

PROJECT NAME

GAIA MK. II



BASED ON

Catalinbread® Galileo

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

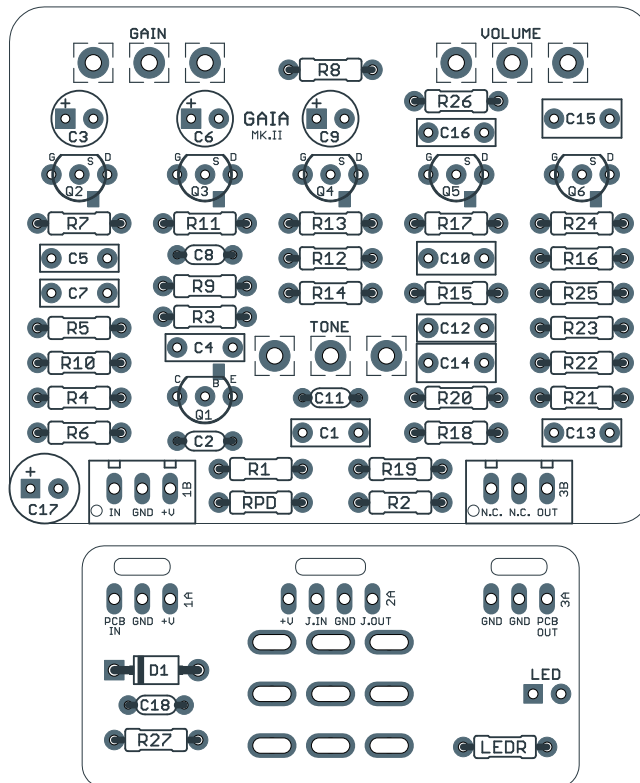
Overdrive / Amp Emulation

DOCUMENT VERSION

1.0.0 (2020-11-27)

PROJECT SUMMARY

An adaptation of the signature tone of Brian May from Queen, achieved by combining a Rangemaster-style treble booster with a Vox® AC30 amp.



Actual size is 2.3" x 1.86" (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 Gaia Preamp Drive is an adaptation of the Catalinbread Galileo, their pedal emulation of treble-boosted Vox® AC30 tone made famous by Brian May of Queen.

The Galileo is essentially a combination of two other Catalinbread pedals, the [Naga Viper](#) (a hot-rodded silicon Rangemaster treble booster) and the CB30, their take on the AC30. In fact, the first version of the Galileo was just these two circuits in the same enclosure with separate controls and footswitches for both circuits.

The second version of the Galileo was a complete redesign, taking the same basic building blocks of a treble booster + amp-style overdrive, but reducing it down to 3 knobs: treble booster gain (just called Gain), tonestack treble (just called Tone), and master volume. The amp section's gain control and bass knob are internally fixed. This 3-knob Galileo is the version that this project is adapted from.

The original 3-knob Galileo used MPF4393 JFETs, which are no longer produced. Aion FX sells the [original MPF4393](#) in sets of 5. The PCB also has an extra pad so that surface-mount JFETs can be used (part number MMBF4393), which are still in production and perform identically to those used in Catalinbread pedals. See build notes for more details.

The Gaia Mk. II is compatible with the [18V Voltage Doubler / Bypass module](#) if you want to run the circuit at 18V without an external adapter. The higher voltage provides increased volume and clarity.

USAGE

The Gaia Mk. II has the following controls:

- **Gain** controls the amount of gain in the treble-booster stage that precedes the amplifier section.
- **Tone** is equivalent to the treble control of the AC30's tone stack.
- **Volume** is the overall output level.

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	220k	Metal film resistor, 1/4W	
R2	68k	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	8k2	Metal film resistor, 1/4W	
R5	100k	Metal film resistor, 1/4W	
R6	470k	Metal film resistor, 1/4W	
R7	680k	Metal film resistor, 1/4W	
R8	1k	Metal film resistor, 1/4W	
R9	1k	Metal film resistor, 1/4W	
R10	1M	Metal film resistor, 1/4W	
R11	1M	Metal film resistor, 1/4W	
R12	56k	Metal film resistor, 1/4W	
R13	470k	Metal film resistor, 1/4W	
R14	1k	Metal film resistor, 1/4W	
R15	1k	Metal film resistor, 1/4W	
R16	1M	Metal film resistor, 1/4W	
R17	1M	Metal film resistor, 1/4W	
R18	10k	Metal film resistor, 1/4W	
R19	100k	Metal film resistor, 1/4W	
R20	62k	Metal film resistor, 1/4W	
R21	12k	Metal film resistor, 1/4W	
R22	1k	Metal film resistor, 1/4W	
R23	2M2	Metal film resistor, 1/4W	
R24	2M2	Metal film resistor, 1/4W	
R25	4k7	Metal film resistor, 1/4W	
R26	8k2	Metal film resistor, 1/4W	
R27	100R	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	4n7	Film capacitor, 7.2 x 2.5mm	
C2	47pF	MLCC capacitor, NP0/COG	

PARTS LIST, CONT.

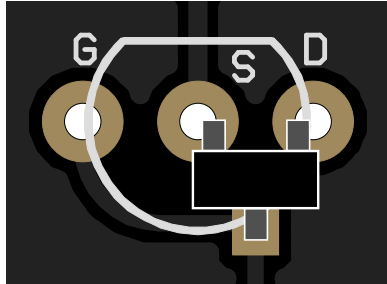
PART	VALUE	TYPE	NOTES
C3	47uF	Electrolytic capacitor, 5mm	
C4	10n	Film capacitor, 7.2 x 2.5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	2.2uF	Film capacitor, 7.2 x 5mm	Can also substitute electrolytic (polarity marked on PCB)
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	470pF	MLCC capacitor, NP0/C0G	
C9	22uF	Electrolytic capacitor, 5mm	
C10	220n	Film capacitor, 7.2 x 2.5mm	
C11	47pF	MLCC capacitor, NP0/C0G	
C12	22n	Film capacitor, 7.2 x 2.5mm	
C13	22n	Film capacitor, 7.2 x 2.5mm	
C14	1uF	Film capacitor, 7.2 x 3.5mm	
C15	1uF	Film capacitor, 7.2 x 3.5mm	
C16	1n	Film capacitor, 7.2 x 2.5mm	
C17	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C18	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	PN2222A	BJT transistor, NPN, TO-92	Can also substitute 2N3904.
Q2	MMBF4393	JFET, N-channel, SOT-23	Substitute for MPF4393 (TO-92). See build notes.
Q3	MMBF4393	JFET, N-channel, SOT-23	Substitute for MPF4393 (TO-92). See build notes.
Q4	MMBF4393	JFET, N-channel, SOT-23	Substitute for MPF4393 (TO-92). See build notes.
Q5	MMBF4393	JFET, N-channel, SOT-23	Substitute for MPF4393 (TO-92). See build notes.
Q6	MMBF4393	JFET, N-channel, SOT-23	Substitute for MPF4393 (TO-92). See build notes.
GAIN	5kC	16mm right-angle PCB mount pot	
TONE	1MA	16mm right-angle PCB mount pot	
VOL.	250kB	16mm right-angle PCB mount pot	
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

Using SMD JFETs

The MPF4393 JFET is no longer available from the original manufacturer in through-hole format. This PCB uses a hybrid through-hole/SMD outline for each JFET. An extra “G” (gate) pad is included to accommodate the MMBF4393 surface-mount version without the need for adapters.

SMD JFETs should be oriented as follows:

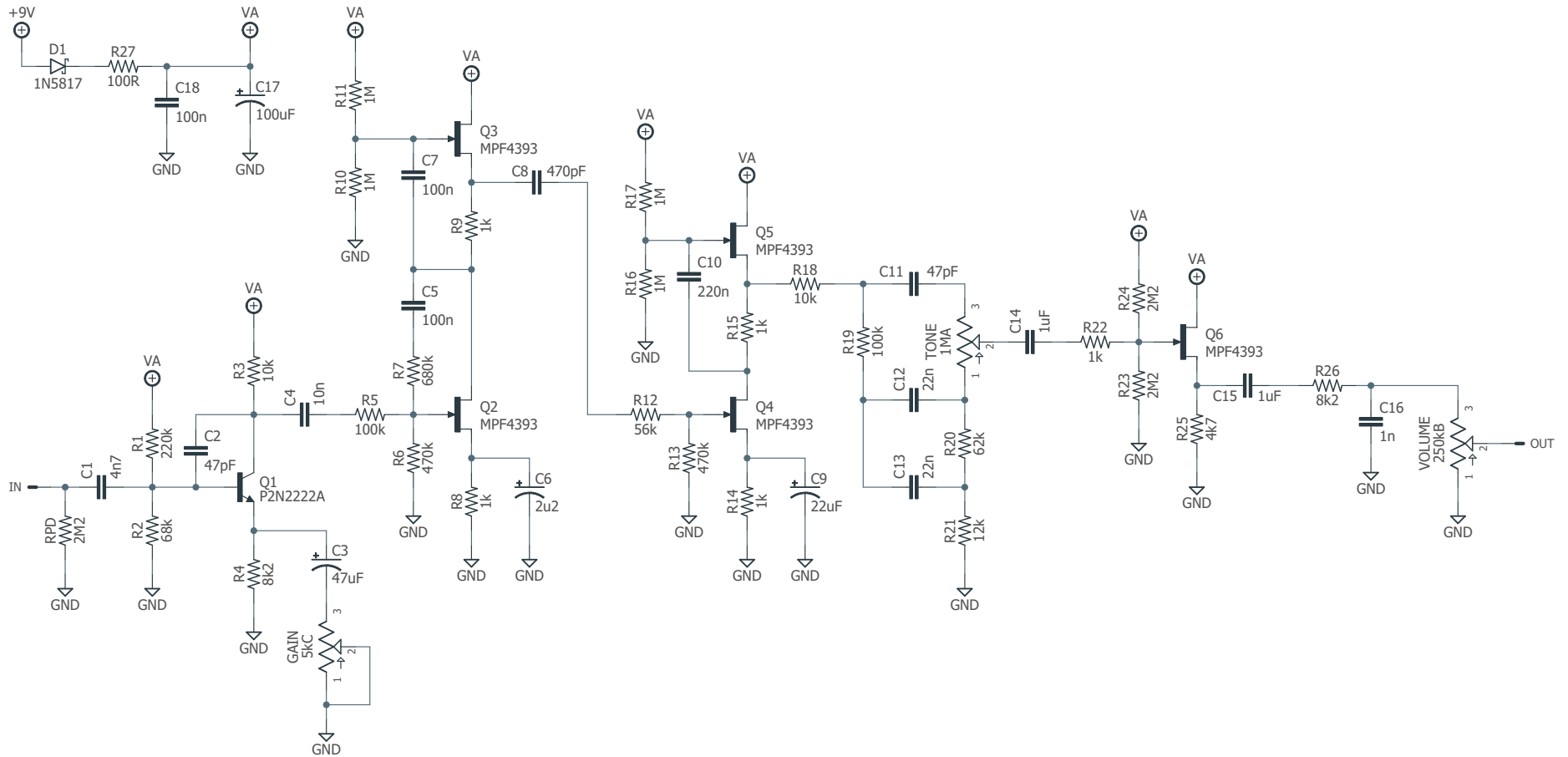


All surface-mount JFETs use the same pinout, so this configuration will fit any type that we’re aware of. However, always check the datasheet if you’re uncertain—they’re difficult to desolder if you make a mistake.

MPF4393s from Aion FX

We have a large quantity of [through-hole MPF4393](#) and should be able to provide them in hobbyist quantities for the foreseeable future. They are available in sets of 5. They are manufactured by ON Semiconductor, the same as those used in the original Catalinbread pedal. They test in the same range and will perform identically.

SCHEMATIC



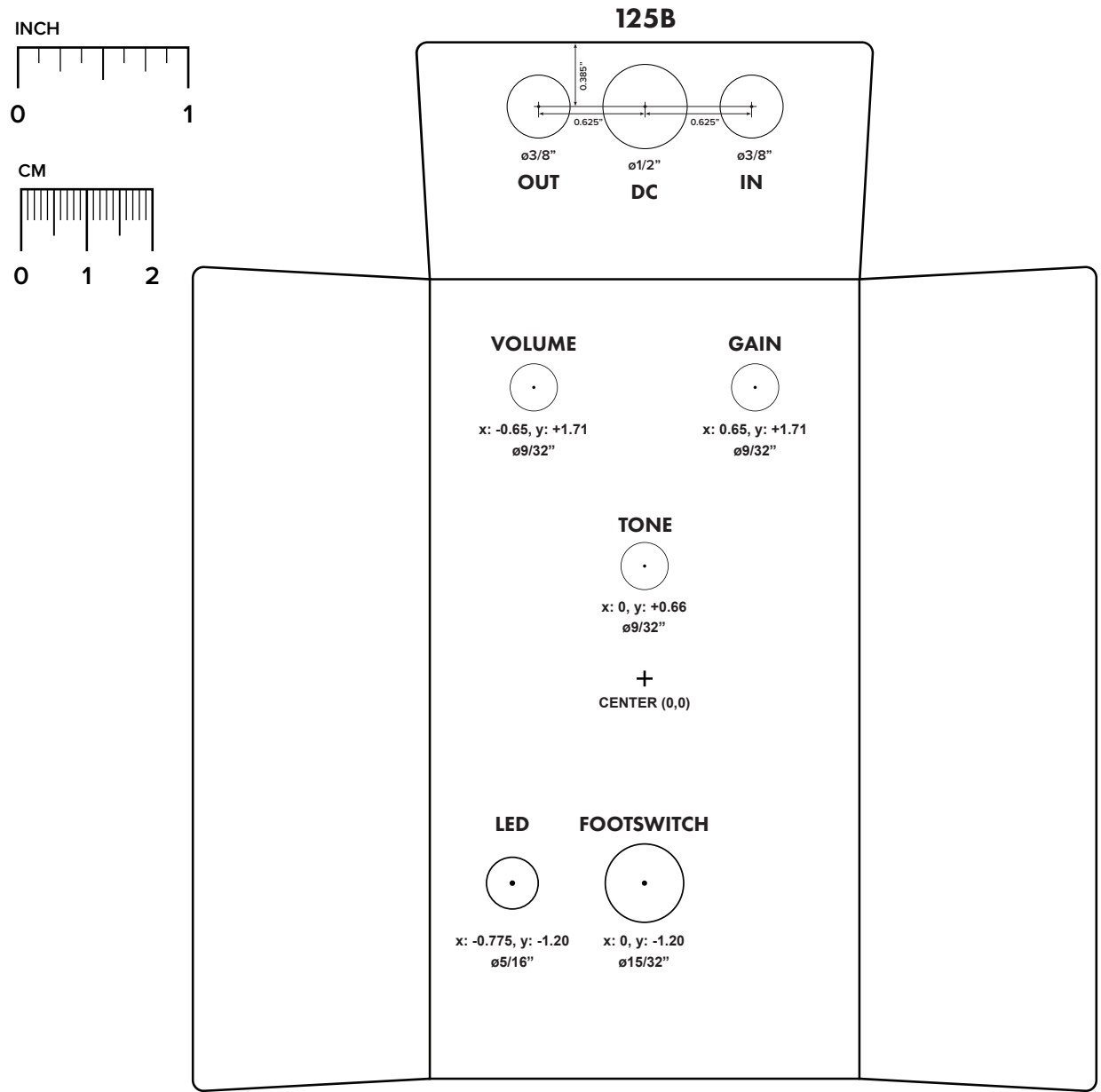
DRILL TEMPLATE

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.

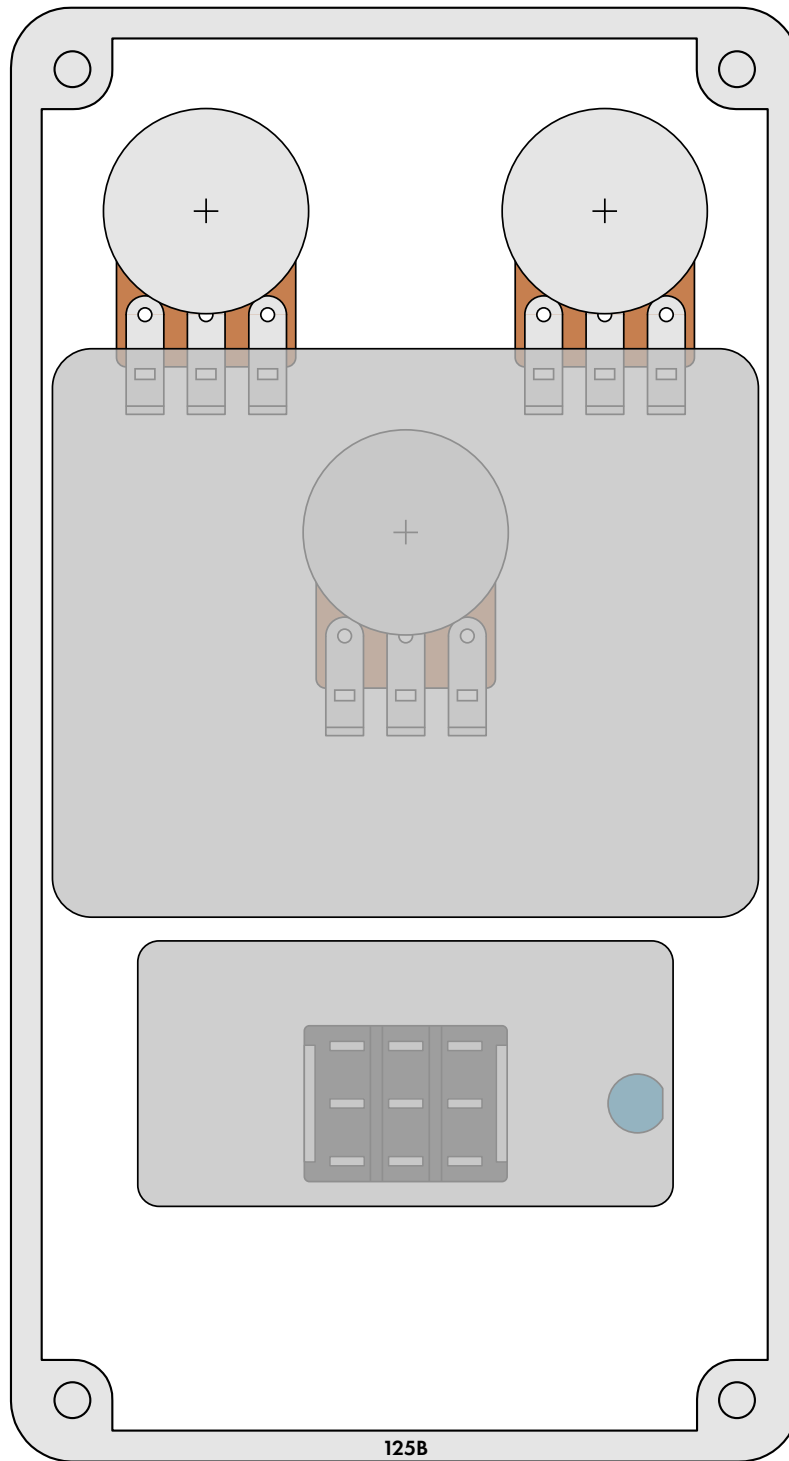
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

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.

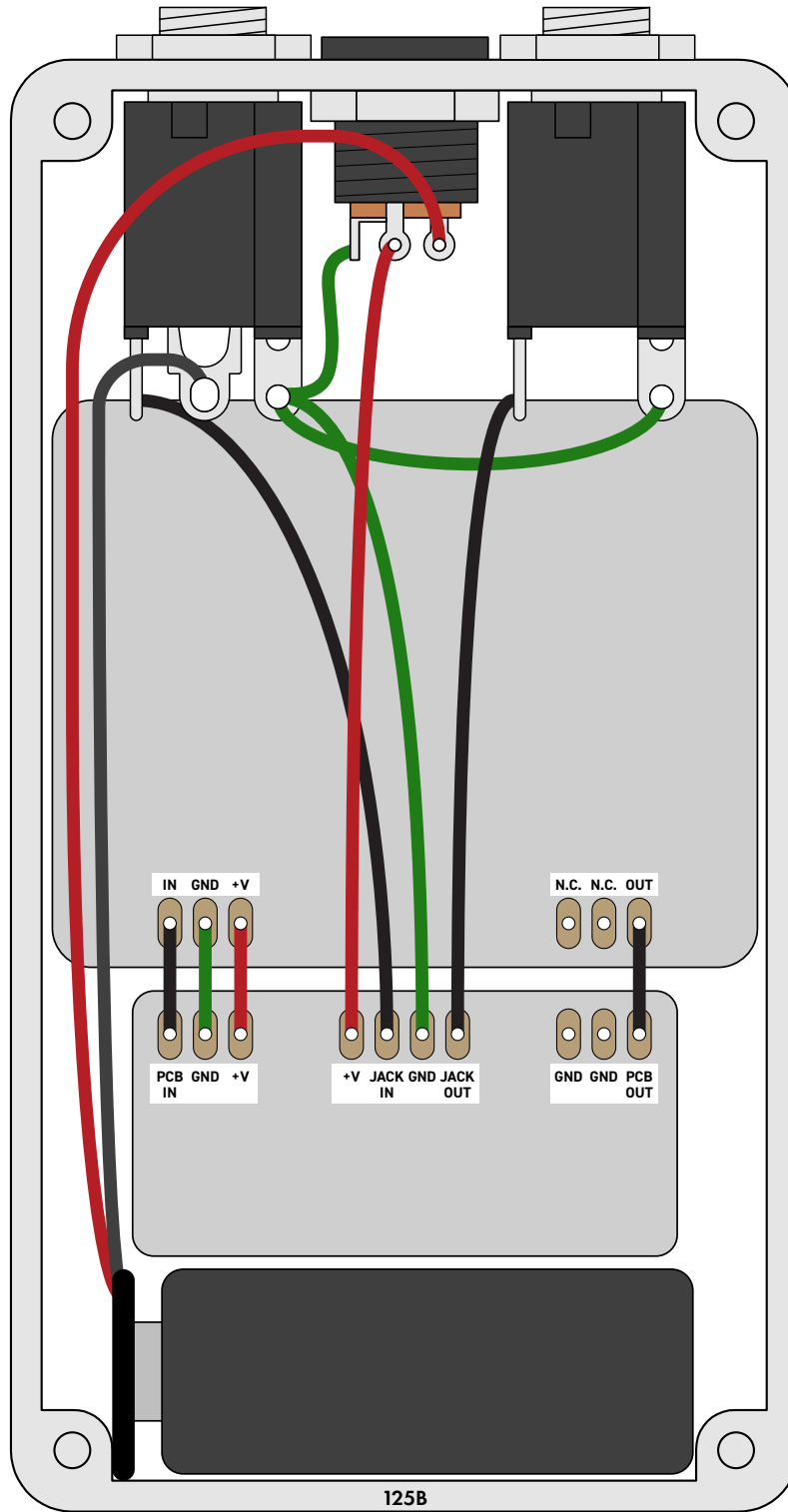


ENCLOSURE LAYOUT

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 (2020-11-27)

Initial release.