PROJECT NAME

PARADOX

aion DIY GUITAR EFFECTS

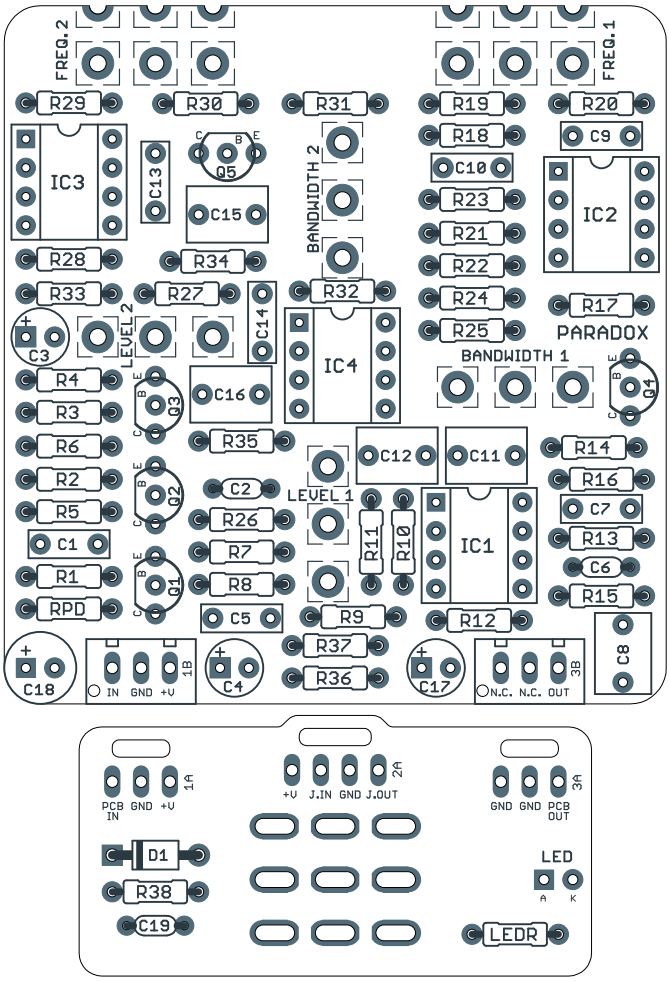
BASED ON
Pearl PE-10 Parametric EQ

BUILD DIFFICULTY
Intermediate

EFFECT TYPE
2-band parametric EQ

DOCUMENT VERSION
1.0.0 (2026-07-03)

PROJECT SUMMARY
A two-band fully parametric EQ with frequency, gain and bandwidth controls for both bands.



Actual size is 2.3” x 2.42” (main board) and 1.78” x 0.91” (bypass board).

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INTRODUCTION

The Paradox Parametric EQ is based on the Pearl PE-10, a two-band parametric EQ that was originally released in 1981 or 1982 and discontinued a few years later. We originally traced this pedal all the way back in 2015 as one of our very first traces. It took over ten years to release a PCB, but we got there eventually!

The PE-10 is part of Pearl's "Sound Spice" series of effects which was designed by Korg. Each of these pedals is similar to classic effects such as the Tube Screamer or CE-2, but all of them have a twist that makes them stand out in some way.

This circuit is distinct from other compact parametric EQs in that it has a "Q" or bandwidth control, which most others such as the Ibanez PQ-9 or Boss PQ-4 are lacking. Because of this, it meets the definition of a fully parametric EQ while the others are technically only semi-parametric.

The Paradox is a direct adaptation of the PE-10 circuit. The only change is that the JFET switching has been converted to true bypass.

USAGE

The Paradox has six controls:

- **Frequency 1 and 2** control the center frequency of each parametric band.
- **Bandwidth 1 and 2** set the bandwidth (or Q) of each parametric band, from narrow to wide.
- **Level 1 and 2** set the amount of boost or cut in the selected band. At the 12:00 position, the frequencies are unaffected and the tone is neutral.

PARTS LIST

This parts list is also available in a spreadsheet format which can be imported directly into Mouser for easy parts ordering. Mouser doesn't carry all the parts—notably potentiometers—so the second tab lists all the non-Mouser parts as well as sources for each.

View parts list spreadsheet →

PART	VALUE	TYPE	NOTES
R1	10k	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	47k	Metal film resistor, 1/4W	
R4	220k	Metal film resistor, 1/4W	
R5	100k	Metal film resistor, 1/4W	
R6	10k	Metal film resistor, 1/4W	
R7	1k	Metal film resistor, 1/4W	
R8	5k1	Metal film resistor, 1/4W	
R9	10k	Metal film resistor, 1/4W	
R10	10k	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	1k	Metal film resistor, 1/4W	
R14	5k1	Metal film resistor, 1/4W	
R15	100k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	10k	Metal film resistor, 1/4W	
R18	10k	Metal film resistor, 1/4W	
R19	1k8	Metal film resistor, 1/4W	
R20	1k8	Metal film resistor, 1/4W	
R21	4k7	Metal film resistor, 1/4W	
R22	1k	Metal film resistor, 1/4W	
R23	470k	Metal film resistor, 1/4W	
R24	10k	Metal film resistor, 1/4W	
R25	470R	Metal film resistor, 1/4W	
R26	10k	Metal film resistor, 1/4W	
R27	10k	Metal film resistor, 1/4W	
R28	10k	Metal film resistor, 1/4W	
R29	1k8	Metal film resistor, 1/4W	
R30	1k8	Metal film resistor, 1/4W	
R31	4k7	Metal film resistor, 1/4W	
R32	1k	Metal film resistor, 1/4W	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
R33	470k	Metal film resistor, 1/4W	
R34	10k	Metal film resistor, 1/4W	
R35	470R	Metal film resistor, 1/4W	
R36	4k3	Metal film resistor, 1/4W	
R37	6k2	Metal film resistor, 1/4W	
R38	33R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pull-down resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	33n	Film capacitor, 7.2 x 2.5mm	
C2	150pF	MLCC capacitor, NP0/C0G	
C3	10uF	Electrolytic capacitor, 5mm	
C4	10uF	Electrolytic capacitor, 5mm	
C5	33n	Film capacitor, 7.2 x 2.5mm	
C6	220pF	MLCC capacitor, NP0/C0G	
C7	33n	Film capacitor, 7.2 x 2.5mm	
C8	1uF	Film capacitor, 7.2 x 5mm	
C9	15n	Film capacitor, 7.2 x 2.5mm	
C10	15n	Film capacitor, 7.2 x 2.5mm	
C11	1uF	Film capacitor, 7.2 x 5mm	
C12	1uF	Film capacitor, 7.2 x 5mm	
C13	15n	Film capacitor, 7.2 x 2.5mm	
C14	15n	Film capacitor, 7.2 x 2.5mm	
C15	1uF	Film capacitor, 7.2 x 5mm	
C16	1uF	Film capacitor, 7.2 x 5mm	
C17	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C18	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C19	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	2N5088	BJT transistor, NPN, TO-92	
Q2	2N5088	BJT transistor, NPN, TO-92	
Q3	2N3906	BJT transistor, PNP, TO-92	
Q4	2N5088	BJT transistor, NPN, TO-92	
Q5	2N5088	BJT transistor, NPN, TO-92	
IC1	TL072	Operational amplifier, dual, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	TL072	Operational amplifier, dual, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
IC3	TL072	Operational amplifier, dual, DIP8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
IC4	TL072	Operational amplifier, dual, DIP8	
IC4-S	DIP-8 socket	IC socket, DIP-8	
FREQ. 1	100kC	16mm right-angle PCB mount pot	Reverse audio (reverse log) taper.
FREQ. 2	100kC	16mm right-angle PCB mount pot	Reverse audio (reverse log) taper.
BANDWIDTH 1	50kB	16mm right-angle PCB mount pot	Linear taper.
BANDWIDTH 2	50kB	16mm right-angle PCB mount pot	Linear taper.
LEVEL 1	20kW	16mm right-angle PCB mount pot	W taper. Original uses 50kW. Can substitute 50kB. See build notes for more information.
LEVEL 2	20kW	16mm right-angle PCB mount pot	
LED	5mm	LED, 5mm, red diffused	
IN	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
DC	2.1mm	DC jack, 2.1mm panel mount	Lumberg NEB/J 21 C or equivalent.
FSW	3PDT	Stomp switch, 3PDT	Available from Aion FX.
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

IC selection

The original PE-10 uses JRC4558D op-amps. Since this is an EQ effect, it does not benefit from low-quality op-amps in the same way that an overdrive might, so it's recommended to use op-amps like the TL072 that have higher fidelity.

If you experiment with other types of op-amps, just be mindful of the total current draw. If you use something like the NE5532, consider reducing the R38 resistor to 10R since they take around 3 times the current of the TL072 or JRC4558D.

Level 1 and Level 2 potentiometer value

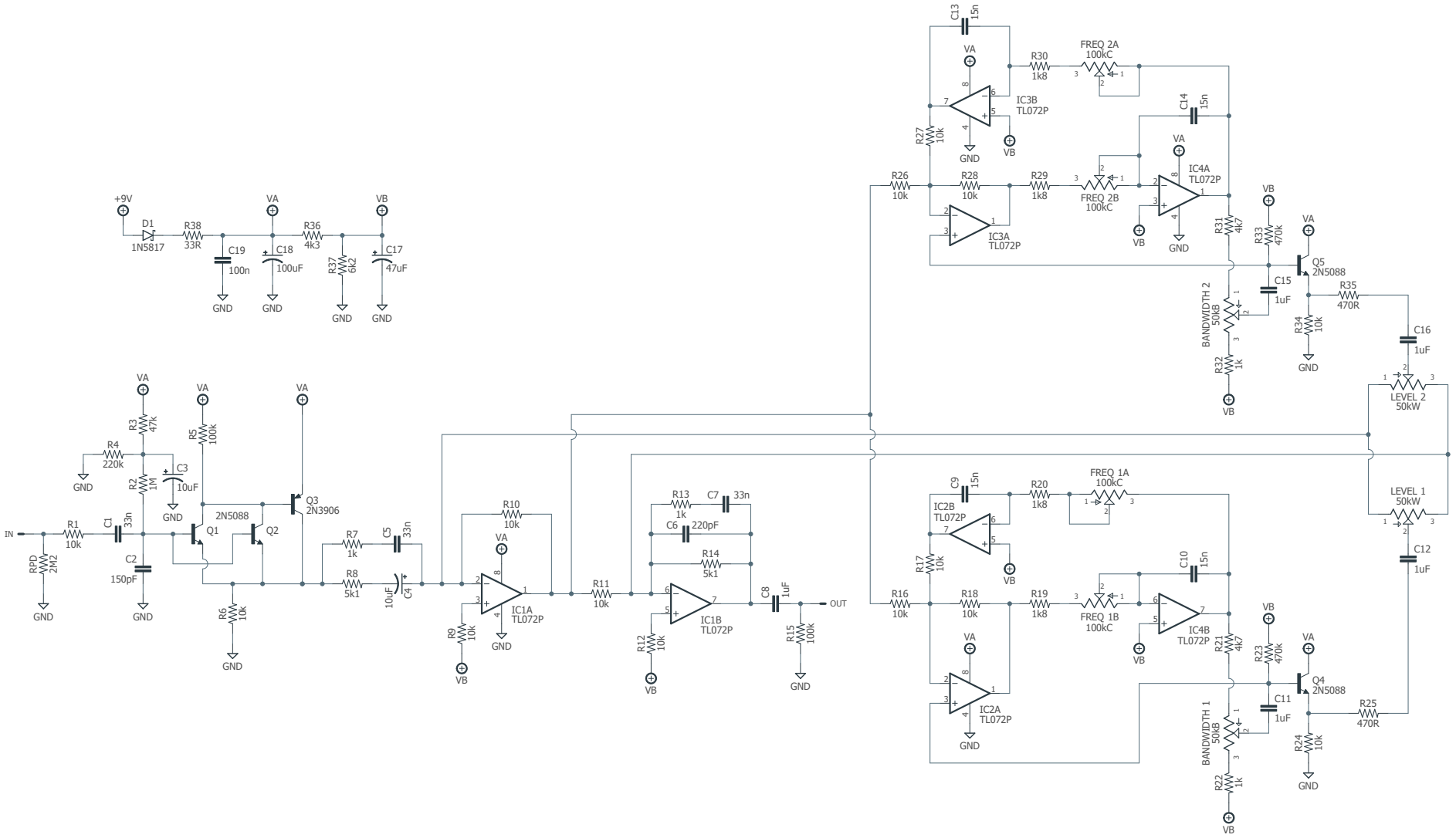
The Level potentiometers are 50kW (W-taper) in the original unit. W-taper pots act as a reverse audio taper from 0 to 50%, linear at 50%, and standard audio taper from 50% to 100%. Most suppliers carry 20kW, which is used for the Tube Screamer tone control, but other values are rare.

The only 50kW potentiometer we are aware of is this one from Tayda Electronics, which is frequently out of stock. It's a standard 16mm pot, but the legs are an odd format and spacing. You can cut the legs off and solder wires to the base of the pins. You can also try to form the pins into the correct shape, but note that the ends of the pins will be too large for the holes on the PCB so they will need to be trimmed or filed down.

The recommended solution is to use a 20kW potentiometer in both positions. This has the advantage of being much easier to dial in at the cost of a small reduction in the max boost or cut level, about 10%-15% on either end. This is because the taper is logarithmic, so the first 20k is significantly more effective than the next 30k even though the total pot value is 2.5x higher.

The other solution is just to use a 50kB pot. The 0, 50% and 100% positions will be the same, it's just the settings in between that will be more difficult to dial in.

SCHEMATIC


+9V
D1
1N5817
R38
33R
C19
100n
C18
100uF
R36
4k3
R37
6k2
C17
47uF
VA
VB
GND
IN
RPD
2M2
R1
10k
C1
33n
C2
150pF
R2
1M
R3
47k
R4
220k
C3
10uF
R5
100k
R6
10k
Q1
2N5088
Q2
Q3
2N3906
R7
1k
R8
5k1
C5
33n
C4
10uF
R10
10k
R9
10k
IC1A
TL072P
R11
10k
R13
1k
C7
33n
C6
220pF
R14
5k1
R12
10k
IC1B
TL072P
C8
1uF
R15
100k
OUT
C13
15n
IC3B
TL072P
R30
1k8
FREQ 2A
100kC
R27
10k
C14
15n
R26
10k
R28
10k
R29
1k8
FREQ 2B
100kC
IC3A
TL072P
IC4A
TL072P
R31
4k7
R33
470k
Q5
2N5088
C15
1uF
R35
470R
BANDWIDTH 2
50kB
R34
10k
R32
1k
C16
1uF
LEVEL 2
50kW
LEVEL 1
50kW
C12
1uF
C9
15n
IC2B
TL072P
R20
1k8
FREQ 1A
100kC
R17
10k
C10
15n
R16
10k
R18
10k
R19
1k8
FREQ 1B
100kC
IC4B
TL072P
IC2A
TL072P
R21
4k7
R23
470k
Q4
2N5088
C11
1uF
R25
470R
BANDWIDTH 1
50kB
R24
10k
R22
1k

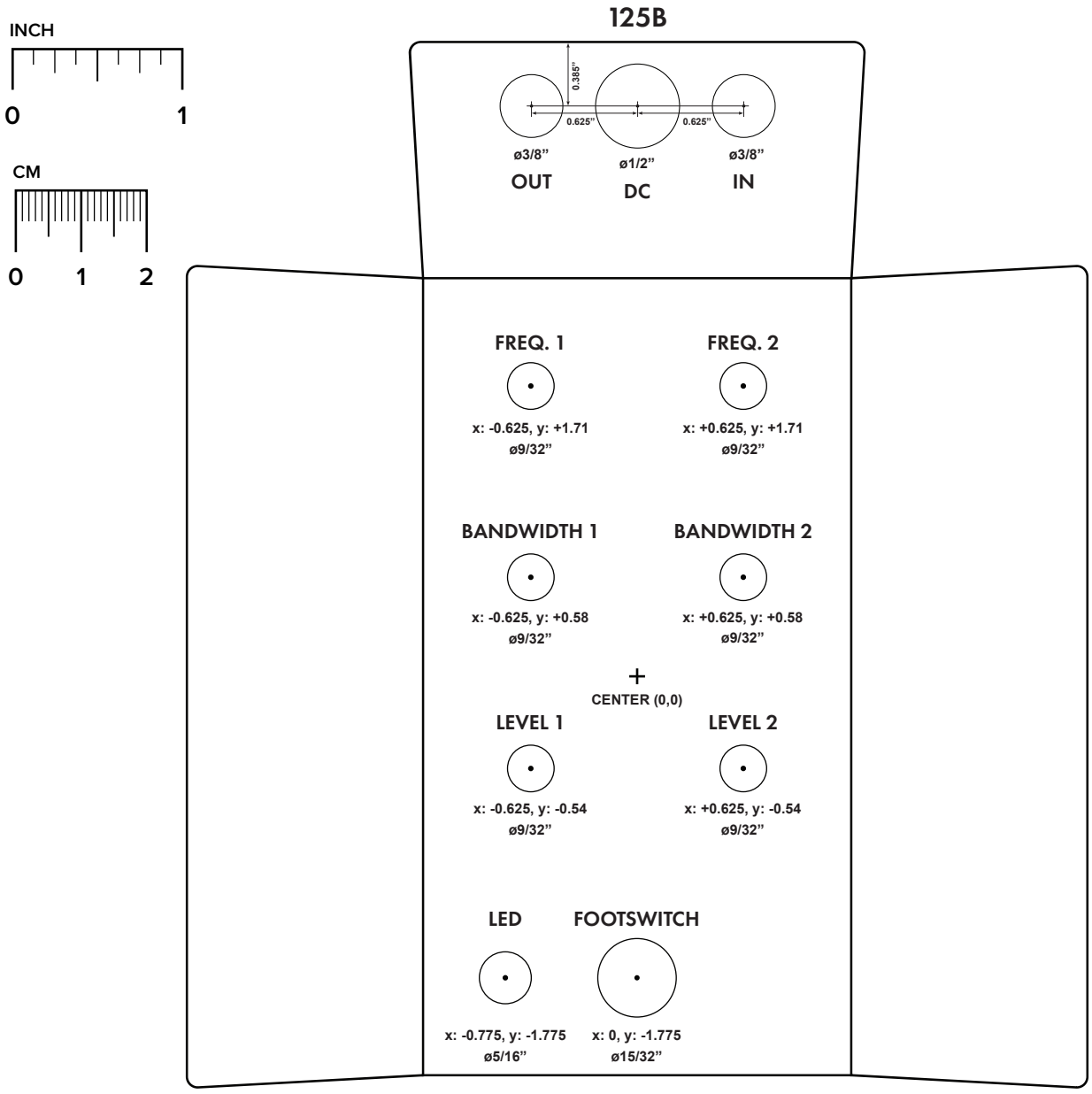
DRILL TEMPLATE

Cut out this drill template, fold the edges and tape it to the enclosure. Before drilling, it's recommended to first use a center punch for each of the holes to help guide the drill bit.

Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

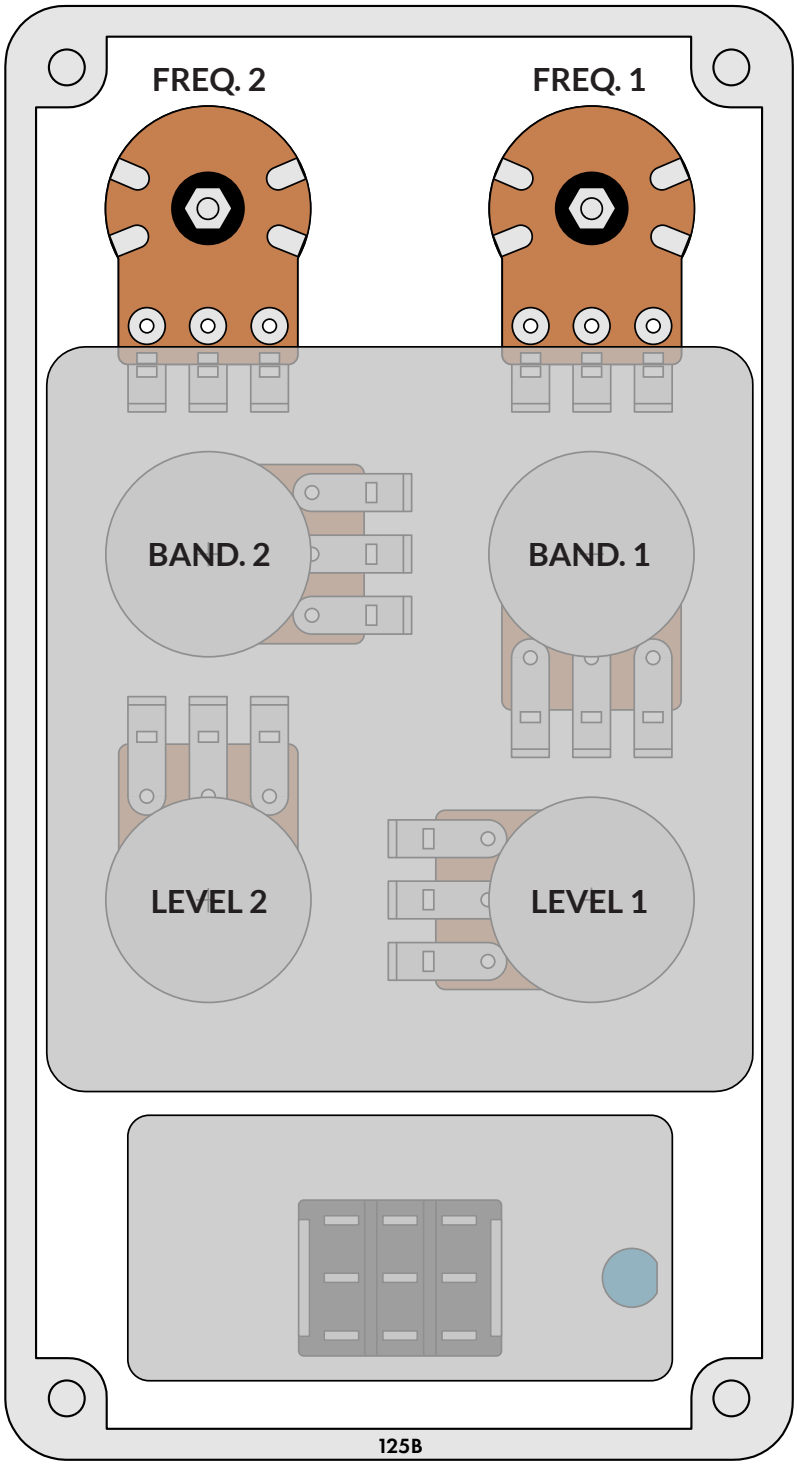
LED hole drill size assumes the use of a 5mm LED bezel, available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



ENCLOSURE LAYOUT

Enclosure is shown without jacks. See next page for jack layout and wiring.

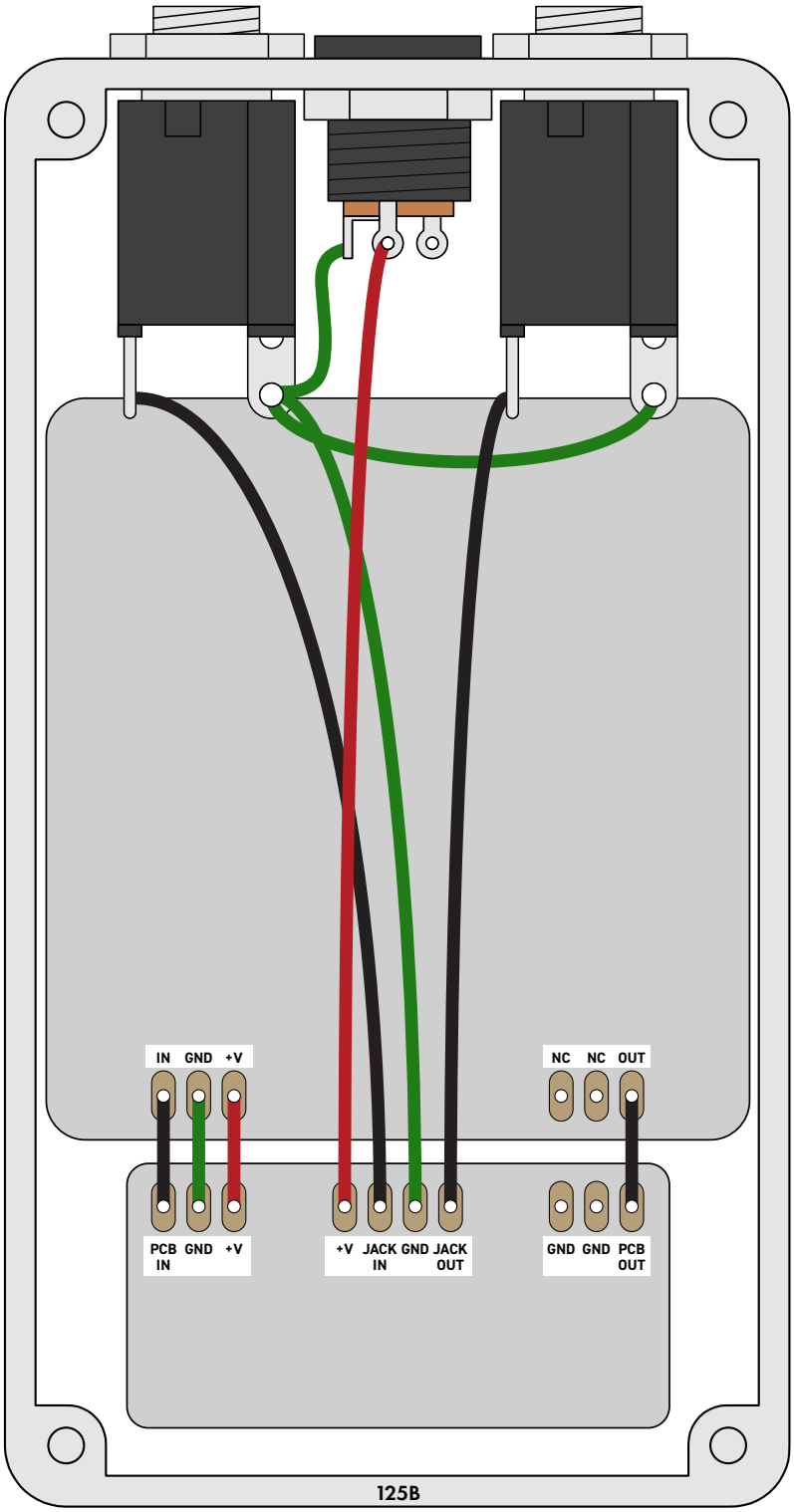
Note the positioning of the potentiometers. Most other Aion FX projects have all the potentiometers pointing in the same direction, but this layout allows the pots to be arranged in two columns for a more intuitive control scheme.



Note: The upper pads for the dual-gang gain potentiometers appear to be cut in half. **This is intentional!** It's called a *plated half-hole* or *castellated hole*, and they're used so that the PCB can lay flat across the pots instead of angling upward for the dual pot.

Solder the pots like you would if they were normal pads, but bend the top pins forward slightly so they make contact with the edge of the pads.

WIRING DIAGRAM



LICENSE & USAGE

No direct support is offered for these projects beyond the provided documentation. It's assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error.

All of these circuits have been tested in good faith in their base configurations. However, not all the modifications or variations have necessarily been tested. These are offered only as suggestions based on the experience and opinions of others.

Projects may be used for commercial endeavors in any quantity unless specifically noted. No attribution is necessary, though a link back is always greatly appreciated. The only usage restrictions are that **(1) you cannot resell the PCB as part of a kit without prior arrangement**, and **(2) you cannot "goop" the circuit, scratch off the screenprint, or otherwise obfuscate the circuit to disguise its source**. (In other words: you don't have to go out of your way to advertise the fact that you use these PCBs, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!)

DOCUMENT REVISIONS

1.0.0 (2026-07-03)
Initial release.