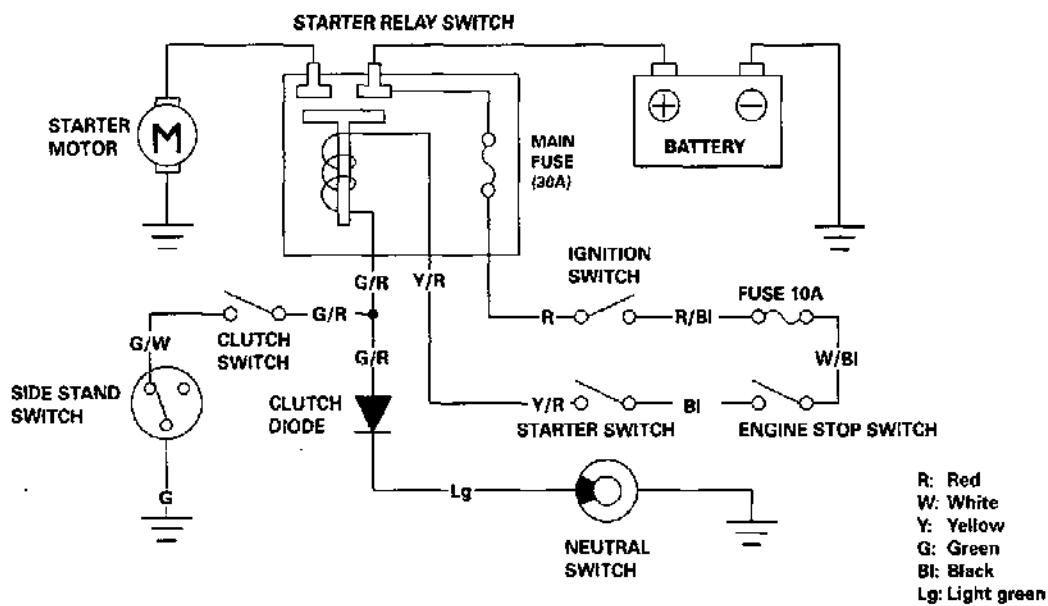
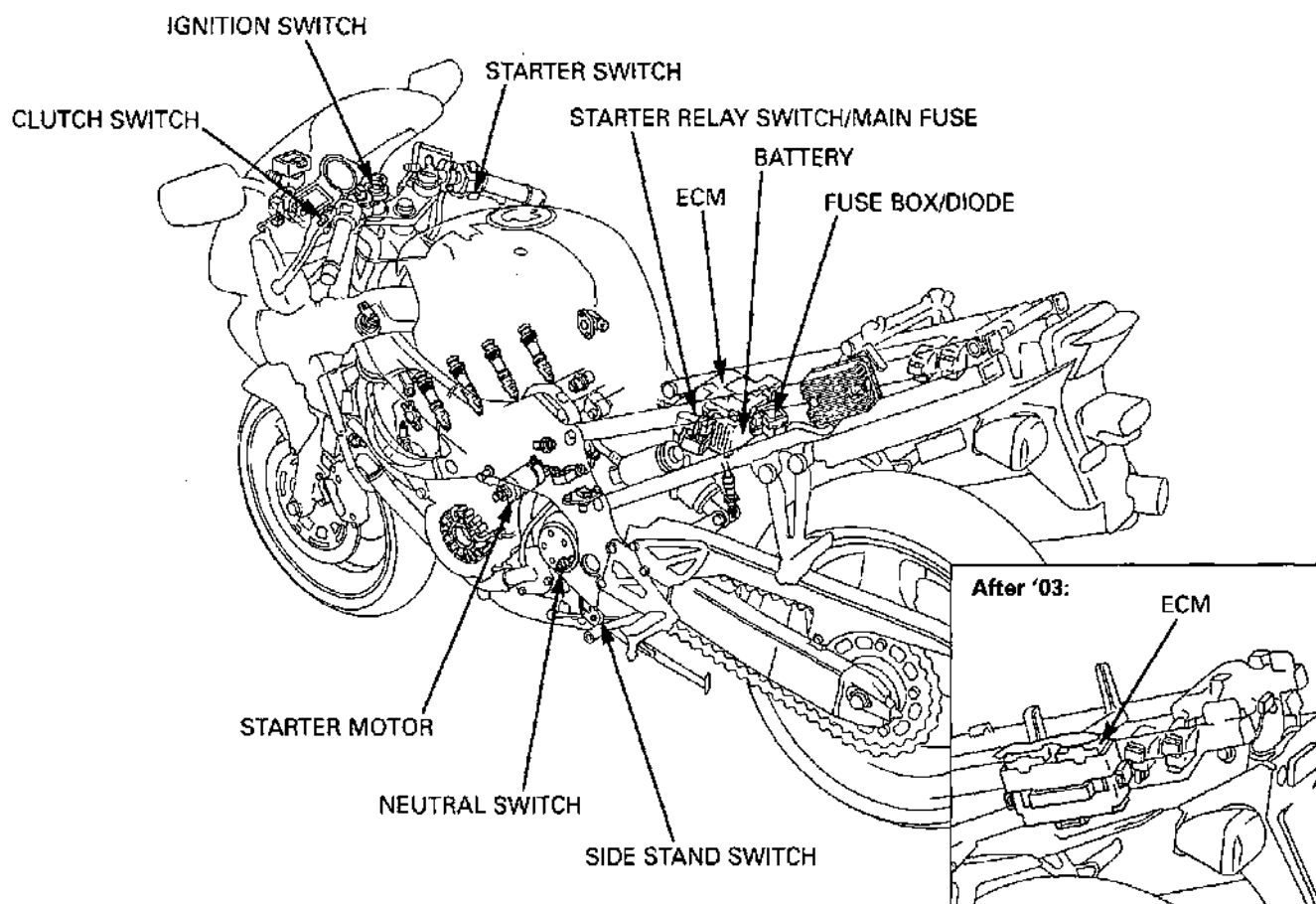


## ELECTRIC STARTER

### SYSTEM DIAGRAM



# 18. ELECTRIC STARTER

SYSTEM DIAGRAM	18-0	STARTER MOTOR	18-4
SERVICE INFORMATION	18-1	STARTER RELAY SWITCH	18-10
TROUBLESHOOTING	18-2	DIODE	18-11

## SERVICE INFORMATION

### GENERAL

- Always turn the ignition switch to "OFF" before servicing the starter motor. The motor could suddenly start, causing serious injury.
- When checking the starter system, always follow the steps in the troubleshooting flow chart (page 18-2).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- 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.
- See section 10 for starter clutch servicing.
- See section 19 for following components:
  - Ignition switch
  - Engine stop switch
  - Starter switch
  - Neutral switch
  - Side stand switch
  - Clutch switch

### SPECIFICATION

Unit: mm (in)

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

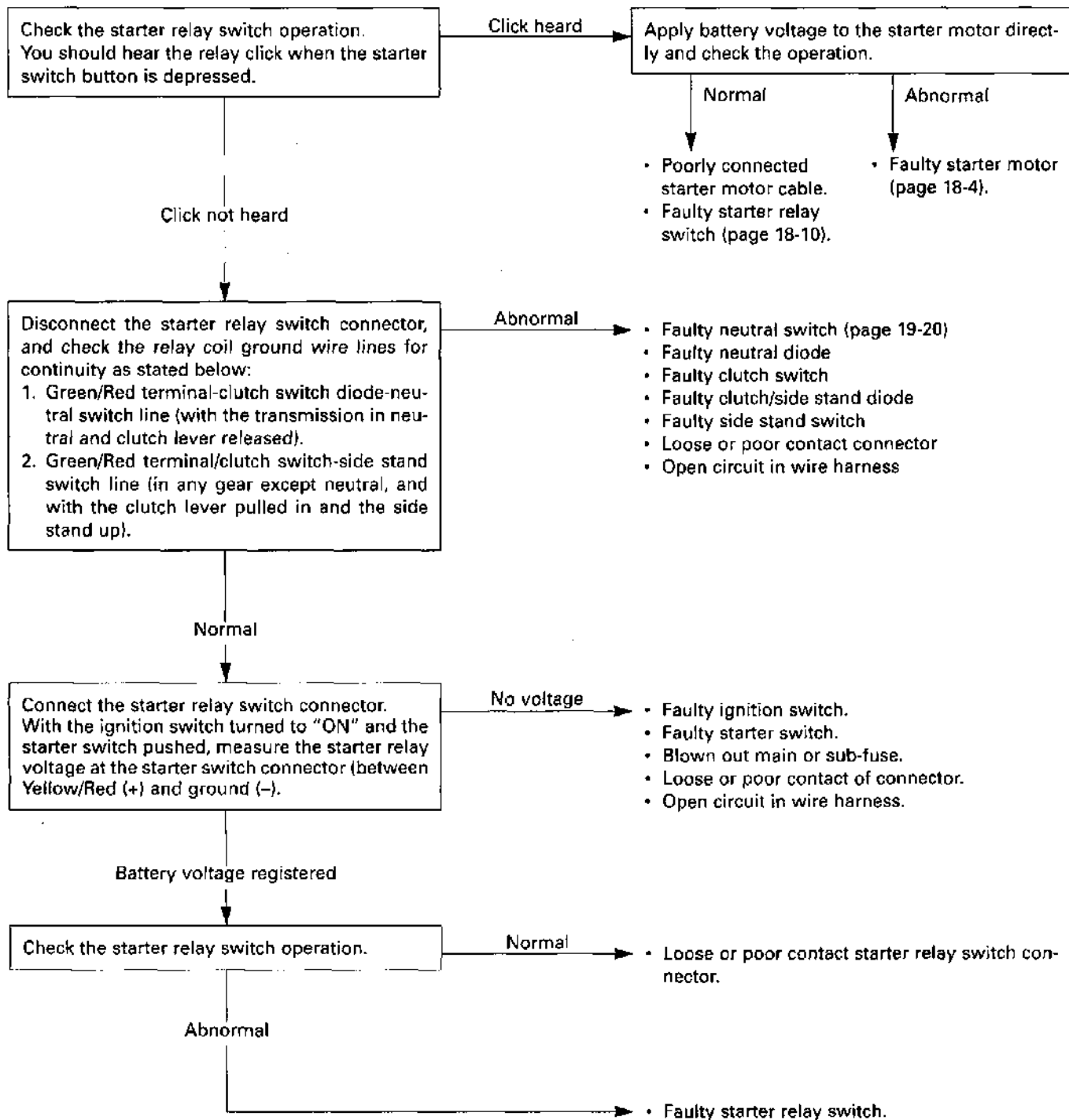
### TORQUE VALUE

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

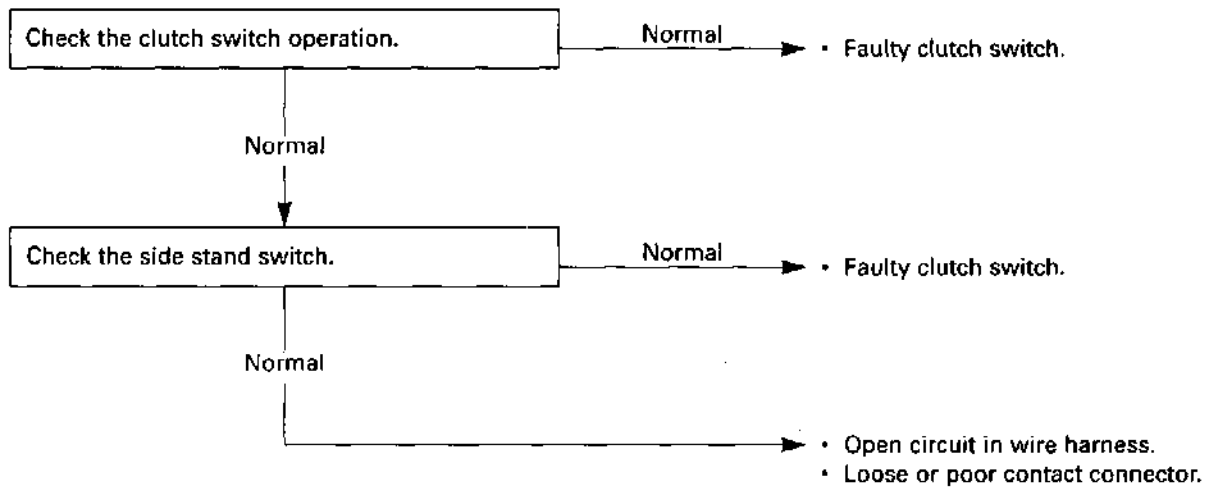
### TROUBLESHOOTING

#### Starter motor does not turn

- Check for blown main or sub fuses before servicing.
- Make sure the battery is fully charged and in good condition.



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.



### **Starter motor turns engine slowly**

- Low battery voltage
- Poorly connected battery terminal cable
- Poorly connected starter motor cable
- Faulty starter motor
- Poor 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 drive gear

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

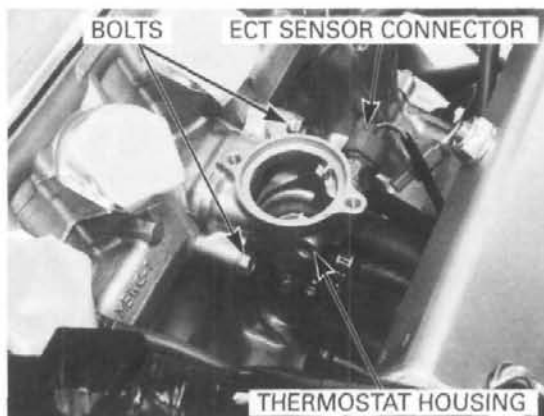
- Crankshaft does not turn due to engine problems

### STARTER MOTOR

#### REMOVAL

Support the front end of fuel tank (page 3-4).  
Drain the coolant (page 6-4).  
Remove the throttle body (page 5-60).  
Remove the thermostat housing (page 6-7).

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

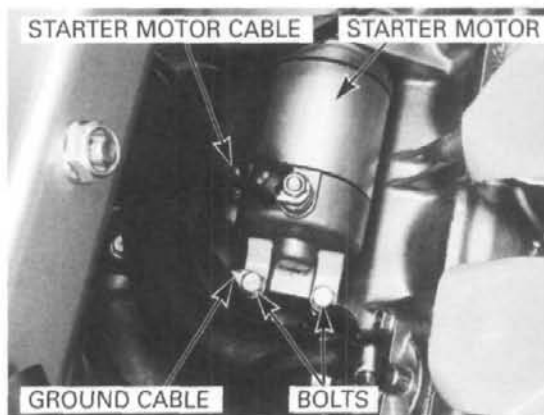


*Be careful not to damage the water hose.*

Remove the nut and the starter motor cable from the starter motor.

Remove the starter motor mounting bolts and ground cable.

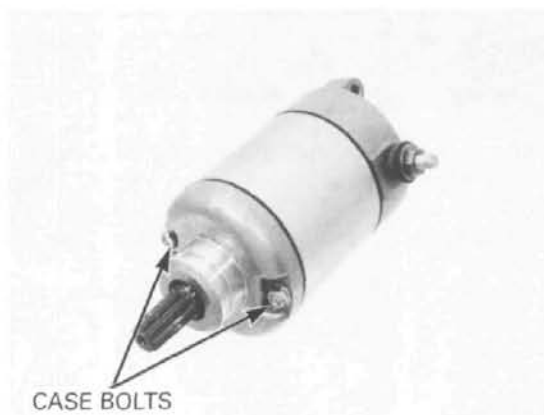
Pull the starter motor out of the crankcase.



#### DISASSEMBLY

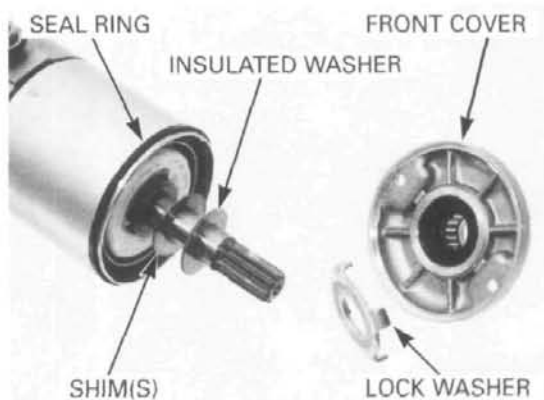
Remove the following:

- Starter motor case bolts/O-rings



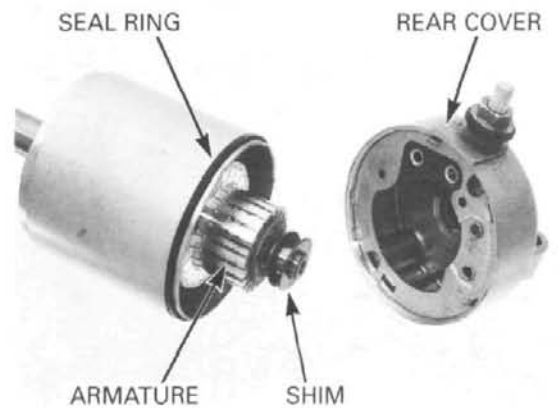
*Record the location and number of shims.*

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



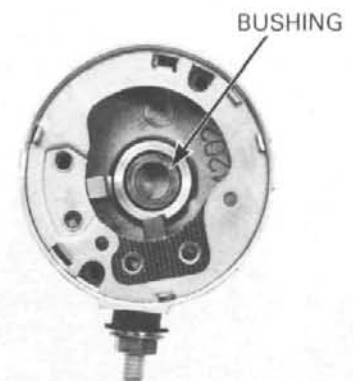
Remove the following:

- Rear cover assembly
- Seal ring
- Shims
- Armature

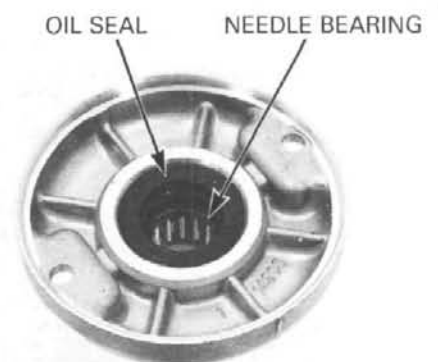


### INSPECTION

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



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



*Do not use emery cloth or sand paper on the commutator.*

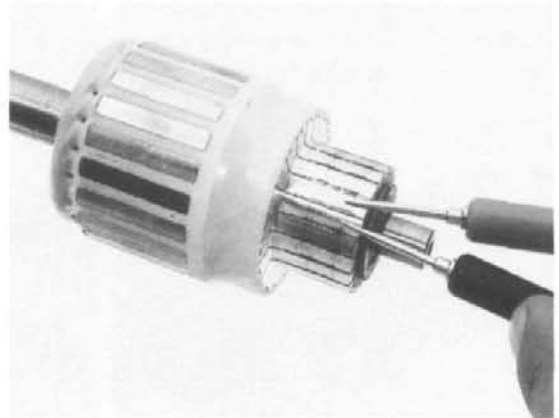
Check the commutator bars of the armature for discoloration.



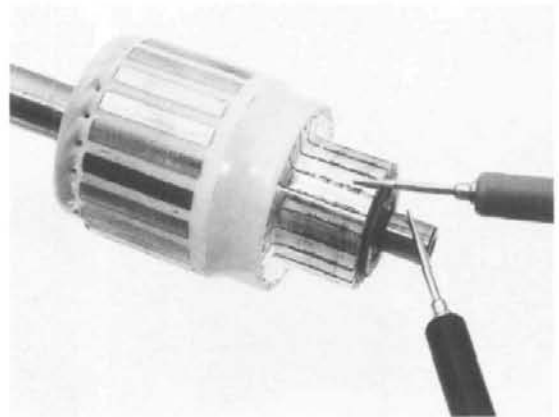
## ELECTRIC STARTER

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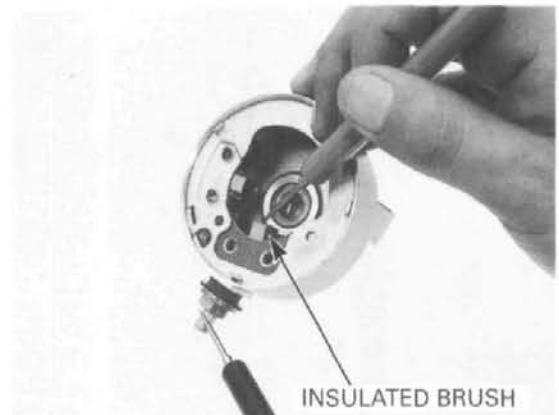
Check for continuity between the pairs of commutator bars.  
There should be continuity.



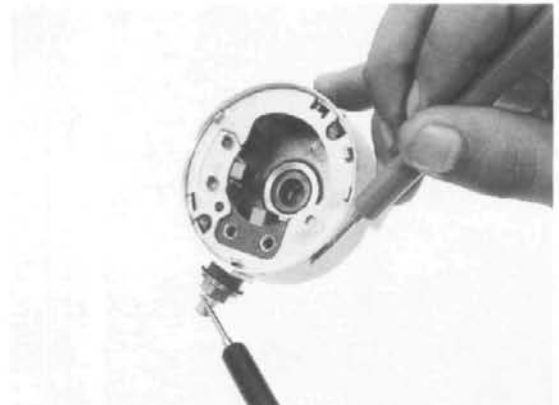
Check for continuity between each commutator bar and the armature shaft.  
There should be no continuity.



Check for continuity between the insulated brush and cable terminal (the indigo colored wire or the insulated brush holder).  
There should be continuity.

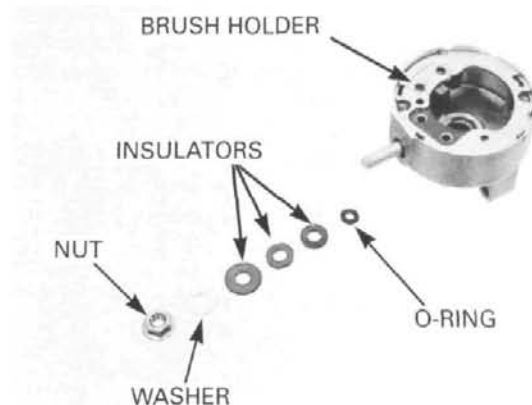


Check for continuity between the cable terminal and the rear cover.  
There should be no continuity.



Remove the following:

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

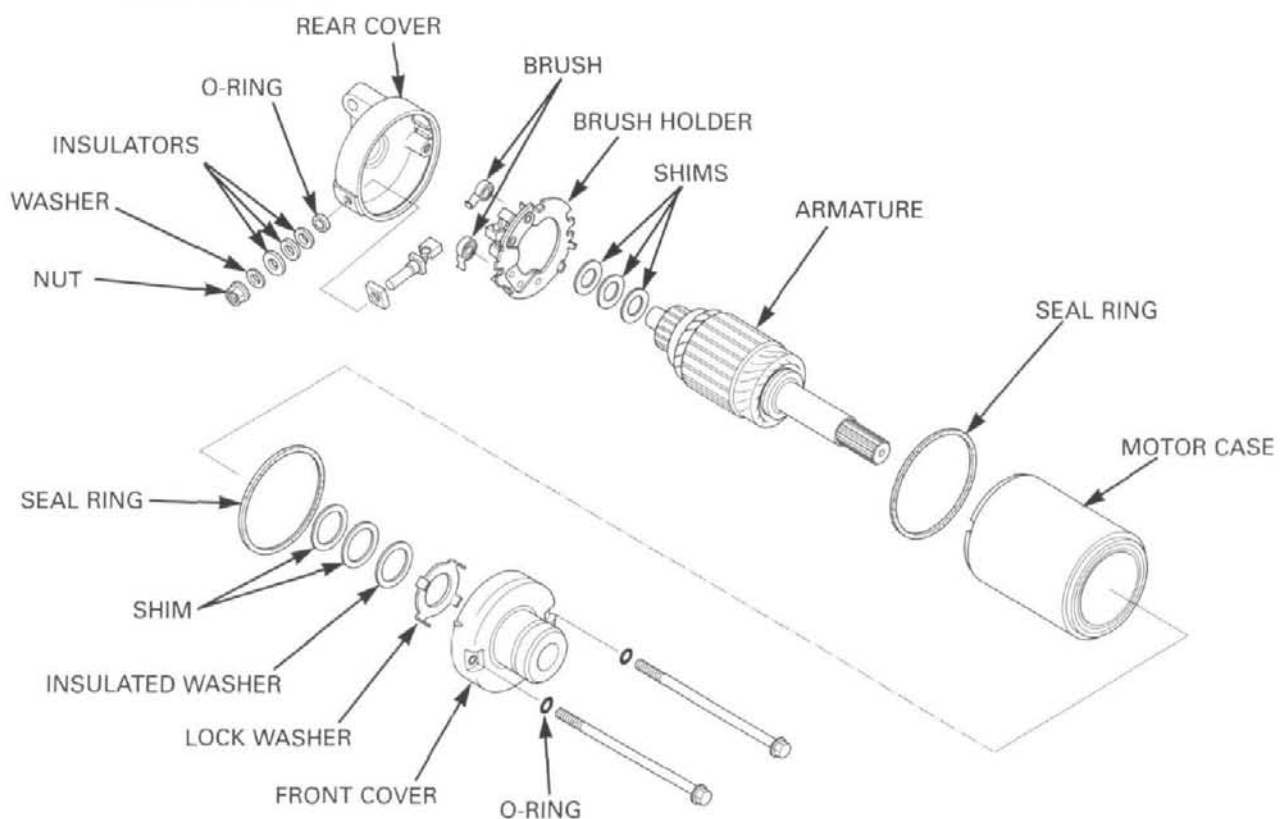


Inspect the brushes for damage and measure the brush length.

**SERVICE LIMIT: 6.5 mm (0.26 in)**



## ASSEMBLY





## ELECTRIC STARTER

Install the brushes into the brush holder.  
Install the cable terminal and brush holder into the rear cover, aligning the holder tab with the rear cover groove.

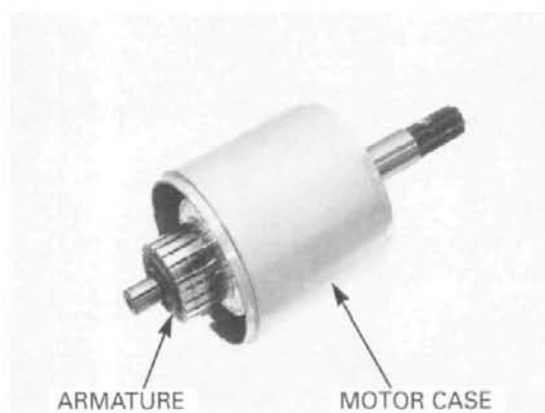
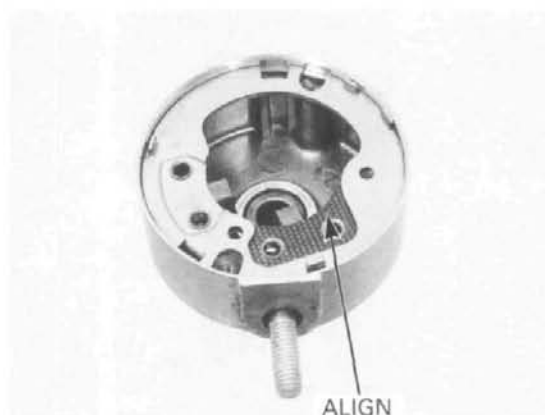
Install the following:

- New O-ring
- Insulated washers
- Washer
- Nut

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

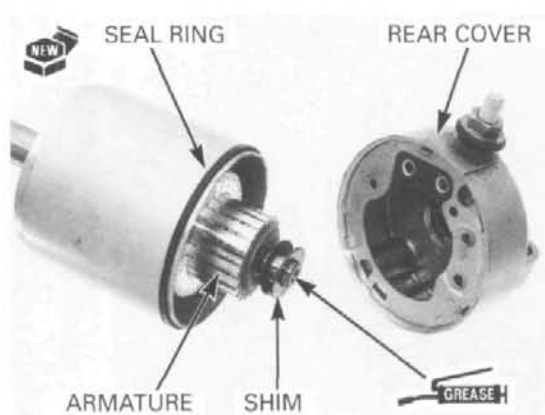
### NOTICE

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



Install the same number of shims in the same location as noted during disassembly.  
Install a new seal ring onto the motor case.  
Apply a thin coat of grease to the armature shaft end.

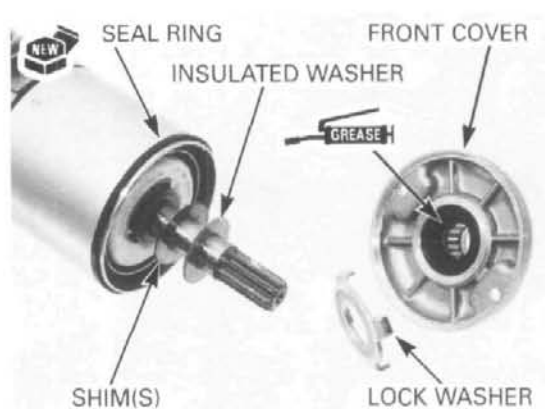
Install the rear cover, while pushing in the brushes into the brush holder and aligning the brush holder tab with the motor case groove.



*Install the shims properly as noted during removal.*

Install the shims 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 onto the front cover.  
Install the front cover.



Install 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.



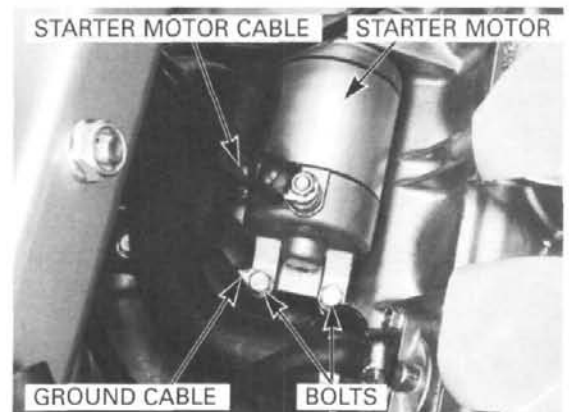
Install the starter motor into the crankcase.

*Be careful not to  
damage the water  
hose.*

Route the starter motor cable and ground cable.  
Install the ground cable and mounting bolts, and  
tighten the bolts securely.  
Install the starter motor cable, then tighten the termi-  
nal nut to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Install the rubber cap securely.



Install a new O-ring into the thermostat housing groove.

Install the thermostat housing to the cylinder head.



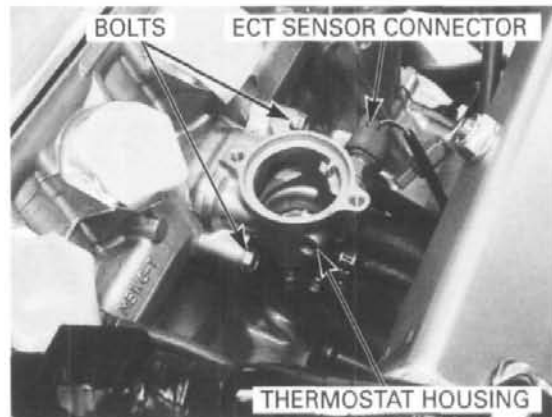
## ELECTRIC STARTER

Install and tighten the mounting bolts.

Install the following:

- Thermostat housing/thermostat (page 6-6).
- Throttle body (page 5-62).

Fill the system with the recommended coolant (page 6-4).



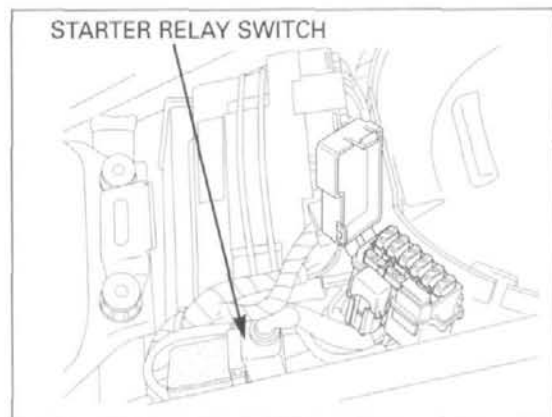
## STARTER RELAY SWITCH

### OPERATION INSPECTION

Remove the seat (page 2-2).

Shift the transmission into neutral.  
Turn the ignition switch to "ON" and engine stop switch on.  
Push the starter switch button.  
The coil is normal if the starter relay switch clicks.

If you do not hear the switch click, inspect the relay switch using the procedure below.

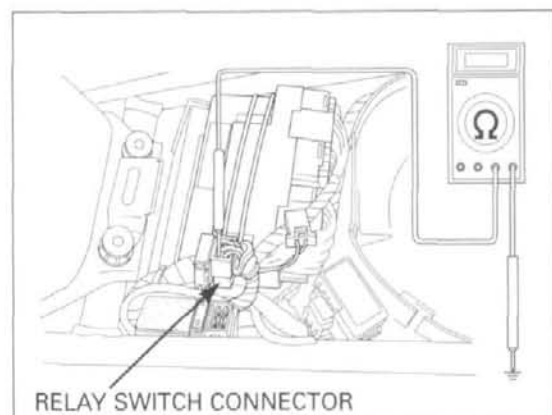


### GROUND LINE INSPECTION

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 or when the clutch is disengaged and the side stand switch is retracted, the ground circuit is normal (in neutral, there is a slight resistance due to the diode).

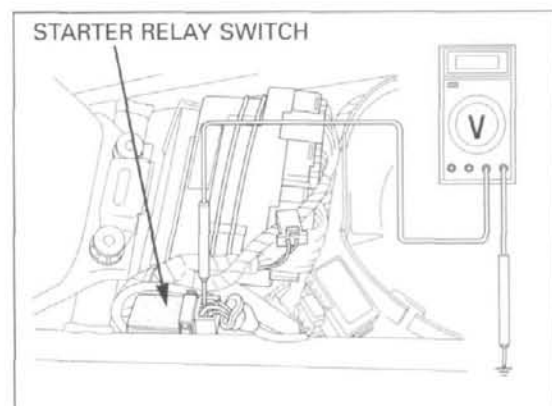


### STARTER RELAY VOLTAGE INSPECTION

Connect the starter relay switch 4P connector.

Shift the transmission into neutral.  
Measure the voltage between the Yellow/Red wire terminal (+) and ground (-).

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



## CONTINUITY INSPECTION

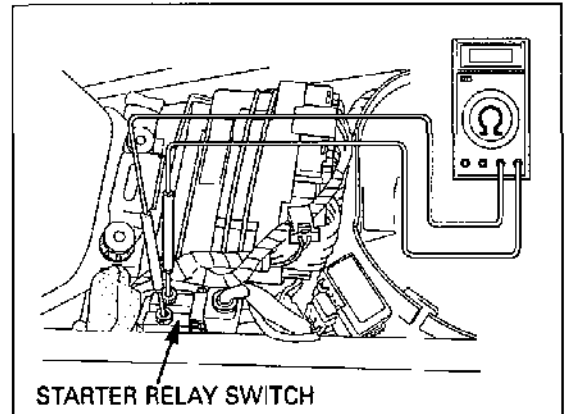
Disconnect the starter relay connector and cables.

Connect an ohmmeter to the large starter relay switch terminals.

Connect a fully charged 12-V battery to the starter relay switch connector terminals (Yellow/Red and Green/Red).

Check for continuity between the starter relay switch terminals.

There should be continuity while 12-V battery is connected to the starter relay switch connector terminals and should be no continuity when the battery is disconnected.

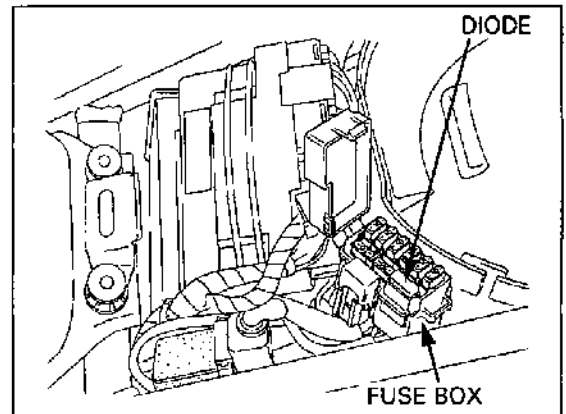


## DIODE

### REMOVAL

Remove the seat (page 2-2).

Open the fuse box and remove the diode.



### 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.

### INSTALLATION

Install the diode in the reverse order of removal.

