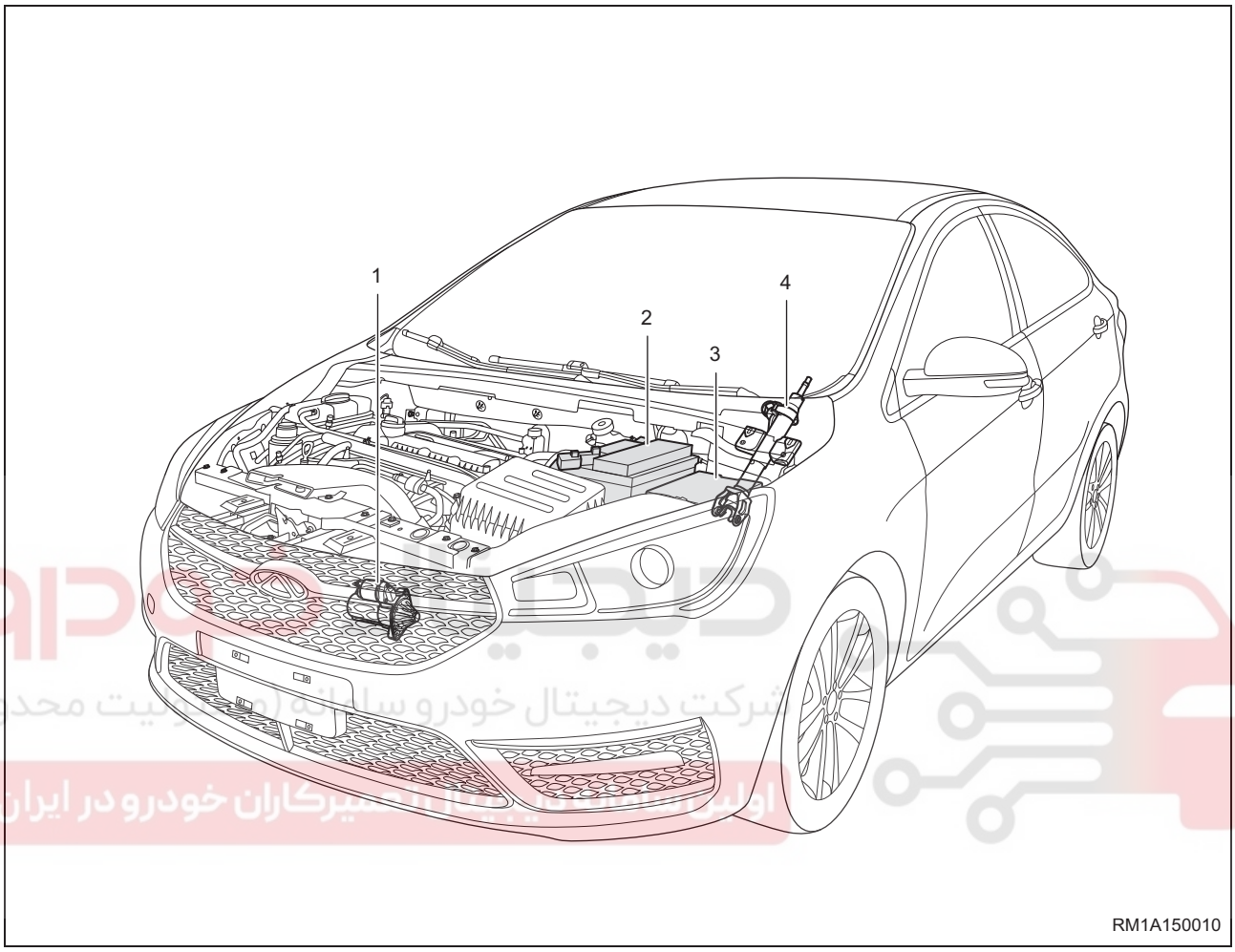
SQRE4G15B STARTING SYSTEM

GENERAL INFORMATION

Description

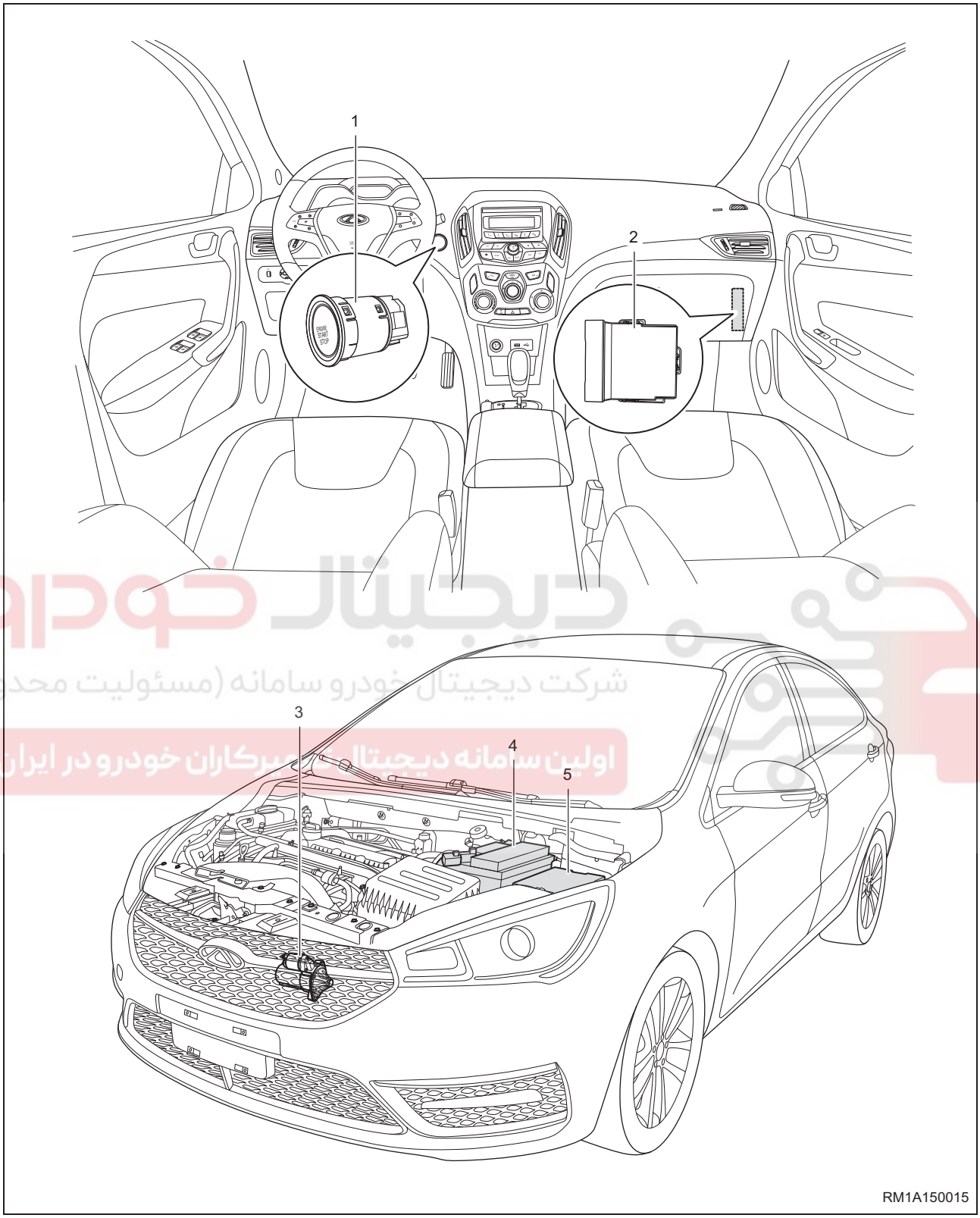
W/O PEPS System



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

Starting system w/o PEPS system consists of battery, ignition switch and starter etc.

W/ PEPS System



1 - Engine Switch	2 - PEPS Controller
3 - Starter	4 - Battery
5 - Fuse & Relay Box	

Starting system equipped with PEPS system consists of PEPS controller, engine switch, built-in low frequency antenna (there are 3 antennas located in vehicle to determine key position), immobilizer coil for backup starting, handle sensors (built into right and left front door handles), luggage compartment opener switch and smart key.

Operation

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

1. Control mechanism (magnetic switch): controls engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off DC motor circuit; magnetic switch can also short out ignition coil to add resistance when starting.
2. Drive train mechanism: When engine starts, it engages starter drive gear with flywheel gear ring and transmits torque of starter to engine crankshaft. After engine starts, drive gear will automatically disengage from flywheel gear ring, so that engine cannot drive starter at high speed conversely by flywheel, avoiding damage to the starter.
3. DC motor: converts electrical energy from battery into electromagnetic moment.

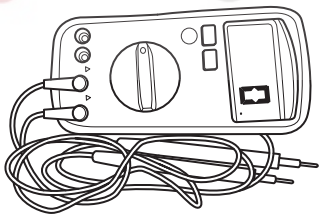
Specifications

Torque Specifications

Description	Torque (N·m)
Starter Power Cable Nut	18 ± 2
Starter Fixing Bolt	40 ± 5
Ignition Starting Switch Fixing Screw	15 ± 2.5

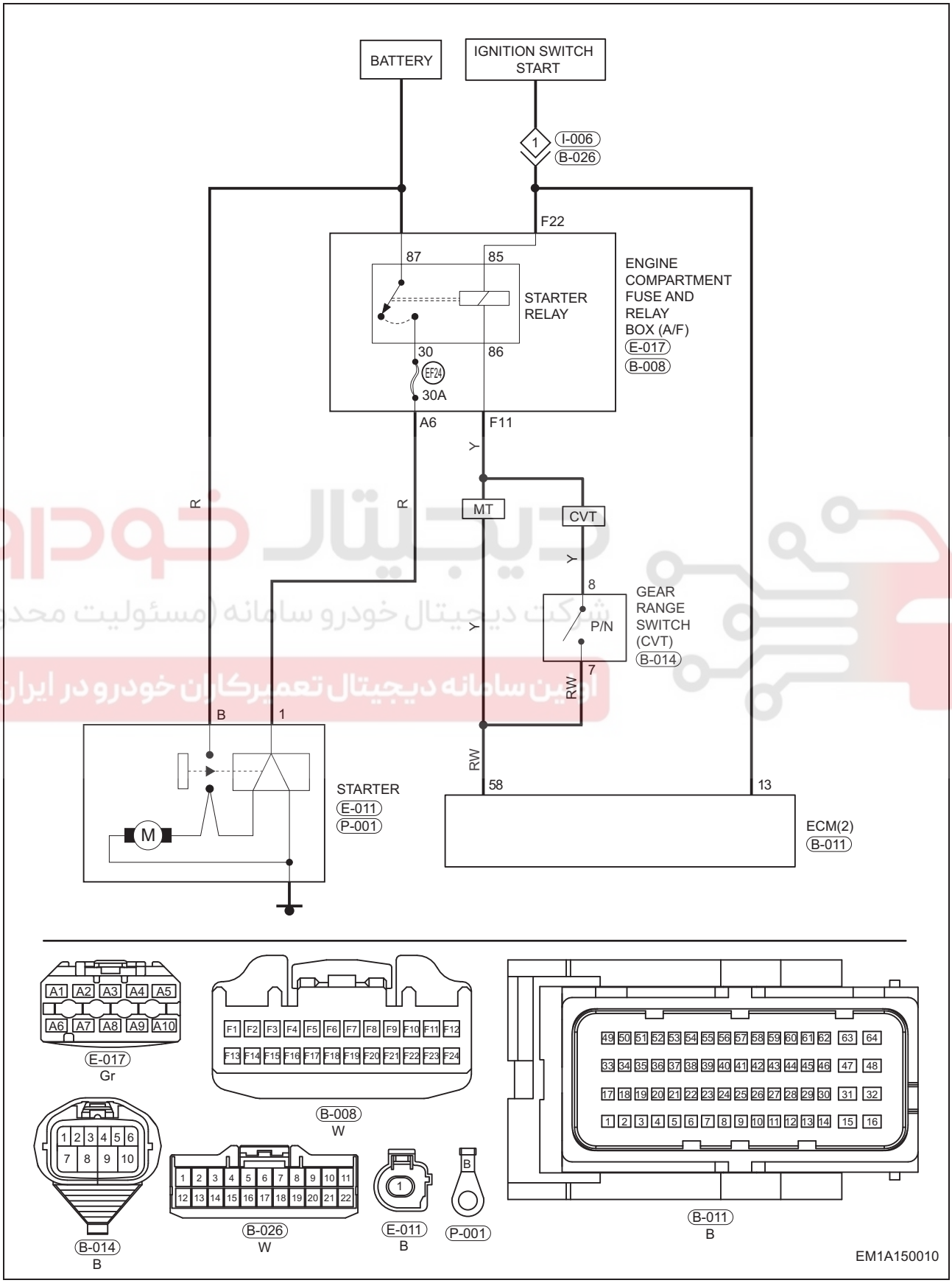
Tool

General Tool

Digital Multimeter	 RCH0000002

Circuit Diagram

Starting System



DIAGNOSIS & TESTING

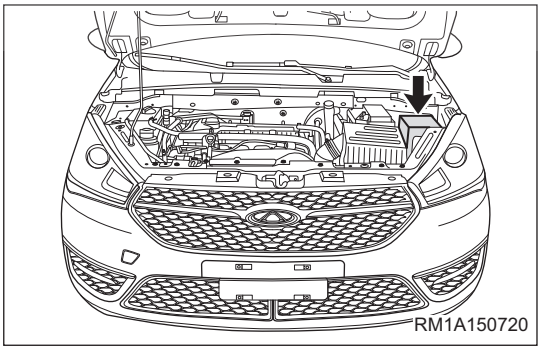
Problem Symptoms Table

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
When ignition switch is turned to START, magnetic switch makes a "clanking" sound and engine cannot start	Battery (depleted)	16-7
	Starter (magnetic switch)	15-10
Starter does not run	Battery (depleted)	16-7
	Fuse	54-32
	Relay	54-32
	Starting system wire harness	54-41
	Ignition switch	15-13
	Gear range switch (CVT)	18-112
	Starter	15-9
	ECM	06-290
Starter runs weakly	Battery (depleted)	16-7
	Starter	15-9
Starter races	Starter (incorrect installation, internal fault)	15-9
	Flywheel ring gear (gear teeth broken)	07-29

Starter Relay Inspection

1. Recognize and remove starter relay from engine compartment fuse and relay box.



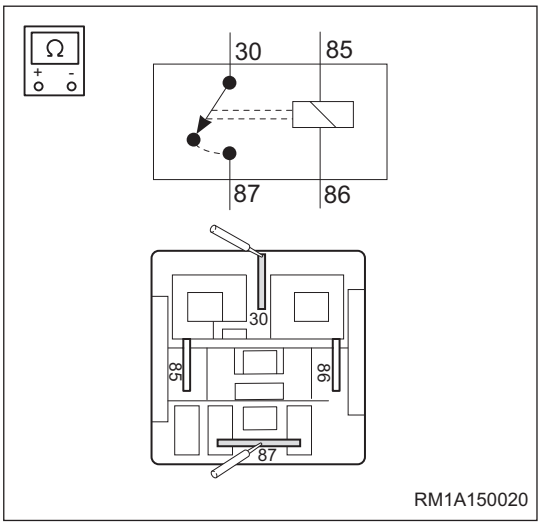
2. Check the starter relay.

   Using a digital multimeter, measure resistance according to the value(s) in table below.

   Standard Resistance

Multimeter Connection	Specified Condition
30 - 87	No continuity
30 - 87	Continuity (battery voltage applied between terminals 85 and 86)

   If result is not as specified, replace starter relay.



Precautions for Starting System

1. Transmission should be in N and parking brake is applied. Depress the clutch pedal while starting.
2. Make sure that battery is fully charged to reduce repeated operating time of starter.
3. Do not start engine for more than 5 seconds each time, while it should not be less than 10 -15 seconds for repeated starting interval, and not more than 3 times for consecutive starting.
4. If starter cannot stop, turn off ignition switch immediately, or remove the negative battery cable to find problem.
5. Check starter circuit frequently to make sure that each wire of starting system is connected securely and in good insulation.
6. Generally, perform maintenance service for starter when servicing vehicle. Also, maintenance interval can be shortened or extended depending on actual conditions.
7. Remove the negative battery cable before removing starter.

ON-VEHICLE SERVICE

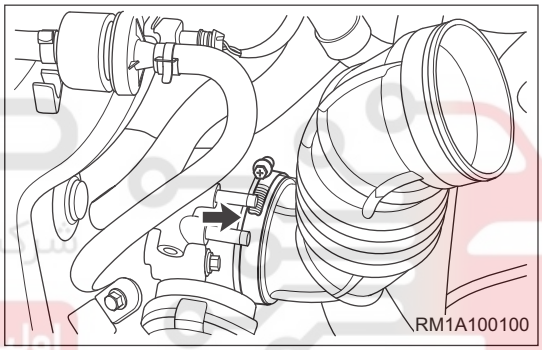
Starter

Removal

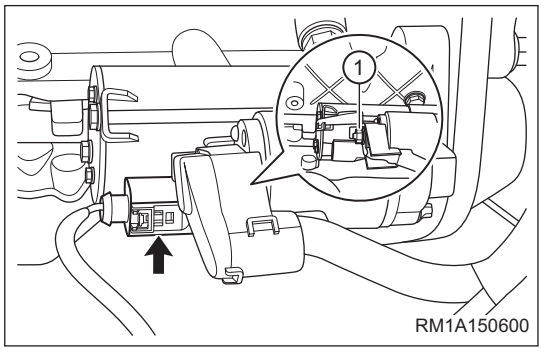
CAUTION

- 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.

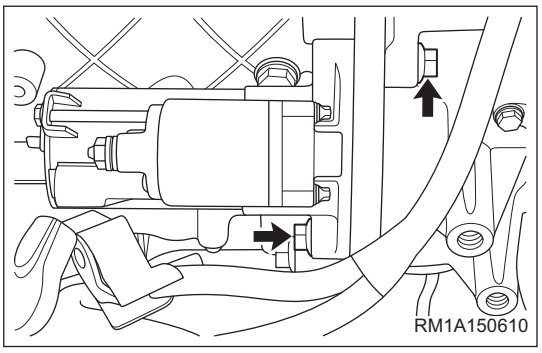
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the air filter assembly (See page 10-12).
5. Remove the front bumper lower protector (See page 49-20).
6. Move away the intake hose.
   a. Loosen worm clamp (arrow), and disconnect connection between intake hose and electronic throttle assembly.
   (Tightening torque: 3 ± 0.5 N·m)



   b. Move intake hose to one side.
7. Remove the starter.
   a. Disconnect the starter connector (arrow).
   b. Move away terminal cap, remove starter power cable nut (1) and disconnect starter power cable.
   (Tightening torque: 13 ± 1 N·m)



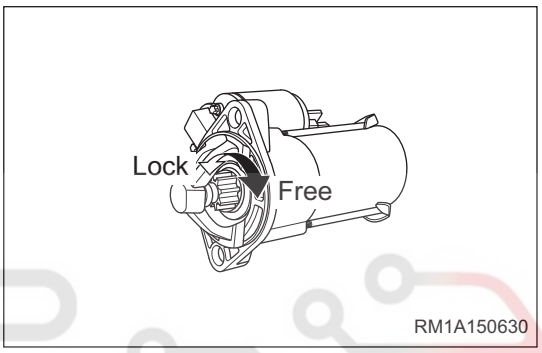
c. Remove 2 coupling bolts (arrow) between starter and transmission.
(Tightening torque: 40 + 5 N·m)



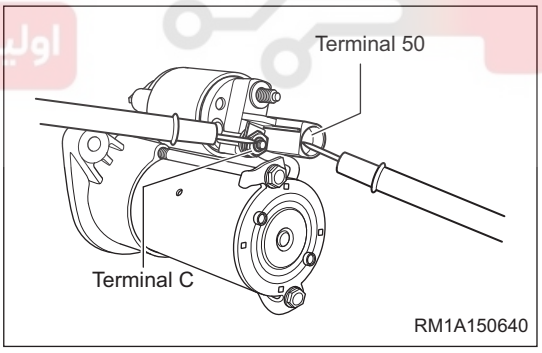
d. Remove the starter.

Inspection

1. Check the starter clutch.
   a. Rotate clutch pinion gear clockwise as shown in illustration, and check that it turns freely. Rotate clutch pinion gear counterclockwise and check that it locks.
   If result is not as specified, replace starter.



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

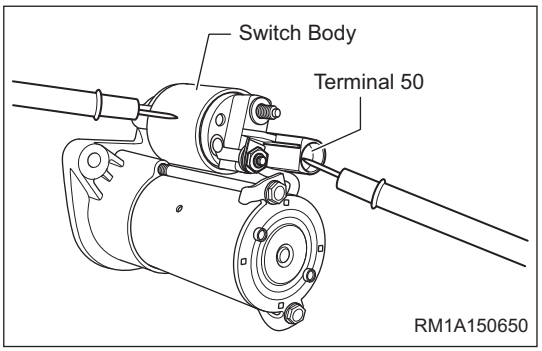


      - Standard resistance should be below 2 Ω.

   If result is not as specified, replace starter.

b. Check the hold-in coil.

- Measure resistance between terminal 50 and starter magnetic switch housing.



- Standard resistance should be below 2 Ω.

If result is not as specified, replace starter.

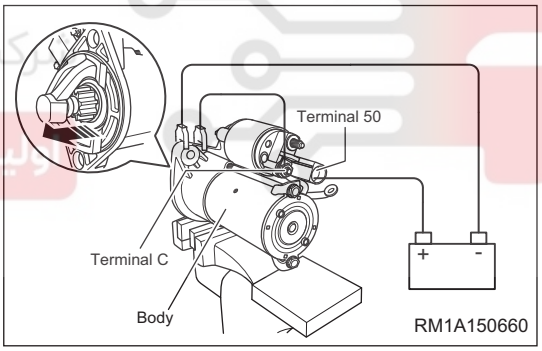
3. Check the starter assembly.

CAUTION

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

a. Perform the pull-in test.

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

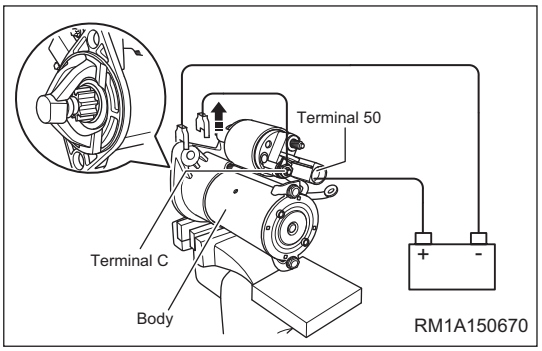


If starter clutch pinion gear does not move, replace starter assembly.

b. Perform the hold-in test.

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

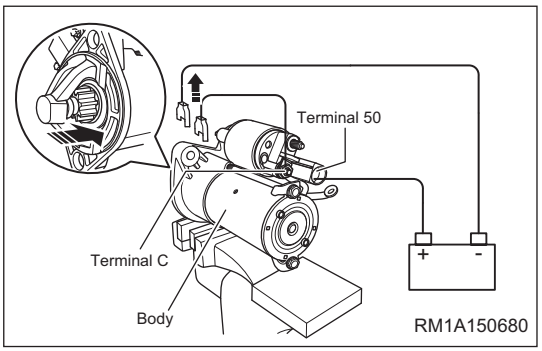
  Check that starter clutch pinion gear keeps sticking out.



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

c. Check if starter clutch pinion gear returns to original position.

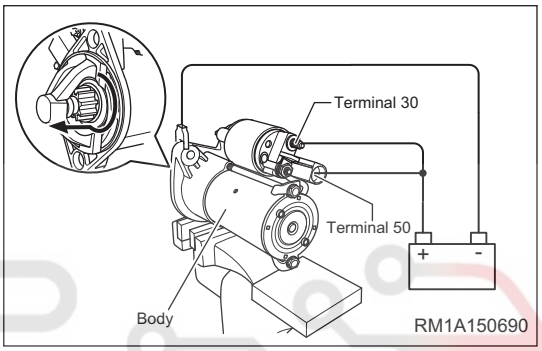
- Disconnect negative battery cable from starter body. Check that starter clutch pinion gear returns to original position.



If starter clutch pinion gear does not return to original position, replace starter assembly.

d. Check if starter rotates smoothly.

- Connect 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 starter clutch pinion gear moves outward.



CAUTION

- When connecting leads, avoid the pinion gear side to prevent them from getting caught as pinion gear rotates.

If result is not as specified, replace starter assembly.

Installation

Installation is in the reverse order of removal.

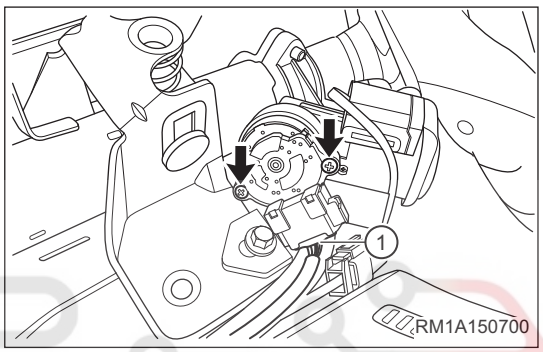
Ignition Starting Switch

Removal

CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent vehicle interior 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 28-13).
4. Remove the ignition starting switch.
   a. Disconnect the ignition starting switch connector (1).
   b. Remove the ignition starting switch fixing screws (arrow).
   (Tightening torque: 13 ± 2 N·m)

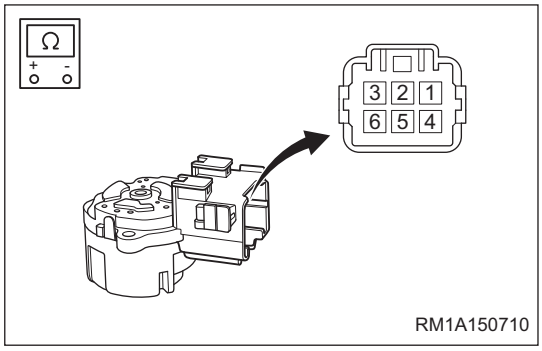


   c. Remove the ignition starting switch.

Inspection

1. Check for continuity of ignition starting switch.

   Using a digital multimeter, check for continuity between terminals of ignition starting switch according to table below.



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

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

Installation

Installation is in the reverse order of removal.