Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BHV4
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM (for PHEV Model): P33EC16-P33EE16; (Extreme) Hybrid/EV Battery Stack 1 Cell Circuit Voltage Below Threshold; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P33EC16**	**(Extreme) Hybrid/EV Battery Stack 1 Cell Circuit Voltage Below Threshold**

DTC	**P33ED16**	**(Extreme) Hybrid/EV Battery Stack 2 Cell Circuit Voltage Below Threshold**

DTC	**P33EE16**	**(Extreme) Hybrid/EV Battery Stack 3 Cell Circuit Voltage Below Threshold**

DESCRIPTION

If the voltage of an HV battery cell is lower than the threshold for a certain amount of time, the battery ECU assembly will interpret this as a malfunction.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P33EC16	(Extreme) Hybrid/EV Battery Stack 1 Cell Circuit Voltage Below Threshold	The voltage of any cell of the No. 1 HV supply stack sub-assembly has decreased excessively. (1 trip detection logic)	• No. 1 HV supply stack sub-assembly • Battery voltage sensor	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33EC
P33ED16	(Extreme) Hybrid/EV Battery Stack 2 Cell Circuit Voltage Below Threshold	The voltage of any cell of the No. 2 HV supply stack sub-assembly has decreased excessively. (1 trip detection logic)	• No. 2 HV supply stack sub-assembly • Battery voltage sensor	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33ED

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P33EE16	(Extreme) Hybrid/EV Battery Stack 3 Cell Circuit Voltage Below Threshold	The voltage of any cell of the No. 3 HV supply stack sub-assembly has decreased excessively. (1 trip detection logic)	• No. 3 HV supply stack sub-assembly • Battery voltage sensor	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33EE

MONITOR DESCRIPTION

If the battery ECU assembly detects voltage drop in a battery module, the battery ECU assembly will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P33EC (INF P33EC16), P33ED (INF P33ED16), P33EE (INF P33EE16): Cell voltage too low
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	-

COMPONENT OPERATING RANGE

Battery ECU assembly	DTC P33EC (INF P33EC16) is not detected DTC P33ED (INF P33ED16) is not detected DTC P33EE (INF P33EE16) 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. Drive the vehicle on urban roads for approximately 10 minutes.[*1]

HINT:

[*1]: 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 P1A001C.

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)**

Pre-procedure1

(a) None

Procedure1

(b) Check for DTCs.

Powertrain > HV Battery > Trouble Codes
Powertrain > Hybrid Control > Trouble Codes

RESULT	PROCEED TO
"P33EC16, P33ED16 or P33EE16" 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
	P1AC413	Hybrid/EV Battery Stack 1 Current Interrupt Device Circuit Open
	P1AC513	Hybrid/EV Battery Stack 2 Current Interrupt Device Circuit Open
	P1AC613	Hybrid/EV Battery Stack 3 Current Interrupt Device Circuit Open
	P1AC713	Hybrid/EV Battery Stack 4 Current Interrupt Device Circuit Open
	P1AC49E	Hybrid/EV Battery Stack 1 Current Interrupt Device Stuck On
	P1AC59E	Hybrid/EV Battery Stack 2 Current Interrupt Device Stuck On
	P1AC69E	Hybrid/EV Battery Stack 3 Current Interrupt Device Stuck On
	P1AC79E	Hybrid/EV Battery Stack 4 Current Interrupt Device Stuck On
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

2.	**CHECK DTC**

(a) Check the DTCs that were output when the vehicle was brought to the workshop.

RESULT	PROCEED TO
"P33EC16" is also output.	A
"P33ED16" is also output.	B
"P33EE16" is also output.	C

B **GO TO STEP 8**

C **GO TO STEP 13**

A

3.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY VOLTAGE SENSOR CONNECTOR)**

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.

Procedure1

(b) Check the connections of the battery voltage sensor connectors.

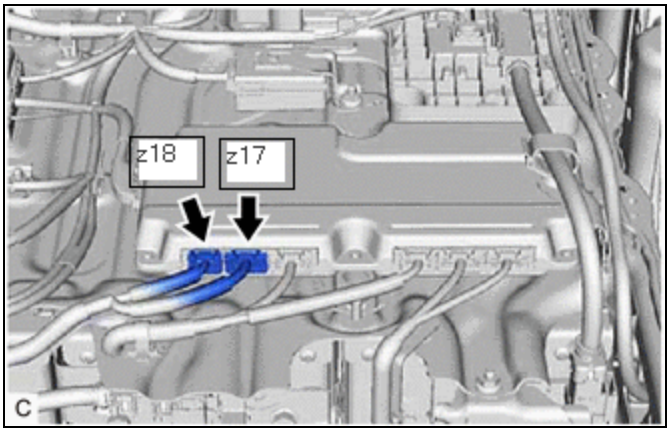
HINT:

Click here INFO

OK:

The connector is connected securely and there are no contact problems.

Result:



RESULT		PROCEED TO
OK		A
Not connected securely	The terminals are not damaged or corroded	B
Connector is not connected securely	The terminals are damaged or corroded	C

Post-procedure1

(c) None

B ▶ **CONNECT SECURELY**

C ▶ **REPLACE NO. 1 HV SUPPLY STACK SUB-ASSEMBLY**

A

4.	CHECK FREEZE FRAME DATA

Pre-procedure1

(a) None

Procedure1

(b) Read the value of freeze frame data items "Hybrid/EV Battery Cell 1 voltage" through "Hybrid/EV Battery Cell 24 voltage" for DTC P33EC16 and make a note if the value of any is 1.6 V or less.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

5.	**CHECK NO. 1 HV SUPPLY STACK SUB-ASSEMBLY (HYBRID BATTERY CELL 1 TO 24 VOLTAGE)**

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 1.6 V or less.	A
Other than above	B

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

6.	**CHECK BATTERY VOLTAGE SENSOR (VA1 - VA24)**

Click here INFO

RESULT	PROCEED TO
The resistance between the terminals is 50 kΩ or more.	A
Other than above	B

A ▶ **REPLACE NO. 1 HV SUPPLY STACK SUB-ASSEMBLY**

B

7.	**REPLACE NO. 1 HV SUPPLY STACK SUB-ASSEMBLY**

HINT:

Click here INFO

NEXT ▶ **REPLACE BATTERY VOLTAGE SENSOR**

8.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY VOLTAGE SENSOR CONNECTOR)**

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.

Procedure1

(b) Check the connections of the battery voltage sensor connectors.

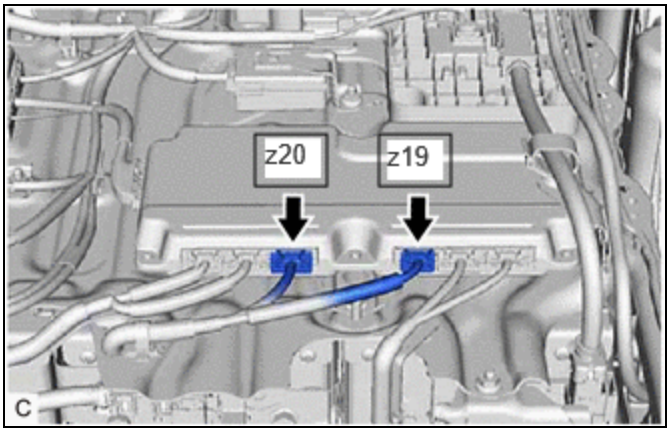
HINT:

Click here INFO

OK:

The connector is connected securely and there are no contact problems.

Result:



RESULT		PROCEED TO
OK		A
Not connected securely	The terminals are not damaged or corroded	B
Not connected securely	The terminals are damaged or corroded	C

Post-procedure1

(c) None

B ▶ **CONNECT SECURELY**

C ▶ **REPLACE NO. 2 HV SUPPLY STACK SUB-ASSEMBLY**

A ▼

9.	**CHECK FREEZE FRAME DATA**

Pre-procedure1

(a) None

Procedure1

(b) Read the value of freeze frame data items "Hybrid/EV Battery Cell 25 voltage" through "Hybrid/EV Battery Cell 48 voltage" for DTC P33ED16 and make a note if the value of any is 1.6 V or less.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

10.	**CHECK NO. 2 HV SUPPLY STACK SUB-ASSEMBLY (HYBRID BATTERY CELL 25 TO 48 VOLTAGE)**

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 1.6 V or less.	A
Other than above	B

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

11.	**CHECK BATTERY VOLTAGE SENSOR (VA25 - VA48)**

Click here INFO

RESULT	PROCEED TO
The resistance between the terminals is 50 kΩ or more.	A

RESULT	PROCEED TO
Other than above	B

A ▶ **REPLACE NO. 2 HV SUPPLY STACK SUB-ASSEMBLY**

B

12.	**REPLACE NO. 2 HV SUPPLY STACK SUB-ASSEMBLY**

HINT:

Click here INFO

NEXT ▶ **REPLACE BATTERY VOLTAGE SENSOR**

13.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY VOLTAGE SENSOR CONNECTOR)**

CAUTION:

Be sure to wear insulated gloves and protective goggles.

Pre-procedure1

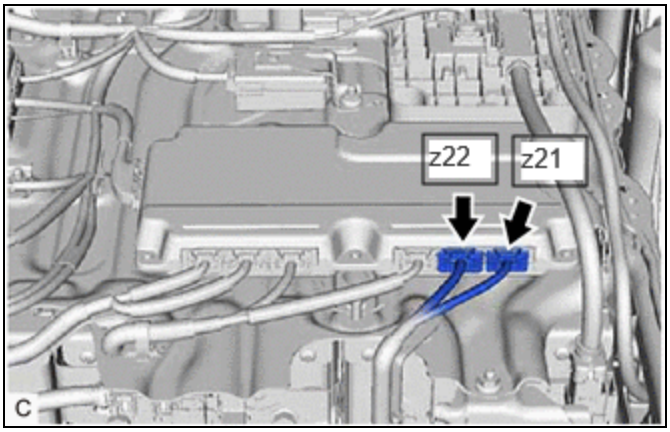
(a) Check that the service plug grip is not installed.

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.

Procedure1

(b) Check the connections of the battery voltage sensor connectors.



HINT:

Click here INFO

OK:

The connector is connected securely and there are no contact problems.

Result:

RESULT	PROCEED TO
OK	A

RESULT		PROCEED TO
Not connected securely	The terminals are not damaged or corroded	B
Not connected securely	The terminals are damaged or corroded	C

Post-procedure1

(c) None

B ▶ **CONNECT SECURELY**

C ▶ **REPLACE NO. 3 HV SUPPLY STACK SUB-ASSEMBLY**

A

14.	CHECK FREEZE FRAME DATA

Pre-procedure1

(a) None

Procedure1

(b) Read the value of freeze frame data items "Hybrid/EV Battery Cell 49 voltage" through "Hybrid/EV Battery Cell 72 voltage" for DTC P33EE16 and make a note if the value of any is 1.6 V or less.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

15.	CHECK NO. 3 HV SUPPLY STACK SUB-ASSEMBLY (HYBRID BATTERY CELL 49 TO 72 VOLTAGE)

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 1.6 V or less.	A
Other than above	B

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

16.	**CHECK BATTERY VOLTAGE SENSOR (VA49 - VA72)**

Click here INFO

RESULT	PROCEED TO
The resistance between the terminals is 50 kΩ or more.	A
Other than above	B

A ▶ **REPLACE NO. 3 HV SUPPLY STACK SUB-ASSEMBLY**

B

17.	**REPLACE NO. 3 HV SUPPLY STACK SUB-ASSEMBLY**

HINT:

Click here INFO

NEXT ▶ **REPLACE BATTERY VOLTAGE SENSOR**