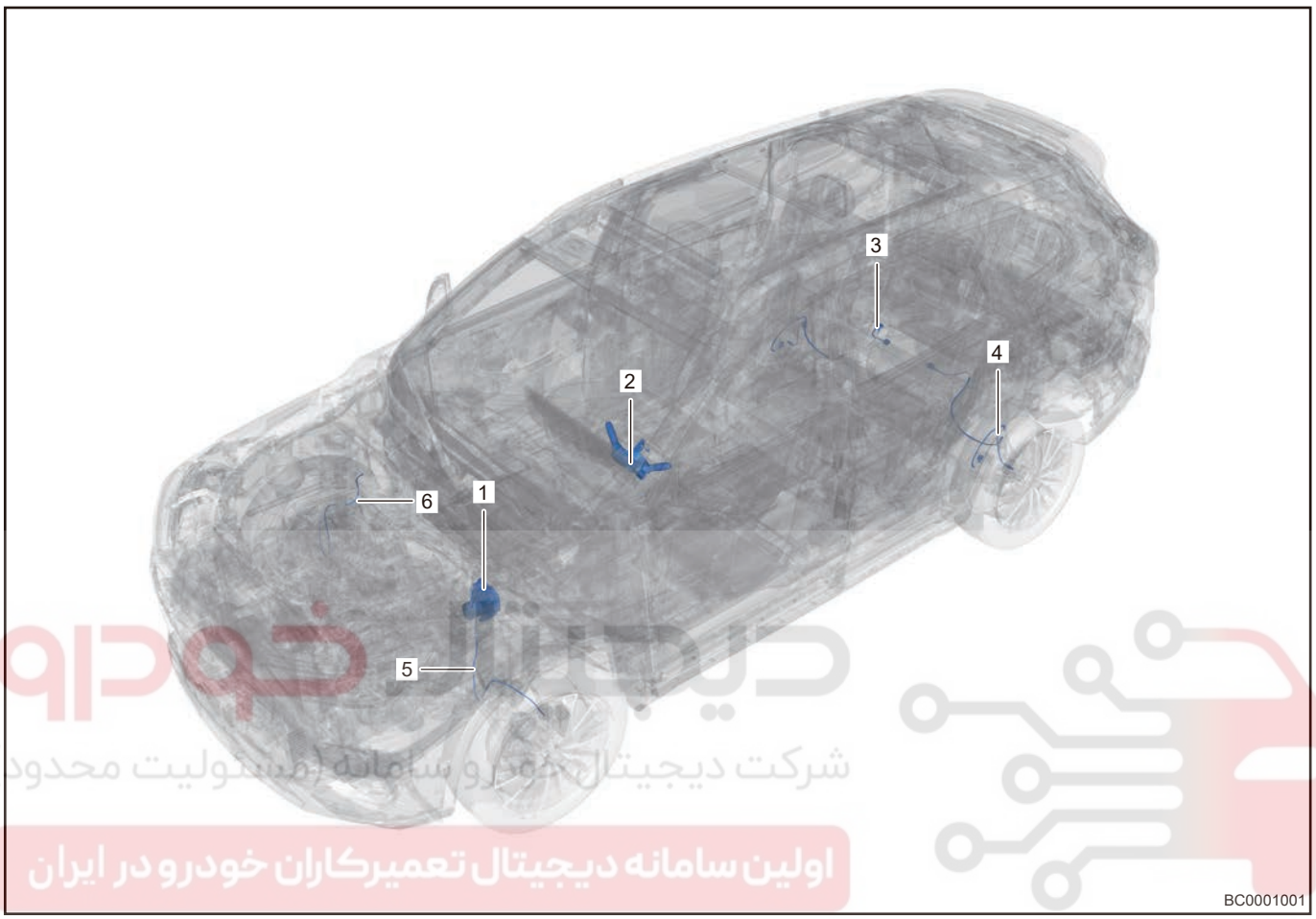
BRAKE CONTROL SYSTEM

BRAKE CONTROL SYSTEM

GENERAL INFORMATION

Description



1	EPB/ESP Control Module Assembly	4	Rear Left Wheel Speed Sensor
2	Steering Angle Sensor	5	Front Left Wheel Speed Sensor
3	Rear Right Wheel Speed Sensor	6	Front Right Wheel Speed Sensor

Brake control system equipped on this model is ABS (Anti-lock Brake System) + EBD (Electronic Brake Force Distribution), ESP (Body Electronic Stability Program). With HDC (Hill Descent Control). It mainly consist of following components:

- EPB/ESP control module assembly (hydraulic control module and electronic control module).
- Wheel speed sensors (each wheel has one sensor).
- Steering angle sensor (ESP).
- Yaw rate sensor (built in ESP control module assembly).
- HBA is English abbreviation of brake assist system, which functions as extension of ESP system. In emergency situation, drivers always apply braking timely, but not apply maximum braking force generally, thus extending brake distance. When this occurs, brake assist system will operate: when driver depresses brake pedal quickly in emergency with insufficient depressing force, HBA will increase brake pressure to maximum quickly, thus brake distance will be shortened by anti-lock brake system quickly and effectively.
- HHC is English abbreviation of Hill-start Assist Control System. When vehicle is static, HHC will determine if vehicle is on slope via longitudinal acceleration sensor. When vehicle starts to up from resting state (uphill forward or reversing), HHC will enter operating state automatically. When starting

off, system will keep previous brake pressure for 1 to 2 seconds after driver releases brake pedal, make sure vehicle is still stopped. Brake pressure will decrease when drive torque increases, thus avoiding an accident caused by vehicle sliding rearward during starting off on a slope.

- TCS is English abbreviation of Traction Control System. Drive wheel may slip when vehicle starts up or accelerates rapidly. Accident may occur due to direction out of control on smooth road surface such as ice and snow etc. TCS detects that drive wheel idling can be avoided when accelerating by applying brake to idling wheel or decreasing engine torque when driven wheel speed is lower than drive wheel (a feature of sliding).

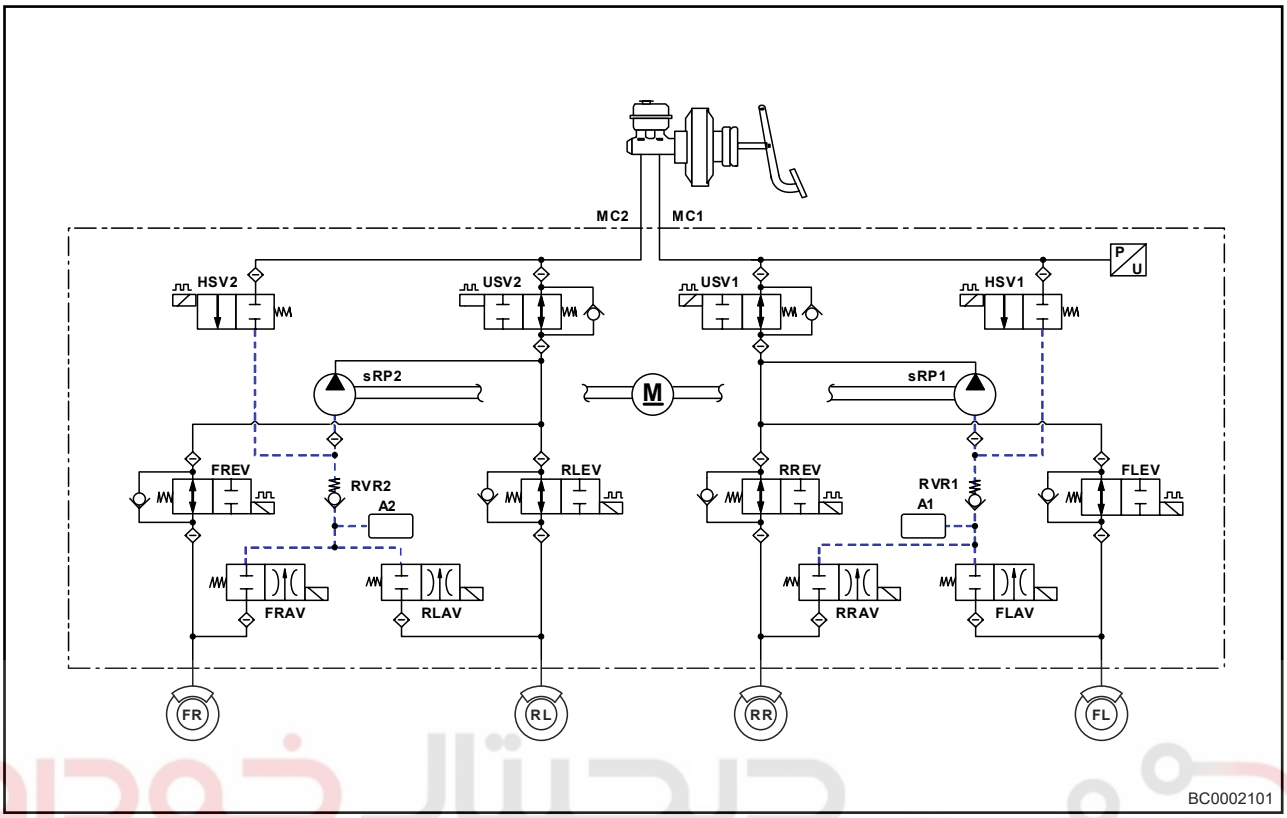
Primary purpose of ABS is to prevent wheels from being locked during sudden braking. It has following effects:

- Improving vehicle driving stability.
- Improving vehicle steering ability.
- Maintaining optimal brake pressure.
- Shortening brake distance efficiently.

EPB/ESP Operation

1. ABS Braking
   a. If ABS system detects that wheels may be locked when applying brake, brake system will enter ABS braking mode. During braking, EPB/ESP control module outputs signal from each wheel speed sensor to each solenoid valve after analysis in order to adjust fluid pressure in each line, to prevent wheels from being locked.
   b. There are some operating symptoms of EPB/ESP, but in fact they are normal.
      - If electronic control module is malfunctioning, fail-safe function will be activated, EPB/ESP system will not operate and EPB/ESP warning light will come on.
      - After vehicle is powered on or engine is started, short “buzz” sound can be heard. This is normal sound from EPB/ESP self-check.
      - Motor, solenoid valve, and return pump movement in hydraulic unit will cause noise when EPB/ESP is operating normally, but this is normal.
      - Brake pedal may vibrate slightly and mechanical noise can be heard during EPB/ESP operation, but this is normal.
      - Bumping sound between suspension and vehicle body can be caused by sudden brake.

2. EPB/ESP Control Mode



Description	Definition	Description	Definition
MC1	Brake Master Cylinder Circuit 1	FLEV	Front Left Wheel Inlet Valve
MC2	Brake Master Cylinder Circuit 2	FLAV	Front Left Wheel Outlet Valve
M	Motor	FREV	Front Right Wheel Inlet Valve
RP1	Return Pump 1	FRAV	Front Right Wheel Outlet Valve
RP2	Return Pump 2	FLEV	Rear Left Wheel Inlet Valve
A1	Accumulator 1	RLAV	Rear Left Wheel Outlet Valve
A2	Accumulator 2	RREV	Rear Right Wheel Inlet Valve
FL	Front Left Wheel	RRAV	Rear Right Wheel Outlet Valve
FR	Front Right Wheel	HSV1	High Pressure Switch Valve 1
RL	Rear Left Wheel	HSV2	High Pressure Switch Valve 2
RR	Rear Right Wheel	USV1	Circuit Control Valve 1
UP	Pressure Sensor	USV2	Circuit Control Valve 2

Pressure regulation is achieved by ESP/EPB module assembly mainly through four input valves (EV) (-normal open valve), four output valves (AV) (normal close valve), two high pressure valves (HSV), two circuit control valves (USV), return pump motor, return pump (sRP), pressure sensor and low pressure accumulator, etc.

3. General Brake Operating Condition
   - For vehicles equipped with ABS, if brake pressure applied to wheels is not enough to lock wheels, oil pressure generated by master cylinder will be transmitted to wheel cylinder through normal open valve, producing regular braking effect. When it is not necessary to continue braking, and if driver reduces pressure to brake pedal, brake fluid of each wheel returns to master cylinder and brake pressure decreases.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	OFF	ON
Normal Close Valve	OFF	OFF

4. EPB/ESP Operating (Relief) Condition
   - For vehicles equipped with EPB/ESP, if brake pressure is applied excessively, friction coefficient between wheels and road will decrease, and wheels will be decelerated earlier than vehicle, which could cause wheels to lock. In this case, EPB/ESP control module transmits the command that reduces wheel pressure to hydraulic control module. In other words, normal open valve cuts off oil passage and the oil passage of normal close valve is open, in order to reduce wheel cylinder pressure. At this time, brake fluid drained from wheel cylinder is temporarily stored in low pressure accumulator. Then, the brake fluid stored in low pressure accumulator returns to master cylinder with rotation of motor.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	ON	OFF
Normal Close Valve	ON	ON

5. EPB/ESP Operating (Maintaining) Condition
   - When appropriate pressure is applied to wheel cylinder by boosting or relieving pressure, ABS system enters maintaining pressure state. In other words, normal open valve cuts off oil passage and normal close valve also cuts off oil passage, the wheel cylinder pressure is maintained.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	OFF	ON
Normal Close Valve	OFF	OFF

6. EPB/ESP Operating (Boost) Condition
   - When relieving pressure condition, if brake fluid is drained excessively or friction coefficient between wheels and road increases, it needs to increase each wheel pressure. In this case, EPB/ESP control module transmits the command that increases wheel pressure to hydraulic control module. Normal open valve opens oil circuit and normal close valve cuts off oil circuit. Brake fluid stored in low pressure accumulator is supplied to each wheel cylinder through master cylinder and normal open valve to boost pressure of each wheel cylinder.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	OFF	ON
Normal Close Valve	OFF	OFF

ABS system operates circularly under relief, maintaining and boost pressure conditions until vehicle is completely stopped, so vehicle braking and steering performance will be guaranteed. ESP adjustment procedure is similar to ABS adjustment procedure. Brake fluid is supplied to wheel cylinders that need to increase pressure by pump, when stability control is realized and HSV valve opens and USV valve closes.

Hill Descent Control (HDC)

HDC system is a hill descent control system, which can help driver downhill in low speed and without brake intervention by driver actively.

No.	Function	Operation Method	Precautions
1	Function ON	Press HDC switch button on auxiliary fascia console manually, functional indicator of meter and operation indicator of button turn on. (Green car icon light on meter turns on, switch indicator turns on).	Speed range of function on is between 0 and 60 Km/h; HDC function is invalid when ESP system is malfunctioning.
2	Function off	Manually off: Press HDC switch button on auxiliary fascia console manually again, functional indicator of meter and operation indicator of button turn off. (Green car icon light on meter turns off, switch indicator turns off) Automatically off: When vehicle speed is higher than 60 Km/h or system has a fault, function turns off automatically.	
3	Functional roles	After function turns on, automatic gear vehicle can perform vehicle speed control within 8 to 60 Km/h, manual gear vehicle can perform vehicle speed control within 14 to 60 Km/h; If initial speed is lower than minimum or higher than maximum controlling speed, vehicle will perform control with minimum or maximum controlling speed acquiescently; Current controlling speed can be increased or decreased in given speed interval by depressing accelerator pedal or brake pedal.	This function applies brake actively via ESP increases pressure actively, at this time there is hydraulic operating sound, and it is normal.

Indicators and Warning Lights

No.	Function	Operation Method	Precautions
1	Green HDC indicator remains on	Function turns on normally	Function turns on normally
2	Green HDC indicator intermittently on	HDC function works	Function turns on normally
3	Yellow ESP light remains on	ESP is malfunctioning, HDC function can not turn on	It is suggested to check and repair by Chery dealer

Hint:

- When HDC system is operating, ABS will be activated automatically if wheel is locked.
- When HDC system is operating, brake force will be distributed to wheel with higher attachment coefficient if any wheel loses contact with ground.
- When HDC system is operating, for safety, driver must make preparations to control vehicle any time. Because system may be overheating or ESP system malfunction will occur except it is locked by button. At this time system will exit control automatically, driver needs to control speed timely instead of HDC.

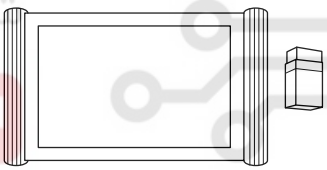
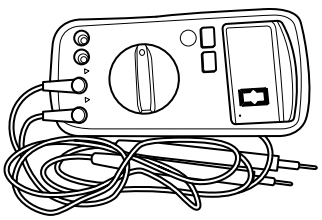
Specifications

Torque Specifications

Description	Torque (N•m)
Wheel Mounting Bolt	110 ± 10
Fixing Nut Between EPB/ESP Control Module Assembly and Mounting Bracket	8 ± 2
Fixing Bolt Between EPB/ESP Control Module Assembly Mounting Bracket and Body	23 ± 3.5
Front Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Rear Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Coupling Bolt Between Brake Pipe and EPB/ESP Control Module Assembly	16 ± 2

Tools

General Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH000106
Digital Multimeter	 RCH000206

Technical Parameters Table

Description	Data
Brake Fluid Type	DOT4

DIAGNOSIS & TESTING

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 turning ENGINE START STOP switch ON, EPB/ESP warning light does not come on	Fuse
	Wire harness or connector
	EPB/ESP control module assembly
	Instrument cluster
EPB/ESP warning light remains on	Fuse
	Wire harness or connector
	EPB/ESP control module assembly
	Instrument cluster
EPB/ESP operation is abnormal	Wheel speed sensor (damaged, improperly installed, foreign matter attached)
	Hub ring gear (damaged, improperly installed, foreign matter attached)
	Brake line (blocked or leaked)
	Wire harness or connector
	EPB/ESP control module assembly
Communication with EPB/ESP control module assembly cannot be performed	Fuse
	Wire harness or connector
	EPB/ESP control module assembly
	Diagnostic tester

Problem Repair (No DTC)

If there is a problem in brake system, but no DTC is stored in EPB/ESP control module assembly, this problem is called a problem without DTC. A problem without DTC is caused by basic brake system malfunction. For example:

1. Brake fluid leakage (it may result in weak braking, brake pedal over-travel or even ineffective braking).
2. Using inferior brake fluid (it can result in corrosion of brake line and EPB/ESP hydraulic regulating module internal elements, or even ineffective braking).
3. Air in brake line (it may result in weak braking or even ineffective braking).
4. Brake line blockage (it may result in hard braking or even ineffective braking).
5. Excessive wear of brake disc (it may result in weak braking, brake pedal over-travel).
6. Brake booster malfunction (it may result in weak or hard braking, brake pedal over-travel or even ineffective braking).

7. Wrong brake line connection (it may result in EPB/ESP braking performance decreasing, drift, long braking distance etc.).

Hint:

- Note: No power supply to EPB/ESP or abnormally interrupted power supply will cause EPB/ESP warning light remaining on without storing DTC.
- Troubleshooting method: check corresponding component according to the malfunction, repair or replace as necessary.

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 EPB wire harness system grounds related to the latest 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.

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 wiggling 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.

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.

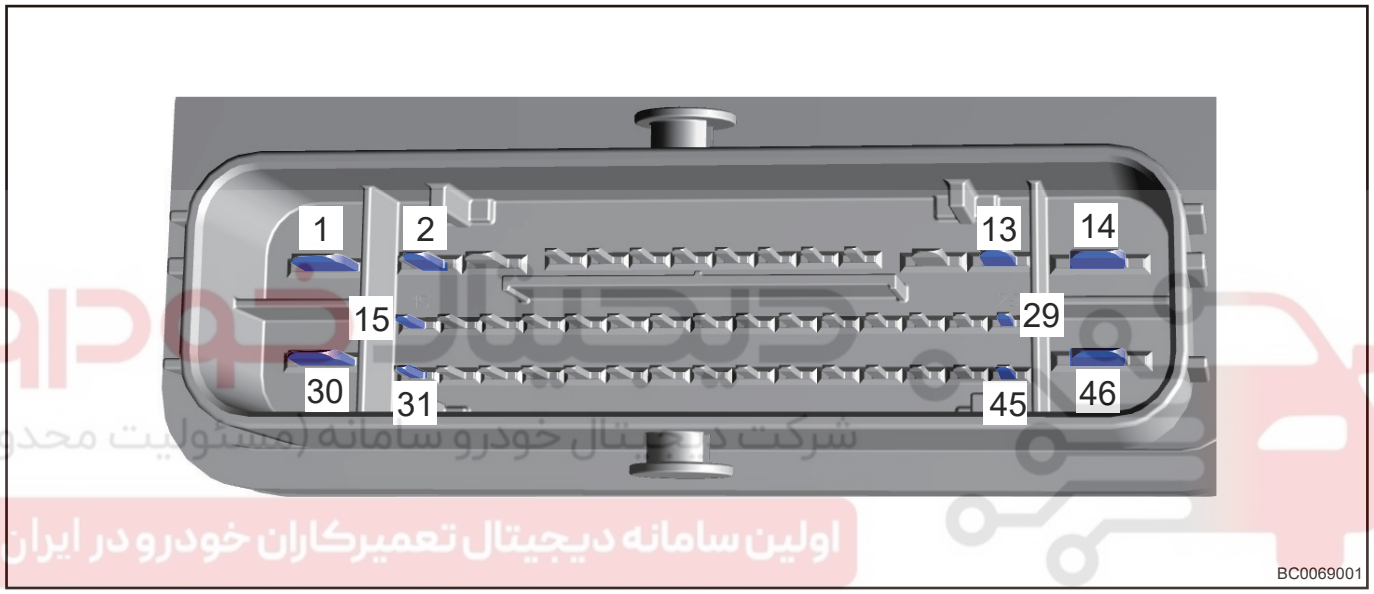
DTC Confirmation Procedure

Confirm that battery voltage is over 12V 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 the 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.

EPB/ESP Control Module Assembly Terminal List (EPB)

Connector Terminal



Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Motor Power Supply End (Positive)	24	Wheel Speed Sensor Power Supply End (- Front Left)
2	Right Caliper Motor	25	CAN2-L
3	Right Caliper Motor	26	Wheel Speed Sensor Signal End (Front Right)
4	-	27	-
5	CAN1-H	28	-
6	-	29	-
7	Wheel Speed Sensor Signal End (Front Left)	30	Valve Relay Power Supply End
8	AUTO HOLD Switch Indicator	31	EPB Switch
9	-	32	EPB Switch
10	HDC Switch Indicator	33	-

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
11	CAN2-H	34	-
12	Left Caliper Motor	35	-
13	Left Caliper Motor	36	Ignition Wire
14	Motor Ground End	37	Right Wheel Speed Sensor Signal End
15	EPB Switch	38	Brake Light Switch
16	EPB Switch	39	Left Wheel Speed Sensor Power Supply End
17	HDC Function Switch	40	-
18	EPB Switch Indicator	41	AUTO HOLD Switch
19	CAN1-L	42	-
20	-	43	-
21	Wheel Speed Sensor Supply End (Front Right)	44	-
22	Right Wheel Speed Sensor Power Supply End	45	-
23	Left Wheel Speed Sensor Signal End	46	ECU Ground End

Calibration

Calibrating Steering Angle Sensor
Prerequisites for sensor calibration:

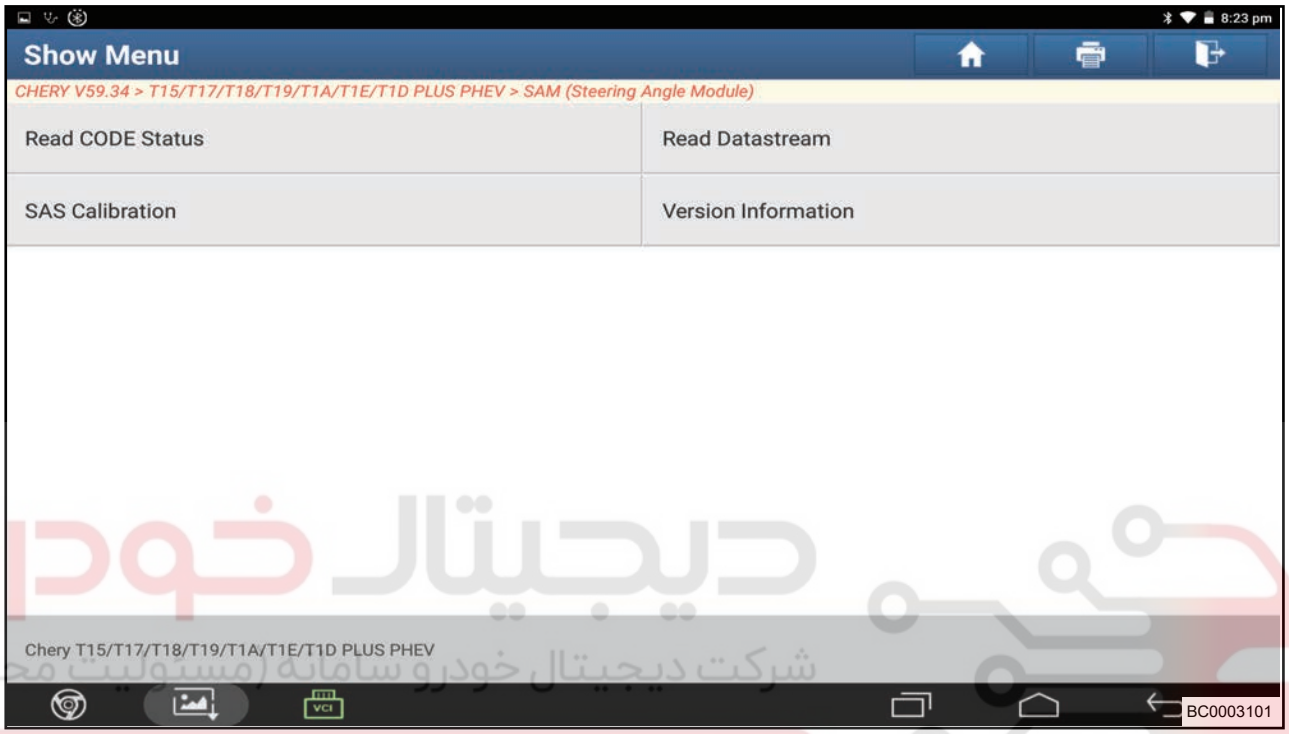
- Perform zero point calibration after steering angle sensor is installed.
- Calibration should be performed at front (four) wheel alignment station (make sure that the four wheel alignment parameters are correct).
- Before calibrating, straighten up the vehicle and wheels must be in straight lines along proceeding direction. Difference between the two angles should meet toe-in of four wheel alignment parameters value. Steering wheel must be adjusted to center.
- Before calibrate a calibrated sensor again, always calibrate it again to make it return uncalibrated state.

Caution
Steering wheel must be centered in the actual calibration. If not, even the data is correct, it can cause wrong calibration when performing four-wheel alignment. This problem may not be detected at factory. Long-term cumulative errors may be caused or overrange phenomenon and ESP light illumination problem may occur when turning steering wheel to limit position during actual driving. Therefore, when performing four-wheel alignment, the steering wheel must be centered.

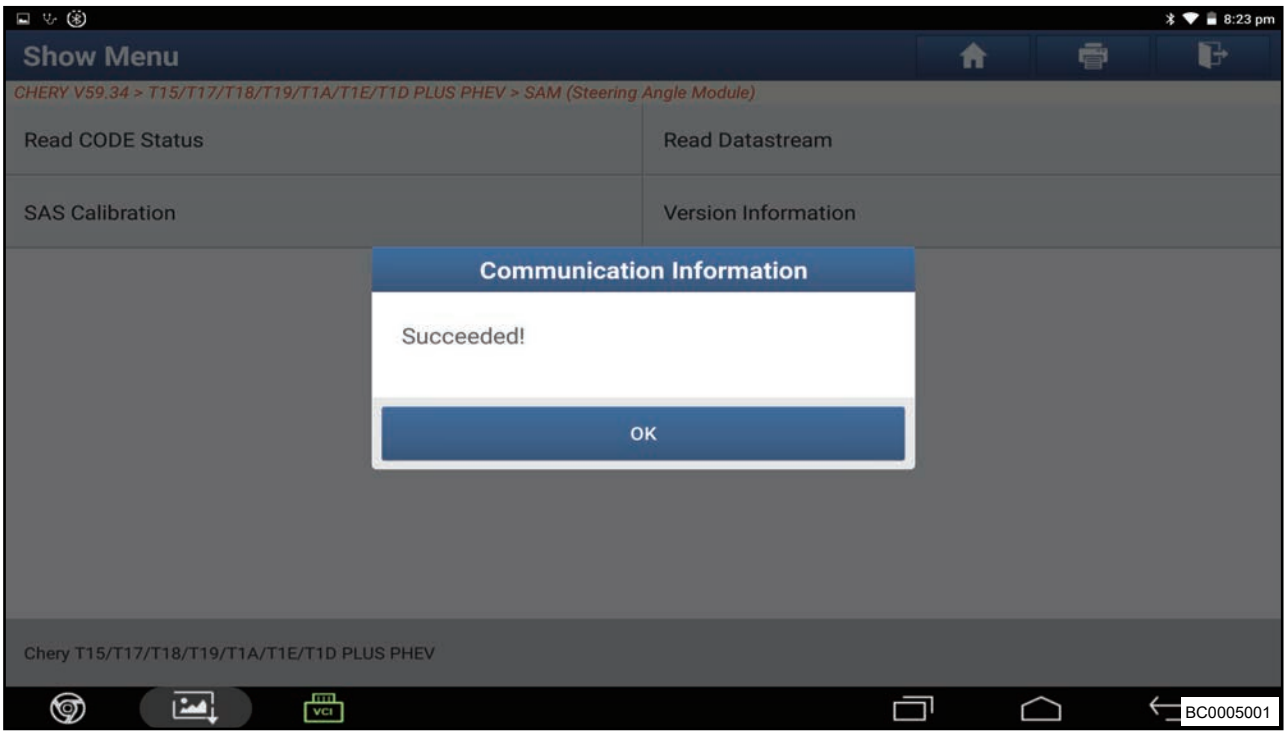
Operation Step

1. Connect the diagnostic tester.

2. Turn ENGINE START STOP switch to ON.
3. Place the steering wheel to center position (straighten up the vehicle, wheels must be in straight lines along proceeding direction, and center steering wheel).
4. Power should not be cut during calibration.
5. Using diagnostic tester, enter “SAM (Steering Angle Module)”.
6. Click “SAS Calibration”.



7. Diagnostic tester will detect sensor malfunction and calibration automatically; if sensor has malfunction, it will exit calibration.
8. If sensor has been calibrated, “Recalibration” will be prompted. In this case, click “Recalibration” according to prompt on diagnostic tester and then click “Initial Calibration”. If there is no response, it will exit calibration.
9. Diagnostic tester will prompt whether calibration is success or not.



Warning
Never cut off the power during calibration. (Power applied to equipment and steering angle sensor must not be cut off during calibration. Also, diagnostic tester and sensor must be connected properly. Otherwise, calibration cannot be performed properly. If any of them are connected poorly, electrical overload of the products can be caused worst of all.)

Caution
The steering angle sensor should to be calibrated again after four wheel alignment is performed.

Calibrating Yaw Rate Sensor

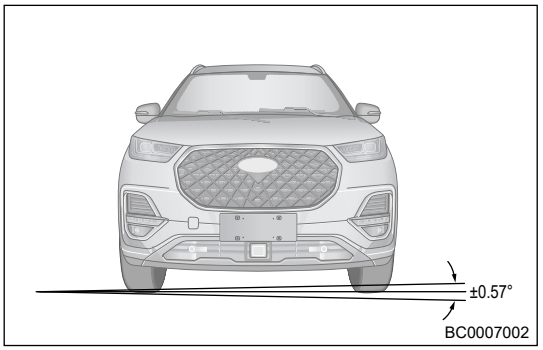
Prerequisites for sensor calibration:

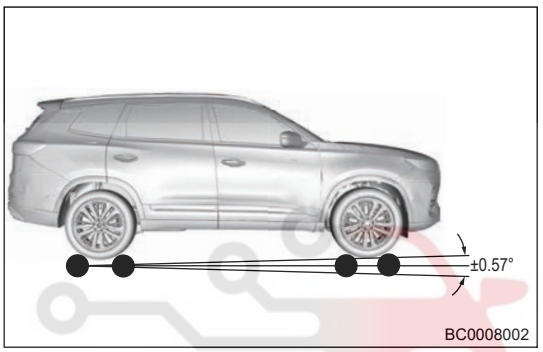
- Calibration can be performed on rotary hub tester or a flat area.
- Maximum tilting angle of tester must be within allowable range, that both are met ± 0.57° (± 1%) in two positive directions.
- The tester must be stationary.
- Turn steering wheel to straight ahead position.
- Tire pressure is proper.
- Vehicle load is normal.
- Less remaining fuel in fuel tank is allowable.
- Vehicle stands on its own wheels.
- Only driver sits in vehicle.
- Additional interference is prohibited, such as vibration due to opening or closing hood etc.

Caution
When replacing EPB/ESP module, integrated sensor must be calibrated. During calibration, ECU will write the measured new data into the EEPROM for use by ESP. Ensure the above calibration conditions are right, because ESP cannot determine whether the above mentioned preconditions are proper or not. If offset is too large, system will reject the calibration. In the case, it is necessary to repair the vehicle.

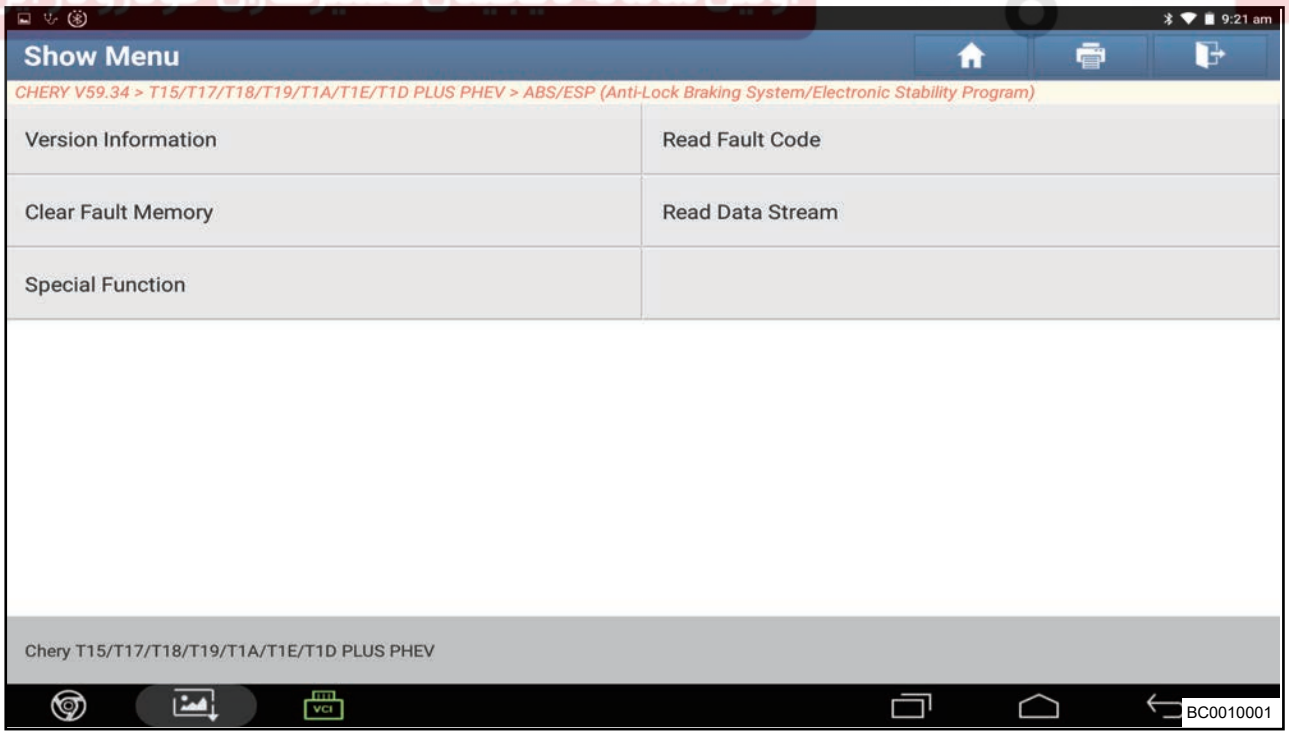
Operation Step

1. Connect the diagnostic tester.
2. Turn ENGINE START STOP switch to ON.
3. Make sure vehicle tilt angle is in range of ± 0.57° (± 1%).

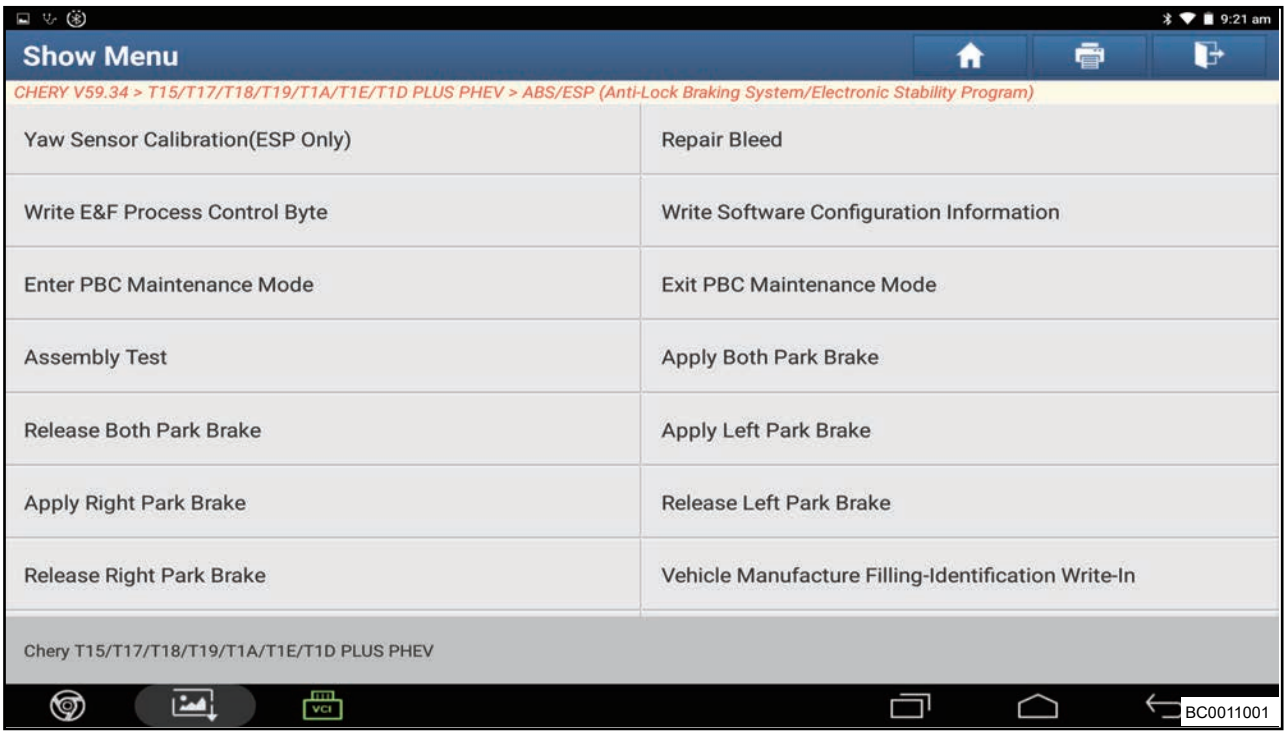




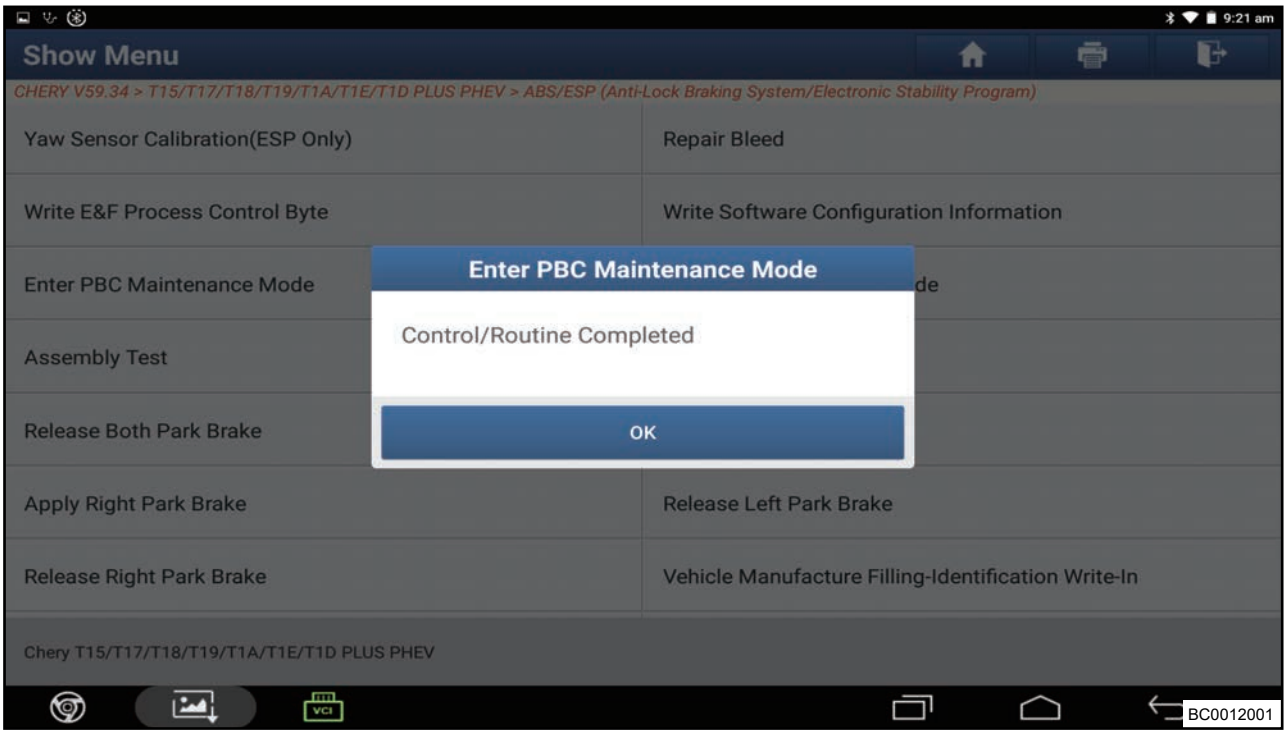
4. Enter menu “ABS/ESP (Anti-lock Braking System/Electronic Stability Program)”.
5. Click “Special Function”.



6. Click “Yaw Sensor Calibration (ESP Only)”.



7. Diagnostic tester will prompt whether calibration is success or not.



Warning
Never cut off the power during calibration. (Power applied to equipment and steering angle sensor must not be cut off during calibration. Also, diagnostic tester and sensor must be connected properly. Otherwise, calibration cannot be performed properly. If any of them are connected poorly, electrical overload of the products can be caused worst of all.)

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C0034-29	Front Right Wheel Speed Sensor Signal Invalid
C0001-04	TCS Control Channel Changeover Valve1 (ESP Only)
C0002-04	TCS Control Channel Changeover Valve2 (ESP Only)
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
C0010-04	Left Front Inlet Control-System Internal Failure
C0011-04	Left Front Outlet Control-System Internal Failure
C0014-04	Right Front Inlet Control-System Internal Failure
C0015-04	Right Front Outlet Control-System Internal Failure
C0018-04	Left Rear Inlet Control-System Internal Failure
C0019-04	Left Rear Outlet Control-System Internal Failure
C001C-04	Right Rear Inlet Control-System Internal Failure
C001D-04	Right Rear Outlet Control-System Internal Failure
C0020-04	ABS Pump Motor Control-System Internal Failure
C0031-00	Front Left Wheel Speed Sensor Fault
C0031-09	Front Left Wheel Speed Sensor Component Fault
C0031-11	Front Left Wheel Speed Sensor Short to Ground
C0031-12	Front Left Wheel Speed Sensor Short to Power Supply
C0031-13	Front Left Wheel Speed Sensor Open
C0031-29	Front Left Wheel Speed Sensor Signal Invalid
C0031-37	Front Left Wheel Speed Sensor Signal Out of Range
C0034-00	Front Right Wheel Speed Sensor Fault
C0034-09	Front Right Wheel Speed Sensor Component Fault
C0034-11	Front Right Wheel Speed Sensor Short to Ground
C0034-12	Front Right Wheel Speed Sensor Short to Battery
C0034-13	Front Right Wheel Speed Sensor Open

DTC	DTC Definition
C0034-29	Front Right Wheel Speed Sensor Signal Invalid
C0034-37	Front Right Wheel Speed Sensor Signal Out of Range
C0037-00	Rear Left Wheel Speed Sensor Fault
C0037-09	Rear Left Wheel Speed Sensor Component Fault
C0037-11	Rear Left Wheel Speed Sensor Short to Ground
C0037-12	Rear Left Wheel Speed Sensor Short to Power Supply
C0037-13	Rear Left Wheel Speed Sensor Open
C0037-29	Rear Left Wheel Speed Sensor Signal Invalid
C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range
C003A-00	Rear Right Wheel Speed Sensor Fault
C003A-09	Rear Right Wheel Speed Sensor Component Fault
C003A-11	Rear Right Wheel Speed Sensor Short to Ground
C003A-12	Rear Right Wheel Speed Sensor Short to Power Supply
C003A-13	Rear Right Wheel Speed Sensor Open
C003A-29	Rear Right Wheel Speed Sensor Signal Invalid
C003A-37	Rear Right Wheel Speed Sensor Signal Out of Range
C0040-64	Brake Pedal Switch Failure (ESP Only)
C0044-01	Brake Pressure Sensor Failure (ESP Only)- General Electrical Failure
C0044-28	Brake Pressure Sensor Signal Bias Level Out Of Range Failure (ESP Only)
C0051-29	Steering Wheel Angle Sensor Signal Invalid (ESP Only)
C0051-54	Steering Wheel Angle Sensor Uncalibrated (ESP Only)
C0051-64	Steering Wheel Angle Sensor Signal Abnormal (ESP Only)
C0061-64	Lateral Acceleration Sensor Signal Abnormal (ESP Only)
C0062-64	Longitudinal Acceleration Sensor Signal Abnormal (ESP Only)
C0063-01	Yaw Rate Sensor General Electrical Fault

DTC	DTC Definition
C0063-54	Yaw Rate Sensor Uncalibrated
C0063-64	Yaw Rate Sensor Signal Abnormal (ESP Only)
C006B-00	Stability System Active Too Long
C0089-04	TCS Disable Switch (ESP Only)
C1000-16	ECU Voltage Too Low
C1000-17	ECU Voltage Too High
C1001-04	Internal fault in ECU system
C1002-49	CAN Hardware Internal Electronic Failure
C1003-04	Valve Relay Failure-System Internal Failure
C1004-00	General Valve-No Sub Type Information
C1007-29	Reverse Gear Switch Signal Invalid (ESP Only)
C1008-00	General WSS-No Sub Type Information
C1009-00	ECU Hardware Related Fault
U0005-00	High Speed CAN Communication Bus (+) High
U0007-00	High Speed CAN Communication Bus (-) Low
U0073-88	Control Module Communication Bus Off
U0100-87	Lost Communication With ECM (ESP Only)
U0101-87	Lost Communication With TCM (ESP Only)
U0616 - 87	Lost Communication With Steering Angle Sensor Module (ESP Only)
U0140-87	Lost Communication With BCM (ESP Only)
U0401-81	Invalid Data Received From ECM (ESP Only)-Invalid Serial Date Received
U0402-81	Invalid Data Received From TCM (ESP Only)-Invalid Serial Date Received
U0422-81	Invalid Data Received From Body Control Module (ESP Only)-Invalid Serial Date Received
U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)-Invalid Serial Date Received
U1300-55	Software Configuration Error
C1800-19	Left Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold
C1800-72	Left Actuator - Release Failed-Actuator Stuck Open
C1800-73	Left Actuator - Apply Failed-Actuator Stuck Closed

DTC	DTC Definition
C1800-74	Left Actuator - Actuator Slipping (Apply TimeOut)-Actuator Slipping
C1800-91	Left Actuator - Wrong Operating Characteristics Detect-Parametric
C1800-92	Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation
C1800-93	Left Actuator - No Motor Start Detected-No Operation
C1800-97	Left Actuator - Action Limited
C1801-19	Right Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold
C1801-72	Right Actuator -Release Failed-Actuator Stuck Open
C1801-73	Right Actuator - Apply Failed-Actuator Stuck Closed
C1801-74	Right Actuator - Actuator Slipping (Apply TimeOut)-Actuator Slipping
C1801-91	Right Actuator - Wrong Operating Characteristics Detect-Parametric
C1801-92	Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation
C1801-93	Right Actuator - No Motor Start Detected-No Operation
C1801-97	Right Actuator - Action Limited
C1802-16	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold
C1802-17	Supply Voltage
C1802-44	PBC EEPROM Fault
C1803-95	Assembly Test
C1804-53	Maintenance Mode
C1805-94	Hydric Support Failed
C1806-01	EPB Button Line Failure-General Electrical Failure
C1806-04	EPB Button Always Pushed or Pulled-System Internal Failure
C1824-01	EPB Left Actuator Electrical Failure-General Electrical Failure
C1825-01	EPB Right Actuator Electrical Failure-General Electrical Failure
C1822-00	EPB Left Actuator Failure

DTC	DTC Definition
C1821-00	EPB Right Actuator Failure
C1824-1E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C1825-1E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C1830-00	APBActL_CAT
C1833-00	EPB Right Actuator Unintended Run-No Sub Type Information
C1831-00	APBActR_CAT
C186D-44	SupervisionFail-Data Memory Failure
C1832-00	EPB Left Actuator Unintended Run-No Sub Type Information
C1806-16	APB Button Under Voltage
C1823-00	APB Motor Enable Line Violation
C1807-98	Disc Over Heat
C1826-01	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure
C1808-12	Circuit Short To Battery of Left Rear caliper
C1808-11	Circuit Short To Ground of Left Rear Caliper
C1808-13	Short Circuit in Left Rear Caliper
C1810-01	Short in Left Rear Caliper Positive and Negative
C1815-12	Circuit Short To Battery of Right Rear Caliper-Circuit Short To Battery
C1815-11	Circuit Short To Ground of Right Rear Caliper-Circuit Short To Ground
C1815-13	Short Circuit in Right Rear Caliper
C1817-01	Short in Right Rear Caliper Positive and Negative
C10AD-08	Vacuum Sensor General Fault
C156B-00	EPBASIC_GenericError-No Sub Type Information
C1546-04	EPB_SupplyFault-System Internal Failure
U1163-87	Lost Communication With ACC (ESP Only)-Miss Message
U0433 - 81	Invalid Data Received From ACC (ESP Only)-Invalid Serial Date Received
U1410 - 81	HAS_InvalidValue-Invalid Serial Date Received
U1411 - 81	APBSystemState_InvalidValue APB-Invalid Serial Date Received

DTC	DTC Definition
U1412-81	ABANet_InvalidValue-Invalid Serial Date Received
U1413-81	ABPNet_InvalidValue-Invalid Serial Date Received
U1414-81	ACCNet_InvalidValue-Invalid Serial Date Received
U1415-81	AEBNet_InvalidValue-Invalid Serial Date Received
U1416-81	AWBNet_InvalidValue-Invalid Serial Date Received
U1417-81	AccPedalNet_InvalidValue-Invalid Serial Date Received
U1418-81	BTMNet_InvalidValue-Invalid Serial Date Received
U1419-81	CDDNet_InvalidValue-Invalid Serial Date Received
U1421 - 81	SClutch_InvalidValue-Invalid Serial Date Received
U1422 - 81	EngineNet_InvalidValue-Invalid Serial Date Received
U1423 - 81	StartStopNet_InvalidValue StartStop-Invalid Serial Date Received
U1424 - 81	TCUNet_InvalidValue-Invalid Serial Date Received
U1425 - 81	VLCNet_InvalidValue-Invalid Serial Date Received
U1426-81	VacuumNet_InvalidValue-Invalid Serial Date Received
C2000 - 04	Rollerbench Mode Dismatch Vehicle Actual State
U0146 - 87	Lost Communication with Central Gateway
U0447-81	Invalid Data Received From CGW-Invalid Serial Date Received
U0155-87	Lost Communication With ICM-Miss Message
U0423-81	Invalid Data Received From ICM-Invalid Serial Date Received
U0142-87	Lost Communication With AVM-Miss Message
U0443-81	Invalid Data Received From AVM-Invalid Serial Date Received
U1432-81	APANet_InvalidValue-Invalid Serial Date Received
U1427-81	EngineNet_InvalidValue-Invalid Serial Date Received

DTC Diagnosis Procedure

DTC	C1802-16	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-2-16	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 battery voltage

Use circuit diagram as a guide to perform the following inspection procedures:

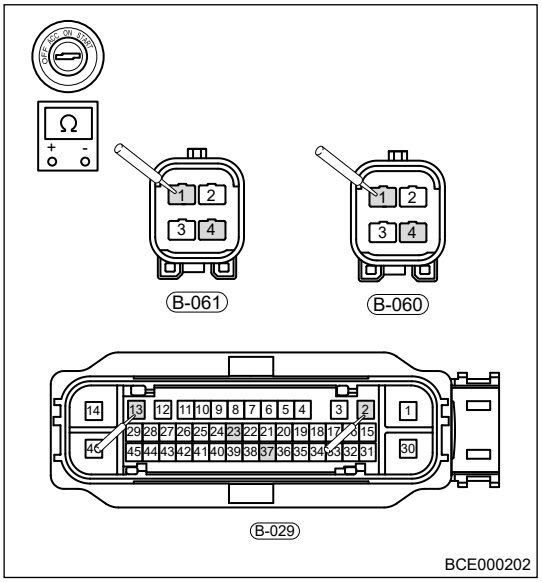
(a) Check battery voltage. Standard voltage: 9 - 16 V.

NG → **Check or replace charging system or battery.**

OK

2	Check wire harness and connector (brake caliper - EPB module)

(a) Check if related wire harness connection and installation are in good condition.
(b) Disconnect the negative battery cable.
(c) Disconnect the EPB module connector B-029.
(d) Disconnect the rear left brake caliper connector B-061.
(e) Disconnect the rear right brake caliper connector B-060.
(f) Check for continuity between EPB module and brake caliper.



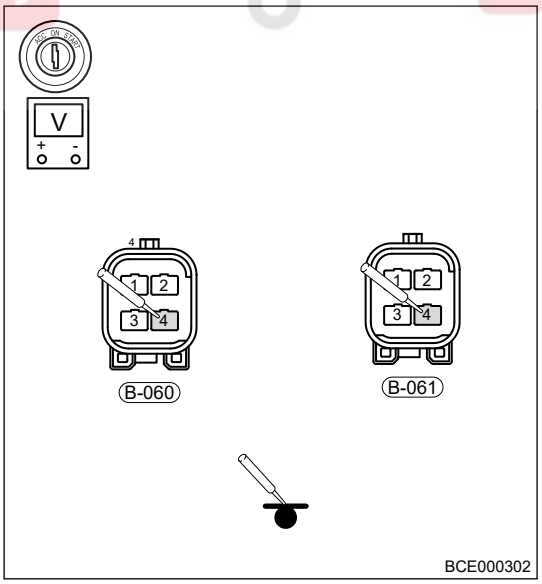
Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-061 (4) - B-029 (23)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω
B-060(4) - B-029 (37)	Always	Less than 1 Ω

NG → **Repair or replace wire harness or connector.**

OK

3	**Check brake caliper power supply circuit**

(a) Disconnect the rear left brake caliper connector B-061.
(b) Disconnect the rear right brake caliper connector B-060.
(c) Turn ENGINE START STOP switch to ON.
(d) Perform the voltage inspection.



Multimeter Connection	Condition	Specified Condition
B-061 (4) - Body ground	ENGINE START STOP switch ON	5 V
B-060 (4) - Body ground	ENGINE START STOP switch ON	5 V

OK → **Replace brake caliper**

NG → **Replace EPB module**

DTC	C1802-17	Supply Voltage

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-2-17	Supply Voltage	Supply Voltage	Supply Voltage	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Check battery voltage. Standard voltage: 9 - 16 V.

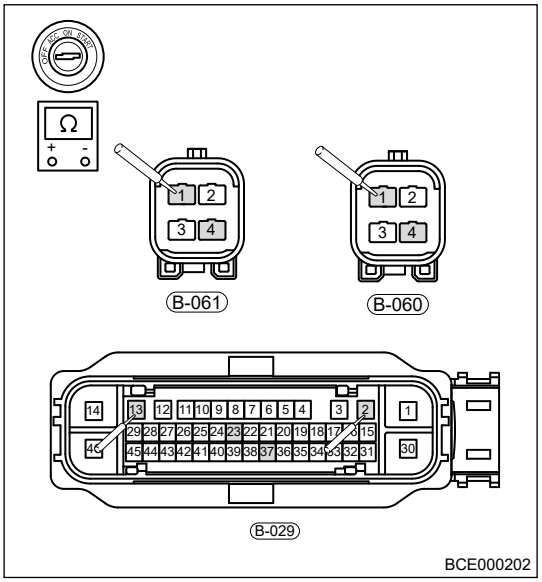
NG → **Check or replace charging system or battery.**

OK

2	**Check wire harness and connector (Brake caliper - EPB module)**

(a) Check if related wire harness connection and installation are in good condition.
(b) Disconnect the negative battery cable.
(c) Disconnect the EPB module connector B-029.
(d) Disconnect the rear left brake caliper connector B-061.
(e) Disconnect the rear right brake caliper connector B-060.
(f) Check for continuity between EPB and brake caliper.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-061 (4) - B-029 (23)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω
B-060(4) - B-029 (37)	Always	Less than 1 Ω



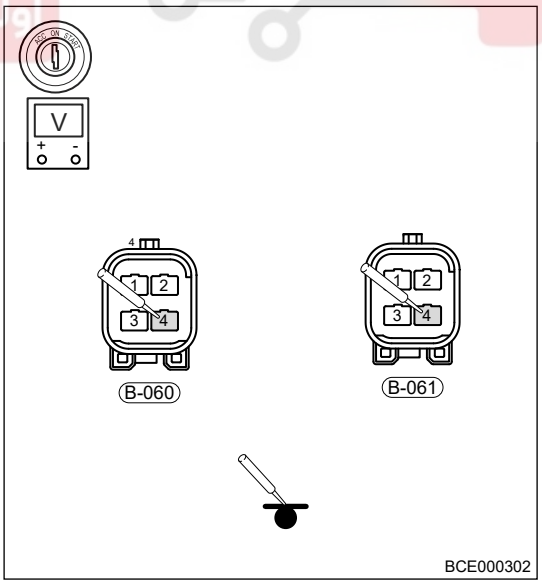
NG → **Repair or replace wire harness or connector.**

OK

3	**Check brake caliper power supply circuit**

(a) Disconnect the rear left brake caliper connector B-061.
(b) Disconnect the rear right brake caliper connector B-060.
(c) Turn ENGINE START STOP switch to ON.
(d) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-061 (4) - Body ground	ENGINE START STOP switch ON	5 V
B-060 (4) - Body ground	ENGINE START STOP switch ON	5 V



OK → **Replace brake caliper**

NG → **Replace EPB module**

DTC	C0010-04	Left Front Inlet Control-System Internal Failure
DTC	C0011-04	Left Front Outlet Control-System Internal Failure
DTC	C0014-04	Right Front Inlet Control-System Internal Failure
DTC	C0015-04	Right Front Outlet Control-System Internal Failure
DTC	C0018-04	Left Rear Inlet Control-System Internal Failure
DTC	C0019-04	Left Rear Outlet Control-System Internal Failure
DTC	C001C-04	Right Rear Inlet Control-System Internal Failure
DTC	C001D-04	Right Rear Outlet Control-System Internal Failure
DTC	C0001-04	TCS Control Channel Changeover Valve1 (ESP Only)
DTC	C0002-04	TCS Control Channel Changeover Valve2 (ESP Only)
DTC	C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)
DTC	C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
DTC	C1003-04	Valve Relay Failure-System Internal Failure
DTC	C1004-00	General Valve-No Sub Type Information

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-01-0-04	Left Front Inlet Control-System Internal Failure	Left front inlet control-system internal failure	Left front inlet control-system internal failure	/	/	• Solenoid valve power supply is abnormal • Poor connection of EPB control module assembly ground wire • Fuse malfunction • Solenoid valve short or open circuit itself • Overheat protection triggered • EPB control module assembly is damaged	/	/
C0-011-04	Left Front Outlet Control-System Internal Failure	Left front outlet control-system internal failure	Left front outlet control-system internal failure	/	/		/	/
C0-01-4-04	Right Front Inlet Control-System Internal Failure	Right front inlet control-system internal failure	Right front inlet control-system internal failure	/	/		/	/
C0-01-5-04	Right Front Outlet Control-System Internal Failure	Right front outlet control-system internal failure	Right front outlet control-system internal failure	/	/		/	/
C0-01-8-04	Left Rear Inlet Control-	Left rear inlet control-system	Left rear inlet control-	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	System Internal Failure	internal failure	system internal failure					
C0-01-9-04	Left Rear Outlet Control-System Internal Failure	Left rear outlet control-system internal failure	Left rear outlet control-system internal failure	/	/		/	/
C0-01-C-04	Right Rear Inlet Control-System Internal Failure	Right rear inlet control-system internal failure	Right rear inlet control-system internal failure	/	/		/	/
C0-01-D-04	Right Rear Outlet Control-System Internal Failure	Right rear outlet control-system internal failure	Right rear outlet control-system internal failure	/	/		/	/
C0-00-1-04	TCS Control Channel Changeover Valve1	TCS control channel changeover valve1 (ESP only)	TCS control channel changeover valve1 (esp only)	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	(ESP Only)							
C0-00-2-04	TCS Control Channel Changeover Valve2 (ESP Only)	TCS control channel changeover valve2 (ESP only)	TCS control channel changeover valve2 (ESP only)	/	/		/	/
C0-00-3-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)	TCS control channel high pressure switch valve 1 (ESP only)	TCS control channel high pressure switch valve 1 (ESP only)	/	/		/	/
C0-00-4-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)	TCS control channel high pressure switch valve 2 (ESP only)	TCS control channel high pressure switch valve 2 (ESP only)	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-00-3-04	Valve Relay Failure-System Internal Failure	Valve relay failure-system internal failure	Valve relay failure-system internal failure	/	/		/	/
C1-00-4-00	General Valve-No Sub Type Information	General valve-no sub type information	General valve-no sub type information	/	/		/	/

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 fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check fuse SB08.

NG → **Replace the related fuse.**

OK

2	**Check EPB module power supply circuit**

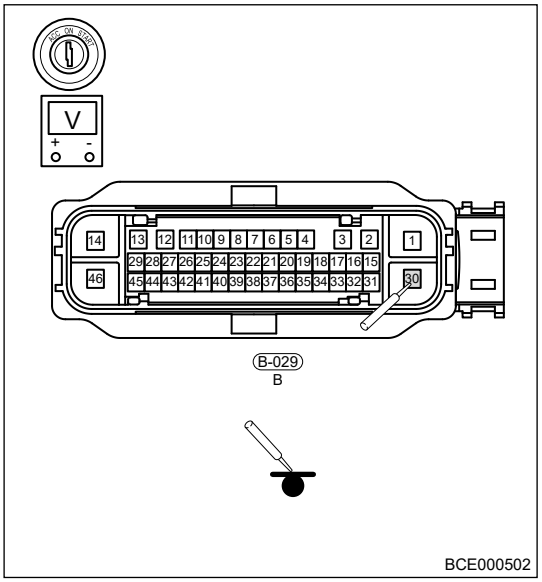
(a) Disconnect the EPB module connector B-029.

(b) Check if related wire harnesses are worn, pinched or broken.

(c) Check if related connector terminals are loose, broken, bent or corrosive.

(d) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-029 (30) - Body ground	Always	9 - 16 V



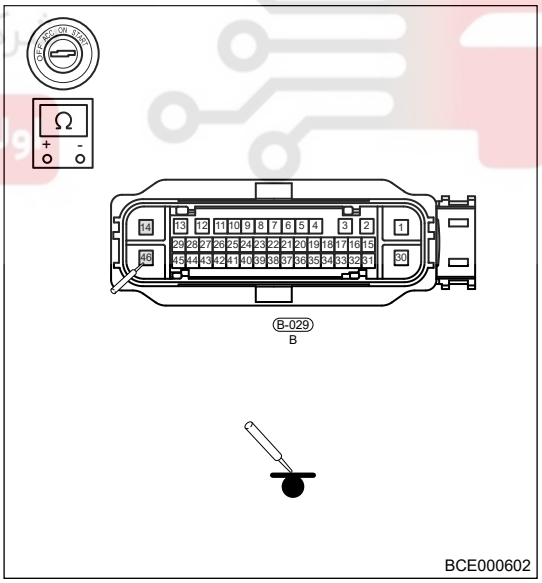
NG → **Repair or replace wire harness or connector.**

OK

3	Check EPB module ground circuit

(a) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-029 (14) - Body ground	Always	Less than 1 Ω
B-029 (46) - Body ground	Always	Less than 1 Ω



NG → **Repair or replace wire harness or connector**

OK

4	Confirm DTCs again

(a) Reconnect the EPB module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK	**Check if intermittent malfunction occurs**
NG	**Replace EPB module**

DTC	C0020-04	ABS Pump Motor Control-System Internal Failure

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-02-0-04	ABS Pump Motor Control-System Internal Failure	ABS Pump Motor Control-System Internal Failure	ABS Pump Motor Control-System Internal Failure	/	/	• Fuse malfunction • Pump motor has poor ground connection • System overheat protection • System overheat protection • Abnormal pump motor power supply • Pump motor malfunction	/	/

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 fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check fuse SB07.

NG → **Replace related fuse**

OK

2 Check EPB module power supply circuit

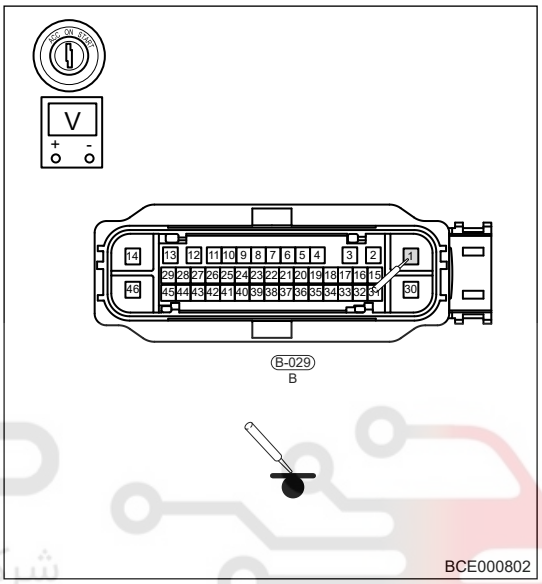
(a) Check if related wire harnesses are worn, pinched or broken.

(b) Check if related connector terminals are loose, broken, bent or corrosive.

(c) Disconnect the EPB module connector B-029.

(d) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
B-029 (1) - Body ground	Always	9 - 16 V



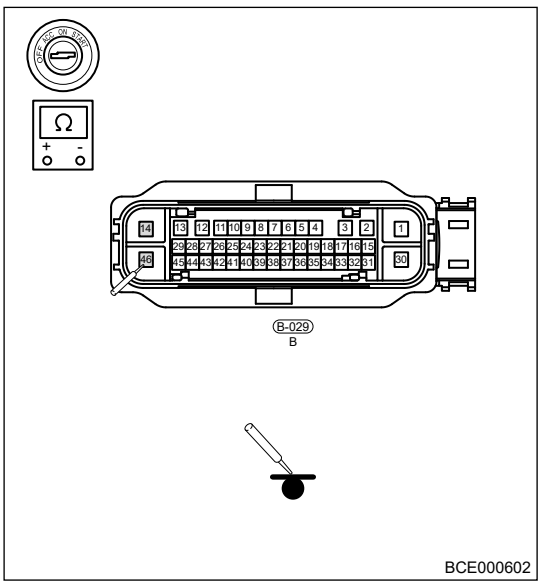
NG → **Repair or replace wire harness or connector**

OK

3 Check EPB module ground circuit

(a) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-029 (14) - Body ground	Always	Less than 1 Ω
B-029 (46) - Body ground	Always	Less than 1 Ω



NG → **Repair or replace wire harness or connector**

OK

4	**Confirm DTCs again**

(a) Reconnect the EPB module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK → **Check if intermittent malfunction occurs**

NG → **Replace EPB module**

DTC	C0031-00	Front Left Wheel Speed Sensor Fault
DTC	C0031-09	Front Left Wheel Speed Sensor Component Fault
DTC	C0031-11	Front Left Wheel Speed Sensor Short to Ground
DTC	C0031-12	Front Left Wheel Speed Sensor Short to Power Supply
DTC	C0031-13	Front Left Wheel Speed Sensor Open
DTC	C0031-29	Front Left Wheel Speed Sensor Signal Invalid
DTC	C0031-37	Front Left Wheel Speed Sensor Signal Out of Range

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-1-00	Front Left Wheel Speed Sensor Fault	Front left wheel speed sensor fault	Front left wheel speed sensor fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-1-09	Front Left Wheel Speed Sensor	Front left wheel speed sensor component fault	Front left wheel speed sensor component fault	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Component Fault							
C0-03-1-11	Front Left Wheel Speed Sensor Short to Ground	Front left wheel speed sensor short to ground	Front left wheel speed sensor short to ground	/	/		/	/
C0-03-1-12	Front Left Wheel Speed Sensor Short to Power Supply	Front left wheel speed sensor open	Front left wheel speed sensor open	/	/		/	/
C0-03-1-13	Front Left Wheel Speed Sensor Signal Invalid	Front left wheel speed sensor signal invalid	Front left wheel speed sensor signal invalid	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-1-29	Front Left Wheel Speed Sensor Signal Invalid	Front left wheel speed sensor signal invalid	Front left wheel speed sensor signal invalid	/	/		/	/
C0-03-1-37	Front Left Wheel Speed Sensor Signal Out of Range	Front left wheel speed sensor signal out of range	Front left wheel speed sensor signal out of 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 front left wheel speed sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check front left wheel speed sensor.

(d) Check if related wire harness connector installation is in good condition and check for dirty.

NG → **Clean or replace front left wheel speed sensor.**

OK →

2	Check wire harness and connector (front left wheel speed sensor - EPB module)

(a) Turn ENGINE START STOP switch to OFF.

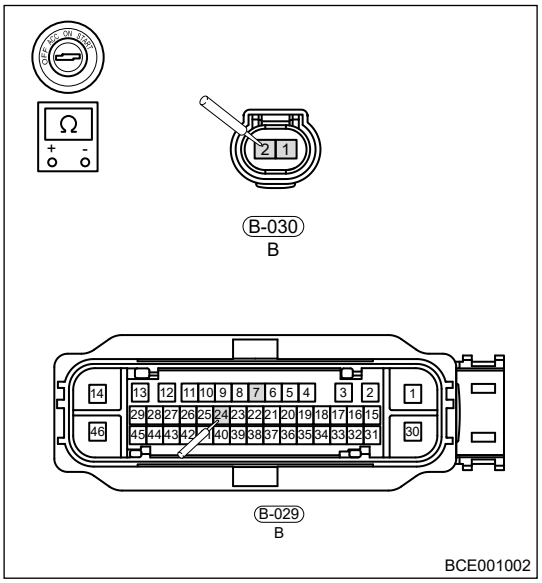
(b) Disconnect the negative battery cable.

(c) Check front left wheel speed sensor connector B-030.

(d) Check EPB module connector B-029.

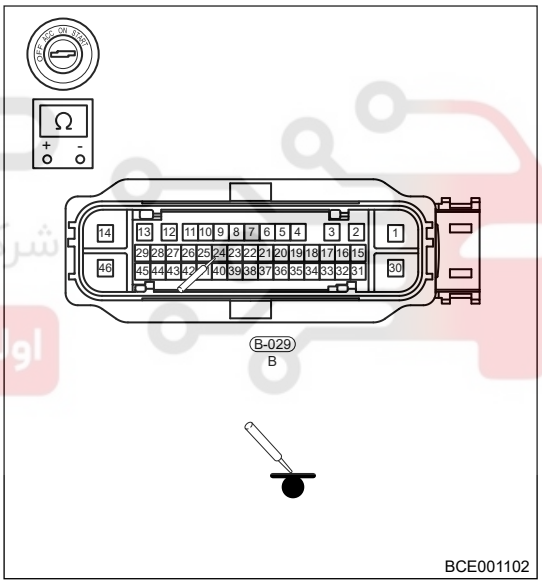
(e) Measure the continuity between front left wheel speed sensor and EPB module according to the table below.

Multimeter Connection	Condition	Specified Condition
B-030 (1) - B-029 (7)	Always	Less than 1 Ω
B-030(2) - B-029 (24)	Always	Less than 1 Ω



(f) Check if resistance between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (7) - Body ground	Always	∞
B-029 (24) - Body ground	Always	∞

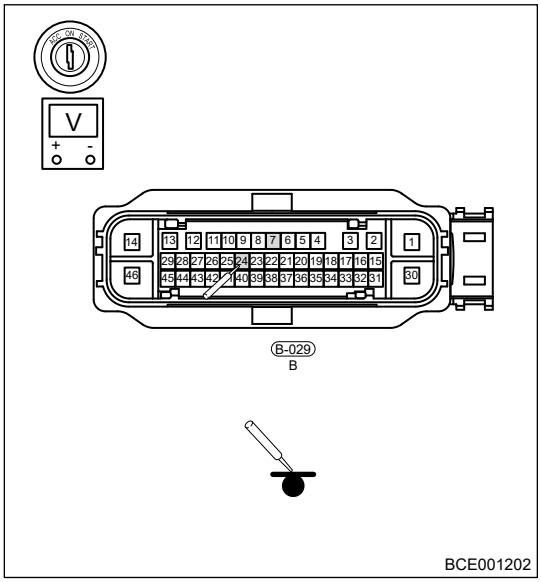


(g) Connect the negative battery cable.

(h) ENGINE START STOP switch ON.

(i) Check if voltage between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (7) - Body ground	Always	0 V
B-029 (24) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector.**

OK

3	Confirm DTCs again

(a) Reconnect the EPB module connector B-029.

(b) Clear DTCs.

(c) Start the vehicle.

(d) Read DTCs again.

(e) Check if the same DTCs occur.

OK → **Check if intermittent malfunction occurs**

NG → **Replace EPB module**

DTC	C0034-00	Front Right Wheel Speed Sensor Fault
DTC	C0034-09	Front Right Wheel Speed Sensor Component Fault
DTC	C0034-11	Front Right Wheel Speed Sensor Short to Ground
DTC	C0034-12	Front Right Wheel Speed Sensor Short to Power Supply
DTC	C0034-13	Front Right Wheel Speed Sensor Open
DTC	C0034-29	Front Right Wheel Speed Sensor Signal Invalid
DTC	C0034-37	Front Right Wheel Speed Sensor Signal Out of Range

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-4-00	Front Right Wheel Speed Sensor Fault	Front right wheel speed sensor fault	Front right wheel speed sensor fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-4-09	Front Right Wheel Speed Sensor Component Fault	Front right wheel speed sensor component fault	Front right wheel speed sensor component fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-4-11	Front Right Wheel Speed Sensor Short to Ground	Front right wheel speed sensor short to ground	Front right wheel speed sensor short to ground	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-4-12	Front Right Wheel Speed Sensor Short to Power Supply	Front right wheel speed sensor open	Front right wheel speed sensor open	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-4-13	Front Right Wheel Speed Sensor Signal Invalid	Front right wheel speed sensor signal invalid	Front right wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-4-29	Front Right Wheel Speed Sensor Signal Invalid	Front right wheel speed sensor signal invalid	Front right wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-4-37	Front Right Wheel Speed Sensor Signal Out of Range	Front right wheel speed sensor signal out of range	Front right wheel speed sensor signal out of range	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 front right wheel speed sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check front right wheel speed sensor.

(d) Check if related wire harness connector installation is in good condition and check for dirty.

NG → **Clean or replace front right wheel speed sensor.**

OK

2	**Check wire harness and connector (front right wheel speed sensor - EPB module)**

(a) Turn ENGINE START STOP switch to OFF.

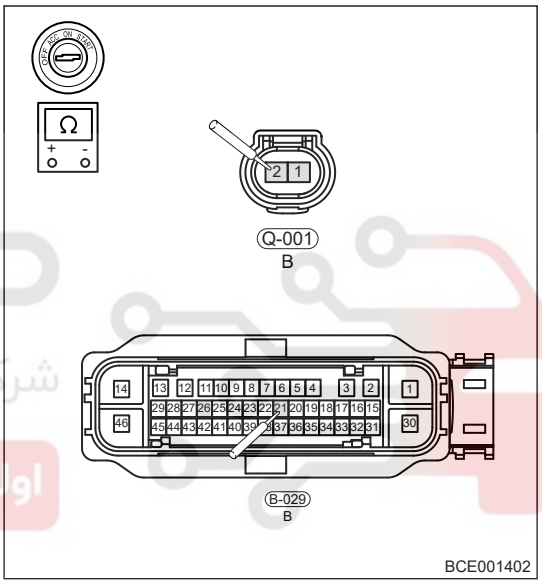
(b) Disconnect the negative battery cable.

(c) Check front right wheel speed sensor connector Q-001.

(d) Check EPB module connector B-029.

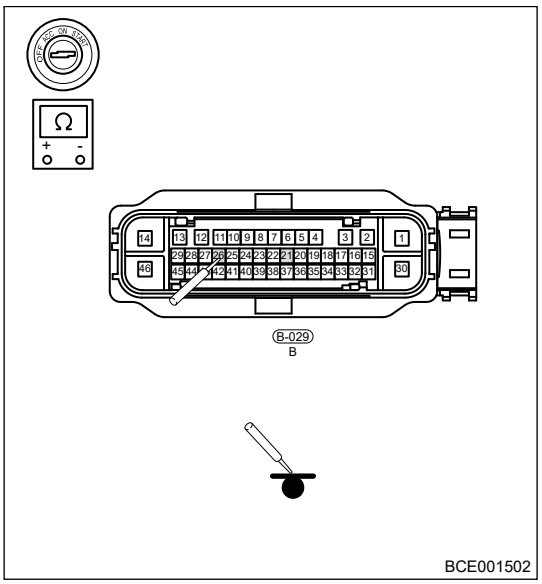
(e) Measure the continuity between front right wheel speed sensor and EPB module according to the table below.

Multimeter Connection	Condition	Specified Condition
Q-001 (1) - B-029 (26)	Always	Less than 1 Ω
Q-001 (2) - B-029 (21)	Always	Less than 1 Ω



(f) Check if resistance between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (26) - Body ground	Always	∞
B-029 (21) - Body ground	Always	∞

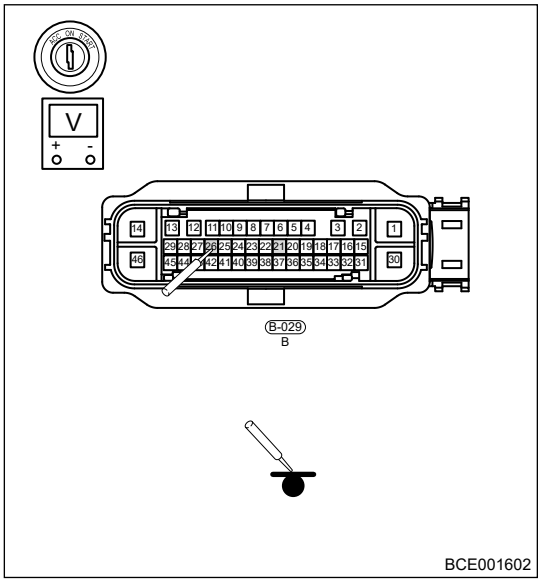


(g) Connect the negative battery cable.

(h) ENGINE START STOP switch ON.

(i) Check if voltage between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (26) - Body ground	Always	0 V
B-029 (21) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector.**

OK →

3	Confirm DTCs again

(a) Reconnect the EPB module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK → **Check if intermittent malfunction occurs**

NG → **Replace EPB module**

DTC	C0037-00	Rear Left Wheel Speed Sensor Fault
DTC	C0037-09	Rear Left Wheel Speed Sensor Component Fault
DTC	C0037-11	Rear Left Wheel Speed Sensor Short to Ground
DTC	C0037-12	Rear Left Wheel Speed Sensor Short to Power Supply
DTC	C0037-13	Rear Left Wheel Speed Sensor Open
DTC	C0037-29	Rear Left Wheel Speed Sensor Signal Invalid
DTC	C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-7-00	Rear Left Wheel Speed Sensor Fault	Rear left wheel speed sensor fault	Rear left wheel speed sensor fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-7-09	Rear Left Wheel Speed Sensor Component Fault	Rear left wheel speed sensor component fault	Rear left wheel speed sensor component fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-7-11	Rear Left Wheel Speed Sensor Short to Ground	Rear left wheel speed sensor short to ground	Rear left wheel speed sensor short to ground	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-7-12	Rear Left Wheel Speed Sensor Short to Power Supply	Rear left wheel speed sensor open	Rear left wheel speed sensor open	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-7-13	Rear Left Wheel Speed Sensor Signal Invalid	Rear left wheel speed sensor signal invalid	Rear left wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-7-29	Rear Left Wheel Speed Sensor Signal Invalid	Rear left wheel speed sensor signal invalid	Rear left wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-7-37	Rear Left Wheel Speed Sensor Signal Out of Range	Rear left wheel speed sensor signal out of range	Rear left wheel speed sensor signal out of range	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 rear left wheel speed sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check rear left wheel speed sensor.

(d) Check if related wire harness connector installation is in good condition and check for dirty.

NG → **Clean or replace rear left wheel speed sensor.**

OK

2	**Check wire harness and connector (rear left wheel speed sensor - EPB module)**

(a) Turn ENGINE START STOP switch to OFF.

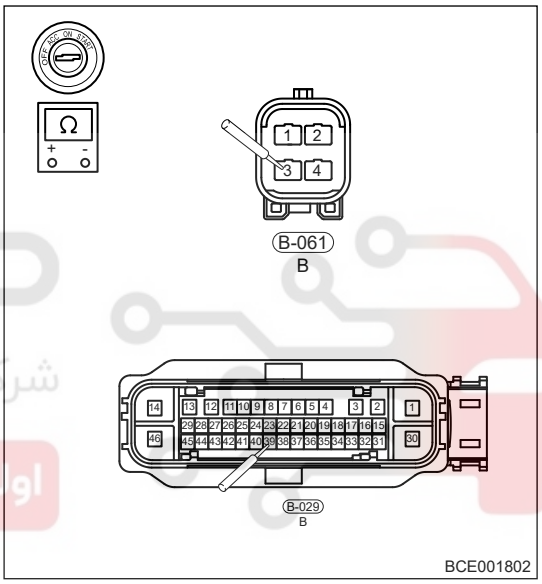
(b) Disconnect the negative battery cable.

(c) Check rear left wheel speed sensor connector B-061.

(d) Check EPB module connector B-029.

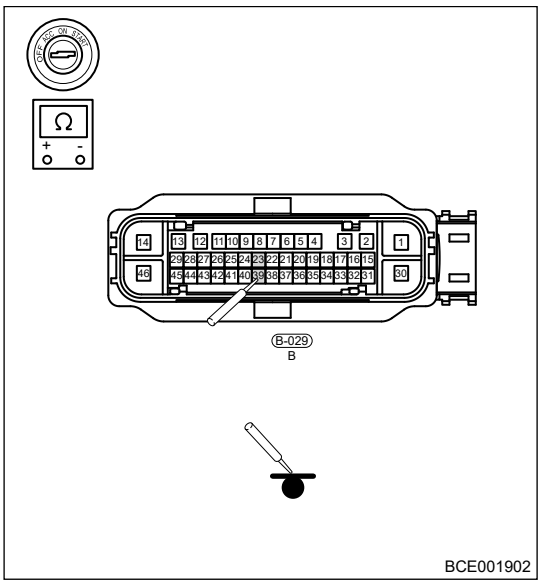
(e) Measure the continuity between rear left wheel speed sensor and EPB module according to the table below.

Multimeter Connection	Condition	Specified Condition
B-061 (4) - B-029 (23)	Always	Less than 1 Ω
B-061(3) - B-029 (39)	Always	Less than 1 Ω



(f) Check if resistance between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (23) - Body ground	Always	∞
B-029 (39) - Body ground	Always	∞

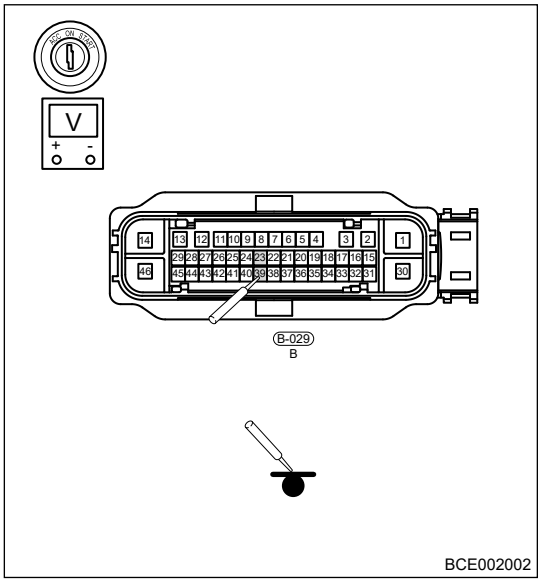


(g) Connect the negative battery cable.

(h) ENGINE START STOP switch ON.

(i) Check if voltage between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (23) - Body ground	Always	0 V
B-029 (39) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector.**

OK →

3	Confirm DTCs again

(a) Reconnect the EPB module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK → **Check if intermittent malfunction occurs**

NG → **Replace EPB module**

DTC	C003A-00	Rear Right Wheel Speed Sensor Fault
DTC	C003A-09	Rear Right Wheel Speed Sensor Component Fault
DTC	C003A-11	Rear Right Wheel Speed Sensor Short to Ground
DTC	C003A-12	Rear Right Wheel Speed Sensor Short to Power Supply
DTC	C003A-13	Rear Right Wheel Speed Sensor Open
DTC	C003A-29	Rear Right Wheel Speed Sensor Signal Invalid
DTC	C003A-37	Rear Right Wheel Speed Sensor Signal Out of Range

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-A-00	Rear Right Wheel Speed Sensor Fault	Rear right wheel speed sensor fault	Rear right wheel speed sensor fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-09	Rear Right Wheel Speed Sensor Component Fault	Rear right wheel speed sensor component fault	Rear right wheel speed sensor component fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-11	Rear Right Wheel Speed Sensor Short to Ground	Rear right wheel speed sensor short to ground	Rear right wheel speed sensor short to ground	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-12	Rear Right Wheel Speed Sensor Short to Power Supply	Rear right wheel speed sensor open	Rear right wheel speed sensor open	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-A-13	Rear Right Wheel Speed Sensor Signal Invalid	Rear right wheel speed sensor signal invalid	Rear right wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-29	Rear Right Wheel Speed Sensor Signal Invalid	Rear right wheel speed sensor signal invalid	Rear right wheel speed sensor signal invalid	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-37	Rear Right Wheel Speed Sensor Signal Out of Range	Rear right wheel speed sensor signal out of range	Rear right wheel speed sensor signal out of range	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 rear right wheel speed sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check rear right wheel speed sensor.

(d) Check if related wire harness connector installation is in good condition and check for dirty.

NG → **Clean or replace rear right wheel speed sensor.**

OK

2	**Check wire harness and connector (rear right wheel speed sensor - EPB module)**

(a) Turn ENGINE START STOP switch to OFF.

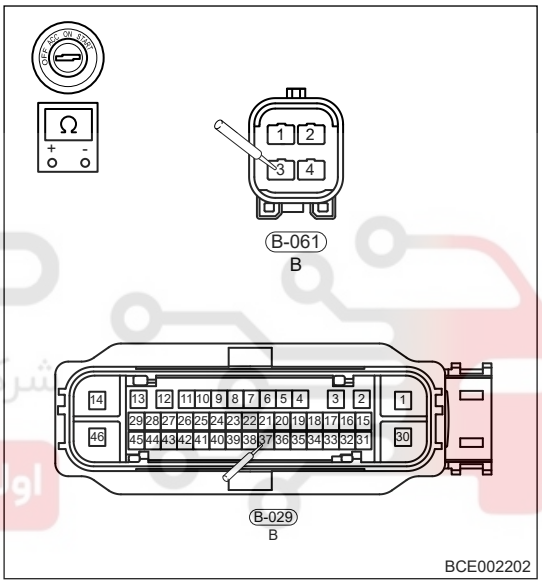
(b) Disconnect the negative battery cable.

(c) Check rear right wheel speed sensor connector B-060.

(d) Check EPB module connector B-029.

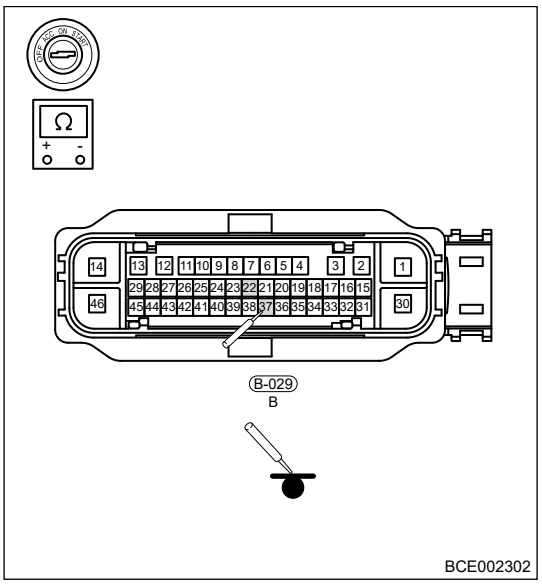
(e) Measure the continuity between rear right wheel speed sensor and EPB module according to the table below.

Multimeter Connection	Condition	Specified Condition
B-060(4) - B-029 (37)	Always	Less than 1 Ω
B-060(3) - B-029 (22)	Always	Less than 1 Ω



(f) Check if resistance between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (37) - Body ground	Always	∞
B-029 (22) - Body ground	Always	∞

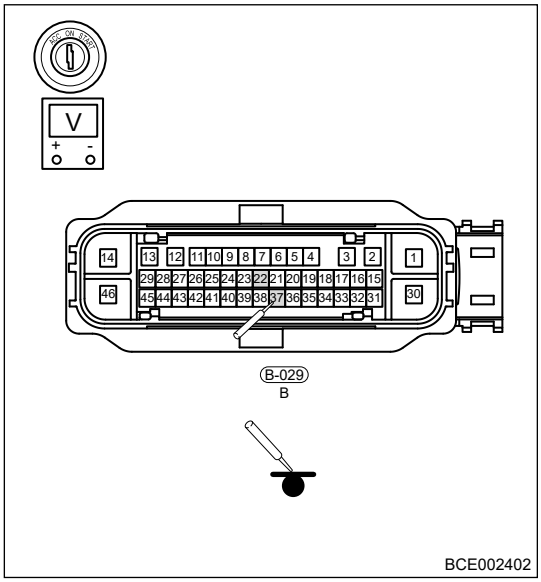


(g) Connect the negative battery cable.

(h) ENGINE START STOP switch ON.

(i) Check if voltage between EPB module and body ground is normal according to the table below

Multimeter Connection	Condition	Specified Condition
B-029 (37) - Body ground	Always	0 V
B-029 (22) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector.**

OK

3	Confirm DTCs again

(a) Reconnect the EPB module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK → **Check if intermittent malfunction occurs**

NG → **Replace EPB module**

DTC	C0051-29	Steering Wheel Angle Sensor Signal Invalid (ESP Only)
DTC	C0051-54	Steering Wheel Angle Sensor Uncalibrated (ESP Only)
DTC	C0051-64	Steering Wheel Angle Sensor Signal Abnormal (ESP Only)

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-03-A-00	Steering Wheel Angle Sensor Signal Invalid (ESP Only)	Steering wheel angle sensor signal invalid (ESP only)	Steering wheel angle sensor signal invalid (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-09	Steering Wheel Angle Sensor Uncalibrated (ESP Only)	Steering wheel angle sensor uncalibrated (ESP only)	Steering wheel angle sensor uncalibrated (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-03-A-11	Steering Wheel Angle Sensor Signal Abnormal (ESP Only)	Steering wheel angle sensor signal abnormal (ESP only)	Steering wheel angle sensor signal abnormal (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 angle sensor calibration**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to recalibrate angle sensor.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(f) Check if the same DTCs are still output.

NG → **Calibrate steering angle sensor**

OK

2	**Check fuse**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check if fuse RF03(10A) is damaged.

NG → **Replace fuse**

OK

3	**Check related wire harness and connector of steering angle sensor**

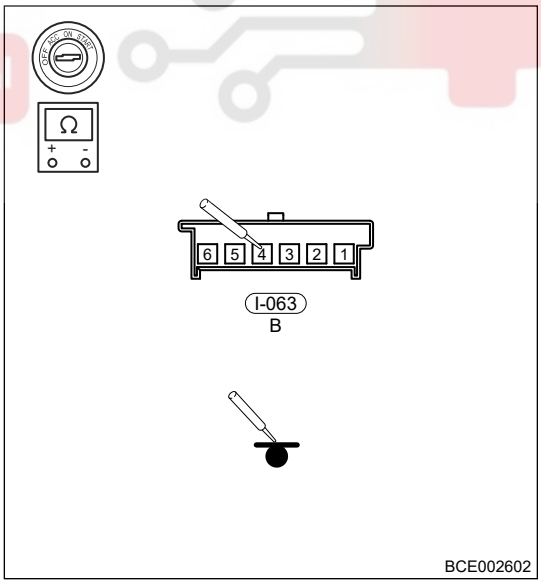
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the angle sensor connector I-063.

(d) Check if related wire harnesses are worn, pinched or broken.

(e) Check if related connector terminals are loose, broken, bent or corrosive.



(f) Check for continuity between steering angle sensor and body ground.

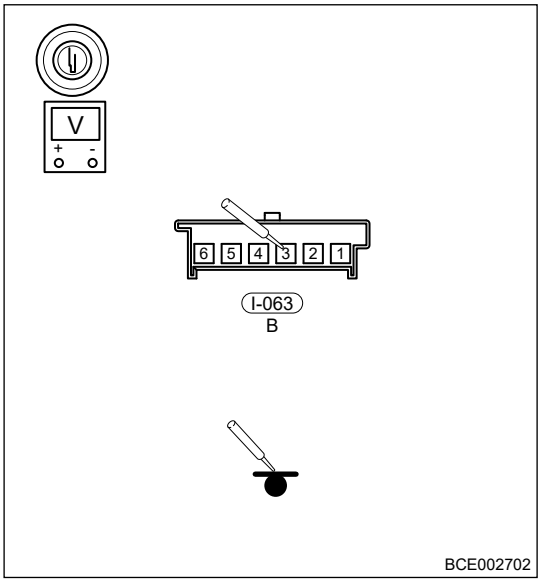
Multimeter Connection	Condition	Specified Condition
I-063 (4) - Body ground	Always	Less than 1 Ω

(g) Connect the negative battery cable.

(h) Turn ENGINE START STOP switch to ON.

(i) Check if voltage between steering angle sensor and body ground is normal.

Multimeter Connection	Condition	Specified Condition
I-063 (3) - Body ground	Always	More than 12 V



NG → **Repair or replace related wire harness or connector.**

OK

4	**Confirm DTCs again**

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C0061-64**	**Lateral Acceleration Sensor Signal Abnormal (ESP Only)**
DTC	**C0062-64**	**Longitudinal Acceleration Sensor Signal Abnormal (ESP Only)**
DTC	**C0063-64**	**Yaw Rate Sensor Signal Abnormal (ESP Only)**
DTC	**C0063-01**	**Yaw Rate Sensor General Electrical Fault**
DTC	**C0063-54**	**Yaw Rate Sensor Uncalibrated**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-06-1-64	Lateral Acceleration Sensor Signal Abnormal (ESP Only)	Lateral acceleration sensor signal abnormal (ESP only)	Lateral acceleration sensor signal abnormal (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-06-2-64	Longitudinal Acceleration Sensor Signal Abnormal (ESP Only)	Longitudinal acceleration sensor signal abnormal (ESP only)	Longitudinal acceleration sensor signal abnormal (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-06-3-64	Yaw Rate Sensor Signal Abnormal (ESP Only)	Yaw Rate sensor signal abnormal (ESP only)	Yaw rate sensor signal abnormal (ESP only)	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-06-3-01	Yaw Rate Sensor General Electrical Fault	Yaw rate sensor general electrical fault	Yaw rate sensor general electrical fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C0-06-3-54	Yaw Rate Sensor Uncalibrated	Yaw rate sensor uncalibrated	Yaw rate sensor uncalibrated	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 lateral acceleration/yaw rate sensor calibration**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to recalibrate lateral acceleration/yaw rate sensor.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(f) Check if the same DTCs are still output.

NG → **Lateral acceleration/yaw rate sensor is not calibrated**

OK

2	**Check EPB module**

(a) Check ESP control module assembly fixing bolt for looseness.
(b) Check ESP control module assembly fixing bracket bolt for looseness.

NG → **Tighten EPB module fixing bolt and fixing bracket bolt properly**

OK

3	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	C006B-64	Stability System Active Too Long

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C0-06-B-64	Stability System Active Too Long	Stability system active too long	Stability system active too long	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 related wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect all wheel speed sensor and angle sensor connectors.

(d) Check if related wire harnesses are worn, pinched or broken.

NG → **Repair or replace related wire harness and connector**

OK ↓

2	**Check installation of wheel speed sensor**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check wheel speed sensor fixing bolt for looseness.

(d) Check for excessive clearance between installation position of wheel speed sensor and front steering knuckle.

(e) Check installation position of rear right wheel speed sensor for dirt.

NG → **Tighten fixing bolt properly, clean or replace wheel speed sensor**

OK ↓

3	**Check hub gear ring and drive shaft upper gear ring**

(a) Check hub gear ring and drive shaft upper gear ring for foreign matter, missing teeth or damage.

NG → **Replace hub bearing assembly or outer ball cage assembly**

OK ↓

4	**Check wheel speed sensor**

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.

(b) Check if data change of wheel speed sensor matches that of other wheel speed sensors.

NG → **Replace corresponding wheel speed sensor assembly**

OK ↓

5	**Check installation of angle sensor**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if angle sensor connector is connected securely.
(d) Check if angle sensor is installed in place.
(e) Check if angle sensor connector position is dirty.

NG → **Clean or replace spiral cable**

OK

6	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1000-16**	**ECU Voltage Too Low**
DTC	**C1000-17**	**ECU Voltage Too High**
DTC	**C1001-04**	**Internal fault in ECU system**
DTC	**C1009-00**	**ECU Hardware Related Fault**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-00-0-16	ECU Voltage Too Low	ECU voltage too low	ECU voltage too low	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C1-00-0-17	ECU Voltage Too High	ECU voltage too high	ECU voltage too high	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-00-1-04	Internal Fault in ECU System	Internal fault in ECU system	Internal fault in ECU system	/	/	• Battery voltage is too low or battery is damaged • ECU internal fault	/	/
C1-00-9-00	ECU Hardware Related Fault	ECU hardware related fault	ECU hardware related fault	/	/	• Battery voltage is too low or battery is damaged • ECU internal 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 fuse**

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if related wire harness or connector is well installed and check for looseness.
(d) Check fuse SB08 (40A) and EF28 (7.5A).
(e) Check if fuse is blown.

NG → **Replace related fuse**

OK

2	**Check battery voltage**

(a) Standard voltage: Not less than 12 V.

NG → **Replace battery or check charging system**

OK

3	Check wire harness and connector

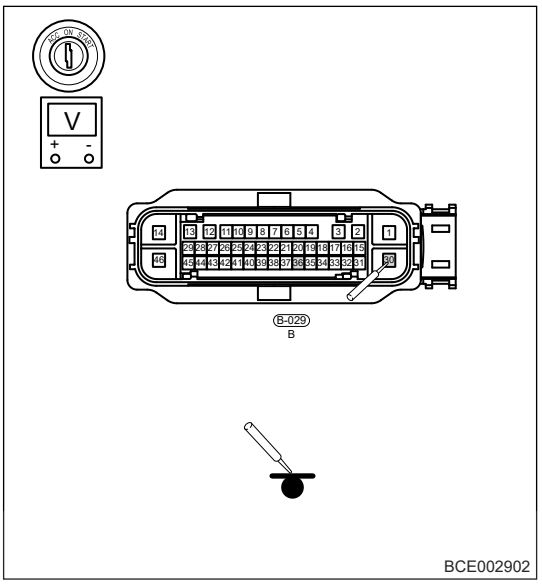
(a) Disconnect the EPB module connector B-029.

(b) Turn ENGINE START STOP switch to ON.

(c) Check if voltage between EPB module and body ground is normal.

Voltage Measurement

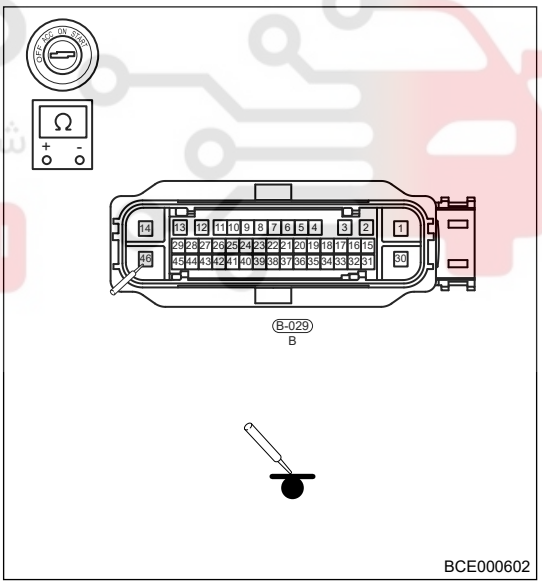
Multimeter Connection	Condition	Specified Condition
B-029 (30) - Body ground	Always	More than 12 V
B-029 (36) - Body ground	Always	More than 12 V



(d) Check if resistance between EPB module and body ground is normal.

Resistance Measurement

Multimeter Connection	Condition	Specified Condition
B-029 (14) - Body ground	Always	Less than 1 Ω
B-029 (46) - Body ground	Always	Less than 1 Ω



NG → **Repair or replace related wire harness and connector**

OK

4	Confirm DTCs again

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	C1803-95	Assembly Test

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-3-95	Assembly Test	Assembly test	Assembly test	/	/	• Assembly test is not performed • Power is not turned off normally after performing assembly test	/	/

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	**Perform assembly test**

(a) Turn off power normally after performing assembly test using diagnostic tester.

Next

2	**Confirm DTCs again**

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	C1804-53	Maintenance Mode

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-4-53	Maintenance Mode	Maintenance mode	Maintenance mode	/	/	• Enter service mode and not exit	/	/

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	**Perform assembly test**

(a) Turn off power normally after performing assembly test using diagnostic tester.

Next

2	**Confirm DTCs again**

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	C1826-01	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-82-6-01	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure	EPB actuator driver gen electrical failure - general electrical failure	EPB actuator driver gen electrical failure - general electrical failure	/	/	• Electronic control execution unit • ECU internal 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 related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left rear/right rear brake caliper connectors B-061 and B-060.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair/replace related wire harness and connector**

OK

2	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

3	Confirm DTCs again

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	C1807-98	Disc Over Heat

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-7-98	Disc Over Heat	Disc over heat	Disc over heat	/	/	• Electronic control execution unit • ECU internal 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	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	C1823-00	APB Motor Enable Line Violation

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-82-3-00	APB Motor Enable Line Violation	APB motor enable line violation	APB motor enable line violation	/	/	• Electronic control execution unit • ECU internal 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.

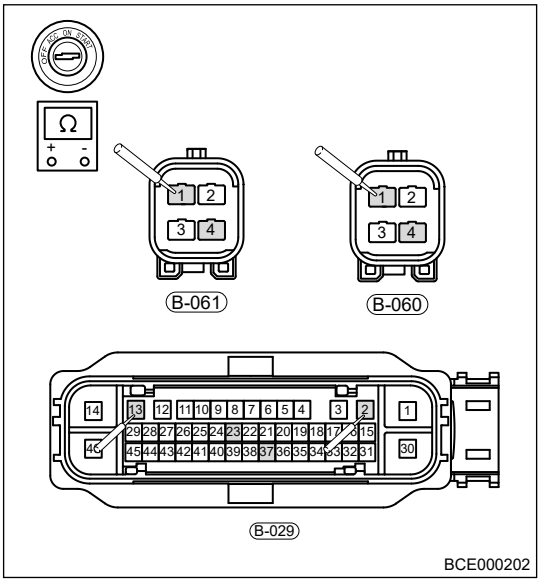
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

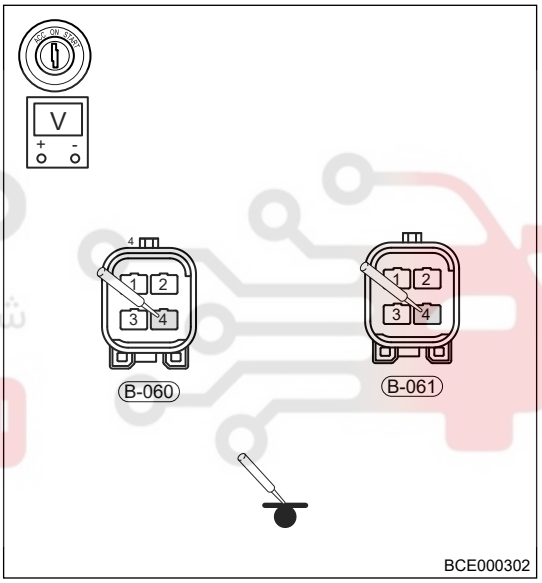
(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



(h) Check if resistance between left/right brake caliper and body ground is normal.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - Body ground	Always	0 V
B-061 (4) - Body ground	Always	0 V
B-060 (1) - Body ground	Always	0 V
B-060 (4) - Body ground	Always	0 V

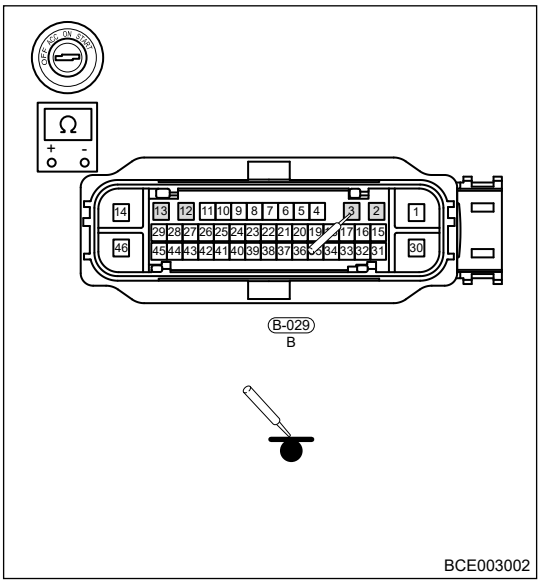


(i) Connect the negative battery cable.

(j) Turn ENGINE START STOP switch to ON.

(k) Check the voltage between EPB module and body ground.

Multimeter Connection	Condition	Specified Condition
B-029 (12) - Body ground	Always	More than 10 kΩ
B-029 (13) - Body ground	Always	More than 10 kΩ
B-029 (3) - Body ground	Always	More than 10 kΩ
B-029 (2) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK

2	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1806-01**	**EPB Button Line Failure-General Electrical Failure**
DTC	**C1806-16**	**APB Button Under Voltage**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-6-01	EPB Button Line Failure-General Electrical Failure	EPB button line failure-general electrical failure	EPB button line failure-general electrical failure	/	/	• EPB switch failure • ECU internal fault	/	/
C1-80-6-16	APB Button Under Voltage	APB button under voltage	APB button under 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) Standard voltage: Not less than 12 V.

NG → **Repair charging system/replace battery**

OK

2	**Check EPB switch**

(a) Turn ENGINE START STOP switch to OFF.

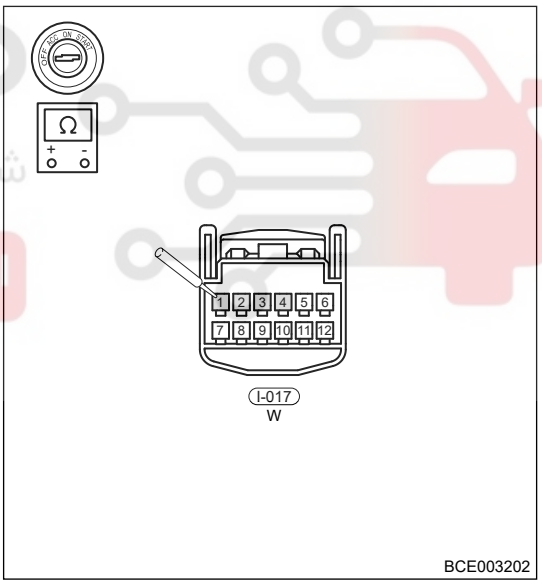
(b) Disconnect the negative battery cable.

(c) Disconnect the EPB switch connector I-017.

(d) Check if EPB switch is stuck or pushed in by other objects.

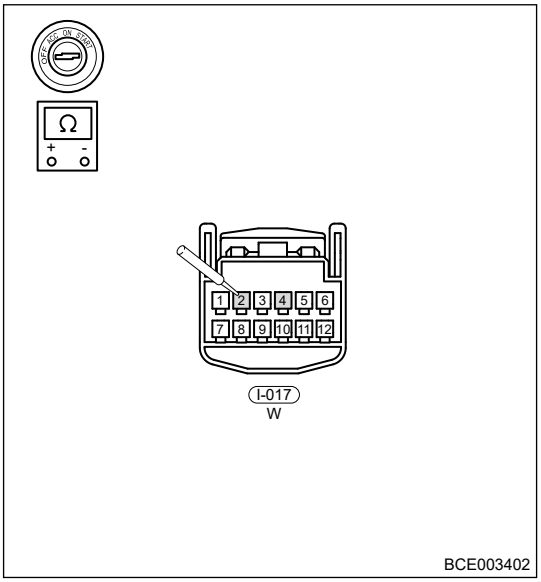
(e) Check for switch continuity when EPB switch is not pressed.

Multimeter Connection	Condition	Specified Condition
I-017 (1) - I-017 (2)	Always	Less than 1 Ω
I-017 (3) - I-017 (4)	Always	Less than 1 Ω



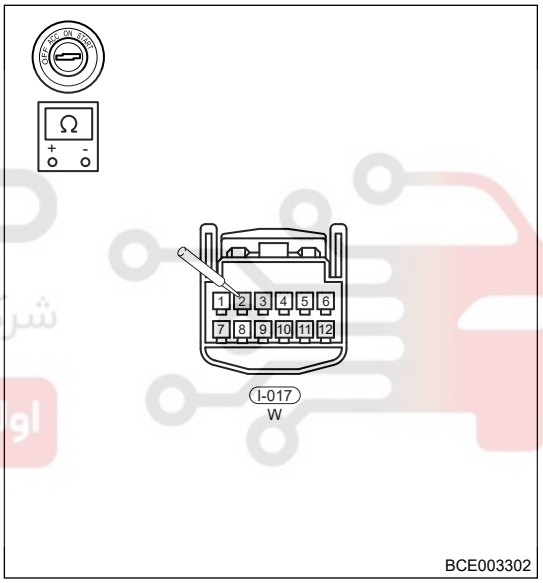
(f) Check for switch continuity when EPB switch is pressed.

Multimeter Connection	Condition	Specified Condition
I-017 (1) - I-017 (4)	Always	Less than 1 Ω



(g) Check for switch continuity when EPB switch is pulled.

Multimeter Connection	Condition	Specified Condition
I-017 (2) - I-017 (3)	Always	Less than 1 Ω

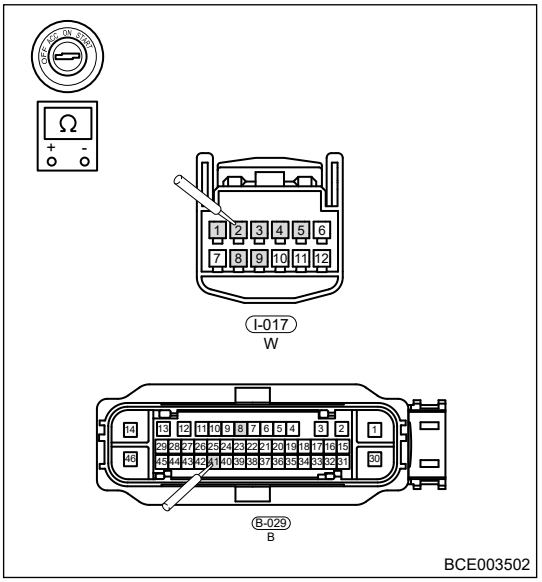


NG → **Replace EPB switch**

OK →

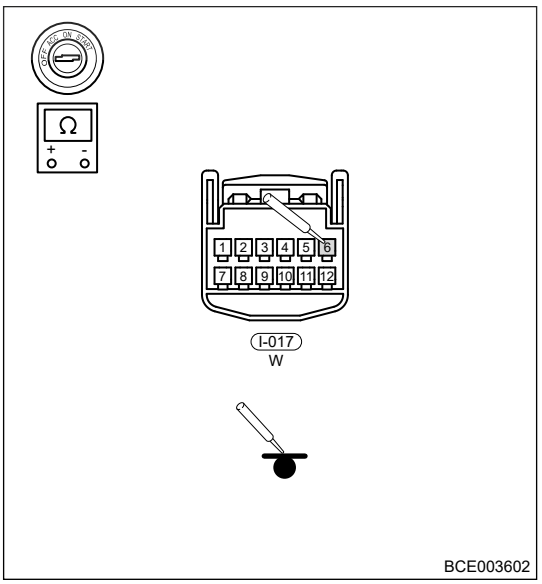
3	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the EPB switch connector I-017.
(d) Disconnect the EPB control module assembly B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Check for continuity between EPB switch and EPB module wire harness.



Multimeter Connection	Condition	Specified Condition
I-017 (1) - B-029 (31)	Always	Less than 1 Ω
I-017 (2) - B-029 (16)	Always	Less than 1 Ω
I-017 (3) - B-029 (15)	Always	Less than 1 Ω
I-017 (4) - B-029 (32)	Always	Less than 1 Ω
I-017 (5) - B-029 (18)	Always	Less than 1 Ω
I-017 (9) - B-029 (8)	Always	Less than 1 Ω
I-017 (8) - B-029 (41)	Always	Less than 1 Ω

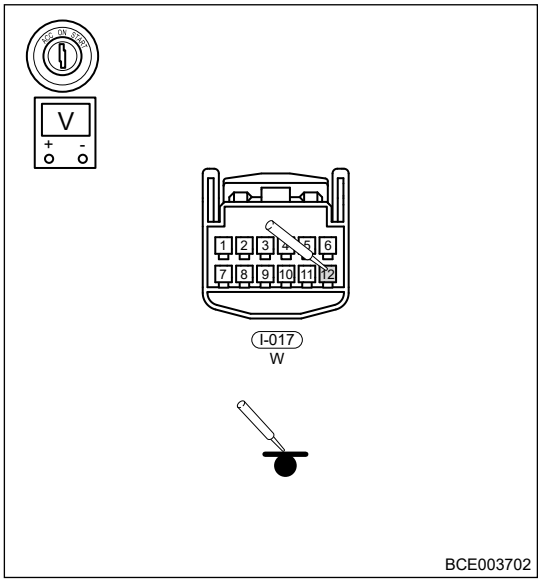
(h) Check the resistance between EPB switch and body ground.



Multimeter Connection	Condition	Specified Condition
I-017 (6) - Body ground	Always	Less than 1 Ω

(i) Check the voltage between EPB switch and body ground.

Multimeter Connection	Condition	Specified Condition
I-017 (12) - Body ground	Always	5 V



NG → **Repair/replace related wire harness and connector**

OK

4	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	C1830-00	APBActL_CAT
DTC	C1831-00	APBActR_CAT

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-83-0-00	APB-ActL_CAT	APBA-ctL_CAT	APBA-ctL_CAT	/	/	• Electronic control execution unit • ECU internal fault	/	/
C1-83-1-00	APB-ActR_CAT	APBA-ctL_CAT	APBA-ctL_CAT	/	/		/	/

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.

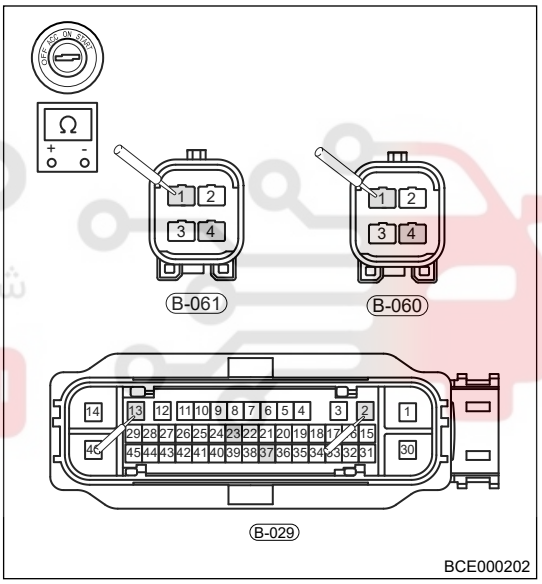
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

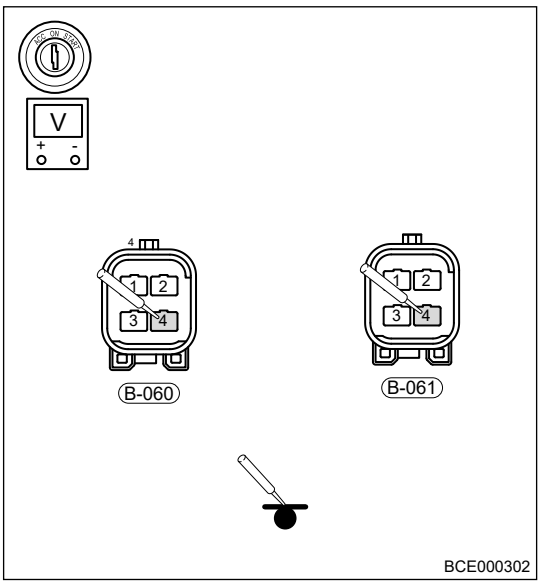
(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



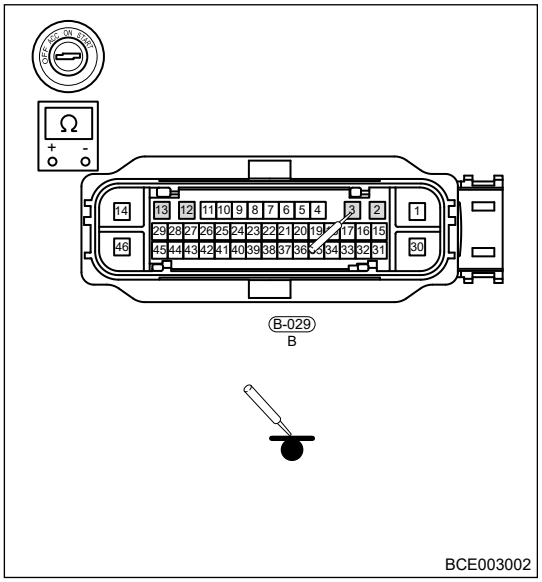
(h) Check the voltage between left/right brake caliper and body ground.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - Body ground	Always	0 V
B-061 (4) - Body ground	Always	0 V
B-060 (1) - Body ground	Always	0 V
B-060 (4) - Body ground	Always	0 V



(i) Connect the negative battery cable.
(j) Turn ENGINE START STOP switch to ON.
(k) Check the resistance between EPB module and body ground.

Multimeter Connection	Condition	Specified Condition
B-029 (12) - Body ground	Always	More than 10 kΩ
B-029 (13) - Body ground	Always	More than 10 kΩ
B-029 (3) - Body ground	Always	More than 10 kΩ
B-029 (2) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK

2	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1800-97**	**Left Actuator - Action Limited**
DTC	**C1801-97**	**Right Actuator - Action Limited**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-97	Left Actuator - Action Limited	Left actuator - action limited	Left actuator - action limited	/	/	• Electronic control execution unit failure • Dynamic park	/	/
C1-80-1-97	Right Actuator - Action Limited	Right actuator - action limited	Right actuator - action limited	/	/		/	/

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.

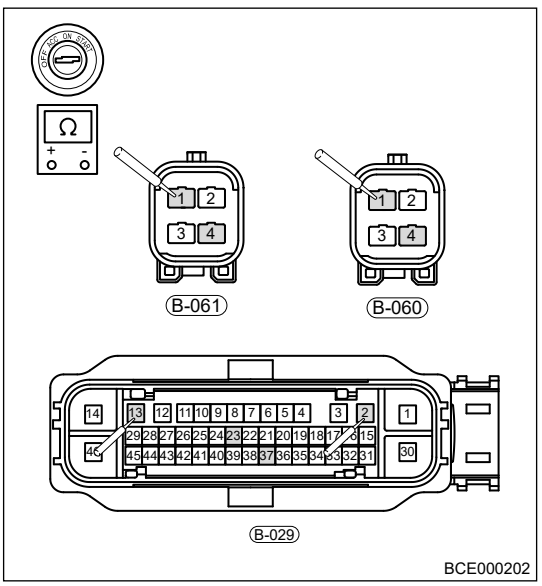
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

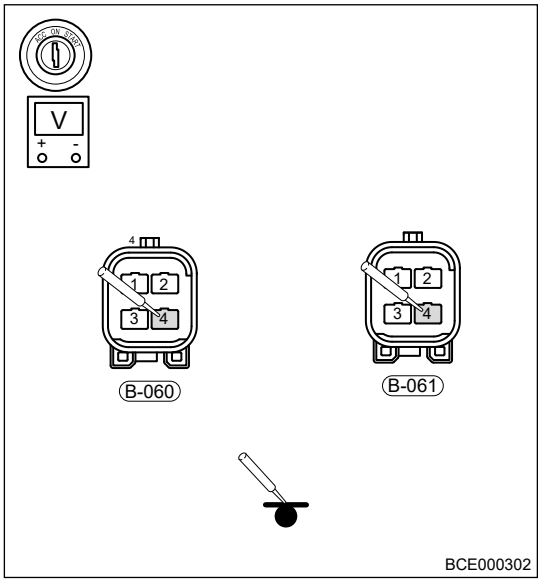
(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



(h) Check the voltage between left/right brake caliper and body ground.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - Body ground	Always	0 V
B-061 (4) - Body ground	Always	0 V
B-060 (1) - Body ground	Always	0 V
B-060 (4) - Body ground	Always	0 V

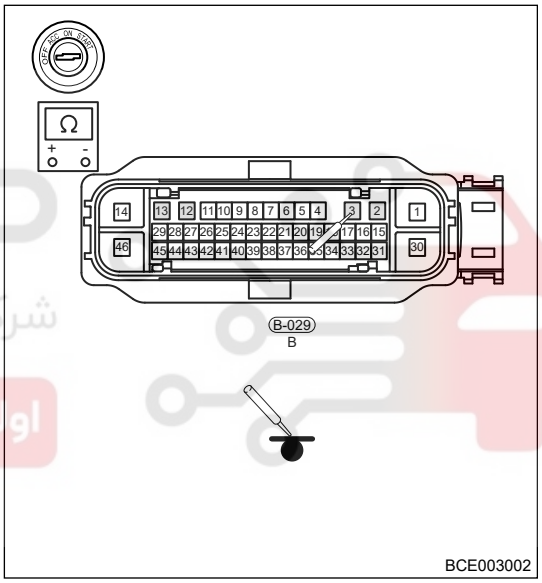


(i) Connect the negative battery cable.

(j) Turn ENGINE START STOP switch to ON.

(k) Check the resistance between EPB module and body ground.

Multimeter Connection	Condition	Specified Condition
B-029 (12) - Body ground	Always	More than 10 kΩ
B-029 (13) - Body ground	Always	More than 10 kΩ
B-029 (3) - Body ground	Always	More than 10 kΩ
B-029 (2) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK

2	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

3	Confirm DTCs again

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	**C1832-00**	**EPB Left Actuator Unintended Run-No Sub Type Information**
DTC	**C1833-00**	**EPB Right Actuator Unintended Run-No Sub Type Information**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-83-2-00	EPB Left Actuator Unintended Run-No Sub Type Information	EPB left actuator unintended run-no sub type information	EPB left actuator unintended run-no sub type information	/	/	• ECU internal fault	/	/
C1-83-3-00	EPB Right Actuator Unintended Run-No Sub Type Information	EPB right actuator unintended run-no sub type information	EPB right actuator unintended run-no sub type information	/	/		/	/

DTC Confirmation Procedure

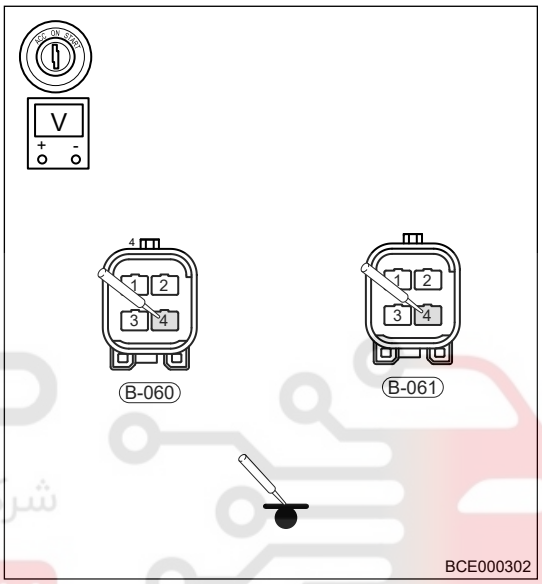
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Check the voltage between left/right brake caliper and body ground.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - Body ground	Always	0 V
B-061 (2) - Body ground	Always	0 V
B-060 (1) - Body ground	Always	0 V
B-060 (2) - Body ground	Always	0 V



NG → **Repair or replace related wire harness and connector**

OK →

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	C1800-73	Left Actuator - Apply Failed-Actuator Stuck Closed
DTC	C1801-73	Right Actuator - Apply Failed-Actuator Stuck Closed

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-73	Left Actuator - Apply Failed-Actuator Stuck Closed	Left actuator - apply failed-actuator stuck closed	Left actuator - apply failed-actuator stuck closed	/	/	• Vehicle Power Supply Voltage - Voltage Below Threshold • Electronic control execution unit internal resistance is too big	/	/
C1-80-1-73	Right Actuator - Apply Failed-Actuator Stuck Closed	Right actuator - apply failed-actuator stuck closed	Right actuator - apply failed-actuator stuck closed	/	/		/	/

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) Standard voltage: Not less than 12 V.

NG → **Repair charging system/replace battery**

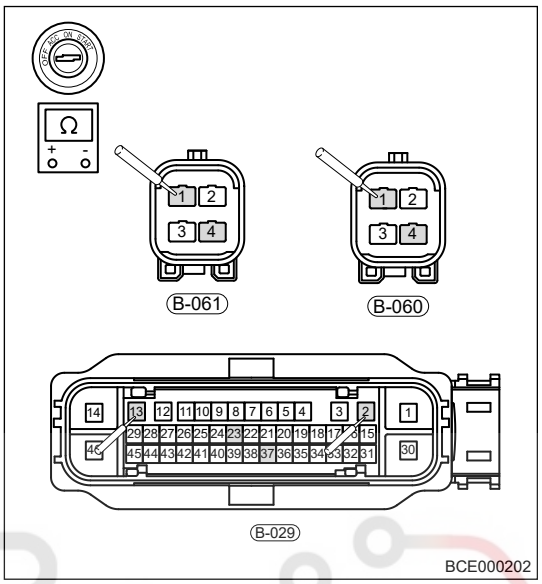
OK

2	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



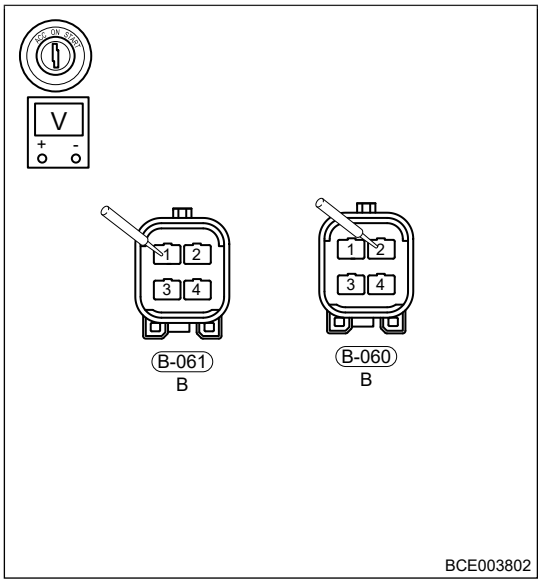
NG → **Repair or replace related wire harness and connector**

OK

3	**Check left/right brake caliper**

(a) Check internal resistance of left/right brake caliper motor.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-061 (2)	Always	1.1 -1.6 Ω
B-060 (1) - B-060 (2)	Always	1.1 -1.6 Ω



NG → **Replace left/right brake caliper**

OK

4	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1800-72**	**Left Actuator - Release Failed-Actuator Stuck Open**
DTC	**C1801-72**	**Right Actuator -Release Failed-Actuator Stuck Open**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-72	Left Actuator - Release Failed-Actuator Stuck Open	Left actuator - release failed-actuator stuck open	Left actuator - release failed-actuator stuck open	/	/	• Electronic control execution unit internal mechanical malfunction	/	/
C1-80-1-72	Right Actuator -- Release Failed-Actuator Stuck Open	Right actuator -- release failed-actuator stuck open	Right actuator -- release failed-actuator stuck open	/	/		/	/

DTC Confirmation Procedure

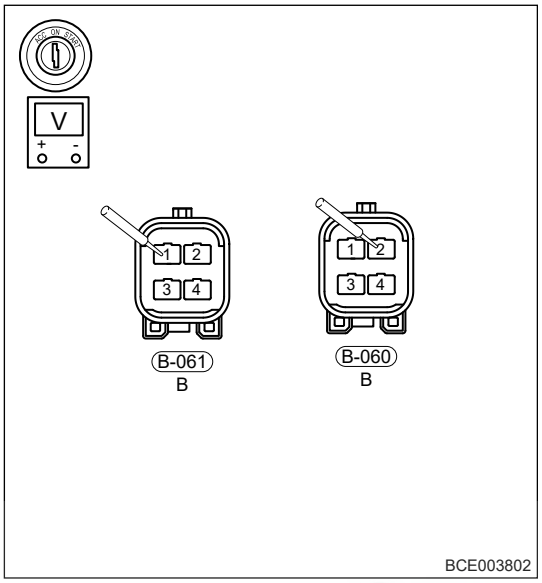
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Check left/right brake caliper**

(a) Check internal resistance of left/right brake caliper motor.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-061 (2)	Always	1.1 -1.6 Ω
B-060 (1) - B-060 (2)	Always	1.1 -1.6 Ω



NG → **Replace left/right brake caliper**

OK

2	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1800-93**	**Left Actuator - No Motor Start Detected-No Operation**
DTC	**C1801-93**	**Right Actuator - No Motor Start Detected-No Operation**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-93	Left Actuator - No Motor Start Detected-No Operation	Left actuator - no motor start detected-no operation	Left actuator - no motor start detected-no operation	/	/	• Electronic control execution unit internal resistance is too big	/	/
C1-80-1-93	Right Actuator - No Motor Start Detected-No Operation	Right actuator - no motor start detected-no operation	Right actuator - no motor start detected-no operation	/	/		/	/

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.

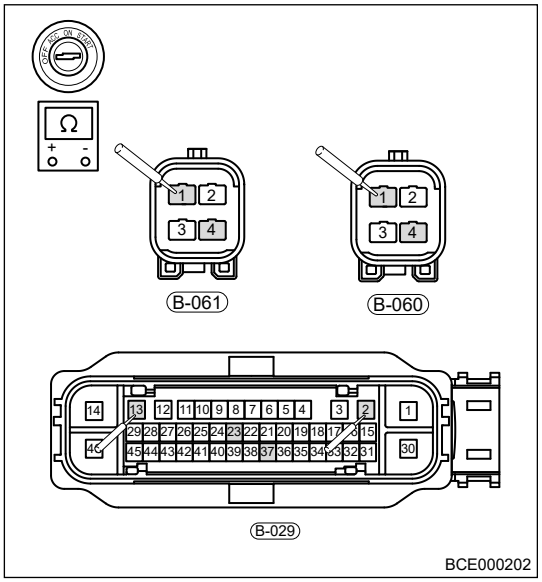
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



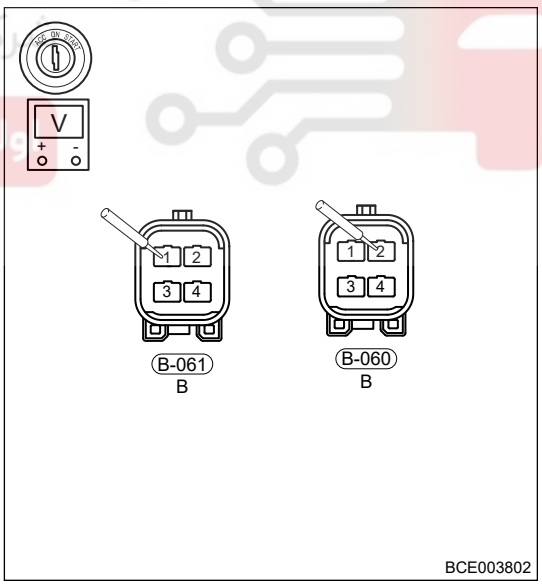
NG → **Repair or replace related wire harness and connector**

OK

2	**Check left/right brake caliper**

(a) Check internal resistance of left/right brake caliper motor.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-061 (2)	Always	1.1 -1.6 Ω
B-060 (1) - B-060 (2)	Always	1.1 -1.6 Ω



NG → **Replace left/right brake caliper**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace EPB module**

DTC	**C1800-19**	**Left Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold**
DTC	**C1801-19**	**Right Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1800-19	Left Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold	Left actuator - circuit current above threshold-circuit current above threshold	Left actuator - circuit current above threshold-circuit current above threshold	/	/	• Short circuit in electronic control execution unit	/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-1-19	Right Actuator - Circuit Current Above Threshold-Circuit Current Above Threshold	Right actuator - circuit current above threshold-circuit current above threshold	Right actuator - circuit current above threshold-circuit current above threshold	/	/		/	/

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.

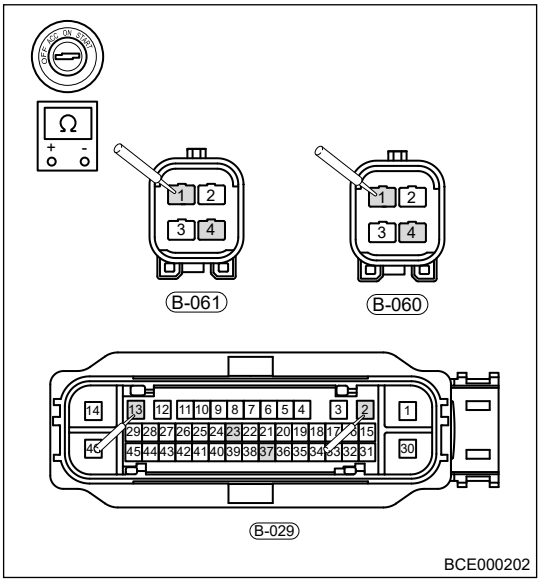
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

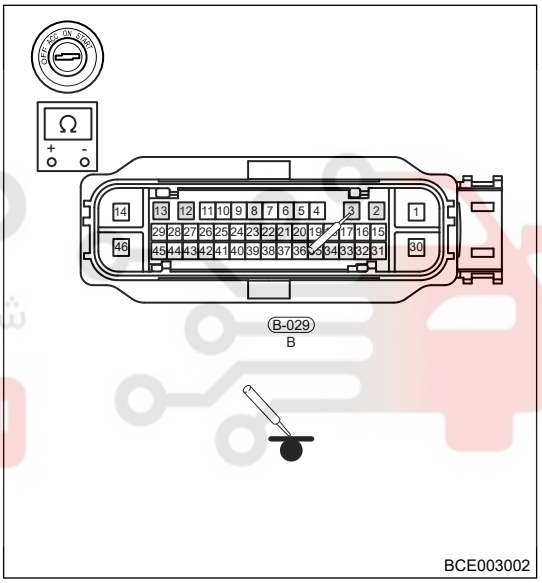
(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



(h) Check the resistance between EPB module and body ground.

Multimeter Connection	Condition	Specified Condition
B-029 (12) - Body ground	Always	More than 10 kΩ
B-029 (13) - Body ground	Always	More than 10 kΩ
B-029 (3) - Body ground	Always	More than 10 kΩ
B-029 (2) - Body ground	Always	More than 10 kΩ



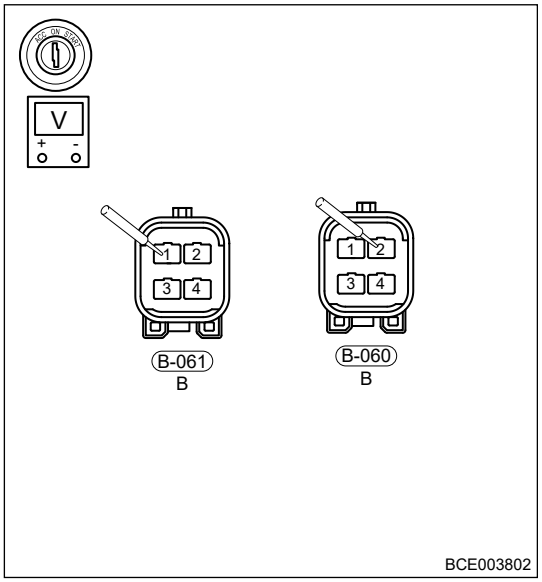
NG → **Repair or replace related wire harness and connector**

OK

2	**Check left/right brake caliper**

(a) Check internal resistance of left/right brake caliper motor.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-061 (2)	Always	1.1 -1.6 Ω
B-060 (1) - B-060 (2)	Always	1.1 -1.6 Ω



NG → **Replace left/right brake caliper**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1800-92**	**Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation**
DTC	**C1801-92**	**Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-92	Left Actuator - High Mechanical Resistance- Performance or Incorrect Operation	Left actuator - high mechanical resistance- performance or incorrect operation	Left actuator - high mechanical resistance- performance or incorrect operation	/	/	• Electronic control execution unit mechanical malfunction	/	/
C1-80-1-92	Right Actuator - High Mechanical Resistance- Performance or Incorrect Operation	Right actuator - high mechanical resistance- performance or incorrect operation	Right actuator - high mechanical resistance- performance or incorrect operation	/	/		/	/

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	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

OK

2	Confirm DTCs again

(a) Clear DTCs.

(b) Start the vehicle.

(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.

(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	C1800-91	Left Actuator - Wrong Operating Characteristics Detect-Parametric
DTC	C1801-91	Right Actuator - Wrong Operating Characteristics Detect-Parametric

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-80-0-91	Left Actuator - Wrong Operating Characteristics Detect-Parametric	Left actuator - wrong operating characteristics detect-parametric	Left actuator - wrong operating characteristics detect-parametric	/	/	• Electronic control execution unit internal resistance is too big	/	/
C1-80-1-91	Right Actuator - Wrong Operating Characteristics Detect-Parametric	Right actuator - wrong operating characteristics detect-parametric	Right actuator - wrong operating characteristics detect-parametric	/	/		/	/

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.

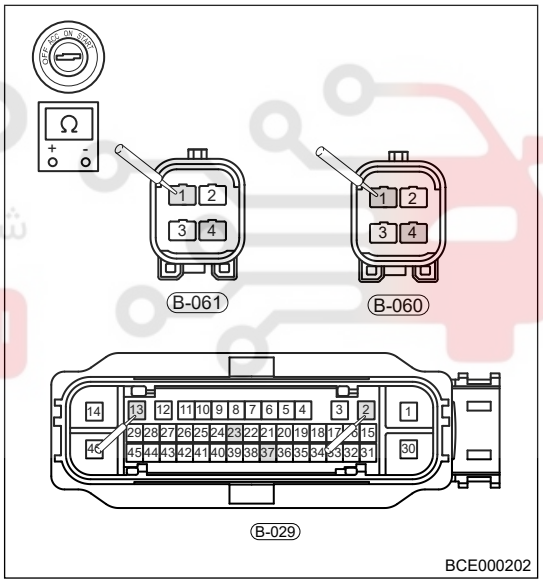
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



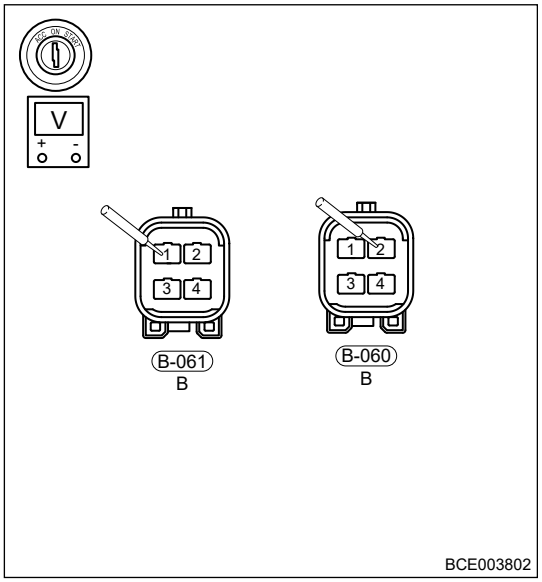
NG → **Repair or replace related wire harness and connector**

OK

2	Check left/right brake caliper

(a) Check internal resistance of left/right brake caliper motor.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - B-061 (2)	Always	1.1 -1.6 Ω
B-060 (1) - B-060 (2)	Always	1.1 -1.6 Ω



NG → **Replace left/right brake caliper**

OK →

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**C1824-01**	**EPB Left Actuator Electrical Failure-General Electrical Failure**
DTC	**C1822-00**	**EPB Left Actuator Failure**
DTC	**C1824-1E**	**EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range**
DTC	**C1825-01**	**EPB Right Actuator Electrical Failure-General Electrical Failure**
DTC	**C1821-00**	**EPB Right Actuator Failure**
DTC	**C1825-1E**	**EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
C1-82-4-01	EPB Left Actuator Electrical Failure-General Electrical Failure	EPB left actuator electrical failure-general electrical failure	EPB left actuator electrical failure-general electrical failure	/	/	• Electronic control execution unit • ECU internal fault	/	/
C1-82-2-00	EPB Left Actuator Failure	EPB left actuator failure	EPB left actuator failure	/	/		/	/
C1-82-4-1E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	EPB left actuator shunt on line or ECU-circuit resistance out of range	EPB left actuator shunt on line or ECU-circuit resistance out of range	/	/		/	/
C1-82-5-01	EPB Right Actuator Electrical Failure-General Electrical	EPB right actuator electrical failure-general electrical failure	EPB right actuator electrical failure-general electrical failure	/	/		/	/

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Failure							
C1-82-1-00	EPB Right Actuator Failure	EPB right actuator failure	EPB right actuator failure	/	/		/	/
C1-82-5-1E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	EPB right actuator shunt on line or ECU-circuit resistance out of range	EPB right actuator shunt on line or ECU-circuit resistance out of 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	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active tester.

NG → **Replace left/right brake caliper**

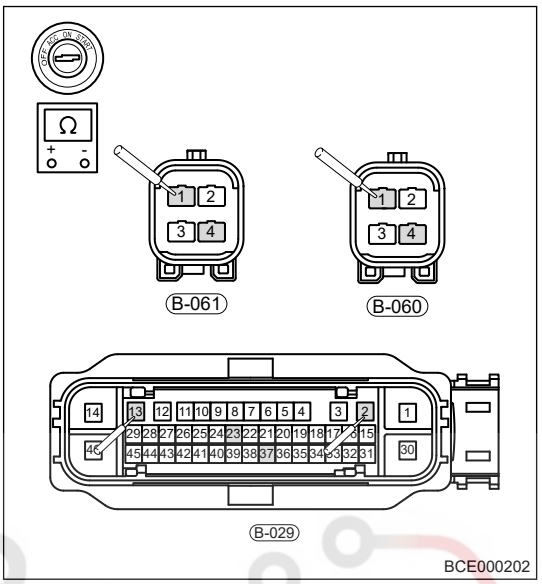
OK

2	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left/right brake caliper connectors B-061 and B-060.
(d) Disconnect the EPB control module assembly connector B-029.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.

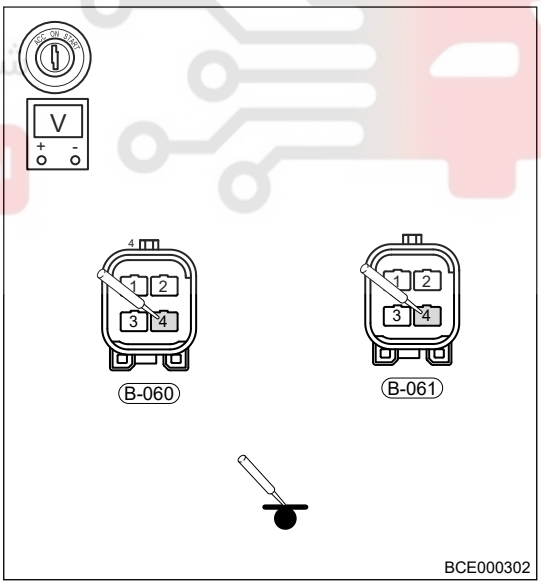
(g) Check for continuity between left/right brake caliper and EPB module wire harness.

Multimeter Connection	Condition	Specified Condition
B-061 (2) - B-029 (12)	Always	Less than 1 Ω
B-061 (1) - B-029 (13)	Always	Less than 1 Ω
B-060(2) - B-029 (3)	Always	Less than 1 Ω
B-060(1) - B-029 (2)	Always	Less than 1 Ω



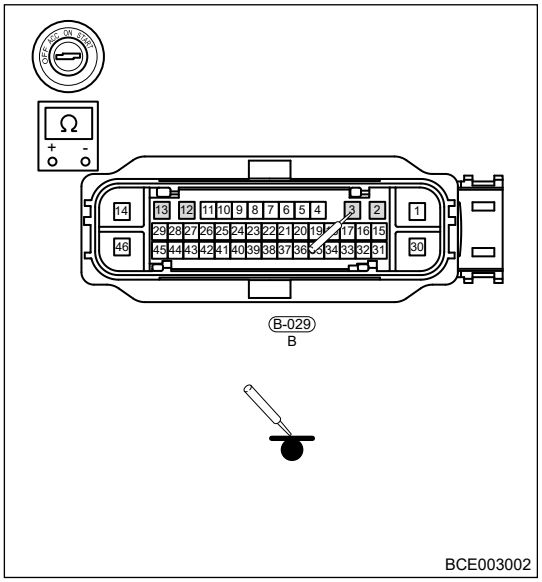
(h) Check the voltage between left/right brake caliper and body ground.

Multimeter Connection	Condition	Specified Condition
B-061 (1) - Body ground	Always	0 V
B-061 (2) - Body ground	Always	0 V
B-060 (1) - Body ground	Always	0 V
B-060 (2) - Body ground	Always	0 V



(i) Connect the negative battery cable.
(j) Turn ENGINE START STOP switch to ON.
(k) Check the resistance between EPB module and body ground.

Multimeter Connection	Condition	Specified Condition
B-029 (12) - Body ground	Always	More than 10 kΩ
B-029 (13) - Body ground	Always	More than 10 kΩ
B-029 (3) - Body ground	Always	More than 10 kΩ
B-029 (2) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK →

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace EPB module**

DTC	**U0005-00**	**High Speed CAN Communication Bus (+) High**
DTC	**U0007-00**	**High Speed CAN Communication Bus (-) Low**
DTC	**U0073-88**	**Control Module Communication Bus Off**
DTC	**U0100-87**	**Lost Communication With ECM (ESP Only)**
DTC	**U0101-87**	**Lost Communication With TCM (ESP Only)**
DTC	**U0616 - 87**	**Lost Communication With Steering Angle Sensor Module (ESP Only)**
DTC	**U0140-87**	**Lost Communication With BCM (ESP Only)**
DTC	**U0401-81**	**Invalid Data Received From ECM (ESP Only)-Invalid Serial Date Received**
DTC	**U0402-81**	**Invalid Data Received From TCM (ESP Only)-Invalid Serial Date Received**

DTC	U0422-81	Invalid Data Received From Body Control Module (ESP Only)
DTC	U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)
DTC	U1300-55	Software Configuration Error
DTC	U1163-87	Lost Communication With ACC (ESP Only)-Miss Message
DTC	U0433 - 81	Invalid Data Received From ACC (ESP Only)-Invalid Serial Date Received
DTC	U1410 - 81	HAS_InvalidValue-Invalid Serial Date Received
DTC	U1411 - 81	APBSystemState_InvalidValue APB-Invalid Serial Date Received
DTC	U1412-81	ABANet_InvalidValue-Invalid Serial Date Received
DTC	U1413-81	ABPNet_InvalidValue-Invalid Serial Date Received
DTC	U1414-81	ACCNet_InvalidValue-Invalid Serial Date Received
DTC	U1415-81	AEBNet_InvalidValue-Invalid Serial Date Received
DTC	U1416-81	AWBNet_InvalidValue-Invalid Serial Date Received
DTC	U1417-81	AccPedalNet_InvalidValue-Invalid Serial Date Received
DTC	U1418-81	BTMNet_InvalidValue-Invalid Serial Date Received
DTC	U1419-81	CDDNet_InvalidValue-Invalid Serial Date Received
DTC	U1421 - 81	SClutch_InvalidValue-Invalid Serial Date Received
DTC	U1422 - 81	EngineNet_InvalidValue-Invalid Serial Date Received
DTC	U1423 - 81	StartStopNet_InvalidValue StartStop-Invalid Serial Date Received
DTC	U1424 - 81	TCUNet_InvalidValue-Invalid Serial Date Received
DTC	U1425 - 81	VLCNet_InvalidValue-Invalid Serial Date Received
DTC	U1426-81	VacuumNet_InvalidValue-Invalid Serial Date Received
DTC	U0146 - 87	Lost Communication With CGW
DTC	U0447-81	Invalid Data Received From CGW-Invalid Serial Date Received
DTC	U0155-87	Lost Communication With ICM-Miss Message
DTC	U0423-81	Invalid Data Received From ICM-Invalid Serial Date Received
DTC	U0142-87	Lost Communication With AVM-Miss Message
DTC	U0433 - 81	Invalid Data Received From AVM-Invalid Serial Date Received

Refer to CAN data communication.

ON-VEHICLE SERVICE

Brake System Bleeding

Operation Step

Warning
• When bleeding brake system, wear safety glasses. If brake fluid gets on your eyes or skin, wash off with water completely. • Brake fluid has a corrosive on body paint surface. Do not drop brake fluid on body paint surface.

Caution
• Brake fluid should meet Chery specified type (DOT4). DO NOT mix brake fluid with other types of brake fluid. • Brake fluid has strong water absorbability, be sure to place it in the original sealed container. • To prevent dust and other foreign matter from entering reservoir, wipe it off before removing reservoir cap.

1. Bleeding procedures for brake system with diagnostic tester are as follows:
   a. Make sure all brake lines are installed and tightened properly.
   b. Check that battery voltage is normal.
   c. Turn ENGINE START STOP switch to OFF.
   d. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
   e. Turn ENGINE START STOP switch to ON.
   f. Using diagnostic tester, read and clear DTCs stored in EPB/ESP control module assembly.
   g. Using diagnostic tester, enter Brake Control System, select manual bleeding, and then perform operation according to information and procedures displayed on diagnostic tester.

      Hint:
      - If bleeder plug is open, never depress brake pedal repeatedly. Doing so will increase the amount of air in system.
      - Do not drain brake fluid from brake fluid reservoir while bleeding the system. Otherwise, low fluid level in brake reservoir will cause additional air to enter the brake system.
      - Always check brake fluid level at all times to ensure that brake fluid level in brake reservoir is always close to MAX level.

   h. For X type brake circuit, the bleeding order is: rear left wheel, front left wheel, front right wheel, rear right wheel.
   i. After bleeding is completed, fill brake reservoir with brake fluid to MAX level.
   j. Drive vehicle to perform a road test, and confirm that EPB/ESP system operates normally and brake pedal feel is good.

EPB/ESP Control Module Assembly

Removal

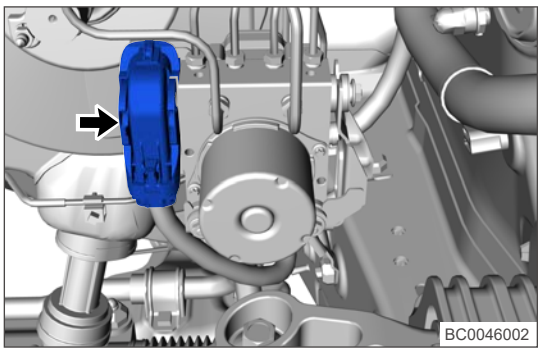
Caution
• When repairing EPB/ESP system, first release the pressure of high pressure brake fluid in accumulator, to prevent high pressure brake fluid from spraying out and causing injury. • Operation step: First turn ENGINE START STOP switch off, then depress and release brake pedal repeatedly, until brake pedal becomes hard. • In addition, never turn on ENGINE START STOP switch before EPB/ESP system is installed completely to prevent hydraulic pump from energizing and running.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable
3. Remove the battery assembly.
4. Drain the brake fluid.

   Hint:
   Drained brake fluid should be well kept in a container. Never discard it at will.

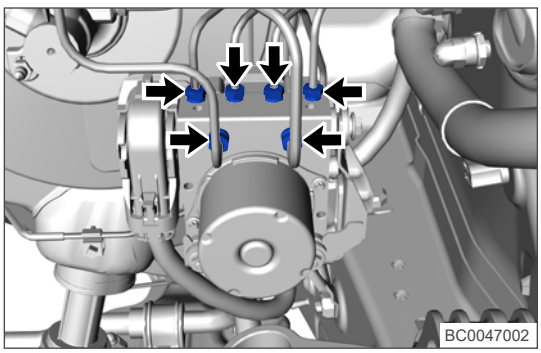
Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

5. Remove the EPB/ESP control module assembly.
   a. Press the lock area of EPB/ESP control module assembly connector, toggle the connector lock bracket downward and disconnect the EPB/ESP control module assembly connector (arrow).



   b. Using a fixing wrench, carefully disconnect 6 brake pipe coupling bolts (arrow).

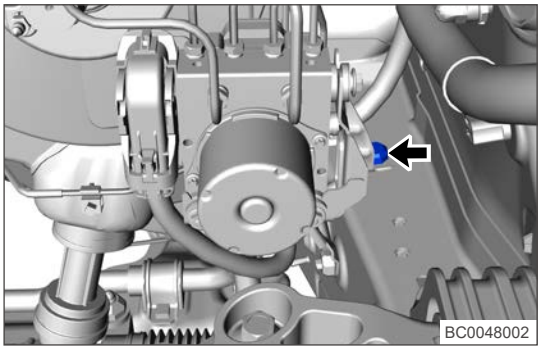
      Tightening torque: 18 ± 2 N m



Caution
• When removing brake line, prevent foreign matter form entering EPB/ESP control module assembly threaded holes. • After disconnecting brake line, sealing measure should be taken to prevent foreign matter form entering.

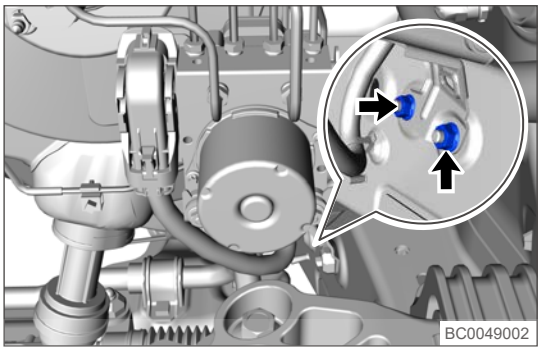
c. Remove fixing bolt (arrow) between EPB/ESP control module assembly mounting bracket and body.

Tightening torque: 23 ± 3.5 N·m



d. Remove coupling nuts (arrow) between EPB/ESP control module assembly mounting bracket and body.

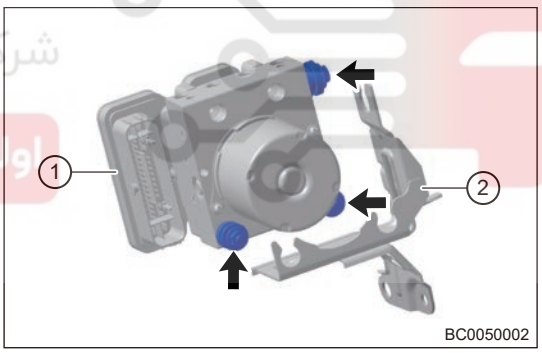
Tightening torque: 23 ± 3.5 N·m



e. Remove the EPB/ESP control module assembly with mounting bracket.

Disassembly

1. Remove the EPB/ESP control module assembly.
   a. Remove 3 fixing nuts (arrow) between EPB/ESP control module assembly (1) and mounting bracket (2).



   b. Remove the EPB/ESP control module assembly with mounting bracket.

Installation

1. Installation is in the reverse order of removal.

Caution
• EPB/ESP control module assembly contains hydraulic control module and electronic control module. As a unit, they cannot be repaired or replaced individually. • Check insulator for aging or damage. Replace if necessary. • When installing fixing bolts and screws, be sure to tighten them to specified torque. • Perform ABS bleeding procedures for brake system after completing installation. • Using diagnostic tester, enter brake control system, record and clear trouble code, then drive vehicle to perform a road test, confirming that EPB/ESP system operates normally and brake pedal feel is good. • It is necessary to perform yaw rate sensor calibration after replacing ESP assembly. • After replacing ESP assembly, perform “Assembly Inspection” with diagnostic tester, otherwise, malfunction may be lit.

Front Wheel Speed Sensor (Front Left Wheel as Example)

Removal

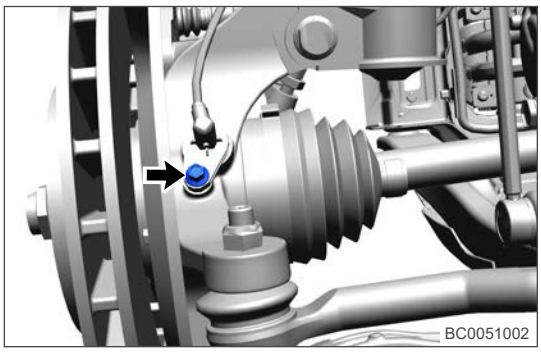
Caution
Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.

Hint:

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

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable
3. Remove the front left wheel.
4. Remove the front left wheel speed sensor.
   a. Remove the fixing bolt (arrow) between front left wheel speed sensor and front left steering knuckle assembly, and disengage the front left wheel speed sensor carefully.

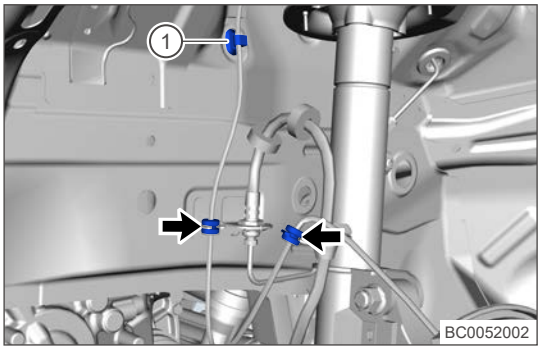
      Tightening torque: 9 ± 1.5 N·m



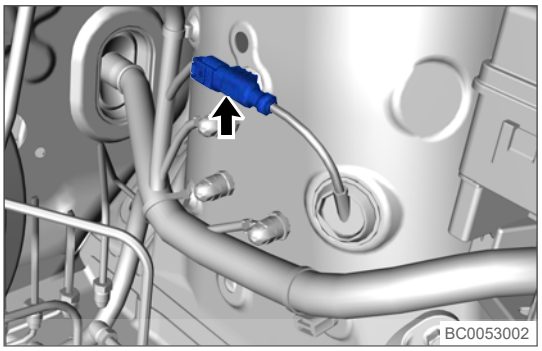
Caution
Keep head and installation hole of sensor free of foreign matter.

b. Disengage the attachment part (arrow) of front left wheel speed sensor wire harness from front left shock absorber assembly and fixing bracket, disengage fixing clip (1) from front left wheel speed sensor wire harness.

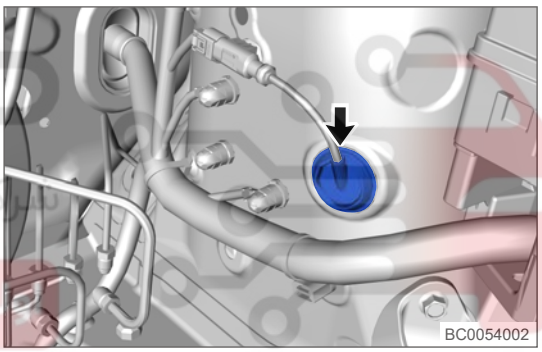
Hint:
Observe winding direction of sensor wire harness to prevent incorrect installation.



c. Disconnect the front left wheel speed sensor wire harness connector (arrow).



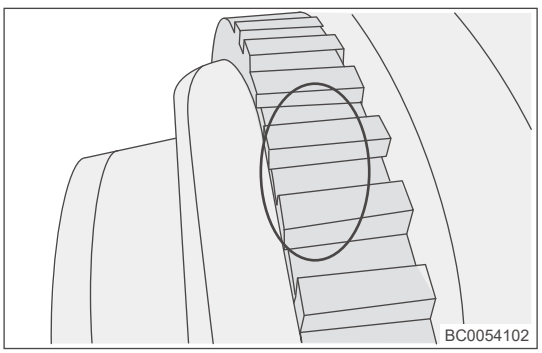
d. Detach the front left wheel speed sensor wire harness cover (arrow) from body.



e. Remove the front left wheel speed sensor.

Inspection

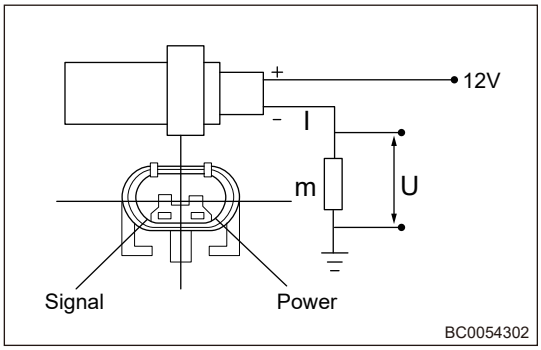
1. Check the front wheel speed sensor.
   a. Check front wheel speed sensor surface for breakage, dents or notch.
   b. Check front wheel speed sensor connector or wire harness for scratches, breakage or damage.
   c. If any of above conditions occurs, replace the front wheel speed sensor with a new one.
   d. Check wheel speed sensor for proper installation.
   e. Using a diagnostic tester, read datastream of wheel speed sensor, record if each wheel speed is consistent with acceleration display, and if vehicle speed display is accurate.



f. If wheel speed display is inconsistent, check the corresponding wheel speed sensor signal ring gear for missing teeth, dirt, demagnetization, off center.

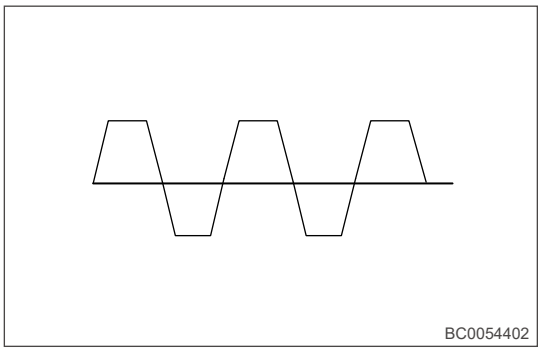
2. Simple test for wheel speed sensor

a. Connect power supply terminal of sensor to 12 V power supply, connect sensor signal terminal and 75 Ω resistor in series and make it grounded, then rotate wheels and test voltage signal of resistor with an oscilloscope.



b. U is switched between high and low levels without any obvious teeth missing as ring gear rotates.

- U low ≈ 0.54 V
- U high ≈ 1.07 V



Caution
• Poles cannot be connected inversely during test, otherwise, damage may be caused. • Above mentioned is a simple method and cannot replace the complete function test. • Causes that affect test may include: Ring gear quality, installation error, etc.

c. After any repair actions on wheel speed sensor, it is necessary to accelerate vehicle to 40 Km/h or more to perform dynamic self-test of EPB/ESP system.

d. If malfunction still cannot be eliminated after completing dynamic self-test, replace wheel speed sensor.

e. After repair is finished, perform completion inspection.

Installation

1. Installation is in the reverse order of removal.

Caution
When installing coupling bolts, be sure to tighten them to specified torque.

Rear Wheel Speed Sensor (Rear Left Wheel as Example)

Removal

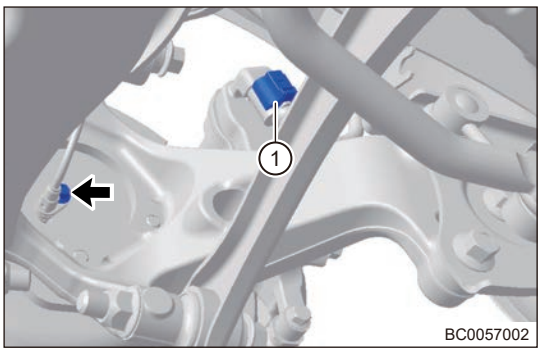
Caution
Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.

Hint:

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

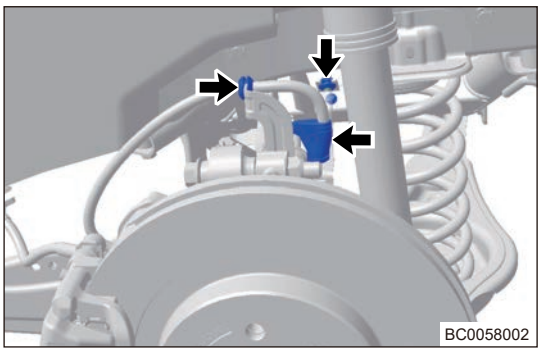
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable
3. Remove the rear left wheel.
4. Remove the rear left wheel speed sensor.
   a. Remove fixing bolt (arrow) from rear left wheel speed sensor.

      Tightening torque: 9 ± 1.5 N·m

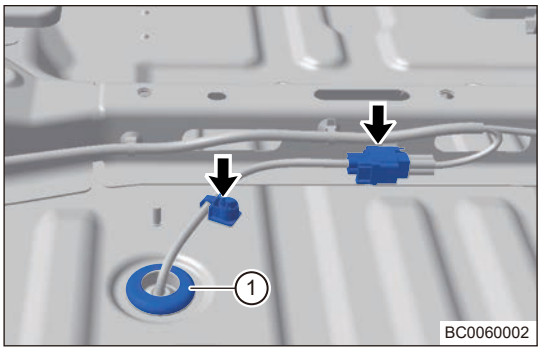


Caution
Keep head and installation hole of sensor free of foreign matter.

   b. Detach attachment parts (arrow) of rear wheel speed sensor wire harness from fixing bracket.



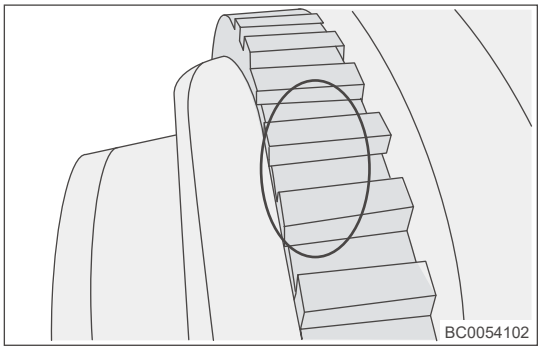
   c. Remove the rear seat cushion assembly.
   d. Disconnect connector (arrow) from rear wheel speed sensor with caliper wire harness assembly.



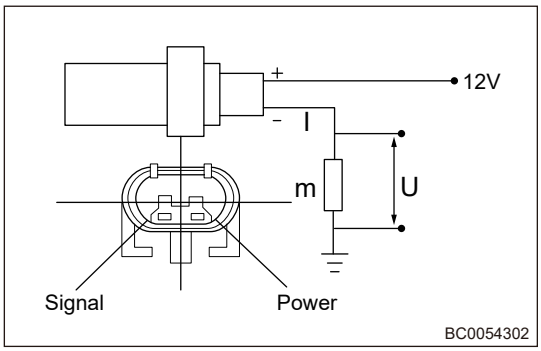
e. Remove the rear left wheel speed sensor.

Inspection

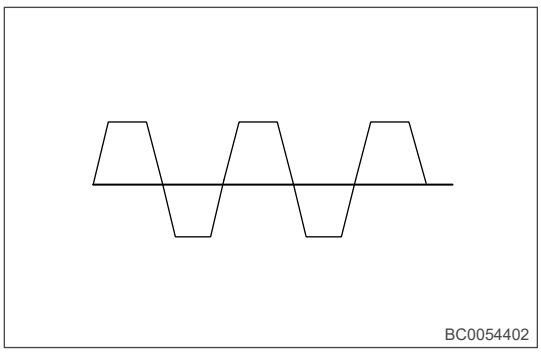
1. Check the rear left wheel speed sensor.
   a. Check rear wheel speed sensor surface for breakage, dents or notch.
   b. Check rear wheel speed sensor connector or wire harness for scratches, breakage or damage.
   c. If any of above conditions occurs, replace rear wheel speed sensor with a new one.
   d. Check wheel speed sensor for proper installation.
   e. Using a diagnostic tester, read datastream of wheel speed sensor, record if each wheel speed is consistent with acceleration display, and if vehicle speed display is accurate.



   f. If wheel speed display is inconsistent, check the corresponding wheel speed sensor signal ring gear for missing teeth, dirt, demagnetization, off center.
2. Simple test for wheel speed sensor
   a. Connect power supply terminal of sensor to 12 V power supply, connect sensor signal terminal and 75 Ω resistor in series and make it grounded, then rotate wheels and test voltage signal of resistor with an oscilloscope.



   b. U is switched between high and low levels without any obvious teeth missing as ring gear rotates.
      - U low ≈ 0.54 V
      - U high ≈ 1.07 V



Caution
• Poles cannot be connected inversely during test, otherwise, damage may be caused. • Above mentioned is a simple method and cannot replace the complete function test. • Causes that affect test may include: Ring gear quality, installation error, etc.

c. After any repair actions on wheel speed sensor, it is necessary to accelerate vehicle to 40 Km/h or more to perform dynamic self-test of EPB/ESP system.
d. If malfunction still cannot be eliminated after completing dynamic self-test, replace wheel speed sensor.
e. After repair is finished, perform completion inspection.

Installation

1. Installation is in the reverse order of removal.

Caution
When installing coupling bolts, be sure to tighten them to specified torque.

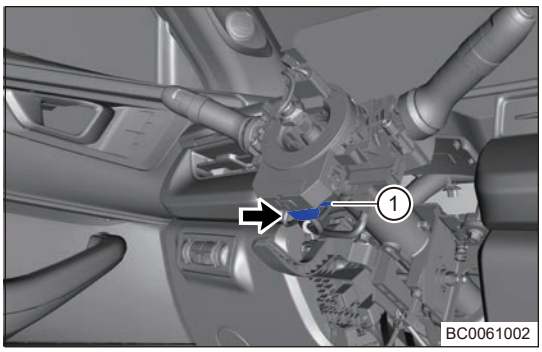
Steering Angle Sensor

Removal

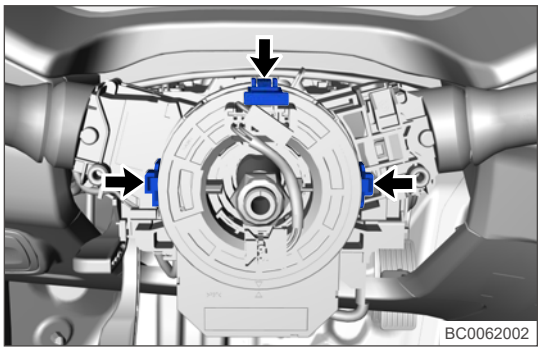
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable

Caution
Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

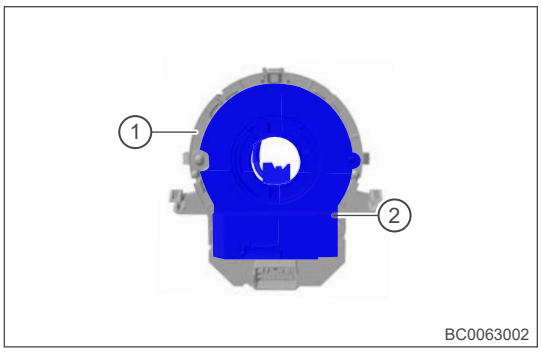
3. Position the front wheels straight ahead.
4. Remove the steering wheel assembly
5. Remove the combination switch cover.
6. Remove the steering angle sensor.
   a. Disconnect the spiral cable wire harness connector (-arrow) and angle sensor connector (1).



   b. Detach the fixing claws (arrow) between spiral cable and steering column, and remove the spiral cable.



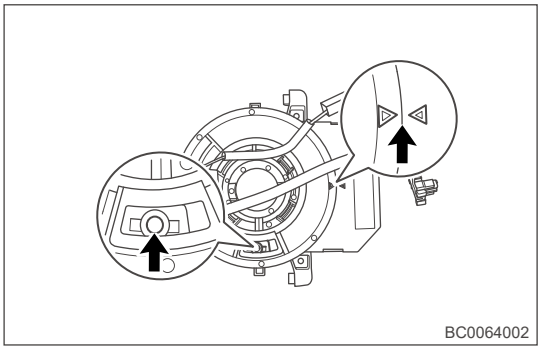
   c. Detach the steering angle sensor fixing claws and separate the angle sensor (1) and spiral cable (2).



Installation

1. Installation is in the reverse order of removal.

- Always install spiral cable correctly according to matchmarks on spiral cable and steering column (fully turn spiral cable clockwise slowly, then turn it counterclockwise until yellow ball appears in transparent neutral window and arrow marks are aligned with each other), otherwise the spiral cable may be damaged.



Caution

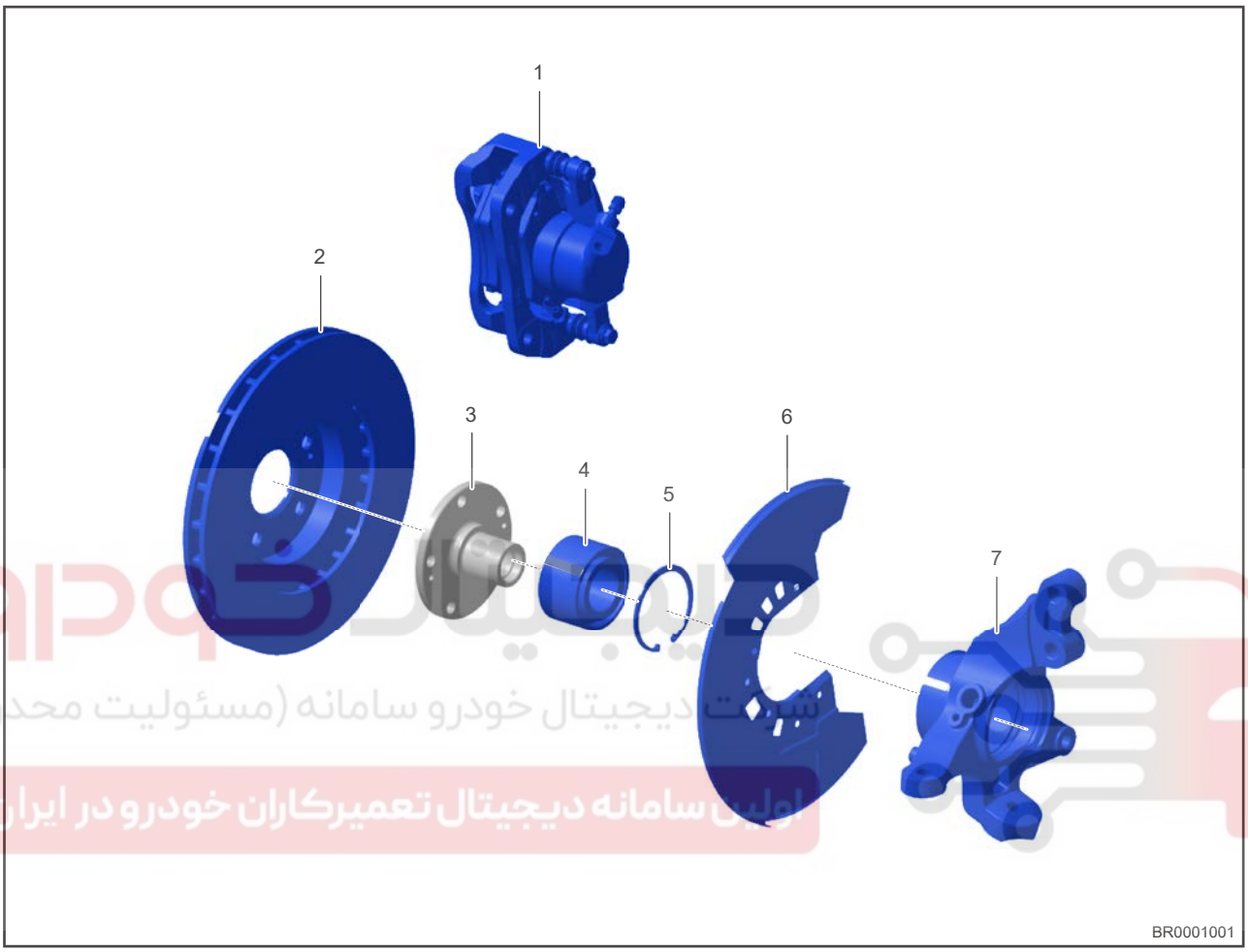
- Always install spiral cable correctly according to specified operating instructions.
- DO NOT rotate the spiral cable over specified turns to prevent it from breaking.
- Be sure to install fixing claws in place when installing spiral cable.
- Check that horn operates normally after installation.
- Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.
- It is necessary to adjust front wheel alignment.

BRAKE

GENERAL INFORMATION

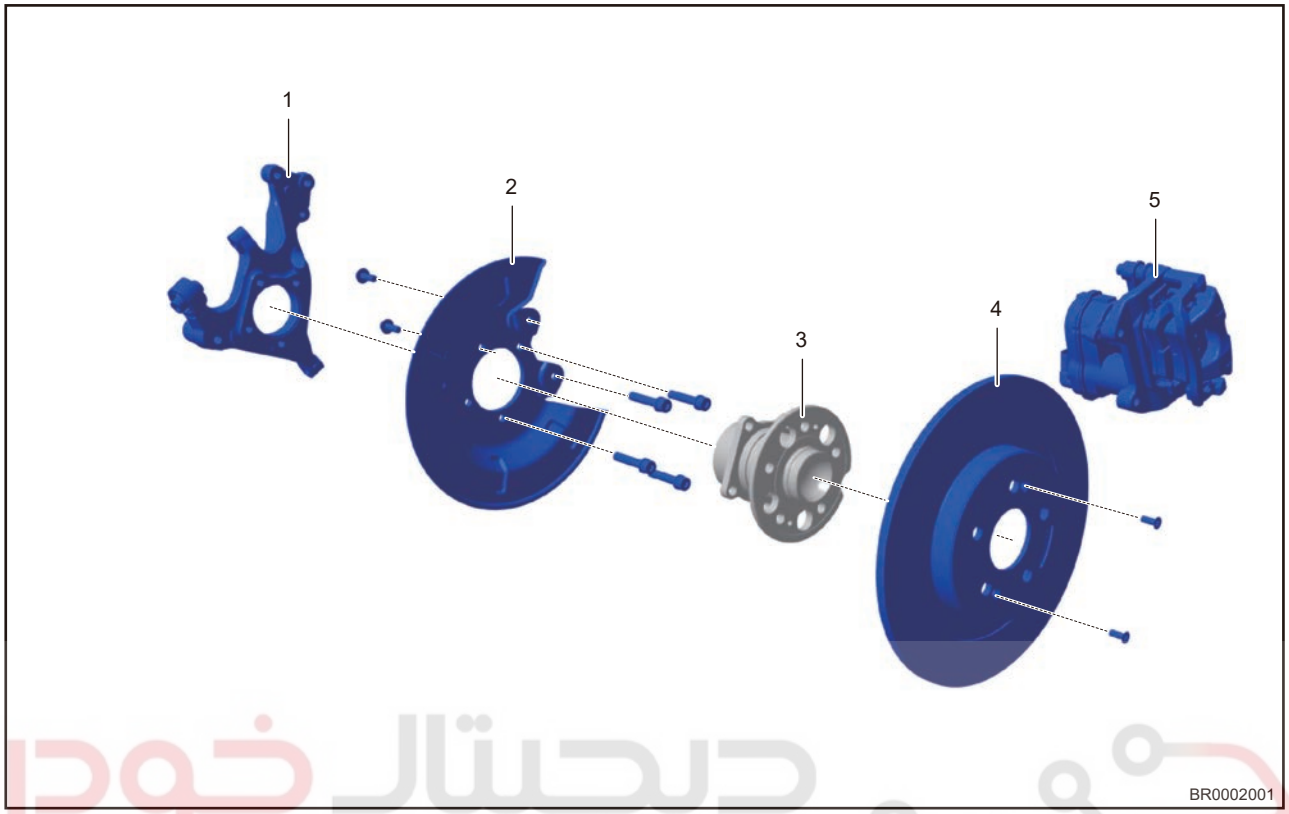
Description

Front Ventilated Disc Brake Assembly



1	Front Brake Caliper Assembly	5	Bearing Retainer
2	Front Brake Disc	6	Front Dust Guard
3	Front Hub	7	Front Steering Knuckle
4	Front Hub Bearing		

Rear Solid Disc Brake Assembly



1	Rear Steering Knuckle	4	Rear Brake Disc
2	Rear Dust Guard	5	Rear Brake Caliper Assembly
3	Rear Hub Bearing Assembly		

Brake system uses the following configuration: a ventilated disc brake is used for each front wheel, and solid disc brake is used for each rear wheel (disc brake is used for service brake, and electric parking is used for parking brake).Using lever principle, brake pedal pushes the pushrod into vacuum booster, which boosts the force of pushrod by using vacuum and then transmits the force to brake master cylinder assembly. Hydraulic pressure, produced in the brake master cylinder assembly, is transmitted to ESP Hydraulic Control Unit (HCU) through the brake line, and then distributed to individual brake calipers. Brake calipers apply force to brake linings using hydraulic pressure. Brake linings will cause wheel speed to decrease or stop depending on the amount of brake pressure applied.

Specifications

Torque specifications

Description	Torque (N•m)
Wheel Mounting Bolt	110 ± 10
Master Cylinder Mounting Nut	13.7 ~ 21.6
Fixing Plug Between Brake Master Cylinder Assembly and Brake Pipe	18 ± 2
Fixing Nut Between Vacuum Booster Assembly and Brake Pedal Assembly	23 ± 2

Description	Torque (N•m)
Fixing Nut Between Brake Pedal Assembly and Body	23 ± 2
Coupling Plug Between Front Brake Caliper Assembly and Front Brake Hose Assembly	20 ± 2
Coupling Bolt Between Front Brake Caliper Assembly and Front Steering Knuckle Assembly	90 ~ 110
Front Brake Disc Locating Screw	4.5 ± 0.5
Front Brake Caliper Bleeder Screw	9 ~ 11
Guide Bolt Between Front Brake Caliper Fixing Bracket and Front Brake Cylinder Assembly	22 ~ 32
Coupling Plug Between Front Brake Hose Assembly and Front Brake Pipe	18 ± 2
Coupling Bolt Between Rear Brake Caliper Assembly and Rear Brake Hose Assembly	27 ± 2
Coupling Bolt Between Rear Brake Caliper Assembly and Brake Caliper Mounting Board Assembly	70 ± 5
Rear Brake Disc Locating Screw	4.5 ± 0.5
Rear Brake Caliper Bleeder Screw	9 ~ 11
Guide Bolt Between Rear Brake Caliper Fixing Bracket and Rear Brake Cylinder Assembly	22 ~ 32
Coupling Plug Between Rear Brake Hose Assembly and Brake Pipe	18 ± 2
Parking Actuator Mechanism Fixing Screw	9 ~ 11

Front Disc Brake

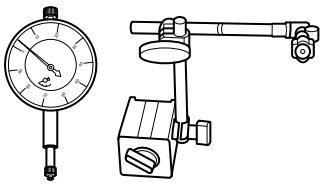
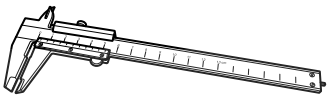
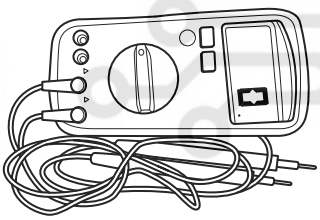
Description	Standard Thickness (mm)	Minimum Thickness (mm)	Brake Disc Runout (mm)
Front Brake Disc	25	23	Less than 0.06
Front Brake Lining	11	2	-

Rear Disc Brake

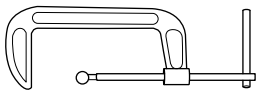
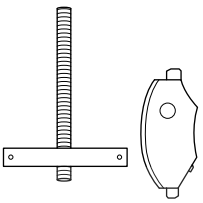
Description	Standard Thickness (mm)	Minimum Thickness (mm)	Brake Disc Runout (mm)
Rear Brake Disc	10	8	Less than 0.06
Rear Brake Lining	10.2	2	-

Tools

General Tools

Tool Name	Tool Drawing
Dial Indicator and Magnetic Holder	 RCH0023006
Vernier Caliper	 RCH0019006
Digital Multimeter	 RCH000206

Special Tool

Tool Name	Part No.	Tool Drawing
G-pliers	-	 RCH0093006
Rear Brake Cylinder Release Tool	Part No.: CH30003, with aid of wasted brake	 RCH0116006

DIAGNOSIS & TESTING

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	Possible Cause
Brake shakes	Brake disc thickness is out of limit thickness
	Real brake disc runout is out of limit amount
	Hub bearing is damaged or worn
	Brake assembly bolt becomes loose
	Steering/suspension part is loose or worn
	Tire dynamic balance
	Four-wheel alignment
	ABS operates
Abnormal noise occurs on bumpy road	Spring plate is worn or deformed
	Brake assembly bolt becomes loose
	Abnormal noise is caused by slight axial movement of brake caliper on bumpy road
	Steering/suspension part becomes loose or shock absorber is worn
Wheel dragging	Residual pressure in brake system
	Bearing is damaged
	Large sliding resistance of brake caliper
	Guide pin is deformed
	Guide pin is not installed in place
	Guide pin dust boot is damaged
	Linings are not installed correctly
	Drive shaft
	Chassis interference part
Brake noise	Metal scratching occurs during braking
	Continuous “squeak” sound occurs for a longer time during braking
	A clear “click” sound occurs at the beginning of braking
	Relevant bolt s are loose and parts are damaged

ON-VEHICLE SERVICE

On-Vehicle Inspection

Caution
• Use well-sealed brake fluid DOT4 or equivalent. DO NOT use oily solution, otherwise brake system seal may be damaged. • Brake fluid may damage paint surface. If brake fluid spills on paint surface, wash it off immediately with water. • DO NOT use gasoline, kerosene, alcohol, engine oil, transmission oil or any other fluid that contains mineral oil to clean the system components. These kinds of fluid will damage the rubber cover and seal. • During servicing, be sure to clean the grease or other foreign matter on the outer surface of brake caliper assembly, brake lining, brake disc and wheel hub. • When operating brake disc and brake caliper, be careful not to damage brake disc and brake caliper and scratch or cut brake shoe linings.

1. Check conditions of tires and wheels. Damaged or worn wheels and tires can cause a pull, shudder, vibration and a condition similar to sudden braking.
2. If noise occurs while braking, check suspension components. Bounce the vehicle up and down several times and check suspension or steering components for any looseness, wear or damage.
3. Check brake fluid level and condition.
   a. If brake fluid level is low, check ESP control unit assembly, brake caliper, brake line, brake master cylinder assembly and brake fluid reservoir, etc. for leakage.
   b. If brake fluid is contaminated, drain a certain amount of fluid for inspection. Replace with new fluid as necessary.

Brake Bleeding

Bleeding the brake

1. Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
2. There are 2 methods for brake bleeding, and specific operation procedures are as follows

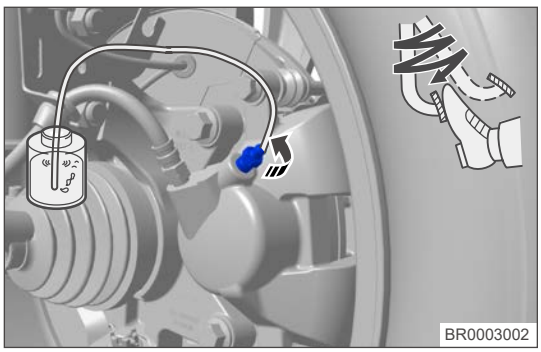
Method 1: Manual bleeding brake

Caution
• When bleeding brake system, wear safety glasses. • Be careful when bleeding air, as brake fluid at high pressure may spray out from bleeder screw.

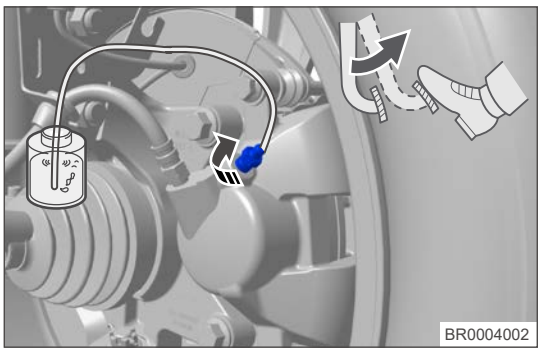
Warning
• Before removing brake fluid reservoir, wipe off any dust and other foreign matters on brake fluid reservoir to prevent them from entering. • Use fresh, clear and well-sealed brake fluid with specified type or equivalent. • DO NOT allow the brake fluid to adhere to any paint surface, such as vehicle body. If brake fluid leaks onto any paint surface, immediately wash it off. • During bleeding, do not depress brake pedal repeatedly at any time with bleeder screw opened. Otherwise, air amount in the system will increase to make an extra bleeding. • DO NOT drain the brake fluid in brake fluid reservoir while bleeding brake system.

Hint:
An assistant will be required to assist when bleeding brake system.

1. Fill brake fluid reservoir with brake fluid to a proper level.
2. Loosen bleeder screw cap and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.
3. Have an assistant depress brake pedal 3 to 4 times repeatedly; and depress and hold it at a lower position, then loosen the bleeder screw.



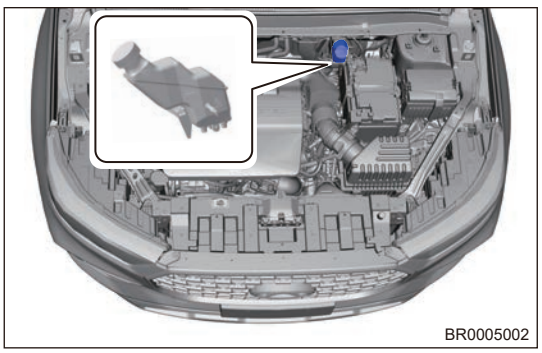
4. Tighten bleeder screw every time brake pedal goes down quickly, then release the brake pedal.



5. Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

   Empty sign: A stream of fresh brake fluid flows into clear container without bubbles.

   Hint:
   During bleeding of brake system, make sure brake fluid level in brake fluid reservoir is always near "MAX" mark. Check brake fluid level at all times during bleeding. Add brake fluid as necessary.



6. Check and adjust the brake fluid level to "MAX" mark.
7. Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.
8. Test vehicle to confirm that brakes operate properly with good depressing feel.

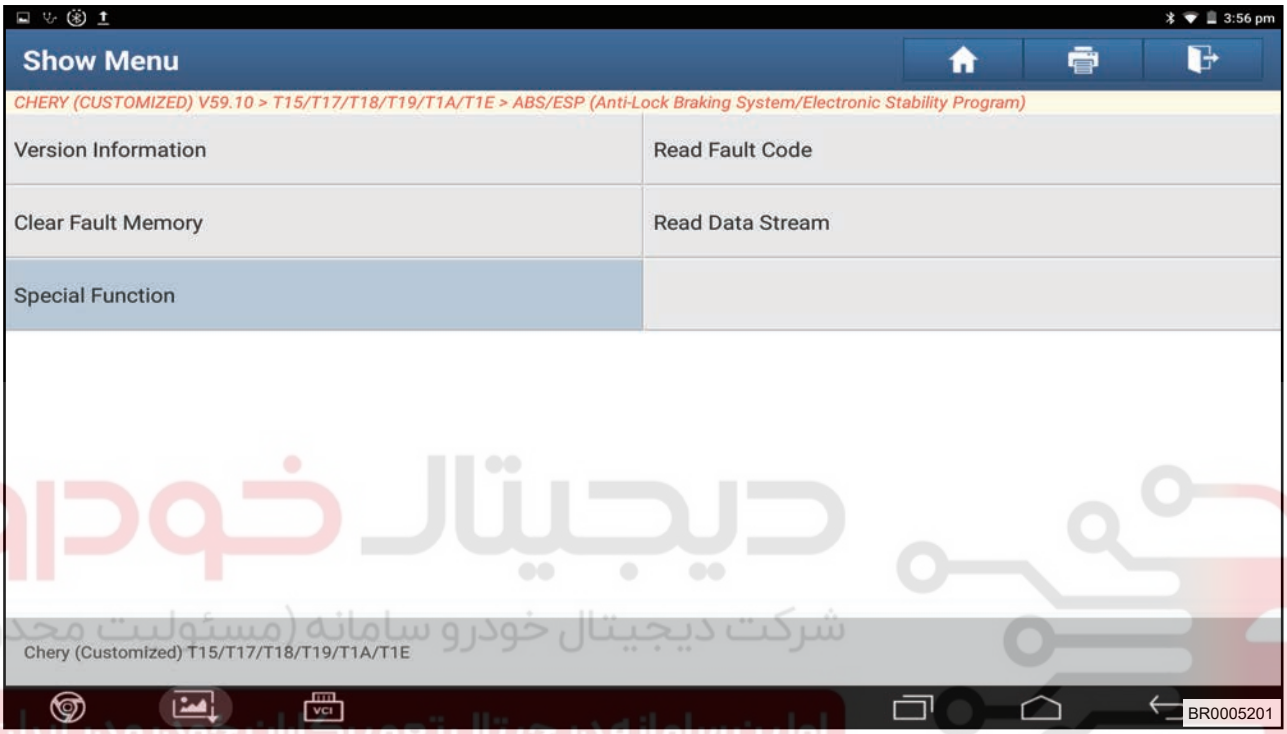
Method 2: Bleeding brake using diagnostic tester

Warning
• Check that battery voltage should not be lower than 12 V. • Bleeding order must be rear left/front left/front right/rear right. • If it is necessary to repeat part or whole bleeding procedure, be sure to wait for 5 minutes to cool solenoid valve down, otherwise solenoid valve may be damaged due to overheat. • Depress brake pedal repeatedly with a frequency of 0.5 times per second in the whole bleeding process.

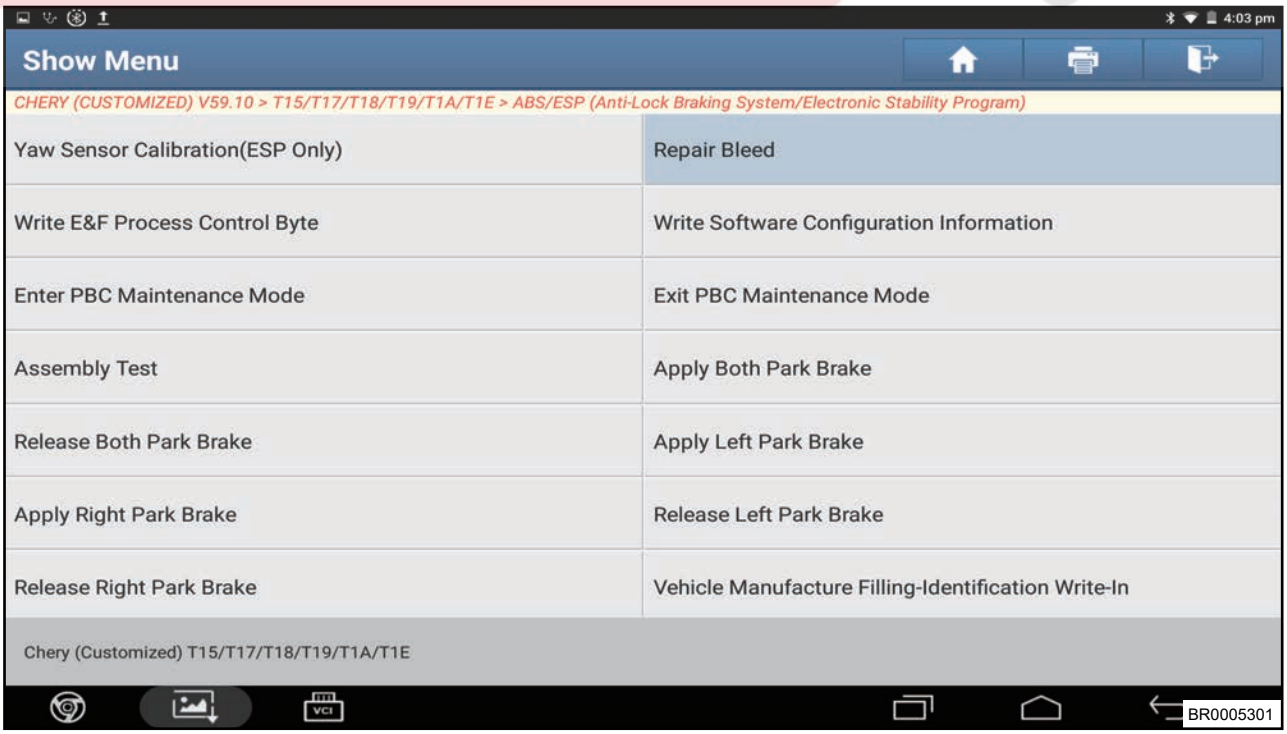
Hint:

To reach sufficient pressure in hydraulic regulator, brake pedal needs to be depressed repeatedly during whole process.

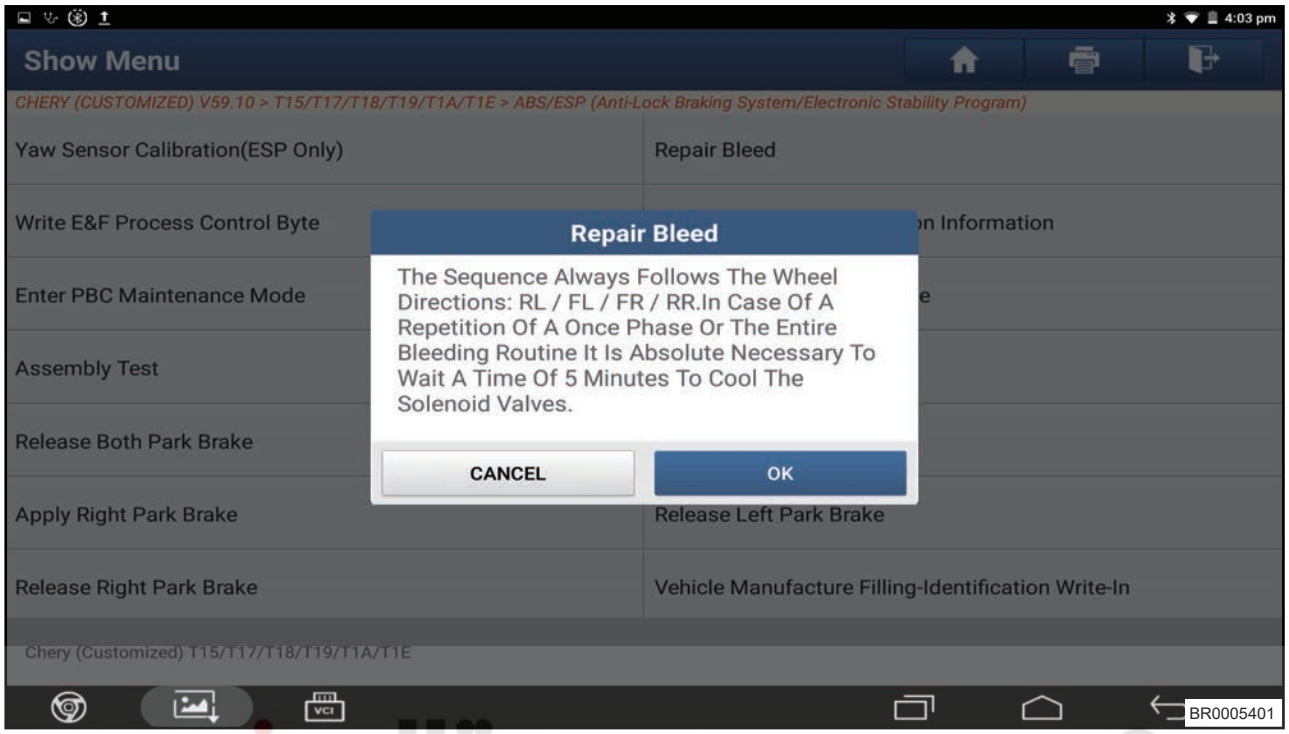
1. Fill brake fluid reservoir with brake fluid to a proper level.
2. Depress brake pedal more than 20 times with engine stopped.
3. Turn ENGINE START STOP switch to “ON” and connect to diagnostic tester.
   a. Click “ABS/ESP Anti-lock Braking System/Electronic Stability Program”.
   b. Click “Special Function”.



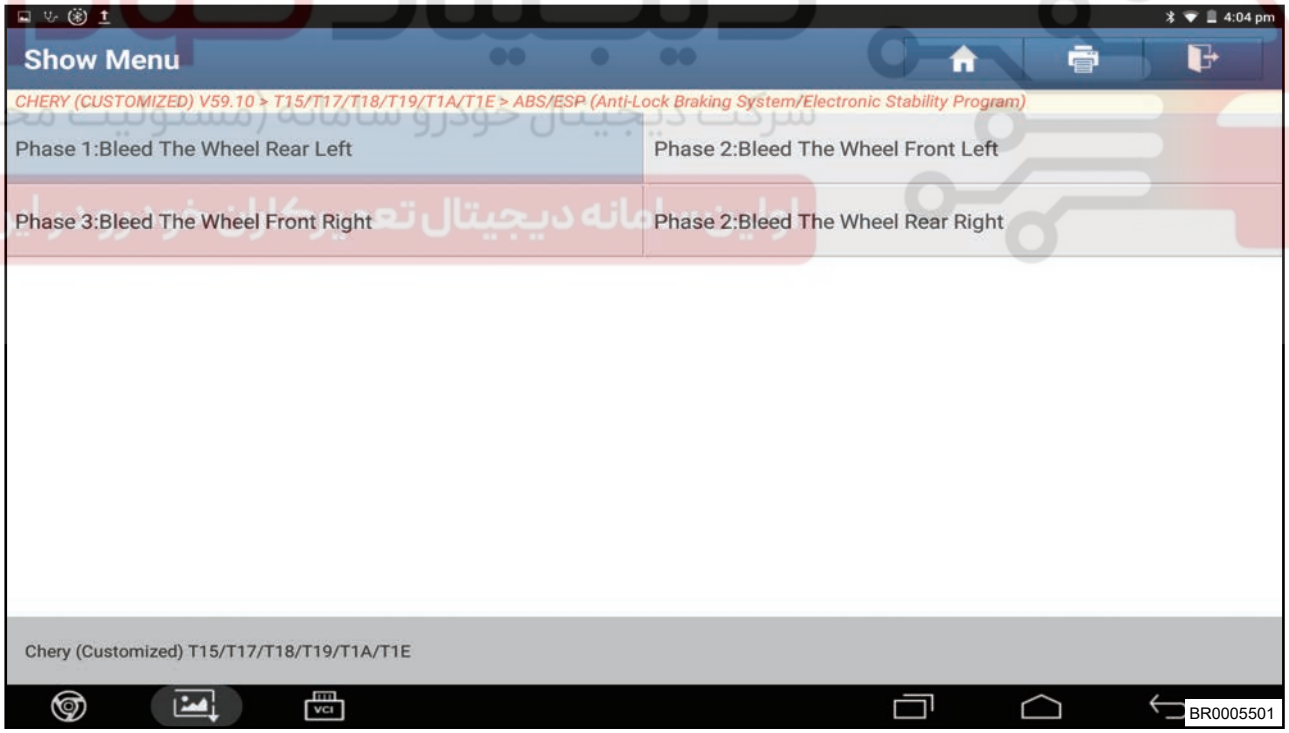
c. Click “Manual Bleed”.



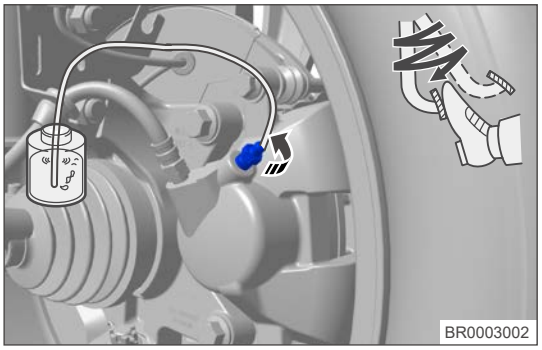
d. Screen displays illustration below, click OK.



e. Click “Phase 1: Bleed the wheel rear left” to perform bleeding operation for rear left wheel.



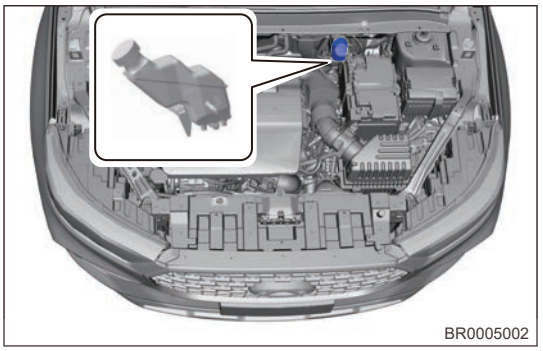
4. Loosen bleeder screw cap of rear left wheel and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.



5. Use same bleeding procedures as rear left wheel to bleed air for brake lines of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

   Empty sign: A stream of fresh brake fluid flows into clear container without bubbles.

   Hint:
   During bleeding of brake system, make sure brake fluid level in brake fluid reservoir is always near “MAX” mark. Check brake fluid level at all times during bleeding. Add brake fluid as necessary.

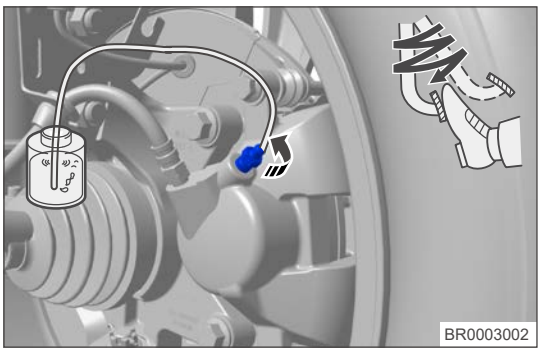


6. Check and adjust the brake fluid level to “MAX” mark.
7. Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.
8. Test vehicle to confirm that brakes operate properly with good depressing feel.

Brake Fluid Replacement

Replace the brake fluid

1. Drain the brake fluid.
   a. Start engine and run it at idle.
   b. Screw off filler cap of brake fluid reservoir assembly. Loosen bleeder screw cap and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.
   c. Loosen bleeder screw, and depress brake pedal continuously until no brake fluid comes out.

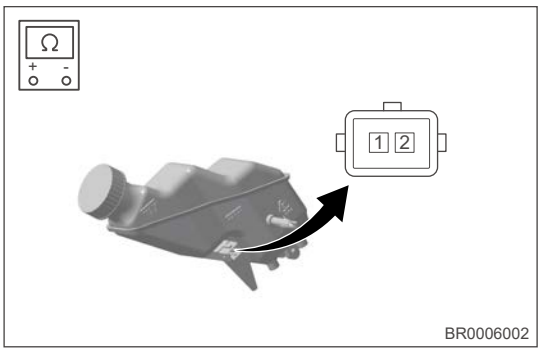


2. Add brake fluid.
   a. Tighten bleeder screw after confirming that brake fluid has been drained. Fill brake fluid reservoir with new brake fluid to a proper level.
3. Perform bleeding procedures.
   a. After replacing with new brake fluid, be sure to bleed the brake system for normal operation.

Brake Fluid Reservoir Assembly

ON-VEHICLE INSPECTION

1. Check the brake fluid level warning switch.
   a. Remove the brake fluid reservoir filler cap.
   b. Disconnect the brake fluid level warning switch wire harness connector.
   c. Using ohm band of digital multimeter, check for continuity between brake fluid level warning switch terminals according to conditions shown in table below.



Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Float upward (- switch ON)	∞
Terminal 1 - Terminal 2	Float downward (- switch OFF)	⩽ 1 Ω

Hint:
- There is a float in fluid reservoir. Position of float changes as brake fluid level rises or drops.
- If result is not as specified, replace brake fluid reservoir assembly.

   d. Unplug fluid level sensor connector when warning light comes on. If warning light remains on, check wire harness and instrument cluster. If instrument cluster warning indicator goes off immediately, the fluid level sensor is malfunctioning. (Precondition: Brake fluid is within scale range)
   e. Add brake fluid to MAX mark.

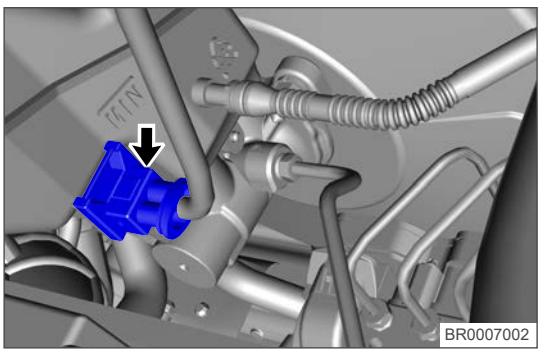
Removal

1. Drain the brake fluid.

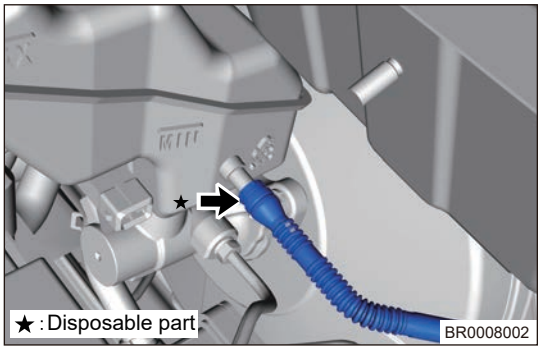
Hint:
Drained brake fluid should be well kept in a container. Never discard it at will.

Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

2. Remove the brake fluid reservoir assembly.
   a. Disconnect the brake fluid level connector (arrow).

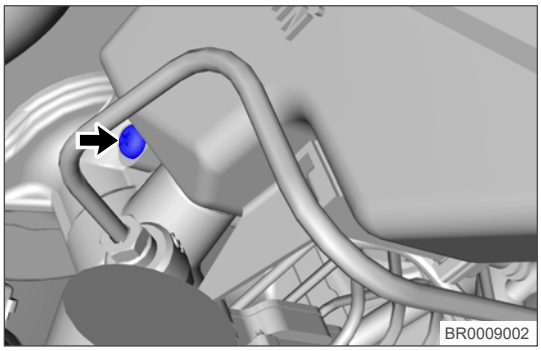


b. Loosen clamp between brake fluid reservoir and master cylinder connecting pipe from brake fluid reservoir assembly.



c. Remove 2 fixing nuts (arrow) from brake fluid reservoir assembly.

Tightening torque: 5 ± 1 N·m



d. Remove the brake fluid reservoir assembly.

Installation

1. Installation is in the reverse order of removal.

Hint:
Perform bleeding procedures for brake system and add brake fluid to a proper level after completing installation.

Caution
After hose is bent, it is normal that some material between two corrugations is “whitish”.

Brake Master Cylinder Assembly

Removal

Warning
• To prevent brake master cylinder assembly damage and other dirt from being attracted by booster, remove vacuum from vacuum booster before removing brake master cylinder assembly. • Remove vacuum by depressing brake pedal repeatedly without engine running, until brake pedal is depressed firmly. • After removing brake line, sealing measure should be taken to prevent foreign matter form entering.

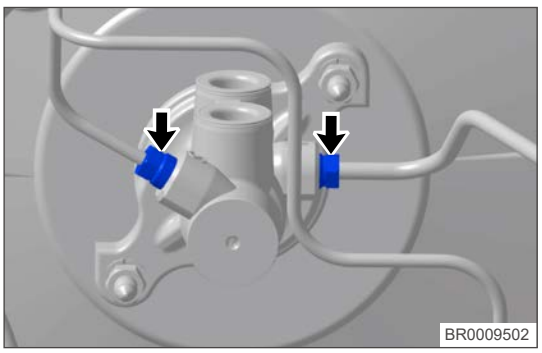
1. Drain the brake fluid.

   Hint:
   Drained brake fluid should be well kept in a container. Never discard it at will.

Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

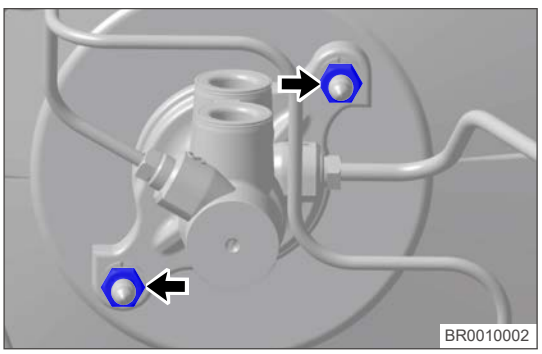
2. Remove the brake fluid reservoir assembly.
3. Remove the brake master cylinder assembly.
   a. Loosen 2 fixing plugs (arrow) between brake master cylinder assembly and brake pipe.

      Tightening torque: 18 ± 2 N·m



   b. Loosen 2 fixing nuts and washers (arrow) between brake master cylinder assembly and vacuum booster.

      Tightening torque: 13.7 - 21.6 N•m



   c. Remove brake fluid reservoir assembly from brake master cylinder assembly.

Caution
• The design of brake master cylinder assembly and piston makes piston fall out easily. To prevent the occurrence of this case, make sure the master cylinder is level or end surface faces downward (-piston surface facing upward) when operating brake master cylinder assembly, to prevent master cylinder piston from dropping. • Make sure that no foreign matter adheres to brake master cylinder assembly piston. If foreign matter adheres, clean it off with a piece of clean cloth. Then, apply grease to entire outer edge contact surface of the master cylinder piston. • Master cylinder should be handled carefully. Avoid any impact to master cylinder, such as dropping. It cannot be reused if dropped. • DO NOT tap or pinch the master cylinder piston, and avoid damaging the master cylinder piston in any other ways.

Installation

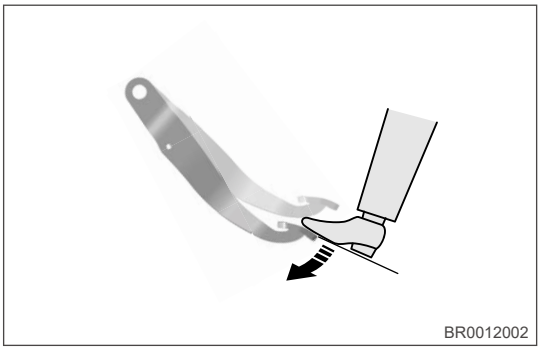
1. Installation is in the reverse order of removal.

Caution
• Be sure to tighten fixing bolt and nut to specified torque during installation. • Perform bleeding procedures for brake system and add brake fluid to a proper level after completing installation. • Check if distance between brake master cylinder and brake pedal is within normal range after installation. Specified distance: 125 mm

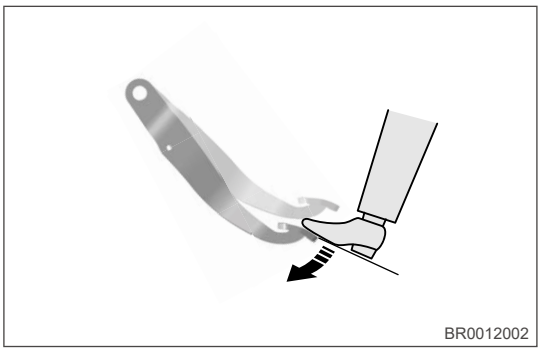
Vacuum Booster with Brake Master Cylinder Assembly

On-vehicle Inspection

1. Air tightness inspection
   a. Check air tightness
      - Start engine and stop it after 1 or 2 minutes, then disconnect negative battery cable. Slowly depress the brake pedal several times.
      - Make sure that booster is airtight. Check that every pedal depression amount becomes less than the previous one. If pedal operation is not as specified, check the check valve. If check valve is normal, replace the vacuum booster assembly.
      - Start the engine. Depress and hold pedal, and then stop engine.
      - Make sure that booster is airtight. Depress and hold pedal for 30 seconds, and check that pedal reserve distance does not change.
   b. Operation Inspection
      - Stop engine and disconnect negative battery cable.
      - Depress the pedal several times and check that pedal reserve distance does not change.



      - Depress and hold the pedal, and then start engine. Check that the pedal can only be depressed slightly.



      - If pedal operation is not as specified, check the check valve. If check valve is normal, replace the vacuum booster assembly.

Removal

1. Drain the brake fluid.

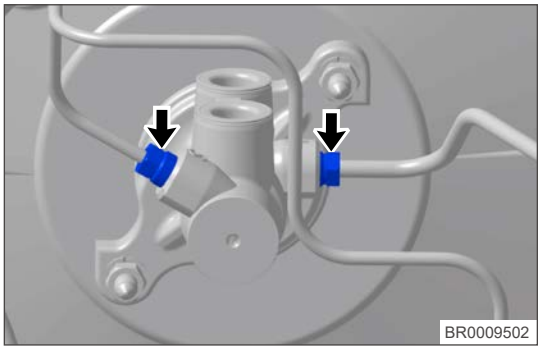
   Hint:
   Drained brake fluid should be well kept in a container. Never discard it at will.

Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

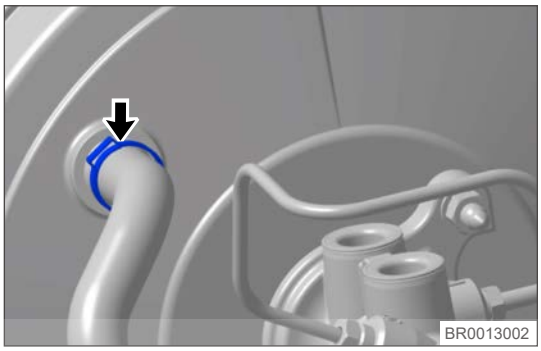
2. Disconnect the negative battery cable.
3. Remove the brake fluid reservoir assembly.
4. Remove the vacuum booster with brake master cylinder assembly.

a. Loosen 2 fixing plugs (arrow) between brake master cylinder assembly and brake pipe.

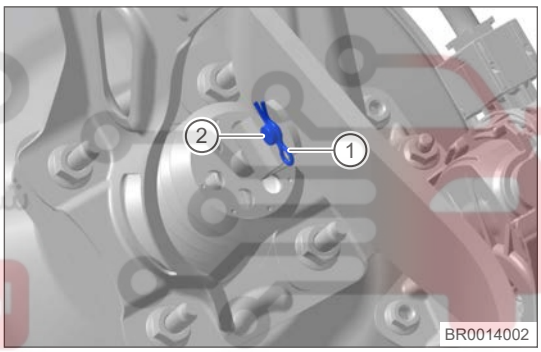
Tightening torque: 18 ± 2 N·m



b. Detach vacuum tube assembly with check valve (-arrow) from vacuum booster assembly.

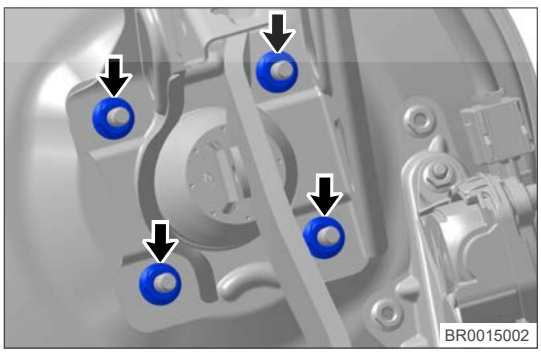


c. Remove locking pin (2) and push rod pin (1) from vacuum booster push rod and disengage brake pedal assembly.



d. Remove 4 fixing nuts (arrow) between vacuum booster assembly and brake pedal assembly.

Tightening torque: 23 ± 2 N·m

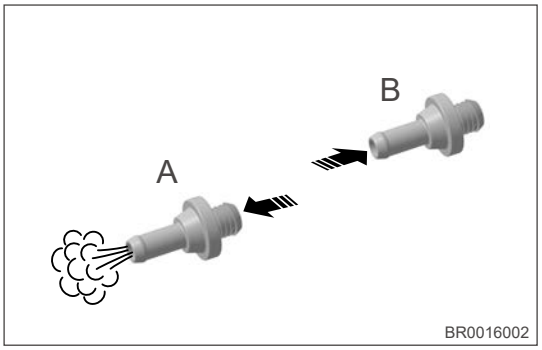


e. Move away the brake pedal.

f. Remove vacuum booster with brake master cylinder assembly from engine compartment.

Inspection

1. Check the check valve.
   a. Remove check valve from vacuum tube assembly.
   b. Check that there is airflow (A) from vacuum booster to engine, and no airflow (B) from engine to vacuum booster. If result is not as specified, replace vacuum tube assembly.



Installation

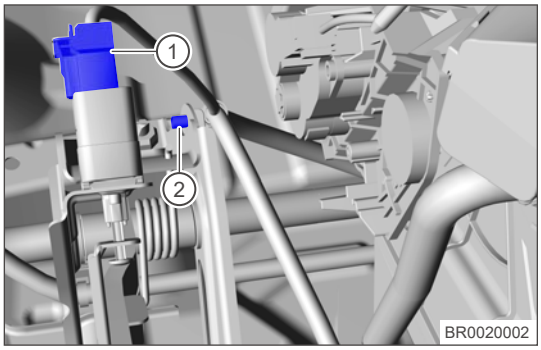
1. Installation is in the reverse order of removal.

Caution
• Be sure to tighten fixing bolt and nut to specified torque during installation. • Perform bleeding procedures for brake system and add brake fluid to a proper level after completing installation. • It is necessary to check or adjust brake switch assembly after removing vacuum booster with brake master cylinder assembly (Refer to installation of brake switch assembly).

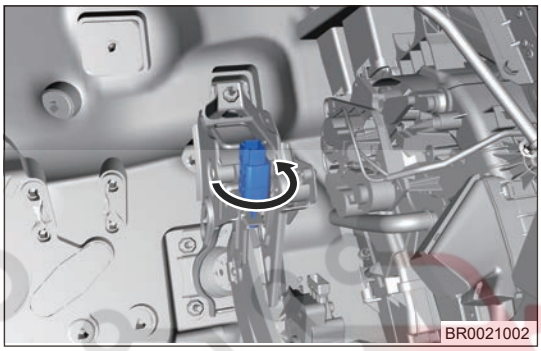
Brake Pedal Assembly

Removal

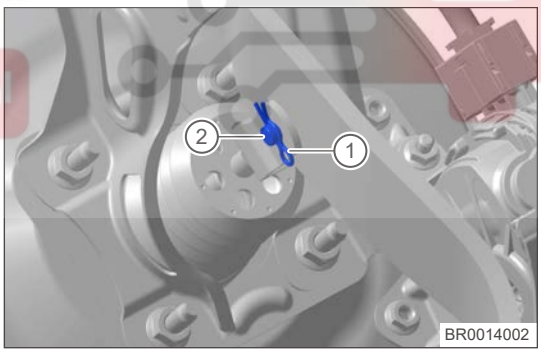
1. Remove the brake light switch assembly.
   a. Disconnect brake light switch assembly wire harness connector (1) and brake pedal fixing clip (2).



   b. Press switch by hand and turn it counterclockwise, align the switch body with lengthwise direction of pedal installation hole, and pull out brake switch assembly along opening of pedal, then remove brake switch assembly.

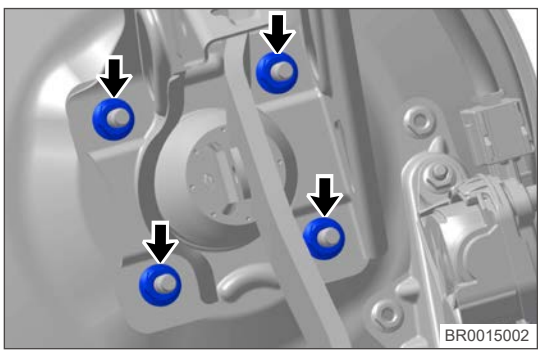


2. Remove the brake pedal assembly.
   a. Remove locking pin (2) and push rod pin (1) from vacuum booster push rod and disengage brake pedal assembly.



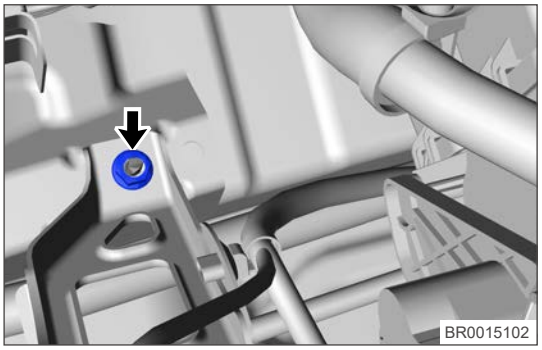
   b. Remove 4 fixing nuts (arrow) between vacuum booster assembly and brake pedal assembly.

      Tightening torque: 23 ± 2 N·m



c. Remove fixing nut (arrow) between brake pedal assembly and body.

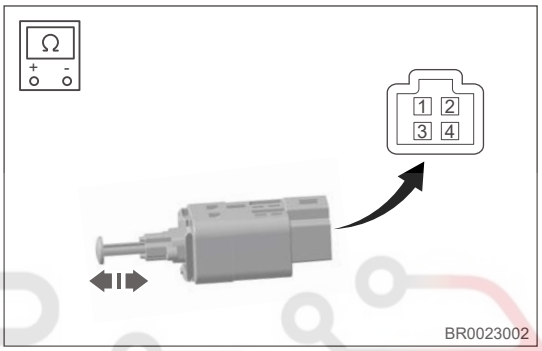
Tightening torque: 23 ± 2 N·m



d. Remove brake pedal assembly from cabin.

Inspection

1. Check the brake light switch assembly.
   a. Using ohm band of digital multimeter, check for continuity between brake light switch assembly terminals according to table below.



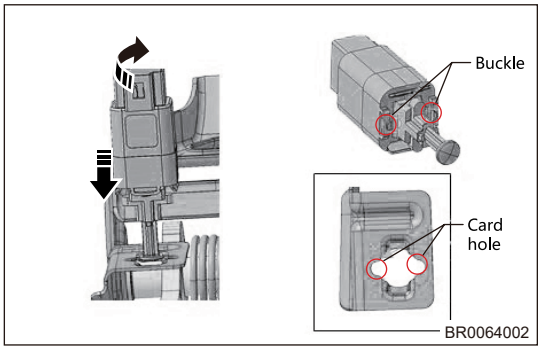
Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 3	Brake pedal depressed (-switch pin released)	⩽ 1 Ω
Terminal 2 - Terminal 4	Brake pedal depressed (-switch pin released)	∞
Terminal 1 - Terminal 3	Brake pedal released (-switch pin pushed)	∞
Terminal 2 - Terminal 4	Brake pedal released (-switch pin pushed)	⩽ 1 Ω

Hint:
If result is not as specified, replace brake light switch assembly.

Installation

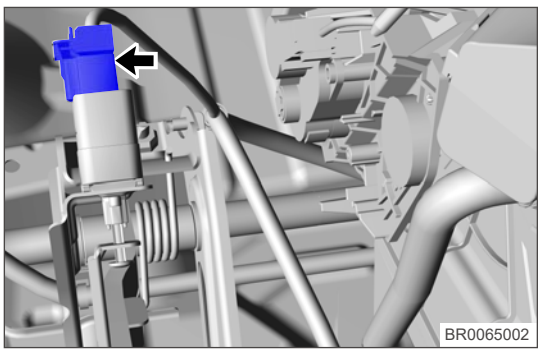
1. Install the brake pedal assembly. (Installation is in the reverse order of removal).
2. Install the brake switch assembly.
   a. Before assembling brake switch to vehicle, the lever must be pulled out completely. If the switch lever cannot be pulled out in the direction of axis, the lever has been pulled to the longest.

b. Depress brake pedal fully, align brake switch body with mounting hole of pedal and insert it into mounting hole, press switch and turn it clockwise to clamp switch clip into clip hole of pedal (before assembly, brake pedal has been installed to brake master cylinder).



c. Release brake pedal slowly to return brake pedal to initial position automatically under the action of return spring, and automatically adjust brake switch lever to appropriate gear position simultaneously.

d. Connect the back light switch assembly wire harness connector (arrow).



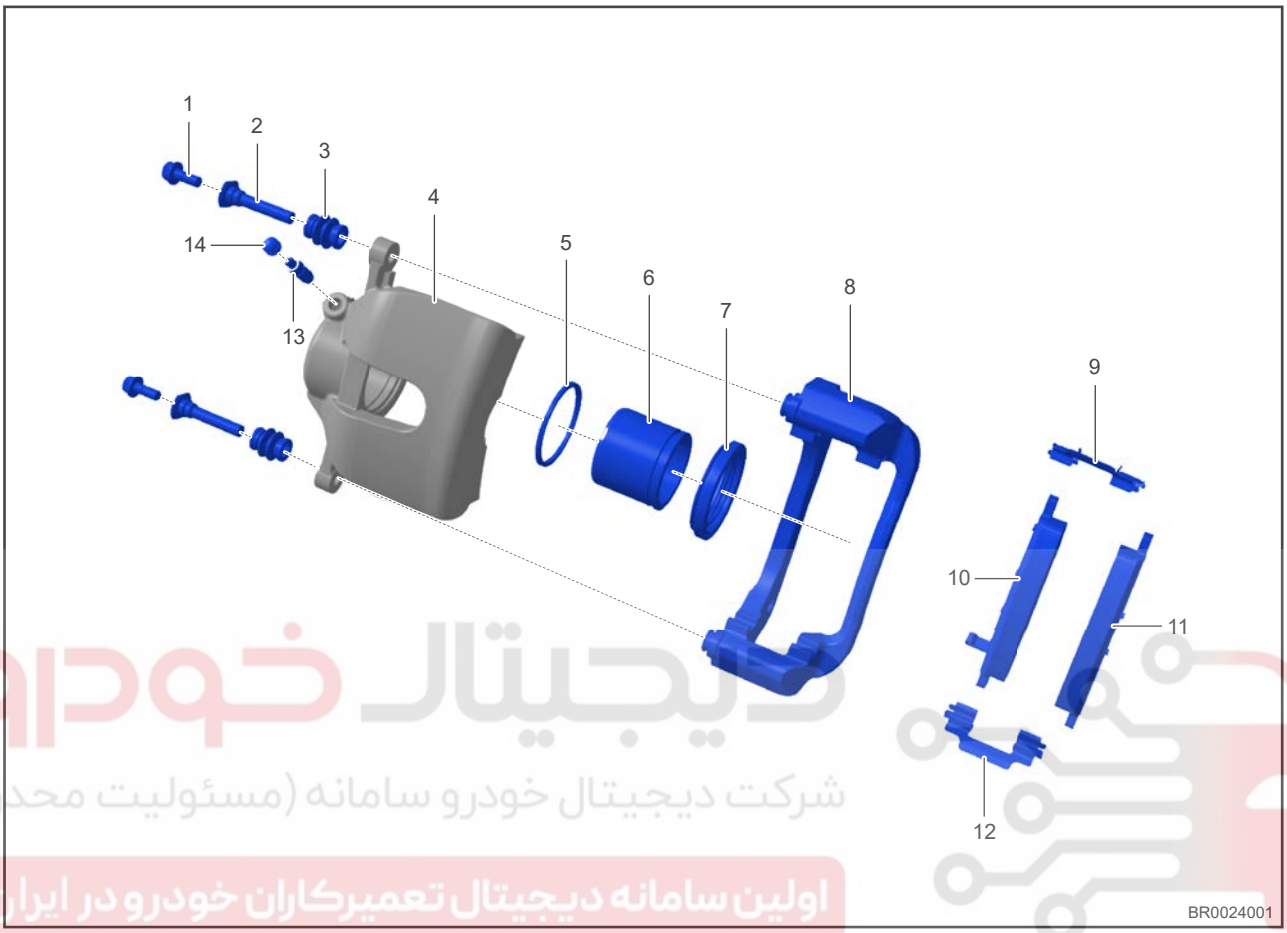
e. Installation is finished.

Caution

- After completing installation, brake pedal should fully contact with brake switch lever (lever is compressed).
- After brake pedal is fully depressed, the hand should not release pedal during auto return of pedal and make pedal return to original position slowly. Avoid releasing pedal suddenly, large impact may lead brake switch to jump.
- Be sure to tighten fixing nuts to specified torques during installation.
- Check that brake light operates normally after installation.
- Check if brake pedal travel is within normal range after installing brake pedal.
  Normal range: ⩾120 mm

Front Disc Brake Assembly

Description

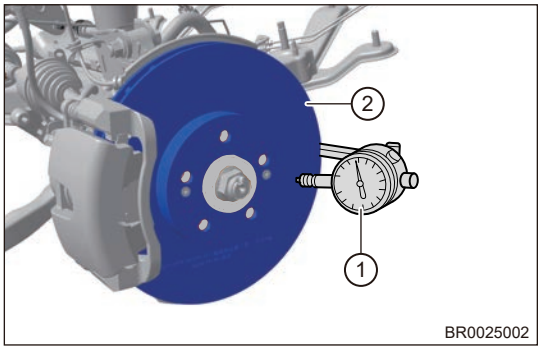


1	Brake Caliper Guide Bolt	8	Front Disc Brake Caliper Fixing Bracket
2	Brake Caliper Guide Bolt Guide Pin	9	Upper Support Shim
3	Brake Caliper Guide Pin Rubber Dust Boot	10	Inner Brake Lining
4	Front Disc Brake Cylinder	11	Outer Brake Lining
5	Front Disc Brake Piston Seal Ring	12	Lower Support Shim
6	Front Disc Brake Piston	13	Bleeder Screw
7	Front Disc Brake Piston Dust Boot	14	Bleeder Screw Cap

ON-VEHICLE INSPECTION

1. Check the brake disc runout.
   a. Remove the front wheel.
   b. Fix dial indicator (1) to a proper position, then set its pointer to a position about 10 mm from out edge of brake disc.

c. Turn brake disc (2) slowly and check its runout, mark the lowest and highest points and record these measured value.



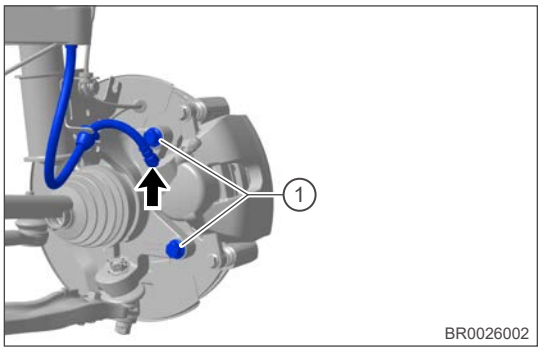
d. Check the runout on the other side of brake disc in the same manner, mark the lowest and highest points and record these measured value.
e. Compare recorded runout value with limit value.
   Front brake disc runout: Less than 0.06 mm
f. If runout exceeds the maximum value, replace brake disc.

Removal

Hint:

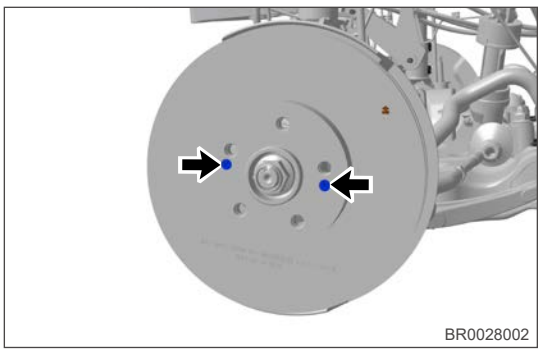
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

1. Remove the front left wheel.
2. Remove the front left brake caliper assembly.
   a. Remove 2 coupling bolts (1) between front left brake caliper assembly and front left steering knuckle.
      Tightening torque: 90 ~ 110 N•m
   b. Fix dial indicator (1) to a proper position, then set its pointer to a position about 10 mm from out edge of brake disc.
      Tightening torque: 20 ± 2 N·m



Caution
DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.

   c. Remove the front left brake caliper assembly.
3. Remove the front left brake disc.
   a. Remove 2 locating screws (arrow) and front left brake disc.
      Tightening torque: 4.5 ± 0.5 N·m



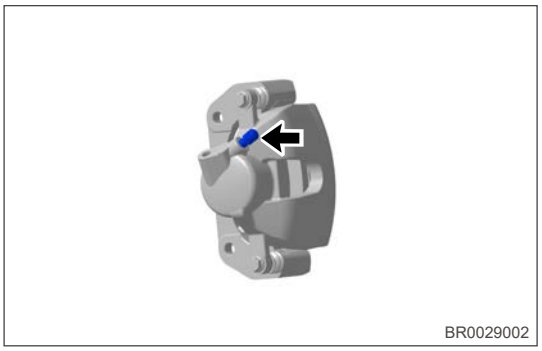
Disassembly

Hint:

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

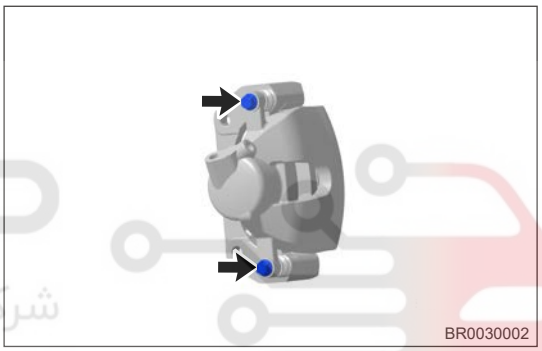
1. Remove the bleeder screw (with bleeder screw cap).
   a. Remove bleeder screw (with bleeder screw cap) (-arrow) from brake caliper assembly.

      Tightening torque: 9 ~ 11 N•m

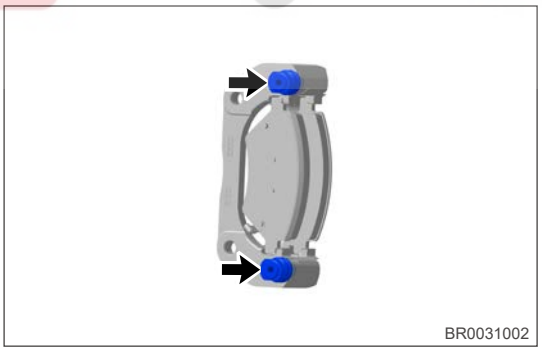

BR0029002

2. Remove the brake cylinder assembly.
   a. Remove 2 guide bolts (arrow) between brake caliper fixing bracket and brake cylinder assembly.

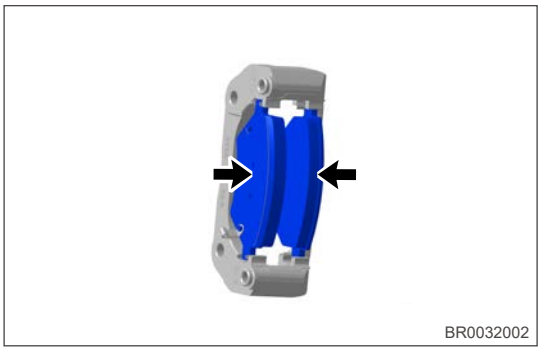
      Tightening torque: 22 ~ 32 N•m


BR0030002

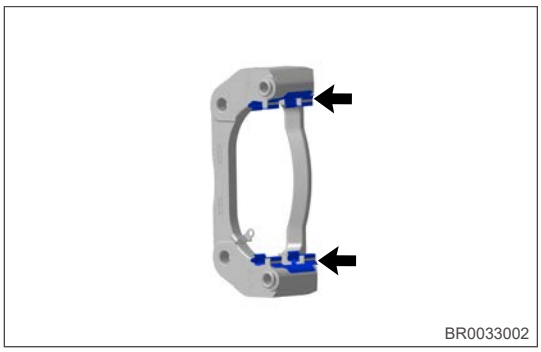
   b. Separate brake cylinder assembly from brake caliper fixing bracket.
3. Remove the front brake caliper guide bolt guide pin (with dust boot).
   a. Remove 2 brake caliper guide bolt guide pins (with dust boot) (arrow) from brake caliper fixing bracket.


BR0031002

4. Remove the front brake lining.
   a. Remove inner brake lining and outer brake lining (-arrow) from brake caliper fixing bracket.

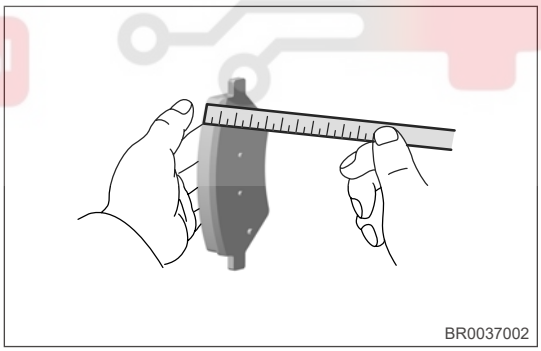

BR0032002

5. Remove the brake lining support shim.
   a. Remove 2 brake lining support shims (arrow) from brake caliper fixing bracket.


BR0033002

Inspection

1. Check brake caliper fixing bracket and brake caliper guide pin set.
   a. Clean the contact surfaces of brake caliper fixing bracket and brake lining support shims with brake cleaner. Check for deformation, cracks, rust and foreign matter which is difficult to remove.
   b. Check brake caliper guide pin rubber dust boot for deformation, cracks, wear and foreign matter which is difficult to remove.
   c. Install the brake caliper guide pin and its rubber dust boot to brake caliper fixing bracket. Brake caliper guide pin set should move smoothly without sticking when pushing it with hand; otherwise replace it.
   d. After installing the brake lining, check if it is easy to drop (due to insufficient elasticity of support shim). Replace as necessary.
2. Check the brake lining.
   a. Visually check the brake lining for flatness, and also check for excessive wear. If the condition of lining cannot be confirmed accurately only by visual inspection, perform physical inspection as necessary.
   b. Measure the minimum brake lining thickness. When the minimum thickness of brake lining is 2 mm or less, replace the brake linings.

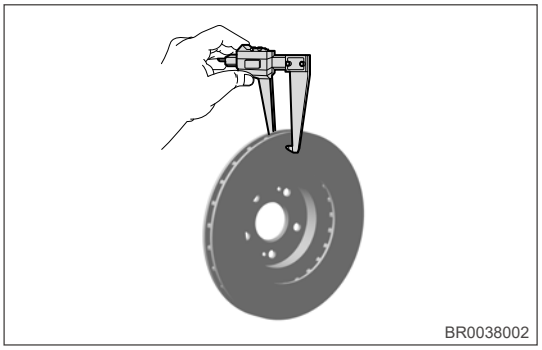

BR0037002

   c. When replacing the excessively worn brake linings (inner and outer), it is also necessary to replace the linings on opposite side of vehicle as well as unchecked linings to maintain proper braking performance. If it is unnecessary to replace brake linings, be sure to reinstall brake linings to original positions.
3. Check the brake disc.
   a. Minor scratch or wear on brake disc surface is acceptable. If severe scratch or deformation exists, the brake disc must be replaced.
   b. Excessive wear of brake disc may cause poor contact between brake lining and surface of brake disc. If protrusion on the disc is not removed before installing new brake lining, it will cause abnormal wear of brake disc.
   c. It is normal that the surface of brake disc is worn when replacing brake lining. If cracks or burned spots exist, the brake disc must be replaced.
4. Check the brake disc thickness.

a. Using a vernier caliper, measure brake disc thickness at center of brake lining contact surface as shown in illustration.

Standard thickness: 25 mm

Minimum thickness: 23 mm


BR0038002

b. If it is less than the minimum thickness due to wear, replace brake disc.

Caution
DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.

Assembly

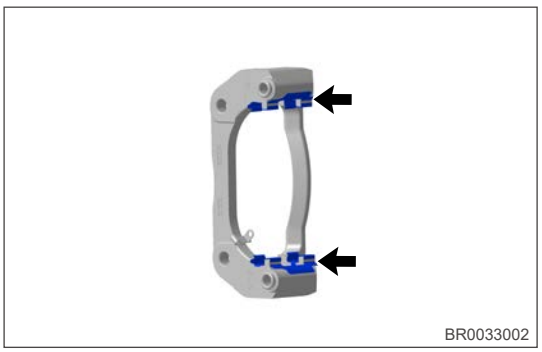
Hint:

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

Caution
• When assembling brake caliper assembly, always keep your hands clean. • When assembling brake caliper assembly, always use new clean brake fluid. • Never use old front disc brake piston seal ring.

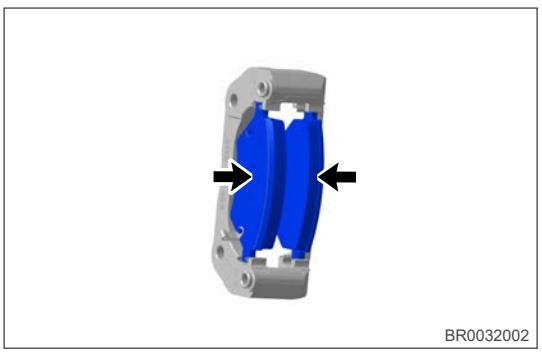
1. Install the brake lining support shim.

a. Securely install upper and lower support shims (arrow) onto brake caliper fixing bracket.


BR0033002

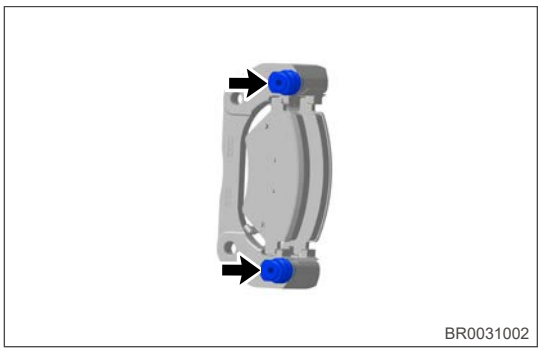
2. Install the front brake lining.

a. Securely install inner brake lining and outer brake lining (arrow) onto brake caliper fixing bracket. Make sure they are clamped in place.

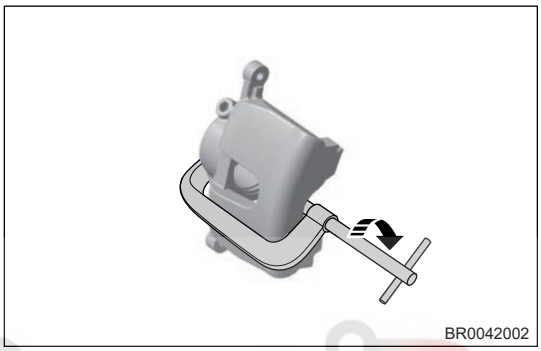

BR0032002

Caution
Make sure contact surface of lining and brake disc is free of oil and grease.

3. Install the front brake caliper guide bolt guide pin (with dust boot).
   a. Apply a small amount of grease to the contact surface between guide bolt guide pin and guide pin rubber dust boot (arrow), and securely install them to brake caliper fixing bracket.


BR0031002

4. Install the brake cylinder assembly.
   a. Using G type pliers, slightly retract brake cylinder piston.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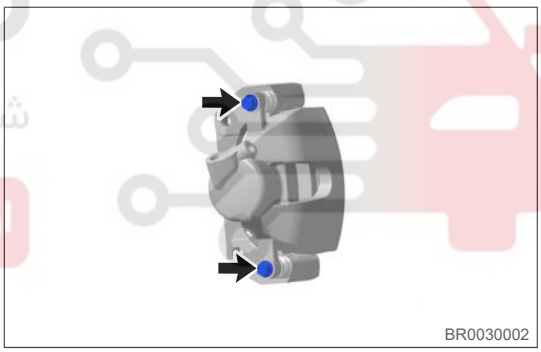
   b. Align brake caliper guide bolts (arrow) with guide pin holes and securely install brake cylinder assembly.
      Tightening torque: 22 ~ 32 N•m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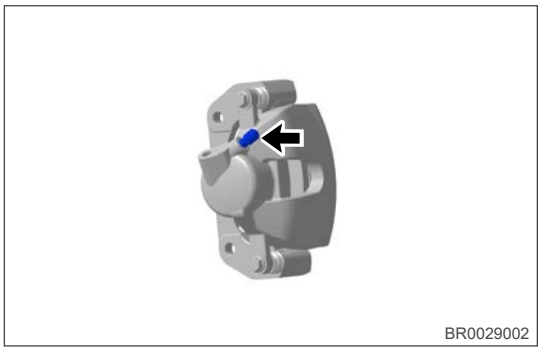
5. Install the bleeder screw (with bleeder screw cap).
   a. Securely install bleeder screw (with bleeder screw cap) (arrow) to front brake caliper assembly.
      Tightening torque: 9 ~ 11 N•m


BR0029002

Installation

1. Installation is in the reverse order of removal.

Caution
• Make sure contact surface of lining and brake disc is free of oil and grease. • Before installing brake linings, completely retract brake caliper piston back into bore of brake caliper. • Depress brake pedal several times to secure brake linings to brake disc in order to ensure safety after installing brake linings and before moving vehicle. • Replace the brake linings in pairs. DO NOT replace one alone. • DO NOT install inner brake lining and outer brake lining reversely. • Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary. • Be sure to perform bleeding procedures for brake system after installation. • Be sure to add brake fluid to a proper level after installation.

Front Brake Hose Assembly

Removal

Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing. • Try to prevent body paint surface from being scratched during removal and installation.

Hint:

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

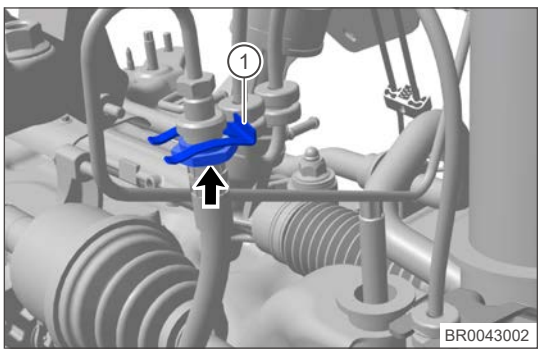
1. Remove the front left wheel.
2. Drain the brake fluid.

   Hint:
   Drained brake fluid should be well kept in a container. Never discard it at will.

Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

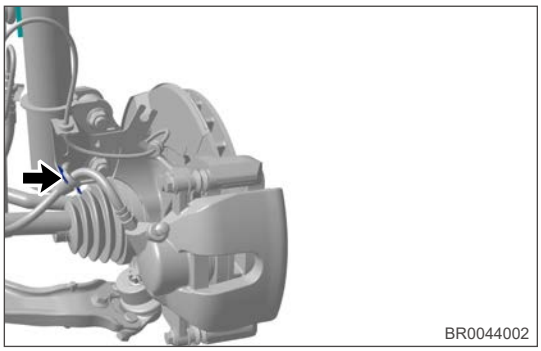
3. Remove the front left brake hose assembly.
   a. Loosen coupling bolt (arrow) between front left brake hose assembly and front left brake pipe, and disengage fixing clip (1).

      Tightening torque: 18 ± 2 N·m



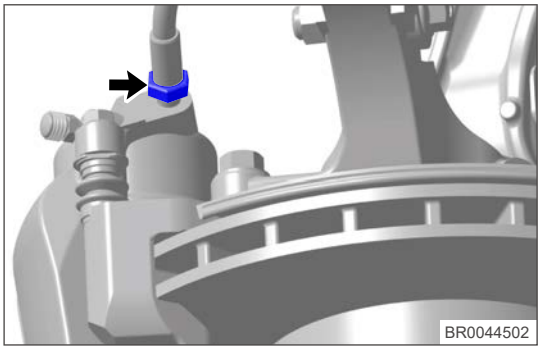
Caution
• DO NOT bend or damage brake tube. • DO NOT allow any foreign matter such as dirt and dust to enter brake pipe from joint parts. • After removing brake line, perform sealing treatment to prevent foreign matter from entering.

   b. Disengage fixing part (arrow) of front left brake hose assembly from front left shock absorber assembly.



c. Remove coupling plug (arrow) between front left brake caliper assembly and front left brake hose assembly.

Tightening torque: 20 ± 2 N·m



Caution
DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.

d. Remove the front left brake hose assembly.

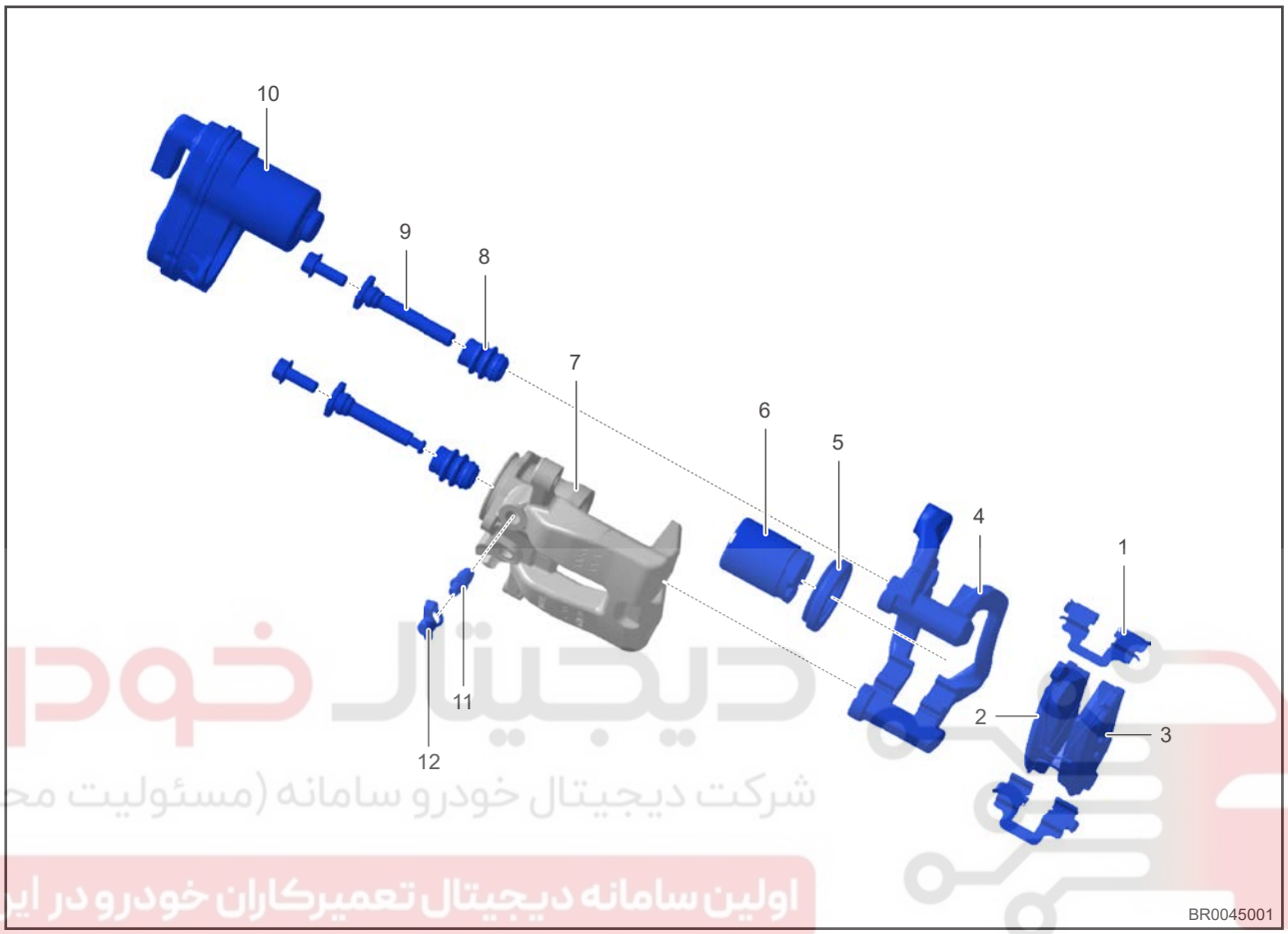
Installation

1. Installation is in the reverse order of removal.

Caution
• Be sure to tighten fixing plugs to specified torques during installation. • Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary. • Be sure to perform bleeding procedures for brake system after installation. • Be sure to add brake fluid to a proper level after installation.

Rear Disc Brake Assembly

Description

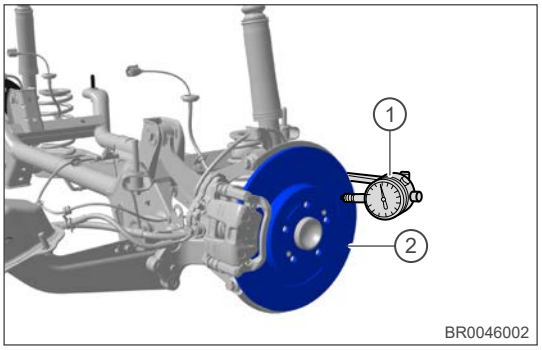


1	Upper Support Shim	7	Rear Disc Brake Cylinder
2	Inner Brake Lining	8	Brake Caliper Guide Bolt Guide Pin
3	Outer Brake Lining	9	Brake Caliper Guide Bolt
4	Rear Disc Brake Caliper Fixing Bracket	10	Parking Actuator
5	Rear Disc Brake Piston Dust Boot	11	Bleeder Screw
6	Rear Disc Brake Piston	12	Bleeder Screw Cap

ON-VEHICLE INSPECTION

1. Check the brake disc runout.
   a. Remove the rear wheel.
   b. Fix dial indicator (1) to a proper position, then set its pointer to a position about 10 mm from out edge of rear brake disc.

c. Turn brake disc (2) slowly and check its runout, mark the lowest and highest points and record these measured value.



d. Check the runout on the other side of brake disc in the same manner, mark the lowest and highest points and record these measured value.
e. Compare recorded runout value with limit value.
   Rear brake disc runout: Less than 0.06 mm
f. If runout exceeds the maximum value, replace brake disc.

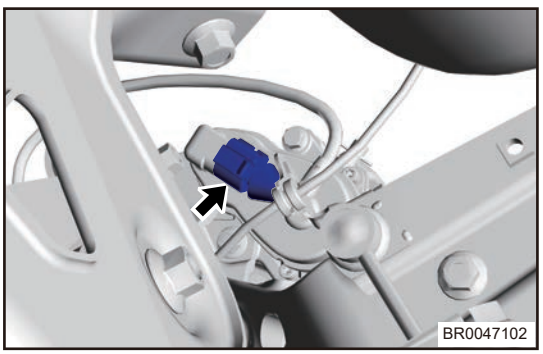
Removal

Hint:

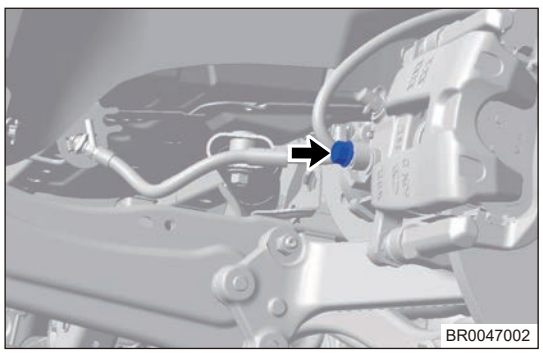
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

Caution
Be sure to perform “Enter Parking Brake Maintenance Mode” using diagnostic equipment before removal.

1. Remove the rear left wheel.
2. Remove the rear left brake caliper assembly.
   a. Unplug parking actuator connector (arrow) from EPB caliper.



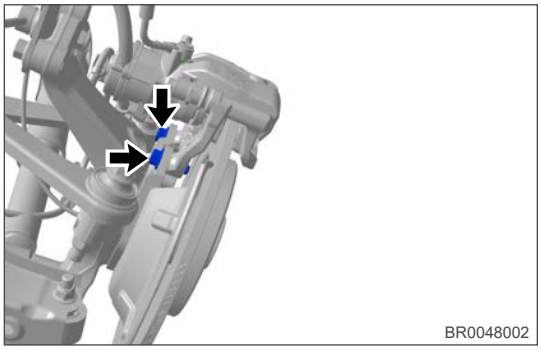
   b. Remove coupling bolt and washer (arrow) between rear left brake caliper assembly and rear left brake hose assembly.
      Tightening torque: 27 ± 2 N·m



Caution
DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.

c. Remove coupling bolts (arrow) between rear left brake caliper assembly and left brake caliper mounting board assembly.

Tightening torque: 70 ± 5 N·m

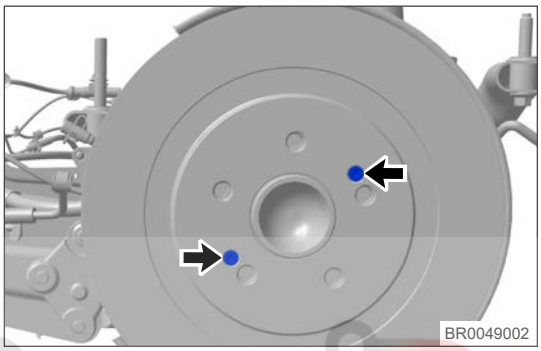


d. Remove the rear left brake caliper assembly.

3. Remove the rear left brake disc.

a. Remove locating screws (arrow) from rear left brake disc, and remove rear left brake disc.

Tightening torque: 4.5 ± 0.5 N·m



Disassembly

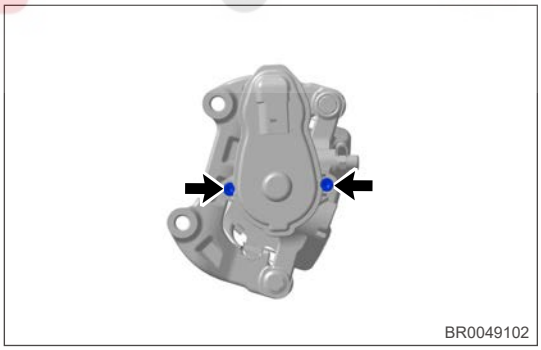
Hint:

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

1. Remove the parking actuator.

a. Remove 2 parking actuator fixing screws.

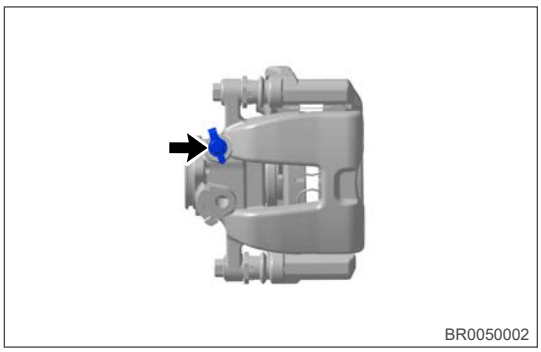
Tightening torque: 9 ~ 11 N•m



2. Remove the bleeder screw (with bleeder screw cap).

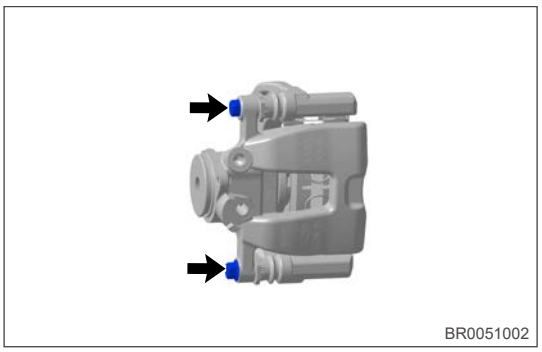
a. Remove bleeder screw (with bleeder screw cap) (-arrow) from brake caliper assembly.

Tightening torque: 9 ~ 11 N•m



3. Remove the brake cylinder assembly.
   a. Remove 2 guide bolts (arrow) between brake caliper fixing bracket and brake cylinder assembly.

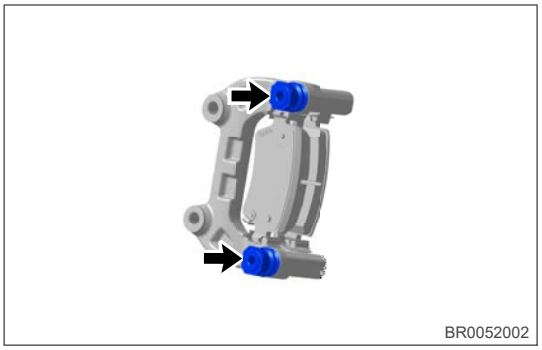
      Tightening torque: 22 ~ 32 N•m


BR0051002

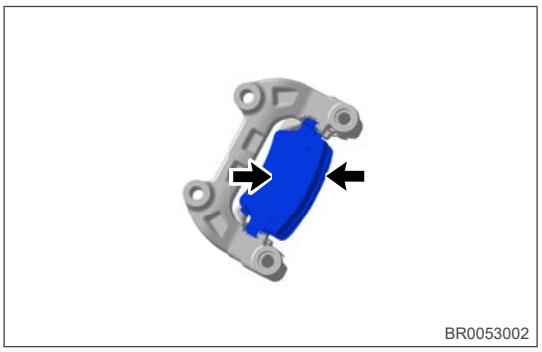
   b. Separate brake cylinder assembly from brake caliper fixing bracket.

Caution
Slowly operate when performing this procedure using caliper with slanted spring, or brake plate may be popped out by spring, be careful not to injuring your feet.

4. Remove the rear brake caliper guide bolt guide pin (with dust boot).
   a. Remove 2 brake caliper guide bolt guide pins (with dust boot) (arrow) from brake caliper fixing bracket.


BR0052002

5. Remove the rear brake lining.
   a. Remove inner brake lining and outer brake lining (-arrow) from brake caliper fixing bracket.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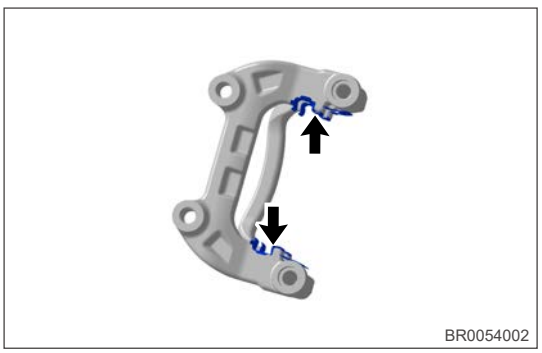
6. Remove the brake lining support shim.
   a. Remove 2 brake lining support shims (arrow) from brake caliper fixing bracket.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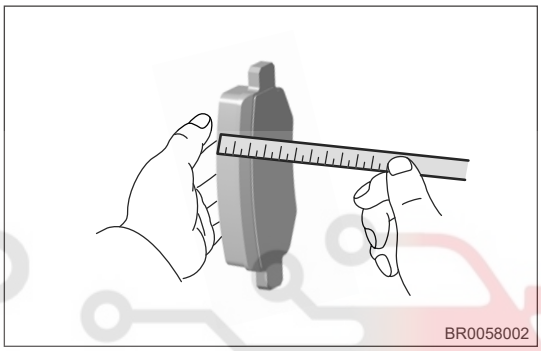
Inspection

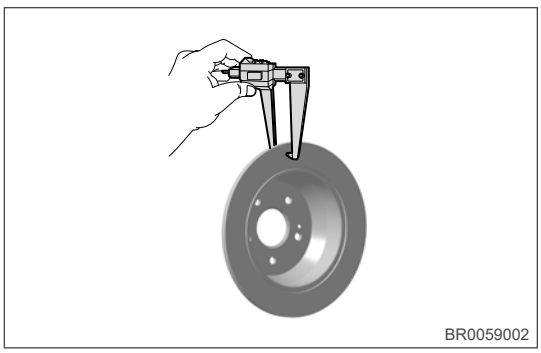
1. Check brake caliper fixing bracket and brake caliper guide pin set.
   a. Clean the contact surfaces of brake caliper fixing bracket and brake lining support shims with brake cleaner. Check for deformation, cracks, rust and foreign matter which is difficult to remove.
   b. Check brake caliper guide pin rubber dust boot for deformation, cracks, wear and foreign matter which is difficult to remove.
   c. Install the brake caliper guide pin and its rubber dust boot to brake caliper fixing bracket. Brake caliper guide pin set should move smoothly without sticking when pushing it with hand; otherwise replace it.
   d. After installing the brake lining, check if it is easy to drop (due to insufficient elasticity of support shim). Replace as necessary.
2. Check the brake lining.
   a. Visually check the brake lining for flatness, and also check for excessive wear. If the condition of lining cannot be confirmed accurately only by visual inspection, perform physical inspection as necessary.
   b. Measure the minimum brake lining thickness. When the minimum thickness of brake lining is 2 mm or less, replace the brake linings.


BR0058002

   c. When replacing the excessively worn brake linings (inner and outer), it is also necessary to replace the linings on opposite side of vehicle as well as unchecked linings to maintain proper braking performance. If it is unnecessary to replace brake linings, be sure to reinstall brake linings to original positions.
3. Check the brake disc.
   a. Minor scratch or wear on brake disc surface is acceptable. If severe scratch or deformation exists, the brake disc must be replaced.
   b. Excessive wear of brake disc may cause poor contact between brake lining and surface of brake disc. If protrusion on the disc is not removed before installing new brake lining, it will cause abnormal wear of brake disc.
   c. It is normal that the surface of brake disc is worn when replacing brake lining. If cracks or burned spots exist, the brake disc must be replaced.
4. Check the brake disc thickness.
   a. Using a vernier caliper, measure brake disc thickness at center of brake lining contact surface as shown in illustration.

      Standard thickness: 10 mm

      Minimum thickness: 8 mm


BR0059002

   b. If it is less than the minimum thickness due to wear, replace brake disc.

Caution
DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.

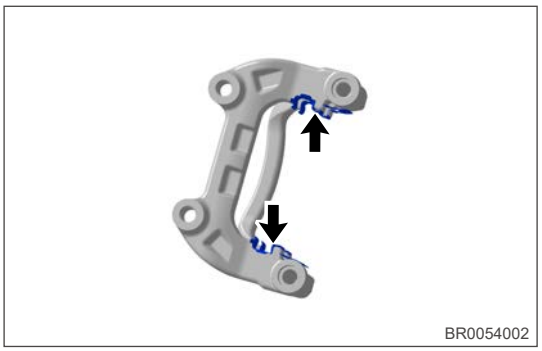
Assembly

Hint:

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

Caution
• When assembling brake caliper assembly, always keep your hands clean. • When assembling brake caliper assembly, always use new clean brake fluid. • Never use old front disc brake piston seal ring.

1. Install the brake lining support shim.
   a. Securely install upper and lower support shims (arrow) onto brake caliper fixing bracket.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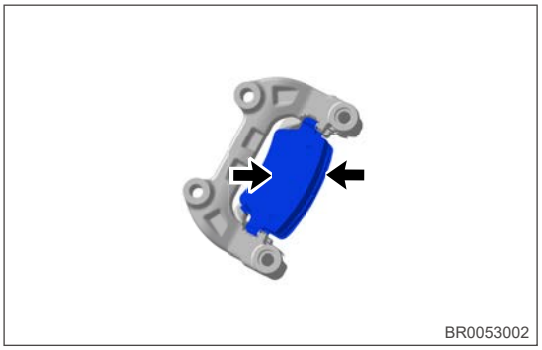
2. Install the rear brake lining.
   a. Securely install inner brake lining and outer brake lining (arrow) onto brake caliper fixing bracket. Make sure they are clamped in place.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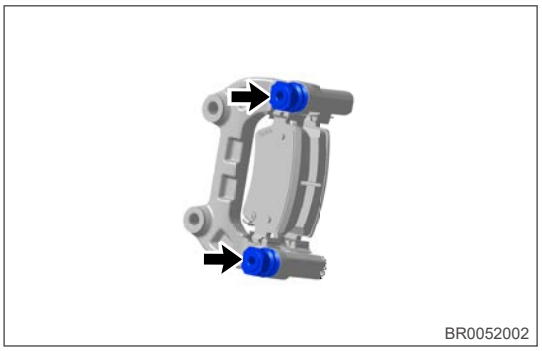
Caution
Make sure contact surface of lining and brake disc is free of oil and grease.

3. Install the rear brake caliper guide bolt guide pin (with dust boot).
   a. Apply a small amount of grease to the contact surface between guide bolt guide pin and guide pin rubber dust boot (arrow), and securely install them to brake caliper fixing bracket.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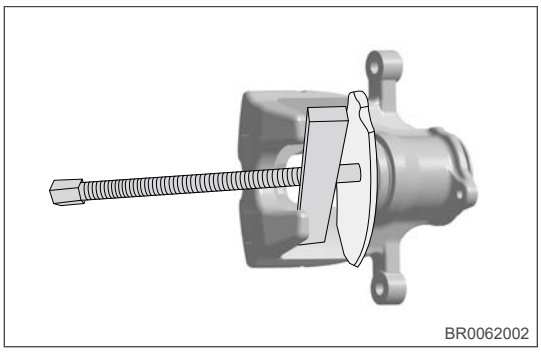
4. Firmly press the brake piston.
   a. Using brake cylinder piston pressing tool, slightly retract brake cylinder piston.

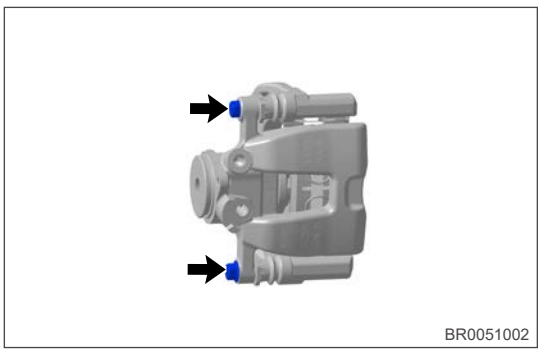

BR0062002

5. Install the slanted spring.
   a. Pinch the well installed brake plate with hand, so that it closes to brake disc.
   b. Install 2 legs of slanted spring into small holes on support lugs at the same side of inner and outer brake plates separately, and install slanted spring on the other side while keeping brake plates clamped.

Caution
Slowly operate when performing this procedure using caliper with slanted spring, or brake plate may be popped out by spring, be careful not to injuring your feet.

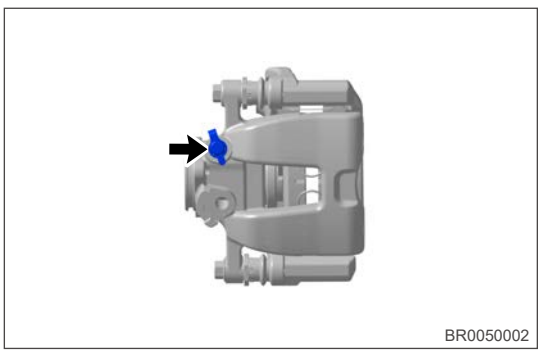
6. Install the brake cylinder assembly.
   c. Align brake caliper guide bolts (arrow) with guide pin holes and securely install brake cylinder assembly.

      Tightening torque: 22 ~ 32 N•m


BR0051002

7. Install the bleeder screw (with bleeder screw cap).
   d. Securely install bleeder screw (with bleeder screw cap) (arrow) to rear brake caliper assembly.

      Tightening torque: 9 ~ 11 N•m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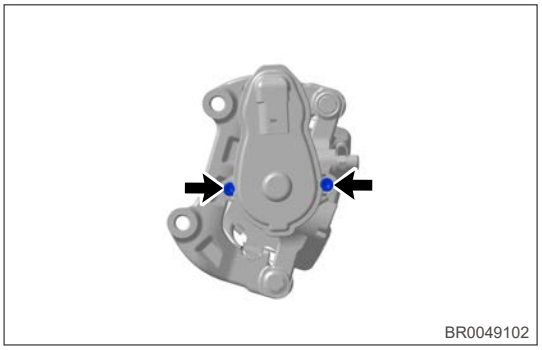
8. Install the parking actuator.

e. Install 2 parking actuator fixing screws.
   Tightening torque: 9 ~ 11 N•m



Installation

1. Installation is in the reverse order of removal.

Caution
• Make sure to tighten fixing bolt and nut to specified torque during installation. • Before installing brake linings, completely retract brake caliper piston back into bore of brake caliper. • Depress brake pedal several times to secure brake linings to brake disc in order to ensure safety after installing brake linings and before moving vehicle. • Replace the brake linings in pairs. DO NOT replace one alone. • DO NOT install inner brake lining and outer brake lining reversely. • Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary. • Be sure to perform bleeding procedures for brake system after installation. • Be sure to add brake fluid to a proper level after installation. • Be sure to perform “Exit Parking Brake Maintenance Mode” using diagnostic equipment after installation.

Rear Brake Hose Assembly

Removal

Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing. • Try to prevent body paint surface from being scratched during removal and installation.

Hint:

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

1. Drain the brake fluid.

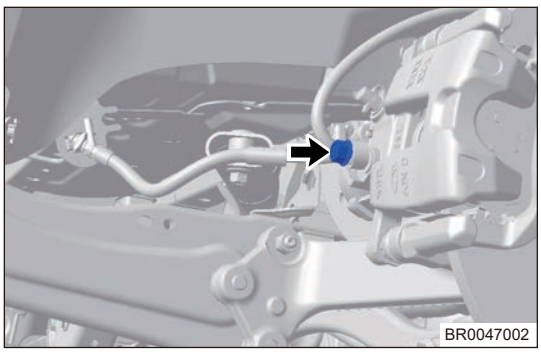
   Hint:
   Drained brake fluid should be well kept in a container. Never discard it at will.

Caution
Wash off brake fluid immediately if it comes in contact with any paint surface.

2. Remove the rear left brake hose assembly.

   a. Remove coupling bolt and washer (arrow) between rear left brake caliper assembly and rear left brake hose assembly.

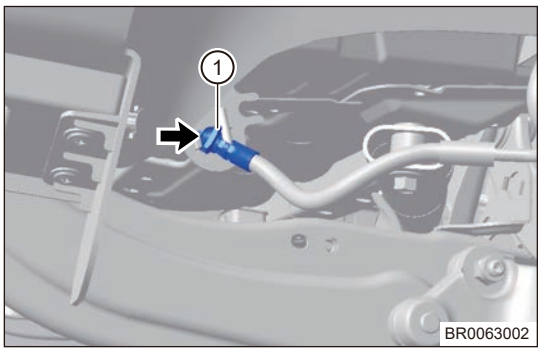
      Tightening torque: 27 ± 2 N·m



Caution
DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.

   b. Loosen coupling plug (arrow) between rear left brake hose assembly and rear brake pipe.

      Tightening torque: 18 ± 2 N·m



Caution
• DO NOT bend or damage brake tube. • DO NOT allow any foreign matter such as dirt and dust to enter brake pipe from joint parts. • After removing brake line, perform sealing treatment to prevent foreign matter from entering.

   c. Remove the rear left brake hose assembly.

Installation

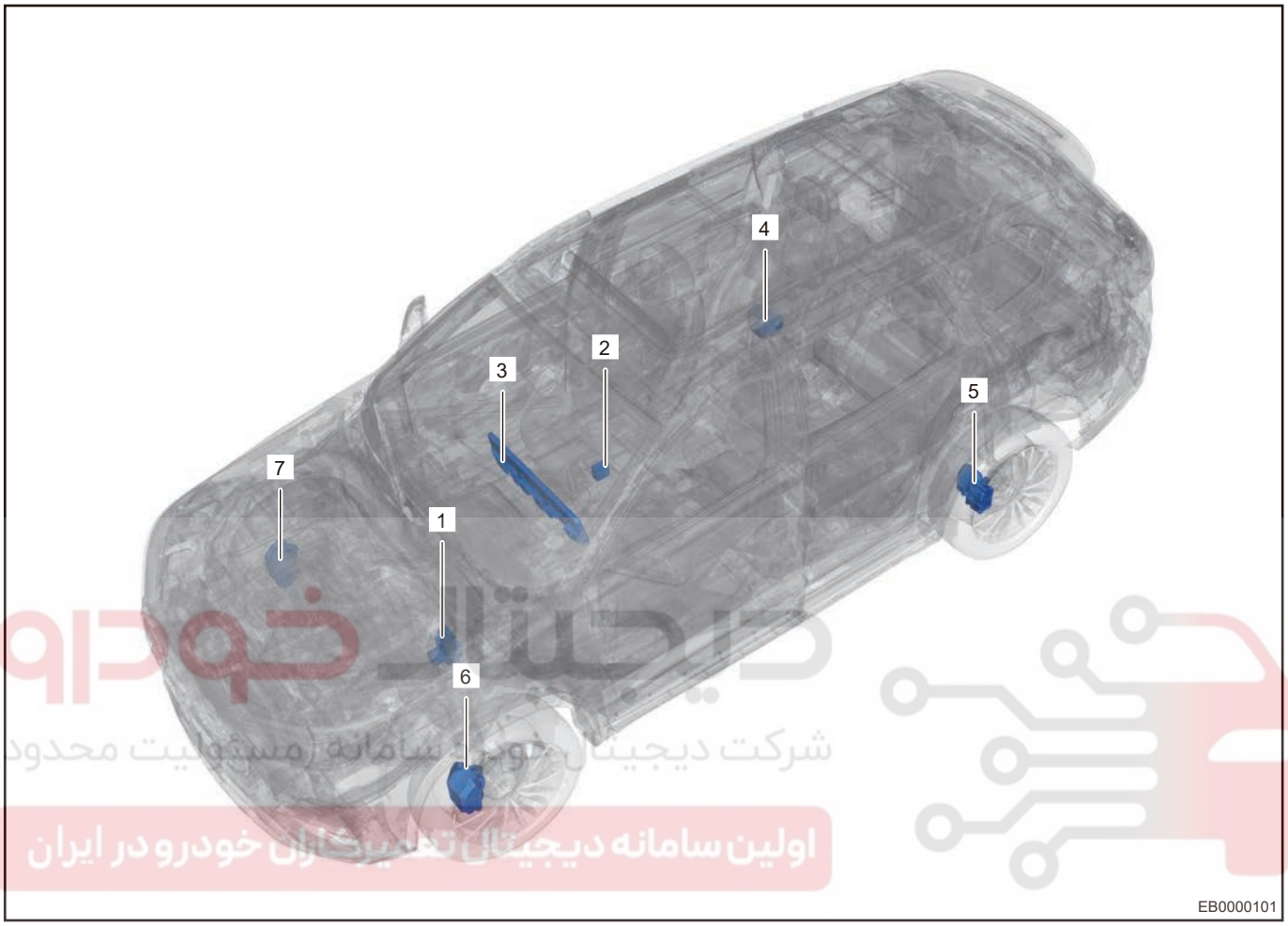
1. Installation is in the reverse order of removal.

Caution
• Be sure to tighten fixing plugs to specified torques during installation. • Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary. • Be sure to perform bleeding procedures for brake system after installation. • Be sure to add brake fluid to a proper level after installation.

ELECTRONIC PARKING BRAKE SYSTEM

GENERAL INFORMATION

Description



1	ESP Control Module	5	Rear Left Integrated Caliper Assembly
2	EPB Button Assembly	6	Front Left Brake Caliper Assembly
3	Instrument Cluster	7	Front Right Brake Caliper Assembly
4	Rear Right Integrated Caliper Assembly		

EPB (Electrical Parking Brake) system: Electrical parking brake system can apply parking brake and emergency brake by electronic control, and traditional handbrake operation is replaced by electronic parking button. Automatic parking function: stop vehicle by service brake, release brake pedal to park automatically.

System Function Introduction

I : Manual Parking Function

Function	Vehicle Status	Engine Status	Key Status	EPB Status	Operation Method	HMI Status	
						Instrument Cluster	Switch
Manual Parking Function	Stationary	Ignition	ON	Released	Pull up EPB switch	Red P light comes on (goes off 20 seconds after engine stalled)	EPB switch indicator comes on (goes off 20 seconds after engine stalled)
		Stall	ON				
		Within 20 s after stalling	OFF				

II : Manual Releasing Function

Function	Vehicle Status	Engine Status	Key Status	EPB Status	Operation Method	HMI Status	
						Instrument Cluster	Switch
Manual Releasing Function	Stationary	Ignited/ Stall	ON	Firmly applied	Depress brake pedal and press EPB switch simultaneously	Red P light goes off	EPB switch indicator goes off when accelerator pedal is depressed
					Depress accelerator pedal and press EPB switch simultaneously		

III : Stall and Park

- With vehicle in stationary status, turn off engine with key or turn key to OFF from ON position, EPB system will park automatically.
- For vehicles with start and stop function, when engine stalls with start and stop function operating, parking state of vehicle will not change.
- Automatic parking also operates at stall when starting off.

Function	Vehicle Status	Engine Status	Key Status	EPB Status	Operation Method	HMI Status	
						Instrument Cluster	Switch
Automatic Parking	Stationary	Ignition	ON→OFF	Released	Turn ENGINE START STOP switch to OFF	Red P light comes on (goes off 20 seconds after engine stalled)	EPB switch indicator comes on (goes off 20 seconds after engine stalled)
		Stall					

IV: EPB Automatic Releasing

Function	Vehicle Status	Engine Status	Key Status	EPB Status	Driver Seat Belt Status	Gear position	Operation Method	HMI Status	
								Instrument Cluster	Switch
EPB Automatic Releasing	Stationary	Ignition	ON	Firmly applied	OFF	Driving or reverse position	Accelerator pedal depressed	Red P light goes off	EPB switch indicator goes off

V: Automatic Parking Function ON

1. This function is four wheels parking brake supplied by ESP system.
2. After automatic parking, when any of following conditions is met, automatic parking will exit and turn to electrical caliper parking, parking light will turn to red P from green P, and a "fizz" sound of electrical caliper will be heard and it is normal operating sound; if there is a malfunction in system, yellow P comes on simultaneously.
   a. Keep automatic parking for more than 10 minutes.
   b. Turn off automatic parking function manually.
   c. Release seat belt.
   d. Driver door is opened.
   e. ESP system is malfunctioning.
   f. Engine stalls.
3. Operation methods for automatic parking and automatic releasing are as shown in table below:

Function	Vehicle Status	Engine Status	Driver Door Status	Driver Seat Belt Status	Operation Method	HMI Status	
						Instrument Cluster	Switch
Automatic Parking Function ON	/	Ignition	OFF	Lock	Press automatic parking switch	Automatic parking function is turned on	Automatic parking switch indicator comes on

VI: Automatic Parking Activation

Function	Vehicle Status	Engine Status	EPB Status	Driver Door Status	Driver Seat Belt Status	Operation Method	HMI Status	
							Instrument Cluster	Switch
Automatic Parking Activation	Stationary	Ignition	Released	OFF	Lock	Brake pedal depressed	Green P light comes on	Automatic parking switch indicator comes on
	Driving → Stationary							

VII: Automatic Releasing

Function	Vehicle Status	Engine Status	Gear Position Status	EPB Status	Driver Door Status	Driver Seat Belt Status	Operation Method	HMI Status	
								Instrument Cluster	Switch
Automatic Releasing	Stationary	Ignition	Driving or reverse position	Firmly applied	OFF	Lock	Accelerator pedal depressed	Green P light goes off	EPB switch indicator comes on

VIII: Reclamping Function

1. If system enters parking status after keeping brake disc at excessively high temperature for a long time (under conditions such as service brake or down-hill HDC ON), electric parking system will perform second clamping according to the brake disc temperature for safety; during the second clamping process, system will produce a certain operating sound, which is normal.
2. If vehicle coasts after stopping (within 10 minutes), for safety, system will increase parking brake force automatically, to make vehicle stationary; during the process of increasing parking brake force, system will produce a certain operating sound, which is normal.
3. Functions of reclamping at coasting and reclamping at high temperature are performed automatically by system without any operation.

Function	Vehicle Status	Engine Status	Key Status	EPB Status	HMI Status	
					Instrument Cluster	Switch
Reclamping at Coasting	Stationary	Ignited/Stall	Within 10 minutes after ON or OFF	Firmly applied	Red P light comes on (- goes off 20 seconds after engine stalled)	EPB switch indicator comes on (- goes off 20 seconds after engine stalled)
Reclamping at High Temperature						

IX: Trailer Mode

1. EPB caliper will not clamp automatically after stalling in trailer mode for towing vehicle.
2. Operation method for entering trailer mode is as shown in table below:

Function	Vehicle Status	Engine Status	Key Status	EPB Status	Operation Method	HMI Status	
						Instrume-nt Cluster	Switch
Trailer Mode	Stationary	Ignited/ Stall	ON	Released	Turn off engine while keeping EPB switch pressed	No P light comes on	No indicator comes on

X **: Roller Mode**

1. This mode is used in brake detection during annual inspection of vehicle. EPB system will enter roller mode automatically only when following conditions are met without performing other operations, and there is no any indication on instrument cluster.
2. Operation method for entering roller mode is as shown in table below:

Function	Vehicle Status	Engine Status	Key Status	Operation Method	HMI Status	
					Instrument Cluster	Switch
Roller Mode	Driving	Ignition	ON	Front wheel speed is 1 km/h or less; rear wheel speed is 1.5-18 km/ h; wheel speed difference between two rear wheels is 5 km/h or less	No P light comes on	No indicator comes on

XI: Service Mode

1. This mode is used when checking and repairing EPB system.
2. When entering service mode, EPB caliper will be released in place automatically.
3. Never perform “Exit Maintenance Mode” if inspection and repair of vehicle are not finished, to prevent serious accident.
4. Diagnostic tester must be used to perform “Exit Maintenance Mode” after inspection and repair of vehicle are finished (such as replacing brake linings with new ones), failure to do so may cause vehicle to lose EPB function, however, conventional braking will not be affected.
5. When service mode function is triggered, a “drone” sound will be heard, it is normal.
6. Operation methods for entering and exiting service mode are as shown in table below:

Function	Vehicle Status	Engine Status	Key Status	Operation Method	HMI Status	
					Instrument Cluster	Switch
Service Mode	Stationary	Ignited/Stall	ON	Entering or exiting is performed using diagnostic tester or by professional technicians at 4S shop	Red P and yellow P lights flash when entering service mode, and reflect EPB status of real-vehicle after exiting service mode	Reflect EPB status of real vehicle

XII: Emergency Brake

1. This function is used when service brake becomes unavailable. Never use electric parking brake on this vehicle in emergency case other than service brake failure.
2. Emergency brake refers to the ESP system brake, and the brake force is constant during emergency brake.
3. Brake light comes on normally during emergency brake.
4. When emergency brake function is triggered, a “drone” sound will be heard, it is normal.
5. Operation methods for entering and exiting emergency brake are as shown in table below:

Function	Vehicle Status	Engine Status	Key Status	Operation Method	HMI Status	
					Instrument Cluster	Switch
Entering Emergency Brake	Driving	Ignited/Stall	ON	Pull up EPB switch and hold it when vehicle speed is more than 3 km/h	Red P light flashes	EPB switch indicator flashes
Exiting Emergency Brake	Driving	Ignited/Stall	ON	Release EPB switch/ depress accelerator pedal	No P light comes on	No indicator comes on
	Driving → Stationary			Stop vehicle		

Meter Indicator Light and Prompt Information

No.	Indicator Light Condition or Prompt Information	Indicator Light Description	Treatment
1	Yellow P light - remains ON	EPB system malfunction	Check and repair
2	Red and yellow P lights - flash simultaneously	EPB is in check and repair mode	Check and repair
3	Red P light - flashes	In emergency brake mode	Normal, don’ t need to repair
4	Red P light - remains ON	EPB parking function is operative	Normal, don’ t need to repair
5	Green P light - remains ON	Automatic parking function is operative	Normal, don’ t need to repair
6	“Please depress brake pedal when releasing parking brake”	Press EPB release button when parking brake is applied and brake pedal is not depressed	Depress brake pedal and press EPB button simultaneously
7	“Please fasten seat belt”	Seat belt is not fastened when driving away after parking	Fasten seat belt and depress accelerator pedal
8	“Please close door and fasten seat belt”	Press automatic parking switch when seat belt is not fastened or a door is not closed	Close driver door and fasten seat belt, then press automatic parking switch
9	“Parking slope is too large, Please take care”	Static parking on a slope is larger than 30%	It is recommend to park vehicle on a small slope

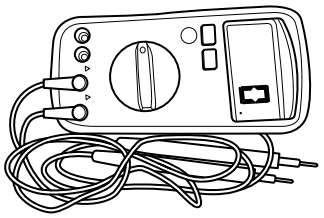
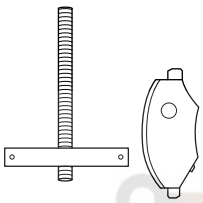
Specifications

Torque Specifications

Description	Torque (N•m)
Left Integrated Caliper Motor Fixing Bolt	10 ± 1.0
Right Integrated Caliper Motor Fixing Bolt	10 ± 1.0
Left Integrated Caliper Guide Pin Bolt	30 ± 2.0
Right Integrated Caliper Guide Pin Bolt	30 ± 2.0

Tools

General Tools

Tool Name	Part No.	Tool Drawing
Digital Multimeter	-	 RCH000206
Rear Brake Cylinder Release Tool	Part No.: CH30003, with aid of wasted brake	 RCH0116006

ON-VEHICLE SERVICE

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 linings on both sides visually, replace it when minimum value is less than 2 mm.
2. When brake lining is worn to limit state, there will be mechanical alarm, and the brake lining 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.

Integrated Caliper Motor

Removal

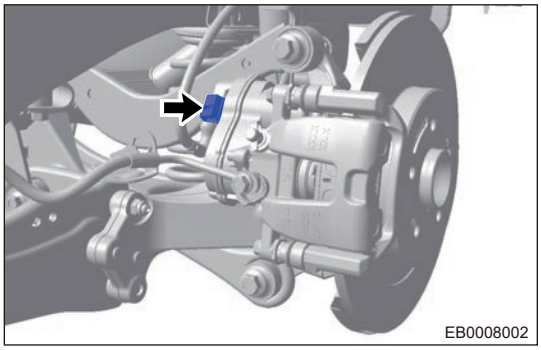
Hint:

- 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.

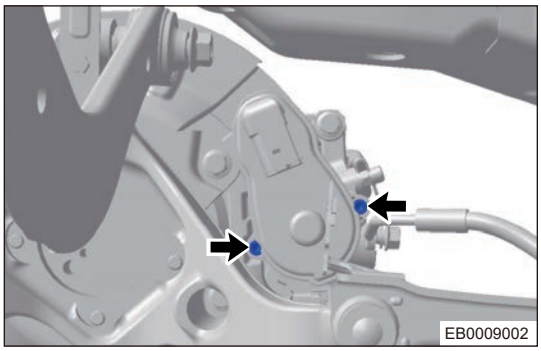
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable
3. Remove the rear tires
4. Remove the integrated caliper motor

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

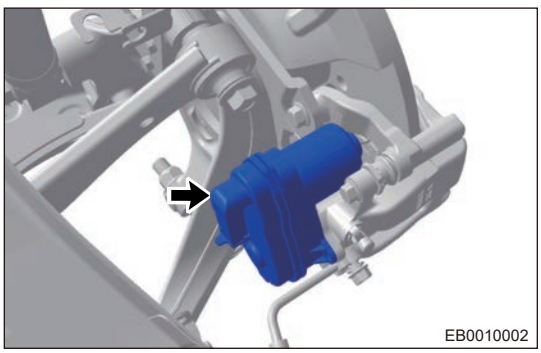


b. Remove 2 fixing bolts (arrows) from left integrated caliper motor.

Tightening torque: 10 ± 1.0 N·m



c. Remove the integrated caliper motor (arrow).



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

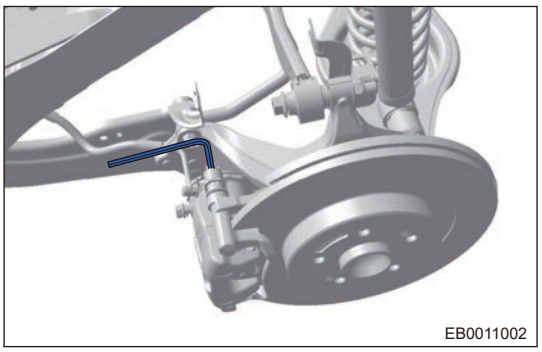
EPB Brake Caliper Emergency Release

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).



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. Installation is in the reverse order of removal.

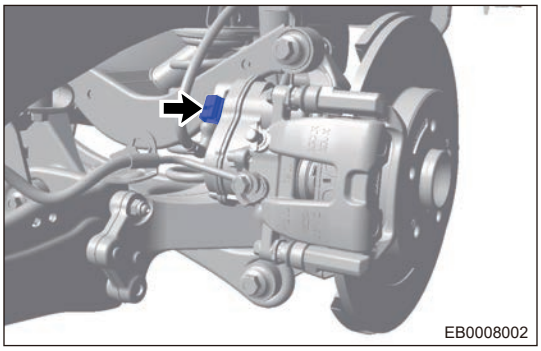
Caution
• Be sure to wear safety equipment to prevent accidents, when installing integrated caliper motor. • When installing integrated caliper motor, remove sediment, dust and other foreign objects that are on matching surface of parking actuator and on head of parking caliper. • When installing integrated 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.

Rear Brake Lining

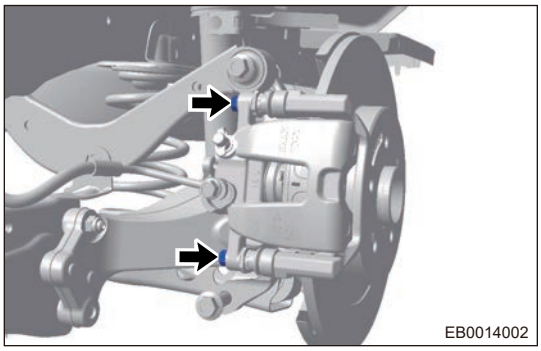
Removal

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.

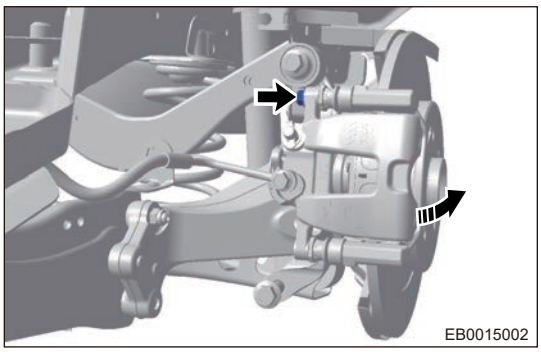
1. Use diagnostic tester to enter parking brake maintenance mode
2. Remove the rear brake lining
   a. Disconnect the integrated caliper motor wire harness connector (arrow).



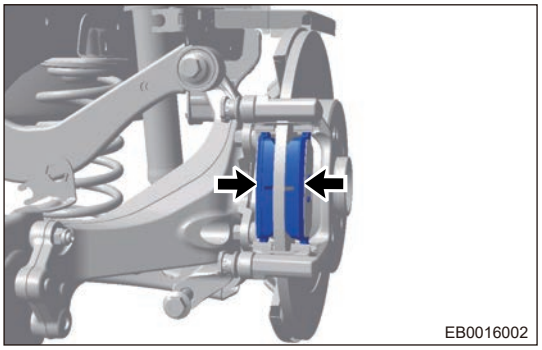
   b. Remove the lower fixing bolt (arrow) from single guide pin.



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



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

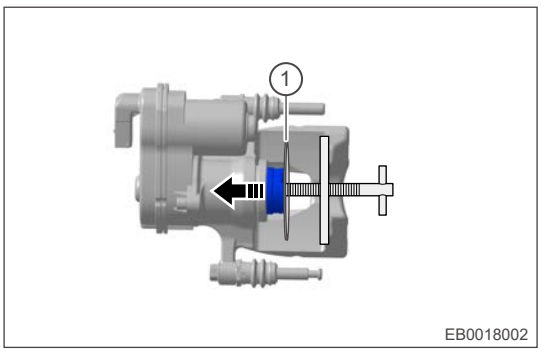


Caution
• After removing EPB caliper set, it is strictly forbidden to depress brake pedal, otherwise the piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts. • Move caliper equipped with spring diaphragm slowly during this process, spring may 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 rear wheel brake lining
   a. 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.
   b. Use special tool to press piston along the direction of hand as shown in figure to push piston back to bottom of cylinder hole.

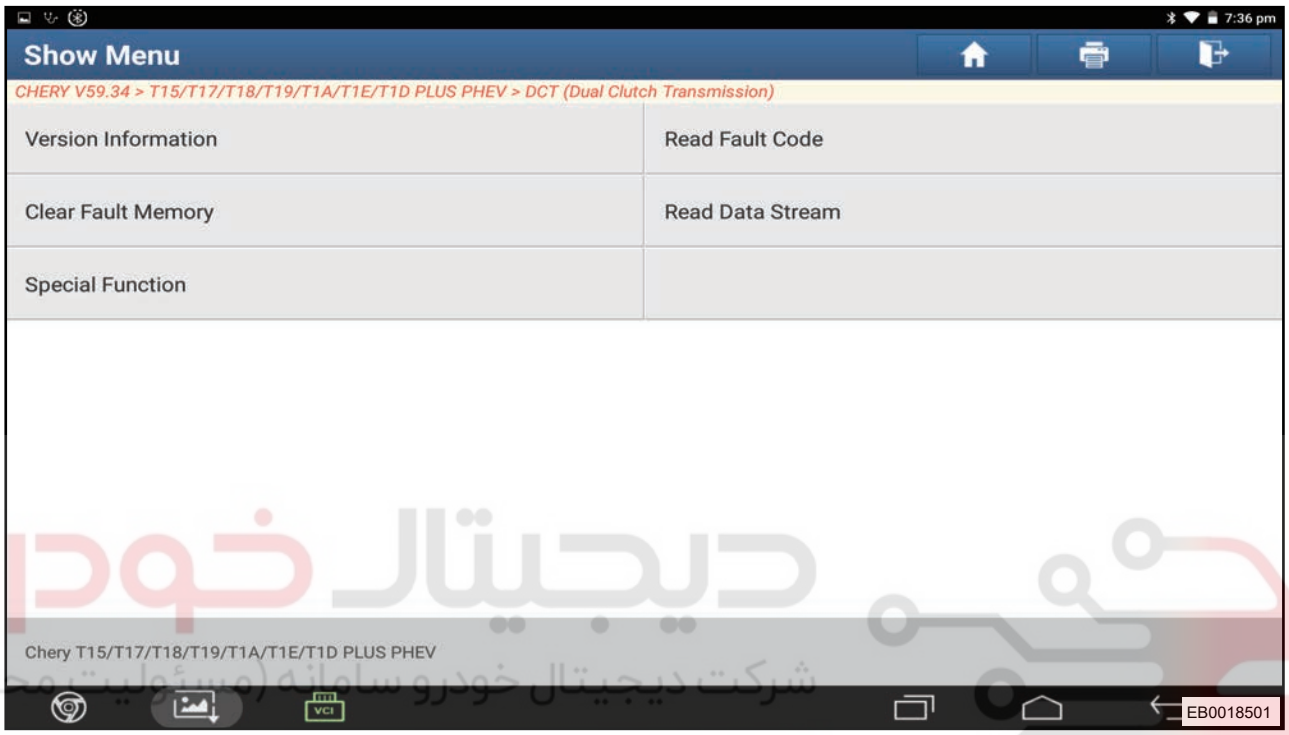


   c. Install new brake lining.
   d. Install brake caliper bolt in place.
2. Connect EPB connector and install wheel.
3. Perform “Exit Maintenance Mode” using diagnostic tester.

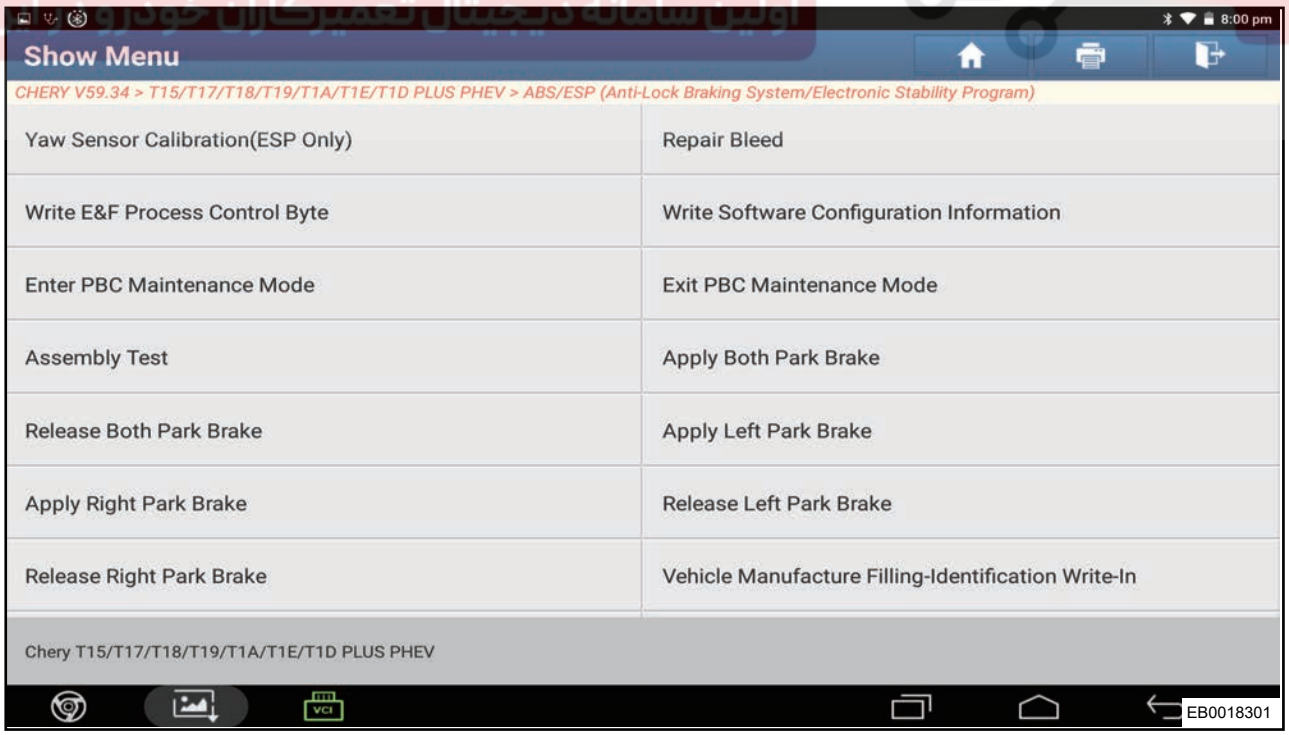
Caution
• When replacing brake lining, check whether piston dust boot and guide pin dust boot is broken, and whether the spring plate is deformed or damaged, replace it when necessary. • After completing replacing new brake lining, make sure to perform “Exit Parking Brake Maintenance Mode” with diagnostic 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.

Diagnostic Tester Test

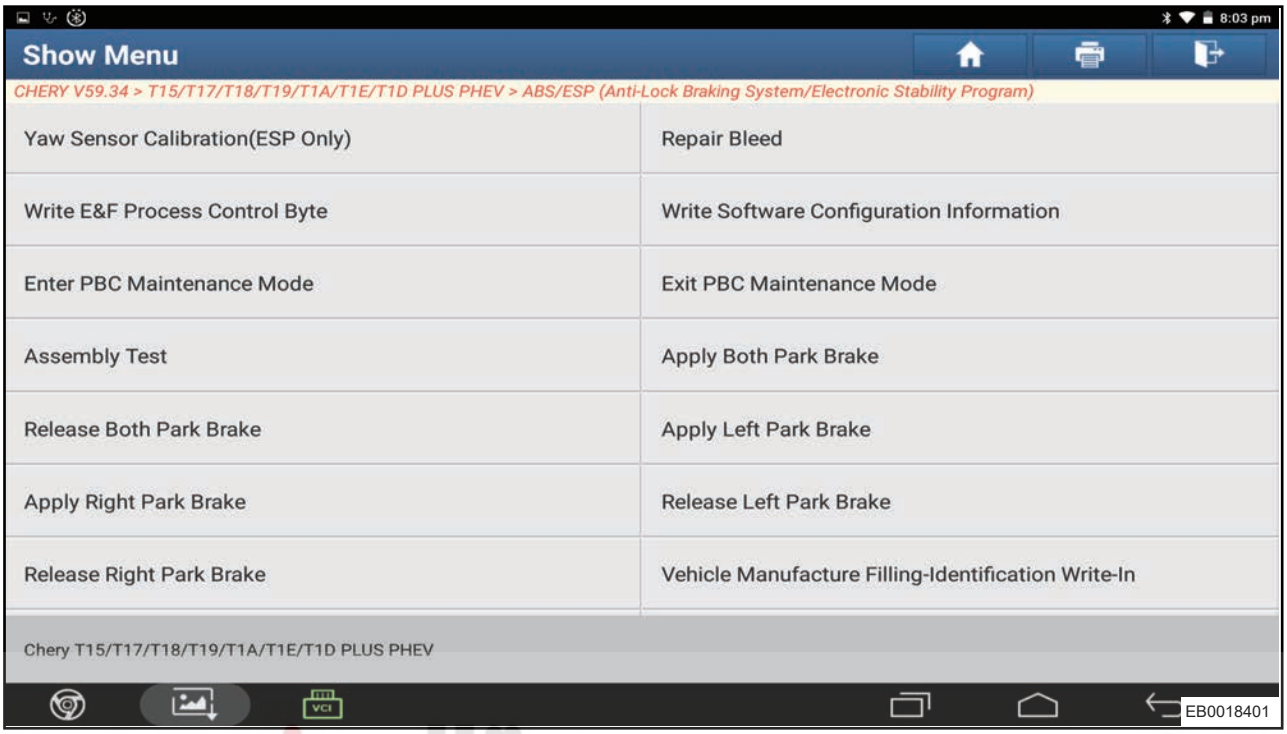
1. Brake System Service Mode
   a. Turn ENGINE START switch to ON.
   b. Connect the diagnostic tester.
   c. Select and enter “ABS/ESP (Anti-lock Braking System/Electronic Stability Program)”.
   d. Click “Special Function”.



   e. Click “Enter PBC Maintenance Mode”.



f. Click “Exit PBC Maintenance Mode”.



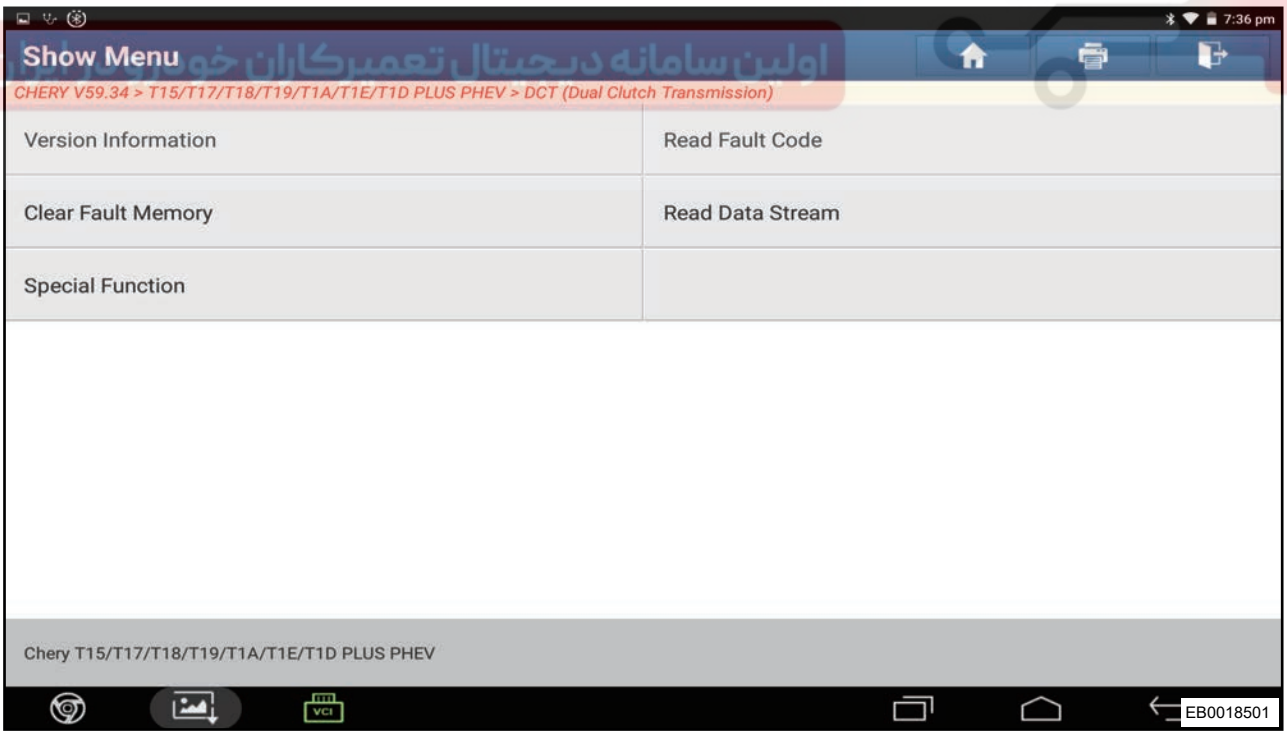
2. Simultaneously Apply and Release Rear Brake Caliper Test

a. Turn ENGINE START switch to ON.

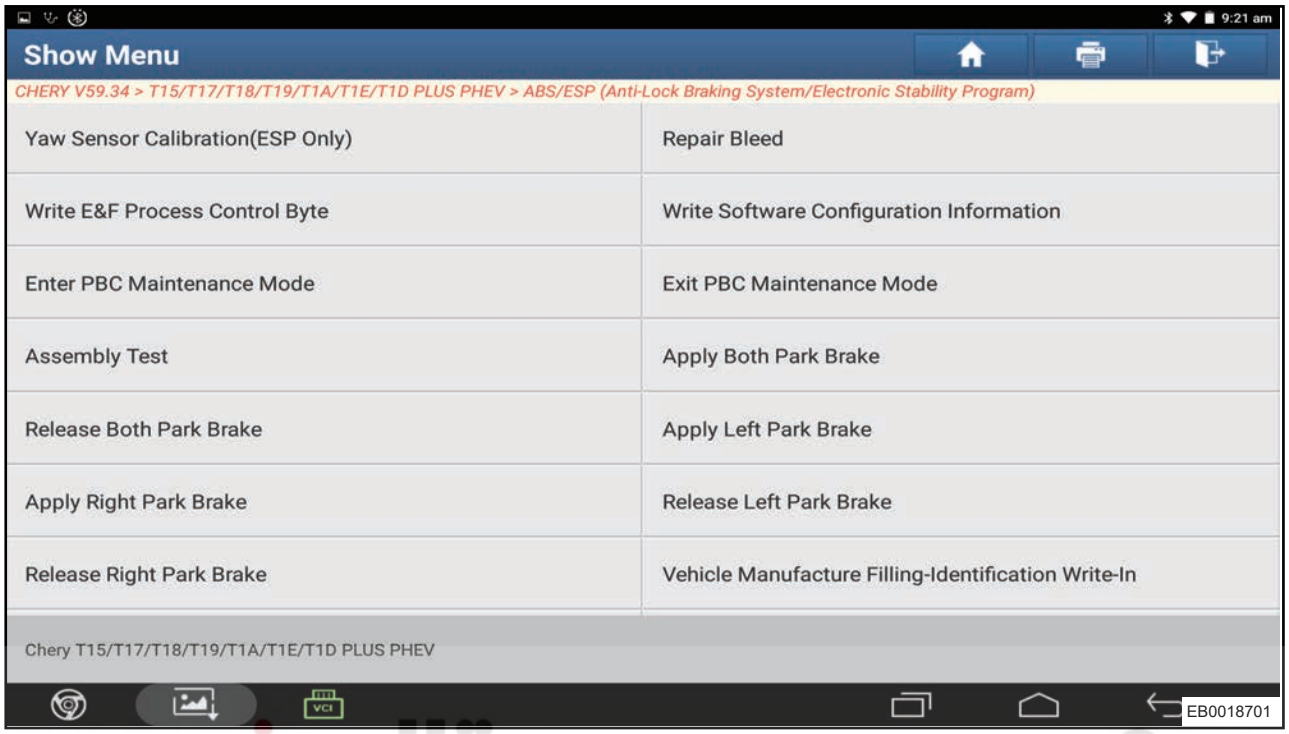
b. Connect the diagnostic tester.

c. Select and enter “ABS/ESP (Anti-lock Braking System/Electronic Stability Program)”.

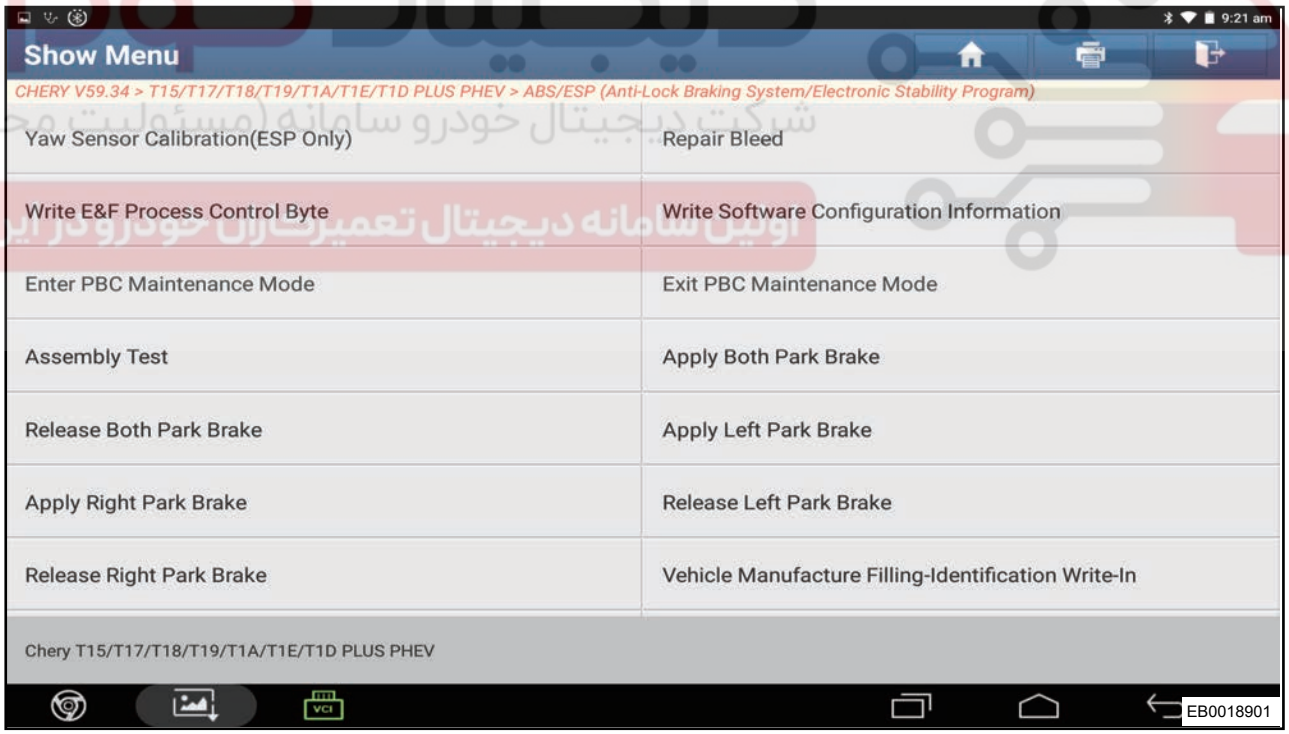
d. Click “Special Function”.



e. Click “Apply Both Park Brake”.

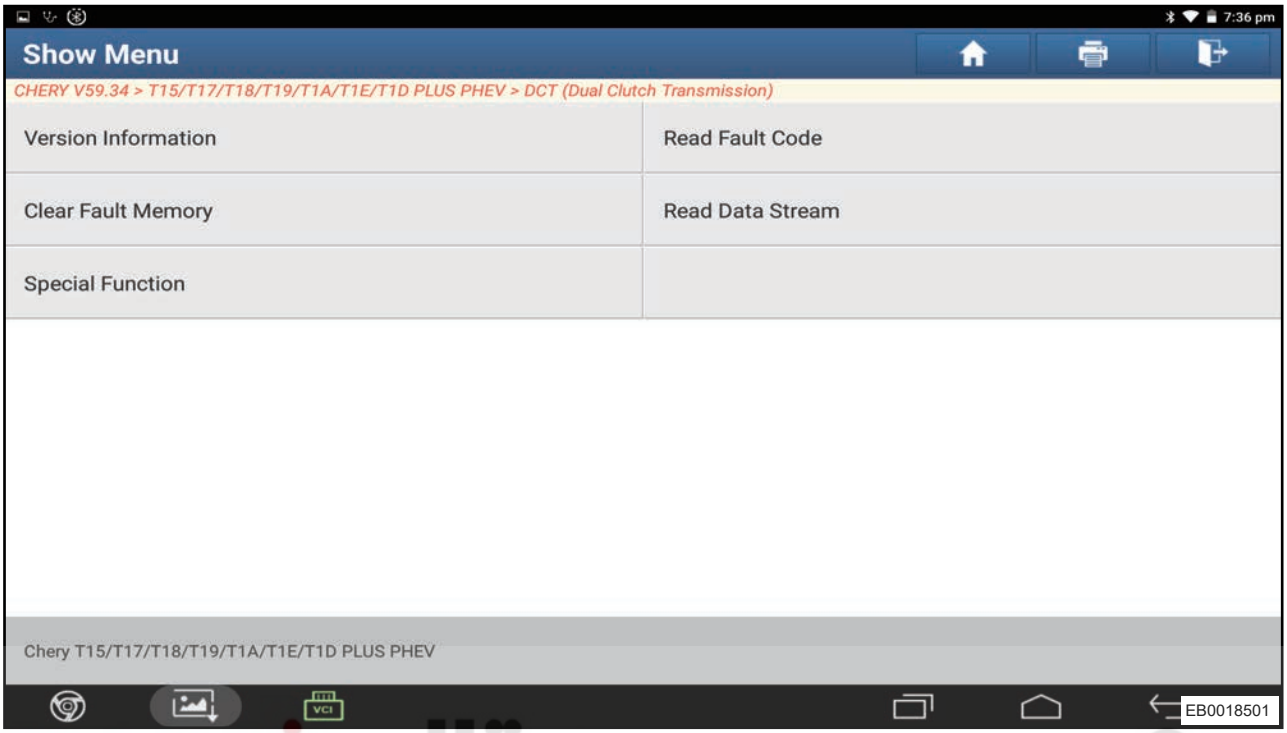


f. Click “Release Both Park Brake”.

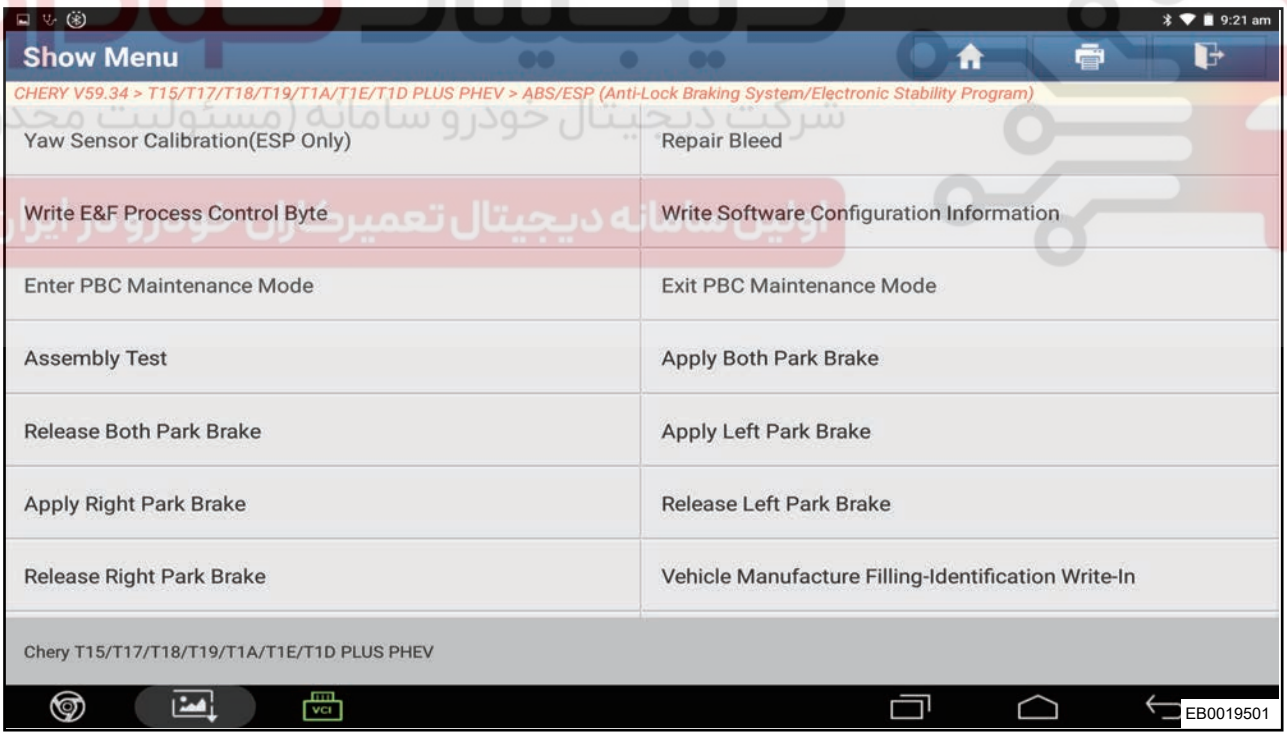


3. Rear brake calipers separately release and clamp test
   a. Turn ENGINE START switch to ON.
   b. Connect the diagnostic tester.
   c. Select and enter “ABS/ESP (Anti-lock Braking System/Electronic Stability Program)”.

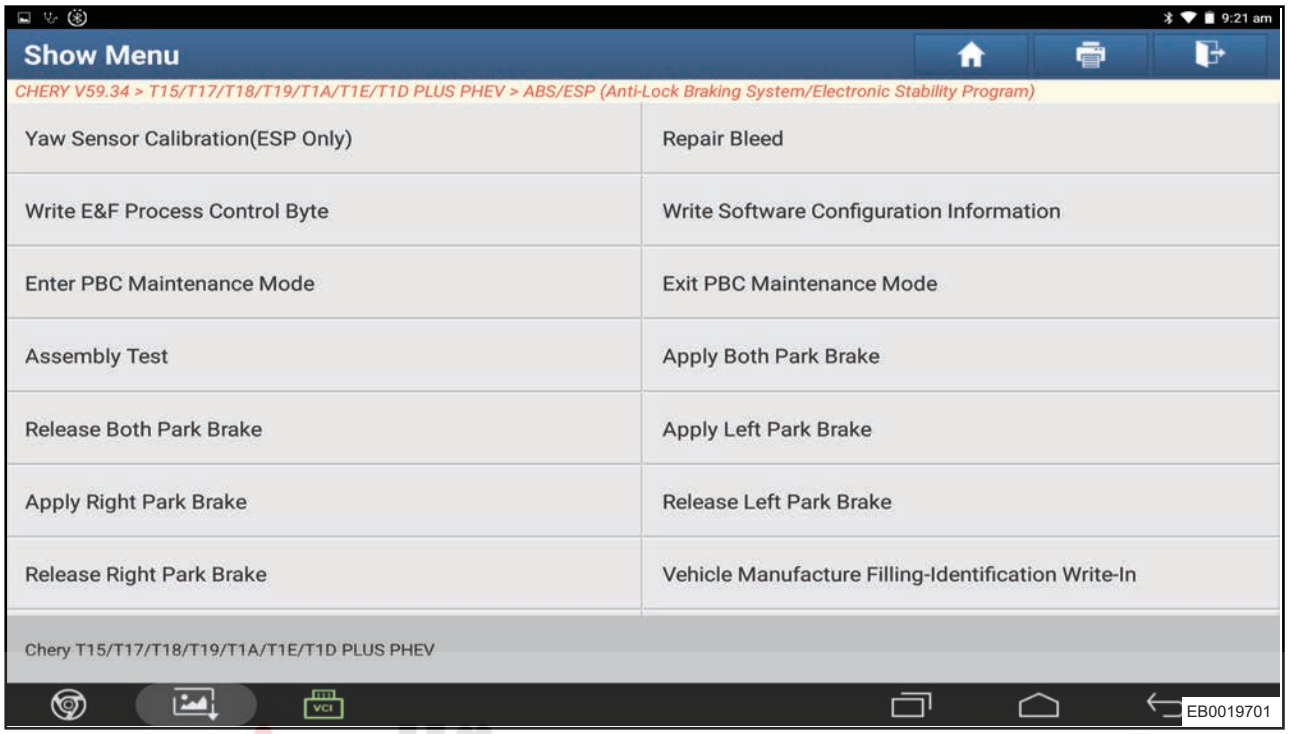
d. Click “Special Function”.



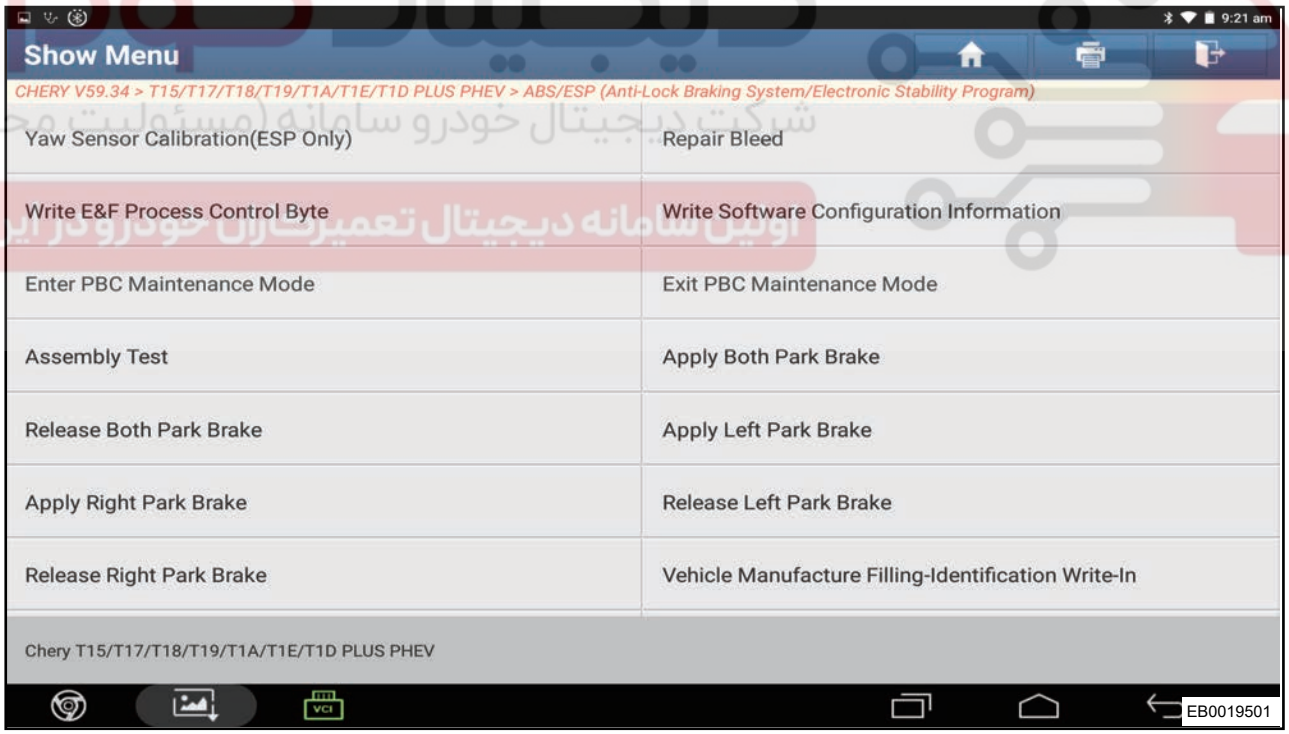
e. Click “Apply Left Park Brake”.



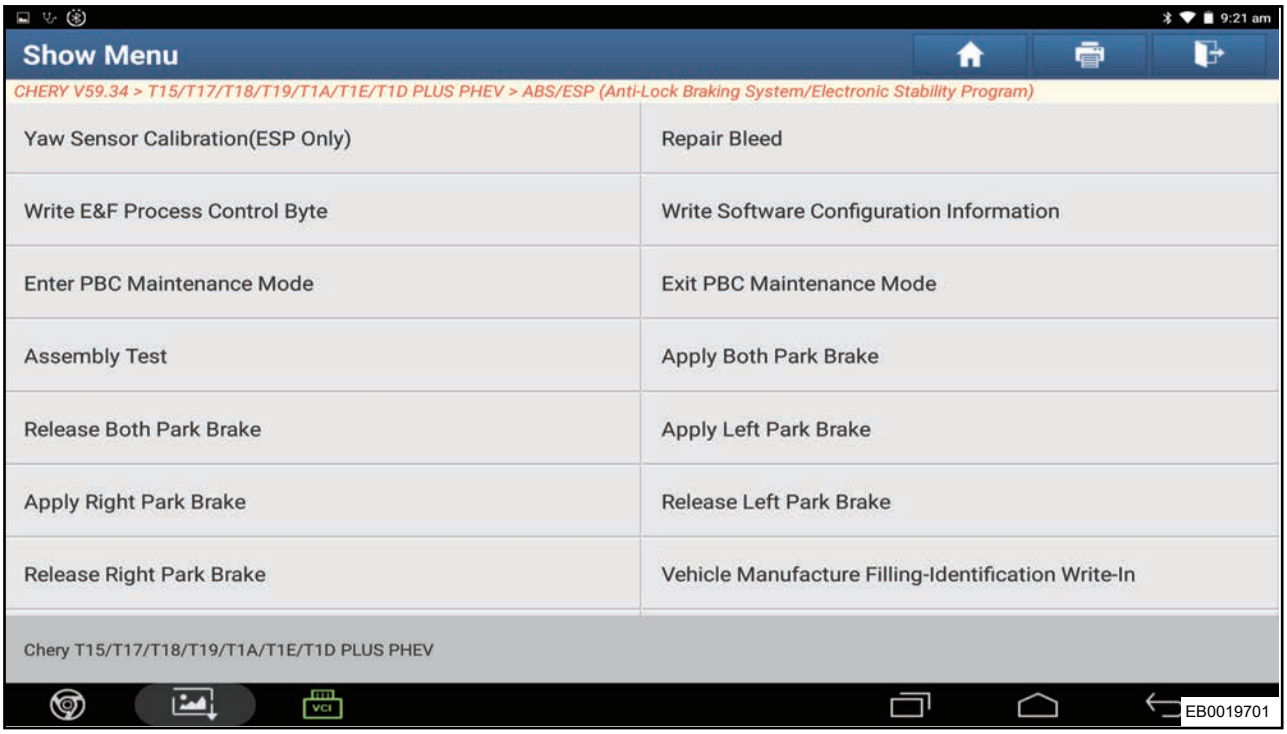
f. Click “Release Left Park Brake”.



g. Click “Apply Right Park Brake”.



h. Click “Release Right Park Brake”.

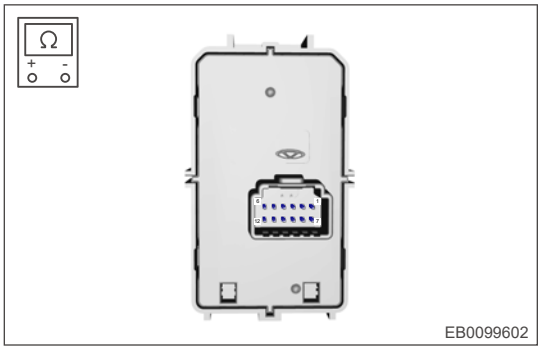


Caution
All actions of the EPB action test should be in line with the actual operation, otherwise the EPB system should be overhauled.

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	⩽ 1 Ω
Terminal 3 - Terminal 4	No action	⩽ 1 Ω
Terminal 1 - Terminal 3 - Terminal 4	Parking brake pulled up	⩽ 1 Ω
Terminal 3 - Terminal 2 - Terminal 1	Parking brake released	⩽ 1 Ω

Multimeter Connection	Automatic Parking Switch State	Specified Condition
Terminal 6 - Terminal 8	Not pressed	∞
Terminal 6 - Terminal 8	Pressed	⩽ 1 Ω

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