

PROJECT NAME

THULCANDRA



BASED ON
Xotic Soul Driven

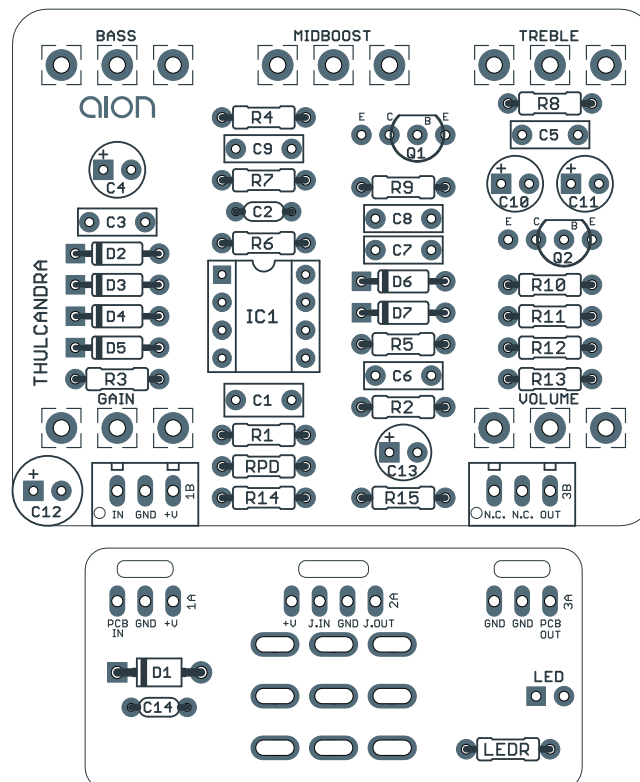
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
Boost / Overdrive

DOCUMENT VERSION
1.0.0 (2019-10-18)

PROJECT SUMMARY

A mid-gain overdrive with three different tone controls to fine-tune the character. Developed in collaboration with Allen Hinds as a signature effect.



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

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INTRODUCTION

The Thulcandra Boost/Overdrive is an adaptation of the Xotic Soul Driven, a cousin of the classic AC Booster with roots in the Tube Screamer family, originally released in collaboration with Allen Hinds. This is an original trace by Aion FX.

The Soul Driven replaces the tone section of the AC/RC Booster circuit with a gyrator-based bass boost stage that emphasizes the 120Hz frequency. Using internal DIP switches, four bass boost settings are available: flat, +2.4dB, +3.6dB and +6dB.

The “Mid Boost” control is similar to the Zendrive’s Voice control or the Timmy’s Bass knob, varying the resistor in the R-C filter to ground from the op-amp clipping stage. This has the effect of raising or lowering the bass cutoff frequency as well as changing the overall gain ratio.

The Thulcandra project is faithful to the original, with the exception that the DIP switch has been replaced by a potentiometer to allow fine control over the amount of bass. (The DIP switch just selects between four pre-set resistor values, and it’s likely due to space considerations that they made it an internal control rather than an external potentiometer.)

USAGE

The Thulcandra has the following controls:

- **Gain** controls the amount of gain in the op-amp clipping stage.
- **Treble** is a passive treble-cut filter similar to the one found in the RAT, Zendrive and Timmy.
- **Bass** is an active bass-boost at 120 Hz, from flat at minimum position to +6dB at maximum.
- **Mid Boost** raises or lowers the cutoff frequency of the clipping stage.
- **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 (most notably potentiometers) so the second tab lists all the non-Mouser parts as well as sources for each.

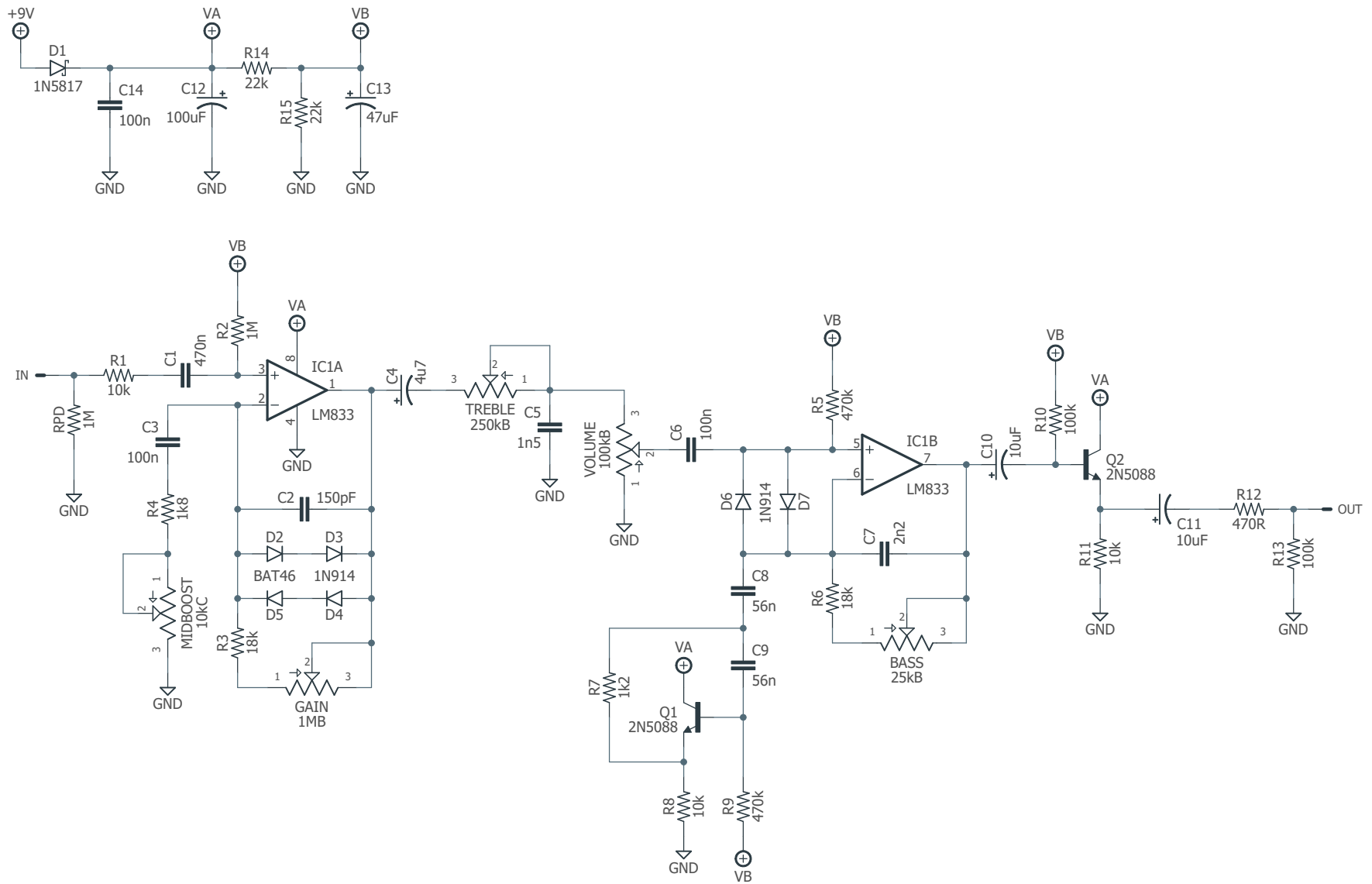
[View parts list spreadsheet](#) →

PART	VALUE	TYPE	NOTES
R1	10k	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	18k	Metal film resistor, 1/4W	
R4	1k8	Metal film resistor, 1/4W	
R5	470k	Metal film resistor, 1/4W	
R6	18k	Metal film resistor, 1/4W	
R7	1k2	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	
R9	470k	Metal film resistor, 1/4W	
R10	100k	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	470R	Metal film resistor, 1/4W	
R13	100k	Metal film resistor, 1/4W	
R14	22k	Metal film resistor, 1/4W	
R15	22k	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LED R	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	470n	Film capacitor, 7.2 x 3mm	
C2	150pF	MLCC capacitor, NP0/COG	
C3	100n	Film capacitor, 7.2 x 2.5mm	
C4	4u7 bipolar	Electrolytic capacitor, 5mm	Can also use polarized (oriented according to silkscreen).
C5	1n5	Film capacitor, 7.2 x 2.5mm	
C6	100n	Film capacitor, 7.2 x 2.5mm	
C7	2n2	Film capacitor, 7.2 x 2.5mm	
C8	56n	Film capacitor, 7.2 x 2.5mm	
C9	56n	Film capacitor, 7.2 x 2.5mm	
C10	10uF bipolar	Electrolytic capacitor, 5mm	Can also use polarized (oriented according to silkscreen).
C11	10uF bipolar	Electrolytic capacitor, 5mm	Can also use polarized (oriented according to silkscreen).
C12	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C13	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C14	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	BAT46	Schottky diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	BAT46	Schottky diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
Q1	2N5088	BJT transistor, NPN, TO-92	Original part number is BC849C, SMD type. 2N5088 is an equivalent.
Q2	2N5088	BJT transistor, NPN, TO-92	Original part number is BC849C, SMD type. 2N5088 is an equivalent.
IC1	LM833	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
TREBLE	250kB	16mm right-angle PCB mount pot	
BASS	25kB	16mm right-angle PCB mount pot	
MID	10kC	16mm right-angle PCB mount pot	
GAIN	1MB	16mm right-angle PCB mount pot	
VOL	100kB	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.
BATT	Battery snap	9V battery snap	Optional. Use the soft plastic type—the hard-shell type will not fit.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

SCHEMATIC



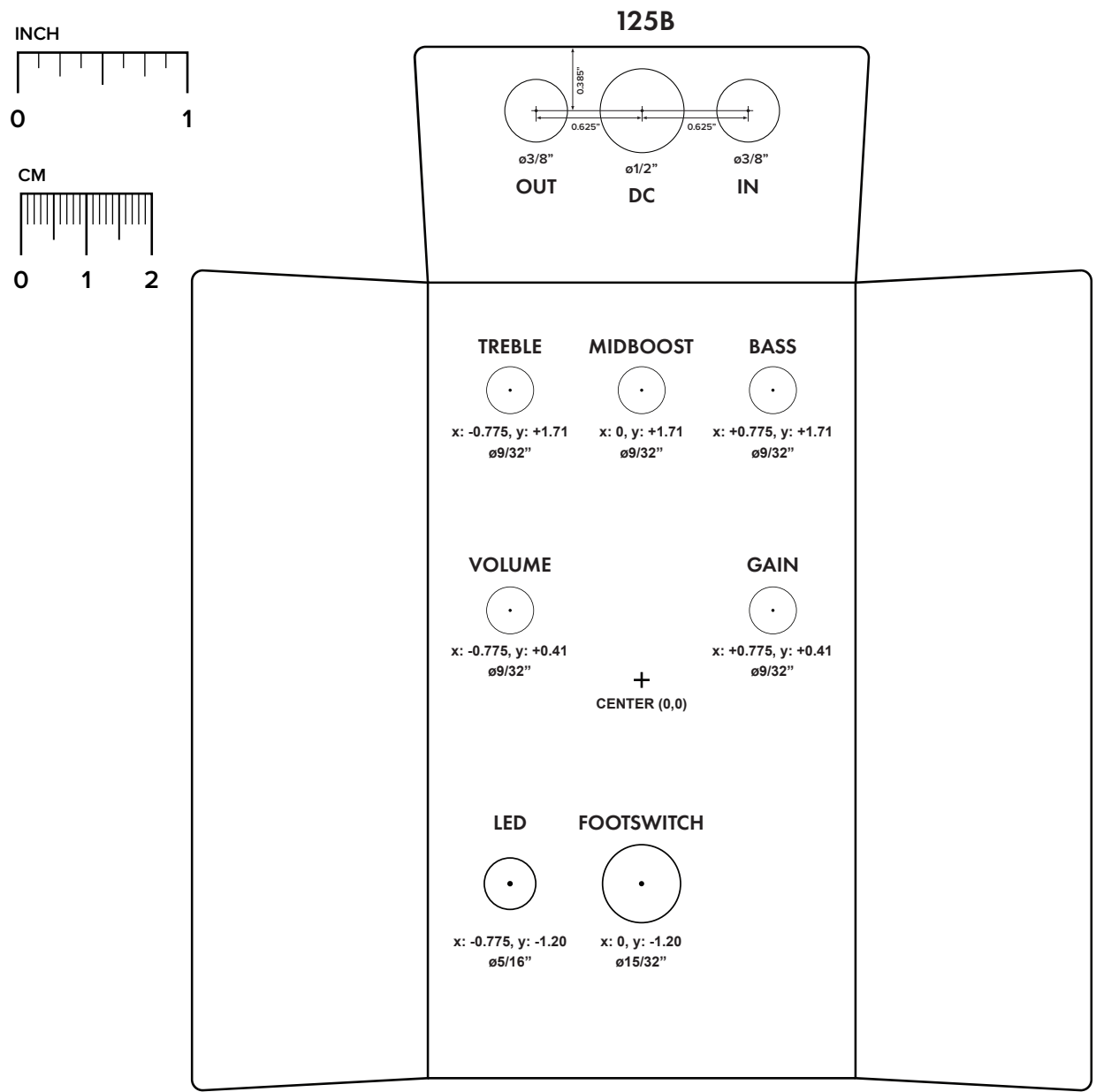
DRILL TEMPLATE

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.

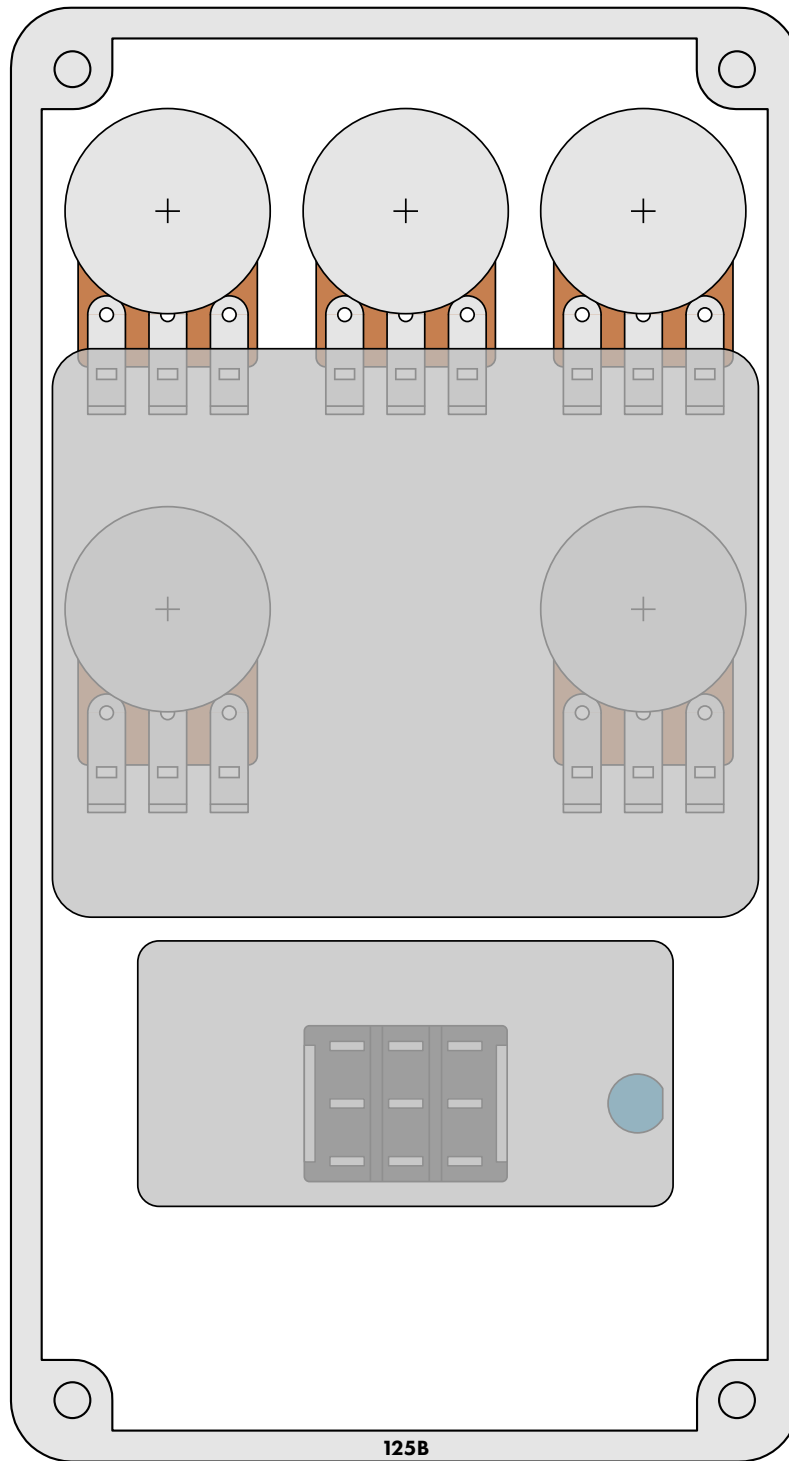
Top jack layout requires the use of closed-frame jacks like the [Switchcraft 111X](#). Open-frame jacks will not fit in layouts with 5 or more knobs due to the placement of the DC jack.

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.

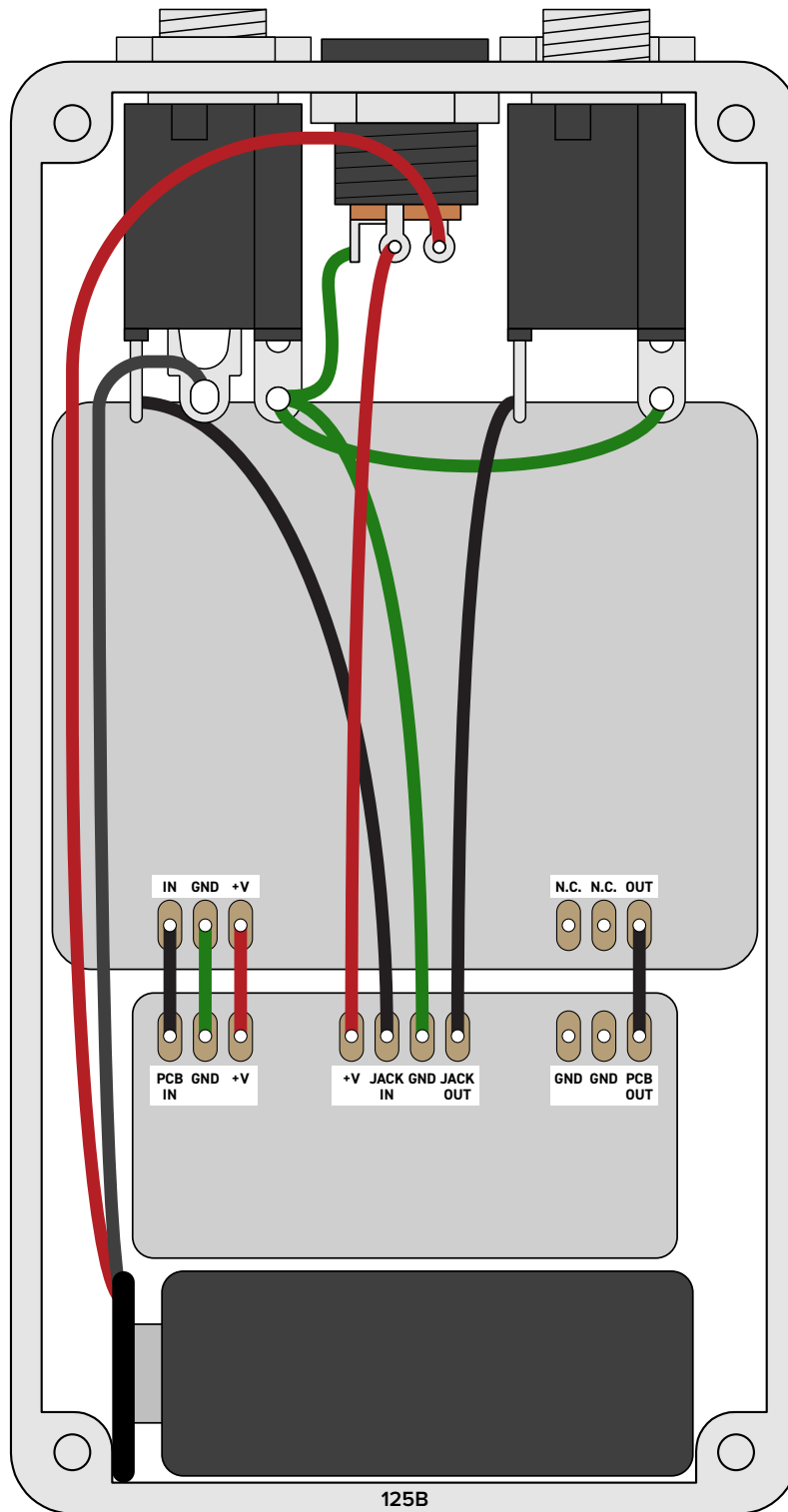


ENCLOSURE LAYOUT

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 (2019-10-18)

Initial release.