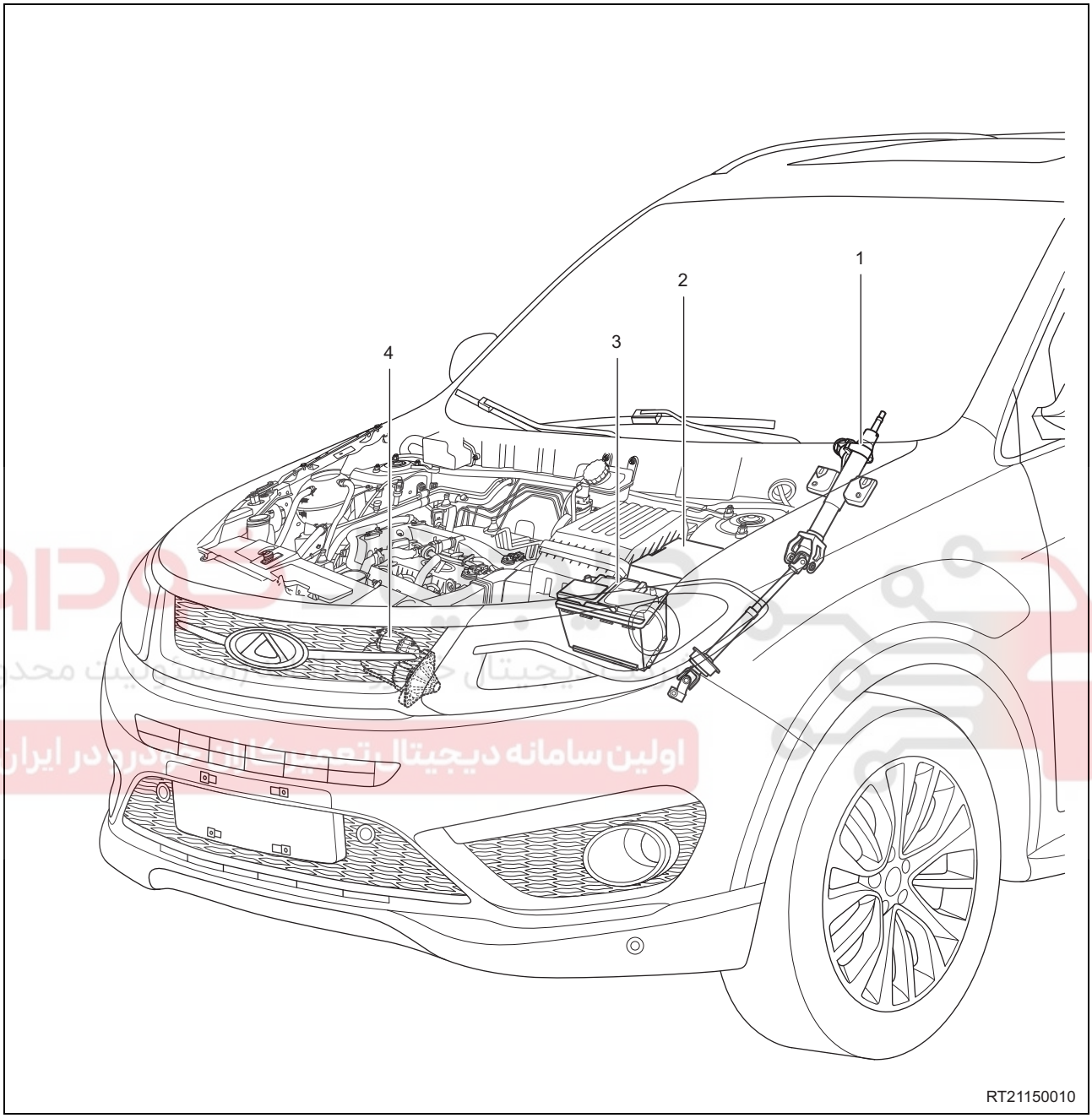
SQR484F STARTING SYSTEM

GENERAL INFORMATION

Description



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

Starting system consists of battery, ignition switch and starter, etc. 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.

Operation

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

1. Control mechanism (solenoid switch): controls engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off the DC motor circuit, solenoid switch can also short out the ignition coil, to give assistance when starting.
2. 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 starter.
3. DC motor: converts electrical energy from battery into electromagnetic moment.

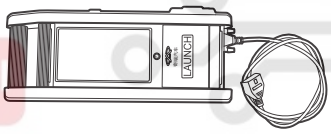
Specifications

Torque Specifications

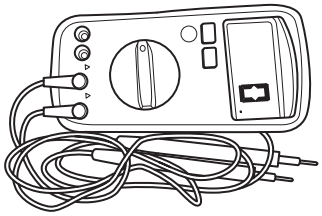
Description	Torque (N·m)
Starter Power Cable Nut	13 ± 1
Starter Fixing Bolt	35 ± 5
Ignition Starting Switch Fixing Screw	13 ± 2

Tools

Special Tool

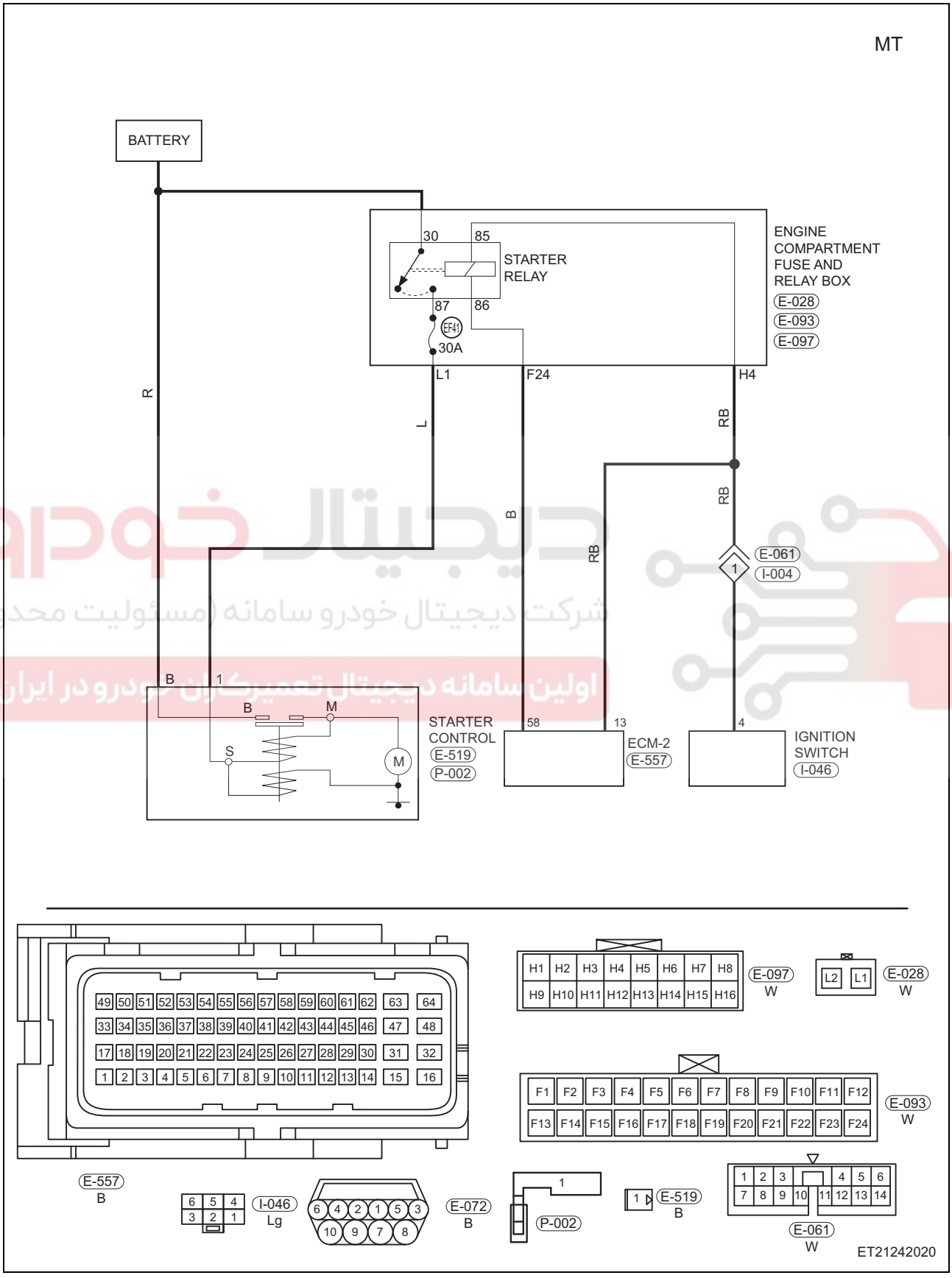
X-431 3G Diagnostic Tester	 RCH0000001

General Tool

Digital Multimeter	 RCH0000002

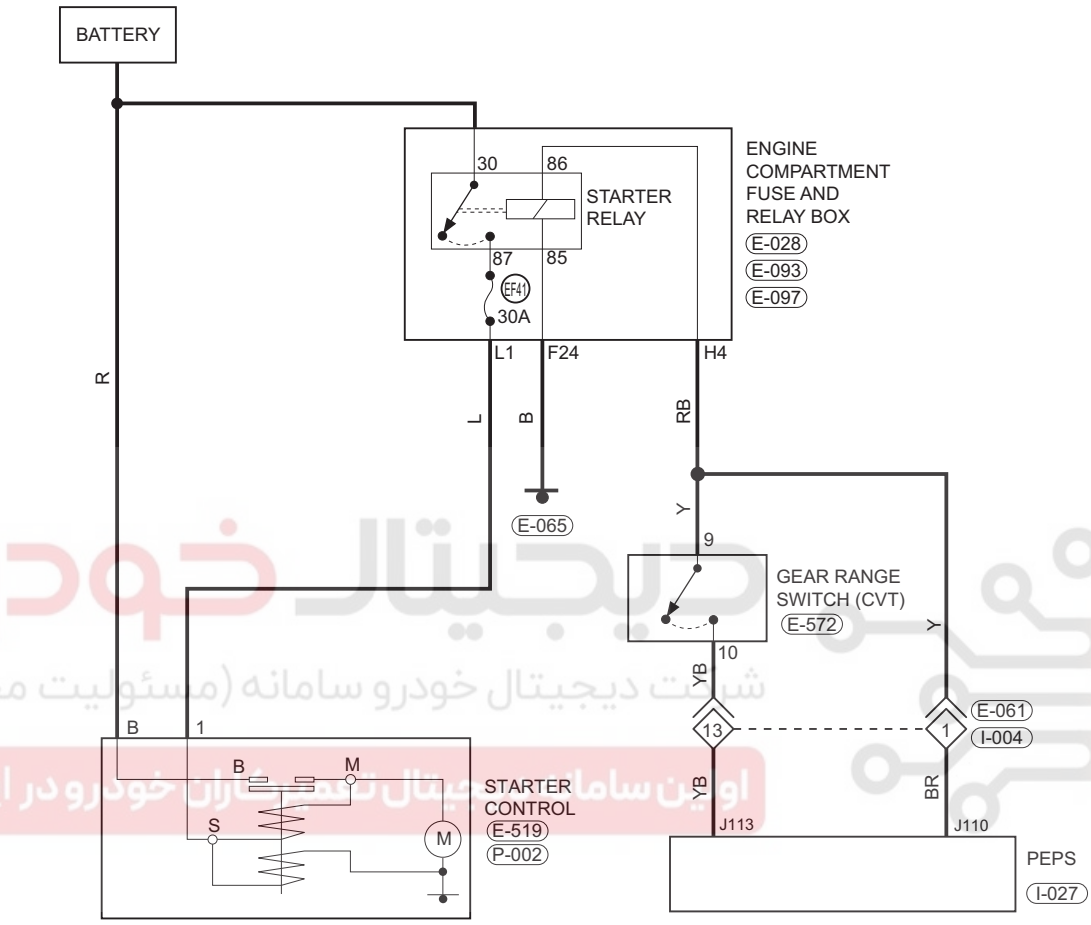
Circuit Diagram

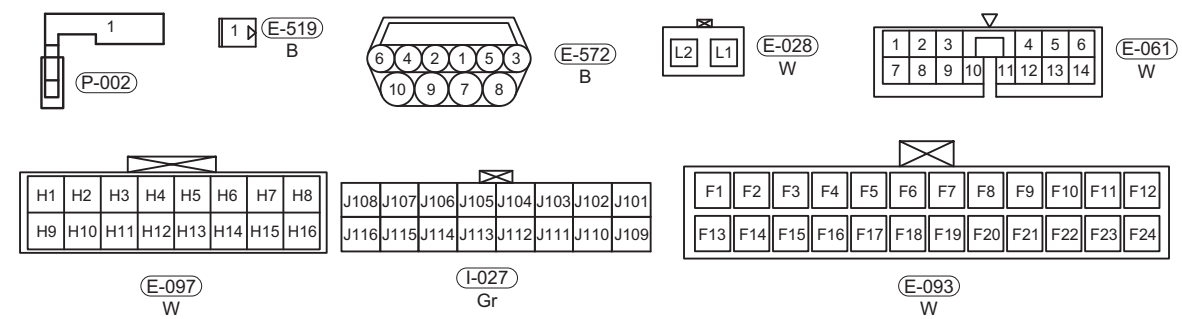
Starting System (Page 1 of 2)



Starting System (Page 2 of 2)

CVT





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DIAGNOSIS & TESTING

Problem Symptoms Table

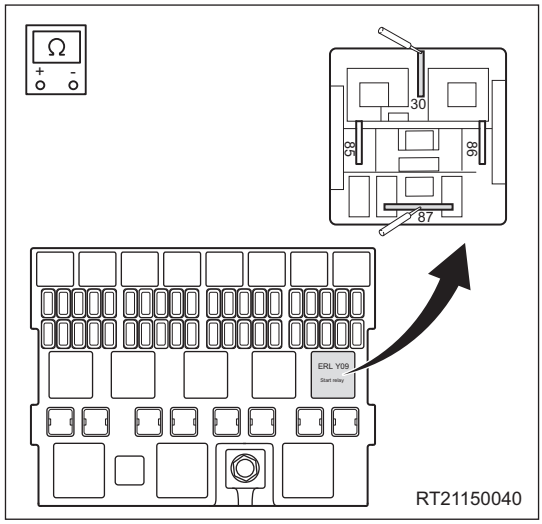
HINT:
Use the table below to help determine the cause of the problem. Check each suspected area in sequence. Repair or replace the faulty components, or adjust as necessary.

Engine Switch Function Failure

Symptom	Suspected Area	See page
When ignition switch is turned to START, solenoid switch makes a "clanking" sound and engine cannot start	Battery (depleted) Starter (solenoid switch)	24-10
Starter does not run	Battery (depleted)	-
	Fuse	24-5
	Relay	24-8
	Starting system wire harness	24-5
	Ignition switch	24-13
	Gear switch (CVT)	24-6
	Starter	24-10
	ECM	06-257
Starter runs weakly	Battery (depleted)	26-7
	Starter	24-10
Starter races	Starter (incorrect installation, internal fault)	24-10
	Flywheel ring gear (gear teeth broken)	07-42

Starter Relay Inspection

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



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

Standard Resistance

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

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

Precautions for Starting System

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

ON-VEHICLE SERVICE

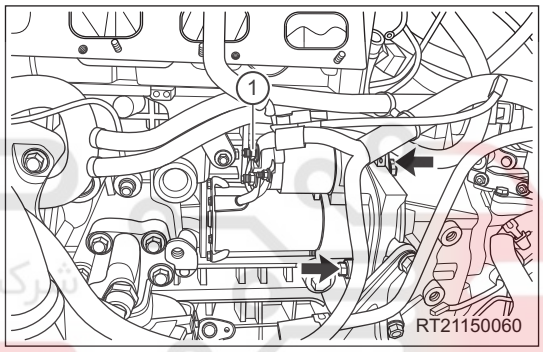
Starter

Removal

CAUTION

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

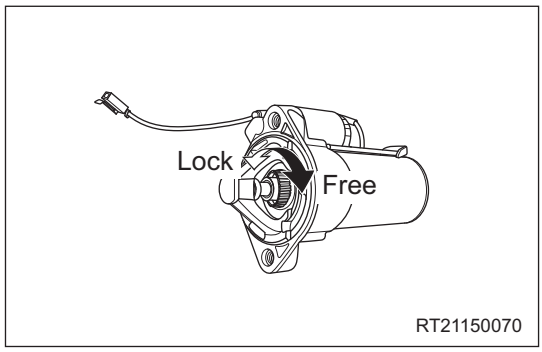
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover assembly (See page 14-9).
4. Remove the intake manifold assembly (See page 14-23).
5. Remove the starter.
   a. Move away the terminal cover, remove the starter power cable nut (1) and disconnect the starter power cable.
   (Tightening torque: 13 ± 1 N·m)
   b. Remove 2 fixing bolts (arrow) from starter.
   (Tightening torque: 35 ± 5 N·m)



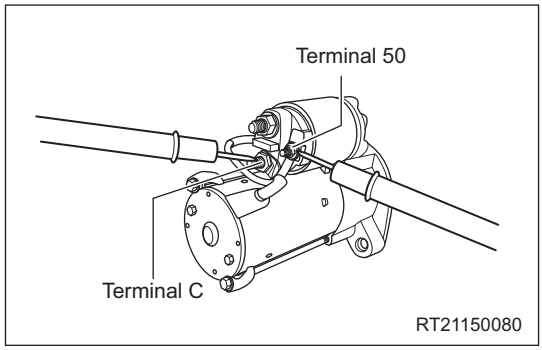
   c. Remove the starter.

Inspection

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



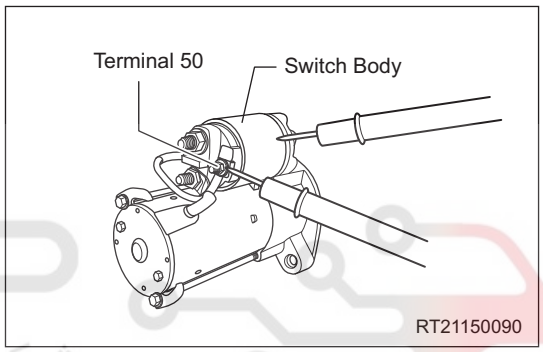
2. Check starter solenoid switch.
   a. Check pull-in coil.
      - Measure resistance between terminal 50 and terminal C.



      - Standard resistance should be below 2 Ω.

      If result is not as specified, replace the starter.

   b. Check hold-in coil.
      - Measure resistance between terminal 50 and starter solenoid switch body.



      - Standard resistance should be below 2 Ω.

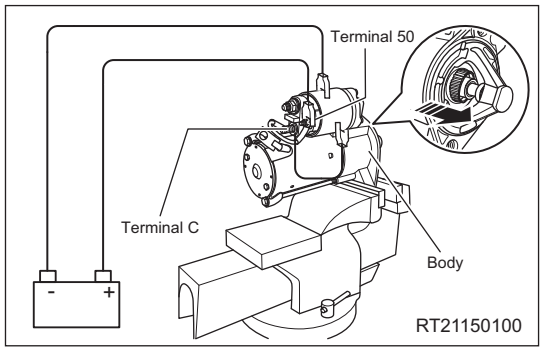
      If result is not as specified, replace the starter.

3. Check starter assembly.

CAUTION

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

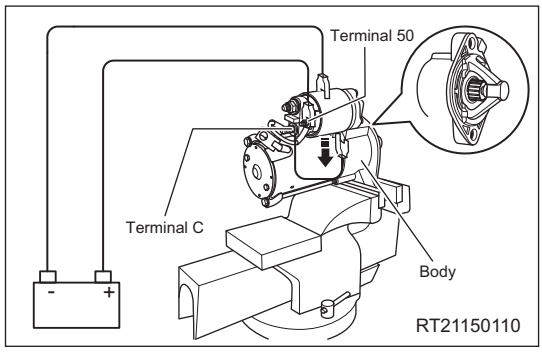
   a. Perform pull-in test.
      - Remove the nut, and disconnect the field coil lead from terminal C.
      - As shown in the illustration, connect battery to the solenoid switch, and check that the starter clutch pinion extends.



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

b. Perform hold-in test.

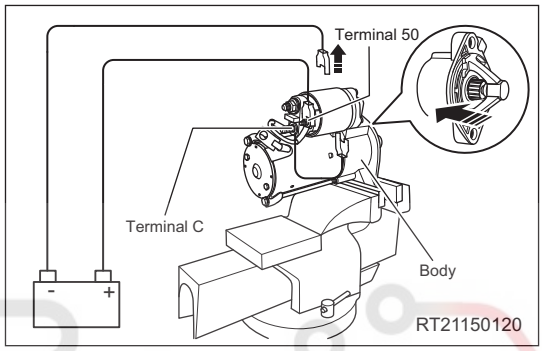
- Keep the starter clutch pinion extending and connections of battery mentioned above, and disconnect the negative battery cable from terminal C.
- Check that the starter clutch pinion remains extended.



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

c. Check if starter clutch pinion returns.

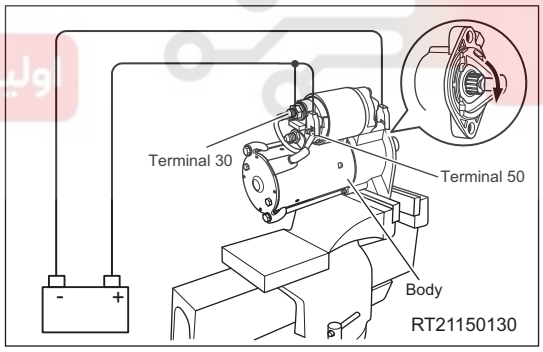
- Disconnect negative battery lead from the starter body. Check that the starter clutch pinion returns.



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

d. Check if starter rotates smoothly.

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



CAUTION

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

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

Installation

Installation is in the reverse order of removal.

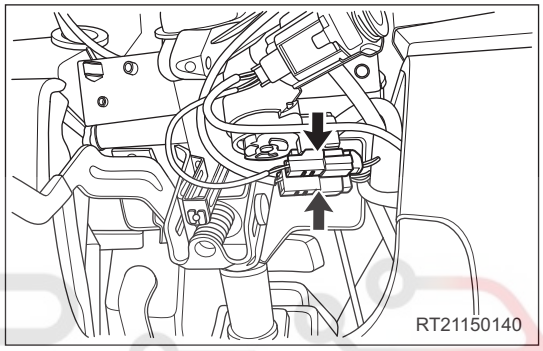
Ignition Starting Switch

Removal

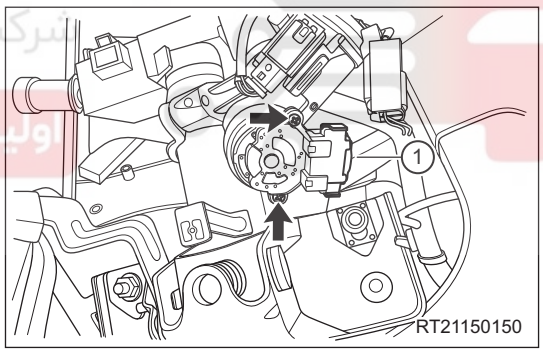
CAUTION

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

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the combination switch cover (See page 39-13).
4. Remove the ignition starting switch.
   a. Move the wire harness connectors (arrow) away from ignition starting switch.



   b. Disconnect the ignition starting switch connector (1).
   c. Remove the fixing screws (arrow) from ignition starting switch.
   (Tightening torque: 13 ± 2 N·m)

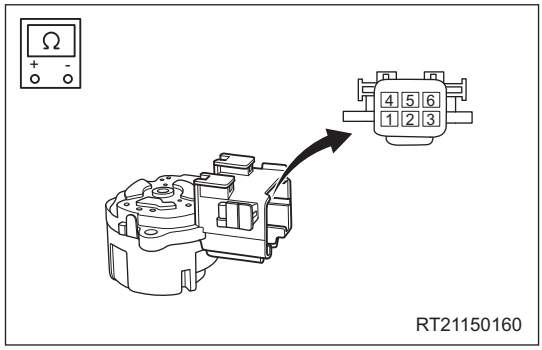


   d. Remove the ignition starting switch.

Inspection

1. Check for continuity of ignition starting switch.

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



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

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

Installation

Installation is in the reverse order of removal.