PROJECT NAME

CELERITAS

aion DIY GUITAR EFFECTS

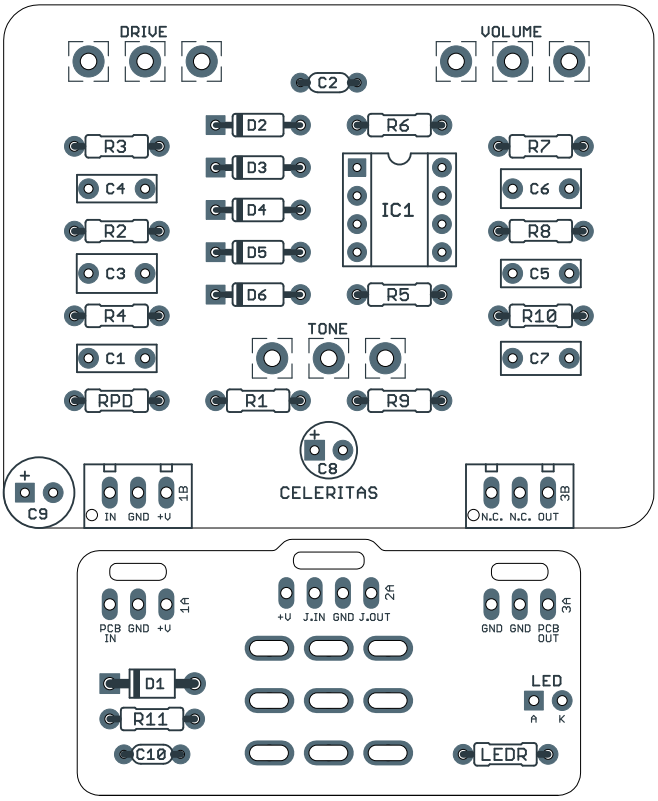
BASED ON
Greer Lightspeed

BUILD DIFFICULTY
▮▯▯▯▯ Beginner

EFFECT TYPE
Overdrive

DOCUMENT VERSION
1.0.0 (2024-11-29)

PROJECT SUMMARY
A high-end transparent overdrive with low parts count inspired by the Timmy and Zendrive.



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

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INTRODUCTION

The Celeritas Organic Overdrive is based on the Greer Lightspeed, first released in 2013.

The Lightspeed is a stripped-down transparent overdrive inspired by circuits like the Timmy and Zendrive. The input clipping stage is the same topology as the Tube Screamer, with soft clipping diodes in the feedback loop of the op-amp. This is followed by gain recovery and passive tone shaping that has some resemblance to the OCD, including a treble cut control at the end of the circuit.

While not terribly innovative, the Lightspeed circuit is very carefully tuned and has earned its spot on the pedalboards of many A-list musicians.

The Celeritas is a straightforward adaptation with no modifications other than some tweaks to the power supply for consistency with other Aion FX projects.

USAGE

The Celeritas has three controls:

- **Drive** controls the amount of gain in the op-amp clipping stage.
- **Tone** is a passive hi-cut filter right before the end of the circuit.
- **Volume** controls the overall output.

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	430k	Metal film resistor, 1/4W	
R2	5k6	Metal film resistor, 1/4W	
R3	3k3	Metal film resistor, 1/4W	
R4	12k	Metal film resistor, 1/4W	
R5	5k6	Metal film resistor, 1/4W	
R6	4k7	Metal film resistor, 1/4W	
R7	3k9	Metal film resistor, 1/4W	
R8	3k3	Metal film resistor, 1/4W	
R9	4k7	Metal film resistor, 1/4W	
R10	5k6	Metal film resistor, 1/4W	
R11	47R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	47n	Film capacitor, 7.2 x 2.5mm	
C2	100pF	MLCC capacitor, NP0/C0G	
C3	470n	Film capacitor, 7.2 x 3mm	
C4	47n	Film capacitor, 7.2 x 2.5mm	
C5	10n	Film capacitor, 7.2 x 2.5mm	
C6	1uF	Film capacitor, 7.2 x 3.5mm	
C7	220n	Film capacitor, 7.2 x 2.5mm	
C8	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C9	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C10	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	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
IC1	OPA2134	Operational amplifier, dual, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	

PARTS LIST, CONT.

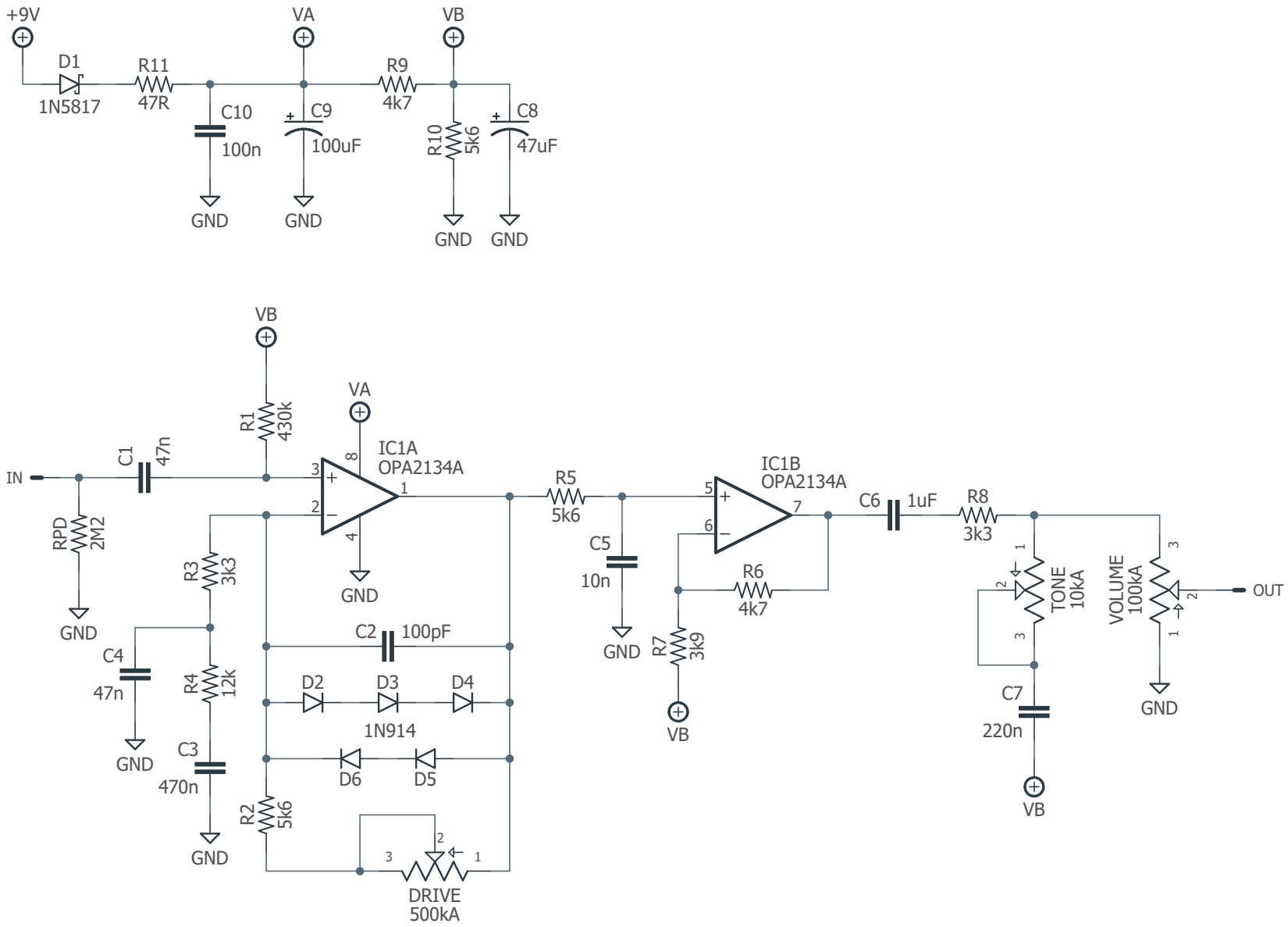
PART	VALUE	TYPE	NOTES
DRIVE	500kA	16mm right-angle PCB mount pot	Audio (log) taper.
TREBLE	10kA	16mm right-angle PCB mount pot	Audio (log) taper.
VOLUME	100kA	16mm right-angle PCB mount pot	Audio (log) taper.
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 112BX or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
LED	5mm	LED, 5mm, red diffused	
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.

BUILD NOTES

IC selection

The original Lightspeed uses the OPA2134 for IC1, which is a high-performance and fairly expensive choice. The pedal is a cheap enough build overall, so we recommend keeping it the same as the original, but if you want to save a few dollars, you can use any other dual op-amp instead. Something like the TL072 or NE5532 should work similarly.

SCHEMATIC


+9V
D1
1N5817
R11
47R
C10
100n
GND
VA
C9
100uF
GND
R9
4k7
VB
R10
5k6
C8
47uF
GND
GND
VB
R1
430k
VA
IN
C1
47n
RPD
2M2
GND
IC1A
OPA2134A
R3
3k3
GND
C4
47n
GND
R4
12k
C3
470n
GND
C2
100pF
D2
D3
D4
1N914
D6
D5
R2
5k6
DRIVE
500kA
R5
5k6
C5
10n
GND
IC1B
OPA2134A
R6
4k7
R7
3k9
VB
C6
1uF
R8
3k3
TONE
10kA
C7
220n
VB
VOLUME
100kA
GND
OUT

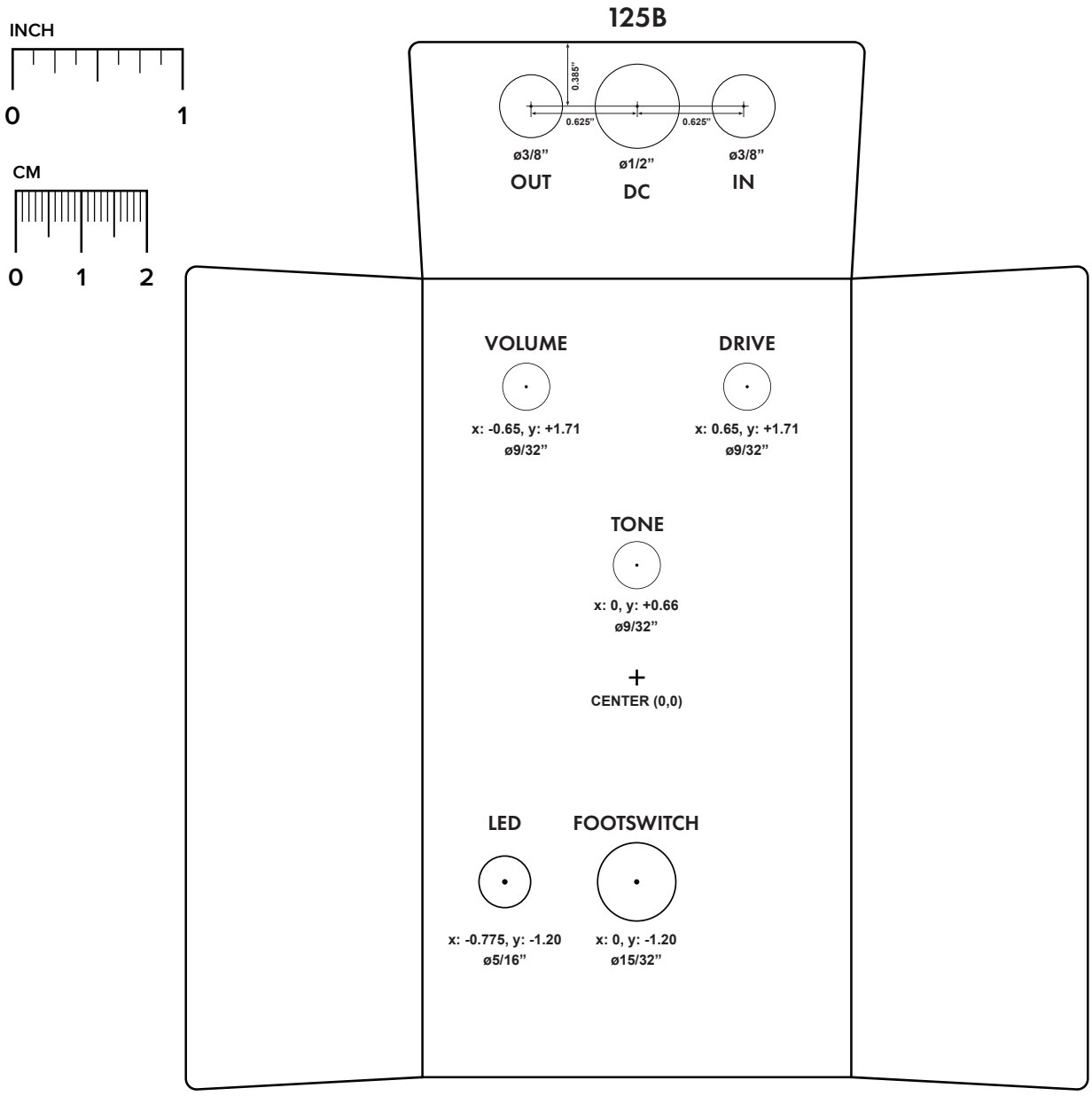
DRILL TEMPLATE

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.

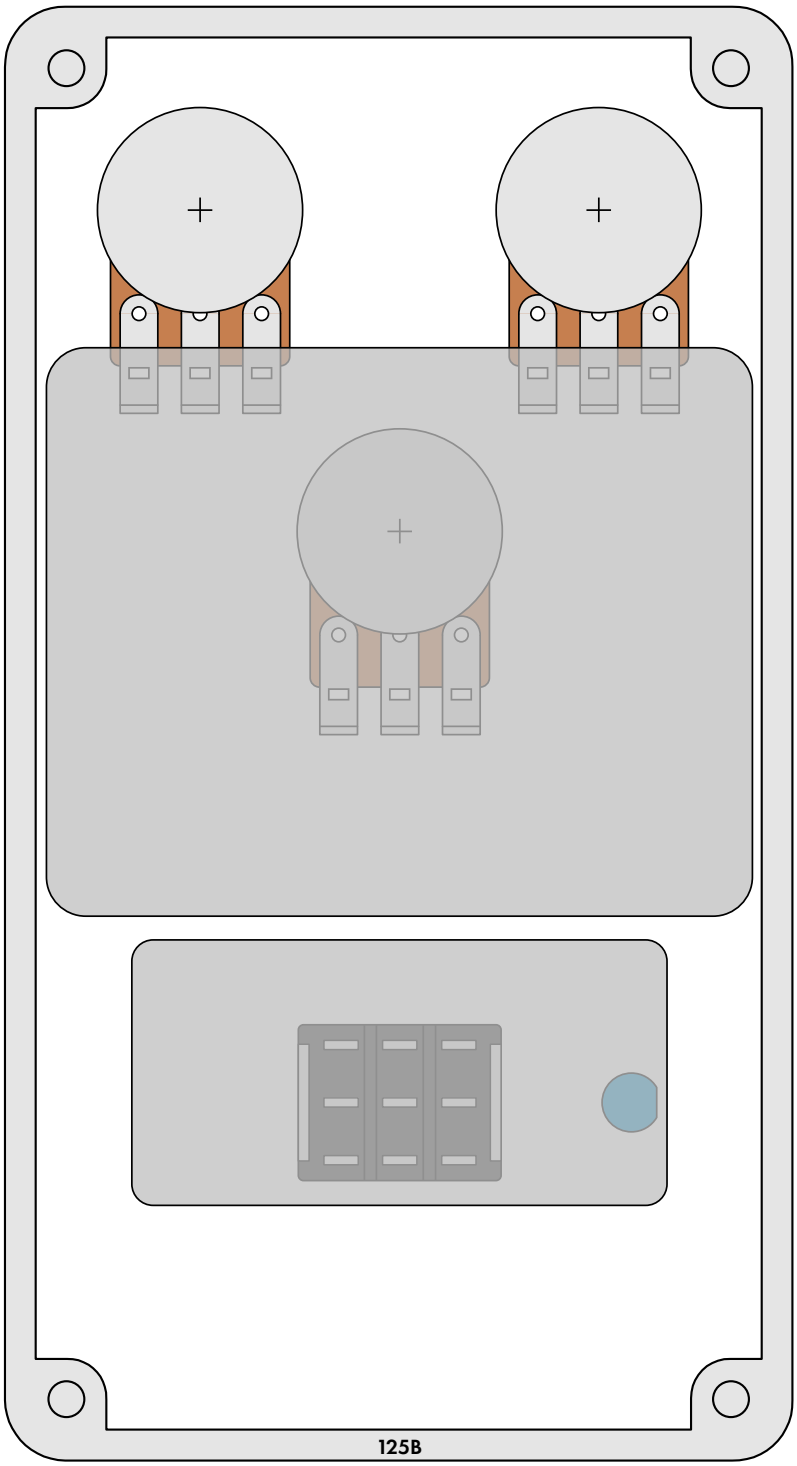
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. Open-frame jacks will not fit in layouts with 5 or more knobs due to the placement of the DC jack.

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.

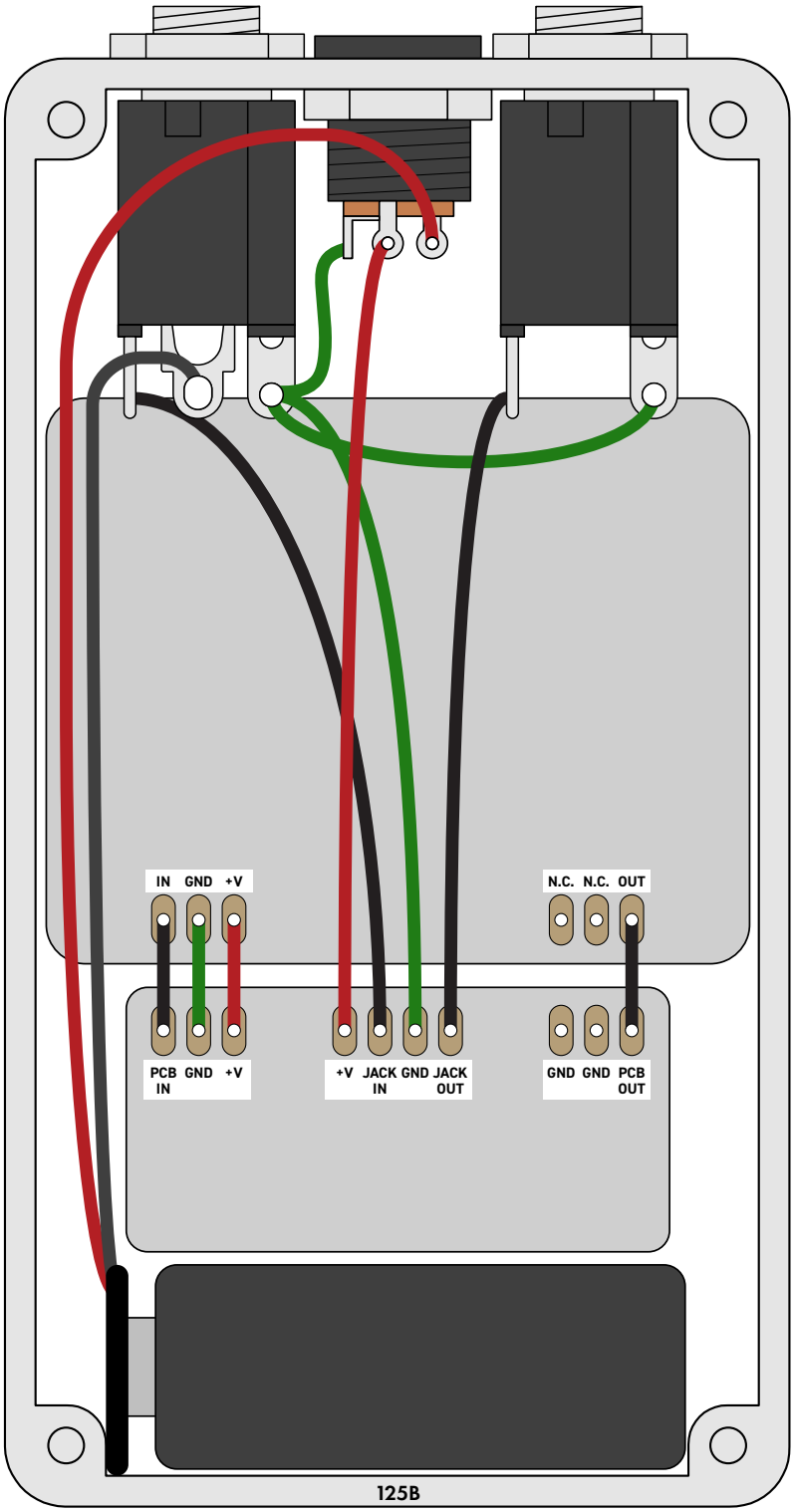


ENCLOSURE LAYOUT

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 cannotbe 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 (2024-11-29)

Initial release.