Power up

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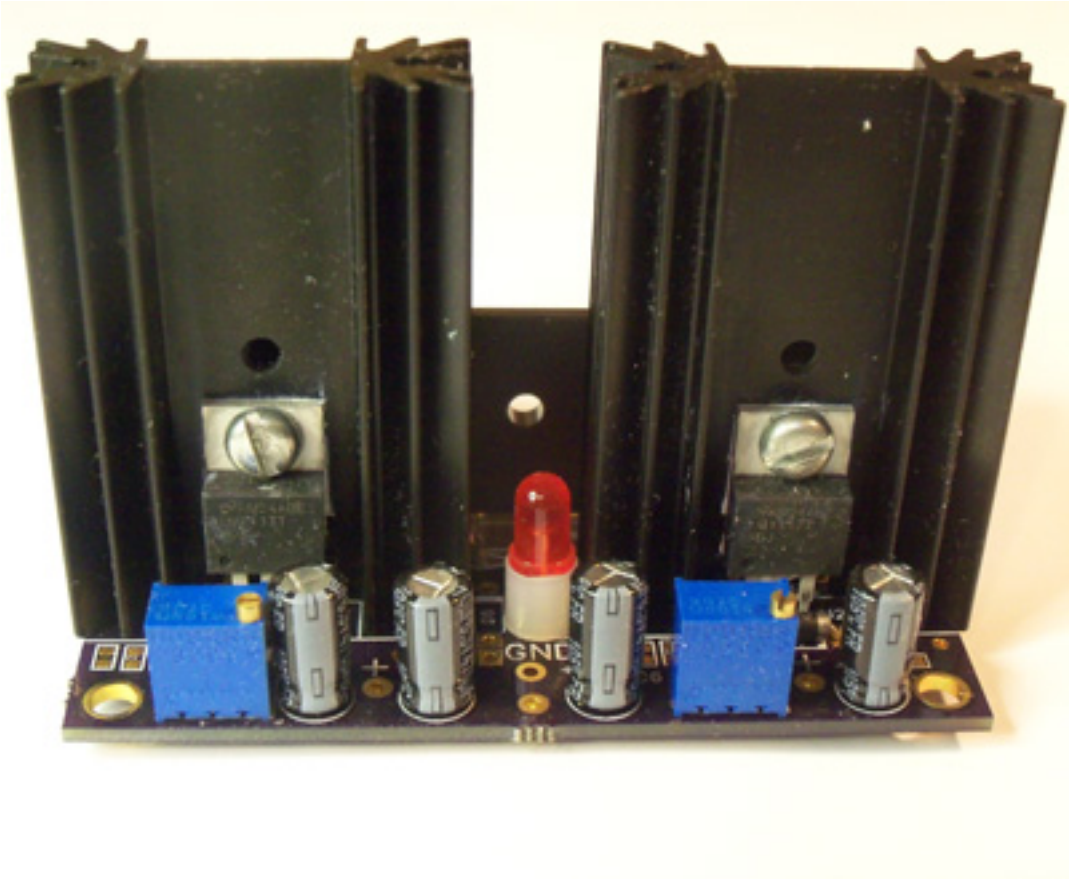
 As the weeks and months go by, I am going to be doing a number of hands-on projects. OSH Park [1] will be making boards for those projects available for those of you who want to build something. But it does no good to build something if you don't have power to power it. So the first item on the building agenda is a +5 volt and a +3.3 volt power supply which can deliver 0.8 Amps at each voltage. I also have a positive and negative power supply board in the works for the analog side of things.

You can find the schematic, a parts layout, and parts list at Space-Time Productions [2]. You can order the board for this project at Dual Positive Power Supply boards [3] for $12.45 each.



I chose a linear supply because if they are sufficiently filtered, they are usually quieter than switching supplies. Power-supply noise rejection is at a maximum for most linear regulators below 200 Hz. I also decided on an adjustable supply so you can run the supplies a little "hot" if you like. Digital circuits usually perform better when run at the high end of their allowable range. I like 3.40 volts for the 3.3 volt supply and 5.15 volts for the +5 volt supply. The supplies can be adjusted plus and minus 1 volt (roughly) from nominal with the resistor values given in the parts list and schematic. Be sure to adjust them before you connect any semiconductor loads. Semiconductors do not like voltages that are TOO high. Of course, you can change the resistor values to suit whatever voltage you want. Be sure to change the other components accordingly. You can also use an LM317 instead of the LM1117 called out - but your power losses will be higher since the LM1117 is a low drop out (LDO) regulator, and the transformer has been called out accordingly. You can go to higher output voltages with the LM317. Check to see how that affects the amount of current you can draw and what transformer you will need. Likely, it will be less than the .8 Amps the LM1117 allows because of heat sinking limits even though the LM317 is rated at 1.5 Amps or about twice the current of the LM1117.

Another point of interest or caution: When you order a transformer, make sure it can deliver about 2X or more the AC current relative to the DC current you plan to use. This is because a capacitor input filter draws current from the line in pulses. Thus, the heating value (RMS) is higher than just feeding the AC current into a resistor. Let me illustrate that with the present supply. The two regulators are designed to draw .8 Amps apiece. That is 1.6 Amps total. The AC transformer should be rated at 3.2 Amps. But since we are using a center tapped design, the transformer need only be rated at 1/2 that. So a 12.6 volt transformer rated at 1.6 Amps or above (a 2 Amp rating is common and the transformer will run cooler) will

allow full current output from both the +3.3 and +5 supplies. I used a 4 Amp-rated transformer since I plan to install 2 power supplies in the chassis I have - do watch out for ground loops since the supplies will have a common ground if you use one transformer for two supplies. But that is a subject for a whole 'nuther day.

I must add here a note of thanks to my local electronic parts supplier, Jaytronics [4]. There is only one supplier of note in a town as small as mine and they are it. Jaytronics had some essential parts that helped me finish the project in a timely fashion. The counter guy, Andy Hanson, has been in the electronics business a long time. We got to talking about this and that and the price of solder came up. We both lamented that a pound of solder, which used to go for $10 for a one-pound roll, now runs $35. Fortunately, surface-mount parts (which is what I use mostly these days) take a lot less solder than plated through-holes.

You can read more about assembling the power supply and find the schematic, a parts list, and a printed circuit-board, parts-placement drawing so you can roll your own at Space-Time - Power Up [2].

M. Simon's e-mail can be found on the sidebar at Space-Time Productions [5].

Engineering is the art of making what you want from what you can get at a profit.

Links:
[1] http://oshpark.com/
[2] http://spacetimepro.blogspot.com/2012/10/power-up.html
[3] http://store.oshpark.com/collections/space-time-productions/products/stp-dpps
[4] http://jaytronics.com/
[5] http://spacetimepro.blogspot.com/