PROJECT NAME

PLASMA

aion DIY GUITAR EFFECTS

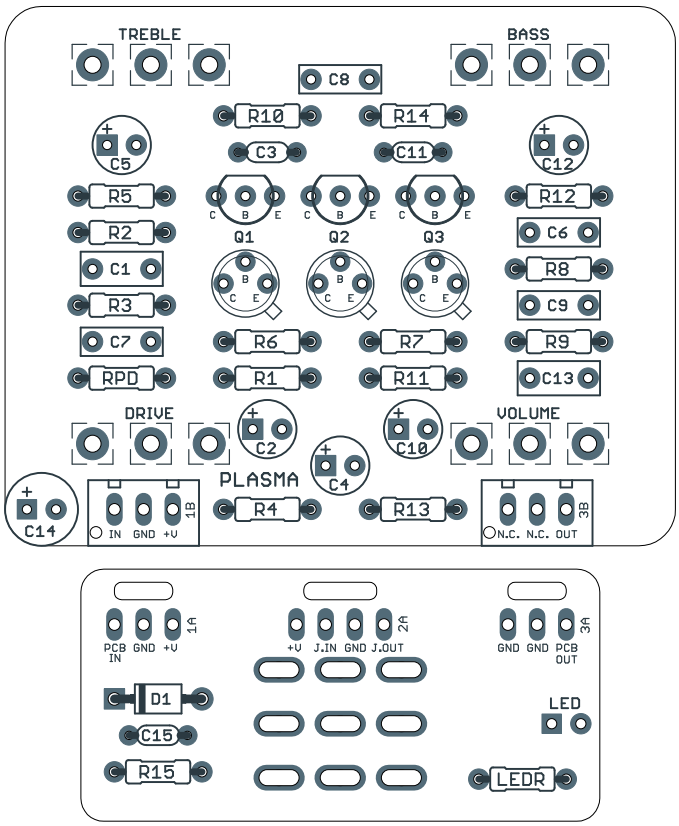
BASED ON
Colorsound Overdriver

BUILD DIFFICULTY
Easy

EFFECT TYPE
Boost / drive

DOCUMENT VERSION
1.0.1 (2020-07-20)

PROJECT SUMMARY
A reproduction of a boost pedal from the early 1970s that featured a two-band tone stack.



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

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INTRODUCTION

The Plasma Vintage Drive is a clone of the Colorsound Overdriver, a transistor-based boost/drive pedal with 2-band tonestack that was first sold in 1972.

The Overdriver was an updated version of the Power Booster from 1970. The Power Booster ran at 18V using two batteries in series. The Overdriver dropped the requirement of the second battery and ran on a normal 9V supply. There were a few other very minor tweaks to component values, but it's the same basic circuit.

The Plasma project is a direct clone of the Overdriver, but with one modification: it adds an output volume control. This way you can set the gain according to the tone you want without being tied to the volume that is produced along with it.

Note that the Overdriver can be "splatty" at medium gain levels as the notes decay. It works best at low gain as a clean boost with tone-shaping capabilities, or at high gain where it's not unlike a Big Muff. If you hear this splattiness, know that it's a byproduct of transistor-based distortion and it's working correctly!

The 125B version of the Plasma is different from the first version in that it drops the Power Booster compatibility. The Power Booster is instead available as another circuit, the Nucleus, which has an on-board charge pump for 18V operation. In addition, in this updated version, the transistor bias trimmers have been removed. It's not necessary to bias the transistors in the Overdriver circuit for correct operation.

USAGE

The Plasma has two controls and one toggle:

- **Gain** controls the amount of gain from the first transistor stage.
- **Treble** controls the high-end response of the circuit and forms half of the Baxandall tone stack.
- **Bass** controls the low-end response of the circuit and forms the other half of the Baxandall tone stack.
- **Volume** is the output volume 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	120k	Metal film resistor, 1/4W	100k in some units.
R2	150k	Metal film resistor, 1/4W	
R3	6k8	Metal film resistor, 1/4W	
R4	1k8	Metal film resistor, 1/4W	
R5	470R	Metal film resistor, 1/4W	
R6	12k	Metal film resistor, 1/4W	
R7	4k7	Metal film resistor, 1/4W	
R8	4k7	Metal film resistor, 1/4W	
R9	39k	Metal film resistor, 1/4W	
R10	5k6	Metal film resistor, 1/4W	
R11	150k	Metal film resistor, 1/4W	
R12	33k	Metal film resistor, 1/4W	
R13	1k8	Metal film resistor, 1/4W	
R14	470R	Metal film resistor, 1/4W	
R15	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	220n	Film capacitor, 7.2 x 2.5mm	
C2	22uF	Electrolytic capacitor, 5mm	10uF in some units.
C3	220pF	MLCC capacitor, NP0/C0G	470pF in some units.
C4	10uF	Electrolytic capacitor, 5mm	
C5	22uF	Electrolytic capacitor, 5mm	
C6	100n	Film capacitor, 7.2 x 2.5mm	
C7	10n	Film capacitor, 7.2 x 2.5mm	
C8	10n	Film capacitor, 7.2 x 2.5mm	
C9	100n	Film capacitor, 7.2 x 2.5mm	
C10	10uF	Electrolytic capacitor, 5mm	
C11	100pF	MLCC capacitor, NP0/C0G	
C12	22uF	Electrolytic capacitor, 5mm	
C13	220n	Film capacitor, 7.2 x 2.5mm	

PARTS LIST, CONT.

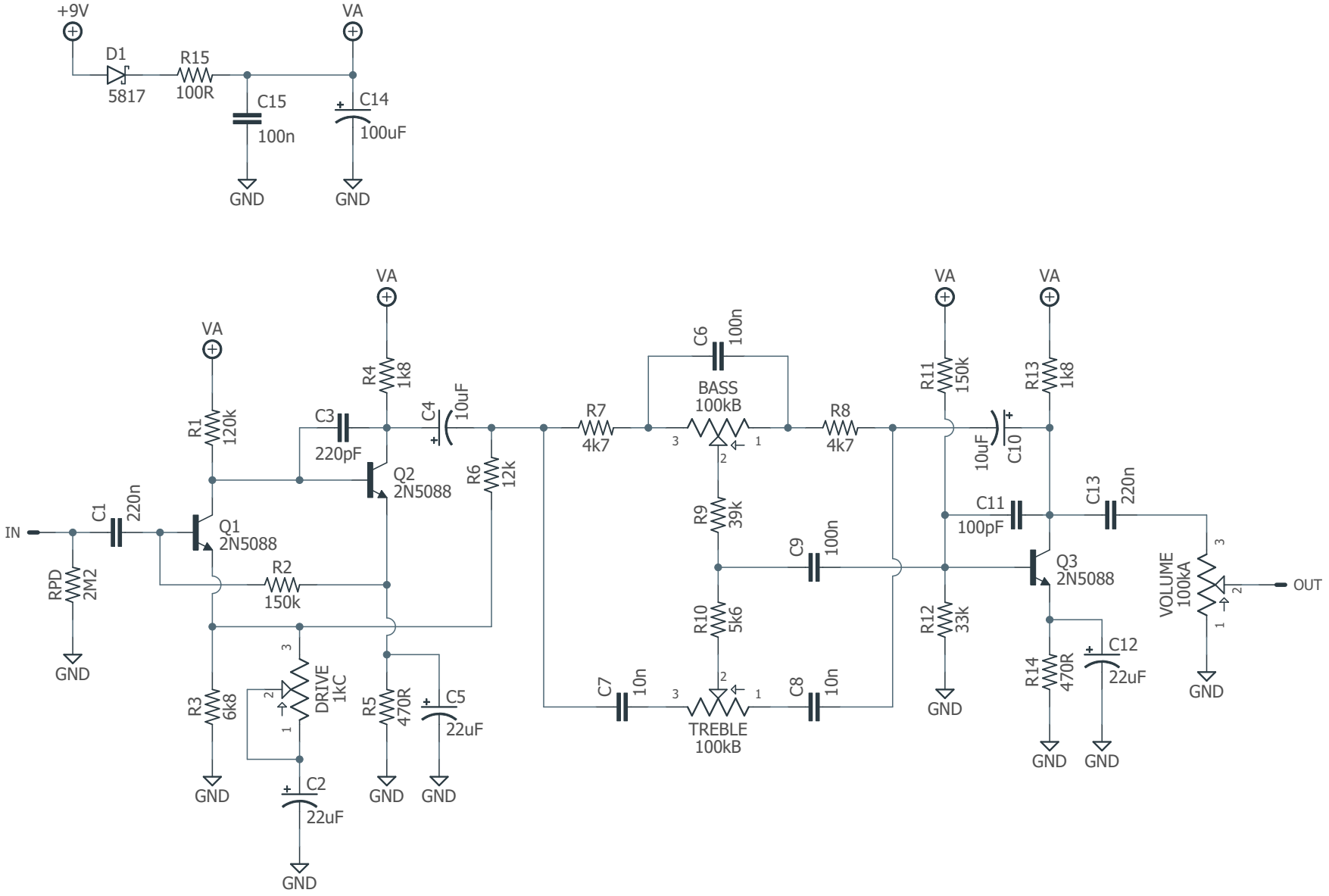
PART	VALUE	TYPE	NOTES
C14	100uF	Electrolytic capacitor, 6.3mm	
C15	100n	MLCC capacitor, X7R	
D1	1N5817	Schottky diode, DO-41	
Q1	2N5088	BJT transistor, NPN, TO-92	Original units used BC109, BC169C, BC184C or BC184L. These are all high-gain transistors (hFE 400+). 2N5088 is a suitable low-noise and commonly-available replacement. See build notes for more info.
Q2	2N5088	BJT transistor, NPN, TO-92	
Q3	2N5088	BJT transistor, NPN, TO-92	
BASS	100kB	16mm right-angle PCB mount pot	
DRIVE	1kC	16mm right-angle PCB mount pot	Original uses 10kB, but 1kC will provide a much more usable control.
TREBLE	100kB	16mm right-angle PCB mount pot	
VOL.	100kA	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.

Transistor outlines

The PCB has outlines for either TO-18 (metal can) or TO-92 transistors. The BC109C is TO-22, but the other recommended types are TO-92. All three pads are connected together for each transistor, so only use one or the other from each pair.

Be careful of the pinout. The TO-92 outline is set up for USA convention (2N5088, 2N3904, etc.) but the original transistors used European convention which is reversed. If using any of the BC-series transistors, you'll likely need to rotate them 180 degrees, but check the datasheet or measure them with a transistor tester to be sure.

SCHEMATIC


+9V
D1
5817
R15
100R
C15
100n
GND
VA
C14
100uF
GND
VA
R4
1k8
C3
220pF
C4
10uF
R1
120k
Q2
2N5088
R6
12k
IN
C1
220n
Q1
2N5088
RPD
2M2
GND
R2
150k
R3
6k8
DRIVE
1kC
GND
C2
22uF
GND
R5
470R
C5
22uF
GND
GND
R7
4k7
C6
100n
BASS
100kB
R8
4k7
R9
39k
C9
100n
R10
5k6
C7
10n
TREBLE
100kB
C8
10n
GND
VA
R11
150k
10uF
C10
R12
33k
GND
VA
R13
1k8
C11
100pF
C13
220n
Q3
2N5088
R14
470R
C12
22uF
GND
GND
VOLUME
100kA
OUT
GND

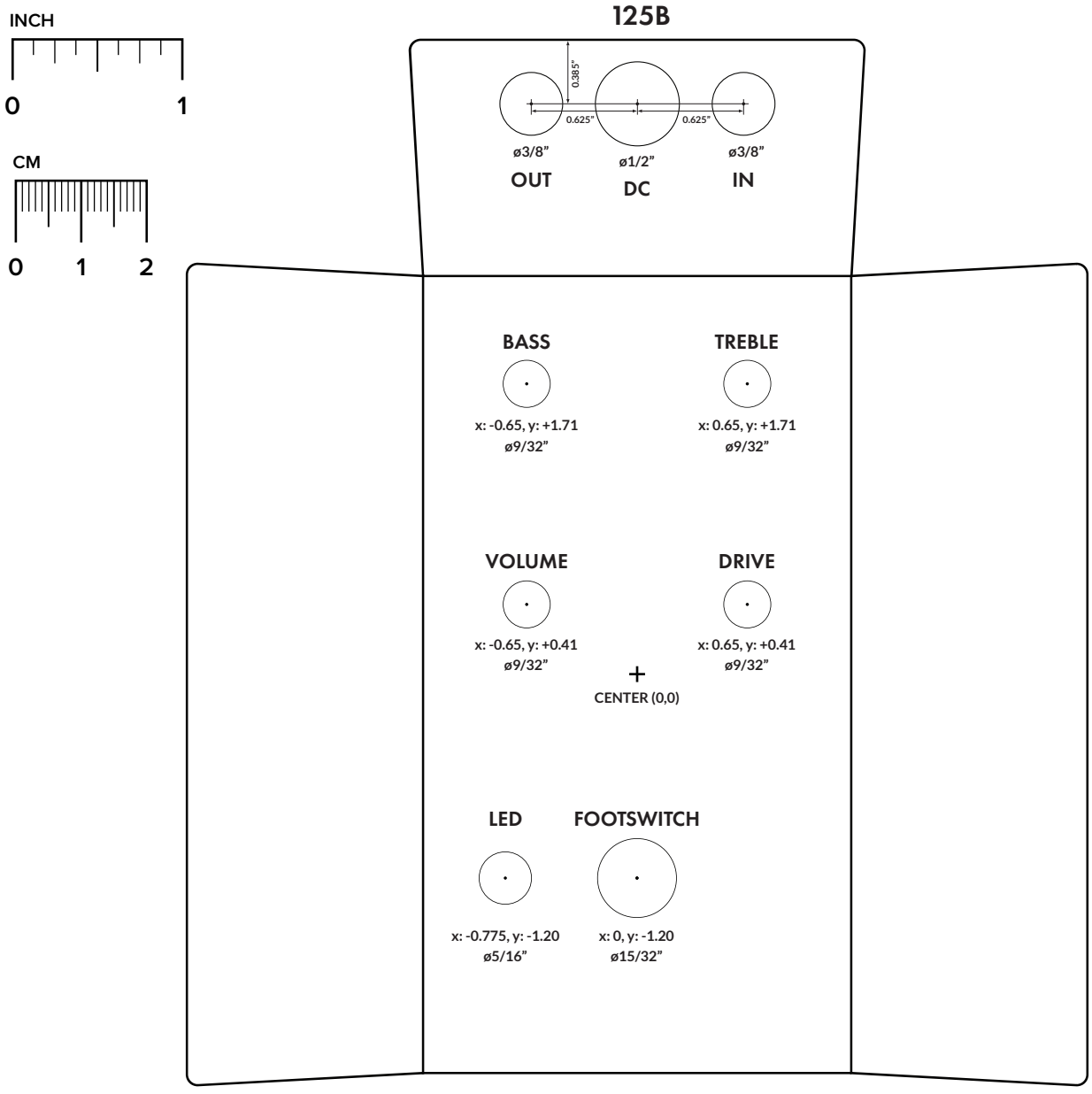
DRILL TEMPLATE

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.

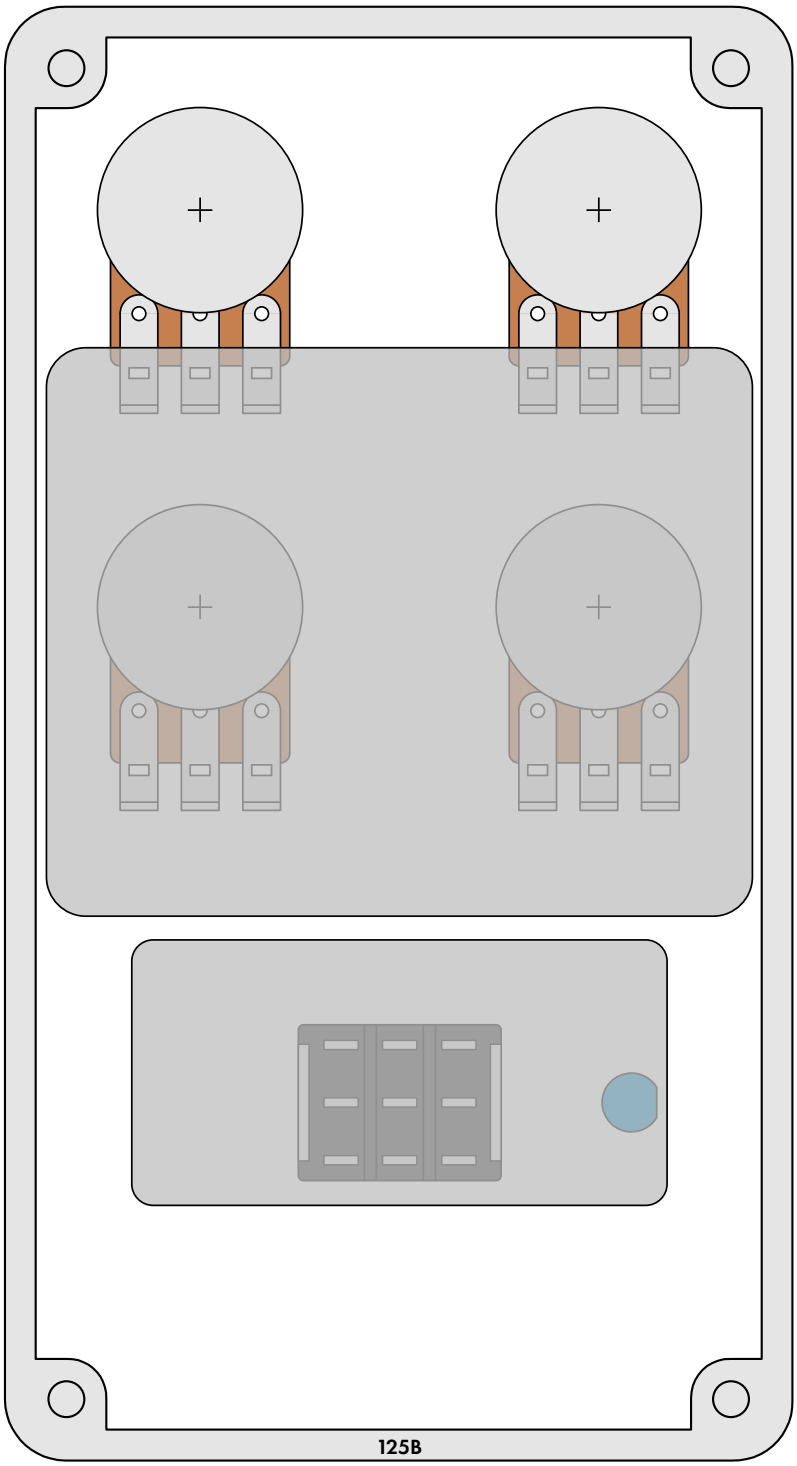
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

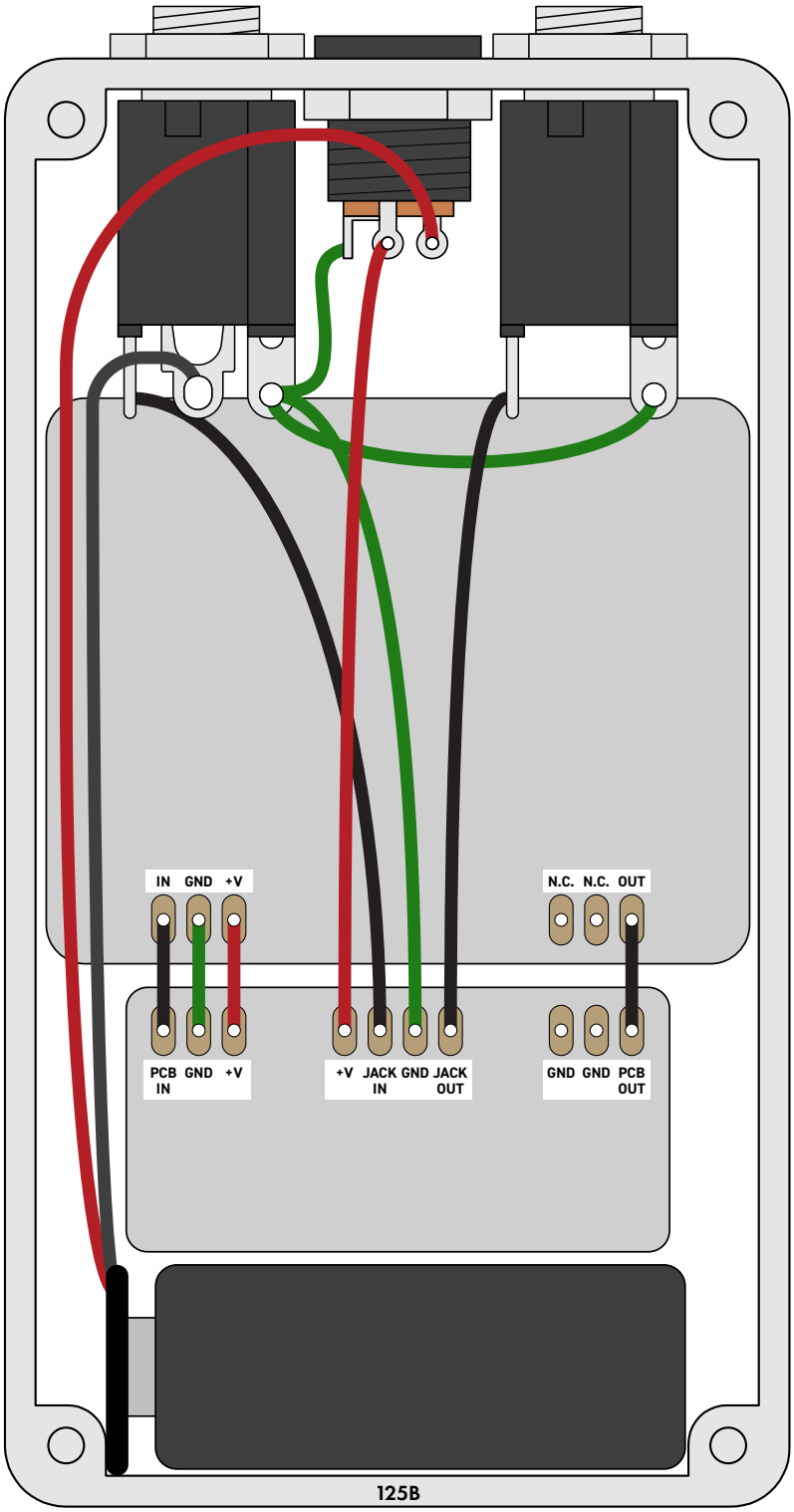


ENCLOSURE LAYOUT

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 (2020-07-20)
Updated link to parts list spreadsheet.

1.0.0 (2020-07-03)
Initial release.