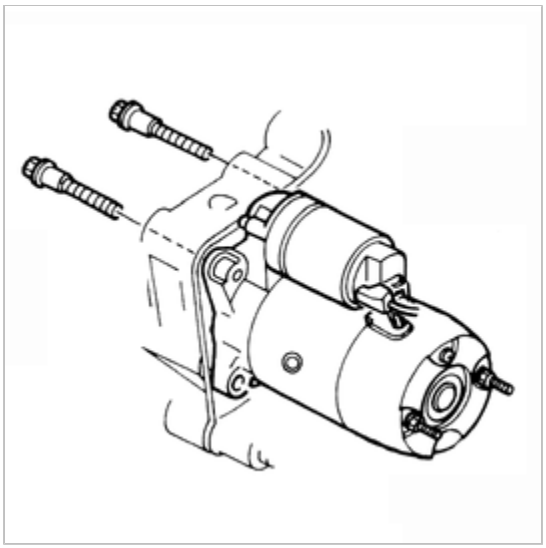
**Sportage [AL] > 2000 > Engine > 2.0 DOHC**

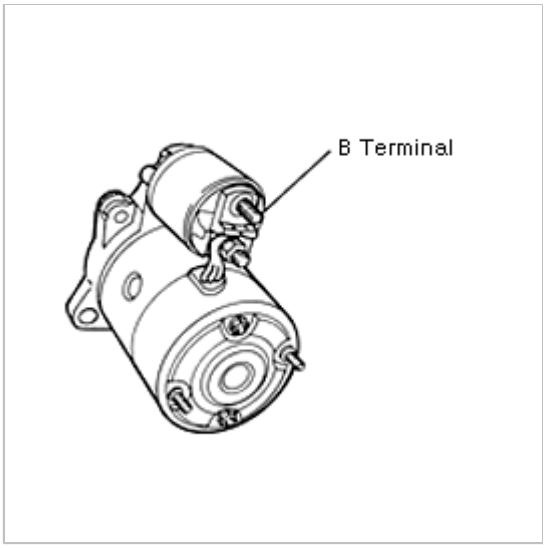
## REMOVAL

1. Disconnect negative battery cable.
2. Remove the upper two bolts from the intake manifold bracket.
3. Raise vehicle and support.
4. Remove the two bolts on the clutch release. cylinder and push aside(M/T).

5. Remove the lower two intake manifold bracket bolts.
6. Remove intake manifold bracket.
7. Remove the two upper starter bolts.



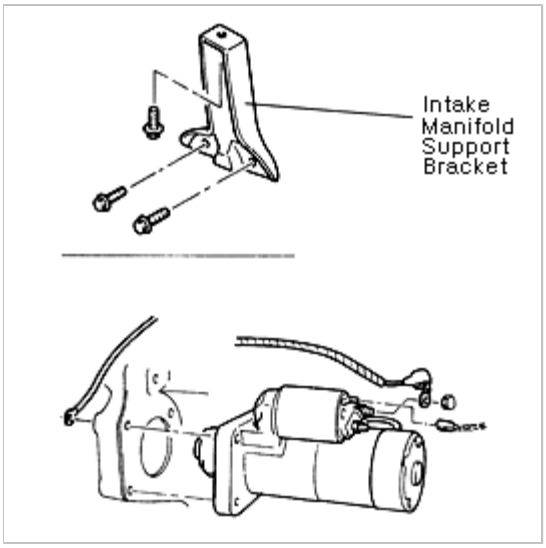
8. Remove the lower starter bolt.
9. Pull the starter from the clitch(M/T)/ torque converter (A/T) housing and prop in place.
10. Lower the vehicle.
11. From above, disconnect the S-terminal connector.
12. Remove nut and lock washer on B-terminal.
13. Disconnect B-terminal.




14. Raise and support vehicle.
15. Push transmisson wire harness aside.
16. Remove starter.

## INSTALLATION

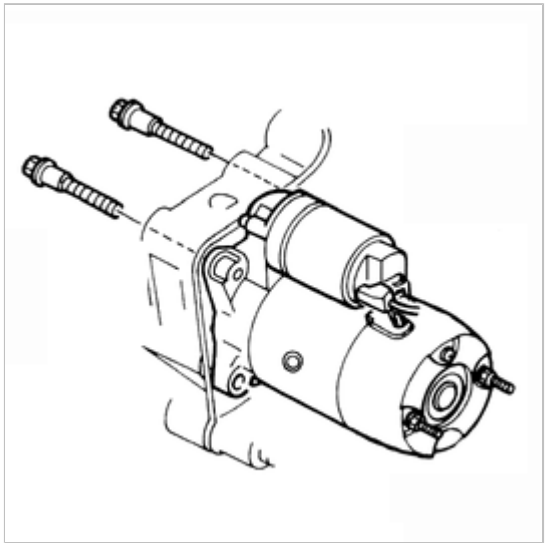
1. Place starter in engine well.
2. Lower vehicle.
3. Connect B-terminal wire.
4. Install washer and nut on B-terminal and tighten.
5. Connect S-terminal.
6. Lower intake manifold bracket into position and insert the two upper bolts.




7. Raise and support vechicle.
8. Place starter in position.
9. Insert the two upper starter bolts.
10. Inseet lower starter bolt.

NOTE

The starter may require adjustment after installation. If required, rotate the starter slightly to provide proper clearance.



11. Tighten the three starter bolts.

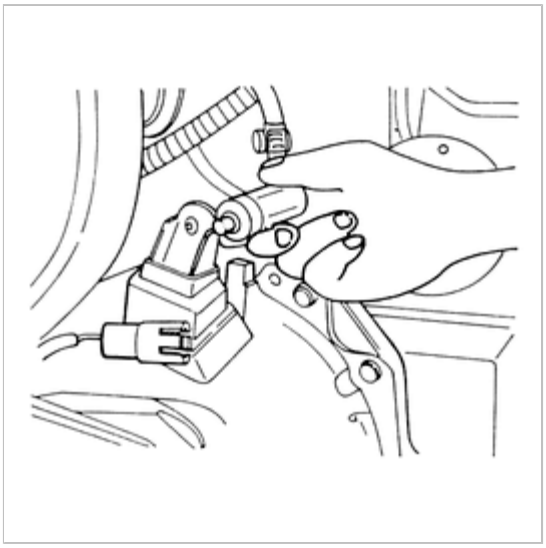
Tighten the bolts to 27-40 lb·ft (37-54N·m)

12. Insert lower bracket bolts and tighten.

Tighten the bolts to 27-40 lb·ft (37-54N·m)

13. Position clutch release cylinder and install bolts (M/T).

Tighten the bolts to 27-40 lb·ft (27-54 N·m)



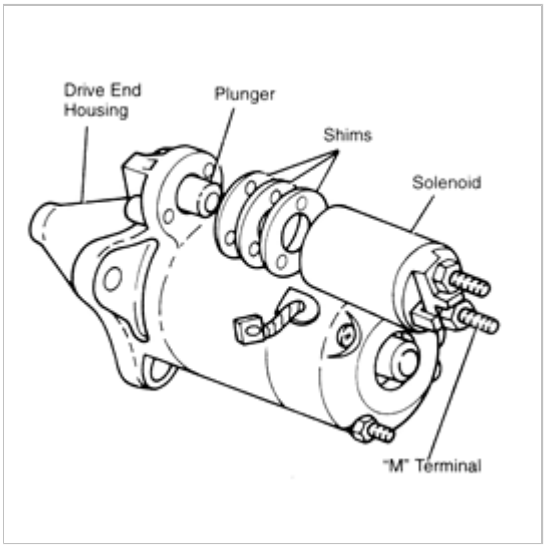
14. Lower vehicle.
15. Tighten the two upper intake manifold bolts.

Tighten the bolts to 27-40 lb·ft (37-54 N·m)

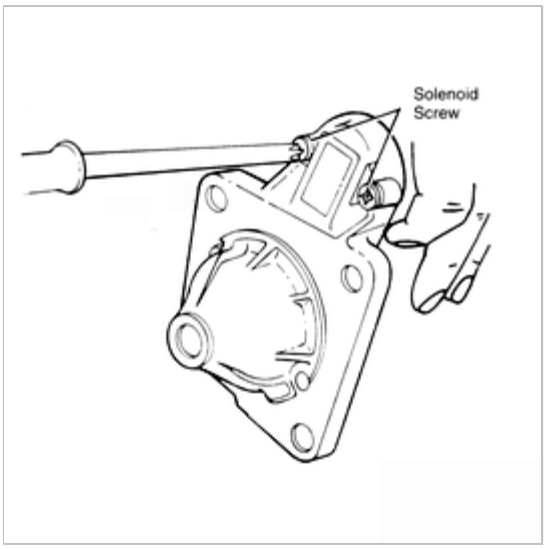
## DISSEMBLY

1. Remove the nut from the solenoid M-terminal.
2. Remove the field wire from the solenoid M-terminal.

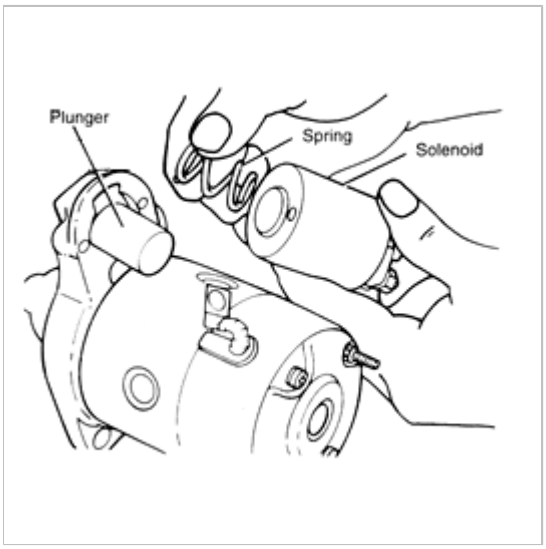
If pinion depth shims are found between, remove them and set aside.



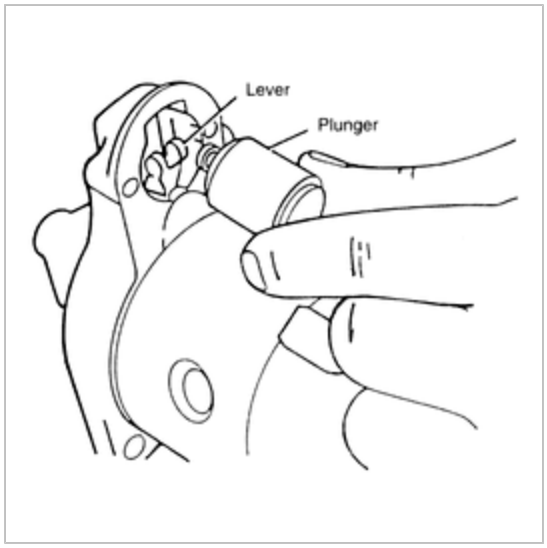

3. Remove the solenoid screws and the magnetic switch.



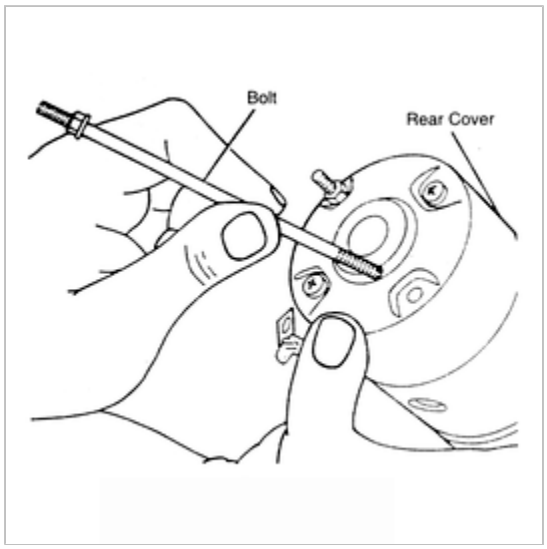

4. Remove the solenoid plunger spring.



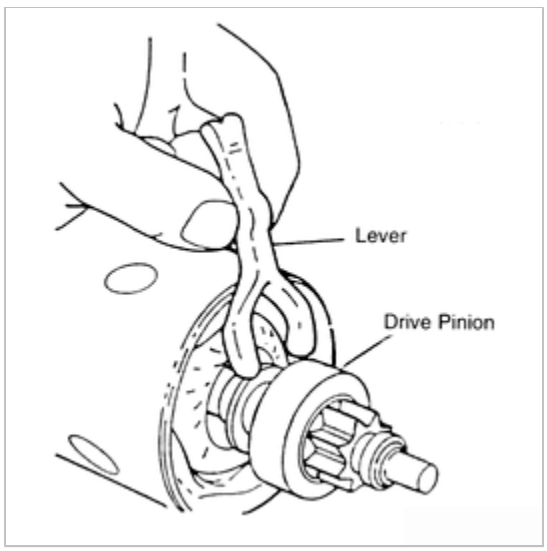

5. Disengage the plunger from the lever and remove the plunger.



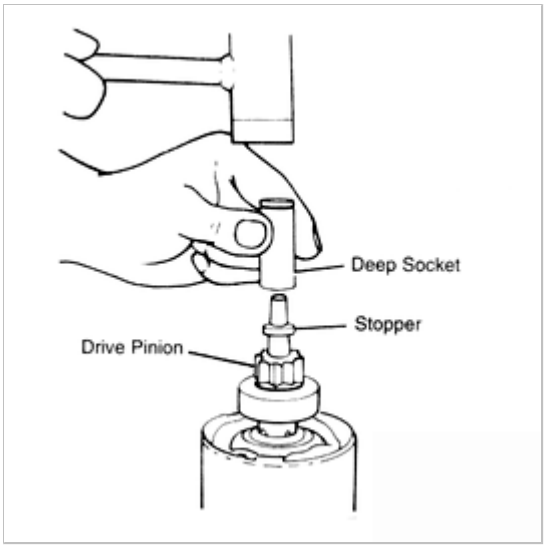

6. Remove the bolts from the rear cover. Separeter the motor assembly from the drive end housing. Also separte the motor assembly from the planetary gear set, if present.



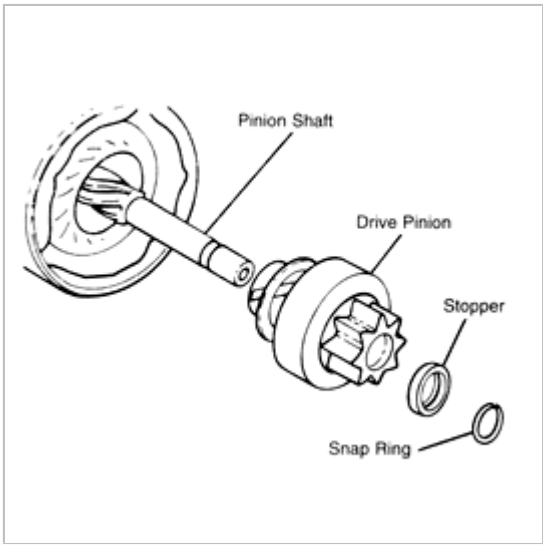

7. Remove the lever from the drive pinion.



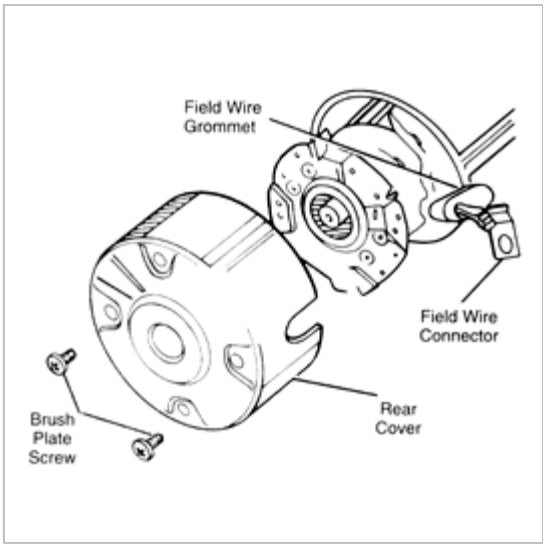

8. Use a deep well socket, or similar tool, to drive the stopper from the snap ring.




9. Remove the snap ring from its groove in the pinion shaft.
10. Remove the stopper and drive pinion from the pinion shaft.




11. Remove the two brush plate screws and the rear cover.




12. Remove the armature from the field coil housing.
13. Remove the armaure washers from the end of the armature.

## INSPECTION

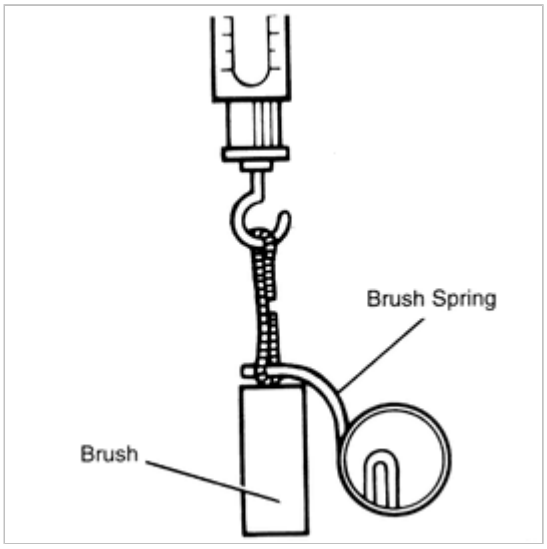
1. Solenoid
   (1) Contin0uity(S-terminal, M-terminal)
   Check for continuity between S-and M-terminals with ohmmeter. Replace the solenoid if there is no continuity.

   (2) Continuity(S-terminal-Body)
   Check for continuity between S-terminal and the body with ohmmeter. Replace the solenoid if there is no continuity.

   (3) Grounding
   Check for continuity between M-and B-terminals with ohmmeter. Replace the solenoid if there is no continuity.

2. Brush and brush holder
   (1) Insolatin
   Check for continuity insulated brush and the plate with ohmmeter. Replace the brush holder if there is continuity.

(2) Measure the force of the brush spring with a commercially available spring balance.

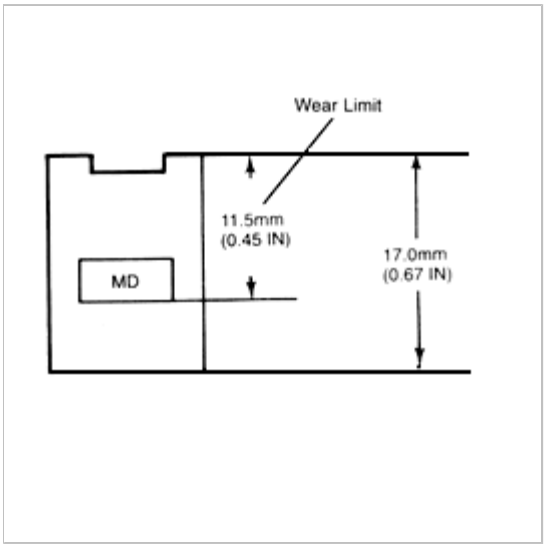



Brush spring force : 2.0lb(8.8N)

(3) Replace the spring if necessary.

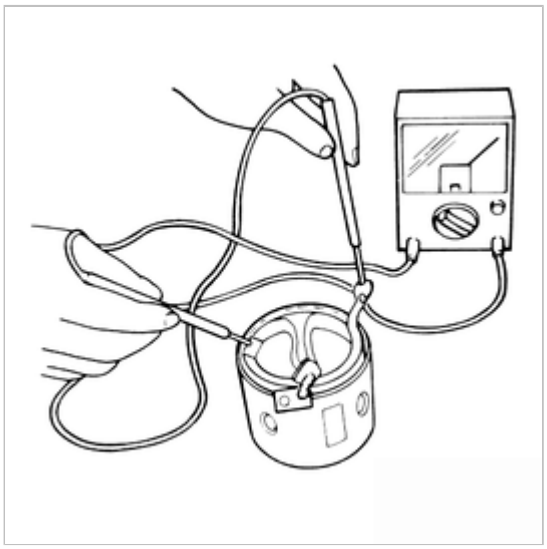
3. Brush

If a brush is worn to, or beyond, the wear limit, replace all the brushes.

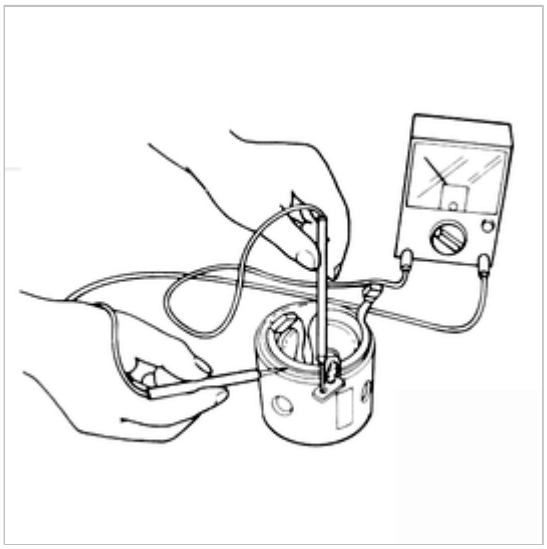


Standard : 0.67in(17mm)Wear Limit : 0.45in(11.5mm)

4. Field coil
   (1) Check for continuity between the M-terminal wire and the brushes with ohmmeter. Replace the yoke assembly if there is continuity.

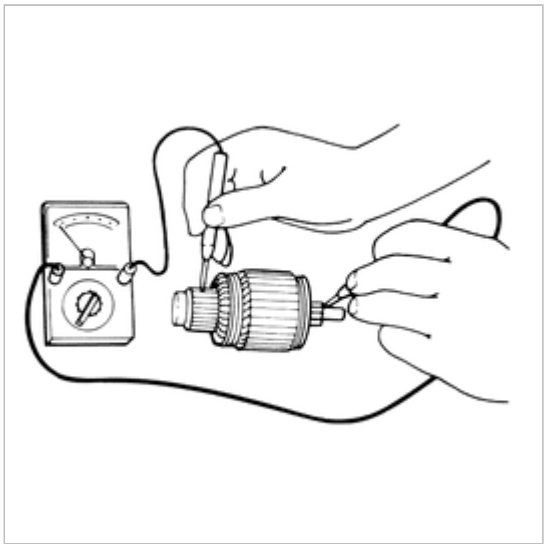


   (2) Check continuity between the M-terminal wire and yoke with ohmmeter. Replace the yoke assembly if necessary.
   (3) Check if the field coil is loose. Replace the yoke assembly if necessary.

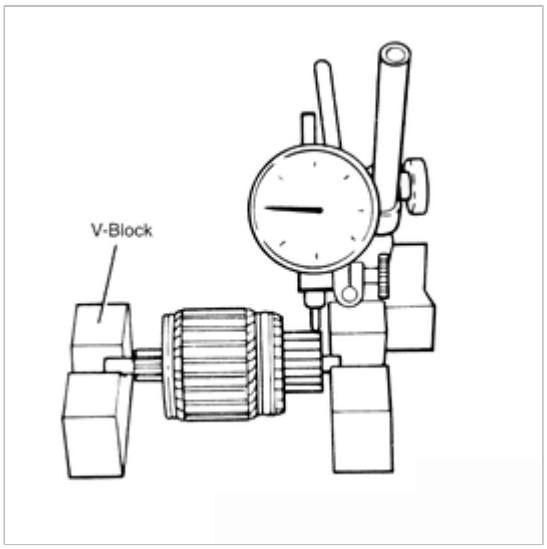


5. Armature
   (1) Check continuity between the commutator and the core with an ohmmeter. Replace the armature if there is continuity.

(2) Check continuity between the commutator and the shaft with an ohmmeter. Replace the armature if there is continuity.



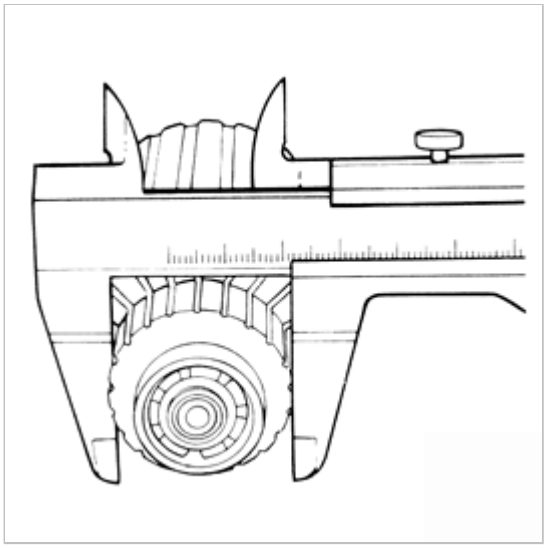
(3) Place the armature on V-blocks, and measure the runout with a dial indicator.
If the runout is not within specification, repair it with a lathe or replace the armature.




Runout : 0.002inch(0.05mm)Maximum : 0.016inch(0.4mm)

(4) Replace the armature if the outer diameter of the commutator is at, or less than, the grind limit.

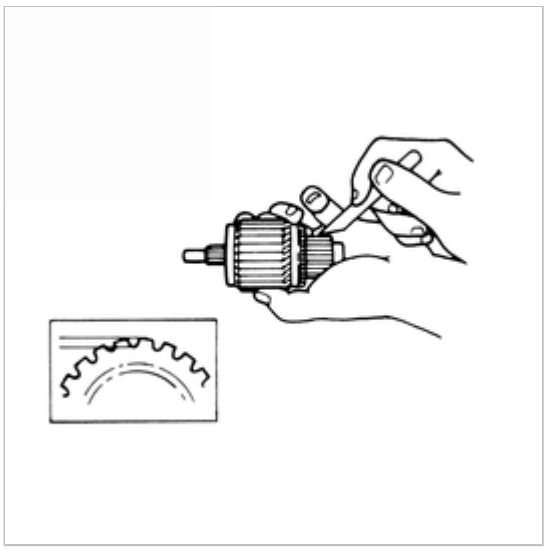
(5) If the commuatator surface is dirty, wipe if with a cloth; if it is rough, repair it with a lathe or fine sandpaper.



Grind Limit : 1.22 in (31mm)

(6) Segment groove depth

If the depth of the mold between segments is at or less than, the minimum, replace the armature.



Depth : 0.02-0.03inch(0.5-0.8mm)Minimum : 0.008inch(0.2mm)

## ASSEMBLY

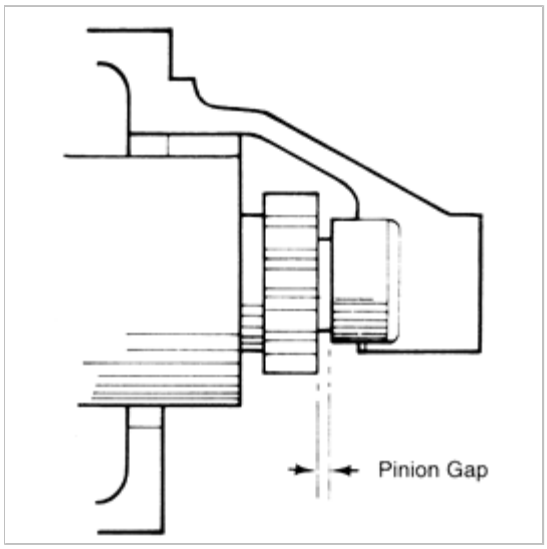
Assemble in the reverse order of disassembly, referring to following points :

**Adjustment of pinion gap**

1. Disconnect the wiring from M-terminal.
2. Apply battery power to the S-terminal and ground the starter motor body. The pinion will eject outward and then stop.
3. Measure the slearance(pinioin gap) between the pinion and the stopper.

NOTE

Be careful not to let electricity flow continuously for more than 10seconds.




Pinion gap : 0.020-0.079inch(0.5-2.0mm)

4. If the pinion gap is not within the specified range, make the adjustment by increasing or decreasing the number of washers used between the solenoid and the drive housing. The gap will become smaller if the number of washers is increased.

NOTE

Do not use more washers than plates.