B.Y.O.C. 10-band graphic equalizer instructions
version 1.0

Checklist

Resistors:
1 - 470ohm (yellow/purple/black/black/brown)
1 - 4.7k (yellow/purple/black/brown/brown)
1 - 6.8k (blue/gray/black/brown/brown)
1 - 470k (yellow/purple/black/orange/brown)
1 - 2.2m (red/red/black/yellow/brown)

Capacitors:
1 - 100pf ceramic disc (101)
1 - 180pf ceramic disc (181)
1 - 270pf ceramic disc (271)
1 - 560pf ceramic disc (561)
1 - 820pf ceramic disc (821)
1 - .0018uf film (182)
1 - .0022uf film (222)
1 - .0027uf film (272)
1 - .0056uf film (562)
1 - .0068uf film (682)
1 - .0082uf film (822)
1 - .01uf film (103)
1 - .022uf film (223)
1 - .027uf film (273)
1 - .033uf film (333)
1 - .068uf film (683)
1 - .082uf film (823)
3 - .1uf film (104)
1 - .22uf film (224)
1 - .33uf film (334)
1 - 1uf aluminum electrolytic
1 - 3.3uf aluminum electrolytic
2 - 10uf aluminum electrolytic
2 - 100uf aluminum electrolytic

Diode:
1 - 1N4001
1 - red LED status light

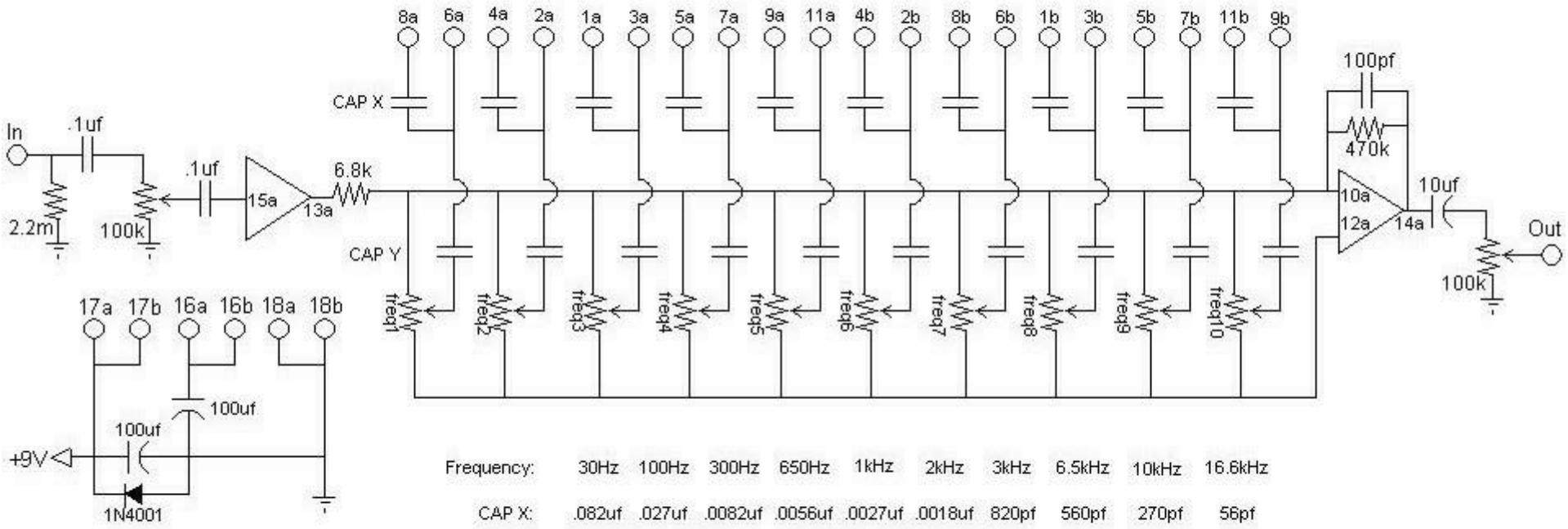
IC:
2 - BA3812L (ZIP 18 package)

Potentiometers:
12 - B100k miniature sliders

Hardware:
3 - 4/40 1 & 1/8" screws
3 - 3/8 round nylon spacer 6 x 3/8"
6 - 4/40 hex nut
6 - #4 tooth lock washer

4 - 6/32 screws (for enclosure)
1 - pre-tooled enclosure
1 - circuit board
1 - 3PDT foot switch
1 - 1/4” stereo jack
1 - 1/4” mono jack
1 - battery snap
1 - AC adaptor jack
4 - bumpers
hook up wire

B.Y.O.C. 10 BAND GRAPHIC EQUALIZER

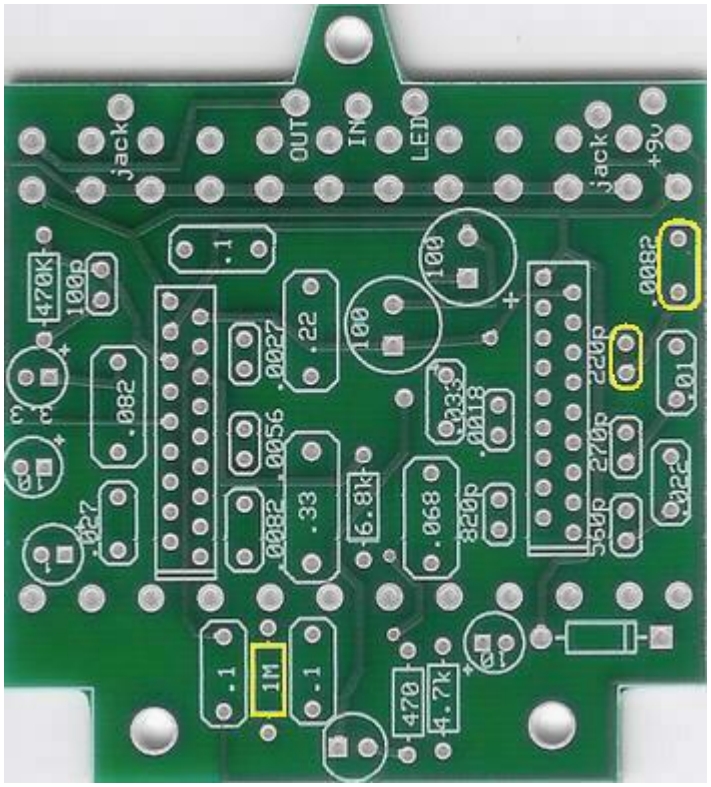


Frequency:	30Hz	100Hz	300Hz	650Hz	1kHz	2kHz	3kHz	6.5kHz	10kHz	16.6kHz
CAP X:	.082uf	.027uf	.0082uf	.0056uf	.0027uf	.0018uf	820pf	560pf	270pf	56pf
CAP Y:	3.3uf	1uf	.33uf	.22uf	.1uf	.068uf	.033uf	.022uf	.01uf	.022uf

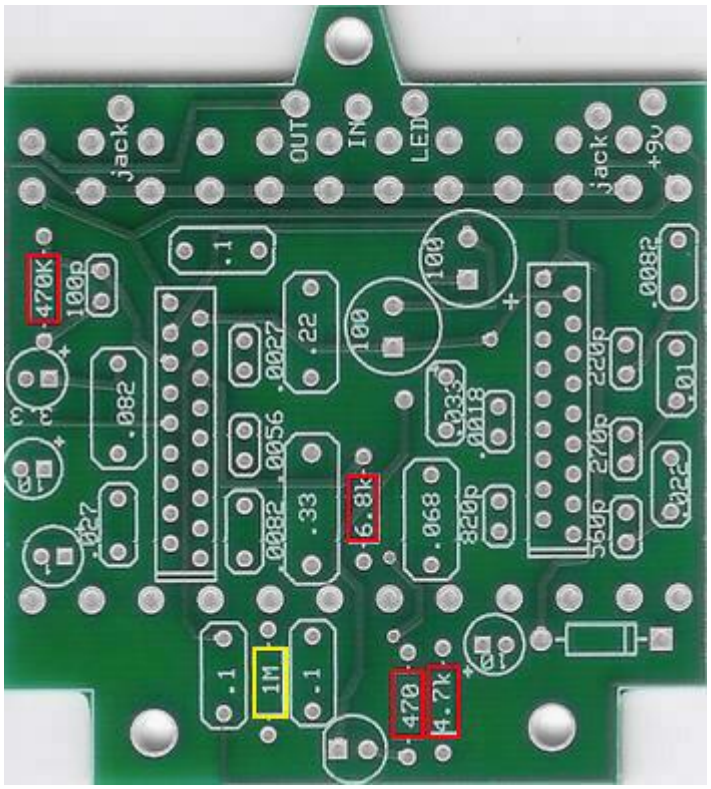
IC a: BA3812L (ZIP18)
IC b: BA3812L (ZIP18)
All potentiometers B100K sliders

drawn by K. Vonderhulls

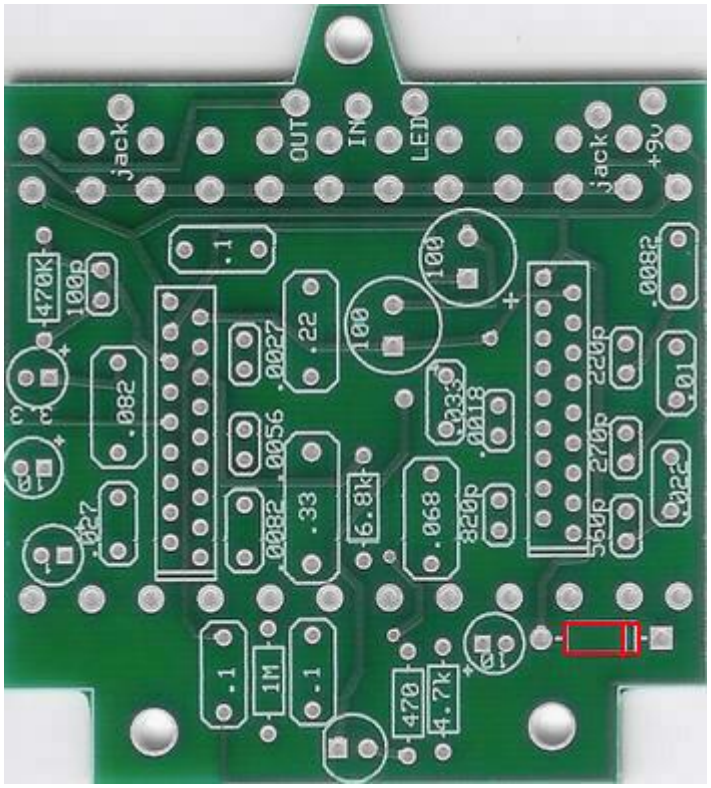
Populating the Circuit board



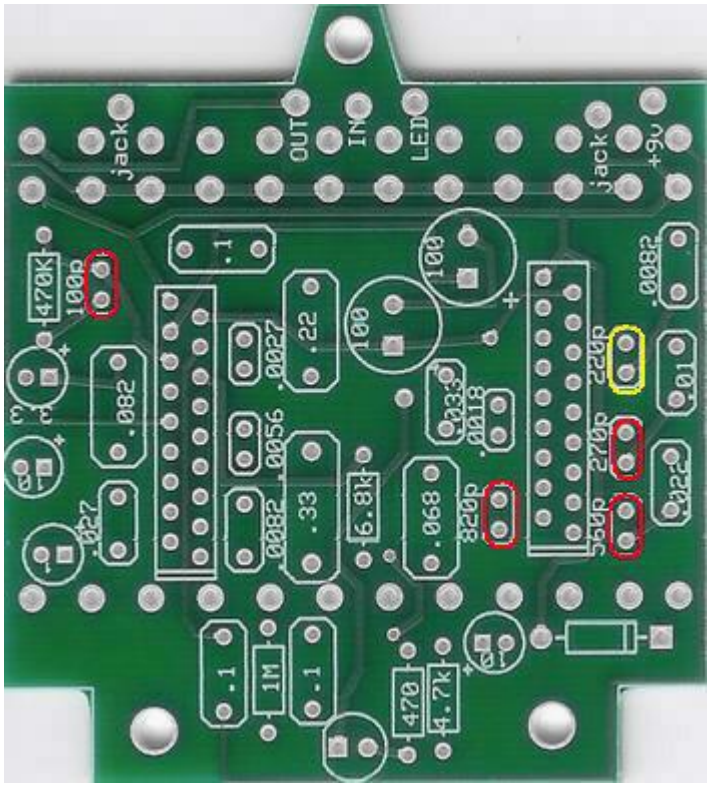
Before you start, make note that there are 3 typos on the PCB silk screening highlighted here in yellow. The 1M resistor should be a 2.2M, the 220pf cap should be a 180pf, and the .0082uf cap should be a .0068uf.



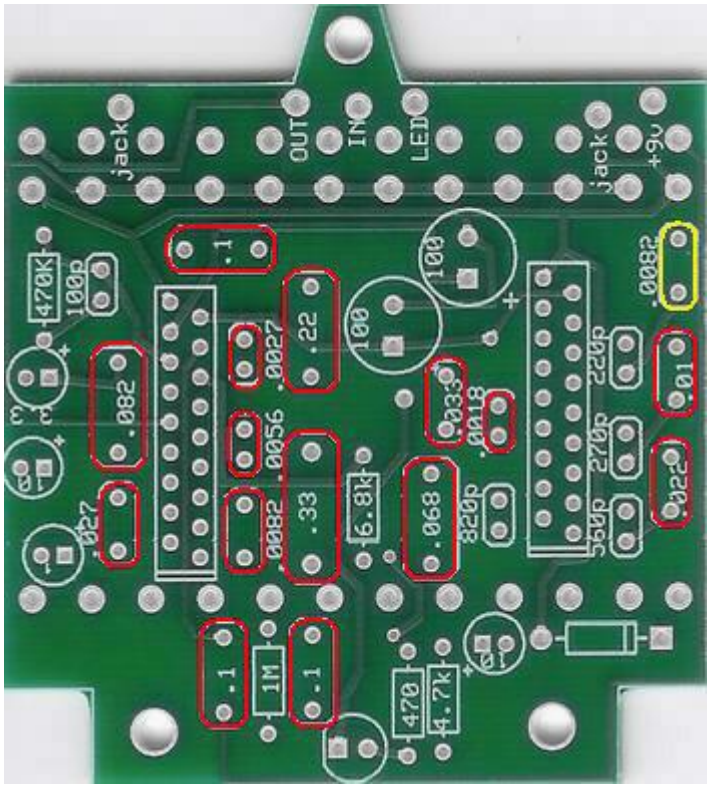
Step 1: Add the resistors. Resistors are not polarized and can go in either direction. Remember to use the 2.2m resistor in place of the 1M.



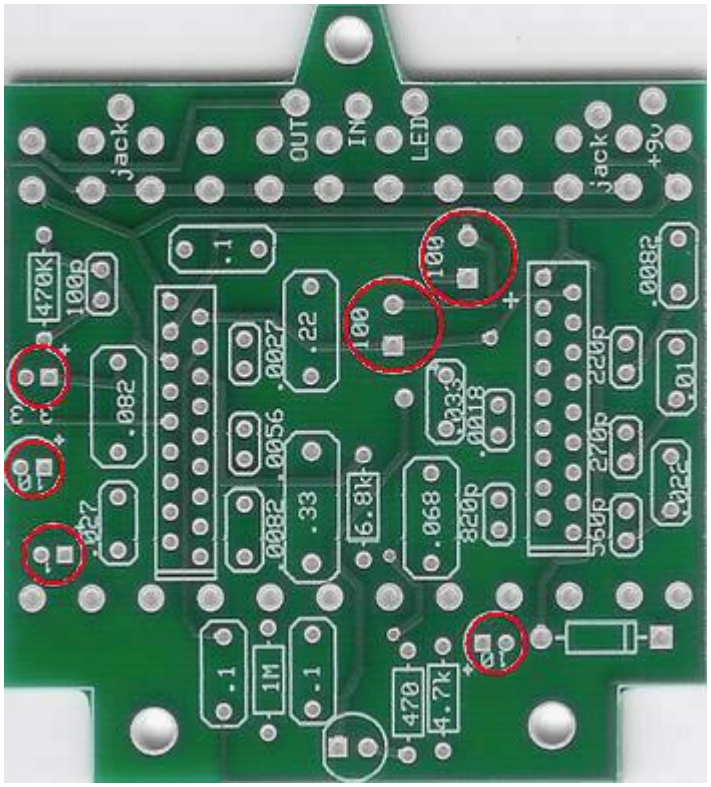
Step 2: Add the diode. Be sure to match the stripe on the diode with the stripe on the PCB layout.



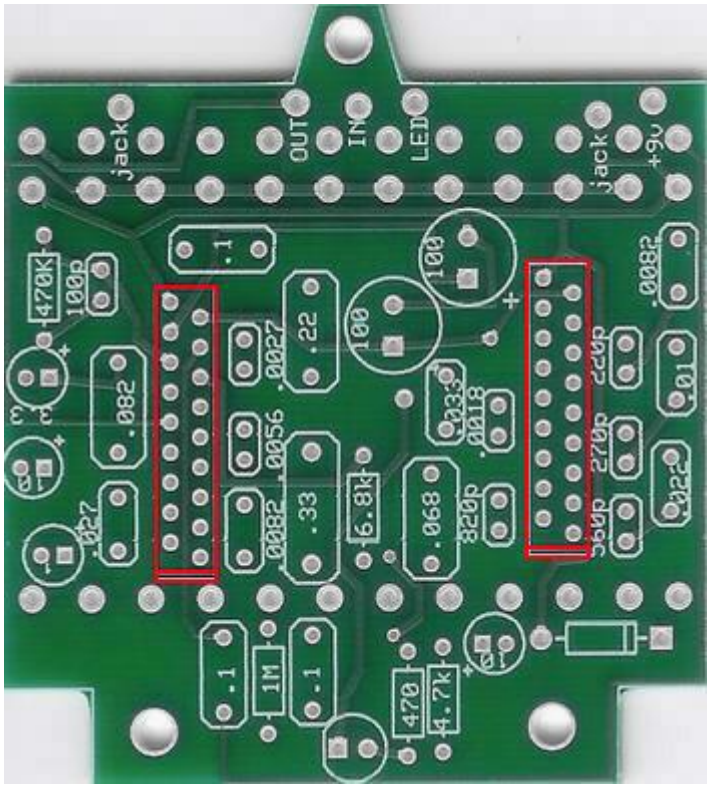
Step 3: Add the ceramic disc capacitors. These are not polarized and can go in either direction. Remember to use the 56pf instead of the 220pf.



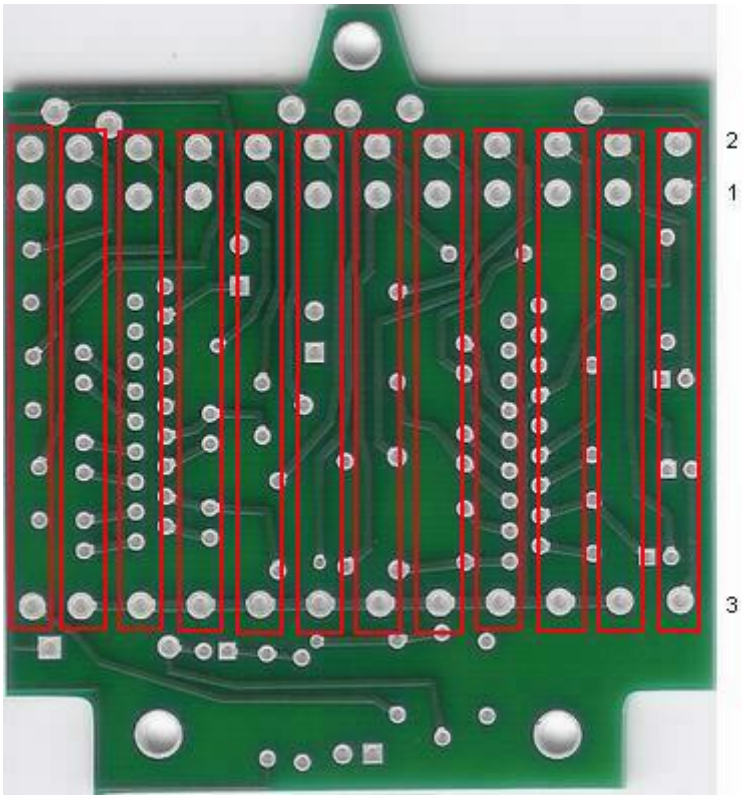
Step 4: Add the film capacitors. These are not polarized and can go in either direction. Remember to use the .0022uf instead of the .0082uf.



Step 5: Add the aluminum electrolytic capacitors. These are polarized. The positive lead will be longer and should go in the square solder pad. The negative lead will be shorter and have a black stripe down one side and should go in the round solder pad.

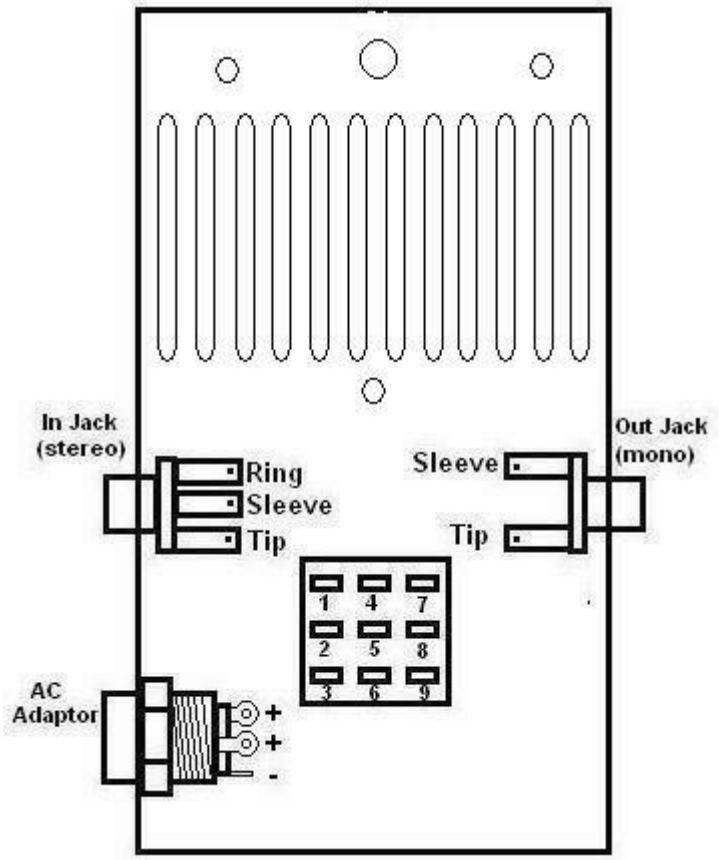


Step 6: Add the two BA3812L's. MAKE SURE TO PROPERLY ORIENTATE THESE CHIPS!!!. Line up the end that has the notch in it with the end of the layout that has the double lines. Make sure all the pins are straight and alligned before you try sticking it in.



Step 7: Add the sliders. These will go on the bottom side of the PCB. It should be fairly obvious how to orientate them since there is only one way they can fit in the board.

Assembly

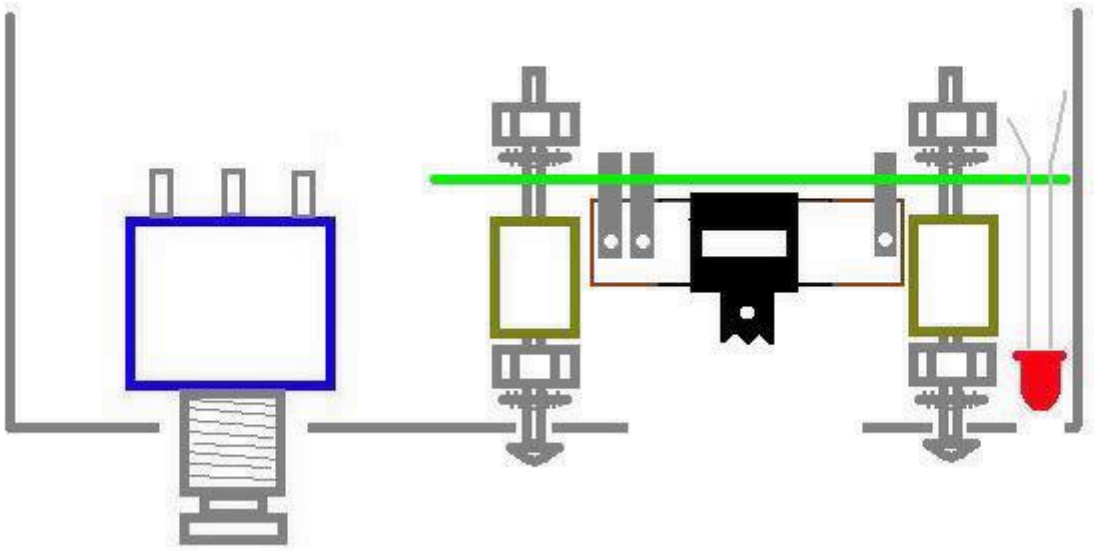


1. Install the jacks first. If you are looking down inside the enclosure, the mono jack goes on the right side and the stereo jack goes on the left. Place the washer on the outside of the enclosure. Use a 1/2" wrench to tighten.

2. Install the AC adaptor jack. The bolt goes on the inside. Use a 3/4" or 14mm wrench to tighten.

3. Install the footswitch. The first bolt and metal washer go inside. The plastic washer and second bolt go on the outside. It does not matter which side you designate as the "leading edge" of the footswitch as long as you orientate it so that the flat sides of the solder lugs are aligned in horizontal rows, not vertical columns.

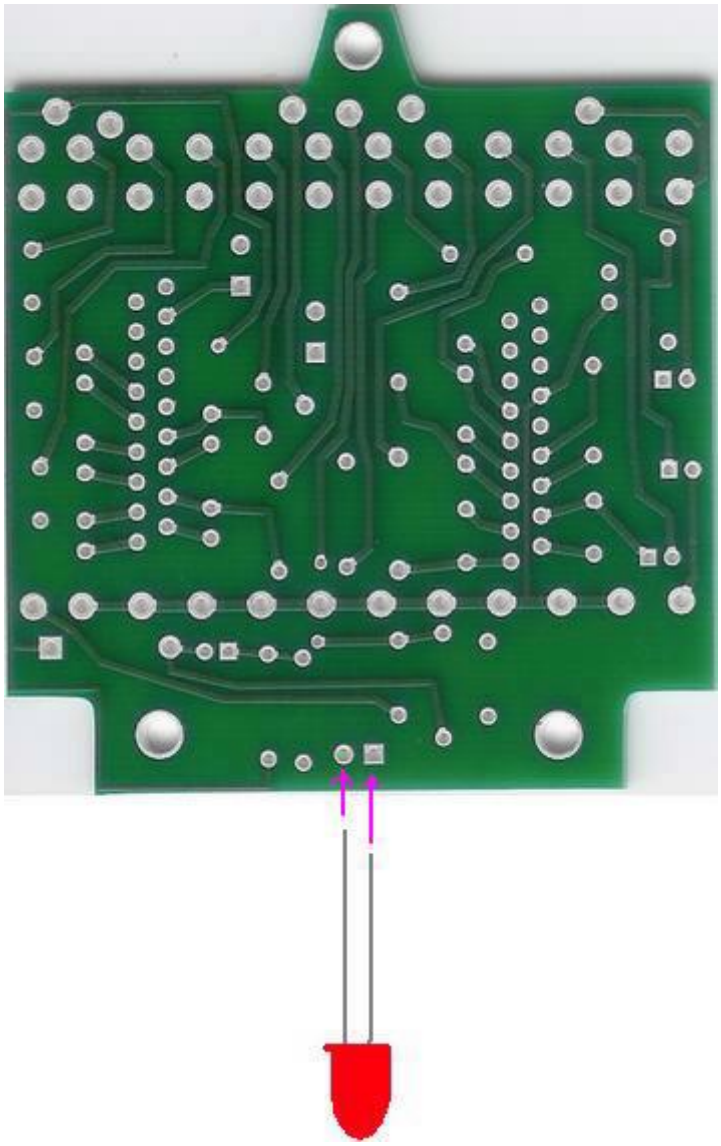
Mounting the Circuit Board



Step 1: Insert the three 4/40 screws from the outside of the enclosure. Then add one #4 toothed lock washer to each screw on the inside of the enclosure. Then add one 4/40 hex nut to each screw and tighten.

Step 2: Add one 3/8 nylon spacer to each screw.

Step3: Insert the LED into the slider side of the PCB. Put the longer LED lead (anode) into the round solder pad hole and the shorter LED lead (cathode) into the square solder pad hole. Do not solder the LED yet. Only bend the ends of the LED leads so that you can flip it over and not have the LED fall out.



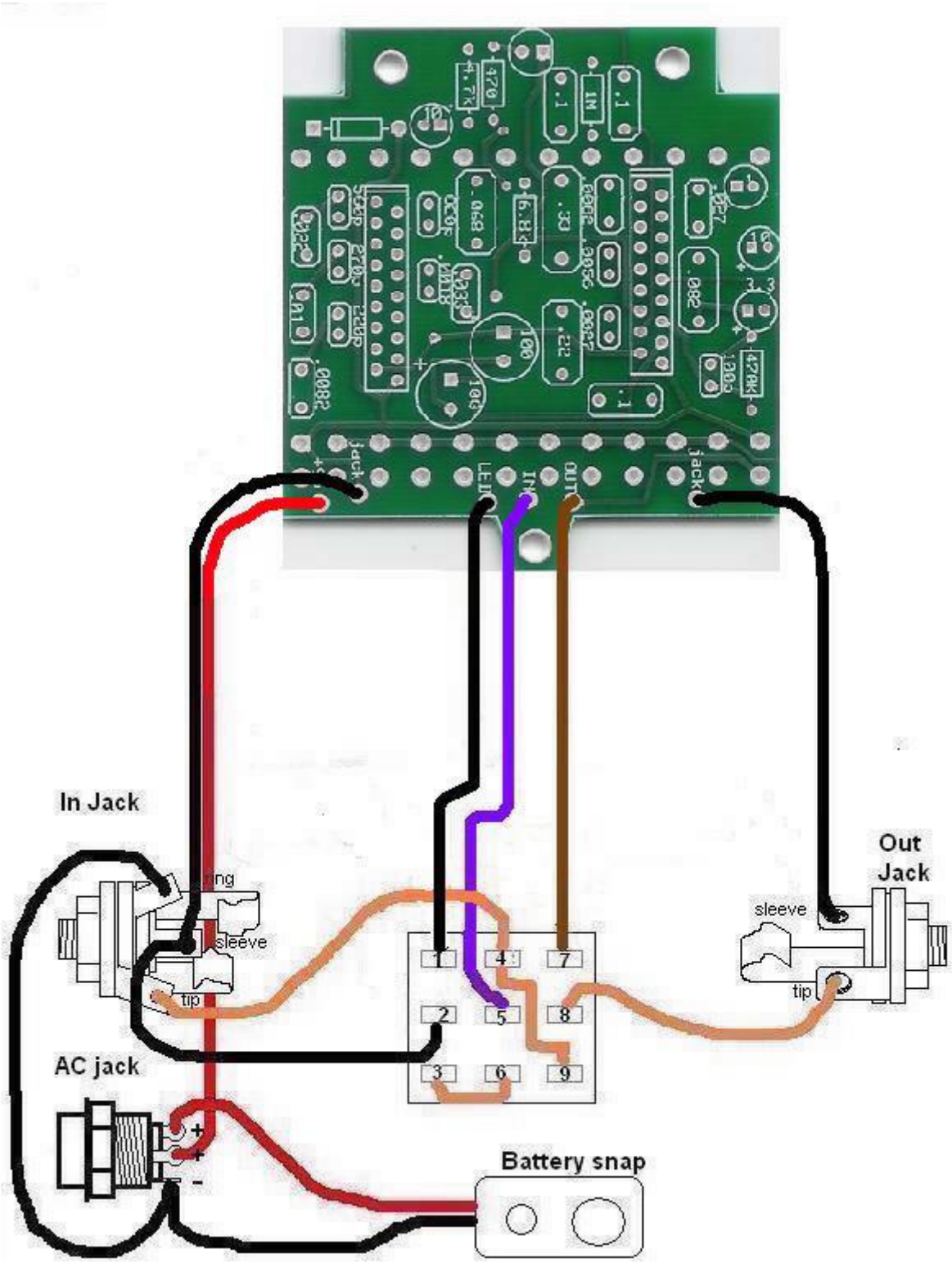
Step 4: Install the circuit board so that the 3 screws fit into the 3 mounting holes in the circuit board. CAREFULLY !!!!!!!!! slide the circuit board all the way down to the nylon spacers. The slider knobs will probably not line up with their respective channels. You will need to use some sort of probe-like tool like a very small screwdriver and insert it into the trouble channels and very gently bend the entire slide to one side so that it is properly aligned with its channel.

Even if the slider knob fit into its channel without any trouble, you should still go through all of the sliders and “center” any that are not perfectly aligned.

Step 5:Add a toothed lock washer followed by a 4/40 hex nut to each of the 3 mounting screws and tighten.

Step 6: Grab the LED leads that are sticking out of the “component side” of the PCB and guide the LED into its hole. You only want the tip of the LED to stick out. You don't want it to stick all the way out. Once you position the LED, solder it in place.

EQ wiring diagram



Finishing Up

Add the enclosure cover and screws and test the pedal. Here are some common problems:

1. No sound at all in either the bypass or on position. If you aren't getting sound in bypass then you did not wire your footswitch correctly. Getting the bypass to work is the first thing you need to worry about.
2. Bypass works and the LED lights up when "on", but there's no sound. You either have a problem with the wiring from the in to the out of the circuit board and foot switch. . Or you have a problem with something on the circuit board.
3. Bypass works, but there's sound when on and the LED does not come on. You probably aren't getting any power to the circuit. .

The nice thing about this particular pedal is that if you get it to "mostly" work, it's very easy to find the problem. If a particular frequency isn't working then you likely have a cold solder joing on one of the 2 capacitors or slider that affects that frequency. If you notice that the lower 5 frequencies work but not the upper 5 frequencies, then you likely have a problem with ICb. If the problem is the opposite, then you likely have a problem with ICa.

If none of this helps, and you can't seem to figure out the problem, I always find that it is best to just set the pedal aside for a day or 2 and then come back to it with a fresh pair of eyes. Then the problem usually jumps right out at you….usually.

If you still can't get it working, start a thread on the BYOC forum and ask for help. board.buildyourownclone.com

Modifying the Selected Frequencies

So now you've got your pedal working and you want to tailor it for a very specific set up....OK. The “stock” frequency spread that is supplied with the kit is designed to provide the widest frequency range available for guitar. But the lowest and highest frequencies may slightly extrapolate your guitar amp's abilities depending upon your speakers' frequency range.

If you find that the highest frequency seems a little weak, you may want to remove the caps for 16.5kHz and replace them with caps for 12kHz.

If you find that the lowest frequency seems a little weak, you may want to remove the caps for 30Hz and replace them with caps for 65Hz.

If you want very detailed control of the mid range you may want to get rid of the two most extreme frequencies and add two other mid frequencies.

If you are playing direct into a PA system or recording direct, you probably don't want to change anything. But if you are mic'ing a guitar amp, you will still be limited by your speakers' frequency range.

Frequency - Capacitors(in µF unless noted)
30Hz* = .082/3.3
65Hz = 056/2.2
100Hz* = .027/1
200Hz = .018/.68
300Hz* = .0082/.33
470Hz = .0068/.27
650Hz* = .0056/.22
830Hz = .0033/.15
1kHz* = .0027/.1
2kHz* = .0018/.068
3kHz* = 820p/.033
4.7kHz = 680p/.027
6.5kHz* = 560p/.022
8.3kHz = 330p/.015
10kHz* = 270p/.01
12kHz = 220p/.0082
16.5kHz* = 180p/.0068
*stock values included with kit.

If you want a very exact frequency that's not supplied above here's the fomula to figure out the capacitor combination:

$$Hz = 2\pi\sqrt{\frac{1}{1.2k \times 68k \times CX \times CY}}$$

CX = Cap X and CY = Cap Y. Refer to the schematic on page 4.