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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: C059749,C12F662,C12F762,C13BF62; Brake System Control Module "A" Internal Electronic Failure; 2023 - 2024 MY Prius Prius Prime [12/2022 -          ]

| DTC | C059749 | Brake System Control Module "A" Internal Electronic Failure |
|---|---|---|

| DTC | C12F662 | Left Front Wheel ABS Hold Solenoid / Right Front Wheel ABS Hold Solenoid Signal Compare Failure |
|---|---|---|

| DTC | C12F762 | Left Rear Wheel ABS Hold Solenoid / Right Rear Wheel ABS Hold Solenoid Signal Compare Failure |
|---|---|---|

| DTC | C13BF62 | Brake Pressure Control Solenoid "A" / "B" Signal Compare Failure |
|---|---|---|

# DESCRIPTION

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

The solenoid valves control the brake fluid pressure at each wheel cylinder.

When these DTCs are stored, the fail-safe function operates and the solenoid relay is turned off to prevent the 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 |
|---|---|---|---|---|---|---|---|
| C059749 | Brake System Control Module "A" Internal Electronic Failure | When the +BS terminal voltage is from 9.5 to 17.4 V and the solenoid relay is ON, the relay contact is ON and the pump motor is in a low voltage state continuously for 0.1 seconds or more. | No. 2 skid control ECU (brake actuator assembly) | Comes on | Brake/EPB | A | • SAE Code: C0597<br>• Output ECU: No. 2 skid control ECU (brake actuator assembly) |

| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| C12F662 | Left Front Wheel ABS Hold Solenoid / Right Front Wheel ABS Hold Solenoid Signal Compare Failure | A difference in holding solenoid (SFLH) and holding solenoid (SFRH) output accuracy continues for 0.2 seconds or more. | No. 2 skid control ECU (brake actuator assembly) | Comes on | Brake/EPB | A | • SAE Code: C12F6<br>• Output ECU: No. 2 skid control ECU (brake actuator assembly) |
| C12F762 | Left Rear Wheel ABS Hold Solenoid / Right Rear Wheel ABS Hold Solenoid Signal Compare Failure | A difference in holding solenoid (SRLH) and holding solenoid (SRRH) output accuracy continues for 0.2 seconds or more. | No. 2 skid control ECU (brake actuator assembly) | Comes on | Brake/EPB | A | • SAE Code: C12F7<br>• Output ECU: No. 2 skid control ECU (brake actuator assembly) |
| C13BF62 | Brake Pressure Control Solenoid "A" / "B" Signal Compare Failure | A difference in master cylinder cut solenoid (SM1) and master cylinder cut solenoid (SM2) output accuracy continues for 0.2 seconds or more. | No. 2 skid control ECU (brake actuator assembly) | Comes on | Brake/EPB | A | • SAE Code: C13BF<br>• Output ECU: No. 2 skid control ECU (brake actuator assembly) |

# MONITOR DESCRIPTION

**C0597:**

The No. 2 skid control ECU (brake actuator assembly) monitors the solenoid circuit and when an abnormal monitor value is detected, the MIL is illuminated and a DTC is stored.

**C12F6, C12F7 and C13BF:**

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

- A difference in output accuracy of the ABS holding solenoid (SFLH) and ABS holding solenoid (SFRH) is detected.
- A difference in output accuracy of the ABS holding solenoid (SRLH) and ABS holding solenoid (SRRH) is detected.
- A difference in output accuracy of the Master cylinder cut solenoid (SM1) and master cylinder cut solenoid (SM2) is detected.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | C0597 (Case 1): ABS hold solenoid circuit stuck<br>C0597 (Case 2 to 5): ABS hold solenoid performance<br>C12F6: ABS hold solenoid other functional<br>C12F7: ABS hold solenoid other functional<br>C13BF: SM solenoid other functional |
| 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 | 0.012 seconds: C0597 (Case 2 and 5)<br>0.054 seconds: C0597 (Case 3 and 4)<br>0.102 seconds: C0597 (Case 1)<br>0.198 seconds: C12F6, C12F7 and C13BF |
| MIL Operation | Immediately |
| Sequence of Operation | None |

## TYPICAL ENABLING CONDITIONS

**C0597 (Case 1)**

| | |
|---|---|
| Monitor runs whenever the following DTCs are not stored | C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open<br>C12A7 (Case 3): ABS hold solenoid (FL) circuit low<br>C12A8 (Case 1): ABS hold solenoid (FL) circuit high (solenoid Off current)<br>C12A8 (Case 2 and 3): ABS hold solenoid (FL) circuit high (IC data)<br>C12A8 (Case 4): ABS hold solenoid (FL) circuit high (solenoid On current)<br>C12B2: ABS release solenoid (FL) circuit low<br>C12B3: ABS release solenoid (FL) circuit high<br>C12BD (Case 1 and 2): ABS hold solenoid (FR) circuit open<br>C12BD (Case 3): ABS hold solenoid (FR) circuit low<br>C12BE (Case 1): ABS hold solenoid (FR) circuit high (solenoid Off current)<br>C12BE (Case 2 and 3): ABS hold solenoid (FR) circuit high (IC data)<br>C12BE (Case 4): ABS hold solenoid (FR) circuit high (solenoid On current)<br>C12C8: ABS release solenoid (FR) circuit low<br>C12C9: ABS release solenoid (FR) circuit high<br>C12D3 (Case 1 and 2): ABS hold solenoid (RL) circuit open<br>C12D3 (Case 3): ABS hold solenoid (RL) circuit low<br>C12D4 (Case 1): ABS hold solenoid (RL) circuit high (solenoid Off current)<br>C12D4 (Case 2 and 3): ABS hold solenoid (RL) circuit high (IC data)<br>C12D4 (Case 4): ABS hold solenoid (RL) circuit high (solenoid On current)<br>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 |
| | C137D: Brake system voltage circuit high |
| | 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) |
| | 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 | 9.5 V or higher |
| D. Following condition is met | More than 0.22 seconds |
| +BS voltage | 17.4 V or less |
| E. IGR voltage | Higher than 10 V |
| F. IGP voltage | Higher than 10 V |

## C0597 (Case 2)

| | |
|---|---|
| Monitor runs whenever the following DTCs are not stored | C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open |
| | 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 |
|  | 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 |
|  | 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 |
|  | 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 |
|  | C137D: Brake system voltage circuit high |
|  | 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) |
|  | 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) |
|  | 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. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | Off |
| D. ASIC output permission | Off |
| E. AST voltage | Higher than 1.3 V |
| F. +BS voltage | 9.5 V or higher |
| G. IGR voltage | Higher than 10 V |
| H. IGP voltage | Higher than 10 V |

## C0597 (Case 3)

| Monitor runs whenever the following DTCs are not stored | C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open |
|---|---|
|  | 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 |
| | 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 |
| | 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 |
| | 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 |
| | C137D: Brake system voltage circuit high |
| | C13BF: SM solenoid other functional |
| | 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 |
| | 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. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | On |
| D. ASIC output permission | Off |
| E. Solenoid current output order value | 0.16 A |
| F. AST voltage | 6 V or higher |
| G. IGR voltage | Higher than 10 V |
| H. IGP voltage | Higher than 10 V |

## C0597 (Case 4)

| Monitor runs whenever the following DTCs are not stored | C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open |
|---|---|
| | 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 |

| | 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 |
| | 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 |
| | 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 |
| | C137D: Brake system voltage circuit high |
| | C13BF: SM solenoid other functional |
| | 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 |
| | 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. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | On |
| D. ASIC output permission | Off |
| E. Solenoid current output order value | 0.16 A |
| F. Command to NC solenoid | On |
| G. AST voltage | 6 V or higher |
| H. IGR voltage | Higher than 10 V |
| I. IGP voltage | Higher than 10 V |

**C0597 (Case 5)**

| Monitor runs whenever the following DTCs are not stored | C12A7 (Case 1 and 2): ABS hold solenoid (FL) circuit open |
| | 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 |

| | 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 |
| | 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 |
| | 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 |
| | C137D: Brake system voltage circuit high |
| | C13BF: SM solenoid other functional |
| | 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 |
| | C143C: Brake system voltage power supply relay circuit open |
| All of the following conditions are met | - |
| ECU status | Premain |
| Command to solenoid relay | Off |
| ASIC output permission | Off |
| ASIC QA answer | NG answer |
| +BS voltage | 9.5 V or higher |
| IGR voltage | Higher than 10 V |
| IGP voltage | Higher than 10 V |

**C12F6 and C12F7**

| 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

C137D: Brake system voltage circuit high

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)

| | 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 0.12 seconds |
| Absolute value of the change in solenoid target current value during 0.018 seconds | Below 0.022 A |
| E. Following condition is met | More than 0.12 seconds |
| Absolute value of the change in reference solenoid target current value during 0.018 seconds | Below 0.022 A |
| F. Solenoid target current value | Reference solenoid target current value |
| G. Solenoid target current value | 0.25 A or higher, and 1 A or less |
| H. Reference solenoid target current value | 0.25 A or higher, and 1 A or less |
| I. +BS voltage | 9.5 V or higher |
| J. IGR voltage | Higher than 10 V |
| K. IGP voltage | Higher than 10 V |

**C13BF**

| 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 |
| | 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 |
| | 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 0.24 seconds |
| Absolute value of the change in SM1 solenoid target current value during 0.018 seconds | Below 0.022 A |
| E. Following condition is met | More than 0.24 seconds |
| Absolute value of the change in SM2 solenoid target current value during 0.018 seconds | Below 0.022 A |
| F. SM1 solenoid target current value | SM2 solenoid target current value |
| G. SM1 solenoid target current value | 0.348 A or higher, and 0.568 A or less |
| H. SM2 solenoid target current value | 0.348 A or higher, and 0.568 A or less |
| 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

### C0597 (Case 1)

| Charge pump low voltage detection signal (IC Data) | On |
|---|---|

### C0597 (Case 2)

| Either of the following conditions is met | - |
|---|---|
| ASIC ERRIN malfunction | Not detected |
| Solenoid GND terminal disconnection signal (IC Data) | Off |
| Solenoid driver overtemperature signal (IC Data) | Off |
| Solenoid freewheeling terminal disconnection signal (IC Data) | Off |
| Solenoid overcurrent signal (IC Data) | Off |
| Solenoid load leakage signal (IC Data) | Off |
| Solenoid load open/short to ground signal (IC Data) | Off |

### C0597 (Case 3 and 4)

| Either of the following conditions is met | - |
|---|---|
| Solenoid current | 0.1 A or more |
| Solenoid GND terminal disconnection signal (IC Data) | Off |
| Solenoid driver overtemperature signal (IC Data) | Off |
| Solenoid freewheeling terminal disconnection signal (IC Data) | Off |

| | |
|---|---|
| Solenoid overcurrent signal (IC Data) | Off |
| Solenoid load leakage signal (IC Data) | Off |
| Solenoid load open/short to ground signal (IC Data) | On |

**C0597 (Case 5)**

| | |
|---|---|
| ASIC_Q&A malfunction (IC Data) | Not detected |

**C12F6**

| | |
|---|---|
| Divide SFRH current monitor value by SFLH current monitor value | More than 2.08, or less than 0.48 |

**C12F7**

| | |
|---|---|
| Divide SRRH current monitor value by SRLH current monitor value | More than 2.08, or less than 0.48 |

**C13BF**

| | |
|---|---|
| Divide SM1 current monitor value by SM2 current monitor value | More than 2.08, or less than 0.48 |

# COMPONENT OPERATING RANGE

**C0597 (Case 1)**

| | |
|---|---|
| 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 0.012 seconds |
| AST voltage | 6 V or higher |
| C. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| D. Charge pump low voltage detection signal (IC Data) | Off |

**C0597 (Case 2)**

| | |
|---|---|
| All of the following conditions are met | A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q and R |
| A. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | Off |
| D. ASIC output permission | Off |
| E. AST voltage | Higher than 1.3 V |
| F. Premain | Finished |
| G. BM voltage | 6 V or higher |

| H. Wheel speed sensor fail (C0503, C0509, C050F, C0515) | Not detected |
|---|---|
| I. Brake system voltage fail (C143B, C143C) | Not detected |
| J. ABS pump motor fail (C052D, C052E) | Not detected |
| K. ABS pump motor performance (gate voltage) fail (C052B) | Not detected |
| L. ASIC ERRIN malfunction | Detected |
| M. Solenoid GND terminal disconnection signal (IC Data) | On |
| N. Solenoid driver overtemperature signal (IC Data) | On |
| O. Solenoid freewheeling terminal disconnection signal (IC Data) | On |
| P. Solenoid overcurrent signal (IC Data) | On |
| Q. Solenoid load leakage signal (IC Data) | On |
| R. Solenoid load open/short to ground signal (IC Data) | On |

## C0597 (Case 3)

| All of the following conditions are met | A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q and R |
|---|---|
| A. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | On |
| D. ASIC output permission | Off |
| E. Solenoid current output order value | 0.16 A |
| F. AST voltage | 6 V or higher |
| G. Premain | Finished |
| H. BM voltage | 6 V or higher |
| I. Wheel speed sensor fail (C0503, C0509, C050F, C0515) | Not detected |
| J. Brake system voltage fail (C143B, C143C) | Not detected |
| K. ABS pump motor fail (C052D, C052E) | Not detected |
| L. ABS pump motor performance (gate voltage) fail (C052B) | Not detected |
| M. Solenoid current | Below 0.1 A |
| N. Solenoid GND terminal disconnection signal (IC Data) | On |
| L. Solenoid driver overtemperature signal (IC Data) | On |
| O. Solenoid freewheeling terminal disconnection signal (IC Data) | On |
| P. Solenoid overcurrent signal (IC Data) | On |
| Q. Solenoid load leakage signal (IC Data) | On |
| R. Solenoid load open/short to ground signal (IC Data) | Off |

**C0597 (Case 4)**

| All of the following conditions are met | A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R and S |
|---|---|
| A. ECU status | Premain |
| B. Following condition is met | More than 0.22 seconds |
| +BS voltage | 9.5 V or higher |
| C. Command to solenoid relay | On |
| D. ASIC output permission | Off |
| E. Solenoid current output order value | 0.16 A |
| F. Command to NC solenoid | On |
| G. AST voltage | 6 V or higher |
| H. Premain | Finished |
| I. BM voltage | 6 V or higher |
| J. Wheel speed sensor fail (C0503, C0509, C050F, C0515) | Not detected |
| K. Brake system voltage fail (C143B, C143C) | Not detected |
| L. ABS pump motor fail (C052D, C052E) | Not detected |
| M. ABS pump motor performance (gate voltage) fail (C052B) | Not detected |
| N. Solenoid current | Below 0.1 A |
| L. Solenoid GND terminal disconnection signal (IC Data) | On |
| O. Solenoid driver overtemperature signal (IC Data) | On |
| P. Solenoid freewheeling terminal disconnection signal (IC Data) | On |
| Q. Solenoid overcurrent signal (IC Data) | On |
| R. Solenoid load leakage signal (IC Data) | On |
| S. Solenoid load open/short to ground signal (IC Data) | Off |

**C0597 (Case 5)**

| All of the following conditions are met | - |
|---|---|
| ECU status | Premain |
| Command to solenoid relay | Off |
| ASIC output permission | Off |
| ASIC QA answer | NG answer |
| Premain | Finished |
| BM voltage | 6 V or higher |
| Wheel speed sensor fail (C0503, C0509, C050F, C0515) | Not detected |
| Brake system voltage fail (C143B, C143C) | Not detected |
| ABS pump motor fail (C052D, C052E) | Not detected |

| ABS pump motor performance (gate voltage) fail (C052B) | Not detected |
| --- | --- |
| ASIC Q&A malfunction (IC Data) | Detected |

## C12F6

| All of the following conditions are met | - |
| --- | --- |
| ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA) | 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 |
| Divide SFRH current monitor value by SFLH current monitor value | 2.08 or more, and 0.48 or less |

## C12F7

| All of the following conditions are met | - |
| --- | --- |
| ABS hold solenoid fail (C12A7, C12A8, C12BD, C12BE, C12D3, C12D4, C12E9, C12EA) | 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 |
| Divide SRRH current monitor value by SRLH current monitor value | 2.08 or more, and 0.48 or less |

## C13BF

| All of the following conditions are met | A, B, C, D, E, F, G, H, I, J and K |
| --- | --- |
| 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 (C13C2, C13C3, C13CB, C13CC) | Not detected |
| Brake system voltage fail (C143B, C143C) | Not detected |
| Initial check | Finished |
| Divide SM1 current monitor value by SM2 current monitor value | 2.08 or more, and 0.48 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