

Mezmerize is a DC-coupled B1 buffer with symmetrical shunt-regulated power supplies, six inputs selected by relays, and provision for an on-board pot.

Hypnotize is identical to Mezmerize, except that it has no input selector relays, and no provision for an on-board pot.

The following is basically a compilation from the threads with the author's name under the comments. To help you build your PCB...

1. WHAT RESISTANCE VALUE POT SHOULD BE USED?

I forgot to mention that I used 10K Alps Volume pot (do I have to change it to 20K as originally recommended?)

kannan_s

20k will be easier on your sources. Sweet spot value for being drivable enough and good on what DCB1 likes to see.

Salas.

Is it also possible to go outside those values, eg a 50K ALPS??

I can get an 20K ALPS, but at 2 times the cost of a 50K. (different shop, different prices.....)

cHoc

Don't. It will work but we don't want such impedance. It will hinder the quality you can attain. In any case if you must, you should make the 220k resistor a 520k one.

No changes if you use the Lightspeed and it is between 10-20k.

If with no pot, you should change the 220k down to 22k across the input. You can parallel 22k-27k underneath pcb at the 220k and take it out later.

Salas.

NOTE: For correct orientation of the pot see:
<http://www.diyaudio.com/forums/showthread.php?p=1934234>

2. MATCHING THE LED STRINGS

Your goal is 9V total for Vref string and 5.4V total for CCS string.

So match your Vref strings by testing your leds with 5-6 mA.

One 9V battery, one 1k resistor on +, led from 1k to -, measure Vdrop across led, put em on a piece of paper, note Vdrop under each one, make two comparable VdropTotal strings.

Salas.

Note 1: The Vref string is the string of 5 LED's, the CCS string is the string of 3 LED's.

Note 2: 3mm LED's with 1.8V forward voltage are specified in the BOM. If your favourite choice of LED is 5mm they will need to be raised 5mm (1/4") or so in order to fit.

3. MATCHING THE 2SK170BL PAIRS IN THE B1 BUFFER

The FETs and BJTs do not need to be matched.

All you need are two pair of B1 FETs (one pair/channel) that have similar Idss.

The B1 buffer has two jFETs, the 2sk170.

They run at roughly Idss.

Select the pair to have similar Idss and the lower run then biases the upper one.

That's all that is required.

AndrewT.

Note: a simple method for "matching" the 2SK170BL that may be good enough for the purpose:

http://www.diamondstar.de/transistor_matching_jfet.html

Pairs in the 8 to 10mA Idss region are preferable. By matching the Idss within a pair, the DC offset will be closer to minimum.

4. BUILDING TIPS

PCB pics:

<http://www.diyaudio.com/forums/showthread.php?p=1937486>

Overlay1:

<http://www.diyaudio.com/forums/showthread.php?p=1909777>

Overlay2:

<http://www.diyaudio.com/forums/showthread.php?p=1921296>

Note: These are overlays for the proto PCB's, the new production overlay was changed slightly to help the builder. The basic PCB and track layout did not change, except that the resistor and LED pads were enlarged.

Schematics:

<http://www.diyaudio.com/forums/showthread.php?p=1932001>

That (power) led is supposed to go to the front panel.

Salas. (Note: the LED near the LM7812 reg)

- use 7812 voltage regulator only, even for 5V relay use and then use Resistors (2 x 600 Ohms) to drop the Voltage down to 5V for relay coils. (Note: 2 x 600 ohms for Hypnotize and 2 x 300 ohms for Mesmerize).

5. HOW TO KNOW IF THE CIRCUIT IS WORKING PROPERLY

In general, if its not noisy, too hot, or having high DC offset, and the +reg is 3% more on average for matched leds on both banks and between them, plus side R5 has more mV than neg side, is good to go.

Salas.

1. See that you have $2V \pm 0.3V$ across R1 combinations. That says the shunts CCS currents are normal.
2. Check that you hear the output relay clicking one time 3-4 seconds after power on.
3. See that you have less than $\pm 5mV$ DC offset on the audio outputs.
4. See that you have +Vout a bit more than - Vout.

If all of the above are OK, connect to stereo. Check for ground loops. If the background is silent, play some music.

Salas.

DaveM it looks great. 0.5v difference between the sides seems to be normal for this build so you are in spec with that. I too find my 1st set of FETs run a bit hot I put some small sinks on them and they seem happy now.

billyk.

Check all LEDs light up when powered (if there is a fault some LEDS will not light up - my experience in building this)

Once powered check whether there is a click sound after 5-7 seconds delay on powering up. This indicates relay is working correctly. Measure Voltage across the Diode fitted across relay coil for knowing the voltage. If not, something to be corrected on switch on delay circuit.

Everybody is getting similar 10.9V and -10.5V range ie one side is about 0.5 V higher than the other leg - it does not affect buffer offset. Also the Mosfet can be held for 5 seconds without pulling out - you do not need heatsink for functioning. However placing a heatsink does not do any harm either. It is good to go -

kannan_s

Measure your DC offset at the output. If under 5mV, leave it as it is. Depending on the B1 jfet match, some reg assymetry is beneficial, as it offsets the offset. If the output DC is more than 5mV, you can give more voltage by substituting stronger Vf led(s) in the opposite supply. I.e. If your offset is +5mV you want to make the negative reg Vout stronger. If over -5mV, do the opposite. I could get it down to absolute zero that way. But guess what, it amounts to absolutely nothing. Not safer, no better square wave, or any better sound. If you got DC audio

out offset in the +/-5mV range, just drink a beer. Forget it.

Salas.

You will always check the drop across the R1 you calculated for use. $I_{R1} = I_{CCS} = V_{drop} R1 / R1$. That will be your experimental confirmation if you look to alter the current for any use, or relax a bit some excess if your leds batch is high and/or Mosfets batch Vgs low.

Salas.

6. BOARD SIZE AND OUTPUT IMPEDANCE

Hypnotize basic board is 127X68.58mm

Mezmerize is 197.49X68.58mm

Output impedance: Has a 220 buffer resistor +30 to 40 2SK170BL internal = 250-260 Ohm output impedance and Idss current drive capability. 8.5mA BL mean average in my zip bag.

Salas.

7. NOTES ABOUT USING THE HYPNOTIZE AS A SYMMETRIC SHUNT ONLY

There is a thread for this here:

<http://www.diyaudio.com/forums/power-supplies/153484-using-hypnotize-general-shunt-reg-pcb.html#post1952317>