**Seventh Circle Audio**



# A12-500 Microphone Preamp

Based on classic American preamp designs of the late ‘60s and early ‘70s, the A12 delivers the sound of rock. A simple, single stage, transformer-coupled preamp, the A12 produces an aggressive midrange with pronounced transformer coloration. The A12 sounds fantastic with rock drums and electric guitars,but is versatile enough to be used with just about any source.

**Who Should Build This Kit?**

The A12 is not difficult to build, but it is not intended for absolute beginners. You should have built at least one project on a printed circuit board (PCB) before trying the A12. Sorry, but soldering cables doesn’t count. If you’ve never built an electronic project of any kind, this is probably not the one to start with. To guarantee success make sure you have:

- The ability to make basic voltage and resistance measurements using a digital multimeter (DMM).
- At least a rudimentary understanding of Ohm’s Law and the relationship between voltage, current, and resistance.
- Some experience soldering on printed circuit boards.
- The patience to follow instructions precisely and work carefully.

**Essential Tools**

Fine tipped 20-30 watt soldering iron w/ cleaning sponge (Hakko 936 or similar)
Eutectic (63/37) rosin core or “no clean” solder (.025” diameter is usually best)
Good-quality DMM
Small needle nose pliers
Small diagonal cutters
Wire stripper
Phillips screwdriver (#1)
Precision straight blade screwdriver (for adjusting potentiometers)

**Highly Recommended Tools**

Lead bender (Mouser 5166-801)
T-Handle wrench and 4-40 tap (Hanson 12001 and 8012)
MOLEX crimp tool (Waldom W-HT-1919 or equivalent)
Magnifying glass

**Optional Tools**

Panavise with circuit board head (PV-312, PV-300, and PV-315 or PV-366) 1/4" nut driver
Oscilloscope
Signal generator

**Work Area**
Find a clean, flat, stable, well-lit surface on which to work. An anti-static mat is recommended for this project. If you're in a dry, static-prone environment, it's highly recommended. The importance of good lighting can't be overstated. Component markings are tiny, and you'll be deciphering a lot of them.

**Soldering Technique**
Make sure your iron's tip is tinned properly, and keep it clean! The trick to making perfect solder joints is to heat the joint quickly and thoroughly before applying the solder, and a properly tinned and clean tip is essential for this. Apply enough solder to form a "fillet" between the lead and the pad, a little mound of solder that smoothly transitions from the plane of the board up to the lead, **but don't use too much**. The finished joint should be smooth and shiny, not rough or gritty looking.

If you've never soldered a board with plated-through holes, you might be surprised to discover how difficult it can be to remove a component once you've soldered it in place. If you're using solder wick to correct a mistake, be very careful not to overheat the pads, since they will eventually delaminate and "lift". It's often better to sacrifice the component and remove its leads individually, and start over with a new part. If for some reason you need to unsolder a multipin component (like a rotary switch or integrated circuit), remove as much solder as you can with solder wick or a solder sucker, and then use a small heat gun to heat all the leads simultaneously. With care, you can remove the component without damaging the board.

**Instruction Conventions**

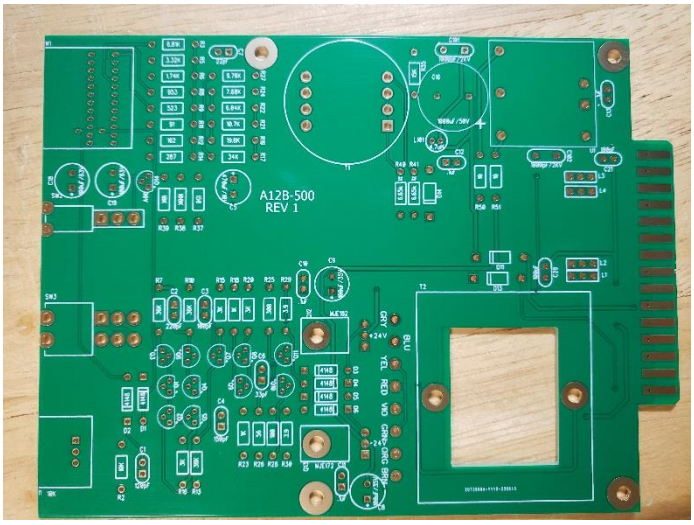
Text in **orange** indicates a step where extra care needs to be taken. Doing it wrong isn't a disaster, but it'll need to be corrected.

Text in **red** indicates a step that **must** be done correctly. Doing it wrong will guarantee improper operation, and probably damage components and/or the circuit board.

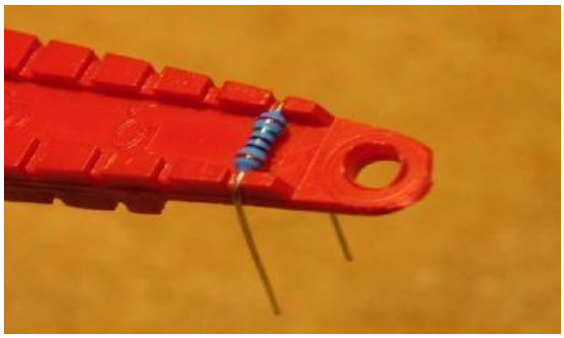
**Assembly**

1. Before you begin, carefully unpack the kit and examine the parts. Check the contents of each small bag against the BOM to make sure all the parts have been included. If you think something's missing, please e-mail the details to sales@seventhcircleaudio.com and we'll ship replacement parts ASAP.

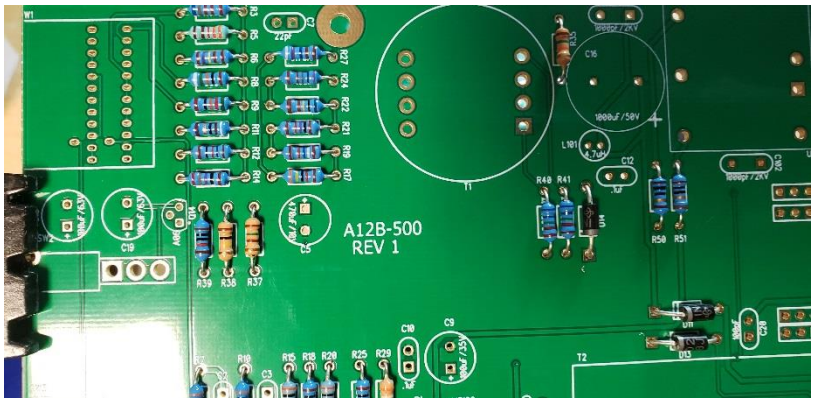
2. Generally, the idea when "stuffing" or "populating" a circuit board by hand is to start with the lowest profile parts, such as the resistors, and work your way up to the taller components. In each step below, insert the components, flip the board onto your work surface component-side down, and carefully solder and trim the leads. Use a piece of stiff cardboard to hold the parts in place while you flip the board. First, orient the board as shown.



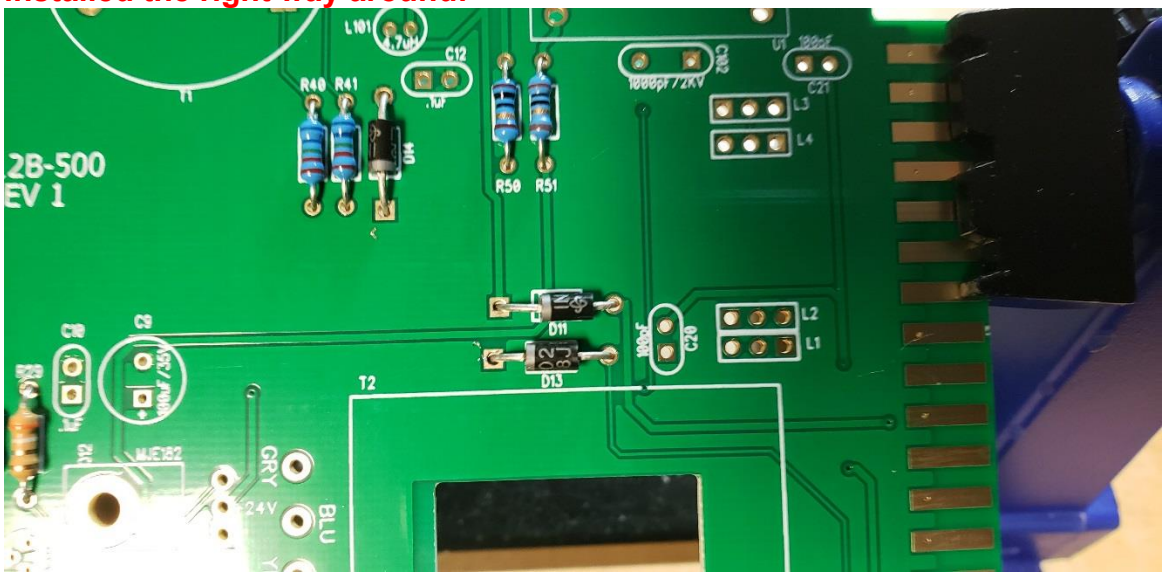

**3.** Before installing the resistors, prepare the leads using small needle nose pliers or a lead-forming tool as shown below. **Whatever you do, don't bend the leads at the resistor body and force them into the board.** This not only results in an ugly job; it can damage the parts. The resistors should be uniformly level and flush with the board.



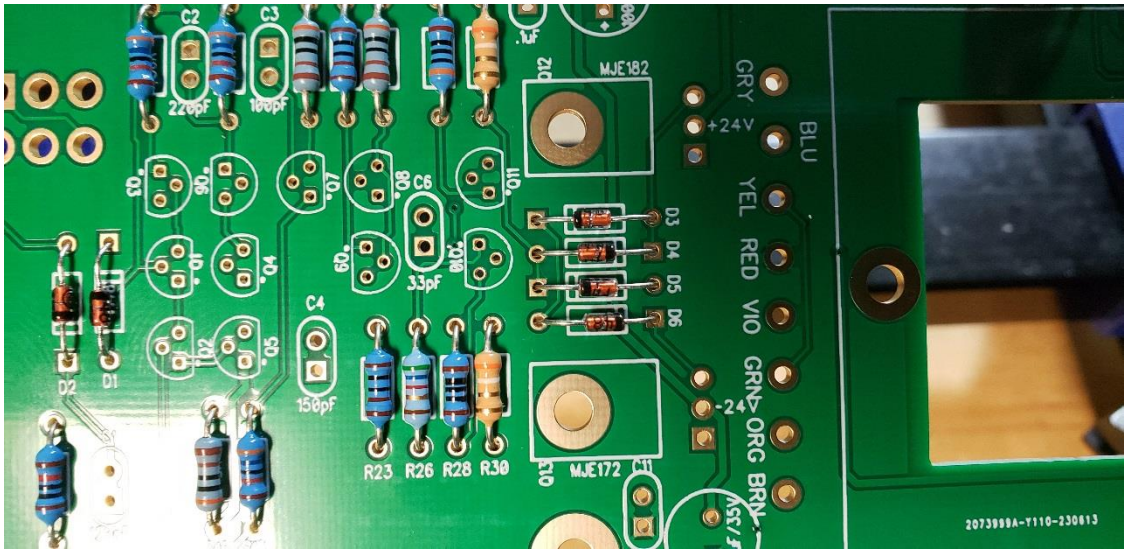
**4.** Install the 1/4-watt resistors. Check the Bill of Materials (BOM) for help in reading the resistor color bands. It's also a good idea to actually measure each resistor with your DMM as you place it on the board, just in case you've read it wrong. Don't rely on the photos for component placement. If the resistor value silk-screened on the board doesn't agree with the value on the schematic or parts list, follow the schematic



**5.** Next, add the protection diodes D11, D13, and D14. **Diodes are polarized and must be installed the right way around!**

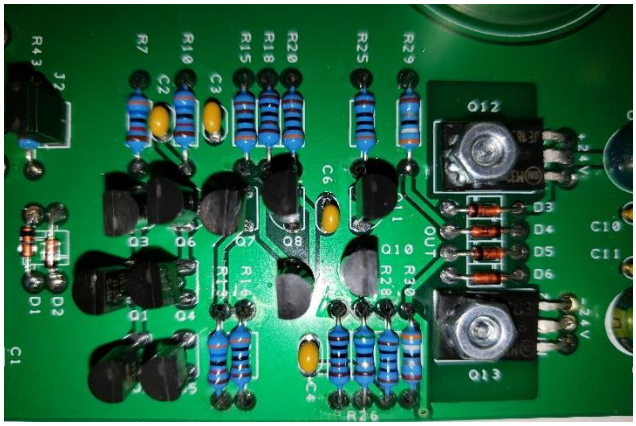



**6.** Add the glass diodes D1-D6. The colored band on the diode matches the white band on the silkscreen. **Diodes are polarized and must be installed the right way around!**



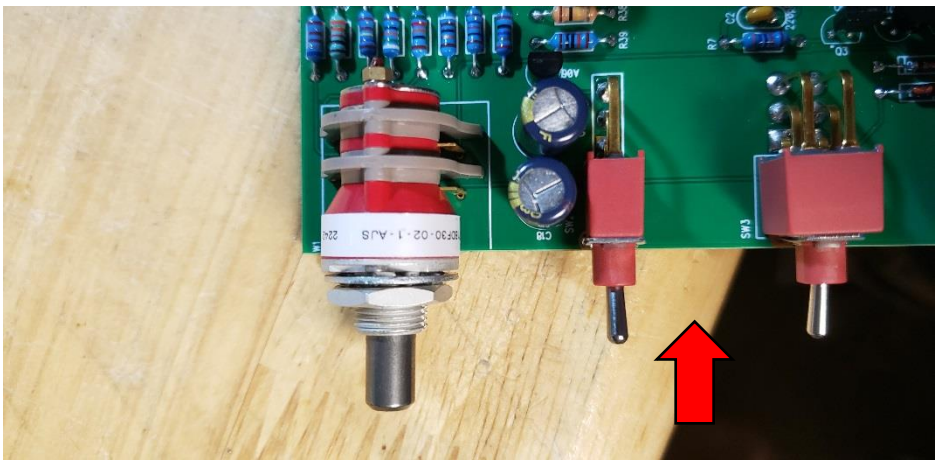
**7.** Add the small yellow ceramic capacitors. These capacitors are not polarized and can be installed in either direction but **pay close attention to the capacitor markings!** These parts all look alike, but they are not interchangeable. Putting one in the wrong spot will not prevent the preamp from passing signal, but it can seriously impair its performance. Add the blue, 3-pin filters.

**8.** Install 14 transistors. **Be sure to orient the transistors correctly!** These parts are not the same and are not interchangeable. Align the flat side of the transistor with the flat side of the silkscreen outline. The two larger transistors will be bent to lay down on the board after inserted. Use screw and nut to fasten to PCB, THEN solder the pins,

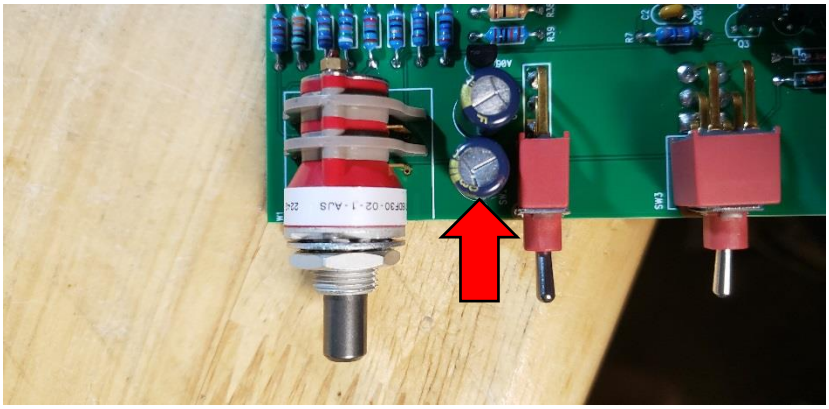



**9.** Add dark blue aluminum electrolytic capacitors. **Aluminum electrolytic capacitors are polarized and must be installed the right way around!** Be absolutely sure to observe the correct polarity when installing this part. The **negative lead** of the capacitor is marked with a colored stripe. The **positive pad** on the circuit board is marked with a small "+" sign.

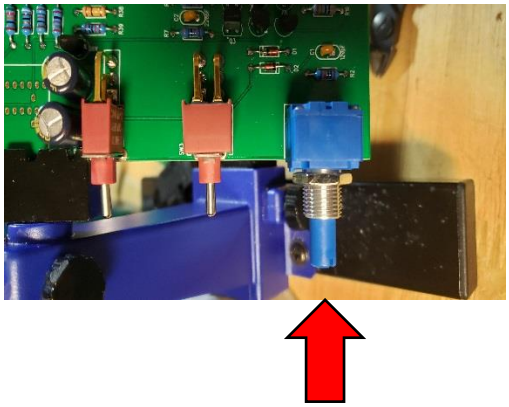
**10.** Carefully mount the toggle switches. Be sure they're seated flat on the board before soldering all of the pins. You may find it easier to solder the first pin with the board component side up.



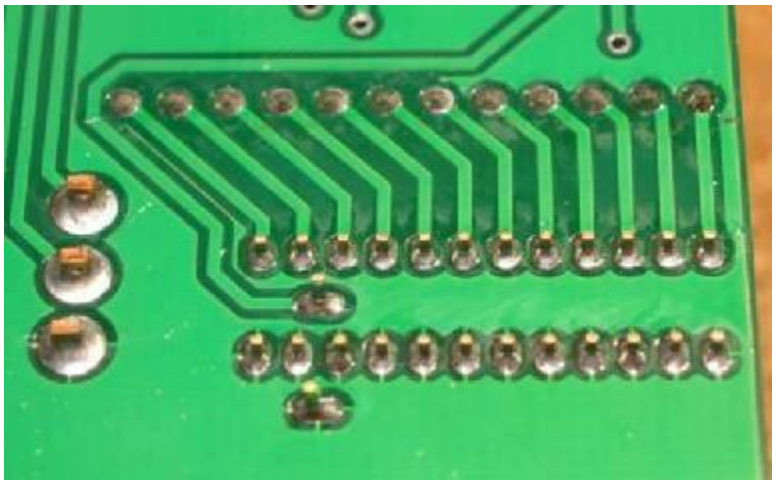
**11.** Install C18 and C19, the phantom power filter caps. **Aluminum electrolytic capacitors are polarized and must be installed the right way around!** Again, be absolutely sure to observe the correct polarity when installing these parts. The **negative leads** of the electrolytic caps are marked with a colored stripe. The **positive pads** on the circuit board are marked with a small "+" sign.



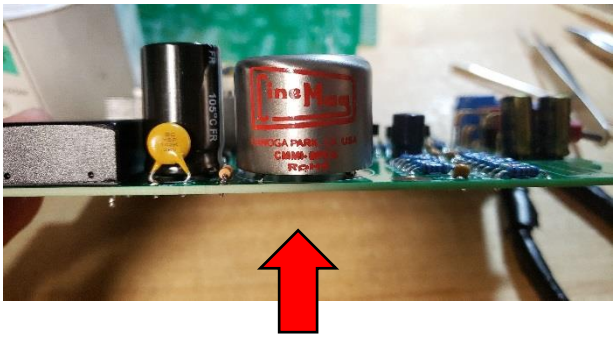
**12.** Attach gain trim control R1. Make sure the control is seated flat to the board before soldering the leads. You may want to add a small dab of silicone adhesive to the bottom of the control to hold it more securely.



**13.** Make sure the rotary switch is fully seated and solder it to the board. Try to make your solder joints as neat as possible, and don't use too much solder.

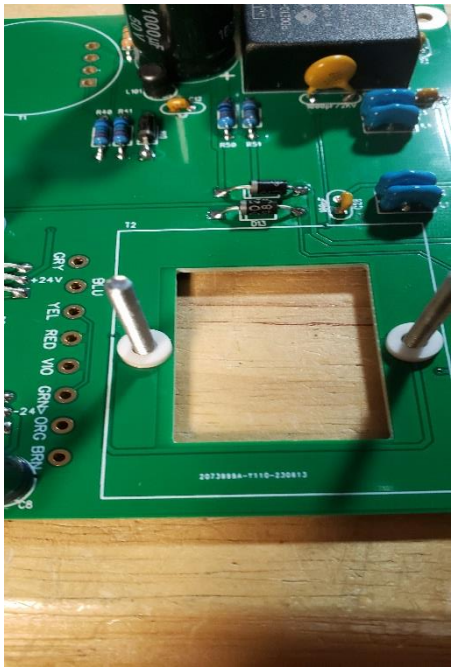


**14.** Attach the input transformer T1. Pin 1 on the transformer is clearly indicated with a red dot. The Cinemag logo faces AWAY from PCB center. Leave a small gap between the transformer case and the PCB! (See arrow)

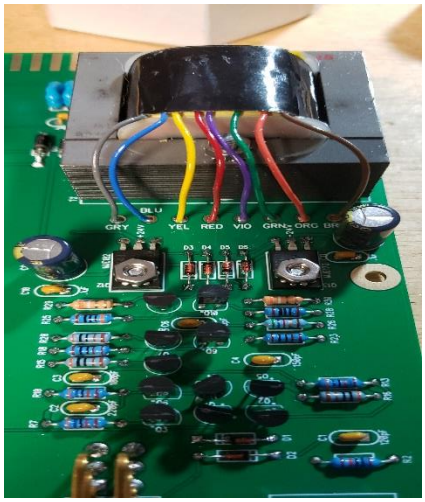


**15.**

Using two #4-40 x 1" screws, attach the output transformer to the board. Place a 1/16" spacer on each screw between the transformer and the circuit board. Secure each screw with a #4 keps nut. Trim the leads to length, then strip and tin them with solder as shown. Tinning the leads makes them easier to manage in the next step.



**16.** Solder the transformer leads to the circuit board as shown. The wire color is silk-screened next to each pad. The leads should not cross over and should be trimmed to the length shown. Do not leave the leads un-trimmed. GRAY, BLUE,YELLOW,RED,VIOLET,GREEN, ORANGE,BROWN.






**17.** Install the parts for the power supply. The DC/DC converter, caps, and Inductor. Be extra careful to not leave solder shorts on these parts!

**18.** That's it! Before going on to initial power-up, carefully check your work. Make sure you haven't created any solder bridges between pads, or between a pad and the ground plane.

**Initial Power-Up and Testing.**

**19.** Again, carefully check your work. Make sure you've got the right resistors in the right locations. Make absolutely sure you've got all the diodes and electrolytic capacitors soldered in the right way around! Double check to make sure you haven't inadvertently swapped the voltage regulators or trim pots. Check for poor solder joints and solder bridges, and make sure you fix any problems before continuing.

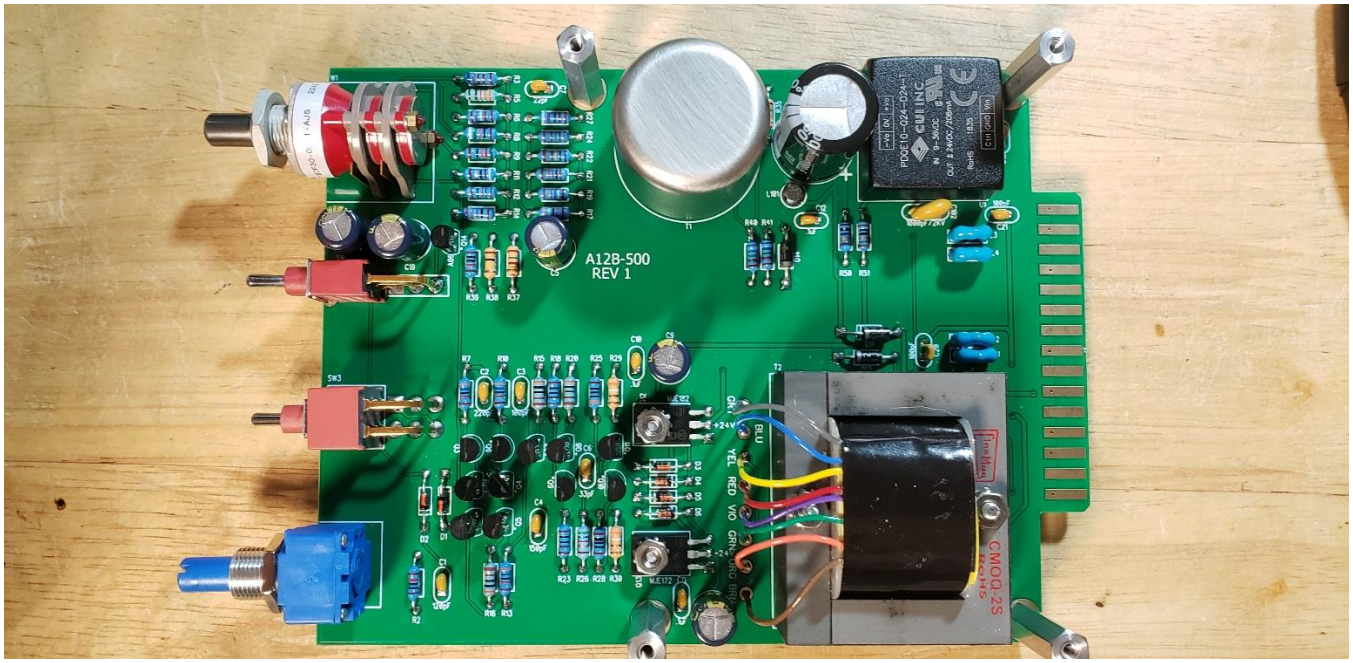
**20.** You can temporarily solder leads to measuring points as an alternative to trying to use probes. Use the cut output transformer leads if you want. You can install directly into a 500-series chassis or use the recommended extender assembly.

**21.** Set your DMM to measure DC voltages of 20V or greater and turn on the power. Connect the negative meter probe to GND, and measure the voltage at Q12, pin 2. You should see about +23V.

**22.** Keep the negative probe at GND, and measure the voltage at Q13, pin 2. You should see about -23V. If these voltages are way off, by more than 1 volt, you have problems. Possible things to check are incorrectly installed diodes, backwards caps or shorts.

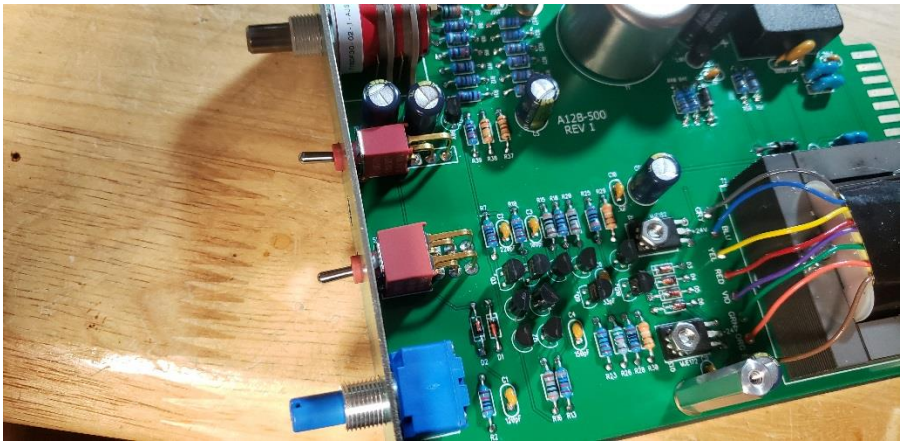
**23.** Measure roughly +47VDC at the anode of D14 with SW2 to the left.

## Installation into 500 series case




1. Make sure all 4 standoffs/spacers are installed. Short M-F spacer on the bottom, long on top of the PCB.

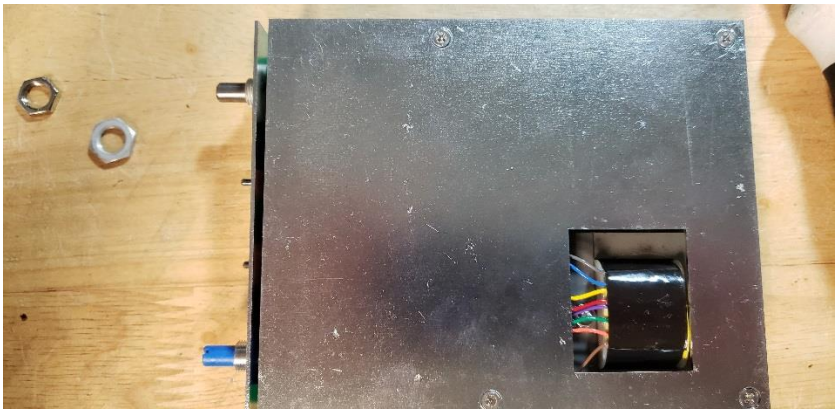
2. With nuts and washers from rotary switch and gain trim removed, fit the switches through the holes on the bottom tray. You can throw away the washers,but keep the nuts for the faceplate! The toggle switches may need to be pressed to the side to fit. If one is too far off, use the solder iron to reflow and straighten!




3. Use 4 small flat head screws to secure PCB to bottom tray.



4. Install cover using 4 small flathead screws.



**5.** Attach faceplate using the nuts, but NOT the washers! Add knobs to the front.




**6.** Congratulations! You have completed your build!