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Title: BRAKE CONTROL / DYNAMIC CONTROL SYSTEMS: ELECTRONICALLY CONTROLLED BRAKE SYSTEM: C13C012,…,C13C91D; Brake Pressure Control Solenoid "A" Control Circuit Short to Battery; 2023 - 2024 MY Prius Prius Prime [12/2022 -   ]

DTC	C13C012	**Brake Pressure Control Solenoid "A" Control Circuit Short to Battery**

DTC	C13C014	**Brake Pressure Control Solenoid "A" Control Circuit Short to Ground or Open**

DTC	C13C018	**Brake Pressure Control Solenoid "A" Control Circuit Current Below Threshold**

DTC	C13C019	**Brake Pressure Control Solenoid "A" Control Circuit Current Above Threshold**

DTC	C13C01D	**Brake Pressure Control Solenoid "A" Control Circuit Current Out of Range**

DTC	C13C912	**Brake Pressure Control Solenoid "B" Control Circuit Short to Battery**

DTC	C13C914	**Brake Pressure Control Solenoid "B" Control Circuit Short to Ground or Open**

DTC	C13C918	**Brake Pressure Control Solenoid "B" Control Circuit Current Below Threshold**

DTC	C13C919	**Brake Pressure Control Solenoid "B" Control Circuit Current Above Threshold**

DTC	C13C91D	**Brake Pressure Control Solenoid "B" Control Circuit Current Out of Range**

DESCRIPTION

The solenoid relay and master cylinder cut solenoid valves are built into the brake actuator assembly.

The master cylinder cut solenoid valves control the brake fluid pressure from the pump in the brake actuator assembly and output brake fluid pressure in accordance with operation of the system.

When these DTCs are stored, the fail-safe function operates and the solenoid relay is turned off to prevent the master cylinder cut solenoid valves from operating.

HINT:

- Brake pressure control solenoid "A": Solenoid SM1
- Brake pressure control solenoid "B": Solenoid SM2

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C13C012	Brake Pressure Control Solenoid "A" Control Circuit Short to Battery	An excessive current is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13C3 (Case 2 and 3) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C014	Brake Pressure Control Solenoid "A" Control Circuit Short to Ground or Open	Insufficient current is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13C2 (Case 1 and 2) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C018	Brake Pressure Control Solenoid "A" Control Circuit Current Below Threshold	An open is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13C2 (Case 3) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C019	Brake Pressure Control Solenoid "A" Control Circuit Current Above Threshold	Overcurrent is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13C3 (Case 4) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C01D	Brake Pressure Control Solenoid "A" Control Circuit Current Out of Range	Current leakage is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13C3 (Case 1) • Output ECU: No. 2 skid

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
							control ECU (brake actuator assembly)
C13C912	Brake Pressure Control Solenoid "B" Control Circuit Short to Battery	An excessive current is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13CC (Case 2 and 3) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C914	Brake Pressure Control Solenoid "B" Control Circuit Short to Ground or Open	Insufficient current is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13CB (Case 1 and 2) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C918	Brake Pressure Control Solenoid "B" Control Circuit Current Below Threshold	An open is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13CB (Case 3) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C919	Brake Pressure Control Solenoid "B" Control Circuit Current Above Threshold	Overcurrent is detected in the solenoid for 0.05 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C13CC (Case 4) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C13C91D	Brake Pressure Control Solenoid "B" Control	Current leakage is detected in the solenoid for	No. 2 skid control ECU (brake	Comes on	Brake/EPB	A	• SAE Code: C13CC (Case 1)

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
	Circuit Current Out of Range	0.05 seconds or more.	actuator assembly)				• Output ECU: No. 2 skid control ECU (brake actuator assembly)

MONITOR DESCRIPTION

The No. 2 skid control ECU (brake actuator assembly) monitors the drive voltage and current of the master cylinder cut solenoid. Based on the monitored information, if any of the following abnormal conditions are detected, the MIL is illuminated and a DTC is stored.

- Excessively high current in a solenoid circuit is detected
- Excessively low current in a solenoid circuit is detected
- An open in a solenoid circuit is detected
- Overcurrent in a solenoid circuit is detected
- A current leak in a solenoid circuit is detected

MONITOR STRATEGY

Related DTCs	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): SM1 solenoid circuit high (solenoid Off current)
	C13CC (Case 2 and 3): SM1 solenoid circuit high (IC data)
	C13CC (Case 4): SM1 solenoid circuit high (solenoid On current)
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	0.054 seconds: C13C2, C13C3 (Case 1 to 3), C13CB and C13CC (Case 1 to 3) -:C13C3 (Case 4) and C13CC (Case 4)
MIL Operation	Immediately
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

C13C2 (Case 1), C13CB (Case 1), C13C3 (Case 2) and C13CC (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)
	C12A8 (Case 2 and 3): ABS hold solenoid (FL) circuit high (IC data)
	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)
	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
	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)
	C137D: Brake system voltage circuit high

	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E and F
A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	6 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. +BS voltage	9.5 V or higher
E. IGR voltage	Higher than 10 V
F. IGP voltage	Higher than 10 V

C13C2 (Case 2) and C13CB (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)
	C12A8 (Case 2 and 3): ABS hold solenoid (FL) circuit high (IC data)
	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)
	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
	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)
	C137D: Brake system voltage circuit high
	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E, F and G
A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	6 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. Following condition is met	More than 0.054 seconds
Solenoid target current value	0 A
E. +BS voltage	9.5 V or higher
F. IGR voltage	Higher than 10 V
G. IGP voltage	Higher than 10 V

C13C2 (Case 3) and C13CB (Case 3)

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)
	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)
	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
	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)
	C137D: Brake system voltage circuit high
	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J and K
A. Command to solenoid relay	On

B. Following condition is met	More than 0.012 seconds
AST voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. Following condition is met	More than 0.048 seconds
Solenoid target current value	0.348 A or higher
E. Solenoid overcurrent signal (IC Data)	Off
F. Solenoid driver overtemperature signal (IC Data)	Off
G. Solenoid return current terminal disconnection signal (IC Data)	Off
H. Solenoid GND terminal disconnection signal (IC Data)	Off
I. +BS voltage	9.5 V or higher
J. IGR voltage	Higher than 10 V
K. IGP voltage	Higher than 10 V

C13C3 (Case 1) and C13CC (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)
	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)
	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
	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)
	C137D: Brake system voltage circuit high
	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L and M
A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	6.0 V or higher
C. Following condition is met	More than 0.054 seconds
Solenoid target current value	0 A
D. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
E. Solenoid overcurrent signal (IC Data)	Off
F. Solenoid driver overtemperature signal (IC Data)	Off
G. Solenoid load open/short to ground signal (IC Data)	Off
H. Solenoid load leakage signal (IC Data)	Off
I. Solenoid return current terminal disconnection signal (IC Data)	Off

J. Solenoid GND terminal disconnection signal (IC Data)	Off
K. +BS voltage	9.5 V or higher
L. IGR voltage	Higher than 10 V
M. IGP voltage	Higher than 10 V

C13C3 (Case 3) and C13CC (Case 3)

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)
	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)
	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
	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)
	C137D: Brake system voltage circuit high
	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E, F, G and H
A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	6 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. Following condition is met	More than 0.054 seconds
Solenoid target current value	0 A
E. Solenoid load open/short to ground signal (IC Data)	Off
F. +BS voltage	9.5 V or higher
G. IGR voltage	Higher than 10 V
H. IGP voltage	Higher than 10 V

C13C3 (Case 4) and C13CC (Case 4)

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)
	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)
	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
	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)
	C137D: Brake system voltage circuit high
	C143B: Brake system voltage power supply relay circuit high
	C143C: Brake system voltage power supply relay circuit open
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J and K
A. Command to solenoid relay	On
B. Following condition is met	More than 0.012 seconds
AST voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. Following condition is met	More than 0.048 seconds

Solenoid target current value	Below 0 A
E. Solenoid overcurrent signal (IC Data)	Off
F. Solenoid driver overtemperature signal (IC Data)	Off
G. Solenoid return current terminal disconnection signal (IC Data)	Off
H. Solenoid GND terminal disconnection signal (IC Data)	Off
I. +BS voltage	9.5 V or higher
J. IGR voltage	Higher than 10 V
K. IGP voltage	Higher than 10 V

TYPICAL MALFUNCTION THRESHOLDS

C13C2 (Case 1) and C13CB (Case 1)

Either of the following conditions is met	-
Solenoid return current terminal disconnection signal (IC Data)	On
Solenoid GND terminal disconnection signal (IC Data)	On

C13C2 (Case 2) and C13CB (Case 2)

Solenoid load open/short to ground signal (IC Data)	On

C13C2 (Case 3) and C13CB (Case 3)

Solenoid current monitor value / Solenoid target current value	Less than 0.25

C13C3 (Case 1) and C13CC (Case 1)

Solenoid current monitor value	Higher than 0.1 A

C13C3 (Case 2) and C13CC (Case 2)

Either of the following conditions is met	-
Solenoid overcurrent signal (IC Data)	On
Solenoid driver overtemperature signal (IC Data)	On

C13C3 (Case 3) and C13CC (Case 3)

Solenoid load leakage signal (IC Data)	On

C13C3 (Case 4) and C13CC (Case 4)

Either of the following conditions is met	A or B
A. Both of the following conditions are met	More than 0.054 seconds

Solenoid target current value	0.348 A or higher
Solenoid current monitor value / Solenoid target current value	More than 2
B. Both of the following conditions are met	More than 0.054 seconds
Solenoid target current value	Below 0.348 A
Solenoid current monitor value	Higher than 0.696 A

COMPONENT OPERATING RANGE

C13C2 (Case 1) and C13CB (Case 1)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid return current terminal disconnection signal (IC Data)	Off
Solenoid GND terminal disconnection signal (IC Data)	Off

C13C2 (Case 2) and C13CB (Case 2)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid load open/short to ground signal (IC Data)	Off

C13C2 (Case 3) and C13CB (Case 3)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected

SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid current monitor value / Solenoid target current value	0.25 or more

C13C3 (Case 1) and C13CC (Case 1)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid current monitor value	0.1 A or less

C13C3 (Case 2) and C13CC (Case 2)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid overcurrent signal (IC Data)	Off
Solenoid driver overtemperature signal (IC Data)	Off

C13C3 (Case 3) and C13CC (Case 3)

All of the following conditions are met	-
ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected

Brake system voltage fail (C143B, C143C)	Not detected
Initial check	Finished
Solenoid load leakage signal (IC Data)	Off

C13C3 (Case 4) and C13CC (Case 4)

All of the following conditions are met	A, B, C, D, E and F
A. ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA, C12F6, C12F7)	Not detected
B. ABS release solenoid fail (C12B2, C12B3, C12C8, C12C9, C12DE, C12DF, C12F4, C12F5)	Not detected
C. SM solenoid fail (C13BF, C13C2, C13C3, C13CB, C13CC)	Not detected
D. Brake system voltage fail (C143B, C143C)	Not detected
E. Initial check	Finished
F. Both of the following conditions are met	a and b
a. Both of the following conditions are met	-
Solenoid target current value	0.348 A or higher
Solenoid current monitor value / Solenoid target current value	2 or less
b. Both of the following conditions are met	-
Solenoid target current value	Below 0.348 A
Solenoid current monitor value	0.696 A 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. 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.

PROCEDURE

1.	REPLACE BRAKE ACTUATOR ASSEMBLY

HINT:

Click here INFO

NEXT ▶ END