

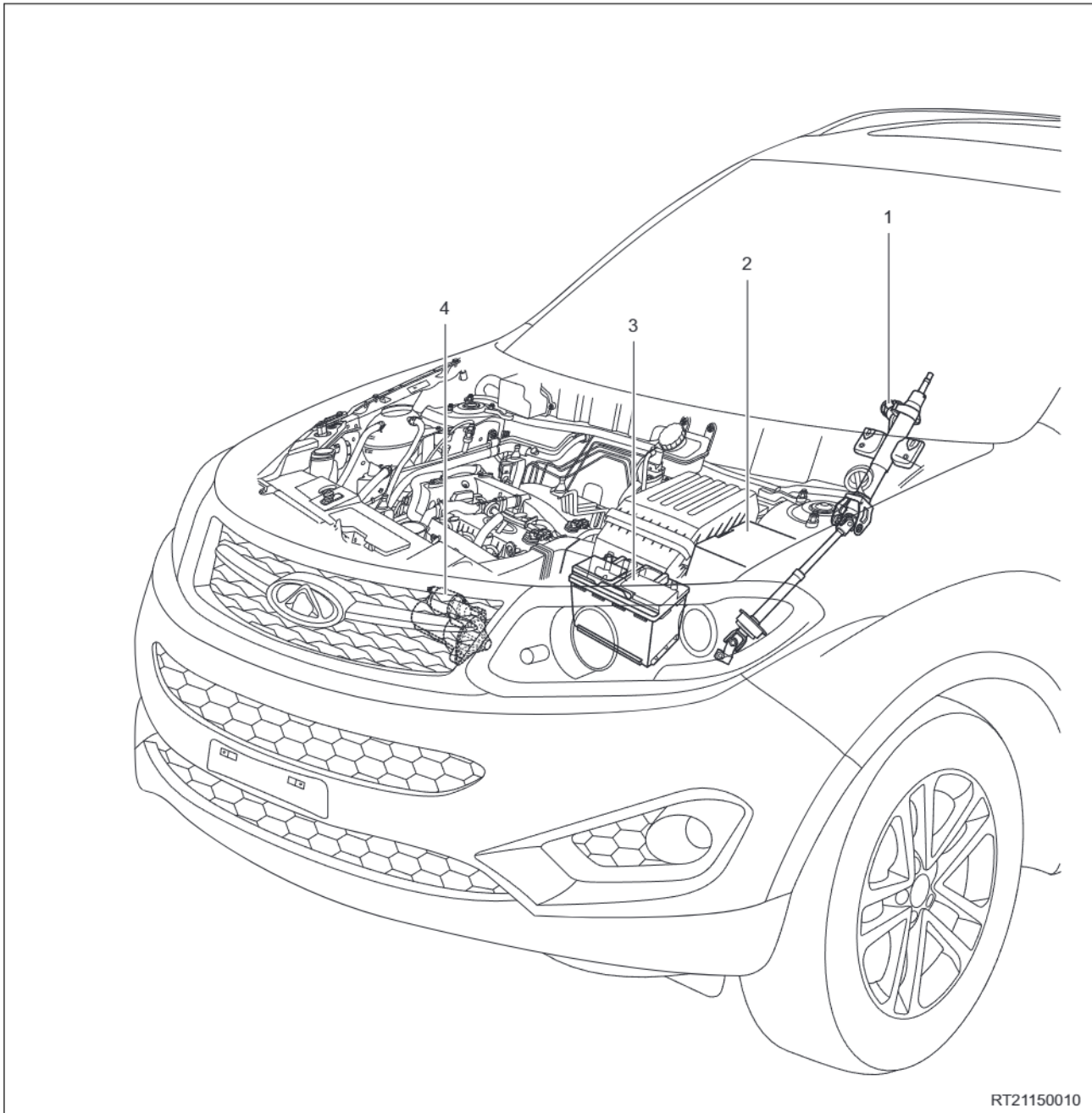
SQR484F STARTING SYSTEM

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GENERAL INFORMATION

Description

w/o PEPS System



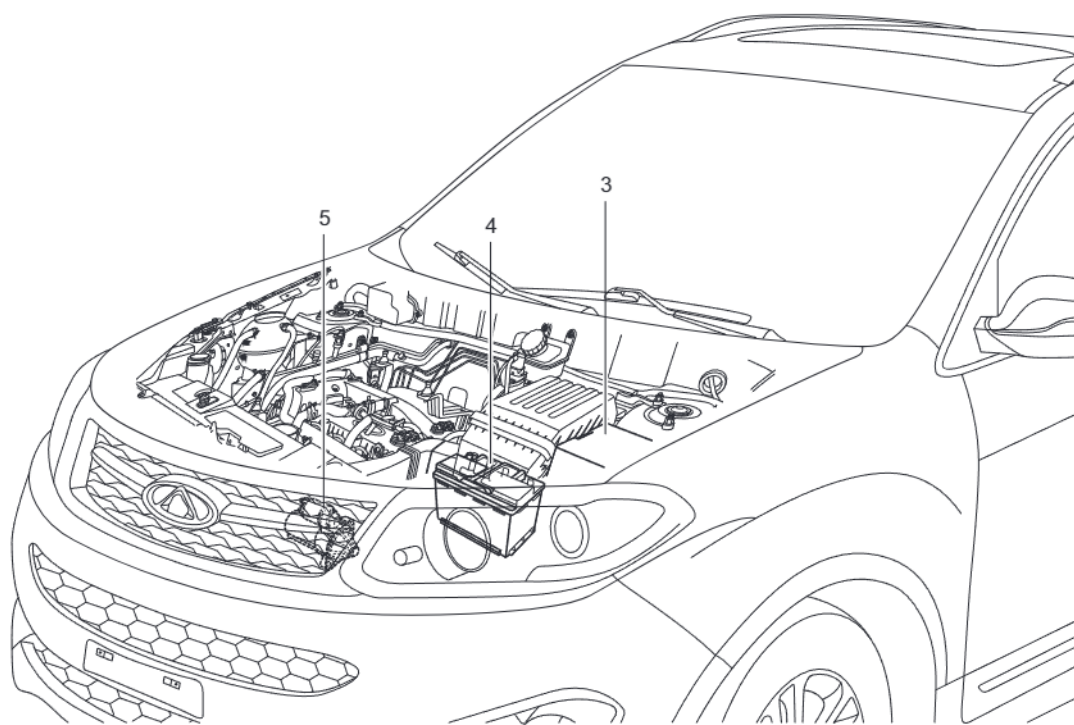
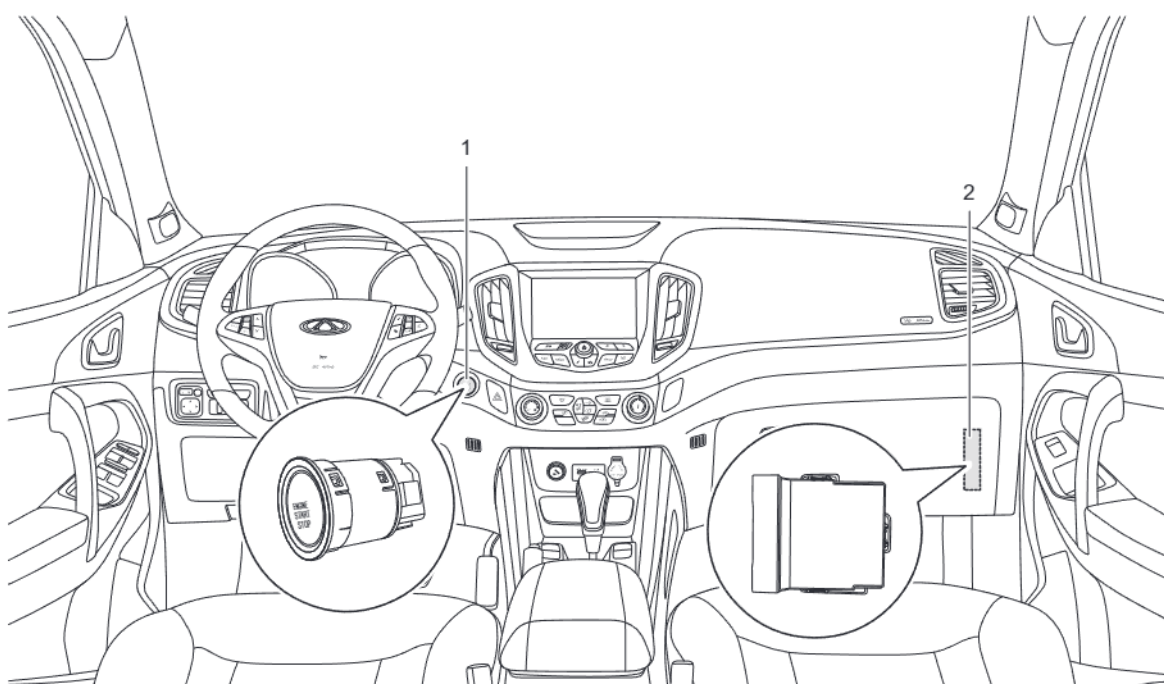
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1 - Ignition Starting Switch	2 - Fuse and Relay Box
3 - Battery	4 - Starter

Starting system, equipped in the vehicle without Passive Entry & Passive Start (PEPS) system, consists of battery, ignition switch and starter, etc.

w/ PEPS System



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1 - Engine Switch

2 - Passive Entry & Passive Start (PEPS) Controller

3 - Fuse and Relay Box

4 - Battery

5 - Starter

Starting system, equipped in the vehicle with Passive Entry & Passive Start (PEPS) system, consists of PEPS controller, engine switch, built-in low frequency antenna (3 antennas are equipped in vehicle to position where the key is), anti-theft coil to back up starting, door handle sensor (built into front left/right door handle), back door opener switch and smart key.

Passive Entry & Passive Start (PEPS) system has the following functions:

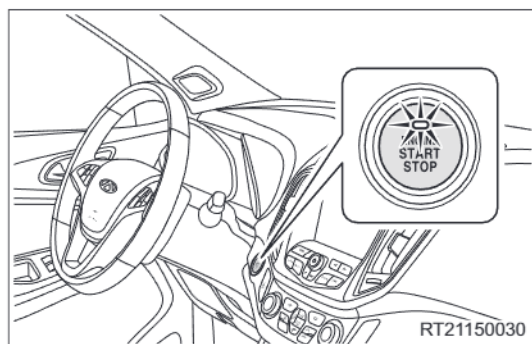
- Keyless entry function;
- Compatible general remote function;
- One-button keyless start function;
- Back door smart open function;
- Engine immobilizer function.

Operation

Engine Switch (w/ PEPS System)

Engine switch is located at the right side of instrument cluster on instrument panel, the function of which is to transform entire vehicle power state and control the starter.

There are 2 colors (amber and green) for LED indicator in the engine switch. Driver can check current power mode and if engine can start according to the illumination condition of indicator.



Engine Switch Indicator Condition

Indicator Condition	Description
Indicator OFF	- Engine switch is in OFF mode and brake pedal (for CVT model) or clutch pedal (for MT model) is released. - Engine has been started.
Indicator ON (Amber)	Engine switch is in ACC or ON mode and brake pedal (for CVT model) or clutch pedal (for MT model) is released.
Indicator ON (Green)	For CVT model: With shift lever in P or N position and brake pedal depressed, press engine switch to start engine. For MT model: With clutch pedal depressed, press engine switch to start engine.

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CAUTION

- For CVT model, if shift lever is in a position other than P when turning off the engine, the engine switch will be turned to ACC mode, not to OFF.

Starter

The function of starter is to convert electrical energy from battery into mechanical energy so as to crank the engine initially, and to disconnect the power transmission between starter and engine when the engine cranks normally.

Starter consists of three parts: control mechanism, drive train mechanism and DC motor.

- Control mechanism (solenoid switch): it controls the engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off the DC motor circuit; the solenoid switch can also short out the ignition coil additional resistance when starting.
- Drive train mechanism: it makes the starter drive gear get engaged with the flywheel gear when engine starts and transmits the torque of starter to engine crankshaft; after the engine starts, the drive gear and flywheel gear disengage automatically, so that the engine cannot drive the starter to run at a high speed in reverse by flywheel, avoiding damage to the starter.
- DC motor: it converts electrical energy from battery into electromagnetic moment.

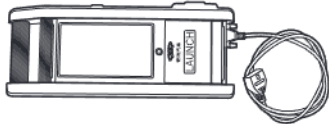
Specifications

Torque Specifications

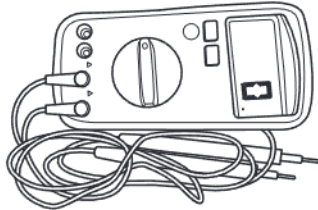
Description	Torque (N·m)
Starter Power Cable Nut	13 ± 1
Starter Fixing Bolt	35 ± 5
Ignition Starting Switch Fixing Screw	13 ± 2

Tools

Special Tool

X-431 3G Diagnostic Tester	 RCH0000001
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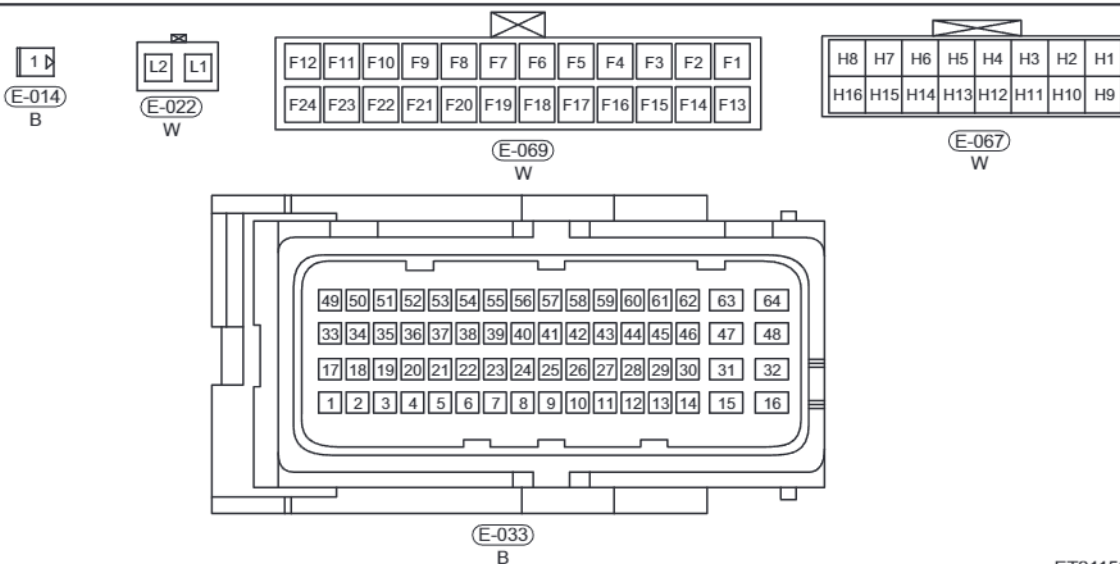
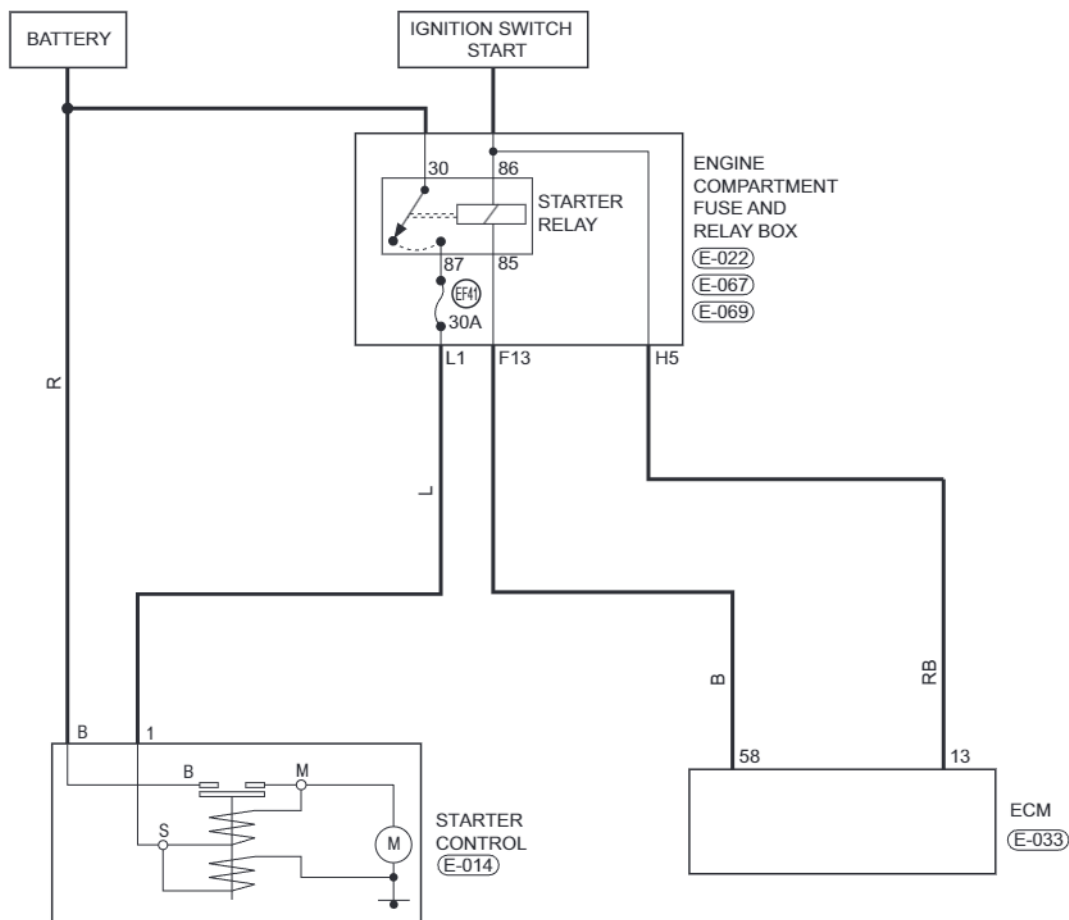
General Tool

Digital Multimeter	 RCH0000002
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Circuit Diagram

Starting System (Page 1 of 2)

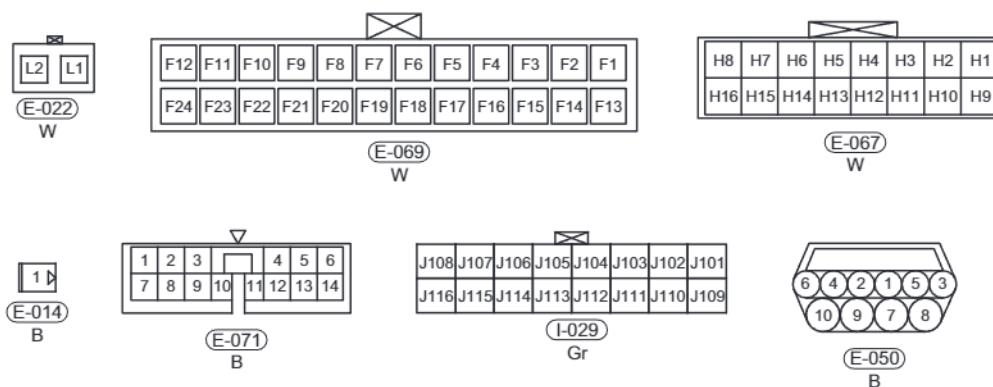
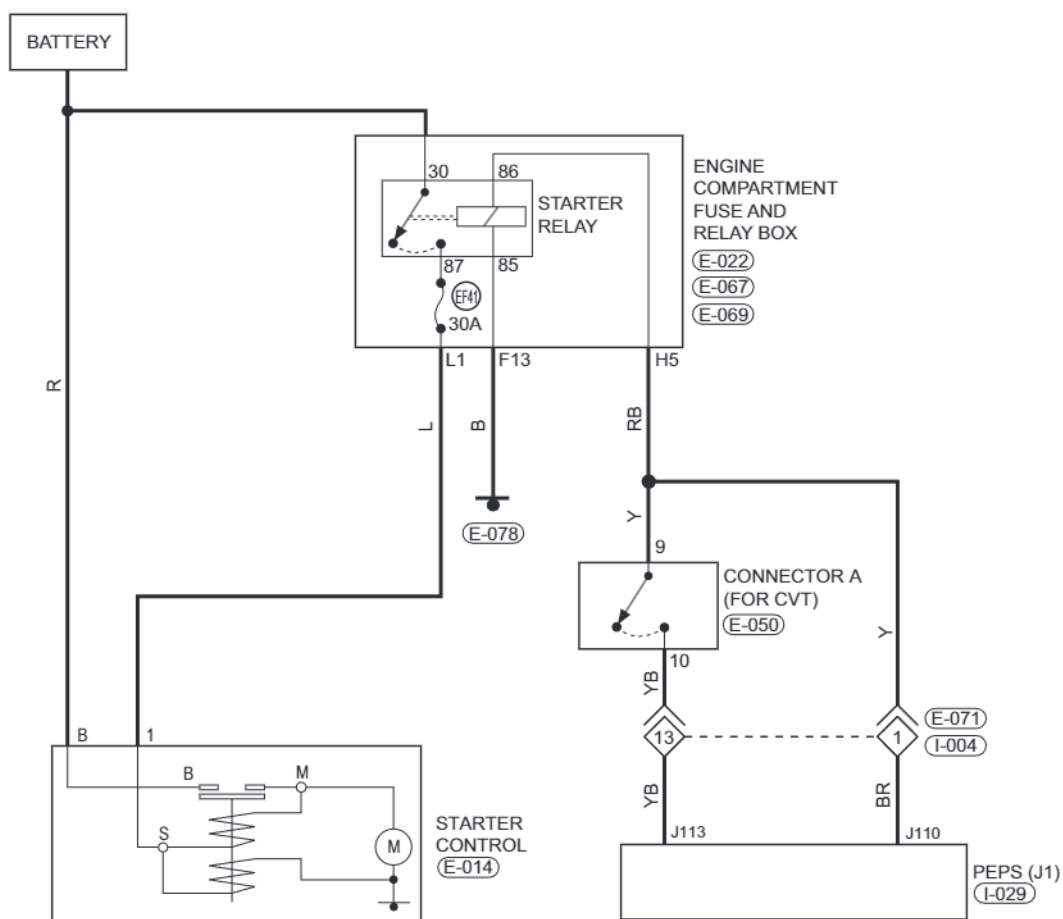
MT



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Starting System (Page 2 of 2)

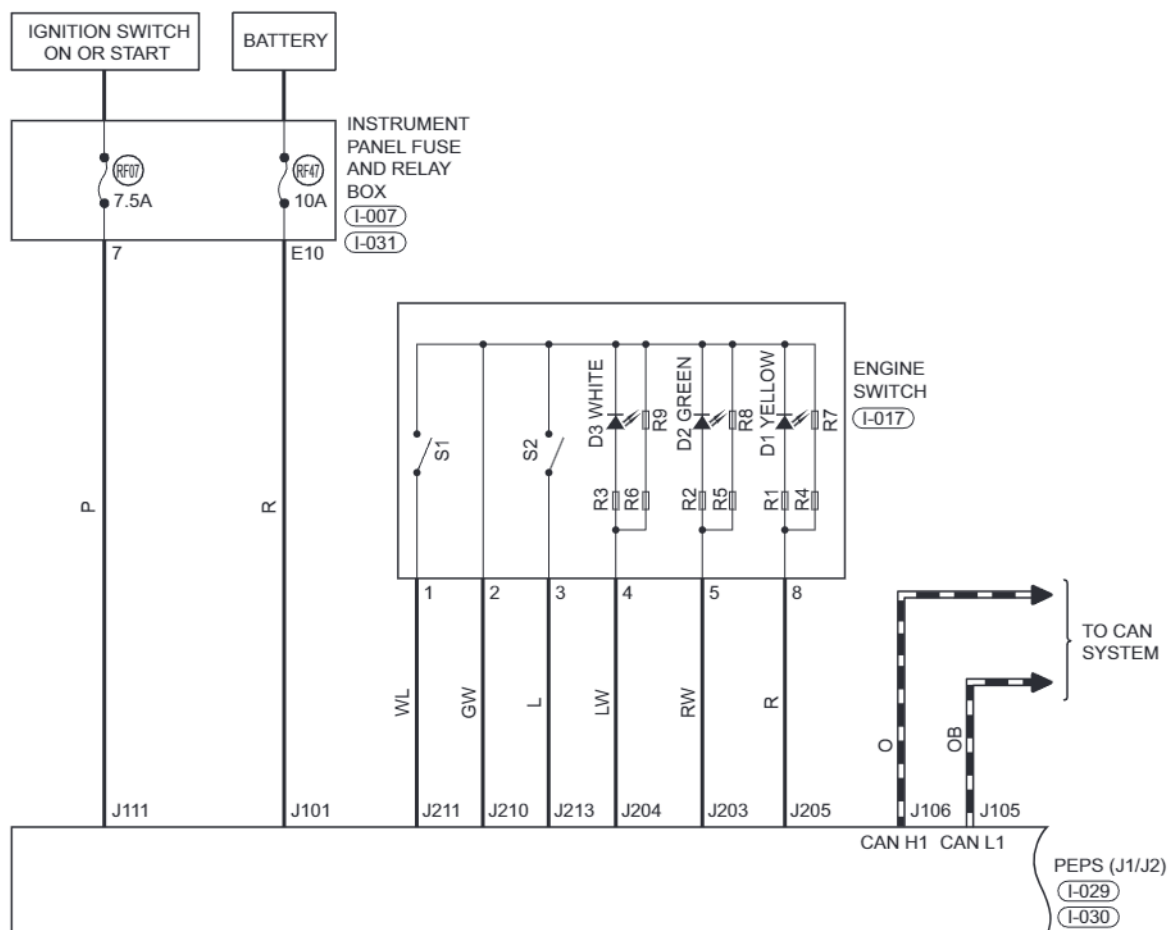
CVT



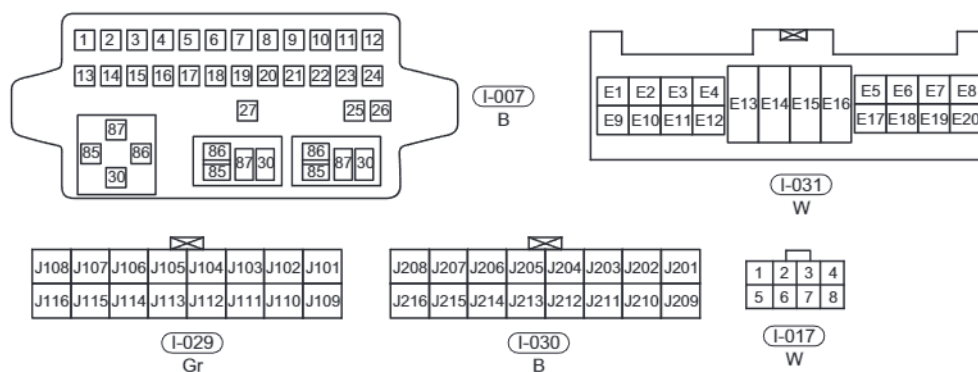
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PEPS System (Page 1 of 4)

CVT



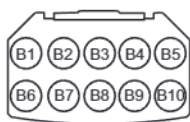
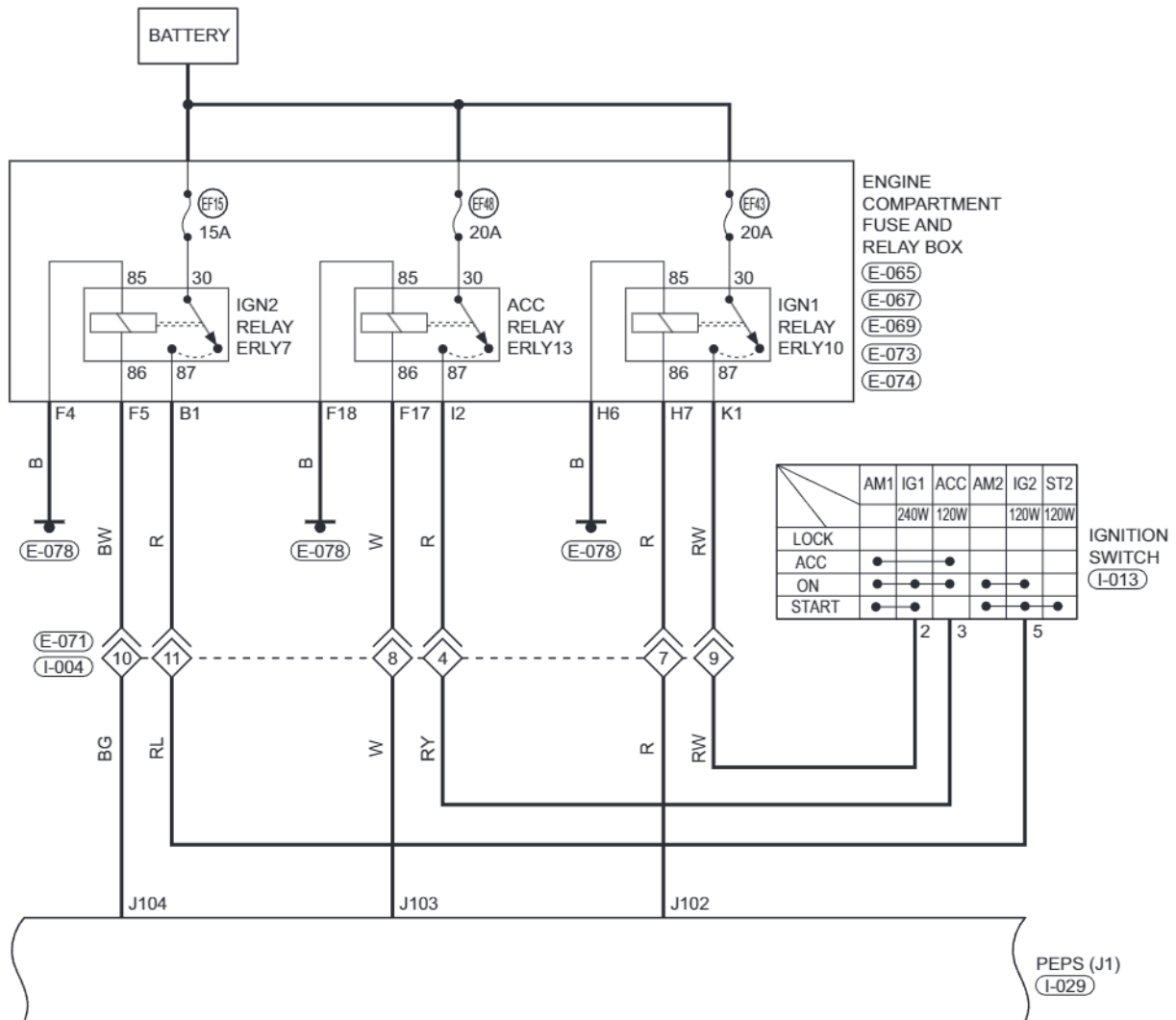
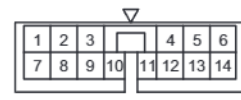
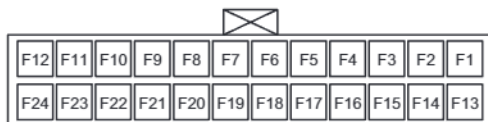
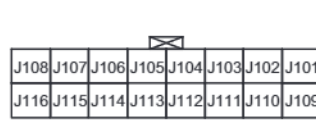
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PEPS System (Page 2 of 4)

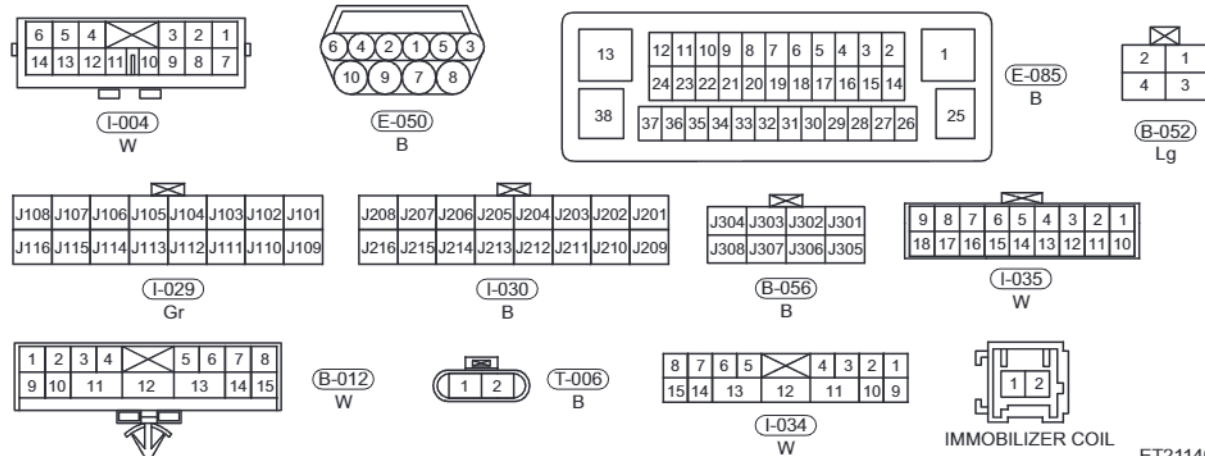
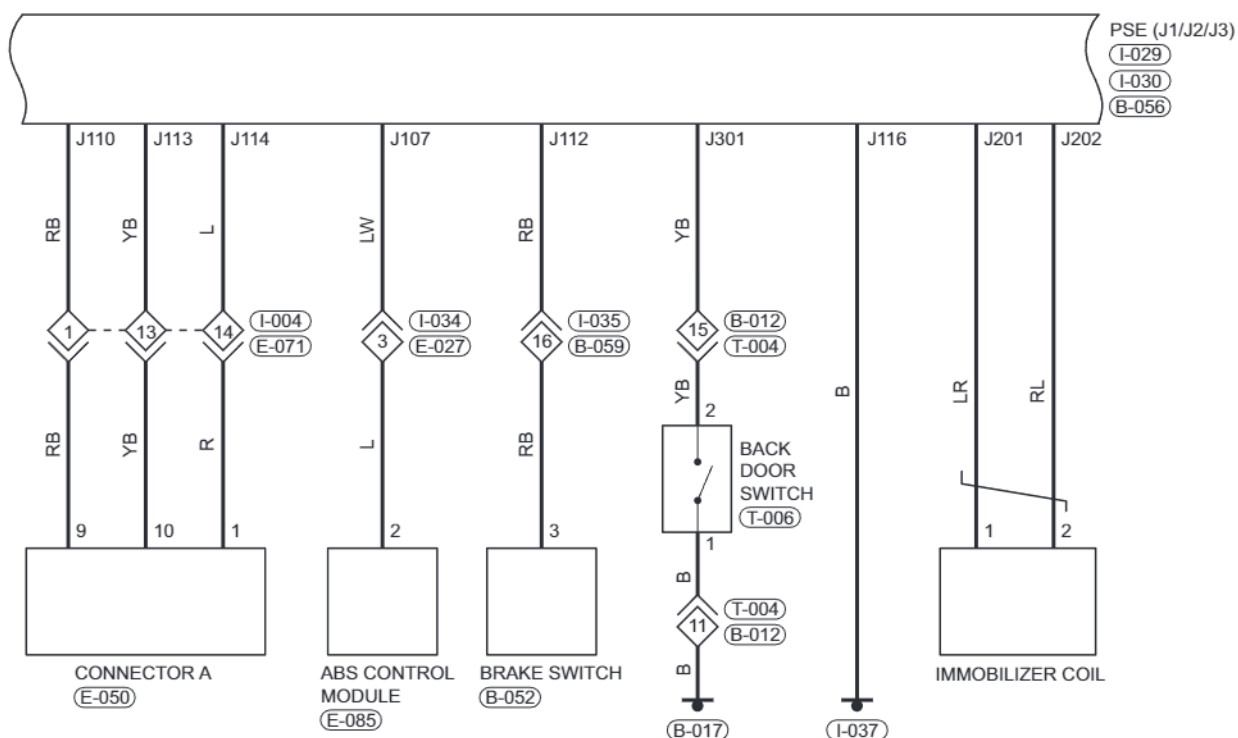
CVT

(E-073)
Y(E-065)
B(E-074)
Gr(E-067)
W(E-071)
B(E-069)
W(I-029)
Gr(I-013)
Lg

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PEPS System (Page 3 of 4)

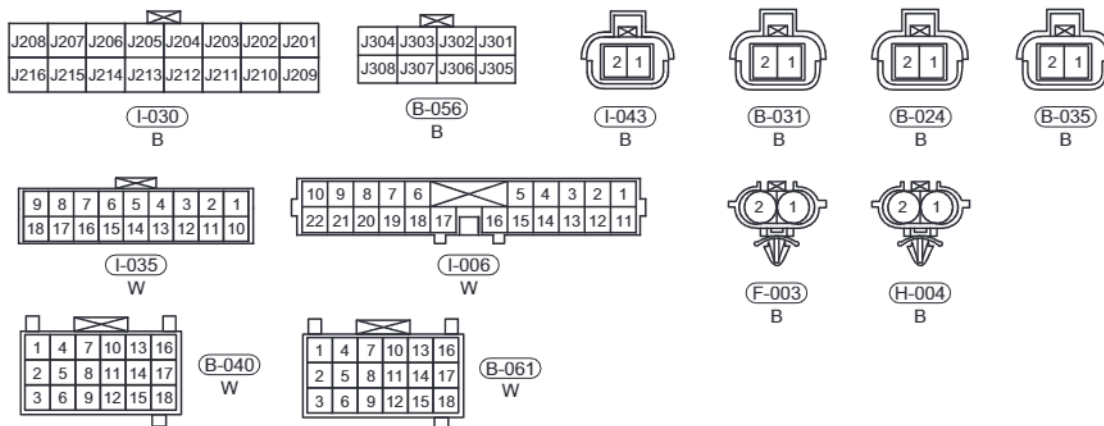
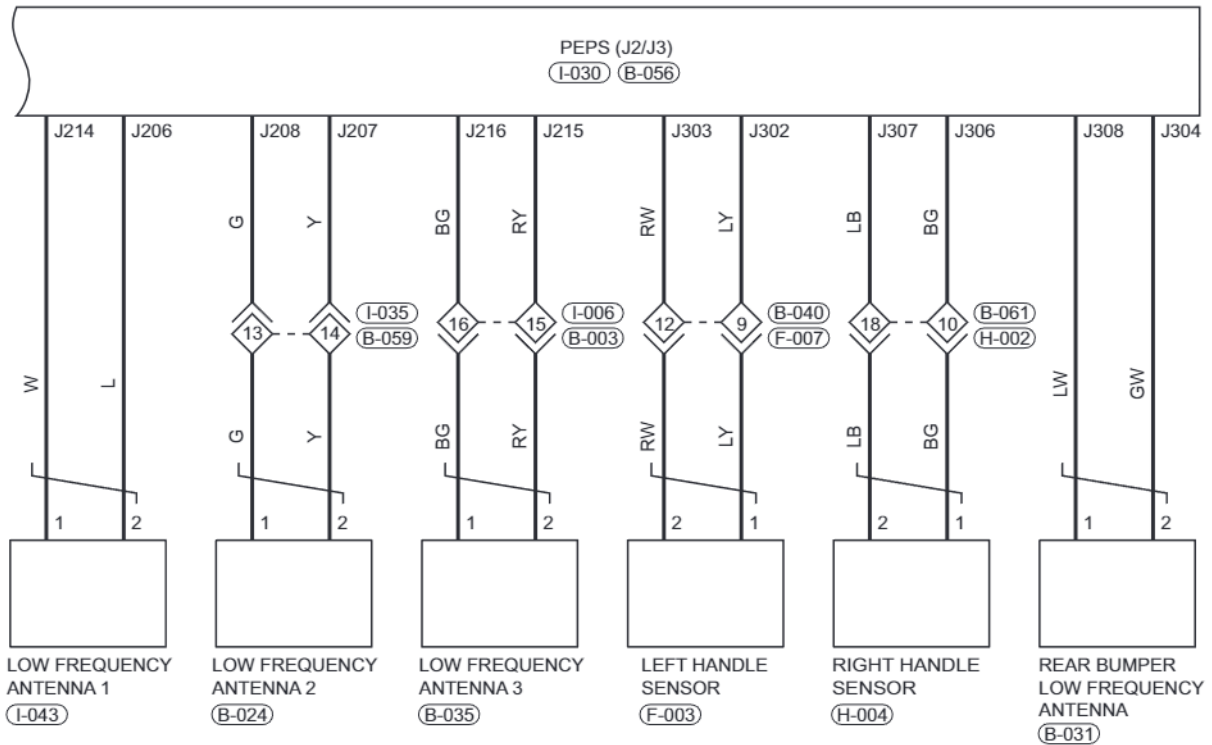
CVT



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PEPS System (Page 4 of 4)

CVT



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DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Engine Switch Function Failure

Symptom	Suspected Area	See page
Power cannot be turned on	Fuse	51-34
	ACC relay	51-34
	ING1 relay	51-34
	ING2 relay	51-34
	Engine switch	15-6
	Wire harness or connector	-
	Passive Entry & Passive Start (PEPS) controller	15-71
	Engine Control Module (ECM)	06-256
Engine switch indicator does not come on	Engine switch	15-6
	Wire harness or connector	-
	Passive Entry & Passive Start (PEPS) controller	15-71

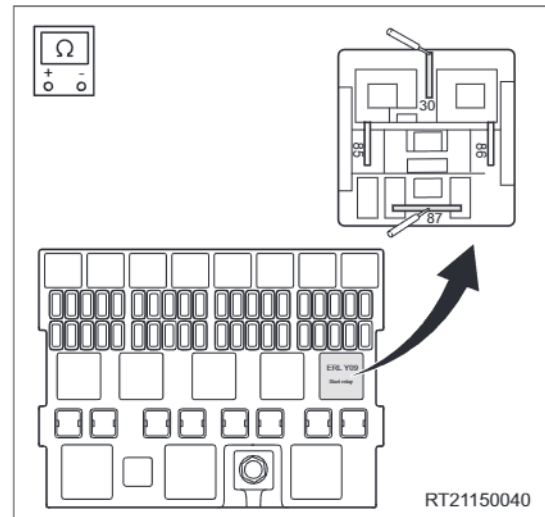
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Starter Failure

Symptom	Suspected Area	See page
When ignition switch is turned to START, solenoid switch makes a "clanking" sound and engine cannot start	Battery (weak battery, poor contact of battery cable)	16-7
	Starter	15-64
Starter does not run	Battery (depleted)	16-7
	Starter relay	51-34
	Ignition switch	15-67
	Engine switch	15-6
	Starter	15-64
	Passive Entry & Passive Start (PEPS) controller	15-71
	Wire harness or connector	-
Starter runs weakly	Battery (weak battery, internal fault)	16-7
	Starter	15-64
Starter is racing	Starter (incorrect installation, internal fault)	15-64
	Flywheel ring gear (gear teeth broken)	07-42

Starter Relay Inspection

1. Remove the starter relay from engine compartment fuse and relay box.



2. Check starter relay.
 - a. Using a digital multimeter, measure resistance according to the value(s) in the table below.

Standard Resistance

Multimeter Connection	Specified Condition
30 - 87	10 k Ω or more
30 - 87	Below 1 Ω (when battery voltage is applied to terminals 85 and 86)

If result is not as specified, replace the starter relay.

Precautions for Starting System

1. For models with PEPS system, shift the transmission to P or N before starting and firmly depress the clutch pedal (for MT model) or brake pedal (for CVT model) until engine switch indicator illuminates in green.
2. For models without PEPS system, shift the transmission to neutral and apply parking brake before starting, and depress the clutch pedal while starting.
3. For models with PEPS system, power supply mode (LOCK, ACC, ON) is always stored in vehicle. When the battery cable is disconnected and reconnected, the power supply returns to the mode it was in before the battery cable was disconnected. Be sure to turn engine switch off before disconnecting the cable from battery terminal. Be careful if the power supply condition before the battery became depleted is not known.
4. Make sure that battery is fully charged to reduce the repeat operating time of starter.
After the battery is disconnected and reconnected, be sure to wait 10 seconds or more before engine start. The engine may not start immediately after battery is reconnected.
5. Do not start engine for more than 5 seconds each time, the repeat starting time should be not less than 10 - 15 seconds, and the consecutive starting is not allowed more than 3 times.
6. If starter cannot stop, turn off ignition switch immediately, or remove negative battery cable to find the problem.
7. Check starter circuit frequently to make sure that each wire for starting system is connected securely and in good insulation.
8. Generally, perform maintainable service for starter when servicing the vehicle. Also, the maintenance interval can be shortened or extended properly depending on actual conditions.
9. Remove the negative battery cable before removing the starter.

Diagnosis Procedure

HINT:

Perform troubleshooting according to the procedures below.

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

NEXT

2	Customer problem analysis check
----------	--

HINT:

In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgement. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.

NEXT

3	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

4	Read DTCs
----------	------------------

15

DTC occurs

go to step 5

No DTC

go to step 7

5	Record DTCs, and clear DTCs
----------	------------------------------------

NEXT

6	Verify and duplicate problem: simulate problem occurring condition, and read DTCs again
----------	--

DTC occurs

For current DTC, go to step 8

No DTC

For history DTC, go to step 9



7	Problem repair (no DTC), then go to step 10
---	---

NEXT

8	Troubleshoot according to Diagnostic Trouble Code (DTC) chart, then go to step 10
---	---

NEXT

9	Troubleshoot according to Problem Symptoms Table, then go to step 10
---	--

NEXT

10	Confirm problem is repaired, and perform repair completion inspection
----	---

NEXT

11	End
----	-----

Problem Repair (No DTC)

If PEPS system has problems, but no DTC is stored in PEPS system, this problem is called a problem without DTC.

Symptom	Suspected Area
Instrument cluster indicator does not come on or remains on	Instrument cluster indicator (broken)
	Wire harness (incorrectly connected)

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

Diagnostic Help

1. Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module by the data network.
2. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
3. If DTC cannot be deleted, the malfunction is current.
4. Visually check the related wire harness and connector.
5. Check and clean all wire harness connectors and grounds related to current DTC.
6. If multiple trouble codes were set, refer to the circuit diagrams to look for any common ground circuit or power supply circuit applied to the DTC.
7. Refer to any Technical Bulletin that may apply to the malfunction.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

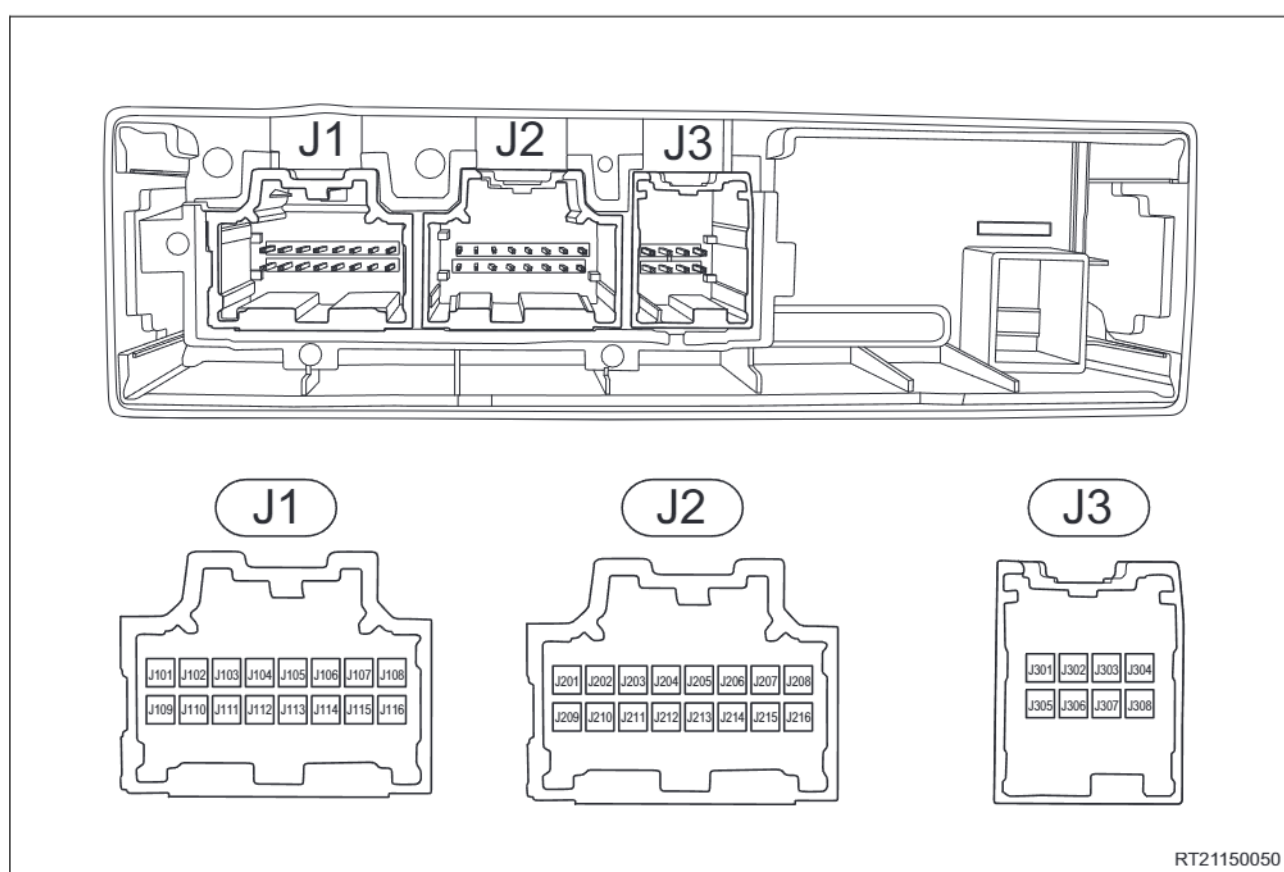
- Check if connectors are loose.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Wiggle related wire harnesses and connectors and observe if signal is interrupted in the related circuit.
- If possible, try to duplicate the conditions under which the DTC was set.
- Look for the data that has changed or the DTC to be reset during the wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and grounding parts related to the current DTC.
- Remove the PEPS controller from the malfunctioning vehicle and install it to a new vehicle and perform a test. If DTC cannot be cleared, the PEPS controller is malfunctioning. If DTC can be cleared, reinstall the PEPS controller to original vehicle.
- If multiple trouble codes were set, refer to the circuit diagrams to look for any common ground circuit or power supply circuit applied to the DTC.
- Refer to Technical Bulletin that is applied to the malfunction.

Ground Inspection

Groundings are very important to entire circuit system, which are normal or not can seriously affect the entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) and oxidation may increase load resistance. This situation will seriously affect the normal operation of the circuit. The operations to check the ground points are 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 contacting is in a good condition.
4. Reinstall the ground bolt or nut securely.
5. Check if add-on accessories interfere with the ground circuit.
6. If several wire harnesses are crimped into one ground terminal, check if they are installed correctly. Make sure all wire harnesses are clean, securely fastened and providing a good ground path.

Passive Entry & Passive Start (PEPS) Controller Terminal List



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Connector J1 Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
J101	Battery Power Supply	J109	Clutch Switch Signal
J102	IG1 Relay Drive (High)	J110	Starter Relay Inspection
J103	ACC Relay Drive (High)	J111	Ignition Signal
J104	IG2 Relay Drive (High)	J112	-
J105	CAN-L	J113	Starter Relay (High)
J106	CAN-H	J114	Gear Position Signal

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
J107	Hard Wire Speed Signal	J115	-
J108	-	J116	GND

Connector J2 Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
J201	Anti-theft Coil Positive	J209	-
J202	Anti-theft Coil Negative	J210	Engine Switch Ground
J203	Engine Switch Indicator (Green)	J211	Engine Switch 1
J204	Engine Switch Backlight (White)	J212	-
J205	Engine Switch Indicator (Amber)	J213	Engine Switch 2
J206	Low Frequency Antenna 1 Negative	J214	Low Frequency Antenna 1 Positive
J207	Low Frequency Antenna 2 Negative	J215	Low Frequency Antenna 3 Negative
J208	Low Frequency Antenna 2 Positive	J216	Low Frequency Antenna 3 Positive

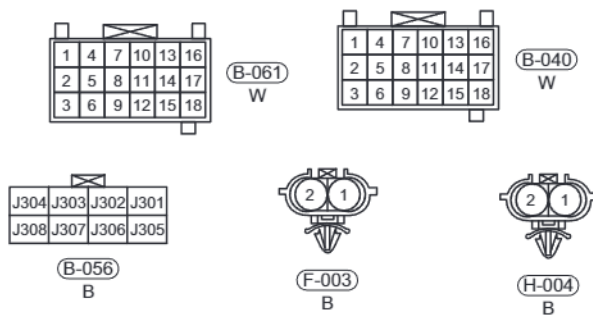
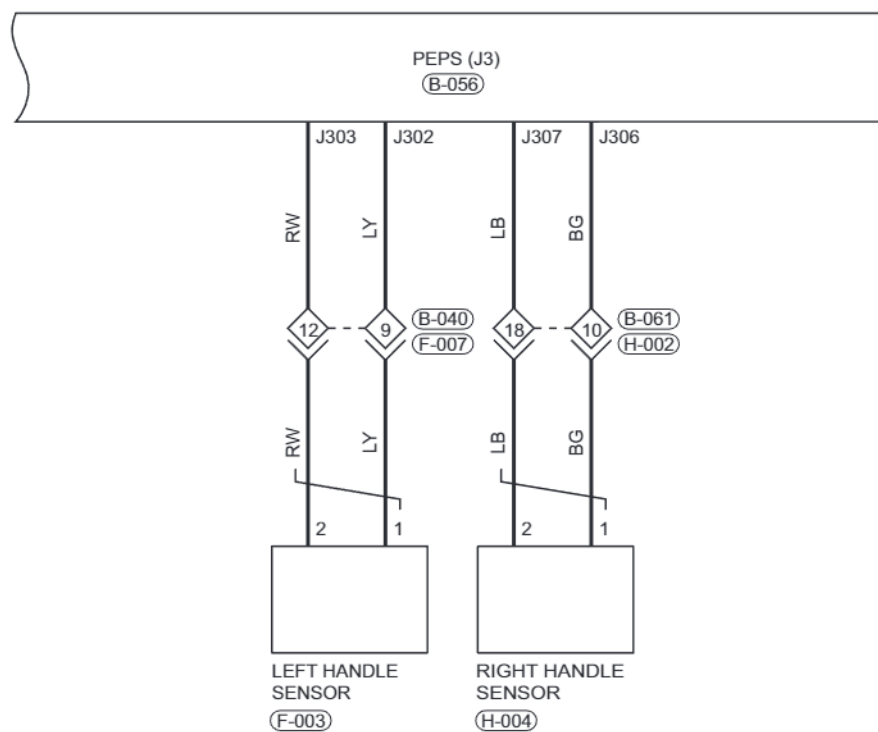
Connector J3 Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
J301	Back Door Unlock Signal	J305	-
J302	Front Left Door Handle Sensor (Low Frequency Antenna) Negative	J306	Front Right Door Handle Sensor (Low Frequency Antenna) Negative
J303	Front Left Door Handle Sensor (Low Frequency Antenna) Positive	J307	Front Right Door Handle Sensor (Low Frequency Antenna) Positive
J304	Back Door Low Frequency Antenna Negative	J308	Back Door Low Frequency Antenna Positive

Diagnostic Trouble Code (DTC) Chart

DTC Code	DTC Definition
B1500-13	Driver Door Outside LF Antenna Circuit Open
B1501-13	Passenger Door Outside LF Antenna Circuit Open
B1502-13	Front Internal LF Antenna Circuit Open
B1503-13	Middle Internal LF Antenna Circuit Open
B1504-13	Rear Internal LF Antenna Circuit Open
B1505-13	Bumper LF Antenna Circuit Open
B1506-00	Abnormality ON Switches of Engine Switch No Subtype Information
B1507-00	Abnormality in IG Circuit No Subtype Information
B1508-00	Abnormality in ACC Circuit No Subtype Information
B1509-00	Abnormality in Brake Signal No Subtype Information
B150A-00	Abnormality in Vehicle Speed Signal No Subtype Information
B150C-00	Clutch Switch Signal Error No Subtype Information
B150D-00	Abnormality on ESCL LCK_GND No Subtype Information
B150E-00	Abnormality on ESCL LCK_PS No Subtype Information
B150F-00	ESCL Anti-scanning No Subtype Information
B1510-00	Abnormality on Wheel Speed Signal No Subtype Information
B1511-00	Abnormality in ESCL Lock No Subtype Information
B1512-00	Abnormality in ESCL Unlock No Subtype Information
B1513-00	ESCL External Failure No Subtype Information
B1514-00	Abnormality on STAR Power Supply No Subtype Information
B1515-45	ROM for Checksum Failure
B1516-19	HSU Overload
B1517-23	HSU Switch Continuously Pressed Failure
U0073-88	Control Module Communication Bus Off
U0100-87	Lost Communication with EMS Missing Message
U0101-87	Lost Communication with TCM Missing Message
U0129-87	Lost Communication with BSM Missing Message
U0140-87	Lost Communication with BCM Missing Message
U0329-87	Lost Communication with ESCL Missing Message
U1300-55	Software Configuration Error Not Configured

DTC	B1500-13	Driver Door Outside LF Antenna Circuit Open
DTC	B1501-13	Passenger Door Outside LF Antenna Circuit Open
DTC	B1516-19	HSU Overload
DTC	B1517-23	HSU Switch Continuously Pressed Failure



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1500-13	Driver Door Outside LF Antenna Circuit Open	Engine switch ON	- Wire harness or connector damaged - Outside low frequency antenna on driver side - Outside low frequency antenna on passenger side - Passive Entry & Passive Start (PEPS) controller
B1501-13	Passenger Door Outside LF Antenna Circuit Open		
B1516-19	HSU Overload		
B1517-23	HSU Switch Continuously Pressed Failure		

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

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Diagnosis Procedure

1 Check wire harness and connector

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Disconnect the left handle sensor F-003 and right handle sensor H-004.
- Disconnect the PEPS controller connector B-056.
- Disconnect the front left door wire harness connector F-007 and body wire harness connector B-040.
- Disconnect the front right door wire harness connector H-002 and body wire harness connector B-061.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

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Repair or replace related wire harness and connector

OK

2 Check body wire harness and connector

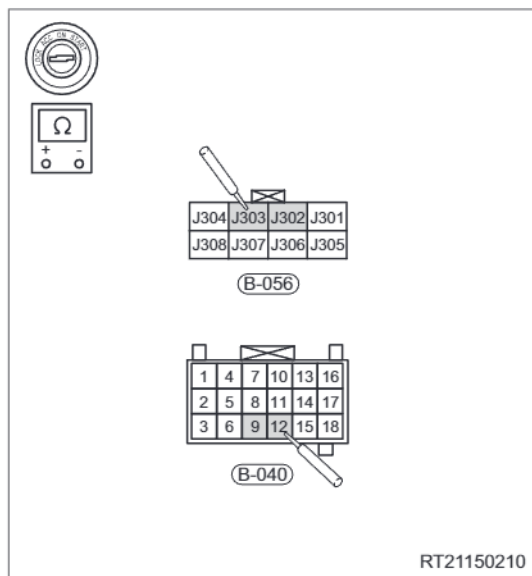
- a. Check the body wire harness and connector (outside low frequency antenna on driver side).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-056 (J303) - B-040 (12)	Always	Continuity
B-056 (J302) - B-040 (9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-056 (J303) or B-040 (12) - Body ground	Always	No continuity
B-056 (J302) or B-040 (9) - Body ground	Always	No continuity
B-056 (J303) or B-040 (12) - Battery positive	Always	No continuity
B-056 (J302) or B-040 (9) - Battery positive	Always	No continuity



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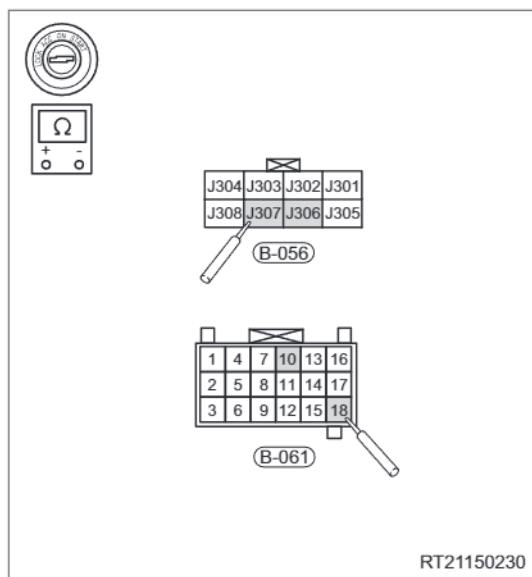
- b. Check the body wire harness and connector (outside low frequency antenna on passenger side)

Check for Open

Multimeter Connection	Condition	Specified Condition
B-056 (J307) - B-061 (18)	Always	Continuity
B-056 (J306) - B-061 (10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-056 (J307) or B-061 (18) - Body ground	Always	No continuity
B-056 (J306) or B-061 (10) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
B-056 (J307) or B-061 (18) - Battery positive	Always	No continuity
B-056 (J306) or B-061 (10) - Battery positive	Always	No continuity

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Repair or replace body wire harness and connector

OK

3 Check front left door wire harness and connector

Check for Open

Multimeter Connection	Condition	Specified Condition
F-007 (12) - F-003 (2)	Always	Continuity
F-007 (9) - F-003 (1)	Always	Continuity

Check for Short

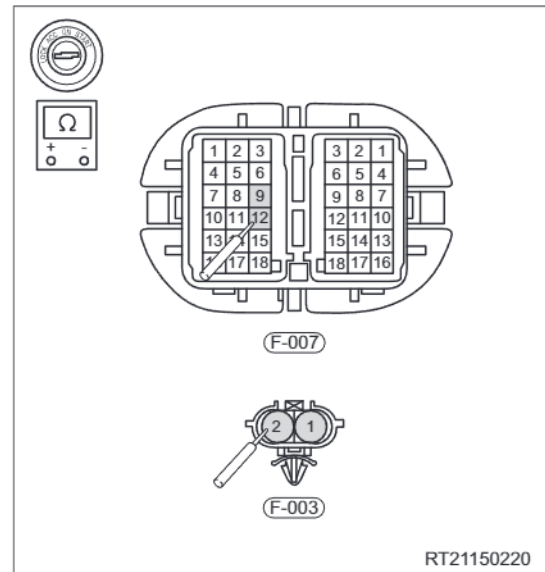
Multimeter Connection	Condition	Specified Condition
F-007 (12) or F-003 (2) - Body ground	Always	No continuity
F-007 (9) or F-003 (1) - Body ground	Always	No continuity
F-007 (12) or F-003 (2) - Battery positive	Always	No continuity
F-007 (9) or F-003 (1) - Battery positive	Always	No continuity

NG

Repair or replace front left door wire harness and connector

OK

4 Check front right door wire harness and connector



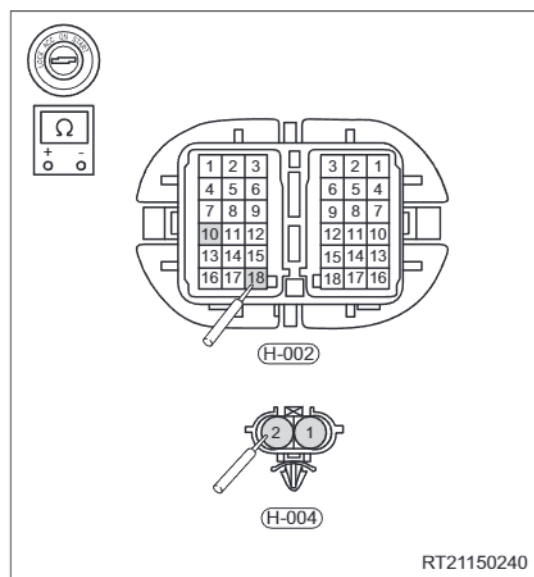
15

Check for Open

Multimeter Connection	Condition	Specified Condition
H-002 (18) - H-004 (2)	Always	Continuity
H-002 (10) - H-004 (1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
H-002 (18) or H-004 (2) - Body ground	Always	No continuity
H-002 (10) or H-004 (1) - Body ground	Always	No continuity
H-002 (18) or H-004 (2) - Battery positive	Always	No continuity
H-002 (10) or H-004 (1) - Battery positive	Always	No continuity



NG

Repair or replace front right door wire harness and connector

15

OK

5

Confirm DTCs

- Connect related wire harness connectors.
- Connect the negative battery cable.
- Turn ignition switch ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

OK

System operates normally

NG

6

Reconfirm DTCs after replacing front door handle sensor (built-in low frequency antenna)

- Remove the front left door handle sensor (built-in low frequency antenna) ([See page 37-56](#)).
- Remove the front right door handle sensor (built-in low frequency antenna).
- Replace front left/right door handle sensors (built-in low frequency antenna) with new ones.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again to check if any DTC is detected.

NG

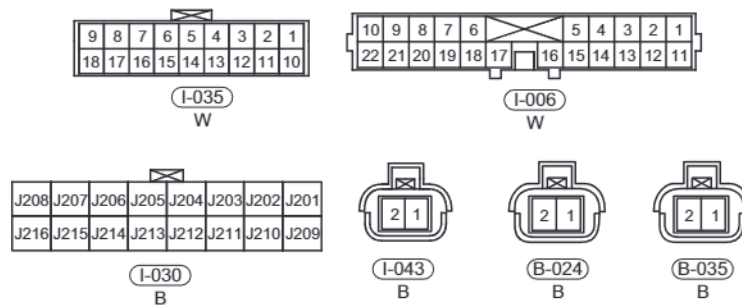
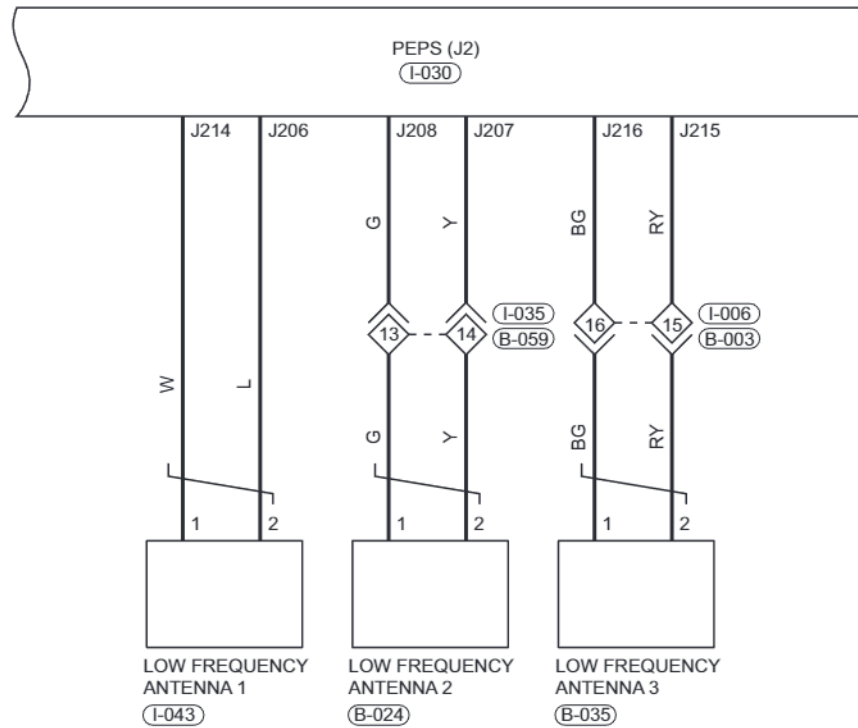
Repair or replace PEPS controller

OK

System operates normally

DTC	B1502-13	Front Internal LF Antenna Circuit Open
DTC	B1503-13	Middle Internal LF Antenna Circuit Open
DTC	B1504-13	Rear Internal LF Antenna Circuit Open

CVT



ET21140070

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1502-13	Front Internal LF Antenna Circuit Open	Engine switch ON	• Wire harness or connector damaged • Front internal low frequency antenna • Middle internal low frequency antenna • Rear internal low frequency antenna • Passive Entry & Passive Start (PEPS) controller
B1503-13	Middle Internal LF Antenna Circuit Open		
B1504-13	Rear Internal LF Antenna Circuit Open		

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

15**Diagnosis Procedure****1 Check wire harness and connector**

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Disconnect the PEPS controller connector I-030.
- Disconnect the front internal low frequency antenna connector I-043, middle internal low frequency antenna connector B-024 and rear internal low frequency antenna connector B-035.
- Disconnect the instrument panel wire harness connectors I-035 and I-006, and body wire harness connectors B-059 and B-003.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

Repair or replace related wire harness and connector

OK

2

Check instrument panel wire harness and connector

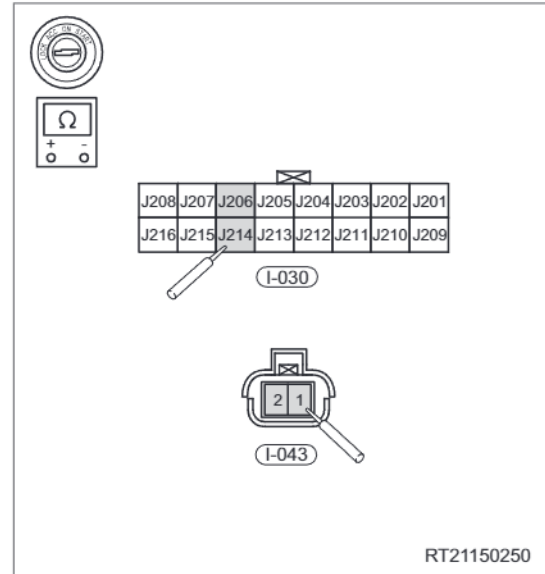
- a. Check the instrument panel wire harness and connector (front internal low frequency antenna).

Check for Open

Multimeter Connection	Condition	Specified Condition
I-030 (J214) - I-043 (1)	Always	Continuity
I-030 (J206) - I-043 (2)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (J214) or I-043 (1) - Body ground	Always	No continuity
I-030 (J206) or I-043 (2) - Body ground	Always	No continuity
I-030 (J214) or I-043 (1) - Battery positive	Always	No continuity
I-030 (J206) or I-043 (2) - Battery positive	Always	No continuity



15

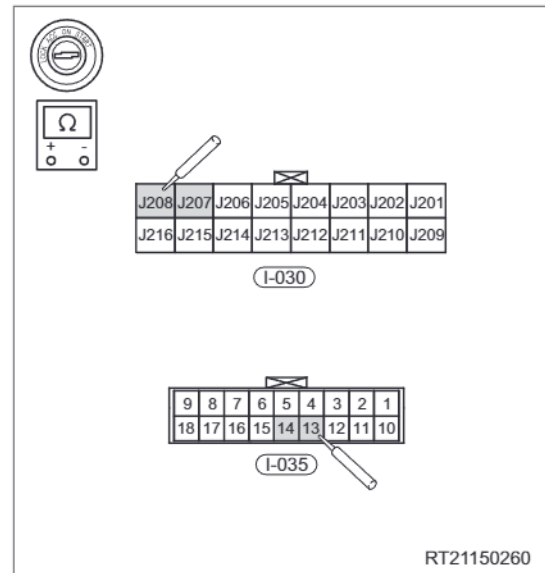
- b. Check the instrument panel wire harness and connector (middle internal low frequency antenna).

Check for Open

Multimeter Connection	Condition	Specified Condition
I-030 (J208) - I-035 (13)	Always	Continuity
I-030 (J207) - I-035 (14)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (J208) or I-035 (13) - Body ground	Always	No continuity
I-030 (J207) or I-035 (14) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
I-030 (J208) or I-035 (13) - Battery positive	Always	No continuity
I-030 (J207) or I-035 (14) - Battery positive	Always	No continuity

- c. Check the instrument panel wire harness and connector (rear internal low frequency antenna).

Check for Open

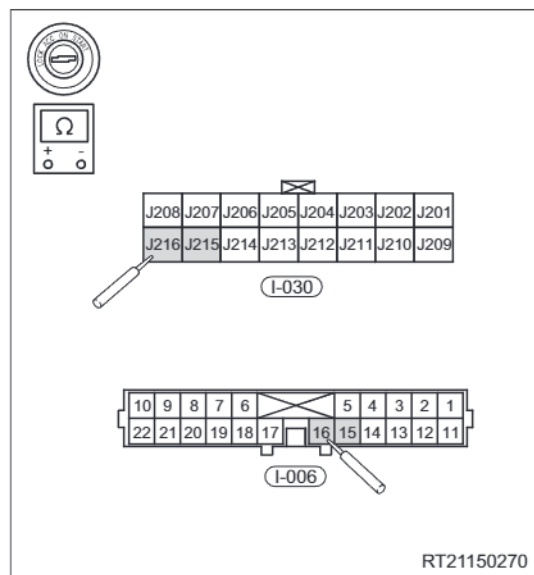
Multimeter Connection	Condition	Specified Condition
I-030 (J216) - I-006 (16)	Always	Continuity
I-030 (J215) - I-006 (15)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (J216) or I-006 (16) - Body ground	Always	No continuity
I-030 (J215) or I-006 (15) - Body ground	Always	No continuity
I-030 (J216) or I-006 (16) - Battery positive	Always	No continuity
I-030 (J215) or I-006 (15) - Battery positive	Always	No continuity

NG

Repair or replace instrument panel wire harness and connector



OK

3 Check body wire harness and connector

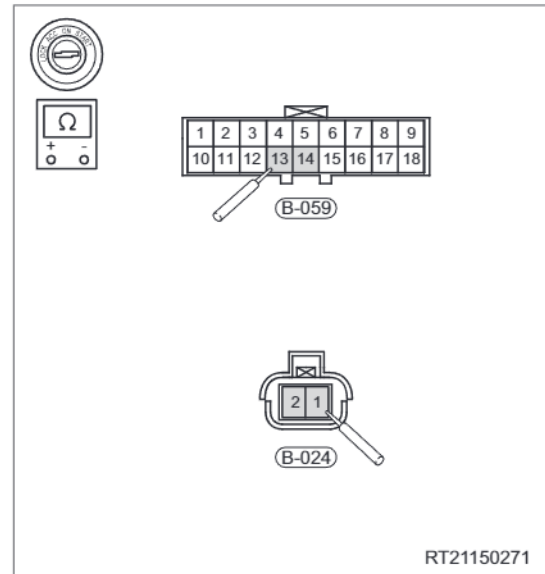
a. Check the body wire harness and connector.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-059 (13) - B-024 (1)	Always	Continuity
B-059 (14) - B-024 (2)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-059 (13) or B-024 (1) - Body ground	Always	No continuity
B-059 (14) or B-024 (2) - Body ground	Always	No continuity
B-059 (13) or B-024 (1) - Battery positive	Always	No continuity
B-059 (14) or B-024 (2) - Battery positive	Always	No continuity



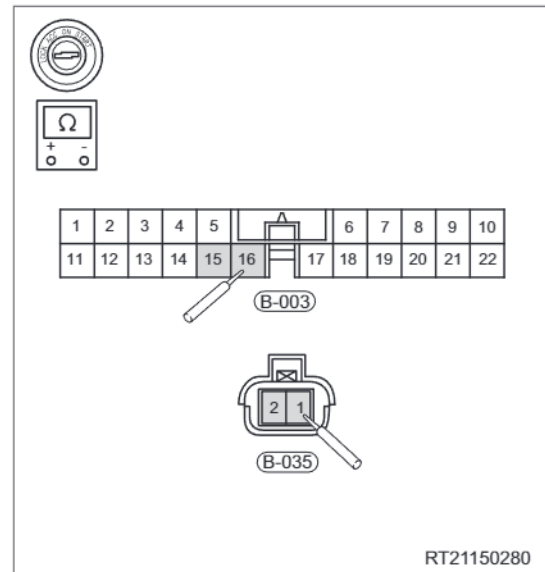
b. Check the body wire harness and connector.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-003 (16) - B-035 (1)	Always	Continuity
B-003 (15) - B-035 (2)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-003 (16) or B-035 (1) - Body ground	Always	No continuity
B-003 (15) or B-035 (2) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
B-003 (16) or B-035 (1) - Battery positive	Always	No continuity
B-003 (15) or B-035 (2) - Battery positive	Always	No continuity

NG

Repair or replace body wire harness and connector

OK

4

Confirm DTCs

- Connect related wire harness connectors.
- Connect the negative battery cable.
- Turn ignition switch ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

OK

System operates normally

NG

5

Replace low frequency antenna

- Remove the low frequency antenna ([See page 37-54](#)).
- Install new low frequency antenna.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again to check if any DTC is detected.

NG

Repair or replace PEPS controller

OK

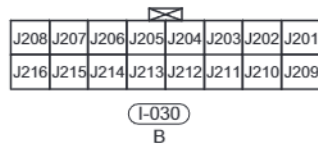
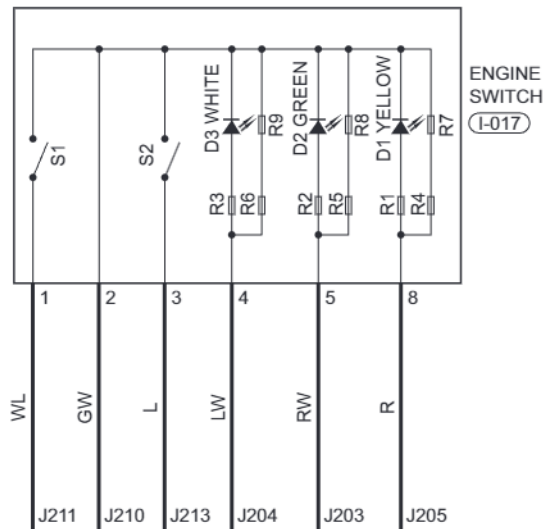
System operates normally

DTC

B1506-00

Abnormality ON Switches of Engine Switch No Subtype Information

CVT



ET21140080

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1506-00	Abnormality ON Switches of Engine Switch No Subtype Information	Engine switch ON	• Wire harness or connector damaged • Engine switch • Passive Entry & Passive Start (PEPS) controller

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

Diagnosis Procedure**15****1 Check wire harness and connector**

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Disconnect the PEPS controller connector I-030.
- Disconnect the engine switch connector I-017.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

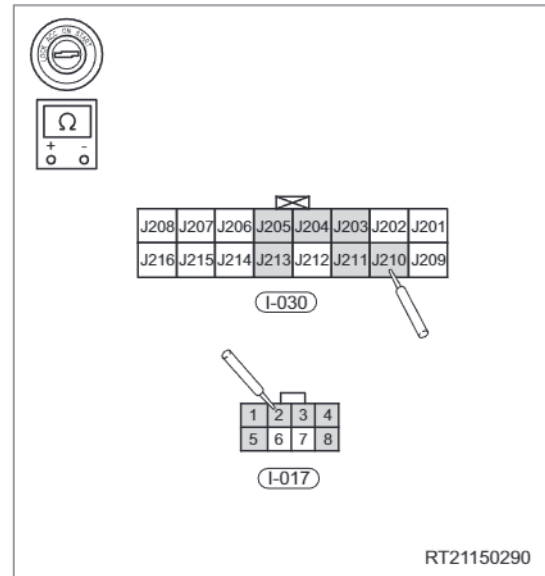
Repair or replace related wire harness and connector

OK

2 Check instrument panel wire harness and connector

Check for Open

Multimeter Connection	Condition	Specified Condition
I-030 (J211) - I-017 (1)	Always	Continuity
I-030 (J210) - I-017 (2)	Always	Continuity
I-030 (J213) - I-017 (3)	Always	Continuity
I-030 (J204) - I-017 (4)	Always	Continuity
I-030 (J203) - I-017 (5)	Always	Continuity
I-030 (J205) - I-017 (8)	Always	Continuity



Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (J211) or I-017 (1) - Body ground/Battery positive	Always	No continuity
I-030 (J210) or I-017 (2) - Body ground/Battery positive	Always	No continuity
I-030 (J213) or I-017 (3) - Body ground/Battery positive	Always	No continuity
I-030 (J204) or I-017 (4) - Body ground/Battery positive	Always	No continuity
I-030 (J203) or I-017 (5) - Body ground/Battery positive	Always	No continuity
I-030 (J205) or I-017 (8) - Body ground/Battery positive	Always	No continuity

NG

Repair or replace instrument panel wire harness and connector

OK

3 Check engine switch

- a. Remove the engine switch ([See page 15-69](#)).
- b. Check the engine switch ([See page 15-70](#)).

NG

Repair or replace engine switch

OK

4 Confirm DTCs

- a. Connect related wire harness connectors.
- b. Connect the negative battery cable.
- c. Turn ignition switch ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

NG

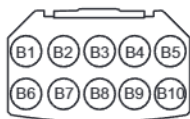
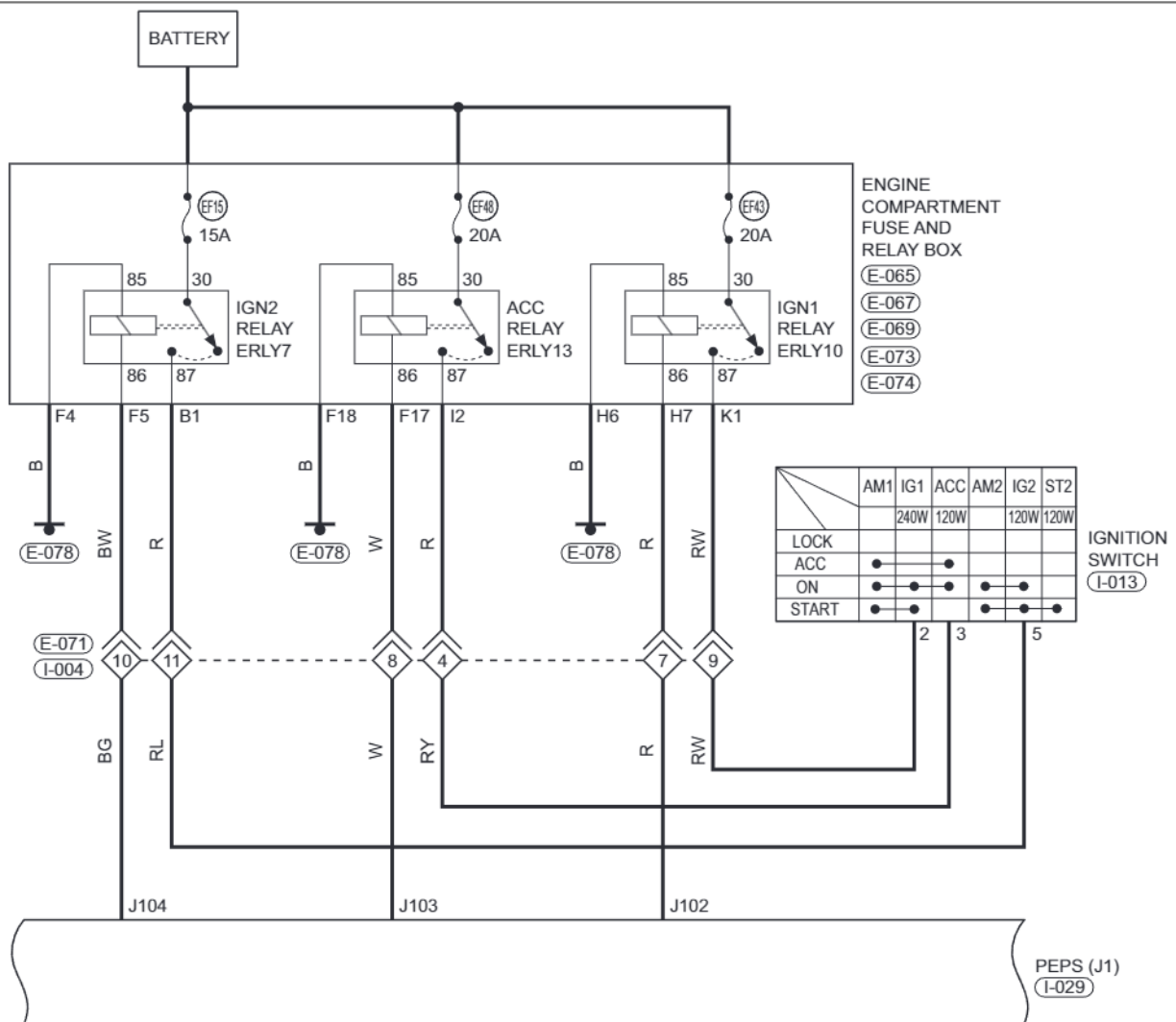
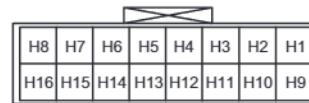
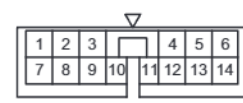
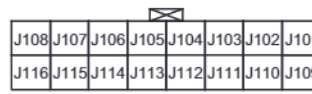
Repair or replace PEPS controller

OK

System operates normally

DTC	B1507-00	Abnormality in IG Circuit No Subtype Information
-----	----------	--

DTC	B1508-00	Abnormality in ACC Circuit No Subtype Information
-----	----------	---

(E-073)
Y(E-065)
B(E-074)
Gr(E-067)
W(E-071)
B(E-069)
W(I-029)
Gr(I-013)
Lg

ET21140030

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1507-00	Abnormality in IG Circuit No Subtype Information	Engine switch ON	• Wire harness or connector damaged • Fuse • IGN1 relay • IGN2 relay • ACC relay • Engine switch • Passive Entry & Passive Start (PEPS) controller
B1508-00	Abnormality in ACC Circuit No Subtype Information		

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

15

Diagnosis Procedure**1 Check fuse and relay**

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Remove the fuses EF15 (15 A), EF48 (20 A) and EF43 (20 A) from engine compartment fuse and relay box.
- Remove the IGN1 relay, IGN2 relay and ACC relay from engine compartment fuse and relay box.
- Check if fuses and relays are blown or damaged.

NG

Repair or replace damaged fuses and relays.

OK

2 Check engine compartment fuse and relay box ground

- Check engine compartment fuse and relay box ground E-078 ([See page 51-42](#)).

NG

Repair or replace ground wire harness or ground point

OK

3

Check wire harness (battery - engine compartment fuse and relay box)

- Remove the IGN1 relay, IGN2 relay and ACC relay from engine compartment fuse and relay box.
- Connect the negative battery cable.
- Turn the digital multimeter to DC voltage band to check if voltage output from the terminal 30 of relay is 12 V.

NG

Repair or replace wire harness (battery - engine compartment fuse and relay box)

OK

4

Check engine compartment wire harness

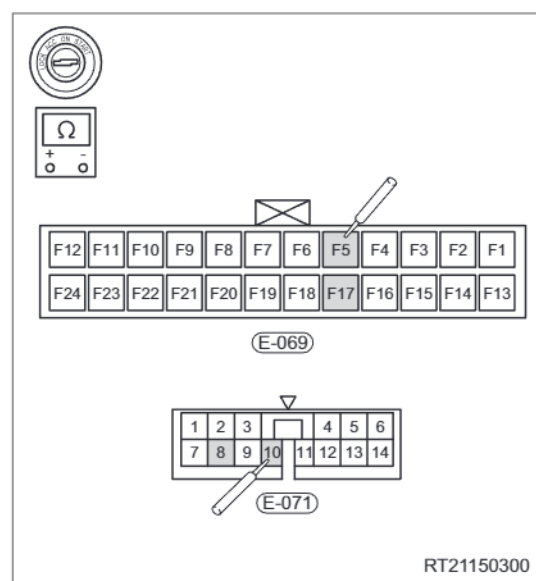
- Check the wire harness between engine compartment fuse and relay box connector E-069 and engine compartment wire harness connector E-071.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (F5) - E-071 (10)	Always	Continuity
E-069 (F17) - E-071 (8)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (F5) or E-071 (10) - Body ground	Always	No continuity
E-069 (F17) or E-071 (8) - Body ground	Always	No continuity
E-069 (F5) or E-071 (10) - Battery positive	Always	No continuity
E-069 (F17) or E-071 (8) - Battery positive	Always	No continuity



15

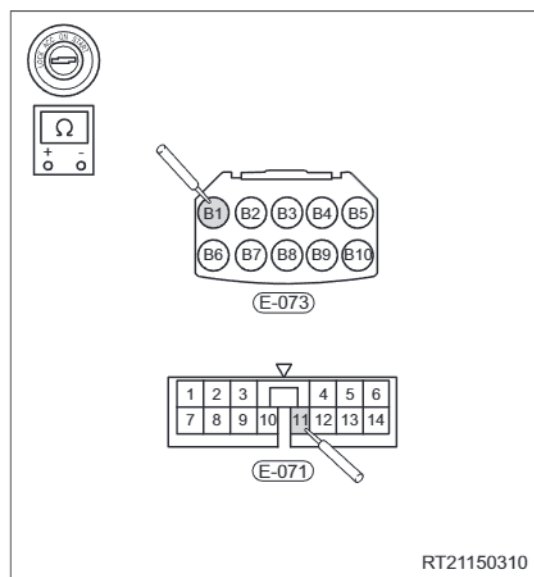
- b. Check the wire harness between engine compartment fuse and relay box connector E-073 and engine compartment wire harness connector E-071.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-073 (B1) - E-071 (11)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-073 (B1) or E-071 (11) - Body ground	Always	No continuity
E-073 (B1) or E-071 (11) - Battery positive	Always	No continuity



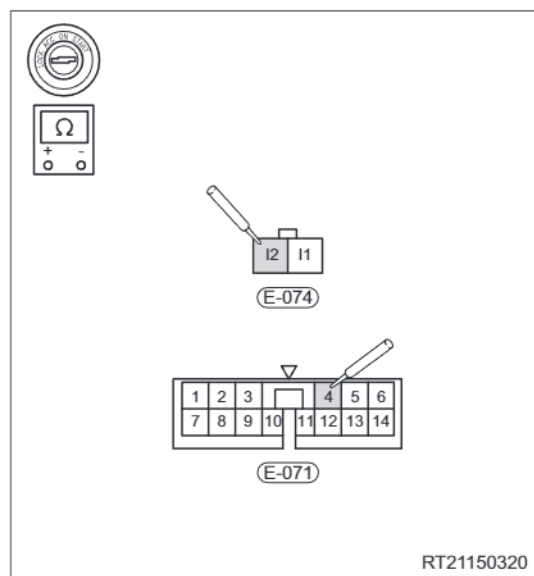
- c. Check the wire harness between engine compartment fuse and relay box connector E-074 and engine compartment wire harness connector E-071.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-074 (I2) - E-071 (4)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-074 (I2) or E-071 (4) - Body ground	Always	No continuity
E-074 (I2) or E-071 (4) - Battery positive	Always	No continuity



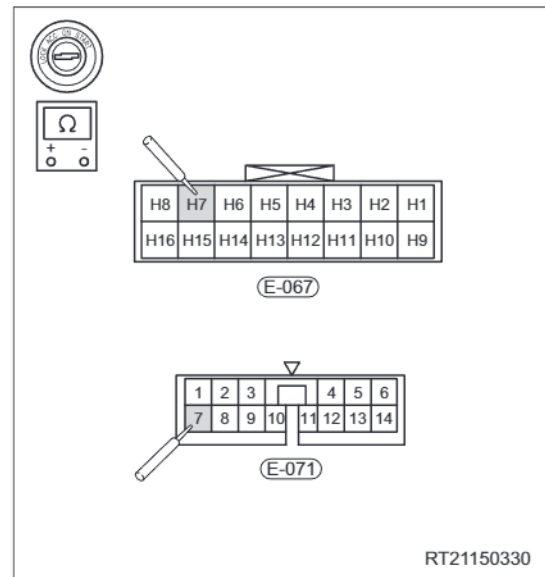
- d. Check the wire harness between engine compartment fuse and relay box connector E-067 and engine compartment wire harness connector E-071.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-067 (H7) - E-071 (7)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-067 (H7) or E-071 (7) - Body ground	Always	No continuity
E-067 (H7) or E-071 (7) - Battery positive	Always	No continuity



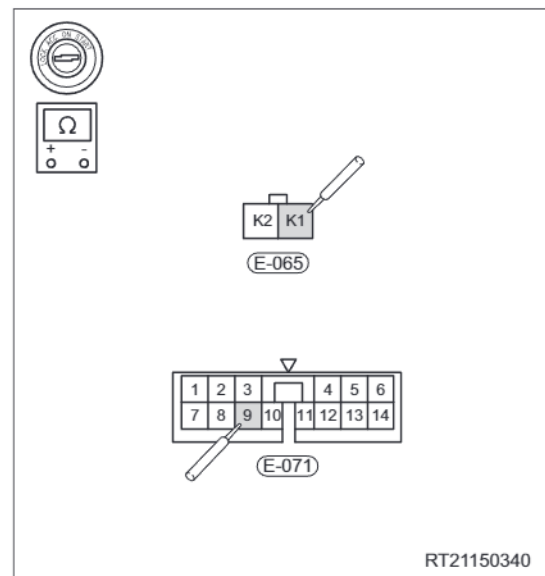
- e. Check the wire harness between engine compartment fuse and relay box connector E-065 and engine compartment wire harness connector E-071.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-065 (K1) - E-071 (9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-065 (K1) or E-071 (9) - Body ground	Always	No continuity
E-065 (K1) or E-071 (9) - Battery positive	Always	No continuity



NG

Repair or replace engine compartment wire harness

OK

5 Check instrument panel wire harness

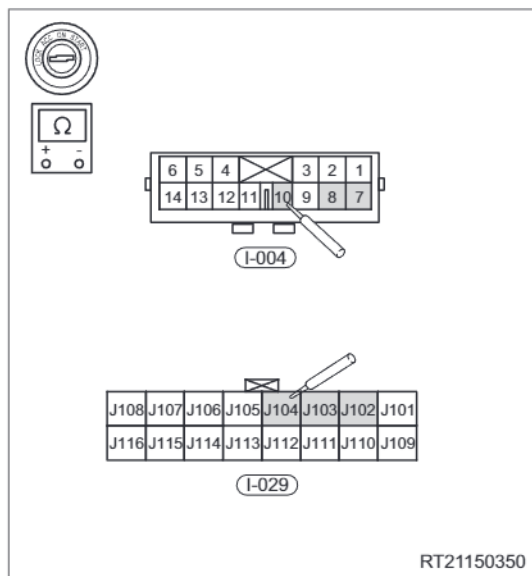
- a. Check the wire harness between instrument panel wire harness connectors I-004 and I-029.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-004 (10) - I-029 (J104)	Always	Continuity
I-004 (8) - I-029 (J103)	Always	Continuity
I-004 (7) - I-029 (J102)	Always	Continuity

Check for Short

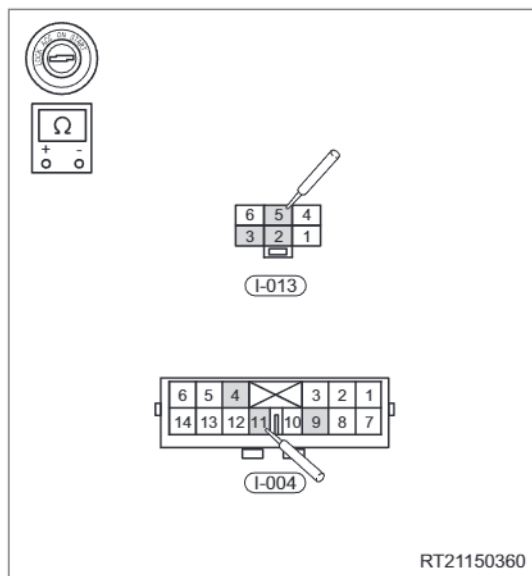
Multimeter Connection	Condition	Specified Condition
I-004 (10) or I-029 (J104) - Body ground/Battery positive	Always	No continuity
I-004 (8) or I-029 (J103) - Body ground/Battery positive	Always	No continuity
I-004 (7) or I-029 (J102) - Body ground/Battery positive	Always	No continuity



- b. Check the wire harness between instrument panel wire harness connectors I-004 and I-013.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-004 (11) - I-013 (5)	Always	Continuity
I-004 (4) - I-013 (3)	Always	Continuity
I-004 (9) - I-013 (2)	Always	Continuity



Check for Short

Multimeter Connection	Condition	Specified Condition
I-004 (11) or I-013 (5) - Body ground/ Battery positive	Always	No continuity
I-004 (4) or I-013 (3) - Body ground/ Battery positive	Always	No continuity
I-004 (9) or I-013 (2) - Body ground/ Battery positive	Always	No continuity

NG

Repair or replace instrument panel wire harness

OK

6

Check engine switch

- a. Remove the engine switch ([See page 15-69](#)).
- b. Check the engine switch ([See page 15-70](#)).

NG

Repair or replace engine switch

OK

7

Confirm DTCs

- a. Connect related wire harness connectors.
- b. Connect the negative battery cable.
- c. Turn ignition switch ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

NG

Repair or replace PEPS controller

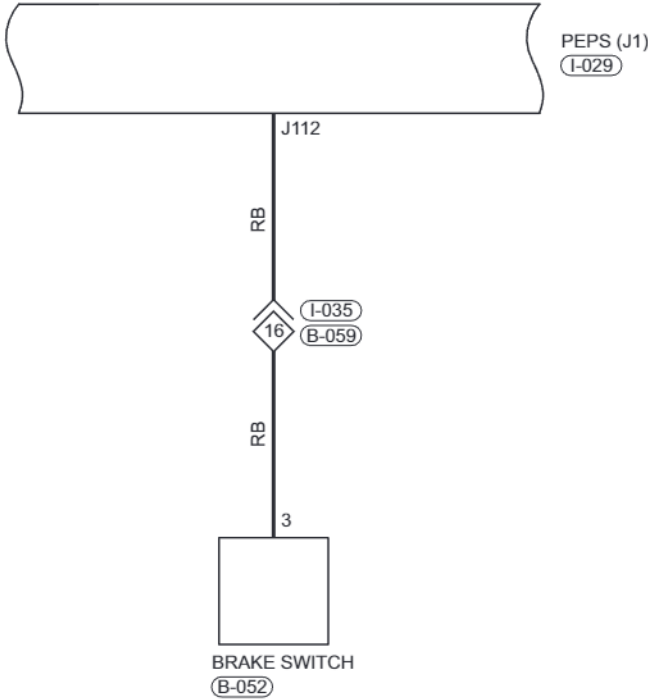
OK

15

System operates normally

DTC	B1509-00	Abnormality in Brake Signal No Subtype Information
-----	----------	--

CVT



15

✕							
J108	J107	J106	J105	J104	J103	J102	J101
J116	J115	J114	J113	J112	J111	J110	J109

(I-029)
Gr

								
9	8	7	6	5	4	3	2	1
18	17	16	15	14	13	12	11	10

I-035
W

✕	
2	1
4	3

(B-052)
Lg

ET21140090

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1509-00	Abnormality in Brake Signal No Subtype Information	Engine switch ON	• Wire harness or connector damaged • Brake switch assembly • Passive Entry & Passive Start (PEPS) controller

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

Diagnosis Procedure**1****Check wire harness and connector****15**

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Disconnect the brake switch connector B-052 and PEPS controller connector I-029.
- Disconnect the instrument panel wire harness connector I-035 and body wire harness connector B-059.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

Repair or replace related wire harness and connector

OK

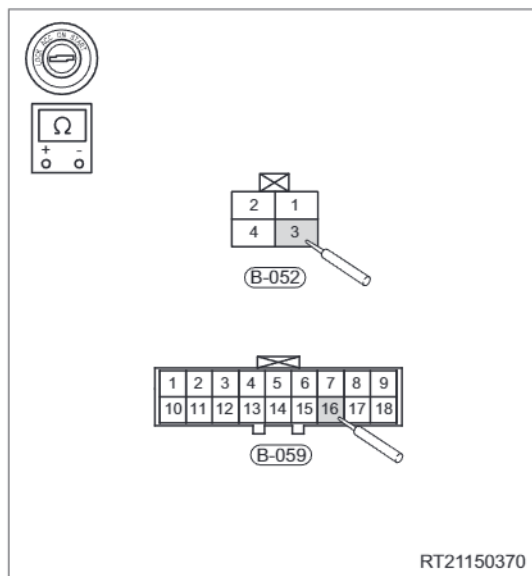
2 Check body wire harness

Check for Open

Multimeter Connection	Condition	Specified Condition
B-052 (3) - B-059 (16)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-052 (3) or B-059 (16) - Body ground	Always	No continuity
B-052 (3) or B-059 (16) - Battery positive	Always	No continuity



NG

Repair or replace body wire harness

OK

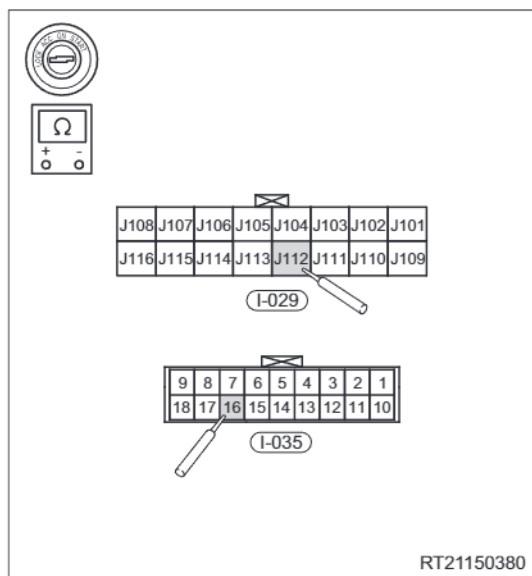
3 Check instrument panel wire harness

Check for Open

Multimeter Connection	Condition	Specified Condition
I-029 (J112) - I-035 (16)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-029 (J112) or I-035 (16) - Body ground	Always	No continuity
I-029 (J112) or I-035 (16) - Battery positive	Always	No continuity



NG

Repair or replace instrument panel wire harness

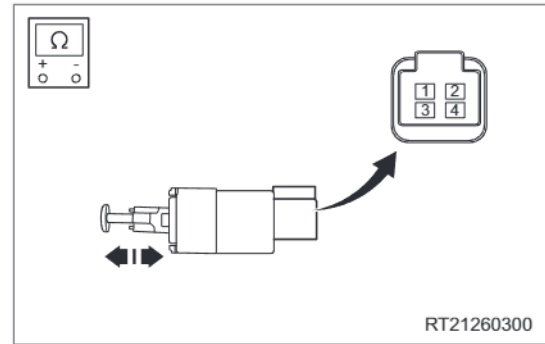
OK

4 Check brake switch assembly

- Remove the brake switch assembly (See page 27-9).
- Check the brake switch assembly.

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

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 3	Brake pedal depressed (switch pin released)	Continuity
Terminal 2 - Terminal 4	Brake pedal depressed (switch pin released)	No continuity
Terminal 1 - Terminal 3	Brake pedal released (switch pin pushed)	No continuity
Terminal 2 - Terminal 4	Brake pedal released (switch pin pushed)	Continuity



NG

Replace brake switch assembly

OK

5 Confirm DTCs

15

- Connect related wire harness connectors.
- Connect the negative battery cable.
- Turn ignition switch ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

NG

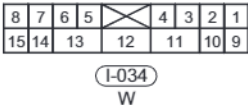
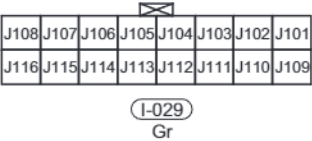
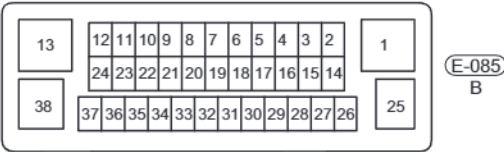
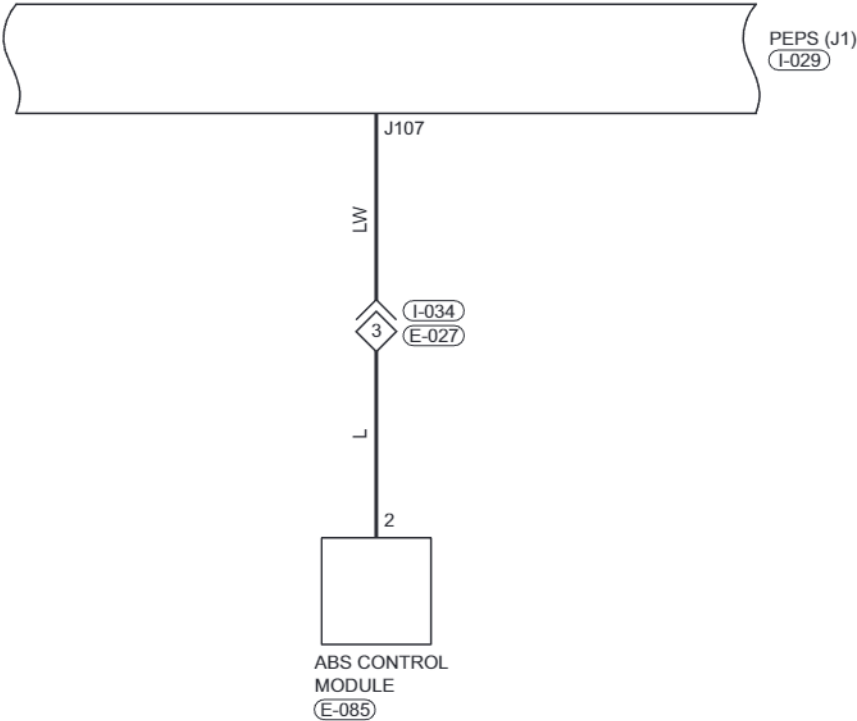
Repair or replace PEPS controller

OK

System operates normally

DTC	B1510-00	Abnormality on Wheel Speed Signal No Subtype Information
-----	----------	--

CVT



ET21140100

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1510-00	Abnormality on Wheel Speed Signal No Subtype Information	Engine switch ON	• Wire harness or connector damaged • ABS module • Passive Entry & Passive Start (PEPS) controller

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

Diagnosis Procedure

1 Check wire harness and connector

15

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Disconnect the ABS module connector E-085 and PEPS controller connector I-029.
- Disconnect the instrument panel wire harness connector I-034 and engine compartment wire harness connector E-027.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Look for broken, bent, protruded or corroded terminals.
- Check that the related connector pins are in good condition.

NG

Repair or replace related wire harness and connector

OK

2 Check engine compartment wire harness

Check for Open

Multimeter Connection	Condition	Specified Condition
E-085 (2) - E-027 (3)	Always	Continuity

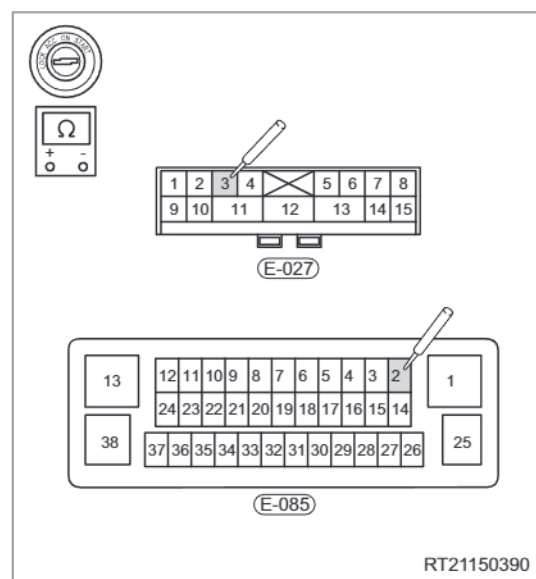
Check for Short

Multimeter Connection	Condition	Specified Condition
E-085 (2) or E-027 (3) - Body ground	Always	No continuity
E-085 (2) or E-027 (3) - Battery positive	Always	No continuity

NG

Repair or replace engine compartment wire harness

OK



3 Check instrument panel wire harness

Check for Open

Multimeter Connection	Condition	Specified Condition
I-034 (3) - I-029 (J107)	Always	Continuity

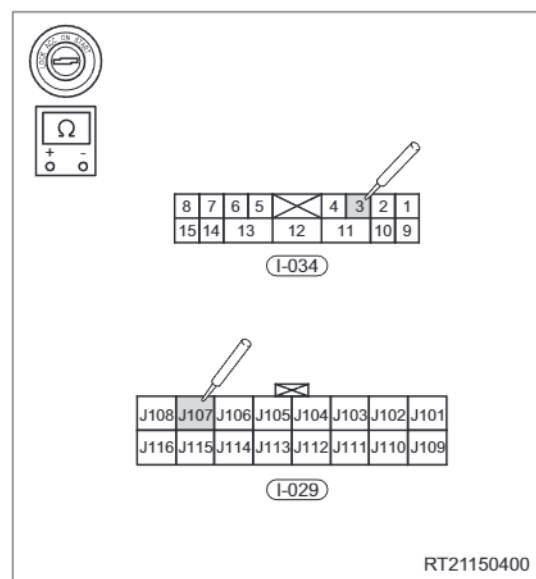
Check for Short

Multimeter Connection	Condition	Specified Condition
I-034 (3) or I-029 (J107) - Body ground	Always	No continuity
I-034 (3) or I-029 (J107) - Battery positive	Always	No continuity

NG

Repair or replace instrument panel wire harness

OK



4 Confirm DTCs

- a. Connect related wire harness connectors.
- b. Connect the negative battery cable.
- c. Turn ignition switch ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

OK**System operates normally****NG****5 Reconfirm DTCs after replacing ABS module**

- a. Remove the ABS module ([See page 25-71](#)).
- b. Replace the ABS module.
- c. Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again to check if any DTC is detected.

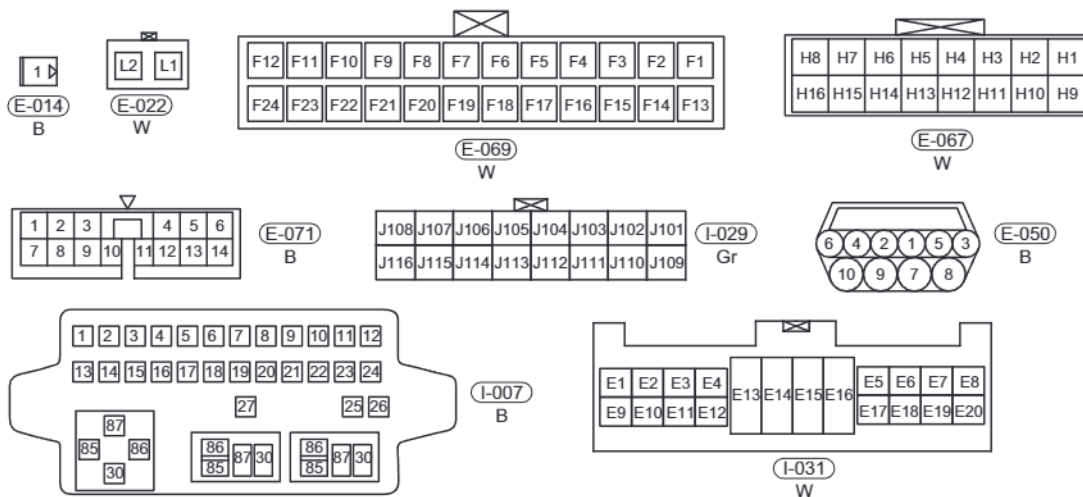
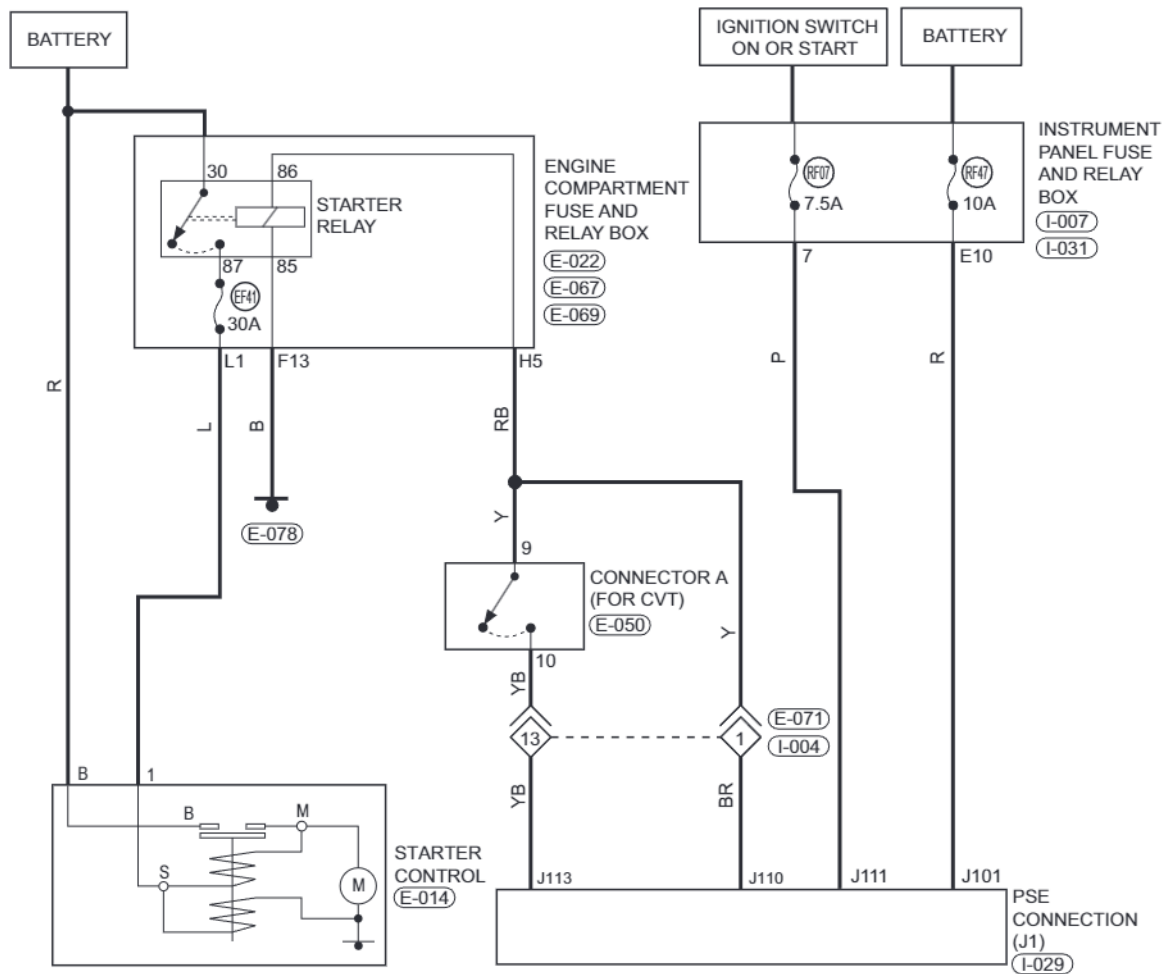
NG**Repair or replace PEPS controller****OK****System operates normally**

DTC

B1514-00

Abnormality on STAR Power Supply No Subtype Information

CVT



ET21140110

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
B1514-00	Abnormality on STAR Power Supply No Subtype Information	Engine switch ON	• Wire harness or connector damaged • Fuse • Relay • Connector A (for CVT model) • Passive Entry & Passive Start (PEPS) controller

CAUTION

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

DTC Confirmation Procedure

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

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch ON.
- Use X-431 3G diagnostic tester to record and clear the DTCs stored in the PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to select "Read Code".
- If DTC is detected, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent ([See page 15-19](#)).

Diagnosis Procedure

15

1 Check the fuses and relays

- Turn off all the electrical equipment and ignition switch.
- Disconnect the negative battery cable.
- Remove the fuse EF41 (30 A) and starter relay from engine compartment fuse and relay box.
- Remove the fuses RF07 (7.5 A) and RF47 (10 A) from instrument panel fuse and relay box.
- Check if the fuses and relays are blown or damaged.

NG

Repair or replace damaged fuses and relays.

OK

2 Check engine compartment fuse and relay box ground

- Check engine compartment fuse and relay box ground E-078 ([See page 51-42](#)).

NG

Repair or replace ground wire harness or ground point

OK

3 Check battery wire harness

- Check if the voltage between starter power supply wire harness and battery negative is battery voltage.
- Check if the voltage between engine compartment fuse and relay box power supply wire harness and battery negative is battery voltage.

NG

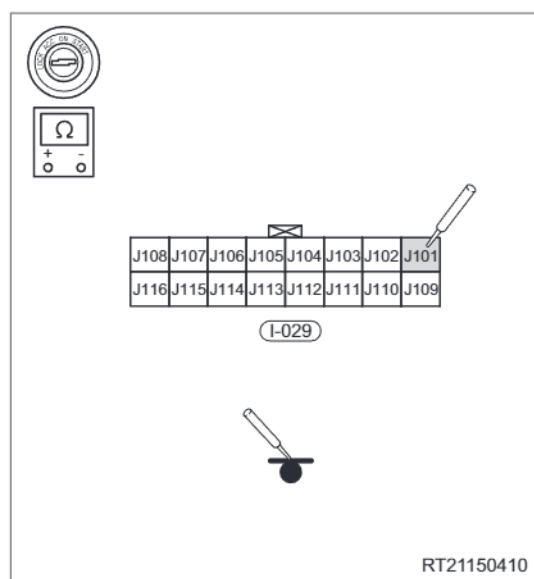
Repair or replace battery wire harness

OK

4 Check PEPS controller power supply voltage

- Disconnect the PEPS controller connector I-029.
- Check the voltage between terminal J101 of PEPS controller connector I-029 and body ground.

Multimeter Connection	Condition	Specified Condition
I-029 (J101) - Body ground	Always	11 - 14 V



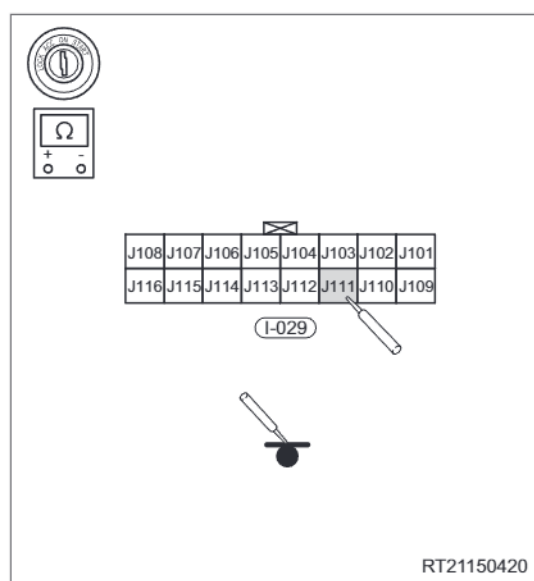
15

- Turn ignition switch ON.
- Check the voltage between terminal J111 of PEPS controller connector I-029 and body ground.

Multimeter Connection	Condition	Specified Condition
I-029 (J111) - Body ground	Always	11 - 14 V

OK

Go to step 6



NG

5 Check PEPS controller power supply circuit

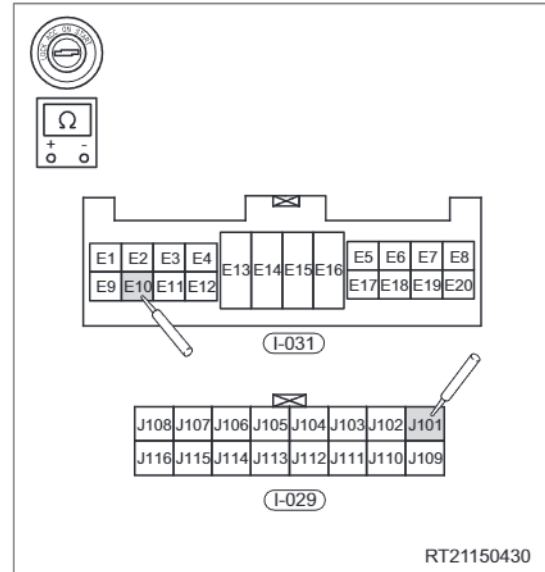
- Turn ignition switch off.
- Disconnect the instrument panel fuse and relay box connectors I-007 and I-031.
- Check the wire harness between terminal E10 of instrument panel fuse and relay box connector I-031 and terminal J101 of PEPS controller connector I-029.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-031 (E10) - I-029 (J101)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-031 (E10) or I-029 (J101) - Body ground	Always	No continuity
I-031 (E10) or I-029 (J101) - Battery positive	Always	No continuity



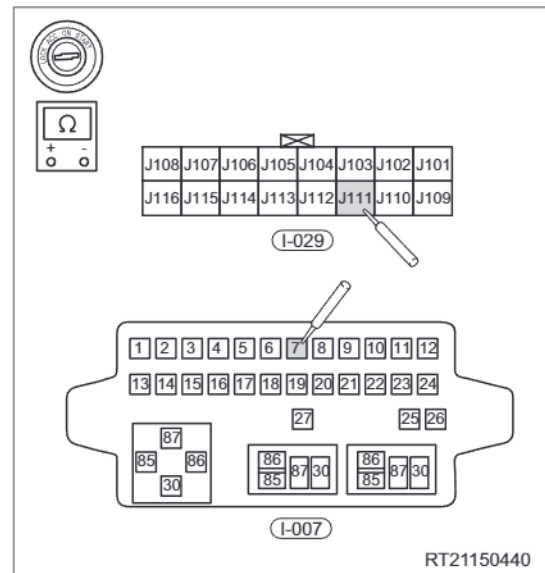
- Check the wire harness between terminal 7 of instrument panel fuse and relay box connector I-007 and terminal J111 of PEPS controller connector I-029.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-007 (7) - I-029 (J111)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-007 (7) or I-029 (J111) - Body ground	Always	No continuity
I-007 (7) or I-029 (J111) - Battery positive	Always	No continuity



15

NG

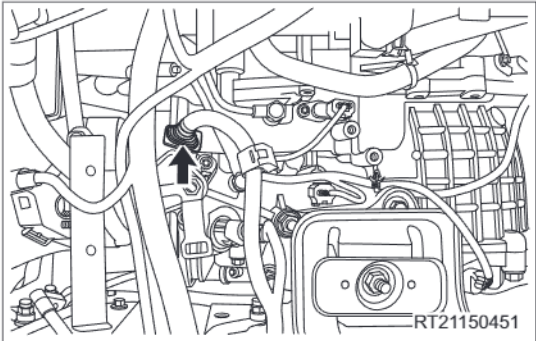
Repair or replace related wire harness or connector (instrument panel fuse and relay box - PEPS controller)

OK

6

Check CVT connector A

a. Disconnect the CVT connector A (arrow).



b. Check the CVT connector A.

Gearshift Position	Terminal No.	Specified Condition
P	1 - 7, 9 - 10	Continuity
R	7 - 8	
N	2 - 7, 9 - 10	
D	3 - 7	
L	4 - 7	

15

NG

Repair or replace CVT connector A

OK

7

Check wire harness (instrument panel - engine compartment)

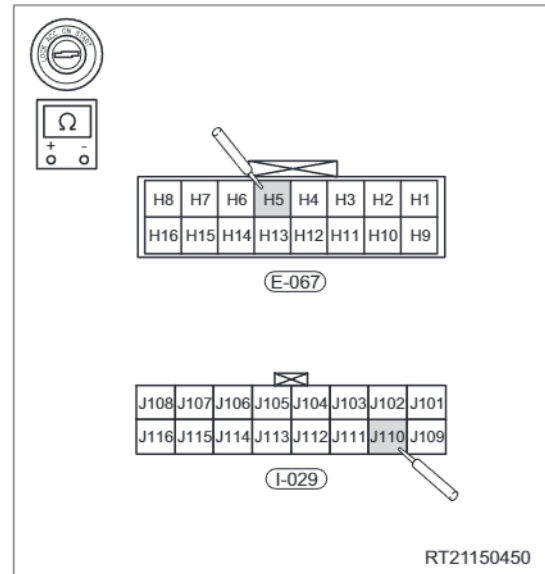
- Disconnect the engine compartment wire harness connector E-067.
- Check the wire harness between PEPS controller connector I-029 and engine compartment fuse and relay box connector E-067.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-029 (J110) - E-067 (H5)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-029 (J110) or E-067 (H5) - Body ground	Always	No continuity
I-029 (J110) or E-067 (H5) - Battery positive	Always	No continuity



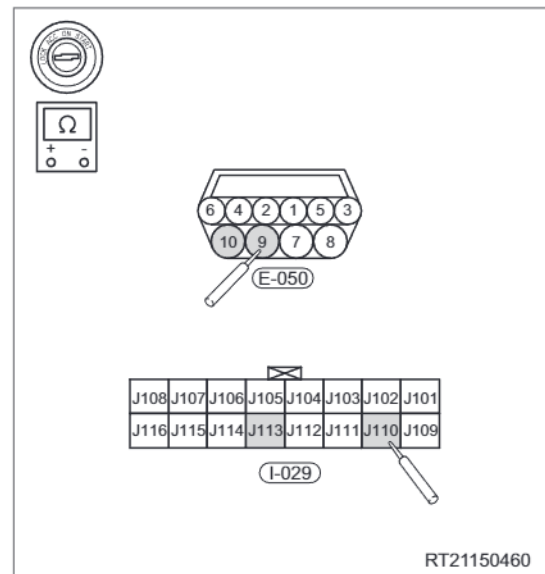
- Check the wire harness between PEPS controller connector I-029 and CVT connector A E-050.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-029 (J110) - E-050 (9)	Always	Continuity
I-029 (J113) - E-050 (10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-029 (J110) or E-050 (9) - Body ground	Always	No continuity
I-029 (J113) or E-050 (10) - Body ground	Always	No continuity
I-029 (J110) or E-050 (9) - Battery positive	Always	No continuity
I-029 (J113) or E-050 (10) - Battery positive	Always	No continuity



NG

Repair or replace wire harness
(instrument panel - engine compartment)

OK

8

Check starter field wire harness

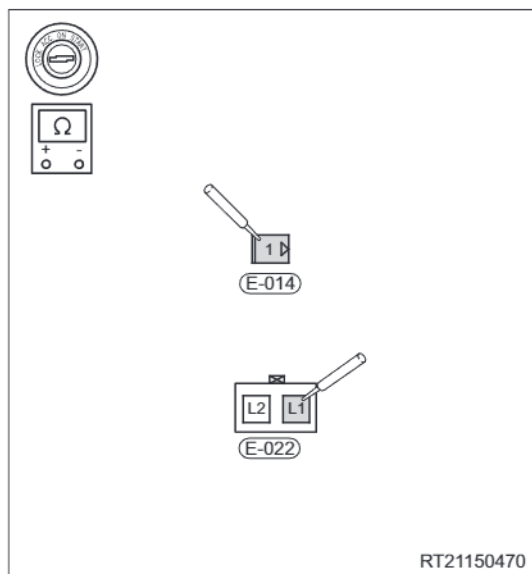
- Disconnect the starter control connector E-014 and engine compartment fuse and relay box connector E-022.
- Check the starter field wire harness.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-014 (1) - E-022 (L1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-014 (1) or E-022 (L1) - Body ground	Always	No continuity
E-014 (1) or E-022 (L1) - Battery positive	Always	No continuity



15

NG

Repair or replace starter field wire harness

OK

9

Confirm DTCs

- Connect related wire harness connectors.
- Connect the negative battery cable.
- Turn ignition switch ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) to check if any DTC is detected.

OK

System operates normally

NG

10 Reconfirm DTCs after replacing starter

- a. Remove the starter ([See page 15-64](#)).
- b. Replace the starter.
- c. Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again to check if any DTC is detected.

NG

Repair or replace PEPS controller

OK

System operates normally

ON-VEHICLE SERVICE

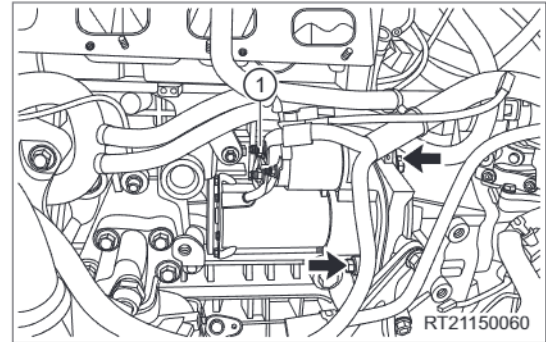
Starter

Removal

CAUTION

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

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover assembly (See page 10-10).
4. Remove the intake manifold assembly (See page 10-24).
5. Remove the starter.
 - a. Move away the terminal cover, remove the starter power cable nut (1) and disconnect the starter power cable.
(Tightening torque: 13 ± 1 N·m)
 - b. Remove 2 fixing bolts (arrow) from starter.
(Tightening torque: 35 ± 5 N·m)

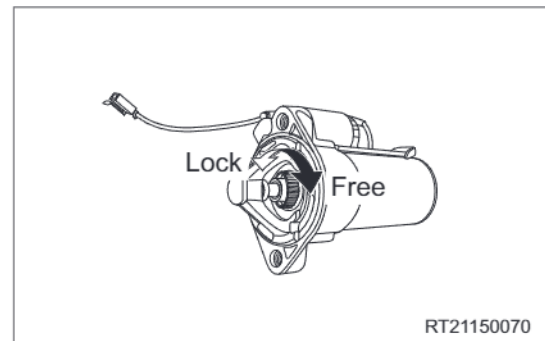


15

- c. Remove the starter.

Inspection

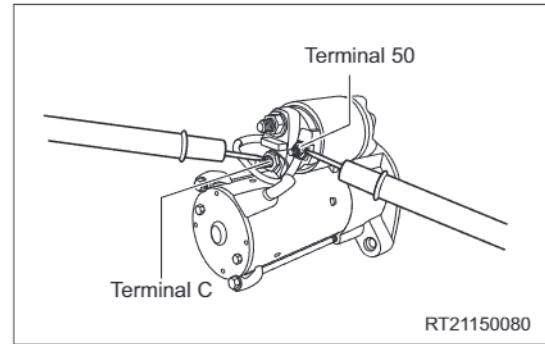
1. Check starter clutch.
 - a. As shown in the illustration, rotate the clutch pinion clockwise to check that it rotates smoothly. Rotate the clutch pinion counterclockwise to check that it locks. If result is not as specified, replace the starter.



2. Check starter solenoid switch.

a. Check pull-in coil.

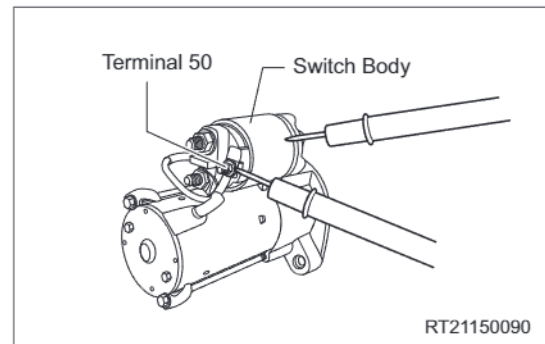
- Measure resistance between terminal 50 and terminal C.



- Standard resistance should be below 2 Ω .
If result is not as specified, replace the starter.

b. Check hold-in coil.

- Measure resistance between terminal 50 and starter solenoid switch body.



- Standard resistance should be below 2 Ω .
If result is not as specified, replace the starter.

3. Check starter assembly.

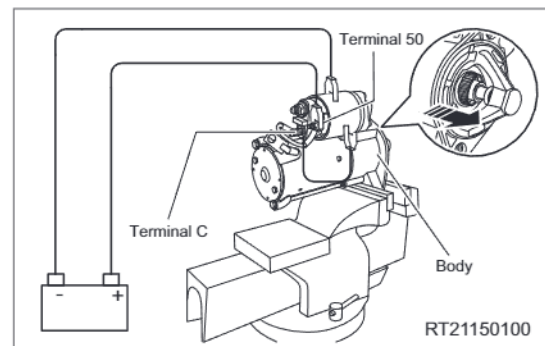
15

CAUTION

- These tests must be performed within 3 to 5 seconds to avoid burning out coil.
- Secure the starter assembly in a vise. Jaws of the vise should be covered by aluminum plate or brass plate; otherwise the starter assembly will be easily damaged when clamping it.

a. Perform pull-in test.

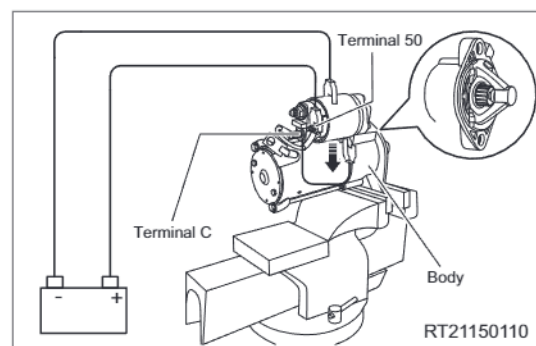
- Remove the nut, and disconnect the field coil lead from terminal C.
- As shown in the illustration, connect battery to the solenoid switch, and check that the starter clutch pinion extends.



If the starter clutch pinion does not move, replace the starter assembly.

b. Perform hold-in test.

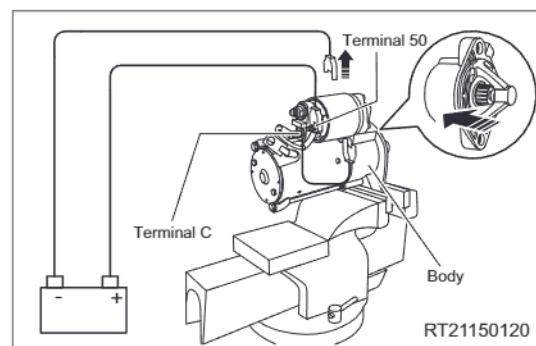
- Keep the starter clutch pinion extending and connections of battery mentioned above, and disconnect the negative battery cable from terminal C.
- Check that the starter clutch pinion remains extended.



If the starter clutch pinion moves inward, replace the starter assembly.

c. Check if starter clutch pinion returns.

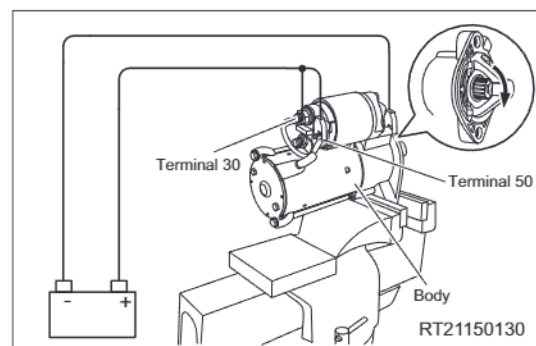
- Disconnect negative battery lead from the starter body. Check that the starter clutch pinion returns.



If the starter clutch pinion does not return, replace the starter assembly.

d. Check if starter rotates smoothly.

- Connect the field coil lead to terminal C, and tighten it with a nut.
- As shown in the illustration, connect battery to the starter. Check that the starter rotates smoothly and steadily when the starter clutch pinion is moving outward.



CAUTION

- The lead to be connected should avoid the pinion side to prevent the lead from getting caught as the pinion rotates.

If result is not as specified, replace the starter assembly.

Installation

Installation is in the reverse order of removal.

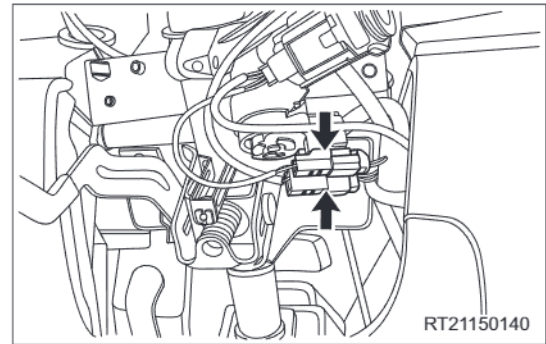
Ignition Starting Switch (w/o PEPS System)

Removal

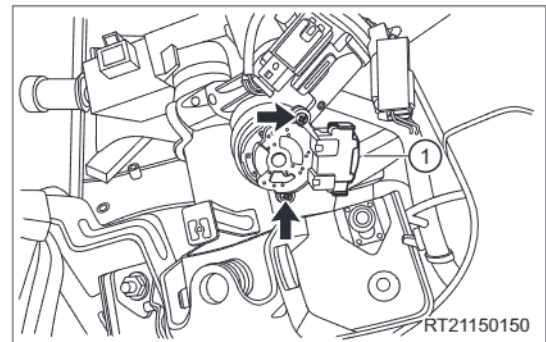
CAUTION

- Be sure to wear necessary safety equipment when repairing to prevent accidents.
- Try to prevent vehicle protector from being scratched during removal and installation.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the combination switch cover ([See page 28-13](#)).
4. Remove the ignition starting switch.
 - a. Move the wire harness connectors (arrow) away from ignition starting switch.



- b. Disconnect the ignition starting switch connector (1).
- c. Remove the fixing screws (arrow) from ignition starting switch.
(Tightening torque: $13 \pm 2 \text{ N}\cdot\text{m}$)



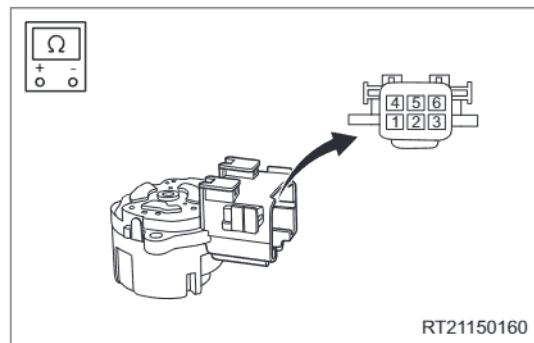
- d. Remove the ignition starting switch.

Inspection

1. Check for continuity of ignition starting switch.

Using ohm band of the digital multimeter, check for continuity of ignition starting switch according to the table below.

Multimeter Connection	Switch Condition	Specified Condition
All terminals	LOCK	No continuity
Terminal 1 - Terminal 3	ACC	Continuity
Terminal 1 - Terminal 2 Terminal 1 - Terminal 3 Terminal 2 - Terminal 3 Terminal 5 - Terminal 6	ON	Continuity
Terminal 1 - Terminal 2 Terminal 4 - Terminal 5 Terminal 4 - Terminal 6 Terminal 5 - Terminal 6	START	Continuity



If result is not as specified, replace the ignition starting switch.

15

Installation

Installation is in the reverse order of removal.

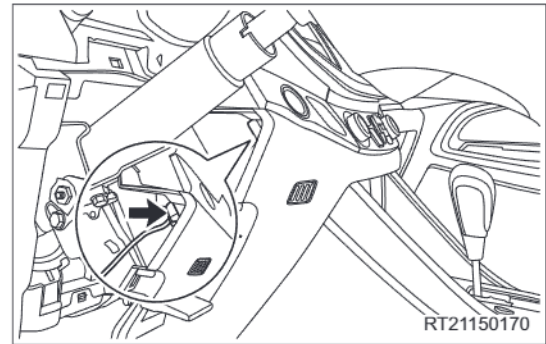
Engine Switch (w/ PEPS System)

Removal

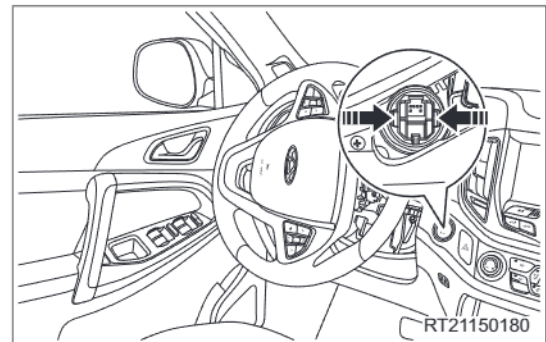
CAUTION

- Be sure to wear necessary safety equipment when repairing to prevent accidents.
- Try to prevent vehicle protector from being scratched during removal and installation.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the combination switch cover ([See page 28-13](#)).
4. Remove the engine switch.
 - a. Disconnect the engine switch connector (arrow).



- b. Detach 2 claws on engine switch in the direction of arrow as shown in the illustration, and remove the engine switch.



Inspection

1. Check for continuity of engine switch.

Using ohm band of the digital multimeter, check for continuity of engine switch according to the table below.

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Not pushed	No continuity
Terminal 3 - Terminal 2	Not pushed	No continuity
Terminal 1 - Terminal 2	Pushed	Continuity
Terminal 3 - Terminal 2	Pushed	Continuity

If result is not as specified, replace the engine switch.

2. Check engine switch indicator illumination.

Apply battery voltage between terminals of engine switch, check engine switch indicator illumination.

HINT:

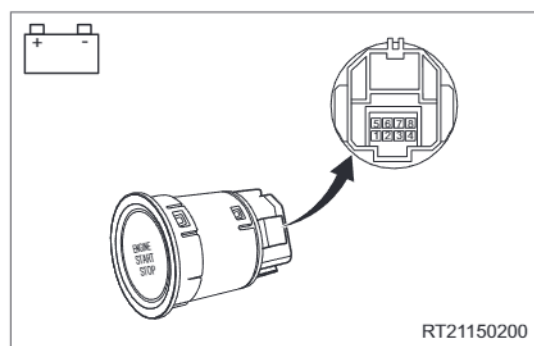
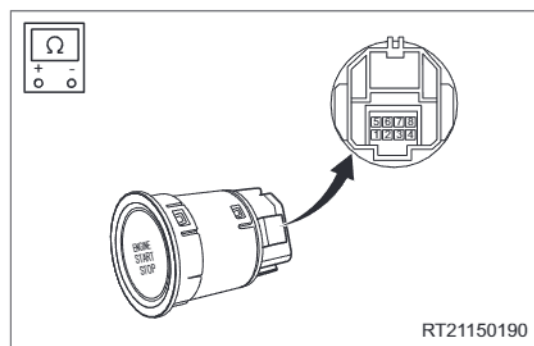
- If positive (+) lead and negative (-) lead are connected incorrectly, the engine switch indicator does not come on.
- When battery voltage is too low, the engine switch indicator does not come on.

Measurement Condition	Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 2	Always	Come on (stamping word)
Battery positive (+) → Terminal 5 Battery negative (-) → Terminal 2	Always	Come on (amber)
Battery positive (+) → Terminal 8 Battery negative (-) → Terminal 2	Always	Come on (green)

If result is not as specified, replace the engine switch

Installation

Installation is in the reverse order of removal.



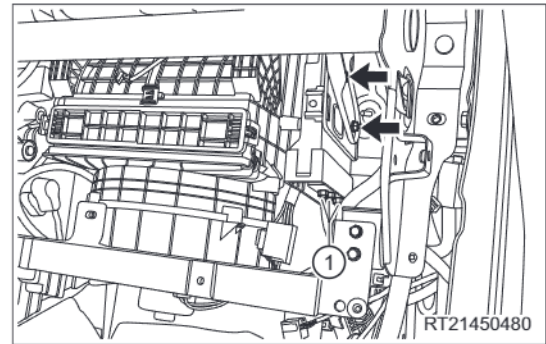
Passive Entry & Passive Start (PEPS) Controller (w/ PEPS System)

Removal

CAUTION

- Be sure to wear necessary safety equipment when repairing to prevent accidents.
- Try to prevent vehicle protector from being scratched during removal and installation.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the glove box assembly ([See page 45-17](#)).
4. Remove the PEPS controller.
 - a. Disconnect the PEPS controller connectors (1).
 - b. Remove 2 fixing nuts (arrow) from PEPS controller bracket.
(Tightening torque: $7 \pm 1 \text{ N}\cdot\text{m}$)



- c. Remove the PEPS controller with bracket from engine crossmember.

CAUTION

- DO NOT separate PEPS controller and bracket if not as necessary. DO NOT separate them over and over again if it is necessary to separate, to avoid damage to claws of PEPS controller.

15

Installation

Installation is in the reverse order of removal.

CAUTION

- It is necessary to match the PEPS controller after replacing it ([See page 15-71](#)).
- With PEPS controller not matched, do not carelessly turn on and off the power, as the non-matched PEPS controller has 50 chances to turn the power from off to ignition state, PEPS controller will not be used once more than 50 times.

