

Description

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The solenoid plunger and clutch shift lever are activated, and the clutch pinion engages the ring gear. The contacts close and the starter motor cranks.

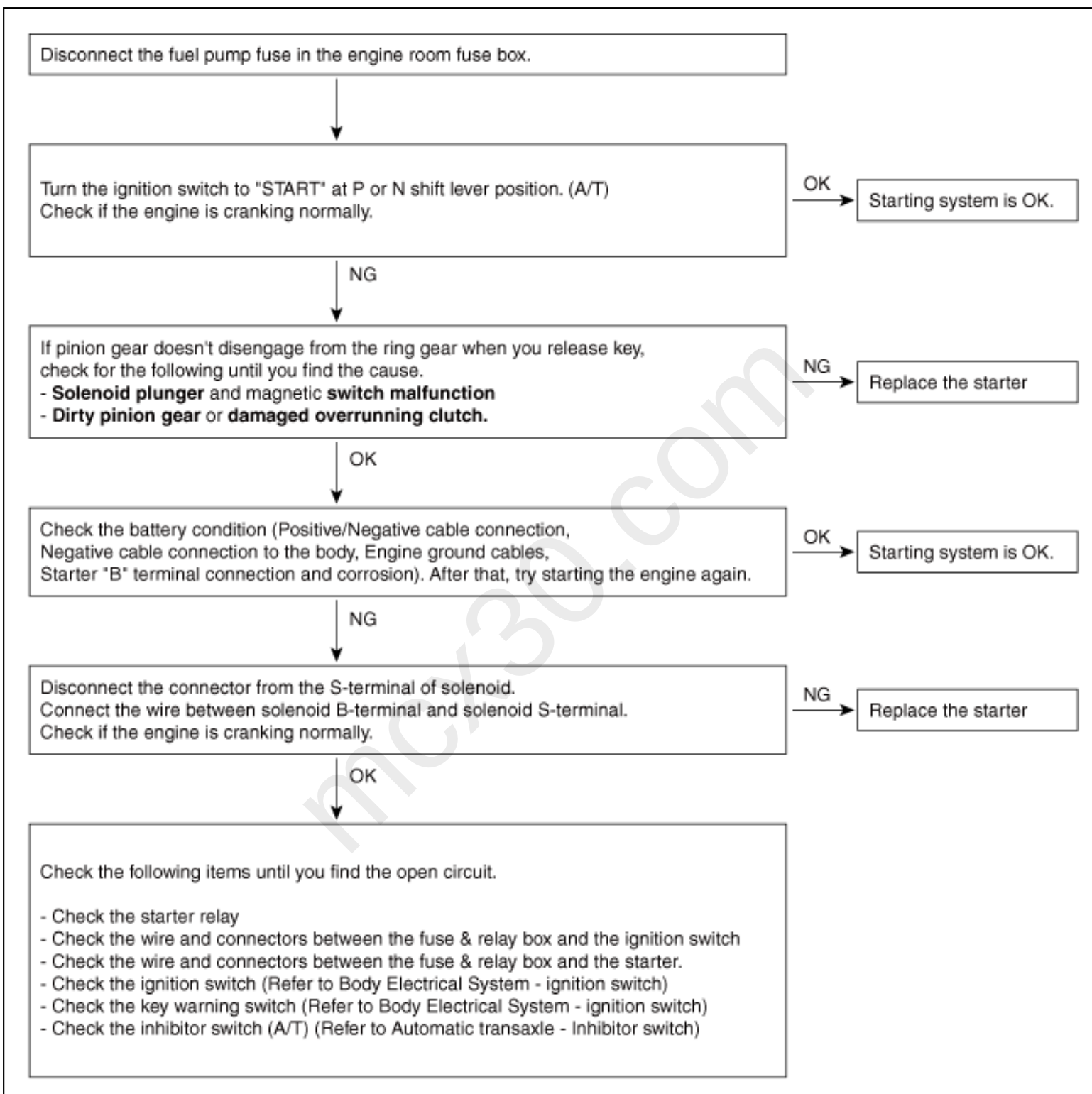
In order to prevent damage caused by excessive rotation of the starter armature when the engine starts, the clutch pinion gear overruns.

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Troubleshooting



- The battery must be in good condition and fully charged for this troubleshooting.



Trouble symptom	Probable cause	Remedy
Engine will not crank	Battery charge low	Charge or replace battery
	Battery cables loose, corroded or worn out	Repair or replace cables

	Transaxle range switch (Vehicle with automatic transaxle only)	Refer to AT group-automatic transaxle
	Fuse blown	Replace fuse
	Starter motor faulty	Replace
	Ignition switch faulty	Replace
Engine cranks slowly	Battery charge low	Charge or replace battery
	Battery cables loose, corroded or worn out	Repair or replace cables
	Starter motor faulty	Replace
Starter keeps running	Starter motor faulty	Replace
	Ignition switch	Replace
Starter spins but engine will not crank	Short in wiring	Repair or replace wiring
	Pinion gear teeth broken or starter motor	Replace
	Ring gear teeth broken	Replace fly wheel or torque converter

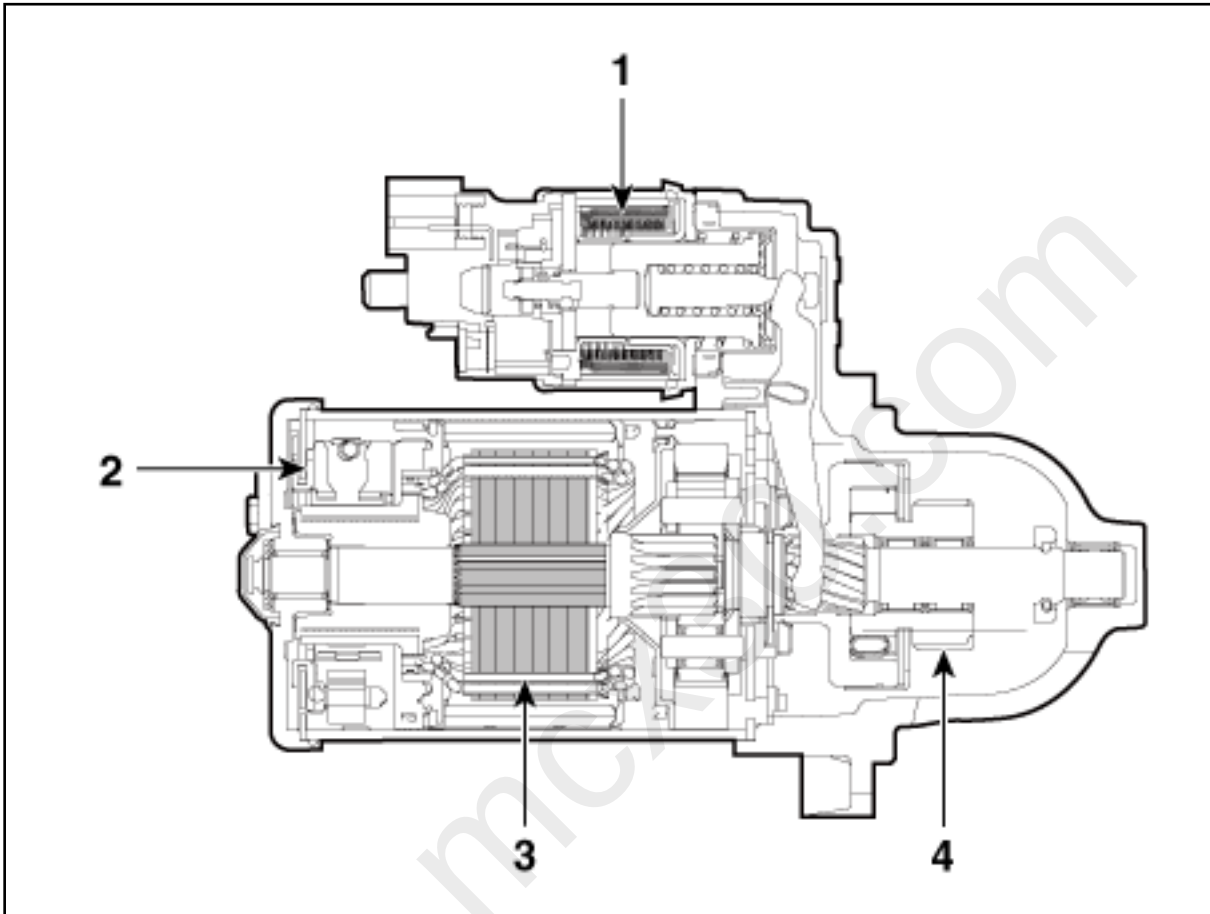
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1. Solenoid
2. Brush assembly
3. Armature
4. Overrun clutch

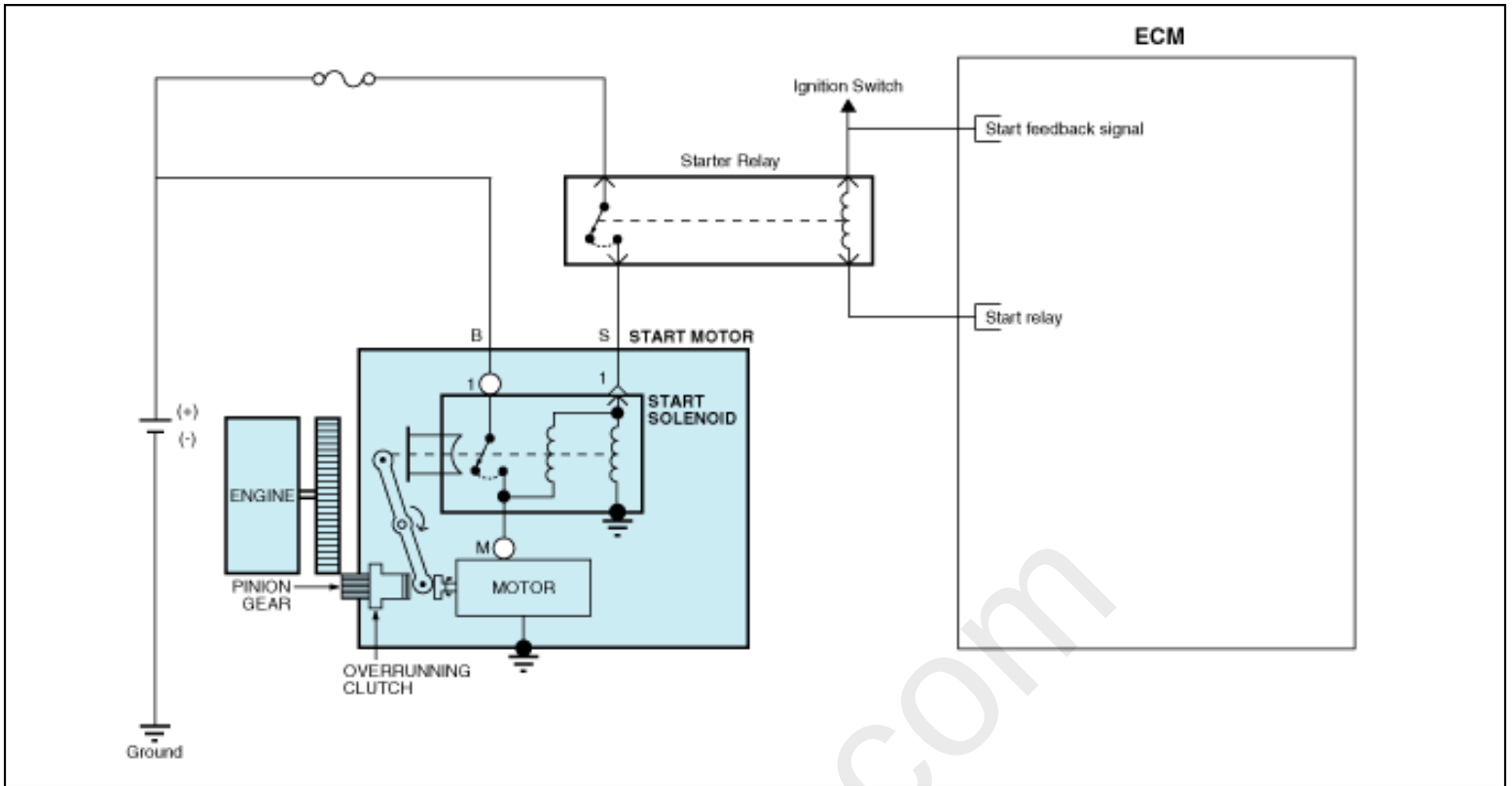
Specification

Starter

Item		Specification
Rated voltage		12V, 1.3 kW
The number of pinion teeth		13
Performance	Ampere	Max. 100 A
[No-load, 11.0V]	Speed	Min. 3,400 RPM

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Circuit
Diagram

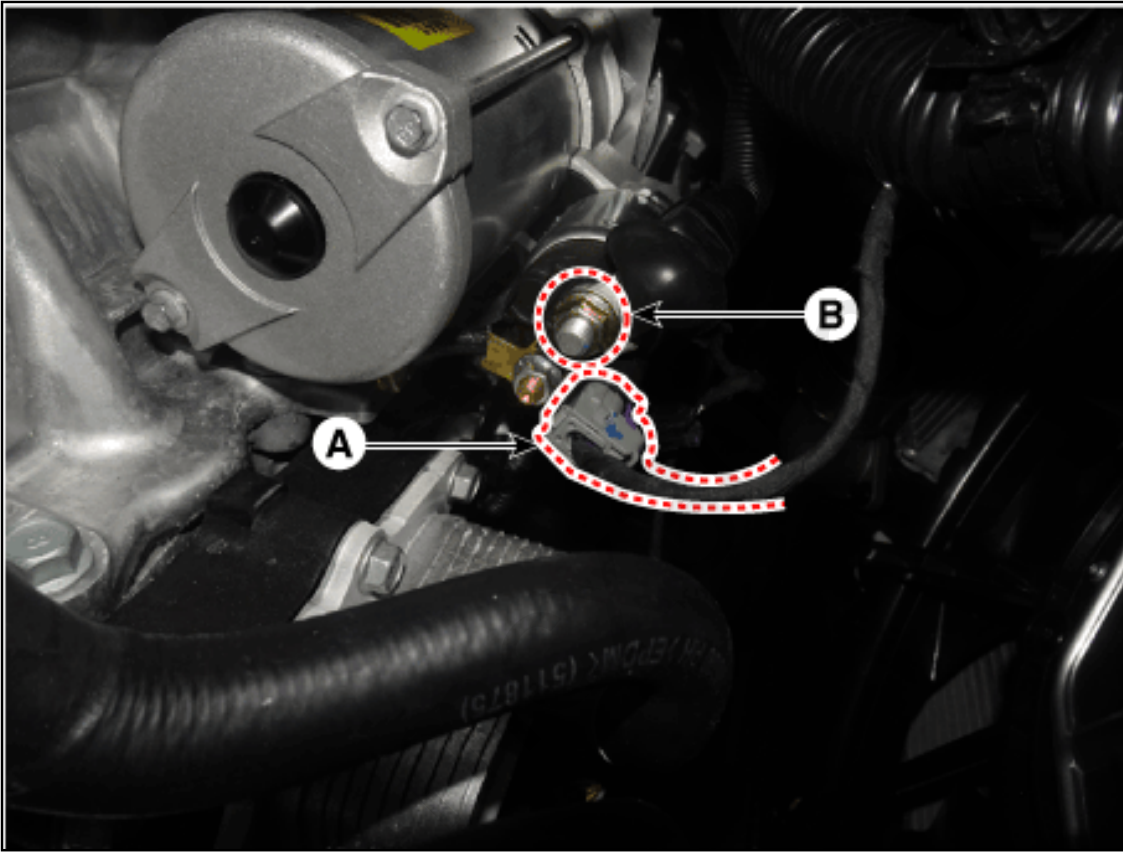


Removal

1. Turn the ignition switch OFF and disconnect the battery (-) terminal.
 2. Remove the air cleaner assembly.
(Refer to Engine Mechanical System - "Air Cleaner")
 3. Remove the engine room under cover.
(Refer to Engine Mechanical System - "Engine Room Under Cover")
 4. Disconnect the starter ST connector (A).
 5. Remove the stater "B" terminal cable mounting nut (B).
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Tightening torque :

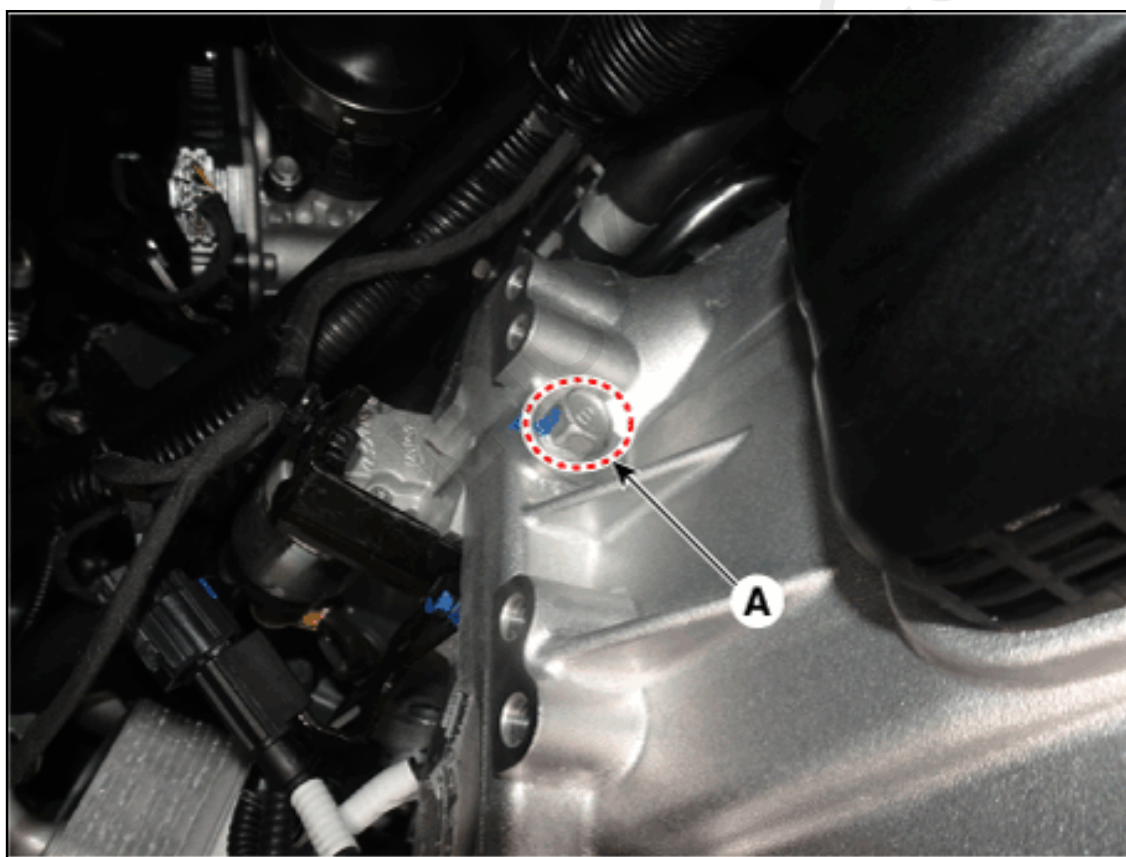
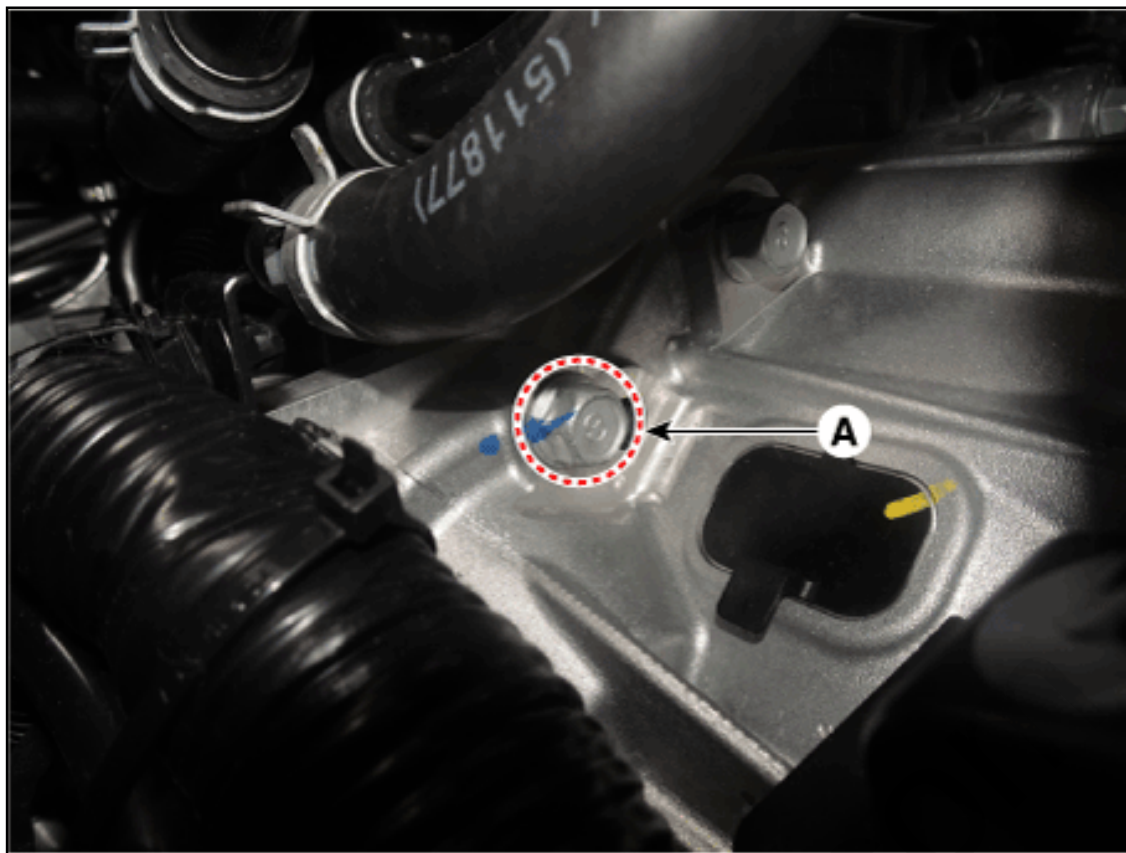
9.8 - 11.8 N.m (1.0 - 1.2 kgf.m, 7.2 - 8.7 lb-ft)



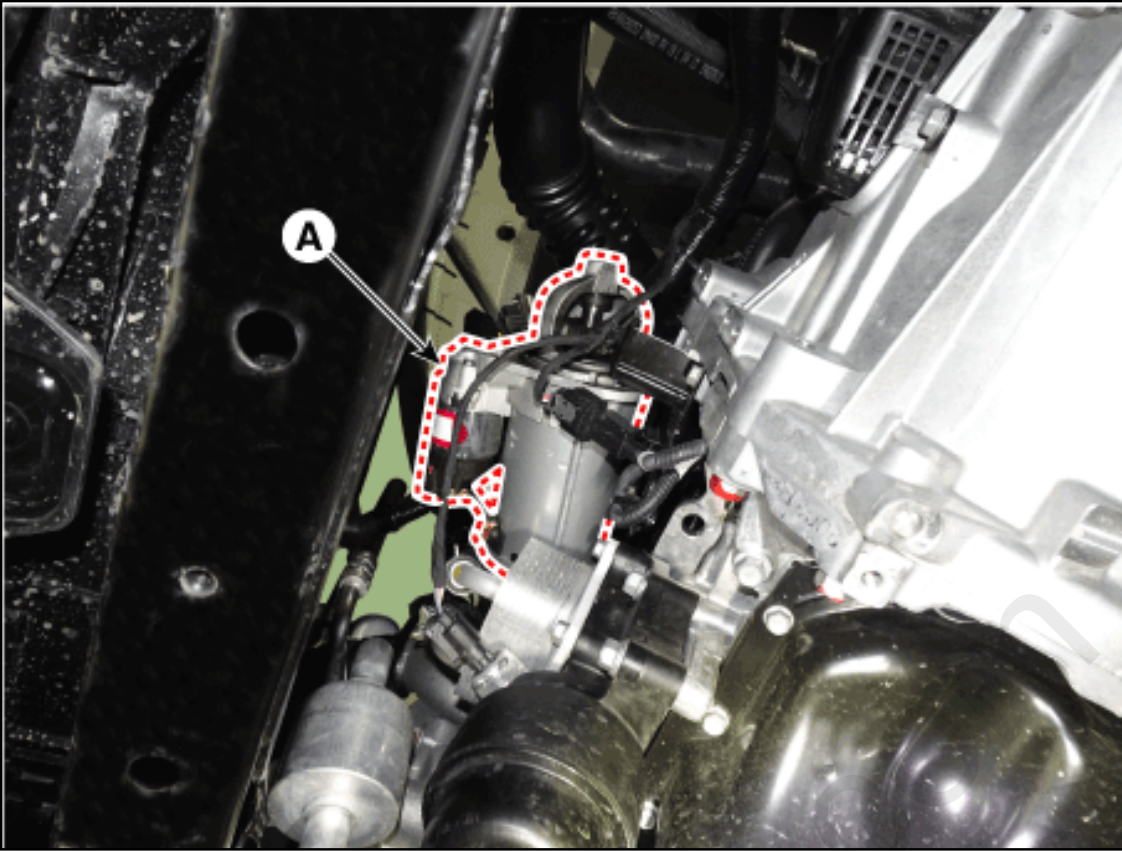
6. Remove the starter mounting bolt (A).
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Tightening torque :

49.0 - 63.7 N.m (5.0 - 6.5 kgf.m, 36.2 - 47.0 lb-ft)



7. Remove the starter (A).

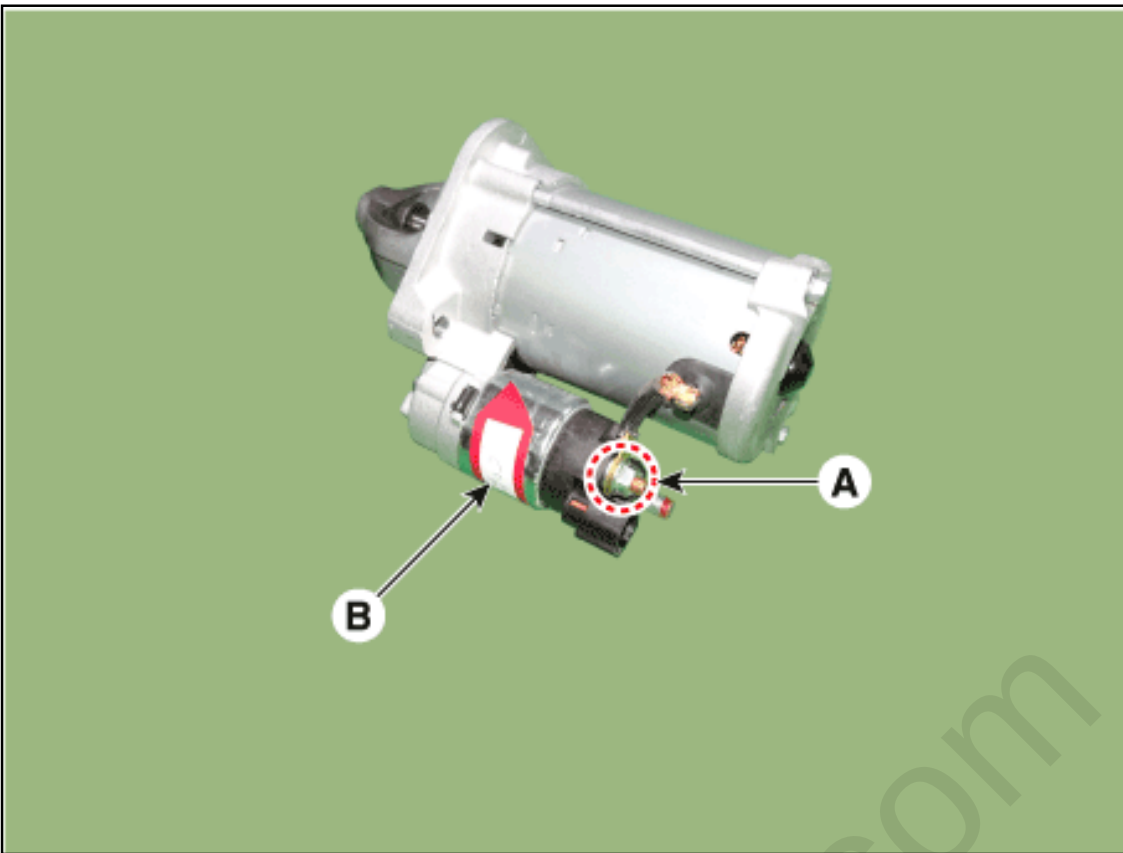


Installation

1. Install in the reverse order of removal.

Disassembly

1. Remove the M-terminal nut (A) on the magnetic switch assembly (B).



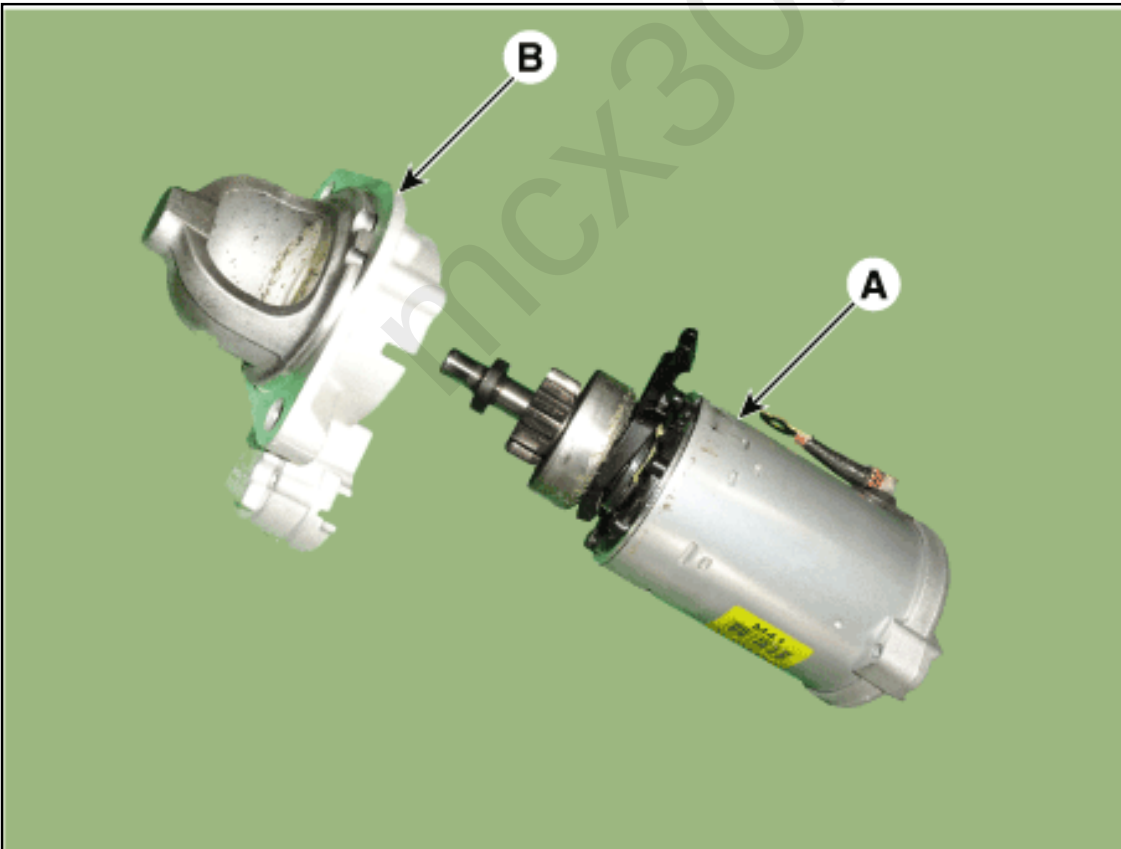
2. After loosening the screws (A), remove the magnetic switch assembly.



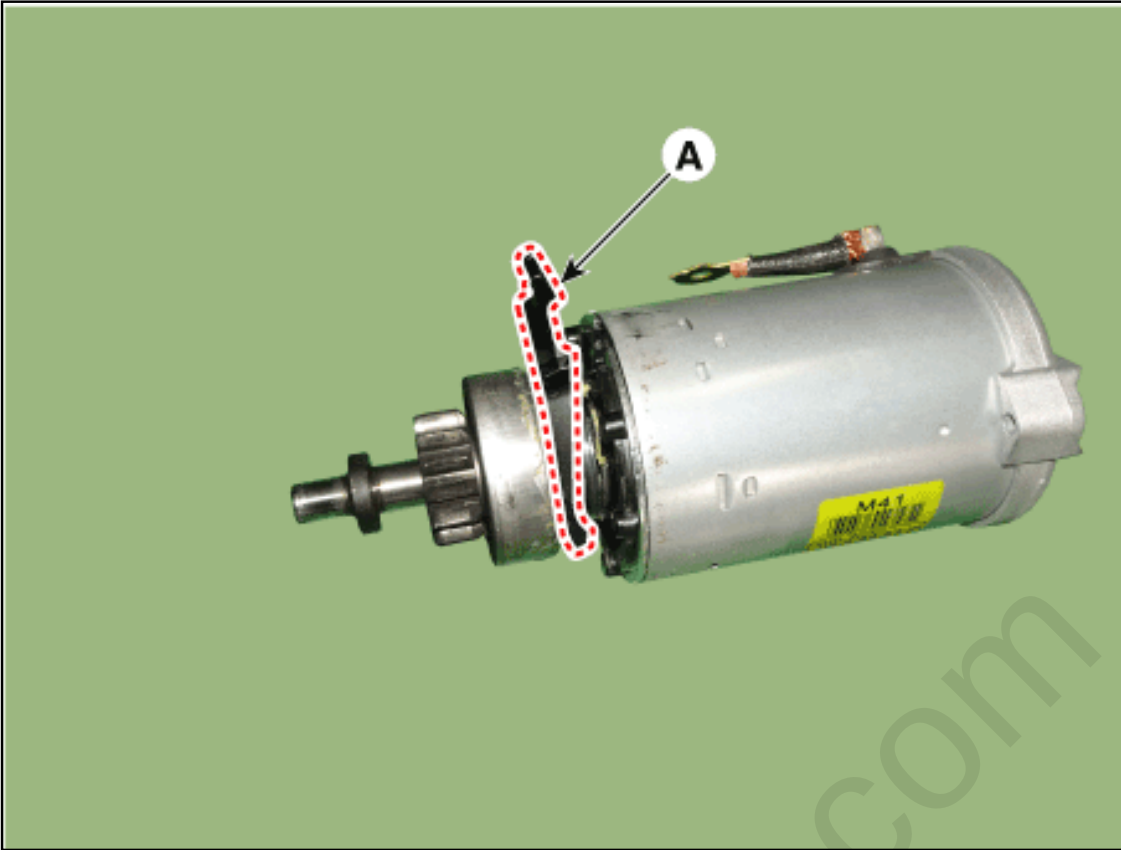
3. Remove the through bolts (A).



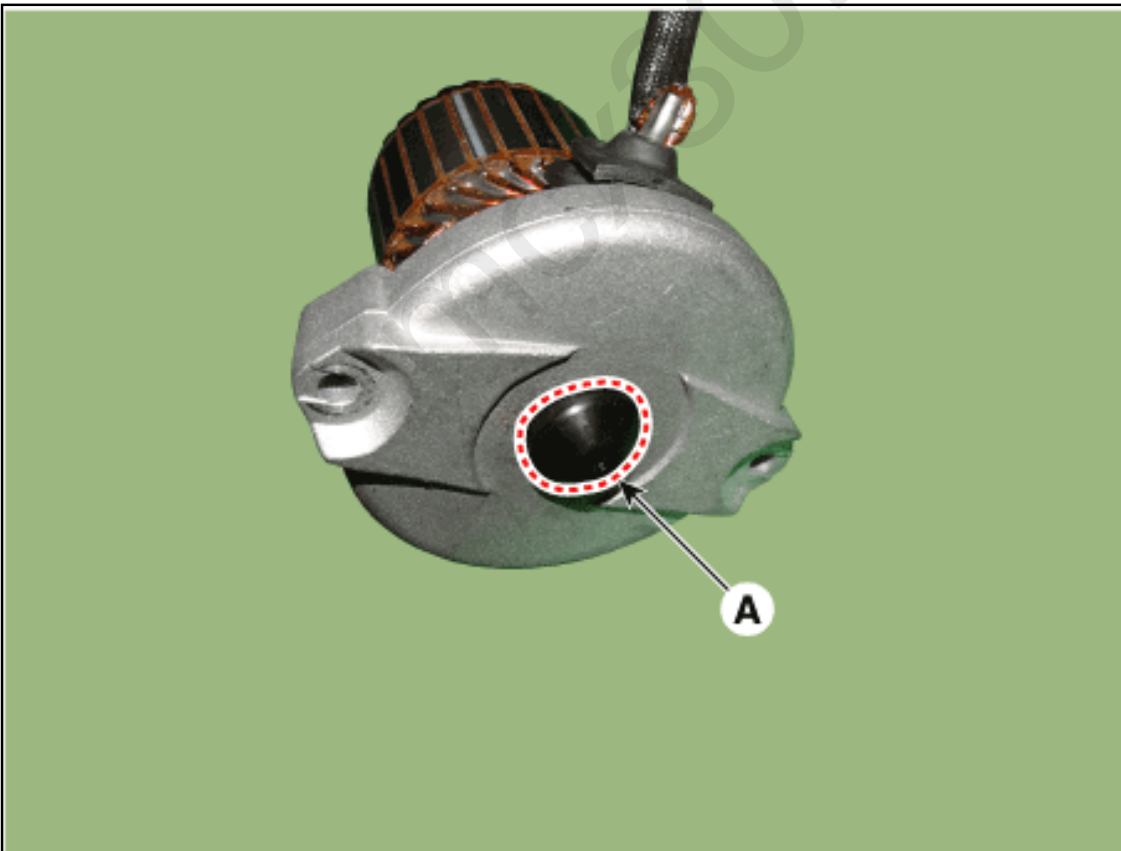
4. Remove the front bracket (B) from the planet gear shaft and yoke assembly (A).



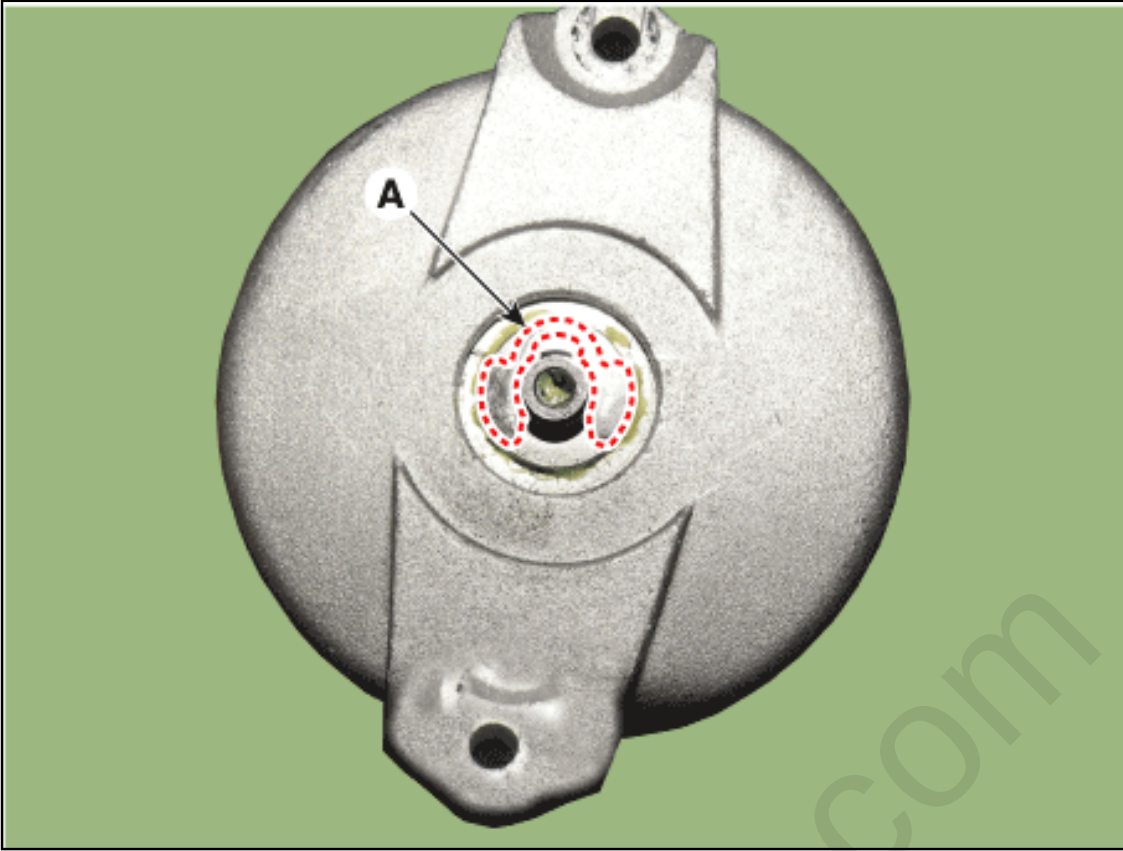
5. Remove the lever (A).



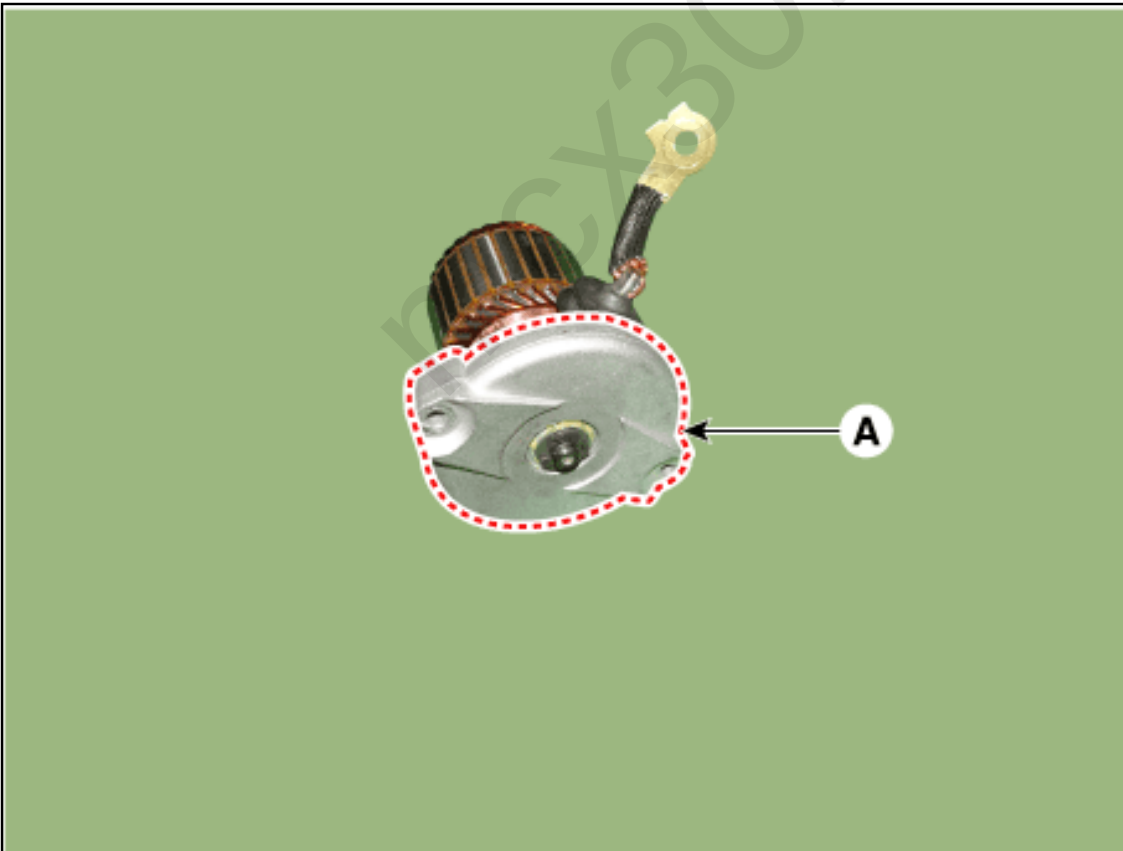
6. Remove the brush holder assembly cover cap (A).



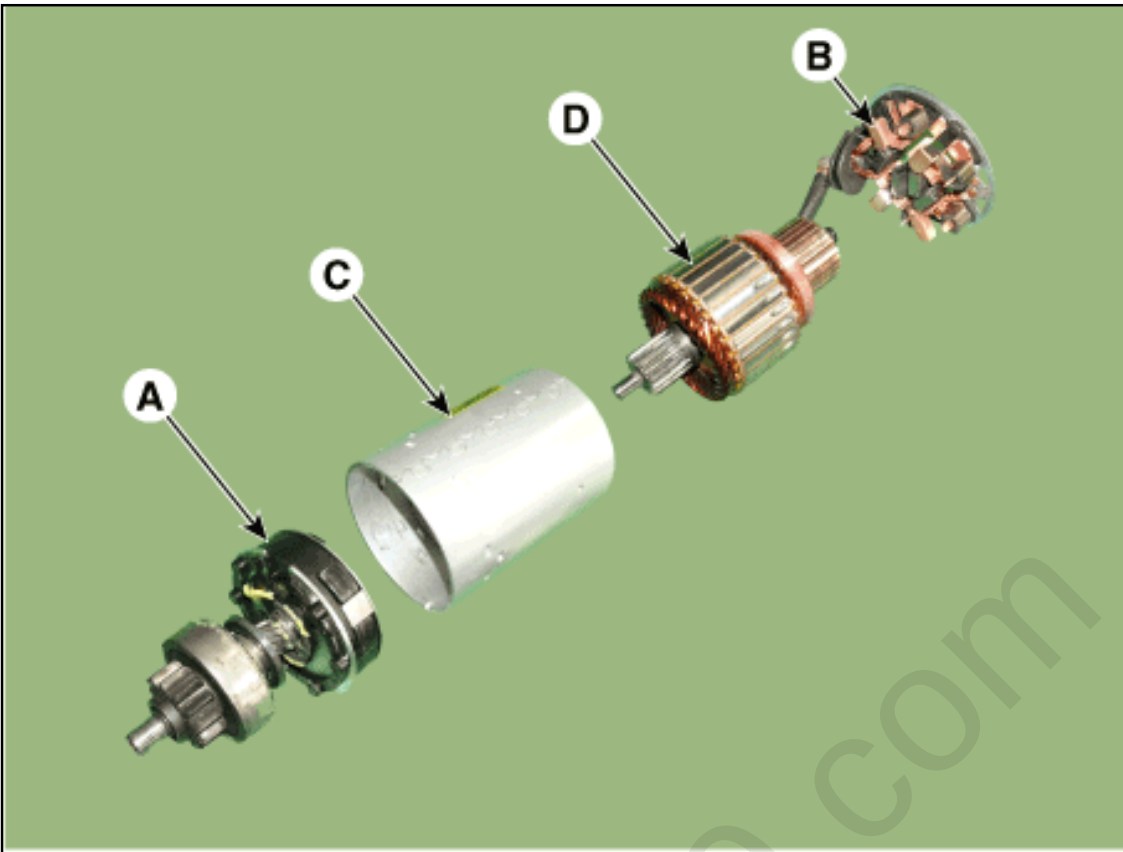
7. Remove the C-ring (A).



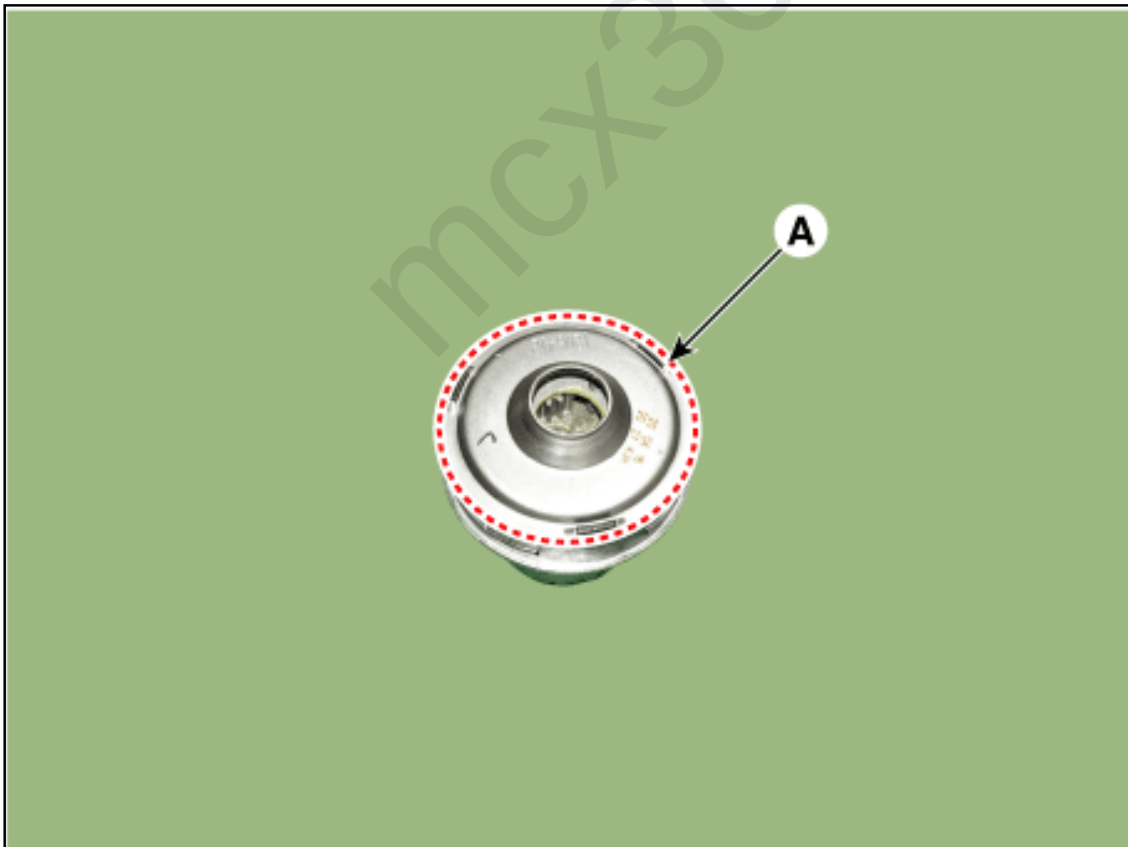
8. Remove the brush holder assembly cover (A).



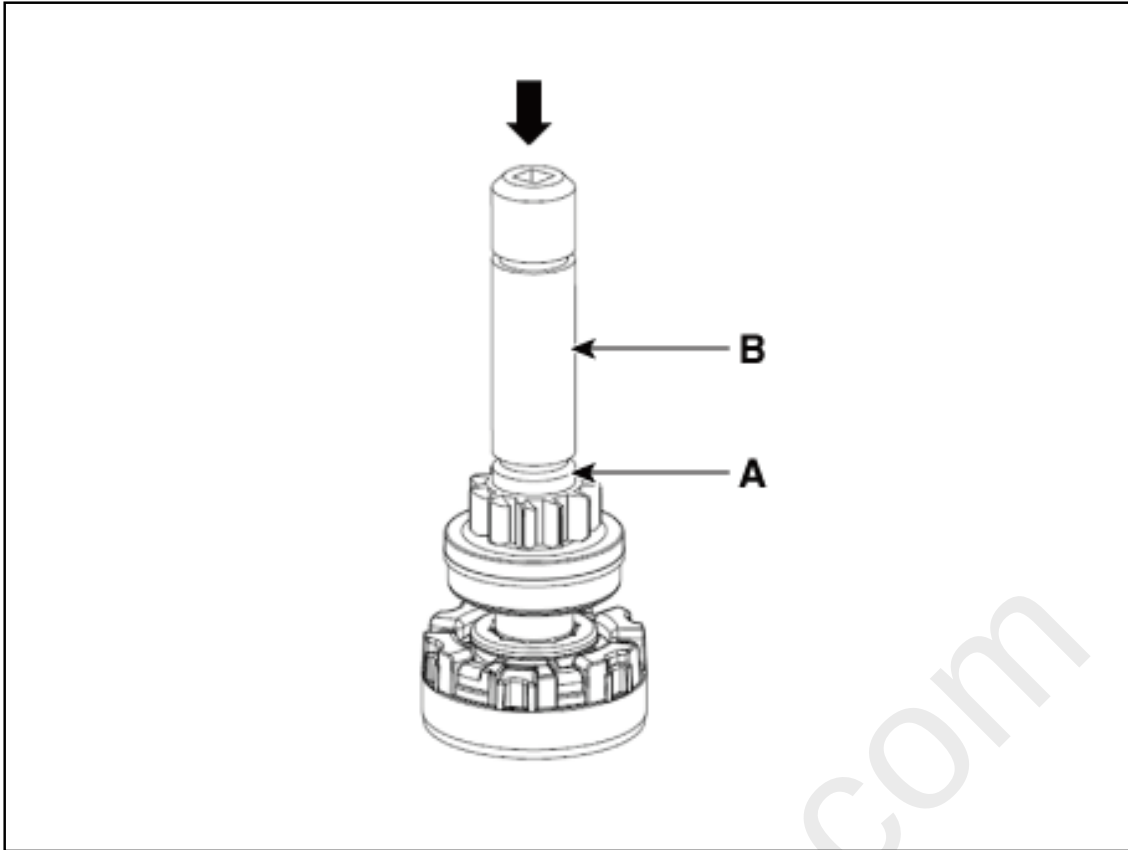
9. Detach the planet gear shaft assembly (A), brush holder assembly (B), armature assembly (D) and yoke assembly (C).



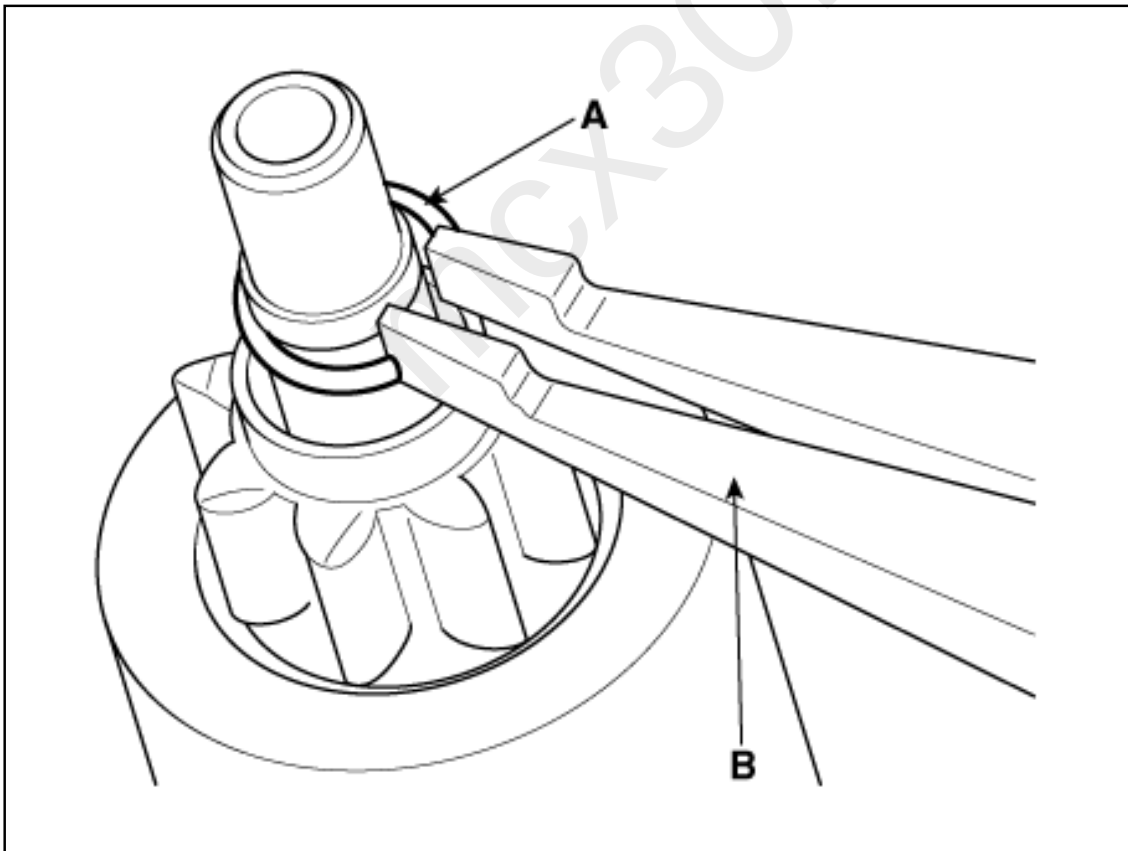
10. Remove the gasket seat (A).



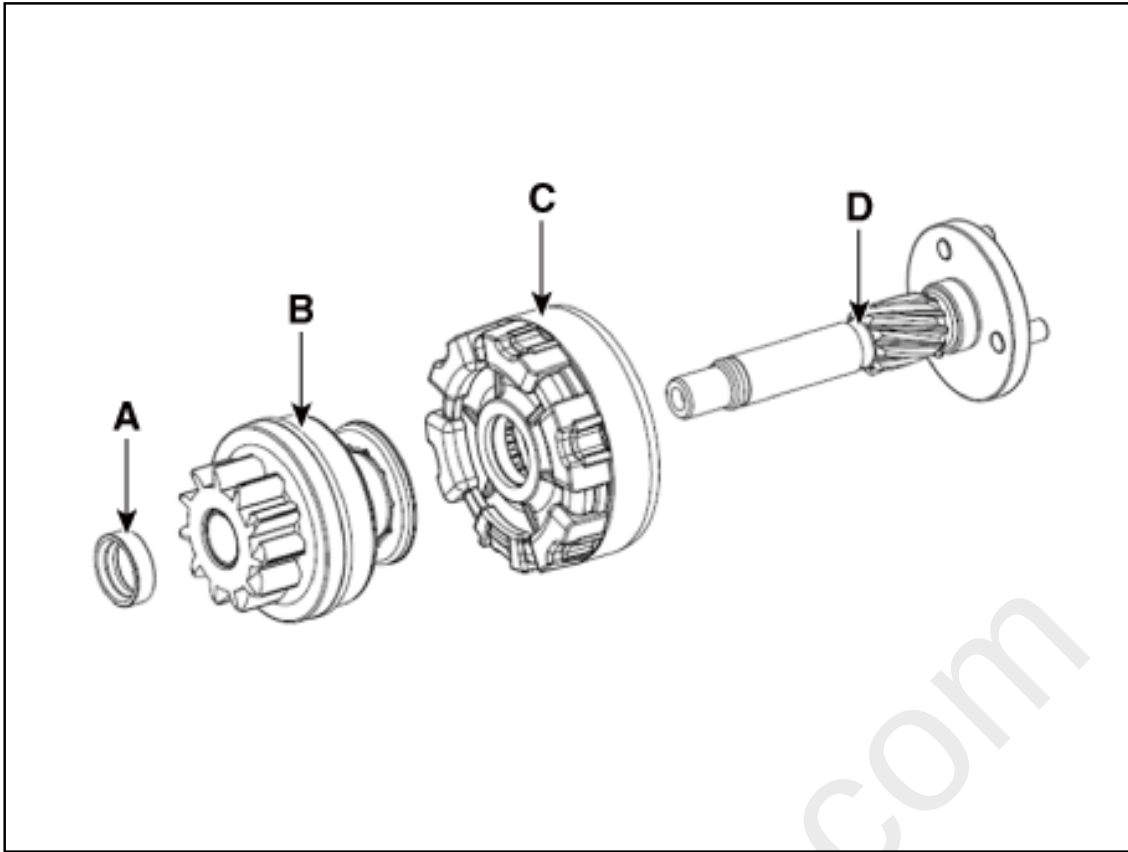
11. Pass the stopper (A) using a socket (B).



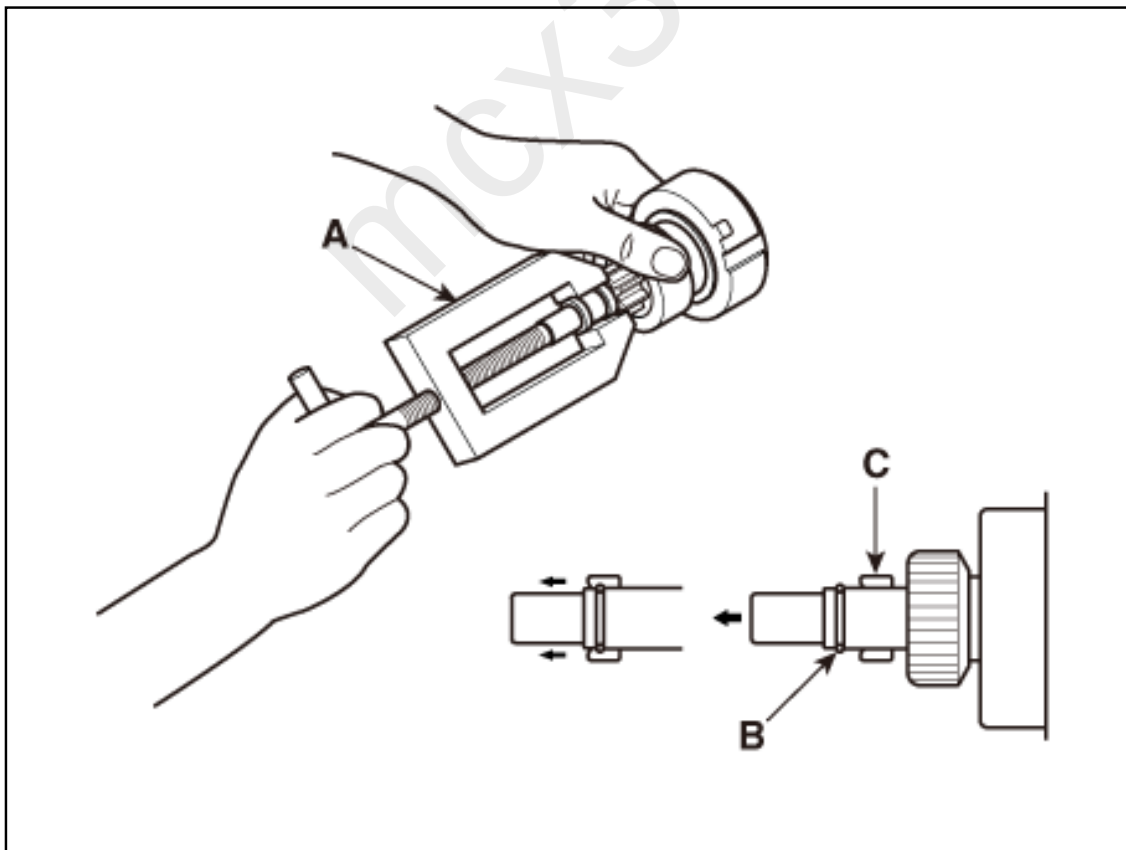
12. Remove the stop ring (A) using the stop ring pliers (B).



13. Remove the stopper (A), overrunning clutch (B), internal gear (C) and planet shaft (D).



- Using a suitable pulling tool (A), pull the overrunning clutch stop ring (B) over the stopper (C).



Reassembly

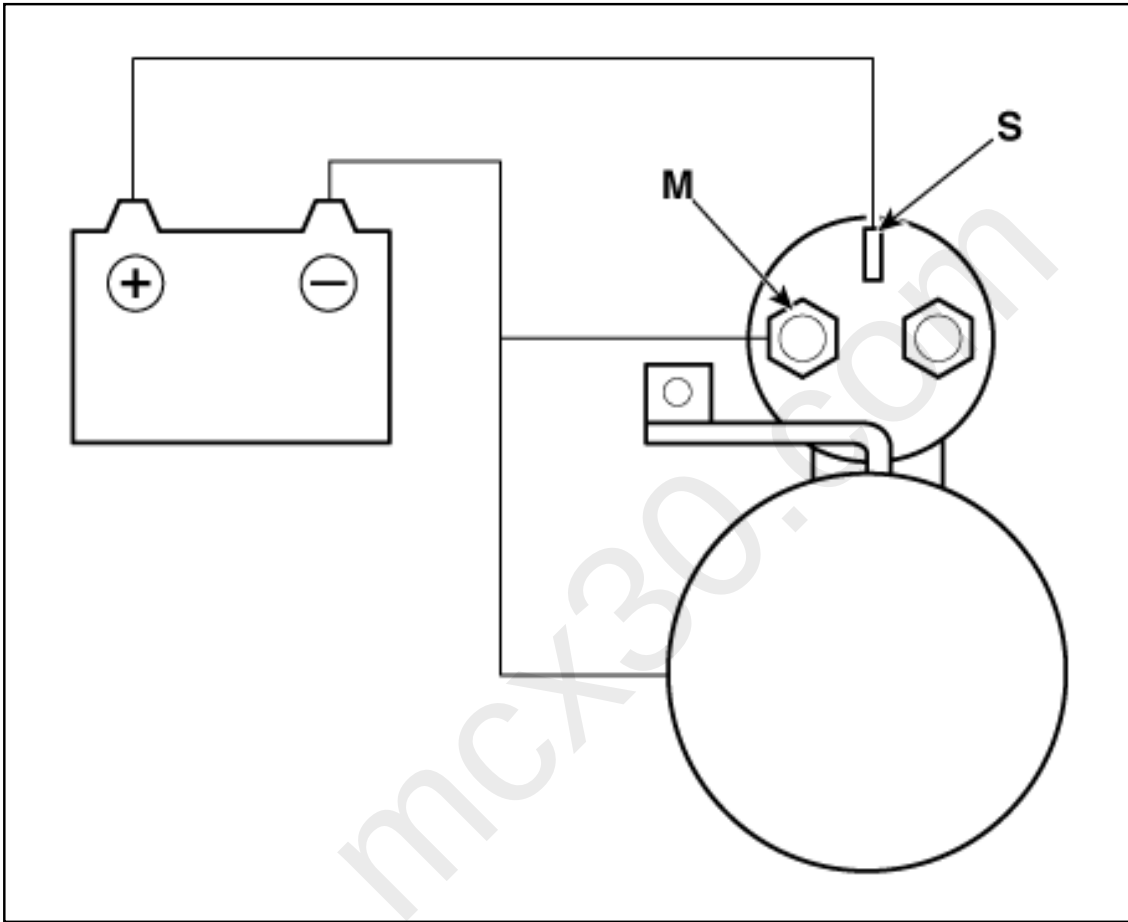
1. Reassemble in the reverse order of disassembly.

Inspection

Starter Solenoid Inspection

1. Disconnect the lead wire from the M-terminal of solenoid switch.
2. Connect the battery as shown. If the starter pinion pops out, it is working properly.

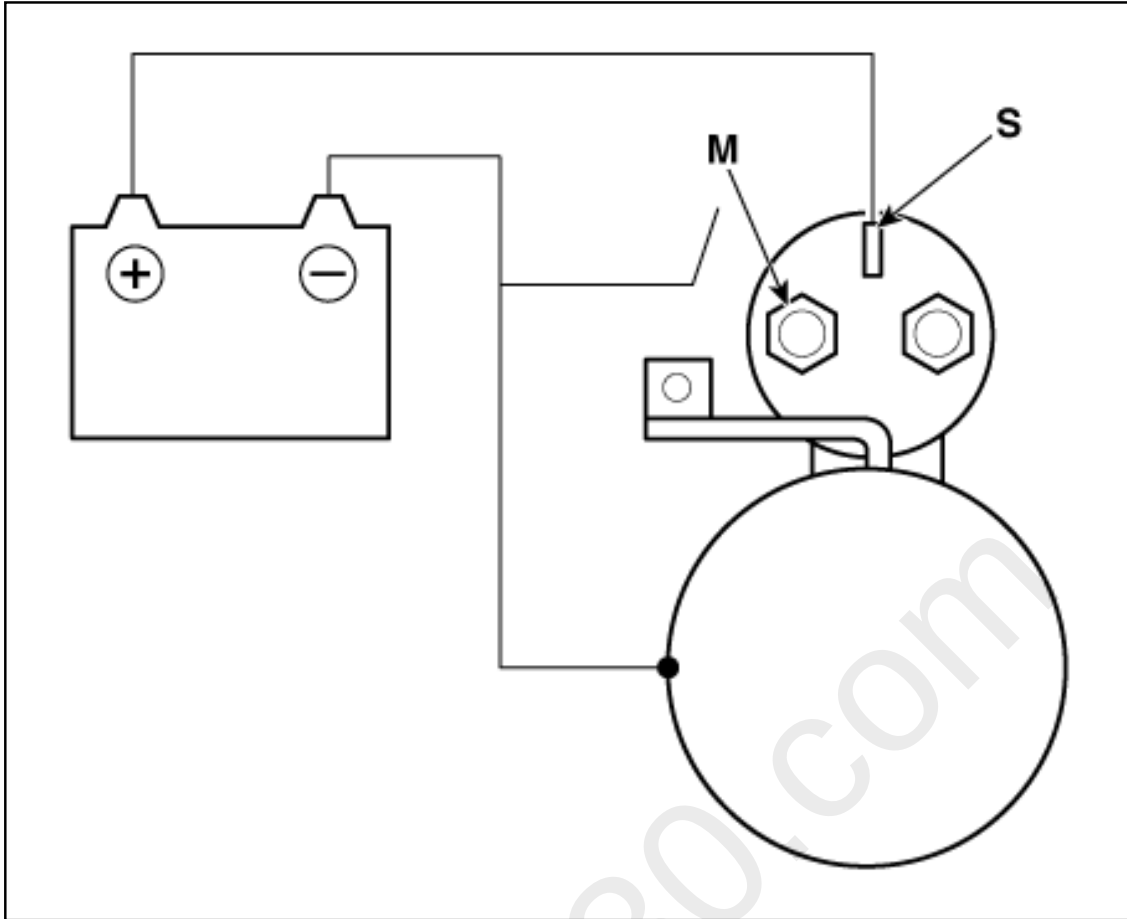
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- To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



3. Disconnect the battery from the M terminal.
If the pinion does not retract, the hold-in coil is working properly.



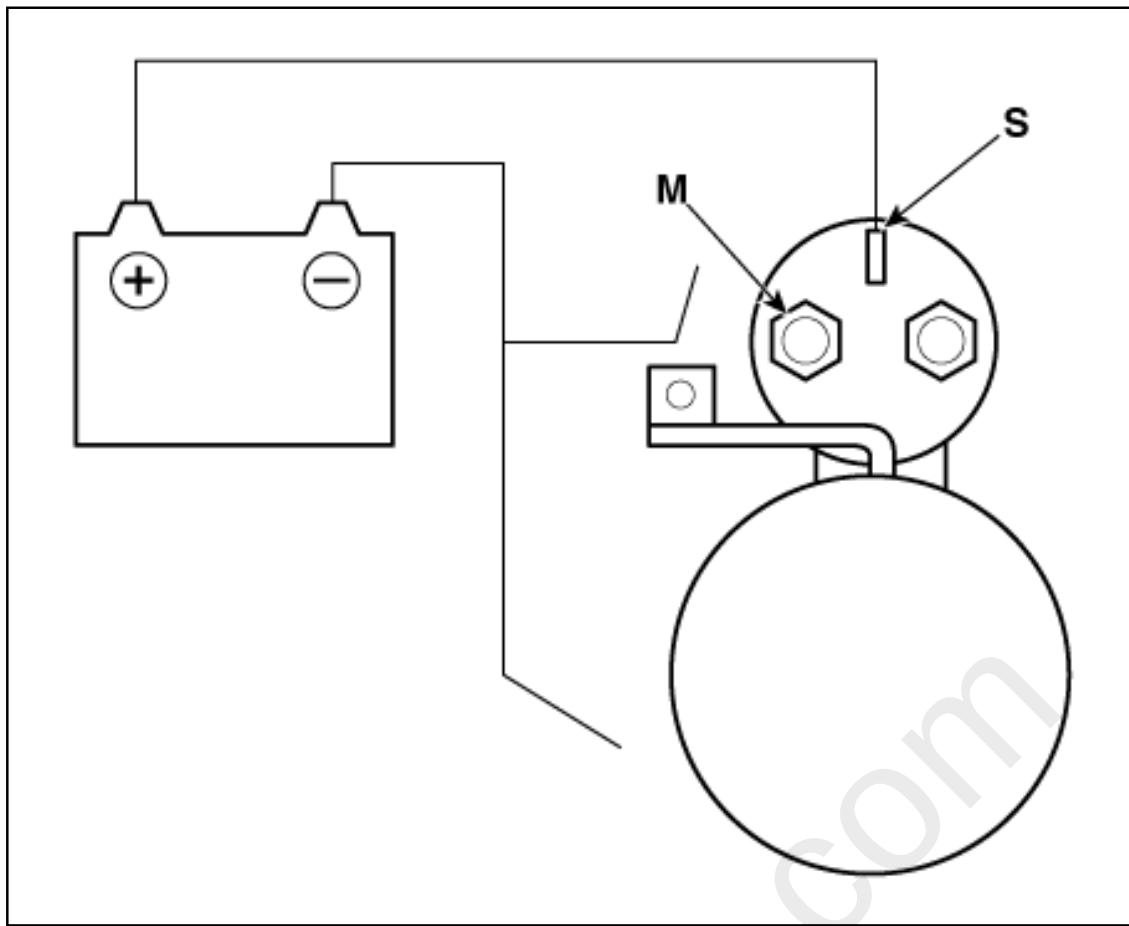
- To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



4. Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly.

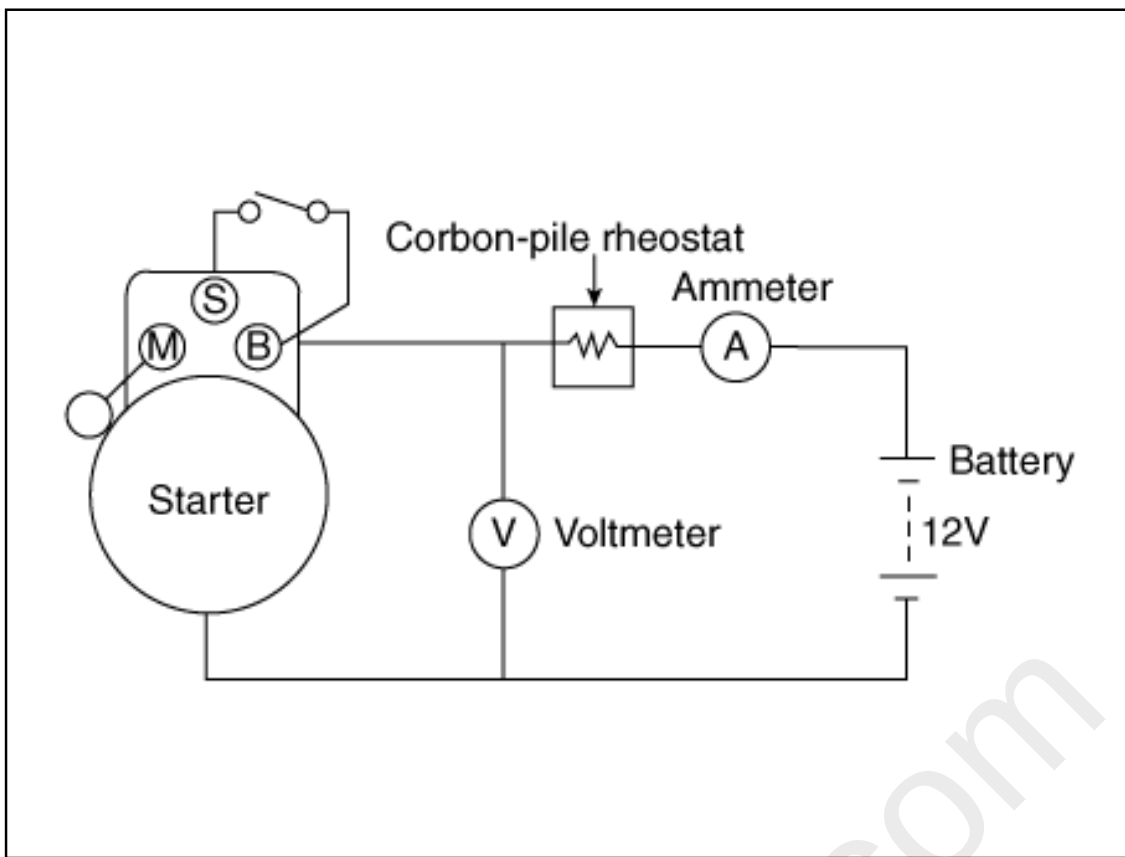


- To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



Free Running Inspection

1. Place the starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows.
2. Connect a test ammeter (150-ampere scale) and carbon pile rheostats shown is the illustration.
3. Connect a voltmeter (15-volt scale) across starter motor.

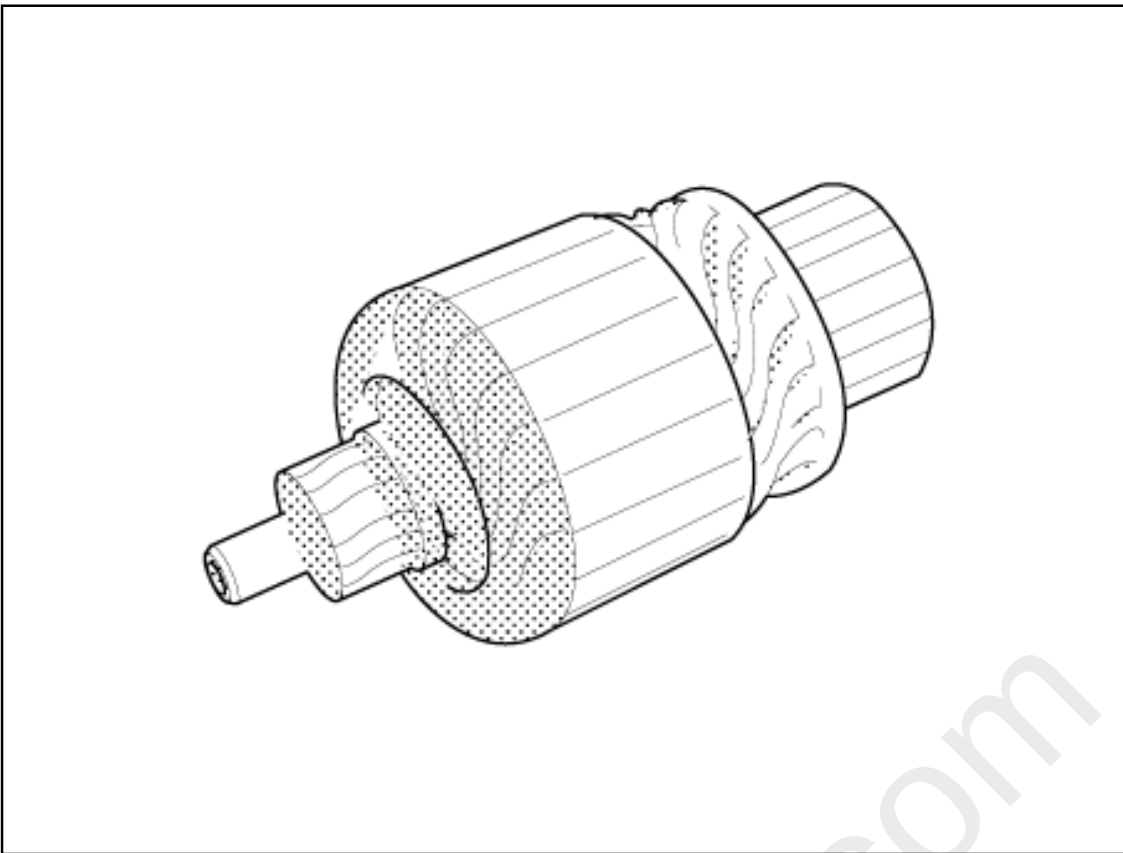


4. Rotate carbon pile to the off position.
5. Connect the battery cable from battery's negative post to the starter motor body.
6. Adjust until battery voltage shown on the voltmeter reads 11.5 and 11 volts.
7. Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely.

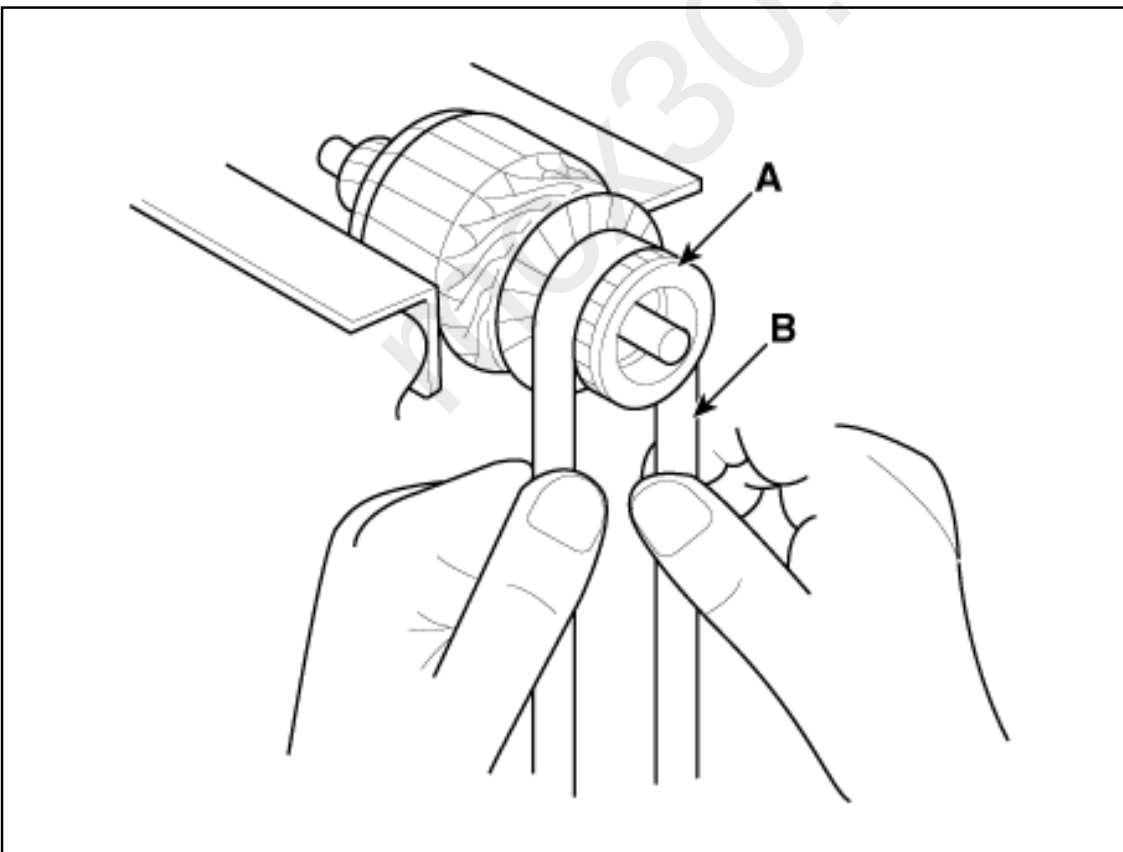
Items	Specification
Current (Max.)	Max. 100 A
Speed (Min.)	Min. 3,400 RPM

Armature Inspection and Test

1. Remove the starter.
2. Disassemble the starter as shown at the beginning of this procedure.
3. Inspect the armature for wear or damage from contact with the permanent magnet. If there is wear or damage, replace the armature.



4. Check the commutator (A) surface. If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper (B).



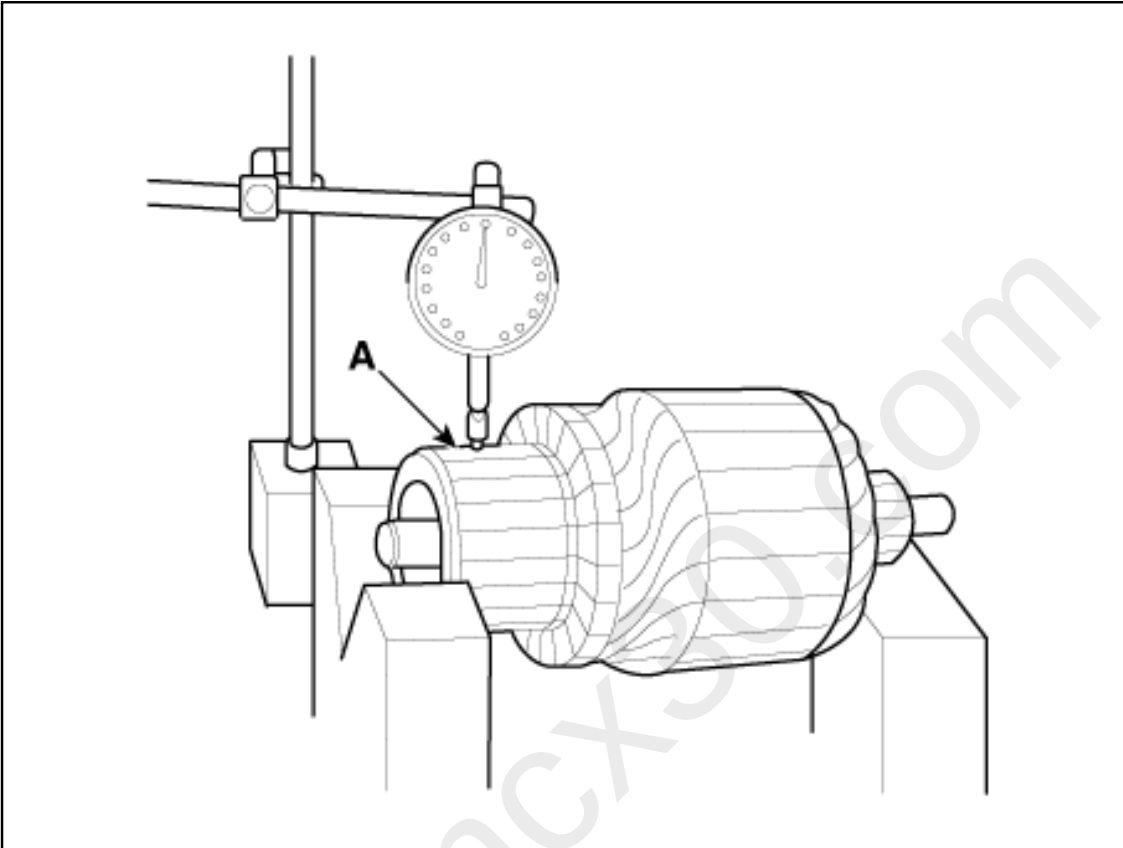
5. Measure the commutator (A) runout.

- If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
- If the commutator run out is not within the service limit, replace the armature.

Commutator runout

Standard (New) : 0.05 mm (0.0019 in.) max

Service limit : 0.08 mm (0.0031 in.)

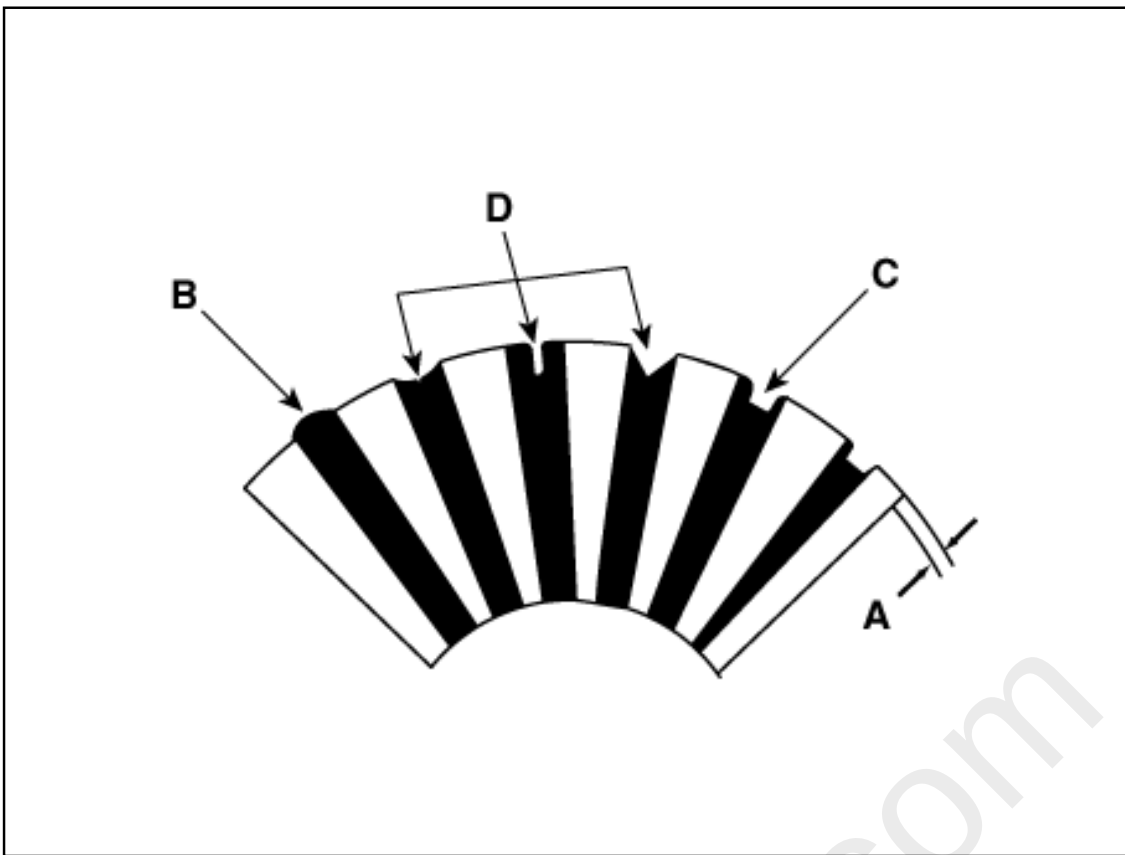


6. Check the mica depth (A). If the mica is too high (B), undercut the mica with a hacksaw blade to the proper depth. Cut away all the mica (C) between the commutator segments. The undercut should not be too shallow, too narrow, or v-shaped (D).

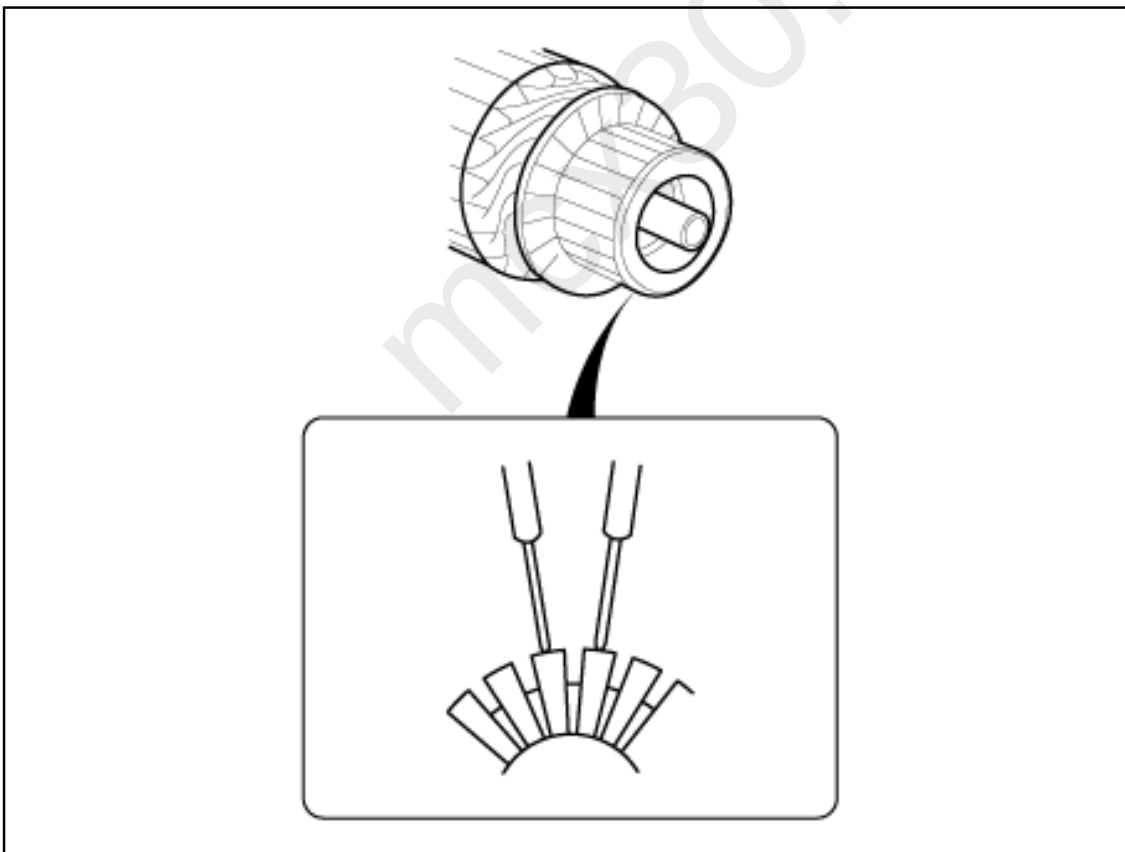
Commutator mica depth

Standard (New) : 0.7 mm (0.0276 in.)

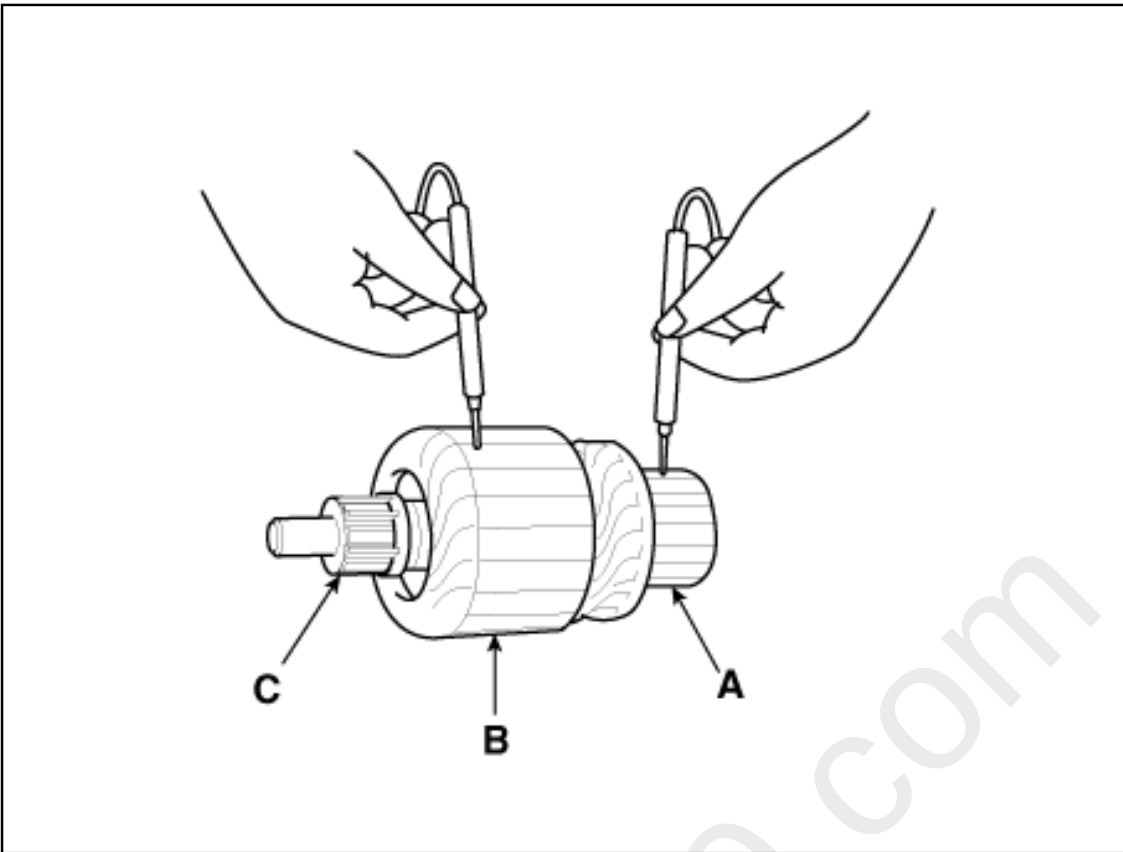
Limit : 0.2 mm (0.0079 in.)



7. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.

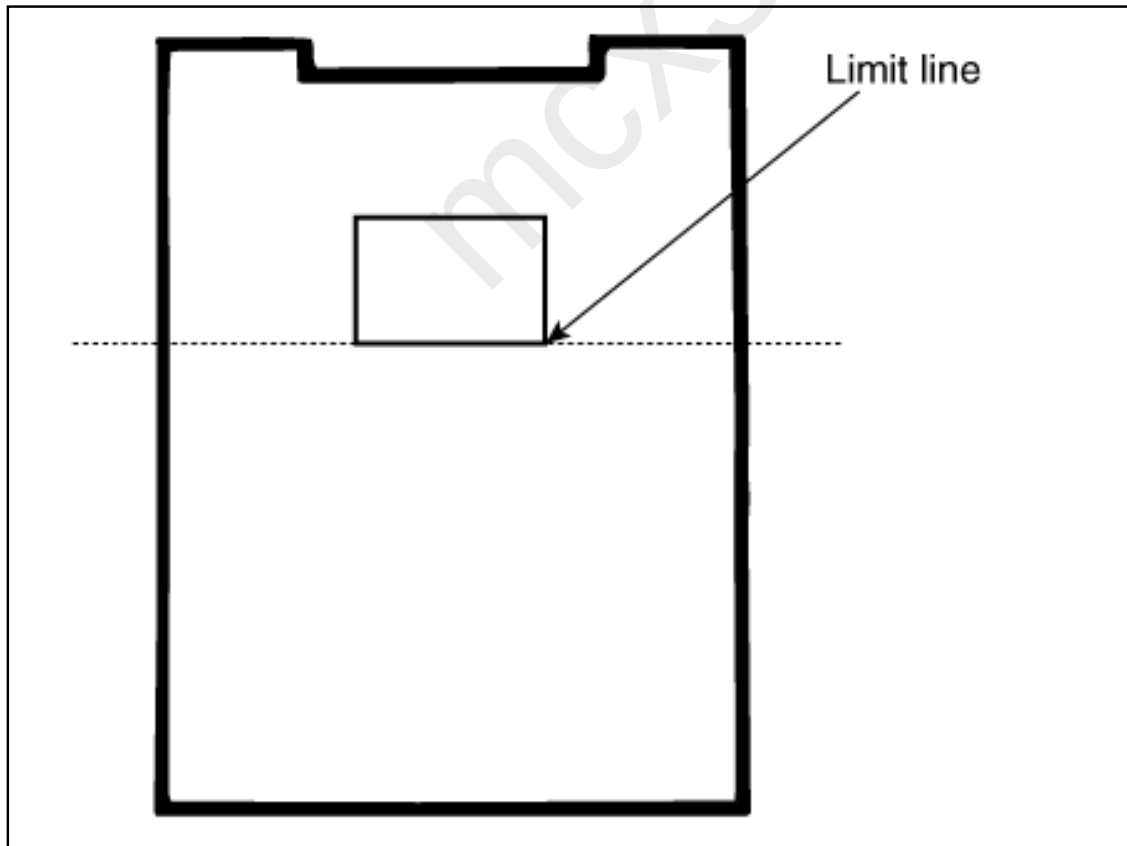


8. Check with an ohmmeter that no continuity exists between the commutator (A) and armature coil core (B), and between the commutator and armature shaft (C). If continuity exists, replace the armature.



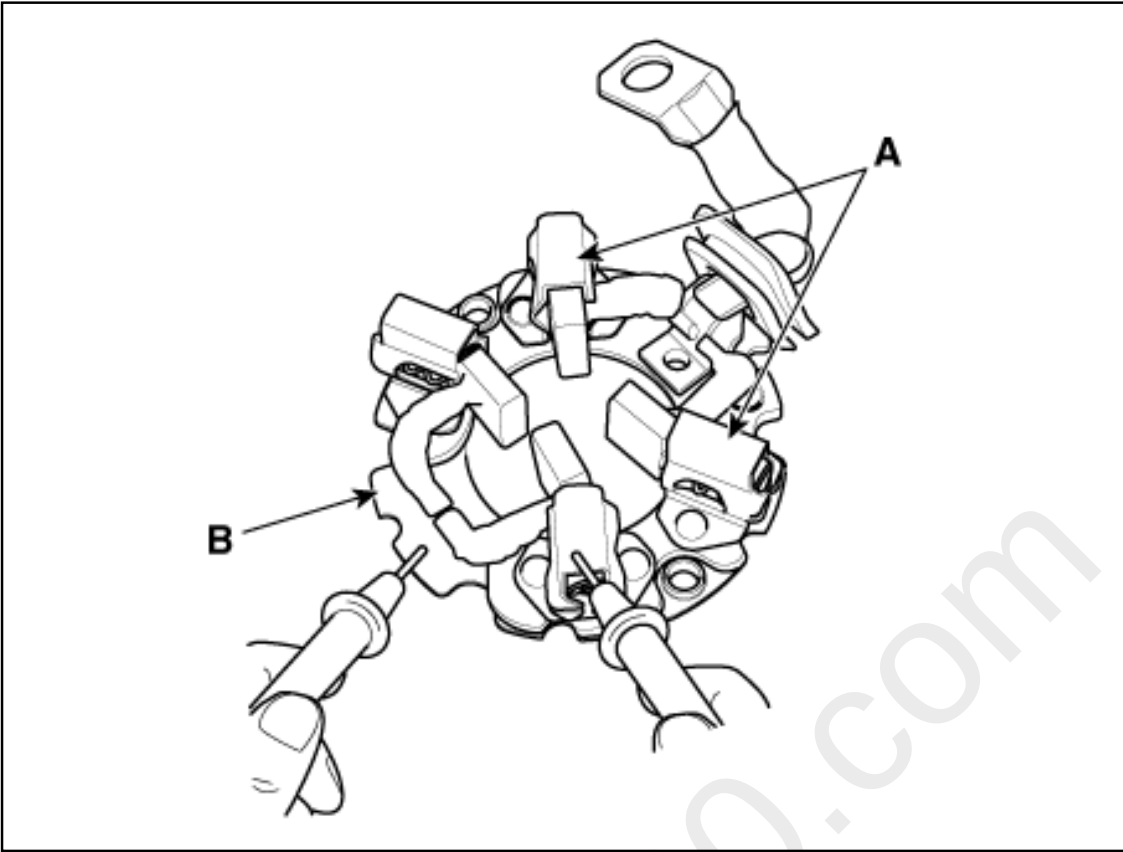
Inspect Starter Brush

Any worn out or oil-soaked brushes should be replaced.



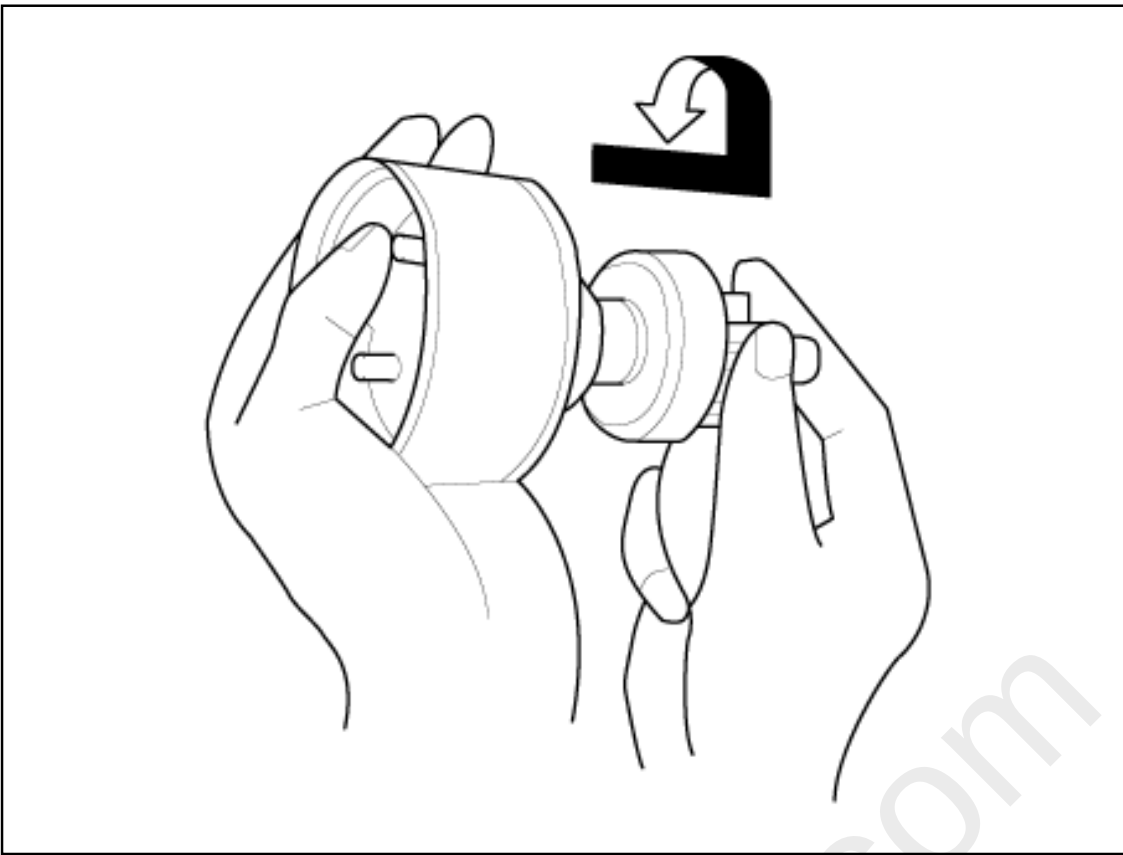
Starter Brush Holder Test

1. Check that there is no continuity between the (+) brush holder (A) and (-) plate (B). If there is continuity, replace the brush holder assembly.



Inspect Overrunning Clutch

1. Slide the overrunning clutch along the shaft.
Replace if it does not slide smoothly.
2. Rotate the overrunning clutch both ways.
Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or locks in both directions, replace it.



3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly. (The gear is not available separately.)

Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

Cleaning

1. Do not immerse parts in cleaning solvent.

Immersing the yoke assembly and/or armature will damage the insulation wipe these parts with a cloth only.

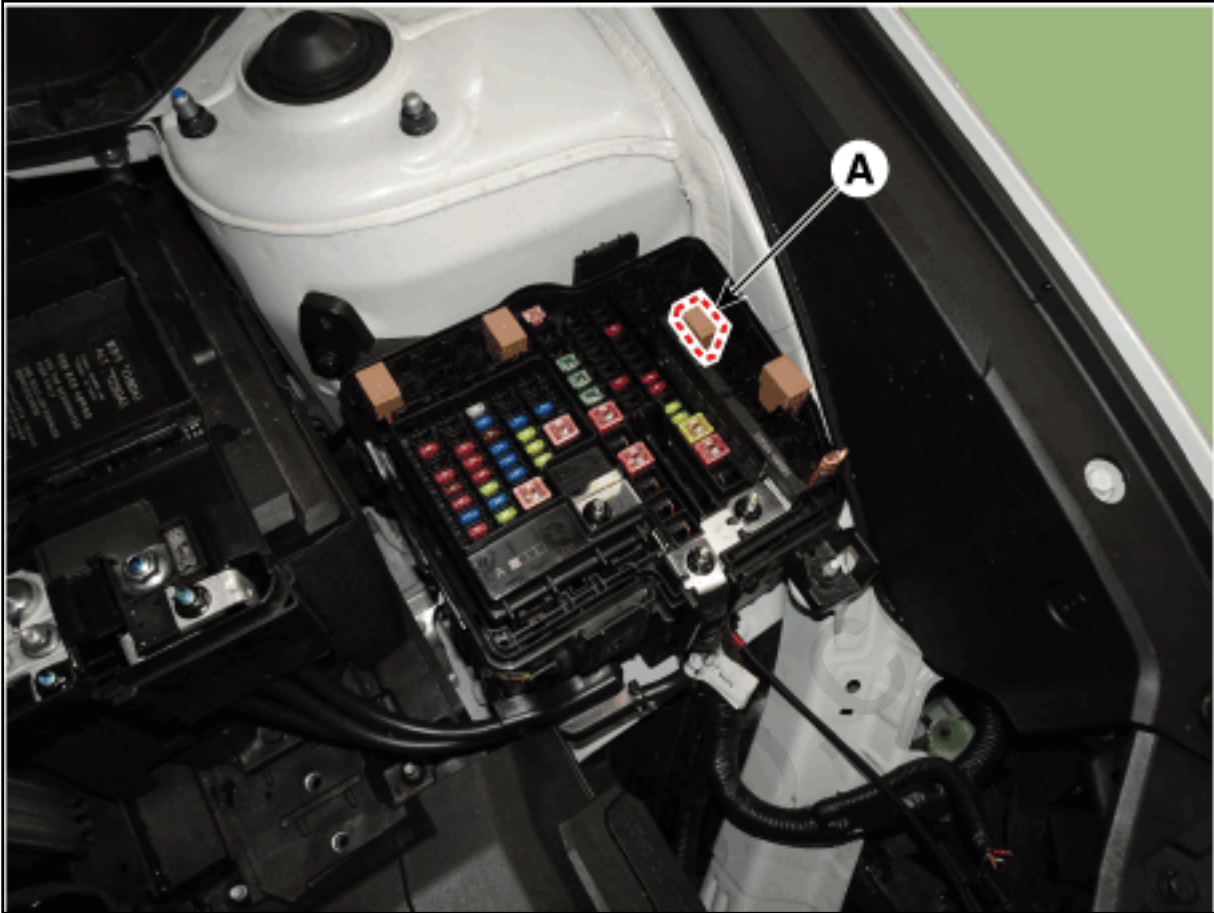
2. Do not immerse the drive unit in cleaning solvent.

The overrun clutch is pre-lubricated at the factory and solvent will wash lubrication from the clutch.

3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

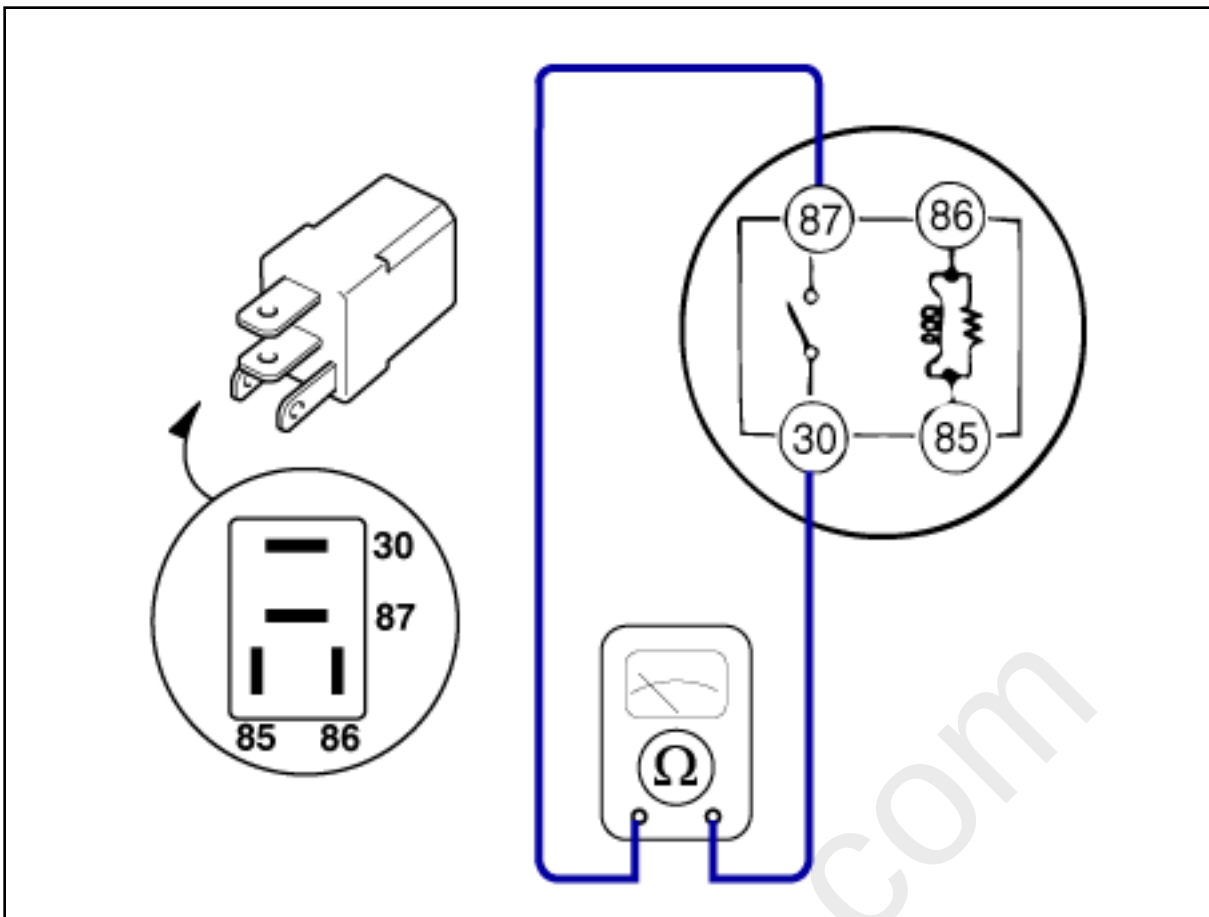
Inspection

1. Turn ignition switch OFF and disconnect the battery negative (-) terminal.
2. Remove the fuse box cover.
3. Remove the starter relay (A).



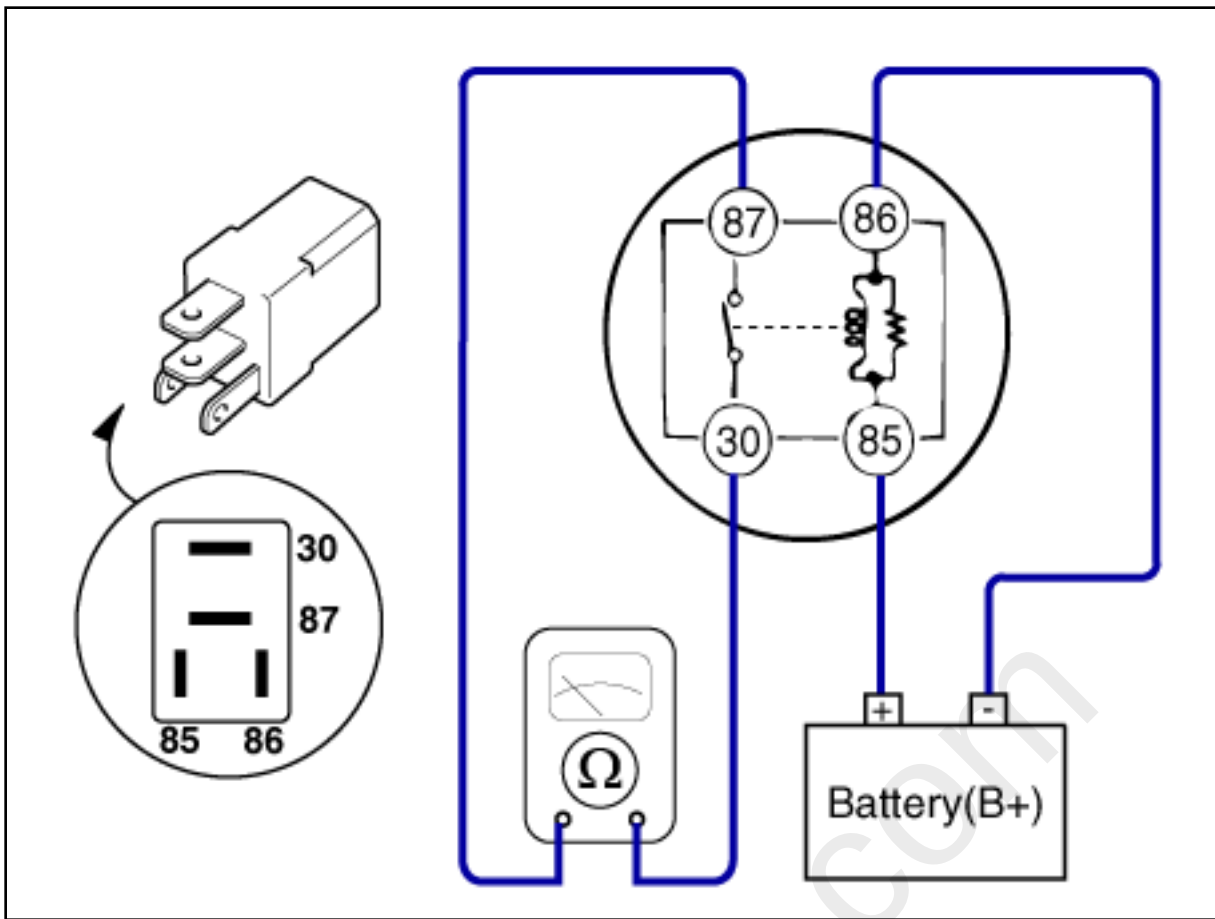
4. Check for continuity between the terminals (30 and 87) using an ohmmeter.

Terminal	Resistance	Measure
30 - 87	1 M Ω or higher	If there is continuity between the terminals, replace the relay.



5. Apply 12V to the terminal 85 and ground to the terminal 86 and then check for continuity between the terminals (30 and 87).

Terminal	Resistance	Measure
30 - 87	1Ω or less	If there is no continuity between the terminals, replace the relay.



6. Install the starter relay.
7. Install the fuse box cover.