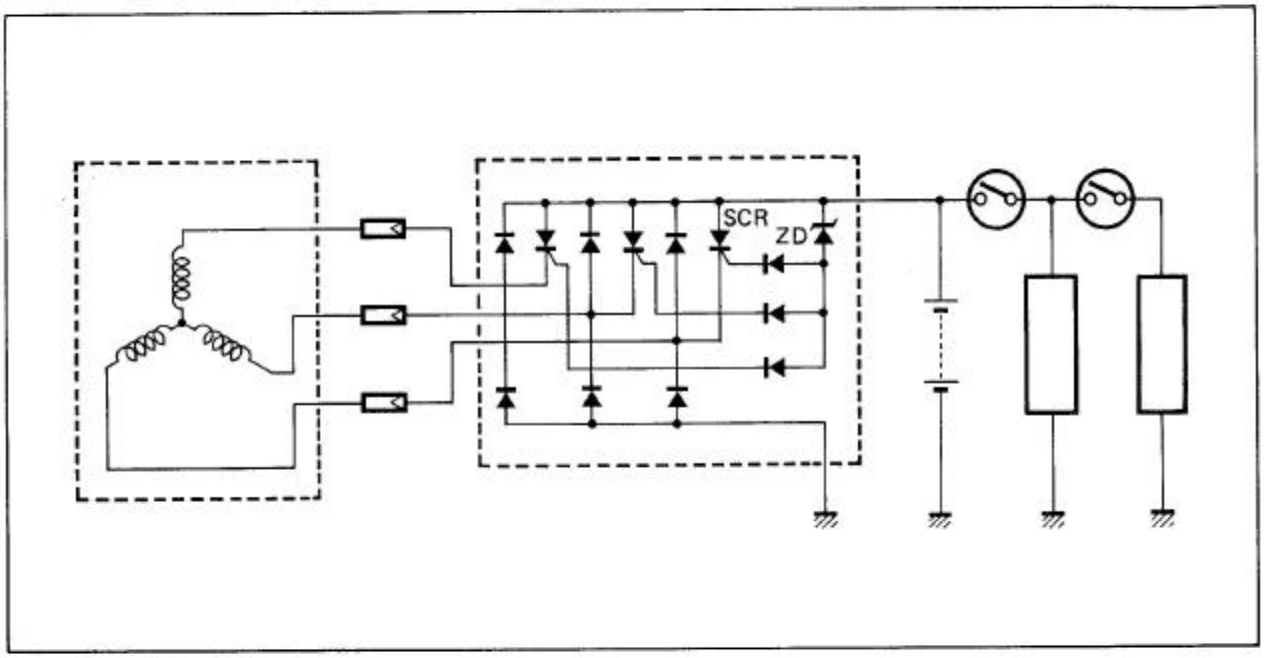
ELECTRICAL SYSTEM

CONTENTS

CHARGING SYSTEM

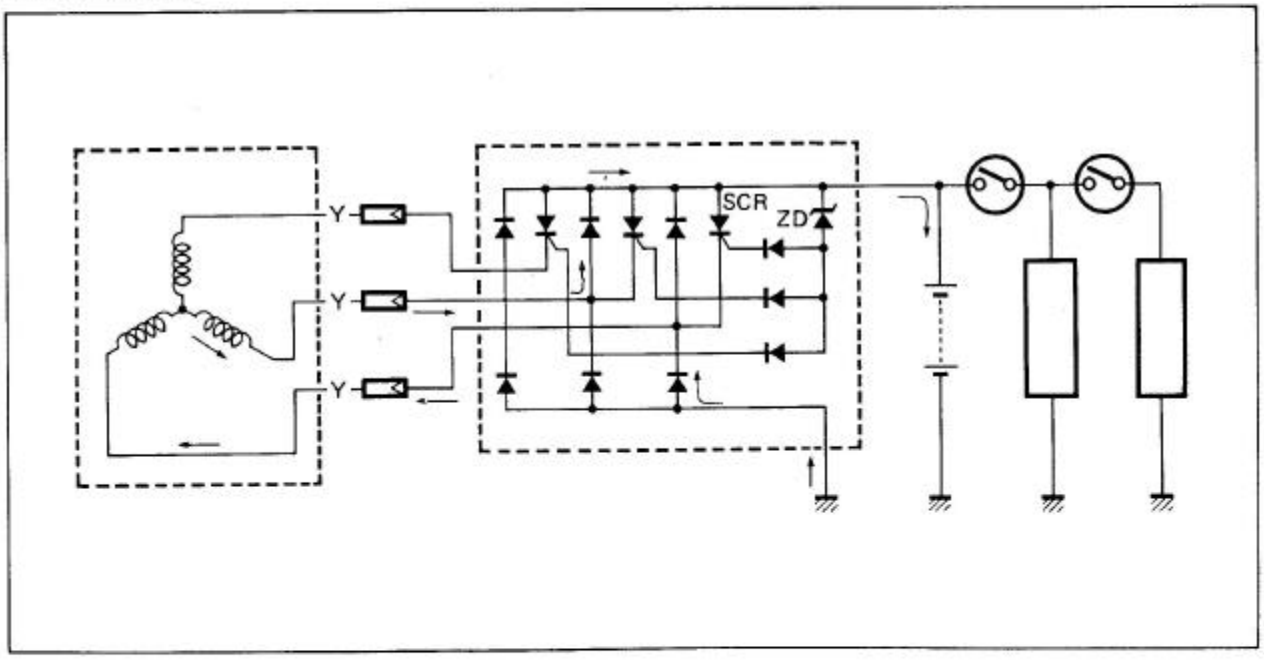
DESCRIPTION

The diagram below shows the charging system circuit composed of an AC generator, regulator/-rectifier unit and battery.
The AC current generated from AC generator is rectified by rectifier and is converted into DC current, then it charges the battery.

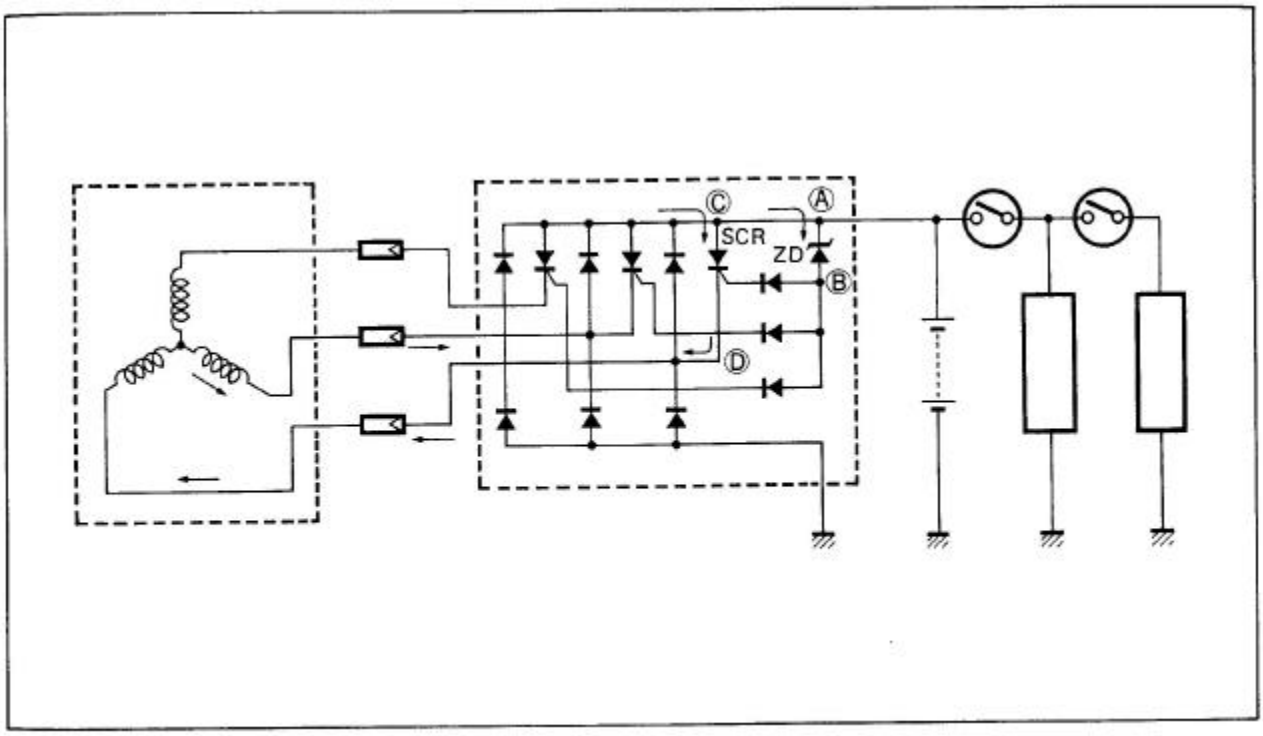


Function of Regulator

While the engine r/min is low and the generated voltage of AC generator is lower than the predetermined voltage of Regulator, the regulator does not function, and therefore the generated current charges the battery directly.



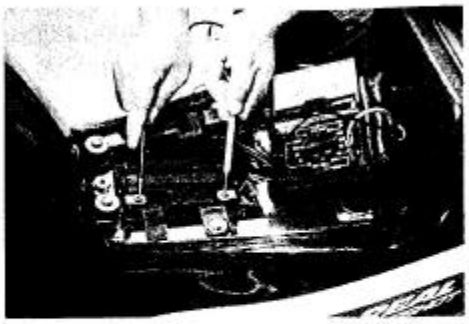
When the engine r/min becomes higher, the generated voltage of AC generator also becomes higher. This causes the voltage between points Ⓐ and Ⓑ of regulator rises, and when it reaches the designed voltage of regulator, ZD (Zener diode) becomes "ON" condition and, signal will be sent to the SCR (Thyristor) gate and SCR will become "ON" condition.
Then the SCR becomes conductive to the direction from point Ⓒ to point Ⓓ. With the SCR conductive, the current generated from the AC generator is short circuited through 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 into the point Ⓓ, reverse current tends to flow to SCR, then the circuit of SCR turns to OFF mode and begins to charge the battery again. Thus these repetitions maintain charging voltage to the battery constant and protect it from overcharging.

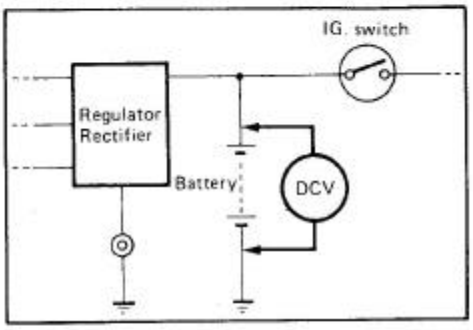


INSPECTION

CHARGING OUTPUT CHECK

- Remove the seat and fuel tank. (Refer to page 7-4.)
- Start the engine and keep it running at 5 000 r/min with lighting switch turned ON and dimmer switch turned to HI position.
- Using the pocket tester, measure the DC voltage between the battery terminal ⊕ and ⊖.
  If the tester reads under 13.0V or over 15.0V, check the AC generator no-load performance and regulator/rectifier.





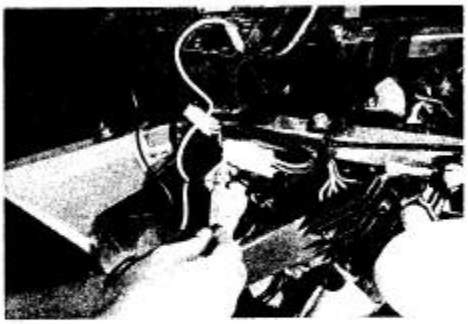
NOTE:
When making this test, be sure that the battery is in fully-charged condition.

STD charging output: 13.0 – 15.0V (DC) at 5 000 r/min

09900-25002: Pocket tester

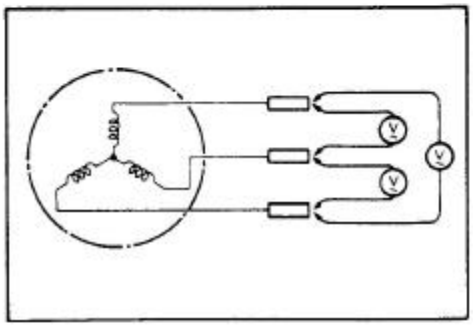
AC GENERATOR NO-LOAD PERFORMANCE

- Remove the left fairing.
- 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 yellow lead wires.
  If the tester reads under 53V, the AC generator is faulty.



STD No-load performance: More than 49V (AC) at 5 000 r/min

09900-25002: Pocket tester



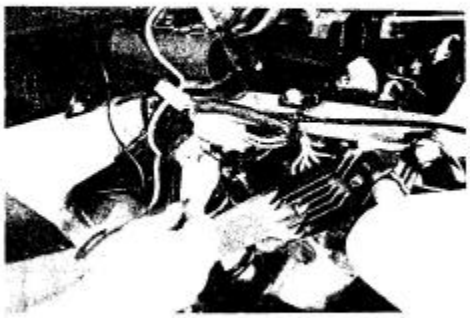
AC GENERATOR CONTINUITY CHECK

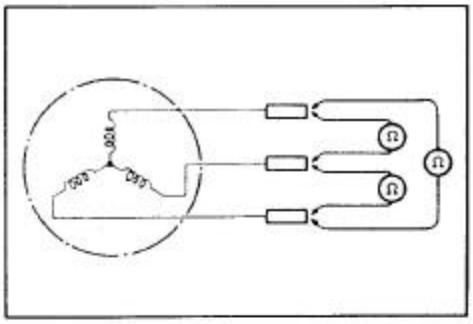
- Using the pocket tester, check the continuity between the Yellow lead wires of the stator.
  Also check that the stator core is insulated.

NOTE:
When making this test, it is not necessary to remove the AC generator.

09900-25002: Pocket tester

STD resistance: 0.1 – 1.0 Ω

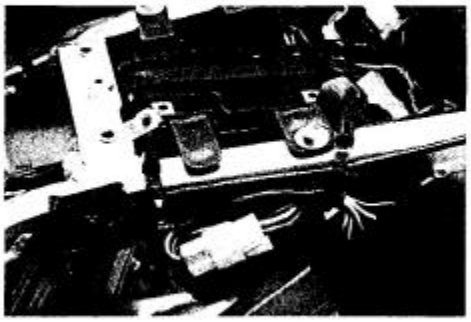




REGULATOR/RECTIFIER

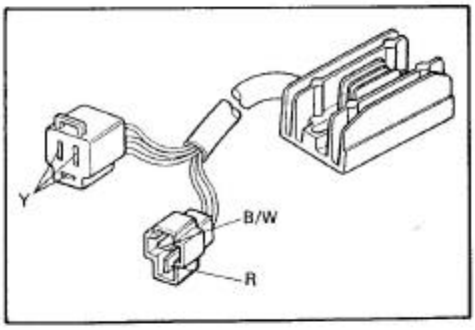
- Remove the seat, fuel tank, right and left frame covers.
- Remove the front fairing and windshield.
- Using the pocket tester (x 1kΩ range), measure the resistance between the lead wires in the following table.
  If the resistance checked is incorrect, replace the regulator/rectifier.

09900-25002: Pocket tester



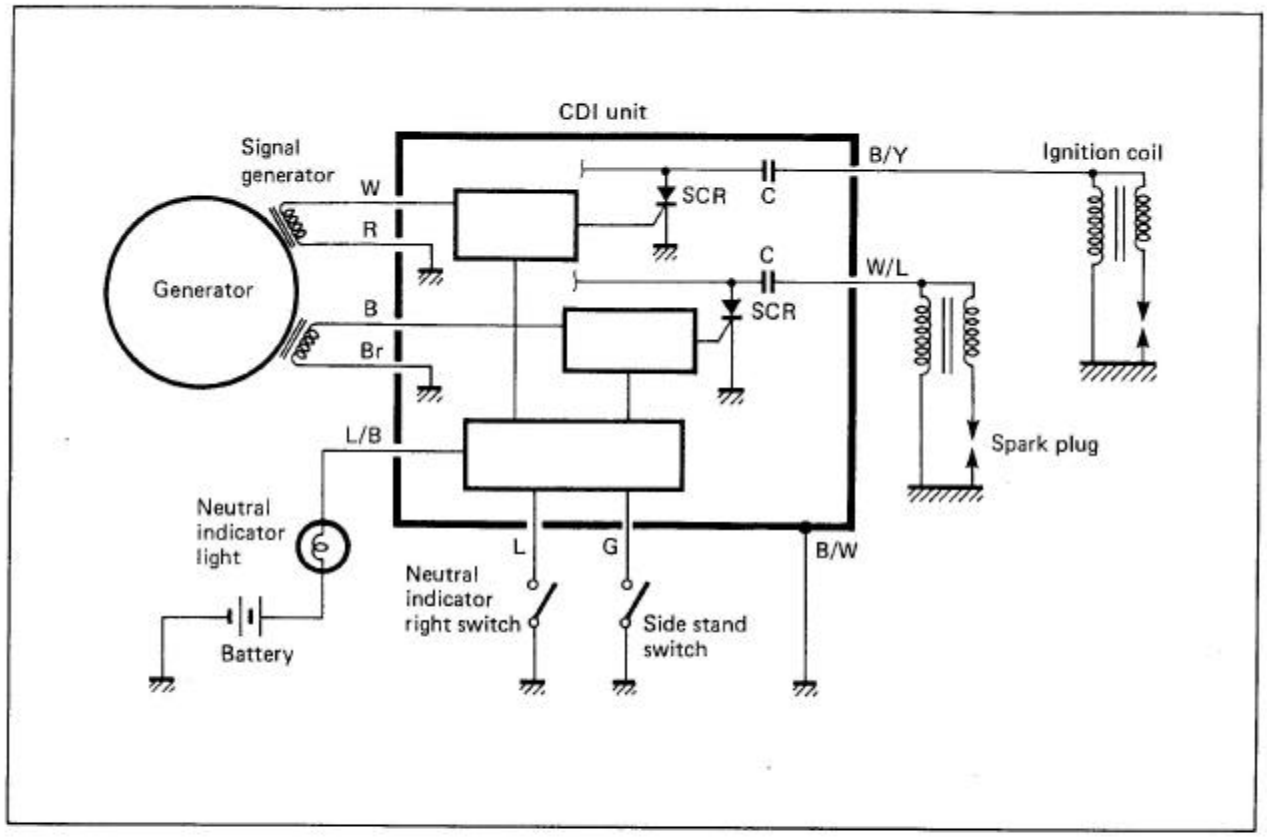
Unit: Approx. kΩ

⊖ Probe of tester to:	⊕ Probe of tester to: Y	Y	Y	R	B/W
Y		∞	∞	1 – 10	∞
Y	∞		∞	1 – 10	∞
Y	∞	∞		1 – 10	∞
R	∞	∞	∞		∞
⊖	1 – 10	1 – 10	1 – 10	2 – 20	



CAUTION:
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



DESCRIPTION

The RGV250 engine is equipped with a new type ignition system. This new system minimizes timing fluctuations. It has an "ignition timing control circuit" which accurately controls ignition timing depending on the engine r/min.

OPERATION

There is a DC-DC converter in the CDI unit, which steps up the battery voltage to a higher voltage and charges the capacitor (C). An SCR connected to the capacitor becomes conductive (turns on) when a forward voltage signal is sent to its gate allowing the electric energy stored in the capacitor (C) to discharge instantly to the ignition primary coil. This then causes a high voltage to be induced in the secondary coil and a hot spark jumps across the spark plug gap. Therefore, the spark in the spark plug occurs when the SCR is turned on. In other words, the SCR's being turned on is the ignition timing (or spark timing). This ignition timing is controlled by the control circuit which processes the signal generator pulses to form an SCR gate signal. The signal is then sent to the SCR just when the crankshaft has reached the best ignition timing for the current engine revolutions.

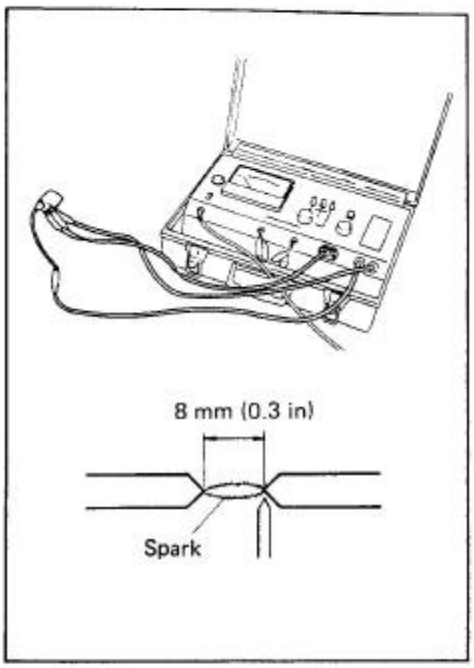
INSPECTION

IGNITION COIL (Checking with Electro Tester)

- Remove the seat and fuel tank.
- Remove the ignition coil from the frame.
- Using the electro tester, test each ignition coil for sparking performance. The test connection is as indicated. Make sure that the three-prong sparking distance is at least 8 mm.
  If no sparking or orange color sparking occurs with this gap, then it is defective and must be replaced.

09900-28107: Electro tester

STD Spark performance: 8 mm (0.3 in)

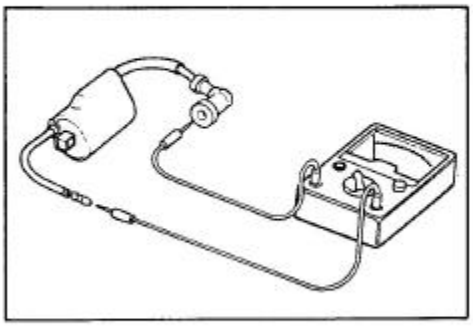


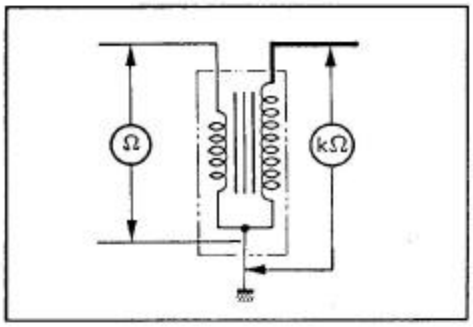
IGNITION COIL (Checking with Pocket Tester)

- A SUZUKI pocket tester or an ohmmeter 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.

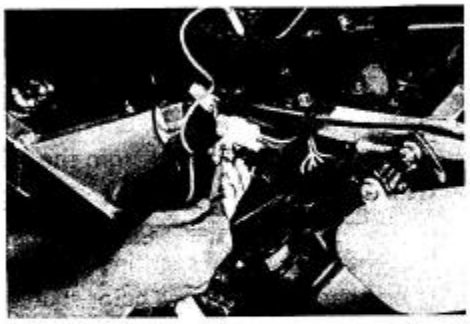
09900-25002: Pocket tester

Ignition coil resistance	
Primary	0.17 – 0.23 Ω
Secondary	10 – 30 kΩ





PICK-UP COIL



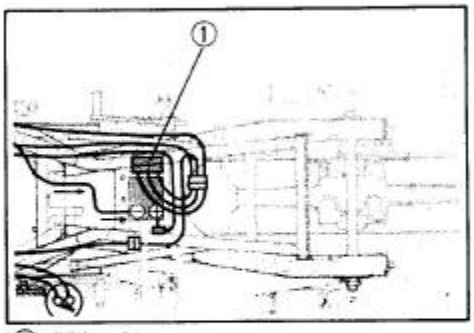
- Remove the Lower fairing and disconnect the pick-up coil lead coupler.
- Using a pocket tester (x 100 Ω) measure the resistance between Black and Brown lead wires. If the resistance is infinity or less than the specification, the pick-up coil must be replaced.

09900-25002: Pocket tester

- Signal generator

Tester connected to:	Resistance	Tester range
R – W	20 – 200 Ω	x 10 Ω
B – Br	20 – 200 Ω	x 10 Ω

CDI UNIT (Checking with Pocket Tester)



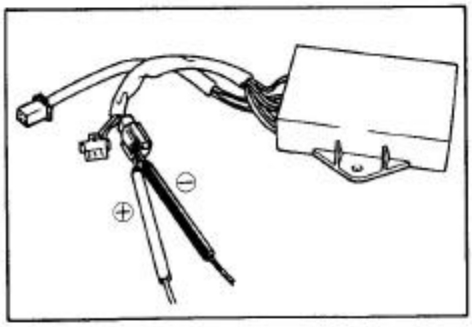
① CDI unit

- Using the SUZUKI pocket tester, bring the ⊕ probe and the ⊖ probe into contact with each lead wire of the CDI unit, check for continuity, and measure the resistance value.

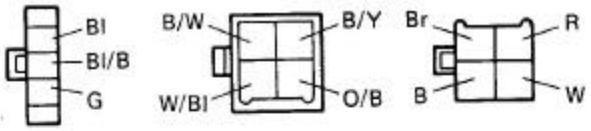
09900-25002: Pocket tester

- When the continuity and the resistance values are as shown in the following table, the CDI unit is judged to be normal.

CAUTION:
As capacitors, diodes, etc. are used inside this CDI unit, the resistance values will differ when an ohmmeter other than SUZUKI pocket tester is used.



- Measure the resistance between the leads.
- Tester range – x kΩ



Unit: Approx. kΩ

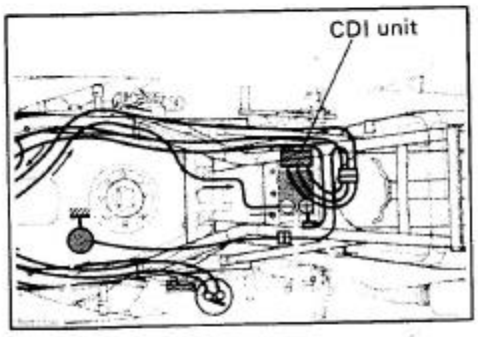
⊖ Probe of tester to:	⊕ Probe of tester to: B	W	Br	R	G	Bl/B	Bl	W/Bl	O/B	B/W	B/Y
B		0	1 – 10	1 – 10	1 – 10	∞	2 – 20	∞	∞	0	∞
W	0		1 – 10	1 – 10	1 – 10	∞	2 – 20	∞	∞	0	∞
Br	1 – 10	1 – 10		2 – 20	2 – 20	∞	3 – 30	∞	∞	1 – 10	∞
R	1 – 10	1 – 10	2 – 20		2 – 20	∞	3 – 30	∞	∞	1 – 10	∞
G	1 – 10	1 – 10	2 – 20	2 – 20		∞	1 – 10	∞	∞	1 – 10	∞
Bl/B	∞	∞	∞	∞	∞		1 – 10	∞	∞	∞	∞
Bl	∞	∞	∞	∞	∞	∞		∞	∞	∞	∞
W/Bl	1 – 10	1 – 10	2 – 20	2 – 20	2 – 20	∞	5 – 30		∞	1 – 10	∞
O/B	2 – 20	2 – 20	2 – 20	3 – 30	2 – 20	∞	5 – 30	∞		2 – 20	∞
B/W	0	0	1 – 10	1 – 10	1 – 10	∞	2 – 20	∞	∞		∞
B/Y	1 – 10	1 – 10	2 – 20	2 – 20	2 – 20	∞	3 – 30	∞	∞	1 – 10	

CDI UNIT (Checking with Ignitor Checker)

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

09931-64410: Ignitor Checker

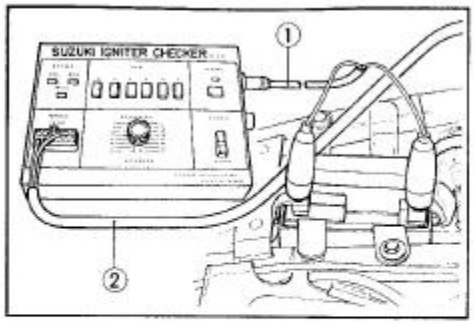
- Remove the seat and fuel tank. (Refer to page 3-2.)
- Remove the under fairing. (Refer to page 3-2.)



WIRING PROCEDURE:

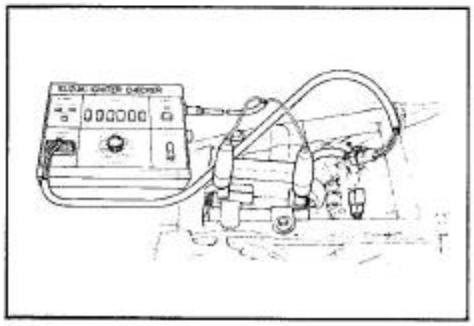
- Disconnect CDI lead wire couples at the CDI unit.

- Prepare the ignitor checker lead wire "MODE 4" ② which comes supplied with the ignitor checker and connect its end to the CDI unit and another end to the checker.
- Connect the power source leads ① to the battery.



CAUTION:

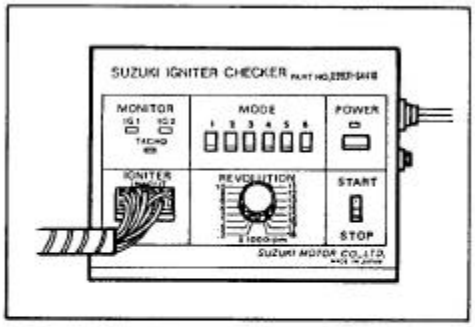
* **Be sure the Black lead is connected to the battery ⊖ terminal and Red lead to the ⊕ terminal.**
* **Before connecting the power source leads, make sure both "POWER" button and "START" switch are in "off" position (POWER button not depressed).**



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

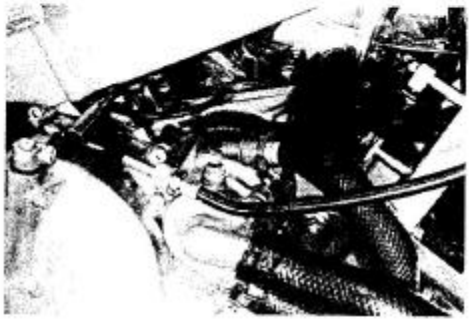
CHECK PROCEDURE:
With all the lead wires properly connected, check the CDI unit as follow.

Depress "MODE 4" button then "POWER" button. This time, "POWER" lamp should come on. If not, battery is undercharged.



NOTE:
In this check, the monitor does not operate.

- Remove the spark plugs from front and rear cylinders. Connect the respective plug caps and place the spark plugs on the cylinder head.
  If blue hot sparks are seen in the spark plugs, the system is functioning properly.

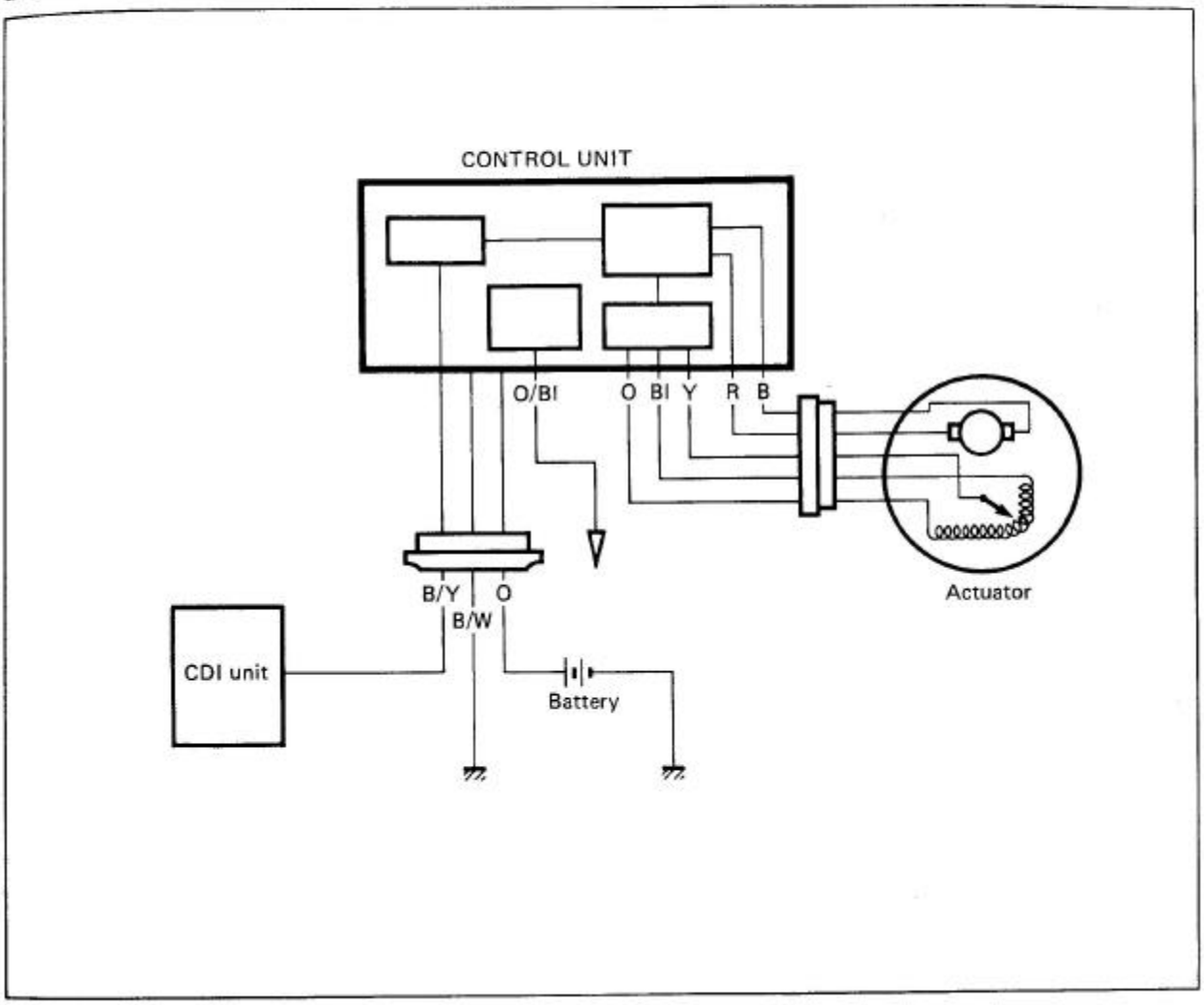


NOTE:
This checking presupposes that the ignition coil and the signal generator coil used for checking are good ones.

CAUTION:
When making this test, keep the fire away from the cylinder head.

AUTOMATIC EXHAUST VALVE CONTROL UNIT AND ACTUATOR

DIAGRAM

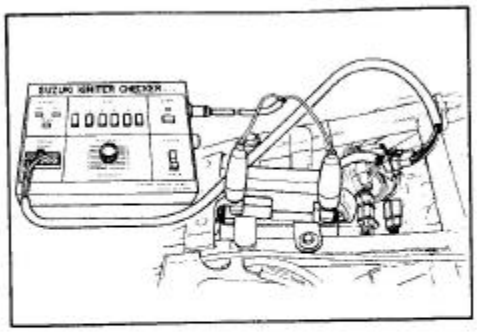


This system is designed for controlling the exhaust valve using an actuator and its controlling circuit in relations with the engine speed. The revolution detecting circuit counts the ignition primary pulse signal sent from the CDI unit and outputs a current signal to the drive operating circuit when the engine speed has reached a predetermined level. Then, the actuator is driven by the current signal supplied from the drive operating circuit. The actuator's operating angle is determined and constantly monitored by the actuator's own potentiometer which feeds back the current angle signal to the angle detecting circuit.

INSPECTION

EXHAUST VALVE OPERATION

- Refer to page 3-8.
- Start the engine and increase the engine r/min to check the exhaust valve operation.



Exhaust valve	Engine r/min
Close → Open	8 000 – 8 500 r/min
Open → Close	8 500 – 8 000 r/min

- If the exhaust valve does not operate at the specified r/min, inspect the individual parts for any defect.

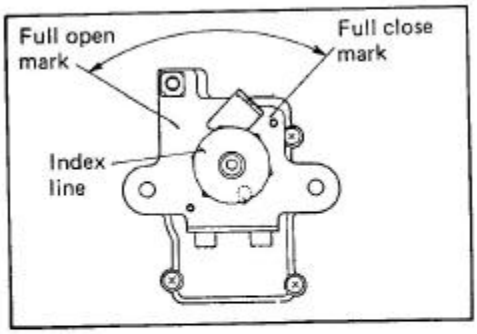
ACTUATOR PULLEY

- For removal procedure, refer to page 3-8.
- Check the actuator resistance values.

Tester connected to:	Resistance	Tester range
R – B	1 – 20 Ω	x 1 Ω
O – Y	4 – 6 kΩ	x k Ω

NOTE:
Do not move the pulley at the this time.

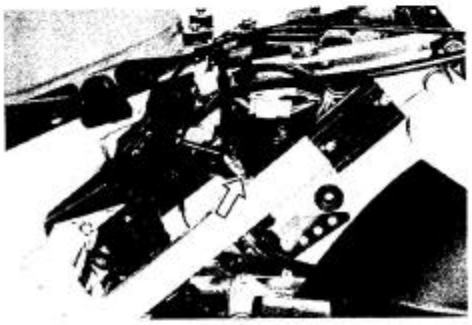
- The pulley should move within the angle range indicated by the arrow.



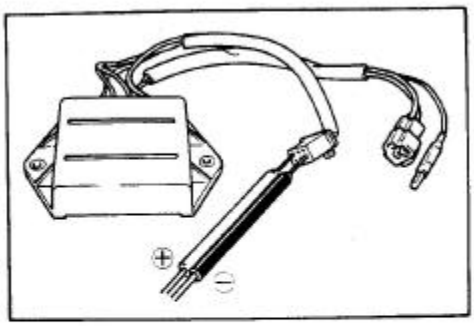
CAUTION:
Do not force the pulley in an attempt to move it beyond the angle range indicated by the arrow.

ACTUATOR CONTROL UNIT

- Refer to page 3-3.



- Use a SUZUKI pocket tester (x 25 DCV) and connect the ⊕ and ⊖ probe pins to Gray and Pink leads respectively.
- Apply 12V (DC) to the Orange ⊕ and Black/White ⊖ .
- If the tester shows 8 – 12V for approx. one second, control unit is in good condition for TIMER circuit and motor driving circuit.
- Further inspection is needed.
- Using the SUZUKI pocket tester, bring the ⊕ probe and the ⊖ probe into contact with each lead wire of the control unit, check for continuity, and measure the resistance value.



Unit: Approx. kΩ

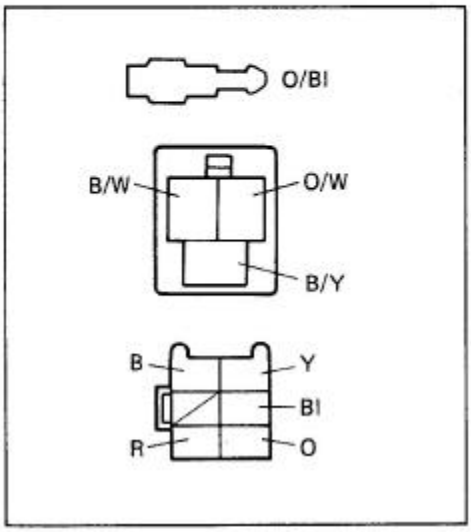
		⊕ Probe of tester to:								
		B	R	Y	Bl	O	B/W	O/W	B/Y	O/Bl
⊖ Probe of tester to:	B		2 – 10	∞	∞	∞	∞	∞	∞	∞
	R	2 – 10		∞	∞	∞	∞	∞	∞	∞
	Y	50 – 500	50 – 500		50 – 500	50 – 500	50 – 500	∞	∞	∞
	Bl	1 – 10	1 – 10	50 – 500		0.1 – 5	0	∞	∞	∞
	O	1 – 10	1 – 10	50 – 500	0.1 – 5		0.1 – 5	∞	∞	∞
	B/W	1 – 10	1 – 10	50 – 500	0	0.1 – 5		∞	∞	∞
	O/W	5 – 30	5 – 30	50 – 500	5 – 30	5 – 20	5 – 20		∞	∞
	B/Y	∞	∞	∞	∞	∞	∞	∞		∞
	O/Bl	10 – 100	10 – 100	50 – 500	10 – 100	10 – 100	10 – 100	∞	∞	

- When the continuity and the resistance values are as shown in the above table, the control unit is judged to be normal.

09900-25002: SUZUKI Pocket tester

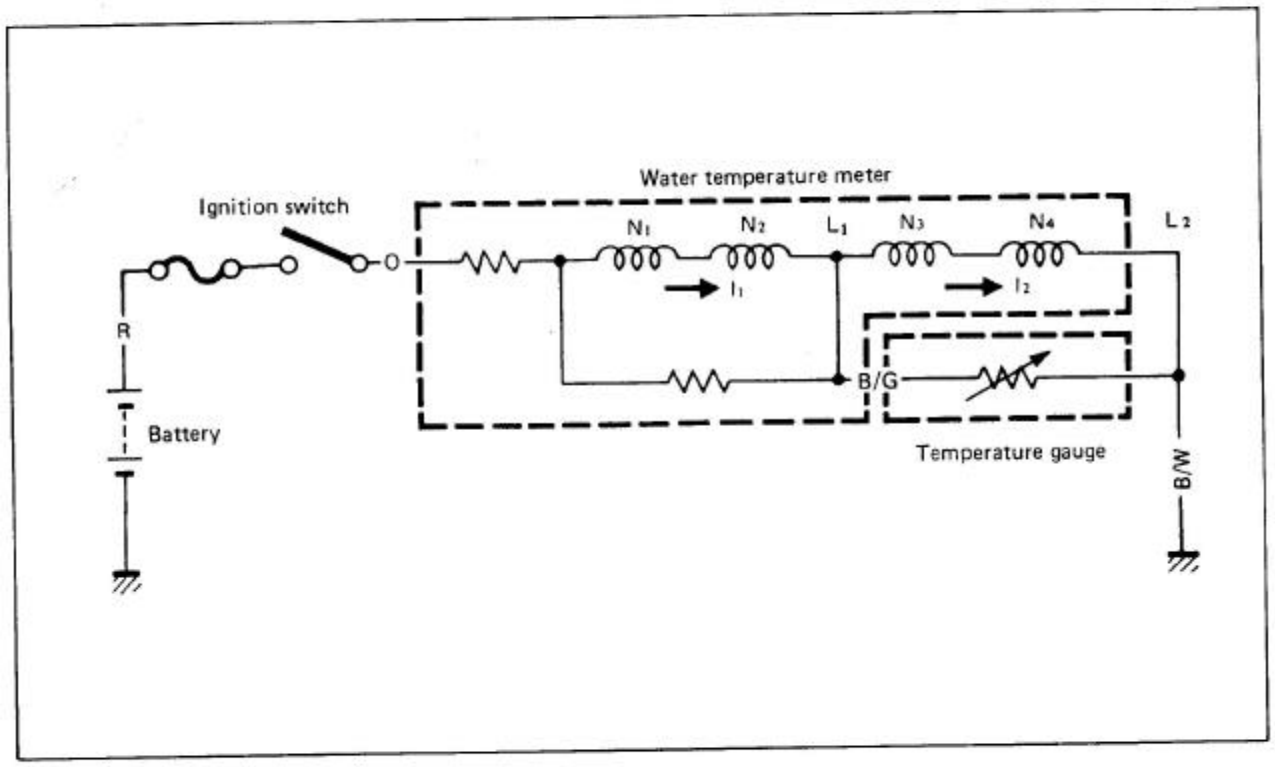
- Measure the resistance between the leads.
- Tester range – x kΩ

CAUTION:
As capacitors, diodes, etc. are used inside this unit, the resistance values will differ when an ohmmeter other than SUZUKI pocket tester is used.



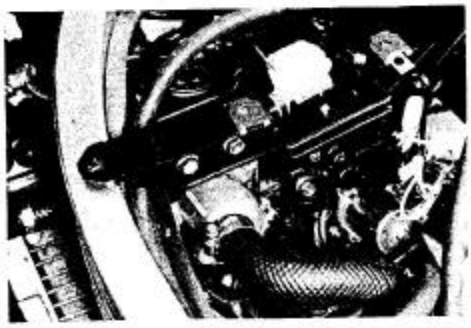
WATER TEMPERATURE METER

As shown in Fig. 1, four coils are located in the water Temp. meter (N_1, N_2, N_3 and N_4). As the resistance from the sending unit varies along with the coolant temperature, the current at points L_1 and L_2 will also vary. This in turn will cause the strength of the magnetic field generated in the four coils to increase or decrease (causing a related increase or decrease in the force vector H in Fig. 2) which will force the needle to move to the proper position (Fig. 3).
When the ignition switch is turned off, the pointer returns to the original position.



WATER TEMPERATURE METER INSPECTION

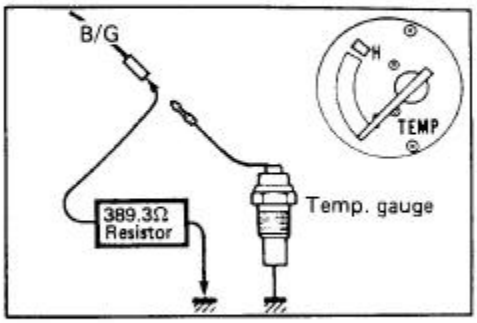
As the coil spring is installed on the needle shaft of the water temperature meter, the needle is forced back to the original position when ignition switch is turned OFF.
To test the water temperature meter, two different checks may be used. The first, and simplest test will tell if the meter is operating but will not indicate the meters accuracy throughout the range.

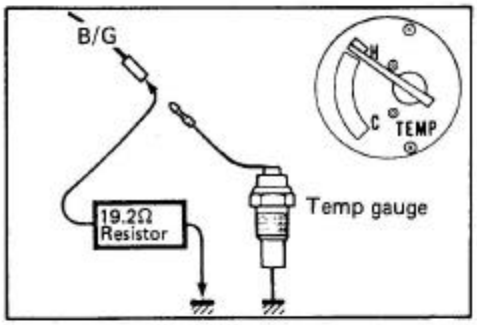


To perform this test, disconnect the B/G lead wire of the water temperature meter from the water temperature gauge. Connect a jumper wire between B/G wires coming from the main wiring harness and engine ground. With the ignition switch turned on, the water temperature meter should indicate "H".

The second test will check the accuracy of the meter in the "H" and "C" positions.

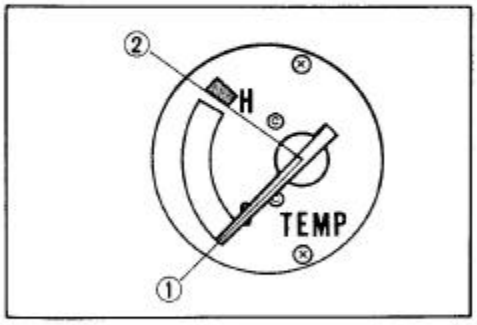
Connect a 389.3-ohm resistor between the B/G lead wire of the water temperature gauge and the ground lead wire. The water temperature gauge is normal if its pointer indicates the C position when the specified voltage is applied to the circuit and if its pointer indicates the H position when the resistor is changed to 19.2-ohms. If either one or both indications are abnormal, replace the water temperature meter with a new one.





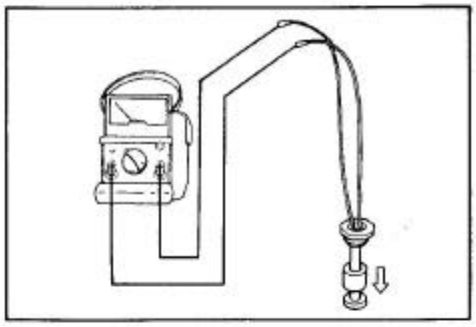
WATER TEMPERATURE METER

POSITION	TEMP	RESISTANCE
①	37°C	389.3 Ω
②	127.5°C	19.2 Ω



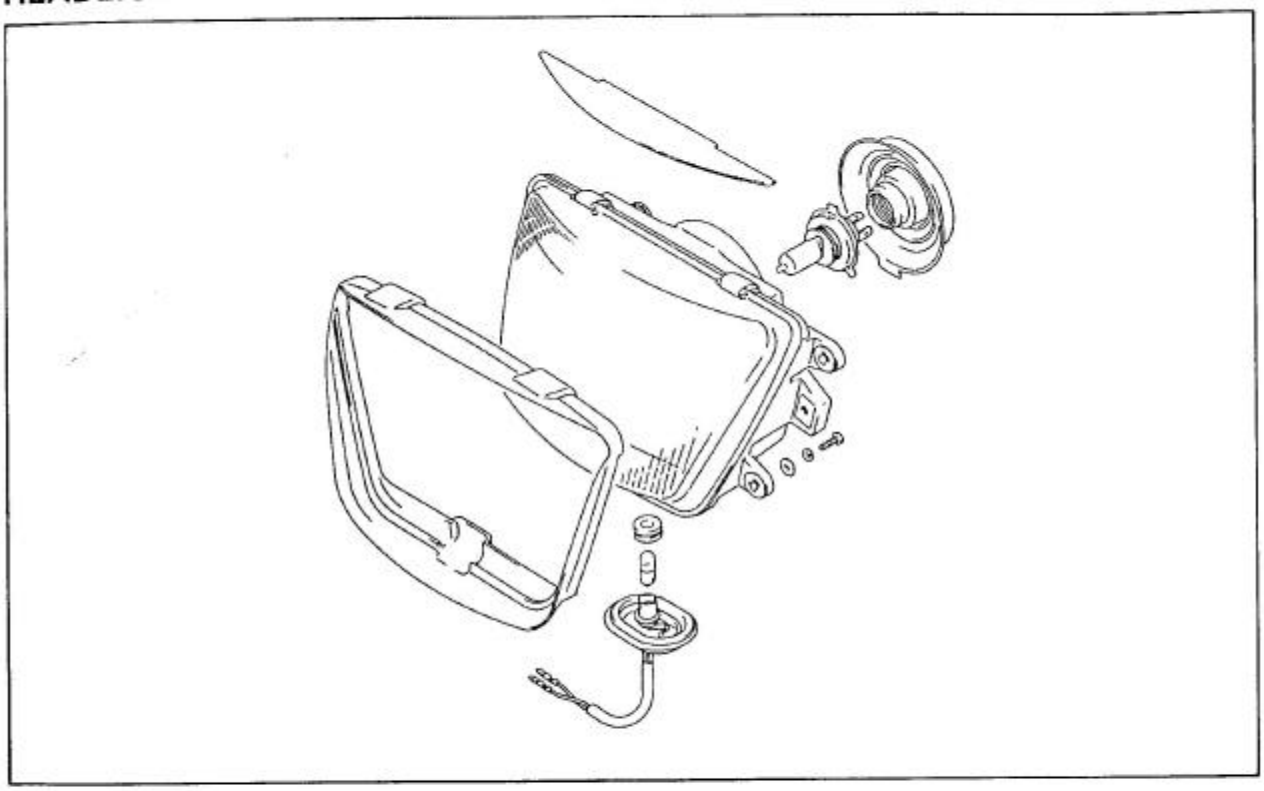
OIL LEVEL GAUGE

Check the oil level switch for continuity between BI/W and O/R lead wires. If the tester does not show the value of 0 – 1 ohm when the switch ring is in bottom, file the contact surface or replace the unit.

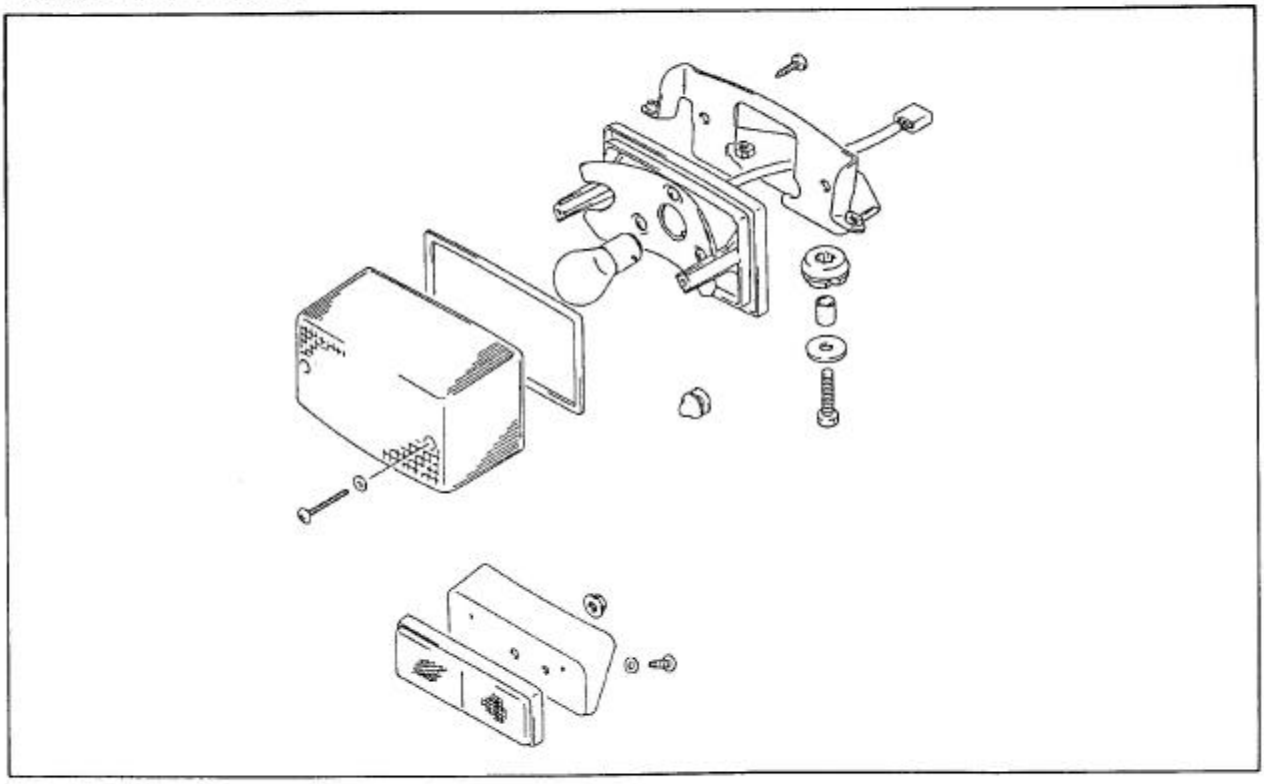


LAMPS

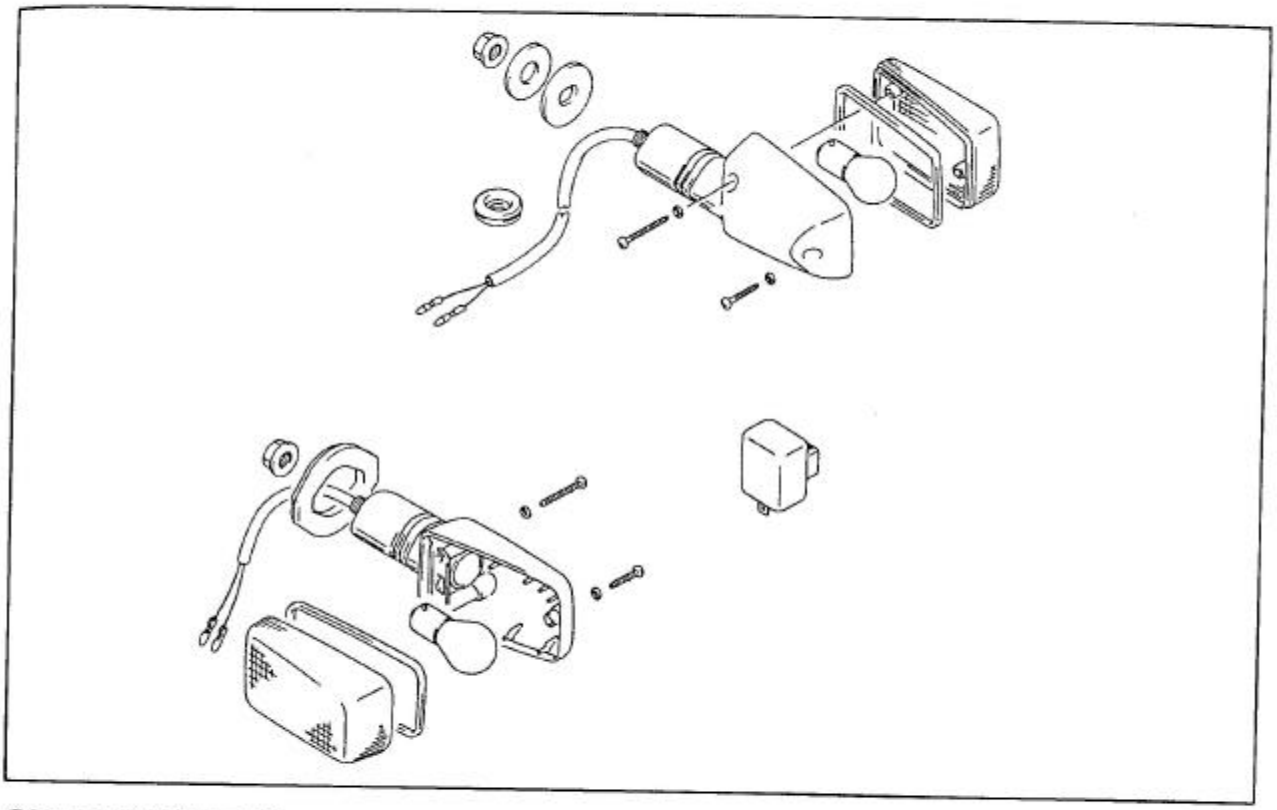
HEADLIGHT



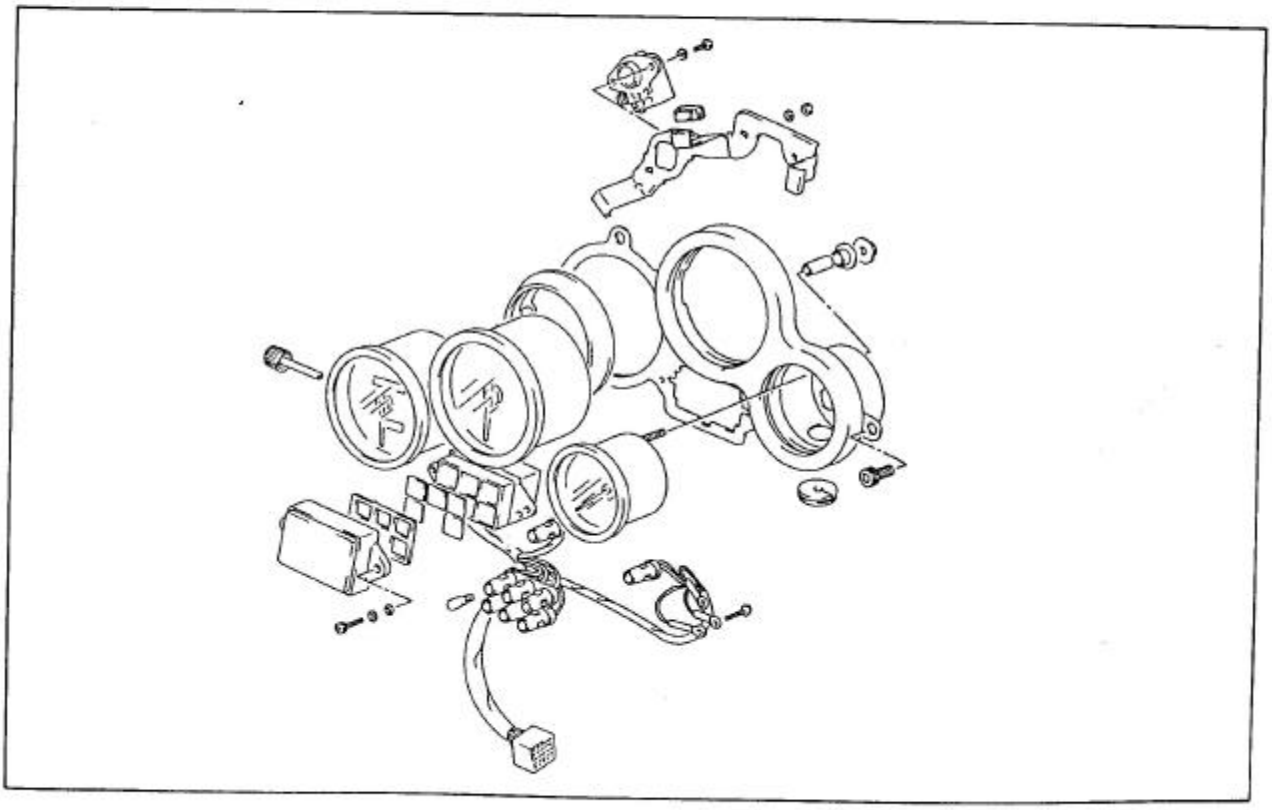
TAIL/BRAKE LIGHT



TURN SIGNAL LIGHT



SPEEDOMETER

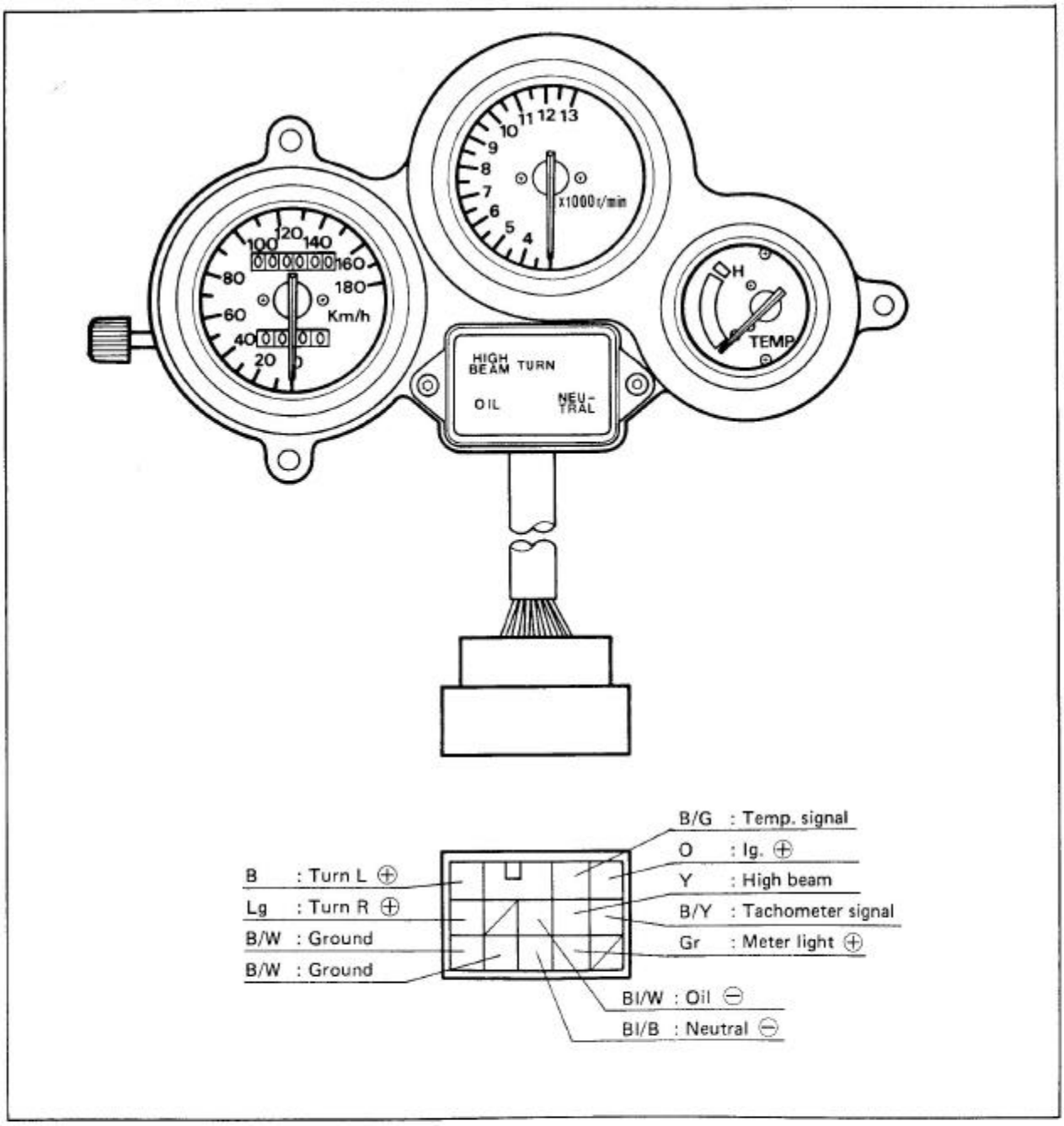


SPEEDOMETER WIRING INSPECTION

Using the pocket tester, check the continuity between lead wires in the following diagram.
If the continuity measured is incorrect, replace the respective parts.

09900-25002: Pocket tester

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



SWITCHES

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

09900-25002: Pocket tester

IGNITION SWITCH

	R	O	O/R	O/Bl	Gr	Br
OFF						
C	○		○	○		
ON	○	○	○		○	○
P	○					○

LIGHTING SWITCH

	O	Gr	Y/W
OFF			
S	○	○	
ON	○	○	○

DIMMER SWITCH

	Y/W	Y	W
HI	○	○	
LO	○		○

TURN SIGNAL LIGHT

	B	Lbl	Lg
R		○	○
•			
L	○	○	

FRONT BRAKE SWITCH

	B	B
ON	○	○
OFF		

REAR BRAKE SWITCH

	B	B
ON	○	○
OFF		

NEUTRAL SWITCH

	Bl	Bl
Neutral position	○	○

PASSING SWITCH

	O/R	Y
ON (Push)	○	○
OFF		

HORN BUTTON

	G	B/W
ON (Push)	○	○
OFF		

SIDE STAND SWITCH

	G	B/W
ON (upright position)	○	○
OFF (down position)		

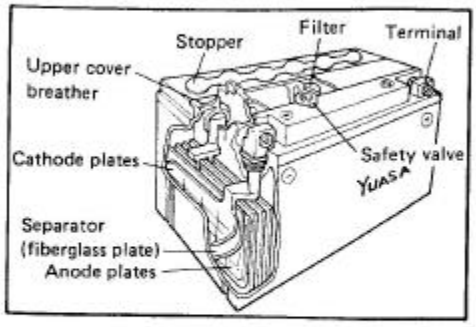
WIRE COLOR

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

BATTERY

SPECIFICATIONS

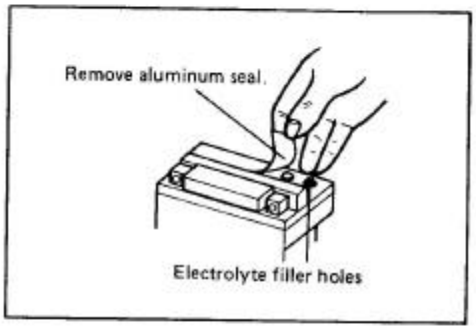
Type designation	YT4L-12B
Capacity	12V, 10.8kC (3 Ah)/10HR
Standard electrolyte S.G.	1.32 at 20°C (68°F)



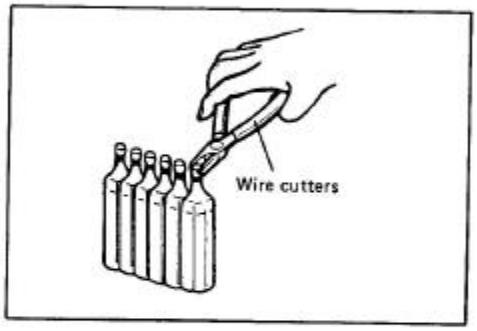
INITIAL CHARGING

Filling electrolyte

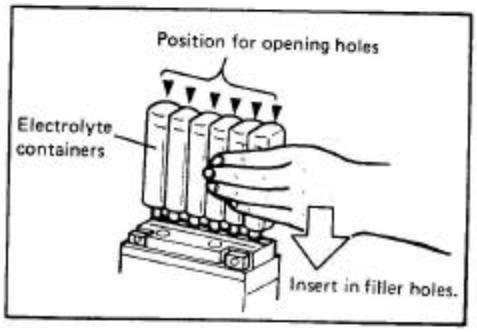
- Remove the aluminum tape sealing the battery electrolyte filler holes.



- Hold the electrolyte container with its nozzles upright, and use wire cutters, etc. to cut out off the end of the nozzles at the designated locations (between the ends and the packing).



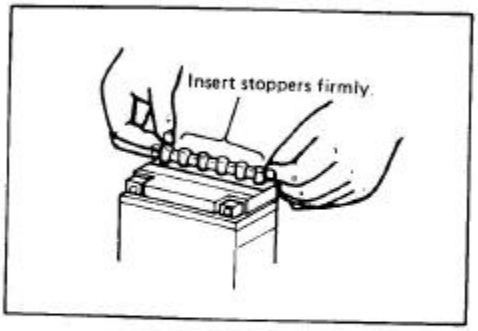
- Insert the nozzles of the electrolyte container into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.
- Use wire cutters to cut the protruding part on the bottom of each container, and leave in this position for about 10 minutes.
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for around 10 minutes.
- Insert the stoppers into the filler holes, pressing in firmly so that the top of the stoppers do not protrude above the upper surface of the battery's top cover.



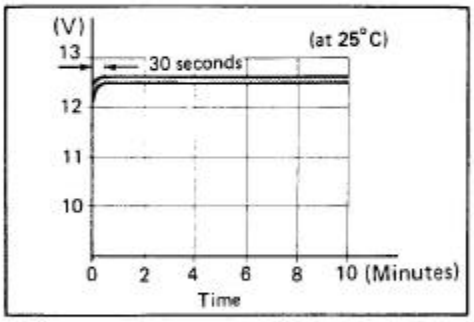
CAUTION:

* Never use anything except the specified battery.

* Once the stoppers has been installed to the battery, do not remove the stoppers.



- Using SUZUKI pocket tester, measure the battery voltage. The tester should indicate more than 12.5V (DC) as shown in the Fig. If the battery voltage is lower than the specification, charge the battery with a battery charger.



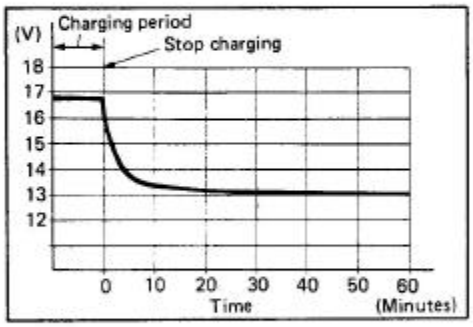
NOTE:
Initial charging for a new battery is recommended if two years have elapsed since the date of manufacture.

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

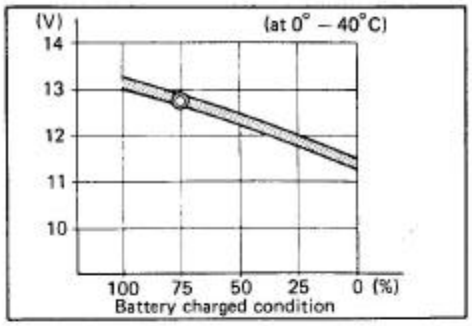
- Using the pocket tester, check the battery voltage. If the voltage reading is less than the 12.0V (DC), recharge the battery with a battery charger.



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: 3A for half hour or 0.3A for 5 hours



CAUTION:
Be careful not to permit the charging current to exceed 3A 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.