

Re: Dual Power Supply

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Thanks everybody! I have the answers I needed. Unfortunately it means that I have to do a bit of redesigning - especially the short circuit protection. I have to make sure both rails are clamped down as soon as the current exceeds a maximum of 2 amps on any one of the rails. As per Chris's suggestions - I am going to improve on this circuit later. Looks like I need to look around and decide on which regulator (or maybe use op amps) is the best for my application.

Thanks
Roy

Chris wrote:

Ramendra S Roy wrote:

Hi!
I have been trying to make a +15 0 -15 regulated power supply. I have been using a pair of LM 723C with TIP 3055 and TIP 2955 (I think I have the correct number here) as the pass transistors (NPN and PNP) for the +ve and -ve sides respectively. I am interested in a dual supply which can supply up to 2 amps with high regulation and as low ripple as possible.

The question is - are there resources which explain the use of the 723 in detail? Can I make sure that the +ve and -ve rails are at the same level from 0? Do I really need 2 723s? Lots of questions I know. Many thanks to anybody who can help me even on one of the questions here!

Thanks
roy

Hi, Mr. Roy. The data sheet of the LM723 (referenced in Mr. Popelish's

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post above) shows a lot of what you need. Look at the schematic in Fig. 4 for your basic circuit.

Unfortunately, the current limit and current foldback don't work with a negative supply. So your best shot might be to use two 16VAC, 4 amp transformers, and have both of them feed bridge rectifiers and mongo filter caps (think at least 20,000uF). You can then have two separate trimmer pots to trim voltages to be identical, and tie the negative of one LM723 15V regulator to the + of the second 15V regulator. You can call the junction 0V, and there's your +/-15V supply. Use two 1N5402 barrel diodes at the outputs to protect against reversing voltage.

The term describing a dual +/- power supply where the magnitude of the negative voltage stays the same as the positive voltage is "tracking regulator". A good tracking regulator will have both supplies tracking (usually the positive supply is the master, and the negative the slave), so the negative supply will even compensate for output variations in the positive supply with loading or line power variations.

If you're interested in doing this, It's possible to make a +/- tracking regulator with two 723s and several op amps, but it's pretty complicated.

A very simple home-brew tracking regulator can be made with an LM340-5, an LM320-5 and an LM1558 dual op amp as shown in Fig. 17 of National Semiconductor AN-103

<http://www.national.com/an/AN/AN-103.pdf#page=10>

This is good to the current limit of the LM340 and LM320. You can use the tricks in Fig. 6 and Fig. 10 to bump up the maximum current on one or both supplies with a pass transistor, and to set short circuit current limit with a current sense resistor. It tracks from +/-5V to +/-15V. You can use two LM741s instead of an LM1558 if you want, and tweak the offset adjust on one of the op amps, or better, introduce a DC offset voltage to the feedback to compensate for differences between the + and - voltage. Post again if this is of interest.

A very simple ersatz 1 amp +/- 1.25 to +/-15V regulator can be made with an LM317, an LM337 and a dual 1.5K ganged pot. Tweak differences in reference voltage by adding a few ohms to one of the 120 ohm resistors. Also, you can make an ersatz 2 amp dual regulator with two ST Semi L200s and a dual-ganged 10K pot. These aren't technically

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tracking regulators, because the negative supply won't track voltage droop caused by line or loading, but it should be OK for most applications. The latter is described in Fig. 21 of the ST appnote "A Designer's Guide to the L200 Voltage Regulator".

<http://www.st.com/stonline/products/literature/an/1678.pdf>

The L200 can crank 2 amps, and no extra op amps are required. Later in the appnote is a more complex circuit that will track for you. This circuit goes from +/-2.85V to +/-15V. Obviously, use TO-3 packages for all transistors and power ICs.

The best thing is to make something easy that will do the job, and get in the game. And be sure to get massive heat sinks, and get a good fan. Two amps on both + and - linear supplies will mean up to 80 watts of heat to dissipate.

Good luck
Chris