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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM (for PHEV Model): P0D1A71; Hybrid/EV Battery Pack Coolant Control Valve "B" Performance/Stuck Off Actuator Stuck; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P0D1A71**	**Hybrid/EV Battery Pack Coolant Control Valve "B" Performance/Stuck Off Actuator Stuck**

DTC SUMMARY

MALFUNCTION DESCRIPTION

The system determines that there is a deviation in characteristics for the magnet valve (No. 1 traction battery cooler tube) in the HV battery refrigerant cooling system and prevents the HV battery temperature from rising excessively.

DESCRIPTION

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P0D1A71	Hybrid/EV Battery Pack Coolant Control Valve "B" Performance/Stuck Off Actuator Stuck	Detected when either of the following conditions is satisfied within the specified time from when HV battery cooling started (2 trip detection logic) **Open malfunction detected** When the command value sent to the magnet valve (No. 1 traction battery cooler tube) is the minimum opening angle command, the	• Magnet valve (No. 1 traction battery cooler tube) • No. 1 traction battery cooler tube (duct inlet 1) • No. 1 traction battery cooler conductor (duct outlet 1) • Battery ECU assembly • Wire harness or connector • A/C cooler	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P0D1B

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
		difference in the temperature of the refrigerant inlet and outlet is less than the specified value. **Close malfunction detected** The change in temperature for the refrigerant inlet is lower than the specified value when the command value sent to the magnet valve (No. 1 traction battery cooler tube) is an open command	pipe • HV battery cooler pipe • Cooling fan system					

MONITOR DESCRIPTION

Within the specified time from when HV battery cooling starts, if it is detected that the command value sent to the magnet valve is a close command and the change in the refrigerant inlet and outlet temperature is higher than the specified value, or the command value sent to the magnet valve is an open command and the change in the refrigerant inlet temperature is lower than the specified value, the battery ECU assembly illuminates the MIL and stores a DTC.

MONITOR STRATEGY

Related DTCs	P0D1B (INF P0D1A71): Hybrid/EV Battery Pack Coolant Control Valve "B" Performance/Stuck Off

Required sensors/components	Magnet valve, Air Conditioning Thermistor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not stored	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery ECU assembly	DTC P0D1B (INF P0D1A71) is not detected

CONFIRMATION DRIVING PATTERN

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

  Click here INFO

- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

  Click here INFO

1. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
2. Turn the ignition switch off and wait for 2 minutes or more.
3. Enter the following menus: Powertrain / HV Battery / Active Test / Hybrid/EV Battery Refrigerant Cooling Control / Data List / Hybrid/EV Battery Temperature 1 to 15, Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1), Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1).[*1]
4. Check that the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" is a minimum of 11°C (52°F) or more, and the value of Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" is 0°C (32°F) or more.[*2]

Conditions for performing "Hybrid/EV Battery Refrigerant Cooling Control" Active Test

HINT:

The HV battery minimum temperature must be 11°C (52°F) and the refrigerant temperature inside the HV battery must be 0°C (32°F) or higher.

If the above conditions are not established, perform the "Hybrid/EV Battery Heater Relay" Active Test in an environment with an ambient temperature of 5°C (41°F) or higher and increase the HV battery temperature.

In consideration of the temperature drop after the heater stops, increase the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" to a minimum of 12°C (54°F) or more, and the value of Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" to 1°C (34°F) or more.

(At an ambient temperature of 5°C (41°F), "Hybrid/EV Battery Heater Relay" will need to be performed for approximately 5 hours.)

5. Set the vehicle to the following conditions.[*3]

ITEM	CONDITION
A/C Switch	ON
Blower Speed	HI
Set Temperature	◦ MAX COLD when the ambient temperature is 25°C (77°F) or higher ◦ MAX HOT when the ambient temperature is less than 25°C (77°F)

HINT:

If the ambient temperature is from 25°C (77°F) to 30°C (86°F), perform the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test within 1 minute from setting the above conditions.

6. Check that the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" is a minimum of 11°C (52°F) or more, and the value of Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" is 0°C (32°F) or more.[*4]

HINT:

Setting "A/C Switch" to "ON" and "Blower Speed" to "HI" in the vehicle may cause the refrigerant temperature inside the HV battery to drop.

If the temperature has dropped lower than the conditions for performing the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test, perform the "Hybrid/EV Battery Heater Relay" Active Test in an environment with an ambient temperature of 5°C (41°F) or higher and increase the temperature.

7. Perform the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test for 14 minutes.[*5]
8. Turn the ignition switch off and wait for 1 minute or more.[*6]
9. Enter the following menus: Powertrain / HV Battery / Active Test / Hybrid/EV Battery Refrigerant Cooling Control / Data List / Hybrid/EV Battery Temperature 1 to 15, Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1), Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1).[*7]
10. Check that the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" is a minimum of 11°C (52°F) or more, and the value of Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" is 0°C (32°F) or more.[*8]

Conditions for performing "Hybrid/EV Battery Refrigerant Cooling Control" Active Test

HINT:

The HV battery minimum temperature must be 11°C (52°F) and the refrigerant temperature inside the HV battery must be 0°C (32°F) or higher.

If the above conditions are not established, perform the "Hybrid/EV Battery Heater Relay" Active Test in an environment with an ambient temperature of 5°C (41°F) or higher and increase the HV battery temperature.

In consideration of the temperature drop after the heater stops, increase the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" to a minimum of 12°C (54°F) or more, and the value of

Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" to 1°C (34°F) or more.

(At an ambient temperature of 5°C (41°F), "Hybrid/EV Battery Heater Relay" will need to be performed for approximately 5 hours.)

11. Set the vehicle to the following conditions.[*9]

ITEM	CONDITION
A/C Switch	ON
Blower Speed	HI
Set Temperature	◦ MAX COLD when the ambient temperature is 25°C (77°F) or higher ◦ MAX HOT when the ambient temperature is less than 25°C (77°F)

HINT:

If the ambient temperature is from 25°C (77°F) to 30°C (86°F), perform the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test within 1 minute from setting the above conditions.

12. Check that the value of Data List item "Hybrid/EV Battery Temperature 1 to 15" is a minimum of 11°C (52°F) or more, and the value of Data List item "Hybrid/EV Battery Refrigerant Temperature (Duct Inlet 1)" and "Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" is 0°C (32°F) or more.[*10]

HINT:

Setting "A/C Switch" to "ON" and "Blower Speed" to "HI" in the vehicle may cause the refrigerant temperature inside the HV battery to drop.

If the temperature has dropped lower than the conditions for performing the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test, perform the "Hybrid/EV Battery Heater Relay" Active Test in an environment with an ambient temperature of 5°C (41°F) or higher and increase the temperature.

13. Perform the "Hybrid/EV Battery Refrigerant Cooling Control" Active Test for 14 minutes.[*11]

HINT:

[*1] to [*11]: Normal judgment procedure.

The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.

14. Enter the following menus: Powertrain / HV Battery / Utility / All Readiness.
15. Check the DTC judgment result.

HINT:

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows INCOMPLETE or N/A, perform the normal judgment procedure again.

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0D1A18.

Click here INFO

CAUTION / NOTICE / HINT

CAUTION:

Refer to the precautions before inspecting high voltage circuit.

Click here INFO

NOTICE:

- After the ignition switch is turned off, there may be a waiting time before disconnecting the auxiliary negative (-) battery terminal.

  Click here INFO
- When disconnecting and reconnecting the auxiliary battery.

HINT:

When disconnecting and reconnecting the auxiliary battery, there is an automatic learning function that completes learning when the respective system is used.

Click here INFO

PROCEDURE

1.	**CHECK DTC OUTPUT (HV BATTERY, HYBRID CONTROL, AIR CONDITIONER)**

Pre-procedure1

(a) None

Procedure1

(b) Check for DTCs.

Powertrain > HV Battery > Trouble Codes
Powertrain > Hybrid Control > Trouble Codes
Body Electrical > Air Conditioner > Trouble Codes

RESULT	PROCEED TO
"P0D1A71" only is output, or DTCs except the ones in the table below are also output.	A
DTCs of hybrid battery system in the table below are output.	B
DTCs of hybrid control system in the table below are output.	C
DTCs of air conditioning system in the table below are output.	D

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
Air conditioner malfunction	Air conditioning system	B138571	A/C Cooling Electric Expansion Valve Actuator Stuck
		B3A0A71	A/C Heating Electric Expansion Valve Actuator Stuck
		P0EC971	A/C Low Pressure Magnetic Valve Actuator Stuck
		P05301C	Refrigerant Pressure Sensor Circuit Voltage Out of Range
		P15017A	Hybrid/EV Battery Cooling Refrigerant Gas Fluid Leak or Seal Failure
		P2D4496	A/C Compressor Component Internal Failure

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
Microcomputer malfunction	Hybrid battery system	P060A47	Hybrid/EV Battery Energy Control Module Monitoring Processor Watchdog / Safety MCU Failure
		P060B49	Hybrid/EV Battery Energy Control Module A/D Processing Internal Electronic Failure
		P060687	Hybrid/EV Battery Energy Control Module Processor to Monitoring Processor Missing Message
	Hybrid control system	P0A1F94	Hybrid/EV Battery Energy Control Module Unexpected Operation

Post-procedure1

(c) Turn the ignition switch off.

B ▶ **GO TO DTC CHART (HYBRID BATTERY SYSTEM)**

C ▶ **GO TO DTC CHART (HYBRID CONTROL SYSTEM)**

D ▶ **GO TO DTC CHART (AIR CONDITIONING SYSTEM)**

A ▼

2.	**CHECK VEHICLE CONDITION**

Pre-procedure1

(a) Make sure that the front side of the radiator grille is not blocked with anything.

Procedure1

(b) Ask the customer if the front side of the radiator grille was blocked with anything.

RESULT	PROCEED TO
Not blocked.	A
Is/was blocked.	B

HINT:

If the radiator grille is blocked, the inverter coolant temperature will increase and this DTC may be stored.

Post-procedure1

(c) None

B **IF EQUIPPED, EXPLAIN TO CUSTOMER THAT OPTIONAL COMPONENTS WILL BE REMOVED**

A

3.	**INSPECT COOLING FAN**

Pre-procedure1

(a) None

Procedure1

(b) Perform the "Control the Engine Cooling Fan Duty Ratio" Active Test.

Powertrain > Engine > Active Test

TESTER DISPLAY
Control the Engine Cooling Fan Duty Ratio

OK:

GTS OPERATION	FAN OPERATION
30 - 100%	Cooling fan operates
0%	Cooling fan stops

RESULT	PROCEED TO
Cooling fan operate	A
Cooling fan does not operate	B
Cooling fan do not stop	

Post-procedure1

(c) Turn the ignition switch off.

B **GO TO COOLING FAN CIRCUIT**

A

4.	**REFRIGERANT SHORTAGE CHECK USING GTS**

HINT:

Click here INFO

NG ▶ **GO TO STEP 8**

OK ▼

5.	**CHECK HARNESS AND CONNECTOR (MAGNET VALVE (NO. 1 TRACTION BATTERY COOLER TUBE) - BATTERY ECU ASSEMBLY)**

Click here INFO

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

6.	**INSPECT MAGNET VALVE (NO. 1 TRACTION BATTERY COOLER TUBE)**

Click here INFO

NG ▶ **REPLACE NO. 1 TRACTION BATTERY COOLER TUBE**

OK ▼

7.	**CHECK BATTERY ECU ASSEMBLY (OUTPUT WAVEFORM)**

Click here INFO

RESULT	PROCEED TO
Normal (The pulse output of waveform 1)	A
No pulse generation	B

A ▶ REPLACE NO. 1 TRACTION BATTERY COOLER TUBE

B ▶ REPLACE BATTERY ECU ASSEMBLY

8.	INSPECT FOR REFRIGERANT LEAK (AIR CONDITIONING SYSTEM)

Click here INFO

NG ▶ GO TO PROBLEM SYMPTOMS TABLE (AIR CONDITIONING SYSTEM)

OK ▼

9.	INSPECT FOR REFRIGERANT LEAK (INLET SIDE OF HV SUPPLY BATTERY ASSEMBLY)

Click here INFO

OK ▶ CHECK AND REPLACE REFRIGERANT LEAK (HV SUPPLY BATTERY ASSEMBLY)

NG ▶ GO TO PROBLEM SYMPTOMS TABLE (AIR CONDITIONING SYSTEM)