The Stator Papers IV

A fault finding chart to check the components of your entire charging system

By Peter Huppertz
(*with modifications by the current editors*)

This page is for a large part a result of the knowledge of Ritzo Muntinga, top dog of ElectroSport Industries.

The object is to present you with a clear testing scheme to determine which component in your charging system is at fault. All too often, someone (yes, that includes quite a few dealers as well) will come to the conclusion that the stator has died, and thus replace the stator, and leave it at that. Chances are that you'll have a charging problem again soon, leading to the conclusion that All Stators Suck, whereas the real reason might be a defective regulator/rectifier.
Before reading on, you might want to take a look at The Stator Papers I: A Primer on GS charging systems, which tries to explain the theory.

If you have an item of note...

that you feel is of value and should be featured for the Stator Pages, simply put your item in our forum under the **GS Stators** topic. We will be checking out the forums often. If we see an item or tip that we feel everyone would be interested in reading, we will notify you via email to let you know that we would like to include it in this section.

WARNING:

This fault-finding chart assumes that the user has knowledge of the basics of electricity (you should know the difference between voltage, current, resistance, etc.), and some knowledge about electrical systems on motorcycles in general. If you do not have this knowledge and experience, find someone that has and let her/him use these charts and check the charging-system on the bike in order to prevent structural damage to you, the bike, and in the worst case the house as
well.
The use of this fault-finding chart is entirely at the risk of the user. Once again, we have

to refer you to our wretched disclaimer before you start using this testing scheme on your motorcycle. In any case, use your commonsense!

SCOPE:

This testing scheme has been adapted to fit all air-cooled Suzuki GS models with a standard charging system. A more generic testing scheme covering all motorcycles can be obtained from ElectroSport Industries.

GET ON WITH IT:

OK, after dealing with these general issues, let's get underway.

- First of all. fully charge the battery. If the battery is not healthy AND fully charged, you are likely to get unpredictable results using this fault-finding chart.You could just replace it with a battery off another motorcycle that has a good functioning charging-system. Using an acid-meter, verify that the battery is still healthy. If you haven't got one, any garage can do this for you.
- Use an accurate digital multimeter. The $15 filler station variety will not do, but if you know anything about electrics, that's old news for you.
- Throughout this procedure, the abbreviation RR is used to designate Regulator-Rectifier because it's a tongue-twisting long term. All diagnoses are against a yellow background.

START				
Switch the multimeter to DC Volts. Switch the range to 20 or 50 V. Connect the multimeter leads to the battery terminals. Start and rev the engine up to 2500 rpm. Check the battery-voltage	Higher than 13.5 V 	Rev the engine up to 5000 rpm. Check the reading on the meter.	Lower than 14.8 V 	Charging system perfectly OK. You could still disconnect most of the connections on the bike and spray them with contact cleaner or WD40. This could prevent problems in the future.
Lower than 13.5 V		Higher than 14.8 V		

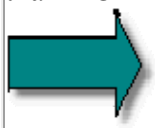
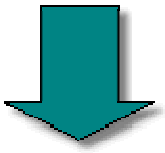
Let the engine idle, and connect the black multimeter lead to the battery(+). Connect the red multimeter lead to the RED output wire of the RR. Leave the RR connected to the bike. Check the reading on the meter. Leave the engine idling!	more than 0.2 V	Bad connection in the positive lead from RR to battery(+). Check the entire lead (suspect the connectors as well as the fuse-box and fuses). Good connections are extremely important in this high current lead. Solve the problem and return to START
Less than 0.2 V		
Connect the red multimeter lead up to the battery's negative pole (-) Connect the black multimeter lead up to the negative output of the RR (BLACK/WHITE), but leave the RR connected up to its leads on the bike. If you can't find a negative output wire, then the casing of the RR is normally the negative lead to the frame. Check the reading on the meter. Leave the engine idling !	more than 0.2 V	Bad connection in the negative lead from RR to battery(-). Check the whole lead to the battery(-). If the RR doesn't have an output lead but uses the case as connection to the frame, clean the area where it is bolted and use new screws. Also check the connection between battery(-) and frame. Also suspect the plate on which the RR is mounted (sometimes it is rubber mounted and uses an extra cable from this plate to the battery(-) or frame). Disconnect all suspect terminals and clean. Best solution: connect the RR straight up to the battery(-) with an extra lead. Solve the problem and return to START
Less than 0.2 V		

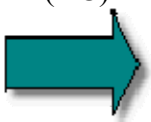
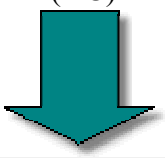
Test Phase

B

TAKE NOTICE OF THE FOLLOWING :

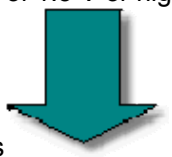
On the GS models, Suzuki used different colours for the three output-wires of the stator. They are the only manufacturer doing this.The only conscious reason for this would be a desire to cause confusion, because the output of all the three wires is the same. The colours on the wires from the stator are : Yellow, White/blue and White/green. On the RR we're talking : Yellow, White/blue and White/red. JUST THINK THEM ALL BEING YELLOW, and then go on with the checks below

Stop the engine. Disconnect the wires emerging from the stator. Switch the multimeter to Ohms, the lowest range on the meter. Connect the multimeter leads BETWEEN two of the three yellow wires. Check the reading on the meter. Switch one of the multimeter leads to another of the three wires and check the reading again. Switch the other multimeter lead to another of the three wires, and check the reading again. So, you need to take three readings.	One of the readings is lower than 0.5 Ohms or higher than 2 Ohms 	**Bad News.** **Stator is at fault. Replace the stator and return to START**
All readings are within 0.5 to 2.0 Ohms 		
Connect one of the multimeter leads to one of the three yellow wires. Connect the other multimeter lead up to the engine casing. Check the reading on the meter. Make sure the connection to the casing is a good one !	any reading between 100 Ohms and zero Ohms 	
Infinite resistance (no reading at all, or OL in the display) 		
Switch the multimeter to AC-Voltage (Range	The three readings	

at least to 100 Vac). Make sure you DON'T switch it to DC-Voltage (=DCV or Vdc). Connect the multimeter leads between two of the three yellow wires emerging from the stator. Start the engine and rev it up to approx. 5000rpm. Check the reading on the meter. Switch one of the multimeter leads to another one of the three yellow wires and check the reading again. Connect the other multimeter lead to another one of the three yellow wires, and check the reading again.	are not equal, or one of them is below 60 Volts (AC) 	
Three equal readings, all higher than 60 Volts (AC) 		

Test Phase C

Disconnect the RR from the bike. Switch the multimeter to the diode test position. Connect the RED multimeter lead to the RED positive output wire of the RR. Connect the BLACK multimeter-lead to one of the yellow wires. Check the reading. Repeat this procedure for the two other yellow wires.	You have a reading of 1.00 V or lower on one of the three tests. 	**Different Bad News.** **Regulator/rectifier is at fault. Replace it and return to START**
You have a reading of 1.5 V or higher on all three tests 		
Connect the BLACK multimeter lead to the RED output wire of the RR. Connect the RED multimeter lead to one yellow wire. Check the reading. Repeat this procedure for the two other yellow wires.	You have a reading below 0.2 V or above 1.0 V on one of the three tests 	
You have a reading of around 0.50 V on all three tests 		

Connect the BLACK multimeter lead to the negative output wire (BLACK/WHITE) 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 wire. Check the reading. Repeat this procedure for the two other yellow wires.	You have a reading of 1.00 V or lower on one of the three tests. 	
You have a reading of 1.5 V or higher on  all three tests		
Connect the RED multimeter lead to the negative output wire (BLACK/WHITE) 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 wire. Check the reading. Repeat this procedure for the two other yellow wires.	You have a reading below 0.2 V or above 1.0 V on one of the three tests 	
You have a reading on the display around 0.50 V on all three tests 		
As this was the last test, the only thing that can be at fault is the battery itself. Replace it with a healthy, fully charged one and return to START.		