



Spring reverb effect

11-11-2023

—

Version 1.0

github.com/ExquisiteCatBread/SpringReverb

I. Version history

Version	Changes
1.0	First version

II. Table of contents

I. Version history	1
II. Table of contents	2
1. Product description	3
2. Schematics	4
3. PCB layout	7
4. Bill of materials	13
5. Housing dimensions	16
6. Mounting 3D models	17
7. Development costs	18
9. Pictures	23
10. Used sources	35

1. Product description

The spring reverb effect is an effect used to create a reverb. It is based on a opamp driver circuit and a 8EB2C1B spring reverb tank.

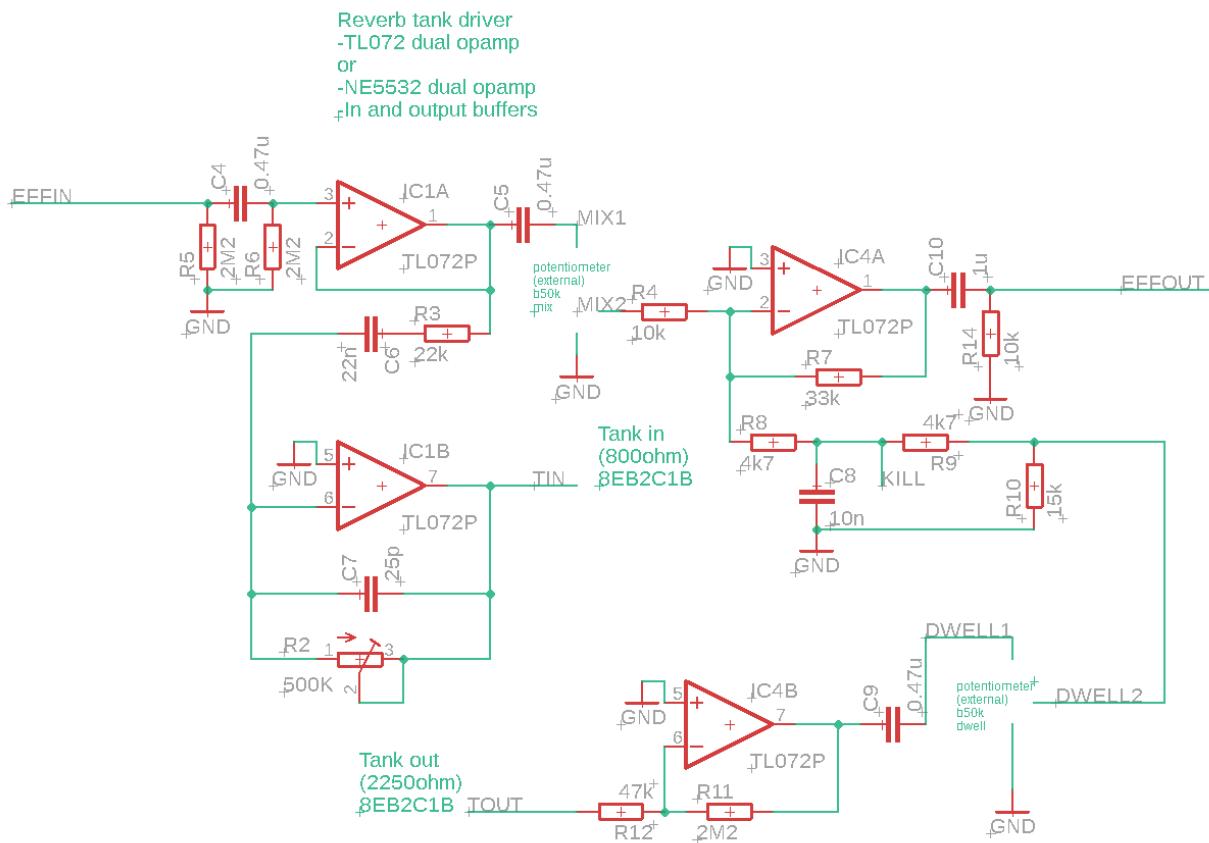
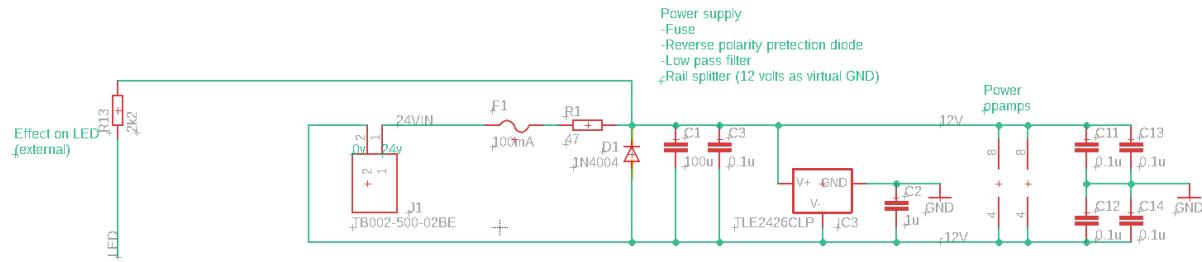
The effect is powered by its own 230VAC power supply. The effect circuit itself works on 24VDC. It is fused via a PTC 100mA fuse and protected against reverse polarity via a diode. The power stage contains a low pass filter to filter out noise. A TLE2426 is used to create 12 volts used as a virtual ground for the opamps.

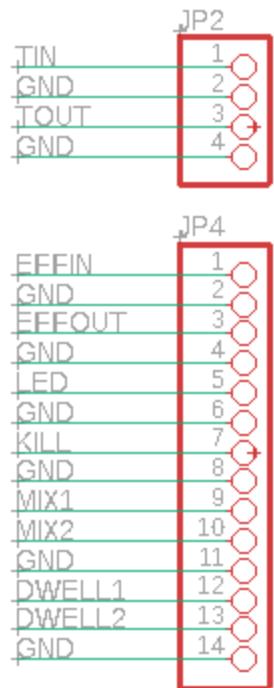
Both the input and output contain an opamp based signal buffer. Both the in and output from the tank have their own opamp driver. This gives the circuit a total of 4 opamps.

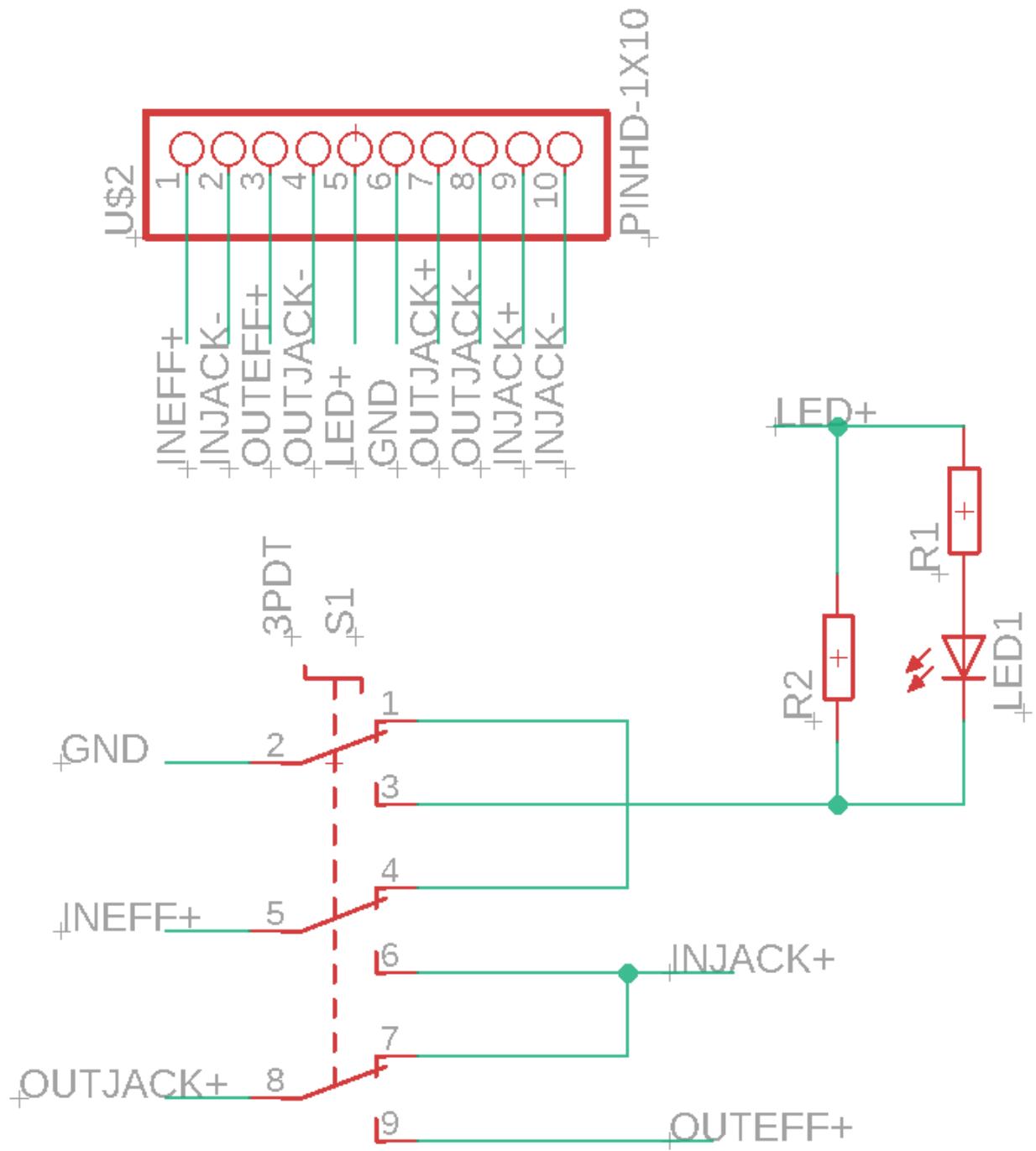
The opamp used is currently 2x a NE5532 dual opamp. The TL072 opamp is also tested in development. This one works, although seems to be a bit more noisy.

The effect is housed in an aluminum pedal housing. Power can be supplied via a Schuko plug (230VAC). For the audio in- and output 6.35mm mono audio jacks are used. A stomp switch is used to create a true bypass.

2. Schematics

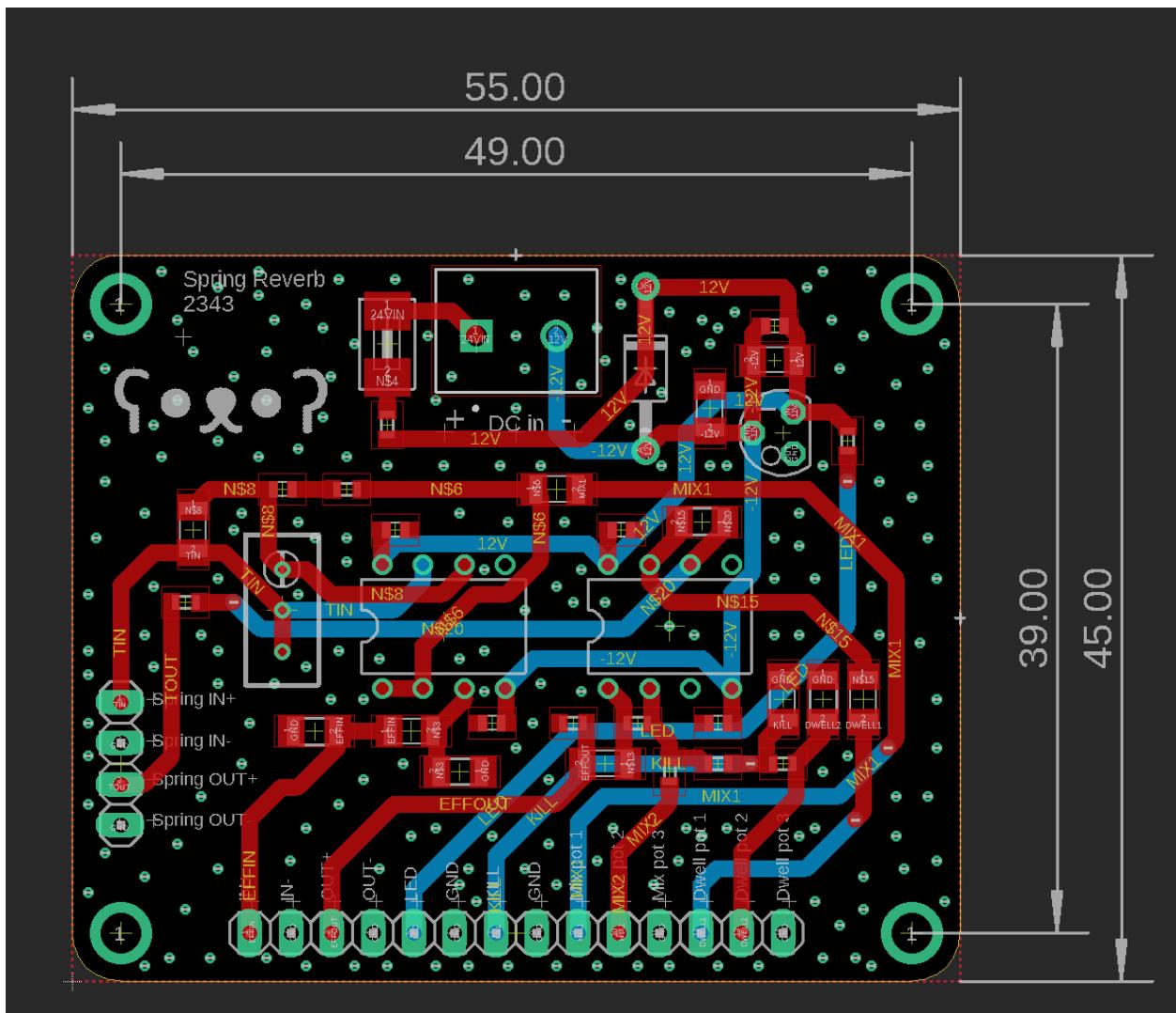




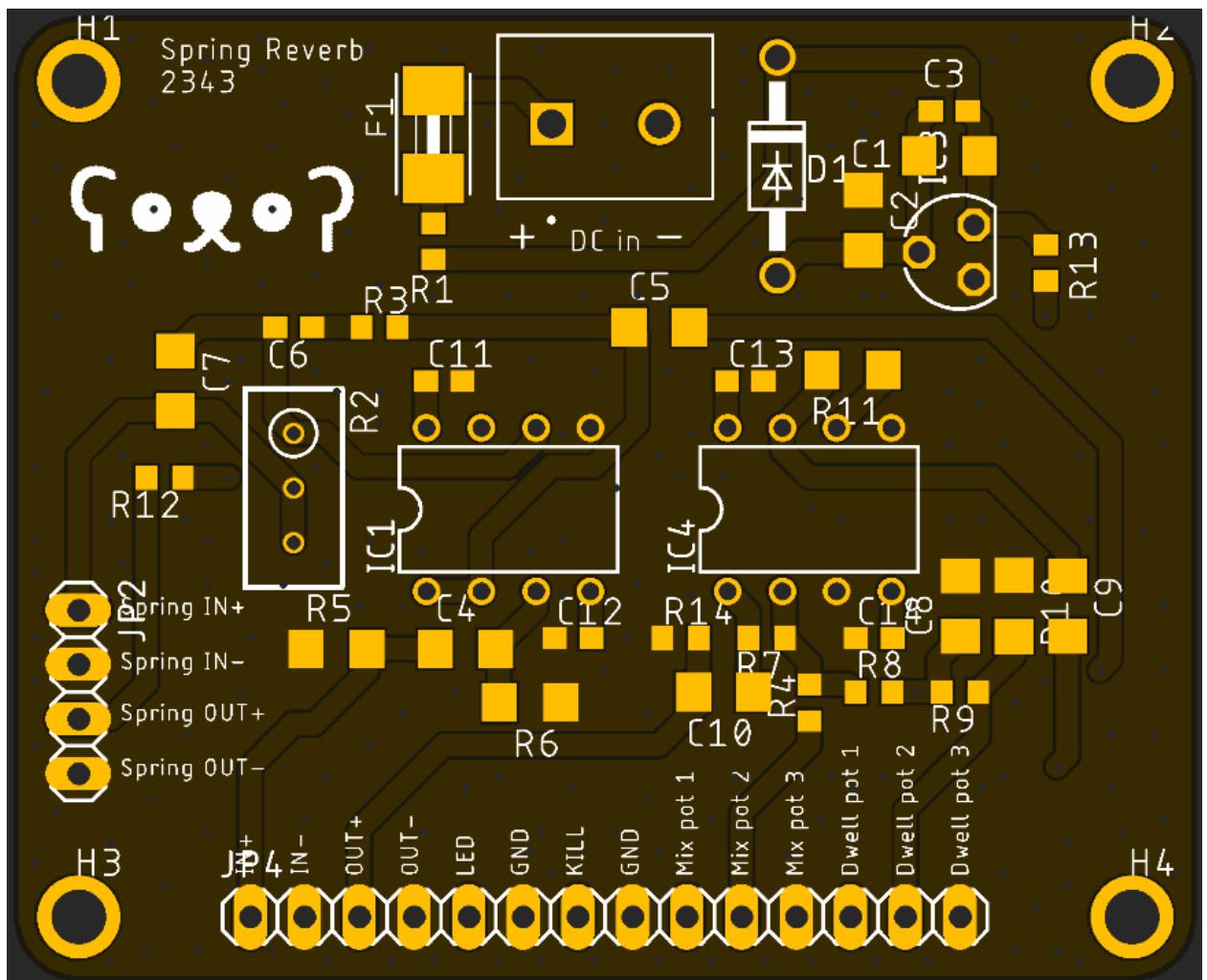


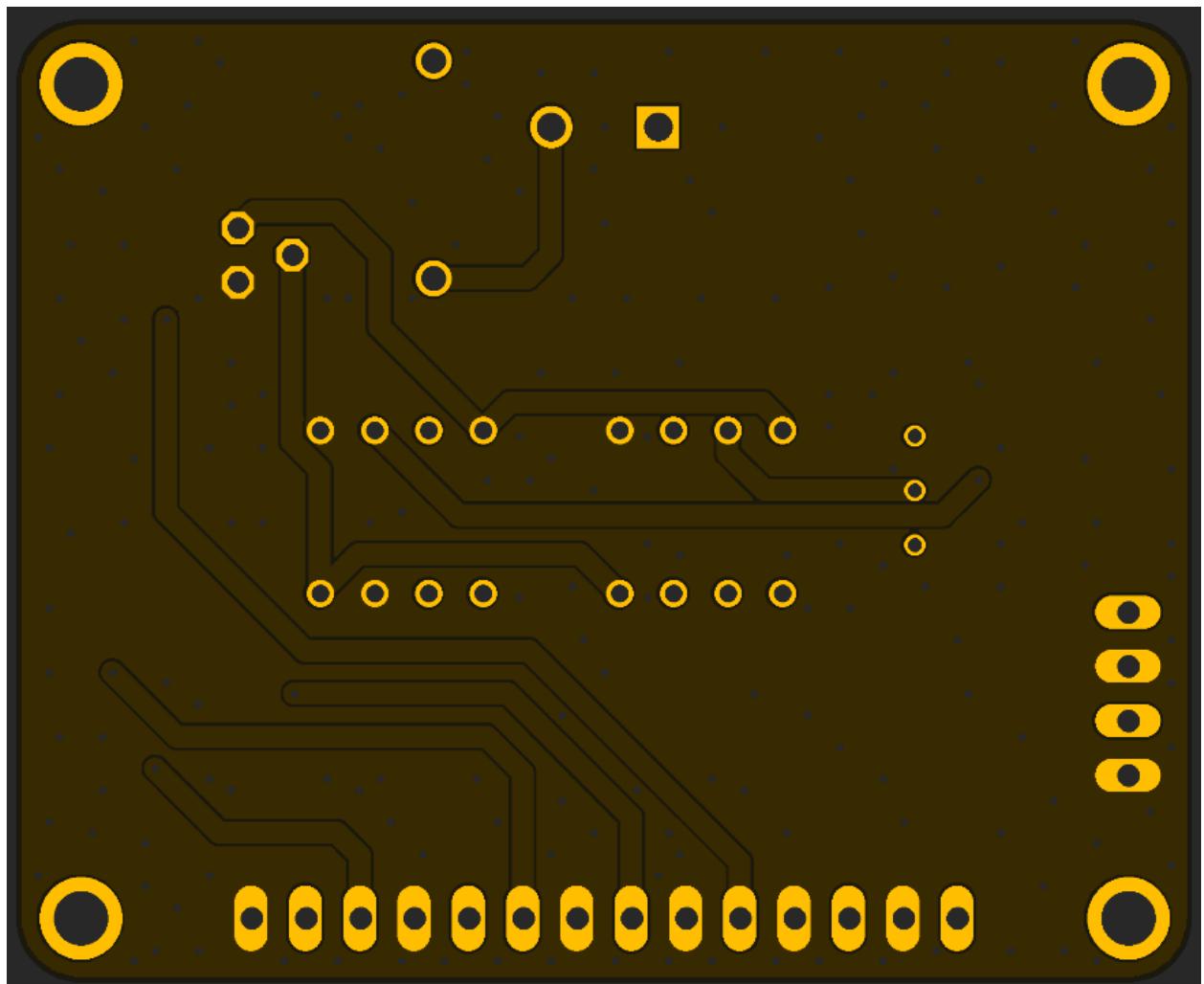
3. PCB layout

The PCB design is as shown in the picture below. The dimensions of the PCB are also shown in the drawing.

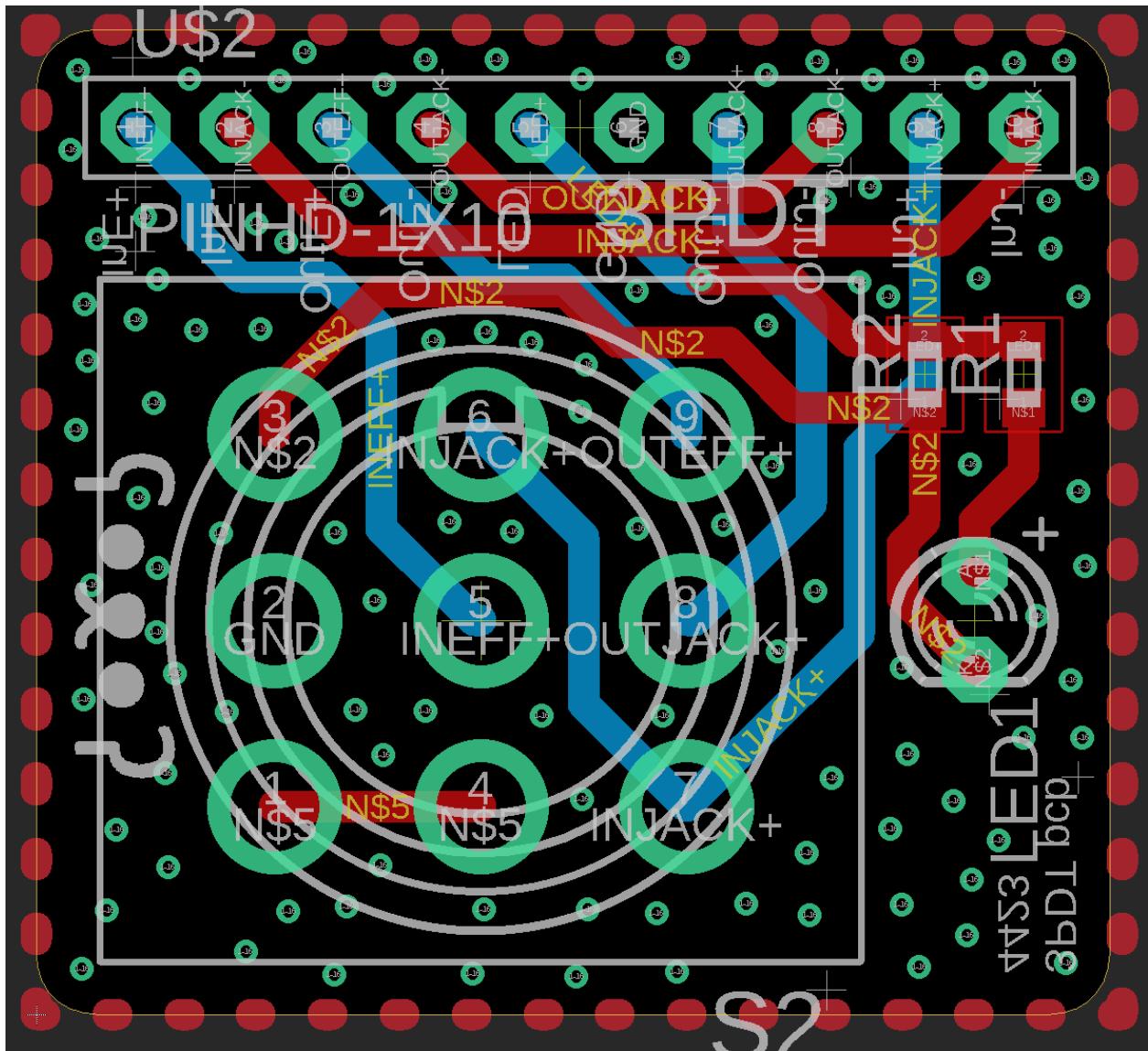


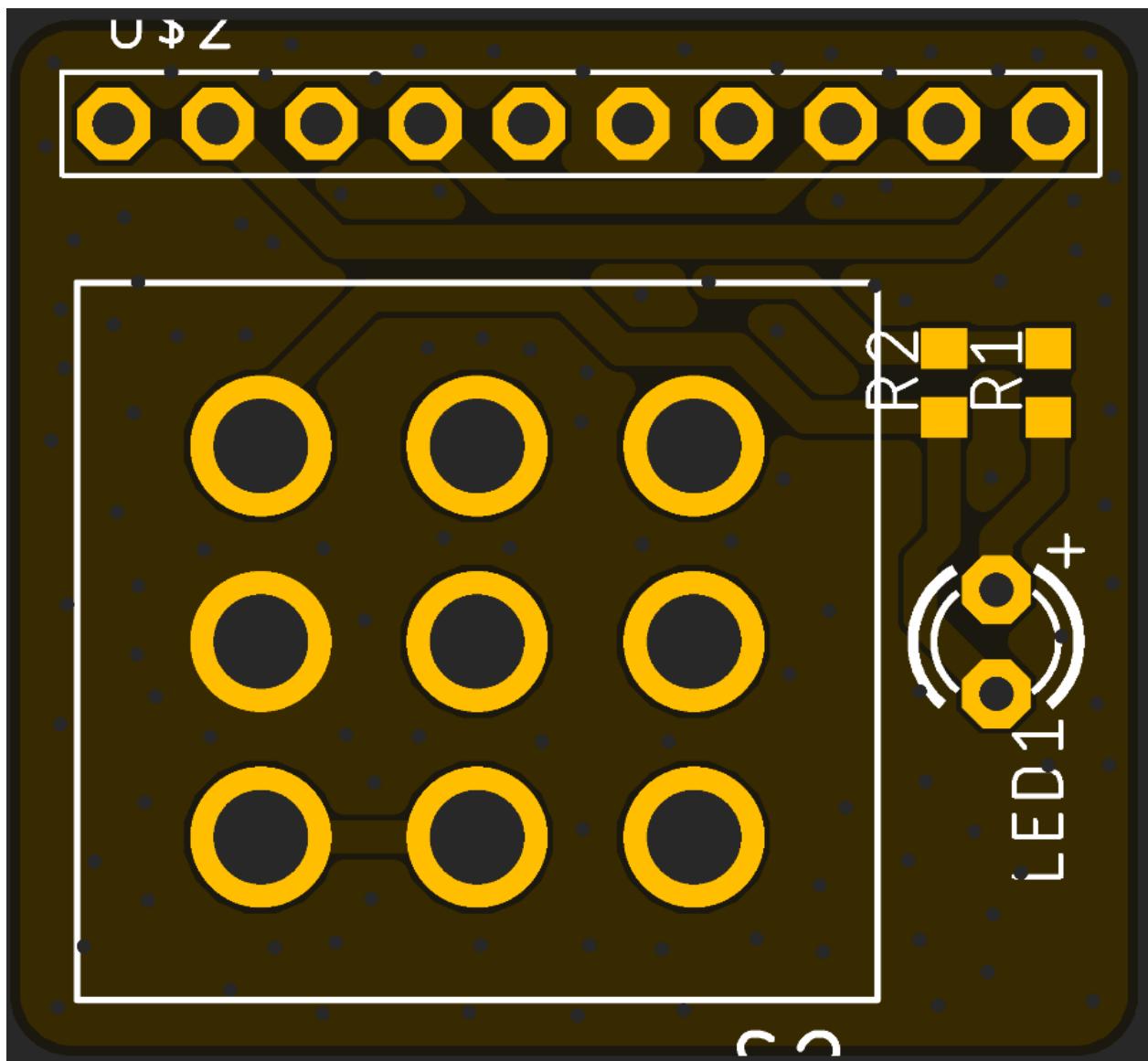
Note: Component number not visible on real PCB

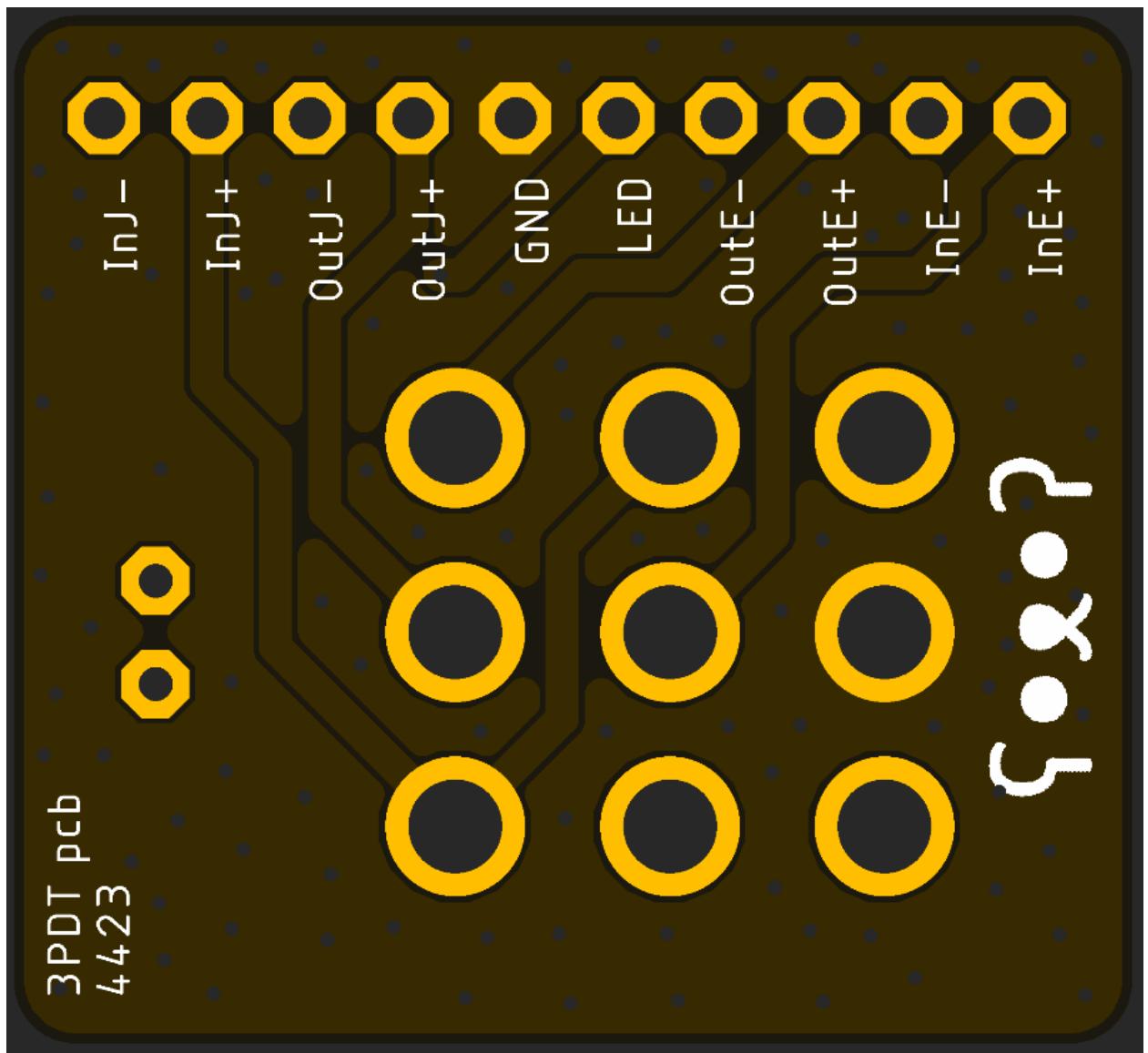




The 3PDT switch also has its own PCB. This is done for easy wiring.







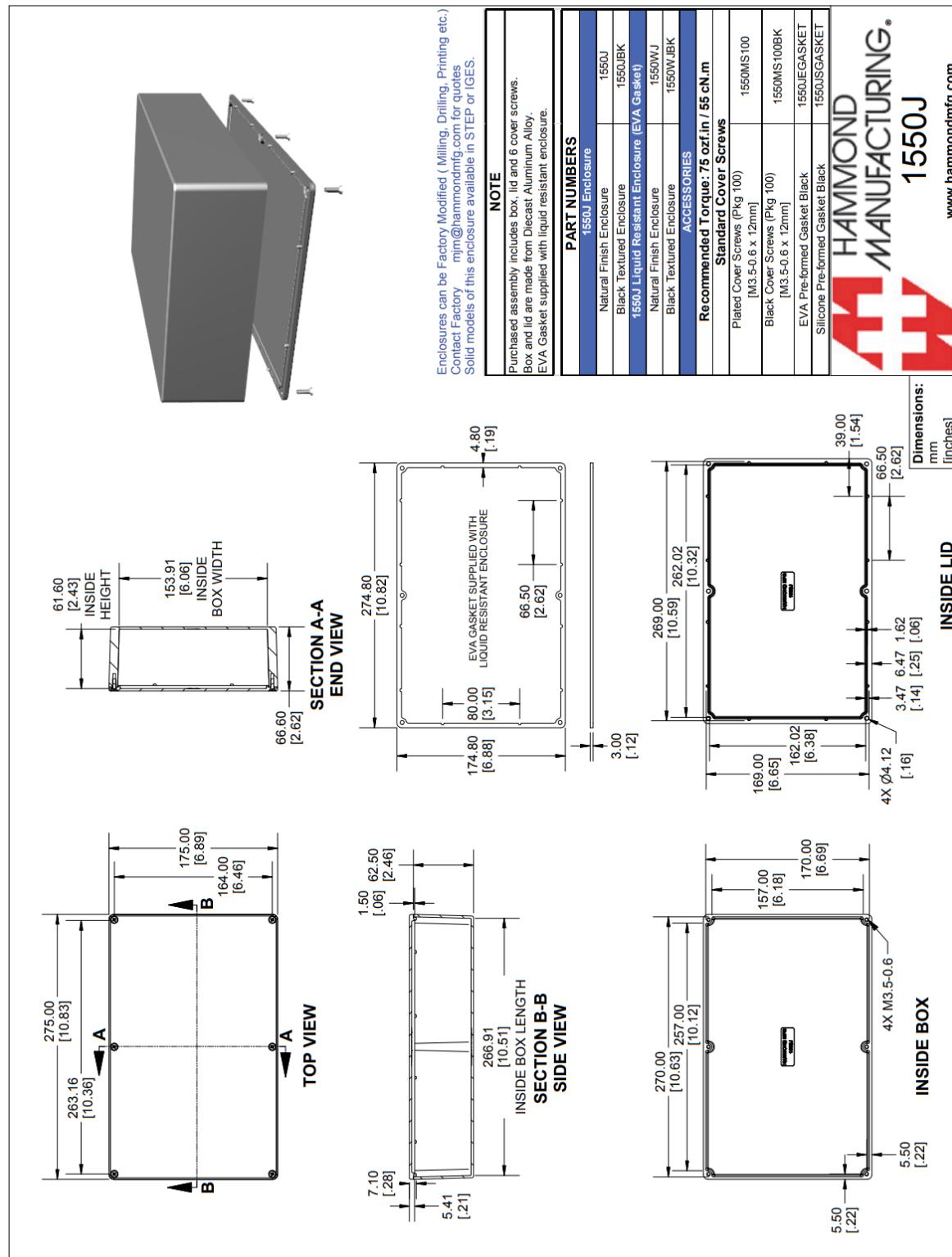
4. Bill of materials

Part number	Device	Footprint	Type / value	Total parts
C1	Capacitor	1206	100uF	1
C2, C10	Capacitor	1206	1uF	2
C3, C11, C12, C13, C14	Capacitor	0603	0.1uF	5
C4, C5, C9	Capacitor	1206	0.47uF	3
C6	Capacitor	0603	22nF	1
C7	Capacitor	1206	25pF	1
C8	Capacitor	1206	10nF	1
R1	Resistor	0603	47 ohm	1
R2	Variable resistor	3296 trimmer	500k trimmer (3296)	1
R3	Resistor	0603	22k ohm	1
R4, R14	Resistor	0603	10k ohm	2
R5, R6, R11	Resistor	1206	2.2M ohm	3
R7	Resistor	0603	33k ohm	1
R8, R9	Resistor	0603	4.7k ohm	2
R10	Resistor	1206 (0603 used)	15k ohm	1
R12	Resistor	0603	47k ohm	1
R13	Resistor	0603	2.2k ohm	1
D1	Diode	D041	1N4004	1
F1	Polyfuse	1812	100mA	1
J1	Power screw terminal	KF301-2P	KF301-2P	1
JP2	1x4 JST pin header	1x4 2.56mm pitch	1x4	1

JP4	1x14 JST pin header	1x14 2.56mm pitch	1x14	1
IC1	Unipolar to bipolar power separator	T092	TLE2426CP	1
IC3, IC4	Opamp	DIL08 / DIP08	TL072 or NE5532 (used)	2
LED	LED	3mm trough hole	3mm LED	1
MIX pot, Dwell pot	Potentiometer	Panel mount	b50k	2
Reverb tank	Spring reverb tank	235mm x 86mm x 33mm	8EB2C1B	1
Power supply	Power supply	62mm x 51mm x 28mm	Mean Well RS-15-24 24 Volt, 15 watt	1
Wire (2x0.25)	Wire (2x0.25)	2x0.25mm2	Lapp LIYCY 2x0,25	1m
Wire (3x0.25)	Wire (3x0.25)	3x0.25mm2	Lapp LIYCY 3x0,25	1m
Internal earth wire	Wire (3x0.75) (separated earth wire)	3x0.75mm2	H03VV	0.3mm
Power cable	Wire (3x0.75) with Schuko	Wire (3x0.75) with Schuko	Wire (3x0.75) with Schuko	2m
Power cable gland	rubber gland	6mm inside diameter	KDF6	1
3PDT switch	3PDT switch	3PDT	3PDT	1
Audio in, Audio out	Audio jack	6.35mm	6.35mm	2
JST connectors	JST connectors	JST 2pin, 3pin, 6pin 2.56mm pitch	2pin, 3pin, 6pin	4 2pin 2 3pin 2 6pin
M2 standoffs	M2 standoffs	M2	M2 standoff + screw	4
Tank in, out	Coaxial connectors	Cinch	red, white	1 red 1 white
Housing	Housing	1550J	Hammond 1550JBK	1
Housing feet	Rubber feet	12,7mmx3mm round	GF61	4
Pot knobs	Knobs	30 x 13mm	30 x 13mm	2

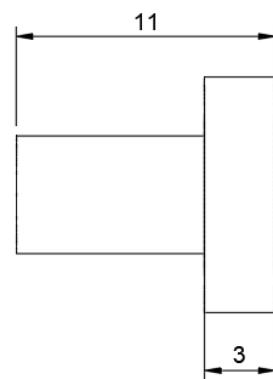
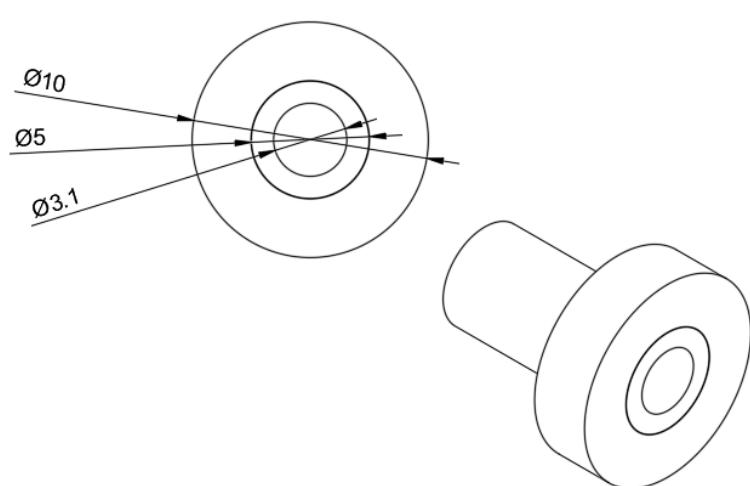
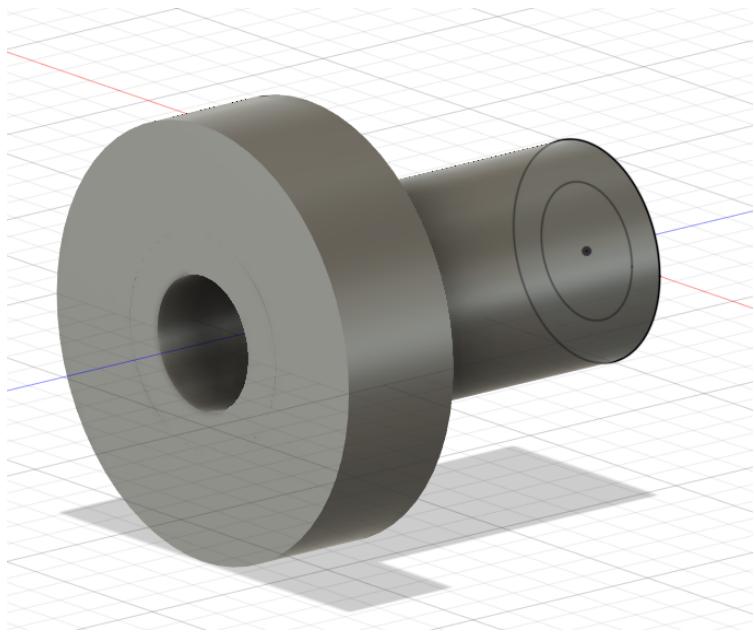
PCB switch	PCB	27.6mm x 25.4mm	version 2344	1
PCB effect	PCB	45mm x 55mm	version 2343	1
Heatshrink	Heatshrink	Misc	Misc	-
Solder paste	Solder	Bi57Sn42Ag1	Bi57Sn42Ag1	-
Solder wire	Solder	Sn60Pb39Cu1	Sn60Pb39Cu1	-
Misc mounting hardware	M3 screws, nuts, ferrules, cable shoes, tiewraps	Misc	Misc	-

5. Housing dimensions



6. Mounting 3D models

Mounting spacer for reverb tank. Printed with 3D printer.



7. Development costs

Only the material costs (no hours) are included in the development costs.

Part number	Device	Type / value	Total parts ordered	Total parts price (€)	Shipping price (€)	Total price incl shipping (€)	Total price per piece (€)	Total in project	Total price per pieces used (€)	Link (at time of order)	Remark
C1	Capacitor	100uF	20	4,91	3,15	8,06	0,40	1	0,40	Aliexpress	
C2, C10	Capacitor	1uF	-	-	-	-	-	2	-	Aliexpress	From stock
C3, C11, C12, C13, C14	Capacitor	0.1uF	-	-	-	-	-	5	-	Reichelt	From stock
C4, C5, C9	Capacitor	0.47uF	100	1,07	1,13	2,20	0,02	3	0,06	Aliexpress	
C6	Capacitor	22nF	-	-	-	-	-	1	-		From stock
C7	Capacitor	25pF	100	1,12	1,13	2,25	0,02	1	0,02	Aliexpress	
C8	Capacitor	10nF	100	1,01	1,13	2,14	0,02	1	0,02	Aliexpress	
R1	Resistor	47 ohm	-	-	-	-	-	1	-	Aliexpress	From stock
R2	Variable resistor	500k trimmer (3296)	10	1,08	1,11	2,19	0,22	1	0,22	Aliexpress	
R3	Resistor	22k ohm	-	-	-	-	-	1	-	Aliexpress	From stock
R4, R14	Resistor	10k ohm	-	-	-	-	-	2	-	Aliexpress	From stock
R5, R6, R11	Resistor	2.2M ohm	100	0,54	1,13	1,84	0,02	3	0,06	Aliexpress	
R7	Resistor	33k ohm	-	-	-	-	-	1	-	Aliexpress	From stock
R8, R9	Resistor	4.7k ohm	-	-	-	-	-	2	-	Aliexpress	From stock
R10	Resistor	15k ohm	-	-	-	-	-	1	-	Aliexpress	From stock
R12	Resistor	47k ohm	-	-	-	-	-	1	-	Aliexpress	From stock
R13	Resistor	2.2k ohm	-	-	-	-	-	1	-	Aliexpress	From stock
D1	Diode	1N4004	-	-	-	-	-	1	-	Aliexpress	From stock
F1	Polyfuse	100mA	-	-	-	-	-	1	-	Aliexpress	From stock

J1	Power screw terminal	KF301-2P	-	-	-	-	-	1	-	Aliexpress	From stock
JP2	1x4 JST pin header	1x4	1 kit	25,99	-	25,99	0,04	1	0,04	Amazon	Piece price assuming price divided by ~800 pieces
JP4	1x14 JST pin header	1x14	-	-	-	-	0,04	1	0,04	Amazon	See JP2
IC1	Unipolar to bipolar power separator	TLE2426CP	4	8,20	2,95	11,15	2,79	1	2,79	Aliexpress	
IC3, IC4	Opamp	NE5532	10	4,84	1,25	6,09	0,61	2	1,22	Reichelt	shipping divided among other used parts in same order
LED	LED	3mm LED	10	0,71	1,25	1,96	0,20	1	0,20	Reichelt	shipping divided among other used parts in same order
MIX pot, Dwell pot	Potentiometer	b50k	5	6,75	2,00	8,75	1,75	2	3,50	vanalleenmeer.nl	
Reverb tank	Spring reverb tank	8EB2C1B	1	29,30	6,95	36,25	36,25	1	36,25	tonefactor.vnl	
Power supply	Power supply	Mean Well RS-15-24 24 Volt, 15 watt	1	12,66	-	12,66	12,66	1	12,66	Amazon	
Wire (2x0.25)	Wire (2x0.25)	Lapp LIYCY 2x0,25	10	7,19	-	7,19	0,72	1	0,72	Lapp	Ordered via Technische Unie
Wire (3x0.25)	Wire (3x0.25)	Lapp LIYCY 3x0,25	3	2,80	-	2,80	0,93	1	0,93	Lapp	Ordered via Technische Unie
Internal earth wire	Wire (3x0.75) (separate d earth wire)	H03VV	5m	5,19	1,25	6,44	1,29	0,3	0,39	Reichelt	shipping divided among other used parts in same order

Power cable	Wire (3x0.75) with Schuko	Wire (3x0.75) with Schuko	-	-	-	-	-	2	-	NA	From stock, reissued from old device
Power cable gland	rubber gland	6mm inside diameter	15	1,52	1,25	2,77	0,18	1	0,18	Reichelt	shipping divided among other used parts in same order
3PDT switch	3PDT switch	3PDT	-	-	-	-	-	1	-	Aliexpress	From stock
Audio in, Audio out	Audio jack	6.35mm	10	8,23	-	8,23	0,82	2	1,64	Aliexpress	
JST connectors	JST connectors	2pin	-	-	-	-	0.04	4	0.16	Amazon	See JP2
JST connectors	JST connectors	3pin	-	-	-	-	0.04	2	0.08	Amazon	See JP2
JST connectors	JST connectors	6pin	-	-	-	-	0.04	2	0.08	Amazon	See JP2
M2 standoffs	M2 standoffs	M2 standoff + screw	-	-	-	-	-	4	-	NA	From stock
Tank out	Coaxial connectors	Red	5	0,91	1,25	2,16	0,43	1	0,43	Reichelt	shipping divided among other used parts in same order
Tank in	Coaxial connectors	White	5	1,12	1,25	2,37	0,47	1	0,47	Reichelt	shipping divided among other used parts in same order
Housing	Housing	Hammond 1550JBK	1	34,98	1,25	36,23	36,23	1	36,23	Reichelt	shipping divided among other used parts in same order
Housing feet	Rubber feet	12,7mmx3 mm round, rubber, self adhesive	50	2,90	1,25	4,15	0,08	4	0,32	Reichelt	shipping divided among other used parts in same order

Pot knobs	Knobs	30 x 13mm	3	4,23	2,87	7,10	2,37	2	4,74	Aliexpress	
PCB switch	PCB	version 2344	5	3,30	3,75	7,05	1,41	1	1,41	JLCPCB	
PCB effect	PCB	version 2343	5	3,30	28,40	31,7	6,34	1	6,34	JLCPCB	
PCB stencil	PCB stencil	-	1	6,55	-	6,55	6,55	0	-	JLCPCB	shipping is included with PCB effect, this stencil is optional for production
Heatshrink	Heatshrink	Misc	-	-	-	-	-	-	-	Aliexpress	From stock
Solder paste	Solder	Bi57Sn42Ag1	-	-	-	-	-	-	-	Digikey	From stock
Solder wire	Solder	Sn60Pb39Cu1	-	-	-	-	-	-	-	NA	From stock
Misc mounting hardware	M3 screws, nuts, ferrules, cable shoes, tiewraps	Misc	-	-	-	-	-	-	-	NA	From stock

Total single unit cost based on the per piece prices is **€111,60**. PCB stencil, time and parts already in house are not included in this calculation.

Assuming in-stock parts are worth about 20 euros (probably less in reality) , total unit price would be **€121,60**.

To give an idea of how much the project really costs in total, the total order costs per shop:

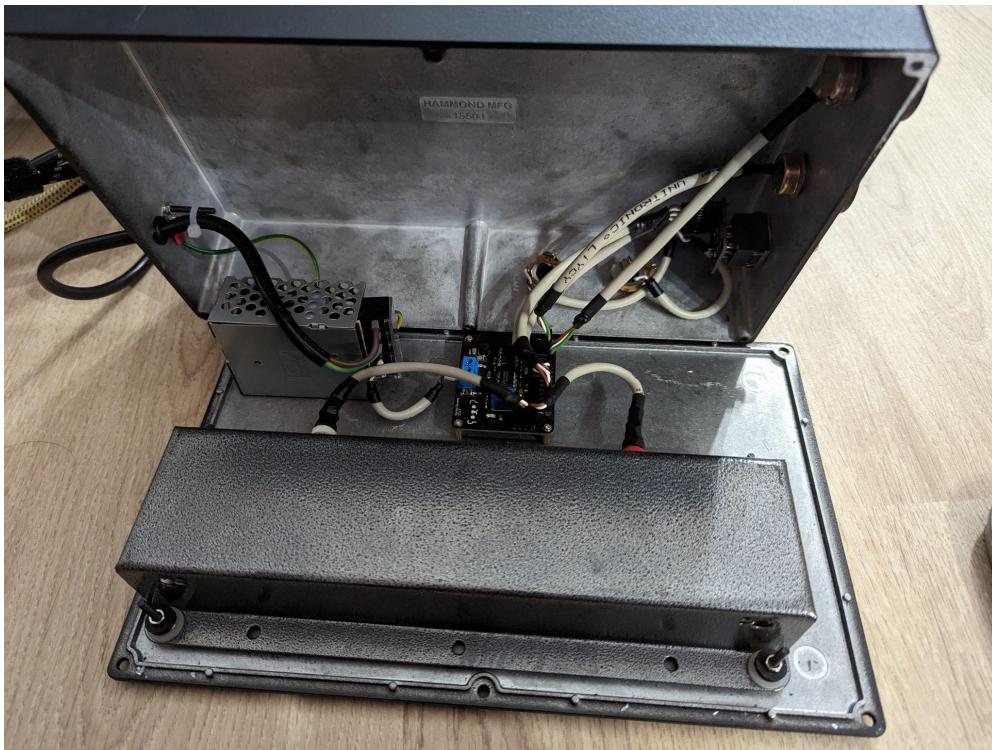
Shop	Cost
Aliexpress	74,54
Amazon	84,84
Technische Unie	12,78
Vanallesenmeer	42,90
Reichelt	89,60
JLCPCB	50,46
Tonefactory	36,25

Total development cost including prototyping parts, unused parts ordered and new tools, excluding parts already in house is **€391,37**.

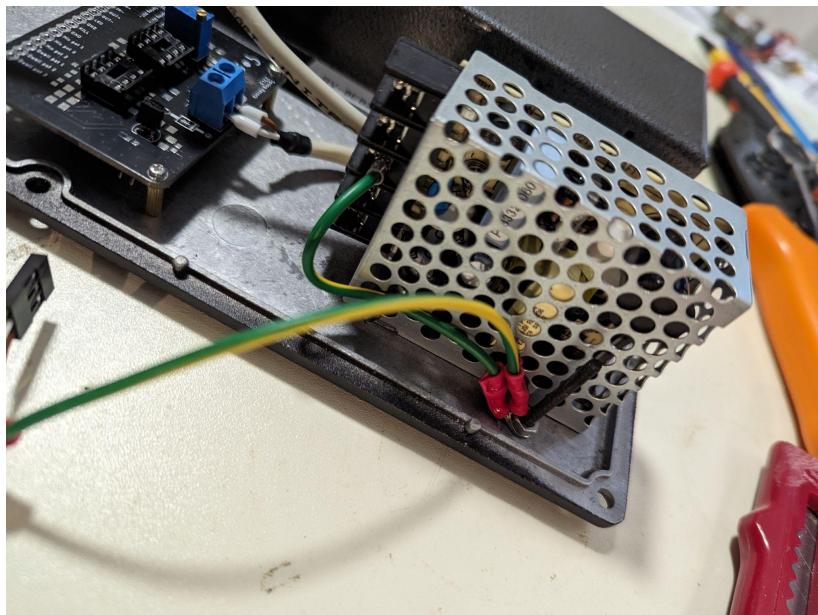
Excluding the new tools this cost would be about **€290,-**.

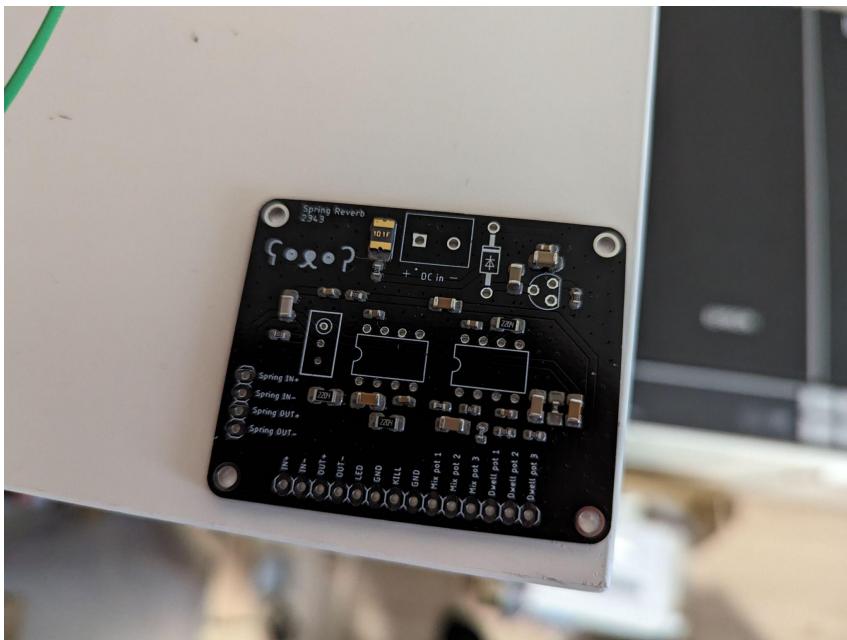
Again assuming stock parts are worth about 10 euros (probably less in reality) , total development price, without tools, would be around **€300,-**.

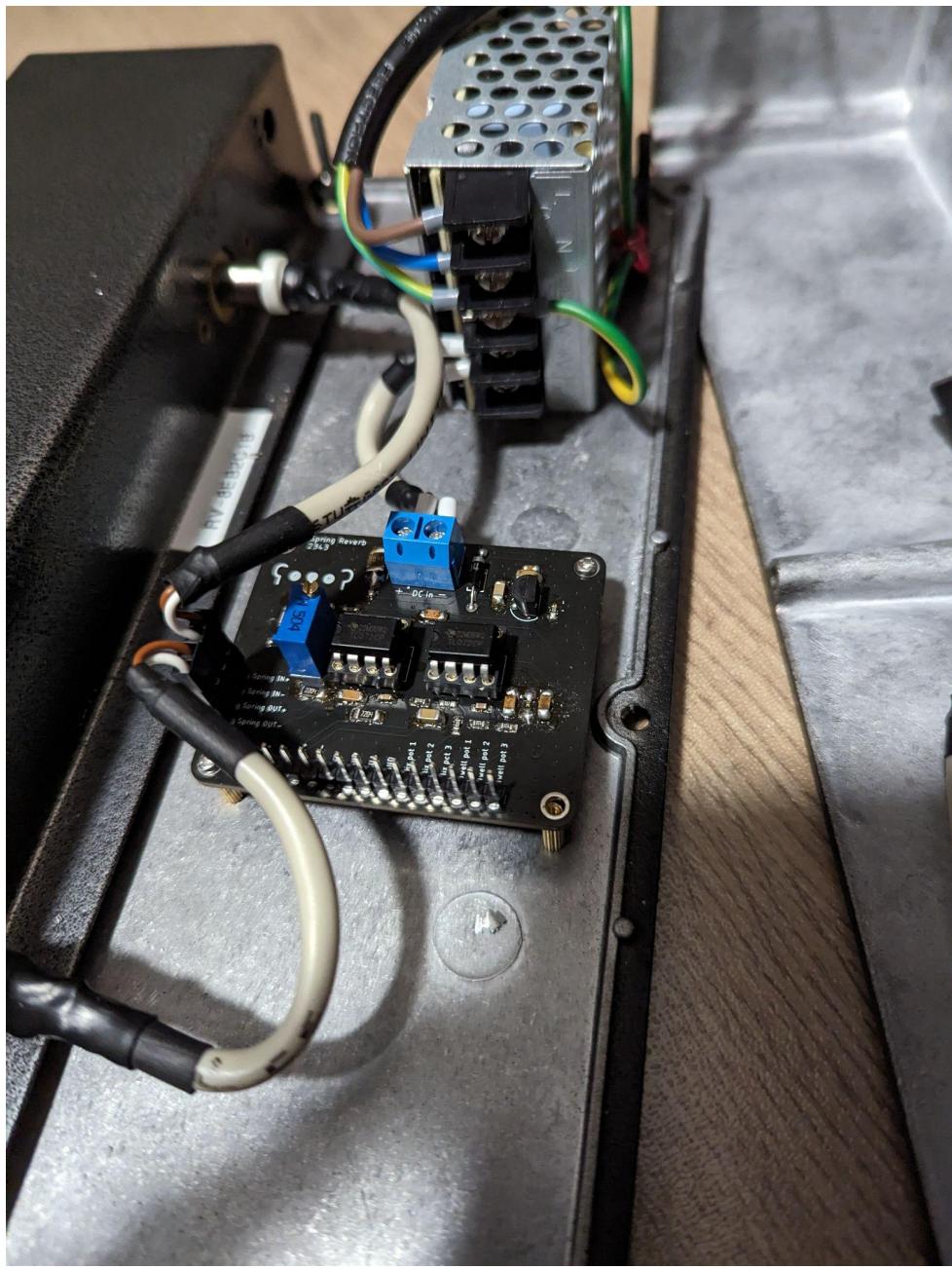
9. Pictures



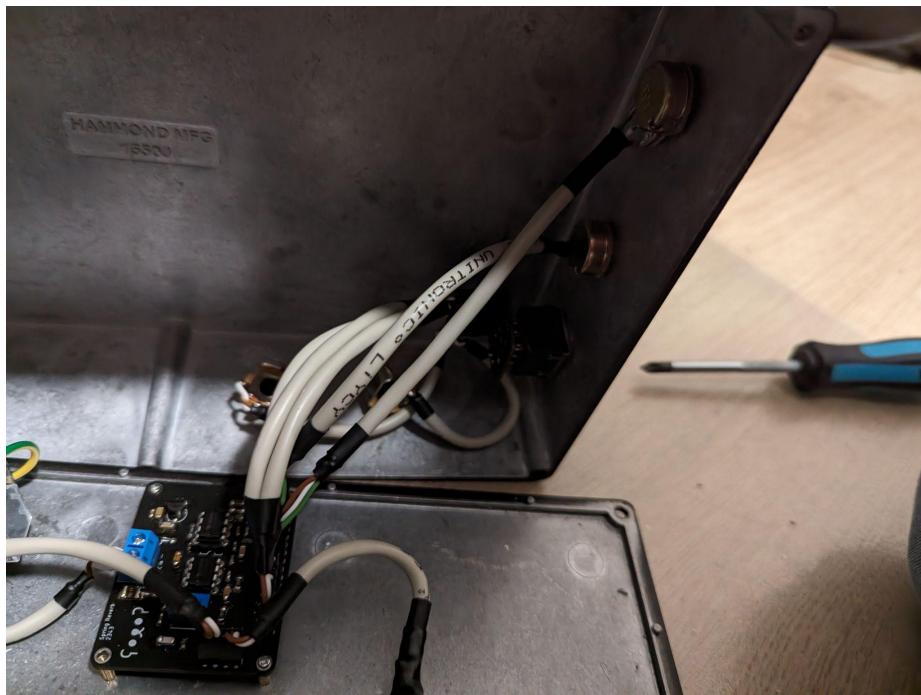




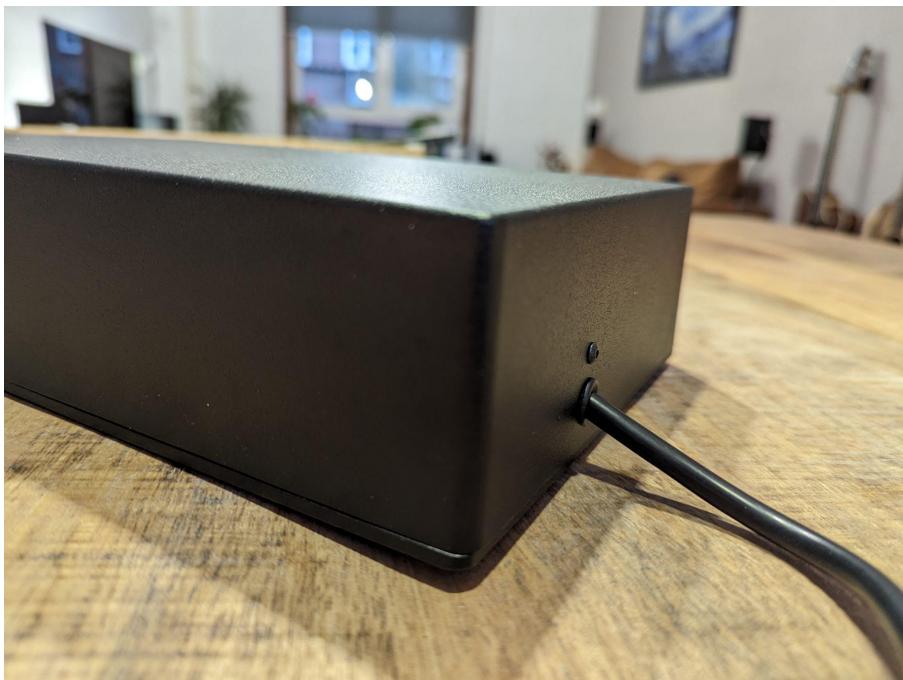


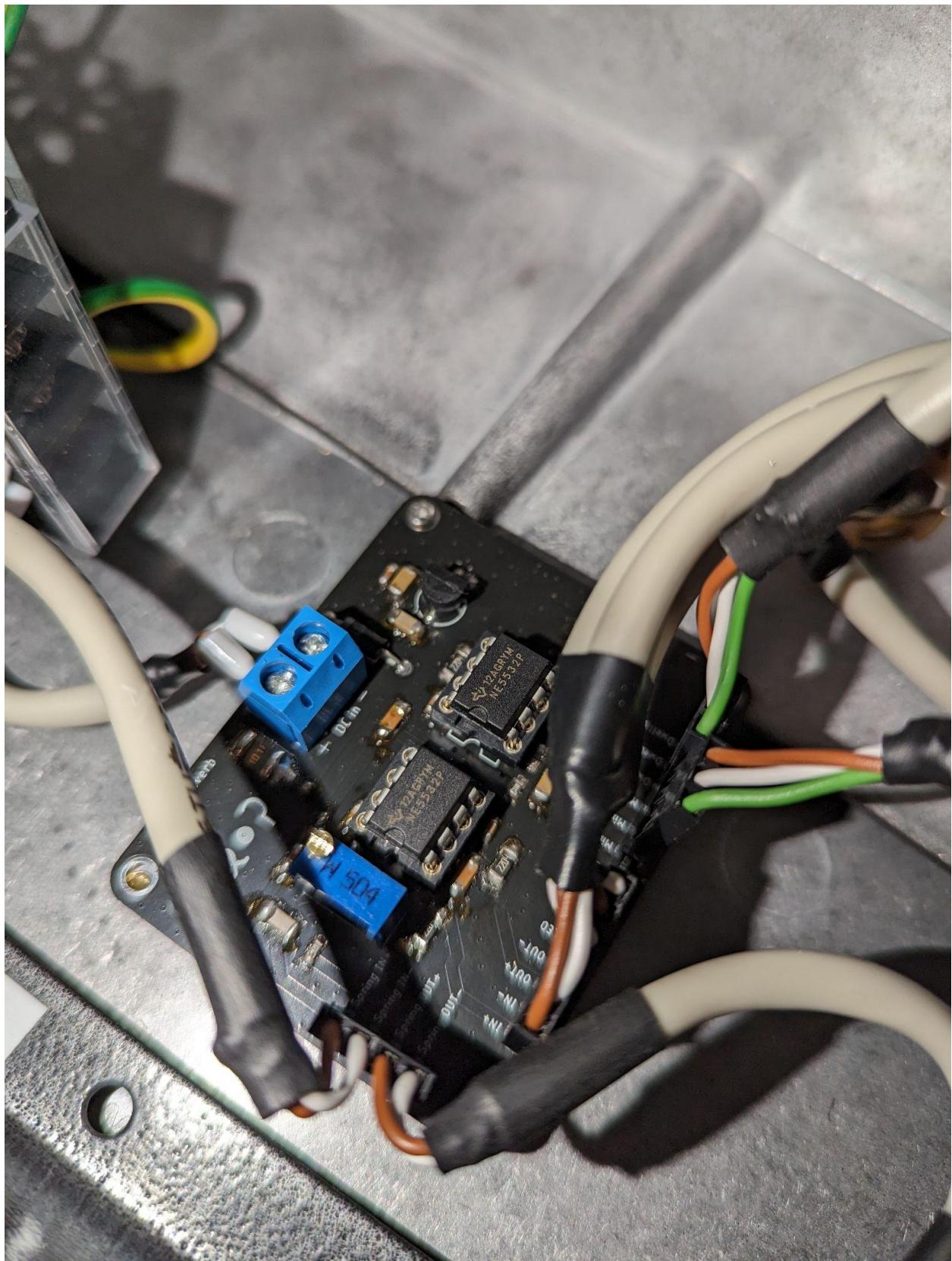




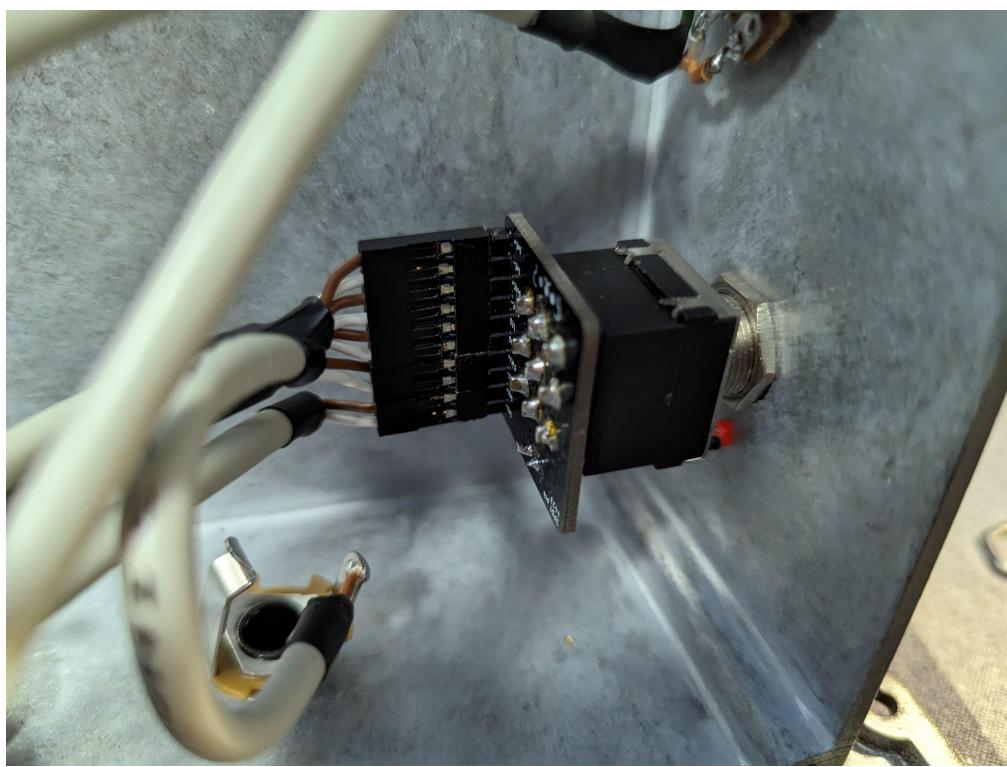












10. Used sources

- [1] Reddit. 2021. *Build my own spring reverb pedal* [online] Available at: <https://www.reddit.com/r/diypedals/comments/mw9ptj/build_my_own_spring_reverb_pedal/> [Accessed November 2023].
- [2] Imgur. 2021. *Spring Reverb Schematic & PCB* [online] Available at: <<https://imgur.com/a/YJTHmMS>> [Accessed November 2023].
- [3] roymal.tripod.com. 2001. *Spring Reverb Info Page* [online] Available at: <<https://roymal.tripod.com/>> [Accessed November 2023].
- [4] tubeampdoctor. 2010. *tubeampdoctor.com - Technical Data* [online] Available at: <<https://www.tubeampdoctor.com/media/pdf/ba/fa/78/tad-reverb-datasheet.pdf>> [Accessed November 2023].
- [5] ua726. 2012. *Tombola's DIY spring reverb driver circuit* [online] Available at: <<https://ua726.co.uk/2012/07/08/tombolas-diy-spring-reverb-driver-circuit/>> [Accessed November 2023].
- [6] General Gadgets. 2017. *Stage Center Reverb* [online] Available at: <<https://generalguitargadgets.com/effects-projects/reverb/stage-center-reverb/>> [Accessed November 2023].
- [7] General Gadgets. 2017. *Spring Reverb Stompbox Circuit* [online] Available at: <https://generalguitargadgets.com/pdf/ggg_sc_verb_mod_sc.pdf> [Accessed November 2023].
- [8] DIYstompboxes. 2008. *Spring Reverb Stompbox Circuit* [online] Available at: <<https://www.diystompboxes.com/smforum/index.php?topic=64231.0>> [Accessed November 2023].
- [9] Stinkfoot.se. 2014. *True bypass wiring schemes.* [online] Available at: <<https://stinkfoot.se/archives/2233>> [Accessed 10 December 2021].