

PROJECT NAME
PARSEC

BASED ON
Systech Harmonic Energizer

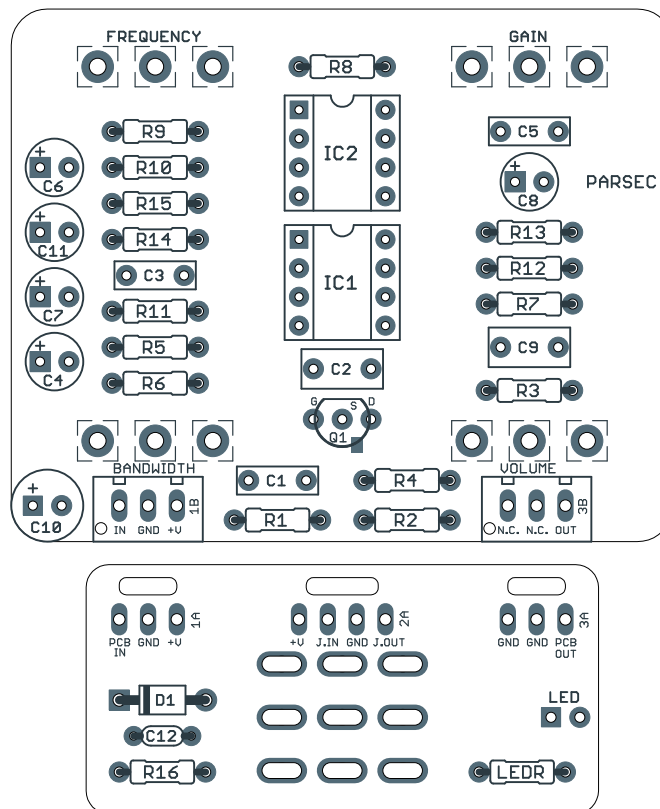
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
Filter, EQ

DOCUMENT VERSION
1.0.0 (2021-07-02)

PROJECT SUMMARY

A frequency-variable filter and tone shaper notably used by Frank Zappa, Adrian Belew and others.



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

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INTRODUCTION

The Parsec Harmonic Enhancer is based on the Systech Harmonic Energizer, a filter/EQ pedal from the mid-1970s that was notably used by Frank Zappa, Joe Walsh, Les Claypool, Greg Lake and Adrian Belew among others.

The Harmonic Energizer uses a fairly straightforward state-variable filter to achieve its frequency boost. This type of filter was more often found in synthesizers and related gear, so it was an innovative idea at the time to use the concept in a guitar pedal.

While the circuit has no intentional clipping stage, the extreme frequency boost can overload the final op-amp for a bit of fuzz at certain settings.

The Parsec is a direct clone of the Harmonic Energizer, with the addition of a volume control at the end to let you dial down to unity volume at higher bandwidth & gain settings.

USAGE

The Parsec has the following controls:

- **Frequency** sets the frequency to be boosted.
- **Bandwidth** sets the Q (sharpness) of the frequency's peak.
- **Gain** is the boost level of the frequency.
- **Volume** is the output volume. Set it full-up at first and then dial it down to unity once you've set the other controls to your liking.

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.

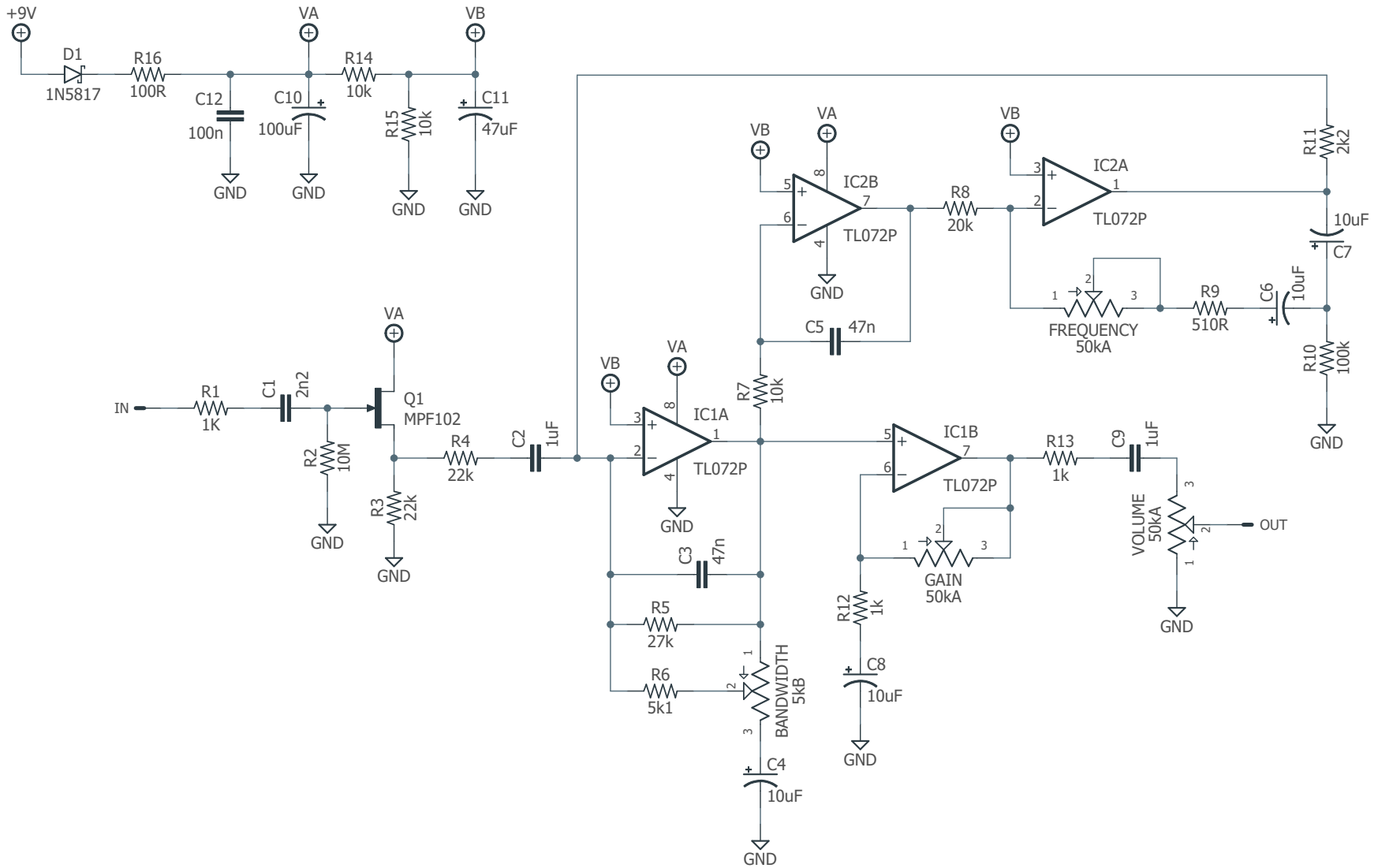
[View parts list spreadsheet](#) →

PART	VALUE	TYPE	NOTES
R1	1K	Metal film resistor, 1/4W	
R2	10M	Metal film resistor, 1/4W	
R3	22k	Metal film resistor, 1/4W	
R4	22k	Metal film resistor, 1/4W	
R5	27k	Metal film resistor, 1/4W	
R6	5k1	Metal film resistor, 1/4W	
R7	10k	Metal film resistor, 1/4W	
R8	20k	Metal film resistor, 1/4W	
R9	510R	Metal film resistor, 1/4W	
R10	100k	Metal film resistor, 1/4W	
R11	2k2	Metal film resistor, 1/4W	
R12	1k	Metal film resistor, 1/4W	
R13	1k	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	
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	2n2	Film capacitor, 7.2 x 2.5mm	
C2	1uF	Film capacitor, 7.2 x 3.5mm	
C3	47n	Film capacitor, 7.2 x 2.5mm	
C4	10uF	Electrolytic capacitor, 5mm	
C5	47n	Film capacitor, 7.2 x 2.5mm	
C6	10uF	Electrolytic capacitor, 5mm	
C7	10uF	Electrolytic capacitor, 5mm	
C8	10uF	Electrolytic capacitor, 5mm	
C9	1uF	Film capacitor, 7.2 x 3.5mm	
C10	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C11	47uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.
C12	100n	MLCC capacitor, X7R	Power supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
D1	1N5817	Schottky diode, DO-41	
Q1	2N5457	JFET, N-channel, TO-92	Substitute. Original uses 2N5458.
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	
BAND.	5k Ω	16mm right-angle PCB mount pot	
FREQ.	50k Ω	16mm right-angle PCB mount pot	
GAIN	50k Ω	16mm right-angle PCB mount pot	
VOL	50k Ω	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



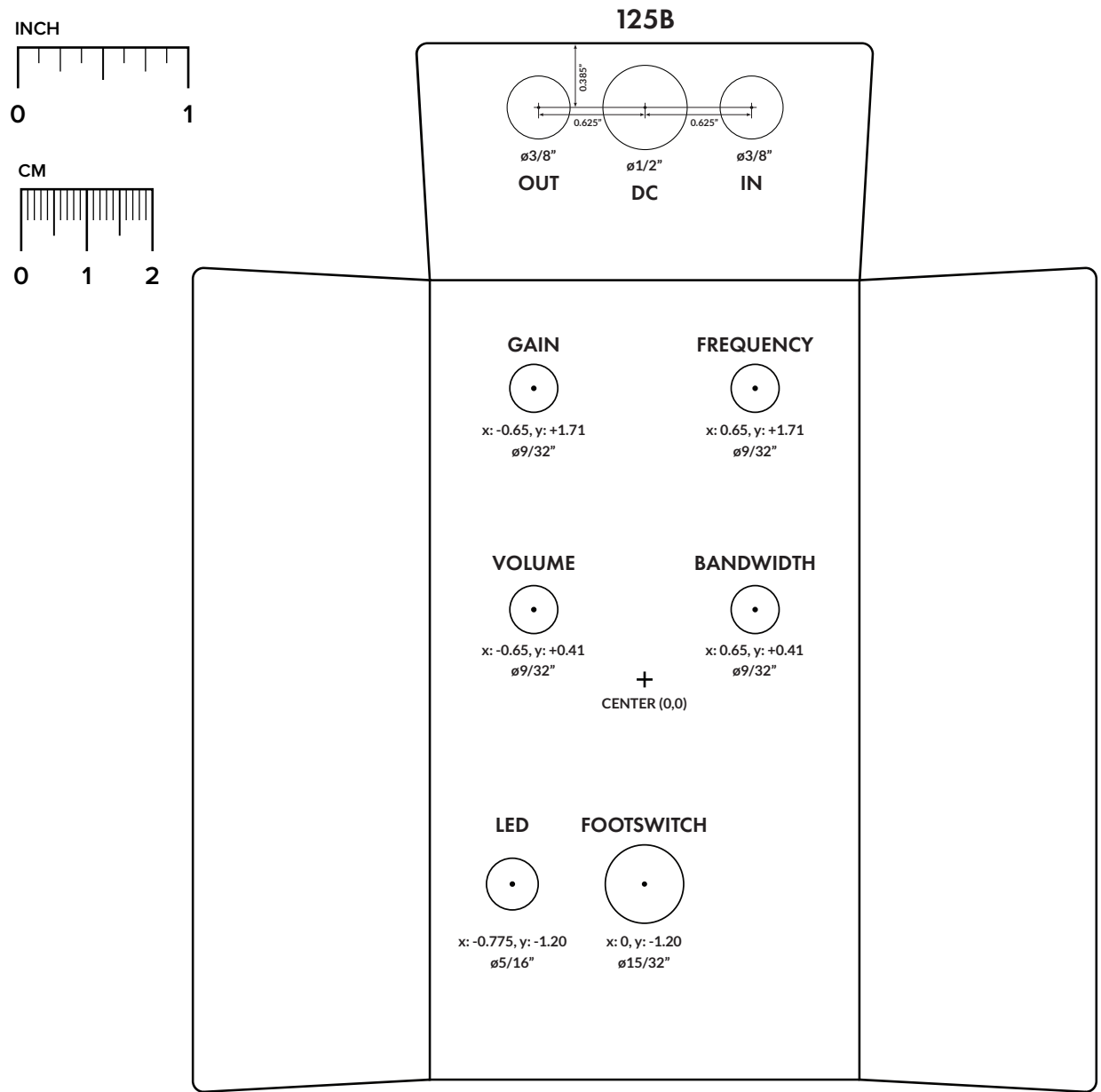
DRILL TEMPLATE

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.

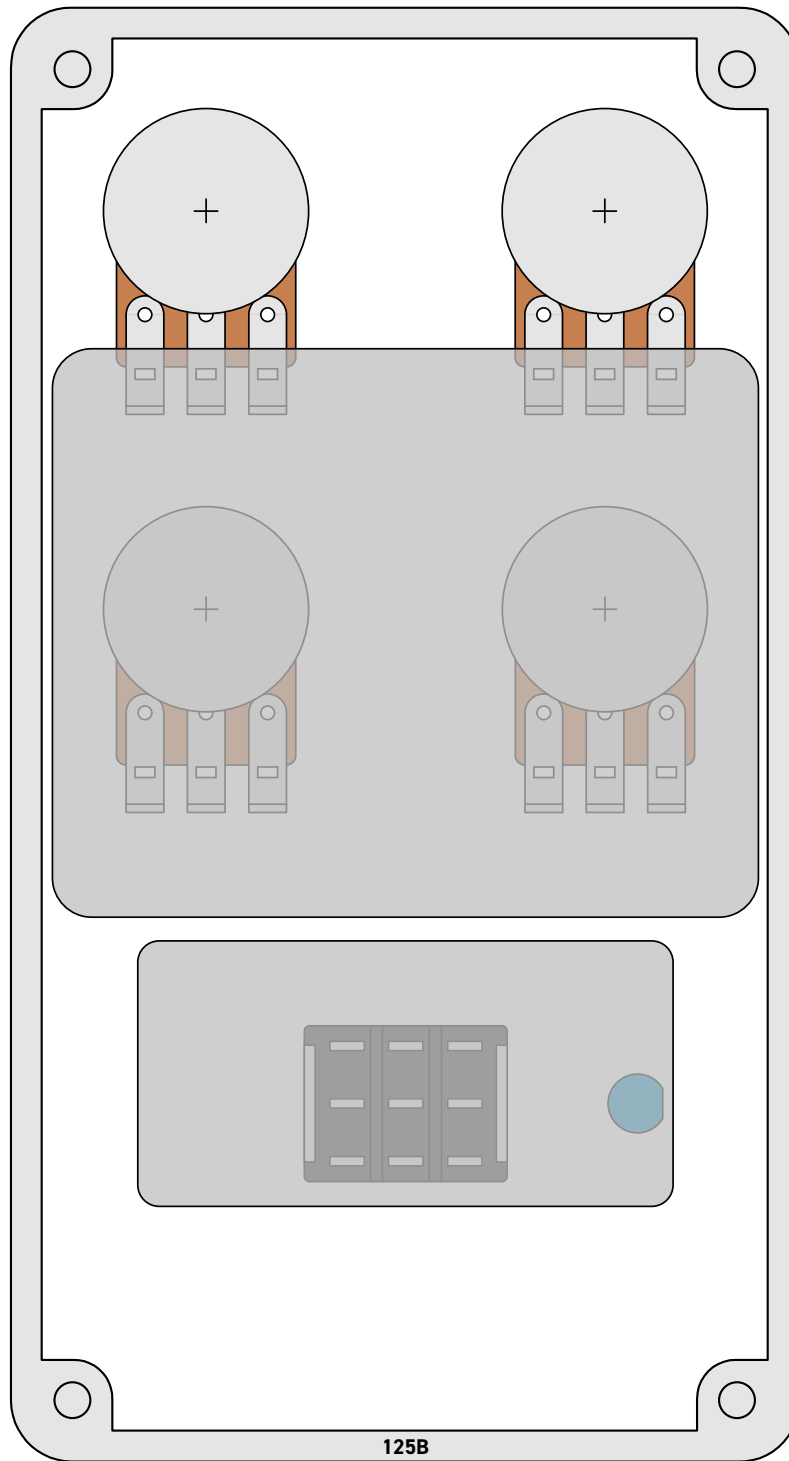
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

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.

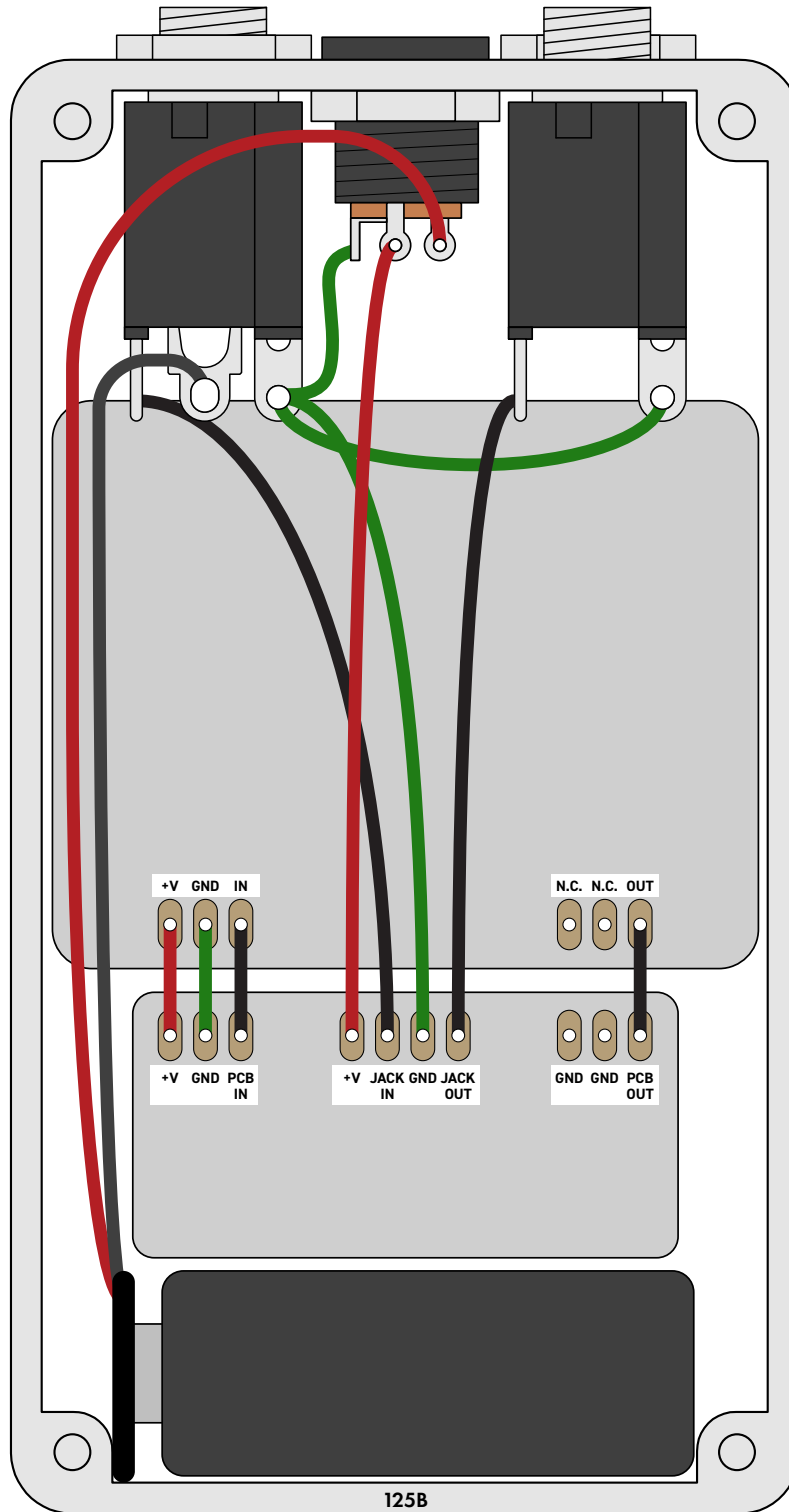


ENCLOSURE LAYOUT

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 (2021-07-02)

Initial release.