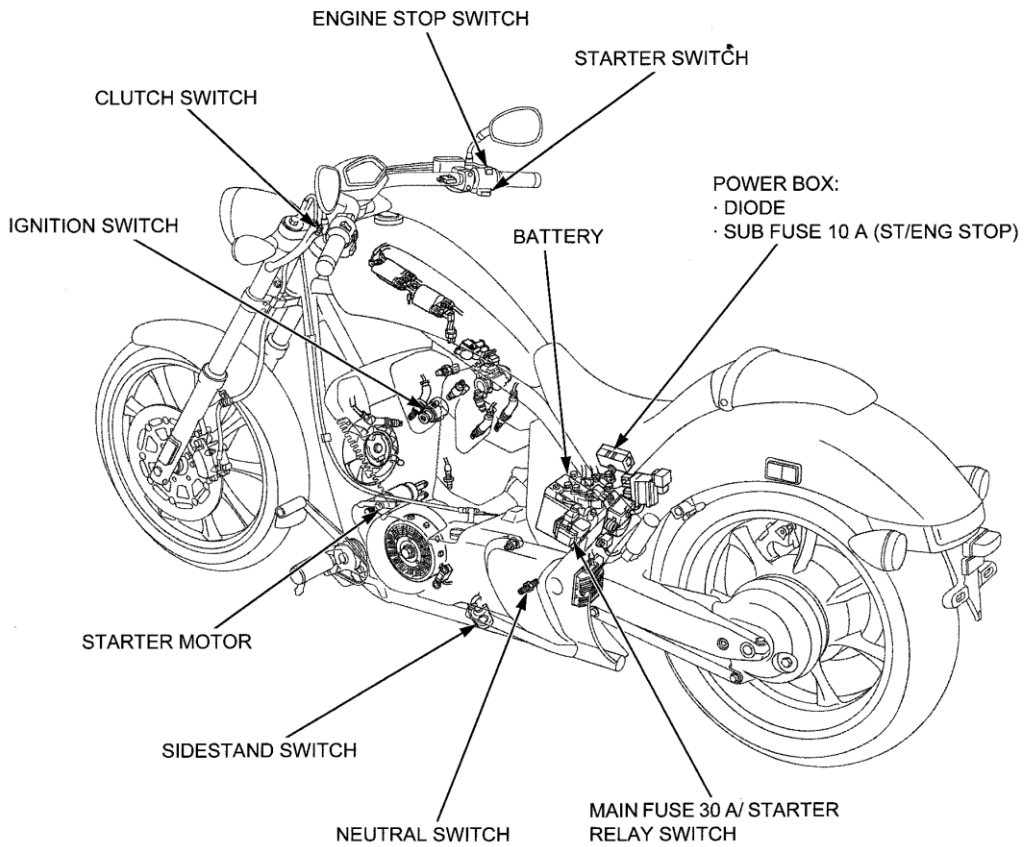


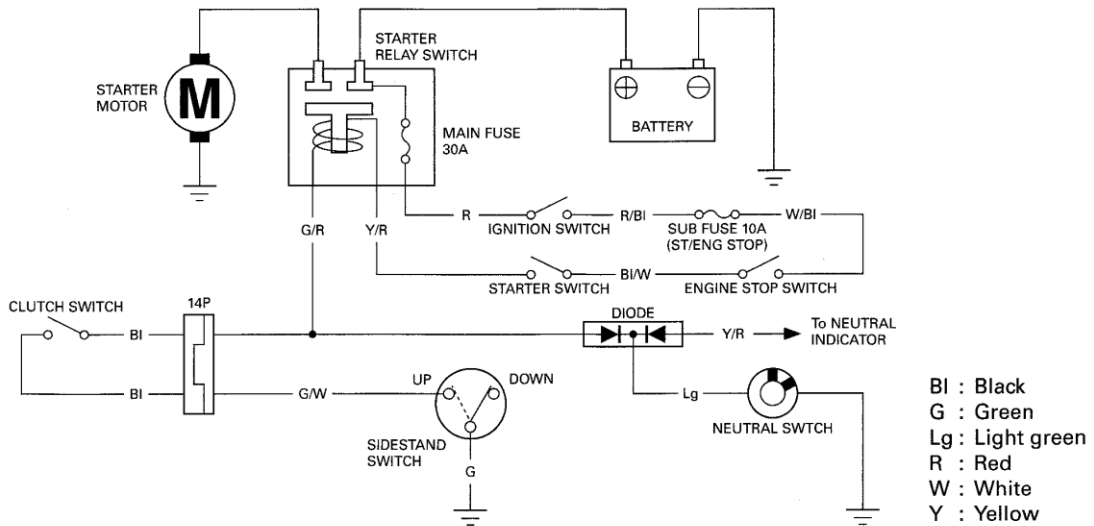
21. ELECTRIC STARTER

SYSTEM LOCATION.....	21-2	STARTER MOTOR	21-6
SYSTEM DIAGRAM	21-2	STARTER RELAY SWITCH	21-14
SERVICE INFORMATION	21-3	DIODE	21-15
TROUBLESHOOTING.....	21-4		

ELECTRIC STARTER SYSTEM LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

NOTICE

- If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- The starter motor can be serviced with the engine in the frame.
- When checking the starter system, always follow the steps in the troubleshooting flow chart (page 21-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- Ignition switch service (page 22-20).
- Engine stop switch and starter switch inspection (page 22-21).
- Clutch switch inspection (page 22-23).
- Neutral switch service (page 22-24).
- Sidestand switch service (page 22-25).

SPECIFICATIONS

ITEM	STANDARD	Unit: mm (in)
		SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	4.5 (0.18)

TORQUE VALUES

Starter motor cable terminal nut	7 N·m (0.7 kgf·m, 5.2 lbf·ft)
Starter motor assembly bolt	4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)
Negative brush screw	3.7 N·m (0.4 kgf·m, 2.7 lbf·ft)
Starter relay switch terminal socket bolt	5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)

ELECTRIC STARTER

TROUBLESHOOTING

Starter motor does not turn

1. Fuse Inspection

Check for blown main fuse 30 A or sub fuse 10 A (ST/ENG STOP).

Is the fuse blown?

YES – Replace the fuse.

NO – GO TO STEP 2.

2. Battery Inspection

Make sure the battery is fully charged and in good condition (page 19-6).

Is the battery in good condition?

YES – GO TO STEP 3.

NO – Charge or replace the battery.

3. Starter Relay Switch Operation

Check the starter relay switch operation.

You should hear the relay "CLICK" when the starter switch is depressed.

Is there a "CLICK"?

YES – GO TO STEP 4.

NO – GO TO STEP 5.

4. Starter Motor Inspection

Apply battery voltage directly to the starter motor and check the operation.

Does the starter motor turn?

YES – • Poorly connected starter motor cable
• Faulty starter relay switch (page 21-14)

NO – Faulty starter motor (page 21-6)

5. Relay Coil Ground Lines Inspection

Disconnect the starter relay switch connector, and check the relay coil ground lines as below for continuity:

1. Green/red terminal – diode – neutral switch line (with the transmission in neutral and clutch lever released).
2. Green/red terminal – clutch switch – sidestand switch line (in any gear except neutral, and with the clutch lever pulled in and the sidestand up).

Is there continuity?

YES – GO TO STEP 6.

NO – • Faulty neutral switch (page 22-24)
• Faulty diode (page 21-15)
• Faulty clutch switch (page 22-23)
• Faulty sidestand switch (page 22-25)
• Loose or poor contact connector
• Open circuit in wire harness

6. Starter Relay Voltage Inspection

Connect the starter relay switch connector.

With the ignition switch ON and engine stop switch "O" and the starter switch pushed, measure the voltage at the starter relay switch 4P (Red) connector (between Yellow/red (+) and body ground (-)).

Is there battery voltage?

YES – GO TO STEP 7.

NO – • Faulty ignition switch (page 22-20)
• Faulty starter switch (page 22-21)
• Faulty engine stop switch (page 22-21)
• Loose or poor contact connector
• Open circuit in wire harness

7. Starter Relay Switch Continuity Inspection

Remove the starter relay switch.

Connect the fully charged 12 V battery positive wire to the starter relay switch Yellow/red wire terminal and negative wire to the Green/red wire terminal.

Check for continuity between the starter relay switch large terminals while the battery connected.

Is there continuity?

YES – Loose or poor contact starter relay switch 4P (Red) connector

NO – Faulty starter relay switch

The starter motor turns when the transmission is in neutral, but does not turn with the transmission in any position except neutral, with the sidestand up and the clutch lever pulled in.

1. Clutch Switch Inspection

Check the clutch switch operation (page 22-23).

Is the clutch switch operation normal?

YES – GO TO STEP 2.

NO – Faulty clutch switch

2. Sidestand Switch Inspection

Check the sidestand switch operation (page 22-25).

Is the sidestand switch operation normal?

YES – • Open circuit in wire harness
• Loose or poor contact connector

NO – Faulty sidestand switch (page 22-25)

Starter motor turns slowly

- Low battery voltage
- Poorly connected battery terminal cable
- Poorly connected starter motor cable
- Faulty starter motor
- Poorly connected battery ground cable

Starter motor turns, but engine does not turn

- Starter motor is running backwards
 - Case assembled improperly
 - Terminals connected improperly
- Faulty starter clutch
- Damaged or faulty starter idle gear and/or reduction gear
- Faulty starter torque limiter

Starter relay switch "Clicks", but engine does not turn over

- Crankshaft does not turn due to engine problems
- Faulty starter torque limiter or idle gear

ELECTRIC STARTER

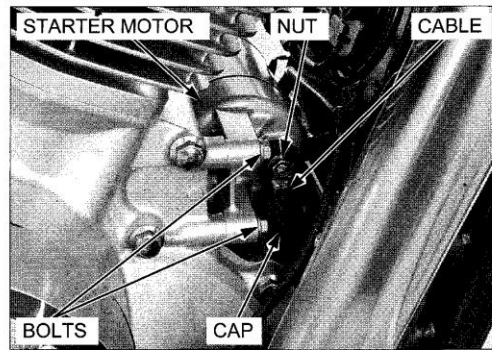
STARTER MOTOR

REMOVAL

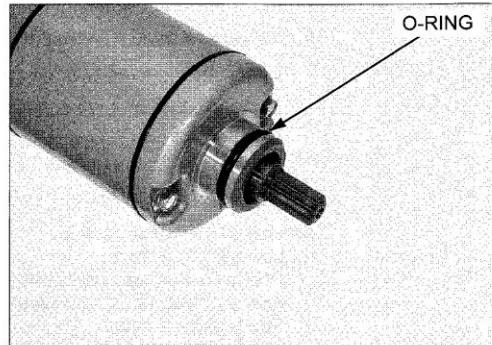
Remove the rear brake reservoir mounting bolt (page 4-21).

Remove the rubber cap and disconnect the starter motor cable by removing the terminal nut.

Remove the mounting bolts and the starter motor from the crankcase.

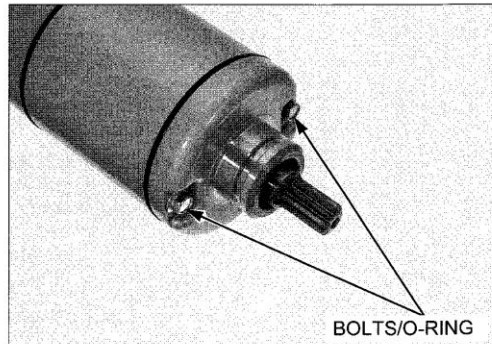


Remove the O-ring from the starter motor.

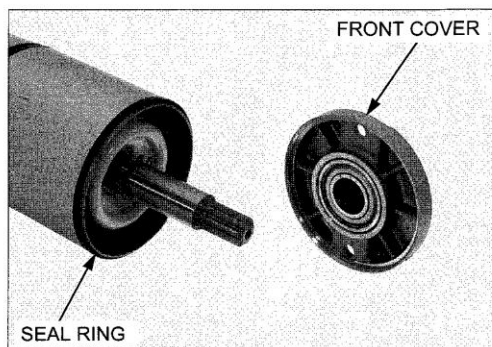


DISASSEMBLY/INSPECTION

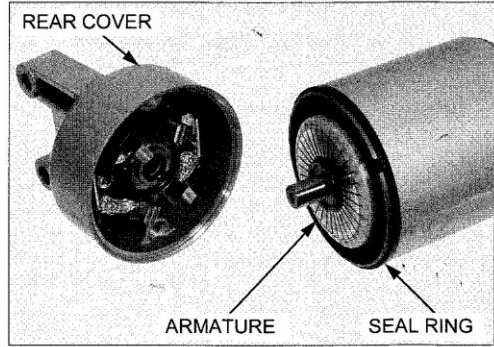
Remove the starter motor assembly bolts and O-ring.



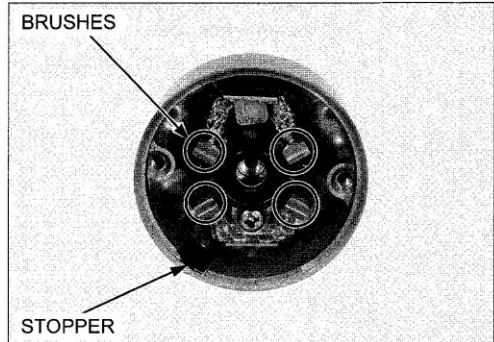
Remove the front cover and seal ring.



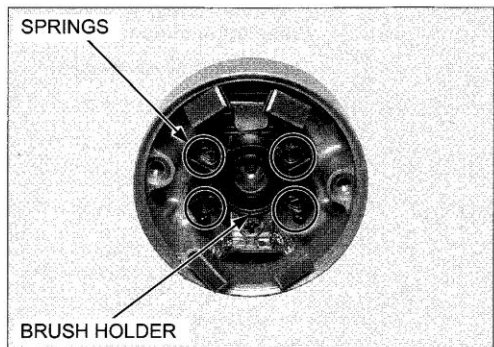
Remove the rear cover, seal ring and armature from the motor case.



Remove the brushes and stopper.



Remove the springs from the brush holder.

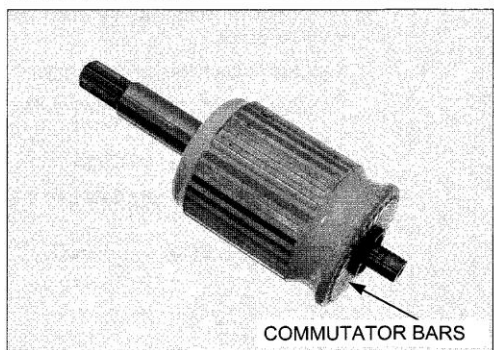


Check the commutator of the armature for damage or abnormal wear.

Check the commutator bars for discoloration.

NOTE:

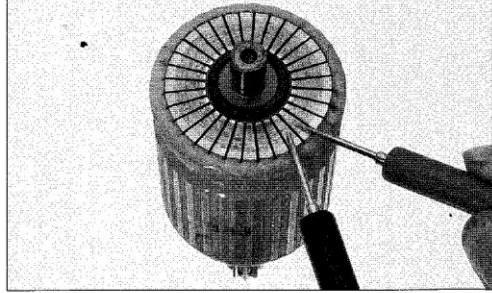
- Do not use emery or sand paper on the commutator.
- Clean the metallic debris off between commutator bars.
Replace the armature with a new one if necessary.



ELECTRIC STARTER

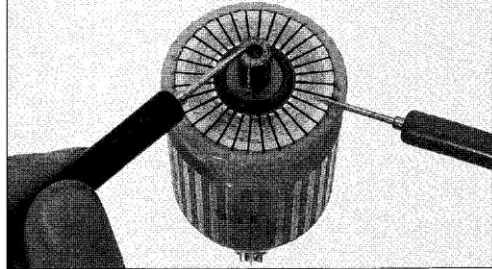
Check for continuity between pairs of commutator bars.
There should be continuity.

Continuity:



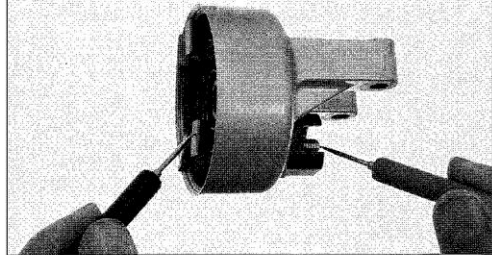
Check for continuity between each commutator bar and the armature shaft.
There should be no continuity.

No continuity:



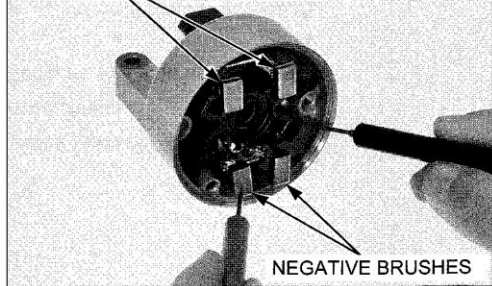
Check for continuity between the positive brushes and starter motor cable terminal.
There should be continuity.

Continuity:



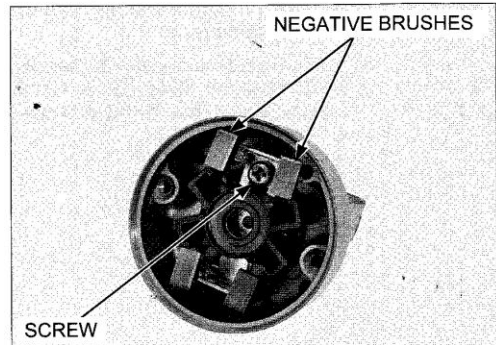
Check for continuity between the positive brushes and rear cover.
There should be no continuity.
Check for continuity between the negative brushes and rear cover.
There should be continuity.
Check for continuity between the positive and negative brushes.
There should be no continuity.

POSITIVE BRUSHES



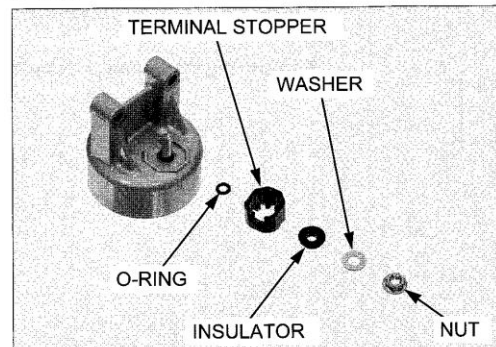
ELECTRIC STARTER

Remove the screw and negative brushes.



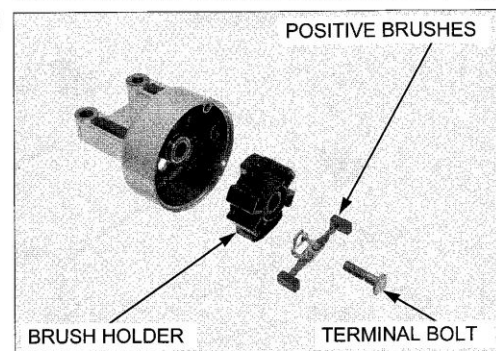
Remove the following:

- Terminal nut
- Washer
- Insulator
- Terminal stopper
- O-ring



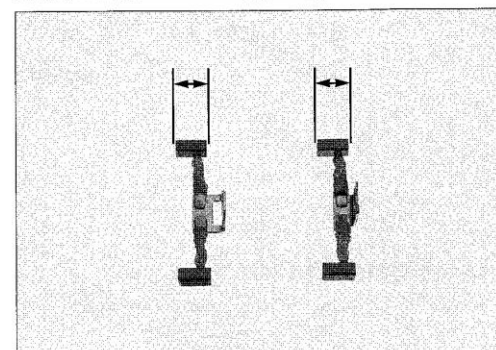
Remove the terminal bolt, positive brushes and brush holder.

Check the brush holder for crack or damage.



Measure the brush length.

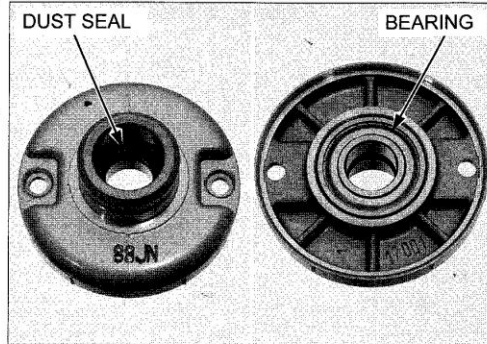
SERVICE LIMIT: 4.5 mm (0.18 in)



ELECTRIC STARTER

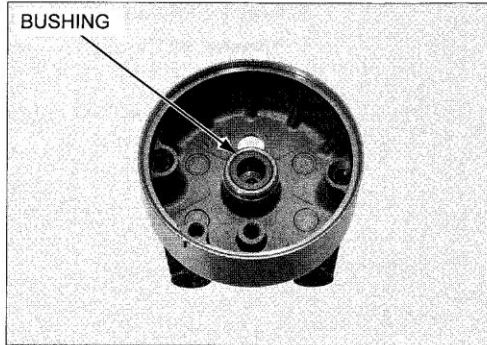
Check the dust seal and bearing of the front cover for wear or damage.

Turn the inner race of the bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the front cover.

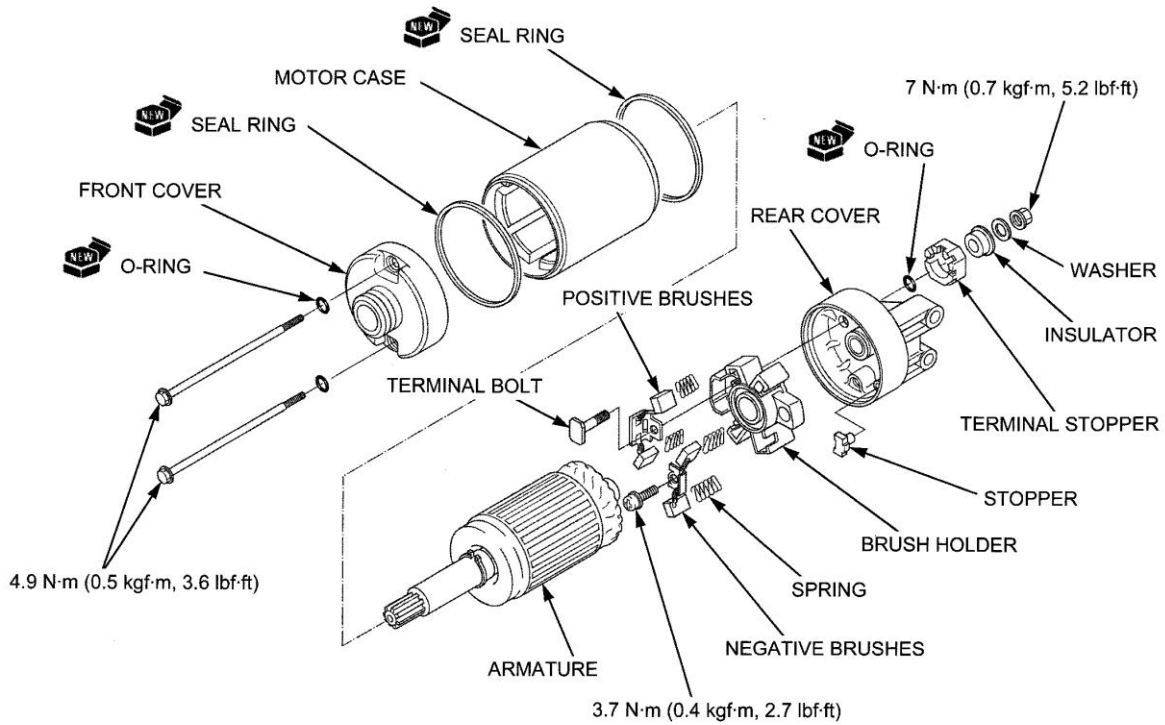


Check the rear cover bushing of the rear cover for wear or damage.

Replace the starter motor assembly if necessary.

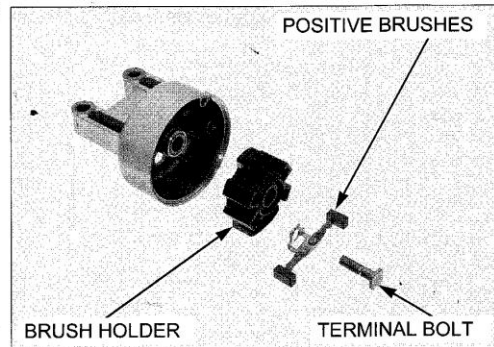


ASSEMBLY



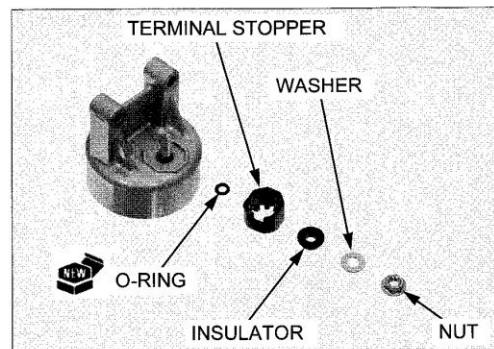
ELECTRIC STARTER

Install the brush holder, positive brushes and terminal bolt.

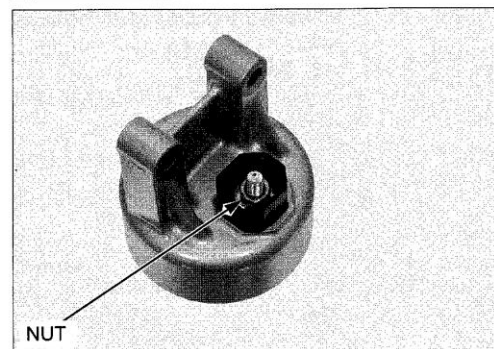


Install the following:

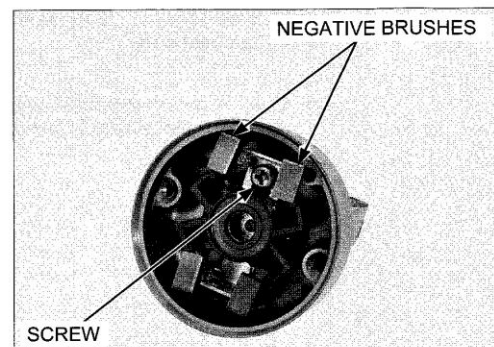
- New O-ring
- Terminal stopper
- Insulator
- Washer
- Terminal nut



Tighten the terminal nut.

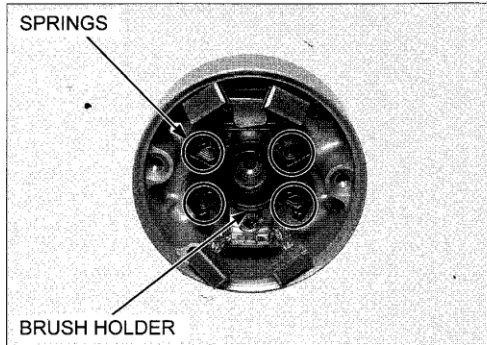


Install the negative brushes and screw.
Tighten the screw to the specified torque.
TORQUE: 3.7 N·m (0.4 kgf·m, 2.7 lbf·ft)

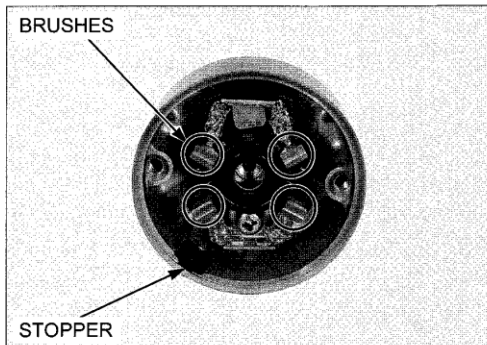


ELECTRIC STARTER

Install the brush springs to the brush holder.



Install the brushes and stopper.



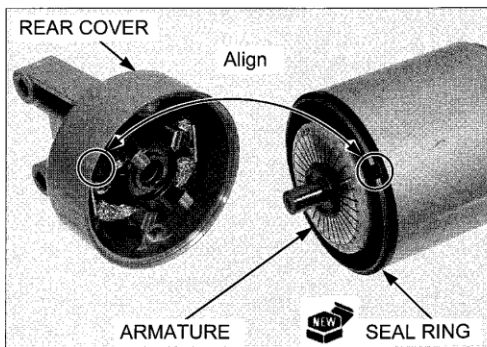
Install the armature into the motor case.

NOTICE

The coil may be damage if the magnet pulls the armature against the case.

Install a new seal ring to the motor case.

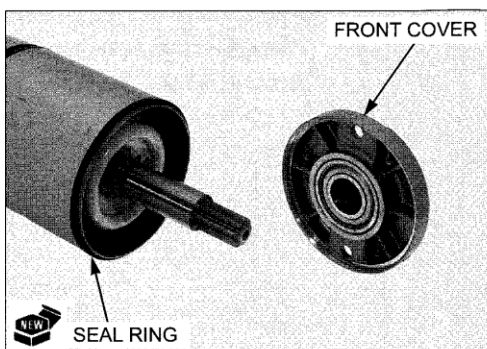
Install the motor case by aligning the case groove with stopper of the rear cover.



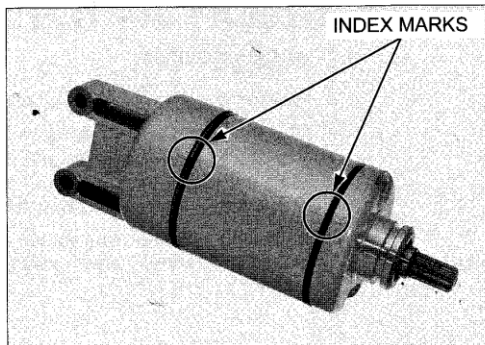
Install a new seal ring to the motor case.
Install the front cover.

NOTE:

- When installing the front cover, take care to prevent damaging the oil seal lip with the armature shaft.

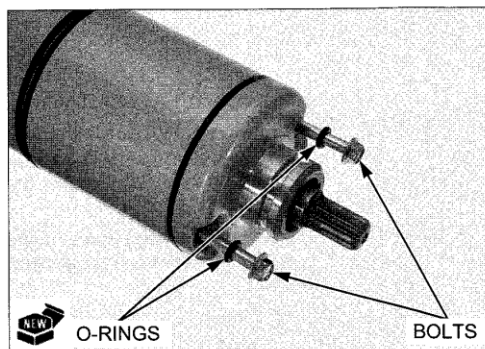


Align the index marks on the motor case and rear cover.



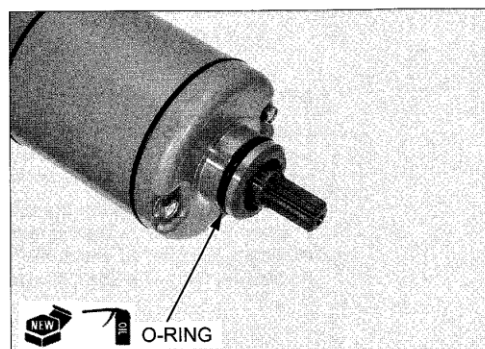
Install new O-rings to the starter motor assembly bolts.
Install and tighten the starter motor assembly bolts to the specified torque.

TORQUE: 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)



INSTALLATION

Apply engine oil to a new O-ring and install it to the starter motor groove.



Install the starter motor into the crankcase.
Install and tighten the mounting bolts.

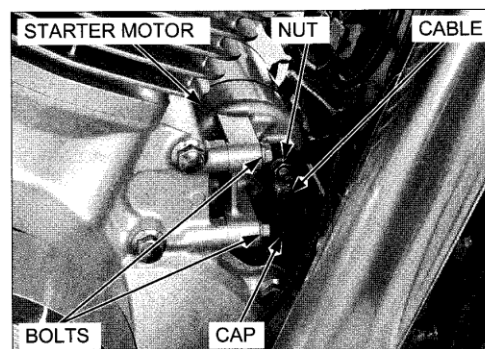
Connect the starter motor cable.

Install and tighten the terminal nut to the specified torque.

TORQUE: 7 N·m (0.7 kgf·m, 5.2 lbf·ft)

Reposition the rubber cap securely.

Install the rear brake reservoir mounting bolt (page 4-21).



ELECTRIC STARTER

STARTER RELAY SWITCH

INSPECTION

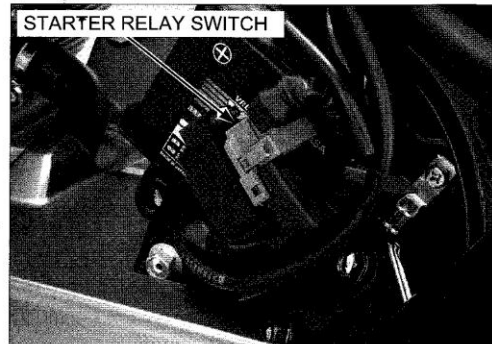
Remove the left side cover (page 3-6).

Shift the transmission into neutral.

Turn the ignition switch ON and engine stop switch "O". Push the starter switch.

The coil is normal if the starter relay switch clicks.

If you do not hear the starter relay switch "CLICK", inspect the starter relay switch using the procedure below.

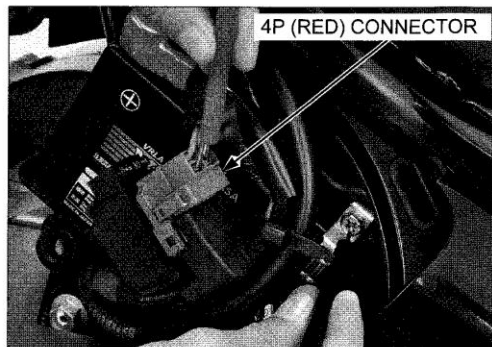


STARTER RELAY VOLTAGE

Shift the transmission into neutral.

Turn the ignition switch ON and engine stop switch "O". Measure the voltage between the yellow/red wire terminal (+) and ground (-).

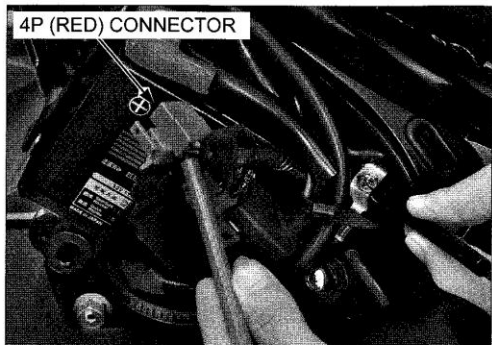
If the battery voltage appears when the starter switch is pushed, the power supply circuit of the relay coil is normal.



GROUND LINE

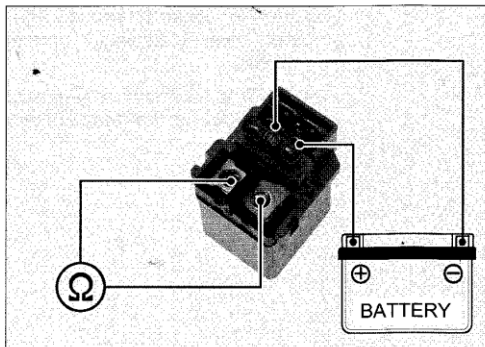
Disconnect the starter relay switch 4P (Red) connector. Check for continuity between the Green/red wire (ground line) terminal and ground.

If there is continuity when the transmission is in neutral or when the clutch is disengaged and the sidestand is retracted, the ground circuit of the relay coil is normal. (In neutral, there is a slight resistance due to the diode.)



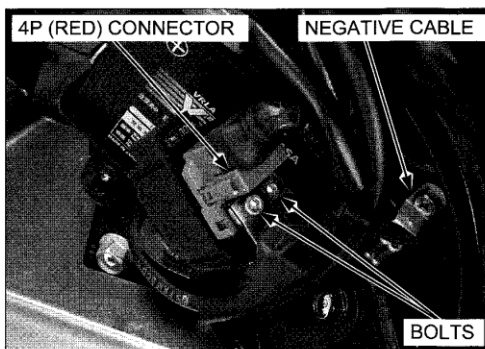
CONTINUITY

Remove the starter relay switch (page 21-15).
 Connect an ohmmeter to the starter relay switch cable terminals.
 Connect a fully charged 12 V battery positive (+) wire to the starter relay switch Yellow/red terminal and negative (-) wire to the Green/red terminal.
 There should be continuity between the cable terminals while the battery is connected, and no continuity when the battery is disconnected.



REMOVAL/INSTALLATION

Remove the left side cover (page 3-6).
 Turn the ignition switch OFF.
 Disconnect the battery negative (-) cable.
 Disconnect the starter relay switch 4P (Red) connector.
 Remove the socket bolts and cables.
 Pull out the starter relay switch with the rubber holder and remove it from the rubber holder.
 Installation is in the reverse other of removal.
TORQUE:
 Starter relay switch terminal socket bolt:
 5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)

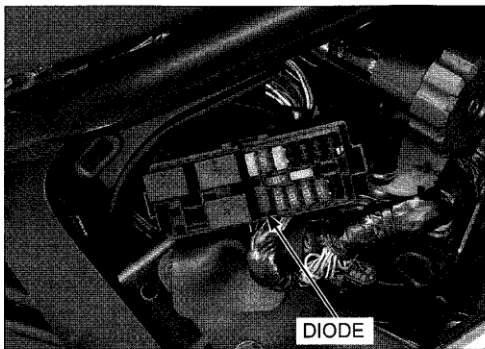
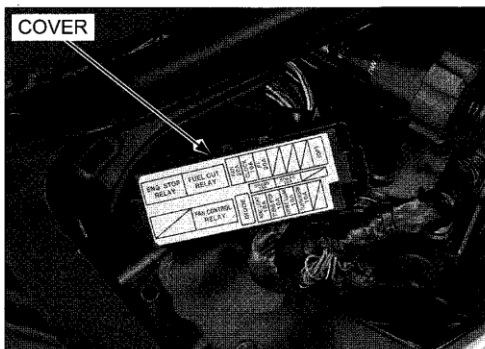


DIODE

REMOVAL/INSTALLATION

Remove the right side cover (page 3-6).
 Open the power box cover.

 Disconnect the diode.
 Installation is in the reverse other of removal.



ELECTRIC STARTER

INSPECTION

Check for continuity between the diode terminals.
When there is continuity, a small resistance value will register.

If there is continuity only in arrow direction shown on the diode body, the diode is normal.

