

LittleBear P5-1 Blue, Version 1.3, Line Amplifier

May 2017

Version 1.3 is apparently an improvement over version 1.2. The power supply is now a “wall wart” with a 12 VAC output at 600 mA or 1 A (according to the online specs). My P5-1 came with a 600 mA supply which works very well. My Blue Little Bear is pictured below. I added rubber bumpers at the bottom four corners so the screw heads wouldn’t scratch whatever surface I placed the amp on.



The yellow dot is to set the amp to unity gain (0 dB) which can be useful for a line amp.

As suggested by several online blogs, I replaced the original vacuum tubes with a pair of closely matched JAN 5654Ws from Riverstone.



AMPLIFIER CIRCUIT

Page 3 shows the amplifier circuit diagram. The dual volume control is also the on/off switch. At minimum on (fully CCW) the output voltage is very low – it's a good attenuator. Unity gain is reached at about 2:00 PM, the yellow dot in the above photo. Maximum gain is about 7 dB with the volume control fully CW.

Although the tubes are pentodes, they are triode connected with the screen grid tied to the plate. This is a simple circuit but it has very good bandwidth, low distortion and low noise but at the expense of fairly low gain. But it is just a line amp and works very well.

The tube heaters are connected in series and DC powered for lower hum and noise.

POWER SUPPLY CIRCUIT

The power supply diagram is included on page 4. It uses a pair of voltage doublers to get about ± 28 VDC from the 12 VAC input.

The dual transistor circuits are capacitance multipliers which multiply the 470 μF ** capacitors by about the beta of the series transistor. The resulting power line ripple is so low that it's lost in the noise. The 60 Hz peak shown in the distortion graph on page 5 is amplified power line pickup. It is not caused by power supply ripple.

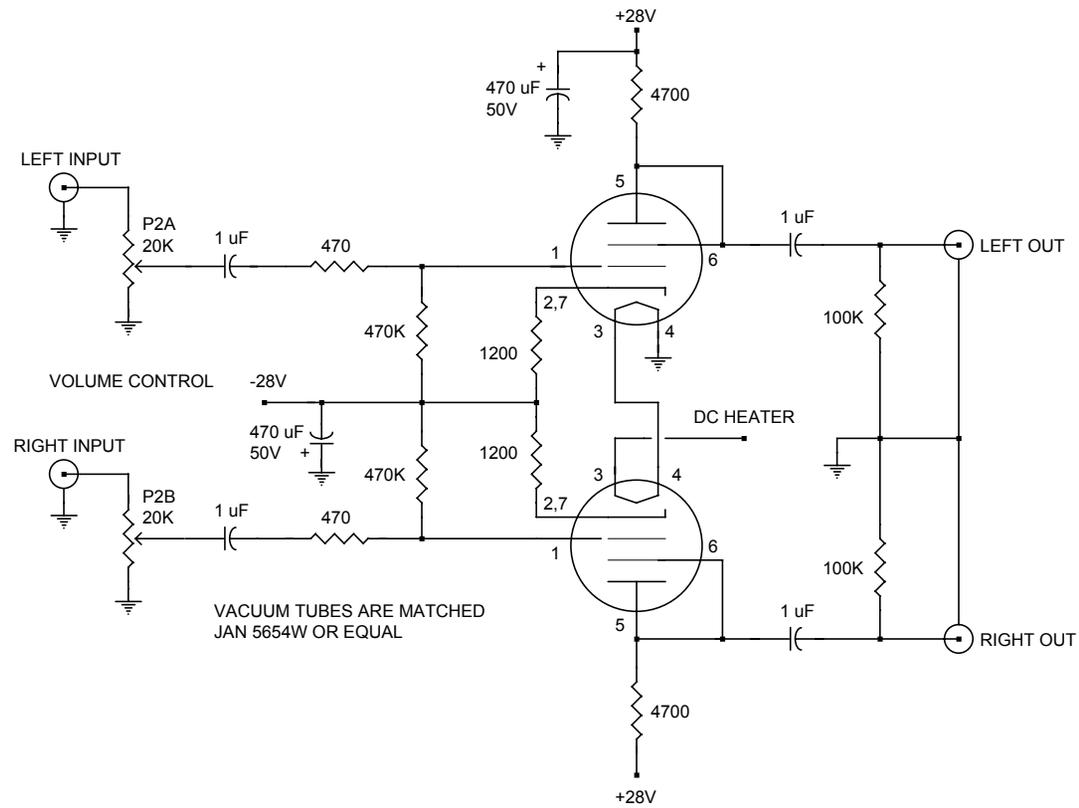
FREQUENCY RESPONSE

The frequency response graph at max gain is included as page 6. The two channels are matched to about 0.5 dB which would not be an audible difference for most people.

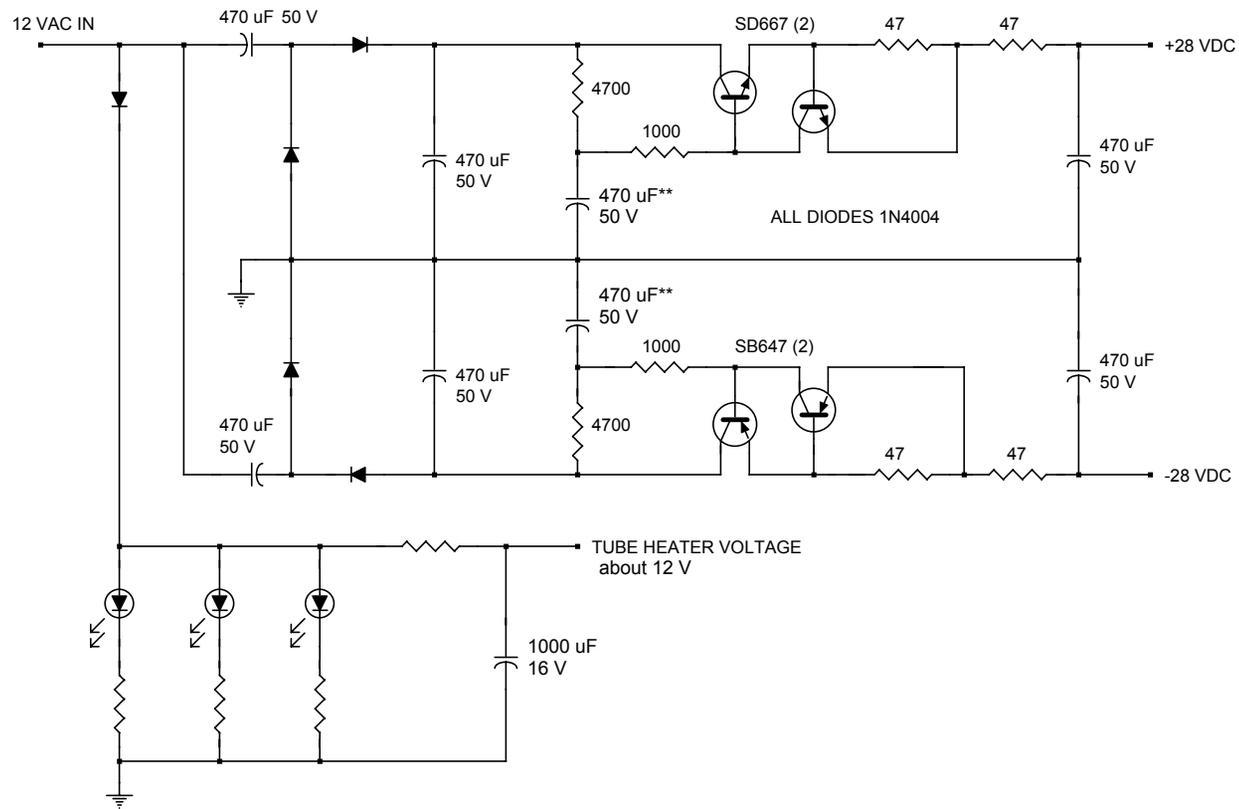
Positive peak distortion starts to become noticeable for an input voltage of about 2 VRMS at max volume (max gain).

CIRCUIT BOARD PHOTO

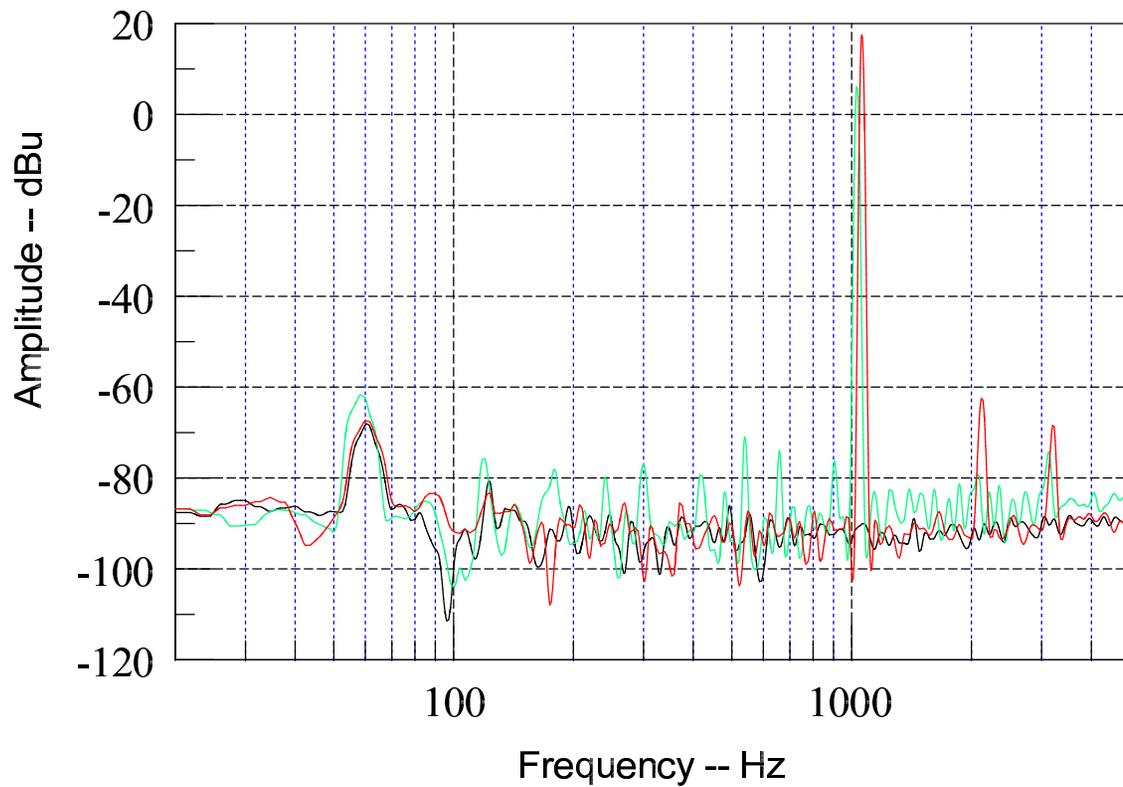
The photo on the last page may be for version 1.2 because it does not exactly match the board in my version 1.3 amp. However, it may still be a useful reference.



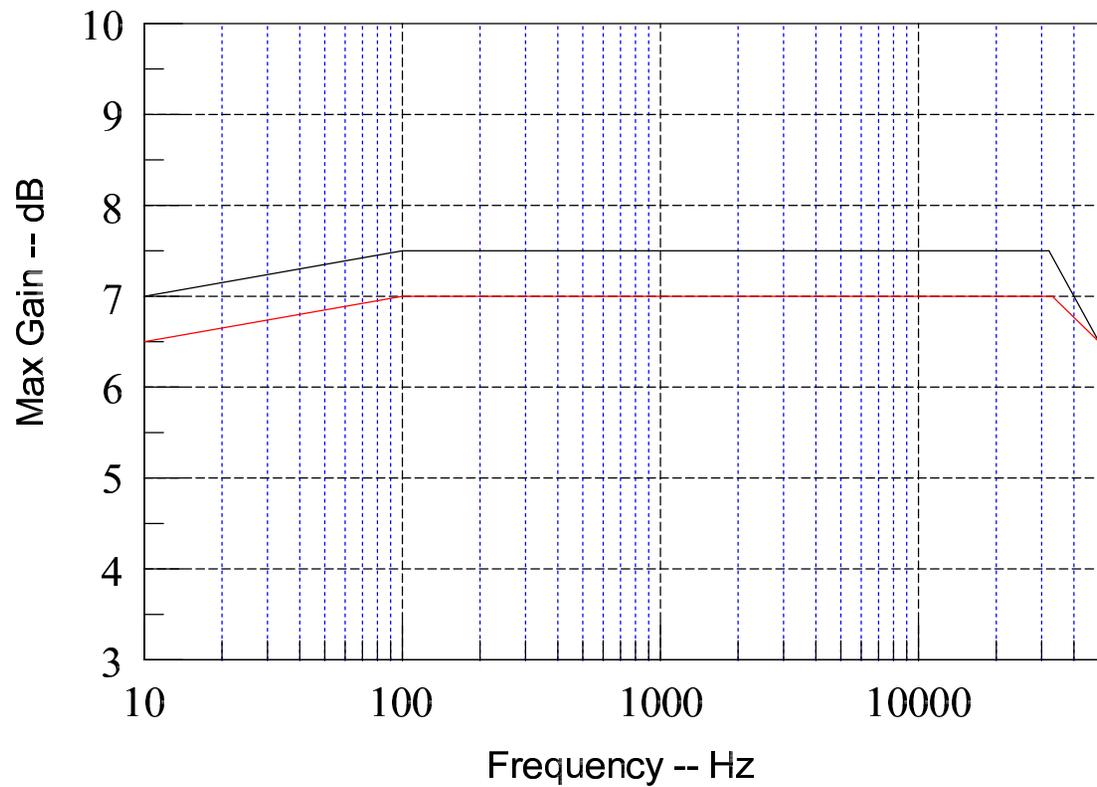
LITTLE BEAR P5-1 AMPLIFIER VER 1.3 CIRCUIT DIAGRAM



LITTLE BEAR P5-1 POWER SUPPLY -- Version 1.3

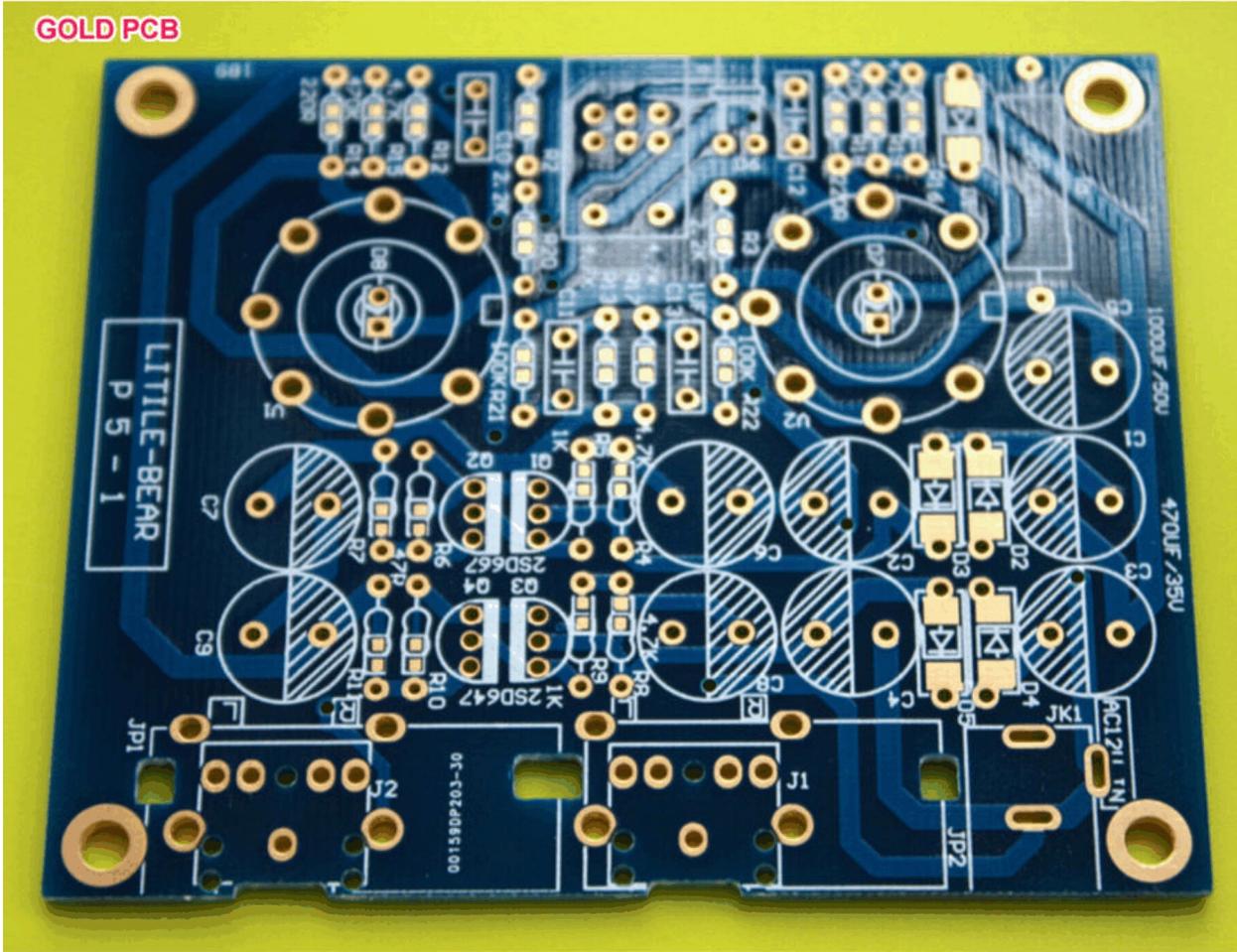


Little Bear Amplifier Distortion -- 1000 Hz input
Black line -- noise floor, max volume
Green line -- unity gain
Red line -- max volume, +7 dB gain



Little Bear Amplifier Max Gain. Volume control fully CW.
Black line is left channel and red is right channel.

GOLD PCB



The Little Bear Blue P5-1 circuit board shown here is enlarged to better show the detail.