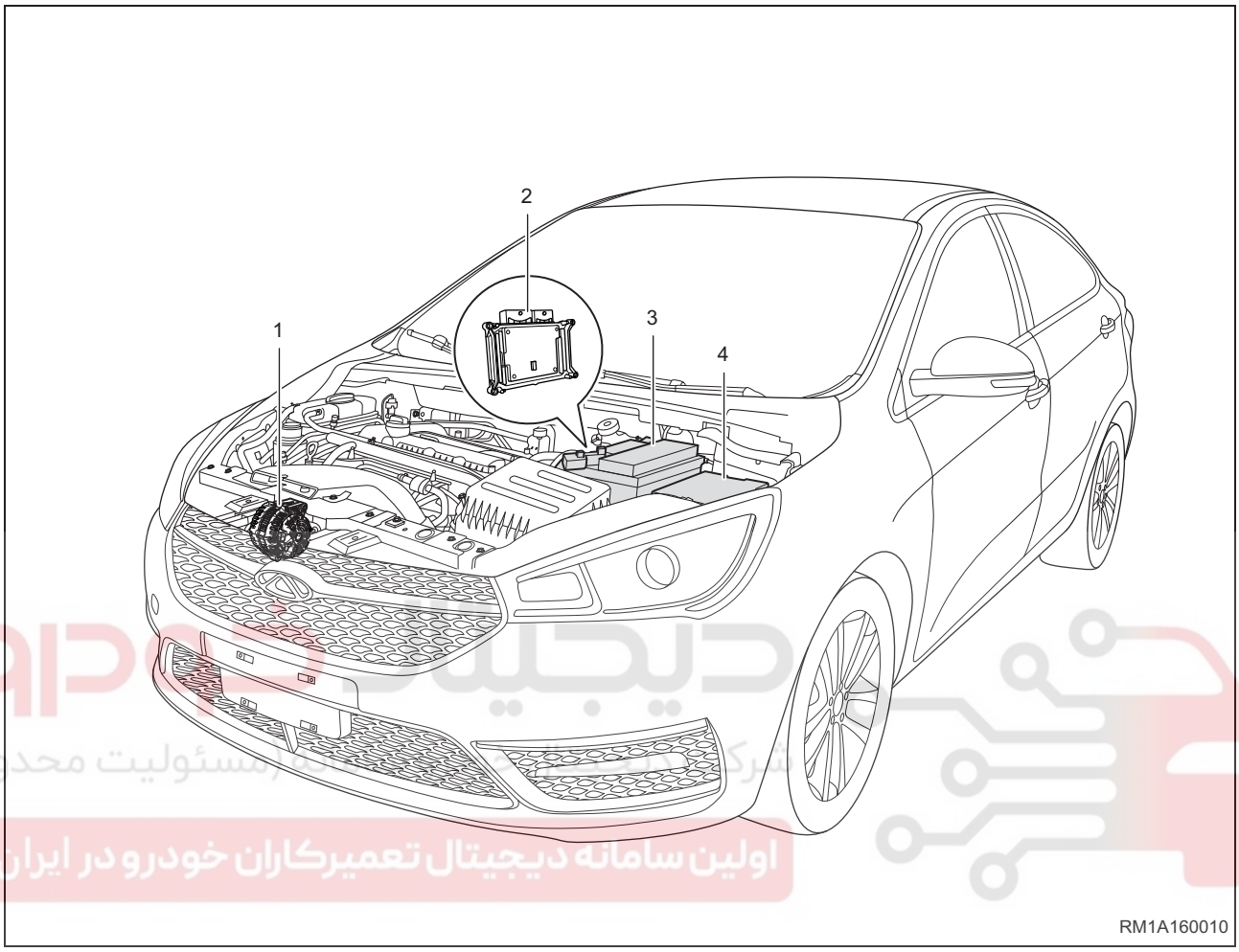
SQRE4G15B CHARGING SYSTEM

GENERAL INFORMATION

Description



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

Alternator is a key component of 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. Alternator operates as a complete assembly, so if it fails for any reason, entire assembly 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 poles energize magnetic field to produce alternating induced electromotive force. Stator is installed outside of rotor, which is secured together with 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 magnetic flux of stator winding, generating an induced electromotive force, producing alternating current. Three phase alternating current generated by alternator, is converted by rectifier to direct current, which is transmitted to vehicle electrical system and battery.

Specifications

Torque Specifications

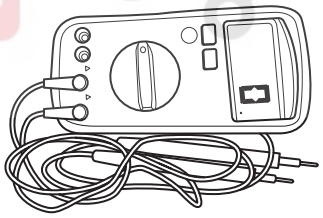
Description	Torque (N·m)
Battery Pressure Plate Fixing Bolt	25 ± 2.5
Battery Tray Fixing Bolt in Engine Compartment Fuse and Relay Box	7 ± 1
Battery Tray Fixing Bolt	25 ± 2.5
Engine Control Module Fixing Bolt	7 ± 1
Accessory Drive Belt Tensioner Fixing Bolt	40 + 5
Idler Gear Fixing Bolt	40 + 5
Alternator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

Battery Specification

Engine Type	Battery Type	Specification
SQRE4G15B	L2 400	12 V, 60 Ah, 480 A

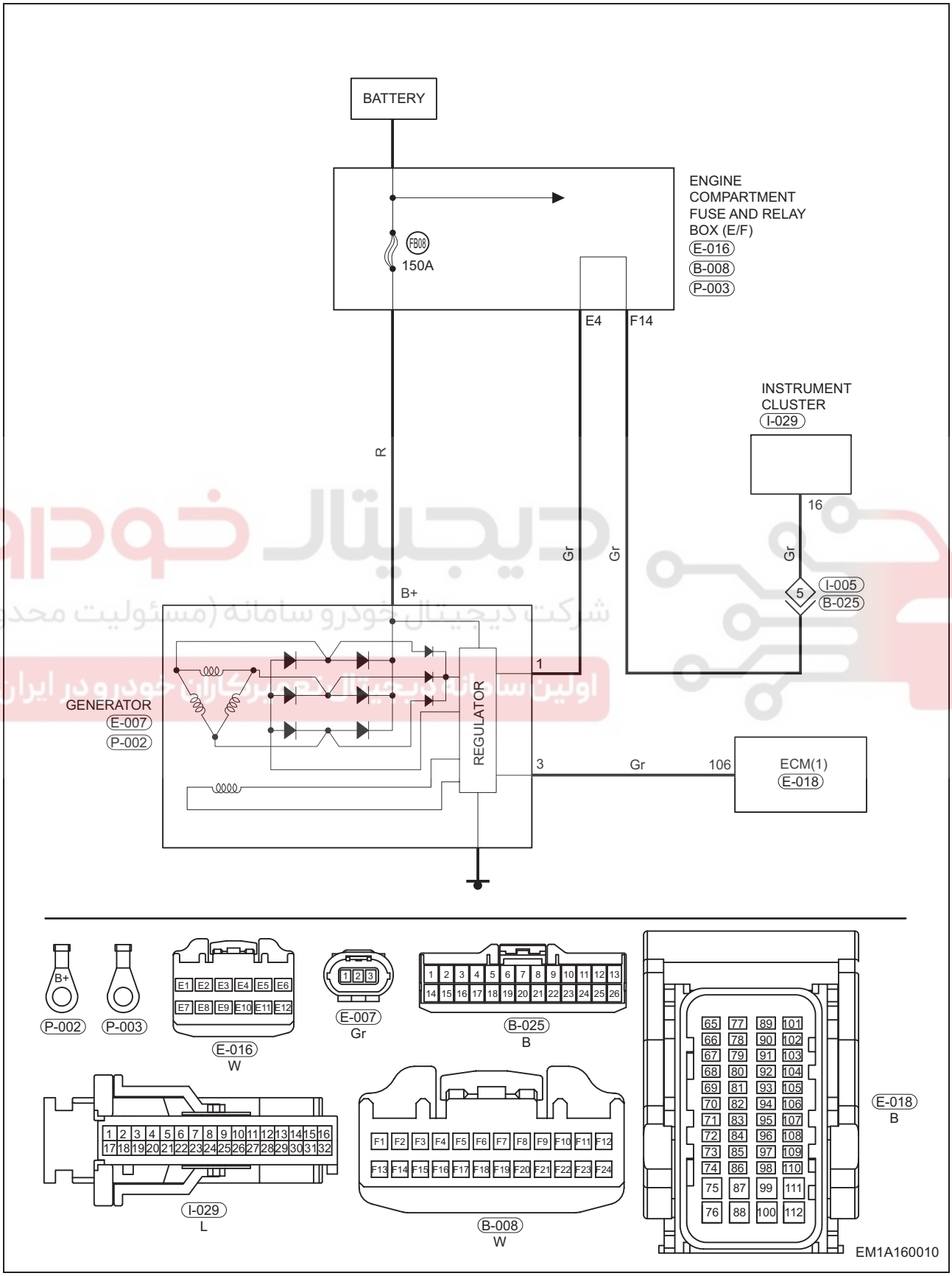
Tool

General Tool

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	16-11
	Instrument cluster	39-49
	Wire harness	-
Noises are heard from alternator after engine starts	Fixing bolt (loose)	16-4
	Accessory drive belt (misaligned, loose or fault)	07-20
	Alternator	16-11

Charging System Charging Voltage Inspection

1. Leave vehicle under no load test condition and idle engine. Using a digital multimeter, measure battery voltage.
   Standard voltage: 14.1 ± 0.3 V.
   If result is not as specified, replace alternator (See page 16-11).
2. Leave vehicle under load test condition and idle engine. Using a digital multimeter, measure battery voltage.
   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 temperature of outlet to the highest.
     Standard voltage: 14.1 ± 0.3 V.

   If result is not as specified, replace alternator (See page 16-11).

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 battery.
3. Check the battery voltage.

   Turn ignition switch to ON and switch headlights on. After 20 to 30 seconds, turn ignition switch off. This will eliminate surface charge on battery. Using a digital multimeter, measure battery voltage.

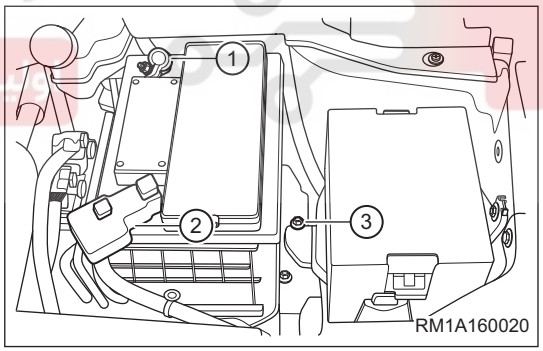
Measurement Temperature	Specification
20°C	12 - 13 V

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 negative battery cable locking nut, and remove negative (-) battery cable (1).
   b. Open positive battery terminal cover, loosen positive battery cable locking nut, and remove positive (+) battery cable (2).
   c. Remove fixing bolt (3), and remove battery pressure plate.
   (Tightening torque: 25 ± 2.5 N·m)



CAUTION

- Please be careful to prevent metal tools from contacting both electrodes of battery at the same time, or accidentally touching 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 specifications of old battery.
- Used battery contains sulfuric acid and lead, so never discard it at will. Please dispose of it at a qualified local waste treatment station.

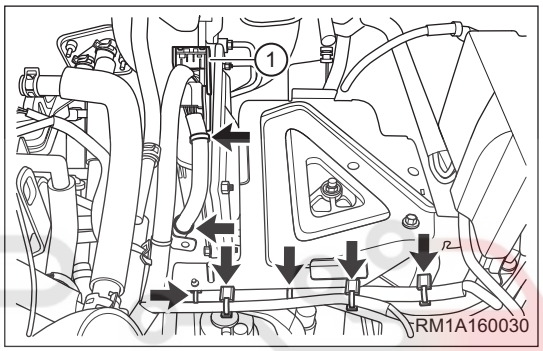
Battery Tray

Removal

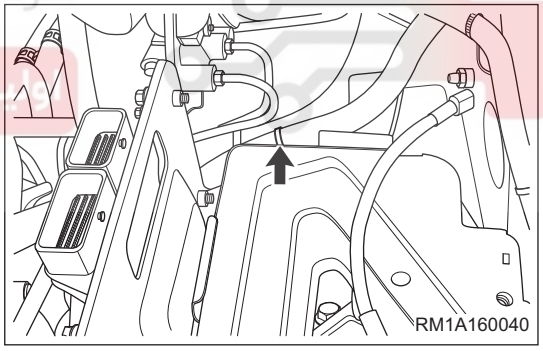
CAUTION

- 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.

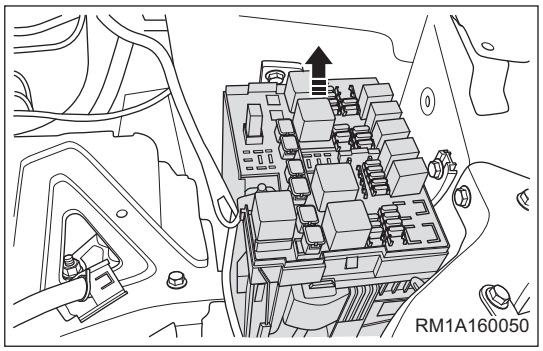
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-12).
4. Remove the battery (See page 16-7).
5. Remove the battery tray with engine control module assembly.
   a. Disconnect the Engine Control Module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



   c. Disconnect wire harness fixing clip (arrow) from rear end of battery tray.



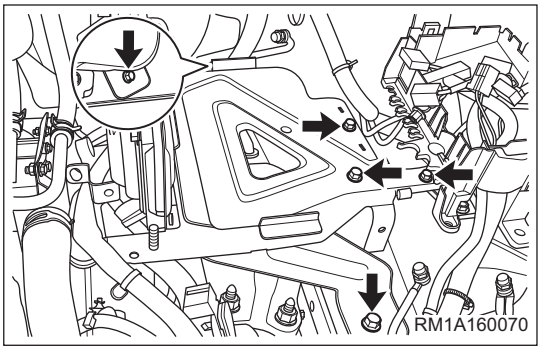
   d. Remove the engine compartment fuse and relay box cover.
   e. Using a screwdriver wrapped with protective tape, separate engine compartment fuse and relay box fixing clamp, and move away engine compartment fuse and relay box.



CAUTION

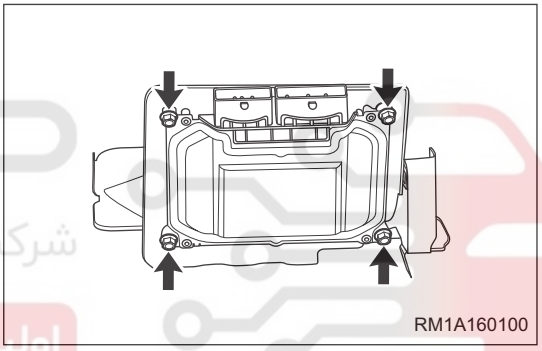
- Move away engine compartment fuse and relay box carefully, to prevent damaging engine compartment fuse and relay box and connector, or breaking wire harness.

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



g. Remove the battery tray with engine control module assembly.

6. Separate battery tray and engine control module.
   a. Remove 4 fixing bolts (arrow) from engine control module, and remove engine control module. (Tightening torque: 7 ± 1 N·m)



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Installation

Installation is in the reverse order of removal.

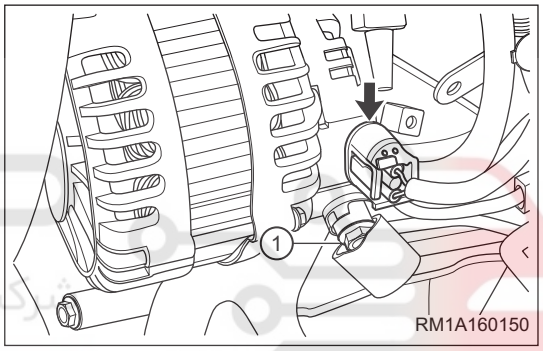
Alternator and Alternator Bracket

Removal

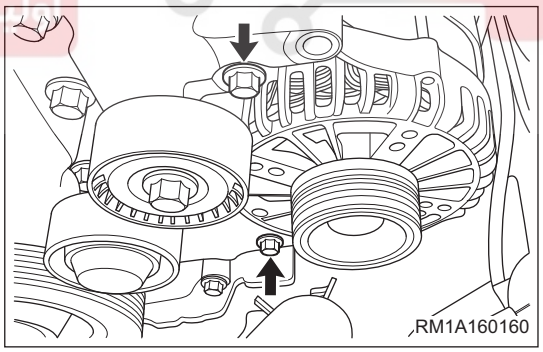
CAUTION

- 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.

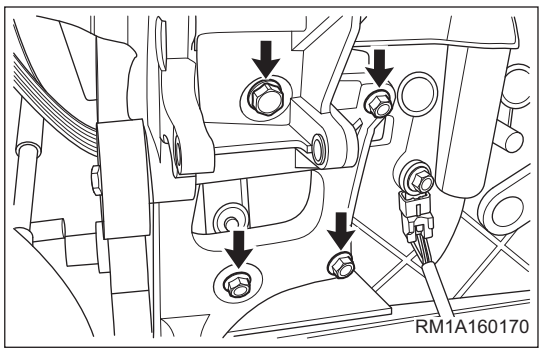
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Move away the accessory drive belt (See page 07-20).
5. Remove alternator and alternator bracket.
   a. Drain the power steering fluid (See page 29-8).
   b. Remove the power steering pump (See page 29-15).
   c. Disconnect alternator connector (arrow), move away terminal cap, remove alternator output cable fixing nut (1) and move away output cable.
   (Tightening torque: 20 ± 2 N·m)



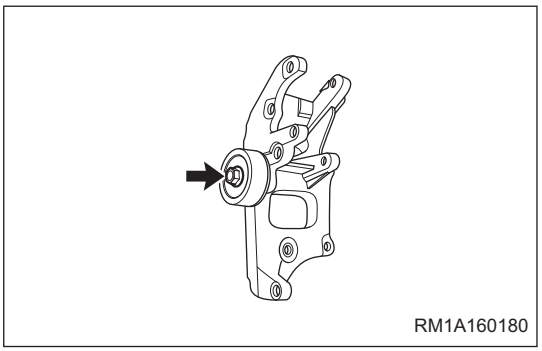
   d. Remove 2 fixing bolts (arrow) from alternator.
   (Tightening torque: 20 + 5 N·m)



   e. Remove alternator from alternator bracket.
   f. Remove 4 fixing bolts (arrow) from alternator bracket, and remove alternator bracket.
   (Tightening torque: 40 + 5 N·m)



g. Remove upper idler gear fixing bolt (arrow) from alternator bracket, and remove upper idle gear. (Tightening torque: 40 + 5 N·m)



Installation

Installation is in the reverse order of removal.