Evan. Ntzios, from Greece, contributed this article on a build-your-own rectifier. If you have any questions, you may find Evan on the SOHC/4 Forums.

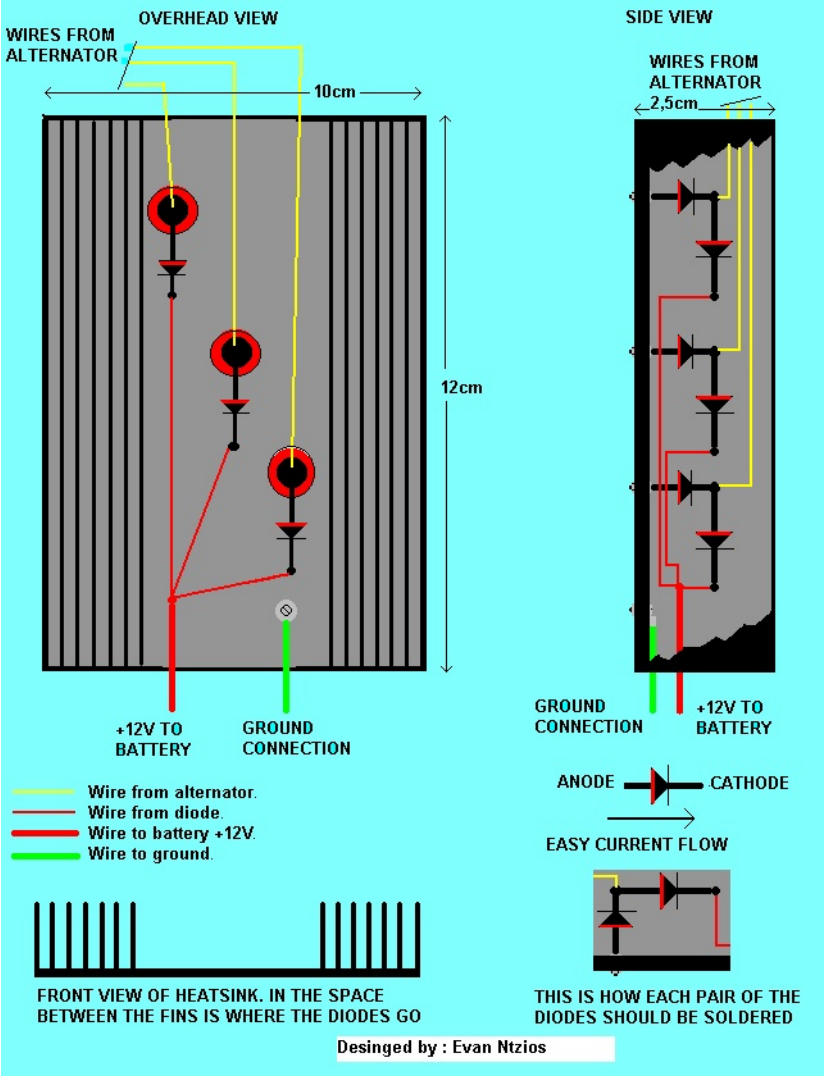
Well about two years ago I changed the ignition on my CB400F to a DYNA-S electronic ignition with DYNA 3ohm COILS, I already had a halogen bulb in the headlight the result was a dead battery. I tried boosting the alt. output by adjusting the regulator. Above 3000rpm everything was fine below that dead batteries. The solution, rewire the alt. for more power. After that everything was perfect, but two days later the battery was dead again. After close inspection I found one of the diodes in the rectifier was "dead". To make a long story short in 8 months I went through 9 rectifiers!! Evan tried rectifiers from bigger bikes, same outcome.

Since I have a little hand on experience in electronics. I decided to see the amps the whole system was drawing from the alt. With everything turned on it was 15amps. I assumed that the diodes in the original rectifier were not up to handling so many amps. The heat build up on the small heat sink was also very big at those ranges of power something had to give.

So I took the decision to make a rectifier to handle all this power with the little knowledge I have. Well it's working now on my bike for over a year through everyday driving (rain, temps from –6C to 42C) from 10 min. trips to the supermarket to 6 hour trips with all the lights turned on with no problem.

Well below you will find everything you need to make one. I would advise a little electronic know how would be very helpful, and like I said I have no sophisticated equipment for my tests just an ordinary ohm meter and a few helpful hints from some friends.

This rectifier will only work on systems that have a 6-diode rectifier. If your system has a 9-diode rectifier, forget it.



PARTS

- ALUMINUM HEATSINK: 12cm x 10cm x 2,5cm cooling fins on the sides (see schematic).
- DIODES 6 pieces: IXYS / DS17 – 04A / 345M the anode side has bolt end with a nut.
- YELLOW WIRE GAGE: Metric 1,310 / AWG 16
- RED WIRE GAGE: Metric 1,310 / AWG 16 Three wires from diodes.
- RED WIRE GAGE: Metric 2,080 / AWG 14 To battery.
- GREEN WIRE GAGE: Metric 2,080 / AWG 14 To ground.
- SILICONE: One that stays rubbery. I use GE silicone.

TOOLS NEEDED

- Soldering iron, a 60watt unit is ideal.
- Ohm meter
- Wire cutters

The biggest problem was trying to find where to place the rectifier on the bike do to its size and to feed it with enough cold air. I eventually put it between the seat and the taillight. It doesn’t look bad especially

if you do a good job filing it with silicone or epoxy.

If you live in a colder climate than I do you could probably get away with a smaller heatsink. The measurements for the heatsink you see above are the minimum for hot climates.

First of all determine where you will place the rectifier on the bike and mark the heatsink where you'll have to place bolts to mount it. I drilled and tapped four holes in the fins for 6mm bolts. While drilling the mounting holes drill the three holes in the open part of the heatsink for the diodes and for the ground crimp (see the schematic drawing).

Bolt the three diodes to the heatsink. Take your ohmmeter, touch the negative probe of the meter on the heatsink and check with the positive probe the diodes. Make sure there is no continuity between them. If you have continuity on any diode, make sure you have them positioned properly or if it's burned out. Two of the eight diodes I bought were burned out from the factory. If you reverse the probes you should have continuity.

Next comes the tricky part. You might need to call on a helper. Not the wife they are terrible at holding things steady while you solder. Ok girls don't get mad it's only a personal opinion based on my experience. Take special care while soldering the diodes, too much heat can damage them. On the top part of the diodes that are bolted up you'll have to solder the other diodes (cathode to anode, see schematic drawing) and the three yellow wires from the alternator. Make sure you leave enough yellow wire to reach the alternator socket. They should end up like a T from the side. To make the soldering easier I bolted an eyelet crimp on the diode and soldered it the other diode along with the yellow wire.

Check for continuity again. Place the positive probe on each end of the yellow wires and the negative probe on the other end of the diode that's connected to the wire, you should have continuity. Reverse the probes and you should have no continuity. Next place the negative probe on the heatsink and the positive probe on the yellow wires and on the ends of the diodes alternatively, you should get no continuity.

Next cut three small pieces of the red wire (gage Metric 1,310 / AWG 16) long enough to solder one end to the cathode side of the diodes and the other end to crimp and solder all three together with the red wire that will go to the battery, within the confines of the heatsink.

Check again for continuity as before but this time placing the probes on the red wires. Take special care that the red wires don't come close to any part of the heatsink or diodes.

Now crimp and bolt the green wire (ground) to the other hole you've drilled in the heatsink.

Check again for continuity. If everything checks out fine you are ready to test the rectifier on the bike.

Unplug your old rectifier and using the appropriate crimps plug the new one its place. Before you hook up the three yellow wires to the alternator block connect the red wire to the battery.

DO NOT CONNECT THE GROUND WIRE OR TOUCH THE RECTIFIER TO THE BIKE.

Turn your ohmmeter to the DC volt range, ground the negative probe to your bike and with the positive probe check that you have no electricity at the yellow wires or on the heatsink or ground wire. If everything checks out fine connect the three yellow wires to the alternator block and the ground wire to ground. Start the bike and check the voltage and amperage at the battery terminals. The readings should be identical or better than the manual.

If everything checks out, shut off the bike unplug the rectifier. Now it's time to fill in the open part of the heatsink where the diodes are. I filled it in with silicone. This way if (God forbid) any diode burns out I'll just dig into the silicone and change the diode. I used General Electric silicone it stays rubbery with superior strength. It is also clear and the rectifier looks really nice with the diodes and wires showing through the silicone. If you want you can use epoxy too. If you use silicone let dry for atleast 5 days before you use it. That's it you're done.I would like to say just one important thing. If you don't fully understand the whole procedure don't try it. It sounds and looks easy, but if something is not connected properly an electrical fire is just around the corner. I don't want to be held responsible for something like that.

From the Comments to this article:

"This is a terrible way to make a rectifier. Three of the six diodes are on the heatsink (this is good) and the other three are floating in silicon rubber, a good thermal insulator (this is unacceptably bad). All 6 diodes need a heatsink. If you must use discrete diodes you can get insulating washer kits for the studs and mount them all on the heatsink. This is risky as 3 of the the diode cases and studs will be at battery "+" with no fuse... and a slipped tool may get really exciting. You could insulate these parts with silicon rubber I suppose, the heat will still get to the heatsink at least.
The vastly better way to do this is to purchase an encapsulated diode bridge and bolt it to a heatsink: these universally come with insulated cases. Single phase bridge units are easily available and quite cheap, a 35A unit should be less than $10.00. You need two of these (connect the "+" and "-" together, the yellow wires go on any three of the four "~" terminals available) or there are 3-phase units available less readily (not at radio Shack but Allied, Mouser, Newark etc have them online). You need a heatsink still - not huge - and if you put a vinyl sleeve or heatshrink over the spade terminals connecting to the bridge itself the "live" bits will be fairly well protected. Using discrete axial lead diodes is also possible if you glue them to a heatsink with thermal epoxy. The maximum amp rating for axial lead diodes is quite low though - I haven't seen any over 10A. The only good approach, if you don't want to use a stock rectifier, is to use the encapsulated bridge assembly."