Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BHRX
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: MOTOR GENERATOR CONTROL SYSTEM (for PHEV Model): P0A7873; Drive Motor "A" Inverter Actuator Stuck Closed; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P0A7873**	**Drive Motor "A" Inverter Actuator Stuck Closed**

DTC SUMMARY

MALFUNCTION DESCRIPTION

This DTC is stored when a short is detected in the inverter with converter assembly (motor inverter) or the hybrid vehicle transaxle assembly (motor (MG2)). The cause of this malfunction may be one of the following:

Internal inverter malfunction

- Motor inverter internal circuit malfunction

Hybrid vehicle transaxle assembly (motor (MG2)) malfunction

- Open or short circuit
- Iron particles or damage from foreign objects

DESCRIPTION

For a description of the inverter.

Click here INFO

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P0A7873	Drive Motor "A" Inverter Actuator Stuck Closed	Current flow to any phase of the motor (MG2) exceeds the threshold after the motor inverter is shut down due to a DTC indicating a motor inverter malfunction (overheating, overcurrent or circuit malfunction) being stored. (1 trip detection logic)	• Inverter with converter assembly • Motor cable • Hybrid vehicle transaxle assembly	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0A78

MONITOR DESCRIPTION

The motor generator control ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the motor generator control ECU will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF P0A7873): MFIV detection (Short circuit malfunction)
Required sensors/components	Motor inverter
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

Motor generator control ECU	DTC P0A78 (INF P0A7873) 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]
4. Turn the ignition switch to ON (READY) and wait for 5 seconds or more. [*2]
5. Drive the vehicle for approximately 10 minutes mainly using the engine. [*3]

NOTICE:

As the state of charge of the HV battery may be low after driving in fail-safe mode, it will automatically be charged for 5 to 10 minutes with ignition switch ON (READY) after repairs have been performed.

HINT:

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

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

6. Enter the following menus: Powertrain / Motor Generator / Utility / All Readiness.
7. 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 Motor High-voltage 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

- DTC P0A7873 is stored after DTCs P0A789E and/or P1C5D19 are stored. After troubleshooting and repairing the malfunction which caused DTC P0A7873 to be stored, be sure to troubleshoot the other DTCs.
- Depending on the conditions in which the vehicle is being operated when a short circuit occurs in the inverter with converter assembly, the hybrid vehicle transaxle assembly may be affected. As this DTC is stored if a short circuit occurs in the inverter with converter assembly, it is necessary to perform a road test to check the hybrid vehicle transaxle assembly. If problems are found, replace the malfunctioning parts.
- After completing the repair, including the repair of previously output DTCs, drive the vehicle at a speed of approximately 40 km/h (25 mph) for 1 minute and check that DTC P0A9000 is not output. If DTC P0A9000 is output, replace the hybrid vehicle transaxle assembly.

HINT:

P0A7873 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.)

MALFUNCTION CONTENT	RELEVANT DTC	
Insulation malfunction	P1C7C49	Hybrid/EV Battery Voltage System Isolation (A/C Area) Internal Electronic Failure
	P1C7D49	Hybrid/EV Battery Voltage System Isolation (Hybrid/EV Battery Area) Internal Electronic Failure

MALFUNCTION CONTENT	RELEVANT DTC	
	P1C7E49	Hybrid/EV Battery Voltage System Isolation (Transaxle Area) Internal Electronic Failure
	P1C7F49	Hybrid/EV Battery Voltage System Isolation (Direct Current Area) Internal Electronic Failure
	P1C8049	Hybrid/EV Battery Voltage System Isolation (Rear Motor Area) Internal Electronic Failure

PROCEDURE

1.	**CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR (MG2))**

CAUTION:

Be sure to wear insulated gloves.

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 motor cable from the hybrid vehicle transaxle assembly.

HINT:

Click here INFO

Procedure1

(c) Check the motor (MG2) for an interphase short using a milliohmmeter.

(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

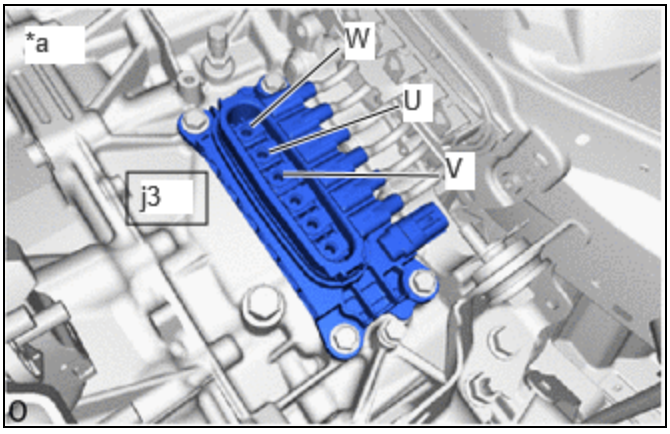
HINT:

If the motor (MG2) temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle has been stopped.

Standard Resistance:

EWD INFO

Click Location & Routing(j3)
Click Connector(j3)



*a	Motor Cable not connected (Hybrid Vehicle Transaxle Assembly)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
j3-1 (W) - j3-2 (U)	Ignition switch off	54.6 to 61.8 mΩ [*1]
j3-2 (U) - j3-3 (V)	Ignition switch off	54.6 to 62.1 mΩ [*2]
j3-1 (W) - j3-3 (V)	Ignition switch off	54.8 to 62.2 mΩ [*3]

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 20°C (68°F).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 20°C (68°F) (mΩ)
Rt: Measured resistance (mΩ)
T: Temperature when the resistance is measured (°C)

Procedure2

(d) Check the difference in measured resistance values according to the table below.

Standard:

INSPECTION ITEM	SPECIFIED CONDITION
[*1] - [*2]	-1.4 to 1.2 mΩ
[*2] - [*3]	-1.5 to 1.2 mΩ
[*3] - [*1]	-1.1 to 1.6 mΩ

Procedure3

(e) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

EWD INFO

Click Location & Routing(j3)
Click Connector(j3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
j3-1 (W) - Body ground and shield ground	Ignition switch off	100 MΩ or higher
j3-2 (U) - Body ground and shield ground	Ignition switch off	100 MΩ or higher

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
j3-3 (V) - Body ground and shield ground	Ignition switch off	100 MΩ or higher

Post-procedure1

(f) Connect the motor cable.

NG ▶ **GO TO STEP 4**

OK
▼

2.	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

HINT:

Click here INFO

NEXT
▼

3.	**REPLACE MOTOR CABLE**

HINT:

Click here INFO

NEXT ▶ **GO TO STEP 7**

4.	**REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

HINT:

Click here INFO

NEXT
▼

5.	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

HINT:

Click here INFO

NEXT

6.	**REPLACE MOTOR CABLE**

HINT:

Click here INFO

NEXT

7.	**CHECK DTC OUTPUT (MOTOR GENERATOR)**

(a) Check the other DTCs that were output together with DTC P0A7873.

Powertrain > Motor Generator > Trouble Codes

RELEVANT DTC	
P0A789E	Drive Motor "A" Inverter Stuck On
P1C5D19	Drive Motor "A" Inverter Circuit Current Above Threshold

NOTICE:

DTC P0A7873 is stored after DTCs P0A789E and/or P1C5D19 are stored. After troubleshooting and repairing the malfunction which caused P0A7873 to be stored, be sure to troubleshoot the other DTCs.

NEXT **GO TO DTC CHART (MOTOR GENERATOR CONTROL SYSTEM)**