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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): P1BAC1C; Hybrid/EV Battery Charging System Positive/Negative Contactor Enable Circuit Circuit Voltage Out of Range; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P1BAC1C**	**Hybrid/EV Battery Charging System Positive/Negative Contactor Enable Circuit Circuit Voltage Out of Range**

DTC SUMMARY

The hybrid vehicle control ECU has a function to disconnect the CHR via the WCEN circuit.

At the start of AC charging, the hybrid vehicle control ECU checks the integrity of the WCEN circuit by comparing the WCEN command value output by the hybrid vehicle control ECU and the WCEN recognition value of the battery ECU assembly.

If the command value and the recognition value do not match, a WCEN logic fault judgment is made.

The cause of this malfunction may be one of the following:

- Hybrid vehicle control ECU internal failure
- Battery ECU assembly internal malfunction
- WCEN signal harness malfunction

DESCRIPTION

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P1BAC1C	Hybrid/EV Battery Charging System Positive/Negative Contactor Enable Circuit Circuit Voltage Out of Range	WCEN command value output by hybrid vehicle control ECU and Battery ECU assembly WCEN recognition value do not match. (1 trip detection logic)	• Hybrid vehicle control ECU • Battery ECU assembly • Wire harness or connector	Comes on	Master Warning: Comes on	Hybrid Control	A	SAE Code: P1BAF

Related Data List

DTC NO.	DATA LIST
P1BAC1C	• AC Charging Relay Permission Signal Status • AC Charging Relay Permission Signal Stuck Low Status • AC Charging Relay Permission Signal Stuck High Status • AC Charging Relay Permission Signal Status (Hybrid/EV Battery)

MONITOR DESCRIPTION

If the command value and the recognition value do not match, a WCEN logic fault judgment is made, it will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P1BAF (INF P1BAC1C): Battery Charging System Positive Contactor Enable Circuit Range/Performance
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

Hybrid vehicle control ECU	DTC P1BAF (INF P1BAC1C) 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. Enter the following menus: Powertrain / Hybrid Control / Data List.

3. Check that "Hybrid/EV Battery SOC" shows 70% or less.
4. Turn the ignition switch off and wait for 2 minutes or more.
5. Connect the electric vehicle charger cable assembly, and plug-in charge the vehicle for at least 30 seconds. [*1]
6. Disconnect the electric vehicle charger cable assembly and wait for 10 seconds or more. [*2]
7. Turn the ignition switch to ON. [*3]

HINT:

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

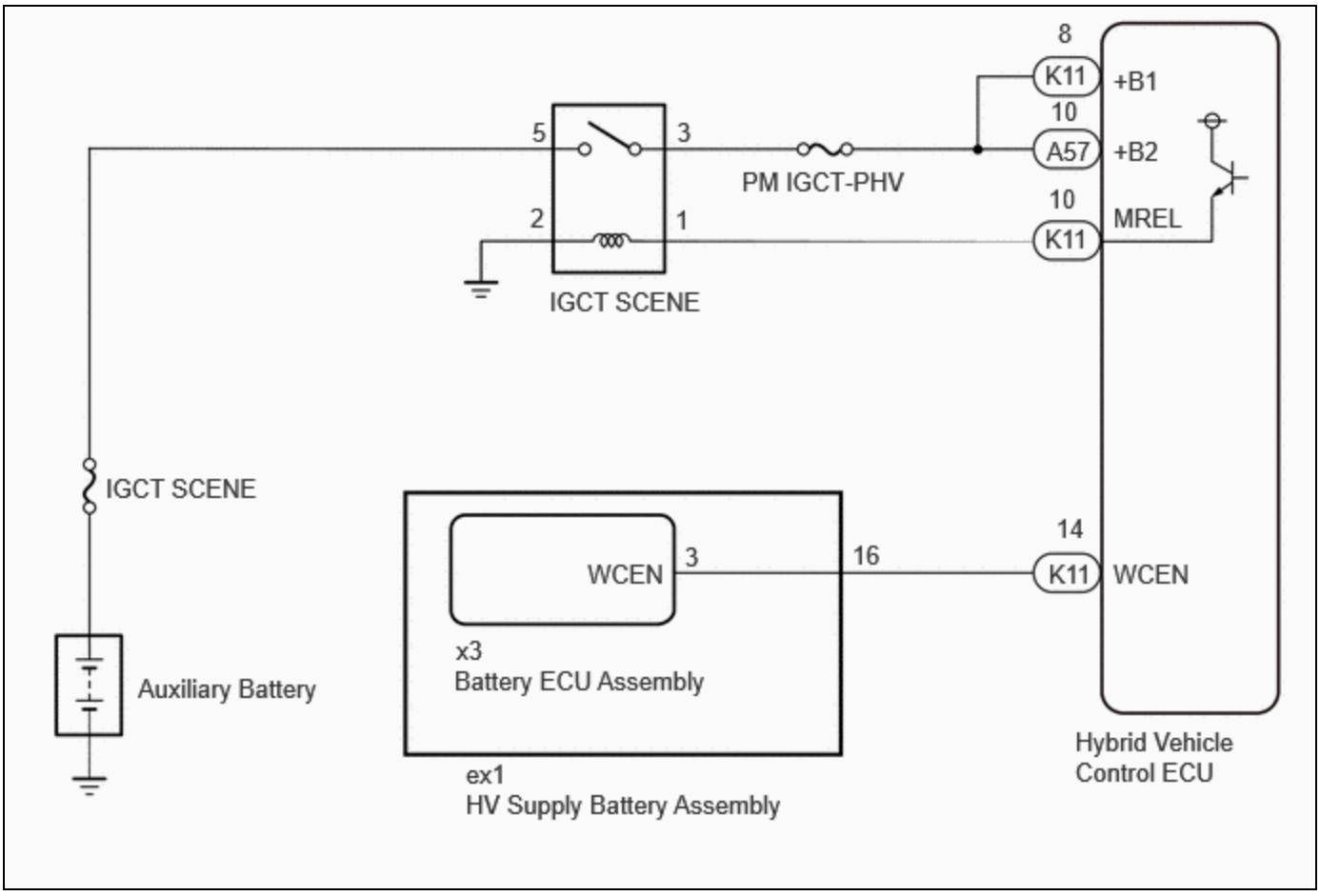
The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.

8. Enter the following menus: Powertrain / Hybrid Control / Utility / All Readiness.
9. 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 driving pattern again.

WIRING DIAGRAM



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 (HYBRID CONTROL)**

Pre-procedure1

(a) None.

Procedure1

(b) Check for DTCs.

Powertrain > Hybrid Control > Trouble Codes

RESULT	PROCEED TO
P1BAC1C only is output, or DTCs except the ones in the table below are also output.	A
Any of the following DTCs including pending DTCs are also output.	B

MALFUNCTION CONTENT	RELEVANT DTC	
Microcomputer malfunction	P060647	Hybrid/EV Powertrain Control Module Processor Watchdog / Safety MCU Failure
	P060687	Hybrid/EV Powertrain Control Module Processor to Monitoring Processor Missing Message
	P060A47	Hybrid/EV Powertrain Control Module Monitoring Processor Watchdog / Safety MCU Failure
	P060A87	Hybrid/EV Powertrain Control Module Processor from Monitoring Processor Missing Message
System malfunction	P1C9E9F	Hybrid/EV System Reset Stuck Off
Communication system malfunction	U011187	Lost Communication with Hybrid/EV Battery Energy Control Module "A" Missing Message

HINT:

P1BAC1C may be output as a result of the malfunction indicated by the DTCs above.

1. The chart above is listed in inspection order of priority.

2. 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.)

Post-procedure1

(c) Turn the ignition switch off.

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

A

2.	**CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR)**

Click here INFO

NG ▶ **CONNECT SECURELY**

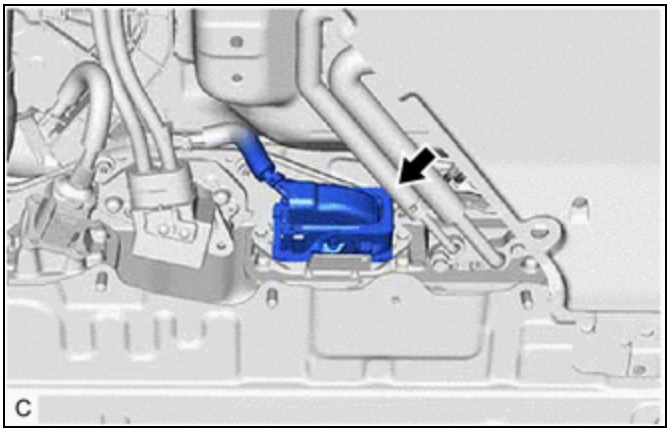
OK

3.	**CHECK CONNECTOR CONNECTION CONDITION (FLOOR UNDER WIRE CONNECTOR)**

(a) Check the connection condition of the floor under wire connector and the contact pressure of each terminal. Check the terminals for deformation, and check the connector for water ingress and foreign matter.

Click here INFO

OK:
- The connector is connected securely.
- The terminals are not deformed and are connected securely.
- No water or foreign matter in the connector.



RESULT	PROCEED TO
OK	A

RESULT	PROCEED TO
NG (The connector is not connected securely.)	B
NG (The terminals are not making secure contact or are deformed, or water or foreign matter exists in the connector.)	C

B ▶ **CONNECT SECURELY**

C ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

A

4.	CHECK CONNECTOR CONNECTION CONDITION (BATTERY ECU ASSEMBLY 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.

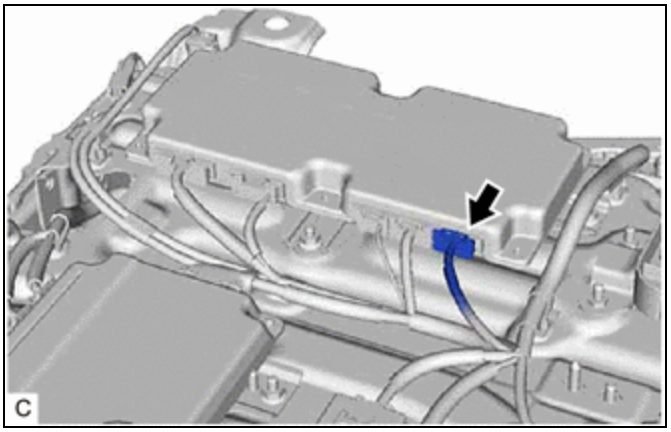
Procedure1

(b) Check the connector connections and contact pressure of the relevant terminal of the battery ECU assembly connector.

Click here INFO

OK:

The connectors are connected securely and there are no contact pressure problems.



Post-procedure1

(c) None.

NG ▶ **CONNECT SECURELY**

OK

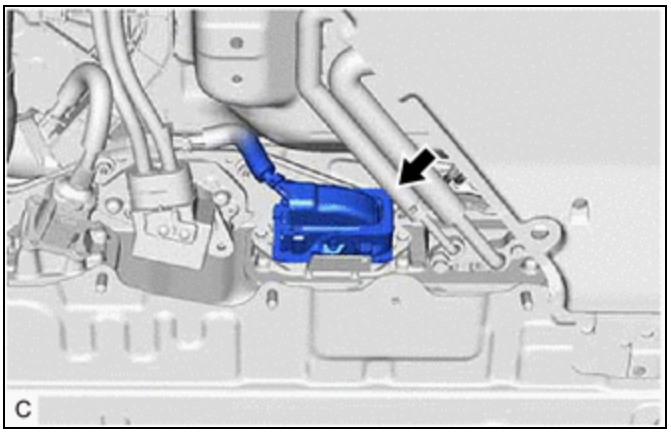
5.	**CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - HV SUPPLY BATTERY ASSEMBLY)**

Pre-procedure1

(a) Disconnect the hybrid vehicle control ECU connector.

(b) Disconnect the No. 2 traction battery wire connector.

Click here INFO



Procedure1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(K11,ex1)
Click Connector(K11)
Click Connector(ex1)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K11-14 (WCEN) - ex1-16 (WCEN)	Ignition switch off	Below 1 Ω
K11-14 (WCEN) or ex1-16 (WCEN) - Other terminals and body ground	Ignition switch off	10 kΩ or higher

Post-procedure1

(d) Reconnect the No. 2 traction battery wire connector.

(e) Reconnect the hybrid vehicle control ECU connector.

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

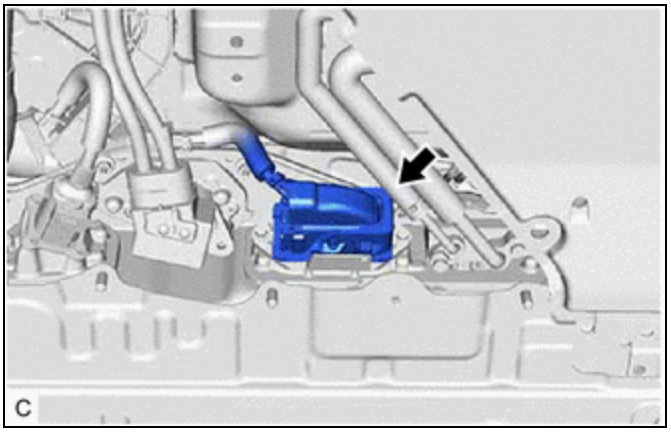
OK

6.	**CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - HV SUPPLY BATTERY ASSEMBLY)**

Pre-procedure1

(a) Disconnect the No. 2 traction battery wire connector.

Click here INFO



(b) Disconnect the battery ECU assembly connector.

Procedure1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(ex1,x3)
Click Connector(ex1)
Click Connector(x3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
ex1-16 (WCEN) - x3-3 (WCEN)	Ignition switch off	Below 1 Ω
ex1-16 (WCEN) or x3-3 (WCEN) - Other terminals and body ground	Ignition switch off	10 kΩ or higher

Post-procedure1

(d) Reconnect the battery ECU assembly connector.

(e) Reconnect the No. 2 traction battery wire connector.

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

OK

7.	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BODY GROUND)

Pre-procedure1

(a) Disconnect the hybrid vehicle control ECU connector.

(b) Turn the ignition switch to ON.

Procedure1

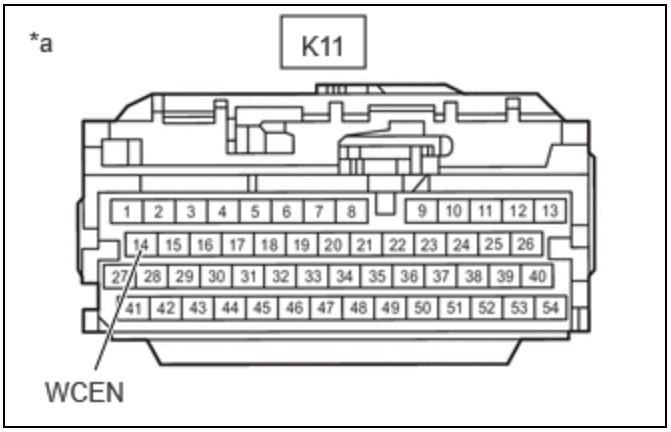
(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(K11)
Click Connector(K11)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K11-14 (WCEN) - Body ground	Ignition switch ON	Below 1 V



*a	Front view of wire harness connector (to Hybrid Vehicle Control ECU)

NOTICE:

Turning the ignition switch to ON with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

Post-procedure1

(d) Turn the ignition switch off.

(e) Reconnect the hybrid vehicle control ECU connector.

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

OK

8.	READ VALUE USING FREEZE FRAME DATA (AC CHARGING RELAY PERMISSION SIGNAL STUCK LOW STATUS, AC CHARGING RELAY PERMISSION SIGNAL STUCK HIGH STATUS)

Pre-procedure1

(a) None.

Procedure1

(b) Read the freeze frame data of DTC P1BAC1C.

Powertrain > Hybrid Control > DTC(P1BAC1C) > Freeze Frame Data

TESTER DISPLAY
AC Charging Relay Permission Signal Stuck Low Status
AC Charging Relay Permission Signal Stuck High Status

Result	PROCEED TO
"AC Charging Relay Permission Signal Stuck High Status" is ON	A
"AC Charging Relay Permission Signal Stuck Low Status" is ON	B

Post-procedure1

(c) Turn the ignition switch off.

B ▶ **GO TO STEP 10**

A ▼

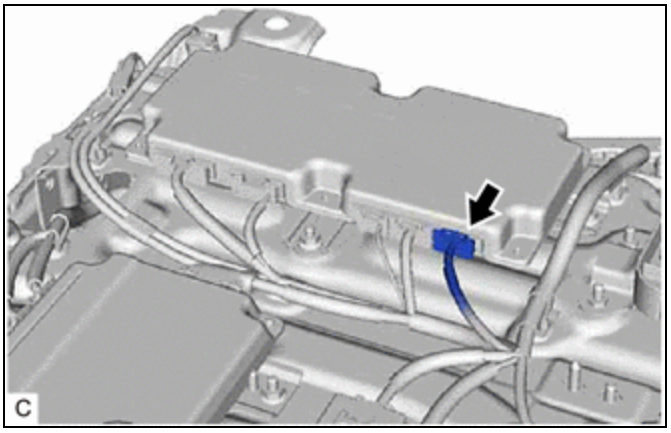
9.	**CHECK HYBRID VEHICLE CONTROL ECU**

Pre-procedure1

(a) Connect the SST.

Click here INFO

(b) Disconnect the battery ECU assembly connector.



(c) Turn the ignition switch to ON.

Procedure1

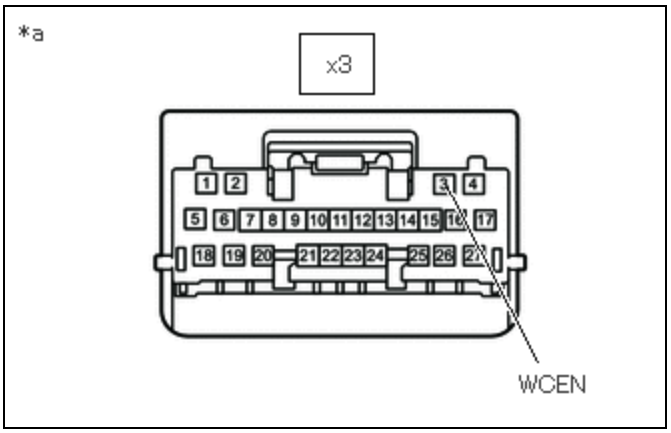
(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(x3)
Click Connector(x3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
x3-3 (WCEN) - Body ground	Ignition switch ON	Below 1 V



*a	Front view of wire harness connector (to Battery ECU Assembly)

NOTICE:

Turning the ignition switch to ON with the battery ECU assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

Post-procedure1

(e) Turn the ignition switch off.

(f) Reconnect the battery ECU assembly connector.

(g) Disconnect the SST.

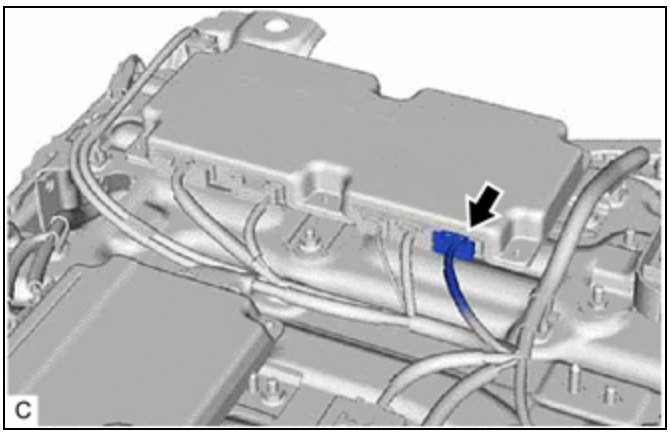
OK ▶ **REPLACE BATTERY ECU ASSEMBLY**

NG ▶ **REPLACE HYBRID VEHICLE CONTROL ECU**

10.	**CHECK HYBRID VEHICLE CONTROL ECU (BATTERY ECU ASSEMBLY - BODY GROUND)**

Pre-procedure1

(a) Disconnect the battery ECU assembly connector.



Procedure1

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(x3)
Click Connector(x3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
x3-3 (WCEN) - Body ground	Ignition switch off	10 kΩ or higher

Post-procedure1

(c) Reconnect the battery ECU assembly connector.

NG ▶ **REPLACE HYBRID VEHICLE CONTROL ECU**

OK
▼

11.	**CHECK HYBRID VEHICLE CONTROL ECU (HYBRID VEHICLE CONTROL ECU - BODY GROUND)**

Pre-procedure1

(a) Disconnect the hybrid vehicle control ECU

(b) Turn the ignition switch to ON.

Procedure1

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

Standard Voltage:

Click Location & Routing(K11,A57)
Click Connector(K11)
Click Connector(A57)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K11-8 (+B1) - Body ground	Ignition switch ON	8 V or more
A57-10 (+B2) - Body ground	Ignition switch ON	8 V or more

NOTICE:

Turning the ignition switch to ON with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

Post-procedure1

(d) Turn the ignition switch off.

(e) Reconnect the hybrid vehicle control ECU

OK ▶ **REPLACE BATTERY ECU ASSEMBLY**

NG ▶ **REPLACE HYBRID VEHICLE CONTROL ECU**