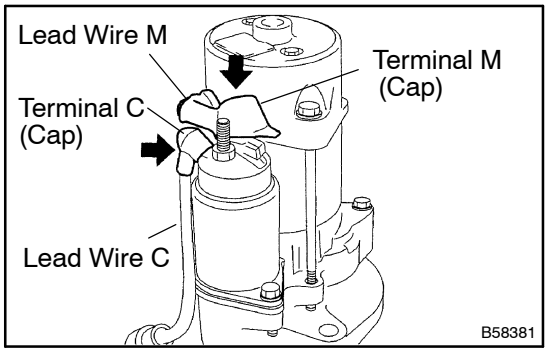
190M0–01

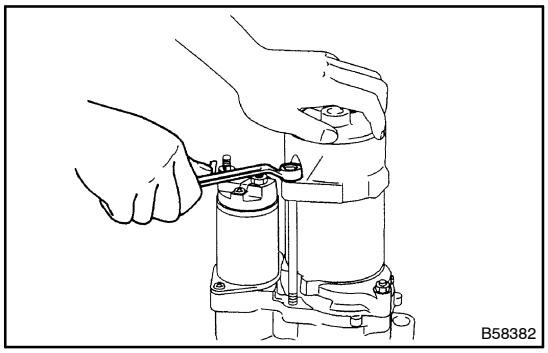
OVERHAUL



1. REMOVE STARTER YOKE ASSY

(a) Move the cap of terminal M, then remove the nut and lead wire M.

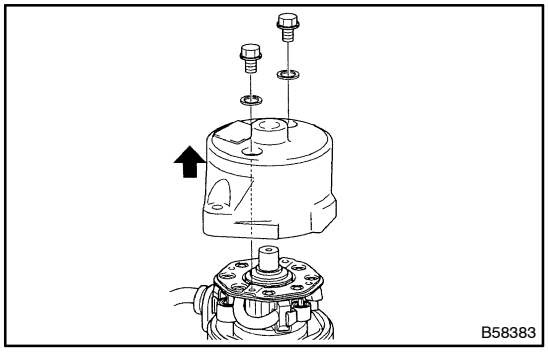
(b) Move the cap of terminal C, then remove the bolt.



(c) Remove the 2 through bolts, and pull out the starter yoke together with the armature.

HINT:

Hold the starter by hand so that it will not fall or drop.

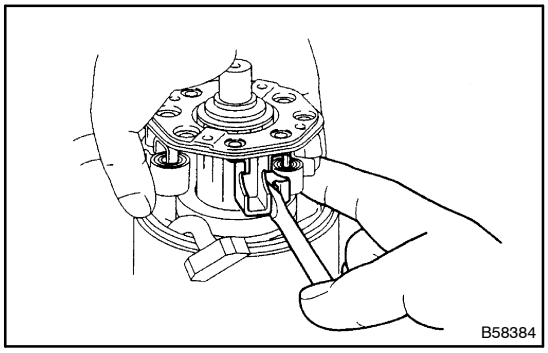


2. REMOVE STARTER COMMUTATOR END FRAME ASSY

(a) Remove the 2 screws, commutator end frame and O–ring.

HINT:

Holding lead wire M, remove the bracket rear by taking it upward.



3. REMOVE STARTER BRUSH HOLDER ASSY

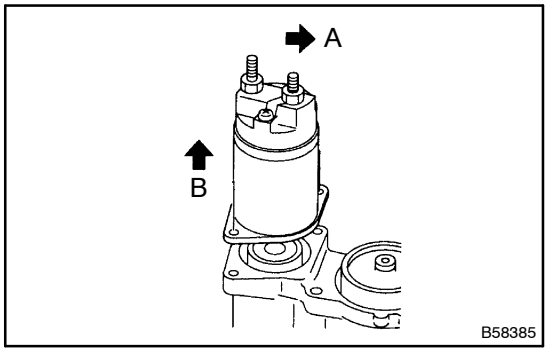
(a) Using a screwdriver, hold the spring tank back and disconnect the brush from the brush holder.

(b) Disconnect the 4 brushes, and remove the brush holder.

4. REMOVE STARTER ARMATURE ASSY

(a) Remove the armature from the starter yoke assy.

(b) Remove the felt and washer from the armature.



5. REMOVE MAGNET STARTER SWITCH ASSY

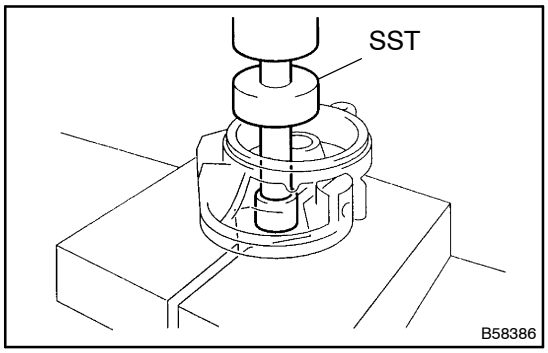
(a) Loosen the 2 bolts holding the magnet switch to the drive housing.

(b) Pull out the magnet switch in direction B by tilting the upper part of the main switch in the direction A, as shown in the illustration.

6. REMOVE MOTOR HOUSING

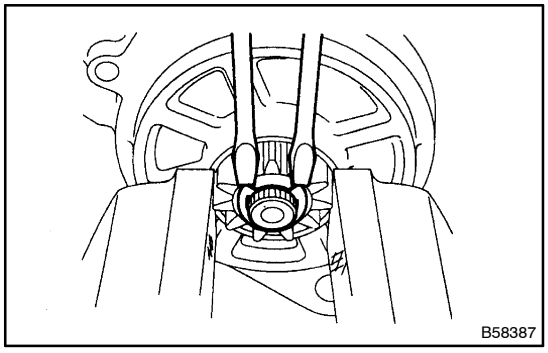
(a) Remove the bolt and motor housing.

(b) Remove the plate, spring and rubber seal from the drive housing.



7. REMOVE ARMATURE BEARING

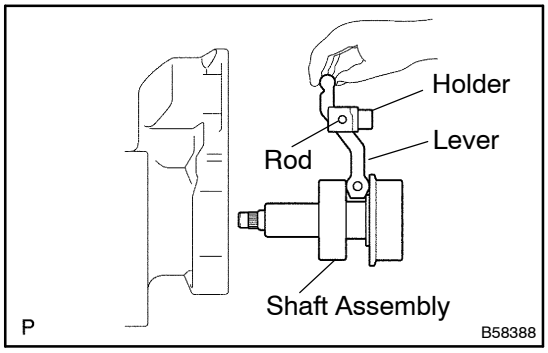
(a) Using SST, remove the bearing from the motor housing.
SST 09820–36010



8. REMOVE PINION GEAR

(a) Fix the pinion softly, place 2 screwdrivers against the both sides of the retainers opening port and then take the retainer off by tapping those handles ends lightly with a plastic hammer.

(b) Remove the pinion gear.



9. REMOVE STARTER CLUTCH SUB–ASSY

(a) Remove the starter clutch together with the drive lever from the starter drive housing.

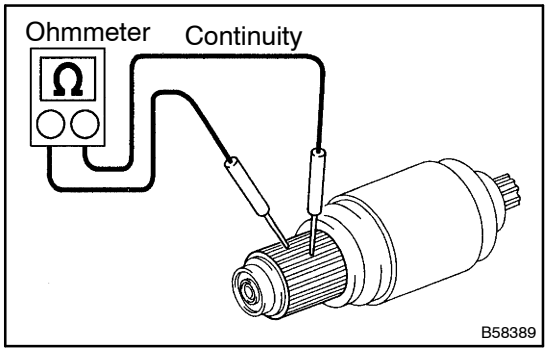
10. REMOVE STARTER PINION DRIVE LEVER

(a) Remove the lever and shaft assembly out simultaneously from the pinion case.

(b) Pull out the rod and remove the holder from the lever.

11. REMOVE STARTER DUST PROTECTOR

(a) Remove the protector by prying it with a screwdriver.



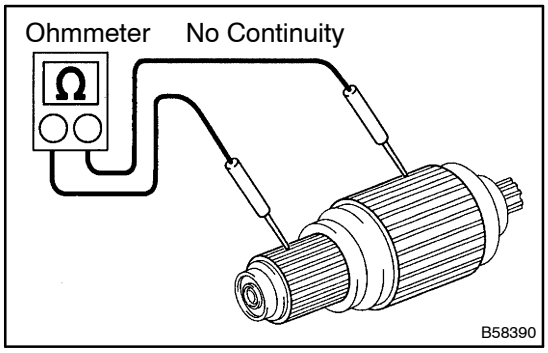
12. INSPECT STARTER ARMATURE ASSY

(a) If the surface of the commutator is dirty or burned, polish the part with sandpaper (#400) or replace the armature.

(b) Check the commutator open circuit.

(1) Using an ohmmeter, check that there is continuity between the segments of the commutator.

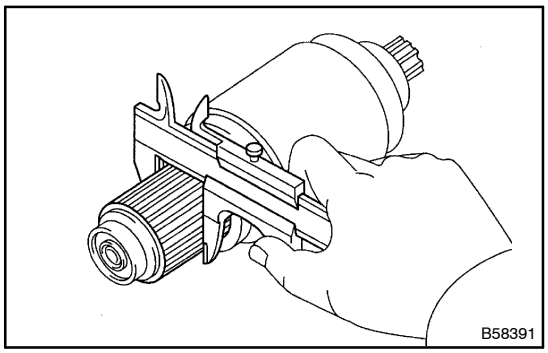
If there is no continuity between any segment, replace the armature assy.



(c) Check the commutator ground.

(1) Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is continuity, replace the armature assy.



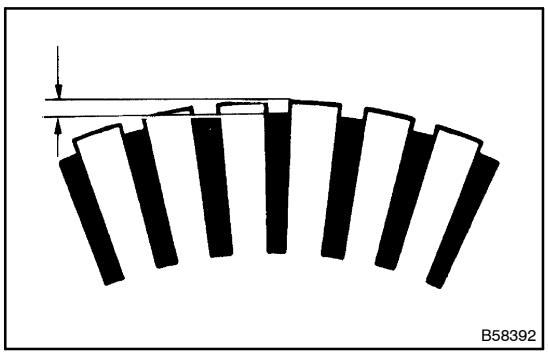
(d) Check the commutator diameter.

(1) Using vernier calipers, measure the commutator diameter.

Diameter:

Standard	Minimum
32.0 mm (1.260 in.)	30.0 mm (1.181 in.)

If the diameter is less than the minimum, replace the armature assy.



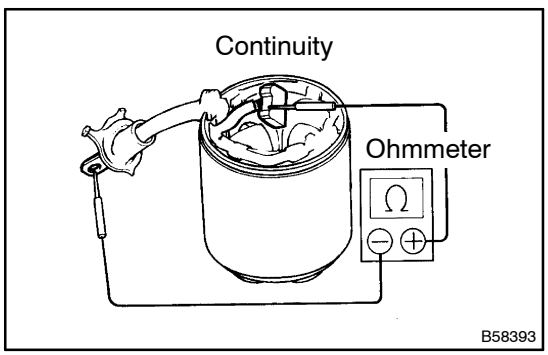
(e) Measure the undercut depth of the commutator.

(1) Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

Undercut depth:

Standard	Minimum
0.7 mm (0.028 in.)	0.2 mm (0.008 in.)

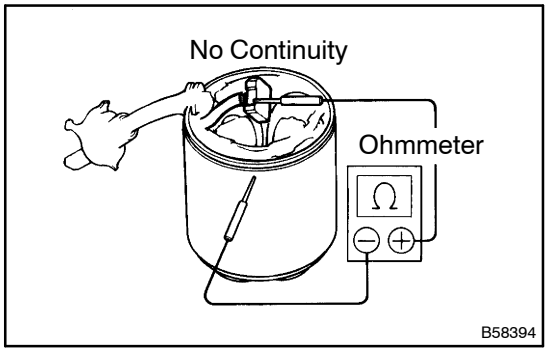
If the undercut depth is less than the minimum, correct it with a hacksaw blade.



13. INSPECT STARTER YOKE ASSY

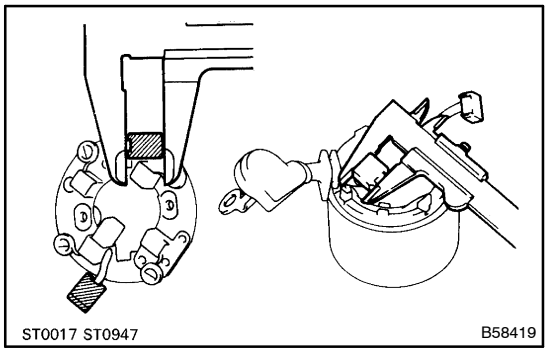
(a) Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

If there is no continuity, replace the starter yoke assy.



(b) Inspect for ground.
(1) Using an ohmmeter, check that there is no continuity between the field coil end and starter yoke.

If there is continuity, repair or replace the starter yoke assy.

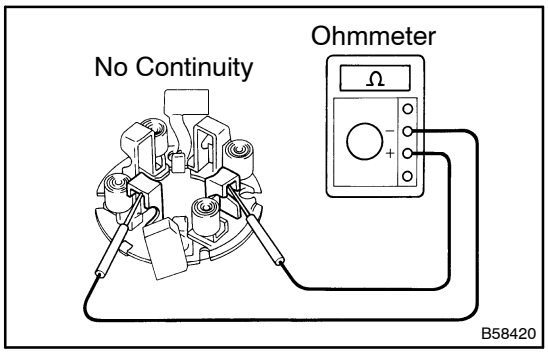


14. INSPECT BRUSH

(a) Using vernier calipers, measure the brush length.
Length:

Standard	Minimum
18 mm (0.709 in.)	12 mm (0.472 in.)

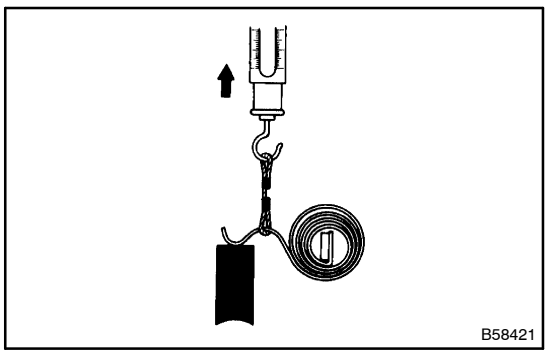
If the length is less than the minimum, replace the brush holder and starter yoke assy.



15. INSPECT STARTER BRUSH HOLDER ASSY

(a) Using an ohmmeter, check that there is no continuity between the positive (+) and negative (–) brush holders.

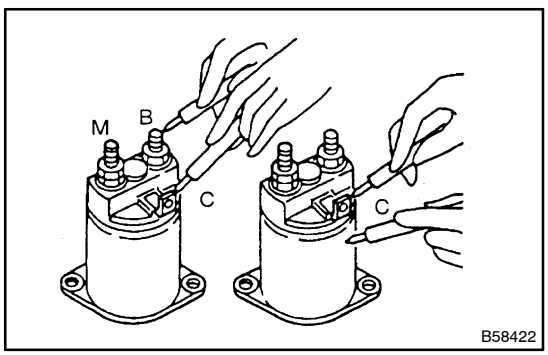
If there is continuity, repair or replace the brush holder.



(b) Take the pull scale reading instant the brush spring separates from the brush.
Installed load:

Standard	Minimum
42.2 – 51.0 N (4.3–5.2 kgf, 9.3–11.2 lbf)	22.5 N (2.3 kgf, 4.9 lbf)

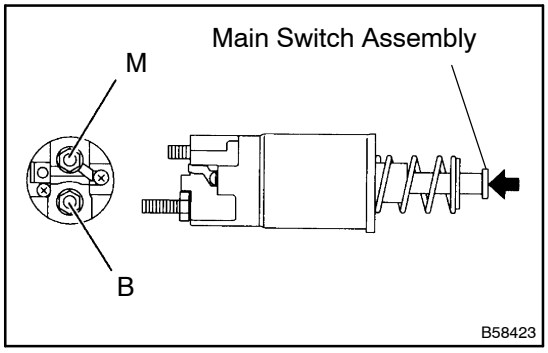
If the installed load is less than the minimum, replace the brush springs.



16. INSPECT MAGNET STARTER SWITCH ASSY

(a) Perform the pull–in coil open circuit test.
Using an ohmmeter, check that there is resistance between terminals M and C.
Standard resistance: 0.16 – 0.19 Ω

(b) Perform the hold–in coil open circuit test.
Using an ohmmeter, check that there is resistance between terminal M and the switch body.
Standard resistance: 0.84 – 0.94 Ω

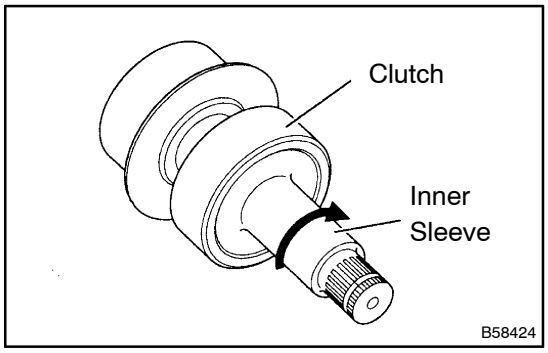


(c) Using an ohmmeter, check that there is continuity between terminals B and M.

If there is continuity, replace the magnet switch assy.

(d) Push the main switch assembly, using an ohmmeter, check that there is continuity between terminals B and M.

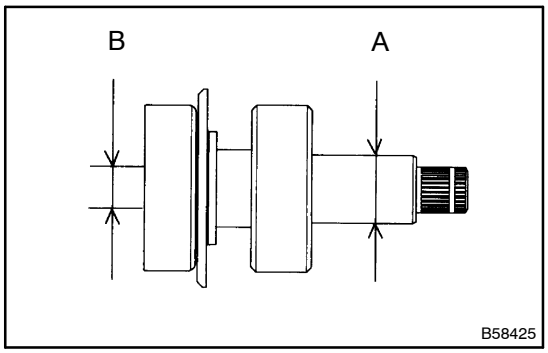
If there is no continuity, replace the magnet switch assy.



17. INSPECT STARTER CLUTCH SUB–ASSY

(a) With the clutch fixed, turn only the inner sleeve right and left.

(b) Check that the inner sleeve turns lightly in the arrow mark direction but does not turn in the opposite direction.

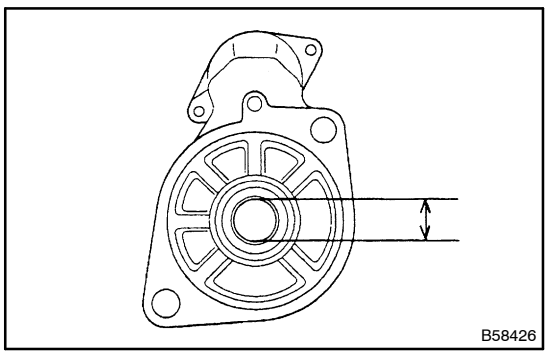


(c) Using a micrometer, check each diameter of the starter clutch.

Diameter:

Standard	Minimum
A: 26 mm (1.024 in.)	A: 25.88 mm (1.019 in.)
B: 12.1 mm (0.476 in.)	B: 12 mm (0.472 in.)

If the diameter is less than the minimum, replace the starter clutch.



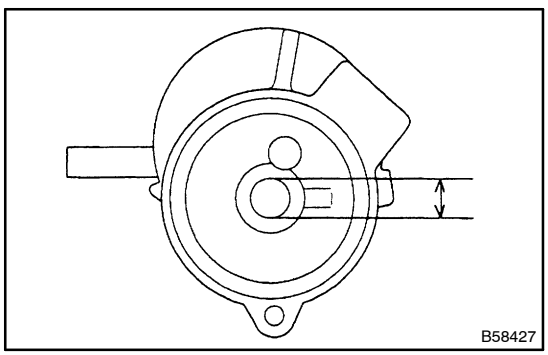
18. INSPECT DRIVE HOUSING

(a) Using a cylinder gauge, check the inside diameter of the starter drive housing bush.

Inside diameter:

Standard	Maximum
26 mm (1.024 in.)	26.2 mm (1.031 in.)

If the diameter is greater than the maximum, replace the drive housing.



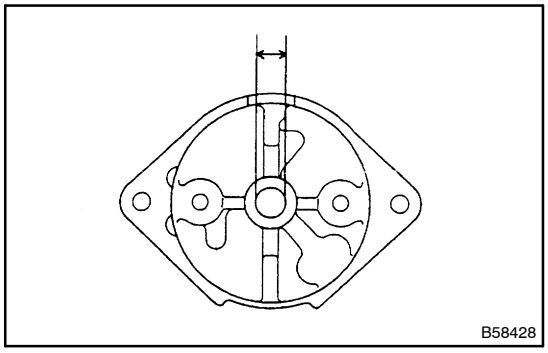
19. INSPECT MOTOR HOUSING

(a) Using a cylinder gauge, check the inside diameter of the motor housing bush.

Inside diameter:

Standard	Maximum
12.1 mm (0.476 in.)	12.3 mm (0.484 in.)

If the diameter is greater than the maximum, replace the motor housing.



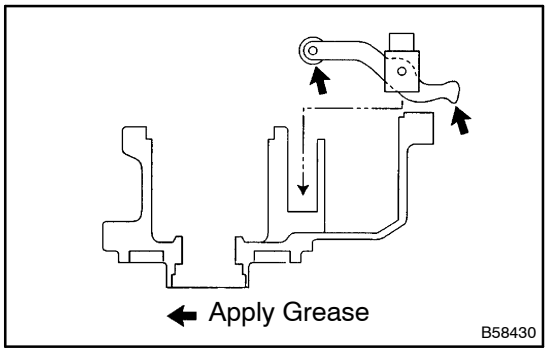
20. INSPECT STARTER COMMUTATOR END FRAME ASSY

(a) Using a cylinder gauge, check the inside diameter of the end frame bush.

Inside diameter:

Standard	Minimum
12.0 mm (0.472 in.)	12.2 mm (0.480 in.)

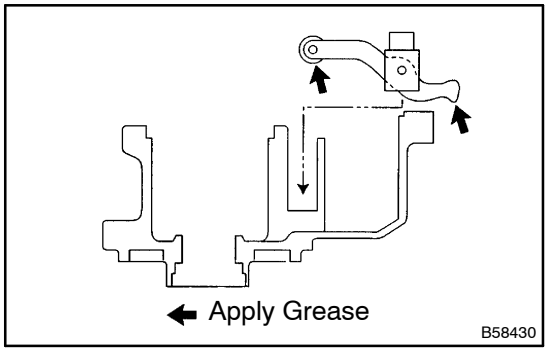
If the diameter is greater than the minimum, replace the frame.



21. INSTALL STARTER BRUSH

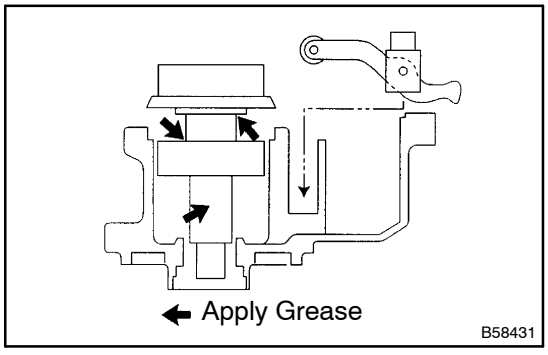
22. INSTALL STARTER DUST PROTECTOR

(a) Using SST and a plastic–faced hammer, tap in the protector.
SST 09950–60010 (09951–00260, 09951–00390, 09952–06010)



23. INSTALL STARTER PINION DRIVE LEVER

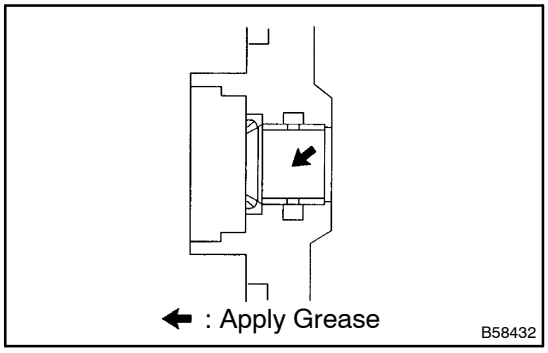
(a) Install the holder to the drive lever with a pin.
(b) Apply grease to the portions of the drive lever.



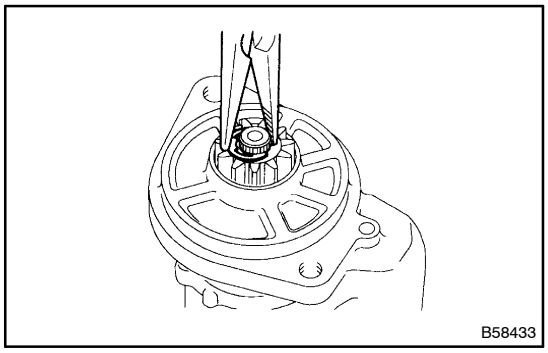
24. INSTALL STARTER CLUTCH SUB–ASSY

(a) Apply grease to the portions of the starter clutch, and install the drive lever together with it to the starter drive housing.

HINT:
Check that the starter clutch is in the depth, then lightly slides there.

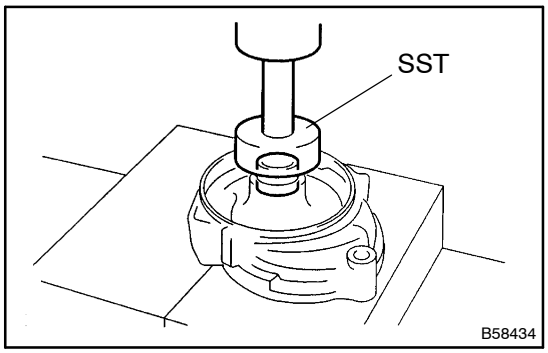


(b) Apply much grease to the extent that it would overflow from the reservoir of the start drive housing.



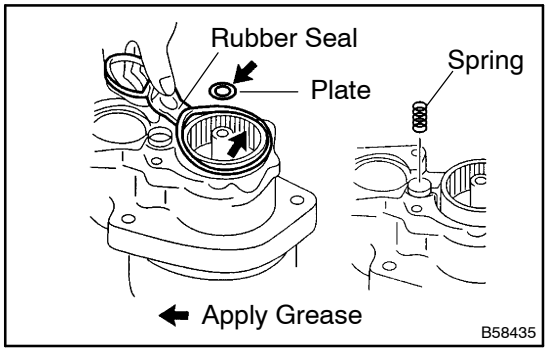
25. INSTALL PINION GEAR

(a) Install the pinion gear to the shaft by tapping it uniformly.
(b) Using pliers, pinch a new retainer and the shaft, then press them in.



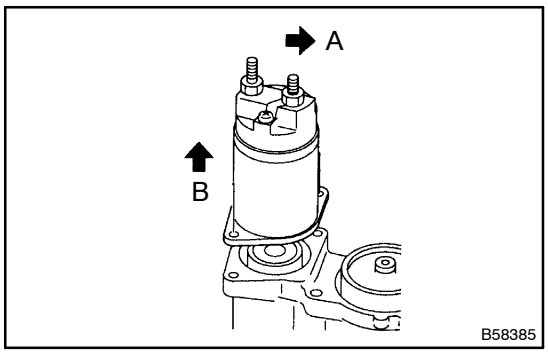
26. INSTALL ARMATURE BEARING

(a) Using SST and a press, install the bearing.
SST 09820–36010



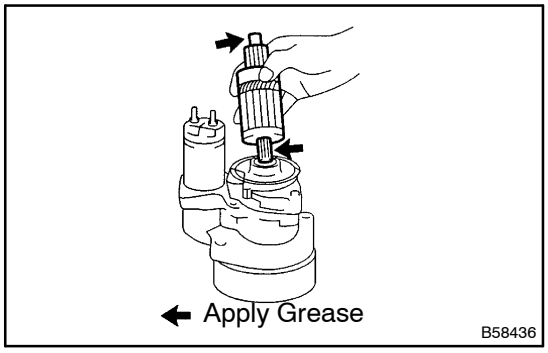
27. INSTALL MOTOR HOUSING

(a) Apply grease to the parts as shown in illustration.
(b) Install a new rubber seal, spring and plate.
(c) Install the bolt and motor housing.
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)



28. INSTALL MAGNET STARTER SWITCH ASSY

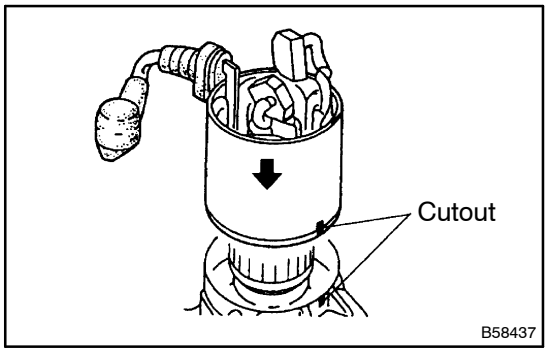
(a) Attach the drive lever to the upper port of the main switch in direction A, then install it with the 2 bolts by inserting it in direction B.
Torque: 14.7 N·m (150 kgf·cm, 11 ft·lbf)



29. INSTALL STARTER ARMATURE ASSY

(a) Apply grease to the portions of the armature as shown in illustration.

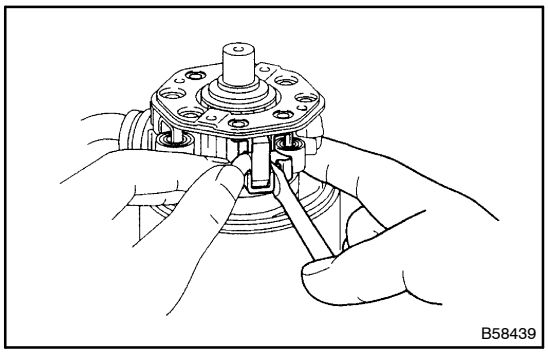
(b) Install the armature to the motor housing.



30. INSTALL STARTER YOKE ASSY

(a) Align the cutout of the starter yoke with the cutout of the motor housing.

(b) Install the starter yoke.



31. INSTALL STARTER BRUSH HOLDER ASSY

(a) Place the brush holder in position on the armature.

(b) Using a screwdriver, hold the brush spring back, and connect the brush into the brush holder. Connect the 4 brushes.

32. INSTALL STARTER COMMUTATOR END FRAME ASSY

(a) Install the end frame 2 with the through bolts.
Torque: 14.7 N·m (150 kgf·cm, 11 ft·lbf)

(b) Install a new O–ring to the screws.

(c) Install the 2 new screws with O–rings.
Torque: 4.3 N·m (44 kgf·cm, 38 in.·lbf)