

PROJECT NAME

ARTEMIS MK. II

BASED ON

Catalinbread® SFT (V2)

EFFECT TYPE

Overdrive / Amp Emulation

BUILD DIFFICULTY

■■■□□ Intermediate

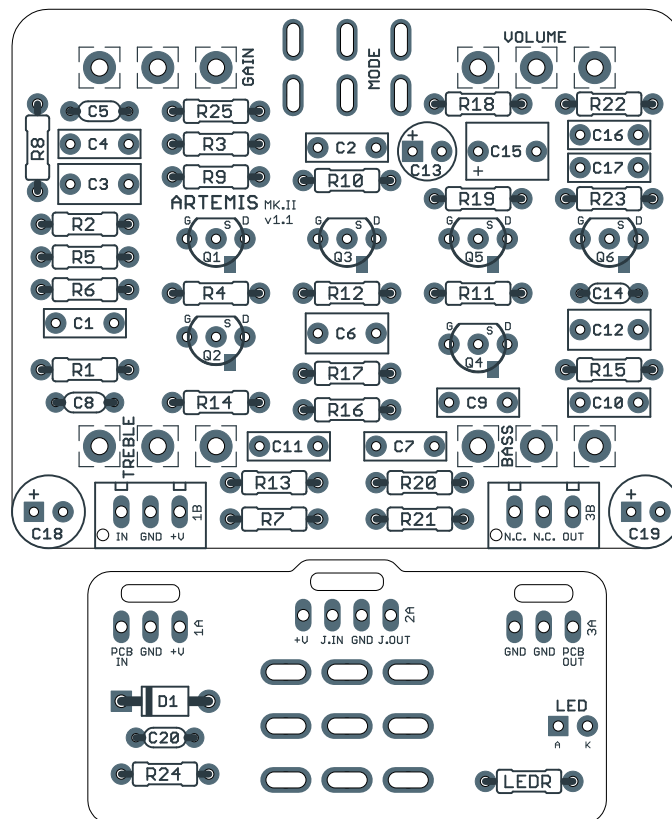
DOCUMENT VERSION

1.1.0 (2023-06-24)

aion
DIY GUITAR EFFECTS

PROJECT SUMMARY

An updated adaptation of the Ampeg® SVT, a legendary high-powered bass amplifier that first appeared in 1969. It uses cascaded mu-amp stages in place of tubes for amp-like tone in a small box.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.87" (bypass board).

IMPORTANT NOTE

This documentation is for the **Mk. II** version of the project. There is also a [Mk. I version](#), based on the SFT V1. While the name is similar, the circuit and part numbering are different. Please be sure your PCB is labeled "Artemis Mk. II" before proceeding with this build document.

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INTRODUCTION

The Artemis Preamp Drive Mk. II is an adaptation of the second version of the Catalinbread SFT, based on the legendary Ampeg SVT bass amplifiers. It was originally released in 2016. While the SVT was a bass amp, this circuit is suitable for bass or guitar.

Like several other Catalinbread pedals, this circuit blurs the line between a preamp and an overdrive. Like a true preamplifier, it's very reactive to what comes before it, so it's best placed after other drive pedals but before modulation. However, it also generates more than enough drive on its own and can be used as a standalone overdrive pedal just like any other.

The original version of the SFT was released in 2009. While both circuits are voiced with the same Ampeg SVT amplifiers as a reference, the two circuits are very different. The V2 also includes the "Stones/Stoner" switch, which re-voices the tone and increases the gain so it borders on fuzz territory.

The SFT V2 uses MPF4393 JFETs, which are no longer produced. Aion FX sells the [original MPF4393](#) in sets of 6, the quantity needed for this circuit. 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 Artemis 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 Artemis Mk. II has four controls and one toggle:

- **Gain** controls the amount of gain in the first amplifier stage.
- **Bass** and **Treble** form a two-band tone stack arranged the same as the original SVT amplifiers.
- **Volume** is the overall output level.
- **Mode** (toggle) selects between "Stones" (classic rock) and "Stoner" (Queens of the Stone Age "desert sound") modes.

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	470k	Metal film resistor, 1/4W	
R2	100k	Metal film resistor, 1/4W	
R3	470k	Metal film resistor, 1/4W	
R4	10k	Metal film resistor, 1/4W	
R5	1k	Metal film resistor, 1/4W	Early units used 10k here.
R6	1M	Metal film resistor, 1/4W	
R7	1M	Metal film resistor, 1/4W	
R8	22k	Metal film resistor, 1/4W	
R9	100k	Metal film resistor, 1/4W	
R10	4k7	Metal film resistor, 1/4W	
R11	1k	Metal film resistor, 1/4W	Early units used 10k here.
R12	1M	Metal film resistor, 1/4W	
R13	1M	Metal film resistor, 1/4W	
R14	100k	Metal film resistor, 1/4W	
R15	10k	Metal film resistor, 1/4W	Early units used 4k7 here.
R16	120k	Metal film resistor, 1/4W	
R17	10k	Metal film resistor, 1/4W	
R18	1k8	Metal film resistor, 1/4W	
R19	1k	Metal film resistor, 1/4W	
R20	1M	Metal film resistor, 1/4W	
R21	1M	Metal film resistor, 1/4W	
R22	3k9	Metal film resistor, 1/4W	
R23	2k2	Metal film resistor, 1/4W	
R24	100R	Metal film resistor, 1/4W	
R25	1M	Metal film resistor, 1/4W	Added in v1.1 to prevent biasing issues for Q1.
LED R	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	4n7	Film capacitor, 7.2 x 2.5mm	
C3	1uF	Film capacitor, 7.2 x 3.5mm	
C4	68n	Film capacitor, 7.2 x 2.5mm	
C5	150pF	MLCC capacitor, NP0/C0G	
C6	1uF	Film capacitor, 7.2 x 3.5mm	

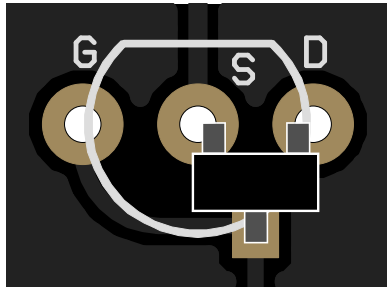
PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	680pF	MLCC capacitor, NP0/C0G	
C9	1n	Film capacitor, 7.2 x 2.5mm	
C10	4n7	Film capacitor, 7.2 x 2.5mm	
C11	4n7	Film capacitor, 7.2 x 2.5mm	
C12	1uF	Film capacitor, 7.2 x 3.5mm	
C13	22uF	Electrolytic capacitor, 5mm	
C14	47pF	MLCC capacitor, NP0/C0G	
C15	2.2uF	Film capacitor, 7.2 x 5mm	
C16	4n7	Film capacitor, 7.2 x 2.5mm	
C17	4n7	Film capacitor, 7.2 x 2.5mm	
C18	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C19	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C20	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	MPF4393	JFET, N-channel, SOT-23	
Q2	MPF4393	JFET, N-channel, SOT-23	
Q3	MPF4393	JFET, N-channel, SOT-23	
Q4	MPF4393	JFET, N-channel, SOT-23	
Q5	MPF4393	JFET, N-channel, SOT-23	
Q6	MPF4393	JFET, N-channel, SOT-23	
GAIN	1MA	16mm right-angle PCB mount pot	
TREBLE	1MA	16mm right-angle PCB mount pot	
BASS	1MA	16mm right-angle PCB mount pot	
VOL.	250kA	16mm right-angle PCB mount pot	
MODE	DPDT	Toggle switch, DPDT on-on	
LED	5mm	LED, 5mm, red diffused	
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 111BX 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 since they are difficult to desolder.

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 6. 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.

Power supply filtering

The SFT V2 was traced on Freestompboxes.org several years ago, but many people who have built it said theirs has a low-frequency feedback issue when in Stoner mode unless gain and bass are turned way down. We experienced this same issue in the original prototype of the Artemis Mk. II, so we put the project on hold and traced an original unit to see if the FSB trace may have been in error.

After tracing it, we concluded that the [final version of the FSB trace](#) does appear to be correct. There are three resistor values that are slightly different, but these are likely production changes since the pedal from FSB trace was a very early unit. However, we noticed the original unit uses 470uF as a filter capacitor. This value was in the FSB schematic, but our prototype used 100uF as a matter of habit.

By changing this to 220uF, and adding a second 220uF capacitor in parallel since 470uF capacitors are prohibitively large in the necessary voltage rating, the bass oscillation issue went away. Therefore, it’s critical that both 220uF capacitors are used in this build. We would suspect that people who experienced this issue in their DIY builds were also using a lower-value filter capacitor.

If you experience this oscillation in Stoner mode, try using a different power source, because the issue is directly related to the quality of the supply. However, since we haven’t seen any reports of this oscillation in production SFT V2 units, it’s likely that 440-470uF is enough for almost any situation.

BUILD NOTES

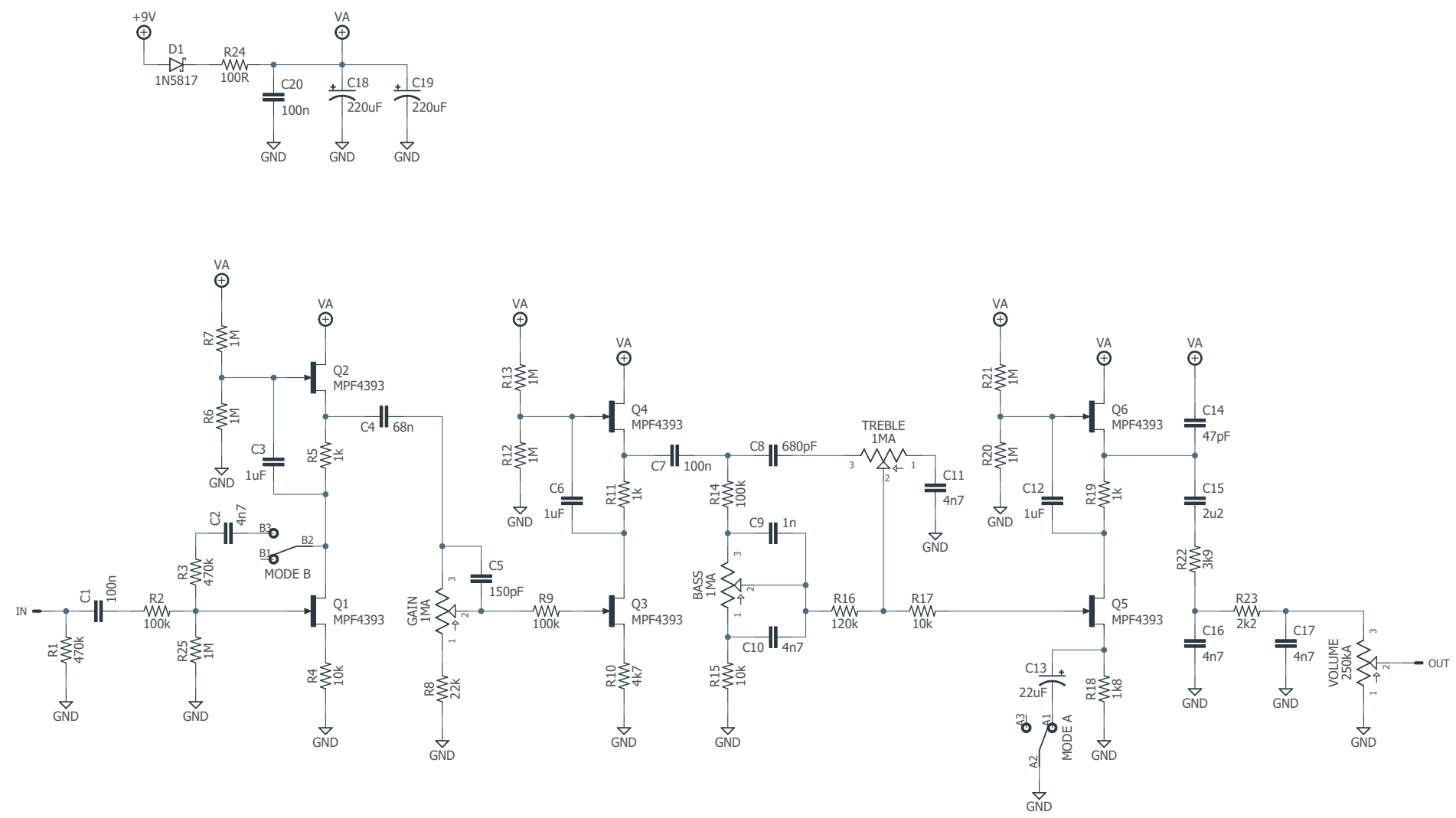
R25 (Q1 gate resistor)

The original SFT V2 is missing a resistor from Q1's gate to ground, which is normally required to bias the JFET correctly. We've confirmed on two different SFT V2 units that the production pedal does not have this resistor, and in developing this project, our prototype worked exactly the same as the original without it.

However, there could be scenarios outside of our testing (and outside the production process for the original) in which the lack of a gate bias resistor could cause issues, such as when different types of JFETs are used, or even the same type from a different manufacturer.

If Q1 is incorrectly biased, it can cause intermittent failures where it will work normally for a few seconds and then cut off for a few seconds. We received a few reports of this issue in the original release of the Artemis Mk II, so in version 1.1 we've added R25 as a gate bias resistor for Q1. This is optional, but recommended to avoid the possibility of issues later on.

SCHEMATIC



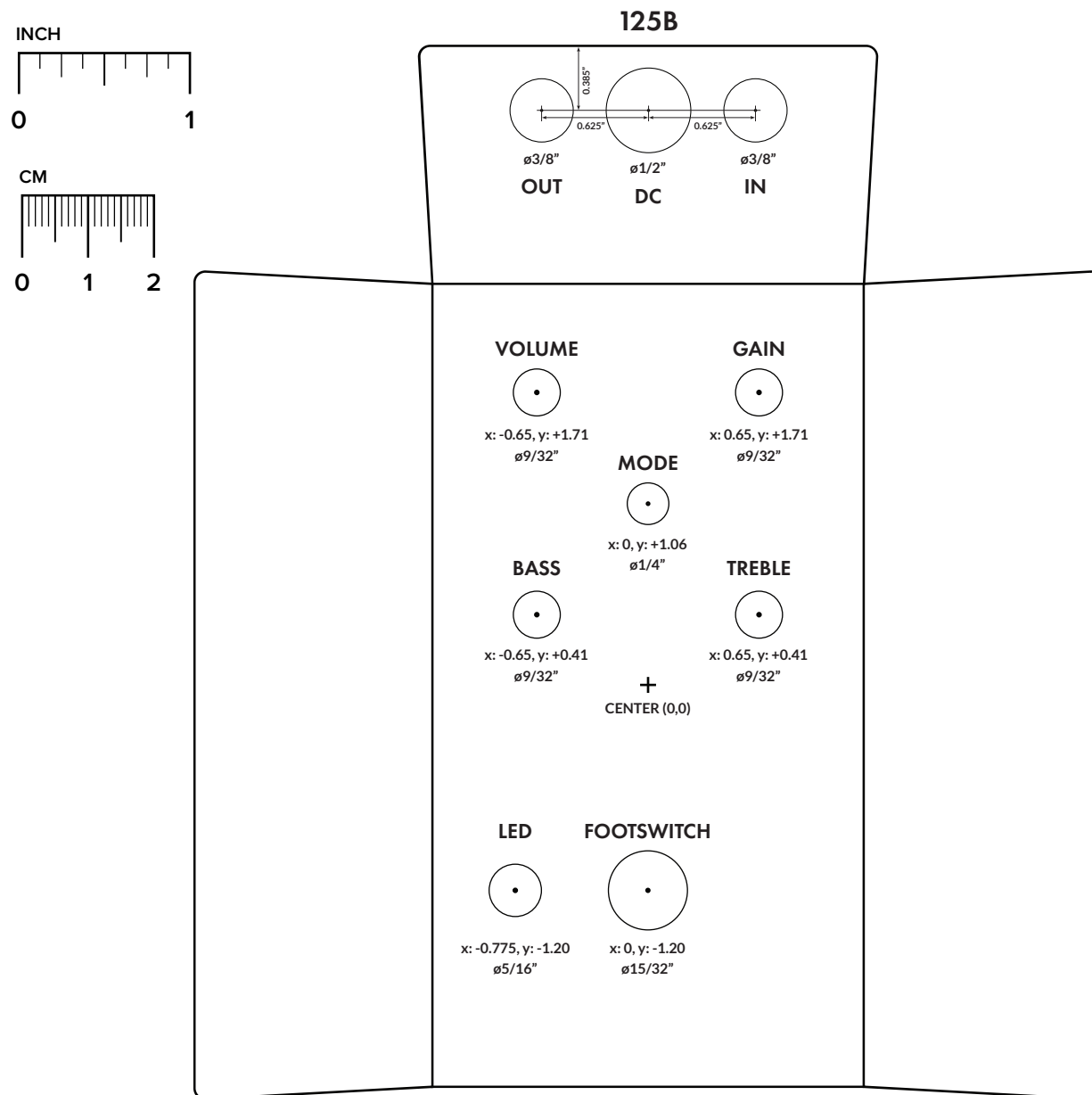
DRILL TEMPLATE

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.

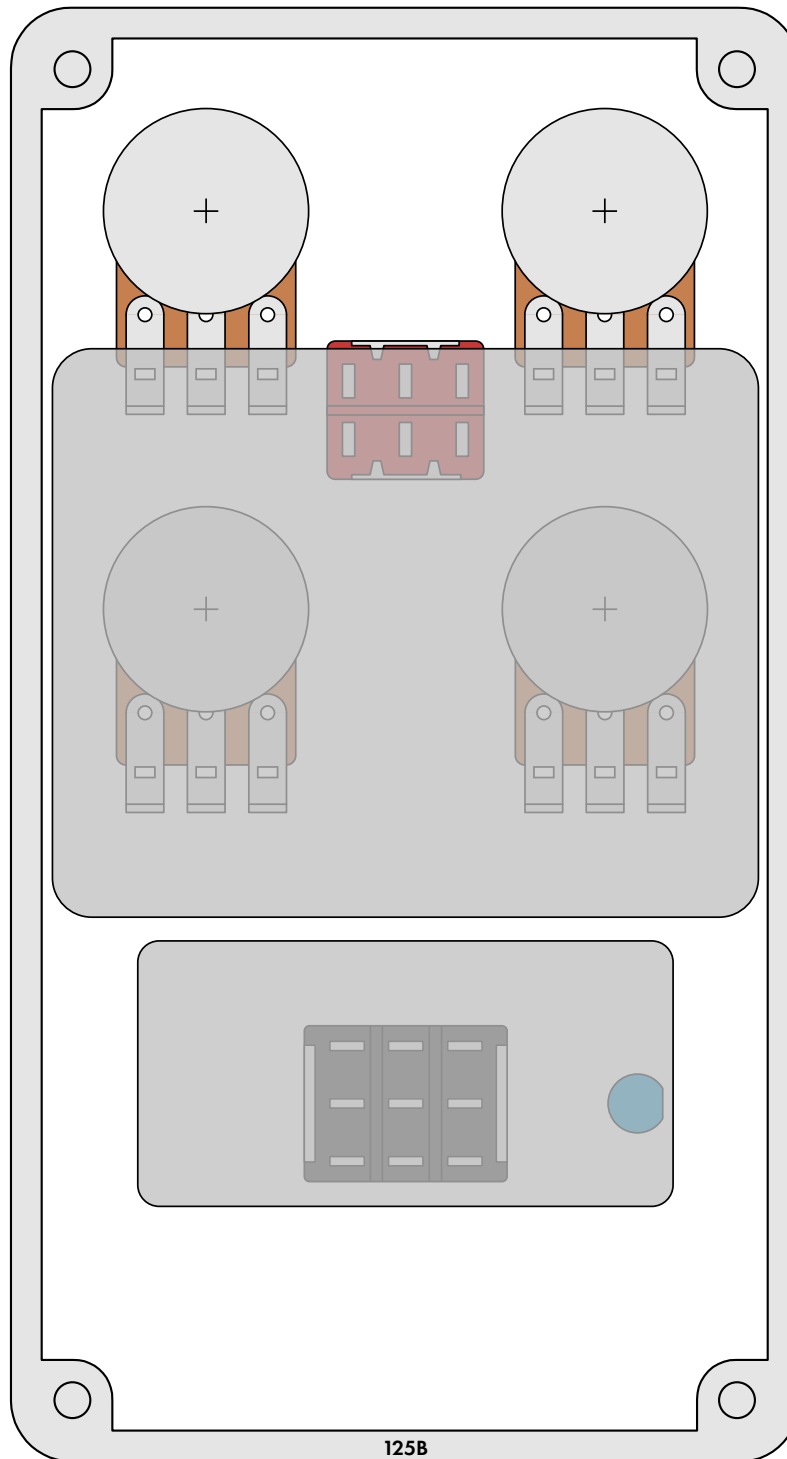
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

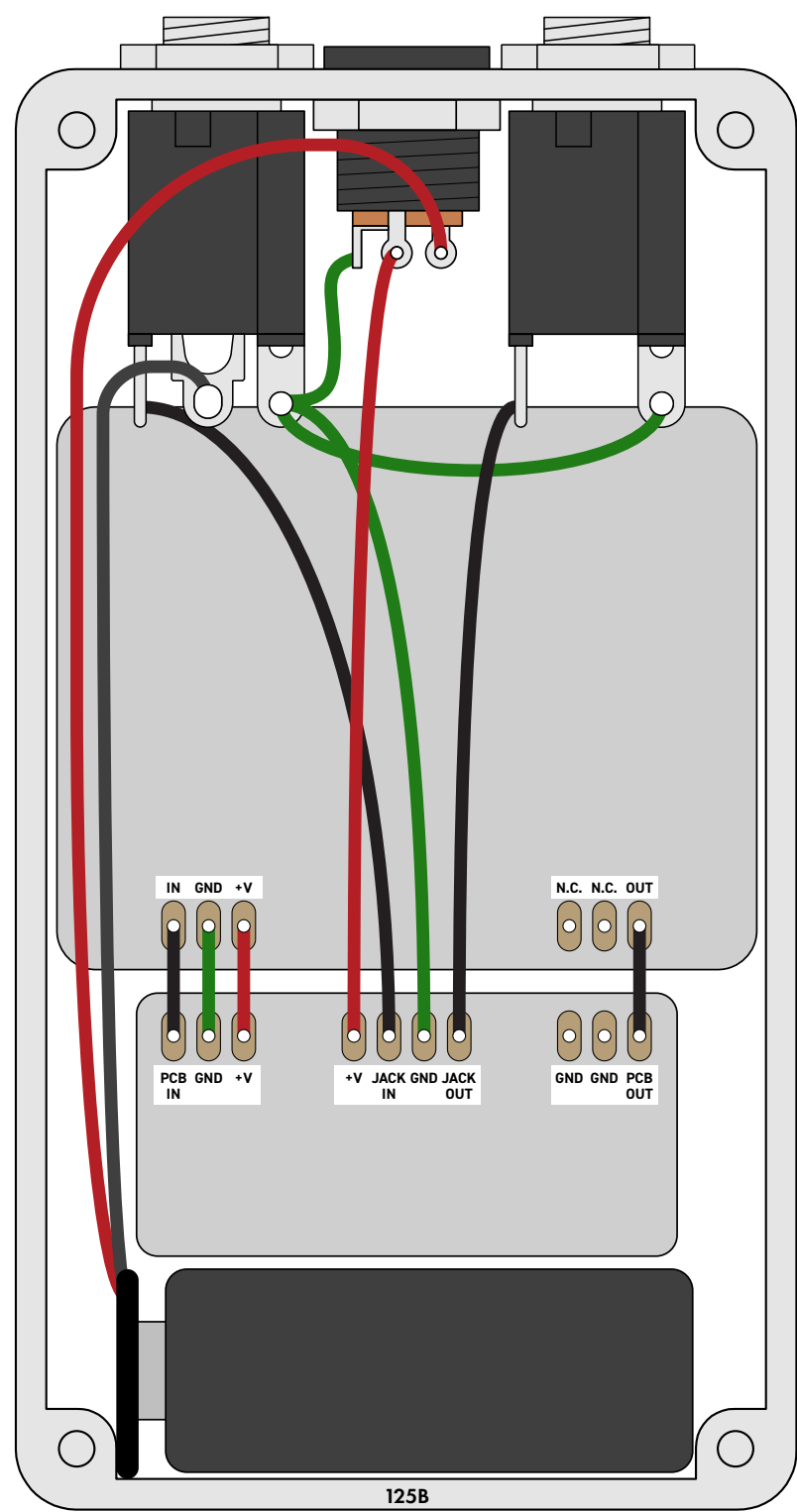


ENCLOSURE LAYOUT

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

1.1.0 (2023-06-24)

Added R25 gate bias resistor for Q1.

1.0.1 (2021-11-15)

Added note on pg. 6 about Q1 gate bias resistor.

1.0.0 (2021-11-12)

Initial release.