Board – Chassis Integration Part 4

Wall of Sound.ca DIY all tube phono preamp project

Tools and supplies required:

Same as Part 1

Shorting plugs

Multi-meter

Label maker

Waxed Dental Tape or Floss

Final Assembly and Testing:

Remove the screw temporarily anchoring the front panel ground wire and lug.

Put the screw just removed through the hole in the lower left corner of the front panel.

Assemble the front panel to the rest of the chassis, capturing the grounding lug with the screw and threading the screw into the lower left side.

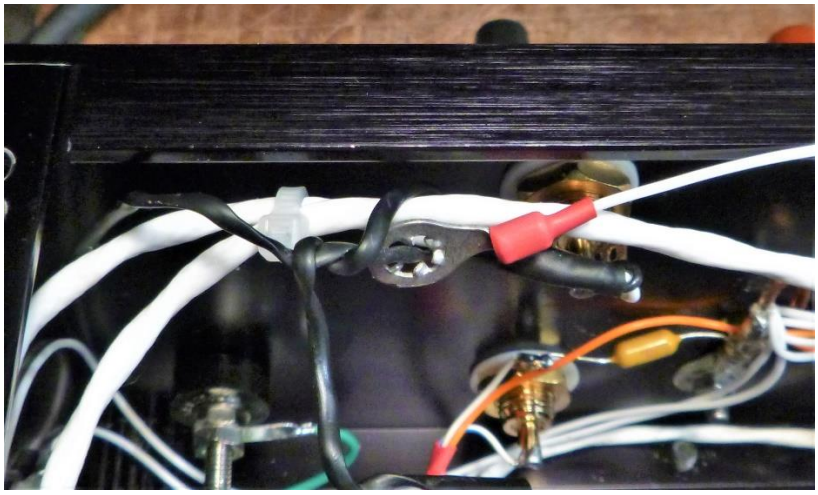
Secure the front panel to the bottom with two screws.

Assemble the power switch to the front panel. Don't use the supplied washer. Put a drop of nail polish on the thread. Assemble the nut but don't over-tighten, there isn't much thread to spare.

With pliers turn the switch shaft fully clockwise.

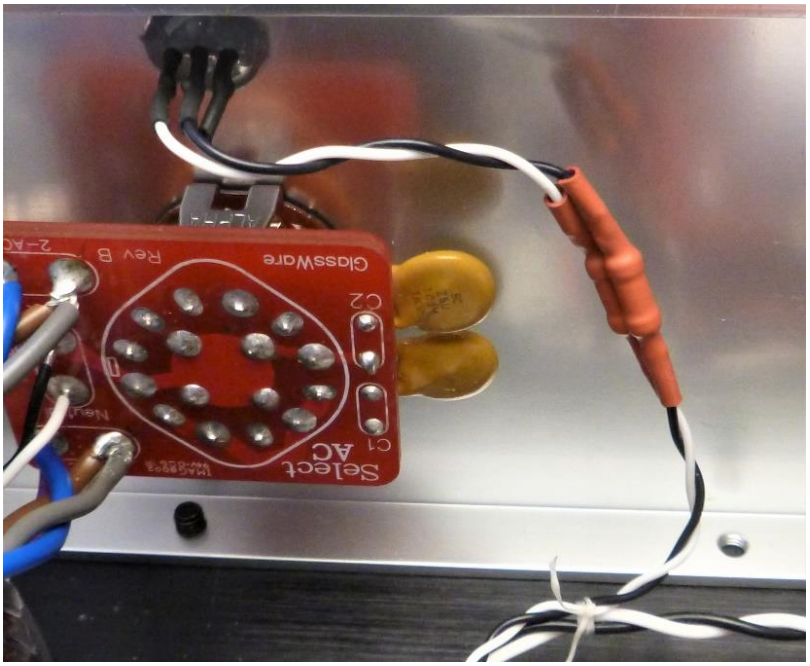
Assemble the knob over the shaft and rotate until the index dot is straight up, see below. Tighten the set screw then turn the knob fully counter-clockwise to the off position.

To prevent the ground lead that will be connected to the top panel from getting into trouble temporarily anchor it with a twist tie as shown below.

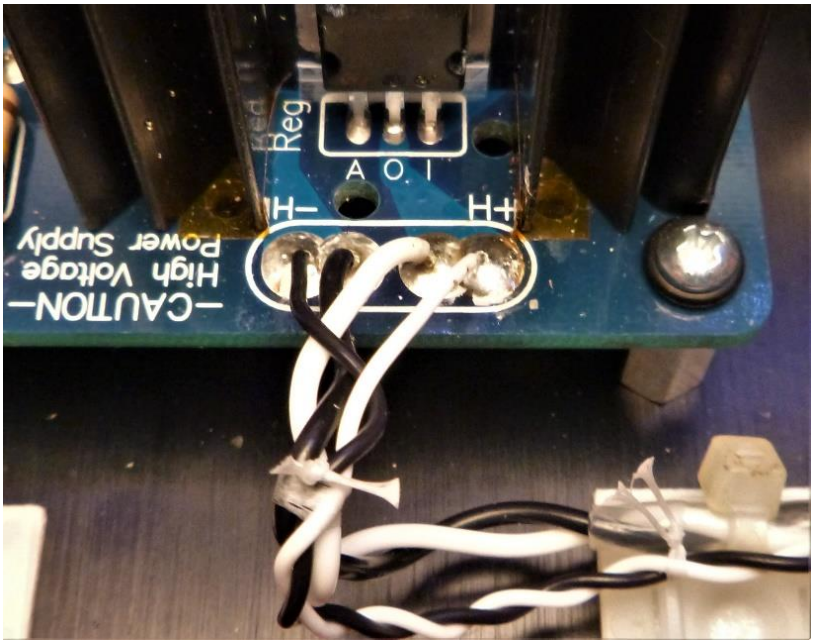


The B+ power leads from the amplifier board will be connected to the power supply board after initial testing.

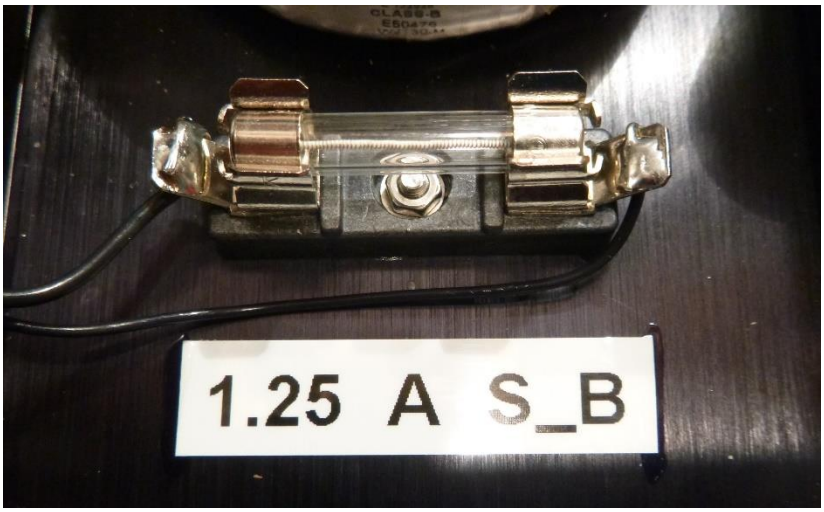
Tie the LED wiring away from the power stitch with dental tape or zip ties if you prefer. See below.



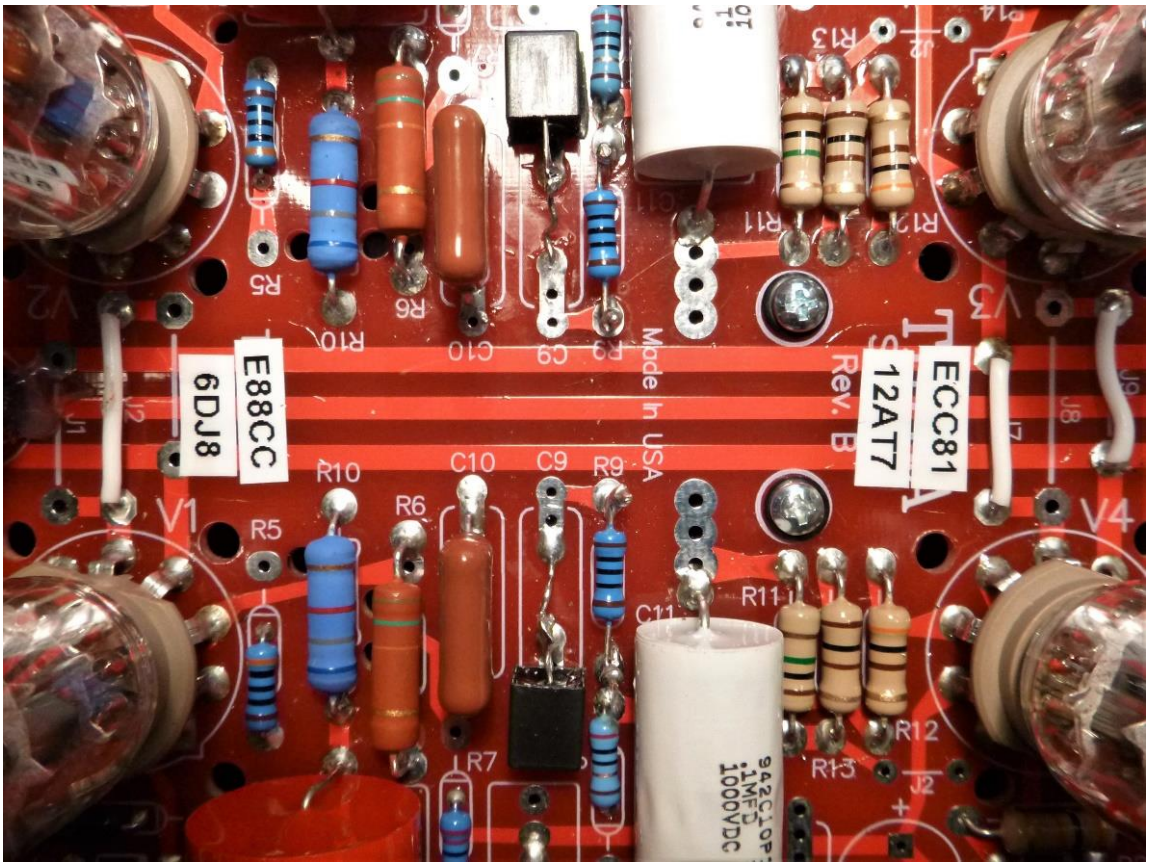
Route the wires from the LED along the filament wires from the amp board and secure with dental tape or zip ties. Cut to length and strip the ends. Solder the wire from the **centre** pin of the LED to the spare **H-** pad on the power supply board. Connect the other lead to the spare **H+** pad on the power supply board.



Put a 1.25 amp, slow blow fuse in the fuse holder. Using a label maker, identify the fuse rating, see below.



Identify the tube sockets to avoid confusion, and possibly burned out tubes, especially if you have built the standard version that uses two different tube types, see below.



Plug the E88CC tubes included in the kit into sockets V1 and V2 (closest to the back panel).

Plug the ECC81 tubes included in the kit into sockets V3 and V4 (closest to the front panel).

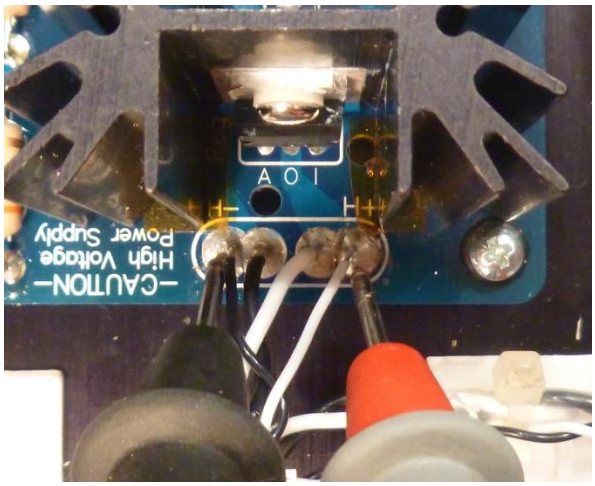
The next steps will involve voltages inside the chassis from 120 AC to over 300 DC. All of the usual precautions apply. If you are unsure or need help ask an experienced DIYer. Post a message on the Tubes/Valves section of diyAudio.com. There might be someone living close to you that could help. If you zap yourself or your project don't say you haven't been warned.

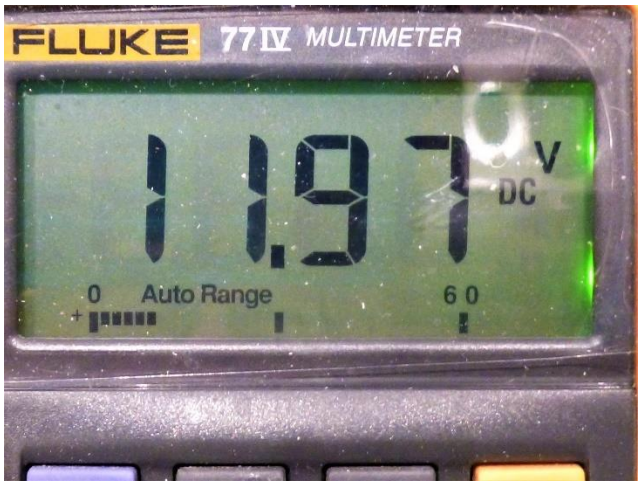
Make sure the power switch is in the off, fully counter-clockwise, position.

Connect a power cable to the AC inlet.

Turn the power switch to the first (clockwise rotation) position. The LED should light and the tubes should start to glow. If the fuse blows you have likely made a wiring error. Check the orientation of the filament supply diodes, I've made this error. Another possibility is the filament transformer primaries or secondaries have been connected incorrectly. Go back the transformer wiring and double check that the wires (check the colours) are connected correctly.

If everything is good so far, check the filament voltage at the power supply **H-** and **H+** pads as shown below. It should measure very close to 12 volts.

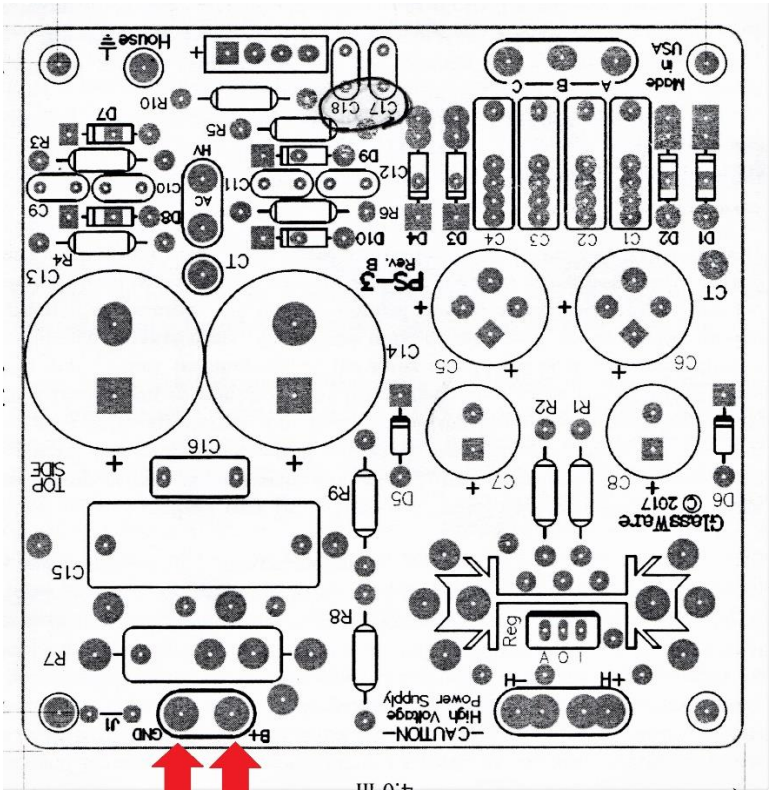




Wait for about 60 seconds then check that both sections of all four tubes are glowing.

Advance the power switch to the second position. This will apply AC to the high voltage (B+) part of the power supply board. I'm sorry, I forgot to take a picture of this operation but the diagram from the manual, see below, will show you the measurement points.

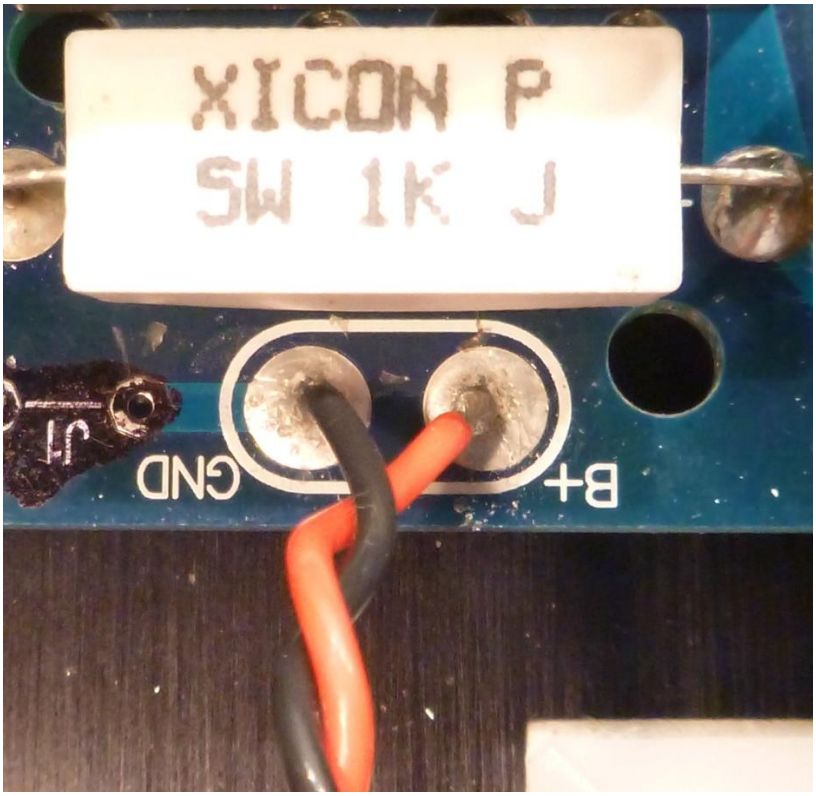
Check the B+ voltage at the **GND** and **B+** pads on the board. It will probably read around 350 volts or possibly a bit more. Don't be concerned out the high reading. It will drop once the power supply has been connected to the amplifier board.

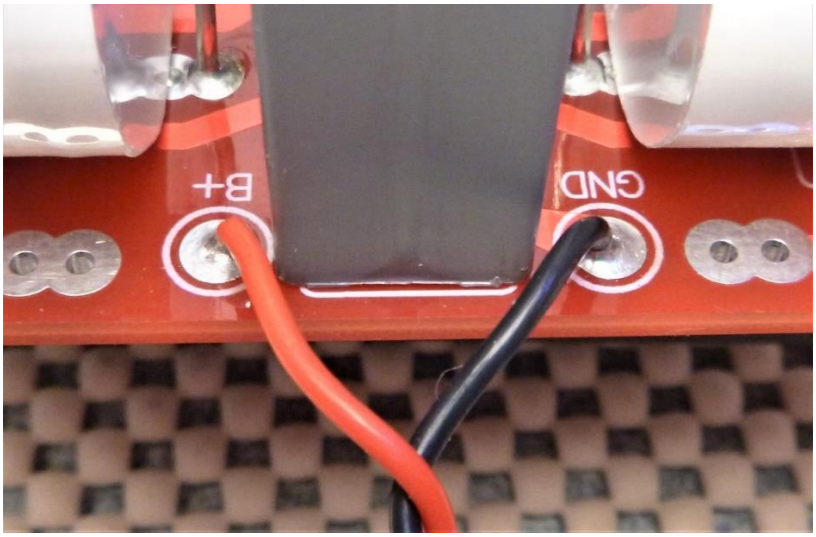


Turn off the amp and unplug it. Wait 10 minutes for the voltage to drop on the B+ supply.

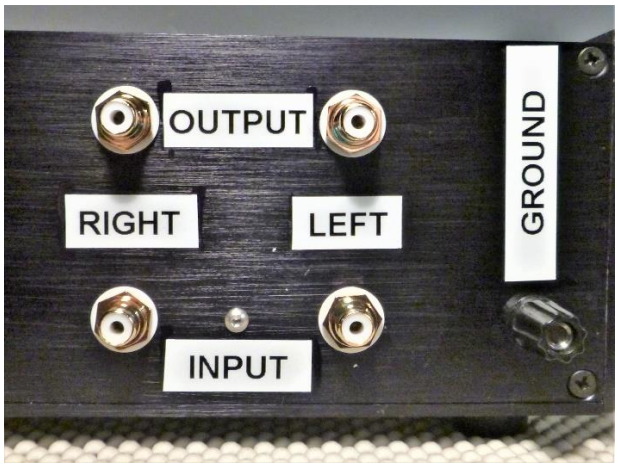
Measure the voltage at the **GND** and **B+** pads on the board as shown above. It should have dropped to about 10 volts or less. **Wait until the voltage has dropped to 5 volts or less before proceeding.**

Strip the wires from the **GND** and **B+** on the amp board, black and red in this instance. Connect to the **GND** and **B+** on the power supply board. **Before soldering ensure that the <u>GND</u> on the amp goes to the <u>GND</u> on the power supply and the <u>B+</u> on the amp goes to the <u>B+</u> on the power supply.** See below.





Label the rear panel as shown below if you wish.

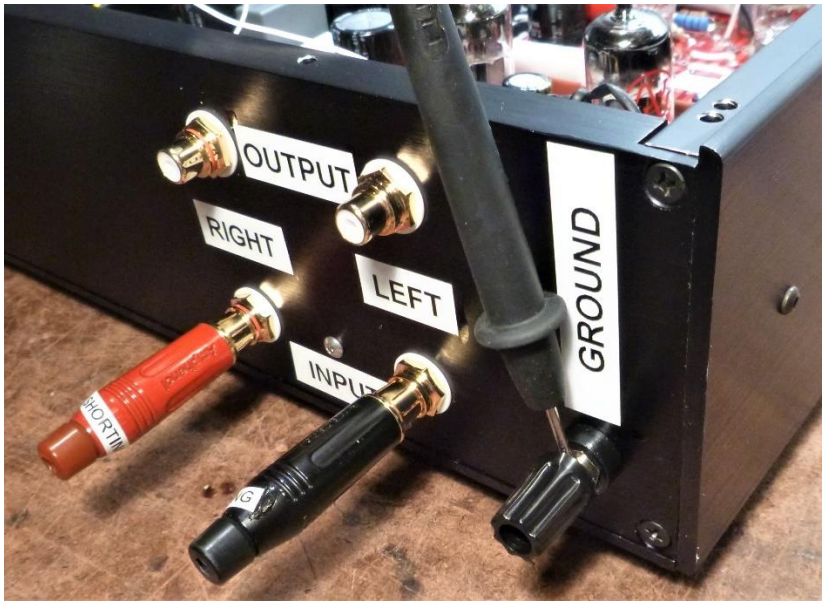


Install shorting plugs in the input jacks.

Connect the amplifier to the AC line and turn the power switch to the first notch.

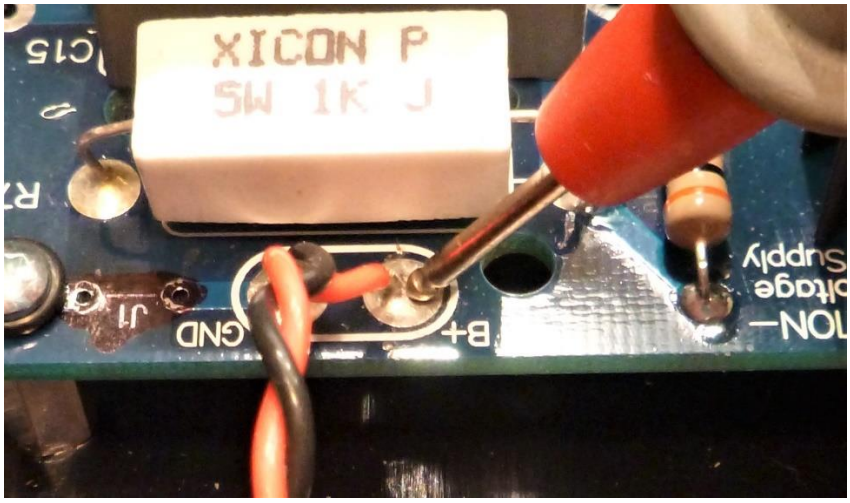
After about 60 seconds turn the power switch to the second notch.

Connect the **negative** probe from your multimeter to the **GROUNDING** terminal on the back of the amplifier. See below. The GROUNDING terminal is connected to the power supply and amplifier GND. This will allow you to probe the board to make voltage measurements only having to concentrate on one probe.

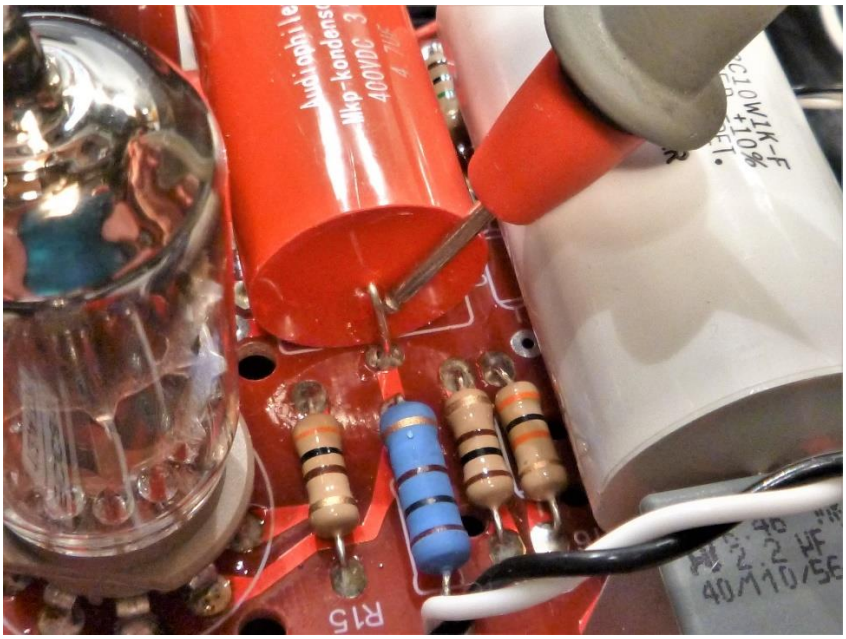


Note: The voltages measured below were with 120 volts AC input. Variations on this, different tubes and aging tubes might cause your measured voltages to vary slightly.

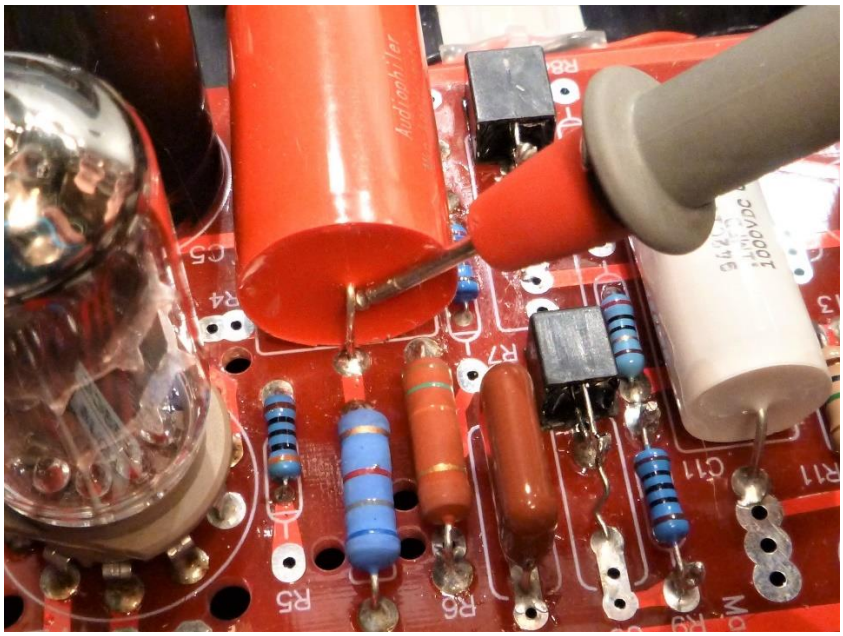
Measure the voltage at the **B+** pad on the power supply board as shown below. It should read about 290 volts on the standard version of the amp and about 330 volts on the alternate (all 12AT7) version. The main reason for the difference is the R7 resistor chosen for the power supply board. 1,000 ohms for the standard version versus 300 ohms for the alternate.



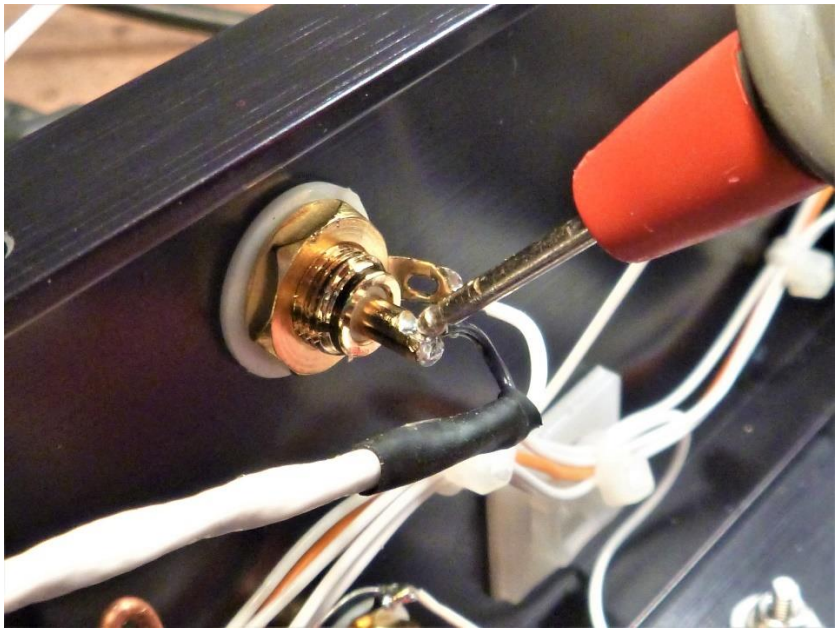
Measure the voltage after the first filter by touching the **positive** probe on the inboard ends of capacitors **C15**, one on each channel, as shown below. It should measure about 2 volts less than the measurement at the power supply board above on the standard version and about 30 volts less on the alternate version.



Measure the voltage after the second filter by touching the **positive** probe on the inboard ends of capacitors **C4**, one on each channel, as shown below. The voltage should be about 215 volts on the standard version and 280 volts on the alternate version.



Lastly check the AC and DC voltages on both output jacks as shown below. In either case it should measure well under 1/10 of a volt and likely much less.



Turn the amplifier off and disconnect the multimeter negative lead from the ground. Leave the grounding plugs in place.

Connect the phono amp up to your line stage or integrated amp. Set the volume on the line or integrated to minimum.

Power up both amps.

Select the input from the phono stage.

After giving both a minute or two to warm up, slowly increase the volume control. Only a faint hiss should be heard at higher than normal volume control settings. If not refer to: http://wallofsound.ca/audioreviews/analog/troubleshooting-phono-amplifier-sut-noise/

Assuming everything is fine, reduce the volume setting to near minimum.

Turn the phono stage power switch to the first (filaments only) position.

Remove the shorting plugs and connect the left and right interconnects from your turntable.

Connect the grounding wire from your turntable to the ground terminal on the phono amp.

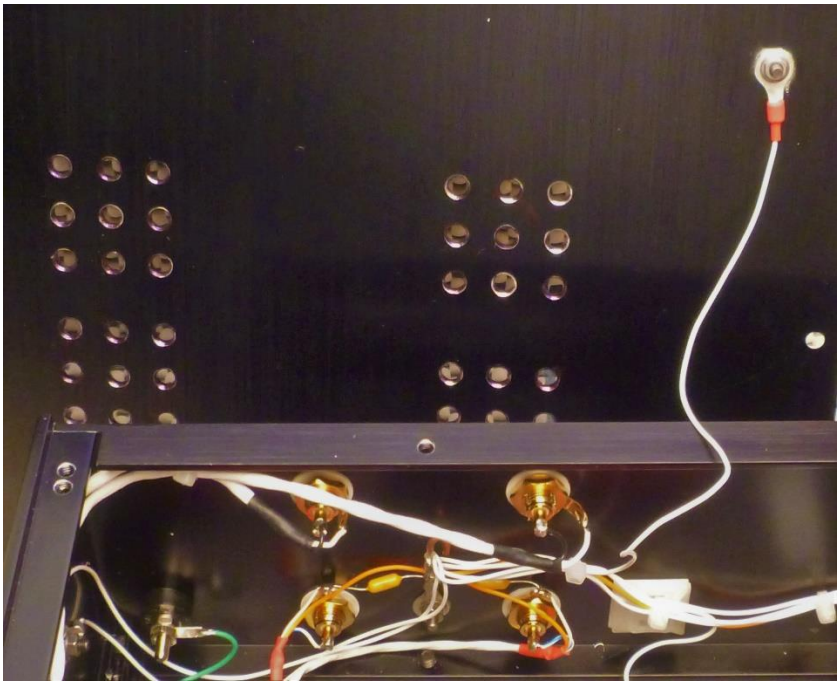
Advance the power knob on the phono stage to the second (full on) position.

Slowly advance the volume control. If there is hum or noise consult the link above.

If everything is OK reduce the volume and spin some vinyl.

Leave the top off if you wish, only if there are no children or pets likely to be present. Over the next few days, with the volume on the line stage or integrated set to minimum, check the voltages from time to time.

Connect the grounding lead to the top as shown below.



Assemble the top to the chassis and secure with screws.

You’re done, spin some vinyl to celebrate!