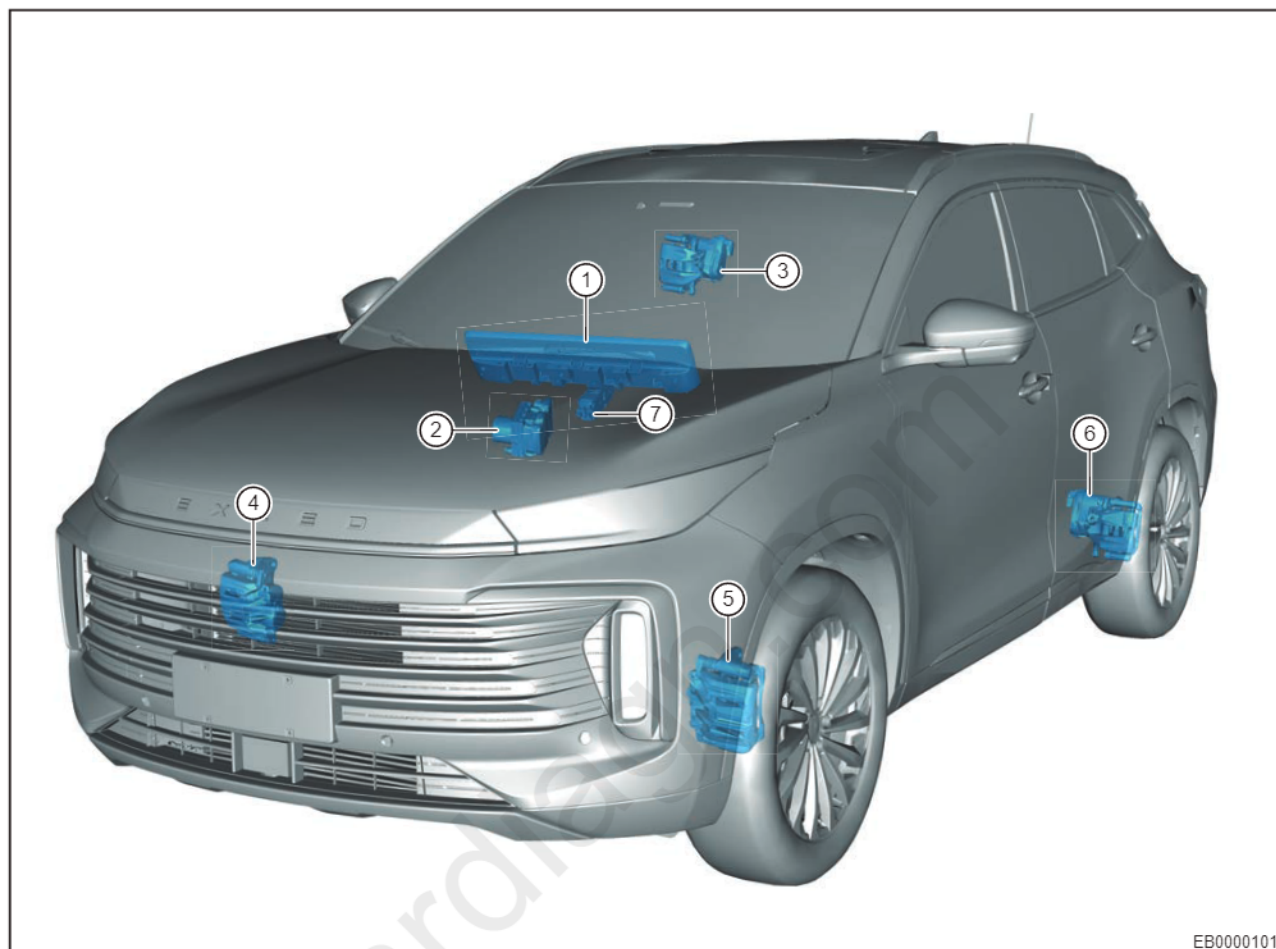

BRAKE

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26.1 ELECTRONIC PARKING BRAKE SYSTEM

1 GENERAL INFORMATION

1.1 Description



EB0000101

1	Instrument Cluster	5	Front Left Brake Caliper Assembly
2	ESC Control Module EPB	6	Rear Left Integrated Caliper Assembly
3	Rear Right Integrated Caliper Assembly	7	Electrical Parking Brake Switch
4	Front Right Brake Caliper Assembly		

Electronic parking brake system consists of ESC control module, brake caliper, electronic parking controller and electronic parking switch, etc. Electronic parking brake system can apply parking brake and emergency brake by electronic control, and electronic parking brake button is a substitute of traditional parking brake operation.

2 FUNCTION PRINCIPLE

2.1 System Function Introduction

■ Basic Function

- (1) Manual releasing: Release EPB by detecting signals of EPB switch and accelerator/brake pedal.
- (2) Automatic releasing: Release EPB by detecting signals of accelerator pedal, engine speed, engine torque, gear position and gradient, etc.
- (3) Manual parking: EPB applies parking brake by detecting EPB switch signal.

- (4) Stall parking: With vehicle stationary, EPB applies parking brake automatically after ignition switch is turned off.
- (5) Auto Hold: EPB applies parking brake together with ESP by detecting information of brake pedal and deceleration process.
- (6) Reclamping at high temperature: Monitor the brake disc temperature, engine and vehicle status. Reclamp when temperature exceeds the limit to prevent vehicle from slipping downward.
- (7) Slipping downward reclamping: EPB reclamps with the maximum clamping force if slipping downward is determined by monitoring wheel speed signal after vehicle is parked.
- (8) Switch reclamping: If parking request from EPB switch exceeds 3 seconds after parking, EPB reclamps with the maximum clamping force.
- (9) ESP-linked: Detects the brake request of EPB switch, sends deceleration request to ESP via CAN, and apply brake by ESP.
- (10) RWU braking: When ESP fails, it controls EPB by the EPB switch operation during driving, to perform the rear wheel anti-lock brake.
- (11) Degraded braking: When wheel speed fails, it applies rear wheel brake with a constant small clamping force.
- (12) Press and hold EPB switch while stalling the engine, EPB will not operate, achieving stalling without parking.

■ Assist Function

- (1) Rotating hub detection: It recognizes the rotating hub detection mode automatically. Pull up EPB switch to realize the parking force detection, and parking force increases in stages when pulling EPB switch.
- (2) Clearance adjustment: When parking and releasing operations are not performed and a certain mileage has been accumulated continuously, perform self-check to adjust the clearance change.
- (3) Network wake-up: In sleep status, EPB can be woken up via CAN network message.
- (4) Switch wake-up: In sleep status, EPB can be woken up through the switch, and parking vehicle can be completed by switch.
- (5) Service releasing: Release EPB to the installation position by a specific operation of EPB switch. It provides convenience for the replacement of EPB mechanical parts.
- (6) External request: Responds to the EPB parking and releasing commands sent by external system via CAN.

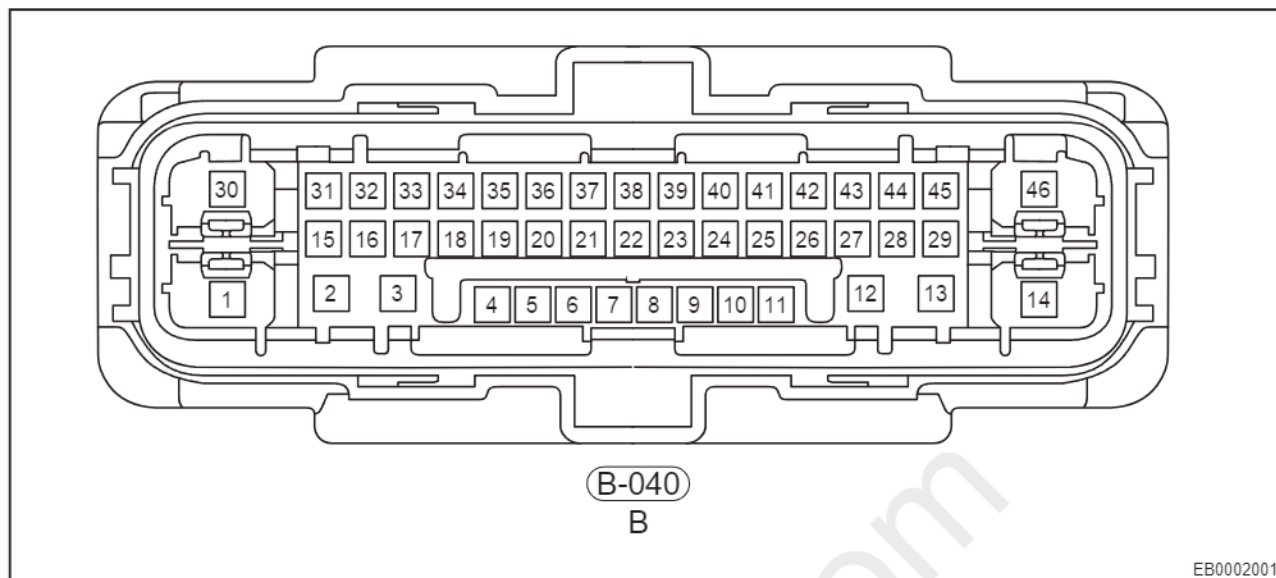
3 SPECIFICATIONS

3.1 Torque Specifications

Description	Torque (N·m)
Guide Pin Fixing Bolt	22 - 32

4 System Circuit Diagram

4.1 Module Terminal Definition

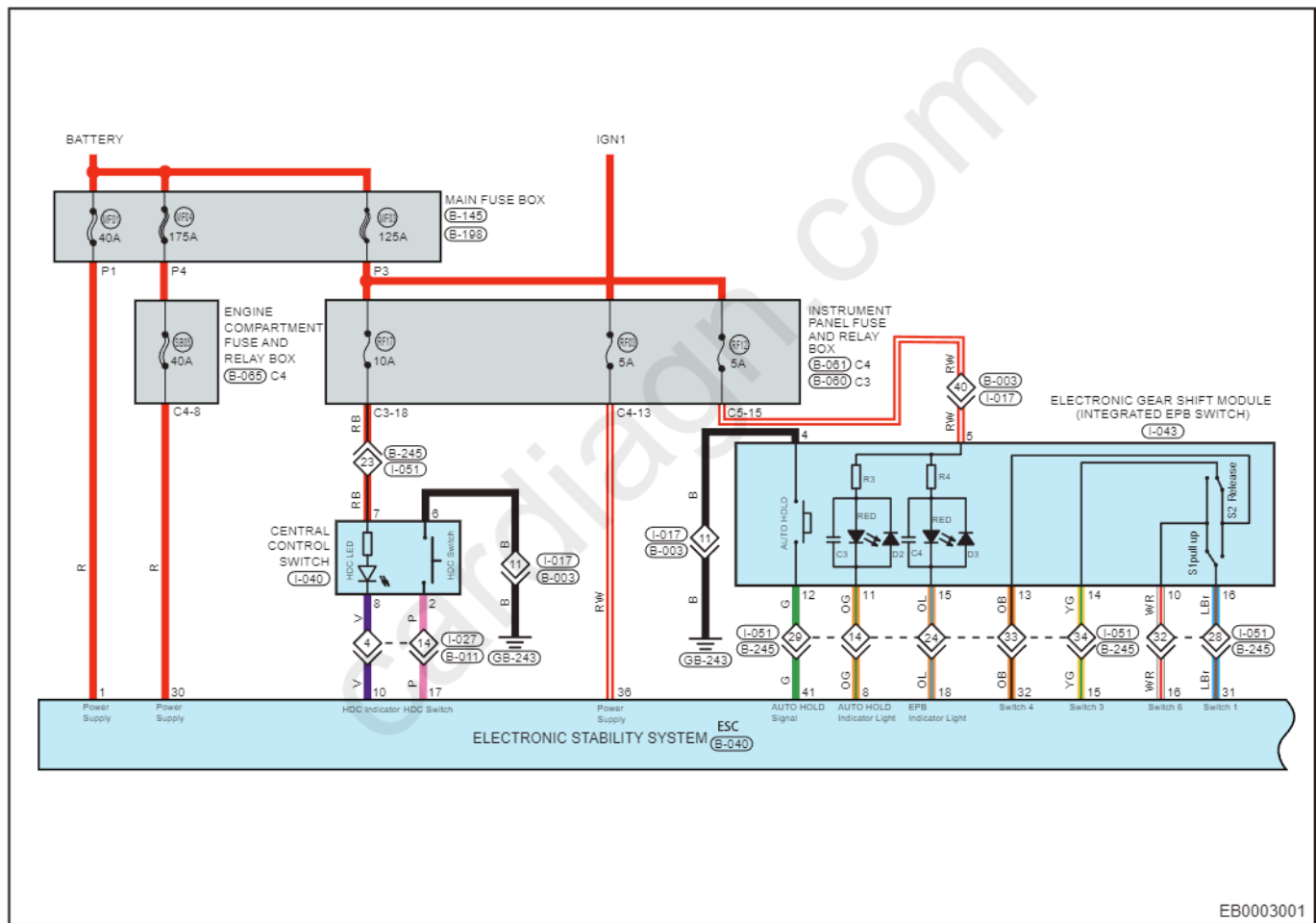


Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	KL30 Power Supply	24	Front Left Wheel Speed Sensor Power Supply
2	Right EPB Motor Power Supply	25	CHA Low
3	Right EPB Motor Ground	26	Front Right Wheel Speed Sensor Signal
4	Reserved	27	Reserved
5	CHA High	28	Reserved
6	Reserved	29	Reserved
7	Front Left Wheel Speed Sensor Signal	30	KL30 Power Supply
8	AUTO HOLD Indicator	31	Switch 1
9	Reserved	32	Switch 4
10	HDC Switch Indicator	33	Reserved
11	CHA High	34	Reserved
12	Left EPB Motor Ground	35	Reserved
13	Left EPB Motor Power Supply	36	ING1 Power Supply
14	Ground	37	Rear Right Wheel Speed Sensor Signal
15	Switch 3	38	Brake Switch Signal
16	Switch 2	39	Rear Left Wheel Speed Sensor Power Supply
17	HDC Switch Signal	40	Reserved
18	EPB Indicator	41	AUTO HOLD Switch Signal

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
19	CHA Low	42	Reserved
20	Reserved	43	ESP OFF
21	Front Right Wheel Speed Sensor Power Supply	44	Reserved
22	Rear Right Wheel Speed Sensor Power Supply	45	Reserved
23	Rear Left Wheel Speed Sensor Signal	46	Ground

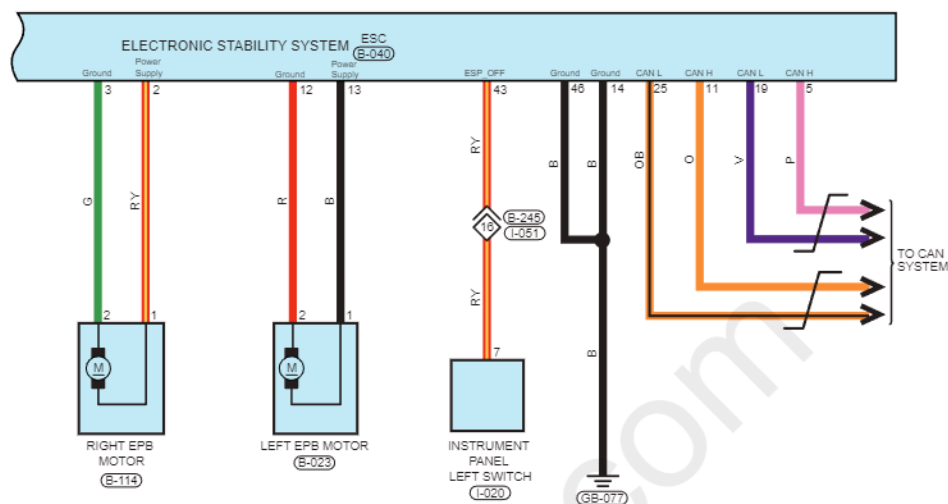
4.2 Circuit Diagram

■ Electronic Parking Brake System 1



EB0003001

■ Electronic Parking Brake System 2



EB0004001

5 DIAGNOSIS & TESTING

5.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
When ENGINE START STOP switch is turned to ON, EPB warning light does not come on	Fuse
	Wire harness or connector
	EPB control module assembly
	Instrument cluster
EPB warning light remains on	Fuse
	Wire harness or connector
	EPB control module assembly
	Instrument cluster
EPB does not operate normally	Brake caliper motor
	Brake lining (excessive wear)

Symptom	Suspected Area
	Wire harness or connector
	Brake fluid (leaked)
	EPB control module assembly
Unable to communicate with ESC control module	Fuse
	Wire harness or connector
	ESC control module assembly

5.2 Diagnostic Help

- (1) Connect diagnostic tester (the latest software) to diagnostic connector, and make it communicate with vehicle electronic module through data network.
- (2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- (3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
- (4) Only use a digital multimeter to measure voltage of brake control system.
- (5) Refer to any Technical Bulletin that may apply to this malfunction.
- (6) Visually check related wire harness and connector.
- (7) Check and clean all wire harness connectors and ground parts related to DTC.
- (8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

5.3 Intermittent Troubleshooting

If malfunction is intermittent, perform the followings:

- (1) Check if connector is loose.
- (2) Check if wire harness is worn, pierced, pinched or partially broken.
- (3) Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- (4) If possible, try to duplicate the conditions under which DTC was set.
- (5) Look for data that has changed or DTC to reset during wiggle test.
- (6) Look for broken, bent, protruded or corroded terminals.
- (7) Inspect the mounting areas of brake control system, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
- (8) Check and clean all wire harness connectors and ground parts related to DTC.
- (9) Refer to any Technical Bulletin that may apply to this malfunction.

5.4 Ground Inspection

Ground points are very important to normal work of circuit, and they are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- (1) Remove ground bolt or nut.
- (2) Check all contact surfaces for tarnish, dirt and rust, etc.
- (3) Clean as necessary to ensure that contact is in good condition.
- (4) Reinstall ground bolt or nut securely.
- (5) Check if any additional accessories interfere with ground circuit.
- (6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

5.5 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures:

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to diagnostic connector, and make it communicate with vehicle electronic module through data network.
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in EPB system.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to ON, select “Read DTC” .
- If DTC is not detected, malfunction indicated by DTC is intermittent.

5.6 Diagnostic Trouble Code (DTC) Chart

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C230016	Communication Under Voltage
C230017	Communication Over Voltage
C230060	Voltage Out of Actuator Spec Range
C230116	IGN Line (Short to Ground or Open)
C230604	ECU Hardware Fault ECU (Sub)
C230640	ECU Hardware Fault ECU (AD Module)
C230642	ECU Hardware Fault (EEPROM)
C230644	ECU Hardware Fault (RAM)
C230645	ECU Fault ECU (Failure of Stack)
C230646	ECU Hardware Fault (Flash/ROM)
C23064C	ECU Hardware Fault (Interprocessor Communication Error)
C230654	ECU Hardware Fault (Not Calibrated Correctly)
C230655	ECU Hardware Fault (Not Configed)
C23067C	ECU Hardware Fault (Sub ECU Control Fault)
C230686	ECU Hardware Fault (Invalid Data)
C230860	Switch Broken (Failure of Line)
C230862	Switch Broken (Switch State Not Agree)
C230A11	Left Actuator Fault (Control Circuit Fault)
C230A13	Left Actuator Fault (Open)
C230A15	Left Actuator Fault (Motor Short)
C230A54	Left Actuator Fault (Failure of Calibration)
C230A63	Left Actuator Fault (Failure of Transistor)
C230A70	Left Actuator Fault (Actuator Broken)
C230A7C	Left Actuator Fault (Operates for Too Long)
C230A7D	Left Actuator Fault (Failure of Relay)

DTC	DTC Definition
C230A7E	Left Actuator Fault (Failure of Mosfet)
C231329	G Sensor (Signal Invalid)
C231396	G Sensor (Self Test Fail)
C231654	EOL Calibration Fault (EOL Calibration Not Completed)
C231655	Variant Code Configuration Not Correct (Vehicle Type Config is Wrong)
C231D12	EPB Status Lamp Line (Short to Battery)
C231D14	EPB Status Lamp Line (Short to Ground or Open)
C23352A	Switch Broken (Switch Apply Stuck)
C23362A	Switch Broken (Switch Release Stuck)
C233800	Switch Broken
C233861	Switch Broken (Switch Not Stable)
C233A11	Right Actuator Fault (Control Circuit Fault)
C233A13	Right Actuator Fault (Open)
C233A15	Right Actuator Fault (Motor Short)
C233A54	Right Actuator Fault (Failure of Calibration)
C233A63	Right Actuator Fault (Failure of Transistor)
C233A70	Right Actuator Fault (Actuator Broken)
C233A7C	Right Actuator Fault (Operates for Too Long)
C233A7D	Right Actuator Fault (Failure of Relay)
C233A7E	Right Actuator Fault (Failure of Mosfet)
C234A18	Actuator Error or Incoherent
C234A77	Actuator Error or Incoherent
U007388	Controller Bus Off
U010087	Lost Communication with EMS
U010187	Lost Communication with TCU
U012187	Lost Communication with ABS
U012287	Lost Communication with ESC
U014187	Lost Communication with BCM
U040086	Invalid Data from EMS
U040186	Invalid Data from TCU
U042186	Invalid Data from ABS
U042286	Invalid Data from ESC
U044186	Invalid Data from BCM

DTC Diagnosis Procedure

DTC	C230016	Communication Under Voltage
DTC	C230017	Communication Over Voltage

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C230016	Communication Under Voltage	ENGINE START STOP switch ON	• Battery fault • Wire harness or connector fault • Charging system fault • EPB control module fault
C230017	Communication Over Voltage		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check battery voltage

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal, which is not less than 12 V.

NG

Replace battery

OK

2 Check charging system

- (a) Start engine and use a digital multimeter to measure if system voltage is between 13.5 V and 14.8 V.

NG

Repair or replace alternator or related wire harness

OK

3 Check EPB fuse

- (a) Turn ENGINE START STOP switch to ON.
 (b) Check if fuses MF03 125A, MF04 175A and MF01 40A in main fuse box B-145 are blown.
 (c) Check if fuse RF03 5A in instrument panel fuse box B-061 and fuse SB05 40A in engine compartment fuse and relay box B-065 are blown.

NG

Replace fuse

OK

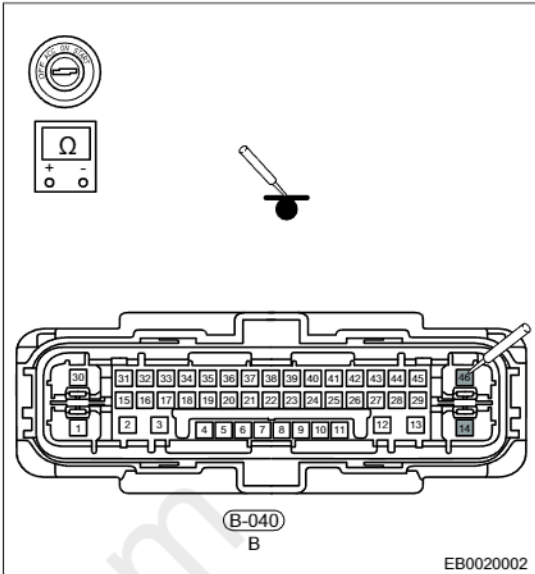
4

Check EPB controller ground and power supply wire harness connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect EPB module connector, and check if it is bent, deformed or loose.
- (c) Using a multimeter, check for continuity between EPB controller B-040 (14, 46) and ground circuit.

Standard Resistance

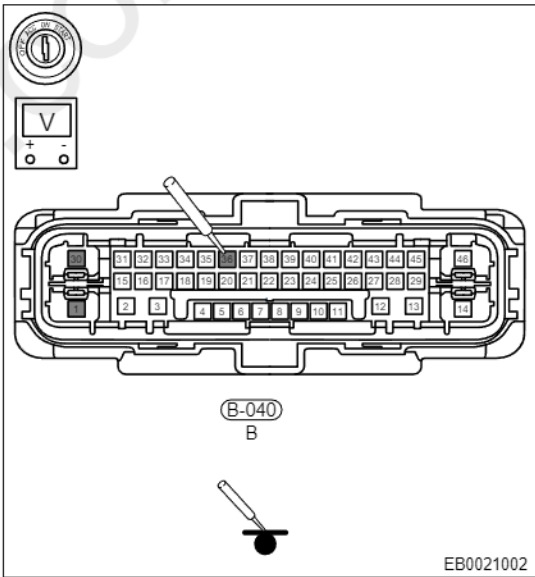
Multimeter Connection	Condition	Specified Condition
B-040 (46) - Body ground	Always	$\leq 1\ \Omega$
B-040 (14) - Body ground	Always	$\leq 1\ \Omega$



- (d) Turn ENGINE START STOP switch to ON.
- (e) Using a multimeter, measure voltage between terminals 1, 30 and 36 of EPB controller B-040 and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-040 (1) - Body ground	Always	Not less than 12 V
B-040 (30) - Body ground	Always	Not less than 12 V
B-040 (36) - Body ground	Always	Not less than 12 V



NG

Replace or repair wire harness or connector

OK

5

Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

OK

System operates normally

NG

Replace EPB control module assembly

DTC	C230A11	Left Actuator Fault (Control Circuit Fault)
DTC	C230A13	Left Actuator Fault (Open)
DTC	C230A15	Left Actuator Fault (Motor Short)
DTC	C230A54	Left Actuator Fault (Failure of Calibration)
DTC	C230A63	Left Actuator Fault (Failure of Transistor)
DTC	C230A70	Left Actuator Fault (Actuator Broken)
DTC	C230A7C	Left Actuator Fault (Operates for Too Long)
DTC	C230A7D	Left Actuator Fault (Failure of Relay)
DTC	C230A7E	Left Actuator Fault (Failure of Mosfet)
DTC	C230060	Voltage Out of Actuator Spec Range

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C230A11	Left Actuator Fault (- Control Circuit Fault)	ENGINE START STOP switch ON	- Wire harness or connector fault - Left parking brake actuator fault - EPB module fault
C230A13	Left Actuator Fault (Open)		
C230A15	Left Actuator Fault (Motor Short)		
C230A54	Left Actuator Fault (Failure of Calibration)		
C230A63	Left Actuator Fault (Failure of Transistor)		
C230A70	Left Actuator Fault (- Actuator Broken)		
C230A7C	Left Actuator Fault (- Operates for Too Long)		
C230A7D	Left Actuator Fault (Failure of Relay)		
C230A7E	Left Actuator Fault (Failure of Mosfet)		
C230060	Voltage Out of Actuator Spec Range		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check left actuator wire harness or connector
---	---

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (d) Check wire harness, connector and terminal for deformation, bend or damage.

NG

Repair or replace wire harness or connector

OK

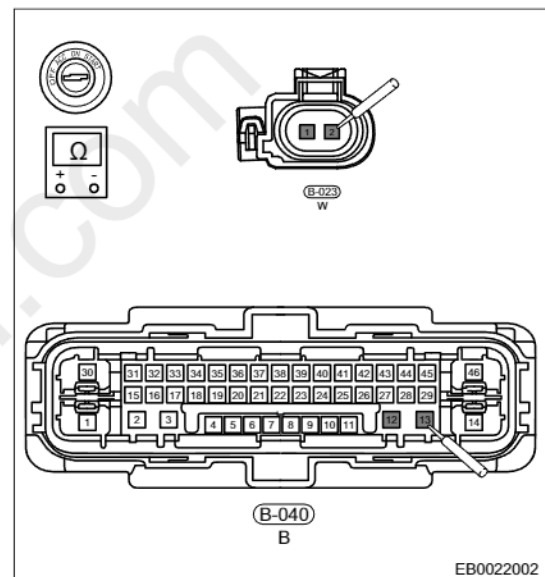
2

Check circuit of left actuator wire harness or connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect connector B-040 and left actuator connector B-023.
- (d) Using ohm band of multimeter, check for continuity between terminals 12 and 13 of B-040 and terminals 1 and 2 of B-023.

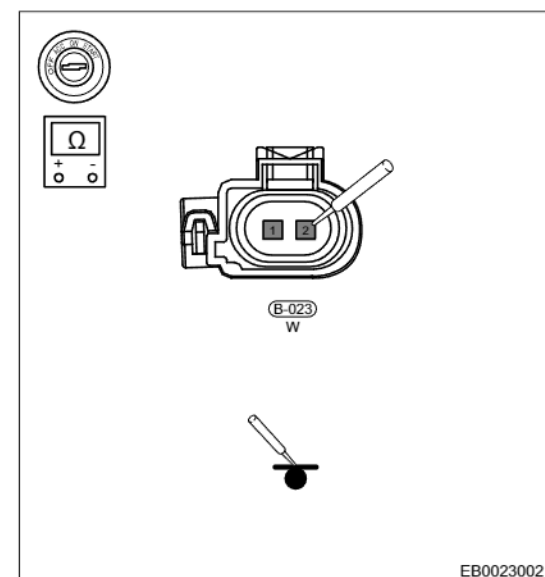
Standard Resistance

Multimeter Connection	Condition	Specified Condition
B-040 (13) - B- 023 (1)	Always	$\leq 1 \Omega$
B-040 (12) - B- 023 (2)	Always	$\leq 1 \Omega$



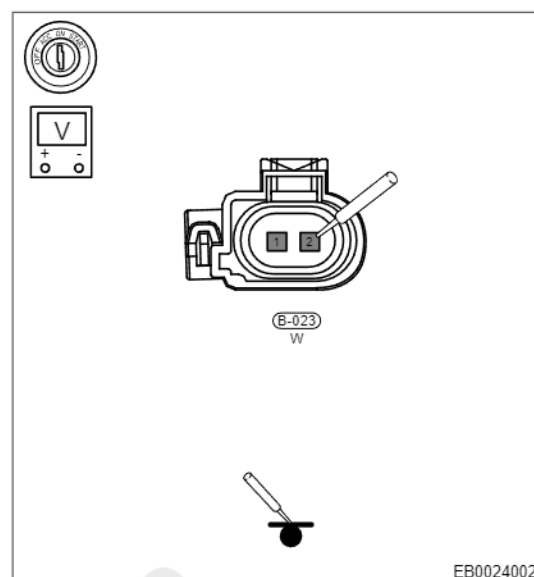
- (e) Using a digital multimeter, check for continuity between terminal of left actuator connector B-023 and body ground according to value(s) in table below.

Multimeter Connection	Condition	Specified Condition
B-023 (2) - Body ground	Always	∞
B-023 (1) - Body ground	Always	∞



- (f) Connect the negative battery cable.
- (g) Turn ENGINE START STOP switch to ON.
- (h) Using a digital multimeter, check if left actuator connector is short to power source according to table below.

Multimeter Connection	Condition	Specified Condition
B-023 (2) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-023 (1) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector between left caliper motor connector and EPB control module assembly

OK

3 Test left actuator

- (a) Connect the negative battery cable.
- (b) Turn ENGINE START STOP switch to OFF.
- (c) Disconnect the left actuator wire harness connector B-023.
- (d) Measure internal resistance of left actuator.

Multimeter Connection	Condition	Specified Condition
B-023 (1) - B-023 (2)	Always	0.4 Ω - 0.9 Ω

Hint:

The multimeter error should be subtracted from the measurement result when measuring internal resistance of actuator.

NG

Replace left actuator

OK

4 Reconfirm DTCs

- (a) Turn ENGINE START STOP switch to ON.
- (b) Use diagnostic tester to clear DTCs.
- (c) Start the engine.
- (d) Check if the same DTCs are still output.

OK

System operates normally

NG

Replace EPB control module assembly

DTC	C233A11	Right Actuator Fault (Control Circuit Fault)
DTC	C233A13	Right Actuator Fault (Open)
DTC	C233A15	Right Actuator Fault (Motor Short)
DTC	C233A54	Right Actuator Fault (Failure of Calibration)
DTC	C233A63	Right Actuator Fault (Failure of Transistor)
DTC	C233A70	Right Actuator Fault (Actuator Broken)
DTC	C233A7C	Right Actuator Fault (Operates for Too Long)
DTC	C233A7D	Right Actuator Fault (Failure of Relay)
DTC	C233A7E	Right Actuator Fault (Failure of Mosfet)
DTC	C234A18	Actuator Error or Incoherent
DTC	C234A77	Actuator Error or Incoherent

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C233A11	Right Actuator Fault (- Control Circuit Fault)	ENGINE START STOP switch ON	- Wire harness or connector fault - EPB right actuator fault - EPB module fault
C233A13	Right Actuator Fault (Open)		
C233A15	Right Actuator Fault (- Motor Short)		
C233A54	Right Actuator Fault (- Failure of Calibration)		
C233A63	Right Actuator Fault (- Failure of Transistor)		
C233A70	Right Actuator Fault (- Actuator Broken)		
C233A7C	Right Actuator Fault (- Operates for Too Long)		
C233A7D	Right Actuator Fault (- Failure of Relay)		
C233A7E	Right Actuator Fault (- Failure of Mosfet)		
C234A18	Actuator Error or Incoherent		
C234A77	Actuator Error or Incoherent		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check wire harness and connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the right actuator wire harness and connector.
- (d) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (e) Check for broken, bent, protruded or corroded terminals.
- (f) Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related wire harness and connector

OK**2 Check right caliper motor**

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the right actuator connector, replace actuator and test.

NG

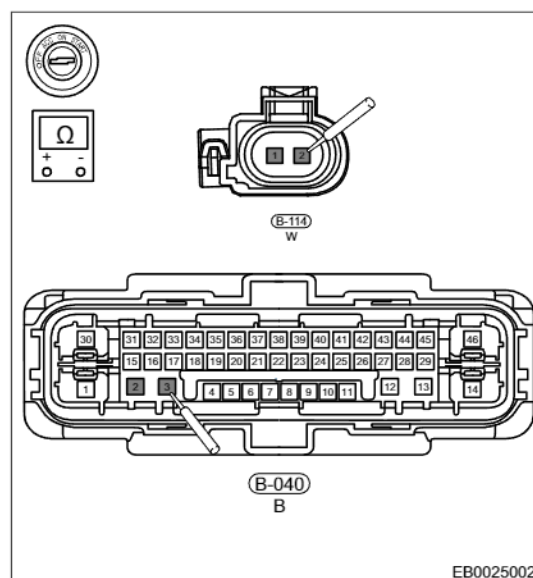
Replace right parking brake actuator

OK**3 Check wire harness and connector for continuity**

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Using ohm band of multimeter, check for continuity between terminals 2, 3 of EPB module connector B-040 and terminals 1, 2 of left actuator connector B-114.

Standard Resistance

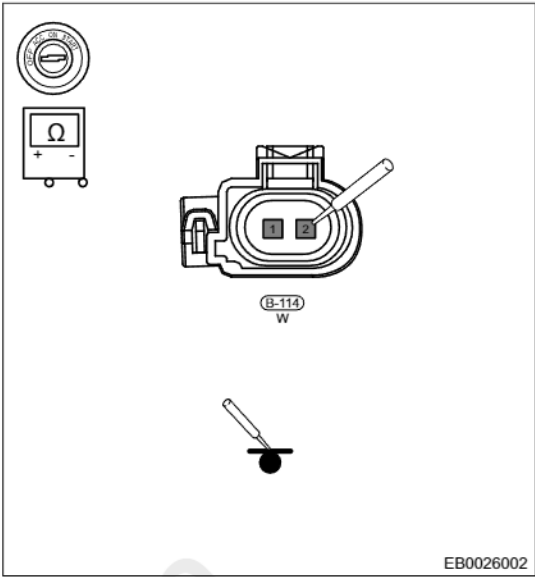
Multimeter Connection	Condition	Specified Condition
B-040 (2) - B-114 (1)	Always	$\leq 1 \Omega$
B-040 (3) - B-114 (2)	Always	$\leq 1 \Omega$



(d) Using a digital multimeter, check if left caliper motor connector is short to ground according to table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
B-114 (2) - Body ground	Always	∞
B-114 (1) - Body ground	Always	∞

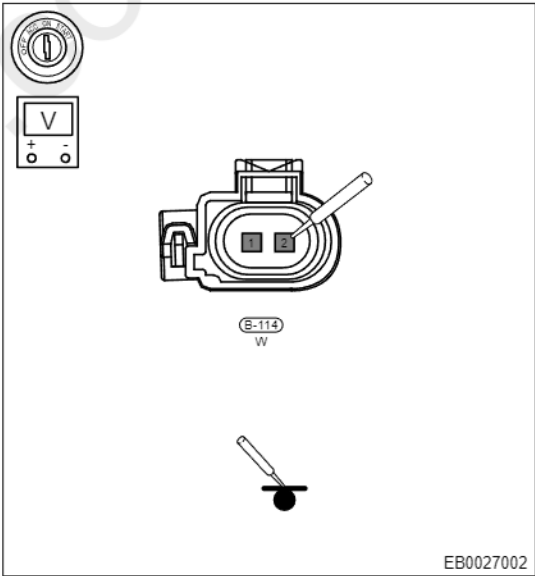


- (e) Connect the negative battery cable.
(f) Turn ENGINE START STOP switch to ON.

(g) Using a digital multimeter, check if right caliper motor connector is short to power source according to table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-114 (2) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-128 (1) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector

OK

4

Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Drive vehicle at 40 km/h or above, read EPB/ESP control module assembly DTC again with diagnostic tester.
(d) Check if the same DTCs are still output.

OK

System operates normally

NG

Replace right parking brake actuator

DTC	C230860	Switch Broken (Failure of Line)
DTC	C230862	Switch Broken (Switch State Not Agree)
DTC	C23352A	Switch Broken (Switch Apply Stuck)
DTC	C23362A	Switch Broken (Switch Release Stuck)
DTC	C233800	Switch Broken
DTC	C233861	Switch Broken (Switch Not Stable)

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C230860	Switch Broken (Failure of Line)	ENGINE START STOP switch ON	• Wire harness or connector fault • EPB switch fault • EPB control module fault
C230862	Switch Broken (Switch State Not Agree)		
C23352A	Switch Broken (Switch Apply Stuck)		
C23362A	Switch Broken (Switch Release Stuck)		
C233800	Switch Broken		
C233861	Switch Broken (Switch Not Stable)		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check EPB switch

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect EPB switch connector, remove switch assembly, and check appearance of EPB switch for damage, dirt, sticking.
- Check EPB switch pin for deformation, broken, loose.

NG

Repair or replace EPB switch

OK

2 Check EPB switch wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect EPB switch connector, check if wire harness is broken or damaged.

NG

Repair or replace wire harness or connector

OK

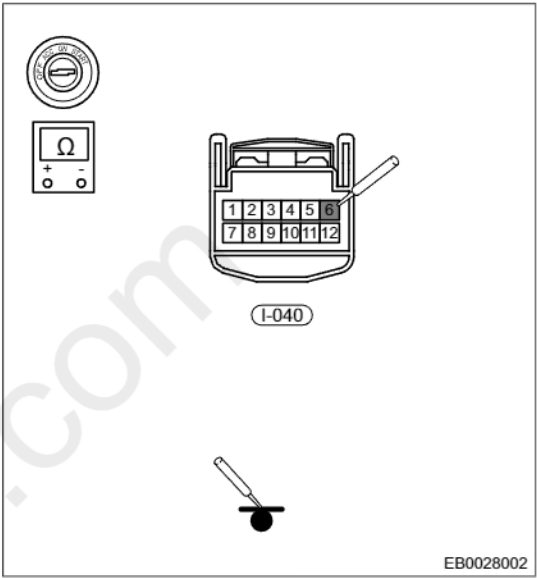
3

Check EPB switch ground and wire harness for continuity

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Using a multimeter, check for continuity between EPB switch I-040 (6) and body ground.

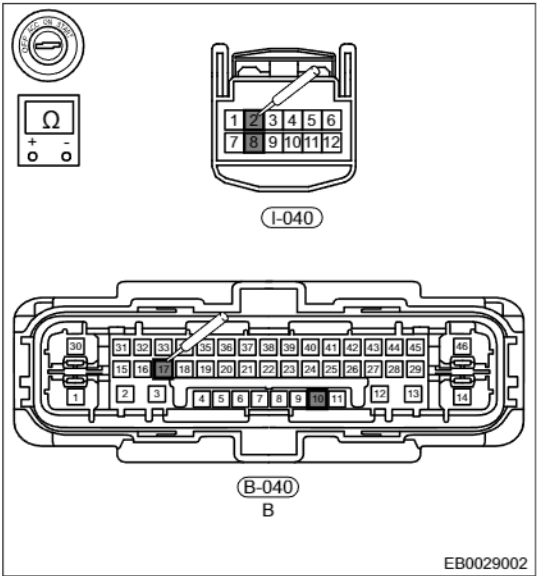
Standard Resistance

Multimeter Connection	Condition	Specified Condition
I-040 (6) - Body ground	Always	$\leq 1 \Omega$

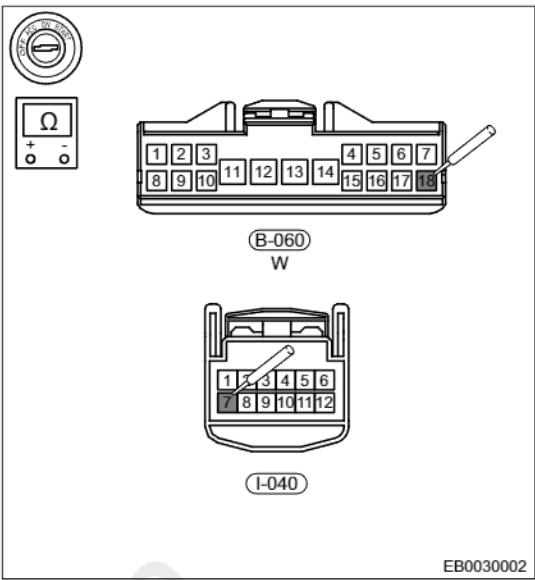


- (d) Disconnect EPB switch connector I-040, and disconnect EPB control module connector B-040.
- (e) Using a multimeter, check for continuity of wire harness between EPB control module connector B-040 and EPB switch connector I-040 according to table below.

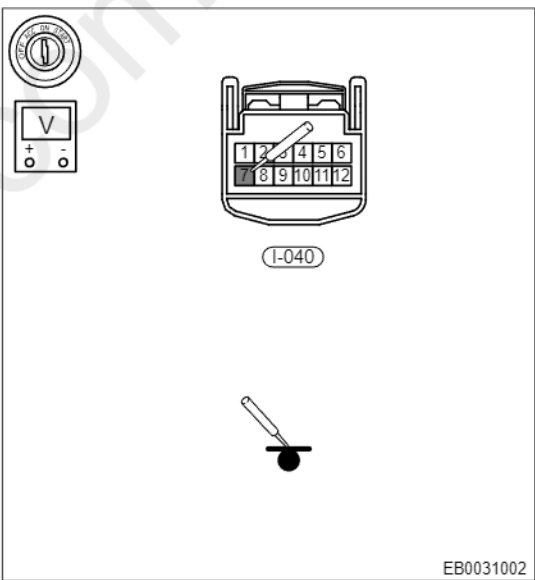
Multimeter Connection	Condition	Specified Condition
B-040 (10) - I-040 (8)	Always	$\leq 1 \Omega$
B-040 (17) - I-040 (2)	Always	$\leq 1 \Omega$



- (f) Turn ENGINE START STOP switch to ON.
- (g) Check if fuse RF17 10A in instrument panel fuse and relay box B-060 is blown.
- (h) Check for continuity between instrument panel fuse and relay box wire harness B-060 C3 (18) and EPB switch I-040 (7).



- (i) Turn ENGINE START STOP switch to ON.
- (j) Check for 12 V voltage in electronic parking switch wire harness connector I-040 (7).



NG

Repair or replace wire harness and connector

OK

4

Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

OK

System operates normally

NG

Replace EPB control module

DTC	C230604	ECU Hardware Fault ECU (Sub)
DTC	C230640	ECU Hardware Fault ECU (AD Module)

DTC	C230644	ECU Hardware Fault (RAM)
DTC	C230645	ECU Fault ECU (Failure of Stack)
DTC	C230655	ECU Hardware Fault (Not Configed)
DTC	C23067C	ECU Hardware Fault (Sub ECU Control Fault)
DTC	C230686	ECU Hardware Fault (Invalid Data)
DTC	C230642	ECU Hardware Fault (EEPROM)
DTC	C230646	ECU Hardware Fault (Flash/ROM)
DTC	C23064C	ECU Hardware Fault (Interprocessor Communication Error)
DTC	C230654	ECU Hardware Fault (Not Calibrated Correctly)
DTC	C231329	G Sensor (Signal Invalid)
DTC	C231396	G Sensor (Self Test Fail)

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C230604	ECU Hardware Fault ECU (Sub)	ENGINE START STOP switch ON	• Wire harness or connector fault • CAN network fault • EPB control module fault
C230640	ECU Hardware Fault ECU (AD Module)		
C230644	ECU Hardware Fault (RAM)		
C230645	ECU Fault ECU (Failure of Stack)		
C230655	ECU Hardware Fault (Not Configed)		
C23067C	ECU Hardware Fault (Sub ECU Control Fault)		
C230686	ECU Hardware Fault (- Invalid Data)		
C230642	ECU Hardware Fault (EEPROM)		
C230646	ECU Hardware Fault (Flash/ROM)		
C23064C	ECU Hardware Fault (- Interprocessor Communication Error)		
C230654	ECU Hardware Fault (Not Calibrated Correctly)		
C231329	G Sensor (Signal Invalid)		
C231396	G Sensor (Self Test Fail)		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

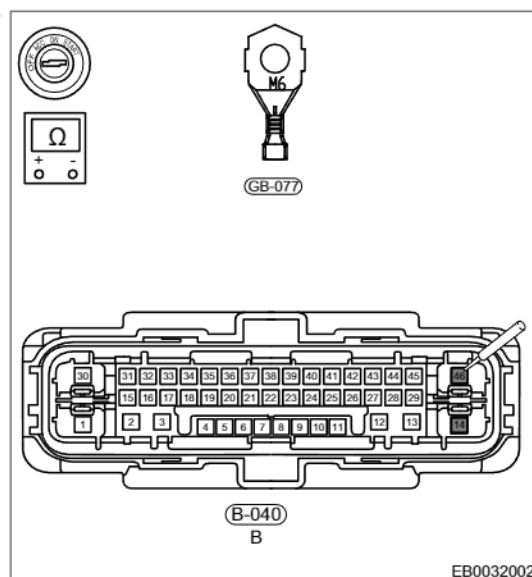
1 Check EPB control module wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Connect the negative battery cable.
- Disconnect the EPB control module connector B-040.
- Check if EPB control module wire harness is damaged, pierced, pinched or broken.
- Check EPB module connector for bending, broken terminals.
- Check EPB module pin for bending, breakage, corrosion.

NG
Repair or replace related wire harness and connector
OK
2 Check for continuity in EPB module ground

- Turn ENGINE START STOP switch to OFF.
- Using a multimeter, check for continuity between EPB control model GB-040 (46) and ground GB-077.
- Using a multimeter, check for continuity between EPB control model GB-040 (14) and ground GB-077.

Multimeter Connection	Condition	Specified Condition
B-040 (46) - GB-077	Always	$\leq 1 \Omega$
B-040 (14) - GB-077	Always	$\leq 1 \Omega$


NG
Repair or replace related wire harness and connector
OK
3 Check EPB control module fuse

- Turn ENGINE START STOP switch to ON.
- Check if fuse MF03 125A in main fuse box B-145 is blown.
- Check if fuse SB05 40A in engine compartment fuse and relay box B-065 and fuse RF03 5A in instrument panel fuse box B-061 are blown.

NG

Replace fuse

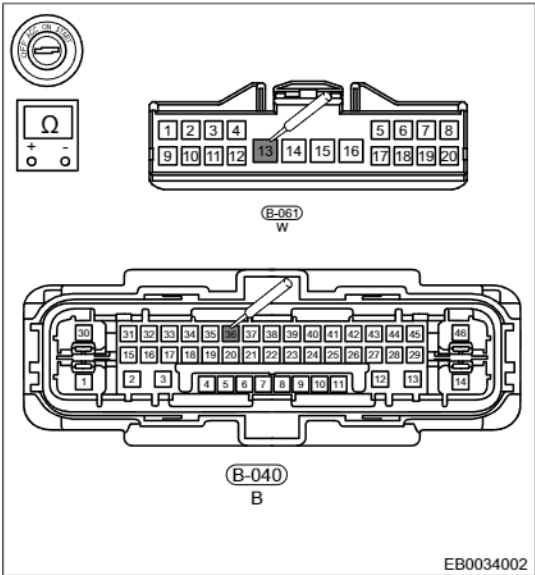
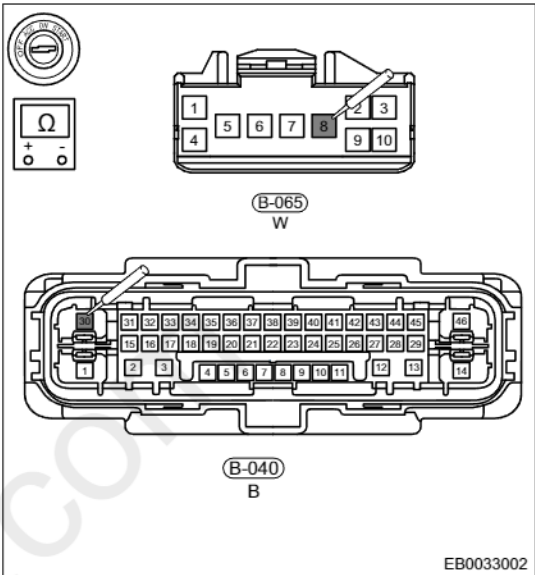
OK

4 Check power supply circuit of EPB control module

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the EPB control module connector B-040.
- (c) Using a multimeter, check for continuity in EPB control module power supply circuit.

Standard Resistance

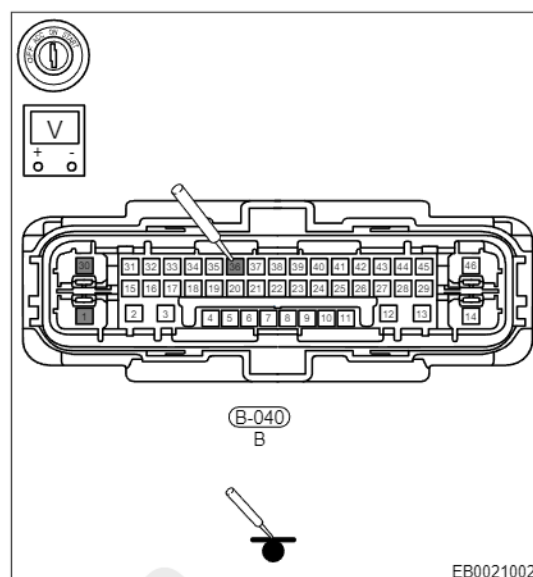
Multimeter Connection	Condition	Specified Condition
B-040 (30) - B-065 (C4-8)	Always	$\leq 1 \Omega$
B-040 (36) - B-061 (C4-13)	Always	$\leq 1 \Omega$



- (d) Turn ENGINE START STOP switch to ON.
- (e) Using a multimeter, check for 12 V voltage in EPB controller wire harness connector terminals B-040 (1), (30), (36).

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-040 (1) - Body ground	ENGINE START STOP switch ON	Not less than 12 V
B-040 (30) - Body ground	ENGINE START STOP switch ON	Not less than 12 V
B-040 (36) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Repair or replace wire harness or connector

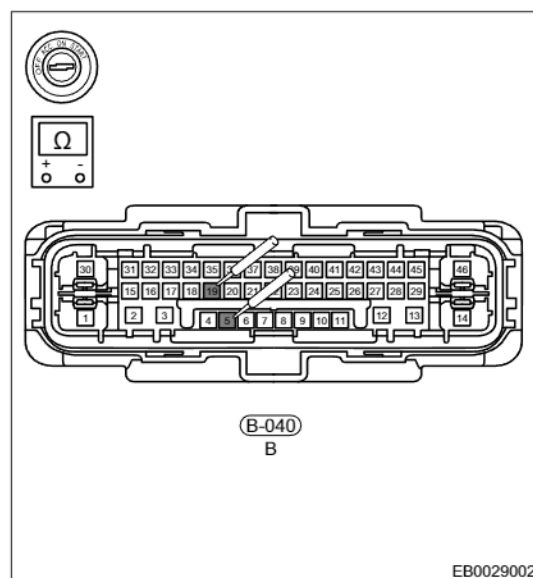
5

Check CAN network

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the EPB module connector B-040.
- (d) Using a multimeter, measure if CAN resistance between EPB module connectors B-040 (5) and B-040 (19) is 60 Ω .

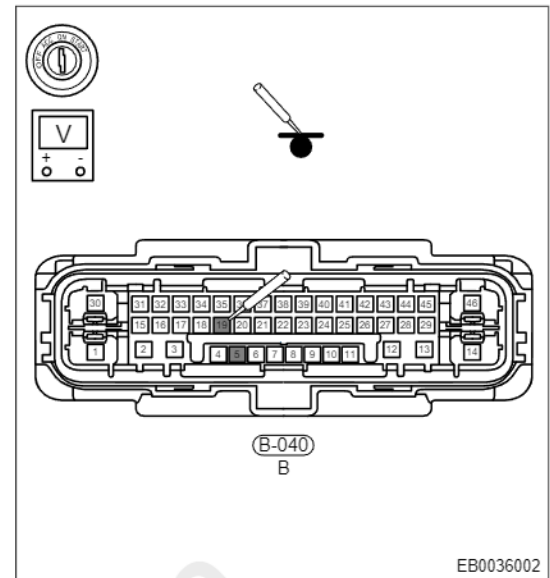
Standard Resistance

Multimeter Connection	Condition	Specified Condition
B-040 (5) - B-040 (19)	Always	Approximately 60 Ω



- (e) Turn ENGINE START STOP switch to ON.
- (f) Using a multimeter, measure voltage of CAN network.
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-040 (5) - Body ground	ENGINE START STOP switch ON	Between 2.5 V and 3.5 V
B-040 (19) - Body ground	ENGINE START STOP switch ON	Between 1.5 V and 2.5 V



NG

Repair or replace CAN network wire harness

OK

6

Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

OK

System operates normally

NG

Replace EPB control module assembly

DTC	U010087	Lost Communication with EMS
DTC	U010187	Lost Communication with TCU
DTC	U012187	Lost Communication with ABS
DTC	U012287	Lost Communication with ESC
DTC	U014187	Lost Communication with BCM
DTC	U040086	Invalid Data from EMS
DTC	U040186	Invalid Data from TCU
DTC	U042186	Invalid Data from ABS
DTC	U042286	Invalid Data from ESC
DTC	U044186	Invalid Data from BCM

For communication fault, refer to CAN communication system.

DTC	U007388	Controller BUS OFF
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Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
U007388	Controller BUS OFF	ENGINE START STOP switch ON	- Wire harness or connector fault - EPB control module fault

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check EPB control module wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Connect the negative battery cable.
- Disconnect the EPB control module connector B-040.
- Check if EPB control module wire harness is damaged, pierced, pinched or broken.
- Check EPB module connector for bending, broken terminals.
- Check EPB module pin for bending, breakage, corrosion.

NG

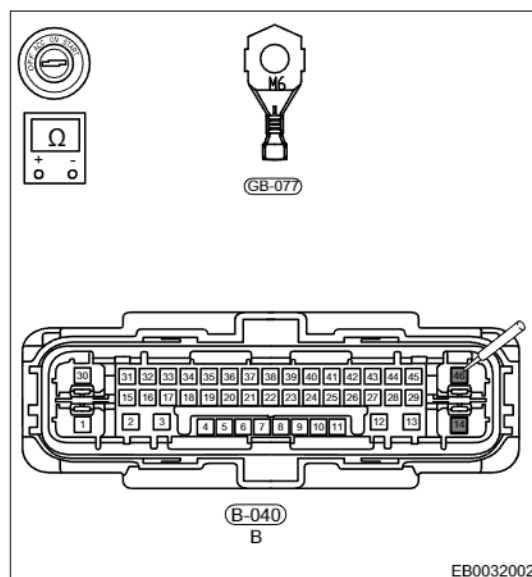
Repair or replace related wire harness and connector

OK

2 Check EPB control module ground circuit

- Turn ENGINE START STOP switch to OFF.
- Using a multimeter, check for continuity between EPB control module B-040 (46) and ground GB-077, B-040 (14) and ground GB-040.

Multimeter Connection	Condition	Specified Condition
B-040 (46) - GB-077	Always	$\leq 1 \Omega$
B-040 (14) - GB-077	Always	$\leq 1 \Omega$



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NG

Repair or replace wire harness or connector

OK

3

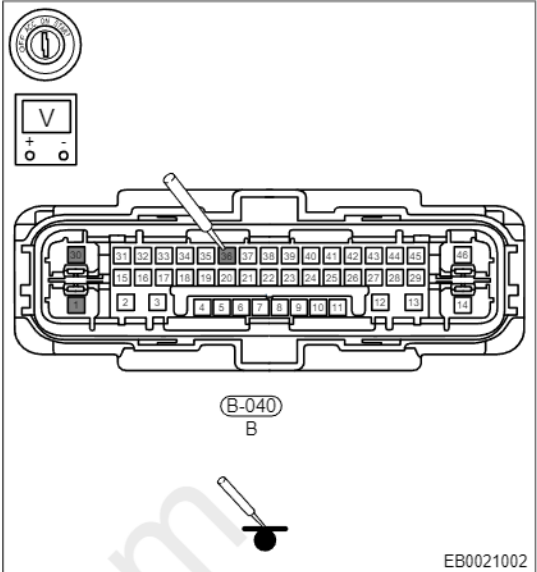
Check power supply circuit of EPB control module

- (a) Turn ENGINE START STOP switch to ON.
- (b) Using a multimeter, measure power supply voltage of EPB control module.
- (c) Check for 12 V voltage in EPB control module connectors B-040 (1), (30), (36) separately.
- Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-040 (1) - Ground	ENGINE START STOP switch ON	Not less than 12 V
B-040 (30) - Ground	ENGINE START STOP switch ON	Not less than 12 V
B-040 (36) - Ground	ENGINE START STOP switch ON	Not less than 12 V

NG

Repair or replace related wire harness and connector



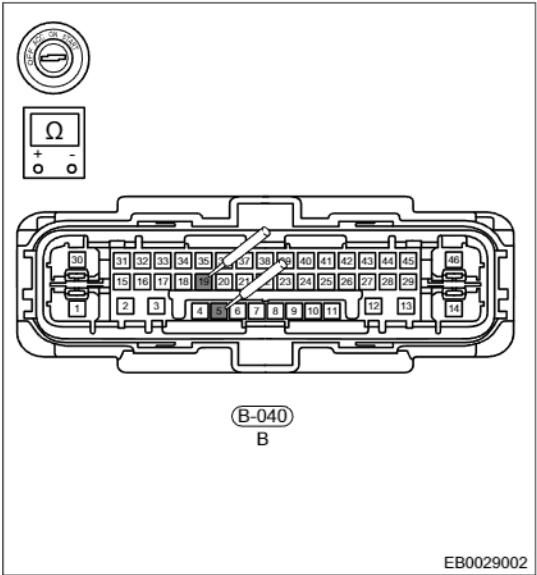
OK

4

Check CAN network

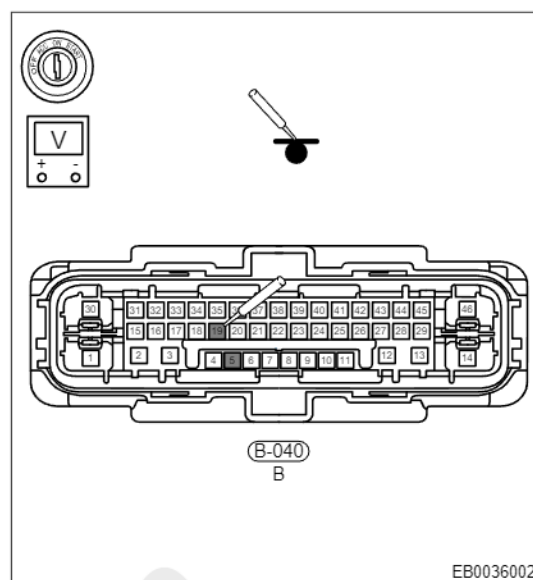
- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the EPB module connector B-040.
- (d) Using a multimeter, measure if CAN resistance between EPB module connectors B-040 (5) and B-040 (19) is 60 Ω.
- Standard Resistance

Multimeter Connection	Condition	Specified Condition
B-040 (5) - B-040 (19)	Always	Approximately 60 Ω



- (e) Turn ENGINE START STOP switch to ON.
- (f) Using a multimeter, measure voltage of CAN network.
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-040 (5) - Body ground	ENGINE START STOP switch ON	Between 2.5 V and 3.5 V
B-040 (19) - Body ground	ENGINE START STOP switch ON	Between 1.5 V and 2.5 V



NG

Repair or replace CAN network wire harness

OK

5 Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

OK

Same DTC is not output

NG

Replace EPB control module assembly

DTC	C231655	Variant Code Configuration Not Correct (Vehicle Type Config is Wrong)
DTC	C231654	EOL Calibration Fault (EOL Calibration Not Completed)

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C231655	Variant Code Configuration Not Correct (Vehicle Type Config is Wrong)	ENGINE START STOP switch ON	EPB module fault
C231654	EOL Calibration Fault (EOL Calibration Not Completed)		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check EPB configuration information and calibration result with diagnostic tester.
----------	---

- (a) Turn ENGINE START STOP switch to ON.
- (b) Connect the diagnostic tester and enter EPB electronic parking system, read EPB configuration information, and record the configuration information contents.
- (c) Use diagnostic tester to check the off-line calibration result, and check if calibration method is correct.
- (d) Rewrite the correct configuration information with diagnostic tester.
- (e) Perform off-line calibration on EPB system again, and perform off-line calibration in steps and order according to the prompt on diagnostic tester.

NG

Repair or replace EPB module

OK

2	Reconfirm DTCs
----------	-----------------------

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

OK

Same DTC is not output

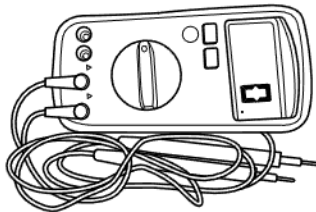
NG

Replace EPB control module assembly

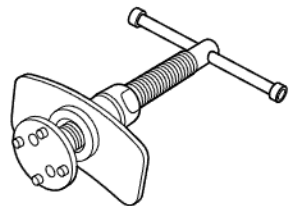
6 ON-VEHICLE SERVICE

6.1 Tools

■ General Tools

Tool Name	Part No.	Tool Drawing
Digital Multimeter	-	 RCH000206
Diagnostic Tester	-	 S00001

■ Special Tool

Tool Name	Part No.	Tool Drawing
Brake Cylinder Release Tool	ECH-0005	

6.2 EPB System

■ On-vehicle Inspection

⚠ Caution

- **EPB system must be repaired by professional technicians who have trained and mastered maintenance skills and only use original parts for replacement.**
- **Before perform a fault diagnosis of EPB system, it is necessary to confirm that vehicle CAN interface can be connected properly.**
- **Note following when connecting EPB wire harness: Turn ENGINE START STOP switch off before disconnecting wire harness connector, make sure that connector is dry and clean and avoid any foreign material entering; Wire harness must be installed in place horizontally and vertically in order to avoid damaging connector.**
- **If EPB motor fuse need to be replaced, make sure that it is exactly the same with original model, including shape and parameters, and ensure that connection is fully in place.**

- (1) Inspect friction material thickness of brake discs on both sides visually, replace it when minimum value is less than 2 mm.
- (2) When brake disc is worn to limit state, there will be mechanical alarm, and the brake disc should be replaced.
- (3) It is necessary to replace 4 brake linings of left and right brake calipers when replacing brake linings.
- (4) If removed brake lining can be reused, it must be installed at original position when it is reinstalled.
- (5) During warranty period of brake lining, it is not possible to replace brake lining with different wear thickness. If friction material thickness is less than 2mm in warranty period, brake lining should be replaced, and check brake caliper for dragging at the same time.
- (6) Check EPB wire harness for aging or damage, replace as necessary.

6.3 Integrated Caliper Motor

■ Removal

Hint:

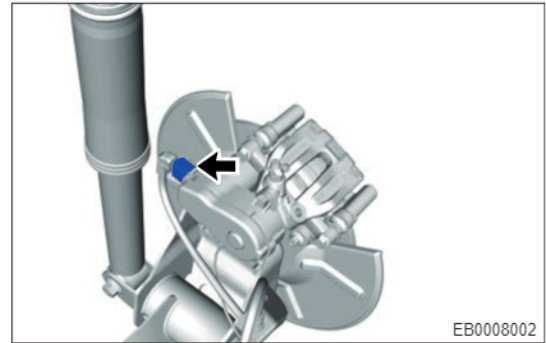
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

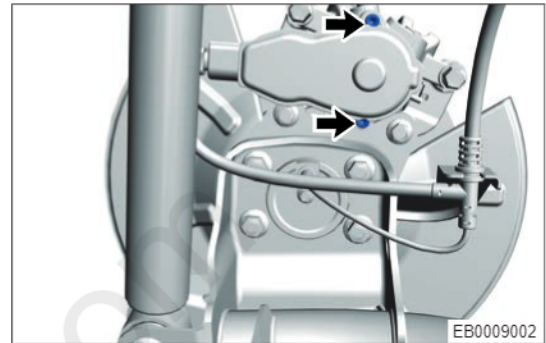
- **Be sure to wear safety equipment to prevent accidents, when removing integrated caliper motor.**
- **Remove integrated caliper motor without damaging motor seal ring and replace it when necessary.**
- **When removing integrated caliper motor, do not allow foreign matter enter into motor.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear tires.
- (4) Remove the integrated caliper motor.

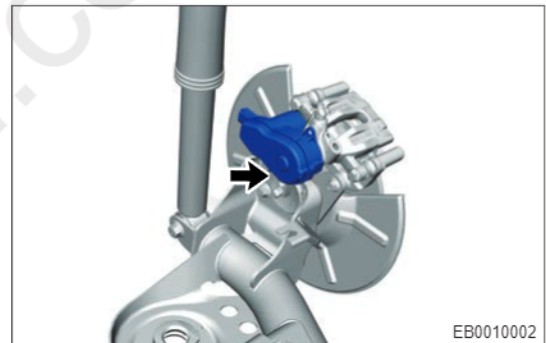
- 1) Disconnect the integrated caliper motor wire harness connector (arrow).



- 2) Remove 2 fixing bolts (arrows) from left integrated caliper motor.



- 3) Remove the integrated caliper motor (arrow).



⚠ Caution

- Save the removed parking actuator properly to avoid dust or water polluting grease and seal rings.

■ EPB Brake Caliper Emergency Release

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- If parking brake cannot be released by parking brake switch manually or automatically due to unexpected circumstances (such as battery does not output voltage, parking brake system failure, etc.) during using EPB system, you need to enable parking emergency releasing function to release parking brake, please follow the following steps for specific methods.
- If this malfunction occurs on a slope, please try to tow vehicle to a level road or place obstacles such as rocks in front of or rear of front wheels respectively to prevent wheel rolling, avoiding coasting accident after releasing rear wheel brake urgently.
- Be sure to wear safety equipment to prevent accidents, when EPB brake caliper emergency releasing.

- (1) Remove the rear tires.
- (2) Remove the integrated caliper motor.

- (3) Align inner hexagon 6# with spline in EPB caliper, rotate 2-3 cycles clockwise (when operator faces spline) or stop until brake disc can rotate freely (it is normal that a large rotation force is needed due to vehicle parking brake condition).



EB0011002

- (4) The vehicle only loses parking function and does not affect normal braking function after releasing parking brake.

Caution

- **Emergency release is highly specialized, it is recommend to perform by Chery 4S shop professionals.**

■ Installation

- (1) Install rear left integrated caliper motor and tighten 2 fixing bolts.

Tightening torque: $10 \pm 1.0 \text{ N}\cdot\text{m}$

- (2) Connect the rear left integrated caliper motor wire harness connector.
- (3) Install the rear left tire.
- (4) Connect the negative battery cable.

Caution

- **Be sure to wear safety equipment to prevent accidents, when installing integrated caliper motor.**
- **When installing integrated caliper motor, remove sediment, dust and other foreign objects that are on matching surface of parking actuator and on head of parking caliper.**
- **When installing integrated caliper motor, check whether the o-ring of parking caliper head is invalid or abnormal. Please replace it in time.**
- **When installing integrated caliper motor, parking caliper head and actuator motor must be tightly coupled, tighten fixing bolts to specified torque.**
- **When installing integrated caliper motor, check whether the o-ring seal is extruded between parking actuator and parking caliper, if it is extruded, should be reinstalled.**
- **When installing integrated caliper motor, manual parking clamp and release must be performed to confirm if parking function is normal.**

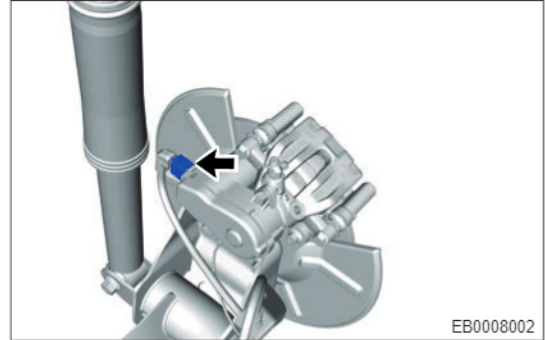
6.4 Rear Brake Lining

■ Removal

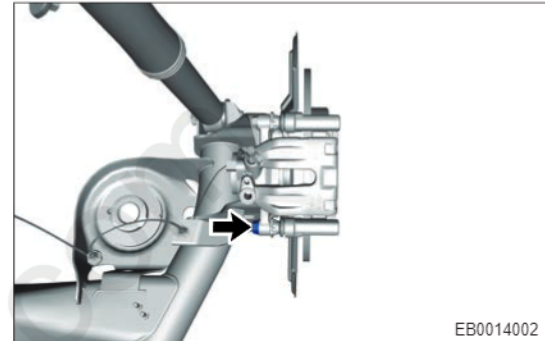
Caution

- **When worn minimum value of brake lining is 2 mm, replace 4 brake linings of left and right brake calipers.**
- **DO NOT perform "Exit Maintenance Mode" using diagnostic tester during vehicle maintenance.**
- **After removing EPB caliper set, it is strictly forbidden to depress brake pedal, otherwise the piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.**
- **After completing replacing new brake lining, make sure to perform "Exit Parking Brake Maintenance Mode" with diagnostic tester.**
- **When installing integrated caliper motor, check whether the o-ring seal is extruded between parking actuator and parking caliper, if it is extruded, should be reinstalled.**
- **When installing integrated caliper motor, manual parking clamp and release must be performed to confirm if parking function is normal.**

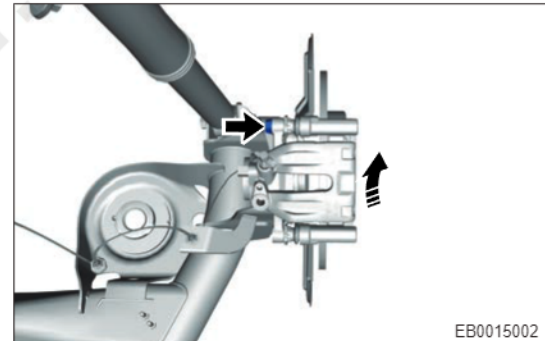
- (1) Use diagnostic tester to enter parking brake maintenance mode.
- (2) Remove the rear wheel brake lining.
 - 1) Disconnect the integrated caliper motor wire harness connector (arrow).



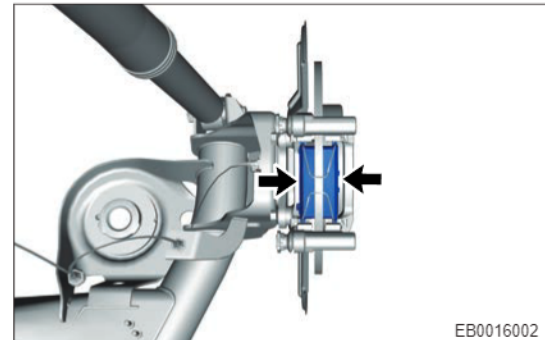
- 2) Remove the lower fixing bolt (arrow) from single guide pin.



- 3) Flip the parking caliper around another guide pin (- arrow) and use hook to lift the caliper.



- 4) Remove the brake lining (arrow) that needs to be replaced.



⚠ Caution

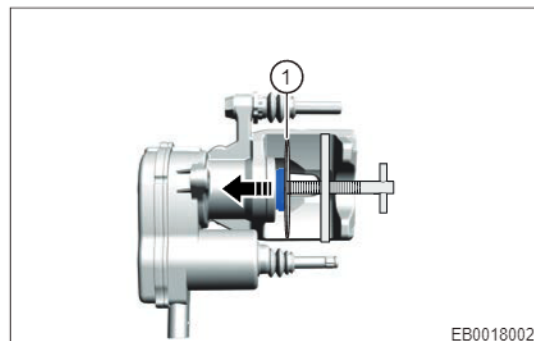
- After removing EPB caliper set, it is strictly forbidden to depress brake pedal, otherwise the piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- Move caliper equipped with spring diaphragm slowly during this process, spring may flick the brake lining and drop on the foot.

■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing rear brake linings.**

- (1) Install the rear wheel brake lining.
 - 1) A thin sheet of steel (1) or old brake lining is added to the piston end to prevent damaging anti-rotating tooth of end surface.
 - 2) Use special tool to press piston along the direction of hand as shown in figure to push piston back to bottom of cylinder hole.



- 3) Install new brake lining.
 - 4) Install brake caliper bolt in place.
- (2) Connect EPB connector and install wheel.
- (3) Perform "Exit Maintenance Mode" using diagnostic tester.

⚠ Caution

- **When replacing brake lining, check whether piston dust boot and guide pin dust boot is broken, and whether the spring plate is deformed or damaged, replace it when necessary.**
- **After completing replacing new brake lining, make sure to perform "Exit Parking Brake Maintenance Mode" with diagnostic tester.**
- **After installing rear brake linings, two manual parking and release are carried out to make the brake lining fully in contact with the brake disc.**

■ Test

- (1) Rear brake calipers release and clamp test
 - 1) Turn ENGINE START switch to ON.
 - 2) Connect the diagnostic tester.

- 3) Click diagnostic tester to enter "ESP (iEPB) (Electronic Stability Control Module (Integrated Electronic Parking Brake))".

Show Menu

EXEED V10.61 > New TXL > System Selection

EMS (Engine Management System)	TCU (Transmission Control Unit)
BCM (Body Control Module)	ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))
EPS (Electronic Power Steering)	AIPM (Integrated Panel Module)
CLM (Climate Module)	DMC (Infotainment Domain Controller)
AVM (Around View Monitor Module)	PDC (Parking Distance Control)
BSDL (Blind Spot Detection Left)	BSDR (Blind Spot Detection Right)
PEPS (Passive Entry And Passive Start System)	FCM (Front Camera Module)

Exeed New TXL

EB0018501

- 4) Click "Special Function" .

Show Menu







EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))

Version Information	Read Fault Code
Clear Fault Memory	Read Data Stream
Special Function	

Exeed New TXL

EB0018601

5) Click “Left Caliper Clamp” .

Show Menu



EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))

Assembly Check	Tighten Left Brake Caliper
Release Left Brake Caliper	Tighten Right Brake Caliper
Release Right Brake Caliper	

Exeed New TXL

EB0018701

6) Click “Left Caliper Clamp Release” .

Show Menu



EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))

Assembly Check	Tighten Left Brake Caliper
Release Left Brake Caliper	Tighten Right Brake Caliper
Release Right Brake Caliper	

Exeed New TXL

EB0018701

7) Click “Right Caliper Clamp” .

Show Menu

EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))

Assembly Check	Tighten Left Brake Caliper
Release Left Brake Caliper	Tighten Right Brake Caliper
Release Right Brake Caliper	

Exeed New TXL

EB0018701

8) Click “Right Caliper Release” .

Show Menu

EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))

Assembly Check	Tighten Left Brake Caliper
Release Left Brake Caliper	Tighten Right Brake Caliper
Release Right Brake Caliper	

Exeed New TXL

EB0018701

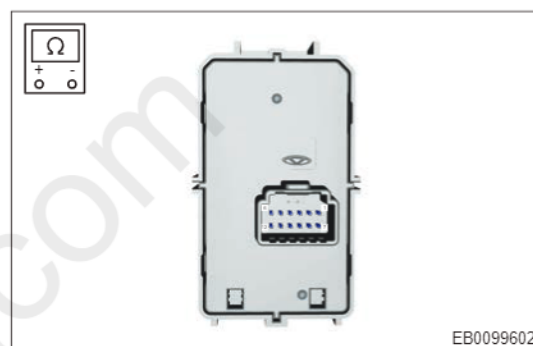
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when installing rear brake linings.
- When replacing brake lining, check whether piston dust boot and guide pin dust boot is broken, and whether the spring plate is deformed or damaged, replace it when necessary.
- After completing replacing new brake lining, make sure to perform “Exit Parking Brake Maintenance Mode” with diagnostic tester.
- After installing rear brake linings, two manual parking and release are carried out to make the brake lining fully in contact with the brake disc.
- All actions of the EPB action test should be in line with the actual operation, otherwise the EPB system should be overhauled.

6.5 EPB Switch

■ Inspection

- (1) According to circuit diagram, internal resistance of EPB switch is measured using digital multimeter ohm gear. If it does not match with measured value of following table, replace the EPB switch.



Multimeter Connection	Manual Parking Switch State	Specified Condition
Terminal 1 - Terminal 2	No action	$\leq 1 \Omega$
Terminal 3 - Terminal 4	No action	$\leq 1 \Omega$
Terminal 1 - Terminal 3 - Terminal 4	Parking brake pulled up	$\leq 1 \Omega$
Terminal 3 - Terminal 2 - Terminal 1	Parking brake released	$\leq 1 \Omega$

Multimeter Connection	Automatic Parking Switch State	Specified Condition
Terminal 6 - Terminal 8	Not pressed	∞
Terminal 6 - Terminal 8	Pressed	$\leq 1 \Omega$

Multimeter Connection	Manual Parking Switch State	Specified Condition
Terminal 12 - Terminal 5	Manual parking switch indicator	2.2 kΩ
Terminal 12 - Terminal 9	Automatic parking switch indicator	2.2 kΩ