PROJECT NAME

CALLIOPE

aion DIY GUITAR EFFECTS

BASED ON
Catalinbread® Karma Suture (Ge/Si)

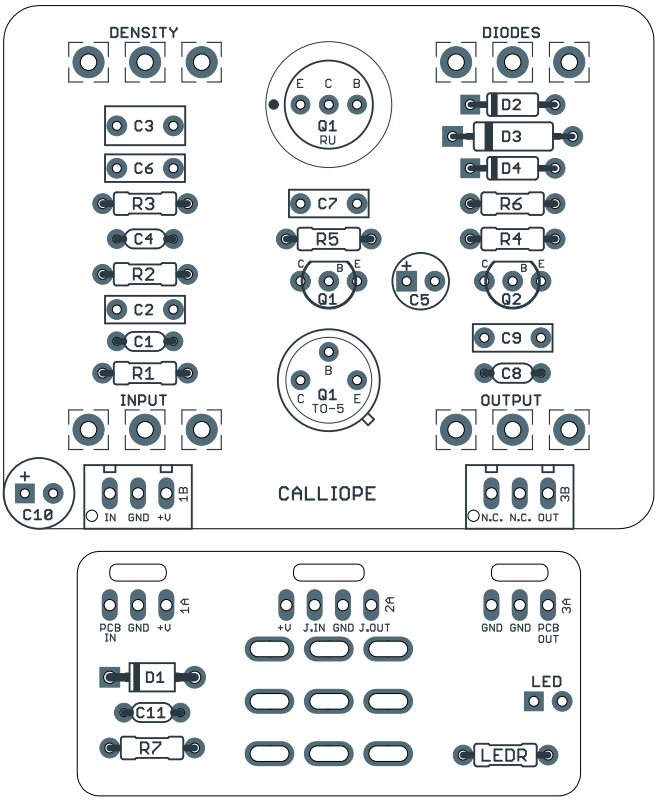
BUILD DIFFICULTY
▮▮▯▯▯ Easy

EFFECT TYPE
Fuzz / Overdrive

DOCUMENT VERSION
1.0.1 (2022-09-20)

PROJECT SUMMARY

An adaptation of the Interfax Harmonic Percolator, with additional controls for diode clipping and pre-gain bass. Silicon and germanium versions are both supported.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.87" (bypass board).

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INTRODUCTION

The Calliope Vintage Fuzz is an adaptation of the Catalinbread Karma Suture (germanium and silicon versions), originally traced by Aion FX in 2021.

The original Karma Suture was released in 2014. It was based on the Interfax Harmonic Percolator, but with several circuit changes to make it into its own effect rather than a straight clone. Most of the values have been changed from the original, and the “Density” and “Diodes” controls have been added.

The silicon version followed in 2016, again with several part changes from the germanium version. While the framework of the schematic is nearly identical, the silicon version sounds completely different and they really are two different pedals.

The Calliope PCB supports both the germanium and silicon versions. The default parts list is for the germanium version, while alternate values are provided for the silicon version. Other than the inclusion of additional transistor footprints on the PCB, there are no other modifications or changes to the circuit. See build notes for more information on transistor selection.

The Harmonic Percolator is also available from Aion FX as the Particle Vintage Fuzz.

USAGE

The Calliope has the following controls:

- **Input** controls the signal level coming into the transistor fuzz stage. Its effect is nearly identical to rolling back the guitar volume.
- **Density** blends between two input capacitors, gradually adding bass & fullness as it’s turned up.
- **Diodes** acts as a sort of volume control for the diodes, gradually increasing the amount of clipping and compression as the control is turned up.
- **Output** is the overall output volume level.

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	4k7	Metal film resistor, 1/4W	
R2	220k	Metal film resistor, 1/4W	150k for silicon version.
R3	33k	Metal film resistor, 1/4W	
R4	750k	Metal film resistor, 1/4W	470k for silicon version.
R5	91k	Metal film resistor, 1/4W	
R6	OMIT	Metal film resistor, 1/4W	5k6 for silicon version. Leave empty for germanium version.
R7	100R	Metal film resistor, 1/4W	
LEDR	4k7	Metal film resistor, 1/4W	
C1	220pF	MLCC capacitor, NP0/C0G	47pF for silicon version.
C2	4n7	Film capacitor, 7.2 x 2.5mm	
C3	220n	Film capacitor, 7.2 x 2.5mm	1uF for silicon version.
C4	47pF	MLCC capacitor, NP0/C0G	
C5	47uF	Electrolytic capacitor, 5mm	
C6	1n	Film capacitor, 7.2 x 2.5mm	
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	330pF	MLCC capacitor, NP0/C0G	100pF for silicon version.
C9	47n	Film capacitor, 7.2 x 2.5mm	
C10	100uF	Electrolytic capacitor, 6.3mm	
C11	100n	MLCC capacitor, X7R	
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	Ge	Germanium diode, DO-07	Germanium version only. Leave empty for silicon. Any NOS germanium diode will work here.
D4	OMIT		1N914 for silicon version. Leave empty for germanium version.
Q1	Ge	Germanium transistor, PNP	2N5401 for silicon version.
Q2	PN2222A	BJT transistor, NPN, TO-92	2N5088 for silicon version. (Original uses BC550B, no longer available.)

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
INPUT	100kB	16mm right-angle PCB mount pot	
DENS.	500kC	16mm right-angle PCB mount pot	
DIODE	50kB	16mm right-angle PCB mount pot	
OUT.	100kA	16mm right-angle PCB mount pot	
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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Germanium transistor

The original germanium version of the Karma Suture uses 1T308A Russian transistors. These are among the lowest-gain of all the Russian types, and like other Russian transistors they also have very low leakage. In the unit traced, the transistor measured **33 hFE** and zero leakage.

These transistors are still readily available from Eastern European sellers on eBay in sets of 10 or boxes of 100, but they are not sold individually by any of the normal DIY parts stores. Because of this, it may be easier to substitute something else. Any NOS low-gain germanium PNP transistor will work.

Typically, Harmonic Percolator circuits are reported to work best with transistors in the range of 30 to 45, so we'd expect this to also be a good baseline range for the Karma Suture circuit. Most 1T308As are in the 30-60 range, so these are great if you can find them, but there are also many low-gain types to be found in the MP series that will work just as well.

Q1 transistor outlines

There are three different types of transistors that may be used for Q1 depending on the build: Russian E-C-B germanium (1T and GT series, as in the original unit), "standard" E-B-C germanium (USA/European and many other Russian types such as the MP series), and silicon.

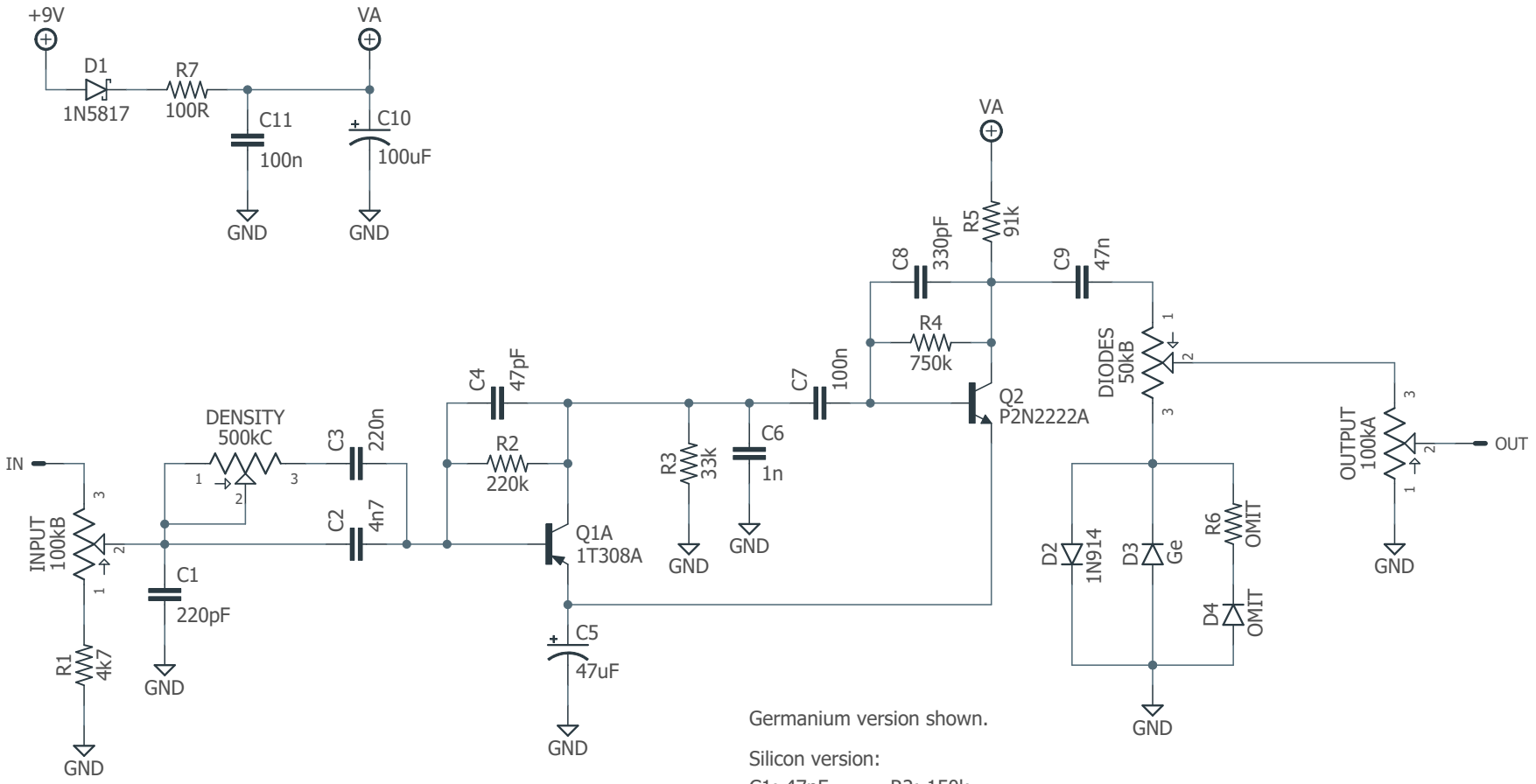
The two types of germanium transistors are similar size and appearance, but they have different pin configurations. The PNP silicon has yet a third package and configuration. For convenience, the PCB has three different outlines for Q1 corresponding to each type.

These three transistor outlines are all connected together on the PCB. Only one of the Q1 outlines should be used, in accordance with the type of transistor. Make sure you know the pinout before installing the transistors, because you don't want to have to desolder them. Germaniums can easily be damaged or have their characteristics permanently altered by being exposed to excessive heat.

Russian E-C-B transistors have their legs in a straight line, so they can be installed backwards if you're not careful. The emitter side is marked by a dot of paint, so line that up with the dot mark on the Russian Q1 outline (marked "RU").

Outside of the GT308 and 1T308 series, the vast majority of Russian germanium transistors use the USA/European E-B-C convention, so the footprint we label "Russian" does not by any means apply to all Russian transistors—it's just the one that is exclusively used by Russian types.

SCHEMATIC



Germanium version shown.

Silicon version:

C1: 47pF	R2: 150k
C3: 1uF	R4: 470k
C8: 100pF	R6: 5k6

D3: (omit) D4: 1N914

Q1: 2N5401 (sub 2N3906)
Q2: BC550B (sub 2N5088)

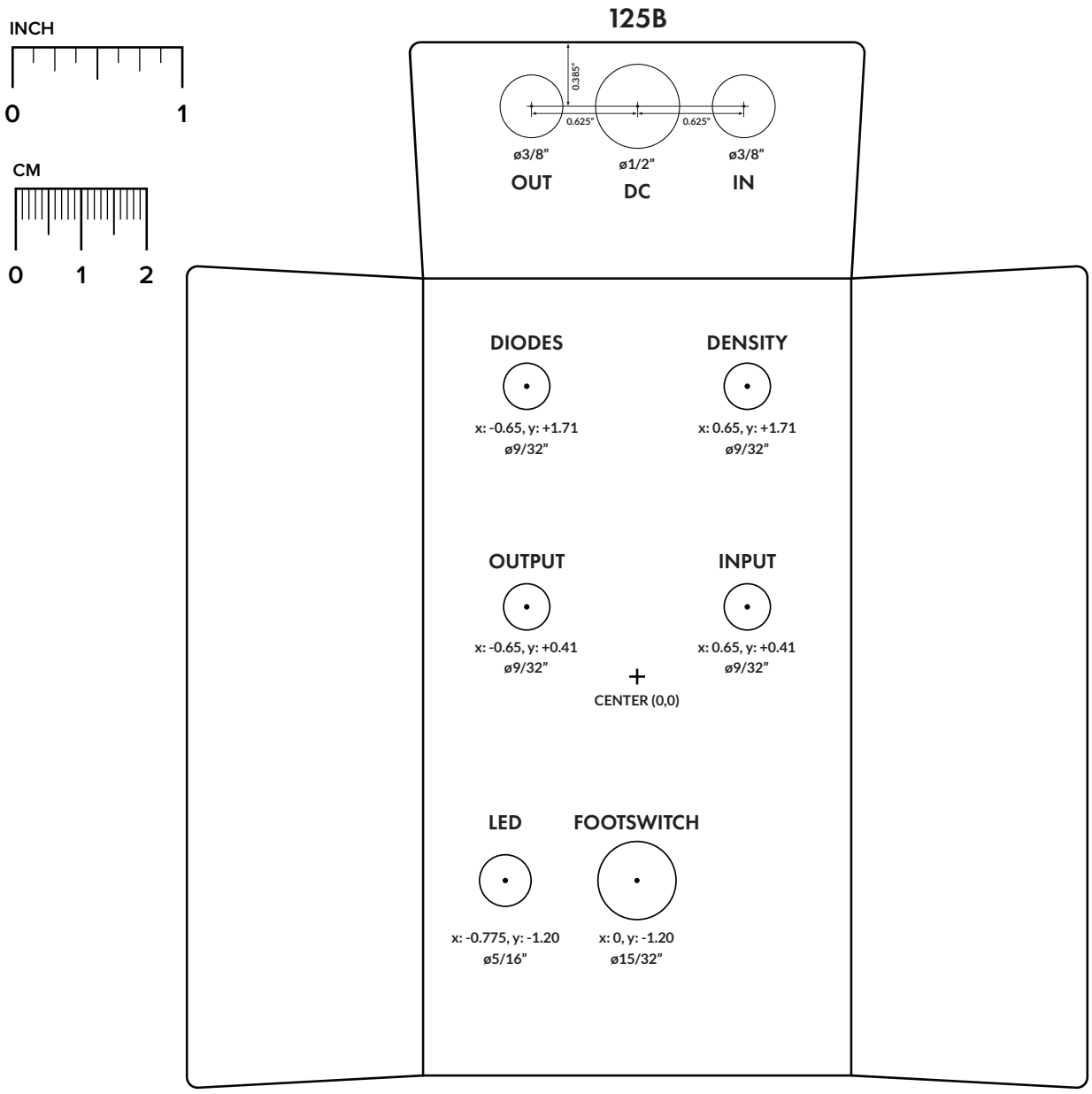
DRILL TEMPLATE

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.

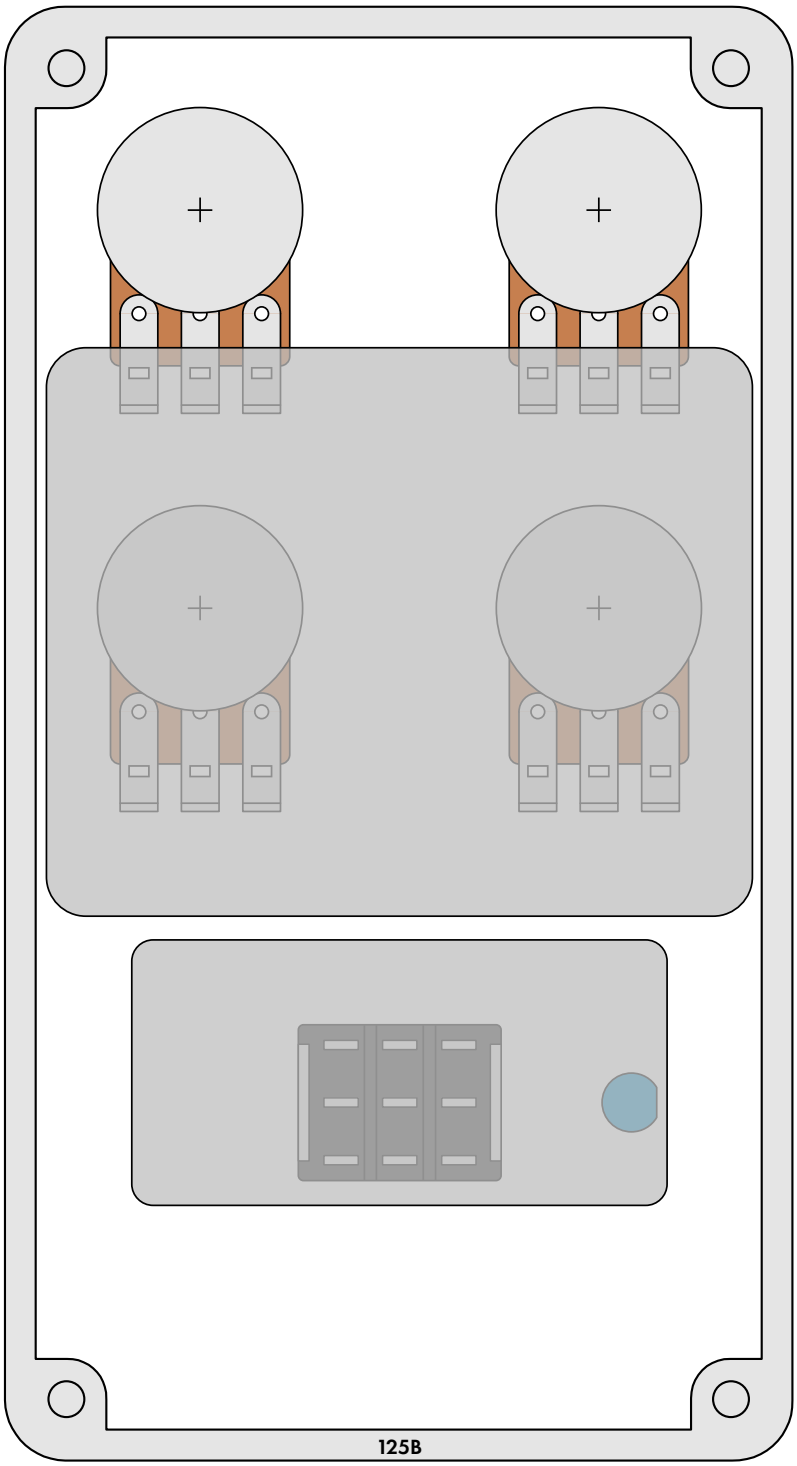
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

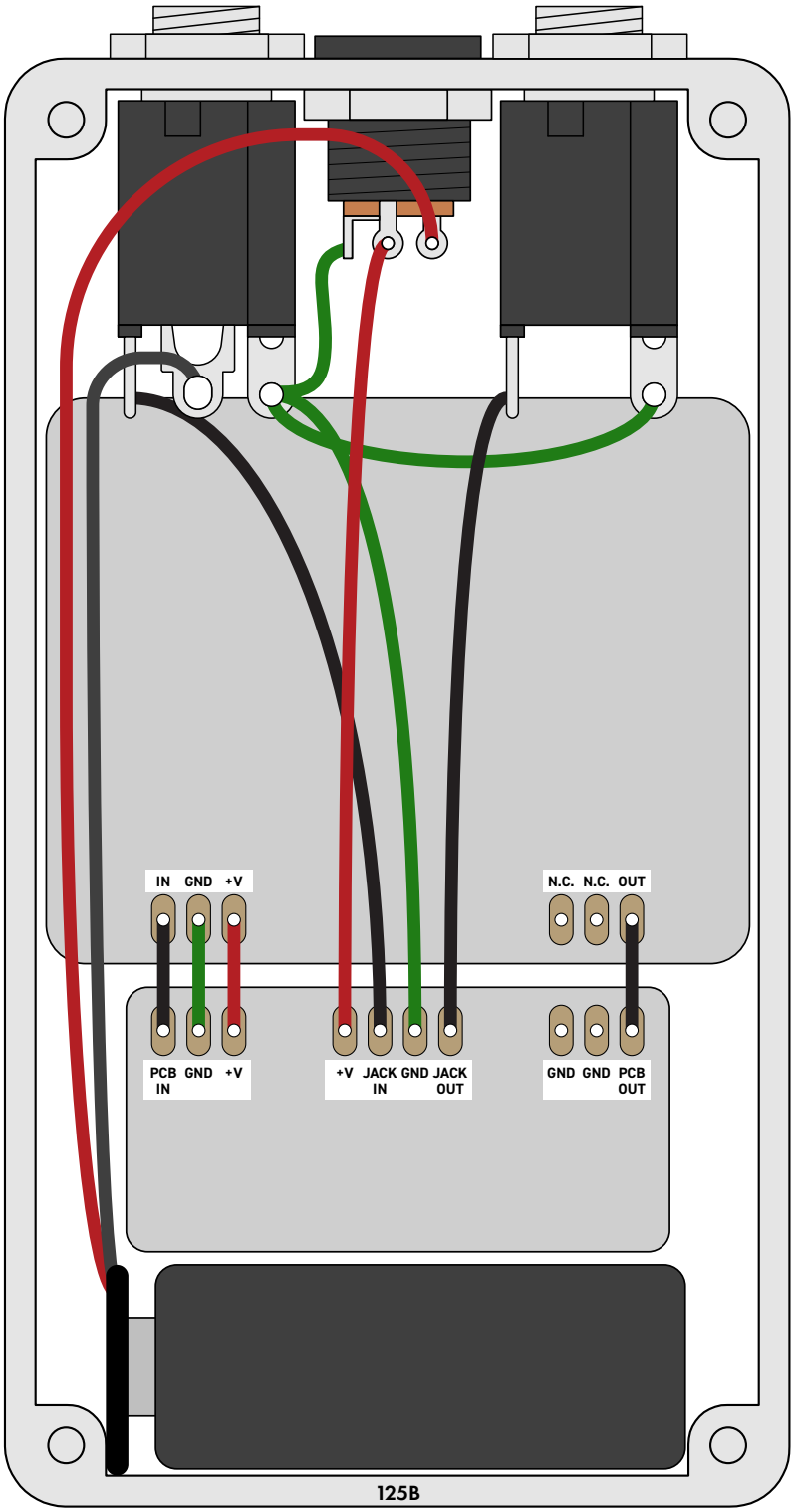


ENCLOSURE LAYOUT

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

1.0.1 (2022-09-20)
Revised the build notes for clarity.

1.0.0 (2021-02-19)
Initial release.