
SUSPENSION SYSTEM

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27.1 BRAKE CONTROL SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

- In order to avoid possible property loss, personal injury or death, 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:
 - Brake system noise.
 - Hard brake pedal.
 - During normal braking, brake pedal or vehicle vibrates.
 - Vehicle brake pulls.
 - 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:
 - After ignition switch is turned to ON and system performs self-check, the warning light remains on.
 - The warning light remains on during driving.

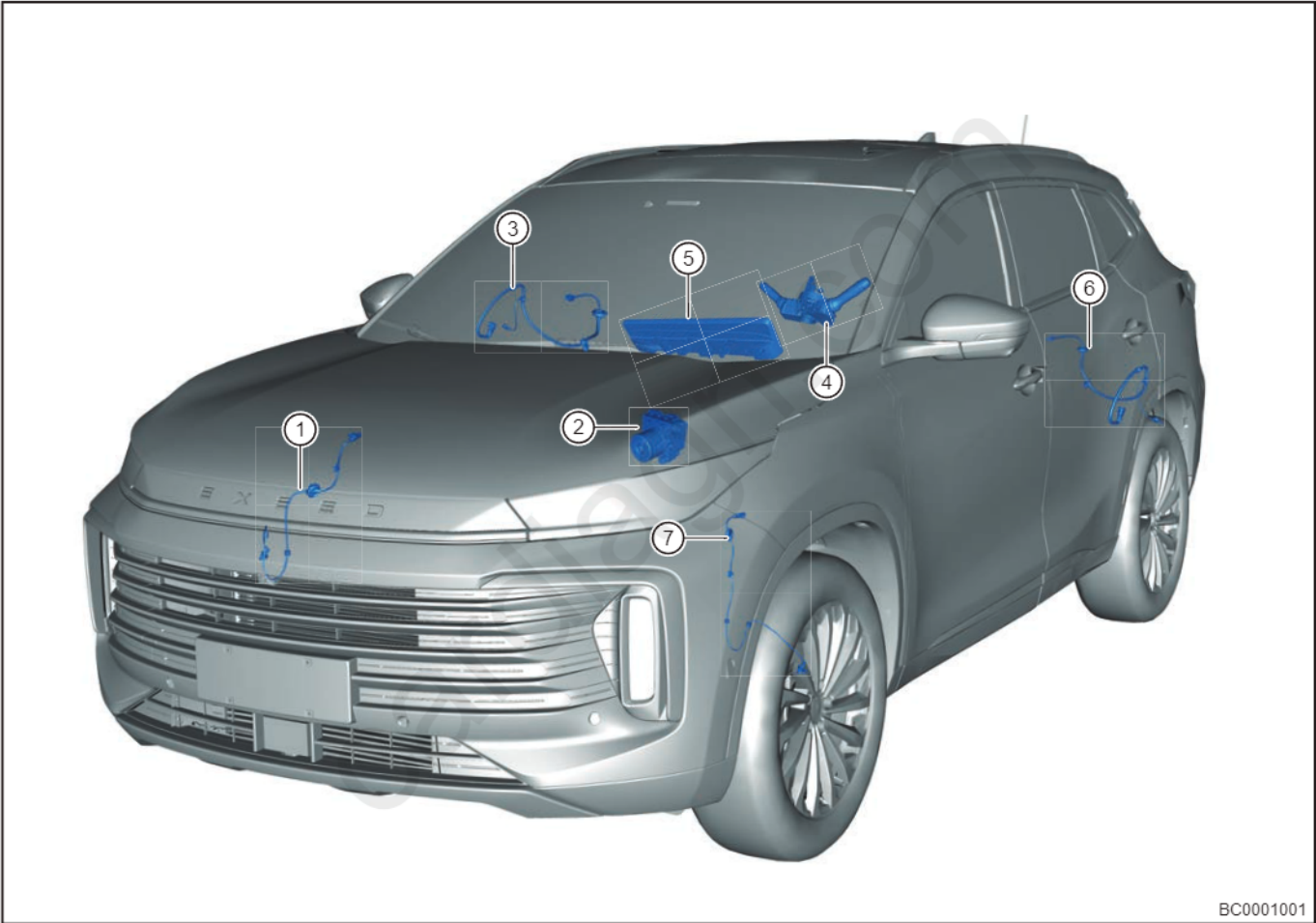
At this time, driver can perform regular brake, but the applied brake force should be reduced as much as possible to prevent wheels from being locked. After the warning light comes on, drive carefully and go to the service station for inspection and repair immediately to prevent more faults, which may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

- (5) Pay attention to the followings when connecting ESP and sensor wire harness:
 - Before unplugging ESP wire harness and sensor wire harness, the ignition switch must be turned off.
 - Ensure that connector is dry and clean, and avoid any foreign matter entering.
 - 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:
 - MC1: Brake line 1 connected to brake master cylinder;
 - MC2: Brake line 2 connected to brake master cylinder;
 - FL: Brake line connected to brake wheel cylinder of front left wheel;
 - FR: Brake line connected to brake wheel cylinder of front right wheel;
 - RL: Brake line connected to brake wheel cylinder of rear left wheel;
 - RR: Brake line connected to brake wheel cylinder of rear right wheel.
- (7) ESP generates noise in following situations:

- 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.
- Sound may be heard when ESP is operating properly, and it is mainly reflected in the following aspects:
 - 1) Operating sound from motor, solenoid valve and return pump in ESP hydraulic unit.
 - 2) Sound caused by brake pedal rebound.
 - 3) Bumping sound between suspension and vehicle body caused by sudden braking.

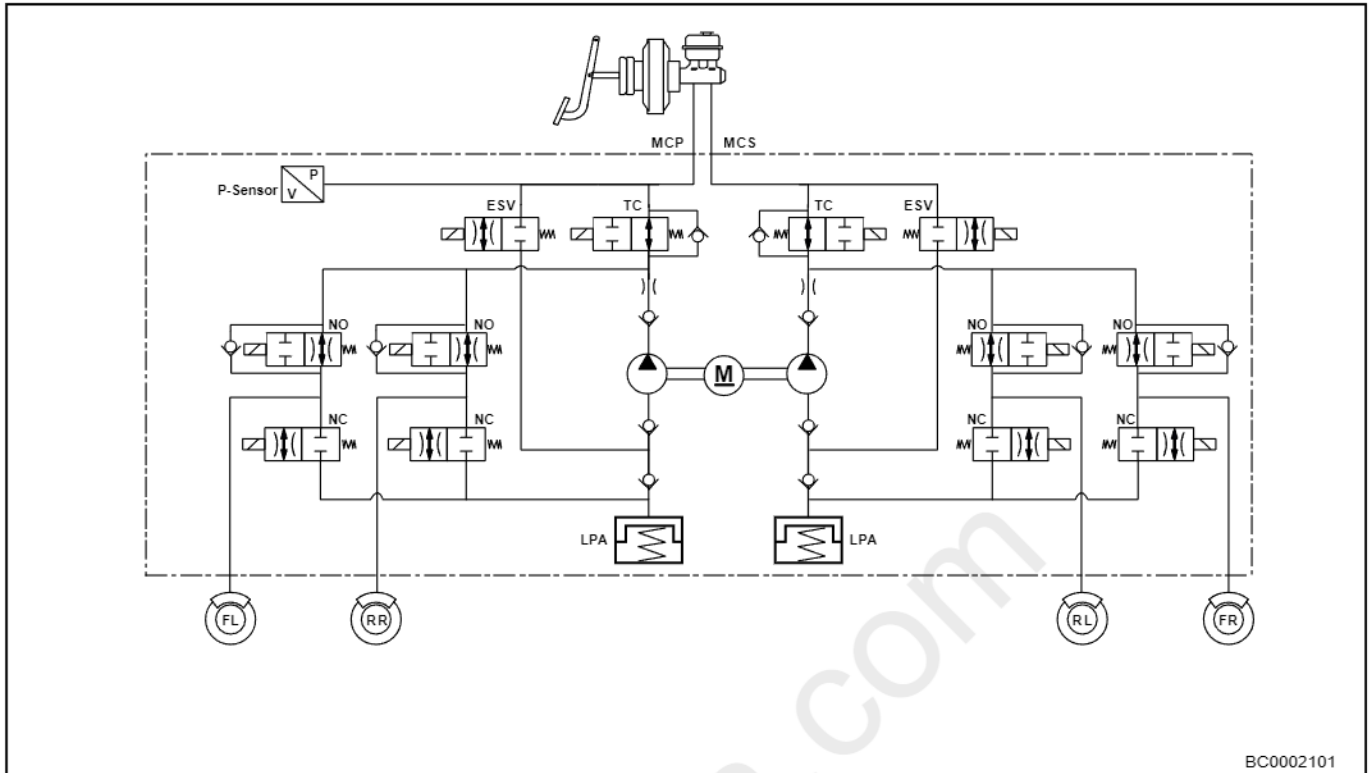
2 System Overview

2.1 System Components Diagram



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



Description	Definition	Description	Definition
MCP	Brake Master Cylinder Circuit 1	NC	Normal Close Valve
MCA	Brake Master Cylinder Circuit 2	LPA	Low Pressure Accumulator
M	Motor	FL	Front Left Wheel
P-Sensor	Pressure Sensor	RR	Rear Right Wheel
TC	Traction Control Valve	RL	Rear Left Wheel
ESV	Electronic Shift Valve	FR	Front Right Wheel
NO	Normal Open Valve		

■ 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 (EV)	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 (EV)	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 (EV)	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 (EV)	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 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

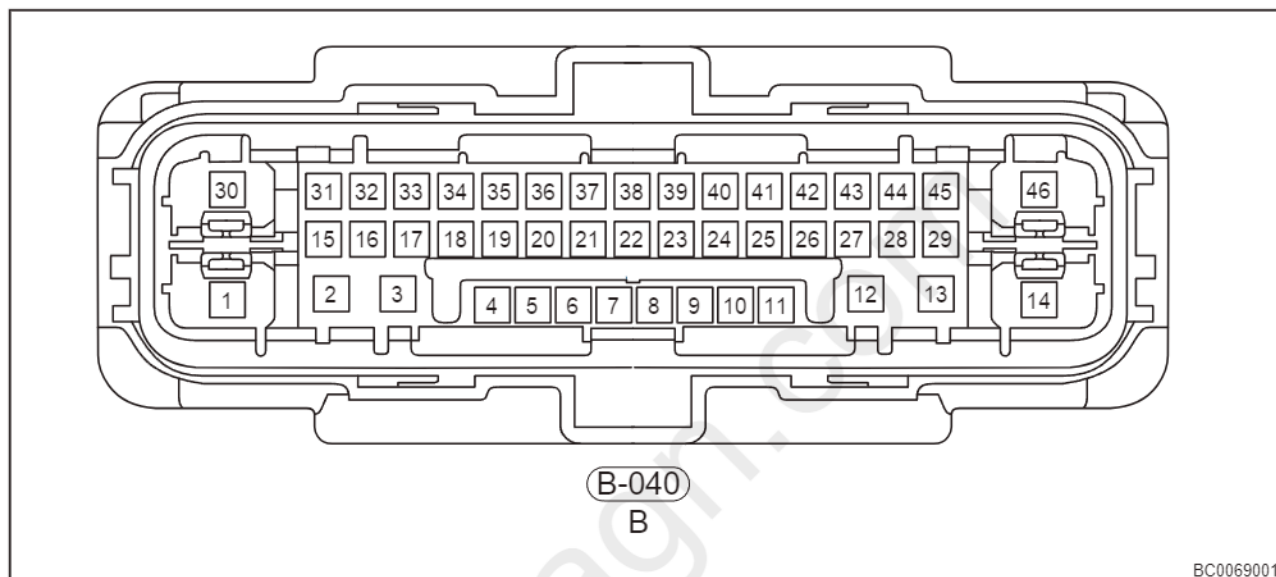
calculation, adjusts engine speed and wheel brake force. If actual movement track deviates from expected movement track, ESP control module automatically controls and applies brake to a wheel, thus correcting understeer and oversteer of vehicle, to avoid vehicle slipping, understeer, oversteer and locking,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

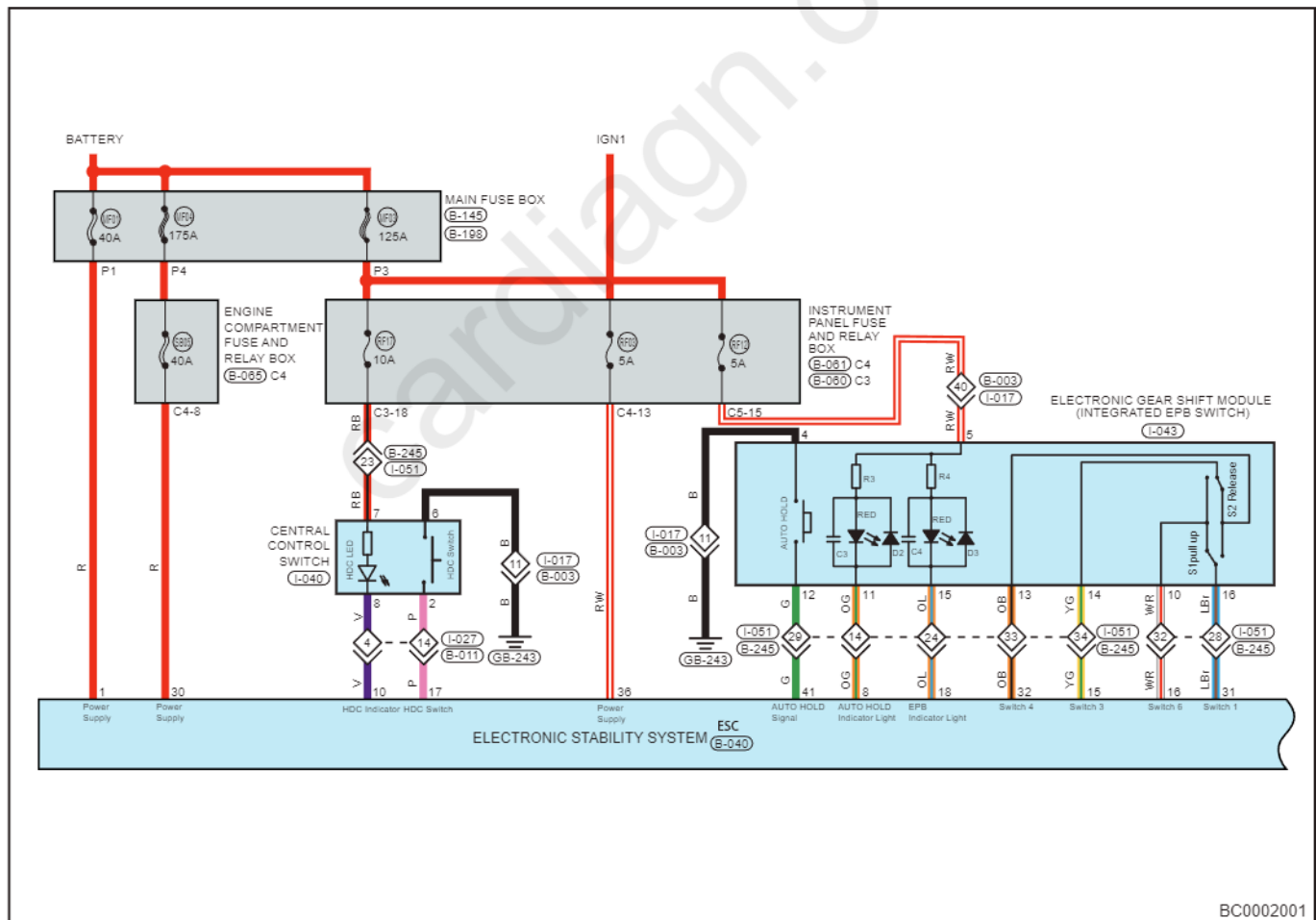


Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	KL30 Power Supply	24	Front Left Wheel Speed Sensor Power Supply
2	Right EPB Motor Power Supply	25	CHA Low
3	Right EPB Motor Ground	26	Front Right Wheel Speed Sensor Signal
4	Reserved	27	Reserved
5	CHA High	28	Reserved
6	Reserved	29	Reserved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

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

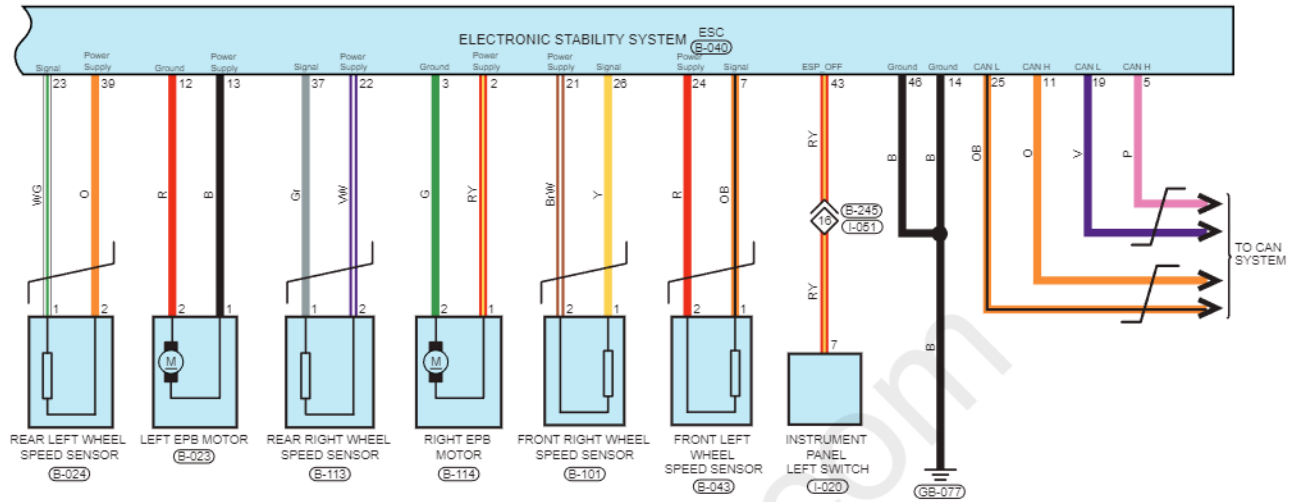
3.2 Circuit Diagram

■ Brake Control System 1



BC0002001

■ Brake 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

Symptom	Possible Cause
	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 on 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.

■ 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 for a few seconds.
- Turn ENGINE START STOP switch to ON and check the DTCs in system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

■ Intermittent DTC Troubleshooting

- 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.

■ Ground Inspection

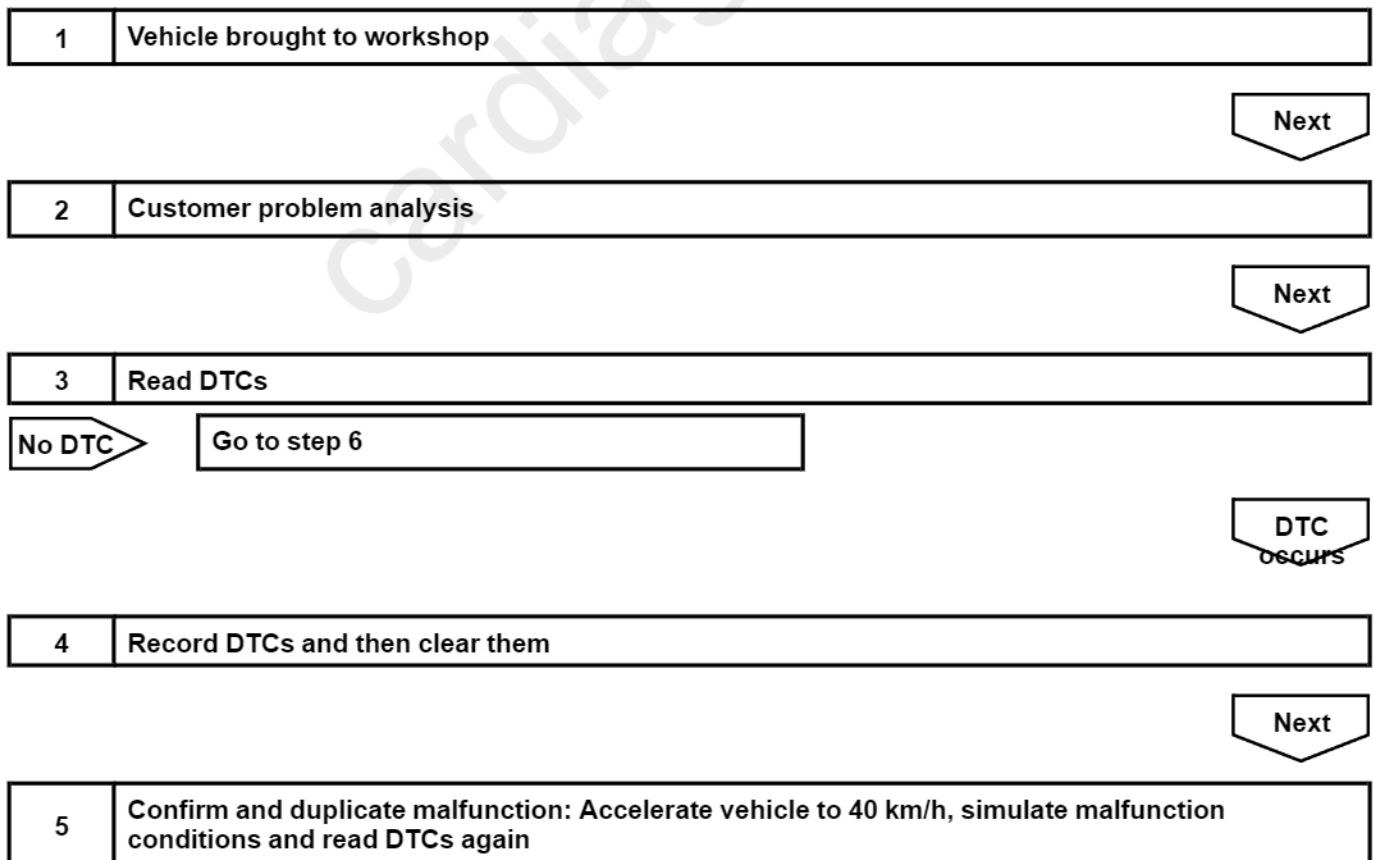
Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper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

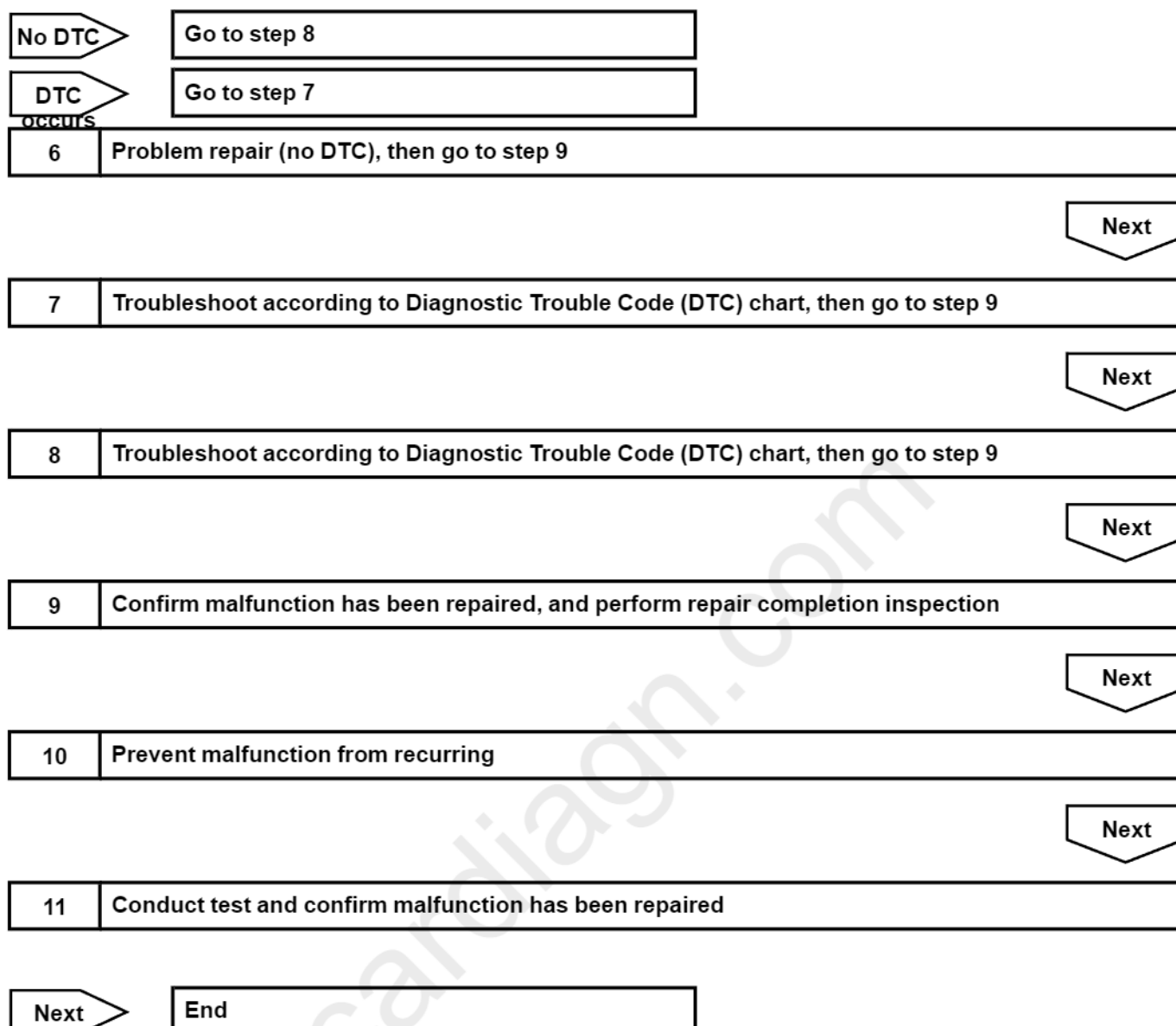
- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped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

4.3 Diagnosis Procedure

HINT:

Use following procedures to troubleshoot the system.





■ 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.

■ 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 for a few seconds.
- Turn ENGINE START STOP switch to ON and check the DTCs in system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

■ 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	Problem Simulation	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.

■ 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.

4.4 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0001-04	TCS Control Channel Changeover Valve 1 (ESP Only)	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	TCS Control Channel Changeover Valve 2 (ESP Only)			
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)	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		
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		occurs in valve driver/hardware.		
C0010-04	Front Left Input Control	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 Left Input Control			
C0014-04	Front Right Input Control			
C0015-04	Front Right Input Control			
C0018-04	Rear Left Input Control			
C0019-04	Rear Left Input Control			
C001C-04	Rear Right Input Control			
C001D-04	Rear Right Input Control			

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 UMGEn 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 problem	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	Front Left Wheel Speed Sensor 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 sensor is shorted to another sensor	- Wheel speed sensor fault - 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 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 Short to Power Supply	Short to UBATT in signal/power supply circuit		
C0031-13	Front Left Wheel Speed Sensor Open	1. Signal circuit is shorted to GND or circuit is open.		
C0031-29	Front Left Wheel Speed Sensor Signal Invalid	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	- Wheel speed sensor is faulty. - Interference and signal interference occurs. - Circuit is faulty. - It is not fixed firmly. - Fall off from bracket. - Teeth is worn or missing. - 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

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		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.		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 and then to OFF. 4. Clear DTC. 5. 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	Front Right Wheel Speed Sensor 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 sensor is shorted to another sensor	- Wheel speed sensor fault - 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 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 Short to Power Supply	Short to UBATT in signal/power supply circuit		
C0034-13	Front Right Wheel Speed Sensor 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 Invalid	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 and then to OFF. 4. Clear DTC. 5. Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.
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DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0037-00	Rear Left Wheel Speed Sensor 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 sensor is shorted to another sensor	- Wheel speed sensor fault - 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 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 Short to Power Supply	Short to UBATT in signal/power supply circuit		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0037-13	Rear Left Wheel Speed Sensor Open	Signal circuit is shorted to GND or circuit is open		
C0037-29	Rear Left Wheel Speed Sensor Signal Invalid	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 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 and then to OFF. 4. Clear DTC. 5. Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds.
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DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C003A-00	Rear Right Wheel Speed Sensor 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 sensor is shorted to another sensor	- Wheel speed sensor fault - 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 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 Short to Power Supply	Short to UBATT in signal/power supply circuit		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C003A-13	Rear Right Wheel Speed Sensor Open	Signal circuit is shorted to GND or circuit is open		
C003A-29	Rear Right Wheel Speed Sensor Signal Invalid	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 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 - Ignition switch - Clear DTCs - Perform ECU reset service and wait for 10 seconds, then drive vehicle at 50 kph for 30 seconds
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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 Angle Sensor Signal Invalid (ESP Only)	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 Wheel Angle Sensor Uncalibrated (ESP Only)	Steering wheel angle sensor uncalibrated (ESP only)	Angle sensor is not calibrated	Recalibrate the angle sensor.
C0051-64	Steering Wheel Angle Sensor Signal Abnormal (ESP Only)	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
C0061-64	Lateral Acceleration Sensor Signal Abnormal (ESP Only)	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. 3. General electrical problem occurs in yaw rate sensor.	1. Check if inertial sensor is installed incorrectly or not aligned. 2. Check the inertial sensor calibration.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C0062-64	Longitudinal Acceleration Sensor Signal Abnormal (ESP Only)	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.		
C0063-64	Yaw Rate Sensor Signal Abnormal (ESP Only)	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).		
C0063-01	Yaw Rate Sensor General Electrical Fault	Yaw rate sensor general electrical fault		
C0063-54	Yaw Rate Sensor Uncalibrated	Yaw rate sensor uncalibrated		
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C008904	Switch Fault (ESP (-IEPB) OFF Switch or AVH Switch Long Pressed)	The pressing time for AVH/PATA button exceeds the specified time	1. Switch is pressed and held for a long time. 2. Switch is stuck.	Make sure button is not pressed for a long time

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1000-16	ECU Voltage Too Low	The power supply voltage of ECU is lower than 9.6 V for 1 second	- Power supply fault - Circuit fault	- Check fuse - Measure battery voltage - Check charging system - Check wire harness or connector - Check ESP control module
C1000-17	ECU Voltage Too High	The power supply of ECU is higher than 16.5 V for 1 second		
C1001-04	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 and then to OFF. 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 current source of driver ASIC used for valve coil resistance measurement is not equal to the required source current, a fault will be set.	- 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 and then to OFF. b. 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.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
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.
C1009-00	ECU Hardware Related Fault	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	TCS Control Channel Changeover Valve 1 (ESP Only)
C0002-04	TCS Control Channel Changeover Valve 2 (ESP Only)
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)

DTC	DTC Definition
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
C0010-04	Front Left Input Control
C0011-04	Front Left Input Control
C0014-04	Front Right Input Control
C0015-04	Front Right Input Control
C0018-04	Rear Left Input Control
C0019-04	Rear Left Input Control
C001C-04	Rear Right Input Control
C001D-04	Rear Right Input Control

1 Check intermittent fault

- (a) Wait for 120 seconds, turn the ignition switch to ON and then to OFF.
 (b) Clear DTC service 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 SB05 (40A) and main relay box MF01 (40A) from engine compartment fuse box.
 (d) Check if fuse is blown.

NG

Check and repair or replace corresponding fuse

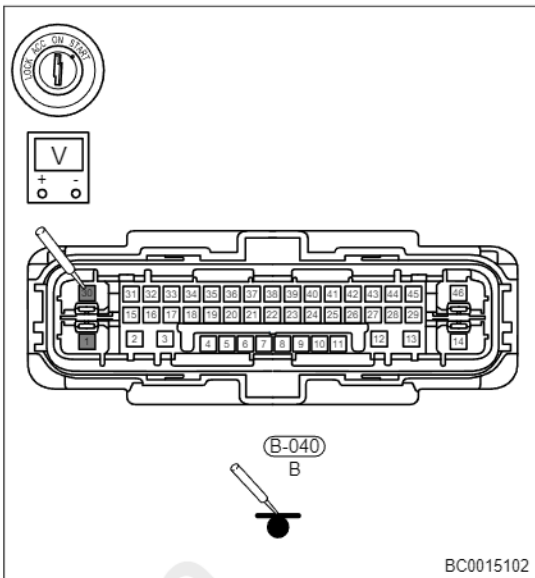
OK

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-040.
- (d) Check if related wire harnesses are worn, pinched or broken.
- (e) Check if related connector terminals are loose, broken, bent or corroded.
- (f) Using a digital multimeter, measure if voltage between ESP module assembly connector B-040 (1, 30) and body ground is normal according to table below.

Standard Voltage

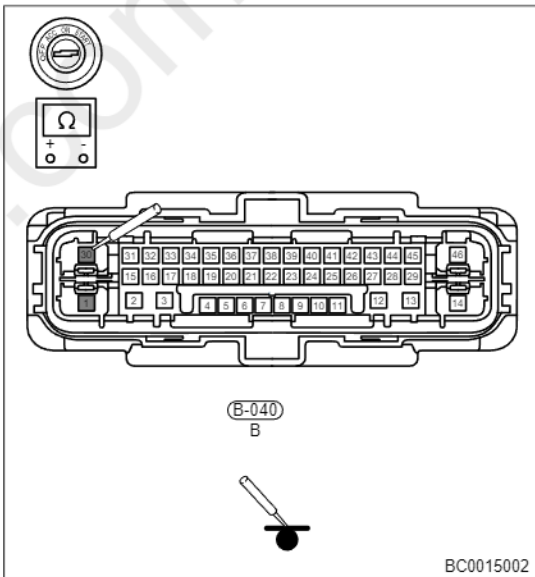
Multimeter Connection	Condition	Specified Condition
B-040 (1, 30) - Body ground	Always	$\geq 12\text{ V}$



- (g) Using a digital multimeter, check for normal continuity between ESP module assembly connector B-040 (1, 30) and body ground according to table below.

Normal Resistance

Multimeter Connection	Condition	Specified Condition
B-040 (1) - Body ground	Always	$\leq 1\ \Omega$
B-047 (30) - Body ground	Always	$\leq 1\ \Omega$



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

DTC	DTC Definition
C002004	Return Pump Fault
C002001	Return Pump Power Supply Motor Relay Fault 1

⚠ Caution

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

1 Check for DTCs

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

NG

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

OK

2 Check fuse

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Remove MF-01 (40 A) from main fuse box.
- (d) Check if fuse is blown.

NG

Replace fuse MF-01

OK

3 Check wire harness and connector

Use circuit diagram as a guide to perform following procedures:

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP(IEPB) control module connector B -040.
- (d) Check wire harness between terminal P1 of main fuse box connector B-145 and terminal 1 of ESP (IEPB) control module assembly.
- (e) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (f) Check for broken, bent, protruded or corroded terminals.
- (g) Using a multimeter, check for continuity in wiring harness between main fuse box P1 and ESP (IEPB) controller.

NG

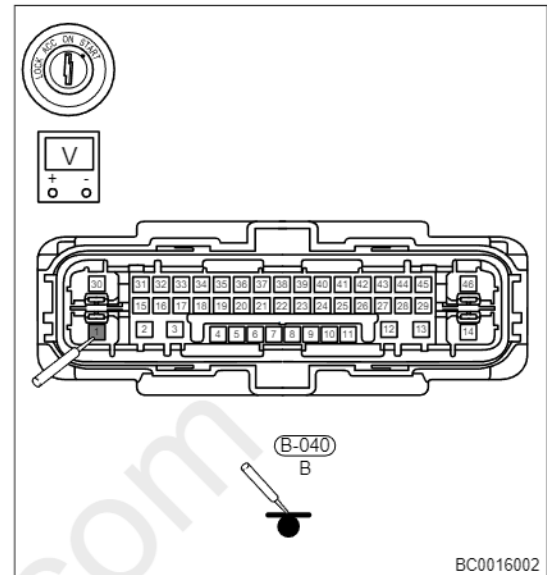
Repair or replace body wire harness and connector

OK

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

- Connect the negative battery cable.
- Turn ENGINE START STOP switch to OFF.
- Disconnect the ESP (IEPB) control module connector B-040.
- Turn ENGINE START STOP switch to ON.
- 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-040 (1) - Body ground (digital multimeter)	Always	Not less than 12 V
B-040 (1) - Body ground (test light 21 W)	Always	On



NG

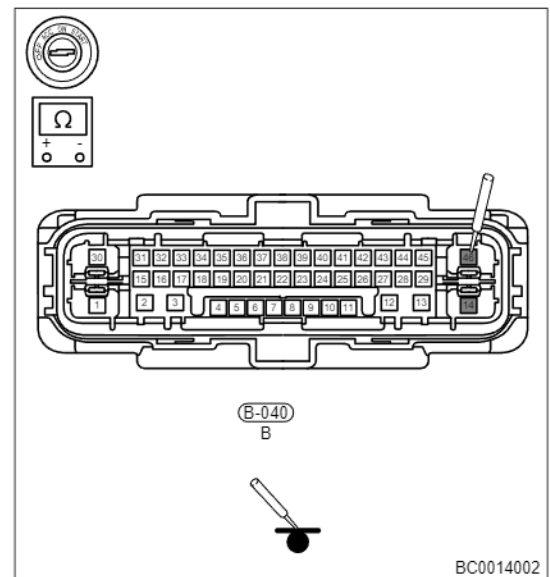
Repair or replace body wire harness and connector

OK

5 Check ground circuit of ESP (IEPB) control module

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the ESP (IEPB) control module connector B-040.
- 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-040 (14) - Body ground	Always	$\leq 1 \Omega$
B-040 (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

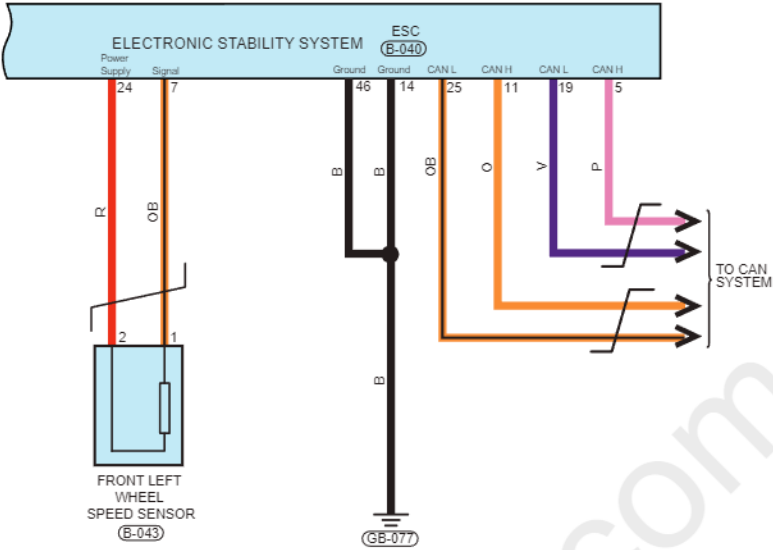
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Replace ESP (IEPB) control module assembly

■ Front Left Wheel Speed Sensor Fault**Description**

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

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the front left wheel speed sensor connector B-043.
- (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 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

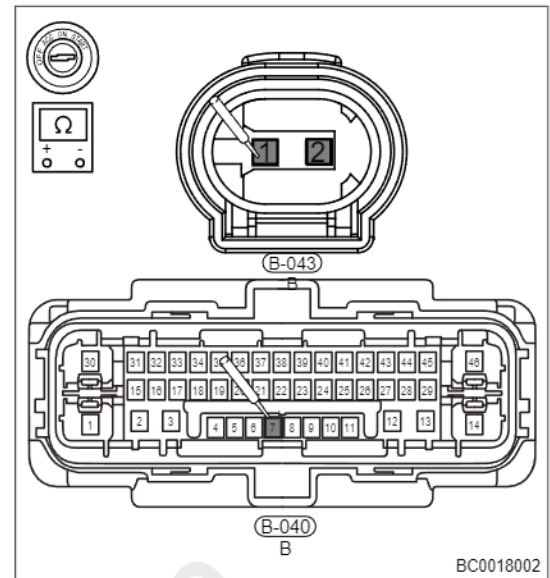
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Check wire harness and connector (front left wheel speed sensor - ESP (IEPB) control module)

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the ESP (IEPB) control module connector B-040.
- (d) Disconnect the front left wheel speed sensor connector B-043.

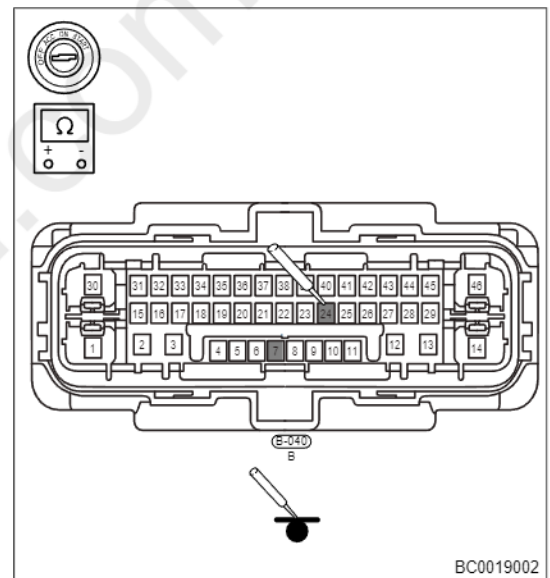
- (e) Using a digital multimeter, check for continuity between terminals of connector B-040 and connector B-043 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-040 (7) - B-043 (1)	Always	$\leq 1 \Omega$
B-040 (24) - B-043 (2)	Always	$\leq 1 \Omega$
B-040 (7) - B-043 (2)	Always	∞
B-040 (24) - B-043 (1)	Always	∞



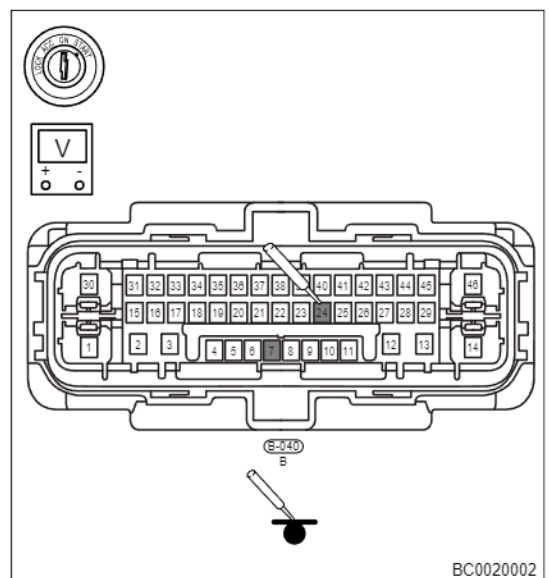
- (f) Using a digital multimeter, check for continuity between connector B-040 and body ground to check if front left wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-040 (7) - Body ground	Always	∞
B-040 (24) - Body ground	Always	∞



- (g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Using voltage band of digital multimeter, measure voltage between connector B-040 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-040 (7) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-040 (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

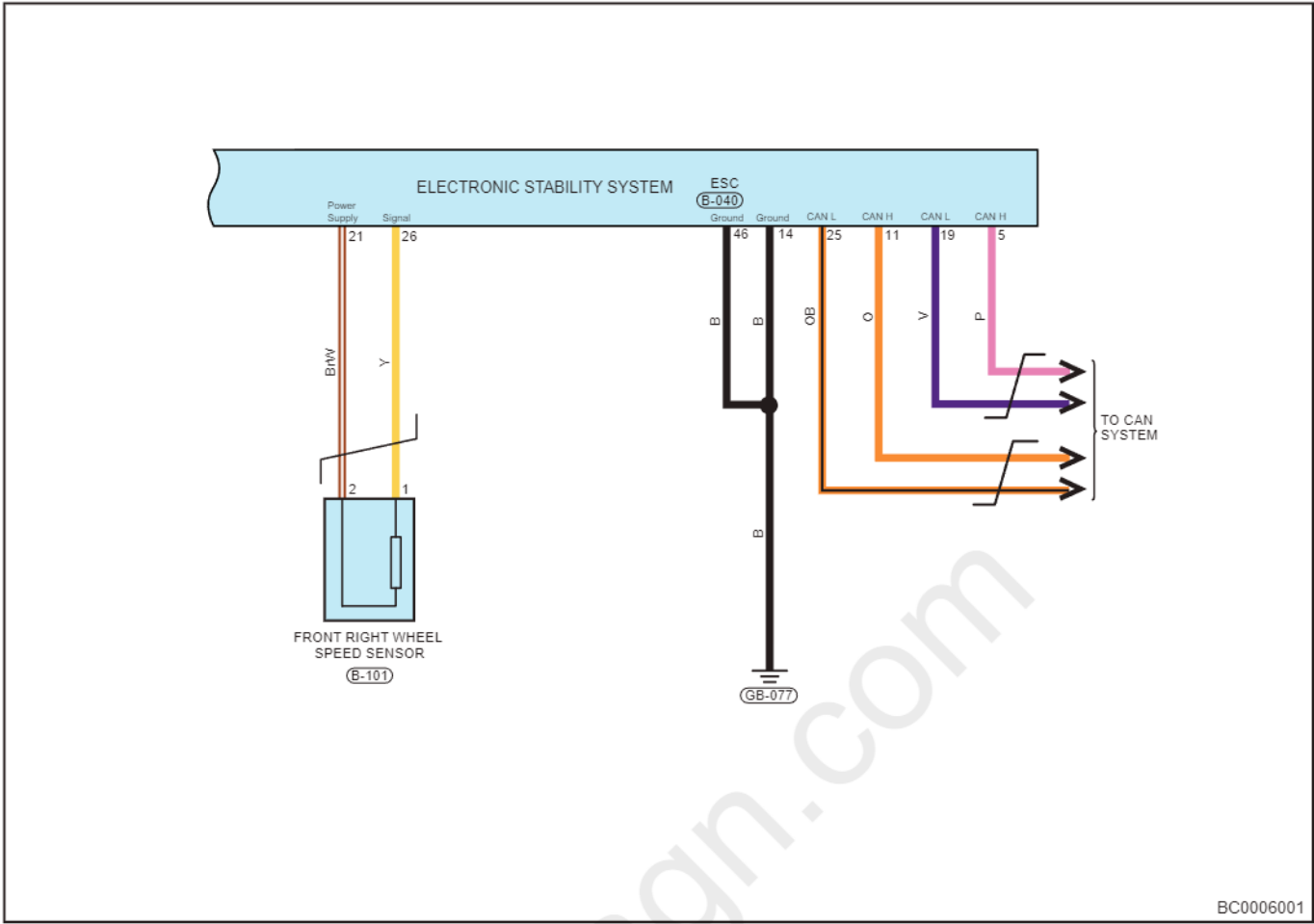
Replace ESP (IEPB) control module assembly

■ **Front Right Wheel Speed Sensor Fault**

Description

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

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the front right wheel speed sensor connector B-101.
- (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 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

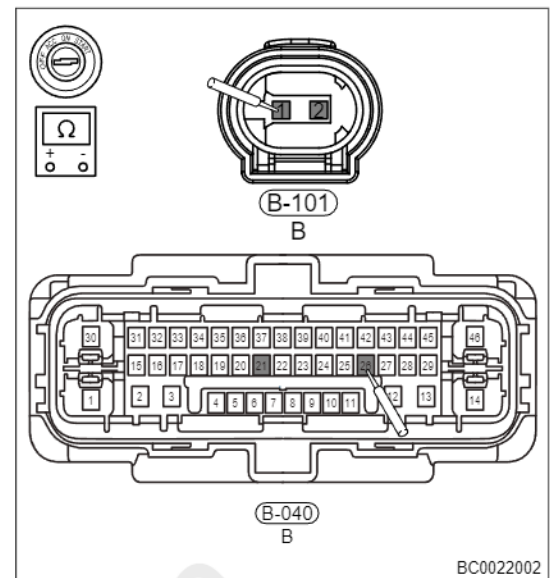
5

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-040.
- (d) Disconnect the front right wheel speed sensor connector B-101.

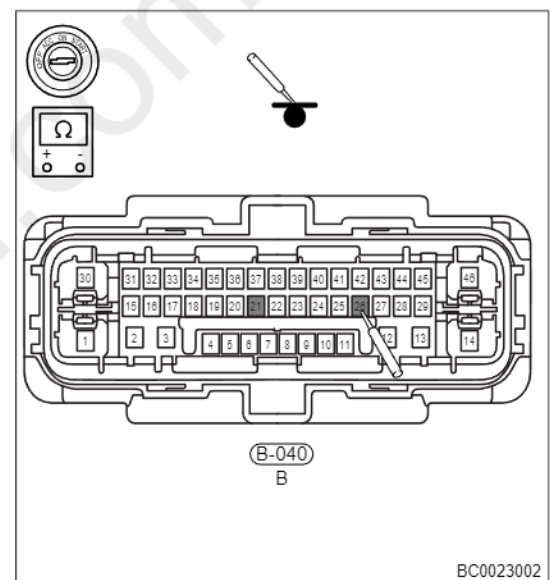
- (e) Using a digital multimeter, check for continuity between terminals of connector B-040 and connector B-101 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-040 (26) - B-101 (1)	Always	$\leq 1 \Omega$
B-040 (21) - B-101 (2)	Always	$\leq 1 \Omega$
B-040 (21) - B-101 (2)	Always	∞
B-040 (26) - B-101 (1)	Always	∞



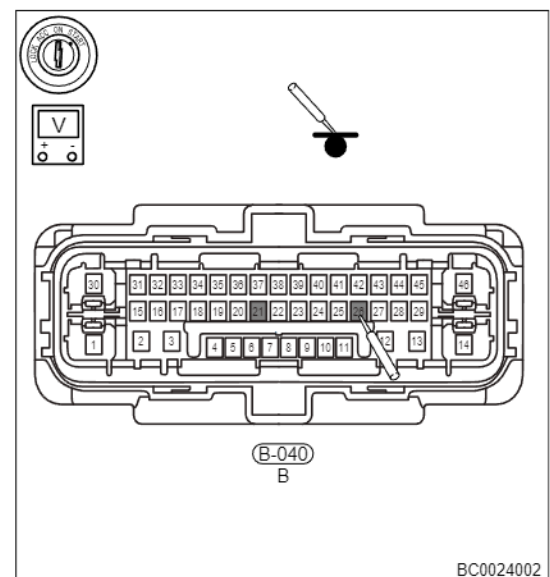
- (f) Using a digital multimeter, check for continuity between connector B-040 and body ground to check if front right wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-040 (21) - Body ground	Always	∞
B-040 (26) - Body ground	Always	∞



- (g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Using a digital multimeter, measure voltage between connector B-040 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-040 (21) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-040 (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

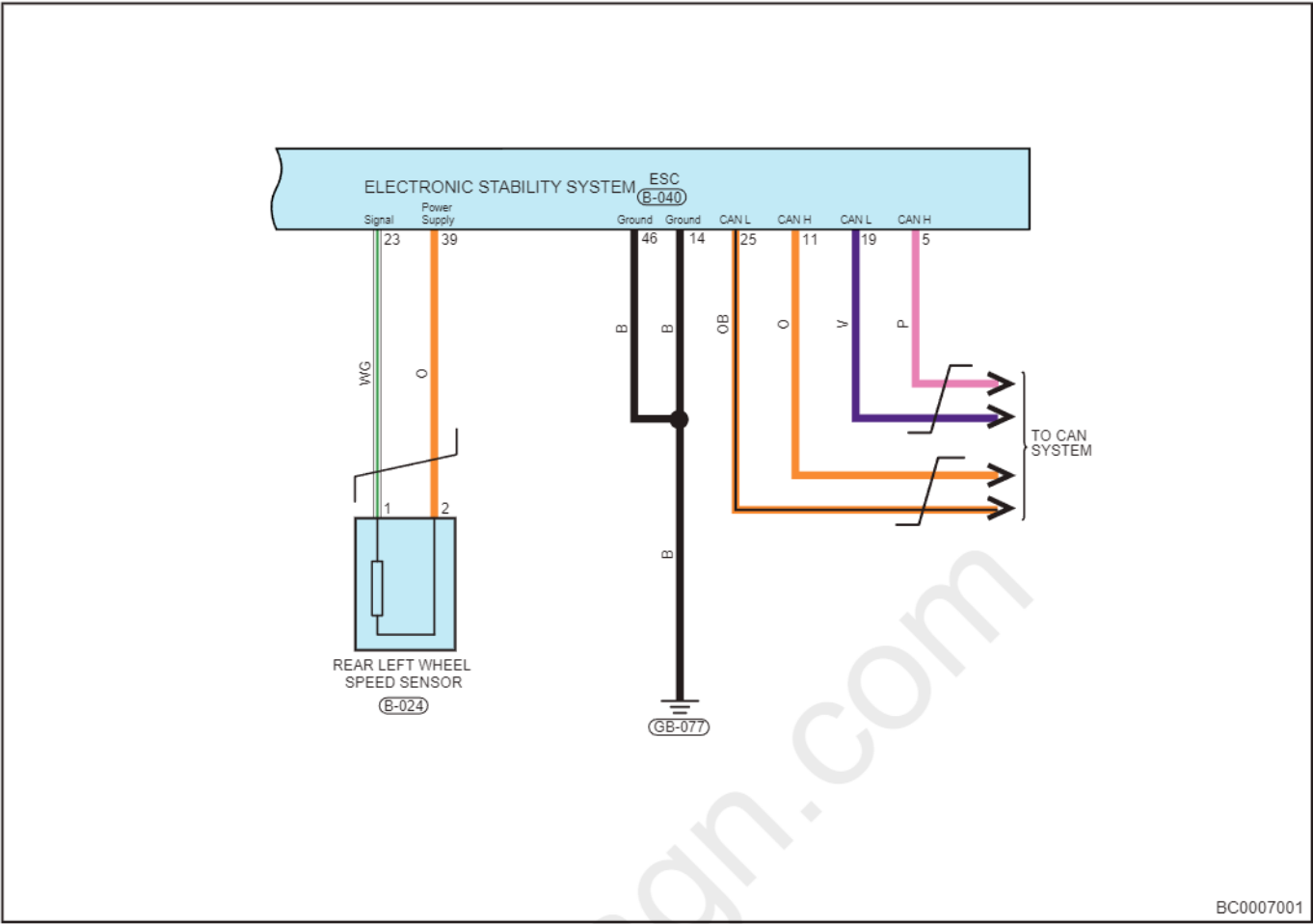
Replace ESP (IEPB) control module assembly

■ **Rear Left Wheel Speed Sensor Fault**

Description

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

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the rear left wheel speed sensor connector B-024.
- (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 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

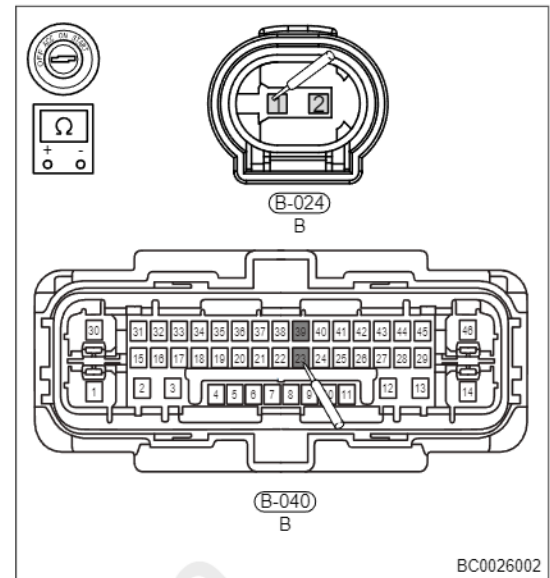
5

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-040.
- (d) Disconnect the rear left wheel speed sensor connector B-024.

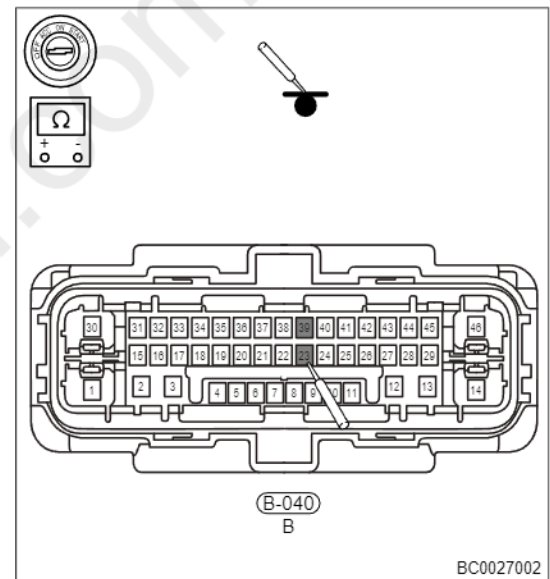
- (e) Using a digital multimeter, check for continuity between terminals of connector B-040 and connector B-024 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B-040 (23) - B-024 (1)	Always	$\leq 1 \Omega$
B-040 (39) - B-024 (2)	Always	$\leq 1 \Omega$
B-040 (39) - B-024 (2)	Always	∞
B-040 (23) - B-024 (1)	Always	∞



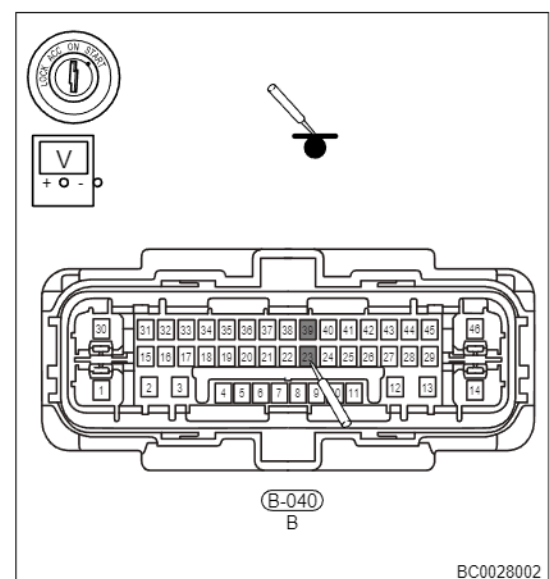
- (f) Using a digital multimeter, check for continuity between connector B-040 and body ground to check if rear left wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B-040 (23) - Body ground	Always	∞
B-040 (39) - Body ground	Always	∞



- (g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Using a digital multimeter, measure voltage between connector B-040 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-040 (23) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B-040 (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

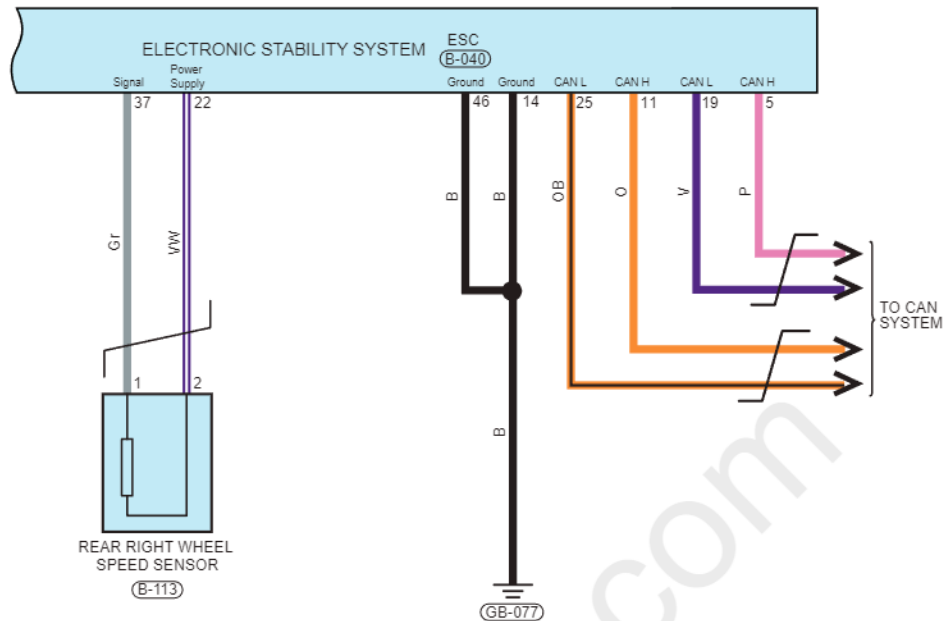
Replace ESP (IEPB) control module assembly

■ **Rear Right Wheel Speed Sensor Fault**

Description

DTC	DTC Definition
C003A-00	Rear Right Wheel Speed Sensor Fault
C003A-09	Rear Right Wheel Speed Sensor Component Fault
C003A-11	Rear Right Wheel Speed Sensor Short to Ground
C003A-12	Rear Right Wheel Speed Sensor Short to Power Supply
C003A-13	Rear Right Wheel Speed Sensor Open
C003A-29	Rear Right Wheel Speed Sensor Signal Invalid
C003A-37	Rear Right Wheel Speed Sensor Signal Out of Range
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-113.
- 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

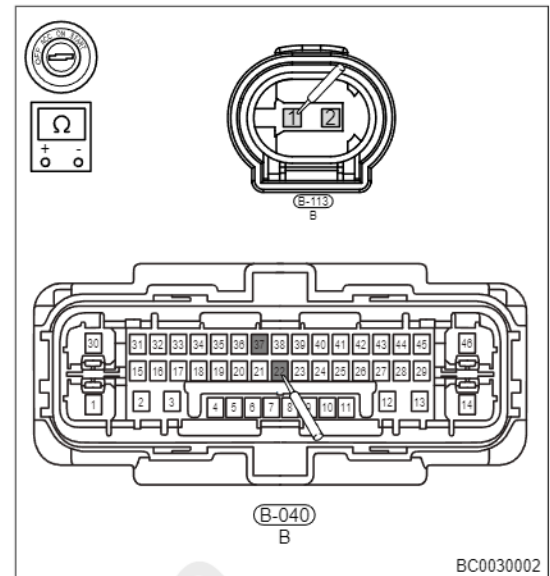
OK

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-040.
- (d) Disconnect the rear right wheel speed sensor connector B-113.

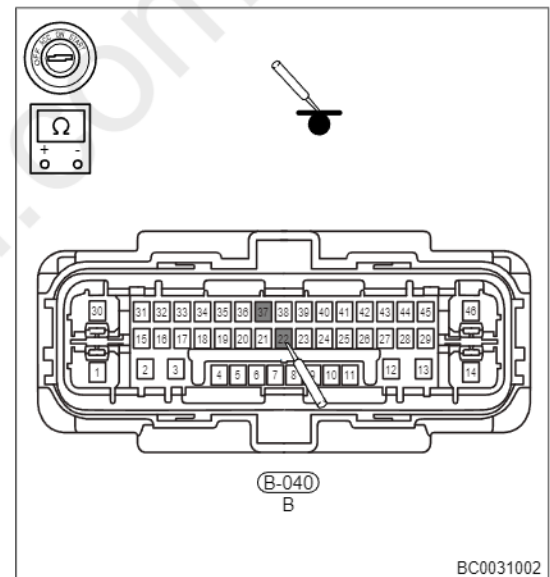
- (e) Using a digital multimeter, check for continuity between terminals of connector B-040 and connector B-113 to check if there is an open in the wire harness and connector according to table below.

Multimeter Connection	Condition	Specified Condition
B040 (37) - B113 (1)	Always	$\leq 1 \Omega$
B040 (22) - B113 (2)	Always	$\leq 1 \Omega$
B040 (22) - B113 (2)	Always	∞
B040 (37) - B113 (1)	Always	∞



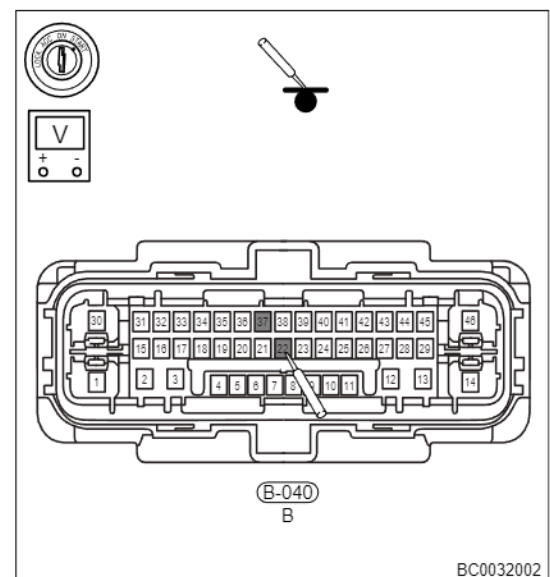
- (f) Using a digital multimeter, check for continuity between connector B-040 and body ground to check if rear right wheel speed sensor is short to ground.

Multimeter Connection	Condition	Specified Condition
B040 (37) - Body ground	Always	∞
B040 (22) - Body ground	Always	∞



- (g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Using a digital multimeter, measure voltage between connector B-040 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
B040 (22) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
B040 (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

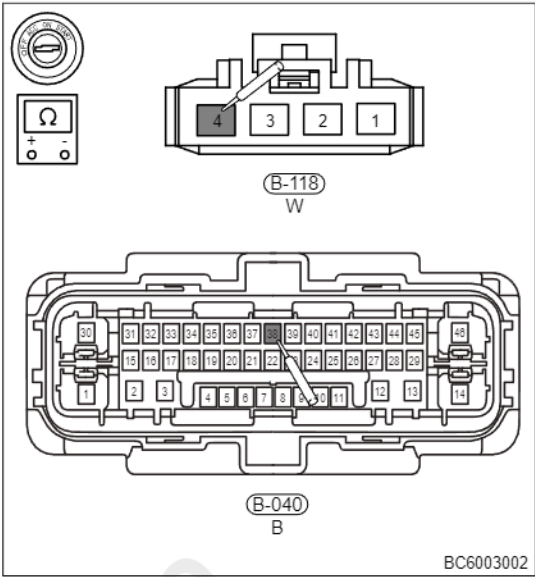
2

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-040.
- (d) Disconnect the brake switch connector B-118.
- (e) Check if related wire harnesses are worn, pinched or broken.
- (f) Check if related connector terminals are loose, broken, bent or corroded.
- (g) Using a digital multimeter, check for normal continuity between ESP (IEPB) module assembly connector B-040 (38) and brake switch connector B-118 (4) according to table below.

OK

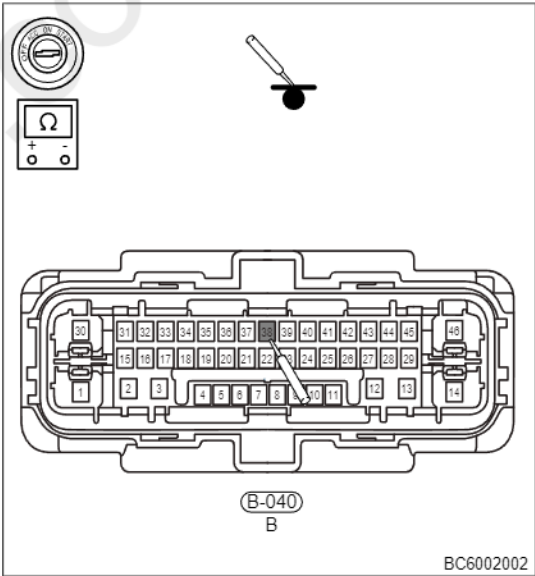
Multimeter Connection	Specified Condition
B-040 (38) - B-118 (4)	$\leq 1 \Omega$



(h) Using a digital multimeter, check for normal continuity between ESP (IEPB) module assembly connector B-040 (38) and body ground according to table below.

OK

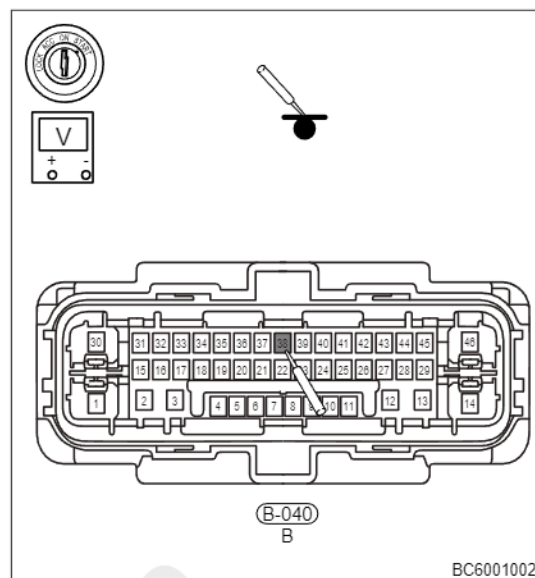
Multimeter Connection	Specified Condition
B-040 (38) - Body ground	∞



- (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-040 (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

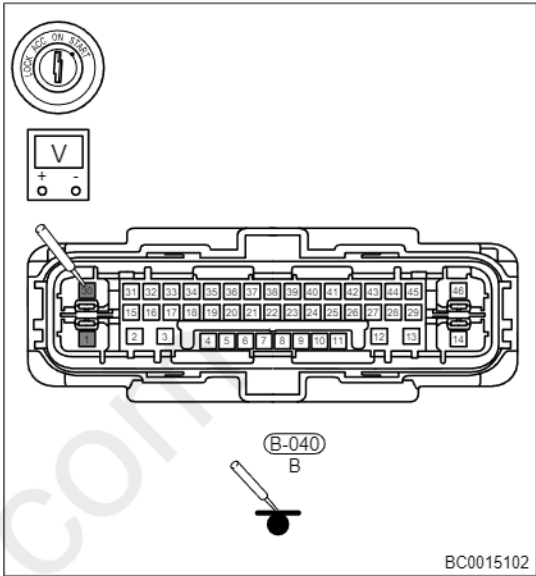
NG

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-040.
- (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-040 (1, 30) and body ground is normal according to table below.

OK

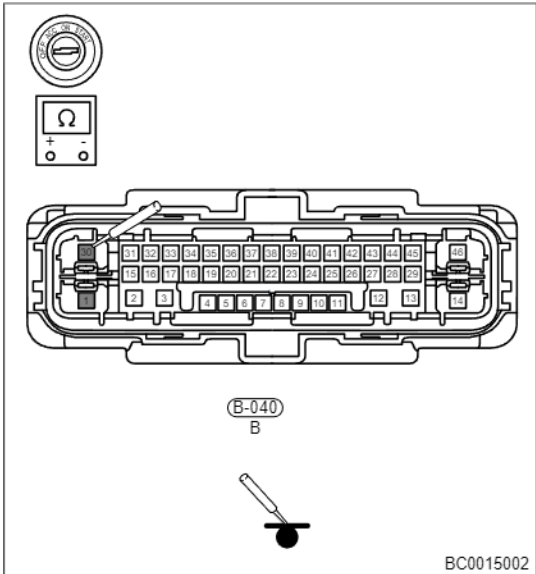
Multimeter Connection	Specified Condition
B-040 (1, 30) - Body ground	$\geq 12\text{ V}$



- (f) Using a digital multimeter, check for continuity between ESP (IEPB) module assembly connector B-040 (1, 30) and body ground according to table below.

OK

Multimeter Connection	Specified Condition
B-040 (1) - Body ground	$\leq 1\ \Omega$
B-040 (30) - Body ground	$\leq 1\ \Omega$



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 Wheel Angle Sensor Fault

Description

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

⚠ 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

- 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

Steering angle sensor is not calibrated

OK

2 Check fuse

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Check if fuse RF16 5A in instrument panel fuse and relay box B-144 is blown.

NG

Replace fuse RF16

OK

3 Check wire harness and connector

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the steering angle sensor connector I-004.
- 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

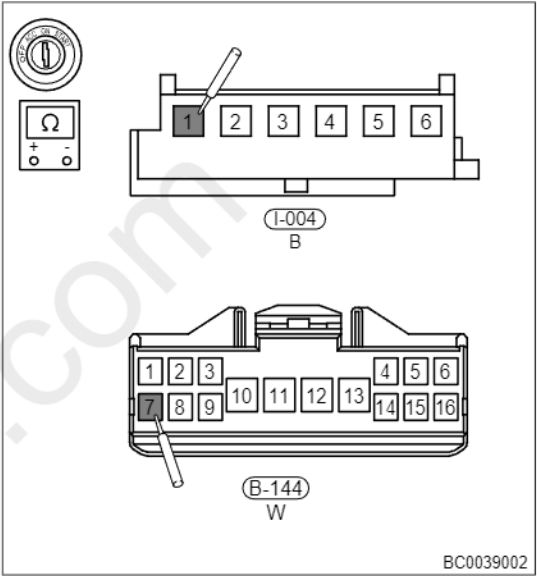
Repair or replace instrument panel wire harness and connector

OK

4 Check steering angle sensor power supply and instrument panel fuse and relay box B-144

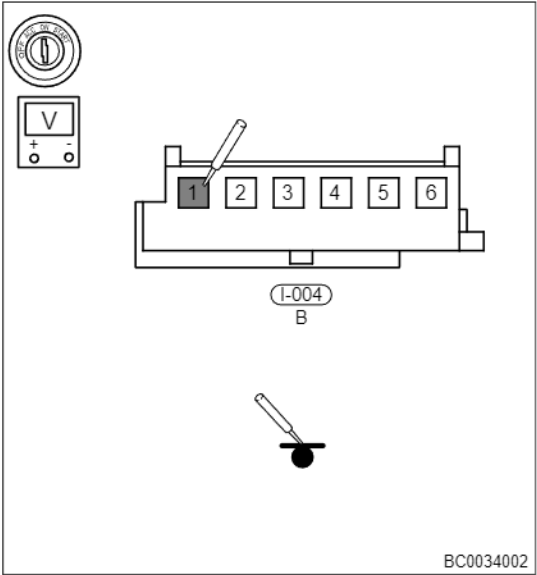
- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the instrument panel fuse box connector B-144.
- (c) Check if terminal of instrument panel fuse box connector is deformed, bent or loose.
- (d) Using a multimeter, check for continuity between wire harness terminal C4-4 of instrument panel fuse box B-144 and terminal A1 of steering angle sensor connector I-004.

Multimeter Connection	Condi-tion	Specified Condition
I-004 (A1) - B-144 (C5-7)	Always	≤ 1 Ω



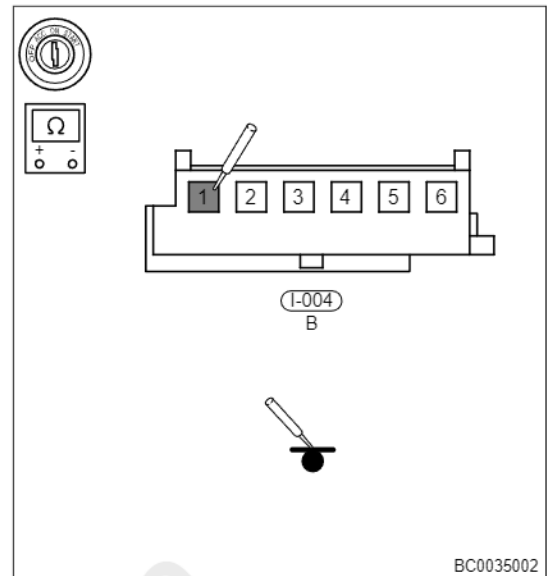
- (e) Turn ENGINE START STOP switch to ON.
- (f) Using a multimeter, measure if there is 12 V power supply voltage for connector terminal I-004 (A1) of steering angle sensor.

Multimeter Connection	Condi-tion	Specified Condition
I-004 (A1) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
I-004 (A1) - Body ground (test light 21 W)	ENGINE START STOP switch ON	On



- (g) Using a multimeter, check for continuity between steering angle sensor connector I-004 (A1) and ground to check if it is short to ground.

Multimeter Connection	Condition	Specified Condition
I-004 (A1) - Body ground	Always	∞



NG

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

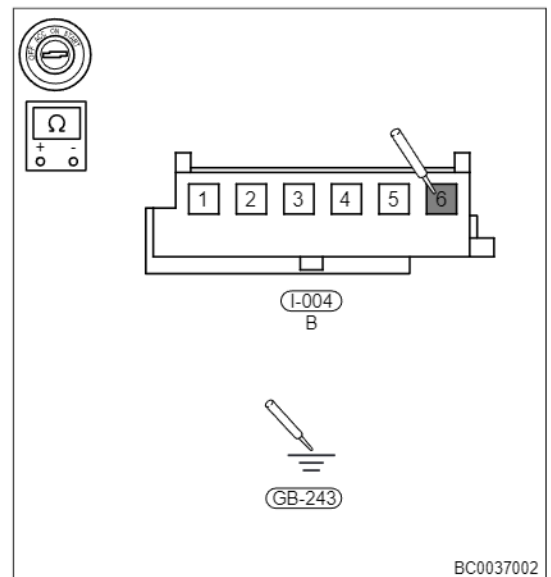
OK

5

Check ground wire harness and CAN wire of steering angle sensor

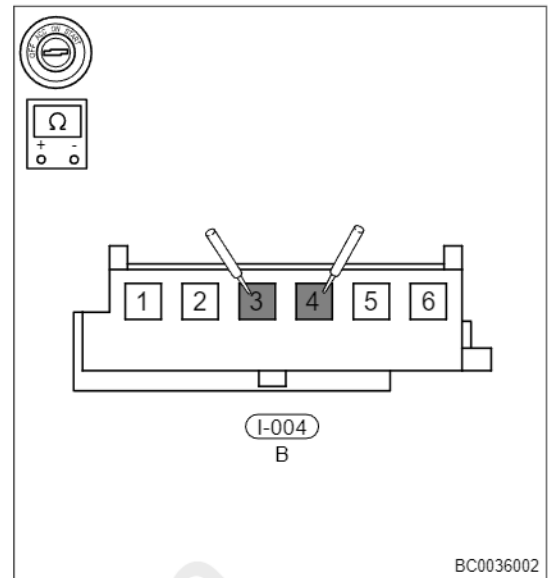
- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the steering angle sensor connector I-004.
 (c) Using a multimeter, check for continuity between wire harness connector I-004 (A6) of steering angle sensor and ground point GB-243.

Multimeter Connection	Condition	Specified Condition
I-004 (A6) - GB-243	Always	$\leq 1 \Omega$



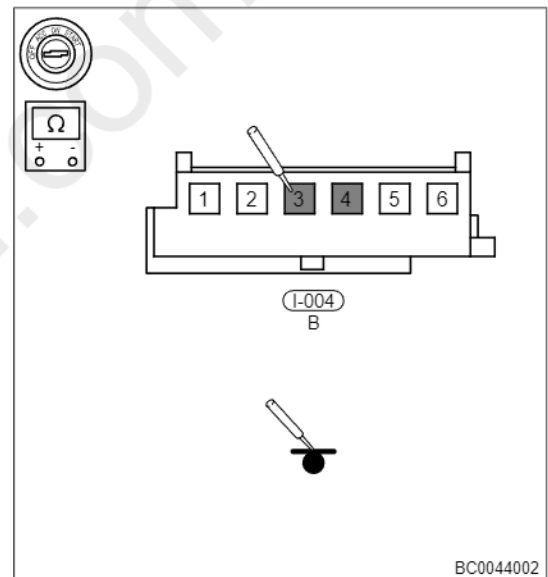
- (d) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.
- (e) Using a digital multimeter, check if connection between steering angle sensor and CAN communication line is normal according to table below (measure terminal resistance from CAN node).

Multimeter Connection	Condition	Specified Condition
I-004 (3) - I-004 (4)	Always	$\approx 60 \Omega$



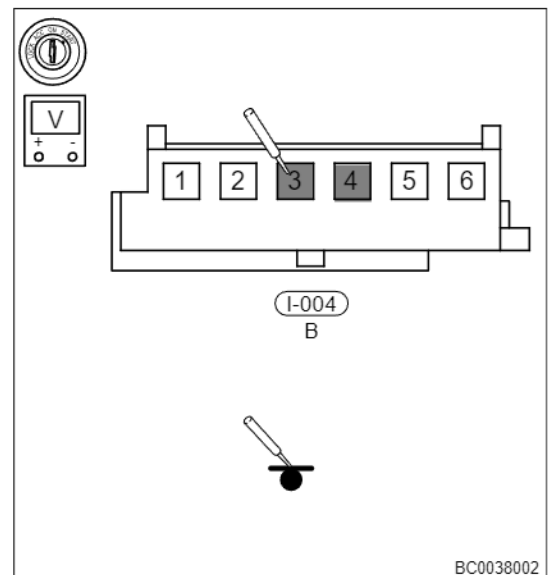
- (f) Using a digital multimeter, check if CAN circuit connected to steering angle sensor is short to body ground.

Multimeter Connection	Condition	Specified Condition
I-004 (3) - Body ground	Always	∞
I-004 (4) - Body ground	Always	∞



- (g) Connect the negative battery cable.
- (h) Turn ENGINE START STOP switch to ON.
- (i) Using a digital multimeter, check if voltage of steering angle sensor I-004 CAN (3) (4) wire harness is normal.

Multimeter Connection	Condition	Specified Condition
I-040 (3) - Body ground	Always	1.5 - 2.5 V
I-040 (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
C0061-64	Lateral Acceleration Sensor Signal Abnormal (ESP Only)
C0062-64	Longitudinal Acceleration Sensor Signal Abnormal (ESP Only)
C0063-64	Yaw Rate Sensor Signal Abnormal (ESP Only)
C0063-01	Yaw Rate Sensor General Electrical Fault
C0063-54	Yaw Rate Sensor Uncalibrated

⚠ 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 (ESP (IEPB) 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
---	-------------------------

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

NG	Replace ESP (IEPB) switch
----	---------------------------

OK

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

NG	Replace related fuse
----	----------------------

OK

3	Check wire harness and connector
---	----------------------------------

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- 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.

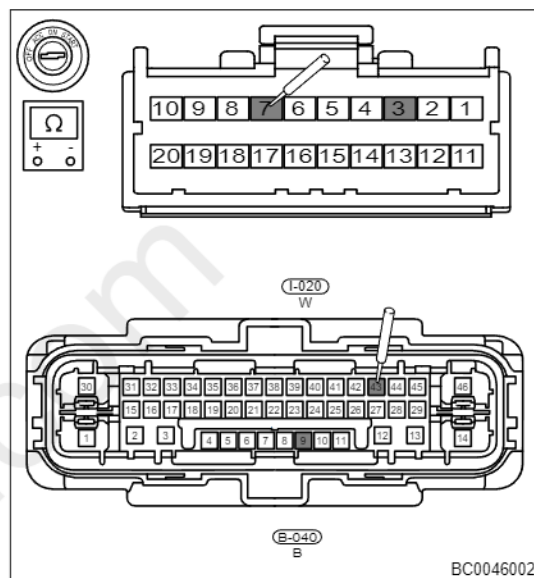
NG	Repair or replace body/instrument panel wire harness and connector
----	--

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-040.
 (d) Disconnect the ESP (IEPB) switch connector I-020.
 (e) Using a digital multimeter, check for continuity between terminals of connector B-040 and connector I-020 to check if there is an open circuit in wire harness.

Multimeter Connection	Condition	Specified Condition
B-040 (43) - I-020 (7)	Always	$\leq 1 \Omega$
B-040 (9) - I-020 (3) (low configuration)	Always	$\leq 1 \Omega$



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

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

OK

System operates normally

NG

Replace ESP (IEPB) module assembly

■ ECU Power Supply and Hardware Fault

Description

DTC	DTC Definition
C1000-16	ECU Voltage Too Low
C1001-04	ECU Fault (General Software Problem)
C2202-49	CAN Hardware Fault
C1000-17	ECU Voltage Too High

⚠ Caution

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

1 Check fuse

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check fuses MF01 40A and MF04 175A in main fuse and relay box B-145 and fuse SB05 30A in engine compartment fuse box B-065.
- (d) Check if fuse is blown.

NG

Replace fuse

OK

2 Check battery voltage

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

NG

Replace battery

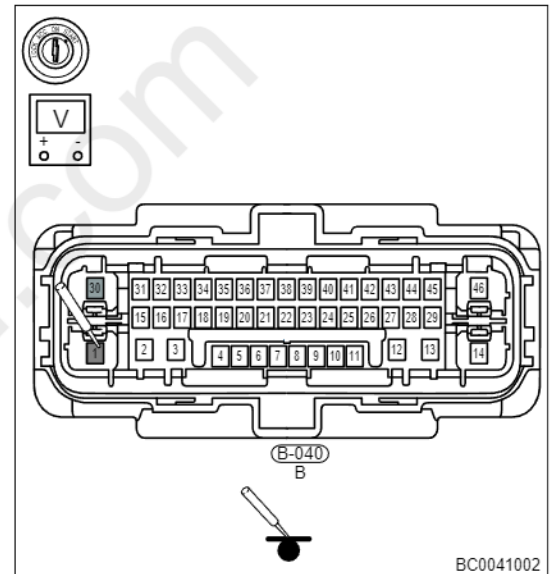
OK

3

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

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the negative battery cable.
 (c) Disconnect the ESP (IEPB) control module assembly connector B-040.
 (d) Connect the negative battery cable.
 (e) Turn ENGINE START STOP switch to ON.
 (f) Using a digital multimeter, measure power supply voltage between ESP (IEPB) control module assembly connector B-040 and body ground to check if power supply circuit is normal.

Multimeter Connection	Condition	Specified Condition
B040 (1) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
B040 (1) - Body ground (test light 21 W)	ENGINE START STOP switch ON	On
B040 (30) - Body ground (digital multimeter)	ENGINE START STOP switch ON	Not less than 12 V
B040 (30) - Body ground (test light 21 W)	ENGINE START STOP switch ON	On



NG

Repair or replace related wire harness and connector

OK

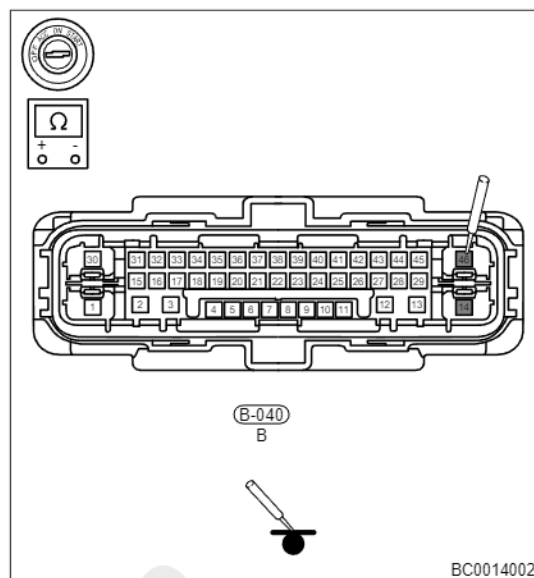
4

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-040.

- (d) Using a digital multimeter, check for continuity between ESP (-IEPB) module connector B-040 (46) (14) and ground GB-077 to check if ground circuit is normal.

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



NG

Repair or replace 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)
C1009-00	ECU Hardware Related Fault
C0061-64	Lateral Acceleration Sensor Signal Abnormal (ESP Only)

⚠ 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

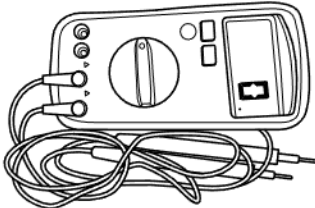
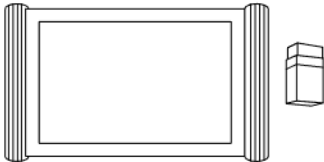
OK

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.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Drain the brake fluid.

Hint:

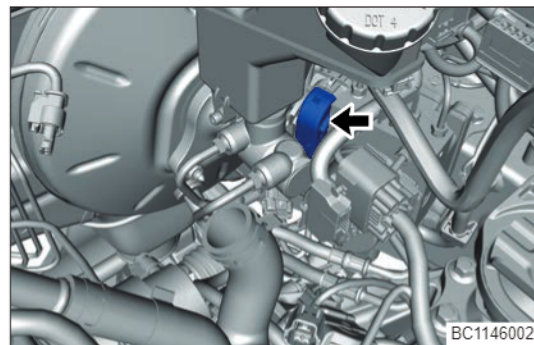
- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Warning

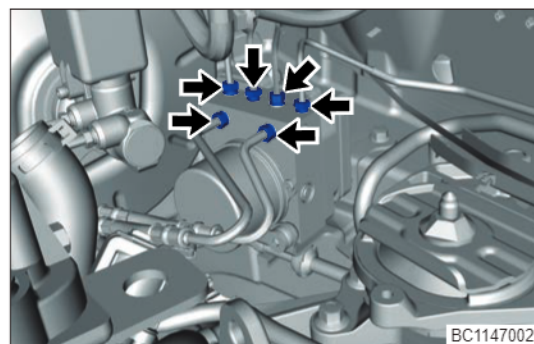
- Wash off brake fluid immediately if it comes in contact with any paint surface.

- (4) Remove the engine compartment left trim cover assembly.
- (5) Remove the air filter assembly.
- (6) Remove the battery.
- (7) Remove the battery tray assembly.
- (8) Remove the ESP (IEPB)/ESP control module assembly.

a. Disconnect the ESP (IEPB)/ESP control module assembly connector (arrow).



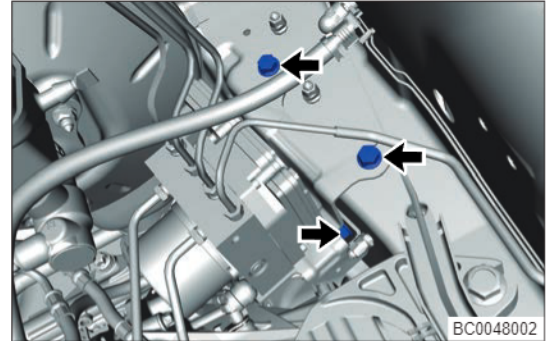
b. Using a fixing wrench, carefully disconnect 6 brake pipe coupling bolts (arrow).



⚠ 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 from entering.

c. Remove 3 fixing bolts (arrow) between ESP (IEPB)/ESP control module assembly and mounting bracket.

**⚠ Warning**

- When installing, pre-tighten bolt at upper opening first and then align mounting hole of ESP module with bracket and mounting hole of body left side member.
- Tighten upper mounting bolts one by one and then tighten lower mounting bolts one by one.

■ Installation

- (1) Install 3 fixing bolts between ESP (IEPB)/ESP control module assembly and mounting bracket.

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

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

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

- (3) Connect the ESP (IEPB)/ESP control module assembly connector.
- (4) Install the battery tray assembly.
- (5) Install the battery.
- (6) Install the air filter assembly.
- (7) Fill brake fluid and drain air.
- (8) Install the engine compartment left trim cover assembly.

⚠ 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.

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.

5.4 Front Wheel Speed Sensor (Take Front Left Wheel as Example)

■ Removal

 Warning

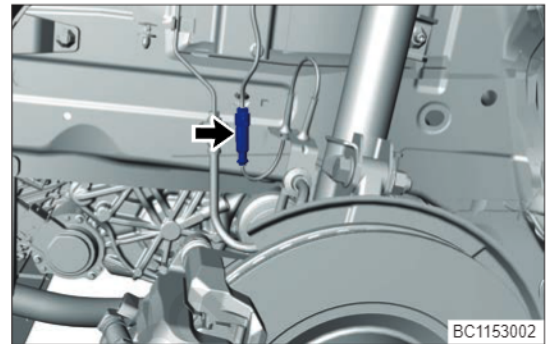
- Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.

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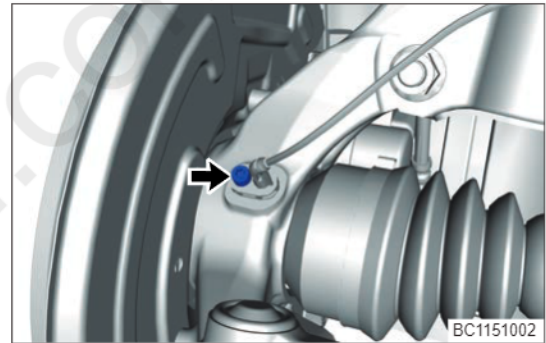
Hint:

- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
 - (2) Disconnect the negative battery cable.
 - (3) Remove the front left wheel.
 - (4) Remove the front left wheel speed sensor.

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



b. Remove fixing bolt (arrow) between front left wheel speed sensor and front left steering knuckle assembly, and disengage front left wheel speed sensor carefully.



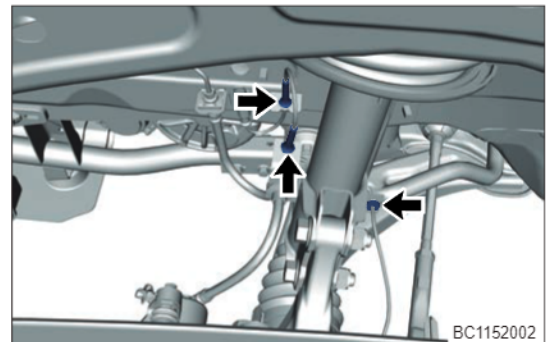
Caution

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

c. Detach attachment parts (arrow) of front left wheel speed sensor wire harness.

Hint:

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



d. Remove the front left wheel speed sensor.

■ 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.
- (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.

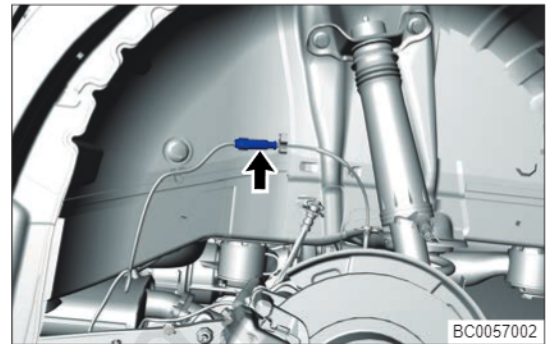
5.5 Rear Wheel Speed Sensor (Take Rear Left Wheel as Example)**■ Removal**** Warning**

- 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.

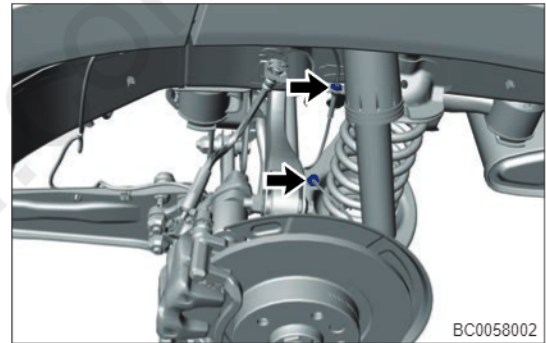
Hint:

- 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 speed sensor.

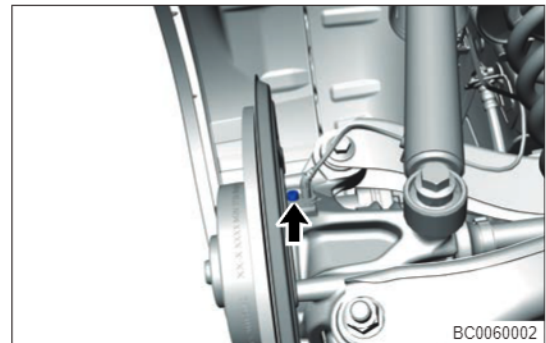
a. Remove the rear left wheel speed sensor connector (arrow).



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



c. Remove fixing bolt (arrow) from rear left wheel speed sensor, and disengage wheel speed sensor carefully.



Caution

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

d. Remove the rear left wheel speed sensor.

■ 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.
- (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.
- (5) Connect the negative battery cable.

** Caution**

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

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5.6 Combination Switch Assembly

■ Removal

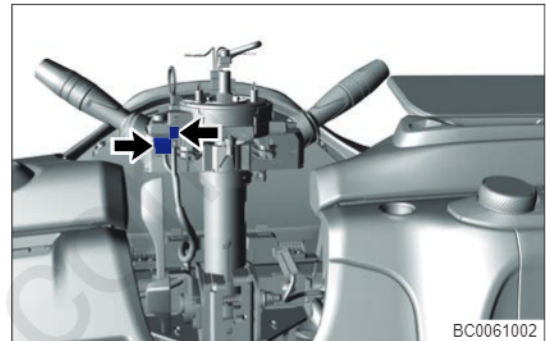
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.

⚠ Caution

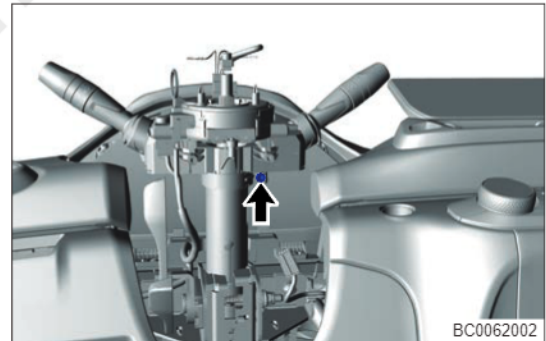
- **After disconnecting the negative battery cable, wait for at least 90 seconds.**

- (3) Position the front wheels straight ahead.
- (4) Remove the steering wheel assembly.
- (5) Remove the steering column cover.
- (6) Remove the combination switch assembly.

a. Disconnect 2 connectors (arrow) from spiral cable wire harness.



b. Loosen fixing bolt (arrow) between combination switch assembly and steering column.



c. Remove the combination switch assembly.

⚠ Caution

- **As zero position of spiral cable is very important to (steering column control module) SCM, before installing steering wheel, do not remove zero pin to avoid losing zero position.**
- **When removing steering wheel, fixed tape shall be prepared. Once steering wheel is removed, fix zero position of spiral cable with tape immediately, to avoid losing zero position.**
- **When repairing steering switch, remove steering wheel first. As it is necessary to operate on main airbag, always disconnect the negative battery cable first to ensure the removing safety of airbag.**

■ Installation

- (1) Install combination switch assembly and tighten fixing bolt between combination switch assembly and steering column.
- (2) Connect 2 spiral cable wire harness connectors.
- (3) Install the steering column cover.
- (4) Install the steering wheel assembly.