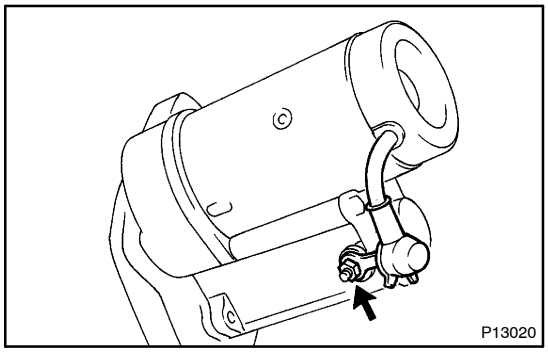
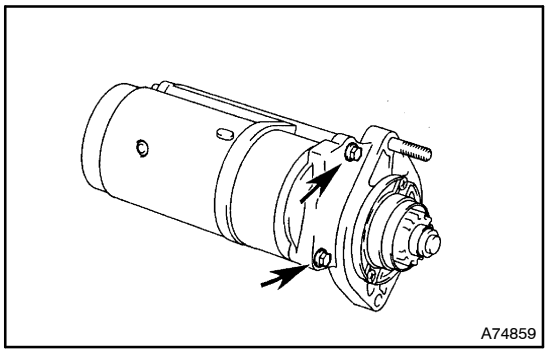
190IH–01

OVERHAUL



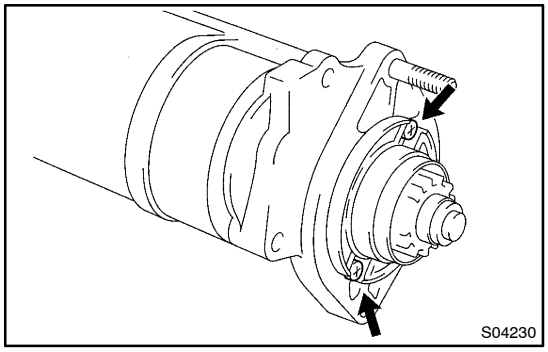
1. REMOVE STARTER YOKE ASSY

(a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.



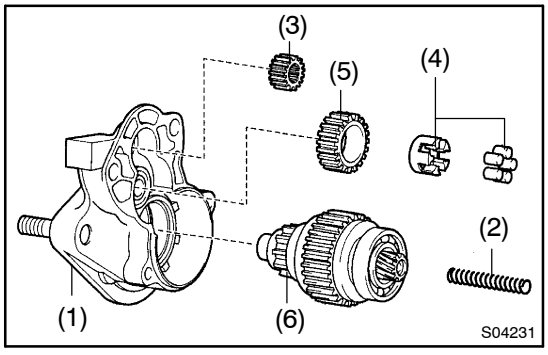
(b) Remove the 2 through bolts.

(c) Pull out the field frame with the armature from the magnetic switch assembly.



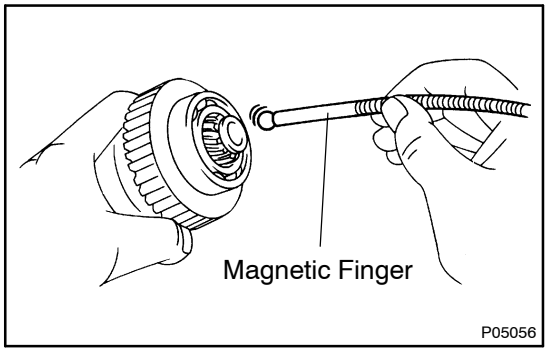
2. REMOVE MAGNET STARTER SWITCH ASSY

(a) Remove the 2 screws.

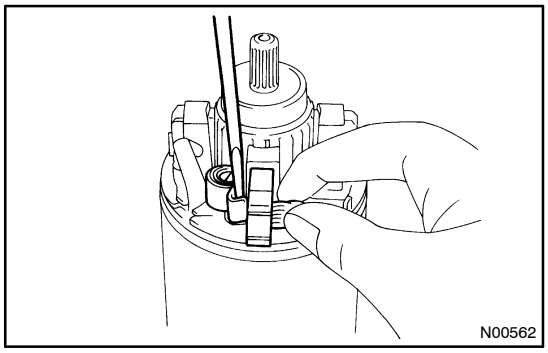


(b) Remove these parts from the magnetic switch assembly:

(1)	Starter housing
(2)	Return spring
(3)	Pinion gear
(4)	Bearing
(5)	Idler gear
(6)	Clutch assembly

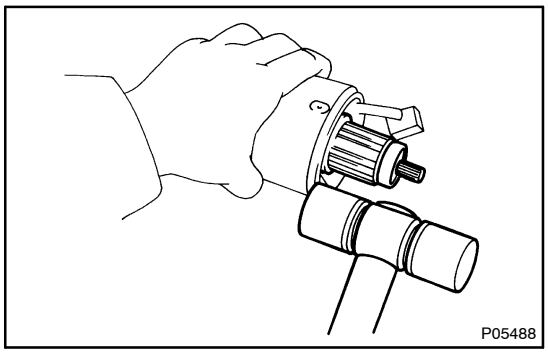


(c) Using a magnetic finger, remove the steel ball from the clutch shaft hole.



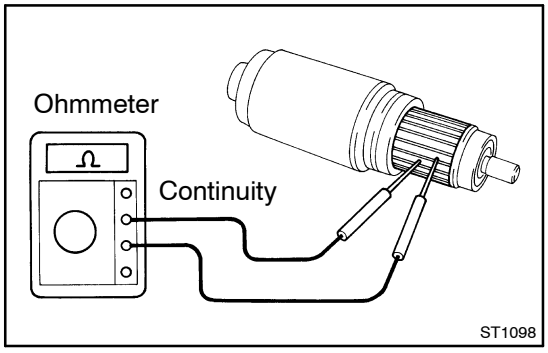
3. REMOVE STARTER BRUSH HOLDER ASSY

(a) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes and remove the brush holder.



4. REMOVE STARTER ARMATURE ASSY

(a) Using a plastic hammer, tap the frame end to remove the armature from the field frame.

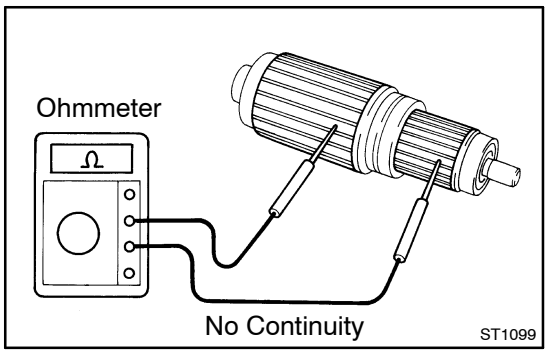


5. INSPECT STARTER ARMATURE ASSY

(a) Inspect commutator for open circuit.

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

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



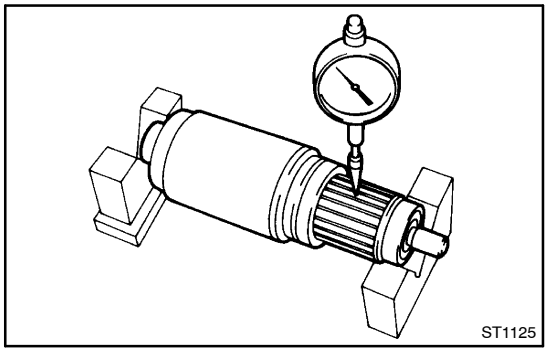
(b) Inspect commutator for ground.

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

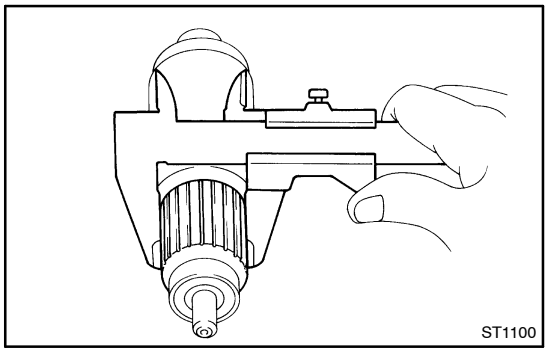
If there is continuity, replace the armature.

(c) Inspect commutator for dirty and burnt surfaces.

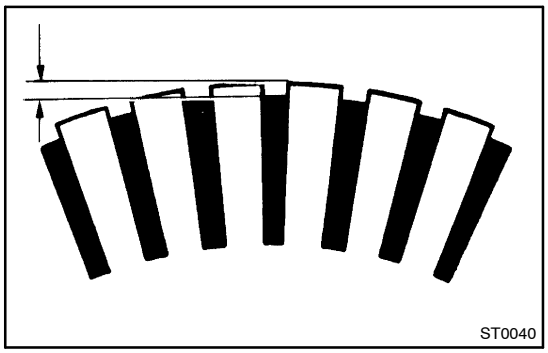
If the surface is dirty or burnt, correct it with sandpaper (No. 400) or on a lathe.



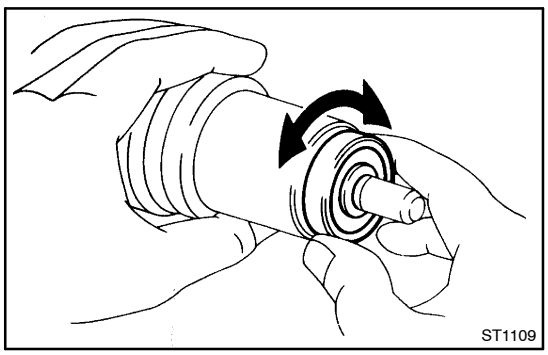
(d) Inspect commutator circle runout.
(1) Place the commutator on V–blocks.
(2) Using a dial gage, measure the circle runout.
Maximum circle runout: 0.05 mm (0.0020 in.)
If the circle runout is greater than maximum, correct it on a lathe.



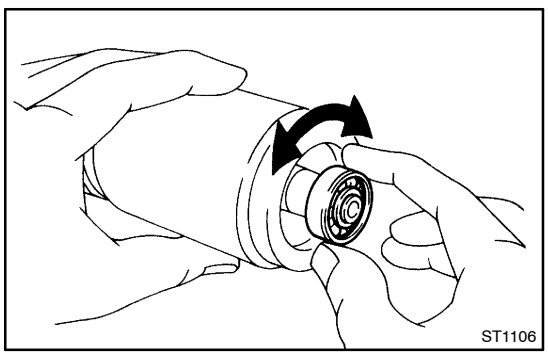
(e) Inspect commutator diameter.
(1) Using a vernier caliper, measure the commutator diameter.
Standard diameter: 35.0 mm (1.378 in.)
Minimum diameter: 34.0 mm (1.339 in.)
If the diameter is less than minimum, replace the armature.



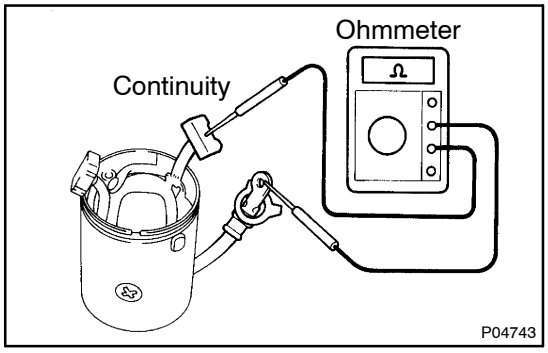
(f) Inspect undercut depth.
(1) Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.
Standard undercut depth: 0.7 mm (0.028 in.)
Minimum undercut depth: 0.2 mm (0.008 in.)
If the undercut depth is less than minimum, correct it with a hacksaw blade.



(g) Inspect front bearing.
(1) Turn the bearing by hand while applying inward force.
If resistance is felt or the bearing sticks, replace the armature.



(h) Inspect rear bearing.
(1) Turn the bearing by hand while applying inward force.
If resistance is felt or the bearing sticks, replace the armature.

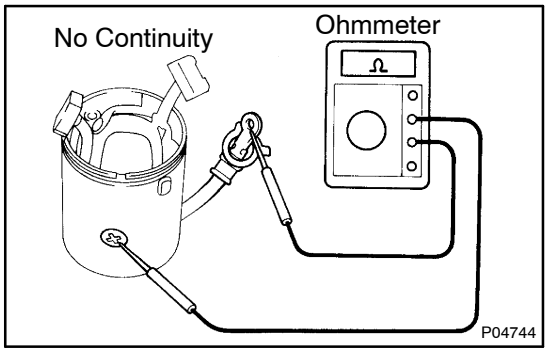


6. INSPECT STARTER YOKE ASSY

(a) Inspect field coil for open circuit.

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

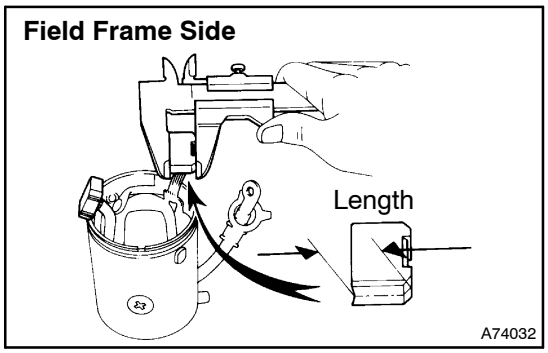
If there is no continuity, replace the field frame.



(b) Inspect field coil for ground.

(1) Using an ohmmeter, check that there is no continuity between the field coil end and field frame.

If there is continuity, repair or replace the field frame.



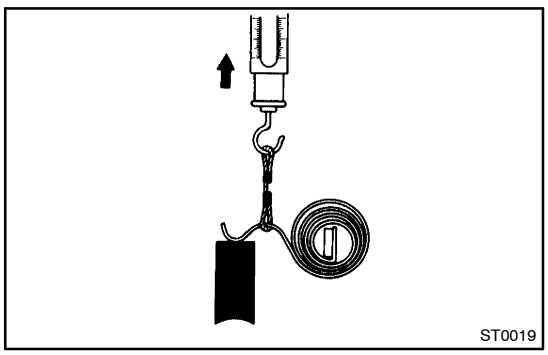
(c) Inspect brush length.

(1) Using a vernier caliper, measure the brush length.

Standard length: 16.5 mm (0.650 in.)

Minimum length: 9.0 mm (0.354 in.)

If the length is less than minimum, replace the field frame.



7. INSPECT STARTER BRUSH HOLDER ASSY

(a) Inspect brush spring load.

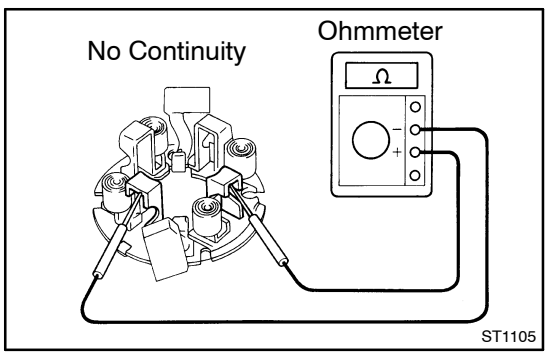
(1) Take the pull scale reading the instant the brush spring separates from the brush.

Standard spring installed load:

26.5 – 32.3 N (2.7 – 3.3 kgf, 5.9 – 7.3 lbf)

Minimum spring installed load: 17.6 N (1.8 kgf, 4.0 lbf)

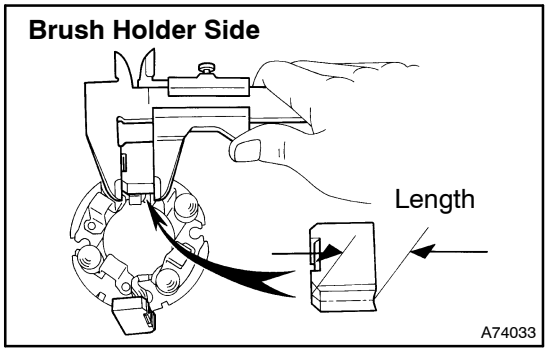
If the installed load is less than minimum replace the brush holder.



(b) Inspect brush holder insulation.

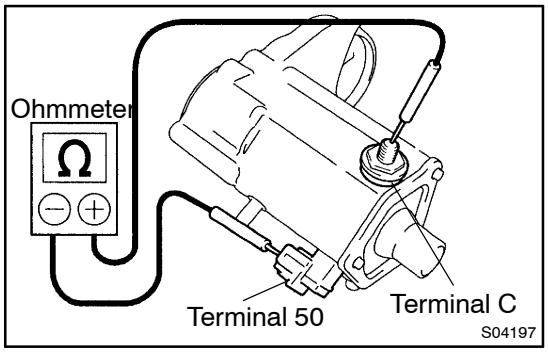
(1) Using an ohmmeter, check that there is no continuity between the positive (+) and negative (–) brush holders.

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



(c) Inspect brush length.
(1) Using a vernier caliper, measure the brush length.
Standard length: 16.5 mm (0.650 in.)
Minimum length: 9.0 mm (0.354 in.)

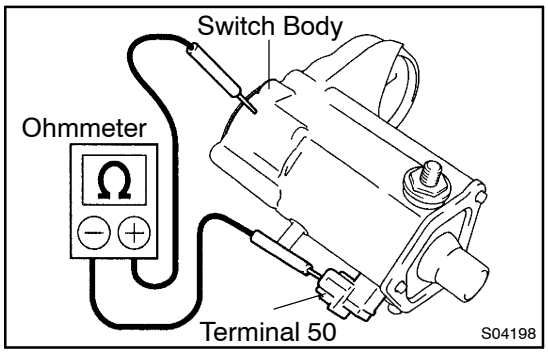
If the length is less than minimum, replace the brush holder.



8. INSPECT MAGNET STARTER SWITCH ASSY

(a) Do pull–in coil open circuit test.
(1) Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, replace the magnetic switch.



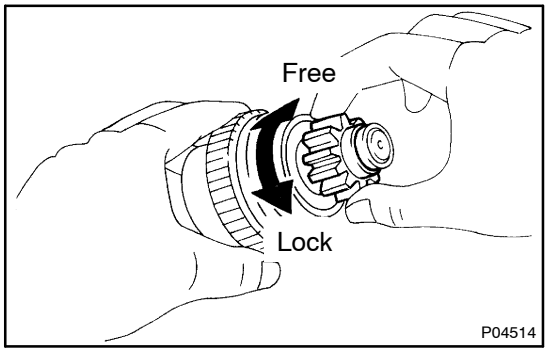
(b) Do hold–in coil open circuit test.
(1) Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

9. INSPECT STARTER CLUTCH SUB–ASSY

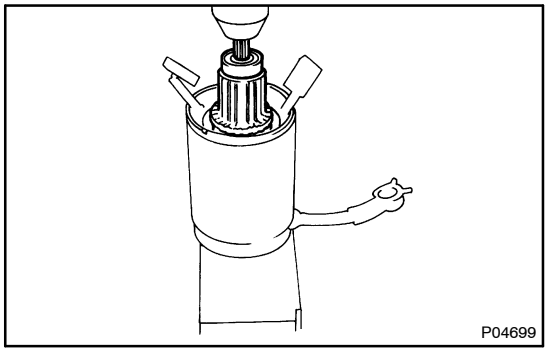
(a) Inspect gear teeth.
(1) Check the gear teeth on the pinion gear, idle gear and clutch assembly for wear or damage.

If damaged, replace the gear or clutch assembly.
If damaged, also check the drive plate ring gear for wear or damage.



(b) Inspect clutch pinion gear.
(1) Hold the starter clutch and rotate the pinion gear clockwise, and check that it turns freely. Try to rotate the pinion gear counterclockwise and check that it locks.

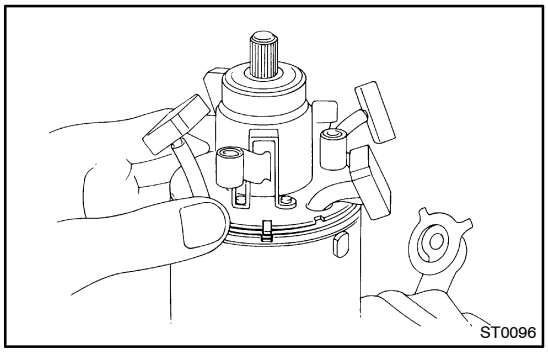
If necessary, replace the clutch assembly.



10. INSTALL STARTER ARMATURE ASSY

(a) Apply a grease to the armature bearings.

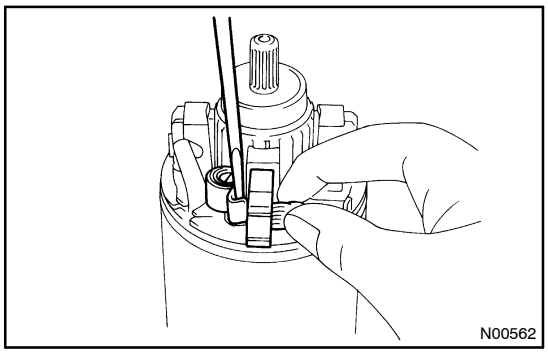
(b) Using a press, press the armature into the field frame.



11. INSTALL STARTER BRUSH HOLDER ASSY

(a) Align the claw of the brush holder with the claw groove of the field frame.

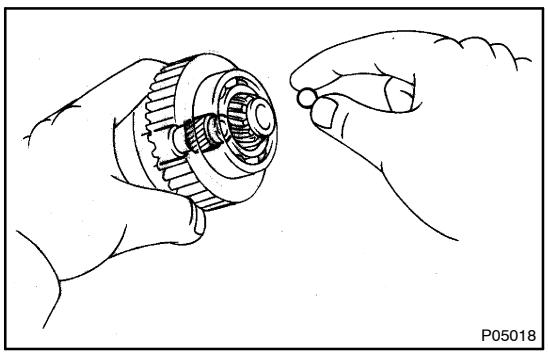
(b) Place the brush holder on the field frame.



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

NOTICE:

Check that the positive (+) lead wires are not grounded.



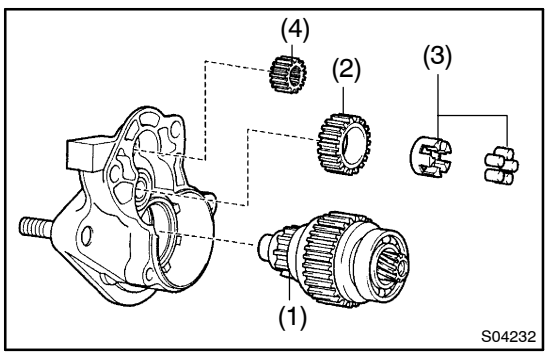
12. INSTALL MAGNET STARTER SWITCH ASSY

(a) Apply grease to the steel ball.

(b) Insert the steel ball into the clutch shaft hole.

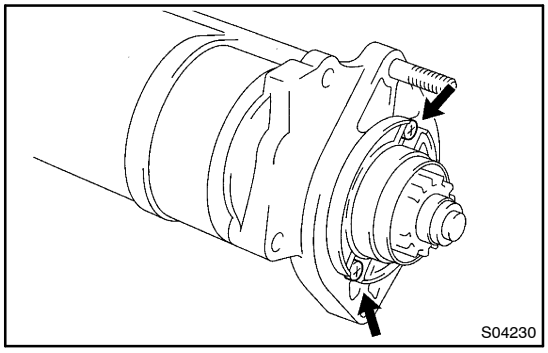
(c) Apply grease to the return spring.

(d) Insert the return spring into the magnetic switch hole.

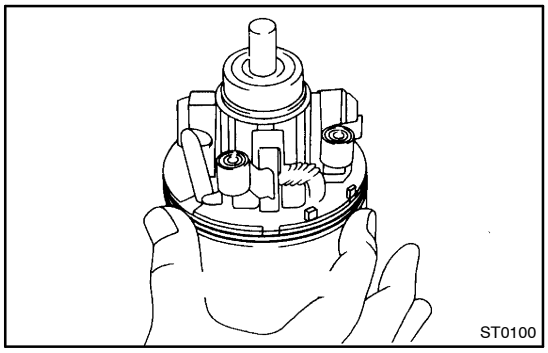


(e) Place the following parts in position on the starter housing:

(1)	Clutch assembly
(2)	Idler gear
(3)	Bearing
(4)	Pinion gear

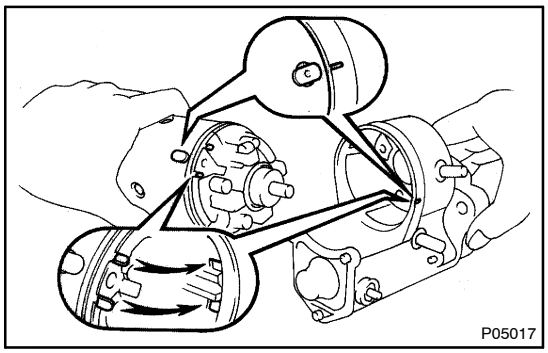


(f) Assemble the starter housing and magnetic switch assembly and install the 2 screws.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



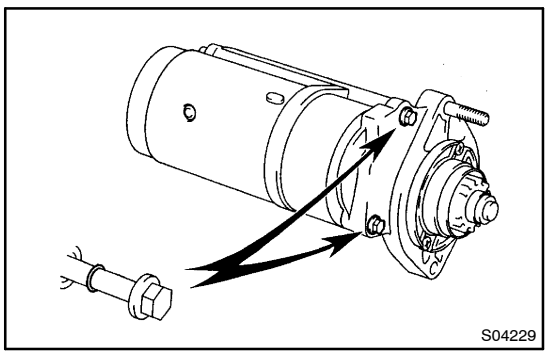
13. INSTALL STARTER YOKE ASSY

(a) Place a new O–ring in position on the field frame.



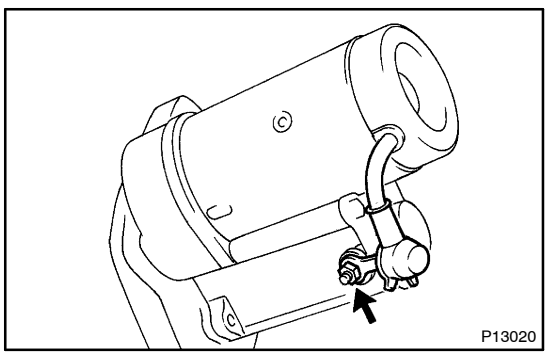
(b) Align the claws of the brush holder with the grooves of the magnetic switch, and install the field frame and armature shaft assembly.

(c) Align the punch mark of the field frame with the line of the magnet switch.



(d) Install a new O–ring to the through bolts.

(e) Install the field frame and armature assembly with the 2 through bolts.
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)



(f) Connect the lead wire to terminal C, and install the nut.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)