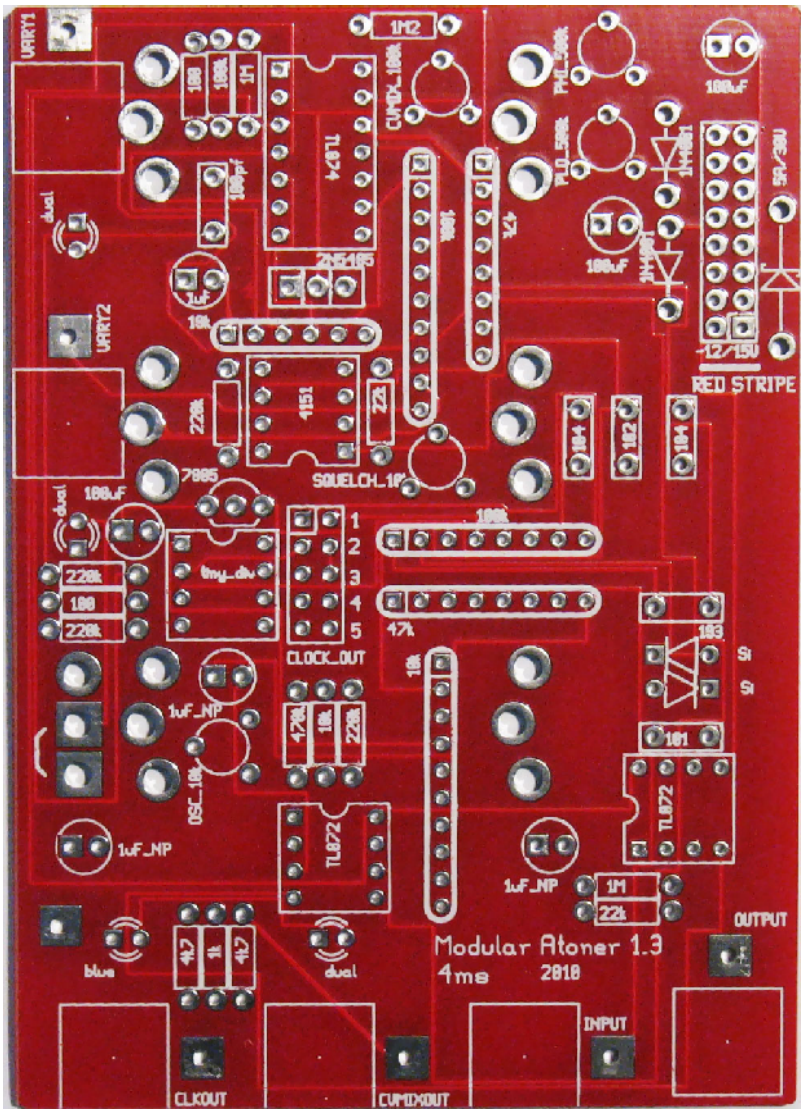
4ms Atoner Module

Kit Builder's Guide for PCB v1.3

4mspedals.com



Eurorack format Atoner Module

This guide is for building the 4ms Atoner module in Eurorack format. The kit includes all the parts you need.

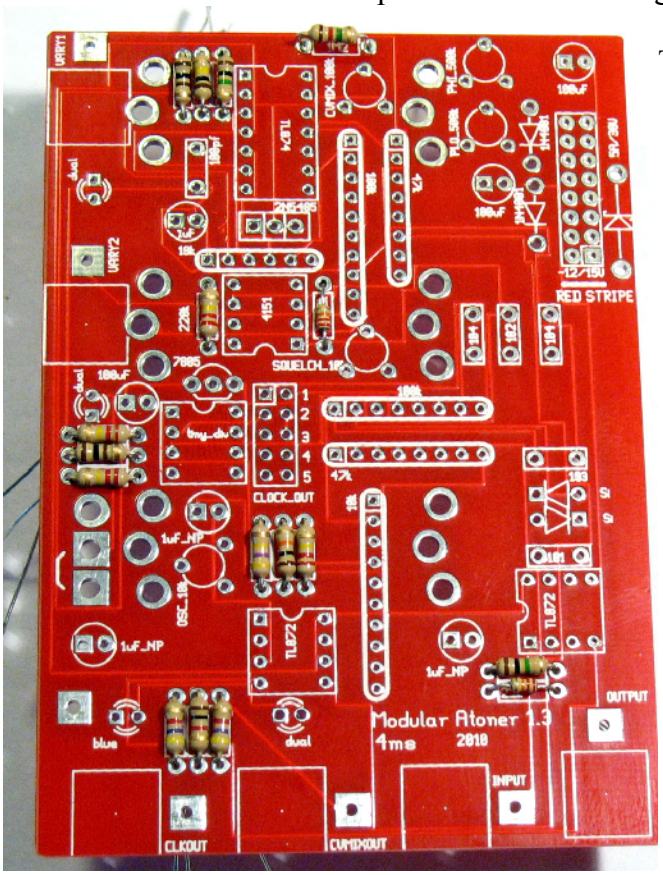
Tools Needed:

- Soldering iron
- Flush snips
- Needlenose pliers
- Small flat head screwdriver

Get comfortable, get all your tools together, take a deep breath... and enjoy!

Step 1: Resistors

Insert and solder the resistors. After soldering, snip the leads nearly flush to the PCB (you'll be snipping the leads flush on all the components after soldering). Save some of the lead snippings for later steps.

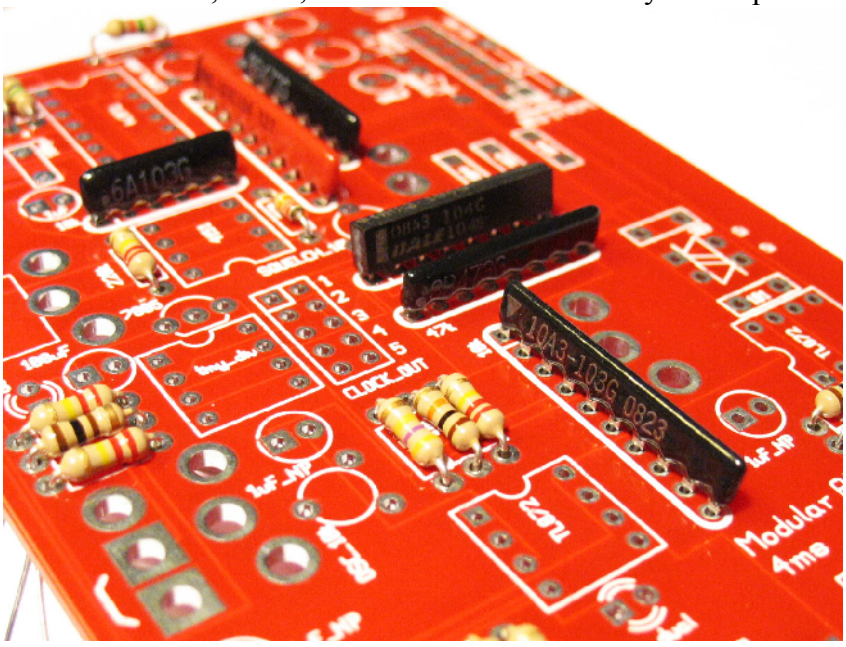


The Atoner has 17 resistors:

- *1M2 x 1 (brown red green)*
- *1M x 2 (brown black green)*
- *470k x 1 (yellow violet yellow)*
- *220k x 4 (red red yellow)*
- *100k x 1 (brown black yellow)*
- *22k x 2 (red red orange)*
- *10k x 1 (brown black orange)*
- *4k7 x 2 (yellow violet red)*
- *1k x 1 (brown black red)*
- *100 x 2 (brown black brown)*

Step 2: Resistor Arrays

Insert and solder the six resistor arrays. There are five types, one of each and two of the 47k type.
NOTE: The dot, arrow, or line on the resistor array lines up with the square outlined hole on the PCB.



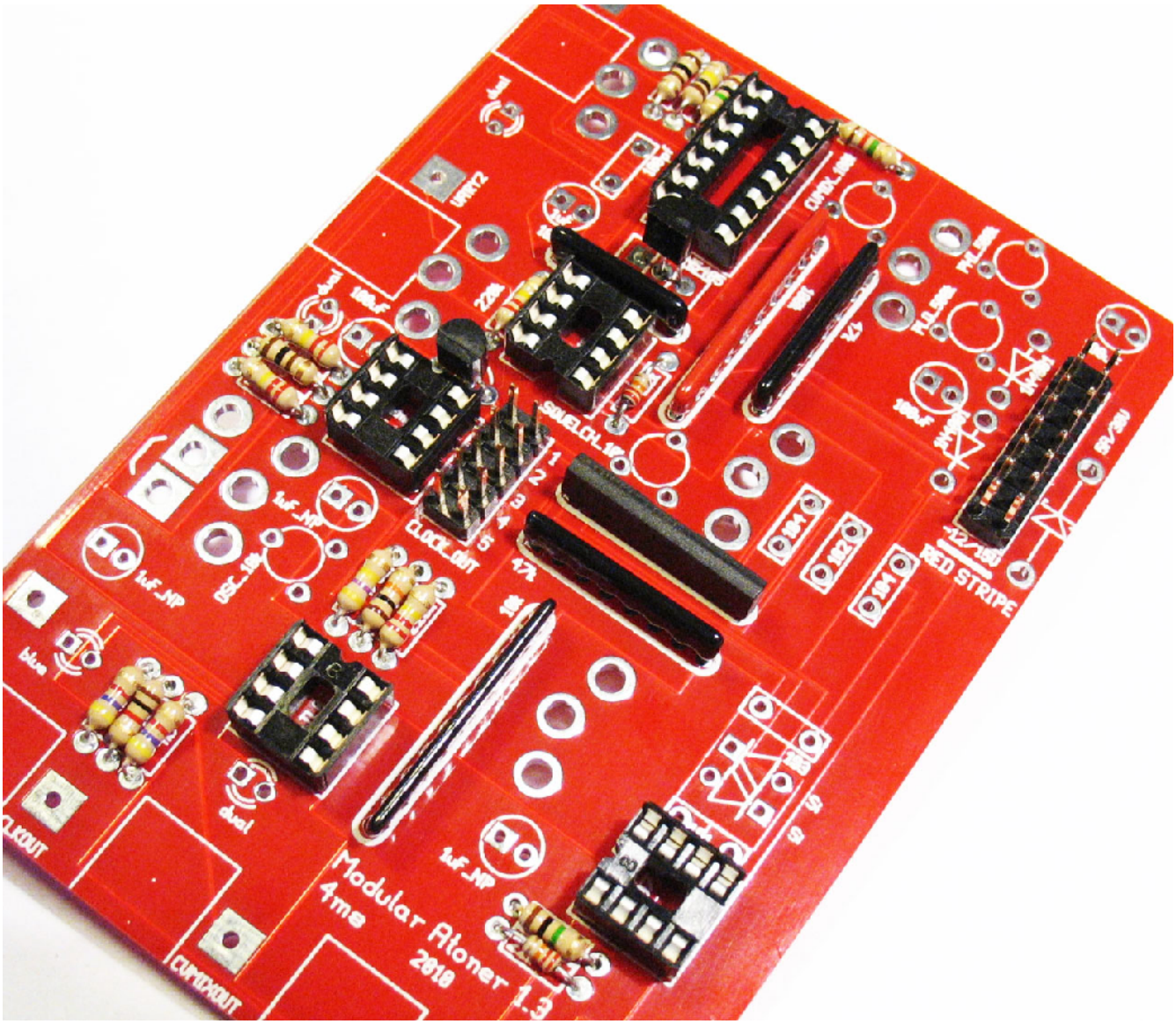
- 10k, 10 pin isolated
  "10B103G" or "10A3-103G"
- 10k, 6 pin bussed
  "6A103G"
- 47k, 8 pin isolated x 2
  "8B473G"
- 100k, 10 pin isolated
  "10B104G" or "103C104" (red)
- 100k, 8 pin isolated
  "8B104G" or "08A3 104G" (square blocky shape)

Step 3: IC Sockets, Header pins, and FET/regulator

A. Insert and solder the 14-pin IC socket, and the four 8-pin IC sockets. The notch in the sockets points towards the notch drawn in white on the PCB (three point up, one points down, one points left).

B. Insert and solder the Voltage Regulator (7805), matching the curve of the package to the curve drawn on the PCB. Insert and solder the 2N5485 FET with the same orientation (see photo).

C. Insert and solder the two header pins assemblies: one 16-pin power connector, and one 10-pin header for clock select jumpers.

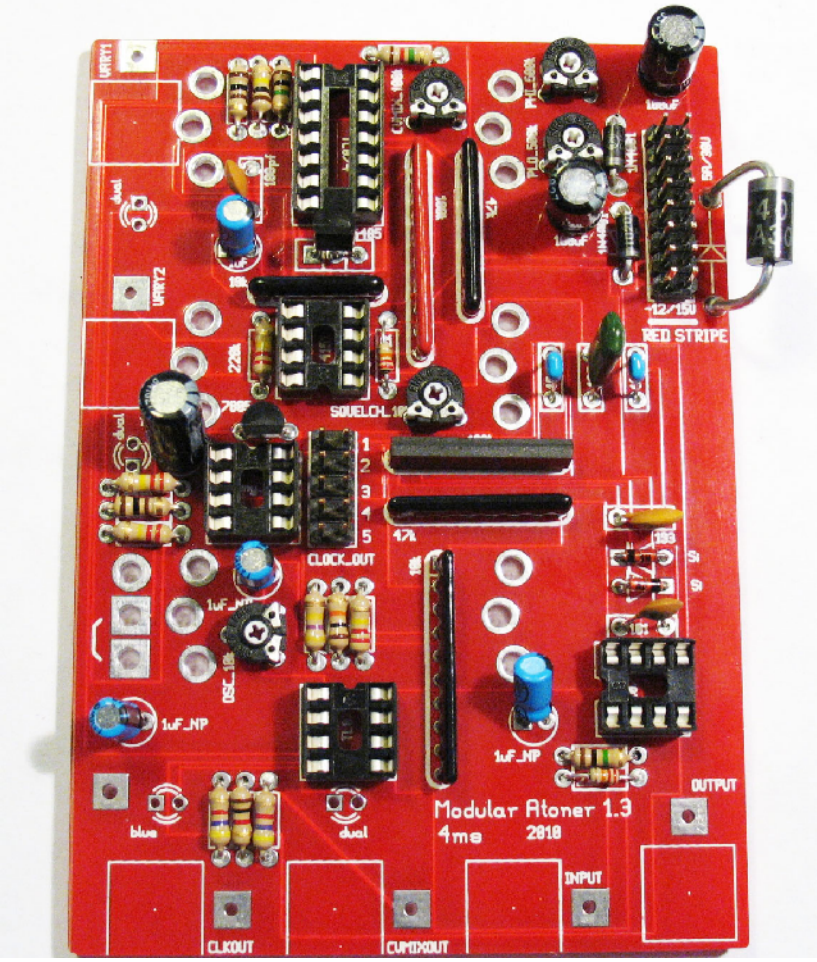


Step 4: Capacitors, Diodes, and Trimpots

A. Insert and solder the 13 capacitors. The 1uF and 100uF capacitors have an orientation such that the long lead goes in the square hole, and the short lead (also marked by a black or white stripe on the body of the cap) goes in the round hole.

B. Insert and solder the 5 diodes. On the large 5A/30V diode, make sure it sits high off the PCB so that it can be bent over to make room for the power connector (see photo). The diodes also have an orientation such that the end marked with a black or white band point in the same direction as the arrow on the PCB.

C. Insert and solder the 5 trim pots. The value of the trimpot is stamped very lightly on the curved part of the body of the trimpot. Use a bright light and magnifying glass if your eyesight is anything less than perfect! Or use a meter to measure the resistance between the outer two pins.



Capacitors:

- 100pF (“101”) x 2
- 1000pF (“102”) x 1
- 0.01uF (“103”) x 1
- 0.1uF (“104”) x 2
- 1uF x 4
- 100uF x 3

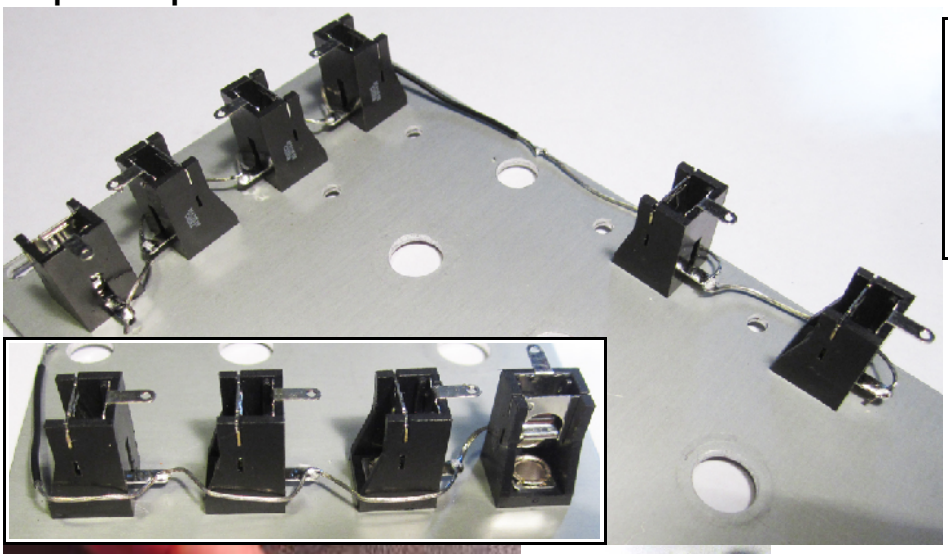
Diodes:

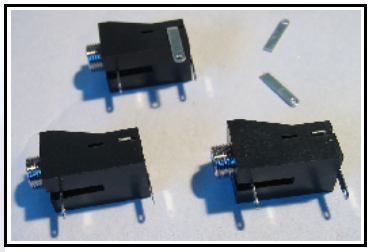
- 1N914 "Si" diodes x 2 (small red glass)
- 1N4001 diodes x 2 (small black)
- “5A/30V” 1N5401 diode x 1 (large black diode) ← **Keep a 1/4” clearance between this and the PCB to allow for bending so the power connector can fit.**

Trimpots:

- 10k trimpot x 2
- 100k trimpot x 1
- 500k trimpot x 2

Step 5: Prepare to mount



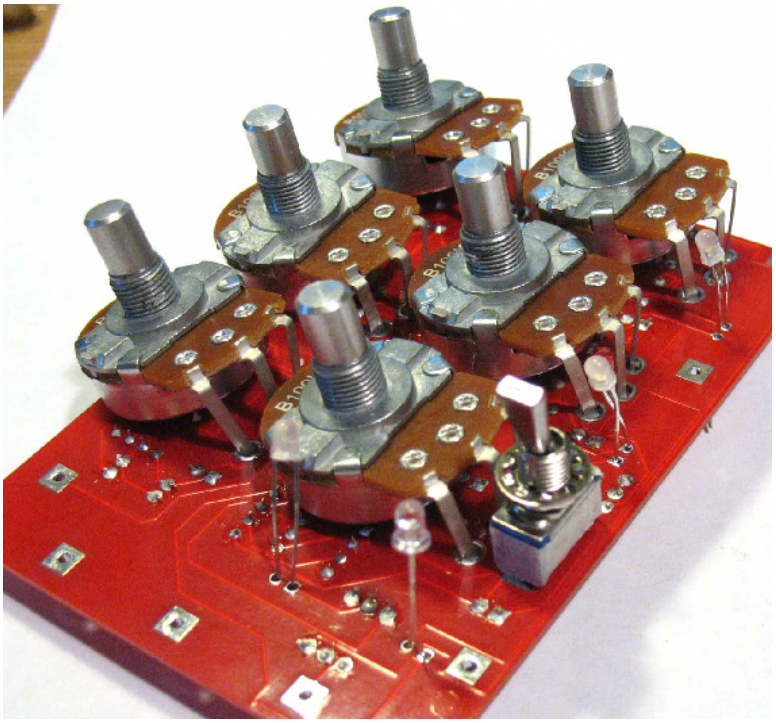


A. Break off the side tabs on the 6 jacks (see above photo).

B. Mount the 6 jacks to the panel with the orientations as shown (the tabs of three of the jacks point towards the top of the panel, and the other three jack tabs point towards one side). Tighten the nuts down, but not all the way because you may need to nudge them slightly in step 7.

C. Run a ground wire connecting all 6 ground tabs of the jacks (inset photo shows reverse view of bottom 4 jacks).

D. Remove the nut and washers from the 100k pots. Then break off the tab on the top of the pot as shown in the photo.



E. Cover the metal portion of the switch body with masking tape (or any insulator). This keeps the OSC pot from shorting out to the switch.
Remove the top nut and one washer from the flip switch.

F. Place the pots and switch into the PCB. **Do not solder yet!!**

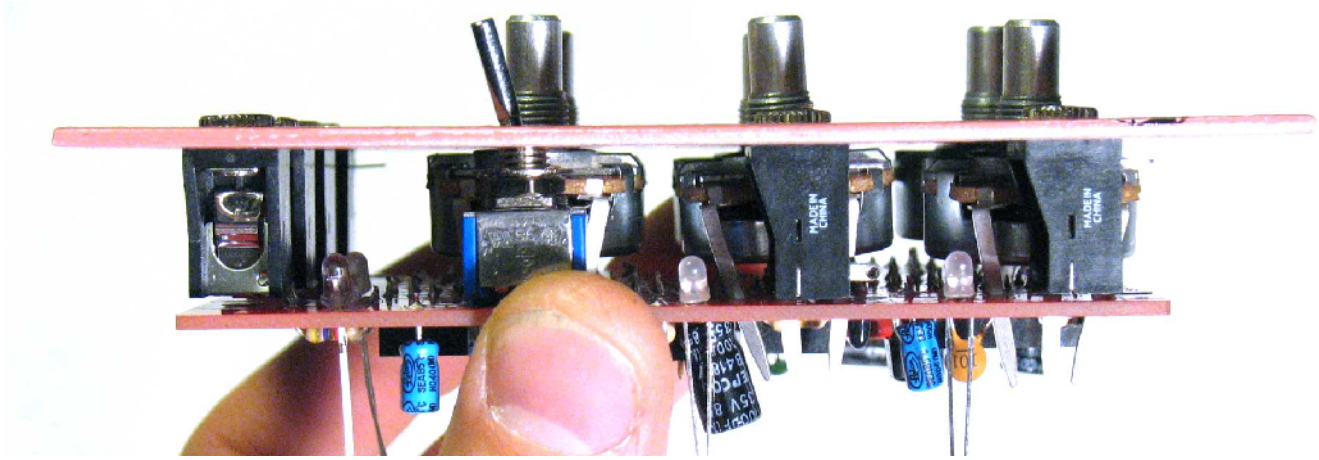
G. Insert the LEDs with the orientation as follows:

- Blue LED x 1 (clear body):
  long lead goes into the square hole
- Dual LEDs x 3 (milky body):
  long lead goes into the round hole

Do not solder them yet, they aren't lined up!

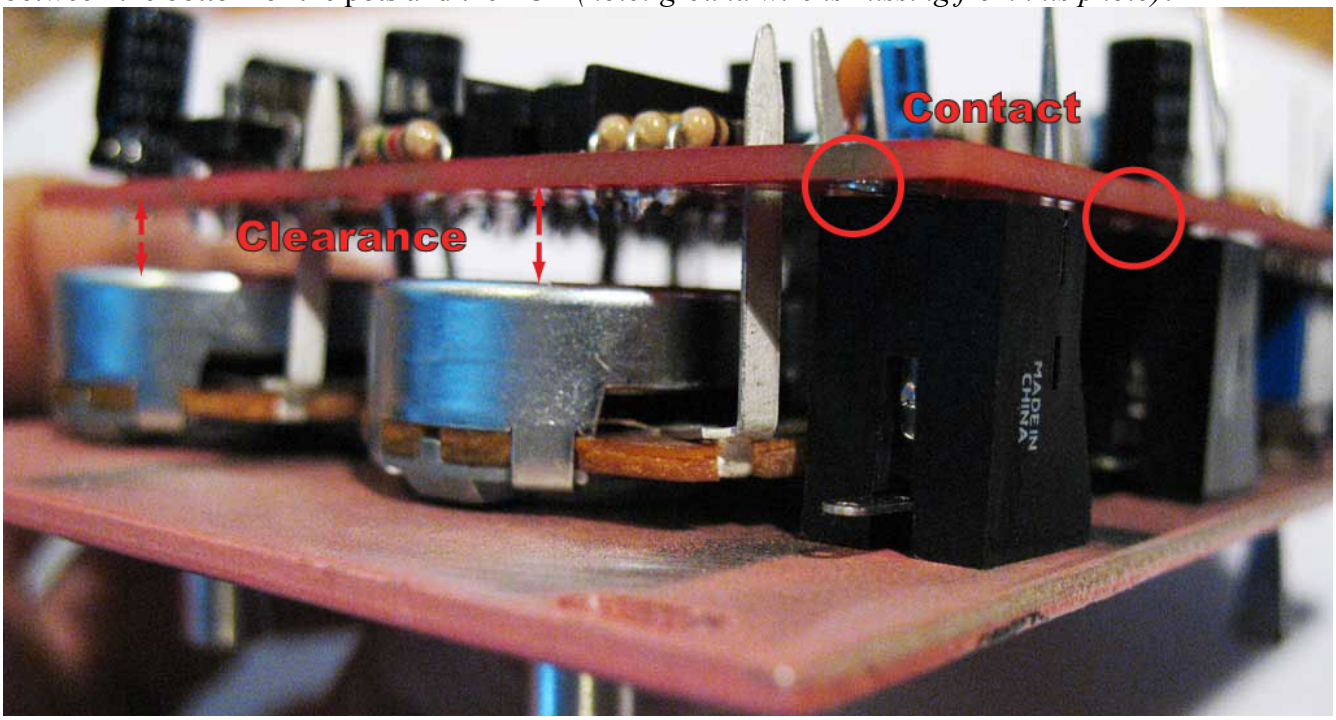
Step 6: Mounting

A. Put the panel on:
Keeping the PCB held in one hand, lower the panel (with the jacks attached) onto the pots/switch so the holes line up with the pots and switch. Wiggle things around as you shimmy it down so that the threads of the controls push through the panel:

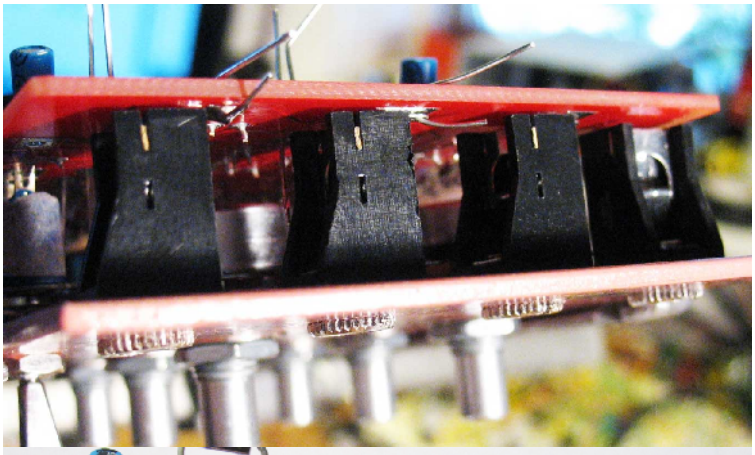


B. Put the nuts on:
When all 7 controls are lined up, put a washer and nut over each pot and switch and tighten them down finger-tight (the washer under the switch nut is optional). Verify that the LEDs are still in place and check to make sure all the controls are roughly vertical. Now tighten the seven nuts down with a wrench, making sure the pot or switch doesn't rotate while you tighten.

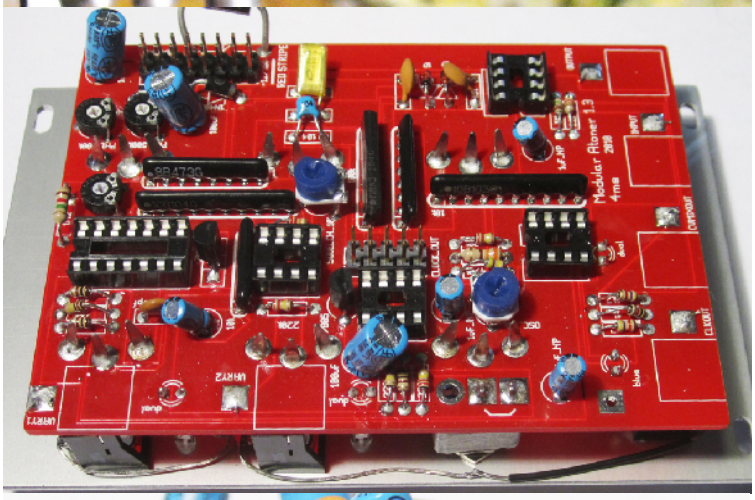
C. Check for clearance and contact:
Flip the board over so you can see the gap between the PCB and the bottom of the pots. Verify that the PCB is parallel to the panel, and in full contact with the bottom of each jack, and there's clearance between the bottom of the pots and the PCB *(note: ground wire is missing from this photo)*:



Step 7: Soldering the jacks and controls.

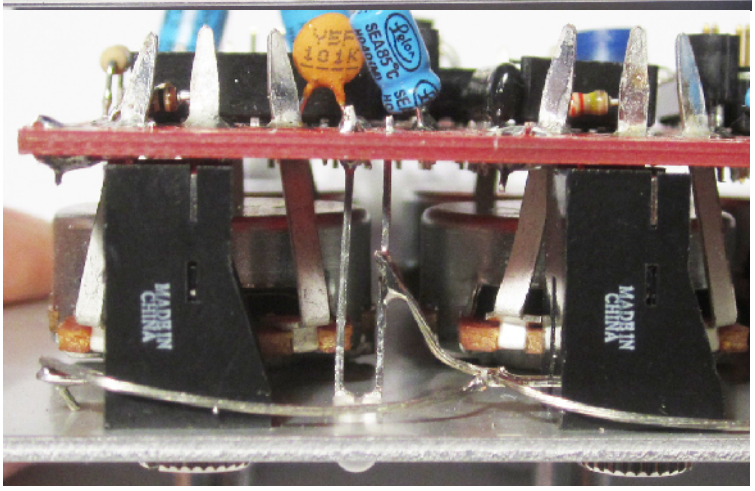


A. Attach each jack to the PCB by running a small piece of snipped resistor lead or wire through the hole in the PCB and the hole in the jack tab. You may need to loosen the nut and nudge each jack a bit to get the holes to line up. Bend this lead/wire over into a "U" shape so that it doesn't fall out. Solder each one as you go along from the top and bottom sides. Snip the excess wire off when you're done.



B. Push each LED head down so it sits in the hole in the panel. Splay the leads slightly so it stays in place while you solder it. Snip the excess lead off when done.

C. Solder all the pot leads, and the three switch tabs. You may wish to stick a piece of resistor lead into the smaller switch tab holes to insure the solder fully connects with the tabs.



D. Solder a small piece of lead or wire from the ground tab on the VARY-2 jack to the nearby lead of the VARY-1 LED (see photo at left). This insures that the panel is grounded to the PCB.

E. Flip the unit over and tighten all the nuts very tightly. Attach the knobs with a small flat-head screwdriver.

Step 8: Calibration

Insert all the ICs. Make sure to line up the notch/dot in the IC with the notch in the IC socket.

Power the unit on using a standard doepfer-style power connector. The red stripe (-12/15V) goes towards the bottom. Make sure nothing is getting hot before you proceed.
Plug the OUT jack into something so you can listen, and get ready to turn some trimpots!

1. Squelch Tweak
    1. All 6 knobs straight up (50%)
    2. OSC switch on
    3. Turn SQUECLH_10K trim pot as you listen to the output. There should be a range somewhere in the middle where the Atoner outputs clicking sounds. Set the trim pot to center of this audible range
2. Oscillator tweak
    1. Turn PHI_500K trim pot all the way up
    2. Turn Freq knob all the way up
    3. Turn Position knob all the way up
    4. Turn OSC_10k trim pot until you hear about a 10kHz tone (dog whistle). It doesn't need to be exact, and you can change this later, this trimpot merely sets the maximum frequency the internal oscillator can produce.
3. Position Tweak
    1. Make sure Position knob is still all the way up.
    2. Turn PHI_500K trim pot down slowly until you hear the sound jump an octave or a fifth down.
    3. Turn Freq knob down until you get a 1kHz tone (roughly an octave above A-440). Again, there is no reason this needs to be exactly measured. Later, if you don't like the range of the Position knob, you can re-adjust PHI and PLO trim pots.
    4. Turn Position knob to straight up (50%). You probably will hear clicking.
    5. Turn PLO_500K trim pot up **VERY SLOWLY**, listening to the pitch jump upwards. Keep turning until it stops jumping upwards. Then turn it back slowly until the pitch just starts to jump down.
4. CV Mix tweak
    1. Run a slow positive-only envelope into the VARY 1 jack, maybe 1 or 2 seconds per cycle. Wiard Envelator +OUT, or MATHS with scale knob all the way up works great.
    2. Set Vary 1 knob exactly at the first major hash mark to the right of center (about 1 o'clock)
    3. Make sure the Oscillator is still on and outputting about 1kHz (about 3 o'clock)
    4. Turn Position down slightly until you hear a nice scale being played up and down without very much clicking or holding on the high note.
    5. Now **SLOWLY** adjust the CVMIX_100k trim pot until the CV Mix LED fades from Off to Green, but doesn't turn Red at all.
5. Clock Out jumper
    1. Put a jumper on one of the Clock Output jumpers. Standard setting is jumper 3. See the Atoner cheat-sheet for jumper settings. The blue LED should flash faster with higher output pitches.

You're done! Congrats!