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Model Year Start: 2023	Model: Prius Prime	Prod Date Range: [03/2023 -]
Title: HYBRID / BATTERY CONTROL: HYBRID CONTROL SYSTEM (for PHEV Model): P31B300; Hybrid/EV Battery Voltage High; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	P31B300	Hybrid/EV Battery Voltage High
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DTC SUMMARY

MALFUNCTION DESCRIPTION

The hybrid vehicle control ECU uses the inverter voltage to monitor the HV battery voltage and detect malfunctions.

The cause of this malfunction may be the following:

Inverter with converter assembly malfunction

- VH sensor malfunction

HV battery system

- Battery ECU assembly malfunction
- HV battery malfunction

Electric vehicle charger voltage sensor (VCHG) internal circuit malfunction

- Voltage sensor (VCHG) malfunction

Solar energy control ECU assembly internal circuit malfunction

- Solar energy control ECU assembly malfunction

DESCRIPTION

The hybrid vehicle control ECU uses the inverter voltage to monitor the HV battery voltage and detect malfunctions.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P31B300	Hybrid/EV Battery Voltage High	The inverter voltage exceeds the threshold. (1 trip detection logic)	<ul style="list-style-type: none"> • Inverter with converter assembly • Battery ECU assembly • HV battery 	Comes on	Master Warning Light: Comes on	Hybrid Control	A	SAE Code: P31B3

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the cell overcharge signal. If the hybrid vehicle control ECU detects an abnormality in the sensor signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P31B3 (INF P31B300): Hybrid/EV Battery Voltage high
Required sensors/components	Battery ECU assembly
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	-
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COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	P31B3 (INF P31B300) is not detected
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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

- Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
- Turn the ignition switch off and wait for 2 minutes or more.
- Turn the ignition switch to ON (READY) and wait for 30 seconds or more. [*1]

HINT:

[*1] : Normal judgment procedure.

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

- Enter the following menus: Powertrain / Hybrid Control / Utility / All Readiness.
- 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, perform the normal judgment procedure again.

WIRING DIAGRAM

Refer to the wiring diagram for the HV battery high-voltage line circuit.

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 negative (-) auxiliary 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](#)

HINT:

- P31B300 may be output as a result of the malfunction indicated by the DTCs in table below.
 - The chart above is listed in inspection order of priority.
 - Check DTCs that are output at the same time by following the listed order. (The main cause of the malfunction can be determined without performing unnecessary inspections.)

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
Sensor and actuator circuit malfunction	Hybrid control system	P0D2D1C	Drive Motor "A" Inverter Voltage Sensor Voltage Out of Range
	Motor generator control system	P0D2D16	Drive Motor "A" Inverter Voltage Sensor (VH) Circuit Voltage Below Threshold
		P0D2D17	Drive Motor "A" Inverter Voltage Sensor (VH) Circuit Voltage Above Threshold
		P0D2D1F	Drive Motor "A" Inverter Voltage Sensor(VH) Circuit Intermittent
	Plug-in charge control system	P0D4C14	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Circuit Short to Ground Open
		P0D4C12	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Circuit Short to Auxiliary Battery

PROCEDURE

1.	READ VALUE USING GTS (HYBRID/EV BATTERY VOLTAGE)
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Pre-procedure1

(a) Read the Data List.

Powertrain > HV Battery > Data List

TESTER DISPLAY
Hybrid/EV Battery Voltage

NOTICE:

Be sure not to measure when the ignition switch is ON (READY).

Procedure1

(b) Make a note of the data list item "Hybrid/EV Battery Voltage".

Post-procedure1

(c) Turn the ignition switch off.

NEXT**2. CHECK HV SUPPLY BATTERY ASSEMBLY****CAUTION:**

Be sure to wear insulated gloves and protective goggles.

Pre-procedure1

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

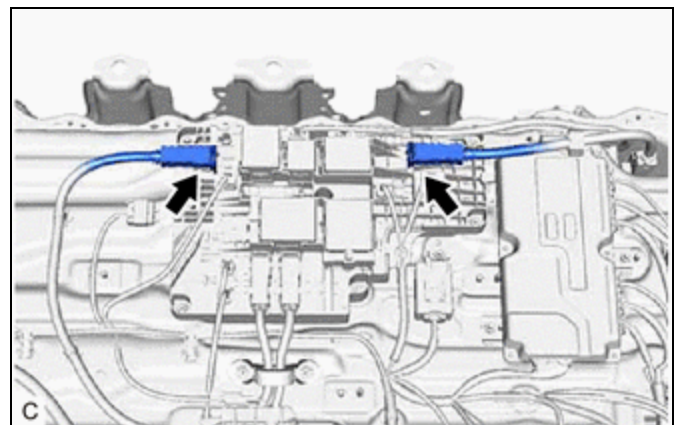
NOTICE:

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) Disconnect the HV battery high voltage connector from the No. 1 traction battery device box assembly.

NOTICE:

Insulate each disconnected high-voltage connector with insulating tape. Wrap the connector from the wire harness side to the end of the connector.



(c) Install the service plug grip.

Procedure1

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

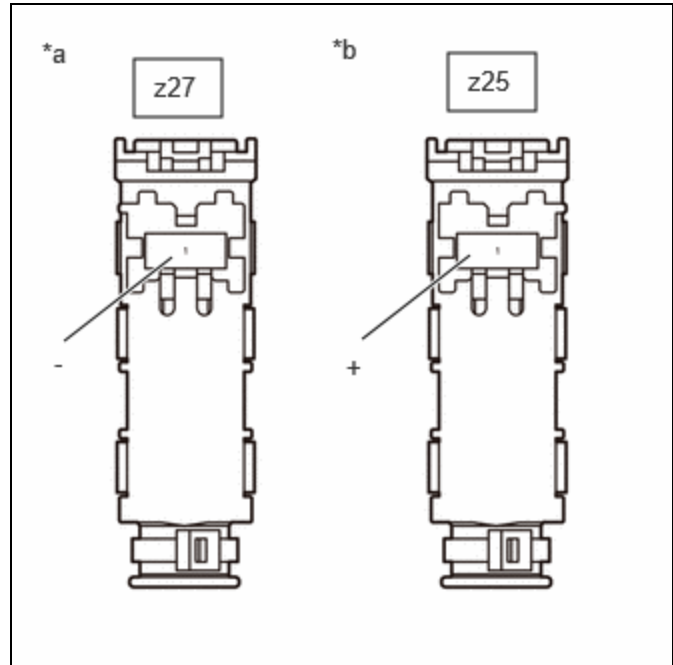
Condition:



[Click Location & Routing\(z25,z27\)](#)

[Click Connector\(z25\)](#)

[Click Connector\(z27\)](#)



TESTER CONNECTION	CONDITION
z25-1 (+) - z27-1 (-)	Ignition switch off

CAUTION:

Do not allow the probes of the electrical tester to contact each other during this inspection.

*a	No. 1 HV Supply Stack Sub-assembly Connector (No. 1 traction battery device box assembly connector)
*b	No. 4 HV Supply Stack Sub-assembly Connector (No. 1 traction battery device box assembly connector)

(e) Check the value in the data list "Hybrid/EV Battery Voltage" and the hybrid battery voltage value that was actually measured.

RESULT	PROCEED TO
When the difference between "Hybrid/EV Battery Voltage" in the Data List and the measurement value of the HV battery voltage* is 5 V or more.	A
Other than above	B

Post-procedure1

(f) Remove the service plug grip.

(g) Reconnect the HV battery high voltage connector to the No. 1 traction battery device box assembly.

A ▶ REPLACE BATTERY ECU ASSEMBLY



3.	CHECK FREEZE FRAME DATA (HYBRID CONTROL)
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Pre-procedure1

(a) None.

Procedure1

(b) Read the freeze frame data of DTC P31B300.

Powertrain > Hybrid Control > DTC(P31B300) > Freeze Frame Data

TESTER DISPLAY
VH-Voltage after Boosting
Hybrid/EV Battery Voltage
Charging Voltage for Hybrid/EV Battery

RESULT	PROCEED TO
Any of the following conditions is met. <ul style="list-style-type: none"> "Charging Voltage for Hybrid/EV Battery" is 324 V or more. "Hybrid/EV Battery Voltage" is less than 294 V. 	A
Any of the following conditions is met. <ul style="list-style-type: none"> "VH-Voltage after Boosting" is less than 336 V. "Hybrid/EV Battery Voltage" is less than 294 V. 	B

Post-procedure1

(c) Turn the ignition switch off.

B **REPLACE INVERTER WITH CONVERTER ASSEMBLY**



4.	CHECK VEHICLE CONDITION
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(a) Choose the model to be inspected.

RESULT	PROCEED TO
without solar charge system	A
with solar charge system	B

A ► REPLACE ELECTRIC VEHICLE CHARGER ASSEMBLY

B



5.	CHECK DATA LIST AND FREEZE FRAME DATA (HYBRID CONTROL)
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Pre-procedure1

(a) Connect the electric vehicle charger cable assembly, and plug-in charge the vehicle.

Procedure1

(b) Read the Data List.

Powertrain > Hybrid Control > Data List

TESTER DISPLAY
Charging Voltage for Hybrid/EV Battery

(c) Read the freeze frame data of DTC P31B300.

Powertrain > Hybrid Control > DTC(P31B300) > Freeze Frame Data

TESTER DISPLAY
Hybrid/EV Battery Voltage

RESULT	PROCEED TO
Any of the following conditions is met. <ul style="list-style-type: none"> • "Charging Voltage Hybrid/EV Battery" is 324 V or more. • "Hybrid/EV Battery Voltage" is less than 294 V. 	A
Except above	B

Post-procedure1

(d) Turn the ignition switch off.

(e) Disconnect the electric vehicle charger cable assembly.

A ► REPLACE ELECTRIC VEHICLE CHARGER ASSEMBLY

B ► REPLACE SOLAR ENERGY CONTROL ECU ASSEMBLY

