PROJECT NAME

PROXIMA

aion DIY GUITAR EFFECTS

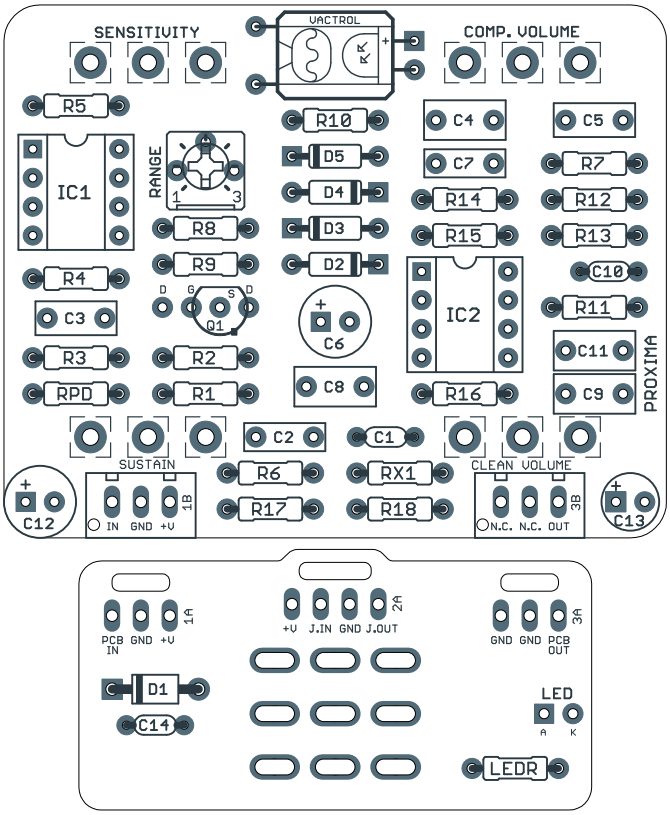
BASED ON
Hollis Flatline Compressor

BUILD DIFFICULTY
Easy

EFFECT TYPE
Compressor

DOCUMENT VERSION
1.0.0 (2023-03-24)

PROJECT SUMMARY
A simple, cheap and surprisingly effective optical compressor that works great on bass or guitar.



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

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INTRODUCTION

The Proxima Optical Compressor is an expanded adaptation of the Flatline Compressor, a DIY classic originally invented by John Hollis in 2001.

There have been several community modifications and revisions during the past two decades, so while the original version only had Sustain and Volume controls, the Proxima has a more deluxe control set.

This version includes several additions: a JFET input buffer to split the signal, a sensitivity or threshold knob, a clean blend by way of separate Effect Volume and Clean Volume controls, and an output buffer to correct the phase from the mixing stage. If you like the Flatline but wish it had more flexibility, the Proxima is what you're after.

In addition to John Hollis, we are indebted to the work of Madbean and Stompville for many of the ideas utilized in this version, and we're hopeful that ours will in turn inspire others to take it even further.

USAGE

The Proxima has the following controls:

- **Sustain** sets the amount of compression.
- **Sensitivity** sets the envelope detection threshold (the signal level at which the compression begins to occur). This should normally be set around noon, but it can be turned down for high-output instruments or turned up when the input signal is weaker.
- **Comp Volume** controls the mix of the compressed signal at the output.
- **Clean Volume** controls the mix of the clean (uncompressed) signal at the output. The total signal level is a function of both Comp and Clean volume controls in combination.
- **Range** (internal trimmer) sets the range of the Sustain control to account for different types of LDRs and vactrols.

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	Leave empty if using a BJT for Q1. See build notes.
R3	10k	Metal film resistor, 1/4W	
R4	1M	Metal film resistor, 1/4W	
R5	100k	Metal film resistor, 1/4W	
R6	10k	Metal film resistor, 1/4W	
R7	22k	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	
R9	22k	Metal film resistor, 1/4W	
R10	330R	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	22k	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	
R14	10k	Metal film resistor, 1/4W	
R15	100R	Metal film resistor, 1/4W	
R16	100k	Metal film resistor, 1/4W	
R17	10k	Metal film resistor, 1/4W	
R18	10k	Metal film resistor, 1/4W	
RX1	OMIT	Metal film resistor, 1/4W	Only used for BJT input buffer. See build notes.
RPD	2M2	Metal film resistor, 1/4W	Input pull-down resistor. Can be as low as 1M.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	47pF	MLCC capacitor, NP0/C0G	
C2	33n	Film capacitor, 7.2 x 2.5mm	
C3	220n	Film capacitor, 7.2 x 2.5mm	
C4	1uF	Film capacitor, 7.2 x 3.5mm	
C5	220n	Film capacitor, 7.2 x 2.5mm	
C6	100uF	Electrolytic capacitor, 6.3mm	
C7	OMIT		Leave empty for VTL5C3. See build notes.
C8	1uF	Film capacitor, 7.2 x 3.5mm	
C9	470n	Film capacitor, 7.2 x 3mm	
C10	47pF	MLCC capacitor, NP0/C0G	
C11	1uF	Film capacitor, 7.2 x 3.5mm	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C12	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C13	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C14	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	BAT46	Schottky diode, DO-35	
D3	BAT46	Schottky diode, DO-35	
D4	BAT46	Schottky diode, DO-35	
D5	BAT46	Schottky diode, DO-35	
Q1	2N5457	JFET, N-channel, general purpose	Can also use 2N5088. See build notes.
IC1	TL072	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	TL072	Operational amplifier, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
VACT	VTL5C3	Optocoupler	Can also use VTL5C2, NS-32 or others. See build notes.
SUSTAIN	100kA	16mm right-angle PCB mount pot	
SENSITIVITY	50kB	16mm right-angle PCB mount pot	
CLEAN VOL.	100kB	16mm right-angle PCB mount pot	
COMP VOL.	100kB	16mm right-angle PCB mount pot	
RANGE	500k trimmer	Trimmer, 10%, 1/4”	
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.
FSW	3PDT	Stomp switch, 3PDT	
BATT.	9V	9V battery snap	Soft vinyl type. The hard-shell type will not fit.
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Vactrol selection

The original Flatline design used a DIY LED/LDR combo of unknown specifications. Later implementations in the DIY community seem to have settled on the VTL5C3 vactrol. The VTL5C2 and NSL-32 will also work fine, but the attack capacitor (C6 or C7) may need to be changed. The circuit is very forgiving of different types of optical devices, but it's not usually going to be a drop-in replacement and will require some tuning.

C6/C7 capacitors

The C6 and C7 capacitors set the attack time. John Hollis's original Flatline design used a 100n capacitor here with his LED/LDR combination. The VTL5C3 works better with a large electrolytic capacitor (e.g. 100uF). The NSL-32 or VTL5C2 vactrols will likely sound best with the smaller 100n capacitor.

C7 should normally be left empty, but if you'd rather use a small-value film capacitor then you can try using 100n here and leave C6 empty instead. (It won't hurt anything to include them both, but C7 will not have any function since C6 is so much larger.)

Setting the Range trimmer

Most Flatline adaptations use a 220k resistor in the op-amp feedback loop as in John's original design. This resistor is in parallel with the LDR and serves to limit the maximum total resistance in order to keep the gain from getting too out of hand when the LED is dark.

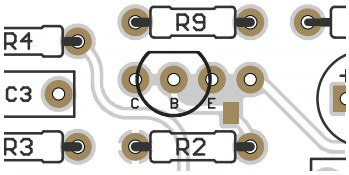
As with C6/C7, though, this was suited to his particular LED/LDR setup and it may be the case that a different resistance value will work better with other types of LDRs and vactrols. Because of this, we included a "Range" trimmer to change the value of this resistor anywhere between 100k and 600k.

To start with, the Range trimmer should be set at approximately 25% rotation (i.e. between 9:00 and 10:00) which is close to the original 220k value. From there, turn Clean Vol all the way down so you're only hearing the compressed signal, and test the full range of the Sustain control to make sure it sounds good at all settings. Adjust the trimmer if you want more sustain.

Input buffer

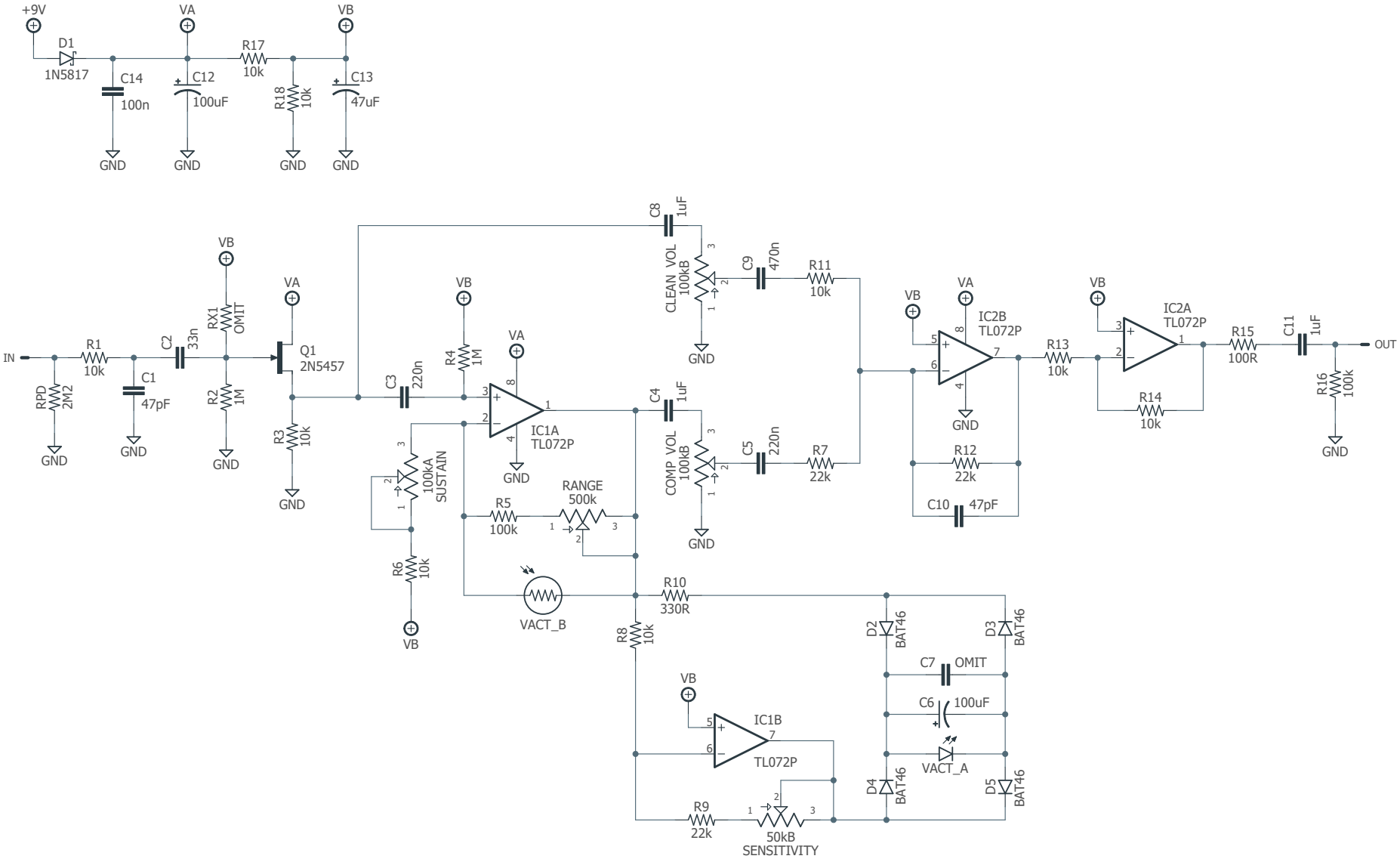
The Proxima adds a JFET input buffer to enable the signal to be split cleanly for the blend function. The default configuration from the parts list & layout is to use a JFET, such as our 2N5457. However, the buffer can be configured to instead use a more common NPN bipolar transistor such as a 2N5088 or 2N3094 with only one resistor change.

To use a BJT, **omit R2 and use 470k for RX1**. Then, insert the transistor as shown below:



Assuming E-B-C pinout, you just shift it to the left by 1 pin from where the JFET would normally go.

SCHEMATIC


+9V
VA
VB
D1
1N5817
C14
100n
C12
100uF
R17
10k
R18
10k
C13
47uF
GND
IN
R1
10k
C2
33n
RX1
OMIT
RPD
2M2
C1
47pF
R2
1M
R3
10k
Q1
2N5457
C3
220n
R4
1M
IC1A
TL072P
C8
1uF
CLEAN VOL
100kB
C9
470n
R11
10k
C4
1uF
COMP VOL
100kB
C5
220n
R7
22k
100kA
SUSTAIN
R5
100k
RANGE
500k
R6
10k
VACT_B
R10
330R
R8
10k
IC1B
TL072P
R9
22k
50kB
SENSITIVITY
IC2B
TL072P
R12
22k
C10
47pF
R13
10k
IC2A
TL072P
R14
10k
R15
100R
C11
1uF
R16
100k
OUT
D2
BAT46
D3
BAT46
C7
OMIT
C6
100uF
VACT_A
D4
BAT46
D5
BAT46

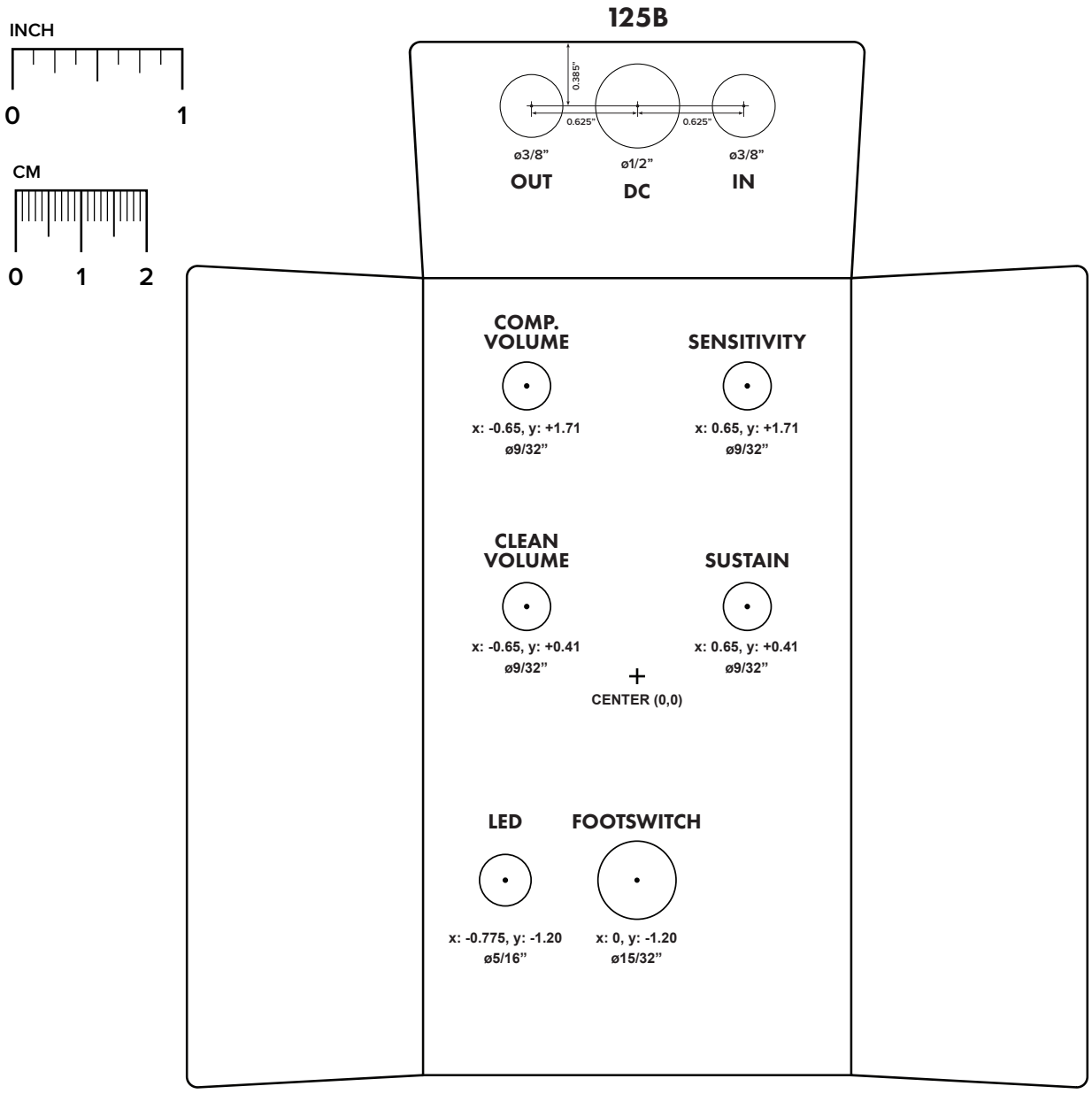
DRILL TEMPLATE

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.

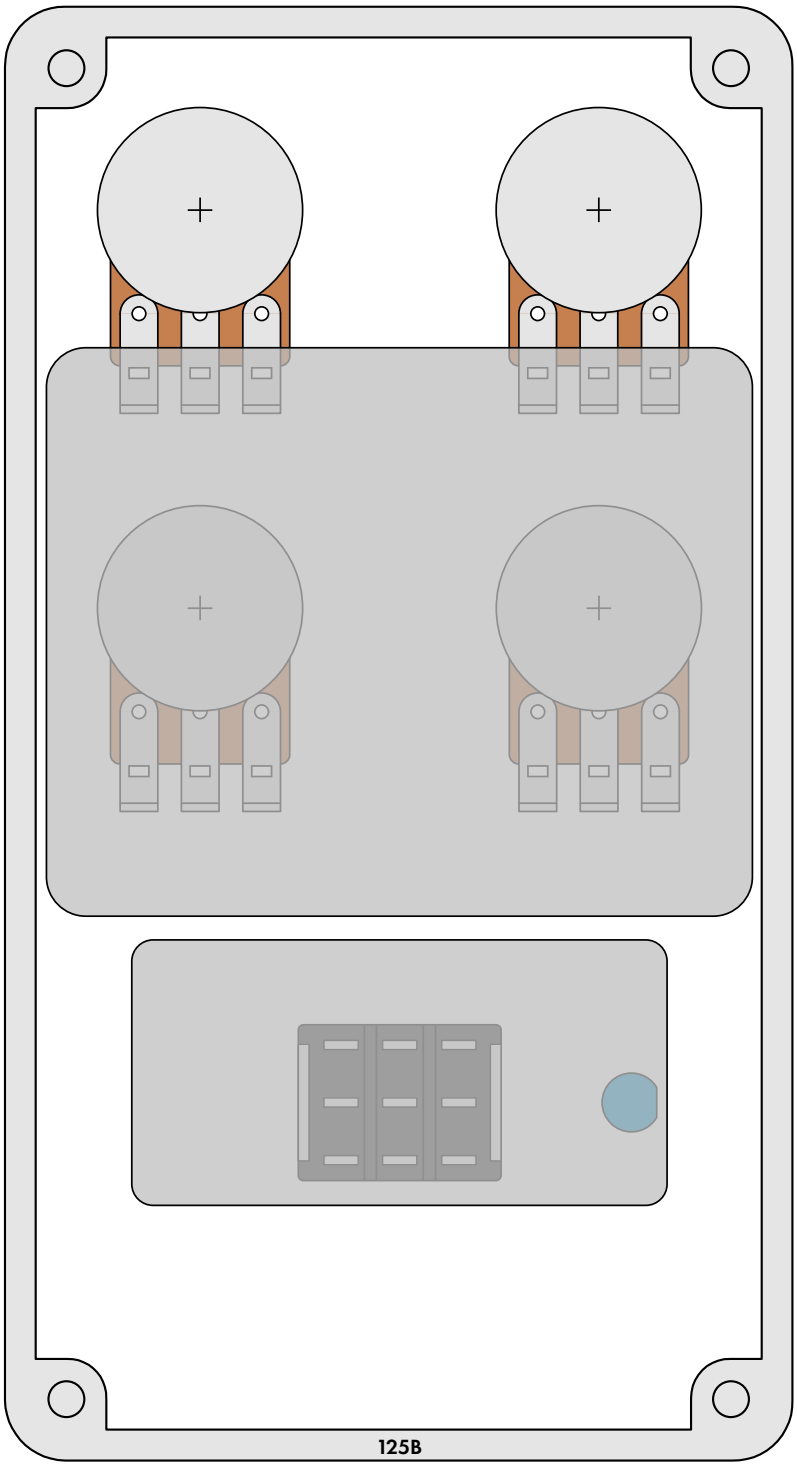
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

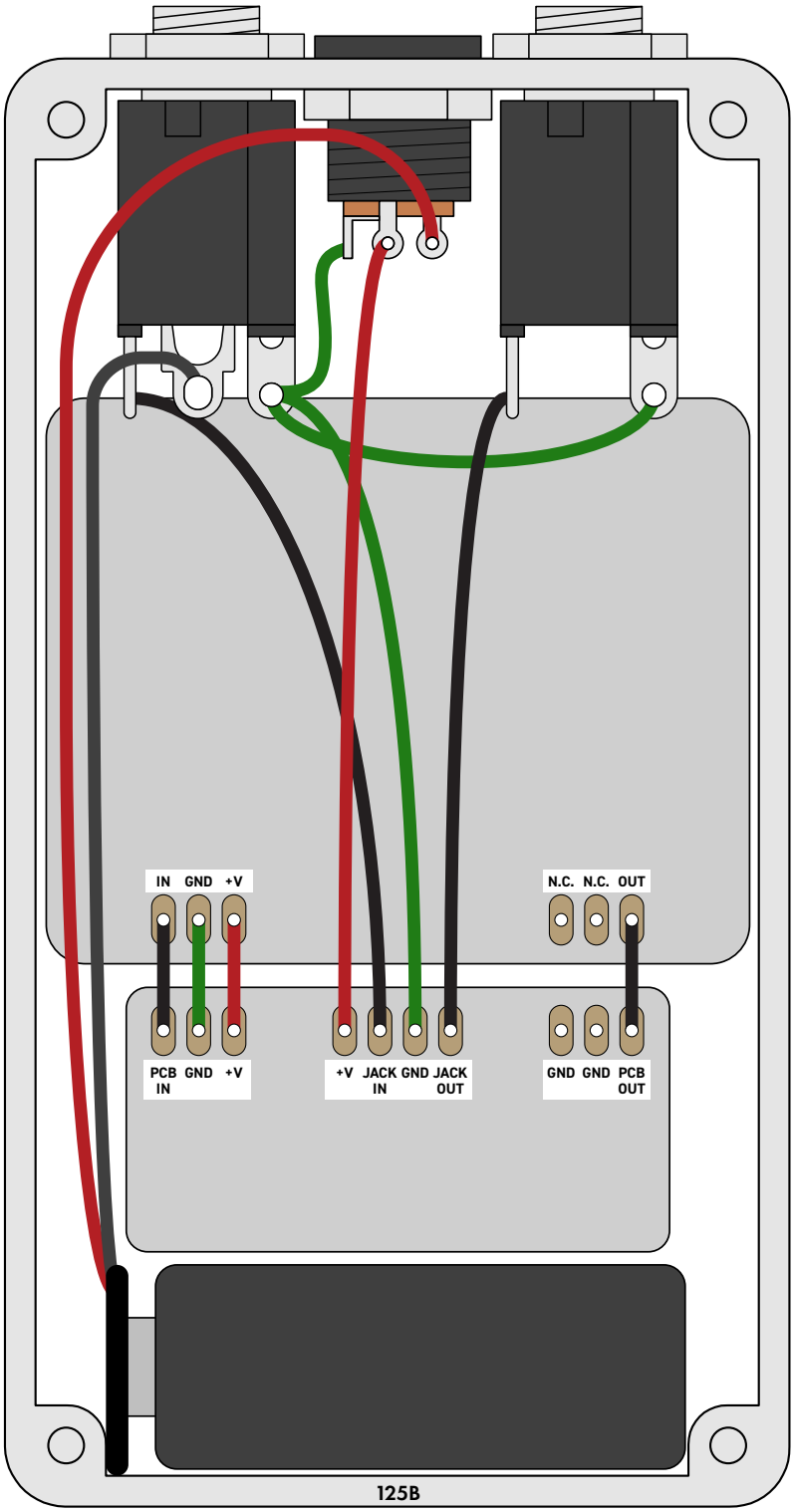


ENCLOSURE LAYOUT

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



WIRING DIAGRAM



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 (2023-03-24)
Initial release.