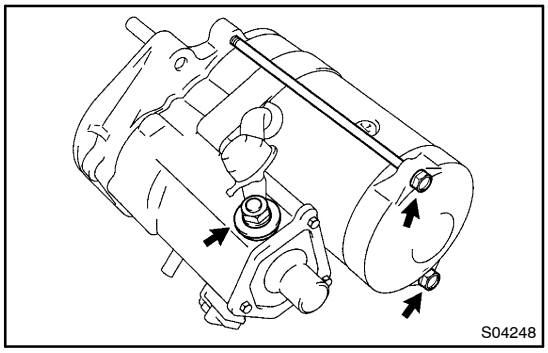
1912I–03

OVERHAUL

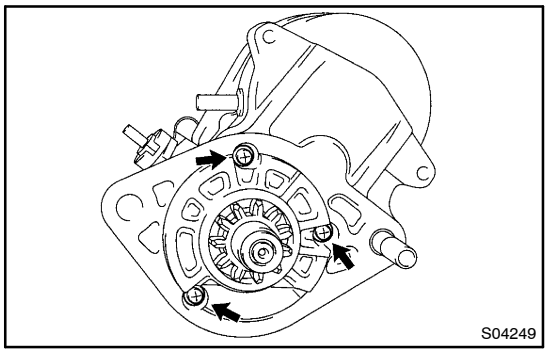


1. REMOVE STARTER YOKE ASSY

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

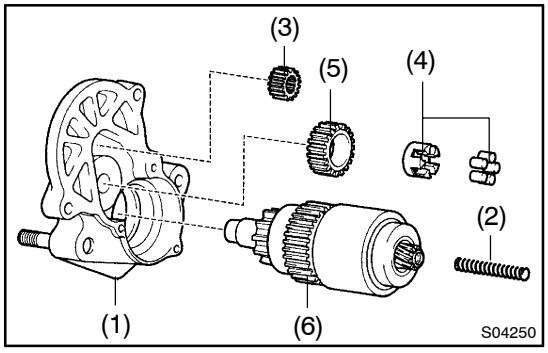
(b) Remove the 2 bolts.

(c) Pull out the starter yoke assy together with the starter armature from the magnet starter switch.



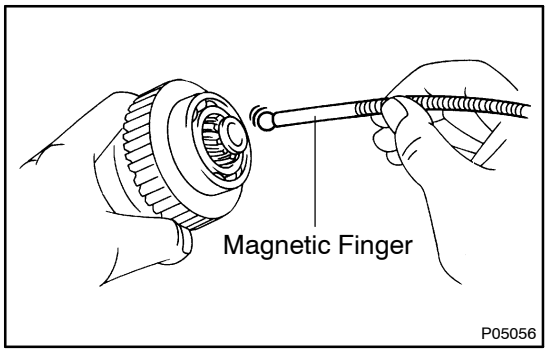
2. REMOVE MAGNET STARTER SWITCH ASSY

(a) Remove the 3 screws.

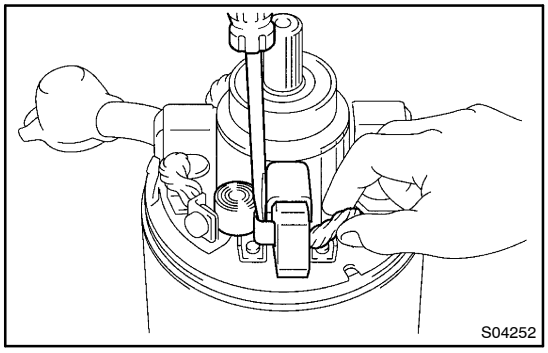


(b) Remove the following parts from the magnet starter switch assy:

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



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



3. REMOVE STARTER BRUSH HOLDER ASSY

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

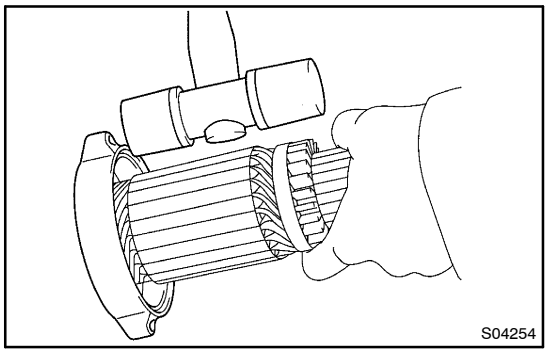
(b) Remove the starter brush holder assy from the starter yoke.

(c) Remove the 2 O–rings.

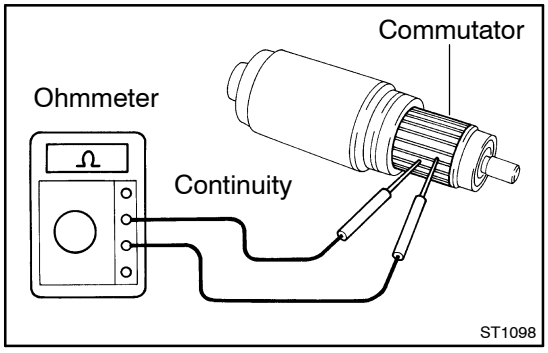
4. REMOVE STARTER ARMATURE ASSY

(a) Place matchmarks on the starter yoke and commutator end frame.

(b) Remove the starter armature with the commutator end frame from the starter yoke.



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

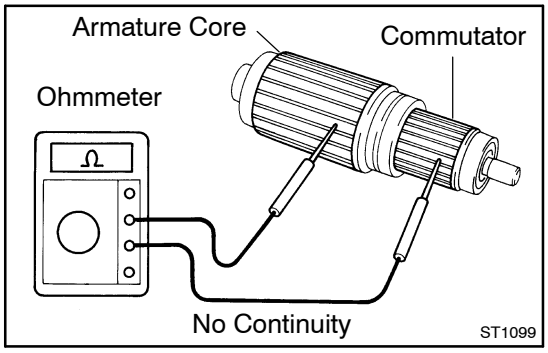


5. INSPECT STARTER ARMATURE ASSY

(a) Inspect 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 starter armature assy.



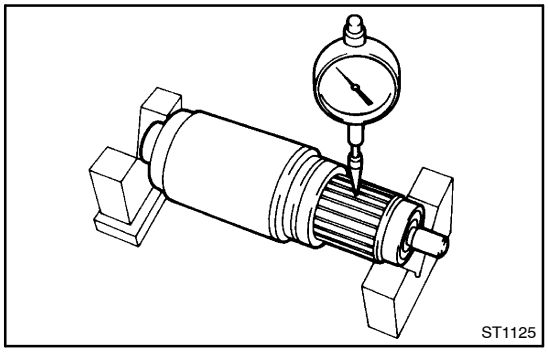
(b) Inspect commutator for ground.

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

If there is continuity, replace the starter armature assy.

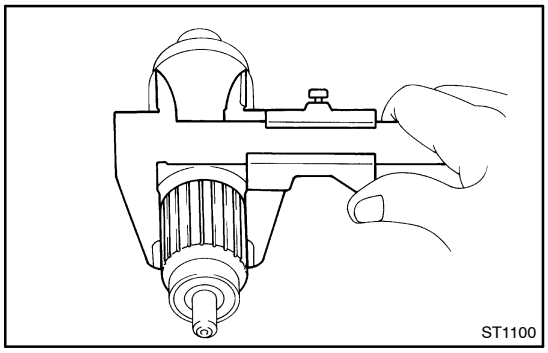
(c) Inspect commutator for diary and burnt surface.

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



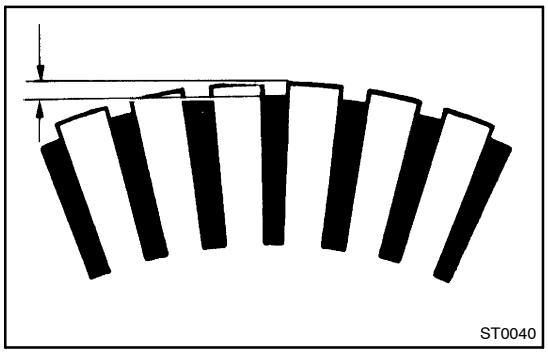
(d) Inspect commutator circle runout.
(1) Place the commutator on V–blocks.
(2) Using a dial indicator, measure the circle runout.
Maximum circle runout: 0.05 mm (0.0020 in.)

If the circle runout is greater than the maximum, correct it with sandpaper (#400) or replace the starter armature assy.



(e) Inspect commutator diameter.
(1) Using vernier calipers, measure the commutator diameter.
Standard diameter: 43.0 mm (1.692 in.)
Minimum diameter: 42.0 mm (1.654 in.)

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

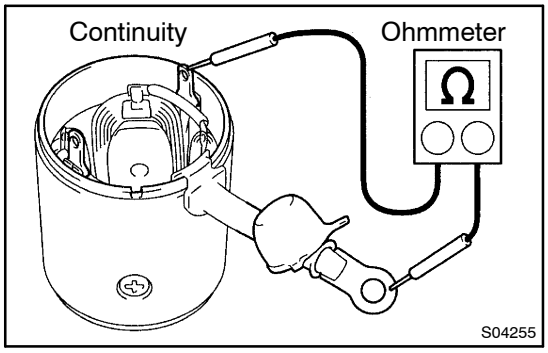


(f) Inspect undercut depth.
(1) Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.
Standard undercut depth: 0.7 mm (0.028 in.)
Minimum undercut depth: 0.2 mm (0.008 in.)

If the undercut depth is less than the minimum, replace the starter armature assy.

(g) Inspect front and rear bearing.
(1) Turn the bearing by hand while applying inward force.

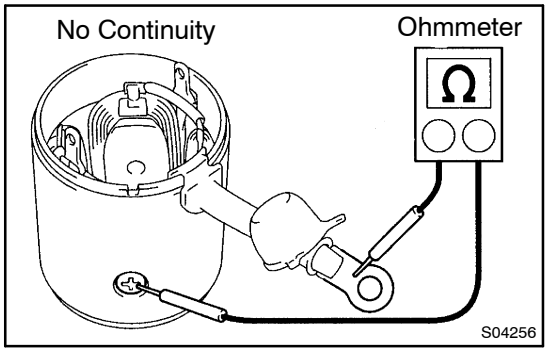
If resistance is felt or the bearing sticks, replace the starter armature assy.



6. INSPECT STARTER YOKE ASSY

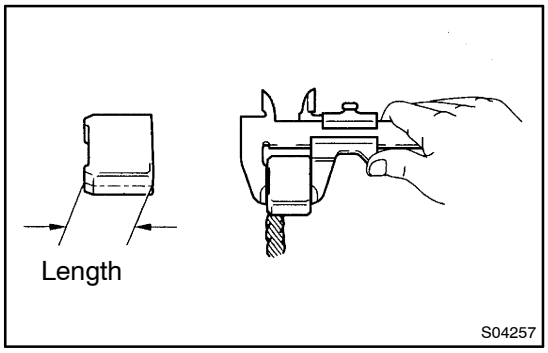
(a) Inspect field coil for open circuit.
(1) Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

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



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

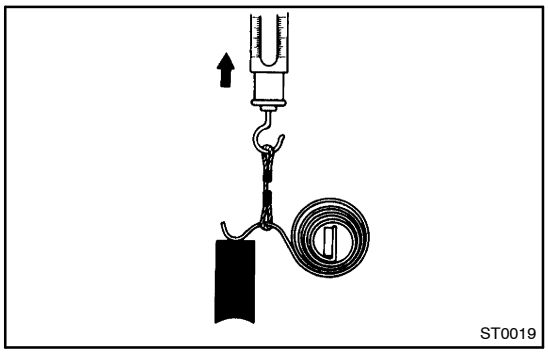
If there is continuity, repair or replace the starter yoke assy.



7. INSPECT STARTER BRUSH HOLDER ASSY

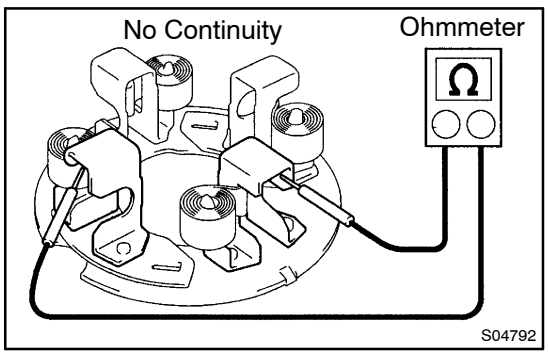
(a) Inspect brush length.
(1) Using vernier calipers, measure the brush length.
Standard length: 21.0 mm (0.828 in.)
Minimum length: 12.0 mm (0.472 in.)

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



(b) Inspect brush spring load.
(1) Take the pull scale reading the instant the brush spring separates from the brush.
Standard spring installed load:
27.5 to 37.3 N (2.8 to 3.8 kgf, 6.1 to 8.3 lbf)
Minimum spring installed load:
14.7 N (1.5 kgf, 3.3 lbf)

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



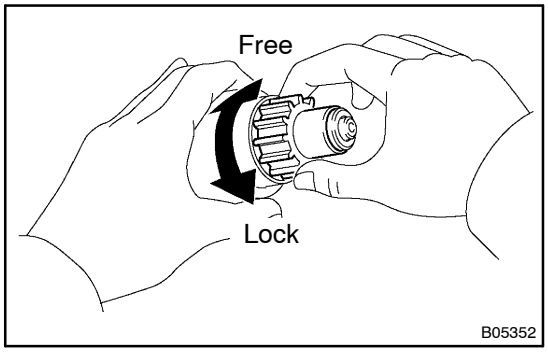
(c) Inspect brush holder insulation.
(1) Using an ohmmeter, check that there is no continuity between the positive (+) and negative (–) brush holders.

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

8. INSPECT STARTER CLUTCH SUB–ASSY

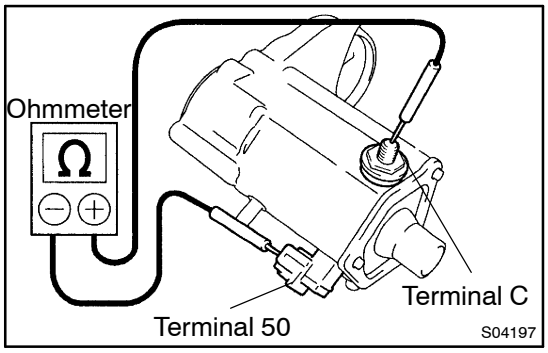
(a) Inspect gear teeth.
(1) Check the gear teeth on the pinion gear, idle gear and the starter clutch sub–assy for wear or damage.

If damaged, replace the gear or starter clutch sub–assy.



(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.

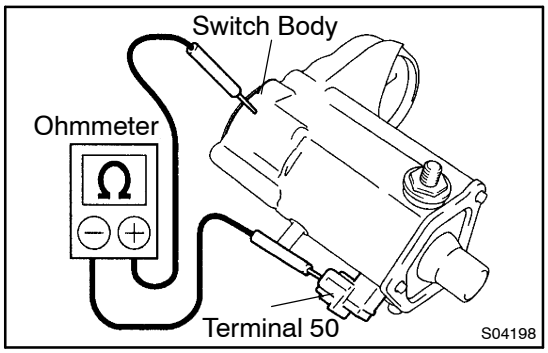
If necessary, replace the starter clutch sub–assy.



9. INSPECT MAGNET STARTER SWITCH ASSY

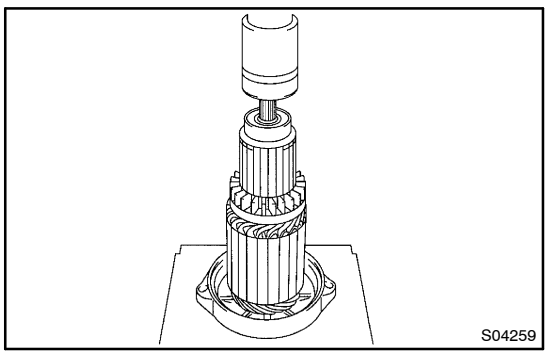
(a) Do pull–in coil open circuit test.
(1) Using an ohmmeter, check that there is continuity between terminals 50 and C.

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



(b) Do holding 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 magnet starter switch assy.

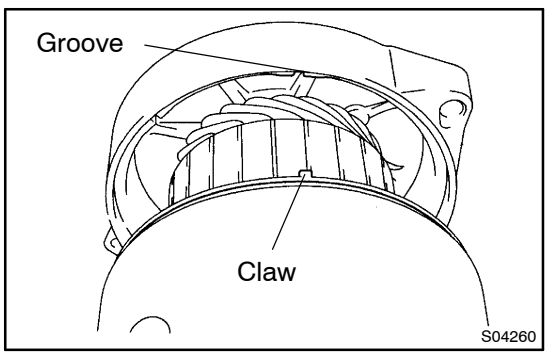


10. INSTALL STARTER ARMATURE ASSY

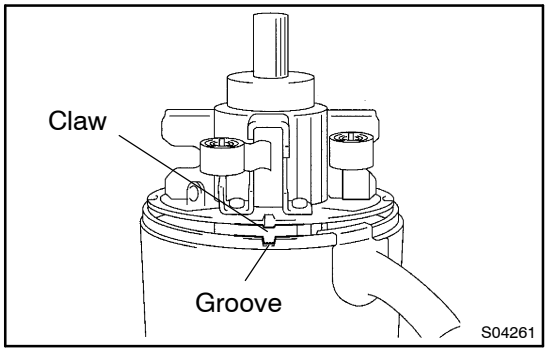
HINT:

Use high–temperature grease to lubricate the bearings and gears when assembling the starter.

(a) Apply grease to the armature bearings.
(b) Using a press, press the armature into the commutator end frame.
(c) Install the 2 O–rings.



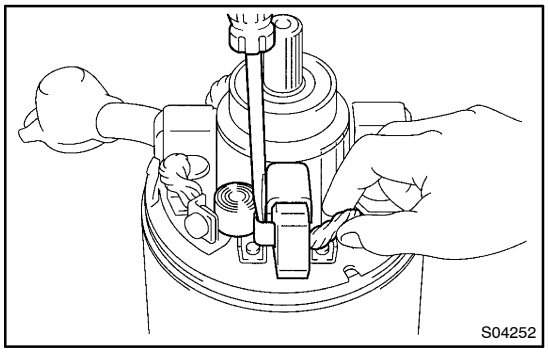
(d) Align the claw of the starter yoke with the groove of the commutator end frame, and install the armature commutator end frame.



11. INSTALL STARTER BRUSH HOLDER ASSY

(a) Align the claw of the brush holder with the claw groove of the starter yoke.

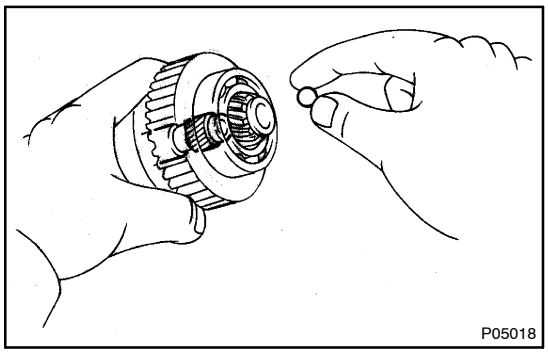
(b) Place the starter brush holder assy on the starter yoke .



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

NOTICE:

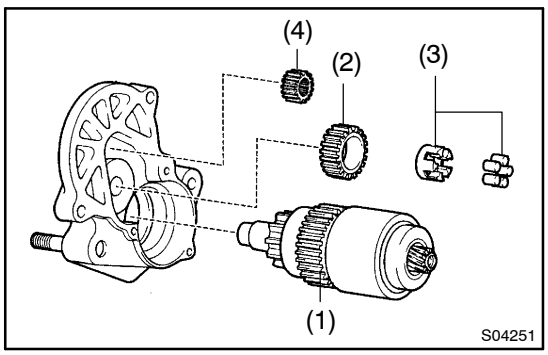
Check that the positive (+) lead wires are not grounded.



12. INSTALL MAGNET STARTER SWITCH ASSY

(a) Apply high–temperature grease to the steel ball.

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

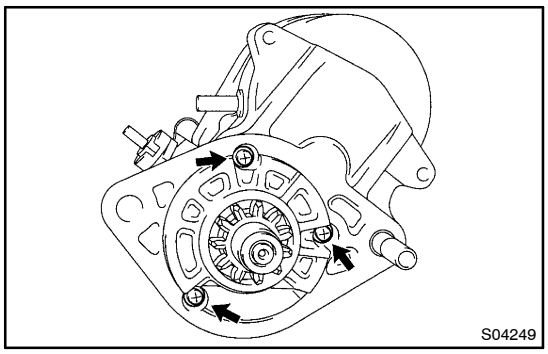


(c) Apply high–temperature grease to the return spring.

(d) Insert the return spring into the magnet starter switch assy hole.

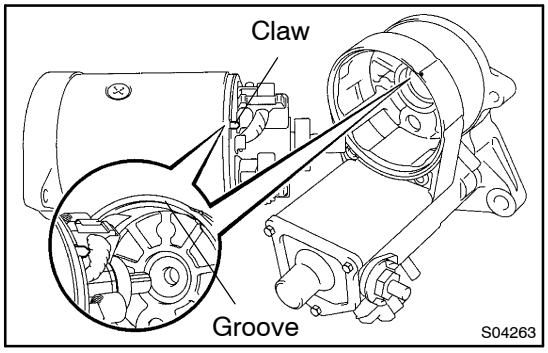
(e) Place the following parts in position on the starter housing:

(1)	Starter clutch assy
(2)	Idler gear
(3)	Bearing
(4)	Pinion gear



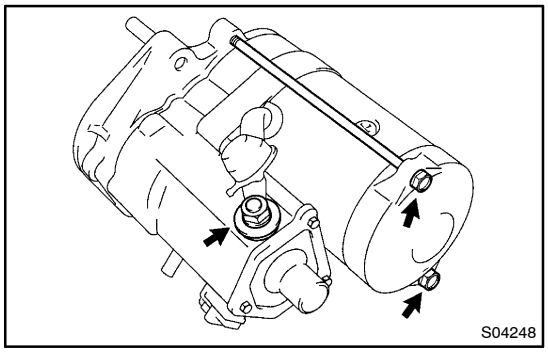
(f) Assemble the starter housing and magnet starter switch assy and install the 3 screws.

Torque: 11 N·m (115 kgf·cm, 8.5 ft·lbf)



13. INSTALL STARTER YOKE ASSY

(a) Align the claw of the brush holder with the groove of the magnet starter switch, and install the starter yoke assy and starter armature.



(b) Install the starter yoke assy and starter armature with the 2 bolts.
Torque: 14 N·m (145 kgf·cm, 10 ft·lbf)

(c) Connect the lead wire to terminal C, and install the nut.
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)