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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: HYBRID / BATTERY CONTROL: MOTOR GENERATOR CONTROL SYSTEM (for M20A-FXS): P1C661F,P1CAE49,P1CB138; Drive Motor "B" Control Module Circuit Intermittent; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**P1C661F**	**Drive Motor "B" Control Module Circuit Intermittent**

DTC	**P1CAE49**	**Drive Motor "B" Position Sensor Internal Electronic Failure**

DTC	**P1CB138**	**Drive Motor "B" Position Sensor REF Signal Frequency Incorrect**

DESCRIPTION

The motor generator control ECU, which is built into the inverter with converter assembly, monitors its internal operation and detects malfunctions.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P1C661F	Drive Motor "B" Control Module Circuit Intermittent	Excitation signal (REF signal) for resolver angle detection cycle malfunction detected when DTC P0C7917, P0E5717, P0D3319, P1C5D19, P1C5F19 or P1C5E19 is stored. (1 trip detection logic)	• Inverter with converter assembly • Hybrid vehicle transaxle assembly • Rear traction motor with transaxle assembly • Wire harness or connector	Does not come on	Master Warning: Does not come on	Motor Generator	A	SAE Code: P1C66
P1CAE49	Drive Motor "B" Position Sensor Internal Electronic Failure	Rear motor resolver angle malfunction: The difference between the resolver angle for control and estimated	• Inverter with converter assembly • Hybrid vehicle transaxle assembly	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P1CAE

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
		resolver angle exceeds the allowable limit. (1 trip detection logic)	• Rear traction motor with transaxle assembly • Wire harness or connector					
P1CB138	Drive Motor "B" Position Sensor REF Signal Frequency Incorrect	Rear motor resolver REF signal cycle malfunction: Excitation signal (REF signal) for resolver angle detection cycle malfunction. (1 trip detection logic)	• Inverter with converter assembly • Hybrid vehicle transaxle assembly • Rear traction motor with transaxle assembly • Wire harness or connector	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P1CB1

MONITOR DESCRIPTION

The motor generator control ECU performs diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the motor generator control ECU checks for an R/D (Resolver/ Digital converter) malfunction involving the rear motor resolver. If the motor generator control ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the rear motor resolver. The motor generator control ECU will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P1CAE (INF P1CAE49): Drive Motor "B" Control Module R/D Processing (Drive Motor "B" Position) Performance P1CB1 (INF P1CB138): Drive Motor "B" Position Sensor Reference Signal Performance
Required sensors/components	Rear motor resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
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

Motor generator control ECU	DTC P1CAE (INF P1CAE49) is not detected DTC P1CB1 (INF P1CB138) 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. Turn the ignition switch to ON and wait for 5 seconds or more.* [*1]

   *: Lightly wiggle the connectors and wire harnesses up and down and right and left.
4. Turn the ignition switch to ON (READY) and wait for 5 seconds or more. [*2]
5. Depress the accelerator pedal of the vehicle with the engine stopped and the shift lever in P to start the engine. [*3]
6. Keep the engine running for 5 seconds or more. [*4]
7. Drive the vehicle forward with the shift lever in D for 5 m (16 ft.) or more. [*5]
8. Drive the vehicle backward with the shift lever in R for 5 m (16 ft.) or more. [*6]

HINT:

[*1] to [*6]: Normal judgment procedure.

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

9. Enter the following menus: Powertrain / Motor Generator / Utility / All Readiness.
10. 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 DTC P1CAC49.

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:

- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.
- If the resolver is malfunctioning, the vehicle may not drive smoothly.
- When inspecting the connectors, if it is difficult to judge if a connector was disconnected, deformed or improperly secured, disconnect and reconnect the connector and then check for DTCs again. Check if the same DTC is output. If the same DTC is not output, improper connection of connectors is suspected.
- As a malfunction detection threshold may be exceeded when performing the vibration or heat connector inspections, make sure to perform the following inspection to check that the DTC was not stored due to the malfunction of a part.
- P1C661F, P1CAE49 or P1CB138 may be output as a result of the malfunctions indicated by the DTCs in table below.

  a. The chart above is listed in inspection order of priority.
  b. 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.)

SYSTEM	RELEVANT DTC	
Motor generator control system	P0A3F16	Drive Motor "A" Position Sensor Circuit Voltage Below Threshold
	P0A4516	Drive Motor B" Position Sensor Circuit Voltage Below Threshold
	P0A4B16	Generator Position Sensor Circuit Voltage Below Threshold
	P0C5513	Drive Motor B" Position Sensor Circuit "A" Circuit Open
	P0C5516	Drive Motor B" Position Sensor Circuit "A" Circuit Voltage Below Threshold
	P0C5517	Drive Motor B" Position Sensor Circuit "A" Circuit Voltage Above Threshold
	P0C5F13	Drive Motor B" Position Sensor Circuit "B" Circuit Open
	P0C5F16	Drive Motor B" Position Sensor Circuit "B" Circuit Voltage Below Threshold
	P0C5F17	Drive Motor B" Position Sensor Circuit "B" Circuit Voltage Above Threshold

PROCEDURE

1.	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR)**

Click here INFO

RESULT	PROCEED TO
OK	A
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

▼

2.	**CHECK REAR MOTOR RESOLVER CIRCUIT**

Click here INFO

NEXT

▼

3.	**CHECK GENERATOR RESOLVER CIRCUIT**

Click here INFO

NEXT

▼

4.	**CHECK MOTOR RESOLVER CIRCUIT**

Click here INFO

HINT:

If the "Motor Resolver Circuit" inspection results are normal, perform the next step.

NEXT ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**