

ACCESSORIES & EQUIPMENT

Window Defogger (Diagnostics & Symptom Tests) - Sienna

WINDOW DEFOGGER SYSTEM

PRECAUTION

PRECAUTION

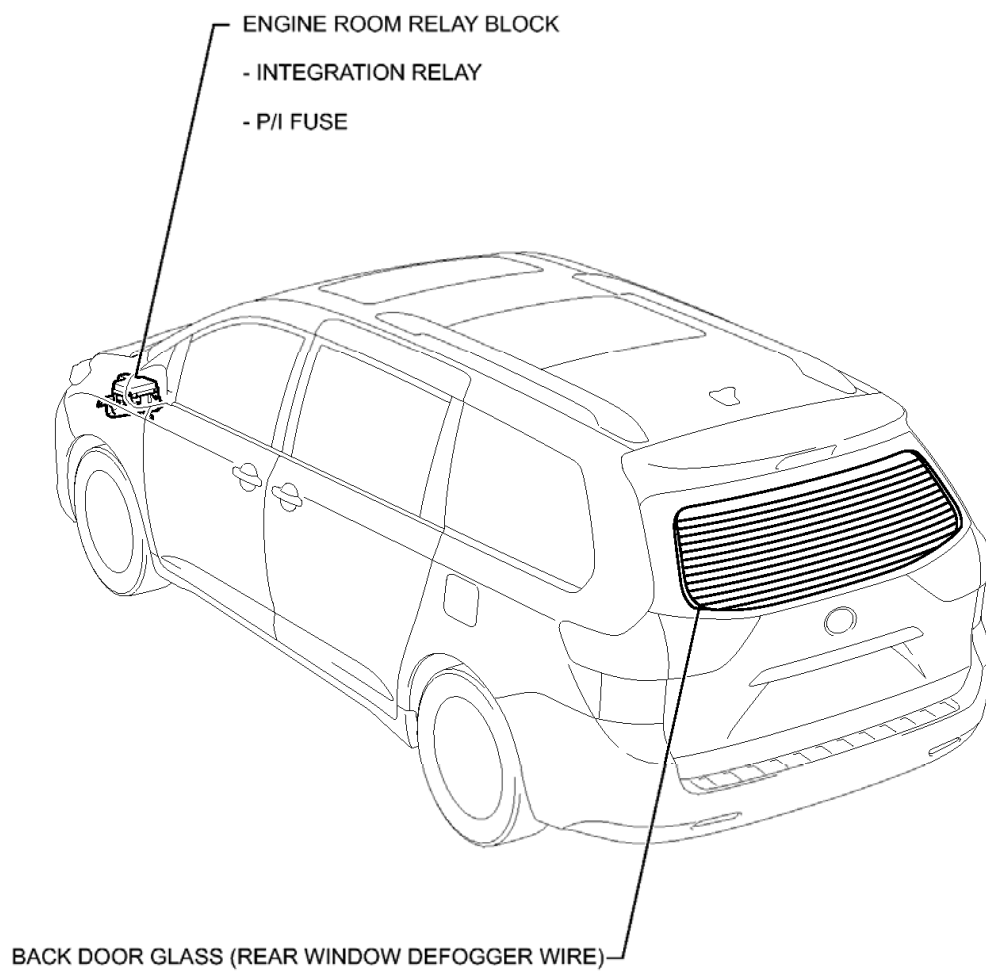
1. EXPRESSIONS OF IGNITION SWITCH

- 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 ON	ON	On (IG)
Ignition switch ACC	ACC	On (ACC)
Engine Start	START	Start

PARTS LOCATION

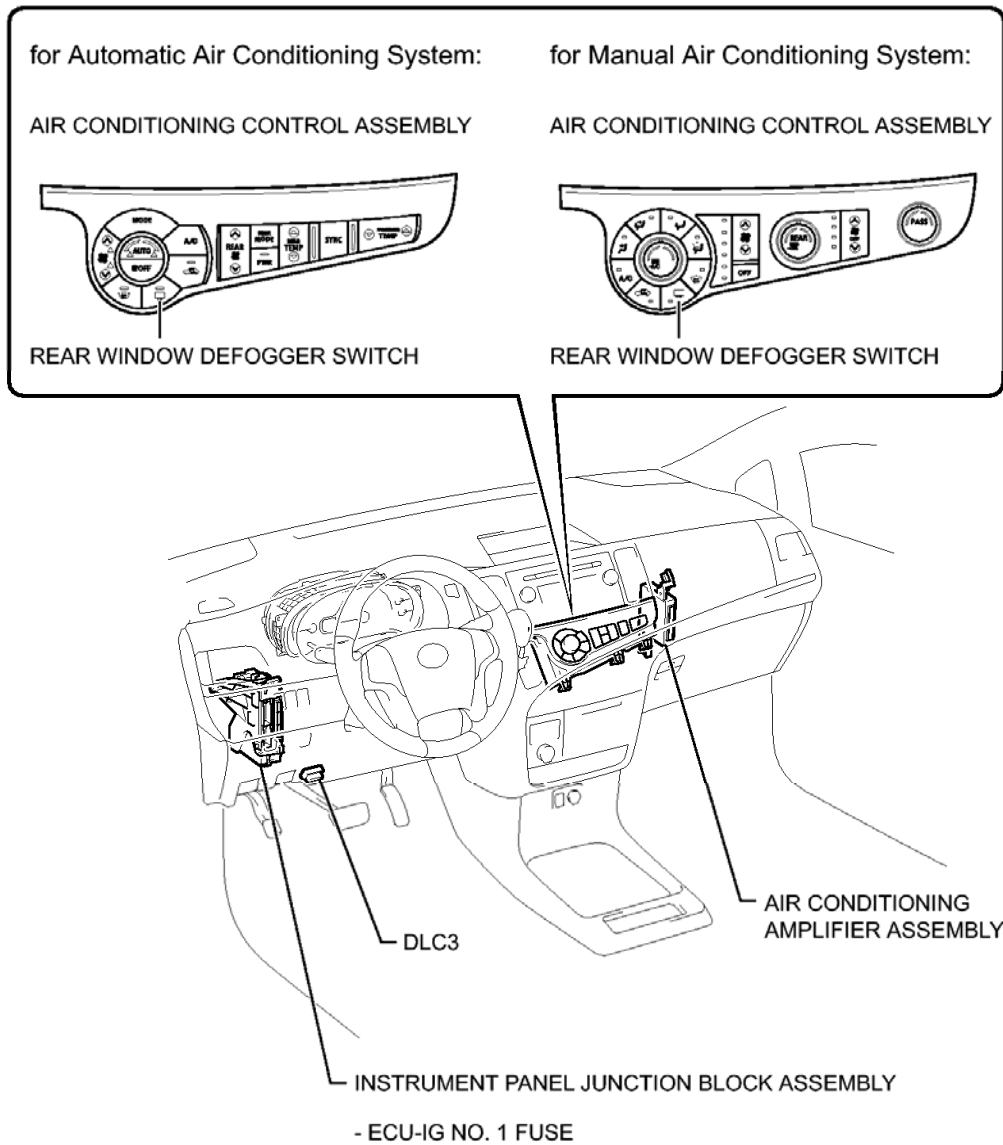
ILLUSTRATION



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

ILLUSTRATION



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Fig. 2: Window Defogger System Components Location (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

SYSTEM DIAGRAM

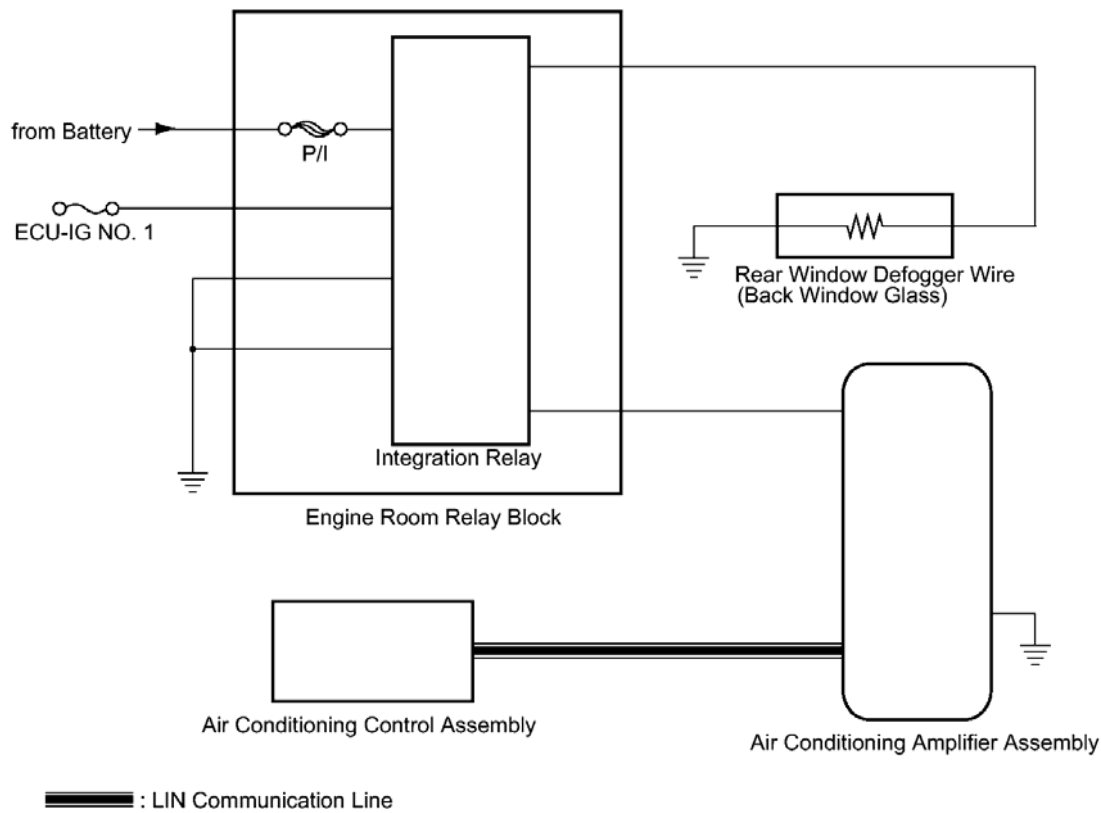


Fig. 3: Window Defogger System Diagram
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMMUNICATION TABLE

Transmitting ECU	Receiving ECU	Signal	Communication Method
Air Conditioning Control Assembly	Air Conditioning Amplifier Assembly	Rear window defogger switch signal	LIN

SYSTEM DESCRIPTION

SYSTEM DESCRIPTION

1. GENERAL

The rear window defogger wires are attached to the inside of the rear window and defog the window surface quickly by pressing the rear window defogger switch on the air conditioning control assembly. The indicator light is illuminated while the system is operating. The system automatically turns off after approximately 15 minutes.

HINT:

- The rear window defogger is linked with the mirror heater and windshield deicer.
- If both of the following conditions are met after approximately 15 minutes from the rear window defogger was activated, the rear window defogger continues to operate up to 45 minutes. If any of the following conditions are not met, the rear window defogger stops operating immediately.
 - The outside temperature is 0°C (32 °F) or below.
 - The vehicle speed is 60 km/h (37 mph) or more.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Air Conditioning Control Assembly	Sends signals to the air conditioning amplifier assembly to operate the rear window defogger.
Air Conditioning Amplifier Assembly	Sends rear window defogger activation request signal to the integration relay.
Integration Relay	Receives rear window defogger activation request signal from the air conditioning amplifier assembly and supplies power to the rear window defogger wire (back window glass).
	Receives power from the

Rear Window Defogger Wire (Back Window Glass)	integration relay and heats the rear window using the rear window defogger wire (back window glass).
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HOW TO PROCEED WITH TROUBLESHOOTING

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the window defogger 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
When	Date, time, occurrence frequency
Where	Road conditions
	Driving

Under what conditions?	conditions, weather conditions
How did it happen?	Problem symptoms

NEXT: Go to next step

3. INSPECT BATTERY VOLTAGE

- Measure the battery voltage.

Standard voltage

11 to 14 V

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

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*

- Terminals of ECU. Refer to **TERMINALS OF ECU**
- Data List / Active Test. Refer to **DATA LIST / ACTIVE TEST**
- On-vehicle Inspection. Refer to **ON-VEHICLE INSPECTION**

NEXT: Go to next step

6. REPAIR OR REPLACE

NEXT: Go to next step

7. CONFIRMATION TEST

NEXT --> END

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 related to this system before inspecting the suspected areas below.

WINDOW DEFOGGER SYSTEM

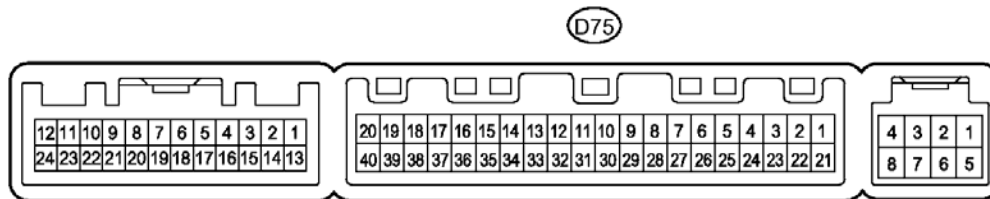
Symptom	Suspected Area	See
Rear Window Defogger System does not Operate	Proceed to "Rear Window Defogger System does not Operate"	Refer to <u>Rear Window Defogger System does not Operate</u>
	Air conditioning system (for automatic air conditioning system)	Refer to <u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	Air conditioning system (for manual air conditioning system)	Refer to <u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	Integration relay	-
	Air conditioning control assembly	-
	Air conditioning amplifier assembly	-
	Wire harness or connector	-
	Rear window defogger wire (back window glass)	Refer to <u>ON-VEHICLE INSPECTION</u>

TERMINALS OF ECU

TERMINALS OF ECU

1. CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY

- a. Disconnect the D75 air conditioning amplifier assembly connector.



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Fig. 4: ECU Connector Terminal Identification - Air Conditioning Amplifier Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Measure the voltage and resistance 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
D75-1 (IG+) - D75-14 (GND)	R - W- B	Power source (IG)	Ignition switch ON	11 to 14 V
			Ignition switch off	Below 1 V
D75-21 (B) - D75-14 (GND)	P - W- B	Power source (Back-up)	Always	11 to 14 V
D75-14 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

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

- c. Reconnect the D75 air conditioning amplifier assembly connector.
- d. Measure the voltage and check for pulses according to the value(s) in the table below.

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

D75-38 (RDFG) - D75-14 (GND)	Y - W- B	Rear window defogger signal	Ignition switch ON, rear window defogger switch off	11 to 14 V
			Ignition switch ON, rear window defogger switch on	Below 1 V
D75-37 (LIN1) - D75-14 (GND)	LG - W-B	LIN communication line	Ignition switch ON	Pulse generation

If the result is not as specified, the air conditioning amplifier assembly may have a malfunction.

2. CHECK AIR CONDITIONING CONTROL ASSEMBLY

- a. Disconnect the D69 air conditioning control assembly connector.

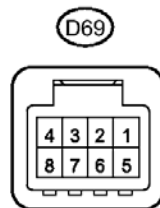


Fig. 5: ECU Connector Terminal Identification - Air Conditioning Control Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Measure the voltage and resistance 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
D69-4 (IG+) - D69-5 (GND)	R - W- B	Power source (IG)	Ignition switch ON	11 to 14 V
			Ignition	Below 1

			switch off	V
D69-5 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

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

- c. Reconnect the D69 air conditioning control assembly connector.
- d. Check for pulses according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D69-8 (LIN1) - D69-5 (GND)	LG - W-B	LIN communication line	Ignition switch ON	Pulse generation

If the result is not as specified, the air conditioning control assembly may have a malfunction.

DIAGNOSIS SYSTEM

DIAGNOSIS SYSTEM

1. CHECK DLC3

- a. Check the DLC3. Refer to **GENERAL INFORMATION** .

2. INSPECT BATTERY VOLTAGE

- a. Measure the battery voltage.

Standard voltage

11 to 14 V

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

DATA LIST / ACTIVE TEST

DATA LIST / ACTIVE TEST

1. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows 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 Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Body Electrical / Air Conditioner / Active Test.
- e. Perform the Active Test according to the display on the Techstream.

AIR CONDITIONER (AIR CONDITIONING AMPLIFIER ASSEMBLY)

Tester Display	Test Part	Control Range	Diagnostic Note
Defogger Relay (Rear)	Rear window defogger	OFF or ON	-

SYMPTOM TESTS

Rear Window Defogger System does not Operate

DESCRIPTION

When the rear window defogger switch on the air conditioning control assembly is pressed, the operation signal is transmitted to the air conditioning amplifier assembly through a LIN communication line. When the air conditioning amplifier assembly receives the signal, it turns on the integration relay to operate the rear window defogger.

WIRING DIAGRAM

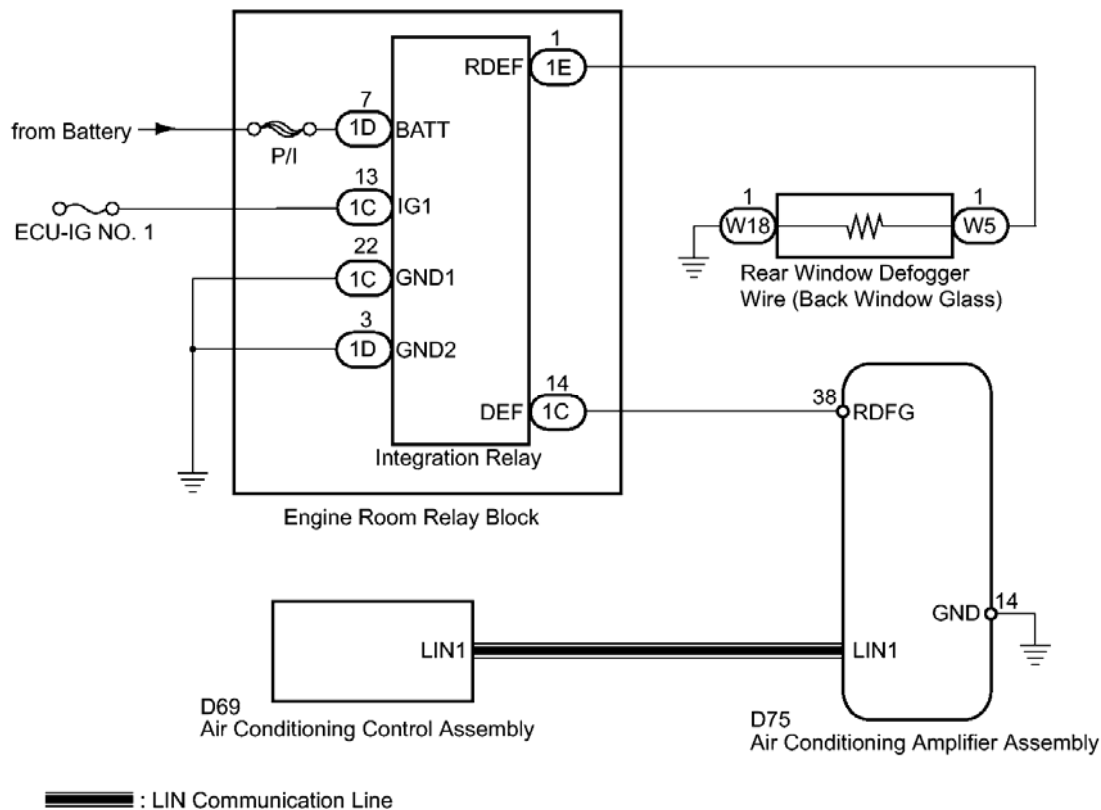


Fig. 6: Rear Window Defogger System Circuit - Wiring Diagram
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: Inspect the fuses for circuits related to this system before performing the following inspection procedure.

PROCEDURE

1. CHECK AIR CONDITIONING SYSTEM

- Check the air conditioning system.

HINT:

Both the window defogger system operation signal and air conditioning system operation signal are transmitted to the air conditioning amplifier assembly through the same communication line.

RESULT

Result	Proceed to

The air conditioning system operates normally.	A
The air conditioning system does not operate normally. (for Automatic Air Conditioning System)	B
The air conditioning system does not operate normally. (for Manual Air Conditioning System)	C

B --> See step 14

C --> See step 15

A: Go to next step

2. PERFORM ACTIVE TEST USING TECHSTREAM (DEFOGGER RELAY)

- Connect the Techstream to the DLC3.
- Turn the ignition switch to ON.
- Turn the Techstream on.
- Enter the following menus: Body Electrical / Air Conditioner / Active Test.
- Perform the Active Test according to the display on the Techstream.

AIR CONDITIONER (AIR CONDITIONING AMPLIFIER ASSEMBLY)

Tester Display	Test Part	Control Range	Diagnostic Note
Defogger Relay (Rear)	Rear window defogger	OFF or ON	-

RESULT

Result	Proceed to
The window defogger system operates normally.	A
The window defogger system does not operate normally. (for Automatic Air Conditioning System)	B
The window defogger system does not operate normally. (for Manual Air Conditioning System)	C

B --> See step 12

C --> See step 18

A: Go to next step

3. CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BODY GROUND)

- Disconnect the 1C and 1D integration relay connectors.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
1C-22 (GND1) - Body ground	Always	Below 1 ohms

1D-3 (GND2) - Body ground	Always	Below 1 ohms
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NG --> **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK: Go to next step

4. CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BATTERY)

- a. Disconnect the 1C and 1D integration relay connectors.
- b. Measure the voltage according to the value(s) in the table below.

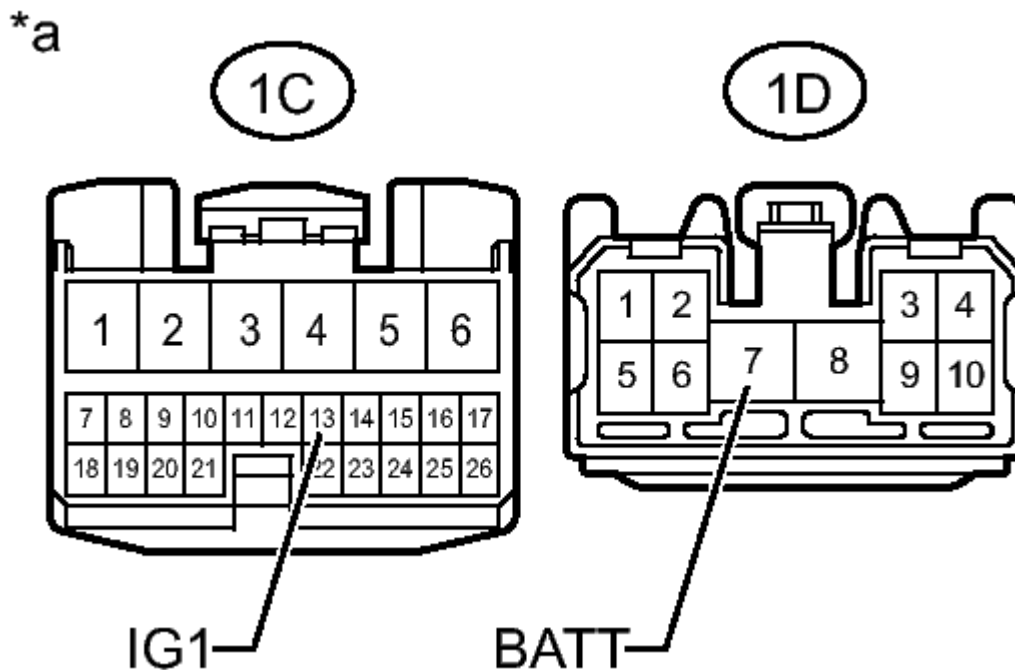


Fig. 7: Checking Harness And Connector (Integration Relay - Battery) With 1C & 1D Connector End View

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

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
1D-7 (BATT) - Body ground	Always	11 to 14 V
1C-13		

(IG1) - Body ground	Ignition switch ON	11 to 14 V
1C-13 (IG1) - Body ground	Ignition switch off	Below 1 V

TEXT IN ILLUSTRATION

*a	Front view of wire harness connector (to Integration Relay)
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NG --> REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

5. CHECK HARNESS AND CONNECTOR (AIR CONDITIONING AMPLIFIER ASSEMBLY - INTEGRATION RELAY)

- Disconnect the D75 air conditioning amplifier assembly connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
D75-38 (RDFG) - 1C-14 (DEF)	Always	Below 1 ohms
1C-14 (DEF) - Body ground	Always	10 kohms or higher
D75-14 (GND) - Body ground	Always	Below 1 ohms

NG --> REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

6. CHECK INTEGRATION RELAY

- a. Reconnect the 1C and 1D integration relay connectors.
- b. Measure the voltage according to the value(s) in the table below.

*a

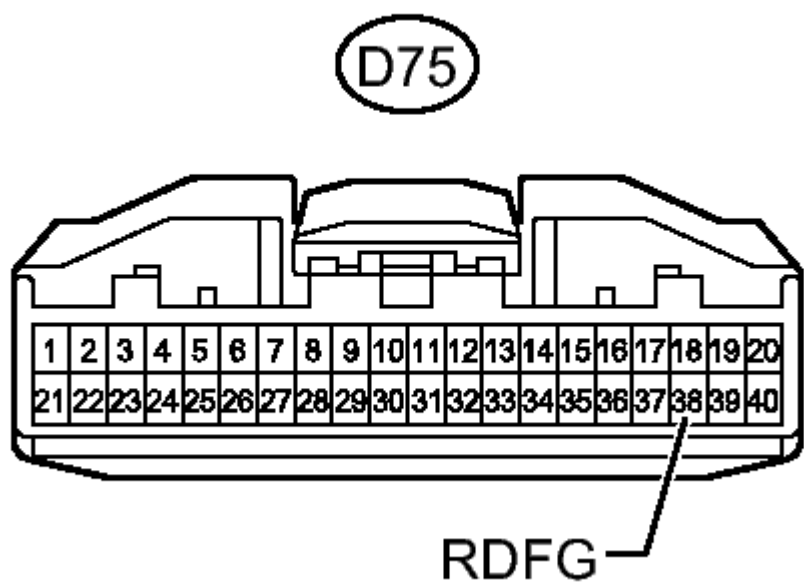


Fig. 8: Checking Integration Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
D75-38 (RDFG) - Body ground	Ignition switch ON	11 to 14 V

TEXT IN ILLUSTRATION

*a	Front view of wire harness connector (to Air Conditioning Amplifier Assembly)
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NG --> REPLACE INTEGRATION RELAY

OK: Go to next step

7. CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY

- a. Reconnect the D75 air conditioning amplifier assembly connector.

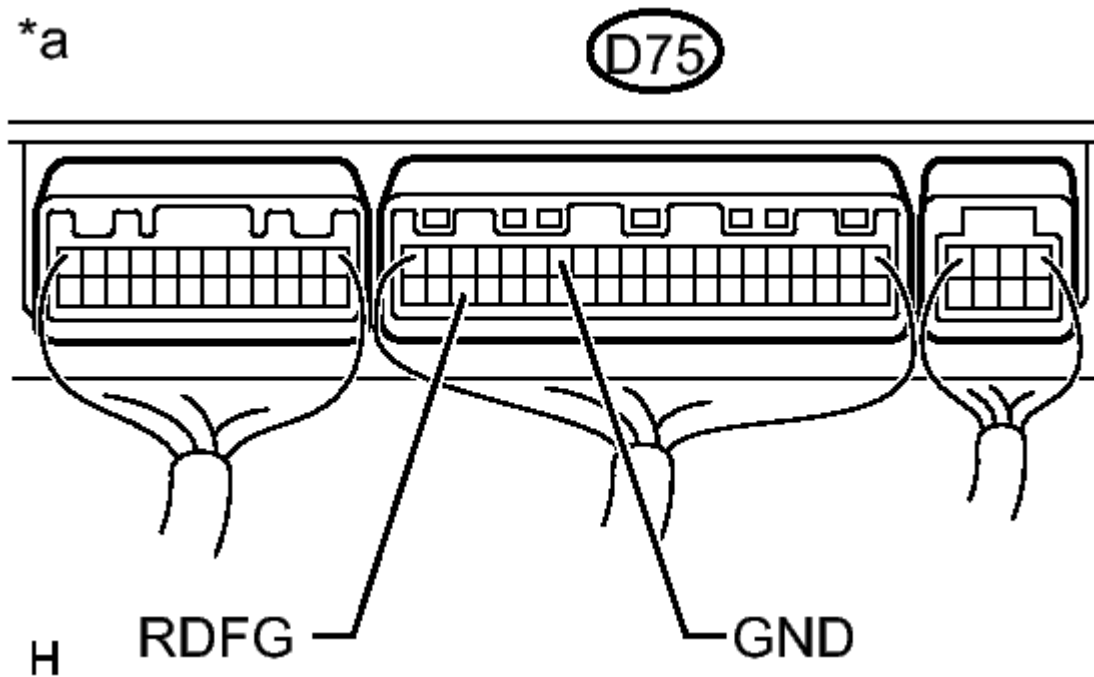


Fig. 9: Checking Air Conditioning Amplifier Assembly Voltage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
D75-38 (RDFG) - D75-14 (GND)	Ignition switch ON, rear window defogger switch off	11 to 14 V
D75-38 (RDFG) - D75-14 (GND)	Ignition switch ON, rear window defogger	Below 1 V

	switch on	
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TEXT IN ILLUSTRATION

*a	Component with harness connected (Air Conditioning Amplifier Assembly)
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NG --> See step 16

OK: Go to next step

8. CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - REAR WINDOW DEFOGGER WIRE)

- Disconnect the W5 rear window defogger wire (back window glass) battery side connector.
- Disconnect the 1E integration relay connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
1E-1 (RDEF) - W5-1	Always	Below 1 ohms
1E-1 (RDEF) - Body ground	Always	10 kohms or higher

NG --> REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

9. CHECK INTEGRATION RELAY

- Reconnect the 1E integration relay connector.
- Measure the voltage according to the value(s) in the table below.

*a



Fig. 10: Checking Integration Relay Voltage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
W5-1 - Body ground	Ignition switch ON, rear window defogger switch on	11 to 14 V
W5-1 - Body ground	Ignition switch ON, rear window defogger switch off	Below 1 V

TEXT IN ILLUSTRATION

*a	Front view of wire harness connector (to Rear
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Window Defogger Wire)

NG --> REPLACE INTEGRATION RELAY

OK: Go to next step

10. CHECK HARNESS AND CONNECTOR (REAR WINDOW DEFOGGER WIRE - BODY GROUND)

- Disconnect the W18 rear window defogger wire (back window glass) ground side connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
W18-1 - Body ground	Always	Below 1 ohms

NG --> REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

11. CHECK WINDOW DEFOGGER SYSTEM

- Check the operation of the window defogger system.

OK

The rear window defogger system operates normally.

NG --> See step 17

OK --> See step 13

- REPLACE AIR CONDITIONING CONTROL ASSEMBLY (for Automatic Air Conditioning System). Refer to REMOVAL**
- USE SIMULATION METHOD TO CHECK. Refer to HOW TO PROCEED WITH TROUBLESHOOTING**
- GO TO AIR CONDITIONING SYSTEM (for Automatic Air Conditioning System). Refer to HOW TO PROCEED WITH TROUBLESHOOTING**
- GO TO AIR CONDITIONING SYSTEM (for Manual Air Conditioning System). Refer to HOW TO PROCEED WITH TROUBLESHOOTING**
- REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY. Refer to REMOVAL**

17. **REPLACE REAR WINDOW DEFOGGER WIRE (BACK WINDOW GLASS). Refer to REMOVAL**
18. **REPLACE AIR CONDITIONING CONTROL ASSEMBLY (for Manual Air Conditioning System). Refer to REMOVAL**