

PROJECT NAME

# NEBULA



BASED ON

Maxon® DS-830 Distortion Master

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

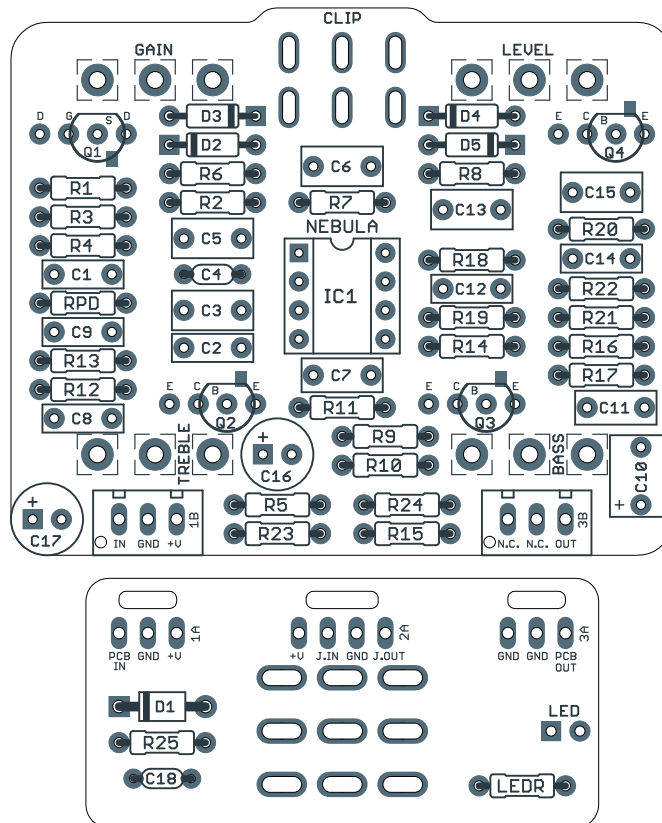
Distortion

DOCUMENT VERSION

1.0.0 (2022-04-08)

PROJECT SUMMARY

A vintage-inspired distortion that uses both hard and soft clipping along with an active boost or cut for both bass and treble frequencies.



Actual size is 2.3" x 1.90" (main board) and 1.78" x 0.87" (bypass board).

# TABLE OF CONTENTS

---

1	Project Overview	7	Drill Template
2	Introduction & Usage	8	Enclosure Layout
3-4	Parts List	9	Wiring Diagram
5	Build Notes	10	Licensing
6	Schematic	10	Document Revisions

## INTRODUCTION

---

The Nebula Vintage Distortion is based on the Maxon DS-830 Distortion Master, first released in 2001 as part of Maxon's Vintage Series. While the circuit was a brand new design, its aesthetics were inspired by the "big box" Maxon and Ibanez effects of the late 1970s such as the OD-880 and Phase Tone II.

The DS-830 circuit features both hard and soft clipping, with op-amp feedback diodes followed by diodes to ground, similar to the Nobels ODR-1. The EQ is made of two active gyrators, a bass control at 126 Hz and a treble control at 2.5kHz. Each of these frequencies can be boosted or cut as needed.

The updated version of the Nebula includes one new feature: a 3-way toggle switch that allows you to select soft clipping only, hard clipping only, or the stock mode with both sets of diodes engaged. (Other modes are also available. See build notes for potential modifications.)

This lends a bit of extra control over the clipping character not found in the original pedal. Other than this addition, it's a direct adaptation of the DS-830.

## USAGE

---

The Nebula has four controls and one switch:

- **Gain** controls the amount of gain from the op amp that is fed through the clipping diodes.
- **Bass** boosts or cuts frequencies centered around 126 Hz.
- **Treble** boosts or cuts frequencies centered around 2.5kHz.
- **Level** is the output level of the effect.
- **Clipping** (toggle) is a 3-way switch that selects between soft clipping only, hard clipping only, or both (stock DS-830 configuration).

## 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	10k	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	10k	Metal film resistor, 1/4W	
R5	100k	Metal film resistor, 1/4W	
R6	2k	Metal film resistor, 1/4W	
R7	390R	Metal film resistor, 1/4W	
R8	1k	Metal film resistor, 1/4W	
R9	10k	Metal film resistor, 1/4W	
R10	100k	Metal film resistor, 1/4W	
R11	22k	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	560R	Metal film resistor, 1/4W	
R14	3k9	Metal film resistor, 1/4W	
R15	10k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	220R	Metal film resistor, 1/4W	
R18	3k	Metal film resistor, 1/4W	
R19	510k	Metal film resistor, 1/4W	
R20	10k	Metal film resistor, 1/4W	
R21	100k	Metal film resistor, 1/4W	
R22	470R	Metal film resistor, 1/4W	
R23	10k	Metal film resistor, 1/4W	
R24	10k	Metal film resistor, 1/4W	
R25	100R	Metal film resistor, 1/4W	
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	100n	Film capacitor, 7.2 x 2.5mm	
C2	3n9	Film capacitor, 7.2 x 2.5mm	
C3	1uF	Film capacitor, 7.2 x 3.5mm	
C4	10pF	MLCC capacitor, NP0/C0G	
C5	1uF	Film capacitor, 7.2 x 3.5mm	

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C6	1uF	Film capacitor, 7.2 x 3.5mm	
C7	470n	Film capacitor, 7.2 x 3mm	
C8	100n	Film capacitor, 7.2 x 2.5mm	
C9	3n3	Film capacitor, 7.2 x 2.5mm	
C10	3.3uF	Film capacitor, 7.2 x 5.5mm	
C11	220n	Film capacitor, 7.2 x 2.5mm	
C12	47n	Film capacitor, 7.2 x 2.5mm	
C13	1uF	Film capacitor, 7.2 x 3.5mm	
C14	100n	Film capacitor, 7.2 x 2.5mm	
C15	1uF	Film capacitor, 7.2 x 3.5mm	
C16	220uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C17	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C18	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2-D5	1N914	Fast-switching diode, DO-35	
Q1	2N5457	JFET, N-channel, TO-92	Substitute. Original uses 2SK256-Y.
Q2-Q4	2N5088	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC1815-BL.
IC1	JRC4558D	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
GAIN	250kA	16mm right-angle PCB mount pot	
BASS	5kC	16mm right-angle PCB mount pot	
TREBLE	100kW	16mm right-angle PCB mount pot	Can substitute 20kW if you can't find 100kW.
LEVEL	100kA	16mm right-angle PCB mount pot	
CLIP	DPDT on-on-on	Toggle switch, DPDT on-on-on	See build notes for possible modifications.
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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

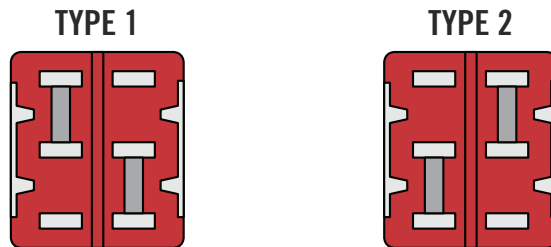
## BUILD NOTES

---

### Clipping switch

Like the [Nobels ODR-1](#), the DS-830 utilizes both soft clipping and hard clipping. The updated version of the Nebula adds a DPDT switch to allow you to select only one or the other, in addition to the stock setting where both are enabled.

The clipping switch is a DPDT on-on-on toggle. For this type of switch, depending on the manufacturer, there are two different types of configurations for the center position, which are as follows:



The Nebula requires the **Type 2** configuration, which is used by most major manufacturers such as Taiway. If you're considering a different brand, make sure to check the configuration of the center position. Many of the on-on-on switches sold by Tayda or Love My Switches are Type 1 and will not work.

You can also use a different type of switch if you can't find the right one or if you want different clipping options available:

- A DPDT on-on switch will allow for either soft or hard clipping, but not both together.
- A DPDT on-off-on switch (also called center-off) will allow for soft, hard or no clipping.

The hard-clipping-only mode is very similar to the soft/hard mode, so it may be the case that the soft/hard mode is not needed and a no-clipping option is more useful instead.

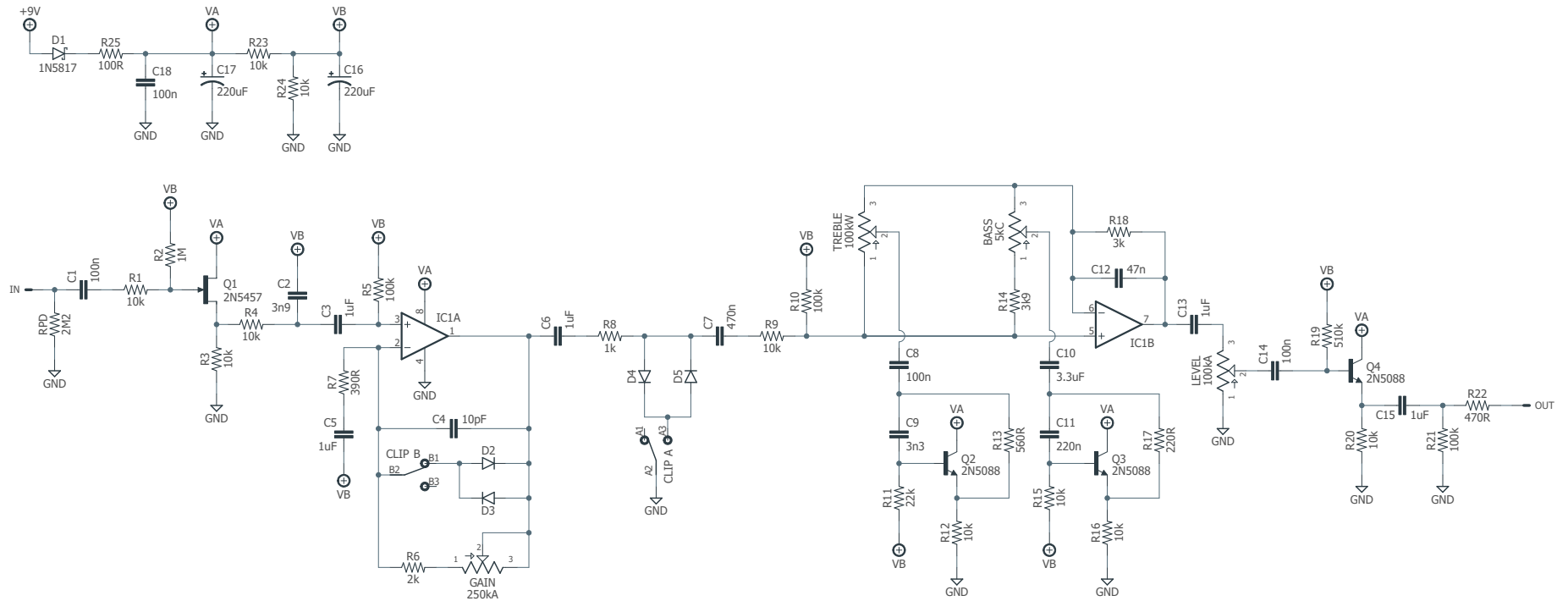
In either case, no other substitutions are needed—just use the type of switch that corresponds to the functionality you want.

### Treble potentiometer value

The Treble pot is 100kW in the original DS-830. This is a very uncommon value, currently only available from [Tayda Electronics](#) in a different configuration. The legs will need to be cut down to size and bent differently in order to fit.

You can also use 20kW if you want. The range will be slightly reduced on the upper and lower end—but since it's a type of logarithmic taper, it's more like a 10% difference than a 500% difference.

# SCHEMATIC



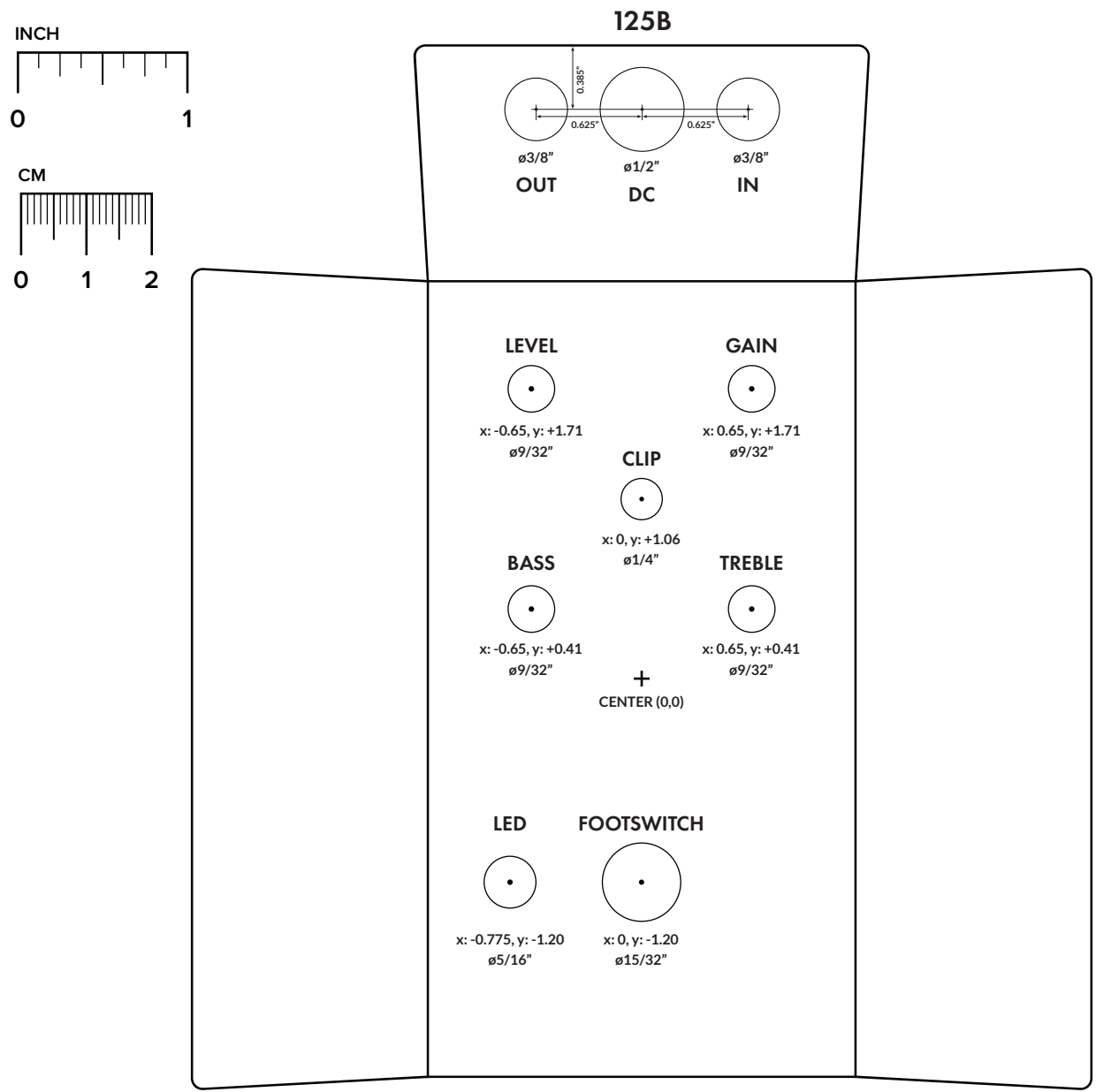
# DRILL TEMPLATE

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.

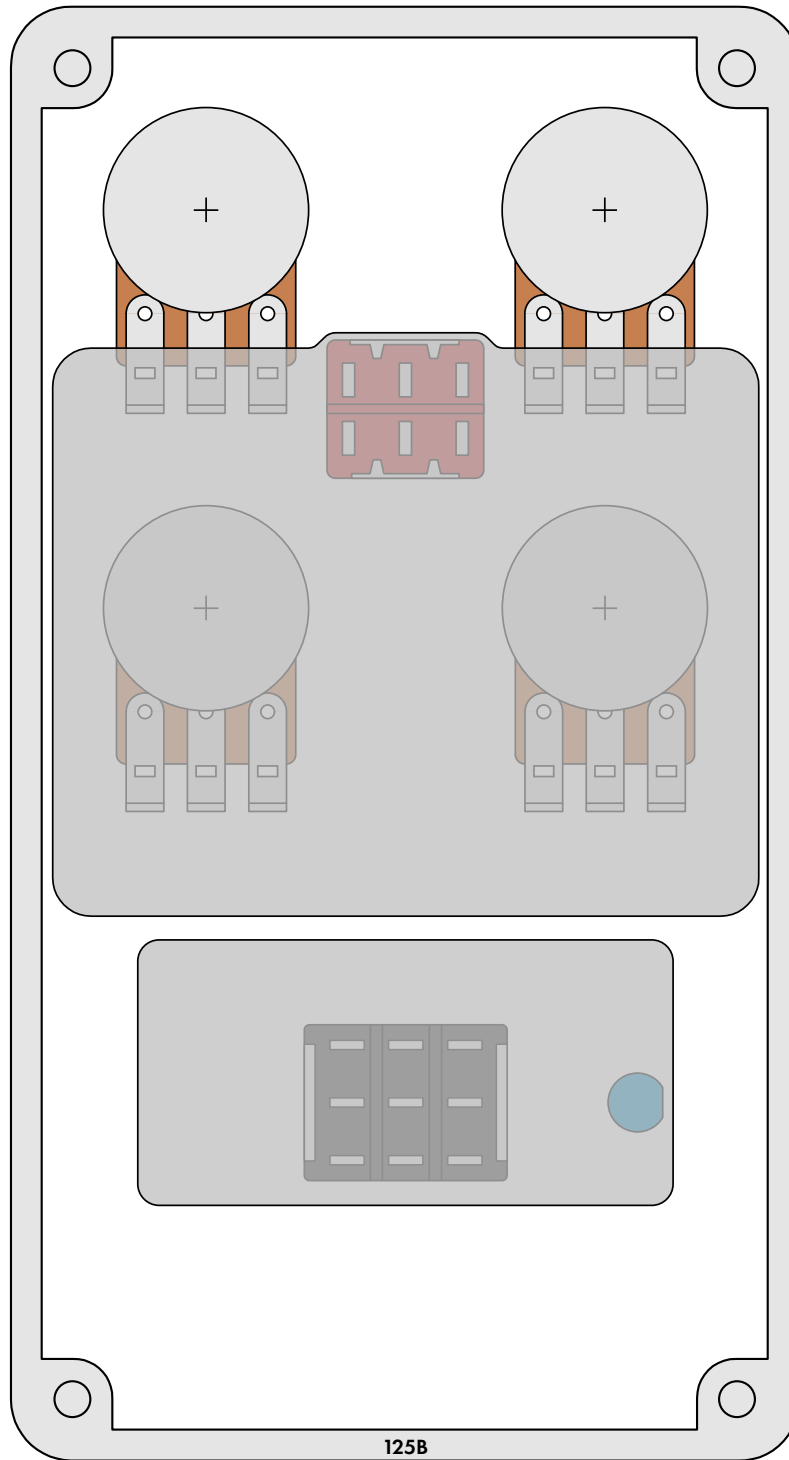
**LED hole drill size** assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



# ENCLOSURE LAYOUT

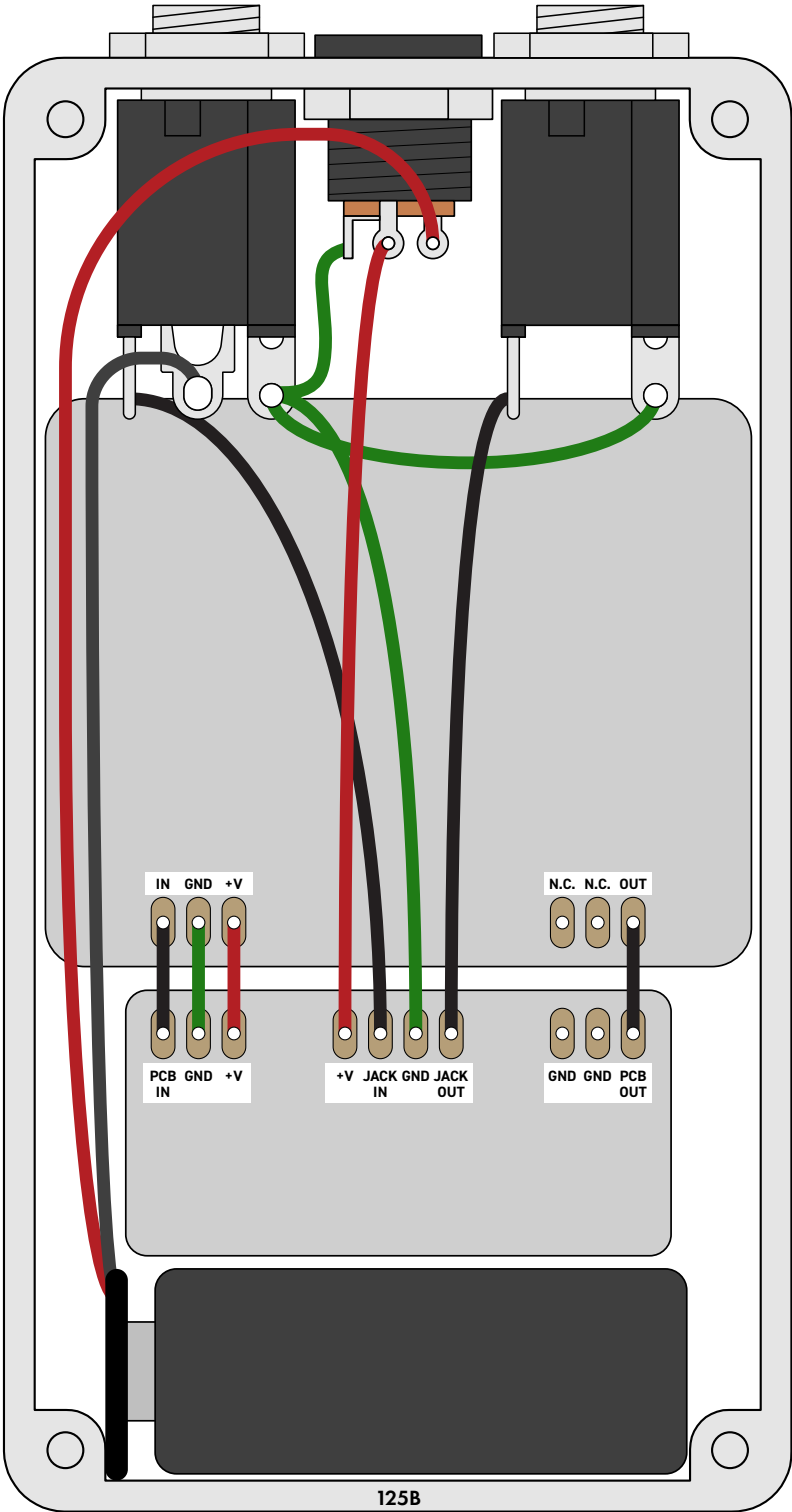
---

Enclosure is shown without jacks. See next page for jack layout and wiring.





# WIRING DIAGRAM



## 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 (2022-04-08)**

Initial release.