PROJECT NAME

EMPYREAN

aion
DIY GUITAR EFFECTS

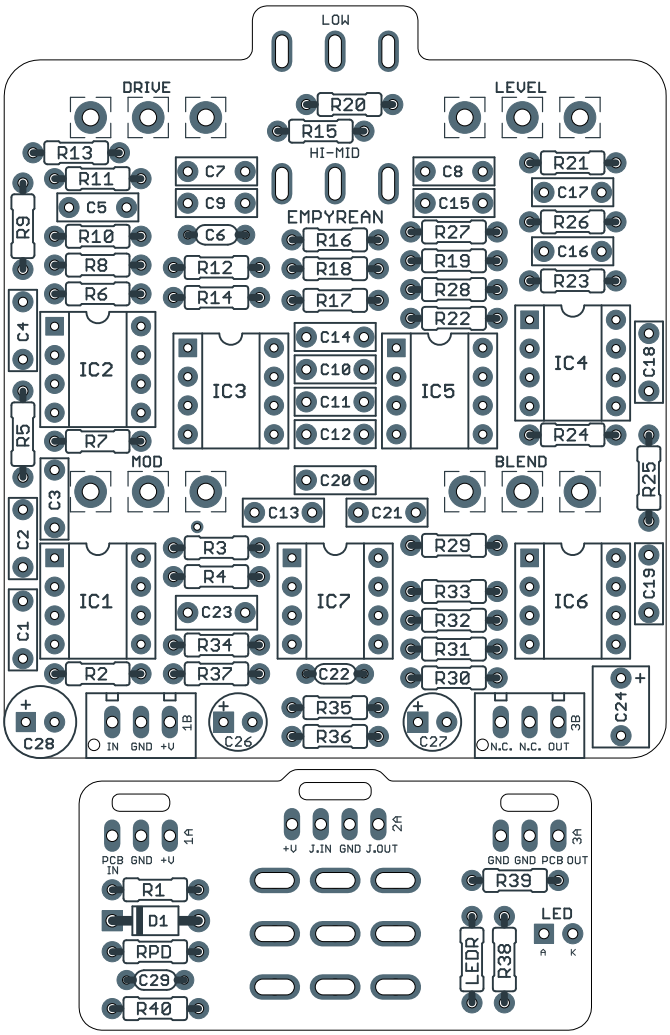
BASED ON
Darkglass® Alpha Omicron

BUILD DIFFICULTY
Intermediate

EFFECT TYPE
Bass distortion

DOCUMENT VERSION
1.0.0 (2025-03-28)

PROJECT SUMMARY
A dual-mode bass distortion that delivers modern rock & metal bass tones by way of carefully-tuned signal filtering, plus a clean blend to retain the low end.



Actual size is 2.3” x 2.61” (main board) and 1.78” x 0.86” (bypass board).

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INTRODUCTION

The Empyrean Dual Distortion is based on the Darkglass Alpha Omicron, a bass distortion designed in collaboration with Jon Stockman, an Australian bassist with the progressive band Karnivool. It was first released in 2017 and traced by Aion FX in 2025.

The Alpha Omicron is similar in spirit to the B3K and Duality, featuring several shared design elements that have become Darkglass signatures. But the two distortion sections (called Alpha and Omega) are unique to this pedal, and there are no overdriven CMOS stages like the B3K or Duality.

After some standard tone shaping, the signal is split into two paths. The Alpha path is described as punchy and tight, while the Omega path is described as brutal and raw. The “Mod” control blends between the two. Then, as with the other Darkglass circuits, there’s a clean blend to mix in the dry signal.

The Empyrean is a direct adaptation of the Alpha Omicron based on our trace. It’s been converted to true bypass and the flip-flop circuitry has been removed, but the effect signal path is the same.

The Alpha Omega is the same core circuit as the Alpha Omicron, but with an added 3-band EQ at the end for more tone-shaping options. We traced the Alpha Omega alongside this pedal, and it is available as the Empyrean Deluxe.

USAGE

The Empyrean has six controls:

- **Drive** controls the amount of gain from the op-amp that is fed through the two distortion stages.
- **Mod** pans between “Alpha” (more filtered and refined) and “Omega” (more raw) distortion circuits.
- **Level** sets the overall output of the drive signal before the clean blend.
- **Blend** pans between the buffered clean signal and the drive signal.
- **Low** (toggle) adds bass frequencies before the op-amp gain stage.
- **Hi-Mid** (toggle) engages a 2.8k midrange boost.

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	10k	Metal film resistor, 1/4W	
R4	100k	Metal film resistor, 1/4W	
R5	220k	Metal film resistor, 1/4W	
R6	220k	Metal film resistor, 1/4W	
R7	2k2	Metal film resistor, 1/4W	
R8	2k2	Metal film resistor, 1/4W	
R9	100k	Metal film resistor, 1/4W	
R10	100k	Metal film resistor, 1/4W	
R11	47k	Metal film resistor, 1/4W	
R12	330k	Metal film resistor, 1/4W	
R13	3k3	Metal film resistor, 1/4W	
R14	8k2	Metal film resistor, 1/4W	
R15	150k	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	47k	Metal film resistor, 1/4W	
R20	47k	Metal film resistor, 1/4W	
R21	47k	Metal film resistor, 1/4W	
R22	10k	Metal film resistor, 1/4W	
R23	47k	Metal film resistor, 1/4W	
R24	22k	Metal film resistor, 1/4W	
R25	47k	Metal film resistor, 1/4W	
R26	10k	Metal film resistor, 1/4W	
R27	10k	Metal film resistor, 1/4W	
R28	20k	Metal film resistor, 1/4W	
R29	10k	Metal film resistor, 1/4W	
R30	10k	Metal film resistor, 1/4W	
R31	56k	Metal film resistor, 1/4W	
R32	10k	Metal film resistor, 1/4W	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
R33	10k	Metal film resistor, 1/4W	
R34	10k	Metal film resistor, 1/4W	
R35	10k	Metal film resistor, 1/4W	
R36	10k	Metal film resistor, 1/4W	
R37	10k	Metal film resistor, 1/4W	
R38	100k	Metal film resistor, 1/4W	
R39	1k	Metal film resistor, 1/4W	
R40	22R	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	100n	Film capacitor, 7.2 x 2.5mm	
C2	22n	Film capacitor, 7.2 x 2.5mm	
C3	68n	Film capacitor, 7.2 x 2.5mm	
C4	1n	Film capacitor, 7.2 x 2.5mm	
C5	10n	Film capacitor, 7.2 x 2.5mm	
C6	47pF	MLCC capacitor, NP0/C0G	
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	2n2	Film capacitor, 7.2 x 2.5mm	
C9	22n	Film capacitor, 7.2 x 2.5mm	
C10	1n	Film capacitor, 7.2 x 2.5mm	
C11	1n	Film capacitor, 7.2 x 2.5mm	
C12	1n	Film capacitor, 7.2 x 2.5mm	
C13	1n	Film capacitor, 7.2 x 2.5mm	
C14	2n2	Film capacitor, 7.2 x 2.5mm	
C15	22n	Film capacitor, 7.2 x 2.5mm	
C16	1n	Film capacitor, 7.2 x 2.5mm	
C17	1n	Film capacitor, 7.2 x 2.5mm	
C18	2n2	Film capacitor, 7.2 x 2.5mm	
C19	1n	Film capacitor, 7.2 x 2.5mm	
C20	6n8	Film capacitor, 7.2 x 2.5mm	
C21	120n	Film capacitor, 7.2 x 2.5mm	
C22	270pF	MLCC capacitor, NP0/C0G	
C23	270n	Film capacitor, 7.2 x 3.5mm	
C24	2.2uF	Film capacitor, 7.2 x 3.5mm	1uF in original. See build notes.
C26	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C27	47uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.
C28	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C29	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
IC1	RC4559P	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	
IC3	RC4559P	Operational amplifier, dual, DIP8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
IC4	RC4559P	Operational amplifier, dual, DIP8	
IC4-S	DIP-8 socket	IC socket, DIP-8	
IC5	RC4559P	Operational amplifier, dual, DIP8	
IC5-S	DIP-8 socket	IC socket, DIP-8	
IC6	RC4559P	Operational amplifier, dual, DIP8	
IC6-S	DIP-8 socket	IC socket, DIP-8	
IC7	RC4559P	Operational amplifier, dual, DIP8	
IC7-S	DIP-8 socket	IC socket, DIP-8	
DRIVE	100kC	16mm right-angle PCB mount pot	Reverse audio (reverse log or antilog) taper.
MOD	100kB	16mm right-angle PCB mount pot	Linear taper.
LEVEL	100kA	16mm right-angle PCB mount pot	Audio (log) taper.
BLEND	100kB	16mm right-angle PCB mount pot	Linear taper.
LOW	SPDT on-on	Toggle switch, SPDT on-on	
HI-MID	SPDT on-on	Toggle switch, SPDT on-on	
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	Mouser 163-4302-E or equivalent.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

IC selection

The original Alpha Omicron uses the MC33178 for IC1 and IC3-7. This op-amp is a favorite of Darkglass, used in nearly all of their pedals in some capacity.

For the Omega/Omicron circuits in particular, the the distortion comes from overdriving the op-amps directly, so selection is important, and different op-amps may have wildly different characteristics when overdriven.

The 33178 is an older op-amp, still readily available in SMD format but nearly impossible to find in DIP. We cross-referenced datasheets for dozens of different audio op-amps and found that the **RC4559P** is a near-exact match.

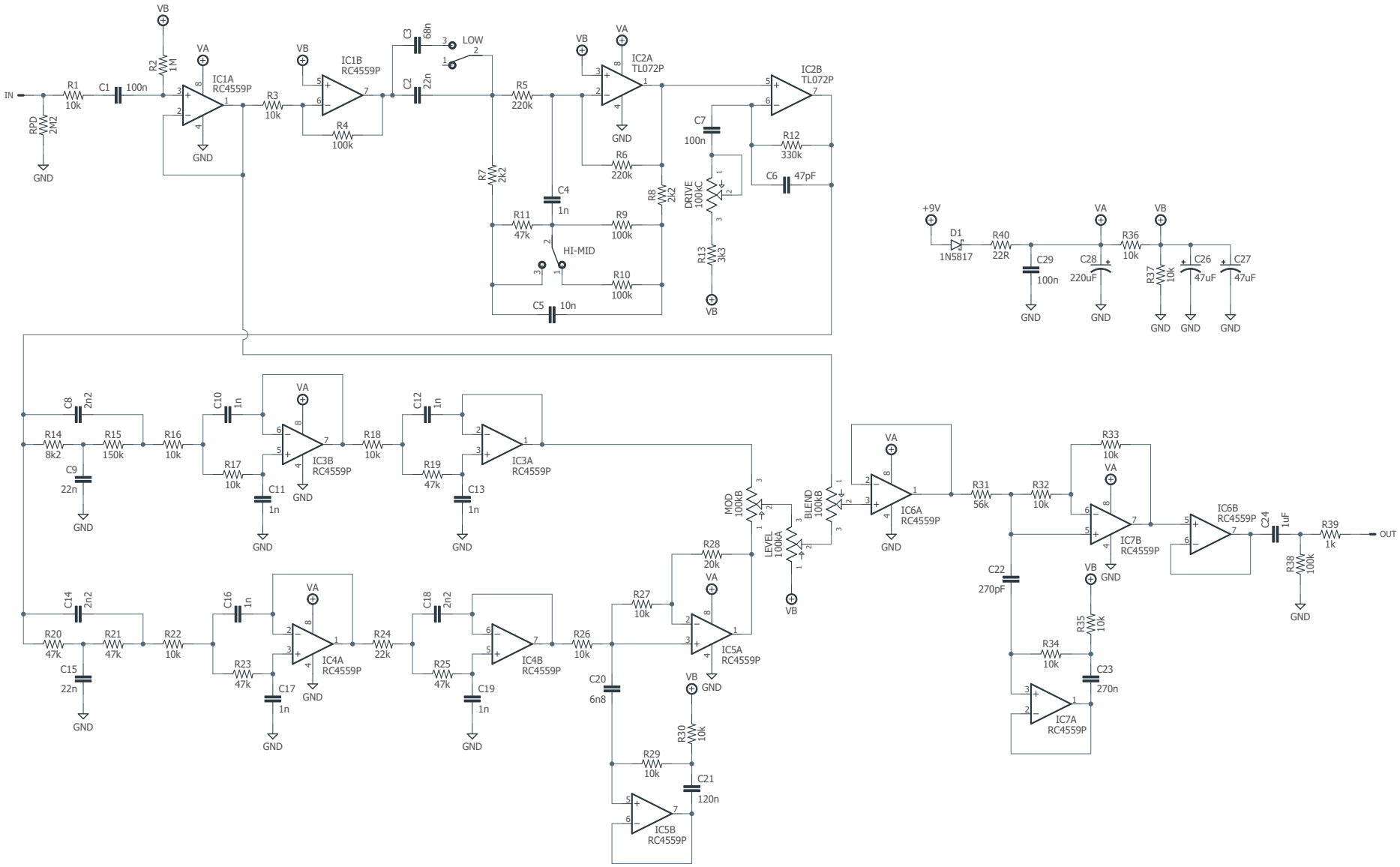
It could be the case that they are truly identical and that the slight differences are due to different measurement techniques between ONSemi and Texas Instruments. But either way, it's very close in the ways that matter—slew rate, noise figure, and gain-bandwidth product—and in our testing it sounded the same.

C24 capacitor value

C24 (the output capacitor) is 1uF in the original. This is probably fine in nearly all situations, but since the output capacitor interacts with the input capacitor of what follows, it's recommended to increase the value to 2.2uF.

If you want to increase it even further, polarity marks have been added to the footprint, but these should be ignored unless using a polarized capacitor.

SCHEMATIC


IN
RPD 2M2
GND
R1 10k
C1 100n
R2 1M
VB
VA
IC1A RC4559P
R3 10k
IC1B RC4559P
R4 100k
C3 68n
LOW
C2 22n
R5 220k
R7 2k2
C4 1n
R11 47k
R9 100k
HI-MID
R10 100k
C5 10n
IC2A TL072P
R6 220k
R8 2k2
C7 100n
DRIVE 100KC
R13 3k3
IC2B TL072P
R12 330k
C6 47pF
+9V
D1 1N5817
R40 22R
C29 100n
C28 220uF
R36 10k
R37 10k
C26 47uF
C27 47uF
C8 2n2
R14 8k2
R15 150k
R16 10k
C9 22n
C10 1n
R17 10k
C11 1n
IC3B RC4559P
R18 10k
C12 1n
R19 47k
C13 1n
IC3A RC4559P
MOD 100kB
LEVEL 100kA
BLEND 100kB
IC6A RC4559P
R31 56k
R32 10k
R33 10k
IC7B RC4559P
C22 270pF
R35 10k
R34 10k
C23 270n
IC7A RC4559P
IC6B RC4559P
C24 1uF
R39 1k
R38 100k
OUT
C14 2n2
R20 47k
R21 47k
R22 10k
C15 22n
C16 1n
R23 47k
C17 1n
IC4A RC4559P
R24 22k
C18 2n2
R25 47k
C19 1n
IC4B RC4559P
R26 10k
R28 20k
R27 10k
C20 6n8
R30 10k
R29 10k
C21 120n
IC5A RC4559P
IC5B RC4559P

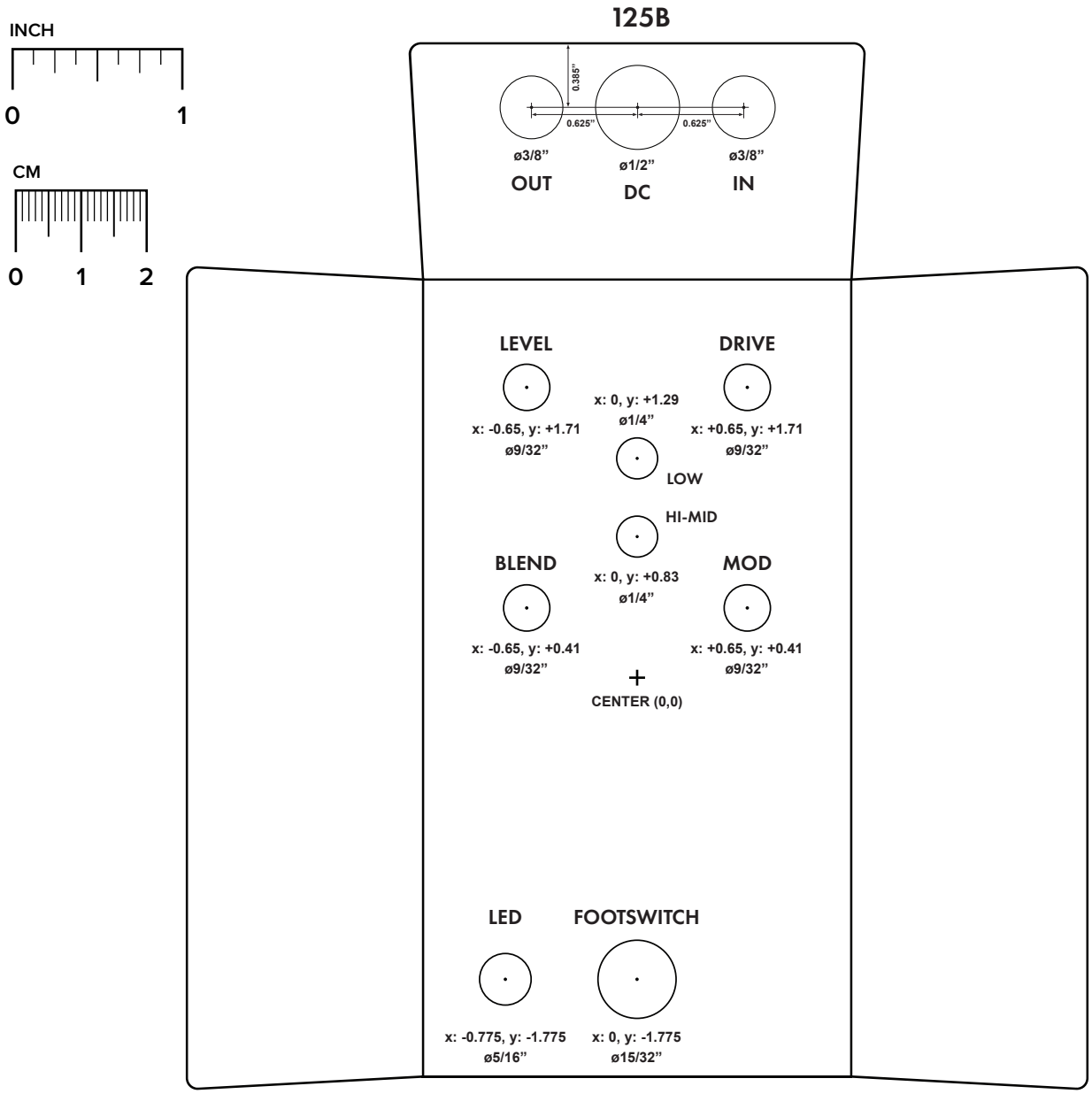
DRILL TEMPLATE

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.

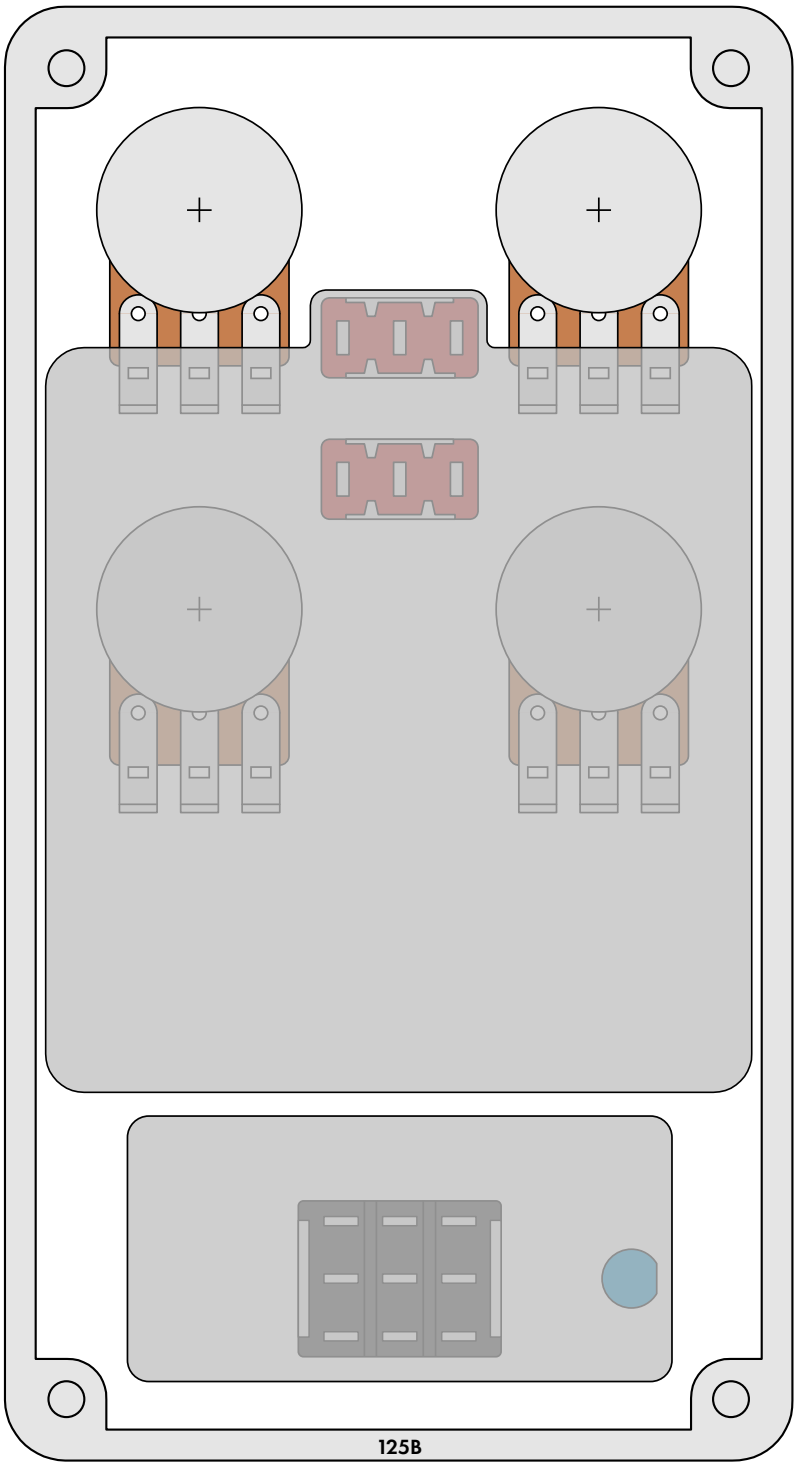
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

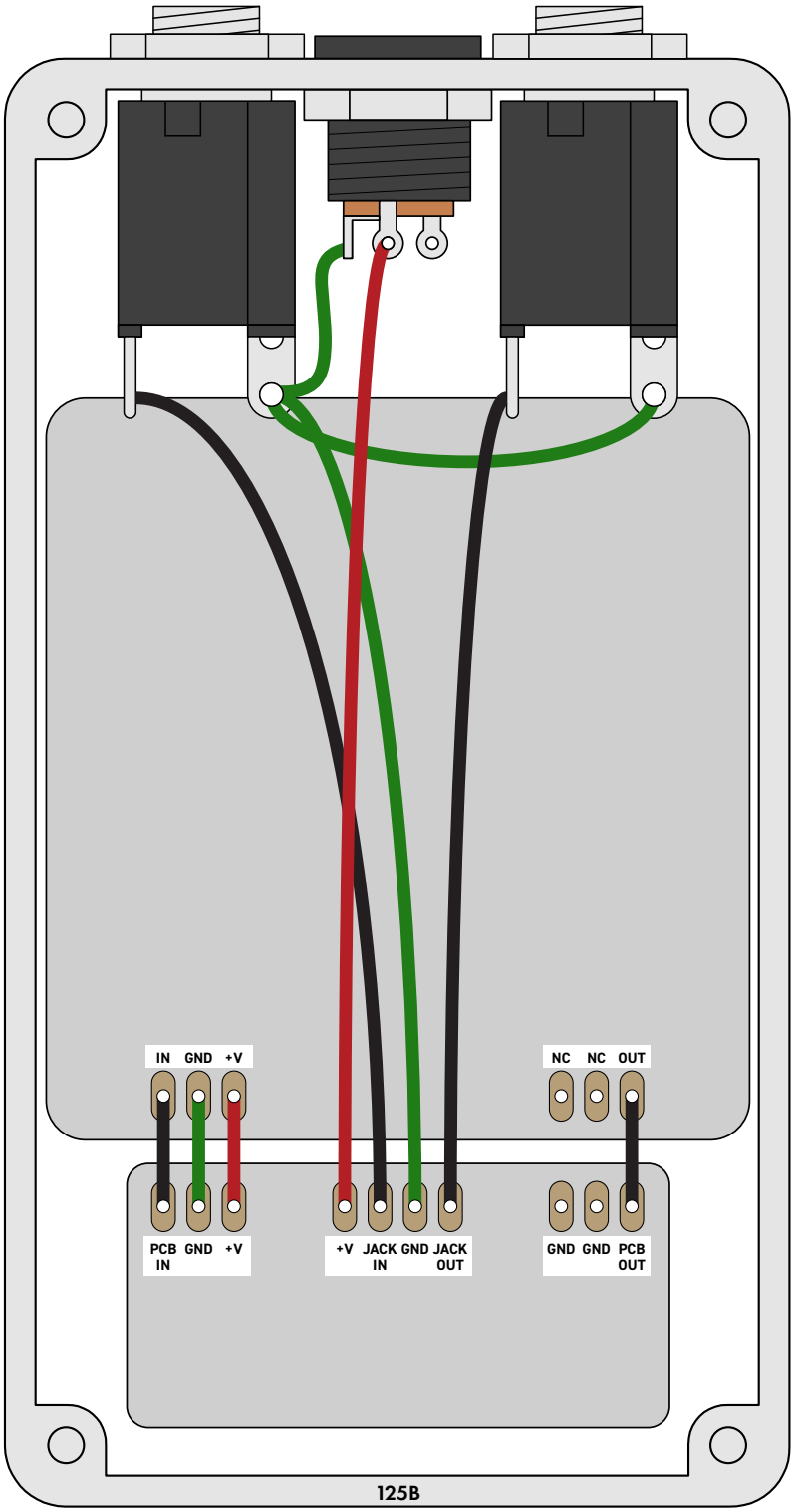


ENCLOSURE LAYOUT

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



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 (2025-03-28)
Initial release.