
BRAKE SYSTEM

7.1	FRONT BRAKE	977
1	Warnings and Precautions	977
1.1	Precautions	977
2	System Overview	977
2.1	System Components Diagram.....	977
2.2	Brake Disc Specifications	979
3	DIAGNOSIS & TESTING.....	979
3.1	Problem Symptoms Table	979
4	On-vehicle Service	980
4.1	Tools	980
4.2	Brake Bleeding.....	981
4.3	Replace Front Disc Brake Assembly	985
4.4	Replace Lining Assembly.....	987
7.2	REAR BRAKE	990
1	Warnings and Precautions	990
1.1	Precautions	990
2	System Overview	990
2.1	System Components Diagram.....	990
2.2	Brake Disc Specifications	992
3	DIAGNOSIS & TESTING.....	992
3.1	Problem Symptoms Table	992
4	On-vehicle Service	993
4.1	Tools	993
4.2	Brake Bleeding.....	994
4.3	Replace Rear Left Brake Assembly	998
4.4	Replace electronic control execution unit	1001
4.5	Replace lining assembly	1001
7.3	HYDRAULIC BRAKE	1004
1	Warnings and Precautions	1004
1.1	Precautions	1004
2	System Overview	1004
2.1	System Components Diagram.....	1004
2.2	System Schematic Diagram	1006
2.3	Components Operation Description.....	1006
3	DIAGNOSTIC INFORMATION AND STEPS	1006
3.1	Problem Symptoms Table	1006
4	On-vehicle Service	1007
4.1	Tools	1007
4.2	Brake Bleeding.....	1007
4.3	Replacement of Brake Pedal Assembly.....	1008
4.4	Replacement of Brake Fluid Reservoir Assembly	1011
4.5	Replacement of Brake Master Cylinder Assembly.....	1012
4.6	Replacement of Vacuum Booster Assembly	1013
4.7	Replacement of Vacuum Pump Assembly	1014

BRAKE SYSTEM

4.8	Replacement of Vacuum Pipe Assembly	1016
4.9	Replacement of Front Brake Hose Assembly	1018
4.10	Replacement of Rear Brake Hose Assembly	1019
4.11	Replacement of Brake Pipe Assembly	1021
7.4	ELECTRONIC PARKING BRAKE SYSTEM	1028
1	Warning and Precautions	1028
1.1	Precaution	1028
2	System Overview	1028
2.1	System Description	1028
2.2	System Components Diagram	1029
2.3	System Schematic Diagram	1032
3	System Circuit Diagram	1033
3.1	Module Terminal Definition	1033
3.2	ESP Module Terminal Definition	1036
3.3	Circuit Diagram	1036
4	Diagnostic Information and Steps	1038
4.1	Problem Symptoms Table	1038
4.2	Diagnosis Procedure	1038
4.3	Diagnostic Help	1039
4.4	Intermittent Troubleshooting	1039
4.5	Ground Inspection	1040
4.6	DTC Confirmation Procedure	1040
4.7	Diagnostic Trouble Code (DTC) Chart	1040
5	On-vehicle Service	1085
5.1	Tool	1085
5.2	EPB System	1086
5.3	Integrated Caliper Motor	1086
5.4	Rear Brake Lining	1088
5.5	EPB Switch	1094
7.5	ELECTRONIC STABILITY CONTROL SYSTEM	1096
1	Warnings and Precautions	1096
1.1	Precautions	1096
2	System Overview	1097
2.1	System Components Diagram	1097
2.2	System Schematic Diagram	1098
2.3	System Function Description	1099
2.4	Component Operation Description	1099
3	System Circuit Diagram	1100
3.1	Module Terminal Definition	1100
3.2	Circuit Diagram	1102
4	Diagnostic Information and Steps	1104
4.1	Problem Symptoms Table	1104
4.2	Primary Inspection	1104
4.3	DTC Confirmation Procedure	1105

BRAKE SYSTEM

4.4	Intermittent DTC Troubleshooting	1105
4.5	Ground Inspection	1106
4.6	Diagnosis Procedure.....	1106
4.7	Diagnostic Trouble Code (DTC) Chart	1108
5	ON-VEHICLE SERVICE	1158
5.1	Tools	1158
5.2	ESP (iEPB)/ESP Control Module Assembly	1158
5.3	Brake System Bleeding	1162
5.4	Front Wheel Speed Sensor.....	1163
5.5	Rear Wheel Speed Sensor	1164

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7.1 FRONT BRAKE

1 Warnings and Precautions

1.1 Precautions

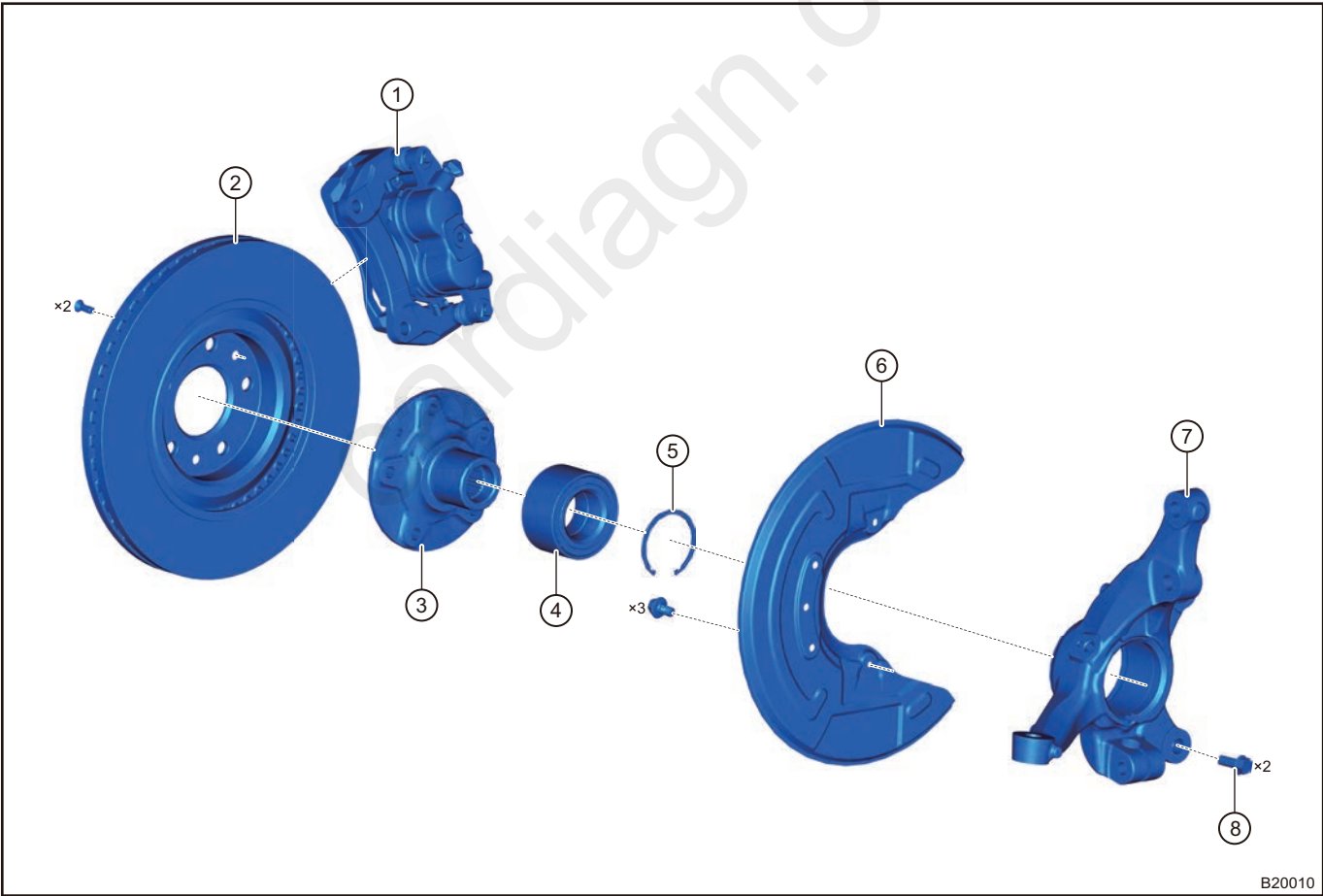
In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

- (1) DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.
- (2) After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- (3) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

■ Front Left Steering Knuckle with Disc Brake Assembly



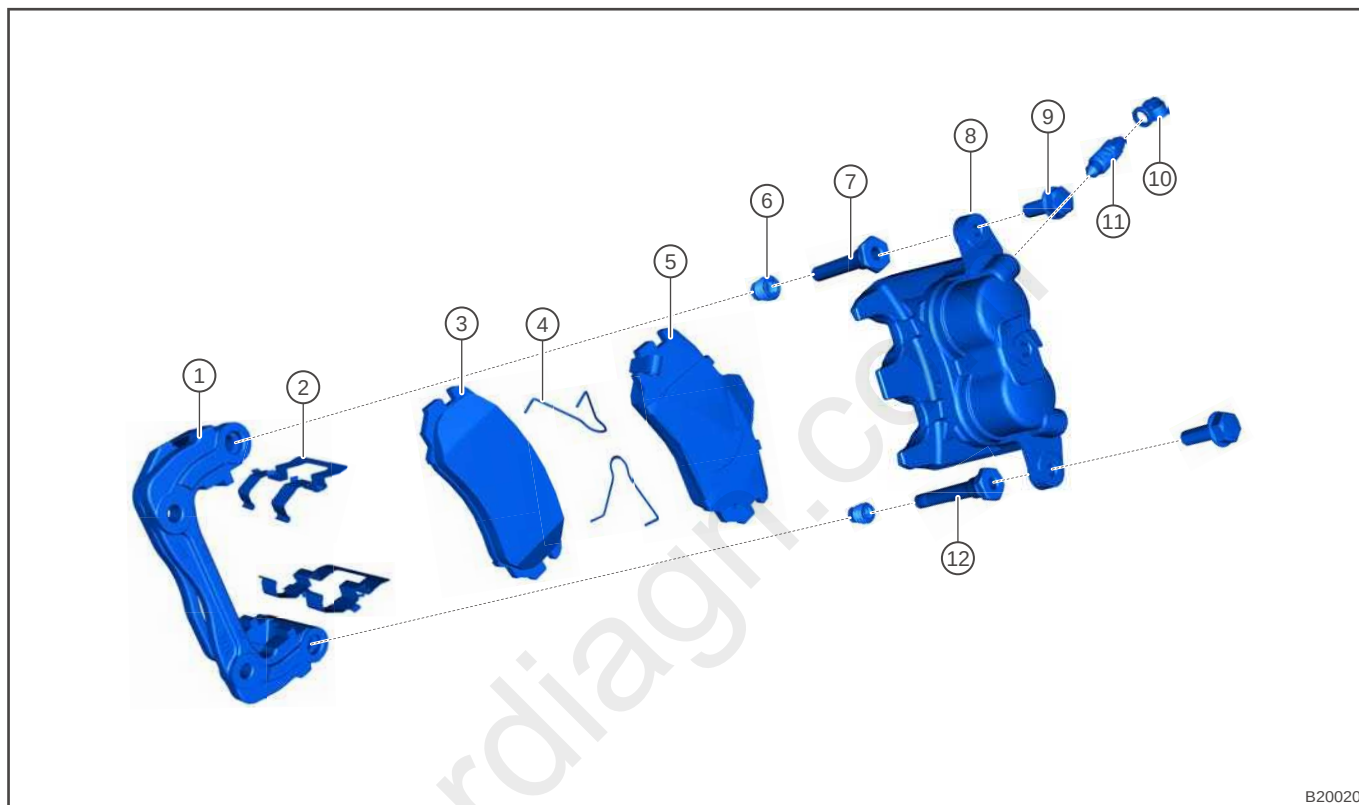
1	Front Left Brake Caliper Assembly	5	Snap Ring
2	Front Brake Disc	6	Front Left Dust Guard

3	Front Hub	7	Front Left Steering Knuckle
4	Front Hub Bearing	8	Front Brake Caliper Fixing Bolt

Front left steering knuckle with disc brake assembly is mainly composed of front left brake caliper assembly, front brake disc, front hub, front hub bearing, snap ring, etc.

Front brake disc is fixed on front hub, clamped in the middle of rear outer lining assembly/rear inner lining assembly, and rotates with wheel. Front brake caliper body assembly is connected with front brake caliper bracket (bracket is fixed on steering knuckle) through guide pin tightening bolt.

■ Front Left Brake Caliper Assembly



1	Front Brake Caliper Bracket	7	Main Guide Pin (without Bushing)
2	Front Spring Plate	8	Front Left Brake Caliper Body Assembly
3	Front Outer Lining Assembly	9	Guide Pin Tightening Bolt
4	Lining Return Spring	10	Bleeder Plug Cover
5	Front Inner Lining Assembly	11	Bleeder Plug
6	Guide Pin Dust Boot	12	Sub Guide Pin (with Bushing)

⚠ Caution

- **Main guide pin is installed on the side close to bleeder plug, and sub guide pin is installed on the side far away from bleeder plug. Incorrect installation method will lead to abnormal sound on bumpy road.**

Front left brake caliper assembly is mainly composed of front brake caliper bracket, front left brake caliper body assembly, guide pin, guide pin dust boot, etc. When braking, brake fluid of brake master cylinder enters brake caliper assembly of each wheel through hydraulic line. A force acting on brake caliper assembly piston pushes brake caliper assembly piston and its inner lining assembly to move to the left and press it onto brake disc, so brake disc applies a rightward reaction force to brake caliper assembly piston, making brake caliper assembly piston and brake caliper body assembly move to the right along guide pin until outer lining

assembly is also pressed onto brake disc. At this time, lining assemblies on both sides are pressed on brake disc, and brake disc is clamped to make it brake.

2.2 Brake Disc Specifications

■ Front Disc Brake

Description	Minimum Thickness (mm)
Front Brake Disc	26
Front Brake Lining	2

3 DIAGNOSIS & TESTING

3.1 Problem Symptoms Table

Hint:

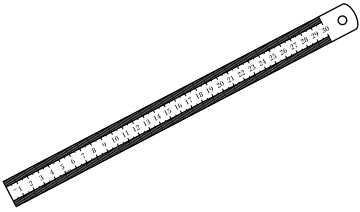
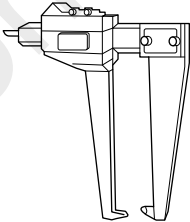
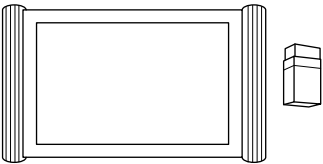
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Braking deviation	Oily lining assembly
	Uneven brake disc wear
	Brake caliper body assembly failure (piston stuck)
Brake shakes	Hub bearing is damaged
	Uneven brake disc wear
	Steering/suspension part is loose
	Uneven lining assembly wear
	Brake caliper assembly fixing bolt is loose
Abnormal noise occurs during braking	Spring plate is damaged
	Hub bearing is damaged
	Abnormal brake disc wear
	Oily lining assembly
	Steering/suspension part is loose
	Abnormal lining assembly wear
	Brake caliper assembly fixing bolt is loose
Brake stuck	Minimum brake pedal free play
	Poor returning of guide pin (deformed or damaged)
	Brake caliper body assembly failure (piston stuck)

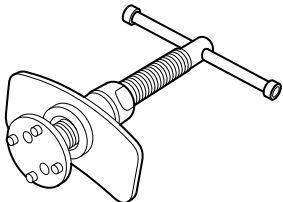
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Caliper	 S00044
Thickness measurement caliper	 S00082
Diagnostic tester	 S00001

■ Special Tool

Tool Name	Part No.	Tool Drawing
Brake Cylinder Release Tool	ECH-0005	 S00076

4.2 Brake Bleeding

Hint:

- Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
- An assistant will be required to assist when bleeding brake system.
- There are 2 methods for brake bleeding, and specific operation procedures are as follows:

■ Manual Bleeding

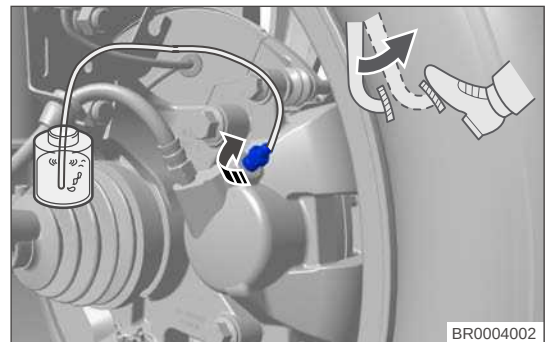
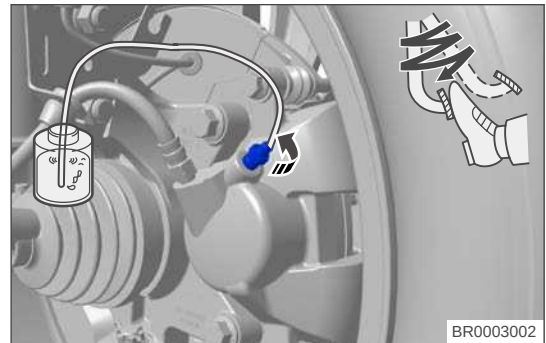
⚠ Caution

- When performing bleeding procedures for 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.
- 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.

- (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.

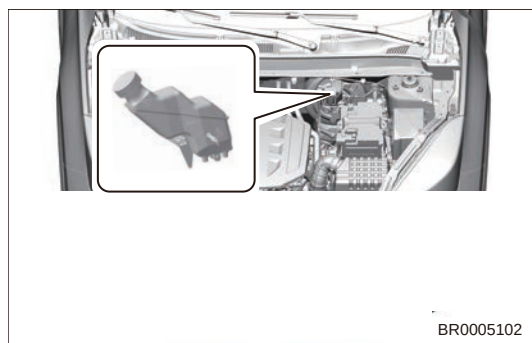


- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

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.

■ **Bleeding brake using diagnostic tester**

Hint:

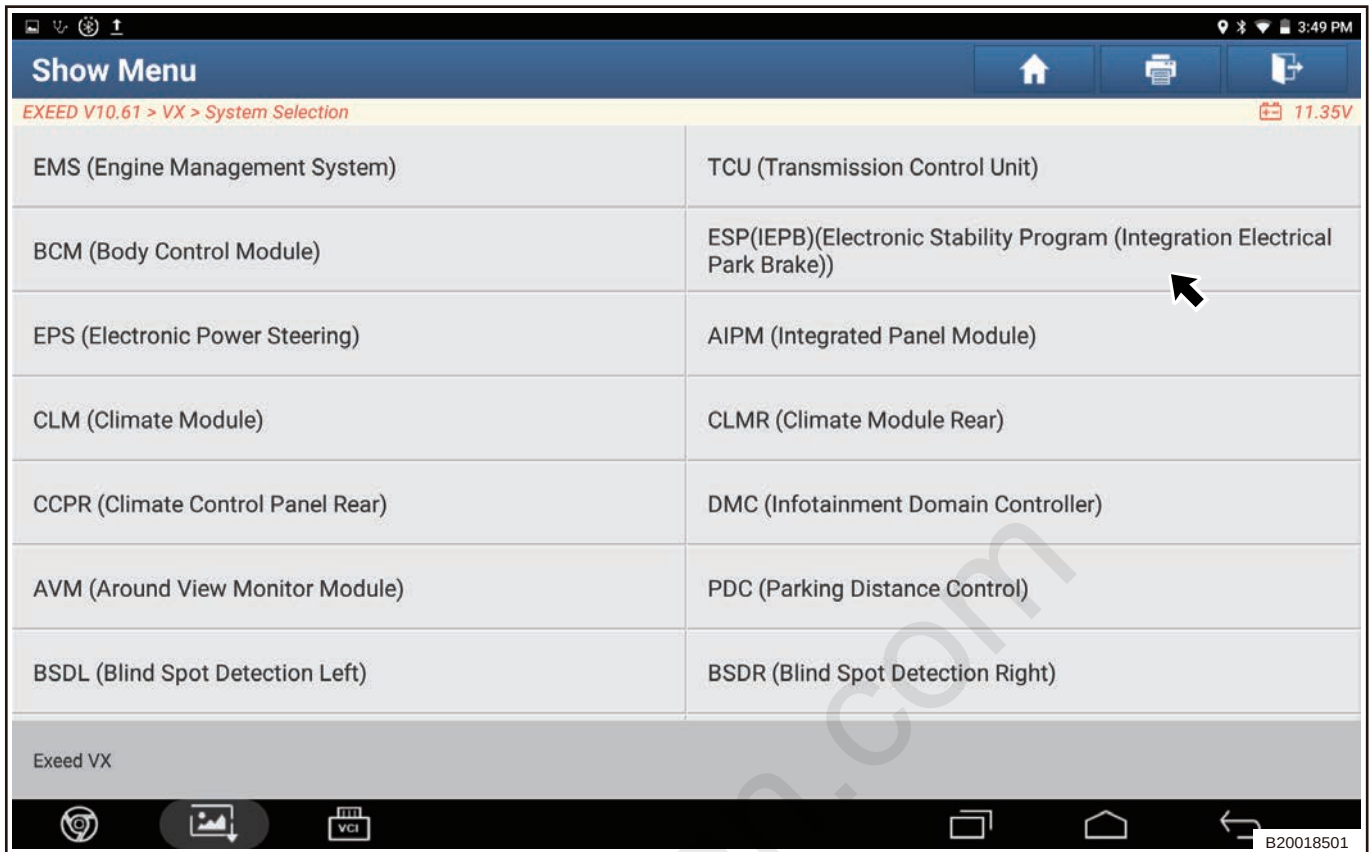
To reach sufficient pressure in hydraulic regulator, brake pedal needs to be depressed repeatedly during whole process.

Warning

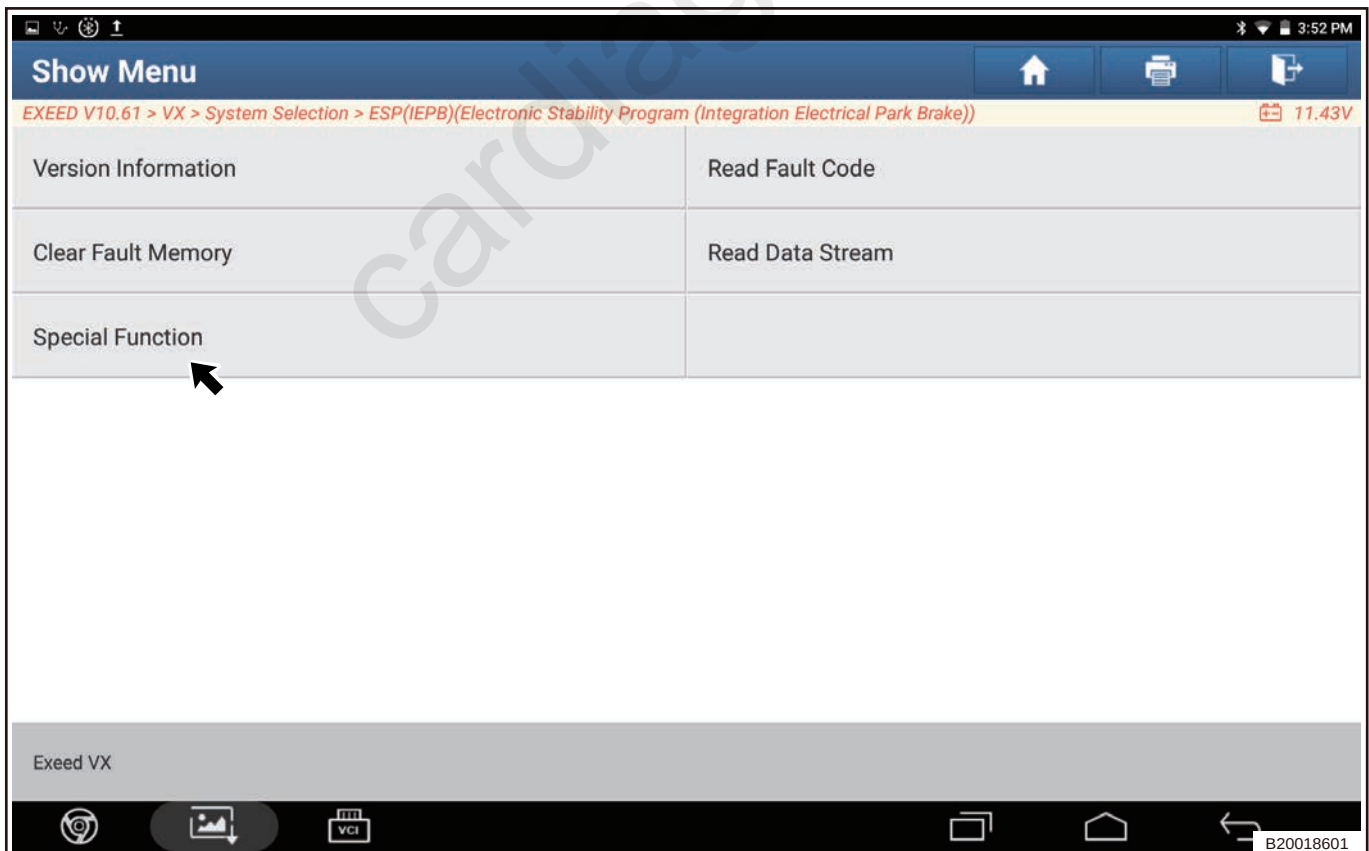
- Check that battery voltage should not be less than 12 V.
- Bleeding order must be rear left/front left/front right/rear right.
- If it is necessary to repeat part or whole bleeding procedure, be sure to wait for 5 minutes to cool solenoid valve down, otherwise solenoid valve may be damaged due to overheat.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

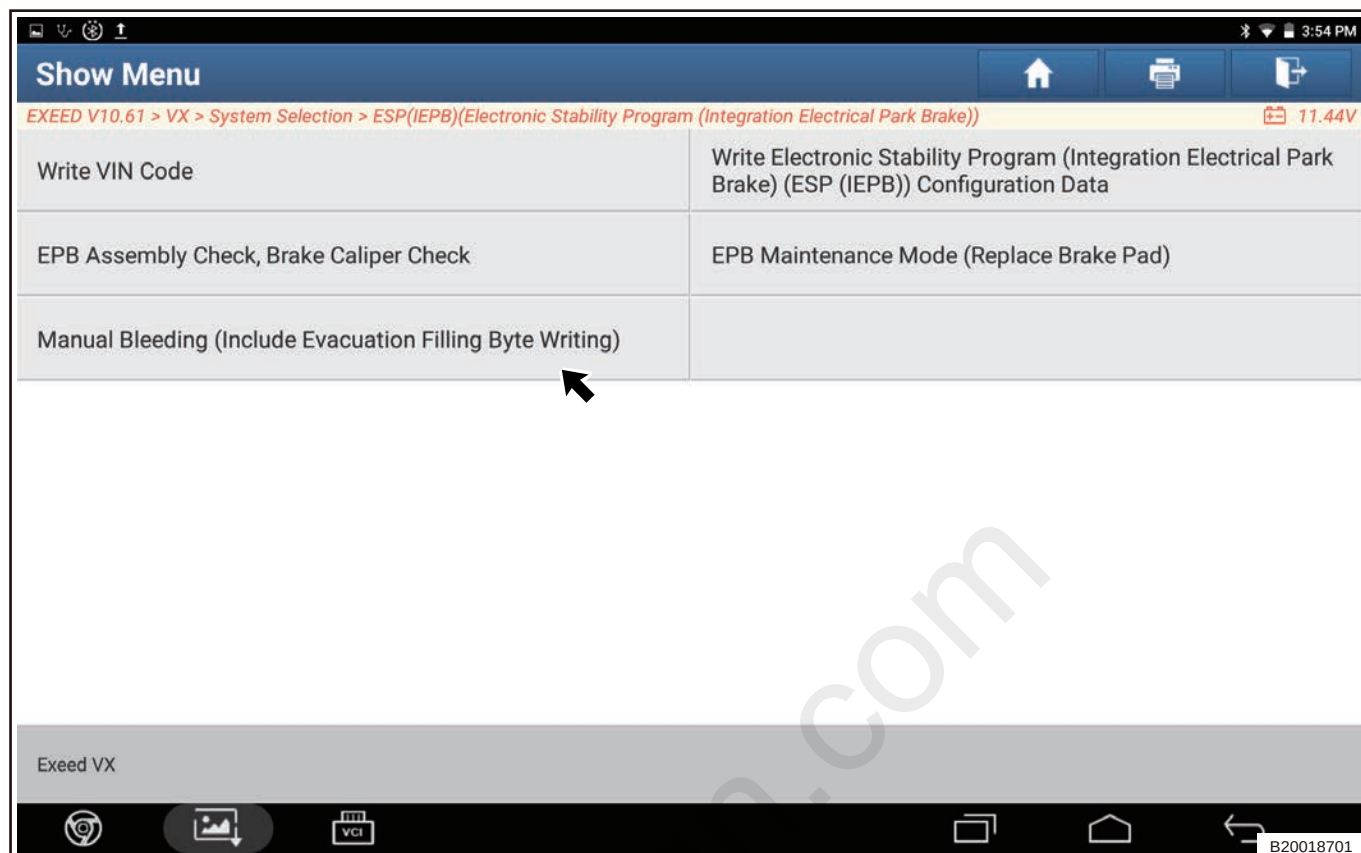
- 1) Click “ESP (iEPB) Electronic Stability Control Module (Integration Electric Parking Brake)” .



- 2) Click “Special Function” .

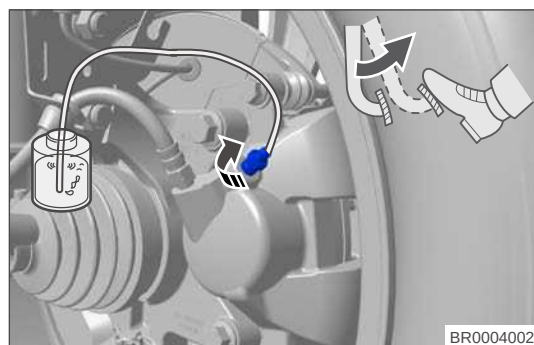


3) Click “Manual Bleeding” .



4) Click OK, please select [Phase 1: Bleed the wheel rear left] on Diagnostic program screen, then perform bleeding operation for rear left wheel.

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



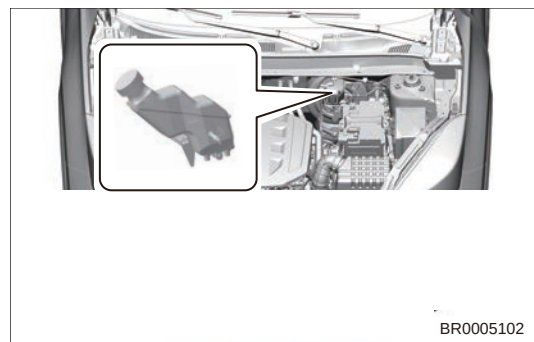
- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

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.

4.3 Replace Front Disc Brake Assembly

■ On-vehicle Inspection

⚠ Caution

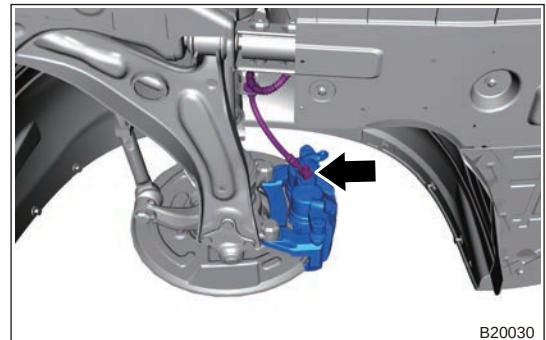
- Use well-sealed DOT4 brake fluid specified by EXEED. DO NOT use oily solution, otherwise brake system seal may be damaged.
- Brake fluid may damage paint surface. If brake fluid spills on paint surface, wash it off immediately with water.
- DO NOT use gasoline, kerosene, alcohol, engine oil, transmission 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.
 - If brake fluid level is low, check ESP (iEPB) control unit assembly, brake caliper, brake line, brake master cylinder assembly and brake fluid reservoir, etc. for leakage.
 - If brake fluid is contaminated, drain a certain amount of fluid for inspection. Replace with new fluid as necessary.

■ Removal

Hint:

- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
 - Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.
- (1) Remove the front left wheel.
 - (2) Loosen coupling bolt (arrow) between front left brake hose assembly and front left brake caliper assembly.



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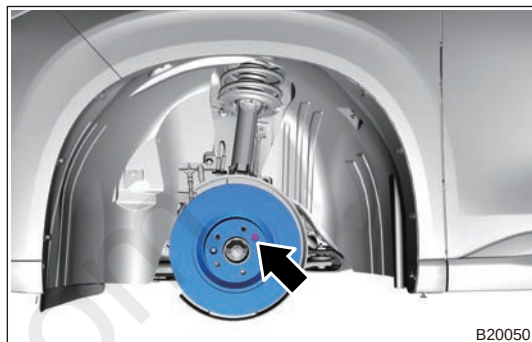
⚠ Caution

- After removing brake hose, perform sealing treatment to prevent foreign matter from entering.
- DO NOT allow any foreign matter such as dirt and dust to enter brake hose from joint parts.

- (3) Remove 2 coupling bolts (arrow) between front left brake caliper assembly and front left steering knuckle, remove front left brake caliper assembly.



- (4) Remove fixing screw (arrow) from front left brake disc.



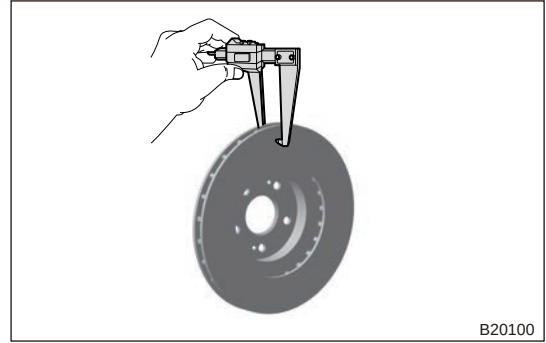
- (5) Remove the front left brake disc.

■ Inspection

- (1) Check brake caliper fixing bracket and brake caliper guide pin set.
 - 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.
 - Check brake caliper guide pin rubber dust boot for deformation, cracks, wear and foreign matter which is difficult to remove.
 - 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.
 - 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.
 - 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.
 - Measure the minimum brake lining thickness. When the minimum thickness of brake lining is 2mm or less, replace the brake linings.
 - 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.
 - Minor scratch or wear on brake disc surface is acceptable. If severe scratch or deformation exists, the brake disc must be replaced.
 - Excessive wear of brake disc may cause poor contact between brake lining and surface of brake disc. If protrusion on the brake disc is not removed before installing new brake lining, it will cause abnormal wear of brake disc.
 - 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.

Check the brake disc thickness.

Minimum thickness: 26mm



Caution

- If it is less than the minimum thickness due to wear, replace brake disc.
- **DO NOT** machine the brake disc, because it may make brake disc thickness less than the minimum thickness.

■ Installation

Caution

- Be sure to tighten coupling bolts and nuts to specified torque.
- Be sure to add brake fluid to a proper level after installation.
- Be sure to perform bleeding procedures for brake system after installation.
- Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.

- (1) Install the front brake disc.
- (2) Install 1 fixing screw of front brake disc.

Torque: $19 \pm 3 \text{ N m}$

- (3) Install the front left brake caliper assembly.
- (4) Tighten coupling bolt between front left brake hose assembly and front left brake caliper assembly.

Torque: $44 \pm 6 \text{ N m}$

- (5) Install 2 coupling bolts (thread locking glue shall be applied) between front left brake caliper assembly and front left steering knuckle.

Torque: $165 \pm 12 \text{ N m}$

- (6) Install the front left wheel.

4.4 Replace Lining Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.
- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

■ Removal

Caution

- After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.

- (1) Remove the front left wheel.

- (2) Remove 1 guide pin tightening bolt between front left brake caliper body assembly and front brake caliper bracket.



- (3) Slowly lift up front left brake caliper body assembly and remove 2 lining return springs.



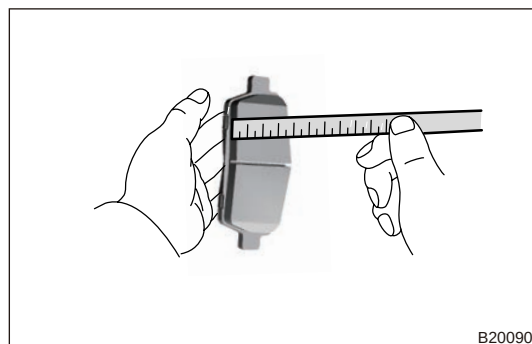
- (4) Remove the front outer/inner lining assembly.
- (5) Remove 2 front spring plates.



■ Inspection

- (1) Visually check lining assembly for flatness, and also check for excessive wear. If the condition of lining assembly cannot be confirmed only by visual inspection, perform physical inspection as necessary.
- (2) If it is less than the minimum thickness due to wear, replace lining assembly.

Minimum thickness: 2mm



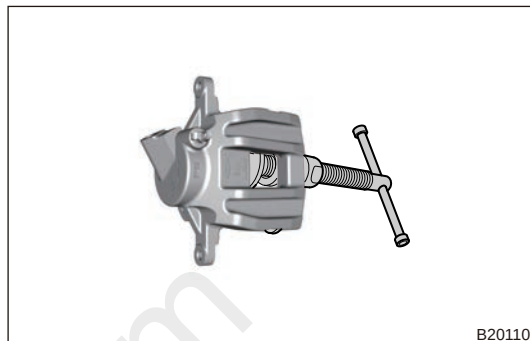
- (3) When replacing lining assembly, it is necessary to replace front outer/inner lining assembly as well as lining on the other side of vehicle to maintain proper braking performance.
- (4) If it is unnecessary to replace lining assembly, be sure to reinstall brake linings to original positions.

■ Installation

⚠ Caution

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

- (1) Using brake cylinder release tool, slightly retract brake caliper piston.



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- (2) Install 2 front spring plates.
- (3) Install the front outer/inner lining assembly.
- (4) Install 2 lining return springs and put front left brake caliper body assembly down slowly.
- (5) Install 1 guide pin tightening bolt (thread locking glue shall be applied) between front left brake caliper body assembly and front brake caliper bracket.

Tightening torque: 22 - 32 N·m

- (6) Install the front left wheel.

7.2 REAR BRAKE

1 Warnings and Precautions

1.1 Precautions

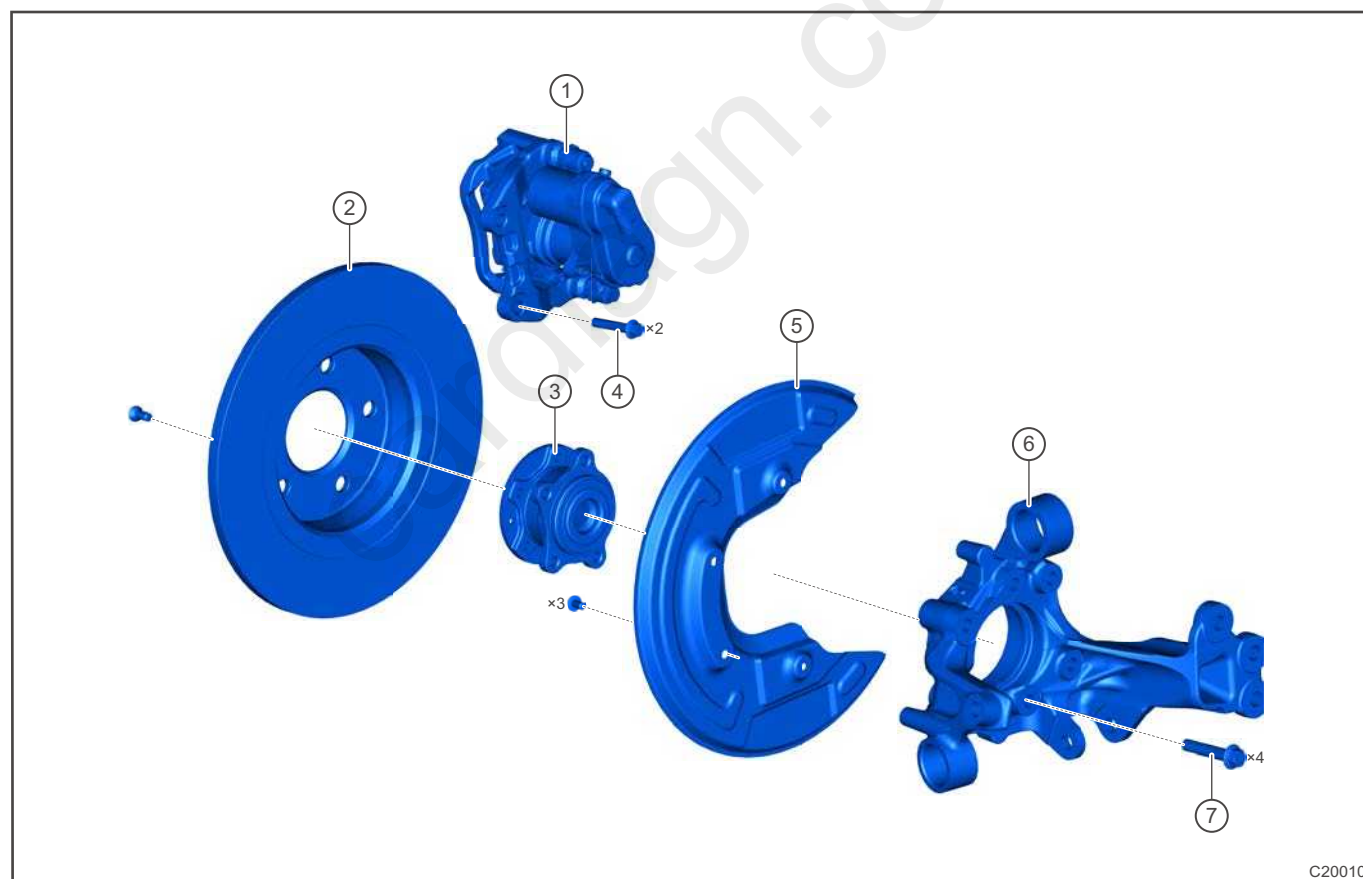
In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

- (1) DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.
- (2) After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- (3) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

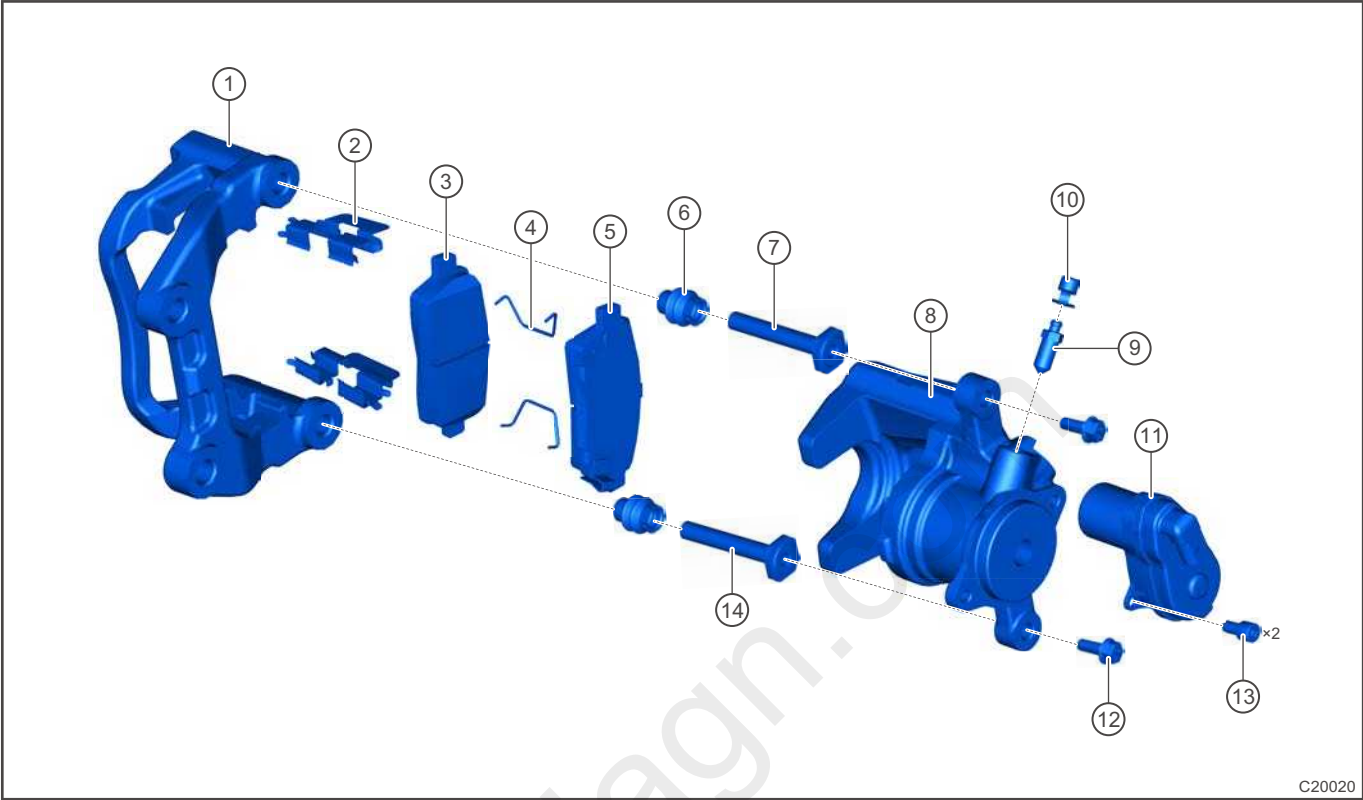
■ Rear Left Brake Assembly



1	Rear Left Brake Caliper Assembly	5	Rear Left Dust Guard
2	Rear Brake Disc	6	Rear Left Steering Knuckle
3	Rear Hub Bearing Unit	7	Hub Bearing Fixing Bolt x 4
4	Brake Caliper Mounting Bolt x 2		

Rear left brake assembly is mainly composed of rear left brake caliper assembly, rear brake disc, front hub, rear hub bearing unit, etc.
Rear brake disc is fixed on rear hub bearing unit, clamped in the middle of rear outer lining assembly/rear inner lining assembly, and rotates with wheel. Rear brake caliper body assembly is connected with rear brake caliper bracket (bracket is fixed on steering knuckle) through guide pin tightening bolt.

■ Rear Left Brake Caliper Assembly



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1	Rear Brake Caliper Bracket	8	Rear Left Brake Caliper Body Assembly
2	Rear Spring Plate x 2	9	Drain Plug
3	Rear Outer Lining Assembly	10	Drain Plug Cover
4	Lining Return Spring x 2	11	Electronic Control Execution Unit
5	Rear Inner Lining Assembly	12	Guide Pin Tightening Bolt
6	Guide Pin Dust Boot	13	Electronic Control Execution Unit Mounting Bolt x 2
7	Main Guide Pin	14	Sub Guide Pin

⚠ Caution

- **Main guide pin is installed on the side close to bleeder plug, and sub guide pin is installed on the side far away from bleeder plug. Incorrect installation method will lead to abnormal sound on bumpy road.**

Rear left brake caliper assembly is mainly composed of rear brake caliper bracket, rear left brake caliper body assembly, electronic control execution unit, guide pin, guide pin dust boot, etc. When braking, brake fluid of brake master cylinder enters brake caliper assembly of each wheel through hydraulic line. A force acting on brake caliper assembly piston pushes brake caliper assembly piston and it's inner lining assembly to move to the left and press it onto brake disc, so brake disc applies a rightward reaction force to brake caliper assembly piston, making brake caliper assembly piston and brake caliper body assembly move to the right along guide pin until outer lining assembly is also pressed onto brake disc. At this time, lining assemblies on both sides are pressed on brake disc, and brake disc is clamped to make it brake.

2.2 Brake Disc Specifications

■ Rear Disc Brake

Description	Minimum Thickness (mm)
Rear Brake Disc	9
Rear Brake Lining	2

3 DIAGNOSIS & TESTING

3.1 Problem Symptoms Table

Hint:

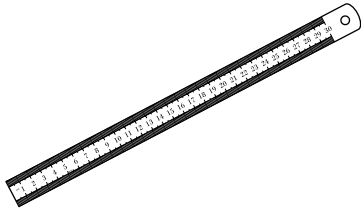
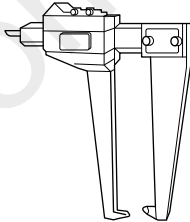
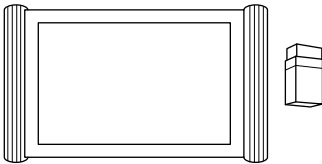
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Braking deviation	Oily lining assembly
	Uneven brake disc wear
	Brake caliper body assembly failure (piston stuck)
Brake shakes	Hub bearing is damaged
	Uneven brake disc wear
	Steering/suspension part is loose
	Uneven lining assembly wear
	Brake caliper assembly fixing bolt is loose
Abnormal noise occurs during braking	Spring plate is damaged
	Hub bearing is damaged
	Abnormal brake disc wear
	Oily lining assembly
	Steering/suspension part is loose
	Abnormal lining assembly wear
	Brake caliper assembly fixing bolt is loose
Brake stuck	Minimum brake pedal free play
	Poor returning of guide pin (deformed or damaged)
	Brake caliper body assembly failure (piston stuck)

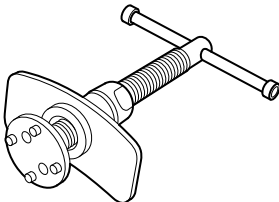
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Caliper	 S00044
Thickness Measurement Caliper	 S00082
Diagnostic Tester	 S00001

■ Special Tool

Tool Name	Part No.	Tool Drawing
Brake Cylinder Release Tool	ECH-0005	 S00076

4.2 Brake Bleeding

Hint:

- Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
- An assistant will be required to assist when bleeding brake system.
- There are 2 methods for brake bleeding, and specific operation procedures are as follows:

■ Manual Bleeding

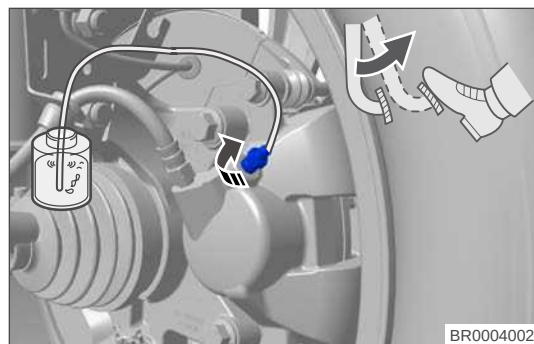
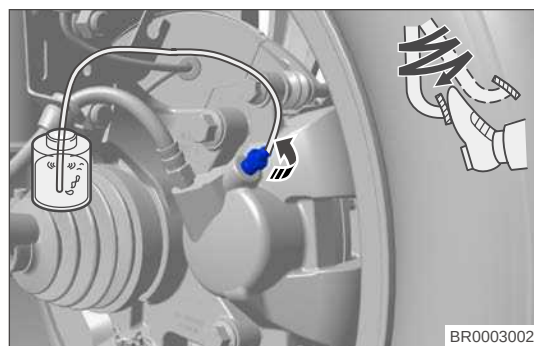
⚠ Caution

- When performing bleeding procedures for 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.
- 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.

- (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.

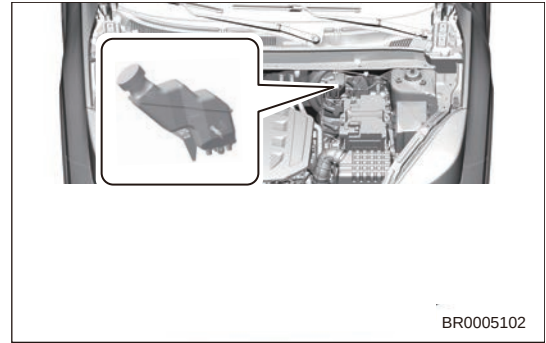


- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

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.

■ **Bleeding brake using diagnostic tester**

Hint:

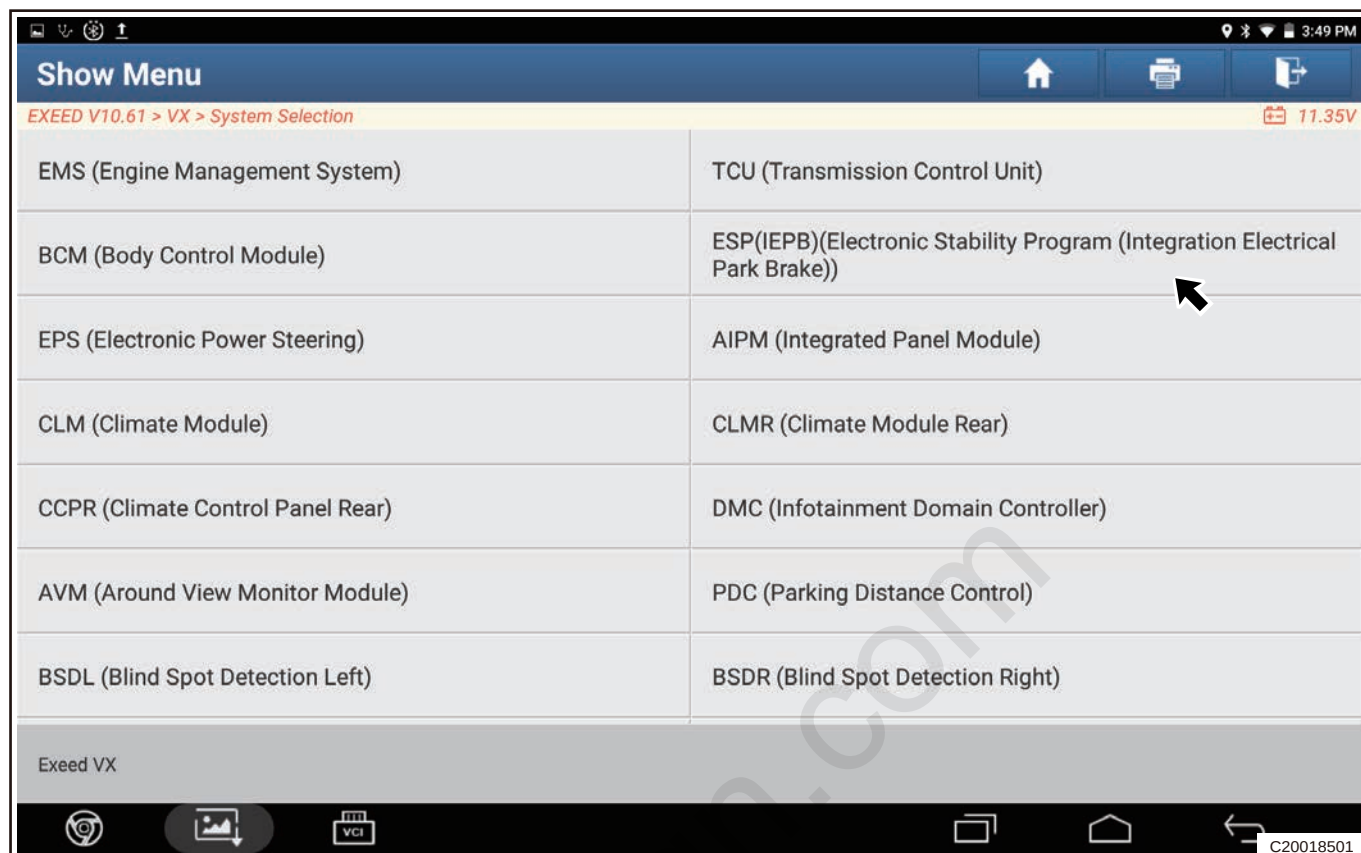
To reach sufficient pressure in hydraulic regulator, brake pedal needs to be depressed repeatedly during whole process.

Warning

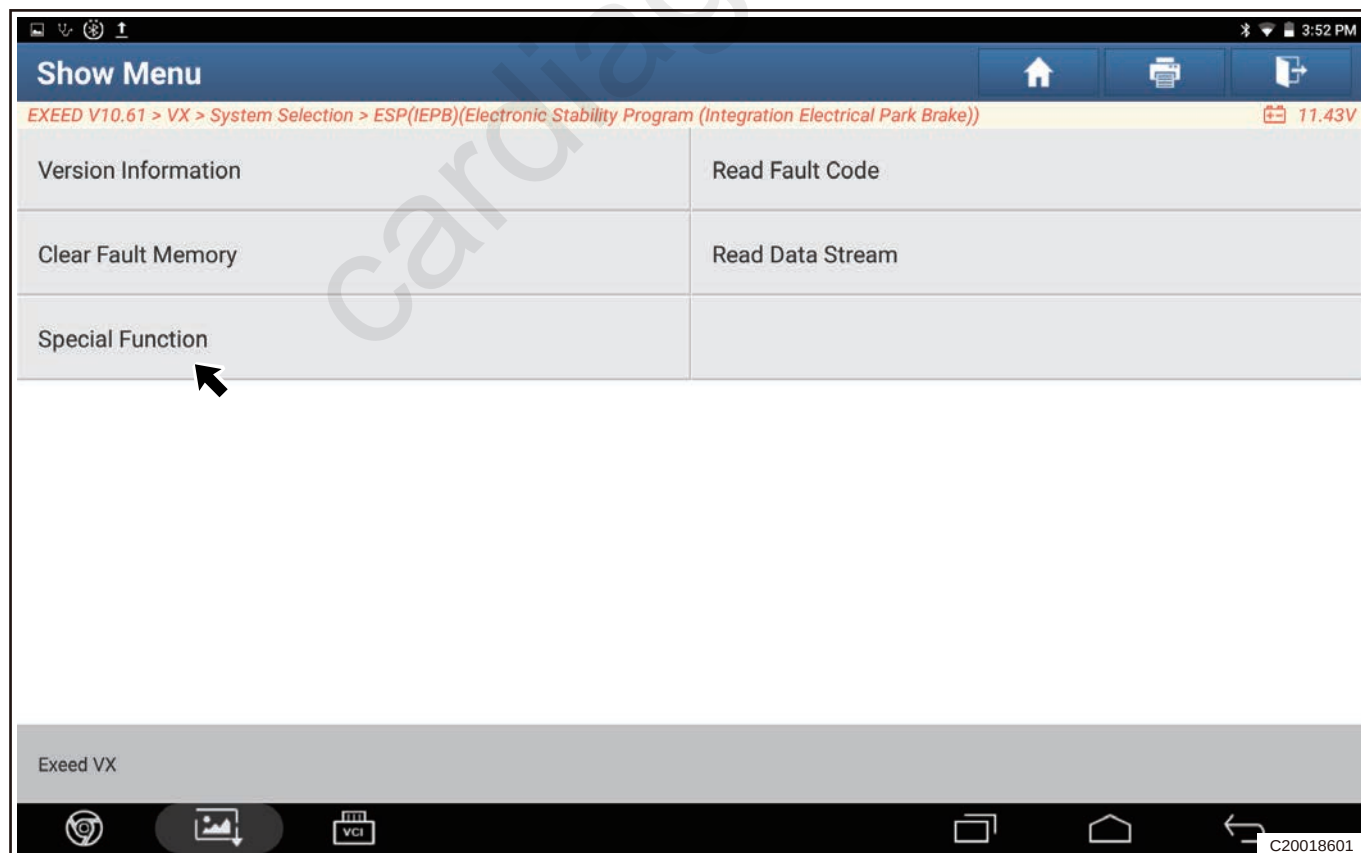
- Check that battery voltage should not be less than 12 V.
- Bleeding order must be rear left/front left/front right/rear right.
- If it is necessary to repeat part or whole bleeding procedure, be sure to wait for 5 minutes to cool solenoid valve down, otherwise solenoid valve may be damaged due to overheat.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

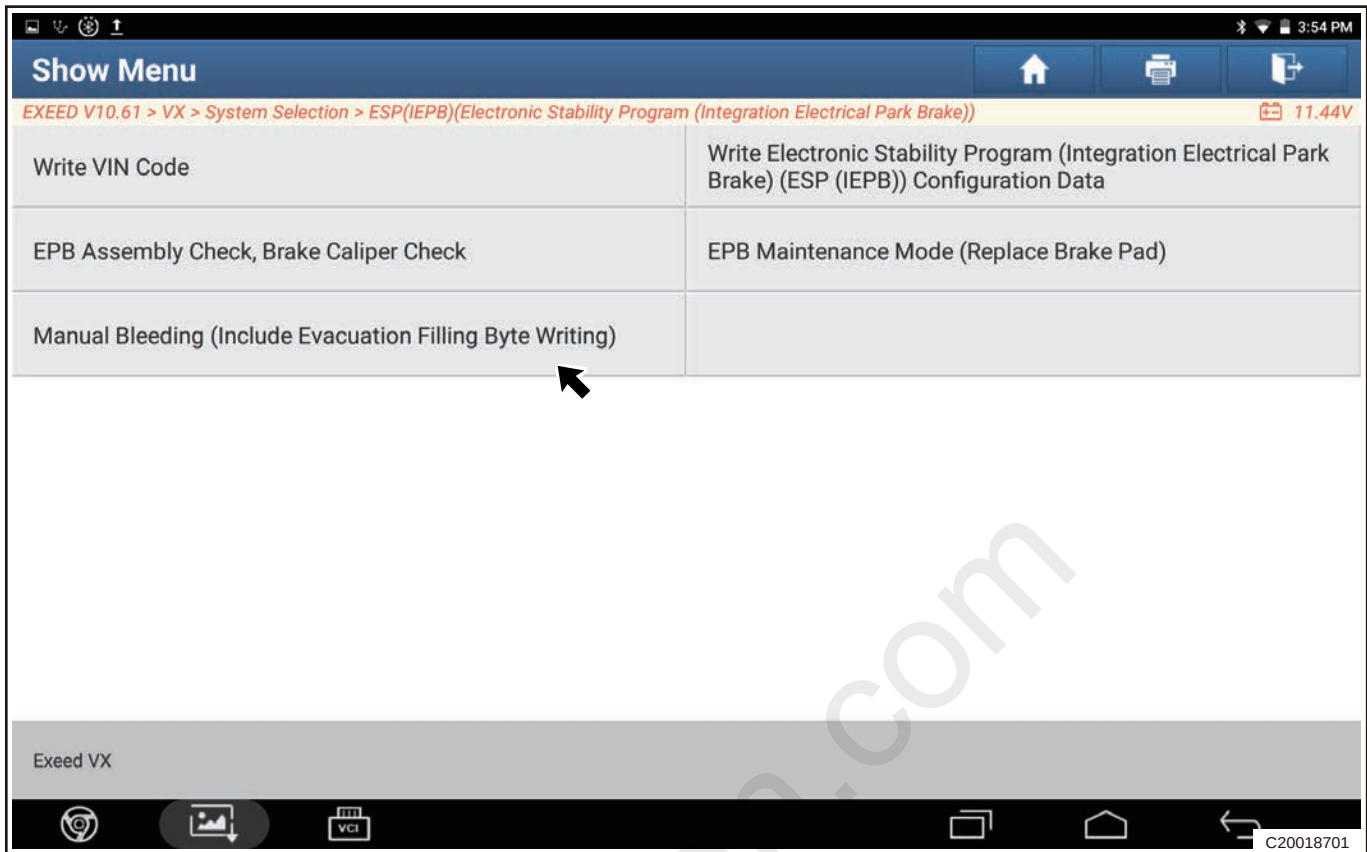
1) Click “ESP (iEPB) Electronic Stability Control Module (Integration Electric Parking Brake)” .



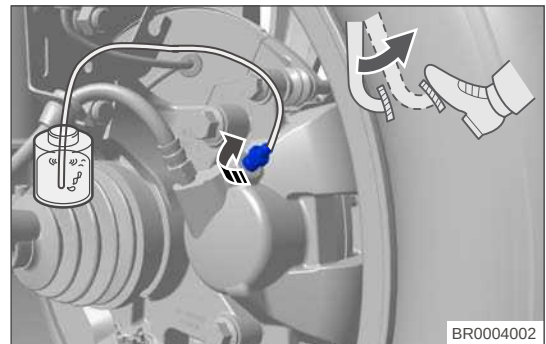
2) Click “Special Function” .



- 3) Click “Manual Bleeding” .



- 4) Click OK, please select [Phase 1: Bleed the wheel rear left] on Diagnostic program screen, then perform bleeding operation for rear left wheel.
- (4) Tighten bleeder screw every time brake pedal goes down quickly, then release the brake pedal.

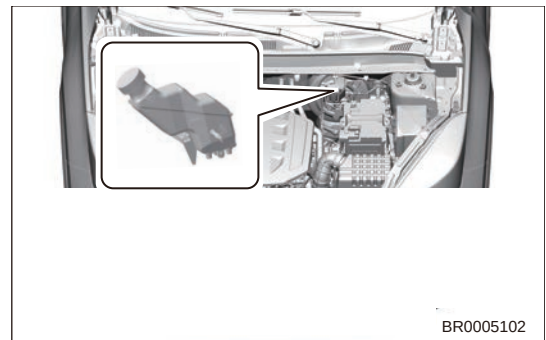


- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

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.

4.3 Replace Rear Left Brake Assembly

■ On-Vehicle Inspection

Caution

- Use well-sealed DOT4 brake fluid specified by EXEED. 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.

■ Removal

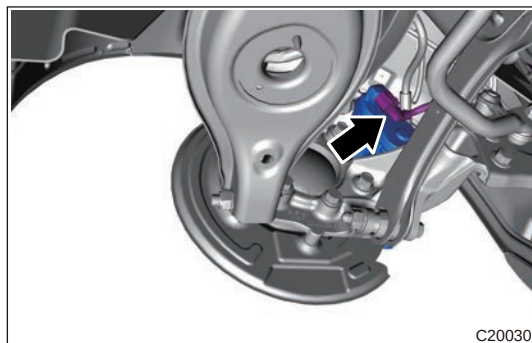
Hint:

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

Caution

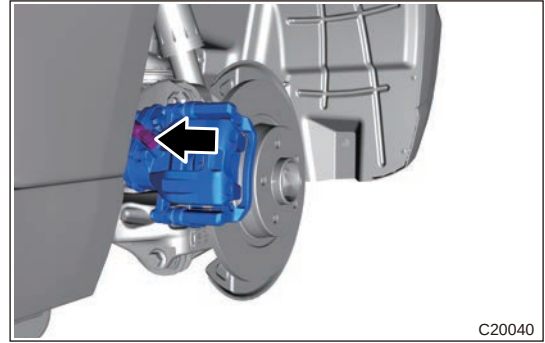
- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.
- Before removing rear disc brake assembly, it is necessary to use diagnostic tester to perform "Enter PBC Maintenance Mode".
- After removing rear brake assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear left wheel.
- (4) Disconnect the integrated caliper motor wire harness connector plug (arrow).



C20030

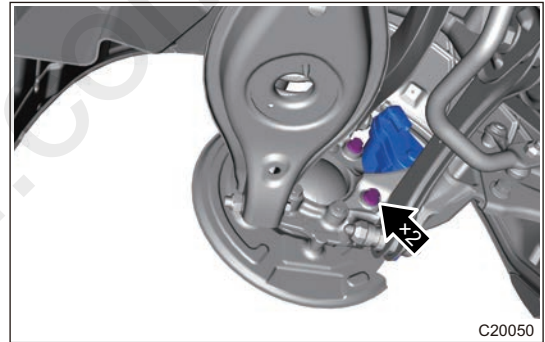
- (5) Remove coupling bolt (arrow) between rear left brake hose assembly and rear left brake caliper assembly.



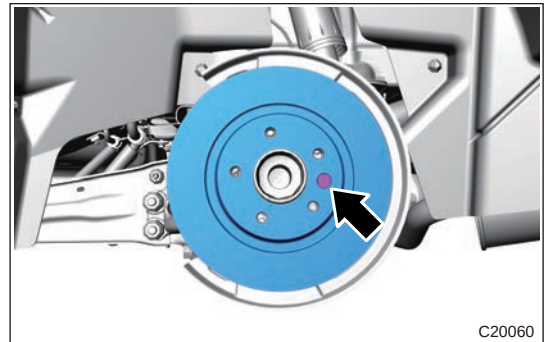
Caution

- When removing coupling bolt, be careful not to drop 2 gaskets.
- **DO NOT** allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.
- After removing brake line, perform sealing treatment to prevent foreign matter from entering.
- **DO NOT** allow any foreign matter such as dirt and dust to enter brake line from joint parts.

- (6) Remove 2 brake caliper mounting bolts (arrow) between rear left brake caliper assembly and rear left steering knuckle.



- (7) Remove the rear left brake caliper assembly.
- (8) Remove 1 fixing screw (arrow) on rear brake disc and remove rear left brake disc.



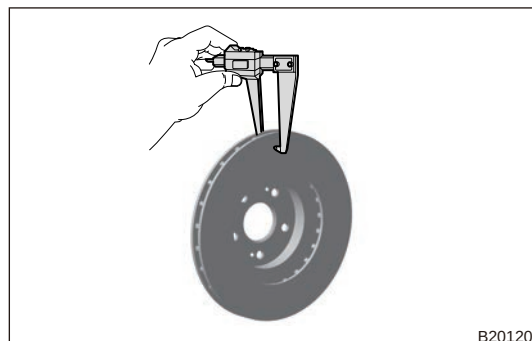
■ Inspection

Rear Brake Disc

- (1) Visually check front brake disc for flatness, and also check for excessive wear. If the condition of front brake disc cannot be confirmed only by visual inspection, perform physical inspection as necessary.

- (2) If it is less than the minimum thickness due to wear, replace front brake disc.

Minimum thickness: 9 mm



B20120

Caution

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

- (3) Slight scratch on the surface of rear brake disc is a normal phenomenon. If crack, severe scratch, deformation and burned spots are found, the brake disc must be replaced.
- (4) Abnormal wear of rear brake disc may cause poor contact between new lining assembly and surface of rear brake disc, which may cause abnormal wear of lining assembly.

Rear Brake Caliper Bracket and Guide Pin Set

- (1) Check if rear spring plate is deformed, cracked, rusted or elasticity is not enough (lining assembly cannot be clamped). Clean the contact surface of rear brake caliper bracket and rear spring plate with brake cleaner.
- (2) Check if guide pin and guide pin dust boot are deformed, cracked and worn. Apply grease to guide pin and install guide pin dust boot to rear brake caliper bracket, and push guide pin back and forth freely without sticking.

Installation

Caution

- **Be sure to tighten coupling bolts and nuts to specified torque.**
- **Be sure to add brake fluid to a proper level after installation.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **After installing rear disc brake assembly, it is necessary to use diagnostic tester to perform "Exit PBC Maintenance Mode".**

- (1) Install the rear brake disc.
- (2) Install 1 fixing screw of rear brake disc.

Torque: 19 ± 3 N m

- (3) Install the rear left brake caliper assembly.
- (4) Install 2 brake caliper mounting bolts (thread locking glue shall be applied) between rear left brake caliper assembly and rear left steering knuckle.

Torque: 165 ± 12 N m

- (5) Install coupling bolt between rear left brake hose assembly and rear left brake caliper assembly.

Torque: 44 ± 6 N m

Hint:

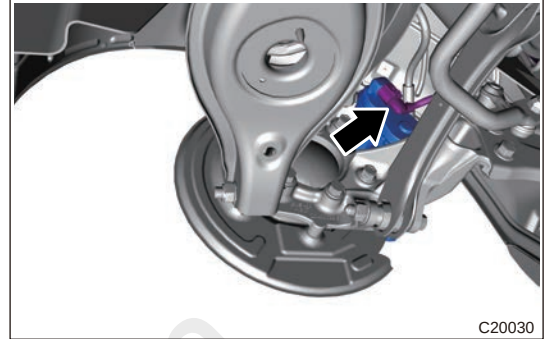
- When connecting bolt, be sure to install 2 gaskets that were removed.
- (6) Connect the electronic control execution unit wire harness connector.
- (7) Install the rear left wheel.

- (8) Connect the negative battery cable.

4.4 Replace electronic control execution unit

■ Removal

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear left wheel.
- (4) Disconnect the electronic control execution unit wire harness connector.



- (5) Remove 2 mounting bolts between electronic control execution unit and rear left brake caliper assembly.



- (6) Remove the electronic control execution unit.

Hint:

- Remove electronic control execution unit and be careful not to damage motor seal ring.

■ Installation

- (1) Install the electronic control execution unit.
- (2) Install 2 mounting bolts between electronic control execution unit and rear left brake caliper assembly.

Tightening torque: 9 - 11 N·m

- (3) Connect the electronic control execution unit wire harness connector.
- (4) Install the rear left wheel.
- (5) Connect the negative battery cable.

4.5 Replace lining assembly

Hint:

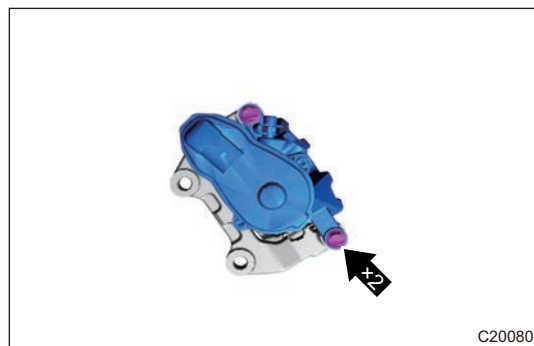
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

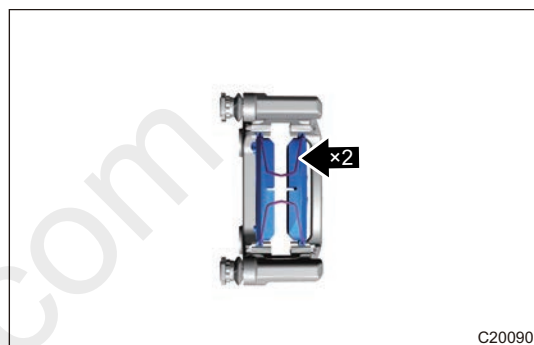
⚠ Caution

- Before removing rear left brake caliper body assembly, it is necessary to use diagnostic tester to perform "Enter PBC Maintenance Mode".
- After removing rear brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.

- (1) Remove the rear left wheel.
- (2) Remove 2 guide pin tightening bolts (arrow) between rear left brake caliper body assembly and rear brake caliper bracket.



- (3) Remove the rear left brake caliper body assembly.
- (4) Remove 2 lining return springs.



- (5) Remove rear outer/inner lining assembly.
- (6) Remove 2 rear spring plates.

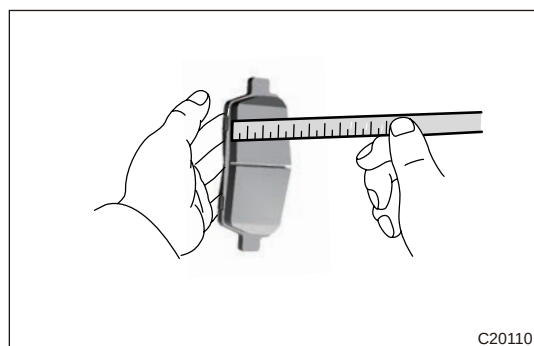


■ Inspection

Lining Assembly

- (1) Visually check lining assembly for flatness, and also check for excessive wear. If the condition of lining assembly cannot be confirmed only by visual inspection, perform physical inspection as necessary.
- (2) If it is less than the minimum thickness due to wear, replace lining assembly.

Minimum thickness: 2 mm



- (3) When replacing lining assembly, it is necessary to replace rear outer/inner lining assembly as well as lining on the other side of vehicle to maintain proper braking performance.
- (4) If it is unnecessary to replace lining assembly, be sure to reinstall brake linings to original positions.

■ Installation

Caution

- Be sure to tighten fixing bolts to specified torques during installation.
- Be sure to add brake fluid to a proper level after installation.
- Be sure to perform bleeding procedures for brake system after installation.
- Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.
- 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 and outer linings in reverse.
- Be sure to perform “Exit Parking Brake Maintenance Mode” using diagnostic tester after installation.

- (1) Install 2 rear spring plates.
- (2) Install the rear outer/inner lining assembly.
- (3) Install 2 lining return springs.
- (4) Install the rear left brake caliper body assembly.
- (5) Install 2 guide pin tightening bolt (thread locking glue shall be applied) between rear left brake caliper body assembly and rear brake caliper bracket.

Tightening torque: 22 - 32 N·m

- (6) Install the rear left wheel.

7.3 HYDRAULIC BRAKE

1 Warnings and Precautions

1.1 Precautions

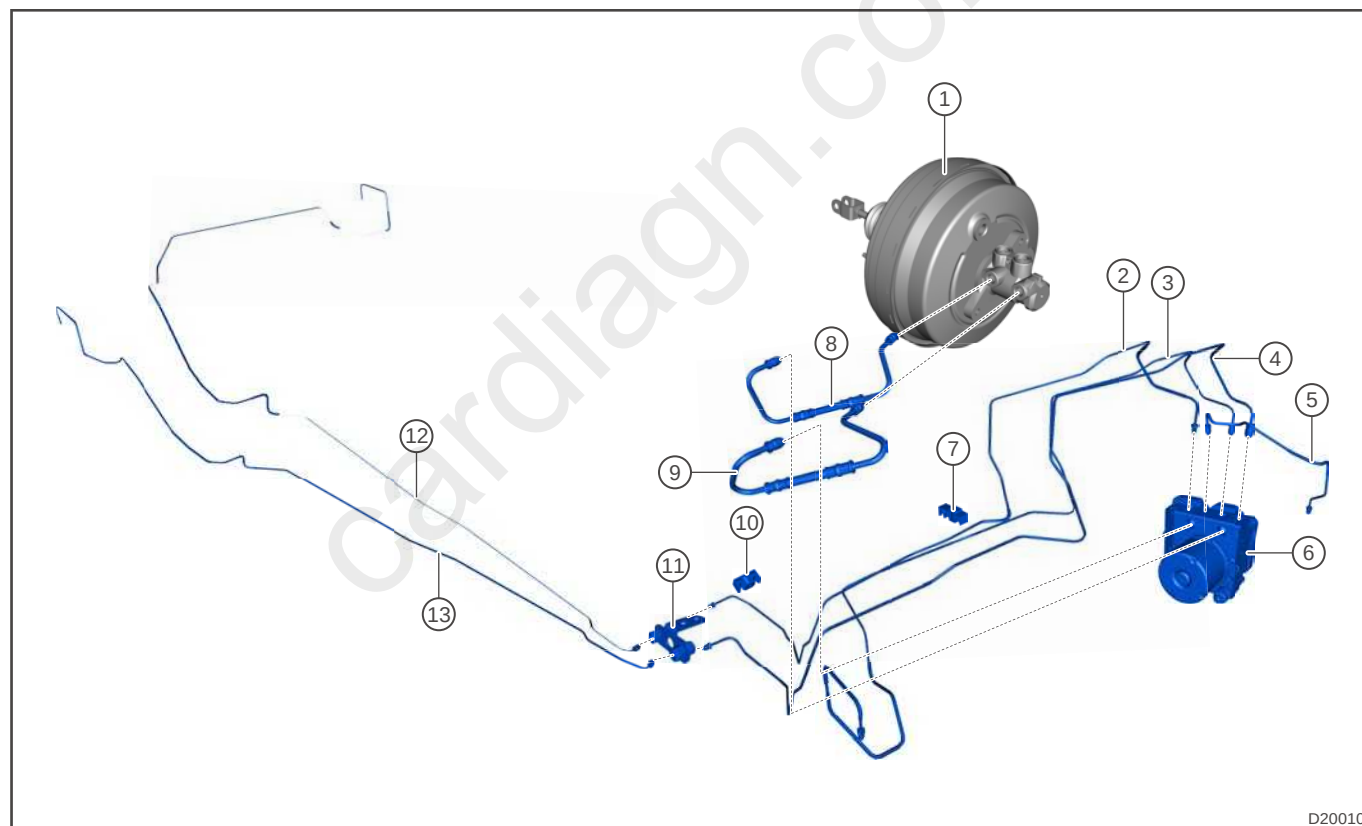
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

- (1) After removing brake line, perform sealing treatment to prevent foreign matter from entering.
- (2) DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.
- (3) DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.
- (4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

■ Brake system



D20010

1	Vacuum Booster with Brake Master Cylinder Assembly	8	Pump Front Pipe I Assembly
2	Rear Left Pipe I Assembly	9	Pump Front Pipe II Assembly
3	Front Right Pipe Assembly	10	Pipe Clamp
4	Rear Left Pipe I Assembly	11	Pipeline Connector
5	Front Left Pipe Assembly	12	Rear Left Brake II

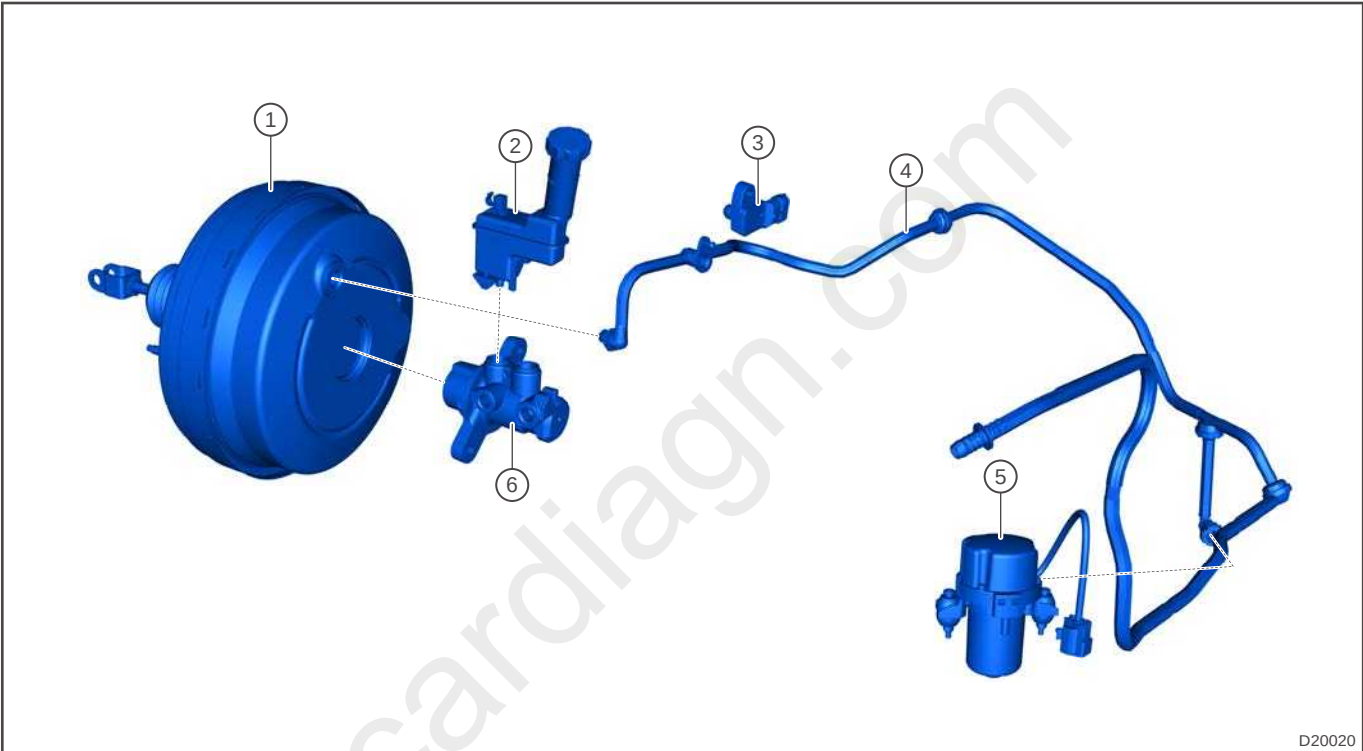
6	ESP Control Module Assembly	13	Rear Right Brake II
7	Pipe Clamp		

Brake system adopts hydraulic transmission device, and mainly consists of ESP controller assembly, vacuum booster with master cylinder assembly, brake master cylinder assembly, brake fluid reservoir assembly, hydraulic line (brake hose, brake pipe), brake caliper assembly, vacuum pump assembly, etc.

When brake pedal assembly is depressed, brake master cylinder assembly piston is pushed forward, and brake fluid pressure in brake master cylinder assembly is increased. Brake fluid enters brake caliper assembly of each wheel through hydraulic line, and brake caliper assembly piston is pushed outward to allow the force of depressing brake pedal to be transmitted to wheel brake caliper assembly, and push wheel brake caliper assembly to brake.

When brake pedal assembly is released, brake master cylinder assembly piston will return under the action of oil pressure and return spring, brake caliper assembly piston and wheel brake caliper assembly will return to release the brake on wheel.

■ Vacuum booster with brake master cylinder assembly



D20020

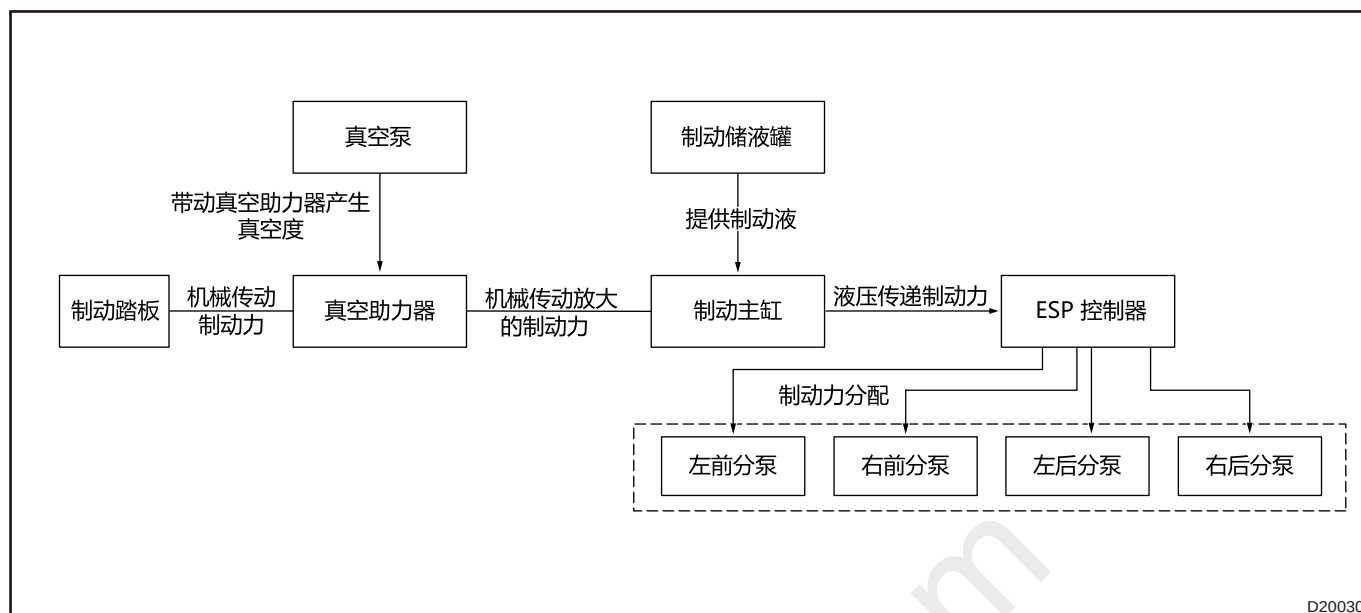
1	Vacuum Booster Assembly	4	Vacuum Brake Hose Assembly
2	Brake Fluid Reservoir	5	Vacuum Pump Assembly
3	Vacuum Pipeline Pressure Sensor Assembly	6	Brake Master Cylinder Assembly

Vacuum booster system is mainly composed of vacuum booster assembly, brake master cylinder assembly, brake fluid reservoir assembly, vacuum pump assembly, atmospheric pressure sensor, etc.

Vacuum booster is a component that uses vacuum (negative pressure) to increase force applied by driver to brake pedal assembly.

Vacuum booster is generally located between brake pedal assembly and brake master cylinder assembly. For easy installation, it is usually combined with master cylinder as a set, and part of master cylinder is penetrated into vacuum booster housing.

2.2 System Schematic Diagram



When vacuum booster can not obtain vacuum or obtained vacuum is insufficient (at high altitude, low temperature, etc.), it will lead to poor assistance of brake system. Vacuum booster system monitors vacuum changes in vacuum booster through atmospheric pressure sensor, judges operating time of vacuum pump through logic and provides appropriate auxiliary power for brake system. Thereby ensuring that it can provide driver with sufficient braking assistance effect under various working conditions.

2.3 Components Operation Description

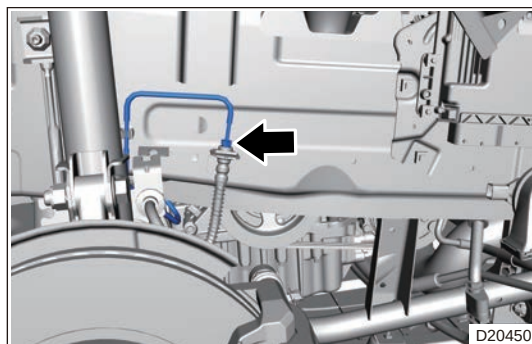
■ Brake Fluid Level Sensor

The float in brake fluid reservoir rises/falls according to brake fluid level.

When brake fluid level is on "MAX (maximum)" mark on brake fluid reservoir, the float in brake fluid reservoir rises.

When brake fluid level is on "MIN (minimum)" mark on brake fluid reservoir, the float in brake fluid reservoir falls.

When brake fluid level is below "MIN (minimum)" mark on brake fluid reservoir, brake system malfunction indicator on instrument cluster will come on.



3 DIAGNOSTIC INFORMATION AND STEPS

3.1 Problem Symptoms Table

Hint:

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

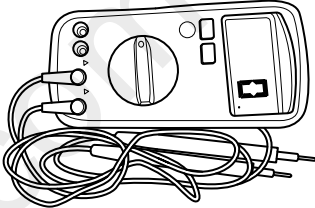
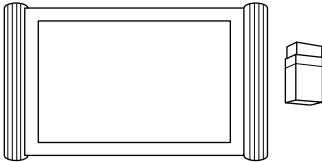
Symptom	Possible Cause
Poor braking effect	Brake fluid quality
	Air in brake system
	Uneven brake disc wear
	Brake master cylinder assembly failure

Symptom	Possible Cause
	Vacuum booster assembly failure
	Uneven lining assembly wear
	Minimum brake pedal free play
	Brake system leakage (fluid or pressure)

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital multimeter	 S00002
Diagnostic tester	 S00001

4.2 Brake Bleeding

Hint:

- Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
- An assistant will be required to assist when bleeding brake system.
- There are 2 methods for brake bleeding, and specific operation procedures are as follows:

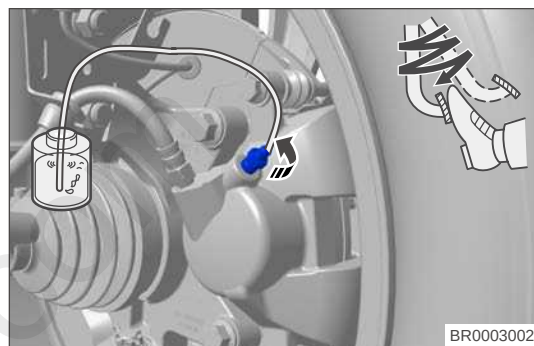
■ Manual Bleeding

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

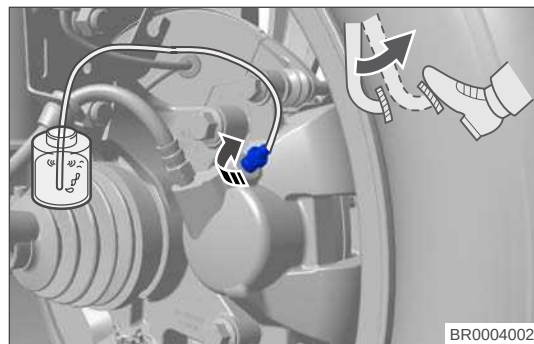
Warning

- 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.
- 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.

- (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 the 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.

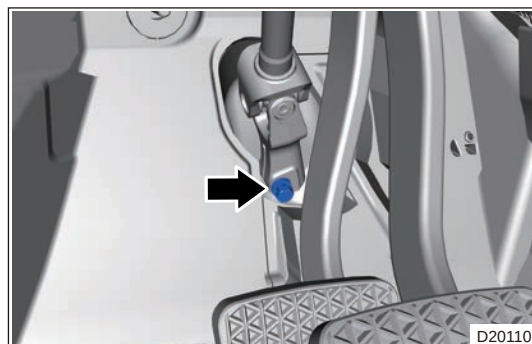
- (6) Check and adjust the brake fluid level to "MAX" mark.
- (7) Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.
- (8) Test vehicle to confirm that brakes operate properly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

4.3 Replacement of Brake Pedal Assembly

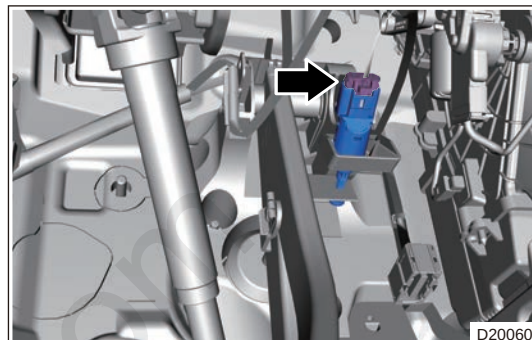
■ Removal

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the instrument panel left soundproof board assembly.
- (4) Fix steering wheel body with steering wheel bracket (with front wheel straight ahead).

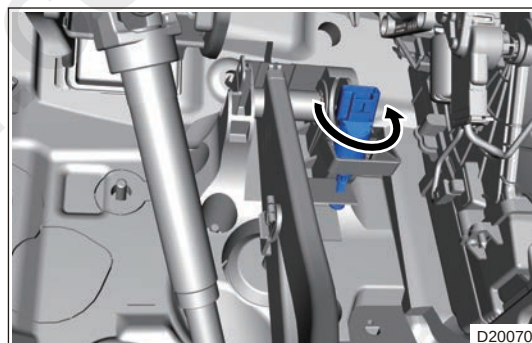
- (5) Remove steering column tightening bolt, and disconnect connection between intermediate shaft assembly and steering gear body.



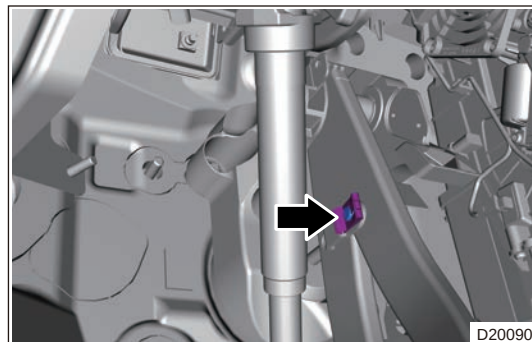
- (6) Disconnect the brake light switch connector (arrow).



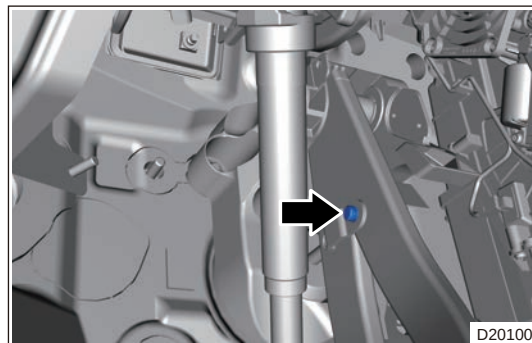
- (7) Press switch by hand and turn it 90° counterclockwise to remove brake switch.



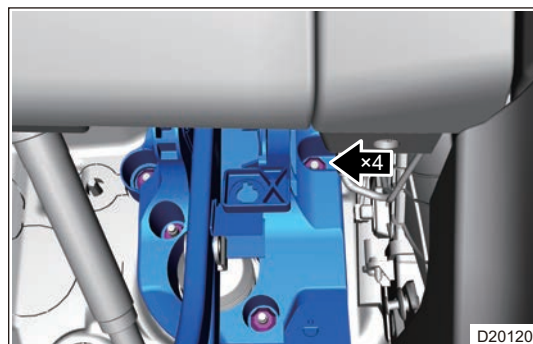
- (8) Remove lock pin (arrow) between vacuum booster assembly and brake pedal assembly.



- (9) Remove lock shaft between vacuum booster assembly and brake pedal assembly.



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

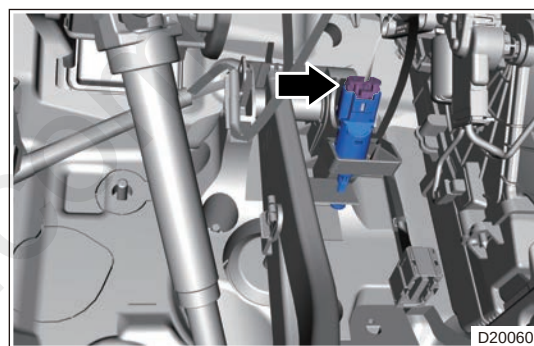


- (11) Remove the brake pedal assembly.

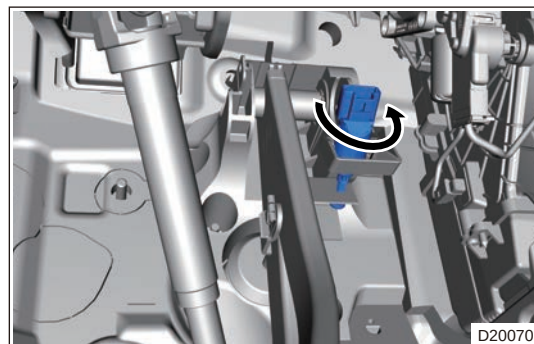
■ Inspection

Brake Switch Assembly

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the brake light switch assembly connector.



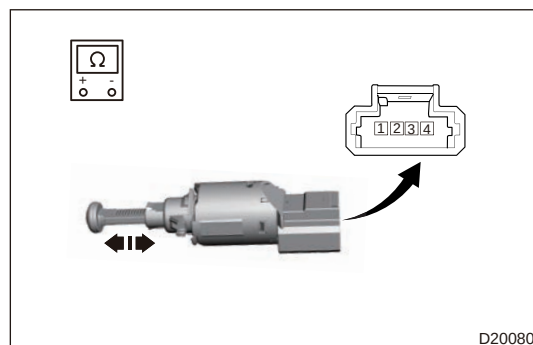
- (3) Press switch by hand and turn it 90° counterclockwise to remove brake switch assembly.



- (4) Using ohm band of digital multimeter, measure brake switch assembly terminal.

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Brake pedal depressed	$\leq 1 \Omega$
Terminal 3 - Terminal 4	Brake pedal depressed	∞
Terminal 1 - Terminal 2	Brake pedal released	∞
Terminal 3 - Terminal 4	Brake pedal released	$\leq 1 \Omega$

If measurement result is not as specified, replace brake switch assembly.



Brake Pedal Assembly

- (1) Brake pedal free play inspection:
 - Stop engine. Depress brake pedal several times until there is no vacuum in vacuum booster (depress brake pedal until resistance is felt), then release brake pedal.
 - Reasonable range of brake pedal free play: 5 - 10 mm.
- (2) Brake pedal height inspection:
 - Turn over carpet and measure the distance between brake pedal center and dash panel.
 - Loosen the vacuum booster push rod locking nut and rotate the vacuum booster push rod clockwise or counterclockwise to adjust brake pedal height to specified value.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Check that brake light operates normally after installation.**
- **Check if brake pedal free travel is within normal range after installing brake pedal.**
Normal range: <25 mm

- (1) Install the brake pedal assembly.
- (2) Install 4 fixing nuts between vacuum booster assembly and brake pedal assembly.
Torque: 23 ± 2 N·m
- (3) Install lock shaft between vacuum booster assembly and brake pedal assembly.
- (4) Install lock pin between vacuum booster assembly and brake pedal assembly.
- (5) Install brake switch assembly, press switch by hand and turn it 90° clockwise.
- (6) Connect the brake light switch assembly connector.
- (7) Connect intermediate shaft assembly and steering gear body, and install steering column tightening bolt.

Tightening torque: 40 ± 3 N·m

- (8) Install the electronic accelerator pedal assembly.
- (9) Install A/C to instrument panel left A/C outlet pipe assembly.
- (10) Install the instrument panel left soundproof board assembly.

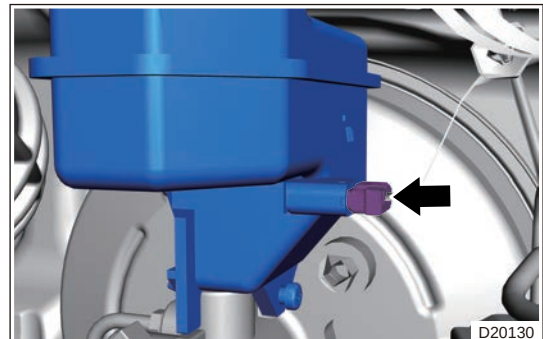
4.4 Replacement of Brake Fluid Reservoir Assembly

Hint:

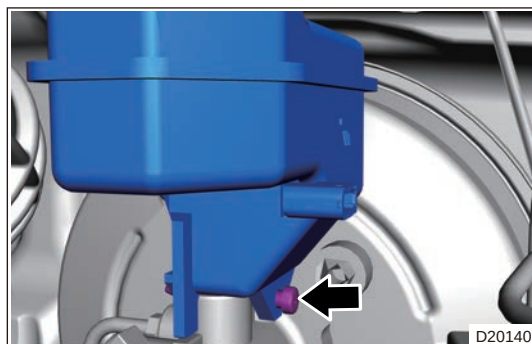
- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

■ Removal

- (1) Remove the engine compartment fuse and relay box lower cover.
- (2) Disconnect the brake fluid level sensor connector.



- (3) Remove fixing pin between brake fluid reservoir and brake master cylinder assembly.

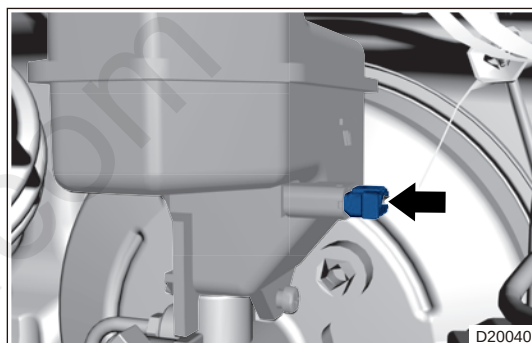


- (4) Remove the brake fluid reservoir.

■ Inspection

Brake Fluid Level Sensor

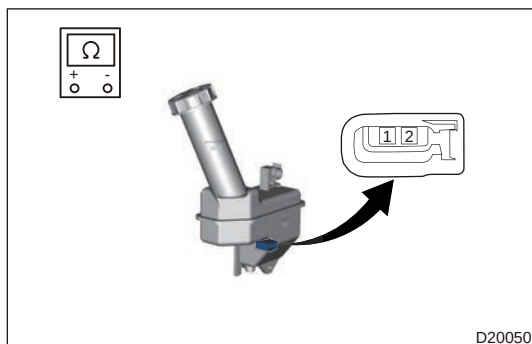
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the brake fluid level sensor connector.



- (3) Using ohm band of digital multimeter, measure brake fluid level sensor terminal.

Multimeter Connection	Brake Fluid Level	Specified Condition
Terminal 1 - Terminal 2	MAX	∞
Terminal 1 - Terminal 2	MIN	$\leq 1 \Omega$

If measurement result is not as specified, replace brake fluid reservoir assembly.



■ Installation

- (1) Install the brake fluid reservoir assembly.
- (2) Install fixing pin between brake fluid reservoir and brake master cylinder assembly.

Tightening torque: 2 - 5 N·m

- (3) Connect the brake fluid level sensor connector.
- (4) Install the engine compartment fuse and relay box lower cover.

4.5 Replacement of Brake Master Cylinder Assembly

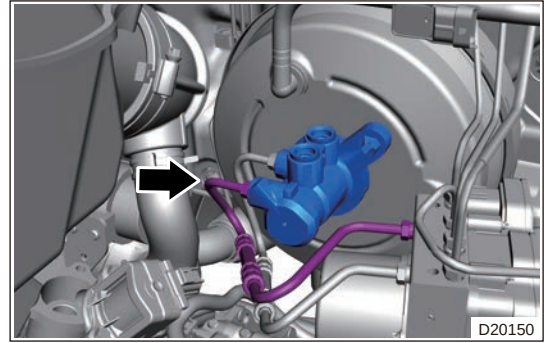
Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

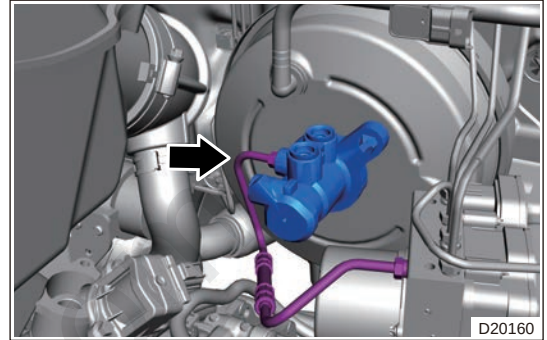
■ Removal

- (1) Remove the battery tray.
- (2) Remove the brake fluid reservoir.

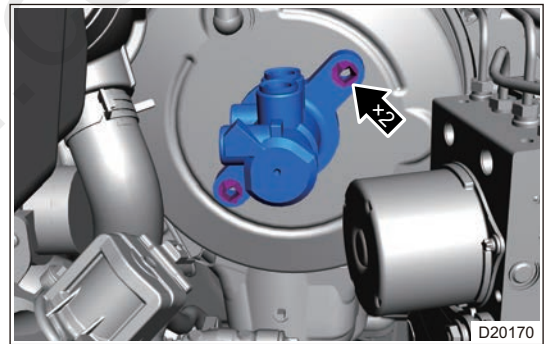
- (3) Loosen fixing nut between pump front pipe II assembly and brake master cylinder assembly.



- (4) Loosen tightening nut between pump front pipe I assembly and brake master cylinder assembly.



- (5) Remove 2 fixing bolts between brake master cylinder assembly and vacuum booster assembly.



- (6) Remove the brake master cylinder assembly.

■ Installation

- (1) Install the brake master cylinder assembly.
- (2) Install 2 fixing bolts between brake master cylinder assembly and vacuum booster assembly.

Tightening torque: 15 ± 3 N·m

- (3) Tighten tightening nut between pump front pipe I assembly and brake master cylinder assembly.

Tightening torque: 17 ± 3 N·m

- (4) Tighten tightening nut between pump front pipe II assembly and brake master cylinder assembly.

Tightening torque: 17 ± 3 N·m

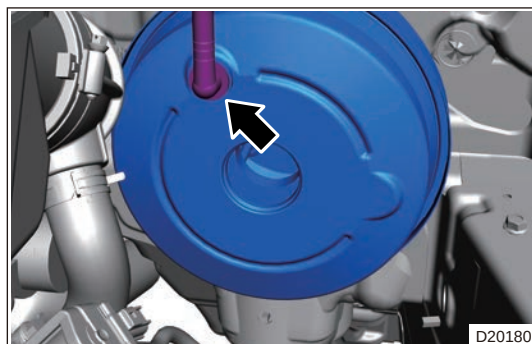
- (5) Install the brake fluid reservoir.
- (6) Install the battery tray.

4.6 Replacement of Vacuum Booster Assembly

■ Removal

- (1) Remove the automatic brake pedal assembly.
- (2) Remove the brake master cylinder assembly.
- (3) Remove the ESP controller assembly.

- (4) Disconnect connection between vacuum brake hose assembly and vacuum booster assembly.



- (5) Remove the vacuum booster assembly.

■ Inspection

Vacuum Booster Assembly

- (1) Air tightness inspection:
- Start engine and stop it after 1 or 2 minutes, disconnect the negative battery cable, and then slowly depress brake pedal several times. Check that each pedal depression amount becomes less than the previous depression.
 - Start engine, depress and hold pedal, and then stop engine. Depress and hold pedal for 30 seconds, and check that pedal reserve distance does not change.
- (2) 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 pedal, and then start engine. Check that pedal can only be depressed slightly.

■ Installation

- (1) Install the vacuum booster assembly.
- (2) Connect vacuum brake hose assembly and vacuum booster assembly.
- (3) Install the ESP controller assembly.
- (4) Install the brake master cylinder assembly.
- (5) Install the automatic brake pedal assembly.

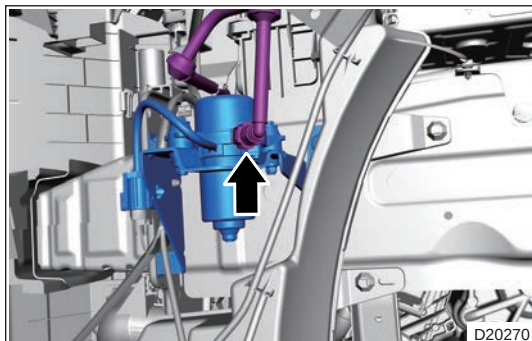
4.7 Replacement of Vacuum Pump Assembly

■ Removal

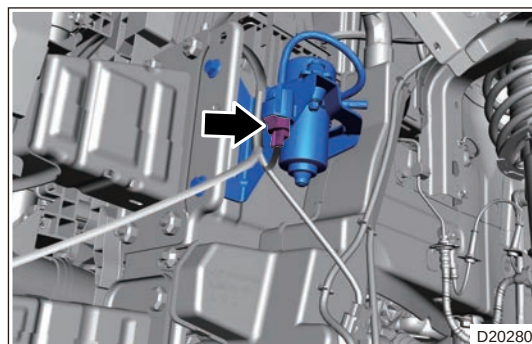
⚠ Caution

- 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.

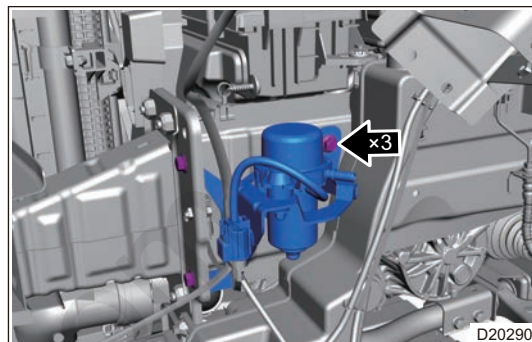
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left wheel.
- (4) Remove the front left wheel house protector body.
- (5) Disconnect connector (arrow) between vacuum pump assembly and vacuum brake hose assembly.



- (6) Disconnect the vacuum pump assembly connector (arrow).



- (7) Remove 3 fixing bolts from vacuum pump assembly.



- (8) Remove the vacuum pump assembly.

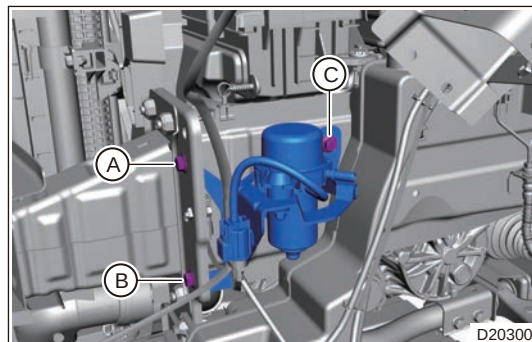
■ Installation

⚠ Caution

- Be sure to tighten fixing plug and nut to specified torque during installation.
- Be sure to check if vacuum pipe is clamped in place after installation. Repair or replace malfunctioning parts as necessary.

- (1) Install the vacuum pump assembly to a proper position.
- (2) Install 3 fixing bolts to vacuum pump assembly.

Torque: $19 \pm 3 \text{ N}\cdot\text{m}$



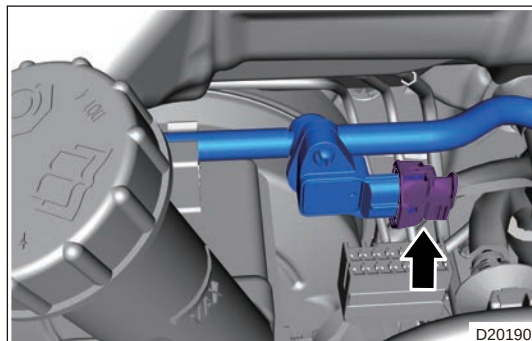
Hint:

- When installing, install and tighten in order of A-B-C.
- (3) Connect the vacuum pump connector.
 - (4) Connect vacuum pump and vacuum pipe.
 - (5) Install the front left wheel house protector body.
 - (6) Install the front left wheel.
 - (7) Connect the negative battery cable.

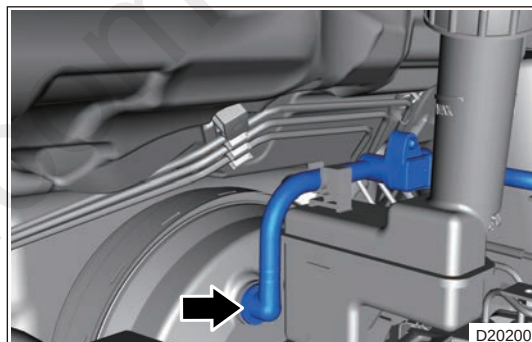
4.8 Replacement of Vacuum Pipe Assembly

■ Removal

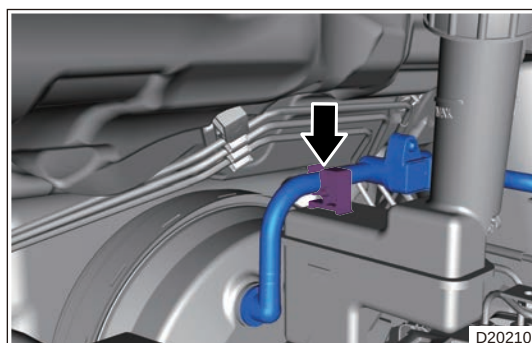
- (1) Remove the air direct pipe assembly.
- (2) Remove air filter assembly and intake hose I.
- (3) Remove the battery tray.
- (4) Disconnect the vacuum pipe pressure sensor assembly connector.



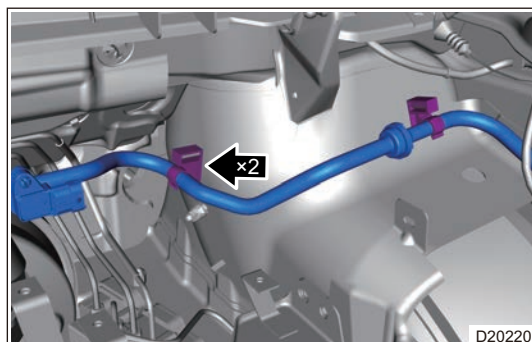
- (5) Disconnect connection between vacuum brake hose assembly and vacuum booster assembly.



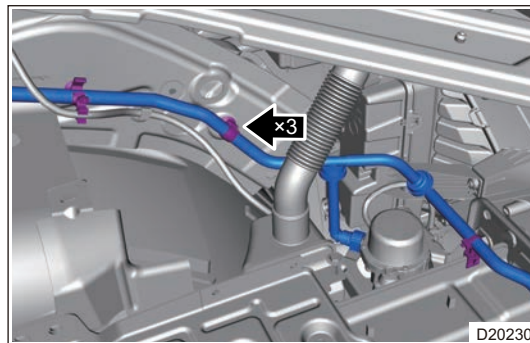
- (6) Separate vacuum brake hose assembly and brake fluid reservoir pipe clamp.



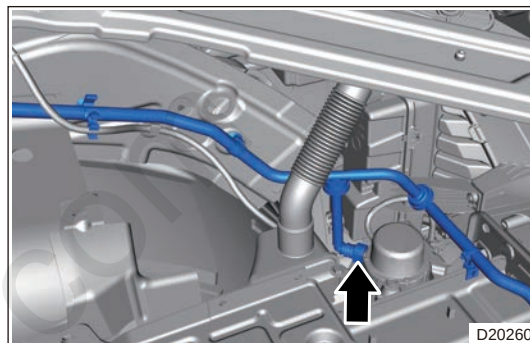
- (7) Separate vacuum brake hose assembly and vehicle body pipe clamps.



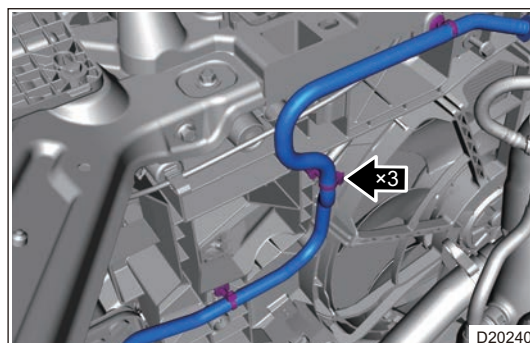
- (8) Separate vacuum brake hose assembly and wire harness bracket pipe clamps.



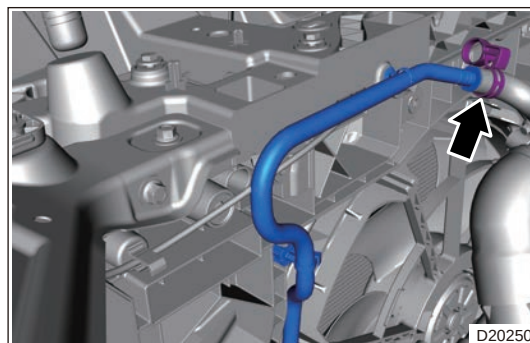
- (9) Disconnect connection between vacuum brake hose assembly and vacuum pump assembly.



- (10) Separate pipe clamps and front cooling mounting module.



- (11) Loosen elastic clamp between vacuum brake hose assembly and engine vacuum connector.



- (12) Remove the vacuum brake hose assembly.

■ Installation

- (1) Install the vacuum brake hose assembly.
- (2) Install elastic clamp between vacuum brake hose assembly and engine vacuum connector.

- (3) Connect pipe clamp and front cooling mounting module.
- (4) Connect vacuum brake hose assembly and vacuum pump assembly.
- (5) Connect vacuum pipe and wire harness bracket pipe clamp.
- (6) Connect vacuum pipe and vehicle body pipe clamp.
- (7) Connect vacuum pipe and brake fluid reservoir pipe clamp.
- (8) Connect the vacuum pipe pressure sensor assembly connector.
- (9) Install the battery tray.
- (10) Install air filter assembly and intake hose I.
- (11) Install the air direct pipe assembly.

4.9 Replacement of Front Brake Hose Assembly

■ Removal

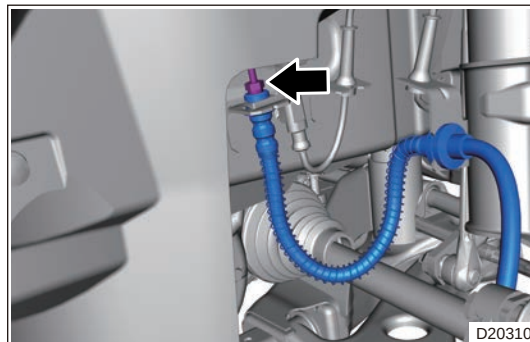
Hint:

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

⚠ 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.**

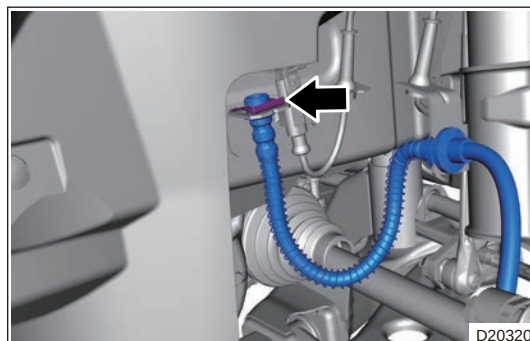
- (1) Remove the front left wheel.
- (2) Loosen coupling nut (arrow) between front left brake hose assembly and front left brake pipe.



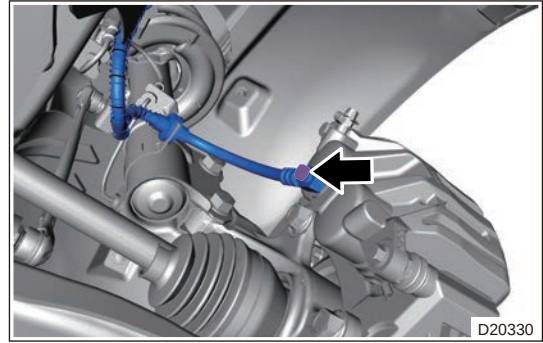
⚠ Caution

- **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.**

- (3) Remove holding reed (arrow) between front left brake hose assembly and front left pipe assembly.



- (4) Loosen tightening bolt (arrow) between front left brake hose assembly and front left brake caliper assembly.



D20330

⚠ Caution

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

- (5) Remove the front left brake hose assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque 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.**

- (1) Install the front left brake hose to a proper position.
- (2) Install coupling plug between front left brake caliper assembly and front left brake hose assembly.

Torque: $44 \pm 1 \text{ N}\cdot\text{m}$

- (3) Install holding reed between front left brake hose assembly and front left pipe assembly.
- (4) Install coupling nut between front left brake hose assembly and front left brake pipe.

Torque: $17 \pm 3 \text{ N}\cdot\text{m}$

- (5) Install the front left wheel.

4.10 Replacement of Rear Brake Hose Assembly

■ Removal

Hint:

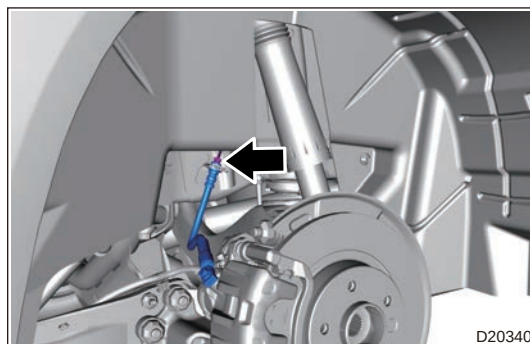
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ 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.**

- (1) Remove the rear left wheel.

- (2) Remove coupling nut (arrow) between rear left brake caliper assembly and rear left brake hose II assembly.

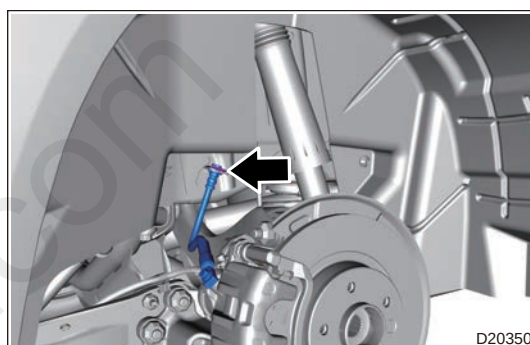


D20340

⚠ Caution

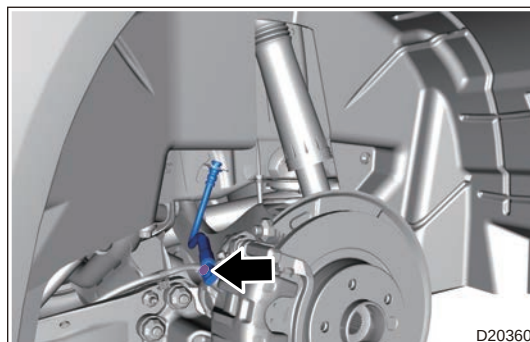
- **DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.**

- (3) Remove holding reed (arrow) between rear left brake hose assembly and rear left brake pipe II assembly.



D20350

- (4) Remove tightening bolt (arrow) between rear left brake hose assembly and rear left brake caliper assembly.



D20360

⚠ Caution

- **When removing tightening bolt, be careful not to drop the 2 gaskets.**
- **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.**
- **DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.**

- (5) Remove the rear left brake hose assembly.

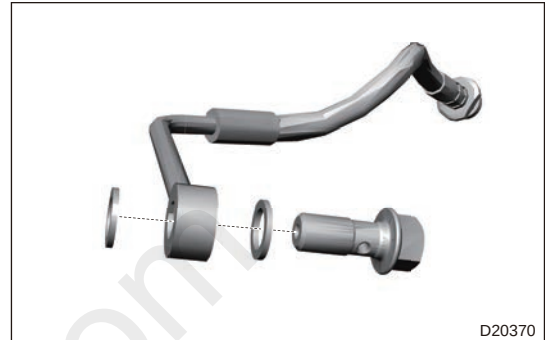
■ Installation

⚠ Caution

- Be sure to tighten fixing plug and nut to specified torque 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.

- (1) Install the rear left brake hose to a proper position.
- (2) Install tightening bolt between rear left brake hose assembly and rear left brake caliper assembly.

Torque: $44 \pm 1 \text{ N}\cdot\text{m}$



D20370

Hint:

- When installing tightening bolt, be sure to install 2 gaskets.
- (3) Install holding reed between rear left brake hose assembly and front left brake pipe II assembly.
 - (4) Install coupling nut between rear left brake caliper assembly and rear left brake hose II assembly.

Torque: $17 \pm 3 \text{ N}\cdot\text{m}$

- (5) Install the rear left wheel.

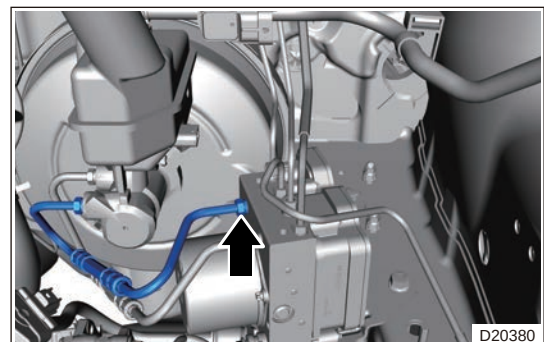
4.11 Replacement of Brake Pipe Assembly

■ Removal

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

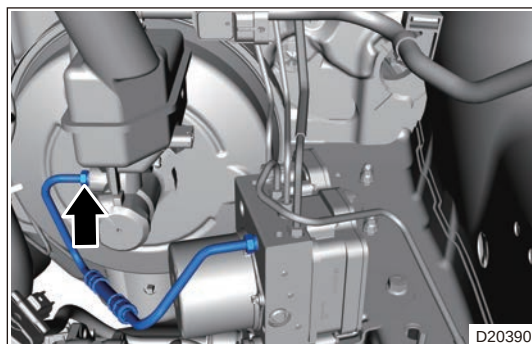
- (1) Remove the pump front pipe assembly.
 - 1) Remove the battery tray.
 - 2) Loosen tightening nut (arrow) between pump front pipe II assembly and ESP controller assembly.



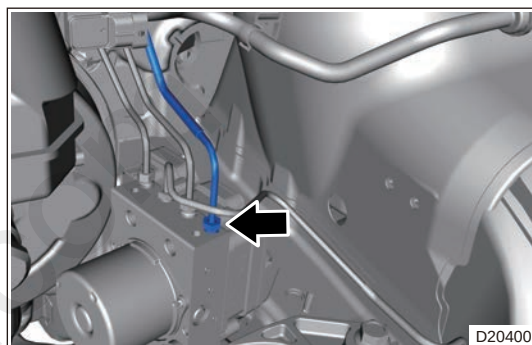
D20380

- 3) Remove the pump front pipe II assembly.

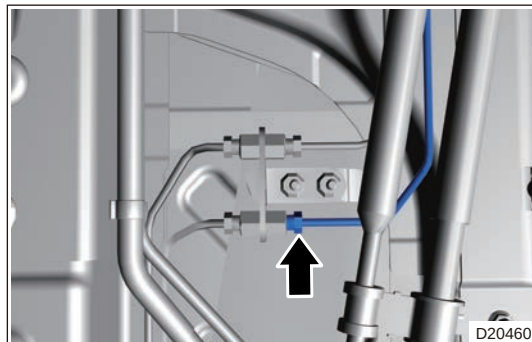
- 4) Loosen tightening nut (arrow) between pump front pipe I assembly and brake master cylinder assembly.



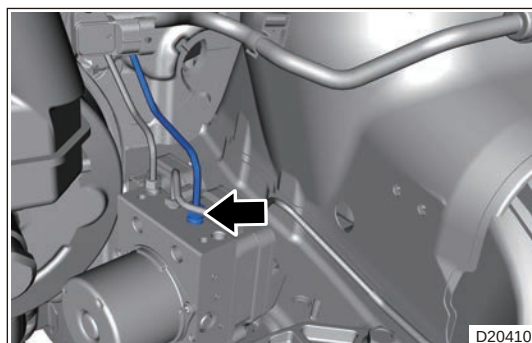
- 5) Remove the pump front pipe I assembly.
- (2) Remove the rear left pipe I assembly.
 - 1) Remove the battery tray.
 - 2) Loosen tightening nut (arrow) between rear left pipe I assembly and ESP controller assembly.



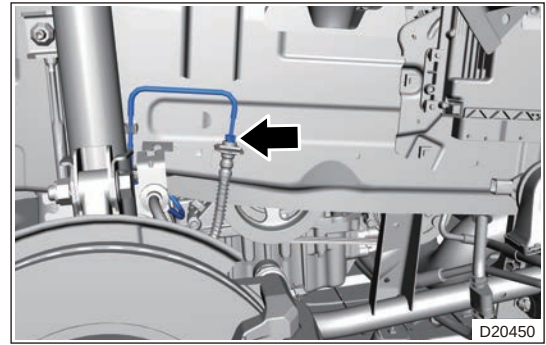
- 3) Loosen tightening nut between rear left pipe I assembly and pipeline connector.



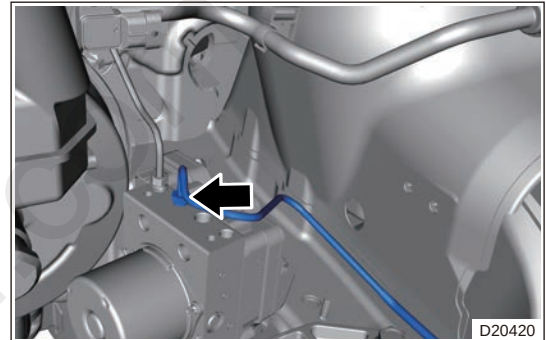
- 4) Remove the rear left pipe I assembly.
- (3) Remove the front right pipe assembly.
 - 1) Remove the battery tray.
 - 2) Remove the front right wheel.
 - 3) Remove the front right wheel house protector body.
 - 4) Loosen tightening nut (arrow) between front right pipe assembly and ESP controller assembly.



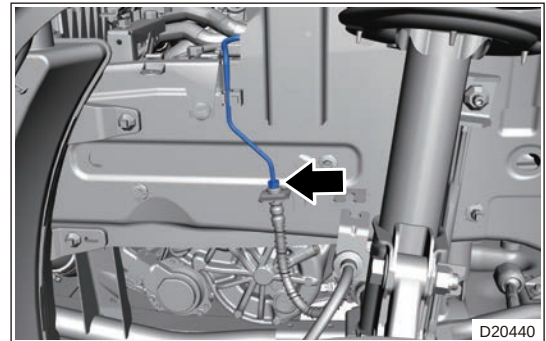
- 5) Loosen tightening nut (arrow) between front right pipe assembly and front right brake hose assembly.



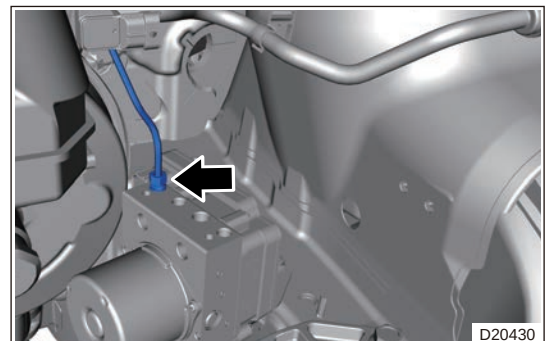
- 6) Remove the front right pipe assembly.
- (4) Remove the front left pipe assembly.
 - 1) Remove the front left wheel.
 - 2) Remove the front left wheel house protector body.
 - 3) Remove the battery tray.
 - 4) Loosen tightening nut (arrow) between front left pipe assembly and ESP controller assembly.



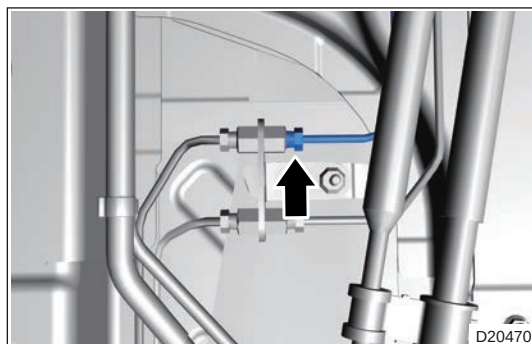
- 5) Loosen tightening nut (arrow) between front left pipe assembly and front left brake hose assembly.



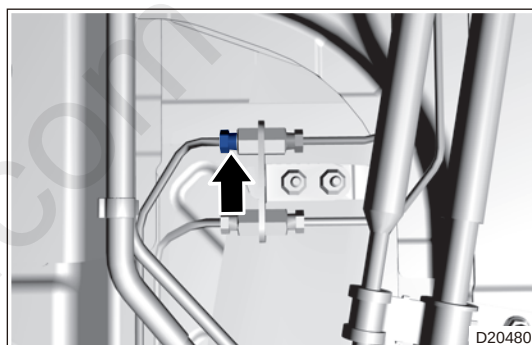
- 6) Remove the front left pipe assembly.
- (5) Remove the rear right pipe I assembly.
 - 1) Remove the battery tray.
 - 2) Loosen tightening nut (arrow) between rear right pipe assembly and ESP controller assembly.



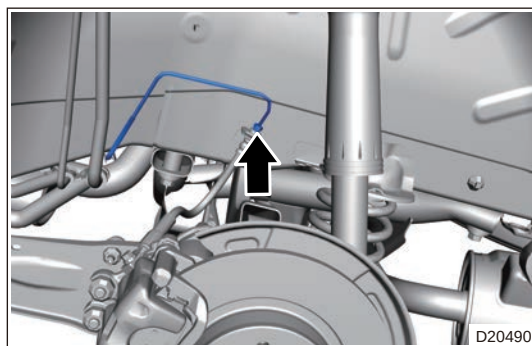
- 3) Loosen tightening nut (arrow) between rear right pipe assembly and front left brake hose assembly.



- 4) Remove the rear right pipe I assembly.
- (6) Remove the rear left brake pipe II.
- 1) Remove the rear left wheel.
 - 2) Remove the rear left wheel house protector body.
 - 3) Remove the battery tray.
 - 4) Loosen tightening nut (arrow) between rear left pipe II and pipeline connector.

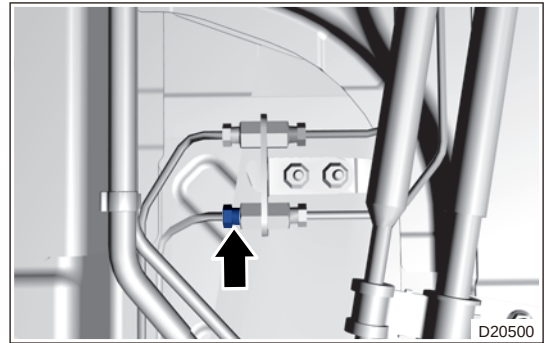


- 5) Loosen tightening nut (arrow) between rear left brake pipe II and rear brake hose assembly.

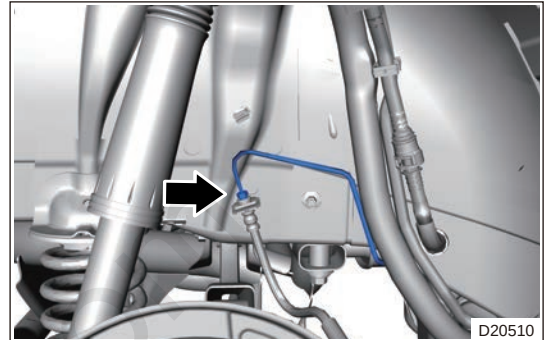


- 6) Remove the rear left brake pipe II.
- (7) Remove the rear right brake pipe II.
- 1) Remove the rear left wheel.
 - 2) Remove the rear left wheel house protector body.
 - 3) Remove the battery tray.

- 4) Loosen tightening nut (arrow) between rear right pipe II and pipeline connector.



- 5) Loosen tightening nut (arrow) between rear right brake pipe II and rear brake hose assembly.



- 6) Remove the rear right brake pipe II.

■ Inspection

Brake System Bleeding

Hint:

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

⚠ Caution

- **When bleeding brake system, wear safety glasses.**
- **DO NOT drain the brake fluid in brake master cylinder assembly while bleeding brake system.**
- **When bleeding brake system, brake fluid may spray out from drain plug due to high pressure.**
- **When bleeding brake system, do not depress brake pedal repeatedly at any time with drain plug opened. Otherwise, air amount in the system will increase to make an extra bleeding.**

- (1) Remove cap from brake fluid reservoir assembly and ensure that brake fluid level is between the “MIN (- Minimum)” and “MAX (Maximum)” mark on brake fluid reservoir.
- (2) Raise vehicle and remove drain plug cover.
- (3) Connect a clear plastic hose to drain plug and submerge the end of hose into container.
- (4) Have an assistant depress brake pedal 3 to 4 times repeatedly (depress to the lower position), and keep depressing brake pedal, then loosen drain plug.
- (5) Tighten drain plug every time brake pedal goes down quickly, then release the brake pedal.
- (6) Ensure that brake fluid level is not lower than "MIN (minimum)" mark on brake fluid reservoir assembly.
- (7) Wait for 2 seconds between 2 brake pedal depressions in order to stabilize brake fluid.
- (8) 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 (a stream of fresh brake fluid flows into clear container without bubbles).
- (9) Install drain plug cover and lower the vehicle.
- (10) Check that brake fluid level is between the “MIN (Minimum)” and “MAX (Maximum)” mark on brake fluid reservoir.
- (11) Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding for brake system again as necessary.
- (12) Test vehicle to confirm that brake system operate properly with good brake pedal feel.

■ Installation

- (1) Install the pump front pipe assembly.
 - 1) Install the pump front pipe II assembly.
 - 2) Tighten tightening nut between pump front pipe II assembly and brake master cylinder assembly and ESP controller assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 3) Install the pump front pipe I assembly.
 - 4) Tighten tightening nut between pump front pipe I assembly and brake master cylinder assembly and ESP controller assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$
- 5) Install the battery tray.
- (2) Install the rear left pipe I assembly.
 - 1) Install the rear left pipe I assembly.
 - 2) Tighten tightening nut between rear left pipe I assembly and ESP controller assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 3) Tighten tightening nut between rear left pipe I assembly and pipeline connector.

Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$
- 4) Install the battery tray.
- (3) Install the front right pipe assembly.
 - 1) Install the front right pipe assembly.
 - 2) Tighten tightening nut between front right pipe assembly and ESP controller assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 3) Tighten tightening nut between front right pipe assembly and front right brake hose assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 4) Install the battery tray.
 - 5) Install the front right wheel house protector body.
 - 6) Install the front right wheel.
- (4) Install the front left pipe assembly.
 - 1) Install the front left pipe assembly.
 - 2) Tighten tightening nut between front left pipe assembly and ESP controller assembly.

Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$

 - 3) Tighten tightening nut between front left pipe assembly and front left brake hose assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 4) Install the battery tray.
 - 5) Install the front left wheel house protector body.
 - 6) Install the front left wheel.
- (5) Install the rear right pipe I assembly.
 - 1) Install the rear right pipe I assembly.
 - 2) Tighten tightening nut between rear right pipe I assembly and ESP controller assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

 - 3) Tighten tightening nut between rear right pipe I assembly and pipeline connector.

Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$
- 4) Install the battery tray.
- (6) Install the rear left brake pipe II.
 - 1) Install the rear left brake pipe II.
 - 2) Tighten tightening nut between rear left pipe II and pipeline connector.

Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$

- 3) Tighten tightening nut between rear left brake pipe II and rear brake hose assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

- 4) Install the battery tray.
- 5) Install the rear left wheel house protector body.
- 6) Install the rear left wheel.
- (7) Install the rear right brake pipe II.
 - 1) Install the rear right brake pipe II.
 - 2) Tighten tightening nut between rear right pipe II and pipeline connector.

Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$

- 3) Tighten tightening nut between rear right brake pipe II and rear brake hose assembly.

Tightening torque: $17 \pm 3 \text{ N}\cdot\text{m}$

- 4) Install the battery tray.
- 5) Install the rear right wheel house protector body.
- 6) Install the rear right wheel.

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7.4 ELECTRONIC PARKING BRAKE SYSTEM

1 Warning and Precautions

1.1 Precaution

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

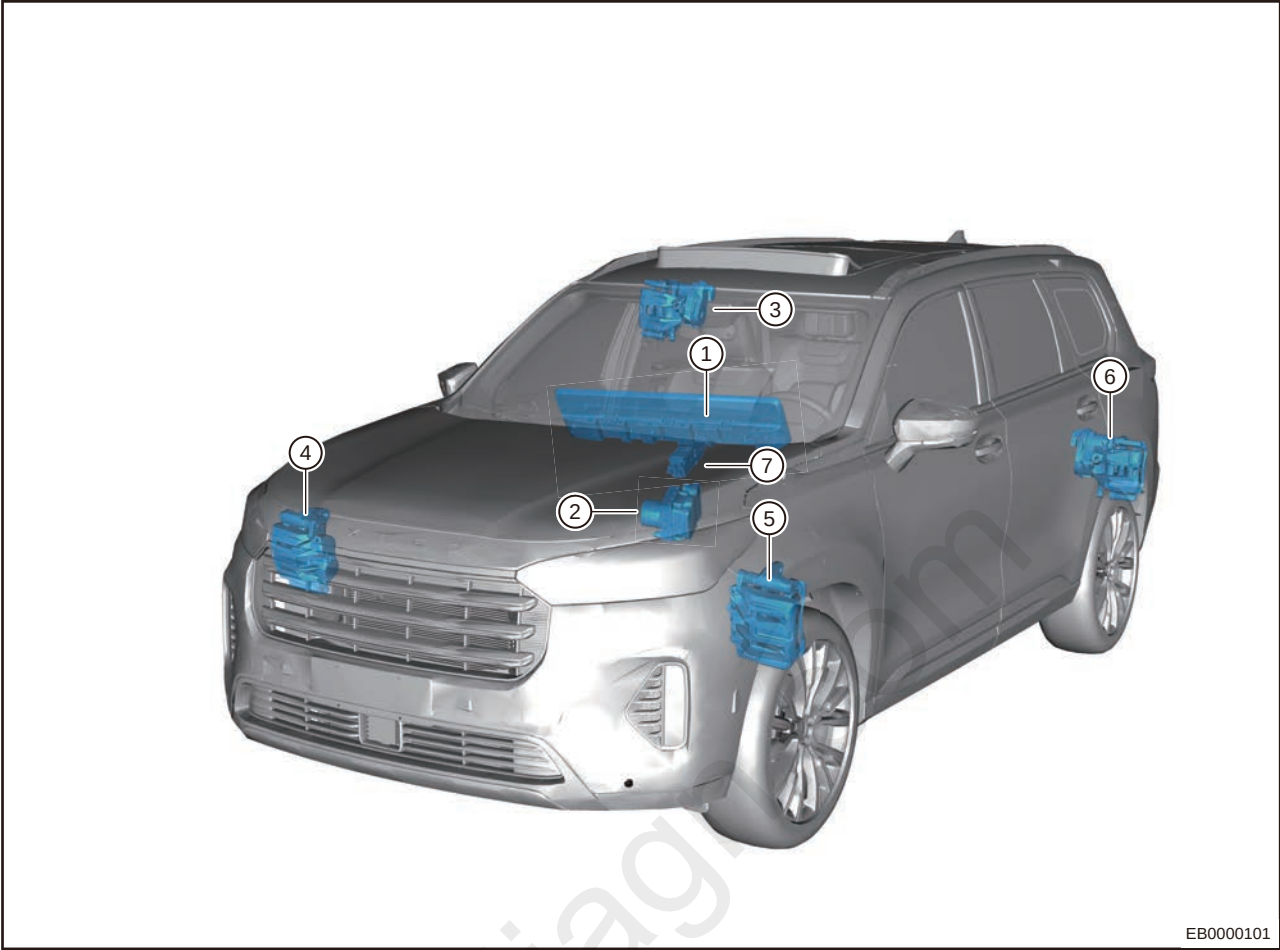
- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.
- If parking brake cannot be released by parking brake switch manually or automatically on a slope, please try to tow vehicle to a level road or place obstacles such as stoppers in front of or rear of front wheels respectively to prevent wheel rolling, avoiding coasting accident after releasing parking brake.
- When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to cut off vehicle power supply.

2 System Overview

2.1 System Description

Electronic parking brake operation is electronic parking brake system. Electronic Parking Brake System (EPB) integrates temporary braking while driving with long-term braking after stopping. Therefore, vehicle can be stopped through electronic parking brake operation. Electronic parking brake stops vehicle through electronic parking brake operation. Its operation principle is the same as mechanical parking brake operation, which is to control vehicle stopping by friction generated from brake disc and brake lining, but control changes to electronic button from mechanical parking brake lever. Electronic parking brake has extended basic parking function to AUTO HOLD. With AUTO HOLD enabled, driver does not have to depress brake pedal for long time when stopping vehicle, and avoid unnecessary moving, that is vehicle will not slide rearward.

2.2 System Components Diagram



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

■ Electronic Parking Brake System (EPB)

Electronic Parking Brake System (EPB) is mainly used to integrate temporary braking while driving with long-term parking braking after stopping. Therefore, vehicle can be stopped through electronic parking brake operation.

- Manual parking: When engine starts or ENGINE START STOP switch is in ON mode while vehicle is stationary, pull up the electronic parking switch, the red indicator and electronic parking switch indicator come on, which indicates parking brake function is operating.
- Manual releasing: When engine starts or ENGINE START STOP switch is in ON mode while depressing brake pedal, press the electronic parking switch manually, the red indicator and electronic parking switch indicator go off, which indicates parking brake function is released.
- Automatic releasing: Fasten driver side seat belt, close driver side door. Depress accelerator pedal when button-type electronic shift module is in D or R position. Then electronic parking brake will be released automatically and red indicator goes off. When vehicle is stopped on a slope and shift module is in D or R, it is necessary to depress accelerator pedal deeply and automatic parking brake is released only when drive force is greater than the force in coasting direction.

- (1) EPB is released automatically when shifting P position to D or R position.
- (2) EPB is applied automatically when shifting to P position from D or R position.

Hint:

- Turn ENGINE START STOP button to OFF, and Electronic Parking Brake (EPB) achieves parking brake automatic application function.

⚠ Caution

- Electronic parking brake can not be released when vehicle battery is depleted.
- With engine starting or ENGINE START STOP switch turned to ON, if parking brake can not be released manually by depressing brake pedal, depress accelerator pedal and press electronic parking brake switch to release electronic parking brake. Use this method only when parking brake can not be released manually by depressing brake pedal. Please take care when using this method.
- Fasten driver side seat belt and close driver side door when electronic parking brake is released automatically. Otherwise, automatic parking brake releasing conditions are not met.
- While electronic parking brake is applied or released, a “fizz” sound may be heard from rear of vehicle, which is generated during parking brake operation. This is normal, please rest assured use.
- If parking brake is applied or released while depressing the brake pedal, brake pedal may move up or down slightly, just depress brake pedal firmly.
- If vehicle coasts after stopping for a while, 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.

⚠ Warning

- To prevent vehicle from moving accidentally, after Electronic Parking Brake System (EPB) operates when vehicle is stopped or leaving vehicle, both red indicator and electronic parking switch indicator come on for a while and then go off. At the moment, observe if the indicators come on to make sure that electronic parking brake is applied successfully.
- To prevent vehicle from moving accidentally, when vehicle is in automatic parking status, it is necessary to confirm the gear position before starting vehicle by depressing accelerator pedal.

■ Automatic Parking Function (AUTO HOLD)

Electronic parking brake system (EPB) has extended basic parking function to automatic parking function (- AUTO HOLD). With AUTO HOLD enabled, driver does not have to depress brake pedal for long time when stopping vehicle, automatic parking can be used to avoid unnecessary moving (such as coasting).

- Turning on automatic parking function: With engine started, driver side door is closed and driver side seat belt is fasten. Press automatic parking switch to start automatic parking function, meanwhile, indicator on the button illuminates, which indicates system enters automatic parking mode.
- Activating automatic parking function: When automatic parking function is on and automatic parking conditions are met, vehicle stops from moving status after depressing brake pedal, automatic parking function is activated and green indicator comes on. When vehicle is stationary and brake pedal is depressed, automatic parking function is activated and green indicator comes on when automatic parking function is turned on and automatic parking conditions are met.
- Closing automatic parking function: With automatic parking function turned on, press automatic parking switch on auxiliary fascia console to turn off automatic parking function and indicator on the button goes off, which indicates system has exited automatic parking mode. With automatic parking function activated, press automatic parking button on auxiliary fascia console to turn off automatic parking function. Both green indicator and indicator on automatic parking button go off, which indicates system has exited automatic parking mode and turned to Electronic Parking Brake (EPB) system function.
- Automatic parking releasing: Automatic parking releasing method is the same as that of electronic parking, including manual and automatic releasing operations.

⚠ Caution

- After vehicle starts, automatic parking switch is turned on, automatic parking system can not be entered if driver side door is not closed or driver side seat belt is unfastened.
- With automatic parking turned on, when vehicle is stopped moving by brake and kept in stationary state, automatic parking system will apply parking brake automatically while vehicle gear is in D or R position. Shift to N in short time parking, and shift to P in long time parking.
- With automatic parking function turned on, when opening driver side door or unfastening driver side seat belt, it will exit automatic parking function. When driver side door is closed or driver side seat belt is fastened again, automatic parking function is turned on again.
- When automatic parking function is activated, open driver side door or unfasten driver side seat belt, then automatic parking turns to electronic parking.
- With automatic parking function activated, if it is necessary to shift gear by depressing brake pedal at this time (for example, shift N to R position). Depress the brake pedal with greater force than when the automatic parking is not turned on (as the automatic parking is operative, the pedal stroke becomes shorter).
- Be sure to observe safety regulations to park the vehicle properly, avoid hurting yourself and pedestrian.
- Be sure to turn automatic parking function off when parking the vehicle in place or driving in narrow space (for example, before driving into car washing room).
- This function cannot be activated during due to insufficient Brake force when brake is extremely slight or vehicle slips to stop.
- Automatic parking function cannot replace parking brake system.

■ Sudden Braking Function

If foot brake is faulty, pull up and hold the electronic parking switch to forcibly apply brake through electric parking brake. The red indicator flashes with alarming sound during emergency braking. To exit emergency braking, release the electronic parking switch.

⚠ Warning

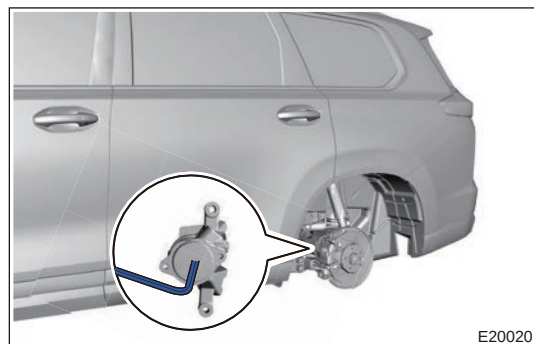
- Turn on sudden braking function only when the foot brake is faulty or brake pedal is stuck. Because Electronic Stability Program (ESP) system and its component can not exceed the physical limit of road adhesion. Turning on emergency braking function when driving on a curve, dangerous road area, heavy traffic road or in bad weather may lead to drift, sideslip or pull. Beware of accident.
- Use this function with caution during normal driving. Prevent other passengers from touching this switch by mistake while driving. Otherwise it may lead to an accident.
- When sudden braking function is triggered, a “drone” sound will be heard, it is normal.
- During sudden braking, electronic parking performs braking operation in a constant deceleration, which may be different from driver's expected deceleration and the braking distance may be different as well.

■ Electronic Parking Brake System (EPB) Emergency Release (Take left side as an example)

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 electronic parking brake system (EPB), you need to enable electronic parking brake system (EPB) emergency releasing function to release parking brake, please follow the following steps for specific methods:

- (1) Remove the rear left wheel.
- (2) Remove the electronic control execution unit.

- (3) Align inner bi-hexagonal wrench M8 with spline in rear left brake caliper body assembly, 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).

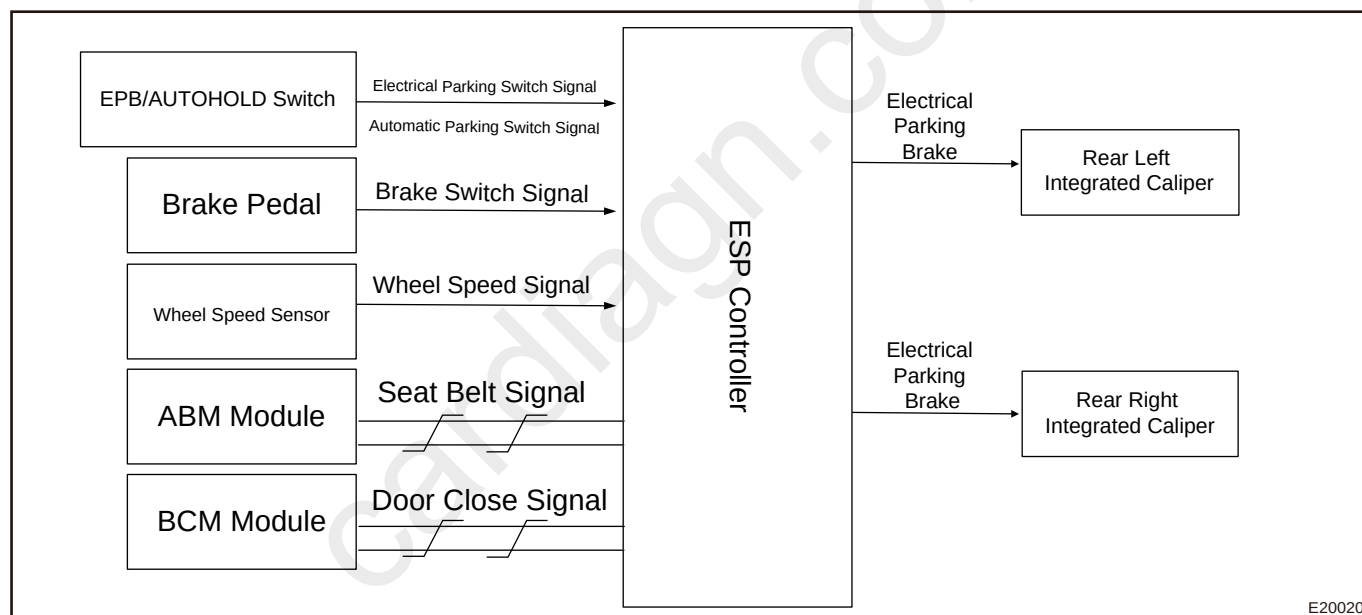


- (4) The vehicle only loses parking brake function and does not affect normal braking function after releasing parking brake.

⚠ Caution

- If parking brake cannot be released by parking brake switch manually or automatically on a slope, please try to tow vehicle to a level road or place obstacles such as stoppers in front of or rear of front wheels respectively to prevent wheel rolling, avoiding coasting accident after releasing parking brake.

2.3 System Schematic Diagram

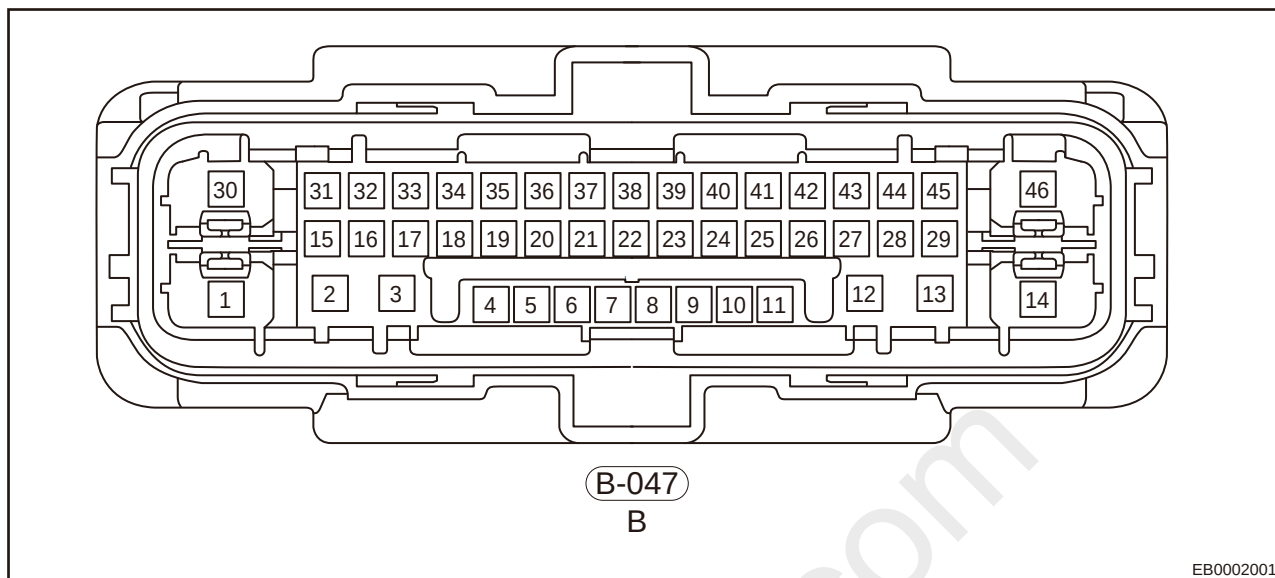


ESP controller assembly collects seat belt signal and door closed signal via CAN line, and collects electric parking switch signal, automatic parking switch signal, brake switch signal and wheel speed signal via hard-wire connection. Then, integrated caliper assembly operates according to data requirements analysis.

3 System Circuit Diagram

3.1 Module Terminal Definition

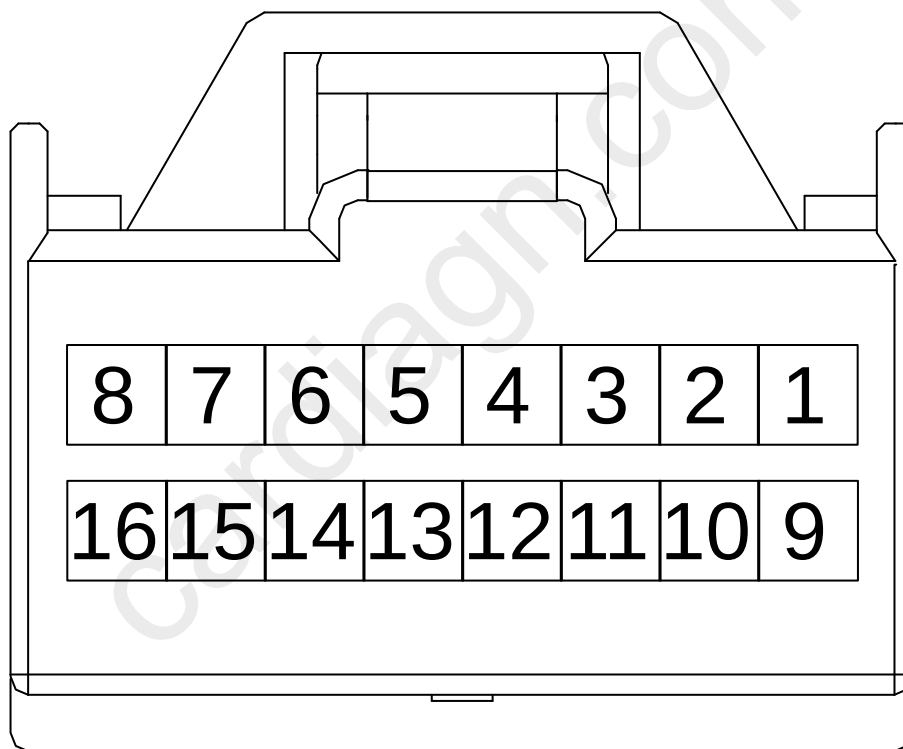
■ ESP Module Terminal Definition



Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	KL30 Power Supply	24	Front Left Wheel Speed Sensor Power Supply
2	Right EPB Motor Power Supply	25	CAN2 Low
3	Right EPB Motor Ground	26	Front Right Wheel Speed Sensor Signal
4	Reserved	27	Reserved
5	CHA High	28	Reserved
6	Reserved	29	Reserved
7	Front Left Wheel Speed Sensor Signal	30	KL30 Power Supply
8	AUTO HOLD Indicator	31	EPB Switch Pin 1
9	Reserved	32	EPB Switch Pin 4
10	HDC Switch Indicator	33	Reserved
11	CAN2 High	34	Reserved
12	Left EPB Motor Ground	35	Reserved
13	Left EPB Motor Power Supply	36	ING1 Power Supply
14	Ground	37	Rear Right Wheel Speed Sensor Signal
15	EPB Switch Pin 3	38	Brake Switch Signal
16	EPB Switch Pin 2	39	Rear Left Wheel Speed Sensor Power Supply
17	HDC Switch Signal	40	Reserved
18	EPB Indicator	41	AUTO HOLD Switch Signal

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

■ EPB Switch (Integrated Electric Shift Module) Terminal Definition



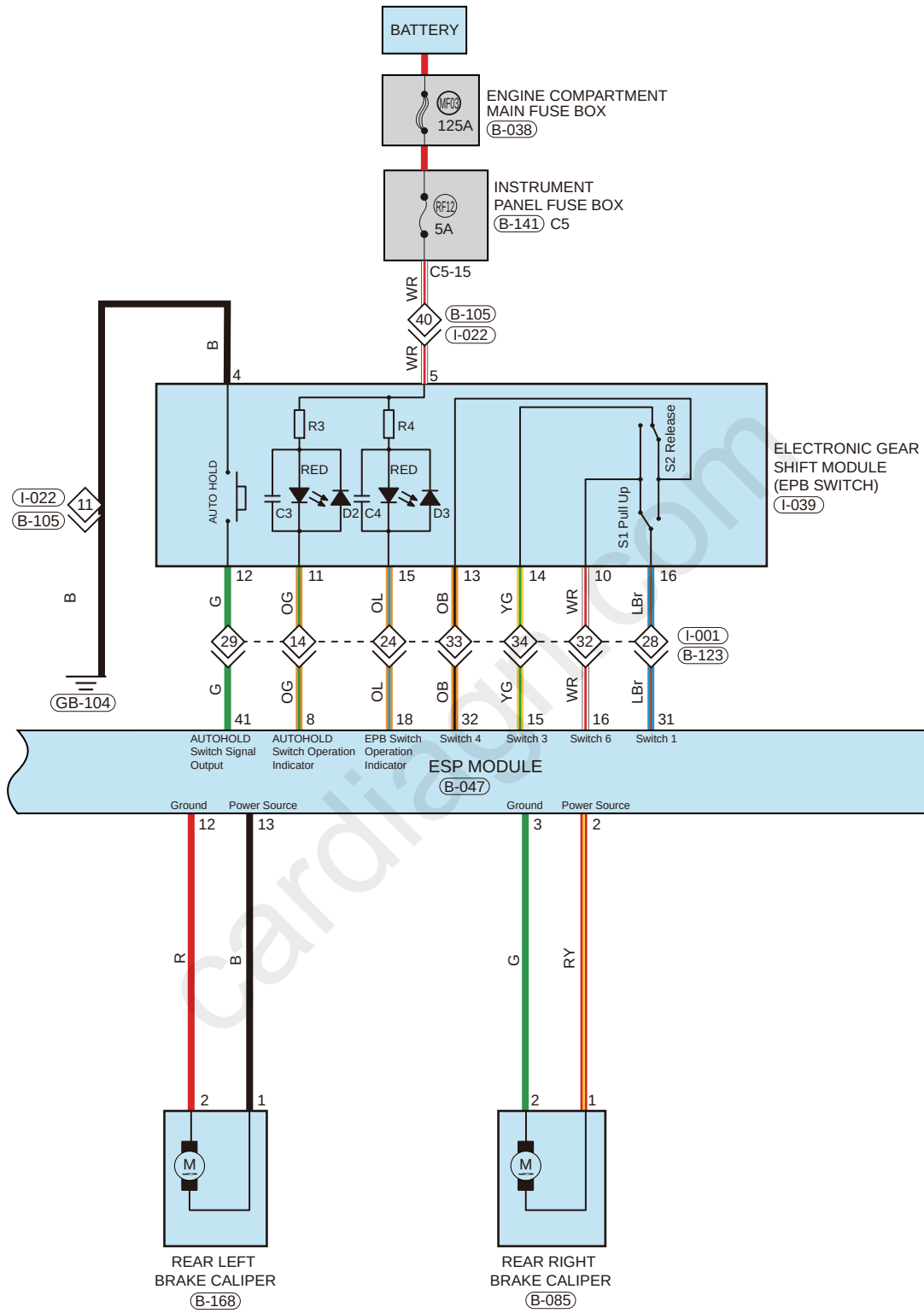
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Pin	Terminal Definition	Pin	Terminal Definition
1	CAN-L	9	-
2	CAN-H	10	SW6

Pin	Terminal Definition	Pin	Terminal Definition
3	-	11	AUTOHOLD switch operation indicator drives
4	Ground	12	AUTOHOLD switch signal outputs
5	Power supply	13	SW4
6	-	14	SW3
7	Ignition signal	15	EPB switch operation indicator drives
8	-	16	SW1

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■ Electronic Parking Brake System 2



EB0004001

4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:

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

Symptom	Suspected Area
EPB warning light illuminates	Electronic control execution unit
	ESP control module assembly
Unable to release/apply parking brake	Fuse malfunction
	Wire harness or connector failure
	ESP control module assembly
	Electronic control execution unit
	Wheel speed signal failure
Switch failed	Switch malfunction
	Fuse malfunction
	Wire harness or connector failure
	ESP control module assembly
CAN network fault	Fuse malfunction
	Wire harness or connector failure
	CGW controller assembly
	ESP controller assembly

4.2 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the Electronic Parking Brake (EPB) system.

1	Vehicle brought to workshop
---	-----------------------------

NEXT

2	Check battery voltage
---	-----------------------

(a) Check if battery voltage is normal.

OK

Standard voltage: Not less than 12 V.

NG

Replace battery

OK

3	Customer problem analysis
---	---------------------------

NEXT

4 Read DTCs

No DTC

Repair according to Problem Symptoms Table

DTCs

5 Read DTCs (current DTC and history DTC)

No DTC

Troubleshoot according to intermittent DTC fault flow

DTCs

6 Repair according to Diagnostic Trouble Code (DTC) chart

NEXT

7 Adjust, repair or replace

NEXT

8 Conduct test and confirm malfunction has been repaired

NEXT

End

4.3 Diagnostic Help

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

4.4 Intermittent Troubleshooting

If malfunction is intermittent, perform the followings:

- (1) Check if connector is loose.
- (2) Check if wire harness is worn, pierced, pinched or partially broken.
- (3) Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- (4) If possible, try to duplicate the conditions under which DTC was set.
- (5) Look for data that has changed or DTC to reset during wiggle test.
- (6) Look for broken, bent, protruded or corroded terminals.

- (7) Inspect the mounting areas of brake control system, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
- (8) Check and clean all wire harness connectors and ground parts related to DTC.
- (9) Refer to any Technical Bulletin that may apply to this malfunction.

4.5 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.

4.6 DTC Confirmation Procedure

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

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

4.7 Diagnostic Trouble Code (DTC) Chart

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C220A19	Left Actuator - Circuit High Current
C220A72	Left Actuator - Release Failed-Actuator Stuck Open
C220A73	Left Actuator - Apply Failed-Actuator Stuck Closed
C220A74	Left Actuator - Actuator Slipping (Apply Time Out)
C220A91	Left Actuator - Wrong Operating Characteristics Detect
C220A92	Left Actuator - High Mechanical Resistance
C220A93	Left Actuator - No Motor Start Detected-No Operation
C220A97	Left Actuator - Action Limited
C220B19	Right Actuator - Circuit High Current
C220B72	Right Actuator -Release Failed-Actuator Stuck Open
C220B73	Right Actuator - Apply Failed-Actuator Stuck Closed
C220B74	Right Actuator - Actuator Slipping (Apply Time Out)

DTC	DTC Definition
C220B91	Right Actuator - Wrong Operating Characteristics Detect
C220B92	Right Actuator - High Mechanical Resistance
C220B93	Right Actuator - No Motor Start Detected-No Operation
C220B97	Right Actuator - Action Limited
C220C16	Supply Voltage Too Low
C220C17	Supply Voltage Too High
C220C44	PBC (Parking Brake Control) EEPROM Fault
C220D95	EPB Assembly Test Incomplete
C220E53	EPB Maintenance Mode-Activated
C220F94	Hydraulic Brake Support Failure
C221001	EPB Button Line Failure - General Electrical Failure
C221004	EPB Button Always Pushed or Pulled
C221016	EPB Button Under Voltage
C221198	Disc Over Heat
C221211	Circuit Short To Ground of Left Rear Caliper
C221212	Circuit Short To Battery of Left Rear caliper
C221213	Circuit Open of Left Rear Caliper-Circuit Open
C221311	Circuit Short To Ground of Right Rear Caliper-Circuit Short To Ground
C221312	Circuit Short To Battery of Right Rear Caliper-Circuit Short To Battery
C221313	Circuit Open of Right Rear caliper-Circuit Open
C221400	EPB Right Actuator Failure
C221500	EPB Left Actuator Failure
C221600	APB Motor Enable Line Violation
C221701	EPB Left Actuator Electrical Failure-General Electrical Failure
C22171E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C221801	EPB Right Actuator Electrical Failure-General Electrical Failure
C22181E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C221901	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure
C221A00	EPB Left Actuator CAT-No Sub Type Information

DTC	DTC Definition
C221B00	EPB Right Actuator CAT-No Sub Type Information
C221C00	EPB Left Actuator Unintended Run-No Sub Type Information
C221D00	EPB Right Actuator Unintended Run-No Sub Type Information
C221E44	SupervisionFail-Data Memory Failure
C222055	Configuration Variant Error
C224604	APB Power Supply Fault
C226B00	EPBASIC_GenericError-No Sub Type Information
C22AD08	Vacuum Sensor General Fault
U000500	CAN Bus Voltage High
U000700	CAN Bus Voltage Low
U007388	P CAN Bus Off
U007488	C CAN Bus Off
U010087	Lost Communication with EMS
U010187	Lost Communication with TCU
U011487	Lost Communication with AWD
U014287	Lost Communication with AVM
U015187	Lost Communication with ACM
U015587	Lost Communication with IPC
U021287	Lost Communication with SCM
U023587	Lost Communication with FRM
U040181	Invalid DLC, Alive Counter, CRC and Data Received from EMS
U040281	Invalid DLC, Alive Counter, CRC and Data Received from TCU
U041481	Invalid DLC, Alive Counter, CRC and Data Received from AWD
U042281	Invalid DLC, Alive Counter, CRC and Data Received from BCM
U042381	Invalid DLC, Alive Counter, CRC and Data Received from IPC
U042981	Invalid DLC, Alive Counter, CRC and Data Received from SCM
U043381	Invalid DLC, Alive Counter, CRC and Data Received from FRM
U044381	Invalid DLC, Alive Counter, CRC and Data Received from AVM
U045281	Invalid DLC, Alive Counter, CRC and Data Received from ACM

■ DTC Diagnosis Procedure

■ System Power Supply Malfunction

DTC	C220C16	Supply Voltage Too Low
DTC	C220C17	Supply Voltage Too High
DTC	C224604	APB Power Supply Fault

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220C16	Supply Voltage Too Low	System power voltage is lower than 9V	• Battery failure • Wire harness or connector failure • Charging system failure • ESP control module failure
C220C17	Supply Voltage Too High	System power voltage is higher than 16V	
C224604	APB Power Supply Fault	• ADC values measured from two channels are unequal • RVP transistor gate can not be changed as required	

■ DTC Confirmation Procedure

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

Hint:

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

1	Check battery voltage
----------	------------------------------

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

NG

Replace battery

OK

2	Check charging system
----------	------------------------------

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

NG

Repair or replace alternator or related wire harness

OK

3	Check EPB fuse
----------	-----------------------

- (a) Turn ENGINE START STOP switch to ON.
 (b) Check if fuses MF03 125A, MF04 175A in main fuse box B-038 and E-041 are blown.
 (c) Check if fuses RF03 5A and RF17 10A in instrument panel fuse box B-140 and B-144, and fuses SB01 40A and SB02 40A in engine compartment fuse and relay box B-039 are blown.

NG

Replace fuse

OK

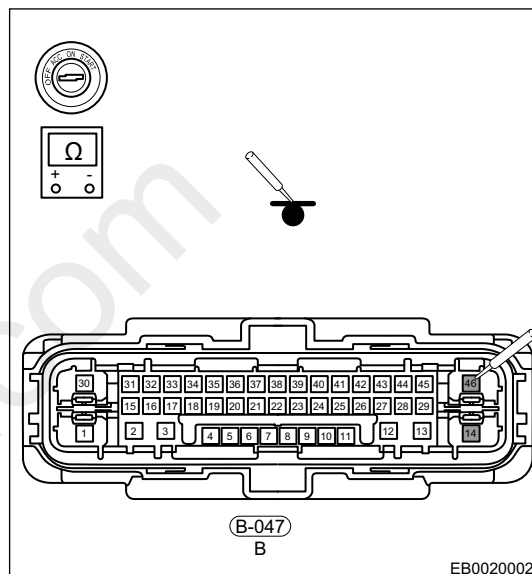
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Check EPB controller ground and power supply wire harness connector

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect EPB module connector, and check if it is bent, deformed or loose.
 (c) Using a multimeter, check for continuity between EPB controller B-047 (14, 46) and ground circuit.

Standard Resistance

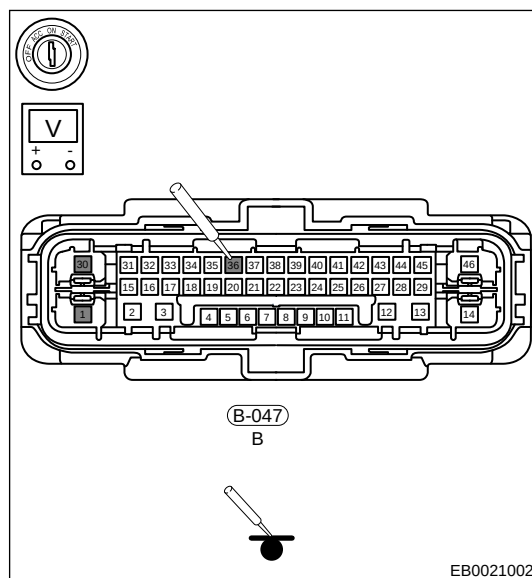
Multimeter Connection	Condition	Specified Condition
B-047 (46) - Body ground	Always	$\leq 1 \Omega$
B-047 (14) - Body ground	Always	$\leq 1 \Omega$



- (d) Turn ENGINE START STOP switch to ON.
 (e) Using a multimeter, measure voltage between terminals 1, 30 and 36 of EPB controller B-047 and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-047 (1) - Body ground	Always	Not less than 12 V
B-047 (30) - Body ground	Always	Not less than 12 V
B-047 (36) - Body ground	Always	Not less than 12 V



NG

Replace or repair wire harness or connector

OK

5 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Assembly Failure

DTC	C220D95	EPB Assembly Test Incomplete
-----	---------	------------------------------

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220D95	EPB Assembly Test Incomplete	EPB Assembly test is incomplete	- Assembly test is not performed or incomplete - ESP control module 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 Perform assembly test

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

2 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ System Activated Failure

DTC	C220E53	EPB Maintenance Mode-Activated
-----	---------	--------------------------------

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220E53	EPB Maintenance Mode-Activated	EPB maintenance mode does not exit	- Maintenance mode does not exit - ESP control module 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 Perform assembly test

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

NG

Replace electronic control execution unit

OK

2 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ System Malfunction

DTC	C221901	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure
-----	---------	---

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221901	EPB Actuator Driver Gen Electrical Failure - General Electrical Failure	Unexpected monitoring in ASIC RCP mode is in continuously active state	• EPB motor hardware failure • ABS / ESC hardware failure

■ 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 electronic control execution unit connector.
 (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 or replace related wire harness or connector

OK

2

Perform electronic control execution unit active test

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

NG

Replace electronic control execution unit

OK

3

Reconfirm DTCs

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to clear DTCs.

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Brake Disc Over Heat Failure

DTC	C221198	Disc Over Heat
Description		

DTC	DTC Definition	Detection Condition	Possible Cause
C221198	Disc Over Heat	- If BTM is turned off through software parameters or diagnostic software, it will set this failure - If temperature of at least one brake disc is higher than certain threshold, it will set this failure	- Mechanical stuck - 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 electronic control execution unit active test

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

NG

Replace electronic control execution unit

OK

2 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Motor Drive Chip Failure

DTC	C221600	APB Motor Enable Line Violation	
Description			
DTC	DTC Definition	Detection Condition	Possible Cause
C221600	APB Motor Enable Line Violation	This failure is caused by PBCSW failure	• EPB switch failure • Wire harness or connector failure • ESP module assembly failure

■ 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 ignition cycle again

- (a) Use diagnostic tester to clear DTCs.
 (b) Read DTC in “ABS/ESP (Anti-lock Braking System/Electronic Stability Program)” again with diagnostic tester.
 (c) Check if the same DTCs are still output.

OK

Intermittent failure

NG

2 Check EPB switch and control circuit

- (a) Check EPB switch and control circuit.

NG

Repair or replace switch or control circuit

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ EPB Switch Fault

DTC	C221001	EPB Button Line Failure-General Electrical Failure
DTC	C221004	EPB Button Always Pushed or Pulled-System Internal Failure
DTC	C221016	APB Button Under Voltage

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221001	EPB Button Line Failure-General Electrical Failure	Electrical Line of EPB button connection failure	• EPB switch failure • Wire harness or connector failure • System power supply failure • ESP module assembly failure
C221004	EPB Button Always Pushed or Pulled-System Internal Failure	EPB button is pushed or pulled for long time	
C221016	APB Button Under Voltage	EPB button voltage is below specified value	

■ 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 or replace charging system or battery

OK

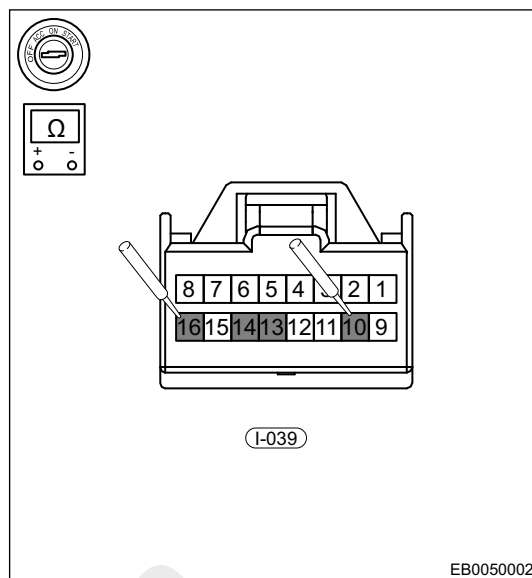
2

Check EPB switch

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the EPB switch connector I-039.
- (d) Check if EPB switch is stuck or pushed in by other objects.
- (e) When EPB switch is not pressed, using a digital multimeter, check if continuity between EPB switch I-039 (10), (16), (13) and (14) is normal according to the table below.

Standard Resistance

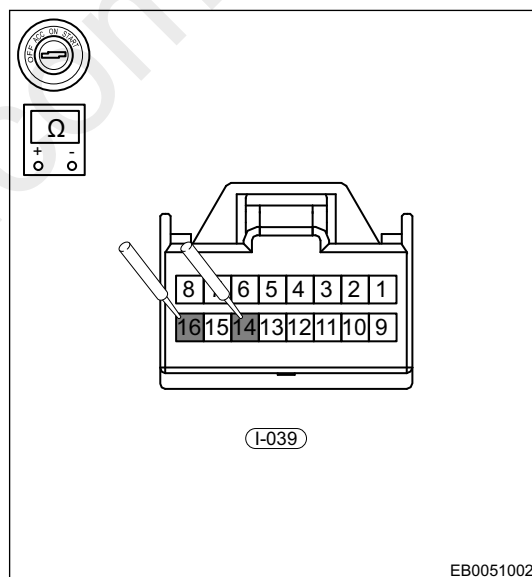
Multimeter Connection	Detection Condition	Specified Condition
I-039 (10) - I-039 (16)	Always	$\leq 1 \Omega$
I-039 (13) - I-039 (14)	Always	$\leq 1 \Omega$



- (f) When EPB switch is pressed, using a digital multimeter, check if continuity between EPB switch I-039 (14) and (16) is normal according to the table below.

Standard Resistance

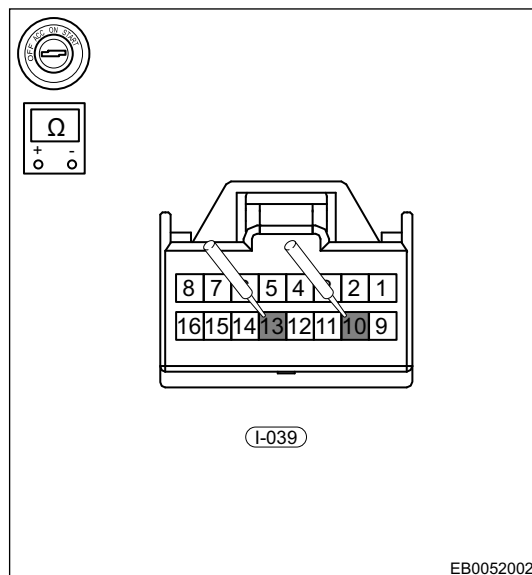
Multimeter Connection	Detection Condition	Specified Condition
I-039 (14) - I-039 (16)	Always	$\leq 1 \Omega$



- (g) When EPB switch is pulled, using a digital multimeter, check if continuity between EPB switch I-039 (10) and (13) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
I-39 (10) - I-039 (13)	Always	$\leq 1 \Omega$



NG

Replace EPB switch

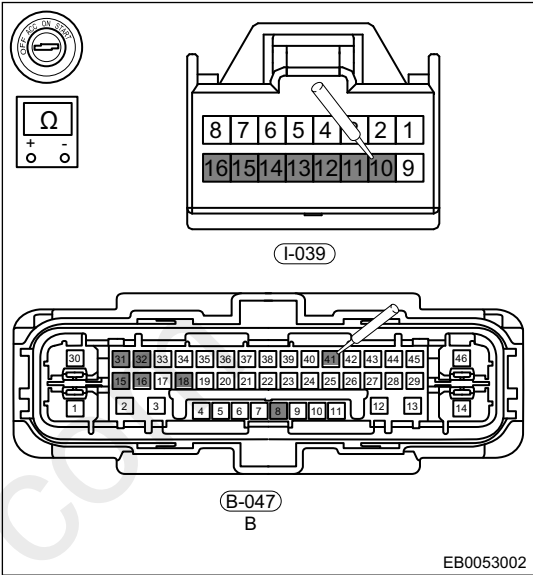
OK

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-039.
- (d) Disconnect the ESP control module assembly B-047.
- (e) Check if related wire harnesses are worn, pinched or broken.
- (f) Check if related connector terminals are loose, broken, bent or corrosive.
- (g) Using a digital multimeter, measure ESP control module assembly connector B-047 (8, 15, 16, 18, 31, 32 and 41) and EPB switch connector I-039 (10, 11, 12, 13, 14, 15 and 16) according to table below.

Standard Resistance

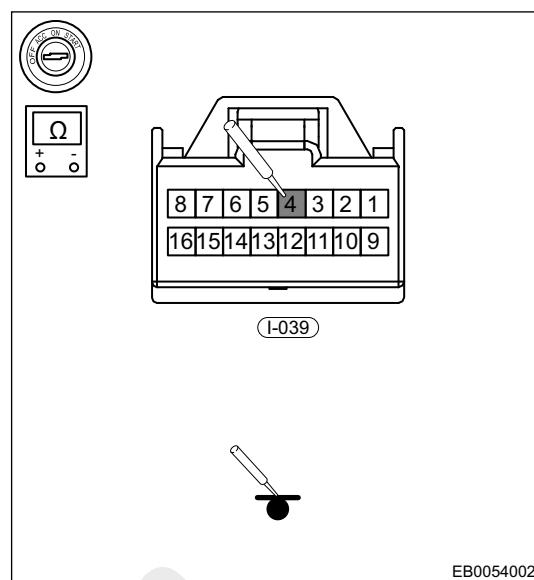
Multimeter Connection	Detection Condition	Specified Condition
B-047 (32) - I-039 (13)	Always	$\leq 1\ \Omega$
B-047 (15) - I-039 (14)	Always	$\leq 1\ \Omega$
B-047 (16) - I-039 (10)	Always	$\leq 1\ \Omega$
B-047 (31) - I-039 (16)	Always	$\leq 1\ \Omega$
B-047 (18) - I-039 (15)	Always	$\leq 1\ \Omega$
B-047 (8) - I-039 (11)	Always	$\leq 1\ \Omega$
B-047 (41) - I-039 (12)	Always	$\leq 1\ \Omega$



- (h) Using a digital multimeter, check if continuity between EPB switch connector I-039 (4) and body ground is normal according to the table below.

Standard Resistance

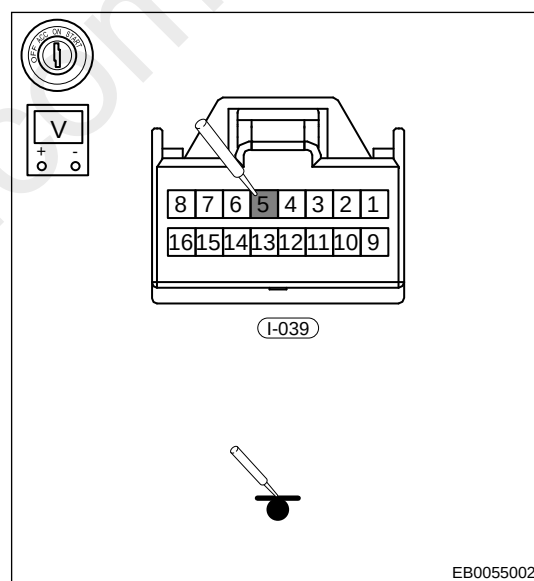
Multimeter Connection	Detection Condition	Specified Condition
I-039 (4) - Body ground	Always	$\leq 1 \Omega$



- (i) Using a digital multimeter, check if voltage between EPB switch connector I-039 (5) and body ground is normal according to the table below.

Standard Voltage

Multimeter Connection	Detection Condition	Specified Condition
I-039 (5) - Body ground	Ignition switch ON	Not less than 12 V



NG

Repair/replace related wire harness or connector

OK

4

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ ECU Motor Drive Failure

DTC	C221B00	EPB Right Actuator CAT-No Sub Type Information
DTC	C221A00	EPB Left Actuator CAT-No Sub Type Information

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221B00	EPB Right Actuator CAT-No Sub Type Information	During circulation motor coupling test (CMCT), H bridge of EPB right motor failure occurs	• EPB motor failure • Wire harness or connector failure • ABS / ESC hardware failure
C221A00	EPB Left Actuator CAT-No Sub Type Information	During circulation motor coupling test (CMCT), H bridge of EPB left motor failure occurs	

■ 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:

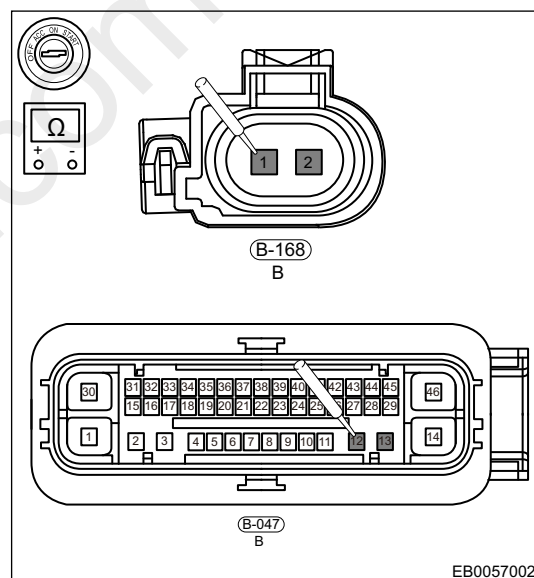
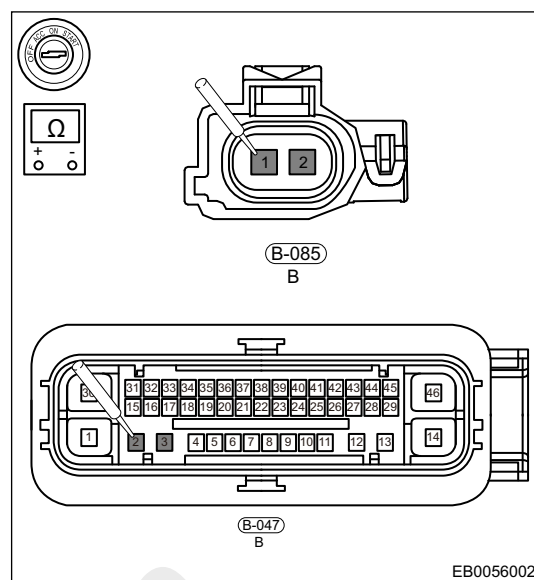
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector
----------	---

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect electronic control execution unit connectors B-168, B-085.
- (d) Disconnect the ESP control module assembly B-047.
- (e) Check if related wire harnesses are worn, pinched or broken.
- (f) Check if related connector terminals are loose, broken, bent or corrosive.
- (g) Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

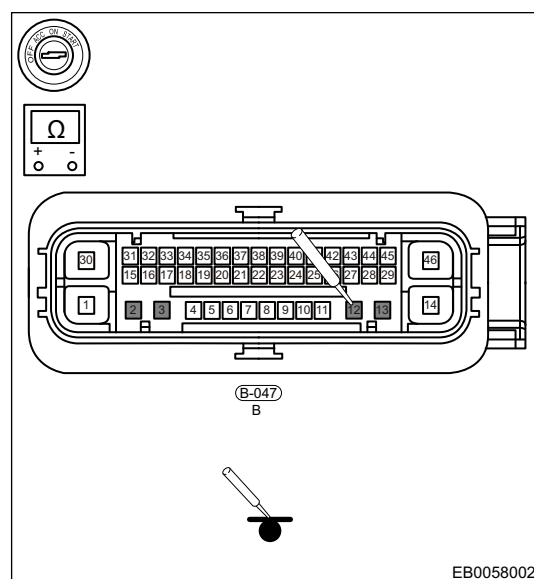
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



- (h) Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and body ground is normal according to table below.

Standard Resistance

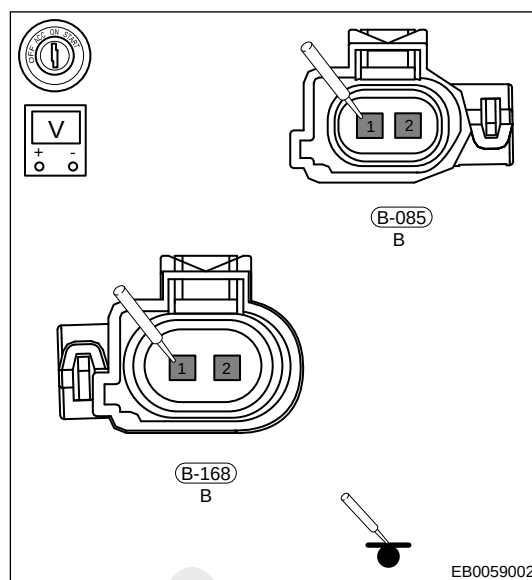
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - Body ground	Always	∞
B-047 (3) - Body ground	Always	∞
B-047 (12) - Body ground	Always	∞
B-047 (13) - Body ground	Always	∞



- (i) Connect the negative battery cable.
- (j) Turn ENGINE START STOP switch to ON.
- (k) Using a digital multimeter, check if voltage between electronic control execution unit connectors B-085 (1, 2), B-168 (1, 2) and body ground is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-085 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-085 (2) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (2) - Body ground	ENGINE START STOP switch ON	0 V



NG

Repair/replace related wire harness or connector

OK

2 Perform electronic control execution unit active test

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

NG

Replace electronic control execution unit

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Actuator - Action Limited Failure

DTC	C220A97	Left Actuator - Action Limited
DTC	C220B97	Right Actuator - Action Limited

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A97	Left Actuator - Action Limited	EPB software detects that left motor current and voltage signal are abnormal	• Actuator failure • Wire harness or connector failure • Manual parking release via switch operation frequency is too high • ESP module assembly failure
C220B97	Right Actuator - Action Limited	EPB software detects that right motor current and voltage signal are abnormal	

■ 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:

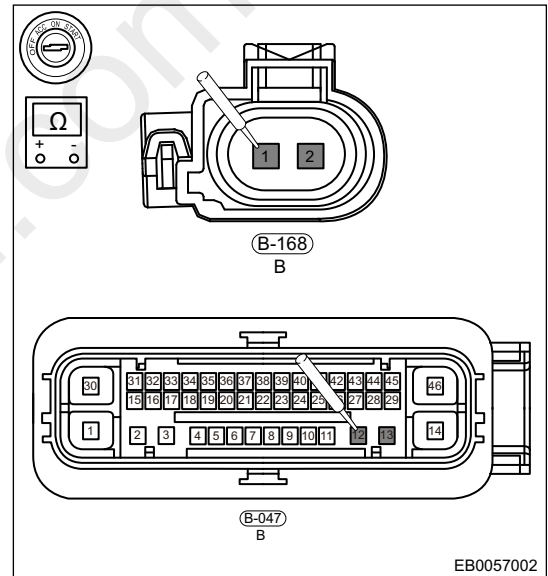
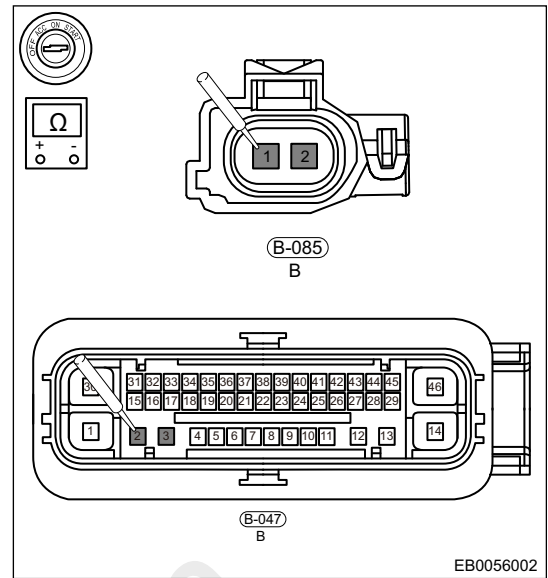
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector
---	--

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

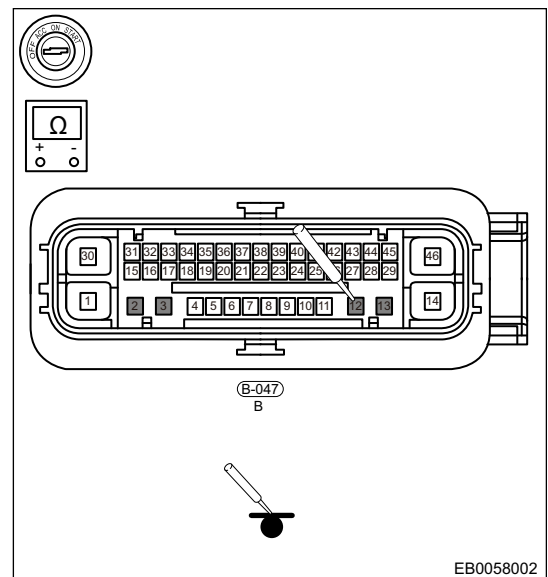
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and body ground is normal according to table below.

Standard Resistance

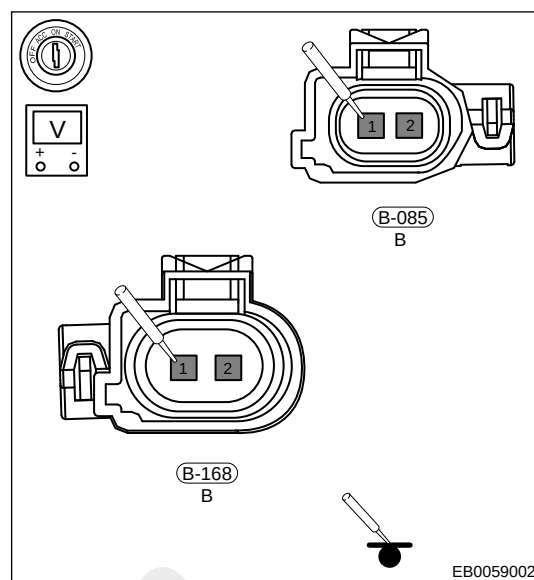
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - Body ground	Always	∞
B-047 (3) - Body ground	Always	∞
B-047 (12) - Body ground	Always	∞
B-047 (13) - Body ground	Always	∞



- (i) Connect the negative battery cable.
- (j) Turn ENGINE START STOP switch to ON.
- (k) Using a digital multimeter, check if voltage between electronic control execution unit connectors B-085 (1, 2), B-168 (1, 2) and body ground is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-085 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-085 (2) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (2) - Body ground	ENGINE START STOP switch ON	0 V



NG

Repair/replace related wire harness or connector

OK

2

Perform electronic control execution unit active test

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

NG

Replace electronic control execution unit

OK

3

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Actuator Unintended Run Failure

DTC	C221D00	EPB Right Actuator Unintended Run-No Sub Type Information
DTC	C221C00	EPB Left Actuator Unintended Run-No Sub Type Information

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221D00	EPB Right Actuator Unintended Run-No Sub Type Information	EPB right actuator rotates unexpectedly	- Wire harness or connector failure - EPB motor hardware failure - ABS / ESC hardware failure
C221C00	EPB Left Actuator Unintended Run-No Sub Type Information	EPB left actuator rotates unexpectedly	

■ 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

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Connect the negative battery cable.
- Turn ENGINE START STOP switch to ON.
- Using a digital multimeter, check if voltage between electronic control execution unit connectors B-085 (1, 2), B-168 (1, 2) and body ground is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-085 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-085 (2) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (2) - Body ground	ENGINE START STOP switch ON	0 V

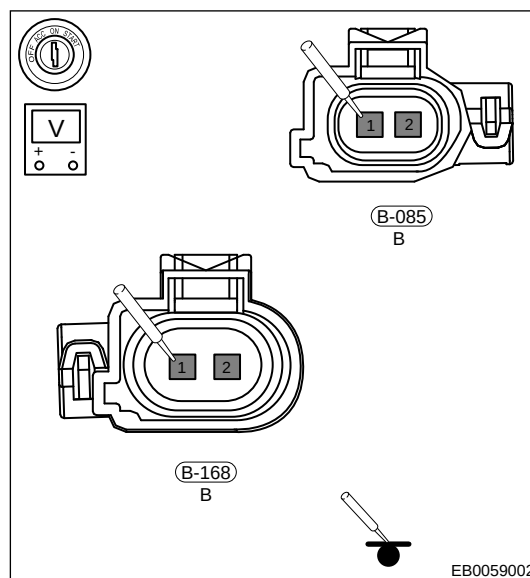
NG

Repair/replace related wire harness or connector

OK

2 Perform electronic control execution unit active test

- Perform rear left/right brake caliper active tester.



NG

Replace electronic control execution unit

OK

3

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Actuator - Apply Failure

DTC	C220A73	Left Actuator - Apply Failed-Actuator Stuck Closed
DTC	C220A74	Left Actuator - Actuator Slipping (Apply Time Out)
DTC	C220B74	Right Actuator - Actuator Slipping (Apply Time Out)
DTC	C220B73	Right Actuator - Apply Failed-Actuator Stuck Closed

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A73	Left Actuator - Apply Failed-Actuator Stuck Closed	EPB software detects that motor is clamping for a certain time, but cannot reach target parking force	- Wire harness or connector failure - Actuator failure - ESP control module malfunction
C220A74	Left Actuator - Actuator Slipping (Apply Time Out)	Left actuator can not return to target position	
C220B74	Right Actuator - Actuator Slipping (Apply Time Out)	Right actuator can not return to target position	
C220B73	Right Actuator - Apply Failed-Actuator Stuck Closed	EPB software detects that motor is clamping for a certain time, but cannot reach target parking force	

■ 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 or replace charging system or battery

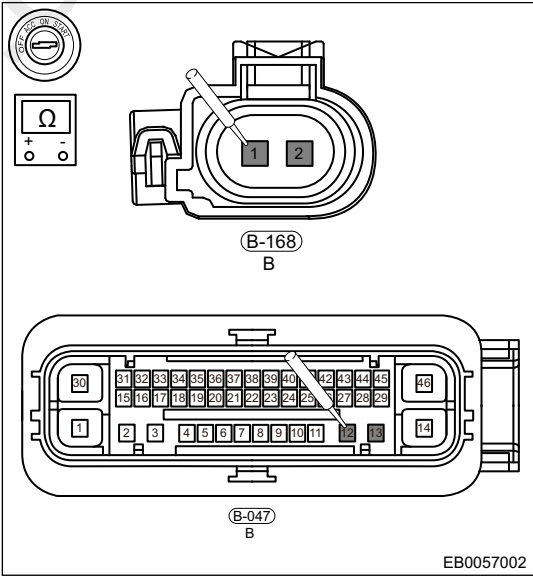
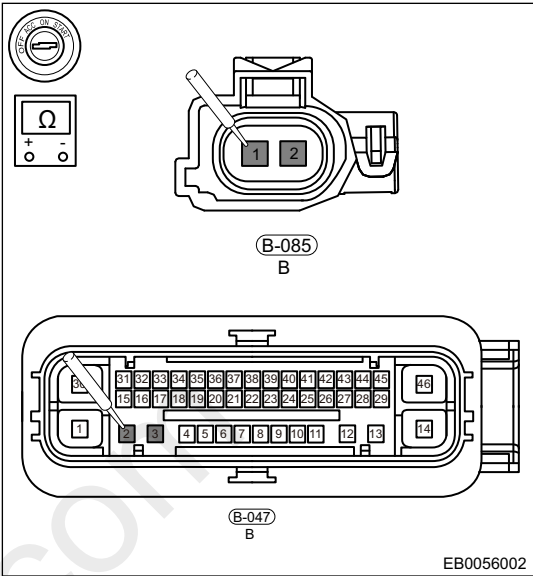
OK

2 Check related wire harness and connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect electronic control execution unit connectors B-168, B-085.
- (d) Disconnect the ESP control module assembly B-047.
- (e) Check if related wire harnesses are worn, pinched or broken.
- (f) Check if related connector terminals are loose, broken, bent or corrosive.
- (g) Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



NG Repair/replace related wire harness or connector

OK

3 Check electronic control execution unit

- (a) Using a digital multimeter, check if resistance between electronic control execution unit (1) and (2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
Electronic control execution unit (1) - Electronic control execution unit (2)	Always	1.1 Ω-1.6 Ω

NG

Replace electronic control execution unit

OK

4

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Actuator - Release Failed

DTC	C220A72	Left Actuator - Release Failed-Actuator Stuck Open
DTC	C220B72	Right Actuator -Release Failed-Actuator Stuck Open

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A72	Left Actuator - Release Failed-Actuator Stuck Open	EPB software detects that left motor is performing releasing for a certain time, but cannot return to target position	- Wire harness or connector failure - Actuator failure - ESP control module malfunction
C220B72	Right Actuator -Release Failed-Actuator Stuck Open	EPB software detects that right motor is performing releasing for a certain time, but cannot return to target position	

■ 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.

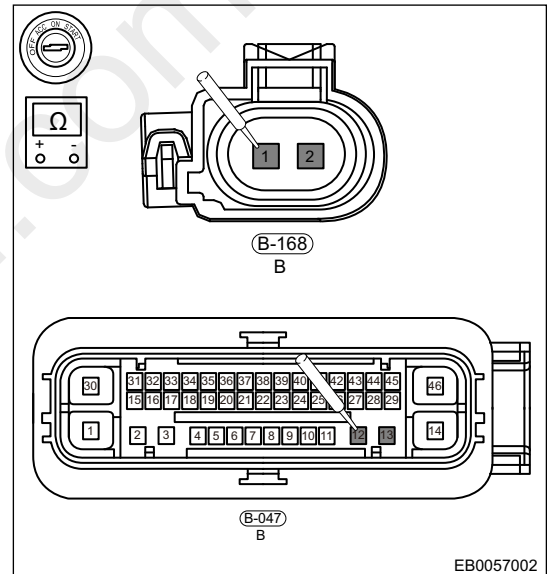
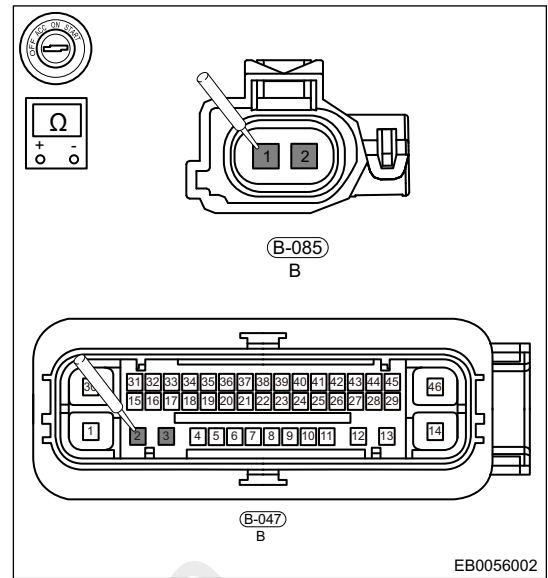
1

Check related wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



NG

Repair/replace related wire harness or connector

OK

2

Check electronic control execution unit

- Using a digital multimeter, check if resistance between electronic control execution unit (1) and (2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
Electronic control execution unit (1) - Electronic control execution unit (2)	Always	1.1 Ω -1.6 Ω

NG

Replace electronic control execution unit

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ **Actuator - No Motor Start Detected-No Operation**

DTC	C220A93	Left Actuator - No Motor Start Detected-No Operation
DTC	C220B93	Right Actuator - No Motor Start Detected-No Operation

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A93	Left Actuator - No Motor Start Detected-No Operation	When ESP related functions are detected, left actuator operation will be limited	• Wire harness or connector failure • Actuator failure • ESP control module malfunction
C220B93	Right Actuator - No Motor Start Detected-No Operation	When ESP related functions are detected, right actuator operation will be 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:

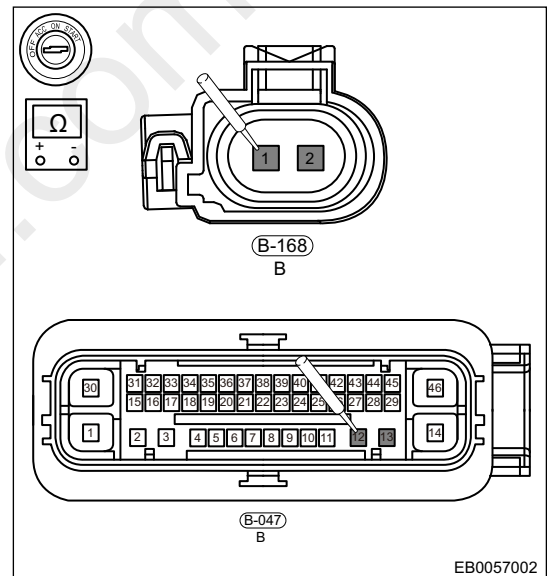
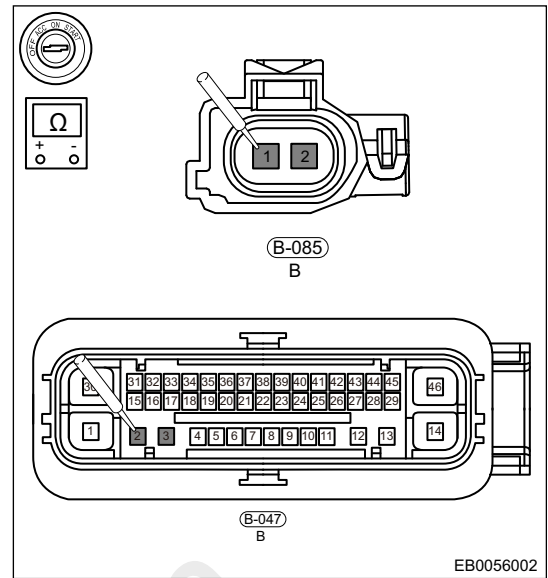
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check related wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



NG

Repair/replace related wire harness or connector

OK

2

Check electronic control execution unit

- Using a digital multimeter, check if resistance between electronic control execution unit (1) and (2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
Electronic control execution unit (1) - Electronic control execution unit (2)	Always	1.1 Ω -1.6 Ω

NG

Replace electronic control execution unit

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ **Actuator - Circuit Current Above Threshold**

DTC	C220A19	Left Actuator - Circuit Current Above Threshold
DTC	C220B19	Right Actuator - Circuit Current Above Threshold

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A19	Left Actuator - Circuit Current Above Threshold	Left actuator current is more than 300 ms when starting	• Wire harness or connector failure • Actuator failure • ESP control module malfunction
C220B19	Right Actuator - Circuit Current Above Threshold	Right actuator current is more than 300 ms when starting	

■ **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:

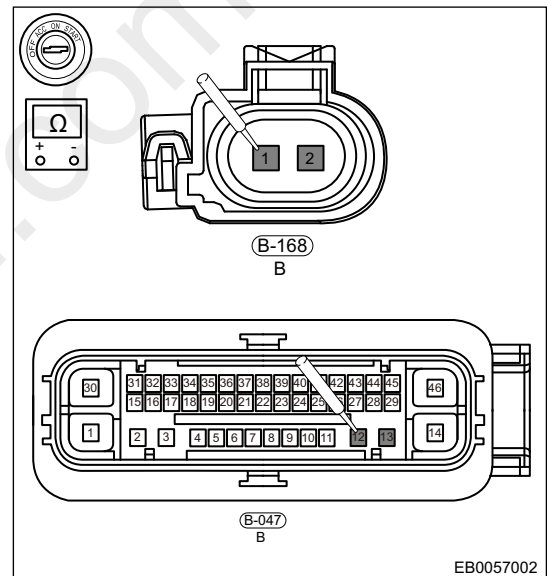
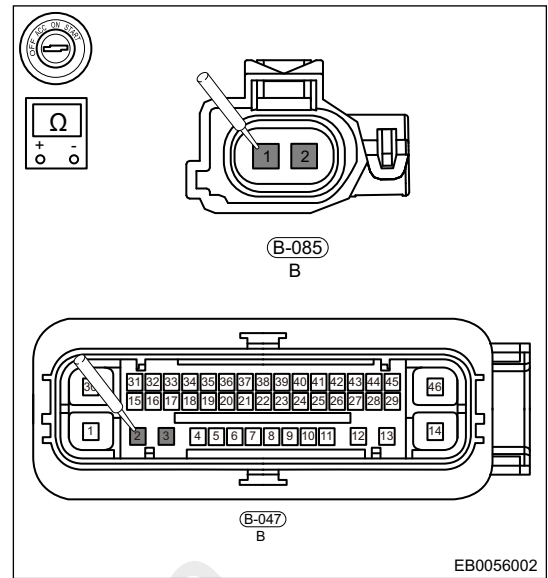
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check related wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

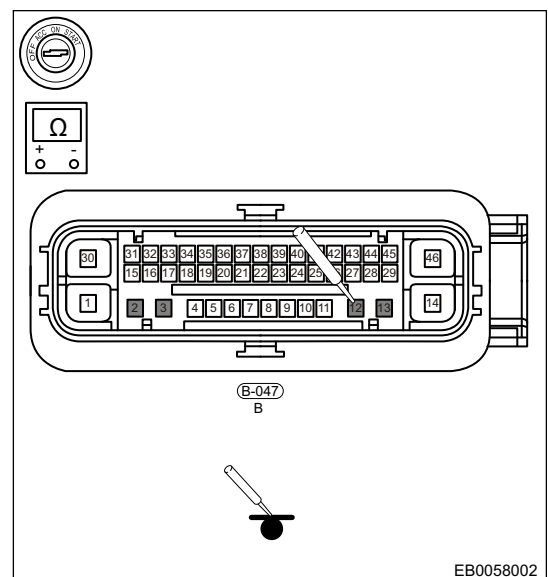
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and body ground is normal according to table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - Body ground	Always	∞
B-047 (3) - Body ground	Always	∞
B-047 (13) - Body ground	Always	∞
B-047 (12) - Body ground	Always	∞



NG

Repair/replace related wire harness or connector

OK

2 Check electronic control execution unit

(a) Using a digital multimeter, check if resistance between electronic control execution unit (1) and (2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
Electronic control execution unit (1) - Electronic control execution unit (2)	Always	1.1 Ω-1.6 Ω

NG

Replace electronic control execution unit

OK

3 Reconfirm DTCs

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to clear DTCs.

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Actuator - Circuit Current Above Threshold

DTC	C220A92	Left Actuator - High Mechanical Resistance
DTC	C220B92	Right Actuator - High Mechanical Resistance

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A92	Left Actuator - High Mechanical Resistance	Left actuator internal mechanical resistance exceeds the threshold	- Actuator failure - ESP control module malfunction
C220B92	Right Actuator - High Mechanical Resistance	Right actuator internal mechanical resistance exceeds the 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 Perform electronic control execution unit active test

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

NG

Replace electronic control execution unit

OK

2 Reconfirm DTCs

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to clear DTCs.

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ **Actuator - Wrong Operating Characteristics**

DTC	C220A91	Left Actuator - Wrong Operating Characteristics Detect
DTC	C220B91	Right Actuator - Wrong Operating Characteristics Detect

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220A91	Left Actuator - Wrong Operating Characteristics Detect	Left actuator can not return to target static force	• Wire harness or connector failure • Actuator failure • ESP control module malfunction
C220B91	Right Actuator - Wrong Operating Characteristics Detect	Right actuator can not reach target static force	

■ **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:

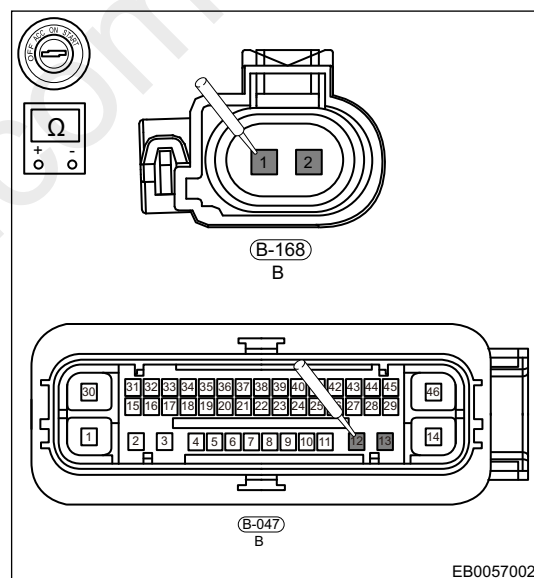
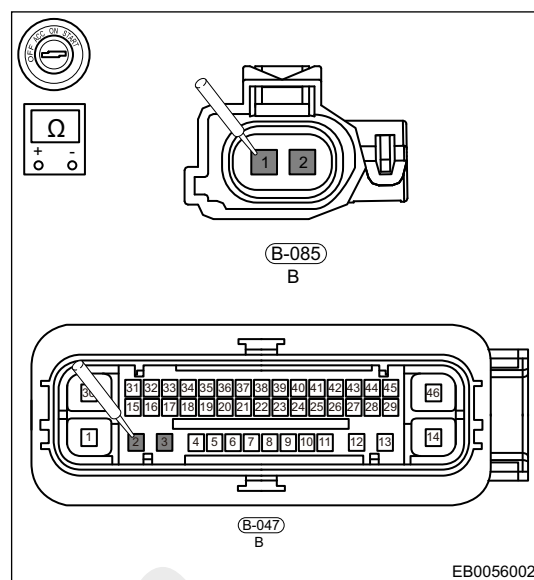
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1 Check related wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



NG

Repair/replace related wire harness or connector

OK

2

Check electronic control execution unit

- Using a digital multimeter, check if resistance between electronic control execution unit (1) and (2) is normal according to the table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
Electronic control execution unit (1) - Electronic control execution unit (2)	Always	1.1 Ω -1.6 Ω

NG

Replace electronic control execution unit

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ **Actuator Failure**

DTC	C221400	EPB Right Actuator Failure
DTC	C221801	EPB Right Actuator Electrical Failure-General Electrical Failure
DTC	C22181E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
DTC	C221500	EPB Left Actuator Failure
DTC	C221701	EPB Left Actuator Electrical Failure-General Electrical Failure
DTC	C22171E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221400	EPB Right Actuator Failure	During each locking or releasing cycle, perform mechanical clamping for MGU or EPB main shaft	- Wire harness or connector failure - EPB motor hardware failure - ABS / ESC hardware failure
C221801	EPB Right Actuator Electrical Failure-General Electrical Failure	- EPB right motor short circuit is detected - Drain electrode of one or more transistors monitors that voltage exceeds the threshold	
C22181E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	When EPB is locked or released, current measurement monitor is in active state	
C221500	EPB Left Actuator Failure	During each locking or releasing cycle, perform mechanical clamping for MGU or EPB main shaft	
C221701	EPB Left Actuator Electrical Failure-General Electrical Failure	- EPB left motor short circuit is detected - Drain electrode of one or more transistors monitors that voltage exceeds the threshold	

DTC	DTC Definition	Detection Condition	Possible Cause
C22171E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	When EPB is locked or released, current measurement monitor is in active state	

■ 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.

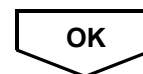
Hint:

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

1	Perform electronic control execution unit active test
---	---

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

NG	Replace electronic control execution unit
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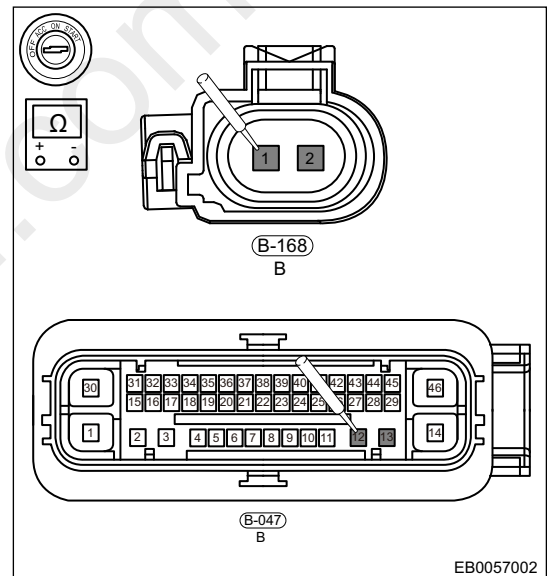
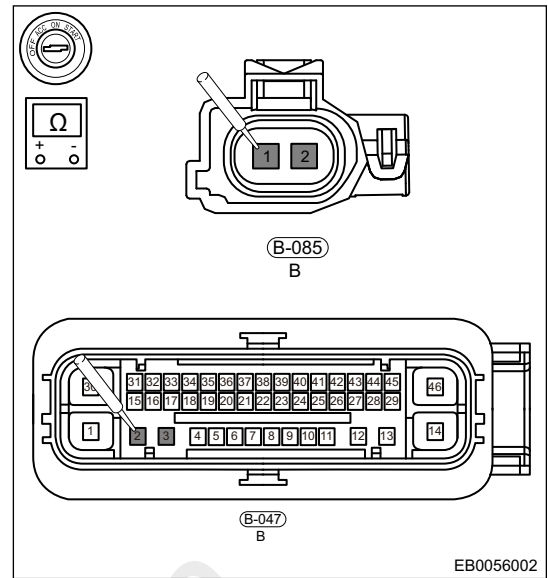


2	Check related wire harness and connector
---	--

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect electronic control execution unit connectors B-168, B-085.
- Disconnect the ESP control module assembly B-047.
- Check if related wire harnesses are worn, pinched or broken.
- Check if related connector terminals are loose, broken, bent or corrosive.
- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

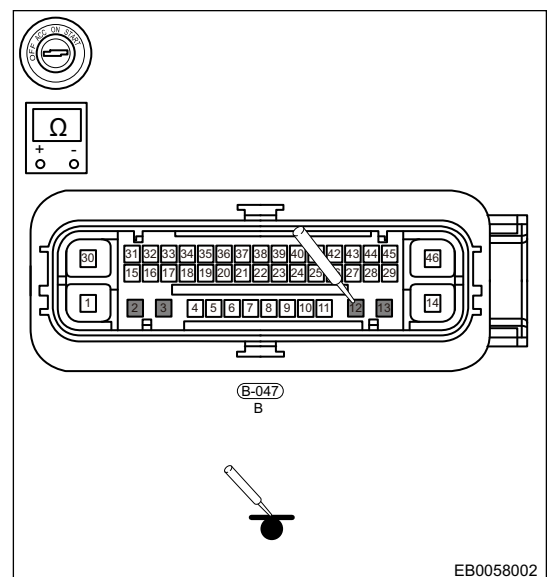
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



- Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and body ground is normal according to table below.

Standard Resistance

Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - Body ground	Always	∞
B-047 (3) - Body ground	Always	∞
B-047 (13) - Body ground	Always	∞
B-047 (12) - Body ground	Always	∞



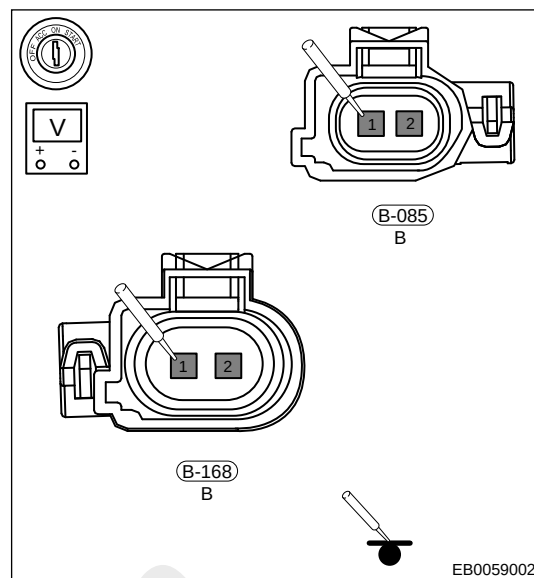
- (i) Connect the negative battery cable.
 (j) Turn ENGINE START STOP switch to ON.
 (k) Using a digital multimeter, check if voltage between electronic control execution unit connectors B-085 (1, 2), B-168 (1, 2) and body ground is normal according to the table below.

Standard Voltage

Multimeter Connection	Detection Condition	Specified Condition
B-085 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-085 (2) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (2) - Body ground	ENGINE START STOP switch ON	0 V

NG

Repair/replace related wire harness or connector



EB0059002

OK

3

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Electrical Caliper - Circuit Failure

DTC	C221211	Circuit Short To Ground of Left Rear Caliper
DTC	C221212	Circuit Short To Battery of Left Rear caliper
DTC	C221213	Circuit Open of Left Rear Caliper-Circuit Open
DTC	C221311	Circuit Short To Ground of Right Rear Caliper-Circuit Short To Ground
DTC	C221312	Circuit Short To Battery of Right Rear Caliper-Circuit Short To Battery
DTC	C221313	Circuit Open of Right Rear caliper-Circuit Open

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221211	Circuit Short To Ground of Left Rear Caliper	Left EPB motor circuit short to ground	- Wire harness or connector failure - ESP module assembly failure
C221212	Circuit Short To Battery of Left Rear caliper	Left EPB motor circuit short to power supply	

DTC	DTC Definition	Detection Condition	Possible Cause
C221213	Circuit Open of Left Rear Caliper - Circuit Open	Left EPB motor circuit open	
C221311	Circuit Short To Ground of Right Rear Caliper-Circuit Short To Ground	Right EPB motor circuit short to ground	
C221312	Circuit Short To Battery of Right Rear Caliper-Circuit Short To Battery	Right EPB motor circuit short to power supply	
C221313	Circuit Open of Right Rear caliper-Circuit Open	Right EPB motor circuit 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.

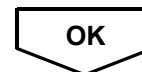
Hint:

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

1	Perform electronic control execution unit active test
---	--

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

NG	Replace electronic control execution unit
----	--

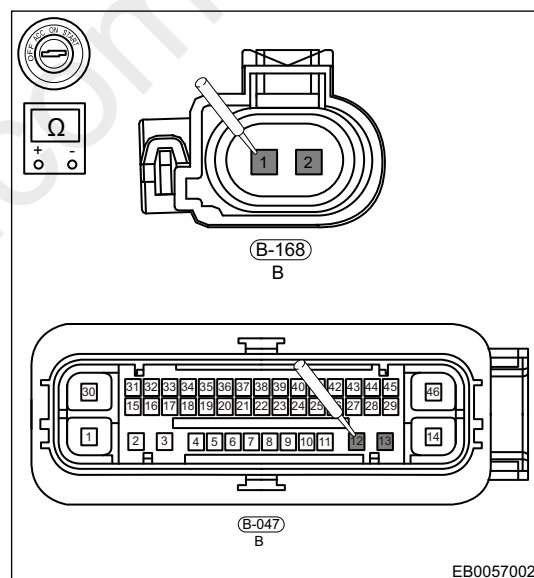
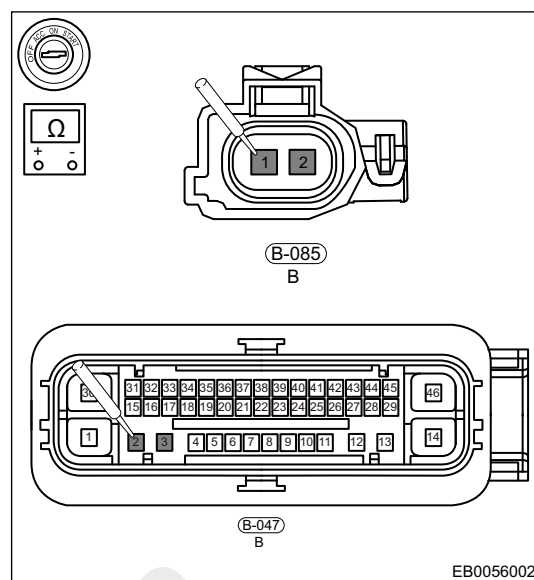


2	Check related wire harness and connector
---	---

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect electronic control execution unit connectors B-168, B-085.
- (d) Disconnect the ESP control module assembly B-047.
- (e) Check if related wire harnesses are worn, pinched or broken.
- (f) Check if related connector terminals are loose, broken, bent or corrosive.
- (g) Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and electronic control execution unit connectors B-085 (1, 2), B-085 (1, 2) is normal according to the table below.

Standard Resistance

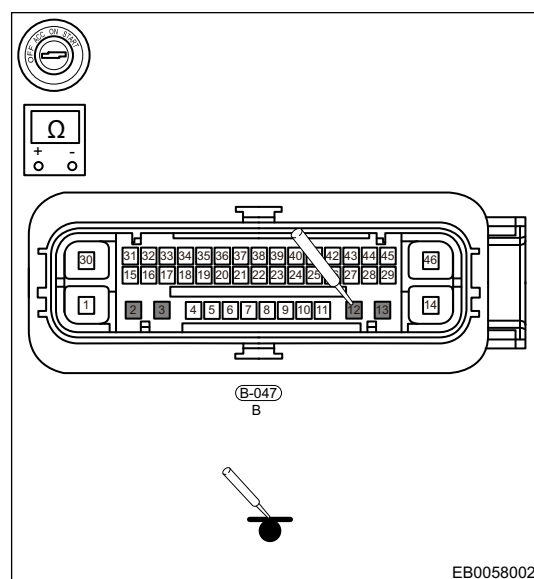
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - B-085 (1)	Always	$\leq 1 \Omega$
B-047 (3) - B-085 (2)	Always	$\leq 1 \Omega$
B-047 (13) - B-168 (1)	Always	$\leq 1 \Omega$
B-047 (12) - B-168 (2)	Always	$\leq 1 \Omega$



- (h) Using a digital multimeter, check if continuity between ESP control module assembly connector B-047 (2, 3, 12, 13) and body ground is normal according to table below.

Standard Resistance

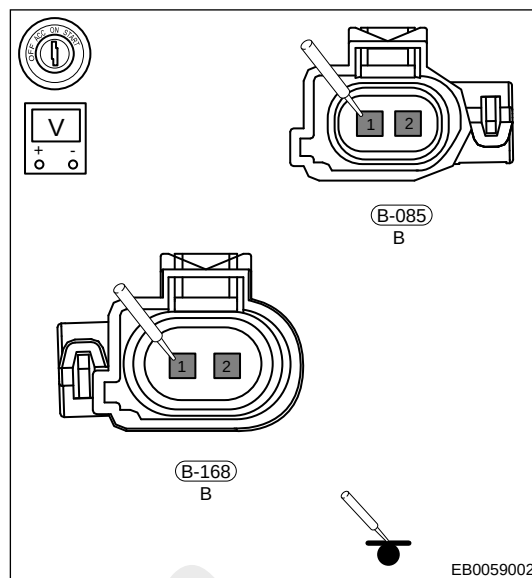
Multimeter Connection	Detection Condition	Specified Condition
B-047 (2) - Body ground	Always	∞
B-047 (3) - Body ground	Always	∞
B-047 (13) - Body ground	Always	∞
B-047 (12) - Body ground	Always	∞



- (i) Connect the negative battery cable.
- (j) Turn ENGINE START STOP switch to ON.
- (k) Using a digital multimeter, check if voltage between electronic control execution unit connectors B-085 (1, 2), B-168 (1, 2) and body ground is normal according to the table below.

Standard Voltage

Multimeter Connection	Detection Condition	Specified Condition
B-085 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-085 (2) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (1) - Body ground	ENGINE START STOP switch ON	0 V
B-168 (2) - Body ground	ENGINE START STOP switch ON	0 V



NG

Repair/replace related wire harness or connector

OK

3

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ EEPROM Failed

DTC	C220C44	PBC (Parking Brake Control) EEPROM Fault
-----	---------	--

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220C44	PBC (Parking Brake Control) EEPROM Fault	Invalid eeprom data or eeprom checksum error	- Intermittent failure - ESP module assembly failure

■ 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 Clear DTC and reset ECU

(a) Clear DTC, conduct test and confirm if it is intermittent failure.

OK

Perform intermittent failure repair

NG

2 Reconfirm DTCs

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to clear DTCs.

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Hydraulic Brake Support Failure**DTC****C220F94****Hydraulic Brake Support Failure**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220F94	Hydraulic Brake Support Failure	ESP hydraulic cannot be reached within the scheduled time	- Intermittent failure - ESP module assembly failure

■ 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 Clear DTC and reset ECU

(a) Clear DTC, conduct test and confirm if it is intermittent failure.

OK

Perform intermittent failure repair

NG

2 Check ESP hydraulic actuator

NG

Replace ESP control module assembly

OK

3 Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Software Execution Error

DTC	C221E44	SupervisionFail-Data Memory Failure
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Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221E44	SupervisionFail-Data Memory Failure	- PBC accesses prohibited zone - Check writing result when EEPROM writing process is completed. After writing, invalid unit will cause read back error	- Intermittent failure - ESP module software failure

■ 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	Clear DTC and reset ECU
---	-------------------------

- (a) Clear DTC, conduct test and confirm if it is intermittent failure.

OK

Perform intermittent failure repair

NG

2	Check for module software failure
---	-----------------------------------

NG

Replace ESP control module assembly

OK

3	Reconfirm DTCs
---	----------------

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ Software Execution Error

DTC	C222055	Configuration Variant Error	
Description			
DTC	DTC Definition	Detection Condition	Possible Cause
C222055	Configuration Variant Error	• NVM has no response • EEPROM reading failure • There is no valid configuration • VAR parameter is out of range • Incompatible configuration is not shown in the configuration table	• No configuration or configuration error • ESP module software failure

■ 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

Clear DTC and reset ECU

(a) Clear DTC, conduct test and confirm if it is intermittent failure.

OK

Perform intermittent failure repair

NG

2

Check if module configuration is normal

NG

Perform module configuration again

OK

3

Reconfirm DTCs

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

OK

Conduct test and confirm system operates normally

NG

Replace ESP control module assembly

■ ASIC Control Chip Failure

DTC	C226B00	EPBASIC_GenericError-No Sub Type Information
-----	---------	--

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C226B00	EPBASIC_GenericError-No Sub Type Information	- CRC failure is detected in OTP data - During cycle operation, CRC failure (used to disposal data) is not set - Asic detects watchdog failure - If overcurrent is detected in GPIO, the ACT_OFF_LS_A overcurrent of GPIO PIN in ASIC system will be set in the memory	Module hardware failure

■ 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	Clear DTC and reset ECU
---	-------------------------

(a) Clear DTC, conduct test and confirm if it is intermittent failure.

OK	Perform intermittent failure repair
----	-------------------------------------

NG

2	Check if module is normal.
---	----------------------------

NG	Replace ESP control module assembly
OK	Conduct test and confirm system operates normally

■ Lost Communication Failure

DTC	U010087	Lost Communication with EMS
DTC	U010187	Lost Communication with TCU
DTC	U011487	Lost Communication with AWD
DTC	U014287	Lost Communication with AVM
DTC	U015187	Lost Communication with ACM
DTC	U015587	Lost Communication with IPC

DTC	U021287	Lost Communication with SCM
DTC	U023587	Lost Communication with FRM
DTC	U040181	Invalid DLC, Alive Counter, CRC and Data Received from EMS
DTC	U040281	Invalid DLC, Alive Counter, CRC and Data Received from TCU
DTC	U041481	Invalid DLC, Alive Counter, CRC and Data Received from AWD
DTC	U042281	Invalid DLC, Alive Counter, CRC and Data Received from BCM
DTC	U042381	Invalid DLC, Alive Counter, CRC and Data Received from IPC
DTC	U042981	Invalid DLC, Alive Counter, CRC and Data Received from SCM
DTC	U043381	Invalid DLC, Alive Counter, CRC and Data Received from FRM
DTC	U043381	Invalid DLC, Alive Counter, CRC and Data Received from AVM
DTC	U045281	Invalid DLC, Alive Counter, CRC and Data Received from ACM

For communication failure, refer to CAN communication system.

■ Controller BUS OFF Failure

DTC	U000500	CAN Bus Voltage High
DTC	U000700	CAN Bus Voltage Low
DTC	U007388	P CAN Bus Off
DTC	U007488	C CAN Bus Off

Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
U000500	CAN Bus Voltage High	ENGINE START STOP switch ON	- Wire harness or connector failure - EPB control module fault
U000700	CAN Bus Voltage Low		
U007388	P CAN Bus Off		
U007488	C CAN Bus Off		

■ DTC Confirmation Procedure

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

Hint:

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

1	Check EPB control module wire harness and connector
---	---

- Turn ENGINE START STOP switch to OFF.
- Connect the negative battery cable.
- Disconnect the EPB control module connector B-047.
- Check if EPB control module wire harness is damaged, pierced, pinched or broken.
- Check EPB module connector for bending, broken terminals.
- Check EPB module pin for bending, breakage, corrosion.

NG

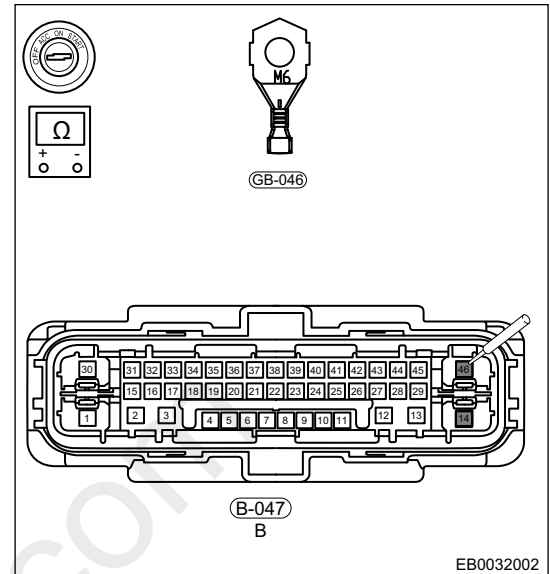
Repair or replace related wire harness and connector

OK

2 Check EPB control module ground circuit

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Using a multimeter, check for continuity between EPB control module B-047(46) and ground GB-046, B-047 (14) and ground GB-046.

Multimeter Connection	Condition	Specified Condition
B-047 (46) - GB-046	Always	$\leq 1 \Omega$
B-047 (14) - GB-046	Always	$\leq 1 \Omega$



NG

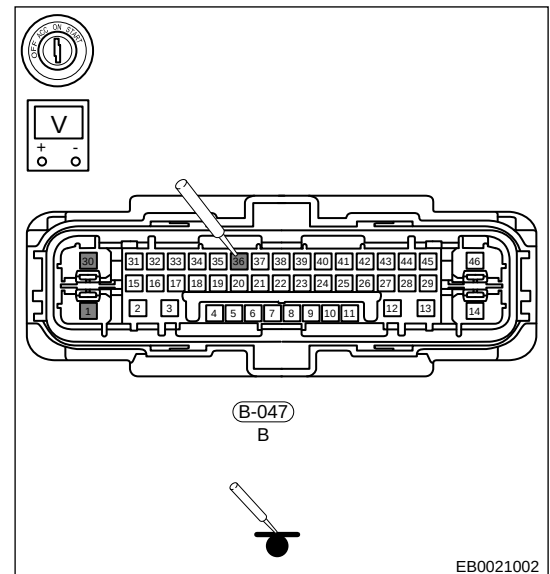
Repair or replace wire harness or connector

OK

3 Check power supply circuit of EPB control module

- (a) Turn ENGINE START STOP switch to ON.
- (b) Using a multimeter, measure power supply voltage of EPB control module.
- (c) Check for 12 V voltage in EPB control module connectors B-047 (1), (30), (36) separately.
- Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-047 (1) - Body ground	ENGINE START STOP switch ON	Not less than 12 V
B-047 (30) - Body ground	ENGINE START STOP switch ON	Not less than 12 V
B-047 (36) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG

Repair or replace related wire harness and connector

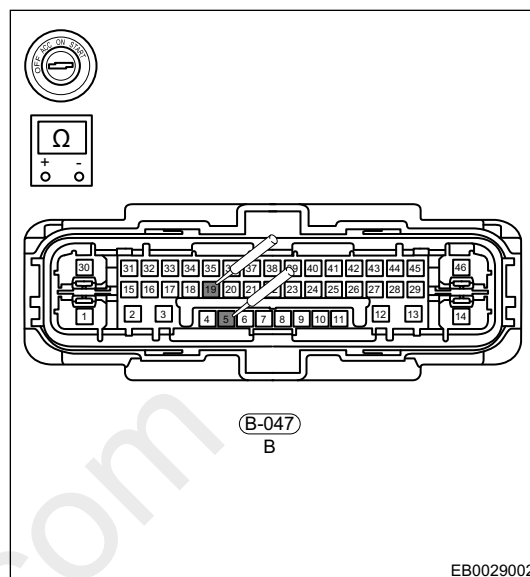
OK

4 Check CAN network

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the EPB module connector B-047.
 (d) Using a multimeter, measure if CAN resistance between EPB module connectors B-047 (5) and B-047 (19) is 60 Ω .

Standard Resistance

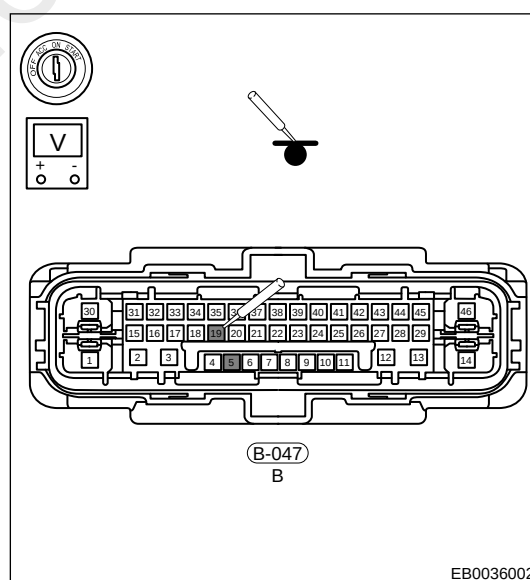
Multimeter Connection	Condition	Specified Condition
B-047 (5) - B-047 (19)	Always	Approximately 60 Ω



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

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-047 (5) - Body ground	ENGINE START STOP switch ON	Between 2.5 V and 3.5 V
B-047 (19) - Body ground	ENGINE START STOP switch ON	Between 1.5 V and 2.5 V



NG

Repair or replace CAN network wire harness

OK

5 Reconfirm DTCs

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

OK

Same DTC is not output

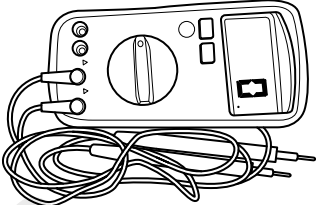
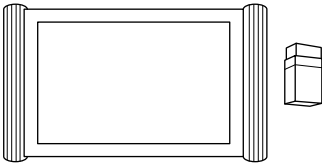
NG

Replace EPB control module assembly

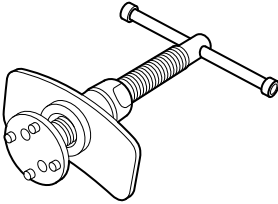
5 On-vehicle Service

5.1 Tool

■ General Tool

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

■ Special Tool

Tool Name	Part No.	Tool Drawing
Brake Cylinder Release Tool	ECH-0005	 S00076

5.2 EPB System

■ On-vehicle Inspection

⚠ Caution

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

- (1) Inspect friction material thickness of brake 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.

5.3 Integrated Caliper Motor

■ Removal

Hint:

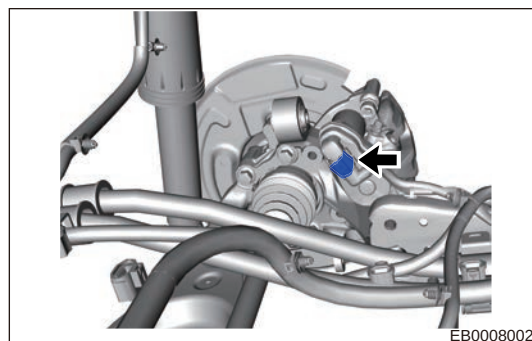
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

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

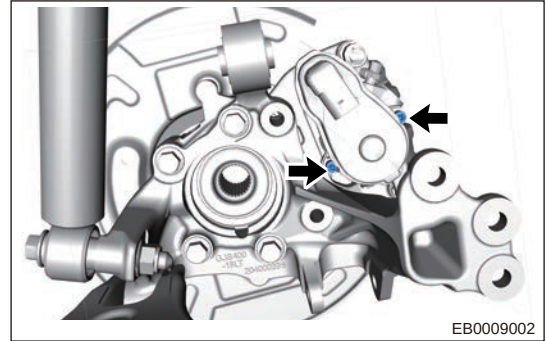
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear tires.
- (4) Remove the integrated caliper motor.

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

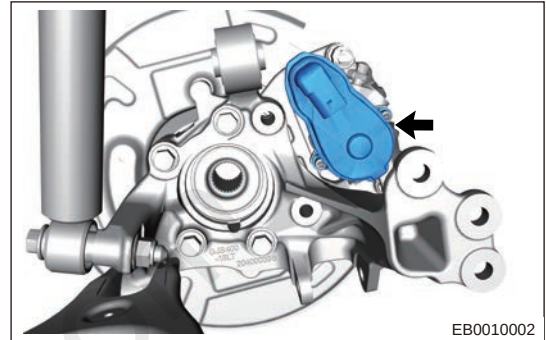


EB0008002

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



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



Caution

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

■ EPB Brake Caliper Emergency Release

Hint:

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

Caution

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

- (1) Remove the rear tires.
- (2) Remove the electronic control execution unit.
- (3) Align inner bi-hexagonal wrench M8 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) Install rear left integrated caliper motor and tighten 2 fixing bolts.

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

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

Caution

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

5.4 Rear Brake Lining

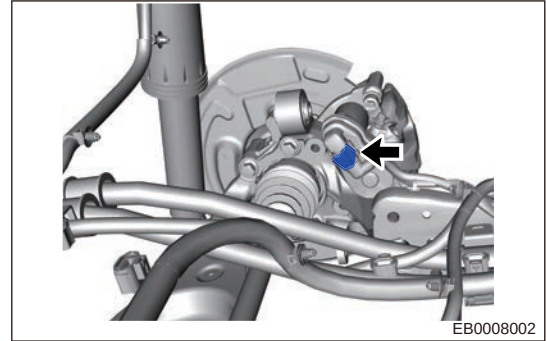
■ Removal

Caution

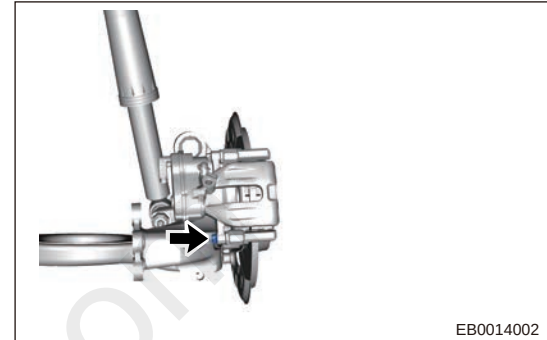
- **When worn minimum value of brake lining is 2 mm, replace 4 brake linings of left and right brake calipers.**
- **DO NOT perform "Exit Maintenance Mode" using diagnostic tester during vehicle maintenance.**
- **After removing EPB caliper set, it is strictly forbidden to depress brake pedal, otherwise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

- (1) Use diagnostic tester to enter parking brake maintenance mode.
- (2) Remove the rear wheel brake lining.

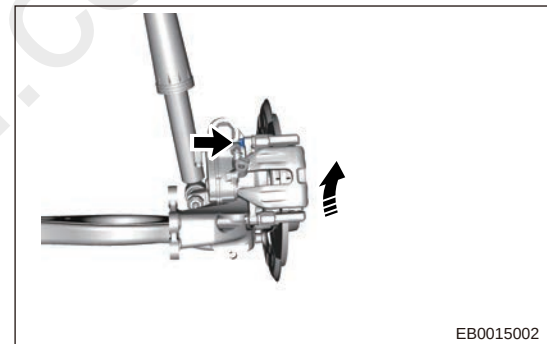
- 1) Disconnect the integrated caliper motor wire harness connector (arrow).



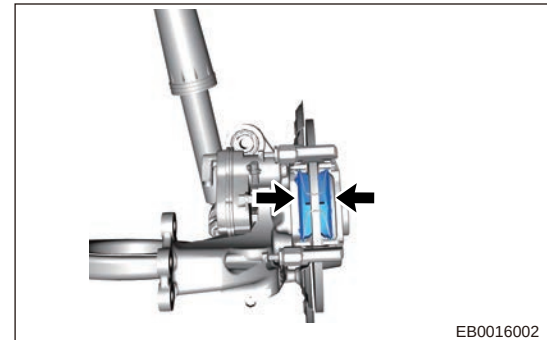
- 2) Remove the lower fixing bolt (arrow) from single guide pin.



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



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



⚠ Caution

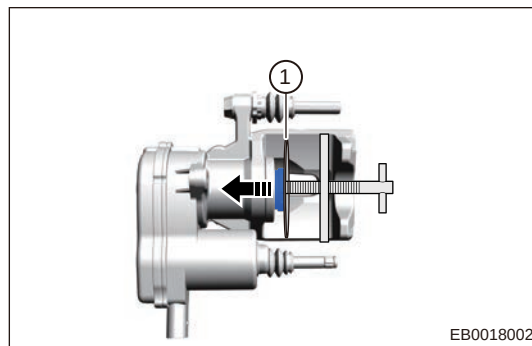
- After removing EPB caliper set, it is strictly forbidden to depress brake pedal, otherwise the piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- Move caliper equipped with spring diaphragm slowly during this process, spring may flick the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

■ Installation

⚠ Caution

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

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



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

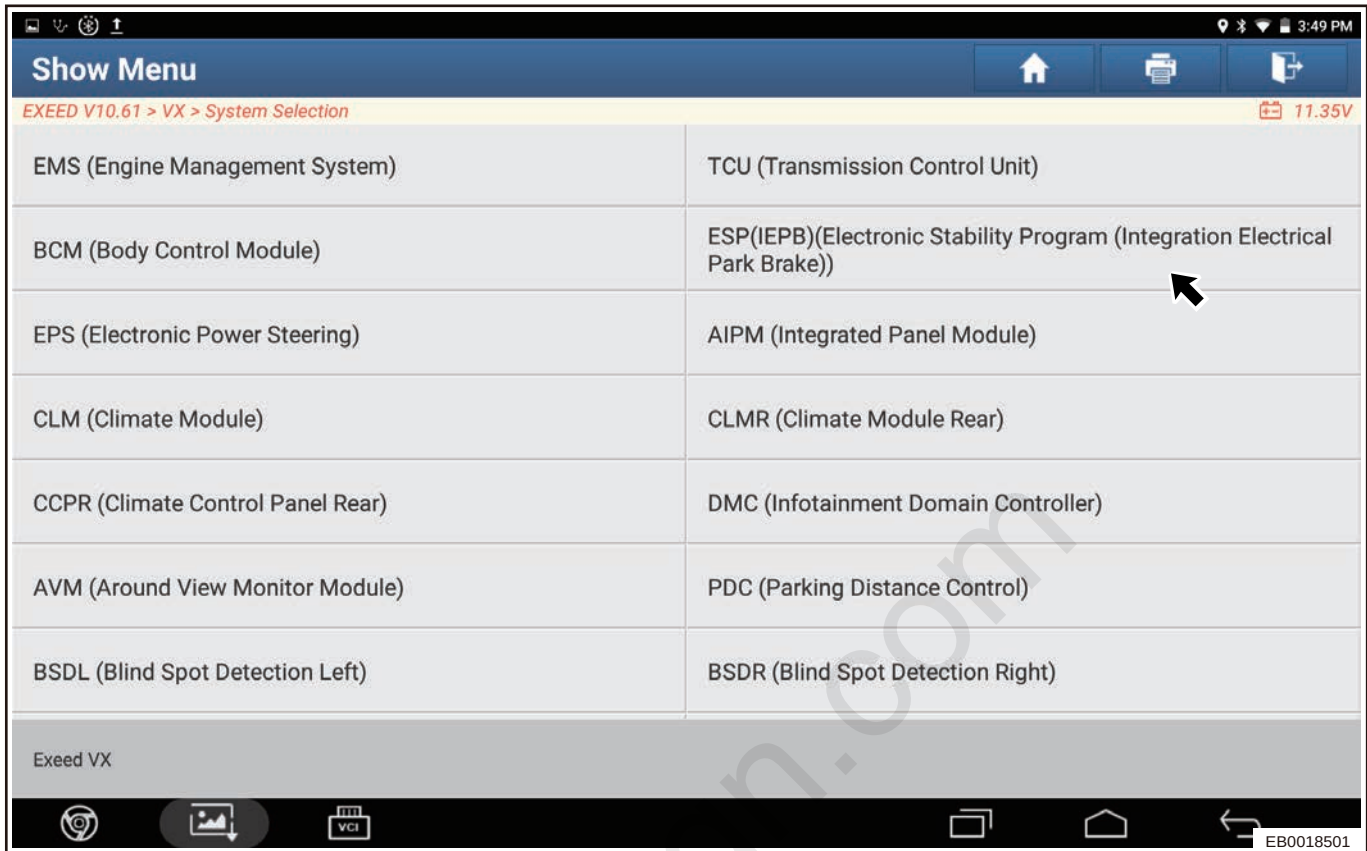
⚠ Caution

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

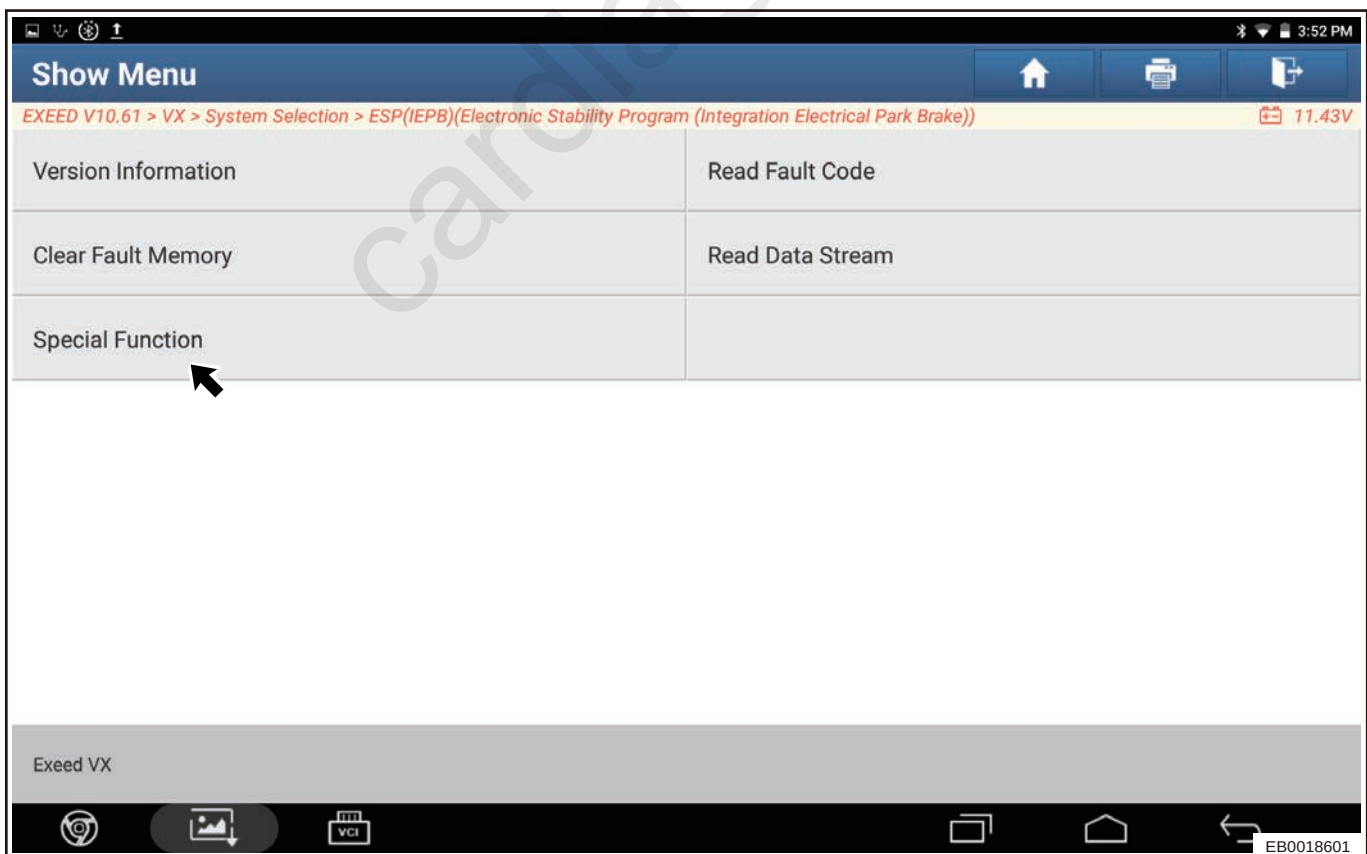
■ Test

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

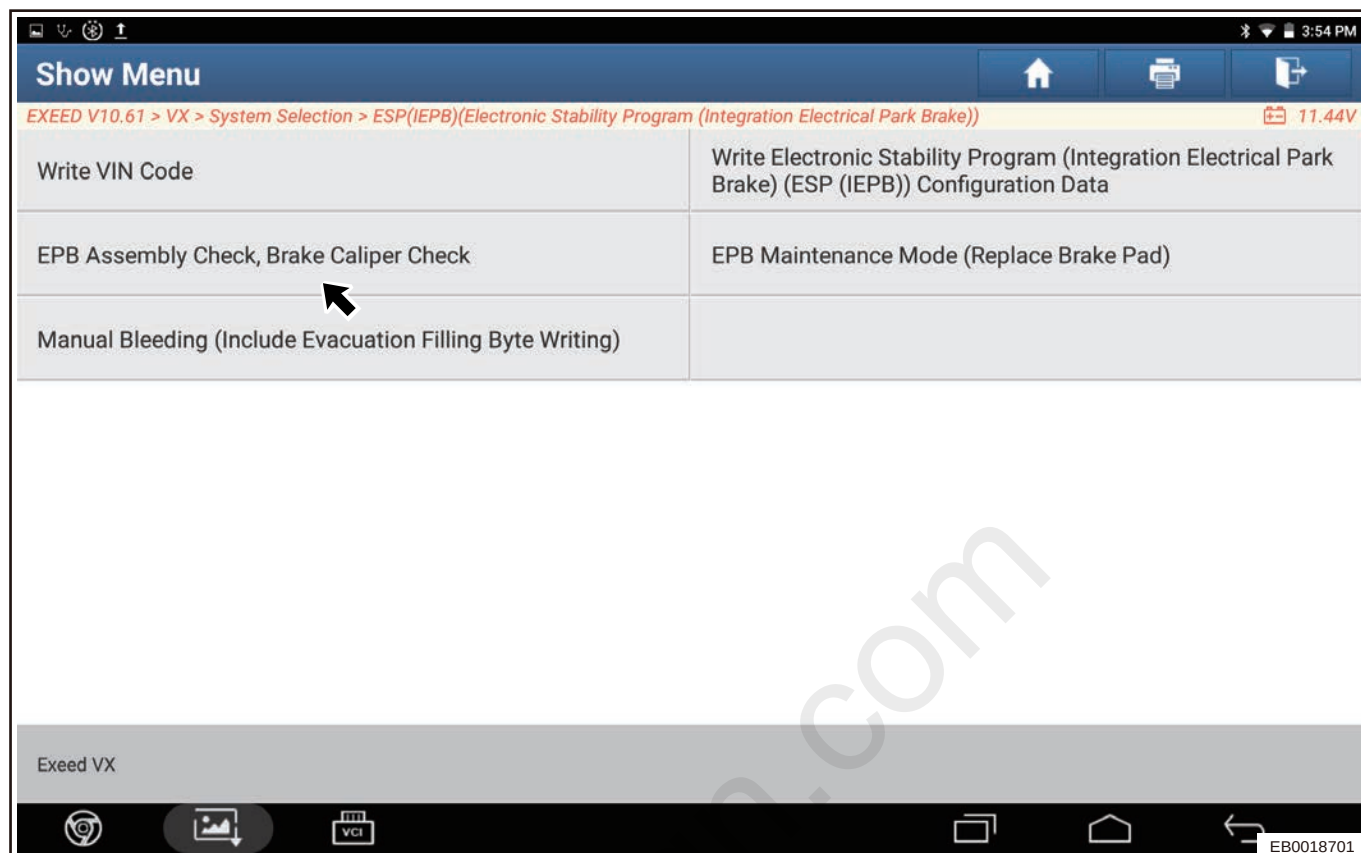
- 3) Click diagnostic tester to enter "ESP (iEPB) (Electronic Stability Control Module (Integrated Electronic Parking Brake))".



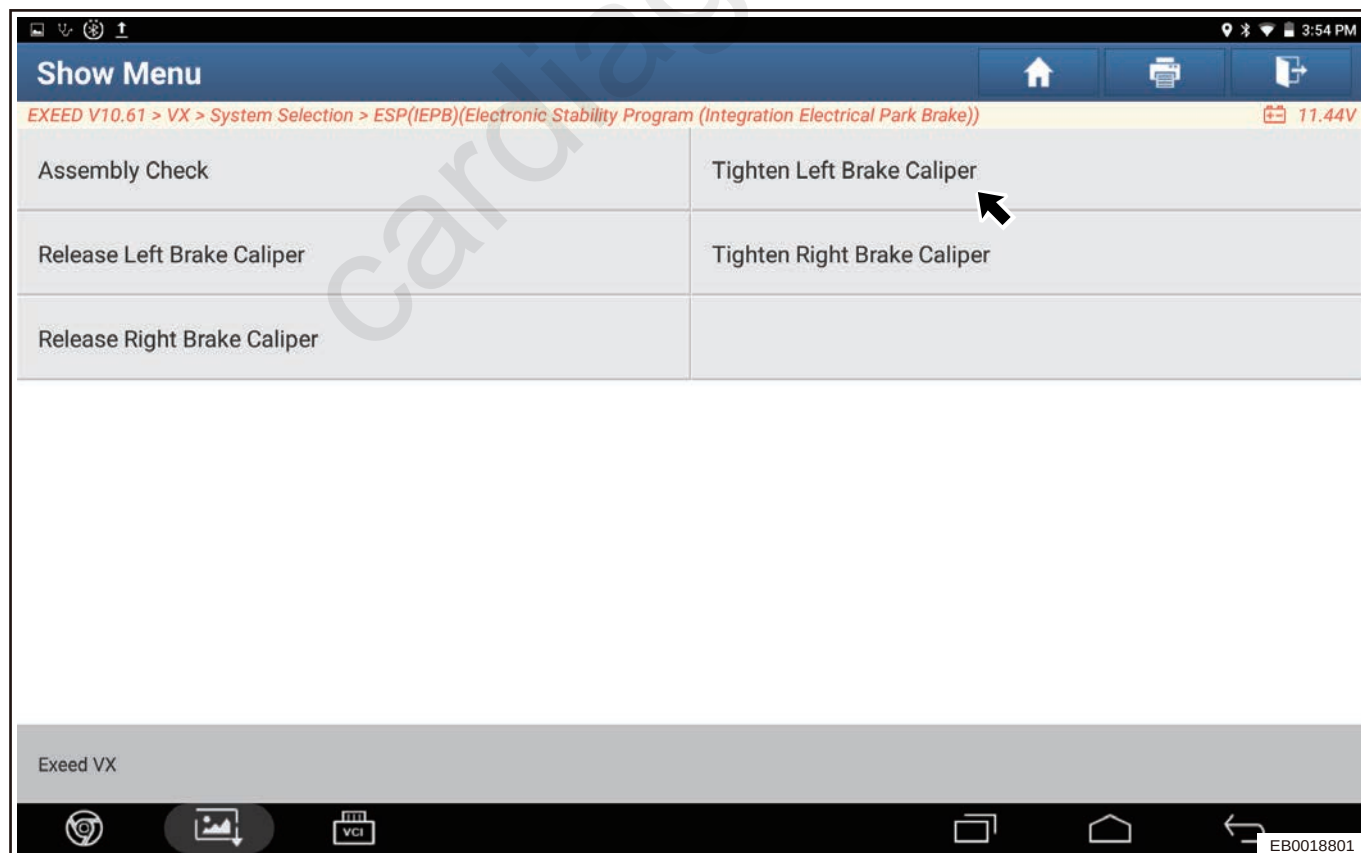
- 4) Click "Special Function" .



5) Click “EPB Assembly Inspection, Brake Caliper Inspection” .



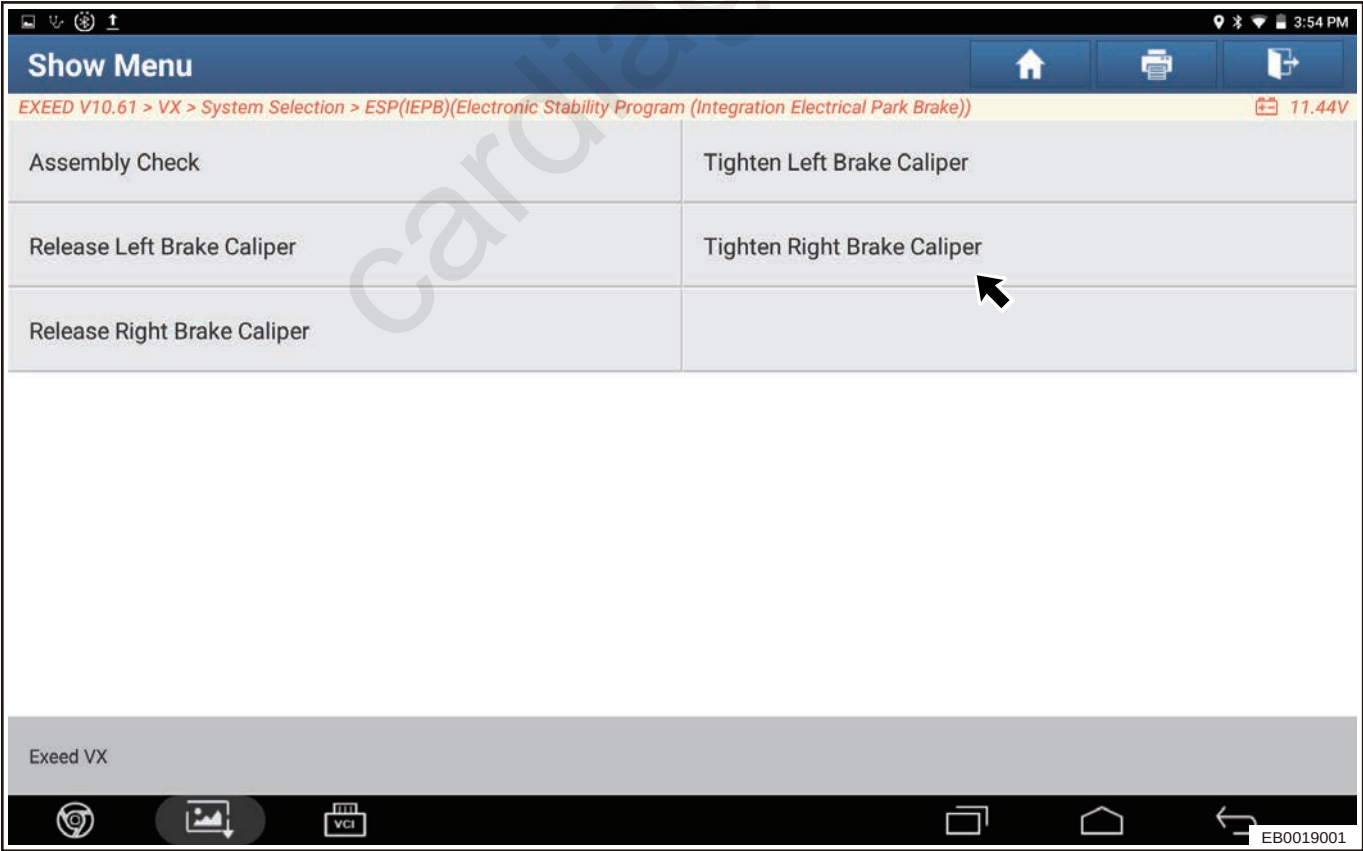
6) Click “Left Caliper Clamp” .



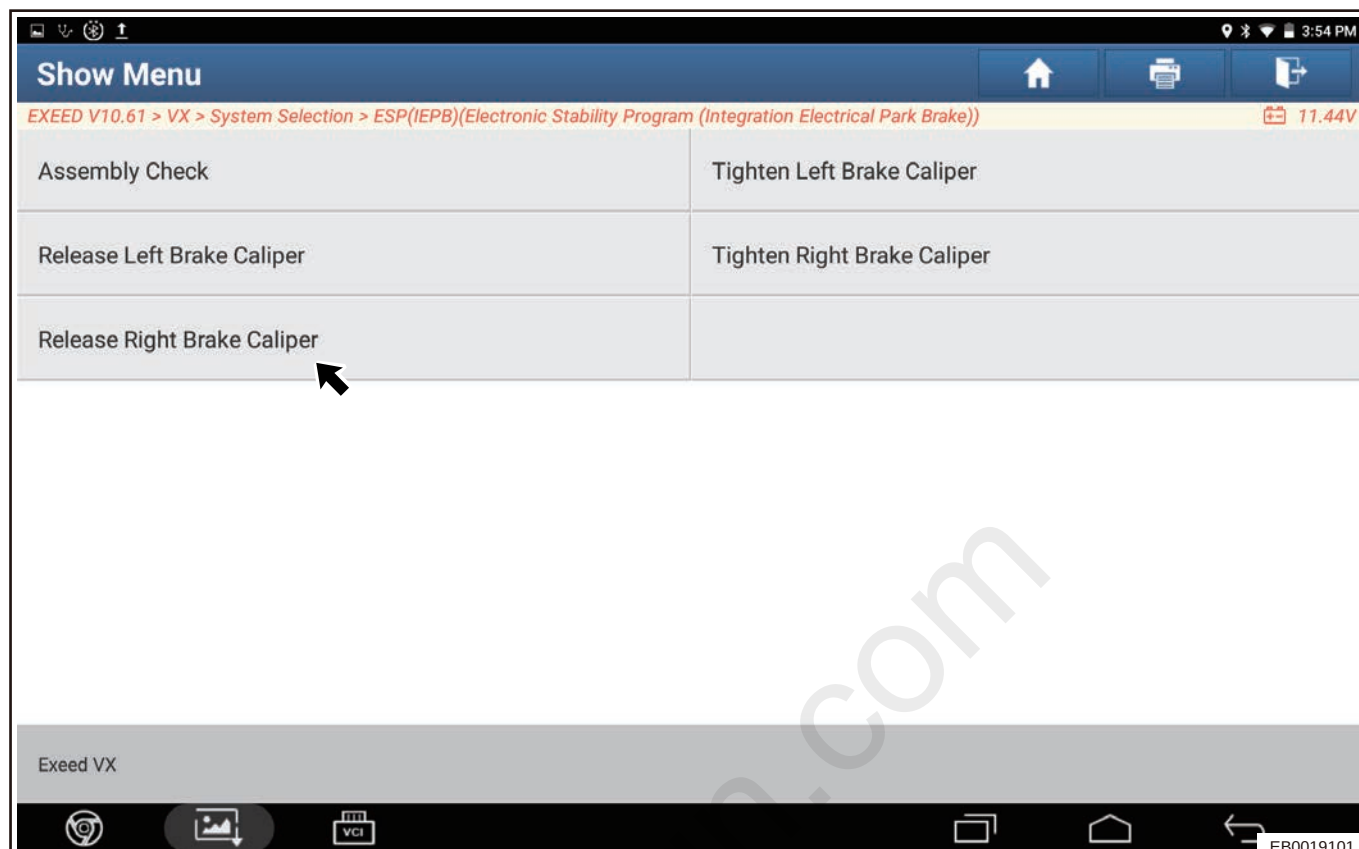
7) Click “Left Caliper Clamp Release” .



8) Click “Right Caliper Clamp” .



9) Click “Right Caliper Release” .



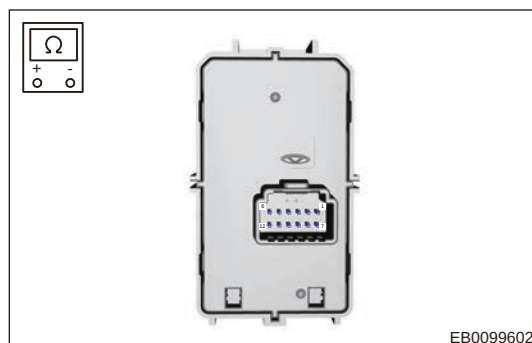
⚠ Caution

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

5.5 EPB Switch

■ Inspection

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



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

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

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

7.5 ELECTRONIC STABILITY CONTROL SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.
- When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to cut off vehicle power supply.
- ESP is a safety related component. Therefore, in addition to general safety and precautionary measures, the following diagnostic precautions must also be observed when performing maintenance and diagnosis on it:

- (1) ESP system must be repaired by professional technicians who have trained and mastered maintenance skills and only use original parts for replacement.
- (2) Before diagnosing ESP system, if basic brake system is malfunctioning, troubleshoot it first, such as:
 - 1) Brake system noise.
 - 2) Hard brake pedal.
 - 3) During normal braking, brake pedal or vehicle vibrates.
 - 4) Vehicle brake pulls.
 - 5) Parking brake system malfunction.
- (3) ESP assembly (refers to ESP electronic control unit and hydraulic regulator assembly, excluding some accessory device such as brake line, sensor, etc.) can only be replaced as a whole, and cannot be disassembled or partially replaced/exchanged. The company does not provide separate spare parts, and ESP assembly being disassembled is not covered under warranty. The company cannot accept any liability for adverse effect caused by disassembling or partially replacing/exchanging ESP hydraulic regulator.
- (4) Both the followings indicate that a malfunction is detected in ESP system:
 - 1) After ignition switch is turned to ON and system performs self-check, the warning light remains on.
 - 2) The warning light remains on during driving.

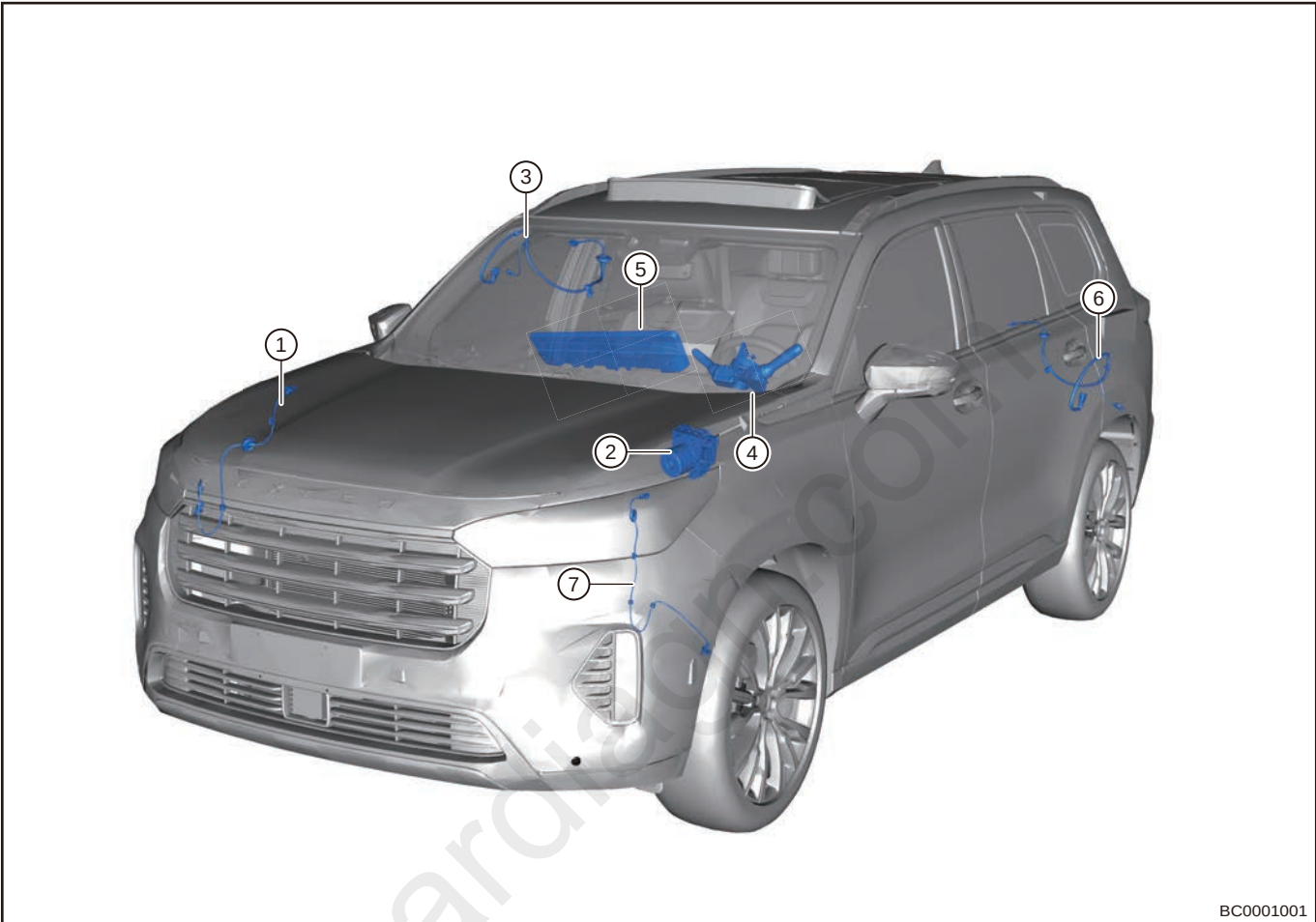
At this time, driver can perform regular brake, but the applied brake force should be reduced as much as possible to prevent wheels from being locked. After the warning light comes on, drive carefully and go to the service station for inspection and repair immediately to prevent more faults, which may lead to traffic accidents.

- (5) Pay attention to the followings when connecting ESP and sensor wire harness:
 - 1) Before unplugging ESP wire harness and sensor wire harness, the ignition switch must be turned off.
 - 2) Ensure that connector is dry and clean, and avoid any foreign matter entering.
 - 3) ESP wire harness connector must be installed in place in horizontal and vertical directions, to avoid damage to the connector.
- (6) When connecting ESP brake line, it must be connected properly. ESP ECU cannot be used to determine if brake line is connected properly. Incorrect connection may cause serious accidents. When connecting brake line, be sure to follow the markings on ESP assembly:
 - 1) MC1: Brake line 1 connected to brake master cylinder;
 - 2) MC2: Brake line 2 connected to brake master cylinder;
 - 3) FL: Brake line connected to brake wheel cylinder of front left wheel;
 - 4) FR: Brake line connected to brake wheel cylinder of front right wheel;
 - 5) RL: Brake line connected to brake wheel cylinder of rear left wheel;
 - 6) RR: Brake line connected to brake wheel cylinder of rear right wheel.
- (7) ESP generates noise in following situations:
 - 1) After engine is started, short “buzz” sound may be heard when vehicle is accelerated to more than 40km/h. This is a normal sound from ESP self-check.
 - 2) Sound may be heard when ESP is operating properly, and it is mainly reflected in the following aspects:
 - a. Operating sound from motor, solenoid valve and return pump in ESP hydraulic unit.

- b. Sound caused by brake pedal rebound.
- c. Bumping sound between suspension and vehicle body caused by sudden braking.

2 System Overview

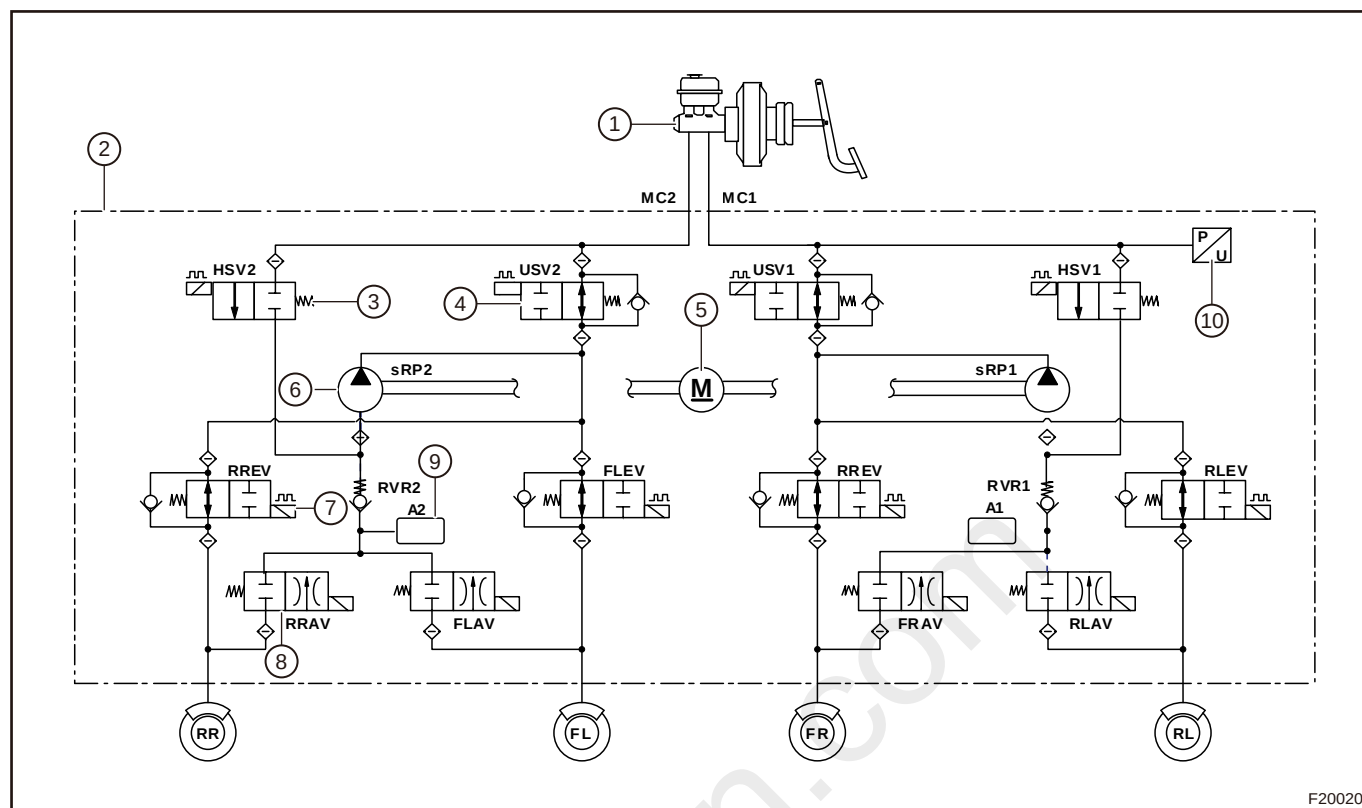
2.1 System Components Diagram



BC0001001

1	Front Right Wheel Speed Sensor	2	ESP Control Module Assembly
3	Rear Right Wheel Speed Sensor	4	Combination Switch Steering Angle Sensor
5	Instrument Cluster	6	Rear Left Wheel Speed Sensor
7	Front Left Wheel Speed Sensor		

2.2 System Schematic Diagram



1	Brake Master Cylinder Assembly	6	Return Pump (sRP)
2	ESP Control Module Assembly	7	Input Valve (EV)
3	High Pressure Valve (HSV)	8	Output Valve (AV)
4	Circuit Control Valve (USV)	9	Low Pressure Accumulator
5	Return Pump Motor	10	Pressure Sensor

Pressure regulation is achieved by ESP control 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.

■ Conventional brake operating condition

When driver does not apply enough pressure to brake pedal to lock wheels, oil pressure generated by brake master cylinder enters brake caliper assembly of each wheel through input valve (EV), producing regular braking effect. If driver reduces pressure to brake pedal, brake fluid of each wheel returns to brake master cylinder assembly, and brake pressure decreases.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Input Valve (EV)	OFF	Normally open
Output Valve (AV)	OFF	Normally closed

■ ESP operating condition (relief)

When driver applies pressure to brake pedal excessively, friction coefficient between wheels and road will decrease, and wheels will be decelerated earlier than vehicle. When wheel locking is about to occur, oil passage of input valve (EV) is cut off, and oil passage of output valve (AV) is opened to reduce wheel brake caliper assembly pressure. Brake fluid of wheel brake caliper assembly is temporarily stored in low pressure accumulator through output valve (AV).

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Input Valve (EV)	ON	Normally closed
Output Valve (AV)	ON	Normally open

■ ESP operating condition (maintaining)

When appropriate pressure is applied to wheel brake caliper assembly by relieving or boosting, pressure will be maintained. Oil passage of input valve (EV) and output valve (AV) will be cut off to maintain pressure of wheel brake caliper assembly unchanged.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Input Valve (EV)	ON	Normally closed
Output Valve (AV)	OFF	Normally closed

■ ESP operating condition (boost)

When ESP operating condition (relief) is performed, friction coefficient between wheels and road increases, it needs to increase each wheel pressure. Oil passage of input valve (EV) is opened, oil passage of output valve (AV) is cut off, brake fluid stored in low pressure accumulator becomes oil source for next boost, and enters wheel brake caliper assembly through return pump (sRP) and input valve (EV).

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Input Valve (EV)	OFF	Normally open
Output Valve (AV)	OFF	Normally closed

2.3 System Function Description

■ Electronic Stability Program System (ESP)

ESP is an active safety control system. It uses system sensor to monitor vehicle driving condition. In case of oversteering or understeering, it adopts power system and brake system intervention to help prevent tendency deviating from an ideal path, so that, it provides better driving safety.

■ Anti-lock Brake System (ABS)

ABS can prevent wheel from being locked in the event of sudden braking or braking on slippery road. When ABS detects that one or more wheels are going to lock, ESP control module will apply or release hydraulic pressure quickly.

■ Traction Control System (TCS)

When Traction Control System (TCS) detects that driven wheel speed is lower than drive wheel speed (a kind of wheel slip symptom) using system sensor, it sends a signal to adjust ignition timing, reduce throttle opening, downshift or brake wheels so that wheel no longer slips.

■ Hill Descent Control System (HDC)

When driving down steep inclines after Hill Descent Control System (HDC) is turned on, the vehicle with automatic transmission can control the speed within a range of 10 to 35 km/h; If initial speed is lower than the minimum speed, vehicle will be controlled at the minimum speed by default; Current controlling speed can be increased or decreased within the given speed range by depressing accelerator pedal or brake pedal.

With ENGINE START STOP switch in ON mode, press HDC switch to turn on hill descent control function. If vehicle speed is more than 35 km/h, hill descent control system is in standby status, and white indicator in instrument cluster comes on; If vehicle speed is no more than 35 km/h, system is activated, and green indicator in instrument cluster comes on.

With hill descent control system ON, press HDC switch to turn off hill descent control system, and green indicator/white indicator in instrument cluster goes off.

When vehicle speed is more than 60 km/h, hill descent control system turns off.

2.4 Component Operation Description

■ ESP control module assembly

During driving, combination switch assembly (steering angle sensor) monitors driver's turning direction and angle, wheel speed sensor monitors vehicle speed, pressure sensor monitors brake force, while lateral acceleration sensor and yaw rate sensor monitor vehicle's yaw and tilt speed. According to these information, ESP control module judges difference between normal and safety driving and driver's operation intention after

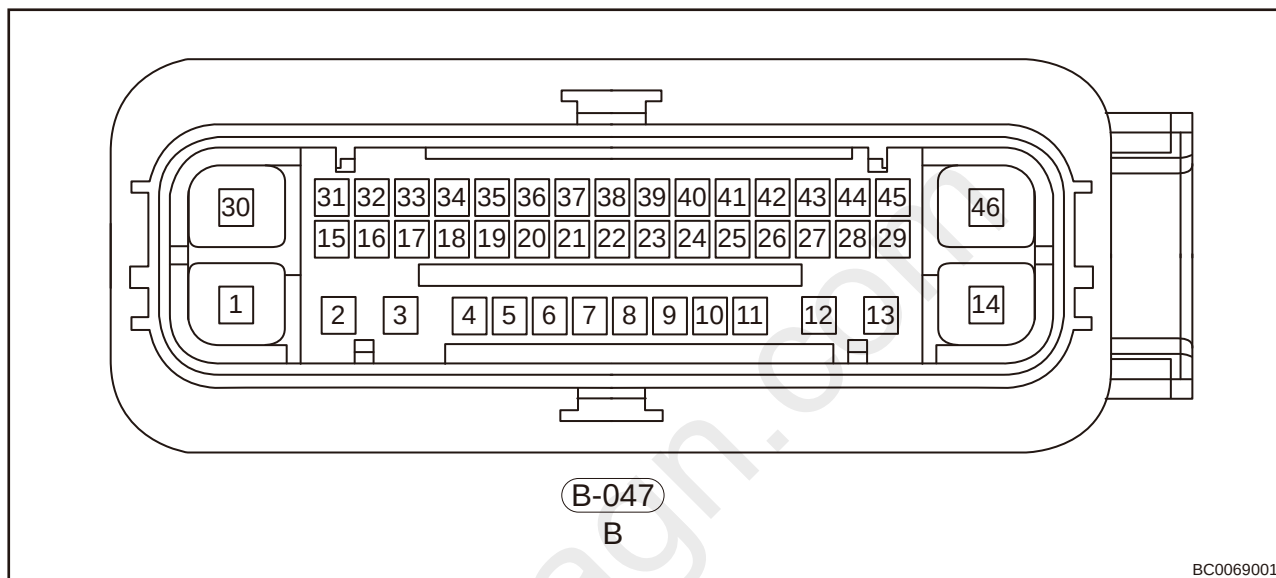
calculation, adjusts engine speed and wheel brake force. If actual movement track deviates from expected movement track, ESP control module automatically controls and applies brake to a wheel, thus correcting understeer and oversteer of vehicle, to avoid vehicle slipping, understeer, oversteer and locking, ensuring vehicle driving safety.

■ Wheel speed sensor

Wheel speed sensor is mainly used to test wheel speed. It has become an indispensable speed information reflecting equipment for modern vehicle. Vehicle's ESP, ABS and automatic transmission control system all need speed information.

3 System Circuit Diagram

3.1 Module Terminal Definition

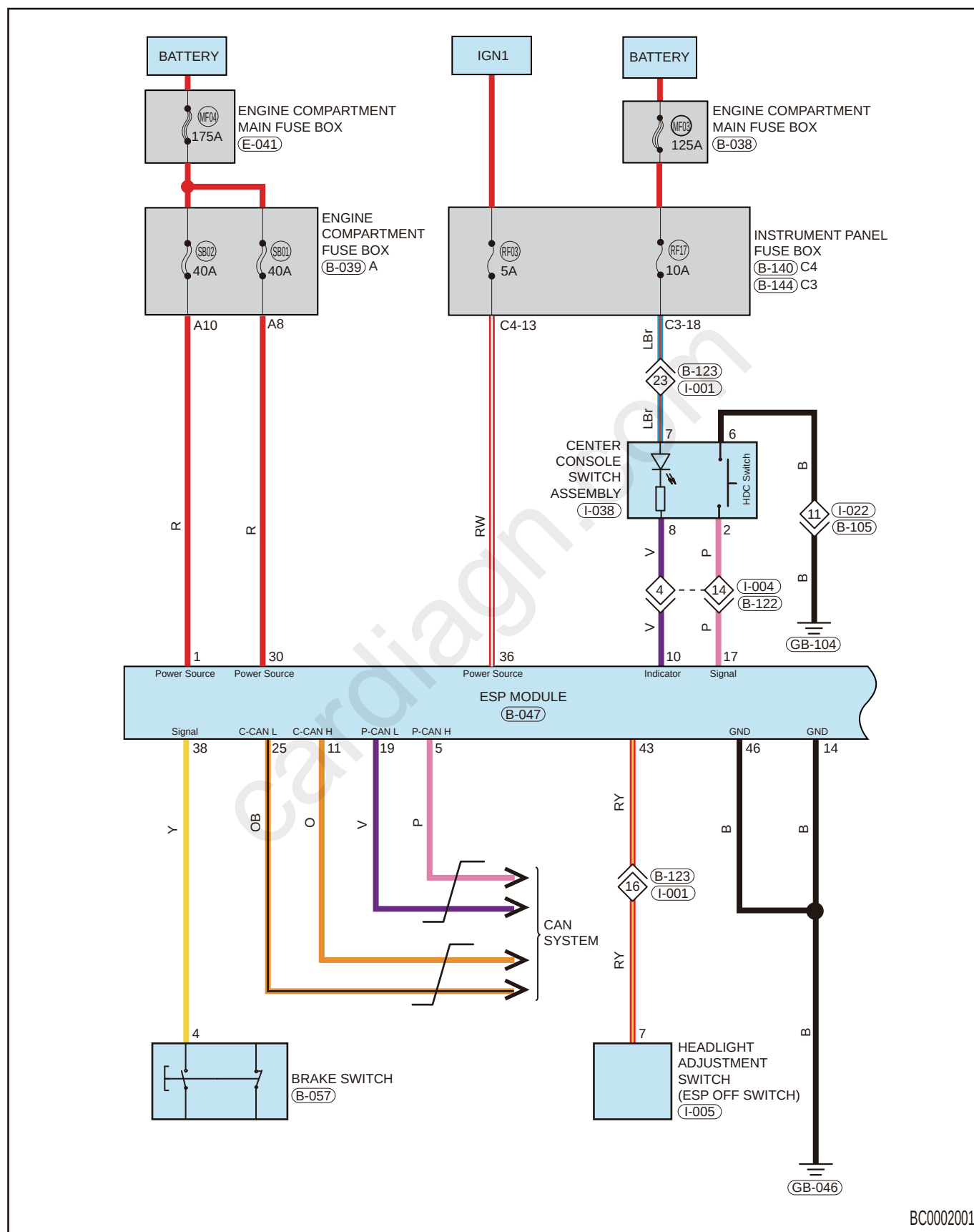


Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	KL30 Power Supply	24	Front Left Wheel Speed Sensor Power Supply
2	Right EPB Motor Power Supply	25	CAN 2 Low
3	Right EPB Motor Ground	26	Front Right Wheel Speed Sensor Signal
4	Reserved	27	Reserved
5	CAN High	28	Reserved
6	Reserved	29	Reserved
7	Front Left Wheel Speed Sensor Signal	30	KL30 Power Supply
8	AUTO HOLD Indicator	31	EPB Switch Pin 1
9	Reserved	32	EPB Switch Pin 4
10	HDC Switch Indicator	33	Reserved
11	CAN2 High	34	Reserved
12	Left EPB Motor Ground	35	Reserved
13	Left EPB Motor Power Supply	36	ING1 Power Supply
14	Ground	37	Rear Right Wheel Speed Sensor Signal

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
15	EPB Switch Pin 3	38	Brake Switch Signal
16	EPB Switch Pin 2	39	Rear Left Wheel Speed Sensor Power Supply
17	HDC Function Switch	40	Reserved
18	EPB Switch Indicator	41	AUTO HOLD Switch Signal
19	CAN Low	42	Reserved
20	Reserved	43	ESP OFF
21	Front Right Wheel Speed Sensor Power Supply	44	Reserved
22	Rear Right Wheel Speed Sensor Power Supply	45	Reserved
23	Rear Left Wheel Speed Sensor Signal	46	Ground

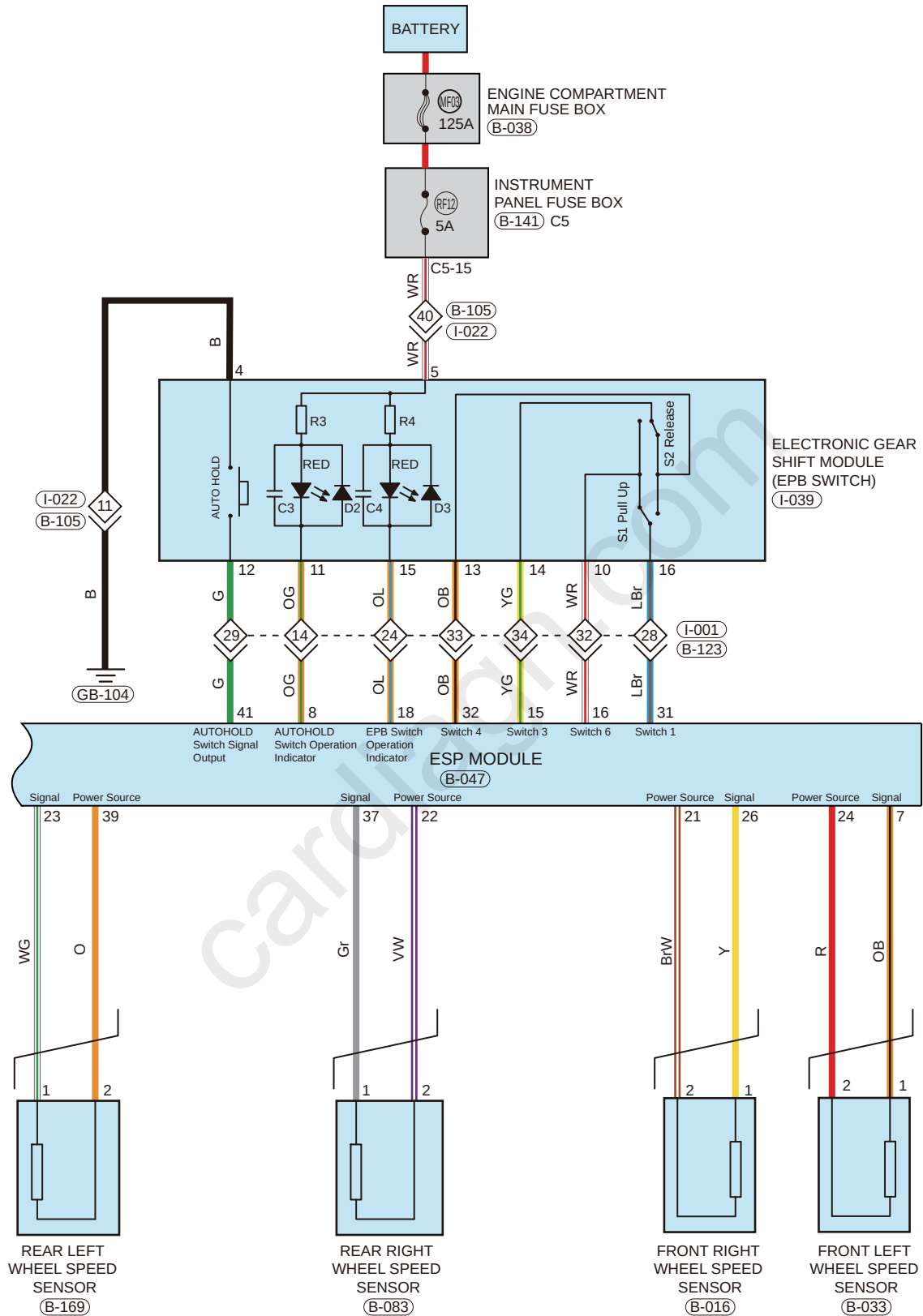
3.2 Circuit Diagram

■ Electronic stability control system 1



BC0002001

■ Electronic stability control system 2



BC0003001

4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

HINT:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence.

Repair, replace or adjust faulty components as necessary.

Brake control system:

Symptom	Possible Cause
ABS/ESP malfunction light comes on	Fuse
	Wire harness fault
	ESP control module assembly
ABS/ESP operation is abnormal	Wire harness fault
	Wheel speed sensor assembly
	ESP controller assembly
	Improper installation for hub bearing
	Brake line (blocked or leaked)
CAN network is faulty	Fuse
	Wire harness fault
	CGW controller assembly
	ESP controller assembly

4.2 Primary Inspection

Before performing diagnosis on ESP (iEPB) system, first check the easily accessible components that may cause ESP (iEPB) system fault. Visual inspection and appearance inspection procedures can quickly determine the fault, so that no further diagnosis is required.

- 1) Make sure that only the recommended size of tire and hub are installed on the vehicle. The pattern style and depth of coaxial tires must be the same.
- 2) Check ESP (iEPB) hydraulic regulator, brake line and connections for leakage.
- 3) Check the fuse of ESP (iEPB) system to make sure that the fuse is not blown and the type is correct. ESP (iEPB) system has two fuses: Pump motor fuse (40 A) and solenoid valve fuse (40 A).
- 4) Check battery voltage and check if battery post is corroded or loose. The normal operating voltage range of ESP (iEPB) system is 9 V to 16 V.
- 5) Check if grounding point of ESP (iEPB) ground wire is loose and if grounding position is changed.
- 6) ESP (iEPB) grounding wire must have good airtightness to prevent water and moisture from penetrating into the connector of ESP (iEPB) ECU through the holes in wire harness under the action of capillary (-siphon) effect, which may cause function failure. Measures: Apply sealant to the exposed end of wire harness and use heat shrinkable tube sleeve.
- 7) Perform visual inspection and appearance inspection to the following electrical components.
 - a. If wire harness and connector of ESP (iEPB) system related components are properly connected, pinched or cut.
 - b. If wire harness is routed too close to high voltage or large current devices, such as high voltage electrical components, alternator/starter, and after-sales added stereo amplifiers, etc.

Caution

- High voltage or large current devices may cause induced noise in the circuit, interfering with the normal operation of circuit.

- c. ESP (iEPB) components are sensitive to electromagnetic interference (EMI). If a intermittent malfunction is suspected, check if after-sales added anti-theft device, light or mobile phone is installed correctly.

8)ESP (iEPB) is an active safety system. Its main function makes optimal use of ground adhesion and maintains the maneuverability and driving stability of vehicle. However, ESP (iEPB) cannot prevent vehicle slippage absolutely when it exceeds physical limits or driving on slippery road at high speed.

9)If excessive noise is heard from ESP (iEPB), it may be caused by the following reasons:

- a. Connection between ESP (iEPB) assembly and ESP (iEPB) bracket becomes loose.
- b. Connection between ESP (iEPB) bracket and vehicle body becomes loose.
- c. Plastic gasket on ESP (iEPB) bracket is missing or damaged.
- d. Brake line is deformed, impacted, or interfered.
- e. Clip of brake line bracket is damaged.

4.3 DTC Confirmation Procedure

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

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.4 Intermittent DTC Troubleshooting

In electronic system, there may be instantaneous poor contact problem in electrical circuit and a point that inputs and outputs signals, resulting in intermittent problem. Sometimes, the problem will disappear by itself, so it is not easy to find the source that problem occurs. When an intermittent problem occurs, simulate the problem in the following way to check if problem occurs again.

No.	Possible Cause	Simulating Malfunction	Note
1	When vibration may be the main cause	• Gently shake ESP ECU connector up and down, left and right • Gently shake ESP wire harness up and down, left and right • Gently shake sensor up and down, left and right • Gently shake other moving parts (such as wheel bearing)	If wire harness is twisted or broken due to tight pulling, new parts must be replaced. When vehicle is moving, short open/ short circuit may occur in wheel speed sensor wire harness as the suspension system moves up and down. Therefore, a actual vehicle driving test must be carried out when checking sensor wire harness.
2	When excessive electrical load may be the main cause	Turn on all electrical switches, including headlights and wipers, so as to make the power supply of vehicle work under high load.	/

HINT:

If problem does not occur again at this time, perform diagnosis and repair only when the next time the problem occurs. Generally, intermittent problem will gradually evolve into reproducible problem, which will not disappear by itself.

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

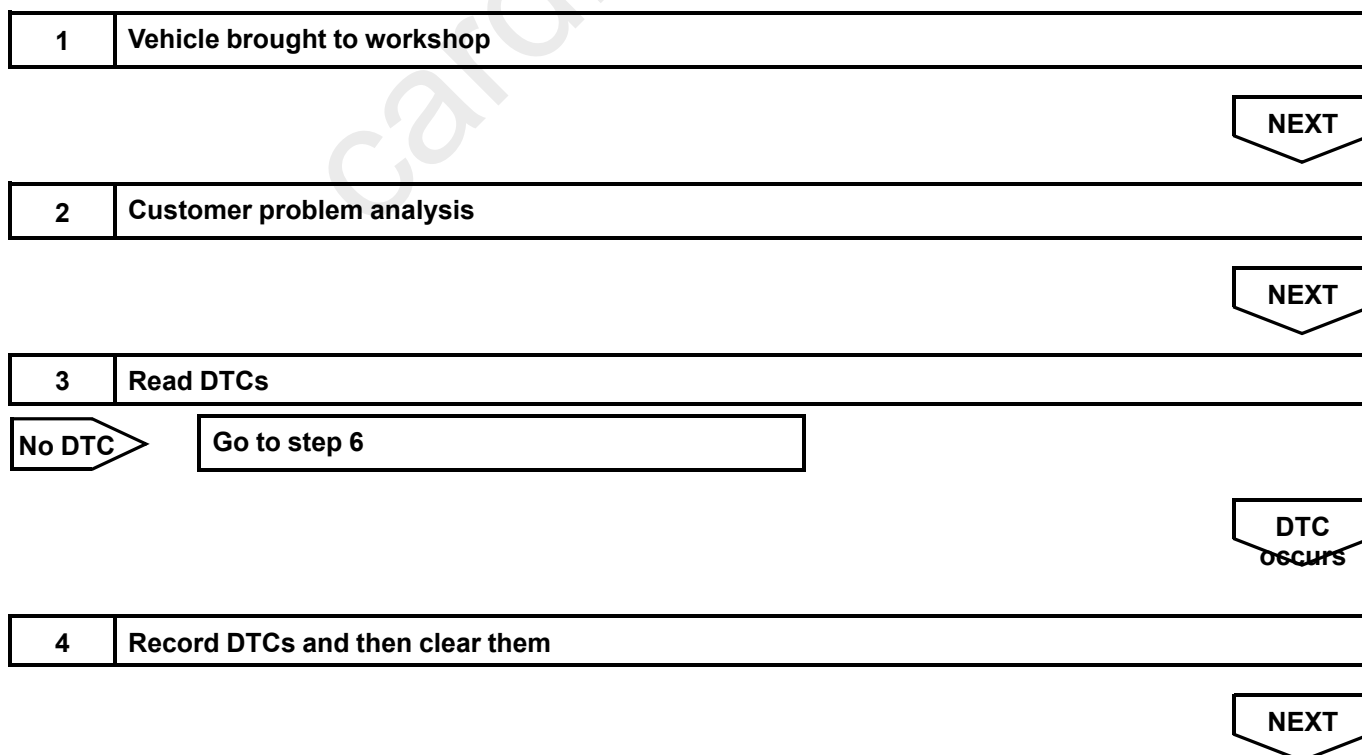
Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper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

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- 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.

4.6 Diagnosis Procedure

HINT:

Use following procedures to troubleshoot the system.



5	Confirm and duplicate malfunction: Accelerate vehicle to 40 km/h, simulate malfunction conditions and read DTCs again
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No DTC	Go to step 8
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DTC	Go to step 7
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occurs

6	Problem repair (no DTC), then go to step 9
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NEXT

7	Troubleshoot according to Diagnostic Trouble Code (DTC) chart, then go to step 9
---	--

NEXT

8	Troubleshoot according to Diagnostic Trouble Code (DTC) chart, then go to step 9
---	--

NEXT

9	Confirm malfunction has been repaired, and perform repair completion inspection
---	---

NEXT

10	Prevent malfunction from recurring
----	------------------------------------

NEXT

11	Conduct test and confirm malfunction has been repaired
----	--

NEXT

End

■ Problem repair (no DTC)

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

- Brake fluid leakage (it may result in weak braking, brake pedal over-travel or even ineffective braking).
- Using inferior brake fluid (it can result in corrosion of brake line and ESP hydraulic regulating module internal elements, or even ineffective braking).
- Air in brake line (it may result in weak braking or even ineffective braking).
- Brake line blockage (it may result in hard braking, braking deviation or even ineffective braking).
- Excessive wear of brake disc (it may result in weak braking, brake pedal over-travel).
- Brake booster malfunction (it may result in weak or hard braking, brake pedal over-travel or even ineffective braking).
- Incorrect brake line connection (it may result in ABS/ESP performance decreasing, drift, long braking distance etc. For the correct installation method, please refer to the marks near oil hole on ESP hydraulic regulating module: MC1 represents No. 1 master cylinder oil pipe; MC2 represents No. 2 master cylinder

oil pipe; FL represents front left wheel cylinder oil pipe; FR represents front right wheel cylinder oil pipe; RL represents rear left wheel cylinder oil pipe; RR represents rear right wheel cylinder oil pipe).

⚠ Caution

- **No power supply to ESP or abnormally interrupted power supply will cause brake warning light, ABS warning light and ESP multi-functional warning light remaining on without storing any DTC.**

Hint:

Troubleshooting recommendation: Check corresponding components according to problem symptom, and troubleshoot by following the vehicle repair manual.

4.7 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0001-04	Valve Fault-USV1 (- Pilot Valve 1)	1. Current through valve coil is more than 4 - 6.5 A. 2. Measured valve resistance is out of range. 3. Leaked current through the valve is more than 0.1 A. 4. Valve is overheated. 5. General problem occurs in valve driver/hardware.	1. Valve is overheated. 2. General problem occurs in valve driver/hardware.	Wait for 120 seconds, and perform the following operations: a. Turn the ignition switch to ON and then to OFF; b. Clear DTC service. C. Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds. If DTC still exists, please replace ABS/ESP (-iEPB) hardware.
C0002-04	Valve Fault-USV2 (- Pilot Valve 2)			
C0003-04	Valve Fault-HSV1 (- High Pressure Valve 1)	1. Current through valve coil is more than 5 - 8 A. 2. Measured valve resistance is out of range. 3. Leaked current through the valve is more than 0.1 A. 4. Valve is overheated. 5. General problem occurs in valve driver/hardware.		
C0004-04	Valve Fault-HSV2 (- High Pressure Valve 2)			
C0010-04	Valve Fault-Front Left Inlet Valve	1. Current through valve coil is more than 4 - 6.5 A. 2. Measured valve resistance is out of range. 3. Leaked current through the valve is more than 0.1 A. 4. Valve is overheated. 5. General problem occurs in valve driver/hardware.		
C0011-04	Front Valve-Front Left Outlet Valve			
C0014-04	Valve Fault-Front Right Inlet Valve			
C0015-04	Valve Fault-Front Right Outlet Valve			
C0018-04	Valve Fault-Rear Left Inlet Valve			
C0019-04	Front Valve-Rear Left Outlet Valve			
C001C-04	Valve Fault-Rear Right Inlet Valve			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C001D-04	Valve Fault-Rear Right Outlet Valve			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C002001	Return Pump Power Supply Motor Relay Fault	1. Power supply voltage of motor relay connector is lower than the specified threshold; 2. Fuse of motor relay power supply circuit is damaged.	1. Intermittent fault; 2. Internal module fault.	1. Check power supply circuit of return pump motor. 2. Perform the following operations: a. Turn the ignition switch to ON; b. Clear DTCs; c. Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.
C002004	Return Pump Fault	1. Motor relay fault is detected; 2. Open or short occurs in the complete UMGGen measurement path; 3. Open, short or defective component exists in the follow current path; 4. Motor relay overload is detected; 5. Motor is disconnected.	Pump motor hardware fault	1. Turn the ignition switch to ON and then to OFF; 2. Clear DTC. 3. Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds. If DTC still exists, please replace ABS/ESP (iEPB) hardware.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0031-00	Wheel-speed Sensor, Front Left-General Fault	- If sensor power supply circuit voltage or ECU power supply circuit voltage when ECU starts is lower than the specified threshold (8.3V), the problem will be set - Sensor is connected incorrectly or installed in the wrong direction - The problem occurs when the sensor is shorted to another sensor	- Wheel speed sensor failure - Sensor is connected incorrectly or installed in the wrong direction - The sensor is shorted to another sensor	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0031-09	Front Left Wheel Speed Sensor Component Fault	- If incorrect type of sensor is installed according to the sensor protocol, the problem will be set. - Lack of stop pulse.	- Wheel speed sensor fault - Sensor is connected incorrectly or installed in the wrong direction	- Check for incorrect clearance between rotating wheel and sensor. - Check if incorrect type of wheel speed sensor is installed. - If DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0031-11	Front Left Wheel Speed Sensor Power Supply Circuit Short to Ground	Short to GND or open in sensor circuit (sensor or power supply circuit)	Circuit fault	1. Check sensor circuit or power supply circuit; 2. If DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0031-12	Front Left Wheel Speed Sensor Signal Circuit Short to Power Supply	Short to UBATT in signal/power supply circuit		
C0031-13	Front Left Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open	1. Signal circuit is shorted to GND or circuit is open.		
C0031-29	Front Left Wheel Speed Sensor Signal Failure (Out of Range, Lost, Interfered or Discontinuous)	1. Unreasonable high frequency is received. 2. It is suspected that the wheel speed sensor is faulty. 3. Use the normal filtration time to monitor the interference and	1. Wheel speed sensor is faulty. 2. Interference and signal interference occurs. 3. Circuit is faulty. 4. It is not fixed firmly. 5. Fall off from bracket. 6. Teeth is worn or	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		signal interference of one or two wheels, and monitor three or more wheels in a short filtration time. 4. Circuit is open. 5. Short to UZ in circuit. 6. Short to GND in circuit. 7. Connector is in poor contact. 8. It is not fixed firmly. 9. Fall off from bracket. 10. Teeth is worn or missing. 11. Input amplifier in ECU is faulty.	missing. 7. Input amplifier in ECU is faulty.	DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0031-37	Front Left Wheel Speed Sensor Signal Out of Range	1. If the maximum wheel speed is reached. 2. If wheel speed is higher than the specified threshold, the problem will be set. 3. If incorrect type of sensor is installed. 4. WSS signal is subject to electrical or mechanical interference. 5. WSS sensor is defective.		1. Check and eliminate any electrical or mechanical interference to the sensor. 2. Make sure to use the correct type of sensor. 3. Check if wheel speed sensor is installed at the correct position. 4. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds.
C003208	Front Left Wheel Speed Sensor: Wrong Direction	1. At least one wheel speed sensor is installed in the wrong direction. 2. At least one incorrect wheel speed sensor is installed. 3. At least one wheel speed sensor is connected incorrectly.	1. Wheel speed sensor is installed incorrectly. 2. Wheel speed sensor is not correct.	1. Make sure to use the correct type of WSS. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON, clear DTC, perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0034-00	Wheel-speed Sensor, Front Right-General Fault	- If sensor power supply circuit voltage or ECU power supply circuit voltage when ECU starts is lower than the specified threshold (8.3V), the problem will be set - Sensor is connected incorrectly or installed in the wrong direction - The problem occurs when the sensor is shorted to another sensor	- Wheel speed sensor failure - Sensor is connected incorrectly or installed in the wrong direction - The sensor is shorted to another sensor	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0034-09	Front Right Wheel Speed Sensor Component Fault	- If incorrect type of sensor is installed according to the sensor protocol, the problem will be set. - Lack of stop pulse.	- Wheel speed sensor fault - Sensor is connected incorrectly or installed in the wrong direction	- Check for incorrect clearance between rotating wheel and sensor. - Check if incorrect type of wheel speed sensor is installed. - If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C0034-11	Front Right Wheel Speed Sensor Power Supply Circuit Short to Ground	Short to GND or open in sensor circuit (sensor or power supply circuit)	Circuit fault	1. Check sensor circuit or power supply circuit; 2. If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C0034-12	Front Right Wheel Speed Sensor Signal Circuit Short to Power Supply	Short to UBATT in signal/power supply circuit		
C0034-13	Front Right Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open	Signal circuit is shorted to GND or circuit is open		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0034-29	Front Right Wheel Speed Sensor: Signal Failure (Out of Range, Lost, Interfered or Discontinuous)	1. Unreasonable high frequency is received. 2. It is suspected that the wheel speed sensor is faulty. 3. Use the normal filtration time to monitor the interference and signal interference of one or two wheels, and monitor three or more wheels in a short filtration time. 4. Circuit is open. 5. Short to UZ in circuit. 6. Short to GND in circuit. 7. Connector is in poor contact. 8. It is not fixed firmly. 9. Fall off from bracket. 10. Teeth is worn or missing. 11. Input amplifier in ECU is faulty.	1. Wheel speed sensor is faulty. 2. Interference and signal interference occurs. 3. Circuit is faulty. 4. It is not fixed firmly. 5. Fall off from bracket. 6. Teeth is worn or missing. 7. Input amplifier in ECU is faulty.	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0034-37	Front Right Wheel Speed Sensor Signal Out of Range	1. If the maximum wheel speed is reached. 2. If wheel speed is higher than the specified threshold, the problem will be set. 3. If incorrect type of sensor is installed. 4. WSS signal is subject to electrical or mechanical interference. 5. WSS sensor is defective.		1. Check and eliminate any electrical or mechanical interference to the sensor. 2. Make sure to use the correct type of sensor. 3. Check if wheel speed sensor is installed at the correct position. 4. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds.
C003508	Front Right Wheel Speed Sensor: Wrong Direction	1. At least one wheel speed sensor is installed in the wrong direction. 2. At least one incorrect wheel speed sensor is installed. 3. At least one wheel speed sensor is connected incorrectly.	1. Wheel speed sensor is installed incorrectly. 2. Wheel speed sensor is not correct.	1. Make sure to use the correct type of WSS. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON, clear DTCs, perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0037-00	Wheel-speed Sensor, Rear Left-General Fault	- If sensor power supply circuit voltage or ECU power supply circuit voltage when ECU starts is lower than the specified threshold (8.3V), the problem will be set - Sensor is connected incorrectly or installed in the wrong direction - The problem occurs when the sensor is shorted to another sensor	- Wheel speed sensor failure - Sensor is connected incorrectly or installed in the wrong direction - The sensor is shorted to another sensor	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0037-09	Rear Left Wheel Speed Sensor Component Fault	- If incorrect type of sensor is installed according to the sensor protocol, the problem will be set - Lack of stop pulse	- Wheel speed sensor fault - Sensor is connected incorrectly or installed in the wrong direction	1. Check for incorrect clearance between rotating wheel and sensor. 2. Check if incorrect type of wheel speed sensor is installed. 3. If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C0037-11	Rear Left Wheel Speed Sensor Power Supply Circuit Short to Ground	Short to GND or open in sensor circuit (sensor or power supply circuit)	Circuit fault	1. Check sensor circuit or power supply circuit; 2. If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C0037-12	Rear Left Wheel Speed Sensor Signal Circuit Short to Power Supply	Short to UBATT in signal/power supply circuit		
C0037-13	Rear Left Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open	Signal circuit is shorted to GND or circuit is open		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0037-29	Rear Left Wheel Speed Sensor: Signal Failure (Out of Range, Lost, Interfered or Discontinuous)	1. Unreasonable high frequency is received. 2. It is suspected that the wheel speed sensor is faulty. 3. Use the normal filtration time to monitor the interference and signal interference of one or two wheels, and monitor three or more wheels in a short filtration time. 4. Circuit is open. 5. Short to UZ in circuit. 6. Short to GND in circuit. 7. Connector is in poor contact. 8. It is not fixed firmly. 9. Fall off from bracket. 10. Teeth is worn or missing. 11. Input amplifier in ECU is faulty.	1. Wheel speed sensor is faulty. 2. Interference and signal interference occurs. 3. Circuit is faulty. 4. It is not fixed firmly. 5. Fall off from bracket. 6. Teeth is worn or missing. 7. Input amplifier in ECU is faulty.	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C0037-37	Rear Left Wheel Speed Sensor Wheel Speed Signal Out of Range	1. If the maximum wheel speed is reached. 2. If wheel speed is higher than the specified threshold, the problem will be set. 3. If incorrect type of sensor is installed. 4. WSS signal is subject to electrical or mechanical interference. 5. WSS sensor is defective.		1. Check and eliminate any electrical or mechanical interference to the sensor. 2. Make sure to use the correct type of sensor. 3. Check if wheel speed sensor is installed at the correct position. 4. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds.
C003808	Rear Left Wheel Speed Sensor: Wrong Direction	1. At least one wheel speed sensor is installed in the wrong direction. 2. At least one incorrect wheel speed sensor is installed. 3. At least one wheel speed sensor is connected incorrectly.	1. Wheel speed sensor is installed incorrectly. 2. Wheel speed sensor is not correct.	1. Make sure to use the correct type of WSS. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON, clear DTCs, perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C003A-00	Wheel-speed Sensor, Rear Right-General Fault	- If sensor power supply circuit voltage or ECU power supply circuit voltage when ECU starts is lower than the specified threshold, the problem will be set to less than 8.3 V - Sensor is connected incorrectly or installed in the wrong direction - The problem occurs when the sensor is shorted to another sensor	- Wheel speed sensor failure - Sensor is connected incorrectly or installed in the wrong direction - The sensor is shorted to another sensor	1. Make sure to use the correct type of sensor. 2. Check if wheel speed sensor is installed at the correct position. 3. Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/problem is not resolved, please replace wheel speed sensor.
C003A-09	Rear Right Wheel Speed Sensor Component Fault	- If incorrect type of sensor is installed according to the sensor protocol, the problem will be set - Lack of stop pulse	- Wheel speed sensor fault - Sensor is connected incorrectly or installed in the wrong direction	1. Check for incorrect clearance between rotating wheel and sensor. 2. Check if incorrect type of wheel speed sensor is installed. 3. If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C003A-11	Rear Right Wheel Speed Sensor Power Supply Circuit Short to Ground	Short to GND or open in sensor circuit (sensor or power supply circuit)	Circuit fault	1. Check sensor circuit or power supply circuit; 2. If DTC still exists/ problem is not resolved, please replace wheel speed sensor.
C003A-12	Rear Right Wheel Speed Sensor Signal Circuit Short to Power Supply	Short to UBATT in signal/power supply circuit		
C003A-13	Rear Right Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open	Signal circuit is shorted to GND or circuit is open		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C003A-29	Rear Right Wheel Speed Sensor: Signal Failure (Out of Range, Lost, Interfered or Discontinuous)	1. Unreasonable high frequency is received. 2. It is suspected that the wheel speed sensor is faulty. 3. Use the normal filtration time to monitor the interference and signal interference of one or two wheels, and monitor three or more wheels in a short filtration time. 4. Circuit is open. 5. Short to UZ in circuit. 6. Short to GND in circuit. 7. Connector is in poor contact. 8. It is not fixed firmly. 9. Fall off from bracket. 10. Teeth is worn or missing. 11. Input amplifier in ECU is faulty.	• Wheel speed sensor is faulty. • Interference and signal interference occurs. • Circuit is faulty. • It is not fixed firmly.	• Make sure to use the correct type of sensor • Check if wheel speed sensor is installed at the correct position • Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds, if DTC still exists/ problem is not resolved, please replace wheel speed sensor
C003A-37	Rear Right Wheel Speed Sensor Wheel Speed Signal Out of Range	1. If the maximum wheel speed is reached. 2. If wheel speed is higher than the specified threshold, the problem will be set. 3. If incorrect type of sensor is installed. 4. WSS signal is subject to electrical or mechanical interference. 5. WSS sensor is defective.	• Fall off from bracket. • Teeth is worn or missing. • Input amplifier in ECU is faulty.	• Check and eliminate any electrical or mechanical interference to the sensor • Make sure to use the correct type of sensor • Check if wheel speed sensor is installed at the correct position • Turn the ignition switch to ON and then to OFF, clear DTC, wait for 10 seconds, and then drive at 50 kph for 30 seconds

C003B08	Rear Right Wheel Speed Sensor: Wrong Direction	1. At least one wheel speed sensor is installed in the wrong direction. 2. At least one incorrect wheel speed sensor is installed. 3. At least one wheel speed sensor is connected incorrectly.	- Wheel speed sensor is installed incorrectly - Wheel speed sensor is not correct	- Make sure to use the correct type of WSS - Check if wheel speed sensor is installed at the correct position - Turn the ignition switch to ON, clear DTCs, perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C004064	Brake Switch Malfunction: Unreliable	1. There is a mechanical defect in BLS. 2. BLS is adjusted incorrectly. 3. BLS is installed incorrectly.	Brake switch is faulty.	Replace BLS switch properly. Perform the following operations: 1. Turn the ignition switch to ON and then to OFF. 2. Clear DTC. 3. Perform ECU reset service.
C004401	Pressure Sensor Fault (Circuit)	1. Open or short to ground in pressure signal circuit or open in sensor power supply; 2. Short to sensor ground or open in pressure signal circuit.	Sensor circuit fault	1. Check for ground to sensor signal circuit. 2. Otherwise, sensor signal circuit is disconnected/ open.
C004428	Pressure Sensor Fault (Signal)	1. Pressure sensor of brake master cylinder has mechanical or electrical defects. 2. Contact resistance in pressure sensor circuit. 3. Open in test pulse signal circuit.	- Intermittent fault - Internal module fault	1. Drive vehicle for a period of time and apply brake for more than 5 seconds during this period. 2. Replace the ABS/ ESP (iEPB) hardware.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0051-29	Steering Wheel Position Sensor Signal Invalid	Steering wheel angle sensor signal invalid (ESP only)	- Angle sensor is not calibrated - Angle sensor circuit is short or open - Angle sensor is damaged	- Calibrate the angle sensor. - Check for short or open in angle sensor circuit. - Replace the angle sensor.
C0051-54	Steering Angle Sensor Calibration Failure	Steering wheel angle sensor uncalibrated (ESP only)	Angle sensor is not calibrated	Recalibrate the angle sensor.
C0051-64	Steering Angle Sensor Fault (Signal)	1. Yaw rate is more than 10 (deg/s * m/s). 2. After the effective long-term compensation, if offset exceeds the limit, problem will be set immediately. 3. SAS scope is monitored. 4. SAS slope is monitored. 5. Perform comparison between SAS authenticity and yaw rate. 6. When vehicle speed is higher than 20 m/s, compare the measured yaw rate with the model yaw rate calculated based on steering angle. 7. Compare the measured yaw rate calculated based on steering angle with the yaw rate calculated based on wheel speed sensors of two axles. It is determined as a fault.	1. Yaw rate sensor is installed incorrectly. 2. Yaw rate sensor is faulty. 3. Yaw rate sensor is not calibrated.	1. Check the installation of SAS sensor. 2. Check if steering mechanism is installed incorrectly. 3. Check if SAS sensor is faulty. 4. Ensure that steering angle sensor calibration is successfully completed and drive vehicle smoothly at a speed of 60 kph for 30 seconds in left and right curves. After troubleshooting, clear DTCs immediately.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0061-29	Lateral Acceleration Sensor: Invalid Value	1. If the absolute value of lateral acceleration is greater than 20 m/s². 2. The lateral acceleration sensor signal and yaw rate signal or SAS signal are unreasonable.	1. Inertial sensor is not installed correctly or not aligned. 2. Inertial sensor is not calibrated.	1. Check if inertial sensor is installed incorrectly or not aligned. 2. Check the inertial sensor calibration.
C0061-64	Lateral Acceleration Sensor: Signal Error			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0062-29	Longitudinal Acceleration Sensor: Invalid Value	1. Compare longitudinal acceleration with acceleration value calculated based on the vehicle speed, and sensor value exceeds the limit of 20 m/s ² . 2. Uncertainty fault occurs in longitudinal acceleration sensor.		
C0062-64	Longitudinal Acceleration Sensor: Signal Error			
C0063-29	Yaw Rate Sensor: Invalid Value	1. If Yrs deviation exceeds 5.25 deg/s. 2. When vehicle is stationary, the absolute value of yaw rate sensor signal exceeds 30 deg/s. 3. The absolute value of yaw rate sensor (YRS) signal is more than 180 94.75 deg/s. 4. Unreasonable inputs of yaw rate and other sensors (WSS, SAS, Ay) are measured. 5. Initial value for YawRate (-detection time is 100 ms). 6. Redundant error of lateral acceleration sensor is detected (-minimum detection time is 20 ms).		
C0063-64	Yaw Rate Sensor: Signal Error			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C008904	Switch Fault (ESC OFF Switch or AVH Switch Long Pressed)	The pressing time for AVH/PATA button exceeds the specified time	- Switch is pressed and held for a long time - Switch is stuck	Make sure button is not pressed for a long time

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C006B00	ABS/ESP Unreasonable Control (Control Time Too Long, Etc.)	ABS/ESP unreasonable control time exceeds the specified time	- Number of teeth is wrong - Sensor failure - Vehicle is in an abnormal condition, such as the incorrect operation of brake components, suspension or sensor	- Check if WSS sensor operates normally. - Check if inertial sensor and steering sensor operate normally.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C2200-16	ECU Voltage Supply Too Low	The power supply voltage of ECU is lower than 9.6 V for 1 second	- Power supply fault - Circuit fault	- Check fuse - Check battery voltage - Check charging system - Check wire harness or connector - Inspect ESP control module assembly
C2200-17	ECU Voltage Supply Too High	The power supply of ECU is higher than 16.5 V for 1 second		
C2201-04	ECU Fault (General Software Problem)	Incorrect software configuration occurs	Internal fault in ECU system	Replace ECU SW
C220249	CAN Hardware Fault	Hardware is damaged or switched	Hardware fault	Replace ECU module
C220304	Valve Relay Fault	1. If a short to ground in ASIC is set, a fault will be set. 2. The electrical resistivity of valve path supply line is higher than the specified threshold. 3. The valve relay cannot be closed. 4. The valve relay cannot be opened.	- Intermittent fault - Hardware fault	Perform the following operations: a. Turn the ignition switch to ON; b. Clear DTC; c. Perform ECU reset service and wait for 10 seconds. If DTC still exists, please replace ABS/ESP (-iEPB) hardware.
C220400	General Valve Fault (Overheat Protection, Signal Invalid, Hardware Fault)	1. If the leaked current is higher than the specified threshold, a fault will be set. 2. If the valve relay cannot be closed by the redundant safety switch, a fault will be set. 3. If the internal	- System overheat protection - Signal invalid - Hardware fault	1. Wait for 120 seconds to 300 seconds to cool valve and pump motor. Check if DTC has been restored. 2. Perform the following operations: a. Turn the ignition switch to ON; b.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		current source of driver ASIC used for valve coil resistance measurement is not equal to the required source current, a fault will be set.		Clear DTC (SID14h). c. Perform ECU reset service (SID 11h) and wait for 10 seconds. 3. If DTC still exists, please replace ABS/ESP (-iEPB) hardware.
C220800	Wheel Speed Sensor General Fault (Interchanged Sensor Installation, Multiple Sensor Error)	1. At least one wheel speed sensor is installed in the wrong direction. 2. At least one incorrect wheel speed sensor is installed. 3. At least one wheel speed sensor is connected incorrectly.	- Position installation error - Circuit fault	1. Check if current wheel speed sensor configuration is correct. 2. Check if WSS power supply circuit is undervoltage.
C2209-00	ECU Fault (- Hardware, Microcontroller Error)	1. uC fault is reported by an incorrect signal module. 2. CPU is abnormal and normal program flow stops. 3. Microcontroller RAM is faulty. 4. Internal system stack or timing error occurs. 5. SPI fault, EEPROM error and ECU ADC conversion fault occur. 6. Lack of charge pump buffer capacitor or charge pump performance. 7 Open or short occurs in the complete UMGEn measurement path. 8. Open, short or defective component exists in the follow current path. 9. Motor relay or gate driver is defective/ overloaded. 10. Fuse is damaged or power supply wire is missing. 11. ASIC internal fault occurs in the load dump detection logic part.	- Intermittent fault - ECU hardware fault	Turn the ignition switch to OFF and then to ON, wait for 5 to 20 seconds, then perform the following operations: 1. Turn the ignition switch to ON and then to OFF; 2. Clear DTC. 3. Perform ECU reset service and wait for 10 seconds, if DTC still exists, please replace ABS/ESP (-iEPB) hardware.

■ TCS control channel changeover valve fault

Description

DTC	DTC Definition
C0001-04	Valve Fault-USV1 (Pilot Valve 1)
C0002-04	Valve Fault-USV2 (Pilot Valve 2)
C0003-04	Valve Fault-HSV1 (High Pressure Valve 1)
C0004-04	Valve Fault-HSV2 (High Pressure Valve 2)
C0010-04	Valve Fault-Front Left Inlet Valve
C0011-04	Front Valve-Front Left Outlet Valve
C0014-04	Valve Fault-Front Right Inlet Valve
C0015-04	Valve Fault-Front Right Outlet Valve
C0018-04	Valve Fault-Rear Left Inlet Valve
C0019-04	Front Valve-Rear Left Outlet Valve
C001C-04	Valve Fault-Rear Right Inlet Valve
C001D-04	Valve Fault-Rear Right Outlet Valve

1 Check intermittent fault

(a) Wait for 120 seconds, turn the ignition switch to ON and then to OFF.

(b) Clear DTC again.

OK

Drive vehicle at 50 kph for 30 seconds, if DTC still exists, please replace ABS/ESP (iEPB) hardware

NG

2 Check fuse

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Remove fuse SB01 (40A) and SB02 (40A) from engine compartment fuse box.

(d) Check if fuse is blown.

NG

Check and repair or replace corresponding fuse

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 ESP module assembly connector B-047.
- (d) Check if related wire harnesses are worn, pinched or broken.
- (e) Check if related connector terminals are loose, broken, bent or corrosive.
- (f) Using a digital multimeter, measure if voltage between ESP module assembly connector B-047 (1, 30) and body ground is normal according to table below.

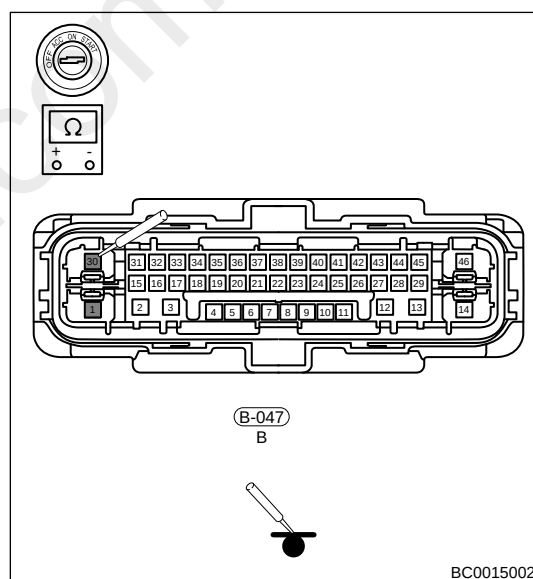
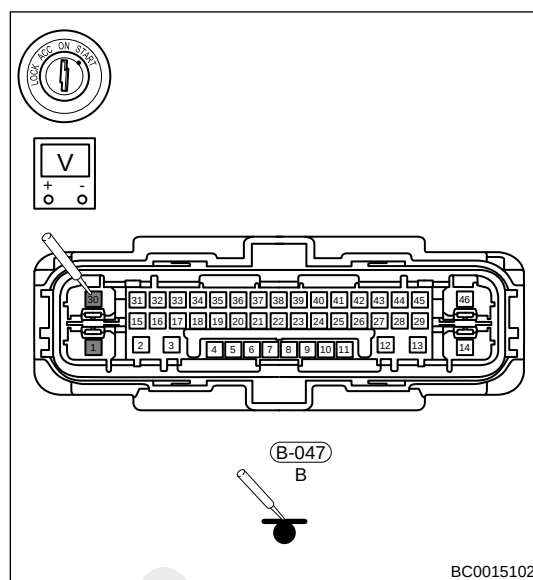
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-047 (1, 30) - Body ground	Always	$\geq 12 \text{ V}$

- (g) Using a digital multimeter, check for normal continuity between ESP module assembly connector B-047 (1, 30) and body ground according to table below.

Normal Resistance

Multimeter Connection	Condition	Specified Condition
B-047 (1) - Body ground	Always	∞
B-047 (30) - Body ground	Always	∞



NG

Check and repair wire harness or connector

OK

4

Check control module ESP (iEPB)

- (a) After replacement, it is necessary to perform configuration.

OK

System is normal and there is no fault

NG

Check and repair or replace controller ESP (-iEPB) assembly

■ Return pump fault

Description

7 - BRAKE SYSTEM

DTC	DTC Definition
C002004	Return Pump Fault
C002001	Return Pump Power Supply Motor Relay Fault

Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check for DTCs

- Leave vehicle for 5 minutes to make it cool down, clear and read ESP (iEPB) control module assembly DTC again with diagnostic tester.
- Refer to "DTC confirmation procedure".
- Check if the same DTC are still output.

NG

Problem indicated by DTC is intermittent (- system overheat protection)

OK

2 Check fuse

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Remove MF04 (175A) from main fuse box.
- Check if fuse is blown.

NG

Replace fuse MF04

OK

3 Check wire harness and connector

Use circuit diagram as a guide to perform following procedures:

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the ESP(iEPB) control module connector B-047.
- Check wire harness between terminal A10 of main fuse box connector B-039 and terminal 1 of ESP (iEPB) control module assembly.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Using a multimeter, check for continuity in wiring harness between main fuse box A10 and ESP (iEPB) controller.

NG

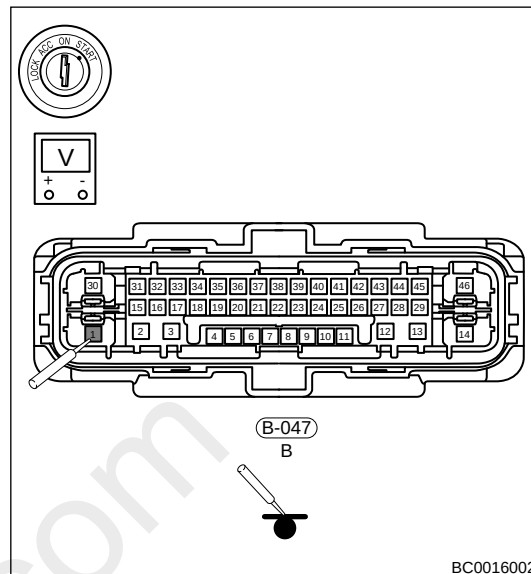
Repair or replace body wire harness and connector

OK

4 Check power supply circuit of ESP (iEPB) control module

- (a) Connect the negative battery cable.
- (b) Turn ENGINE START STOP switch to OFF.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Turn ENGINE START STOP switch to ON.
- (e) Using a digital multimeter, measure voltage between terminal 1 of ESP (iEPB) control module assembly and body ground to check if power supply circuit of system is normal according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (1) - Body ground (digital multimeter)	Always	Not less than 12 V
B-047 (1) - Body ground (test light 21 W)	Always	On



NG

Repair or replace body wire harness and connector

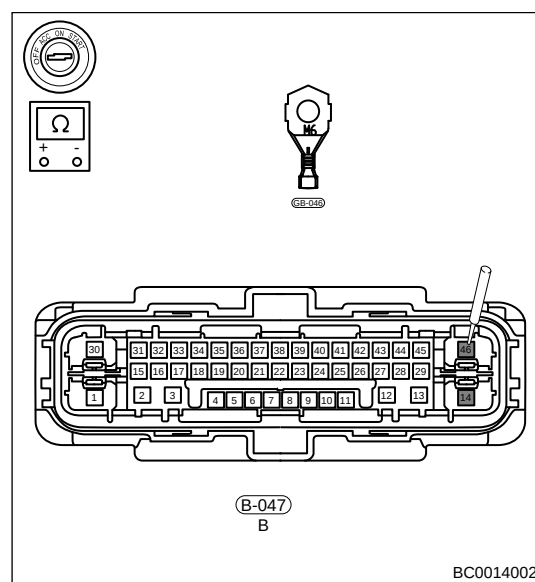
OK

5

Check ground circuit of ESP (iEPB) control module

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Using a digital multimeter, check for continuity between terminals 14, 46 of ESP (iEPB) control module assembly and body ground to check if ground circuit of system is normal.

Multimeter Connection	Condition	Specified Condition
B-047 (14) - Body ground	Always	$\leq 1 \Omega$
B-047 (46) - Body ground	Always	$\leq 1 \Omega$



NG

Repair or replace body wire harness and connector

OK

6 Reconfirm DTCs

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

OK

System operates normally

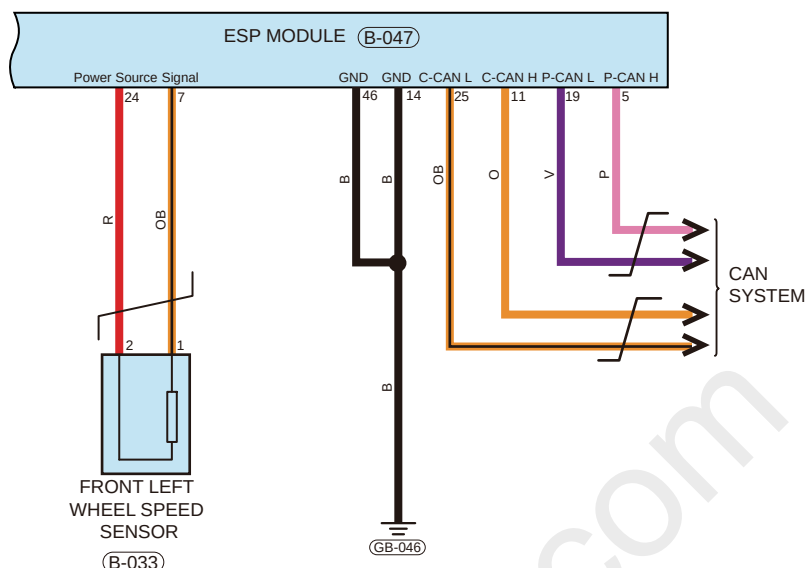
NG

Replace ESP (iEPB) control module assembly

■ Front left wheel speed sensor fault**Description**

DTC	DTC Definition
C0031-00	Wheel-speed Sensor, Front Left-General Fault
C0031-09	Front Left Wheel Speed Sensor Component Fault
C0031-11	Front Left Wheel Speed Sensor Power Supply Circuit Short to Ground
C0031-12	Front Left Wheel Speed Sensor Signal Circuit Short to Power Supply
C0031-13	Front Left Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open
C0031-29	Front Left Wheel Speed Sensor Signal Failure (Out of Range, Lost, Interfered or Discontinuous)
C0031-37	Front Left Wheel Speed Sensor Signal Out of Range
C0032-08	Front Left Wheel Speed Sensor: Wrong Direction

Circuit diagram



BC0005001

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check front left wheel speed sensor wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the front left wheel speed sensor connector B-033.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector pins are in good condition.

NG

Repair or replace front left wheel speed sensor wire harness and connector

OK

2 Check installation of front left wheel speed sensor

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check front left wheel speed sensor mounting bolt for looseness.
- (d) Check if mounting clearance between front left wheel speed sensor and front left hub bearing is too large or too small.
- (e) Check installation position of front left wheel speed sensor for dirt.

NG

Tighten mounting bolt properly, clean or replace front left wheel speed sensor

OK

3

Check front left wheel speed sensor

- (a) Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- (b) Drive vehicle straight ahead, and read datastream of front left wheel speed sensor with diagnostic tester.
- (c) Check if data change of front left wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG

Replace front left wheel speed sensor

OK

4

Check front left hub bearing

- (a) Check front left hub bearing for excessive clearance.
- (b) Check front left hub bearing magnetic strip for foreign matter, defect or damage.

NG

Replace front left hub bearing

OK

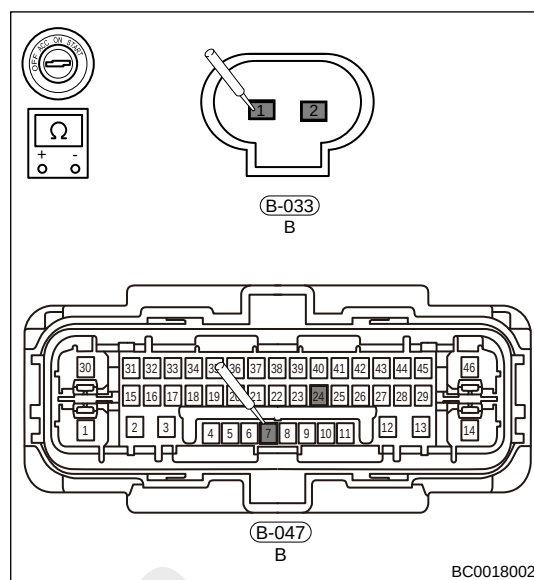
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Check wire harness and connector (front left wheel speed sensor - ESP (iEPB) control module)

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Disconnect the front left wheel speed sensor connector B-033.

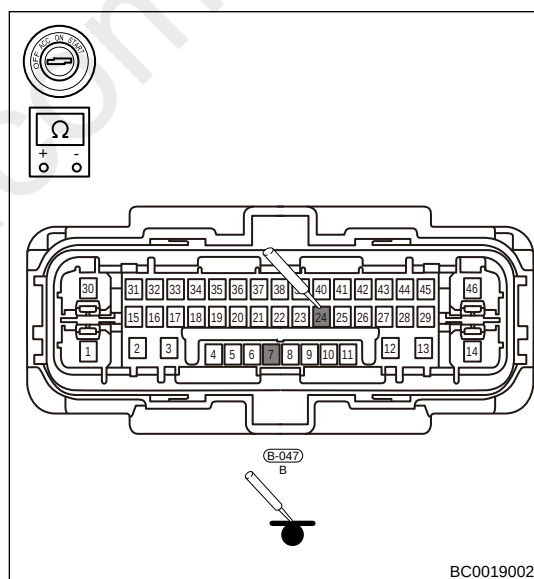
- (e) Using a digital multimeter, check for continuity between terminals of connector B-047 and connector B-033 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (7) - B-033 (1)	Always	$\leq 1 \Omega$
B-047 (24) - B-033 (2)	Always	$\leq 1 \Omega$
B-047 (7) - B-033 (2)	Always	∞
B-047 (24) - B-033 (1)	Always	∞



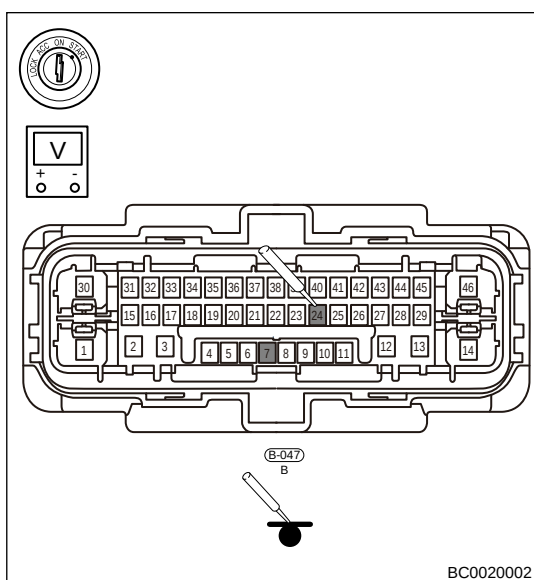
- (f) Using a digital multimeter, check for continuity between connector B-047 and body ground to check if front left wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-047 (7) - Body ground	Always	∞
B-047 (24) - Body ground	Always	∞



- (g) Connect the negative battery terminal cable.
 (h) Turn ENGINE START STOP switch to ON.
 (i) Using voltage band of digital multimeter, measure voltage between connector B-047 and body ground to check if front left wheel speed sensor is short to power supply according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (7) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-047 (24) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector between front left wheel speed sensor and ESP (iEPB) control module assembly

OK

6

Reconfirm DTCs

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

OK

System operates normally

NG

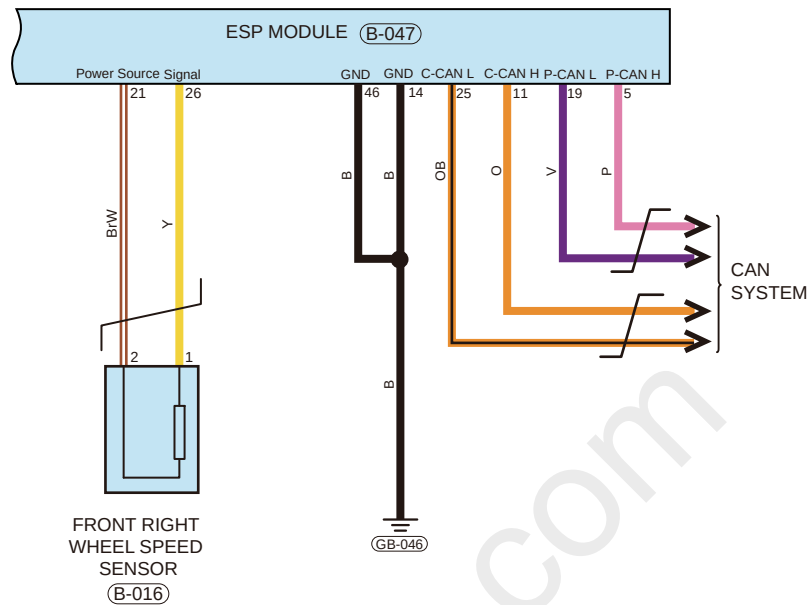
Replace ESP (iEPB) control module assembly

■ **Front right wheel speed sensor fault**

Description

DTC	DTC Definition
C0034-00	Wheel-speed Sensor, Front Right-General Fault
C0034-09	Front Right Wheel Speed Sensor Component Fault
C0034-11	Front Right Wheel Speed Sensor Power Supply Circuit Short to Ground
C0034-12	Front Right Wheel Speed Sensor Signal Circuit Short to Power Supply
C0034-13	Front Right Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open
C0034-29	Front Right Wheel Speed Sensor Signal Failure (Out of Range, Lost, Interfered or Discontinuous)
C0034-37	Front Right Wheel Speed Sensor Signal Out of Range
C0035-08	Front Right Wheel Speed Sensor: Wrong Direction

Circuit diagram



BC0006001

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check front right wheel speed sensor wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the front right wheel speed sensor connector B-016.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector pins are in good condition.

NG

Repair or replace front right wheel speed sensor wire harness and connector

OK

2 Check installation of front right wheel speed sensor

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check front right wheel speed sensor mounting bolt for looseness.
- (d) Check if mounting clearance between front right wheel speed sensor and front right hub bearing is too large or too small.
- (e) Check installation position of front right wheel speed sensor for dirt.

NG

Tighten mounting bolt properly, clean or replace front right wheel speed sensor

OK

3

Check front right wheel speed sensor

- (a) Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- (b) Drive vehicle straight ahead, and read datastream of front right wheel speed sensor with diagnostic tester.
- (c) Check if data change of front right wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG

Replace front right wheel speed sensor

OK

4

Check front right hub bearing

- (a) Check front right hub bearing for excessive clearance.
- (b) Check front right hub bearing magnetic strip for foreign matter, defect or damage.

NG

Replace front right hub bearing

OK

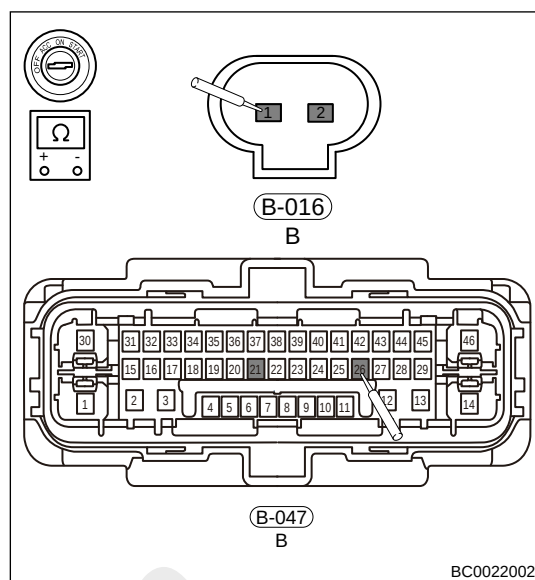
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Check wire harness and connector (Front right wheel speed sensor - ESP (iEPB) control module)

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Disconnect the front right wheel speed sensor connector B-016.

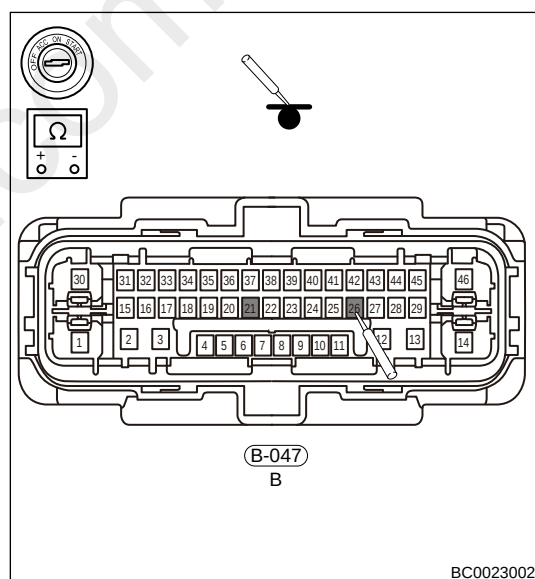
- (e) Using a digital multimeter, check for continuity between terminals of connector B-047 and connector B-016 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (26) - B-016 (1)	Always	$\leq 1 \Omega$
B-047 (21) - B-016 (2)	Always	$\leq 1 \Omega$
B-047 (21) - B-016 (2)	Always	∞
B-047 (26) - B-016 (1)	Always	∞



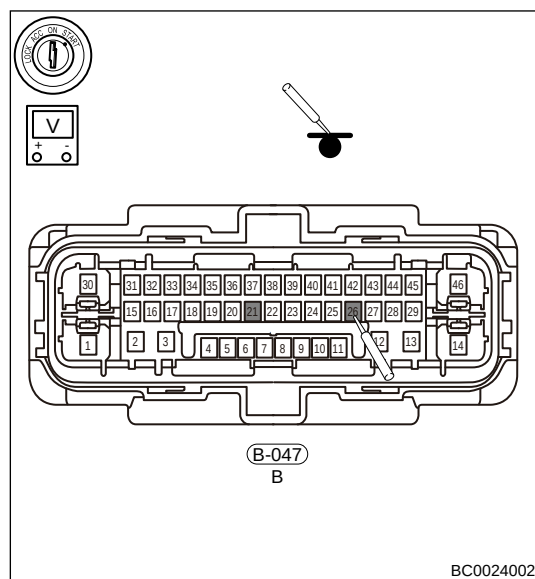
- (f) Using a digital multimeter, check for continuity between connector B-047 and body ground to check if front right wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-047 (21) - Body ground	Always	∞
B-047 (26) - Body ground	Always	∞



- (g) Connect the negative battery terminal cable.
 (h) Turn ENGINE START STOP switch to ON.
 (i) Using a digital multimeter, measure voltage between connector B-047 and body ground to check if front right wheel speed sensor is short to power supply according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (21) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-047 (26) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector between front right wheel speed sensor and ESP (iEPB) control module assembly

OK

6

Reconfirm DTCs

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

OK

System operates normally

NG

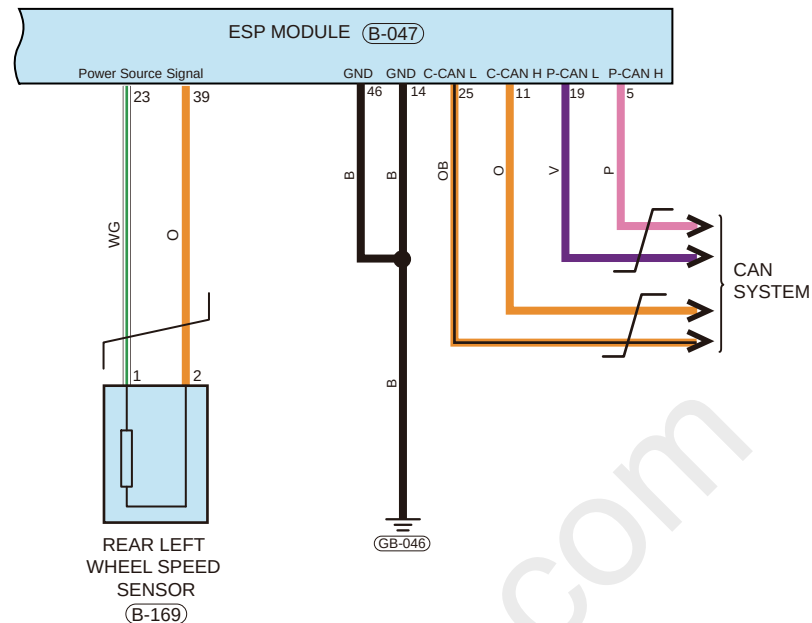
Replace ESP (iEPB) control module assembly

■ **Rear left wheel speed sensor fault**

Description

DTC	DTC Definition
C0037-00	Wheel-speed Sensor, Rear Left-General Fault
C0037-09	Rear Left Wheel Speed Sensor Component Fault
C0037-11	Rear Left Wheel Speed Sensor Power Supply Circuit Short to Ground
C0037-12	Rear Left Wheel Speed Sensor Signal Circuit Short to Power Supply
C0037-13	Rear Left Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open
C0037-29	Rear Left Wheel Speed Sensor Signal Failure (Out of Range, Lost, Interfered or Discontinuous)
C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range
C0038-08	Rear Left Wheel Speed Sensor: Wrong Direction

Circuit diagram



BC0007001

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check rear left wheel speed sensor wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the rear left wheel speed sensor connector B-169.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector pins are in good condition.

NG

Repair or replace rear left wheel speed sensor wire harness and connector

OK

2 Check installation of rear left wheel speed sensor

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check rear left wheel speed sensor mounting bolt for looseness.
- (d) Check if mounting clearance between rear left wheel speed sensor and rear left steering knuckle is too large or too small.
- (e) Check installation position of rear left wheel speed sensor for dirt.

NG

Tighten mounting bolt properly, clean or replace rear left wheel speed sensor

OK

3

Check rear left wheel speed sensor

- (a) Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- (b) Drive vehicle straight ahead, and read datastream of rear left wheel speed sensor with diagnostic tester.
- (c) Check if data change of rear left wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG

Replace rear left wheel speed sensor

OK

4

Check rear left hub bearing

- (a) Check rear left hub bearing for excessive clearance.
- (b) Check rear left hub bearing magnetic strip for foreign matter, defect or damage.

NG

Replace rear left hub bearing assembly

OK

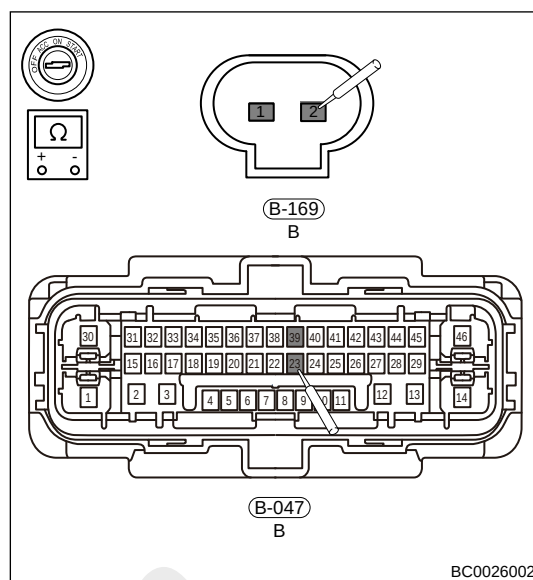
5

Check wire harness and connector (rear left wheel speed sensor - ESP (iEPB) control module)

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Disconnect the rear left wheel speed sensor connector B-169.

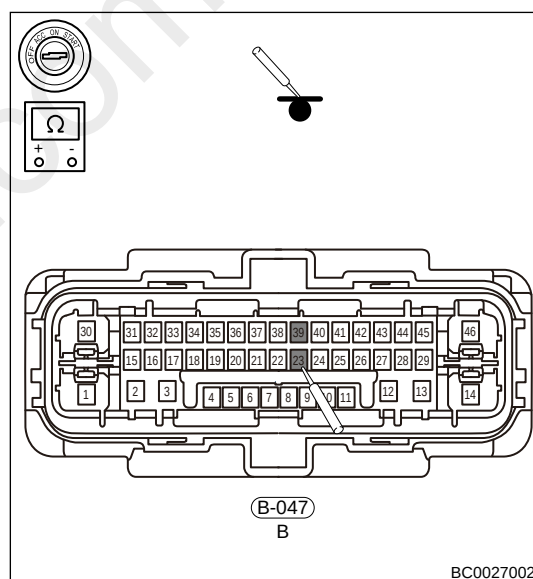
- (e) Using a digital multimeter, check for continuity between terminals of connector B-047 and connector B-169 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (23) - B-169 (1)	Always	$\leq 1 \Omega$
B-047 (39) - B-169 (2)	Always	$\leq 1 \Omega$
B-047 (39) - B-169 (2)	Always	∞
B-047 (23) - B-169 (1)	Always	∞



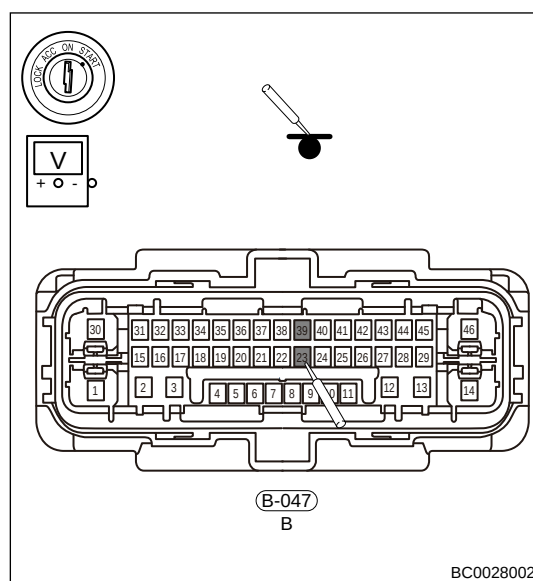
- (f) Using a digital multimeter, check for continuity between connector B-047 and body ground to check if rear left wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-047 (23) - Body ground	Always	∞
B-047 (39) - Body ground	Always	∞



- (g) Connect the negative battery terminal cable.
 (h) Turn ENGINE START STOP switch to ON.
 (i) Using a digital multimeter, measure voltage between connector B-047 and body ground to check if rear left wheel speed sensor is short to power supply according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (23) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-047 (39) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector between rear left wheel speed sensor and ESP (iEPB) control module assembly

OK

6

Reconfirm DTCs

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

OK

System operates normally

NG

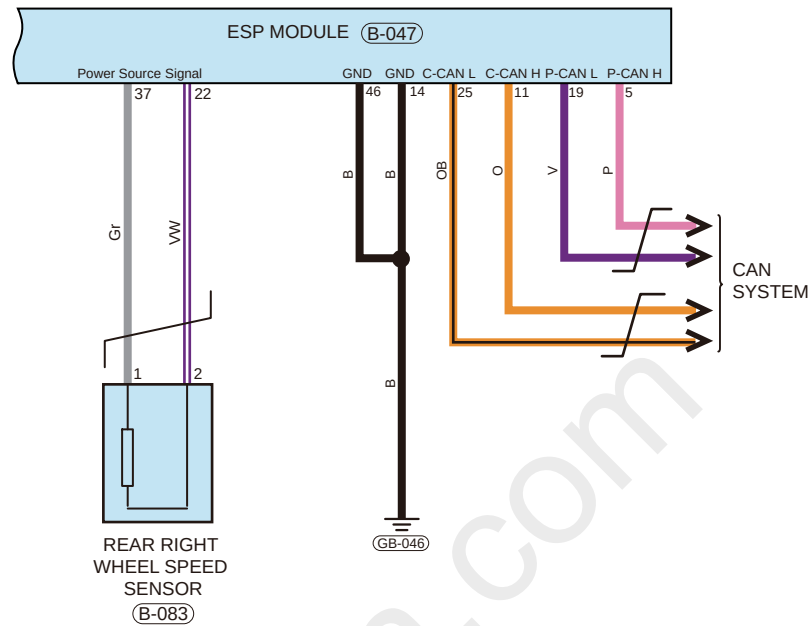
Replace ESP (iEPB) control module assembly

■ **Rear right wheel speed sensor fault**

Description

DTC	DTC Definition
C003A-00	Wheel-speed Sensor, Rear Right-General Fault
C003A-09	Rear Right Wheel Speed Sensor Component Fault
C003A-11	Rear Right Wheel Speed Sensor Power Supply Circuit Short to Ground
C003A-12	Rear Right Wheel Speed Sensor Signal Circuit Short to Power Supply
C003A-13	Rear Right Wheel Speed Sensor: Signal Circuit Short to Ground or Open; Power Supply Circuit Open
C003A-29	Rear Right Wheel Speed Sensor Signal Failure (Out of Range, Lost, Interfered or Discontinuous)
C003A-37	Rear Right Wheel Speed Sensor Signal Out of Range
C003B-08	Rear Right Wheel Speed Sensor: Wrong Direction

Circuit diagram



BC0008001

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check rear right wheel speed sensor wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the rear right wheel speed sensor connector B-083.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector pins are in good condition.

NG

Repair or replace rear right wheel speed sensor wire harness and connector

OK

2 Check installation of rear right wheel speed sensor

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check rear right wheel speed sensor mounting bolt for looseness.
- (d) Check if mounting clearance between rear right wheel speed sensor and rear right steering knuckle is too large or too small.
- (e) Check installation position of rear right wheel speed sensor for dirt.

NG

Tighten mounting bolt properly, clean or replace rear right wheel speed sensor

OK

3

Check rear right wheel speed sensor

- (a) Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- (b) Drive vehicle straight ahead, and read datastream of rear right wheel speed sensor with diagnostic tester.
- (c) Check if data change of rear right wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG

Replace rear right wheel speed sensor

OK

4

Check rear right hub bearing

- (a) Check rear right hub bearing for excessive clearance.
- (b) Check rear right hub bearing magnetic strip for foreign matter, defect or damage.

NG

Replace rear right hub bearing assembly

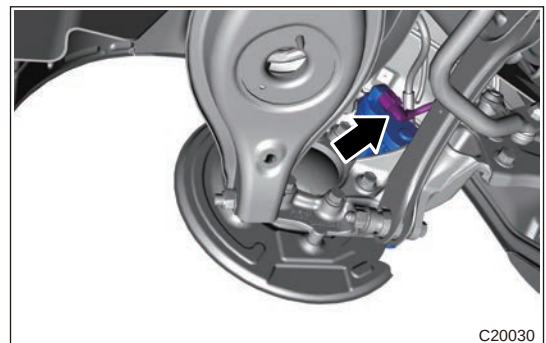
OK

5

Check wire harness and connector (rear right wheel speed sensor - ESP (iEPB) control module)

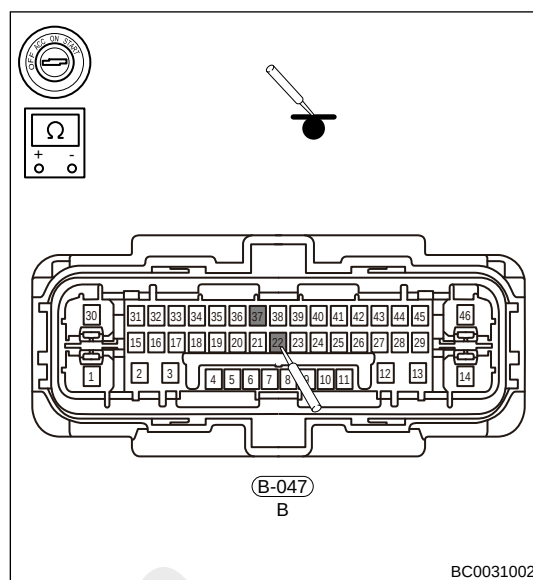
- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) control module connector B-047.
- (d) Disconnect the rear right wheel speed sensor connector B-083.
- (e) Using a digital multimeter, check for continuity between terminals of connector B-047 and connector B-083 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (37) - B-083 (1)	Always	$\leq 1 \Omega$
B-047 (22) - B-083 (2)	Always	$\leq 1 \Omega$
B-047 (22) - B-083 (2)	Always	∞
B-047 (37) - B-083 (1)	Always	∞



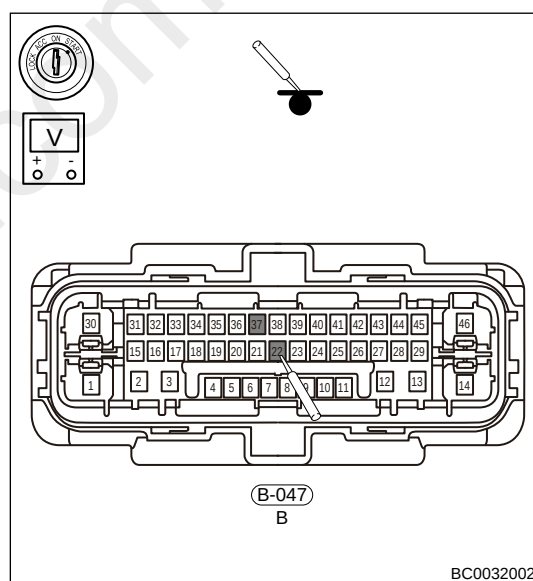
- (f) Using a digital multimeter, check for continuity between connector B-047 and body ground to check if rear right wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-047 (37) - Body ground	Always	∞
B-047 (22) - Body ground	Always	∞



- (g) Connect the negative battery terminal cable.
 (h) Turn ENGINE START STOP switch to ON.
 (i) Using a digital multimeter, measure voltage between connector B-047 and body ground to check if rear right wheel speed sensor is short to power supply according to table below.

Multimeter Connection	Condition	Specified Condition
B-047 (22) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-047 (37) - Body ground	ENGINE START STOP switch ON	Approx. 0 V



NG

Repair or replace wire harness and connector between front right wheel speed sensor and ESP (iEPB) control module assembly

OK

6

Reconfirm DTCs

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

OK

System operates normally

NG

Replace ESP (iEPB) control module assembly

■ Brake switch fault

Description

DTC	DTC Definition
C004064	Brake Switch Malfunction: Unreliable

Circuit diagram

1	Perform basic inspection on brake switch
---	--

- (a) Make sure to use the correct brake switch.
(b) Check if brake switch is installed at the correct position.
(c) Check if there is an incorrect clearance between brake switches.
(d) Check and eliminate any electrical or mechanical interference to the brake switch.

OK

After driving for a period of time and clearing DTC, perform test again. If DTC still exists, please replace brake switch

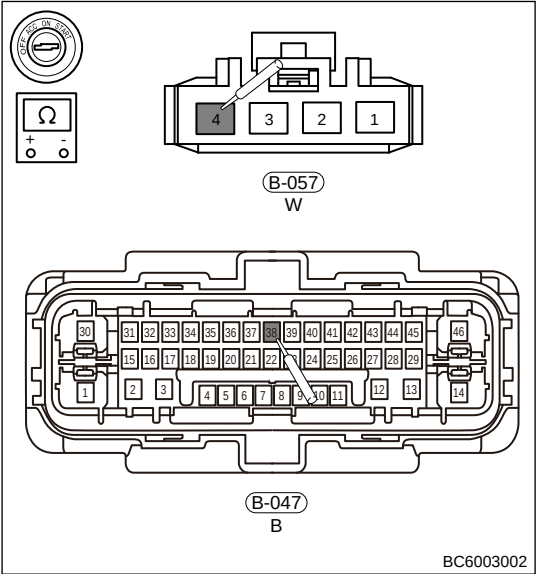
NG

2	Check related wire harness and connector
---	--

- (a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP (iEPB) module assembly connector B-047.
(d) Disconnect the brake switch connector B-057.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a digital multimeter, check for normal continuity between ESP (iEPB) module assembly connector B-047 (38) and brake switch connector B-057 (4) according to table below.

OK

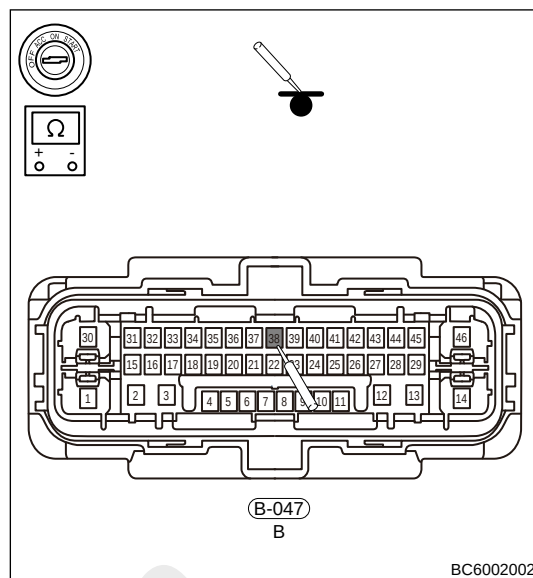
Multimeter Connection	Specified Condition
B-047 (38) - B-057 (4)	$\leq 1 \Omega$



- (h) Using a digital multimeter, check for normal continuity between ESP (iEPB) module assembly connector B-047 (38) and body ground according to table below.

OK

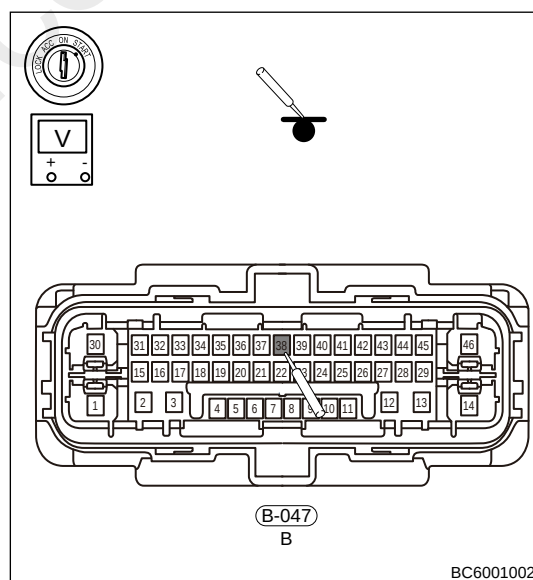
Multimeter Connection	Specified Condition
B-047 (38) - Body ground	∞



- (i) Connect the negative battery cable.
- (j) Turn ENGINE START STOP switch to ON.
- (k) Turn ENGINE START STOP switch to ON.

OK

Multimeter Connection	Specified Condition
B-047 (38) - Body ground	0 V



NG

Repair/replace related wire harness and connector

OK

3

Check ESP (iEPB) control module

OK

System operates normally

NG

Replace ESP (iEPB) control module assembly

■ Pressure sensor fault

Description

DTC	DTC Definition
C004428	Pressure Sensor Fault (Signal)
C004401	Pressure Sensor Fault (Circuit)

1	Check intermittent fault
---	--------------------------

(a) After clearing DTC, drive vehicle for a period of time and apply brake for more than 5 seconds during this period.

OK

After driving for a period of time and clearing DTC, perform test again. If DTC still exists, please replace ESP (iEPB) module

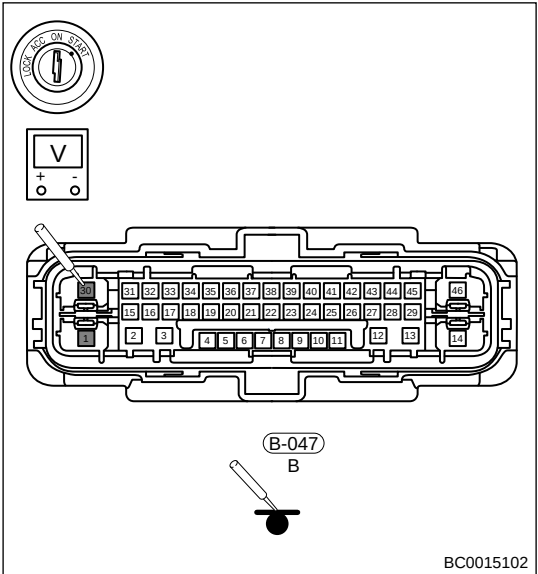
NG

2	Check related wire harness and connector
---	--

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (iEPB) module assembly connector B-047.
- (d) Check if related connector terminals are loose, broken, bent or corroded.
- (e) Using a digital multimeter, measure if voltage between ESP (iEPB) module assembly connector B-047 (1, 30) and body ground is normal according to table below.

OK

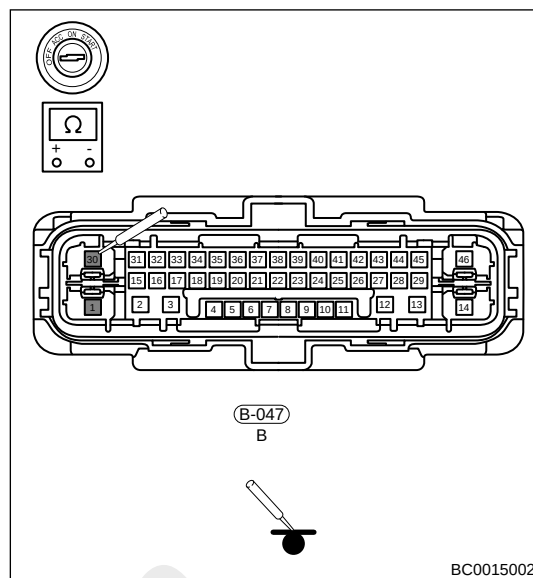
Multimeter Connection	Specified Condition
B-047 (1, 30) - Body ground	$\geq 12\text{ V}$



- (f) Using a digital multimeter, check for continuity between ESP (iEPB) module assembly connector B-047 (1, 30) and body ground according to table below.

OK

Multimeter Connection	Specified Condition
B-047 (1) - Body ground	∞
B-047 (30) - Body ground	∞



NG

Repair/replace related wire harness and connector

OK

3

Check ESP (iEPB) control module

OK

System operates normally

NG

Replace ESP (iEPB) control module assembly

■ Steering angle sensor failure

Description

DTC	DTC Definition
C0051-29	Steering Wheel SAS Offset Error, Noisy Signal
C0051-64	Steering Angle Sensor Fault (Signal)
C0051-54	Steering Angle Sensor Calibration Failure

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1

Check steering angle sensor calibration

- (a) Turn ENGINE START STOP switch to ON.
- (b) Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- (c) Calibrate the steering angle sensor according to instruction of diagnostic tester.
- (d) Use diagnostic tester to clear DTCs.
- (e) Start the engine.
- (f) Drive vehicle at 40 km/h or above, and read ESP (iEPB) control module assembly DTC again with diagnostic tester.
- (g) Check if the same DTCs are still output.

NG

Steering angle sensor is not calibrated

OK

2

Check fuse

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check if fuse RF16 5A in instrument panel fuse and relay box B-141 is blown.

NG

Replace fuse RF16

OK

3

Check wire harness and connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the steering angle sensor connector I-006.
- (d) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (e) Check for broken, bent, protruded or corroded terminals.
- (f) Check if related connector pins are in good condition.

NG

Repair or replace instrument panel wire harness and connector

OK

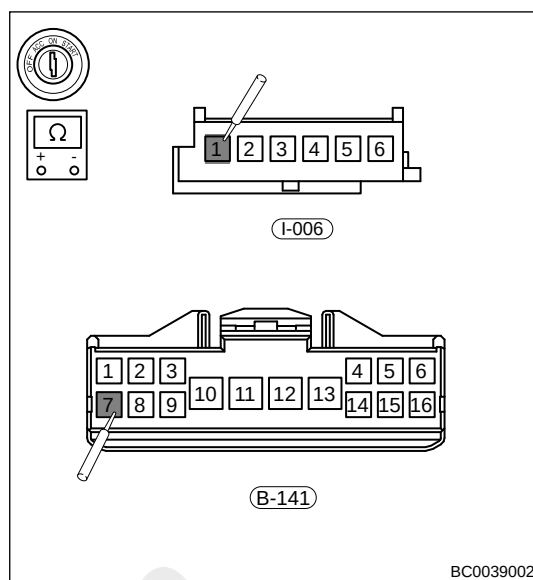
4

Check steering angle sensor power supply and instrument panel fuse and relay box B-141

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the instrument panel fuse box connector B-141.
- (c) Check if terminal of instrument panel fuse box connector is deformed, bent or loose.

- (d) Using a multimeter, check for continuity between wire harness terminal B-141 (7) of instrument fuse box and terminal I-006 (1) of steering angle sensor.

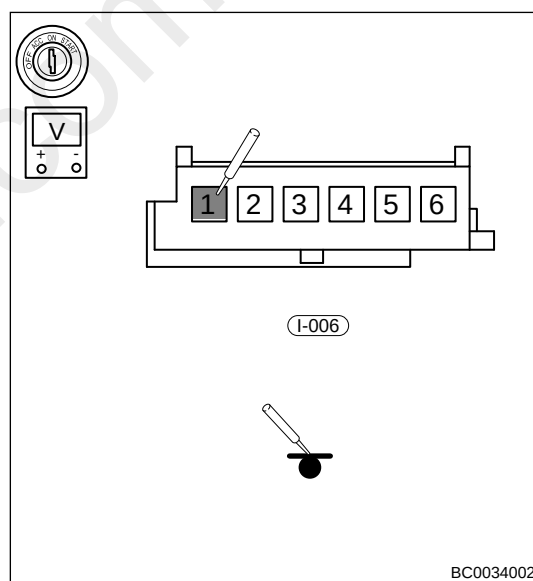
Multimeter Connection	Condition	Specified Condition
I-006 (1) - B-141 (7)	Always	$\leq 1 \Omega$



- (e) Turn ENGINE START STOP switch to ON.

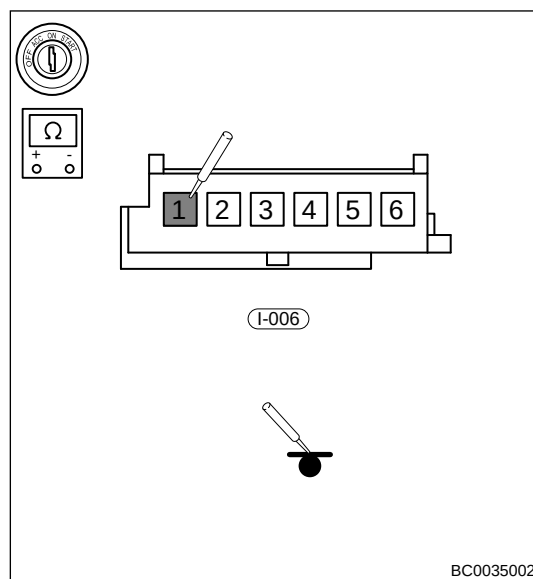
- (f) Using a multimeter, measure if connector terminal I-006 (1) of steering angle sensor has 12 V power supply voltage.

Multimeter Connection	Condition	Specified Condition
I-006 (1) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
I-006 (1) - Body ground (test lamp 21 W)	ENGINE START STOP switch ON	On



- (g) Using a multimeter, check continuity between connector I-006 (1) of steering angle sensor and ground to check if it is short to ground.

Multimeter Connection	Condition	Specified Condition
I-006 (1) - Body ground	Always	∞



NG

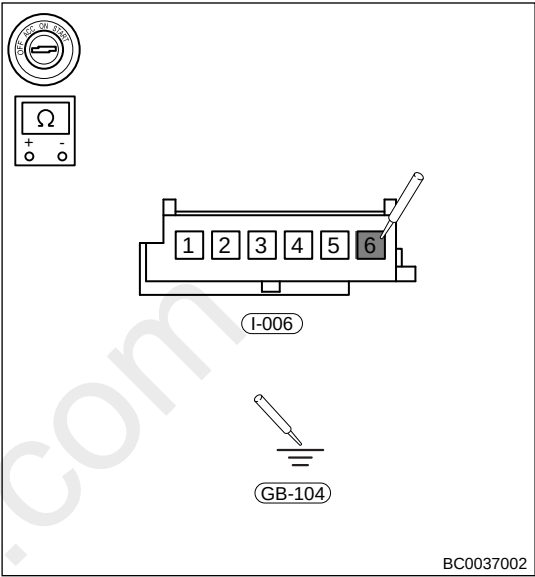
Repair or replace instrument panel wire harness or replace instrument panel fuse box

OK

5 Check ground wire harness and CAN wire of steering angle sensor

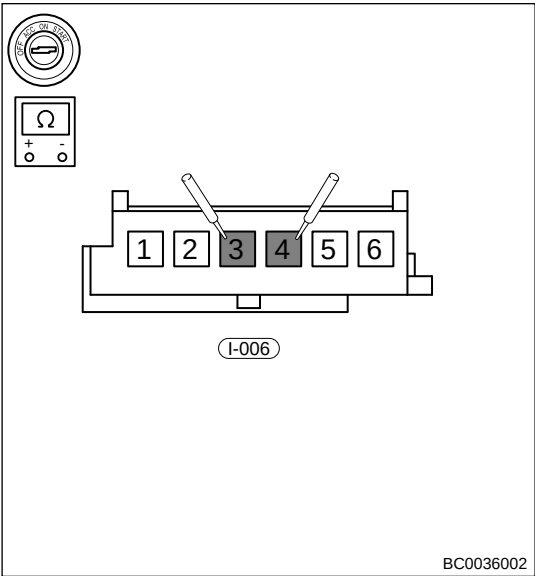
- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the steering angle sensor connector I-006.
- (c) Using a multimeter, check continuity between connector I-006 (6) of steering angle sensor and ground point GB-104.

Multimeter Connection	Condi-tion	Specified Condition
I-006 (6) - GB-104	Always	≤ 1 Ω



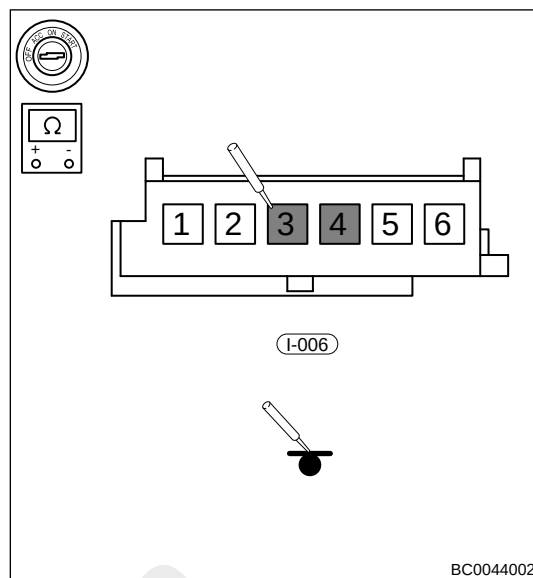
- (d) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.
- (e) Using a digital multimeter check if connection between steering angle sensor and CAN communication line is normal according to table below (measure terminal resistance from CAN node).

Multimeter Connection	Condi-tion	Specified Condition
I-006 (3) - I-006 (4)	Always	≈ 60 Ω



- (f) Using a digital multimeter, check if CAN circuit connected to steering angle sensor is short to body ground.

Multimeter Connection	Condition	Specified Condition
I-006 (3) - Body ground	Always	∞
I-006 (4) - Body ground	Always	∞

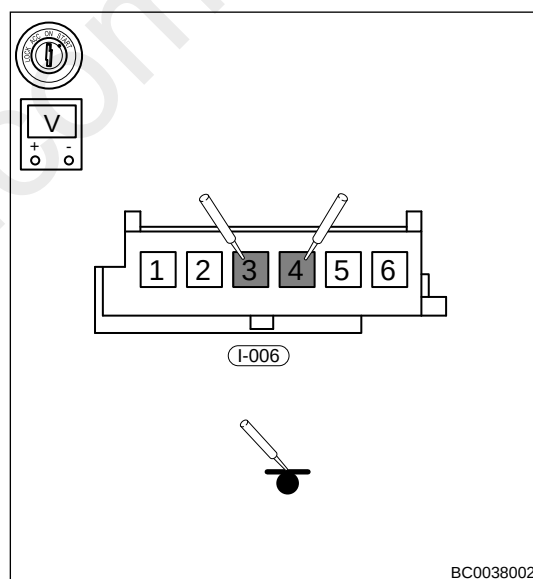


- (g) Connect the negative battery terminal cable.

- (h) Turn ENGINE START STOP switch to ON.

- (i) Using digital multimeter, check if voltage between steering angle sensor I-006 (3) (4) and body ground is normal.

Multimeter Connection	Condition	Specified Condition
I-006 (3) - Body ground	Always	1.5 - 2.5 V
I-006 (4) - Body ground	Always	2.5 - 3.5 V



OK

System operates normally

NG

Repair or replace ground wire harness or replace CAN network wire harness

■ Acceleration & yaw rate sensor fault

Description

DTC	DTC Definition
C0061-29	Lateral Acceleration Sensor: Invalid Value
C0061-64	Lateral Acceleration Sensor: Signal Error
C0062-29	Longitudinal Acceleration Sensor: Invalid Value
C0062-64	Longitudinal Acceleration Sensor: Signal Error
C0063-29	Yaw Rate Sensor: Invalid Value
C0063-64	Yaw Rate Sensor: Signal Error

Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

1 Check sensor calibration

- Turn ENGINE START STOP switch to ON.
- Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- Calibrate the steering angle sensor according to instruction of diagnostic tester.
- Use diagnostic tester to clear DTCs.
- Start the engine.
- Drive vehicle at 40 km/h or above, and read ESP (iEPB) control module assembly DTC again with diagnostic tester.
- Check if the same DTCs are still output.

NG
Lateral acceleration/yaw rate sensor is not calibrated
OK

2 Check installation position of yaw rate sensor

Caution

- **Yaw rate sensor is integrated in the Airbag Control Module (ACM).**

- Check ACM control module fixing bolt for looseness.
- Check pin connector of ACM controller for bending or looseness or wire harness for damage.
- Adjust installation position of yaw rate sensor (always keep sensor level on vehicle body).

NG
Replace ACM module assembly
OK

3 Reconfirm DTCs

- After replacing ACM module, calibrate yaw rate sensor with a diagnostic tester.
- Use diagnostic tester to clear DTCs.
- Start the engine.
- Drive vehicle at 40 km/h or above, and read ESP (iEPB) control module assembly DTC again with diagnostic tester.
- Check if the same DTCs are still output.

OK
System operates normally
NG
Replace ESP (iEPB) control module

Switch fault

Description

DTC	DTC Definition
C008904	Switch Fault (ESC OFF Switch or AVH Switch Long Pressed)

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check ESP (iEPB) switch

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Check if ESP (iEPB) switch is stuck or pushed in by other objects.

NG**Replace ESP (iEPB) switch****OK****2 Check fuse**

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Remove RF17 (10A) from instrument panel fuse box.
 (d) Check if fuse is blown.

NG**Replace fuse****OK****3 Check wire harness and connector**

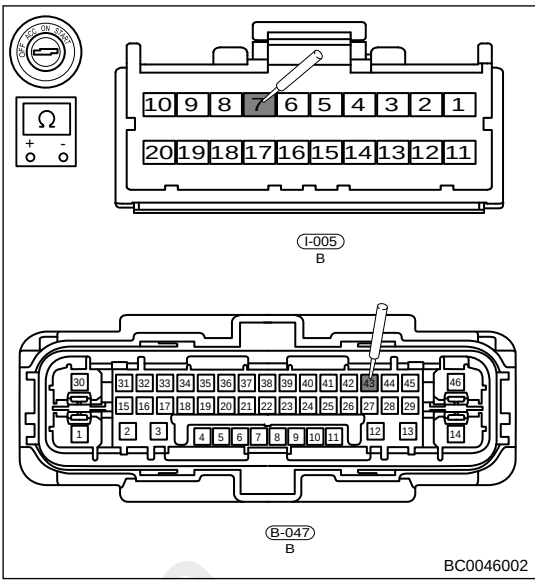
- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Check if wire harnesses are worn, pierced, pinched or partially broken.
 (d) Check for broken, bent, protruded or corroded terminals.
 (e) Check if related connector pins are in good condition.

NG**Repair or replace body/instrument panel wire harness and connector****OK****4 Check wire harness and connector (ESP (iEPB) switch - ESP (iEPB) control module)**

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the ESP (iEPB) control module assembly connector B-047.
 (d) Disconnect the ESP (iEPB) switch connector I-005.

(e) Using a digital multimeter, check for continuity between terminals of connector B-047 and connector I-005 to check if there is an open circuit in wire harness.

Multimeter Connection	Condition	Specified Condition
B-047 (43) - I-005 (7)	Always	≤ 1 Ω



NG

Repair or replace body/instrument panel wire harness

OK

5 Reconfirm DTCs

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

OK

System operates normally

NG

Replace ESP (iEPB) control module

■ ABS/ESP unreasonable control fault
Description

DTC	DTC Definition
C006B-00	ABS/ESP Unreasonable Control (Control Time Too Long, Etc.)

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related 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 all wheel speed sensor and angle sensor connectors.
(d) Check if related connector terminals are loose, broken, bent or corroded.

NG

Repair/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 Steering Column Module (SCM)

OK

6 Reconfirm DTCs

- Use diagnostic tester to clear DTCs.
- Start the engine.
- Drive vehicle at 40 km/h or above, read "ABS/ESP (Anti-lock Brake System/Electronic Stability Program)" system DTC again with diagnostic tester.
- Check if the same DTCs are still output.

OK

System operates normally

NG

Replace ESP (iEPB) module assembly

■ ECU power supply and hardware fault

Description

DTC	DTC Definition
C2200-16	ECU Voltage Supply Too Low
C2201-04	ECU Fault (General Software Problem)
C2202-49	CAN Hardware Fault
C2200-17	ECU Voltage Supply Too High

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1 Check fuse

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Check fuse MF04 175A in main fuse and relay box E-041 and fuses SB01 40A and SB02 40A in engine compartment fuse box B-039.
- Check if fuse is blown.

NG

Replace fuse

OK

2 Check battery voltage

- Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal.
- Battery voltage should be higher than 12 V.

NG

Replace battery

OK

3 Check wire harness and connector (ESP (iEPB) control module assembly - power supply)

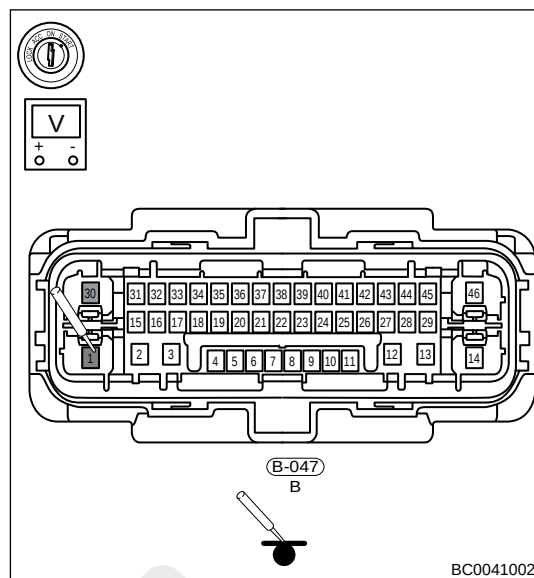
- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the ESP (iEPB) control module assembly connector B-047.
- Connect the negative battery terminal cable.
- Turn ENGINE START STOP switch to ON.

- (f) Using a digital multimeter, measure voltage between ESP (iEPB) control module assembly connector B-047 and body ground to check if power supply circuit is normal.

Multimeter Connection	Condition	Specified Condition
B-047 (1) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
B-047 (1) - Body ground (test light 21 W)	ENGINE START STOP switch ON	On
B-047(30) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
B-047 (30) - Body ground (test light 21 W)	ENGINE START STOP switch ON	On

NG

Repair or replace related wire harness and connector



BC0041002

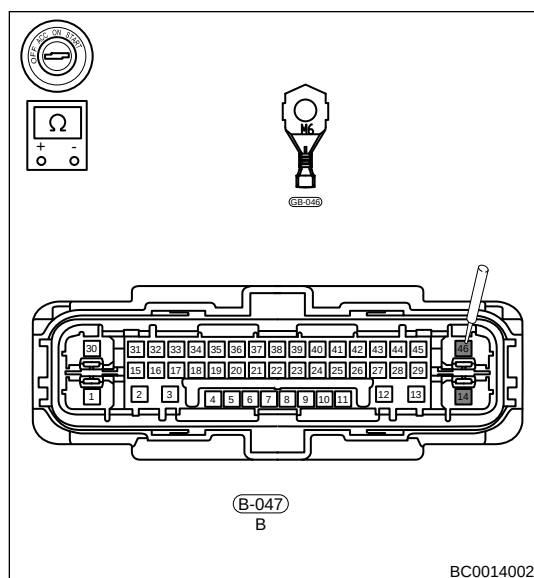
OK

4

Check wire harness and connector (ESP (iEPB) control module assembly - body ground)

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the ESP (iEPB) control module assembly connector B-047.
 (d) Using a digital multimeter, measure continuity between ESP (-iEPB) module connector B-047 (46, 14) and body ground GB-046 to check if ground circuit is normal.

Multimeter Connection	Condition	Specified Condition
B-047 (46) - GB-046	Always	$\leq 1 \Omega$
B-047 (14) - GB-046	Always	$\leq 1 \Omega$



BC0014002

NG

Repair or replace ESP (iEPB) control module assembly wire harness and connector

OK

5

Reconfirm DTCs

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

OK

System operates normally

NG

Replace ESP (iEPB) control module

■ Internal motor fault

Description

DTC	DTC Definition
C220304	Valve Relay Fault
C220400	General Valve Fault (Overheat Protection, Signal Invalid, Hardware Fault)
C220800	Wheel Speed Sensor General Fault (Interchanged Sensor Installation, Multiple Sensor Error)
C2009-00	ECU Fault (Hardware, Microcontroller Error)

⚠ Caution

- When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

1

Perform basic fault inspection

- (a) Perform hardware appearance inspection.

NG

Eliminate hardware appearance interference

OK

2

Check module for intermittent fault

- (a) Clear DTC, drive vehicle for a period of time, and test again.

NG

Replace module

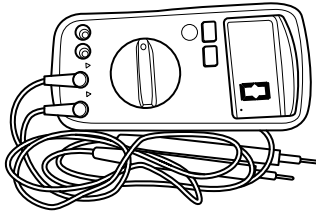
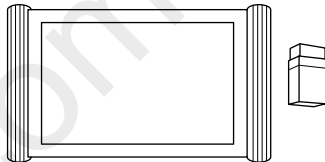
OK

3

Refer to inspection method for intermittent fault

5 ON-VEHICLE SERVICE

5.1 Tools

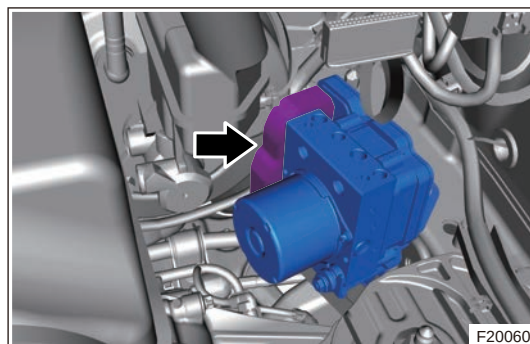
Tool Name	Tool Drawing
Digital Multimeter	 S00002
Diagnostic Tester	 S00001

5.2 ESP (iEPB)/ESP Control Module Assembly

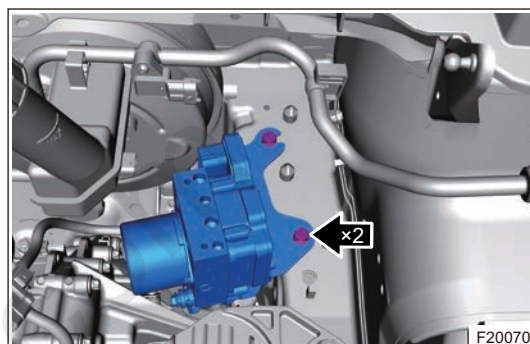
■ Removal

Warning/Caution/Hint
- When repairing ESP (iEPB)/ESP system, first release the pressure of high pressure brake fluid in accumulator, to prevent high pressure brake fluid from spraying out and causing personal 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 ENGINE START STOP switch to ON before ESP (iEPB)/ESP system is installed completely to prevent hydraulic pump from energizing and running. - Turn off all electrical equipment and ENGINE START STOP switch. - Disconnect the negative battery cable. - Remove the air filter assembly. - Remove the battery. - Remove the battery tray assembly. - Remove the brake pipe assembly.
⚠ Warning
- When removing brake line, prevent foreign matter from entering ESP (iEPB)/ESP control module assembly threaded holes. - After disconnecting brake line, sealing measure should be taken to prevent foreign matter form entering.

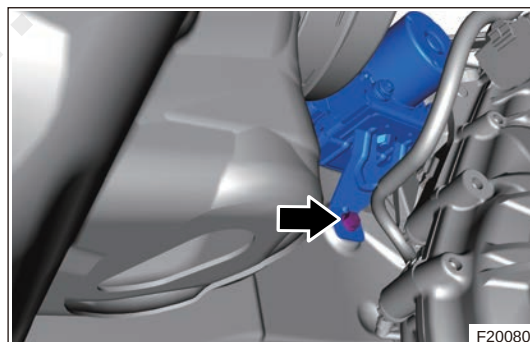
- (7) Disconnect the ESP control module assembly connector.



- (8) Brake pedal is fully depressed and secured by pedal bracket to prevent brake fluid from coming out after brake pipeline is removed from brake master cylinder.
- (9) Remove 2 fixing bolts between ESP control module assembly and upper body of front left side rail.



- (10) Remove 1 fixing bolt between ESP control module assembly and side of front left side rail body.



- (11) Remove the ESP control module assembly.

■ Installation

- (1) Install the ESP control module assembly.
- (2) Install 3 fixing bolts between ESP control module assembly and side rail body.

Tightening torque: $23 \pm 3.5 \text{ N}\cdot\text{m}$

- (3) Install 6 coupling bolts to brake pipe.

Tightening torque: $16 \pm 2 \text{ N}\cdot\text{m}$

- (4) Connect the ESP control module assembly connector.
- (5) Install the battery tray assembly.
- (6) Install the battery.
- (7) Install the air filter assembly.
- (8) Fill brake fluid and drain air.

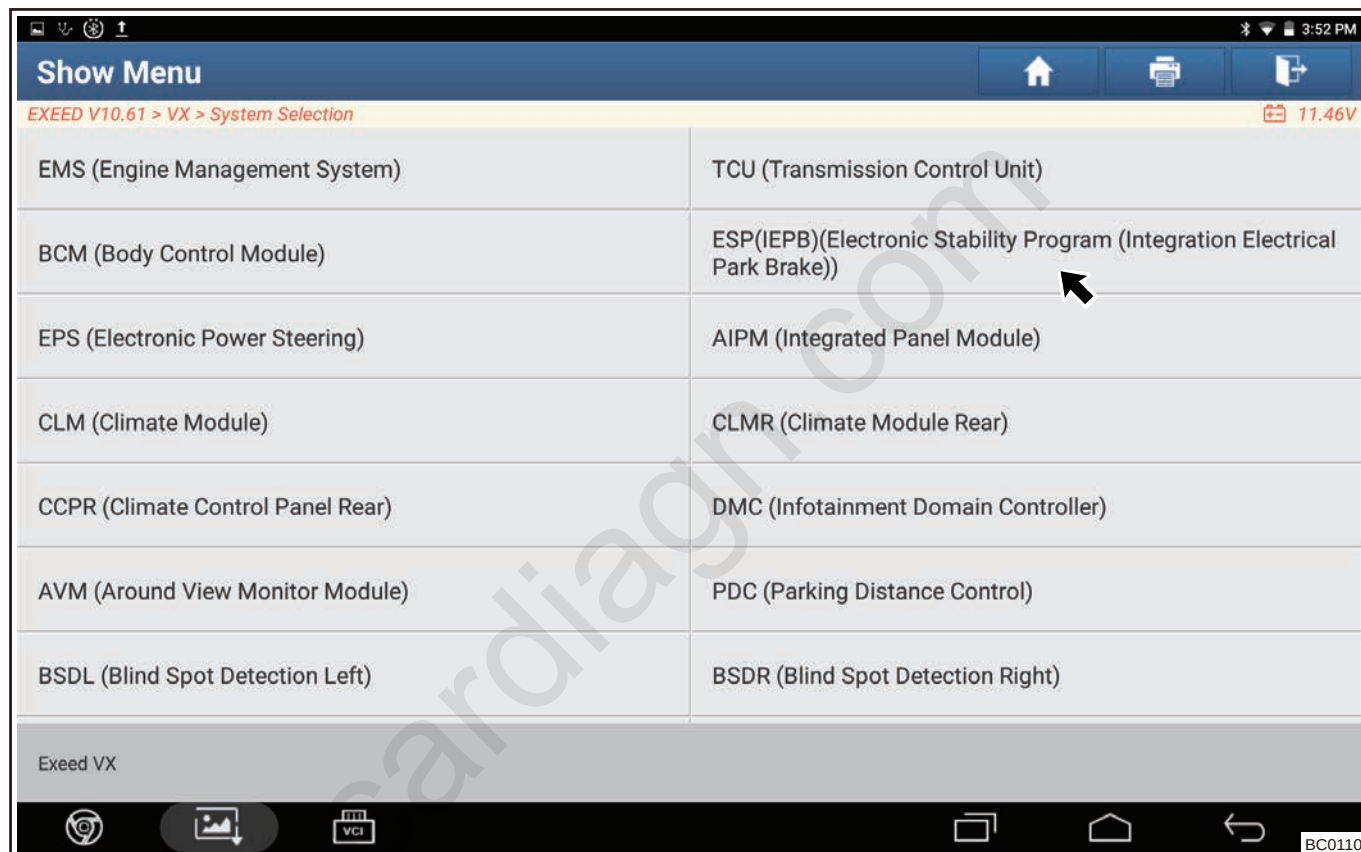
⚠ Caution

- When installing fixing bolts and screws, be sure to tighten them to specified torque.
- Perform ESP (iEPB)/ESP 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 ESP (iEPB)/ESP system operates normally and brake pedal feel is good.

■ Matching learning

Write configuration code with diagnostic tester after ESP module is installed:

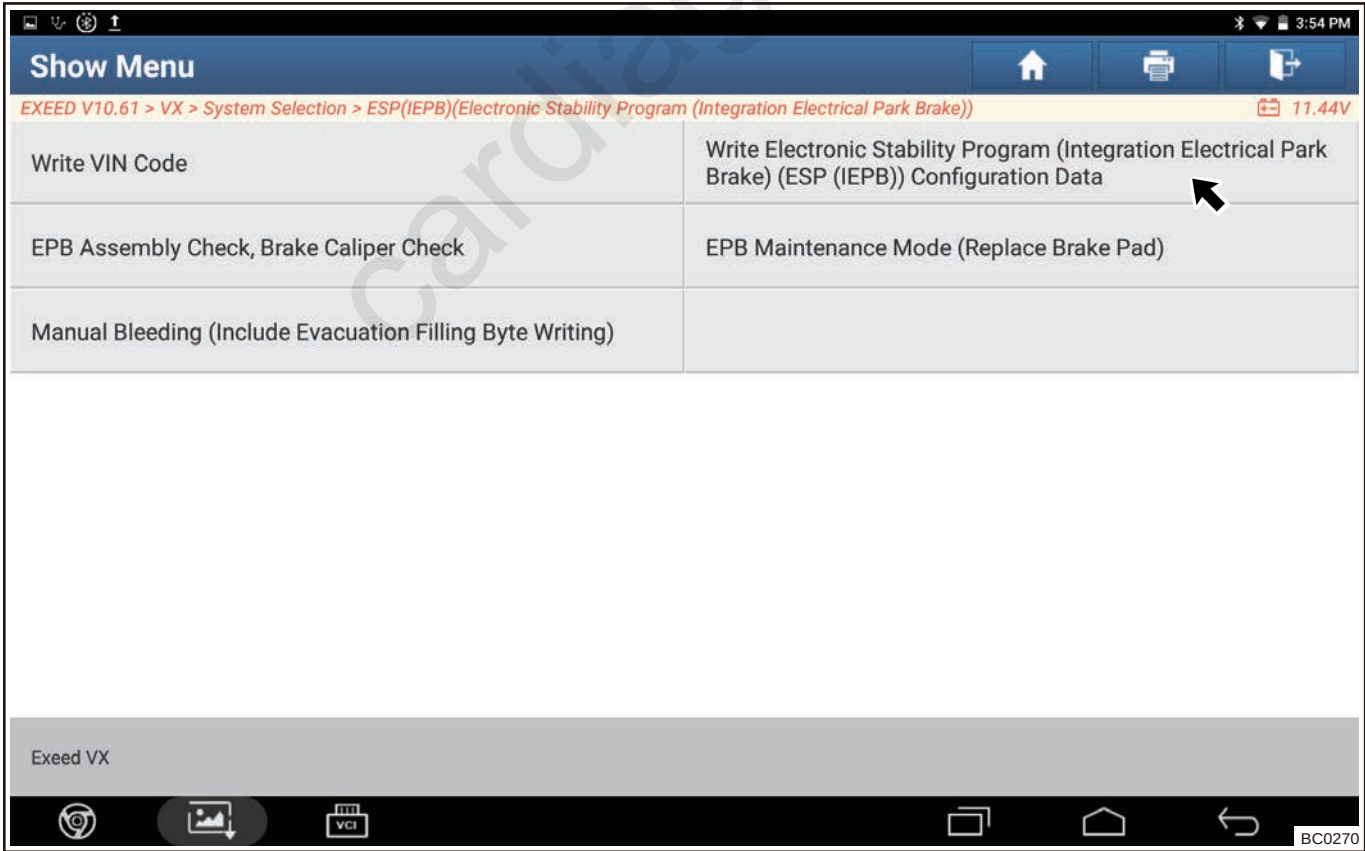
- (1) Click “ESP (IEPB) (Electronic Stability Program (Integration Electrical Park Brake))” .



- (2) Click “Special Function” .



(3) Click “Write Electronic Stability Program (Integration Electrical Park Brake) (ESP (IEPB)) Configuration Data” .



5.3 Brake System Bleeding

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 the specified type. 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.

■ Description

Bleeding must be performed after brake system components are replaced by the customer (such as replacement of brake fluid, brake pipeline, hydraulic unit) or when brake pedal is weak. Manual bleeding may be performed on hydraulic unit, one of three bleeding procedures can be selected during maintenance:

- Bleeding can be performed with filling unit (Bleeding pressure is 2 bar);
- Bleeding can be performed with manual pedal;
- Bleeding can be performed with manual pedal and filling unit.

■ Bleeding with bleeding/filling unit (bleeding pressure is 2 bar)

- (1) Connect bleeding/filling unit to fluid reservoir, confirm that brake fluid is enough to turn on the switch and set pressure to 2 bar.
- (2) Disengage bleeder screw from wheel cylinder until bubbles are drained. Bleeding order is rear left/front left/front right/rear right.
- (3) Check the pedal travel.
- (4) If it is not successful, repeat the bleeding in order.
- (5) After bleeding is finished, check brake fluid level and ensure the level is between maximum value and maximum value.

■ Bleeding with manual pedal

Caution

- During the whole bleeding, fluid level in fluid reservoir cannot be lower than minimum mark.
- 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.

- (1) Fill fluid reservoir with brake fluid (up to the bottleneck of filter).
- (2) Repeat the following bleeding procedures for each wheel cylinder. Bleeding order is rear left/front left/front right/rear right.
- (3) Disengage the bleeder screw.
- (4) Depress brake pedal repeatedly.
- (5) When brake pedal is depressed for the last time, depress and hold it and engage bleeder screw.
- (6) Release the brake pedal.
- (7) Check the brake pedal travel.
- (8) If it is not successful, repeat the above bleeding steps in order.
- (9) After bleeding is finished, check that the brake fluid level is between maximum mark and maximum mark.

■ Bleeding with manual pedal and 2 bar bleeding

⚠ Caution

- During the whole bleeding, fluid level in fluid reservoir cannot be lower than minimum mark.
- 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.

- (1) Connect bleeding/filling unit to fluid reservoir, confirm that brake fluid is enough to turn on the switch and set pressure to 2 bar.
- (2) Disengage bleeder screw from wheel cylinder until bubbles are drained. Bleeding order is rear left/front left/front right/rear right.
- (3) Depress pedal repeatedly.
- (4) Check the brake pedal travel.
- (5) If it is not successful, repeat the bleeding in order.
- (6) Check that the brake fluid level is between maximum value and maximum value.

5.4 Front Wheel Speed Sensor

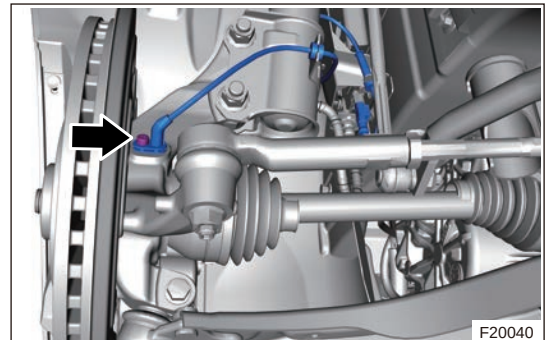
■ Removal

⚠ Warning

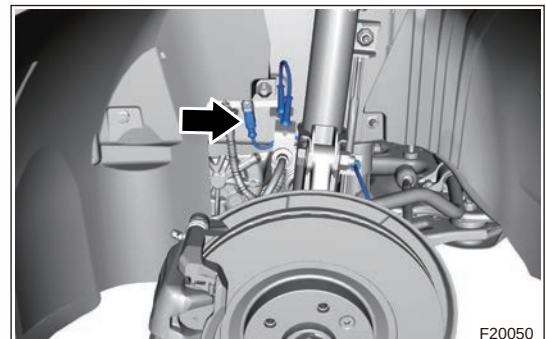
- Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.

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 1 fixing bolt from front left wheel speed sensor assembly.



- (5) Disconnect the front left wheel speed sensor assembly connector.



- (6) Remove the front left wheel speed sensor assembly.

■ Inspection

- (1) Check the front wheel speed sensor.
 - 1) Check front wheel speed sensor surface for breakage, dents or notch.
 - 2) Check front wheel speed sensor connector or wire harness for scratches, breakage or damage.
 - 3) If any of above conditions occurs, replace front wheel speed sensor with a new one.
 - 4) Check wheel speed sensor for proper installation.

■ Installation

- (1) Install front left wheel speed sensor and tighten fixing bolt between front left wheel speed sensor and front left steering knuckle assembly.

Tightening torque: $8 \pm 1.2 \text{ N}\cdot\text{m}$

- (2) Install attachment parts of front left wheel speed sensor wire harness.
- (3) Connect the front left wheel speed sensor wire harness connector.
- (4) Install the front left wheel.
- (5) Connect the negative battery cable.

5.5 Rear Wheel Speed Sensor

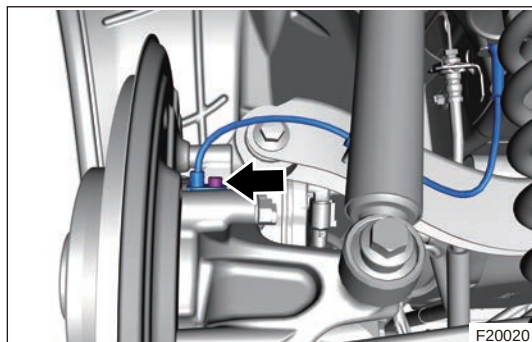
■ Removal

⚠ Warning

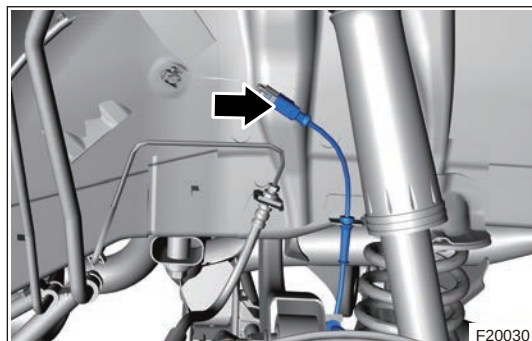
- **Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.**

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 house protector assembly.
 - (5) Remove 1 fixing bolt from rear left wheel speed sensor assembly.



- (6) Disconnect the rear left wheel speed sensor assembly connector.



- (7) Remove the rear left wheel speed sensor assembly.

■ **Inspection**

- (1) Check the rear left wheel speed sensor.
 - 1) Check rear wheel speed sensor surface for breakage, dents or notch.
 - 2) Check rear wheel speed sensor connector or wire harness for scratches, breakage or damage.
 - 3) If any of above conditions occurs, replace rear wheel speed sensor with a new one.
 - 4) Check wheel speed sensor for proper installation.

■ **Installation**

- (1) Install rear left wheel speed sensor and tighten fixing bolt.

Tightening torque: 8 ± 1.2 N·m

- (2) Install attachment parts between fixing bracket and rear wheel speed sensor.
- (3) Connect the rear left wheel speed sensor connector.
- (4) Install the rear left wheel house protector assembly.
- (5) Install the rear left wheel.
- (6) Connect the negative battery cable.



Caution

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