

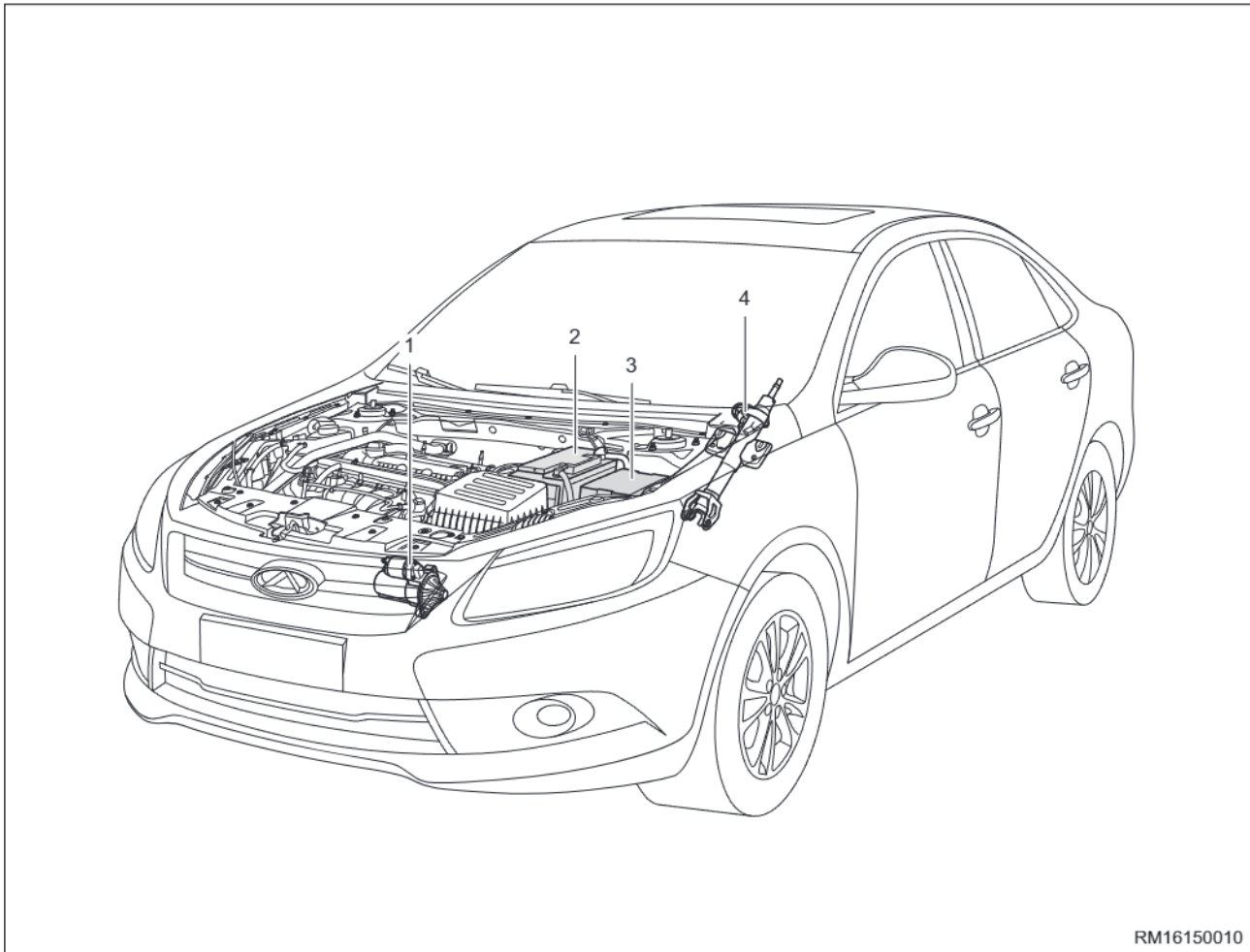
SQRE4G16 STARTING SYSTEM

GENERAL INFORMATION	15-3	B150C-00	15-52
Description	15-3	B1510-00	15-56
Operation	15-5	B1514-00	15-60
Specifications	15-6	B1515-45	15-67
Tools	15-6	U0073-88	15-68
Circuit Diagram	15-8	U0100-87	15-68
DIAGNOSIS & TESTING	15-13	U0101-87	15-68
Problem Symptoms Table	15-13	U0129-87	15-68
Starter Relay Inspection	15-14	U0140-87	15-68
Precautions for Starting System	15-14	U1300-55	15-70
Diagnosis Procedure	15-15	ON-VEHICLE SERVICE	15-71
Problem Repair (No DTC)	15-17	Starter	15-71
Diagnostic Help	15-17	Removal	15-71
Intermittent DTC Troubleshooting	15-17	Inspection	15-72
Ground Inspection	15-18	Installation	15-74
Passive Entry & Passive Start (PEPS)		Ignition Starting Switch	
Controller Terminal List		(w/o PEPS System)	15-75
(For MT Model)	15-19	Removal	15-75
Passive Entry & Passive Start (PEPS)		Inspection	15-75
Controller Terminal List		Installation	15-76
(For CVT Model)	15-21	Engine Switch (w/ PEPS System)	15-77
Diagnostic Trouble Code (DTC) Chart	15-23	Removal	15-77
B1502-13	15-24	Inspection	15-78
B1503-13	15-24	Installation	15-78
B1504-13	15-24	Passive Entry & Passive Start (PEPS)	
B1506-00	15-30	Controller (w/ PEPS System)	15-79
B1507-00	15-35	Removal	15-79
B1508-00	15-42	Installation	15-80
B1509-00	15-47		

GENERAL INFORMATION

Description

w/o PEPS System



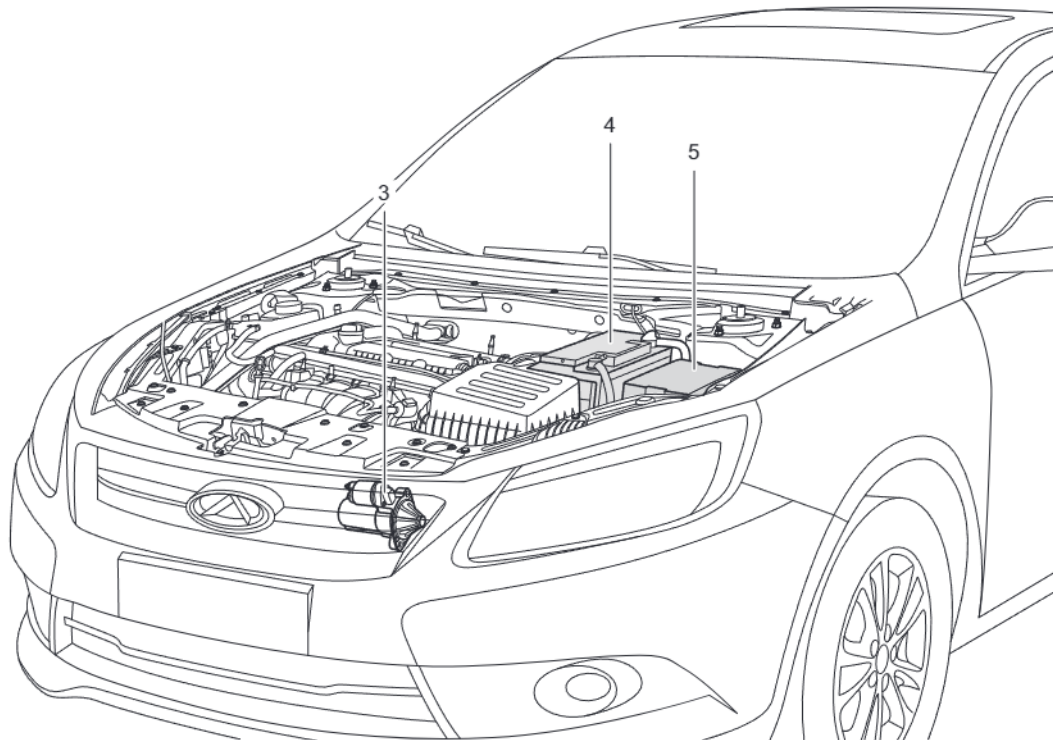
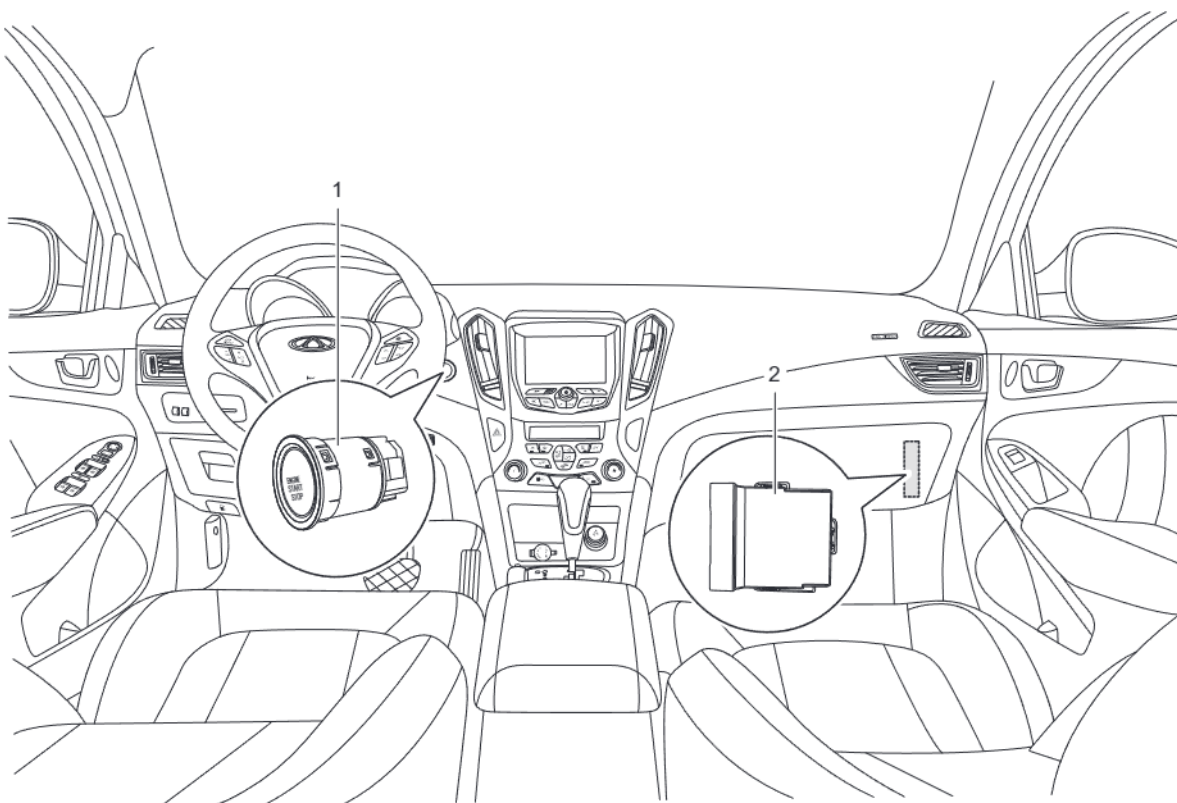
RM16150010

15

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

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

w/ PEPS System



RM16150020

1 - Engine Switch	2 - Passive Entry & Passive Start (PEPS) Controller
3 - Starter	4 - Fuse and Relay Box
5 - Battery	

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 sense where the key is), immobilizer coil for 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 following functions:

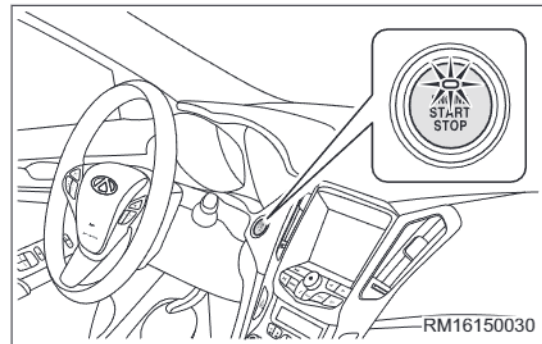
- Keyless entry function;
- Compatible general remote function;
- One-button keyless start function;
- Luggage compartment door smart open function;
- Engine immobilizer function.

Operation

Engine Switch (w/ PEPS System)

Engine switch is located at right side of instrument cluster on instrument panel, the function of which is to control vehicle power and engine starting.

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 illumination condition of indicator.



15

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.

CAUTION

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

Starter

Starter converts electrical energy from battery into mechanical energy, allowing engine to crank initially, and disconnects power transmission between starter and engine when engine runs normally.

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

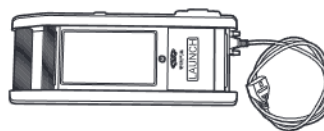
- Control mechanism (solenoid switch): controls engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off the DC circuit.
- Drive train mechanism: When engine starts, it engages starter drive gear with flywheel gear ring and transmits torque of starter motor, to the engine crankshaft. After engine starts, drive gear will automatically disengage from the flywheel gear, so that engine cannot drive starter at high speed, avoiding damage to the starter.
- DC motor: converts electrical energy from battery into electromagnetic moment.

Specifications**Torque Specifications**

Description	Torque (N·m)
Worm Clamp	3 ± 0.5
Starter Power Cable Nut	13 ± 1
Starter Fixing Bolt	35 ± 5
Ignition Starting Switch Fixing Screw	13 ± 2
Glove Box Assembly Fixing Screw	1.5 ± 0.5
PEPS Controller Bracket Fixing Bolt	7 ± 1

Tools**Special Tool**

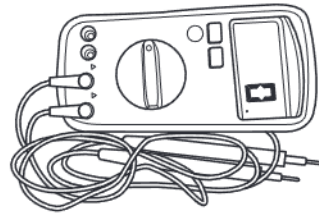
X-431 3G Diagnostic Tester



RCH0000001

General Tool

Digital Multimeter

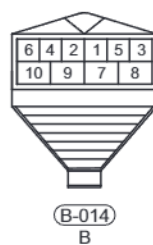
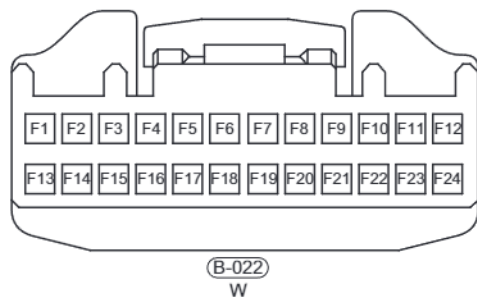
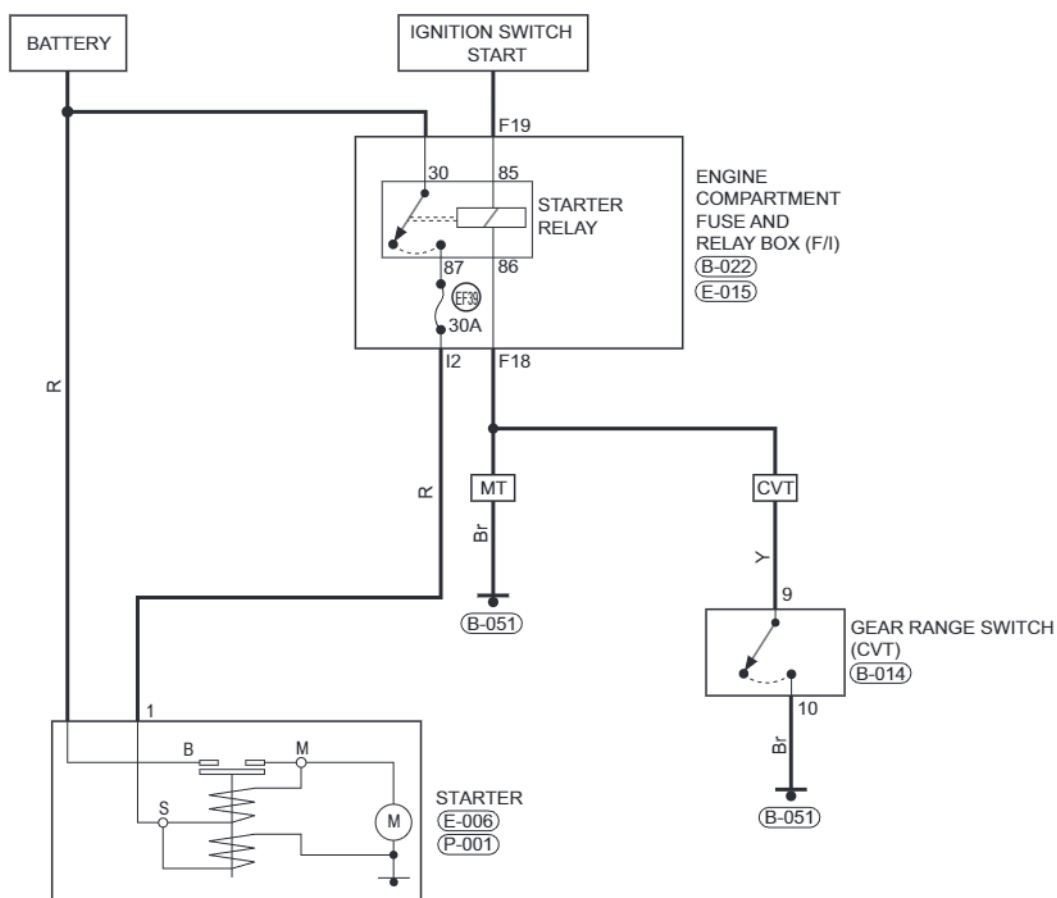


RCH0000002

Circuit Diagram

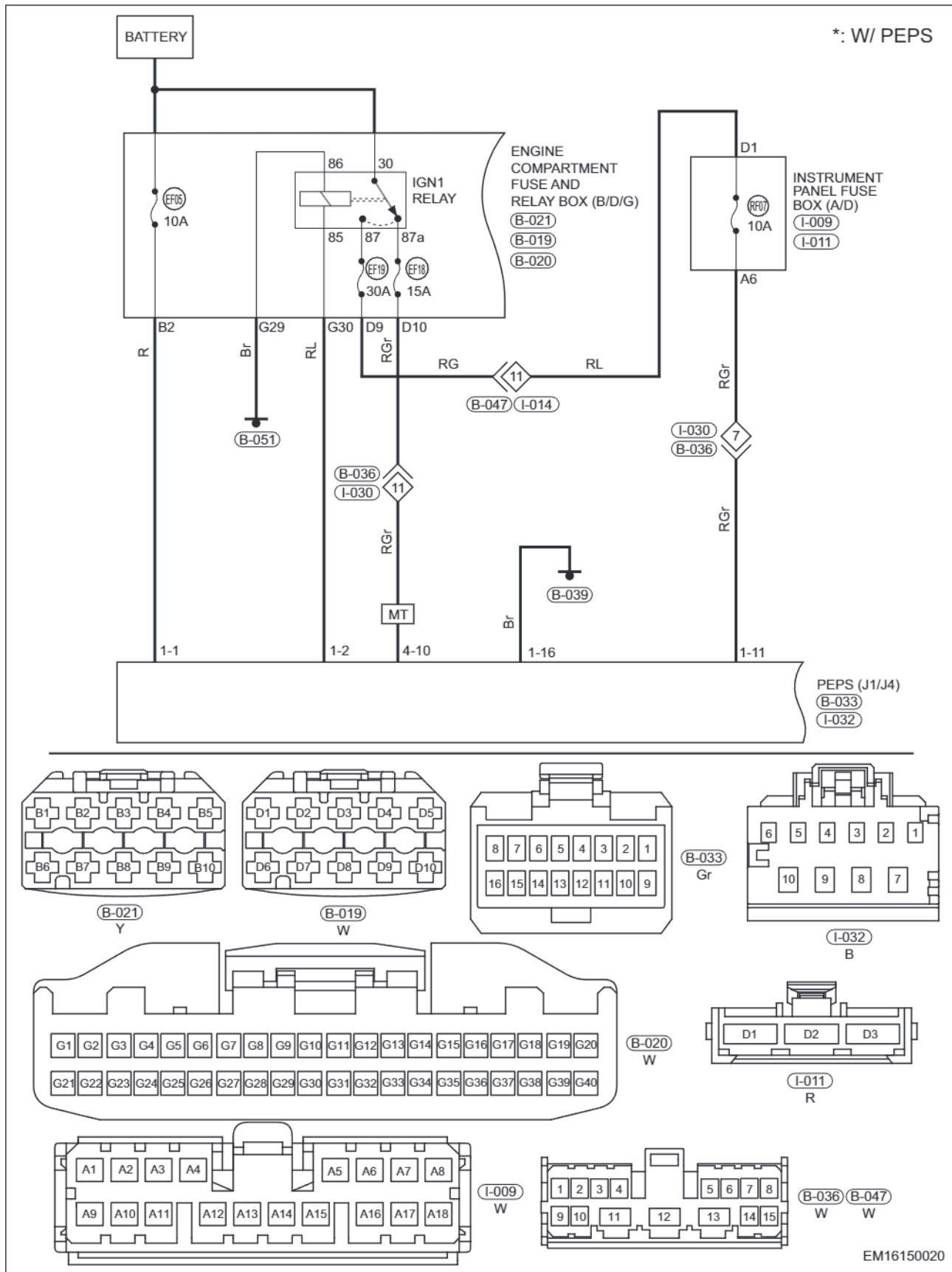
Starting System (Page 1 of 5)

*: W/O PEPS



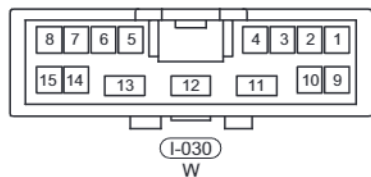
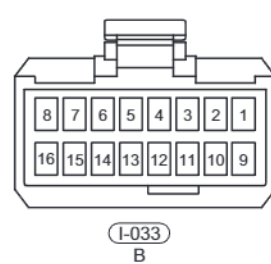
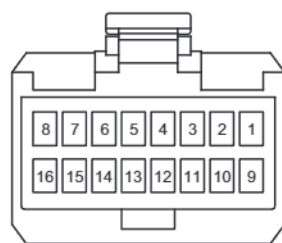
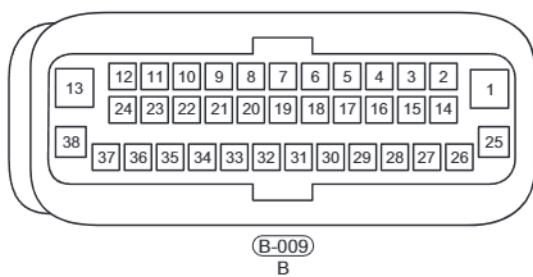
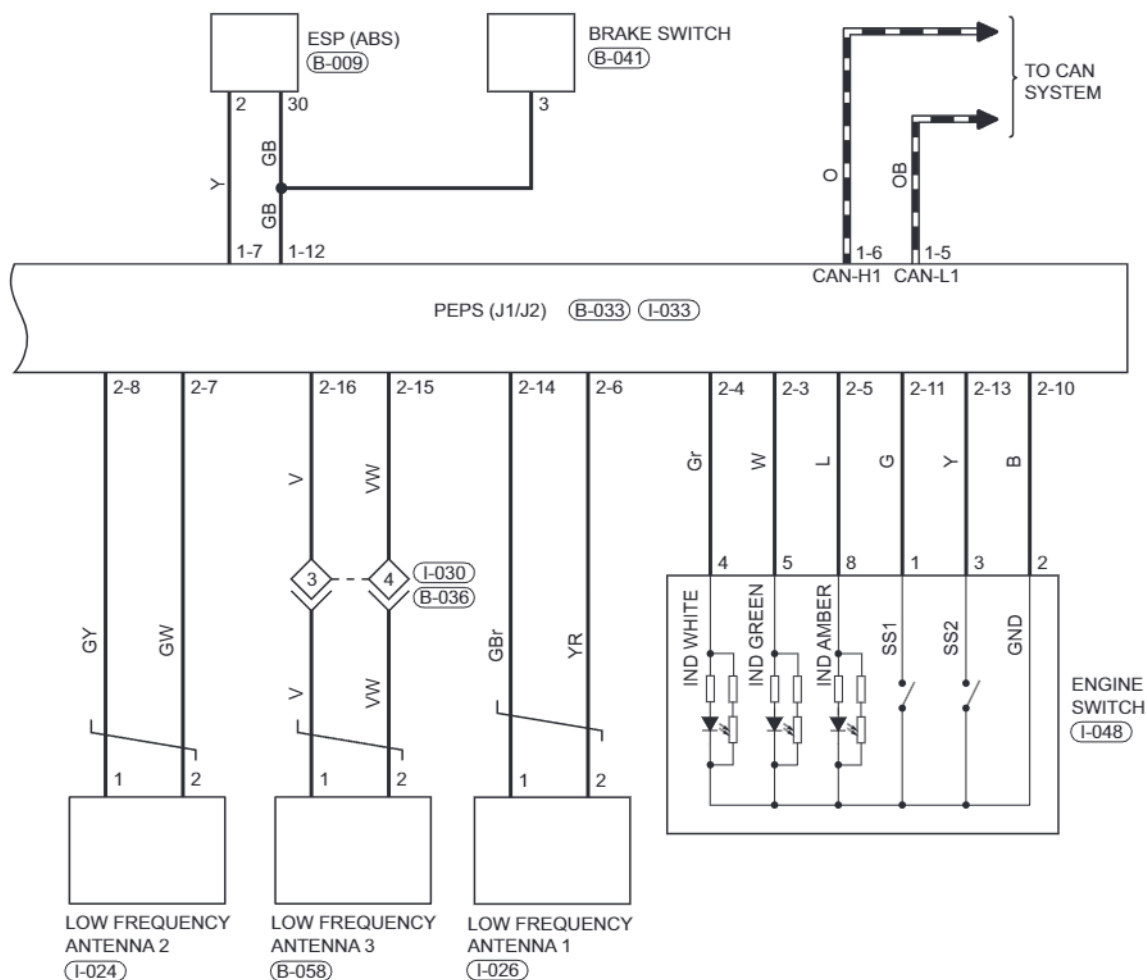
EM16150010

Starting System (Page 2 of 5)



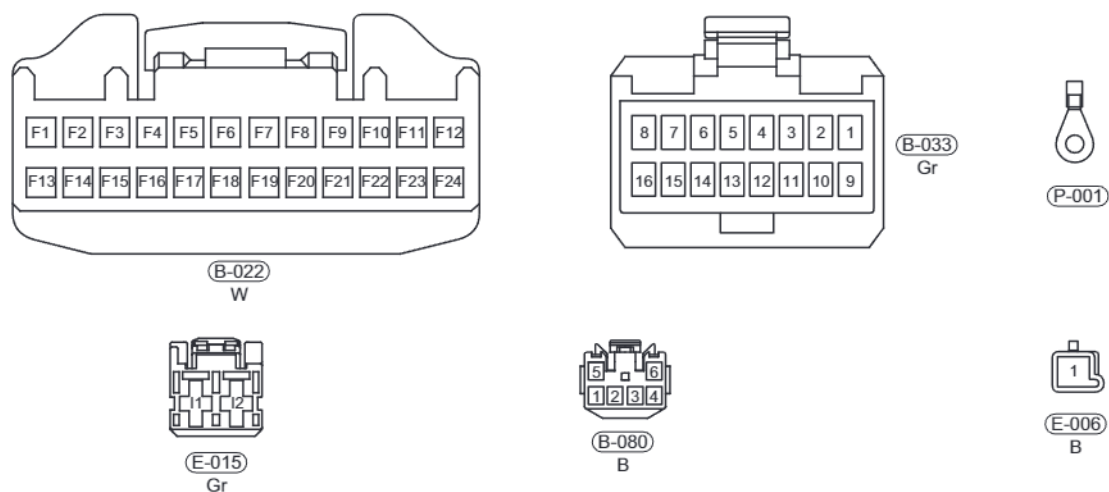
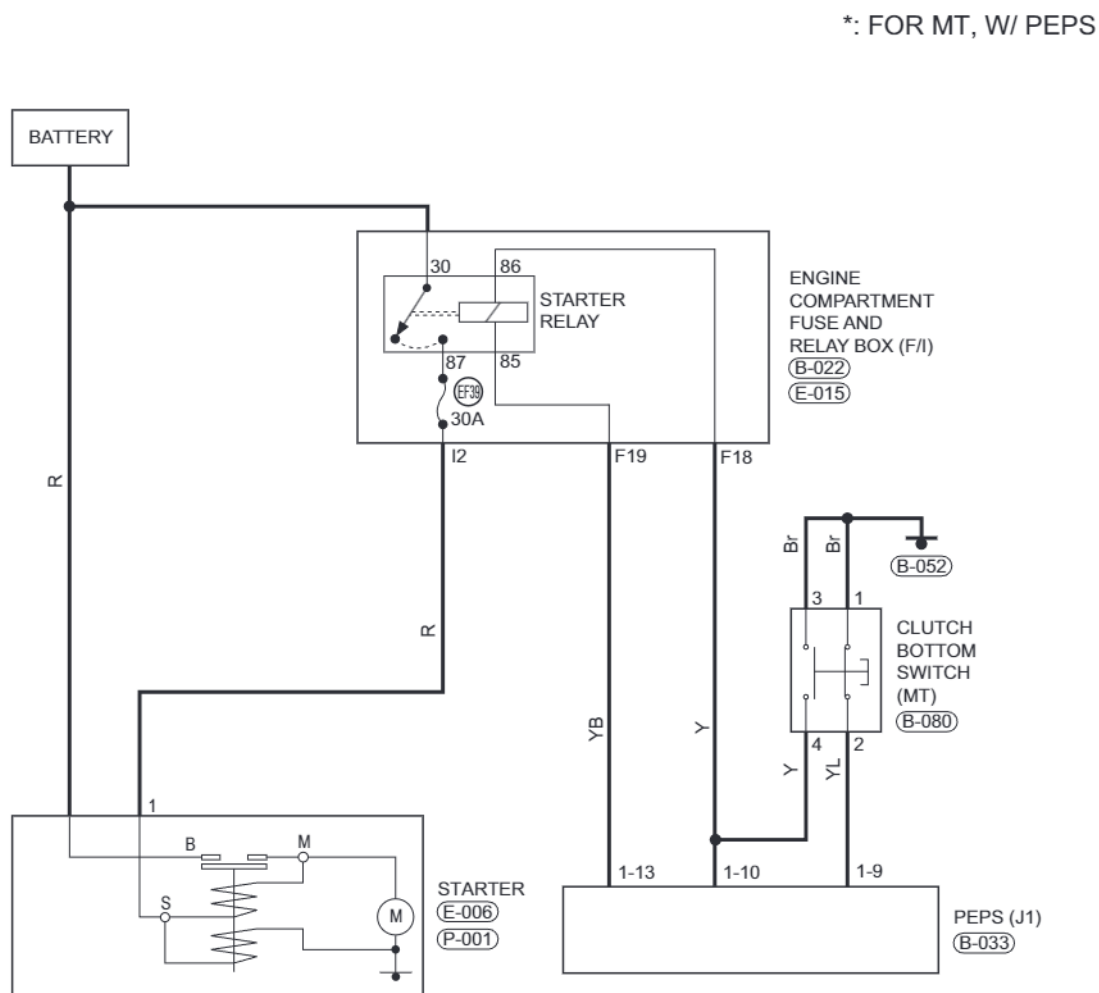
Starting System (Page 3 of 5)

*: W/ PEPS



EM16150030

Starting System (Page 4 of 5)



EM16150040



15

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Engine switch function malfunction

Symptom	Suspected Area	See page
Power cannot be turned on	Fuse	53-36
	ACC relay	53-36
	ING1 relay	53-36
	ING2 relay	53-36
	Engine switch	15-77
	Wire harness or connector	-
	Passive Entry & Passive Start (PEPS) controller	15-79
	Engine Control Module (ECM)	06-281
Engine switch indicator does not come on	Engine switch	15-77
	Wire harness or connector	-
	Passive Entry & Passive Start (PEPS) controller	15-79

Starter Failure

Symptom	Suspected Area	See page
When ignition switch is turned to START (or engine switch indicator is green), solenoid switch makes a "clanking" sound and engine cannot start	Battery (weak battery, poor contact of battery cable)	16-7
	Starter	15-71
Starter does not run	Battery (depleted)	16-7
	Starter relay	53-36
	Fuse	53-36
	Clutch bottom switch (for MT model)	19-8
	Gear switch connector (for CVT model)	-
	Brake switch	26-21
	Ignition starting switch	15-75
	Engine switch	15-77
	Starter	15-71
	Passive Entry & Passive Start (PEPS) controller	15-79
	Wire harness or connector	-

Symptom	Suspected Area	See page
Starter runs weakly	Battery (weak battery, internal fault)	16-7
	Starter	15-71
Starter is racing	Starter (incorrect installation, internal fault)	15-71
	Flywheel ring gear (gear teeth broken)	07-34

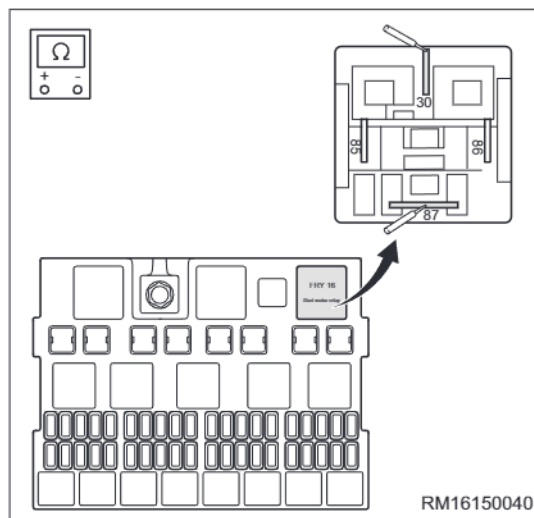
Starter Relay Inspection

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

Using a digital multimeter, check the starter relay according to the specified condition in the table below.

Multimeter Connection	Specified Condition
Terminal 30 - Terminal 87	No continuity
Terminal 30 - Terminal 87	Continuity (When battery voltage is applied between terminal 85 and terminal 86)

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



Precautions for Starting System

1. For models with PEPS system:
(For MT model) Before starting engine, shift transmission to neutral, apply parking brake and depress clutch pedal until engine switch indicator illuminates in green.
(For CVT model) Before starting engine, shift transmission to P or N and firmly press brake pedal, until engine switch indicator illuminates in green.
2. For models without PEPS system: before starting engine, shift transmission to neutral, apply parking brake and depress clutch pedal.
3. For models with PEPS system, power supply mode (LOCK, ACC, ON) is always stored in vehicle. When battery cable is disconnected and reconnected, power supply returns to the mode it was in before battery cable was disconnected. Be sure to turn engine switch off before disconnecting battery cable. Be careful if power source mode of a vehicle with a discharged battery is not known.
4. Make sure that battery is fully charged to reduce repeat operating time of starter.
After battery is reconnected, be sure to wait for 10 seconds or more before starting engine again. Engine may not start immediately after battery is reconnected.
5. Do not start engine for more than 5 seconds each time, repeated starting interval should not be less than 10 - 15 seconds, and consecutive starting is not allowed for more than 3 times.
6. If starter cannot stop, turn off ignition switch immediately, or remove the negative battery cable to find the problem.
7. Check the starter circuit frequently to make sure that each wire of starting system is connected securely and in good insulation.
8. Generally, perform maintainable service for starter when servicing the vehicle. Also, maintenance interval can be shortened or extended depending on actual conditions.
9. Remove the negative battery cable before removing 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 problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask customer about the problem and conditions at the time 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
----------	------------------

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

15



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 through data network.
2. Confirm that malfunction is current and perform diagnostic test and repair procedure.
3. If DTC cannot be cleared, malfunction is current.
4. Visually check 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 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 related circuit.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and grounds related to current DTC.
- Remove the PEPS controller from malfunctioning vehicle, install it to a new vehicle and perform a test. If DTC cannot be cleared, PEPS controller is malfunctioning. If DTC can be cleared, reinstall 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 DTC.
- Refer to any Technical Bulletin that may apply to the malfunction.

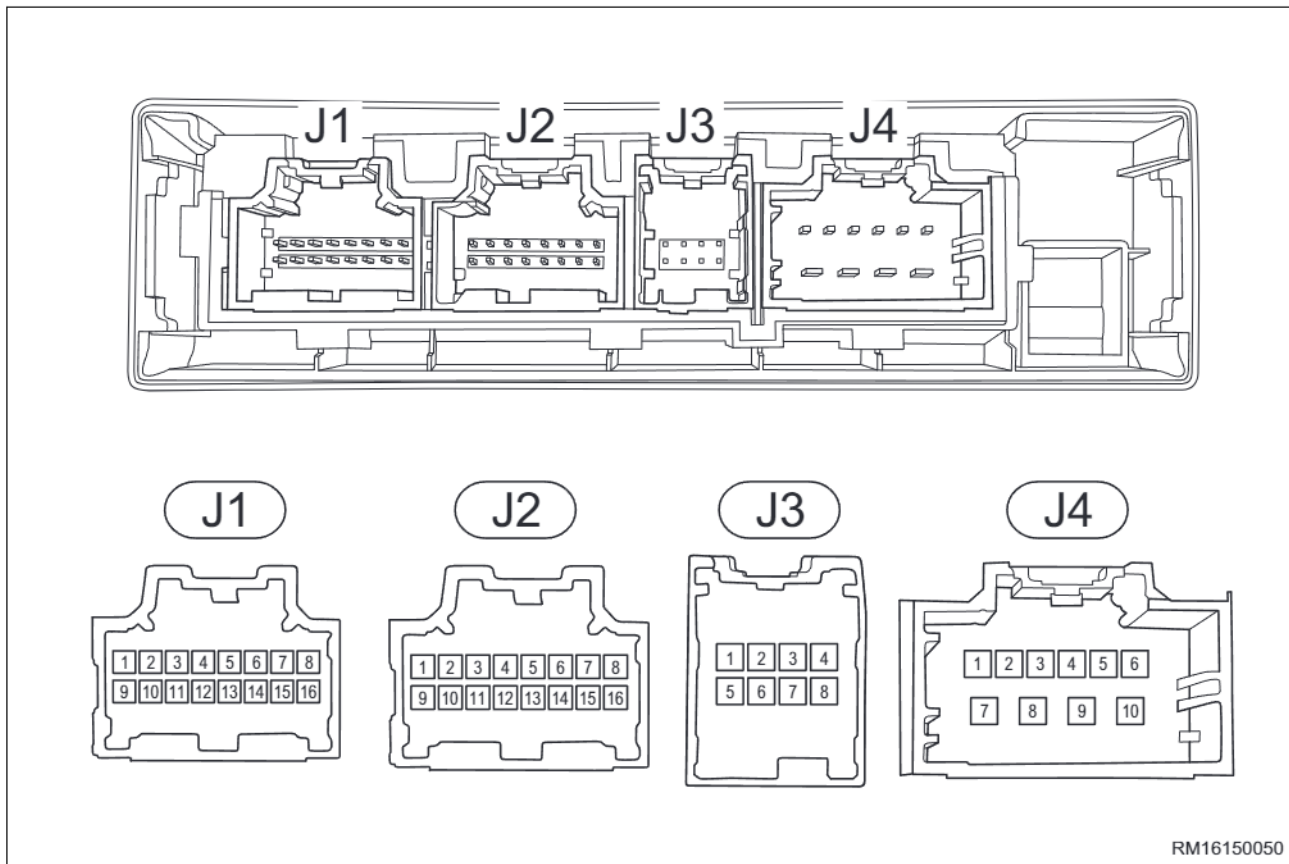
Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) 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 the control circuit. Perform the following operations when checking the ground points:

1. Remove 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 good condition.
4. Reinstall 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.

Passive Entry & Passive Start (PEPS) Controller Terminal List (For MT Model)



J1 Connector Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Battery Power Supply	9	Clutch Bottom Switch Signal
2	IG1 Relay Drive (High)	10	Starter Relay Detection
3	ACC Relay Drive (High)	11	Ignition Signal
4	IG2 Relay Drive (High)	12	-
5	CAN L	13	Starter Relay (High)
6	CAN H	14	-
7	ABS (ESP)	15	-
8	-	16	GND

J2 Connector Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Immobilizer Coil Positive	9	-
2	Immobilizer Coil Negative	10	Engine Switch Ground
3	Engine Switch Indicator (Green)	11	Engine Switch 1
4	Engine Switch Back Light (White)	12	-
5	Engine Switch Indicator (Amber)	13	Engine Switch 2
6	Low Frequency Antenna 1 Negative	14	Low Frequency Antenna 1 Positive
7	Low Frequency Antenna 2 Negative	15	Low Frequency Antenna 3 Negative
8	Low Frequency Antenna 2 Positive	16	Low Frequency Antenna 3 Positive

J3 Connector Terminal Definition

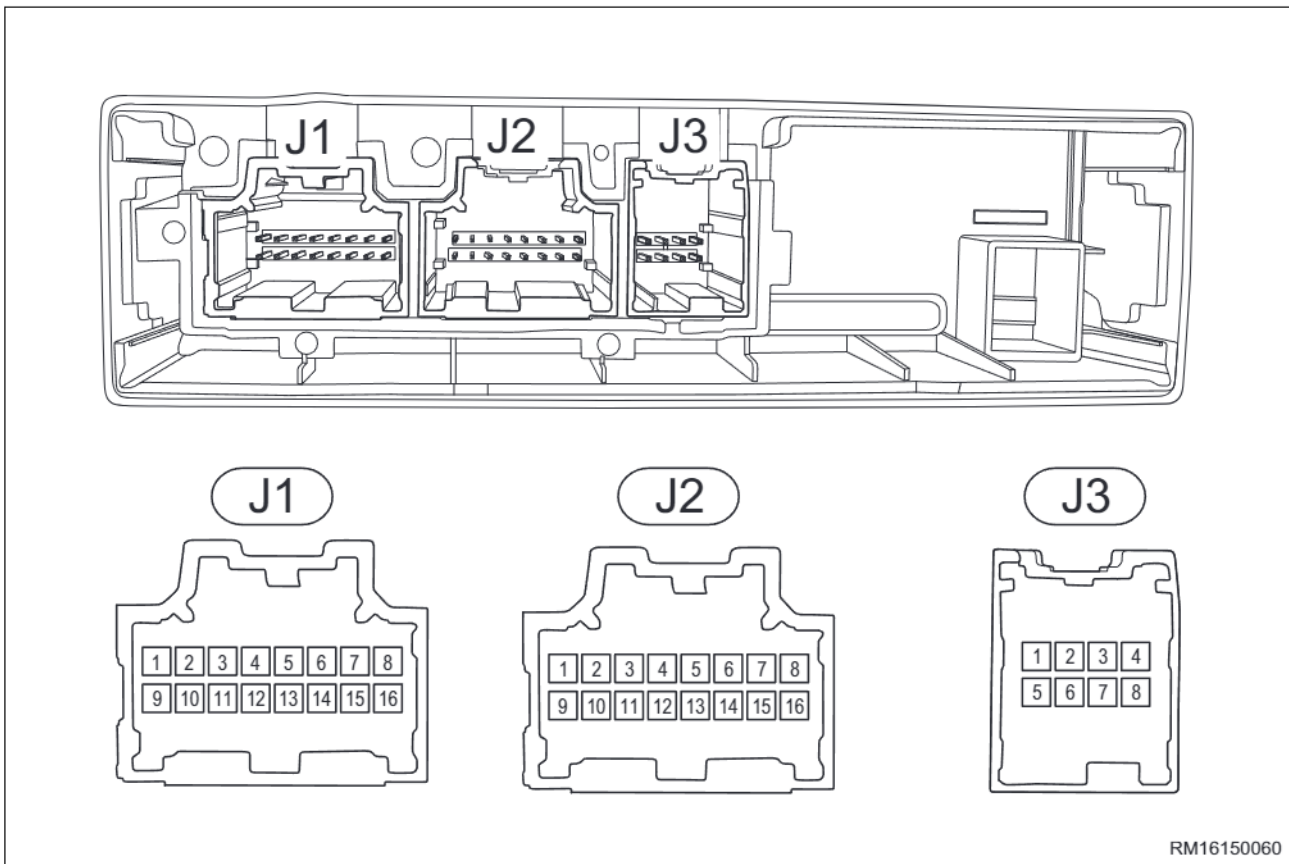
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Luggage Compartment Unlock Signal	5	-
2	Front Left Door Handle Sensor (Low Frequency Antenna) Negative	6	Front Right Door Handle Sensor (Low Frequency Antenna) Negative
3	Front Left Door Handle Sensor (Low Frequency Antenna) Positive	7	Front Right Door Handle Sensor (Low Frequency Antenna) Positive
4	Luggage Compartment Low Frequency Antenna Negative	8	Luggage Compartment Low Frequency Antenna Positive

J4 Connector Terminal Definition

15

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Electric Steering Column Lock Module Control Ground	6	Electric Steering Column Lock Power Source
2	-	7	-
3	Electric Steering Column Lock Ground	8	GND
4	Electric Steering Column Lock Control Line	9	-
5	-	10	Electric Steering Column Lock Power Source Input

Passive Entry & Passive Start (PEPS) Controller Terminal List (For CVT Model)



J1 Connector Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Battery Power Supply	9	-
2	IG1 Relay Drive (High)	10	Starter Relay Detection
3	ACC Relay Drive (High)	11	Ignition Signal
4	IG2 Relay Drive (High)	12	Brake Switch Signal
5	CAN L	13	Starter Relay (High)
6	CAN H	14	-
7	Hard Wire Speed Signal	15	Gear Range Switch (P Position)
8	-	16	GND

J2 Connector Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Anti-theft Coil Positive	9	-
2	Anti-theft Coil Negative	10	Engine Switch Ground
3	Engine Switch Indicator (Green)	11	Engine Switch 1
4	Engine Switch Back Light (White)	12	-
5	Engine Switch Indicator (Amber)	13	Engine Switch 2
6	Low Frequency Antenna 1 Negative	14	Low Frequency Antenna 1 Positive
7	Low Frequency Antenna 2 Negative	15	Low Frequency Antenna 3 Negative
8	Low Frequency Antenna 2 Positive	16	Low Frequency Antenna 3 Positive

J3 Connector Terminal Definition

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Luggage Compartment Unlock Signal	5	-
2	Front Left Door Handle Sensor (Low Frequency Antenna) Negative	6	Front Right Door Handle Sensor (Low Frequency Antenna) Negative
3	Front Left Door Handle Sensor (Low Frequency Antenna) Positive	7	Front Right Door Handle Sensor (Low Frequency Antenna) Positive
4	Luggage Compartment Low Frequency Antenna Negative	8	Luggage Compartment Low Frequency Antenna Positive

Diagnostic Trouble Code (DTC) Chart

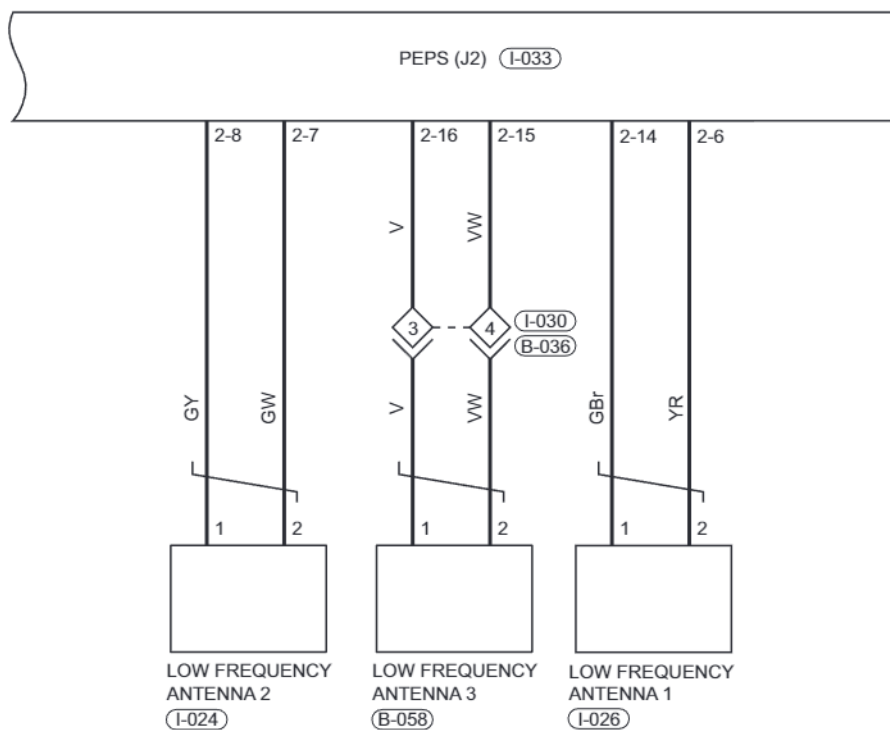
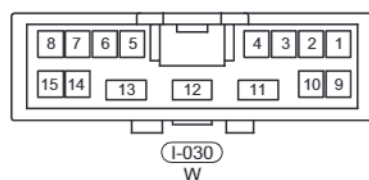
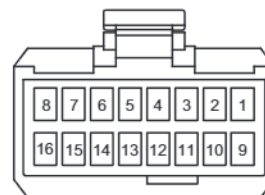
DTC Code	DTC Definition
B1502-13	Front Internal LF Antenna Circuit Open
B1503-13	Middle Internal LF Antenna Circuit Open
B1504-13	Rear Internal LF Antenna Circuit Open
B1506-00	Abnormality on Switches of Engine Switch No Subtype Information
B1507-00	Abnormality in IG Circuit No Subtype Information
B1508-00	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
B1510-00	Abnormality on Wheel Speed Signal No Subtype Information
B1514-00	Abnormality on STAR Power Supply No Subtype Information
B1515-45	ROM for Checksum Failure
U0073-88	Control Module Communication Bus Off 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
U1300-55	Software Configuration Error Not Configured

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
-----	----------	---------------------------------------

*: W/ PEPS

I-024
BB-058
BI-026
BI-030
WI-033
B

EM16150060

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1502-13	Front Internal LF Antenna Circuit Open	Engine switch ON	• Wire harness or connector • Front internal low frequency antenna • Middle internal low frequency antenna • Rear internal low frequency antenna • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

15

1 Check PEPS controller ground

- Turn ignition switch to LOCK.
- Check the PEPS controller ground B-039 ([See page 53-29](#)).

NG

Repair or replace PEPS controller ground wire harness or ground point

OK

2 Check wire harness and connector

- Disconnect the negative battery cable.
- Disconnect the PEPS controller connector I-033.
- Disconnect the front internal low frequency antenna connector I-026, middle internal low frequency antenna connector I-024 and rear internal low frequency antenna connector B-058.
- Disconnect the instrument panel wire harness and body wire harness connectors I-030/B-036.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.



g. Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related wire harness and connector

OK

3

Check instrument panel wire harness and connector

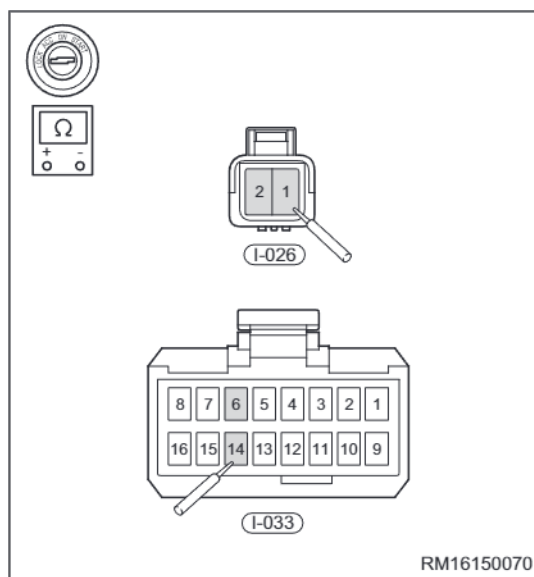
a. Check the instrument panel wire harness and connector (front internal low frequency antenna).

Check for Open

Multimeter Connection	Condition	Specified Condition
I-026 (1) - I-033 (14)	Always	Continuity
I-026 (2) - I-033 (6)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-026 (1) or I-033 (14) - Body ground	Always	No continuity
I-026 (2) or I-033 (6) - Body ground	Always	No continuity
I-026 (1) or I-033 (14) - Battery positive	Always	No continuity
I-026 (2) or I-033 (6) - Battery positive	Always	No continuity



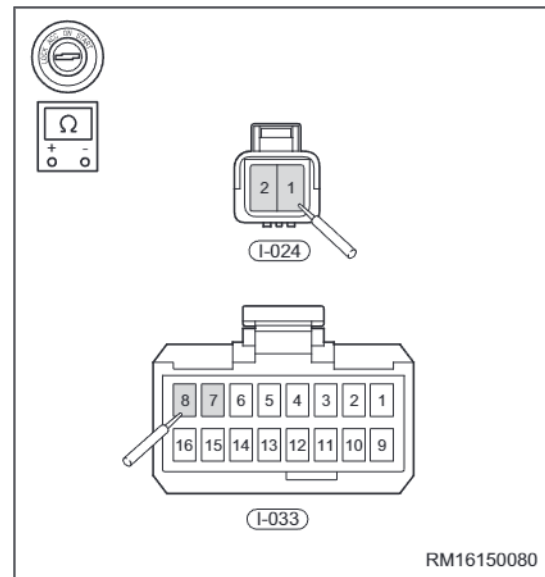
- b. Check the instrument panel wire harness and connector (middle internal low frequency antenna).

Check for Open

Multimeter Connection	Condition	Specified Condition
I-024 (1) - I-033 (8)	Always	Continuity
I-024 (2) - I-033 (7)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-024 (1) or I-033 (8) - Body ground	Always	No continuity
I-024 (2) or I-033 (7) - Body ground	Always	No continuity
I-024 (1) or I-033 (8) - Battery positive	Always	No continuity
I-024 (2) or I-033 (7) - Battery positive	Always	No continuity



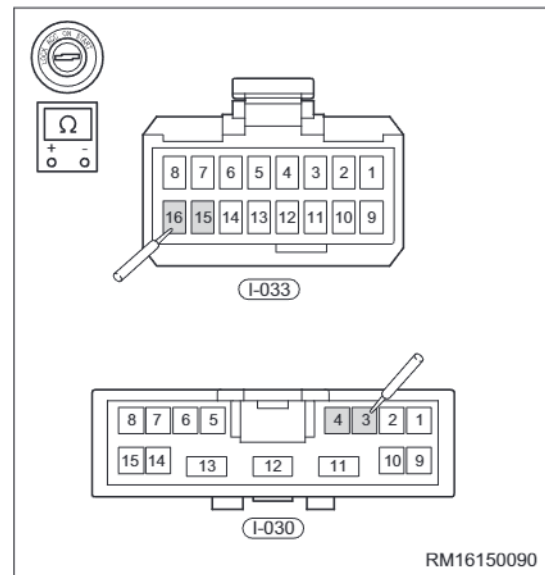
- c. Check the instrument panel wire harness and connector (rear internal low frequency antenna).

Check for Open

Multimeter Connection	Condition	Specified Condition
I-030 (3) - I-033 (16)	Always	Continuity
I-030 (4) - I-033 (15)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (3) or I-033 (16) - Body ground	Always	No continuity
I-030 (4) or I-033 (15) - Body ground	Always	No continuity
I-030 (3) or I-033 (16) - Battery positive	Always	No continuity



Multimeter Connection	Condition	Specified Condition
I-030 (4) or I-033 (15) - Battery positive	Always	No continuity

NG

Repair or replace corresponding instrument panel wire harness and connector

OK

4 Check body wire harness and connector

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

Check for Open

Multimeter Connection	Condition	Condition
B-036 (3) - B-058 (1)	Always	Continuity
B-036 (4) - B-058 (2)	Always	Continuity

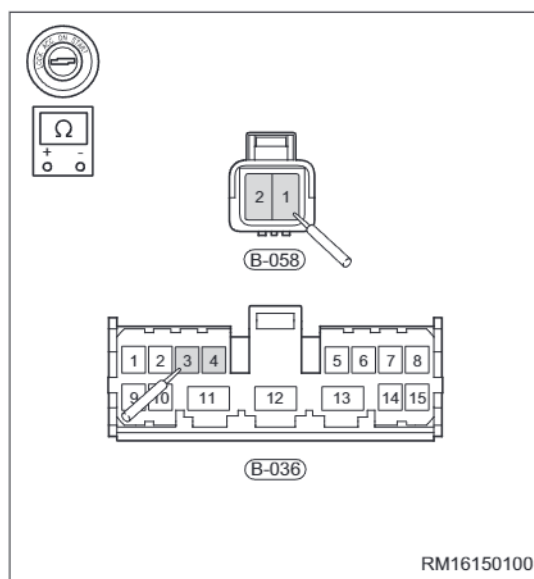
Check for Short

Multimeter Connection	Condition	Specified Condition
B-036 (3) or B-058 (1) - Body ground	Always	No continuity
B-036 (4) or B-058 (2) - Body ground	Always	No continuity
B-036 (3) or B-058 (1) - Battery positive	Always	No continuity
B-036 (4) or B-058 (2) - Battery positive	Always	No continuity

NG

Repair or replace body wire harness and connector

OK



5 Confirm DTCs

- Connect related wire harness connector.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

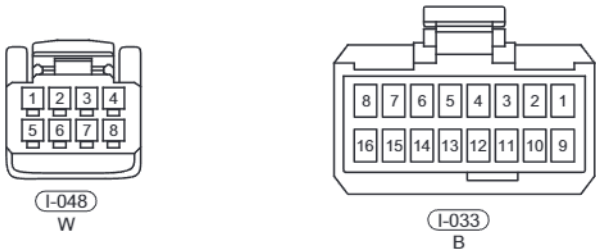
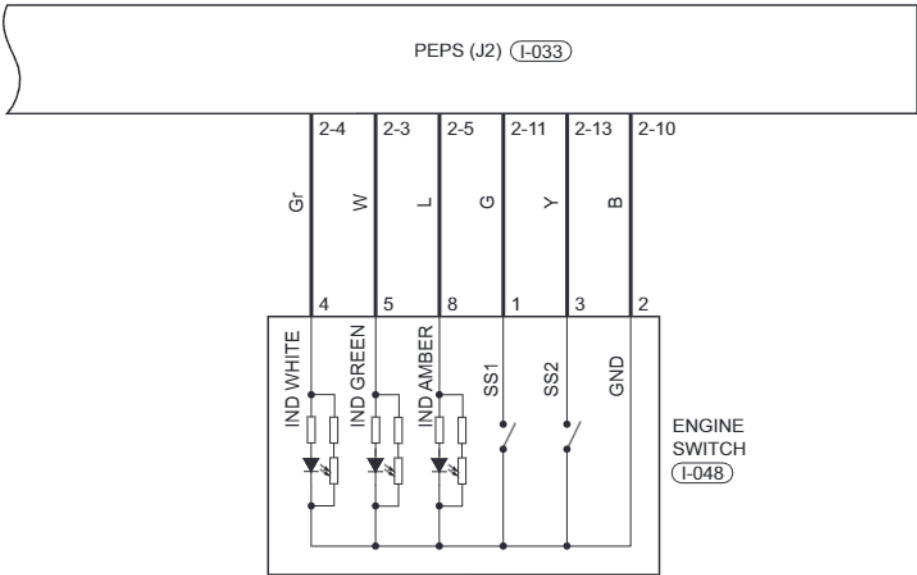
OK**System operates normally****NG****6 Replace low frequency antenna**

- Turn off ignition switch and disconnect the negative battery cable.
- Remove the low frequency antenna (See page xx-xx).
- Install new low frequency antenna.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again, and check whether DTCs are detected.

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

DTC	B1506-00	Abnormality on Switches of Engine Switch No Subtype Information
-----	----------	---

*: W/ PEPS



DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1506-00	Abnormality on Switches of Engine Switch No Subtype Information	Engine switch ON	• Wire harness or connector • Engine switch • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

1 Check PEPS controller ground

- Turn ignition switch to LOCK.
- Check the PEPS controller ground B-039 ([See page 53-29](#)).

NG

Repair or replace PEPS controller ground wire harness or ground point

OK

2 Check wire harness and connector

- Disconnect the negative battery cable.
- Disconnect the PEPS controller connector I-033.
- Disconnect the engine switch connector I-048.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related wire harness and connector

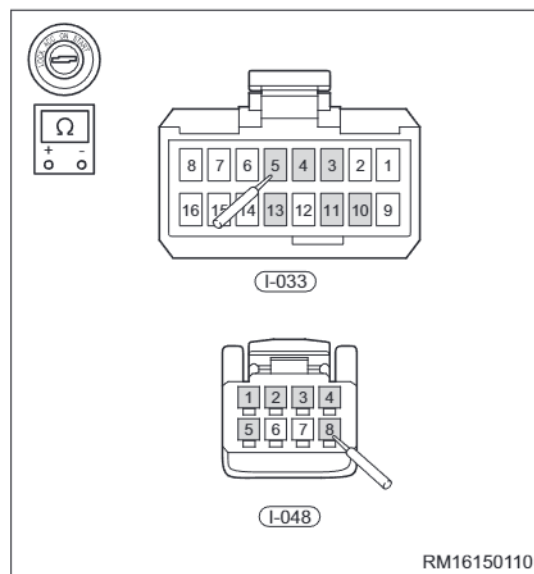
OK

3 Check instrument panel wire harness and connector

- a. Check the wire harness between instrument panel wire harness connectors I-033 and I-048.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-033 (4) - I-048 (4)	Always	Continuity
I-033 (3) - I-048 (5)	Always	Continuity
I-033 (5) - I-048 (8)	Always	Continuity
I-033 (11) - I-048 (1)	Always	Continuity
I-033 (13) - I-048 (3)	Always	Continuity
I-033 (10) - I-048 (2)	Always	Continuity

**Check for Short**

Multimeter Connection	Condition	Specified Condition
I-033 (4) or I-048 (4) - Body ground/ Battery positive	Always	No continuity
I-033 (3) or I-048 (5) - Body ground/ Battery positive	Always	No continuity
I-033 (5) or I-048 (8) - Body ground/ Battery positive	Always	No continuity
I-033 (11) or I-048 (1) - Body ground/ Battery positive	Always	No continuity
I-033 (13) or I-048 (3) - Body ground/ Battery positive	Always	No continuity
I-033 (10) or I-048 (2) - Body ground/ Battery positive	Always	No continuity

NG

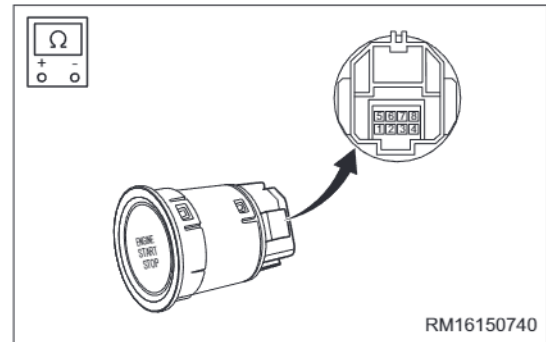
Repair or replace instrument panel wire harness and connector

OK

4 Check engine switch

- Remove the engine switch (See page 15-77).
- Check the engine switch.
 - Using a digital multimeter, check the continuity of the 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

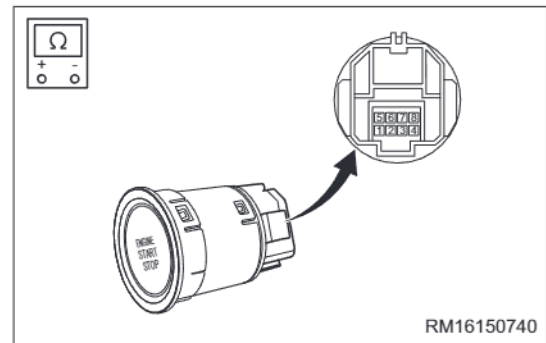


- Apply battery voltage to terminals of engine switch and check the illumination condition of engine switch.

HINT:

- If positive (+) lead and negative (-) lead are incorrectly connected, engine switch indicator will not illuminate.
- If battery voltage is too low, engine switch indicator will not illuminate.

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



15

NG

Repair or replace engine switch

OK

5	Confirm DTCs
----------	---------------------

- a. Connect the related wire harness connector.
- b. Connect the negative battery cable.
- c. Turn ignition switch to ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

NG

Repair or replace PEPS controller
--

OK

System operates normally

DTC	DTC Definition	DTC Detection Condition	DTC Detection Condition
B1507-00	Abnormality in IG Circuit No Subtype Information	Engine switch ON	• Wire harness or connector • Fuse • IGN1 relay • Engine switch • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure**15****1 Check fuse and relay**

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Remove the fuses EF19 (30A) and EF05 (10A) from the engine compartment fuse and relay box.
- Remove the IGN1 relay from engine compartment fuse and relay box.
- Remove the fuse RF07 (10A) from instrument panel fuse box.
- Check if fuse and relay are blown or damaged.

NG**Repair or replace damaged fuse and relay****OK****2 Check engine compartment fuse and relay box ground and PEPS controller ground**

- Check the engine compartment fuse and relay box ground B-051 ([See page 53-29](#)).
- Check the PEPS controller ground B-039 ([See page 53-29](#)).

NG**Repair or replace ground wire harness or ground point**

OK

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

- Remove the ING1 relay from engine compartment fuse and relay box.
- Connect the negative battery cable.
- Turn the digital multimeter to DC voltage band, and check that output voltage at terminal 30 of relay is 12 V.

NG

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

OK

4 Check body wire harness

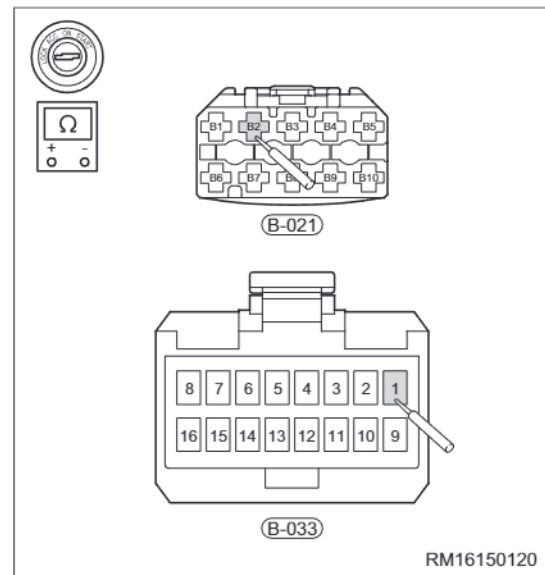
- Check the wire harness between engine compartment fuse and relay box connector B-021 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-021 (B2) - B-033 (1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-021 (B2) or B-033 (1) - Body ground	Always	No continuity
B-021 (B2) or B-033 (1) - Battery positive	Always	No continuity



15

- b. Check the wire harness between engine compartment fuse and relay box connector B-020 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-020 (G30) - B-033 (2)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-020 (G30) or B-033 (2) - Body ground	Always	No continuity
B-020 (G30) or B-033 (2) - Battery positive	Always	No continuity

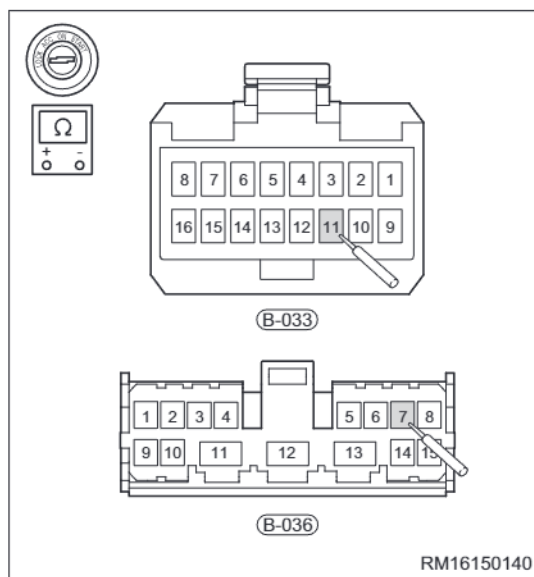
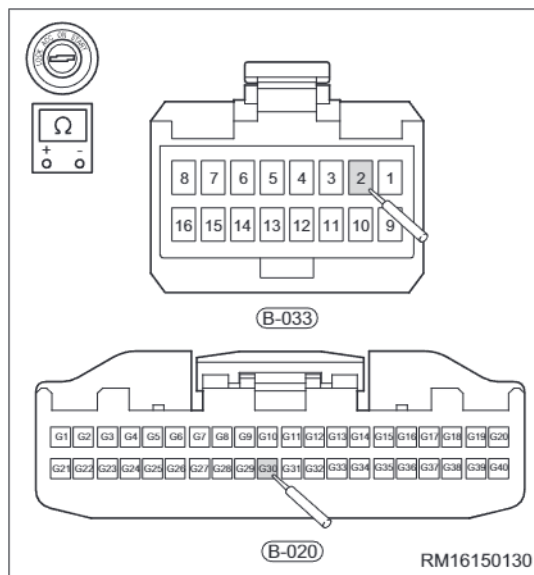
- c. Check the wire harness between body wire harness connector B-036 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-036 (7) - B-033 (11)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-036 (7) or B-033 (11) - Body ground	Always	No continuity
B-036 (7) or B-033 (11) - Battery positive	Always	No continuity



- d. Check the wire harness between body wire harness connector B-047 and engine compartment fuse and relay box connector B-019.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-047 (11) - B-019 (D7)	Always	Continuity

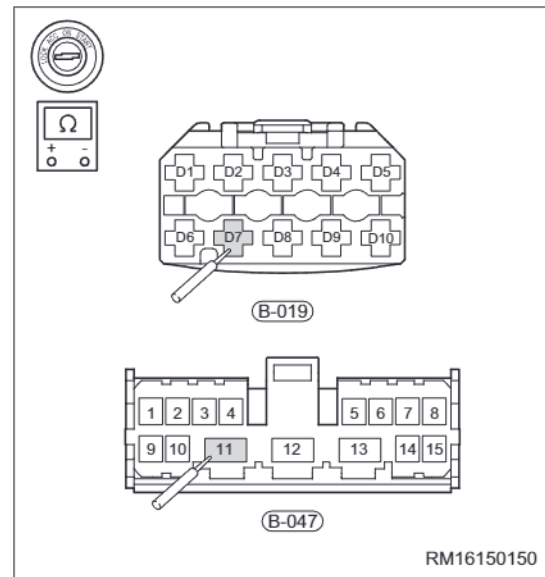
Check for Short

Multimeter Connection	Condition	Specified Condition
B-047 (11) or B-019 (D7) - Body ground	Always	No continuity
B-047 (11) or B-019 (D7) - Battery positive	Always	No continuity

NG

Repair or replace body wire harness

OK



5 Check instrument panel wire harness

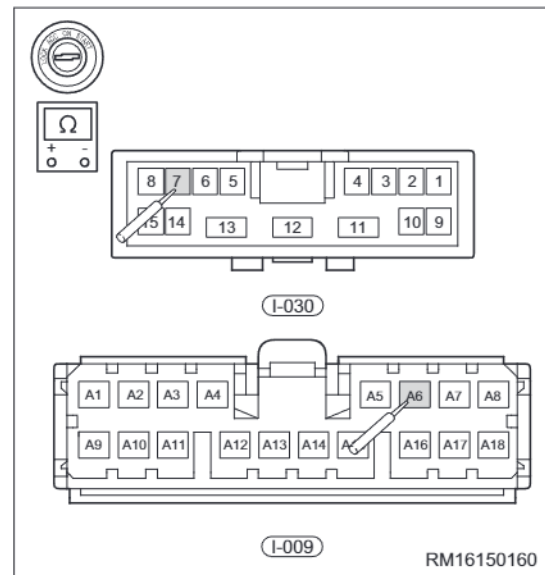
- a. Check the wire harness between instrument panel wire harness connectors I-030 and I-009.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-030 (7) - I-009 (A6)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-030 (7) or I-009 (A6) - Body ground	Always	No continuity
I-030 (7) or I-009 (A6) - Battery positive	Always	No continuity



15

- b. Check the wire harness between instrument panel wire harness connectors I-014 and I-011.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-014 (11) - I-011 (D1)	Always	Continuity

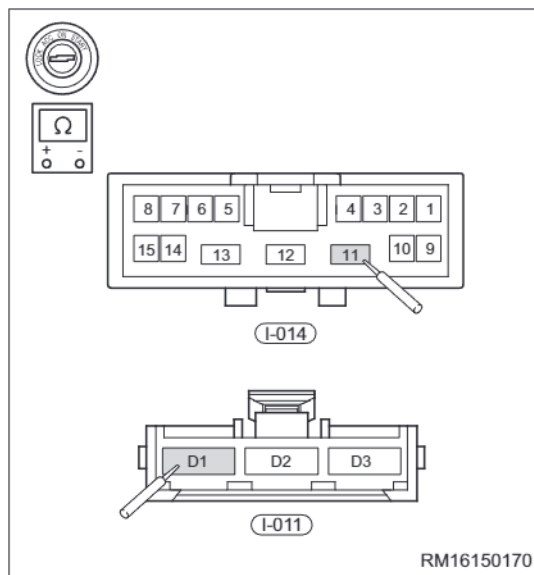
Check for Short

Multimeter Connection	Condition	Specified Condition
I-014 (11) or I-011 (D1) - Body ground	Always	No continuity
I-014 (11) or I-011 (D1) - Battery positive	Always	No continuity

NG

Repair or replace instrument panel wire harness

OK



6

Check engine switch

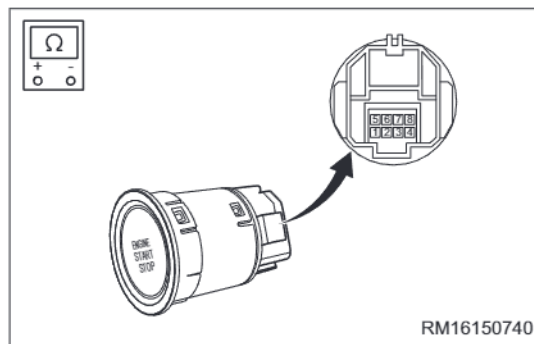
- a. Remove the engine switch (See page 15-77).
- b. Check the engine switch.
- Using a digital multimeter, check the continuity of the engine switch according to the table below.

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

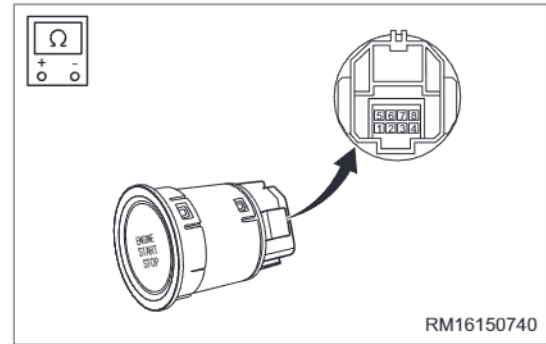
- Apply battery voltage to terminals of engine switch and check the illumination condition of engine switch.

HINT:

- If positive (+) lead and negative (-) lead are incorrectly connected, engine switch indicator will not illuminate.
- If battery voltage is too low, engine switch indicator will not illuminate.



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



NG

Repair or replace engine switch

OK

7

Confirm DTCs

- Connect related wire harness connector.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

NG

Repair or replace PEPS controller

OK

15

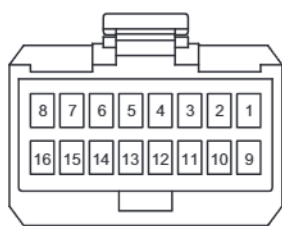
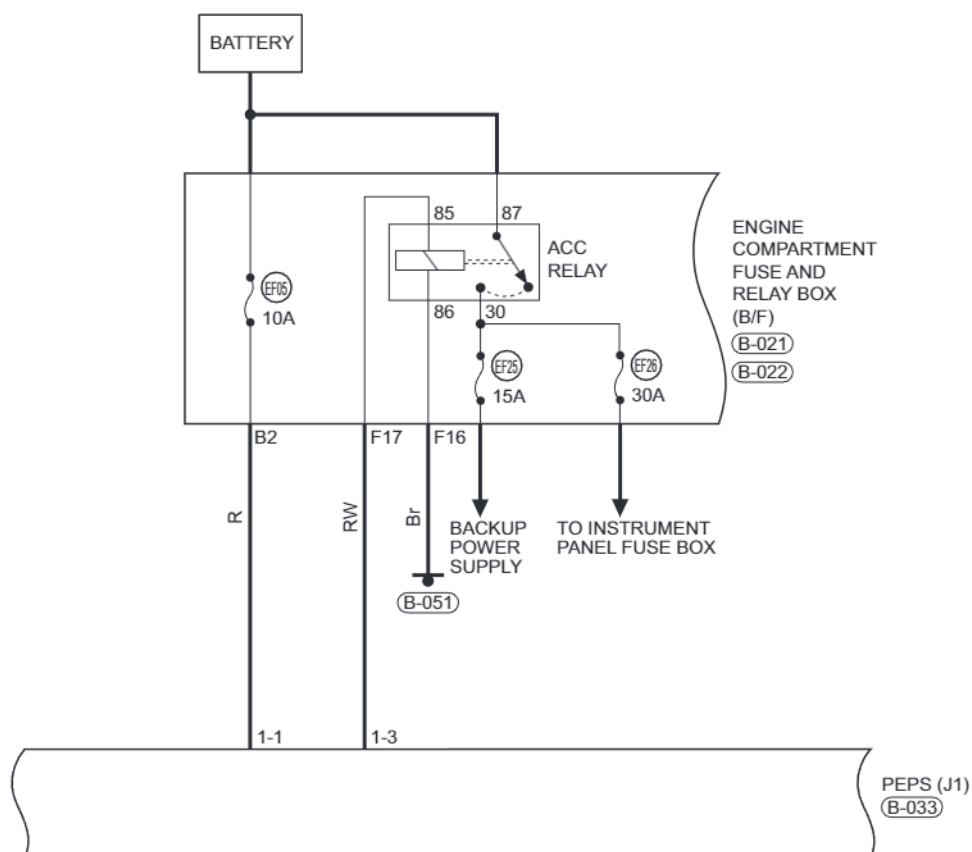
System operates normally

DTC

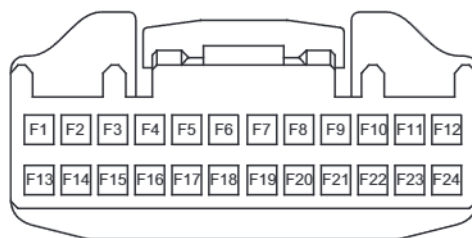
B1508-00

Abnormality in ACC Circuit No Subtype Information

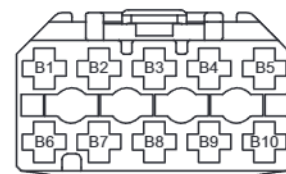
*: W/ PEPS



(B-033)
Gr



(B-022)
W



(B-021)
Y

EM16150090

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1508-00	Abnormality in ACC Circuit No Subtype Information	Engine switch ON	• Wire harness or connector • Fuse • ACC relay • Engine switch • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

1 Check fuse and relay

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Remove the fuse EF05 (10A) from engine compartment fuse and relay box.
- Remove the ACC relay from engine compartment fuse and relay box.
- Check if fuse and relay are blown or damaged.

NG

Repair or replace damaged fuse and relay

OK

2 Check engine compartment fuse and relay box ground and PEPS controller ground

- Check the engine compartment fuse and relay box ground B-051 ([See page 53-29](#)).
- Check the PEPS controller ground B-039 ([See page 53-29](#)).

NG

Repair or replace ground wire harness or ground point

OK

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

- Remove the ACC relay from engine compartment fuse and relay box.
- Connect the negative battery cable.
- Turn the digital multimeter to DC voltage band, and check that output voltage at terminal 30 of relay is 11 - 14 V.

NG

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

OK

4 Check body wire harness

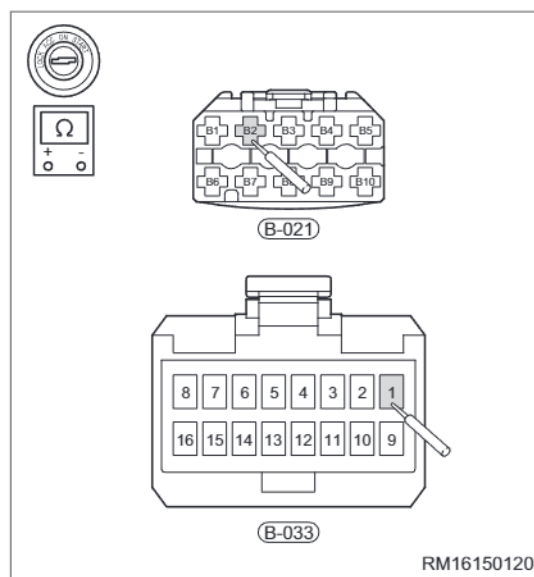
- Check the wire harness between engine compartment fuse and relay box connector B-021 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-021 (B2) - B-033 (1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-021 (B2) or B-033 (1) - Body ground	Always	No continuity
B-021 (B2) or B-033 (1) - Battery positive	Always	No continuity



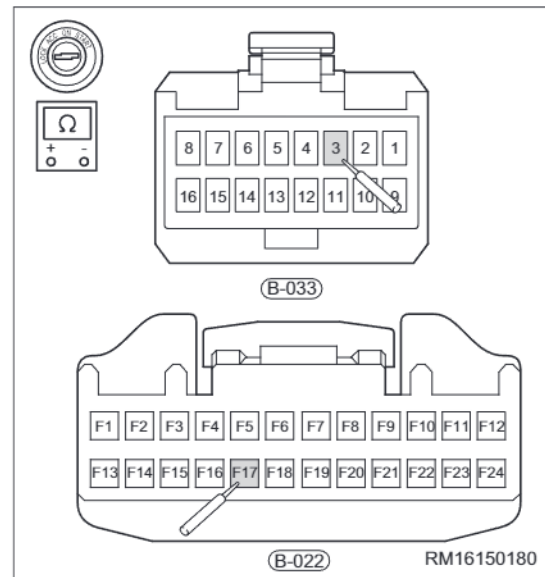
- b. Check the wire harness between engine compartment fuse and relay box connector B-022 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-022 (F17) - B-033 (3)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-022 (F17) or B-033 (3) - Body ground	Always	No continuity
B-022 (F17) or B-033 (3) - Battery positive	Always	No continuity



NG

Repair or replace body wire harness

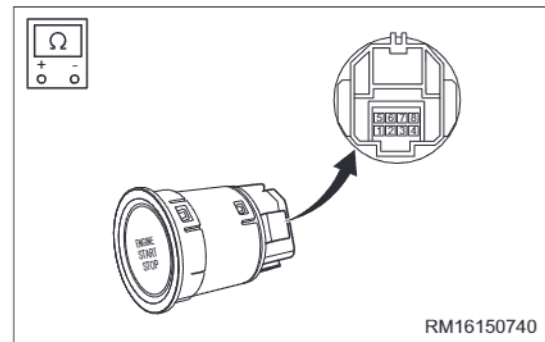
OK

5

Check engine switch

- a. Remove the engine switch (See page 15-77).
- b. Check the engine switch.
- Using a digital multimeter, check the continuity of the engine switch according to the table below.

Multimeter Connection	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

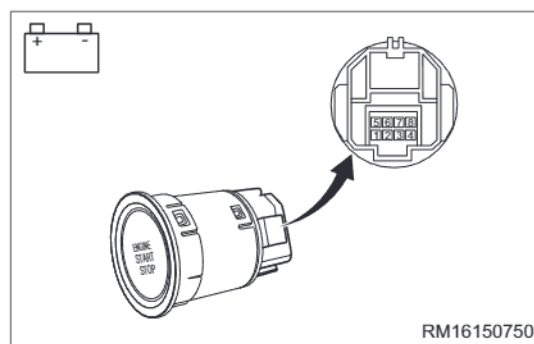


15

- Apply battery voltage to terminals of engine switch and check the illumination condition of engine switch.

HINT:

- If positive (+) lead and negative (-) lead are incorrectly connected, engine switch indicator will not illuminate.
- If battery voltage is too low, engine switch indicator will not illuminate.



Multimeter Connection	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 (green)
Battery positive (+) - Terminal 8 Battery negative (-) - Terminal 2	Always	Come on (amber)

NG**Repair or replace engine switch****OK****15****6****Confirm DTCs**

- Connect related wire harness connector.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

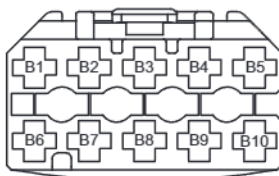
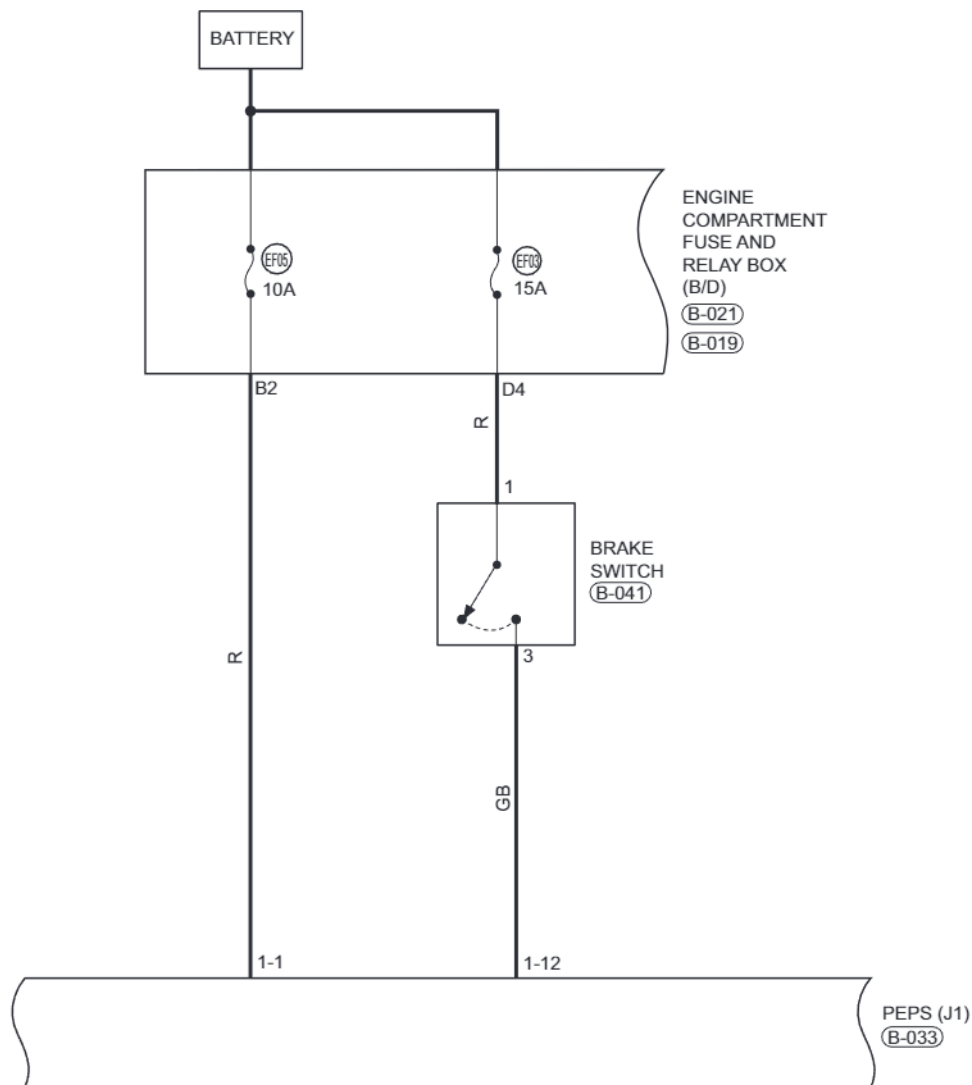
NG**Repair or replace PEPS controller****OK****System operates normally**

DTC

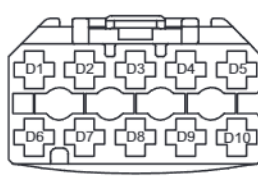
B1509-00

Abnormality in Brake Signal No Subtype Information

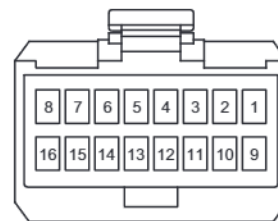
*: FOR CVT, W/ PEPS



(B-021)
Y



(B-019)
W



(B-033)
Gr



(B-041)
B

EM16150100

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1509-00	Abnormality in Brake Signal No Subtype Information	Engine switch ON	• Wire harness or connector • Fuse • Brake switch assembly • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

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

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Remove the fuses EF05 (10A) and EF03 (15A) from engine compartment fuse and relay box.
- Disconnect the brake switch connector B-041 and PEPS controller connector B-033.
- Disconnect the engine compartment fuse and relay box connectors B-021 and B-019.
- Check if the wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related fuse, connector and wire harness

OK**2 Check PEPS controller ground**

- Check the PEPS controller ground B-039 ([See page 53-29](#)).

NG

Repair or replace connector and terminal

OK

3 Check body wire harness

- a. Check the wire harness between engine compartment fuse and relay box connector B-021 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-021 (B2) - B-033 (1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-021 (B2) or B-033 (1) - Body ground	Always	No continuity
B-021 (B2) or B-033 (1) - Battery positive	Always	No continuity

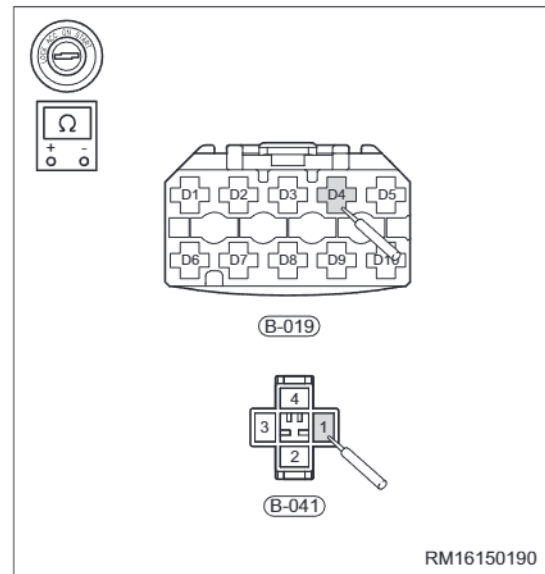
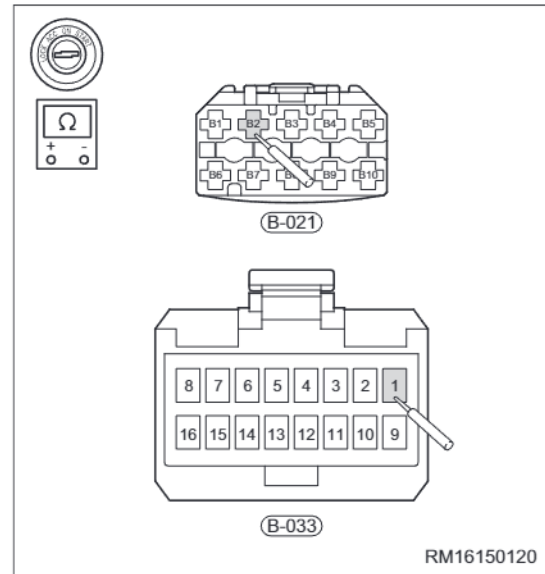
- b. Check the wire harness between engine compartment fuse and relay box connector B-019 and brake switch connector B-041.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-019 (D4) - B-041 (1)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-019 (D4) or B-041 (1) - Body ground	Always	No continuity
B-019 (D4) or B-041 (1) - Battery positive	Always	No continuity



15

- c. Check the wire harness between brake switch connector B-041 and PEPS controller connector B-033.

Check for Open

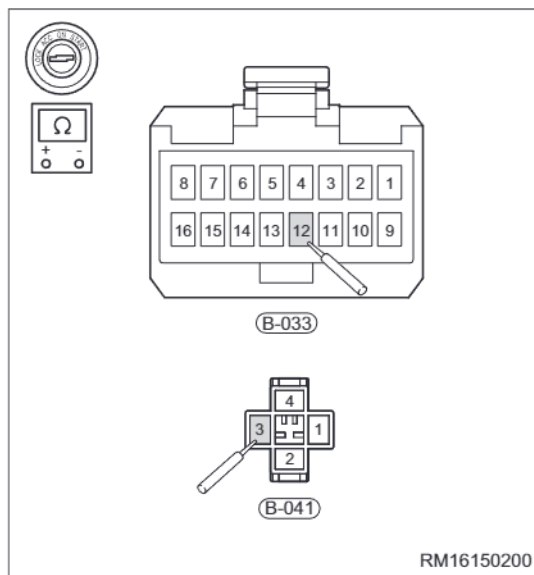
Multimeter Connection	Condition	Specified Condition
B-041 (3) - B-033 (12)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-041 (3) or B-033 (12) - Body ground	Always	No continuity
B-041 (3) or B-033 (12) - Battery positive	Always	No continuity

NG

Repair or replace related body wire harness

OK**4 Check brake switch assembly**

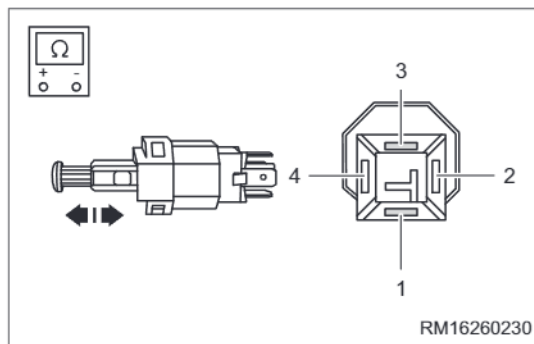
- a. Remove the brake switch assembly (See page 27-10).
- b. Check the brake switch assembly.
- Using the ohm band of digital multimeter, check for continuity between terminals of brake light switch assembly according to the table below.

15

Multimeter Connection	Switch 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

- a. Connect related wire harness connector.
- b. Connect the negative battery cable.
- c. Turn ignition switch to ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

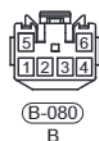
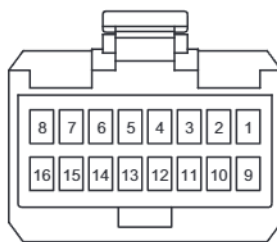
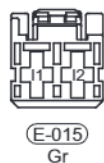
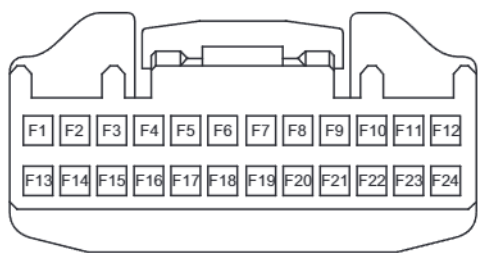
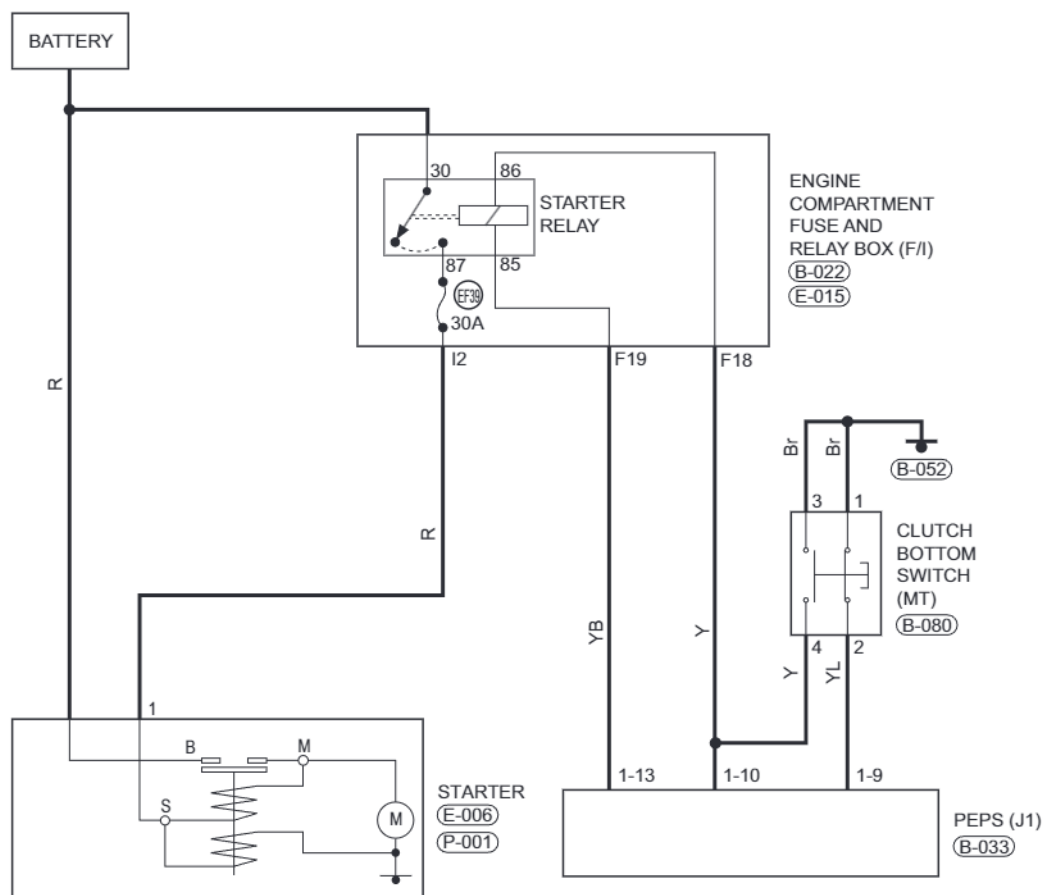
NG**Repair or replace PEPS controller****OK****System operates normally**

DTC

B150C-00

Clutch Switch Signal Error No Subtype Information

*: FOR MT, W/ PEPS



EM16150040

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B150C-00	Clutch Switch Signal Error No Subtype Information	Engine switch ON	• Wire harness or connector • Clutch bottom switch • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

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

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect the clutch bottom switch connector B-080 and PEPS controller connector B-033.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related fuse, connector and wire harness

OK**2 Check body wire harness ground**

- Check the body wire harness ground B-052 ([See page 53-29](#)).

NG

Repair or replace ground wire harness or ground point

OK

3 Check body wire harness

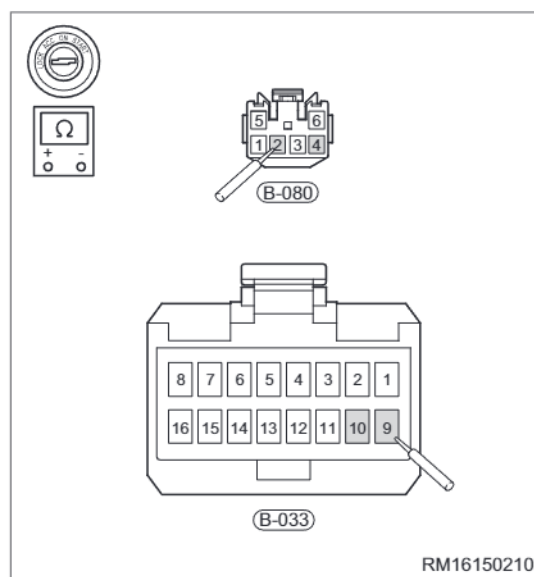
- a. Check the wire harness between clutch bottom switch connector B-080 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-080 (4) - B-033 (10)	Always	Continuity
B-080 (2) - B-033 (9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-080 (4) or B-033 (10) - Body ground	Always	No continuity
B-080 (2) or B-033 (9) - Body ground	Always	No continuity
B-080 (4) or B-033 (10) - Battery positive	Always	No continuity
B-080 (2) or B-033 (9) - Battery positive	Always	No continuity



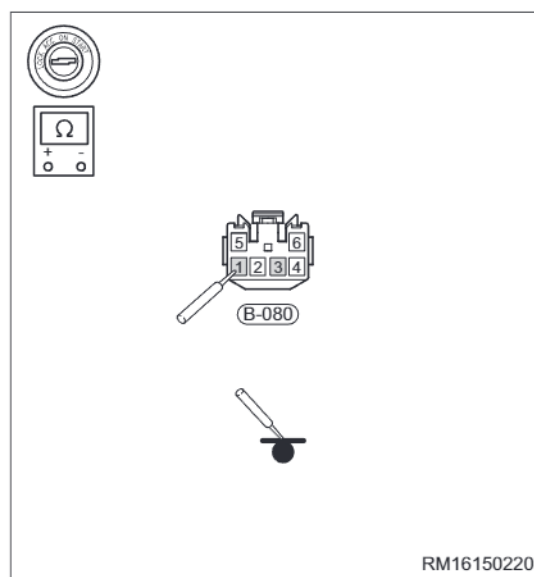
- b. Check the wire harness between clutch bottom switch connector B-080 and body ground.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-080 (3) - Body ground	Always	Continuity
B-080 (1) - Body ground	Always	Continuity

NG

Repair or replace wire harness or connector

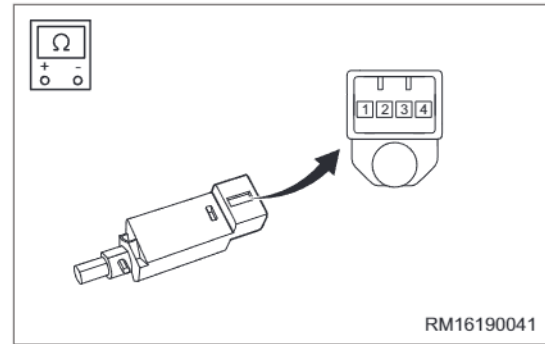


OK

4 Check clutch bottom switch

- a. Remove the clutch bottom switch (See page 19-8).
- b. Check the clutch bottom switch.
 - Using the ohm band of digital multimeter, check for continuity between terminals of clutch bottom switch according to the table below.

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Clutch pedal depressed	No continuity
Terminal 3 - Terminal 4	Clutch pedal depressed	Continuity
Terminal 1 - Terminal 2	Brake pedal released	Continuity
Terminal 3 - Terminal 4	Brake pedal released	No continuity

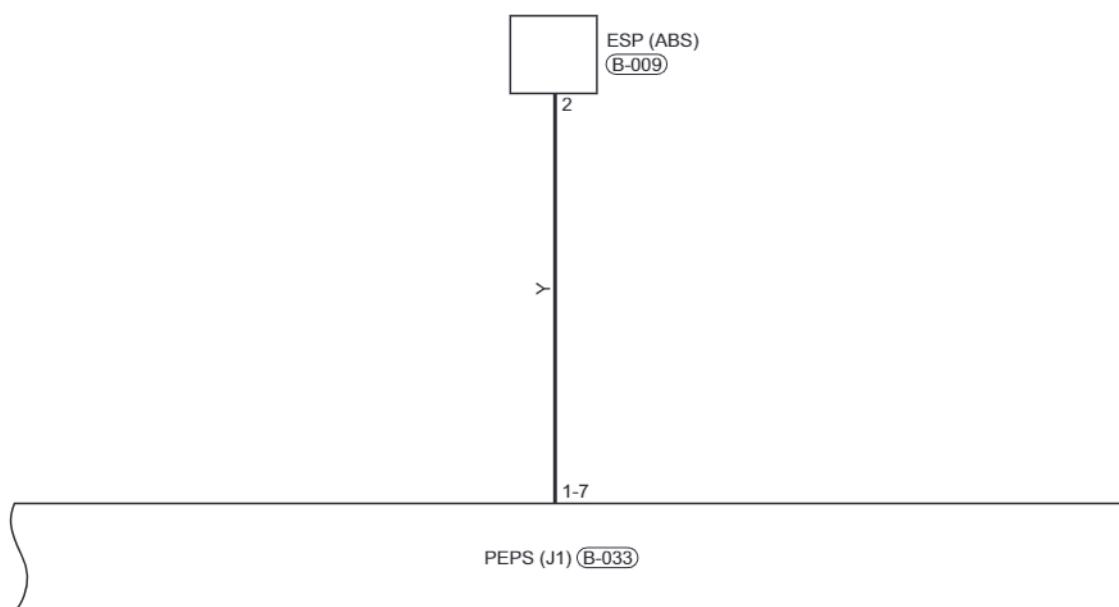
**NG****Replace clutch bottom switch****OK****5 Confirm DTCs**

- a. Connect wire harness connector.
- b. Connect the negative battery cable.
- c. Turn ignition switch to ON.
- d. Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

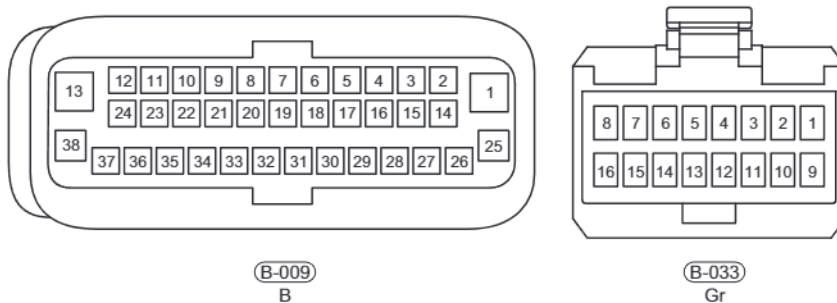
NG**Repair or replace PEPS controller****OK****System operates normally**

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

*: W/ PEPS



15



EM16150110

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1510-00	Abnormality on Wheel Speed Signal No Subtype Information	Engine switch ON	- Wire harness or connector - ABS module - 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure**1 Check brake control system DTC**

- Check if there is any DTC related to wheel speed sensor in brake control system.
- Replace the corresponding wheel speed sensor.
- Using X-431 3G diagnostic tester, check if DTC B1510-00 is present.

NG**Go to next step****OK****2 Check wire harness and connector**

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect the ESP (ABS) connector B-009 and PEPS controller connector B-033.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG**Repair or replace related wire harness and connector**

OK

3 Check body wire harness

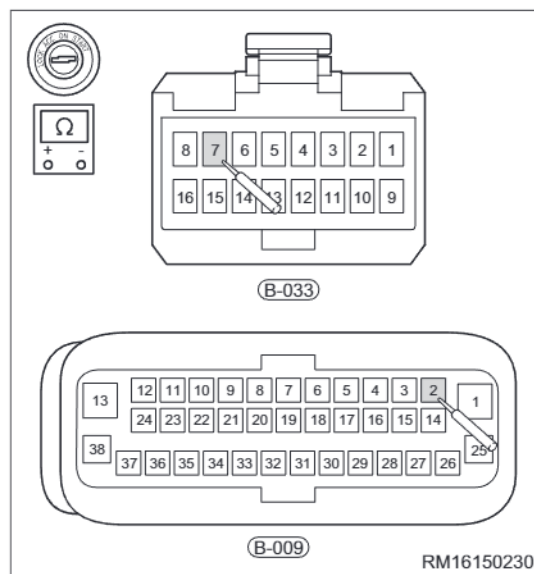
- a. Check the wire harness between ESP (ABS) connector B-009 and PEPS controller connector J1 (B-033).

Check for Open

Multimeter Connection	Condition	Specified Condition
B-009 (2) - B-033 (7)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-009 (2) or B-033 (7) - Body ground	Always	No continuity
B-009 (2) or B-033 (7) - Battery positive	Always	No continuity



NG

Repair or replace related wire harness and connector

OK

15

4 Confirm DTCs

- Connect related wire harness connector.
- Connect negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

OK

System operates normally

NG

5 Reconfirm DTCs after replacing ABS module

- Remove the ABS module ([See page 25-88](#)).
- Replace the ABS module.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again, and check whether DTCs are detected.

NG

Repair or replace PEPS controller

OK

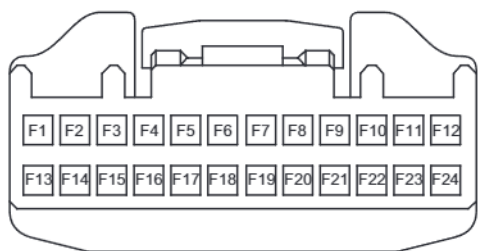
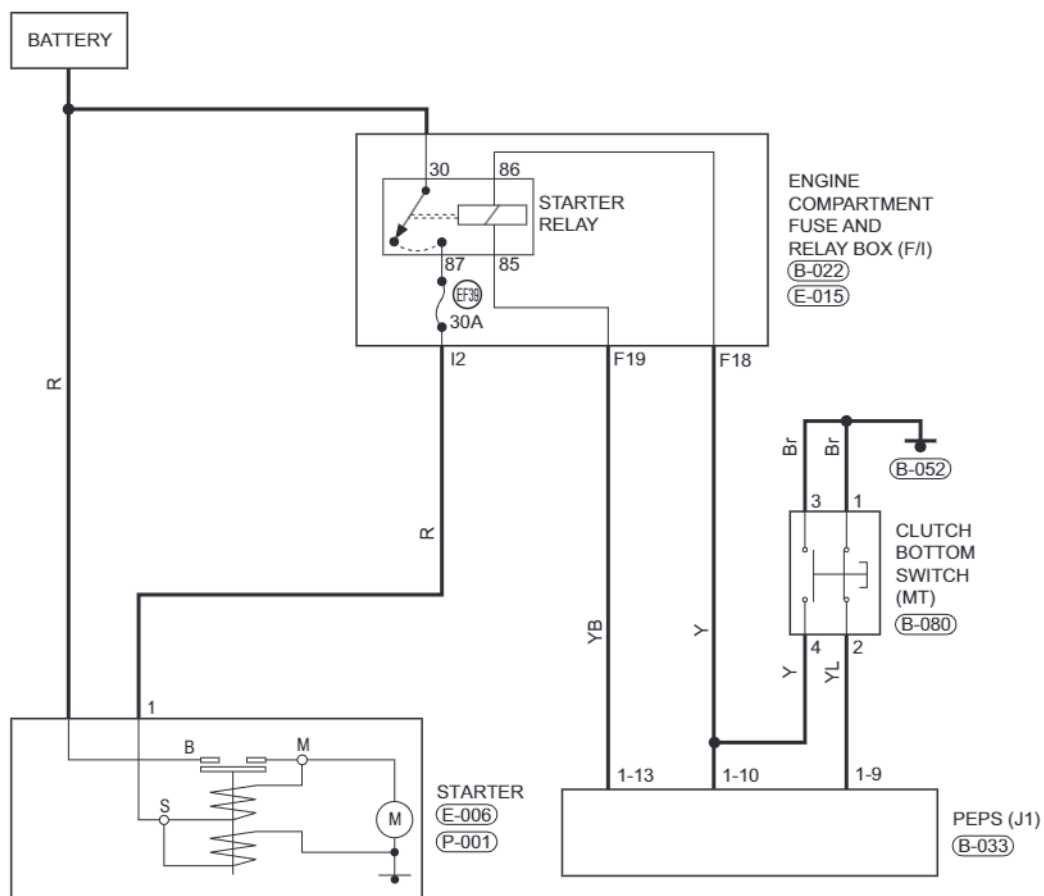
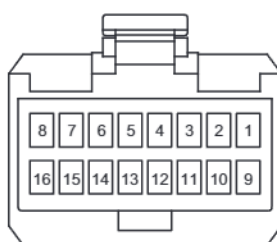
System operates normally

DTC

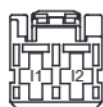
B1514-00

Abnormality on STAR Power Supply No Subtype Information

*: FOR MT, W/ PEPS

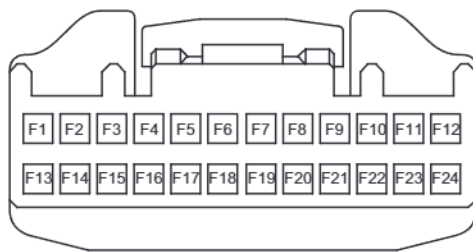
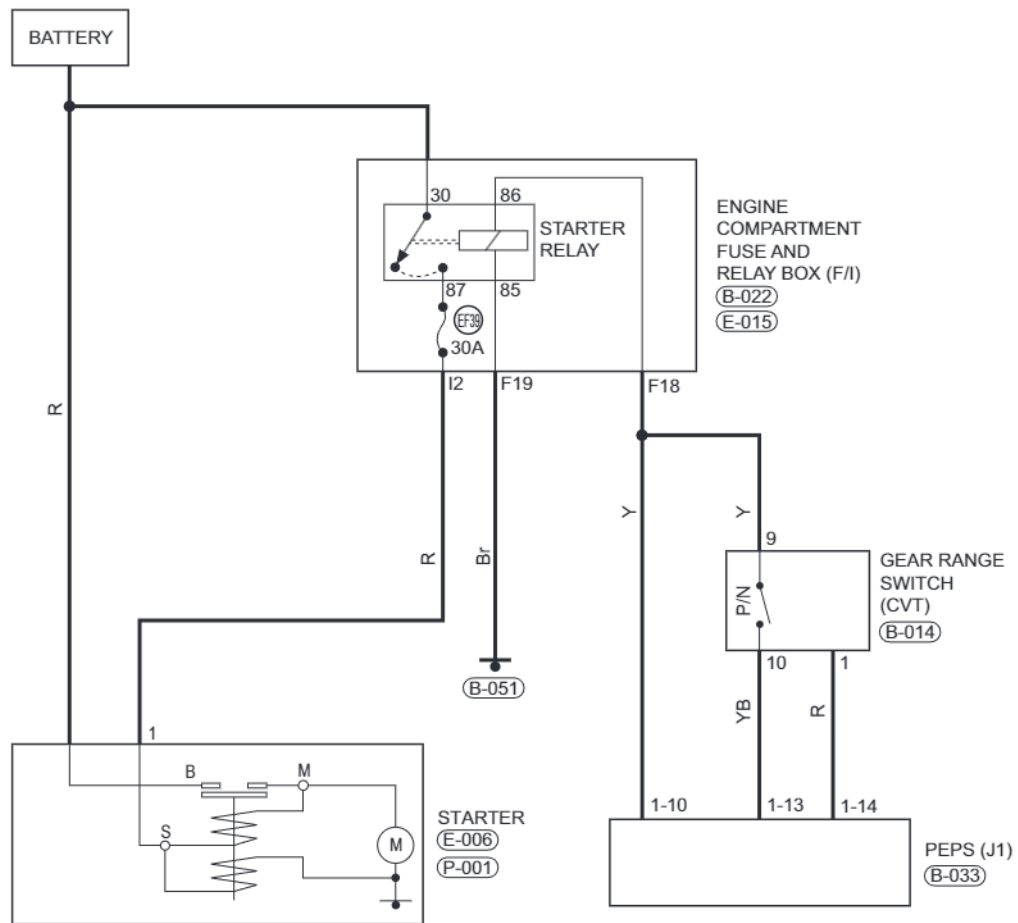
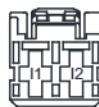
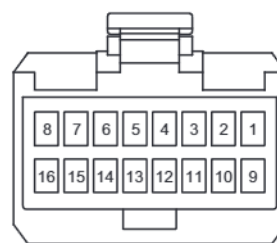
(B-022)
W(B-033)
Gr

(P-001)

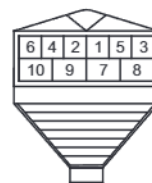
(E-015)
Gr(B-080)
B(E-006)
B

EM16150040

*: FOR CVT, W/ PEPS


(B-022)
W

(E-015)
Gr

(B-033)
Gr


(P-001)


(B-014)
B

(E-006)
B

EM16150050

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1514-00	Abnormality on STAR Power Supply No Subtype Information	Engine switch ON	• Wire harness or connector • Fuse • Relay • Gear switch (for CVT model) • 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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure**15****1 Check fuse and relay**

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Remove the fuses EF39 (30A) and starter relay from engine compartment fuse and relay box.
- Check if fuse and starter relay are blown or damaged.

NG

Repair or replace damaged fuse and starter relay

OK**2 Check body wire harness ground**

- Check the body wire ground points ground B-052 and B-051 ([See page 53-29](#)).

NG

Repair or replace ground wire harness or ground point

OK

3 Check body wire harness (for MT model)

- a. Check the wire harness between PEPS controller connector J1 (B-033) and engine compartment fuse and relay box connector B-022.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-033 (10) - B-022 (F18)	Always	Continuity
B-033 (13) - B-022 (F19)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-033 (10) or B-022 (F18) - Body ground	Always	No continuity
B-033 (13) or B-022 (F19) - Body ground	Always	No continuity
B-033 (10) or B-022 (F18) - Battery positive	Always	No continuity
B-033 (13) or B-022 (F19) - Battery positive	Always	No continuity

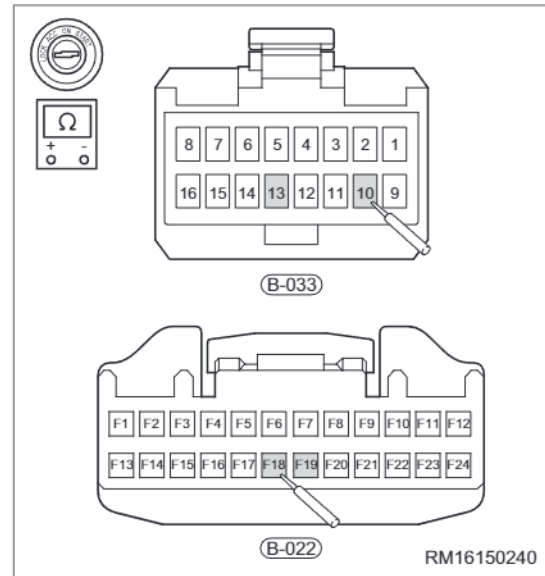
- b. Check the wire harness between PEPS controller connector J1 (B-033) and clutch bottom switch connector B-080.

Check for Open

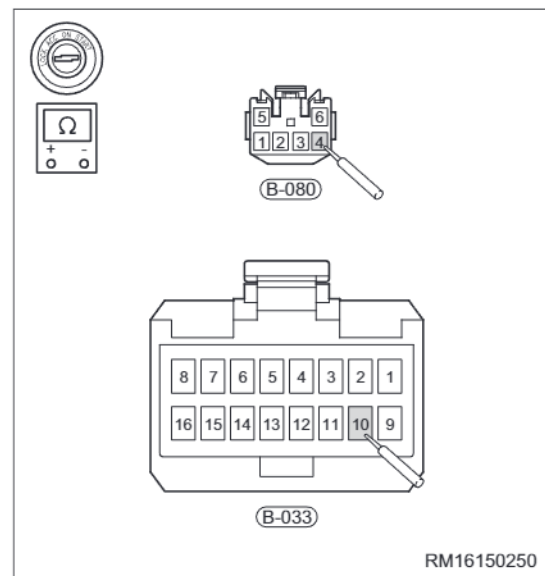
Multimeter Connection	Condition	Specified Condition
B-033 (10) - B-080 (4)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-033 (10) or B-080 (4) - Body ground	Always	No continuity
B-033 (10) or B-080 (4) - Battery positive	Always	No continuity



15



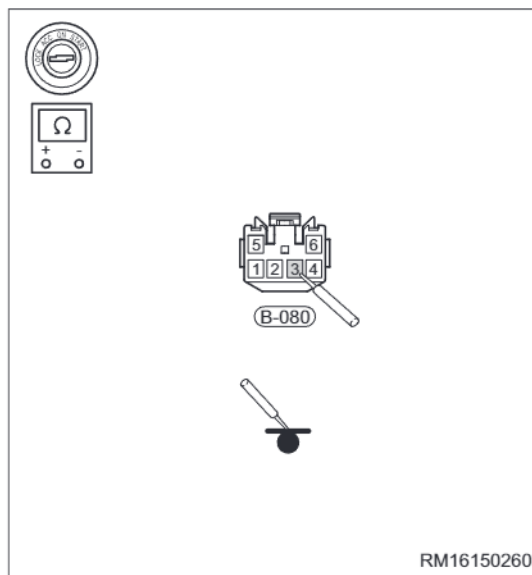
- c. Check the wire harness between clutch bottom switch connector B-080 and body ground.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-080 (3) - Body ground	Always	Continuity

NG

Repair or replace related wire harness or connector



OK

Go to step 6

4 Check body wire harness (for CVT model)

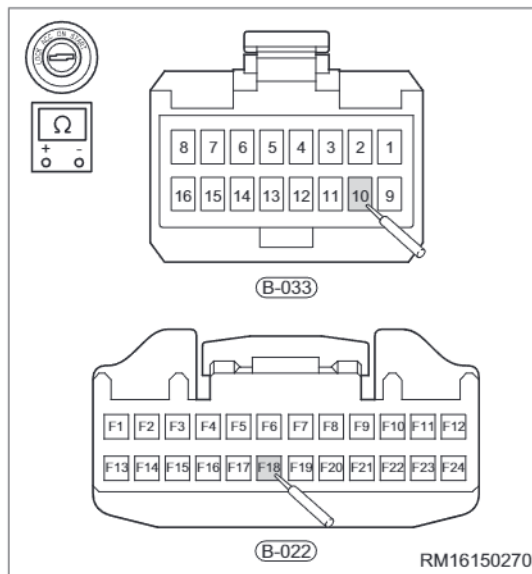
- a. Check the wire harness between engine compartment fuse and relay box connector B-022 and PEPS controller connector B-033.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-022 (F18) - B-033 (10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-022 (F18) or B-033 (10) - Body ground	Always	No continuity
B-022 (F18) or B-033 (10) - Battery positive	Always	No continuity



15

- b. Check the wire harness between gear switch connector B-014 and PEPS controller connector B-030.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-014 (10) - B-030 (13)	Always	Continuity
B-014 (9) - B-030 (10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-014 (10) or B-030 (13) - Body ground	Always	No continuity
B-014 (9) or B-030 (10) - Body ground	Always	No continuity
B-014 (10) or B-030 (13) - Battery positive	Always	No continuity
B-014 (9) or B-030 (10) - Battery positive	Always	No continuity

- c. Check the wire harness between gear switch connector B-014 and engine compartment fuse and relay box connector B-022.

Check for Open

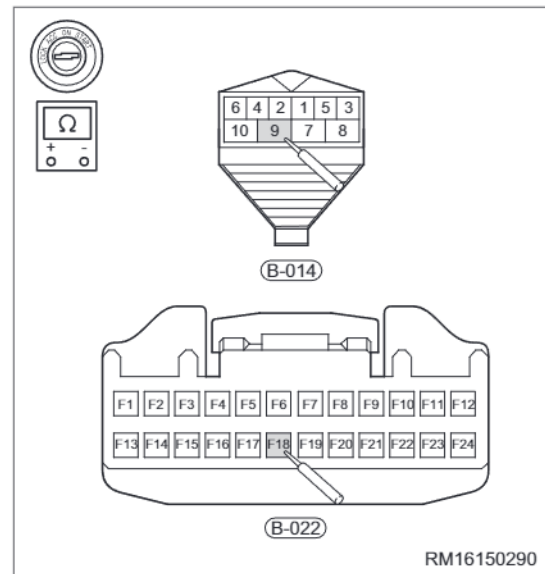
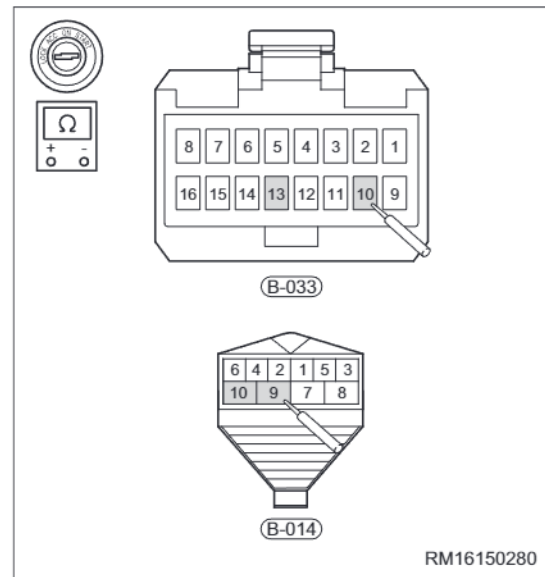
Multimeter Connection	Condition	Specified Condition
B-014 (9) - B-022 (F18)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-014 (9) or B-022 (F18) - Body ground	Always	No continuity
B-014 (9) or B-022 (F18) - Battery positive	Always	No continuity

NG

Repair or replace related wire harness or connector

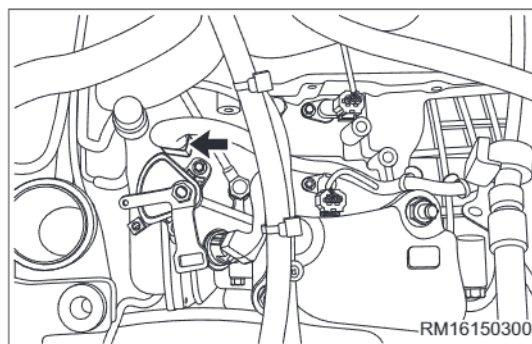


OK

5 Check gear switch (for CVT model)

- Disconnect the gear switch connector (arrow).
- Check gear switch (for CVT model).

Shift Position	Terminal	Specified Condition
P	1 - 7, 9 - 10	Continuity
R	7 - 8	
N	2 - 7, 9 - 10	
D	3 - 7	
L	4 - 7	



NG

Repair or replace gear switch

OK

6 Confirm DTCs

- Connect all related connectors.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

15

OK

System operates normally

NG

7 Reconfirm DTCs after replacing starter

- Remove the starter ([See page 15-71](#)).
- Replace the starter.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC) again, and check whether DTCs are detected.

NG

Repair or replace PEPS controller

OK

System operates normally

DTC	B1515-45	ROM for Checksum Failure
------------	-----------------	---------------------------------

DTC	DTC Definition	DTC Detection Condition	Suspected Area
B1515-45	ROM for Checksum Failure	Engine switch ON	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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

1	Replace PEPS Controller
----------	--------------------------------

15

OK

System operates normally

DTC	U0073-88	Control Module Communication Bus Off Bus Off
DTC	U0100-87	Lost Communication With EMS Missing Message
DTC	U0101-87	Lost Communication With TCM Missing Message
DTC	U0129-87	Lost Communication With BSM Missing Message
DTC	U0140-87	Lost Communication With BCM Missing Message

Self-diagnosis Detection Logic

DTC	DTC Definition	DTC Detection Condition	Suspected Area
U0173-88	Control Module Communication Bus Off Bus Off	Engine switch ON	• Wire harness or connector • PEPS controller
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		

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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

1 Check PEPS controller ground

- Turn ignition switch to LOCK.
- Check the PEPS controller ground points B-039 and I-020 ([See page 53-29](#)).

NG

Repair or replace PEPS controller ground wire harness or ground point

OK

2 Check wire harness and connector

- Disconnect the negative battery cable.
- Disconnect the PEPS controller connector B-033.
- Disconnect the ECM, TCU, ABS and BCM connectors.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related wire harness and connector

OK

3 Confirm DTCs

- Connect related wire harness connector.
- Connect the negative battery cable.
- Turn ignition switch to ON.
- Connect X-431 3G diagnostic tester to Data Link Connector (DLC), and check whether DTCs are detected.

OK

System operates normally

NG

4 Replace PEPS Controller

- Remove the PEPS controller ([See page 15-79](#)).
- Replace the PEPS controller.

OK

System operates normally

DTC	U1300-55	Software Configuration Error Not Configured
------------	-----------------	--

DTC	DTC Definition	DTC Detection Condition	Suspected Area
U1300-55	Software Configuration Error Not Configured	Engine switch ON	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 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.
- Use X-431 3G diagnostic tester to record and clear DTCs stored in PEPS system.
- Turn ignition switch to LOCK and wait for a few seconds.
- Use X-431 3G diagnostic tester to read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If no DTC is detected, malfunction indicated by DTC is intermittent ([See page 15-17](#)).

Diagnosis Procedure

15

1	Replace PEPS controller
---	-------------------------

OK

System operates normally

ON-VEHICLE SERVICE

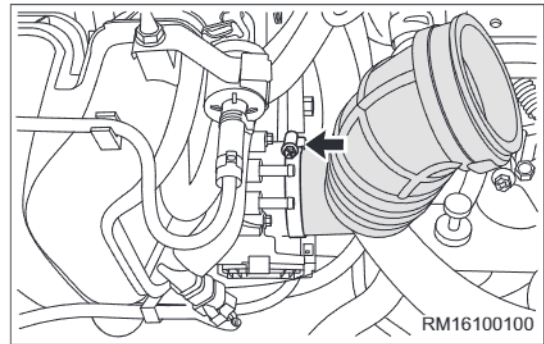
Starter

Removal

CAUTION

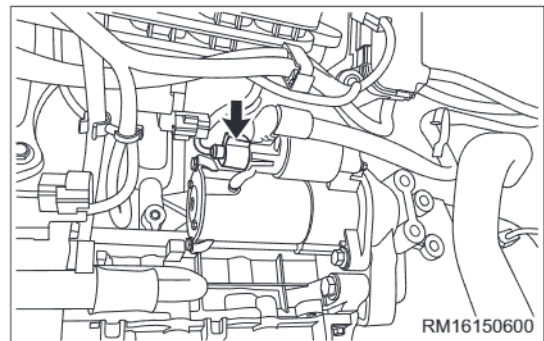
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the air filter assembly ([See page 10-12](#)).
5. Remove the engine lower protector assembly ([See page 49-22](#)).
6. Move away the intake hose.
 - a. Loosen the worm clamp (arrow), and disconnect the connection between intake hose and electronic throttle assembly.
(Tightening torque: $3 \pm 0.5 \text{ N}\cdot\text{m}$)

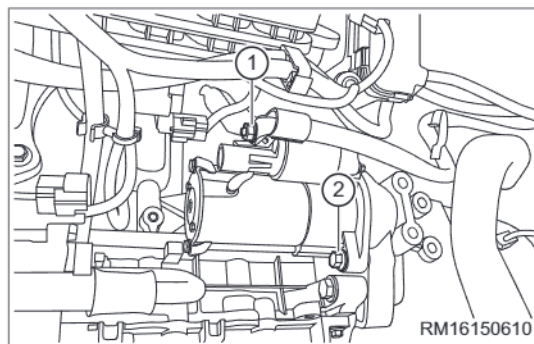


15

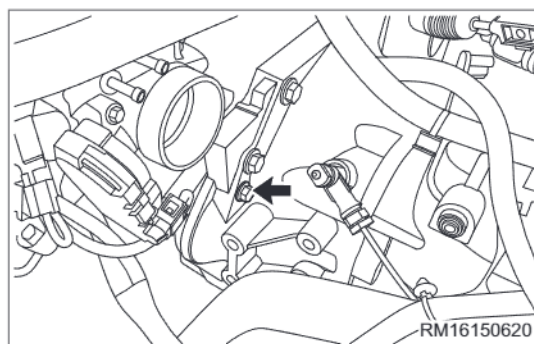
- b. Move the intake hose to one side.
7. Remove the starter.
 - a. Disconnect the starter connector (arrow).



- b. Move away the terminal cap, remove the starter power cable nut (1) and disconnect the starter power cable.
(Tightening torque: 13 ± 1 N·m)
- c. Remove the coupling bolt (2) between the starter and the right side of transmission.
(Tightening torque: 35 ± 5 N·m)



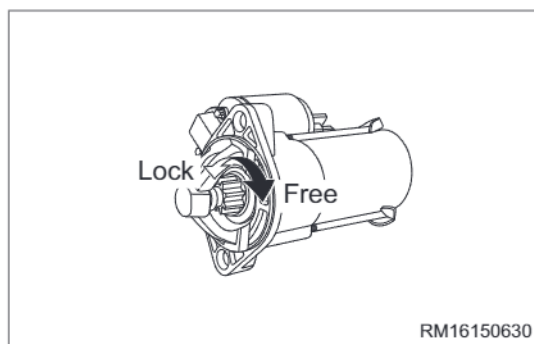
- d. Remove the coupling bolt (arrow) between the starter and the left side of transmission.
(Tightening torque: 35 ± 5 N·m)



- e. Remove the starter.

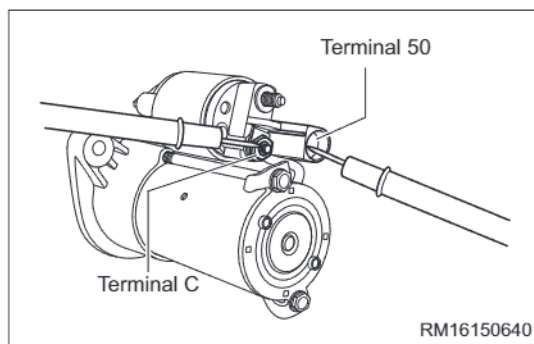
Inspection

1. Check the starter clutch.
 - a. Rotate the clutch pinion gear clockwise and check that it turns freely, as shown in illustration. Rotate the clutch pinion gear counterclockwise and check that it locks.



If result is not as specified, replace the starter.

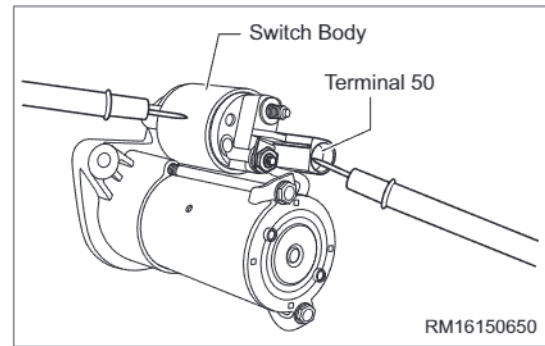
2. Check the starter solenoid switch.
 - a. Check the pull-in coil.
 - Measure the resistance between terminal 50 and terminal C.



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

b. Check the hold-in coil.

- Measure the 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.

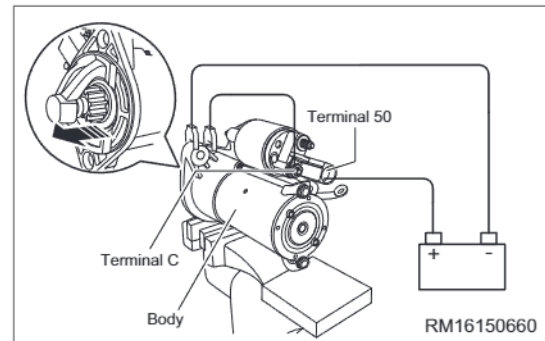
3. Check the starter assembly.

CAUTION

- These measurements must be performed within 3 to 5 seconds to avoid coil burnout.
- Place the starter assembly onto a vise. The jaws of vise should be covered by aluminum sheet or brass plate; otherwise, the starter assembly will be easily damaged when clamping it.

a. Perform pull-in test.

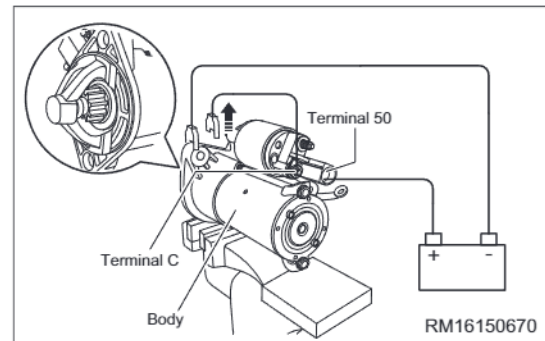
- Remove the nut and disconnect the field coil lead from terminal C.
- As shown in illustration, connect battery to solenoid switch, and check that starter clutch pinion sticks out.



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

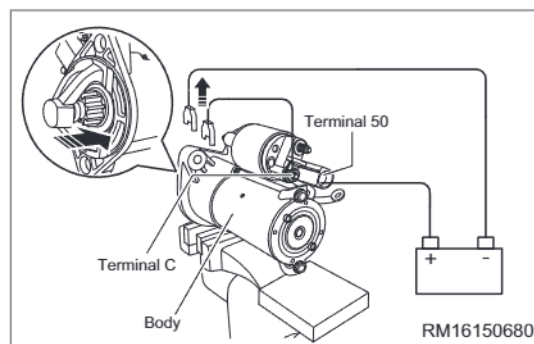
b. Perform hold-in test.

- Keep the starter clutch pinion sticking out and the connection condition of battery mentioned above, and disconnect the negative battery cable from terminal C.
- Check that starter clutch pinion keeps sticking out.



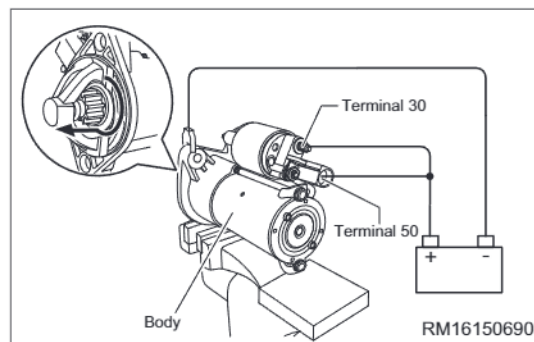
If starter clutch pinion moves inward, replace the starter assembly.

- c. Check if starter clutch pinion returns back.
- Disconnect the negative battery cable from starter body. Check that starter clutch pinion returns back.



If starter clutch pinion does not return back, 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 illustration, connect battery to starter. Check that starter rotates smoothly when the starter clutch pinion moves outward.



CAUTION

- The lead to be connected should avoid the pinion side to prevent lead stuck as pinion rotates.

If result is not as specified, replace the starter.

15

Installation

Installation is in the reverse order of removal.

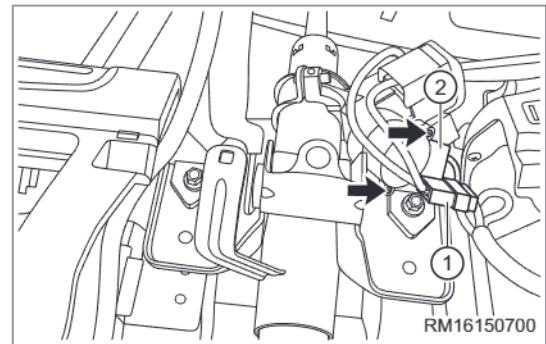
Ignition Starting Switch (w/o PEPS System)

Removal

CAUTION

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

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the combination switch cover (See page 28-28).
4. Remove the ignition starting switch.
 - a. Move away the wire harness connector (1) from ignition starting switch.
 - b. Disconnect the ignition starting switch connector (2).
 - c. Remove the ignition starting switch fixing screws (arrow).
(Tightening torque: $13 \pm 2 \text{ N}\cdot\text{m}$)

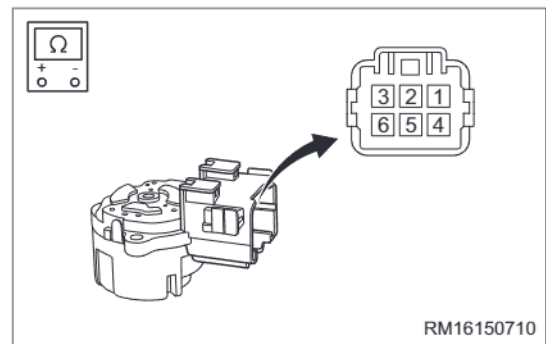


- d. Remove the ignition starting switch.

Inspection

1. Check for continuity of the ignition starting switch.
 - a. Using a digital multimeter, check the 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



Multimeter Connection	Switch Condition	Specified Condition
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.

Installation

Installation is in the reverse order of removal.

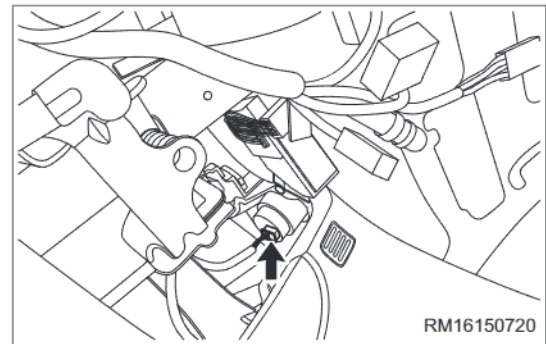
Engine Switch (w/ PEPS System)

Removal

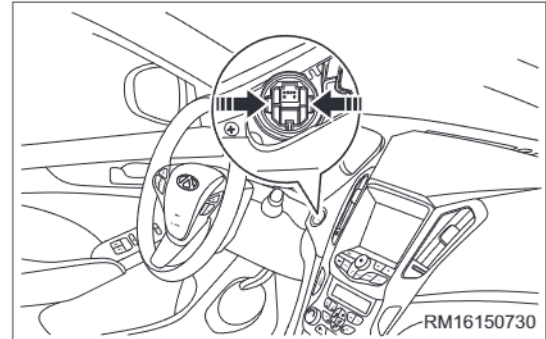
CAUTION

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

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



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



Inspection

1. Check for continuity of the engine switch.
 - a. Using a digital multimeter, check the 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 the illumination condition of the engine switch indicator.
 - a. Apply battery voltage to terminals of engine switch and check the illumination condition of engine switch.

HINT:

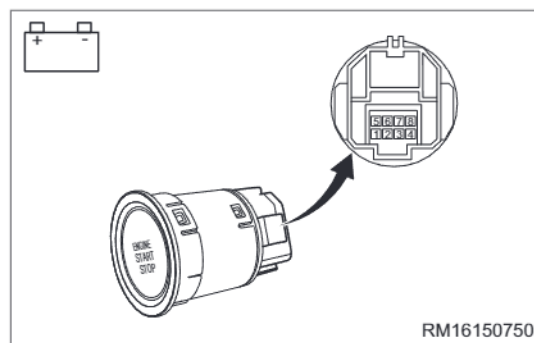
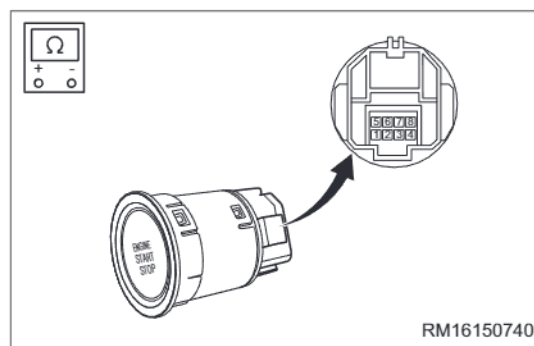
- If positive (+) lead and negative (-) lead are incorrectly connected, engine switch indicator will not illuminate.
- If battery voltage is too low, engine switch indicator will not illuminate.

Multimeter Connection	Condition	Specified Condition
Battery positive (+) - Terminal 4 Battery negative (-) - Terminal 2	Always	Comes on (stamping word)
Battery positive (+) - Terminal 5 Battery negative (-) - Terminal 2	Always	Comes on (green)
Battery positive (+) - Terminal 8 Battery negative (-) - Terminal 2	Always	Comes on (amber)

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

Installation

Installation is in the reverse order of removal.



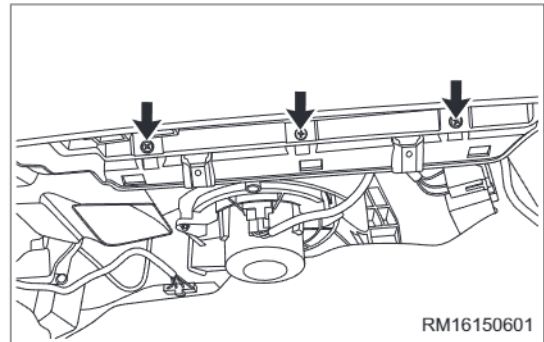
Passive Entry & Passive Start (PEPS) Controller (w/ PEPS System)

Removal

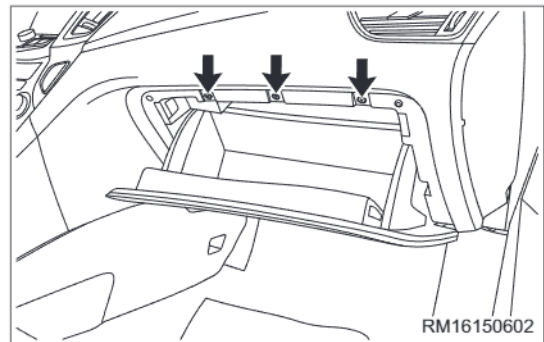
CAUTION

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

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the glove box assembly.
 - a. Remove 3 fixing screws (arrow) from the lower part of glove box assembly.
(Tightening torque: 1.5 ± 0.5 N·m)



- b. Open the glove box and remove 3 fixing screws (arrow) from the upper part of glove box assembly.
(Tightening torque: 1.5 ± 0.5 N·m)



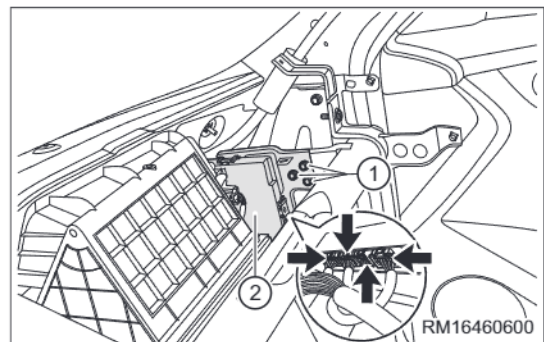
15

- c. Remove the glove box assembly from instrument panel assembly.
4. Remove the PEPS Controller.
 - a. Disconnect the PEPS controller connectors (arrow).

HINT:

For MT model, PEPS controller has 4 wire harness connectors; For CVT model, PEPS controller has 3 wire harness connectors.

- b. Remove 3 fixing bolts (1) from PEPS controller bracket.
(Tightening torque: 7 ± 1 N·m)
- c. Remove the PEPS controller with bracket assembly (2) from engine crossmember.



 CAUTION

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

Installation

Installation is in the reverse order of removal.

 CAUTION

- It is necessary to match PEPS controller after replacing it ([See page 34-9](#)).
- 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, and it will not function if used for more than 50 times.
- For MT model, perform "Erase ESCL" immediately after replacing with a new PEPS controller, or it will cause the Electric Steering Column Lock (ESCL) to enter "Anti-scanning" safe mode.
- If Electric Steering Column Lock (ESCL) enters "Anti-scanning" safe mode, it is necessary to perform "Erase ESCL".

