Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM1000000028X4B
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: BRAKE CONTROL / DYNAMIC CONTROL SYSTEMS: ELECTRONICALLY CONTROLLED BRAKE SYSTEM: C143A7E,C143A7F; ABS Solenoid Control Actuator Stuck On; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**C143A7E**	**ABS Solenoid Control Actuator Stuck On**

DTC	**C143A7F**	**ABS Solenoid Control Actuator Stuck Off**

DESCRIPTION

The ABS solenoid relay is built into the No. 2 skid control ECU in the brake actuator assembly.

The ABS solenoid relay supplies power to the holding solenoid and reduction solenoid.

The solenoid relay is turned on 1.5 seconds after the ignition switch is turned to ON, and is turned off if an open or short in the solenoid is detected by self-diagnosis performed when the vehicle is starting off.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C143A7E	ABS Solenoid Control Actuator Stuck On	When voltage at terminal +BS is 9.5 V or higher, solenoid relay is OFF, relay contact is ON continuously for 4.5 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	B	• SAE Code: C143B • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C143A7F	ABS Solenoid Control Actuator Stuck Off	When voltage at terminal +BS is 9.5 V or higher and solenoid relay is ON, relay contact is OFF continuously for 0.22 seconds or more.	• Wire harness and connector • No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	B	• SAE Code: C143C • Output ECU: No. 2 skid control ECU (brake actuator assembly)

MONITOR DESCRIPTION

The No. 2 skid control ECU (brake actuator assembly) monitors the voltage of the ABS solenoid.

When the ABS solenoid relay is instructed to be on and the voltage of the ABS solenoid is within the range of an open circuit malfunction, or when the ABS solenoid relay is instructed to be off and the voltage of the ABS solenoid is within the range of a short circuit malfunction, an open circuit or short circuit is judged respectively and the MIL is illuminated and a DTC is stored.

MONITOR STRATEGY

Related DTCs	C143B: Brake system voltage power supply relay circuit high C143C: Brake system voltage power supply relay circuit open
Required Sensors/Components(Main)	No. 2 skid control ECU (brake actuator assembly)
Required Sensors/Components(Related)	No. 2 skid control ECU (brake actuator assembly)
Frequency of Operation	Continuous
Duration	4.5 seconds: C143B 0.22 seconds: C143C (Case 1) 0.204 seconds: C143C (Case 2)
MIL Operation	Immediately
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

C143B (Case 1)

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	A, B, C and D
A. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
B. Command to solenoid relay	Off
C. IGR voltage	Higher than 10 V
D. IGP voltage	Higher than 10 V

C143B (Case 2)

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
ECU status	Premain
Command to solenoid relay	Off
+BS voltage	9.5 V or higher
IGR voltage	Higher than 10 V
IGP voltage	Higher than 10 V

C143C (Case 1)

Monitor runs whenever the following DTCs are not stored	C0597: ABS hold solenoid performance C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open C12A7 (Case 3): ABS hold solenoid (FL) circuit low C12A8 (Case 1): ABS hold solenoid (FL) circuit high (solenoid Off current) C12A8 (Case 2 and 3): ABS hold solenoid (FL) circuit high (IC data) C12A8 (Case 4): ABS hold solenoid (FL) circuit high (solenoid On current) C12B2: ABS release solenoid (FL) circuit low C12B3: ABS release solenoid (FL) circuit high C12BD (Case 1 and 2): ABS hold solenoid (FR) circuit open C12BD (Case 3): ABS hold solenoid (FR) circuit low C12BE (Case 1): ABS hold solenoid (FR) circuit high (solenoid Off current) C12BE (Case 2 and 3): ABS hold solenoid (FR) circuit high (IC data) C12BE (Case 4): ABS hold solenoid (FR) circuit high (solenoid On current) C12C8: ABS release solenoid (FR) circuit low C12C9: ABS release solenoid (FR) circuit high C12D3 (Case 1 and 2): ABS hold solenoid (RL) circuit open C12D3 (Case 3): ABS hold solenoid (RL) circuit low C12D4 (Case 1): ABS hold solenoid (RL) circuit high (solenoid Off current) C12D4 (Case 2 and 3): ABS hold solenoid (RL) circuit high (IC data) C12D4 (Case 4): ABS hold solenoid (RL) circuit high (solenoid On current) C12DE: ABS release solenoid (RL) circuit low C12DF: ABS release solenoid (RL) circuit high C12E9 (Case 1 and 2): ABS hold solenoid (RR) circuit open C12E9 (Case 3): ABS hold solenoid (RR) circuit low C12EA (Case 1): ABS hold solenoid (RR) circuit high (solenoid Off current) C12EA (Case 2 and 3): ABS hold solenoid (RR) circuit high (IC data) C12EA (Case 4): ABS hold solenoid (RR) circuit high (solenoid On current) C12F4: ABS release solenoid (RR) circuit low C12F5: ABS release solenoid (RR) circuit high C12F6: ABS hold solenoid other functional C12F7: ABS hold solenoid other functional C13BF: SM solenoid other functional C137D: Brake system voltage circuit high C13C2 (Case 1 and 2): SM1 solenoid circuit open C13C2 (Case 3): SM1 solenoid circuit low C13C3 (Case 1): SM1 solenoid circuit high (solenoid Off current) C13C3 (Case 2 and 3): SM1 solenoid circuit high (IC data) C13C3 (Case 4): SM1 solenoid circuit high (solenoid On current) C13CB (Case 1 and 2): SM2 solenoid circuit open

	C13CB (Case 3): SM2 solenoid circuit low C13CC (Case 1): SM2 solenoid circuit high (solenoid Off current) C13CC (Case 2 and 3): SM2 solenoid circuit high (IC data) C13CC (Case 4): SM2 solenoid circuit high (solenoid On current) C143B: Brake system voltage power supply relay circuit high
All of the following conditions are met	A, B, C and D
A. Command to solenoid relay	On
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. IGR voltage	Higher than 10 V
D. IGP voltage	Higher than 10 V

C143C (Case 2)

Monitor runs whenever the following DTCs are not stored	C0597: ABS hold solenoid performance C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open C12A7 (Case 3): ABS hold solenoid (FL) circuit low C12A8 (Case 1): ABS hold solenoid (FL) circuit high (solenoid Off current) C12B2: ABS release solenoid (FL) circuit low C12B3: ABS release solenoid (FL) circuit high C12BD (Case 1 and 2): ABS hold solenoid (FR) circuit open C12BD (Case 3): ABS hold solenoid (FR) circuit low C12BE (Case 1): ABS hold solenoid (FR) circuit high (solenoid Off current) C12C8: ABS release solenoid (FR) circuit low C12C9: ABS release solenoid (FR) circuit high C12D3 (Case 1 and 2): ABS hold solenoid (RL) circuit open C12D3 (Case 3): ABS hold solenoid (RL) circuit low C12D4 (Case 1): ABS hold solenoid (RL) circuit high (solenoid Off current) C12DE: ABS release solenoid (RL) circuit low C12DF: ABS release solenoid (RL) circuit high C12E9 (Case 1 and 2): ABS hold solenoid (RR) circuit open C12E9 (Case 3): ABS hold solenoid (RR) circuit low C12EA (Case 1): ABS hold solenoid (RR) circuit high (solenoid Off current) C12F4: ABS release solenoid (RR) circuit low C12F5: ABS release solenoid (RR) circuit high C12F6: ABS hold solenoid other functional C12F7: ABS hold solenoid other functional C13BF: SM solenoid other functional C137D: Brake system voltage circuit high C13C2 (Case 1 and 2): SM1 solenoid circuit open C13C3 (Case 1): SM1 solenoid circuit high (solenoid Off current) C13CB (Case 1 and 2): SM2 solenoid circuit open C13CC (Case 1): SM2 solenoid circuit high (solenoid Off current) C143B: Brake system voltage power supply relay circuit high

All of the following conditions are met	-
ECU status	Premain
Command to solenoid relay	On
+BS voltage	9.5 V or higher
IGR voltage	Higher than 10 V
IGP voltage	Higher than 10 V

TYPICAL MALFUNCTION THRESHOLDS

C143B and C143C

Following condition is met	More than 0.012 seconds
AST voltage	6.0 V or higher

COMPONENT OPERATING RANGE

C143B (Case 1)

All of the following conditions are met	A, B and C
A. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
B. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
C. Following condition is met	More than 0.012 seconds
AST voltage	Below 6 V

C143B (Case 2)

All of the following conditions are met	A, B, C, D, E, F, G or H
A. ECU status	Premain
B. Command to solenoid relay	Off
C. ABS pump motor fail (C052D, C052E)	Not detected
D. ABS pump motor performance (gate voltage) fail (C052B)	Not detected
E. Brake system voltage fail (C143C)	Not detected
F. BSCM fail (C0597)	Not detected
G. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
H. Following condition is met	More than 0.012 seconds
AST voltage	Below 6 V

C143C (Case 1)

All of the following conditions are met	A and B

A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	6 V or higher

C143C (Case 2)

All of the following conditions are met	A, B, C, D, E, F, G, H, I or J
A. ECU status	Premain
B. Command to solenoid relay	On
C. Premain	Finished
D. BM voltage	6 V or higher
E. BSCM fail (C0597)	Not detected
F. ABS pump motor fail (C052D, C052E)	Not detected
G. ABS pump motor performance (gate voltage) fail (C052B)	Not detected
H. Brake system voltage fail (C143B)	Not detected
I. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
J. Following condition is met	More than 0.012 seconds
AST voltage	6 V or higher

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. Drive the vehicle at a speed of 20 km/h (12 mph) for 1 minute. [*1]
7. Operate the ABS using a drum tester or equivalent. [*2]

HINT:

[*1] to [*2]: Normal judgment procedure.

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

8. Enter the following menus: Chassis / Brake/EPB* / Utility / All Readiness.

*: Electric Parking Brake System

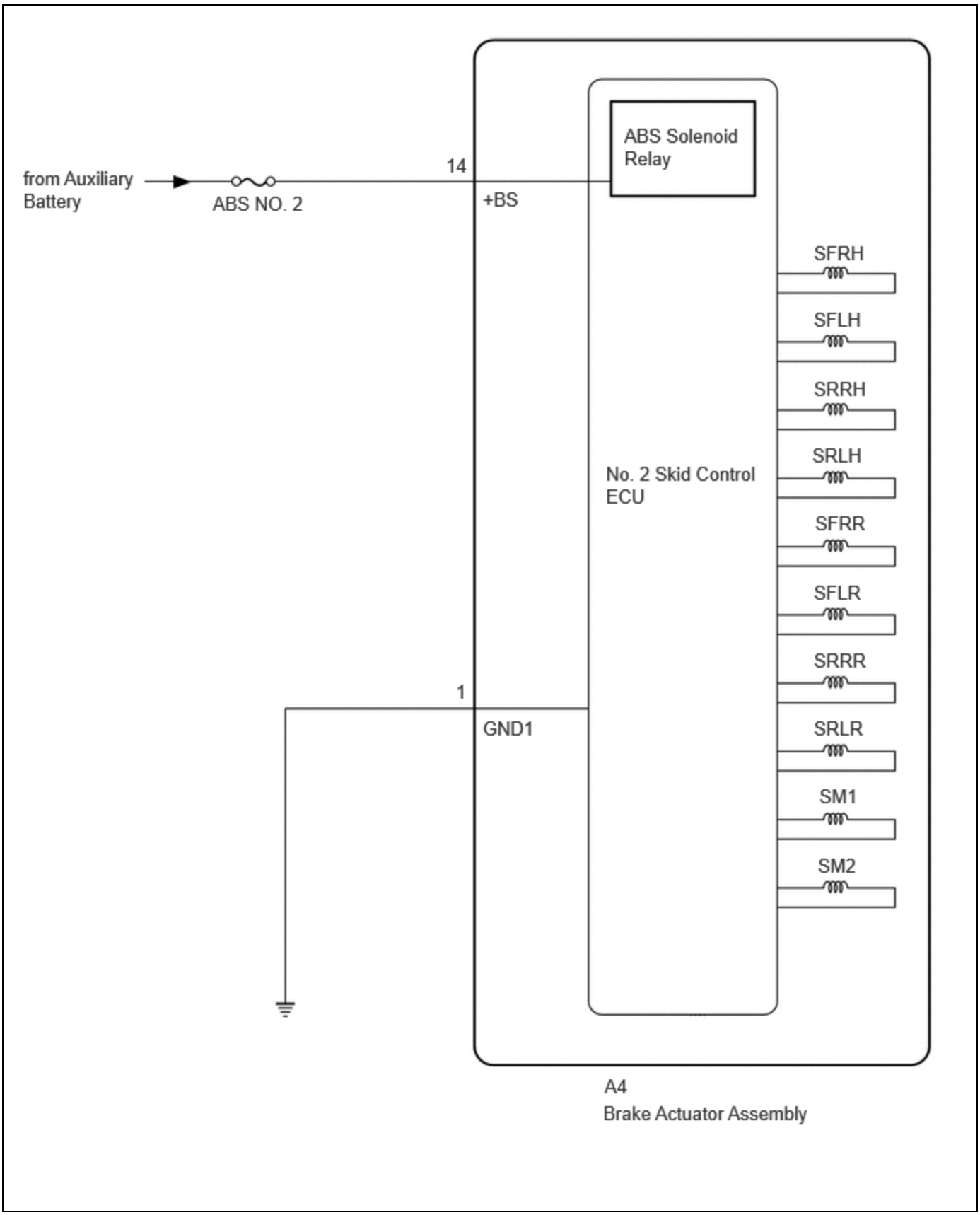
9. Check the DTC judgment result.

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

NOTICE:

Inspect the fuses for circuits related to this system before performing the following procedure.

PROCEDURE

1.	**CHECK DTC**

(a) Check the DTCs that are output.

Chassis > Brake/EPB > Trouble Codes

RESULT	PROCEED TO
Only C143A7E or C143A7F is output	A
C143A7E or C143A7F and other DTCs are output	B

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

A ▼

2.	**CHECK HARNESS AND CONNECTOR (+BS TERMINAL)**

Procedure1

(a) 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-procedure1

(b) Disconnect the A4 No. 2 skid control ECU (brake actuator assembly) connector.

Procedure2

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

OK:

No deformation or corrosion.

Procedure3

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

Standard Voltage:

EWD INFO

Click Location & Routing(A4)
Click Connector(A4)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
A4-14 (+BS) - Body ground	Always	11 to 14 V	V

Post-procedure1

(e) None

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

OK ▼

3.	**CHECK HARNESS AND CONNECTOR (GND1 TERMINAL)**

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

Standard Resistance:

EWD INFO

Click Location & Routing(A4)
Click Connector(A4)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
A4-1 (GND1) - Body ground	1 minute or more after disconnecting the cable from the negative (-) auxiliary battery terminal	Below 1 Ω	Ω

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

OK ▼

4.	**CLEAR DTC**

Pre-procedure1

(a) Reconnect the A4 No. 2 skid control ECU (brake actuator assembly) connector.

Procedure1

(b) Clear the DTCs.

Chassis > Brake/EPB > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off.

NEXT

5.	**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/EPB > Trouble Codes

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the No. 2 skid control ECU (brake actuator assembly) with the ignition switch turned to ON and the stop light switch assembly off, the ECU performs self-diagnosis of the solenoid circuit.
- If the normal system code is output (no DTCs are output), slightly jiggle the connectors, wire harnesses, and fuses of the No. 2 skid control ECU (brake actuator assembly).
- If any DTCs are output while jiggling a connector or wire harness of the No. 2 skid control ECU (brake actuator assembly), inspect and repair the connector or wire harness.
- If no DTCs were output when reconfirming DTCs, checking for intermittent problems is necessary because it is suspected that the original DTCs were stored due to the poor connection of a connector terminal.

RESULT	PROCEED TO
C143A7E and C143A7F are not output	A
C143A7E or C143A7F is output	B

Post-procedure1

(c) None

A **USE SIMULATION METHOD TO CHECK**

B **REPLACE BRAKE ACTUATOR ASSEMBLY** INFO