PROJECT NAME

# NEREUS

aion
DIY GUITAR EFFECTS

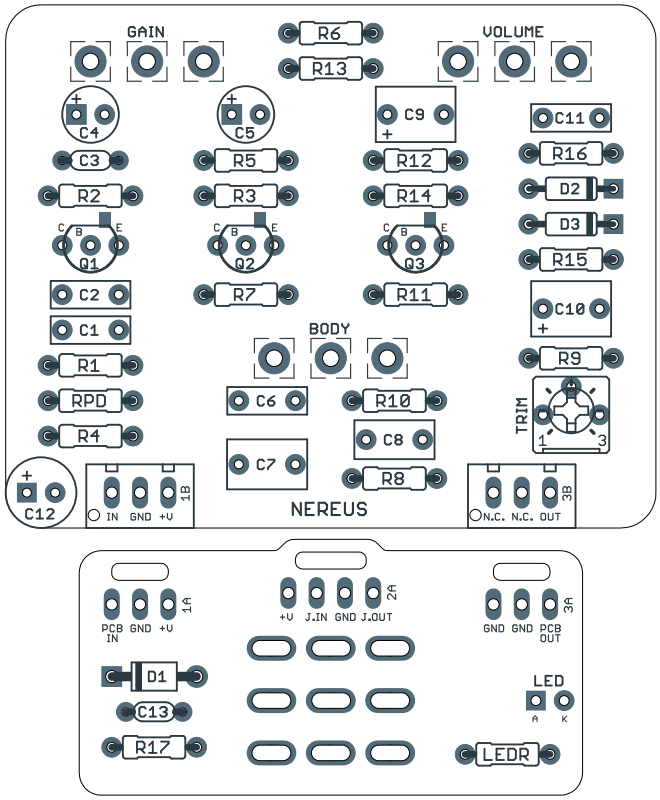
**BASED ON**
Catalinbread Octapussy

**BUILD DIFFICULTY**
▮▮▯▯▯ Easy

**EFFECT TYPE**
Octave-up fuzz

**DOCUMENT VERSION**
1.0.0 (2023-11-24)

**PROJECT SUMMARY**
A vintage-inspired octave-up fuzz in the tradition of the Roger Mayer Octavia.




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

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## INTRODUCTION

The Nereus Octave Fuzz is based on the Catalinbread Octapussy, an octave-up fuzz that was first released in 2012 and traced by Aion FX in 2023.

The Octapussy was called an original circuit, though they hinted that it was related to the Octavia. Based on our trace, this is perhaps stretching the truth a bit since the front half of the circuit is very similar to a silicon Fuzz Face and the octave section is directly lifted from the Octavia.

There are some interesting twists, though, and the end result is undoubtedly better than the sum of its parts. The Fuzz Face input section has a unique feedback arrangement that acts as a tone control and softens the fuzz somewhat, and prepares the signal for a better octave in the following stage.

The Nereus is directly based on our trace of the Octapussy. The only change we made was to reverse the orientation of the output volume control, which was called “Attenuation” on the original and reduced the volume as it was turned up—most likely a marketing decision on their part to make it seem louder.

## USAGE

The Nereus has the following controls:

- **Gain** sets gain of the fuzz stage.
- **Body** controls the frequency of the negative feedback path in the fuzz stage, which cuts highs and emphasizes low frequencies as it’s turned up.
- **Volume** sets the volume level at the 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 (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 | 120k | Metal film resistor, 1/4W | |
| R2 | 6k8 | Metal film resistor, 1/4W | |
| R3 | 150k | Metal film resistor, 1/4W | Carbon comp measured 159.8k in original circuit. See build notes. |
| R4 | 1k8 | Metal film resistor, 1/4W | |
| R5 | 470R | Metal film resistor, 1/4W | |
| R6 | 130R | Metal film resistor, 1/4W | |
| R7 | 15k | Metal film resistor, 1/4W | Carbon comp measured 17.1k in original circuit. See build notes. |
| R8 | 470k | Metal film resistor, 1/4W | |
| R9 | 220k | Metal film resistor, 1/4W | |
| R10 | 10k | Metal film resistor, 1/4W | |
| R11 | 10k | Metal film resistor, 1/4W | |
| R12 | 2M2 | Metal film resistor, 1/4W | |
| R13 | 100k | Metal film resistor, 1/4W | |
| R14 | 680k | Metal film resistor, 1/4W | |
| R15 | 100k | Metal film resistor, 1/4W | |
| R16 | 100k | Metal film resistor, 1/4W | |
| R17 | 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 | 10k | Metal film resistor, 1/4W | LED current-limiting resistor. Adjust value to change LED brightness. |
| C1 | 1n | Film capacitor, 7.2 x 2.5mm | |
| C2 | 33n | Film capacitor, 7.2 x 2.5mm | |
| C3 | 47pF | MLCC capacitor, NP0/C0G | |
| C4 | 22uF | Electrolytic capacitor, 5mm | |
| C5 | 22uF | Electrolytic capacitor, 5mm | |
| C6 | 1n | Film capacitor, 7.2 x 2.5mm | |
| C7 | 680n | Film capacitor, 7.2 x 4.5mm | |
| C8 | 470n | Film capacitor, 7.2 x 3mm | |
| C9 | 2.2uF | Film capacitor, 7.2 x 5mm | Can also use electrolytic (polarity marked on PCB). |
| C10 | 2.2uF | Film capacitor, 7.2 x 5mm | Can also use electrolytic (polarity marked on PCB). |
| C11 | 68n | Film capacitor, 7.2 x 2.5mm | |
| C12 | 100uF | Electrolytic capacitor, 6.3mm | Power supply filter capacitor. |
| C13 | 100n | MLCC capacitor, X7R | Power supply filter capacitor. |

# PARTS LIST, CONT.

| PART | VALUE | TYPE | NOTES |
|---|---|---|---|
| D1 | 1N5817 | Schottky diode, DO-41 | |
| D2 | 1N914 | Fast-switching diode, DO-35 | |
| D3 | 1N914 | Fast-switching diode, DO-35 | |
| Q1 | PN2222A | BJT transistor, NPN, TO-92 | Can substitute PN2222 or 2N3904. |
| Q2 | PN2222A | BJT transistor, NPN, TO-92 | Can substitute PN2222 or 2N3904. |
| Q3 | PN2222A | BJT transistor, NPN, TO-92 | Can substitute PN2222 or 2N3904. |
| TRIM | 100k trimmer | Trimmer, 10%, 1/4” | See build notes for how to set this trimmer. |
| GAIN | 5kC | 16mm right-angle PCB mount pot | Reverse audio (reverse log) taper. |
| BODY | 500kA | 16mm right-angle PCB mount pot | Audio (log) taper. |
| VOLUME | 500kB | 16mm right-angle PCB mount pot | Linear 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. |
| 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

## Setting the bias trimmer

The bias trimmer sets the voltage at the base of Q3. Assuming a 9.6V supply voltage, the trimmer's range is 3.06V to 3.88V. We're not sure how Catalinbread determined the optimum setting, but in the unit we traced, the trimmer was set to 21.5k (21% rotation), which would be 3.26V. Feel free to experiment and see if you notice any significant difference, but otherwise just set it to that position and forget about it.

## Volume knob rotation

The original Octapussy has a knob labeled "Attenuation", which is nothing more than a reversed volume knob that reduces the output as it's turned up. We have reversed this in the Nereus so it acts as a traditional volume control.

## Transistor substitutions

The Octapussy uses PN2222A transistors, which are a TO-92 version of the 2N2222A (TO-18 metal can). This is a low/medium-gain NPN transistor that is almost identical to the 2N3904, which can be substituted with no change in tone.

The "A" suffix designates higher maximum voltage and temperature, but the electrical properties are otherwise is identical between the two versions. The non-"A" PN2222 is available from Aion FX.

## Resistor substitutions

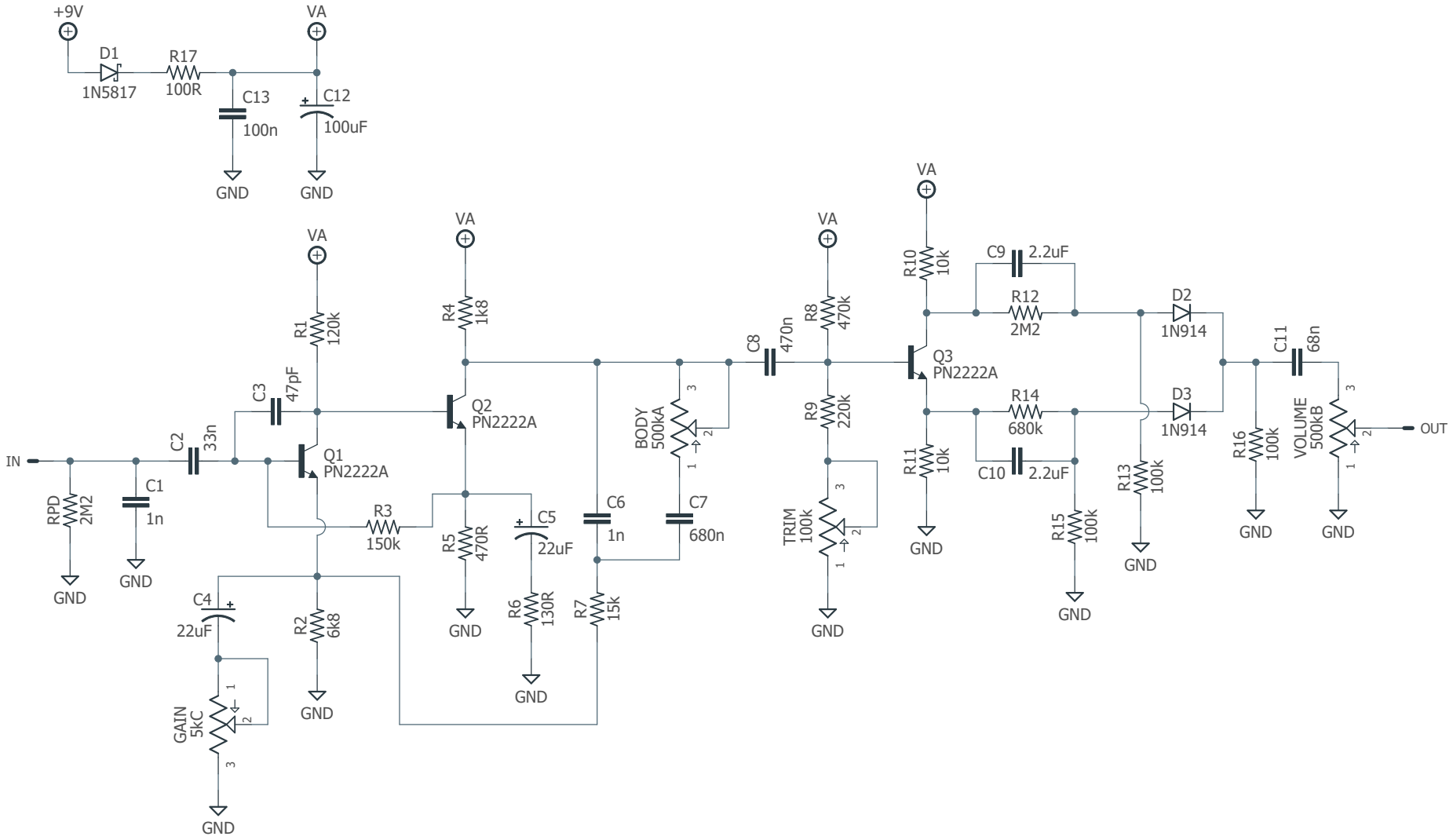
The original circuit used carbon composition resistors for R3 and R7. This type of resistor is notorious for drifting over time. We measured these two resistors in the unit we traced and found that the 15k resistor (R7) measured 17.1k, and the 150k resistor (R3) measured 159.8k. Both are 5% tolerance, but R7 is 14% above nominal and R3 is +6.5%.

We do not recommend using carbon comp resistors when building this circuit, but if you want to replicate the sound of the unit we traced, you can use a 17k metal film resistor for R7 and a 160k metal film resistor for R3, which are the nearest precision values.

## Electrolytic vs. film capacitors

The original Octapussy uses 2.2uF electrolytic capacitors for C9 and C10. We try to avoid electrolytics in the signal path where possible, so the PCB layout uses non-polar film caps. However, if you do want to use electrolytics as in the original, the polarity has been marked on the PCB. Otherwise, these polarity marks can be ignored.

# SCHEMATIC


+9V
D1
1N5817
R17
100R
C13
100n
C12
100uF
VA
GND
IN
C1
1n
RPD
2M2
C2
33n
C3
47pF
R1
120k
Q1
PN2222A
R2
6k8
GAIN
5kC
C4
22uF
R3
150k
R4
1k8
Q2
PN2222A
R5
470R
C5
22uF
R6
130R
R7
15k
C6
1n
BODY
500kA
C7
680n
C8
470n
R8
470k
R9
220k
TRIM
100k
R10
10k
Q3
PN2222A
R11
10k
C9
2.2uF
R12
2M2
R14
680k
C10
2.2uF
D2
1N914
D3
1N914
R13
100k
R15
100k
R16
100k
C11
68n
VOLUME
500kB
OUT

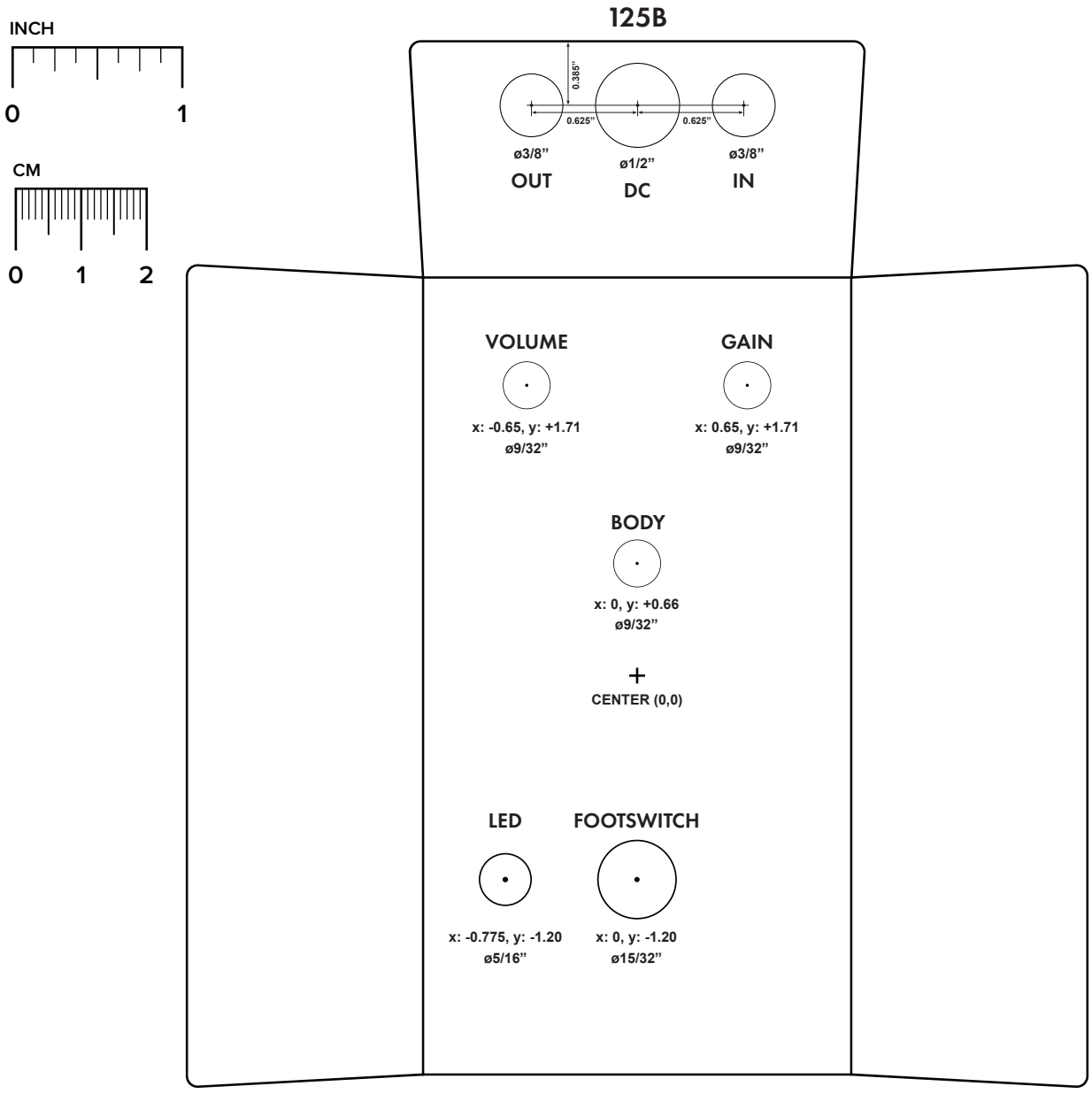
# DRILL TEMPLATE

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.

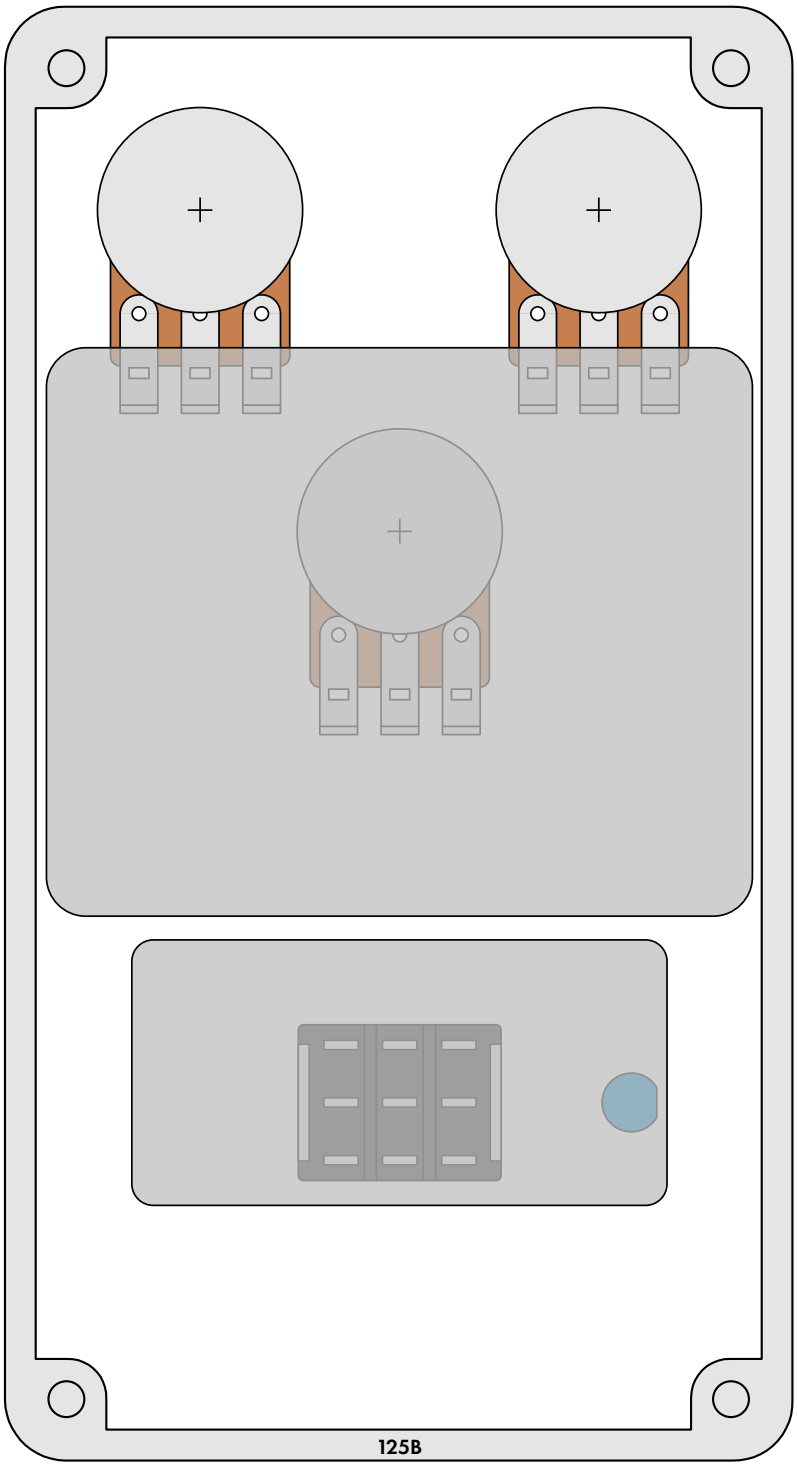
**Top jack layout** assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

**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.

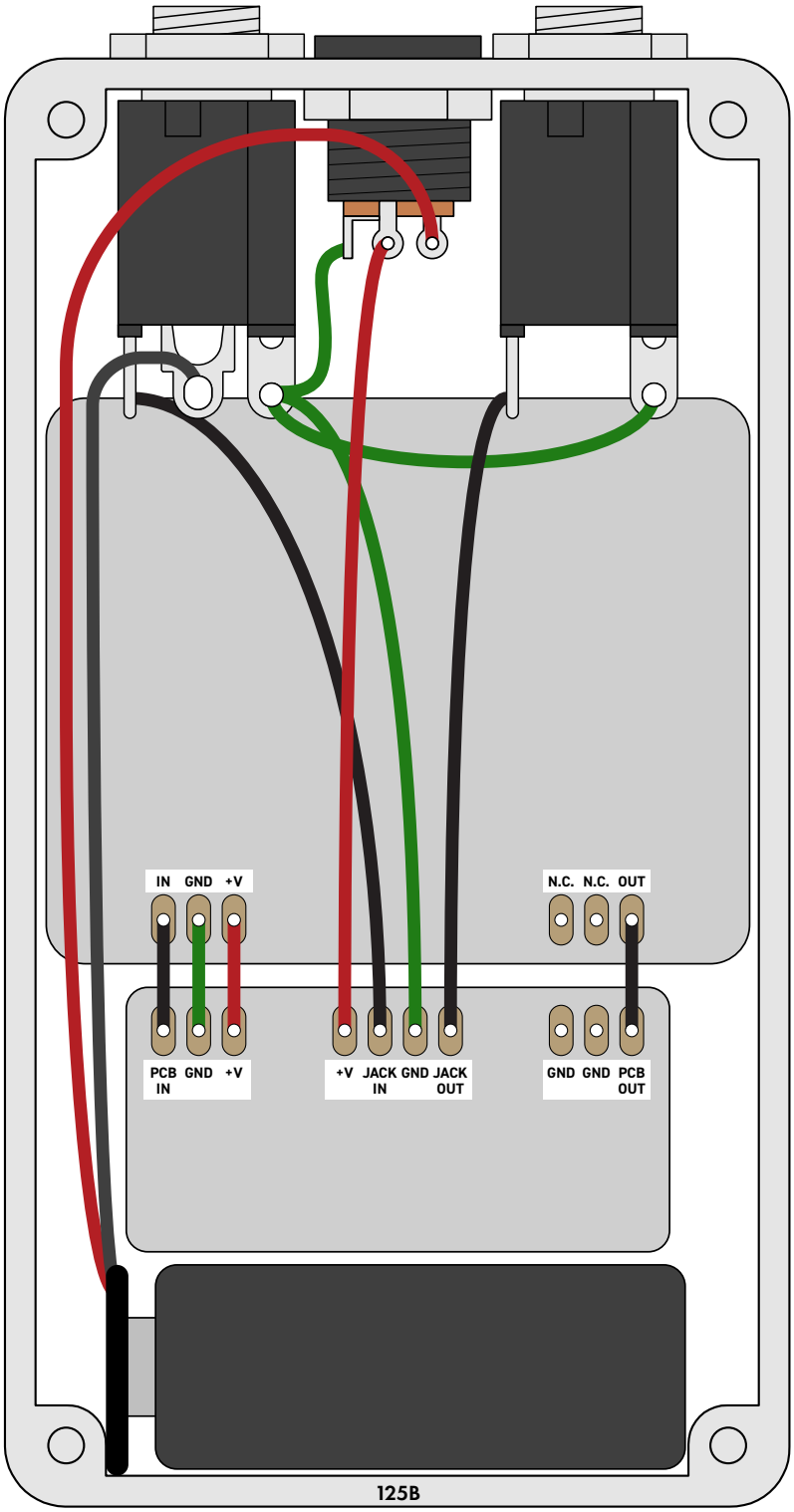


# ENCLOSURE LAYOUT

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 (2023-11-24)**
Initial release.