

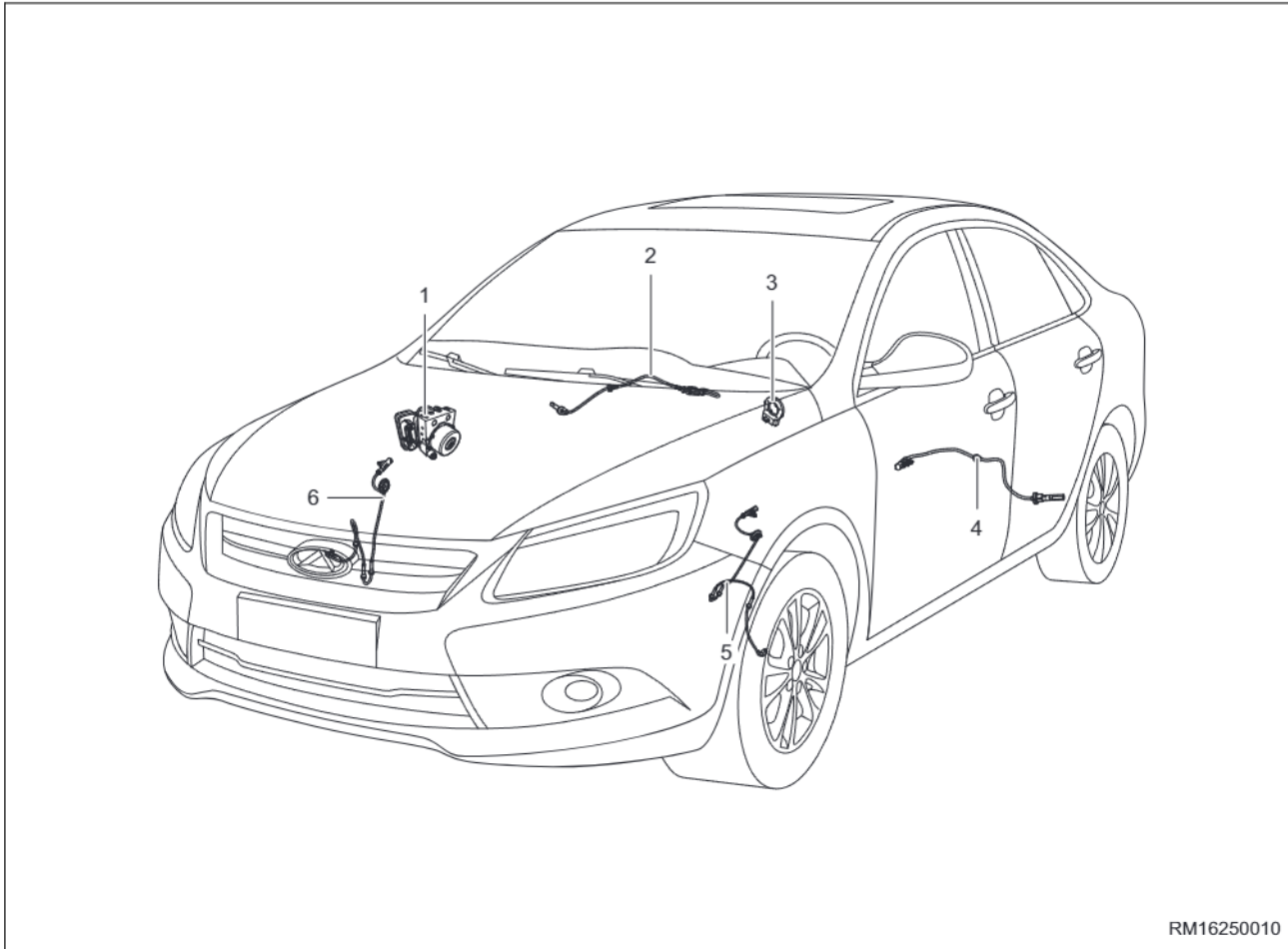
BRAKE CONTROL SYSTEM

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GENERAL INFORMATION

Description



RM16250010

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

Brake control system equipped on this model is ABS (Anti-lock Brake System) + EBD (Electronic Brake Force Distribution) or ESP (Electronic Stability Program). It mainly consist of following components:

- ABS/ESP control module assembly (hydraulic control module and electronic control module)
- Wheel speed sensors (each wheel has one sensor)
- Steering Angle Sensor (if equipped with ESP)
- Yaw Rate Sensor (if equipped with ESP) (built in SRS control module assembly)

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

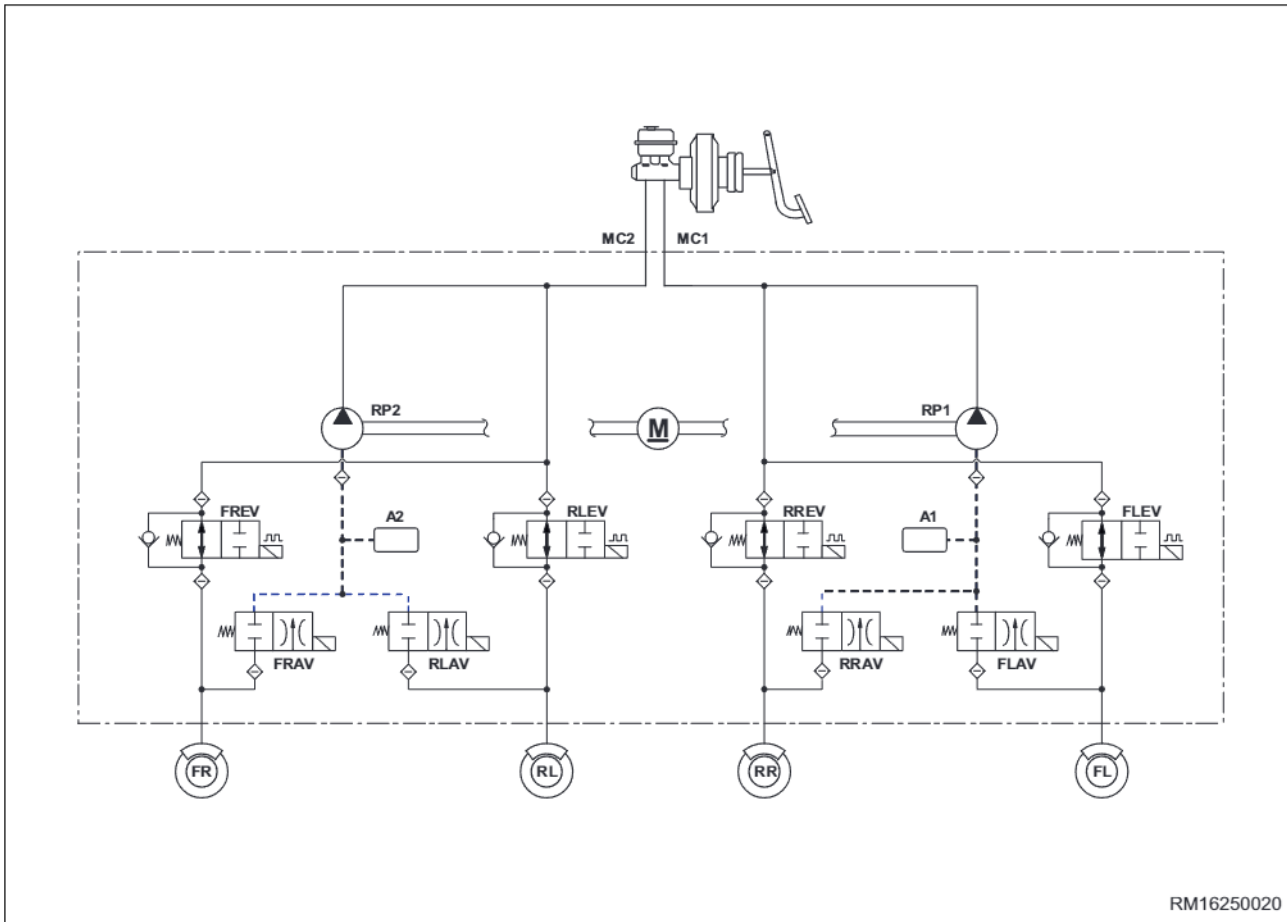
1. Improving vehicle driving stability.
2. Improving vehicle steering ability.
3. Maintaining optimal brake pressure.
4. Shortening brake distance efficiently.

Operation

ABS Braking

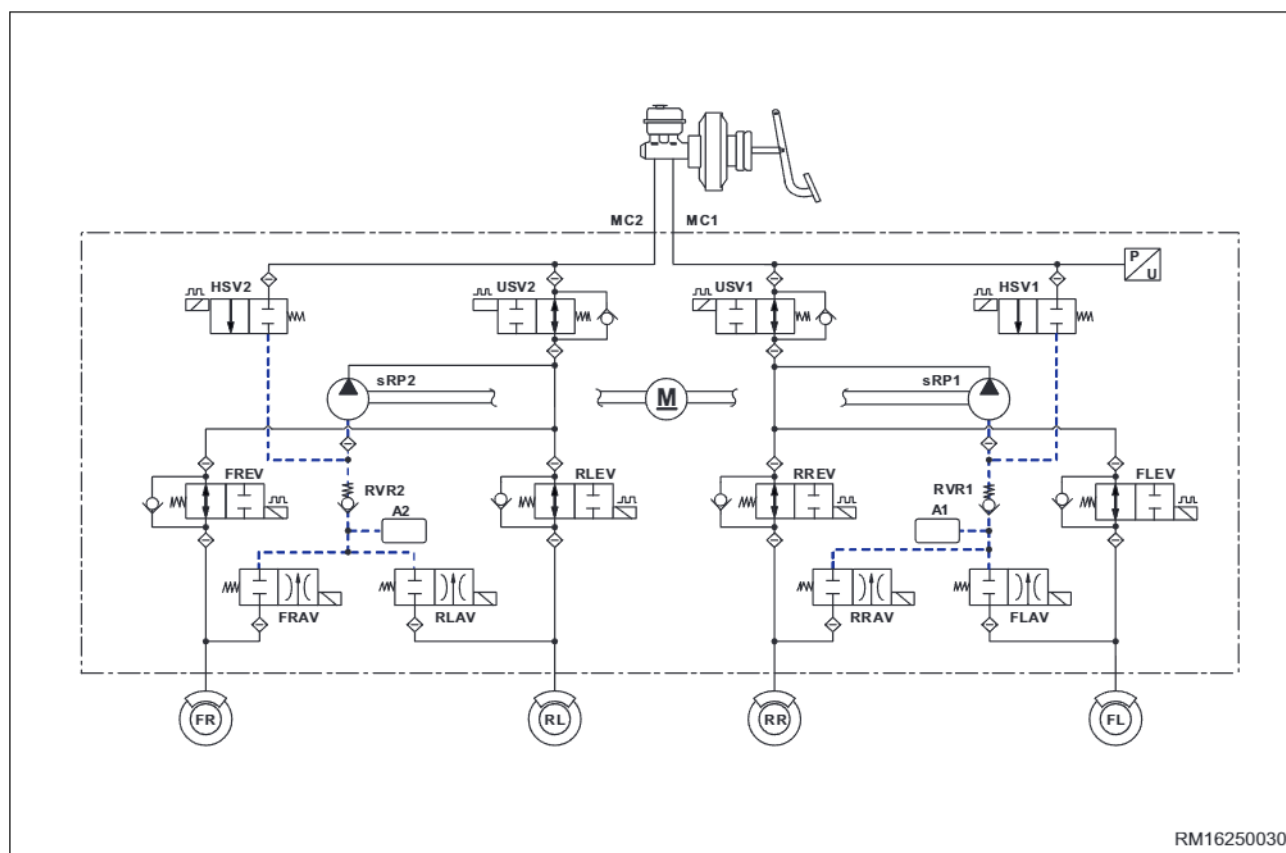
1. If ABS system detects that wheels may be locked when applying brake, brake system will enter ABS braking mode. During braking, ABS/ESP control module outputs signal from each wheel speed sensor to each solenoid valve after analysis in order to adjust fluid pressure in each line, to prevent wheels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

ABS Control Mode



Description	Definition	Description	Definition
MC1	Brake Master Cylinder Circuit 1	FR	Front Right Wheel
MC2	Brake Master Cylinder Circuit 2	FLEV	Front Left Wheel Inlet Valve
M	Motor	FLAV	Front Left Wheel Outlet Valve
RP1	Return Pump 1	FREV	Front Right Wheel Inlet Valve
RP2	Return Pump 2	FRAV	Front Right Wheel Outlet Valve
A1	Accumulator 1	RLEV	Rear Left Wheel Inlet Valve
A2	Accumulator 2	RLAV	Rear Left Wheel Outlet Valve
FL	Front Left Wheel	RREV	Rear Right Wheel Inlet Valve
RR	Rear Right Wheel	RRAV	Rear Right Wheel Outlet Valve
RL	Rear Left Wheel		

ESP Control Mode



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

1. General Brake Operating Condition

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

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

2. ABS Operating (Relief) Condition

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

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

3. ABS Operating (Maintaining) Condition

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

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

4. ABS Operating (Boost) Condition

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

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

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

ESP adjustment procedure is similar to ABS adjustment procedure. Brake fluid is supplied to wheel cylinders that need to increase pressure by pump, when traction control and stability control are realized and HSV valve opens and USV valve closes.

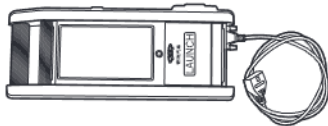
Specifications

Torque Specifications

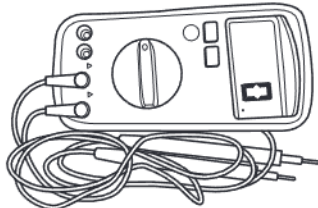
Description	Torque (N·m)
Brake Pipe Coupling Plug	16 ± 2
Coupling Nut Between ABS/ESP Control Module Assembly and Mounting Bracket	8 ± 2
Coupling Bolt Between ABS/ESP Control Module Assembly Mounting Bracket and Body	25 ± 3
Front Wheel Speed Sensor Fixing Bolt	10 ± 1
Rear Wheel Speed Sensor Fixing Bolt	10 ± 1

Tools

Special Tool

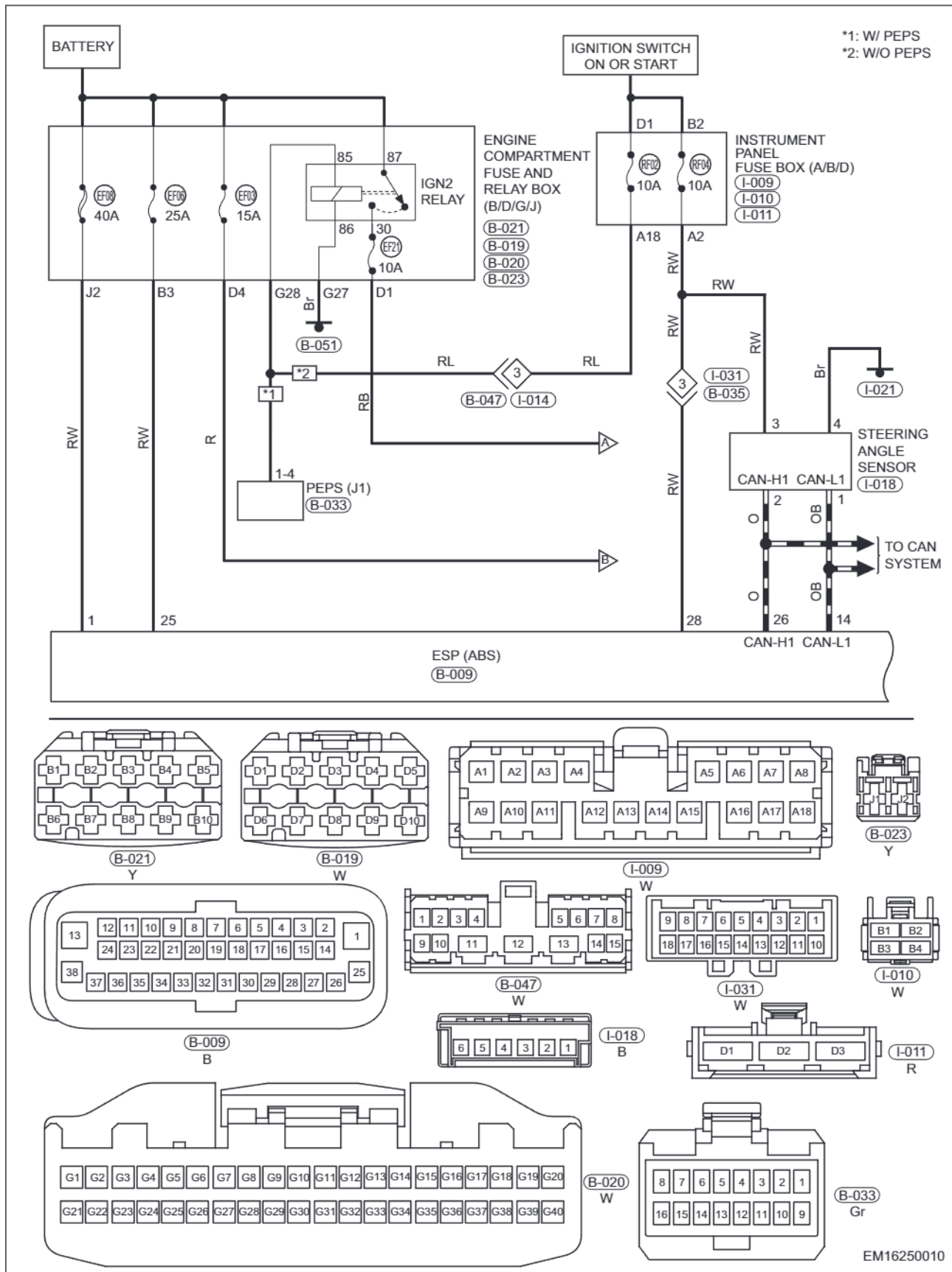
X-431 3G Diagnostic Tester	 RCH0000001
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General Tool

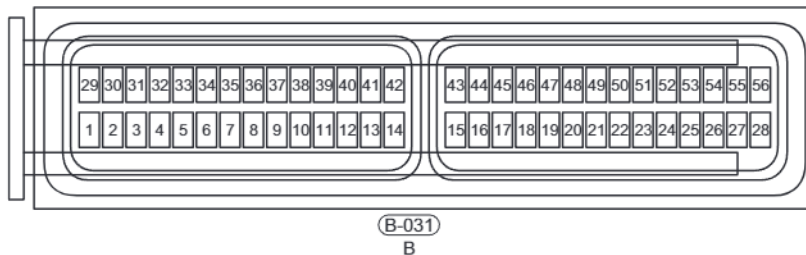
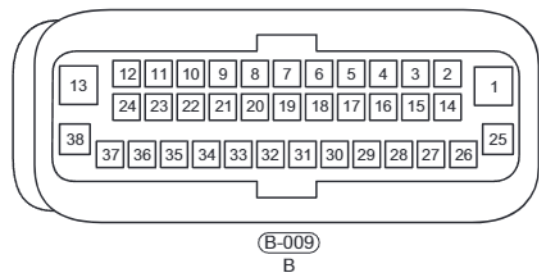
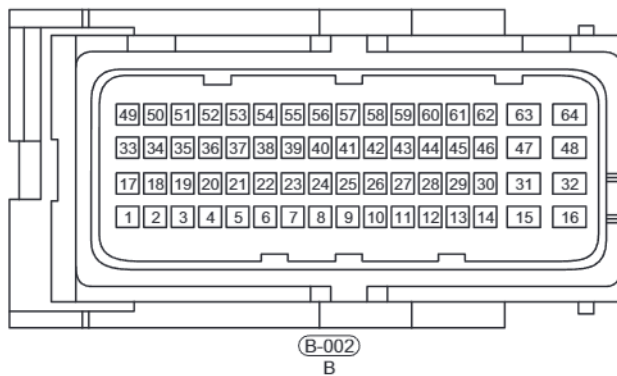
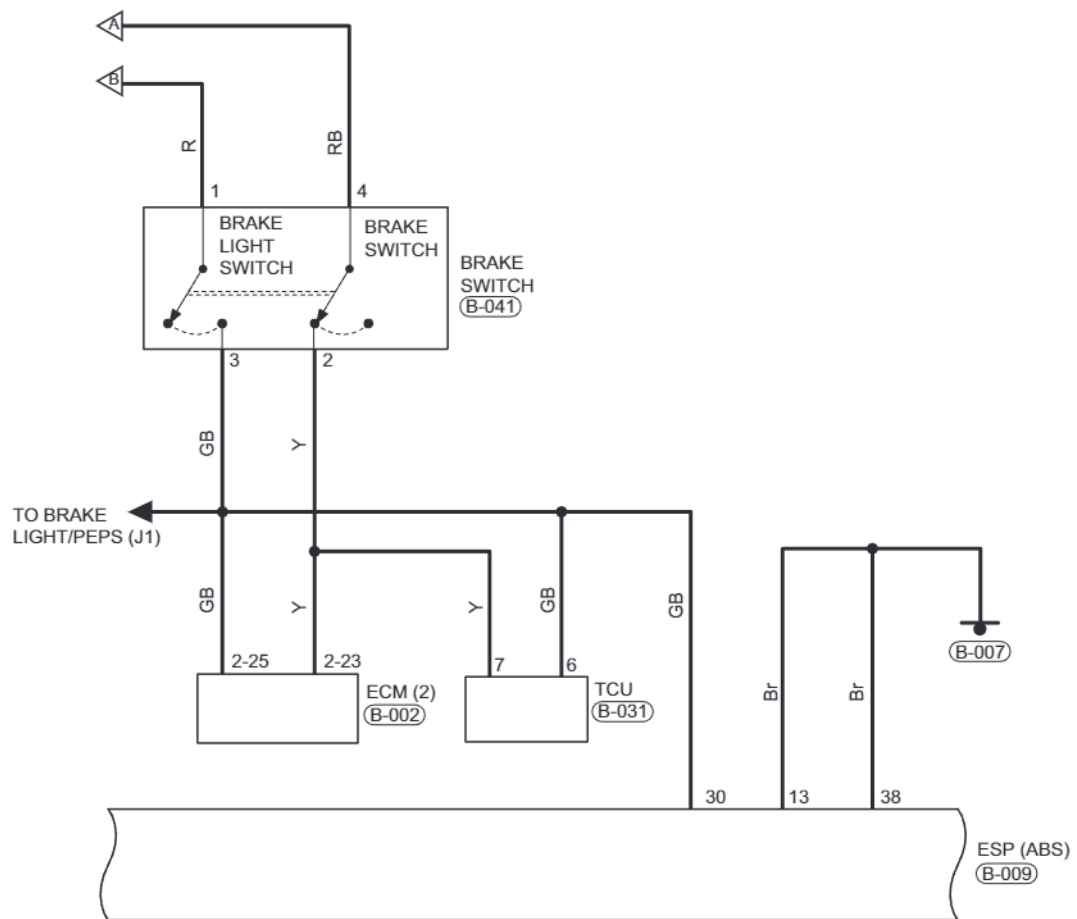
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Circuit Diagram

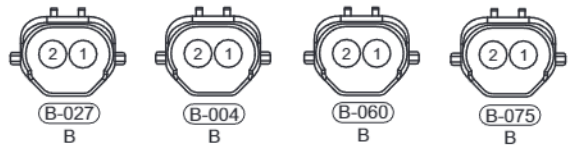
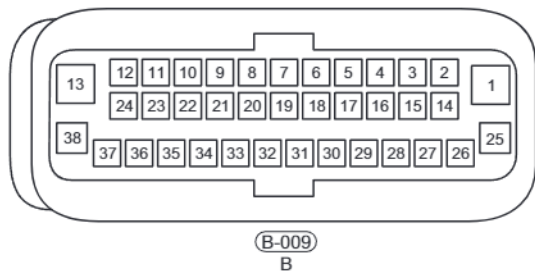
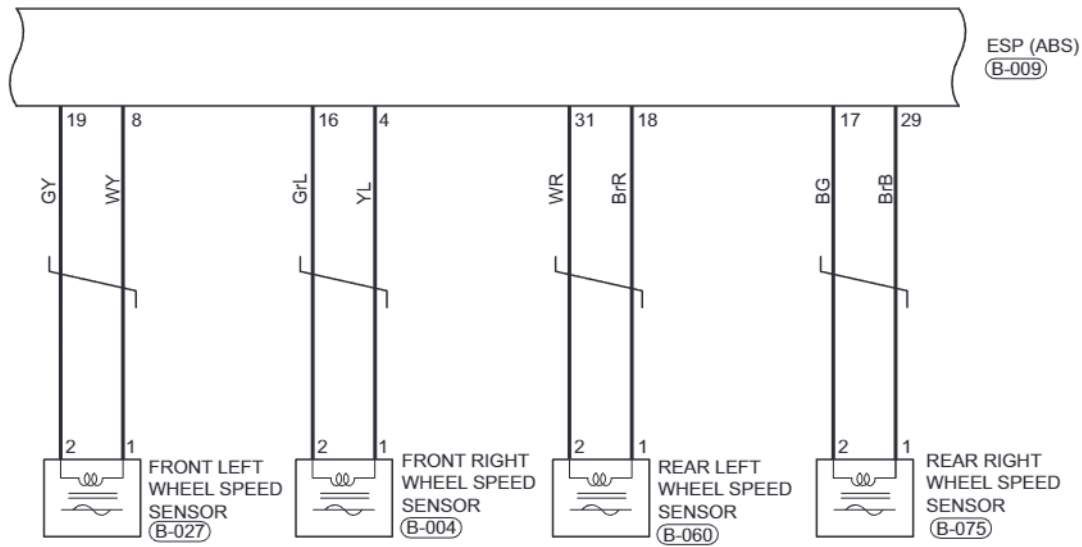
Brake Control System (Page 1 of 4)



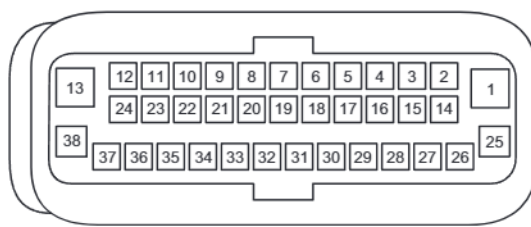
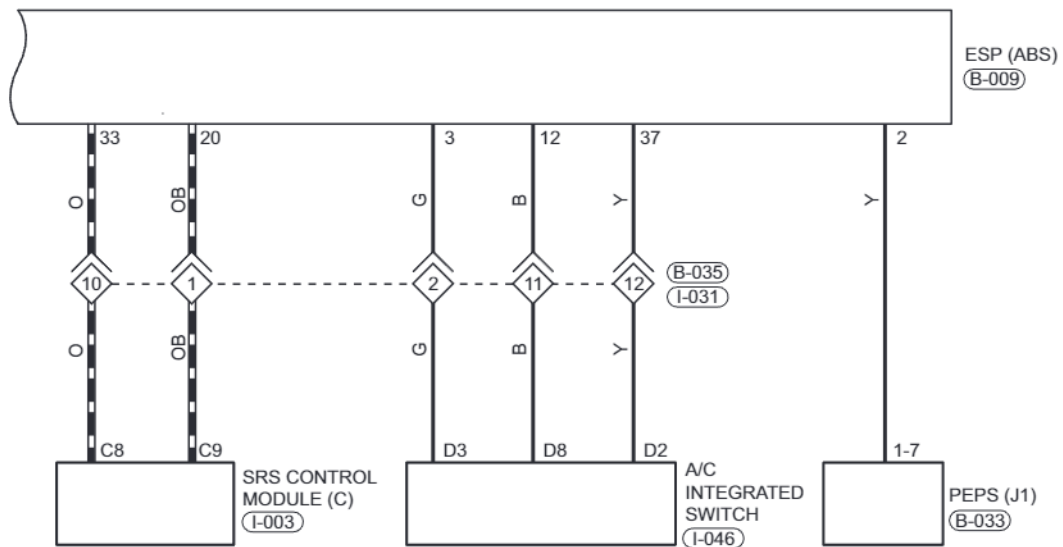
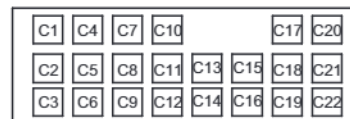
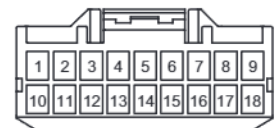
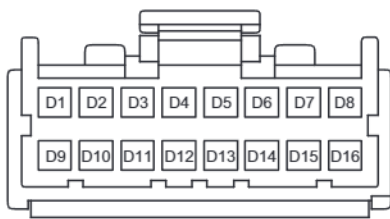
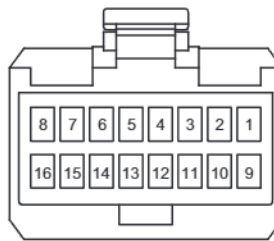
Brake Control System (Page 2 of 4)



Brake Control System (Page 3 of 4)



Brake Control System (Page 4 of 4)

(B-009)
B(I-003)
Y(B-035)
W(I-046)
B(B-033)
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EM16250040

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
When turning ignition switch ON, ABS/ESP warning light does not come on	Fuse	53-36
	Wire harness or connector	-
	ABS/ESP control module assembly	25-88
	Instrument cluster	39-77
ABS/ESP warning light remains on	Fuse	53-36
	Wire harness or connector	-
	ABS/ESP control module assembly	25-88
	Instrument cluster	39-77
ESP OFF indicator does not come on or remains on	Center control integration panel assembly	31-79
	Wire harness or connector	-
	ABS/ESP control module assembly	25-88
	Instrument cluster	39-77
ABS/ESP operation is abnormal	Wheel speed sensor (damaged, improperly installed, foreign matter attached)	25-91
	Hub ring gear (damaged, improperly installed, foreign matter attached)	-
	Steering angle sensor (damaged, improperly installed, foreign matter attached)	
	Brake line (blocked or leaked)	-
	Wire harness or connector	-
	ABS/ESP control module assembly	25-88
Communication with diagnostic tester cannot be performed	Fuse	53-36
	Wire harness or connector	-
	X-431 3G diagnostic tester	-
	ABS/ESP control module assembly	25-88

Diagnosis Procedure

HINT:

Use following procedures to troubleshoot the brake control system.

1 Vehicle brought to workshop

NEXT

2 Check battery voltage

Standard voltage: 11 to 14 V

If voltage is below 11 V, recharge or replace the battery before proceeding to 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 above, 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

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NEXT

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

NEXT

9	Conduct test and confirm malfunction has been repaired
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NEXT

10	End
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Problem Repair (No DTC)

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

1. Brake fluid leakage (it may result in weak braking, brake pedal 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 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 ABS/ESP braking performance decreasing, drift, long braking distance etc.).

CAUTION

- ABS/ESP no power supply or power supply abnormality will cause ABS/ESP warning light remains on without storing DTC.
- Troubleshooting method: check corresponding component according to the malfunction, repair or replace as necessary.

DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ABS/ESP control module assembly.
- Turn ignition switch to LOCK and wait for a few seconds.
- Start engine, drive vehicle at 20 km/h or more and perform road test with X-431 3G diagnostic tester connected to Data Link Connector (DLC).
- Using X-431 3G diagnostic tester, select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is detected, malfunction indicated by DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

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Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

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

Ground Inspection

Ground points are very important to 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 works.

Circuits are very sensitive to proper grounding. A loose or corroded ground can affect control circuit. Check the ground points as follows:

1. Remove the ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that the contacting is in good condition.
4. Reinstall the ground bolt or nut securely.
5. Check if add-on accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground eyelet terminal, check if they are installed correctly. Make sure all 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 Supply (Pump Motor)	20	-
2	Wheel Speed Sensor Signal Output (Only for PEPS Model)	21	-
3	-	22	-
4	Front Right Wheel Speed Sensor Signal	23	-
5	-	24	-
6	-	25	Battery Power Supply (Valve Relay)
7	-	26	CAN1-H
8	Front Left Wheel Speed Sensor Signal	27	-
9	-	28	Power Supply (Ignition Switch)
10	-	29	Rear Right Wheel Speed Sensor Signal
11	-	30	Brake Light Switch Signal
12	-	31	Rear Left Wheel Speed Sensor Power Supply
13	Ground	32	-
14	CAN1-L	33	-
15	-	34	-
16	Front Right Wheel Speed Sensor Power Supply	35	-
17	Rear Right Wheel Speed Sensor Power Supply	36	-
18	Rear Left Wheel Speed Sensor Signal	37	-
19	Front Left Wheel Speed Sensor Power Supply	38	Ground

ESP Control Module Assembly Terminal List

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Battery Power Supply (Pump Motor)	20	SRS Control Module
2	Wheel Speed Sensor Signal Output (Only for PEPS Model)	21	-
3	ESP Switch Indicator	22	-
4	Front Right Wheel Speed Sensor Signal	23	-
5	-	24	-
6	-	25	Battery Power Supply (Valve Relay)
7	-	26	CAN1-H
8	Front Left Wheel Speed Sensor Signal	27	-
9	-	28	Power Supply (Ignition Switch)
10	-	29	Rear Right Wheel Speed Sensor Signal
11	-	30	Brake Light Switch Signal
12	ESP Switch	31	Rear Left Wheel Speed Sensor Power Supply
13	Ground	32	-
14	CAN1-L	33	SRS Control Module
15	-	34	-
16	Front Right Wheel Speed Sensor Power Supply	35	-
17	Rear Right Wheel Speed Sensor Power Supply	36	-
18	Rear Left Wheel Speed Sensor Signal	37	TPMS Switch
19	Front Left Wheel Speed Sensor Power Supply	38	Ground

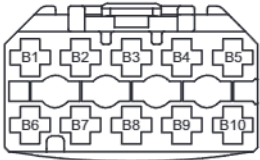
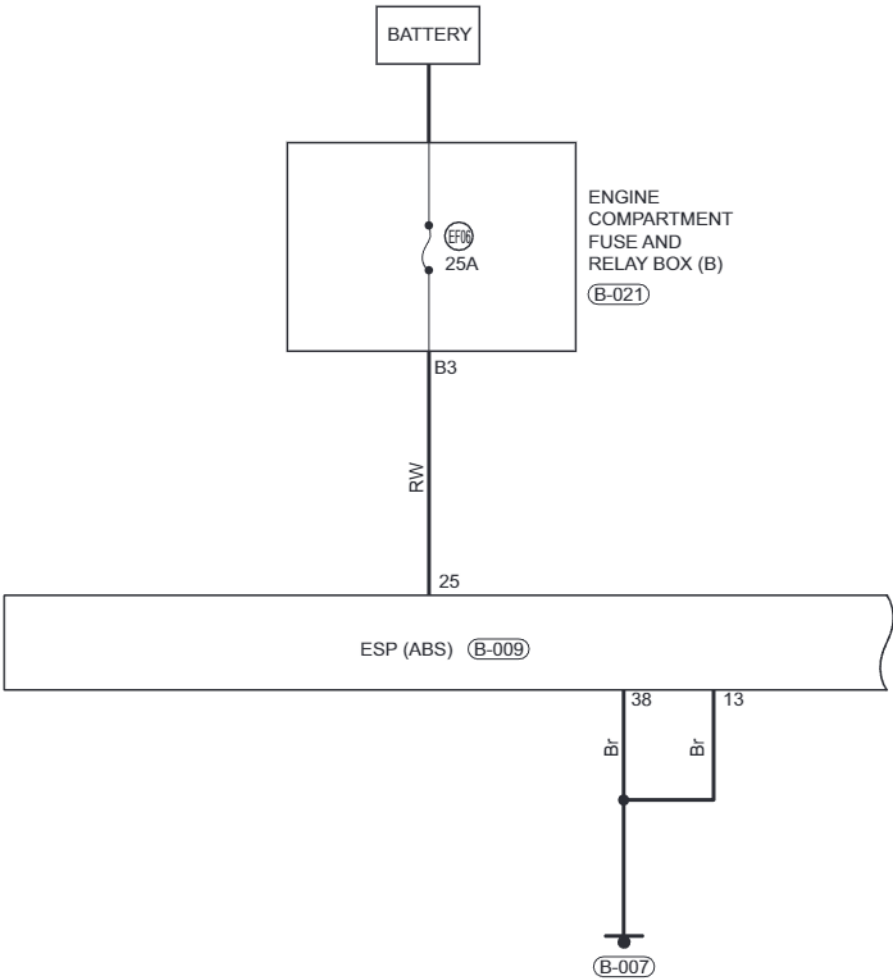
Diagnostic Trouble Code (DTC) Chart

DTC Code	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)
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
C0010-04	Left Front Inlet Control
C0011-04	Left Front Outlet Control
C0014-04	Right Front Inlet Control
C0015-04	Right Front Outlet Control
C0018-04	Left Rear Inlet Control
C0019-04	Left Rear Outlet Control
C001C-04	Right Rear Inlet Control
C001D-04	Right Rear Outlet Control
C1003-04	Valve Relay
C1004-00	General Valve
C0020-04	ABS Pump Motor Control
C0031-00	Left Front Wheel Speed Sensor
C0031-09	Left Front Wheel Speed Sensor
C0031-11	Left Front Wheel Speed Sensor
C0031-12	Left Front Wheel Speed Sensor
C0031-13	Left Front Wheel Speed Sensor
C0031-29	Left Front Wheel Speed Sensor
C0031-31	Left Front Wheel Speed Sensor
C0034-00	Right Front Wheel Speed Sensor
C0034-09	Right Front Wheel Speed Sensor
C0034-11	Right Front Wheel Speed Sensor
C0034-12	Right Front Wheel Speed Sensor
C0034-13	Right Front Wheel Speed Sensor
C0034-29	Right Front Wheel Speed Sensor
C0034-31	Right Front Wheel Speed Sensor
C0037-00	Left Rear Wheel Speed Sensor
C0037-09	Left Rear Wheel Speed Sensor
C0037-11	Left Rear Wheel Speed Sensor
C0037-12	Left Rear Wheel Speed Sensor
C0037-13	Left Rear Wheel Speed Sensor
C0037-29	Left Rear Wheel Speed Sensor
C0037-31	Left Rear Wheel Speed Sensor

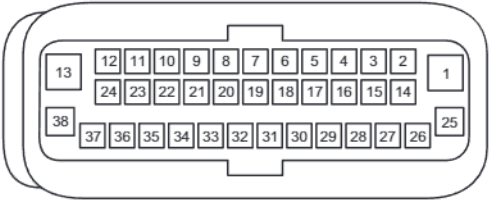


DTC Code	DTC Definition
C003A-00	Right Rear Wheel Speed Sensor
C003A-09	Right Rear Wheel Speed Sensor
C003A-11	Right Rear Wheel Speed Sensor
C003A-12	Right Rear Wheel Speed Sensor
C003A-13	Right Rear Wheel Speed Sensor
C003A-29	Right Rear Wheel Speed Sensor
C003A-31	Right Rear Wheel Speed Sensor
C0051-29	Steering Wheel Position Sensor (ESP Only)
C0051-54	Steering Wheel Position Sensor (ESP Only)
C0051-64	Steering Wheel Position Sensor (ESP Only)
U0126-00	Lost Communication with Steering Angle Sensor Module (ESP Only)
U0428-00	Invalid Data Received From Steering Angle Sensor Module (ESP Only)
C006B-00	Stability System Active Too Long (ESP Only)
C0089-04	TCS Disable Switch (ESP Only)
C1000-16	ECU Voltage Supply
C1000-17	ECU Voltage Supply
C1001-04	ECU
C1009-00	ECU Hard Ware Related
U0005-00	High Speed CAN Communication Bus (+) High
U0007-00	High Speed CAN Communication Bus (-) Low
U0073-00	Control Module Communication Bus Off
U0100-00	Lost Communication with ECM
U0101-00	Lost Communication with TCM (ESP Only)
U0140-00	Lost Communication with BCM
U0401-00	Invalid Data Received from ECM
U0402-00	Invalid Data Received from TCM (ESP Only)
U0422-00	Invalid Data Received from Body Control Module
U1000-00	CAN Error Passive
U1300-55	Software Configuration Error

DTC	C0001-04	TCS Control Channel Changeover Valve 1 (ESP Only)
DTC	C0002-04	TCS Control Channel Changeover Valve 2 (ESP Only)
DTC	C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)
DTC	C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
DTC	C0010-04	Left Front Inlet Control
DTC	C0011-04	Left Front Outlet Control
DTC	C0014-04	Right Front Inlet Control
DTC	C0015-04	Right Front Outlet Control
DTC	C0018-04	Left Rear Inlet Control
DTC	C0019-04	Left Rear Outlet Control
DTC	C001C-04	Right Rear Inlet Control
DTC	C001D-04	Right Rear Outlet Control
DTC	C1003-04	Valve Relay
DTC	C1004-00	General Valve



(B-021)
Y



(B-009)
B

DTC Code	DTC Definition	DTC Detection Conditions	Possible Cause
C0001-04	TCS Control Channel Changeover Valve 1 (ESP Only)	These DTCs occur when any of following conditions is met: 1. Valve power supply malfunction (power supply is short to ground or ground is open). 2. Solenoid valve temperature is too high (overheat protection). 3. Short in solenoid valves more than 5 (fuse). 4. Activate corresponsive solenoid valve, but no feedback. 5. Solenoid valve itself is malfunctioning. 6. Valve set relay is malfunctioning.	• Valve relay power supply is abnormal. • ABS/ESP control module assembly has poor ground connection. • Fuse is malfunctioning. • Solenoid valve is short to power supply and ground, or ground is open. • System overheat protection. • ABS/ESP control module assembly is damaged.
C0002-04	TCS Control Channel Changeover Valve 2 (ESP Only)		
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)		
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)		
C0010-04	Left Front Inlet Control		
C0011-04	Left Front Outlet Control		
C0014-04	Right Front Inlet Control		
C0015-04	Right Front Outlet Control		
C0018-04	Left Rear Inlet Control		
C0019-04	Left Rear Outlet Control		
C001C-04	Right Rear Inlet Control		
C001D-04	Right Rear Outlet Control		
C1003-04	Valve Relay		
C1004-00	General Valve		

CAUTION

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

Diagnosis Procedure

1**Check for DTCs**

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

NO

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

YES**2****Check fuse**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the fuse EF-06 (25 A) from engine compartment fuse and relay box.
- Check if fuse is blown.

NG

Replace fuse EF-06

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

Use circuit diagram as a guide to perform following procedures:

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009 and engine compartment fuse and relay box connector B-021.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

**Repair or replace body wire harness and
connector**

OK

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

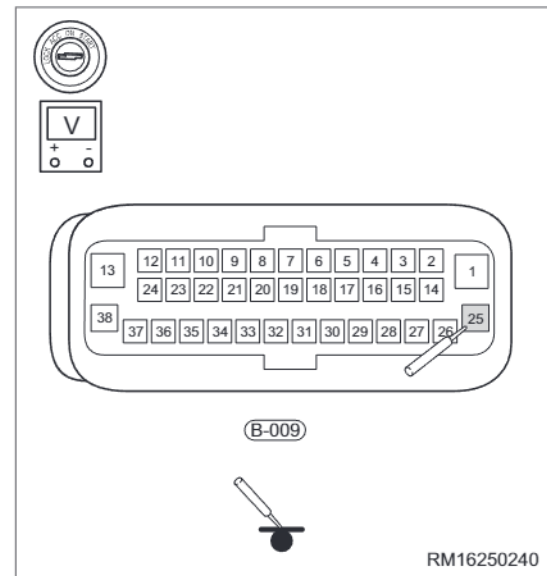
- Connect the negative battery cable.
- Turn ignition switch to LOCK.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Using a digital multimeter, measure the voltage between ABS/ESP control module assembly terminal 25 and body ground to check if power supply circuit is normal according to the table below.

Standard Voltage:

Multimeter Connection	Condition	Specified Condition
B-009 (25) - Body ground	Always	9 to 16 V

NG

Repair or replace body wire harness and connector



OK

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

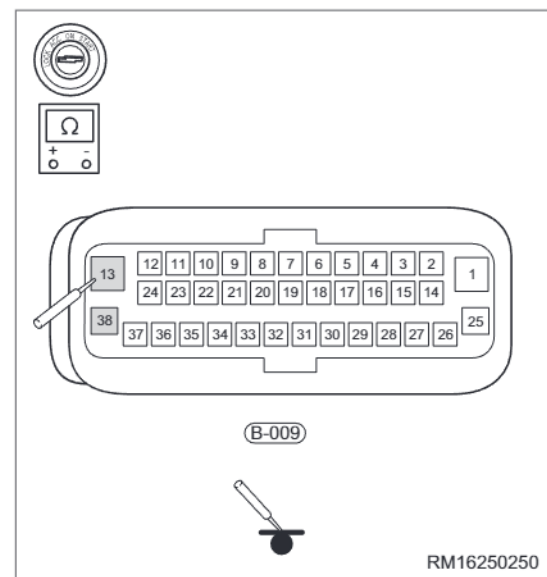
- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Using a digital multimeter, check for continuity between ABS/ESP control module assembly terminals 13, 38 and body ground to check if system ground circuit is normal according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (13) - Body ground	Always	Continuity
B-009 (38) - Body ground	Always	Continuity

NG

Repair or replace body wire harness and connector



OK

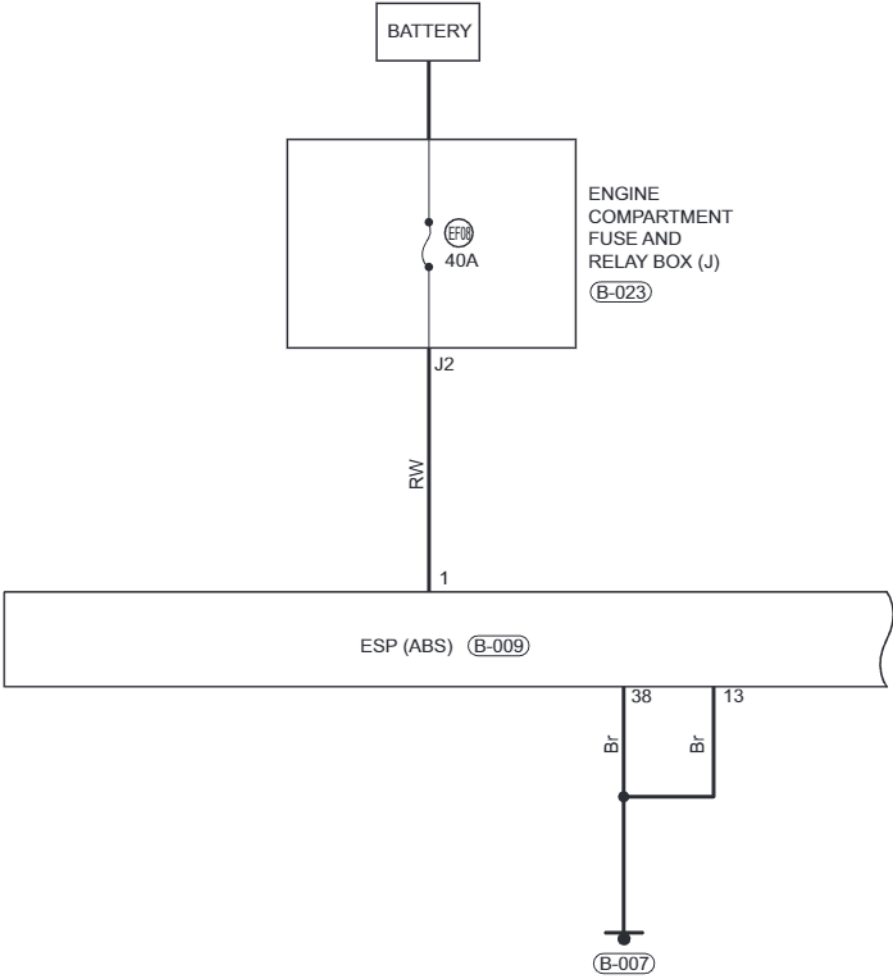
25

6**Reconfirm DTCs**

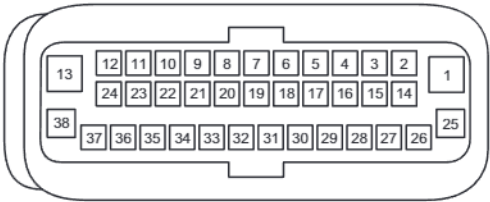
- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

DTC	C0020-04	ABS Pump Motor Control
-----	----------	------------------------



(B-023)
Y



(B-009)
B

EM16250060

DTC Code	DTC Definition	DTC Detection Conditions	Possible Cause
C0020-04	ABS Pump Motor Control	This DTC occurs when any of following conditions is met: 1. Pump motor operates with overload, and temperature is too high (overheat protection). 2. Return pump monitor still cannot detect voltage signal after return pump motor relay operates for 60 ms. 3. Return pump monitor detects voltage for more than 2.5 s when return pump motor relay does not operate. 4. Return pump monitor detects that voltage does not drop when return pump motor relay does not operate.	• Fuse malfunction • Pump motor has poor ground connection • System overheat protection • Pump motor power supply is abnormal • Pump motor relay malfunction • Pump motor malfunction

CAUTION

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

Diagnosis Procedure

1 Check for DTCs

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

NO

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

YES

2 Check fuse

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the fuse EF-08 (40 A) from engine compartment fuse and relay box.
- Check if fuse is blown.

NG

Replace fuse EF-08

OK

3 Check wire harness and connector

Use circuit diagram as a guide to perform following procedures:

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009 and engine compartment fuse and relay box connector B-023.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

**Repair or replace body wire harness and
connector**

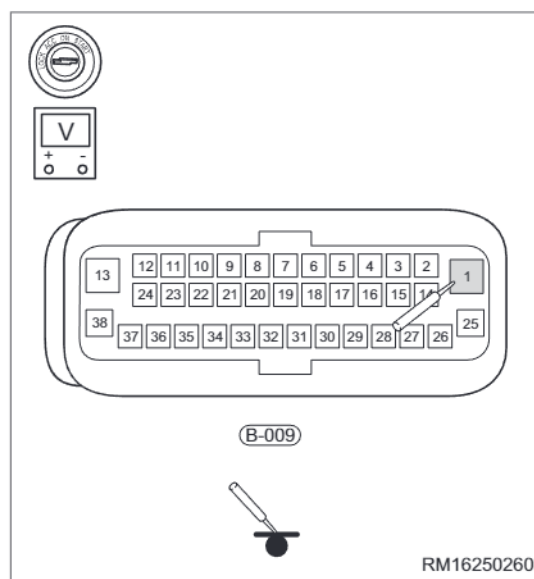
OK

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

- Connect the negative battery cable.
- Turn ignition switch to LOCK.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Using a digital multimeter, measure the voltage between ABS/ESP control module assembly terminal 1 and body ground to check if power supply circuit is normal according to the table below.

Standard Voltage:

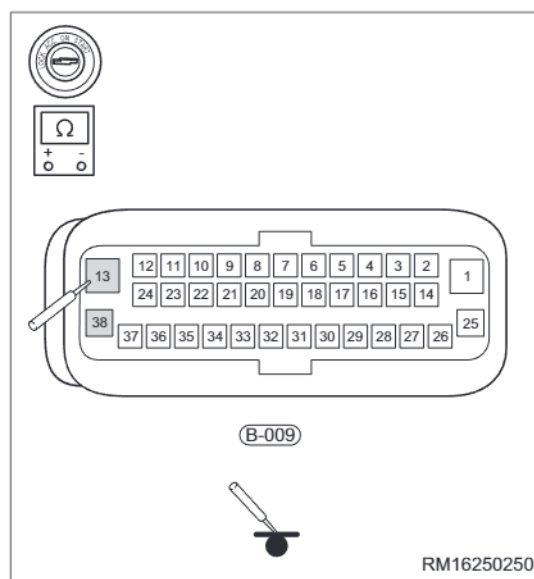
Multimeter Connection	Condition	Specified Condition
B-009 (1) - Body ground	Always	9 to 16 V

NG**Repair or replace body wire harness and connector****OK****5 Check wire harness and connector (ABS/ESP control module assembly - body ground)**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Using a digital multimeter, check for continuity between ABS/ESP control module assembly terminals 13, 38 and body ground to check if system ground circuit is normal according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (13) - Body ground	Always	Continuity
B-009 (38) - Body ground	Always	Continuity

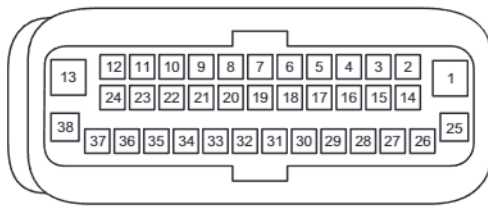
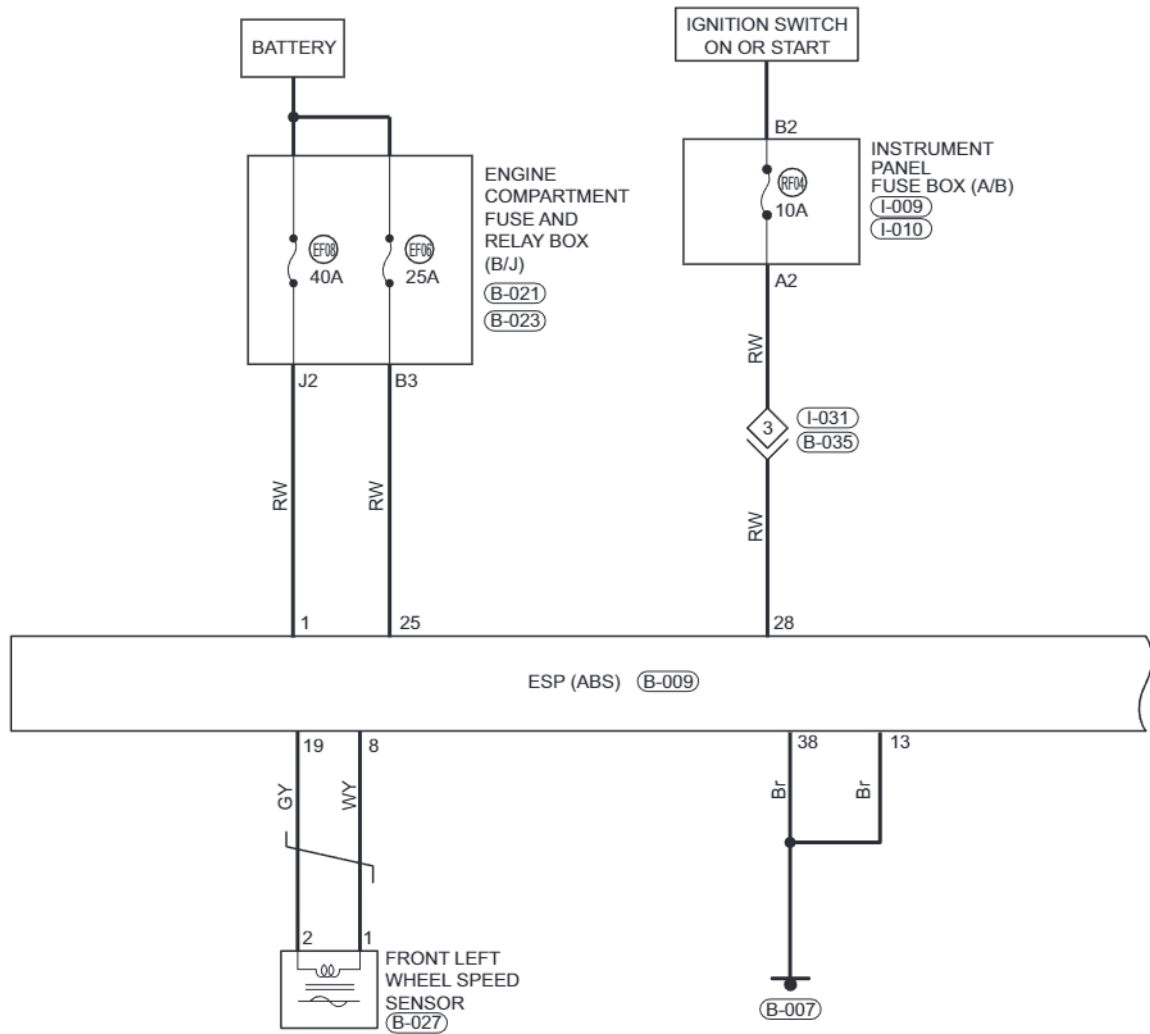
NG**Repair or replace body wire harness and connector****OK**

6**Reconfirm DTCs**

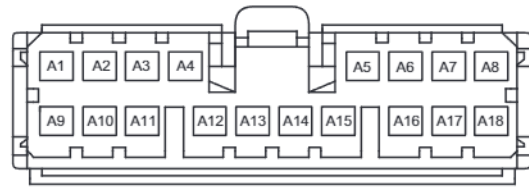
- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

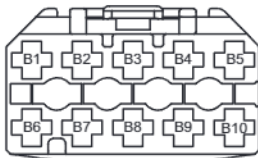
DTC	C0031-00	Left Front Wheel Speed Sensor
DTC	C0031-09	Left Front Wheel Speed Sensor
DTC	C0031-11	Left Front Wheel Speed Sensor
DTC	C0031-12	Left Front Wheel Speed Sensor
DTC	C0031-13	Left Front Wheel Speed Sensor
DTC	C0031-29	Left Front Wheel Speed Sensor
DTC	C0031-31	Left Front Wheel Speed Sensor



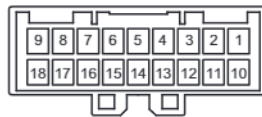
(B-009)
B



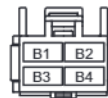
(I-009)
W



(B-021)
Y



(I-031)
W



(I-010)
W



(B-023)
Y



(B-027)
B

EM16250070

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0031-00	Left Front Wheel Speed Sensor	These DTCs occur when any of following conditions is met: 1. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to ground. 2. Wheel speed sensor line is open. 3. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to power supply. 4. ABS/ESP control module assembly detects that wheel speed sensor power supply wire is short to ground. 5. Wheel speed sensor signal is invalid.	• Wheel speed sensor signal wire is connecting with power supply wire in reverse. • Wheel speed sensor signal wire is short to ground. • Wheel speed sensor line is open, connector is loose or broken. • Wheel speed sensor signal wire is short to power supply. • 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, dirty, demagnetized, off center or it has teeth missing. • Clearance between sensor and ring gear is excessive. • Number of ring gear teeth is wrong. • Tire size is not as specified. • ABS/ESP control module assembly is damaged.
C0031-09	Left Front Wheel Speed Sensor		
C0031-11	Left Front Wheel Speed Sensor		
C0031-12	Left Front Wheel Speed Sensor		
C0031-13	Left Front Wheel Speed Sensor		
C0031-29	Left Front Wheel Speed Sensor		
C0031-31	Left Front Wheel Speed Sensor		

CAUTION

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

Diagnosis Procedure

1 Check front left wheel sensor wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the front left wheel speed sensor connector B-027.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact 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 ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check front left wheel speed sensor mounting bolt for looseness.
- Check if excessive clearance exists between installation position of front left wheel speed sensor and front steering knuckle.
- 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

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

NG

Replace front left wheel speed sensor

OK

4 Check 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 front left hub assembly is securely installed.

NG

Replace front left hub ring gear

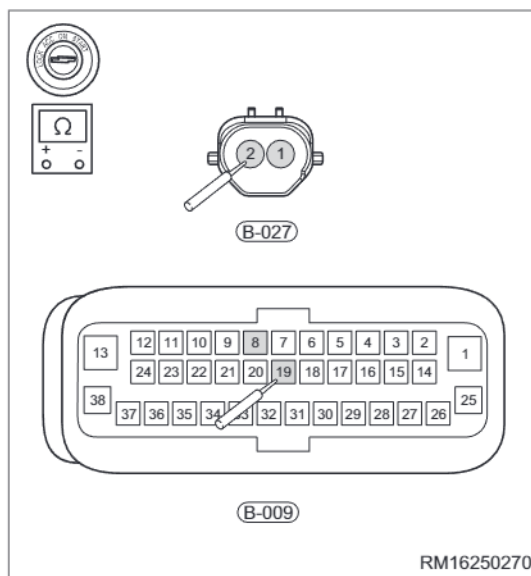
OK

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the front left wheel speed sensor connector B-027.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-027 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-009 (8) - B-027 (1)	Always	Continuity
B-009 (19) - B-027 (2)	Always	Continuity
B-009 (8) - B-027 (2)	Always	No continuity
B-009 (19) - B-027 (1)	Always	No continuity
B-027 (1) - B-027 (2)	Always	No continuity
B-009 (8) - B-009 (19)	Always	No continuity

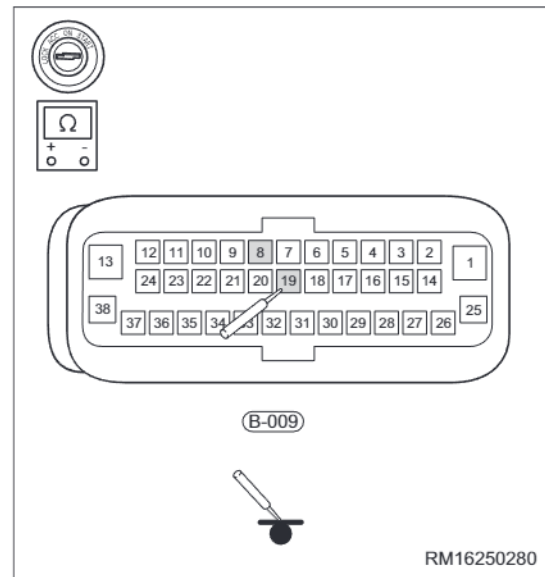


RM16250270

- f. Using a digital multimeter, check for continuity between connector B-009 and body ground to check if front left wheel speed sensor is short to ground according to the table below.

Standard Condition

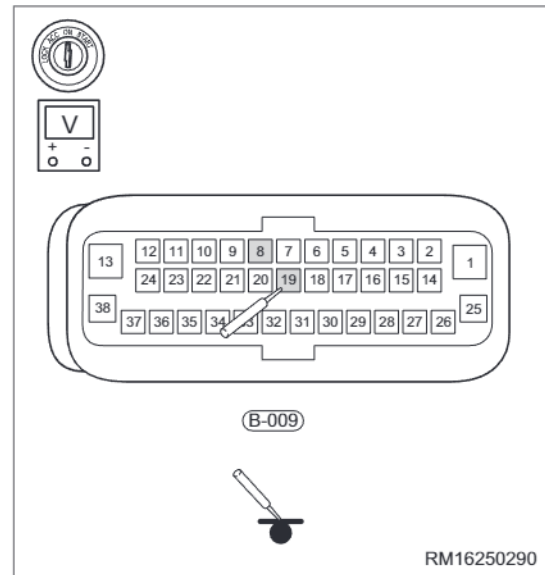
Multimeter Connection	Condition	Specified Condition
B-009 (8) - Body ground	Always	No continuity
B-009 (19) - Body ground	Always	No continuity



- g. Connect the negative battery cable.
h. Turn ignition switch to ON.
i. Using a digital multimeter, measure the voltage between connector B-009 and body ground to check if front left wheel speed sensor is short to power supply according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (8) - Body ground	Ignition switch ON	Approximately 0 V
B-009 (19) - Body ground	Ignition switch ON	Approximately 0 V

**NG**

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

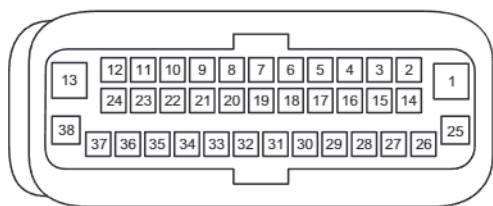
OK

6**Reconfirm DTCs**

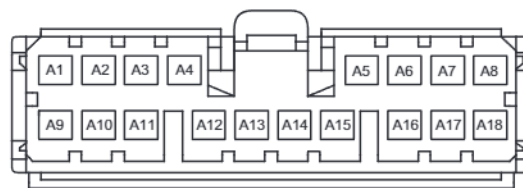
- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

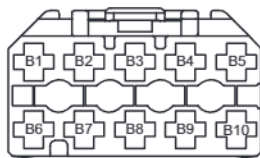
DTC	C0034-00	Right Front Wheel Speed Sensor
DTC	C0034-09	Right Front Wheel Speed Sensor
DTC	C0034-11	Right Front Wheel Speed Sensor
DTC	C0034-12	Right Front Wheel Speed Sensor
DTC	C0034-13	Right Front Wheel Speed Sensor
DTC	C0034-29	Right Front Wheel Speed Sensor
DTC	C0034-31	Right Front Wheel Speed Sensor



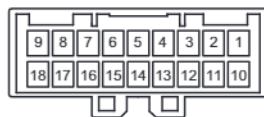
(B-009)
B



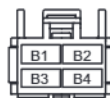
I-009
W



(B-021)



I-031
W



I-010
W



B-023
Y



B-004
B

25-40

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0034-00	Right Front Wheel Speed Sensor	These DTCs occur when any of the following conditions is met: 1. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to ground. 2. Wheel speed sensor line is open. 3. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to power supply. 4. ABS/ESP control module assembly detects that wheel speed sensor power supply wire is short to ground. 5. Wheel speed sensor signal is invalid.	• Wheel speed sensor signal wire is connecting with power supply wire in reverse. • Wheel speed sensor signal wire is short to ground. • Wheel speed sensor line is open, connector is loose or broken. • Wheel speed sensor signal wire is short to power supply. • 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, dirty, demagnetized, off center or it has teeth missing. • Clearance between sensor and ring gear is excessive. • Number of ring gear teeth is wrong. • Tire size is not as specified. • ABS/ESP control module assembly is damaged.
C0034-09	Right Front Wheel Speed Sensor		
C0034-11	Right Front Wheel Speed Sensor		
C0034-12	Right Front Wheel Speed Sensor		
C0034-13	Right Front Wheel Speed Sensor		
C0034-29	Right Front Wheel Speed Sensor		
C0034-31	Right Front Wheel Speed Sensor		

CAUTION

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

Diagnosis Procedure

1 Check front right wheel sensor wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the front right wheel speed sensor connector B-004.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact 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 ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check front right wheel speed sensor mounting bolt for looseness.
- Check if excessive clearance exists between installation position of front right wheel speed sensor and front steering knuckle.
- 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

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

NG

Replace front right hub ring gear

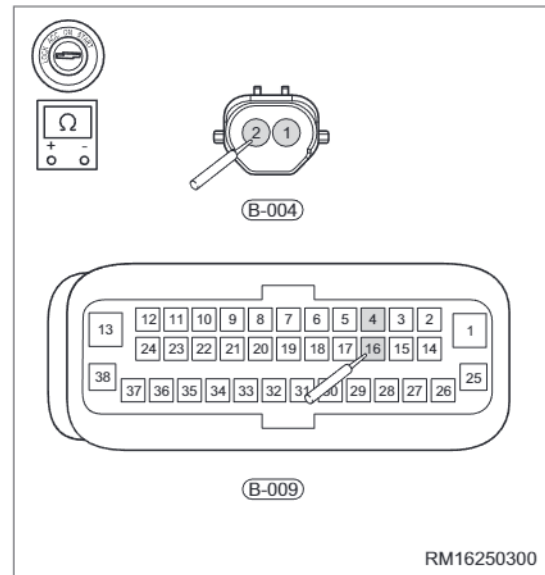
OK

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the front right wheel speed sensor connector B-004.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-004 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

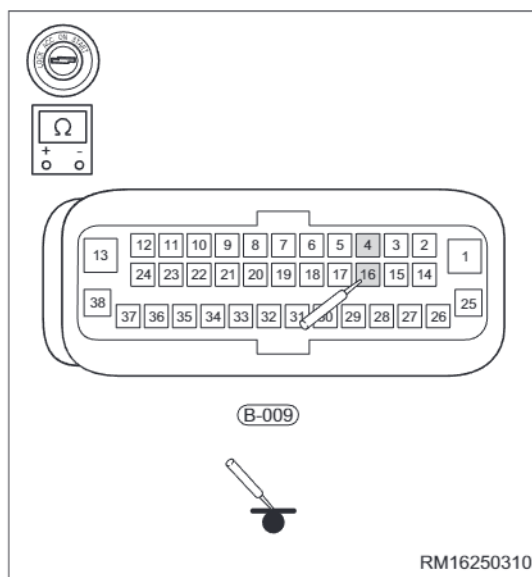
Multimeter Connection	Condition	Specified Condition
B-009 (4) - B-004 (1)	Always	Continuity
B-009 (16) - B-004 (2)	Always	Continuity
B-009 (4) - B-004 (2)	Always	No continuity
B-009 (16) - B-004 (1)	Always	No continuity
B-004 (1) - B-004 (2)	Always	No continuity
B-009 (4) - B-009 (16)	Always	No continuity



- f. Using a digital multimeter, check for continuity between connector B-009 and body ground to check if front right wheel speed sensor is short to ground according to the table below.

Standard Condition

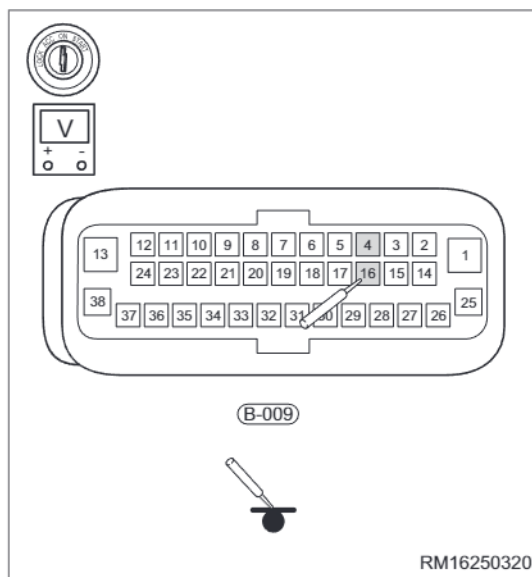
Multimeter Connection	Condition	Specified Condition
B-009 (4) - Body ground	Always	No continuity
B-009 (16) - Body ground	Always	No continuity



- g. Connect the negative battery cable.
h. Turn ignition switch to ON.
i. Using a digital multimeter, measure the voltage between connector B-009 and body ground to check if front right wheel speed sensor is short to power supply according to the table below.

Standard Voltage:

Multimeter Connection	Condition	Specified Condition
B-009 (4) - Body ground	Ignition switch ON	Approximately 0 V
B-009 (16) - Body ground	Ignition switch ON	Approximately 0 V



NG

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

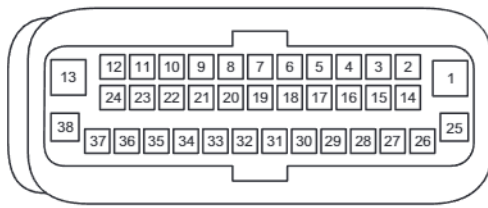
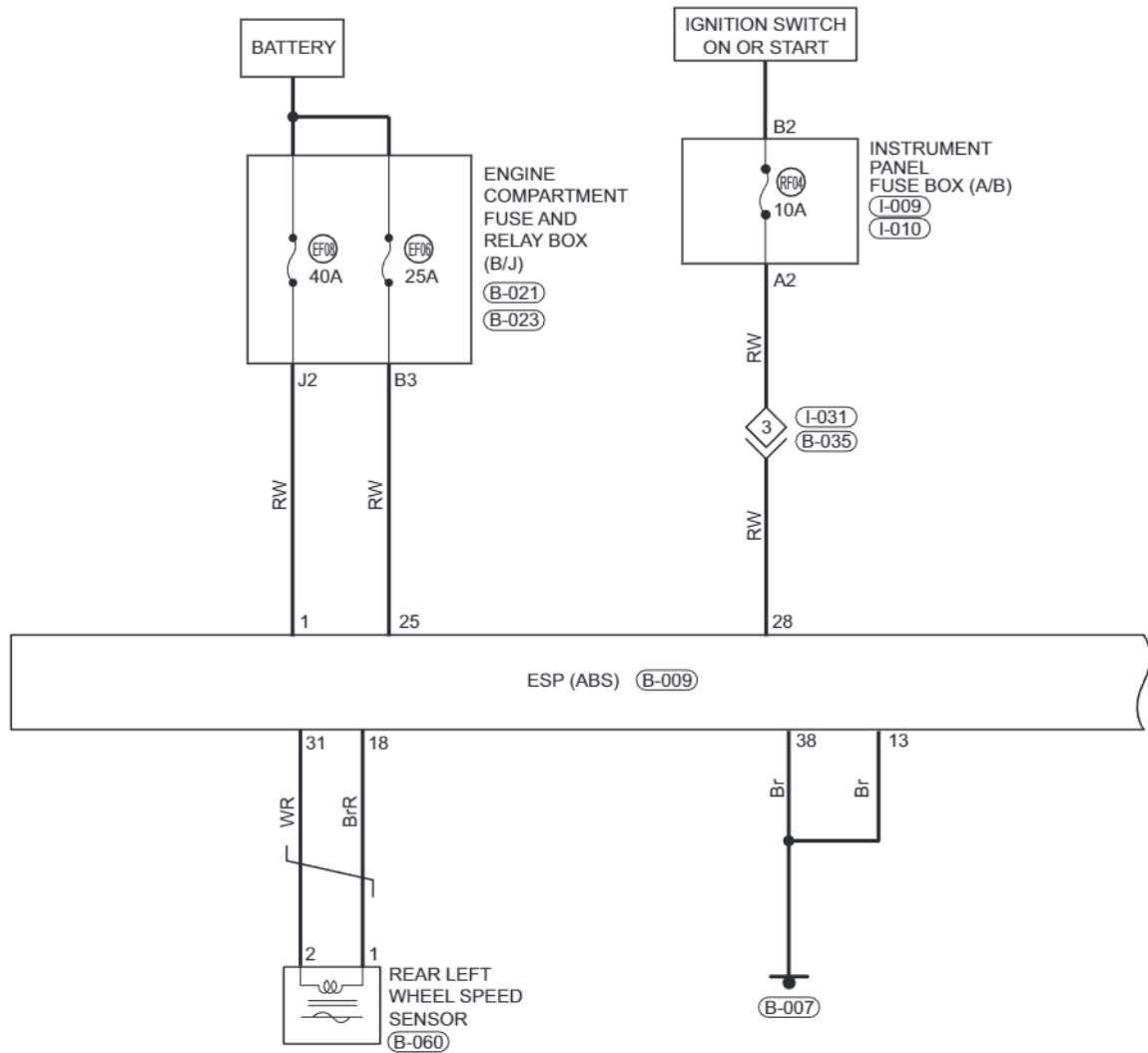
OK

6**Reconfirm DTCs**

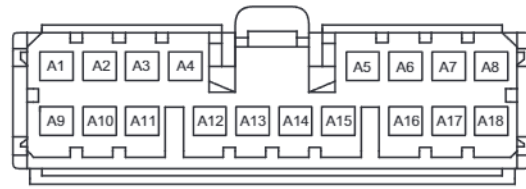
- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

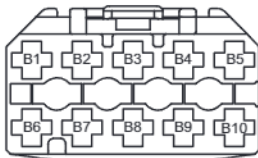
DTC	C0037-00	Left Rear Wheel Speed Sensor
DTC	C0037-09	Left Rear Wheel Speed Sensor
DTC	C0037-11	Left Rear Wheel Speed Sensor
DTC	C0037-12	Left Rear Wheel Speed Sensor
DTC	C0037-13	Left Rear Wheel Speed Sensor
DTC	C0037-29	Left Rear Wheel Speed Sensor
DTC	C0037-31	Left Rear Wheel Speed Sensor



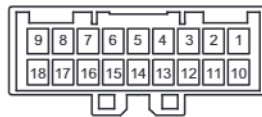
(B-009)
B



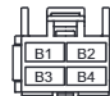
(I-009)
W



(B-021)
Y



(I-031)
W



(I-010)
W



(B-023)
Y



(B-060)
B

EM16250090

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0037-00	Left Rear Wheel Speed Sensor	These DTCs occur when any of the following conditions is met: 1. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to ground. 2. Wheel speed sensor line is open. 3. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to power supply. 4. ABS/ESP control module assembly detects that wheel speed sensor power supply wire is short to ground. 5. Wheel speed sensor signal is invalid.	• Wheel speed sensor signal wire is connecting with power supply wire in reverse. • Wheel speed sensor signal wire is short to ground. • Wheel speed sensor line is open, connector is loose or broken. • Wheel speed sensor signal wire is short to power supply. • 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, dirty, demagnetized, off center or it has teeth missing. • Clearance between sensor and ring gear is excessive. • Number of ring gear teeth is wrong. • Tire size is not as specified. • ABS/ESP control module assembly is damaged.
C0037-09	Left Rear Wheel Speed Sensor		
C0037-11	Left Rear Wheel Speed Sensor		
C0037-12	Left Rear Wheel Speed Sensor		
C0037-13	Left Rear Wheel Speed Sensor		
C0037-29	Left Rear Wheel Speed Sensor		
C0037-31	Left Rear Wheel Speed Sensor		

CAUTION

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

Diagnosis Procedure

1

Check rear left wheel speed sensor wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the rear left wheel speed sensor connector B-060.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact 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 ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check rear left wheel speed sensor mounting bolt for looseness.
- Check if excessive clearance exists between installation position of rear left wheel speed sensor and rear hub ring gear.
- 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

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

NG

Replace rear left hub ring gear

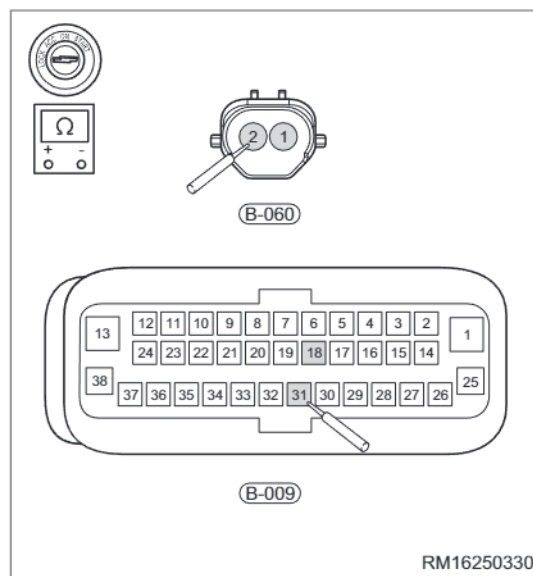
OK

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the rear left wheel speed sensor connector B-060.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-060 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

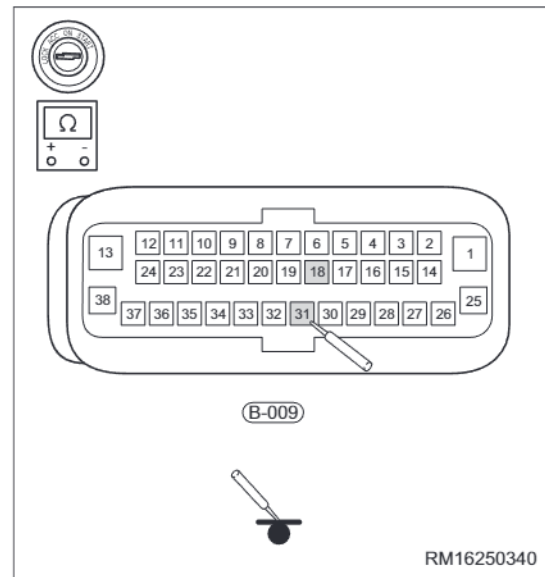
Multimeter Connection	Condition	Specified Condition
B-009 (18) - B-060 (1)	Always	Continuity
B-009 (31) - B-060 (2)	Always	Continuity
B-009 (31) - B-060 (1)	Always	No continuity
B-009 (18) - B-060 (2)	Always	No continuity
B-060 (1) - B-060 (2)	Always	No continuity
B-009 (18) - B-009 (31)	Always	No continuity



- f. Using a digital multimeter, check for continuity between connector B-009 and body ground to check if rear left wheel speed sensor is short to ground according to the table below.

Standard Condition

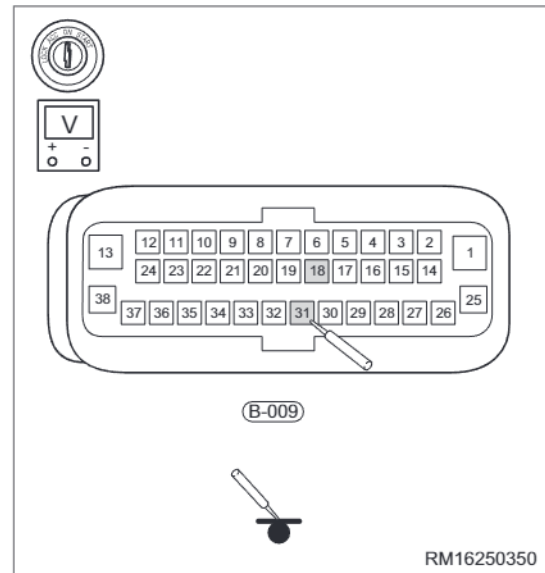
Multimeter Connection	Condition	Specified Condition
B-009 (18) - Body ground	Always	No continuity
B-009 (31) - Body ground	Always	No continuity



- g. Connect the negative battery cable.
h. Turn ignition switch to ON.
i. Using a digital multimeter, measure the voltage between connector B-009 and body ground to check if rear left wheel speed sensor is short to power supply according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (18) - Body ground	Ignition switch ON	Approximately 0 V
B-009 (31) - Body ground	Ignition switch ON	Approximately 0 V

**NG**

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

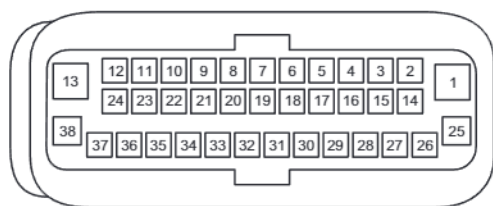
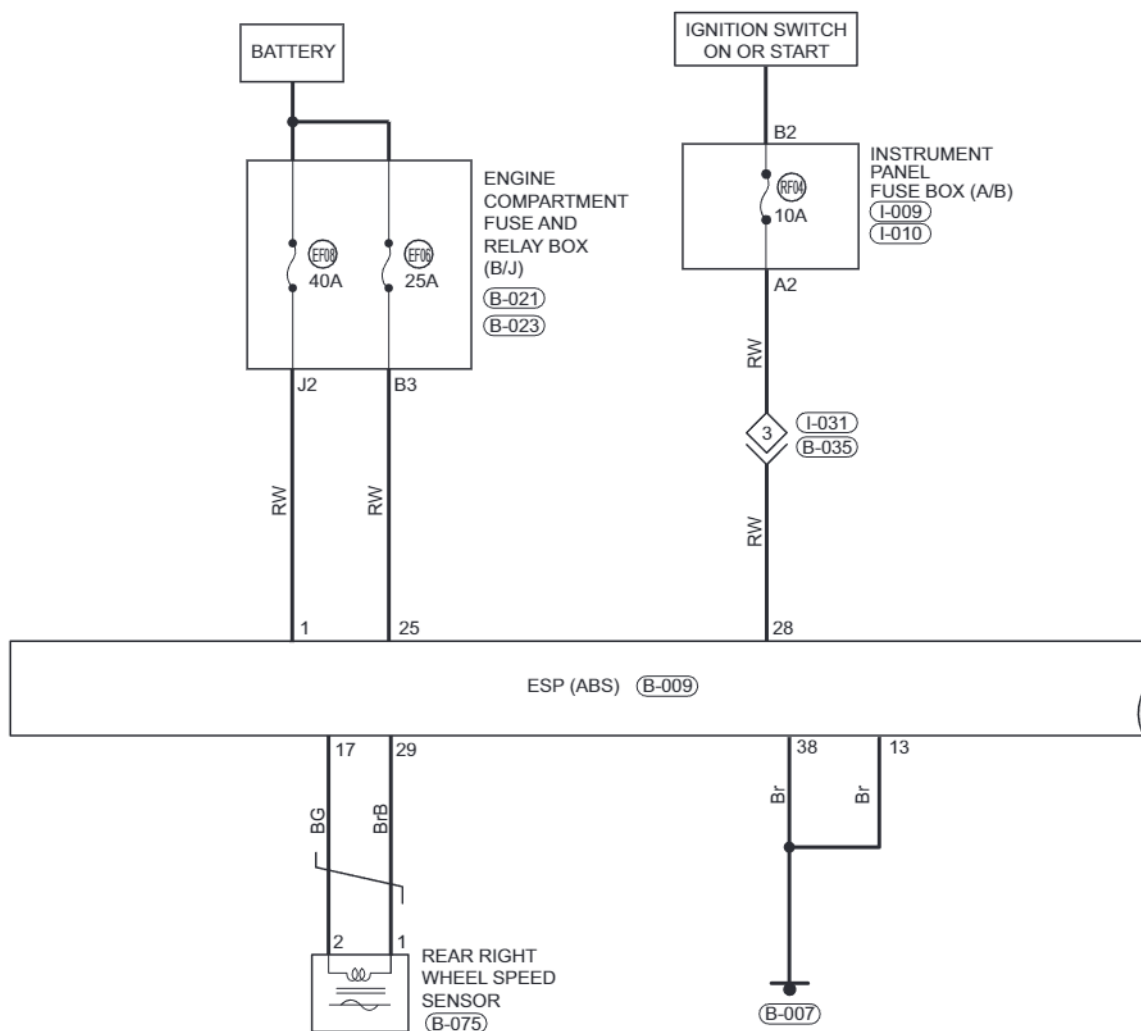
OK

6**Reconfirm DTCs**

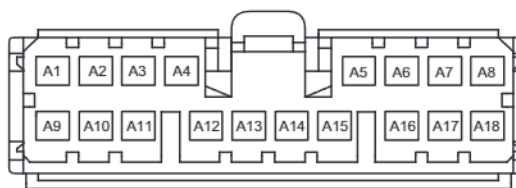
- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

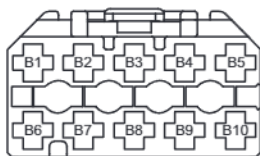
DTC	C003A-00	Right Rear Wheel Speed Sensor
DTC	C003A-09	Right Rear Wheel Speed Sensor
DTC	C003A-11	Right Rear Wheel Speed Sensor
DTC	C003A-12	Right Rear Wheel Speed Sensor
DTC	C003A-13	Right Rear Wheel Speed Sensor
DTC	C003A-29	Right Rear Wheel Speed Sensor
DTC	C003A-31	Right Rear Wheel Speed Sensor



(B-009)
B



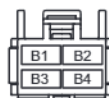
(I-009)
W



(B-021)
Y



(I-031)
W



(I-010)
W



(B-023)
Y



(B-075)
B

EM16250100

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C003A-00	Right Rear Wheel Speed Sensor	These DTCs occur when any of the following conditions is met: 1. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to ground. 2. Wheel speed sensor line is open. 3. ABS/ESP control module assembly detects that wheel speed sensor signal wire is short to power supply. 4. ABS/ESP control module assembly detects that wheel speed sensor power supply wire is short to ground. 5. Wheel speed sensor signal is invalid.	- Wheel speed sensor signal wire is connecting with power supply wire in reverse. - Wheel speed sensor signal wire is short to ground. - Wheel speed sensor line is open, connector is loose or broken. - Wheel speed sensor signal wire is short to power supply. - 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, dirty, demagnetized, off center or it has teeth missing. - Clearance between sensor and ring gear is excessive. - Number of ring gear teeth is wrong. - Tire size is not as specified. - ABS/ESP control module assembly is damaged.
C003A-09	Right Rear Wheel Speed Sensor		
C003A-11	Right Rear Wheel Speed Sensor		
C003A-12	Right Rear Wheel Speed Sensor		
C003A-13	Right Rear Wheel Speed Sensor		
C003A-29	Right Rear Wheel Speed Sensor		
C003A-31	Right Rear Wheel Speed Sensor		

CAUTION

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

Diagnosis Procedure

1 Check rear right wheel sensor wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the rear right wheel speed sensor connector B-075.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact 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 ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check rear right wheel speed sensor mounting bolt for looseness.
- Check if excessive clearance exists between installation position of rear right wheel speed sensor and rear hub ring gear.
- 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

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

NG

Replace rear right hub ring gear

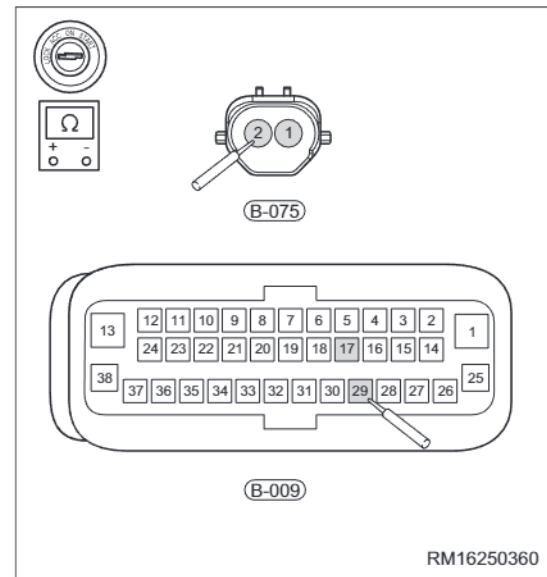
OK

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the rear right wheel speed sensor connector B-075.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-075 to check if there is an open in the wire harness and connector according to the table below.

Standard Condition

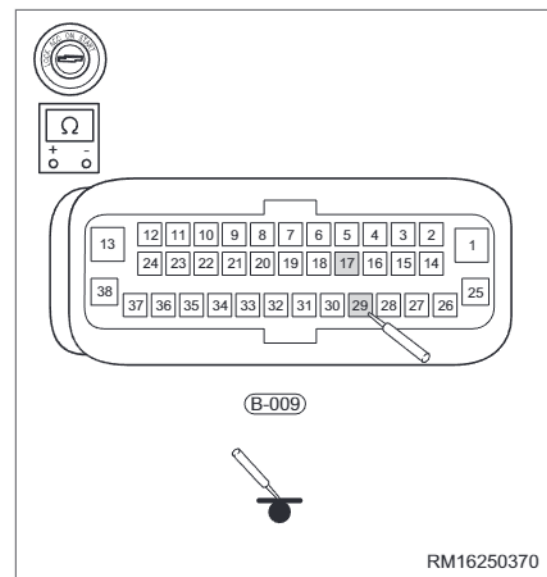
Multimeter Connection	Condition	Specified Condition
B-009 (29) - B-075 (1)	Always	Continuity
B-009 (17) - B-075 (2)	Always	Continuity
B-009 (17) - B-075 (1)	Always	No continuity
B-009 (29) - B-075 (2)	Always	No continuity
B-075 (1) - B-075 (2)	Always	No continuity
B-009 (17) - B-009 (29)	Always	No continuity



- Using a digital multimeter, measure the voltage between connector B-009 and body ground to check if rear right wheel speed sensor is short to ground according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (17) - Body ground	Always	No continuity
B-009 (29) - Body ground	Always	No continuity



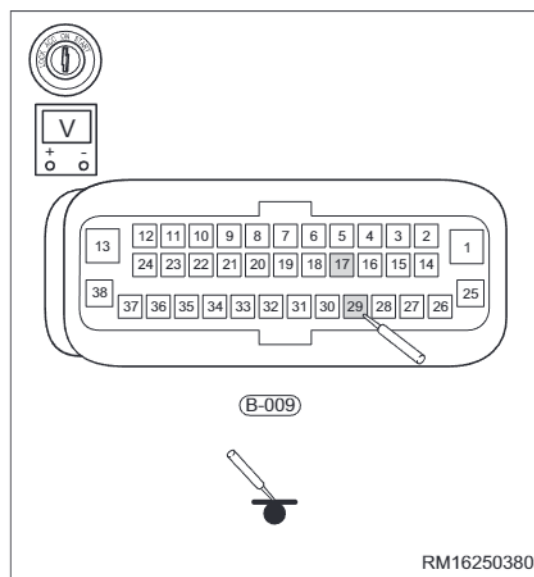
- g. Connect the negative battery cable.
- h. Turn ignition switch to ON.
- i. Using a digital multimeter, measure the voltage between connector B-009 and body ground to check if rear right wheel speed sensor is short to power supply according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (17) - Body ground	Ignition switch ON	Approximately 0 V
B-009 (29) - Body ground	Ignition switch ON	Approximately 0 V

NG

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

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

- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

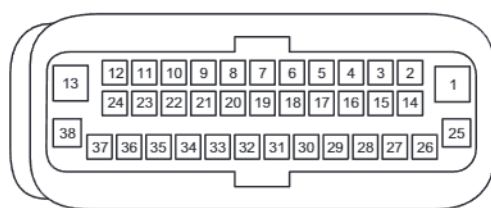
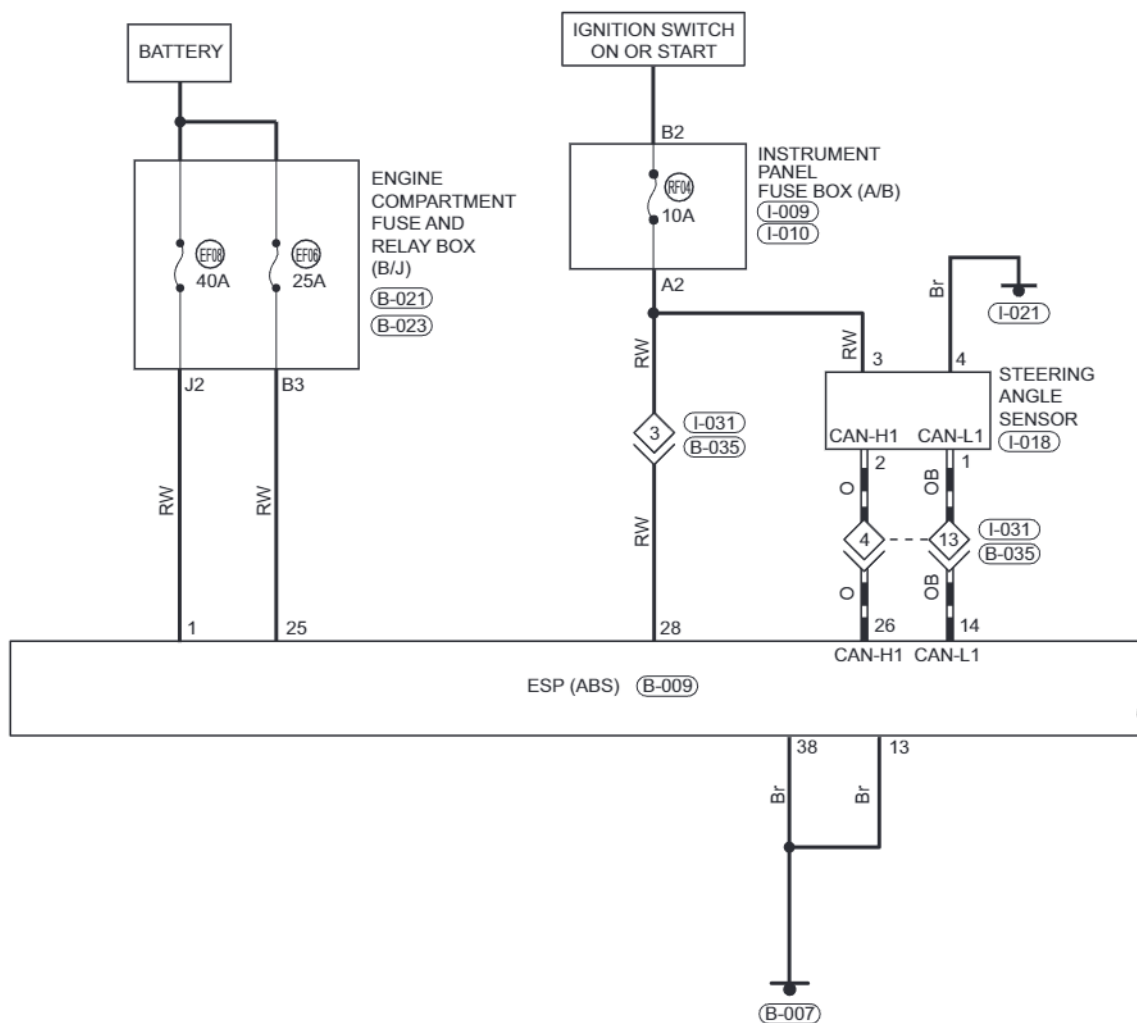
NO

System operates normally

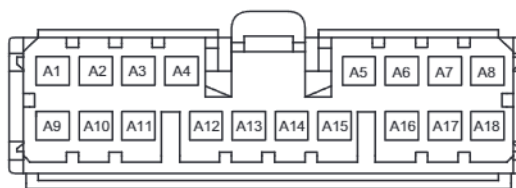
YES

Replace ABS/ESP control module assembly

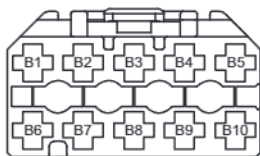
DTC	C0051-29	Steering Wheel Position Sensor (ESP Only)
DTC	C0051-54	Steering Wheel Position Sensor (ESP Only)
DTC	C0051-64	Steering Wheel Position Sensor (ESP Only)
DTC	U0126-00	Lost Communication with Steering Angle Sensor Module (ESP Only)
DTC	U0428-00	Invalid Data Received From Steering Angle Sensor Module (ESP Only)



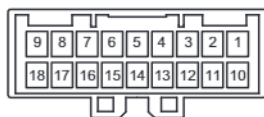
(B-009)
B



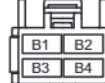
(I-009)
W



(B-021)
Y



(I-031)
W



(I-010)
W



(B-023)
Y



(I-018)
B

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0051-29	Steering Wheel Position Sensor (ESP Only)	These DTCs occur when any of following conditions is met: 1. Steering wheel angle sensor is unmatched (central point is not found). 2. Steering wheel angle sensor signal is abnormal. 3. Steering wheel angle sensor signal is interrupted.	- Steering angle sensor is unmatched. - Steering angle sensor line is short or open. - Steering angle sensor is damaged.
C0051-54	Steering Wheel Position Sensor (ESP Only)		
C0051-64	Steering Wheel Position Sensor (ESP Only)		
U0126-00	Lost Communication with Steering Angle Sensor Module (ESP Only)		
U0428-00	Invalid Data Received From Steering Angle Sensor Module (ESP Only)		

CAUTION

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

Diagnosis Procedure

1 Check matching of steering angle sensor

- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Rematch the steering angle sensor according to instruction of diagnostic tester.
- Use X-431 3G diagnostic tester to clear DTC.
- Start engine.
- Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- Check if same DTC is output.

NO

Steering angle sensor is unmatched

YES

2 Check wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.

- c. Disconnect the ABS/ESP control module assembly connector B-009 and steering angle sensor connector I-018.
- d. Disconnect the body wire harness connector B-035 and instrument panel wire harness connector I-031.
- e. Check if wire harnesses are worn, pierced, pinched or partially broken.
- f. Check for broken, bent, protruded or corroded terminals.
- g. Check if related connector terminal contact pins are in good condition.

NG

Repair or replace body/instrument panel wire harness and connector

OK

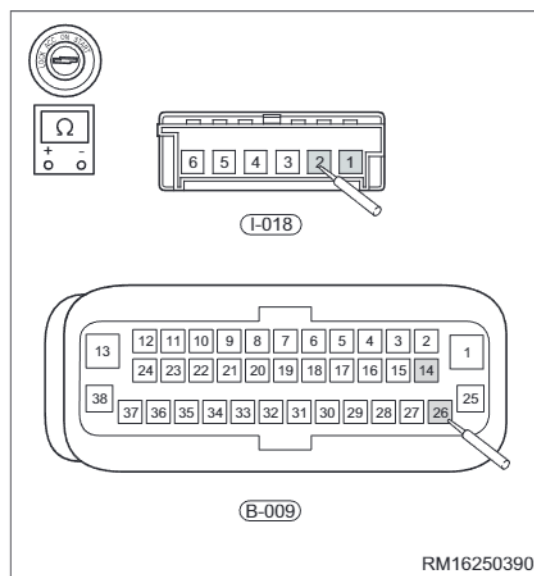
3

Check CAN communication control circuit (ESP - steering angle sensor)

- a. Turn the ignition switch to LOCK, disconnect the negative battery cable and wait for 90 seconds at least.
- b. Disconnect the ABS/ESP control module assembly connector B-009.
- c. Disconnect the steering angle sensor connector I-018.
- d. Using a digital multimeter, check for continuity between the terminals of connector I-018 and connector B-009 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

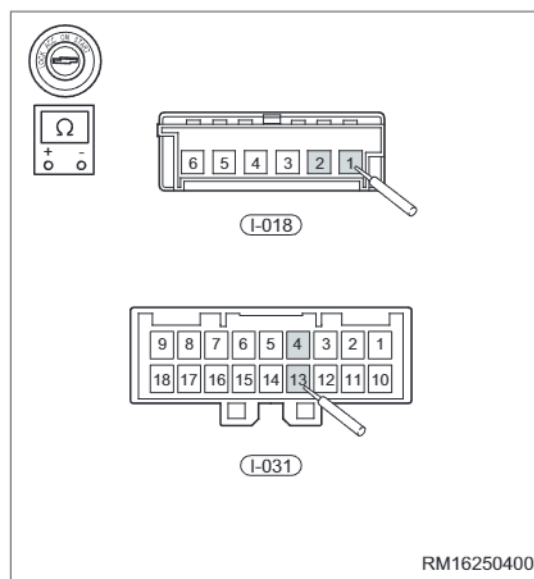
Multimeter Connection	Condition	Specified Condition
I-018 (1) - B-009 (14)	Always	Continuity
I-018 (2) - B-009 (26)	Always	Continuity



- e. Disconnect the body wire harness connector B-035 and instrument panel wire harness connector I-031.
- f. Using a digital multimeter, check for continuity between the terminals of connector I-018 and connector I-031 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
I-018 (2) - I-031 (4)	Always	Continuity
I-018 (1) - I-031 (13)	Always	Continuity



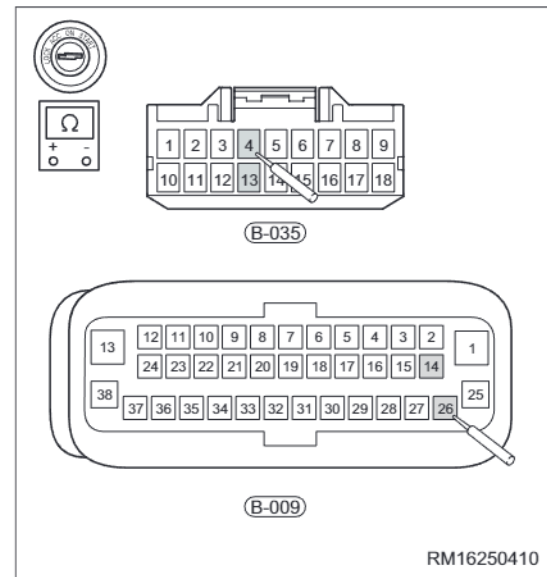
- g. Using a digital multimeter, check for continuity between the terminals of connector B-035 and connector B-009 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-035 (4) - B-009 (26)	Always	Continuity
B-035 (13) - B-009 (14)	Always	Continuity

NG

Repair or replace instrument panel/body wire harness and connector

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

- Use X-431 3G diagnostic tester to clear DTC.
- Start engine.
- Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- Check if same DTC is output.

NO

System operates normally

YES

Replace and rematch steering angle sensor

DTC	C006B-00	Stability System Active Too Long (ESP Only)
------------	-----------------	--

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C006B-00	Stability System Active Too Long (ESP Only)	This DTC occurs when following conditions are met: 1. ABS receives command to continue operating (more than 1 minute). 2. ESP receives command to continue operating (more than 10 seconds).	• Wheel speed difference is excessive. • Sensor signal is incorrect. • ABS/ESP control module assembly is damaged.

CAUTION

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

Diagnosis Procedure

1	Check sensor wire harness and connector
----------	--

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect all wheel speed sensor connectors and steering angle sensor connectors.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

Repair or replace corresponding sensor wire harness and connector

OK

2	Check installation of wheel speed sensor
----------	---

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

NG

Tighten mounting bolt properly, clean or replace wheel speed sensor

OK

3

Check wheel speed sensor

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

NG

Replace corresponding wheel speed sensor

OK

4

Check hub ring gear

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

NG

Replace corresponding hub ring gear

OK

5

Check installation of steering angle sensor

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check if steering angle sensor connector is connected securely.
- Check if steering angle sensor is installed in place.
- Check installation position of steering angle sensor for dirt.

NG

Install correctly and securely, clean or replace steering angle sensor

OK

6

Reconfirm DTCs

- Use X-431 3G diagnostic tester to clear DTC.
- Start engine.
- Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- Check if same DTC is output.

NO

System operates normally

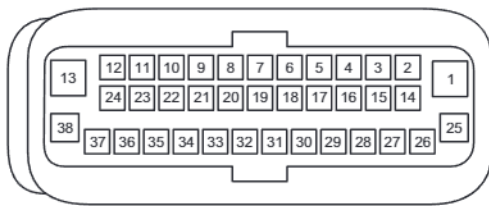
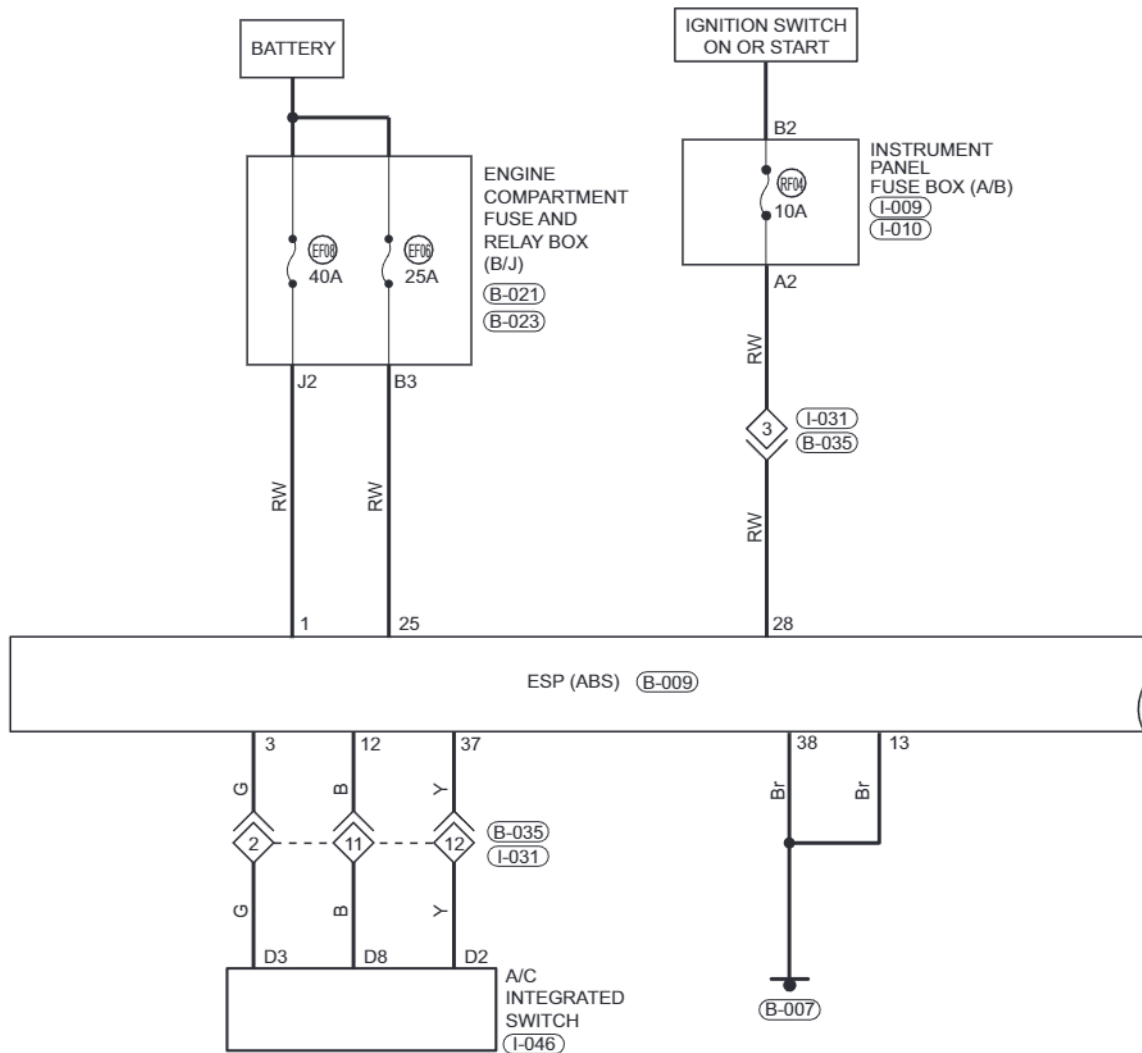
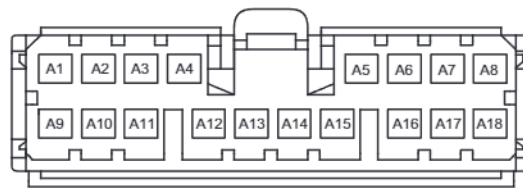
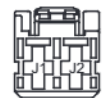
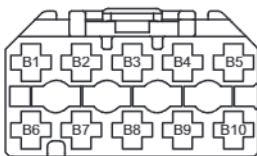
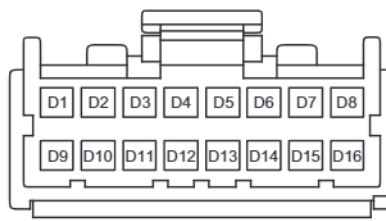
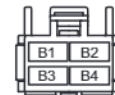
YES

Replace ABS/ESP control module assembly

DTC

C0089-04

TCS Disable Switch (ESP Only)

(B-009)
B(I-009)
W(B-023)
Y(B-021)
Y(I-046)
B(I-031)
W(I-010)
W

EM16250120

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C0089-04	TCS Disable Switch (ESP Only)	This DTC occurs when any of following conditions is met: 1. Press and hold ESP OFF switch for more than 10 seconds. 2. During ignition, ESP OFF switch active signal is detected for more than 2 seconds.	• ESP OFF switch is pressed by something. • ESP OFF switch is damaged.

CAUTION

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

Diagnosis Procedure**1 Check ESP OFF switch**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Check if ESP OFF switch is stuck or pressed by something.

NG

Release ESP OFF switch or move away other objects

OK**2 Check wire harness and connector**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009 and A/C integrated switch connector I-046.
- Disconnect the body wire harness connector B-035 and instrument panel wire harness connector I-031.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

Repair or replace body/instrument panel wire harness and connector

OK

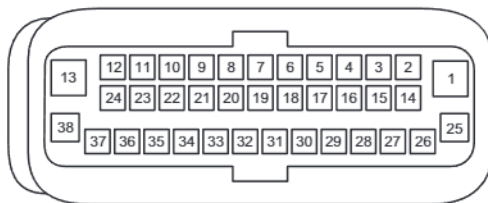
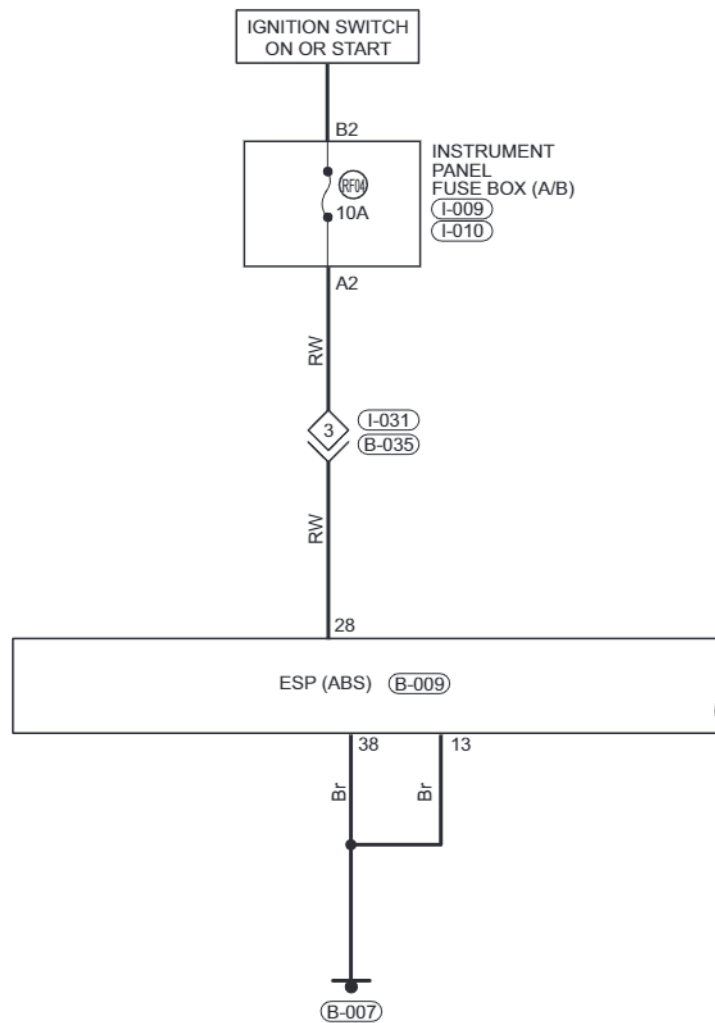
3**Reconfirm DTCs**

- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

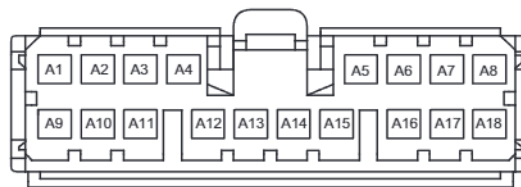
NO**System operates normally****YES****Replace center control integration panel assembly**

DTC	C1000-16	ECU Voltage Supply
-----	----------	--------------------

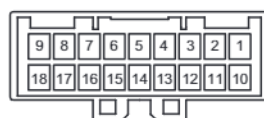
DTC	C1000-17	ECU Voltage Supply
-----	----------	--------------------



(B-009)
B



(I-009)
W



(I-031)
W



(I-010)
W

EM16250130

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C1000-16	ECU Voltage Supply	These DTCs occur when any of following conditions is met: 1. Voltage is below 4.5 V just after vehicle is powered on.	• Fuse malfunction • High or low battery voltage • Charging system malfunction • Wire harness or connector damaged • ABS/ESP control module assembly malfunction
C1000-17	ECU Voltage Supply	2. Voltage is below 7.7 V or above 16.8 V with ignition switch ON. 3. Voltage is 7.7 to 9.2 V when vehicle speed is above 6 km/h.	

CAUTION

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

Diagnosis Procedure**1 Check fuse**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the fuse RF04 (10 A) from instrument panel fuse box.
- Check if fuse is blown.

NG**Replace fuse RF04****OK****2 Check battery voltage**

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

NG**Check charging system (See page 16-6)****OK****3 Check ABS/ESP control module assembly wire harness and connector****25**

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

Repair or replace ABS/ESP control module assembly wire harness and connector

OK

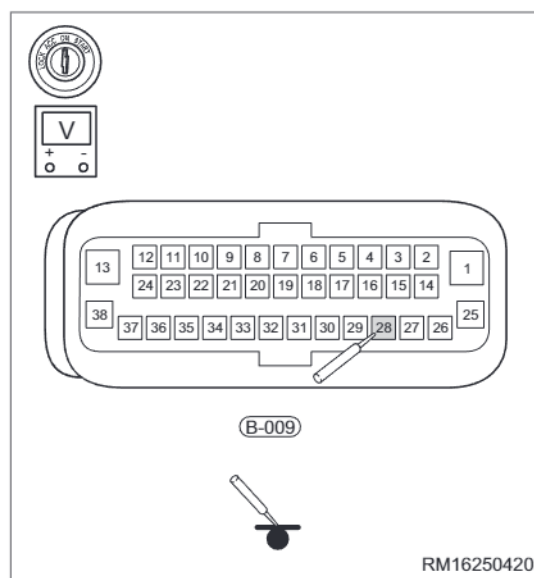
4

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Using a digital multimeter, measure the voltage between ABS/ESP control module assembly connector B-009 and body ground to check if power supply circuit is normal according to the table below.

Standard Voltage:

Multimeter Connection	Condition	Specified Condition
B-009 (28) - Body ground	Ignition switch ON	9 to 16 V



NG

Repair or replace related wire harness and connector

OK

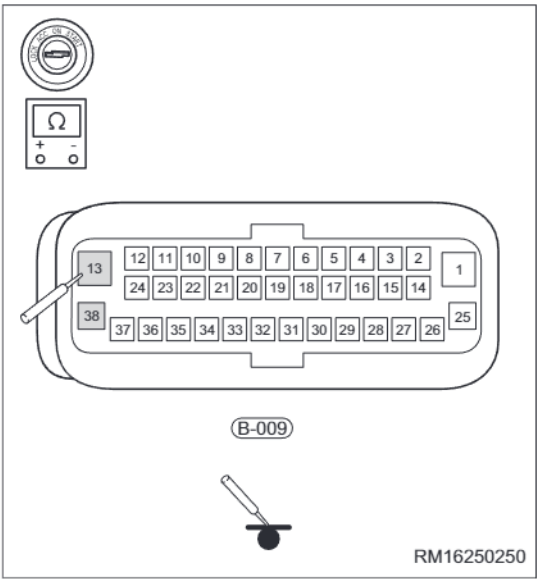
5

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

- a. Turn ignition switch to LOCK.
- b. Disconnect the negative battery cable.
- c. Disconnect the ABS/ESP control module assembly connector B-009.
- d. Using a digital multimeter, check for continuity between ABS/ESP control module assembly connector B-009 and body ground to check if system ground circuit is normal according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (13) - Body ground	Always	Continuity
B-009 (38) - Body ground	Always	Continuity



NG

Repair or replace ABS/ESP control module assembly wire harness and connector

OK

6 Reconfirm DTCs

- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

NO

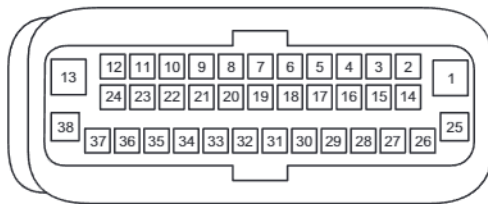
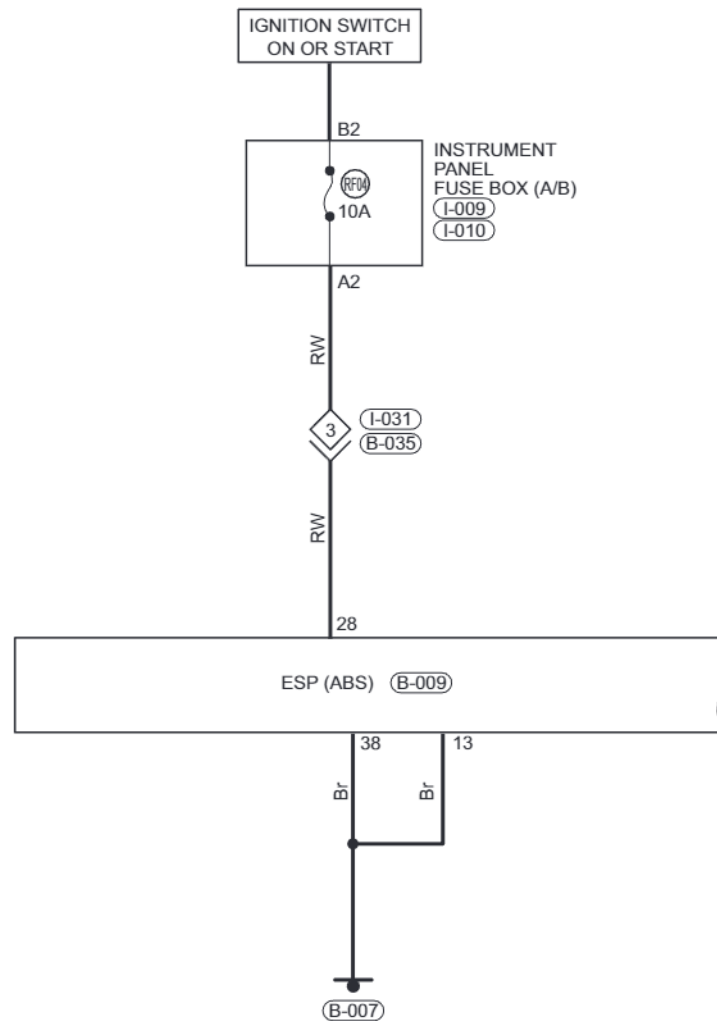
System operates normally

YES

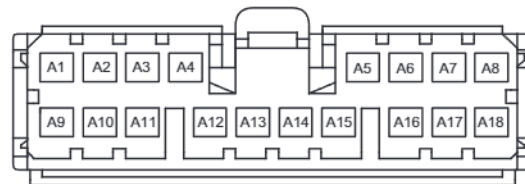
Replace ABS/ESP control module assembly

DTC	C1001-04	ECU
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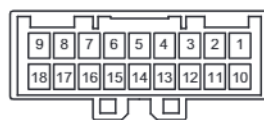
DTC	C1009-00	ECU Hard Ware Related
-----	----------	-----------------------



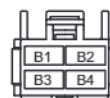
(B-009)
B



(I-009)
W



(I-031)
W



(I-010)
W

EM16250130

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
C1001-04	ECU	These DTCs occur when any of following conditions is met: 1. ECU power supply is malfunctioning. 2. ECU is damaged.	- Fuse malfunction - Wire harness or connector damaged - ABS/ESP control module assembly malfunction
C1009-00	ECU Hard Ware Related		

CAUTION

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

Diagnosis Procedure

1 Check fuse

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Remove the fuse RF04 (10 A) from instrument panel fuse box.
- Check if fuse is blown.

NG

Replace fuse RF04

OK

2 Check ABS/ESP control module assembly wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

Repair or replace ABS/ESP control module assembly wire harness and connector

OK

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Using a digital multimeter, measure the voltage between ABS/ESP control module assembly connector B-009 and body ground to check if power supply circuit is normal according to the table below.

Standard Voltage:

Multimeter Connection	Condition	Specified Condition
B-009 (28) - Body ground	Ignition switch ON	9 to 16 V

NG

Repair or replace engine wire harness and connector

OK

4

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

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Using a digital multimeter, check for continuity between ABS/ESP control module assembly connector B-009 and body ground to check if system ground circuit is normal according to the table below.

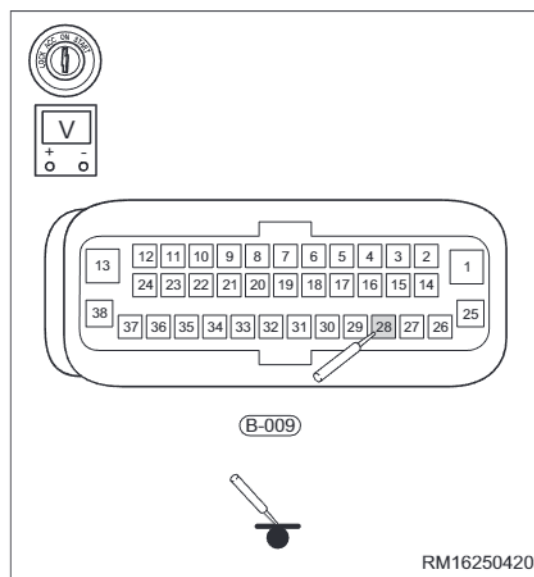
Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (13) - Body ground	Always	Continuity
B-009 (38) - Body ground	Always	Continuity

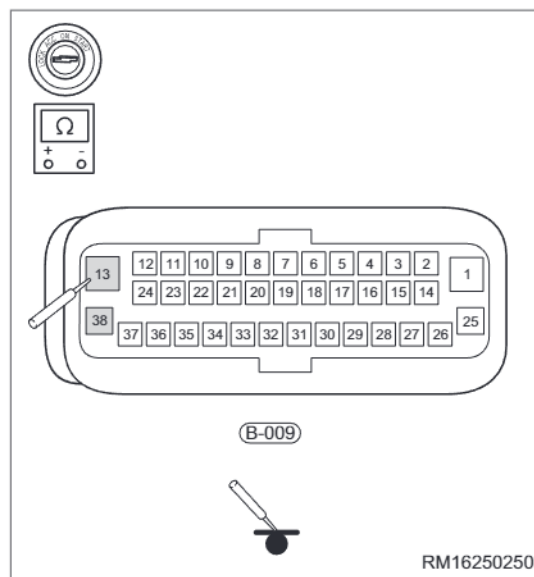
NG

Repair or replace ABS/ESP control module assembly wire harness and connector

OK



RM16250420



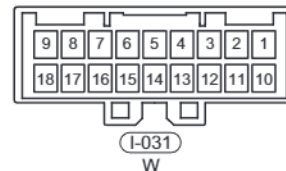
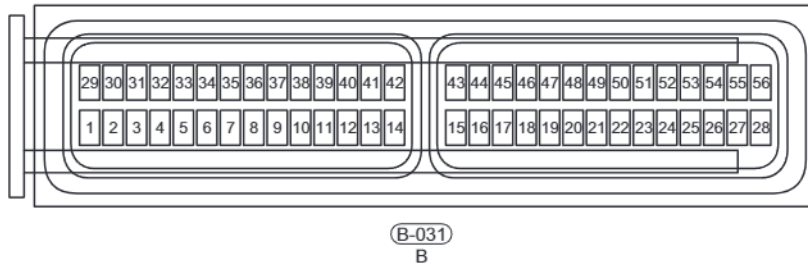
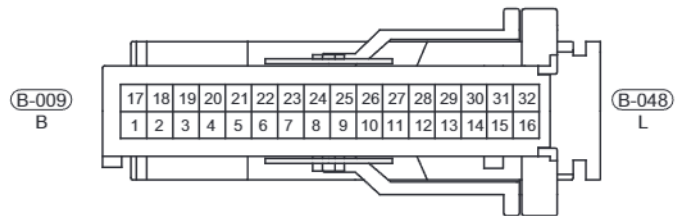
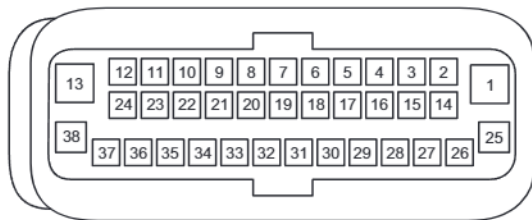
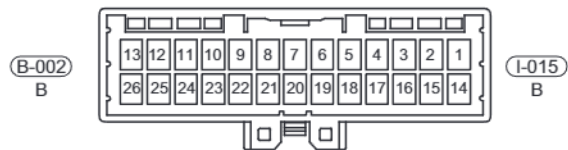
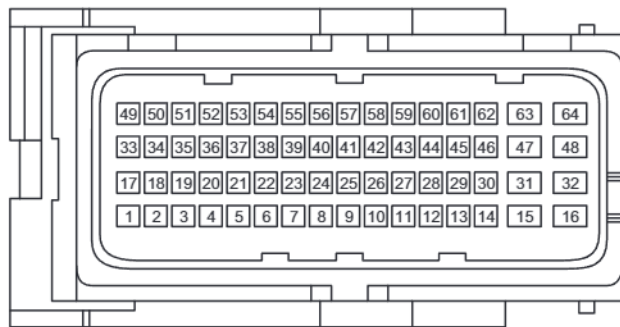
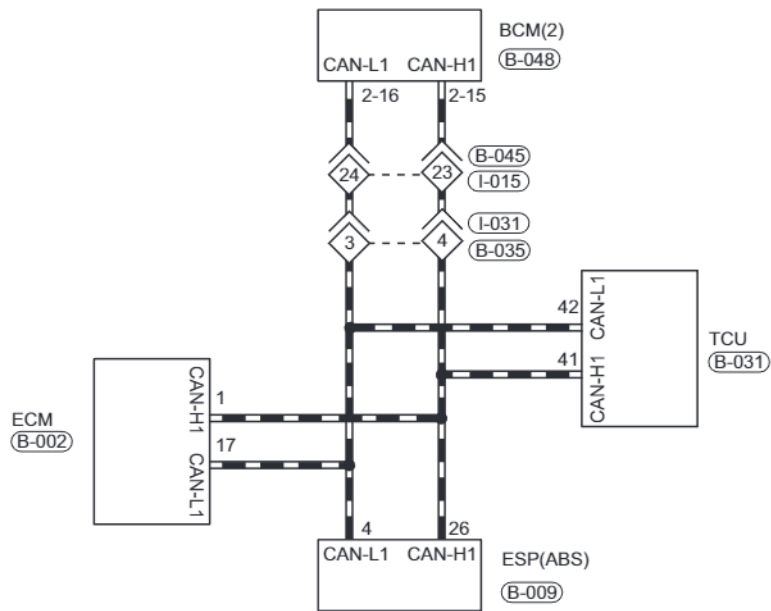
RM16250250

5**Reconfirm DTCs**

- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

DTC	U0005-00	High Speed CAN Communication Bus (+) High
DTC	U0007-00	High Speed CAN Communication Bus (-) Low
DTC	U0073-00	Control Module Communication Bus Off
DTC	U0100-00	Lost Communication with ECM
DTC	U0101-00	Lost Communication with TCM (ESP Only)
DTC	U0140-00	Lost Communication with BCM
DTC	U0401-00	Invalid Data Received from ECM
DTC	U0402-00	Invalid Data Received from TCM (ESP Only)
DTC	U0422-00	Invalid Data Received from Body Control Module
DTC	U1000-00	CAN Error Passive



EM16250140

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0005-00	High Speed CAN Communication Bus (+) High	These DTCs occur when any of following conditions is met: 1. CAN bus communication, configuration information and line are malfunctioning. 2. ECM overtime. 3. ECM error. 4. TCU overtime. 5. TCU error.	• CAN controller malfunction • CAN configuration information unmatched • CAN communication off • CAN bus line malfunction • ECM software version unmatched • ECM damaged • TCU software version unmatched • TCU damaged • BCM damaged • ESP (ABS) damaged
U0007-00	High Speed CAN Communication Bus (-) Low		
U0073-00	Control Module Communication Bus Off		
U0100-00	Lost Communication with ECM		
U0101-00	Lost Communication with TCM (ESP Only)		
U0140-00	Lost Communication with BCM		
U0401-00	Invalid Data Received from ECM		
U0402-00	Invalid Data Received from TCM (ESP Only)		
U0422-00	Invalid Data Received from Body Control Module		
U1000-00	CAN Error Passive		

CAUTION

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

Diagnosis Procedure

1 Check wire harness and connector

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the Engine Control Module (ECM) connector B-002.
- Disconnect the Transmission Control Unit (TCU) connector B-031.
- Disconnect the Body Control Module (BCM) connector B-048.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if related connector terminal contact pins are in good condition.

NG

Repair or replace body wire harness and connector

OK

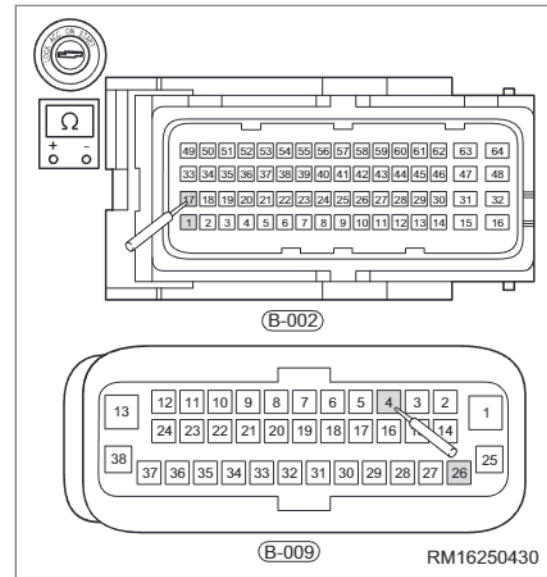
2

Check CAN communication control circuit (ABS/ESP control module assembly - Engine Control Module (ECM))

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the Engine Control Module (ECM) connector B-002.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-002 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (26) - B-002 (1)	Always	Continuity
B-009 (4) - B-002 (17)	Always	Continuity



NG

Repair or replace body wire harness and connector

OK

3

Check CAN communication control circuit (ABS/ESP control module assembly - Transmission Control Unit (TCU))

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the Transmission Control Unit (TCU) connector B-031.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-031 to check if there is an open in the CAN communication circuit according to the table below.

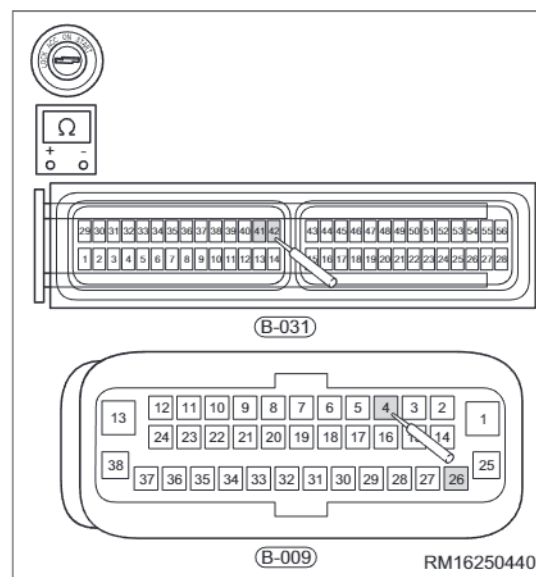
Standard Condition

Multimeter Connection	Condition	Specified Condition
B-009 (26) - B-031 (41)	Always	Continuity
B-009 (4) - B-031 (42)	Always	Continuity

NG

Repair or replace body wire harness and connector

OK



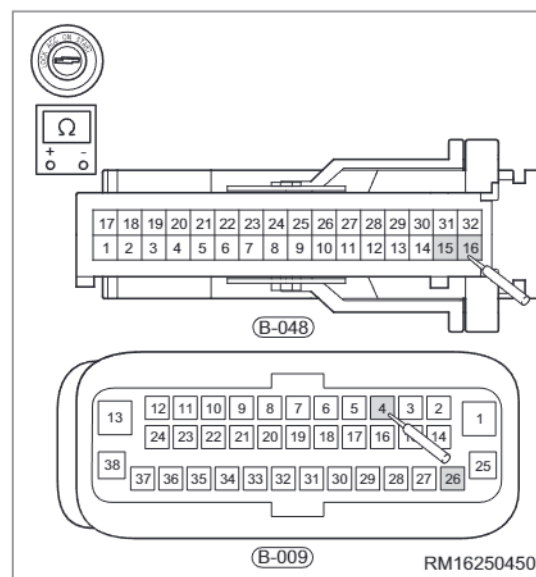
4

Check CAN communication control circuit (ABS/ESP control module assembly - Body Control Module (BCM))

- Turn ignition switch to LOCK.
- Disconnect the negative battery cable.
- Disconnect the ABS/ESP control module assembly connector B-009.
- Disconnect the Body Control Module (BCM) connector B-048.
- Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-048 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

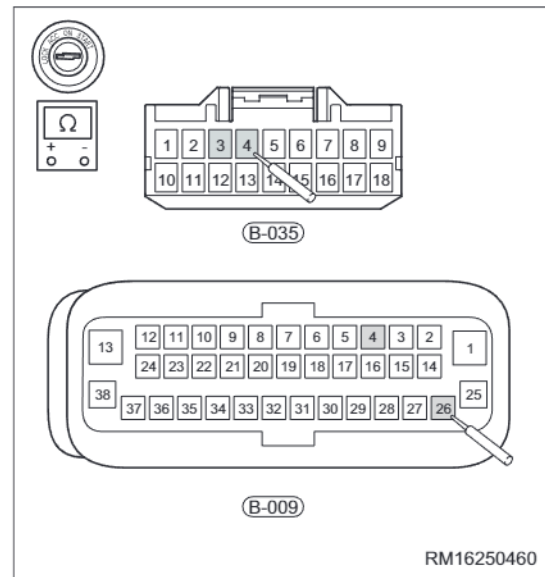
Multimeter Connection	Condition	Specified Condition
B-009 (26) - B-048 (15)	Always	Continuity
B-009 (4) - B-048 (16)	Always	Continuity



- f. Disconnect the body wire harness connector B-035.
- g. Using a digital multimeter, check for continuity between the terminals of connector B-009 and connector B-035 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

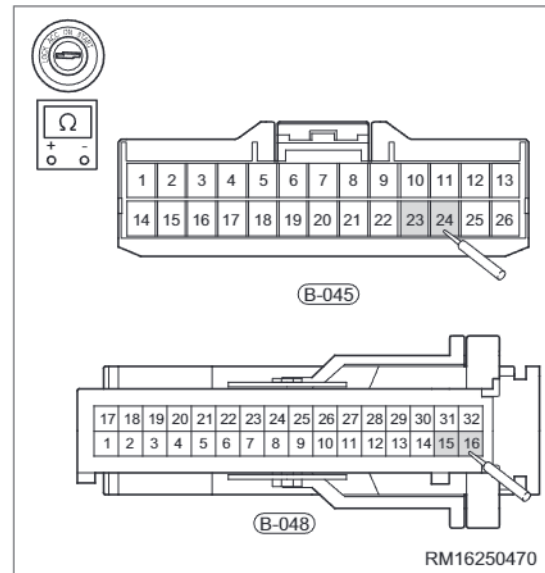
Multimeter Connection	Condition	Specified Condition
B-009 (26) - B-035 (4)	Always	Continuity
B-009 (4) - B-035 (3)	Always	Continuity



- h. Disconnect the body wire harness connector B-045.
- i. Using a digital multimeter, check for continuity between the terminals of connector B-048 and connector B-045 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
B-048 (15) - B-045 (23)	Always	Continuity
B-048 (16) - B-045 (24)	Always	Continuity



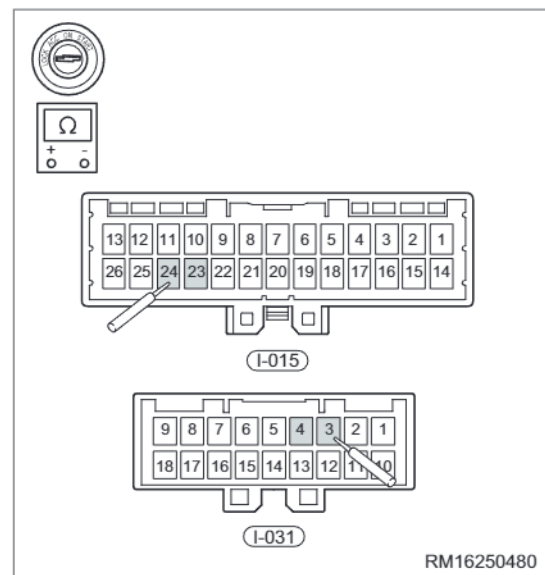
- j. Disconnect the instrument panel wire harness connectors I-031 and I-015.
- k. Using a digital multimeter, check for continuity between the terminals of connector I-031 and connector I-015 to check if there is an open in the CAN communication circuit according to the table below.

Standard Condition

Multimeter Connection	Condition	Specified Condition
I-031 (3) - I-015 (24)	Always	Continuity
I-031 (4) - I-015 (23)	Always	Continuity

NG

Repair or replace body/instrument panel wire harness and connector



OK

5 Check module software version information

- Connect the negative battery cable.
- Turn ignition switch to ON.
- Use X-431 3G diagnostic tester to read ECM/TCU software version information.
- Check if there is any abnormality.

NG

ECM/TCM software version unmatched

OK

6 Reconfirm DTCs

- Use X-431 3G diagnostic tester to clear DTC.
- Start engine.
- Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- Check if same DTC is output.

NO

System operates normally

YES

Replace ABS/ESP control module assembly

DTC	U1300-55	Software Configuration Error
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DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U1300-55	Software Configuration Error	This DTC occurs when any of following conditions is met: 1. Configuration information is not written in. 2. Configuration information is unmatched.	Configuration information is not written in or unmatched.

CAUTION

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

Diagnosis Procedure**1 Check for DTCs**

- Use X-431 3G diagnostic tester (the latest software) to clear and read DTCs stored in ABS/ESP control module assembly.
- Refer to DTC Confirmation Procedure.
- Check if same DTC is output.

NO

Malfunction indicated by the DTC is intermittent

YES**2 Check configuration of ABS/ESP control module assembly**

- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester (the latest version), check if configuration of ABS/ESP control module assembly is accordant to real configuration of vehicle.

NO

Rewrite configuration information correctly

YES**25**

3**Reconfirm DTCs**

- a. Use X-431 3G diagnostic tester to clear DTC.
- b. Start engine.
- c. Drive vehicle at 15 km/h or above, read ABS/ESP control module assembly DTC again with X-431 3G diagnostic tester.
- d. Check if same DTC is output.

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

ON-VEHICLE SERVICE

ABS Bleeding

WARNING

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

CAUTION

- Brake fluid should meet Chery specified type (DOT 4). 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.

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

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

HINT:

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

ABS/ESP Control Module Assembly

Removal

⚠ WARNING

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

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Drain the brake fluid ([See page 26-13](#)).

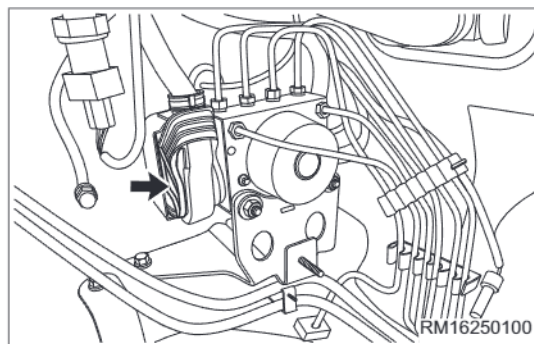
👁 CAUTION

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

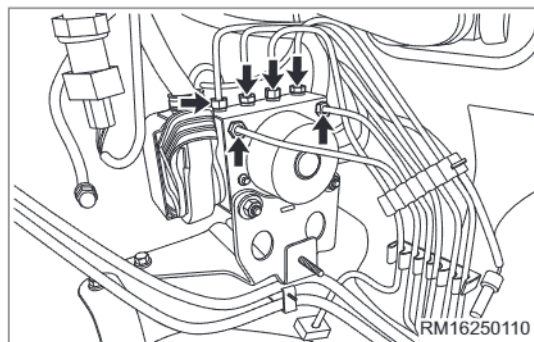
♻ ENVIRONMENTAL PROTECTION

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

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



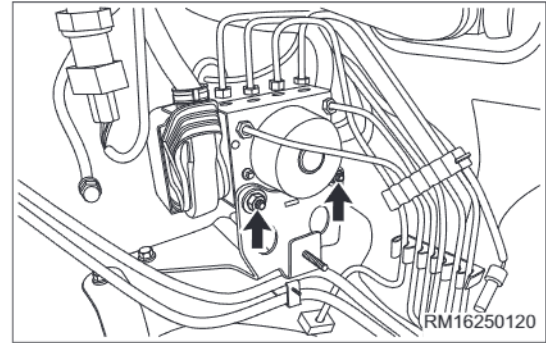
- b. Using a fixing wrench, carefully disconnect 6 brake pipe coupling plugs (arrow).
(Tightening torque: $16 \pm 2 \text{ N}\cdot\text{m}$)



CAUTION

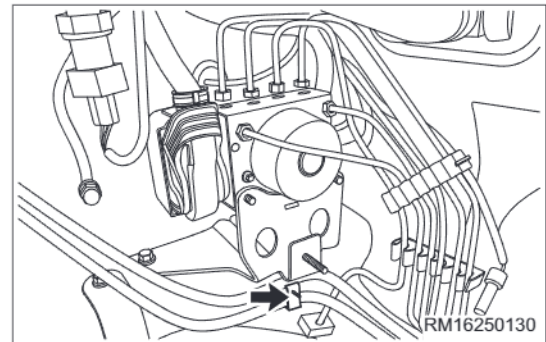
- When removing brake line, prevent foreign matter from entering ABS/ESP control module assembly threaded holes.
- After disconnecting brake line, sealing measure should be taken to prevent foreign matter from entering.

- c. Remove 2 coupling nuts (arrow) between ABS/ESP control module assembly and mounting bracket.
(Tightening torque: $8 \pm 2 \text{ N}\cdot\text{m}$)

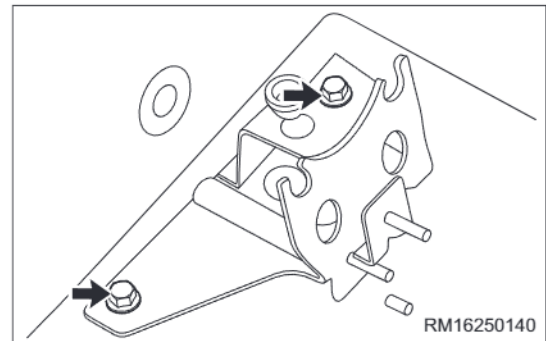


- d. Disengage the insulator from mounting bracket and remove the ABS/ESP control module assembly.
6. Remove the ABS/ESP control module assembly mounting bracket.

- a. Disengage the line fixing bracket (arrow) from ABS/ESP control module assembly mounting bracket.



- b. Remove 2 coupling bolts (arrow) between ABS/ESP control module assembly mounting bracket and body.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



- c. Remove the ABS/ESP control module assembly mounting bracket.

Installation

Installation is in the reverse order of removal.

CAUTION

- ABS/ESP control module assembly contains hydraulic control module and electronic control module. As a unit, they cannot be repaired or replaced individually.
- Check insulator for aging or damage. Replace if necessary.
- When installing fixing bolts and nuts, be sure to tighten to specified torques.
- Perform ABS bleeding procedures for brake system after completing installation ([See page 25-87](#)).
- Using X-431 3G diagnostic tester, enter brake control system, record and clear trouble code, then drive vehicle to perform a road test, confirming that ABS/ESP system operates normally and brake pedal feel is good.

Front Wheel Speed Sensor

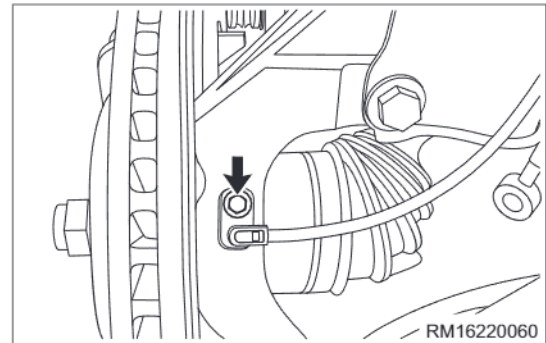
Removal

CAUTION

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

HINT:

- Use the same procedures for the right side and left side.
 - Procedures listed below are for left side.
1. Turn off all electrical equipment and the ignition switch.
 2. Disconnect the negative battery cable.
 3. Remove the front left wheel ([See page 24-9](#)).
 4. Remove the front left wheel speed sensor.
 - a. Remove the coupling bolt (arrow) between front left wheel speed sensor and front left steering knuckle assembly, and disengage the front left wheel speed sensor carefully.
(Tightening torque: $10 \pm 1 \text{ N}\cdot\text{m}$)



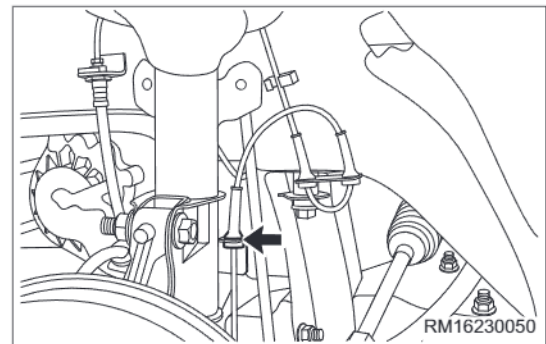
CAUTION

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

- b. Disengage the attachment part (arrow) of front left wheel speed sensor wire harness from front left shock absorber assembly.

HINT:

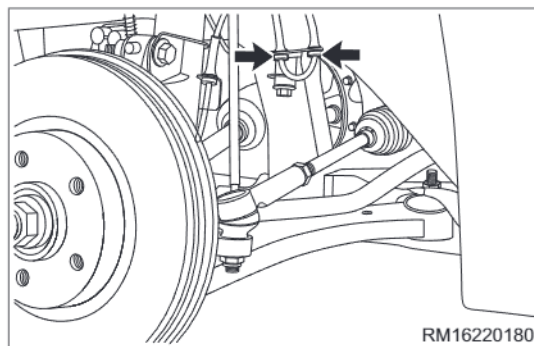
Observe winding direction of sensor wire harness to prevent incorrect installation.



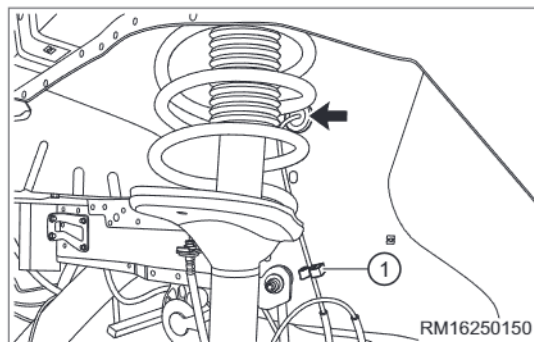
- c. Detach the attachment parts (arrow) of front left wheel speed sensor wire harness from front sub frame welding assembly.

HINT:

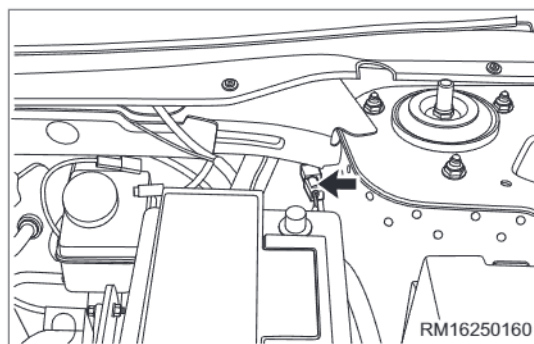
Observe winding direction of sensor wire harness to prevent incorrect installation.



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



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



- f. Detach the wire harness connector fixing clip and remove the front left wheel speed sensor.

Inspection

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

Installation

Installation is in the reverse order of removal.

CAUTION

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

Rear Wheel Speed Sensor

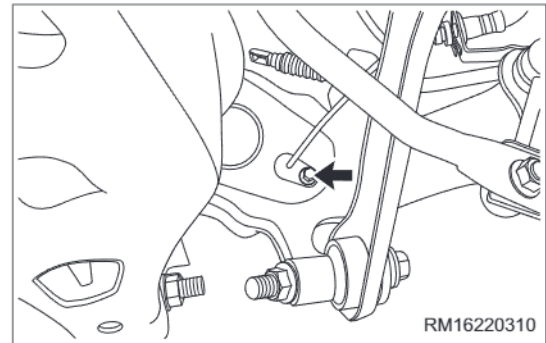
Removal

CAUTION

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

HINT:

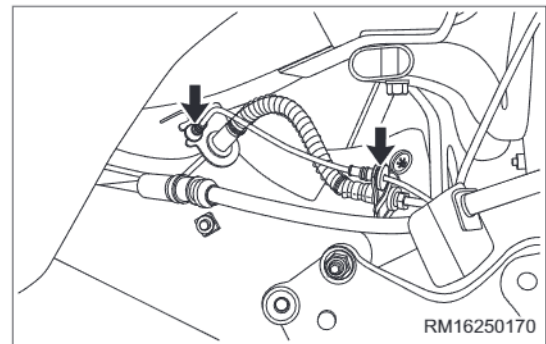
- Use the same procedures for the right side and left side.
 - Procedures listed below are for left side.
1. Turn off all electrical equipment and the ignition switch.
 2. Disconnect the negative battery cable.
 3. Remove the rear left wheel ([See page 24-9](#)).
 4. Remove the rear left wheel speed sensor.
 - a. Remove the coupling bolt (arrow) between rear left wheel speed sensor and rear left steering knuckle assembly, and disengage the rear left wheel speed sensor.
(Tightening torque: $10 \pm 1 \text{ N}\cdot\text{m}$)



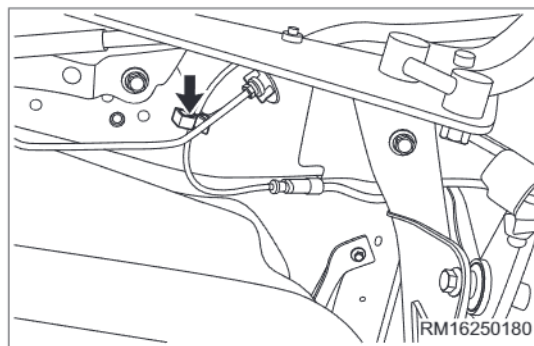
CAUTION

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

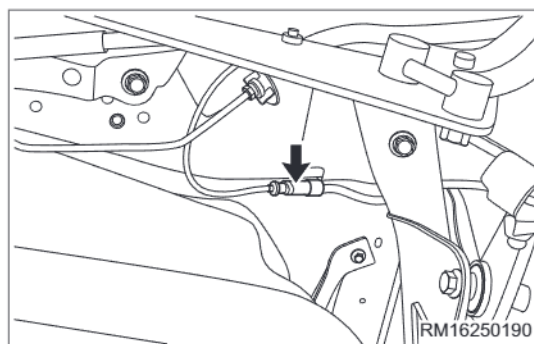
- b. Detach the rear wheel speed sensor wire harness from fixing brackets (arrow) of rear trailing arm assembly and rear brake line.



- c. Detach the rear left wheel speed sensor wire harness from body fixing clamp (arrow).



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

Installation

Installation is in the reverse order of removal.

CAUTION

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

Steering Angle Sensor

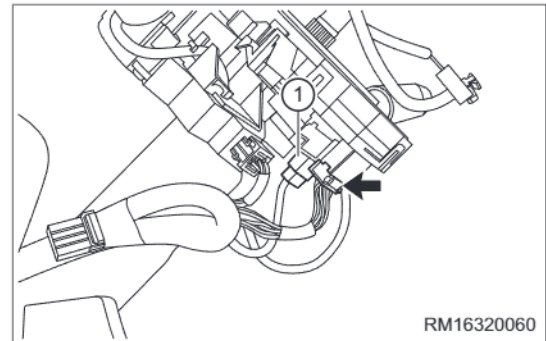
Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.

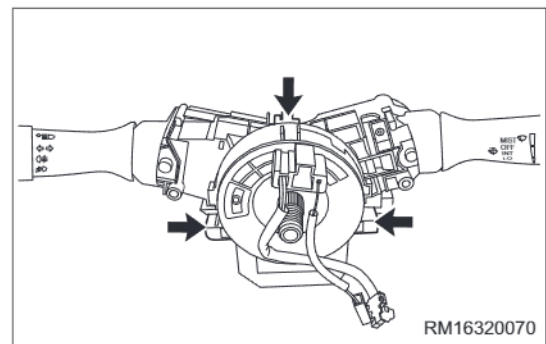
WARNING

- Wait at least 90 seconds after disconnecting negative battery cable to disable supplemental restraint system.

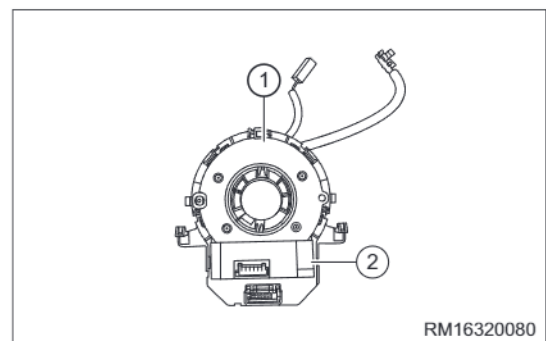
3. Set front wheels to straight-ahead position.
4. Remove the steering wheel assembly ([See page 28-25](#)).
5. Remove the combination switch cover ([See page 28-28](#)).
6. Remove the steering angle sensor.
 - a. Disconnect the spiral cable wire harness connector (arrow) and angle sensor connector (1).



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



- c. Detach the fixing claws of angle sensor, and disengage the angle sensor (1) and spiral cable (2).

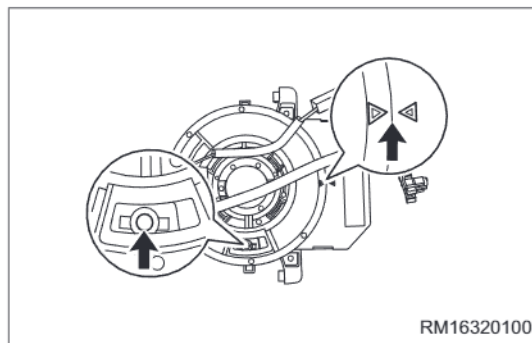


Installation

Installation is in the reverse order of removal.

HINT:

Install the spiral cable correctly according to matchmarks on spiral cable and steering column (turn the spiral cable clockwise slowly until it cannot move, then turn it counterclockwise until yellow ball appears on transparent window and align arrow marks), otherwise the spiral cable will be damaged.



CAUTION

- Make sure to install spiral cable correctly as specified.
- DO NOT turn spiral cable more than specified times to prevent it broken.
- Make sure to install fixing claws in place when installing spiral cable.
- Check that horn operates properly after completing installation.
- Check SRS warning light to make sure supplemental restraint system operates properly after completing installation.

