Sushi Box FX – Black Eye

The Particle Accelerator is based on the Alembic F-2B, which is in turn based on the Fender Dual Showman preamp. This is an all-tube, mid-low gain preamp with a classic Fender/Marshall/Vox tonestack and sounds excellent on both guitar and bass.

DISCLAIMER AND WARNING

This circuit contains high voltages exceeding 200V and is EXTREMELY DANGEROUS. Sushi Box FX is not responsible for any damage or injury caused by improper use or assembly. I encourage you to use the utmost care when building, testing, and using this pedal. If high voltages make you uncomfortable, DO NOT BUILD THIS. Just don't. This is not a beginner project and should not be treated as such. It was designed to be as easy as possible to assemble and make it work, but **you have to be careful**.

Normally I would recommend testing a circuit before putting it into the box, but in this case I recommend fully boxing the unit before testing for the sake of safety. If for any reason you need to probe voltages inside the box, do so with extreme caution, and only keep one hand near the box at a time, do not allow both hands to touch the box/circuit at the same time.

Recommended Build Instructions

This will go similar to most pedal builds; I recommend starting with smaller components and working your way up to the larger components. I recommend assembling in the following order:

1. Resistors
2. Diodes
3. IC socket
4. Ceramic capacitors
5. Film capacitors
6. Electrolytic capacitors
7. Inductor
8. BJT transistor
9. Power MOSFET
10. Tube socket daughter board
11. Potentiometers
12. 3PDT daughter board

Since this build is a bit more involved than most DIY projects, I've provided detailed step-by-step assembly instructions. I recommend assembling the main PCB first, then assembling the tube daughter board PCB and soldering it to the main PCB. Once these PCBs are assembled together I recommend putting it into the enclosure with the 3PDT so you can get the alignment right with the 3PDT daughter board before soldering that to the main PCB as well.

Bill of Materials

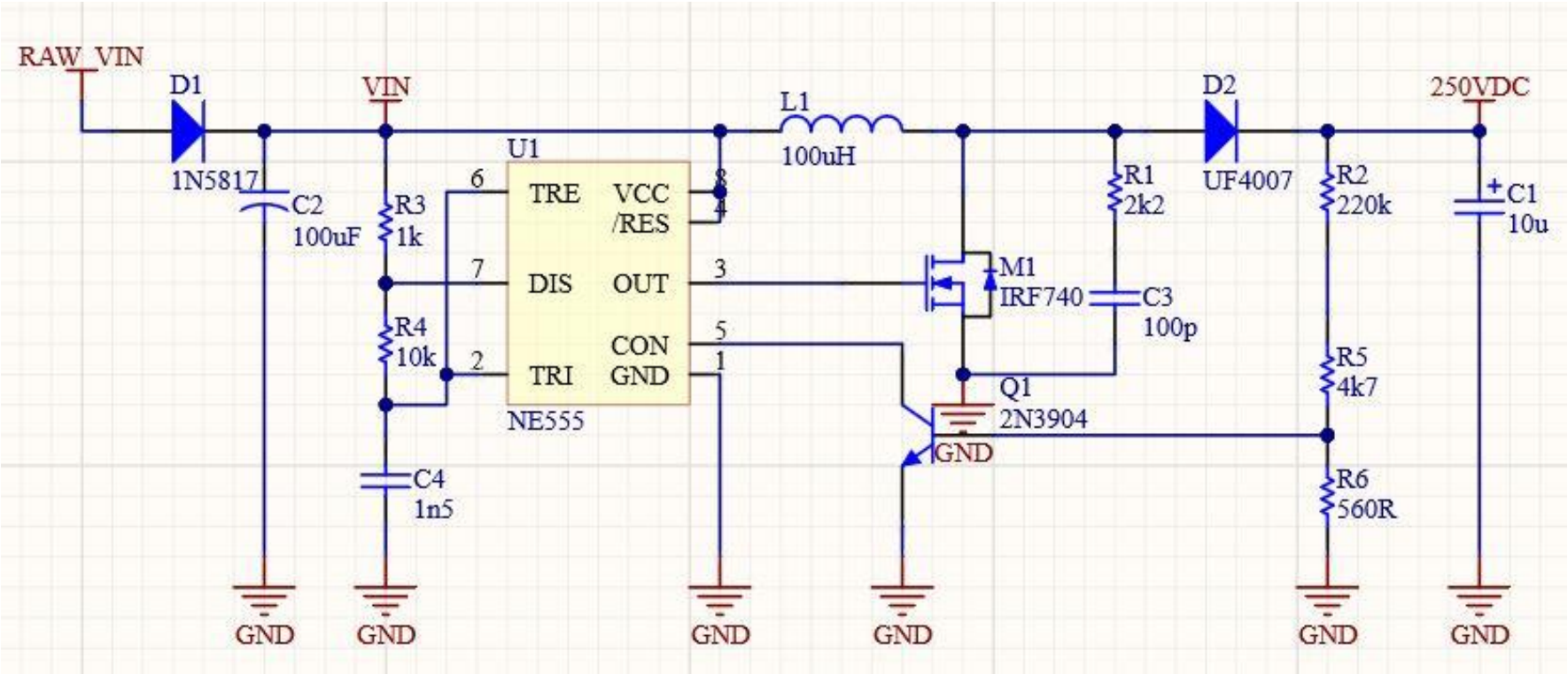
The links below are recommendations and suitable replacements can be used as needed. These are non-affiliated links, I get no compensation of any kind if these links are used.

Comment	Description	Quantity	Link
560R	1/4W Resistor	1	Tayda Link
1k	1/4W Resistor	3	Tayda Link
1k8	1/4W Resistor	2	Tayda Link
2k2	1/4W Resistor	2	Tayda Link
4k7	1/4W Resistor	1	Tayda Link
10k	1/4W Resistor	4	Tayda Link
39k	1/4W Resistor	1	Tayda Link
68k	1/4W Resistor	1	Tayda Link
100k	1/4W Resistor	4	Tayda Link
220k	1/4W Resistor	4	Tayda Link
330k	1/4W Resistor	1	Tayda Link
470k	1/4W Resistor	2	Tayda Link
1M	1/4W Resistor	2	Tayda Link
B25k	9mm Potentiometer	1	Tayda Link
A1M	9mm Potentiometer	2	Tayda Link
100p 50V	Ceramic capacitor	1	Tayda Link
470p 50V	Ceramic capacitor	2	Tayda Link
1n 50V	Film capacitor	2	Tayda Link
1n5 50V	Film capacitor	1	Tayda Link
22n 50V	Film capacitor	1	Tayda Link
22n 630V	High voltage film capacitor	4	Tayda Link
1u 25V	Electrolytic capacitor	2	Tayda Link
10u 250V	Electrolyitic capacitor	1	Tayda Link
100uF 25V	Electrolyitic capacitor	1	Tayda Link
UF4007	Ultra-fast rectifier diode	1	Tayda Link
1N5817	Schottky diode	1	Tayda Link
LED	3mm or 5mm	2	Tayda Link
100uH	100uH 2A Inductor	1	Tayda Link
2N3904	NPN General Purpose Amplifier	1	Tayda Link
IRF740	400V 20A N-Channel MOSFET	1	Tayda Link
NE555	Timer IC	1	Tayda Link

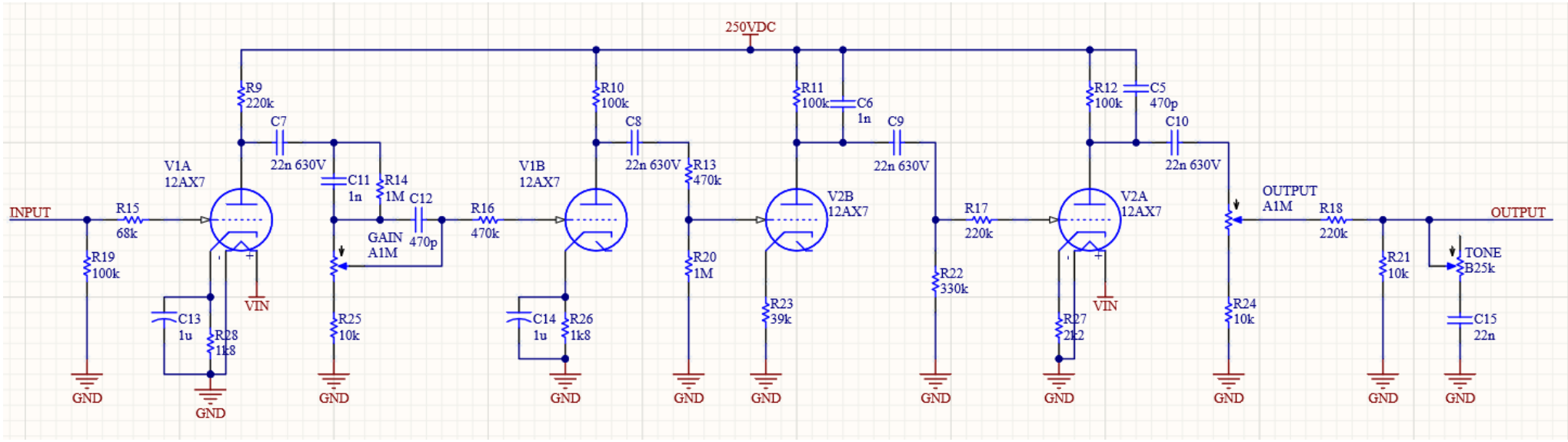
Sushi Box FX – Black Eye Build Instructions

Comment	Description	Quantity	Link
Socket	8-pin DIP socket	1	Tayda Link
12AX7	Dual Triode	2	AES Link
Socket	9-pin Tube Socket	2	AES Link
6-pin Header	Single row straight male header	1	Tayda Link
2x5 RA Header	Dual row right-angle male header	2	Tayda Link
3PDT	3PDT footswitch	1	Tayda Link
1590BB	Aluminum enclosure	1	Tayda Link
1/4" mono	1/4" mono jack	2	AES Link
2.1mm	2.1mm DC jack	1	AES Link

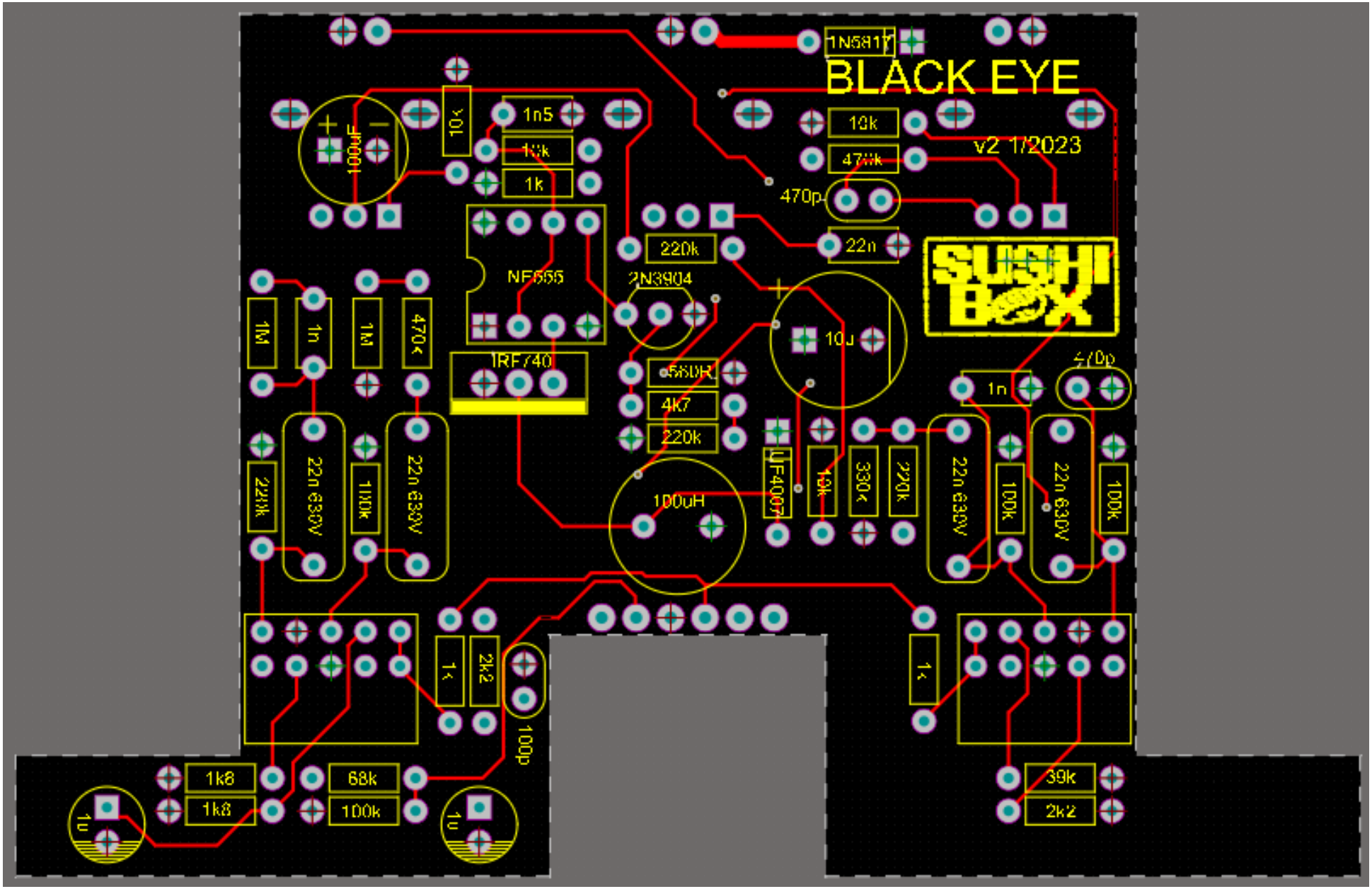
Schematic: Power Supply



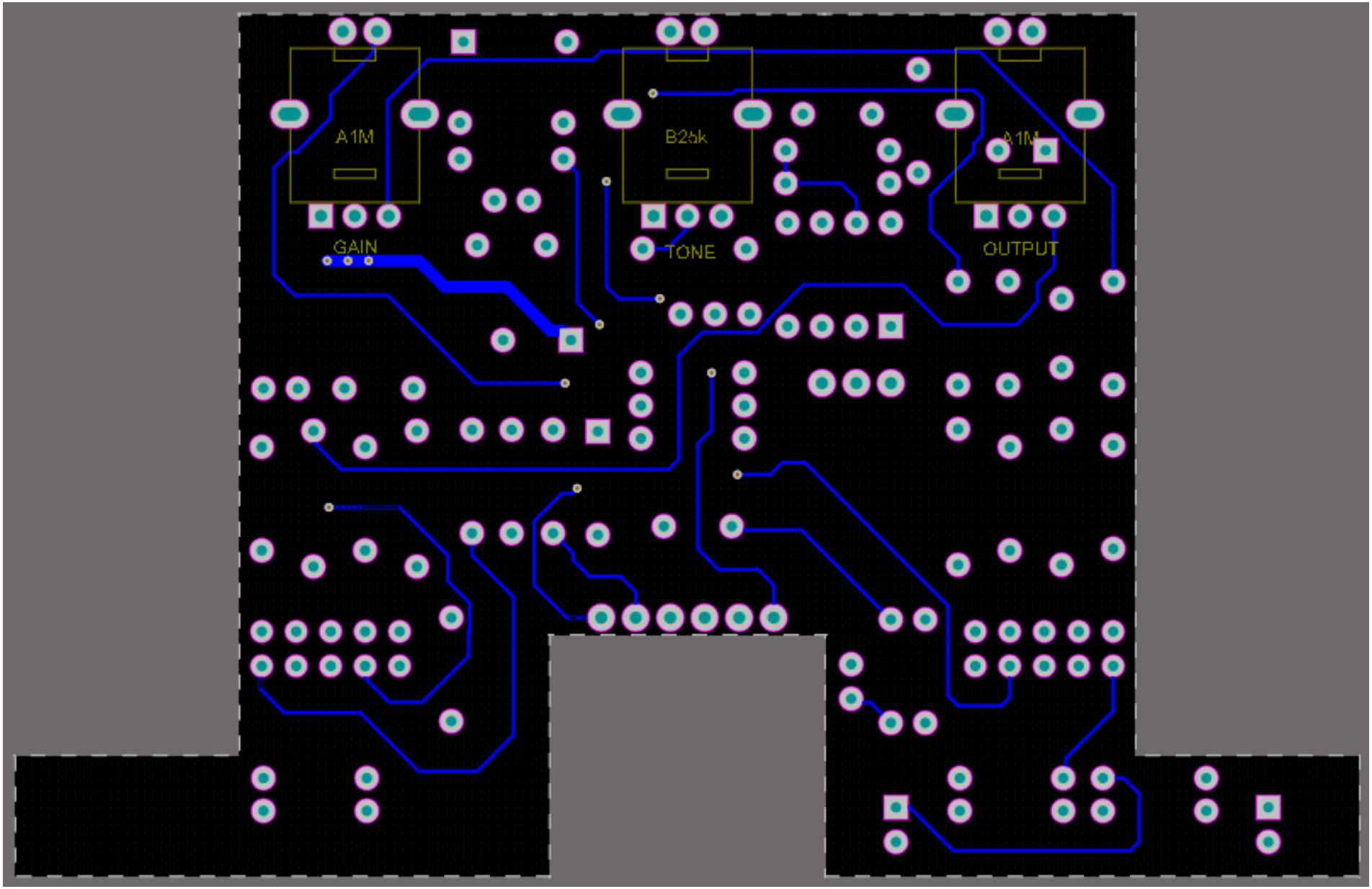
Schematic: Audio



Board Layout - Top

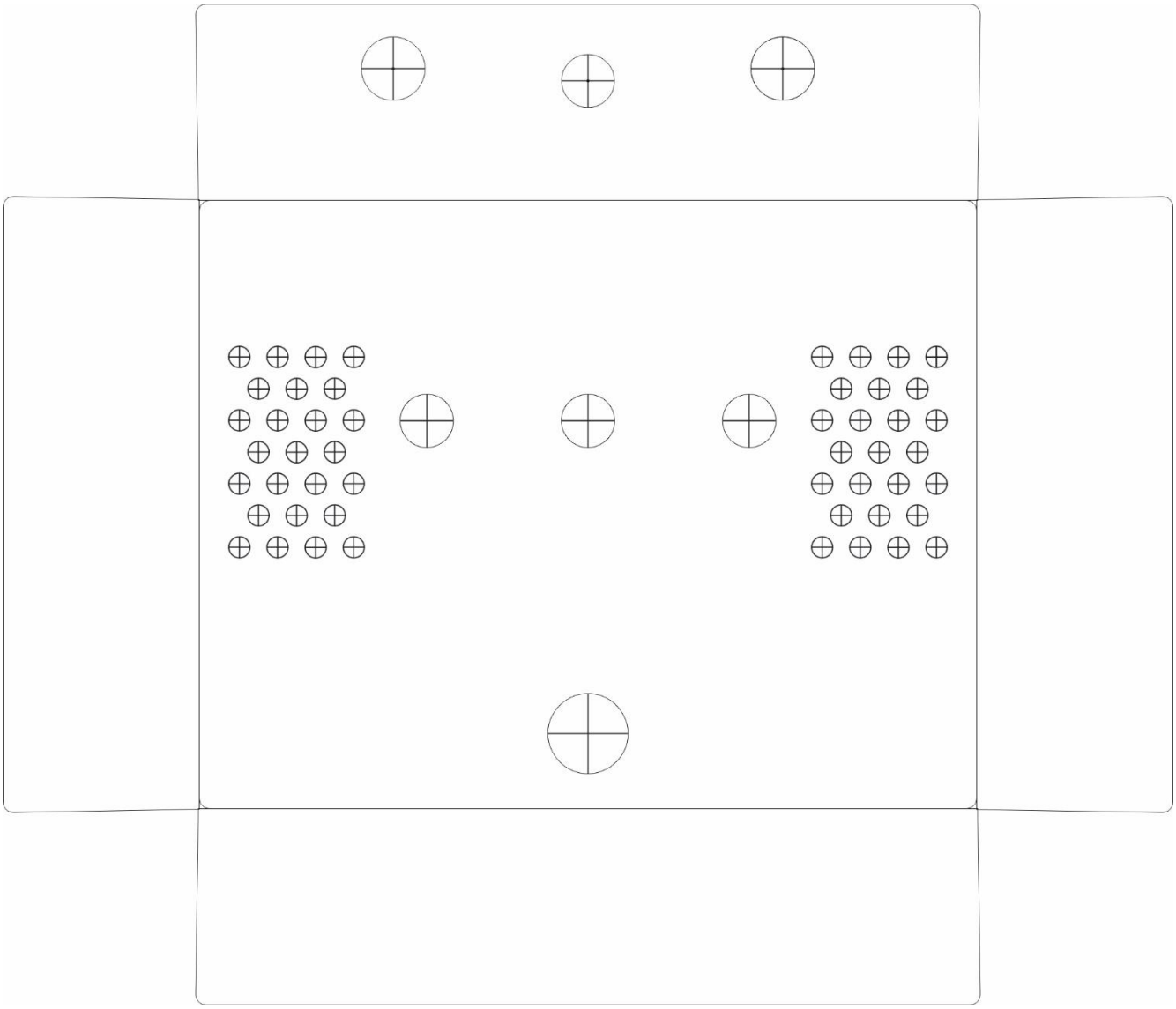


Board Layout – Bottom



Drill Template – 1590BB

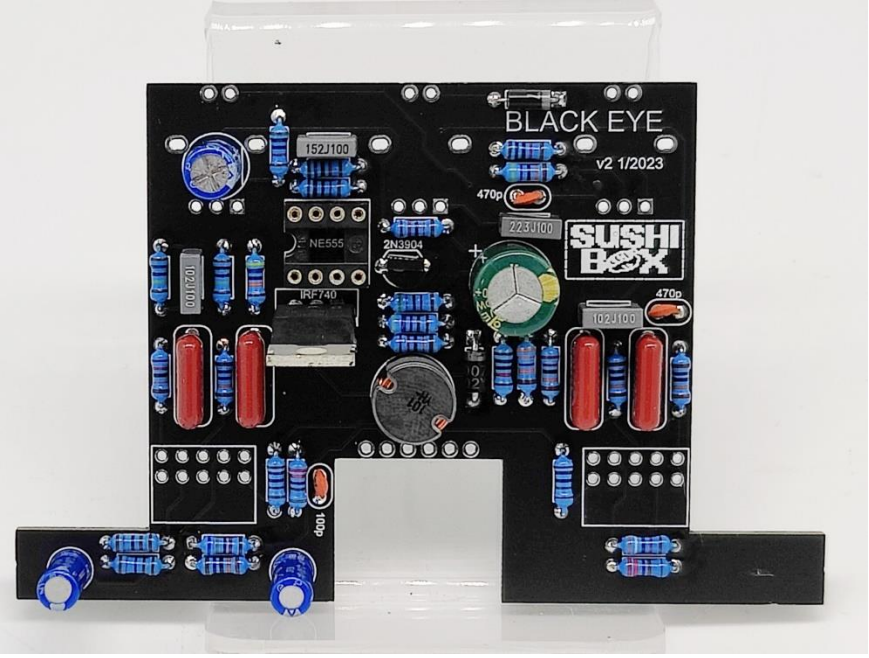
Print to 100% scale; provided as a reference with no guarantees. Holes for tube vent are optional and you can use some or all (or none) of them. Vent holes designed for 1/8” (approx. 3mm) drill bit.



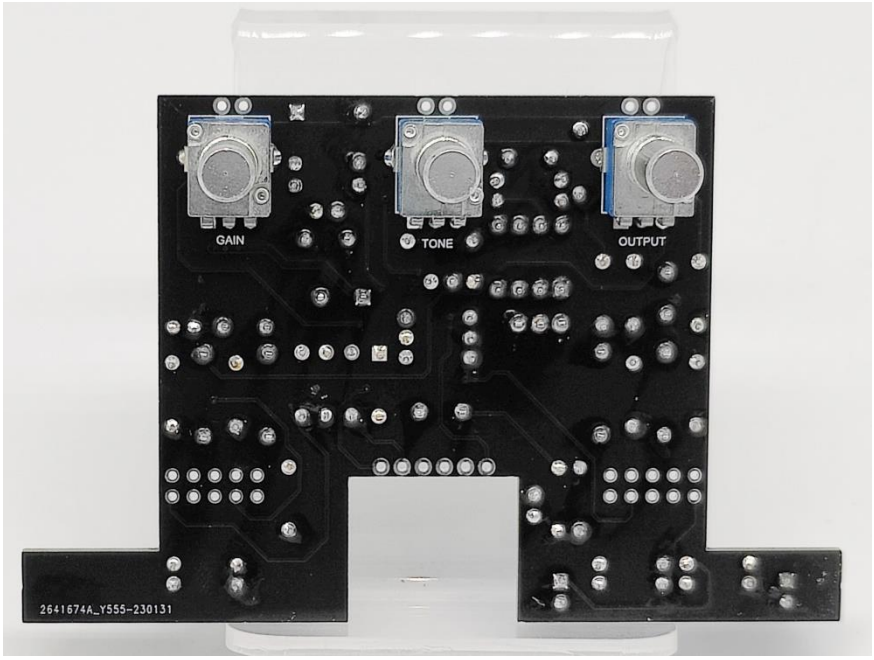
Detailed Build Instructions

Due to the complexity of the build, please reference the following instructions.

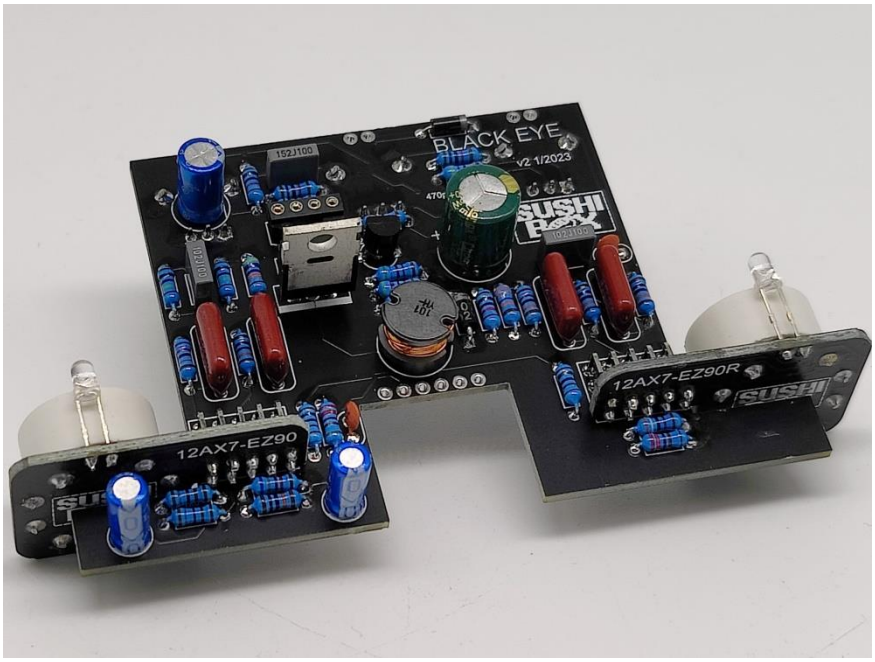
1. Assemble the main PCB. Solder the components to the top of the main PCB and clip the excess leads from the bottom.

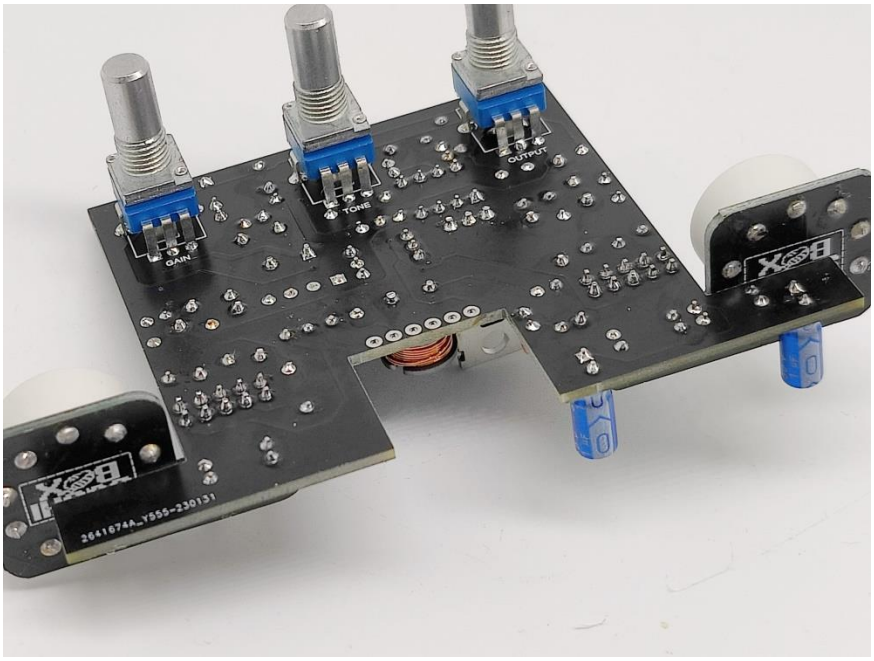


2. Attach the pots. Connect the pots to the bottom side of the main PCB and solder them in place. The two pins on the side of the body are for stability and are also used as a ground connection to the chassis and it is recommended that you solder them in addition to the 3 main signal pins.

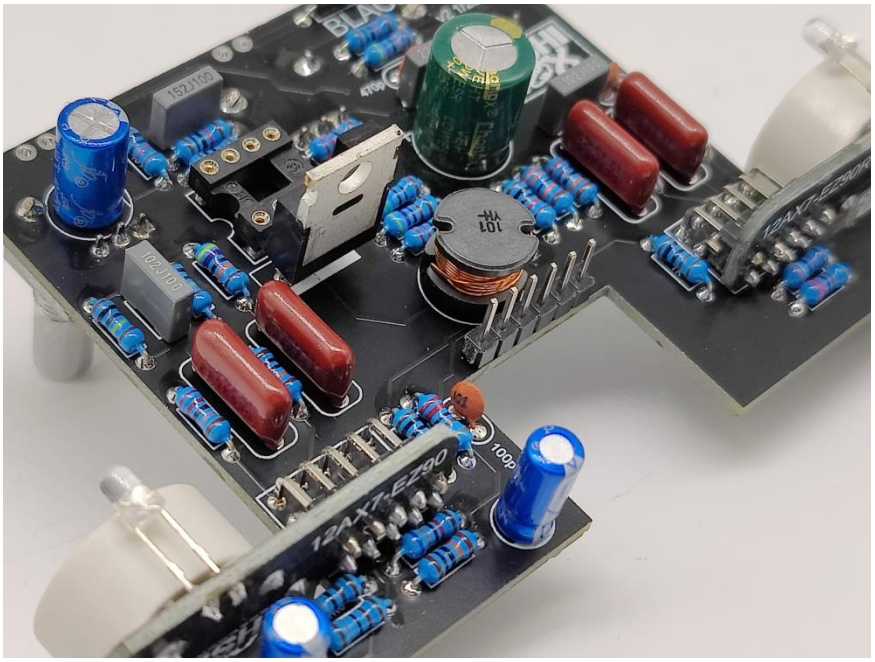


3. Attach the Tube Daughter Boards (labeled “12AX7- EZ90” and “12AX7-EZ90R). After assembling the tube daughter board per these instructions, slide the pins into the pads on the board until the daughter board sits flush with the main PCB, then solder the pins in place from the bottom of the main PCB. Note which board goes on which side.

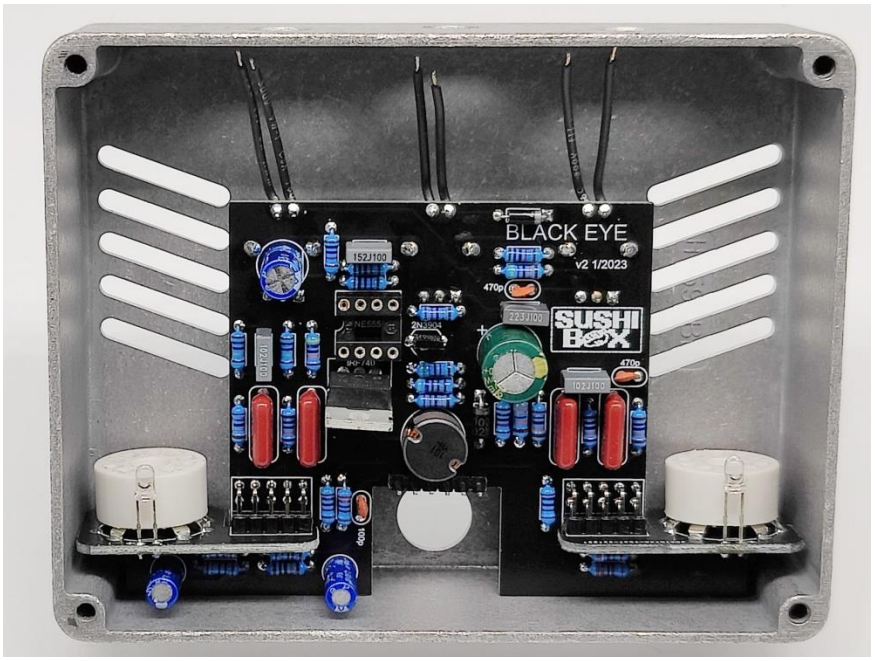




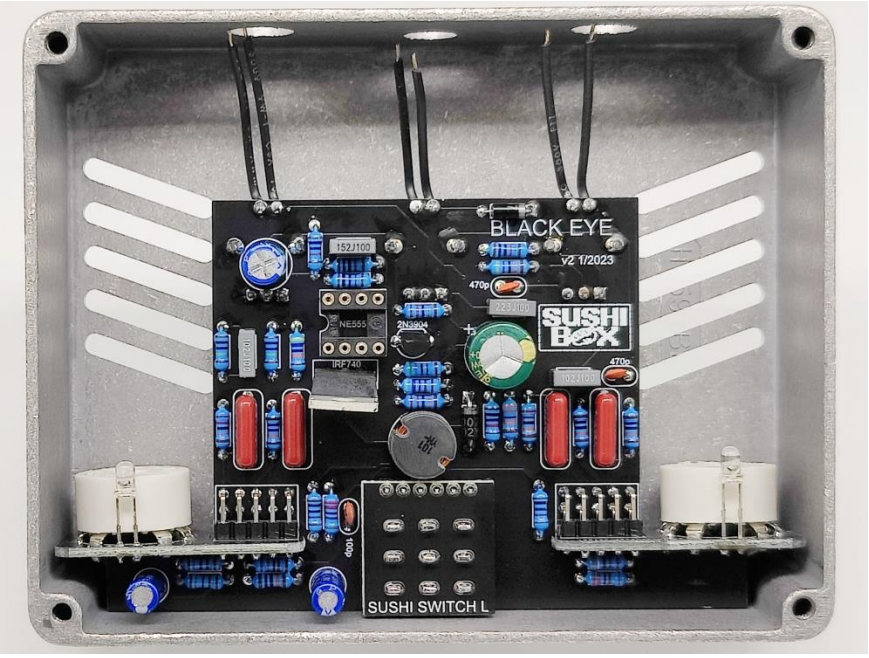
4. Attach the header pins. If you have a long strip of header pins, cut off a strip of 6 pins and solder them to the main PCB as seen in the picture. If your 3PDT is adjusted to sit lower on the top of the enclosure then you will need longer pins, or you could use wire or clipped component leads to make the connections to the 3PDT.



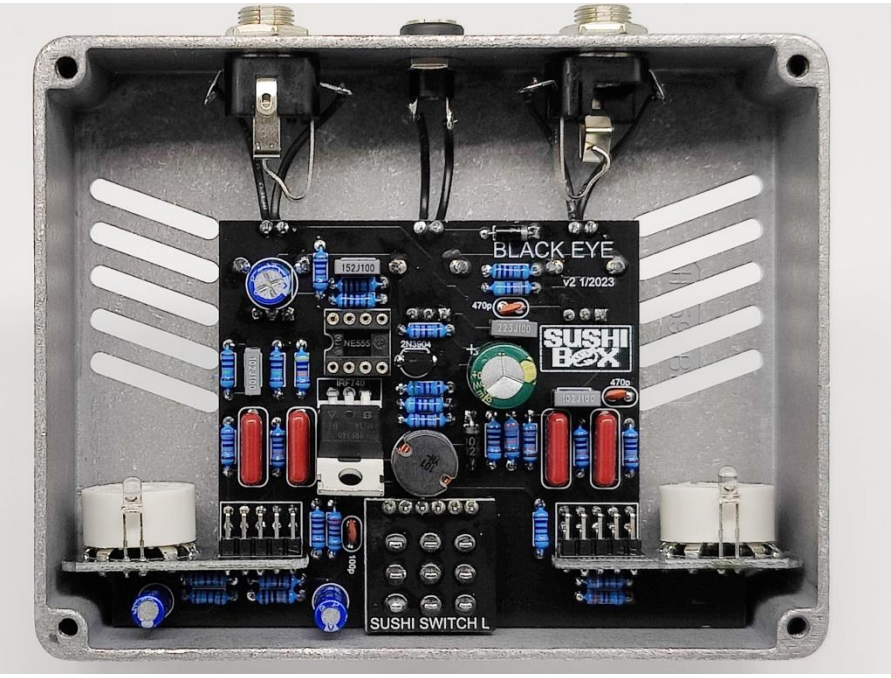
5. Insert the PCB into the enclosure. Secure the PCB to the enclosure with at least one washer and nut on a pot to keep it in place during the remaining assembly steps.



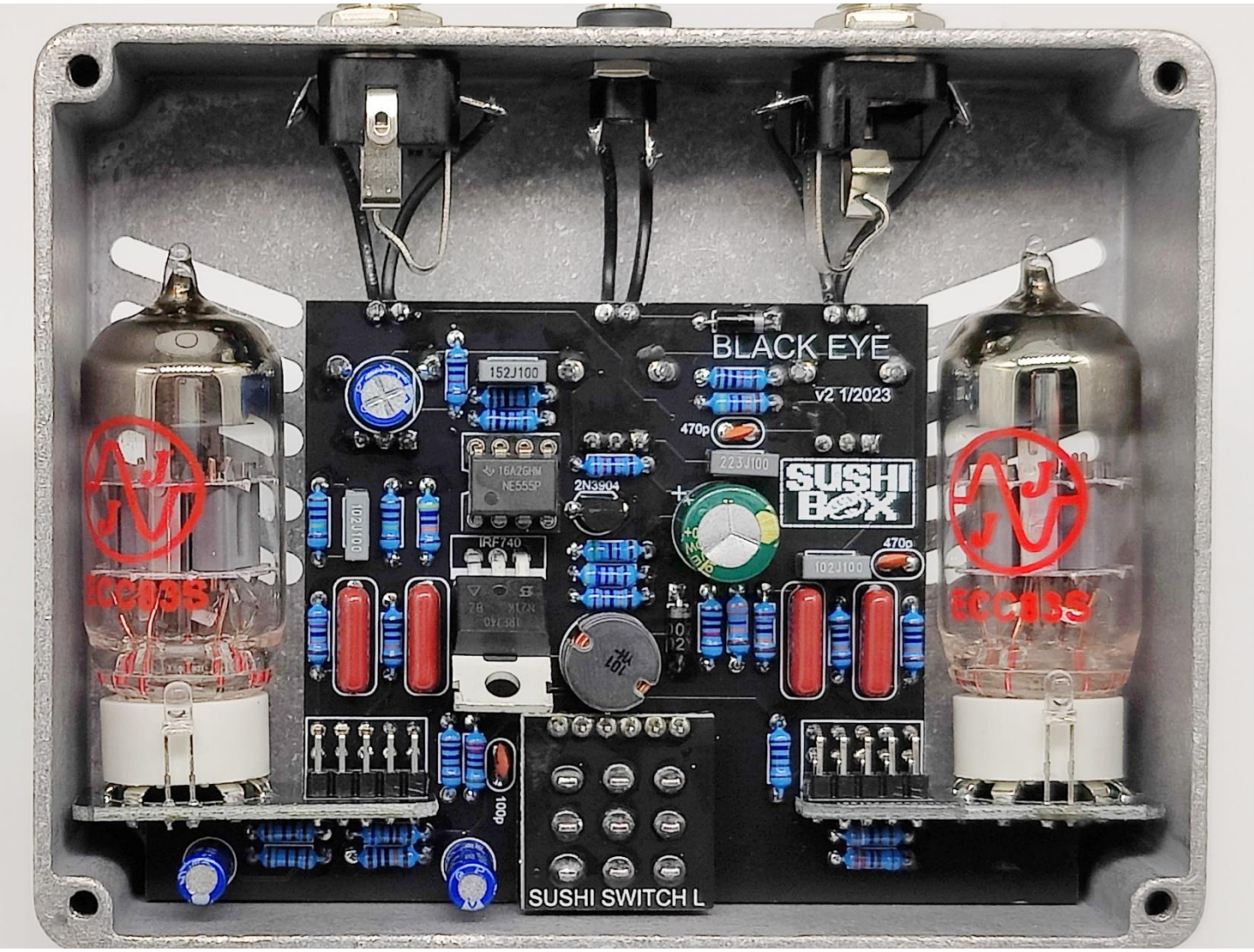
6. Insert the 3PDT and 3PDT PCB (labeled “Sushi Switch L”). The pads at the top of the 3PDT PCB should line up with the header pins; I recommend leaving the nut off of the 3PDT during the fit in case it needs to be moved around to ensure connection to the header pins. Once you have everything fitting snugly, solder the 3PDT PCB to the header pins and the 3PDT.



7. Connect the jacks. Solder wires from the pads at the top of the main PCB to the input, output, and DC In jacks. For each jack the round pad is the ground connection and the square pad is the positive (signal or power) connection.



8. Insert the tube and NE555. I'm specifically mentioning the NE555 because if you plug in the pedal without the NE555 then your MOSFET will get very hot and potentially damage itself, so make sure it gets inserted before being plugged in. The way I like to do this is to put the tube in angled away from the pedal and line up pins 1 and 9 with the socket, then tip the tube backwards toward the enclosure to seat the remaining pins, then push down until the tube sits flush in the socket. You will also need to bend the IRF740 down a bit so the heatsink tab does not touch the bottom plate of the enclosure. **Be sure the tab does not touch any of the other components or pins on the board.**



9. You're done! Plug it in and try it out! If you have any issues or questions regarding assembly or troubleshooting if it doesn't work, please contact me at nslade@suhsiboxfx.com