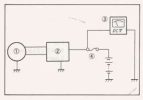
D. Measuring Charging Voltage

The charging current is measured by using the Yamaha pocket tester (0-C.20V).
Connect the positive tester cord to the B terminal of the regulator, and ground the negative tester cord to the frame. While maintaining the engine speed at 3,000 rpm, disconnect the battery circuit at the fuse, and take the voltage reading.

Normal voltage:
14 ~ 16V at 3,000 rpm



1. Dynamo
2. Regulator
3. Pocket tester
4. Fuse

E. Regulator (Voltage Regulator)

The dynamo alone can not provide stable electric current because fluctuating engine rpm affects the voltage. The regulator (also called a voltage relay) stabilizes the voltage generated by breaking the field coil circuit when the voltage exceeds a pre-set level. A current relay (also called a charging relay) is built into the regulator. It allows stable electric current from the dynamo output is lower than that of the battery voltage, it breaks the circuit to the battery so that battery will not drain. The starting switch is provided to direct a flow of current to the starter dynamo when the engine is started.

1. Checkout
   If the regulator can no longer control the voltage, the battery will be drained or over-charged, and all electrical parts may be burned out. So use a good tester when inspecting or adjusting the regulator. (It is advised that you learn how to adjust the regulator at training courses because it is very difficult.)
   a. No-load voltage test
      1) Disconnect the lead wire (red) of the regulator and connect the positive tester lead to the lead wire (red). Then ground the negative tester lead.
      2) Start the engine and keep it running at 2,500 rpm. Your regulator is correct if the tester reads 15.8 ~ 16.5V.
      3) Start the engine and keep it running at 5,000 rpm. Your regulator is correct if the tester reads less than 16.9V.

1. Voltage regulator
2. Cut out relay

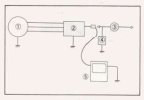
1. Starter relay

b. Adjustment

1) If the measured voltage is more or less than specified, adjust it by tightening or loosening the adjusting screw on the voltage relay side.

2) Cut-in voltage of the Cutout Relay

a) Connect the tester positive lead to the B(red) terminal, and then ground the negative lead to the frame.



1. Dynamo
2. Regulator
3. Main switch
4. Battery
5. Pocket tester

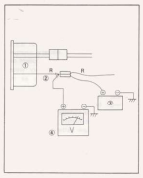
b) Start the engine, and increase engine speeds slowly. The cutout relay is correctly set if its breaker points close at 12.5 ~ 13.5V.

c) Adjustment

If the breaker points will not close at the specified voltage, adjust the cutout relay by changing its spring tension.

NOTES:

1. In actual practice, there will rarely be need to adjust the cutout relay.
2. If the point surfaces of the voltage and cutout relays are worn or pitted, polish them with fine sandpaper (No. 400-600) before making any adjustment.



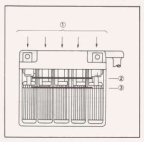
1. Regulator
2. Test lead
3. Battery
4. Pocket tester

2. Regulator Maintenance Standards

	Item	Maintenance standards	Inspection
Voltage regulator	No load voltage adjustment value	15.8 – 16.5V/2,500 rpm	When voltage is irregular
Voltage relay	Voltage coil resistance value Compensation value Core gap Point gap	11.8Ω/20°C (68°F) 10Ω/20°C (68°F) 0.4 – 0.7 mm 0.4 – 0.5 mm	
Cutout relay	Cut-in voltage Reversing current Voltage coil resistance value Core gap Point gap	13 ± 0.5V 5A or less 11.2Ω/20°C (68°F) 0.8 – 1.0 mm 0.6 – 0.8 mm	

F. Battery

1. The battery is a 12V-7AH unit that is the power source for all electrical components.
   Because of the fluctuating charging rate due to the differences in engine rpm, the battery will lose its charge if the horn and stoplight are excessively used at low rpm. The charging of the battery begins at about 2,500 rpm.
   Therefore, it is recommended to sustain engine rpm at about 2,900 to 3,500 rpm to keep the battery charged properly. If the horn and stoplight are used frequently, the battery water should be checked regularly as the continuing charging will dissipate the water. If the battery will not retain a charge (and the battery is in good condition), the voltage regulator setting should be readjusted.
2. Servicing a new battery
   Check battery housing for cracks or other damage. Fill the battery with electrolyte and let set for an hour. This allows the acid to soak into the plates. With the caps off, hook up a trickle charger to the battery and charge it at 1 amp/hour rate or less. Check the specific gravity. Each cell should have a rating of 1.270 ~ 1.280. If the electrolyte has dropped below minimum level after charging, add electrolyte (rating of 1.270 ~ 1.280).



1. Fill hole
2. Max. Level
3. Min. Level

3. Battery maintenance
   a. Periodic inspection can determine the condition of the battery housing and the condition of the internal parts. Check for cracks or holes in the housing. Check for broken plates, sulfation, low fluid level, or corroded terminals.
   b. The battery housing is marked with a minimum and maximum fluid level. If any cell fluid level drops below the minimum level, fill with distilled water to correct height. Check once a month or more often in hot weather. DO NOT use tap water.