

PROJECT NAME
ARES

BASED ON
Echoplex EP-3 Preamp

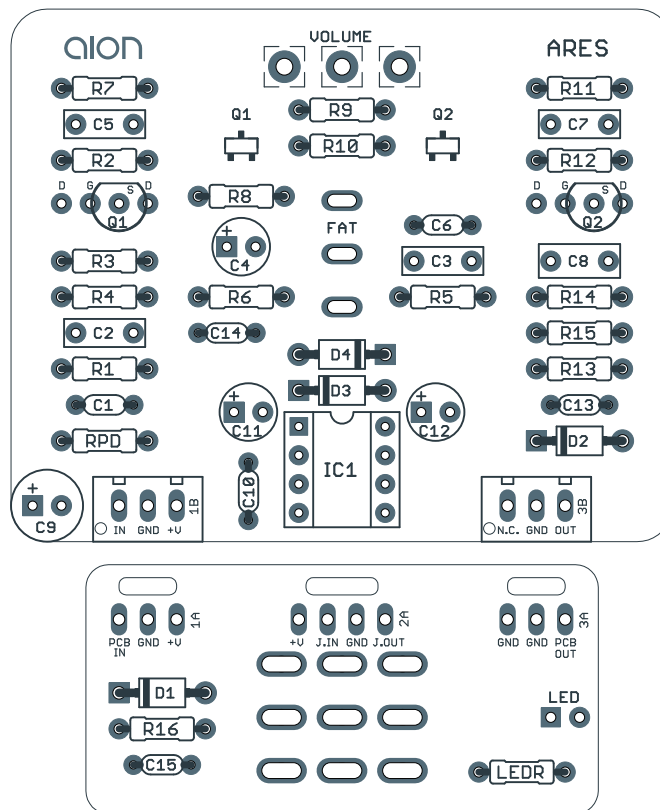
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
Preamp, tone enhancer

DOCUMENT VERSION
1.0.0 (2019-10-18)

PROJECT SUMMARY

A pedal adaptation of the preamp section of the EP-3 Echoplex tape echo unit. It captures the sound of the EP-3 in bypass mode, favored by many guitarists for its “sweetening” effect on the tone.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.86" (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 Ares Vintage Preamp is a reproduction of the Echoplex EP-3 tape echo unit in bypass mode. The EP-3 was originally released in 1970 as a solid-state update to the previous tube-based versions. It became legendary not only for its tape delay effect, but also for the coloration that its preamp would add even with the echo turned off. It's a pretty simple JFET gain stage, but it does something special with the phase response of the signal.

The Ares is more directly based on the ClinchFX EP-Pre, originally traced by Aion FX in 2015. It uses a charge pump to get 18V or 24V from a 9- or 12-volt source, which compares to the 20V supply of the original. There is also an output buffer added to the end so that it interacts more consistently with pedals that follow.

There were two versions of the EP-3: the early version which was brighter and the late version which was a little darker and fatter. The difference is a single capacitor that was added to the first JFET stage in the later version. The Ares has a toggle switch that allows you to switch between these two versions, as well as a third mode with another capacitor that thickens the tone even more.

Note that, like the original Echoplex preamp, there is very little overall gain available. With Volume at maximum, it only gets about 6dB above unity. Despite being called a preamp, this is not a boost pedal, but more of a tone enhancer or conditioner.

USAGE

The Ares has the following controls:

- **Volume** sets the overall volume level. It starts at zero and tops out just slightly above unity with the Fat switch in the center position. The maximum volume is reached at around 2:00 on the rotation, but there is still a slight tonal shift from 2:00 to 5:00. The maximum boost level is increased with the other two switch positions.
- **Fat** selects between early EP-3, late EP-3, and a third "fat" mode that is more full-range than the other two. It also increases the available gain.

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	100k	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	3k3	Metal film resistor, 1/4W	
R4	22k	Metal film resistor, 1/4W	
R5	1M	Metal film resistor, 1/4W	
R6	1M	Metal film resistor, 1/4W	
R7	220k	Metal film resistor, 1/4W	
R8	100k	Metal film resistor, 1/4W	
R9	470k	Metal film resistor, 1/4W	
R10	220k	Metal film resistor, 1/4W	
R11	1M	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	15k	Metal film resistor, 1/4W	
R14	22k	Metal film resistor, 1/4W	
R15	100k	Metal film resistor, 1/4W	
R16	59R	Metal film resistor, 1/4W	Original uses 60R (not easily available in through-hole). Can also substitute 47R or 51R.
RPD	4M7	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	220pF	MLCC capacitor, NP0/C0G	
C2	22n	Film capacitor, 7.2 x 2.5mm	
C3	22n	Film capacitor, 7.2 x 2.5mm	
C4	47uF	Electrolytic capacitor, 5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	220pF	MLCC capacitor, NP0/C0G	
C7	22n	Film capacitor, 7.2 x 2.5mm	
C8	470n	Film capacitor, 7.2 x 3mm	
C9	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C10	470n	MLCC capacitor, X7R	Power supply filter capacitor.
C11	10uF	Electrolytic capacitor, 5mm	Charge pump capacitor.
C12	10uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C13	470n	MLCC capacitor, X7R	Power supply filter capacitor.
C14	22n	MLCC capacitor, X7R	Power supply filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N4743A	Zener diode, 13V, DO-41	
D3	1N5817	Schottky diode, DO-41	
D4	1N5817	Schottky diode, DO-41	
IC1	LT1054CP	Charge pump / voltage converter	
IC1-S	DIP-8 socket	IC socket, DIP-8	
VOL.	500kB	16mm right-angle PCB mount pot	
Q1	2N5484	JFET, small-signal, TO-92	Selected according to specification. See build notes.
Q2	2N5485	JFET, small-signal, TO-92	Selected according to specification. See build notes.
FAT	SPDT cntr off	Toggle switch, SPDT on-off-on	
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.

BUILD NOTES

Wiring note

In order to maintain good grounding practices, the charge pump has been given its own ground instead of sharing a ground plane with the audio signal. Because of this, there is another ground wire that needs to be connected on the right side, adjacent to the “Out” wire.

The wiring diagram shows this added wire, but since it’s otherwise identical to most other Aion projects, it could easily be overlooked.

JFET selection

The TIS58 JFETs used in the original EP-3 are nearly impossible to find. And even if you did find some, they won’t help you too much: JFET manufacturing is notoriously inaccurate and you’ll find an enormous variance even within one part number. Not surprisingly, some original EP-3 units just didn’t have the “it” factor. The preamp is such a simple circuit that the JFET really does make it or break it.

The best way to ensure that the JFETs give the proper response is to test their I_{DSS} and $V_{GS(off)}$ values, which can be done with a component tester such as the Peak Atlas DCA-75 or a JFET tester circuit.

Aion FX measured the JFETs in an original ClinchFX EP-Pre. He sorts his JFETs and only uses ones that fall inside certain parameters. These parameters are not known, so it’s recommended to get as close as possible to the measured values when selecting your own JFETs. Here’s the data, tested with a DCA-75:

PART	TYPE	$V_{GS(off)}$	I_{DSS}	GFS	$R_{DS(on)}$
Q1	2N5484	-1.27V	2.76mA	4.0mA/V	218.2R
Q2	2N5485	-2.66V	7.27mA	3.6mA/V	156.3R

The GFS and $R_{DS(on)}$ values are probably not relevant to this circuit, but they are provided here for sake of completion.

Fortunately, these values fall right about in the middle of the specified ranges for both parts, meaning it should be easy to find ones that will work. It’s recommended to order maybe 3-5 of each of them and select the one that most closely matches the above values.

You can use other JFETs as long as they measure close to the correct specs. Here are some other types that should test close to the specs for Q1 if you can find them:

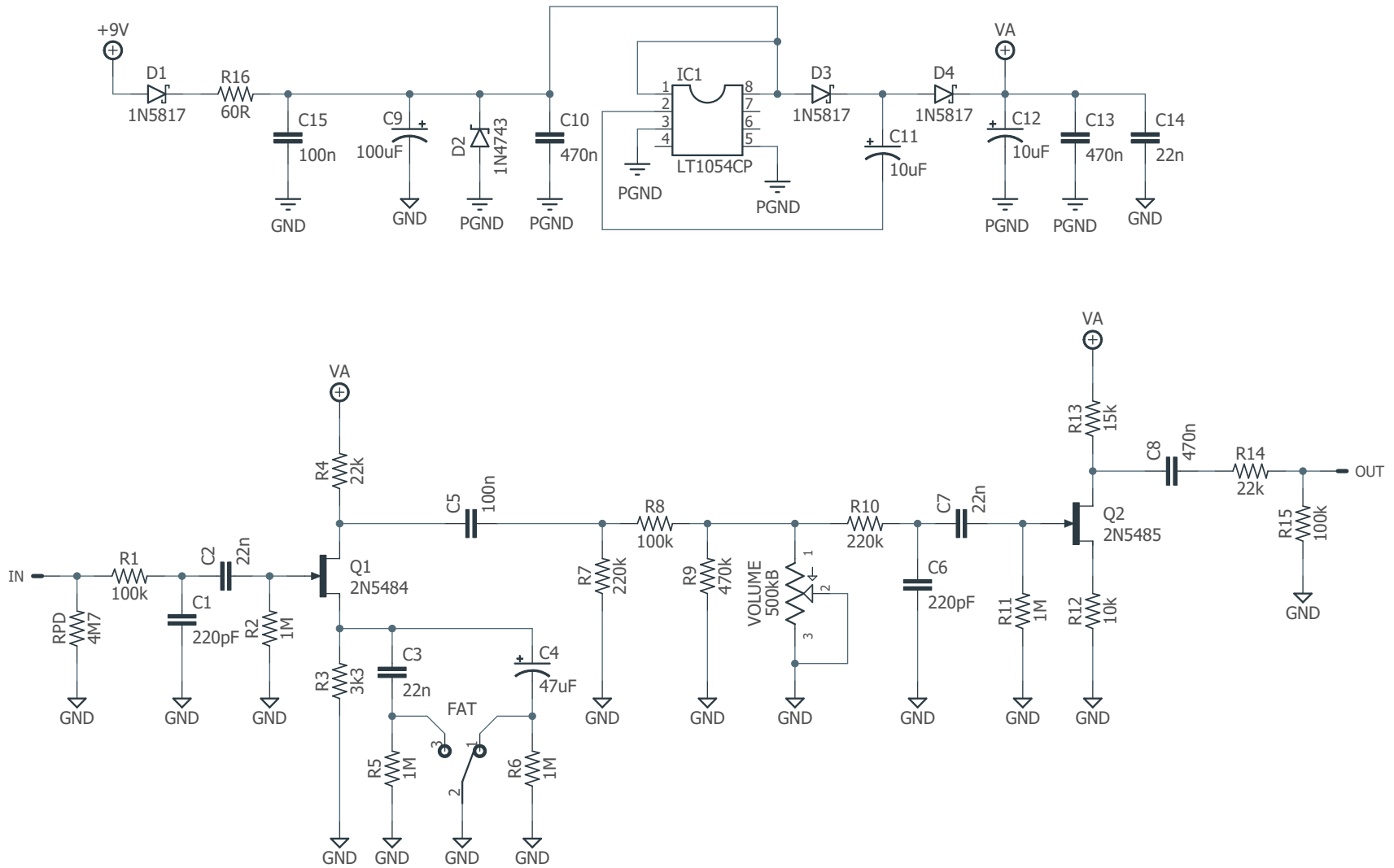
2N5256	2N5952	2N5953	2SK30A-Y	2SK30A-GR	J202
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And here are some that may work for Q2:

2SK30A-GR	J113	2N5457	PN4303	BF244A	BF245A
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Due to the growing scarcity of through-hole JFETs, pads have been provided to allow easy use of surface-mount alternatives if you’re okay soldering those. Just be careful because you can’t socket them like you can with through-hole parts. Once they’re soldered, it’s a lot of work to get them off without specialized desoldering equipment.

SCHEMATIC



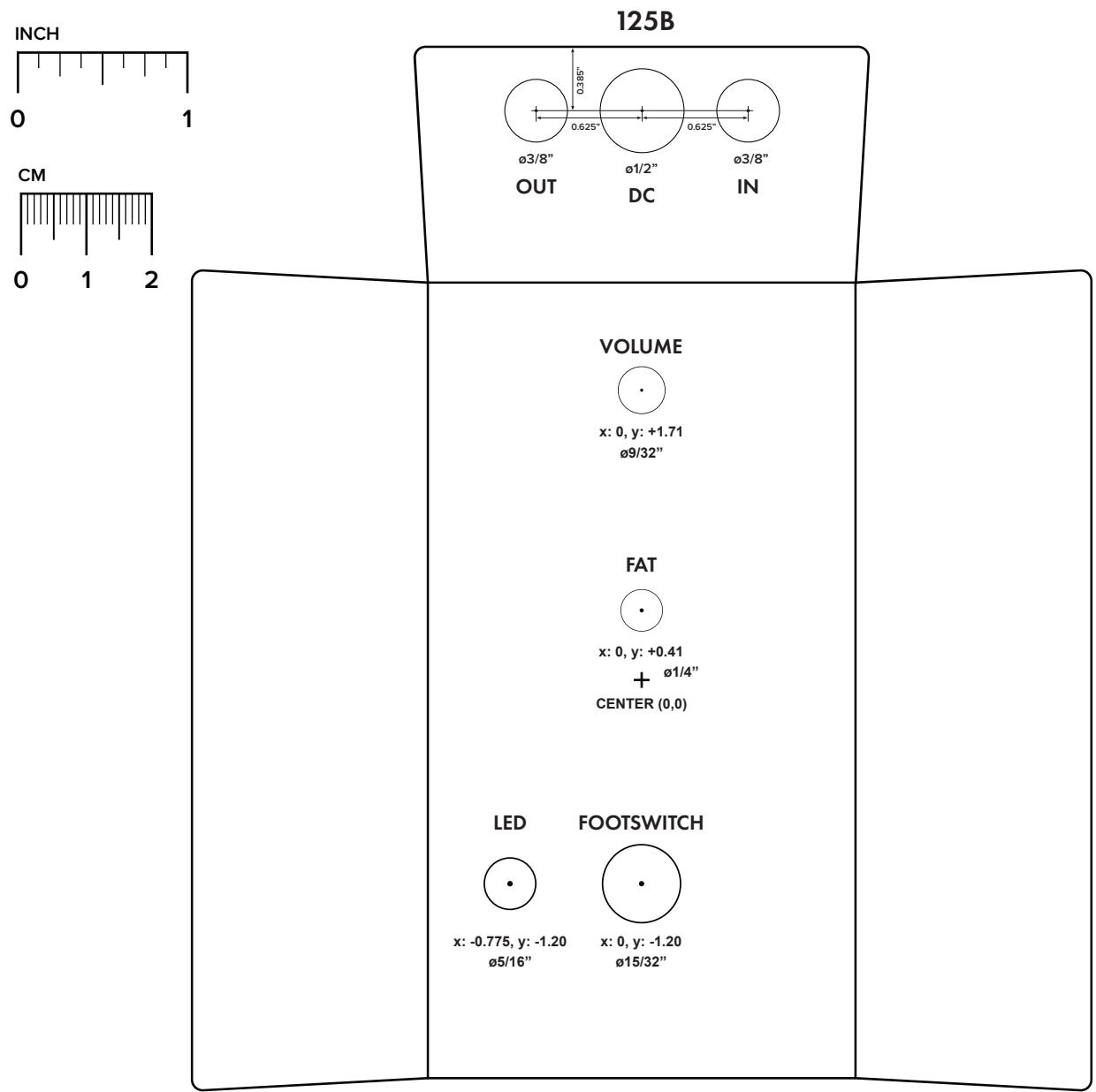
DRILL TEMPLATE

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.

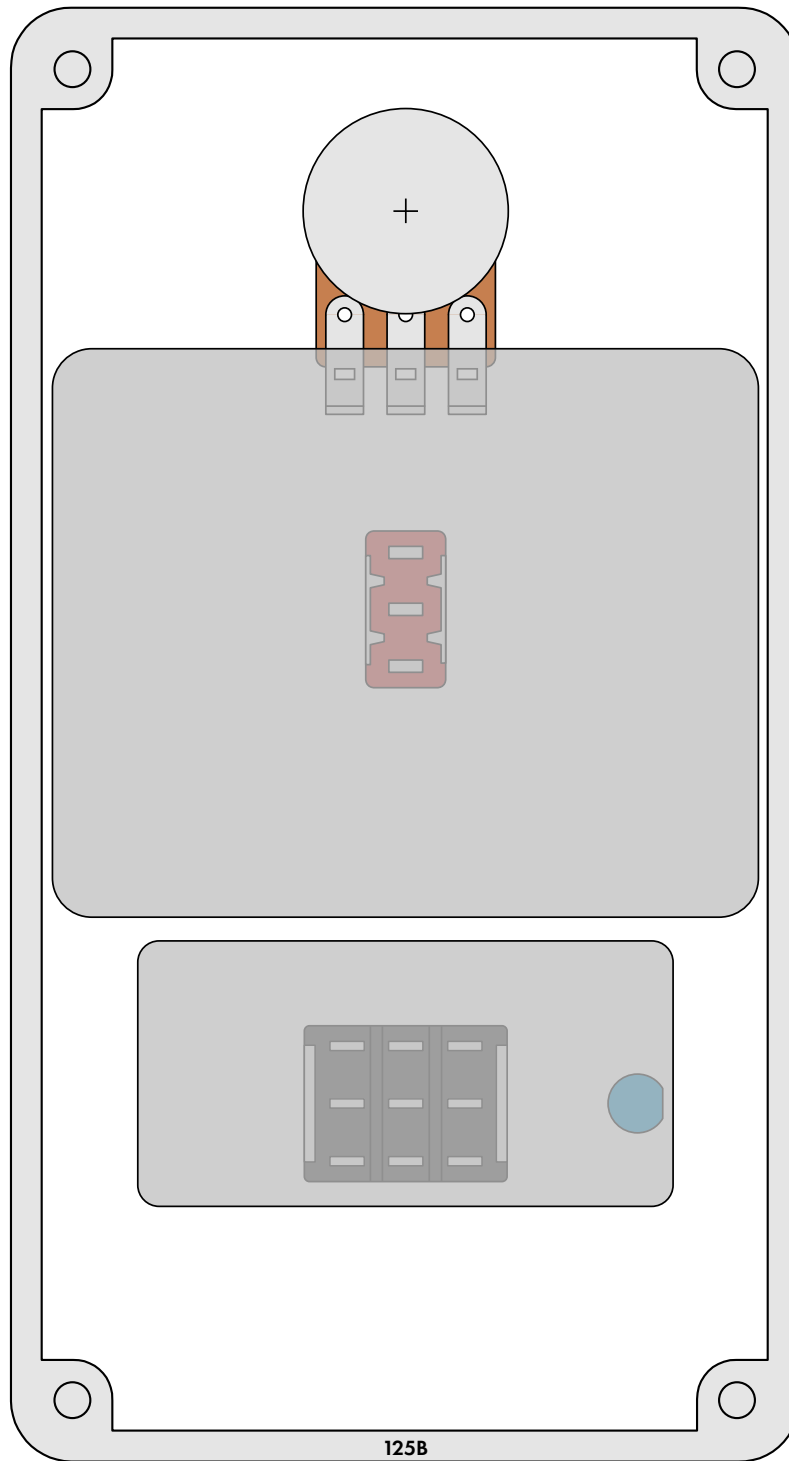
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#).

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.

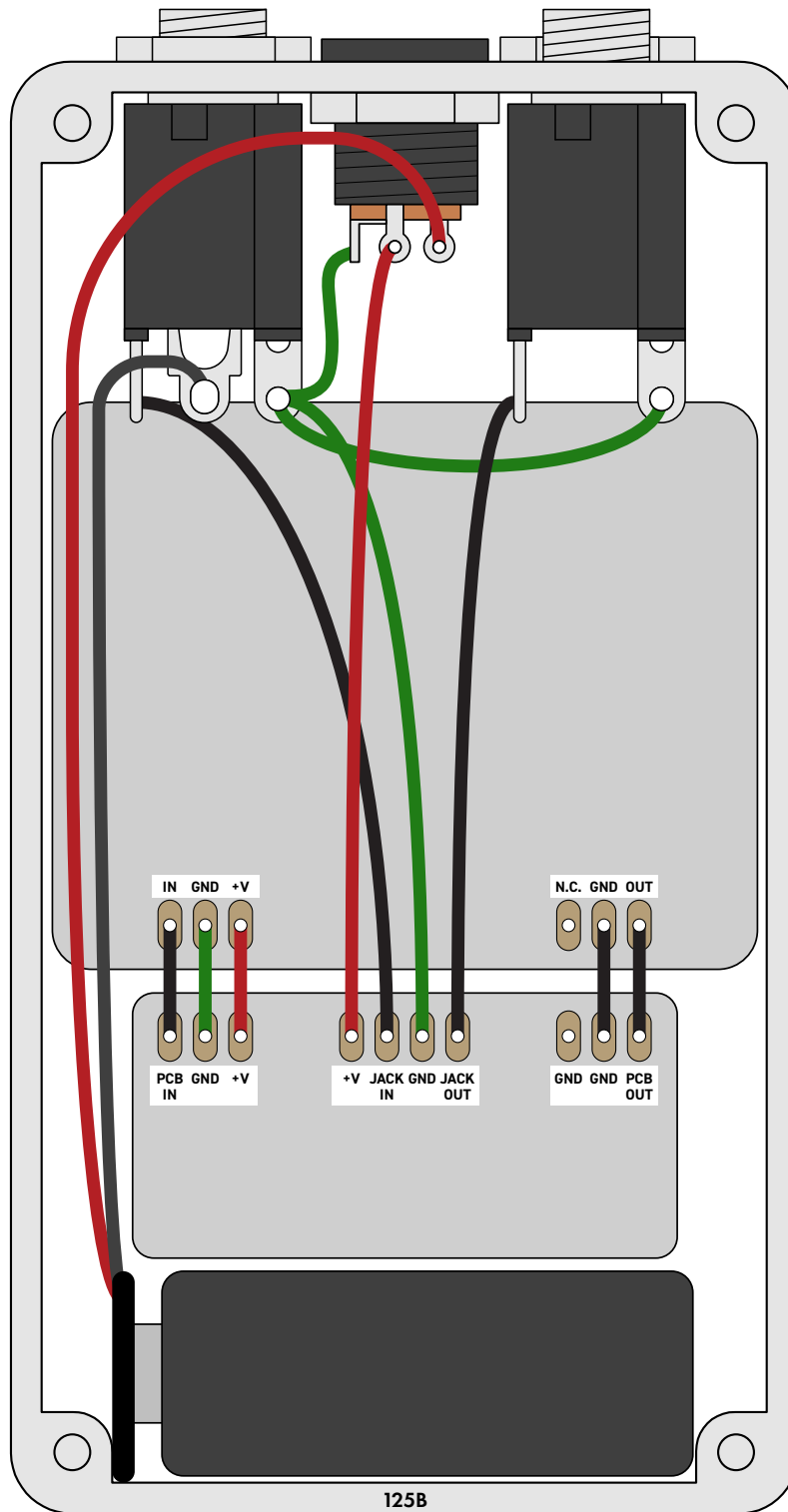


ENCLOSURE LAYOUT

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 (2019-10-18)

Initial release.