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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: BRAKE CONTROL / DYNAMIC CONTROL SYSTEMS: ELECTRONICALLY CONTROLLED BRAKE SYSTEM: C116D00; Brake Servo Pressure Sensor Pressure Increase Malfunction; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**C116D00**	**Brake Servo Pressure Sensor Pressure Increase Malfunction**

DESCRIPTION

In order for the No. 1 skid control ECU (brake booster with master cylinder assembly) to control braking force in coordination with the regenerative braking by the hybrid control system, the operating fluid pressures of the master cylinder and each wheel cylinder are input via the servo pressure sensor.

DTCs may be stored if one of the following occurs:

- Brake fluid leaks.
- Foreign matter enters a solenoid valve.
- Line pressure drops during air bleeding.
- Brake pads are replaced.
- Rotors are replaced.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C116D00	Brake Servo Pressure Sensor Pressure Increase Malfunction	The brake servo pressure decreases significantly (Poor boost malfunction)	• Brake fluid leaks • Wire harness and connector • No. 1 skid control ECU (brake booster with master cylinder assembly	Comes on	Brake/EPB	A	• SAE Code: C116D • Output ECU: Both skid control ECUs

MONITOR DESCRIPTION

When the brake pedal is depressed, the No. 1 skid control ECU (brake booster with master cylinder assembly) monitors the servo pressure and increases the servo pressure by driving the linear solenoid (SLM1).When the brake pedal is depressed, if the actual servo pressure does not change even when the target servo pressure increases for a certain amount of time, the No. 2 skid control ECU (brake actuator assembly) judges that the linear solenoid (SLM1) is stuck closed (the pressure increase during initial braking is abnormal) and illuminates the MIL and stores this DTC.

MONITOR STRATEGY

Related DTCs	C116D: Brake pressure control solenoid (SLM1) stuck on

Required Sensors/Components(Main)	No. 2 skid control ECU (brake actuator assembly) Brake actuator (brake booster with master cylinder assembly)
Required Sensors/Components(Related)	Stop light switch assembly No. 2 skid control ECU (brake actuator assembly) Brake actuator (brake booster with master cylinder assembly)
Frequency of Operation	Continuous
Duration	0.072 seconds
MIL Operation	Immediately
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	C05A1 (Case 1): Servo pressure sensor lost communication C05A1 (Case 2): Servo pressure sensor internal malfunction C05A1 (Case 3): Servo pressure sensor invalid data C05A2: Servo pressure sensor exceeded learning limit C05C0: Brake pedal position sensor learning not complete C05C1: Brake pedal position sensor learning not complete C0639 (Case 1): Stroke simulator pressure sensor Lost communication C0639 (Case 2): Stroke simulator pressure sensor internal check C0639 (Case 3): Stroke simulator pressure sensor invalid data C063C: Stroke simulator pressure sensor exceeded learning limit C1100 (Case 1): Brake pedal position sensor voltage circuit/open C1100 (Case 2): Brake pedal position sensor invalid data C1103 (Case 1): Brake pedal position sensor voltage circuit/open C1103 (Case 2): Brake pedal position sensor invalid data C1168: Stroke simulator pressure sensor intermittent/erratic C116A: Stroke simulator pressure sensor voltage circuit low C116B: Stroke simulator pressure sensor voltage circuit high C116C: Brake position / stroke simulator pressure correlation C121F: Brake system voltage performance C129B: Rotation angle sensor range/performance C12B4 (Case 1): Brake booster motor not rotate C12B4 (Case 2): Brake booster motor performance (motor current) C12BF (Case 1 to 4): Brake booster motor performance (motor upper circuit) C12BF (Case 5 to 9): Brake booster motor performance (motor drive circuit) C12FA: Brake system voltage power supply relay open circuit C12FB: Brake system voltage power supply relay circuit high C1345: Brake pressure control solenoid open current learning not complete C13BB: Brake booster motor range/performance C13D9: Brake pressure too low C1498: Servo pressure sensor voltage circuit low C1499: Servo pressure sensor voltage circuit high C14C4: Servo pressure sensor intermittent/erratic

	C14CE: High pressure hydraulic tube air bleeding not complete C14F3 (Case 1 to 3) Brake pressure control solenoid (SLM1) circuit open C14F3 (Case 4 to 5) Brake pressure control solenoid (SLM1) circuit low C14F4 (Case 1 to 2): Brake pressure control solenoid (SLM2) circuit high (solenoid OFF current) C14F4 (Case 3 to 6): Brake pressure control solenoid (SLM2) circuit high (IC data) C14F4 (Case 7 to 8): Brake pressure control solenoid (SLM2) circuit high (solenoid ON current) C14FC (Case 1 to 3) Brake pressure control solenoid (SLM2) circuit open C14FC (Case 4 to 5) Brake pressure control solenoid (SLM2) circuit low C14FD (Case 1 to 2): Brake pressure control solenoid (SLM1) circuit high (solenoid OFF current) C14FD (Case 3 to 6): Brake pressure control solenoid (SLM1) circuit high (IC data) C14FD (Case 7 to 8): Brake pressure control solenoid (SLM1) circuit high (solenoid ON current) C1509: Brake pressure control solenoid (SSA) circuit low C150A: Brake pressure control solenoid (SSA) circuit high C150F: Brake pressure control solenoid (SGH) circuit low C1510: Brake pressure control solenoid (SGH) circuit high P057A: Brake pedal position sensor invalid data P057C: Brake pedal position sensor open circuit P057D: Brake pedal position sensor circuit high P057E: Brake pedal position sensor intermittent/erratic P05DB: Brake pedal position sensor invalid data P05DD: Brake pedal position sensor open circuit P05DE: Brake pedal position sensor circuit high P05DF: Brake pedal position sensor intermittent/erratic P05E0: Brake pedal position sensor "A"/"B" correlation U0129: Lost communication with BSCM (CH1) U025E: Lost communication with BSCM2 (CH1)
All of the following conditions are met	A, B, C and D
A. Servo pressure sensor fail	Not detected
B. Brake-by-wire controlled mode	On
C. Either of the following conditions is met	a or b
a. Target servo pressure	0.5 MPa (5.1 kgf/cm2, 73 psi) or higher
ABS/TRAC/VSC operation	Off
b. Target servo pressure	3.0 MPa (30.6 kgf/cm2, 435 psi) or higher
ABS/TRAC/VSC operation	On
D. Brake	On

TYPICAL MALFUNCTION THRESHOLDS

Servo pressure	0.1 MPa (1 kgf/cm2, 15 psi) or less

COMPONENT OPERATING RANGE

All of the following conditions are met	-
Servo pressure sensor fail	Not detected
Brake-by-wire controlled mode	On
Brake	On
BSCM2 fail (C121F)	Not detected
Brake system voltage fail (C12FA, C12FB)	Not detected
Brake pedal position sensor fail (C05C0, C05C1, C1100, C1103, P057A, P057C, P057D, P057E, P05DB, P05DD, P05DE, P05DF, P05E0)	Not detected
Pressure sensor fail sensor fail (C05A1, C05A2, C1498, C1499, C14C4, C116A, C116B, C0639, C063C, C1168, C116C)	Not detected
CAN communication fail (U0129, U025E)	Not detected
Brake pressure control solenoid fail(C1345, C14F4, C14FD, C150A, C1510, C14F3, C14FC, C1509, C150F, C13D9, C14CE)	Not detected
Brake booster motor fail (C12BF, C13BB, C12B4)	Not detected
Rotation angle sensor fail (C129B)	Not detected
Servo pressure	Higher than 0.1 MPa (1 kgf/cm2, 15 psi)

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. Drive the vehicle at 3 km/h (2 mph) or more for 1 second.
5. Turn the ignition switch off.
6. Wait 4 minutes.
7. Turn the ignition switch to ON (READY) and turn the GTS on.
8. Depress the brake pedal for 2 seconds, release it and wait 1 second. [*]

HINT:

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

*: Electric Parking Brake System

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 driving pattern again.

CAUTION / NOTICE / HINT

NOTICE:

Make sure to wait 5 minutes or more with the ignition switch turned off before removing the integration control supply or disconnecting any supply power circuit from the integration control supply, in order for the voltage to be discharged and self-diagnosis to run.

PROCEDURE

1.	**CUSTOMER PROBLEM ANALYSIS (CHECK CONDITION WHEN MALFUNCTION OCCURRED) AND FREEZE FRAME DATA**

Pre-procedure1

(a) Interview the customer to check the vehicle conditions when the brake system warning light (yellow indicator) illuminated.

Procedure1

(b) Using the GTS, check for Freeze Frame Data that is recorded when a DTC is stored.

HINT:

Click here INFO

Chassis > Brake Booster > Trouble Codes

HINT:

Freeze Frame Data is only stored once when a DTC is stored.

Post-procedure1

(c) None

NEXT

2.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

Chassis > Brake Booster > Clear DTCs

Chassis > Brake/EPB > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off.

NEXT

3.	**CHECK DTC**

Pre-procedure1

(a) Based on the Freeze Frame Data and interview with the customer, attempt to reproduce the conditions when the malfunction occurred.

Procedure1

(b) Check if the same DTC is output.

Chassis > Brake Booster > Trouble Codes

RESULT	PROCEED TO
Only C116D00 is output	A
C116D00 and other DTCs are output	B

Post-procedure1

(c) None

B **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

A

4.	**CHECK DTC**

(a) Check the DTCs that are output.

Chassis > Brake/EPB > Trouble Codes

RESULT	PROCEED TO
DTCs are not output	A

RESULT	PROCEED TO
DTCs are output	B

B ▶ **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

A

5.	**CHECK FOR FLUID LEAK**

(a) Based on the Freeze Frame Data or interview with the customer, inspect the following items for brake fluid leaks:

- The brake lines from the brake booster with master cylinder assembly to each wheel cylinder.
- The main body of the brake booster with master cylinder assembly and brake actuator assembly.

OK:
There are no fluid leaks.

NG ▶ **REPAIR OR REPLACE APPLICABLE PART**

OK

6.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

Chassis > Brake Booster > Clear DTCs
Chassis > Brake/EPB > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off.

NEXT

7.	**PERFORM AIR BLEEDING**

(a) Perform the air bleeding procedure in Bleed Brake System.

HINT:

Click here INFO

NEXT

8.	**CHECK BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY (ACTUATOR SIDE)**

Pre-procedure1

(a) Turn the ignition switch off.

Procedure1

(b) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

OK:

The connector is securely connected.

Pre-procedure2

(c) Disconnect the A3 No. 1 skid control ECU (brake booster with master cylinder assembly) connector.

Procedure2

(d) Check both the connector case and the terminals for deformation and corrosion.

OK:

No deformation or corrosion.

Post-procedure1

(e) None

NG ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY**

Click here INFO

OK

9.	**CHECK HARNESS AND CONNECTOR (VEHICLE SIDE)**

Pre-procedure1

(a) Reconnect the A3 No. 1 skid control ECU (brake booster with master cylinder assembly) connector.

Procedure1

(b) Measure the voltage and resistance on the wire harness side.

HINT:

Click here INFO

OK:
Voltage and resistance readings are all normal.

Post-procedure1

(c) None

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

10.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

Chassis > Brake Booster > Clear DTCs
Chassis > Brake/EPB > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off.

NEXT ▼

11.	**RECONFIRM DTC**

Pre-procedure1

(a) Based on the Freeze Frame Data and interview with the customer, attempt to reproduce the conditions when the malfunction occurred.

Procedure1

(b) Check if the same DTC is output.

Chassis > Brake Booster > Trouble Codes

HINT:

If the system returns to normal, it is suspected that a DTC was stored due to a poor connection of a terminal in a connector, air in the system, etc.

RESULT	PROCEED TO
C116D00 is not output	A
C116D00 is output	B
Only C116D00 is output	C

Post-procedure1

(c) None

A ▶ **USE SIMULATION METHOD TO CHECK**

B ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY**

Click here INFO

C ▼

12.	**RECONFIRM DTC**

(a) Check the DTCs that are output.

Chassis > Brake/EPB > Trouble Codes

RESULT	PROCEED TO
C140A00 is output	A
DTCs are not output	B

A ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY AND BRAKE ACTUATOR ASSEMBLY**

for Brake Booster with Master Cylinder Assembly: Click here INFO

for Brake Actuator Assembly: Click here INFO

B **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY**

Click here INFO