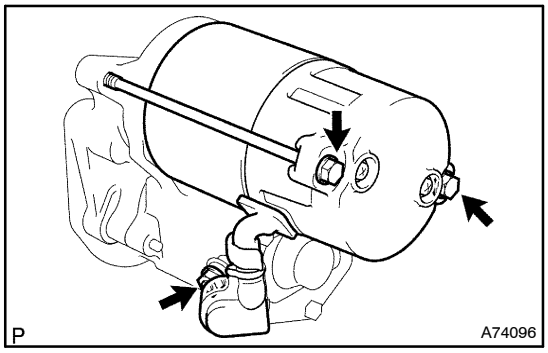
190L5–01

OVERHAUL



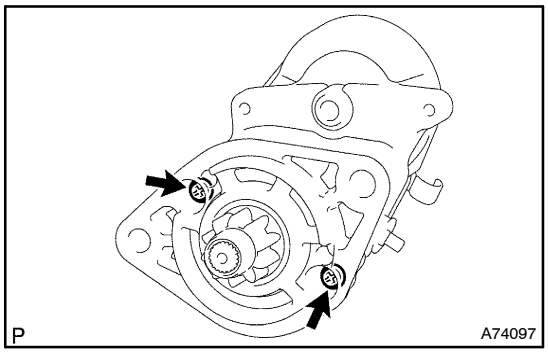
1. REMOVE STARTER YOKE ASSY

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

(b) Remove the 2 through bolts.

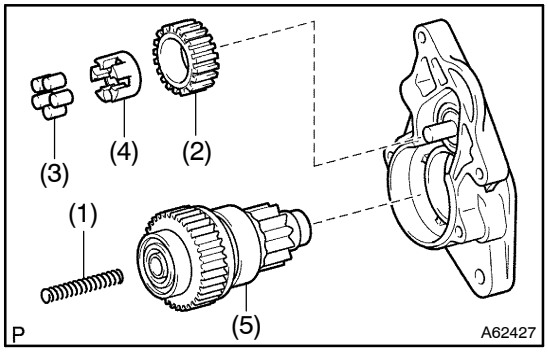
(c) Pull out the starter yoke with the armature.

(d) Remove the O–ring from the starter yoke.



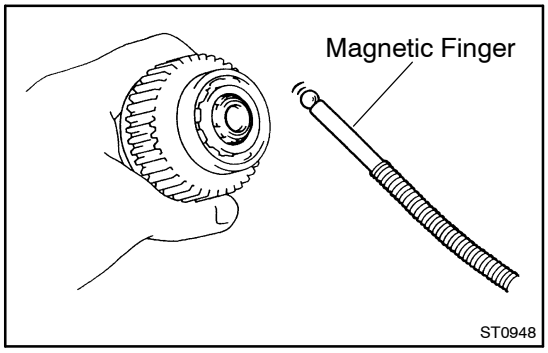
2. REMOVE MAGNET STARTER SWITCH ASSY

(a) Remove the 2 screws and magnet starter switch.



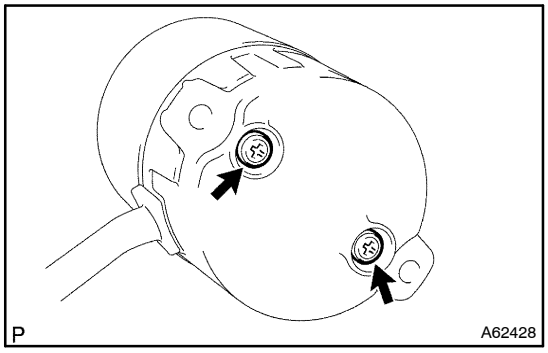
(b) Remove these parts from the starter drive housing.

(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch

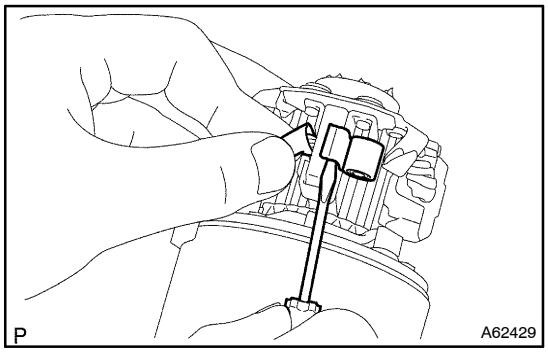


(c) Using a magnetic finger, remove the steel ball from the clutch shaft hole.

3. REMOVE STARTER BRUSH HOLDER ASSY

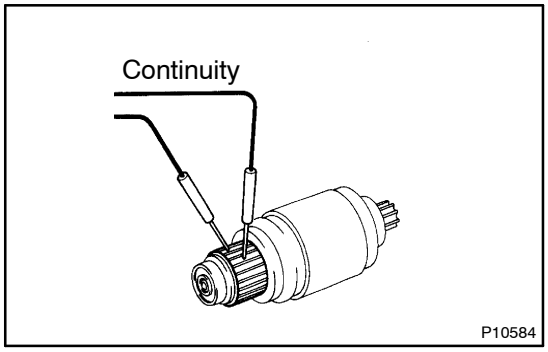


(a) Remove the 2 screws and end cover from the starter yoke.
(b) Remove the O–ring from the starter yoke.



(c) Using a screwdriver, hold the spring back and disconnect the 4 brushes from the brush holder.
(d) Remove the brush holder from the armature.

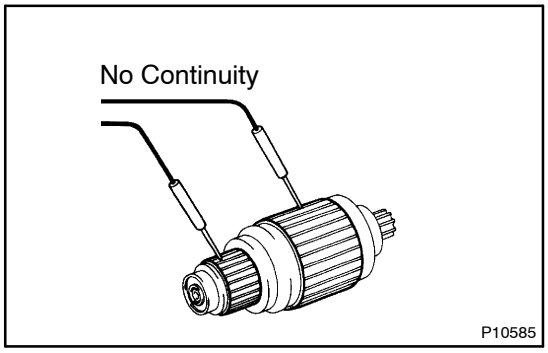
4. REMOVE STARTER ARMATURE ASSY



5. INSPECT STARTER ARMATURE ASSY

(a) Check the commutator for 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.

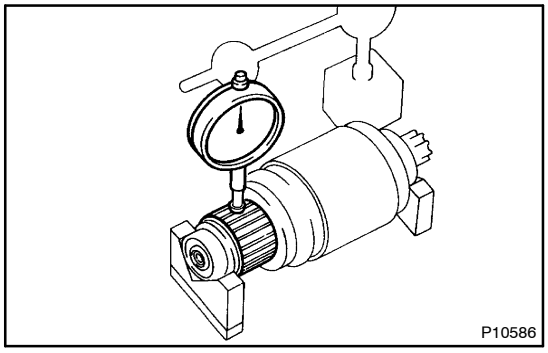


(b) Check the commutator for ground.
  (1) Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is continuity, replace the armature.

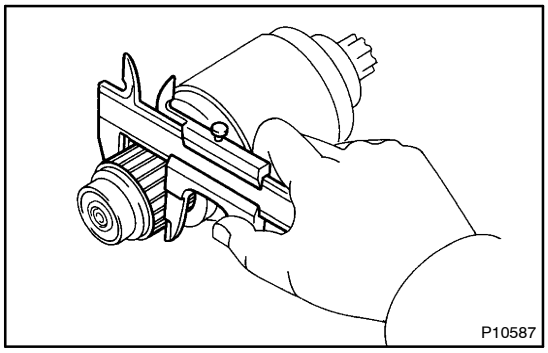
(c) Check the commutator for dirty and burn on surface.

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



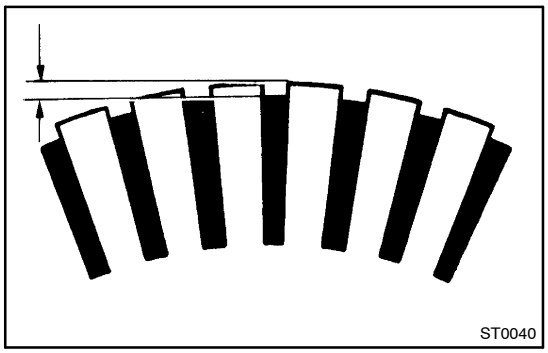
(d) Check for the commutator circle runout.
(1) Place the commutator on V–blocks.
(2) Using a dial gauge, measure the circle runout.
Maximum circle runout: 0.05 mm(0.0020 in.)

If the circle runout is greater than maximum, correct it on a lathe.



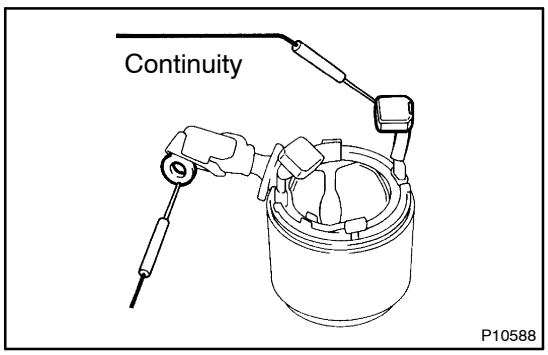
(e) Using vernier calipers, measure the commutator diameter.
Standard diameter: 35.0 mm (1.378 in.)
Minimum diameter: 34.0 mm (1.339 in.)

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



(f) 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.)

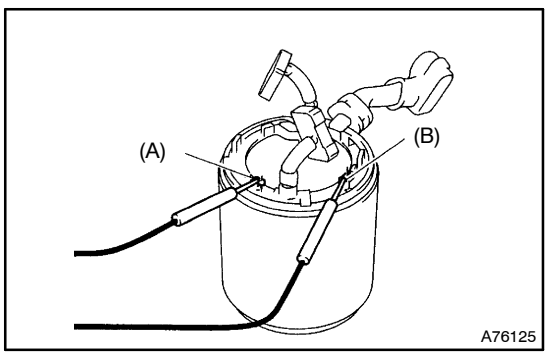
If the undercut depth is less than minimum, correct it with a hacksaw blade.



6. INSPECT STARTER YOKE ASSY

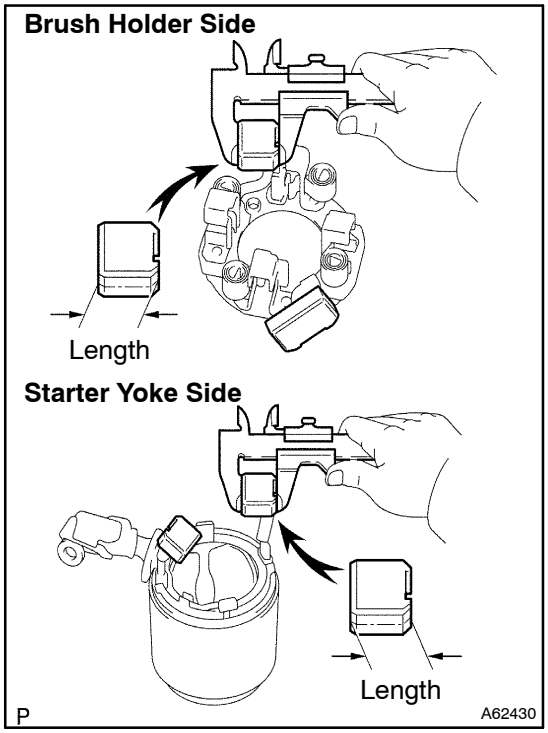
(a) Check the starter yoke for open circuit.
(1) Using an ohmmeter, check that there is continuity between the lead wire and brushes.

If there is no continuity, replace the starter yoke.



(b) Check the shunt coil for open circuit.
(1) Using an ohmmeter, measure the resistance between shunt coil terminals (A) and (B).
Resistance: 1.5 – 1.9 Ω at 20°C (68°F)

If the resistance is not as specified, replace the starter yoke.



7. INSPECT BRUSH

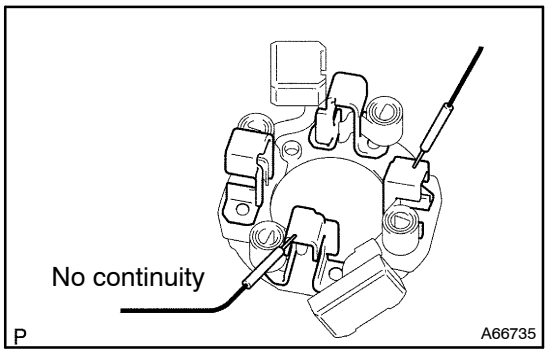
(a) Check the brushes length

(1) Using vernier calipers, measure the brush length.

Standard length: 15.0 mm (0.591 in.)

Minimum length: 9.0 mm (0.354 in.)

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

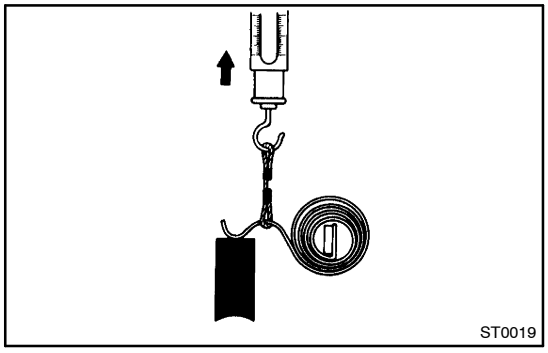


8. INSPECT STARTER BRUSH HOLDER ASSY

(a) Check the blush 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.



(b) Check the brush spring load.

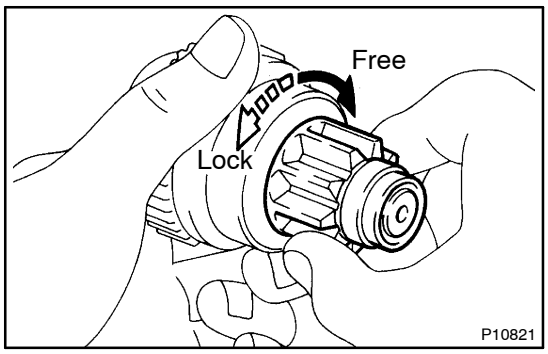
(1) Take the pull scale reading the instant the brush spring separates from the brush.

Standard spring load:

21.5 – 27.5 N (2.2 – 2.8 kgf, 4.8 – 6.2 lbf)

Minimum spring load: 12.7 N (1.3 kgf, 2.9 lbf)

If the spring load is less than the minimum, replace the brush holder.



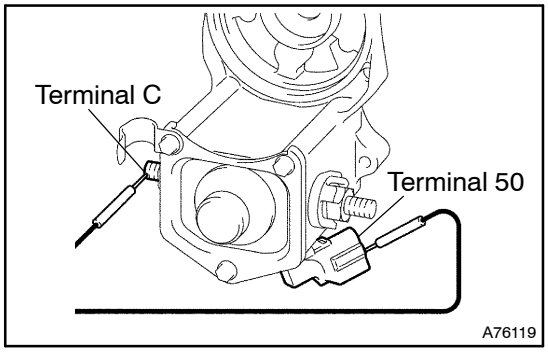
9. INSPECT STARTER CLUTCH SUB–ASSY

(a) Check the clutch pinion gear.

(1) Hold the starter clutch and rotate the pinion gear clockwise, and check that it turns freely.

(2) Try to rotate the pinion gear counterclockwise and check that it locks.

If necessary, replace the starter clutch.

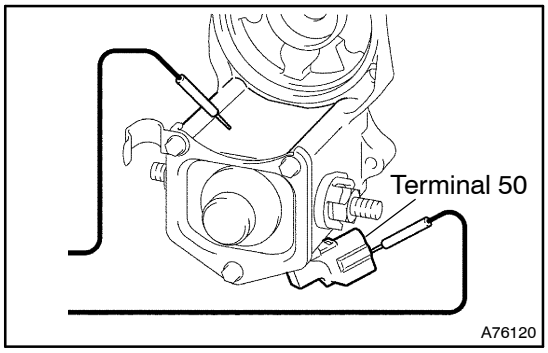


10. INSPECT MAGNET STARTER SWITCH ASSY

(a) Check the pull–in coil for open circuit.

(1) Using an ohmmeter, check that there is continuity between terminals 50 and C.

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



(b) Check the holding coil for open circuit.

(1) Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

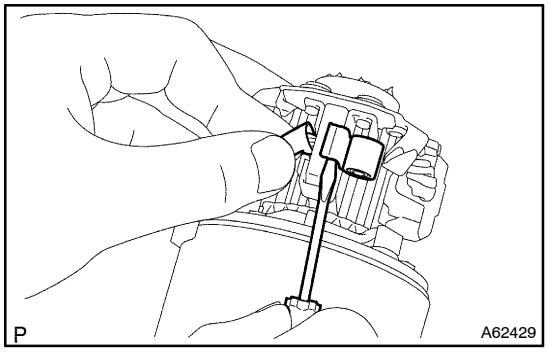
If there is no continuity, replace the magnet starter switch.

11. INSTALL STARTER ARMATURE ASSY

(a) Apply grease to the bearings, and install it to the starter yoke.

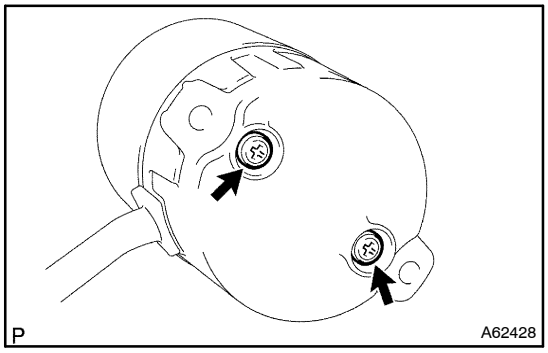
12. INSTALL STARTER BRUSH HOLDER ASSY

(a) Place the brush holder on the armature.



(b) Using a screwdriver, install the 4 brushes.

(c) Install a new O–ring to the groove of the field frame.

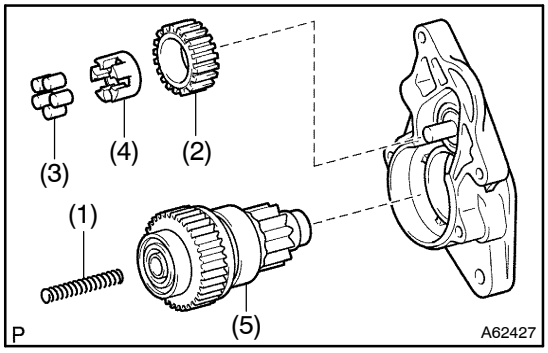


(d) Install the end frame with the 2 screws.

Torque: 3.8 N·m (39 kgf·cm, 34 in.·lbf)

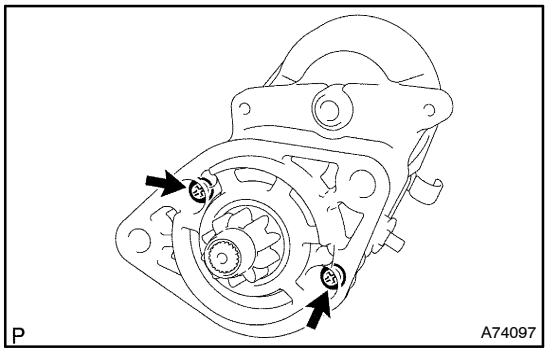
13. INSTALL MAGNET STARTER SWITCH ASSY

(a) Apply grease to the steel ball, and install it to the clutch shaft hole.



(b) Apply grease to the these parts (2) – (5), and its to the starter drive housing.

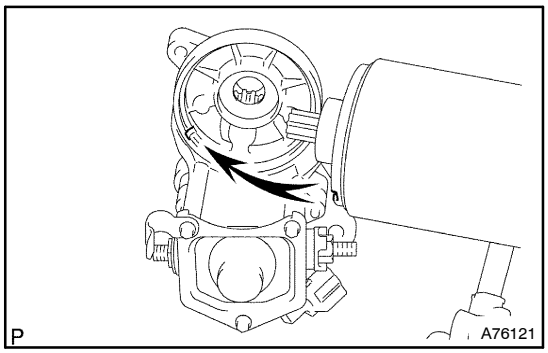
(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch



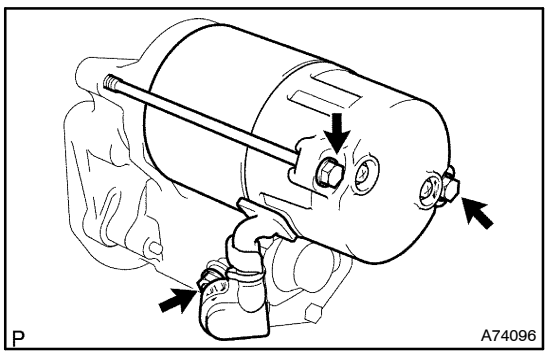
(c) Install the magnet starter switch with the 2 screws.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)

14. INSTALL STARTER YOKE ASSY

(a) Install a new O–ring to the groove of the starter yoke.



(b) Align the protrusion of the starter yoke with the groove of the magnet starter switch.



(c) Install the starter yoke and armature with the 2 through bolts.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)

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