Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BHV0
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM (for PHEV Model): P1CC81E,P1CC91E,P1CCA1E; Hybrid/EV Battery Stack 1 Voltage Difference Out of Range; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P1CC81E**	**Hybrid/EV Battery Stack 1 Voltage Difference Out of Range**

DTC	**P1CC91E**	**Hybrid/EV Battery Stack 2 Voltage Difference Out of Range**

DTC	**P1CCA1E**	**Hybrid/EV Battery Stack 3 Voltage Difference Out of Range**

DESCRIPTION

The HV battery is composed of 72 cells (3.7 V each) in series. The battery ECU assembly monitors difference in voltage of each HV battery cell to detect malfunctions of the HV battery.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P1CC81E	Hybrid/EV Battery Stack 1 Voltage Difference Out of Range	The difference in voltage of each cell of the No. 1 HV supply stack sub-assembly exceeds the specified value. (1 trip detection logic)	• No. 1 HV supply stack sub-assembly • Service plug grip • Battery voltage sensor	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33DA
P1CC91E	Hybrid/EV Battery Stack 2 Voltage Difference Out of Range	The difference in voltage of each cell of the No. 2 HV supply stack sub-assembly exceeds the specified value. (1 trip detection logic)	• No. 2 HV supply stack sub-assembly • Service plug grip • Battery voltage sensor	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33DB
P1CCA1E	Hybrid/EV Battery Stack 3 Voltage Difference Out of Range	The difference in voltage of each cell of the No. 3 HV supply stack sub-assembly	• No. 3 HV supply stack sub-assembly • Service plug grip	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P33DC

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
		exceeds the specified value. (1 trip detection logic)	• Battery voltage sensor					

MONITOR DESCRIPTION

If the difference in voltage between each HV battery cell exceeds the specified value, the battery ECU assembly determines that a malfunction has occurred. When the malfunction detection condition is satisfied, the battery ECU assembly will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P33DA (INF P1CC81E), P33DB (INF P1CC91E), P33DC (INF P1CCA1E): Battery cell malfunction
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 P33DA (INF P1CC81E) is not detected DTC P33DB (INF P1CC91E) is not detected DTC P33DC (INF P1CCA1E) 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 1 hour or more.[*1]
3. Turn the ignition switch to ON and wait for 10 seconds or more.[*2]
4. Drive the vehicle on urban roads for approximately 10 minutes.[*3]

HINT:

- [*1] to [*3]: Normal judgment procedure.

  The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
- This DTC may not be stored if the vehicle is stopped or being driven at a constant speed.

5. Enter the following menus: Powertrain / HV Battery / Utility / All Readiness.
6. 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
"P1CC81E, P1CC91E or P1CCA1E" 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
"P1CC81E" is also output.	A
"P1CC91E" is also output.	B
"P1CCA1E" is also output.	C

B ▶ **GO TO STEP 14**

C ▶ **GO TO STEP 25**

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.

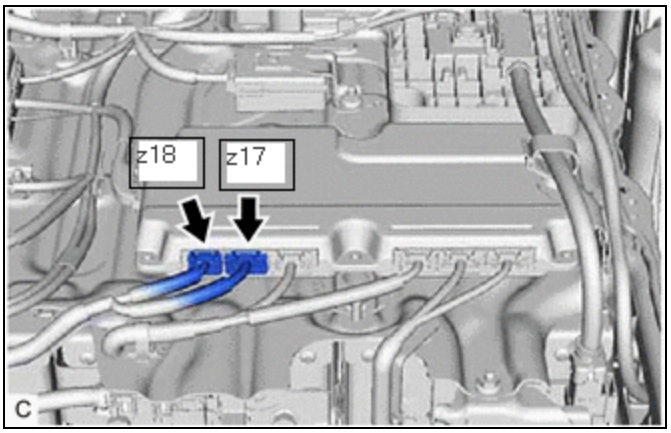
HINT:

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 P1CC81E and make a note if the value of any is the lowest voltage value.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

5.	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

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

6.	**CHECK TOTAL DISTANCE DRIVEN**

(a) Read the odometer to check the total distance the vehicle has been driven.

RESULT		PROCEED TO
Total distance driven is less than 200000 km (124280 mile)		A
Total distance driven is 200000 km (124280 mile) or more	Current total distance driven - total distance driven when service plug grip replaced = less than 200000 km (124280 mile) *1	A
	Other than above	B

HINT:

*1: If the service plug grip has been replaced, use the total distance driven since it was replaced.

B ▶ **GO TO STEP 10**

A

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

HINT:

Click here INFO

NEXT

8.	SIMULATION TEST

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

9.	CHECK DTC OUTPUT (HV BATTERY)

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CC81E" is output.	A
"P1CC81E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A ▶ **REPLACE BATTERY VOLTAGE SENSOR**

B ▶ **END**

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

HINT:

Click here INFO

NEXT

11.	**REPLACE SERVICE PLUG GRIP**

HINT:

Click here INFO

NEXT

12.	**SIMULATION TEST**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

13.	**CHECK DTC OUTPUT (HV BATTERY)**

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CC81E" is output.	A
"P1CC81E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A ▶ **REPLACE BATTERY VOLTAGE SENSOR**

B ▶ **END**

14.	**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.

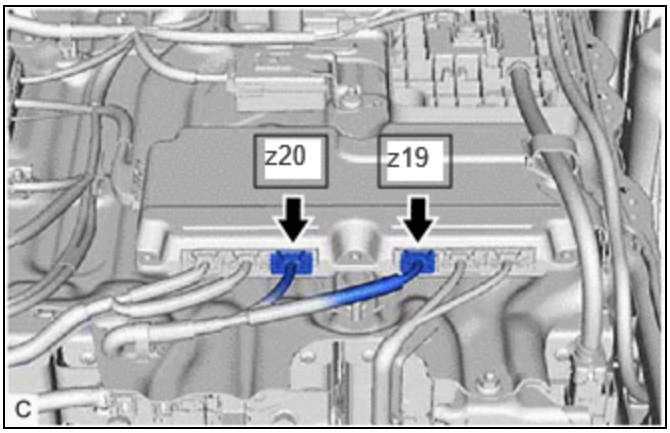
HINT:

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. 2 HV SUPPLY STACK SUB-ASSEMBLY**

A

15.	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 P1CC91E and make a note if the value of any is the lowest voltage value.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

16.	CHECK BATTERY VOLTAGE SENSOR (VA25 - VA48)

Click here INFO

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

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

17.	CHECK TOTAL DISTANCE DRIVEN

(a) Read the odometer to check the total distance the vehicle has been driven.

RESULT		PROCEED TO
Total distance driven is less than 200000 km (124280 mile)		A
Total distance driven is 200000 km (124280 mile) or more	Current total distance driven - total distance driven when service plug grip replaced = less than 200000 km (124280 mile) *1	A
	Other than above	B

HINT:

*1: If the service plug grip has been replaced, use the total distance driven since it was replaced.

B ▶ **GO TO STEP 21**

A

18.	REPLACE NO. 2 HV SUPPLY STACK SUB-ASSEMBLY

HINT:

Click here INFO

NEXT

19.	SIMULATION TEST

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

20.	CHECK DTC OUTPUT (HV BATTERY)

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CC91E" is output.	A
"P1CC91E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A **REPLACE BATTERY VOLTAGE SENSOR**

B **END**

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

HINT:

Click here INFO

NEXT

22.	**REPLACE SERVICE PLUG GRIP**

HINT:

Click here INFO

NEXT

23.	**SIMULATION TEST**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

24.	**CHECK DTC OUTPUT (HV BATTERY)**

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CC91E" is output.	A
"P1CC91E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A ▶ **REPLACE BATTERY VOLTAGE SENSOR**

B ▶ **END**

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

CAUTION:

Be sure to wear insulated gloves and protective goggles.

Pre-procedure1

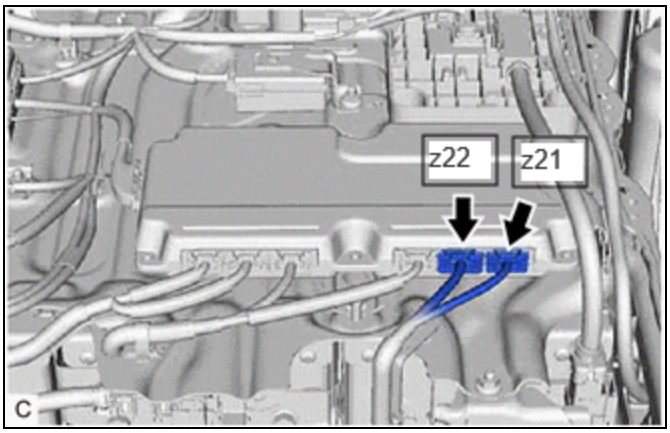
(a) Check that the service plug grip is not installed.

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

26.	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 P1CCA1E and make a note if the value of any is the lowest voltage value.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

27.	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

B ▶ **REPLACE BATTERY VOLTAGE SENSOR**

A

28.	**CHECK TOTAL DISTANCE DRIVEN**

(a) Read the odometer to check the total distance the vehicle has been driven.

RESULT		PROCEED TO
Total distance driven is less than 200000 km (124280 mile)		A
Total distance driven is 200000 km (124280 mile) or more	Current total distance driven - total distance driven when service plug grip replaced = less than 200000 km (124280 mile) *1	A
	Other than above	B

HINT:

*1: If the service plug grip has been replaced, use the total distance driven since it was replaced.

B ▶ **GO TO STEP 32**

A

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

HINT:

Click here INFO

NEXT

30.	SIMULATION TEST

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

31.	CHECK DTC OUTPUT (HV BATTERY)

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CCA1E" is output.	A
"P1CCA1E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A ▶ **REPLACE BATTERY VOLTAGE SENSOR**

B ▶ **END**

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

HINT:

Click here INFO

NEXT

33.	**REPLACE SERVICE PLUG GRIP**

HINT:

Click here INFO

NEXT

34.	**SIMULATION TEST**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > HV Battery > Clear DTCs

Post-procedure1

(c) Turn the ignition switch to ON and wait for 10 seconds or more.

(d) Drive the vehicle on urban roads for approximately 10 minutes.

(e) Turn the ignition switch off.

NEXT

35.	**CHECK DTC OUTPUT (HV BATTERY)**

Pre-procedure1

(a) None

Procedure1

(b) Check if DTCs are output.

Powertrain > HV Battery > Trouble Codes

RESULT	PROCEED TO
"P1CCA1E" is output.	A
"P1CCA1E" is not output.	B

Post-procedure1

(c) Turn the ignition switch off.

A ▶ **REPLACE BATTERY VOLTAGE SENSOR**

B ▶ **END**