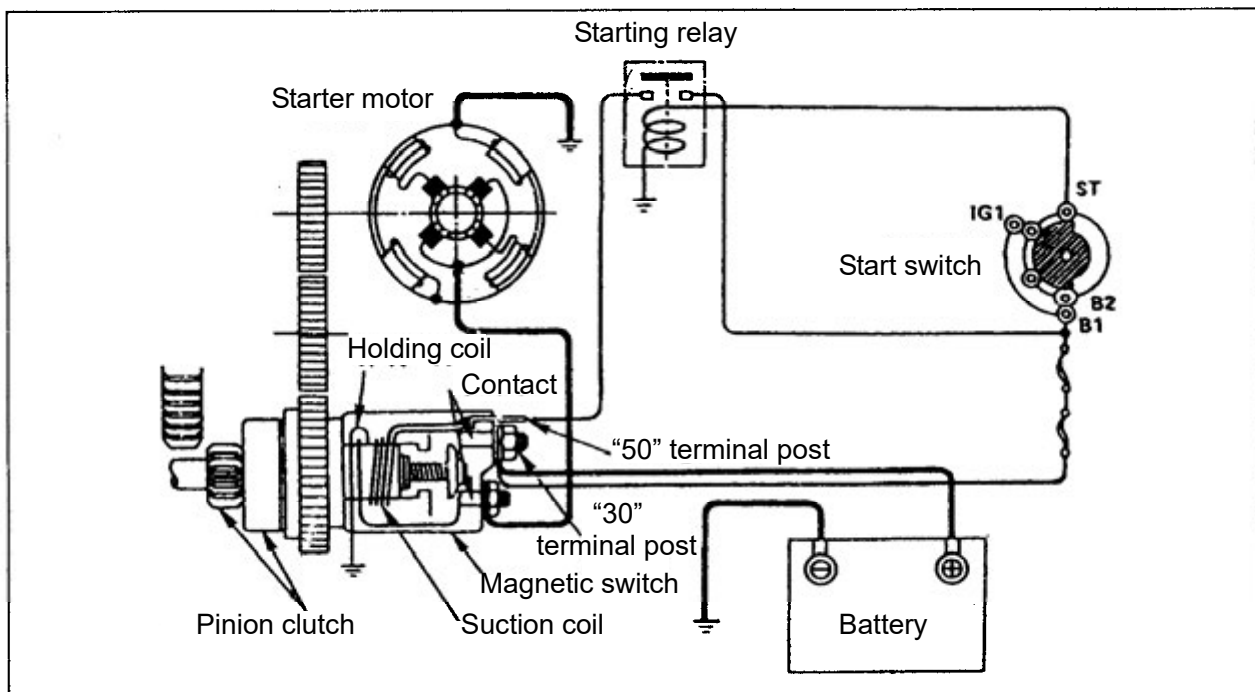




6 Starting system

6.1 General

The starting system consists of battery, starter motor, start switch, starting relay, etc. These parts are connected according to the diagram. The diagram shows the details of the starting circuit.



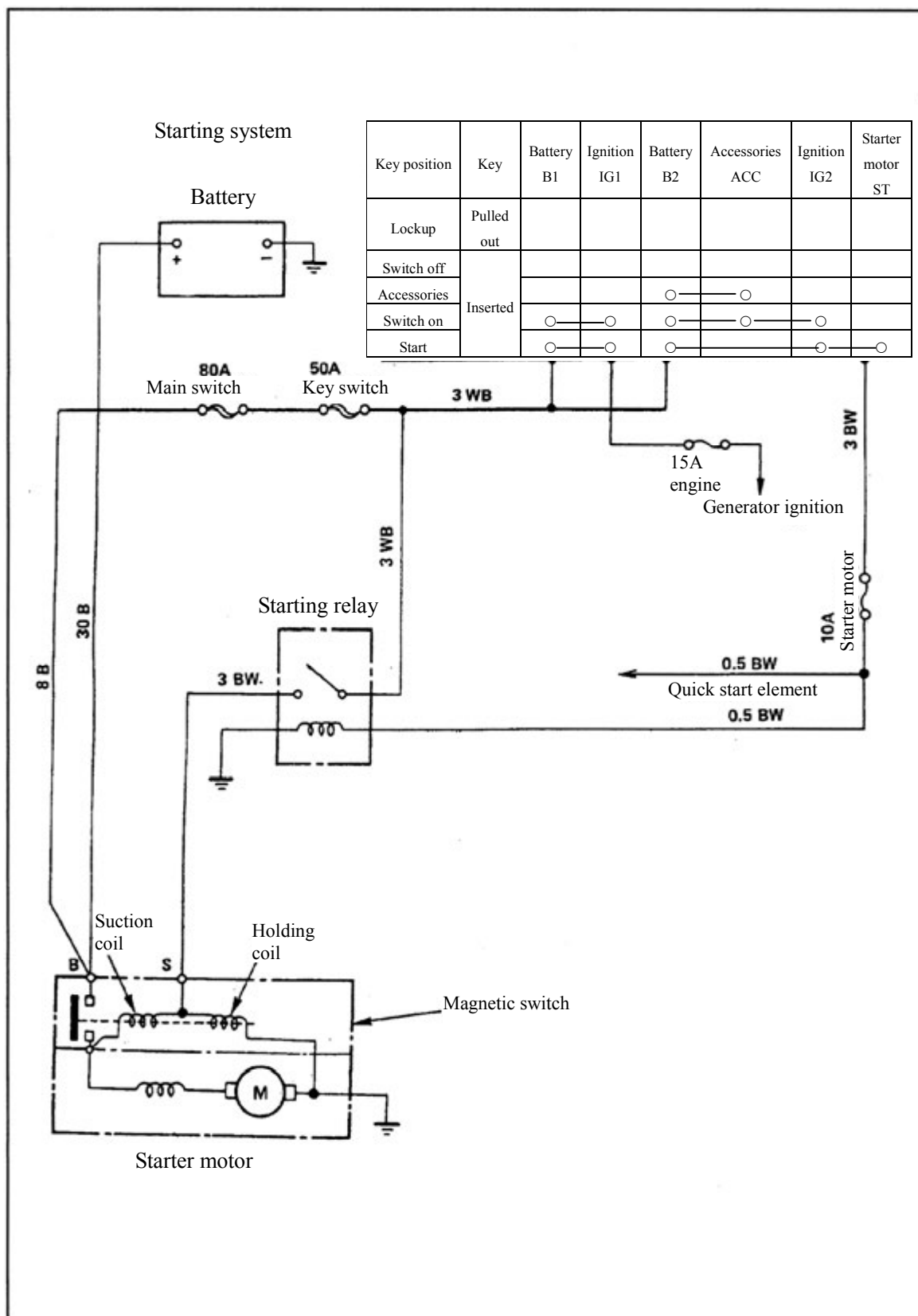
The starting system utilizes the gear reduction magnetic starter motor and its shaft can be used as pinion shaft. When the start switch is switched on, the magnetic switch contact closes causing the armature to rotate. Meanwhile, Move the movable core by suction and push the pinion forward to engage with the ring gear by a deflector rod. Then the ring gear starts to run and the engine starts. When the engine is started and the start switch is switched off, the movable core returns to the original position while the pinion runs out of the ring gear, then the armature stops. When the engine speed is higher than the pinion's, the latter stays in idle state, so it can't drive the armature.

Note:

The starting circuit diagram is only for information and the overall circuit diagram is prevail in specific cases.

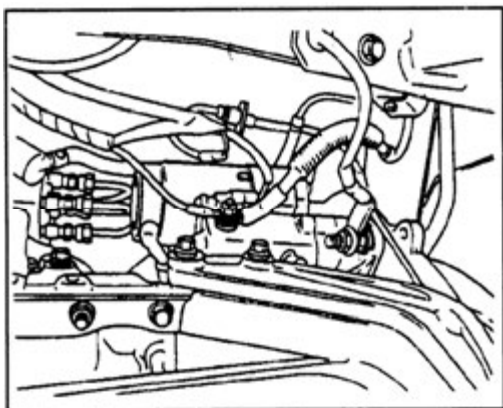
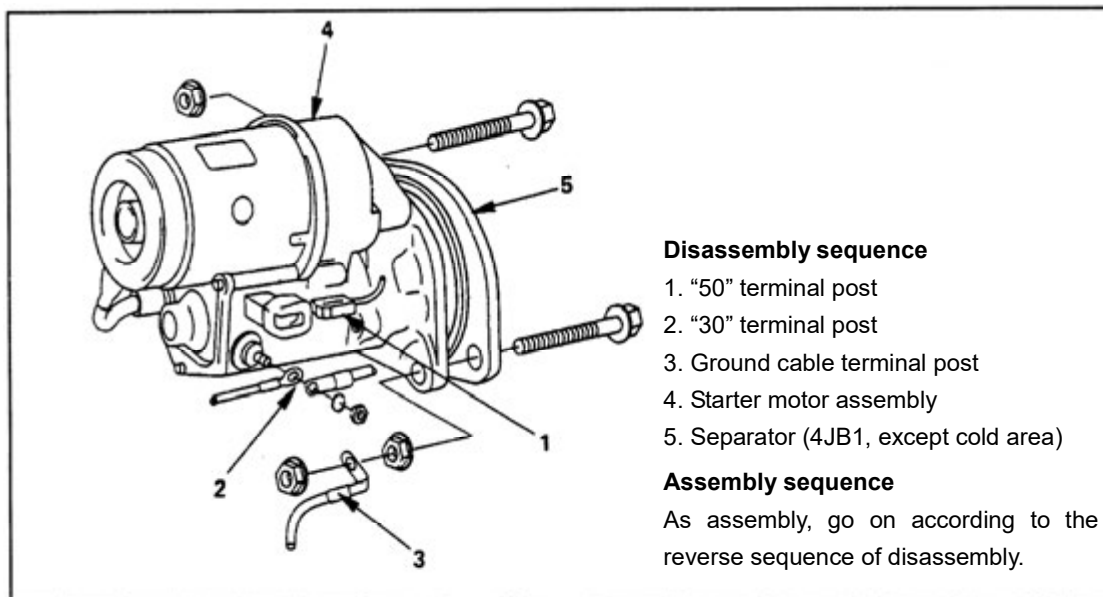


6.2 Starting circuit





6.3 Starter motor



Disassembly

Preparation:

- Remove the ground cables of battery.

1. "50" terminal post
2. "30" terminal post
3. Ground cable terminal post
4. Starter motor assembly
5. Separator (except cold area)

Assembly

5. Separator (except cold area)
4. Starter motor assembly
 - Tighten the fixing bolt(s) and nut(s) to the specified torque.

Starter motor bolt and nut torque	N·m
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81

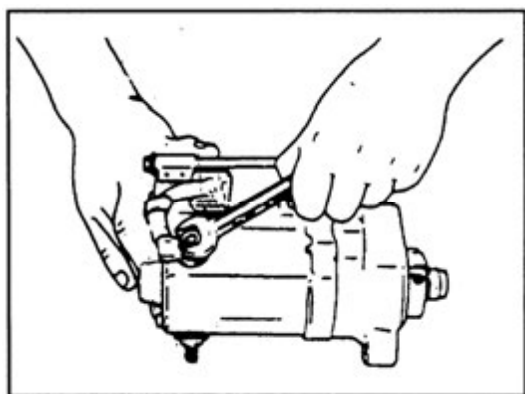
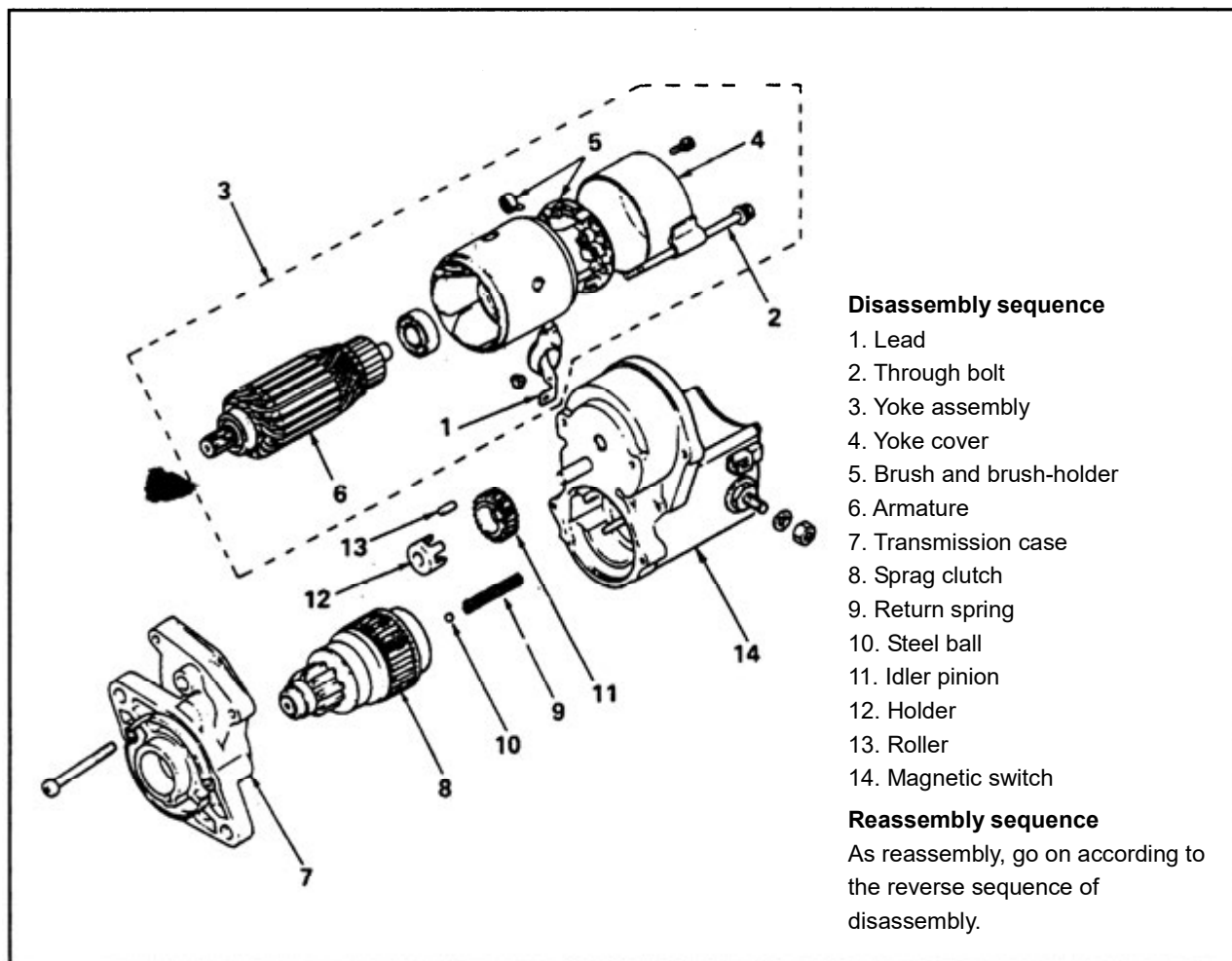
3. Ground cable terminal post
 - Connect the ground cable terminal post.
2. "50" terminal post
 - Connect the wire connector.
1. "30" terminal post
 - Connect the battery cable and start switch wire terminal posts, and tighten nuts to the specified torque.

Fixing nut torque	N·m
-------------------	-----

9

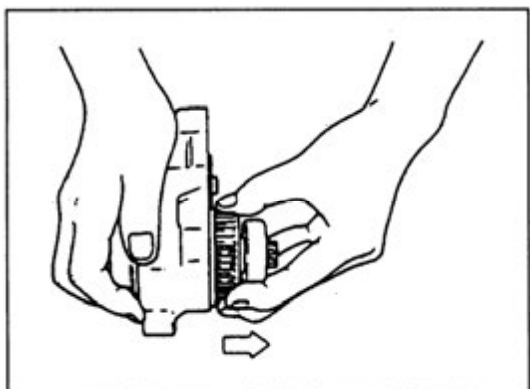


Single-piece repair

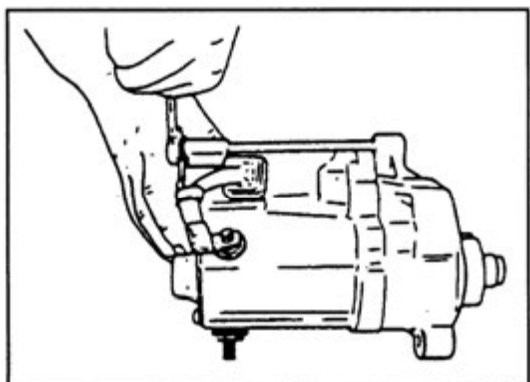


Disassembly

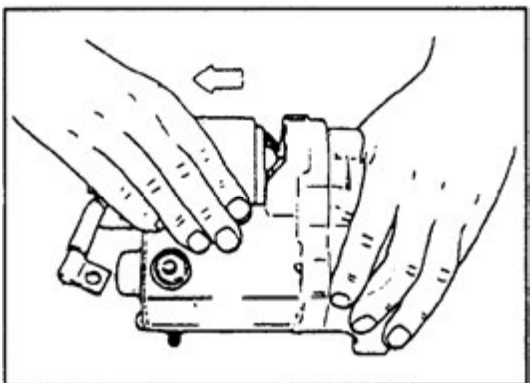
1. Lead
Remove the magnetic switch lead.



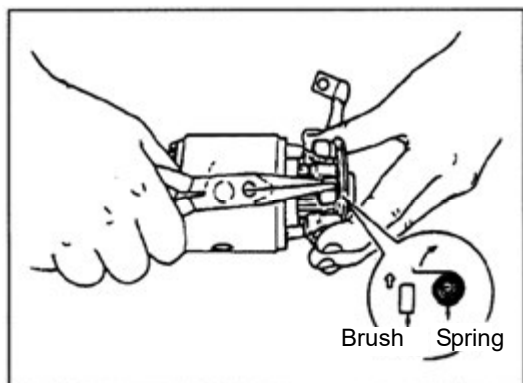
2. Through bolt
Unscrew the yoke through bolt.



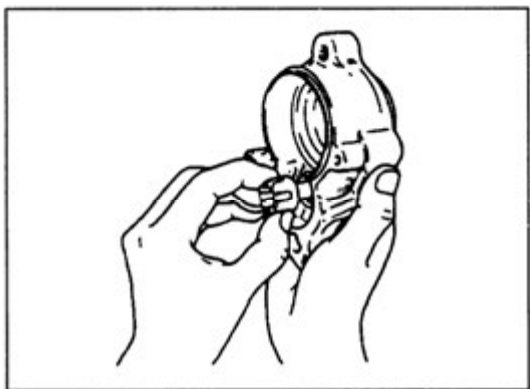
3. Yoke assembly
Dismantle the magnetic switch yoke.
4. Yoke cover



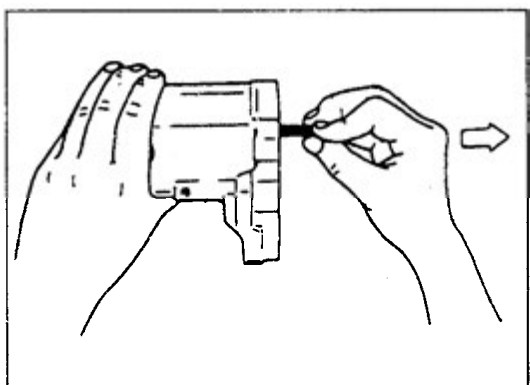
5. Brush and brush-holder
Remove (pull out) the brush and brush-holder from the armature with long nose pliers.
6. Armature
7. Case



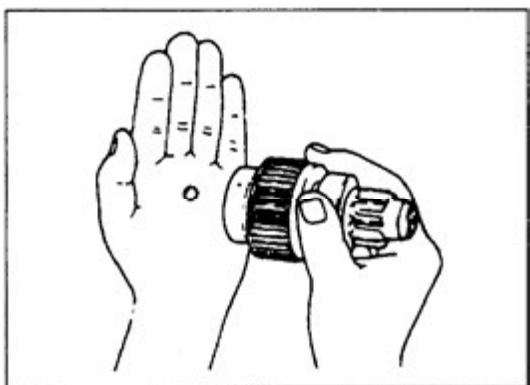
8. Sprag clutch
Remove the sprag clutch from the case



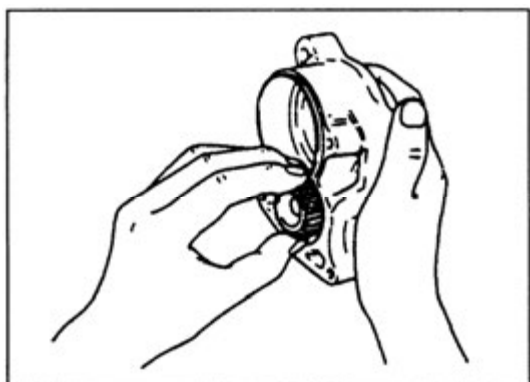
9. Return spring
Remove the return spring from the magnetic spring.



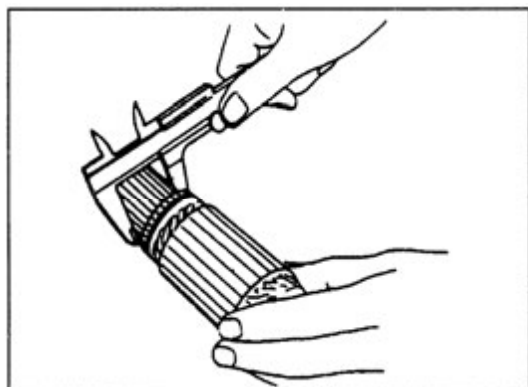
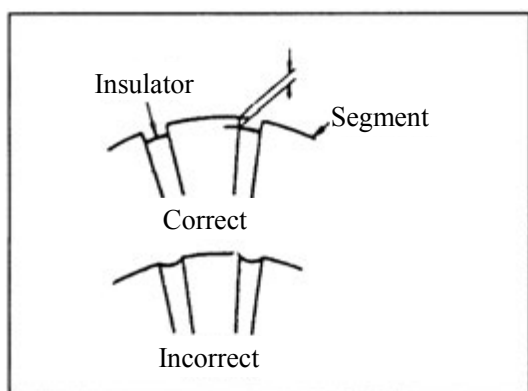
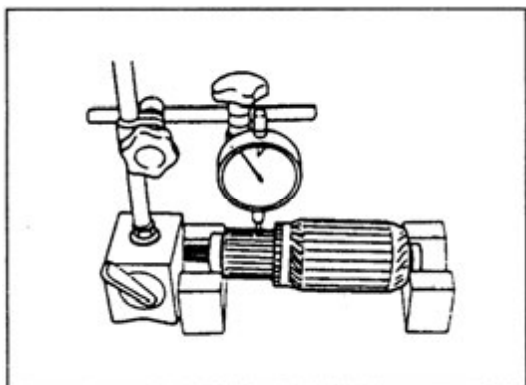
10. Steel ball
Dismantle the steel ball from the sprag clutch.



11. Idler pinion
Remove the idler pinion from the case.



12. Holder
Remove the holder from the case.
13. Roller
14. Magnetic switch



Inspection and repair

If during inspection it is found that some parts are worn-out, damaged or flawed, remove or replace these parts.



Armature

Check the radial runout of the commutator. If the runout exceeds the limits, replace the commutator.

Radial runout mm

kW	Standard value	Limit
2.2	0.02	0.05
2.0		



Check if the mica sheet is worn-out.

The depth of mica sheet mm

kW	Standard value	Limit
2.2	0.7—0.9	0.20
2.0		



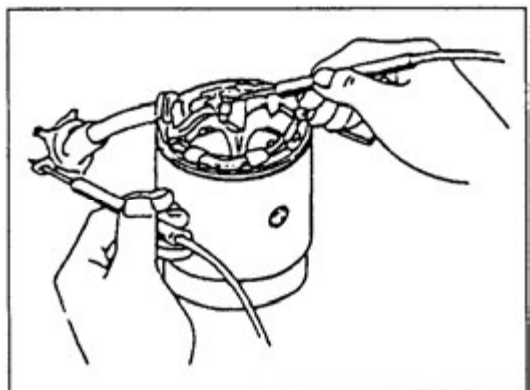
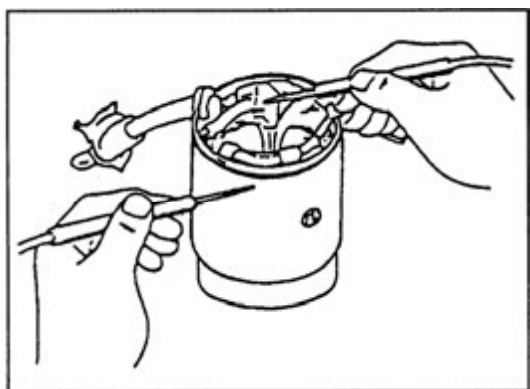
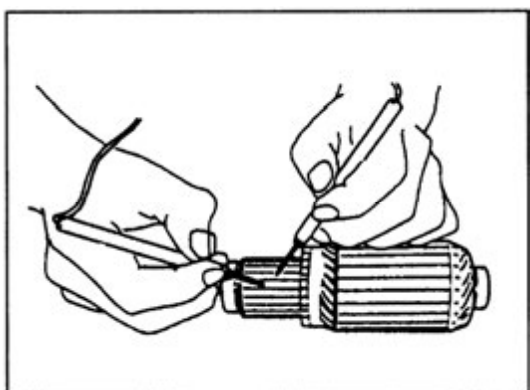
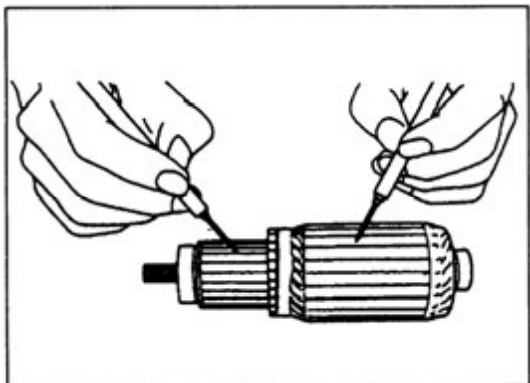
Check the outer diameter of the commutator.

Outer diameter of the commutator mm

kW	Standard value	Limit
2.2	35.00	34.00
2.0		

Short circuit test for the armature

Place the armature in the coil short circuit tester to check if there is any short circuit in the armature. Touch the armature core with a piece of saw blade when rotating the armature slowly. It will cause the saw blade to vibrate and stick to the core if the armature is in short-circuit state. If the saw blade vibrates and sticks to the core, you have to replace the armature for it is short-circuited.



Earth test for the armature

Touch the segment and armature core with test probes of the multimeter to check if the armature is in open-circuit state. If the armature circuit is closed, it means the armature has been earthed. If this is the case, replace the armature.



Closed circuit test for the armature

Touch two segments with both test probes of the multimeter. All test points should be in closed-circuit state. If there is any open circuit, replace the armature.



Yoke

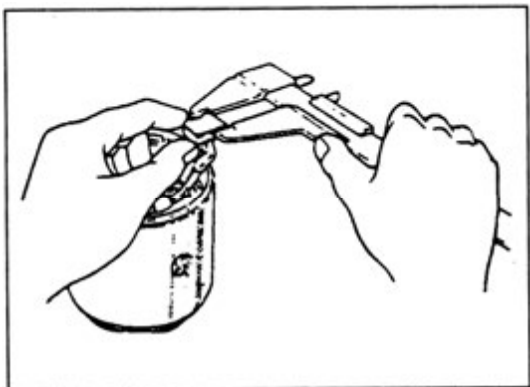
Earth test for the field winding

Touch the field winding wire or brush with one test probe of the multimeter and the yoke outer surface with another test probe to check if the winding is in open-circuit state. If the multimeter shows a closed circuit, it means the field winding has been earthed and you have to replace the yoke assembly.



Closed circuit test for the field winding

Touch the "C" terminal post wire with one test probe and the brush with another test probe to check if the field winding is in closed-circuit state. If there is an open circuit, replace the yoke assembly.

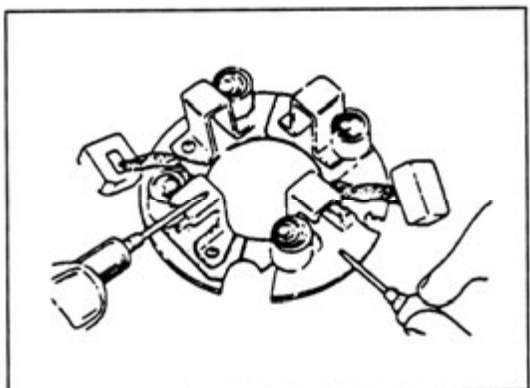


Brush and brush-holder

Measure the brush length. If the worn-out length exceeds the limit, replace the brush.

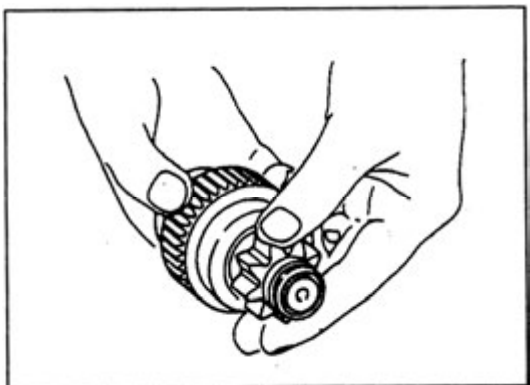
Brush length mm

kW	Standard value	Limit
2.2	14.5	10
2.0	16	



Insulation test for the brush-holder

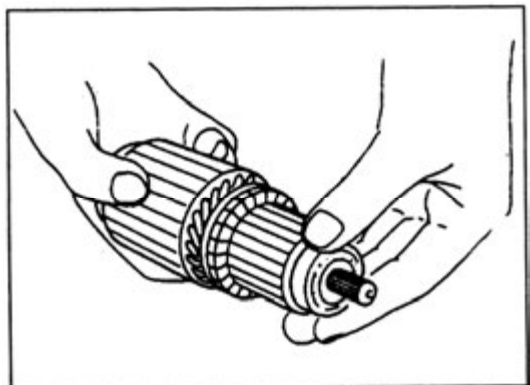
Check if the brush-holder is insulated with a multimeter. Touch the brush-holder plate with one test probe and the positive brush-holder with another test probe. The brush-holder should be in open-circuit state.



Sprag clutch

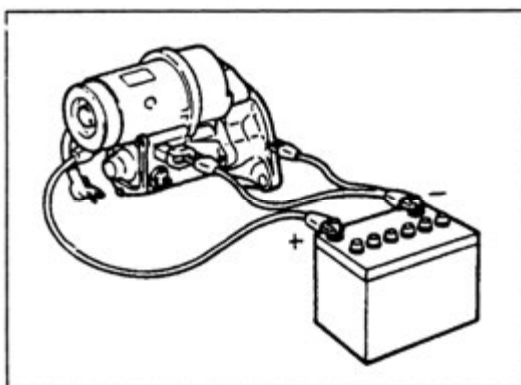
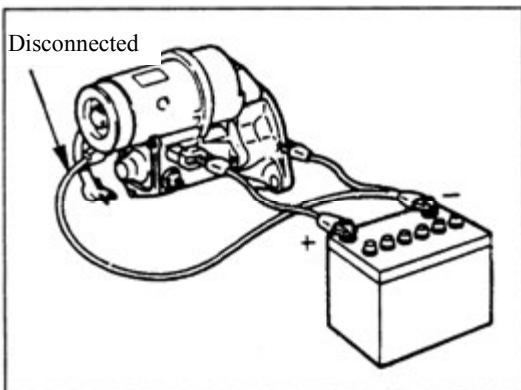
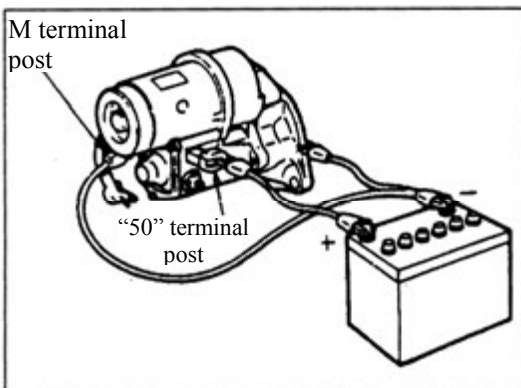
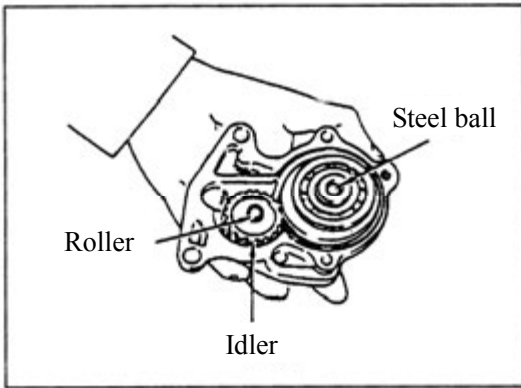
Check whether the pinion teeth are worn-out or damaged and replace the pinion if so. It should be smoothly to turn the pinion clockwise.

But when the pinion is turned anti-clockwise, it should be locked up.



Bearing

Check if the bearings are worn-out and damaged. If there is any noise during bearing operation, you have to replace the bearings.



Reassembly

As reassembly, go on according to the reverse sequence of disassembly and pay attention to the following items:

- magnetic switch
- Idler
- Clutch assembly
- Case

1) Install the clutch assembly to the magnetic switch.

2) Mount the idler and case.

Note:

Remember to mount the steel ball and spring between the clutch and magnetic switch. Install the roller onto the idler beforehand.

Magnetic switch

Temporarily mount a magnetic switch between the clutch and case and carry out the following tests. The duration of each test should not be longer than 3 to 5 seconds.

1. Test of pullout binding force

The negative terminal post of the battery is connected to the magnetic body and M terminal post. While the current is flowing from the positive terminal post to the "50" terminal post, the pinion should chatter.

2. Holding test

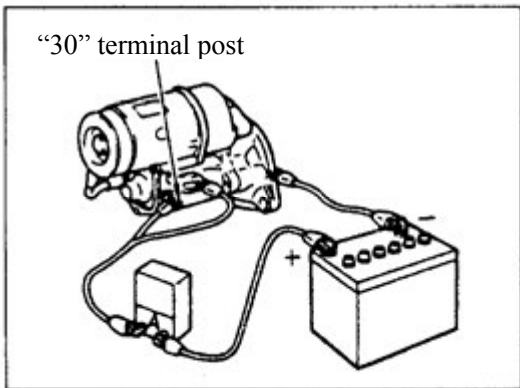
Remove the M terminal post wire. The pinion remains chattering.

3. Return test

The negative battery terminal post is connected to the "50" terminal post and case. The positive battery terminal post is connected to the M terminal post. At this time the pinion should chatter. After the "50" terminal post wire is removed, the pinion should return to its original position immediately.



“30” terminal post



4. Current value

Complete the circuit according to the diagram and measure the current value.

Standard value = 120A or lower

Notes:

You should use fully charged batteries.

Choose heavy gage wire for the flowing-through high current.