

PROJECT NAME

AXION

BASED ON

Echoplex EP-3 Preamp

BUILD DIFFICULTY

■■■■■ Easy

EFFECT TYPE

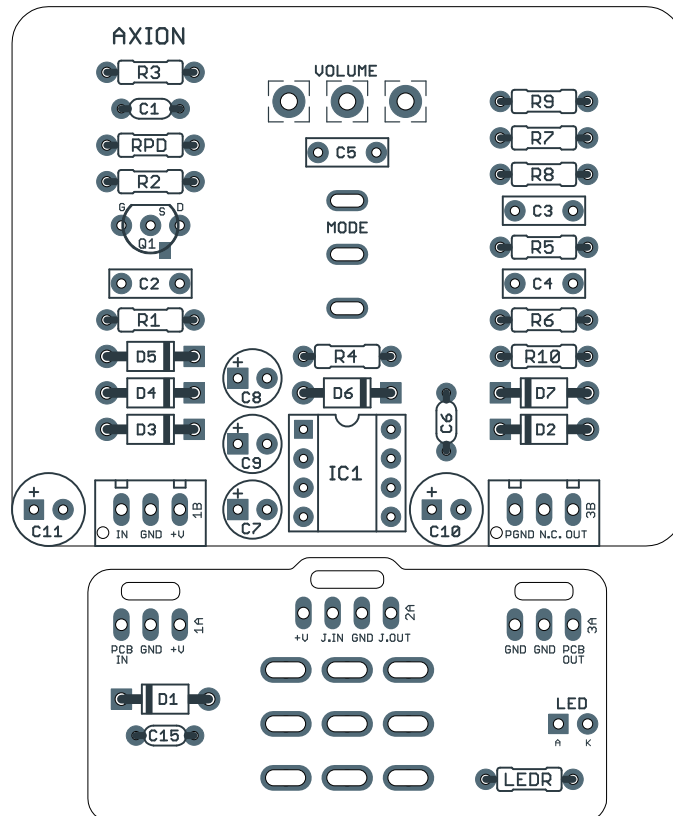
Preamp, tone enhancer

DOCUMENT VERSION

1.0.0 (2025-03-28)

PROJECT SUMMARY

An adaptation of the JFET input stage of the Echoplex EP-3 tape delay unit, famously used by Jimmy Page, Brian May and many others.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.86" (bypass board).

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INTRODUCTION

The Axion JFET Preamp is based on the Chase Tone Secret Preamp, an adaptation of the input section of the Echoplex tape echo delay from the 1970s.

The Secret Preamp was originally released in 2013 and [traced by Aion FX in 2025](#). We were not the first to trace it, but being an accurate reproduction of the Echoplex preamp, there are no big surprises under the hood. Ours had a few alternate values from other units, but nothing to substantially impact the tone.

This is one of three Aion FX projects based on the Echoplex preamp alongside the [Ares](#) (ClinchFX EP-Pre) and [Ephemeris](#) (Xotic EP Booster). Each of the circuits takes a different approach to the inexact nature of copying a delay pedal without the delay.

The Xotic EP Booster is a more usable circuit at the expense of accuracy, acting as a more traditional boost with some tone shaping that gets you into Echoplex territory.

The Clinch EP-Pre is a balance of accuracy and usability. The first stage is a direct implementation of the Echoplex, but an output buffer has been added in order to maintain consistent interaction with pedals that come afterward.

The Secret Preamp, on the other hand, is the closest part-for-part recreation of the three, with only the JFET stage and no second boost or buffer. It also runs on a slightly higher 22V internal voltage by reconfiguring the charge pump. (All three circuits still use 9V as a supply voltage.)

The Ares and Axion should sound the same in normal usage. But for those who are concerned about having the closest part-for-part recreation of the Echoplex, the Axion keeps it simple and direct.

USAGE

The Axion has the following controls:

- **Volume** sets the overall volume level. It starts at zero and tops out just slightly above unity with the Mode switch in the center position. The maximum volume is reached at around 2:00 on the rotation, but there is still a slight tonal shift from 2:00 to 5:00.
- **Mode** selects between early EP-3, late EP-3, and a third in-between mode. The late and in-between modes increase the available gain.

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—most 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	100k	Metal film resistor, 1/4W	Some Secret Preamp units use 110k.
R2	1M	Metal film resistor, 1/4W	
R3	3k3	Metal film resistor, 1/4W	Some Secret Preamp units use 3k6.
R4	22k	Metal film resistor, 1/4W	
R5	1M	Metal film resistor, 1/4W	
R6	1M	Metal film resistor, 1/4W	
R7	240k	Metal film resistor, 1/4W	
R8	100k	Metal film resistor, 1/4W	Some Secret Preamp units use 110k.
R9	100k	Metal film resistor, 1/4W	Some Secret Preamp units use 110k.
R10	1k	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
C1	220pF	MLCC capacitor, NP0/COG	
C2	22n	Film capacitor, 7.2 x 2.5mm	
C3	22n	Film capacitor, 7.2 x 2.5mm	
C4	10n	Film capacitor, 7.2 x 2.5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	470n	MLCC capacitor, X7R	Power supply filter capacitor.
C7	10uF	Electrolytic capacitor, 5mm	Charge pump capacitor.
C8	10uF	Electrolytic capacitor, 5mm	Charge pump capacitor.
C9	10uF	Electrolytic capacitor, 5mm	Charge pump capacitor.
C10	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C11	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N4743A	Zener diode, 13V, DO-41	
D3	1N5817	Schottky diode, DO-41	
D4	1N5817	Schottky diode, DO-41	
D5	1N5817	Schottky diode, DO-41	
D6	1N5817	Schottky diode, DO-41	
D7	1N4748A	Zener diode, 22V, DO-41	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
IC1	LT1054CP	Charge pump / voltage converter	
IC1-S	DIP-8 socket	IC socket, DIP-8	
VOL.	500kA	16mm right-angle PCB mount pot	
Q1	2N5457	JFET, small-signal, TO-92	Available from Aion FX . Can also use 2N5484 .
MODE	SPDT cntr off	Toggle switch, SPDT on-off-on	
LED	5mm	LED, 5mm, red diffused	
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 112BX 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.
BATT	Battery snap	9V battery snap	Optional. Use the soft plastic type—the hard-shell type will not fit.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Wiring note

In order to maintain good grounding practices, the charge pump has been given its own ground instead of sharing a ground plane with the audio signal. Because of this, there is another ground wire that needs to be connected on the right side, to the left of the “Out” wire.

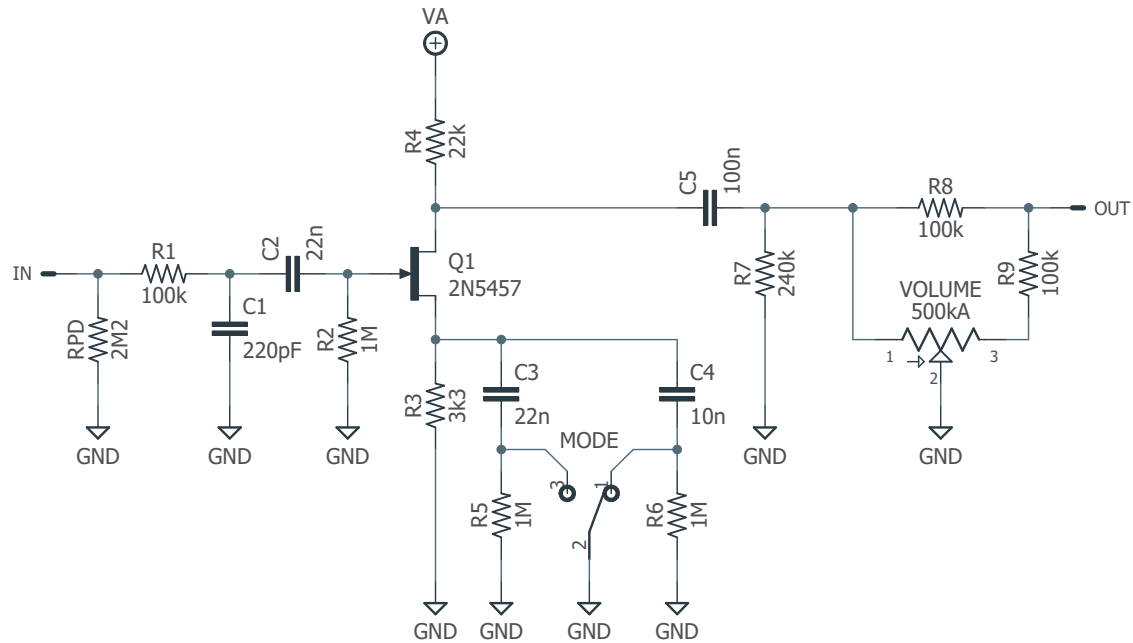
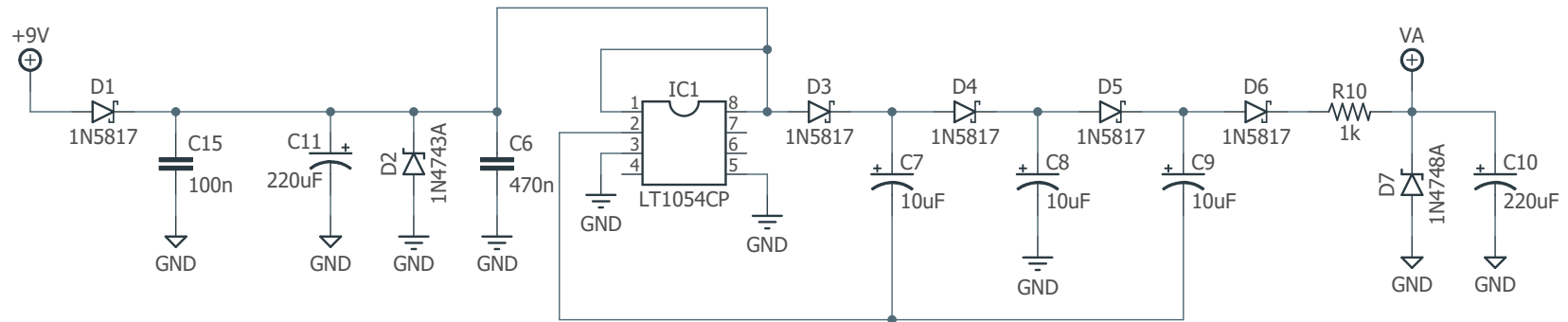
The wiring diagram shows this added wire, but since it’s otherwise identical to most other Aion projects, it could easily be overlooked.

JFET selection

The TIS58 JFETs used in the original EP-3 are nearly impossible to find. Fortunately, there’s nothing special about the TIS58, and it is very similar to current-production JFETs such as the [2N5484](#) (used in the Clinch EP-Pre for Q1) and [2N5457](#) (used in the Secret Preamp).

Due to the growing scarcity of through-hole JFETs, pads have been provided to allow easy use of surface-mount alternatives if you’re okay soldering those. Just be careful because you can’t socket them like you can with through-hole parts. Once they’re soldered, it’s a lot of work to get them off without specialized desoldering equipment.

SCHEMATIC



Early = center (no cap)
 Late = down (22n cap)
 Mod = up (10n cap, in between)

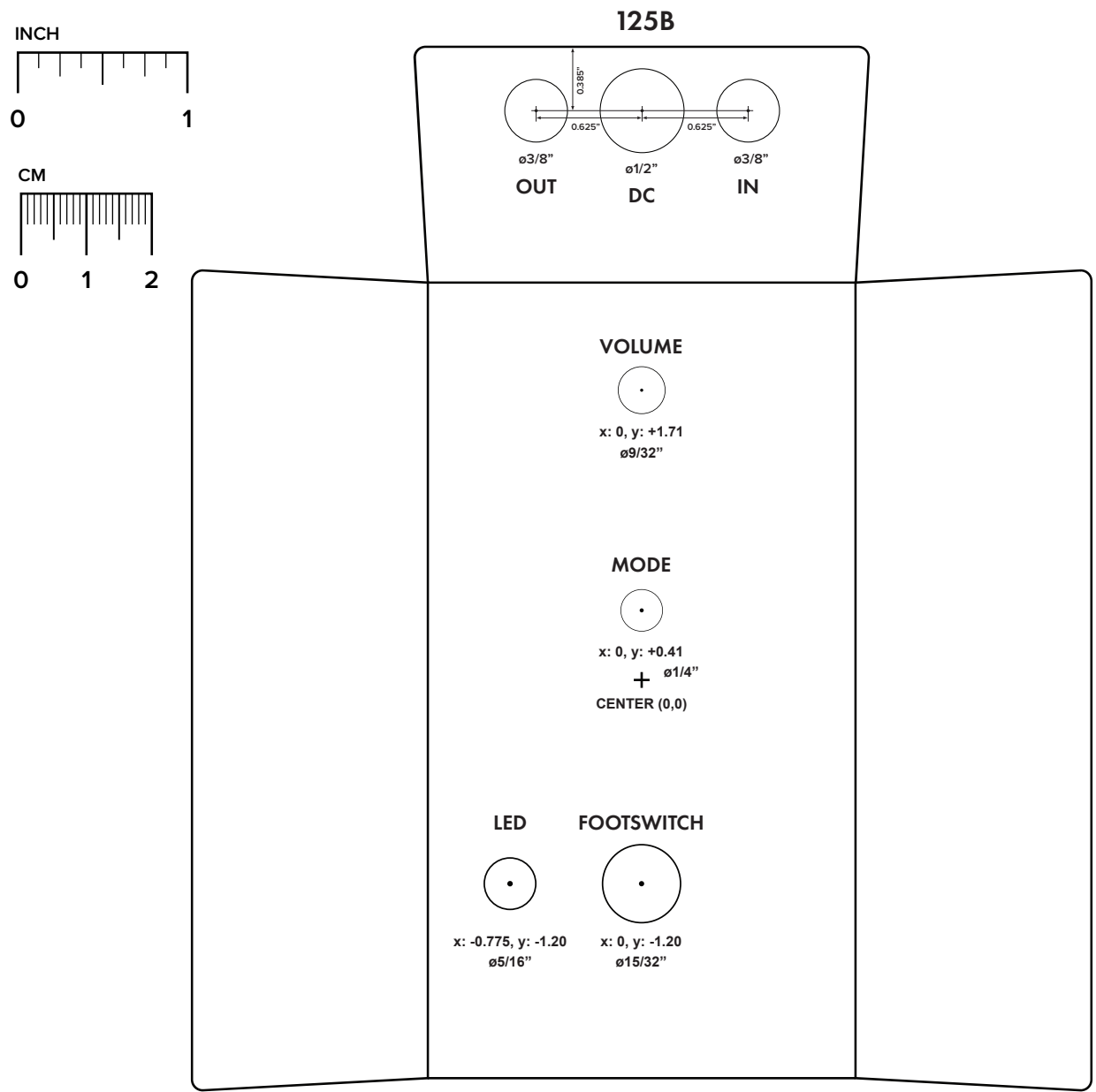
DRILL TEMPLATE

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.

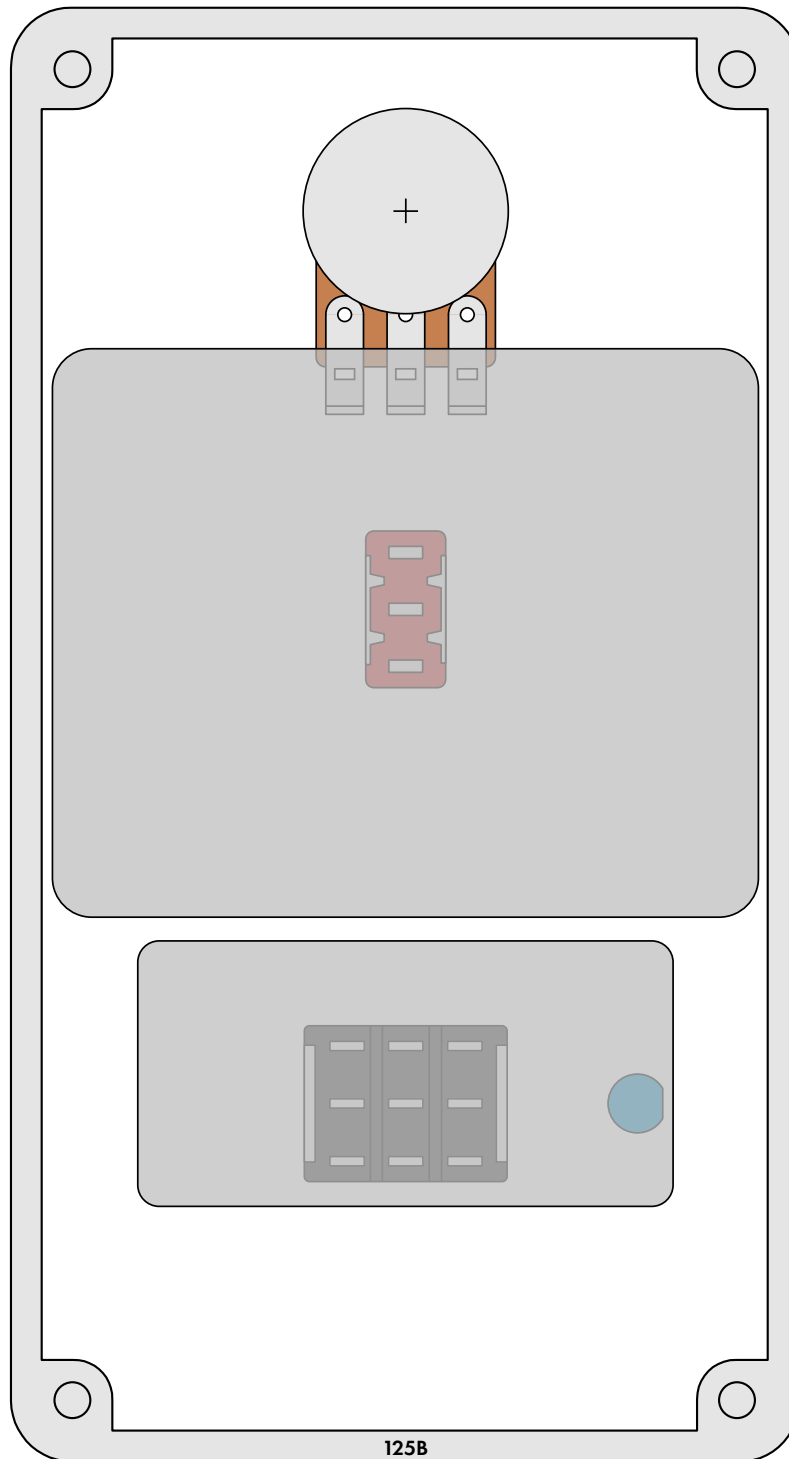
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). Open-frame jacks will not fit in layouts with one knob due to the placement of the DC jack.

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.

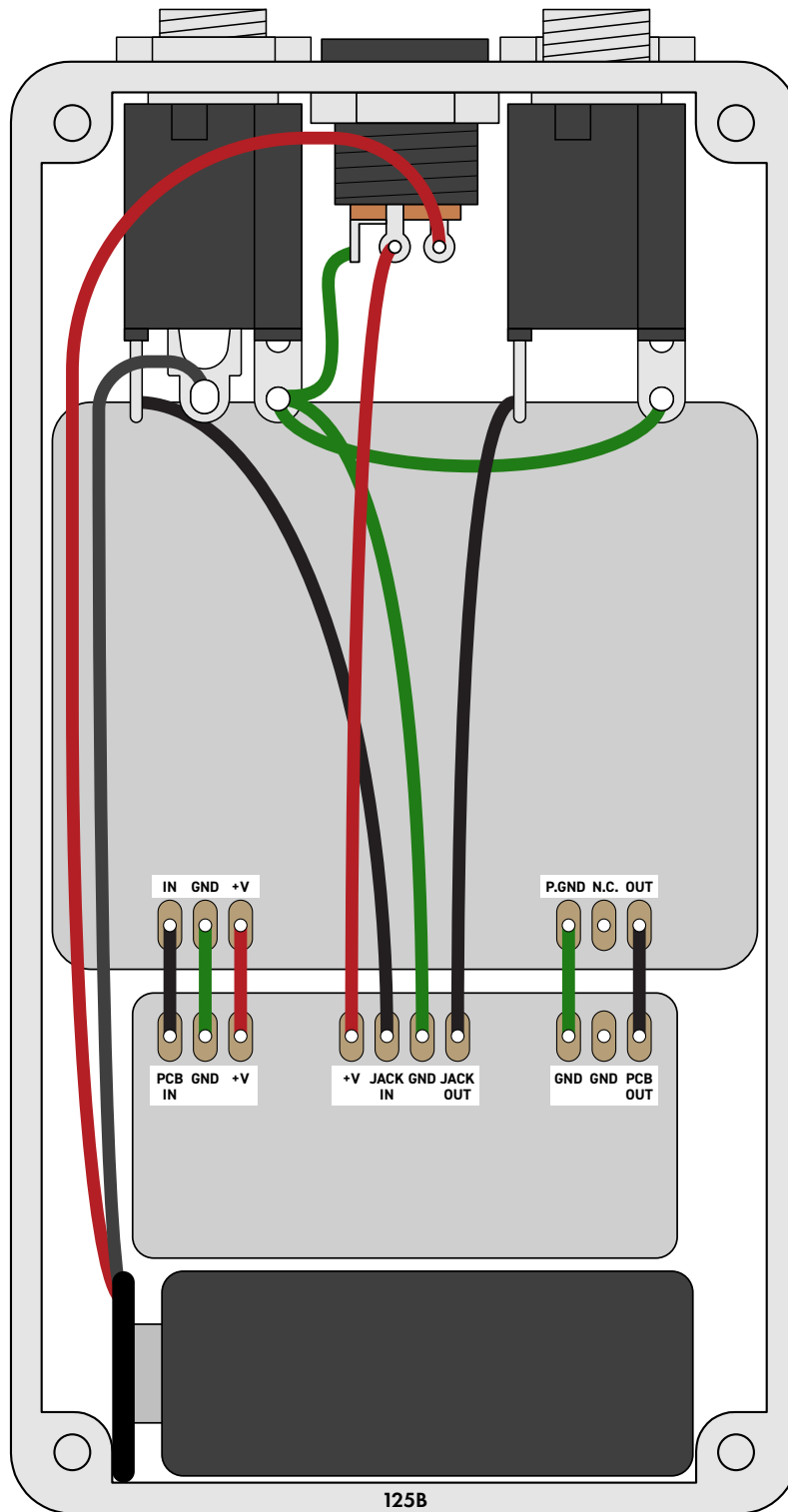


ENCLOSURE LAYOUT

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



WIRING DIAGRAM



*Shown with optional 9V battery. If battery is omitted, both jacks can be mono rather than one being stereo.
Leave the far-right lug of the DC jack unconnected.*

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.