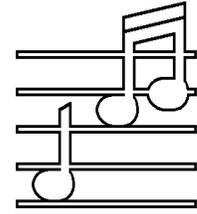


AUDIO BASICS



A MONTHLY NEWSLETTER OF AUDIO INFORMATION
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The Headphone Amplifier Kit - And More!

Because of your interest, we are continuing with the other versions of the new low cost easy do-it-yourself kit. This month we feature the Ω mega II Headphone Amplifier. Note the PFT chassis we specify is available from Allied Electronics (make sure you order the side panels too - they are not part of the basic PFT box package). If you order the whole kit from us you get everything of course. A closer look at our costs, combined with parts procurement in larger quantities, has allowed us to make a reduction in the price of the kit (any version) to \$195 - or \$250 factory wired (plus \$10 shipping in the continental USA). We are refunding the difference for those that ordered at the higher price. The Phase Inverter version will follow next month.

But First, A Significant Low Cost Super Pas Three Upgrade

This improvement is so cost effective that it is scary. It comes from a suggestion by one of my clients, an inquisitive electrical engineering student named Mithat Konar.

A limitation of a vacuum tube preamplifier is the fact that the vacuum tubes circuits are single ended and operate at high voltage levels. Because there are no complimentary N Channel and P Channel vacuum tubes, one cannot build a true balanced direct coupled circuit in which output and interstage capacitors are eliminated. The high voltage vacuum tube circuits must be isolated with coupling capacitors or transformers.

For good low frequency response into low impedance loads, the output coupling capacitor must be electrically large. At the same time, because the circuit operates at high voltage, the capacitor must have a high voltage rating. With solid state circuits running at a few volts, it is easy to select a high quality, high capacitance part at a reasonable price and of a reasonable size to fit on the circuit board. With vacuum tube circuits this isn't as easy. High voltage means a much bigger (and more expensive) capacitor and you start running out of capacitance sooner than you would ideally like.

At the time the Super Pas Three was designed, we selected the largest 250V high quality film capacitor that we could reliably source - a 2.2 μ F at 250V Panasonic E Series part from Digi-Key. This part is used as the last high voltage coupler in the line section and as the output coupler in the phono section. It has worked very well in this application, allowing good bass response into 10K Ω loads and good linearity of the line section feedback loop. We have used it for several years with the excellent results many of you know about first hand.

Recently, Panasonic introduced a complete new film capacitor series, the EF series. This series follows the general trend in capacitor design, namely higher volumetric efficiency (more capacitance per volt in less space). This is a trend that makes electrical

designers happy because circuit board real estate is expensive and when the part uses less space, the cost effectiveness of the design gets better. We noted the new EF series design specifications when they starting shipping over a year ago and have incorporated many of these more compact parts in our new designs.

What we missed is that recently the EF series was expanded, including now an 8 μ F and 10 μ F at 250V part in a case size the same as the previous generation 2.2 μ F/250V part. What Mithat called to our attention was that the new part appeared to him to be an improved choice for the last line section high voltage coupler in the Super Pas Three.

We reacted immediately and ordered sample parts, installed them, and ran careful bench tests. The measured results were interesting. With the larger coupler installed in one line channel only, there was essentially no difference between the two channels when measuring at the output of the preamp into a 10K Ω dummy load with a sine wave at audio frequencies. This is a standard EIA test that as usual gave no useful results and only "proved" again that all preamps sound the same. But, when we started looking inside the feedback loop with low frequency square waves as a source, the differences were obvious. The channel with the larger capacitor in its feedback loop showed major improvements. The error correction signal dropped 6dB and became a much closer mirror of the desired input. In other words, the vacuum tube had to do much less work. The subsonic bass response extended without any signs of instability (the calculated stability is improved) and the preamp became more linear into difficult loads. This was likely worth listening to.

The subjective evaluation was spectacular. Using an Ω mega II 400 amp and a set of Matrix 801 Series Three speakers it was immediately obvious that the bass extension, definition, and impact was a whole bunch better. *More surprisingly, the big improvement in dynamics was wide band!* This deserved a two channel evaluation. Both channels were made identical and now the Super Pas Three comes very close indeed to the range and impact of our solid state and hybrid preamps. Of course with the Ω mega buffers it is even better yet.

All you have to do is locate the two 2.2 μ F (or 2.7 μ F) 250V film capacitors in the line section and replace them with 8 μ F or 10 μ F 250V EF Panasonic film capacitors. (The phono preamp output capacitors are not inside the feedback loop and are not helped by being made larger). If you want us to do it, the cost is just \$35 including return shipping in the continental USA. It will be the nicest \$35 improvement you ever made to your audio system. As usual, you can call us for help and for sources for the parts if you want to do it yourself. The Super Pas Three rebuild kit has been upgraded to include the new parts. Too bad *Stereophile* dropped it because they had not heard it recently! After all, I did rebuild their preamp for them. They could simply take it out of the closet and listen again—or better yet send it back to us for the enhancement. We hope our other Super Pas Three owners follow through a bit better. You will be very pleasantly amazed.

Used Equipment

Mos-Fet 150B Power Amplifier in a good Dyna St-150 chassis for just \$275! The price is low because the amplifier dates back several years but it working as good as new. We ran it for several days and smiled to remember how nice (and rugged) our original mos-fet amp designs have always been. Use it now as is, and later it can be upgraded to an Ω mega II 240. Add \$15 for shipping in the continental USA. 90 day parts and labor warranty.

We got an original Dyna St-150 chassis for \$25 and it is yours for \$25 too – if you pay for an Ω mega II 240 circuit set and a new AVA black faceplate for it. You save \$125 over the price of a complete new Ω mega II 240 and get a complete new two year parts and labor warranty too. It is in decent cosmetic condition and the circuits and the music will be all new and beautiful. Add \$15 for US shipping.

The Ω mega II Headphone Amplifier Kit

The Audio by Van Alstine Ω mega II Headphone Amplifier kit provides you with all of the parts and instructions necessary for you to assemble your very own complete new state of the art solid state headphone amplifier.

These instructions are a supplement to the Ω mega II Line Preamp kit instructions published in the August, 1992 issue of *Audio Basics*. You must have the Line Preamp instructions available as only the non-redundant changes and additions are given here.

Factory Support and Free Bench Checkout.

Same as line preamplifier.

Limited Warranty.

Same as line preamplifier.

Check Out All the Parts First.

Same as line preamplifier.

An Overview of the Rebuild Project.

Essentially the same as line preamplifier except that a headphone jack replaces the DPDT switch.

Mechanical Assembly of the Back Panel.

Essentially the same as line preamplifier except that only two RCA phono jacks are installed. Use the headphone amplifier back panel drill template.

Mechanical Assembly of Front Panel.

Essentially the same as line preamplifier except that a headphone jack (lugs up, washer on inside of panel) replaces the DPDT switch. Use the headphone amplifier front panel drill template.

Preparation of main chassis.

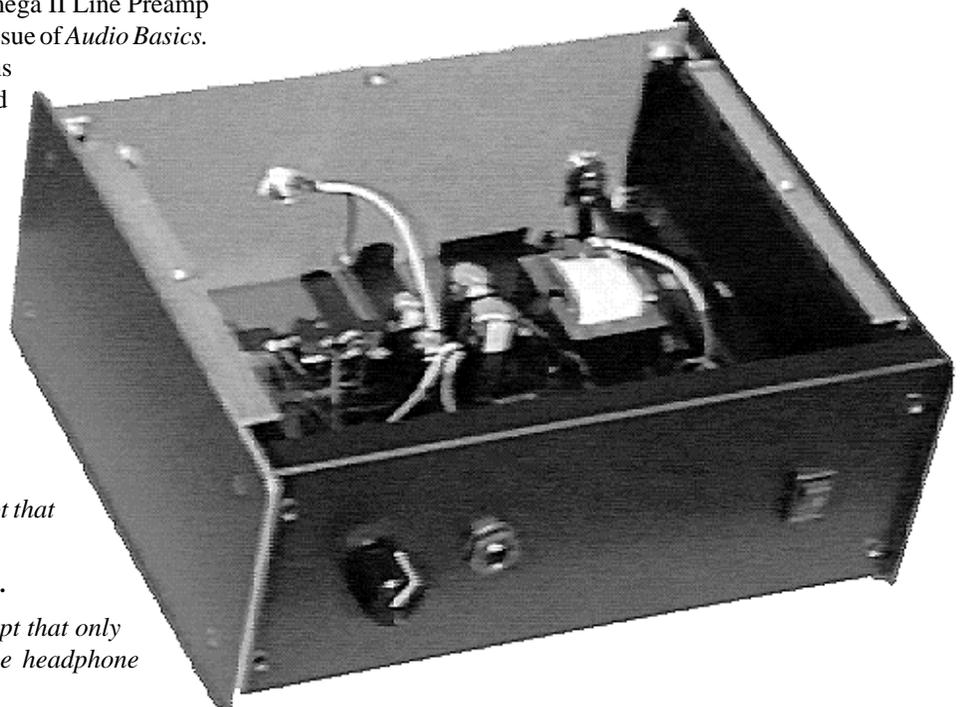
Same as line preamplifier.

Assembly of the PC-392 Circuit Board.

Refer to the *Headphone Amplifier Board Stuffing Guide* and the PC-392 Circuit Board section of the parts list herein and prepare to assemble this main circuit board.

Refer to the line preamp instructions for general guidelines.

1. Install the 6 diodes in their indicated locations on the board (one set of four 1N4007 power supply diodes near the transformer location and one set of two 1N4744A zener diodes near the supply capacitor locations). Note that each diode has a banded (marked) end. Each diode must be installed with the banded end pointing in the direction indicated on the placement guide.
2. Install the zero ohm jumper (small tan body with centered black strip) in its location as shown on the board.
3. Install eight 0.5 watt resistors (two 1.5K, two 4.7K, two 100K, and two 1M) on this board in the locations indicated flush against the board surface. *Place each resistor with the four digit value marking facing up so you can read it when the resistor is on the board.* If you cannot read the values later, it makes finding and correcting mistakes nearly impossible. Make sure each resistor goes in the correct place. Mixing them up will damage the circuit operation. The holes for the leads are all 1/2" apart (the first bend if you have a standard resistor lead bending ladder available). Make sure you do not block the mounting holes for not yet installed parts while soldering. If you do flow solder across and block a pad, careful use of a round wood toothpick and your solder pencil will clear it. Caution, excess heat or force can damage the foil traces and lift pads from the fiberglass board.



solder connections on the foil side to tidy up your work and make bad joints and solder bridges easy to spot and correct.

13. Install the two AD843 integrated circuits in their sockets on the board. The marked end of the IC points towards the nearest end of the PC card (aligns with the marking on the pictorial and the socket). Inspect to insure that no leg folded over or missed the socket. If in doubt use a small screwdriver between the IC and the socket to lift it up and out, gently straighten any bent legs, and try again.

Pre-wiring the PC-392 Board.

It is necessary to install eleven wires on the circuit board before placing it in the chassis as the foil side is not easily accessible afterwards.

The wires are installed from the component (top side) pointing up and are soldered on the foil side. After soldering trim excess lead on the foil side so it cannot touch the chassis bottom when the board is installed.

We have specified wire lengths. The lengths will be slightly on the long side (only the Red Cross has a wire stretcher) so they can be trimmed to fit neatly as desired.

Be careful not to nick the wire when stripping off about 1/4" of insulation. Nicked wires may break off later.

1. Prepare five white wires (two 4", one 4.5" and two 6"). Refer to the Pictorial Diagram and solder one end to the board at the appropriate locations as shown.
2. Prepare three red wires (one 4.5", one 6.5", and one 7"). Refer to the Pictorial Diagram and solder one end to the board at the appropriate locations as shown.
3. Prepare three green wires (one 4.5", one 5", and one 5.5"). Refer to the Pictorial Diagram and solder one end to the board at the appropriate locations as shown. Note that the 5" green is soldered to the top lead of the 6.8K resistor instead of directly to the board.

Chassis Bottom Panel Sub-Assembly.

Same as line preamplifier.

AC Power Wiring

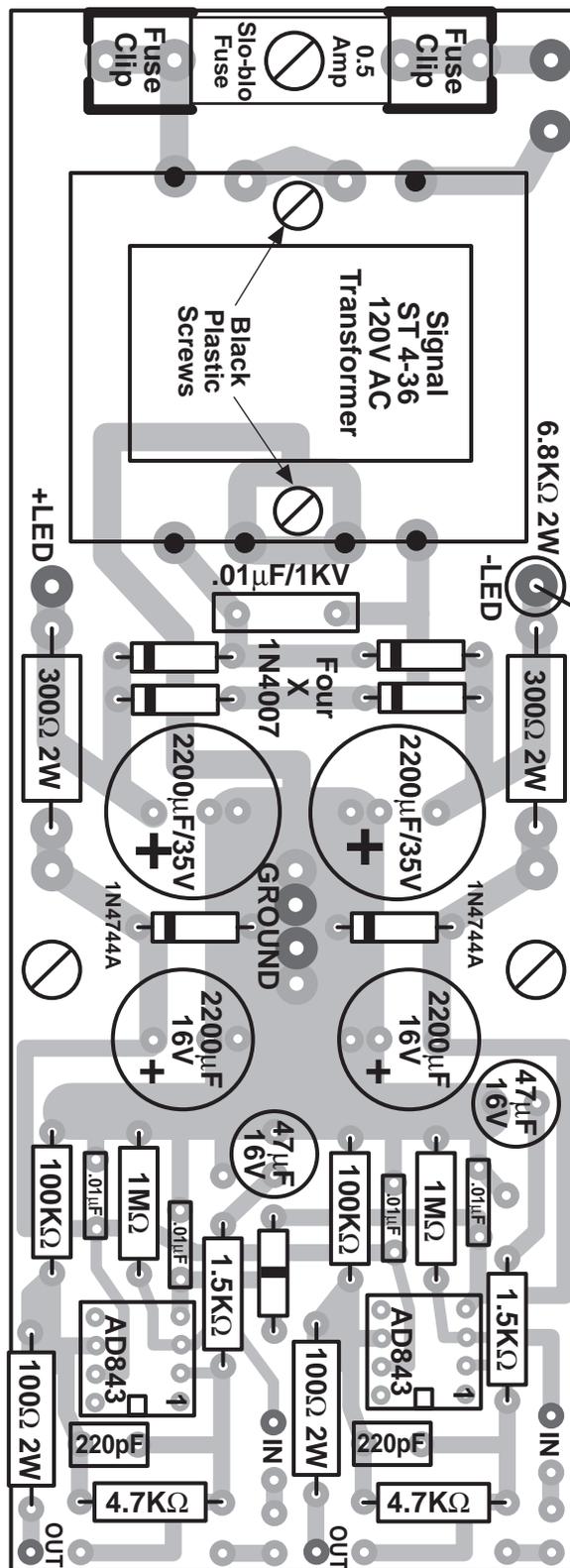
Same as line preamplifier.

Chassis signal wiring.

In making solder connections at the phono jacks do not use excess solder. Make sure the solder cannot run into and block the inner hole so that a cable cannot be installed. If in doubt, use an old interconnect cable inserted into each jack before it is soldered to insure that the jack cannot be blocked with solder.

1. Prepare a 11" red wire and a 12" green wire.
2. Connect the red wire to lug 6 of the volume control. Route along the bottom of the chassis and connect the other end to right channel input jack. Solder both connections taking care to not overheat the switch.
3. Connect the green wire from lug 3 of volume control to left channel input jack. Solder both connections.
4. Connect one of the 6" white wires to headphone jack lug 1 and solder.
5. Connect the other 6" white wire to both volume control lug 1 and lug 4. Solder at both lugs.

6. Connect the 4.5" white wire to the main chassis ground lug on the back panel and solder.
7. Connect the green wire from L OUT on the PC card to headphone jack lug 3 and solder.
8. Connect the red wire from R OUT on the PC card to headphone jack lug 2 and solder.
9. Connect the green wire from L IN on the PC card to VC lug 2 and solder.

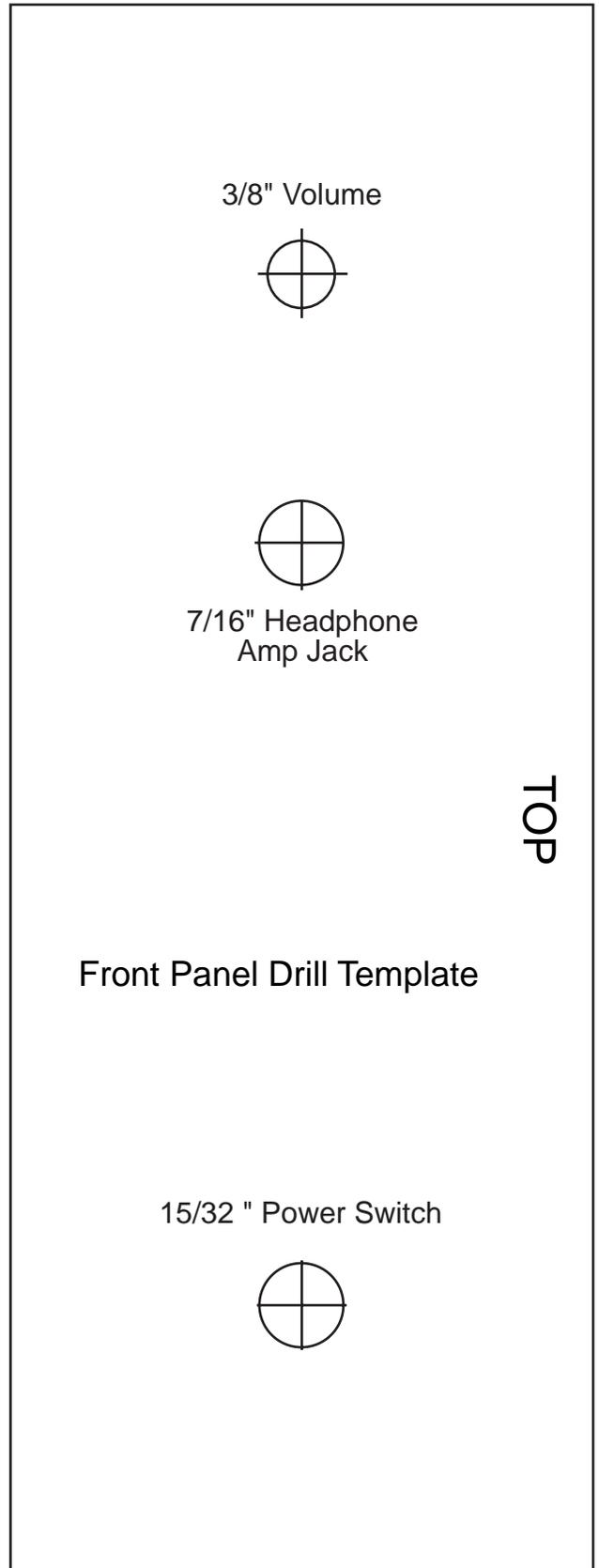
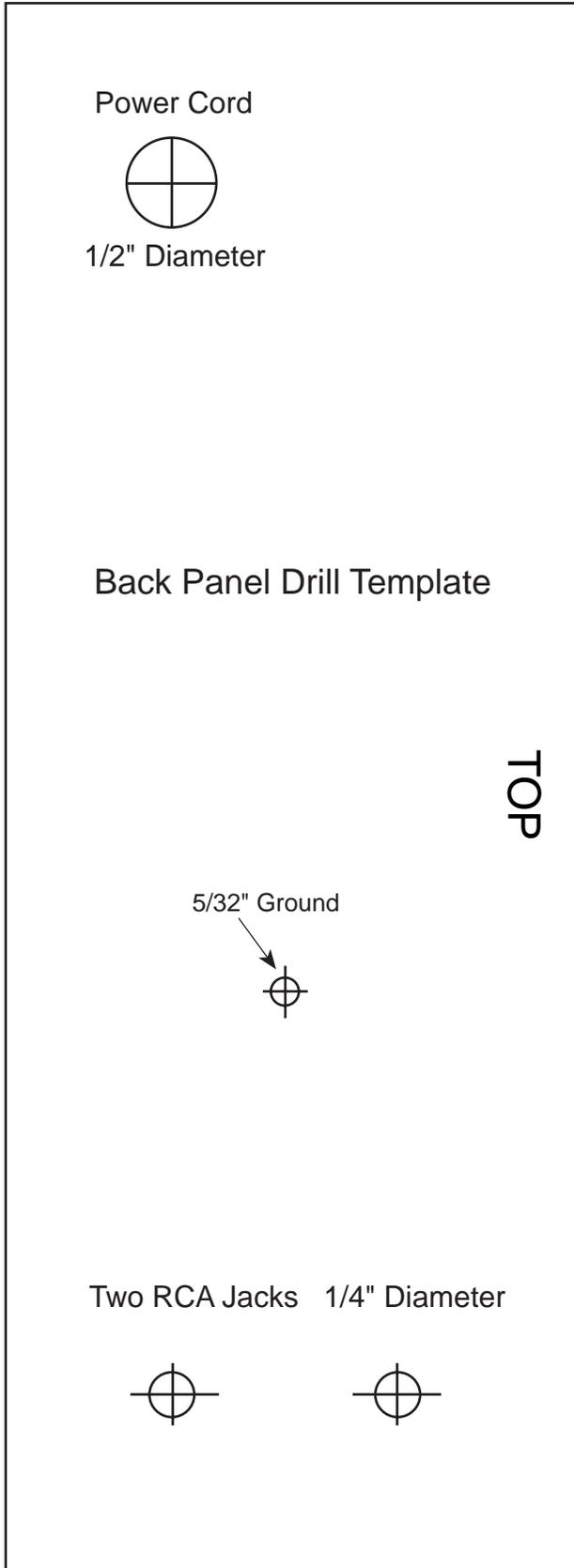


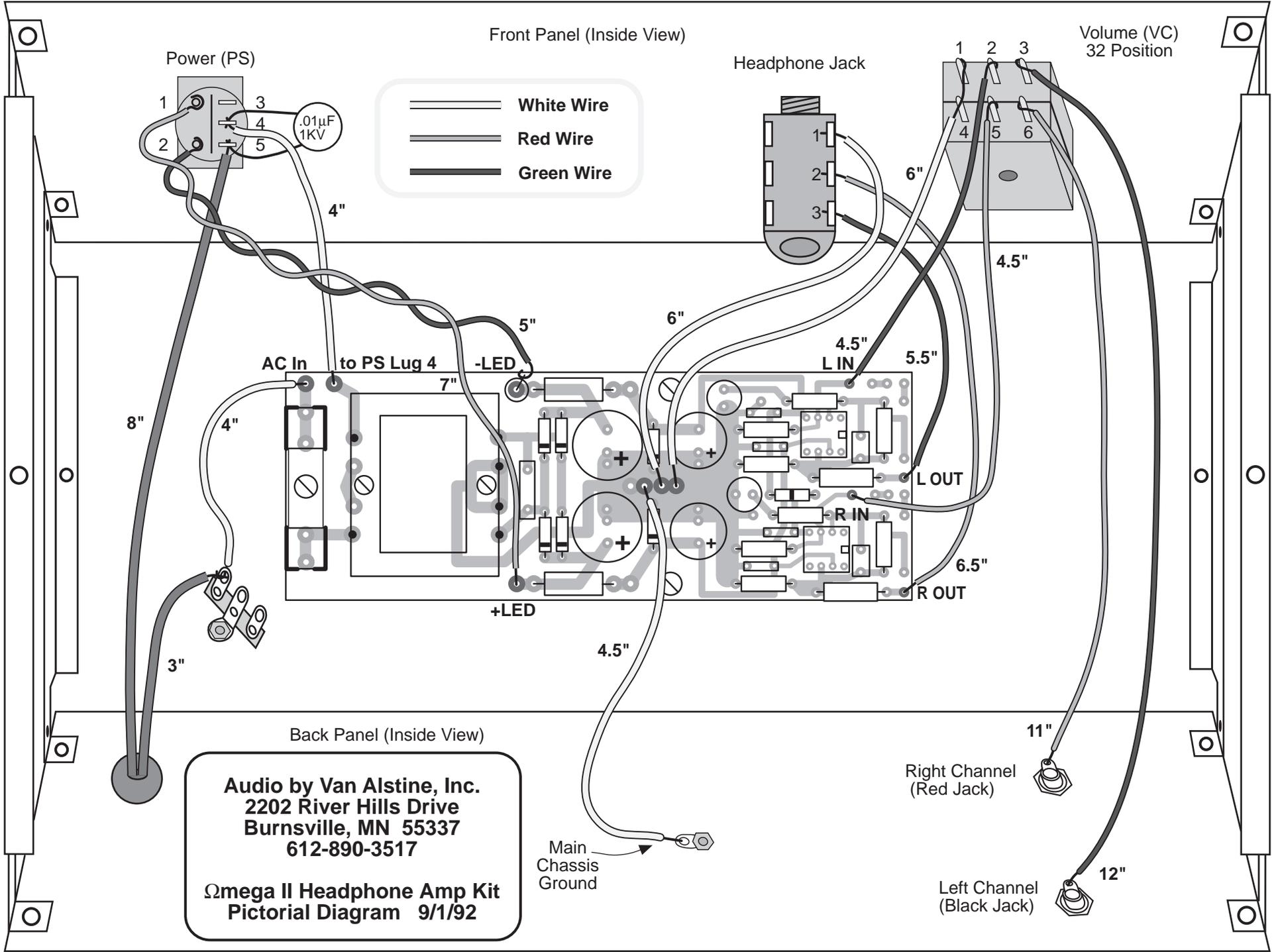
Audio by Van Alstine PC-392 Board Stuffing Guide for Headphone Amplifier 10/1/92

10. Connect the red wire from R IN on the PC card to VC lug 5 and solder.
11. Shake out all the solder blobs, metal filings, and missing tools. Peel the tape from the top and bottom edges of the front panel and dissolve any residue with Ronsonol.
12. Install the two side panels with four 1/4" #6-32 black Phillips flat head screws in each.
13. Install the knob (you will need a 1/16" Allen wrench - available at Radio Shack or your local hardware store). The knob should rotate from about 7 o'clock to 5 o'clock.

Final Inspection and Testing.

Same as line preamplifier. Thats it for this month! FVA





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Omega II Headphone Amp Kit
Pictorial Diagram 9/1/92