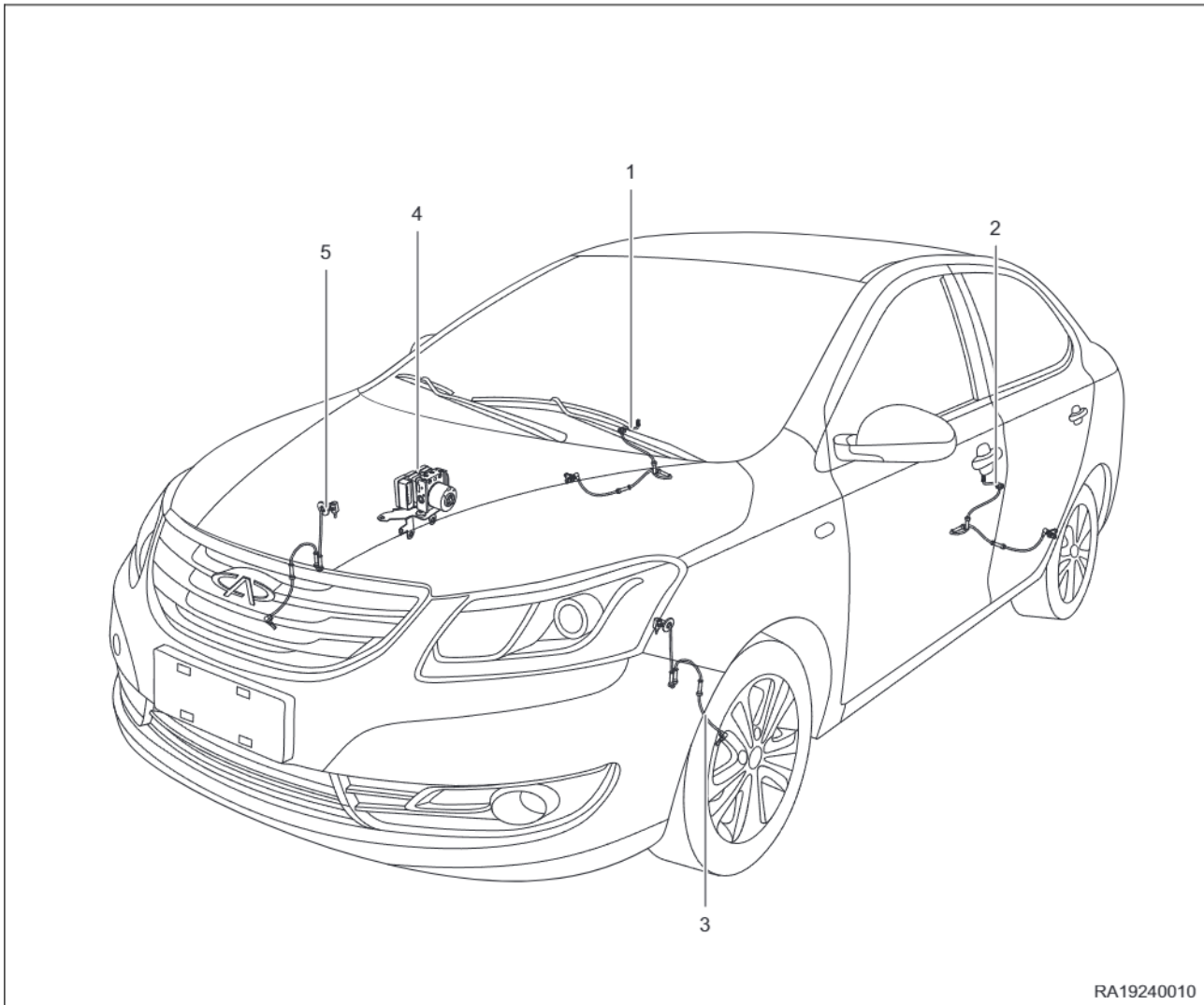


BRAKE CONTROL SYSTEM

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GENERAL INFORMATION

Description



1 - Rear Right Wheel Speed Sensor	2 - Rear Left Wheel Speed Sensor
3 - Front Left Wheel Speed Sensor	4 - ABS Control Module Assembly
5 - Front Right Wheel Speed Sensor	

The brake control system equipped on this vehicle is ABS (Anti-lock Brake System) + EBD (Electronic Brake Force Distribution). It mainly consists of the following components:

- ABS control module assembly (hydraulic control module and electronic control module)
- Wheel speed sensors (each wheel has one sensor)

The primary purpose of ABS is to prevent the wheels from being locked when sudden braking. It has the following effects:

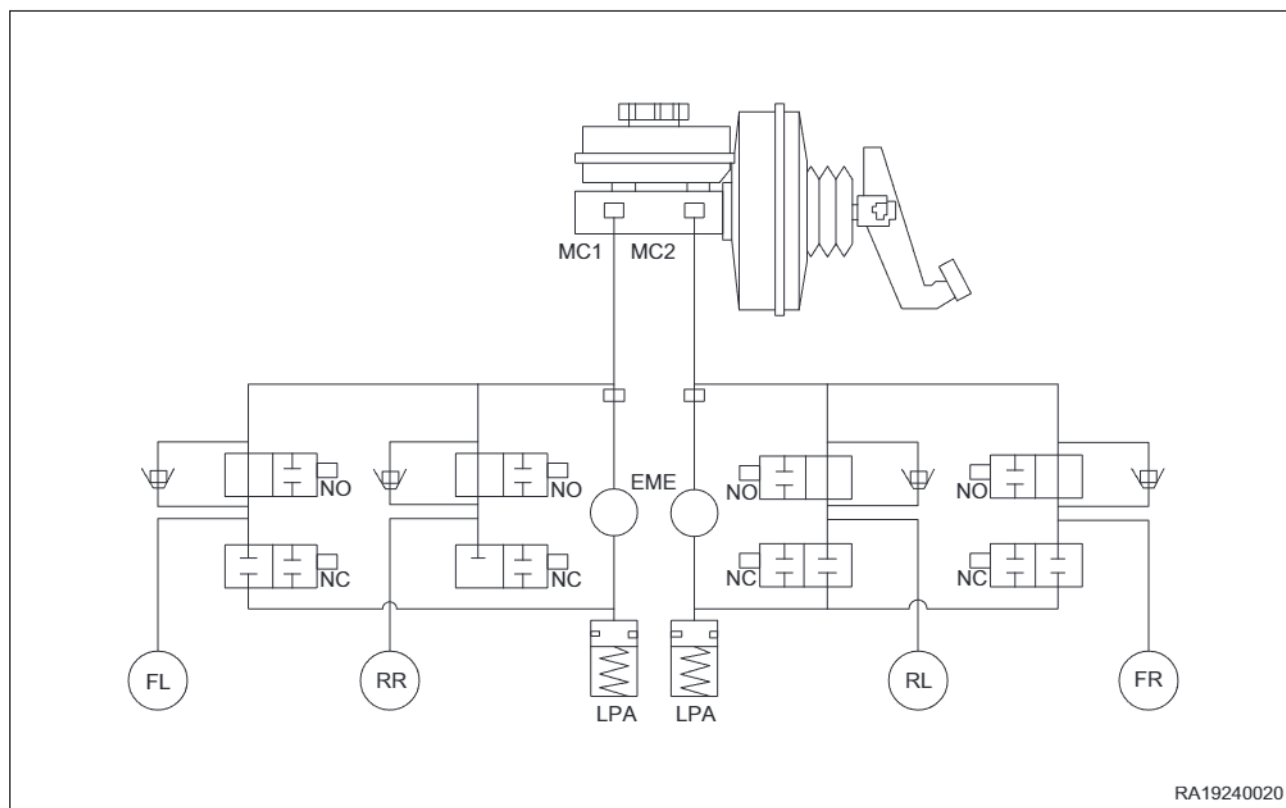
1. Improve vehicle driving stability.
2. Improve vehicle steering ability.
3. Maintain optimal brake pressure.
4. Shorten brake distance effectively.

Operation

ABS Braking

1. If the ABS system detects that the wheels may be locked when applying brake, the brake system will enter ABS control mode. During braking, ABS control module outputs signal from each wheel speed sensor to each solenoid valve after analysis in order to adjust the fluid pressure in each line, to prevent the wheels from being locked.
2. There are some operating symptoms of ABS that seem to be abnormal at first, but in fact they are normal. The symptoms are as follows:
 - a. If the electronic control module is malfunctioning, the fail-safe function will be activated, the ABS system will not be operating and the ABS warning light will come on.
 - b. After vehicle is power on or engine is started, short "buzz" sound can be heard, which is the ABS self-check sound, and this is normal.
 - c. Noise caused by the corresponding solenoid valve movement when EBD is involved in braking can be heard, but this is normal.
 - d. The brake pedal may vibrate slightly and mechanical noise can be heard during ABS operation, but this is normal.
 - e. Braking distance may be longer than that of vehicles without ABS when braking on rough, sandy, or snow-covered roads.

ABS Control Mode

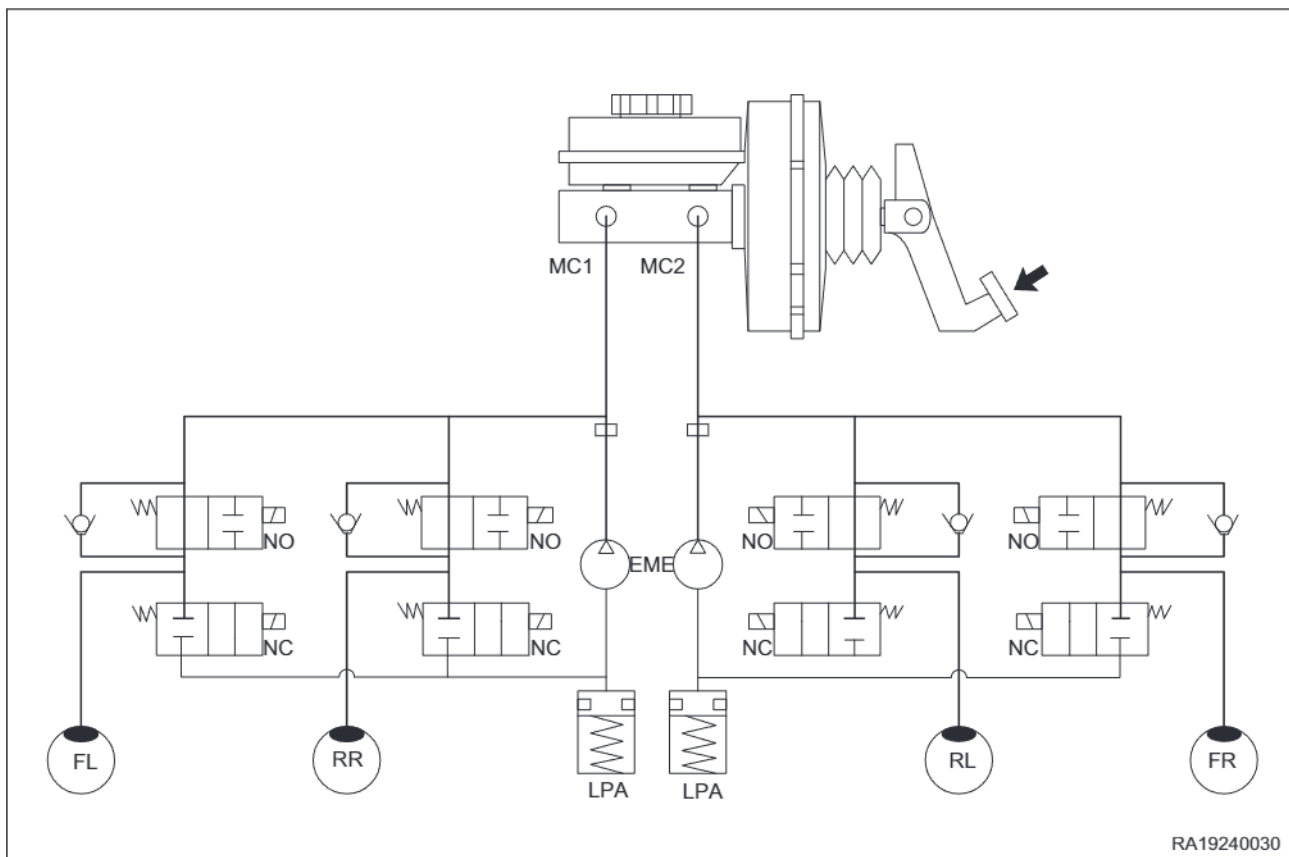


Description	Definition	Description	Definition
MC1	Master Cylinder Outlet 1	LPA	Low Pressure Accumulator
MC2	Master Cylinder Outlet 2	FL	Front Left Wheel
EME	Return Pump	RR	Rear Right Wheel
NO	Normal Open (Solenoid Valve)	RL	Rear Left Wheel
NC	Normal Close (Solenoid Valve)	FR	Front Right Wheel

1. General Brake Operating Condition

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

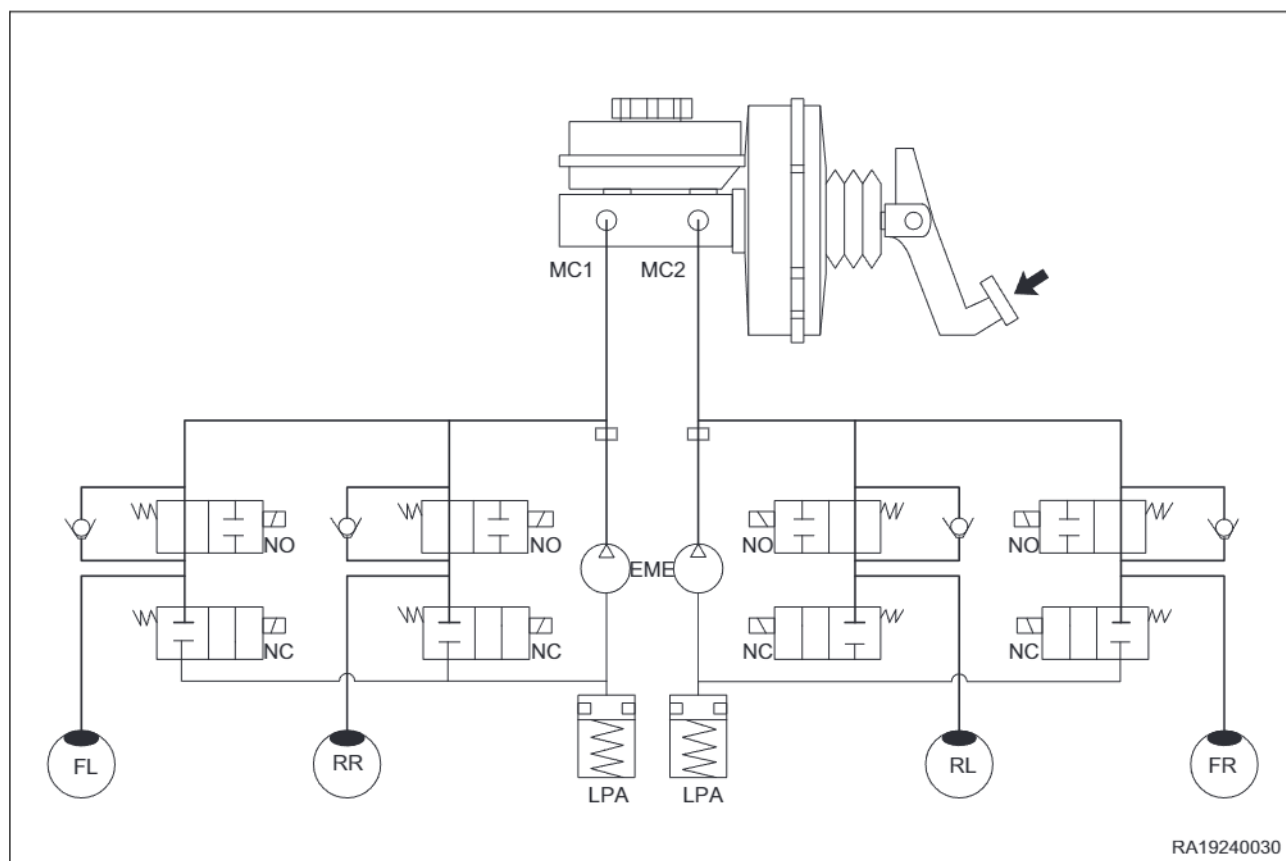
Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	OFF	OPEN
Normal Close Valve	OFF	CLOSE



2. ABS Operating (Relief) Condition

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

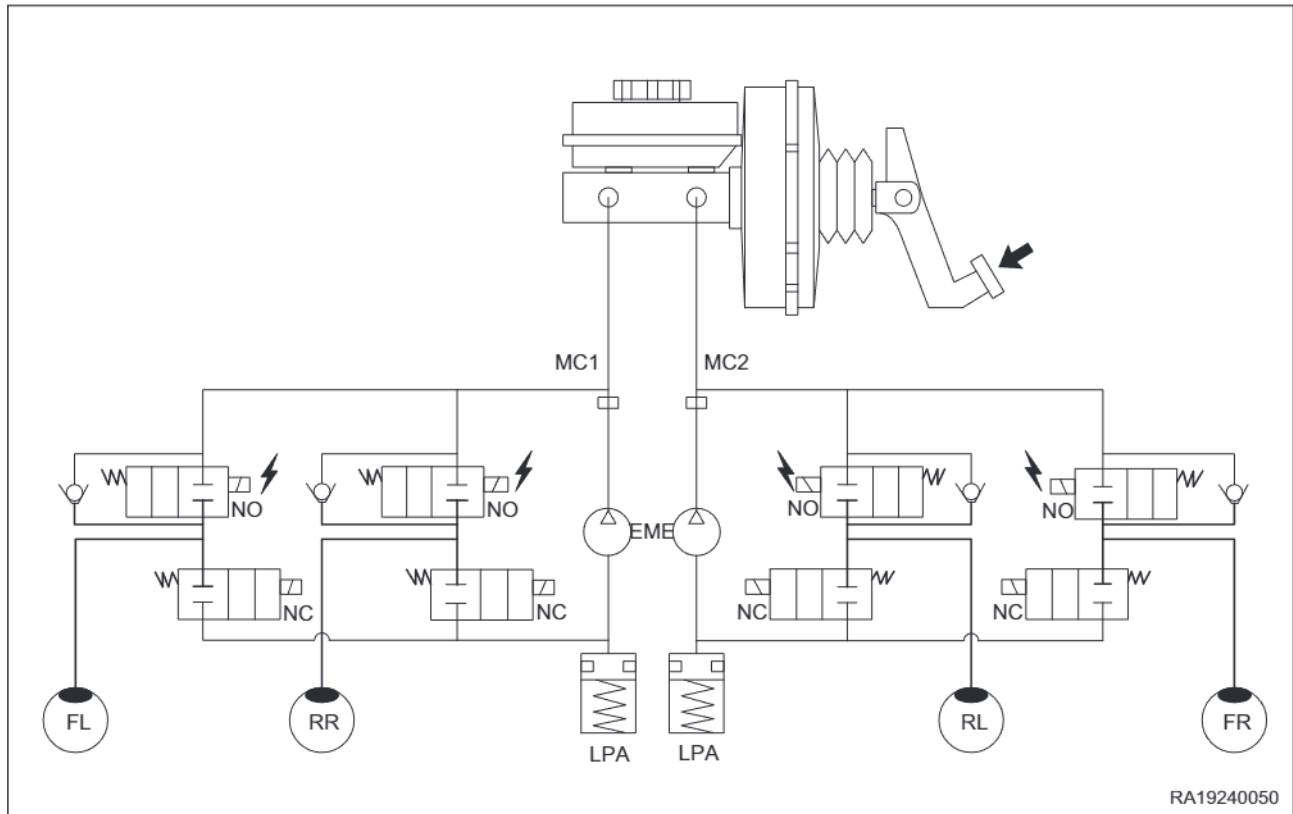
Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	ON	CLOSE
Normal Close Valve	ON	OPEN



3. ABS Operating (Maintaining) Condition

When appropriate pressure is applied to the wheel cylinder, the ABS system enters maintaining pressure state. In other words, the normal open valve cuts off oil passage and the normal close valve also cuts off the oil passage, the wheel cylinder pressure is maintained.

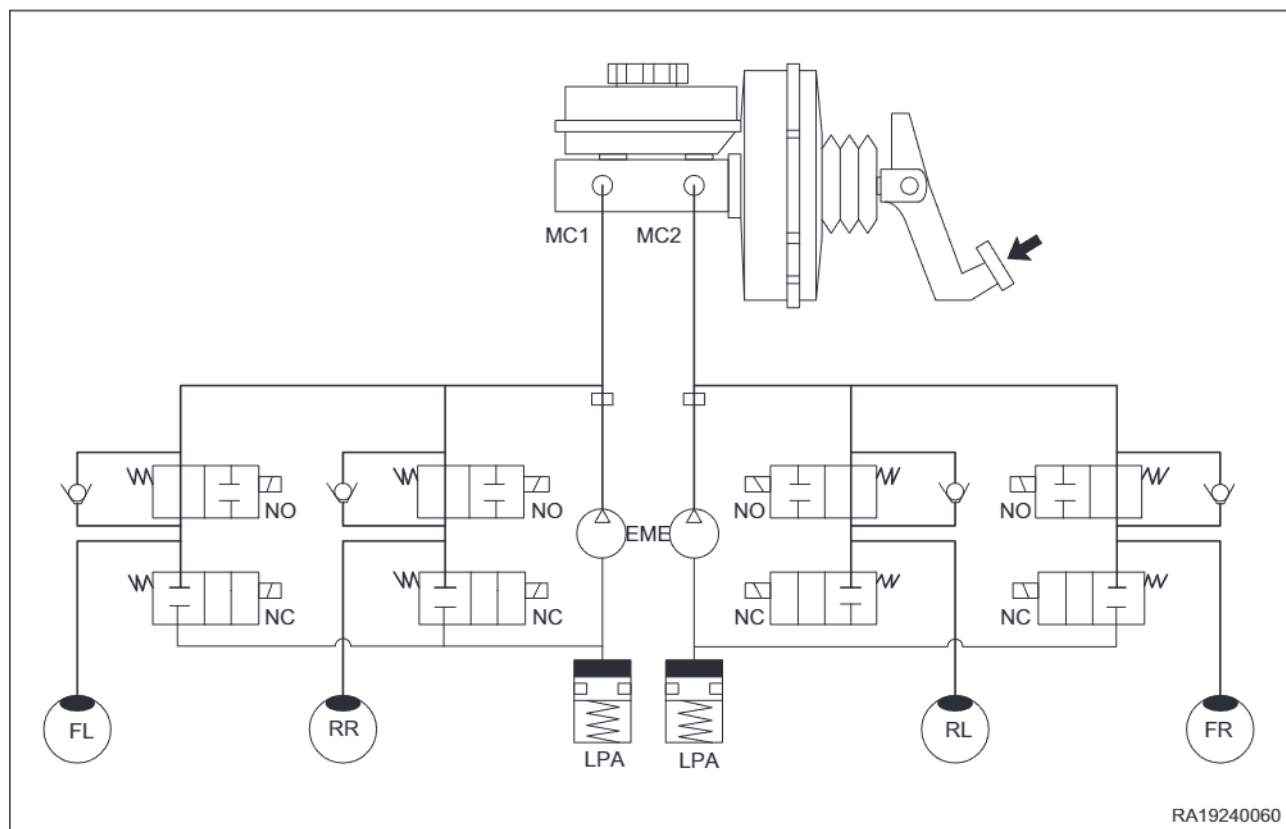
Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	ON	CLOSE
Normal Close Valve	OFF	CLOSE



4. ABS Operating (Boost) Condition

When the ABS operates under relief pressure condition, if brake fluid is drained excessively or friction coefficient between wheel and road surface increases, it needs to increase each wheel pressure. In this case, the ABS control module transmits the command that increases the wheel pressure to the hydraulic control module. In other words, the normal open valve opens oil passage and the normal close valve cuts off oil passage, in order to increase the wheel cylinder pressure. The brake fluid stored in the low pressure accumulator is supplied to each wheel cylinder through the master cylinder and normal open valve.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normal Open Valve	OFF	OPEN
Normal Close Valve	OFF	CLOSE



The ABS system operates circularly under relief, maintaining and boost pressure conditions until vehicle is stopped completely, so the vehicle braking and turning performance will be guaranteed.

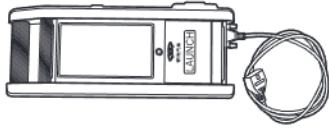
Specifications

Torque Specifications

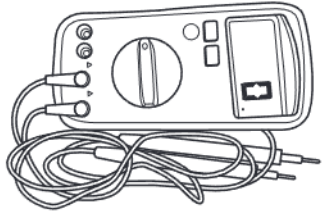
Description	Torque (N·m)
Wheel Mounting Bolt	110 ± 10
Brake Pipe Coupling Plug	18 ± 2
ABS Control Module Assembly Mounting Bracket Fixing Bolt	25 ± 4
ABS Control Module Assembly Bottom Fixing Bolt	10 ± 1.5
ABS Control Module Assembly Side Fixing Screw	10 ± 1.5
Front Wheel Speed Sensor Fixing Bolt	10 ± 1.5
Rear Wheel Speed Sensor Fixing Bolt	10 ± 1.5

Tools

Special Tool

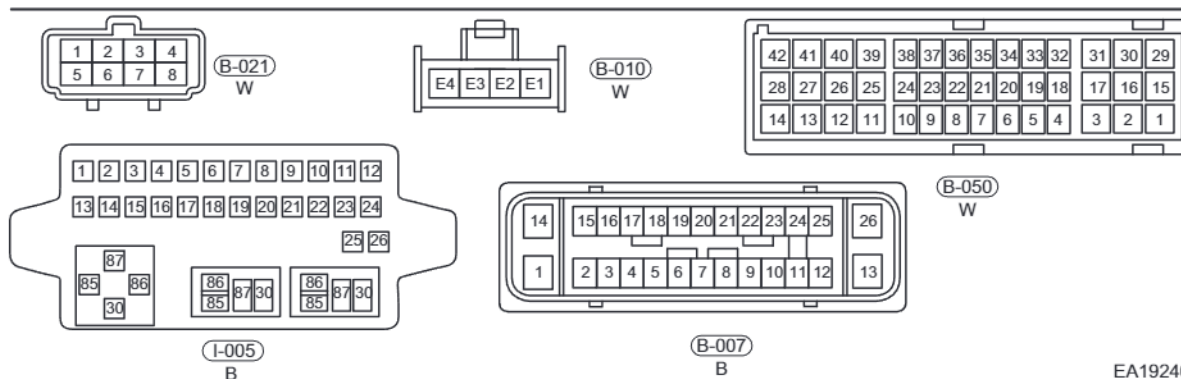
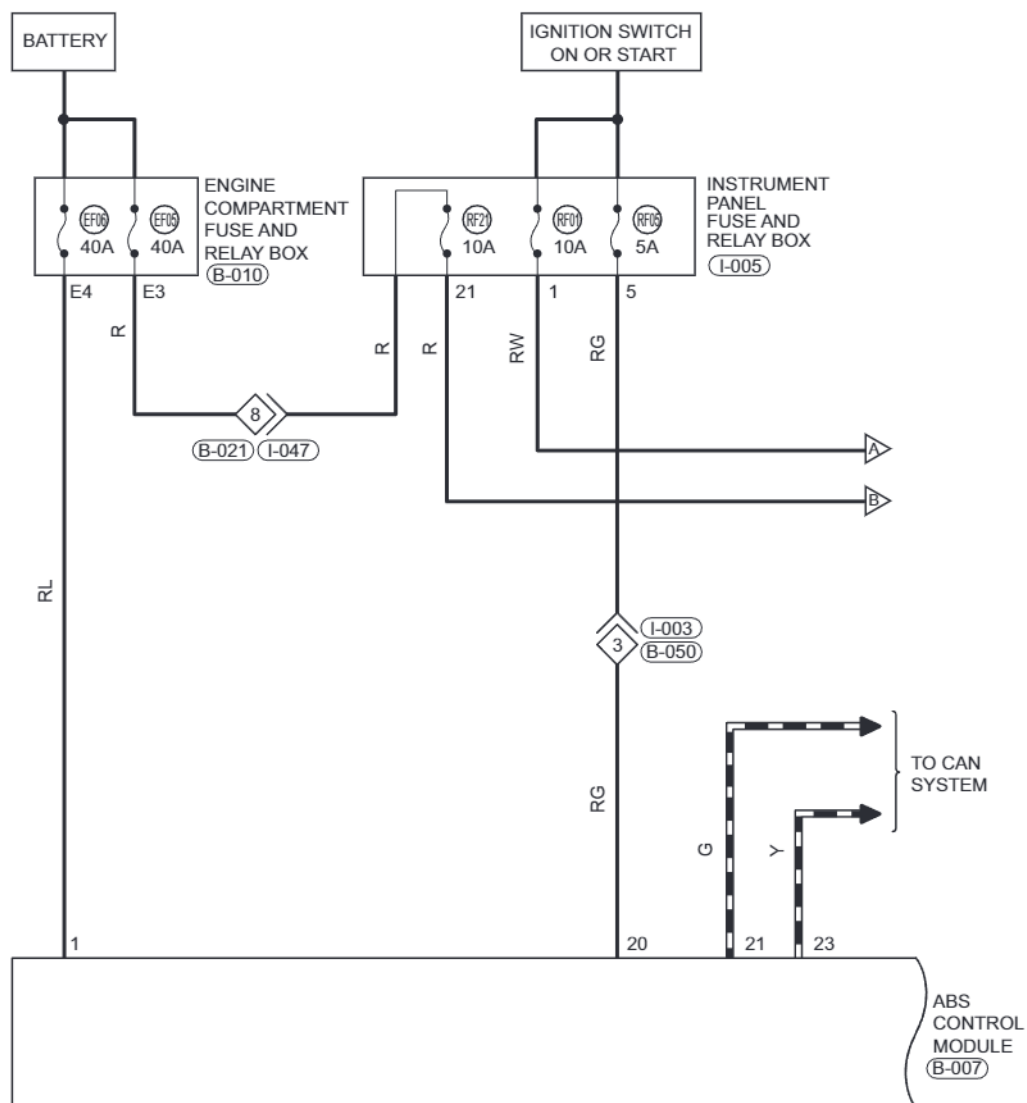
X-431 3G Diagnostic Tester	 RCH0000001
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General Tool

Digital Multimeter	 RCH0000002
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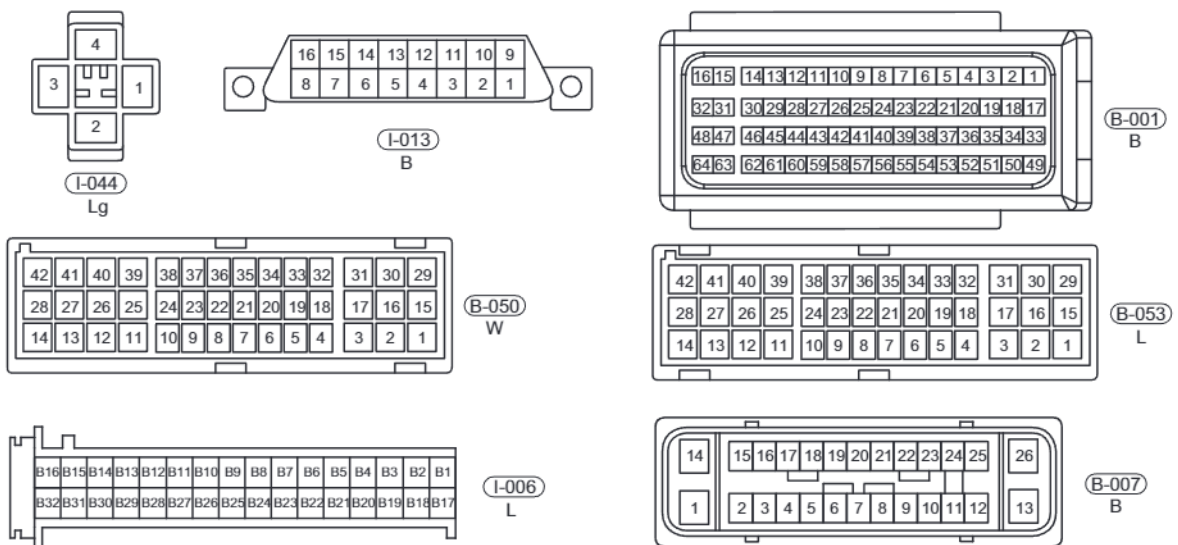
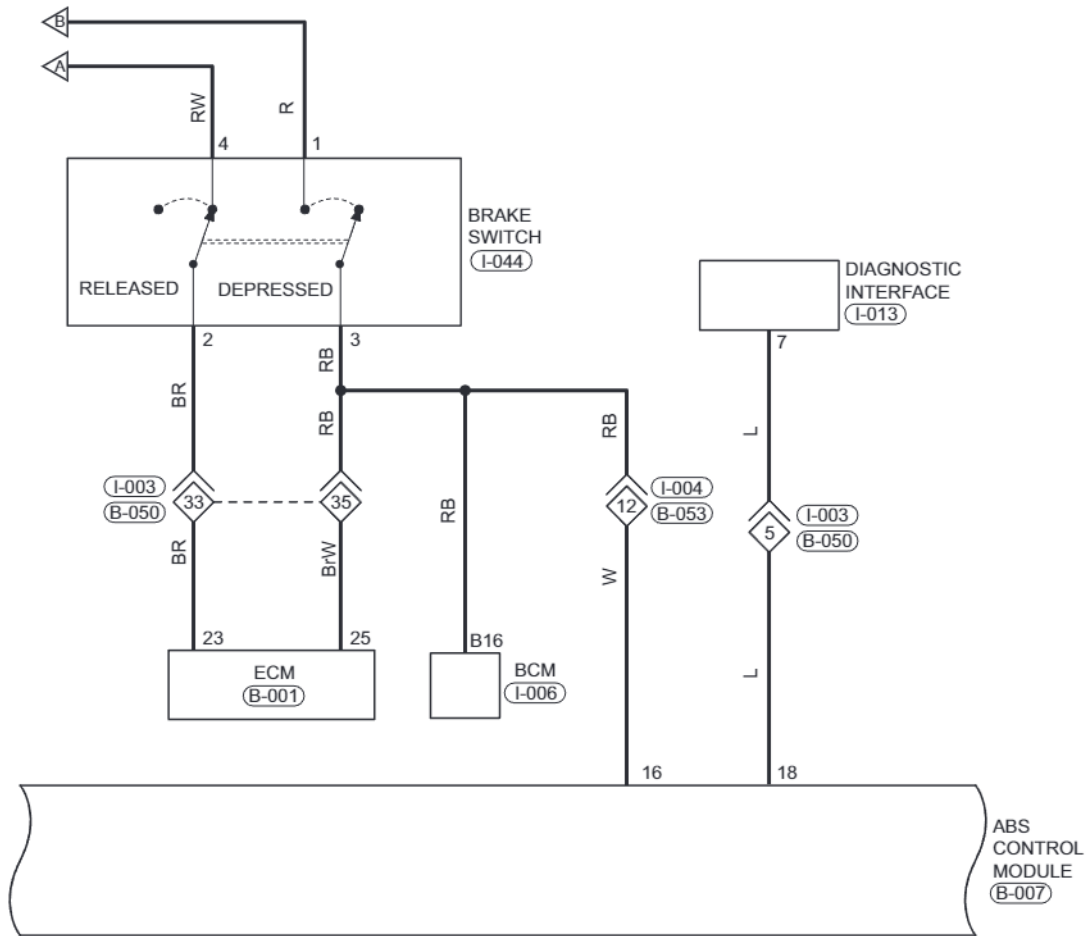
Circuit Diagram

Brake Control System (Page 1 of 3)



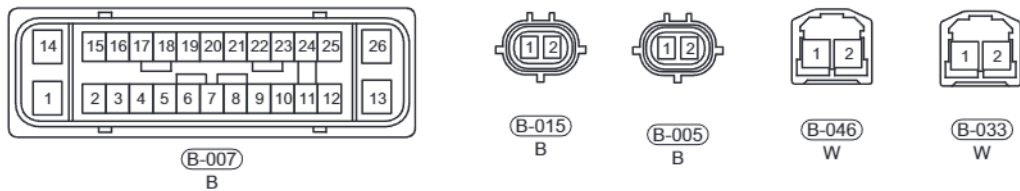
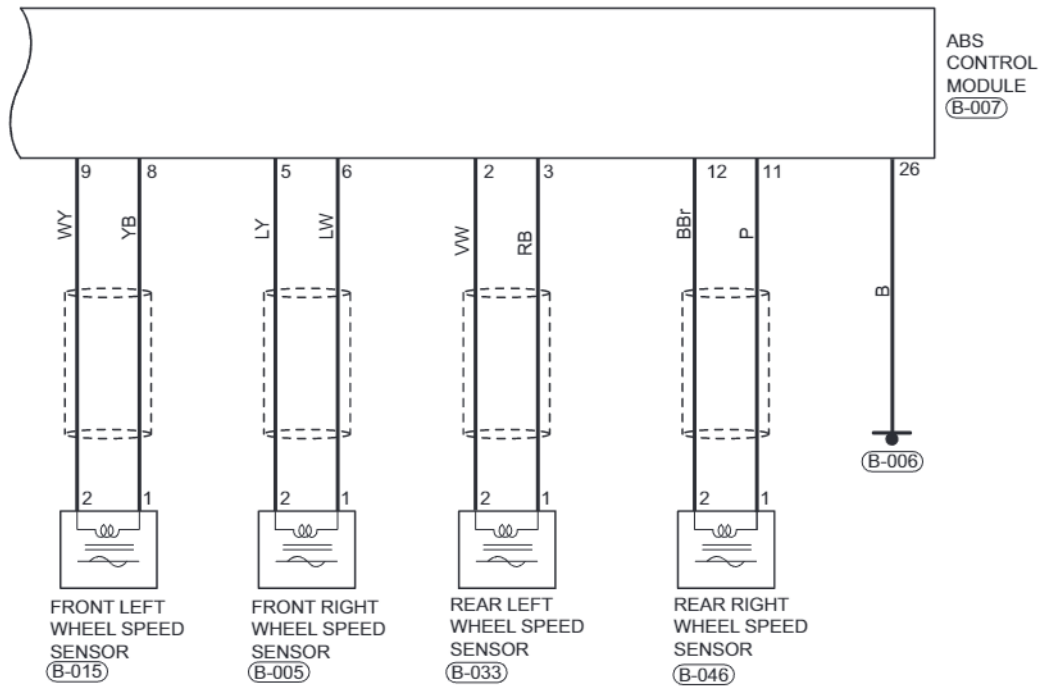
EA19240010

Brake Control System (Page 2 of 3)



EA19240020

Brake Control System (Page 3 of 3)



EA19240030

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
When turning the ignition switch to ON, ABS warning light does not come on	ABS fuse	49-27
	Wire harness or connector	-
	ABS control module assembly	24-58
	Instrument cluster	36-34
ABS warning light remains on	ABS fuse	49-27
	Wire harness or connector	-
	ABS control module assembly	24-58
	Instrument cluster	36-34
ABS operation is abnormal	Wheel speed sensor (damaged, improper installed, foreign matter attached)	24-61
	Hub ring gear (damaged, improper installed, foreign matter attached)	-
	Brake line (blocked or leaked)	-
	Wire harness or connector	-
	ABS control module assembly	24-58
Communication with diagnostic tester cannot be performed	ABS fuse	49-27
	Wire harness or connector	-
	X-431 3G diagnostic tester	-
	ABS control module assembly	24-58

Diagnosis Procedure

HINT:

Use the following procedures to troubleshoot the Anti-lock Brake System (ABS).

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

NEXT

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

Standard voltage: 11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.



NEXT

3 Customer problem analysis

NEXT

4 Check and clear DTCs

NEXT

5 Confirm and duplicate malfunction: accelerate vehicle to 15 km/h or more, simulate malfunction conditions and read DTCs again

DTC
occurs

For current DTC, go to step 7

No
DTC

For history DTC, go to step 8

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

NEXT

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

NEXT

8 Troubleshoot according to Problem Symptoms Table, then go to step 9

NEXT

9 Confirm troubleshooting, perform test

NEXT

24

10 End

Problem Repair (No DTC)

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

1. Brake fluid leakage (it may result in weak braking, brake pedal overtravel, or even ineffective braking).
2. Using inferior brake fluid (it can result in corrosion of brake line and ABS hydraulic regulating module internal elements, or even ineffective braking).
3. Air in the brake line (it may result in weak braking, or even ineffective braking).
4. Brake line blockage (it may result in hard braking, or even ineffective braking).
5. Excessive wear of brake disc (it may result in weak braking, brake pedal overtravel).
6. Brake booster malfunction (it may result in weak or hard braking, brake pedal overtravel, or even ineffective braking).
7. Wrong brake line connection (it may result in braking performance decreasing, drift, long braking distance etc.).

HINT:

ABS interrupted due to no power supply or power supply abnormality will cause the ABS warning light remains on without storing DTC.

Troubleshooting method: check the corresponding component according to the malfunction, repair or replace it as necessary.

DTC Confirmation Procedure

Confirm that the battery voltage is normal before performing the following procedures.

- Turn the ignition switch to LOCK.
- Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
- Turn the ignition switch to ON.
- Using the X-431 3G diagnostic tester to record and clear the DTCs stored in the ABS control module assembly.
- Turn the ignition switch to LOCK and wait for a few seconds.
- Start the engine, drive the vehicle at 20 km/h or more and perform the road test with the X-431 3G diagnostic tester connected to the Data Link Connector (DLC).
- Using the X-431 3G diagnostic tester to select "Read Code".
- If the DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If no DTC is detected, the malfunction indicated by the DTC is intermittent. Refer to the intermittent DTC troubleshooting procedure.

Intermittent DTC Troubleshooting

If the malfunction is intermittent, perform the followings:

- Check if the connectors are loose.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Wiggle the related wire harnesses and connectors and observe if the signal is interrupted in the related circuit.
- If possible, try to duplicate the conditions under which the DTC was set.
- Look for the data that has changed or the DTC to reset during the wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect the wheel speed sensor and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all the wire harness connectors and grounds related to the current DTC.
- Remove the ABS control module assembly from the malfunctioning vehicle and install it to a new vehicle and perform a test. If the DTC cannot be cleared, the ABS control module assembly is malfunctioning. If the DTC can be cleared, reinstall the ABS control module assembly to the original vehicle.
- If multiple trouble codes were set, refer to the circuit diagrams to look for any common ground circuit or power supply circuit applied to the DTC.
- Refer to the Technical Bulletin that is applied to the 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) can increase load resistance. This situation may change the way in which a circuit works.

Circuits are very sensitive to proper grounding. A loose or corroded ground can affect the control circuit. Perform the following operations when checking the ground points:

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

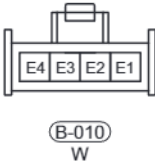
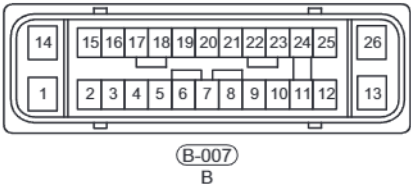
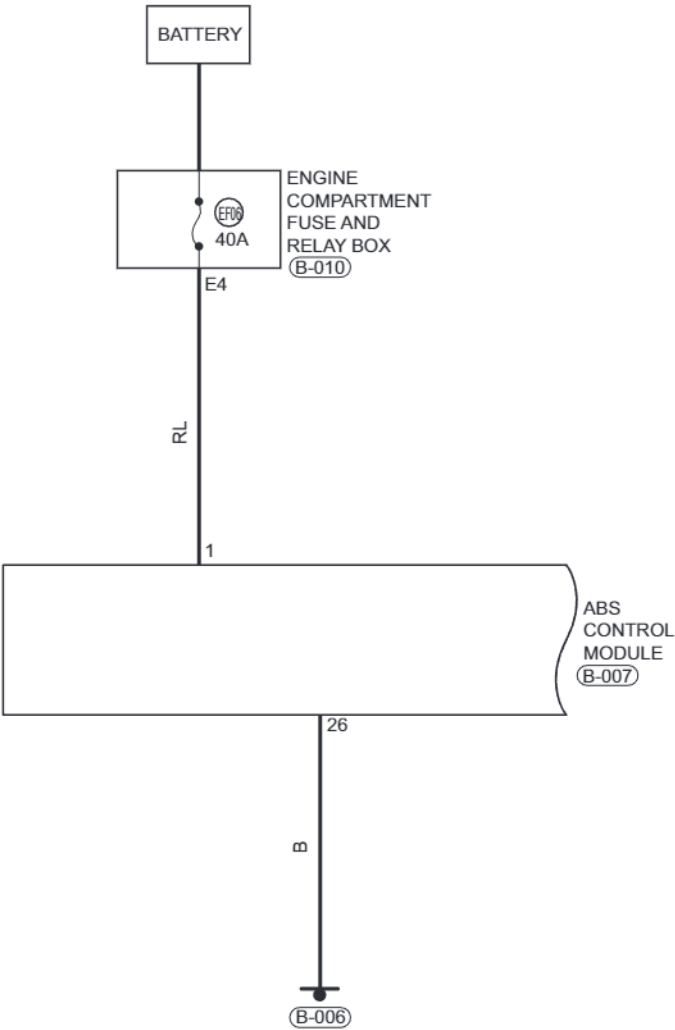
ABS Control Module Assembly Terminal List

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Battery Power (Pump Motor)	14	-
2	Rear Left Wheel Speed Sensor Ground	15	-
3	Rear Left Wheel Speed Sensor Signal	16	Brake Light Switch Signal
4	-	17	-
5	Front Right Wheel Speed Sensor Signal	18	Diagnosis K Wire
6	Front Right Wheel Speed Sensor Ground	19	-
7	-	20	Power Supply (Ignition Switch)
8	Front Left Wheel Speed Sensor Ground	21	CAN L
9	Front Left Wheel Speed Sensor Signal	22	-
10	-	23	CAN H
11	Rear Right Wheel Speed Sensor Signal	24	-
12	Rear Right Wheel Speed Sensor Ground	25	-
13	-	26	Ground

Diagnostic Trouble Code (DTC) Chart

DTC Code	DTC Definition
C0020-01	ABS Pump Motor Control General Electrical Failure
C0020-49	ABS Pump Motor Control Internal Electronic Failure
C0022-00	Brake Booster Solenoid No Subtype Information
C0040-49	Brake Lamp Switch Control Circuit Internal Electronic Failure
C0031-01	Left Front Wheel Speed Sensor General Electrical Failure
C0031-07	Left Front Wheel Speed Sensor Mechanical Failure
C0031-29	Left Front Wheel Speed Sensor Signal Invalid
C0034-01	Right Front Wheel Speed Sensor General Electrical Failure
C0034-01	Right Front Wheel Speed Sensor Mechanical Failure
C0034-01	Right Front Wheel Speed Sensor Signal Invalid
C0037-01	Left Rear Wheel Speed Sensor General Electrical Failure
C0037-01	Left Rear Wheel Speed Sensor Mechanical Failure
C0037-01	Left Rear Wheel Speed Sensor Signal Invalid
C003A-01	Right Rear Wheel Speed Sensor General Electrical Failure
C003A-01	Right Rear Wheel Speed Sensor Mechanical Failure
C003A-01	Right Rear Wheel Speed Sensor Signal Invalid
C1000-16	ECU Voltage Supply Circuit Voltage Below Threshold
C1000-17	ECU Voltage Supply Circuit Voltage Above Threshold
C1001-04	ECU System Internal Failures
C1020-96	ABS Operation Component Internal Failures
U0073-88	Control Module Communication Bus Off
U0100-87	Lost Communication with ECM Missing Message
U0100-87	Lost Communication with Body Control Module Missing Message

DTC	C0020-01	ABS Pump Motor Control General Electrical Failure
-----	----------	---



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0020-01	ABS Pump Motor Control General Electrical Failure	When vehicle speed exceeds 20 km/h and ABS control module assembly detects that the electrical motor cannot work properly, this DTC will be recorded.	- Pump motor has poor ground connection. - System overheat protection. - Power supply for pump motor is abnormal. - Pump motor relay is malfunctioning. - Pump motor is malfunctioning.

CAUTION

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

Diagnosis Procedure**1 Check for DTCs**

- Leave the vehicle for 5 minutes, clear and read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Refer to DTC Confirmation Procedure.
- Check if the same DTC is output.

NO

Problem indicated by DTC is intermittent (system overheat protection)

YES**2 Check ABS fuse**

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the ABS fuse EF-06 (40 A) from the engine compartment fuse and relay box.
- Check if the fuse is blown.

NG

Replace ABS fuse

OK**3 Check wire harness and connector**

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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007 and engine compartment fuse and relay box connector B-010.

- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

Repair or replace body wire harness and connector

OK

4

Check wire harness and connector (ABS control module assembly - battery)

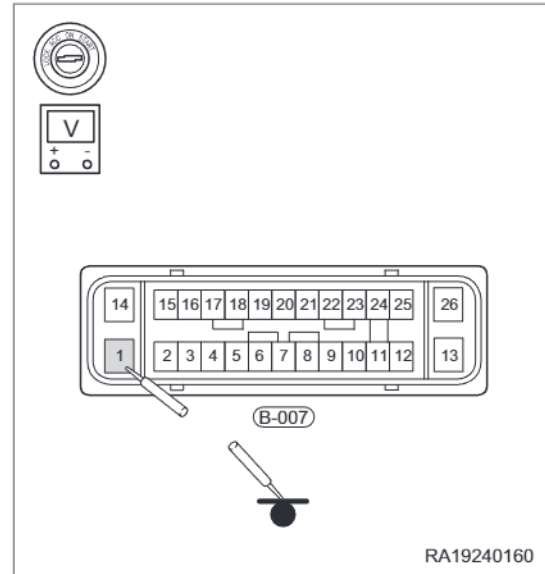
- Connect the negative battery terminal cable.
- Turn the ignition switch to LOCK.
- Disconnect the ABS control module assembly connector B-007.
- Using a digital multimeter, measure the supply voltage between ABS control module assembly and body ground to check if the power supply circuit is normal according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-007-1 - Body ground	Always	9 to 16 V

NG

Repair or replace body wire harness and connector



OK

5

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

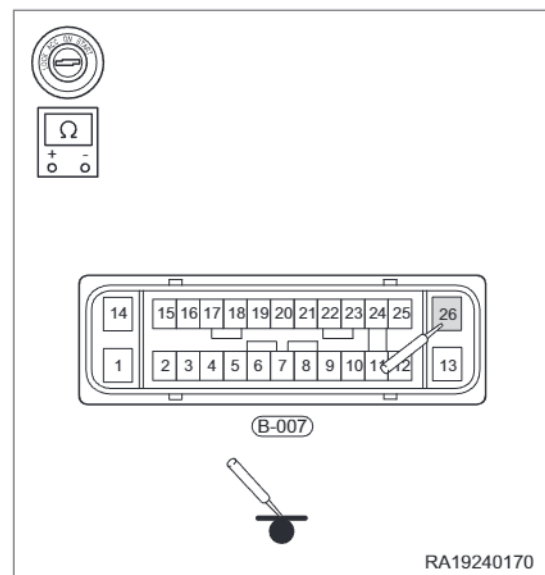
- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Using a digital multimeter, check for continuity between ABS control module assembly and body ground to check if the system ground circuit is normal according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-26 - Body ground	Always	Continuity

NG

Repair or replace body wire harness and connector



24

OK

6

Reconfirm DTCs

- a. Use the X-431 3G diagnostic tester to clear the DTC.
- b. Start the engine.
- c. Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- d. Check if the same DTC is output.

NO

System operates normally

YES

Replace ABS control module assembly

DTC	C0020-49	ABS Pump Motor Control Internal Electronic Failure
------------	-----------------	---

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0020-49	ABS Pump Motor Control Internal Electronic Failure	This DTC occurs when the following condition is met: 1. ABS pump motor has an internal malfunction.	ABS control module assembly malfunction

CAUTION

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

Diagnosis Procedure
1 Reconfirm DTCs

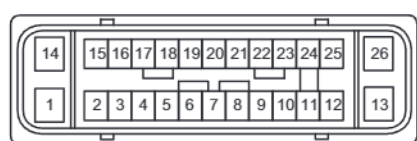
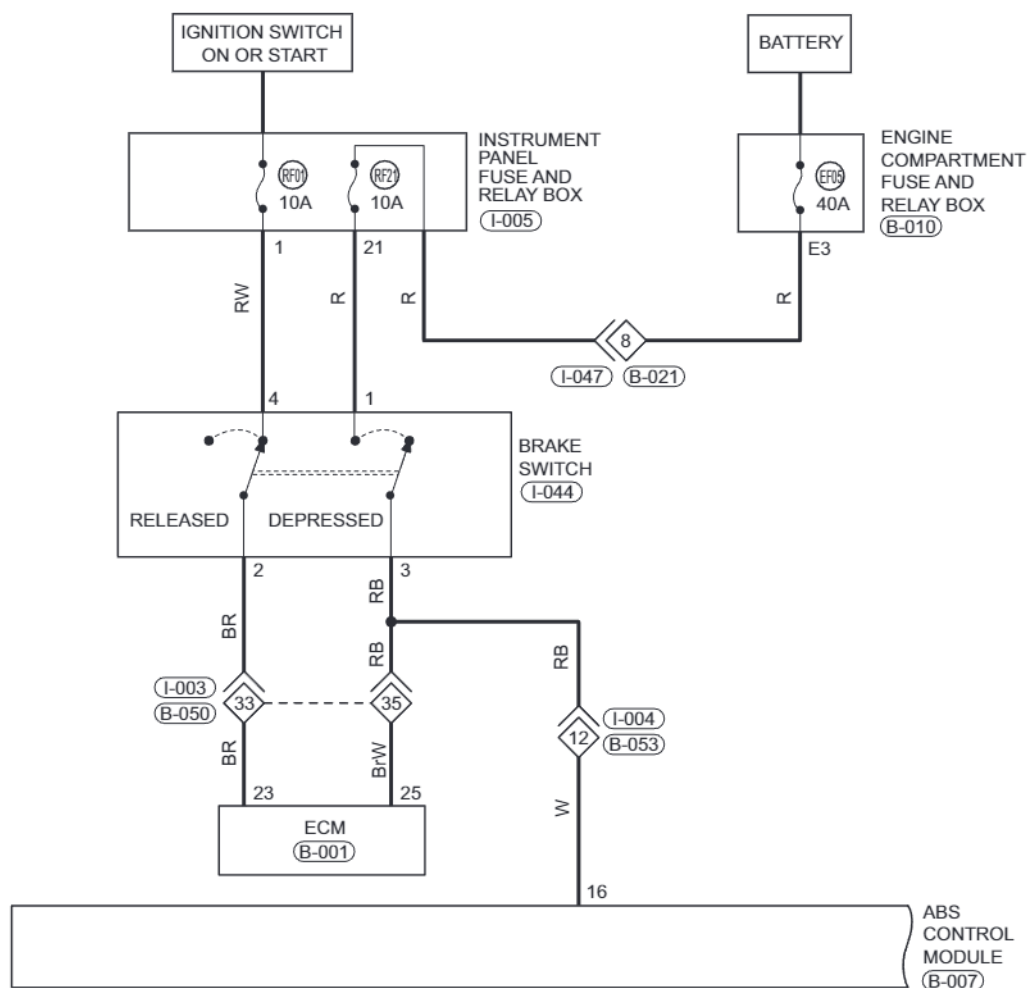
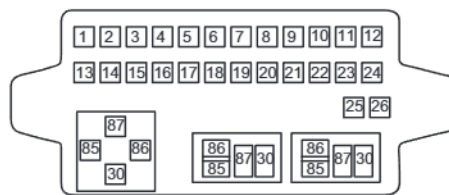
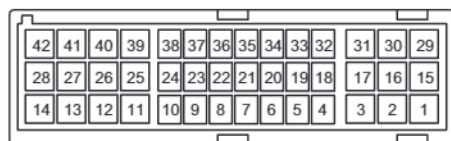
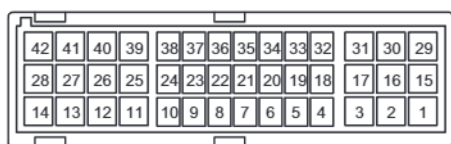
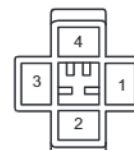
- Use the X-431 3G diagnostic tester to clear the DTC.
- Start the engine.
- Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Check if the same DTC is output.

NO
System operates normally
YES
Replace ABS control module assembly

DTC

C0040-49

Brake Lamp Switch Control Circuit Internal Electronic Failure

(B-007)
B(I-005)
B(B-010)
W(B-050)
W(B-001)
B(B-021)
W(B-053)
L(I-044)
Lg

EA19240050

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0040-49	Brake Lamp Switch Control Circuit Internal Electronic Failure	This DTC occurs when the following condition is met: 1. Brake light switch control circuit malfunction.	- Brake switch malfunction. - Wire harness or connector malfunction. - ABS control module assembly malfunction.

CAUTION

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

Diagnosis Procedure**1 Check brake switch**

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the brake switch from the vehicle.
- Check the brake switch for proper operation ([See page 25-24](#)).

NO**Replace brake switch****YES****2 Check wire harness and connector**

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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007 and brake switch connector I-044.
- Disconnect the instrument panel wire harness connector I-004 and body wire harness connector B-053.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

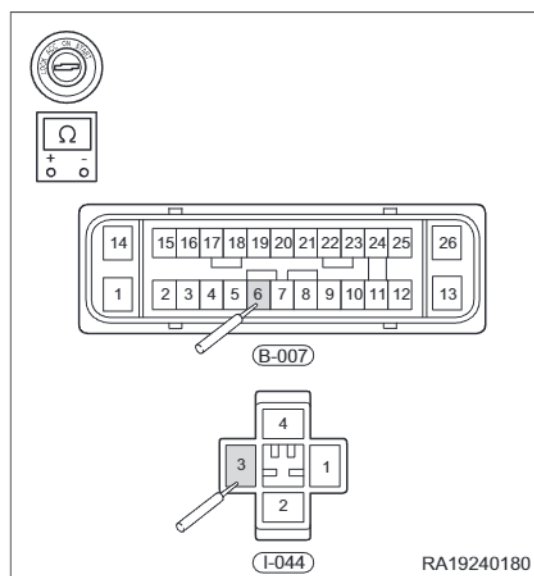
NG**Repair or replace body/instrument panel wire harness and connector****OK****24**

3 Check brake switch control circuit (ABS control module assembly - brake switch)

- Disconnect the negative battery terminal cable.
- Turn the ignition switch to LOCK.
- Disconnect the ABS control module assembly connector B-007 and brake switch connector I-044.
- Using a digital multimeter, check for continuity between terminals of ABS control module assembly and brake switch to check for an open circuit according to the value(s) in the table below.

Standard Condition

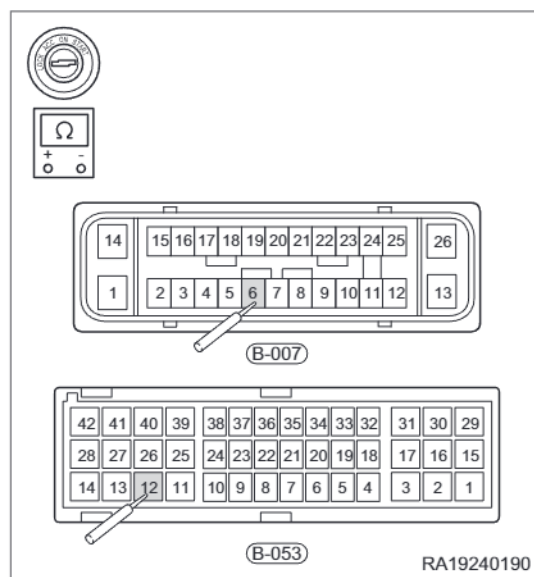
Multimeter Connection	Condition	Specified Condition
B-007-6 - I-044-3	Always	Continuity



- Disconnect the instrument panel wire harness connector I-004 and body wire harness connector B-053.
- Using a digital multimeter, check for continuity between terminals of ABS control module assembly connector B-007 and body wire harness connector B-053 to check for an open circuit according to the value(s) in the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-6 - B-053-12	Always	Continuity



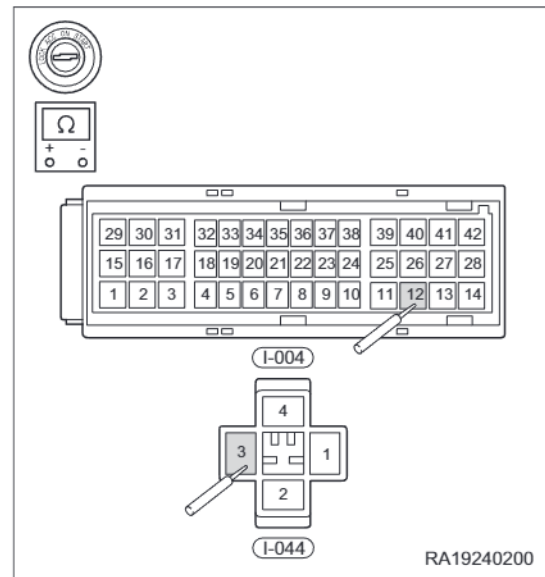
- g. Using a digital multimeter, check for continuity between terminals of brake switch connector I-044 and instrument panel wire harness connector I-004 to check for an open circuit according to the value(s) in the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
I-004-12 - I-044-3	Always	Continuity

NG

Repair or replace body/instrument panel wire harness and connector

**OK****4****Reconfirm DTCs**

- Use the X-431 3G diagnostic tester to clear the DTC.
- Start the engine.
- Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Check if the same DTC is output.

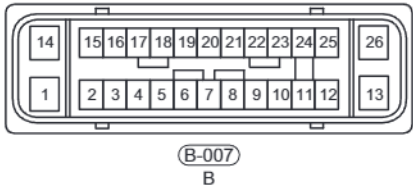
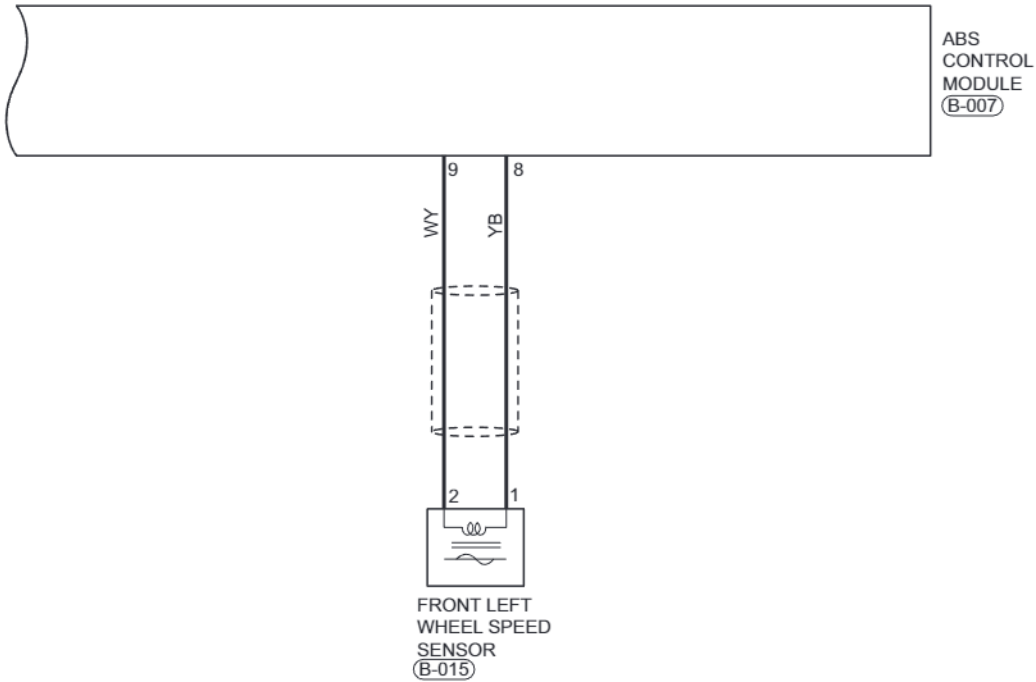
NO

System operates normally

YES

Replace ABS control module assembly

DTC	C0031-01	Left Front Wheel Speed Sensor General Electrical Failure
DTC	C0031-07	Left Front Wheel Speed Sensor Mechanical Failure
DTC	C0031-29	Left Front Wheel Speed Sensor Signal Invalid



EA19240060

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0031-01	Left Front Wheel Speed Sensor General Electrical Failure	These DTCs occur when any of the following conditions is met: 1. Wheel speed sensor line is open. 2. Wheel speed sensor line is short. 3. Wheel speed sensor signal is abnormal.	- Wheel speed sensor signal wire is connecting with power wire in reverse. - Wheel speed sensor signal wire is short to ground. - Wheel speed sensor line is open, and connector is loose or broken. - Wheel speed sensor signal wire is short to power supply.
C0031-07	Left Front Wheel Speed Sensor Mechanical Failure	4. No signal is output when open circuit cannot be detected and the vehicle speed is more than 15 km/h.	- Wheel speed sensor power supply wire is short to ground. - Sensor head or plug pin is damaged. - Wheel speed sensor is interfered by magnetic field outside. (wheel or axle is not demagnetized). - Wheel speed sensor body is malfunctioning.
C0031-29	Left Front Wheel Speed Sensor Signal Invalid	5. When vehicle speed exceeds 20 km/h, the sensor signal exceeds the tolerance of specified value.	- Ring gear is not installed, has teeth missing, dirty, demagnetized or off center. - Clearance between sensor and ring gear is excessive. - Number of ring gear teeth is wrong. - Tire size is not as specified. - ABS control module assembly is damaged.

CAUTION

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

Diagnosis Procedure

1 Check front left wheel speed sensor wire harness and connector

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the front left wheel speed sensor connector B-015.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the 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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check the front left wheel speed sensor fixing bolt for looseness.
- Check if excessive clearance exists between the installation position of front left wheel speed sensor and front steering knuckle.
- Check the installation position of front left wheel speed sensor for dirt.

NG

Tighten fixing bolt properly, clean and replace front left wheel speed sensor

OK

3 Check front left wheel speed sensor

- Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
- Drive the vehicle straight ahead, and read the datastream of front left wheel speed sensor with the X-431 3G diagnostic tester.
- Check if the data change of front left wheel speed sensor is the same with that of other wheel speed sensors.

NG

Replace front left wheel speed sensor

OK

4 Replace front left hub ring gear

- Remove the front left hub assembly.
- Check for foreign matter, missing teeth or damage on the front left hub ring gear.
- Check if the front left hub assembly is securely installed.

NG

Replace front left hub ring gear

OK

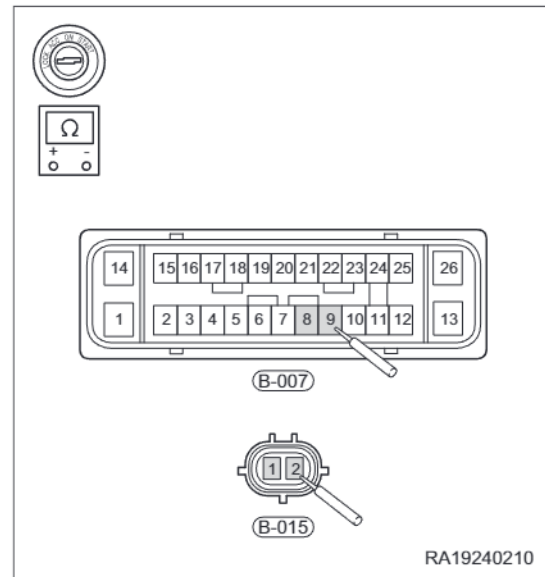
5

Check wire harness and connector (front left wheel speed sensor - ABS control module assembly)

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Disconnect the front left wheel speed sensor connector B-015.
- Using a digital multimeter, check for continuity between the terminals of connector B-007 and connector B-015 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

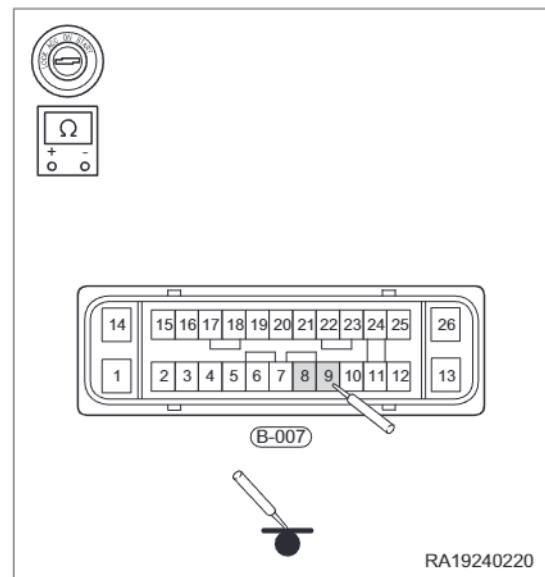
Multimeter Connection	Condition	Specified Condition
B-007-8 - B-015-1	Always	Continuity
B-007-9 - B-015-2	Always	Continuity
B-007-9 - B-015-1	Always	No continuity
B-007-8 - B-015-2	Always	No continuity
B-015-1 - B-015-2	Always	No continuity
B-007-8 - B-007-9	Always	No continuity



- Using a digital multimeter, check for continuity between connector B-007 and body ground to check if the front left wheel speed sensor is short to ground according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-8 - Body ground	Always	No continuity
B-007-9 - Body ground	Always	No continuity



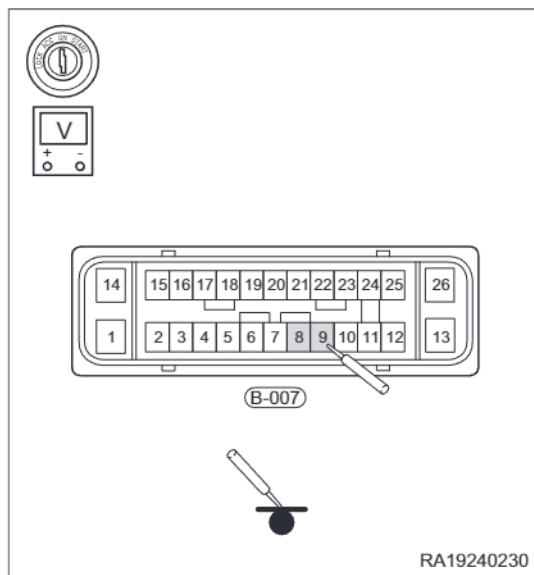
- g. Connect the negative battery cable.
- h. Turn the ignition switch to ON.
- i. Using a digital multimeter, measure the voltage between connector B-007 and body ground to check if the front left wheel speed sensor is short to power supply according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-8 - Body ground	Ignition switch ON	Approximately 0 V
B-007-9 - Body ground	Ignition switch ON	Approximately 0 V

NG

Repair or replace wire harness and connector between front left wheel speed sensor and ABS control module assembly

**OK****6****Reconfirm DTCs**

- a. Use the X-431 3G diagnostic tester to clear the DTC.
- b. Start the engine.
- c. Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- d. Check if the same DTC is output.

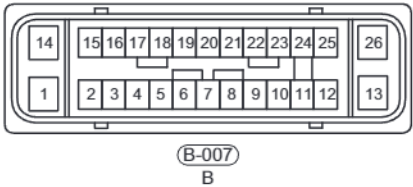
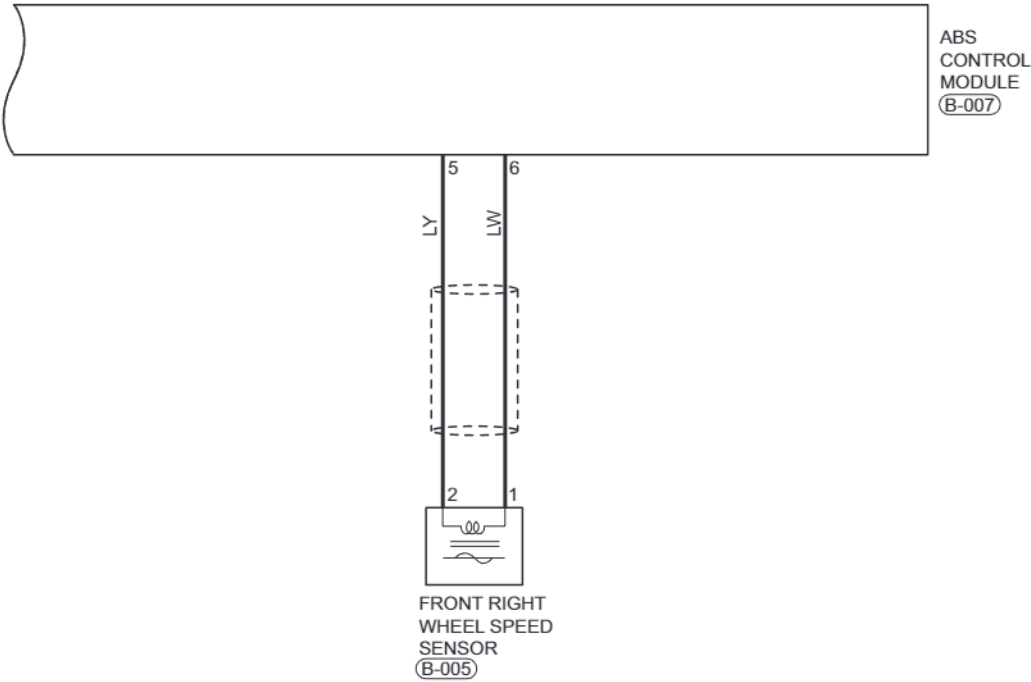
NO

System operates normally

YES

Replace ABS control module assembly

DTC	C0034-01	Right Front Wheel Speed Sensor General Electrical Failure
DTC	C0034-01	Right Front Wheel Speed Sensor Mechanical Failure
DTC	C0034-01	Right Front Wheel Speed Sensor Mechanical Failure



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0034-01	Right Front Wheel Speed Sensor General Electrical Failure	These DTCs occur when any of the following conditions is met: 1. Wheel speed sensor line is open. 2. Wheel speed sensor line is short. 3. Wheel speed sensor signal is abnormal. 4. No signal is output when open circuit cannot be detected and the vehicle speed is more than 15 km/h. 5. When vehicle speed exceeds 20 km/h, the sensor signal exceeds the tolerance of the specified value.	- Wheel speed sensor signal wire is connecting with power wire in reverse. - Wheel speed sensor signal wire is short to ground. - Wheel speed sensor line is open, and connector is loose or broken. - Wheel speed sensor signal wire is short to power supply.
C0034-01	Right Front Wheel Speed Sensor Mechanical Failure		- Wheel speed sensor power supply wire is short to ground. - Sensor head or plug pin is damaged. - Wheel speed sensor is interfered by magnetic field outside. (wheel or axle is not demagnetized). - Wheel speed sensor body is malfunctioning.
C0034-01	Right Front Wheel Speed Sensor Signal Invalid		- Ring gear is not installed, has teeth missing, dirty, demagnetized or off center. - Clearance between sensor and ring gear is excessive. - Number of ring gear teeth is wrong. - Tire size is not as specified. - ABS control module assembly is damaged.

CAUTION

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

Diagnosis Procedure

1

Check front right wheel speed sensor wire harness and connector

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the front right wheel speed sensor connector B-005.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the 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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check the front right wheel speed sensor fixing bolt for looseness.
- Check if excessive clearance exists between the installation position of front right wheel speed sensor and front steering knuckle.
- Check the installation position of front right wheel speed sensor for dirt.

NG

Tighten fixing bolt properly, clean and replace front right wheel speed sensor

OK**3 Check front right wheel speed sensor**

- Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
- Drive the vehicle straight ahead, and read the datastream of front right wheel speed sensor with the X-431 3G diagnostic tester.
- Check if the data change of front right wheel speed sensor is the same with that of other wheel speed sensors.

NG

Replace front right wheel speed sensor

OK**4 Check front right hub ring gear**

- Remove the front right hub assembly.
- Check for foreign matter, missing teeth or damage on the front right hub ring gear.
- Check if the front right hub assembly is securely installed.

NG

Replace front right hub ring gear

OK**5 Check wire harness and connector (front right wheel speed sensor - ABS control module assembly)**

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Disconnect the front right wheel speed sensor connector B-005.
- Using a digital multimeter, check for continuity between the terminals of connector B-007 and connector B-005 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

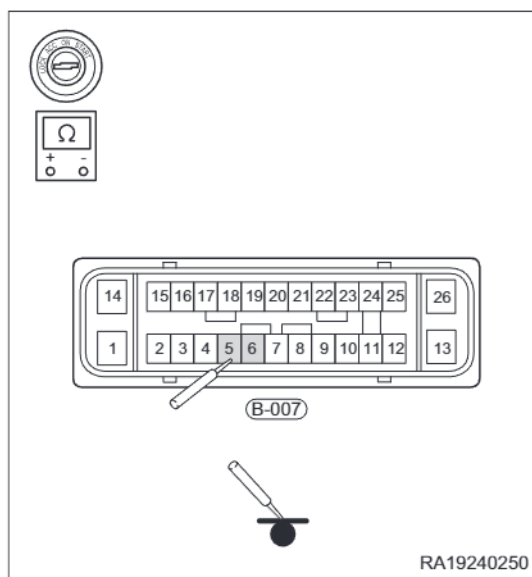
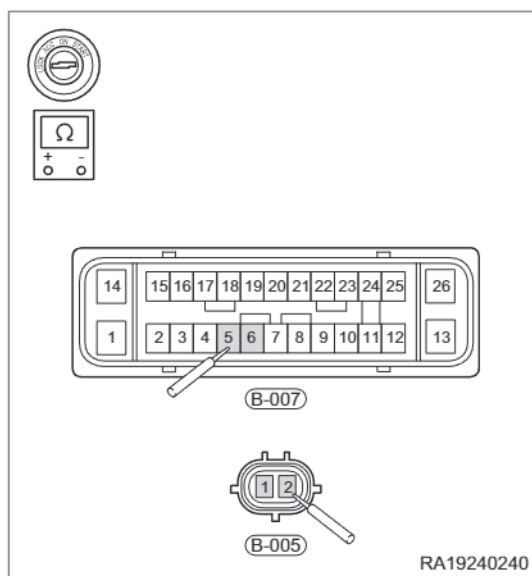
Multimeter Connection	Condition	Specified Condition
B-007-6 - B-005-1	Always	Continuity
B-007-5 - B-005-2	Always	Continuity
B-007-6 - B-005-2	Always	No continuity
B-007-5 - B-005-1	Always	No continuity
B-005-1 - B-005-2	Always	No continuity
B-007-5 - B-007-6	Always	No continuity

- Using a digital multimeter, check for continuity between connector B-007 and body ground to check if the front right wheel speed sensor is short to ground according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-5 - Body ground	Always	No continuity
B-007-6 - Body ground	Always	No continuity

- Connect the negative battery cable.
- Turn the ignition switch to ON.



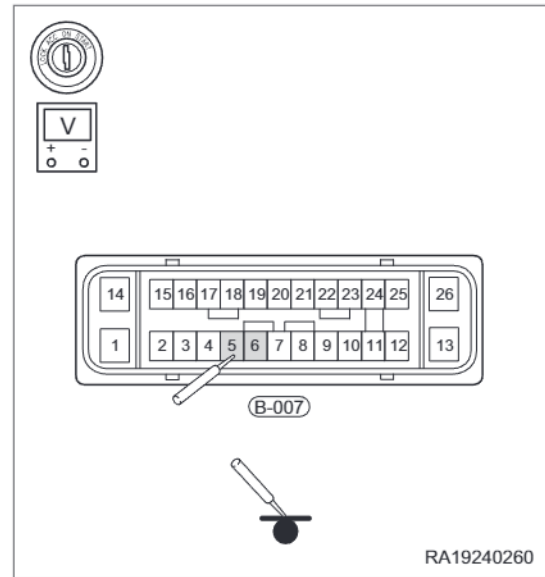
- i. Using a digital multimeter, measure the voltage between connector B-007 and body ground to check if the front right wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-007-5 - Body ground	Ignition switch ON	Approximately 0 V
B-007-6 - Body ground	Ignition switch ON	Approximately 0 V

NG

Repair or replace wire harness and connector between front right wheel speed sensor and ABS control module assembly

**OK****6****Reconfirm DTCs**

- Use the X-431 3G diagnostic tester to clear the DTC.
- Start the engine.
- Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Check if the same DTC is output.

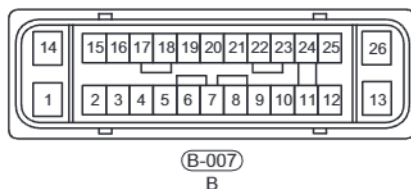
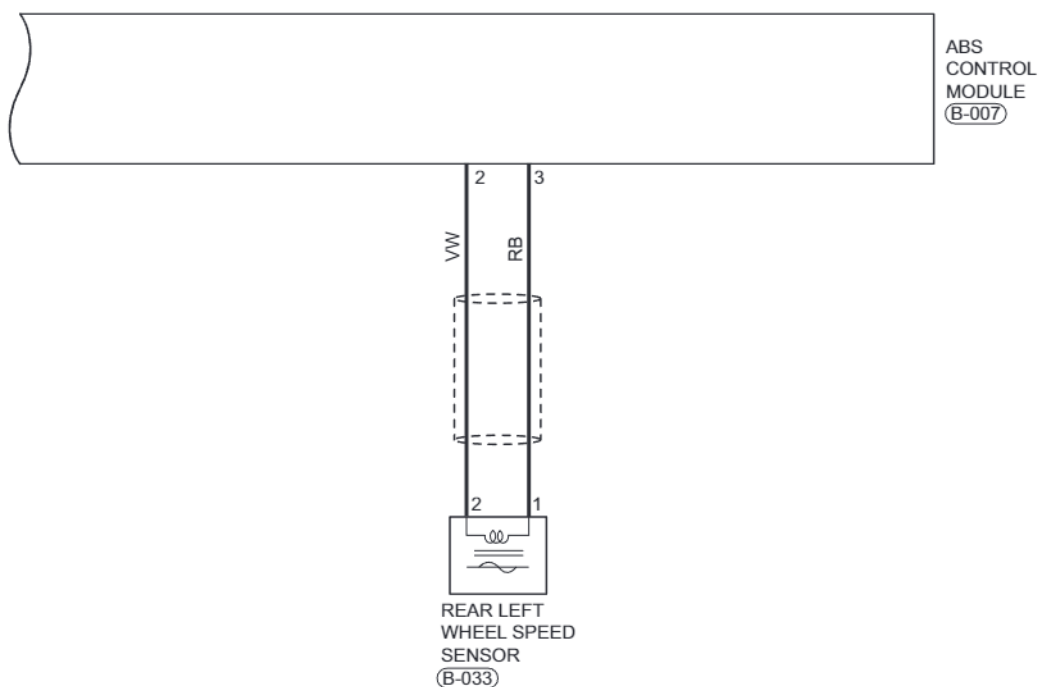
NO

System operates normally

YES

Replace ABS control module assembly

DTC	C0037-01	Left Rear Wheel Speed Sensor General Electrical Failure
DTC	C0037-01	Left Rear Wheel Speed Sensor Mechanical Failure
DTC	C0037-01	Left Rear Wheel Speed Sensor Signal Invalid



EA19240080

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0037-01	Left Rear Wheel Speed Sensor General Electrical Failure	These DTCs occur when any of the following conditions is met: 1. Wheel speed sensor line is open. 2. Wheel speed sensor line is short. 3. Wheel speed sensor signal is abnormal. 4. No signal is output when open circuit cannot be detected and the vehicle speed is more than 15 km/h. 5. When vehicle speed exceeds 20 km/h, the sensor signal exceeds the tolerance of the specified value.	- Wheel speed sensor signal wire is connecting with power wire in reverse. - Wheel speed sensor signal wire is short to ground. - Wheel speed sensor line is open, and connector is loose or broken. - Wheel speed sensor signal wire is short to power supply.
C0037-01	Left Rear Wheel Speed Sensor Mechanical Failure		- Wheel speed sensor power supply wire is short to ground. - Sensor head or plug pin is damaged. - Wheel speed sensor is interfered by magnetic field outside. (wheel or axle is not demagnetized). - Wheel speed sensor body is malfunctioning.
C0037-01	Left Rear Wheel Speed Sensor Signal Invalid		- Ring gear is not installed, has teeth missing, dirty, demagnetized or off center. - Clearance between sensor and ring gear is excessive. - Number of ring gear teeth is wrong. - Tire size is not as specified. - ABS control module assembly is damaged.

CAUTION

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

Diagnosis Procedure

1

Check rear left wheel speed sensor wire harness and connector

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the rear left wheel speed sensor connector B-014.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the 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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check the rear left wheel speed sensor fixing bolt for looseness.
- Check if excessive clearance exists between the installation position of rear left wheel speed sensor and rear axle hub ring gear.
- Check the installation position of rear left wheel speed sensor for dirt.

NG**Tighten fixing bolt properly, clean and replace rear left wheel speed sensor****OK****3 Check rear left wheel speed sensor**

- Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
- Drive the vehicle straight ahead, and read the datastream of rear left wheel speed sensor with the X-431 3G diagnostic tester.
- Check if the data change of rear left wheel speed sensor is the same with that of other wheel speed sensors.

NG**Replace rear left wheel speed sensor****OK****4 Check rear left hub ring gear**

- Remove the rear left hub assembly.
- Check for foreign matter, missing teeth or damage on the rear left hub ring gear.
- Check if the rear left hub assembly is securely installed.

NG**Replace rear left hub ring gear****OK**

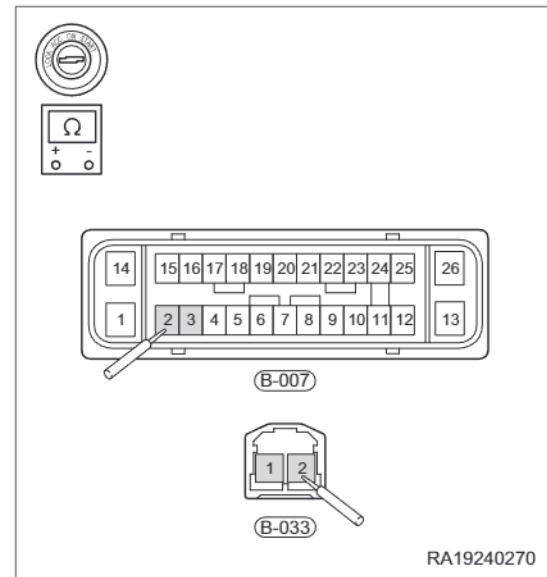
5

Check wire harness and connector (rear left wheel speed sensor - ABS control module assembly)

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Disconnect the rear left wheel speed sensor connector B-033.
- Using a digital multimeter, check for continuity between the terminals of connector B-007 and connector B-033 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

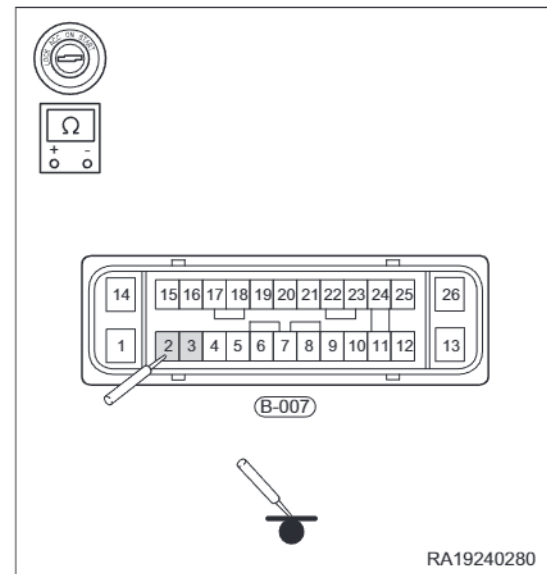
Multimeter Connection	Condition	Specified Condition
B-007-3 - B-033-1	Always	Continuity
B-007-2 - B-033-2	Always	Continuity
B-007-2 - B-033-1	Always	No continuity
B-007-3 - B-033-2	Always	No continuity
B-033-1 - B-033-2	Always	No continuity
B-007-2 - B-007-3	Always	No continuity



- Using a digital multimeter, check for continuity between connector B-007 and body ground to check if the rear left wheel speed sensor is short to ground according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-2 - Body ground	Always	No continuity
B-007-3 - Body ground	Always	No continuity



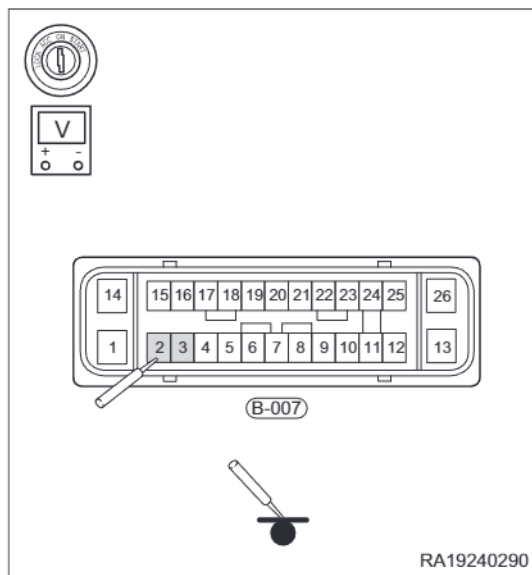
- g. Connect the negative battery cable.
- h. Turn the ignition switch to ON.
- i. Using a digital multimeter, measure the voltage between connector B-007 and body ground to check if the rear left wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-007-2 - Body ground	Ignition switch ON	Approximately 0 V
B-007-3 - Body ground	Ignition switch ON	Approximately 0 V

NG

Repair or replace wire harness and connector between rear left wheel speed sensor and ABS control module assembly

**OK****6****Reconfirm DTCs**

- a. Use the X-431 3G diagnostic tester to clear the DTC.
- b. Start the engine.
- c. Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- d. Check if the same DTC is output.

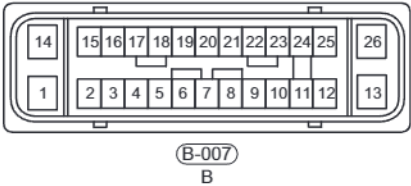
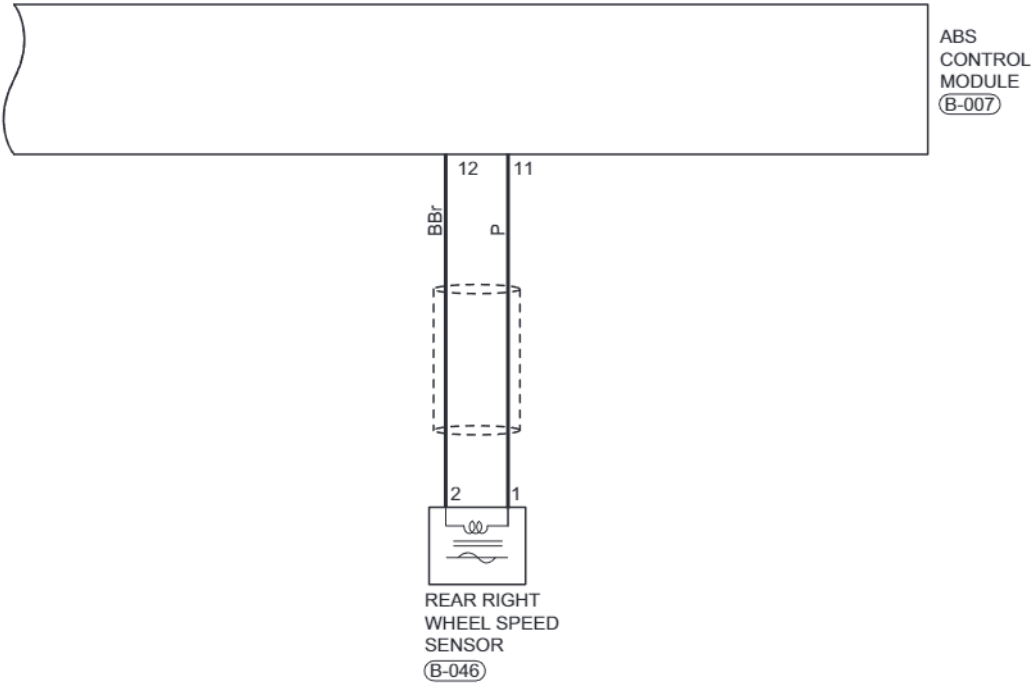
NO

System operates normally

YES

Replace ABS control module assembly

DTC	C003A-01	Right Rear Wheel Speed Sensor General Electrical Failure
DTC	C003A-01	Right Rear Wheel Speed Sensor Mechanical Failure
DTC	C003A-01	Right Rear Wheel Speed Sensor Signal Invalid



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C003A-01	Right Rear Wheel Speed Sensor General Electrical Failure	These DTCs occur when any of the following conditions is met: 1. Wheel speed sensor line is open. 2. Wheel speed sensor line is short. 3. Wheel speed sensor signal is abnormal. 4. No signal is output when open circuit cannot be detected and the vehicle speed is more than 15 km/h. 5. When vehicle speed exceeds 20 km/h, the sensor signal exceeds the tolerance of the specified value.	- Wheel speed sensor signal wire is connecting with power wire in reverse. - Wheel speed sensor signal wire is short to ground. - Wheel speed sensor line is open, and connector is loose or broken. - Wheel speed sensor signal wire is short to power supply.
C003A-01	Right Rear Wheel Speed Sensor Mechanical Failure		- Wheel speed sensor power supply wire is short to ground. - Sensor head or plug pin is damaged. - Wheel speed sensor is interfered by magnetic field outside. (wheel or axle is not demagnetized). - Wheel speed sensor body is malfunctioning. - Ring gear is not installed, has teeth missing, dirty, demagnetized or off center.
C003A-01	Right Rear Wheel Speed Sensor Signal Invalid		- Clearance between sensor and ring gear is excessive. - Number of ring gear teeth is wrong. - Tire size is not as specified. - ABS control module assembly is damaged.

CAUTION

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

Diagnosis Procedure

1

Check rear right wheel speed sensor wire harness and connector

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the rear right wheel speed sensor connector B-046.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the 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

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check the rear right wheel speed sensor fixing bolt for looseness.
- Check if excessive clearance exists between the installation position of rear right wheel speed sensor and rear axle hub ring gear.
- Check the installation position of rear right wheel speed sensor for dirt.

NG

Tighten fixing bolt properly, clean and replace rear right wheel speed sensor

OK**3 Check rear right wheel speed sensor**

- Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
- Drive the vehicle straight ahead, and read the datastream of rear right wheel speed sensor with the X-431 3G diagnostic tester.
- Check if the data change of rear right wheel speed sensor is the same with that of other wheel speed sensors.

NG

Replace rear right wheel speed sensor

OK**4 Check rear right hub ring gear**

- Remove the rear right hub assembly.
- Check for foreign matter, missing teeth or damage on the rear right hub ring gear.
- Check if the rear right hub assembly is securely installed.

NG

Replace rear right hub ring gear

OK**5 Check wire harness and connector (rear right wheel speed sensor - ABS control module assembly)**

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Disconnect the rear right wheel speed sensor connector B-046.
- Using a digital multimeter, check for continuity between the terminals of connector B-007 and connector B-046 to check if there is an open in the wire harness and connector according to the table below.

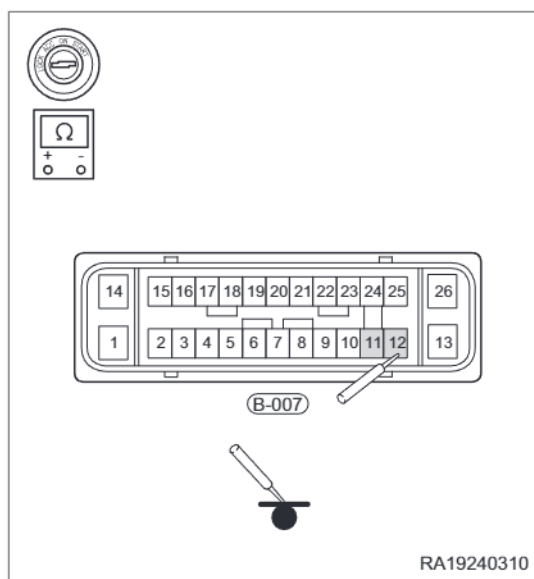
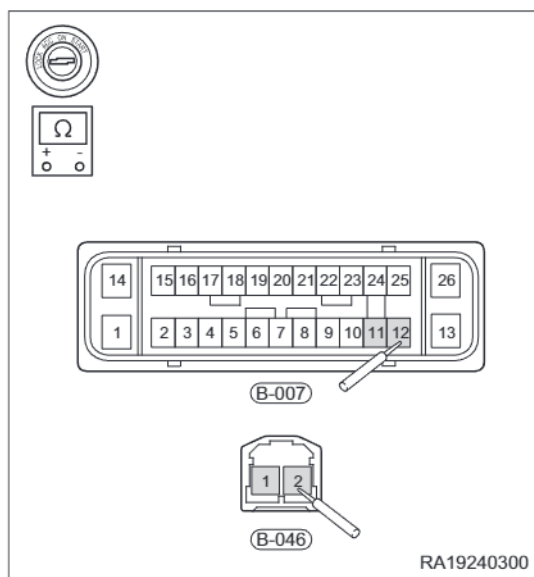
Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-11 - B-046-1	Always	Continuity
B-007-12 - B-046-2	Always	Continuity
B-007-12 - B-046-1	Always	No continuity
B-007-11 - B-046-2	Always	No continuity
B-046-1 - B-046-2	Always	No continuity
B-007-11 - B-007-12	Always	No continuity

- Using a digital multimeter, check for continuity between connector B-007 and body ground to check if the rear right wheel speed sensor is short to ground according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-11 - Body ground	Always	No continuity
B-007-12 - Body ground	Always	No continuity



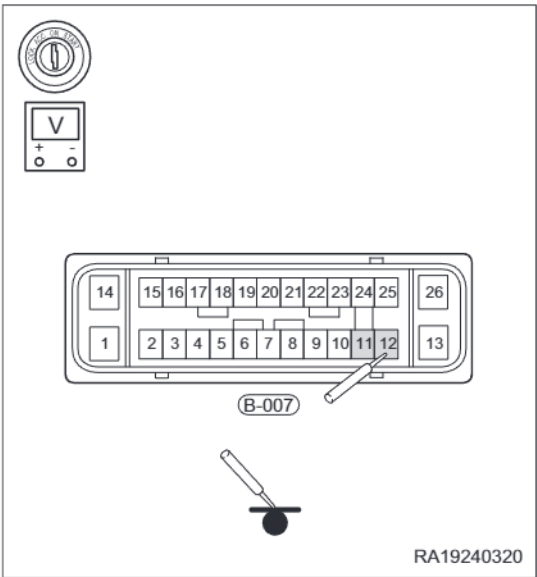
- g. Connect the negative battery cable.
- h. Turn the ignition switch to ON.
- i. Using a digital multimeter, measure the voltage between connector B-007 and body ground to check if the rear right wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-007-11 - Body ground	Ignition switch ON	Approximately 0 V
B-007-12 - Body ground	Ignition switch ON	Approximately 0 V

NG

Repair or replace wire harness and connector between rear right wheel speed sensor and ABS control module assembly



OK

6

Reconfirm DTCs

- a. Use the X-431 3G diagnostic tester to clear the DTC.
- b. Start the engine.
- c. Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- d. Check if the same DTC is output.

NO

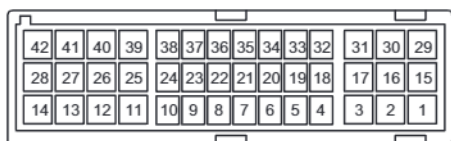
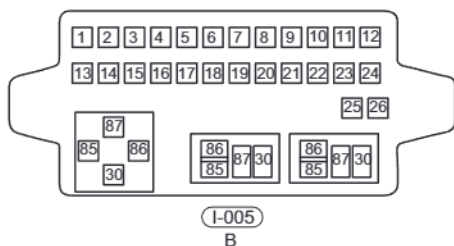
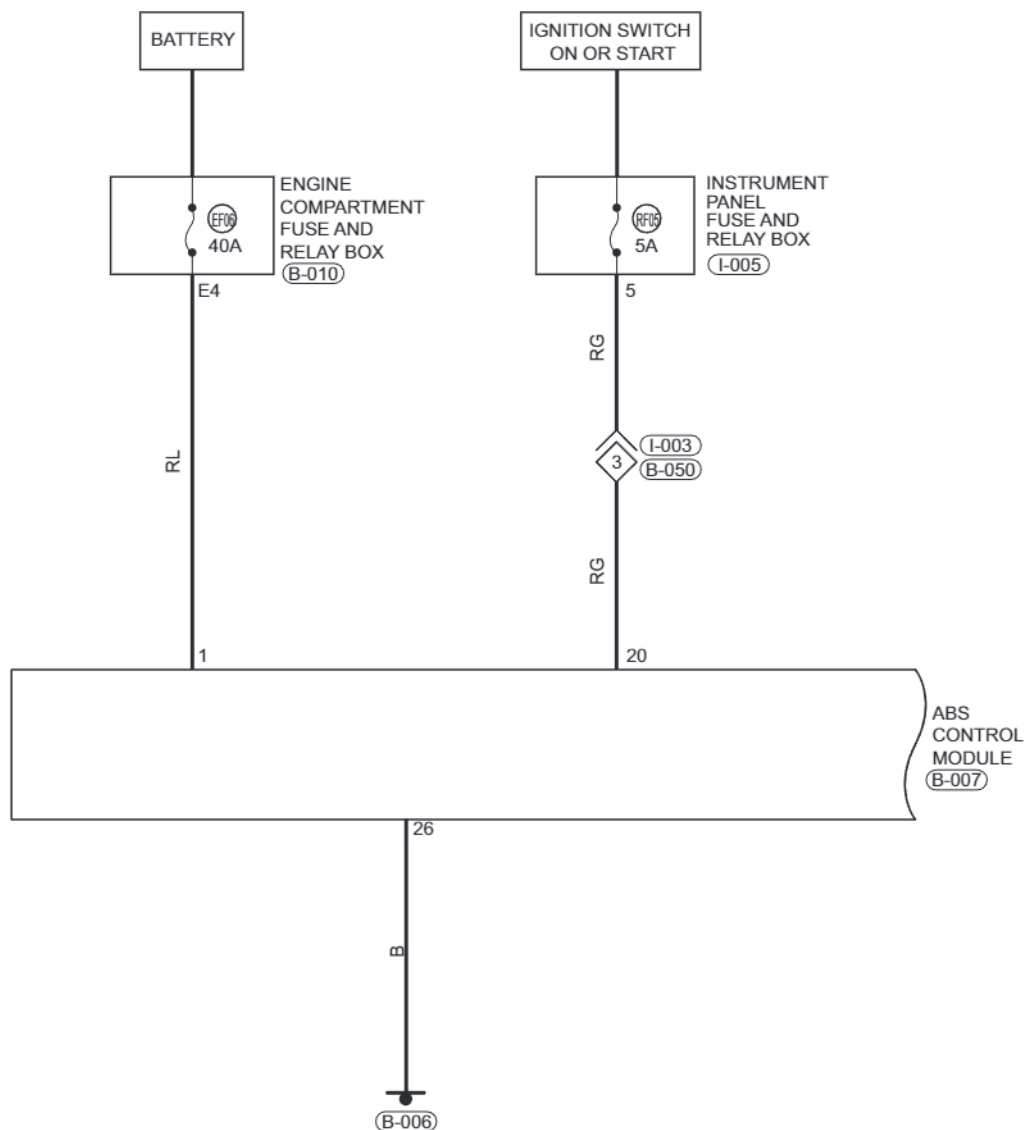
System operates normally

YES

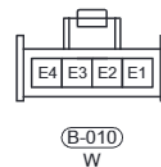
Replace ABS control module assembly

DTC	C1000-16	ECU Voltage Supply Circuit Voltage Below Threshold
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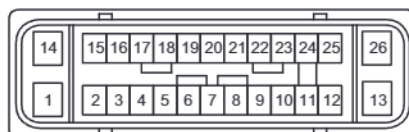
DTC	C1000-17	ECU Voltage Supply Circuit Voltage Above Threshold
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(B-050)
W



(B-010)
W



(B-007)
B

EA19240100

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C1000-16	ECU Voltage Supply Circuit Voltage Below Threshold	These DTCs occur when the supply voltage of ECU meets the following conditions:	- Abnormal battery voltage - Charging system malfunction. - Wire harness or connector damaged. - ABS control module assembly malfunction.
C1000-17	ECU Voltage Supply Circuit Voltage Above Threshold	- No supply voltage of ECU. - Supply voltage of ECU is too low. - Supply voltage of ECU is too high.	

CAUTION

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

Diagnosis Procedure

1 Check ABS fuse

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the ABS fuse EF-06 (40 A) from the engine compartment fuse and relay box.
- Check if the fuse is blown.

NG

Replace ABS fuse

OK

2 Check battery

- Using the digital multimeter, measure the voltage between the positive battery terminal and negative battery terminal.
- The battery voltage should be between 9 and 16 V.

NG

Check charging system ([See page 16-6](#))

OK

3 Check wire harness and connector (ABS control module assembly - battery)

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007.
- Connect the negative battery terminal cable.
- Turn the ignition switch to ON.
- Using a digital multimeter, measure the supply voltage between ABS control module assembly connector B-007 and body ground to check if the power supply circuit is normal according to the table below.

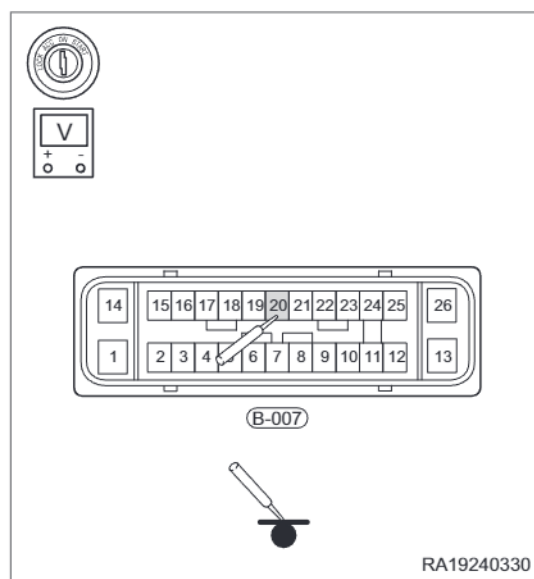
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-007-20 - Body ground	Ignition switch ON	9 to 16 V

NG

Repair or replace related wire harness and connector

OK



4 Check wire harness and connector (ABS control module assembly - body ground)

- Turn the ignition switch to LOCK.
- Disconnect the negative battery terminal cable.
- Disconnect the ABS control module assembly connector B-007.
- Using a digital multimeter, check for continuity between ABS control module assembly connector B-007 and body ground to check if the system ground circuit is normal according to the table below.

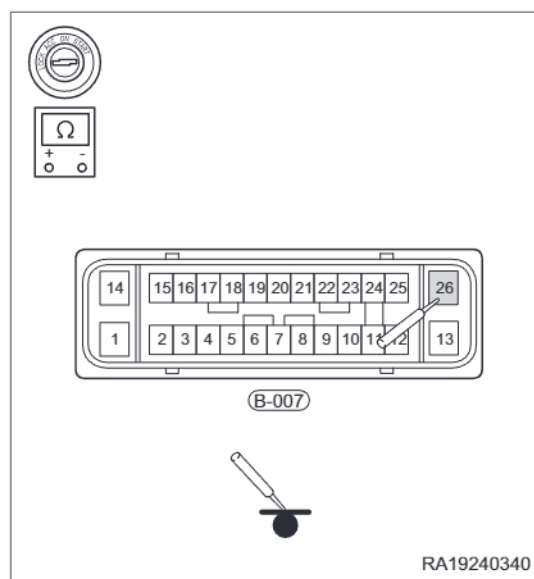
Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-26 - Body ground	Always	Continuity

NG

Repair or replace ABS control module assembly wire harness and connector

OK



5**Reconfirm DTCs**

- a. Use the X-431 3G diagnostic tester to clear the DTC.
- b. Start the engine.
- c. Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- d. Check if the same DTC is output.

NO**System operates normally****YES****Replace ABS control module assembly**

DTC	C1001-04	ECU System Internal Failures
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DTC	C1020-96	ABS Operation Component Internal Failures
------------	-----------------	--

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C1001-04	ECU System Internal Failures	These DTCs occur when the following condition is met:	ABS control module assembly malfunction.
C1020-96	ABS Operation Component Internal Failure	1. ECU power supply malfunction. 2. ECU is damaged.	

CAUTION

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

Diagnosis Procedure

1	Reconfirm DTCs
----------	-----------------------

- Use the X-431 3G diagnostic tester to clear the DTC.
- Start the engine.
- Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Check if the same DTC is output.

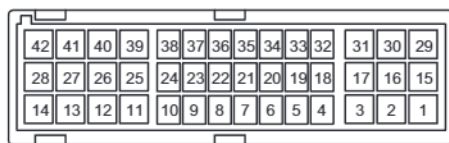
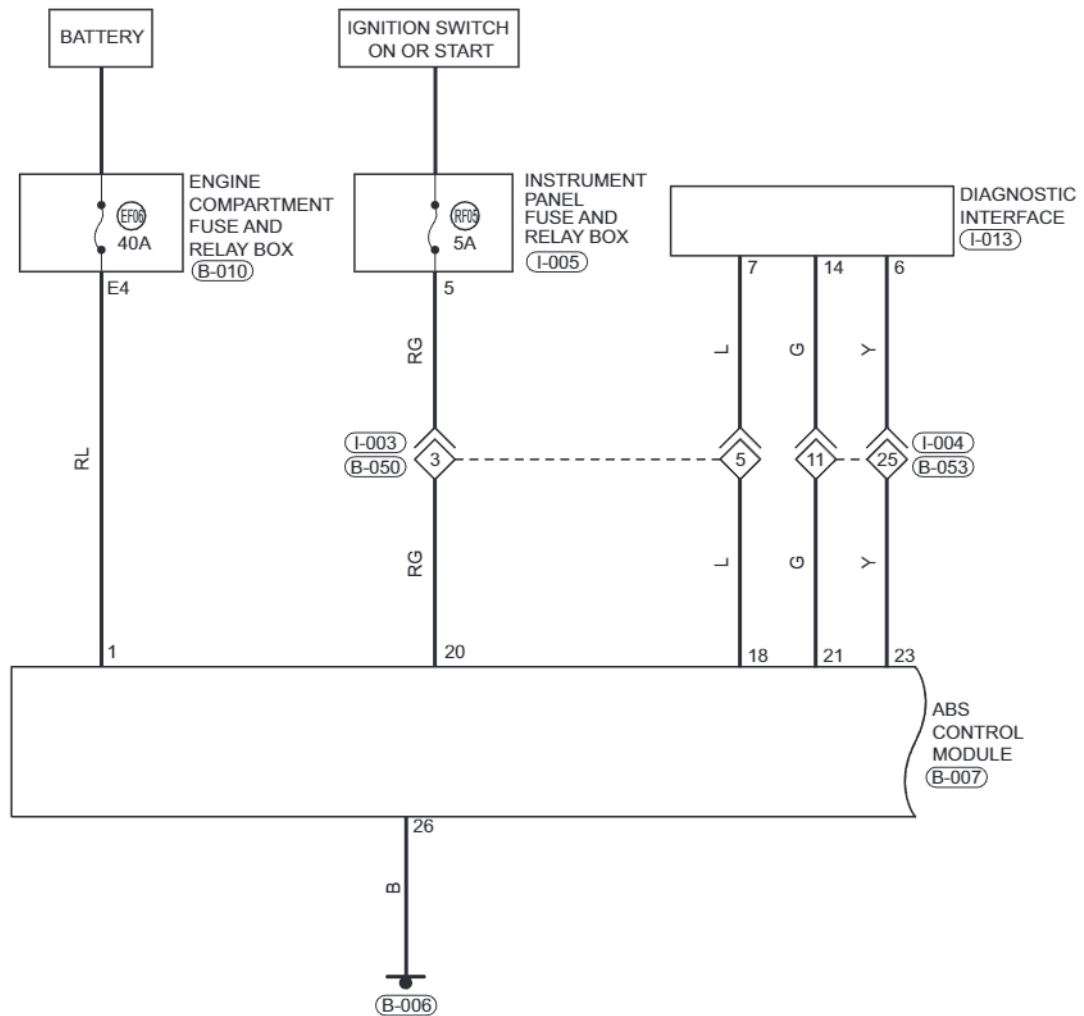
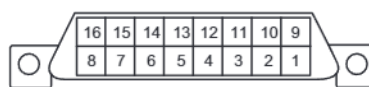
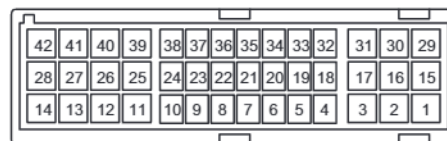
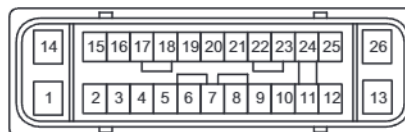
NO

System operates normally

YES

Replace ABS control module assembly

DTC	U0073-88	Control Module Communication Bus Off
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B-053
LI-013
BB-010
WB-050
WI-005
BB-007
B

EA19240110

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0073-88	Control Module Communication Bus Off	When bus line is abnormal or other joints on bus line cannot transmit data properly, this type of DTC occurs.	- High frequency electromagnetic waves interference. - Wire harness or connector damaged. - CAN bus line electrical failure. - ABS control module assembly malfunction.

CAUTION

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

Diagnosis Procedure

1 Check wire harness and connector (ABS control module assembly - diagnostic interface)

- Turn the ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS control module assembly connector B-007 and body wire harness connector B-053.
- Disconnect the diagnostic interface connector I-013 and instrument panel wire harness connector I-004.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

Repair or replace body/instrument panel wire harness and connector

OK

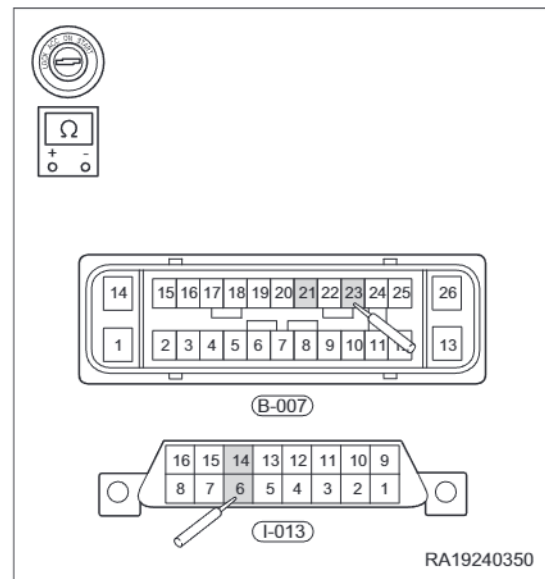
2

Check CAN communication control circuit (ABS control module assembly - diagnostic interface)

- Disconnect the negative battery terminal cable.
- Turn the ignition switch to LOCK.
- Disconnect the ABS control module assembly connector B-007 and diagnostic interface connector I-013.
- Using a digital multimeter, check for continuity between terminals of ABS control module assembly and diagnostic interface to check for an open circuit according to the value(s) in the table below.

Standard Condition

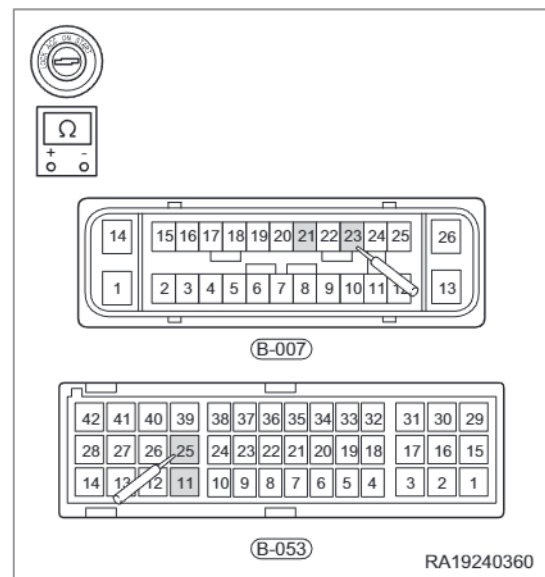
Multimeter Connection	Condition	Specified Condition
B-007-21 - I-013-14	Always	Continuity
B-007-23 - I-013-6	Always	Continuity



- Disconnect the instrument panel wire harness connector I-004 and body wire harness connector B-053.
- Using a digital multimeter, check for continuity between terminals of ABS control module assembly connector B-007 and body wire harness connector B-053 to check for an open circuit according to the value(s) in the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-007-21 - B-053-11	Always	Continuity
B-007-23 - B-053-25	Always	Continuity



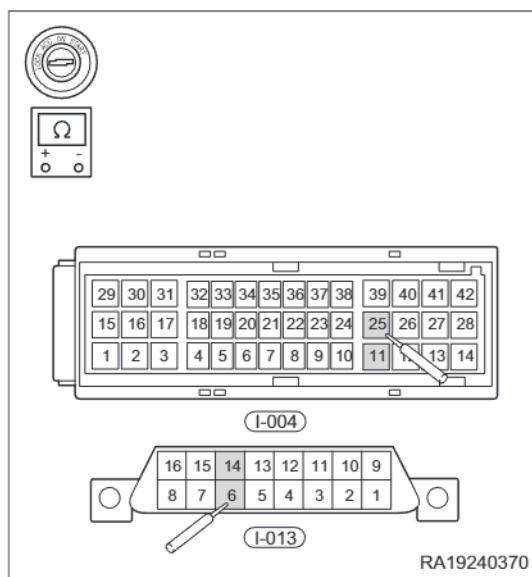
- g. Using a digital multimeter, check for continuity between terminals of diagnostic interface connector I-013 and instrument panel wire harness connector I-004 to check for an open circuit according to the value(s) in the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
I-013-14 - I-004-11	Always	Continuity
I-013-6 - I-004-25	Always	Continuity

NG

Repair or replace body/instrument panel wire harness and connector

**OK****3****Reconfirm DTCs**

- Use the X-431 3G diagnostic tester to clear the DTC.
- Start the engine.
- Drive the vehicle at 20 km/h or more, read the ABS control module assembly DTC again with the X-431 3G diagnostic tester.
- Check if the same DTC is output.

NO

System operates normally

YES

Replace ABS control module assembly

ON-VEHICLE SERVICE

ABS Bleeding

WARNING

- When bleeding the brake system, wear safety glasses. If the brake fluid gets on your eyes or skin, wash off with water completely.
- DO NOT drop the brake fluid onto the body paint, as the brake fluid can corrode the body paint.

CAUTION

- The brake fluid should meet the Chery specified type (DOT4). DO NOT mix the brake fluid with other types of brake fluid.
- The 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 the reservoir, wipe it off before removing the reservoir cap.

The bleeding procedures for brake system with the X-431 3G diagnostic tester are as follows:

1. Make sure all the brake lines have been installed properly and tighten them in place.
2. Check that the battery voltage is normal.
3. Turn the ignition switch to LOCK.
4. Connect the X-431 3G diagnostic tester (the latest software) to the Data Link Connector (DLC).
5. Turn the ignition switch to ON.
6. Using the X-431 diagnostic tester, record and clear the DTCs stored in the ABS control module assembly.
7. Using the X-431 3G diagnostic tester, enter Brake Control System, select Repair Bleed Function, and then perform the operation according to the information and procedures displayed on the diagnostic tester.

HINT:

- If the bleeder plug is open, never depress the brake pedal repeatedly. Doing so will increase the amount of air in the system.
 - Do not drain brake fluid from the brake fluid reservoir while bleeding the system. Otherwise, low fluid level in the brake reservoir will cause additional air to enter the brake system.
 - Always check the brake fluid level at all times to ensure that the brake fluid level in the brake reservoir is always close to the "MAX" level.
8. For X type brake circuit, the bleeding order is: rear left wheel, front right wheel, rear right wheel and front left wheel.
 9. After bleeding is completed, fill the brake reservoir with brake fluid to the MAX level .
 10. Drive the vehicle to perform a road test, confirm that the ABS system operates normally and brake pedal feel is good.

ABS Control Module Assembly

Removal

WARNING

- When repairing the ABS system, first release the pressure of high pressure brake fluid in the accumulator, to prevent the high pressure brake fluid from spraying out and causing injury.
- Operation procedures: turn the ignition switch off first, and then depress and release the brake pedal repeatedly until the brake pedal becomes hard.
- In addition, never turn the ignition switch on before the ABS system is installed completely to prevent the hydraulic pump from energizing and running.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Drain the brake fluid ([See page 25-13](#)).

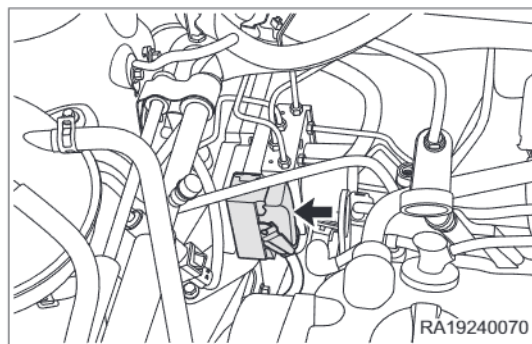
CAUTION

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

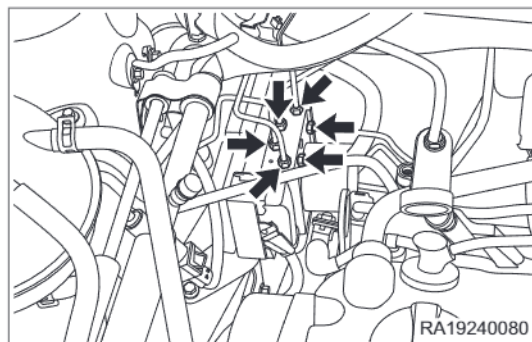
ENVIRONMENTAL PROTECTION

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

4. Remove the engine trim cover.
5. Remove the ABS control module assembly.
 - a. Press the lock area of ABS control module assembly connector, move the connector lock bracket upward and disconnect the ABS control module assembly connector (arrow).



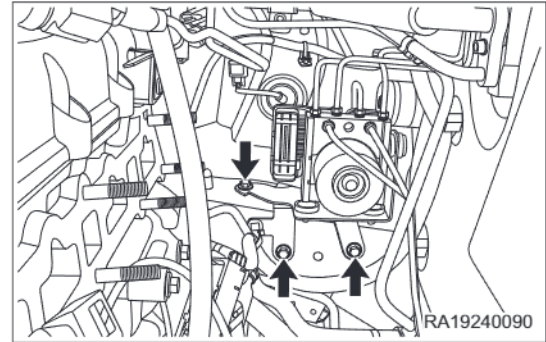
- b. Using a fixing wrench, carefully disconnect 6 brake pipe coupling plugs (arrow).
(Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$)



CAUTION

- When removing the brake line, prevent the foreign matter from entering the ABS control module assembly thread holes.
- After disconnecting the brake line, sealing measure should be taken to prevent the foreign matter from entering.

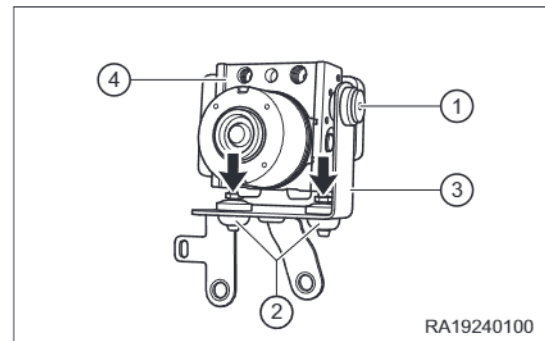
- c. Remove the coupling bolts (arrow) between ABS control module assembly mounting bracket and body.
(Tightening torque: $25 \pm 4 \text{ N}\cdot\text{m}$)



- d. Remove the ABS control module with mounting bracket assembly.

Disassembly

1. Remove the ABS control module assembly.
 - a. Remove the ABS control module assembly side fixing screw (1).
(Tightening torque: $10 \pm 1.5 \text{ N}\cdot\text{m}$)
 - b. Remove the shock pads (2) from the bottom of ABS control module assembly.
 - c. Remove the ABS control module assembly bottom fixing bolts (arrow).
(Tightening torque: $10 \pm 1.5 \text{ N}\cdot\text{m}$)
 - d. Detach the ABS control module assembly (4) from the mounting bracket (3).

**Assembly**

Assembly is in the reverse order of disassembly.

CAUTION

- Check if the shock pads are deteriorated or damaged. Replace them if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION

- ABS control module assembly consists of hydraulic control module and electronic control module. As a unit, they cannot be repaired or replaced individually.
- When installing the fixing bolts and nuts, make sure to tighten them to the specified torque.
- Perform the ABS bleeding procedures for brake system after completing the installation ([See page 24-57](#)).
- Using the X-431 3G diagnostic tester, enter Brake Control System, record and clear the trouble code, then drive the vehicle to perform the road test, confirming that the ABS system operates normally and brake pedal feel is good.

Front Wheel Speed Sensor

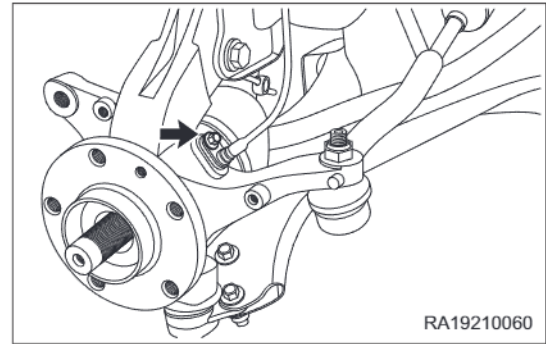
Removal

CAUTION

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

HINT:

- Use the same procedures for the right side and left side.
 - The procedures listed below are for the left side.
- Turn off all the electrical equipment and ignition switch.
 - Disconnect the negative battery cable.
 - Remove the front left wheel speed sensor.
 - Remove the coupling bolt (arrow) between front left wheel speed sensor and front left steering knuckle assembly, and detach the front left wheel speed sensor carefully.
(Tightening torque: $10 \pm 1.5 \text{ N}\cdot\text{m}$)



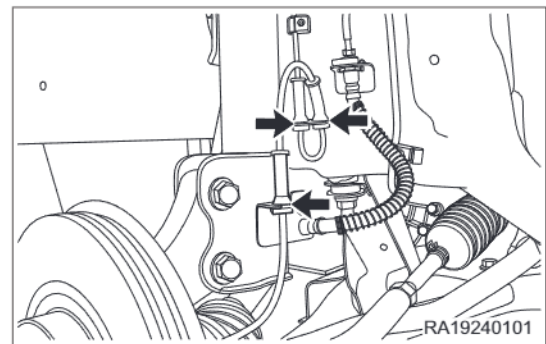
CAUTION

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

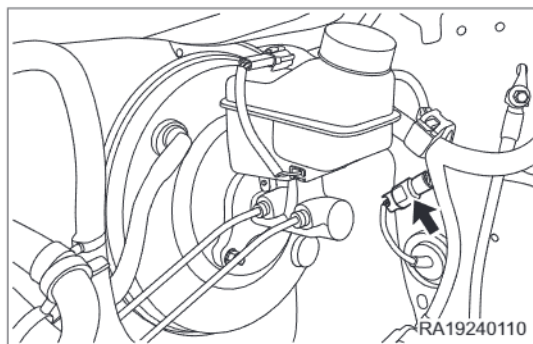
- Detach the attachment parts (arrow) of front left wheel speed sensor wire harness from the front left shock absorber assembly and body.

HINT:

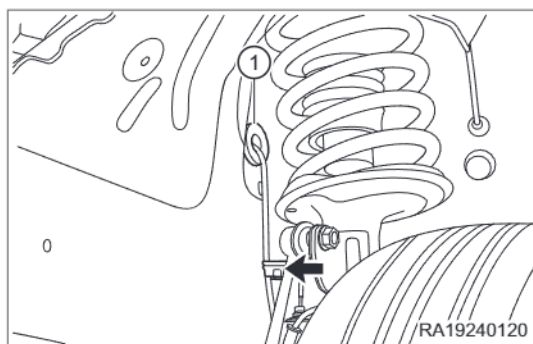
Observe the winding direction of sensor wire harness to prevent incorrect installation.



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



- d. Remove the fixing clip (arrow) between front left wheel speed sensor wire harness and body, and detach the wire harness cover (1) from the body.



- e. Remove the front left wheel speed sensor.

Inspection

1. Check the front wheel speed sensor.
 - a. Check the front wheel speed sensor surface for breakage, dents or notch.
 - b. Check the front wheel speed sensor connector or wire harness for scratches, breakage or damage.
 - c. If any of the above conditions occurs, replace the front wheel speed sensor with a new one.

Installation

Installation is in the reverse order of removal.

CAUTION

- When installing the coupling bolt, make sure to tighten it to the specified torque.

Rear Wheel Speed Sensor

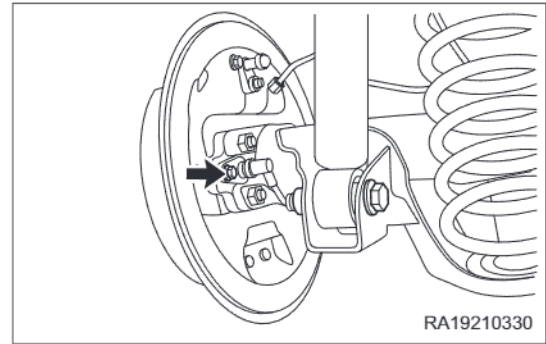
Removal

CAUTION

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

HINT:

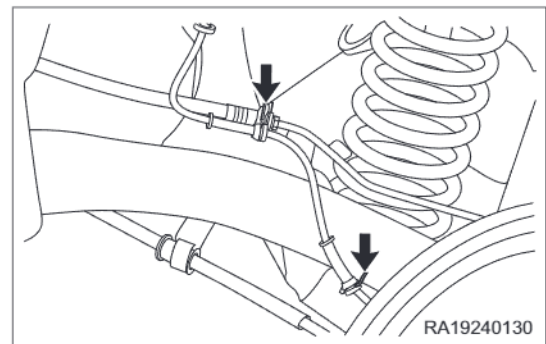
- Use the same procedures for the right side and left side.
 - The procedures listed below are for the left side.
1. Turn off all the electrical equipment and ignition switch.
 2. Disconnect the negative battery cable.
 3. Remove the rear left wheel speed sensor.
 - a. Remove the coupling bolt (arrow) between rear left wheel speed sensor and rear left hub shaft. (Tightening torque: $10 \pm 1.5 \text{ N}\cdot\text{m}$)



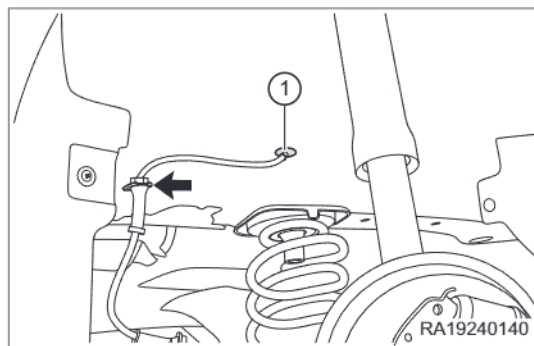
CAUTION

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

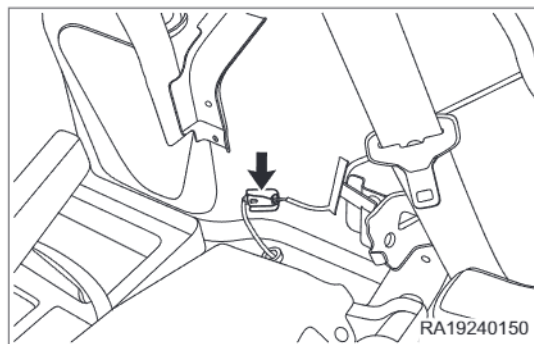
- b. Detach the attachment parts (arrow) of rear left wheel speed sensor wire harness from the rear shaft assembly. (Tightening torque: $18 \pm 2 \text{ N}\cdot\text{m}$)



- c. Detach the attachment part (arrow) between rear left wheel speed sensor wire harness and body, and detach the wire harness cover (1).



- d. Turn over the rear left seat, remove the seat rear left trim cover assembly, then disconnect the rear left wheel speed sensor wire harness connector (arrow).



- e. Remove the rear left wheel speed sensor.

Inspection

1. Check the rear wheel speed sensor.
 - a. Check the rear wheel speed sensor surface for breakage, dents or notch.
 - b. Check the rear wheel speed sensor connector or wire harness for scratches, breakage or damage.
 - c. If any of the above conditions occurs, replace the rear wheel speed sensor with a new one.

Installation

Installation is in the reverse order of removal.

CAUTION

- When installing the coupling bolt, make sure to tighten it to the specified torque.

