

# ELECTRICAL SYSTEM

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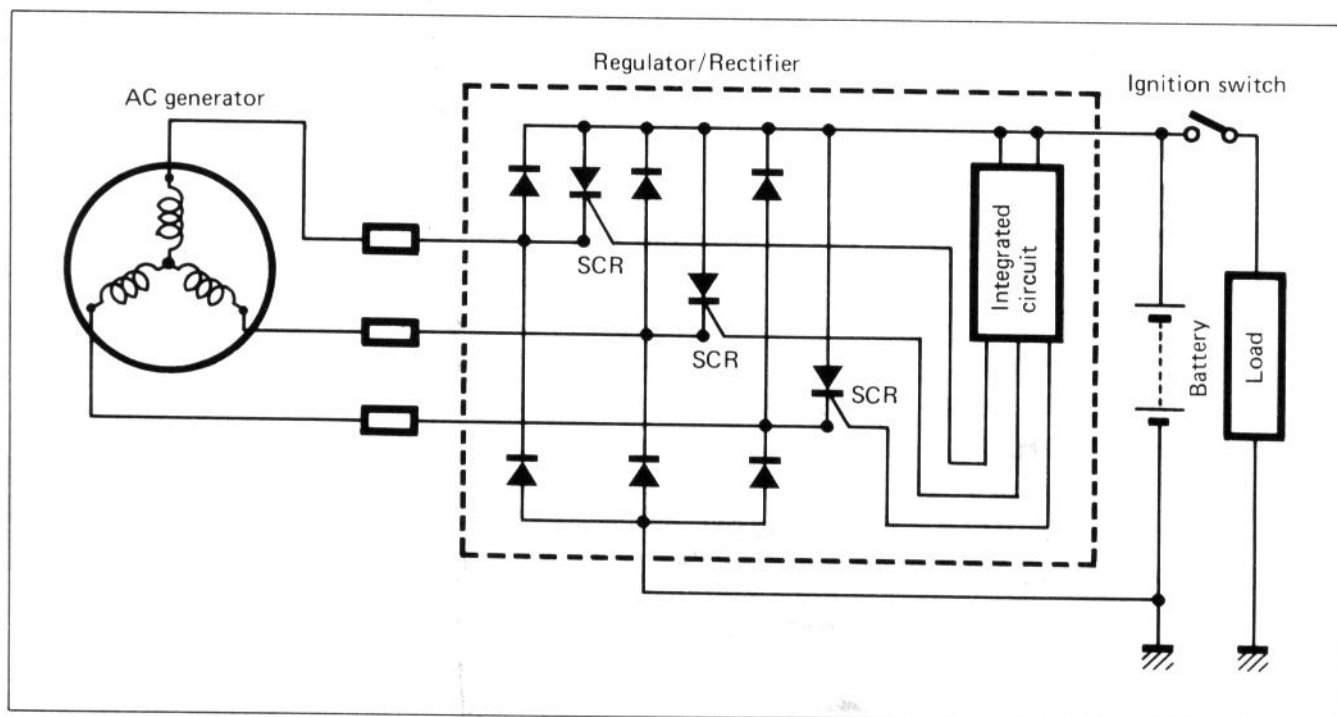
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## CHARGING SYSTEM

### DESCRIPTION

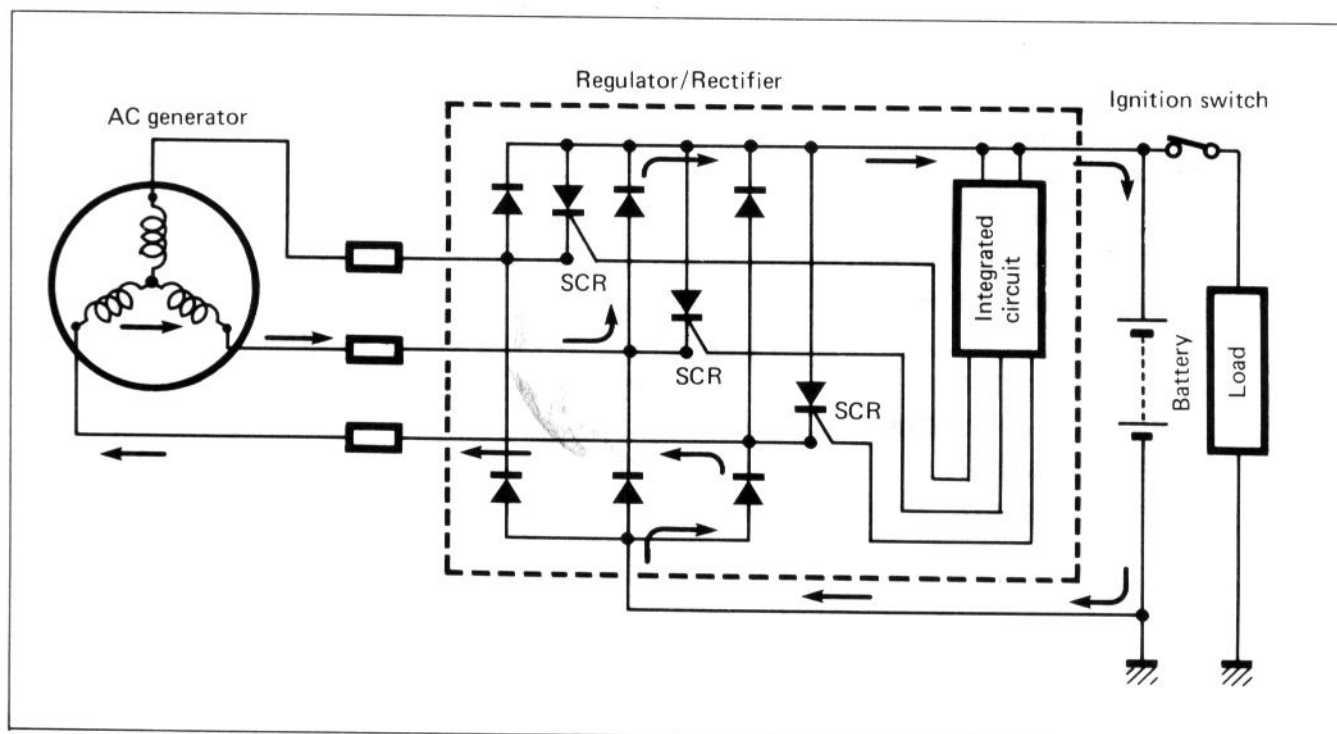
The circuit of the charging system is indicated in the figure, which is composed of an AC generator, regulator/rectifier unit and battery.

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



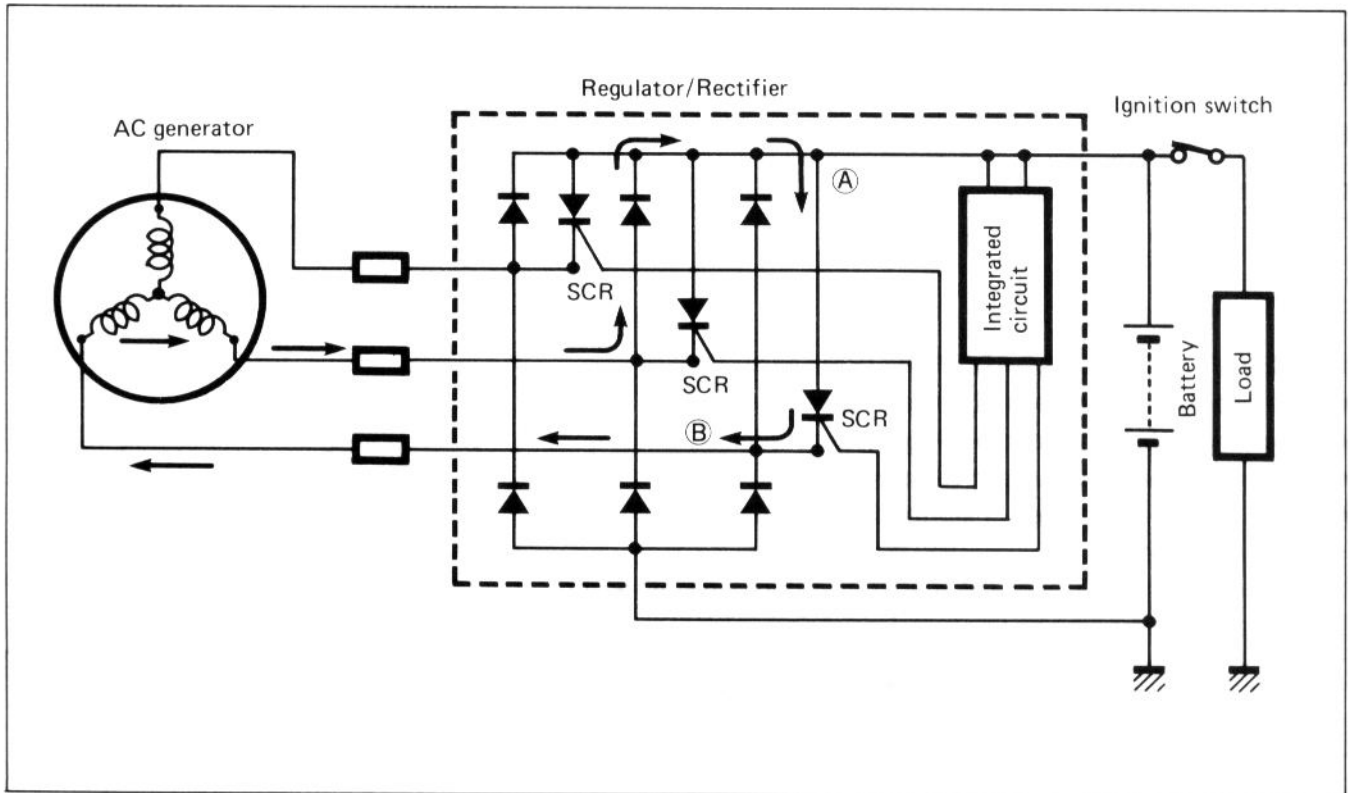
### FUNCTION OF REGULATOR

While the engine r/min is low and the generated voltage of the AC 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 AC 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 ① to point ②. At this time, the current generated from the AC generator gets through the SCR without charging the battery and returns to AC generator again. At the end of this state, since the AC current generated from AC generator flows to point ②, 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.



## INSPECTION

### CHARGING OUTPUT CHECK

- Remove the seat.
- Start the engine and keep it running at 5 000 r/min with lighting switch turned ON and dimmer switch turned HI position.
- Using the pocket tester, measure the DC voltage between the battery terminals,  $\oplus$  and  $\ominus$ .

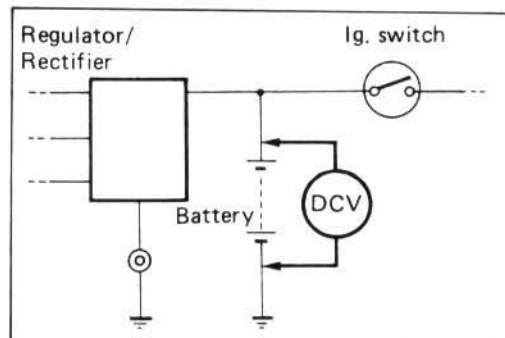
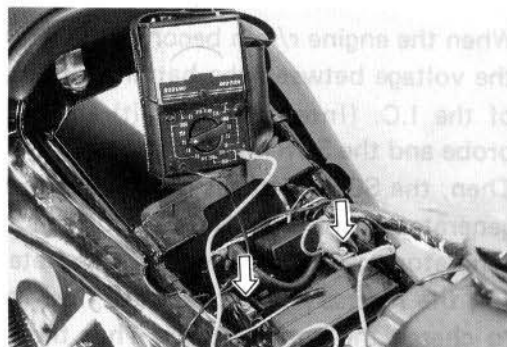
If the tester reads under 13.5V or over 15.5V, check the AC generator no-load performance and regulator/rectifier.

#### NOTE:

When making this test, be sure that the battery is fully-charged condition.

STD charging output : 13.5 – 15.5V (DC) at 5 000 r/min

09900-25002 : Pocket tester



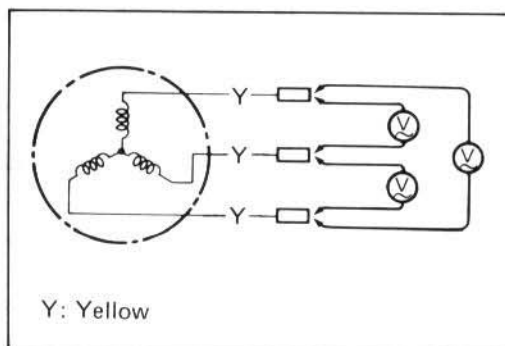
### AC GENERATOR NO-LOAD PERFORMANCE

- Remove the seat and left air cleaner side cover.
- Disconnect the AC generator lead wire coupler.
- Start the engine and keep it running at 5 000 r/min.
- Using the pocket tester, measure the AC voltage between the three lead wires.

If the tester reads under the specified voltage, the AC generator is faulty.

STD no-load performance: More than 70V (AC) at 5000 r/min (When engine cold.)

09900-25002 : Pocket tester



### AC GENERATOR CONTINUITY CHECK

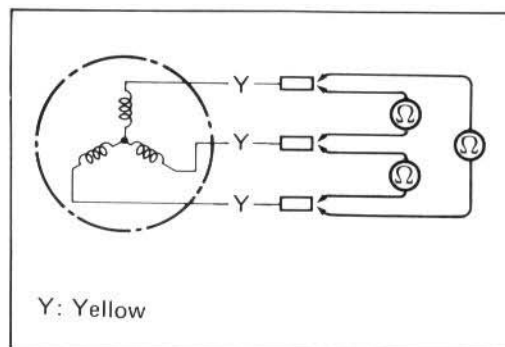
- Using the pocket tester, check the continuity between the three lead wires.

Check that there is no continuity between the lead wires and ground.

09900-25002 : Pocket tester

#### NOTE:

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



**REGULATOR/RECTIFIER**

- Remove the seat and left air cleaner side cover.
- Disconnect the AC generator lead wire coupler.
- Using the pocket tester (x 1 k $\Omega$  range), measure the resistance between the lead wires in the following table.  
If the resistance checked is incorrect, replace the regulator/rectifier.

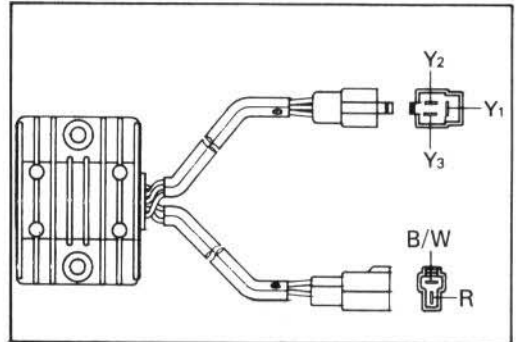
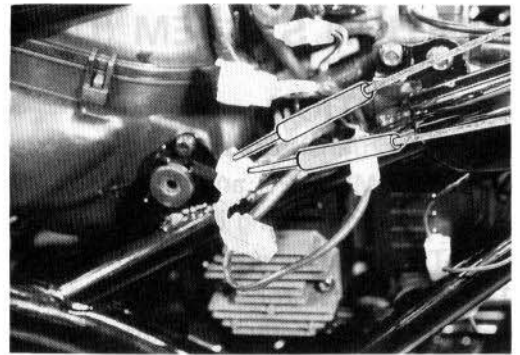
09900-25002 : Pocket tester

Unit: Approx. k $\Omega$ 

⊖ Probe of tester to:	⊕ Probe of tester to:				
	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	R	B/W
	Y <sub>1</sub>	$\infty$	$\infty$	3.5	$\infty$
	Y <sub>2</sub>	$\infty$	$\infty$	3.5	$\infty$
	Y <sub>3</sub>	$\infty$	$\infty$	3.5	$\infty$
	R	$\infty$	$\infty$	$\infty$	$\infty$
	B/W	3.5	3.5	3.5	6

Y: Yellow, R: Red, B/W: Black with White tracer,  $\infty$ : Infinity**NOTE:**

As transistors, capacitors, Zener diodes, etc. are used inside this regulator/rectifier, the resistance values will differ when an ohmmeter other than the SUZUKI pocket tester is used.



## IGNITION SYSTEM (DIGITAL IGNITOR)

### DESCRIPTION

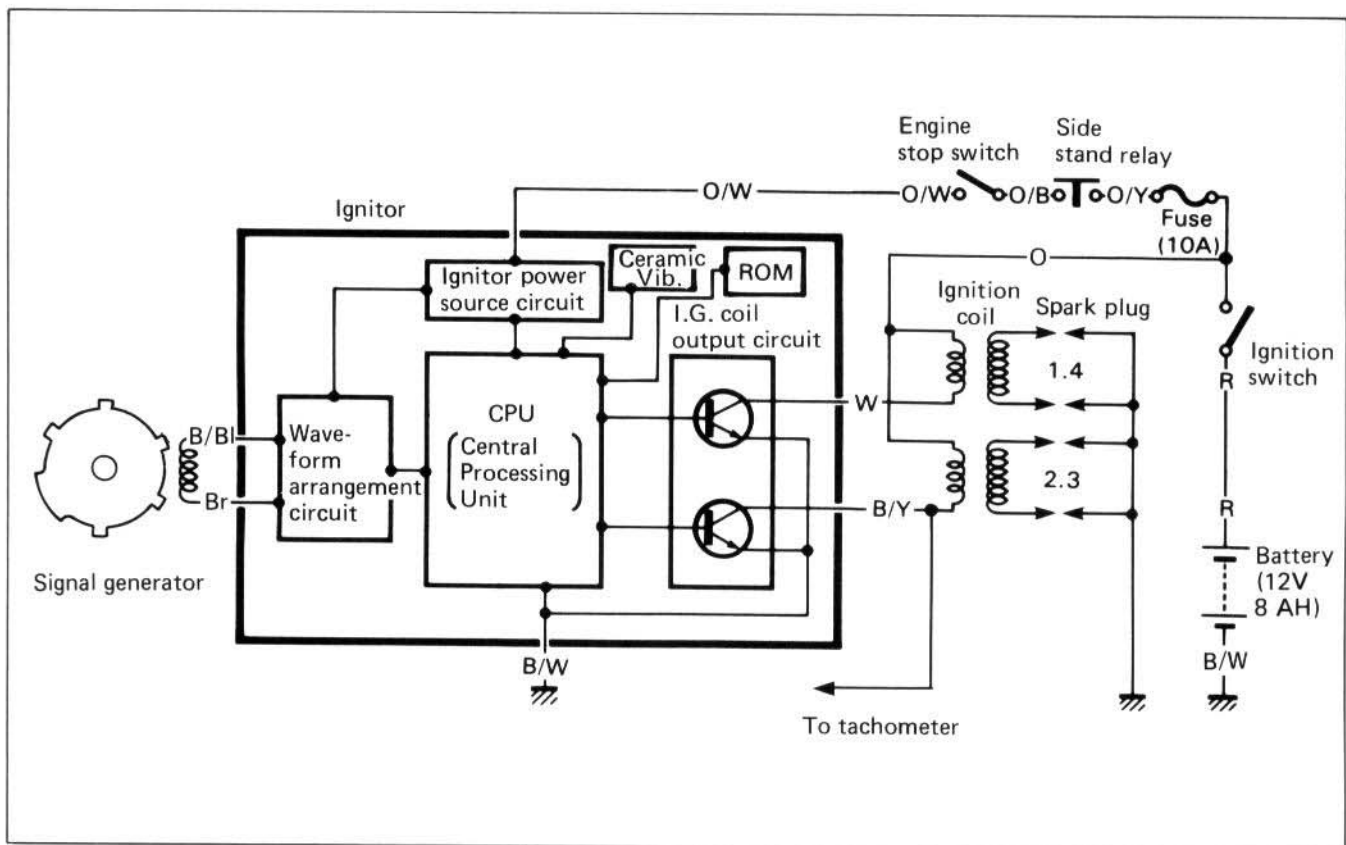
The fully transistorized ignition system consists of a signal generator, ignitor unit (including 8-BIT MICROCOMPUTER and CERAMIC 4MHZ VIBRATOR), ignition coils and spark plugs. The characteristic of the ignition timing is programmed and stored in the "ROM" (READ ONLY MEMORY) of the ignitor unit. The signal generator comprises the rotor tips and pickup coil.

The signal generator is mounted at the starter clutch. The induced signal in the signal generator is sent to wave-form arrangement circuit, and CPU receives this signal and calculates the best ignition timing from the signal of ceramic vibrator and data stored in the ROM. The CPU outputs signal to the transistor of the I.G. coil output circuit which is connected to the primary windings of the ignition coil which is turned OFF and ON accordingly, thus it induces the secondary current on the ignition coil secondary windings and produce the spark between spark plug gaps.

Ignition cut-off circuit is incorporated in the ignitor unit to prevent over-running engine. If engine r/min. reaches 13500 r/min., this circuit cuts off the ignition primary current for all spark plugs.

### CAUTION:

Engine can run over 13500 r/min. without load, even if the ignition cut-off circuit is effective, and it may cause engine damage. Do not run the engine without load over 13500 r/min. at anytime.



## INSPECTION

### IGNITION COIL (Checking with Electro Tester)

- Remove the seat and both sides of the air cleaner side covers.
- Remove the fuel tank.
- Remove the ignition coils, left and right.

#### NOTE:

*Make sure that the three-needle sparking distance of electro tester is set at 8 mm (0.3 in).*

- With the tester and jumper wire, test the ignition coil for sparking performance in accordance with the following two steps.

STEP ①: Connect the jumper wire to the spark plug cap and ignition coil ground.

STEP ②: Switch over the jumper wire to the other plug cap and ground.

If no sparking or orange color sparking occurs in the above conditions, it may be caused by defective coil.

#### 09900-28106: Electro tester

Spark performance: Over 8 mm (0.3 in)

### IGNITION COIL (Checking with Pocket Tester)

- A SUZUKI pocket tester or an ohm meter may be used, instead of the electro tester. In either case, the ignition coil is to be checked for continuity in both primary and secondary windings. Exact ohmic readings are not necessary, but, if the windings are in sound condition, their continuity will be noted with these approximate ohmic values.

#### 09900-25002: Pocket tester

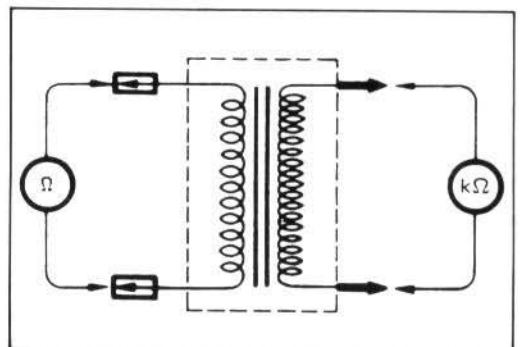
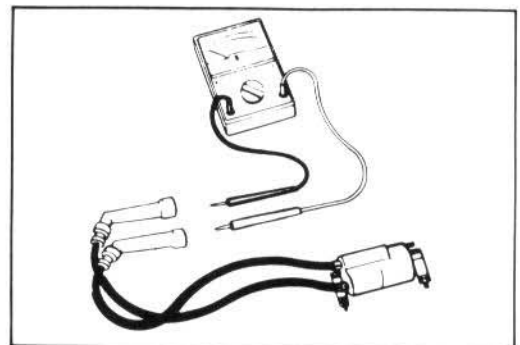
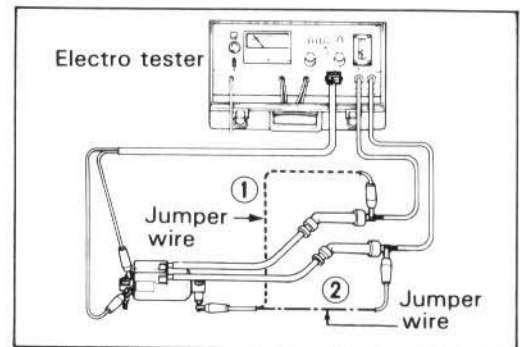
##### Ignition coil resistance

Primary : ⊕ tap — ⊖ tap 2.5 — 3.8  $\Omega$

Tester range: (x 1  $\Omega$ )

Secondary : Plug cap — Plug cap 30 — 50 k $\Omega$

Tester range: (x 1 k $\Omega$ )



### SIGNAL GENERATOR (Checking with Pocket Tester)

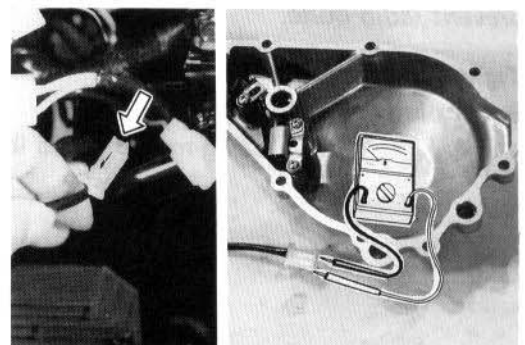
- Remove the seat and left air cleaner side cover.
- Disconnect the signal generator lead wire coupler.
- Measure the resistance between lead wires. If the resistance is infinity or less than the specifications, the signal generator must be replaced.

#### 09900-25002: Pocket tester

Signal coil resistance: 80 — 120  $\Omega$

(Brown — Black with Blue tracer)

Tester range : (x 10  $\Omega$ )





### NOTE:

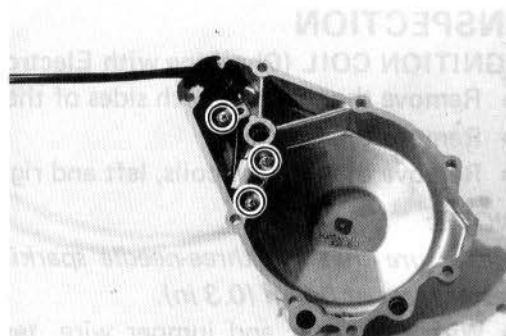
When replacing the signal generator coil, apply a small quantity of **THREAD LOCK SUPER "1322"/"1333B"** to its mounting screws and lead wire guide screws.

(For U.S.A. model)

**99000-32020: THREAD LOCK SUPER "1333B"**

(For the other models)

**99000-32110: THREAD LOCK SUPER "1322"**

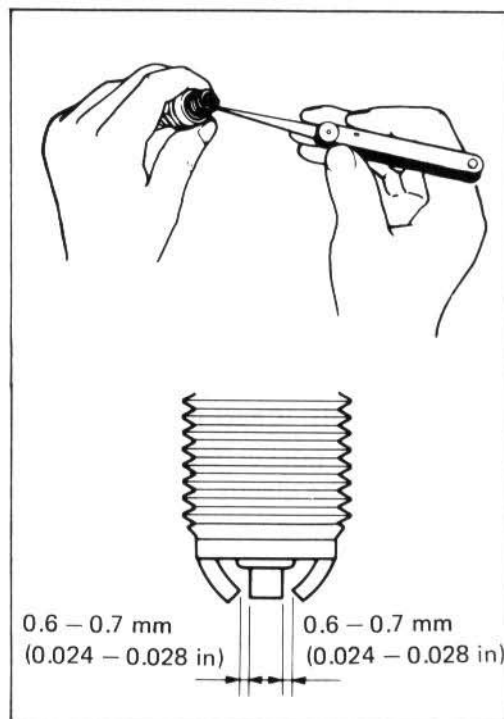


### SPARK PLUG

- Clean the plug with a wire brush and pin. Use the pin to remove carbon, taking care not to damage the porcelain.

- Check the gap with a thickness gauge.

**Spark plug gap: 0.6 – 0.7 mm (0.024 – 0.028 in)**



### Recommended spark plug

ND:	U24ETR	.....	Standard
ND:	U22ETR	.....	Hot type
ND:	U27ETR	.....	Cold type
NGK:	CR8EK	.....	Standard
NGK:	CR7EK	.....	Hot type
NGK:	CR9EK	.....	Cold type

### NOTE:

"R" type spark plug is installed for some specifications. "R" type spark plug has a resistor located at the center electrode to prevent radio noise.

### Tightening torque

**Spark plug: 10 – 12 N·m**

**(1.0 – 1.2 kg·m, 7.0 – 8.5 lb·ft)**



## IGNITOR UNIT (Checking with Digital Ignitor Checker)

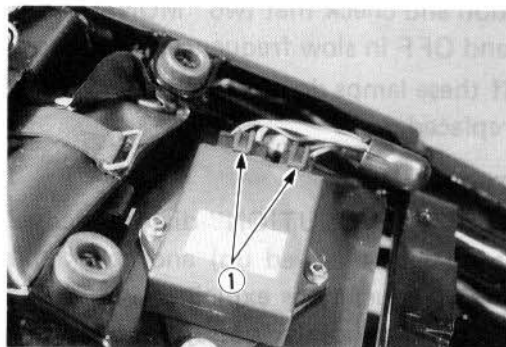
This section explains the checking procedure for the ignitor unit using Digital Ignitor Checker (special tool). With this checker, the ignitor unit can be checked either on the machine or off the machine. The following explains the checking procedure on the machine.

09931-94430: Digital ignitor checker

09931-94460: Adaptor

### WIRING PROCEDURE:

- Remove the seats, front and rear.
- Disconnect two ignitor lead wire couplers ① at the ignitor unit.



- Prepare the ignitor checker lead wire "MODE 2" ② and adaptor ③ which comes supplied with the ignitor checker and connect their ends to the ignitor unit and checker.
- Connect the power source leads ④ to the battery.

### CAUTION:

- \* Be sure that the **BLACK** lead is connected to the battery  $\ominus$  terminal and **RED** lead to the  $\oplus$  terminal.
- \* Before connecting the power source leads, make sure that both "POWER" button and "START" switch are in "off" position (POWER button not depressed)

### NOTE:

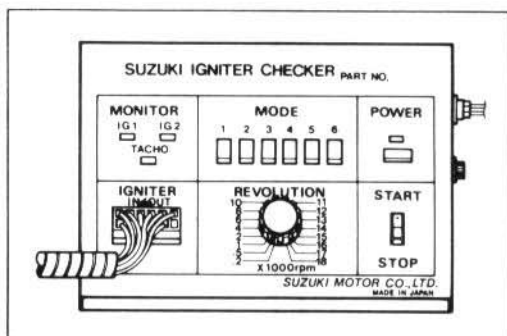
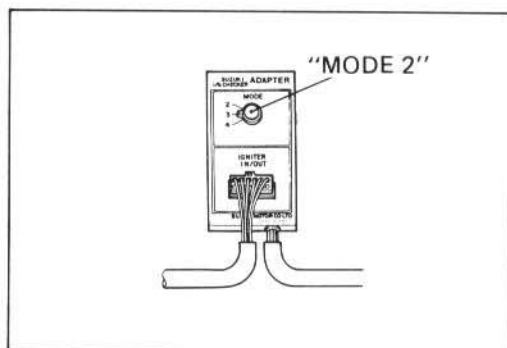
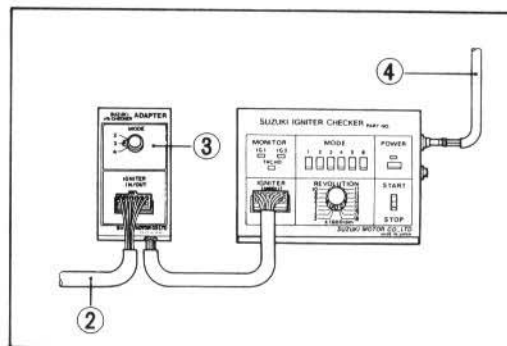
Be sure that the battery used is in fully-charged condition.

### CHECK PROCEDURE:

With all the lead wires properly connected, check the ignitor unit in the following four steps.

#### First Step:

Set "MODE" switch on the adaptor to "2" position and depress "MODE 2" button then "POWER" button. This time, "POWER" lamp should come on, if not, battery is undercharged.



## Second Step:

Set "REVOLUTION" dial pointer to "4" position in which the checker produces the ignition primary current pulses simulating 4000 r/min of engine revolution when "START" switch is turned on. With "START" switch is turned to ON position, check that two "MONITOR" lamps ① and ② turn ON. Then, turn back "REVOLUTION" dial pointer to ".2" position and check that two "MONITOR" lamps ① and ② turn ON and OFF in slow frequency in order of ① – ② as illustrated.

If these lamps do not turn on and off, the ignitor unit should be replaced.

## Third Step:

Turn "REVOLUTION" dial up gradually (assuming the engine is gradually revved up) and check that the MONITOR lamps flash frequency as explained in the second step above increases. As the dial pointer passes beyond the graduation "4" (4000 r/min), the two lamps should shown continuously lighted.

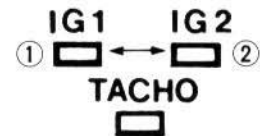
When REVOLUTION dial pointer reaches between "13" and "14" (13000 – 14000 r/min), MONITOR ① lamp should show go off. This is because the ignition "cut-off" provided in the ignition system functions at  $13500 \pm 50$  r/min.

If the lamp go off at the graduation below "13", the engine can not perform properly and therefore the ignitor unit must be replaced.

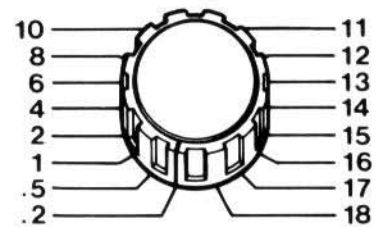
## Fourth Step:

Turn "START" switch to STOP position. If the "IG1" or "IG2", or both lamps remain light more than 5 seconds, the ignitor unit must be replaced.

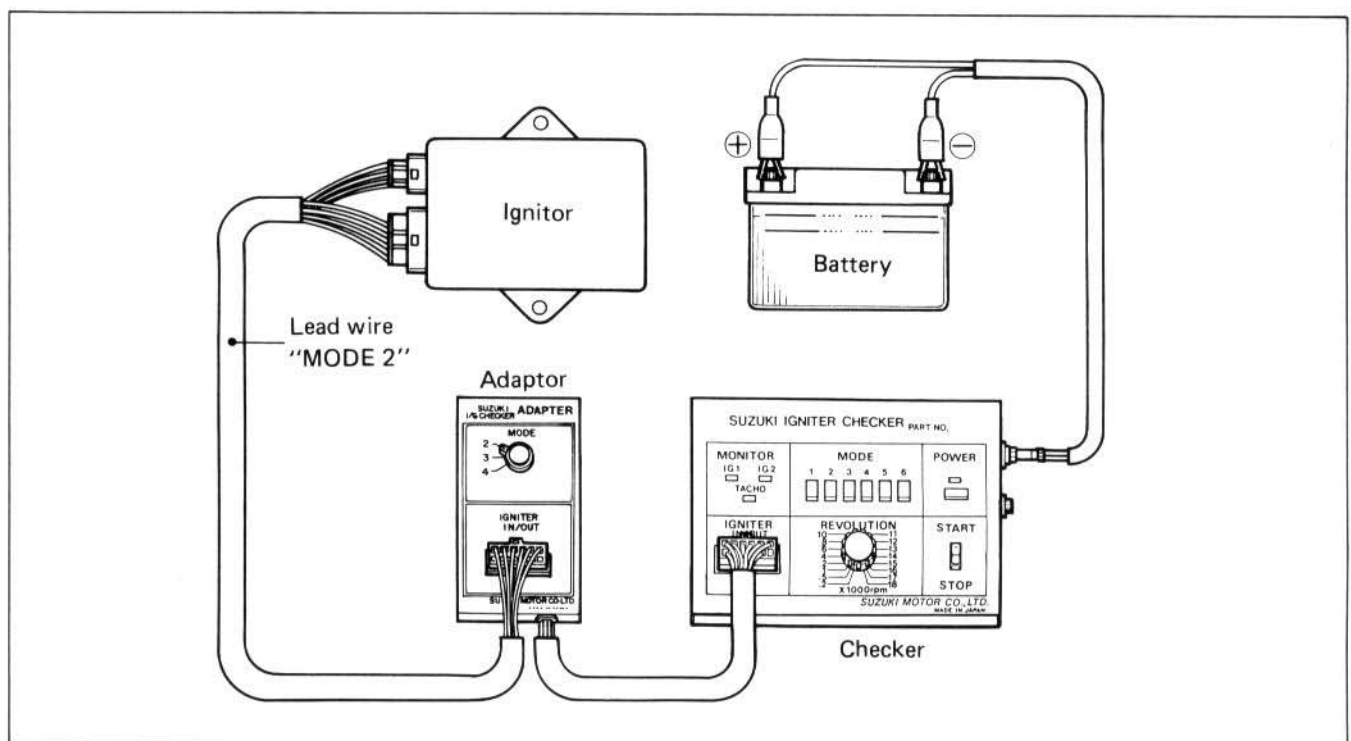
### MONITOR



### REVOLUTION



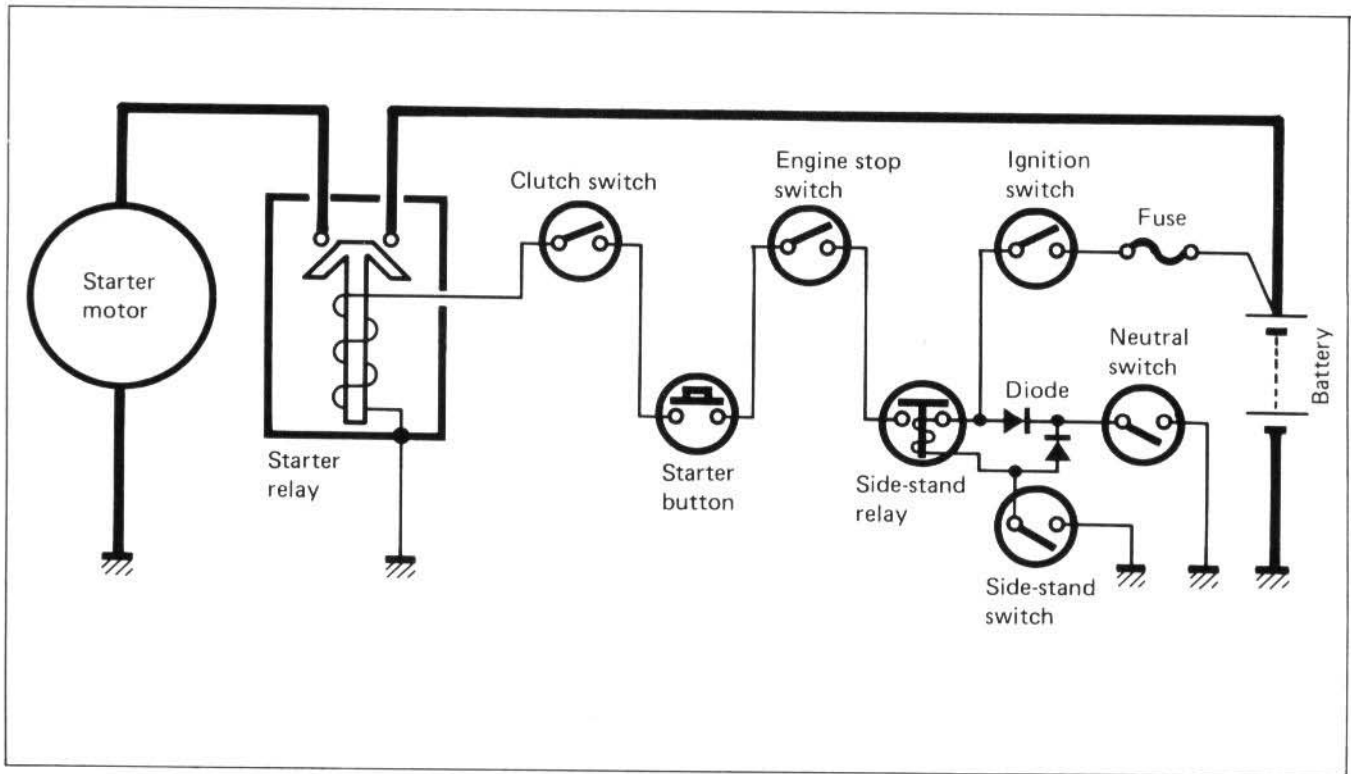
X 1000rpm



## STARTER SYSTEM

### DESCRIPTION

The starter system is shown in the diagram below: namely, the starter motor, starter relay, side stand relay, clutch switch, starter button, engine stop switch, side stand switch, IG switch and battery. Depressing the starter button (on the right handlebar switch box) energizes the relay, causing the contact points to close which connects the starter motor to the battery. The motor draws about 80 amperes to start the engine.

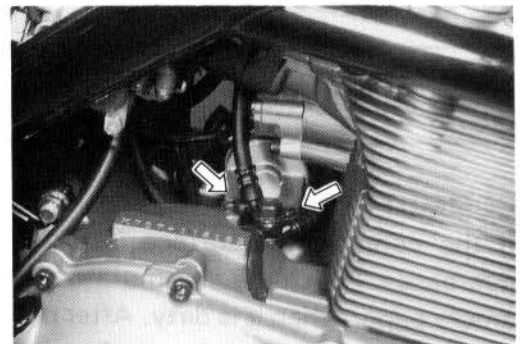


### REMOVAL AND DISASSEMBLY

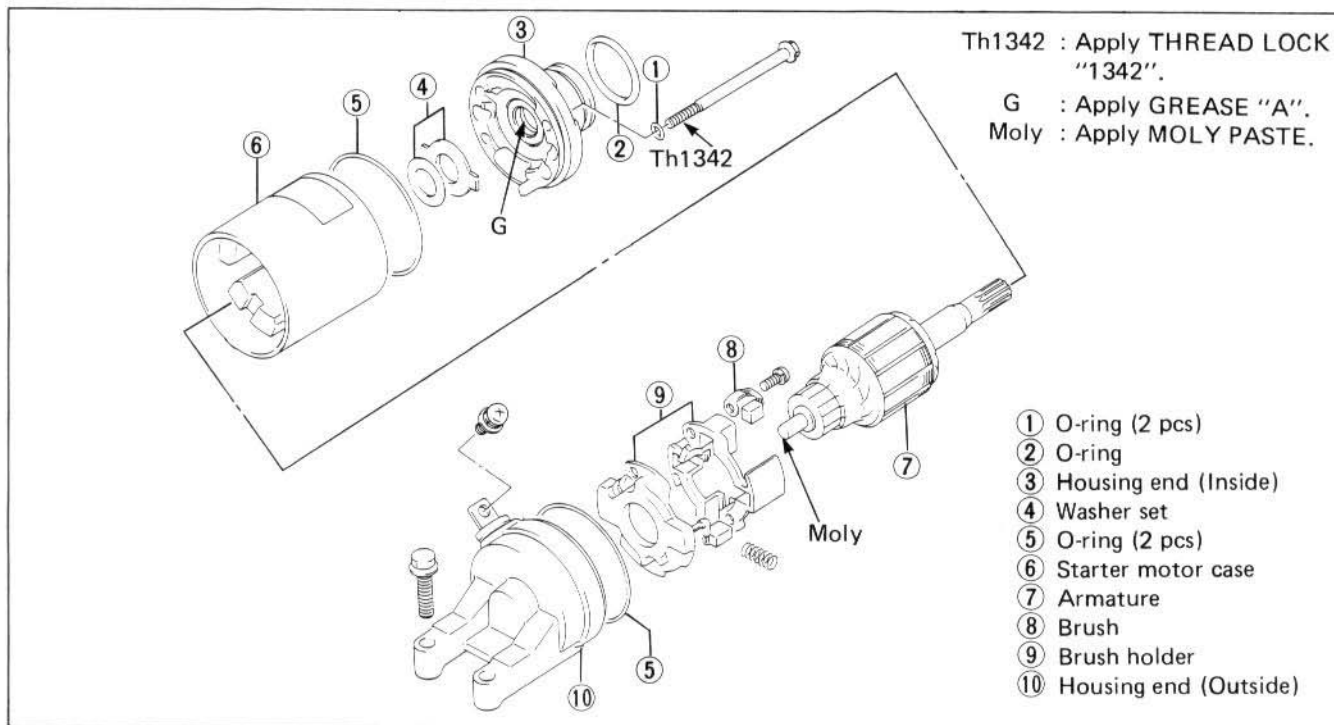
- Disconnect the starter motor lead wire and remove the starter motor. (Refer to pages 3-7 and 3-12.)

#### NOTE:

If it is difficult to remove the starter motor, loosen the oil hose union bolt on the upper crankcase to provide additional clearance.



- Disassemble the starter motor as shown in the illustration.



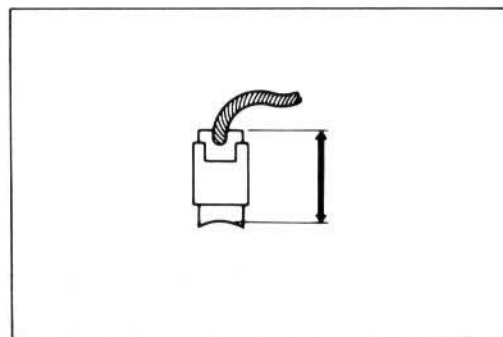
## INSPECTION

### CARBON BRUSH

When the brushes are worn, the motor will be unable to produce sufficient torque, and the engine will be difficult to turn over. To prevent this, periodically, measure the length of the brushes with a vernier calipers, replacing them when they are too short or chipping.

09900-20102 : Vernier calipers (200 mm)

Brush length	Service Limit
	3.5 mm (0.14 in)



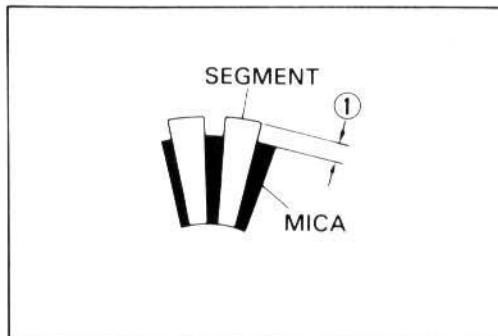
### COMMUTATOR

If the commutator surface is dirty, starting performance decreases. Polish the commutator with # 400 or similar fine emery paper when it is dirty. After polishing it, wipe the commutator with a clean dry cloth.

Measure the commutator under cut ① with a vernier calipers.

09900-20102 : Vernier calipers (200 mm)

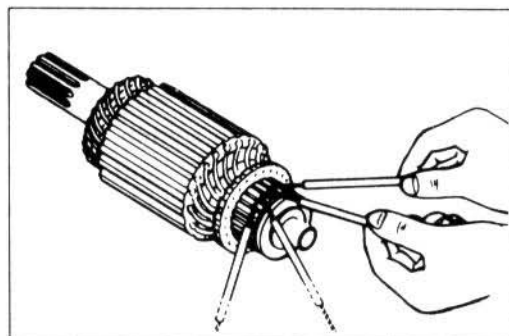
Commutator under-cut	Service Limit
	0.5 mm (0.02 in)



### ARMATURE COIL

Using a pocket tester, check the coil for open and ground by placing probe pins on each commutator segment and rotor core (to test for ground) and on any two segments at various places (to test for open), with the brushes lifted off the commutator surface.

If the coil is found to be open-circuited or grounded replace the armature. Continuous use of a defective armature will cause the starter motor to suddenly fail.



**09900-25002 : Pocket tester**

**Tester knob indication :  $\times 1\Omega$  range**

### OIL SEAL

Check the seal lip for damage or oil leakage. If any damage is found, replace it.

## REASSEMBLY

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

### O-RING

#### CAUTION:

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

### HOUSING END (Inside)

- Apply grease to the lip of oil seal. (Refer to page 6-11.)

**(For U.S.A. model)**

**99000-25030 : SUZUKI SUPER GREASE "A"**

**(For the other models)**

**99000-25010 : SUZUKI SUPER GREASE "A"**

### HOUSING END (Outside)

- Apply a small quantity of SUZUKI MOLY PASTE to the armature end. (Refer to page 7-11.)

**99000-25140 : SUZUKI MOLY PASTE**

- Apply a small quantity of THREAD LOCK "1342" to the starter motor housing bolts. (Refer to page 6-11.)

**99000-32050 : THREAD LOCK "1342"**

## STARTER RELAY INSPECTION

- Disconnect the lead wire of starter motor at starter relay which is located battery holder of right side.
- Turn on the ignition switch, inspect the continuity between the terminals, positive and negative, when squeezing the clutch lever and pushing the starter button.  
If the starter relay is in sound condition, continuity is found.

09900-25002 : Pocket tester

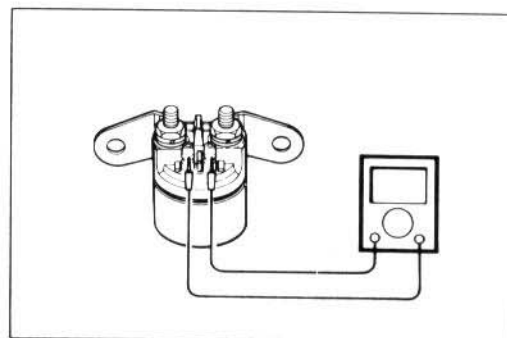
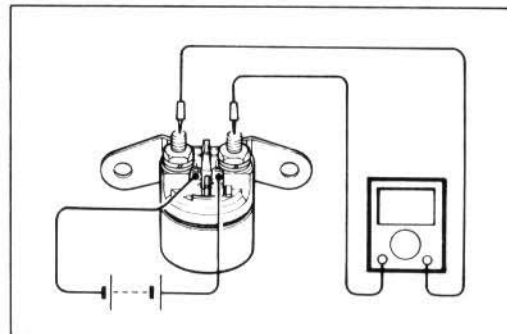
Tester knob indication :  $\times 1\Omega$  range

- Disconnect the lead wires from the starter relay.
- Check the coil for "open", "ground" and ohmic resistance.  
The coil is in good condition if the resistance is as follows.

09900-25002 : Pocket tester

Tester knob indication :  $\times 1\Omega$  range

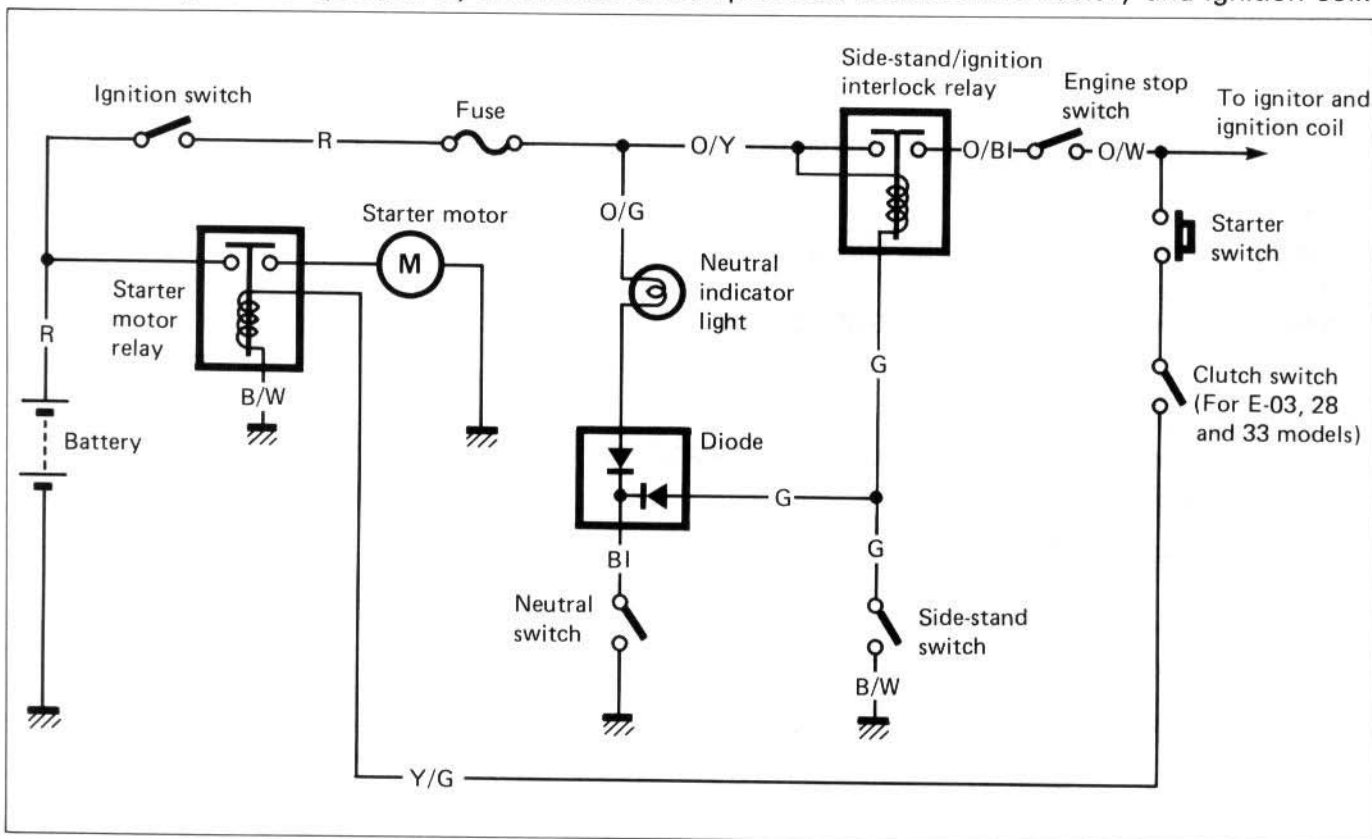
Starter relay resistance	Standard
	3 – 5 $\Omega$



## SIDE-STAND/IGNITION INTERLOCK SYSTEM

### DESCRIPTION

This side-stand/ignition interlock system is to prevent starting the motorcycle with the side-stand left down. The system is operated by an electric circuit provided between the battery and ignition coil.

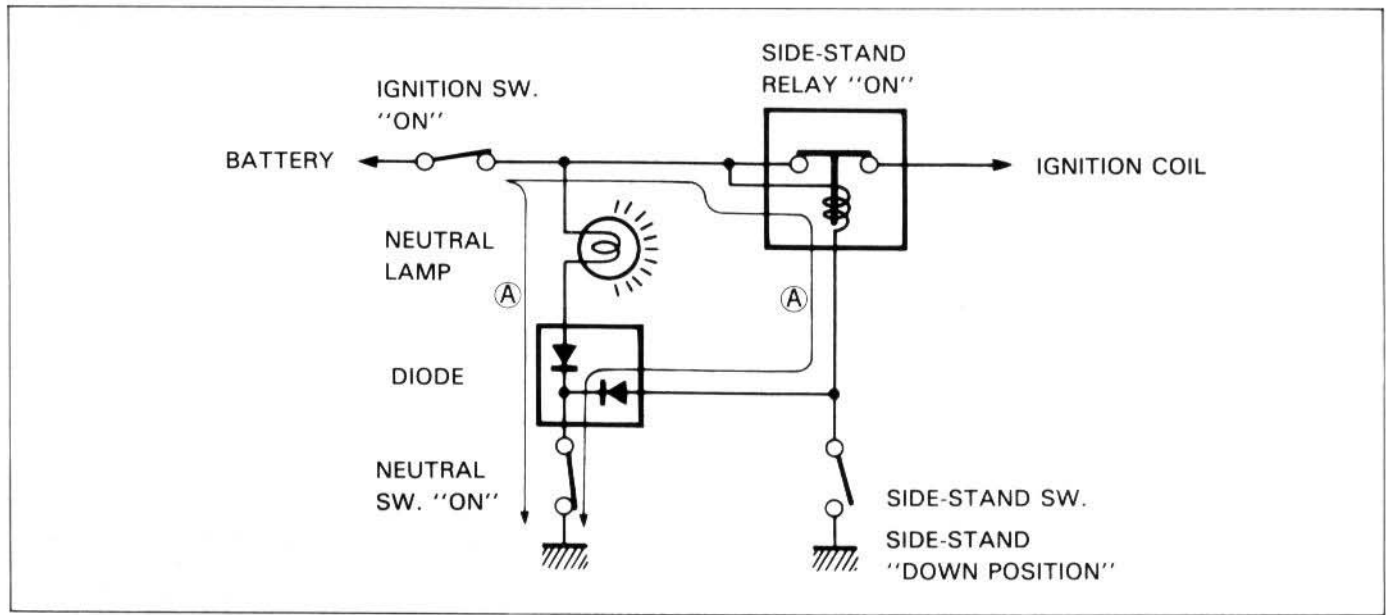


The circuit consists of relay, lamp, diode and switches and decides to live the ignition coil depending on the position of the TRANSMISSION and SIDE-STAND with the neutral and side-stand switches working mutually.

The ignition coil lives only in two situations as follows:

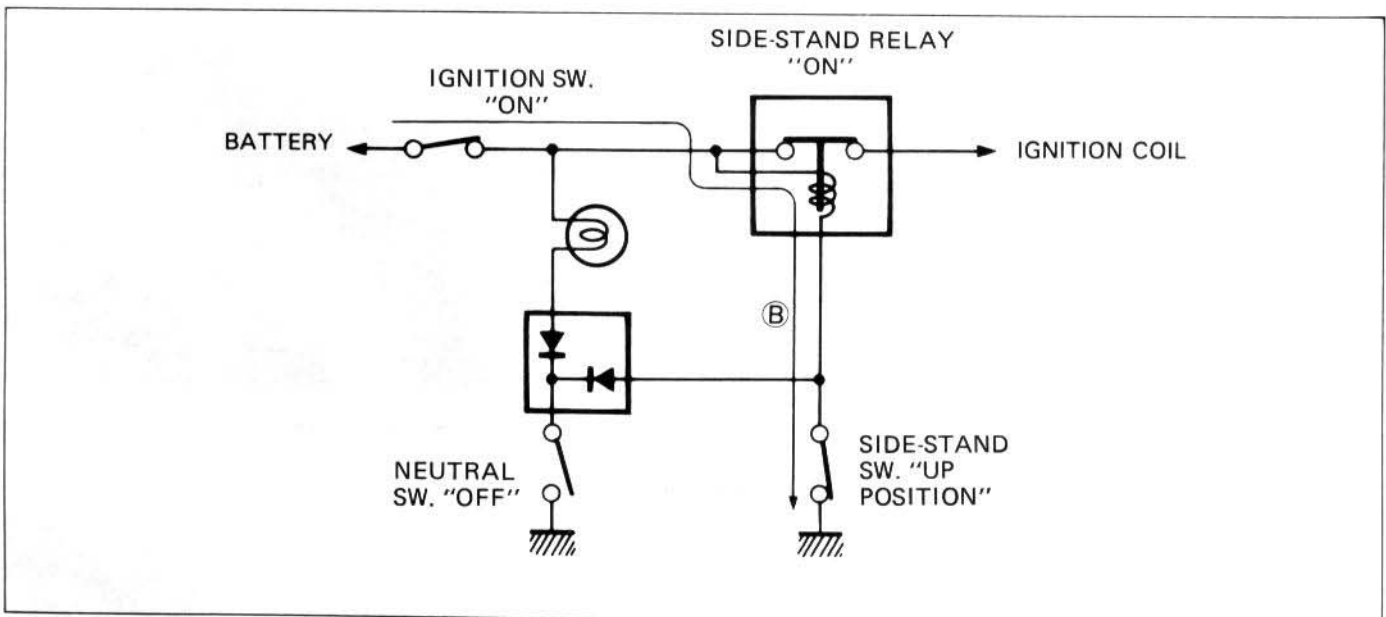
1. Transmission: "NEUTRAL (ON)" Side-stand: "DOWN (OFF)"

The current flow (A) turns "ON" the relay and the ignition coil lives even the side-stand is kept down. This is for warming up the engine.



2. Side-stand: "UP (ON)"

The current flow (B) turns "ON" the relay and the ignition coil lives. The engine can be easily started at any transmission position.





## INSPECTION

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

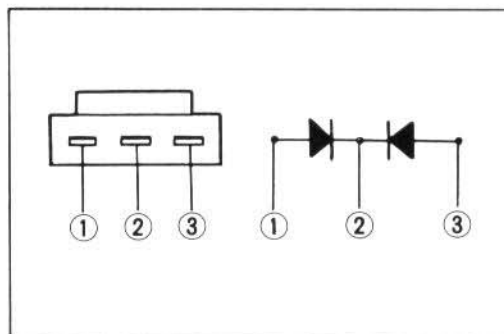
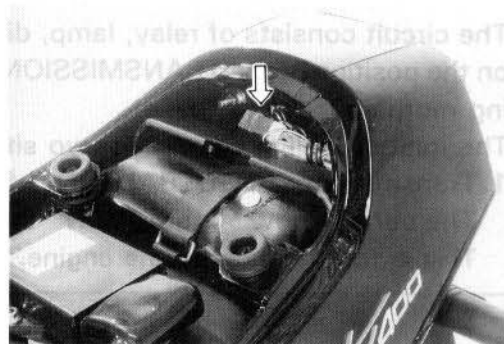
### 09900-25002 : Pocket tester

#### Diode

The diode is located behind the tool bag.

The diode can pass current only in one direction.

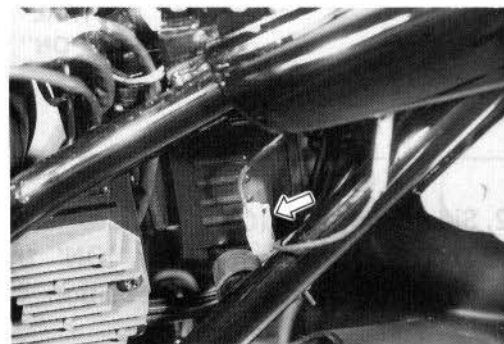
- Check the continuity between ① and ②. If one way continuity the diode is in good condition.
- Also check the continuity between ② and ③ as required.



#### Neutral switch

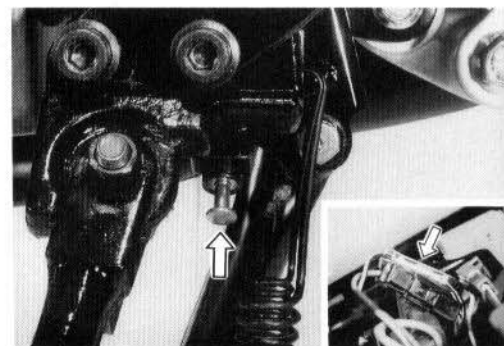
The neutral lead wire coupler is located behind the battery holder.

- Disconnect the neutral switch lead and check the continuity between BI and ground with the transmission in "NEUTRAL".



#### Side-stand switch

	G	B/W
ON (UP position)		
OFF (Down position)		



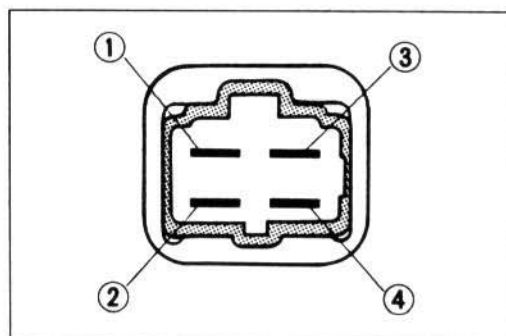
#### Side-stand/ignition interlock relay

The side-stand/ignition interlock relay is located on the left frame back side.



First, check the insulation between ① and ② terminals with pocket tester. Then apply 12 volts to ③ and ④ terminals,  $\oplus$  to ③ and  $\ominus$  to ④, and check the continuity between ① and ②.

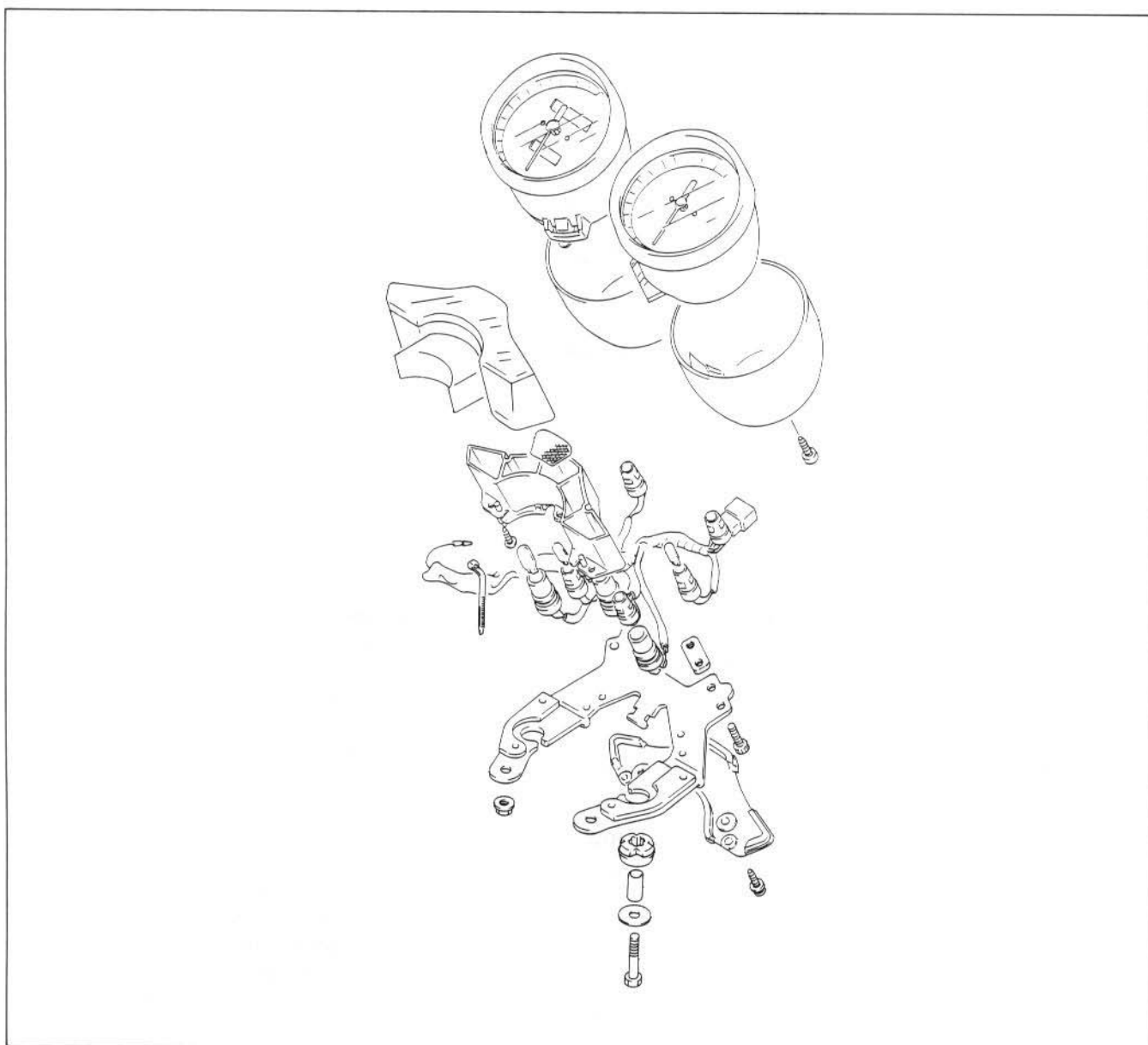
If there is no continuity, replace it with a new one.



## COMBINATION METER

### REMOVAL AND DISASSEMBLY

- Disassemble the combination meter as follows.



## INSPECTION

Using the pocket tester, check the continuity between lead wires in the diagram as shown below.

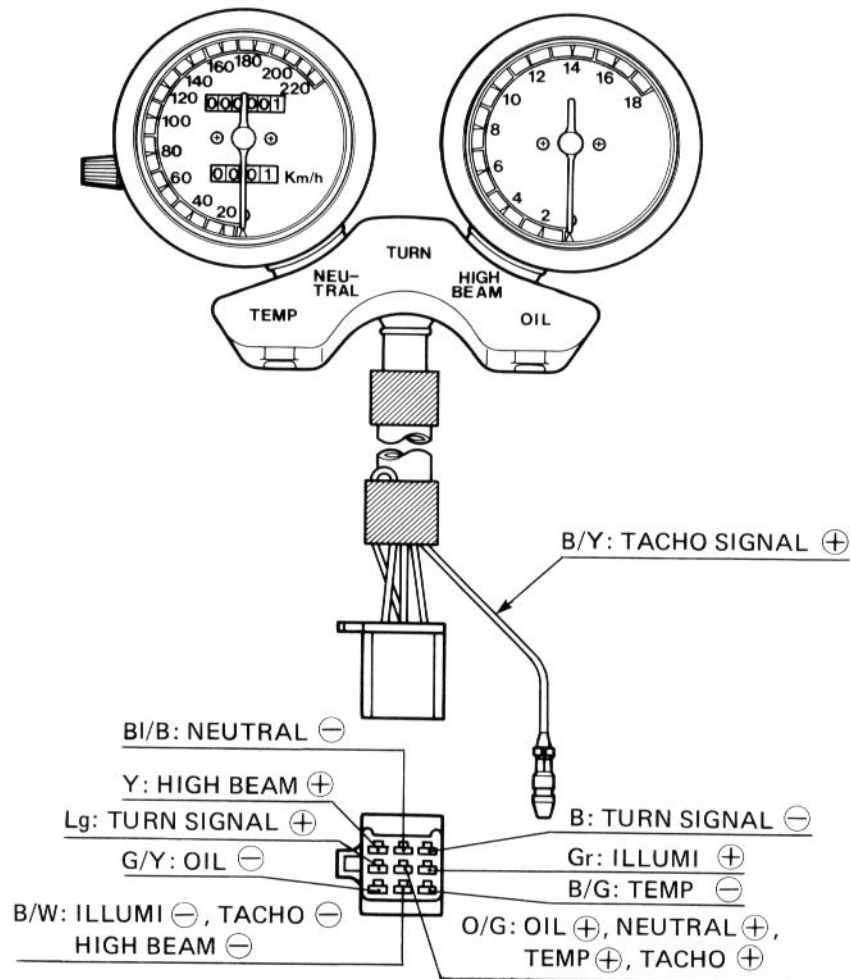
If the continuity measured is incorrect, replace the respective parts.

09900-25002 : Pocket tester

Tester knob indication :  $\times 1\Omega$  range

### NOTE:

When making this test, it is not necessary to remove the combination meter.



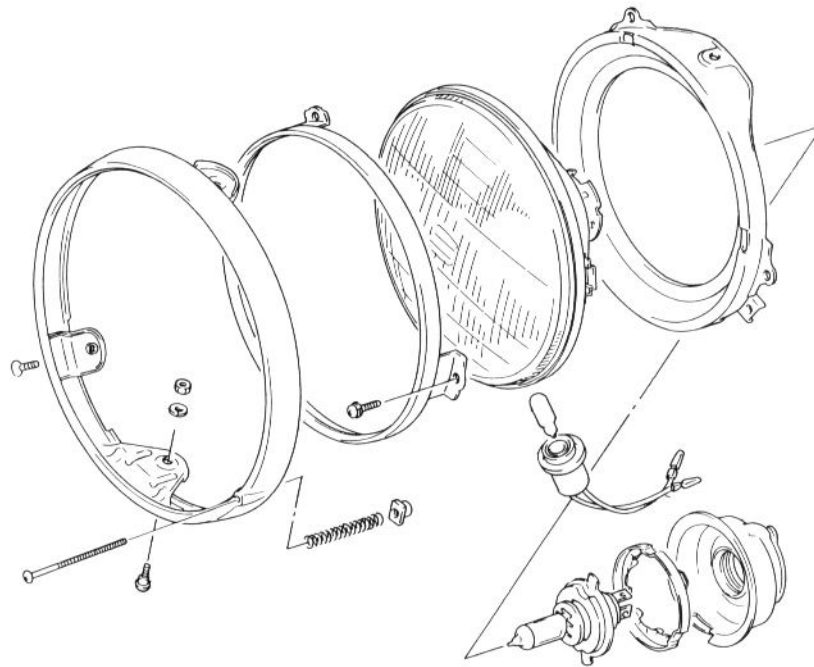
ITEM	⊕ Probe of tester to:	⊖ Probe of tester to:
TURN SIGNAL	Lg	B
ILLUMI	Gr	B/W
HIGH BEAM	Y	B/W
OIL	O/G	G/Y
NEUTRAL	O/G	BI/B
TEMP	O/G	B/G
TACHO	O/G and B/Y	B/W

### WIRE COLOR

B : Black  
 Lg : Light green  
 Gr : Gray  
 Y : Yellow  
 O/G : Orange with Green tracer  
 BI/B : Blue with Black tracer  
 B/W : Black with White tracer  
 G/Y : Green with Yellow tracer  
 B/G : Black with Green tracer  
 B/Y : Black with Yellow tracer

## LAMPS

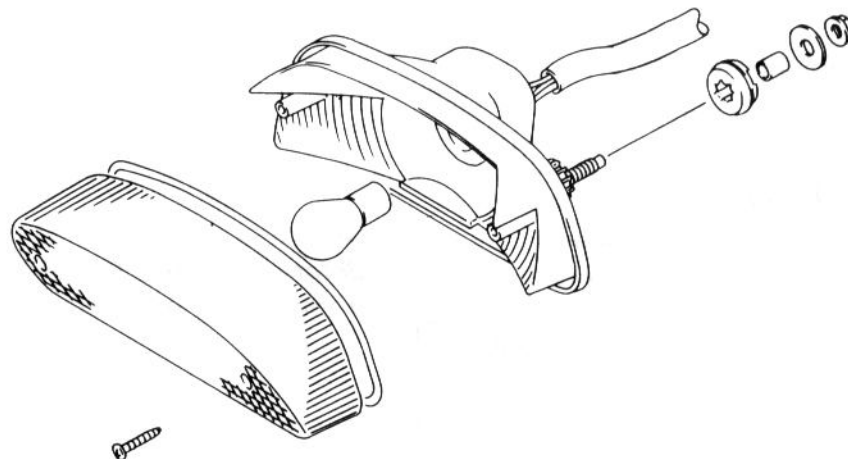
### HEADLIGHT



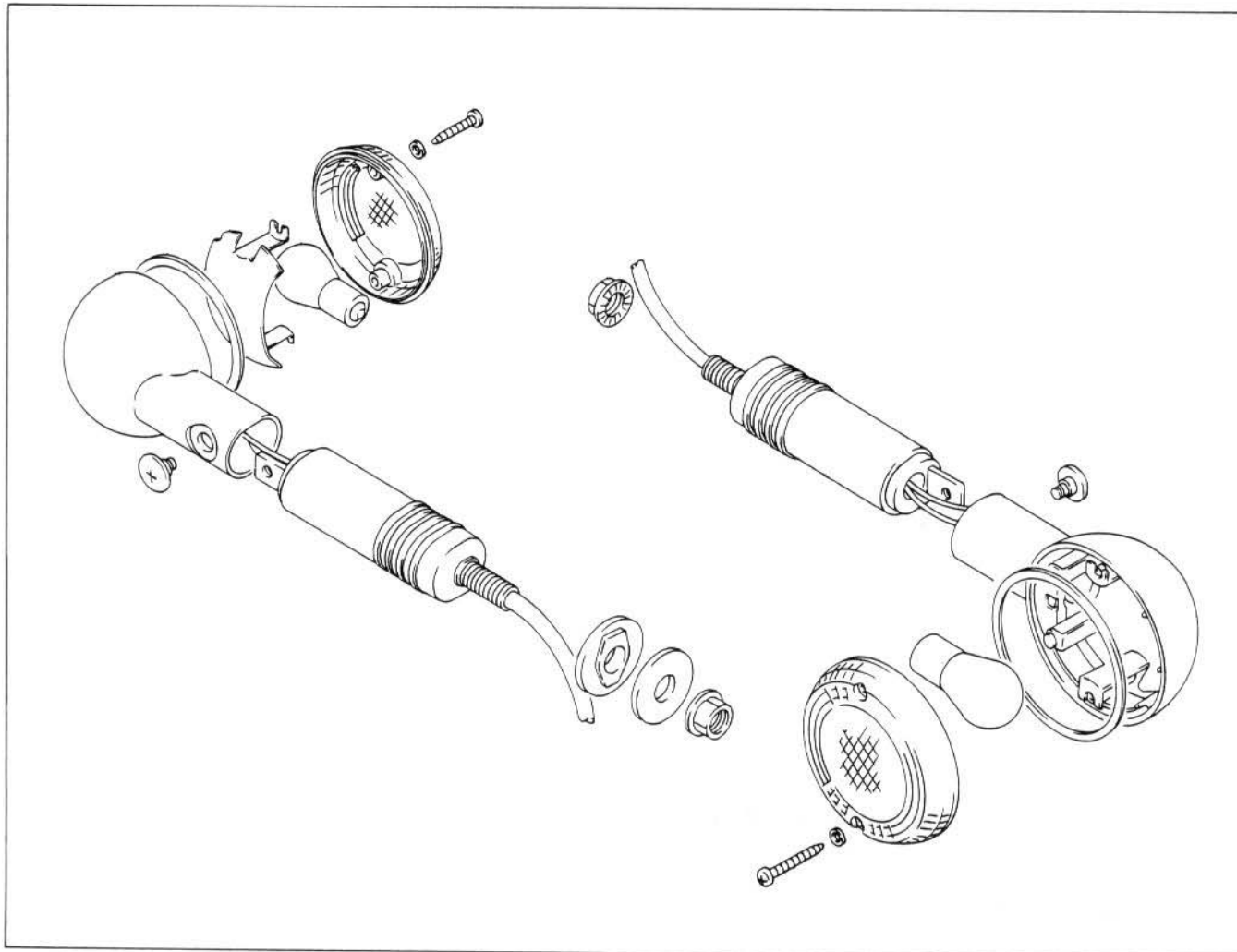
**NOTE:**

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

### TAIL/BRAKE LIGHT



## TURN SIGNAL LIGHT



## SWITCHES

Inspect each switch for continuity with the pocket tester referring to the wiring diagram. If any abnormality is found, replace the respective switch assemblies with new ones. (Refer to the chapter 8 of wiring diagram.)

**09900-25002 : Pocket tester**

**Tester knob indication :  $\times 1\Omega$  range**

## OIL PRESSURE SWITCH

- Continuity, when engine is stopped.
- No continuity, when engine is running.

### NOTE:

*Before inspecting the oil pressure switch, check if the engine oil level is enough.*

	B/G	Ground
ON		
OFF		

## RELAY

### STARTER RELAY

The starter relay is located behind the battery. (Refer to page 6-13 for details.)

### SIDE-STAND RELAY

The side-stand relay is located on the left frame back side. (Refer to page 6-13 for details.)

### TURN SIGNAL RELAY

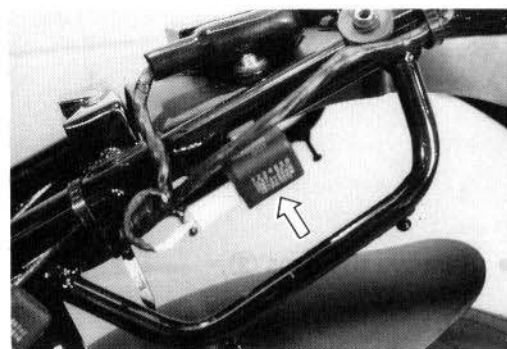
The turn signal relay is located on the left frame back side.

If the turn signal light does not light, inspect the bulb or repair the circuit connection.

If the bulb and circuit connection checked are correct, the turn signal relay may be faulty, replace it with a new one.

**NOTE:**

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



# BATTERY

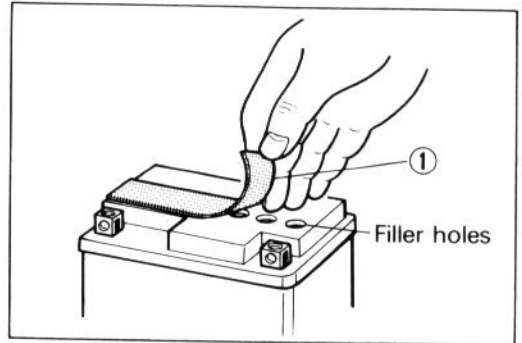
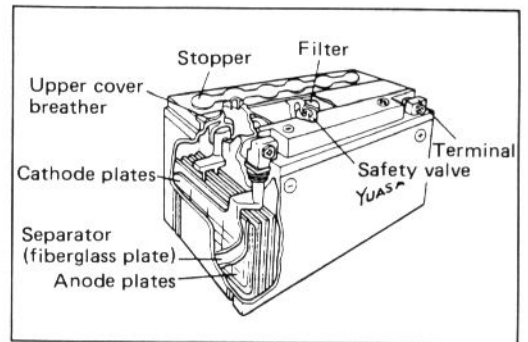
## SPECIFICATIONS

Type designation	YTX9-BS
Capacity	12V 28.8 kC (8 Ah)/10HR
Standard electrolyte S.G.	1.320 at 20°C (68°F)

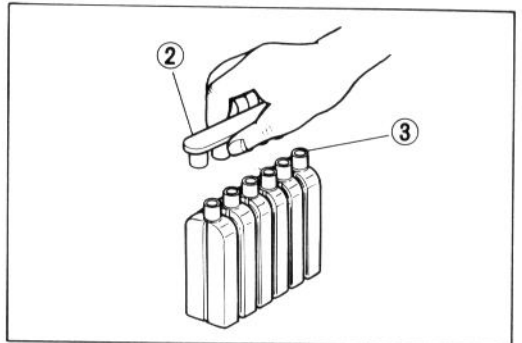
## INITIAL CHARGING

### Filling electrolyte

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



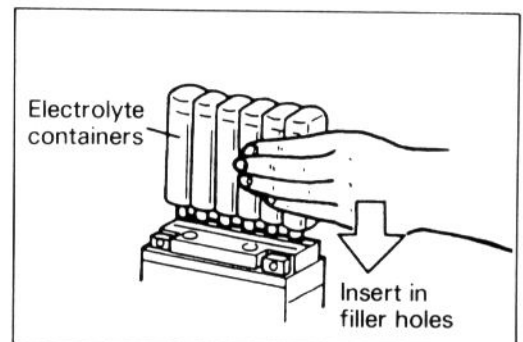
- Remove the caps ②.



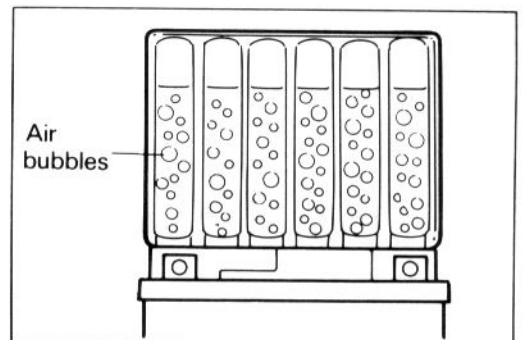
### NOTE:

- \* 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.

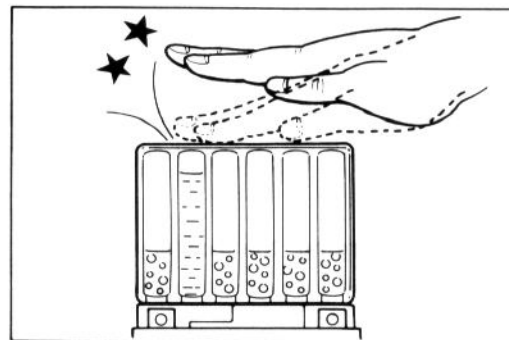




**NOTE:**

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

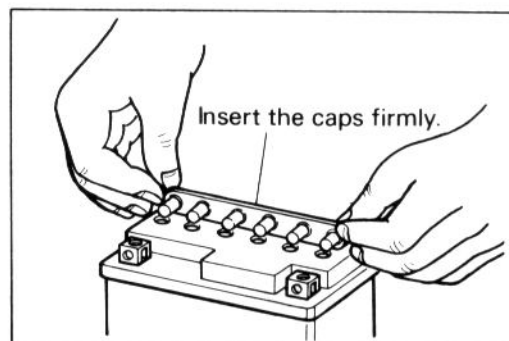
*Never remove the container from the battery.*



- 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:**

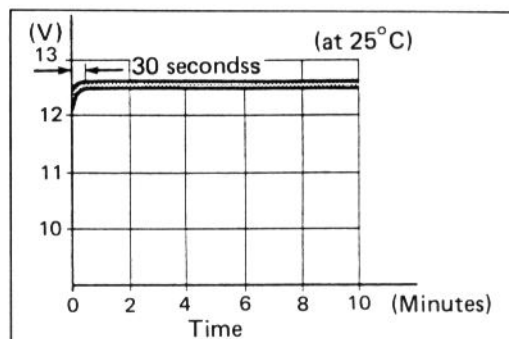
- \* **Never use anything except the specified battery.**
- \* **Once install the caps to the battery; do not remove the caps.**



- Using SUZUKI pocket tester, measure the battery voltage. The tester should indicate more than 12.5 – 12.6 V (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 pocket 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 stoppers on the battery top while recharging.*

Recharging time: 4A for one hour or 0.9A for 5 hours

### CAUTION:

Be careful not to permit the charging current to exceed 4A at any time.

- After recharging, wait for more than 30 minutes and check the battery voltage with a pocket 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 a battery is left for a long term without using, it is subject to discharge. When the motorcycle is not used for more than 1 month (especially during the winter season), recharge the battery once a month at least.

