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Model Year Start: 2024	**Model:** Prius Prime	**Prod Date Range:** [09/2023 -]
Title: BRAKE CONTROL / DYNAMIC CONTROL SYSTEMS: ELECTRONICALLY CONTROLLED BRAKE SYSTEM: C116C62; Brake Pressure Sensor "H" / Brake Pedal Position Sensor Signal Compare Failure ; 2024 MY Prius Prius Prime [09/2023 -]		

DTC	**C116C62**	**Brake Pressure Sensor "H" / Brake Pedal Position Sensor Signal Compare Failure**

DESCRIPTION

If the No. 1 skid control ECU (brake booster with master cylinder assembly) detects an inconsistency between the brake pedal stroke sensor assembly signal and stroke simulator pressure sensor signal, this DTC is stored.

HINT:

Brake pressure sensor "H": Stroke simulator pressure sensor

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C116C62	Brake Pressure Sensor "H" / Brake Pedal Position Sensor Signal Compare Failure	The difference between brake pedal stroke sensor assembly output value and stroke simulator pressure sensor output value is above the threshold for a certain period of time.	• No. 1 skid control ECU (brake booster with master cylinder assembly) • Brake pedal stroke sensor assembly	Comes on	Brake/EPB	A	• SAE Code: C116C • Output ECU: Both skid control ECUs

MONITOR DESCRIPTION

The No. 2 skid control ECU (brake actuator assembly) monitors the ratio of output value of the brake pedal stroke sensor assembly and stroke simulator pressure sensor. When in linear mode (switching solenoid (SSA) on), the brake pedal is being operated and the ratio of the output value of the brake pedal stroke sensor assembly and stroke simulator pressure sensor is outside the normal range, the No. 2 skid control ECU (brake actuator assembly) judges that the ratio of the output value of the brake pedal stroke sensor assembly and stroke simulator pressure sensor is abnormal and illuminates the MIL and stores this DTC.

MONITOR STRATEGY

Related DTCs	C116C: Brake position/ stroke simulator pressure correlation
Required Sensors/Components(Main)	Brake actuator (brake booster with master cylinder assembly) Brake pedal stroke sensor assembly

Required Sensors/Components(Related)	No. 2 skid control ECU (brake actuator assembly) Brake actuator (brake booster with master cylinder assembly) Brake pedal stroke sensor assembly Stop light switch assembly
Frequency of Operation	Continuous
Duration	1.008 seconds
MIL Operation	Immediately
Sequence of Operation	None

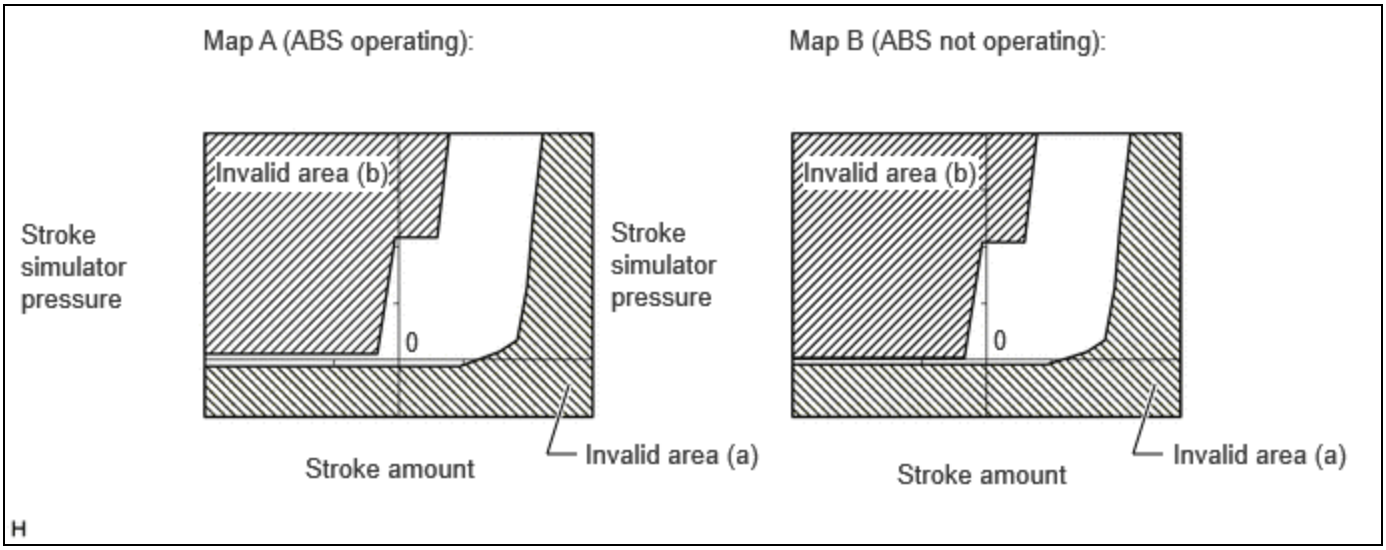
TYPICAL ENABLING CONDITIONS

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 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 C116D: Brake pressure control solenoid (SLM1) stuck on 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) 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, D and E
A. Brake pedal position sensor fail	Not detected
B. Stroke simulator pressure sensor fail	Not detected
C. Brake-by-wire controlled mode	On
D. Brake pedal operation	On
E. Either of the following conditions is met	-
Last brake off duration time	3 seconds or more
Maximum Psrv during braking	Below 0.1 MPa (1 kgf/cm ^{2} , 15 psi)

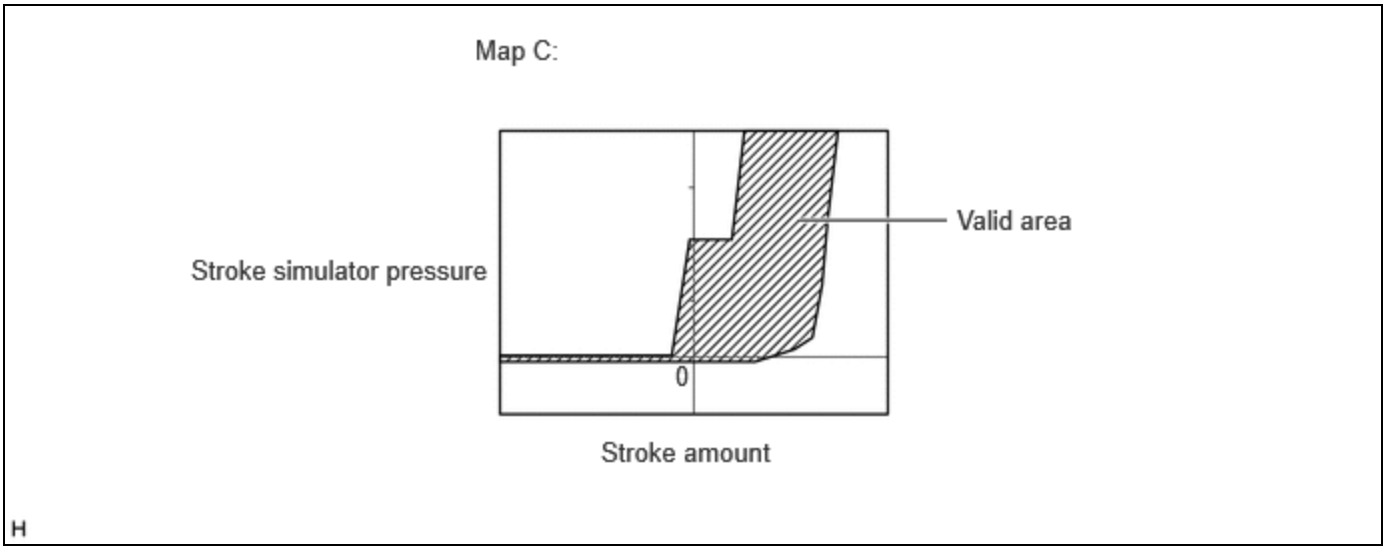
TYPICAL MALFUNCTION THRESHOLDS

Following condition is met	3 times or more
Ratio of the output value of the brake pedal stroke sensor assembly and stroke simulator pressure sensor	Within the invalid area (a) or invalid area (b) of the following Map A or Map B



COMPONENT OPERATING RANGE

All of the following conditions are met	-
Brake position sensor circuit fail	Not detected
Stroke simulator pressure sensor circuit fail	Not detected
Brake-by-wire controlled mode	On
Brake pedal operation	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 (C05A1, C05A2, C1498, C1499, C14C4, C116A, C116B, C0639, C063C, C1168)	Not detected
CAN communication fail (U0129, U025E)	Not detected
Brake pressure control solenoid fail (C1345, C14F4, C14FD, C150A, C1510, C14F3, C14FC, C1509, C150F, C116D, C13D9, C14CE)	Not detected
Brake booster motor fail (C12BF, C13BB, C12B4)	Not detected
Rotation angle sensor fail (C129B)	Not detected
Ratio of the output value of the brake pedal stroke sensor assembly and stroke simulator pressure sensor	Within the valid area of the Map C



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. Depress the brake pedal 3 or more times. [*]

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.

CAUTION / NOTICE / HINT

NOTICE:

If the detection conditions for X2442 are met 3 times in a row in the same trip, DTC C116C62 is stored.

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 (red indicator) and 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.
- If other DTCs are output, repair any malfunctions related to those DTCs first, and then reproduce the conditions that caused DTC C116C62 to be stored based on the interview with the customer.

Post-procedure1

(c) None

NEXT

2.	**READ VALUE USING GTS (STROKE SENSOR)**

(a) With the brake pedal released, confirm the brake pedal stroke sensor assembly output voltage.

Chassis > Brake Booster > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Stroke Sensor	Brake pedal stroke sensor 1	Min.: 0.0 V Max.: 5.0 V	Brake pedal released: 0.6 to 1.4 V	Reading increases when brake pedal is depressed

Chassis > Brake Booster > Data List

TESTER DISPLAY
Stroke Sensor

RESULT	PROCEED TO
The value of Stroke Sensor is between 0.6 and 1.4 V	A
None of the above conditions are met	B

B ▶ **INSPECT/ADJUST INSTALLATION CONDITION OF BRAKE PEDAL STROKE SENSOR ASSEMBLY**

A ▼

3.	**READ VALUE USING GTS (STROKE SENSOR)**

Pre-procedure1

(a) Turn the ignition switch off.

(b) Mount a pedal effort gauge.

(c) Turn the ignition switch to ON (READY) and depress the brake pedal once.

HINT:

Depress the brake pedal after turning the ignition switch to ON (READY) to set the vehicle to linear mode (switching solenoid (SSA) on).

Procedure1

(d) Depress the brake pedal slowly and check the brake pedal stroke sensor assembly output voltages with respect to brake pedal depression force.

Chassis > Brake Booster > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Stroke Sensor	Brake pedal stroke sensor 1	Min.: 0.0 V Max.: 5.0 V	Brake pedal released: 0.6 to 1.4 V	Reading increases when brake pedal is depressed

Chassis > Brake Booster > Data List

TESTER DISPLAY
Stroke Sensor

HINT:

Perform this procedure in linear mode (switching solenoid (SSA) on).

Standard Voltage:

PEDAL EFFORT [N (KGF, LBF)]	STROKE SENSOR [V]
50 (5, 11.2)	0.96 to 1.67
100 (10, 22.5)	1.14 to 1.86
150 (15, 33.7)	1.23 to 1.95

Post-procedure1

(e) None

NG ▶ **REPLACE BRAKE PEDAL STROKE SENSOR ASSEMBLY**

OK ▼

4.	**READ VALUE USING GTS (GAP HOLD CHAMBER OIL PRESSURE)**

(a) Depress the brake pedal slowly and check the gap pressure sensor output values with respect to brake pedal depression force.

Chassis > Brake Booster > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Gap Hold Chamber Oil Pressure	Pressure value of stroke simulator	Min.: 0.00 MPa Max.: 24.48 MPa	Brake pedal released: 0.00 to 1.53 MPa	Brake pedal is being depressed: Changes in proportion to the depression force of the brake pedal

Chassis > Brake Booster > Data List

TESTER DISPLAY
Gap Hold Chamber Oil Pressure

HINT:

Perform this procedure in linear mode (switching solenoid (SSA) on).

Standard Pressure:

PEDAL EFFORT [N (KGF, LBF)]	GAP HOLD CHAMBER OIL PRESSURE [MPA]
50 (5, 11.2)	0.00 to 0.75
100 (10, 22.5)	0.63 to 1.43
150 (15, 33.7)	1.33 to 2.13
200 (20, 45.0)	2.03 to 2.83

NG ▶ **CHECK AND REPAIR BRAKE FLUID LEAKS**

OK
▼

5.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

Chassis > Brake Booster > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off.

NEXT
▼

6.	**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

RESULT	PROCEED TO
C116C62 is not output	A
C116C62 is output	B

Post-procedure1

(c) None

A ▶ **END**

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