Suzuki GT380, GT550 & GT750 Charging System

This guide aims to offer clearer, more practical advice for testing the alternators fitted to the Suzuki GT380, GT550 and GT750. The Author acknowledges the original Suzuki workshop manual as the primary reference, but some of its explanations can be vague or overly technical. This article cuts through the confusion, focusing on what actually works in the real world.

Like many bikes of its era, Suzuki equipped these models with an excellent electrical system. At its heart is a field-controlled alternator — a clever design that regulates output by varying a rotating magnetic field, powered by the battery. Controlling the output with a field winding has several advantages. Firstly, the alternator doesn't draw any significant power from the battery or crankshaft unless charging is actually needed. This gives the windings an easier life, which is one reason these alternators tend to last so well. Their output is much cleaner without all the spikes and pulses found on permanent magnet types, this helps batteries to last longer.

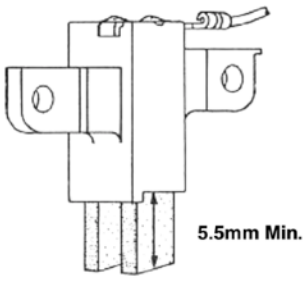
There are two manufacturers of this alternator; Kokusan Denki and Nippon Denso, which results in slight differences in resistance readings. This guide explains the testing process in a simpler, more accurate way to make diagnosis easier and more reliable. All in this is an extremely well designed and long lasting system, the only drawback is that it was built in the mid-1970s, and after around 50 years of service, they are well overdue for an overhaul.

When Charging Problems Strike

If your bike suddenly stops charging, begin with the basics. Check the wiring connections for corrosion or looseness, and make sure the battery is in good condition. A tired or faulty battery can cause all sorts of misleading symptoms, including incorrect voltage readings or a non-functioning charging system.

It's also important to know that lithium batteries operate at different voltages and are not suitable for this system. If you've installed one and are now facing charging issues, the only fix is to replace it with the correct type of battery.

Once those simple checks are out of the way and the issue remains, turn your attention to the alternator brushes. In any electrical system that relies on a mechanical contact, like brushes, this is often where faults begin. The brushes should move freely in the brush holder and protrude more than 5.5mm. Although the workshop manual recommends replacing the entire brush block, these have been unavailable for years. Thankfully, we offer replacement brushes for ND versions that can be soldered in place (P/N: GT-ALT-B1).



Testing the Rotor

Experience shows the rotor is often the first item to fail as it is subjected to heat, electrical load plus rotational forces. Inspect the slip rings for wear, pitting, or contamination. If the winding is faulty or shorted to the rotor body, the charging system won't work. Usually a weak charging system is traced to a lower resistance across the slip rings or low insulation strength.

Field Coil Resistance Check

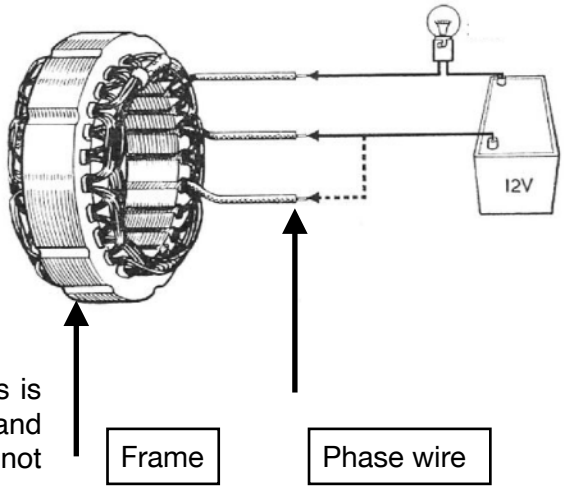
Start by measuring the resistance directly between the two slip rings using a multimeter. The brushes should be removed. Here the Nippon Denso measurement is inaccurate in the Suzuki manual. It seems as if they measure through the brushes, which is incorrect and gives a high reading. This is just another example of many such inaccuracies in Suzuki manuals.

- **Nippon Denso ND - 7.5Ω at 20 degrees C**
- **Kokusan Denki KD 5.8 Ω at 20 degrees C**

Here the resistance only needs to be a couple of ohms different for the charging to be affected. Remember windings are temperature sensitive, so the same part will give different readings at 10 and 40 degrees C respectively, our technicians can help where there is confusion.

Insulation Strength Test (Megger)
To check for insulation breakdown, use an insulation tester (Megger) between either of the slip rings and the rotor body. See the comments below for good readings.

Checking the Alternator Windings
The factory manual suggests measuring the resistance between each pair of stator wires (phases). In reality, this test has limited diagnostic value as you're measuring just a few metres of copper wire, so the resistance will be extremely low, typically less than 1 ohm. Most multimeters struggle to give an accurate reading at such low values.



What matters more is that there **is continuity** between all three phases. You should get a low, consistent reading between each pair of wires. Any figure around 1 ohm or less is generally fine. Alternatively, a simple test using a battery and bulb will also confirm that the windings are connected and not broken.

Checking the Insulation Strength
This is a vital test, old or failing insulation is the number one cause of alternator failure. To check it properly, you'll need an insulation tester often referred to as a Megger. We are able test this for you if you don't have access to this equipment.

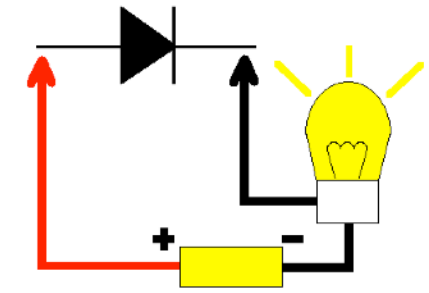
The tester applies a high voltage (normally 500V) which reveals any breakdown in the insulation separating the copper windings from the stator core. If insulation breakdown is detected, the only lasting solution is to **completely remove the windings and old insulation** and apply a fresh coating. This is not something that can be patched, once the insulation starts to degrade, the whole layer must be replaced to restore reliability. Replacement has to be done in a controlled manner, avoiding applying too much heat so as not to damage the stator's magnetic properties.

What's a Good Insulation Reading?
When testing the stator with an insulation tester, you're looking for a resistance of at least **50 megohms (MΩ)** when using a **500V test setting**. This indicates the insulation between the windings and the stator core is acceptable. We use guidelines given in IEEE Std 43-2013 as well as guidance from the Megger instruction manual which is a good rule of thumb in the absence of specific figures in a shop manual. It is worthy of mention that when new the insulation would be closer to 1000M Ohms (maximum reading on the meter), which is the ideal situation.

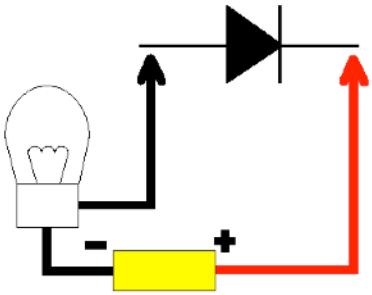
- **50 to 1000MΩ** - Serviceable. The closer to 1000MΩ, the better. This does not mean old insulation will continue to give good service, its age and condition must be considered, our advice will be with onward warranty in mind.
- **1 to 50 MΩ - Borderline;** might be OK for now but readings in this range show degraded insulation This situation is common with old stators or those with faults developing. We would re-test with the stator at its operating temperature, usually this will then return a failure reading. You may notice a fault that comes on only when the engine is hot with insulation readings in this range.
- **Less than 1 MΩ -** Unserviceable. Shows contamination or insulation breakdown.
- **Below 0.1 MΩ** - Unserviceable - serious fault or short circuit.

4. Testing the Rectifier

The rectifier contains six diodes, each one acts like a one-way valve for electricity. A good diode allows current to pass in one direction only, so any test should show current flowing when the diode is 'forward biased', and not when 'reverse biased'. All you need to achieve this is a simple 12V battery and bulb tester: connect it to each diode one way, then reverse the leads. The results should also reverse. If a diode gives the same result both ways, it has failed. If you have a multimeter with a diode test function and know how to use it, that's also fine, the test procedure it exactly the same but the meter is used in place of the bulb tester, there are plenty of helpful videos online if you need guidance.



1. Normal Direction

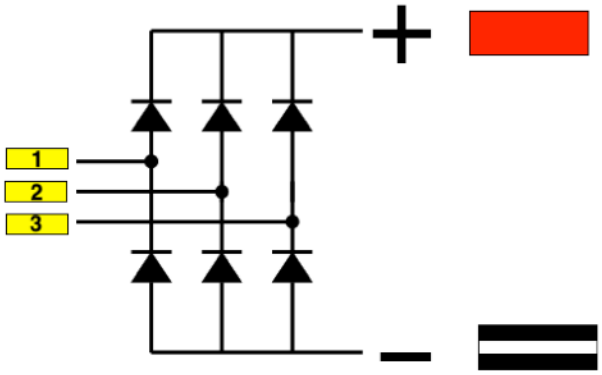


2. Reverse Direction

What we don't recommend is using a multimeter set to resistance (Ohms) unless you're confident in interpreting the readings. The battery and bulb method described or the diode test function on a modern multimeter gives a clear yes/no answer. The shop manual suggests testing with a multimeter on resistance, but then dives into a lot more detail, assuming you fully understand electronic theory.

GT750 Rectifier Test.

Before You Begin: Ensure the rectifier is fully disconnected from the bike's electrical system.



Wiring Reference:

- **Yellow wires** (x3): AC input from the alternator stator 3-phase.
- **Red wire**: DC positive output to battery +.
- **Black/White wire**: DC negative / Ground, to battery '-'.

Test Setup - Bulb Tester Method

- Connect the **positive** terminal of a 12V battery to the **Black/White wire** of the rectifier.
- Connect the negative terminal of the battery **through a 12V test bulb** (e.g., indicator bulb) to one of the **yellow wires**.
- **Check each yellow wire (Phase 1, 2, and 3)** this way: The bulb should **light up** brightly**.** This confirms that the diodes conduct current flow in the normal direction.

Now reverse the test:

- Connect the **negative** terminal of the 12V battery to the **black/white** wire (DC -).
- Connect the **tester positive** wire to each **yellow wire** (one at a time).
- This time, the bulb ***should*** **not** light for each yellow wire. This confirms no conduction in the reverse direction through those rectifier diodes.

Repeat a similar test using the Red wire:

- Connect the bulb tester between the **Red wire** and each **yellow wire**, testing in both polarities:
  - One direction should **light the bulb**……continued over.

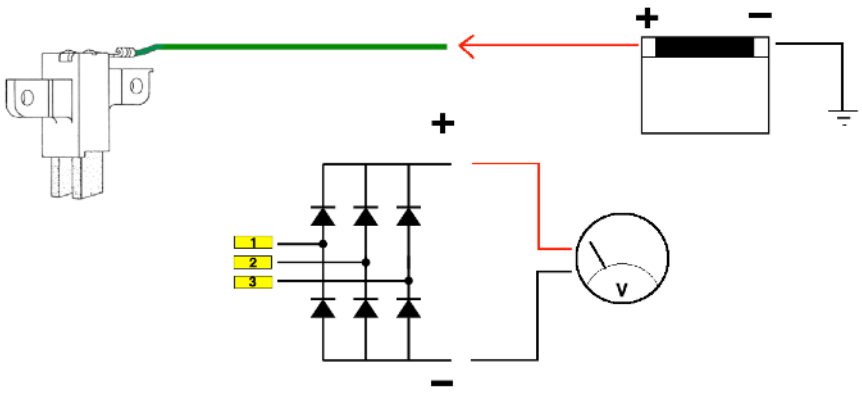
- The opposite direction should **not light** the bulb.
- This checks the **other side of each diode** (positive output side).

If all these checks pass the rectifier is working. It only takes one test failure to show the rectifier must be replaced. We stock replacement rectifiers for the GT models. Check carefully as the 380, 550 & 750 models have a different unit to 250/500cc machines.

5. Testing the Voltage regulator
The original voltage regulator is a mechanical unit that operates by rapidly switching between no output, half output, and full output to maintain an average charging voltage between 13.5 and 14.5 volts. According to the factory manual, adjustment is possible by altering the preload on the internal spring bar. While this may offer limited results, in practice these regulators rely on extremely fine tolerances, making accurate adjustment difficult.

Testing the regulator is challenging, and the manual's instructions are extremely unclear. This method does not check the regulator directly but shows if the rest of the system is able to meet the output when the regulator is not in circuit, the regulator is the likely issue. In essence, the procedure involves disconnecting the three yellow alternator wires and feeding them into a standalone 3-phase rectifier (IE one not connected to the electrical system). The rectifier's DC output is then connected to a voltmeter, **not** to the motorcycle's electrical system. The rotor is powered directly from the battery via the green wire.

With the engine running, increase the RPM and observe the voltage:
- At **1,500 RPM**, voltage should exceed **16 volts**
- At **2,500 RPM**, voltage should exceed **27 volts**



Important: Do not exceed these RPMs or run the engine in this test setup for longer than necessary to obtain the readings. Prolonged operation under these conditions will cause damage to the electrical system. Record your results. If you're unsure or uncomfortable performing this test, it's advisable to have a qualified auto electrician carry it out. When done correctly, this test provides an effective way to assess the regulator and the health of the charging system, but it must be handled with care.

If you regulator has failed we can provide a new MOSFET unit that will fit inside the OEM case, once the old mechanical internals have been removed, allowing you to keep the bike's originality.

We hope you have found this guide useful, we offer a full range of rewinding and repair services for the GT 380, 550 and 750 alternators as well as new rectifier units, regulators, help & advice.

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