

Last Modified: 12-04-2024	6.11:8.1.0	Doc ID: RM10000002AQP6
Model Year Start: 2023	Model: Prius Prime	Prod Date Range: [03/2023 -]
Title: HEATING / AIR CONDITIONING: AIR CONDITIONING SYSTEM (for PHEV Model): No Heating at All; 2023 - 2024 MY Prius Prime [03/2023 -]		

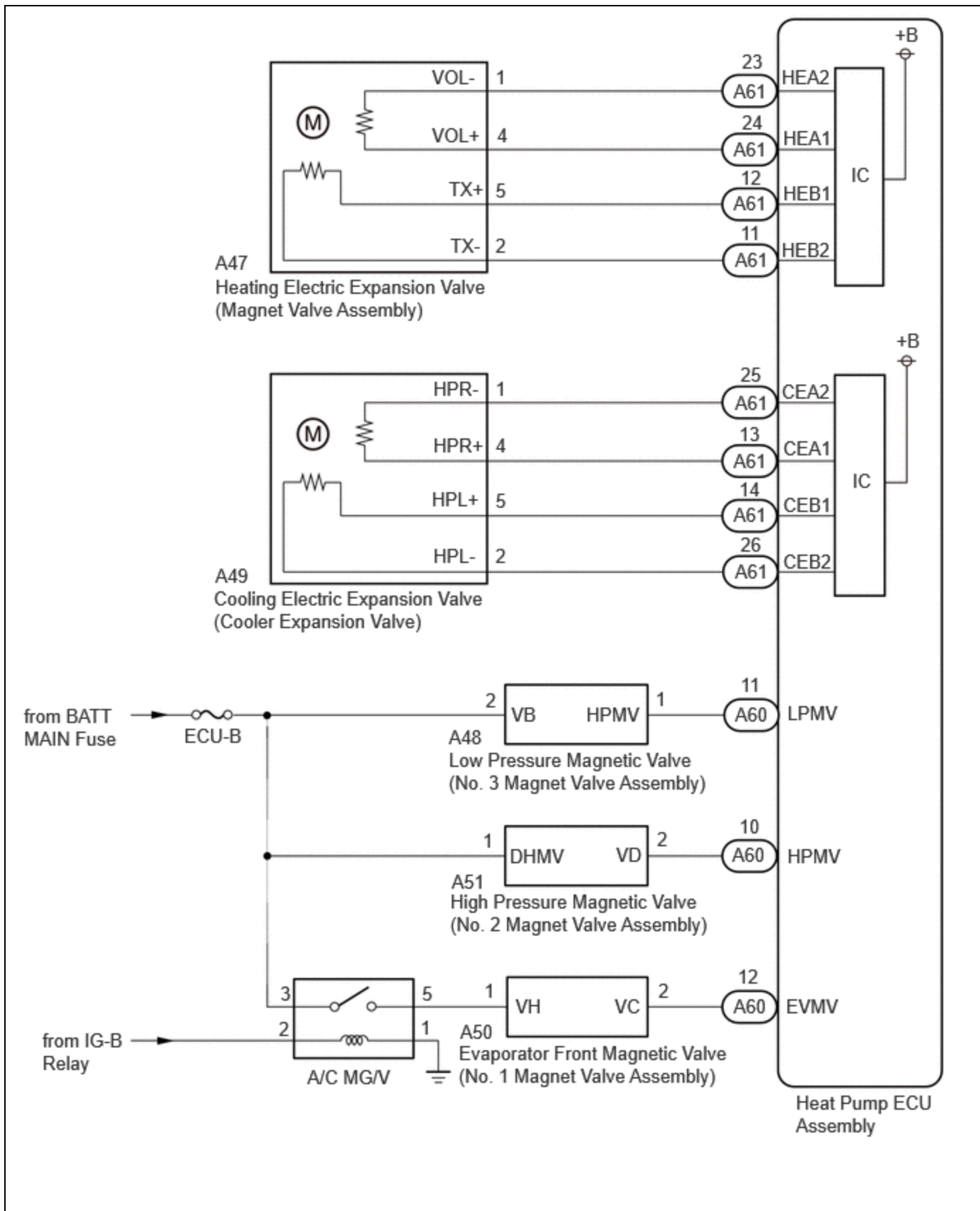
No Heating at All

DESCRIPTION

If cool air blows from the registers regardless of the temperature setting of the air conditioning system, the following factors may be the cause.

MALFUNCTION STATUS	FACTOR
<ul style="list-style-type: none"> No warm air comes out (Blower control is normal) Outlet air temperature does not increase (Blower control is normal) 	<ul style="list-style-type: none"> Refrigerant pressure Cooling electric expansion valve (cooler expansion valve) Heating electric expansion valve (magnet valve assembly) Low pressure magnetic valve (No. 3 magnet valve assembly) High pressure magnetic valve (No. 2 magnet valve assembly) Engine coolant temperature Servo motor (air mix) Damper and damper link Warm-up control Heater radiator unit sub-assembly Heat pump ECU assembly Internal condenser temperature sensor Outer heat exchanger refrigerant temperature sensor (No. 1 air conditioning thermistor assembly) Evaporator refrigerant temperature sensor (No. 2 air conditioning thermistor assembly) Evaporator temp. sensor (No. 1 cooler thermistor) Air conditioning pressure sensor Internal condenser (condenser assembly)

WIRING DIAGRAM



CAUTION / NOTICE / HINT

NOTICE:

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

PROCEDURE

1. CHECK REFRIGERANT SHORTAGE

(a) Prepare the vehicle according to the table below.

Measurement Condition:

ITEM	CONDITION
A/C Switch	On
Ambient Temperature*1	0 to 49°C (32 to 120°F)
Air Conditioning Air Inlet Temperature*2	25 to 35°C (77 to 95°F)
Set Temperature	MAX COLD
Recirculation/fresh Control Switch	Recirculation
Air Vent Damper Position	FACE
Blower Speed	HI

HINT:

*1: This inspection can be judged correctly only if the ambient temperature is within a range of 0 to 49°C (32 to 120°F). Therefore, postpone the test if the temperature is low.

*2: This inspection can be judged correctly only if the air inlet temperature is within a range of 25 to 35°C (77 to 95°F). Therefore, postpone the test if the temperature is out of range.

(b) Using the GTS, check the amount of refrigerant.

Body Electrical > Air Conditioner > Utility

TESTER DISPLAY
Refrigerant Gas Volume Check

NOTICE:

If the conditions for the inspection are not met, "Refrigerant incorrect" will be displayed on the GTS. Confirm the conditions of the inspection and perform the check again.

HINT:

- If the amount of refrigerant is insufficient, "Refrigerant shortage" is displayed on the GTS and the indicator light on the A/C switch turns off.
- When performing this inspection, a DTC will not be output even if "Refrigerant shortage" is displayed on the GTS.

RESULT	AMOUNT OF REFRIGERANT
Refrigerant shortage	Insufficient or leakage
Refrigerant correct	Correct
Refrigerant incorrect	Incorrect

OK:

"Refrigerant correct" is displayed on the GTS.

NG  **CHARGE SYSTEM WITH REFRIGERANT**

OK



2.	READ VALUE USING GTS
-----------	-----------------------------

(a) Read the Data List according to the display on the GTS.

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Coolant Temperature	Engine coolant temperature	Min.: -40°C (-40°F) Max.: 215°C (419°F)	75 to 100°C (167 to 212°F): After warming up	This is the engine coolant temperature. <p style="text-align: center;">HINT:</p> <ul style="list-style-type: none"> After warming up the engine, the engine coolant temperature will be 75 to 100°C (167 to 212°F). After a long soak, the engine coolant temperature, intake air temperature and ambient air temperature will be approximately equal. If the value is -40°C (-40°F), or higher than 135°C (275°F), the sensor circuit is open or shorted. Check if the engine overheats if the value indicated is higher than 135°C (275°F).

Powertrain > Engine > Data List

TESTER DISPLAY
Coolant Temperature

OK:

After warming up the engine, the temperature value displayed is within the range specified in the normal condition column.

NG  **GO TO COOLING FAN SYSTEM**

OK



3.	PERFORM ACTIVE TEST USING GTS
-----------	--------------------------------------

(a) Perform the Active Test according to the display on the GTS.

Body Electrical > Air Conditioner > Active Test

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
Front Air Mix Damper Control Servo Motor	This test activates the front air mix damper control servo motor. (No. 1 air conditioning radiator damper servo sub-assembly (air mix))	128: Min 384: Max	Operate with the ignition switch ON.

Body Electrical > Air Conditioner > Active Test

ACTIVE TEST DISPLAY
Front Air Mix Damper Control Servo Motor

DATA LIST DISPLAY
Front Air Mix Damper Control Servo Motor Actual Pulse

OK:
Damper servo motor is operated.

NG  **GO TO DTC TROUBLESHOOTING PROCEDURE FOR MALFUNCTIONING DAMPER SERVO MOTOR**

OK


4.	CHECK DTC
-----------	------------------

(a) Check for DTCs.

Body Electrical > Air Conditioner > Trouble Codes

OK:
DTC B14067F is not output

NG  **GO TO DIAGNOSTIC TROUBLE CODE CHART**

OK


5.	CHECK HEATING ELECTRIC EXPANSION VALVE (MAGNET VALVE ASSEMBLY)
-----------	---

(a) Set the vehicle to the following conditions.

Measurement Condition:

ITEM	CONDITION
Vehicle Condition	Ignition switch ON (READY)
A/C Switch	On
Ambient Temperature*	0 to 25°C (32 to 77°F)
Set Temperature	MAX COLD
Recirculation/fresh Control Switch	Recirculation
Air Vent Damper Position	FACE
Blower Speed	HI

HINT:

*: This inspection can be judged correctly only if the ambient temperature is within a range of 0 to 25°C (32 to 77°F). Therefore, postpone the test if the temperature is low.

(b) Using the GTS, perform the Active Test and check the Data List values.

Body Electrical > Air Conditioner > Active Test

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
Heating Electric Expansion Valve	This test activates heating electric expansion valve to a target position. (heating electric expansion valve (magnet valve assembly))	0%: Min. 100%: Max.	<ul style="list-style-type: none"> • Ignition switch ON (READY) • EV Mode • Blower: Manual Hi • Set Temperature: Manual Hi • Ambient Temperature: -10°C (14.0°F) or more than -10°C (14.0°F) • A/C Switch: OFF • Air Inlet Mode: Outside Air • Engine Coolant Temperature: 40°C (104°F) or less than 40°C (104°F)

Body Electrical > Air Conditioner > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Regulator Pressure Sensor	Air conditioning pressure sensor	-32768 to 32767 kPa(gauge) (-32.768 to 32.767 MPaG)	Actual refrigerant pressure displayed	<ul style="list-style-type: none"> Refrigerant line (gas leak etc.) Air conditioning pressure sensor circuit malfunction
Front Right Air Outlet Temperature	Target air outlet temperature	-327.68 to 327.67°C	Target air outlet temperature displayed <ul style="list-style-type: none"> MAX COLD: -327.68°C MAX HOT: 327.67°C 	-
Front Right Set Temperature	Set temperature	MAX COLD / 14.0°C to 32.0°C (58°F to 90°F) / MAX HOT	Set temperature displayed	Air conditioning control assembly circuit malfunction
Compressor Actual Speed	Compressor speed	0 to 10000 rpm	Actual compressor speed displayed	When compressor running: <ul style="list-style-type: none"> Compressor with motor assembly
Heating Electric Expansion Valve Target Position	Target opening angle of heating electric expansion valve (magnet valve assembly)	0 to 100 %	Target opening angle of heating electric expansion valve (magnet valve assembly)	Heating electric expansion valve (magnet valve assembly) circuit malfunction
Subcool Target Temperature	Target temperature of the sub-cooler calculated by ECU	-327.68 to 327.67°C	Target temperature of the sub-cooler calculated by ECU	Displays in range of 0 to 30°C (32 to 86°F)
Subcool Estimated Temperature (ECU Calculation Value)	Sub-cooler estimated temperature calculated by ECU	-327.68 to 327.67°C	Sub-cooler estimated temperature calculated by ECU	Displays in range of 0 to 30°C (32 to 86°F)

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Heating Electric Expansion Valve	Actual opening angle of heating electric expansion valve (magnet valve assembly)	0 to 100 %	Actual opening angle following the target opening angle	Heating electric expansion valve (magnet valve assembly) circuit malfunction

Body Electrical > Air Conditioner > Active Test

ACTIVE TEST DISPLAY
Heating Electric Expansion Valve

DATA LIST DISPLAY
Regulator Pressure Sensor
Front Right Air Outlet Temperature
Front Right Set Temperature
Compressor Actual Speed
Heating Electric Expansion Valve Target Position
Subcool Target Temperature
Subcool Estimated Temperature (ECU Calculation Value)
Heating Electric Expansion Valve

OK:

The refrigerant pressure decreases when the control value of the heating electric expansion valve (magnet valve assembly) is increased 50%.

The refrigerant pressure increases when the control value of the heating electric expansion valve (magnet valve assembly) is reverted.

NG  **GO TO STEP 9**

OK


6. CHECK PROBLEM SYMPTOMS

(a) Check the vehicle condition.

RESULT	PROCEED TO
Compressor is operating, but does not heat	A
Operation is stopped due to a high pressure cut	B

A ► REPLACE HEAT PUMP ECU ASSEMBLY

B



7. INSPECT LOW PRESSURE MAGNETIC VALVE (NO. 3 MAGNET VALVE ASSEMBLY)

Click here [INFO](#)

NG ► REPLACE LOW PRESSURE MAGNETIC VALVE (NO. 3 MAGNET VALVE ASSEMBLY)

OK



8. CHECK HARNESS AND CONNECTOR (LOW PRESSURE MAGNETIC VALVE (NO. 3 MAGNET VALVE ASSEMBLY) - HEAT PUMP ECU ASSEMBLY)

(a) Disconnect the A48 low pressure magnetic valve (No. 3 magnet valve assembly) connector.

(b) Disconnect the A60 heat pump ECU assembly connector.

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

Standard Resistance:



[Click Location & Routing\(A48,A60\)](#)

[Click Connector\(A48\)](#)

[Click Connector\(A60\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A48-1 (HPMV) - A60-11 (LPMV)	Always	Below 1 Ω
A48-1 (HPMV) or A60-11 (LPMV) - Body ground	Always	10 k Ω or higher

OK  **REPLACE HEAT PUMP ECU ASSEMBLY**

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

9.	CHECK HARNESS AND CONNECTOR (HEATING ELECTRIC EXPANSION VALVE (MAGNET VALVE ASSEMBLY) - HEAT PUMP ECU ASSEMBLY)
-----------	--

(a) Disconnect the A47 heating electric expansion valve (magnet valve assembly) connector.

(b) Disconnect the A61 heat pump ECU assembly connector.

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

Standard Resistance:



[Click Location & Routing\(A47,A61\).](#)

[Click Connector\(A47\).](#)

[Click Connector\(A61\).](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A47-1 (VOL-) - A61-23 (HEA2)	Always	Below 1 Ω
A47-4 (VOL+) - A61-24 (HEA1)	Always	Below 1 Ω
A47-5 (TX+) - A61-12 (HEB1)	Always	Below 1 Ω
A47-2 (TX-) - A61-11 (HEB2)	Always	Below 1 Ω
A47-1 (VOL-) or A61-23 (HEA2) - Other terminals and body ground	Always	10 k Ω or higher
A47-4 (VOL+) or A61-24 (HEA1) - Other terminals and body ground	Always	10 k Ω or higher
A47-5 (TX+) or A61-12 (HEB1) - Other terminals and body ground	Always	10 k Ω or higher
A47-2 (TX-) or A61-11(HEB2) - Other terminals and body ground	Always	10 k Ω or higher

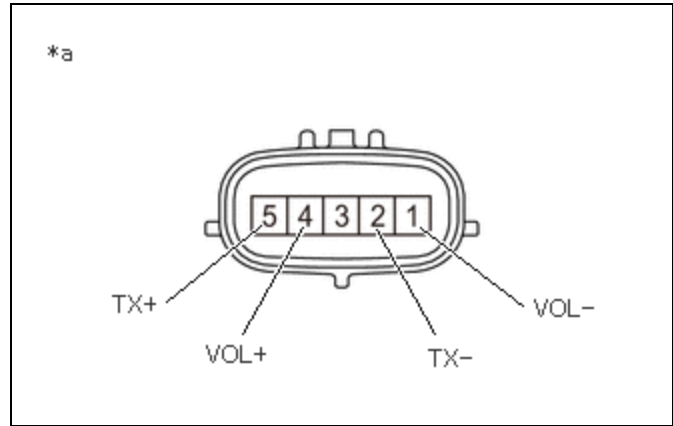
NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



10.	INSPECT HEATING ELECTRIC EXPANSION VALVE (MAGNET VALVE ASSEMBLY)
------------	---

(a) Disconnect the A47 heating electric expansion valve (magnet valve assembly) connector.



*a	Component without harness connected (Heating Electric Expansion Valve (Magnet Valve Assembly))
----	---

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

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 (VOL-) - 4 (VOL+)	20°C (68°F)	8 to 10 Ω
2 (TX-) - 5 (TX+)	20°C (68°F)	8 to 10 Ω

OK ► REPLACE HEAT PUMP ECU ASSEMBLY

NG ► REPLACE HEATING ELECTRIC EXPANSION VALVE (MAGNET VALVE ASSEMBLY)

