Motorcycle Charging System Fault Finding Flow Chart

To successfully use this chart, it is assumed the user knows the basics of electricity, and understands the general components and functions of the motorcycle charging system in general. This guide is provided purely to help RaceTech Electric customers identify problems with their electrical components. RaceTech Electric is not responsible for any damage that may come from using this chart.

To begin, fully charge the motorcycle battery. This chart assumes a known good, and fully charged battery for testing. If necessary, replace it with a known good battery from another bike. Also use a high quality multimeter. These tests assume accurate readings from a good multimeter unit. This chart also assumes your bike has a combined Regulator/Rectifier unit, and will only work as such.

Set multimeter to DC Volts (DCV or Vdc, or V--). Set range to 20 or 50V. Connect the multimeter leads to the battery terminals. Start and rev the engine up to 2500RPM. Check the battery voltage.

- Higher than 13.5V → Rev the engine up to 5000RPM. Check the reading on the multimeter.
  - Lower than 14.8V → Charging system is working correctly. It is recommended to disconnect all plugs on the bike and spray with contact cleaner for preventative maintenance.
  - Higher than 14.8V
- Lower than 13.5V

Count the number of different wire Colors coming from the RR.

- More than 4 colors, or no RR on the bike. → **Go to #4**
- 4 or less

Permanent Magnet Alternator System
Let the engine idle, and connect the BLACK multimeter lead to the to the battery Positive (+) terminal. Connect the RED output wire of the RR. Leave the RR connected to the bike.
Check meter reading, with engine idling.

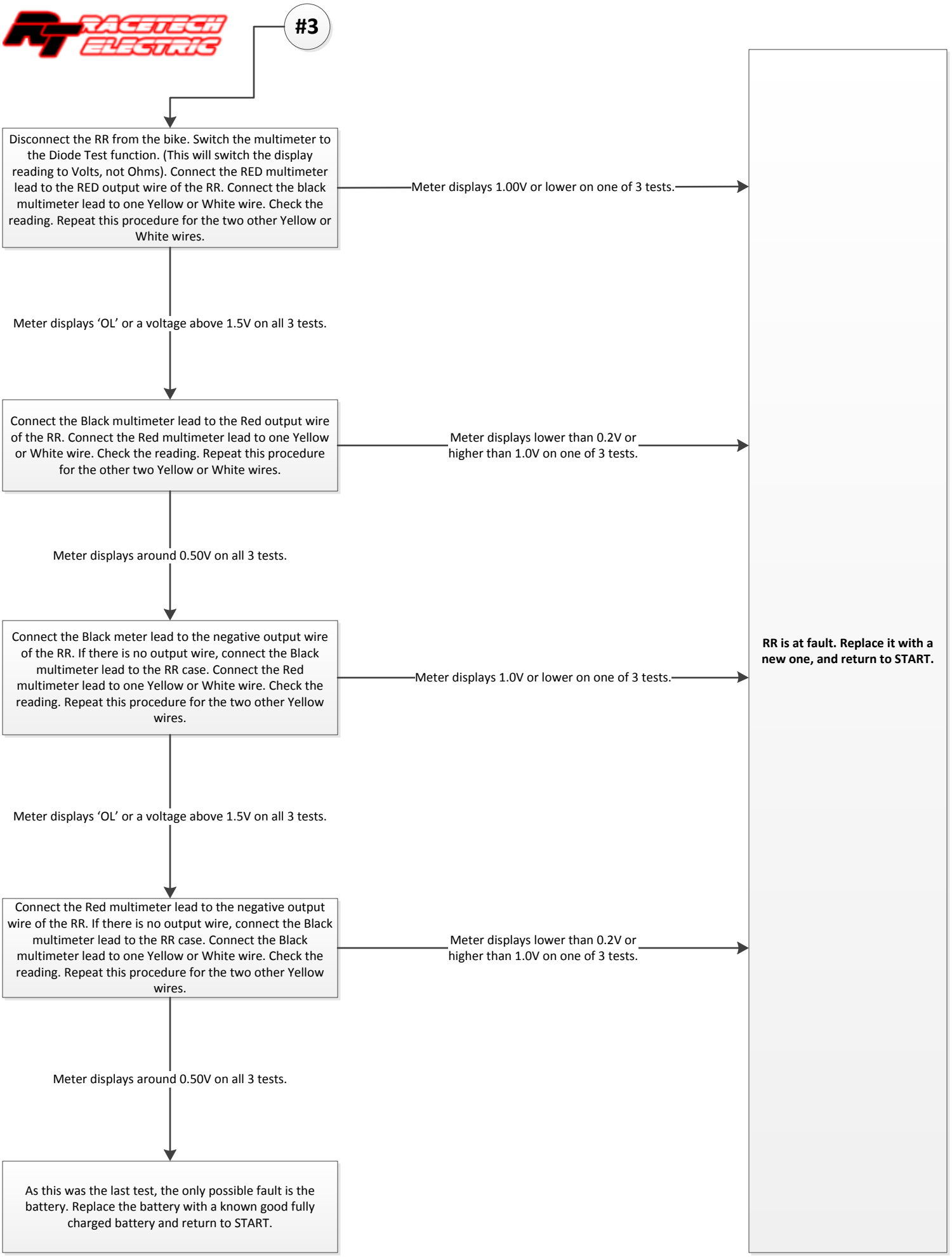
- More than 0.2V → Bad connection in the positive lead from RR to battery Positive (+). Check this connection on both sides, as well as the wire. Many times connectors and fuse block are suspect. This is a high current draw connection, and it is critical this connection is tight and clean.
  Fix problem and return to Start.
- Less than 0.2V

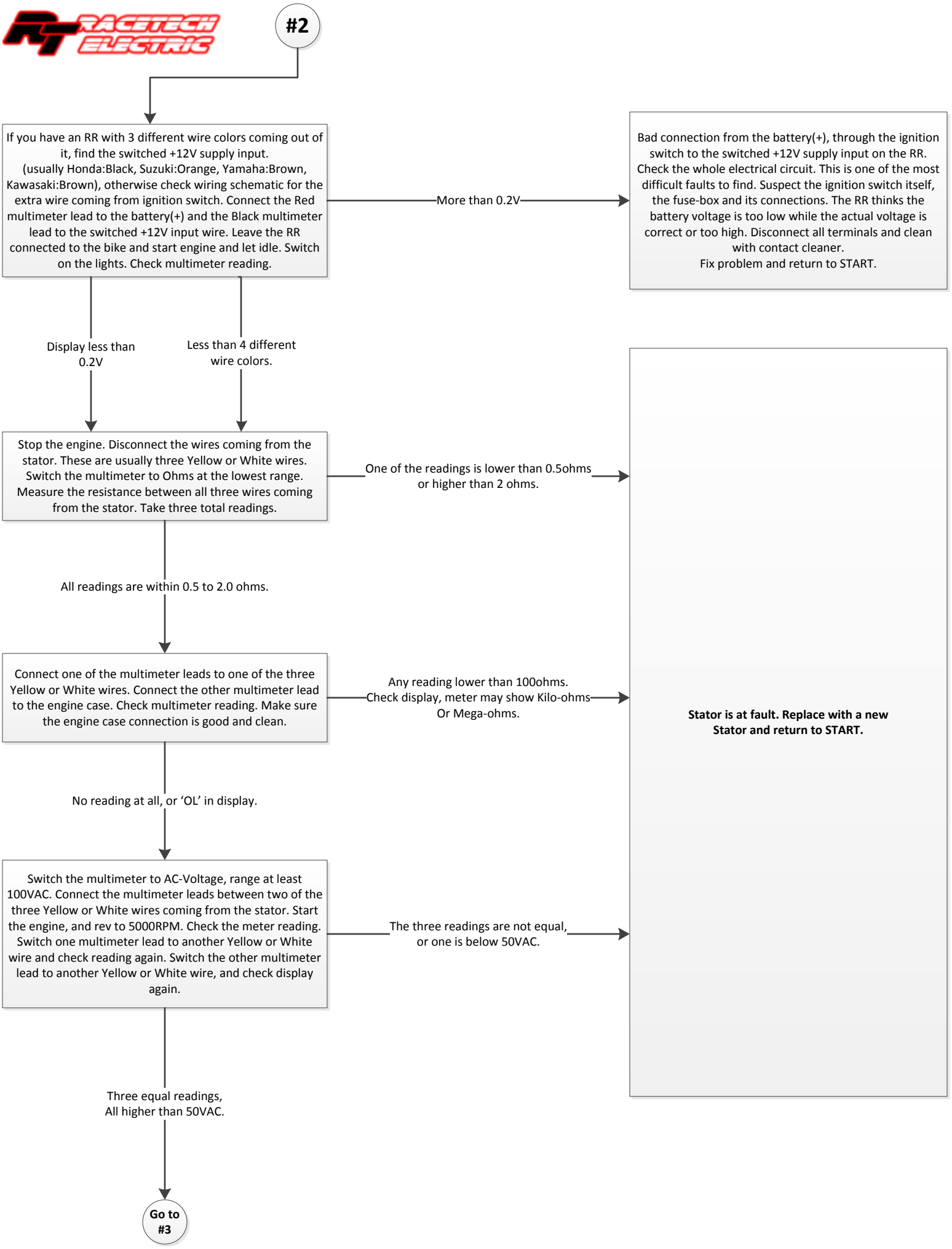
Connect the RED multimeter lead to the battery Negative (-) terminal. Connect the RED multimeter lead to the negative output of the RR. If there is no negative output wire, the heatsink casing of the regulator may be grounded to the frame.
Check meter reading, with engine idling.

- More than 0.2V → Bad connection in the negative lead from RR to the battery Negative (-). Check this connection completely, tracing back to battery negative terminal. If the RR uses the heatsink case as chassis ground, clean the frame mounting area completely. Check battery ground cable to frame. Disconnect all possible terminals and connectors and clean thoroughly. Optionally, connect RR ground directly to battery negative (-) terminal with a separate wire.
  Fix problem and return to Start.

Go to #2


#4
Is there a Regulator/Rectifier mounted on the bike?
No
You have an integrated generator (auto-type with internal regulator and rectifier). The majority of problems with this kind of generator are bad connections from generator to battery (if the battery doesn't charge), or a bad regulator (battery voltage too high). The generator itself can be at fault. Check the resistance of the fieldwinding (usually ~5ohms), and the condition of the brushes. Otherwise a starter or generator repair shop should service the unit.
Fix and return to start.
Yes
Switch the multimeter to DC-Voltage (DCV or Vdc) Range 20 or 50V. Connect the multimeter leads to the battery terminals. Start the engine and rev it up to 5000rpm. Check the voltage reading.
Higher than 14.8V
RR at fault. Voltage is not being regulated properly. Check voltage on the Brown wire (Yamaha, Kawasaki), Black (Honda) wires. If it is lower than battery voltage, you have a bad connection between the battery and the RR through the ignition switch. Fix this bad connection, and/or replace the RR, and return to start.
Lower than 14.8V
Stop the engine. Disconnnect the connector to the generator closes to the engine. This connector must have at least three YELLOW or WHITE wires in it, along with one or two more of various colors. Set the multimeter to the lowest Ohms-range. Measure the resistance between the two other wires, or between the single extra wire (other than Yellow or White), and the engine casing.
Lower than 3ohms or Higher than 10ohms
The fieldwinding in the generator, or the brushes at the rotor are at fault. If there are any brushes inside the generator, disconnect them and measure the resistance between the two copper sliprings on the rotor. These are the rings on which the brushes run.
If there are no brushes inside the generator, replace the fieldwinding, or if not possible separately, replace the whole stator and return to START.
Resistance lower Than 3.6ohms or Higher than 6ohms.
Rotor at fault. Replace it with a new one, and return to START.
Reading between 4ohms and 6 ohms.
Resistance between 4ohms and 6ohms.
Wiring to the brushes or the brushes themselves at fault. Replace the brushes, check the wiring to the brushes, and return to START.
Connect one spare wire to the battery (+) terminal and connect it to one of the extra wires in the connector from the previous step, other than the Yellow or White wires. Connect a second spare wire between the battery (-) and the other extra wire in the connector block. If there is only one extra wire, only connect battery (+) voltage this. Make sure the battery(-) is still connected to the frame. Switch the multimeter to AC-V, range 100VAC. Start the engine, and rev to 5000RPM. Connect the multimeter leads between two of the Yellow or White wires, and check reading. Switch multimeter leads to another Yellow or White wire and check again. Switch multimeter leads to final unused combination of Yellow or White, and check a third time.
The three readings are not equal Or they are below 50VAC.
Stator at fault. Replace stator and return to START.
Three equal readings, all higher than 50VAC.
Stop the engine. Switch the multimeter to DC Voltage. With the block connector disconnected as above, connect the multimeter leads up to the two extra wires in this connector (apart from the three Yellow or White wires). Do this in the connector-block coming from the wiring harness, not the other side going to the generator. If there is only one extra wire, connect it to one multimeter lead, and connect the other multimeter lead to the engine casing. When you switch on the ignition, check the reading on the meter.
No reading or a reading lower than 10VDC.
RR at fault. Replace with a new one and return to START.
Reading 10V or higher.
Go to #3


#3
Disconnect the RR from the bike. Switch the multimeter to the Diode Test function. (This will switch the display reading to Volts, not Ohms). Connect the RED multimeter lead to the RED output wire of the RR. Connect the black multimeter lead to one Yellow or White wire. Check the reading. Repeat this procedure for the two other Yellow or White wires.
Meter displays 1.00V or lower on one of 3 tests.
Meter displays 'OL' or a voltage above 1.5V on all 3 tests.
Connect the Black multimeter lead to the Red output wire of the RR. Connect the Red multimeter lead to one Yellow or White wire. Check the reading. Repeat this procedure for the other two Yellow or White wires.
Meter displays lower than 0.2V or higher than 1.0V on one of 3 tests.
Meter displays around 0.50V on all 3 tests.
Connect the Black meter lead to the negative output wire of the RR. If there is no output wire, connect the Black multimeter lead to the RR case. Connect the Red multimeter lead to one Yellow or White wire. Check the reading. Repeat this procedure for the two other Yellow wires.
Meter displays 1.0V or lower on one of 3 tests.
Meter displays 'OL' or a voltage above 1.5V on all 3 tests.
Connect the Red multimeter lead to the negative output wire of the RR. If there is no output wire, connect the Black multimeter lead to the RR case. Connect the Black multimeter lead to one Yellow or White wire. Check the reading. Repeat this procedure for the two other Yellow wires.
Meter displays lower than 0.2V or higher than 1.0V on one of 3 tests.
Meter displays around 0.50V on all 3 tests.
As this was the last test, the only possible fault is the battery. Replace the battery with a known good fully charged battery and return to START.
RR is at fault. Replace it with a new one, and return to START.


#2
If you have an RR with 3 different wire colors coming out of it, find the switched +12V supply input. (usually Honda:Black, Suzuki:Orange, Yamaha:Brown, Kawasaki:Brown), otherwise check wiring schematic for the extra wire coming from ignition switch. Connect the Red multimeter lead to the battery(+) and the Black multimeter lead to the switched +12V input wire. Leave the RR connected to the bike and start engine and let idle. Switch on the lights. Check multimeter reading.
More than 0.2V
Bad connection from the battery(+), through the ignition switch to the switched +12V supply input on the RR. Check the whole electrical circuit. This is one of the most difficult faults to find. Suspect the ignition switch itself, the fuse-box and its connections. The RR thinks the battery voltage is too low while the actual voltage is correct or too high. Disconnect all terminals and clean with contact cleaner.
Fix problem and return to START.
Display less than 0.2V
Less than 4 different wire colors.
Stop the engine. Disconnect the wires coming from the stator. These are usually three Yellow or White wires. Switch the multimeter to Ohms at the lowest range. Measure the resistance between all three wires coming from the stator. Take three total readings.
One of the readings is lower than 0.5ohms or higher than 2 ohms.
All readings are within 0.5 to 2.0 ohms.
Connect one of the multimeter leads to one of the three Yellow or White wires. Connect the other multimeter lead to the engine case. Check multimeter reading. Make sure the engine case connection is good and clean.
Any reading lower than 100ohms. Check display, meter may show Kilo-ohms Or Mega-ohms.
Stator is at fault. Replace with a new Stator and return to START.
No reading at all, or 'OL' in display.
Switch the multimeter to AC-Voltage, range at least 100VAC. Connect the multimeter leads between two of the three Yellow or White wires coming from the stator. Start the engine, and rev to 5000RPM. Check the meter reading. Switch one multimeter lead to another Yellow or White wire and check reading again. Switch the other multimeter lead to another Yellow or White wire, and check display again.
The three readings are not equal, or one is below 50VAC.
Three equal readings, All higher than 50VAC.
Go to #3