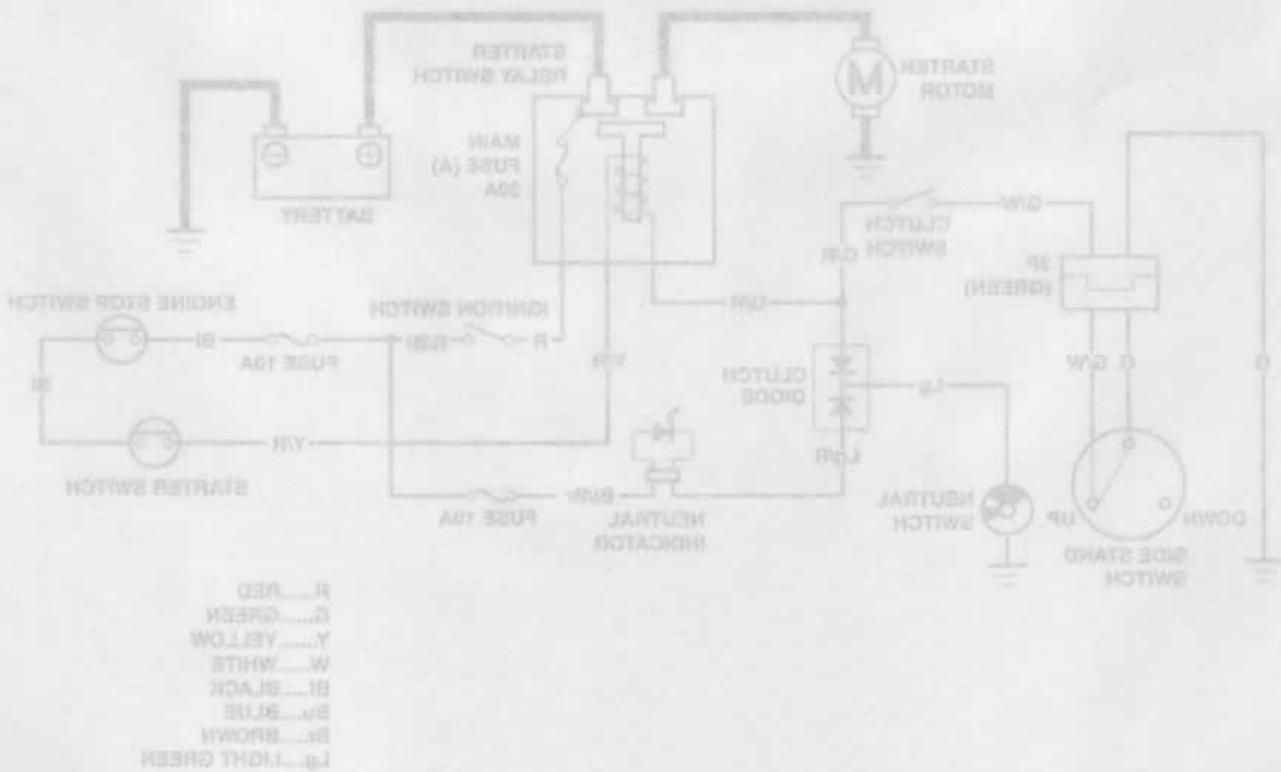
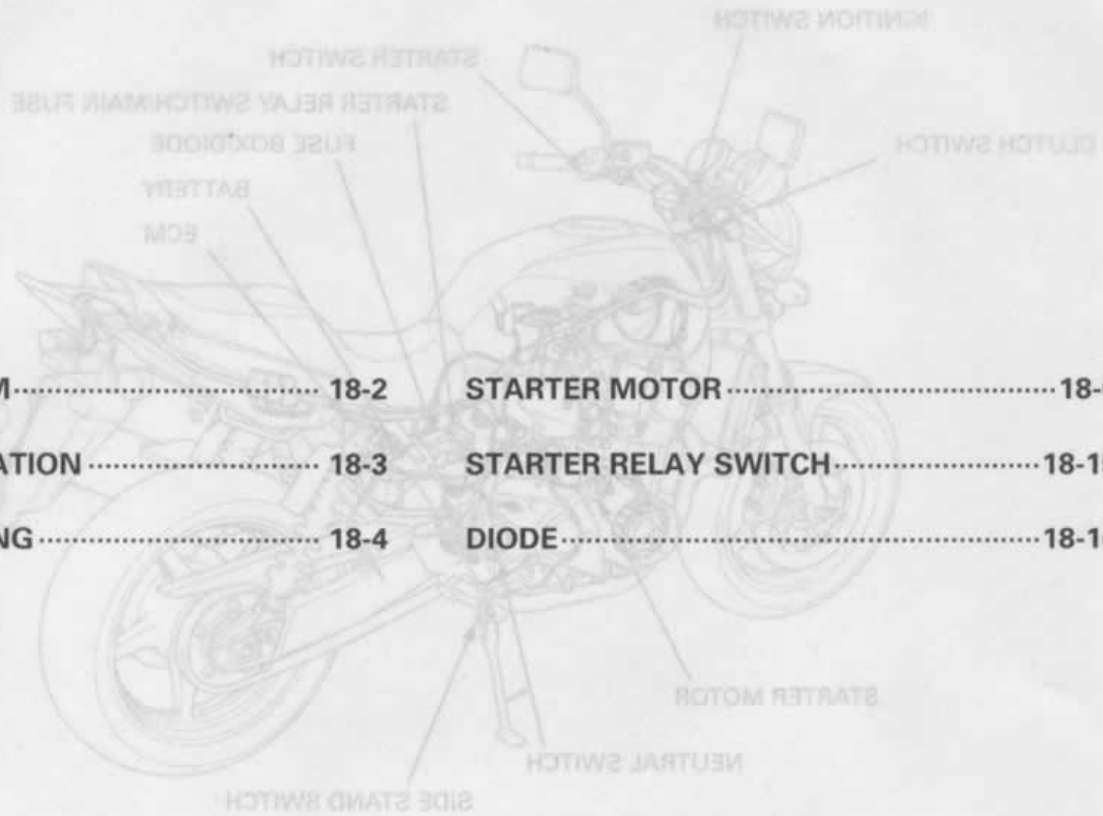
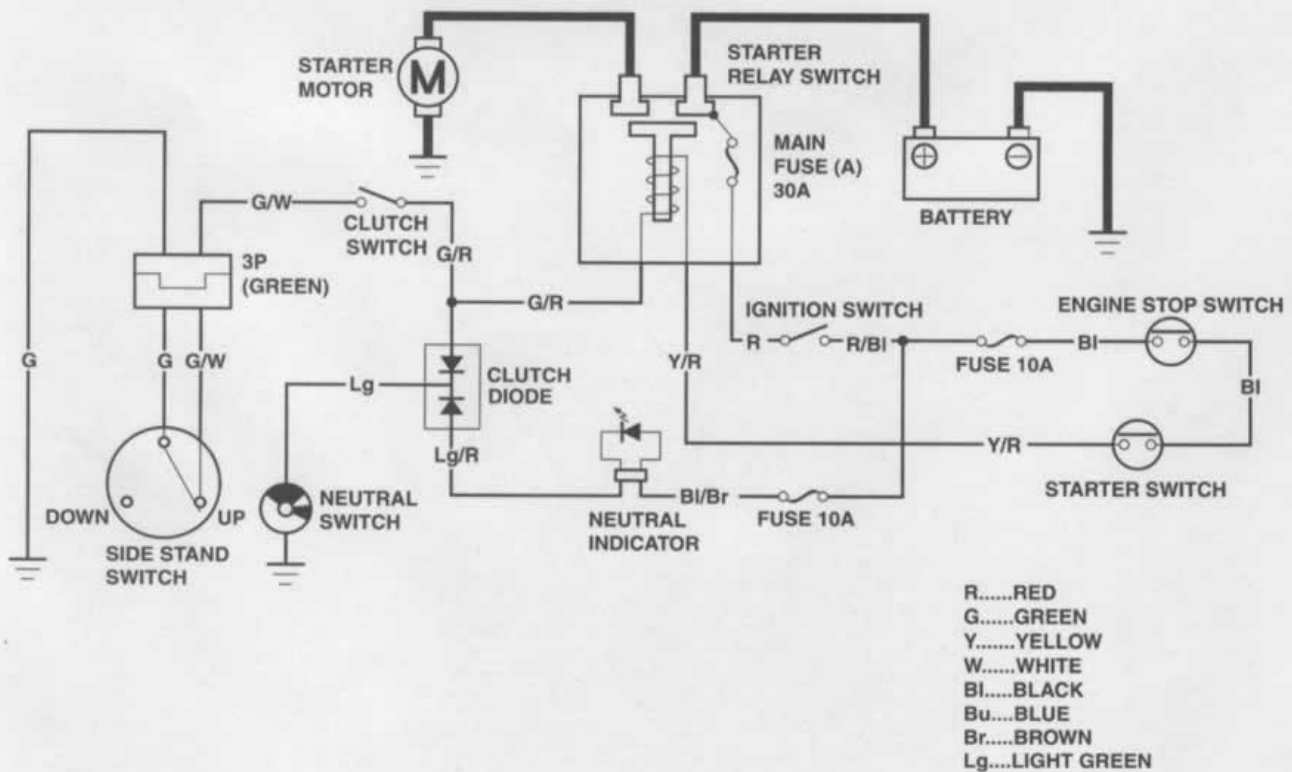
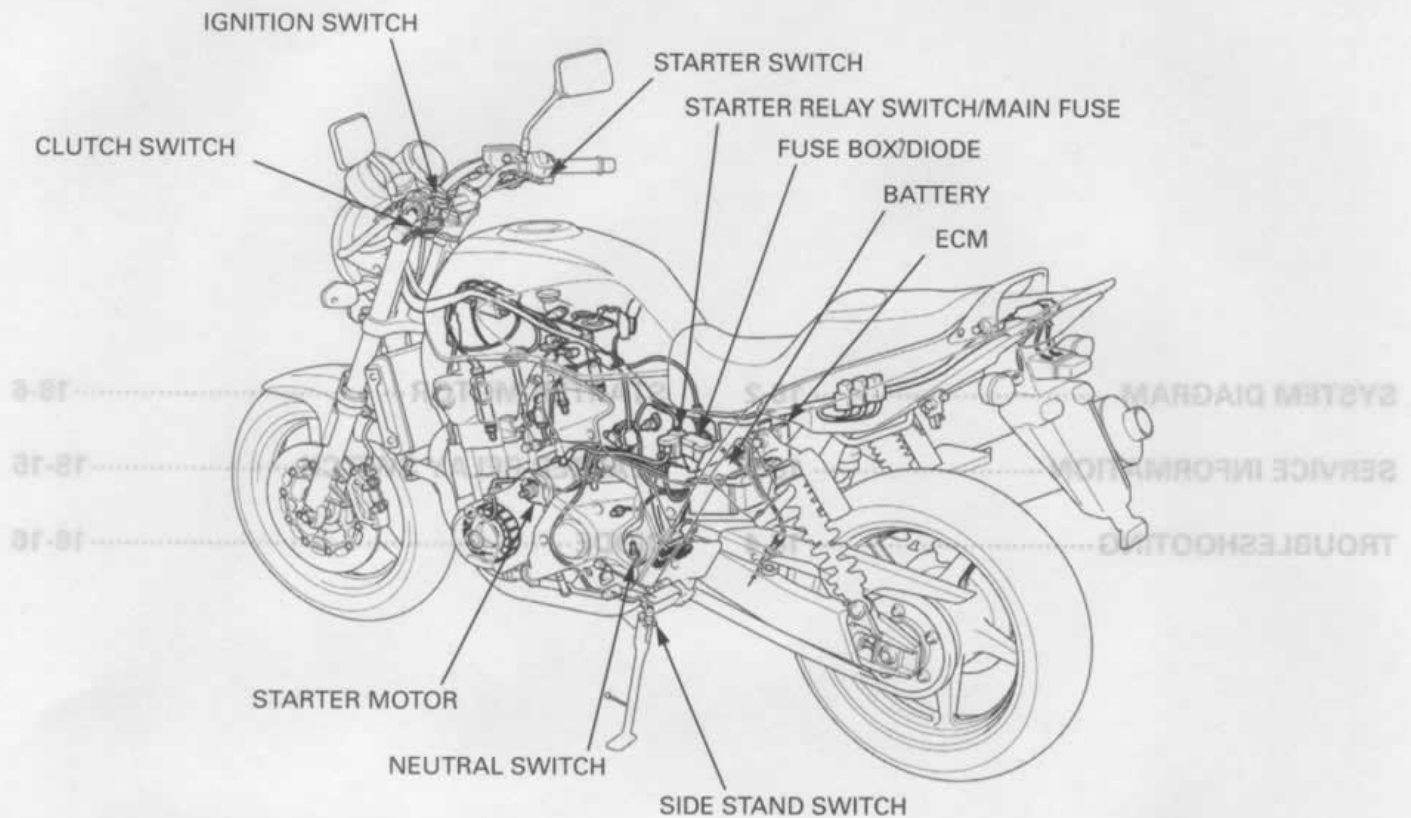


SYSTEM DIAGRAM.....	18-2	STARTER MOTOR.....	18-6
SERVICE INFORMATION.....	18-3	STARTER RELAY SWITCH.....	18-15
TROUBLESHOOTING.....	18-4	DIODE.....	18-16



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

- Always turn the ignition switch 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 18-4).
- 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.
- Refer to the starter clutch servicing (page 11-7).
- Refer to the following components informations.
 - Ignition switch (page 19-23)
 - Engine stop switch (page 19-24)
 - Starter switch (page 19-24)
 - Neutral switch (page 19-26)
 - Side stand switch (page 19-26)
 - Clutch switch (page 19-25)

SPECIFICATIONS

Unit: mm (in)

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

TOEQUE VALUES

Starter motor terminal nut 10 N·m (1.0 kgf·m, 7 lbf·ft)

TROUBLESHOOTING

Starter motor does not turn

1. Fuse Inspection

Check for blown main fuse or sub fuse.

Did the fuse blow?

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 – Replace the fuse

NO – GO TO STEP 3.

3. Starter Relay switch operation

Check the starter relay switch operation.

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

Did the "CLICK" hear?

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.

Did the starter motor turn?

YES – • Poorly connected starter motor cable
• Faulty starter relay switch (page 18-15)

NO – Faulty starter motor (page 18-6)

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 switch 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, and with the clutch lever pulled in and the side stand up).

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

Are there continuity?

NO – • Faulty neutral switch (page 19-26)
• Faulty neutral diode (page 18-16)
• Faulty clutch switch (page 19-25)
• Faulty side stand switch (page 19-26)
• Loose or poor contact connector
• Open circuit in wire harness

YES – GO TO STEP 6.

- Always turn the ignition switch OFF before servicing the starter motor.
- When checking the starter system, always follow the steps in the troubleshooting flow chart (page 18-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply enough current to the starter motor. If the current is kept flowing through the starter motor to turn it while the engine is running, the starter motor may be damaged.
- Refer to the starter clutch servicing (page 11-7).
- Refer to the following components information:
 - Clutch switch (page 19-26)
 - Side stand switch (page 19-26)
 - Neutral switch (page 19-26)
 - Starter switch (page 19-24)
 - Engine stop switch (page 19-24)
 - Ignition switch (page 19-23)

ITEM	STANDARD	UNIT
Starter motor brush length	13.0 – 13.0 (0.51 – 0.51)	mm (in)
	13.0 (0.51)	

6. Starter Relay Voltage Inspection

Connect the starter relay switch connector.

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

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

Is there battery voltage?

- NO** –
- Faulty ignition switch (page 19-23)
 - Faulty starter switch (page 19-24)
 - Faulty engine stop switch (page 19-24)
 - Blown out main or sub-fuse
 - Faulty clutch switch (page 19-25) / side stand diode (page 18-16)
 - Loose or poor contact connector
 - Open circuit in wire harness

YES – GO TO STEP 7.

7. Starter Relay Switch Operation

Check the starter relay switch operation.

Is there battery voltage?

- NO** – Faulty starter relay switch
- YES** – Loose or poor contact starter relay switch 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.

Is the clutch switch operation normally?

- NO** – Faulty clutch switch

YES – GO TO STEP 2.

2. Clutch Switch Inspection

Check the side stand switch operation.

Is the side stand switch operation normally?

- NO** – Faulty side stand switch (page 19-26)

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

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

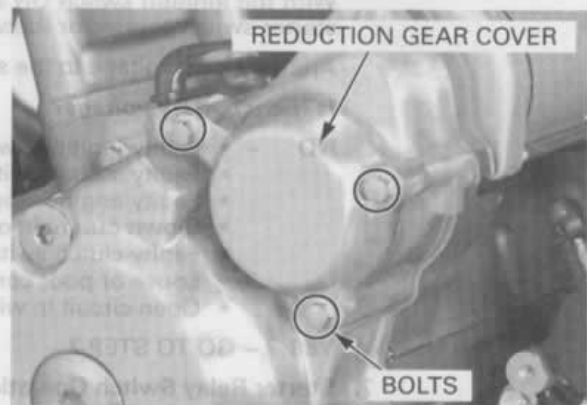
Starter relay switch "Clicks", but engine does not turn over

- Crankshaft does not turn due to engine problems

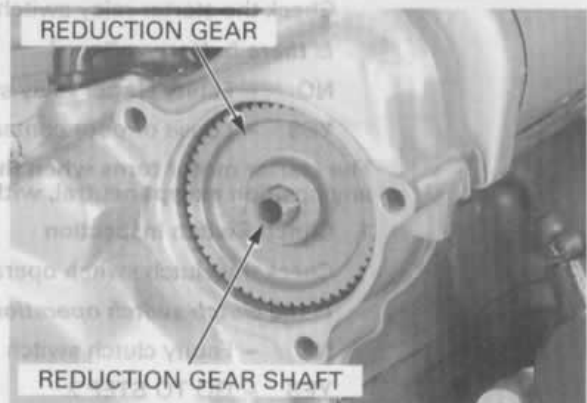
STARTER MOTOR

REMOVAL

Remove the bolts and starter reduction gear cover.

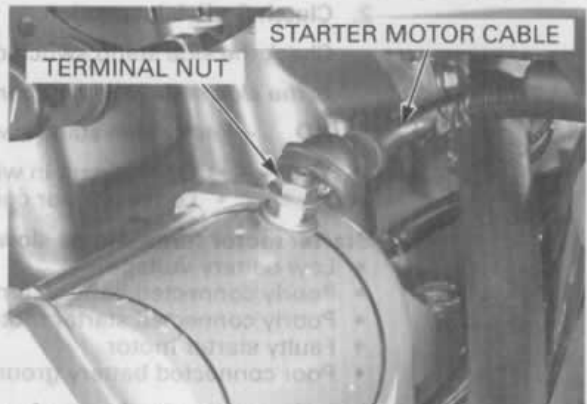


Remove the starter reduction gear shaft and gear.

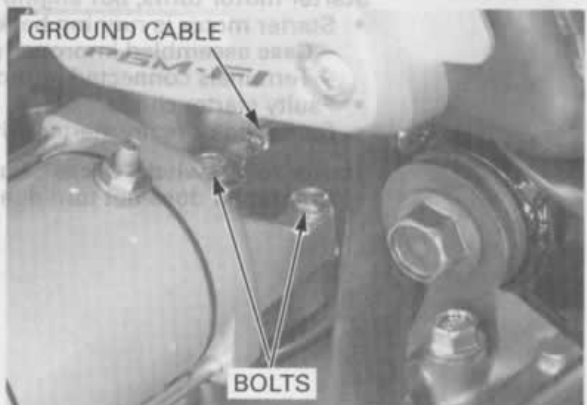


With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.

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

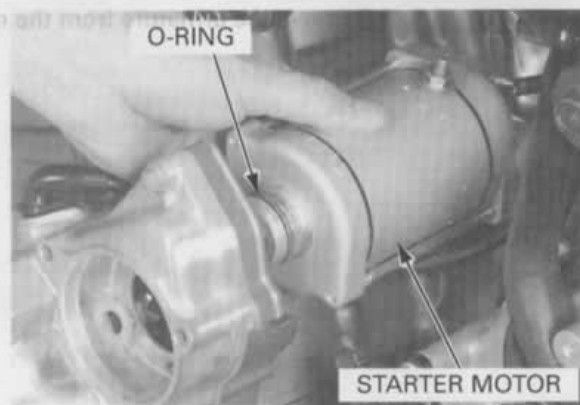


Remove the starter motor mounting bolts and ground cable.



Pull the starter motor out of the crankcase.

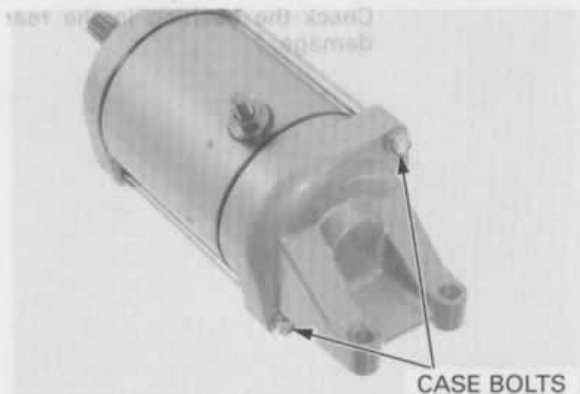
Remove the O-ring.



DISASSEMBLY

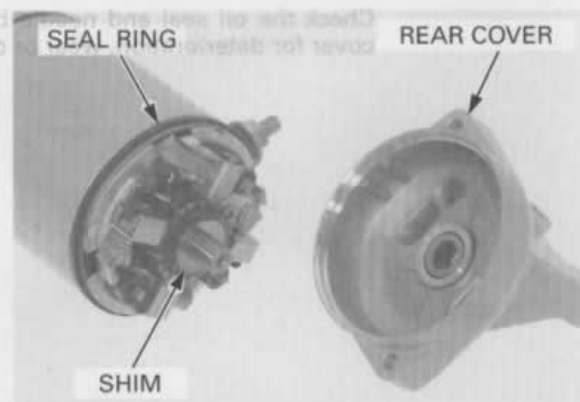
Remove the following:

- Starter motor case bolts



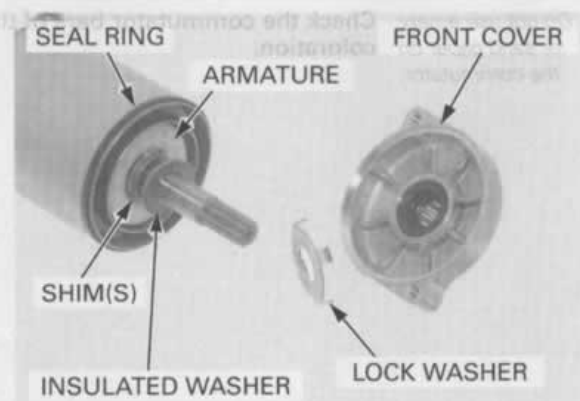
Remove the following:

- Rear cover assembly
- Seal ring
- Shims



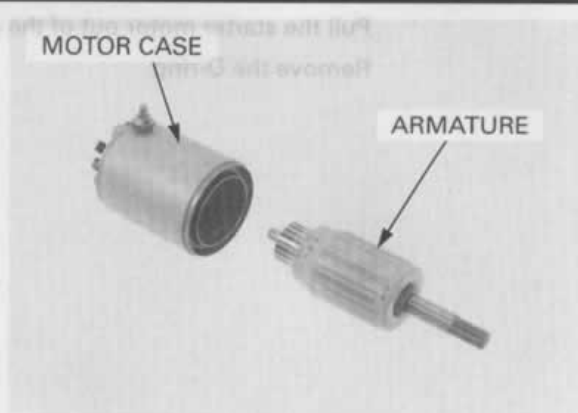
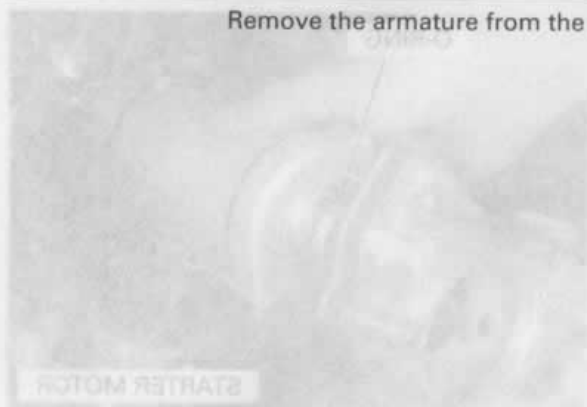
Record the location and number of shims.

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



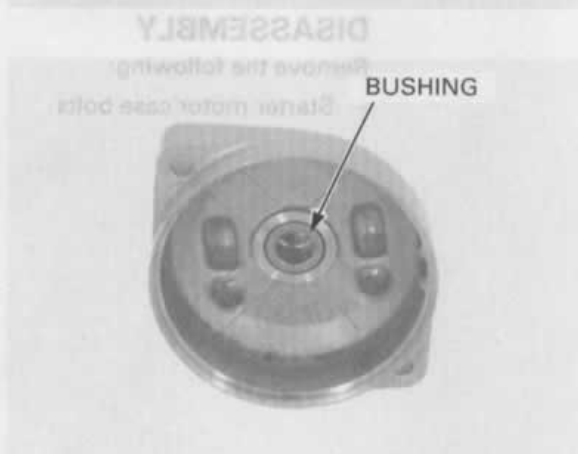
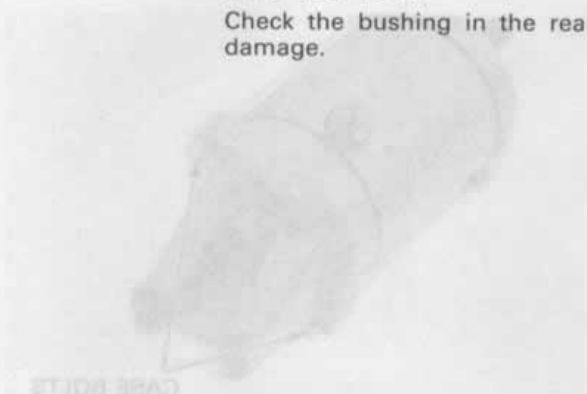
ELECTRIC STARTER

Remove the armature from the motor case.

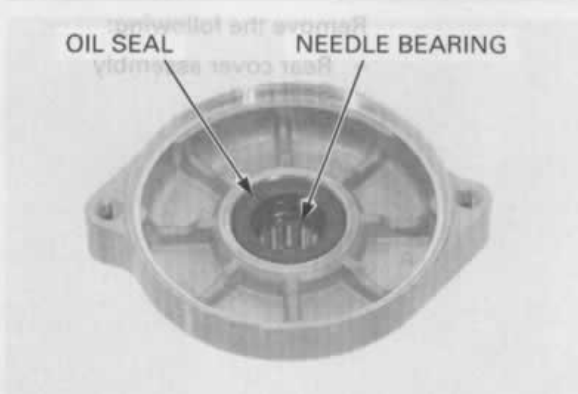


INSPECTION

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

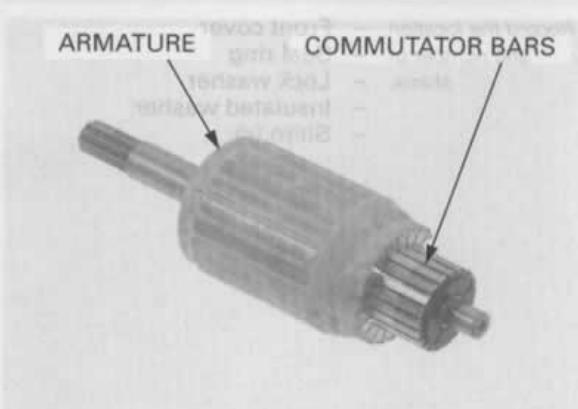


Check the oil seal and needle bearing in the front cover for deterioration, wear or damage.

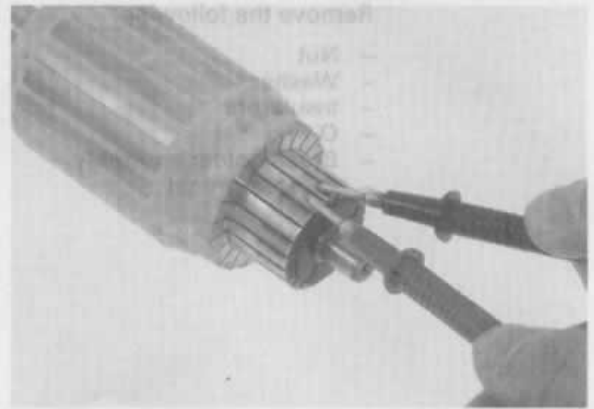


Do not use emery or sand paper on the commutator.

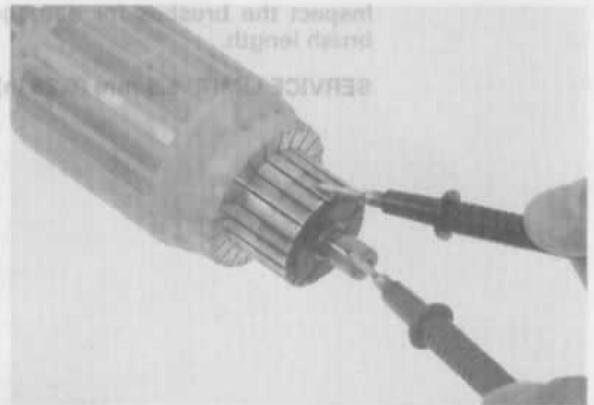
Check the commutator bars of the armature for discoloration.



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



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.



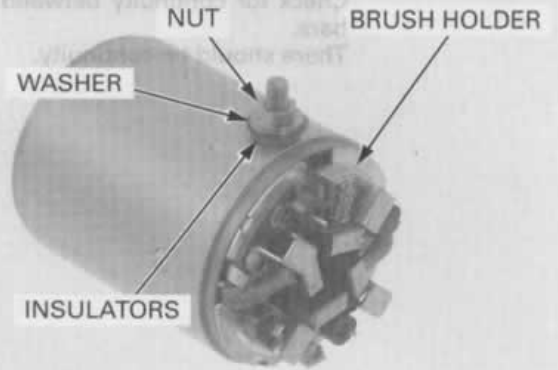
Check for continuity between the cable terminal and the rear cover.
There should be no continuity.



ELECTRIC STARTER

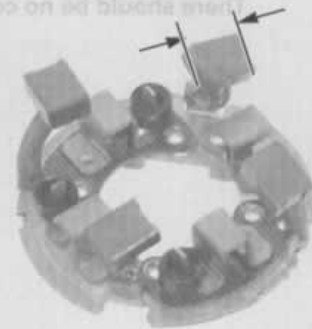
Remove the following:

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

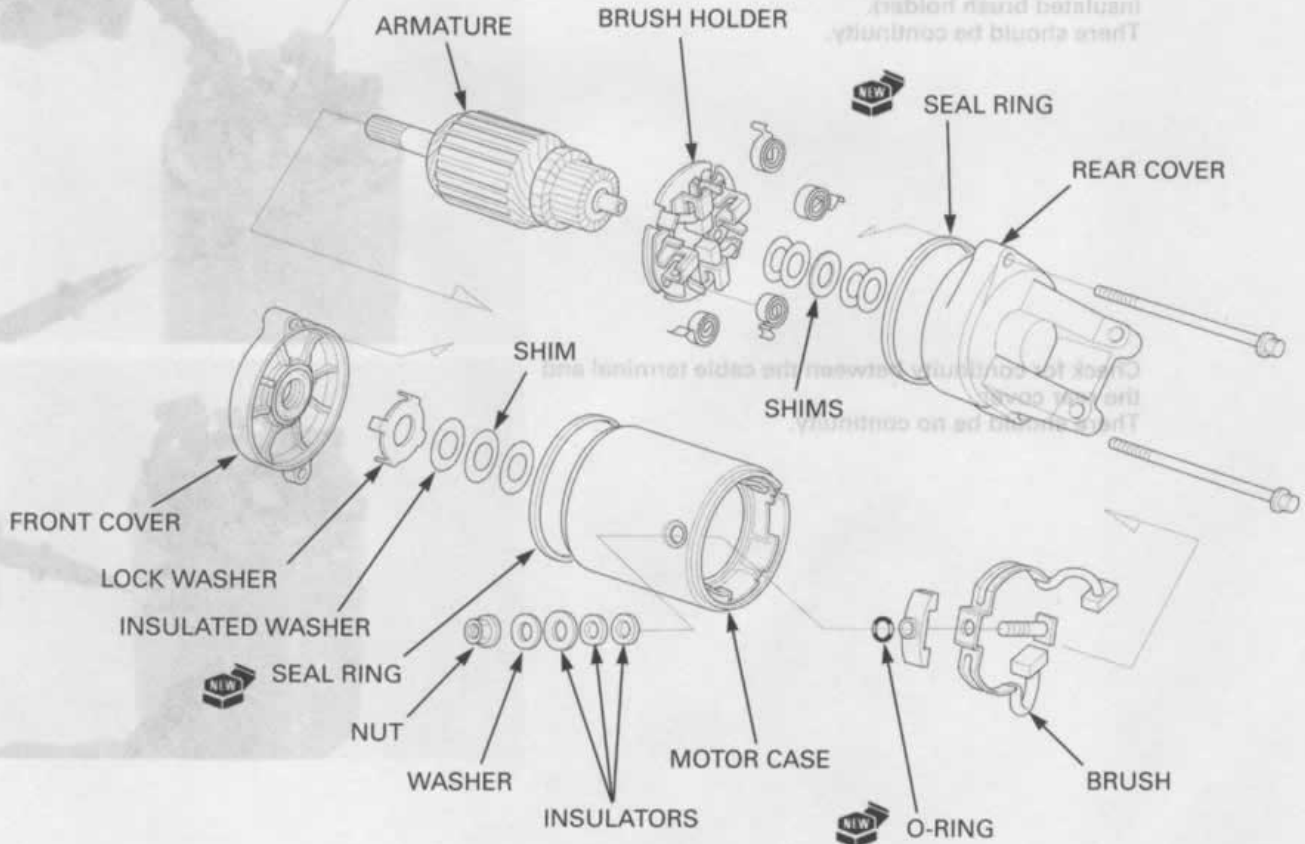


Inspect the brushes for damage and measure the brush length.

SERVICE LIMIT: 6.5 mm (0.26 in)



ASSEMBLY



Install the terminal bolt and insulator to the brush holder.

INSULATOR

TERMINAL BOLT

Install the brushes into the brush holder.

BRUSH HOLDER

ALIGN

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

INSULATORS

O-RING

NUT

WASHER

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.

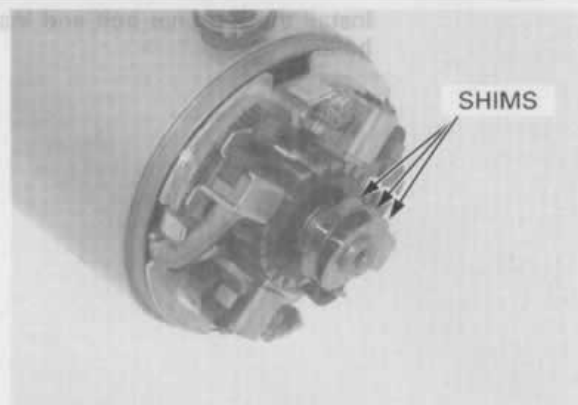
MOTOR CASE

ARMATURE

ELECTRIC STARTER

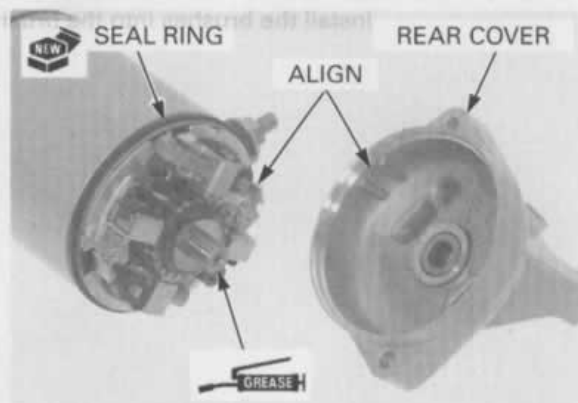
Install the shims properly as noted during removal.

Install the same number of shims in the same location as noted during disassembly.



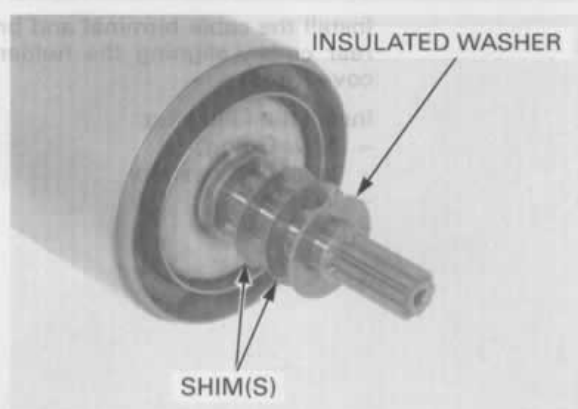
Install a new seal ring onto the motor case. Apply thin coat of grease to the armature shaft end.

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



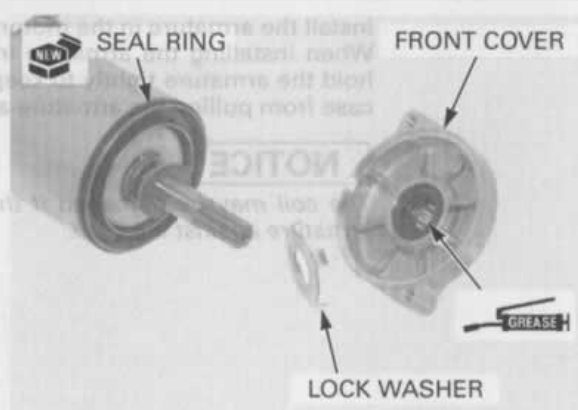
Install the shims properly as noted during removal.

Install the shims and insulated washer onto the armature shaft.

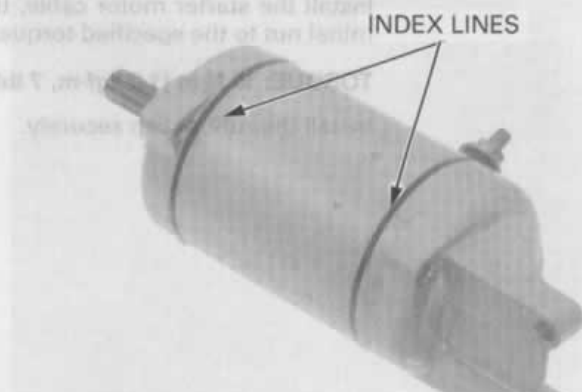


Install a new seal ring onto the motor case. Apply grease to the oil seal lip and needle bearing in the front cover.

Install the lock washer onto the front cover. Install the front cover.

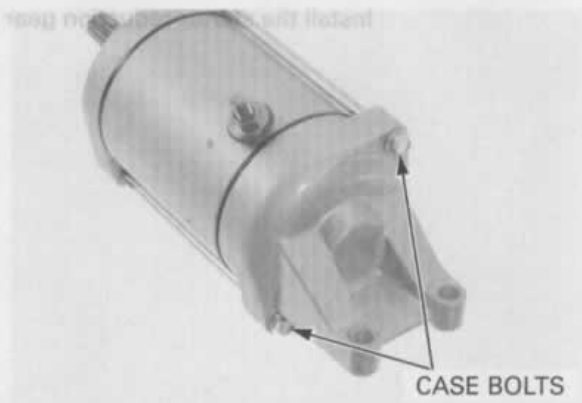


Make sure the index lines on the motor case and covers are aligned.



INDEX LINES

Install and tighten the case bolts securely.

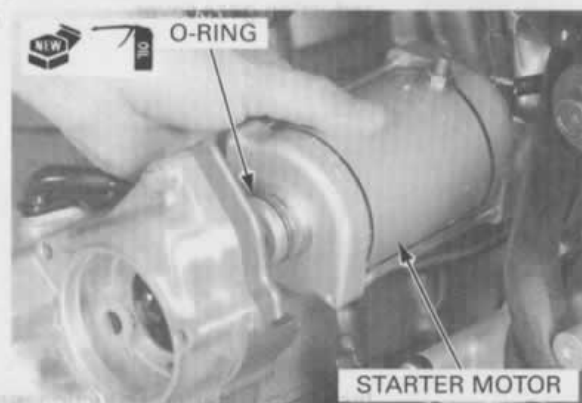


CASE BOLTS

INSTALLATION

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

Install the starter motor into the crankcase.

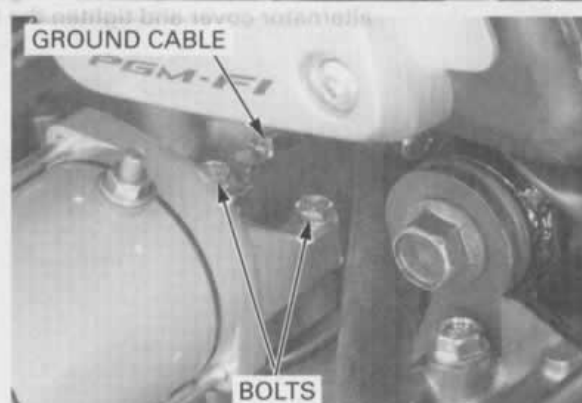
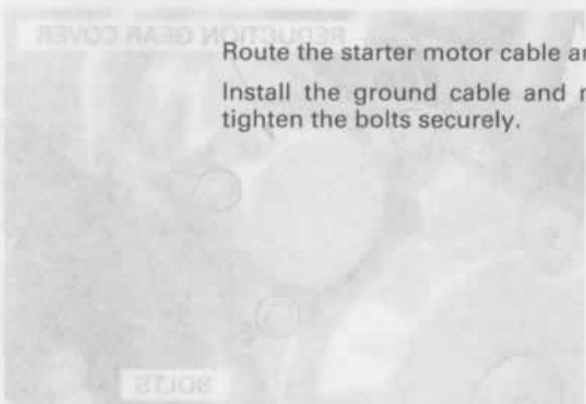


O-RING

STARTER MOTOR

Route the starter motor cable and ground cable.

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



GROUND CABLE

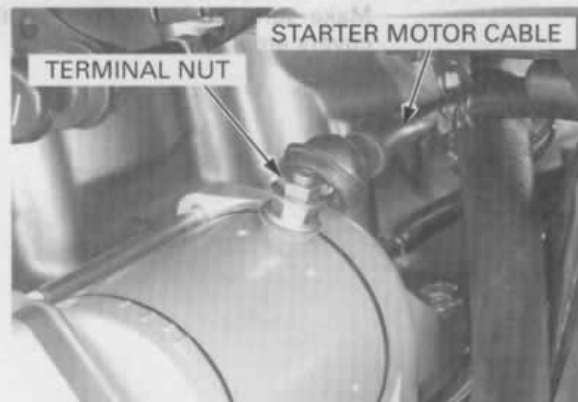
BOLTS

ELECTRIC STARTER

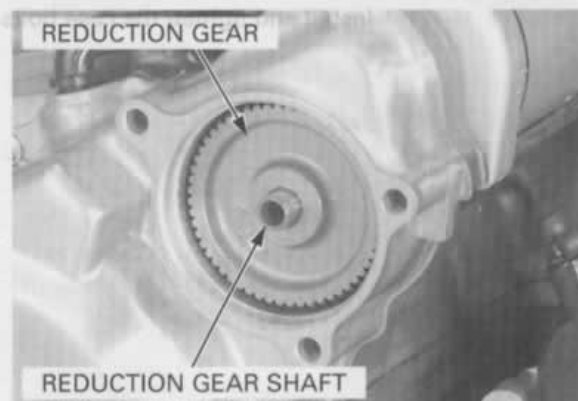
Install the starter motor cable, then tighten the terminal nut to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the rubber cap securely.



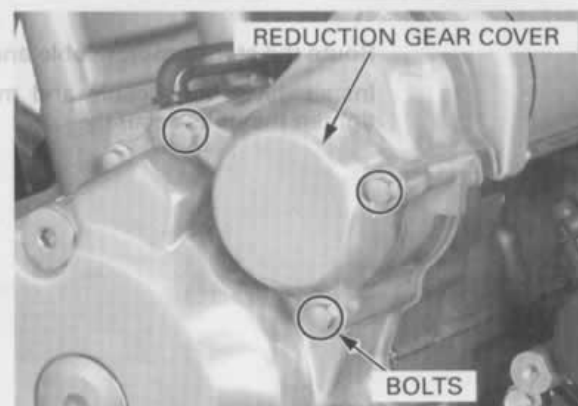
Install the starter reduction gear and shaft.



Install the new O-ring into the groove of the starter reduction gear cover.



Install the starter reduction gear cover onto the alternator cover and tighten the bolts.



STARTER RELAY SWITCH

OPERATION INSPECTION

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

Shift the transmission into neutral.

Turn the ignition switch ON and engine stop switch to RUN.

Turn the ignition switch ON and engine stop switch to RUN.

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.

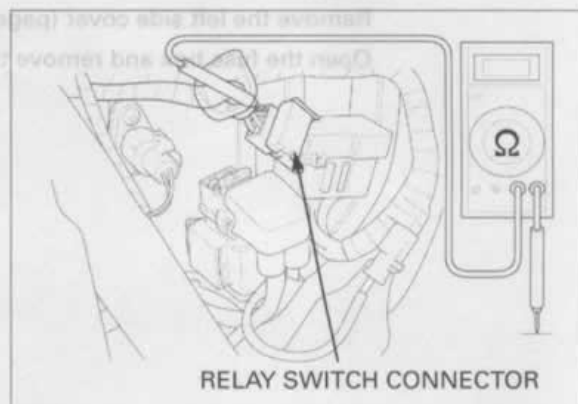


GROUND LINE INSPECTION

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).



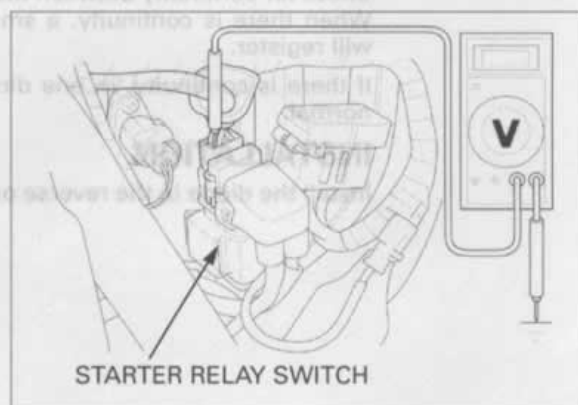
STARTER RELAY VOLTAGE INSPECTION

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 ON and engine stop switch at RUN, it is normal.



CONTINUITY INSPECTION

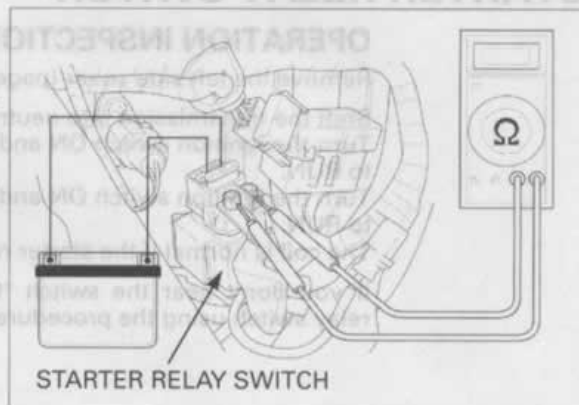
Disconnect the starter relay connector and cables.

Connect an ohmmeter to the starter relay switch large terminals.

Connect a fully charged 12V 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 12V battery is connected to the starter relay switch connector terminals and should be no continuity when the battery is disconnected.

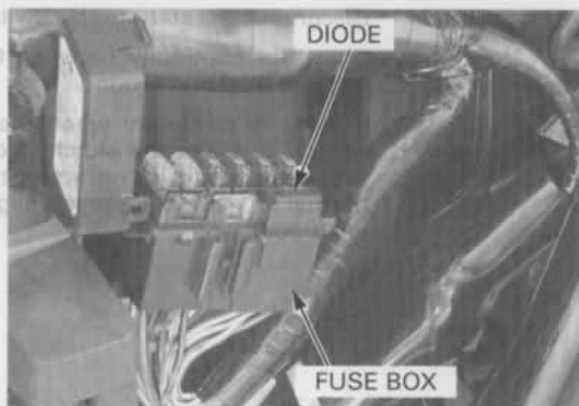


DIODE

REMOVAL

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

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.

