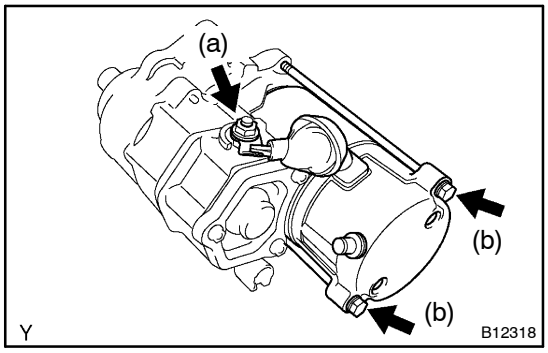
190UU–01

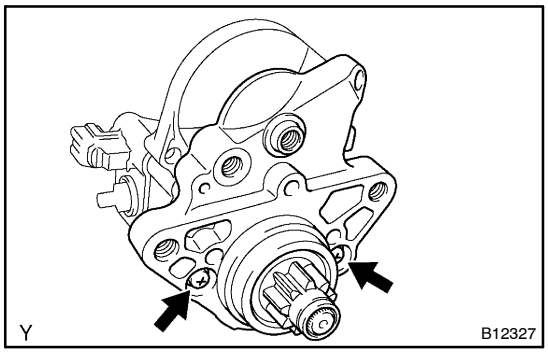
OVERHAUL

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



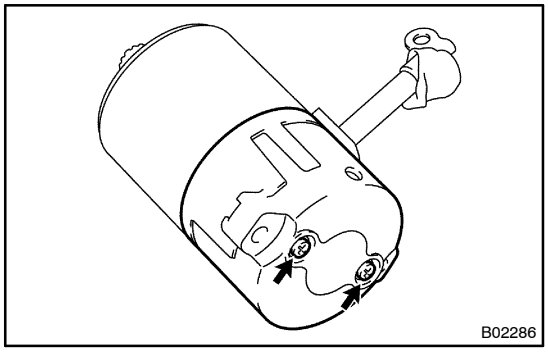
1. REMOVE STARTER YOKE ASSY

(a) Remove the nut and disconnect the lead wire from the magnetic switch terminal.
(b) Remove the 2 bolts and pull out the starter yoke together with the armature from the magnetic switch.
(c) Remove the O–ring from the starter yoke.



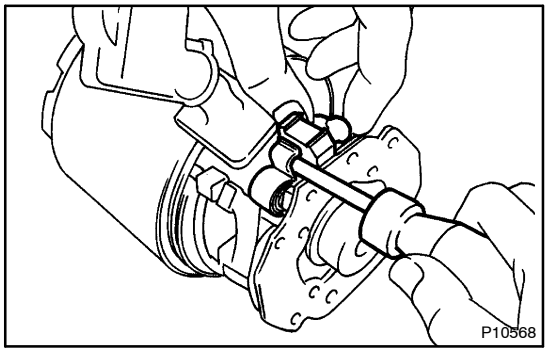
2. REMOVE MAGNET STARTER SWITCH ASSY

(a) Remove the 2 screws, and separate the starter switch and starter housing.
(b) Remove the O–ring, starter clutch, return spring, idler gear and bearing.
(c) Using a magnetic finger, remove the steel ball from the clutch shaft hole.



3. REMOVE END COVER

(a) Remove the 2 screws and end cover.



4. REMOVE STARTER BRUSH HOLDER ASSY

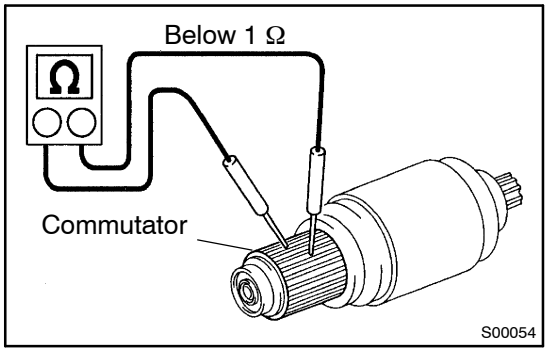
(a) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes, and remove the brush holder.
(b) Disconnect the brushes and remove the brush holder.

5. REMOVE STARTER ARMATURE ASSY

6. INSPECT STARTER ARMATURE ASSY

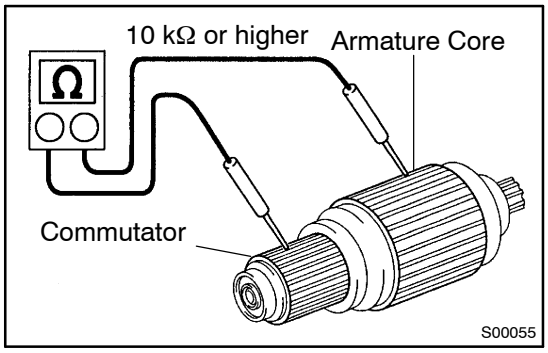
(a) Check the commutator for contamination and burns on its surface.

If the surface is dirty or burnt, correct it with sandpaper (#400) or a lathe.



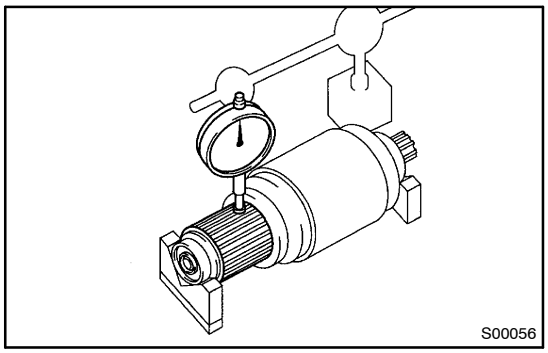
(b) Check if the commutator has an open circuit.
(1) Measure the resistance between the segments of the commutator.
Standard: Below 1 Ω

If the result is not as specified, replace the armature assy.



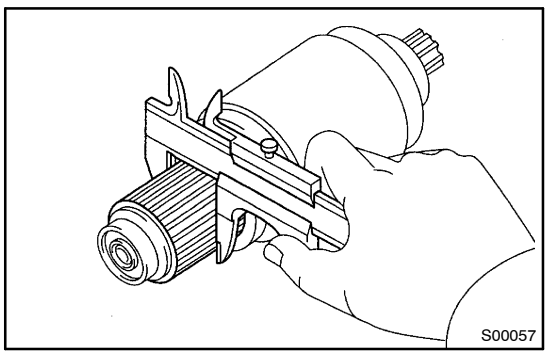
(c) Check if the commutator is grounded.
(1) Measure the resistance between the commutator and armature coil core.
Standard: 10 kΩ or higher

If the result is not as specified, replace the armature assy.



(d) Check the commutator circle runout.
(1) Place the armature on the 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 the maximum, correct it with sandpaper (#400) or replace the armature assy.



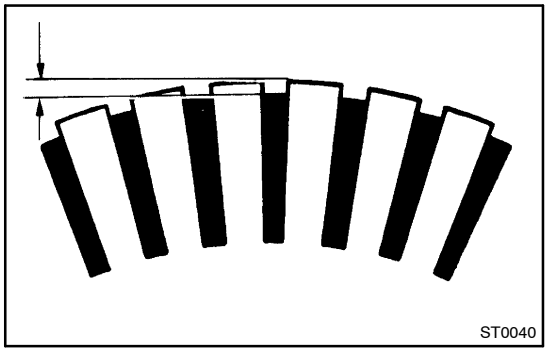
(e) Using vernier calipers, measure the commutator diameter.
Specified diameter:
1.4 kW type

Standard	30.0 mm (1.181 in.)
Minimum	29.0 mm (1.142 in.)

2.0 kW type

Standard	35.0 mm (1.378 in.)
Minimum	34.0 mm (1.339 in.)

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



(f) Measure the undercut depth of the commutator.

Specified depth:

1.4 kW type

Standard	0.6 mm (0.024 in.)
Minimum	0.2 mm (0.008 in.)

2.0 kW type

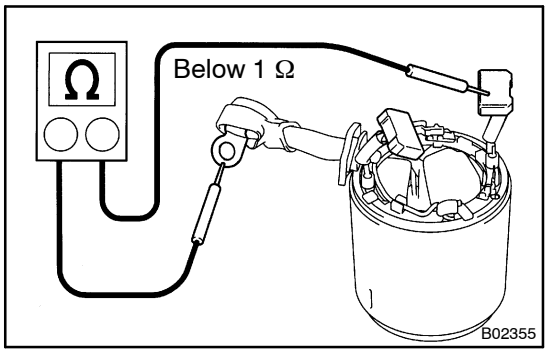
Standard	0.7 mm (0.028 in.)
Minimum	0.2 mm (0.008 in.)

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

(g) Inspect the bearings.

OK: Rotates smoothly

If necessary, replace the armature assy.



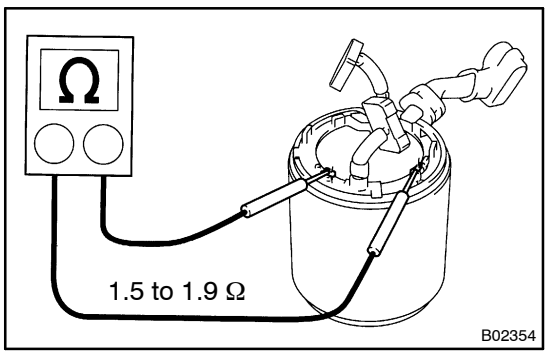
7. INSPECT STARTER YOKE ASSY

(a) Check the field coil resistance.

(1) Using an ohmmeter, measure the resistance between the lead wire and both brushes.

Standard: Below 1 Ω

If the result is not as specified, replace the starter yoke assy.

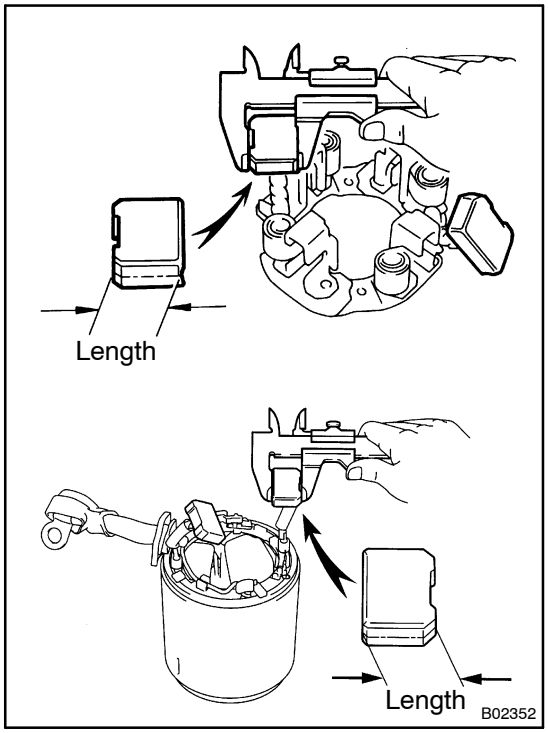


(b) Inspect the shunt coil resistance.

(1) Using an ohmmeter, measure the resistance between the shunt coil terminals.

Standard: 1.5 to 1.9 Ω at 20°C (68°F)

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



8. INSPECT BRUSH

(a) Using vernier calipers, measure the length of the both brushes.

Specified brush length:

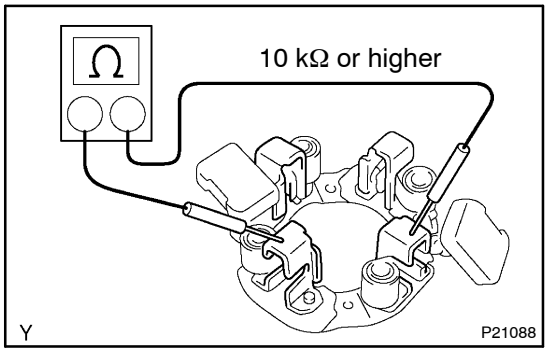
1.4 kW type

Standard	15.5 mm (0.610 in.)
Minimum	8.5 mm (0.335 in.)

2.0 kW type

Standard	15.0 mm (0.591 in.)
Minimum	9.0 mm (0.354 in.)

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



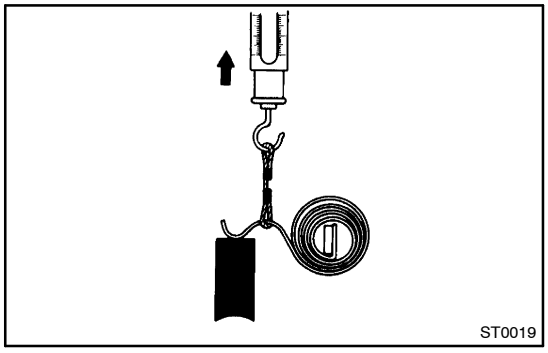
9. INSPECT STARTER BRUSH HOLDER ASSY

(a) Check the brush insulation.

(1) Check the resistance between the positive (+) and negative (–) brush holders.

Standard: 10 kΩ or higher

If the result is not as specified, repair or replace the brush holder assy.



(b) Using a pull scale, measure the brush spring load.

Specified spring load:

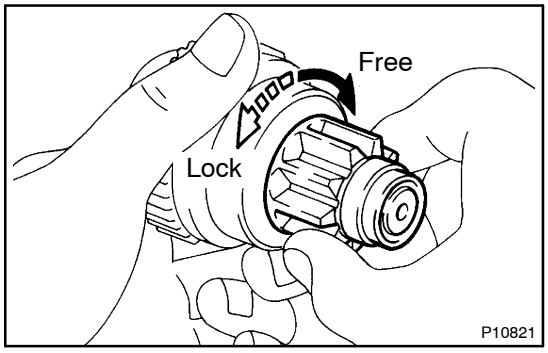
1.4 kW type:

Standard	17.6 to 23.5 N (1.8 to 2.4 kgf, 4.0 to 5.3 lbf)
Minimum	11.8 N (1.2 kgf, 2.7 lbf)

2.0 kW type:

Standard	21.5 to 27.5 N (2.2 to 2.8 kgf, 4.9 to 6.2 lbf)
Minimum	12.7 N (1.3 kgf, 2.9 lbf)

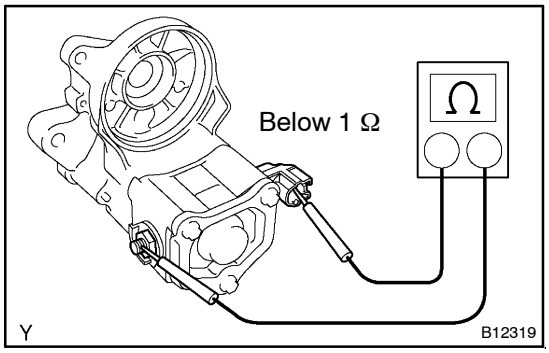
If the spring load is less than the minimum, replace the brush springs.



10. INSPECT STARTER CLUTCH SUB–ASSY

(a) Check that the starter clutch operates as shown in the illustration.

If the starter clutch is does not operate, replace clutch assy.



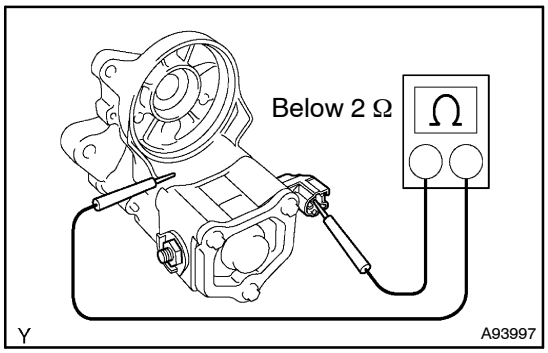
11. INSPECT MAGNET STARTER SWITCH ASSY

(a) Check if the pull–in coil has an open circuit.

(1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard: Below 1 Ω

If the the result is not as specified, replace the magnetic switch assy.



(b) Check if the hold–in coil has an open circuit.

(1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

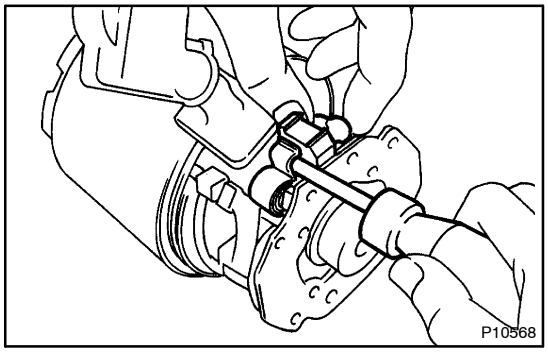
Standard: Below 2 Ω

If the the result is not as specified, replace the magnetic switch assy.

12. INSTALL STARTER ARMATURE ASSY

(a) Apply grease to the armature bearings.

(b) Insert the armature into the yoke.



13. INSTALL STARTER BRUSH HOLDER ASSY

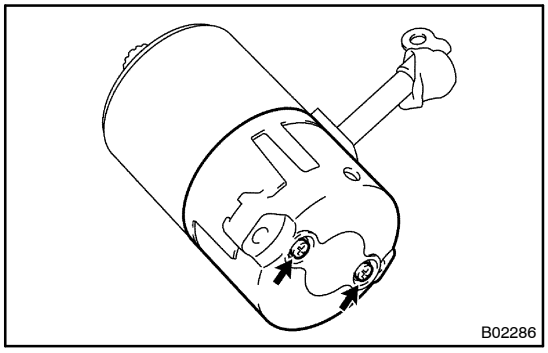
(a) Place the brush holder on the starter yoke.

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

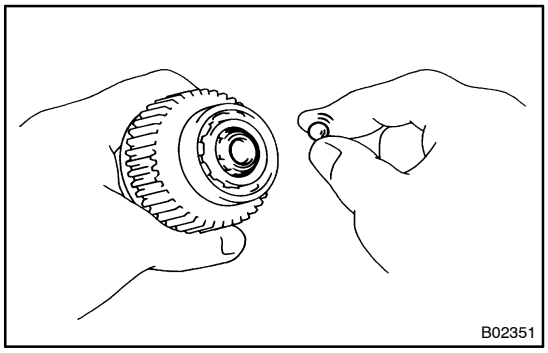
NOTICE:

Check that the positive lead wires are not grounded.

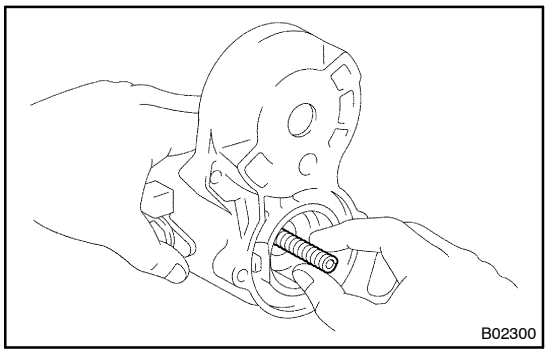
(c) Install a new O–ring to the groove of the starter yoke.



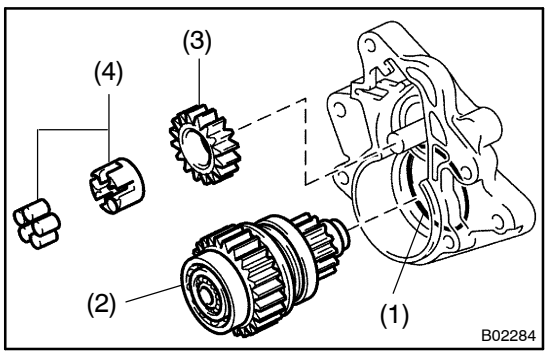
(d) Install the end cover to the starter yoke with the 2 screws.
Torque:
1.5 N·m (15 kgf·cm, 13 in.·lbf) for 1.4 kW type
3.8 N·m (39 kgf·cm, 34 in.·lbf) for 2.0 kW type



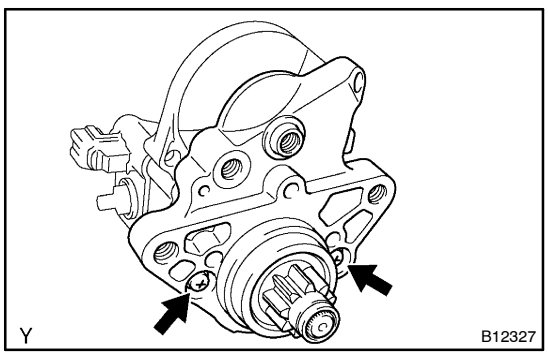
14. INSTALL MAGNET STARTER SWITCH ASSY
(a) Apply grease to the steel ball.
(b) Insert the steel ball into the clutch shaft hole.
(c) Apply grease to the return spring.



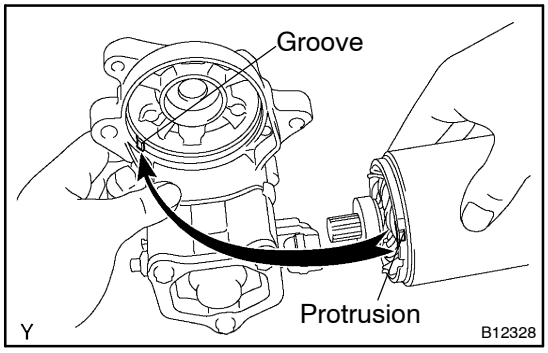
(d) Insert the return spring into the magnetic switch hole.



(e) Place these parts on the starter hosing:
(1) A new O–ring.
(2) The starter clutch.
(3) The idler gear.
(4) The bearing.



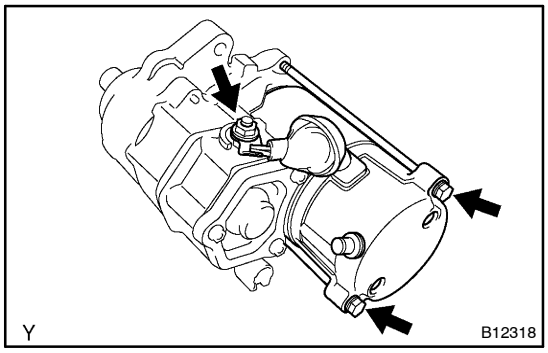
(f) Install the starter housing to the magnetic switch with the 2 screws.
Torque:
5.9 N·m (60 kgf·cm, 52 in.·lbf) for 1.4 kW type
9.3 N·m (95 kgf·cm, 82 in.·lbf) for 2.0 kW type



15. 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 magnetic switch, and install the starter yoke and armature.



(c) Install the starter yoke and armature with the 2 bolts.
Torque:
5.9 N·m (60 kgf·cm, 52 in.·lbf) for 1.4 kW type
9.3 N·m (95 kgf·cm, 82 in.·lbf) for 2.0 kW type

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