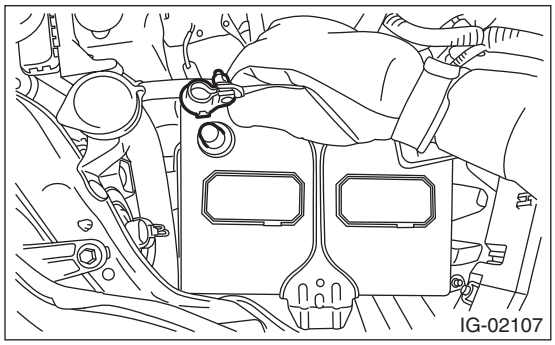
2. Starter

A: REMOVAL

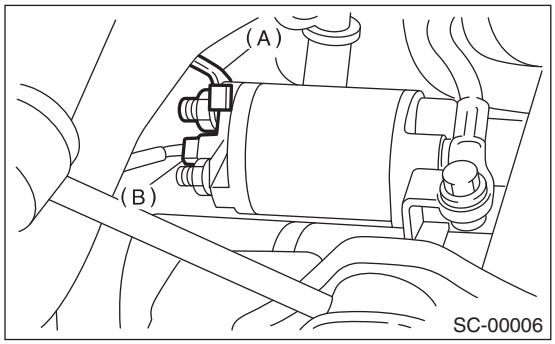
1) Disconnect the ground cable from battery.



2) Remove the air intake boot assembly. (non-turbo model) <Ref. to IN(H4SO)-8, REMOVAL, Air Intake Boot.> <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Boot.>

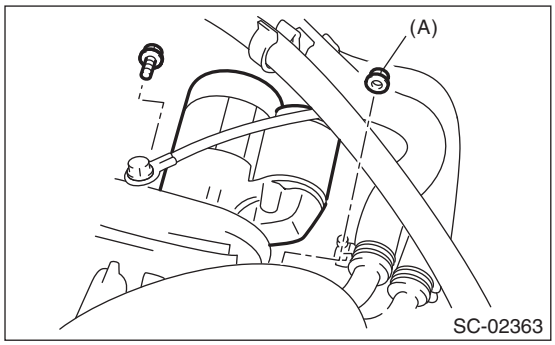
3) Remove the intercooler. (turbo model) <Ref. to IN(H4DOTC)-17, REMOVAL, Intercooler.>

4) Disconnect connector (B) and terminal (A) from starter.



5) Remove the starter from transmission.

NOTE:
For the MT model, a bolt is used in place (A).

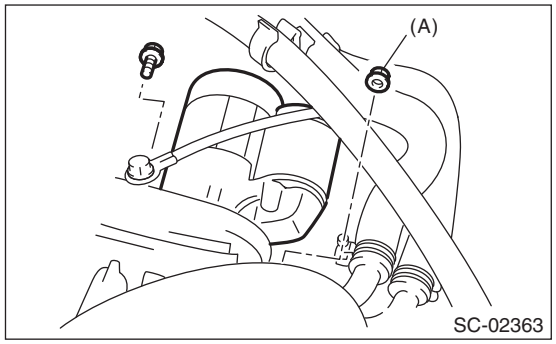


B: INSTALLATION

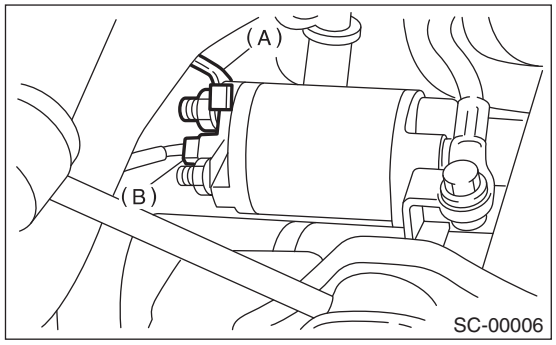
Install in the reverse order of removal.

NOTE:
For the MT model, a bolt is used in place (A).

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

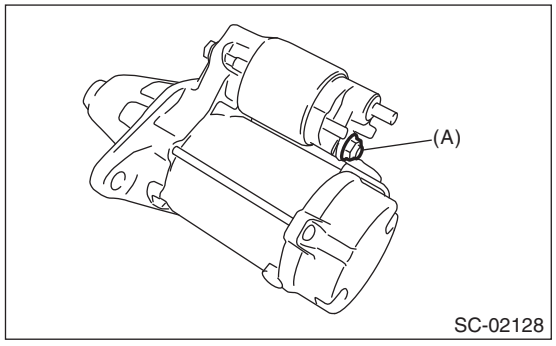


Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

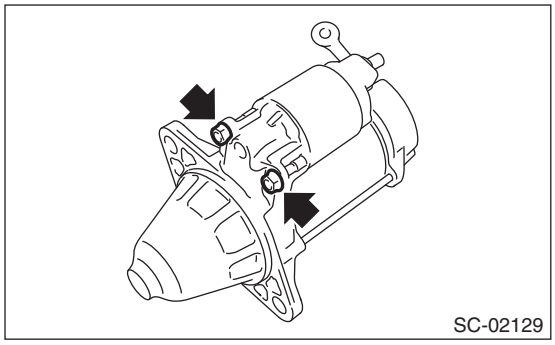


C: DISASSEMBLY

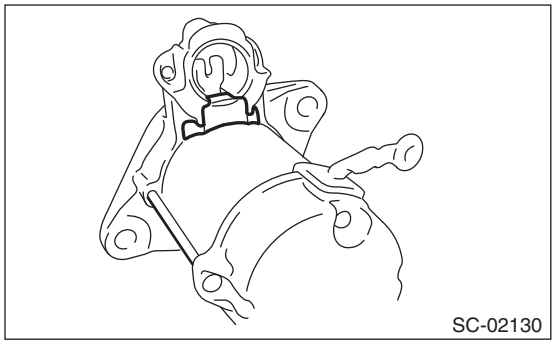
1) Remove the nut which holds terminal M (A) of the magnet switch assembly, then disconnect the harness from the terminal.



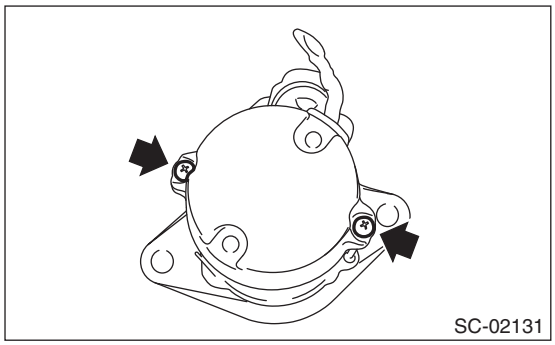
2) Remove the nuts fastening the magnet switch assembly to the starter housing, then remove the magnet switch assembly.

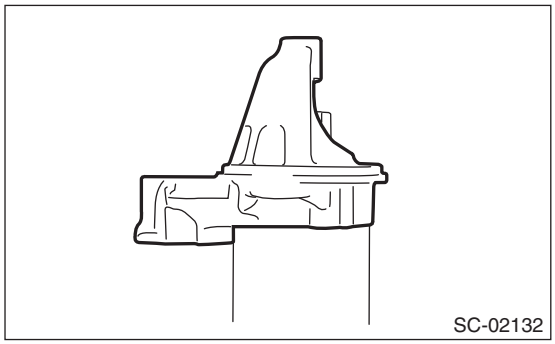

SC-02129

3) Remove the starter seal.

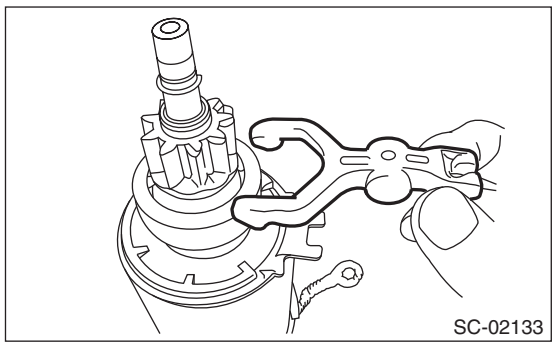

SC-02130

4) Remove the through bolts on both sides, and remove the starter housing.

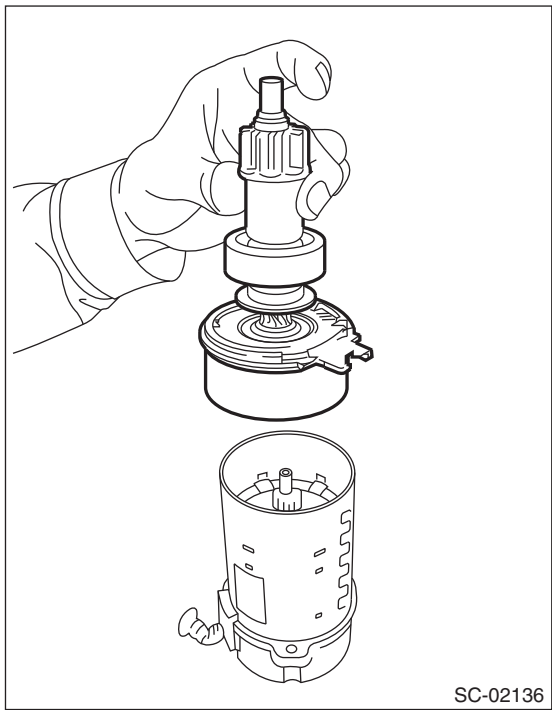

SC-02131


SC-02132

5) Remove the shift lever.

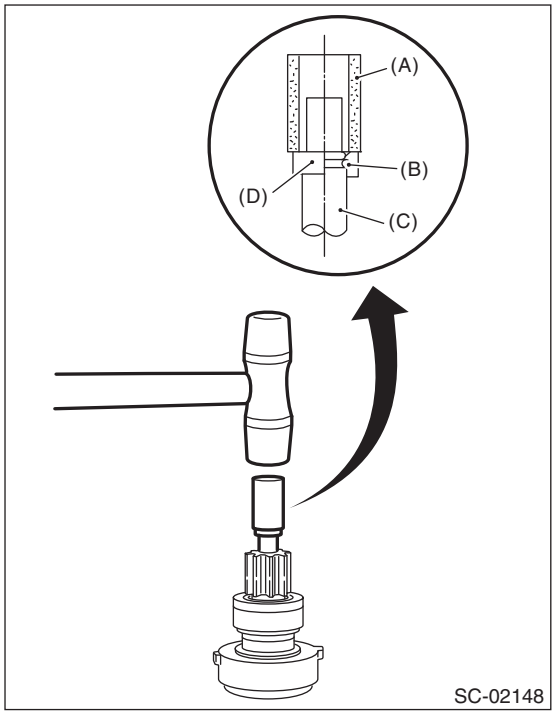

SC-02133

6) Remove the overrunning clutch, shock absorber bearing, and shaft from the yoke as a single unit


SC-02136

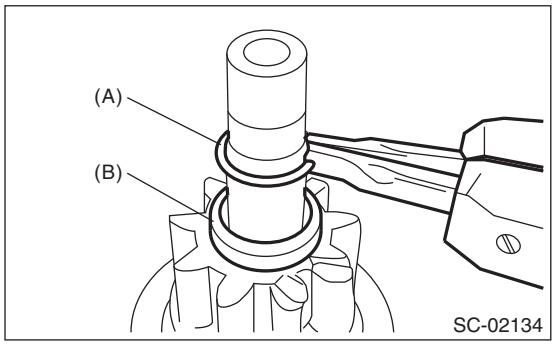
7) Use the following procedures to remove the overrunning clutch from the shaft assembly.

(1) Use an appropriate tool (such as a fit socket wrench), remove the stopper from snap ring by lightly tapping the stopper with a plastic hammer.

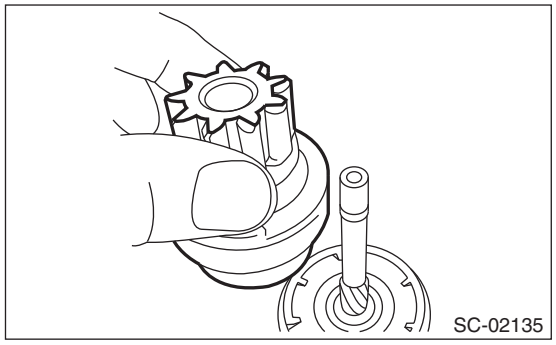


(A) Appropriate tool
(B) Snap ring
(C) Shaft
(D) STOPPER

(2) Remove snap ring (A) from the shaft, and remove stopper (B).

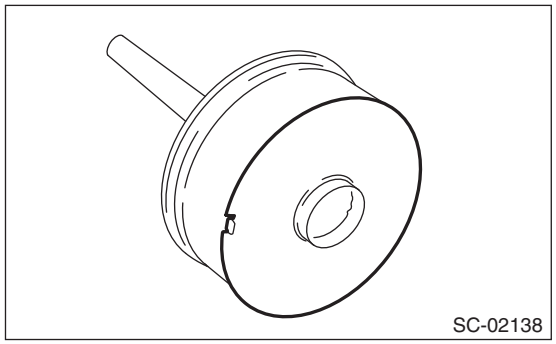


(3) Remove the overrunning clutch from the shaft.

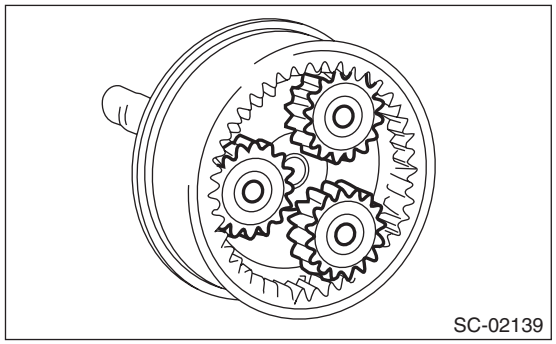


8) Remove the shock absorber in the following procedures:

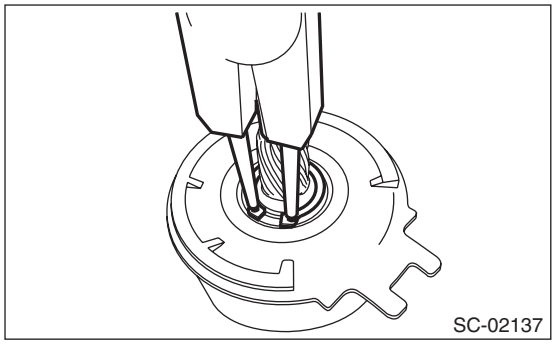
(1) Remove the starter plate.

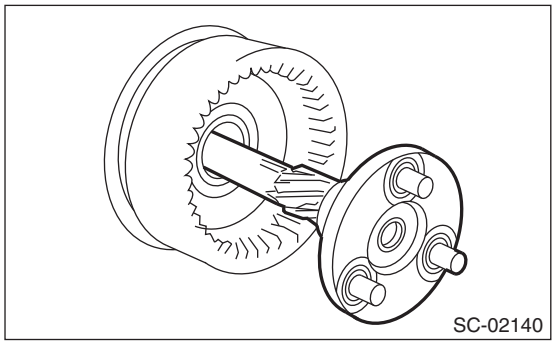


(2) Remove the planetary gear.

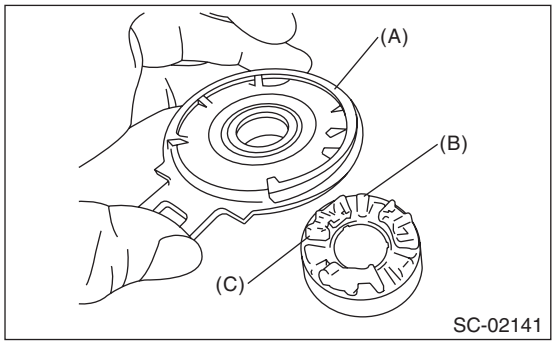


(3) Remove the snap ring, then remove the shaft.


SC-02137


SC-02140

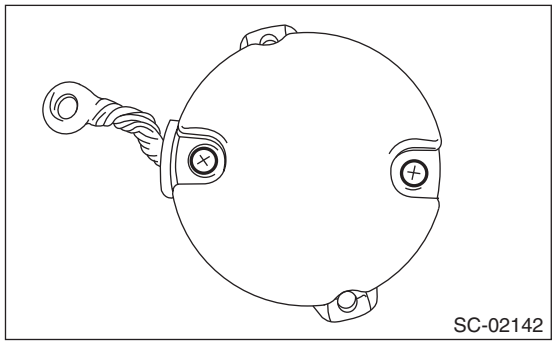
(4) Separate shock absorber bearing (A) from internal gear (B), and remove shock absorber (C).

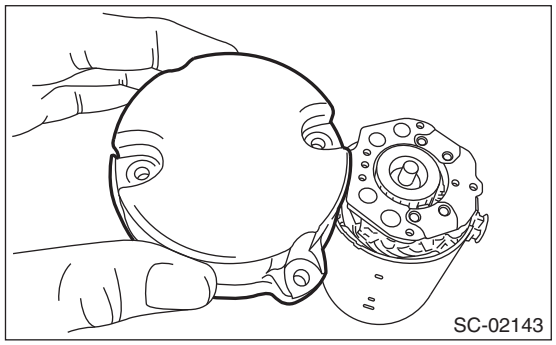


SC-02141

9) Remove the screws, and remove the starter cover from the brush holder assembly.

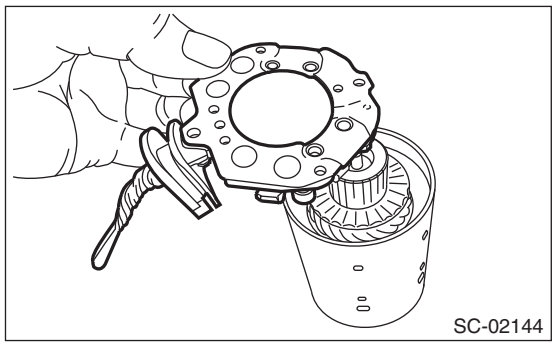
NOTE:
Separate the starter cover by pressing the brush holder assembly using the screws so that the assembly stays onto the armature side.


SC-02142

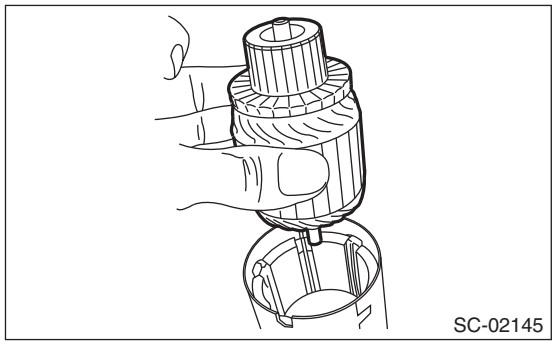

SC-02143

10) Remove the brush holder assembly from the armature.

NOTE:
Expand the brush with your fingers while taking care not to scratch it.

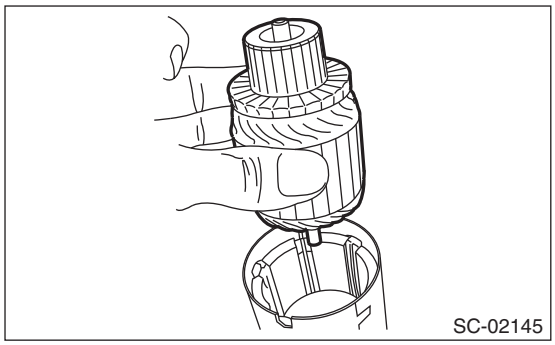

SC-02144

11) Remove the armature from the yoke.


SC-02145

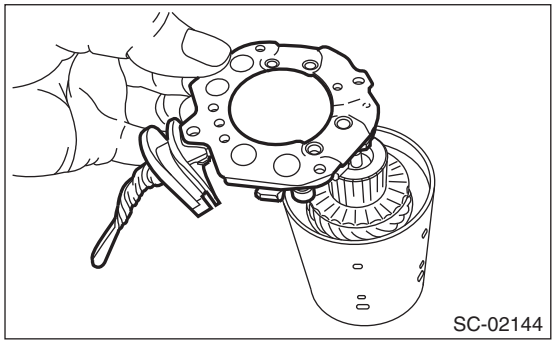
D: ASSEMBLY

1) Install the armature to the yoke.

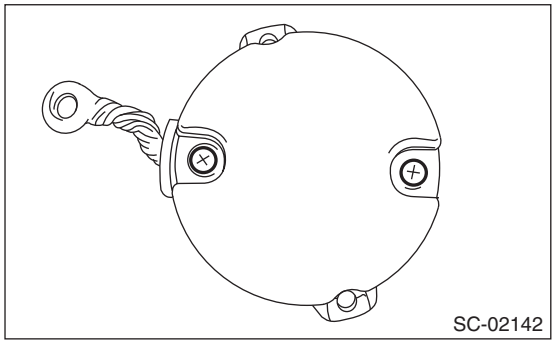


2) Install the brush holder assembly to the armature.

NOTE:
Expand the brush with your fingers while taking care not to scratch it.



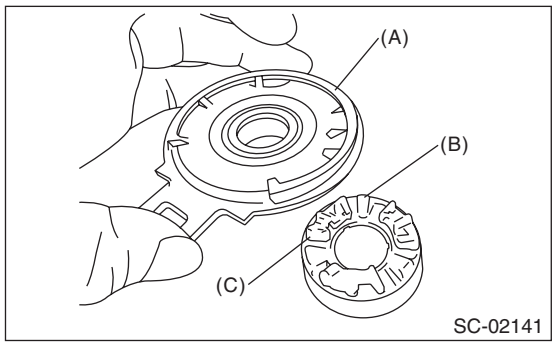
3) Install the starter cover, and secure it to the brush holder assembly with the screws.



4) Assemble the shock absorber in the following procedures:
   (1) Apply grease to shock absorber (C), and assemble internal gear (B) to shock absorber bearing (A).

NOTE:
Align with the claw position of internal gear to assemble the shock absorber bearing.

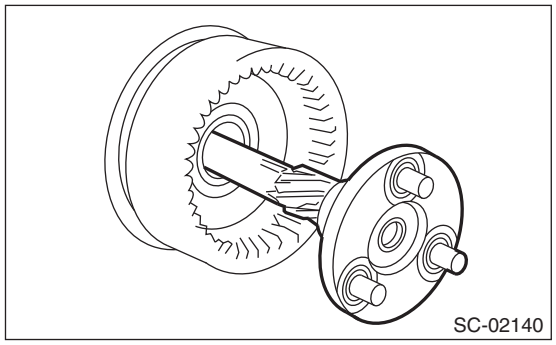
Grease:
DENSO HL50



   (2) Assemble the shaft to the internal gear.

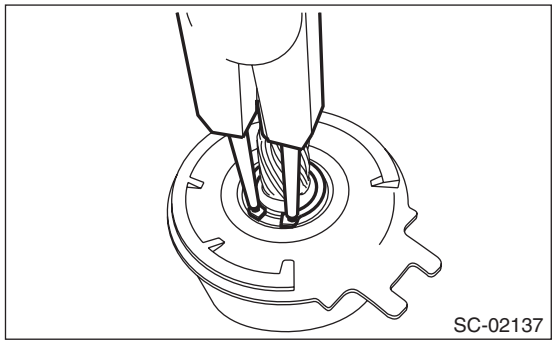
NOTE:
Apply grease to the shaft sliding surfaces inside the internal gear.

Grease:
DENSO HL50



   (3) Attach the snap ring to the shaft.

NOTE:
Use new snap rings.



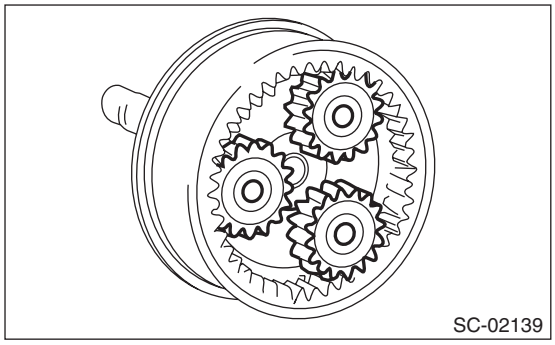
5) Assemble the planetary gear to the internal gear.
   (1) Apply grease to the planetary gear installation position.

Grease:
DENSO HL50

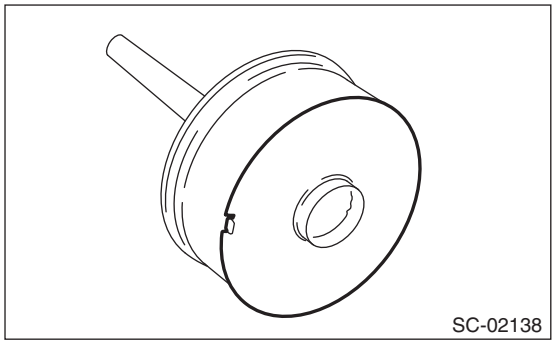
   (2) Install the planetary gear to the pin.
   (3) Apply grease to the planetary gear, internal gear, and upper part of the pin.

NOTE:
• Apply grease so that it contact surfaces of each gear.
• Be careful not to allow dirt to get in.

Grease:
DENSO HL50


SC-02139

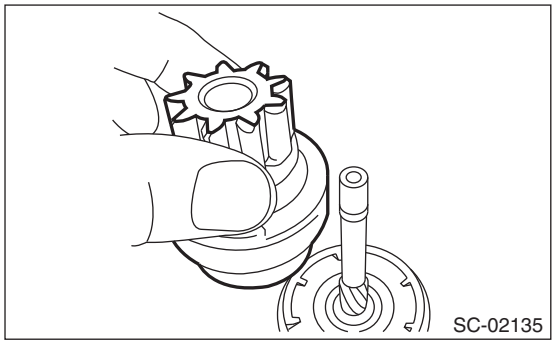
(4) Install the starter plate.


SC-02138

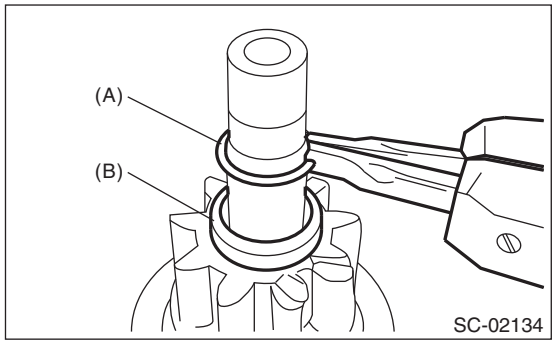
6) Assemble the overrunning clutch as follows:
(1) Apply grease to the spline portion of the shaft.

Grease:
DENSO HL50

(2) Install the overrunning clutch to shaft.

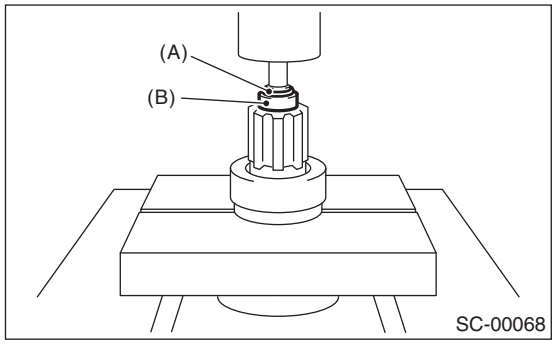

SC-02135

(3) Install stopper (B) to the shaft, then install snap ring (A).



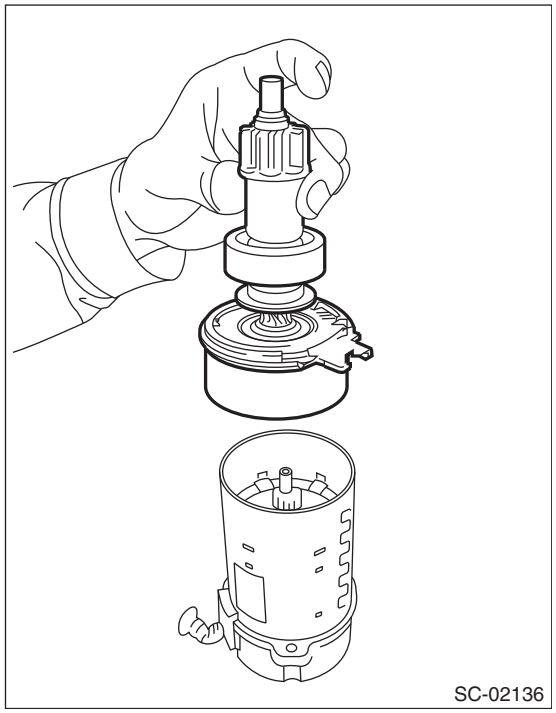
SC-02134

(4) Using a press, pressure fit stopper (B) into snap ring (A).



SC-00068

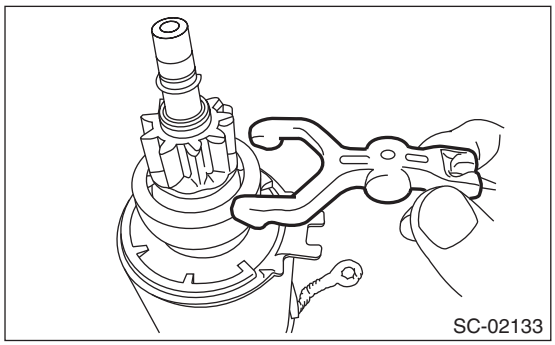
7) Assemble the overrunning clutch, shock absorber, and shaft to the yoke as a single unit


SC-02136

8) Install the shift lever.

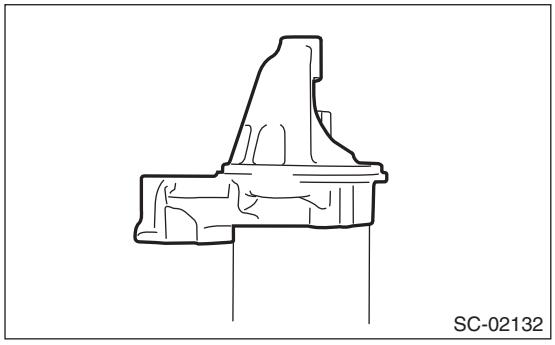
NOTE:
Apply grease to the contact area of the shift lever.

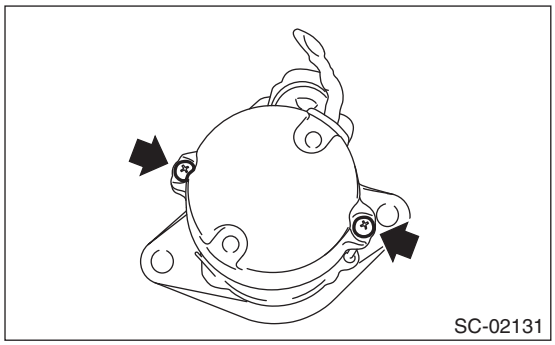
Grease:
DENSO HL50


SC-02133

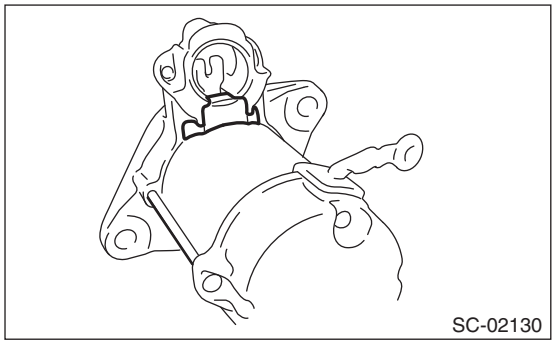
9) Install the starter housing, and tighten through bolts on both sides.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)


SC-02132


SC-02131

10) Install the starter seal.

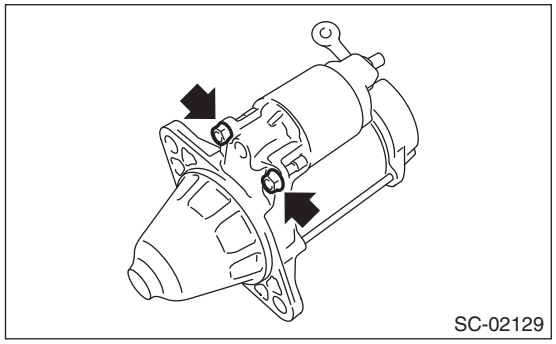

SC-02130

11) Install the magnet switch assembly to the starter housing, and tighten the nuts.

NOTE:
Apply grease to the shift lever installation position.

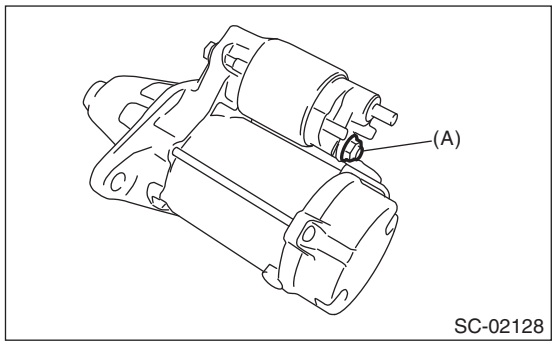
Grease:
DENSO HL50

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)


SC-02129

12) Install the harness to the terminal M (A) of the magnet switch assembly, and tighten the nut.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



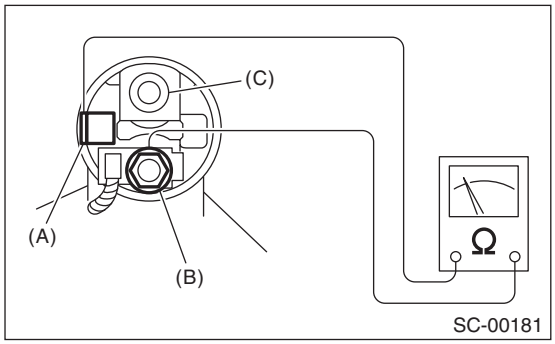
SC-02128

E: INSPECTION

1. SWITCH ASSEMBLY

Using a circuit tester (set to “ohm”), 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 terminals M and B.

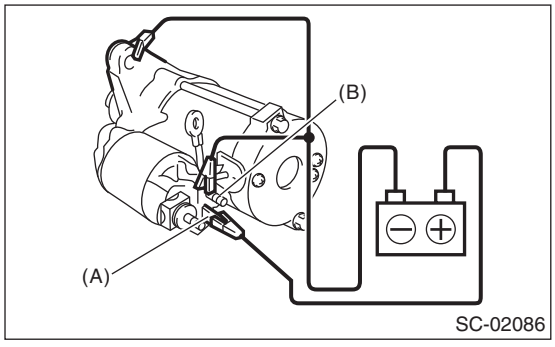
Terminal/Resistance:
S — M/1 Ω or less
S — Ground/1 Ω or less
M — B/1 MΩ or more



(A) Terminal S
(B) Terminal M
(C) Terminal B

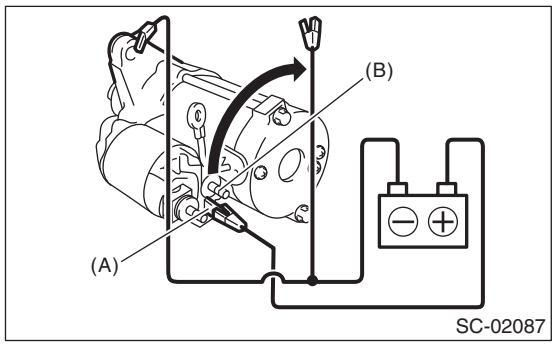
2. SWITCH ASSEMBLY OPERATION

NOTE:
Perform each test in a short period of time (3 — 5 sec).
1) Suction test
Check that the pinion gear comes flying out when the harness is disconnected from terminal M and connected as shown in the figure.



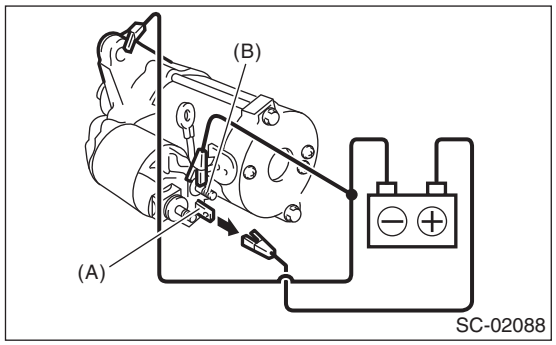
(A) Terminal S
(B) Terminal M

2) Holding test
Check that the pinion gear remains flying out after the cable is disconnected from terminal M.



(A) Terminal S
(B) Terminal M

3) Returning test
With terminal S connected to the positive terminal, and terminal M and starter body connected to the battery ground terminal to suction the main contact point, check that the pinion gear returns to its original position when terminal S is disconnected.

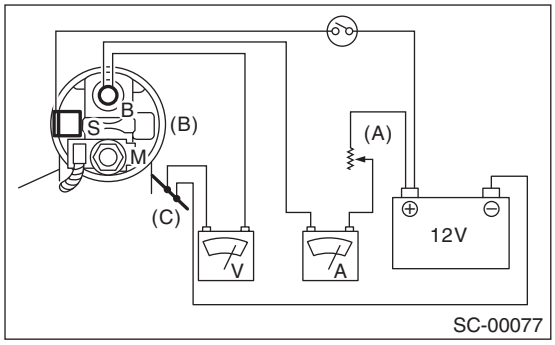


(A) Terminal S
(B) Terminal M

3. 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) Magnetic switch
(C) Starter body

1) No-load test
Adjust the variable resistance with the switch on until the voltage is 11 V, and read the value displayed on the ammeter to measure rotating speed. Compare these values with the standard.

No-load test (standard):

Voltage/Current
Max. 11 V/90 A or less

Rotating speed
2.5 L model
1,900 rpm or more
3.6 L model
1,550 rpm or more

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

Load test (standard):

Voltage/Load
2.5 L model
8 V/11.1 N·m (1.1 kgf-m, 8.2 ft-lb)
3.6 L model
8 V/12.8 N·m (1.3 kgf-m, 9.4 ft-lb)

Current/Rotating speed
2.5 L model
370 A/910 rpm or more
3.6 L model
370 A/800 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
3 V/750 A or less

Torque
2.5 L model
15.5 N·m (1.6 kgf-m, 11.4 ft-lb)
3.6 L model
19.0 N·m (1.9 kgf-m, 14.0 ft-lb)