

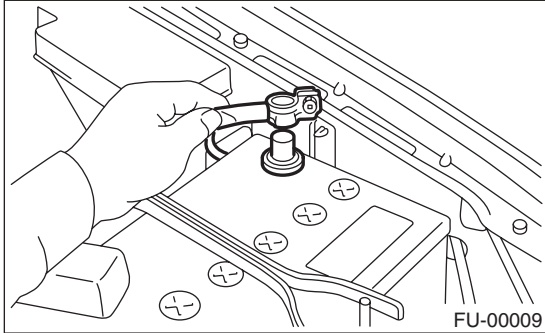
Starter

STARTING/CHARGING SYSTEMS

2. Starter

A: REMOVAL

1) Disconnect the ground cable from the battery.



2) Remove the collector cover. (Turbo model)

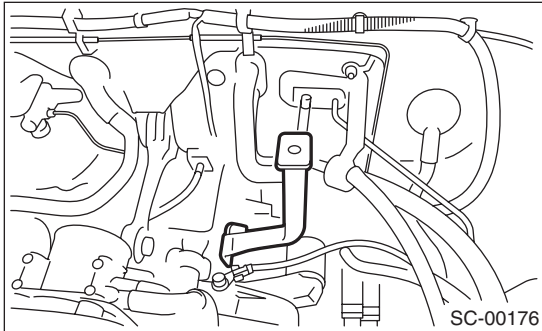
3) Remove the air intake chamber. (Non-turbo model)

<Ref. to IN (H4SO)-6, REMOVAL, Air Intake Chamber.>

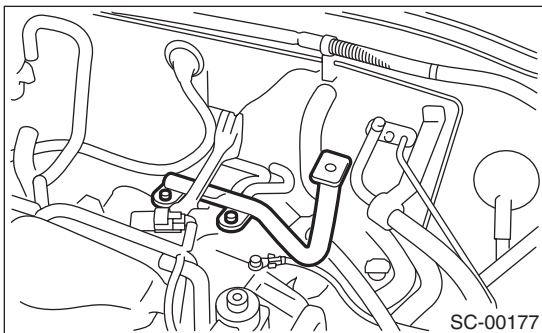
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>

5) Remove the air intake chamber stay LH. (Non-turbo model)

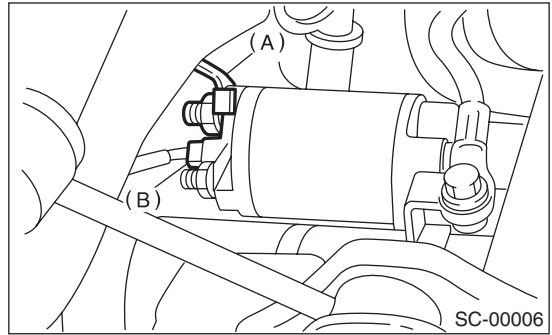
• MT model



• AT model



6) Disconnect the connector and terminal from starter.



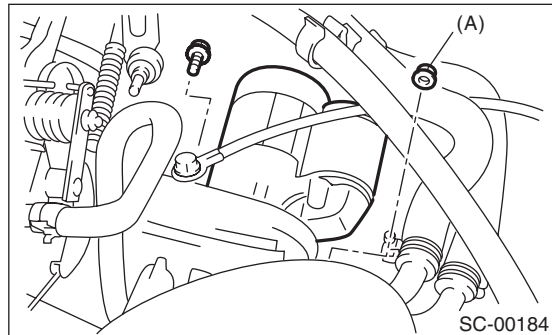
(A) Terminal

(B) Connector

7) Remove the starter from transmission.

NOTE:

For MT model, the bolt is used in place of nut (A) shown in the figure.



B: INSTALLATION

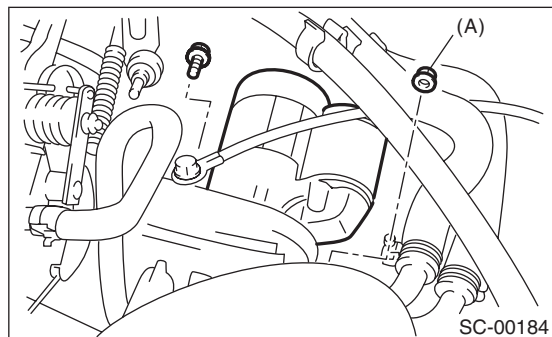
Install in the reverse order of removal.

NOTE:

For MT model, the bolt is used in place of nut (A) shown in the figure.

Tightening torque:

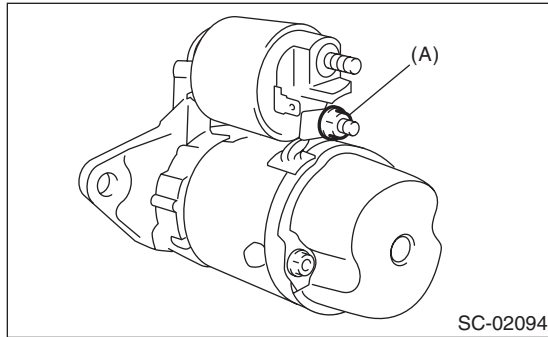
50 N·m (5.1 kgf-m, 37 ft-lb)



C: DISASSEMBLY

1. STARTER ASSEMBLY

1) Loosen the nuts fastening the switch assembly terminal M, then disconnect the connector.

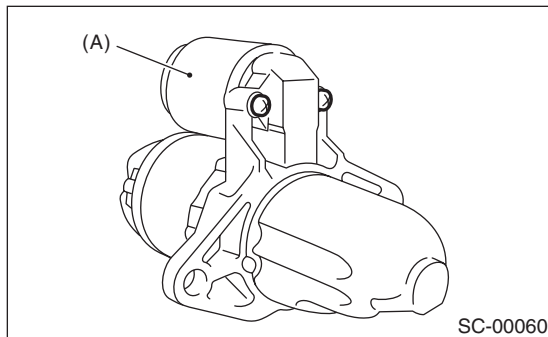


(A) Terminal M

2) Remove the bolts fastening the switch assembly, then remove the switch assembly, plunger and plunger spring as a unit from the starter.

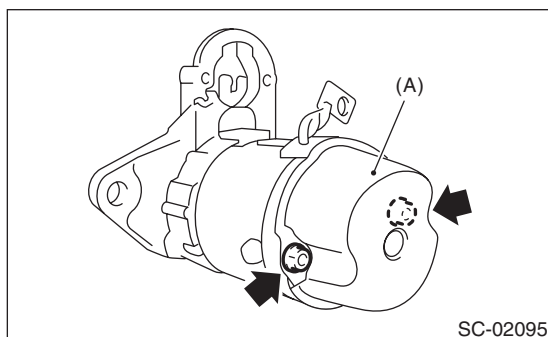
NOTE:

Be careful because the pinion gap adjustment washer may sometimes be used on the mounting surface of the switch assembly.



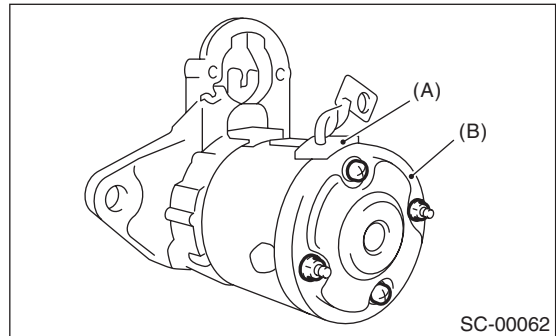
(A) Switch ASSY

3) Remove the bolts on both sides, then remove rear cover set.



(A) Rear cover set

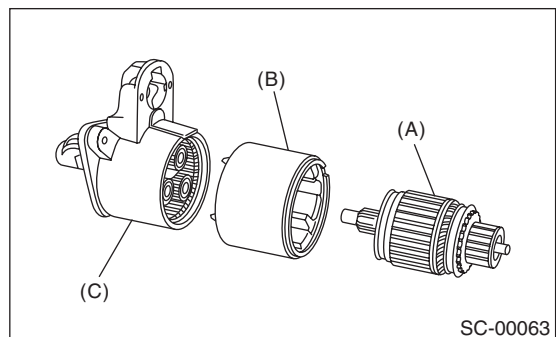
4) Remove the bolts passing through both sides, and the brush holder screws, then remove rear cover and brush holder assembly.



(A) Brush holder ASSY

(B) Rear cover

5) Remove the armature and yoke assembly from the front bracket.

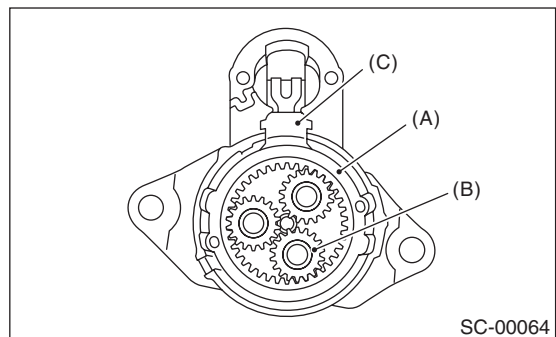


(A) Armature

(B) Yoke ASSY

(C) Front bracket

6) Remove the packing A, planetary gears and packing B.



(A) Packing A

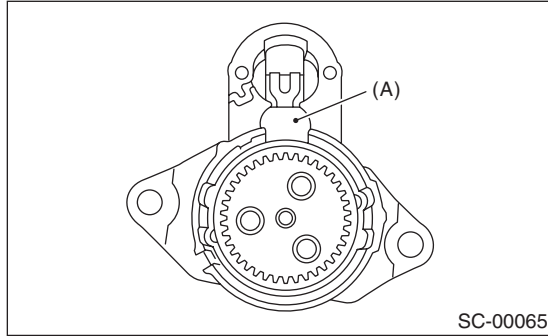
(B) Planetary gear

(C) Packing B

Starter

STARTING/CHARGING SYSTEMS

7) Remove the plate.



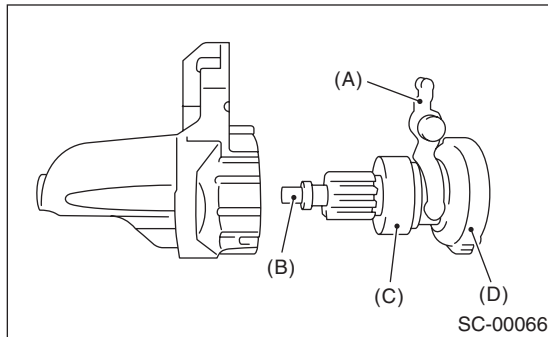
(A) Plate

8) Remove the front assembly and overrunning clutch from the front bracket.

NOTE:

Check the following points before removal.

- Lever direction
- Internal gear assembly position

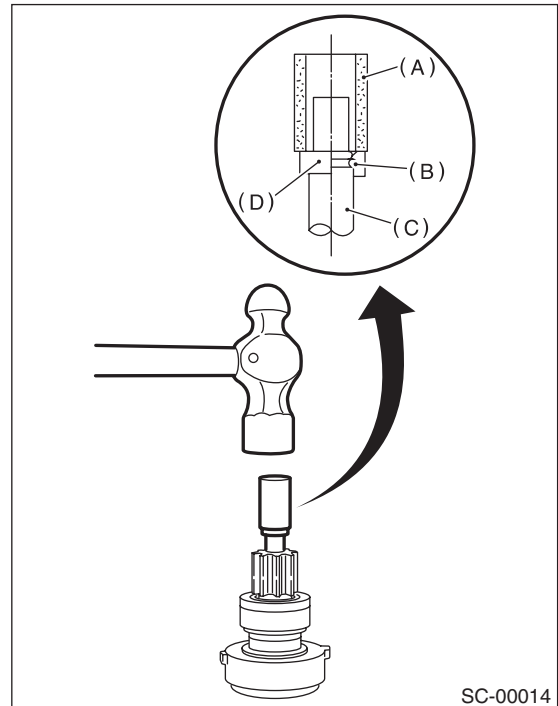


- (A) Lever
- (B) Shaft ASSY
- (C) Overrunning clutch
- (D) Internal gear ASSY

9) Use the following procedures to remove the overrunning clutch from the shaft assembly.

(1) Use the appropriate tool (such as the right size of socket wrench) to lightly tap on the stopper to remove it from the ring.

(2) Remove the ring, spacer, and clutch from the shaft.



- (A) Socket wrench
- (B) Ring
- (C) Shaft
- (D) Stopper

D: ASSEMBLY

NOTE:

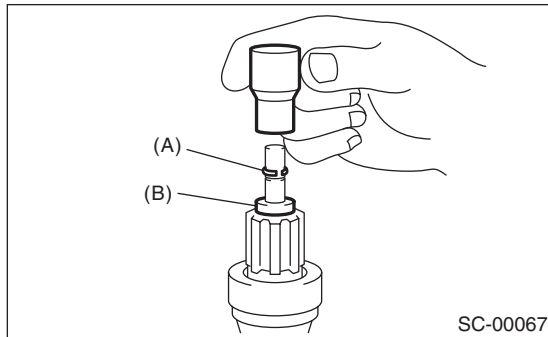
Apply grease to the following parts before assembly.

- Sleeve bearing
- Pinion shaft rotational portion
- Shaft spline portion
- Inside of reduction system
- Lever fulcrum/Clutch rotational portion

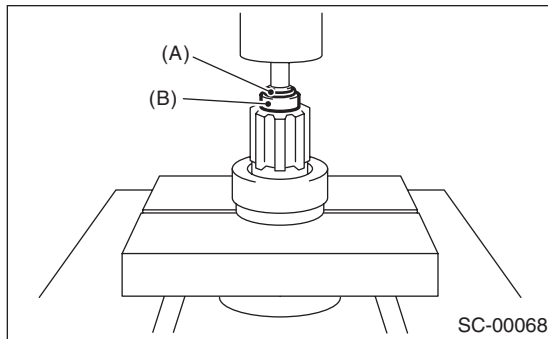
1) Install the overrunning clutch to the shaft assembly.

2) Use the following procedures to install stopper to the shaft assembly.

(1) Use the appropriate tool (such as the right size of socket wrench) to lightly tap on the ring to insert it into the shaft groove.



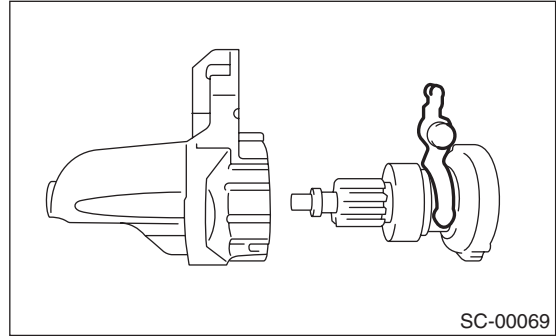
(2) Using the ST, press the stopper into the ring.



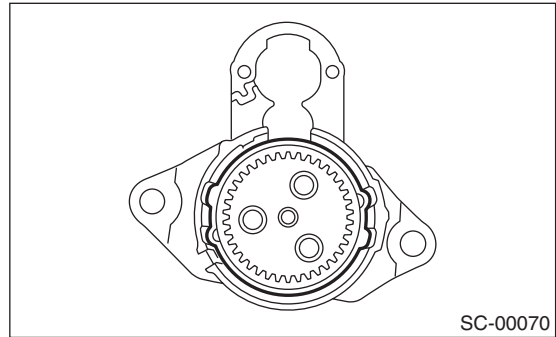
- (A) Ring
- (B) Stopper

3) Be careful of the following to install the shaft assembly to the front bracket.

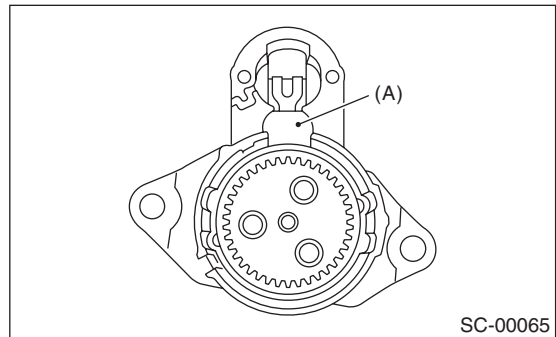
(1) Lever direction



(2) Internal gear position



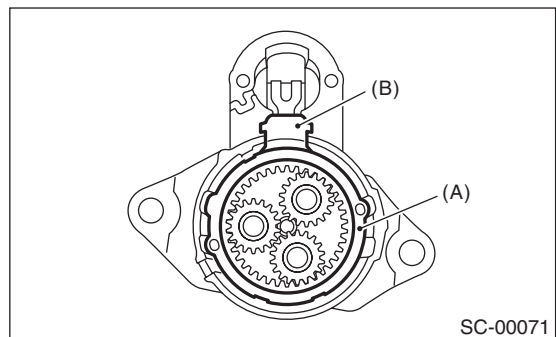
4) Install the plate.



- (A) Plate

5) Install the planetary gear.

6) Be careful of the installation position to install the packing A and B.



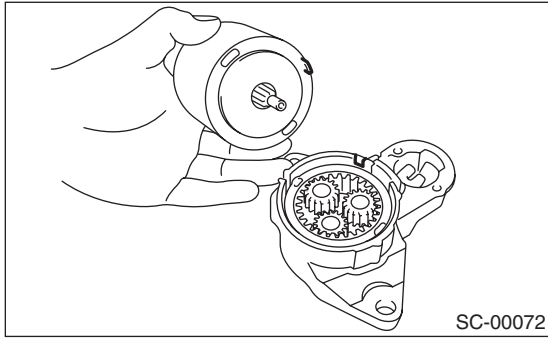
- (A) Packing A
- (B) Packing B

7) Install the armature to the yoke assembly.

Starter

STARTING/CHARGING SYSTEMS

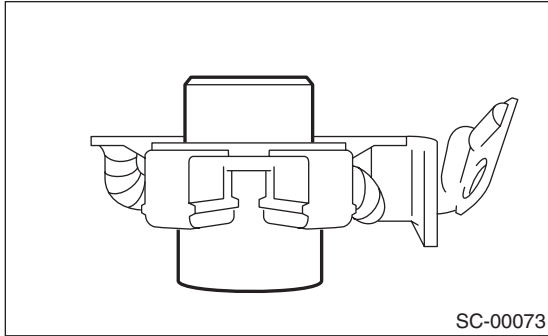
8) Align the yoke assembly with the groove and install it to the front bracket.



SC-00072

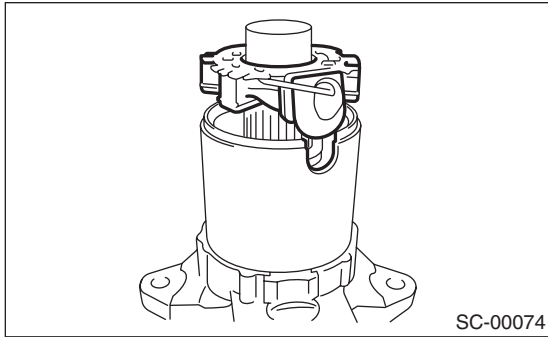
9) Use the following procedures to install the brush holder to the yoke assembly.

(1) Push the brush into the brush holder, then use the appropriate tool (such as the right size of socket wrench) to fasten in position.



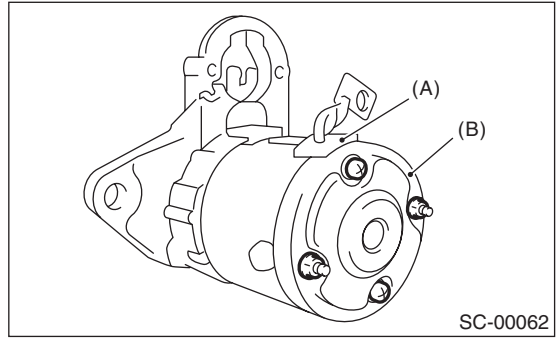
SC-00073

(2) Align the brush holder with the groove in the yoke assembly, the slide to install.



SC-00074

10) Align the rear cover groove with the brush holder assembly to install.

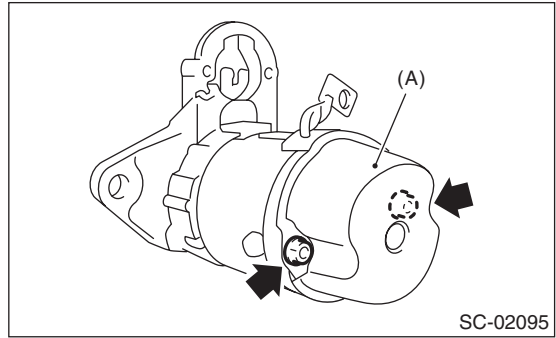


SC-00062

(A) Brush holder ASSY

(B) Rear cover

11) Install the rear cover set.



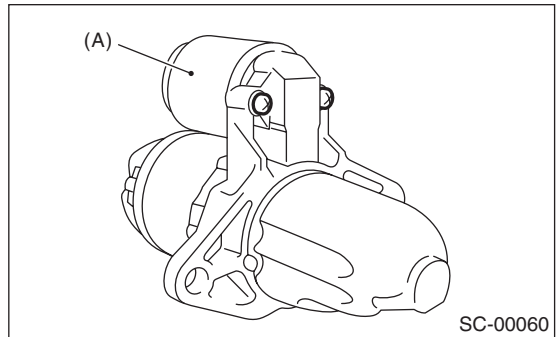
SC-02095

(A) Rear cover set

12) Use the following procedures to install the switch assembly to the front bracket.

(1) Insert the plunger and plunger spring into the switch assembly.

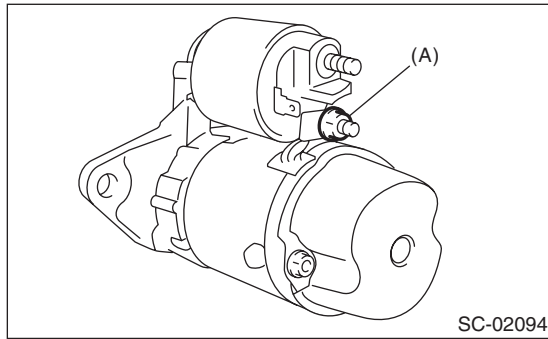
(2) Hook the protrusion on the plunger onto the lever end, then install to the front bracket.



SC-00060

(A) Switch ASSY

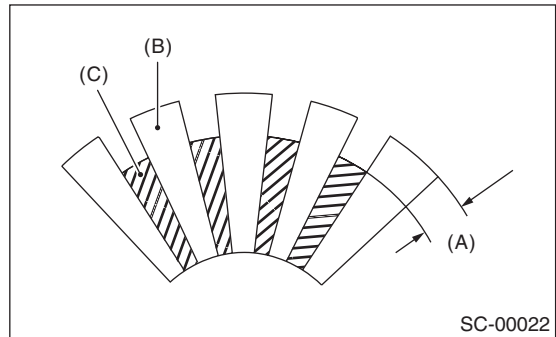
13) Install the connector to the switch assembly terminal M.



(A) Terminal M

3) Depth of segment mold
Check the depth of the segment mold.

**Depth of segment mold:
0.5 mm (0.020 in)**



(A) Depth of segment mold
(B) Segment
(C) Mold

E: INSPECTION

1. ARMATURE

1) Check the commutator for signs of seizure or stepped wear caused by roughness of the surface. If there is light wear, use sandpaper to repair.

2) Run-out test
Check for run-out on the commutator. If excessive, replace it.

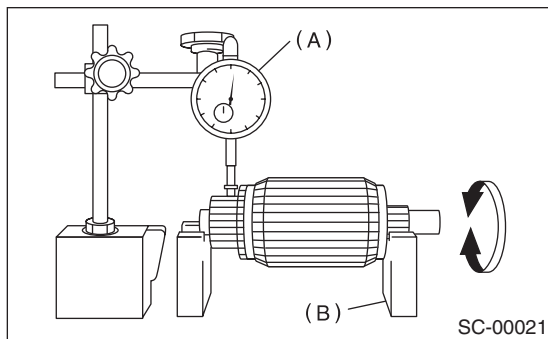
Commutator run-out:

Standard:

0.05 mm (0.0020 in)

Service limit:

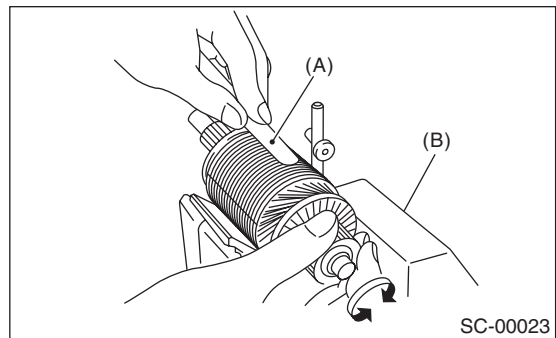
0.10 mm (0.0039 in) or less



(A) Dial gauge
(B) V-block

4) Armature short-circuit test

Place the armature on the growler tester to check for short circuits. While slowly turning the armature, support the steel seat for the armature core. If the circuits on the armature are shorted, the steel seat will vibrate, causing it to move to the core. When the steel seat has moved and vibrated, replace or repair the armature with the shorted circuit.



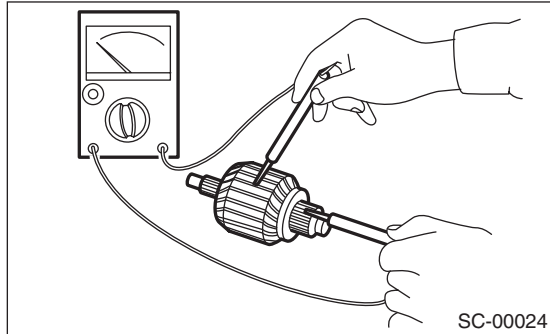
(A) Steel seat
(B) Growler tester

Starter

STARTING/CHARGING SYSTEMS

5) Armature ground test

Use a circuit tester to touch the probe of one side to the commutator segment, and the other probe to the shaft. If there is no continuity, it is normal. If there is continuity, the armature is grounded. If grounded, replace the armature.



2. YOKE

Make sure that the pole is set at the predetermined position.

3. OVERRUNNING CLUTCH

Check that there is no wear or damage to the piston teeth. Replace if damaged. If it rotates smoothly when rotated in the correct direction (counterclockwise) and does not return to the other direction, it is normal.

CAUTION:

To prevent spilling of grease, do not clean the overrunning clutch with oil.

4. BRUSH AND BRUSH HOLDER

1) Brush length

Measure the length of the brush. If it exceeds service limits, replace it.

Replace if there is wear or fissures.

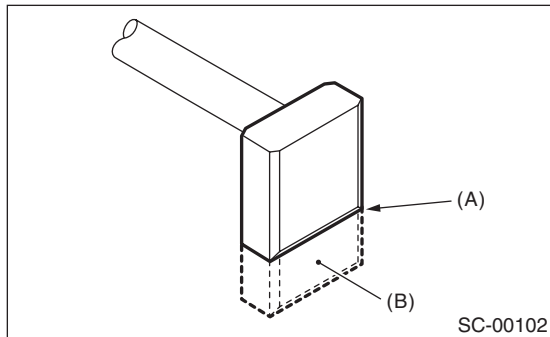
Brush length:

Standard:

12.3 mm (0.484 in)

Service limit:

7.0 mm (0.276 in)



(A) Service limit line

(B) Brush

2) Brush movement

Check that the brush moves smoothly in the brush holder.

3) Brush spring force

Measure the brush spring force with a spring scale. Replace the brush holder if below the service limit.

Brush spring force:

Standard:

15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lb) (When new)

Service limit:

2.5 N (0.25 kgf, 0.56 lb)

5. SWITCH ASSEMBLY

Using a circuit tester (set in Ω), check that there is continuity between terminals S and M, and between terminal S and ground.

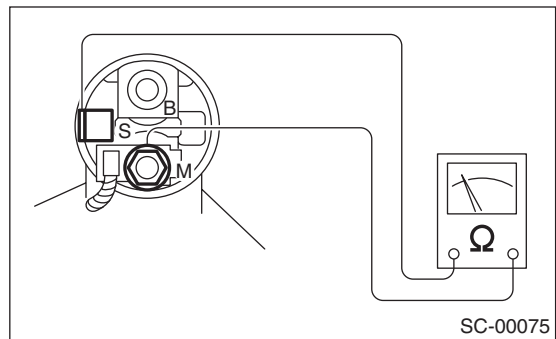
Also check to be sure there is no continuity between terminal M and B.

Terminal / Resistance:

S — M/1 Ω or less

S — Ground/1 Ω or less

M — B/1 M Ω or more



6. SWITCH ASSEMBLY OPERATION

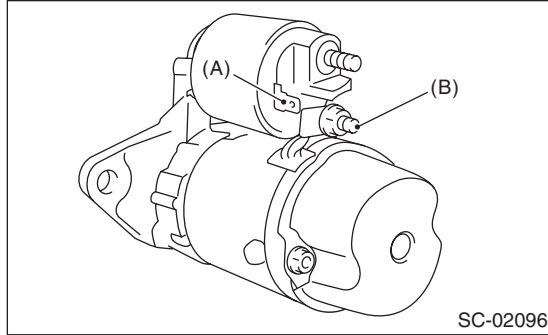
1) Using a lead wire, connect the terminal S of switch assembly to positive terminal of battery, and starter body to ground terminal of battery. The pinion should be forced endwise on shaft.

NOTE:

With the pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

2) Disconnect the connector from terminal M. Then using a lead wire, connect the positive terminal of battery and terminal M and ground terminal to starter body.

In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



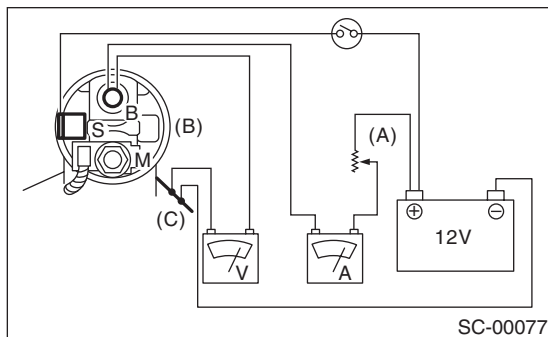
- (A) Terminal S
- (B) Terminal M

7. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.

Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.

For these performance tests, use the circuit shown in figure.



- (A) Variable resistance
- (B) Starter body
- (C) Magnetic switch

1) No-load test

With switch on, adjust the variable resistance until the voltage is 11 V, read the value of ammeter to measure starter speed. Compare these values with the standard.

No-load test (Standard):

Voltage/Current

MT model

Max. 11 V / 95 A

AT model

Max. 11 V / 90 A

Rotating speed:

MT model

More than 2,500 rpm

AT model

More than 2,000 rpm

2) Load test

Apply the specified braking torque to starter. The condition is normal if the current draw and starter speed are within standard.

Load test (Standard):

Voltage/Load:

MT model

7.5 V/8.84 N·m (0.90 kgf-m, 6.5 ft-lb)

AT model

7.7 V/16.7 N·m (1.7 kgf-m, 12.3 ft-lb)

Current/Speed:

MT model

300 A/870 rpm or more

AT model

400 A/710 rpm or more

3) Lock test

With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to standard voltage.

Lock test (Standard):

Voltage/Current

MT model

4 V / 680 A or less

AT model

3.5 V / 960 A or less

Torque:

MT model

17.0 N·m (1.73 kgf-m, 12.5 ft-lb) or more

AT model

31.0 N·m (3.16 kgf-m, 22.9 ft-lb) or more