

PROJECT NAME
ZETA

BASED ON
Colorsound Jumbo Tone Bender

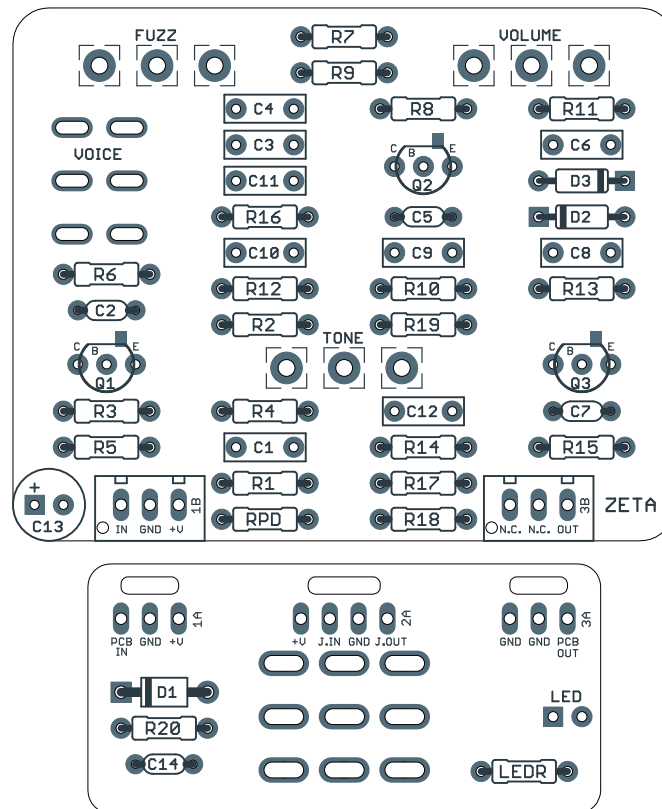
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
Distortion, bass fuzz

DOCUMENT VERSION
1.0.0 (2022-04-08)

PROJECT SUMMARY

The silicon successor to the classic Macaris germanium fuzz pedals of the late 1960s, the Jumbo Tone Bender and its variants were actually adapted from the Big Muff Pi.



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

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INTRODUCTION

The Zeta Distortion/Sustainer is based on Colorsound's 1970s-era "redesign" of the classic germanium [Tone Bender](#), a series of revolutionary germanium fuzzes that were first designed in the late 1960s.

However, while it shares a name with the earlier germanium Tone Benders, under the hood it's a completely different circuit that is actually adapted from the [Electro-Harmonix Big Muff Pi](#). The main differences are that the second stage has had the clipping diodes removed and the post-tone gain recovery stage has been dropped entirely.

With minor part differences, Colorsound sold the circuit under the names Tone Bender Mk. IV, Supa Tone Bender, and Jumbo Tone Bender, and they also produced it for Barnes & Mullins (B&M) as the Fuzz Unit. The last of them were produced in late 1980. In the 1990s, Colorsound also created a vintage-inspired semi-reissue called the Bass Fuzz. They never had a vintage product called the Bass Fuzz, but it's the same basic circuit as the 1970s pedals, just with all the capacitor values doubled.

The default parts list for the Zeta is from a 1976 Jumbo Tone Bender, but component values are provided for each of the other variants and any of them can be built using this PCB. There's also a switch that changes out two components to simultaneously increase the gain of the first stage and change the frequency of the tone control. More on this in the build notes.

USAGE

The Zeta has the following controls:

- **Fuzz** controls the amount of drive or distortion, which also affects the amount of sustain.
- **Tone** is a control that pans between a low-pass filter (high cut) and a high-pass filter (low cut). At the 12:00 position, the bass and treble are flat.
- **Volume** is the overall output.
- **Voice** (toggle switch) increases the gain of the first stage and changes the frequency of the treble side of the tone control.

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	39k	Metal film resistor, 1/4W	1976 value. 33k in many units.
R2	100k	Metal film resistor, 1/4W	
R3	470k	Metal film resistor, 1/4W	
R4	100R	Metal film resistor, 1/4W	
R5	15k	Metal film resistor, 1/4W	10k in some units (covered by Voice switch and R6).
R6	30k	Metal film resistor, 1/4W	
R7	1k	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	1976 value. 8k2 in many units.
R9	100k	Metal film resistor, 1/4W	
R10	470k	Metal film resistor, 1/4W	
R11	100R	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	1976 value. 8k2 in many units.
R14	100k	Metal film resistor, 1/4W	
R15	470k	Metal film resistor, 1/4W	
R16	15k	Metal film resistor, 1/4W	
R17	100R	Metal film resistor, 1/4W	
R18	39k	Metal film resistor, 1/4W	1976 value. 33k in many units.
R19	39k	Metal film resistor, 1/4W	1976 value. 33k in many units.
R20	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor. Can be as low as 1M.
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C2	470pF	MLCC capacitor, NP0/C0G	1n in Bass Fuzz variant.
C3	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C4	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C5	470pF	MLCC capacitor, NP0/C0G	1n in Bass Fuzz variant.
C6	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C7	470pF	MLCC capacitor, NP0/C0G	1n in Bass Fuzz variant.
C8	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C9	100n	Film capacitor, 7.2 x 2.5mm	220n in Bass Fuzz variant.
C10	3n3	Film capacitor, 7.2 x 2.5mm	4n7 in 1976 unit (covered by Voice switch and C11).

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C11	1n5	Film capacitor, 7.2 x 2.5mm	
C12	10n	Film capacitor, 7.2 x 2.5mm	
C13	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C14	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	
Q1	2N3904	BJT transistor, NPN, TO-92	
Q2	2N3904	BJT transistor, NPN, TO-92	
Q3	2N3904	BJT transistor, NPN, TO-92	
FUZZ	100kA	16mm right-angle PCB mount pot	
TONE	100kB	16mm right-angle PCB mount pot	
VOL.	100kA	16mm right-angle PCB mount pot	
VOICE	DPDT on-on	Toggle switch, DPDT on-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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Variants

The Jumbo Tone Bender and its variants (Mk. IV, Supa, B&M, and others) were sold throughout the 1970s. Each version is said to have minor differences in the components. However, there are also variations within particular versions, and some of the differences overlap between different models (e.g. one version of the Jumbo is the same as the B&M while another is different).

It seems more likely that Macaris produced one circuit for all of the variations, and that the parts changed along the way during the 6-7 years it was in production. In other words, a Jumbo Tone Bender would probably have more similarities to a Supa Tone Bender produced in the same year than it would to a Jumbo Tone Bender from a few years earlier or later.

This is only speculation—but it just does not seem plausible that Macaris made these changes to the circuit as a way of distinguishing between the different models when the changes are for the most part inconsequential. Electro-Harmonix was known for making several circuit changes to their own Big Muff just based on the parts they could buy for cheap, and this seems like the same thing.

Therefore, we are not supplying differences between the Jumbo, Super, etc. but rather just the known differences across the span of production. The default parts list is based on a trace of a 1976 Jumbo Tone Bender that was said to sound particularly good. We've also included information for the Bass Fuzz further down, which does have different parts.

Voice switch

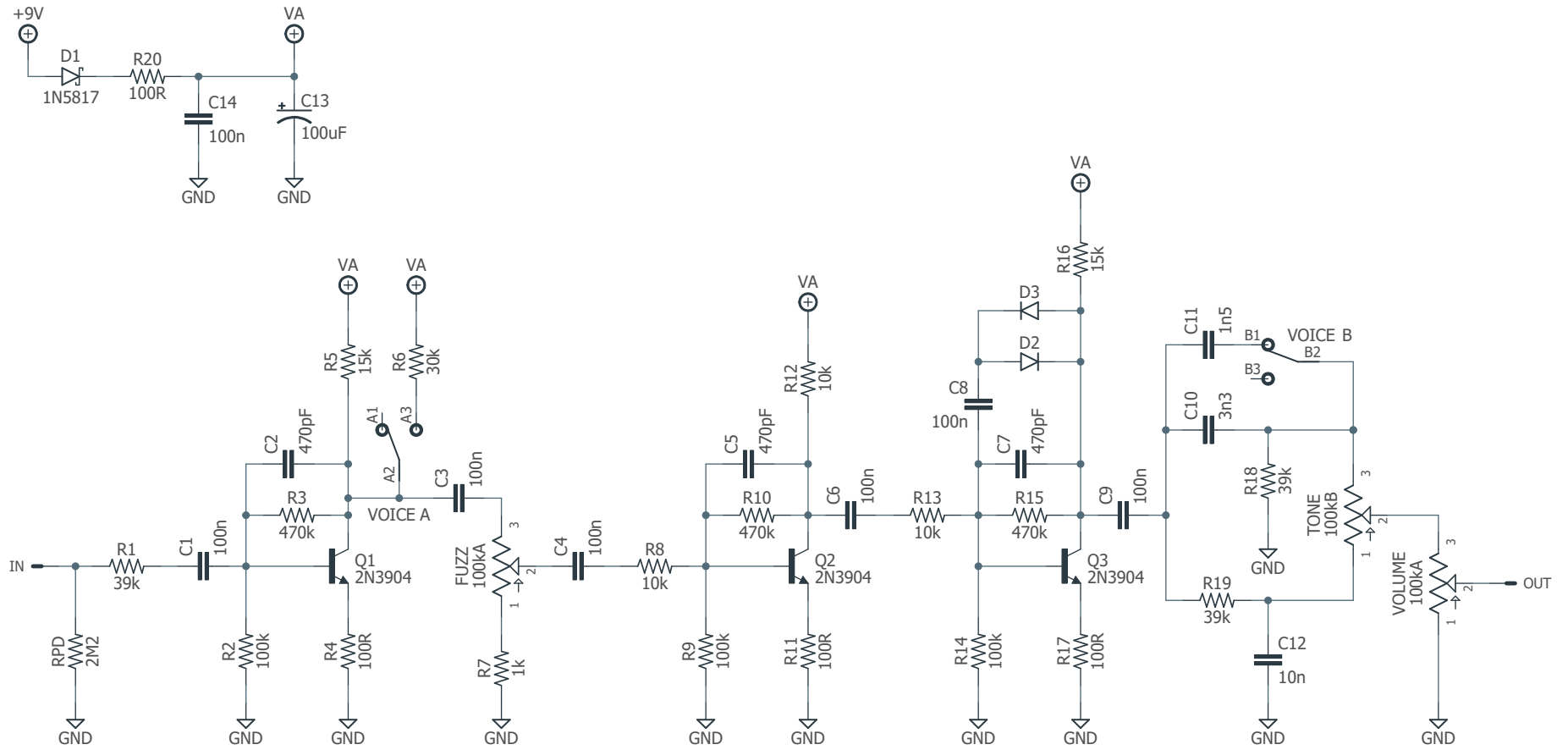
If the default parts list is used, the Voice switch selects between the stock 1976 Tone Bender and one version of the B&M Fuzz Unit. In the “down” position, the tone control capacitor is effectively 4n7, and the first stage collector resistor is 15k, which matches the '76 unit. In the “up” position, the tone capacitor is dropped to 3n3 and the first stage resistor is dropped to 10k.

As mentioned earlier, these two values were used in other variants as well; they are not “B&M specs” specifically so much as “specs seen on one B&M and likely also shared by other versions”.

Bass Fuzz

The Bass Fuzz is the only version with significant differences. All of the 100n capacitors have been changed to 220n, and all the 470pF capacitors have been changed to 1n. With the Voice switch in the “down” position, it matches the stock Bass Fuzz.

SCHEMATIC



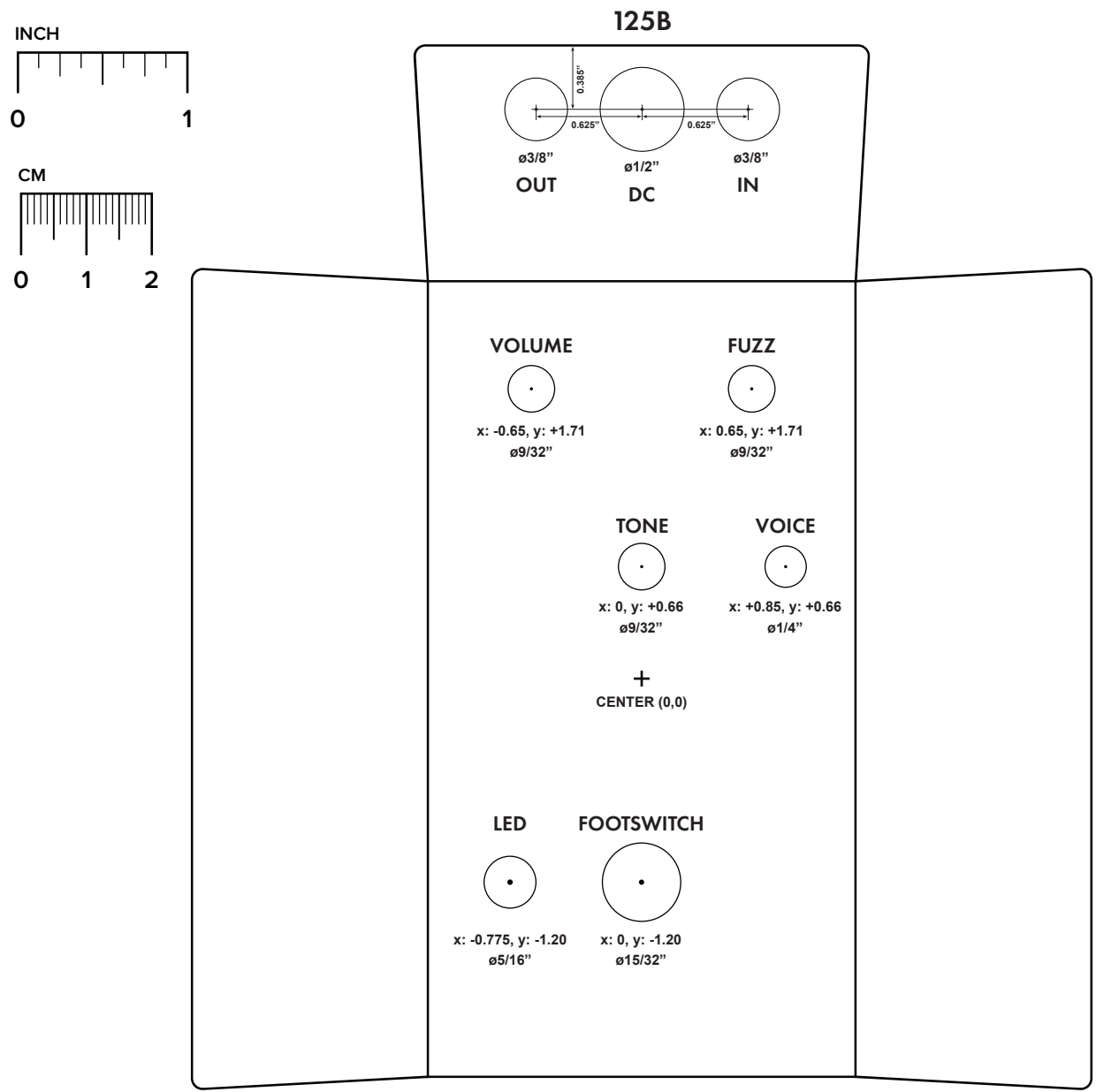
DRILL TEMPLATE

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.

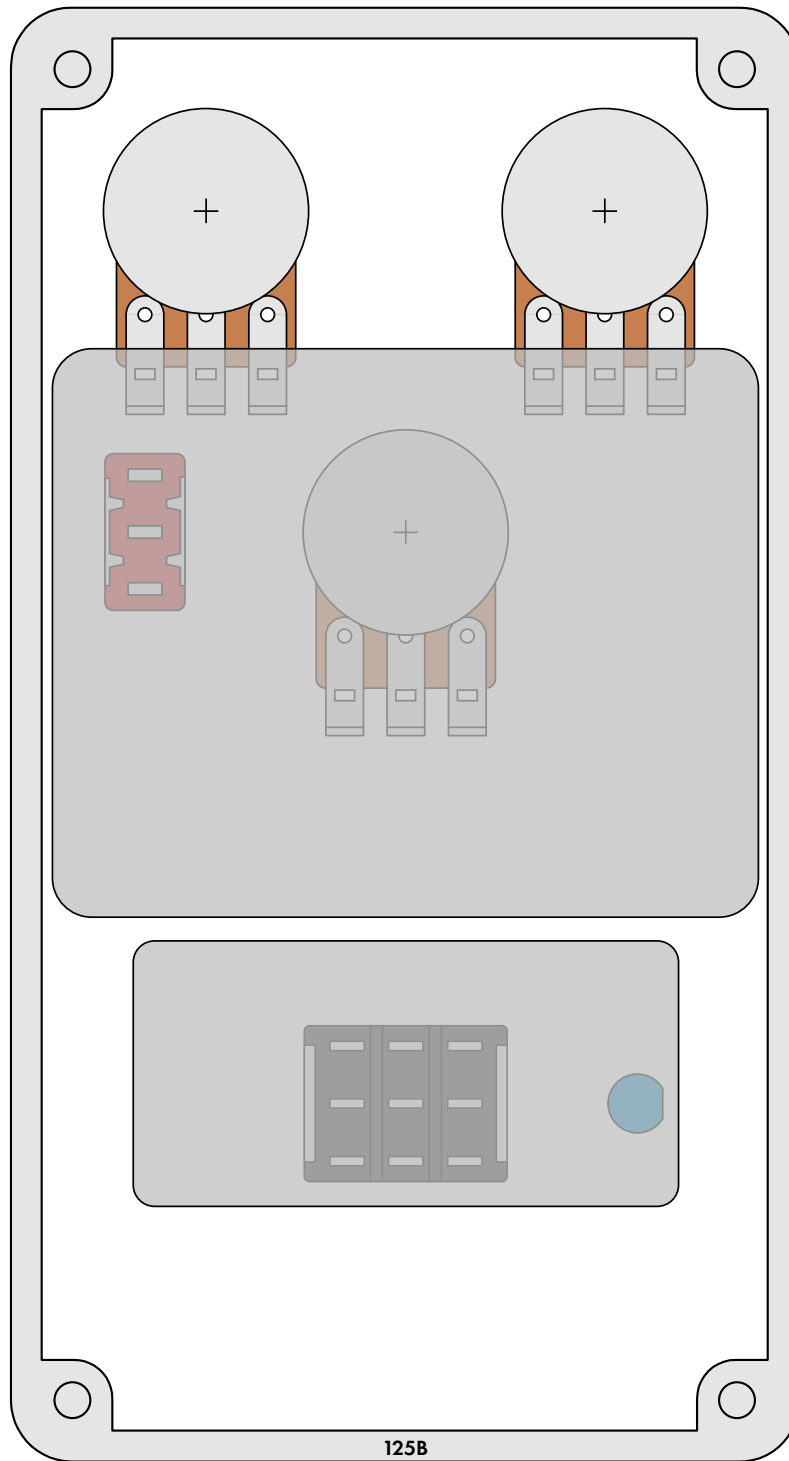
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

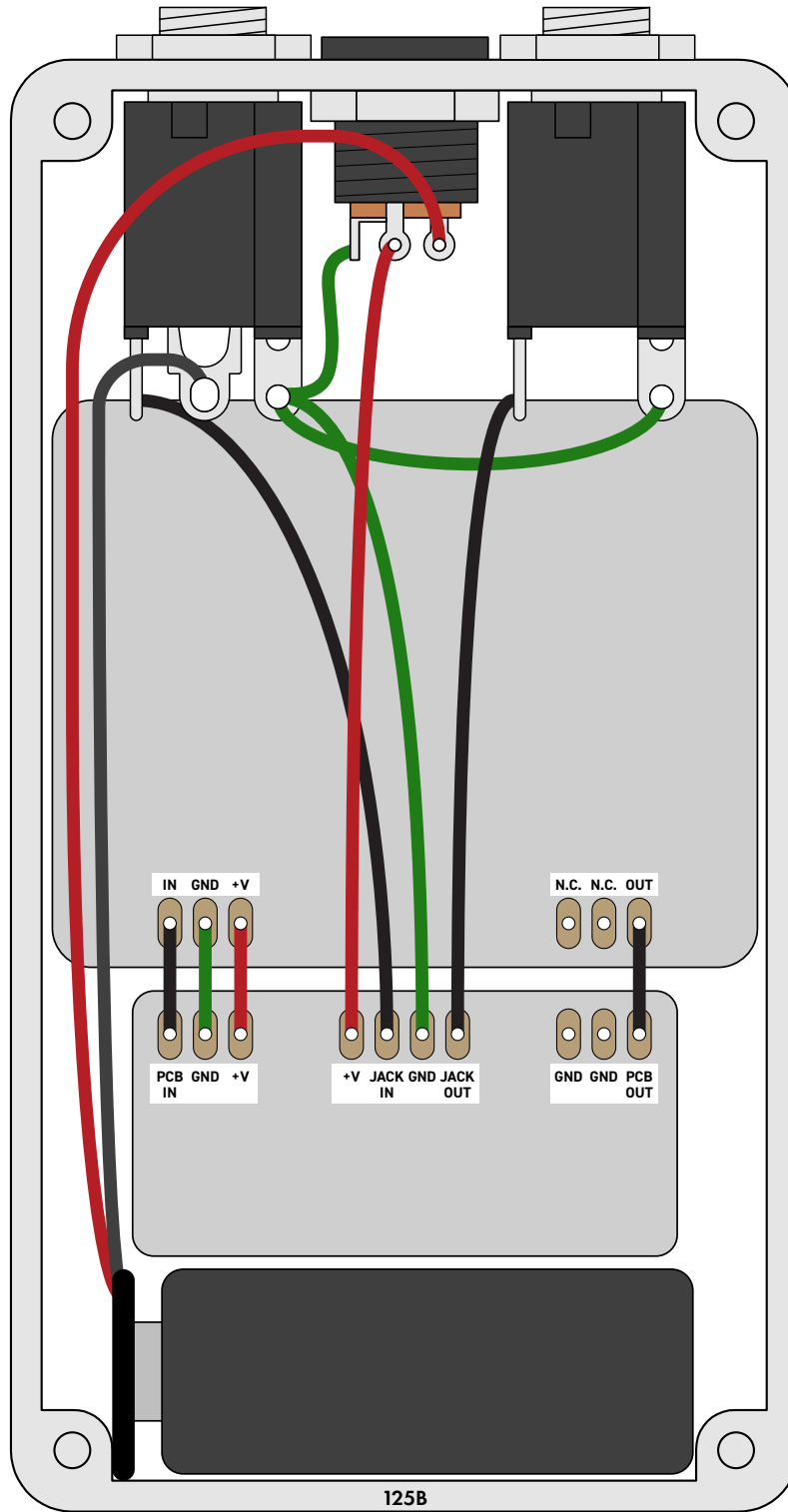


ENCLOSURE LAYOUT

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.