

<b>Last Modified:</b> 12-04-2024	6.11:8.1.0	<b>Doc ID:</b> RM100000028X1Z
<b>Model Year Start:</b> 2023	<b>Model:</b> Prius Prime	<b>Prod Date Range:</b> [12/2022 - ]
<b>Title:</b> BRAKE CONTROL / DYNAMIC CONTROL SYSTEMS: ELECTRONICALLY CONTROLLED BRAKE SYSTEM: C12BF87; Electronic Brake Booster Motor "A" Drive Circuit Missing Message; 2023 - 2024 MY Prius Prius Prime [12/2022 - ]		

<b>DTC</b>	<b>C12BF87</b>	<b>Electronic Brake Booster Motor "A" Drive Circuit Missing Message</b>
------------	----------------	-------------------------------------------------------------------------

## DESCRIPTION

The No. 1 skid control ECU (brake booster with master cylinder assembly) detects malfunctions in the motor drive circuit based on malfunction notifications from the pre-driver IC, which monitors the motor drive circuit.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C12BF87	Electronic Brake Booster Motor "A" Drive Circuit Missing Message	Pre-driver IC malfunction, or open or short circuit within inverter circuit	No. 1 skid control ECU (brake booster with master cylinder assembly)	Comes on	Brake/EPB	A	<ul style="list-style-type: none"> <li>SAE Code: C12BF (Case 5 to 9)</li> <li>Output ECU: Both skid control ECUs</li> </ul>

## MONITOR DESCRIPTION

### Case 5:

The pump motor is built into the No. 1 skid control ECU (brake booster with master cylinder assembly).

With the vehicle power source voltage normal, voltage applied normally to the motor power source terminal and the No. 1 skid control ECU (brake booster with master cylinder assembly) started, if the pre-driver IC outputs a malfunction signal or the pre-driver IC and CPU cannot communicate, the No. 2 skid control ECU (brake actuator assembly) determines that there is a pump motor drive circuit malfunction, the MIL is illuminated and a DTC is stored.

### Case 6:

The pump motor is built into the No. 1 skid control ECU (brake booster with master cylinder assembly).

With the vehicle power source voltage normal, voltage applied normally to the motor power source terminal and during the ECU self-check immediately after the No. 1 skid control ECU (brake booster with master cylinder assembly) starts, if the pre-driver IC is malfunctioning, the No. 2 skid control ECU (brake actuator assembly) determines that there is a pump motor drive circuit malfunction, the MIL is illuminated and a DTC is stored.

### Case 7:

The pump motor is built into the No. 1 skid control ECU (brake booster with master cylinder assembly).

With the vehicle power source voltage normal, voltage applied normally to the motor power source terminal and during the ECU self-check immediately after the No. 1 skid control ECU (brake booster with master cylinder assembly) starts, if pre-driver IC initial setting is not completed normally, the No. 2 skid control ECU (brake actuator assembly) determines that there is a pump motor drive circuit malfunction, the MIL is illuminated and a DTC is stored.

#### Case 8:

The pump motor is built into the No. 1 skid control ECU (brake booster with master cylinder assembly).

With voltage applied normally to the motor power source terminal and during the ECU self-check immediately after the No. 1 skid control ECU (brake booster with master cylinder assembly) starts, if the inverter circuit outputs an OFF command but the status is ON, the No. 2 skid control ECU (brake actuator assembly) determines that there is a pump motor drive circuit malfunction, the MIL is illuminated and a DTC is stored.

#### Case 9:

The pump motor is built into the No. 1 skid control ECU (brake booster with master cylinder assembly).

With voltage applied normally to the motor power source terminal and during the ECU self-check immediately before the No. 1 skid control ECU (brake booster with master cylinder assembly) stops, if the internal voltage of the motor power source circuit is low, the No. 2 skid control ECU (brake actuator assembly) determines that there is a pump motor drive circuit malfunction, the MIL is illuminated and a DTC is stored.

## MONITOR STRATEGY

Related DTCs	C12BF (Case 5 to 9): Brake booster motor performance (motor drive circuit)
Required Sensors/Components(Main)	No. 2 skid control ECU (brake actuator assembly) Brake booster with master cylinder assembly
Required Sensors/Components(Related)	-
Frequency of Operation	Continuous
Duration	4.002 seconds: Case 8 0.204 seconds: Case 9 0.102 seconds: Case 7 0.072 seconds: Case 5 0.024 seconds: Case 6
MIL Operation	Immediately
Sequence of Operation	None

## TYPICAL ENABLING CONDITIONS

#### Case 5

Monitor runs whenever the following DTCs are not stored	C129B: Rotation angle sensor range/performance C12B4 (Case 2): Brake booster motor performance (motor current)
---------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------

	C12BF (Case 1 to 4): Brake booster motor performance (motor upper circuit) C12BF (Case 6 to 9): Brake booster motor performance (motor drive circuit) C13BB: Brake booster motor range/performance C14C8: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D and E
A. All of the following conditions are met	More than 0.198 seconds
+BS cut MOS	Valid
+BS cut MOS voltage	Below 23.2 V
B. All of the following conditions are met	More than 0.198 seconds
+BS cut MOS	Valid
+BS cut MOS voltage	Higher than 7.4 V
C. Following condition is met	More than 0.198 seconds
BM voltage	7.1 V or higher
D. Command to motor failsafe relay	On
E. +BS cut MOS voltage	Higher than 7.8 V

**Case 6**

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
ECU status	Remain
Pre-driver IC SPI communication	On
BS (linear) voltage	9.5 V or higher

**Case 7**

Monitor runs whenever the following DTCs are not stored	None
Both of the following conditions are met	-
ECU status	Remain
Pre-driver IC SPI communication	On

**Case 8**

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
ECU status	Remain
Inverter drive signal	On
BS (linear) voltage	9.5 V or higher
BM voltage	7.1 V or higher

**Case 9**

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
ECU status	Final check
BS (linear) voltage	9.5 V or higher
Command to motor failsafe relay	Off
INHA	On
INLB	On (20% duty drive)
BM voltage	7.1 V or higher

**TYPICAL MALFUNCTION THRESHOLDS****Case 5**

Either of the following conditions is met	-
Pre-driver IC error flag	On
nFAULT monitor	Abnormal
Pre-driver IC SPI communication	Abnormal

**Case 6**

nFAULT monitor	Abnormal
----------------	----------

**Case 7**

Initial settings for pre-driver IC	Abnormal
------------------------------------	----------

**Case 8**

MTT voltage	1.5 V or less, or 6.5 V or higher
-------------	-----------------------------------

**Case 9**

Inverter upper voltage	Higher than BM voltage x 0.25 V
------------------------	---------------------------------

**COMPONENT OPERATING RANGE****All**

Either of the following conditions is met	A, B, C, D or E
A. All of the following conditions are met	a, b, c, d and e
a. Both of the following conditions are met	More than 0.198 seconds
+BS cut MOS	Valid
+BS cut MOS voltage	Below 23.2 V

b. Both of the following conditions are met	More than 0.198 seconds
+BS cut MOS	Valid
+BS cut MOS voltage	Higher than 7.4 V
c. Following condition is met	More than 0.198 seconds
BM voltage	7.1 V or higher
d. Command to motor failsafe relay	On
e. All of the following conditions are met	More than 1 second
Pre-driver IC error flag	Off
nFAULT monitor	Normal
Pre-driver IC SPI communication	Normal
B. All of the following conditions are met	-
ECU status	Premain
Pre-driver IC SPI communication	On
BS (linear) voltage	9.5 V or higher
nFAULT monitor	Normal
C. All of the following conditions are met	-
ECU status	Premain
Pre-driver IC SPI communication	On
Initial settings for pre-driver IC	Normal
D. All of the following conditions are met	-
ECU status	Premain
BM voltage	6 V or higher
Inverter drive signal	Off
BS (linear) voltage	9.5 V or higher
MTT voltage	Higher than 1.5 V, and below 6.5 V
E. All of the following conditions are met	-
ECU status	Final check
BM voltage	6 V or higher
BS (linear) voltage	9.5 V or higher
Command to motor failsafe relay	Off
INHA	On
INLB	On (20% duty drive)
Inverter upper voltage	BM voltage x 0.25 V or less

## **CONFIRMATION DRIVING PATTERN**

### **NOTICE:**

When performing the normal judgment procedure, make sure that the driver door is closed and is not opened at any time during the procedure.

**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.
- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.
  1. Connect the GTS to the DLC3.
  2. Turn the ignition switch to ON and turn the GTS on.
  3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
  4. Turn the ignition switch off.
  5. Turn the ignition switch to ON (READY) and turn the GTS on.
  6. Wait for 5 seconds or more. [\*]

**HINT:**

[\*]: 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: Chassis / Brake/EPB\* / Utility / All Readiness.

\*: Electric Parking Brake System

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 driving pattern again.

## PROCEDURE

<b>1.</b>	<b>REPLACE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY</b>
-----------	------------------------------------------------------------

**HINT:**

Click here 

**NEXT**  **END**

