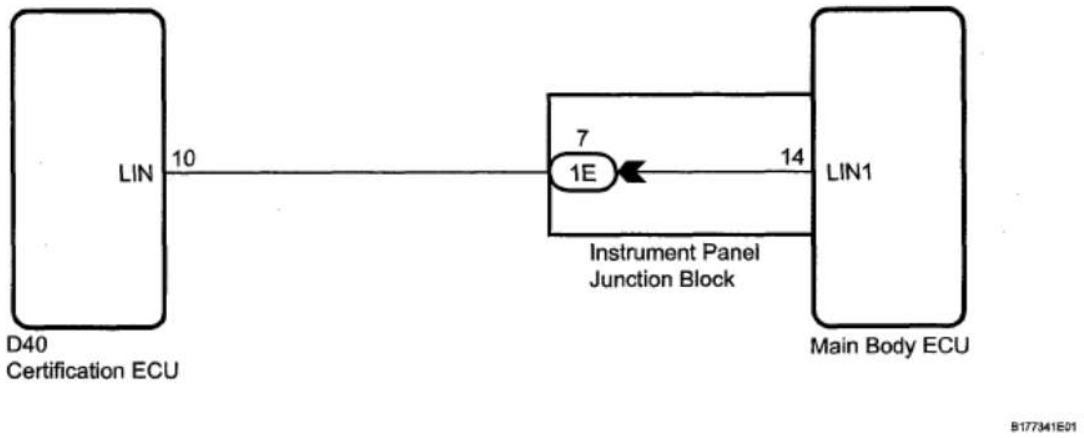


Fig. 61: [Key Collation Waiting Time Over - Wiring Diagram]
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK FOR DTCS**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTC B2289 (Key collection waiting time over) and B2785 (Communication malfunction between ECUs connected by LIN).

   Result

   RESULT REFERENCE CHART

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

   HINT:

   If DTC B2785 is output, perform troubleshooting for DTC B2785 first.

   B: GO TO DTC B2785 (See **DTC B2785 COMMUNICATION MALFUNCTION BETWEEN ECUS CONNECTED BY LIN**)

   C: USE SYMPTOM METHOD TO CHECK (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

   A: Go to next step

2. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - CERTIFICATION ECU)**
   a. Disconnect the D40 and 1E ECU connectors.

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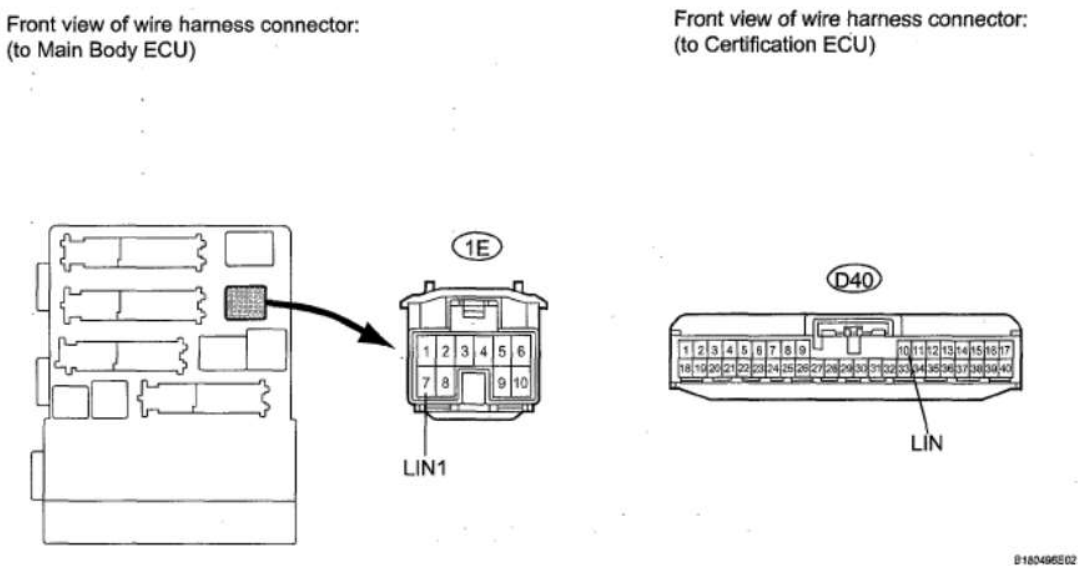


Fig. 62: Identifying D40 And 1E ECU Connectors Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
1E-7 (LIN1) - D40-10 (LIN)	Always	Below 1 ohms
1E-7 (LIN1) or D40-10 (LIN) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

3. **CHECK MAIN BODY ECU OPERATION**
   a. After replacing the main body ECU (instrument panel junction block) with a normally functioning ECU, check that the engine starts.

OK:

Engine starts normally.

HINT:

If the engine does not start, refer to **PROBLEM SYMPTOMS TABLE** of the smart key system (entry) (Room Oscillator does not Recognize Key).

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NG: GO TO SMART KEY SYSTEM (ENTRY) (See **ROOM OSCILLATOR DOES NOT RECOGNIZE KEY**)

OK: END (MAIN BODY ECU DEFECTIVE)

POWER SOURCE MODE DOES NOT CHANGE

DESCRIPTION

When the engine switch is pushed with the electrical key in the cabin, the main body ECU (instrument panel junction block) receives signals to switch the power source mode.

HINT:

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

WIRING DIAGRAM

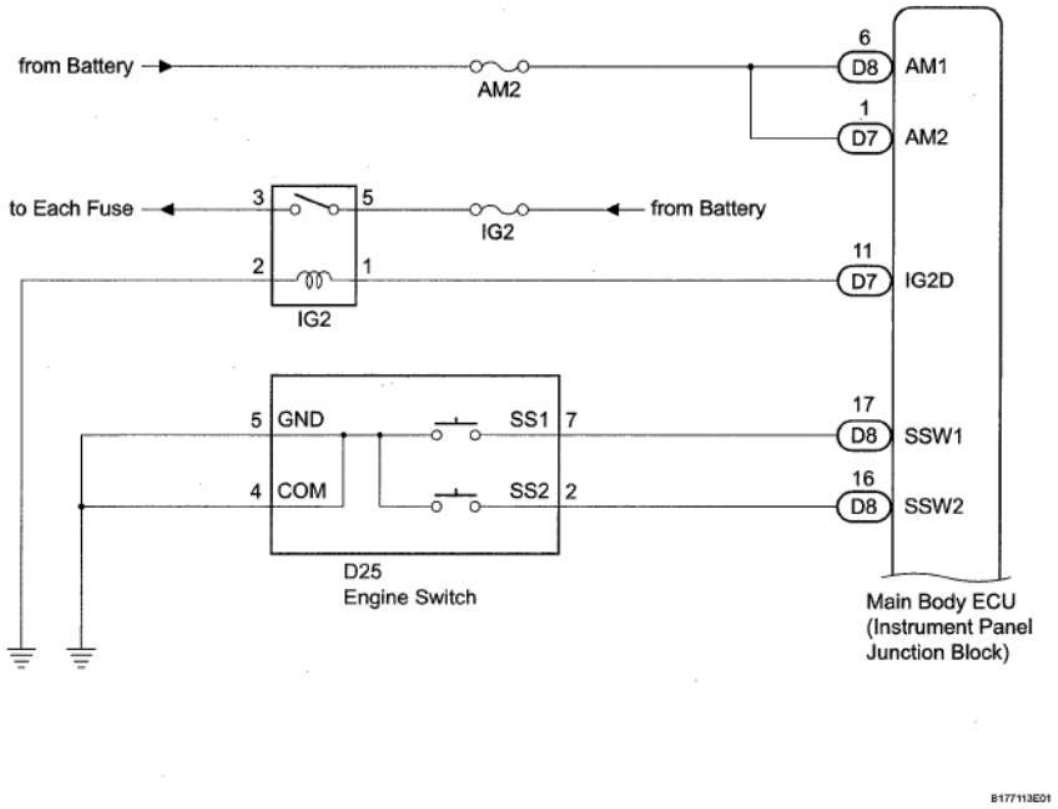


Fig. 63: Power Source Mode Does Not Change - Wiring Diagram (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

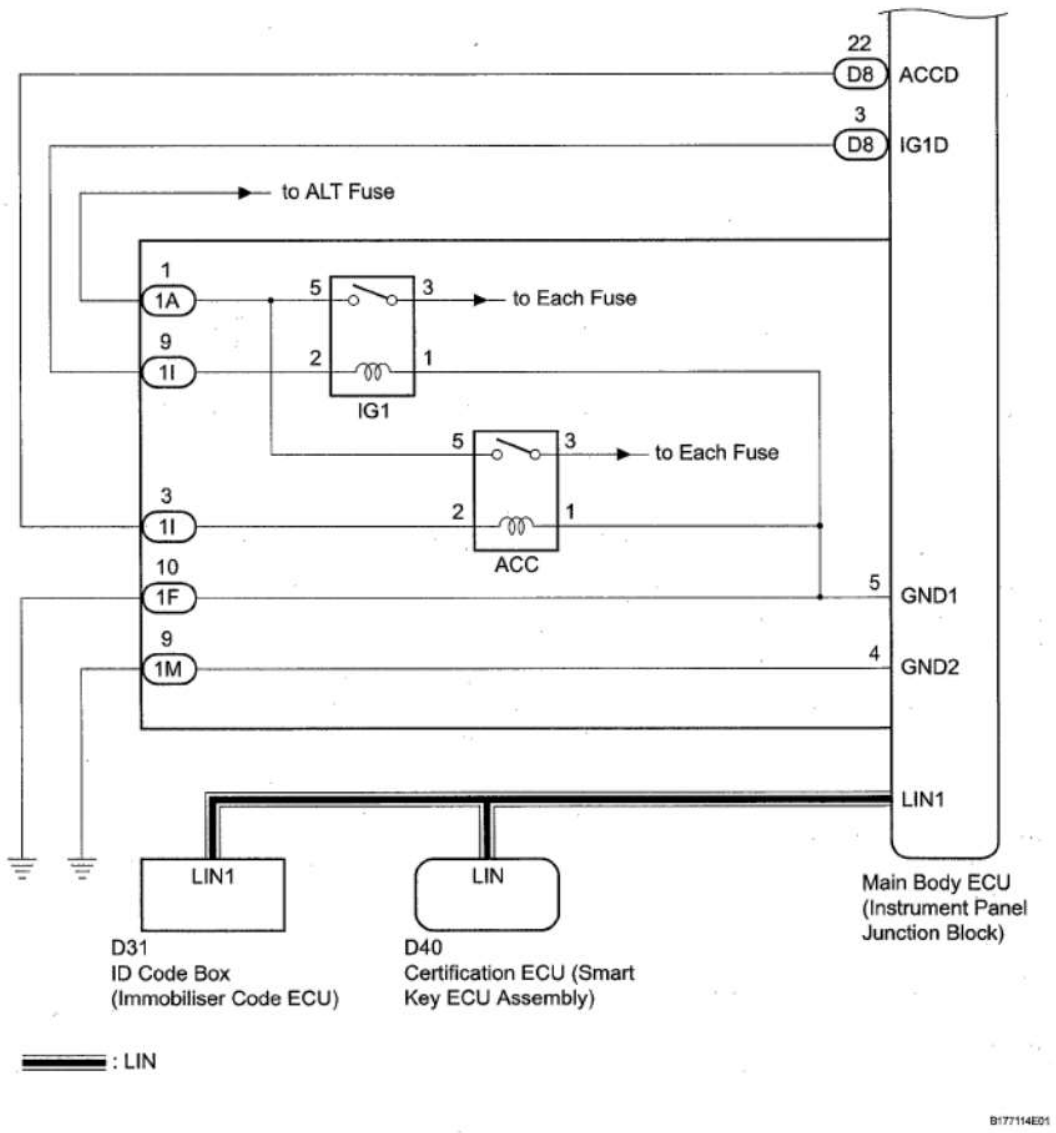


Fig. 64: Power Source Mode Does Not Change - Wiring Diagram (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK SMART KEY SYSTEM**
   a. Remove the battery of the electrical key transmitter (See **REMOVAL**).

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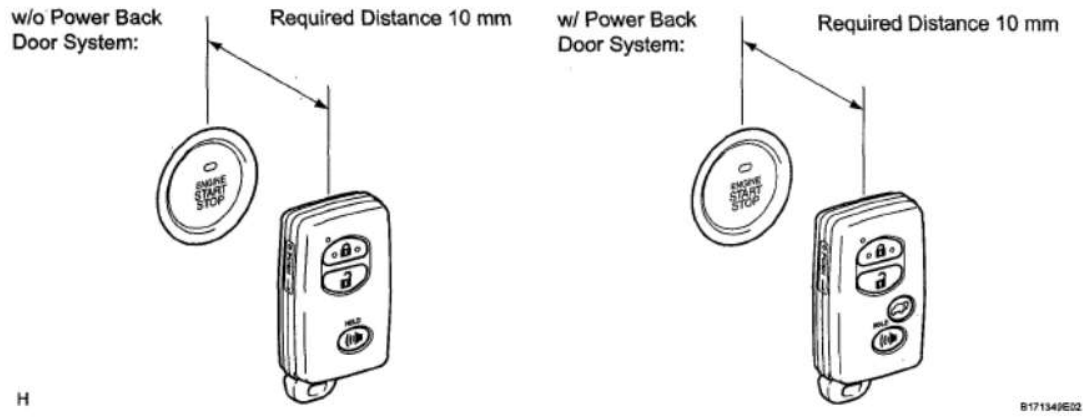


Fig. 65: Inspecting Smart Key System
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Touch the logo side mark of the key or card key to the engine witch.
c. Check that the engine switch can be turned on (IG).

Result

RESULT REFERENCE CHART

Result	Proceed to
Power source mode does not change to on (ACC)	A
Power source mode does not change to on (IG)	B
Power source mode does not change to on (IG and ACC)	C
Power source mode is turned on	D

B: Go to step 4

C: Go to step 10

D: GO TO SMART KEY SYSTEM (ENTRY) (See **ROOM OSCILLATOR DOES NOT RECOGNIZE KEY**)

A: Go to next step

2. **INSPECT ACC RELAY**
   a. Remove the ACC relay from the instrument panel junction block.
   b. Measure the resistance according to the value(s) in the table below.

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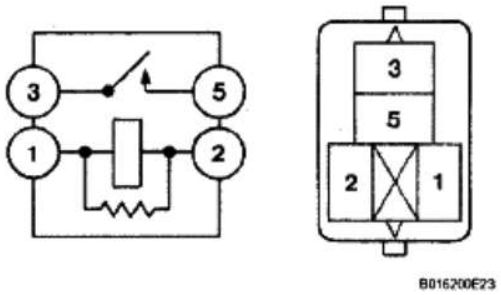


Fig. 66: Inspecting ACC Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

NG: REPLACE ACC RELAY

OK: Go to next step

3. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - INSTRUMENT PANEL JUNCTION BLOCK)**
   a. Disconnect the D8 connector from the main body ECU (instrument panel junction block).

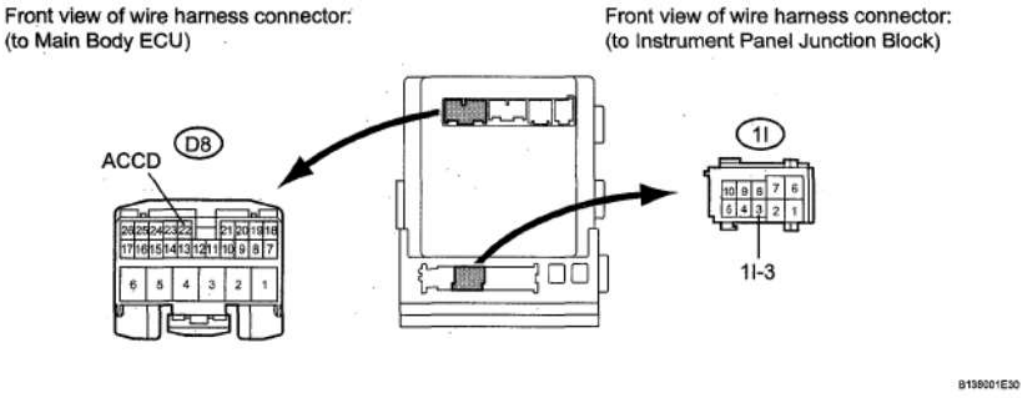


Fig. 67: Identifying D8 Connector And 1I Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the 1I connector from the instrument panel junction block.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

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STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified condition
D8-22 (ACCD) - 1I-3	Always	Below 1 ohms
D8-22 (ACCD) or 1I-3 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

4. **INSPECT IG1 RELAY**
   a. Remove the IG1 relay from the instrument panel junction block.
   b. Measure the resistance according to the value(s) in the table below.

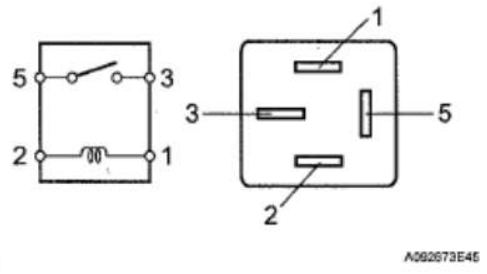


Fig. 68: Inspecting IG1 Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
3 - 5	When battery voltage is not applied to terminals land 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminal 1 and 2	Below 1 ohms

NG: REPLACE IG1 RELAY

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - INSTRUMENT PANEL JUNCTION BLOCK)**
   a. Disconnect the D8 connector from the main body ECU (instrument panel junction block).

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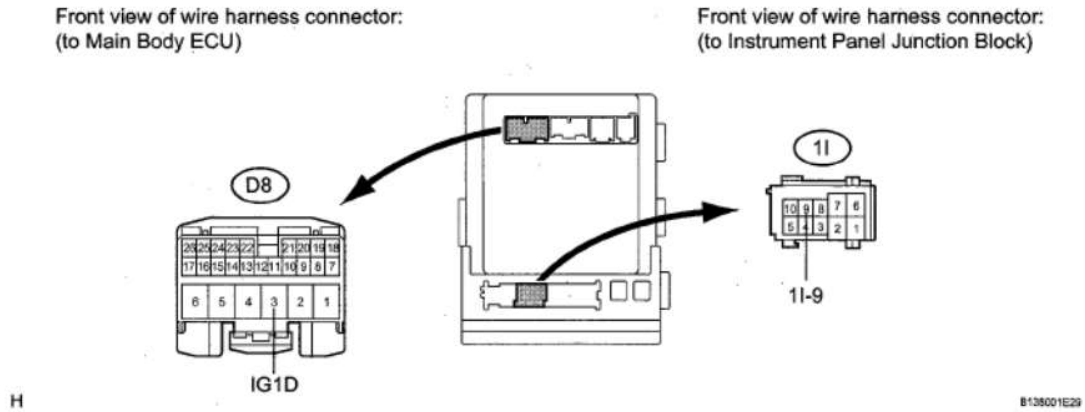


Fig. 69: Identifying D8 Connector And 1I Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Disconnect the 1I connector from the instrument panel junction block.
c. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
D8-3 (IG1D) - 1I-9	Always	Below 1 ohms
D8-3 (IG1D) or 1I-9 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

6. **INSPECT IG2 RELAY**
   a. Remove the IG2 relay from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

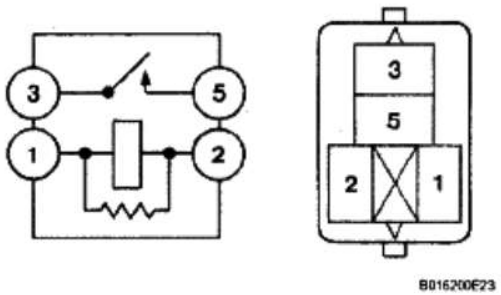


Fig. 70: Inspecting IG2 Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminal 1 and 2	Below 1 ohms

NG: REPLACE IG2 RELAY

OK: Go to next step

7. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - IG2 RELAY)**
   a. Disconnect the D7 connector from the main body ECU (instrument panel junction block).

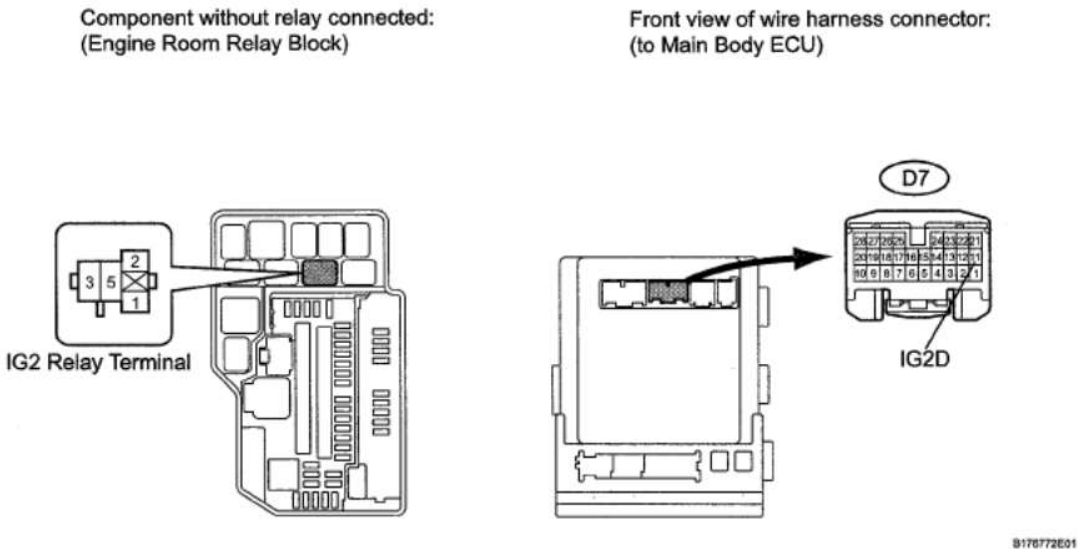


Fig. 71: Identifying IG2 Relay Terminals And D7 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
D7-11 (IG2D) - Engine room relay block IG2 relay terminal 1	Always	Below 1 ohms
D7-11 (IG2D) or Engine room relay block IG2 relay terminal 1 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (BATTERY - IG2 RELAY)**
   a. Measure the voltage according to the value(s) in the table below.

Standard voltage

STANDARD VOLTAGE CHART

Tester connection	Condition	Specified condition
Engine room relay block IG2 relay terminal 5 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR, OR REPLACE IG2 FUSE

Component without relay connected:
(Engine Room Relay Block)

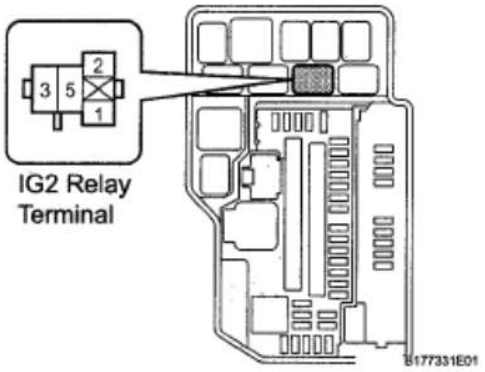


Fig. 72: Identifying IG2 Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (IG2 RELAY - BODY GROUND)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
Engine room relay block IG2 relay terminal 2 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Component without relay connected:
(Engine Room Relay Block)

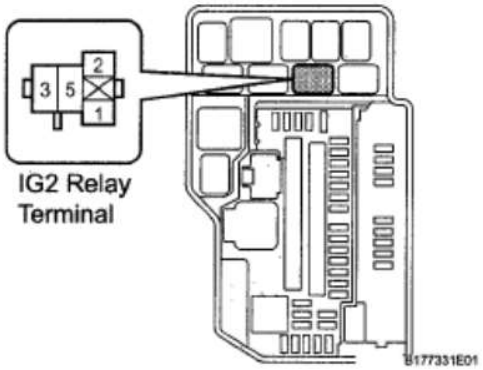


Fig. 73: Identifying IG2 Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

10. **CHECK HARNESS AND CONNECTOR (BATTERY - INSTRUMENT PANEL JUNCTION BLOCK)**
    a. Disconnect the 1A connector from the instrument panel junction block.
    b. Measure the voltage according to the value(s) in the table below.

Standard voltage

STANDARD VOLTAGE CHART

Tester connection	Condition	Specified condition
1A-1 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR, OR REPLACE ALT FUSE

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Front view of wire harness connector:
(to Instrument Panel Junction Block)

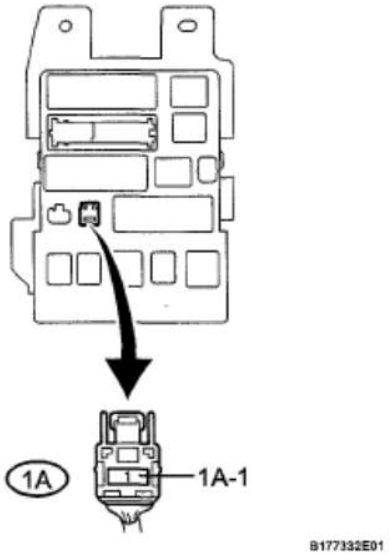


Fig. 74: Identifying 1A Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

11. **CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK - BODY GROUND)**
    a. Disconnect the 1F connector from the instrument panel junction block.
    b. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester connection	Condition	Specified condition
1F-10 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of wire harness connector:
(to Instrument Panel Junction Block)

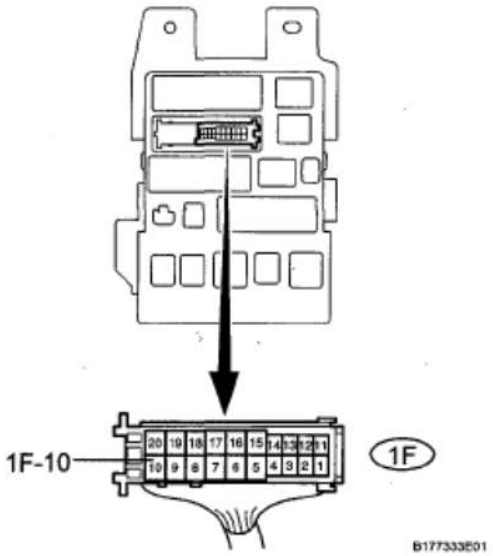


Fig. 75: Identifying 1F Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPAIR OR REPLACE HARNESS OR CONNECTOR

ENGINE DOES NOT START

DESCRIPTION

1. **ENGINE START SYSTEM FUNCTION**
   a. If the engine switch is pressed with the shift lever is in the P or N position and the brake pedal depressed, the main body ECU (instrument panel junction block) determines that it is an engine start request.
   b. The certification ECU (smart key ECU assembly) and other ECUs perform key verification via the LIN communication line.
   c. The main body ECU (instrument panel junction block) activates the ACC relay.
   d. The main body ECU (instrument panel junction block) activates the IG1 and IG2 relays.
   e. The certification ECU (smart key ECU assembly) outputs a steering UNLOCK signal. The signal is sent to the main body ECU (instrument panel junction block) via the steering lock ECU.
   f. The main body ECU (instrument panel junction block) sends an engine start request signal to the ECM.
   g. The ECM sends an ACC cut request signal to the main body ECU (instrument panel junction block).
   h. The ECM and main body ECU (instrument panel junction block) activate the starter relay.
   i. The main body ECU (instrument panel junction block) deactivates the ACC relay until the main

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body ECU (instrument panel junction block) detects an engine start.

j. When engine revolution speed reaches 1200 rpm, the ECM determines that the engine has been started.

The ECM stops sending an ACC cut request signal to the main body ECU.

The main body ECU (instrument panel junction block) reactivates the ACC relay and turns off the engine switch indicator light, when engine revolution speed reaches 800 rpm.

ENGINE START SYSTEM FUNCTION CHART

Symbol of main body ECU	Signal	
STP	Stop light switch ON signal	Input
SSW1/SSW2	Engine switch ON signal	Input
ACCD	ACC relay operation signal	Output
SLP	Steering lock actuator position signal	Input
IG1D	IG1 relay operation signal	Output
IG2D	IG2 relay operation signal	Output
STR2	Starter relay operation signal (Sub)	Output
STR	Park/Neutral position switch signal/Clutch pedal switch signal	Input
TACH	Engine start detection signal	Input
STSW	Starter activation request signal	Output
ACCR	ACC cut request signal	Input

ENGINE START SYSTEM FUNCTION CHART

Symbol of ECM	Signal	
ACCR	ACC cut request signal	Output
TACH	Engine revolution speed signal	Output
STSW	Starter activation request signal	Input
STAR	Starter relay operation signal (Main)	Output
STA	Starter activation signal	Input

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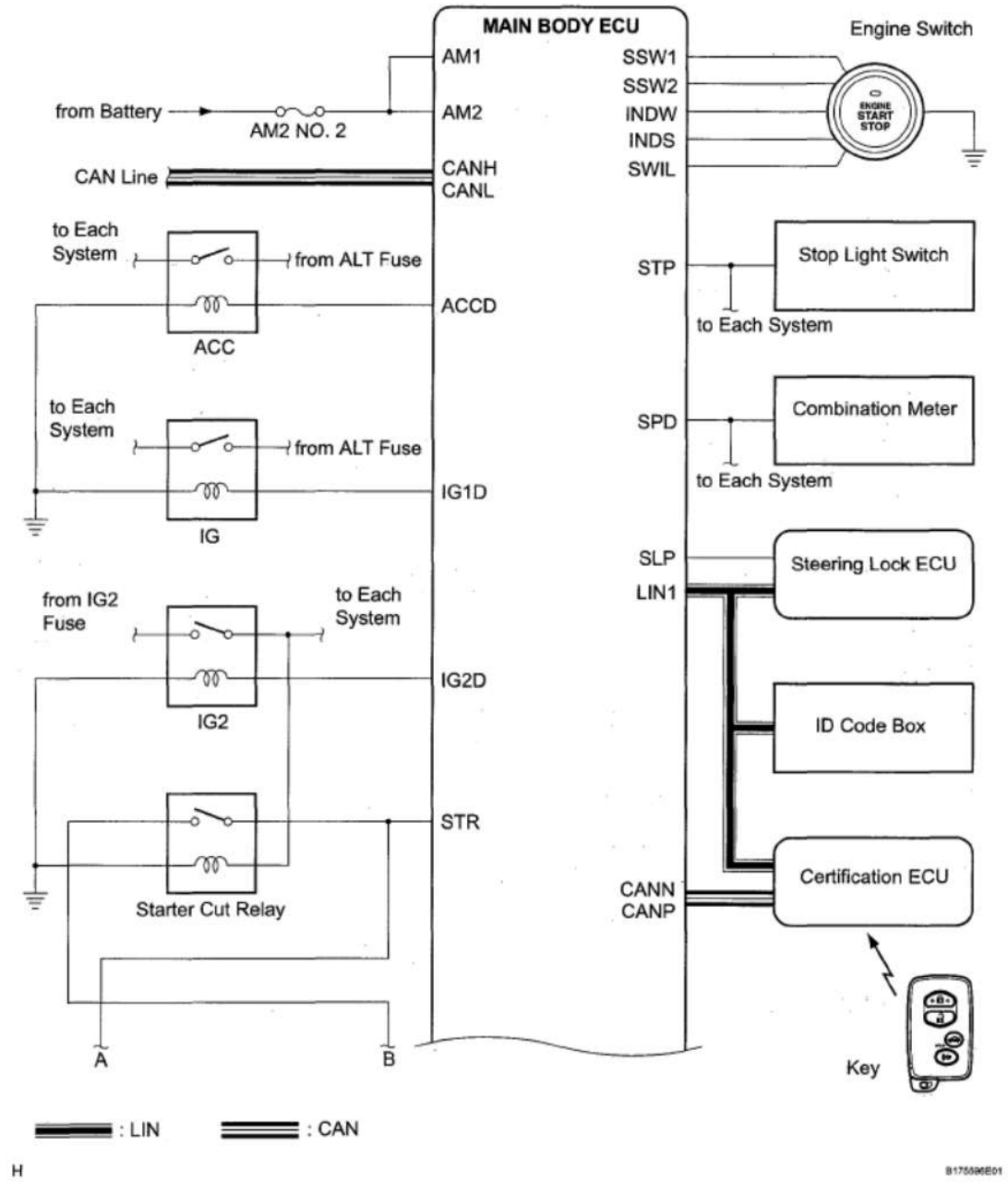


Fig. 76: Engine Start System Circuit Diagram (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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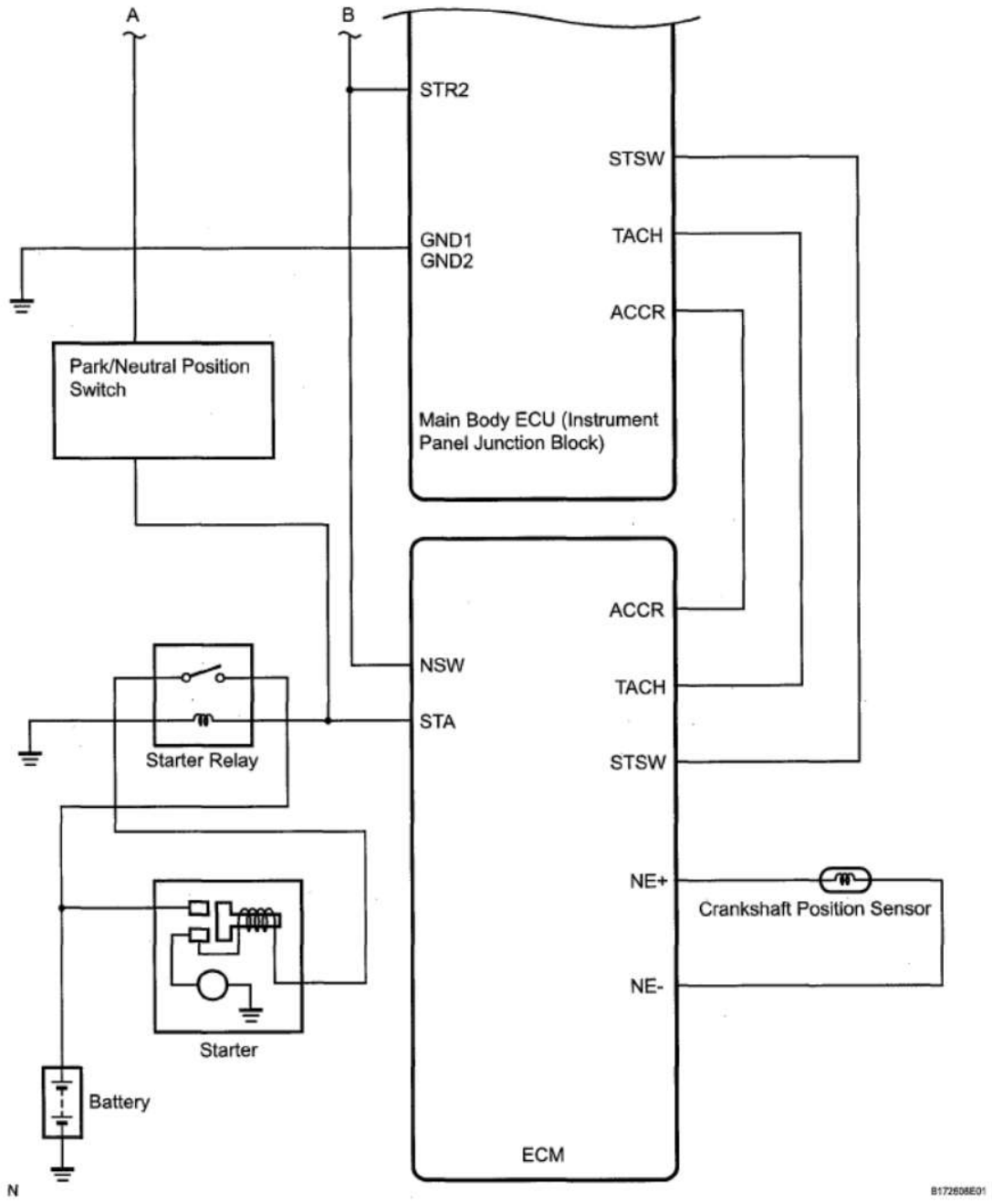


Fig. 77: Engine Start System Circuit Diagram (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

WIRING DIAGRAM

See CRANKING HOLDING FUNCTION CIRCUIT (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

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1. **EMERGENCY ENGINE START CONTROL**
   a. If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU (instrument panel junction block). This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.

      To activate the starter:

      1. Turn the engine switch from off to on (ACC).
      2. Hold pressing and hold the engine switch for 15 seconds.

   HINT:

   After the main body ECU (instrument panel junction block), certification ECU (smart key ECU assembly), steering lock ECU, ID code box (immobiliser code ECU) and/or ECM are/is replaced, perform the registration procedures for the engine immobiliser system (See **REGISTRATION**).

1. **CHECK THE ENGINE SWITCH CONDITION**
   a. Check the power source mode changes.
      1. When the key is inside the vehicle and the shift lever is in the P position, check that the power source mode changes.

   OK:

   off --> on (ACC) --> on (IG) --> off

   NG: GO TO OTHER FLOW CHART (See **POWER SOURCE MODE DOES NOT CHANGE**)

   OK: Go to next step

2. **CHECK DTC**
   a. Delete the DTCs (See **DTC CHECK/CLEAR**).
   b. Check for DTCs again.
   c. Proceed to the next step based on the inspection result.

      Result

      RESULT REFERENCE CHART

Result	Proceed to
No DTC is output	A
Smart key system (starting function) DTCs are output	B
Steering lock DTCs are output	C
Engine immobiliser system DTCs are output	D
Vehicle stability control system DTCs are output	E

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B: GO TO DIAGNOSTIC TROUBLE CODE CHART (SMART KEY SYSTEM (STARTING)) (See **DIAGNOSTIC TROUBLE CODE CHART**)

C: GO TO DIAGNOSTIC TROUBLE CODE CHART (STEERING LOCK SYSTEM) (See **DIAGNOSTIC TROUBLE CODE CHART**)

D: GO TO DIAGNOSTIC TROUBLE CODE CHART (ENGINE IMMOBILISER SYSTEM) (See **DIAGNOSTIC TROUBLE CODE CHART**)

E: GO TO DIAGNOSTIC TROUBLE CODE CHART (VEHICLE STABILITY CONTROL SYSTEM) (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

3. **CHECK CRANKING FUNCTION**
   a. Check the engine cranking function.
      1. When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.

Result

RESULT REFERENCE CHART

Result	Proceed to
Engine cranks	A
Engine does not crank	B

A: GO TO SFI SYSTEM (See **PROBLEM SYMPTOMS TABLE**)

B: Go to next step

4. **READ VALUE USING TECHSTREAM (STARTER CONTROL)**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. Read the DATA LIST according to the displays on the tester screen.

Engine and ECT:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Starter Control	Starter switch signal/ON or OFF	ON: Engine switch on (ST) OFF: Engine switch except on (ST)	-

Standard

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ENGINE SWITCH CONDITION CHART

Engine switch condition	Tester display
When engine switch is on (ST)	ON
When engine switch is except on (ST)	OFF

NG: Go to step 10

OK: Go to next step

5. **PERFORM ACTIVE TEST USING TECHSTREAM (STARTER RELAY)**
   a. Connect Techstream to the DLC3.
   b. Turn the engine switch on (IG).
   c. Perform Active Test according to the prompts displayed on the tester.

      Engine and ECT:

      ACTIVE TEST REFERENCE CHART

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Starter Relay	Starter	ON or OFF	-

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

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
Starter relay terminal 2 - Starter relay terminal 1	When starter relay is ON by Active test using Techstream	8 to 14 V
Starter relay terminal 2 - Starter relay terminal 1	When starter relay is OFF by Active test using Techstream	Below 1 V

NG: Go to step 20

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Component without relay connected:
(Starter Relay)

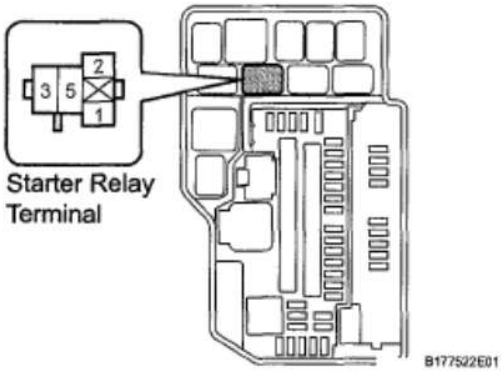


Fig. 78: Identifying Starter Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. **INSPECT STARTER RELAY**
   a. Remove the starter relay from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

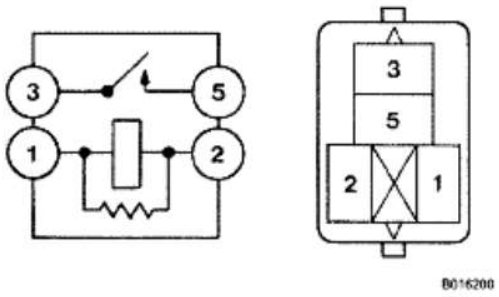


Fig. 79: Inspecting Starter Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

NG: REPLACE STARTER RELAY

OK: Go to next step

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7. **CHECK HARNESS AND CONNECTOR (STARTER RELAY TERMINAL VOLTAGE AND RESISTANCE)**
   a. Measure the voltage according to the value(s) in the table below.

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
Starter relay terminal 5 - Body ground	Always	11 to 14 V

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Starter relay terminal 1 - Body ground	Always	Below 1 ohms

Component without relay connected:
(Starter Relay)

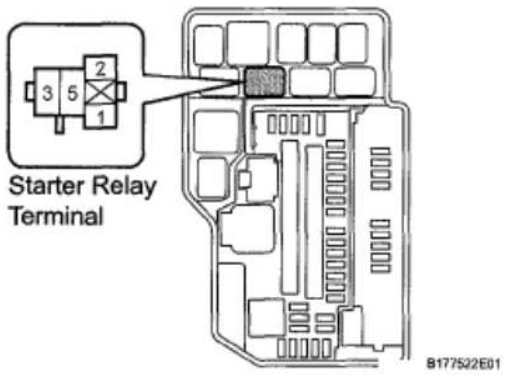


Fig. 80: Identifying Starter Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR, OR REPLACE FUSE

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (STARTER RELAY - STARTER)**
   a. Disconnect the B12 connector.

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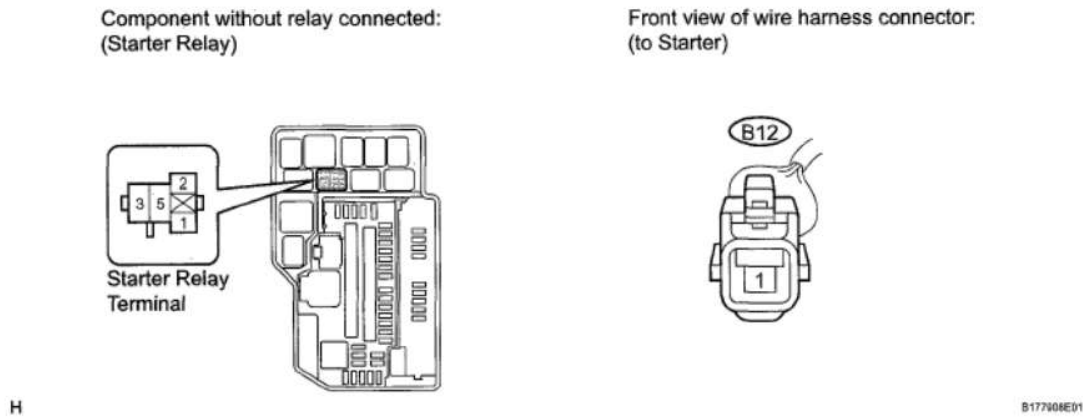


Fig. 81: Identifying Starter Relay Terminals And B12 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block starter relay terminal 3 - B12-1	Always	Below 1 ohms
Engine room relay block starter relay terminal 3 or B12-1 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STARTER RELAY - STARTER)

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (BATTERY - STARTER)**
   a. Disconnect the C1 connector.
   b. Measure the voltage according to the value(s) in the table below.

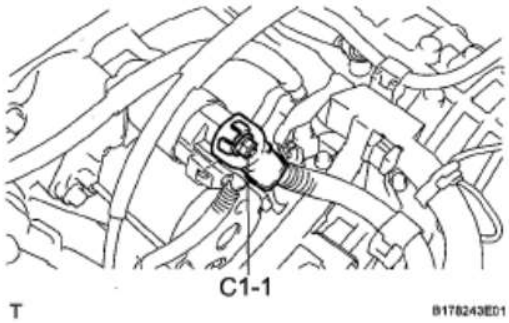


Fig. 82: Identifying C1 Connector

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard voltage

STANDARD VOLTAGE CHART

Tester Connection	Condition	Specified Condition
C1-1 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY - STARTER)

OK: REPLACE STARTER ASSEMBLY

10. **READ VALUE USING TECHSTREAM (PARK/NEUTRAL POSITION SWITCH)**
    a. Connect Techstream to the DLC3.
    b. Turn the engine switch on (IG).
    c. Read the DATA LIST according to the displays on the tester screen.

Main Body:

DATA LIST REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
N SW/C SW	Park/Neutral position switch/ON or OFF	ON: Shift position is P or N OFF: Shift position is not P nor N	-

OK:

"ON" (Shift position is P or N) and "OFF" (Shift position is not P nor N) appear on the screen.

NG: Go to step 14

OK: Go to next step

11. **READ VALUE USING TECHSTREAM (S CODE)**
    a. Connect Techstream to the DLC3.

       HINT:

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

    b. Turn the engine switch on (IG).

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Smart key:

MEASUREMENT ITEM/RANGE CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
S Code Chk	S code check/OK or NG	OK: Normal NG: Malfunction	-

OK:

"OK" is displayed on the screen.

NG: Go to step 24

OK: Go to next step

12. **READ VALUE USING TECHSTREAM (L CODE)**
    a. Connect Techstream to the DLC3.

       HINT:

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

    b. Turn the engine switch on (IG).

Smart key.

MEASUREMENT ITEM/RANGE CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
L Code Chk	L code check/OK or NG	OK: Normal NG: Malfunction	-

OK:

"OK" is displayed on the screen.

NG: Go to step 29

OK: Go to next step

13. **READ VALUE USING TECHSTREAM (IMMOBILISER SYSTEM STATUS)**
    a. Connect Techstream to the DLC3.

       HINT:

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

b. Turn the engine switch on (IG).

Immobiliser:

MEASUREMENT ITEM/RANGE CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Immobiliser	Immobiliser system status/SET or UNSET	UNSET: Engine switch ON SET: Without key	-

OK:

UNSET (Engine switch ON) appears on the screen.

NG: Go to step 34

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

14. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - BODY GROUND)**
    a. Disconnect the D8 connector from the main body ECU (instrument panel junction block).
    b. Measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D8-8 (STR) - Body ground	Shift position is P or N	105 to 115 ohms
D8-8 (STR) - Body ground	Shift position is not P nor N	10 kohms or higher

NG: Go to step 15

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Front view of wire harness connector:
(to Main Body ECU)

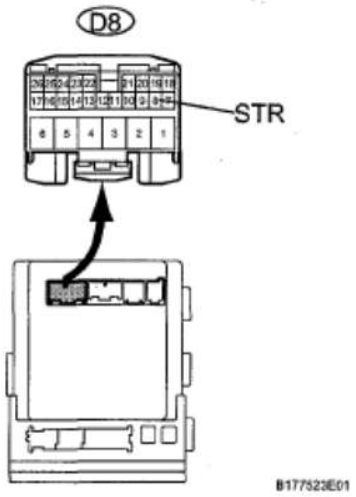


Fig. 83: Identifying D8 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

15. **INSPECT PARK/NEUTRAL POSITION SWITCH**
    a. Disconnect the B5 connector.
    b. Measure the resistance according to the value(s) in the table below.

Standard resistance

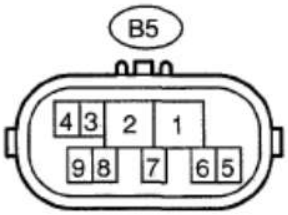
STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
4 - 5	P	Below 1 ohms
4 - 5	N	Below 1 ohms
4 - 5	Except P and N	10 kohms or higher

NG: REPLACE PARK/NEUTRAL POSITION SWITCH (See **ON-VEHICLE INSPECTION**)

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Component without harness connected:
(Park/Neutral Position Switch)



B136016E11

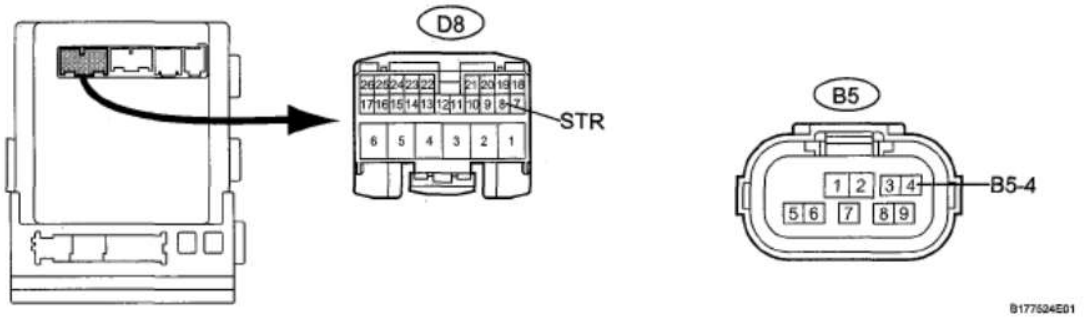
Fig. 84: Identifying Park/Neutral Position Switch B5 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

16. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARK/NEUTRAL POSITION SWITCH)**
    a. Measure the resistance according the the value(s) in the table below.

Front view of wire harness connector:
(to Main Body ECU)

Front view of wire harness connector:
(to Park/Neutral Position Switch)



B177524E01

Fig. 85: Identifying Main Body ECU Connector Terminals And Park/Neutral Position Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D8-8 (STR) - B5-4	Always	Below 1 ohms

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D8-8 (STR) or B5-4 - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU - PARK/NEUTRAL POSITION SWITCH)

OK: Go to next step

17. **CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)**
    a. Disconnect the B3 connector from the ECM.

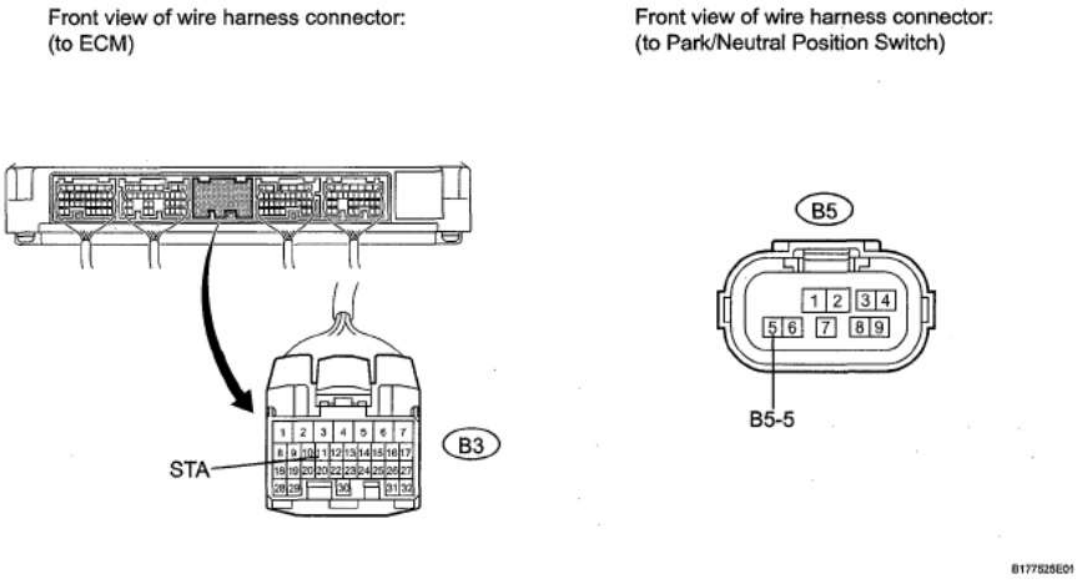


Fig. 86: Identifying Park/Neutral Position Switch Connector Terminals And ECM Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
B5-5 - B3-11 (STA)	Always	Below 1 ohms
B5-5 or B3-11 (STA) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

OK: Go to next step

18. **INSPECT STARTER RELAY**

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a. Remove the starter relay from engine room relay block.
b. Measure the resistance according to the value(s) in the table below.

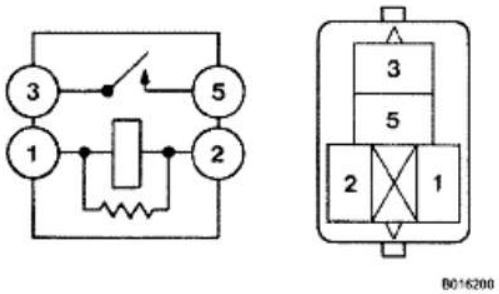


Fig. 87: Inspecting Starter Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms

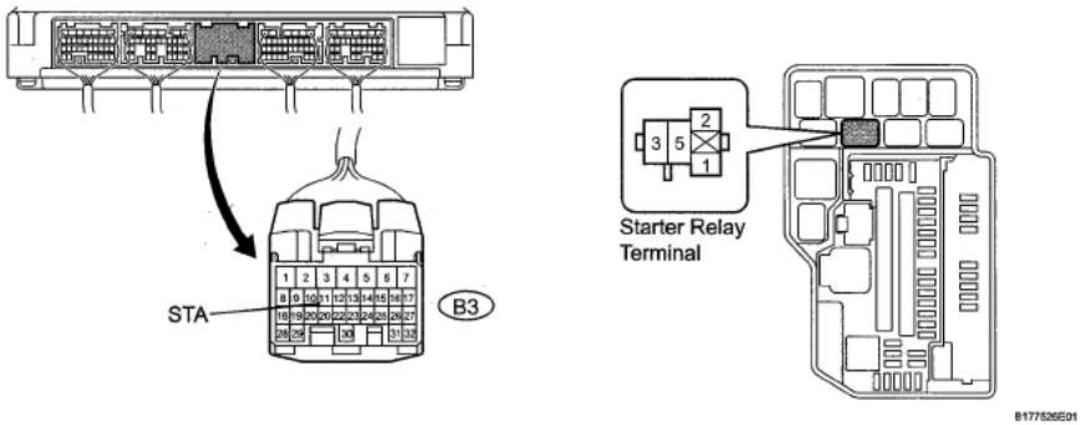
NG: REPLACE STARTER RELAY

OK: Go to next step

19. **CHECK HARNESS AND CONNECTOR (ECM - STARTER RELAY)**
a. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)

Component without relay connected:
(Starter Relay)



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Fig. 88: Identifying ECM Connector Terminals And Starter Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block starter relay terminal 2-B3-11 (STA)	Always	Below 1 ohms
Engine room relay block starter relay terminal 2 or B3-11 (STA) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - STARTER RELAY)

OK: REPAIR OR REPLACE HARNESS OR CONNECTOR (STARTER RELAY - BODY GROUND)

20. **INSPECT STARTER CUT RELAY**
    a. Remove the starter cut relay from the engine room relay block.
    b. Measure the resistance according to the value(s) in the table below.

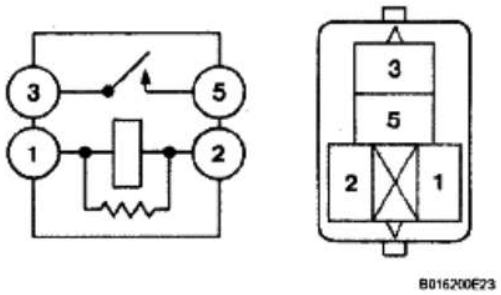


Fig. 89: Inspecting Starter Cut Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 ohms
3 - 5	When battery voltage is not applied to terminals land 2	10 kohms or higher

NG: REPLACE STARTER CUT RELAY

OK: Go to next step

21. **CHECK HARNESS AND CONNECTOR (STARTER CUT RELAY - ECM)**

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a. Disconnect the B2 connector from the ECM.

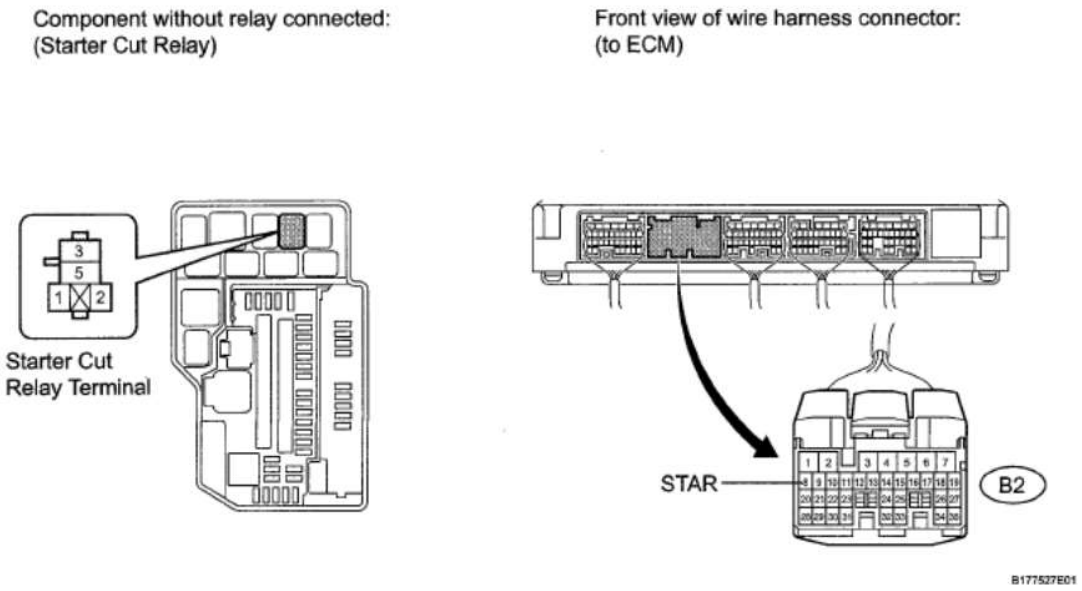


Fig. 90: Identifying Starter Cut Relay Terminals And ECM Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block starter cut relay terminal 5 - B2-8 (STAR)	Always	Below 1 ohms
Engine room relay block starter cut relay terminal 5 or B2-8 (STAR) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STARTER CUT RELAY - ECM)

OK: Go to next step

22. **CHECK HARNESS AND CONNECTOR (STARTER CUT RELAY - MAIN BODY ECU)**
    a. Disconnect the D10 connector from the main body ECU (instrument panel junction block).

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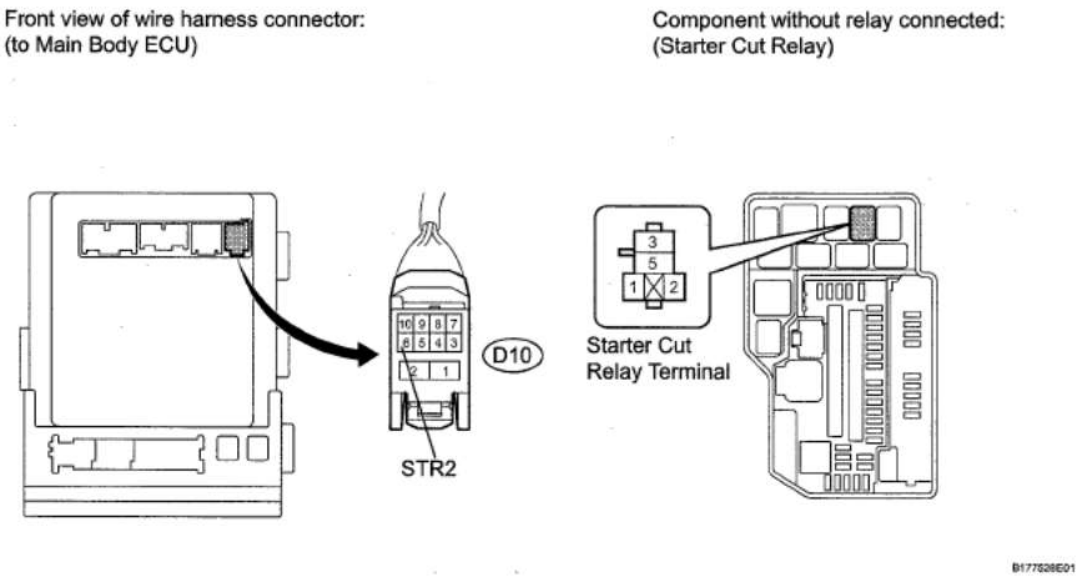


Fig. 91: Identifying Starter Cut Relay Terminals And Main Body ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block starter cut relay terminal 5 - D10-6 (STR2)	Always	Below 1 ohms
Engine room relay block starter cut relay terminal 5 or D10-6 (STR2) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STARTER CUT RELAY - MAIN BODY ECU)

OK: Go to next step

23. **CHECK HARNESS AND CONNECTOR (ECM - STARTER RELAY)**
    a. Measure the resistance according to the value(s) in the table below.

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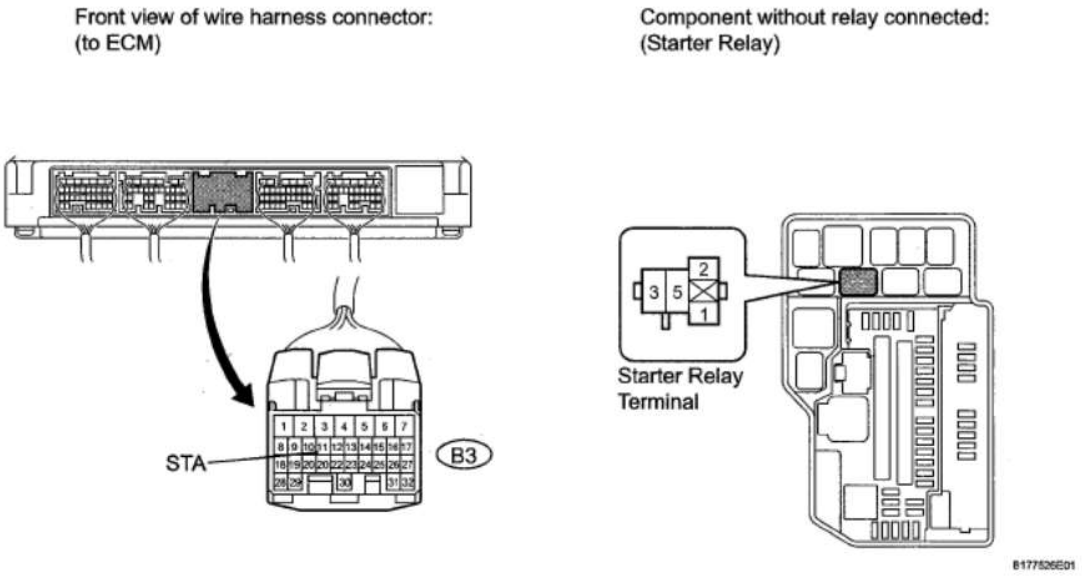


Fig. 92: Identifying ECM Connector Terminals And Starter Relay Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Engine room relay block starter relay terminal 2-B3-11 (STA)	Always	Below 1 ohms
Engine room relay block starter relay terminal 2 or B3-11 (STA) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - STARTER RELAY)

OK: REPLACE ECM (See **REMOVAL**)

24. **REGISTER RECOGNITION CODE (ECU CODE)**
    a. Register the recognition code (ECU code) (See **REGISTRATION**).
25. **CHECK CRANKING FUNCTION**
    a. Check the engine cranking function.
        1. When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.

Result

RESULT REFERENCE CHART

Result	Proceed to

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Engine does not crank	A
Engine cranks	B

B: END

A: Go to next step

26. **REPLACE CERTIFICATION ECU**
    a. Replace the certification ECU (smart key ECU assembly) (See **REMOVAL**).
27. **KEY REGISTRATION**
    a. Register the key (See **REGISTRATION**).
28. **CHECK CRANKING FUNCTION**
    a. Check the engine cranking function.
        1. When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.

Result

RESULT REFERENCE CHART

Result	Proceed to
Engine does not crank	A
Engine cranks	B

B: END

A: REPLACE ID CODE BOX (IMMOBILISER CODE ECU) (See **REMOVAL**)

29. **REGISTER RECOGNITION CODE (ECU CODE)**
    a. Register the recognition code (ECU code) (See **REGISTRATION**).
30. **CHECK CRANKING FUNCTION**
    a. Check the engine cranking function.
        1. When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.

Result

RESULT REFERENCE CHART

Result	Proceed to
Engine does not crank	A
Engine cranks	B

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B: END

A: Go to next step

31. **REPLACE STEERING LOCK ECU**
    a. Replace the steering lock ECU (See **DISASSEMBLY**).
32. **REGISTER RECOGNITION CODE (ECU CODE)**
    a. Register the recognition code (ECU code) (See **REGISTRATION**).
33. **CHECK CRANKING FUNCTION**
    a. Check the engine cranking function.
        1. When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.

Result

RESULT REFERENCE CHART

Result	Proceed to
Engine does not crank	A
Engine cranks	B

B: END

A: REPLACE ID CODE BOX (IMMOBILISER CODE ECU) (See **REMOVAL**)

34. **READ VALUE USING TECHSTREAM (ENGINE START REQUEST)**
    a. Connect Techstream to the DLC3.

    HINT:

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

    b. Turn the engine switch on (IG).

Smart key:

MEASUREMENT ITEM/RANGE CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Start Rqst	Start request signal response/OK or NG	OK: Received NG: Not received	-

OK:

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

NG: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (See **REMOVAL**)

OK: REPLACE ID CODE BOX (IMMOBILISER CODE ECU) (See **REMOVAL**)

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:

ENGINE SWITCH INDICATOR LIGHT CONDITION CHART

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

WIRING DIAGRAM

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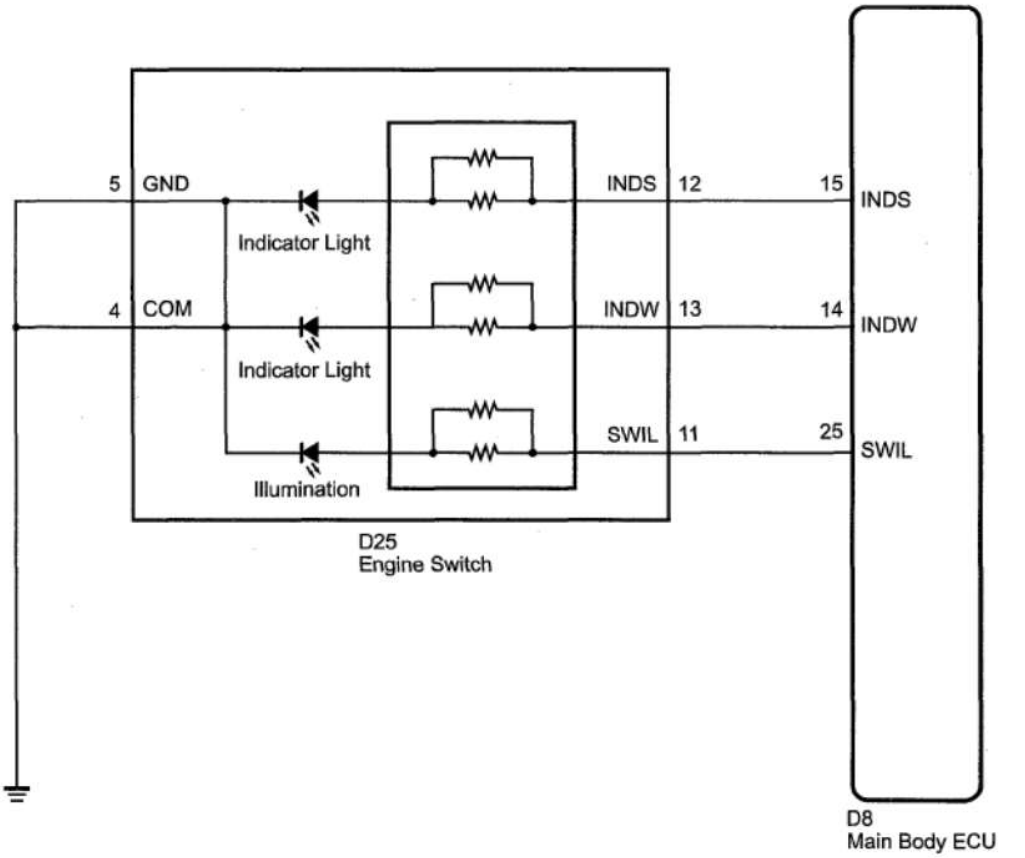


Fig. 93: Engine Switch Indicator Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **INSPECT ENGINE SWITCH**
   a. Remove the engine switch (See **REMOVAL**).

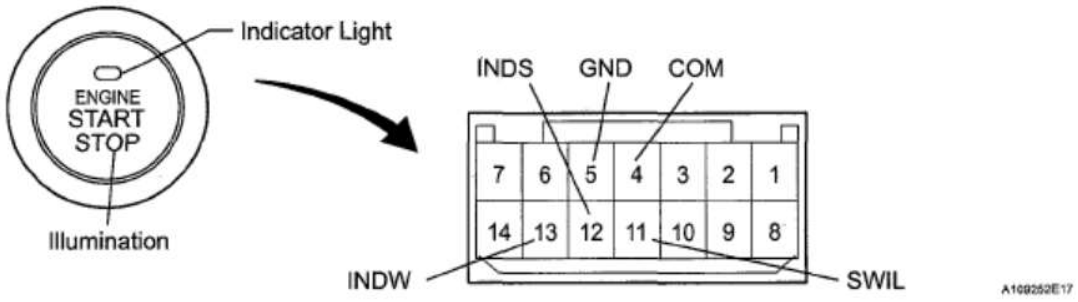


Fig. 94: Identifying Engine Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

NOTE:

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

OK

MEASUREMENT CONDITION CHART

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

NG: REPLACE ENGINE SWITCH (See **REMOVAL**)

OK: Go to next step

2. **CHECK HARNESS AND CONNECTOR (ENGINE SWITCH - MAIN BODY ECU AND BODY GROUND)**
   a. Disconnect the D25 switch connector.

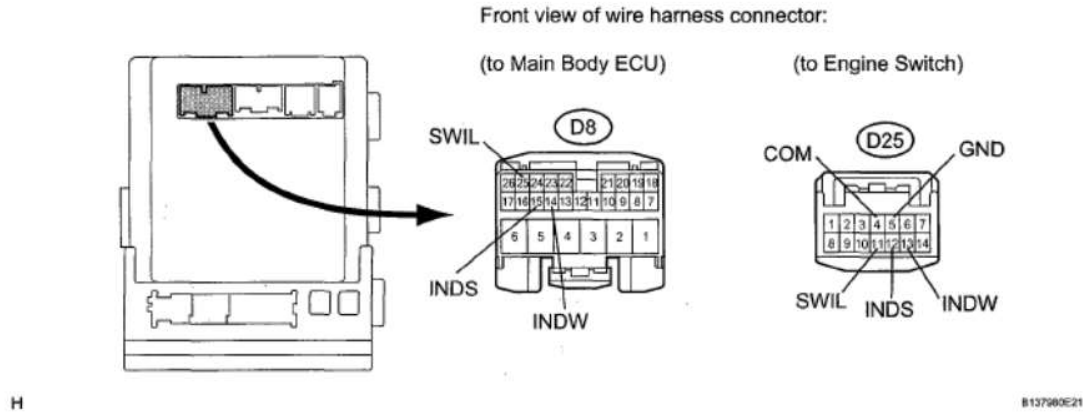


Fig. 95: Identifying D25 Switch Connector Terminals And D8 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disconnect the D8 ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

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Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
D25-11 (SWIL) - D8-25 (SWIL)	Always	Below 1 ohms
D25-12 (INDS) - D8-15 (INDS)		
D25-13 (INDW) - D8-14 (INDW)		
D25-5 (GND) - Body ground		
D25-4 (COM) - Body ground		
D25-11 (SWIL) or D8-25 (SWIL) - Body ground		10 kohms or higher
D25-12 (INDS) or D8-15 (INDS) - Body ground		
D25-13 (INDW) or D8-14 (INDW) - Body ground		

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

STARTER

COMPONENTS

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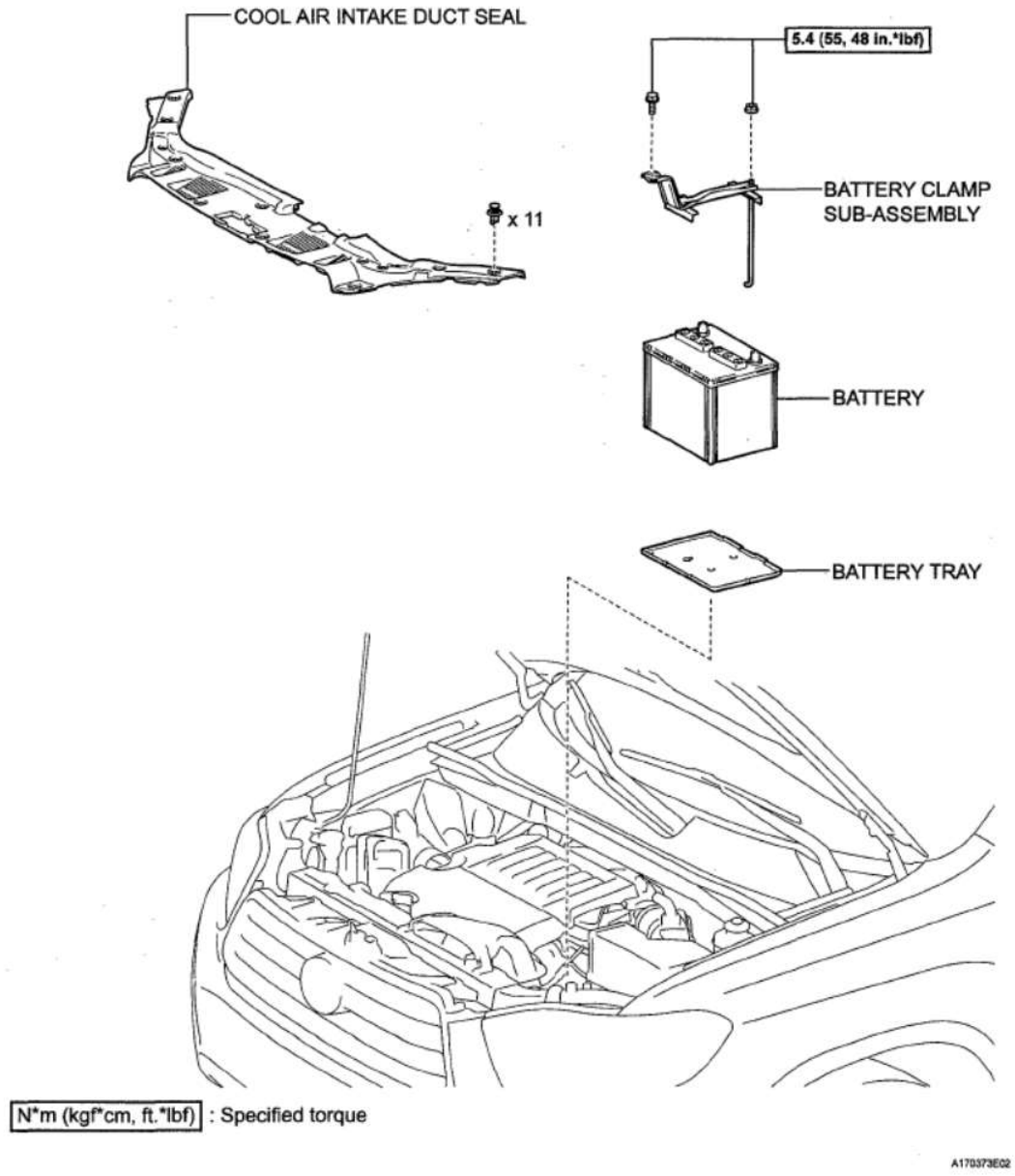


Fig. 96: Identifying Starter Components (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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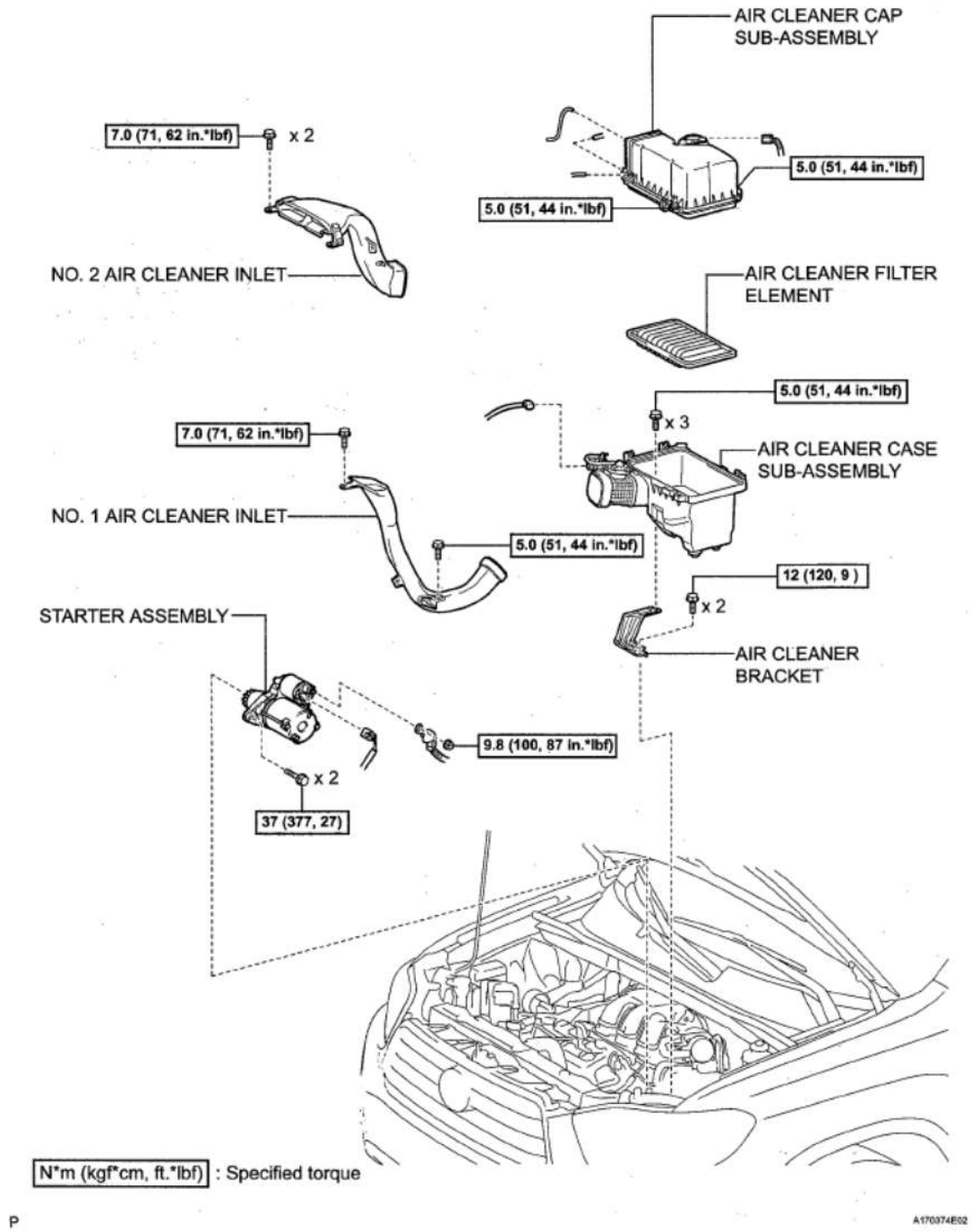


Fig. 97: Identifying Starter Components (2 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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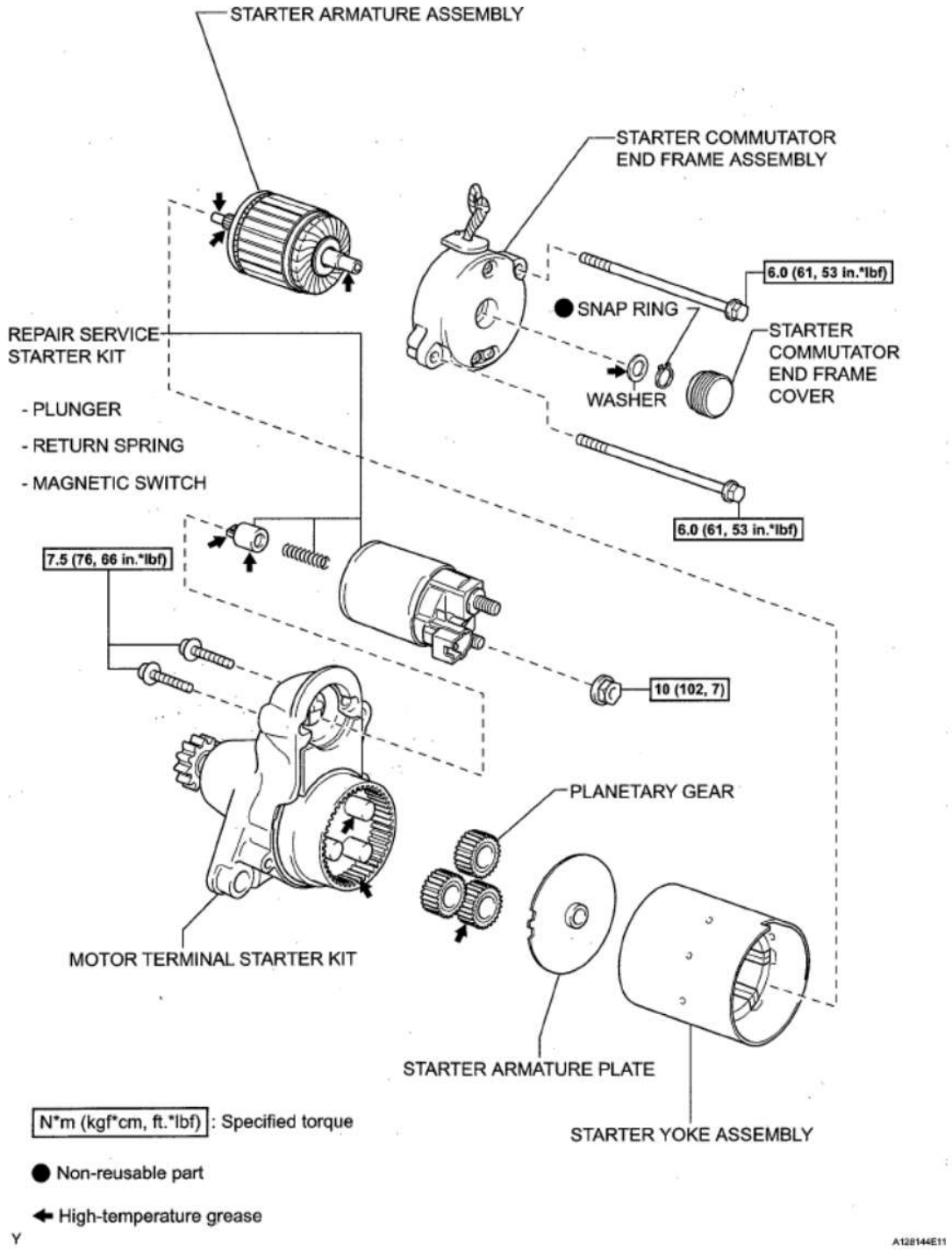


Fig. 98: Identifying Starter Components (3 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL** (See **REMOVAL**)

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2. **REMOVE BATTERY** (See **REMOVAL**)
3. **REMOVE NO. 2 AIR CLEANER INLET** (See **REMOVAL**)
4. **REMOVE NO. 1 AIR CLEANER INLET** (See **REMOVAL**)
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY** (See **REMOVAL**)
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY** (See **REMOVAL**)
7. **REMOVE AIR CLEANER BRACKET**
   a. Remove the 2 bolts and bracket.

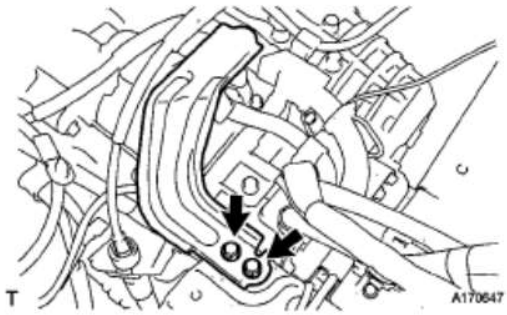


Fig. 99: Locating Air Cleaner Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **REMOVE STARTER ASSEMBLY**
   a. Disconnect the starter connector.
   b. Open the terminal cap, remove the nut and disconnect the starter wire.

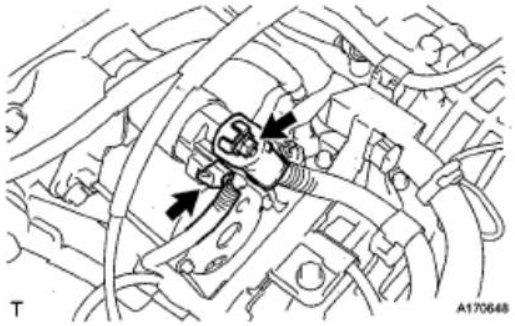


Fig. 100: Locating Starter Connector And Starter Wire Terminal Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Remove the 2 bolts and starter.

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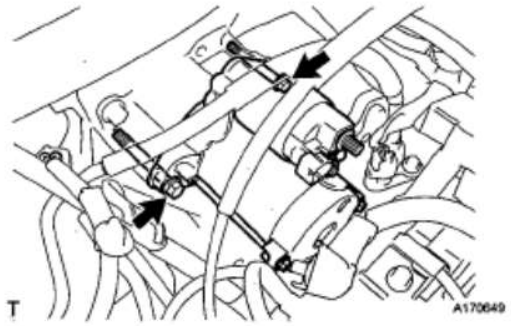


Fig. 101: Locating Starter Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

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

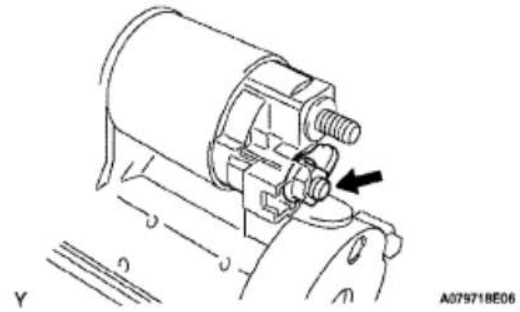


Fig. 102: Locating Terminal C
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

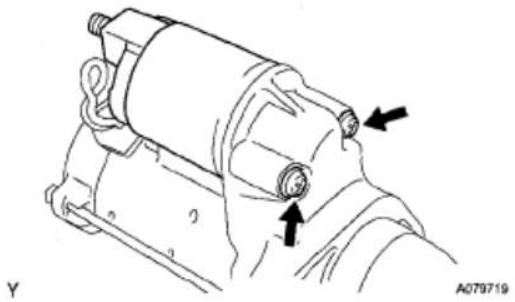


Fig. 103: Locating Repair Service Starter Kit Screws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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2. **REMOVE STARTER YOKE ASSEMBLY**
   a. Remove the 2 through-bolts, and pull out the starter yoke assembly together with the starter commutator end frame assembly.



Fig. 104: Locating Starter Yoke Assembly Through-Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

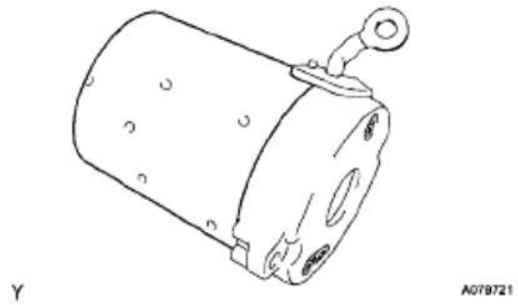


Fig. 105: Identifying Starter Yoke Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REMOVE STARTER ARMATURE PLATE**
   a. Remove the starter armature plate from the starter yoke assembly.

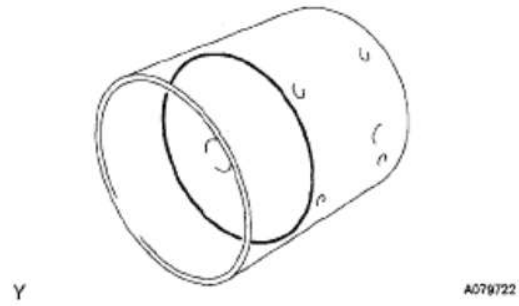


Fig. 106: Identifying Starter Armature Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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4. **REMOVE STARTER COMMUTATOR END FRAME COVER**
   a. Using a screwdriver, remove the starter commutator end frame cover.

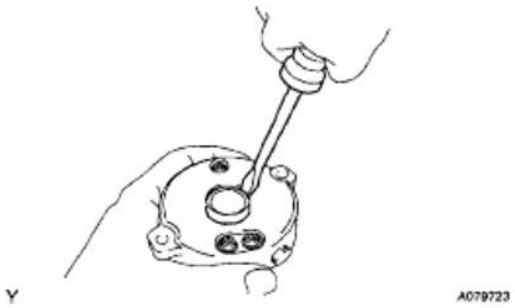


Fig. 107: Removing Starter Commutator End Frame Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE STARTER ARMATURE ASSEMBLY**
   a. Using snap ring pliers, remove the snap ring and plate washer.
   b. Remove the starter armature assembly from the starter commutator end frame assembly.

NOTE: Do not drop the starter armature assembly

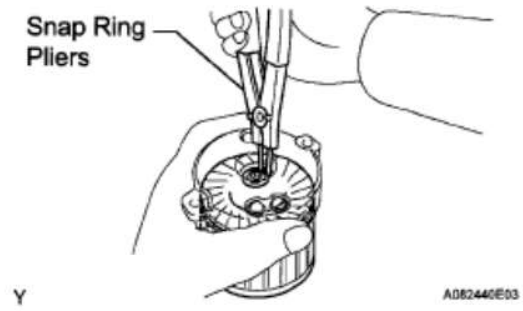


Fig. 108: Removing Snap Ring And Plate Washer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE PLANETARY GEAR**
   a. Remove the 3 planetary gears from the motor terminal starter kit.

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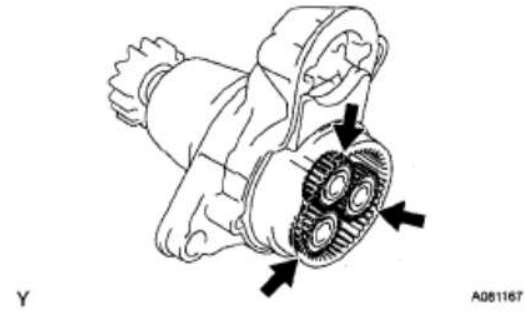


Fig. 109: Locating Planetary Gears In Motor Terminal Starter Kit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT STARTER ASSEMBLY**

NOTE: These tests must be performed within 5 seconds to prevent the coil from burning out.

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. Check that the clutch pinion gear extends.

If the clutch pinion gear does not move, replace the repair service starter kit.

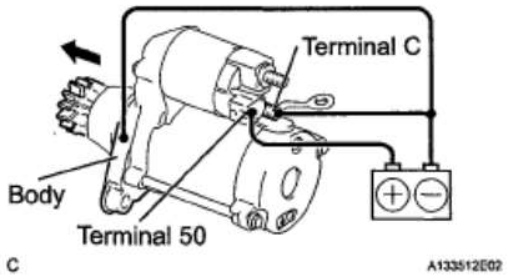


Fig. 110: Inspecting Starter Assembly Pull-In Test
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Perform the hold-in test.
   1. Maintain the battery connections of the pull-in test above, but disconnect the negative (-) lead from terminal C. Check that the pinion gear remains extended.

If the clutch pinion gear returns inward, replace the repair service starter kit.

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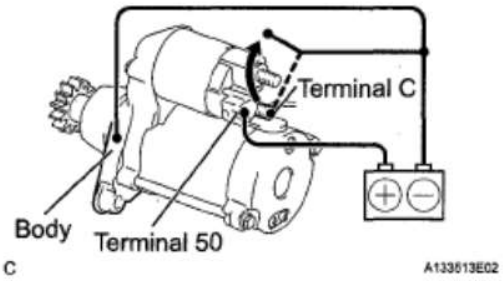


Fig. 111: Inspecting Starter Assembly Hold-In Test
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Perform the clutch pinion gear return test.
   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 repair service starter kit.

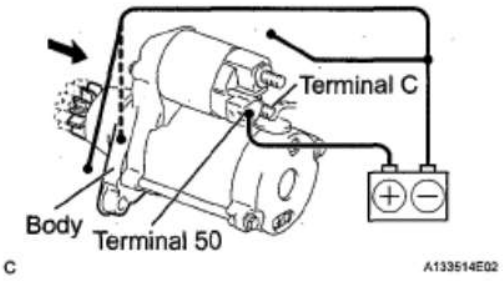


Fig. 112: Inspecting Starter Assembly Clutch Pinion Gear Return Test
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Perform the no-load performance test.
   1. Connect the lead wire to terminal C with the nut. Make sure that the lead is not grounded.

      Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

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

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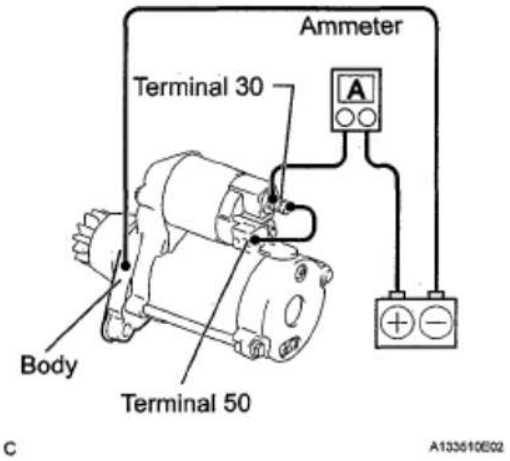


Fig. 113: Inspecting Starter Assembly No-Load Performance Test
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard current

STANDARD CURRENT CHART

Tester Connection	Condition	Specified Condition
Battery positive terminal - Terminal 30 - Terminal 50	11.5V	90 A or less

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

2. **INSPECT REPAIR SERVICE STARTER KIT**
   a. Check the plunger.
      1. Push in the plunger and check that it returns quickly to its original position.

   If necessary, replace the repair service starter kit.

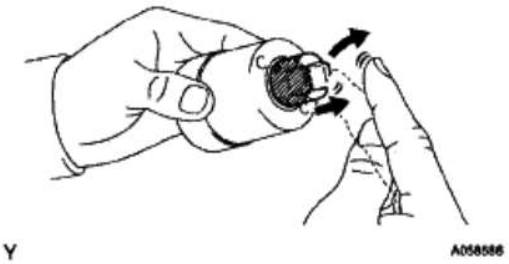


Fig. 114: Checking Plunger
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   b. Check if the pull-in coil has an open circuit.
      1. Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard resistance

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STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Terminal 50 - Terminal C	-	Below 1 ohms

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

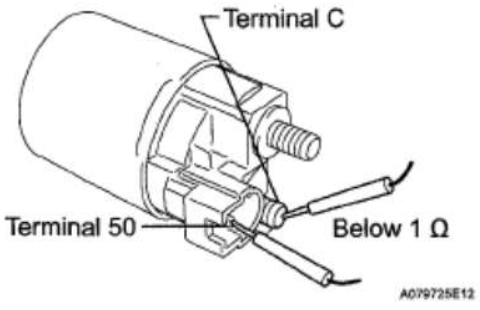


Fig. 115: Checking Pull-In Coil Has An Open Circuit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Check if the hold-in coil has an open circuit.
   1. Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Terminal 50 - Switch body	-	Below 2 ohms

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

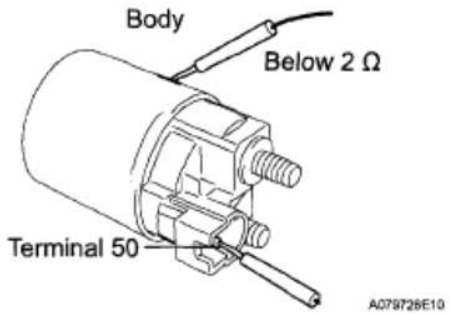


Fig. 116: Checking Hold-In Coil Has An Open Circuit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSPECT STARTER ARMATURE ASSEMBLY**
   a. Check the commutator surface for dirt or burning. If the surface is dirty or burnt, smooth the surface with 400-grit sandpaper or leather.

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b. Check if the commutator has an open circuit.

1. Using an ohmmeter, measure the resistance between any 2 segments of the commutator.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Segment - Segment	-	Below 1 ohms

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

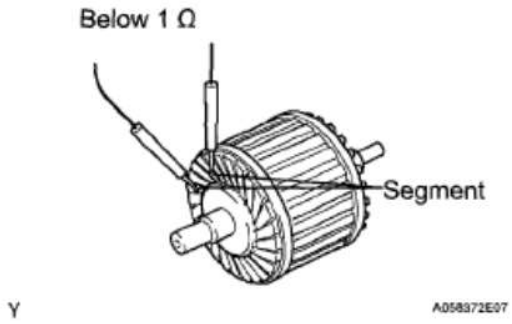


Fig. 117: Measuring Resistance Between Any Two Segments Of Commutator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Using an ohmmeter measure the resistance between each segment of the commutator and armature coil core.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Commutator - Coil core	-	10 kohms or higher

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

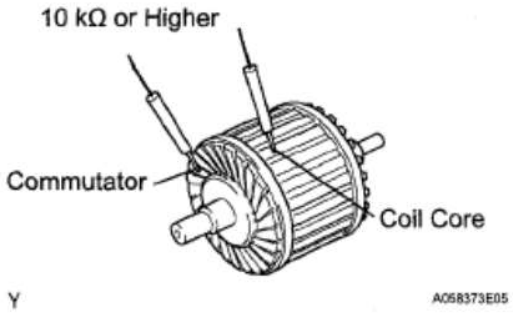


Fig. 118: Measuring Resistance Between Each Segment Of Commutator And Armature Coil

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Core
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a vernier caliper, measure the commutator's length.

Standard length:

3.1 to 3.8 mm (0.122 to 0.150 in.)

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

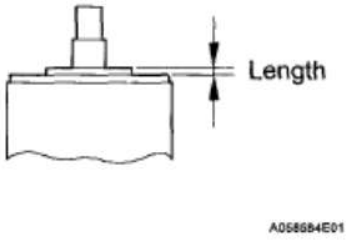


Fig. 119: Identifying Commutator Length
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY**
   a. Using a vernier caliper, measure the brush length.

      Standard length:

      4.0 to 9.0 mm (0.158 to 0.354 in.)

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

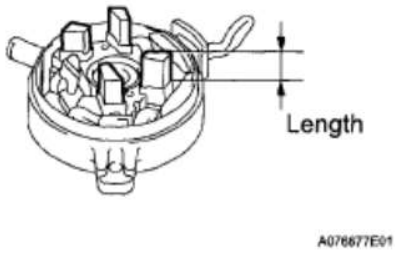


Fig. 120: Measuring Brush Length
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

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STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
Positive (+) brush - Negative (-) brush	-	10 kohms or higher

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

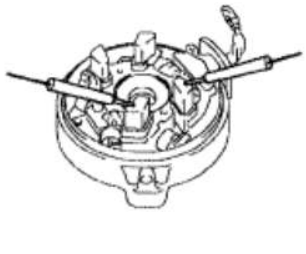


Fig. 121: Measuring Resistance Between Positive (+) And Negative (-) Brushes
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSPECT STARTER CLUTCH**
   a. Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise and check that it locks. If necessary, replace the motor terminal starter kit.

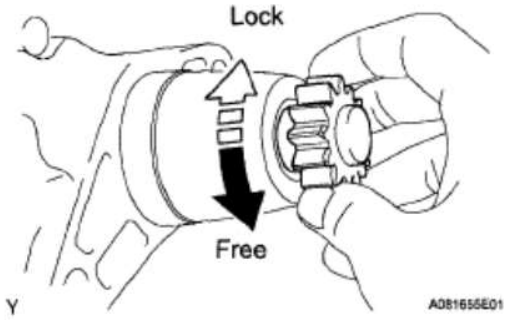


Fig. 122: Checking Starter Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. **INSTALL PLANETARY GEAR**
   a. Apply grease to the planetary gears and pin parts of the planetary shaft.
   b. Install the 3 planetary gears.

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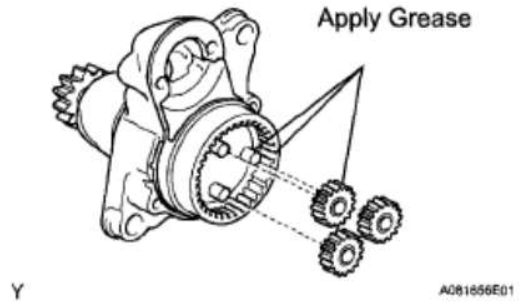


Fig. 123: Applying Grease To Planetary Gears And Pin Parts Of Planetary Shaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL STARTER ARMATURE ASSEMBLY**
   a. Apply grease to the plate washer and the armature shaft.
   b. Install the starter armature assembly to the starter commutator end frame assembly.
   c. Using snap ring pliers, install the plate washer and a new snap ring.

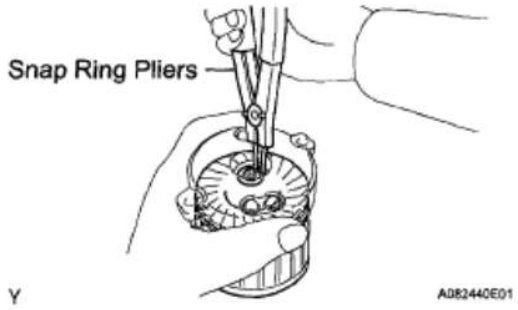


Fig. 124: Installing Plate Washer And Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:
- **Be sure to install the snap ring in the armature shaft groove securely.**
- **Be sure to properly install the snap ring because it easily expands.**

   d. Using a vernier caliper, measure the length of the snap ring.

Maximum length:

5.0 mm (0.197 in.)

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

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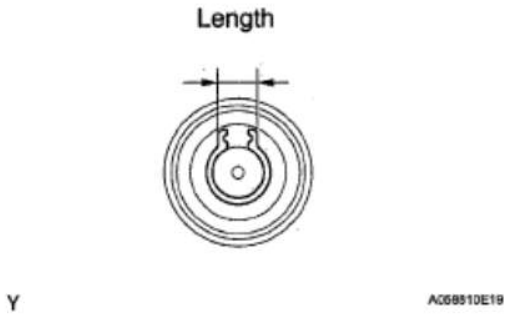


Fig. 125: Identifying Length Of Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL STARTER COMMUTATOR END FRAME COVER**
   a. Install the starter commutator end frame cover to the starter commutator end frame assembly.

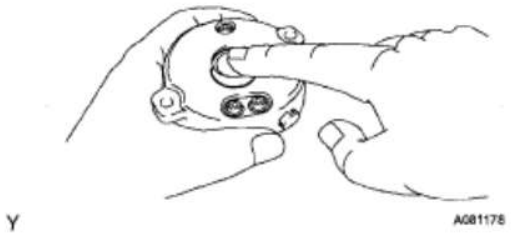


Fig. 126: Installing Starter Commutator End Frame Cover To Starter Commutator End Frame Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL STARTER ARMATURE PLATE**
   a. Insert the armature plate to the starter yoke assembly.
   b. Align the keyway of the starter armature plate with the key inside the starter yoke assembly, and install the starter armature plate.

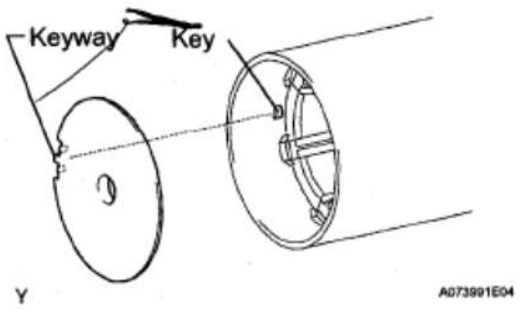


Fig. 127: Aligning Keyway Of Starter Armature Plate With Key Inside Starter Yoke Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY**

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a. Align the rubber of the end frame with the cutout of the starter yoke assembly.
b. Install the starter commutator end frame to the starter yoke assembly.

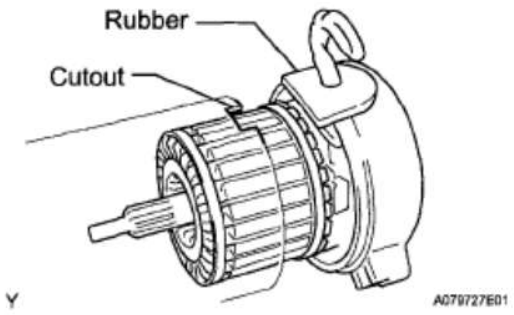


Fig. 128: Aligning Rubber Of End Frame With Cutout Of Starter Yoke Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

6. **INSTALL STARTER YOKE ASSEMBLY**
   a. Align the protrusion of the starter yoke with the cutout of the motor terminal starter kit.

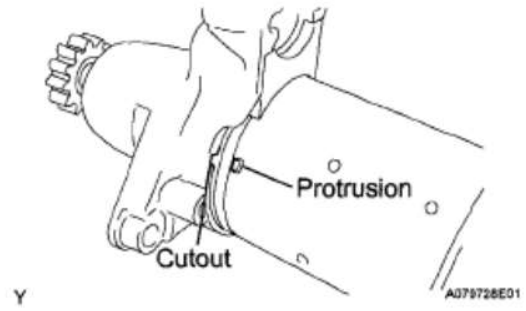


Fig. 129: Aligning Protrusion Of Starter Yoke With Cutout Of Motor Terminal Starter Kit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Install the starter yoke with the 2 through-bolts.

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

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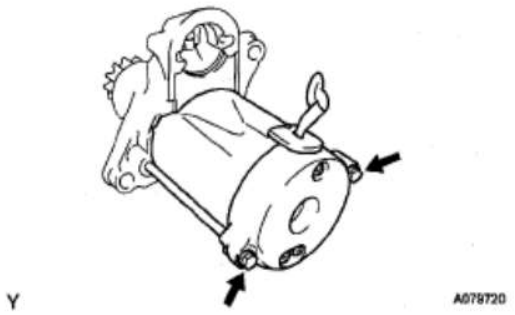


Fig. 130: Locating Starter Yoke Through-Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSTALL REPAIR SERVICE STARTER KIT**
   a. Apply 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 return spring.



Fig. 131: Installing Plunger And Return Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   d. Install the repair service starter kit with the 2 screws.

Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

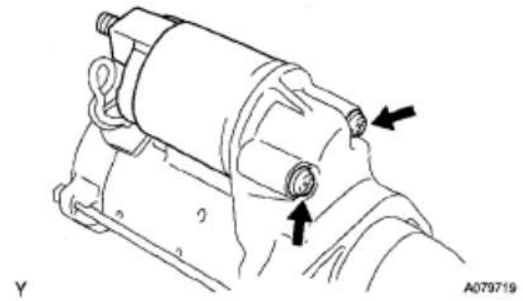


Fig. 132: Locating Repair Service Starter Kit Screws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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e. Connect the lead wire to terminal C with the nut.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

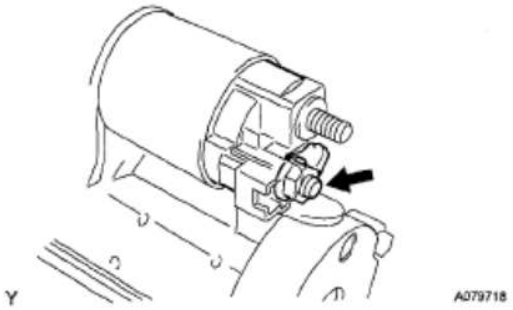


Fig. 133: Locating Terminal C And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL STARTER ASSEMBLY**
   a. Install the starter assembly with the 2 bolts.

   Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

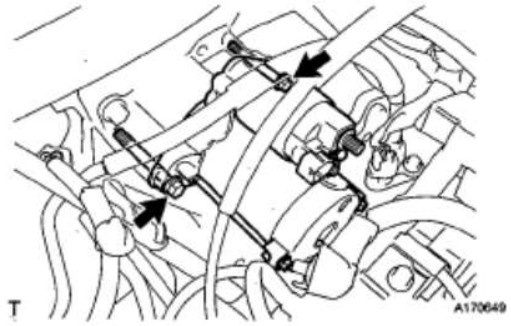


Fig. 134: Locating Starter Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the starter connector.
   c. Connect the starter wire with the nut and cover the nut with the cap.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

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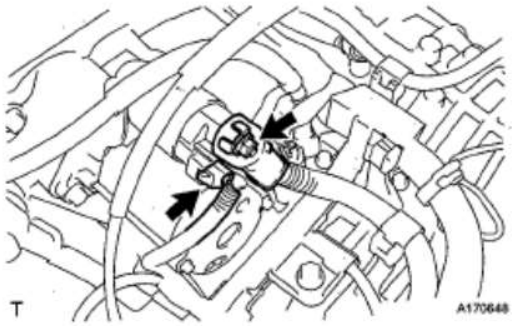


Fig. 135: Locating Starter Connector And Starter Wire Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL AIR CLEANER BRACKET**
   a. Install the bracket with the 2 bolts.

Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)

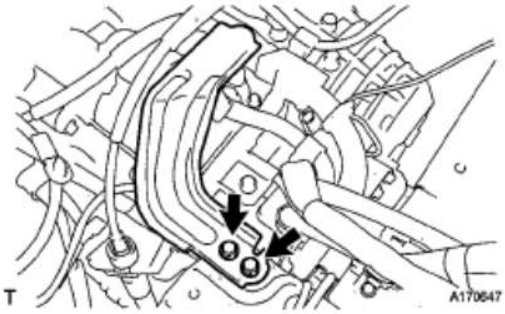


Fig. 136: Locating Air Cleaner Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY** (See **INSTALLATION**)
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY** (See **INSTALLATION**)
5. **INSTALL NO. 1 AIR CLEANER INLET** (See **INSTALLATION**)
6. **INSTALL NO. 2 AIR CLEANER INLET** (See **INSTALLATION**)
7. **INSTALL BATTERY** (See **INSTALLATION**)
8. **INSTALL COOL AIR INTAKE DUCT SEAL** (See **INSTALLATION**)

STARTER RELAY

ON-VEHICLE INSPECTION

1. **INSPECT STARTER RELAY ASSEMBLY**
   a. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

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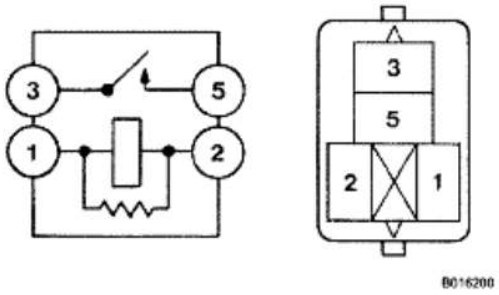


Fig. 137: Inspecting Starter Relay Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 Mohms or higher
3 - 5	Battery voltage is applied to terminals 1 and 2	Below 1 ohms

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

STARTER CUT RELAY

ON-VEHICLE INSPECTION

1. **INSPECT STARTER CUT RELAY**
   a. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

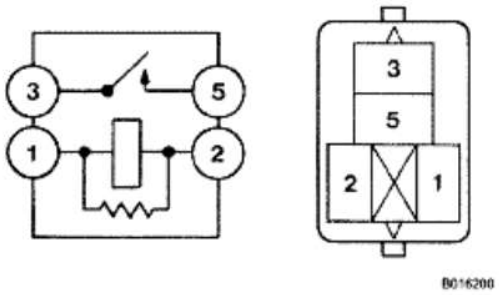


Fig. 138: Inspecting Starter Cut Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 Mohms or higher

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3 - 5	Battery voltage is applied to terminals 1 and 2	Below 1 ohms

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

ACC RELAY

ON-VEHICLE INSPECTION

1. **INSPECT ACC RELAY**
   a. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

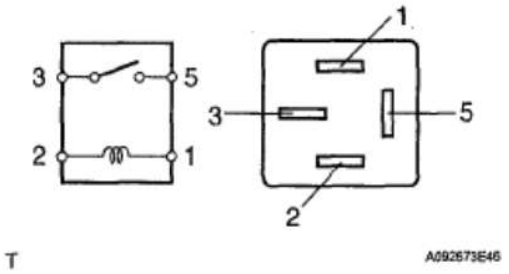


Fig. 139: Inspecting ACC Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	Battery voltage is applied to terminals 1 and 2	Below 1 ohms

If the resistance is not as specified, replace the ACC relay.

IGNITION RELAY

ON-VEHICLE INSPECTION

1. **INSPECT IGNITION RELAY**
   a. Inspect the No. 1 ignition relay.
      1. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

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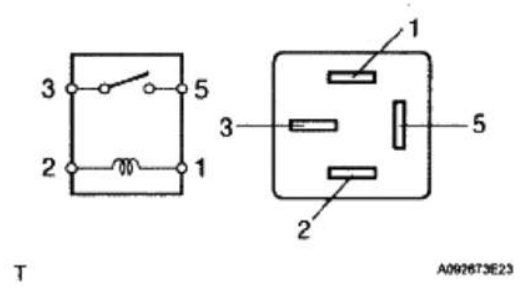


Fig. 140: Inspecting No. 1 Ignition Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	Battery voltage is applied to terminals 1 and 2	Below 1 ohms

If the resistance is not as specified, replace the No. 1 ignition relay.

b. Inspect the No. 2 ignition relay.
   1. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Condition	Specified Condition
3 - 5	Battery voltage is not applied to terminals 1 and 2	10 kohms or higher
3 - 5	Battery voltage is applied to terminals 1 and 2	Below 1 ohms

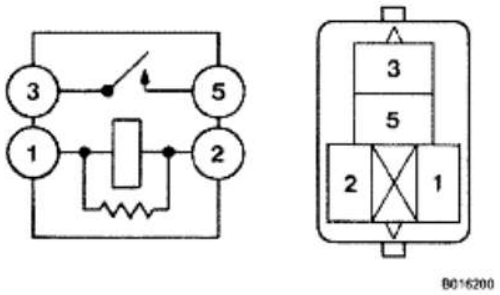


Fig. 141: Inspecting No. 2 Ignition Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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ENGINE SWITCH

COMPONENTS

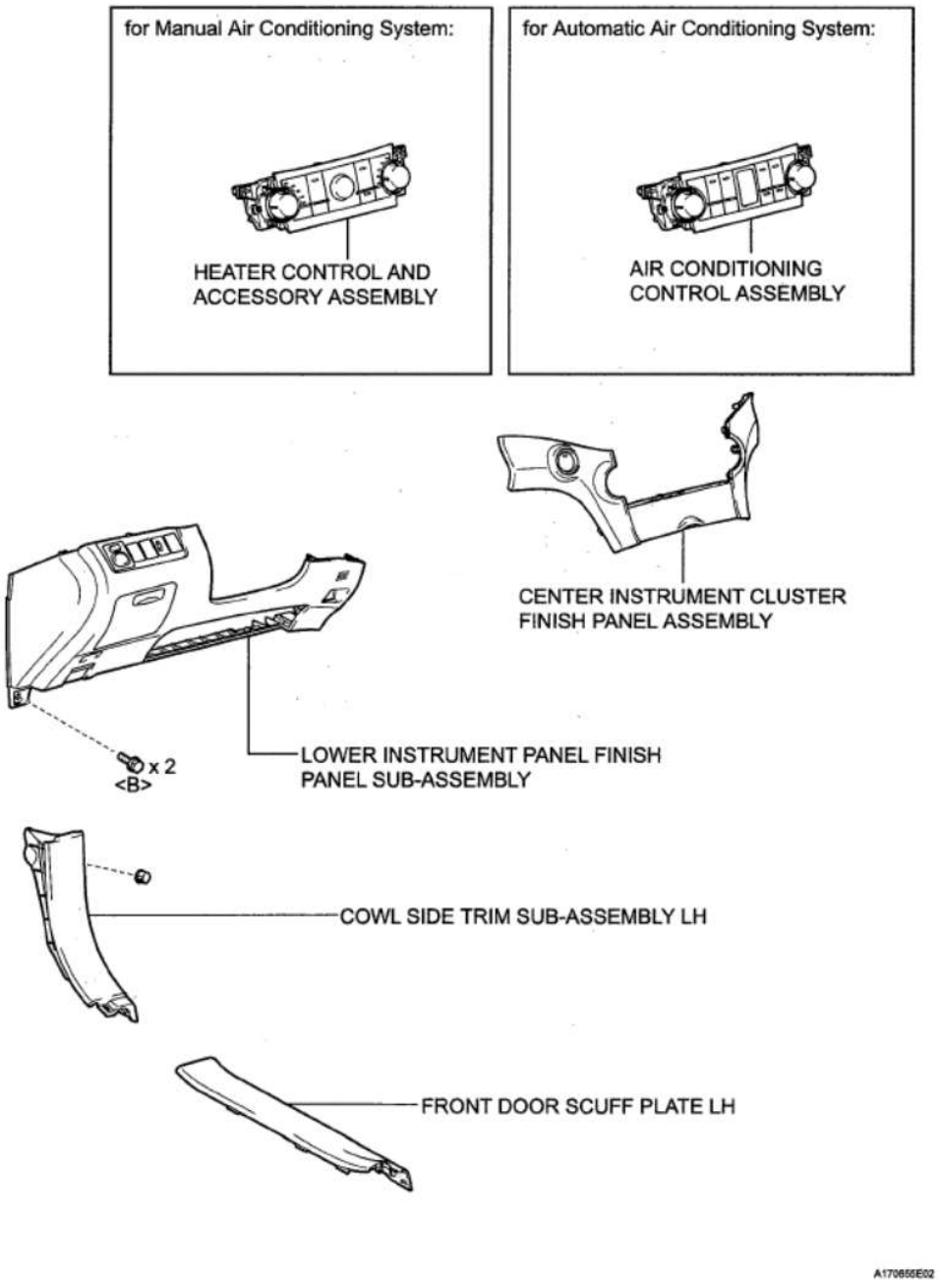


Fig. 142: Identifying Engine Switch Components (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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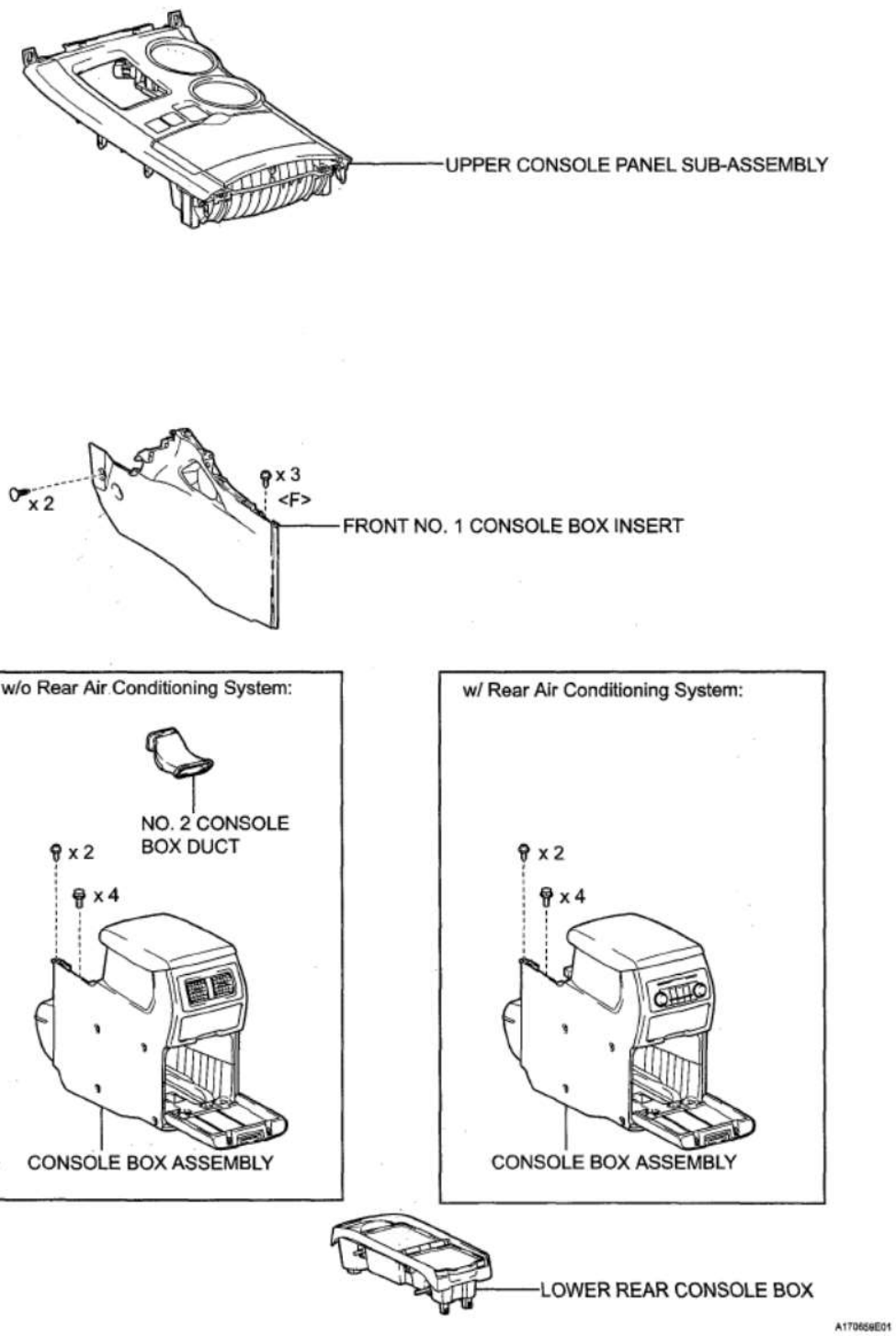


Fig. 143: Identifying Engine Switch Components (2 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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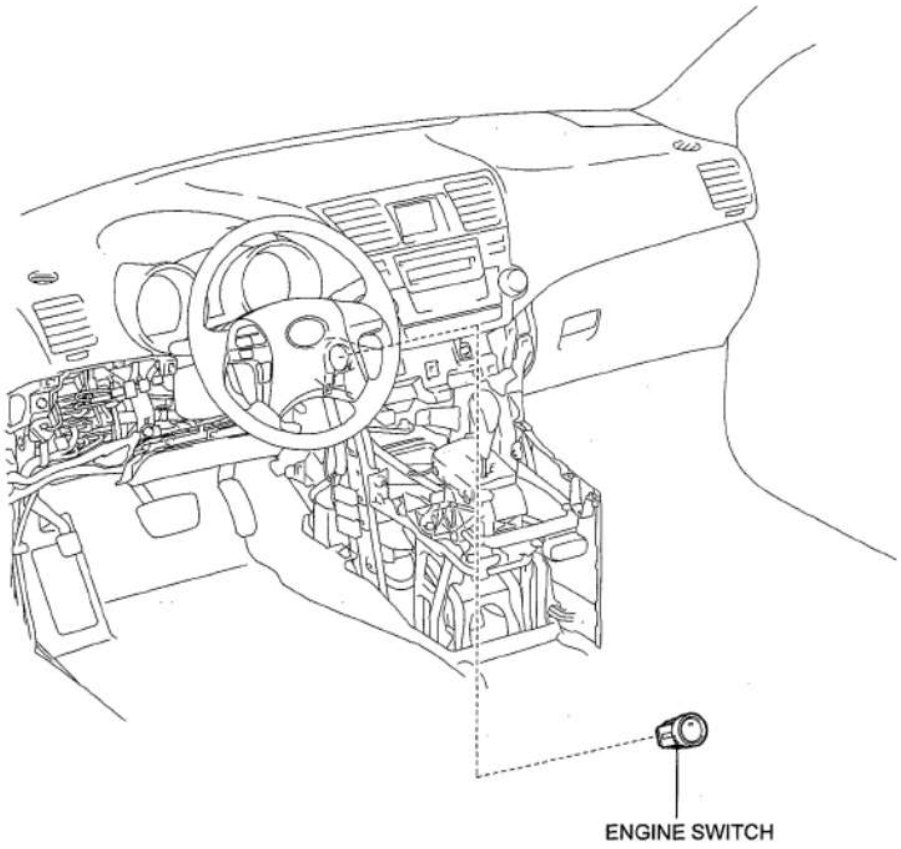


Fig. 144: Identifying Engine Switch Components (3 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

   CAUTION: Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag deployment and seat belt pretensioner activation.

   NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

2. **REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/ Smart Key System)** (See **REMOVAL**)

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3. **REMOVE HEATER CONTROL AND ACCESSORY ASSEMBLY (for Manual Air Conditioning System)** (See **AIR CONDITIONING PANEL (FOR MANUAL AIR CONDITIONING SYSTEM)**)
4. **REMOVE AIR CONDITIONING CONTROL ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)
5. **REMOVE FRONT DOOR SCUFF PLATE LH** (See **REMOVAL**)
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH** (See **REMOVAL**)
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **REMOVAL**)
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)
9. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY** (See **REMOVAL**)
10. **REMOVE NO. 2 CONSOLE BOX DUCT (w/o Rear Air Conditioning System)** (See **REMOVAL**)
11. **REMOVE LOWER REAR CONSOLE BOX** (See **REMOVAL**)
12. **REMOVE CONSOLE BOX ASSEMBLY (w/o Rear Air Conditioning System)** (See **REMOVAL**)
13. **REMOVE CONSOLE BOX ASSEMBLY (w/ Rear Air Conditioning System)** (See **DISASSEMBLY**)
14. **REMOVE FRONT NO. 1 CONSOLE BOX INSERT** (See **REMOVAL**)
15. **REMOVE ENGINE SWITCH**
    a. Disconnect the switch connector.
    b. Disengage the 2 claws and remove the switch.

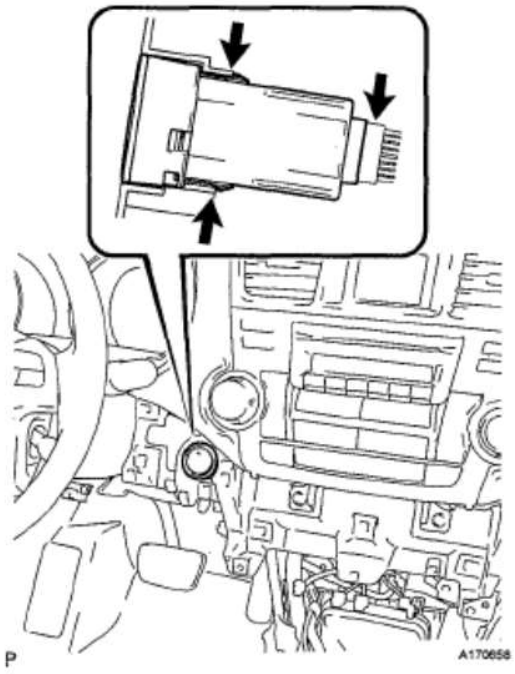


Fig. 145: Locating Engine Switch Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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INSPECTION

1. **INSPECT ENGINE SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

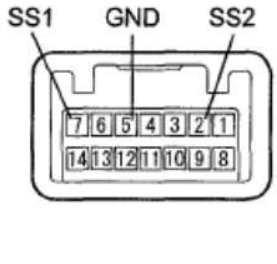


Fig. 146: Identifying Engine Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Not pushed	10 kohms or higher
2 (SS2) - 5 (GND)	Not pushed	10 kohms or higher
7 (SS1) - 5 (GND)	Pushed	15 ohms
2 (SS2) - 5 (GND)	Pushed	15 ohms

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

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

HINT:

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

OK

MEASUREMENT CONDITION CHART

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

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Battery negative (-) --> Terminal 4 (COM) or 5 (GND)	Illuminates

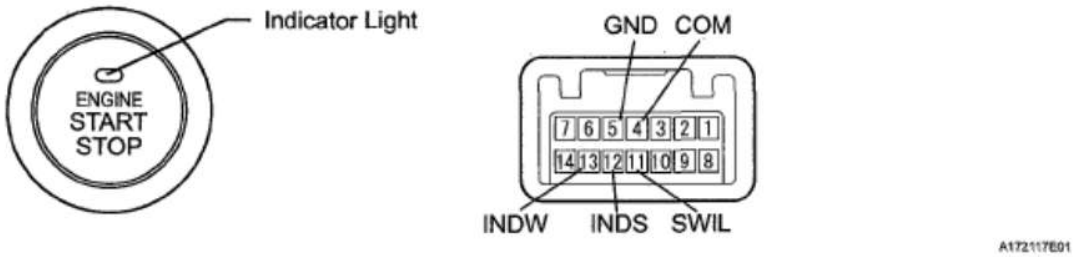


Fig. 147: Identifying Engine Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

INSTALLATION

1. **INSTALL ENGINE SWITCH**
   a. Engage the 2 claws to install the switch.
   b. Connect the switch connector.

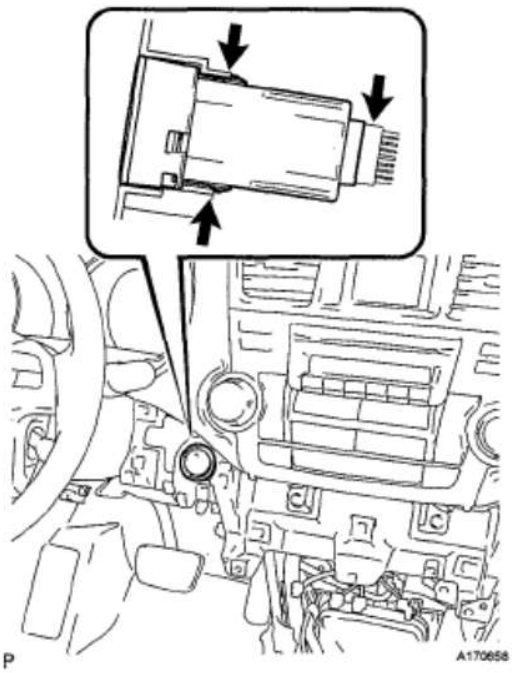


Fig. 148: Locating Engine Switch Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL FRONT NO. 1 CONSOLE BOX INSERT** (See **INSTALLATION**)
3. **INSTALL CONSOLE BOX ASSEMBLY (w/o Rear Air Conditioning System)** (See

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INSTALLATION)

4. **INSTALL CONSOLE BOX ASSEMBLY (w/ Rear Air Conditioning System)** (See INSTALLATION)
5. **INSTALL LOWER REAR CONSOLE BOX** (See INSTALLATION)
6. **INSTALL NO. 2 CONSOLE BOX DUCT (w/o Rear Air Conditioning System)** (See INSTALLATION)
7. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY** (See INSTALLATION)
8. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See INSTALLATION)
9. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See INSTALLATION)
10. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH** (See INSTALLATION)
11. **INSTALL FRONT DOOR SCUFF PLATE LH** (See INSTALLATION)
12. **INSTALL AIR CONDITIONING CONTROL ASSEMBLY (for Automatic Air Conditioning System)** (See REMOVAL)
13. **INSTALL HEATER CONTROL AND ACCESSORY ASSEMBLY (for Manual Air Conditioning System)** (See AIR CONDITIONING PANEL (FOR MANUAL AIR CONDITIONING SYSTEM))
14. **INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/ Smart Key System)** (See INSTALLATION)
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).**

IGNITION SWITCH

COMPONENTS

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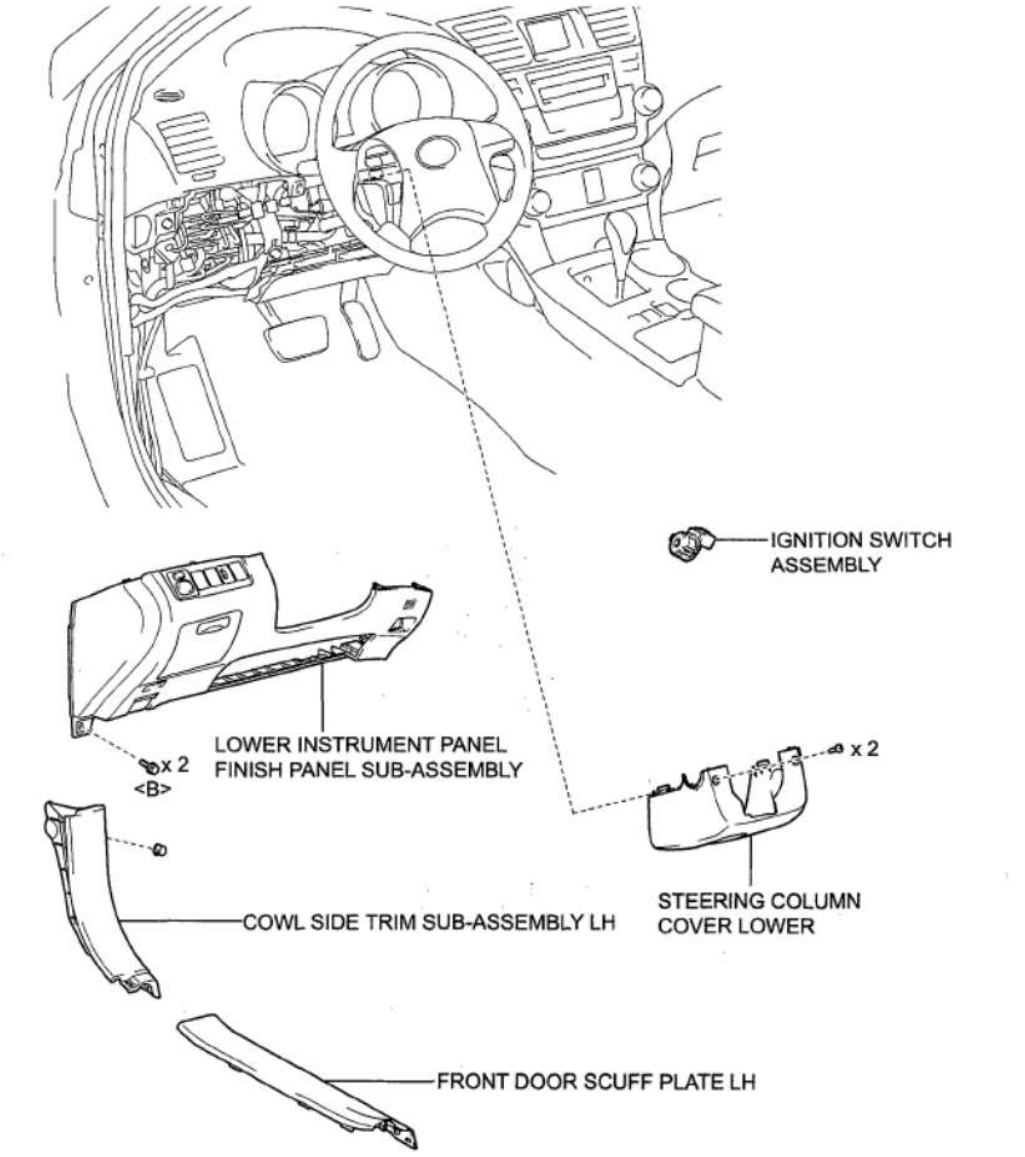


Fig. 149: Identifying Ignition Switch Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION: Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag deployment and seat belt pretensioner activation.

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NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).**

2. **REMOVE STEERING COLUMN COVER LOWER**
   a. Insert the key into the ignition key cylinder and release the steering lock.
   b. Turn the steering wheel clockwise to gain access to the screw and remove the screw.

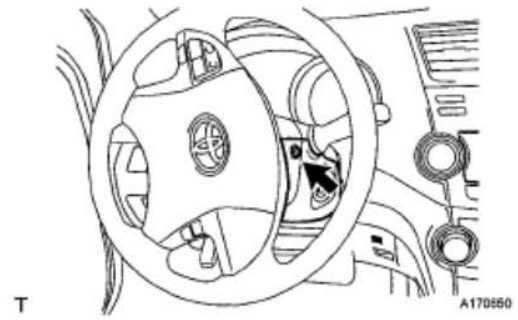


Fig. 150: Locating Steering Column Cover Lower Screw
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Turn the steering wheel counterclockwise to gain access to the screw and remove the screw.
   d. Release the tilt lever.

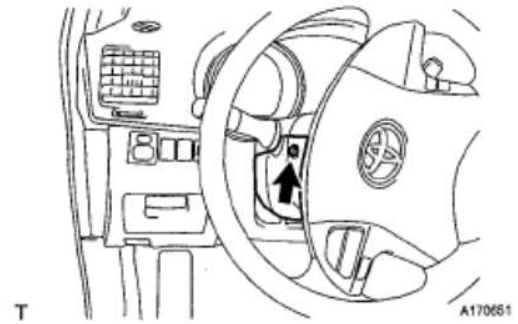


Fig. 151: Locating Steering Column Cover Lower Screw
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   e. Disengage the 2 claws and remove the steering column cover lower.
3. **REMOVE FRONT DOOR SCUFF PLATE LH** (See **REMOVAL**)
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH** (See **REMOVAL**)
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **REMOVAL**)
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)

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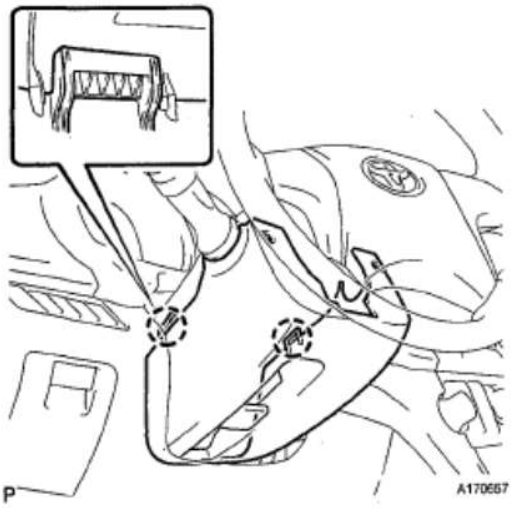


Fig. 152: Identifying Steering Column Cover Lower Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE IGNITION SWITCH ASSEMBLY**
   a. Disconnect the ignition switch connector.

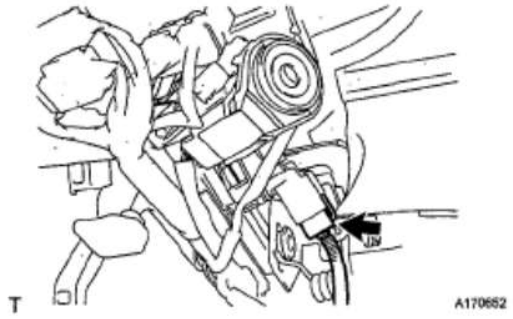


Fig. 153: Locating Ignition Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Disengage the 2 claws and remove the ignition switch.

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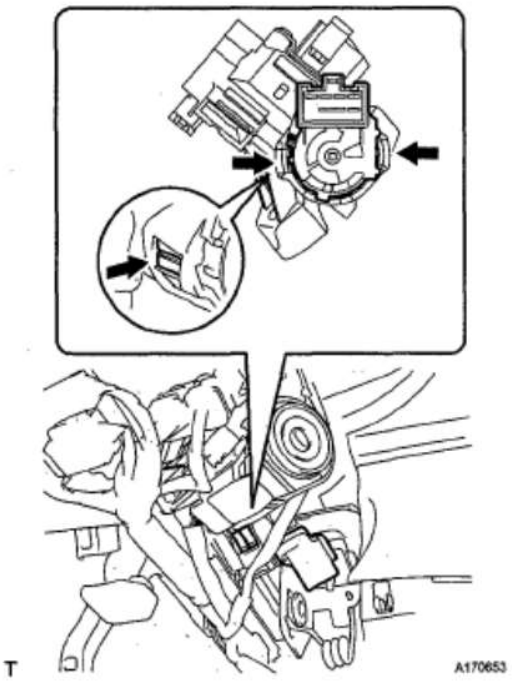


Fig. 154: Locating Ignition Switch Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT IGNITION SWITCH ASSEMBLY**
   a. Measure the resistance according to the value(s) in the table below.

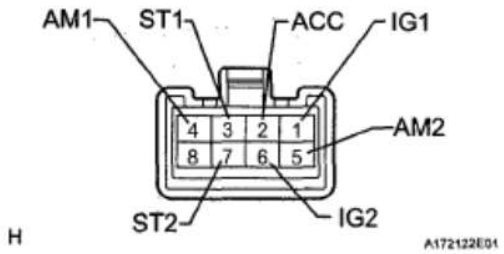


Fig. 155: Identifying Ignition Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

STANDARD RESISTANCE CHART

Tester Connection	Switch Condition	Specified Condition
Between each terminal	LOCK	10 kohms or higher
4 (AM1) - 2 (ACC)	ACC	Below 1 ohms
4 (AM1) - 2 (ACC)		

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4 (AM1) - 1 (IG1) 5 (AM2) - 6 (IG2)	ON	Below 1 ohms
4 (AM1) - 1 (IG1) 4 (AM1) - 3 (ST1) 5 (AM2) - 6 (IG2) 5 (AM2) - 7 (ST2)	START	Below 1 ohms

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

INSTALLATION

1. **INSTALL IGNITION SWITCH ASSEMBLY**
   a. Engage the 2 claws to install the ignition switch.

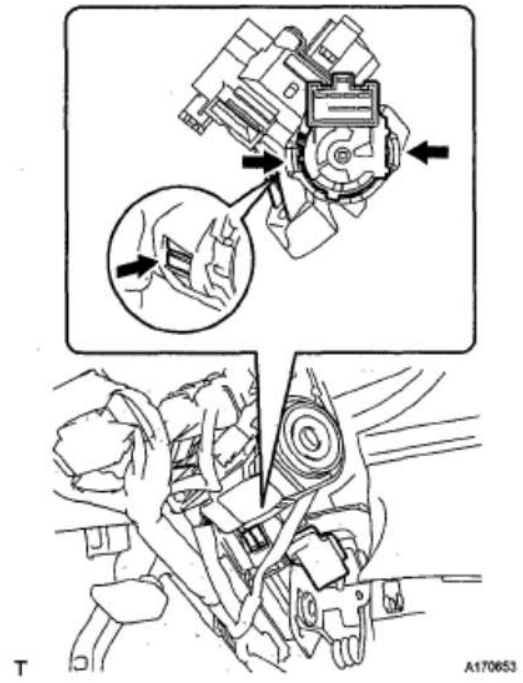


Fig. 156: Locating Ignition Switch Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the ignition switch connector.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **INSTALLATION**)

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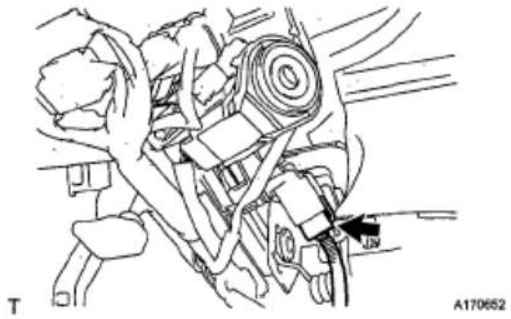


Fig. 157: Locating Ignition Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **INSTALLATION**)
4. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH** (See **INSTALLATION**)
5. **INSTALL FRONT DOOR SCUFF PLATE LH** (See **INSTALLATION**)
6. **INSTALL STEERING COLUMN COVER LOWER**
   a. Engage the 2 claws to install the steering column cover lower.

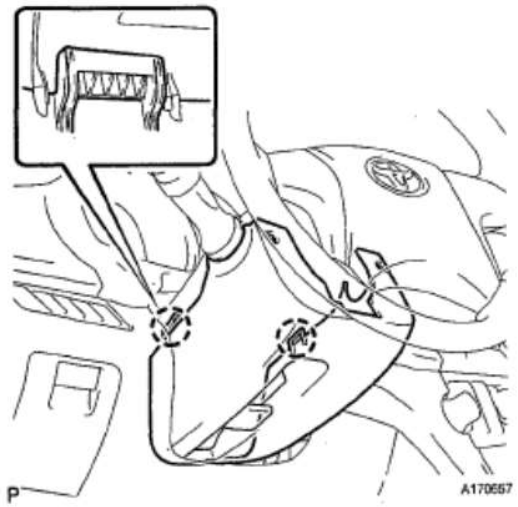


Fig. 158: Identifying Steering Column Cover Lower Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Insert the key into the ignition key cylinder and release the steering lock.
   c. Turn the steering wheel counterclockwise and install the screw.

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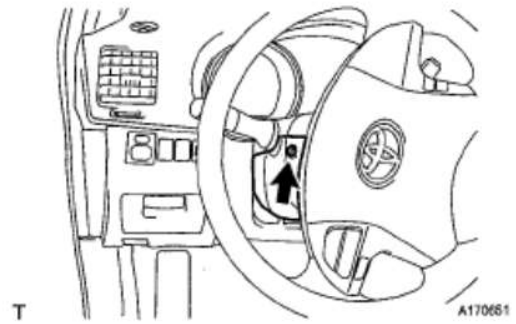


Fig. 159: Locating Steering Column Cover Lower Screw
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Turn the steering wheel clockwise and install the screw.

7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

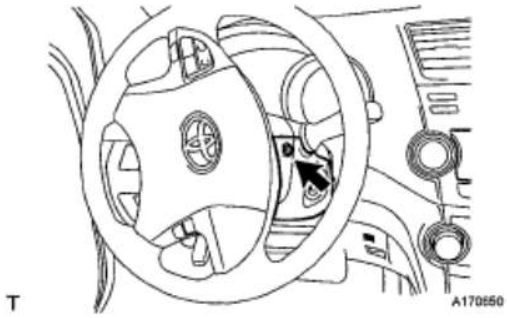


Fig. 160: Locating Steering Column Cover Lower Screw
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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