

Seventh Circle Audio



A12 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.

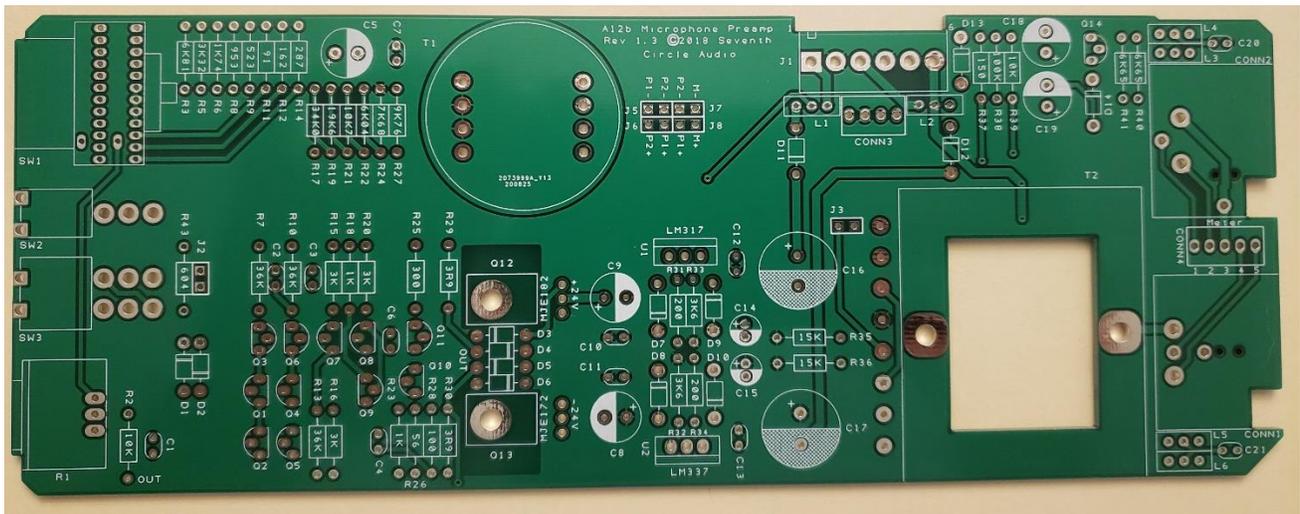
Instruction Conventions

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.

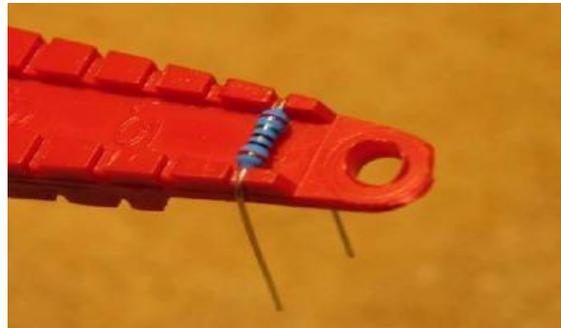
Text in **red** indicates a step that **must** be done correctly. Doing it wrong will guarantee improper operation, and probably damage components and/or the circuit board.

Assembly

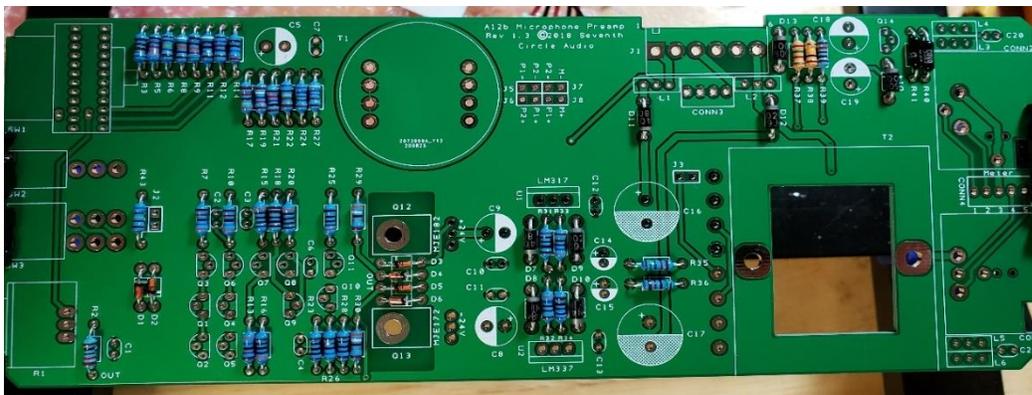
1. Before you begin, carefully unpack the kit and examine the parts. Check the contents of each small bag against the BOM to make sure all the parts have been included. If you think something's missing, please e-mail the details to sales@seventhcircleaudio.com and we'll ship replacement parts ASAP.
2. 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.



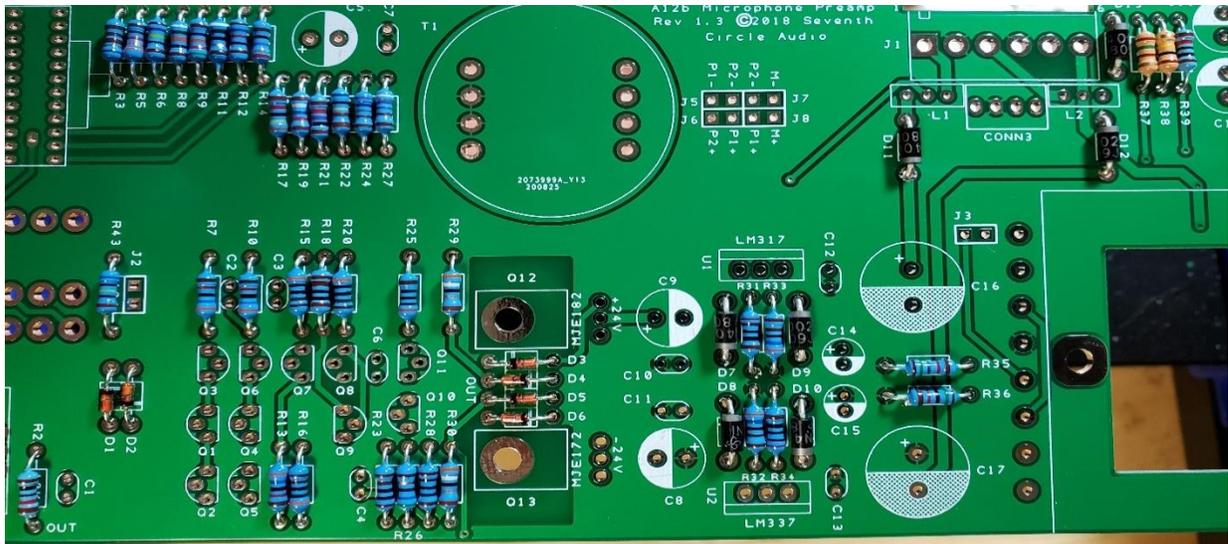
- Before installing the resistors, prepare the leads using small needle nose pliers or a lead-forming tool as shown below. **Whatever you do, don't bend the leads at the resistor body and force them into the board.** This not only results in an ugly job; it can damage the parts. The resistors should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



- 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



- Next, add the protection diodes D7 – D14. **Diodes are polarized and must be installed the right way around!** Add the glass diodes D1-D6. The colored band on the diode matches the white band on the silkscreen.

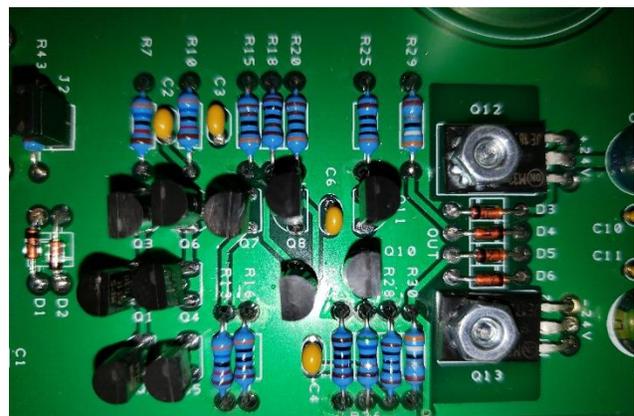


6. Add the small yellow ceramic capacitors. These capacitors are not polarized and can be installed in either direction but **pay close attention to the capacitor markings!** These parts all look alike, but they are not interchangeable. Putting one in the wrong spot will not prevent the preamp from passing signal, but it can seriously impair its performance. Add the blue, 3-pin filters.
7. Add the 0.1" headers. You may find it easier to handle the headers if you attach the shorting jumpers before soldering. **Install the headers with the long pins up!** The function of the headers is as follows:

J2 connects a 604-ohm load resistor across the output. Unless you'll be connecting the A12 to a piece of older gear with 600 ohm input impedance, connect a shorting jumper across J5

J3 - A separate, isolated output signal is available at this header. The amplitude at J6 is half the amplitude at CONN2.

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. **DO NOT install C16 and C17 yet!**
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.



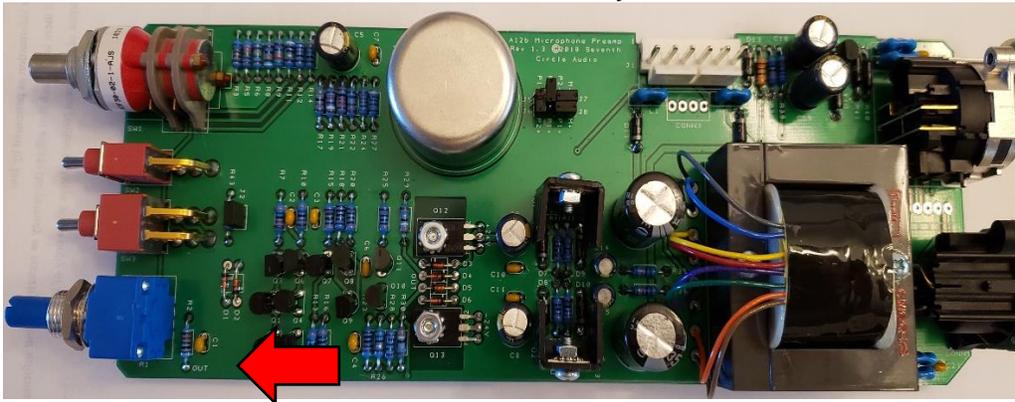
11. Add J7, the MOLEX power connector. Be sure to orient it as shown, with the locking tab away from the edge of the board.



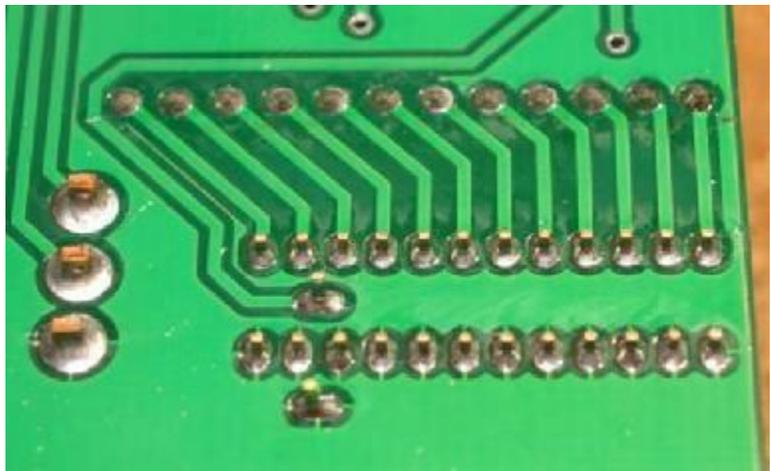
12. Install C16 and C17, the phantom power filter caps. **Aluminum electrolytic capacitors are polarized and must be installed the right way around!** Again, be absolutely sure to observe the correct polarity when installing these parts. The **negative leads** of the electrolytic caps are marked with a colored stripe. The **positive pads** on the circuit board are marked with a small "+" sign.



13. Attach gain trim control R24. 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.



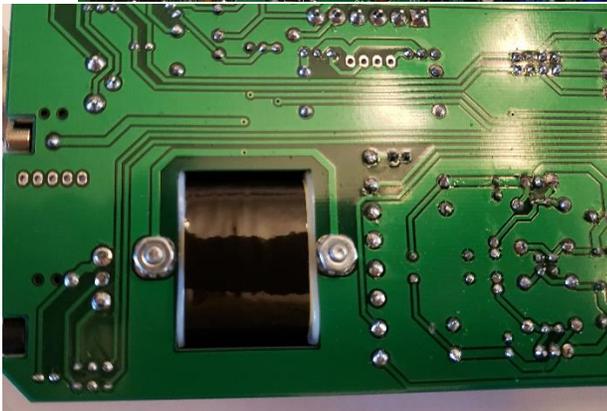
14. Make sure the rotary switch is fully seated and solder it to the board. Try to make your solder joints as neat as possible, and don't use too much solder.



15. Add CONN1 and CONN2 to the board. Make sure they're fully seated before soldering. The BLACK screws are for the XLR's ONLY!



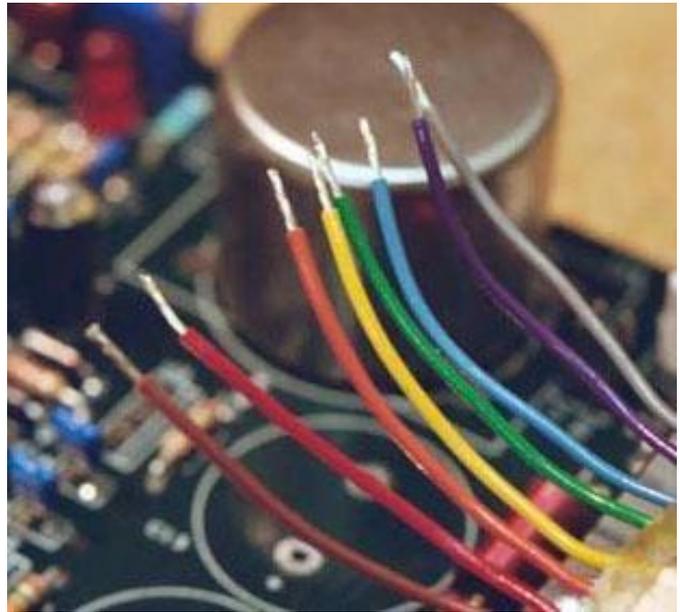
16. Attach the input transformer T1. Pin 1 on the transformer is clearly indicated with a red dot. The Cinemag Logo faces AWAY from PCB center. (See arrow)



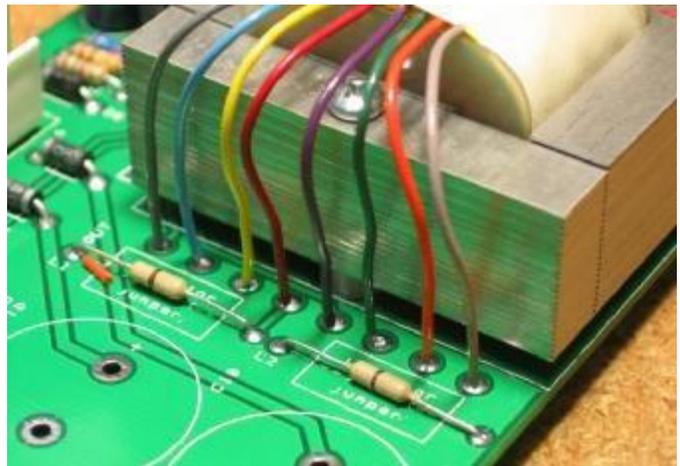
Skip mounting the transformer if installing into a PC01 One Shot, but do attach the wires!

25.

Using two #4-40 x 1" screws, attach the output transformer to the board. Place a 1/8" 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.



26. 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.**



27. Using the hardware supplied, attach heat sinks to U1 and U2 and solder them in place. **Make sure to install the regulators correctly!** These parts are not the same and are not interchangeable. Align the regulator tab with the double line on the silkscreen outline. **Don't swap the positive and negative regulators or mount them backwards!**



28. Install the bulk filter capacitors C16 and C17. Push them in firmly until they are fully seated against the board. Again, **electrolytic capacitors are polarized and must be installed the right way around!** Be absolutely sure to observe the correct polarity when installing these parts.

29. 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.

- 30.** 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.
- 31.** Just to make sure you haven't created any blatant shorts, measure the resistance between pins 1 and 2 of J1. Do the same for pins 3 and 2. You should measure a very high resistance. If you measure a steady resistance under 100 ohms, don't apply power. Carefully check your work until you *find that short*.
- 32.** Connect the P/S to J7. Simply wire the power supply connectors together in a 1:1 fashion. That is, P/S J2, pin 1 to A12 J7, pin 1, pin 2 to pin 2, etc. Pin 1 is toward the front, pin 6 toward the rear. Set your DMM to measure DC voltages of 20V or greater and turn on the power. Connect the negative meter probe to J1, pin 2, and measure the voltage at Q12, pin 2. You should see about +24V.
- 33.** Keep the negative probe at J1, pin 2, and measure the voltage at Q13, pin 2. You should see about -24V. 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.
- 34.** Set transformer jumpers like this:



Add a jumper to J2 if you need 600 ohm output impedance.

35. Congratulations! You've built a A12B preamp!