Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM1000000028ZXZ
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: HYBRID / BATTERY CONTROL: MOTOR GENERATOR CONTROL SYSTEM (for M20A-FXS): P0CA300; DC/DC Converter Step Up Voltage Performance; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**P0CA300**	**DC/DC Converter Step Up Voltage Performance**

DTC SUMMARY

MALFUNCTION DESCRIPTION

This DTC indicates that it has been detected that the VH voltage cannot be boosted as commanded due to malfunction of the boost converter system. The cause of this malfunction may be one of the following:

Internal inverter malfunction

Inverter with converter assembly internal circuit malfunction

Inverter low-voltage circuit malfunction

The connectors are not connected properly

DESCRIPTION

The motor generator control ECU (MG ECU) uses a voltage sensor (VL) that is built into the boost converter to detect the high voltage before it is boosted. It also uses a voltage sensor (VH) that is built into the inverter to detect the high voltage after it is boosted. Based on the voltage before and after it is boosted, the motor generator control ECU (MG ECU) controls the operation of the boost converter to boost the voltage to the target voltage.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P0CA300	DC/DC Converter Step Up Voltage Performance	Abnormal voltage execution value: Boosting cannot be performed as requested due to a boost converter system malfunction. (1 trip detection logic)	• Wire harness or connector • Inverter with converter assembly	Comes on	Master Warning: Comes on	Motor Generator	A	SAE Code: P0CA3

HINT:

With the vehicle stopped, apply the parking brake and turn the ignition switch to ON (READY).

With the shift lever in P, depress the brake pedal firmly, and quickly and fully depress the accelerator pedal.

Immediately after the accelerator pedal is fully depressed, "VH-Voltage after boosting" will be between 400 and 600 V.

MONITOR DESCRIPTION

If the difference between the requested boost converter voltage and the actual boost converter voltage exceeds a predetermined value, the motor generator control ECU determines that there is a malfunction of the execution or monitoring of the boost converter voltage, and the ECU will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P0CA3 (INF P0CA300): Discrepancy between commanded and actual voltage
Required sensors/components	Boost converter
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 P0CA3 (INF P0CA300) 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.

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- 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. Press the HV EV CHG HOLD mode switch to enter HV drive mode. [*3]
6. Depress the accelerator pedal of the vehicle with the engine stopped and the shift lever in P to start the engine. [*4]

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 [*4]: Normal judgment procedure.

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

7. Enter the following menus: Powertrain / Motor Generator / Utility / All Readiness.
8. 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.

CAUTION / NOTICE / HINT

CAUTION:

Refer to the precautions before inspecting high voltage circuit.

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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:

P0CA300 may be output as a result of the malfunction 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.)

Table 1

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
	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

Table 2

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
Microcomputer malfunction	Motor generator control system	P0A1A47	Generator Control Module Watchdog / Safety MC Failure
		P0A1A49	Generator Control Module Internal Electronic Failure
		P0A1B1F	Generator Control Module Circuit Intermittent
		P0A1B47	Drive Motor "A" Control Module Watchdog / Safety MC Failure
		P0A1C47	Drive Motor "B" Control Module Watchdog / Safety MCU Failure
		P0A1C49	Drive Motor "B" Control Module Internal Electronic Failure
		P1C2A1C	Generator A/D Converter Circuit Circuit Voltage Out of Range
		P1C2A49	Generator A/D Converter Circuit Internal Electronic Failure
		P1C2A71	Generator A/D Converter Circuit Actuator Stuck
		P1C2B1C	Drive Motor "A" Control Module A/D Converter Circuit Voltage Out of Range
		P1C2B49	Drive Motor "A" Control Module A/D Converter Circuit Internal Electronic Failure
		P1C2B71	Drive Motor "A" Control Module A/D Converter Circuit Actuator Stuck
		P1C2C1C	Drive Motor "B" Control Module AD Converter Circuit Voltage Out of Range
		P1C2C49	Drive Motor "B" Control Module AD Converter Internal Electronic Failure
		P1C2C71	Drive Motor "B" Control Module A/D Converter Circuit Actuator Stuck
		P310A83	Communication Error from Drive Motor "B" to Drive Motor "A" Value of Signal Protection Calculation Incorrect
		P310A86	Communication Error from Drive Motor "B" to Drive Motor "A" Signal (Some Circuit Quantity, Reported via Serial Data) Invalid
		P310A87	Communication Error from Drive Motor "B" to Drive Motor "A" Missing Message
		P310B83	Communication Error from Drive Motor "A" to Drive Motor "B" Value of Signal Protection Calculation Incorrect
		P310B86	Communication Error from Drive Motor "A" to Drive Motor "B" Signal (Some Circuit Quantity, Reported via Serial Data) Invalid
		P310B87	Communication Error from Drive Motor "A" to Drive Motor "B" Missing Message
		P313383	Communication Error from Generator to Drive Motor "A" Value of Signal Protection Calculation Incorrect

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P313386	Communication Error from Generator to Drive Motor "A" Signal Invalid
		P313387	Communication Error from Generator to Drive Motor "A" 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
		P313487	Communication Error from Drive Motor "A" to Generator Missing Message
		P32BF83	Lost Communication between Drive Motor "A" and "B" (Drive Motor "A") Value of Signal Protection Calculation Incorrect
		P32BF86	Lost Communication between Drive Motor "A" and "B" (Drive Motor "A") Signal (Some Circuit Quantity, Reported via Serial Data) Invalid
		P32BF87	Lost Communication between Drive Motor "A" and "B" (Drive Motor "A") Missing Message
		P32CF83	Lost Communication between Drive Motor "A" and "B" (Drive Motor "B") Value of Signal Protection Calculation Incorrect
		P32CF86	Lost Communication between Drive Motor "A" and "B" (Drive Motor "B") Signal (Some Circuit Quantity, Reported via Serial Data) Invalid
		P32CF87	Lost Communication between Drive Motor "A" and "B" (Drive Motor "B") Missing Message
	Hybrid control system	P0A1B49	Drive Motor "A" Control Module Internal Electronic Failure
Power source circuit malfunction	Motor generator control system	P06B01C	Generator Control Module Position Sensor REF Power Source Circuit Voltage Out of Range
		P06B31C	Drive Motor "B" Control Module Position Sensor REF Power Source Circuit Voltage Out of Range
		P06D61C	Generator Control Module Offset Power Circuit Voltage Out of Range
		P19F81C	Generator Control Module Offset Power Circuit Voltage Out of Range
		P19F91C	Drive Motor "B" Control Module Offset Power Circuit Voltage Out of Range
		P26DF1C	Generator Control Module Position Sensor REF Power Source Circuit Intermittent
Communication malfunction	Motor generator control system	U11B387	Lost Communication with Hybrid/EV Powertrain Control Module (ch5) Missing Message

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
	Hybrid control system	U117E87	Lost Communication with Drive Motor Control Module "A" (ch4) Missing Message
Sensor and actuator circuit malfunction	Motor generator control system	P0A3F16	Drive Motor "A" Position Sensor Circuit Voltage Below Threshold
		P0A3F21	Drive Motor "A" Position Sensor Signal Amplitude < Minimum
		P0A3F22	Drive Motor "A" Position Sensor Signal Amplitude > Maximum
		P0A4516	Drive Motor "B" Position Sensor Circuit Voltage Below Threshold
		P0A4521	Drive Motor "B" Position Sensor Signal Amplitude < Minimum
		P0A4522	Drive Motor "B" Position Sensor Signal Amplitude > Maximum
		P0A4B16	Generator Position Sensor Circuit Voltage Below Threshold
		P0A4B21	Generator Position Sensor Signal Amplitude < Minimum
		P0A4B22	Generator Position Sensor Signal Amplitude > Maximum
		P0A6012	Drive Motor "A" Phase V Current (High Resolution) Circuit Short to Battery
		P0A6014	Drive Motor "A" Phase V Current (High Resolution) Circuit Short to Ground or Open
		P0A601C	Drive Motor "A" Phase V Current (High Resolution) Circuit Voltage Out of Range
		P0A6312	Drive Motor "A" Phase W Current (High Resolution) Circuit Short to Battery
		P0A6314	Drive Motor "A" Phase W Current (High Resolution) Circuit Short to Ground or Open
		P0A631C	Drive Motor "A" Phase W Current (High Resolution) Circuit Voltage Out of Range
		P0A6912	Drive Motor "B" Phase V Current(High Resolution) Circuit Short to Battery
		P0A6914	Drive Motor "B" Phase V Current(High Resolution) Circuit Short to Ground or Open
		P0A691C	Drive Motor "B" Phase V Current(High Resolution) Circuit Voltage Out of Range
		P0A6C12	Drive Motor "B" Phase W Current(High Resolution) Circuit Short to Battery
		P0A6C14	Drive Motor "B" Phase W Current(High Resolution) Circuit Short to Ground or Open
		P0A6C1C	Drive Motor "B" Phase W Current(High Resolution) Circuit Voltage Out of Range

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P0BE512	Drive Motor "A" Phase U Current Sensor Circuit Short to Battery
		P0BE514	Drive Motor "A" Phase U Current Sensor Circuit Short to Ground or Open
		P0BE528	Drive Motor "A" Phase U Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BE912	Drive Motor "A" Phase V Current Sensor Circuit Short to Battery
		P0BE914	Drive Motor "A" Phase V Current Sensor Circuit Short to Ground or Open
		P0BE928	Drive Motor "A" Phase V Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BED12	Drive Motor "A" Phase W Current Sensor Circuit Short to Battery
		P0BED14	Drive Motor "A" Phase W Current Sensor Circuit Short to Ground or Open
		P0BED28	Drive Motor "A" Phase W Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BF112	Drive Motor "B" Phase U Current Sensor Circuit Short to Battery
		P0BF114	Drive Motor "B" Phase U Current Sensor Circuit Short to Ground or Open
		P0BF128	Drive Motor "B" Phase U Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BF512	Drive Motor "B" Phase V Current Sensor Circuit Short to Battery
		P0BF514	Drive Motor "B" Phase V Current Sensor Circuit Short to Ground or Open
		P0BF528	Drive Motor "B" Phase V Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BF912	Drive Motor "B" Phase W Current Sensor Circuit Short to Battery
		P0BF914	Drive Motor "B" Phase W Current Sensor Circuit Short to Ground or Open
		P0BF928	Drive Motor "B" Phase W Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0BFD62	Drive Motor "A" Phase U-V-W Current Sensor Signal Compare Failure
		P0BFE62	Drive Motor "B" Phase U-V-W Current Sensor Signal Compare Failure
		P0C5013	Drive Motor "A" Position Sensor Circuit "A" Circuit Open

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P0C5016	Drive Motor "A" Position Sensor Circuit "A" Circuit Voltage Below Threshold
		P0C5017	Drive Motor "A" Position Sensor Circuit "A" Circuit Voltage Above 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
		P0C5A13	Drive Motor "A" Position Sensor Circuit "B" Circuit Open
		P0C5A16	Drive Motor "A" Position Sensor Circuit "B" Circuit Voltage Below Threshold
		P0C5A17	Drive Motor "A" Position Sensor Circuit "B" 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
		P0C6413	Generator Position Sensor Circuit "A" Circuit Open
		P0C6416	Generator Position Sensor Circuit "A" Circuit Voltage Below Threshold
		P0C6417	Generator Position Sensor Circuit "A" Circuit Voltage Above Threshold
		P0C6913	Generator Position Sensor Circuit "B" Circuit Open
		P0C6916	Generator Position Sensor Circuit "B" Circuit Voltage Below Threshold
		P0C6917	Generator Position Sensor Circuit "B" Circuit Voltage Above Threshold
		P0D2D16	Drive Motor "A" Inverter Voltage Sensor (VH) Circuit Voltage Below Threshold
		P0D2D17	Drive Motor "A" Inverter Voltage Sensor (VH) Circuit Voltage Above Threshold
		P0DFA62	Generator Phase U-V-W Current Sensor Signal Compare Failure
		P0E0012	Generator Phase U Current Sensor Circuit Short to Battery
		P0E0014	Generator Phase U Current Sensor Circuit Short to Ground or Open
		P0E0028	Generator Phase U Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P0E0412	Generator Phase V Current Sensor Circuit Short to Battery
		P0E0414	Generator Phase V Current Sensor Circuit Short to Ground or Open
		P0E0428	Generator Phase V Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0E0812	Generator Phase W Current Sensor Circuit Short to Battery
		P0E0814	Generator Phase W Current Sensor Circuit Short to Ground or Open
		P0E0828	Generator Phase W Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0E3116	DC/DC Converter Voltage Sensor "A" (VL) Circuit Voltage Below Threshold
		P0E3117	DC/DC Converter Voltage Sensor "A" (VL) Circuit Voltage Above Threshold
		P0E5111	DC/DC Converter Current Sensor Circuit Short to Ground
		P0E5115	DC/DC Converter Current Sensor Circuit Short to Battery or Open
		P0E5128	DC/DC Converter Current Sensor Signal Bias Level Out of Range / Zero Adjustment Failure
		P0E512A	DC/DC Converter Current Sensor Signal Stuck In Range
		P1CAC49	Generator Position Sensor Internal Electronic Failure
		P1CAD49	Drive Motor "A" Position Sensor Internal Electronic Failure
		P1CAE49	Drive Motor "B" Position Sensor Internal Electronic Failure
		P1CAF38	Generator Position Sensor REF Signal Cycle Malfunction Signal Frequency Incorrect
		P1CB038	Drive Motor "A" Position Sensor REF Signal Frequency Incorrect
		P1CB138	Drive Motor "B" Position Sensor REF Signal Frequency Incorrect
		P1CFF62	Hybrid/EV Battery Current/DC/DC Converter Current Signal Compare Failure
	Hybrid control system	P0C7600	Hybrid/EV Battery System Discharge Time Too Long
		P0D2D1C	Drive Motor "A" Inverter Voltage Sensor Voltage Out of Range
		P0E311C	Boosting Converter Voltage Sensor "A" Voltage Out of Range
		P1C2D62	Hybrid/EV Battery "A" Voltage Sensor/Boosting Converter Voltage Sensor "A" Signal Compare Failure
System malfunction	Motor generator control system	P0A9000	Drive Motor "A" Performance

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P0A9100	Drive Motor "B" Performance
		P0A9200	Hybrid/EV Generator Performance
		P0BFF1D	Drive Motor "A" Circuit Current Out of Range
		P0C021D	Drive Motor "B" System Circuit Current Out of Range
		P0C1900	Drive Motor "A" Execution Torque Performance
		P0C1A00	Drive Motor "B" Execution Torque Performance
		P0E7100	Generator Execution Torque Performance
		P1CA51D	Hybrid/EV Generator Circuit Current Out of Range

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

A ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

B ▶ **CONNECT SECURELY**

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