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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): P033516,P033517,P033523,P033524; Crankshaft Position Sensor "A" Circuit Voltage Below Threshold; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	P033516	Crankshaft Position Sensor "A" Circuit Voltage Below Threshold
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DTC	P033517	Crankshaft Position Sensor "A" Circuit Voltage Above Threshold
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DTC	P033523	Crankshaft Position Sensor "A" Signal Stuck Low
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DTC	P033524	Crankshaft Position Sensor "A" Signal Stuck High
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DESCRIPTION

If the crankshaft position signal pulse sent from the ECM via a direct line is abnormal, the motor generator control ECU (MG ECU) (built into the inverter with converter assembly) stores DTC P033516, P033517, P033523 or P033524.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P033516	Crankshaft Position Sensor "A" Circuit Voltage Below Threshold	NE signal (crankshaft position sensor) is not input for 2 seconds or more while the engine is running* (1 trip detection logic)	<ul style="list-style-type: none"> SFI system Inverter with converter assembly ECM Wire harness or connector 	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0337
P033517	Crankshaft Position Sensor "A" Circuit Voltage Above Threshold	NE signal (crankshaft position sensor) is not input for 2 seconds or more while the engine is running* (1 trip detection logic)	<ul style="list-style-type: none"> SFI system Inverter with converter assembly ECM Wire harness or connector 	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0338

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P033523	Crankshaft Position Sensor "A" Signal Stuck Low	NE signal (crankshaft position sensor) is not input for 2 seconds or more while the engine is running* (1 trip detection logic)	<ul style="list-style-type: none"> SFI system Inverter with converter assembly ECM Wire harness or connector 	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0337
P033524	Crankshaft Position Sensor "A" Signal Stuck High	NE signal (crankshaft position sensor) is not input for 2 seconds or more while the engine is running* (1 trip detection logic)	<ul style="list-style-type: none"> SFI system Inverter with converter assembly ECM Wire harness or connector 	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0338

HINT:

*: When this DTC is stored, vibration may occur when the engine is stopped.

MONITOR DESCRIPTION

If the motor generator control ECU detects a malfunction of the crankshaft position sensor, it will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P0337 (INF P033516/P033523): Crankshaft Position Signal (Drive Motor "A"/Generator) P0338 (INF P033517/P033524): Crankshaft Position Signal (Drive Motor "A"/Generator)
Required sensors/components	Crankshaft position sensor
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
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Other conditions belong to TMC's intellectual property	-
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TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-
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COMPONENT OPERATING RANGE

Motor generator control ECU	DTC P0337 (INF P033516/P033523) is not detected DTC P0338 (INF P033517/P033524) is not detected
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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

- Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
- Turn the ignition switch off and wait for 2 minutes or more.
- Turn the ignition switch to ON (READY).
- With the vehicle stopped, move the shift lever to P.
- Depress the accelerator pedal to start the engine.
- Depress the accelerator pedal and maintain the engine speed at 1000 rpm or more for 5 seconds or more.

NOTICE:

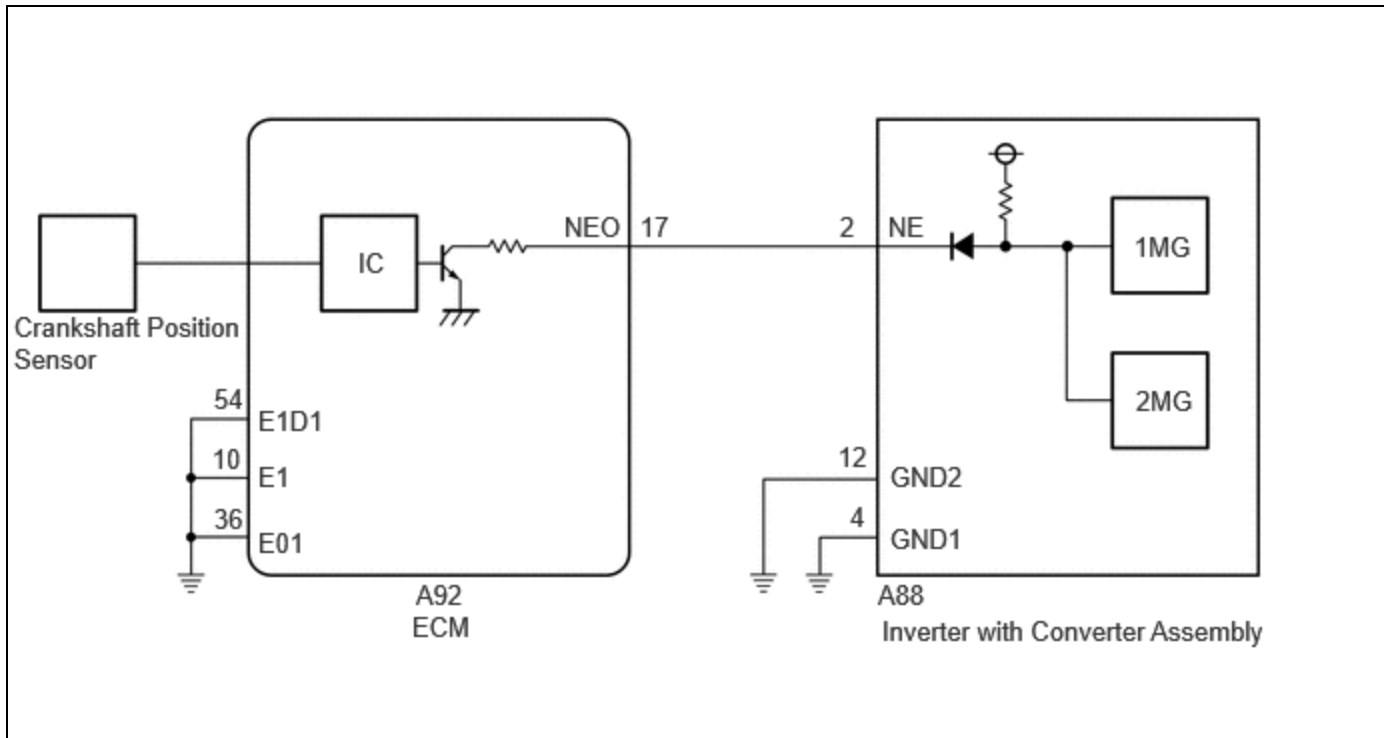
As the state of charge of the HV battery may be low after driving in fail-safe mode, it will automatically be charged for 5 to 10 minutes with ignition switch ON (READY) after repairs have been performed.

- Enter the following menus: Powertrain / Motor Generator / Utility / All Readiness.
- 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 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 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:

P033516, P033517, P033523 or P033524 may be stored due to a malfunction which also causes the DTCs in the table below to be stored. In this case, first troubleshoot the output DTCs in the table below. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

RELEVANT DTC	
P06B01C	Generator Control Module Position Sensor REF Power Source Circuit Voltage Out of Range
P06D61C	Generator Control Module Offset Power Circuit Voltage Out of Range
P0A1B1F	Generator Control Module Circuit Intermittent
P1C2B49	Drive Motor "A" Control Module A/D Converter Circuit Internal Electronic Failure
P1C2B1C	Drive Motor "A" Control Module A/D Converter Circuit Voltage Out of Range
P1CAD49	Drive Motor "A" Position Sensor Internal Electronic Failure

RELEVANT DTC	
P1CB038	Drive Motor "A" Position Sensor REF Signal Frequency Incorrect
P313487	Communication Error from Drive Motor "A" to Generator Missing Message
P313483	Communication Error from Drive Motor "A" to Generator Value of Signal Protection Calculation Incorrect
P313486	Communication Error from Drive Motor "A" to Generator Signal Invalid

PROCEDURE

1. CHECK DTC OUTPUT (ENGINE)

Pre-procedure1

(a) None

Procedure1

(b) Check for DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
SFI system DTCs are not output.	A
Any of the following DTCs are also output.	B

RELEVANT DTC	
P033511	Crankshaft Position Sensor "A" Circuit Short to Ground
P033515	Crankshaft Position Sensor "A" Circuit Short to Battery or Open
P03352A	Crankshaft Position Sensor "A" Signal Stuck in Range
P033531	Crankshaft Position Sensor "A" No Signal

Post-procedure1

(c) Turn the ignition switch off.

B  **GO TO DTC CHART (SFI SYSTEM)**

Click here 

A



2.	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR)
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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.

Procedure1

(b) Check the connection condition of the low voltage connectors of the inverter with converter assembly and the contact pressure of each terminal. Check the terminals for deformation, and the connector for water and foreign matter.

HINT:

Click here [INFO](#)

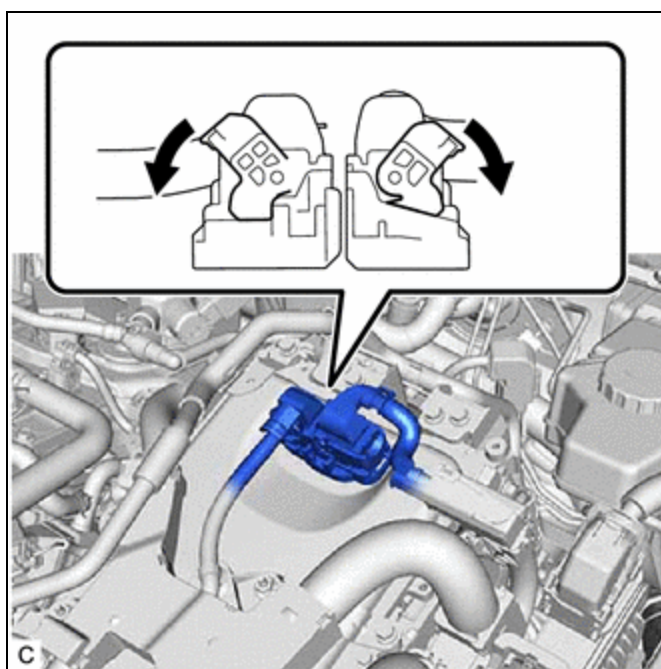
NOTICE:

Before disconnecting the connector, confirm that it is properly connected by checking that the claws of the lock levers are engaged and that the connector cannot be pulled off.

OK:

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

Result:



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

HINT:

When connecting the connector, connect it with the lock levers raised. Rotate each lock lever downward and make sure that the connector is securely connected. When a lock lever is fully lowered, a

click will be heard as its claw engages. After the click is heard, pull up on the connector to confirm that it is securely connected.

Post-procedure1

(c) None

B ▶ CONNECT SECURELY

C ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

A



3. CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR)

(a) Check the connector connections and contact pressure of the relevant terminals for the ECM connectors.

HINT:

Click here 

NOTICE:

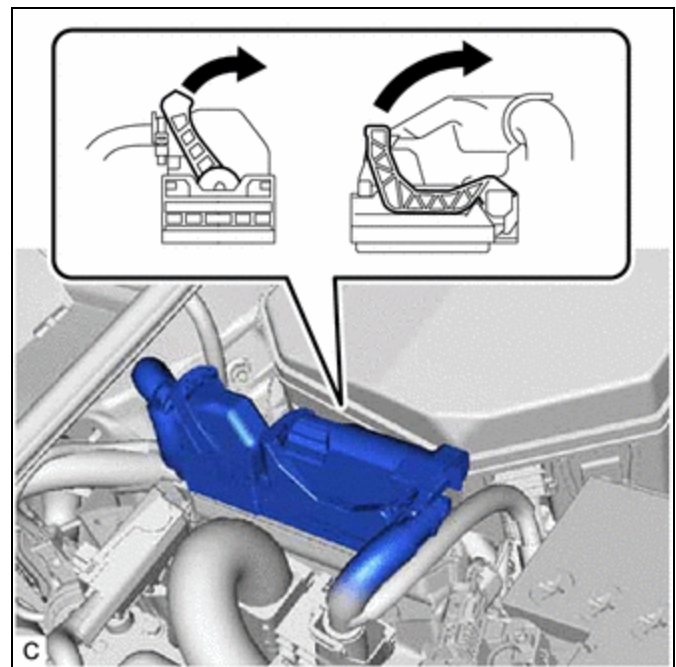
Before disconnecting the connector, confirm that it is properly connected by checking that the locking claws are engaged and that the connector cannot be pulled off.

OK:

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

HINT:

When connecting each connector, connect it with the lock lever raised. Rotate the lock lever downward and make sure that the connector is securely connected. When the lock lever is fully lowered, a click will be heard as its claw engages. After the click is heard, pull up on the connector to confirm that it is securely connected.



NG ▶ CONNECT SECURELY

OK



4. CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ECM)

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 inverter with converter assembly connector.

(c) Disconnect the ECM connector.

(d) Connect the cable to the negative (-) auxiliary battery terminal.

(e) Turn the ignition switch to ON.

Procedure1

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

Standard Voltage:



[Click Location & Routing\(A88\)](#)

[Click Connector\(A88\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A88-2 (NE) - Body ground	Ignition switch ON	Below 1 V

NOTICE:

Turning the ignition switch to ON with the inverter with converter assembly connector and ECM connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

Pre-procedure2

(g) Turn the ignition switch off.

Procedure2

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

Standard Resistance (Check for Open):



[Click Location & Routing\(A88,A92\)](#)

[Click Connector\(A88\)](#)

[Click Connector\(A92\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A88-2 (NE) - A92-17 (NEO)	Ignition switch off	Below 1 Ω

Standard Resistance (Check for Short):



[Click Location & Routing\(A88,A92\).](#)

[Click Connector\(A88\).](#)

[Click Connector\(A92\).](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A88-2 (NE) or A92-17 (NEO) - Body ground and other terminals	Ignition switch off	10 k Ω or higher

Post-procedure1

- (i) Disconnect the cable from the negative (-) auxiliary battery terminal.
- (j) Reconnect the ECM connector.
- (k) Reconnect the inverter with converter assembly connector.

NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK



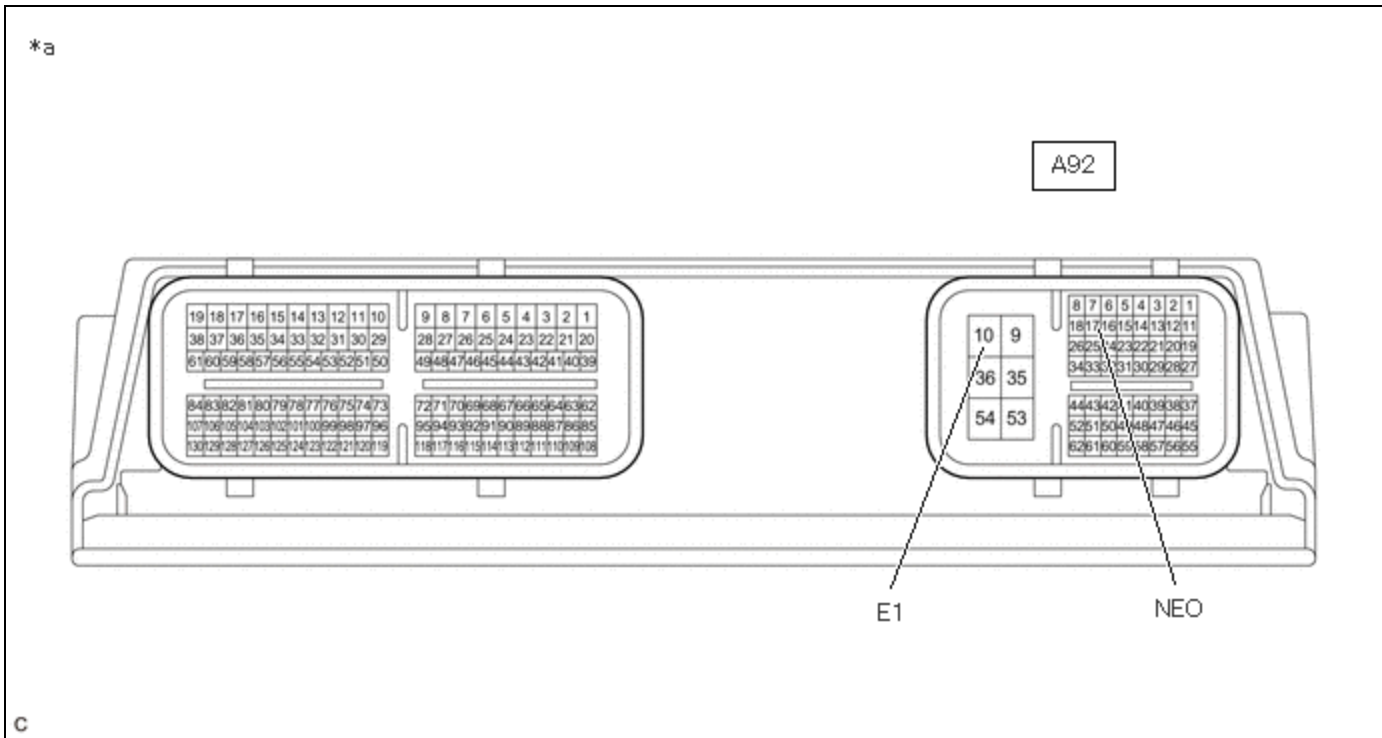
5.	CHECK ECM
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Pre-procedure1

- (a) Disconnect the ECM connector.

Procedure1

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



*a	Component without harness connected (ECM)	-	-
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Standard Resistance:



[Click Location & Routing\(A92\)](#)
[Click Connector\(A92\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A92-17 (NEO) - A92-10 (E1)	Ignition switch off	10 kΩ or higher

Post-procedure1

(c) Reconnect the ECM connector.

OK ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY

NG ▶ REPLACE ECM

Click here [INFO](#)

