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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: C052C14,C052C16,C052C17,C052C49,C052F14; ABS Pump Motor Control Circuit Short to Ground or Open; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**C052C14**	**ABS Pump Motor Control Circuit Short to Ground or Open**

DTC	**C052C16**	**ABS Pump Motor Control Circuit Voltage Below Threshold**

DTC	**C052C17**	**ABS Pump Motor Control Circuit Voltage Above Threshold**

DTC	**C052C49**	**ABS Pump Motor Control Internal Electronic Failure**

DTC	**C052F14**	**ABS Pump Motor Supply Voltage Circuit Short to Ground or Open**

DESCRIPTION

The motor relay and motor fail-safe relay are built into the brake actuator assembly.

When the No. 2 skid control ECU (brake actuator assembly) operates ABS, TRAC, VSC, or brake assist, etc., the motor relay turns ON and drives the pump motor built into the brake actuator assembly.

If any DTCs related to motor supply power are stored, fail-safe is performed and supply of power to the motor relay is cut by the motor fail-safe relay.

If the voltage supplied to the motor relay (BM terminal) is below the DTC detection threshold due to low voltage from the auxiliary battery or DC/DC converter circuit, these DTCs may be stored.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
C052C14	ABS Pump Motor Control Circuit Short to Ground or Open	When the voltage at terminal +BS is between 9.5 and 17.4 V and the motor is being driven at full power, an abnormal voltage is detected for 0.12 seconds or more.	• Wire harness and connector • No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C052E (Case 6 to 8) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C052C16	ABS Pump Motor Control Circuit Voltage Below Threshold	When the voltage at terminal +BS is between 9.5 and 17.4 V and the motor is stopped, the detected motor voltage is excessively low for 2 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C052E (Case 1 to 5) • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C052C17	ABS Pump Motor Control Circuit Voltage Above Threshold	When the voltage at terminal +BS is between 9.5 and 17.4 V and the motor is stopped, the detected motor voltage is excessively high for 2 seconds or more.	No. 2 skid control ECU (brake actuator assembly)	Comes on	Brake/EPB	A	• SAE Code: C052D • Output ECU: No. 2 skid control ECU (brake actuator assembly)
C052C49	ABS Pump Motor Control Internal Electronic Failure	Either of the following is detected: • When the voltage at terminal +BS is between 9.5 and	• Wire harness and connector • No. 2 skid control ECU (brake	Comes on	Brake/EPB	A	• SAE Code: C052B • Output ECU: No. 2 skid control ECU (brake

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
		17.4 V, overcurrent is detected in the motor circuit for 0.05 seconds or more. • When the voltage at terminal +BS is between 9.5 and 17.4 V, an abnormal voltage is detected in the motor relay gate for 0.12 seconds or more.	actuator assembly)				actuator assembly)
C052F14	ABS Pump Motor Supply Voltage Circuit Short to Ground or Open	When voltage at +BS terminal is 9.5 V or more, open in BM terminal continues for 1 second or more.	• Wire harness and connector • No. 2 skid control ECU (brake actuator assembly)	Does not come on	Brake/EPB	A	Output ECU: No. 2 skid control ECU (brake actuator assembly)

MONITOR DESCRIPTION

C052B (Case 1)

If any of the following conditions are met for a certain amount of time, the No. 2 skid control ECU (brake actuator assembly) judges that the gate voltage is abnormal, the MIL is illuminated and a DTC is stored.

- The command to reverse battery protection MOS monitor is on and the reverse battery protection MOS gate voltage malfunction (IC Data) monitor is on.
- The motor relay overcurrent signal monitor is off, freewheeling MOS overcurrent signal monitor is off and the motor relay gate voltage malfunction monitor is on.

C052B (Case 2)

When there is a command to turn off the motor relay, motor fail-safe relay, reverse battery protection MOS and freewheeling MOS, and any of the following conditions are met, the No. 2 skid control ECU (brake actuator

assembly) judges that the gate voltage is abnormal, the MIL is illuminated and a DTC is stored.

- The motor relay gate voltage malfunction monitor is on.
- The reverse battery protection MOS gate voltage malfunction monitor is on.
- The freewheeling MOS gate voltage malfunction monitor is on.

C052B (Case 3)

When there is a command to turn off the motor relay, motor fail-safe relay and reverse battery protection MOS, command to turn on the freewheeling MOS, and the freewheeling MOS gate voltage malfunction monitor is ON, the No. 2 skid control ECU (brake actuator assembly) judges that the gate voltage is abnormal, the MIL is illuminated and a DTC is stored.

C052B (Case 4)

When there is a command to turn off the freewheeling MOS, motor fail-safe relay and reverse battery protection MOS, command to turn on the motor relay, and the motor relay gate voltage malfunction monitor is ON, the No. 2 skid control ECU (brake actuator assembly) judges that the gate voltage is abnormal, the MIL is illuminated and a DTC is stored.

C052B (Case 5)

When there is a command to turn off the motor relay, motor fail-safe relay and freewheeling MOS, command to turn on the reverse battery protection MOS, and the reverse battery protection MOS gate voltage malfunction monitor is ON, the No. 2 skid control ECU (brake actuator assembly) judges that the gate voltage is abnormal, the MIL is illuminated and a DTC is stored.

C052B (Case 6 and 7), C052D and C052E

When the voltage upstream or downstream of the motor is outside of the specified range, the No. 2 skid control ECU (brake actuator assembly) judges that the gate voltage is abnormal or the motor circuit is malfunctioning, the MIL is illuminated and a DTC is stored.

C052B (Case 8)

When this is no history of motor power supply voltage drop, there is a command to turn on the MROC, MRSUV, and overcurrent is detected in the motor circuit, the No. 2 skid control ECU (brake actuator assembly) judges that there is overcurrent, the MIL is illuminated and a DTC is stored.

C052B (Case 9)

When the freewheeling MOS overcurrent signal is ON, the No. 2 skid control ECU (brake actuator assembly) judges that there is a malfunction, the MIL is illuminated and a DTC is stored.

MONITOR STRATEGY

Related DTCs	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay)
Required Sensors/Components(Main)	No. 2 skid control ECU (brake actuator assembly)
Required Sensors/Components(Related)	-
Frequency of Operation	Continuous
Duration	0.12 seconds: C052B (Case 3 to 5), C052D (Case 5) and C052E (Case 3 to 6) 0.054 seconds: C052B (Case 8 and 9)

	2 seconds: C052D (Case 2) 2.004 seconds: C052E (Case 2) 4 seconds: C052E (Case 1) 4.002 seconds: C052B (Case 6 and 7) and C052D (Case 3 to 4) -: C052B (Case 1 and 2) and C052D (Case 1)
MIL Operation	Immediately
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

C052B (Case 1)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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 and E
A. BM voltage	6 V or higher
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. IGR voltage	Higher than 10 V
E. IGP voltage	Higher than 10 V

C052B (Case 2)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L

A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052B (Case 3) and C052E (Case 3)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	On
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V

L. IGP voltage	Higher than 10 V

C052B (Case 4) and C052E (Case 6)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	On
G. Motor duty output order value	100%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052B (Case 5) and C052E (Case 4)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher

C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	On
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052B (Case 6)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L and M
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
C. BM voltage	6 V or higher
D. Motor relay input signal permission	On
E. Command to motor relay	On
F. Motor duty output order value	100%
G. Command to reverse battery protection MOS	Off
H. Command to freewheeling MOS	Off
I. Command to motor failsafe relay	Off
J. ASIC output permission	Off
K. +BS voltage	9.5 V or higher
L. IGR voltage	Higher than 10 V
M. IGP voltage	Higher than 10 V

C052B (Case 7)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E Motor relay input signal permission	Off
F. Command to motor relay	On
G. Motor duty output order value	100%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052B (Case 8)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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. 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. Command to motor relay	On
D. History of motor power supply voltage drop	Off
E. IGR voltage	Higher than 10 V
F. IGP voltage	Higher than 10 V
G. BM voltage	6 V or higher

C052B (Case 9)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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) 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) 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 C1427: ABS pump motor stuck 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	-
BM voltage	6 V or higher
+BS voltage	9.5 V or higher
IGR voltage	Higher than 10 V
IGP voltage	Higher than 10 V

C052D (Case 1)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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. 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. Command to motor relay	On
D. Motor stop status	On
E. IGR voltage	Higher than 10 V
F. IGP voltage	Higher than 10 V
G. BM voltage	6 V or higher

C052D (Case 2)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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. 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. Command to motor relay	Off
D. IGR voltage	Higher than 10 V
E. IGP voltage	Higher than 10 V
F. BM voltage	6 V or higher

C052D (Case 3 to 5)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L

A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052E (Case 1)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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. 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. Motor stop status	On
D. IGR voltage	Higher than 10 V
E. IGP voltage	Higher than 10 V
F. BM voltage	6 V or higher

C052E (Case 2)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) C137D: Brake system voltage circuit high
All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K and L
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	On
K. IGR voltage	Higher than 10 V
L. IGP voltage	Higher than 10 V

C052E (Case 5)

Monitor runs whenever the following DTCs are not stored	C052B (Case 1 to 7): ABS pump motor performance (gate voltage) C052B (Case 8): ABS pump motor performance (motor relay current) C052B (Case 9): ABS pump motor performance (freewheeling MOS current) C052D: ABS pump motor circuit high C052E (Case 1 to 4): ABS pump motor circuit open (motor circuit) C052E (Case 5 and 6): ABS pump motor circuit open (motor relay) 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 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 C1427: ABS pump motor stuck 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. 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. Command to motor relay	On
D. Motor duty output order value	100%
E. IGR voltage	Higher than 10 V
F. IGP voltage	Higher than 10 V
G. BM voltage	6 V or higher

TYPICAL MALFUNCTION THRESHOLDS

C052B (Case 1)

Either of the following conditions is met	A or B
A. Both of the following conditions are met	More than 0.12 seconds
Command to reverse battery protection MOS	On
Reverse battery protection MOS gate voltage malfunction (IC Data)	On
B. All of the following conditions are met	More than 0.12 seconds
Motor relay overcurrent signal (IC Data)	Off
Freewheeling MOS overcurrent signal (IC Data)	Off
Motor duty output order value	100%
Motor relay gate voltage malfunction (IC Data)	On

C052B (Case 2)

Either of the following conditions is met	A or B
A. Following condition is met	More than 0.12 seconds
Either of the following conditions is met	After On/Off checking of motor relay, freewheeling MOS, reverse battery protection MOS and motor failsafe relay
Motor relay gate voltage malfunction (IC Data)	On
Freewheeling MOS gate voltage malfunction (IC Data)	On
Reverse battery protection MOS gate voltage malfunction (IC Data)	On
B. Following condition is met	More than 4.002 seconds
Either of the following conditions is met	Before On/Off checking of motor relay, freewheeling MOS, reverse battery protection MOS and motor failsafe relay
Motor relay gate voltage malfunction (IC Data)	On
Freewheeling MOS gate voltage malfunction (IC Data)	On

Reverse battery protection MOS gate voltage malfunction (IC Data)	On

C052B (Case 3)

Freewheeling MOS gate voltage malfunction (IC Data)	On

C052B (Case 4)

Motor relay gate voltage malfunction (IC Data)	On

C052B (Case 5)

Reverse battery protection MOS gate voltage malfunction (IC Data)	On

C052B (Case 6) and C052D (Case 3)

Either of the following conditions is met	-
MT voltage	3 V or less, or 6.5 V or higher
MTDIF voltage	-1 V or less, or 6.5 V or higher

C052B (Case 7), C052D (Case 4 and 5)

MT voltage	3 V or less, or 6.5 V or higher

C052B (Case 8)

Either of the following conditions is met	-
MROC (IC Data)	On
MRSUV (IC Data)	On

C052B (Case 9)

Freewheeling MOS overcurrent signal (IC Data)	On

C052D (Case 1)

Either of the following conditions is met	A or B
A. Following condition is met	More than 4 seconds
MT voltage	6.5 V or higher
B. Following condition is met	More than 4 seconds
MTDIF voltage	6.5 V or higher

C052D (Case 2)

MT voltage	3 V or higher

C052E (Case 1)

MT voltage	3 V or higher, and 6.5 V or less

C052E (Case 2 to 4)

Either of the following conditions is met	-
MT voltage	Higher than 3 V
MTDIF voltage	-1 V or less, or 6.5 V or higher

C052E (Case 5)

Either of the following conditions is met	-
BM voltage - MT voltage	Higher than 1.5 V
MTDIF voltage	Below 3 V

C052E (Case 6)

Either of the following conditions is met	-
MT voltage	Below BM voltage - 1.5 V
MTDIF voltage	-1 V or less, or 6.5 V or higher

COMPONENT OPERATING RANGE

C052B (Case 1)

All of the following conditions are met	A, B, C, D and E
A. BM voltage	6 V or higher
B. Premain	Finished
C. ABS pump motor fail (C052D, C052E)	Not detected
D. Both of the following conditions are met	-
Command to reverse battery protection MOS	On
Reverse battery protection MOS gate voltage malfunction (IC Data)	Off
E. All of the following conditions are met	-
Motor relay overcurrent signal (IC Data)	Off
Freewheeling MOS overcurrent signal (IC Data)	Off
Motor duty output order value	100%
Motor relay gate voltage malfunction (IC Data)	On

C052B (Case 2)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and Q
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher

C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. SCM fail (C0597)	Not detected
P. Following condition is met	More than 0.12 seconds
All of the following conditions are met	After On/Off checking of motor relay, freewheeling MOS, reverse battery protection MOS and motor failsafe relay
Motor relay gate voltage malfunction (IC Data)	Off
Freewheeling MOS gate voltage malfunction (IC Data)	Off
Reverse battery protection MOS gate voltage malfunction (IC Data)	Off
Q. Following condition is met	More than 0.12 seconds
All of the following conditions are met	Before On/Off checking of motor relay, freewheeling MOS, reverse battery protection MOS and motor failsafe relay
Motor relay gate voltage malfunction (IC Data)	Off
Freewheeling MOS gate voltage malfunction (IC Data)	Off
Reverse battery protection MOS gate voltage malfunction (IC Data)	Off

C052B (Case 3)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and P
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher

C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	On
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. BSCM fail (C0597)	Not detected
P. Freewheeling MOS gate voltage malfunction (IC Data)	Off

C052B (Case 4)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and P
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	On
G. Motor duty output order value	100%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. BSCM fail (C0597)	Not detected
P. Motor relay gate voltage malfunction (IC Data)	Off

C052B (Case 5)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and P
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	On
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. BSCM fail (C0597)	Not detected
P. Reverse battery protection MOS gate voltage malfunction (IC Data)	Off

C052B (Case 6)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L and M
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
C. BM voltage	6 V or higher
D. Motor relay input signal permission	On
E. Command to motor relay	On
F. Motor duty output order value	100%
G. Command to reverse battery protection MOS	Off
H. Command to freewheeling MOS	Off
I. Command to motor failsafe relay	Off
J. ASIC output permission	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected

M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. BSCM fail (C0597)	Not detected
P. MT voltage	Higher than 3 V, and below 6.5 V
Q. MTDIF voltage	Higher than -1 V, and below 6.5 V

C052B (Case 7)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and P
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E Motor relay input signal permission	Off
F. Command to motor relay	On
G. Motor duty output order value	100%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. BSCM fail (C0597)	Not detected
P. MT voltage	Higher than 3 V, and below 6.5 V

C052B (Case 8)

All of the following conditions are met	A, B, C, D and E
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 higher
C. Command to motor relay	On
D. MROC (IC Data)	Off
E. MRSUV (IC Data)	Off

C052B (Case 9)

All of the following conditions are met	-
BM voltage	6 V or higher
Premain	Finished
ABS pump motor fail (C052D, C052E)	Not detected
ABS pump motor performance (gate voltage) fail (C052B)	Not detected
Freewheeling MOS overcurrent signal (IC Data)	Off

C052D (Case 1)

All of the following conditions are met	A, B, C, D, E and F
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 higher
C. Command to motor relay	On
D. Motor stop status	On
E. Following condition is met	More than 4 seconds
MT voltage	Below 3 V
F. Following condition is met	More than 4 seconds
MTDIF voltage	Below 3 V

C052D (Case 2)

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. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or higher
C. Command to motor relay	Off
D. MT voltage	Higher than 3 V

C052D (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. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher

E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052E)	Not detected
O. ABS pump motor performance fail (gate voltage) (C052B)	Not detected
P. BSCM fail (C0597)	Not detected
Q. MT voltage	Higher than 3 V, and below 6.5 V
R. MTDIF voltage	Higher than -1 V, and below 6.5 V

C052D (Case 4 and 5)

All of the following conditions are met	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P and Q
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052E)	Not detected
O. ABS pump motor performance fail (gate voltage) (C052B)	Not detected
P. BSCM fail (C0597)	Not detected
Q. MT voltage	Higher than 3 V, and below 6.5 V

C052E (Case 1)

All of the following conditions are met	A, B, C, D and D
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. Motor stop status	On
D. MT voltage	Below 3 V

C052E (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. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	Off
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	On
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. ABS pump motor performance fail (gate voltage) (C052B)	Not detected
P. BSCM fail (C0597)	Not detected
Q. MT voltage	3 V or higher
R. MTDIF voltage	Higher than -1 V, and below 6.5 V

C052E (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. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	On
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O. ABS pump motor performance (gate voltage) fail (C052B)	Not detected
P. BSCM fail (C0597)	Not detected
Q. MT voltage	3 V or higher
R. MTDIF voltage	Higher than -1 V, and below 6.5 V

C052E (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 and R
A. ECU status	Premain
B. Following condition is met	More than 0.22 seconds
+BS voltage	9.5 V or higher
C. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	Off
G. Motor duty output order value	0%
H. Command to reverse battery protection MOS	On
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O ABS pump motor performance fail (gate voltage) (C052B)	Not detected

P. BSCM fail (C0597)	Not detected
Q. MT voltage	3 V or higher
R. MTDIF voltage	Higher than -1 V, and below 6.5 V

C052E (Case 5)

All of the following conditions are met	A, B, C, D, E, F and G
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. Command to motor relay	On
D. Motor duty output order value	100%
E. BM voltage - MT voltage	1.5 V or less
F. MTDIF voltage	3 V or higher

C052E (Case 6)

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. Following condition is met	More than 0.22 seconds
+BS voltage	17.4 V or less
D. BM voltage	6 V or higher
E. Motor relay input signal permission	On
F. Command to motor relay	On
G. Motor duty output order value	100%
H. Command to reverse battery protection MOS	Off
I. Command to freewheeling MOS	Off
J. Command to motor failsafe relay	Off
K. Premain	Finished
L. Wheel speed sensor fail (C0503, C0509, C050F, C0515)	Not detected
M. Brake system voltage fail (C143B, C143C)	Not detected
N. ABS pump motor fail (C052D, C052E)	Not detected
O ABS pump motor performance fail (gate voltage) (C052B)	Not detected
P. BSCM fail (C0597)	Not detected
Q. MT voltage	BM - 1.5 V or higher
R. MTDIF voltage	Higher than -1 V, and below 6.5 V

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. Wait for 5 seconds or more. [*]

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.

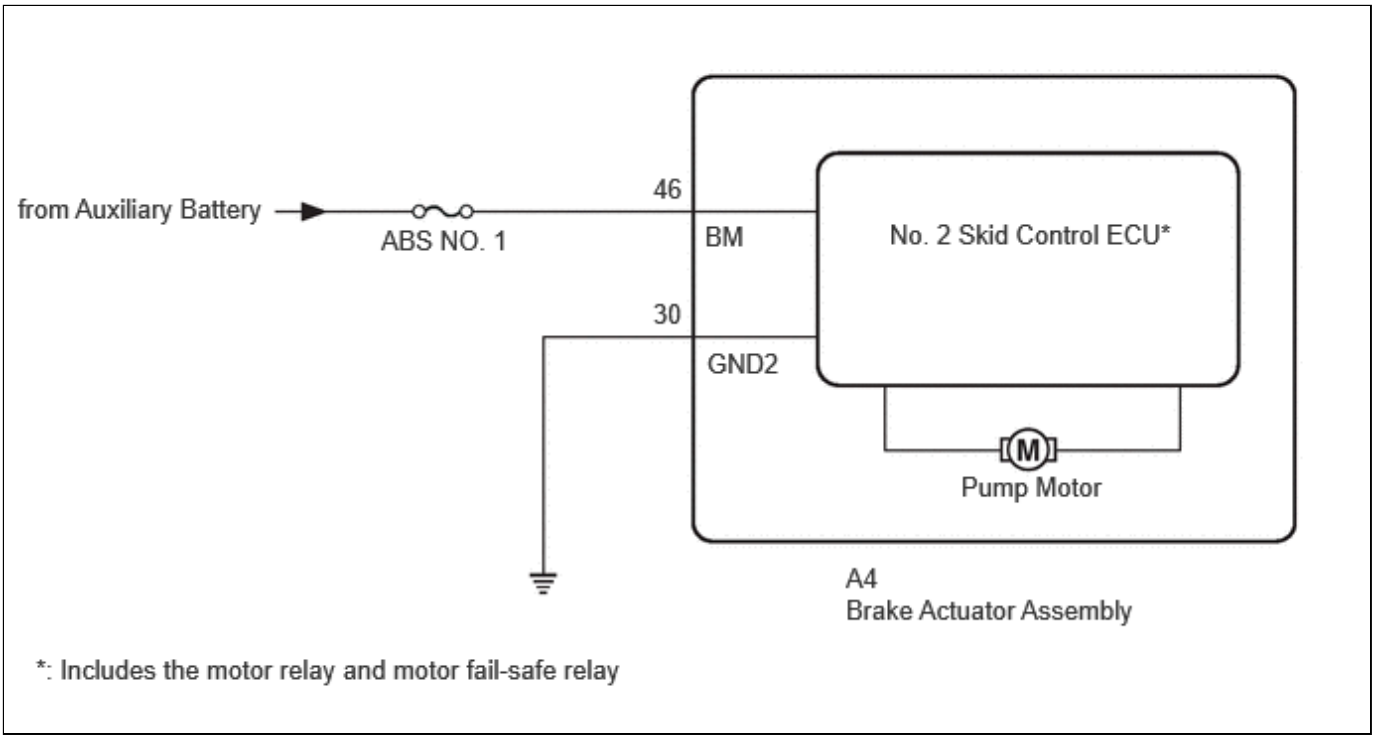
*: Electric Parking Brake System

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.

WIRING DIAGRAM



CAUTION / NOTICE / HINT

NOTICE:

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

PROCEDURE

1.	**CHECK HARNESS AND CONNECTOR (BM 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
A4-46 (BM) - Body ground	Always	11 to 14 V	V

Post-procedure1

(e) None

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

OK ▼

2.	**CHECK HARNESS AND CONNECTOR (GND2 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
A4-30 (GND2) - 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
▼

3.	**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
▼

4.	**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 20 km/h (12 mph) or more is sent 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 motor circuit.
- If the normal system code is output (no DTCs are output), slightly jiggle the connectors, wire harness, 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
C052C14, C052C16, C052C17, C052C49 and C052F14 are not output	A
C052C14, C052C16, C052C17, C052C49 or C052F14 is output	B

Post-procedure1

(c) None

A ▶ **USE SIMULATION METHOD TO CHECK**

B ▶ **REPLACE BRAKE ACTUATOR ASSEMBLY** INFO