Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BHW4
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM (for PHEV Model): P1B4B73; Hybrid/EV Battery Heater Relay Actuator Stuck Closed; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P1B4B73**	**Hybrid/EV Battery Heater Relay Actuator Stuck Closed**

DESCRIPTION

The battery ECU assembly controls the driving relay for the HV battery heater.

If the HV battery heater relay does not turn off when the battery ECU assembly stops outputting current, the battery ECU assembly will detect a malfunction and store a DTC.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P1B4B73	Hybrid/EV Battery Heater Relay Actuator Stuck Closed	The temperature of the HV battery increases even though the battery ECU assembly is not outputting current to turn the traction battery heater relay on. (1 trip detection logic)	• No. 1 traction battery heater • Wire harness or connector • No. 1 traction battery heater relay • Battery ECU assembly	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P1B4E

MONITOR DESCRIPTION

If the battery ECU assembly detects that the temperature of the HV battery is increasing even though it is not applying current to the HV battery heater relay, it will detect a malfunction, illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P1B4E (INF P1B4B73): Hybrid/EV Battery Heater Relay Control Circuit Stuck On
Required sensors/components	HV battery heater temperature sensor relay
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
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 P1B4E (INF P1B4B73) 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 30 minutes or more.[*1]
3. Turn the ignition switch to ON (READY) and wait for 15 minutes or more.[*2]

HINT:

[*1] to [*2]: Normal judgment procedure.

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

4. Enter the following menus: Powertrain / HV Battery / Utility / All Readiness.
5. 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 P1B4B72.

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 AUXILIARY BATTERY VOLTAGE**

Pre-procedure1

(a) Turn the ignition switch off and turn on the high beam headlights for 30 seconds. This will remove the surface charge from the auxiliary battery.

Procedure1

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

Standard Voltage:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	20°C (68°F), Ignition switch off	11.0 V or higher

Post-procedure1

(c) None

NG ▶ **GO TO STEP 11**

OK ▼

2.	**CHECK DTC OUTPUT (HV BATTERY, HYBRID CONTROL)**

Pre-procedure1

(a) None

Procedure1

(b) Check for DTCs.

Powertrain > HV Battery > Trouble Codes

Powertrain > Hybrid Control > Trouble Codes

RESULT	PROCEED TO
"P1B4B73" 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

SYSTEM	RELEVANT DTC	
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)**

A

▼

3.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY ECU ASSEMBLY)**

Click here INFO

NG ▶ **CONNECT SECURELY**

OK

▼

4.	**CHECK CONNECTOR CONNECTION CONDITION (NO. 1 TRACTION BATTERY HEATER RELAY)**

Click here INFO

NG ▶ **CONNECT SECURELY**

OK ▼

5.	**CHECK HARNESS AND CONNECTOR (BATTERY ECU ASSEMBLY - NO. 1 TRACTION BATTERY HEATER RELAY)**

CAUTION:

Be sure to wear insulated gloves and protective goggles.

Pre-procedure1

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the ignition switch to ON (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Connect the SST.

HINT:

Click here INFO

(c) Connect the cable to the negative (-) auxiliary battery terminal.

(d) Turn the ignition switch to ON.

Procedure1

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

Standard Voltage:

EWD INFO

Click Location & Routing(x14)
Click Connector(x14)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
x14-11 (BHR) - Body ground	Ignition switch ON	Below 1 V

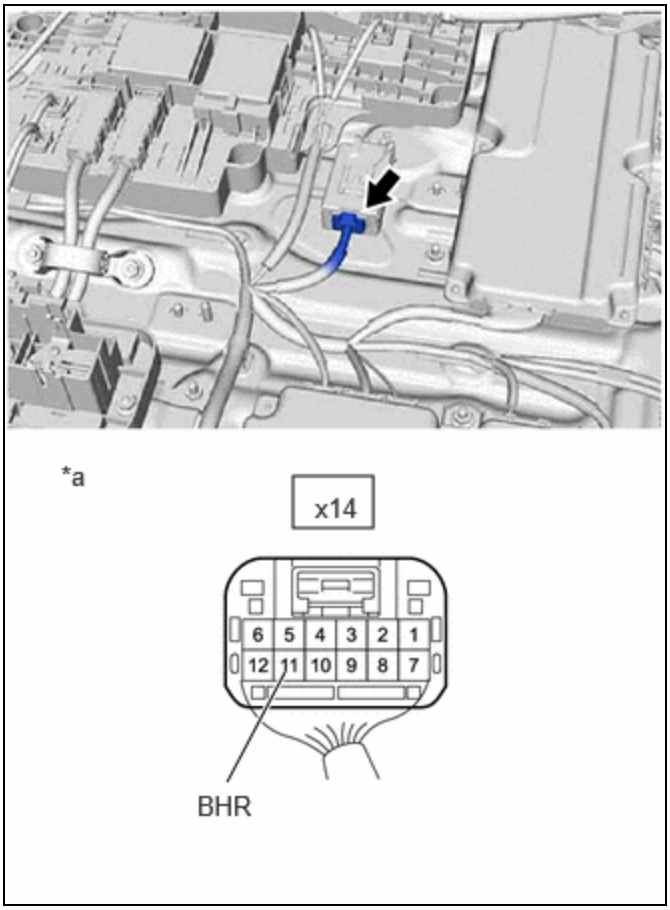
NOTICE:

- Turning the ignition switch to ON with the service plug grip removed causes other DTCs to be stored. Clear the DTCs after performing this inspection.

- If the ignition switch is turned to ON with the connectors disconnected, other DTCs will be stored. Be sure to clear the DTCs after the inspection.

Result:

PROCEED TO
OK
NG



*a	Component with harness connected (to No. 1 Traction Battery Heater Relay)

Post-procedure1

(f) Turn the ignition switch off.

(g) Disconnect the cable from the negative (-) auxiliary battery terminal.

(h) Disconnect the SST.

NG ▶ **GO TO STEP 10**

OK ▼

6.	**CHECK NO. 1 TRACTION BATTERY HEATER (HV BATTERY HEATER TEMPERATURE SENSOR 0)**

Click here INFO

NG ▶ **GO TO STEP 9**

OK

7.	**CHECK NO. 1 TRACTION BATTERY HEATER (HV BATTERY HEATER TEMPERATURE SENSOR 1)**

Click here INFO

OK ▶ **REPLACE NO. 1 TRACTION BATTERY HEATER RELAY**

NG

8.	**CHECK HARNESS AND CONNECTOR (BATTERY ECU ASSEMBLY - NO. 1 TRACTION BATTERY HEATER (HV BATTERY HEATER TEMPERATURE SENSOR 1))**

Click here INFO

OK ▶ **REPLACE NO. 1 TRACTION BATTERY HEATER**

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

9.	**CHECK HARNESS AND CONNECTOR (BATTERY ECU ASSEMBLY - NO. 1 TRACTION BATTERY HEATER (HV BATTERY HEATER TEMPERATURE SENSOR 0))**

Click here INFO

OK ▶ **REPLACE NO. 1 TRACTION BATTERY HEATER**

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

10.	**CHECK HARNESS AND CONNECTOR (BATTERY ECU ASSEMBLY - NO. 1 TRACTION BATTERY HEATER RELAY)**

CAUTION:

Be sure to wear insulated gloves and protective goggles.

Pre-procedure1

(a) Check that the service plug grip is not installed.

NOTICE:

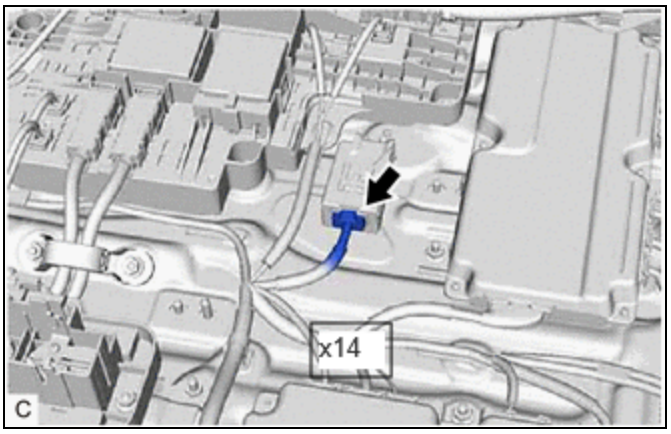
After removing the service plug grip, do not turn the ignition switch to ON (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Connect the SST.

HINT:

Click here INFO

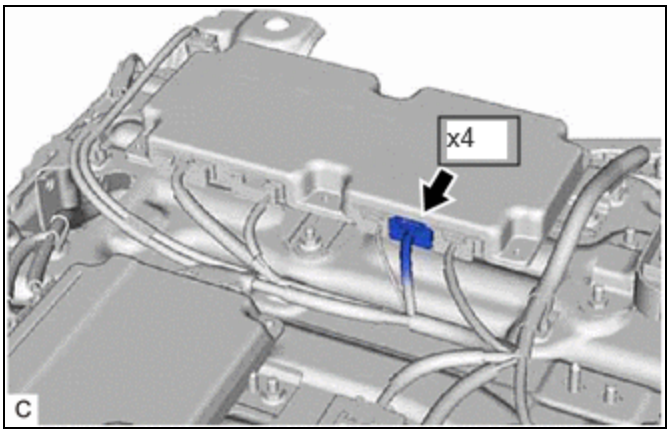
(c) Disconnect the No. 1 traction battery heater relay connector.



NOTICE:

Before disconnecting the connector, check that it is not loose or disconnected.

(d) Disconnect the battery ECU assembly connector.



NOTICE:

Before disconnecting the connector, check that it is not loose or disconnected.

(e) Connect the cable to the negative (-) auxiliary battery terminal.

(f) Turn the ignition switch to ON.

Procedure1

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

Standard Voltage:

EWD INFO

Click Location & Routing(x4)
Click Connector(x4)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
X14-11 (BHR) or x4-12 (BHRB) - Body ground	Ignition switch ON	Below 1 V

NOTICE:

- Turning the ignition switch to ON with the service plug grip removed causes other DTCs to be stored. Clear the DTCs after performing this inspection.
- If the ignition switch is turned to ON with the connectors disconnected, other DTCs will be stored. Be sure to clear the DTCs after the inspection.

Post-procedure1

(h) Turn the ignition switch off.

(i) Disconnect the cable from the negative (-) auxiliary battery terminal.

(j) Reconnect the battery ECU assembly connector.

(k) Reconnect the No. 1 traction battery heater relay connector.

(l) Disconnect the SST.

OK ▶ **REPLACE BATTERY ECU ASSEMBLY**

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

11.	**CHARGE OR REPLACE AUXILIARY BATTERY**

(a) Charge or replace the auxiliary battery.

NEXT ▶ **GO TO STEP 2**