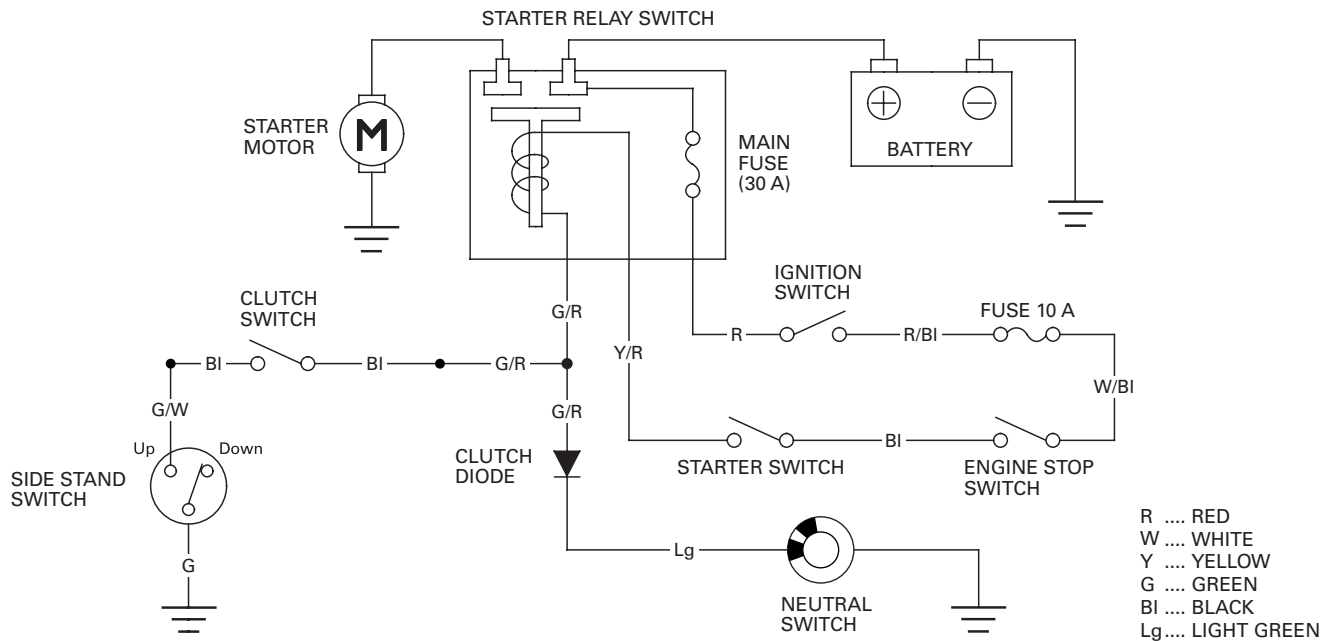
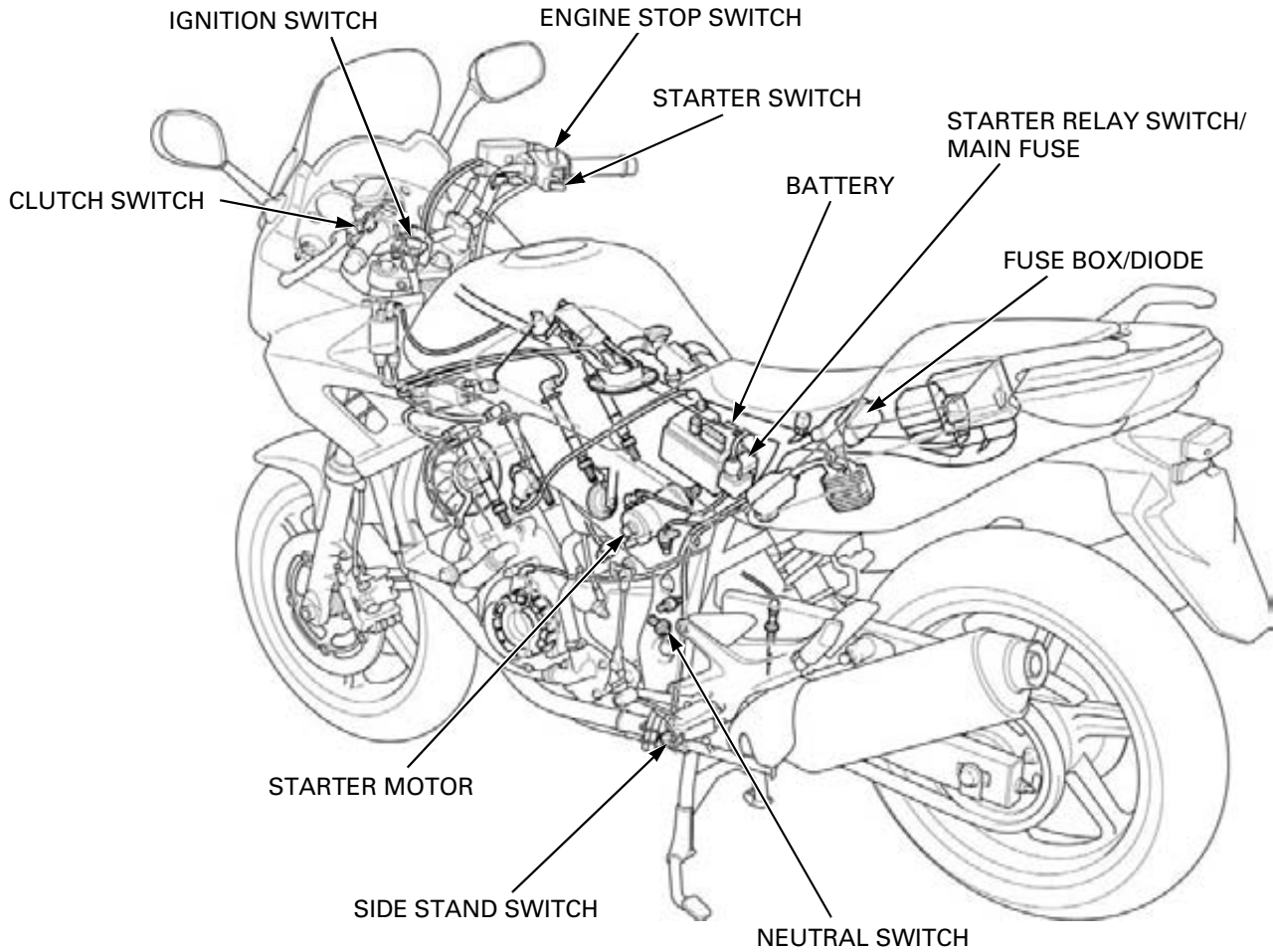


20. ELECTRIC STARTER

SYSTEM DIAGRAM.....	20-2	STARTER MOTOR.....	20-6
SERVICE INFORMATION	20-3	STARTER RELAY SWITCH.....	20-13
TROUBLESHOOTING	20-4	DIODE.....	20-15

ELECTRIC STARTER

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 20-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- Refer to the procedure for starter clutch servicing (page 10-28).
- Refer to the following components informations.
 - Ignition switch (page 21-20)
 - Starter switch (page 21-21)
 - Neutral switch (page 21-24)
 - Side stand switch (page 21-24)
 - Clutch switch (page 21-23)

SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	6.5 (0.26)

TORQUE VALUES

Starter motor terminal nut 12 N·m (1.2 kgf·m, 9 lbf·ft)

TROUBLESHOOTING

Starter motor does not turn

1. Fuse Inspection

Check for blown main fuse or sub fuse.

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.

Is the battery in good condition?

YES – GO TO STEP 3.

NO – Replace the battery (page 18-6)

3. Starter Relay Switch Operation

Check the starter relay switch operation.

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

Is there a "CLICK"?

YES – GO TO STEP 4.

NO – GO TO STEP 5.

4. Starter Motor Inspection

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

Does the starter motor turn?

YES –

- Poorly connected starter motor cable
- Faulty starter relay switch (page 20-13)

NO – Faulty starter motor (page 20-6)

5. Relay Coil Ground Wire Lines Inspection

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

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

Is there continuity?

NO –

- Faulty neutral switch (page 21-24)
- Faulty clutch diode (page 20-15)
- Faulty clutch switch (page 21-23)
- Faulty side stand switch (page 21-24)
- Loose or poor contact connector
- Open circuit in wire harness

YES – GO TO STEP 6.

6. Starter Relay Voltage Inspection

Connect the starter relay switch connector.

With the ignition switch ON and the starter switch pushed, measure the voltage at the starter relay switch connector (between Yellow/red (+) and body ground (-)).

Is the starter relay switch operation correct?

NO –

- Faulty ignition switch (page 21-20)
- Faulty starter switch (page 21-21)
- Faulty engine stop switch (page 21-21)
- Loose or poor contact connector
- Open circuit in wire harness

YES – GO TO STEP 7.

7. Starter Relay Switch Continuity Inspection

Disconnect the starter relay switch 4P connector and cables.

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

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

Is there continuity?

NO – Faulty starter relay switch

YES – Loose or poor contact of the starter relay switch 4P connector

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

1. Clutch Switch Inspection

Check the clutch switch operation (page 21-23).

Is the clutch switch operation normal?

NO – Faulty clutch switch

YES – GO TO STEP 2.

2. Side Stand Switch Inspection

Check the side stand switch operation (page 21-24).

Is the side stand switch operation normal?

NO – Faulty side stand switch (page 21-24)

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

Starter motor turns engine slowly

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

Starter motor turns, but engine does not turn

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

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

- Crankshaft does not turn due to engine problems

ELECTRIC STARTER

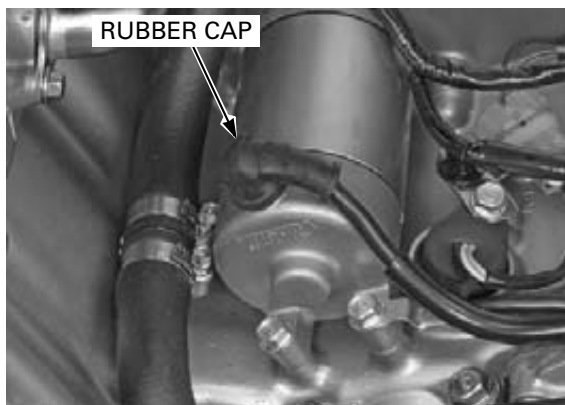
STARTER MOTOR

REMOVAL

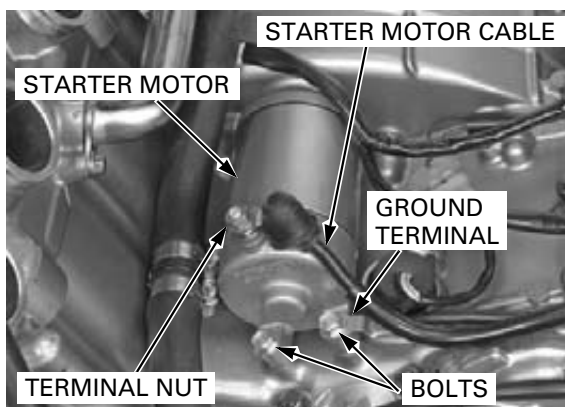
- With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.

Remove the air cleaner housing (page 6-60).

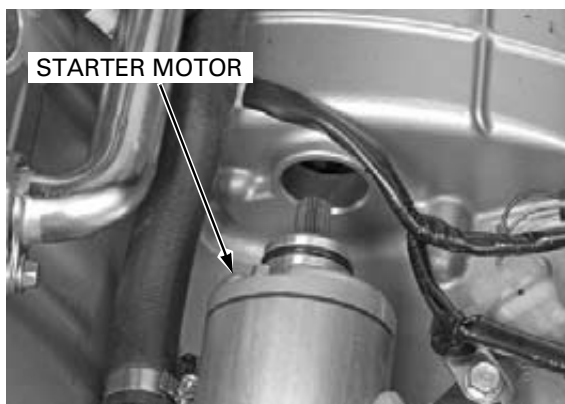
Remove the rubber cap.



Remove the terminal nut and starter motor cable.
Remove the two mounting bolts and ground cable.



Remove the starter motor from the crankcase.



DISASSEMBLY

Remove the following:

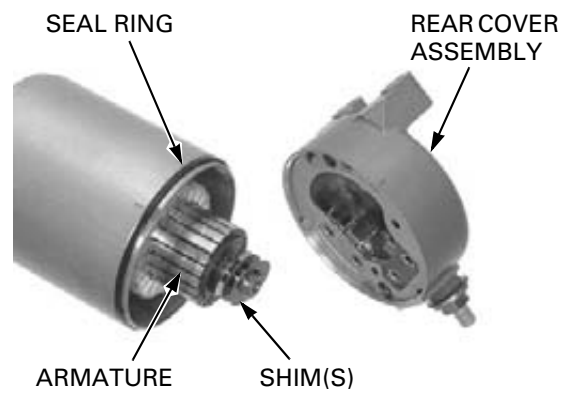
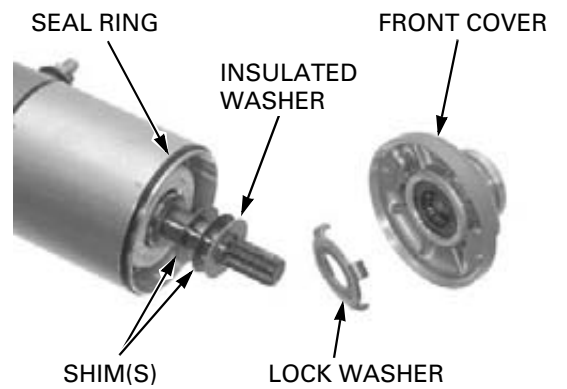
- Starter motor O-ring
- Starter motor case bolts/O-rings

Record the location and number of shims.

- Front cover
- Seal ring
- Lock washer
- Insulated washer
- Shim(s)

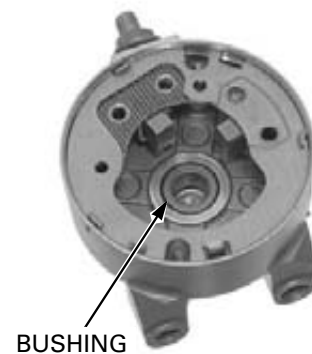
Record the location and number of shims.

- Rear cover assembly
- Seal ring
- Shim(s)
- Armature



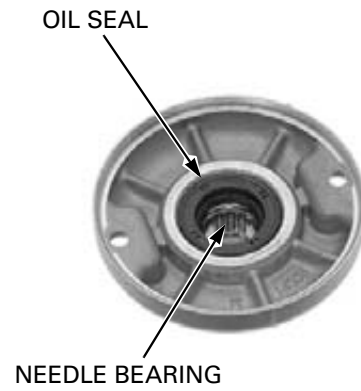
INSPECTION

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

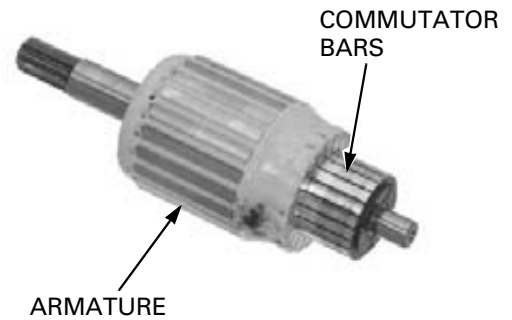


ELECTRIC STARTER

Check the oil seal for deterioration or damage, and needle bearing for wear or damage.



Do not use emery or sand paper on the commutator. Check the commutator bars of the armature for discoloration.



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

Should be CONTINUITY:

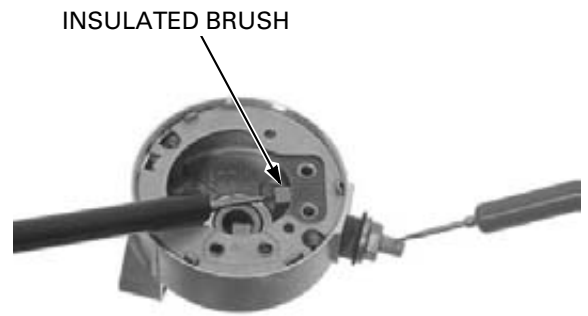


Check for continuity between each commutator bar and the armature shaft. There should be no continuity.

Should NOT be CONTINUITY:



Check for continuity between the insulated brush and cable terminal.
There should be continuity.



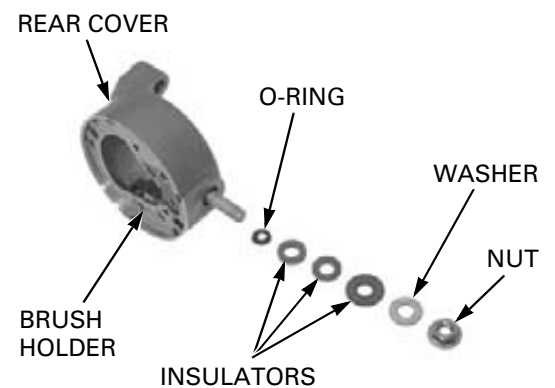
Check for continuity between the cable terminal and the rear cover.
There should be no continuity.



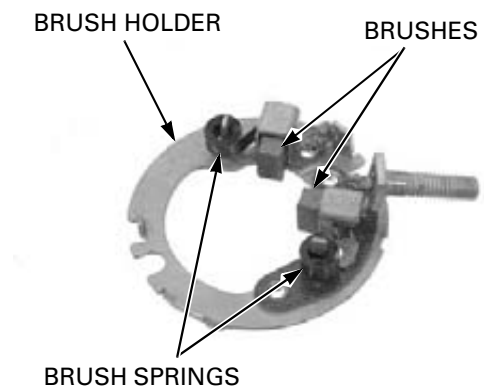
Record the location and number of insulators.

Remove the following:

- Nut
- Washer
- Insulators
- O-ring
- Brush holder assembly



Remove the brush springs and brushes from the brush holder.



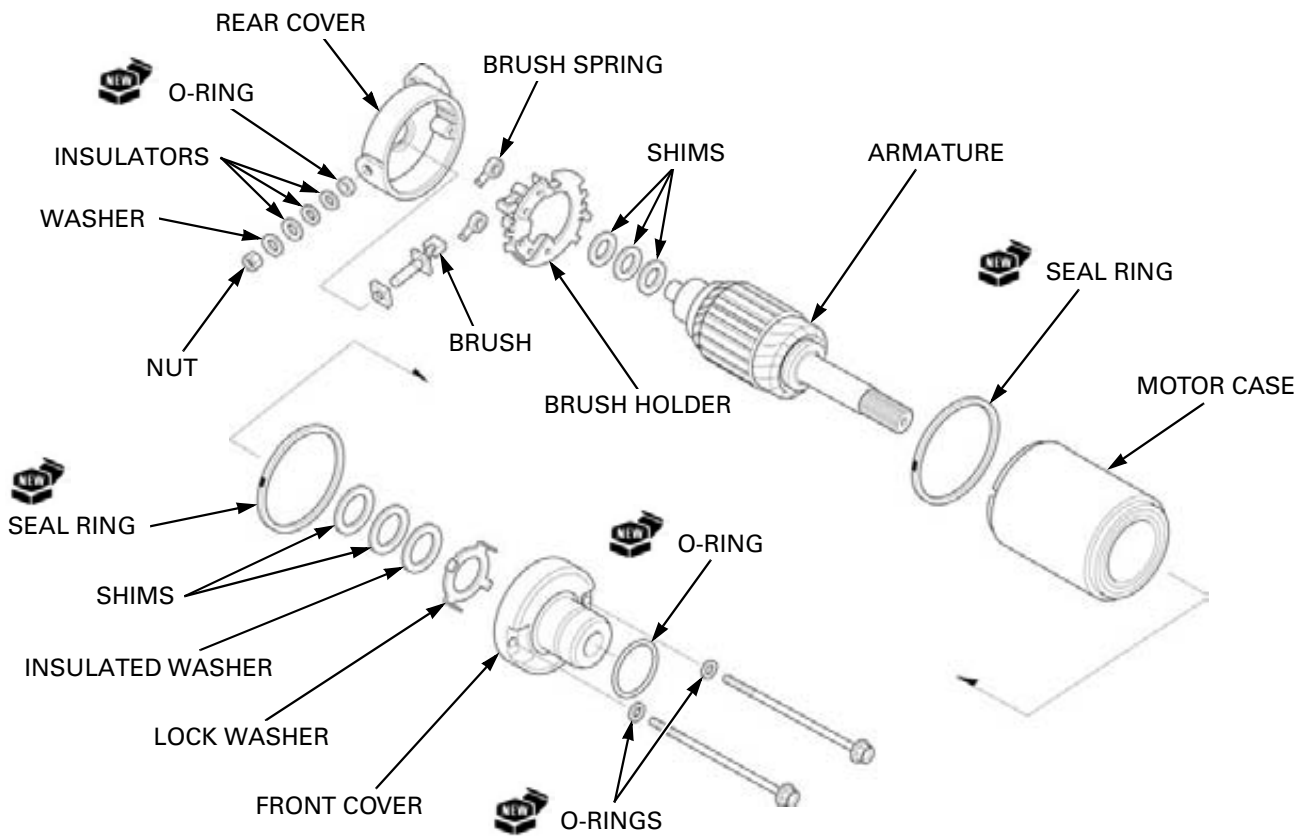
ELECTRIC STARTER

Inspect the brushes for damage and measure the brush length.

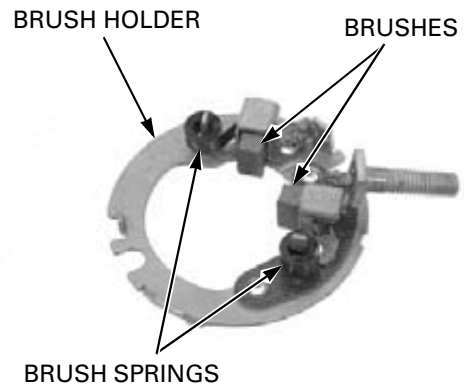
SERVICE LIMIT: 6.5 mm (0.26 in)



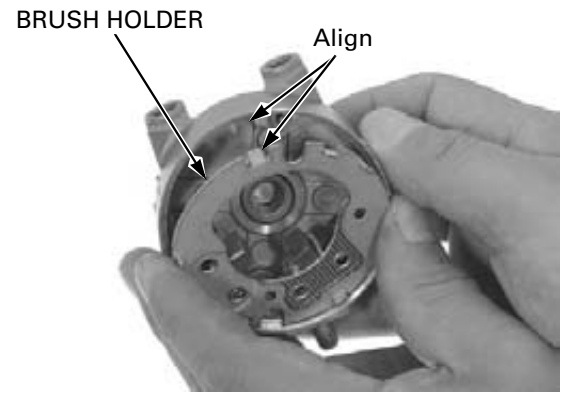
ASSEMBLY



Install the brushes and brush springs to the brush holder.



Install the brush holder into the rear cover, aligning the holder tab with the rear cover groove.



Install the insulators properly as noted during removal.

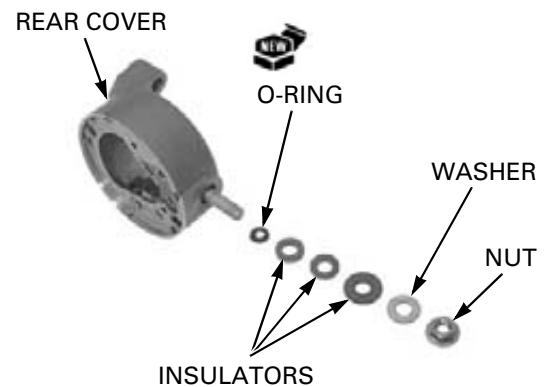
Install the following:

- New O-ring
- Insulators
- Washer
- Nut

Install the armature in the motor case. When installing the armature into the motor case, hold the armature tightly to keep the magnet of the case from pulling the armature against it.

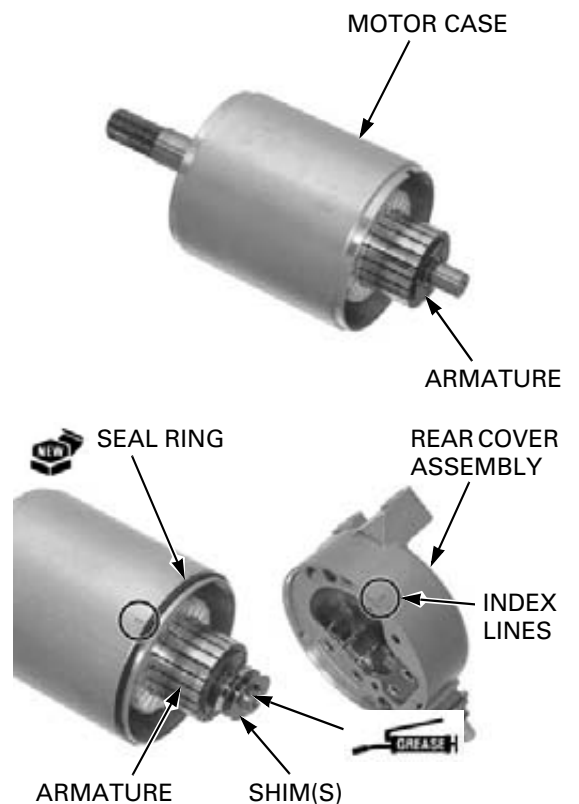
NOTICE

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



Install the shims properly as noted during removal.

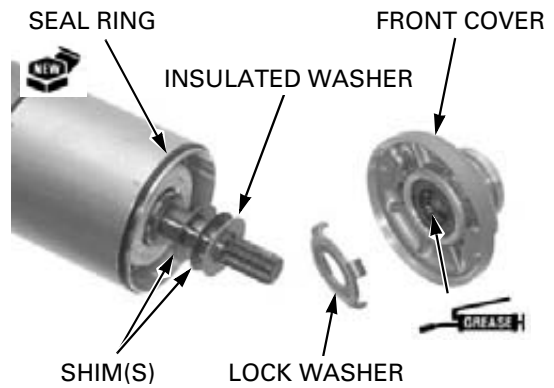
Install a new seal ring onto the motor case. Install the shim(s) onto the armature shaft. Apply thin coat of grease to the armature shaft end. Install the rear cover assembly, while pushing in the brushes into the brush holder and aligning with the index lines of the motor case and rear cover.



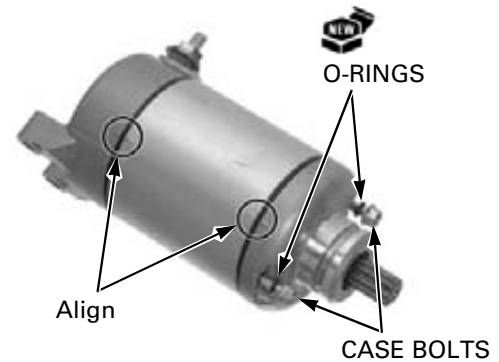
ELECTRIC STARTER

Install the shims properly as noted during removal.

Install the shim(s) and insulated washer onto the armature shaft.
Install a new seal ring onto the motor case.
Apply grease to the oil seal lip and needle bearing in the front cover.
Install the lock washer to the front cover with the lock washer tabs facing to front cover, and install them onto the armature shaft.

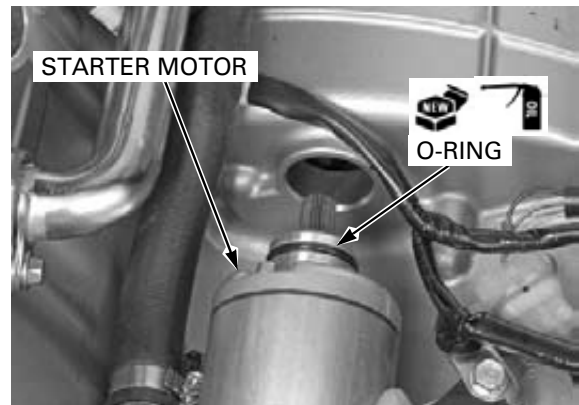


Align each index line of the front and rear cover with that of motor case.
Install the new O-rings onto the motor case bolts.
Install and tighten the case bolts securely.



INSTALLATION

Coat a new O-ring with oil and install it into the starter motor groove.
Install the starter motor into the crankcase.

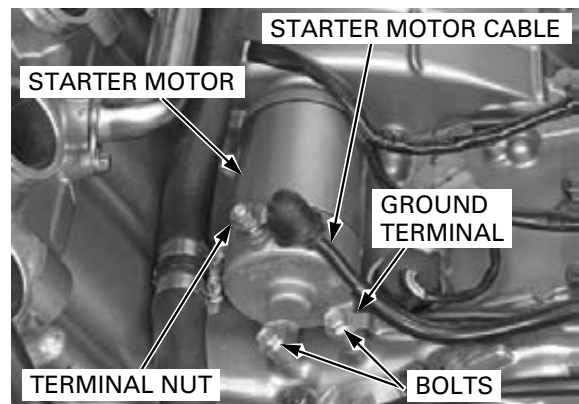


Route the starter motor cable and ground cable properly (page 1-23).

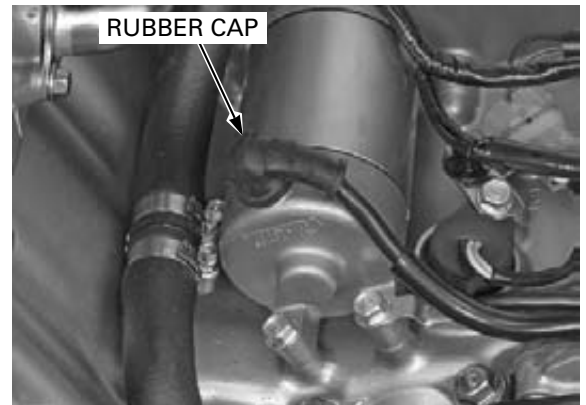
Install the ground cable and mounting bolts, and tighten the bolts securely.

Install the starter motor cable to the terminal, then tighten the terminal nut to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Install the rubber cap securely.
Install the air cleaner housing (page 6-67).



STARTER RELAY SWITCH

INSPECTION

OPERATION INSPECTION

Remove the right side cover (page 3-4).

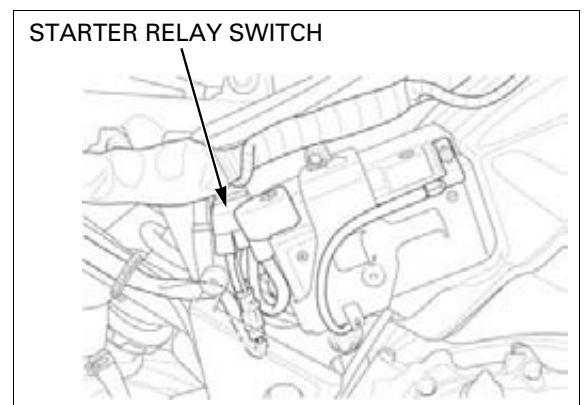
Shift the transmission into neutral.

Turn the ignition switch ON and engine stop switch "G".

Press the starter switch button.

The coil is normal if the starter relay switch clicks.

If you don't hear the switch "click", inspect the relay switch using the procedure below.

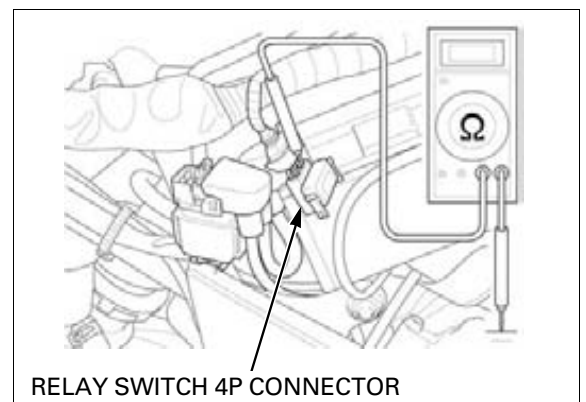


GROUND LINE INSPECTION

Remove the starter relay switch from the stay (page 20-15).

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

If there is continuity when the transmission is in neutral and clutch lever released or when the clutch lever pulled and the side stand up, the ground circuit is normal (In neutral, there is a slight resistance due to the diode).



ELECTRIC STARTER

STARTER RELAY VOLTAGE INSPECTION

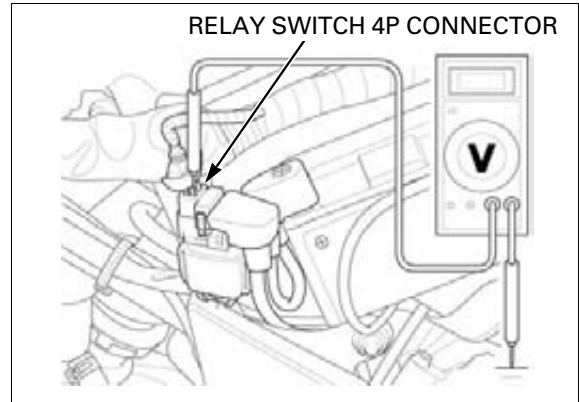
Connect the starter relay switch 4P connector.

Reinstall the battery (page 18-6).

Shift the transmission into neutral.

Measure the voltage between the Yellow/red wire terminal (+) and body ground (-).

If the battery voltage appears only when the starter switch is pushed with the ignition switch ON and engine stop switch "⏻", it is normal.

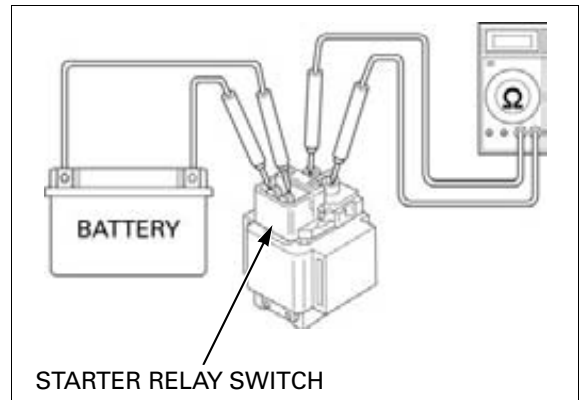


CONTINUITY INSPECTION

Disconnect the starter relay switch 4P connector and cables.

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

There should be continuity between the large terminals while the battery is connected, and no continuity when the battery is disconnected.



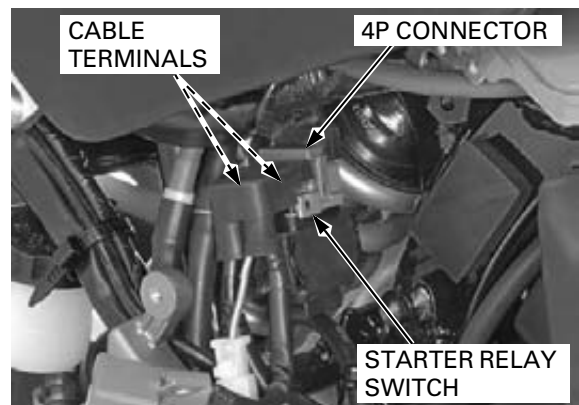
REMOVAL/INSTALLATION

Remove the battery (page 18-6).

Disconnect the starter relay switch 4P connector. Remove the terminal bolts and disconnect the starter relay switch cables.

Pull the starter relay out from the stay.

Installation is in the reverse order of removal.



DIODE

REMOVAL/INSTALLATION

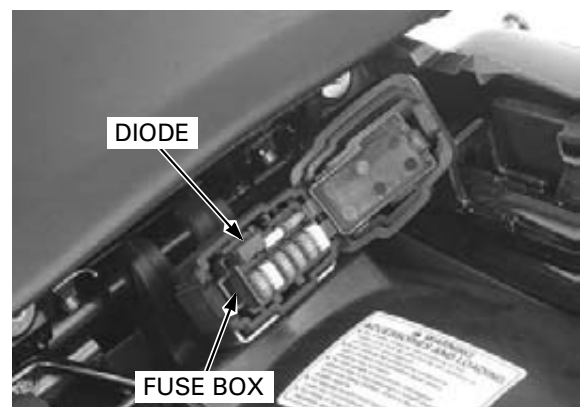
Remove the rear seat (page 3-3).

Open the fuse box dust cover.



Open the fuse box and remove the diode.

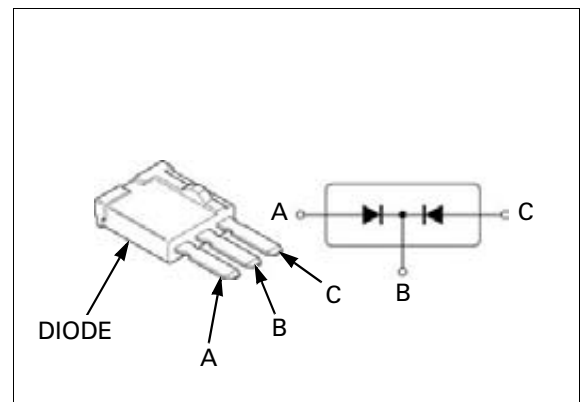
Install the diode in the reverse order of removal.



INSPECTION

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

If there is continuity in one direction, the diode is normal.



MEMO
