

# ELECTRICAL SYSTEM

## CONTENTS

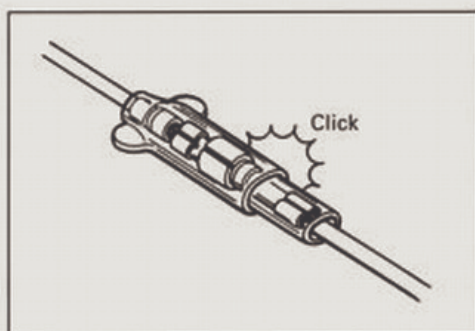
CAUTIONS IN SERVICING .....	7- 1
LOCATION OF ELECTRICAL COMPONENTS .....	7- 3
CHARGING SYSTEM .....	7- 5
DESCRIPTION .....	7- 5
TROUBLESHOOTING .....	7- 7
INSPECTION .....	7- 8
AUTOMATIC DE-COMPRESSION SYSTEM, STARTER SYSTEM AND SIDE-STAND/IGNITION INTERLOCK SYSTEM .....	7-10
AUTOMATIC DE-COMPRESSION SYSTEM, STARTER SYSTEM DESCRIPTION .....	7-10
SIDE-STAND/IGNITION INTERLOCK SYSTEM DESCRIPTION ....	7-11
TROUBLESHOOTING .....	7-12
STARTER MOTOR REMOVAL AND DISASSEMBLY .....	7-14
STARTER MOTOR INSPECTION .....	7-15
STARTER MOTOR REASSEMBLY AND INSTALLATION .....	7-16
STARTER RELAY INSPECTION .....	7-17
SIDE-STAND/IGNITION INTERLOCK SYSTEM PART INSPECTION .....	7-18
AUTOMATIC DE-COMPRESSION RELAY INSPECTION .....	7-20
AUTOMATIC DE-COMPRESSION SOLENOID INSPECTION .....	7-21
IGNITION SYSTEM (DIGITAL IGNITOR) .....	7-22
DESCRIPTION .....	7-22
TROUBLESHOOTING .....	7-23
INSPECTION .....	7-24
SPEEDOMETER .....	7-29
REMOVAL .....	7-29
INSPECTION .....	7-29
RELAYS .....	7-32
STARTER RELAY .....	7-32
AUTOMATIC DE-COMPRESSION RELAY .....	7-32
TURN SIGNAL/SIDE-STAND RELAY .....	7-32
LAMPS .....	7-33
HEADLIGHT .....	7-33
BRAKE LIGHT/TAILLIGHT .....	7-34
TURN SIGNAL LIGHTS .....	7-34
SWITCHES .....	7-35
BATTERY .....	7-36
SPECIFICATIONS .....	7-36
INITIAL CHARGING .....	7-36
SERVICING .....	7-37
RECHARGING OPERATION .....	7-38



## CAUTIONS IN SERVICING

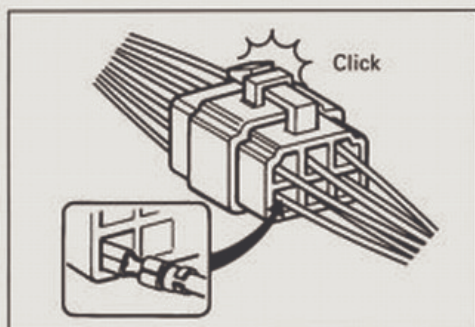
### CONNECTOR

- When disconnecting a connector, be sure to hold the terminals; do not pull the lead wires.
- When connecting a connector, push it in so it is firmly attached.
- Inspect the connector for corrosion, contamination and any breakage in the cover.



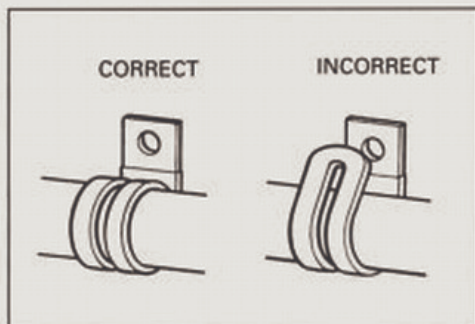
### COUPLER

- With a lock-type coupler, be sure to release the lock before disconnecting it. When connecting a coupler, push it in until the lock clicks shut.
- When disconnecting a coupler, be sure to hold the coupler; do not pull the lead wires.
- Inspect each terminal on the coupler for looseness or bends.
- Inspect each terminal for corrosion and contamination.



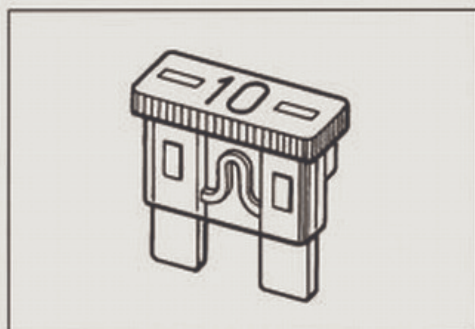
### CLAMPS

- Refer to "WIRE, CABLE AND HOSE ROUTING" (See pp. 8-12 to -18.) for proper clamping procedures.
- Bend the clamp properly as shown in the illustration.
- When clamping the wire harness, do not allow it to hang down.
- Do not use wire or any other substitute for the band-type clamp.



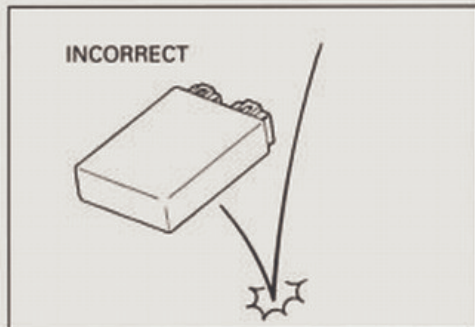
### FUSE

- When a fuse blows, always investigate the cause, correct the problem and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use any substitutes for the fuse (e.g., wire).



### SEMI-CONDUCTOR EQUIPPED PARTS

- Do not drop any part that contains a semi-conductor (e.g., ignitor, regulator/rectifier).
- When inspecting the part, follow the inspection instructions carefully. Neglecting proper procedures may cause this part to be damaged.





## BATTERY

- The MF battery used in this motorcycle does not require maintenance (e.g., electrolyte level inspection, distilled water replenishing).
- During normal charging, no hydrogen gas is produced. However, if the battery is overcharged, hydrogen gas may be produced. Therefore, be sure that there are no fire or spark sources nearby (e.g., short-circuit) when charging the battery.
- Be sure to recharge the battery in a well-ventilated and open area.
- Note that the charging system for the MF battery is different from that of a conventional battery. Do not replace the MF battery with a conventional battery.

## CONNECTING BATTERY

- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the negative (⊖) terminal first.
- When connecting terminals to the battery, be sure to connect the positive (⊕) terminal first.
- If the terminal is found corroded, remove the battery, pour warm water over it and clean with a wire brush.
- Upon completion of connection, apply grease lightly.
- Put a cover over the positive (⊕) terminal.

## WIRING PROCEDURE

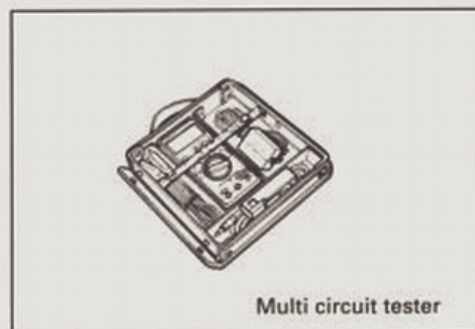
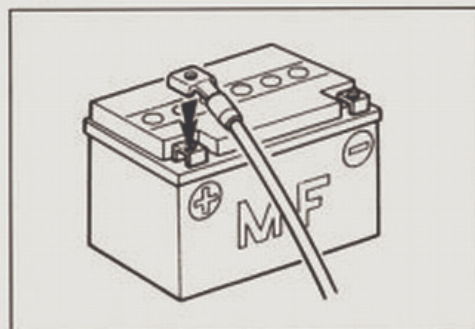
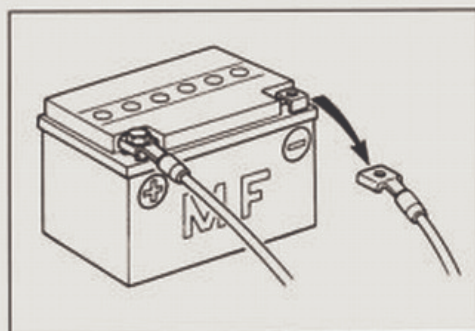
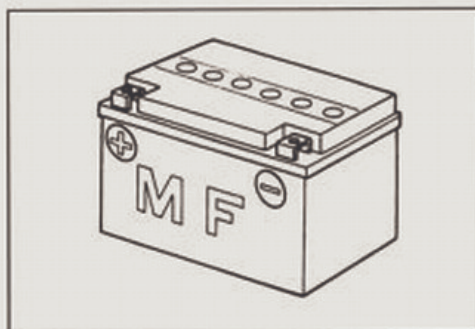
- Route the wire harness properly according to "WIRE HARNESS ROUTING" (See pp. 8-12 to -18.).

## USING MULTI CIRCUIT TESTER

- Be sure to use positive (⊕) and negative (⊖) probes of the tester properly. Their false use may cause damage in the tester.
- If the current values are not known, start measuring in the higher range.
- Taking a measurement where voltage is applied in the resistance range may cause damage in the tester. When measuring resistance, check to make sure that no voltage is applied there.
- After using the tester, turn the switch to the OFF position.

### ⚠ CAUTION

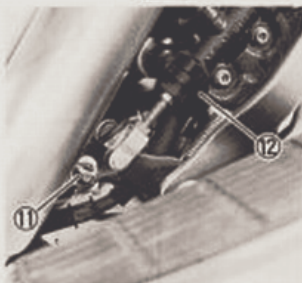
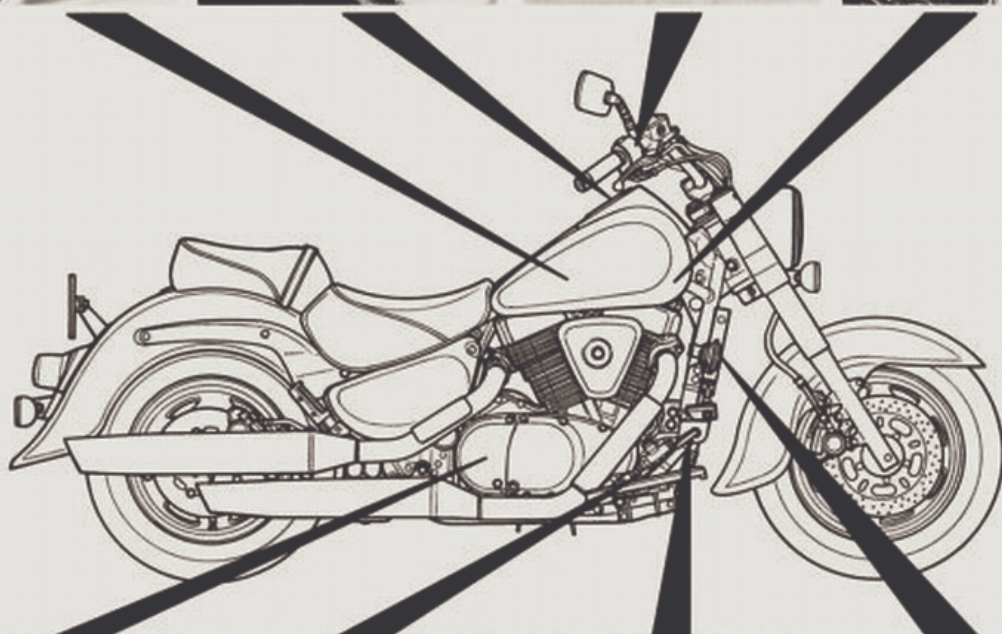
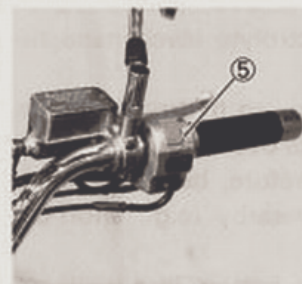
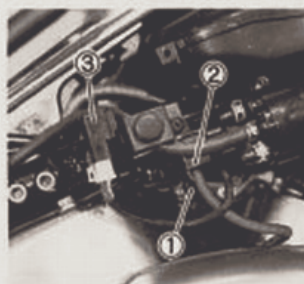
Before using the multi circuit tester, read the instruction manual.



Multi circuit tester

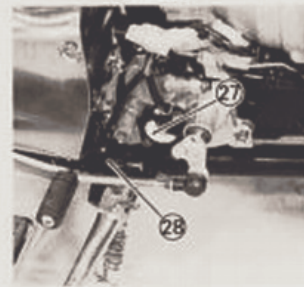
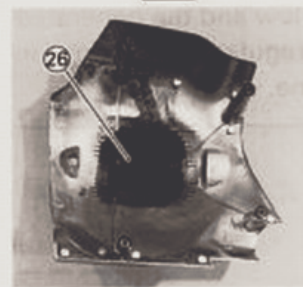
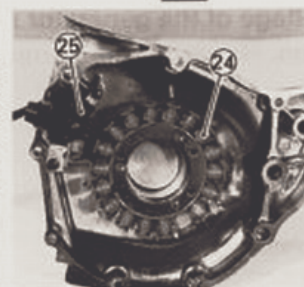
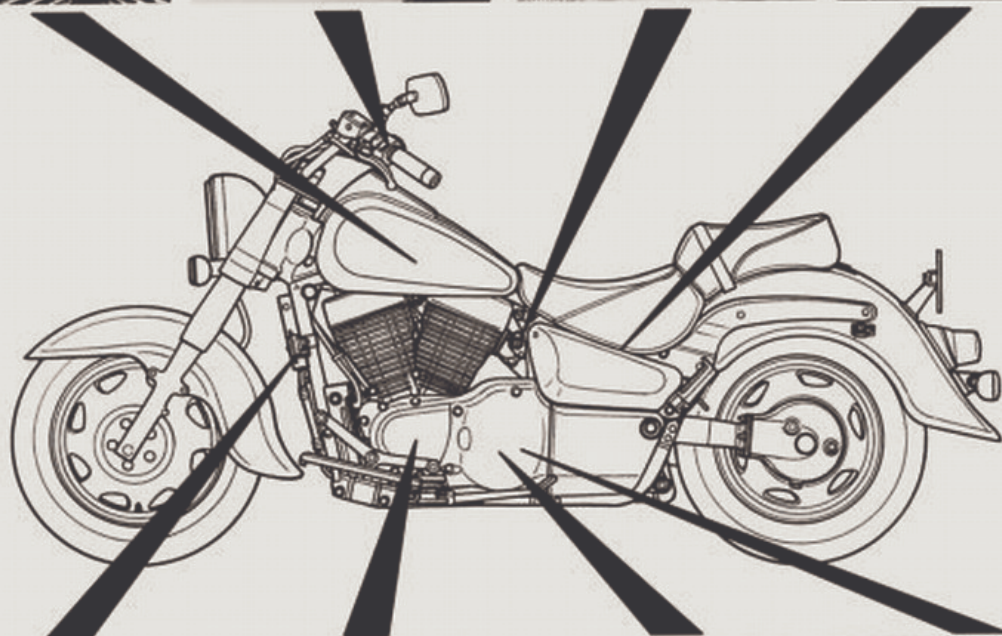


# LOCATION OF ELECTRICAL COMPONENTS



- |                                     |  |
|-------------------------------------|--|
| ① Throttle position sensor          | ⑨ Turn signal/side-stand relay             |
| ② MAP sensor                        | ⑩ Speed sensor                             |
| ③ Automatic de-compression relay    | ⑪ Oil pressure switch                      |
| ④ Speedometer                       | ⑫ Rear brake light switch                  |
| ⑤ Handlebar switch (R)              | ⑬ Starter motor                            |
| ⑥ Automatic de-compression solenoid | ⑭ Battery                                  |
| ⑦ Ignition coil (#2)                | ⑮ Horn (Except for E-03, -24, -28 and -33) |
| ⑧ Fuse box                          |  |





①⑥ Ignition coil (#2)

①⑦ Starter relay

①⑧ Ignitor

①⑨ Fuel pump

②⑦ Handlebar switch (L)

②① Ignition switch

②② Fuel level gauge

②③ Horn (Except for E-03, -24, -28 and -33)

②④ Generator

②⑤ Signal generator

②⑥ Regulator/Rectifier

②⑦ Neutral indicator light switch

②⑧ Side-stand switch

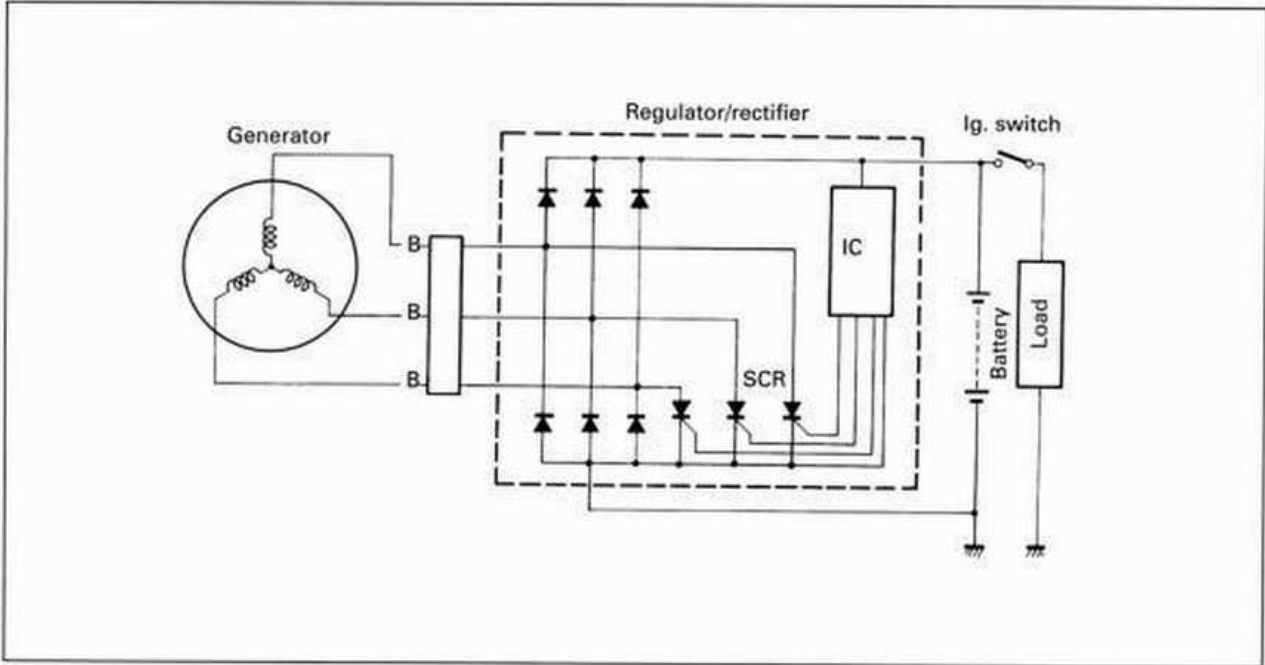


## CHARGING SYSTEM

### DESCRIPTION

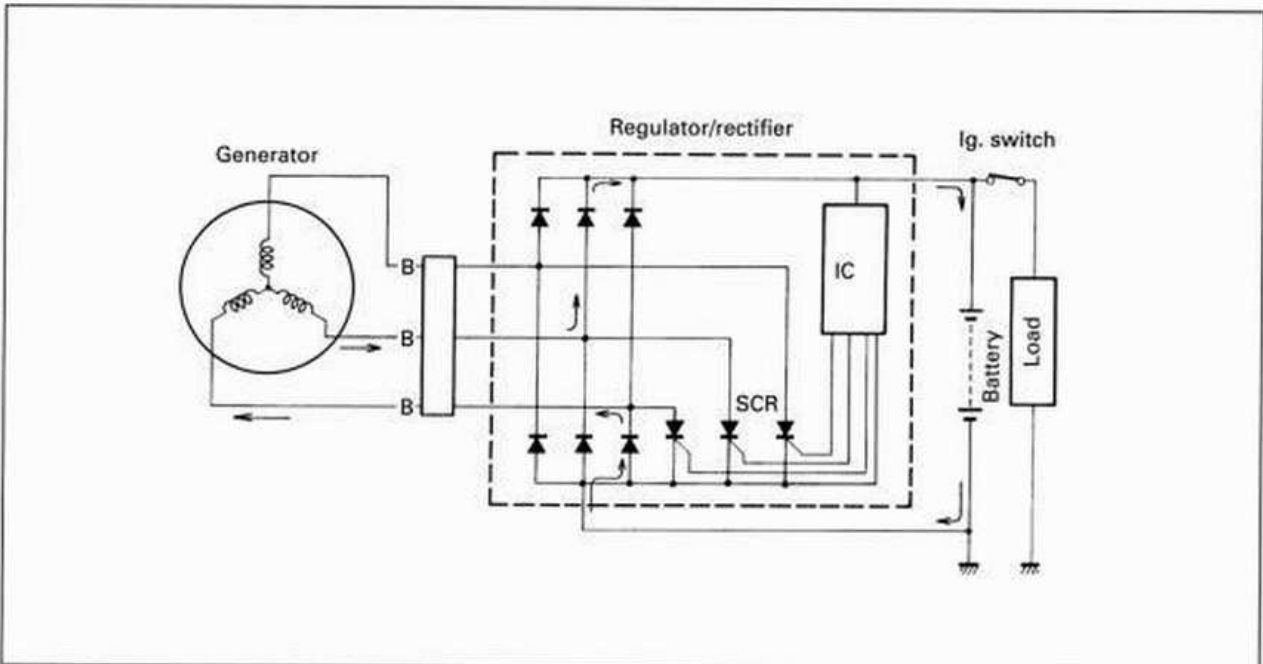
The circuit of the charging system is indicated in the figure, which is composed of a generator, regulator/rectifier unit and battery.

The AC current generated from the generator is rectified by the rectifier and is turned into DC current, then it charges the battery.



### FUNCTION OF REGULATOR

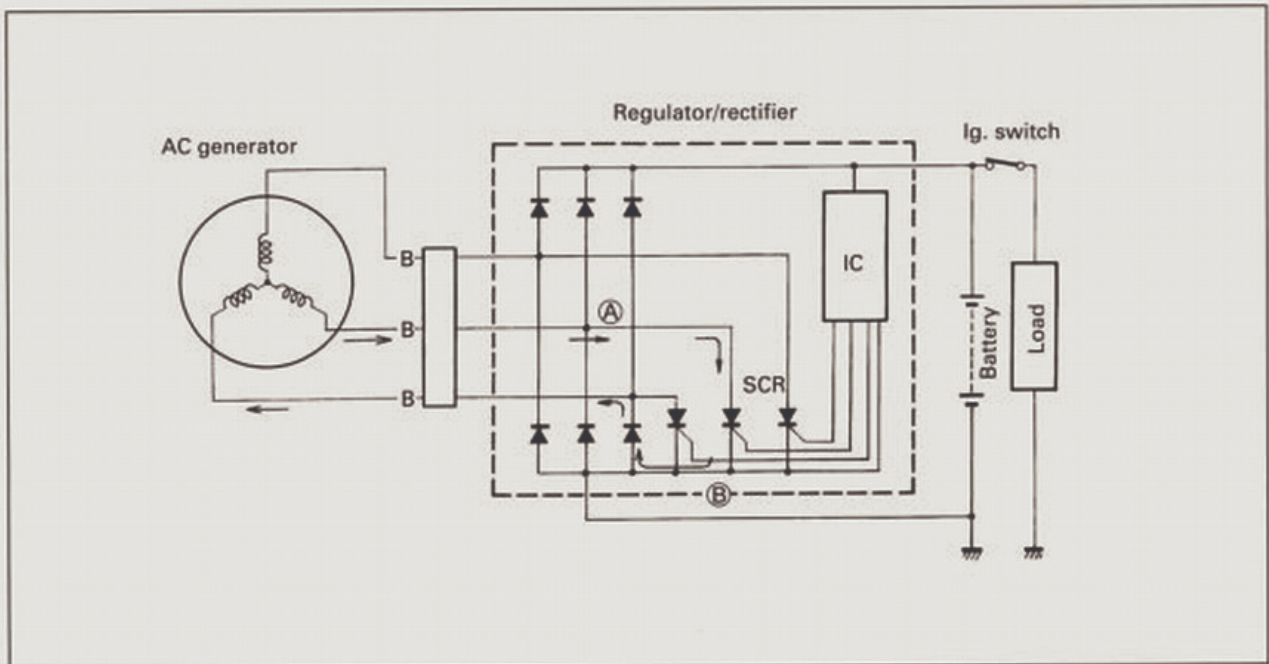
While the engine r/min is low and the generated voltage of the generator is lower than the adjusted voltage of regulator, the regulator does not function. However, the generated current charges the battery directly at this time.





When the engine r/min becomes higher, the generated voltage of the generator also becomes higher and the voltage between the battery terminals becomes high accordingly. When it reaches the adjusted voltage of the I.C., (Integrated Circuit) and it is turned "ON", a signal will be sent to the SCR (Thyristor) gate probe and the SCR will be turned "ON".

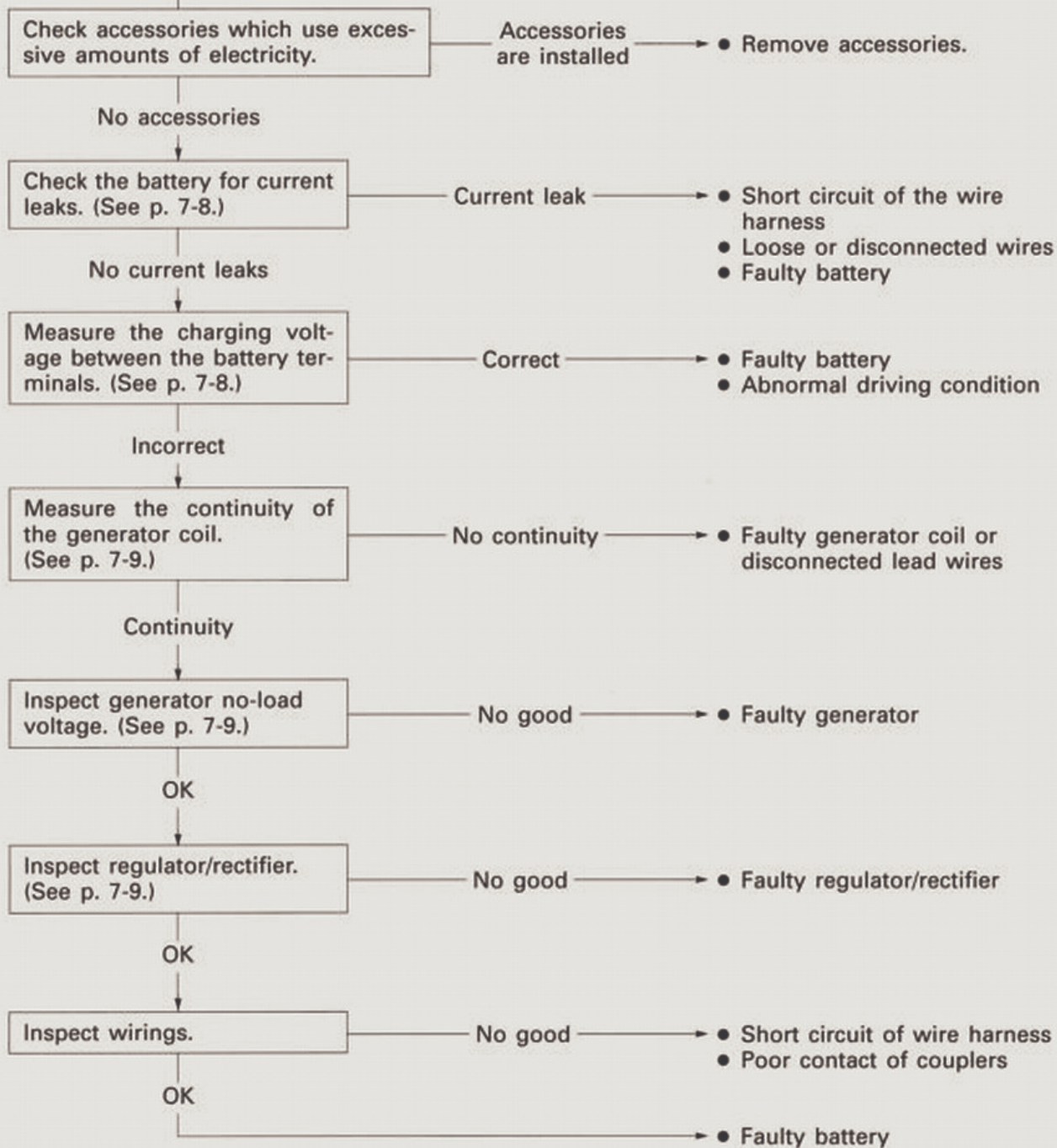
Then, the SCR becomes conductive in the direction from point (A) to point (B). At this time, the current generated from the generator gets through the SCR without charging the battery and returns to generator again. At the end of this state, since the AC current generated from generator flows to point (B), the reverse current tends to flow to SCR. Then, the circuit of SCR turns to the OFF mode and begins to charge the battery again. Thus these repetitions maintain charging voltage and current to the battery constant and protect it from overcharging.





## TROUBLESHOOTING

## Battery runs down quickly.



## Others

## Battery overcharge

- Faulty regulator/rectifier
- Faulty battery
- Poor contact of generator lead wire coupler

## INSPECTION

### BATTERY CURRENT LEAK INSPECTION

- Turn the ignition switch to the "OFF" position.
- Remove the battery cover ①.
- Disconnect the battery  $\ominus$  lead wire.
- Connect the multi circuit tester between the battery  $\ominus$  terminal and the battery  $\ominus$  lead wire.

#### NOTE:

Leakage is evident if the reading is over 1mA.

Battery current leak: Under 1mA

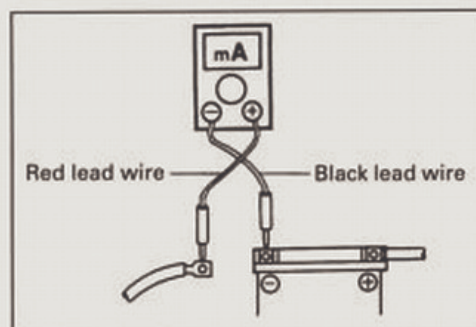
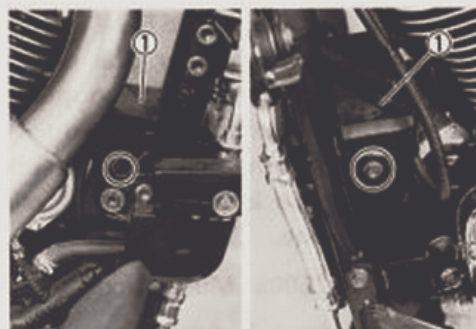
 Tester knob indication: Current (  $\overline{\text{---}}$  , 20mA)

 09900-25008: Multi circuit tester set

#### CAUTION

- \* Because the current leak might be large, turn the tester to the high range first to avoid tester damage.
- \* Do not turn the ignition switch to the "ON" position when measuring the current.

When checking to find the excessive current leak, remove the couplers and connectors, one by one, checking each part.



### CHARGING OUTPUT INSPECTION


- Remove the battery cover.
- Start the engine, turn the lighting switch to ON and the dimmer switch to HI and run the engine at 5 000 r/min.

Measure the DC voltage between the battery  $\oplus$  and  $\ominus$  terminals using a multi-circuit tester. If the tester reads under 13.5V or over 15.0V, inspect the stator coil, regulator/rectifier which are mounted in the generator.

#### NOTE:

When performing this test, make sure that the battery is fully-charged.

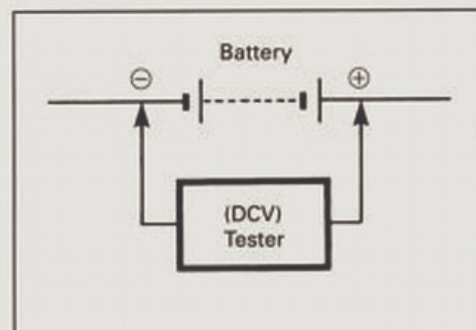
 09900-25008: Multi circuit tester set

 Tester knob indication: Voltage (  $\overline{\text{---}}$  )

#### Specification

Charging output (Regulated voltage):

13.5–15.0V at 5 000 r/min.





**GENERATOR COIL RESISTANCE INSPECTION**


- Remove the secondary gear case cover. (See p. 3-7.)
- Disconnect the generator coupler.

Measure the resistance between the three lead wires.

Also check that the stator core is insulated.

If the resistance is not specified value, replace the stator with a new one.

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Resistance ( $\Omega$ )**

**Specification**

**Generator coil resistance: 0.1–1.0  $\Omega$**

**NOTE:**

When making above test, it is not necessary to remove the generator.

**GENERATOR NO-LOAD PERFORMANCE INSPECTION**

- Remove the secondary gear case cover. (See p. 3-7.)
- Start the engine and keep it running at 5 000 r/min.

Using a multi circuit tester, measure the voltage between three lead wires.

If the tester reads under the specified value, replace the generator with a new one.

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Voltage (V)**

**Specification**

**Generator no-load performance (When engine is cold):**  
**More than 80V (AC) at 5 000 r/min**

**REGULATOR/RECTIFIER INSPECTION**

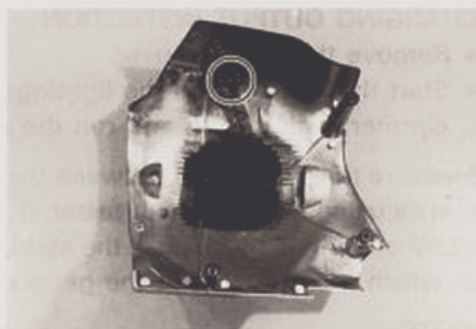
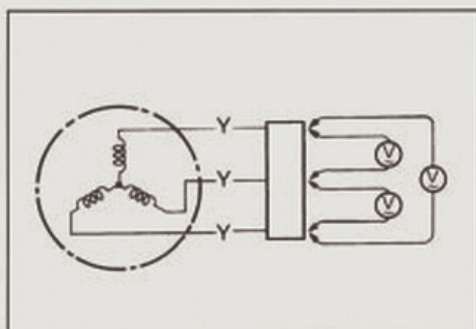
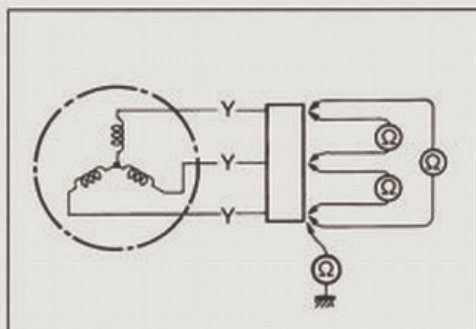
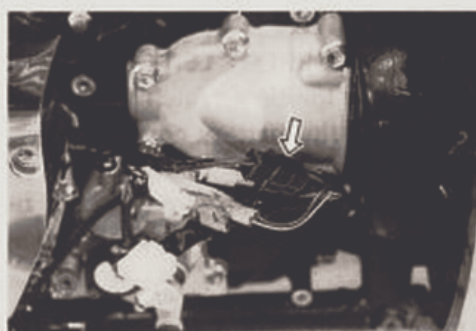
- Remove the secondary gear case cover. (See p. 3-7.)

Using a multi circuit tester, measure the voltage between the lead wires in the following table.

If voltage is incorrect, replace the regulator/rectifier.

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Diode test (→←)**



⊕ Probe of tester to:

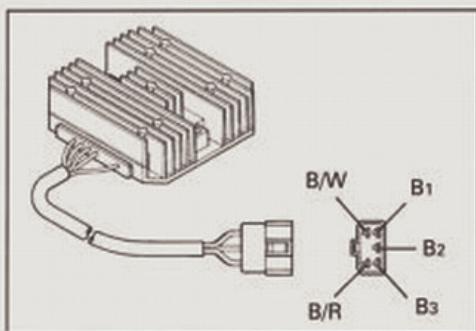
Probe of tester to:	B/R	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B/W
B/R		0.4~0.7	0.4~0.7	0.4~0.7	0.5~1.2
B <sub>1</sub>	Approx. 1.5		Approx. 1.5	Approx. 1.5	0.4~0.7
B <sub>2</sub>	Approx. 1.5	Approx. 1.5		Approx. 1.5	0.4~0.7
B <sub>3</sub>	Approx. 1.5	Approx. 1.5	Approx. 1.5		0.4~0.7
B/W	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 1.5	

B: Black, B/R: Black with Red tracer, B/W: Black with White tracer

**NOTE:**

If the tester read under 1.4V, replace the battery of multi circuit tester when do not connecting the tester probes.

Unit: V





## AUTOMATIC DE-COMPRESSION SYSTEM, STARTER SYSTEM AND SIDE-STAND IGNITION INTERLOCK SYSTEM

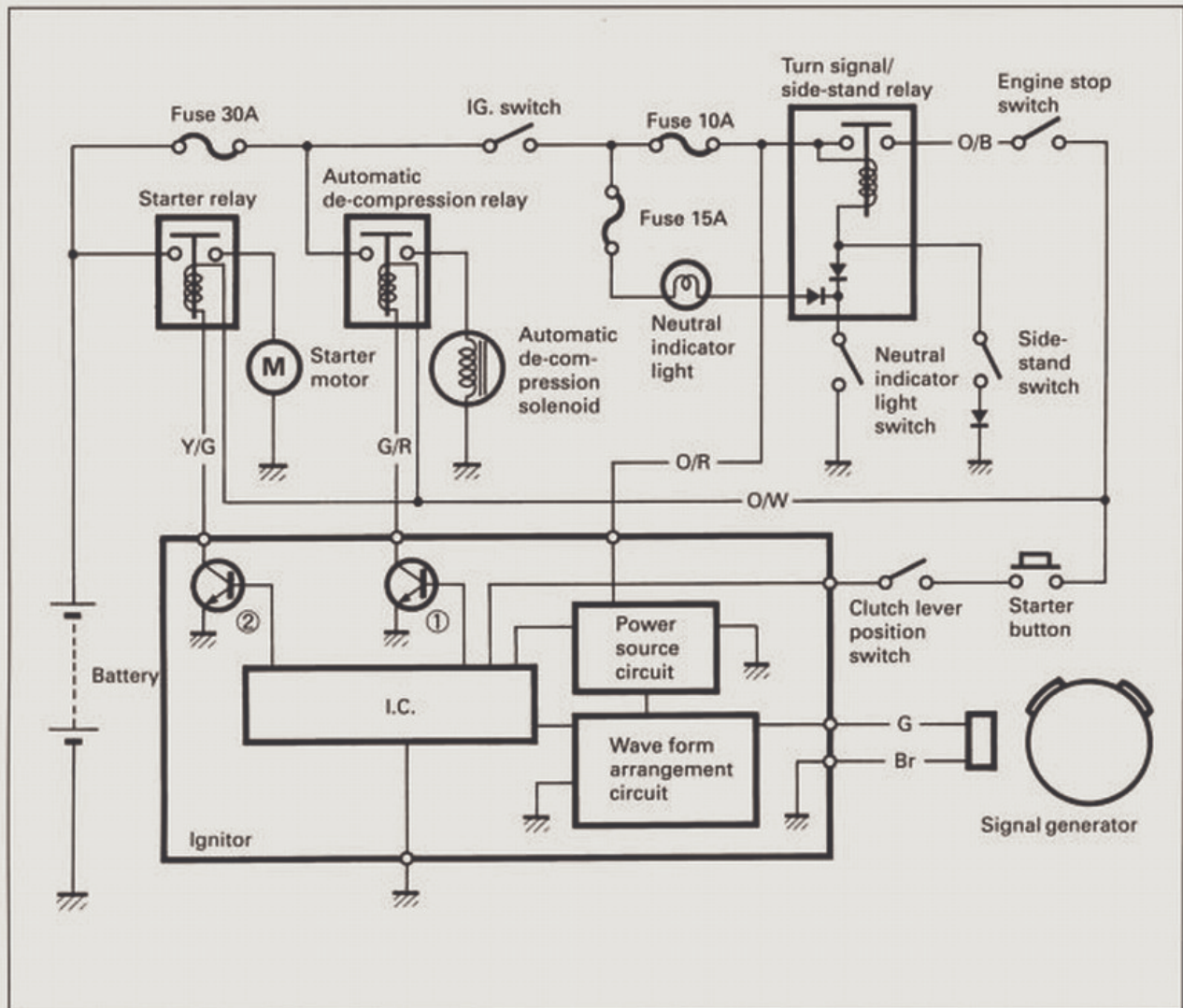
### AUTOMATIC DE-COMPRESSION SYSTEM AND STARTER SYSTEM DESCRIPTION

The automatic de-compression system and starter system consist of the following components: the automatic de-compression solenoid, automatic de-compression relay, starter motor, starter relay, ignitor, signal generator and battery.

The ignitor controls the timing of lifting the de-compression lever up and down, and the start timing of the starter motor.

### AUTOMATIC DE-COMPRESSION SYSTEM AND STARTER SYSTEM OPERATION

When the ignition switch is turned ON, a 12V voltage is applied to ignitor. When all of the side-stand relay, engine stop switch, clutch lever position switch and starter button are turned ON, the I.C. (Integrated Circuit) outputs the signal to the transistor ①. At the same time, the automatic de-compression relay is turned ON and the solenoid lifts up the de-compression lever. When the I.C. outputs the signal to the transistor ② 0.1 second after the starter button is pushed, the starter relay is turned ON and thus the starter motor starts to run. The signal generator senses the crankshaft position. When the signal generator picks up two signals of front cylinder, the I.C. cut off the signal to the transistor ① and the de-compression relay is turned OFF. The de-compression lever returns to the normal position.

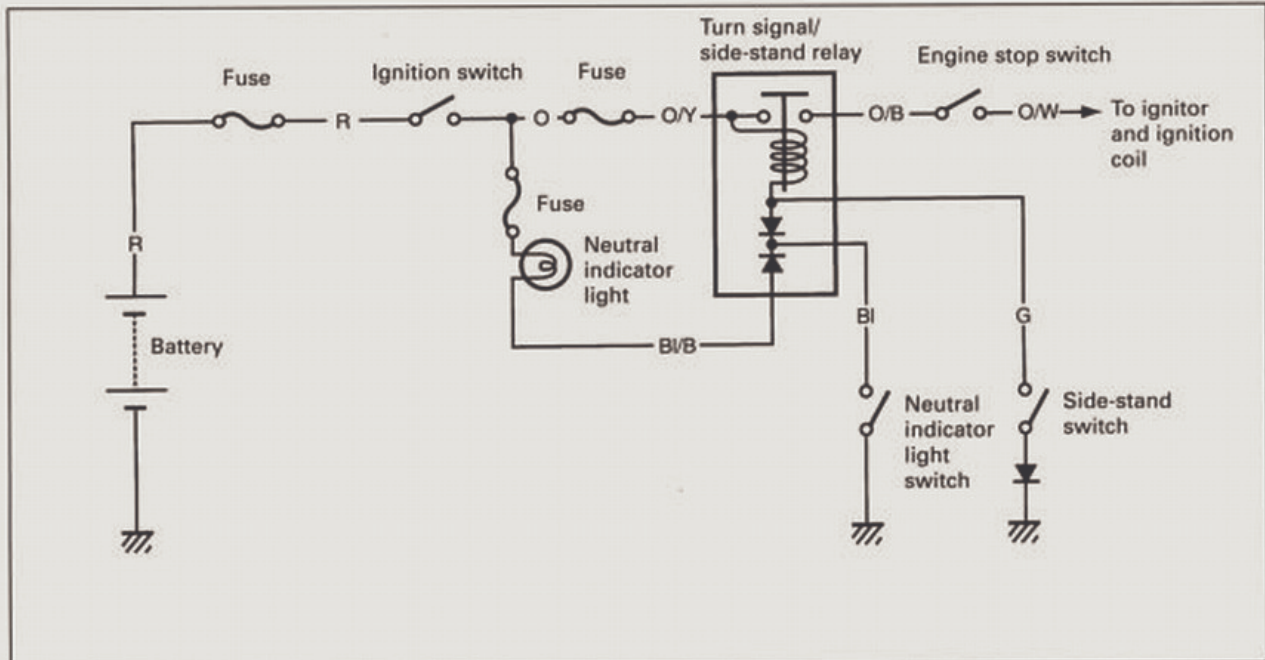




## SIDE-STAND/IGNITION INTERLOCK SYSTEM DESCRIPTION

This system consists of the following components: the turn signal/side-stand relay, neutral indicator light switch, neutral indicator light and side-stand switch.

This side-stand/ignition interlock system prevents the motorcycle from being started with the side-stand down. The ignition coil, de-compression relay and starter relay operation depend on what gear the transmission is in and whether the side-stand is either up or down. The neutral indicator light switch and side-stand switch work together in this system.

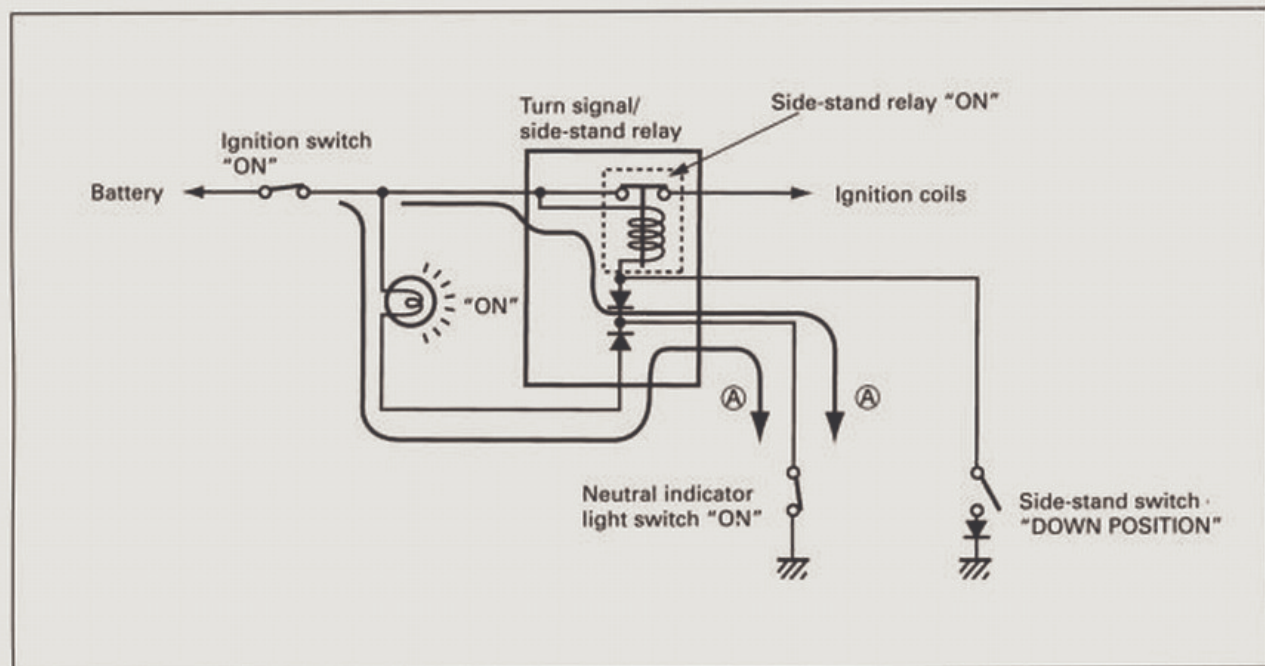


## SIDE-STAND/IGNITION INTERLOCK SYSTEM OPERATION

The ignition coils work only in two situations as follows.

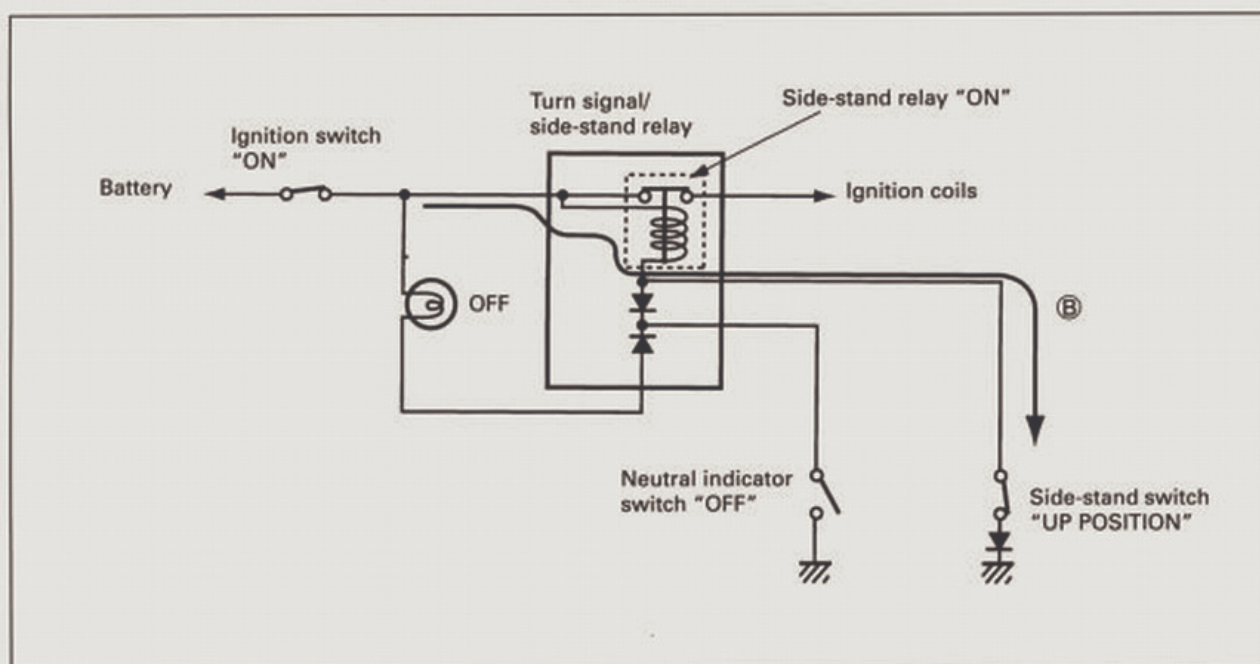
1. Transmission: Neutral (ON) Side-stand: Down (OFF)

The current flow (A) switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs even when the side-stand is kept down.



## 2. Side-stand: Up (ON)

The current flow ⑧ switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs. The engine can be started in any gear.



## TROUBLESHOOTING

**Starter motor will not run.**

\* Check that the transmission is in neutral and the engine stop switch is in the "RUN" position. Grasp the clutch lever. Check that the fuses are not blown and battery is in fully-charged condition before the diagnosis.

Listen for a click from the starter relay when the starter button is pushed.

No click

Check the starter relay.  
(See pp. 7-17 and -18.)

OK

No good

• Faulty starter relay

Clicks

Check if the starter motor runs when its terminal is connected to the battery ⊕ terminal. (Do not use a thin "wire" because a large amount of current flows.)

Runs

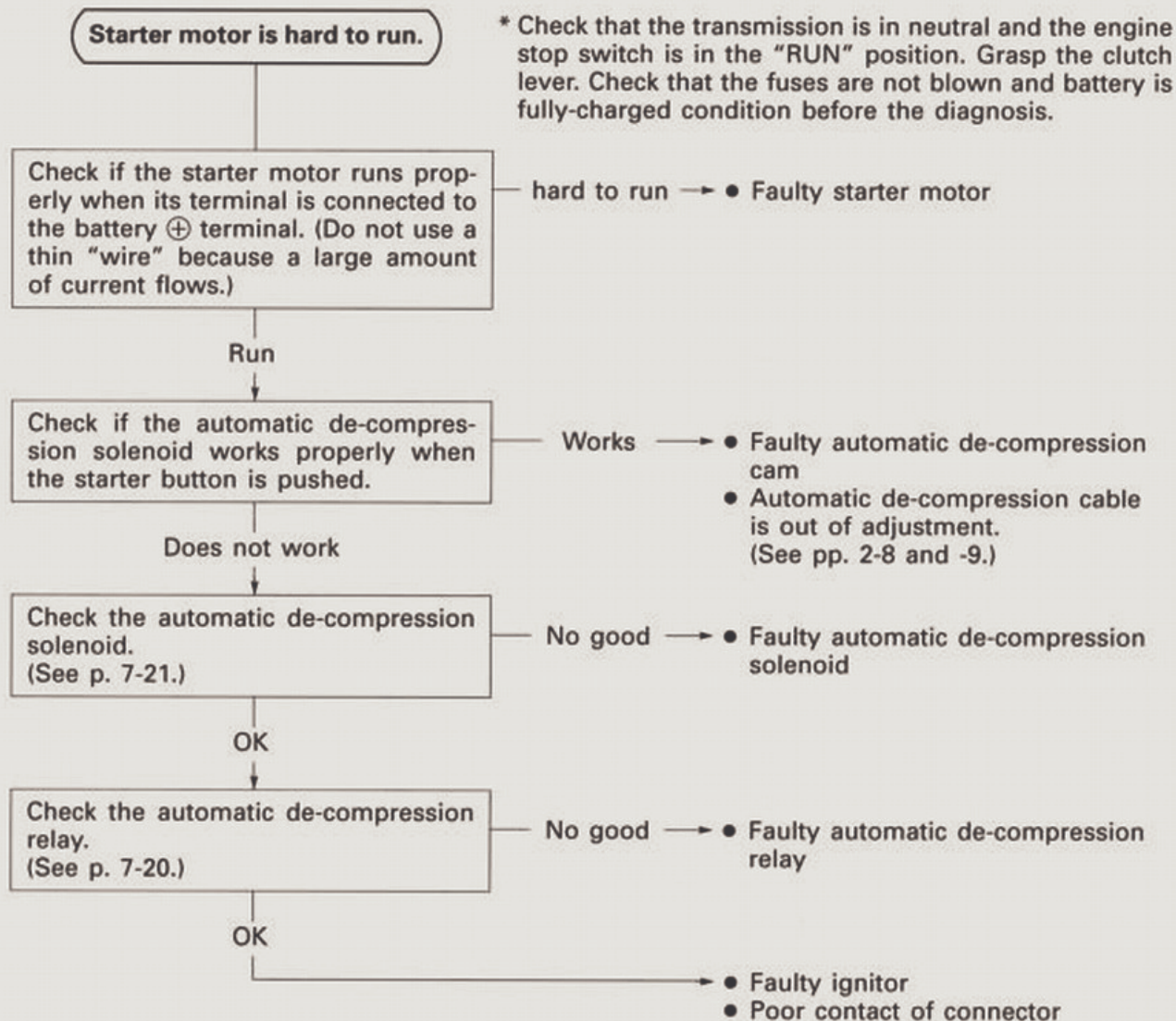
- Faulty ignition switch
- Faulty engine stop switch
- Faulty clutch lever position switch
- Faulty neutral switch
- Faulty turn signal/side-stand relay
- Faulty starter button
- Poor contact of connector
- Open circuit in wire harness

Does not turn

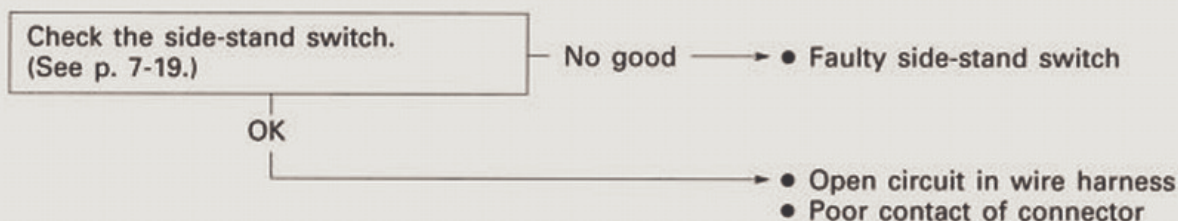
• Faulty starter motor



## TROUBLESHOOTING



The starter motor runs when the transmission is in neutral, but does not run with the transmission is in any position other than neutral, with the side-stand up.

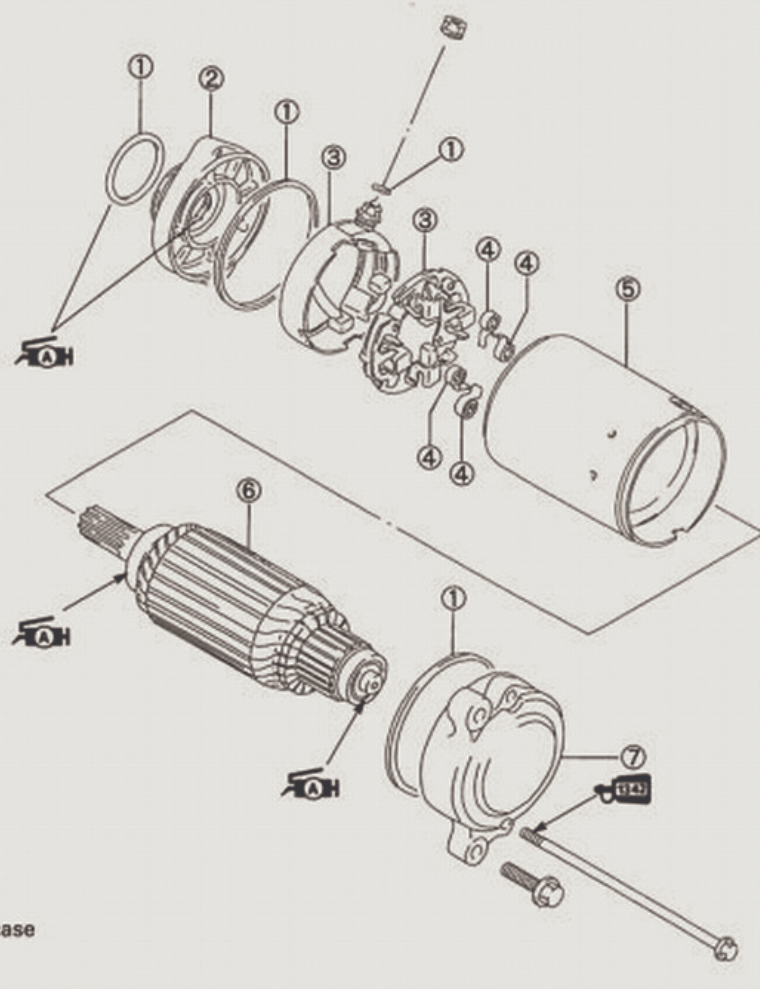


## Others

Engine does not turn though starter motor runs.	<ul style="list-style-type: none"> <li>• Faulty starter clutch</li> <li>• Faulty starter torque limiter</li> </ul>
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## STARTER MOTOR REMOVAL AND DISASSEMBLY

- Remove the engine side box. (See p. 3-3.)
- Remove the exhaust pipe and muffler. (See p. 3-5.)
- Disconnect the starter motor lead wire.
- Remove the starter motor by removing the mounting bolts.
- Disassemble the starter motor, as shown in the illustration.



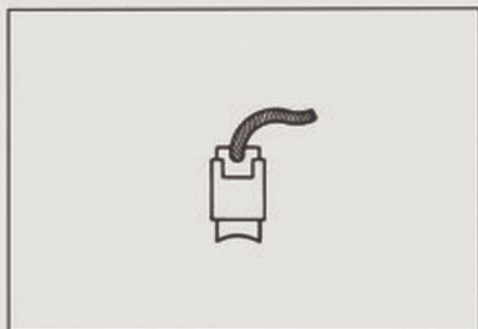
- ① O-ring
- ② Housing end
- ③ Brush holder
- ④ Brush spring
- ⑤ Starter motor case
- ⑥ Armature
- ⑦ Housing end



**STARTER MOTOR INSPECTION****CARBON BRUSHES**

Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.

If either carbon brush is defective, replace the brush assembly.

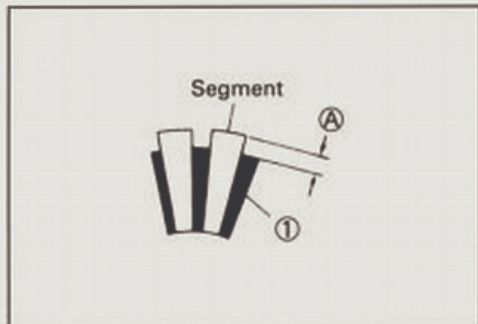
**COMMUTATOR**

Inspect the commutator for discoloration, abnormal wear or undercut (A).

If the commutator is abnormally worn, replace the armature.

If the commutator surface is discolored, polish it with #400 sandpaper and wipe it using a clean, dry cloth.

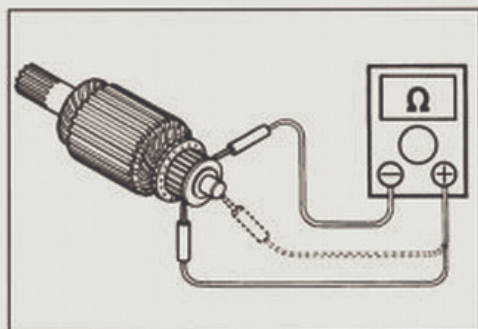
If there is no undercut, scrape out the insulator (1) with a saw blade.

**ARMATURE COIL INSPECTION**

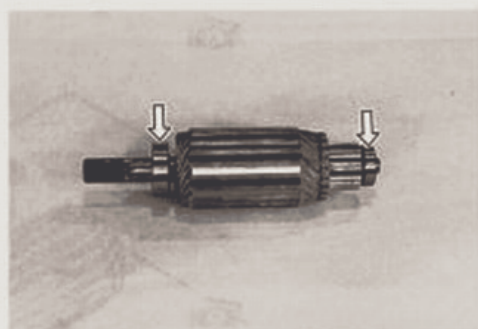
Measure for continuity between each segment.

Measure for continuity between each segment and the armature shaft.

If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

**BEARING INSPECTION**

Inspect the play of the bearings by hand. Rotate the outer race by hand to inspect it for abnormal noise and smooth rotation.

**OIL SEAL INSPECTION**

Check the seal lip for damage or leakage.

If any damage is found, replace the housing end (inside).



## STARTER MOTOR REASSEMBLY AND INSTALLATION

Reassemble the starter motor in the reverse order of disassembly. Pay attention to the following points:

### ⚠ CAUTION

Replace the O-rings with new ones to prevent oil leakage and moisture.

- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

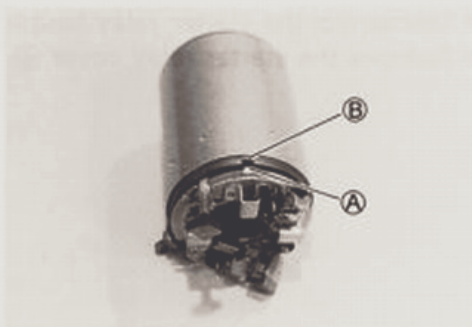
 99000-25030: SUZUKI SUPER GREASE "A"



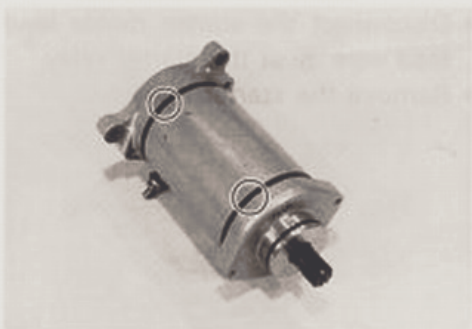
- Before installing the terminal nut, install the O-ring.



- Align the protrusion (A) of the bush holder with the groove (B) of the starter motor case.



- Align the match marks on the starter motor case with the match marks on the housing ends.





- Apply a small quantity of THREAD LOCK "1342" to the starter motor housing bolts.

 99000-32050: THREAD LOCK "1342"

- Install the starter motor with two bolts.

**NOTE:**

- \* Fit the ground lead wire to the lower bolt as shown.
- \* Apply SUZUKI SUPER GREASE "A" to the starter motor O-ring.

 99000-25030: SUZUKI SUPER GREASE "A"

**CAUTION**

Use a new O-ring to prevent oil leakage.

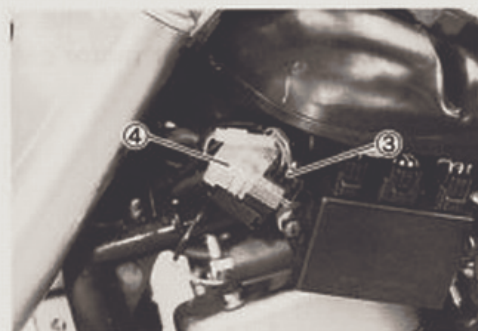
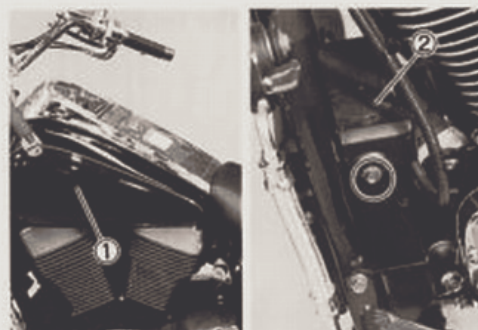
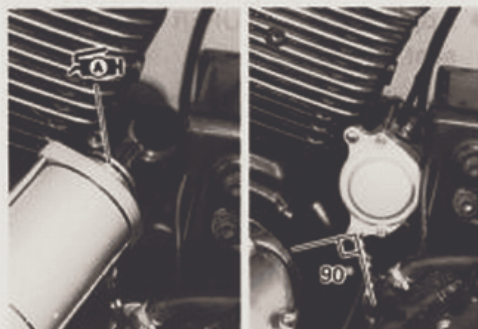
- Install the exhaust pipe and muffler. (See p. 3-15.)
- Check the engine oil level. (See p. 2-6.)

## STARTER RELAY INSPECTION

- Remove the left side upper cover ①. (See p. 6-3.)
- Remove the battery cover ②.
- Disconnect the battery  $\ominus$  lead wire.

- Disconnect the starter relay coupler ③.
- Remove the starter relay cover ④.

- Disconnect the starter motor lead wire ⑤ and battery lead wire ⑥ at the starter relay.
- Remove the starter relay.





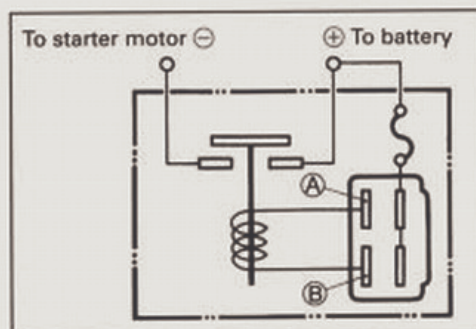
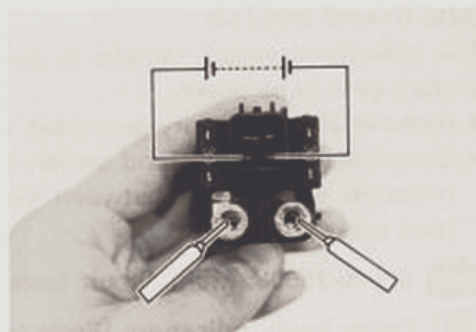
Apply 12 volts to terminals **A** and **B** and measure for continuity between the positive and negative terminals. If the starter relay clicks and continuity is found, the relay is ok.

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Continuity test (•) )**

#### **CAUTION**

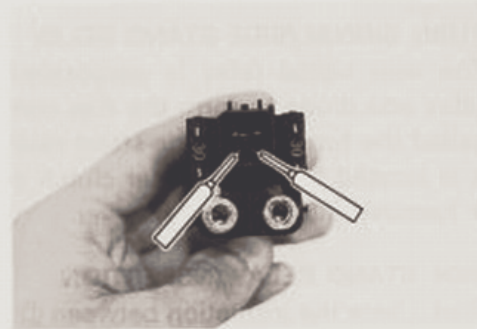
Do not apply battery voltage to the starter relay for more than five seconds.  
This may overheat and damage the relay coil.



- Check the relay coil for opens, grounds and the specified resistance.

#### **Specification**

**Starter relay resistance: 3–6Ω**



### **SIDE-STAND/IGNITION INTERLOCK SYSTEM PART INSPECTION**



If the interlock system does not operate properly, check each component. If any abnormality is found, replace the component with a new one.

#### **NEUTRAL SWITCH**

The neutral position indicator switch coupler is behind the secondary gear case cover.

- Remove the secondary gear case cover. (See p. 3-7.)
- Disconnect the neutral position indicator switch coupler and measure the continuity between Blue and Ground with the transmission in neutral.



	Blue	Ground
ON (in neutral)		
OFF (not in neutral)		




**SIDE-STAND SWITCH**

The side-stand switch coupler is located behind the secondary gear case cover.

- Remove the secondary gear case cover. (See p. 3-7.)
- Disconnect the side-stand switch lead wire coupler and measure the voltage between Green and Black/White lead wires.

 09900-25008: Multi circuit tester set

 Tester knob indication: Diode test (→←)

	Green (⊕ Probe)	Black/White (⊖ Probe)
ON (UP-right position)	0.4–0.6 V	
OFF (Down position)	1.4–1.5 V	

**NOTE:**

If the tester read under 1.4V, replace the battery of multi circuit tester when do not connecting the tester probes.

**TURN SIGNAL/SIDE-STAND RELAY**

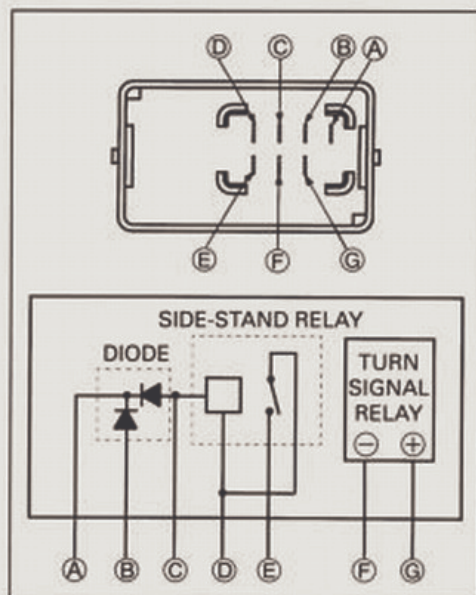
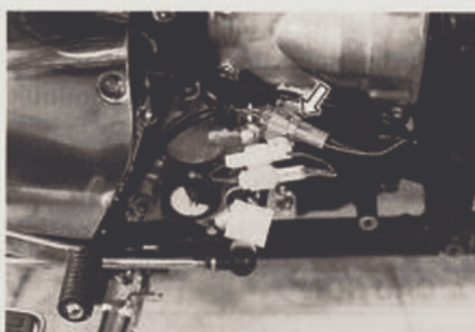
The turn signal relay is incorporated with the side-stand relay and diode to form the one component part which is called the turn signal/side-stand relay.

It is located behind the rear clutch cover.

- Remove the rear clutch cover.

**SIDE-STAND RELAY INSPECTION**

First, check the insulation between ① and ⑤ terminals with tester. Then apply 12 volts to ① and ③ terminals, ⊕ to ① and ⊖ to ③, and check the continuity between ① and ⑤. If there is no continuity, replace turn signal/side-stand relay with a new one.

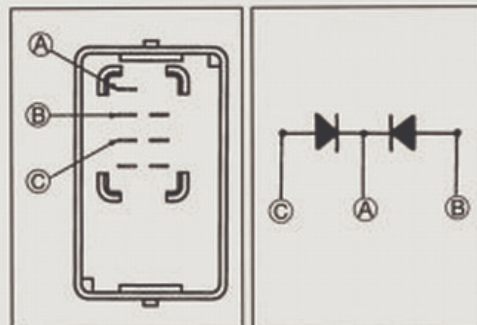


**DIODE INSPECTION**

Using multi circuit tester, measure the voltage between the terminals in the following table.

Unit: V

⊖ Probe of tester to:	⊕ Probe of tester to:	
	ⓐ, ⓑ	ⓐ
ⓐ, ⓑ		1.4-1.5
ⓐ	0.4-0.6	



 09900-25008: Multi circuit tester set

 Tester knob indication: Diode test (  )

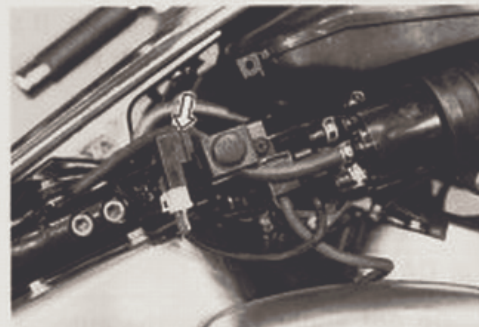
**NOTE:**

If the tester read under 1.4V, replace the battery of multi circuit tester when do not connecting the tester probes.

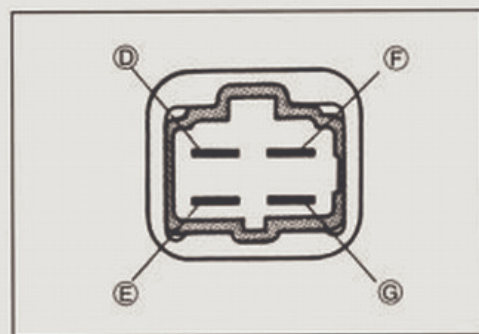
**AUTOMATIC DE-COMPRESSION RELAY INSPECTION**

The automatic de-compression relay is located behind the right side upper cover.

- Remove the right side upper cover. (See p. 6-3.)
- Disconnect the lead wire coupler from the automatic de-compression relay.



First, check the insulation between ⓓ and ⓔ terminals with a tester. Then apply 12 volts to ⓕ and ⓖ terminals, ⊕ to ⓕ and ⊖ to ⓖ, and check the continuity between ⓓ and ⓔ. If there is no continuity, replace turn signal/side-stand relay with a new one.





## AUTOMATIC DE-COMPRESSION SOLENOID INSPECTION

The automatic de-compression solenoid coupler is located behind the right side frame head cover.

- Remove the right side frame head cover. (See p. 6-3.)

- Measure the resistance between the two lead wires. If the resistance is not specified value, replace the automatic de-compression solenoid with a new one.

### Specification

Automatic de-compression solenoid resistance:  
0.1–1.0  $\Omega$  (White–White)

- Apply DC 12V to the solenoid. If the automatic de-compression solenoid does not work properly, replace it with a new one.

### NOTE:

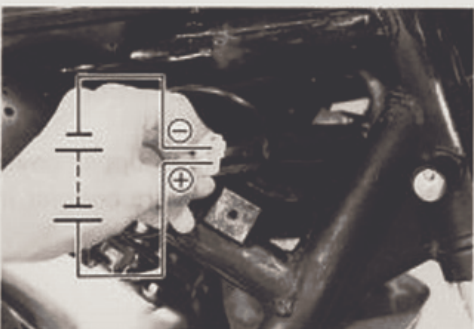
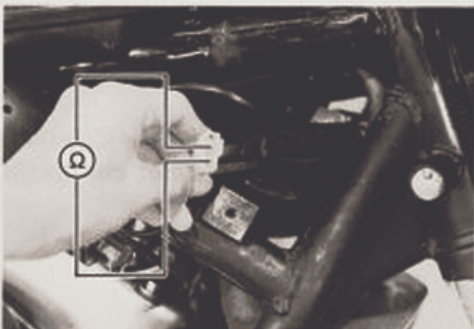
Neglect the positive and negative leads when applying 12V to the automatic de-compression solenoid.

### CAUTION

Do not apply 12V to the automatic de-compression solenoid for more than 5 seconds or damage to its coil may occur.

### NOTE:

The automatic de-compression solenoid unit can be removed after removing the air cleaner box and front cylinder head side cap.



## IGNITION SYSTEM (DIGITAL IGNITOR)

### DESCRIPTION

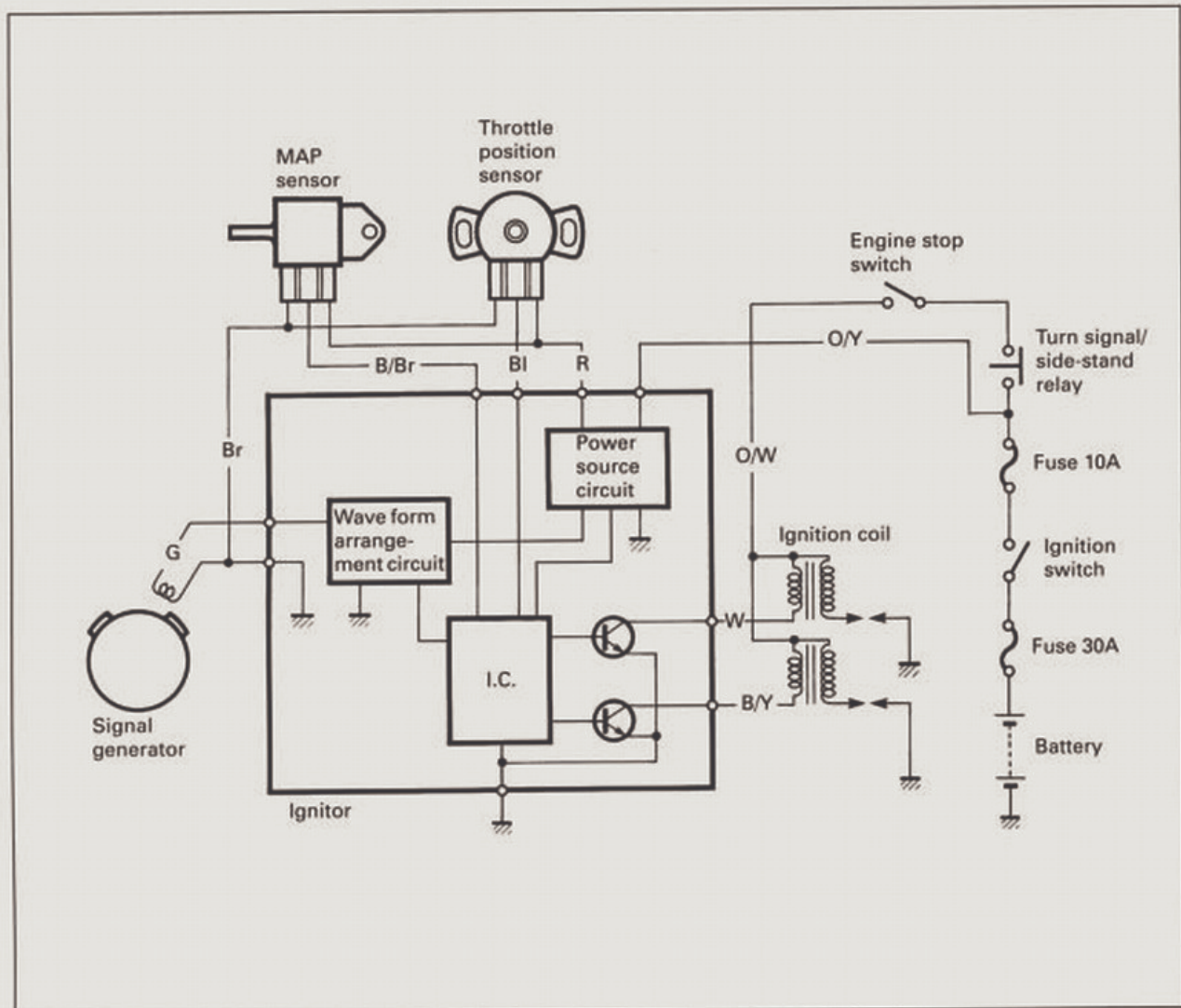
The fully transistorized ignition system consists of the following components: a signal generator (which is made up of the generator rotor and pickup coil), ignitor (including a 8-bit microcomputer), throttle position sensor, MAP sensor, two ignition coils and two spark plugs.

The induced signal in the signal generator is sent to the wave-form arrangement circuit and the I.C. receives this signal and calculates the ignition timing. And also the signals of the throttle position sensor and MAP sensor revise ignition timing properly. The I.C. outputs the signal to the transistor of the ignition coil output circuit which is connected to the primary windings of the ignition coils which is turned "off" and "on" accordingly. Thus, it induces the secondary current in the ignition coil's secondary windings and produces the spark between the spark plug gaps.

The ignition cutoff circuit is incorporated in the ignitor to prevent the engine from overrevving. If the engine speed reaches 6 000 r/min, this circuit will cutoff the ignition primary current for all of the spark plugs.

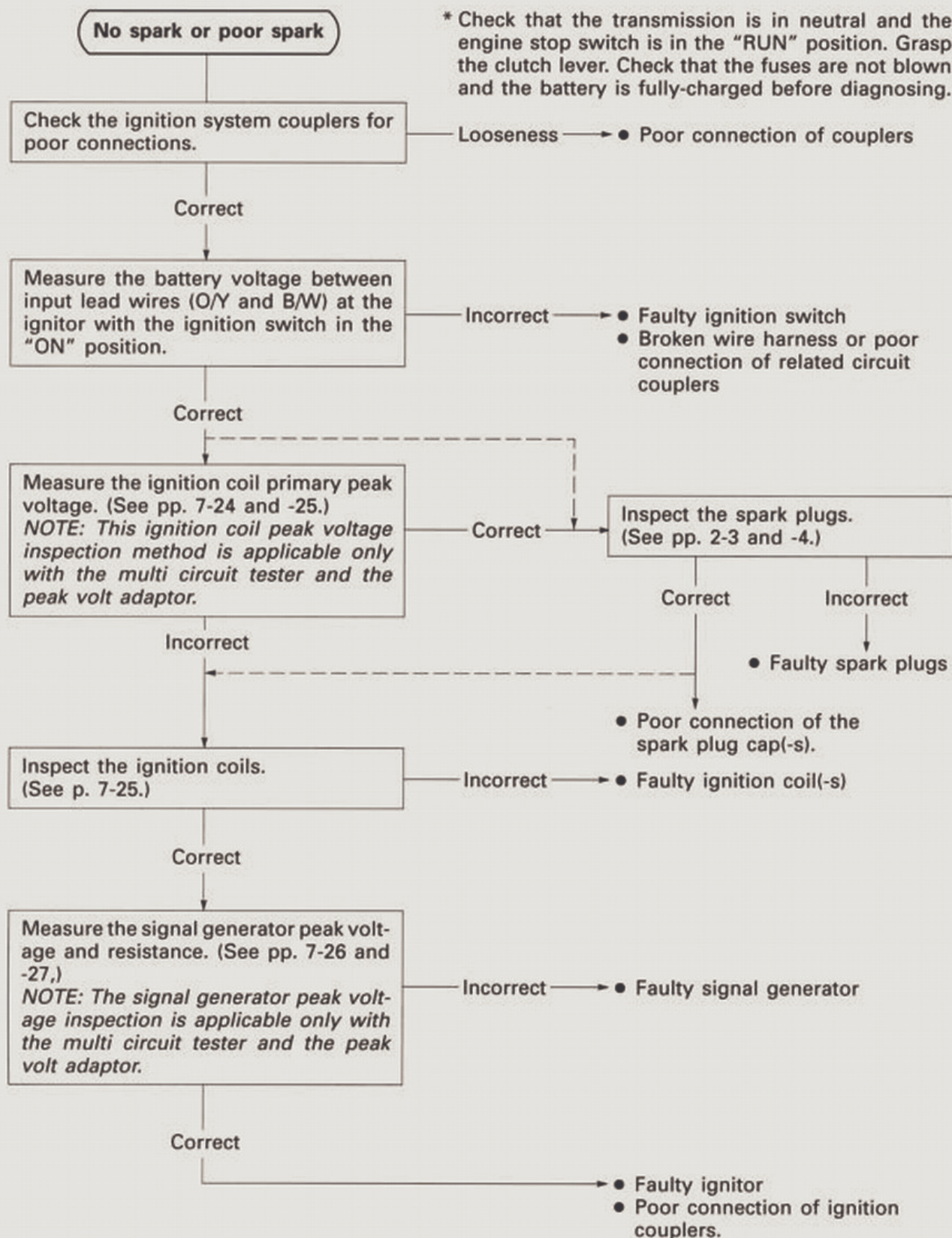
### ▲ CAUTION

The engine is capable of running at over 6 000 r/min without a load, even if the ignition cutoff circuit is in effect; however, this may cause engine damage. Therefore, never run the engine over 6 000 r/min without a load.





## TROUBLESHOOTING





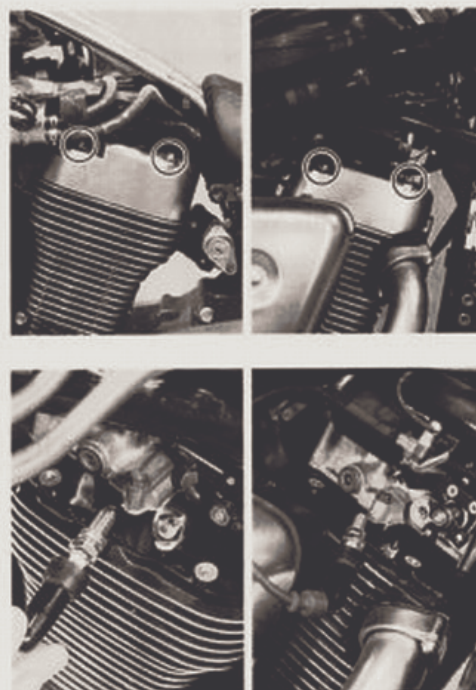
## INSPECTION

### IGNITION COIL PRIMARY PEAK VOLTAGE

- Remove the upper covers. (See p. 6-3.)
- Remove the cylinder head side caps.
- Remove all of the spark plug caps.
- Connect two new spark plugs to each spark plug cap and ground them to the cylinder head.

#### NOTE:

- \* Make sure that all of the spark plug caps and spark plugs are connected properly and the battery is fully-charged.
- \* Make sure that the automatic de-compression cables are adjusted properly.



Measure ignition coil (for #1 cylinder) primary peak voltage in the following procedure.

- Connect the multi circuit tester with the peak voltage adaptor as follows.

Ignition coil (For #1 cylinder): White terminal- Ground  
(⊕ Probe) (⊖ Probe)

#### NOTE:



Do not disconnect the ignition coil primary wire.

 09900-25008: Multi circuit tester set

#### CAUTION

When using the multi circuit tester and peak volt adaptor, refer to the appropriate instruction manual.

- Shift the transmission into neutral, turn the ignition switch to the "ON" position and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.
- Repeat the above procedure a few times and measure the highest ignition coil primary peak voltage.

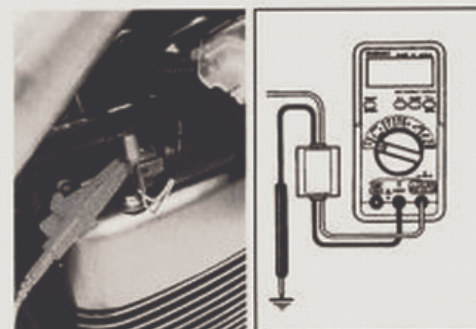
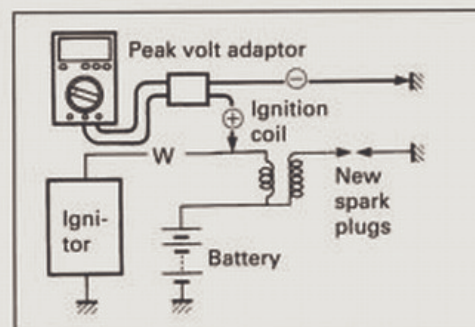
 Tester knob indication: Voltage (  )

#### Specification

Ignition coil primary peak voltage (Rear): More than 200 V

#### WARNING

While testing, do not touch the tester probes and spark plugs to prevent receiving an electric shock.






Measure ignition coil (For #2 cylinder) primary peak voltage in the same manner as cylinder ignition coil (For #1 cylinder) measuring procedure.

Ignition coil (For #2 cylinder): B/Y terminal-Ground  
(⊕ Probe) (⊖ Probe)

B/Y: Black with Yellow tracer

**NOTE:**

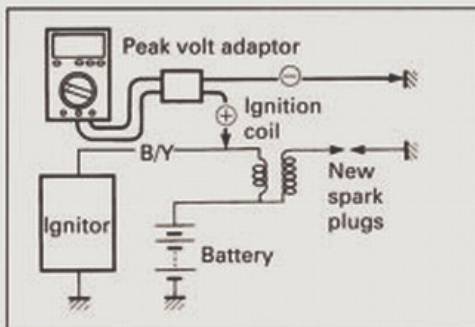
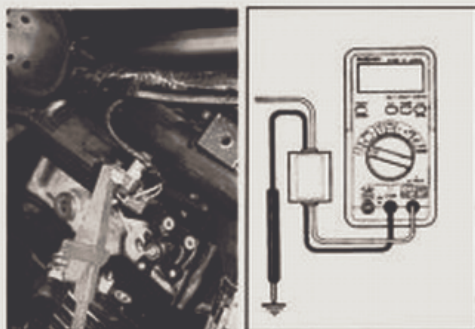
*Do not disconnect the ignition coil primary wire.*

 **Tester knob indication: Voltage ( --- )**

**Specification**

**Ignition coil primary peak voltage (Front): More than 190 V**

If the voltages are lower than the standard values, inspect the ignition coil and the signal generator. (See pp. 6-25 to -27.)



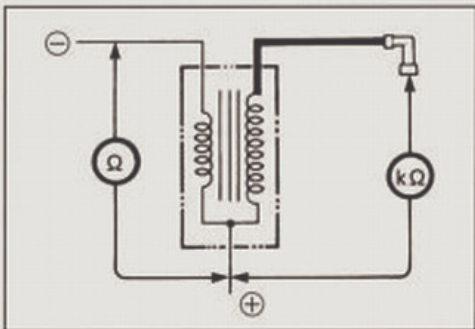
**IGNITION COIL RESISTANCE**

- Measure the ignition coil resistance in both the primary and secondary windings. If the windings are in sound condition, their resistance should be close to the specified values.

**Ignition coil resistance**

**Primary: 1-7Ω (⊕ tap-⊖ tap)**

**Secondary: 18-28 kΩ (Spark plug cap-⊕ tap)**



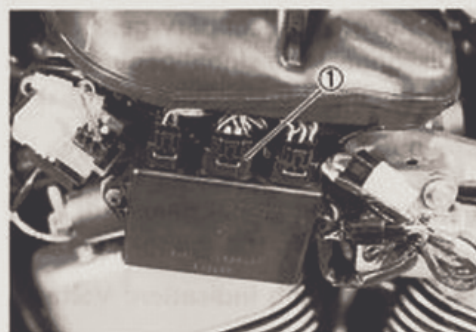
**SIGNAL GENERATOR PEAK VOLTAGE**

- Remove the left side upper cover. (See p. 6-3.)

**NOTE:**

*Be sure that all of the couplers are connected properly and the battery is fully-charged.*

- Disconnect the ignitor coupler ① at the ignitor.



- Measure the signal generator peak voltage between the Green and Brown lead wires on the ignitor coupler.
- Connect the multi circuit tester with the peak voltage adaptor as follows.

Green (+ Probe)–Brown (− Probe)

**TOOL** 09900-25008: Multi circuit tester set

**NOTE:**

- \* When connecting the multi circuit tester, install a sting (O.D. is below 0.5 mm) to the back side of the ignitor coupler and connect the probes of tester to them.
- \* Use a sting, its outer diameter is below 0.5 mm, to prevent damaging the rubber of the water proof coupler.

**CAUTION**

**When using the multi circuit tester and peak volt adaptor, refer to the appropriate instruction manual.**

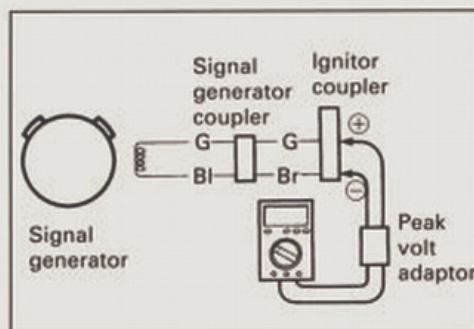
- Shift the transmission into neutral, turn the ignition switch to the "ON" position and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the signal generator peak voltage.
- Repeat the above procedure a few times and measure the highest signal generator peak voltage.

**Tester knob indication: Voltage (  $\overline{\sim}$  )**

**Specification**

**Signal generator peak voltage: More than 2.4 V  
(Green–Brown)**

If the peak voltage measured on the ignitor coupler is lower than the standard value, measure the peak voltage on the signal generator coupler as follows.






- Remove the secondary gear case cover. (See p. 3-7.)
- Disconnect the signal generator coupler and connect the multi circuit tester with the peak volt adaptor.

Green (⊕ Probe)–Blue (⊖ Probe)

- Measure the signal generator peak voltage in the same manner as on the ignitor coupler.

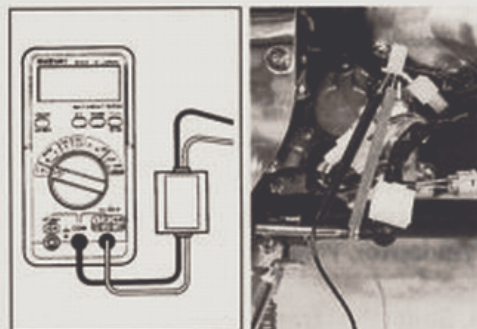
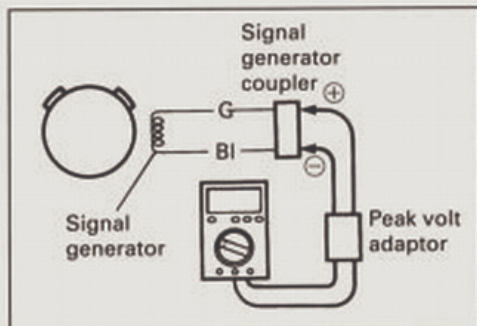
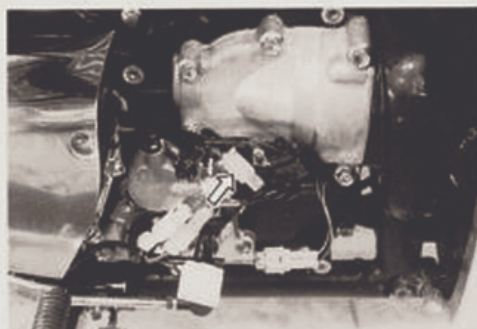
 Tester knob indication: Voltage (  $\overline{\text{---}}$  )

#### Specification

**Signal generator peak voltage:**

**More than 2.4 V (Green–Blue)**

If the peak voltage on the signal generator lead wire couplers is ok but on the ignitor coupler is out of specification, the wire harness must be replaced. If both peak voltages are out of specification, the signal generator must be replaced and re-checked.



#### SIGNAL GENERATOR

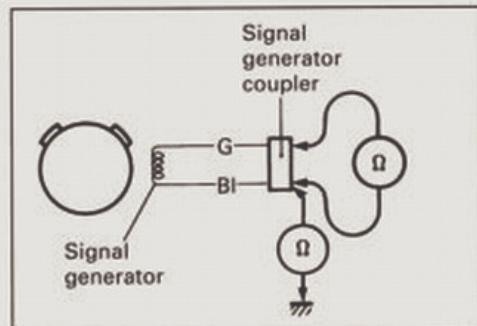
- Remove the secondary gear case cover and disconnect the signal generator couplers.
- Measure the resistance between the lead wires and ground. If the resistance is not within the specified value, the signal generator stator must be replaced.

#### Specification

**Pickup coil resistance:** 178–242  $\Omega$  (Green–Blue)  
 $\infty \Omega$  (Blue–Ground)

#### NOTE:

Refer to the section 3D for signal generator replacement.




**MAP (BOOST) SENSOR INSPECTION**


- Remove the right side upper cover. (See p. 6-3.)
- Disconnect MAP sensor coupler and hose.
- Remove the MAP sensor.



Connect the vacuum pump gauge to the air passage port of the MAP sensor.

Arrange 3 new 1.5V batteries in series (check that total voltage is 4.5–5.0 V) and connect  $\ominus$  terminal to the ground terminal and  $\oplus$  terminal to the Vcc terminal.

 **09917-47010: Vacuum pump gauge**  
**09900-25008: Multi circuit tester set**

 **Tester knob indication: Voltage (  $\overline{\text{---}}$  )**

Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 400 mm Hg by using vacuum pump gauge.

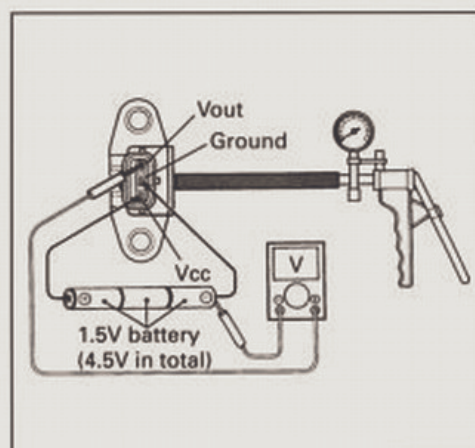
If the voltage is not within the specification, replace the boost sensor with a new one.

**Negative pressure: 400 mm Hg (53 kPa, 7.7 psi)**

**Vcc voltage: 4.5–5.0V**

**Ambient temp.: 20–30°C (68–86°F)**

**Output voltage:**



ALTITUDE (Reference)		ATMOSPHERIC PRESSURE		Output voltage (V)
(ft)	(m)	(mmHg)	kPa	
0   2 000	0   610	760   707	100   94	<b>3.1–3.6</b>
2 001   5 000	611   1 524	Under 707 Over 634	94   85	
5 001   8 000	1 525   2 438	Under 634 Over 567	85   76	<b>2.8–3.4</b>
8 001   10 000	2 439   3 048	Under 567 Over 526	76   70	
				<b>2.6–3.1</b>
				<b>2.4–2.9</b>



## SPEEDOMETER

### REMOVAL

- Remove the meter and fuel inlet cover. (See pp. 6-3 and -4.)
- Remove the speedometer from the cover.

### CAUTION

Do not attempt to disassemble the speedometer. The speedometer is available only as an assembly.

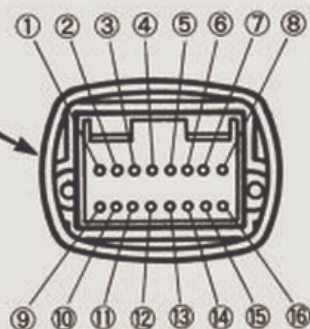
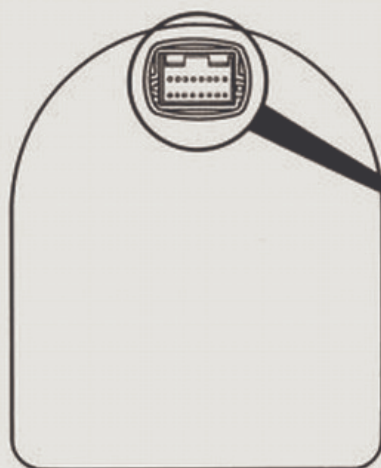
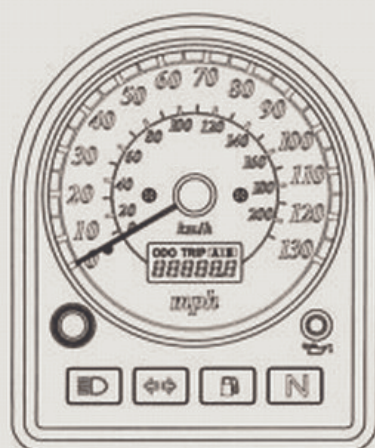
### NOTE:

The bulbs can be replaced after removing the rubber caps.

### INSPECTION

Using the tester, check the continuity between terminals in the following diagram. If the continuity measured is incorrect, remove and check the bulb.

If the bulb is failure, install the new bulb and check the continuity again. If the bulb is correct, replace the unit with a new one.



ITEM	⊕ Probe of tester to:	⊖ Probe of tester to:
ILLUMINATION	12	14
TURN (R)	14	7
TURN (L)	14	6
NEUTRAL	3	4
HIGH BEAM	5	14

1	GROUND
2	FUEL
3	OIL ⊖
4	NEUTRAL ⊖
5	HIGH BEAM ⊕
6	TURN (L) ⊕
7	TURN (R) ⊕
8	BATTERY ⊕
9	SPEED SENSOR (SIGNAL)
10	
11	IGNITION ⊕
12	ILLUMINATION ⊕
13	
14	GROUND
15	
16	SPEED SENSOR ⊕



**FUEL LEVEL INDICATOR LIGHT INSPECTION**

To test the fuel level indicator light, perform the following tests.

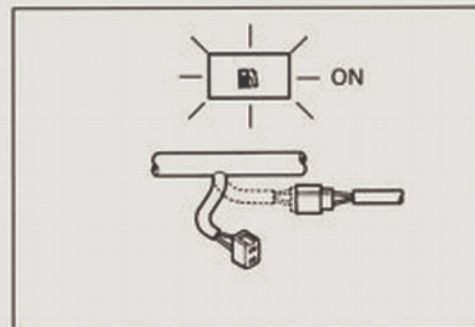
If either test detects a malfunctioning fuel indicator, replace speedometer.

**Test 1**

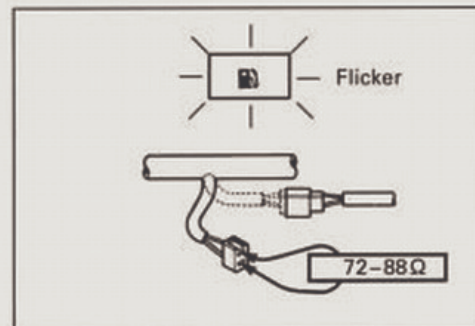
- Check if the fuel level indicator lights up for three seconds when the ignition switch is turned ON.

**Test 2**

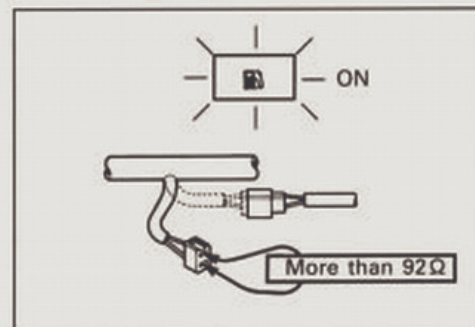
- Remove the seat. (See p. 6-2.)
- Disconnect the fuel level gauge lead wire coupler.
- Turn the ignition switch ON.
- Check if the fuel level indicator lights up after 20 seconds.

**Test 3**

- Connect a resistor (72–88  $\Omega$ ) between Y/B and B/W lead coming from the main wiring harness and check if the fuel level indicator is flickering after 20 seconds.

**Test 4**

- Replace a resistor (72–88  $\Omega$ ) with a resistor (more than 92  $\Omega$ ) and check if the fuel level indicator lights up after 20 seconds.

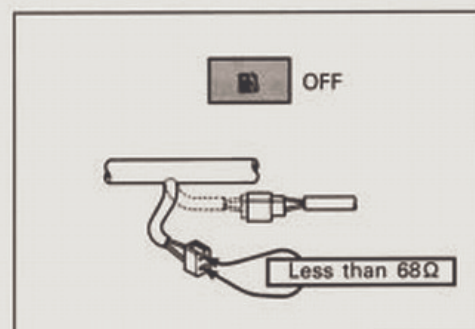
**Test 5**

- Replace a resistor (more than 92  $\Omega$ ) with a resistor (less than 68  $\Omega$ ) and check if the fuel level indicator go off after 20 seconds.

**NOTE:**

The following table shows the relation between resistance and fuel level indicator.

Resistance	Fuel level indicator light
Less than 68	OFF
72 – 88 $\Omega$	Flicker
More than 92 $\Omega$	ON





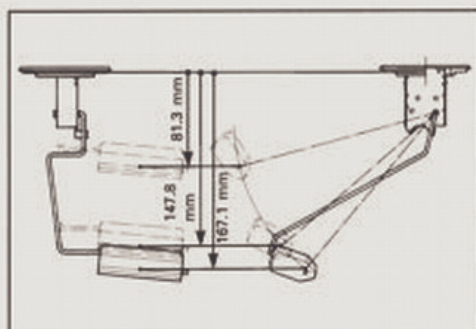
**FUEL LEVEL GAUGE INSPECTION**

- Remove the seat. (See p. 6-2.)
- Remove the fuel level gauge. (See p. 5-6.)
- Measure the resistance at each fuel level gauge float position.
- If the resistance is incorrect, replace the fuel level gauge with a new one.

**NOTE:**

The following table shows the relation between the float position of the fuel level gauge sending unit and the resistance.

Float position	Resistance
81.3 mm (3.2 in)	10–25 $\Omega$
147.8 mm (5.8 in)	66–74 $\Omega$
167.1 mm (6.6 in)	92–102 $\Omega$

**SPEEDOMETER INSPECTION**

If the speedometer, odometer or trip meter does not function properly. Inspect the speed sensor and connection of couplers. If the speed sensor and connection is all right, replace the unit with a new one.

**SPEED SENSOR INSPECTION**

- Remove the rear clutch cover.
- Disconnect the speed sensor lead wire coupler.
- Remove the speed sensor by removing its mounting bolt.
- Arrange 4 new 1.5V batteries in series (check that total voltage is 6.0–6.5V) and connect  $\ominus$  terminal to ground terminal and  $\oplus$  to the Vcc terminal.
- Connect 1k $\Omega$  resistor and the multi circuit tester as shown.

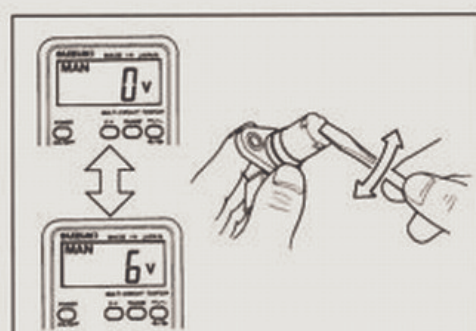
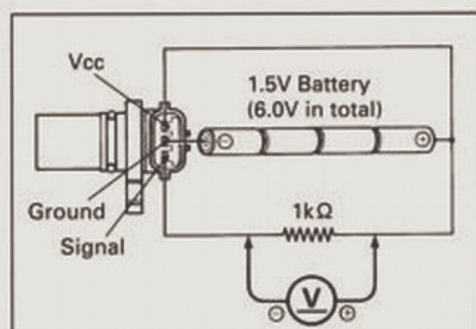
**Tool 09900-25008: Multi circuit tester set**

**Tester knob indication: Voltage (  $\text{---}$  )**

- Under above condition, when a suitable screwdriver touching the pick-up surface of the speed sensor moves, the tester reading voltage relatively changes (0V→6V or 6V→0V). If the tester reading voltage does not change, replace the speed sensor with a new one.

**NOTE:**

The highest tester reading voltage (6V) while testing is same as the total voltage of 4 batteries.

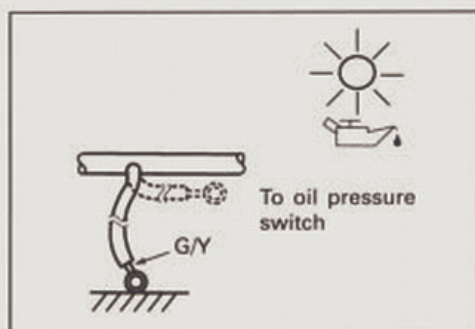




**OIL PRESSURE INDICATOR INSPECTION**

- Disconnect the oil pressure Green/Yellow lead wire from the oil pressure switch.
- Turn the ignition switch on.
- Check if the oil pressure indicator lights up when grounding the Green/Yellow lead wire.

If the oil pressure indicator does not light up, check the couplers. If all of the connections are ok, replace the oil pressure indicator with a new one.

**RELAYS****STARTER RELAY**

The starter relay is located behind the left side upper cover. (See pp. 7-17 and -18.)

**AUTOMATIC DE-COMPRESSION RELAY**

The automatic de-compression relay is right side upper cover. (See p. 7-20.)

**TURN SIGNAL SIDE-STAND RELAY**

The turn signal relay is incorporated with the side-stand relay and diode to form the one component part which is called the turn signal/side-stand relay. It is located behind the rear clutch cover.

- Remove the rear clutch cover.

**INSPECTION**

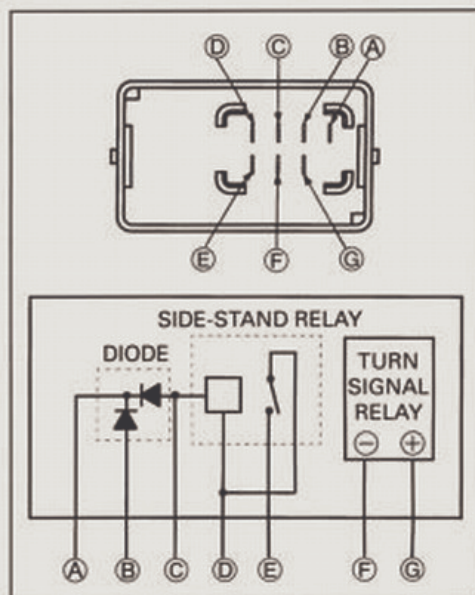
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.

If the turn signal light does not light, inspect the bulb, turn signal switch and circuit connection.

If the bulb, turn signal switch and circuit connection checked are all right, the turn signal relay may be faulty, replace turn signal/side-stand relay with a new one.

**NOTE:**

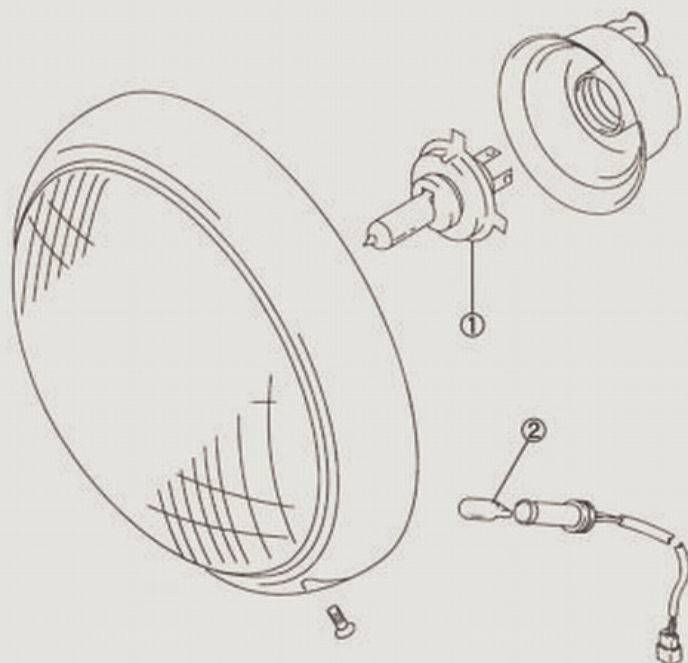
*Be sure that the battery used is in fully-charged condition.*





## LAMPS

## HEADLIGHT



Headlight bulb ①: 12V 60/55W

Position light bulb ②: 12V 4W (Except for E-03, -24, -28 and -33)

**NOTE:**

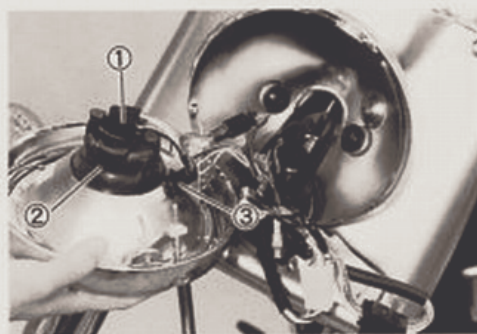
Adjust the headlight, both vertical and horizontal, after reassembling.

**BULB REPLACEMENT**

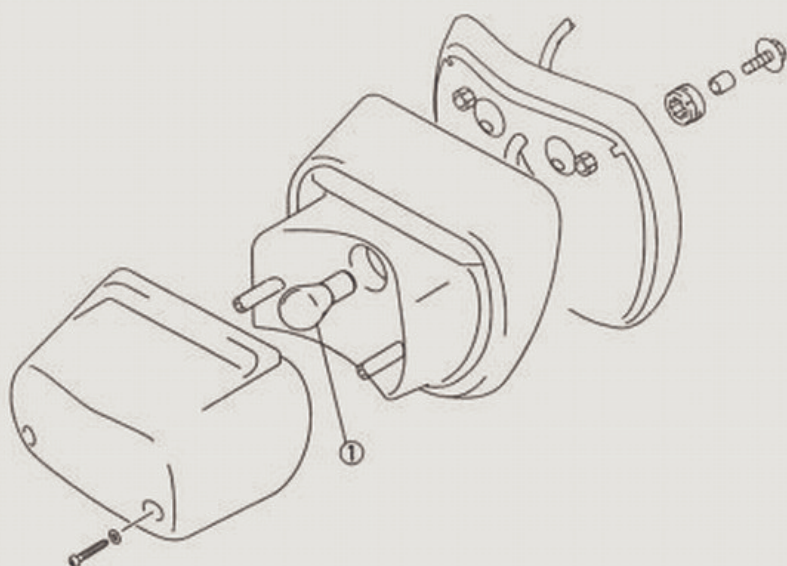
- Remove the headlight.
- Disconnect the socket ① and remove the rubber cap ②.
- Remove the bulb by removing the bulb holder spring.
- Remove the position light bulb ③. (Except for E-03, -24, -28 and -33)
- Reassemble the bulb in the reverse order of removal.

**CAUTION**

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.



## BRAKE LIGHT/TAILLIGHT

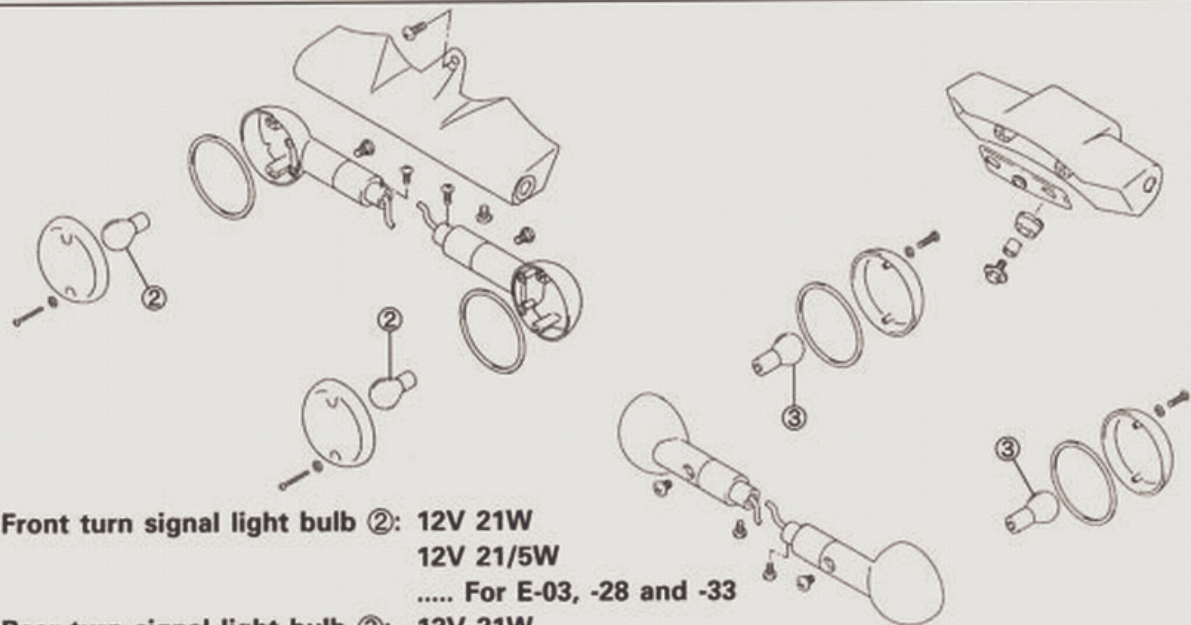


Brake light/Taillight bulb ①: 12V 21/5W

**▲ CAUTION**

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

## TURN SIGNAL LIGHTS



Front turn signal light bulb ②: 12V 21W  
12V 21/5W  
..... For E-03, -28 and -33

Rear turn signal light bulb ③: 12V 21W

**▲ CAUTION**

Do not overtighten the lens fitting screws.

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.



## SWITCHES

Inspect each switch for continuity with a tester. If any abnormality is found, replace the respective switch assemblies with new ones.

### IGNITION SWITCH

(For Australia)

Position \ Color	R	O	O/Y	Gr	Br
OFF					
ON	○	○	○	○	○

(For Others)

Position \ Color	R	O	O/Y	Gr	Br
OFF					
ON	○	○	○	○	○
P	○				

### LIGHTING SWITCH

(Except for Australia, Canada and U.S.A.)

Position \ Color	O/BI	Gr	O/R	Y/W
OFF				
•	○	○		
ON	○	○	○	○

### DIMMER SWITCH

Position \ Color	Y/W	W	Y
HI	○	○	○
LO	○	○	

### TURN SIGNAL SWITCH

Position \ Color	Lg	Lbl	B
L		○	○
PUSH			
R	○	○	

### PASSING LIGHT SWITCH

(Except for Canada and U.S.A.)

Position \ Color	O/R	Y
•		
PUSH	○	○

### ENGINE STOP SWITCH

Position \ Color	O/B	O/W
OFF		
RUN	○	○

### STARTER BUTTON

Position \ Color	O/W	Y/G
•		
PUSH	○	○

### HORN BUTTON

Position \ Color	B/BI	B/W
•		
PUSH	○	○

### FRONT BRAKE SWITCH

Position \ Color	B/BI	B/R
OFF		
ON	○	○

### REAR BRAKE LIGHT SWITCH

Position \ Color	O	W/B
OFF		
ON	○	○

### CLUTCH LEVER POSITION SWITCH

Position \ Color	B/Y	B/Y
OFF		
ON	○	○

### OIL PRESSURE SWITCH

Position \ Color	G/Y	Ground
ON (engine is stopped)	○	○
OFF (engine is running)		

NOTE: Before inspecting the oil pressure switch, check if the engine oil level is enough. (Refer to page 2-6.)

### WIRE COLOR

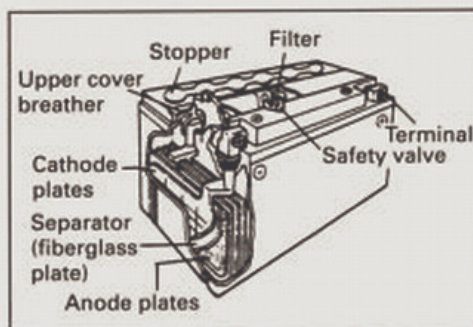
B : Black	Lbl : Light blue	R : Red
Br : Brown	Lg : Light green	Y : Yellow
Gr : Gray	O : Orange	W : White
B/BI : Black with Blue tracer		
B/W : Black with White tracer		
B/Y : Black with Yellow tracer		
B/R : Black with Red tracer		
G/Y : Green with Yellow tracer		
O/B : Orange with Black tracer		
O/BI : Orange with Blue tracer		
O/R : Orange with Red tracer		
O/W : Orange with White tracer		
O/Y : Orange with Yellow tracer		
W/B : White with Black tracer		
Y/G : Yellow with Green tracer		
Y/W : Yellow with White tracer		



# BATTERY

## SPECIFICATIONS

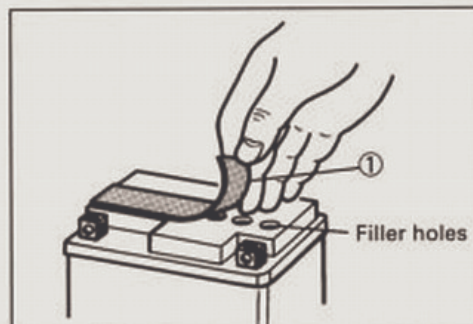
Type designation	FTH16-BS-1
Capacity	12V, 50.4 kC (14 Ah)/10HR
Standard electrolyte S.G.	1.320 at 20°C (68°F)



## INITIAL CHARGING

### Filling electrolyte

- Remove the aluminum tape ① sealing the battery electrolyte filler holes.



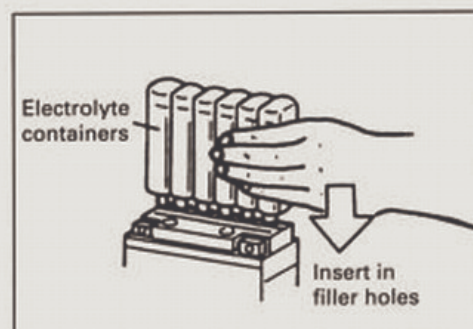
- Remove the caps ②.

### NOTE:

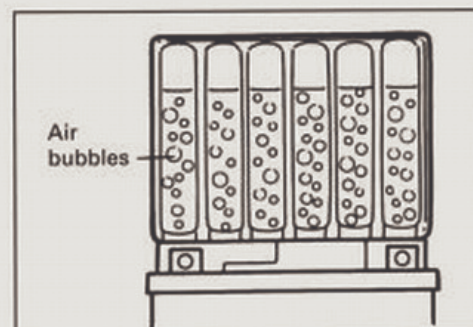
- After filling the electrolyte completely, use the removed cap ② as the sealed caps of battery-filler holes.
- Do not remove or pierce the sealed areas ③ of the electrolyte container.



- Insert the nozzles of the electrolyte container into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.



- Make sure air bubbles are coming up each electrolyte container, and leave in this position for about more than 20 minutes.





**NOTE:**

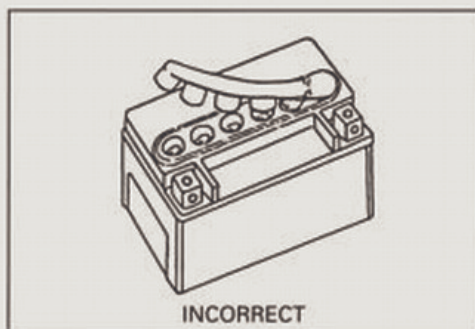
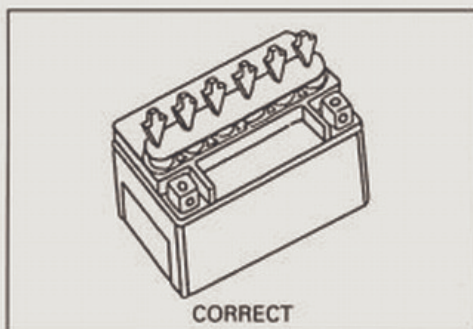
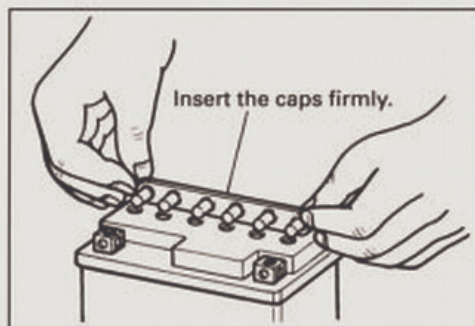
If no air bubbles are coming up from a filler port, tap the bottom of the two or three times.

Never remove the container from the battery.

- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for around 20 minutes.
- Insert the caps into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

**CAUTION**

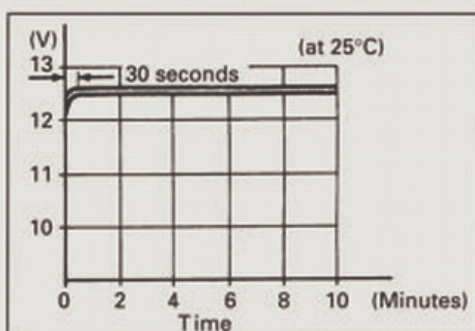
- \* Never use anything except the specified battery.
- \* Once install the caps to the battery; do not remove the caps.



- Using multi circuit tester, measure the battery voltage. The tester should indicate more than 12.5–12.6V (DC) as shown in the Fig. If the battery voltage is lower than the specification, charge the battery with a battery charger. (Refer to the recharging operation.)

**NOTE:**

Initial charging for a new battery is recommended if two years have elapsed since the date of manufacture.

**SERVICING**

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, then this can be cleaned away with sandpaper.

## RECHARGING OPERATION

- Using the multi circuit tester, check the battery voltage. If the voltage reading is less than the 12.0V (DC), recharge the battery with a battery charger.

### ⚠ CAUTION

When recharging the battery, remove the battery from the motorcycle.

### NOTE:

Do not remove the caps on the battery top while recharging.

Recharging time: 7A for one hour or 1.4A for 5 to 10 hours

### ⚠ CAUTION

Be careful not to permit the charging current to exceed 7A at any time.

- After recharging, wait for more than 30 minutes and check the battery voltage with a multi circuit tester.
- If the battery voltage is less than the 12.5V, recharge the battery again.
- If battery voltage is still less than 12.5V, after recharging, replace the battery with a new one.
- When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

