

PROJECT NAME

PLEXUS

BASED ON
BSIAB2 (Brown Sound in a Box)

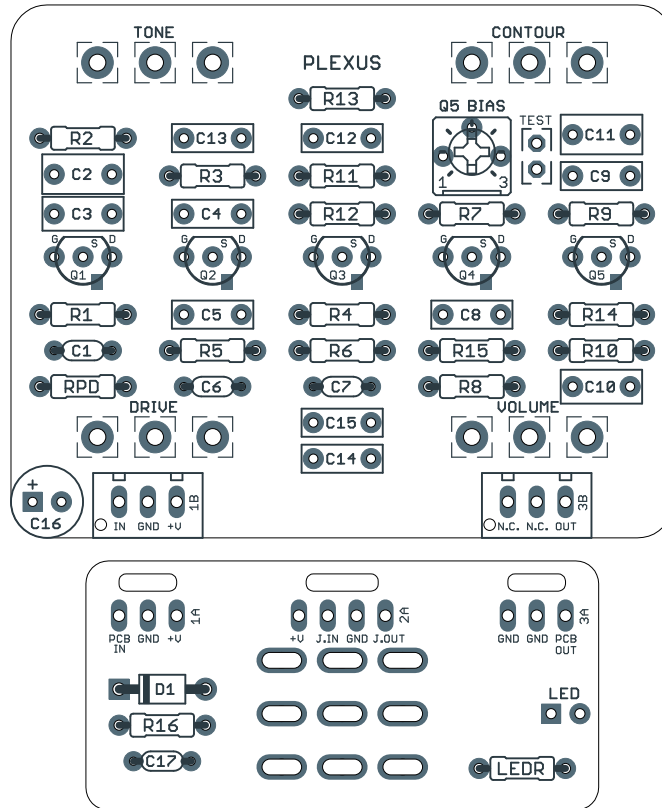
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
Amp-like overdrive

DOCUMENT VERSION
1.0.0 (2022-04-08)

PROJECT SUMMARY

A classic DIY design that uses mu-amp stages to get a sound reminiscent of Van Halen’s classic “brown sound” based around his 1968 Marshall Super Lead amp.



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

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INTRODUCTION

The Plexus Amp Overdrive is based on a classic design from the DIYStompboxes community called the “Brown Sound in a Box”—specifically the second version, which had improved tone shaping.

Designed by Ed Guidry, the first version appeared in 2001 as a modified version of Jack Orman’s Mini-Booster. Aron Nelson had added a Big Muff-style tone stack to the Mini-Booster, and Ed used this topology as a starting point, adding an extra JFET stage and some strategic hi-cuts to make it sound more amp-like.

The [second version](#) followed in 2004. The JFETs were changed from J201 to 2N5457 for a less gainy and compressed drive sound, and more high-end filtering was added to better simulate the resonance of a speaker cabinet. This one caught on even more than the original and is universally considered to be the better design.

2N5457 JFETs are no longer available in through-hole format. Extra pads have been provided if you want to use surface-mount JFETs (part number MMBF5457), which perform identically to those used in Catalinbread pedals. Aion FX also offers [pre-soldered MMBF5457s](#) on adapter boards if you find surface-mount parts intimidating. See build notes for more details.

It’s also worth mentioning that this design has a great deal of similarity to Catalinbread’s “foundation” series of amp-emulation drive pedals, which began in 2009 with the [Dirty Little Secret](#). Catalinbread had roots in the DIY community, so this circuit was almost certainly one of their inspirations for the series.

The Plexus is a direct clone of the BSIAB2, with the addition of the popular “contour” mod from the community that allows the frequency of the tone stack to be adjusted.

USAGE

The Plexus has the following controls:

- **Drive** controls the volume going into the JFET clipping stage. At higher drive levels, the JFETs will overload and clip the signal.
- **Tone** is a Big Muff-style balance control, panning between a bass emphasis on the left and a treble emphasis on the right.
- **Contour** adjusts the frequency of the bass emphasis (hi-cut) half of the tone control, with the biggest impact on the midrange. It has no effect when the tone control is at full treble rotation.
- **Volume** controls the overall output of the effect.

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	390R	Metal film resistor, 1/4W	
R2	680R	Metal film resistor, 1/4W	
R3	1M	Metal film resistor, 1/4W	
R4	1M	Metal film resistor, 1/4W	
R5	470k	Metal film resistor, 1/4W	
R6	120R	Metal film resistor, 1/4W	
R7	1M	Metal film resistor, 1/4W	
R8	1M	Metal film resistor, 1/4W	
R9	82k	Metal film resistor, 1/4W	
R10	5k6	Metal film resistor, 1/4W	
R11	5k6	Metal film resistor, 1/4W	
R12	82k	Metal film resistor, 1/4W	
R13	5k6	Metal film resistor, 1/4W	
R14	10k	Metal film resistor, 1/4W	
R15	10k	Metal film resistor, 1/4W	
R16	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	1M	Metal film resistor, 1/4W	
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	250pF	Ceramic capacitor, X5F	Can substitute 220pF.
C2	1uF	Film capacitor, 7.2 x 3.5mm	
C3	220n	Film capacitor, 7.2 x 2.5mm	
C4	68n	Film capacitor, 7.2 x 2.5mm	
C5	22n	Film capacitor, 7.2 x 2.5mm	
C6	470pF	MLCC capacitor, NP0/C0G	
C7	150pF	MLCC capacitor, NP0/C0G	
C8	100n	Film capacitor, 7.2 x 2.5mm	
C9	22n	Film capacitor, 7.2 x 2.5mm	
C10	OMIT		Use 220n for extra bass. Omit (leave empty) otherwise.
C11	1uF	Film capacitor, 7.2 x 3.5mm	
C12	100n	Film capacitor, 7.2 x 2.5mm	
C13	22n	Film capacitor, 7.2 x 2.5mm	
C14	2n2	Film capacitor, 7.2 x 2.5mm	

PARTS LIST, CONT.

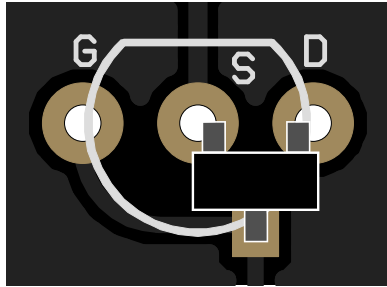
PART	VALUE	TYPE	NOTES
C15	2n2	Film capacitor, 7.2 x 2.5mm	
C16	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C17	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	2N5457	JFET, N-channel, TO-92	
Q2	2N5457	JFET, N-channel, TO-92	
Q3	2N5457	JFET, N-channel, TO-92	
Q4	2N5457	JFET, N-channel, TO-92	
Q5	2N5457	JFET, N-channel, TO-92	
Q5 BIAS	100k trimmer	Trimmer, 10%, 1/4"	Adjust to 4.5V on Q5's drain pin.
DRIVE	500kA	16mm right-angle PCB mount pot	
CONT.	100kB	16mm right-angle PCB mount pot	
TONE	100kB	16mm right-angle PCB mount pot	
VOL.	100kA	16mm right-angle PCB mount pot	
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	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Using SMD JFETs

The 2N5457 JFET is no longer available in through-hole format. This PCB uses a hybrid through-hole/SMD outline for each JFET. An extra “G” (gate) pad is included to accommodate surface-mount devices without the need for adapters.

SMD JFETs should be oriented as follows:



All surface-mount JFETs use the same pinout, so this configuration will fit any type that we’re aware of. However, always check the datasheet if you’re uncertain—they’re difficult to desolder if you make a mistake.

Using through-hole adapters

If you’re not confident in your ability to work with surface-mount parts, Aion FX offers [2N5457 \(MMBF5457\) JFETs](#) that come pre-soldered to adapters for use in through-hole designs. These are from the same manufacturer as those used when the original BSIAB2 was designed and will perform identically.

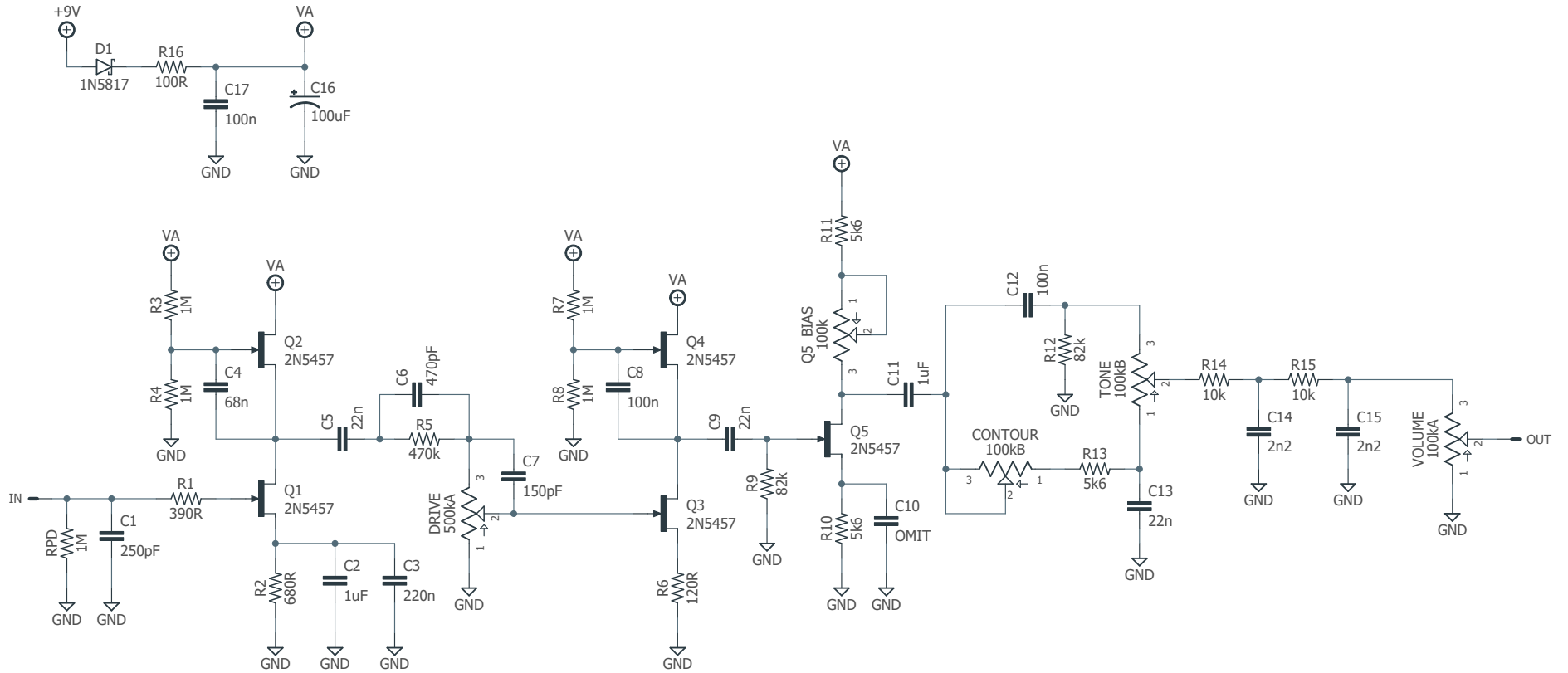
Setting the bias

The trimmer allows adjustment of the Q5 bias. Start with it in the middle, and then adjust it until you read 4.5V on the upper “TEST” pad (which corresponds to the drain pin of Q5). The lower pad is grounded so you can easily measure between these two pads with a multimeter.

Pulldown resistor value

The pulldown resistor (RPD) also sets the bias of Q1. Unlike most other projects where it can be 1.5M or 2.2M depending on what you have available, in this circuit it must be 1M or the first stage may not bias properly.

SCHEMATIC



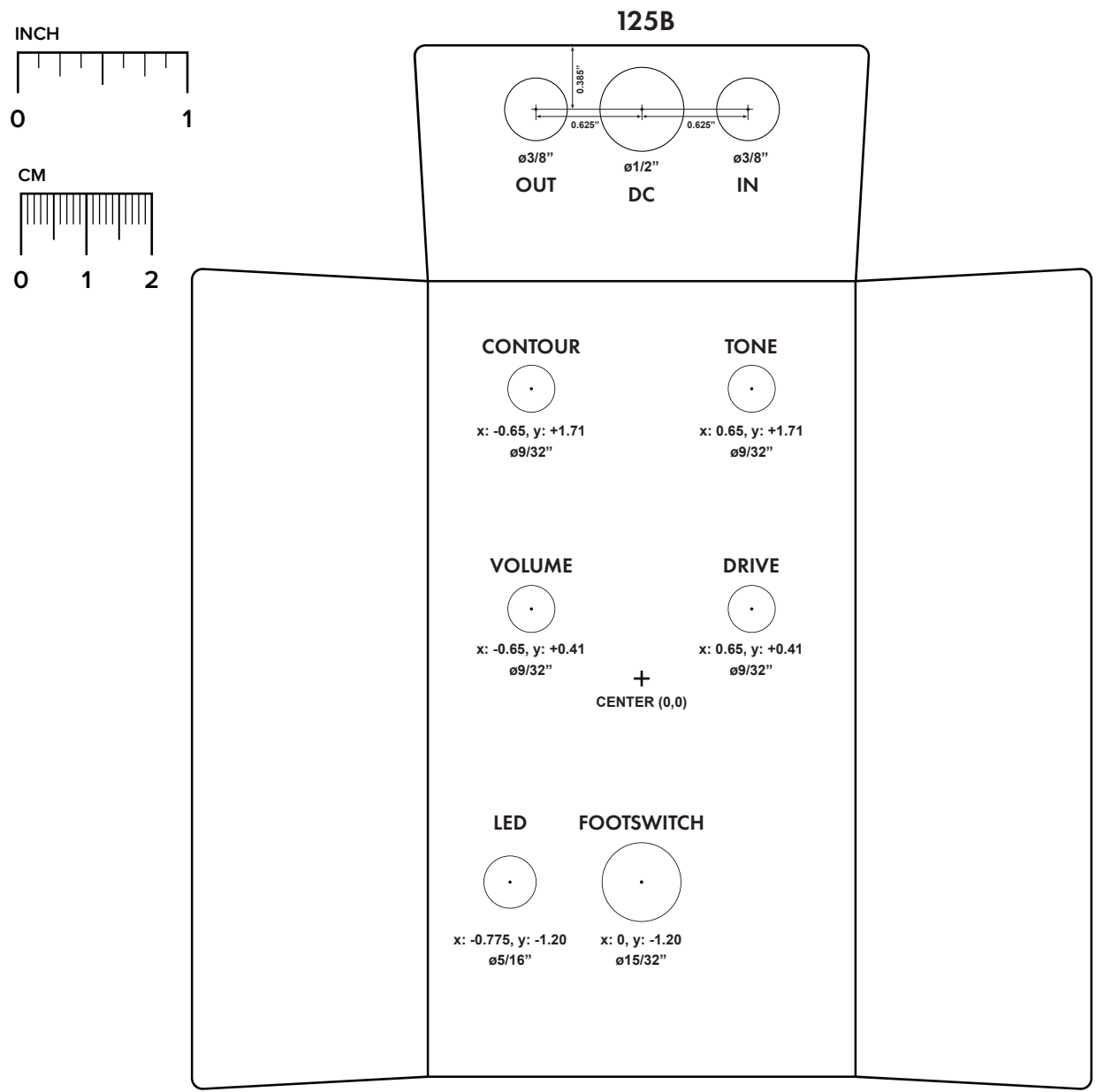
DRILL TEMPLATE

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.

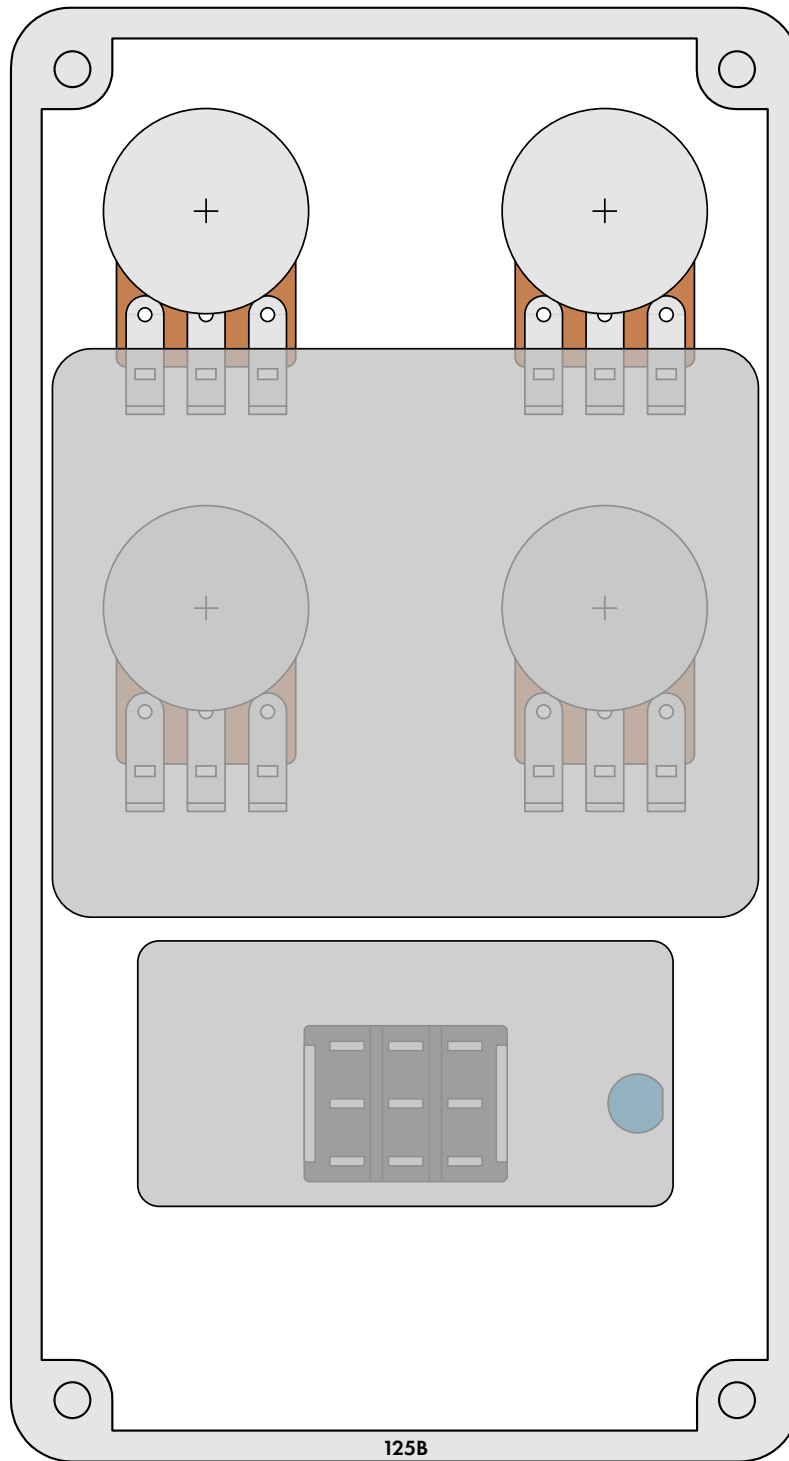
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

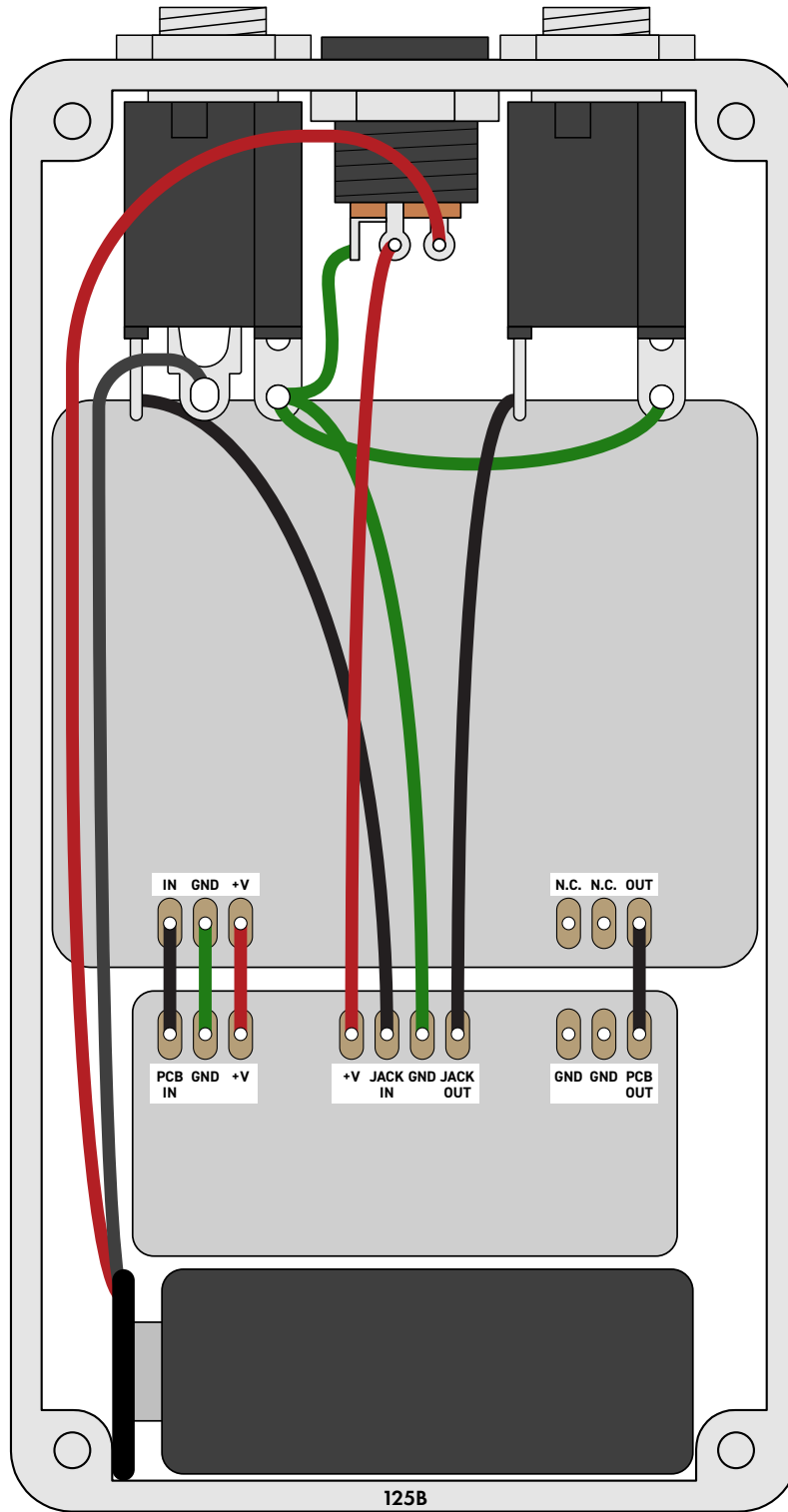


ENCLOSURE LAYOUT

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 (2022-04-08)

Initial release.