

PROJECT NAME

POLYPHEMUS



BASED ON

Pigtronix® Philosopher's Tone

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

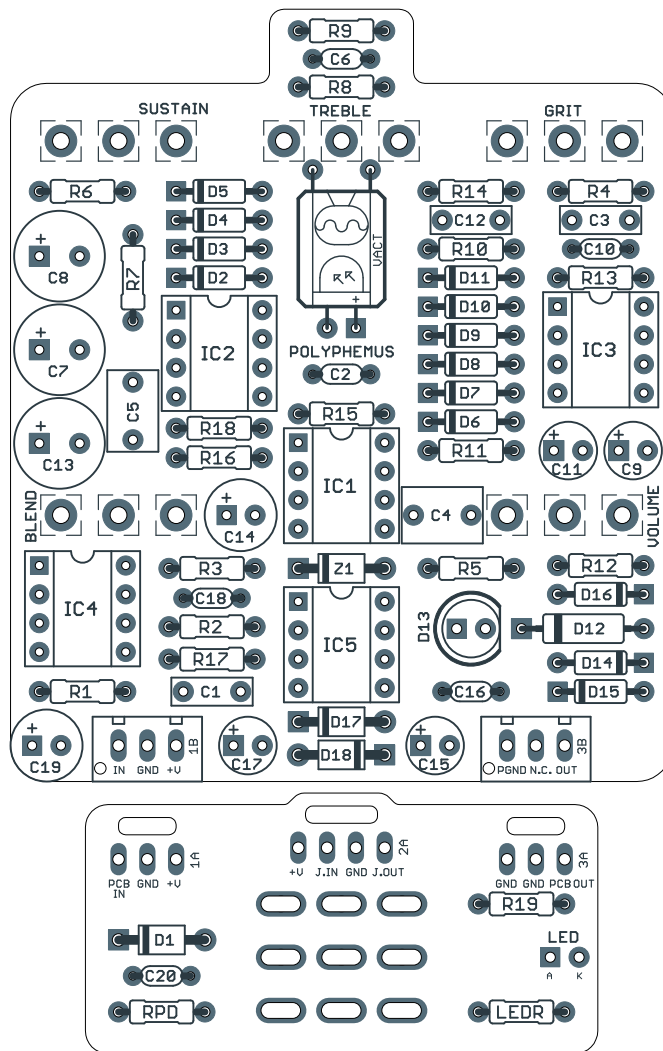
Compressor / Overdrive

DOCUMENT VERSION

1.0.0 (2023-07-04)

PROJECT SUMMARY

An inventive optical compressor noted for its long sustain and blendable overdrive, designed by Howard Davis, best known as the designer of the EHX Memory Man and Electric Mistress.



Actual size is 2.3" x 2.68" (main board) and 1.78" x 0.90" (bypass board).

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INTRODUCTION

The Polyphemus Optical Compressor is based on the Pigtronix Philosopher's Tone, a vactrol-based compressor & overdrive first released in 2009. It's known for its incredibly long sustain, and has a unique diode-clipping overdrive that can be blended in with the clean compressed signal.

The Philosopher's Tone was designed by Howard Davis, the legendary inventor of the Memory Man and Electric Mistress when he worked for Electro-Harmonix in the late 1970s. Since that time, he's designed several effects on a contract basis, and this is one of a few he did for Pigtronix.

After the original release, the Philosopher's Tone underwent several revisions and new editions. The first was the "Germanium Gold" edition, which was in a gold enclosure and featured a single germanium diode in place of one of the silicon diodes in the clipping section (in other words, a marketing gimmick).

Later, the circuit was reworked into two new and slightly simplified pedals: the Philosopher's Rock, which emphasized the overdrive component, and the Philosopher's Bass, which was tuned for bass frequencies. These replaced the original Philosopher's Tone.

Most recently, it was redesigned as a miniature pedal, once again using the original Philosopher's Tone name. This version included an onboard charge pump voltage doubler, so it no longer needed its own 15V or 18V adapter. This is the only one currently manufactured as of this project's release.

The Polyphemus is an amalgamation of all of these, primarily based on the original Philosopher's Tone (which had more features than any subsequent versions) but incorporating various modifications and tweaks from some of the later versions, including the charge pump, germanium diode, and improvements to the sustain control.

USAGE

The Polyphemus has five controls:

- **Sustain** controls the amount of compression applied to the signal.
- **Grit** is the amount of overdrive or clipping applied to the compressed signal. Note that this is closer to a blend than a gain control, and the clipping level is more or less fixed.
- **Treble** cuts or boosts the highs at around 2kHz by up to 6dB in either direction, with flat response at 12:00. This comes after the blend, so it's applied to the dry signal as well as the effect signal.
- **Blend** sets the ratio between dry and effect signals.
- **Volume** is the overall output level. Be aware that even at maximum volume, it doesn't go much higher than unity gain, so it's not suitable for use as a booster.

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	470k	Metal film resistor, 1/4W	
R3	8k2	Metal film resistor, 1/4W	
R4	2k7	Metal film resistor, 1/4W	
R5	10k	Metal film resistor, 1/4W	
R6	2k7	Metal film resistor, 1/4W	
R7	47R	Metal film resistor, 1/4W	
R8	2M2	Metal film resistor, 1/4W	
R9	220k	Metal film resistor, 1/4W	
R10	100k	Metal film resistor, 1/4W	
R11	27k	Metal film resistor, 1/4W	
R12	1M8	Metal film resistor, 1/4W	
R13	56k	Metal film resistor, 1/4W	
R14	2k7	Metal film resistor, 1/4W	
R15	100k	Metal film resistor, 1/4W	
R16	6k8	Metal film resistor, 1/4W	
R17	91k	Metal film resistor, 1/4W	
R18	100k	Metal film resistor, 1/4W	
R19	150R	Metal film resistor, 1/4W	
RPD	1M	Metal film resistor, 1/4W	
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	22n	Film capacitor, 7.2 x 2.5mm	
C2	680pF	MLCC capacitor, NP0/C0G	
C3	6n8	Film capacitor, 7.2 x 2.5mm	
C4	2.2uF	Film capacitor, 7.2 x 5mm	
C5	560n	Film capacitor, 7.2 x 4.5mm	
C6	33pF	MLCC capacitor, NP0/C0G	
C7	1000uF/10V	Electrolytic capacitor, 8mm	See build notes for sizing precautions.
C8	1000uF/10V	Electrolytic capacitor, 8mm	See build notes for sizing precautions.
C9	1uF	Electrolytic capacitor, 4mm	
C10	22pF	MLCC capacitor, NP0/C0G	
C11	1uF	Electrolytic capacitor, 4mm	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C12	2n2	Film capacitor, 7.2 x 2.5mm	
C13	470uF/16V	Electrolytic capacitor, 8mm	Reference voltage filter capacitor. See build notes for sizing precautions.
C14	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C15	10uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.
C16	470n	MLCC capacitor, X7R	Power supply filter capacitor.
C17	10uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.
C18	470n	MLCC capacitor, X7R	Power supply filter capacitor.
C19	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C20	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	1N914	Fast-switching diode, DO-35	
D9	1N914	Fast-switching diode, DO-35	
D10	1N914	Fast-switching diode, DO-35	
D11	1N914	Fast-switching diode, DO-35	
D12	Ge	Germanium diode, DO-7	Original uses 1N60. Can also use BAT46 Schottky. See build notes.
D13	5mm LED	LED, 5mm, red diffused	
D14	1N914	Fast-switching diode, DO-35	
D15	1N914	Fast-switching diode, DO-35	
D16	1N914	Fast-switching diode, DO-35	
D17	1N5817	Schottky diode, DO-41	
D18	1N5817	Schottky diode, DO-41	
Z1	1N4742A	Zener diode, 12V, DO-41	
IC1	NE5532P	Operational amplifier, dual, DIP-8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	TL072	Operational amplifier, dual, DIP-8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
IC3	RC4558P	Operational amplifier, dual, DIP-8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
IC4	LM741	Operational amplifier, single, DIP-8	
IC4-S	DIP-8 socket	IC socket, DIP-8	
IC5	LT1054CP	Charge pump, DIP-8	Can also use TC1044SCPA.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
IC5-S	DIP-8 socket	IC socket, DIP-8	
VACT.	VTL5C6	Vactrol, fast on/fast off	Available from Aion FX . See build notes for optocoupler information.
BLEND	10kB	16mm right-angle PCB mount pot	
SUSTAIN	100kB	16mm right-angle PCB mount pot	
GRIT	100kB	16mm right-angle PCB mount pot	
TREBLE	100kB	16mm right-angle PCB mount pot	
VOLUME	10kA	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	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

Vactrol selection

The original Philosopher's Tone was designed around the resistance range and on/off speed of the VTL5C6 optocouplers. Substitutes such as the VTL5C3 or home-rolled optocouplers do not sound the same and are not recommended for this particular circuit.

When the Philosopher's Rock and Philosopher's Bass were released, they used the VTL5C9, while at the same time changing the R7 resistor (the current-limiting resistor for the optocoupler's LED) from 47R to 470R, presumably with the intention of putting the LDR in a similar resistance range as the 5C6.

However, once Xvive began offering a reissue of the VTL5C6, Pigtronix again switched back to the VTL5C6 for their Philosopher's Tone Micro, the only current-production version of this circuit.

Aion FX carries the [VTL5C6](#) specifically for use in this circuit, so it's recommended to use this type. We have not tried the Polyphemus circuit with the VTL5C9 and 470R resistor, but if that's all you can find, it may work.

Electrolytic capacitor selection

The original Philosopher's Tone used a massive 2,200 μ F capacitor in the bridge rectifier section. All subsequent versions instead used two 1,000 μ F capacitors in parallel, and that's what we've used in our version. They will perform the same as a single 2,200 μ F in this application.

For these capacitors (C7 and C8), the PCB layout assumes 8mm diameter, 3.5mm lead spacing, and 15mm maximum height, which is on the low end of the range for capacitors of this value. They only need to be 10V minimum since they do not see the full 18V supply.

This is also the case for C13, the 470 μ F filter capacitor that supplies the reference voltage to the rectifier. The requirements are the same as C7 and C8 except that it needs to be 16V minimum.

If you use the exact parts listed in the Mouser parts spreadsheet for C7, C8 and C14, they'll fit without any trouble. But if they're ever out of stock (or if you need to order from somewhere other than Mouser) and you need to source a different type, then be very careful of the dimensions.

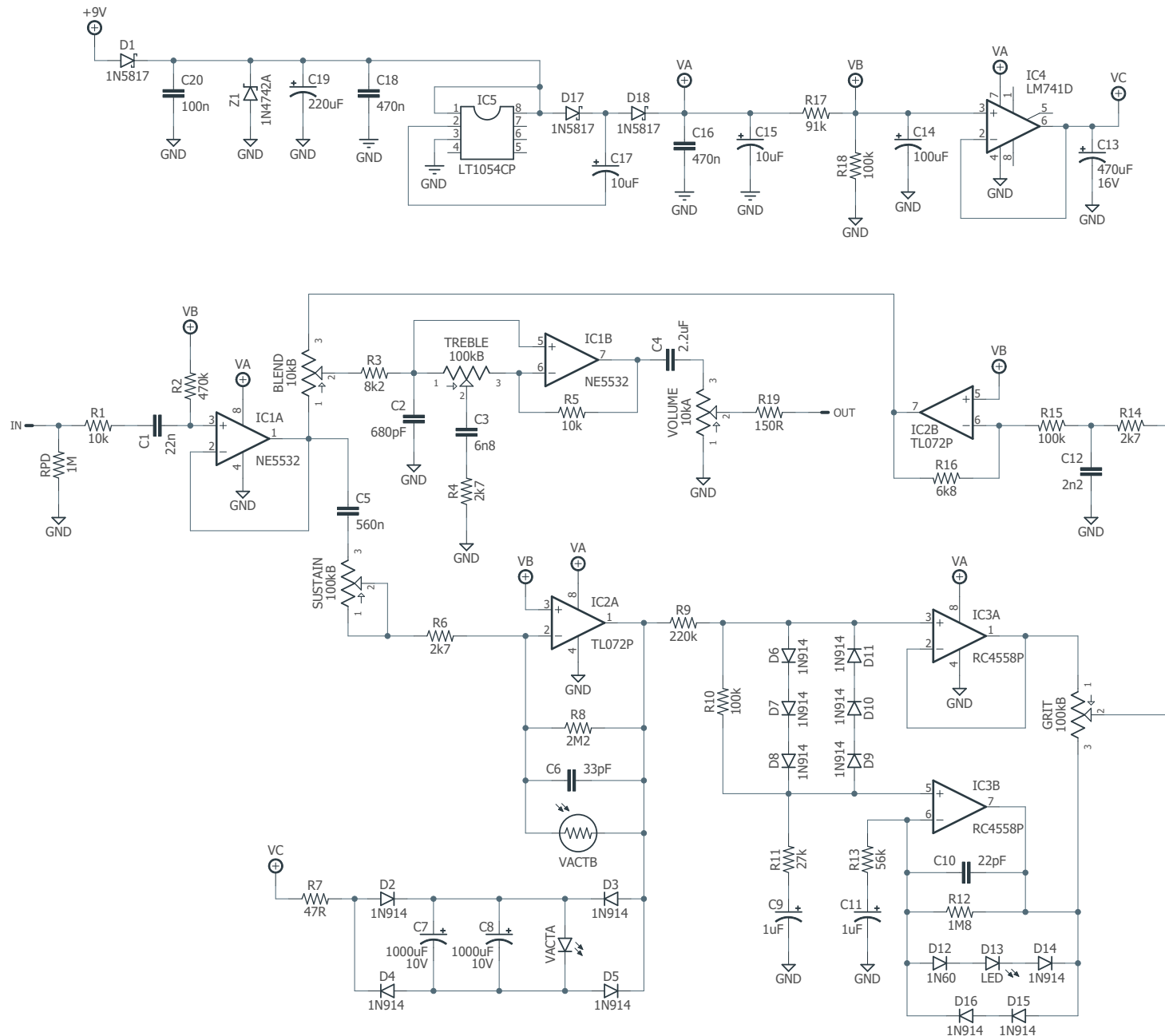
C5 capacitor

C5, the coupling capacitor for the effect signal, is 560n (0.56 μ F), which is a very uncommon value. The most readily available 560n capacitor is an EPCOS / TDK type from Mouser, part number 871-B32529C564J. The width is not specified in the datasheet, so we initially designed the PCB assuming 3.5mm, which is the width of similar values from WIMA.

However, they're actually 4.5mm in width, so there's barely enough space to fit between IC2 and C13. It's recommended to install the IC2 socket first, then fit C5 and C13 together before soldering either of them so that they can adjust to the position.

You can also use 470n with no real change in behavior, in which case no precautions are needed, since they're 3.5mm or narrower. The spacing issue will be fixed on subsequent runs, so if it seems like there's plenty of space then you can disregard this.

SCHEMATIC



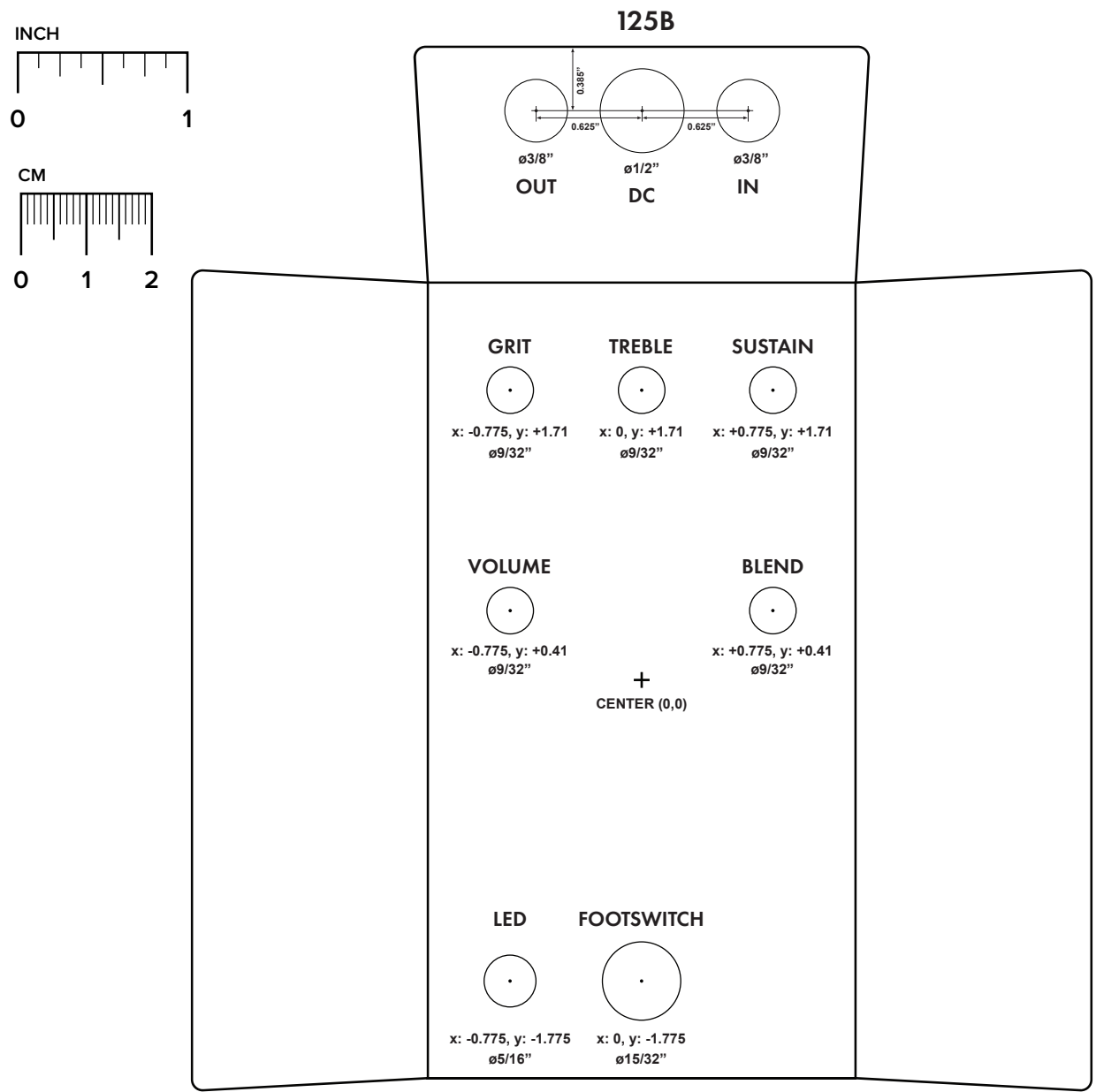
DRILL TEMPLATE

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.

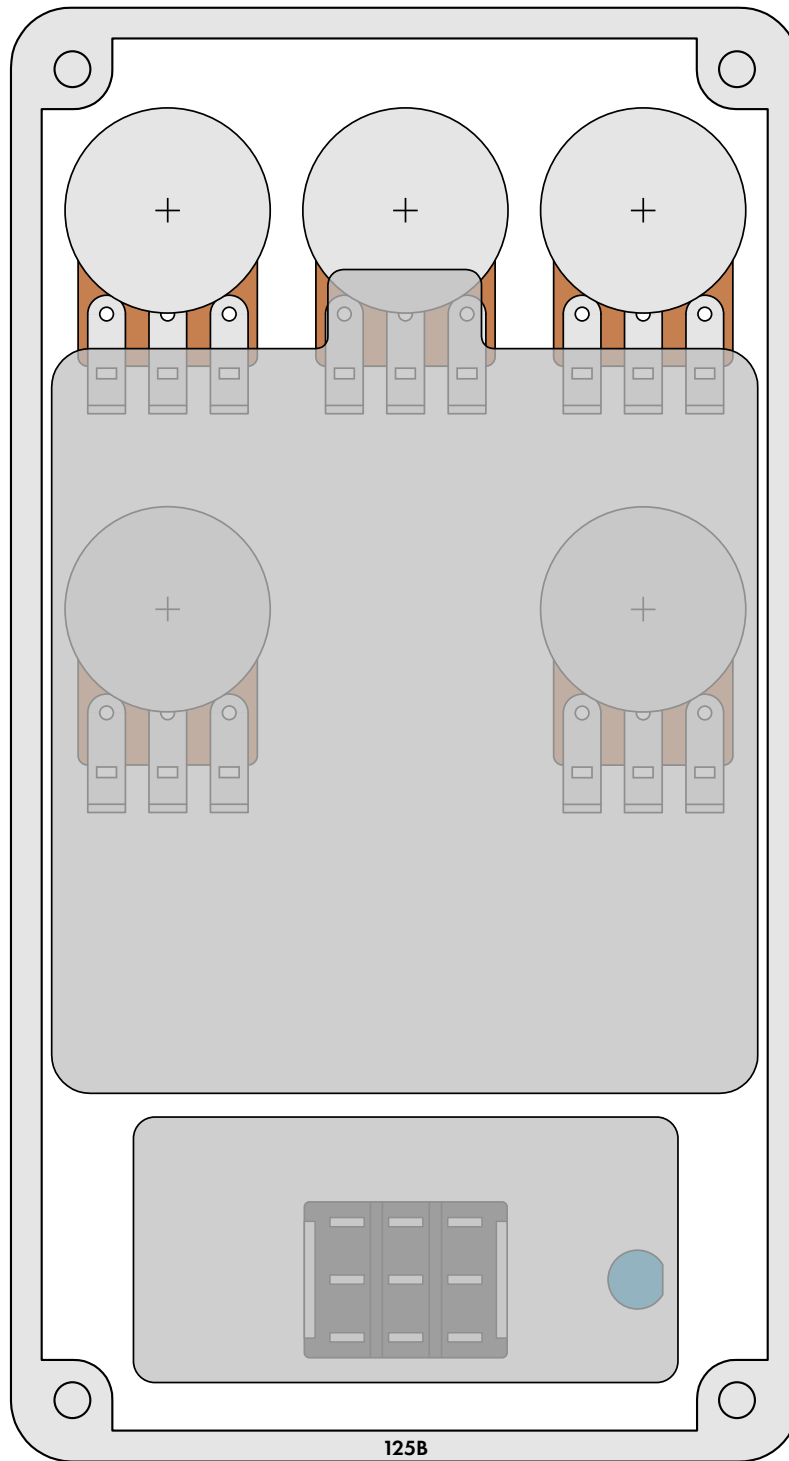
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

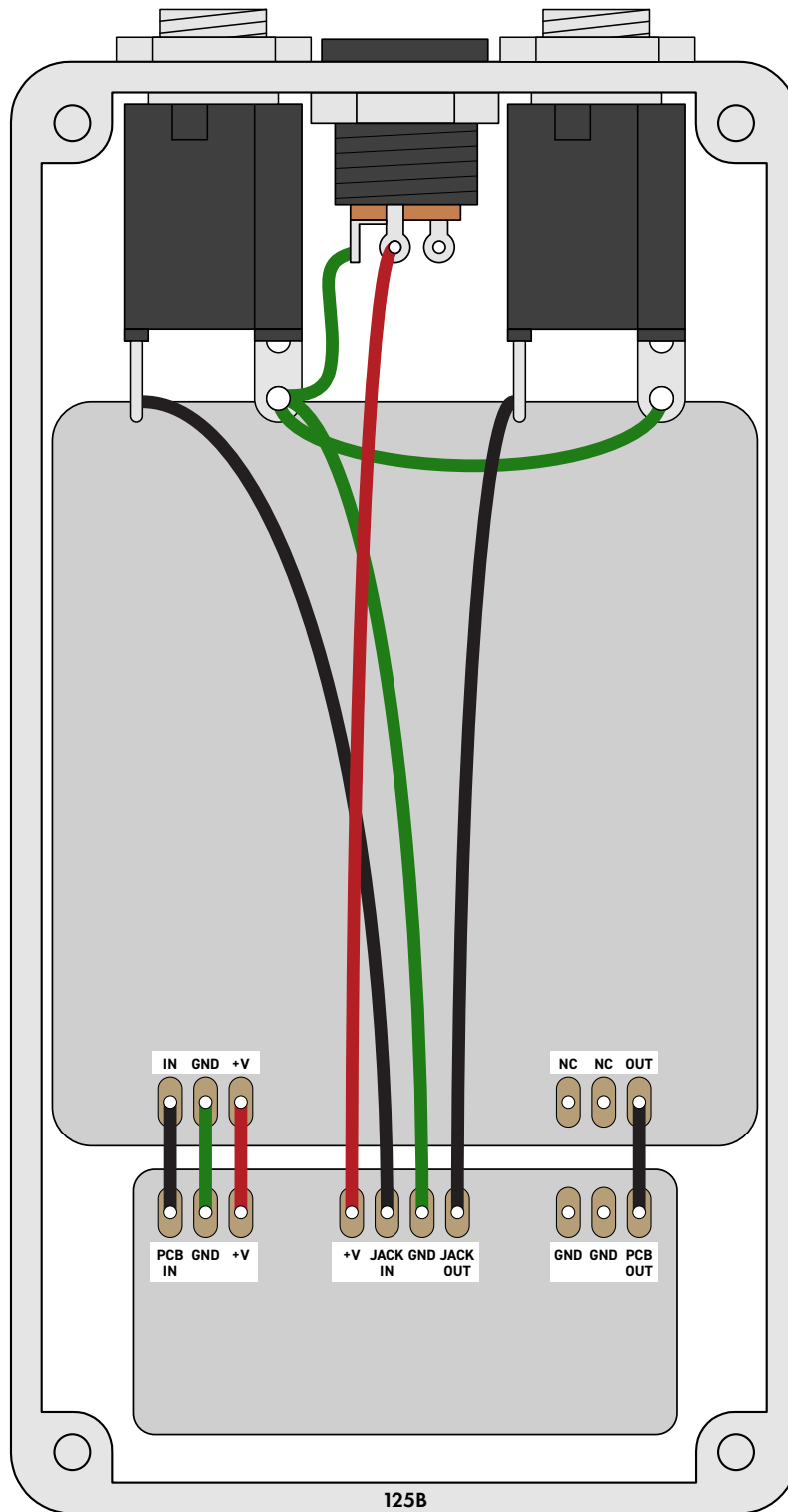


ENCLOSURE LAYOUT

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 (2023-07-04)

Initial release.