PROJECT NAME

PROCYON

aion DIY GUITAR EFFECTS

BASED ON
BJFe Honey Bee Overdrive

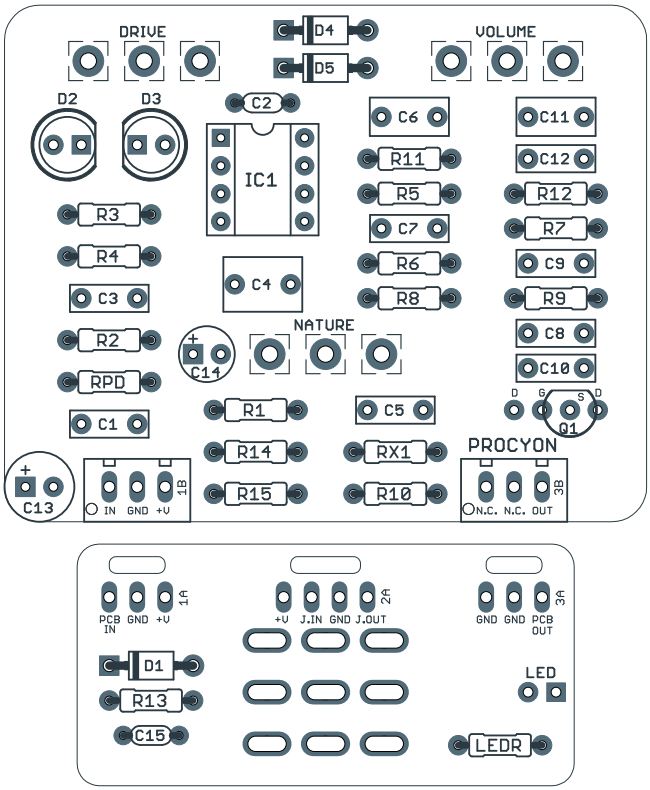
BUILD DIFFICULTY
▮▯▯▯▯ Beginner

EFFECT TYPE
Overdrive

DOCUMENT VERSION
1.0.1 (2021-11-23)

PROJECT SUMMARY

A workalike of one of the original hand-made boutique pedals, originally modeled after vintage Supro amps and noted for its dynamic low-gain tone.



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

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INTRODUCTION

The Procyon Natural Overdrive is a clone of the BJFe Honey Bee Overdrive, a circuit first released in 2002 that is credited for starting the “low gain overdrive” trend.

The circuit itself is a rather unique overdrive design, incorporating both soft and hard clipping and utilizing frequency-dependent negative feedback from different points in the circuit, for a result that is often called “amplike” in tone.

These pedals were handmade in Sweden and were extremely expensive ($300-400 USD), and so in 2011 an agreement was made with BearFoot FX to produce them in the USA for a more reasonable cost.

Bearfoot has also released a number of variants of this basic circuit such as the Model H, Model G, Honey Beest, Uber Bee, and Sparkling Yellow Overdrive. While each of these circuits are similar, the Procyon project only supports the standard Honey Bee (both BJFe and BearFoot versions, which have minor differences).

USAGE

The Procyon has the same control layout as most overdrive or distortion effects:

- **Drive** controls the gain of the op-amp stage which increases the amount of signal clipping.
- **Nature** is a very unique tone control, doing two things at once. On one half of the rotation it affects the amount of bass and changes the gain structure of the circuit. On the other half of the rotation, it blends in a frequency bypass capacitor on the gain-recovery FET, causing the highs to be emphasized more. The end result is that you have more bass on one side and more treble on the other, but the manner of accomplishing this is very different than something like the Big Muff.
- **Volume** controls the overall output level 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.

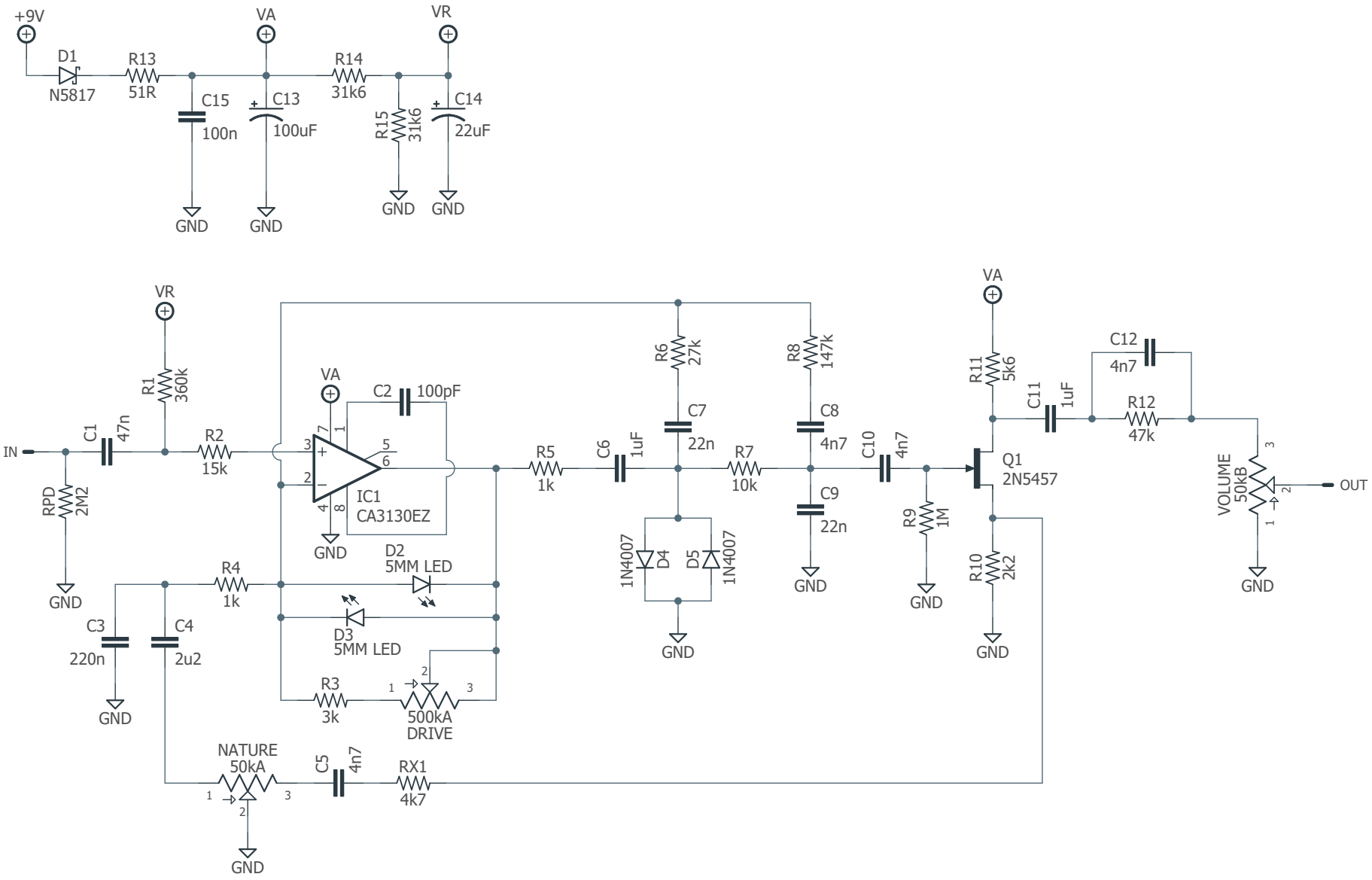
View parts list spreadsheet →

PART	VALUE	TYPE	NOTES
R1	360k	Metal film resistor, 1/4W	
R2	15k	Metal film resistor, 1/4W	
R3	3k	Metal film resistor, 1/4W	
R4	1k	Metal film resistor, 1/4W	
R5	1k	Metal film resistor, 1/4W	
R6	27k	Metal film resistor, 1/4W	
R7	10k	Metal film resistor, 1/4W	
R8	147k	Metal film resistor, 1/4W	Can substitute 150k.
R9	1M	Metal film resistor, 1/4W	
R10	2k2	Metal film resistor, 1/4W	
R11	5k6	Metal film resistor, 1/4W	
R12	47k	Metal film resistor, 1/4W	
R13	51R	Metal film resistor, 1/4W	
R14	31k6	Metal film resistor, 1/4W	
R15	31k6	Metal film resistor, 1/4W	
RX1	4k7	Metal film resistor, 1/4W	Only in the BearFoot version. Jumper RX1 for a stock BJFe Honey Bee.
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	47n	Film capacitor, 7.2 x 2.5mm	
C2	100pF	MLCC capacitor, NP0/C0G	
C3	220n	Film capacitor, 7.2 x 2.5mm	
C4	2.2uF	Film capacitor, 7.2 x 5mm	
C5	4n7	Film capacitor, 7.2 x 2.5mm	220n in the BearFoot version.
C6	1uF	Film capacitor, 7.2 x 3.5mm	
C7	22n	Film capacitor, 7.2 x 2.5mm	
C8	4n7	Film capacitor, 7.2 x 2.5mm	
C9	22n	Film capacitor, 7.2 x 2.5mm	
C10	4n7	Film capacitor, 7.2 x 2.5mm	
C11	1uF	Film capacitor, 7.2 x 3.5mm	
C12	4n7	Film capacitor, 7.2 x 2.5mm	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C13	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C14	22uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	5mm LED	LED, 5mm, red diffused	
D3	5mm LED	LED, 5mm, red diffused	
D4	1N4007	Rectifier diode, DO-41	
D5	1N4007	Rectifier diode, DO-41	
Q1	2N5457	JFET, N-channel, TO-92	Substitute. Original uses BF244A.
IC1	CA3130EZ	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
DRIVE	500kA	16mm right-angle PCB mount pot	
VOL	50kB	16mm right-angle PCB mount pot	
NATR	50kA	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


+9V
VA
VR
D1
N5817
R13
51R
R14
31k6
C15
100n
C13
100uF
R15
31k6
C14
22uF
GND
GND
GND
GND
VR
R1
360k
VA
C2
100pF
IN
C1
47n
R2
15k
IC1
CA3130EZ
R6
27k
C7
22n
R8
147k
C8
4n7
C9
22n
R5
1k
C6
1uF
R7
10k
C10
4n7
VA
R11
5k6
C11
1uF
C12
4n7
R12
47k
Q1
2N5457
VOLUME
50kB
OUT
RPD
2M2
GND
R4
1k
D2
5MM LED
D3
5MM LED
1N4007
D4
D5
1N4007
R9
1M
R10
2k2
C3
220n
C4
2u2
R3
3k
500kA
DRIVE
NATURE
50kA
C5
4n7
RX1
4k7
GND

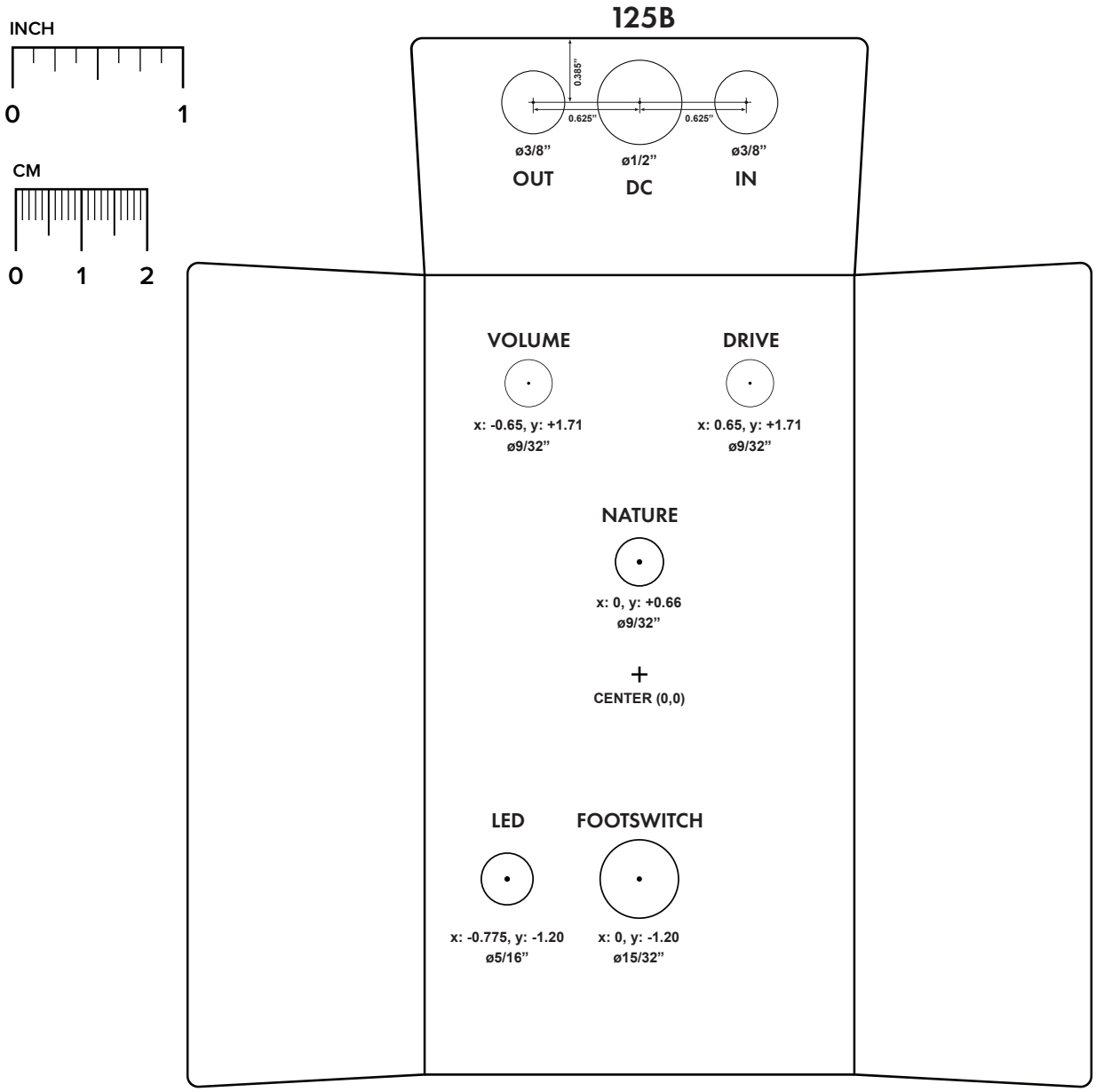
DRILL TEMPLATE

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.

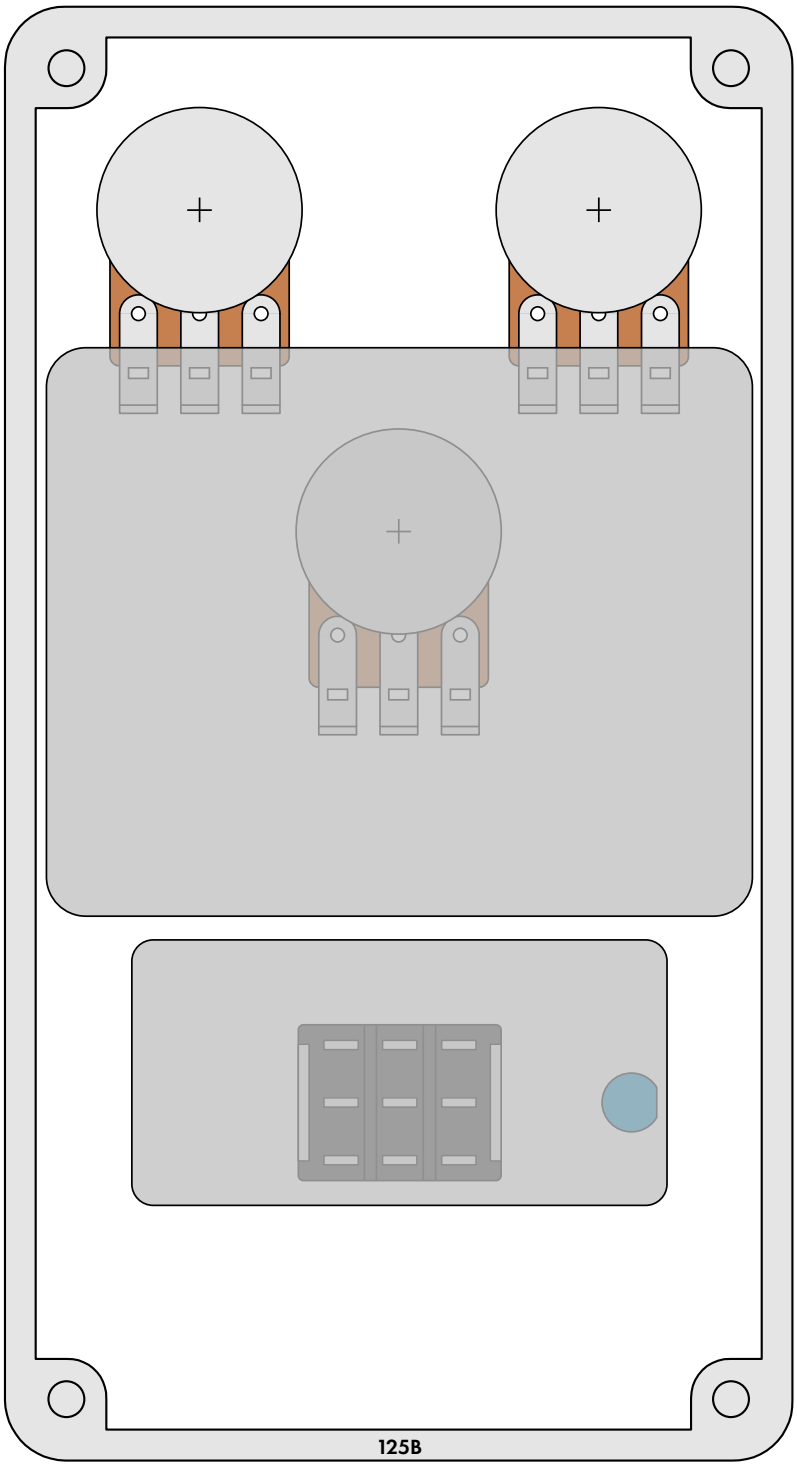
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

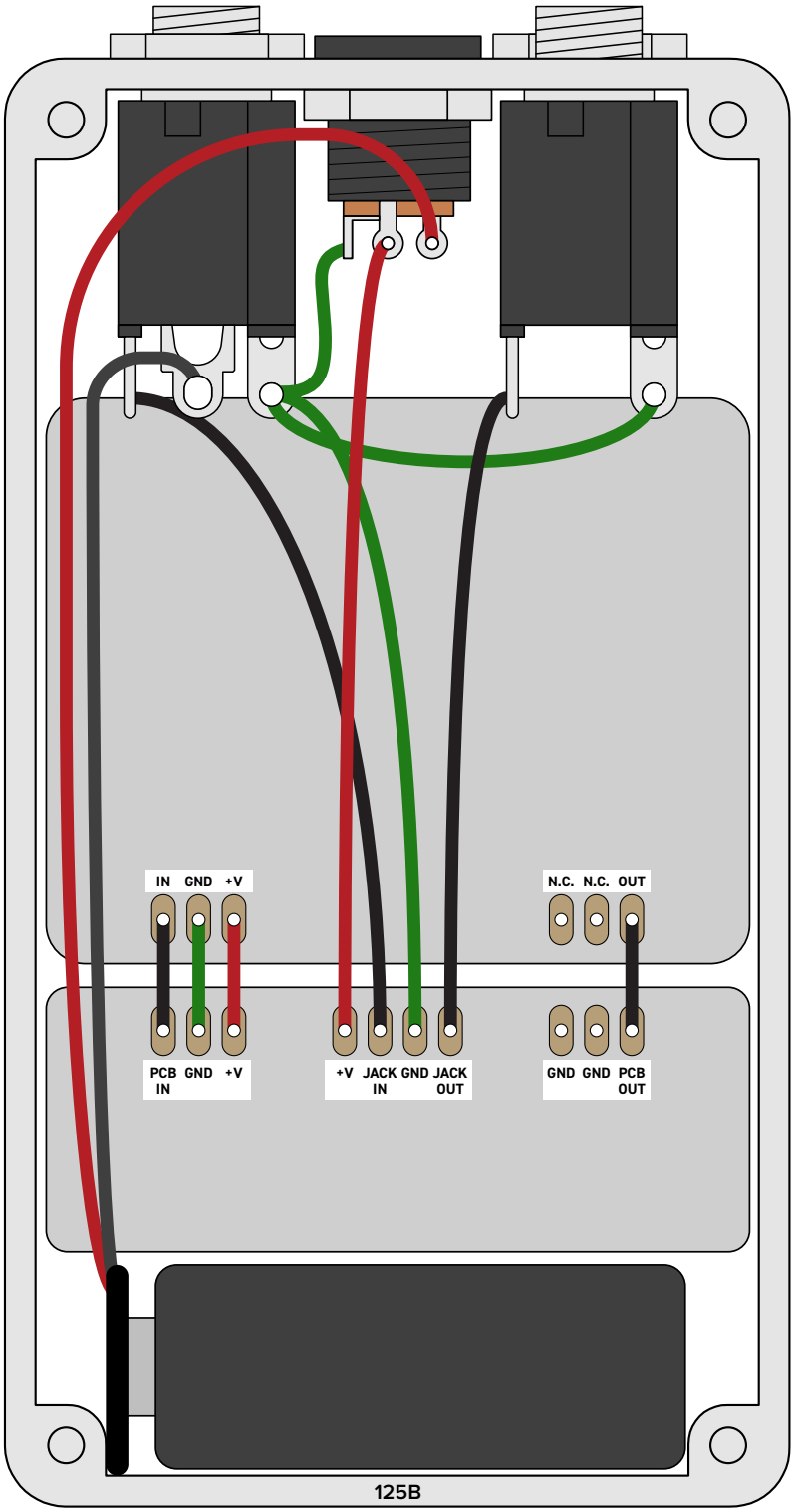


ENCLOSURE LAYOUT

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 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

1.0.1 (2021-11-23)
Corrected R8 to 147k based on likely inaccurate FSB trace dating back more than 10 years. The previous version of the build doc showed 47k.

1.0.0 (2018-08-22)
Initial release.