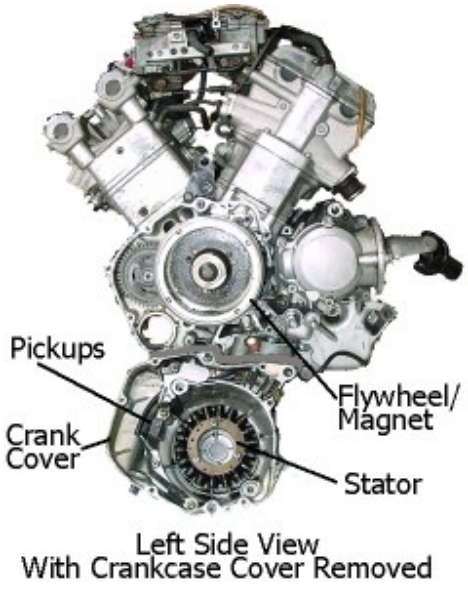

YAMAHA

Motorcycle Charging systems Charging Stators FAQ

Yamaha VISION (xz550 RJ/RK)

Best Viewed At 1024 x 768

UPDATED

2/20/2006

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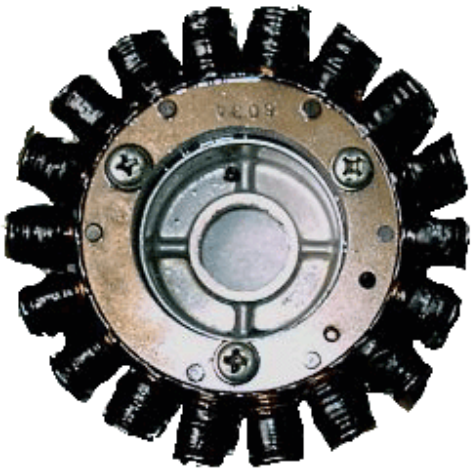
*This page attempts to consolidate info concerning the charging system for the Yamaha Vision motorcycle. Much of this applies to any motorcycle charging system. Most of this has come from the Vision Forum, its riders, ELECTREX, and other sources. My thanks to **EVERYONE**.*

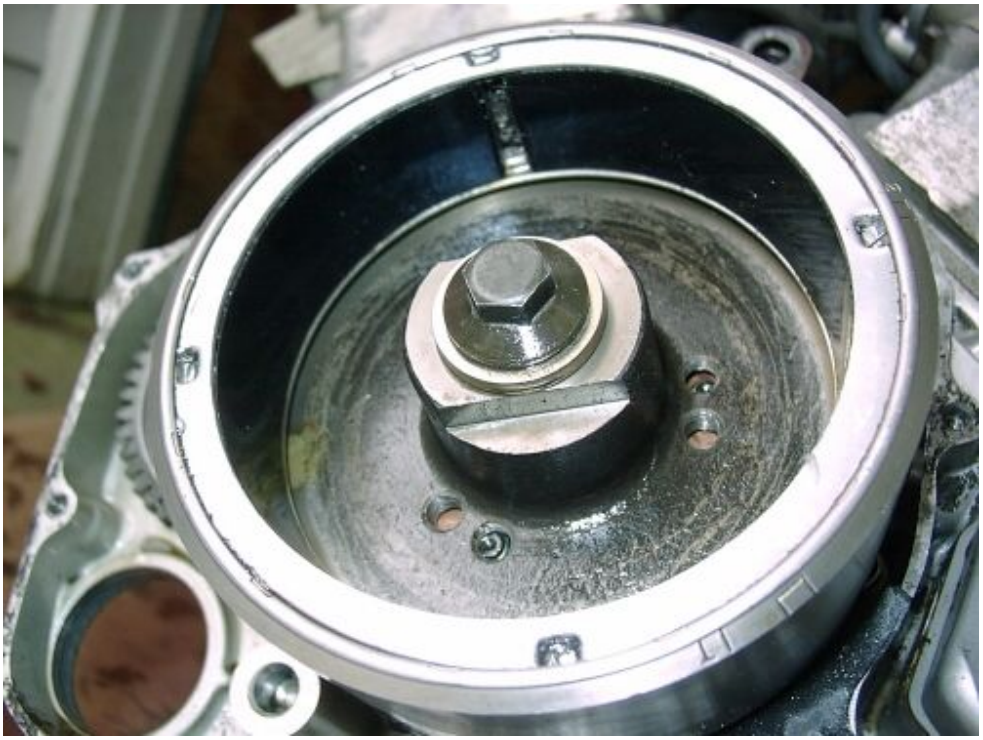
This is linked from the (Vision Ignition FAQ) & my (Vision Home Page).

I will update this for fellow Vision Owners (Vision Riders Group).

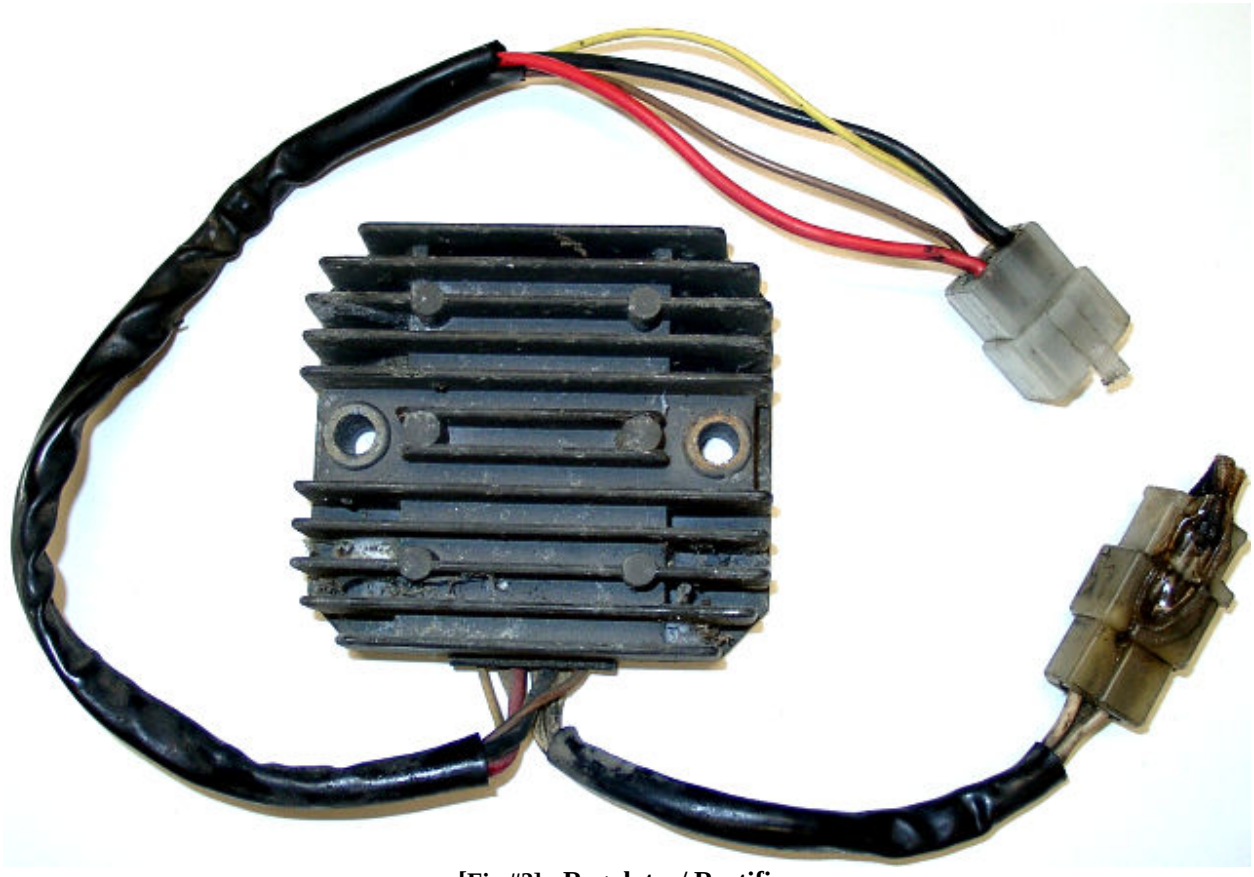
Dave "Leather" Draper JETAV8R@CSI.COM



[Fig #1] : Stator



[Fig #2] : Two (2) Permanent Pole Magnets On Flywheel Rotor



[Fig #3] : Regulator/ Rectifier

Yamaha Vision Charging System

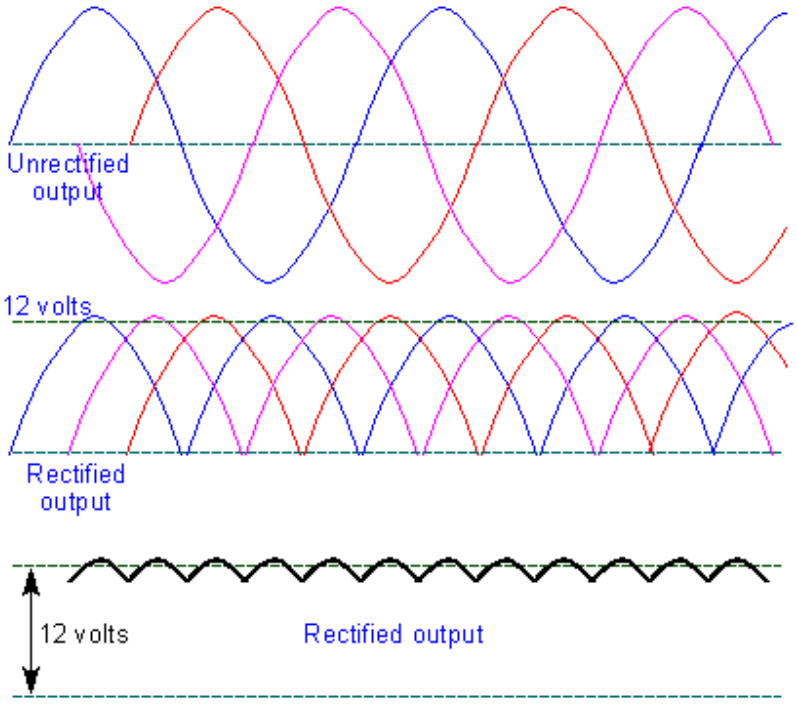
(Reader's Digest Version)

OVERVIEW

The Yamaha Vision (as most motorcycles) has an internal (inside the crankcase) permanent magnet rotor, 3-phase coil stator, and an external "Regulator-Rectifier" (RR) box. That is the whole system. The Vision generator is rated at 20 amps and should produce 14.5 (+/- 0.5) volts unloaded and about 14v loaded when RPM at 3000+. That's what the book says..... Practically speaking your bike should produce a solid 14v at idle.

HOW IT WORKS

A stationary Stator (Fig 1) is mounted to the crankcase cover and sits inside the flywheel Rotor (Fig 1). The Rotor has 2 magnets that (engine running) rotate around the Stator. These magnet produce a "North-South" pole flux (current) in the stator coils. This current is called "A.C." current since it flucuates +/- voltage in a "Sine Wave". The stator is wired so that there are actually 3 circuits producing A.C. current. Each circuit A.C. wave is 1/3 out of phase with the previous winding.

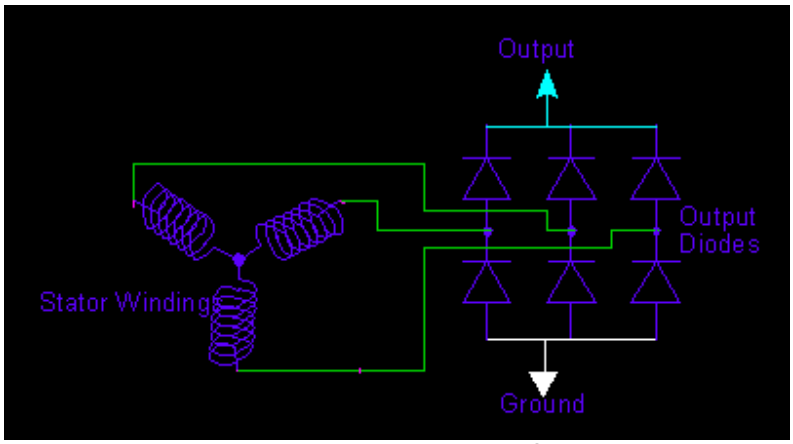


It is important to understand these things:

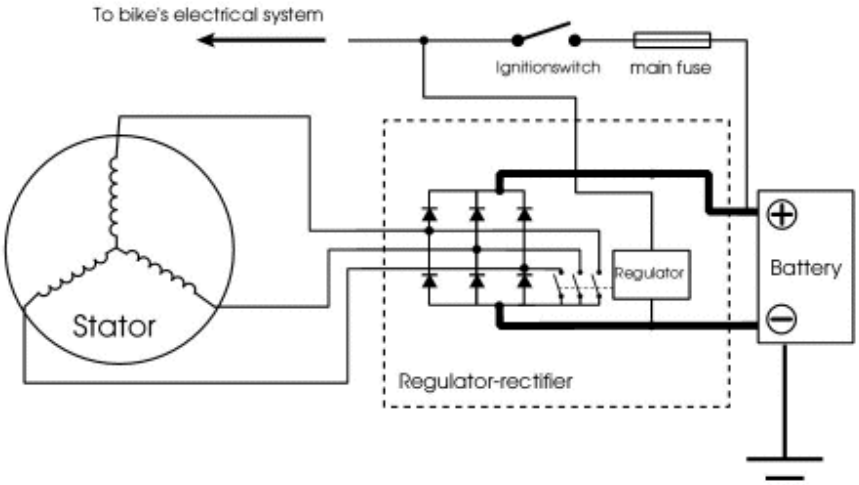
- The stator A.C. output voltage varies with engine RPM. The more RPM the more voltage. So, the stator output must be "Regulated" to provide 12-15 volts into the bike system. The raw A.C. output from each circuit is about 50volts ac at medium RPM.

- The A.C. output is convert to D.C. by "clipping" the bottom (negative) portion of the A.C. wave off. The A. C. current has been "rectified" so that only the positive portion remains.
- The "Regulated" and "Rectified" output is shown above. It is 12-14 volts positive DC. Notice that the bottom chart is simply showing that the "rectified" output is somewhat "dirty". Since the negative output is simply chopped off the AC, the positive DC output is more like a slightly fluctuating "sawtooth" wave. This is good enough for automotive purposes but would wreak havoc on delicate computer circuit.
- Lastly, understand that the AC current is provide between any combination of 2 of the 3 white wires coming out of the stator. The AC phase is "floating" above the bikes -12 frame ground. That means that NO white wire is connected to ground. You measure the AC ouput of the stator between white wires only.

RECTIFIER / REGULATOR ("RR")



3 Stator windings & 6 diode Rectifier Bridge

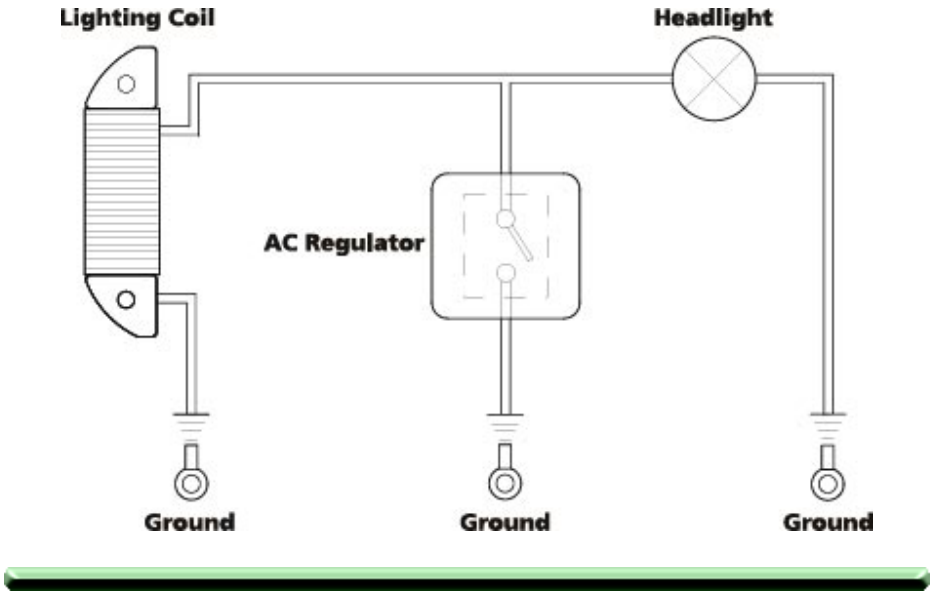


The Regulator-Recifier rectifies the A.C. current by using 6 diodes (2 per phase). The more complex part of the RR is how it regulates the higher DC current down to provide a steady state 12-14v. There are several variations of the process but in simplest terms a circuit monitors the output voltage and "shunts" (partially diverts) the excess portion to ground. Consider these things:

- The RR has a lot of current constantly flowing through it (diodes, etc..). AND, the excess voltage is being

divert directly to ground. So, the RR gets very hot in the process. The construction is totally about disappating this heats. Notice the heat fins. Less noticeable is that the RR circuits inside are encased in Epoxy and esentially glued into the heat sink metal body.

- The RR circuitry can regulate the output voltage several ways. How the Vision RR works is not exactly know but here are some common designs and guesses.
  - The RR actually regulates the AC output based on the DC output. It shunts (grounds out) enough of the AC output to keep the DC under 14volts.
  - The RR may regulate all 3 phases -or- maybe just 1 or 2. For example: That means that 2 phases are producing full voltage while the 3rd is decreased to level off the DC ouput. Obviously, this puts a bigger burden on the regulator and that 1 phase. A better design regulates all three AC phases equally.
  - ***Where*** the RR measures the battery system voltage can be different.
    - The simple setup is that the RR has 2 wires (Red=+12v and Black=ground). The +12 wire is connect direct to the battery. This connection obviously carries a lot of constant current which can (over time) build up some noticeable resistances (voltage drop) due to bad connections.
    - Another common circuit is shown above. This is used on MOST Visions (but not all). Notice that a seperate +12 volt wire is input into the RR. This normally is attached to the ignition (key on +12) and some other points of the bike to monitor voltage. The advantage is that this connection carries less current and is more a accurate picture of the charging output. This results in a normally higher RR output to the battery.
- Some Bikes (not Vision, but often dirt/track) use a "Lighting Coil". This is included for discussion purposes so you understand the slight difference. A Lighting Coil is often a separate winding on the stator to produce AC current for accessories (typically lights). The "Lighting Coil" output may be regulated (or not) and may not be rectified either. Lights don't need DC (whereas things like relays and displays do). A simple regulated Lighting Coil oputput circuit would look like this:



WIRING (See Electrical Diagram)

- **3 WHITE WIRES**

- Connect from rectifier via a "NOTORIOUS CONNECTOR" to stator under crankcase cover (left side of bike). Order is not important. But the connector (pictured with RR top of page) is notorious for getting corroded/dirty and melting from voltage-drop resistance

.

1 RED WIRE

- Connects from Recitifier to +12 volt hot all the time from battery. This is the main output wire from RR to battery.

1 BLACK WIRE

- Connect from Recitifier to frame ground

1 BROWN WIRE

- This is the "Extra" wire found on some RR circuits.
- This wire is connected to +12 at the ignition when the key is on. It provides the reference voltage to the RR. The advantage is that this is low current circuit and provides a more accurate reference than the main battery wire (RED) above.
- Disconnecting this wire will have unpredictable results. The most likely scenario is that the RR will view the reference voltage low (zero) and the RR output will be a constant 14.5 volts at all times. Another words, the RR will constantly charge the battery regardless of battery level.
- This wire is not shown or used on some models. In fact, is **not** shown on my 1983 "RK" diagram but was clearly used on my bike.

1 YELLOW WIRE

- This wire is not on any diagram and is not used. Wire ends at the plug an goes no-where.
  Have been told that it was (on some models, Vision and others?) to be source of power for lights on Euro or Canadian bikes. The lights would only come on while bike was running.

COMMON PROBLEMS AND CORRECTIONS

- **#1. Charging circuit testing and MORE is BEST described at: WWW.ELECTROSPORT.COM**

Direct link to their troubleshooting chart : http://www.electrosport.com/Images/fault_finding.pdf

-or- Direct copy hosted here as of 2/21/06 : ChargeFaultFindingGuide.PDF

Basically what you are trying to do:

You are checking to see if you have the correct DC output. If not, then check to see if the stator wires are good and also producing the correct AC current when engine running. If they are then the regulator is suspect. Check the diodes in the regulator. To be more precise:

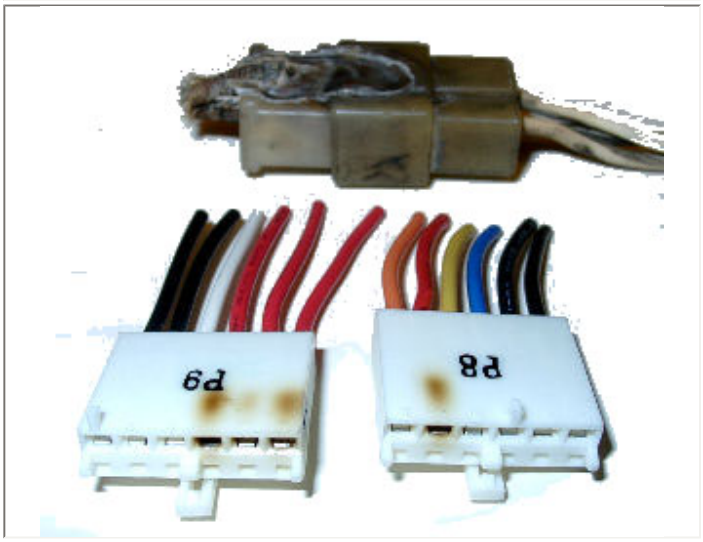
- Output after regulator box should be 14.5 volts DC engine running no load
- Each stator wire should have continuity with the others (0.32 ohms by the book).
- **No** stator wire should have continuity with ground (short or bad insulation)
- Engine running, each set of stator wires (1-2,2-3,1-3) should produce 50v AC.
- Test all 6 diodes to check they block current flow in the correct direction

NO ... I repeat NO white wire should have continuity with ground! EVERY White wire should have continuity with another WHITE wire in any combination 1-2,1-3,2-3.

Poor connections. I believe this is this single biggest cause of stator/RR failures (besides the fact the Vision system is cheaply built). Yes, this is my opinion and here's why. A bad connector creates a resistance in a circuit. That resistance will generate heat. The most obvious example is the connector to the stator. You are generating 14v and 20amp. That's a lot of current and over time the connector get dirty / corroded. If the connector is dirty that current that HAS to go somewhere. ABSOLUTELY make sure you have good connections. Run new wires if you have to, remove connectors and solder suspect connections:

- From Stator to RR
- From RR to Frame Ground (Black Wire)
- From RR to +12 post battery (Red Wire)

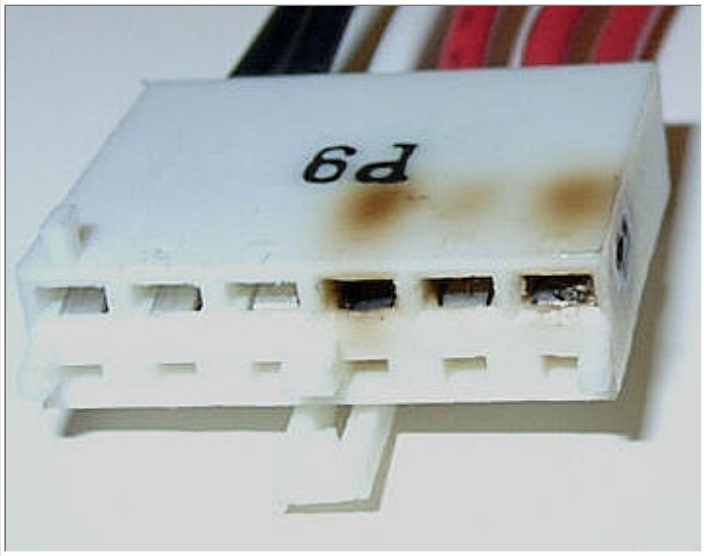
Here is melted stator plug. VERY TYPICAL on Vision. What do you think is happening in other parts of this circuit?



Here's a fun example of the same problem of voltage drop. This plug came from a desktop computer that died with all the symptoms of a bad motherboard: wierd video, strange sounds, no post, no boot, etc..

Guess what it was?
Bad (5 yr old) plugs from the power supply.

DOES THIS LOOK FAMILIAR?



The heat and charring make this a cascading event. It just gets worse (slowly) over time.

TIP : Cut out and directly solder the 3 white wires on left side of bike going to internal stator.

- **#2. The Stator fails internally.** Usually 1 of the 3 stator wire circuits breaks ("opens") internally or shorts through bad insulation to ground (the engine).

NO ... I repeat NO white wire should have continuity with ground! EVERY White wire should have continuity with another WHITE wire in any combination 1-2,1-3,2-3.

- **#3. The Rectifier fails internally.** You can use the fault chart from Electrex to isolate and check this. But it does require a good meter, some understanding of electronics, and patience. The RR is a heat sink surrounding an Epoxy filling circuit board. You cannot inspect it since a dismantled RR looks like this below (after using a grinder).

- **#5. Keep your oil level high.** The stator is partially cooled by oil in the flywheel sump.

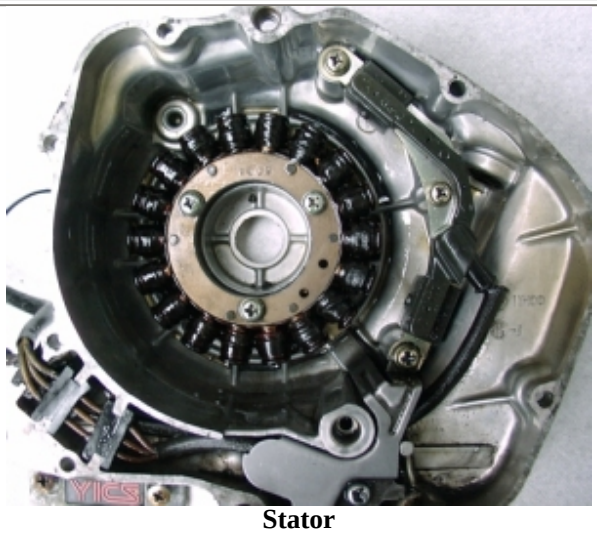
- **#6. To replace the stator** you must remove the left crankcase cover. This is NOT a big job. **BUT,** you must reinstalled the cover and wiring correctly **OR** engine oil will leak out of the crankcase bottom and you'll have to do the whole job over. One word: Yamabond #4.

- **#7. Oh Yeah .... DUH.** Make sure you have a "no-kidding" good battery. A bad-old-dead battery will load down the charging circuit till it overheats and dies. You know when you put a battery charger on a dead battery and it PEGS the amp-meter? Well, that's what a bad battery is doing to your bike charging system.

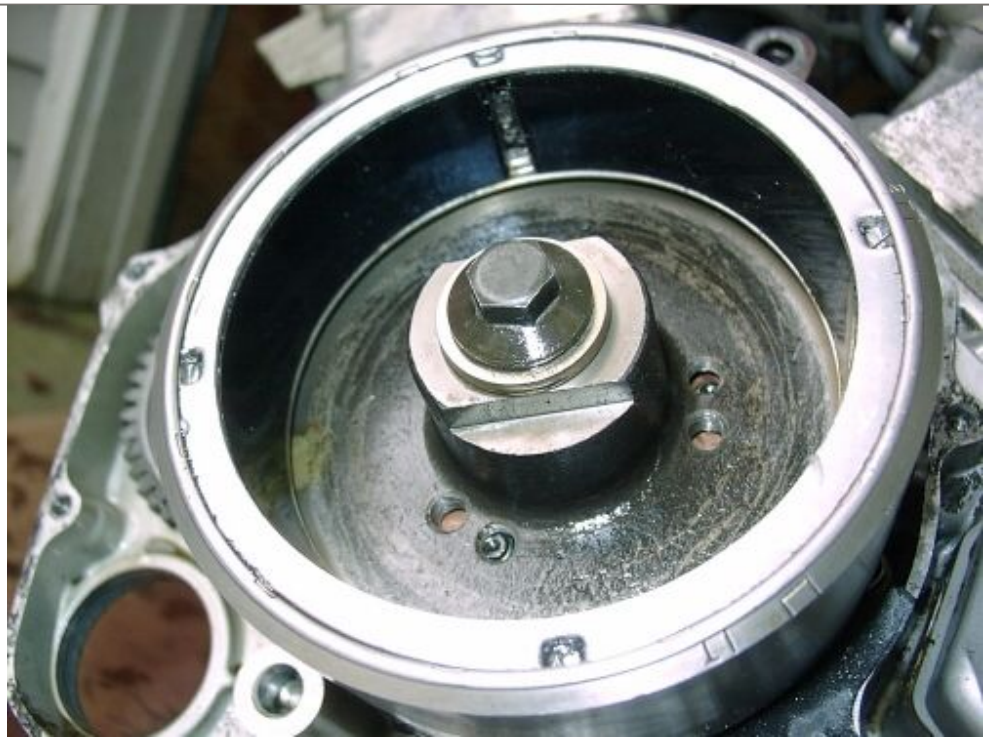
  Personally... I recommend the new "gel cell" sealed batteries. Search the web (ebay). I have batteries made by Odyssey and they work great for both the motorcycles and PWC.

Cautions & Warnings

1. **NEVER run an engine with the battery disconnected. YES you can do it and YES it will fry your charging system.**
2. **DO NOT jump the battery with the positive/negative cables reversed. You will fry the regulator. YES, jumping a good battery under normal circumstances is perfectly O.K.**
3. **DO NOT confuse the stator wire plug with the TCI pickup plug. They both look the same (4-pin connector) and if you plug the stator plug into the TCI (because you have removed the TCI to get to the stator plug & regulator box) you will fry the $400+ TCI module. YES, a good but unlucky rider has done this.**



Stator



Flywheel with 2 magnets inside

WHAT A GOOD CHARGING SYSTEM LOOKS LIKE

Engine Off

On (NOT running)

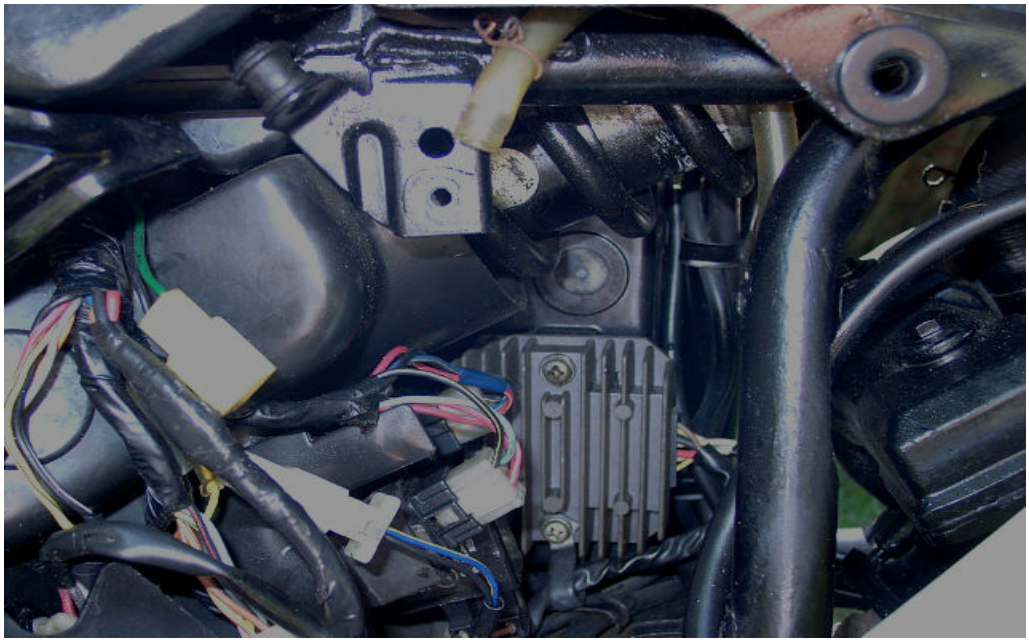
Engine Runnning

I installed a voltmeter onto my bike to be sure I knew what was going on. There are other ways to achieve this. A circuit to light GREEN when the battery is charging and RED when the battery discharging would be good. There are commercial version of this available for about $40. The voltmeter above is made by TELEX. Its a cool piece because it was made for watercraft and so is waterproof. AND... Telex is selling off this line so if you can find one in your marine stores they going for about $25 now (9/2002).

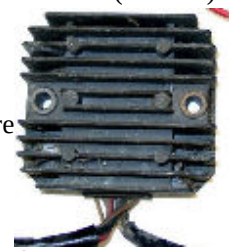
What should a good charging system look like on the Vision. Well, there it is above. Little over 14 volts when running and the battery needs charging. And unless you're doing long rides.... the battery always needs charging.

Click For The BIG Picture

What Goes Bad and Why



Charging systems have typical failures, and some more common than others depending on how well built they are. Here are the common failures.

- Stator Winding failure
  - One of those 3 wires in the stator as broken internally or (worse) has shorted to the engine and ground. This is most typical because the stator is exposed to a lot of heat and vibration inside the engine. Wire insulation also decays over time. Lastly, if the regulator fails or the current draw from the bike is too great (bad battery or bad corroded connections) the stator wiring and connections can begin to melt over time. You will see melted plugs and scorched stator bodies when this happens. Lost phases will decrease AC (and DC) output. And/or shorted wires can fry the stator and regulator too.
- Rectifier failure 
  - The rectifier uses 6 diodes arranged to "chop" the AC output from the stator to DC current. The DC is conditioned a little bit more with capacitors, etc... since "rectified" AC is still a little "choppy" and not good for newer LCD microchip driven displays and other solid state devices. Needless to say, if the diodes burn out you have problems. Depending which diodes go the DC voltage output can be lower to nonexistent (zero).
- Regulator failure
  - Less likely but possible is that regulator circuitry fails and the output will be too little or too much. Too little and the battery eventually dies. Too much and the battery will overheat, bubble over and self-destruct.
- Heat Disappation
  - There is a VARIETY of discussion about the stator and/or rectifier overheating and failing:
    - The stator is cooled by the oil under the crankcase. If the oil is allowed to get low then the stator can potentially overheat and fail.
  - The rectifier does not charge the battery all the time. If the battery is full up then the rectifier will "SHUNT" the electric pulse from the stator back to ground. In laymans terms ... "SHUNT" basically means the white wires are grounded. The stator pulse goes nowhere. This is not exactly what's happenning but close (DON'T GROUND THE WHITE WIRES!). When this happens the electronics in the Rectifier are handling the excess power and things get hot. That's why it has heat fins on it.

- **WHAT DO I BELIEVE ?? Hey.. since I wrote this I get editorial license ==>>**

I personally believe most everyone's charging problems stem from either a bad battery, low oil or MOST IMPORTANTLY bad connections on the bike. ANY bad connection on the bike induce voltage drops acroos the charging circuit that overheat every component in it. It will melt the WHITE 3-wire stator connector (VERY TYPICAL), and ultimately overheat the STATOR and Rectifier. A bad battery will overtax the charging circuit and melt it.

Common Scenarios

- Bad connections in the charging system wiring causes a "voltage drop" across the wiring. This in turn causes an increase in current draw from the generator. The extra power going to bad connection is converted to heat. The heat produced in either the stator or rectifier causes a failure. You might see the signs of melted plugs and wires or heat deformation on stator or rectifier bodies.
- The battery itself is causing the heavy current draw mentioned above. This could be a bad battery -or- a drained battery that you are charging with the motorcycle charging system. People often associate charging system failures with "jumping" a battery. Its not the jump that did it most likely (unless you hook the cables up backwards which instantly fries the rectifier usually). The problem is that your motorcycle charging system is not heavy duty enough to charge a dead or bad battery.
- Crappy components. The truth is the Vision stator is cheaply built. The stator wiring fails. Also, both the stator and regulator could be cooled better for durability. Any way you look at it the system tends to fail prematurely.

Myths

These are some myths concerning charging systems and here are a couple:

- **"Jumping starting will damage your system"**
  Done correctly .... **untrue**. If you jump a dead battery that is not good (will not hold a charge) the charging system may carry a heavier load for longer than it was designed for. Remember the Vision system is "rated" in a perfect world for 20amps ... but **NOT** for the next 2 hours. Add to that some bad connections, headlights, the stereo and A/c (I'm kidding here), and .... you get my point. You may overheat and ultimately fry some part of the system (stators , regulator, both...). If you jump the battery with the cables reversed you will also cream the system (most probably the regulator).
- **"Disconnect one of the 3 stator circuit wires will help the stator run cooler and last longer because there is less unused electricity flowing through the system"**
  This actually sounds good in theory. No, really. But..... **untrue**. Don't take my word for it. Call any knowledgeable shop in the world please. And, really, if this were true this technique would be used on every generator in the world and quite clearly it is not, so_ooooo.....
- **"Magnets never go bad"**
  Sort of ....**untrue**. Magnetism is a nebulous thing (how often do you get to use that word) and from grade school science you should remember that iron magnets tend to lose strength with vibration and heat. Where are those stator magnets again? How often is this a problem. RARE. About as rare as a spark coil going bad. BUT, it is possible and should not be totally left out of your thinking. I had an alternator rewound twice for a car that never quite put out a great solid voltage when loaded up to its rated amp output. What's left that can be wrong? Crappy magnets. Remember in a motorcycle (unlike an all-parts-in-one alternator) your charging parts (stator, magnets, regulator) are all separate pieces.

Preventive Measures For The Yamaha Vision charging system

Unless you buy and install a newer aftermarket stator and regulator (see ELECT REX link below) you can't make it a "better" system. So, the trick is to make what you have bullet proof. Here are the tricks **recommended by others** lifted verbatim from the Vision Forum archives.

- Make all connections in the charging system clean and protected. Solder wires to their respected plug pin ends. Use WD-40. Use dielectric grease on the outside to "water-proof" connectors.
- **QBS**

Using plain simple common wheel bearing grease, put a light coating of grease in the internal areas of the stator coil connector. An even better permanent fix would be to clip off the male and female components of the connector and hard wire/solder the connections. The wires are white in color on both sides of the connection so it's not critical which ones are soldered together as long as a bike wiring harness wire is connected to a stator wire. If for some reason this connection needs to be broken in the future, simply cut the soldered wires and then resolder them upon reassembly.

Electrical system operation:

The V alternator puts out 100% of its capacity ability all the time, given the RPM it is operating at. What the bike load doesn't use is shunted to ground by the regulator. The connector carries whatever amps the alternator is putting out all the time regardless of bike load. Low Rpm = low amp output = low amps passing through connector= electrical needs deficiency made up by battery. High RPM=max amp output=max amps passing through connector=amperage left over after bike load is serviced is shunted to ground. Note that is both cases all amps pass through the connector before any electrical distribution or alteration is done. The alternator always puts out the most it can no matter what is happening down stream. Therefore, the connector is always passing (or attempting to pass) the max amps available.

The way the problem develops:

When the connector is rendered inefficient due to corrosion the alternator continues to put out all the amperage it can. It doesn't know or care about the condition of any of the electrical components that follow after it. It just stays busy doing its thing. However, since the connector is now not able to pass through 100% of the energy going into it, it passes what it can and the rest of the energy backs up in two places and defaults into heat at both places. One place is the connector itself and the other is the alternator stator coil. The heat in the connector melts the connector plastic which turns all gunky and greasy and nasty and generally adds to the connectors' ineffeincy which in turn compounds the problem. The heat in the stator coil melts the coils' insulation which eventually fails and allows the energy the coil creates to go to ground via the engine cover that the coil mounts on. That is why the test for a failed coiled looks for continuity between any one of the stators' 3 coils (accessed through the 3 white output wires in the stator side of the connector) and ground (the engine). Continuity indicating a failed stator coil. Don't forget to please not loose track of where the problem originated, namely corrosion within the stator connector. The Big Clue here is the condition of the connector. A melted nasty connector got that way from heat. Where did the heat come from, inside or outside the connector? If inside, what was the source?

The way I see it you have two options. 1. Clip off the female and male halves of the connector and then solder each former female wire to a former male wire. Of course, each resulting soldered joint must be individually insulated. It doesn't matter which former males are soldered to which former females. All the wires on each side of the connection are white. This what I have done and it has served me very well for the last six years even under extreme heat and load(130/100 watt headlight bulb)situations. The only usual reason to use the connector is replace the stator coil. That problem is now fixed and the side left engine side cover shouldn't need removal for a very long time. When that time comes, simply clip the soldered connections and then resolder them upon reassembly. 2. If you are paranoid about clipping off the connector and it is still serviceable, clean the connector pins and sockets to bright and shiny condition and then apply a thin film of common non metallic wheel bearing grease to all metal connector surfaces. Then reconnect as usual. This process forms a vapor barrier that keeps air borne water away from the connector metal, thereby inhibiting corrosion formation.

- Make sure you have and keep a good battery. You can use a multi meter to measure the amp draw on the battery after starting. With lights off it shouldn't be more than about 5 amps (if that). Much more and you have some problem going on there.
- "The stator rotor is coated. Definitely don't damage it with steel wool. It produces an electrical field with the stator, and should be left alone. "

Repair and Maintenance of The Yamaha Vision charging system

Get and Use A repair book !!

The following discussions have been copied verbatim from rider messages on the Vision forum. They concern repair or replacement of the Stator under the left crankcase cover. In short, you must carefully seal the crankcase cover back to the engine or you will have dreaded oil leak. This is particularly important around the stator and spark pickup wires which exit the crankcase cover.

Stator Wires exiting crankcase cover pictured on left.

- **Yamabond #4 by Dan**

1) Go to Yamaha dealer and obtain a tube of Yamabond #4...nothing else(including Permatex#2) is quite like it as far as tenacity is concerned.
2) Take left cover off again, clean ALL old goo out thoroughly.
3) Using fine sandpaper, clean carefully ALL aluminum surfaces that the grommets come in
contact with ...every stinking edge...until bright shiny and clean.
4) Clean ALL old goo off of every bit of the grommets themselves...and wires.
5)Run a thick ring of Yamabond around both grommets, and directly on the wires where they pass through the grommets...work the wires in and out of the holes a bit to ensure the sealants coating the holes.
6) Wait about ten minutes for the Yamabond to set up a bit.
7) Smush the grommets back into the slots they belong in...carefully place a NEW gasket onto the left side of engine case, and re-assemble.
8) Wait 12 hrs if you can before refilling with oil to make sure the stuff sets up well. NO LEAKS SO FAR IN DOING THIS TWICE THIS WAY AFTER 4 PREVIOUS ATTEMPTS TO SOLVE SAME LEAK.

- **Charge cures by bernard lajoie**
source a re-wind from "Rick's Stator"(west coast)or Cycletronics(use to be"Willy's")in Alabama(east coast). For reg./rect.replacement, throw the yamaha part in trash,go to salvage yard,use either Honda or Kaw. For Honda use cm-400/450 twin or cx-500/650twin only! Wire in this order,3 yellows to stator(one per leg)red w/white to battery pos.,small black wire to (switched HOT)this is the volt reg.wire. If not hooked up bike will over charge(16-19volts,not a good thing). Last hook green wire to battery ground. Some Honda reg./rect. will have (2)red w/wht@(2)green just splice together(red to red,grn to grn). For Kaw.use late model kz/zx 550,kz/zx750,kz/zx 1000/1100 (these are the 2-valve motors,zx=GPZ)or 600r(ninja)4-valve,wire in this order,3 yellows to stator(one per leg)white w/red to battery pos.,brown(smallwire)to(switched HOT). This is reg./rect.wire,black to battery ground(IMPORTANT:you will need the gang plug that plugs into reg./rect.w/2-3in of wire to wire correctly I.E.cut from main harness as nessary,sometimes the salvage guys don't like this). Your bike will now charge@14-14.5v,also ck.battery pos.&ground cables,these are prone to fail.
- **Removal tips by QBS**
Regarding removal of the three Phillips Head screws (and for that matter, all Phillips Head screws in general) that attach the stator coil to the left engine cover: If you don't have an impact screw driver with a properly sized bit, don't touch them until you do.

  Specific to the V: after the left engine cover is off, lay it on its' side, outside down, on a wooden surface. Then use the impact driver and hammer to loosen the three screws. Reattchment with the impact driver is the reverse, being carefull to not over tighten the the screws. First tighten the screws as tight as you can by hand. Then give them one or two (Max!) impact driver blows. who it might be that may have to remove them in the future.

  Another tip: If you haven't got an impact driver, or the screw heads are too trashed to be of any use, but you do have a little room to work with around the screw head area: Use the smallest Vise Grips you can get and grab the screw head very firmly and attempt to turn the screw head in a counter clockwise direction. I've used this technique many times over the years and never fail to get a small thrill of satisfaction everytime I overcome the challange of a screw head that at one time would have caused me hours of frustration and grief.

  Another tip: If you don't have an impact driver, you can simulate one using a screw driver and a hammer. Insert the tip of the screw driver into the screw head, firmly grasp the screw driver
handle and preload the screw in the desired direction of screw rotation, then hit the head of the screw driver with a stout hammer blow. This technique can be used for either direction of screw rotation.

  Another tip: A damaged screw head, bolt head, or nut can sometimes be loosened by using a sharply pointed punch and hammer to rotate it in the desired direction.
- **It's time by QBS**
It's time to reattach your starter clutch. Get a Haynes manual. Remove your stator rotor/flywheel. Remove the three allen screws that attach the SC to the back of the rotor. Inspect the clutch rollers for flat spots and replace all damaged rollers. Inspect the clutch housing for cracks in the roller area. Replace or repair(weld cracks) housing as necessary. Reassemble and reinstall SC. When attaching SC to back of rotor, use new allen screws that protrude 2 or 3 threads beyond the inside surface of the rotor. Use Loc-Tite on these screws and between the very clean oil free mating surfaces of the SC and rotor. After the screws are tightened, pean their protruding threads. Reinstall the rotor SC assembly. If the future ever requires removal of the SC, grind the peaned threads level with the surface of the rotor and unscrew them as usual.

  Before final assembly of the left engine cover, do a continuity check of the stator coil as described in the Haynes manual. If continuety is found, replace the stator coil. When reassembling the left engine cover, inspect the stator coil connector for corrosion related internal heating damage. If found, seriously consider clipping off the connector and hard wiring (soldering) the connection. If the connector is still servicable, at the very least you should lightly grease the inside of the connector. If you don't, stator coil replacement certainly lies in your future. If the above SC attachment and stator coil connector procedures are performed, the left engine cover should not require removal for many years, if ever again.

  After you reattach your SC you'll be amazed at how quite the engine is at idle. Your information regarding V engine life is correct. A

well maintained V should go at least 100K with no major internal problems. Mine is working on 73K.

- **Flywheel removal by pat sullivan**

I recently removed my flywheel to inspect the starter clutch. I used an impact wrench, and with it I did not have to hold the flywheel at all. I checked with the local Yamaha shop in Santa Clara, CA and they indicated that they use pullers for Automotive Harmonic Balancers that they get from local suppliers. I bought one of these for around $30 and it worked fine. Later I found out that you can rent these at several tool supply rental houses.

As indicated earlier in this forum, you have to whack the bolt on the puller quite hard in addition to using the impact wrench. I thought for a while I wasn't going to get it off, but eventually it popped off when I hit it. Put a padded box under the flywheel while you are doing this to catch the flywheel and the starter clutch rollers and springs that are likely come out when the flywheel finally comes off. You'll probably also need a impact socket to do this. I split my regular socket on the first try.

Took stator flywheel off on december of last year because I needed to change the roller pins and get the base where those pins go to welded back as it was cracked. This is how I did:

o Remove left cover

o Put the appropriate size socket + wrench on the flyhweel nut (a.k.a big nut even though right now I do not remember if it was a nut or a bolt. Who cares? =)

o Get a bolt like 2-something inches long (a.k.a. small bolt) and then turn the flywheel (using the wrench on the big nut) until you can jam the bolt between the bike frame and those holes that were drilled on the outside of the flywheel for balancing. The idea is to use the small bolt to stop the flywheel from turning while you play with the big nut.

o Holding the small bolt, so it will not pop out when there is no compression load on it, loose the big nut

o Using an adequate puller, take the flywheel off. What I used was a a 3-bolt puller like the ones used to, say, pull steering wheels off (something that can be found at your friendly Autozone or similar store). Now, the 3 bolts where the wrong size and pitch for my need, so I went to a hardware store that specializes in nuts and bolts and got 3 bolts (allen, not that it matters) that would fit on the thread and would be long enough so they would be in the puller when I threaded them into the 3 flywheel holes. So, their length really depends on the puller you are using.

When you are ready to put the bugger back, do remember to align the flywheel as there is a key/notch arrangement between flywheel and the conical base where the bit nut is bolted to. Besides that, use the small bolt to hold the flywheel in place as you tighten it and you should be home free.

Misc Discussions

Voltmeter?

- **Voltmeter by Burke Storti**

Has any body figured out how to install a volt meter or other indicator which can tell the condition of your charging system while the bike is being ridden?
With this, at least we would have some warning that the stator is "pushing up daisies".
I had a similar experience as Dan. I came home from a 150 mile ride to discover my battery was dead when I killed the motor in front of my house & could not get it to start.

- **I have a voltmeter, and some comments on what it shows by John Logan**

I installed a voltmeter, a clock, and an oil pressure gauge across the dashboard inside my '83's fairing. I glued a hardboard backing to the thin plastic dash for more support.

The gauges I chose were the "Cockpit" series from VDO. They match the Vision's instruments, except that they have blaze orange rather than yellow needles. They have held up perfectly for many years.

It's a very pretty setup. The wiring for a voltmeter couldn't be simpler: you just need a hot wire and a ground. One thing I have found is that the voltage tends to vary in mysterious ways, even when the stator and regulator are new. Revving the engine produces a drop in voltage over
certain rpm ranges, even though there is sufficient voltage at idle.

I also have an indicator LED on my TDM 850 that glows green, yellow or red depending on the voltage. This too shows strange voltage drops during parts of the rpm range.

Following the excellent diagnostics given in the electrexusa.com site, I systematically brought the resistances and voltage drops in the Vision charging circuit within specs. This helped but did not completely remove the strange voltage dips with engine rpm I have always seen with the
voltmeter.

The voltmeter is a great help when the stator is failing, since it gives the warning you need to avoid getting stranded. The rest of the time it should not be too closely examined.

- **Regular voltage check question by QBS**
Thank you for an excellent gauge piece. Could one get the same benefit of impending stator doom warning by doing a multi meter voltage check across the battery terminals before the first ride of the day at say 3500 RPM and keep a mental note of the reading for future comparison., kind of like checking the oil. Battery access is very easy. I realize this a somewhat of a nuisance and won't reveal problems that may happen later in the day, but stators don't seem to fail catastaphically. Rather, they sort of sneak away and before you know it they're gone.
- **makes sense to me by John Logan**
I think your procedure makes sense, but it would be more than I could ever force myself to do routinely. For the '83, a voltmeter in the dash is cheap and easy. Some cost well below $20. For the '82, I'd recommend the LED type -- it's just a little button with a glowing bulb in it, and should be easy to find a spot for. You need a couple of inches of clear space below the mounting hole.

Stators Cooling

- **Stators Cooling by Mark Moreland**
Just found this site. Read a few dozen messages but did not see a suggestion on stator cooling.

I was an REV member about 1990. I obtained several years newsletters. One had a tech tip that suggested adding an oil spray orifice to the bolt in the oil gallery of the stator end of the crankshaft. I recall the orifice was drilled at ~.040" dial, and was counter bored larger to help break up a stream and make the oil sling outwards to the stator.

Does anybody recall this?
- **Red: stator cooling by Chris Arrowroot**
I've seen that fix too, but I can't believe spraying hot oil on the stator would improve its situation.
- **Oil Cooled Stators by Dale**
The Vision's stator is already oil cooled, but the flow is too limited or not even, resulting in the over heating at high Ramps. Increasing the oil flow would help but I have no idea as to how to make sure that it is flowing (in and back out).
- **Possible source for this stator cooling tip**
by John Logan
I do not know whether drilling the rotor bolt helps the stator longevity problem, but I have a clipping from the March, 1984, issue of Rider Magazine discussing a similar fix for the Venture, which is very much like a four-cylinder version of the Vision:

"One of the foremost problems acknowledged by Yamaha has been stator failure. The alternator has been running in an insufficient oil bath, which has caused the stator wires to overheat and short out. Ours failed at 11,500 miles. Most have been giving up at around the 8000- to 10,000-mile mark. In order to lower the operating temperature and increase the reliability of the AC generator, an improved rotor bolt with a 0.7 mm [0.0276 inch -- JAB] oil passage must be installed. This supplies additional oil to the generator area to cool the rotor and stator. An improved [Venture] stator has been designed for '84."

I'd be interested to know if anyone has experience with this type of fix for the Vision or has examined the improved rotor bolt for the '83 Venture. If the latter just has a bore through its center, that should be easy to accomplish. Note that the article's bore is smaller than the value Mark gave. I would be worried about effects on oil pressure -- does anyone have information
about this?
- **response by Jason Morris**
Yes the Venture has a hole drilled thou the bolt but it is larger closer to the crankshaft.A "wire" rests inside the hole keeping it clean and free from blockage.The hole is only about 1/64" at the case cover side.This keeps the volume and pressure high at all times.My '83

venture had the update and was standard '84 on.But you can't use a Venture bolt,the size is completely different.You'll need to have your bolt drilled at a machine shop or do it yourself with a cobalt or titanium drill bit on a drill press.

- **Fix the problem by Jeff Swan**
The problem with the stators is the excess heat created by the corrosion on the connections. The drilled stator bolt was a stop gap measure by Yamaha when stators started burning up. I guess they thought they needed more cooling when the problem was the connection and they knew they couldn't get everyone to clean the connections. I did this mod to my Vision, but that hole is welded up now as I have become better informed. I don't feel it will keep your stator from burning up but will delay the inevitable. I say keep the oil where it can do it's job (in the main and rod bearings) and fix those connections. Use some synthetic oil for cooler running oil tamps if nothing else.

Battery Trivia

Cranking Amps:
Cranking amps is the spec that tells you how much current a battery can produce for 30 seconds at a temperature of 32° F and not have the voltage on any of the individual cells drop below 1.2 volts (7.2 volts for a 6 cell automotive battery). This may also be known as MCA or marine cranking amps.

Cold Cranking Amps:
This is the same test as cranking amps but is done at 0° F. The CCA spec is especially important if you live in a really cold climate. Since the chemical reaction that produces electrical current in the battery slows down as the temperature drops, the battery can produce less current at colder temperatures (especially below freezing). When comparing the current capacity of batteries, make sure that you have some standards to qualify the current ratings. If you see the current rating without CA or CCA, you don't know how the battery was tested and the current rating is virtually useless.

Reserve Capacity:
The reserve capacity is the time that a battery can produce 25 amps at 80° F before the individual cell voltage drops below 1.75 volts (10.5 volts for a 6 cell automotive battery).

Deep Cycle vs Standard Battery:
A normal lead-acid battery will be damaged if it is completely drained (even if it's only one time).
A deep cycle battery is designed to survive being drained multiple times. Deep cycle batteries have more reserve capacity but have less cranking amps for a given size. A standard battery would have more total surface area on its plates when compared to a deep cycle battery of equal size. This extra surface area provides more area for the chemical reaction to take place and therefore produce a higher output current.
The electrolyte in a deep cycle will be a slightly more concentrated sulfuric acid than a standard battery.

Links

These folks were known as Electrex.com. They are the motorcycle stator guru's. They carry new stators for everything including the Vision at about $125.00US and have a full one year warranty.

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