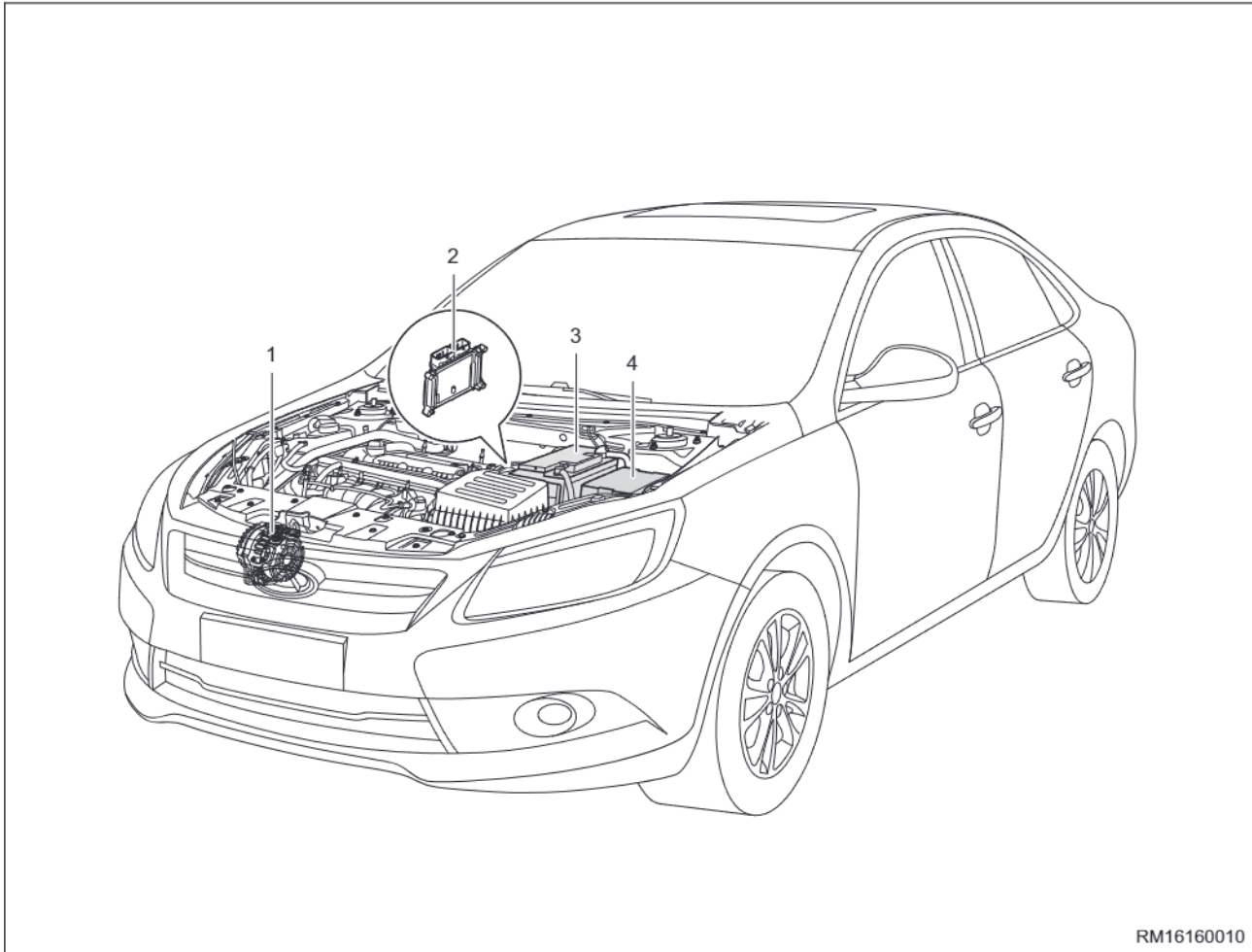

SQRE4G16 CHARGING SYSTEM

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GENERAL INFORMATION

Description



RM16160010

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1 - Alternator	2 - ECM
3 - Battery	4 - Fuse and Relay Box

Alternator is a key component of the charging system. It is a device that converts mechanical energy into electrical energy and generates DC voltage through a rectifying circuit, as one of main power sources of the vehicle. The alternator operates as a complete assembly. If alternator fails for any reason, the entire unit must be replaced.

Alternator Operation

Alternator is a silicon rectifying alternator, which mainly consists of rotor, stator and rectifier.

When direct current flows to rotor winding, rotor claws energize magnetic field to produce alternating induced electromotive force. The stator is installed on the outside of rotor, which is secured together with the front and rear end covers of alternator. When alternator rotor is rotated by drive belt, magnetic pole lines cut stator winding, causing a change in the magnetic flux of stator winding; thus, stator winding generates alternating induced electromotive force, producing alternating current. Three-phase alternating current generated by alternator is converted to direct current from alternating current by rectifier, and direct current is transmitted to the vehicle electrical system and battery.

Specifications

Torque Specifications

Description	Torque (N·m)
Battery Pressure Plate Fixing Bolt	25 ± 2.5
Battery Tray Fixing Bolt in Engine Compartment Fuse and Relay Box	7 ± 1
Battery Tray Fixing Bolt	25 ± 2.5
Engine Control Module Fixing Bolt	7 ± 1
Accessory Drive Belt Tensioner Fixing Bolt	$40 + 5$
Idler Gear Fixing Bolt	$40 + 5$
Alternator Output Cable Fixing Nut	20 ± 2
Alternator Fixing Bolt	$20 + 5$
Alternator Bracket Fixing Bolt	$40 + 5$

Battery Specification

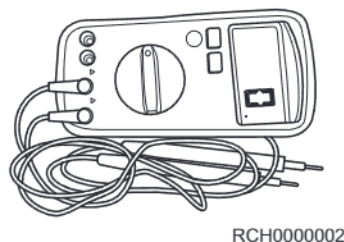
Engine Type	Battery Model	Specification
SQRE4G16	L2 400	12 V, 60 Ah, 480 A

Tool

General Tool

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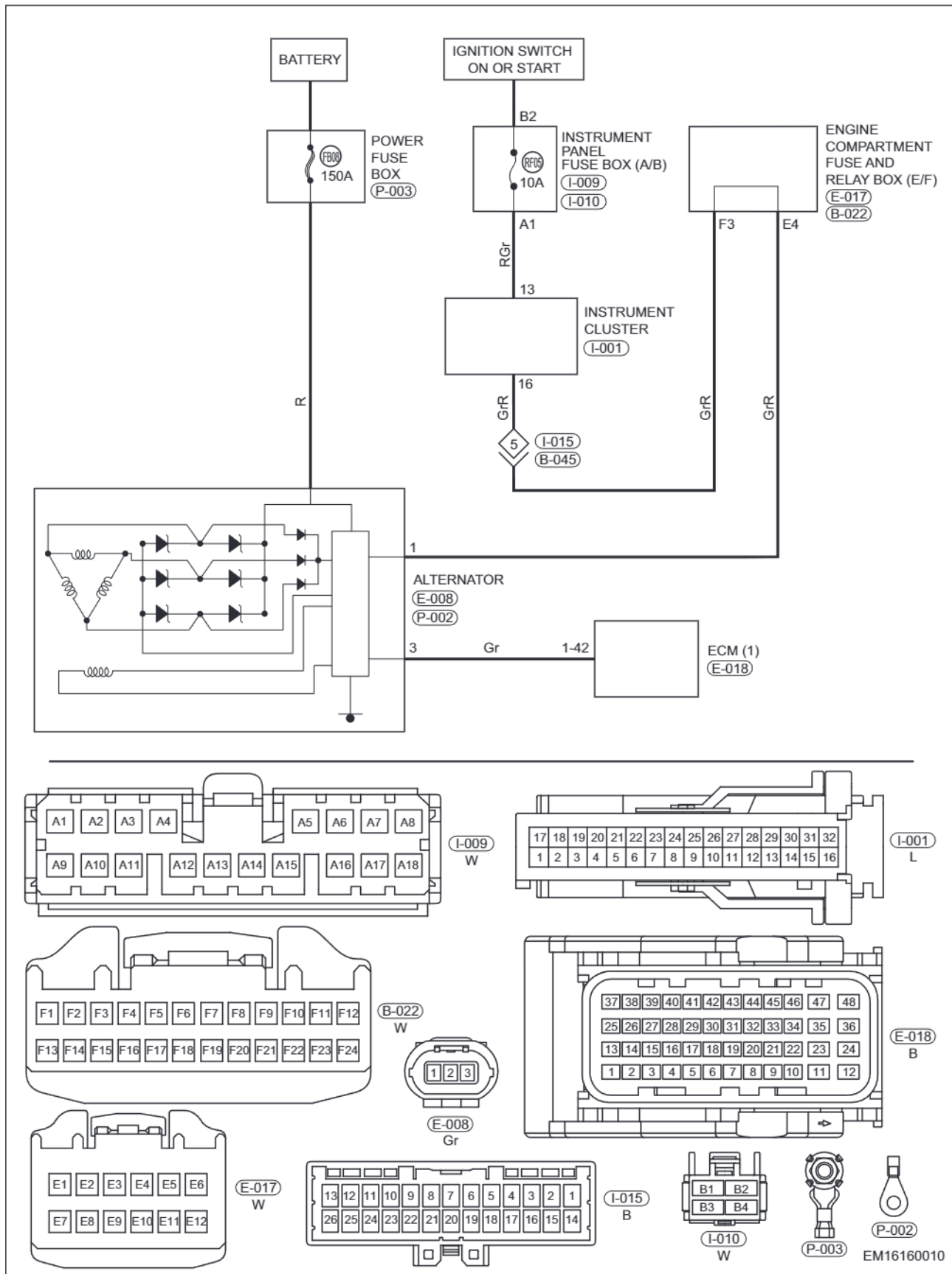
Digital Multimeter



RCH0000002

Circuit Diagram

Charging System



DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
Charging system warning light comes on after engine starts	Alternator	16-12
	Instrument cluster	39-77
	Wire harness	-
Noises are heard from alternator after engine starts	Fixing bolt (loose)	16-4
	Accessory drive belt (misaligned, loose or fault)	07-21
	Alternator	16-12

Charging System Charging Voltage Inspection

1. Leave vehicle under no load test condition and idle the engine. Measure battery voltage with a digital multimeter.

Standard voltage: 14.1 ± 0.3 V.

If result is not as specified, replace the alternator ([See page 16-12](#)).

2. Leave vehicle under load test condition and idle the engine. Measure battery voltage with a digital multimeter.

Load test condition:

- Set headlight to high beam;
- Turn on blower and adjust blower speed to the highest;
- Turn on the "A/C" switch.
- Turn cold and hot switch to adjust the temperature of outlet to the highest.

Standard voltage: 14.1 ± 0.3 V.

If result is not as specified, replace the alternator ([See page 16-12](#)).

CAUTION

- If charging system warning light comes on, charging system may have a malfunction.
- If noises are heard from alternator or generating capacity is extremely high or low, repair or replace the alternator.

ON-VEHICLE SERVICE

Battery

On-vehicle Inspection

1. Check that battery terminals are not loose or corroded.
If battery terminals are corroded, clean them.
2. Check battery for damage, deformation or leakage. If serious damage, deformation or leakage is found, replaced the battery.
3. Check the battery voltage.
Turn ignition switch to on, and turn it off 20 to 30 seconds after turning on headlights. This will eliminate the surface charge on battery. Measure battery voltage with a digital multimeter.

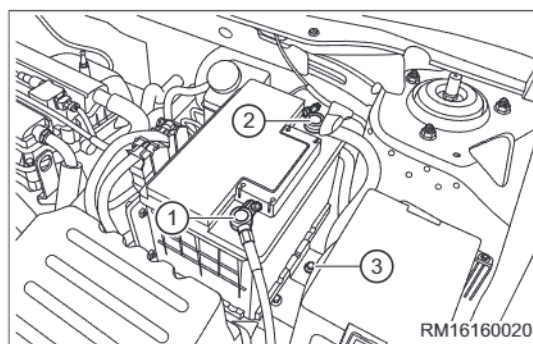
Measurement Temperature	Specification
20°C	12 - 13 V

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. Remove the battery.
 - a. Loosen the negative battery cable locking nut, and remove the negative (-) battery cable (1).
 - b. Open the positive battery terminal cover, loosen the positive battery cable locking nut, and remove the positive (+) battery cable (2).
 - c. Remove the battery pressure plate fixing bolt (3), and take off the battery pressure plate.
(Tightening torque: $25 \pm 2.5 \text{ N}\cdot\text{m}$)



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CAUTION

- Please be careful to prevent metal tools from contacting both electrodes of battery at the same time or accidentally touching the positive electrode and vehicle body.

- d. Remove the battery.

Installation

Installation is in the reverse order of removal.

CAUTION

- Replace battery with a new one which conforms to the specifications.
- Used battery contains sulfuric acid and lead, so never discard it at will. Please dispose of it at a qualified local waste treatment station.

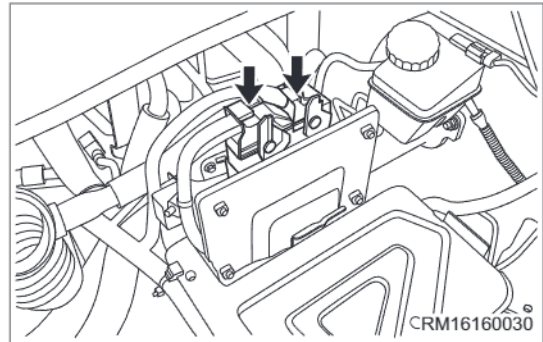
Battery Tray

Removal

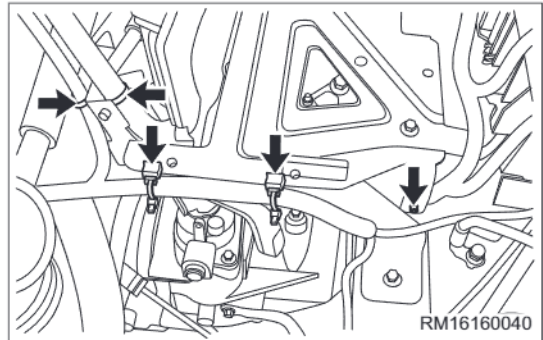
CAUTION

- 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.

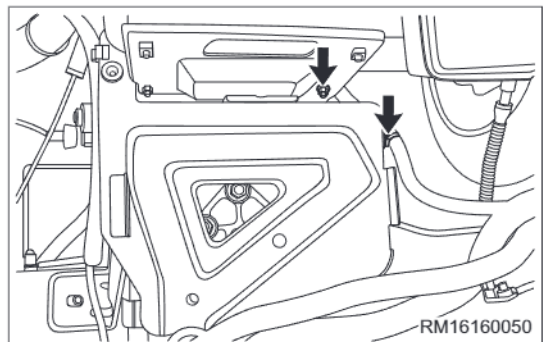
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-12).
4. Remove the battery (See page 16-7).
5. Remove the battery tray with engine control module assembly.
 - a. Disconnect connectors (arrow) from Engine Control Module (ECM).



- b. Disconnect the wire harness fixing clips (arrow) on the front side of battery tray.

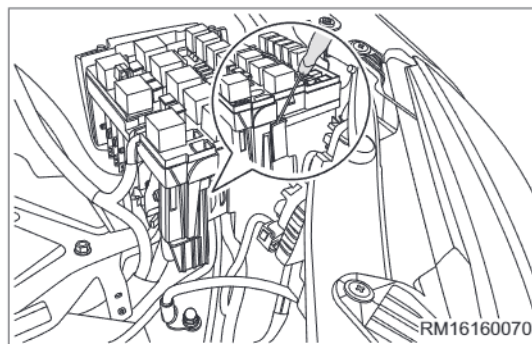


- c. Disconnect the wire harness fixing clips (arrow) on the rear side of battery tray.



- d. Remove the engine compartment fuse and relay box cover.

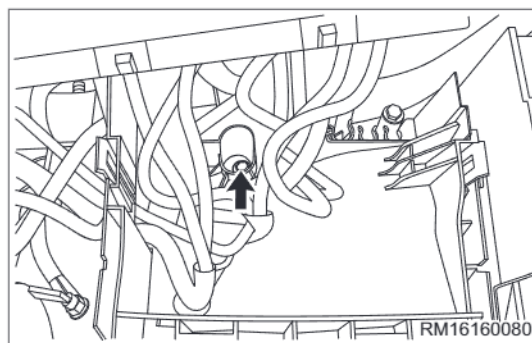
- e. Using a screwdriver wrapped with protective tape, separate engine compartment fuse and relay box fixing clamp and move away engine compartment fuse and relay box.



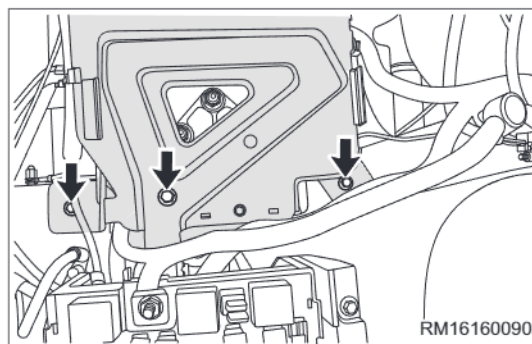
CAUTION

- Move away the engine compartment fuse and relay box carefully, to prevent damaging the engine compartment fuse and relay box and connectors, or breaking the wire harness.

- f. Remove the battery tray fixing bolt (arrow) in engine compartment fuse and relay box.
(Tightening torque: 7 ± 1 N·m)

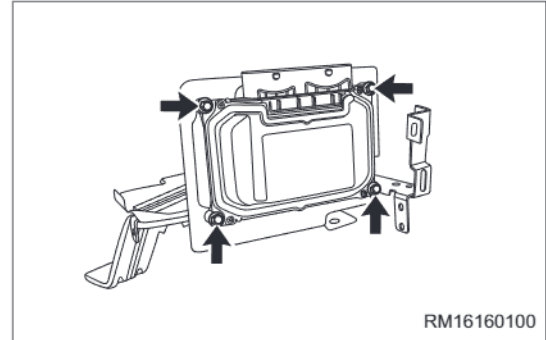


- g. Remove the battery tray fixing bolts (arrow).
(Tightening torque: 25 ± 2.5 N·m)



- h. Remove the battery tray with engine control module assembly.

6. Separate the battery tray and Engine Control Module (ECM).
 - a. Remove 4 fixing bolts (arrow) from Engine Control Module (ECM), and remove the Engine Control Module (ECM).
(Tightening torque: $7 \pm 1 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

Alternator and Alternator Bracket

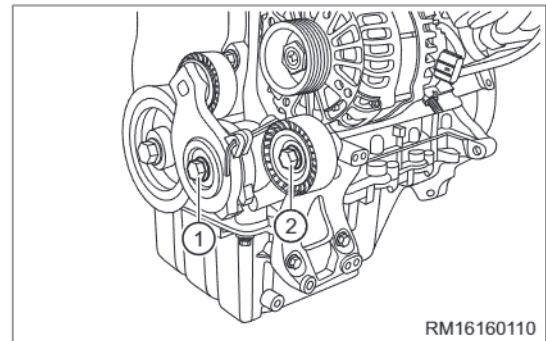
Removal

CAUTION

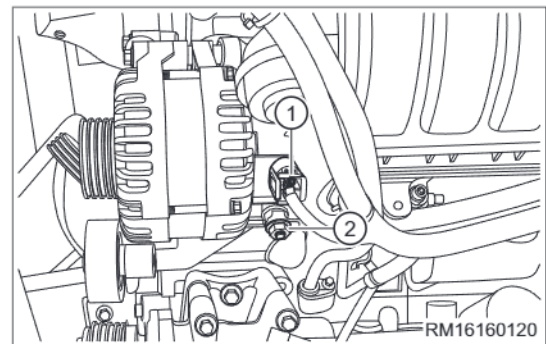
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Move away the accessory drive belt (See page 07-21).
5. Remove the alternator and alternator bracket (vehicle equipped with electronic assist steering).

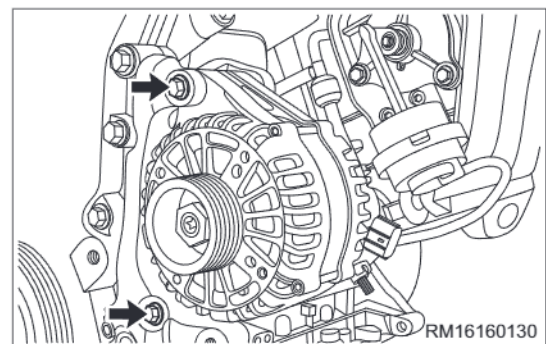
- a. Remove the accessory drive belt tensioner fixing bolt (1) and accessory drive belt tensioner.
(Tightening torque: $40 + 5 \text{ N}\cdot\text{m}$)
- b. Remove the idler gear fixing bolt (2) to take off the idler gear.
(Tightening torque: $40 + 5 \text{ N}\cdot\text{m}$)



- c. Disconnect the alternator connector (1).
- d. Move away the terminal cap, remove the alternator output cable fixing nut (2) and put the output cable aside.
(Tightening torque: $20 \pm 2 \text{ N}\cdot\text{m}$)

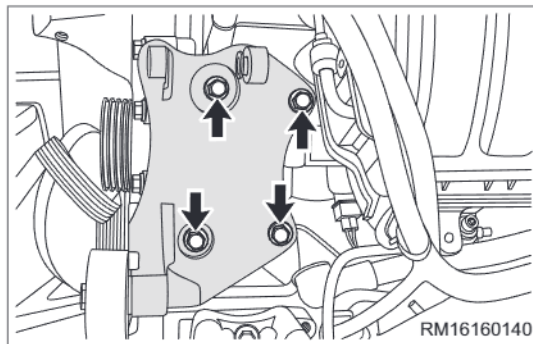


- e. Remove 2 fixing bolts (arrow) from alternator.
(Tightening torque: $20 + 5 \text{ N}\cdot\text{m}$)



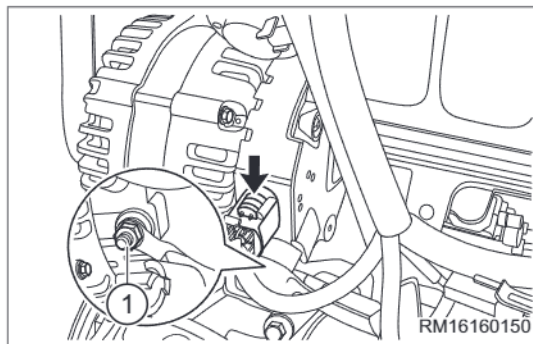
- f. Remove the alternator from alternator bracket.

- g. Remove 4 fixing bolts (arrow) from alternator bracket, and remove the alternator bracket.
(Tightening torque: $40 \pm 5 \text{ N}\cdot\text{m}$)

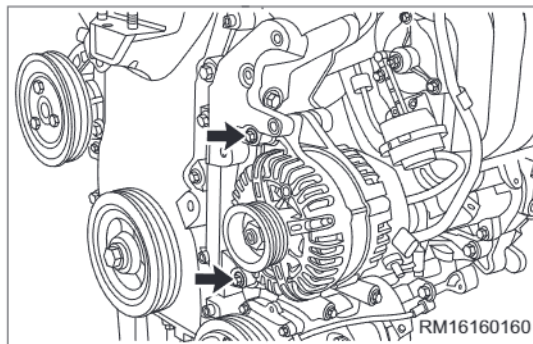


6. Remove the alternator and alternator bracket (vehicle equipped with hydraulic assist steering).

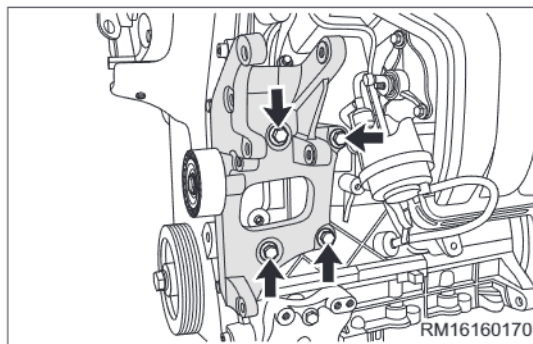
- a. Drain the power steering fluid (See page 29-7).
b. Remove the power steering pump (See page 29-15).
c. Disconnect the alternator connector (arrow).
d. Move away the terminal cap, remove the alternator output cable fixing nut (1) and put the output cable aside.
(Tightening torque: $20 \pm 2 \text{ N}\cdot\text{m}$)



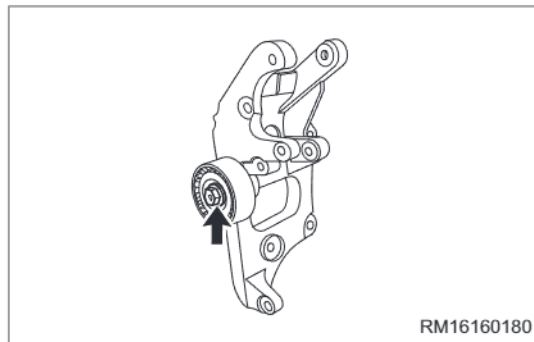
- e. Remove 2 fixing bolts (arrow) from alternator.
(Tightening torque: $20 \pm 5 \text{ N}\cdot\text{m}$)



- f. Remove the alternator from alternator bracket.
g. Remove 4 fixing bolts (arrow) from alternator bracket, and remove the alternator bracket.
(Tightening torque: $40 \pm 5 \text{ N}\cdot\text{m}$)



- h. Remove the upper idler gear fixing bolt (arrow) from alternator bracket and remove the upper idle gear.
(Tightening torque: $40 \pm 5 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

