

ACCESSORIES & EQUIPMENT

Sliding Roof System (Diagnostics) - Sienna

SLIDING ROOF SYSTEM

PRECAUTION

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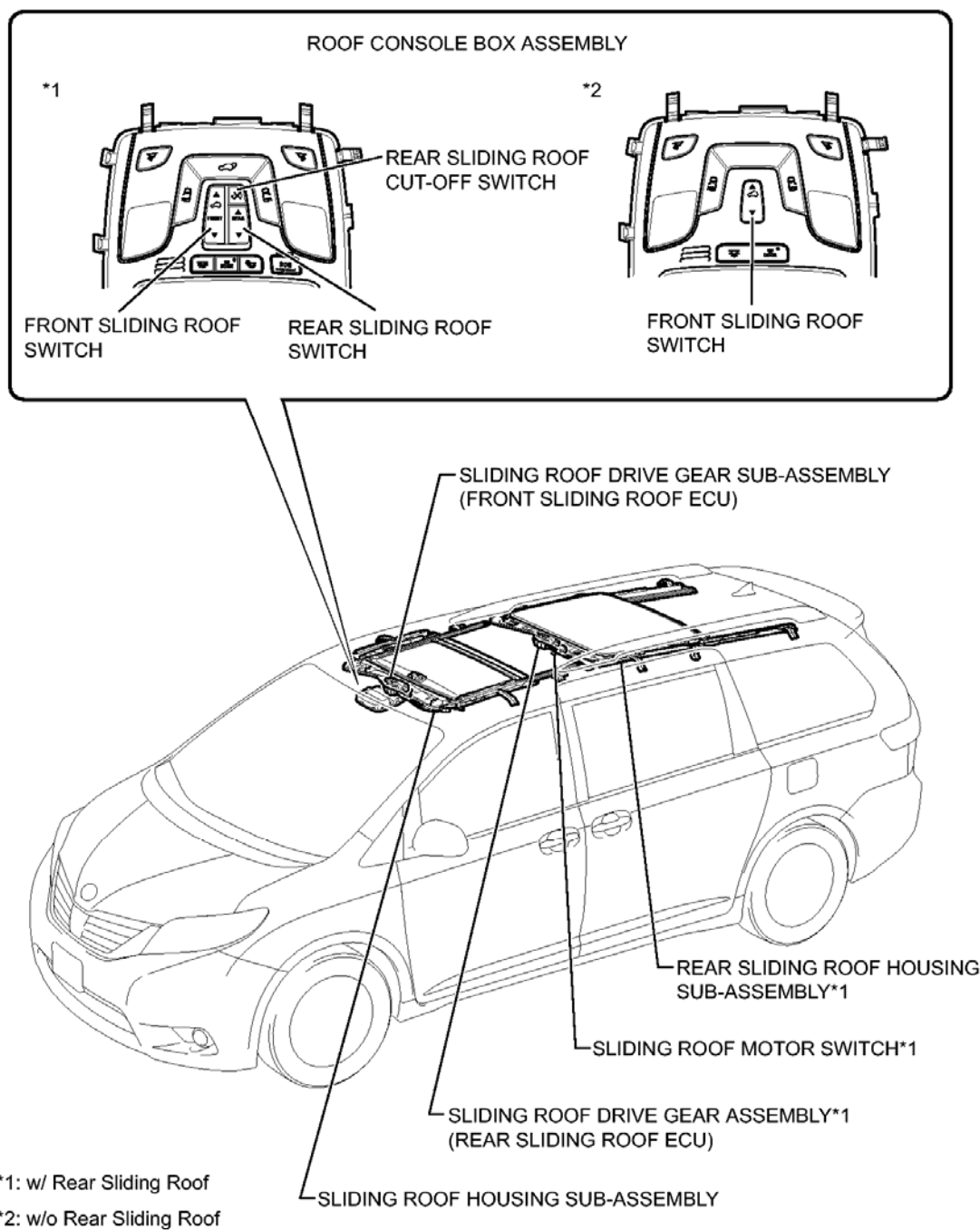
1. IGNITION SWITCH EXPRESSIONS

- a. The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this information.

Expression	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch ACC	ACC	On (ACC)
Ignition switch ON	ON	On (IG)
Engine start	START	Start

PARTS LOCATION

ILLUSTRATION



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Fig. 1: Sliding Roof System Components Location (1 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

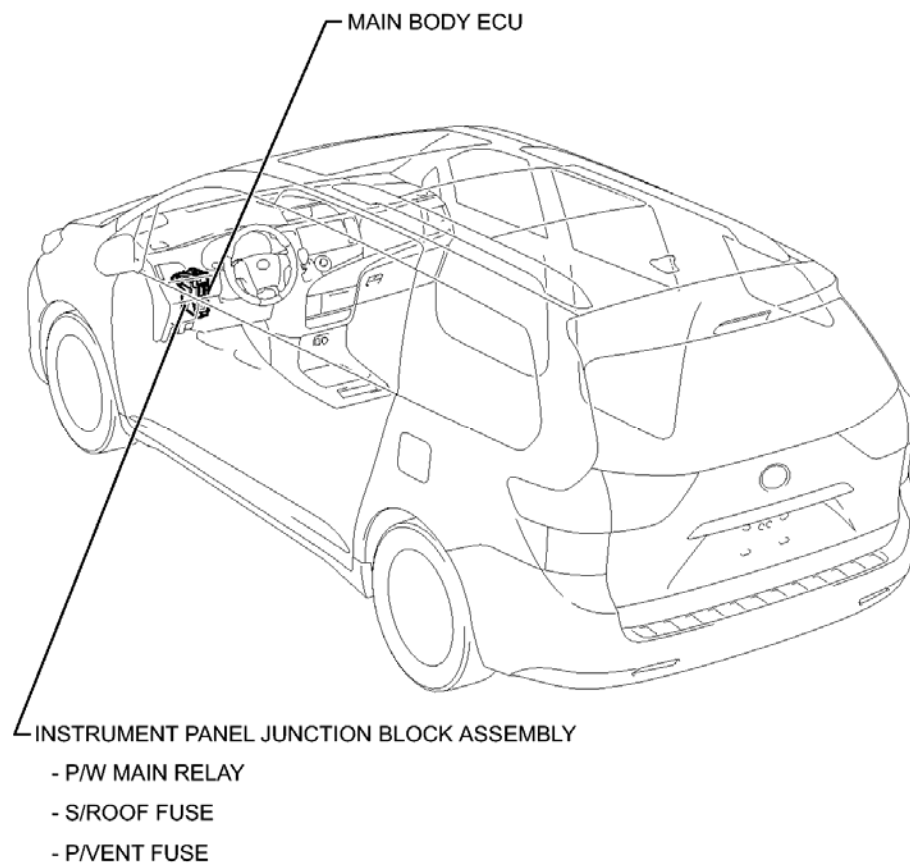


Fig. 2: Sliding Roof System Components Location (2 of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

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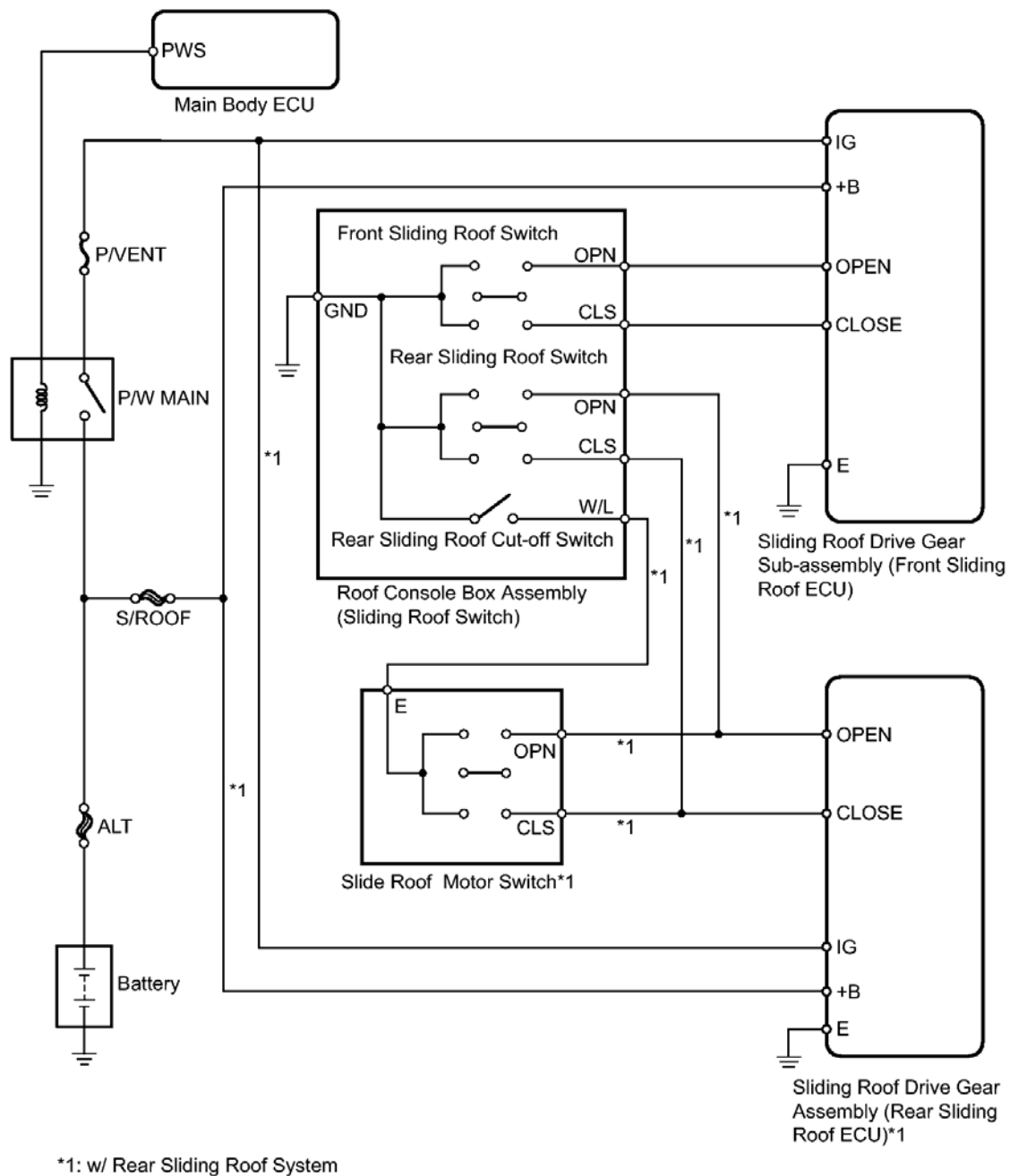


Fig. 3: Sliding Roof System Diagram

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

SYSTEM DESCRIPTION

SYSTEM DESCRIPTION

1. SLIDING ROOF SYSTEM DESCRIPTION

This system has the following functions: manual slide open and close, auto slide open and close, manual tilt up and down*1, auto tilt up and down*1, and jam protection.

*1: w/ Front Sliding Roof System

2. FUNCTION OF MAIN COMPONENTS

Component	Outline
Sliding roof drive gear sub-assembly (Front sliding roof ECU)	The sliding roof ECU controls the rotational direction of the motor, which tilts or slides the front sliding roof glass.
Sliding roof drive gear assembly (Rear sliding roof ECU)	The sliding roof ECU controls the rotational direction of the motor, slides the rear sliding roof glass.
Roof console box	The sliding roof switch outputs operation signals to

assembly (Sliding roof switch)	the front sliding roof ECU or rear sliding roof ECU*1.
Sliding roof motor switch*1	The sliding roof switch outputs operation signals to the rear sliding roof ECU.

*1: w/ Rear Sliding Roof System

3. SYSTEM OPERATION

The sliding roof has the following features.

Function	Outline
Manual slide open and close	This function causes the sliding roof to open (or close) when the slide open switch (or slide close switch) is pressed for less than 0.3 seconds.

	• The sliding roof stops as soon as the switch is released.
Manual tilt up and down*1	• This function causes the sliding roof to tilt up (or tilt down) when the tilt up switch (or tilt down switch) is pressed for less than 0.3 seconds. • The sliding roof stops as soon as the switch is released.
Auto slide open and close	This function causes the sliding roof to be fully opened (or closed) when the slide open switch (or

	slide close switch) is pressed for 0.3 seconds or more.
Auto tilt up and down*1	This function causes the sliding roof to be fully tilted up (or tilted down) when the tilt up switch (or tilt down switch) is pressed for 0.3 seconds or more.
Jam protection function	The jam protection function automatically stops the sliding roof and moves it open halfway (or fully tilts it up*1) if a foreign object gets jammed in the sliding roof during close or tilt down*1 operation.
Key-off operation	The key-off operation function makes it possible to operate the sliding roof for approximately 43 seconds after the ignition switch is turned off if

	the driver side door is not opened.
Rear sliding roof cut-off switch function*2	Depressing the sliding roof cut-off switch located in the roof console box will deactivate the rear sliding roof.

*1: w/ Front Sliding Roof System

*2: w/ Rear Sliding Roof System

HOW TO PROCEED WITH TROUBLESHOOTING

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the sliding roof system.
- *: Use the Techstream.

1. VEHICLE BROUGHT TO WORKSHOP

NEXT: Go to next step

2. CUSTOMER PROBLEM ANALYSIS

HINT:

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

What	Vehicle model, system name
	Date, time,

When	occurrence frequency
Where	Road conditions
Under what conditions?	Driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT: Go to next step

3. INSPECT BATTERY VOLTAGE

Standard voltage

11 to 14 V

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

NEXT: Go to next step

4. PROBLEM SYMPTOMS TABLE

- Refer to **PROBLEM SYMPTOMS TABLE**.

RESULT

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

B --> Go to step 6

A: Go to next step

5. OVERALL ANALYSIS AND TROUBLESHOOTING*

- a. Operation Check. Refer to OPERATION CHECK
- b. Terminals of ECU. Refer to TERMINALS OF ECU

NEXT: Go to next step

6. ADJUST, REPAIR OR REPLACE

NEXT: Go to next step

7. INITIALIZATION

- a. Initialization. Refer to INITIALIZATION

NEXT: Go to next step

8. CONFIRMATION TEST

NEXT --> END

OPERATION CHECK

OPERATION CHECK

1. CHECK AUTO OPERATION (FRONT SLIDING ROOF SYSTEM)

NOTE: **Make sure that initialization is completed before inspection. Refer to INITIALIZATION.**

HINT:

When pressing the switch for 0.3 seconds or less, the roof glass moves but auto operation does not operate.

- a. Turn the ignition switch to ON.
- b. When the roof glass is fully closed, press the OPEN switch for 0.3 seconds or more. Check that the roof glass automatically tilt up until it is fully tilted upward.
- c. When the roof glass is fully tilted up, press the OPEN switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully opened.
- d. When the roof glass is fully open, press the CLOSE switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully closed.
- e. When the roof glass is fully tilted up, press the CLOSE switch for 0.3 seconds or more. Check that the roof glass automatically tilts down until it is fully tilted downward.
- f. When the auto operation is operating, check that pressing any sliding roof switch stops the roof glass operation.

2. CHECK AUTO OPERATION (REAR SLIDING ROOF SYSTEM)

NOTE: **Make sure that initialization is completed before inspection. Refer to INITIALIZATION.**

HINT:

When pressing the switch for 0.3 seconds or less, the roof glass moves but auto operation does not operate.

- a. Turn the ignition switch to ON.
- b. When the roof glass is fully closed, press the OPEN switch for 0.3 seconds or more. Check the roof glass automatically slides until it is fully opened.
- c. When the roof glass is fully open, press the CLOSE switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully closed.
- d. When the auto operation is operating, check that pressing any sliding roof switch stops the roof glass operation.

3. CHECK SLIDING ROOF OPERATION AFTER IGNITION SWITCH IS TURNED OFF

- a. Turn the ignition switch from ON to off, and check that the sliding roof can be operated. Then open the driver or front passenger side door once, and check that the sliding roof cannot be operated.
- b. Turn the ignition switch from ON to off and wait for approximately 43 seconds. Check that the sliding roof cannot be operated.
- c. Operate the auto operation (slide open/close or tilt up/down*1) with the driver or front passenger side door open. While the roof glass is in motion, turn the ignition switch off. Check that the roof glass stops immediately.

*1: w/ Front Sliding Roof System

4. CHECK JAM PROTECTION FUNCTION

WARNING:

- Do not use a part of your body, for example, your hand, to check the jam protection function.
- Do not allow anything to become caught in the sliding roof by accident while performing this inspection.
- Perform the inspection from the inside of the vehicle.

NOTE:

- Do not use hard objects, such as a hammer, to avoid damaging the roof.
- Make sure that initialization is completed before inspection. Refer to INITIALIZATION.
- If the jam protection function does not operate, initialize the sliding roof drive gear sub-assembly (front sliding roof ECU) or sliding roof drive gear assembly (rear sliding roof ECU).
- The jam protection function does not operate when the roof glass is close to the fully closed position.

- a. When the slide close function is operating and an object is caught between the vehicle body and glass, check that the roof glass opens a distance of 189 mm (7.44 in.) from the point of contact with the object, or opens fully if an opening distance of 189 mm (7.44 in.) is not available.
- b. When the tilt down function*1 is operating, and an object is caught between the vehicle body and the roof glass, check that the sliding roof tilts up fully.

*1: w/ Front Sliding Roof System

INITIALIZATION

INITIALIZATION

1. INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (FRONT SLIDING ROOF ECU) AND SLIDING ROOF DRIVE GEAR ASSEMBLY (REAR SLIDING ROOF ECU)

NOTE: When replacing the sliding roof drive gear, the new sliding roof drive gear requires initialization. If a reset is not executed, the following functions do not operate: AUTO operation and jam protection function.

- a. Press the CLOSE switch and keep it pressed until the sliding roof motor stops, then release it.
- b. Press and hold the CLOSE switch again. After 10 seconds, the system enters Initialization mode.
- c. Keep the CLOSE switch pressed, and confirm that the sliding roof moves in the following sequence:

Full close (soft stop position) --> Full close (mechanical stop position) --> Full close (soft stop position)

- d. Release the CLOSE switch.

Press and hold the CLOSE switch again within 5 seconds.

- e. Keep the CLOSE switch pressed, and confirm that the sliding roof moves in the following sequence:

Full close --> Full open --> Full close

- f. Release the CLOSE switch.
- g. The Initialization sequence is now complete.

PROBLEM SYMPTOMS TABLE

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are

listed, 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 this system before inspecting the suspected areas below.

FRONT SLIDING ROOF SYSTEM

Symptom	Suspected Area	See
AUTO function does not operate	Glass position initialization	Refer to <u>INITIALIZATION</u>
	Sliding roof drive gear sub-assembly (sliding roof motor)	Refer to <u>DISASSEMBLY</u>
Sliding roof system does not operate	P/VENT fuse	-
	S/ROOF fuse	-
	P/W MAIN relay	-
	Sliding roof housing sub-assembly	Refer to <u>REMOVAL</u>
	Roof console box assembly (sliding roof switch)	Refer to <u>REMOVAL - Step 1</u>
	Sliding roof drive gear sub-assembly (front sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
Sliding roof system stops operation halfway	Sliding roof drive gear sub-assembly (front sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
	Sliding roof housing sub-assembly	Refer to <u>REMOVAL</u>
Key-off operation does not operate	Front door courtesy light switch LH	Refer to <u>INSPECTION</u>
	Front door courtesy light switch RH	Refer to <u>INSPECTION</u>
	Main body ECU	Refer to <u>TERMINALS OF ECU</u>
	Sliding roof drive gear sub-assembly (front sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
Jam protection function does not operate	Glass position initialization	Refer to <u>INITIALIZATION</u>
	Sliding roof drive gear sub-assembly (front sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>

REAR SLIDING ROOF SYSTEM

Symptom	Suspected Area	See
AUTO function does not	Glass position initialization	Refer to <u>INITIALIZATION</u>

operate	Sliding roof drive gear assembly (sliding roof motor)	Refer to <u>DISASSEMBLY</u>
Sliding roof system does not operate	P/VENT fuse	-
	S/ROOF fuse	-
	P/W MAIN relay	-
	Rear sliding roof housing sub-assembly	Refer to <u>REMOVAL</u>
	Sliding roof drive gear assembly (rear sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
	Roof console box assembly (sliding roof switch)	Refer to <u>REMOVAL - Step 1</u>
	Sliding roof motor switch	Refer to <u>INSPECTION</u>
Sliding roof system stops operation halfway	Sliding roof drive gear assembly (rear sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
	Rear sliding roof housing sub-assembly	Refer to <u>REMOVAL</u>
Key-off operation does not operate	Front door courtesy light switch LH	Refer to <u>INSPECTION</u>
	Front door courtesy light switch RH	Refer to <u>INSPECTION</u>
	Main body ECU	Refer to <u>TERMINALS OF ECU</u>
	Sliding roof drive gear assembly (rear sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>
Jam protection function does not operate	Glass position initialization	Refer to <u>INITIALIZATION</u>
	Sliding roof drive gear assembly (rear sliding roof ECU)	Refer to <u>TERMINALS OF ECU</u>

TERMINALS OF ECU

TERMINALS OF ECU

1. CHECK MAIN BODY ECU AND INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

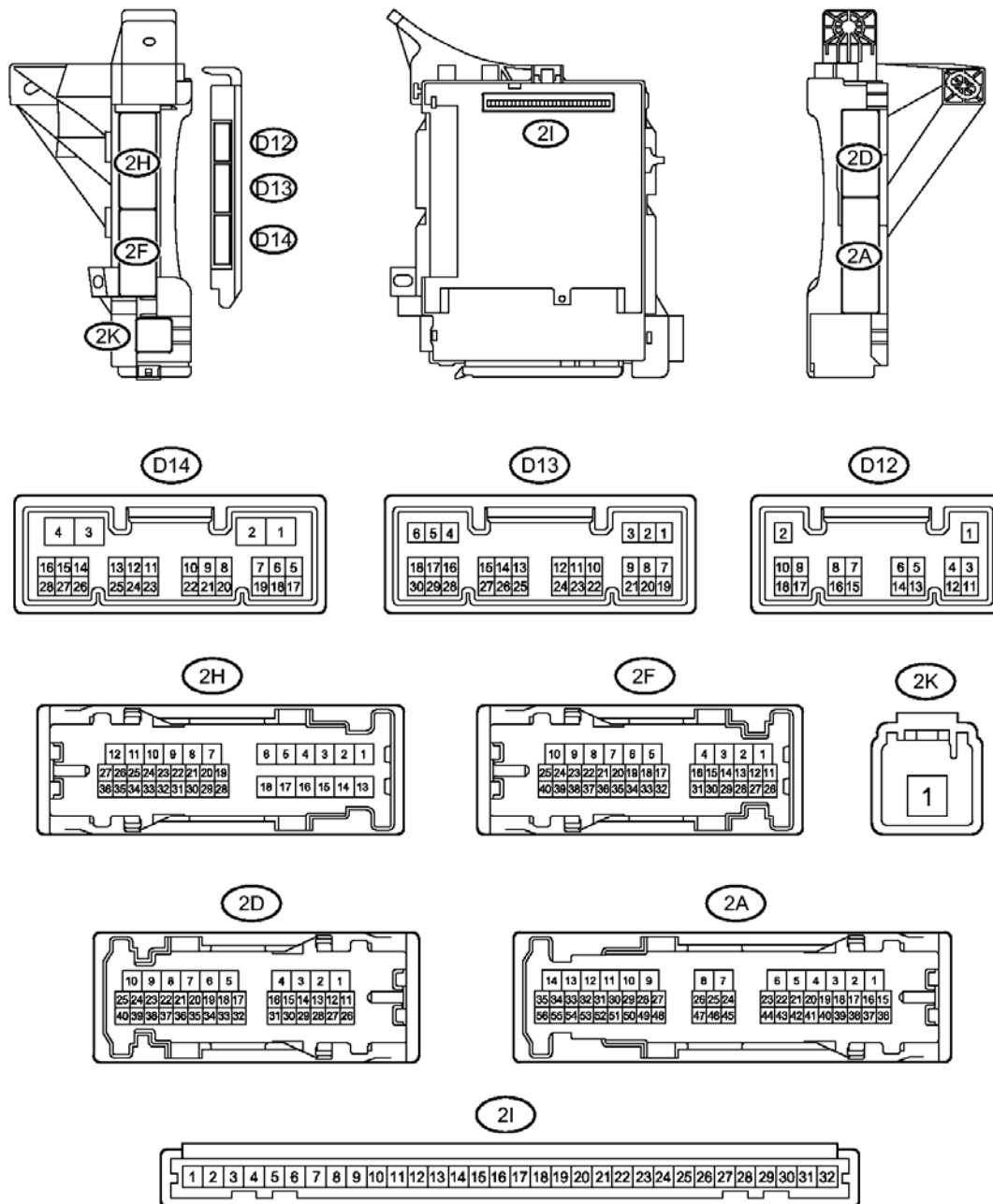


Fig. 4: ECU Connector Terminal Identification - I/P Junction Block & Main Body ECU
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Remove the main body ECU.
- Disconnect the D14 main body ECU connector.
- Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
2I-2 (FLCY) - Body ground	-	Front door courtesy light switch LH input	Driver door Closed (off) --> Open (on)	10 kohms or higher -> Below 1 ohms
2I-4 (FRCY) - Body ground	-	Front door courtesy light switch RH input	Front passenger door Closed (off) --> Open (on)	10 kohms or higher -> Below 1 ohms
2I-11 (GND1) - Body ground	-	Ground	Always	Below 1 ohms
2I-29 (ACC) - Body ground	-	Ignition power supply (ACC signal)	Ignition switch ACC --> off	11 to 14 V --> Below 1 V
2I-30 (BECU) - Body ground	-	Battery power supply	Always	11 to 14 V
2I-31 (ALTB) - Body ground	-	Battery power supply	Always	11 to 14 V
D14-3 (GND2) - 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.

- d. Reinstall the main body ECU.
- e. Reconnect the D14 main body ECU connector.
- f. Measure the voltage according to the value(s) in the table below.

Terminal No.	Wiring	Terminal	Condition	Specified
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(Symbol)	Color	Description		Condition
2H-27 (FRCY) - Body ground	GR - Body ground	Front door courtesy light switch RH input	Front passenger door open	Below 1 V
			Front passenger door closed	11 to 14 V
2H-35 (FLCY) - Body ground	P - Body ground	Front door courtesy light switch LH input	Driver door open	Below 1 V
			Driver door closed	11 to 14 V

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

2. CHECK SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (FRONT SLIDING ROOF ECU)

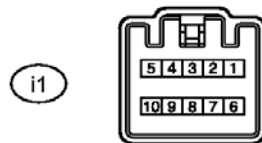


Fig. 5: ECU Connector Terminal Identification - Sliding Roof Drive Gear Sub-Assembly (Front Sliding Roof ECU)

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

- Disconnect the i1 sliding roof drive gear sub-assembly (front sliding roof ECU) connector.
- Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
i1-1 (E) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
i1-3 (IG)	L - W-	IG power	Ignition switch off	Below 1 V
			Ignition	

- i1-1 (E)	B	supply	switch ON	11 to 14 V
i1-6 (B) - i1-1 (E)	R - W-B	Battery 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 i1 sliding roof drive gear sub-assembly (front sliding roof ECU) connector.
- d. Measure the voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
i1-4 (CLS) - i1-1 (E)	BR - W-B	Sliding roof motor close	Ignition switch ON, sliding roof open Slide close switch off	11 to 14 V
			Ignition switch ON, sliding roof open Slide close switch on	Below 1 V
i1-5 (OPN) - i1-1 (E)	B - W-B	Sliding roof motor open	Ignition switch ON, sliding roof closed Slide open switch off	11 to 14 V
			Ignition switch ON, sliding roof closed Slide open switch on	Below 1 V

If the result is not as specified, the sliding roof drive gear sub-assembly may have a malfunction.

3. CHECK SLIDING ROOF DRIVE GEAR ASSEMBLY (REAR SLIDING ROOF ECU)

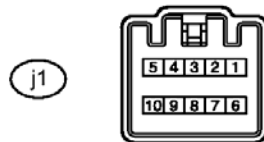


Fig. 6: ECU Connector Terminal Identification - Sliding Roof Drive Gear Assembly (Rear Sliding Roof ECU)

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

- Disconnect the j1 sliding roof drive gear assembly (rear sliding roof ECU) connector.
- Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
j1-1 (E) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
j1-3 (IG) - j1-1 (E)	L - W-B	IG power supply	Ignition switch off	Below 1 V
			Ignition switch ON	11 to 14 V
j1-6 (B) - j1-1 (E)	R - W-B	Battery power supply	Always	11 to 14 V

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

- Reconnect the j1 sliding roof drive gear assembly (rear sliding roof ECU) connector.
- Measure the voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition

j1-4 (CLS) - j1-1 (E)	BR - W-B	Sliding roof motor close	Ignition switch ON, sliding roof open Slide close switch off	11 to 14 V
			Ignition switch ON, sliding roof open Slide close switch on	Below 1 V
j1-5 (OPN) - j1-1 (E)	B - W- B	Sliding roof motor open	Ignition switch ON, sliding roof closed Slide open switch off	11 to 14 V
			Ignition switch ON, sliding roof closed Slide open switch on	Below 1 V

If the result is not as specified, the sliding roof drive gear assembly may have a malfunction.