

PROJECT NAME

# MEGALITH



BASED ON

ZVEX® Box of Rock & Distortron

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

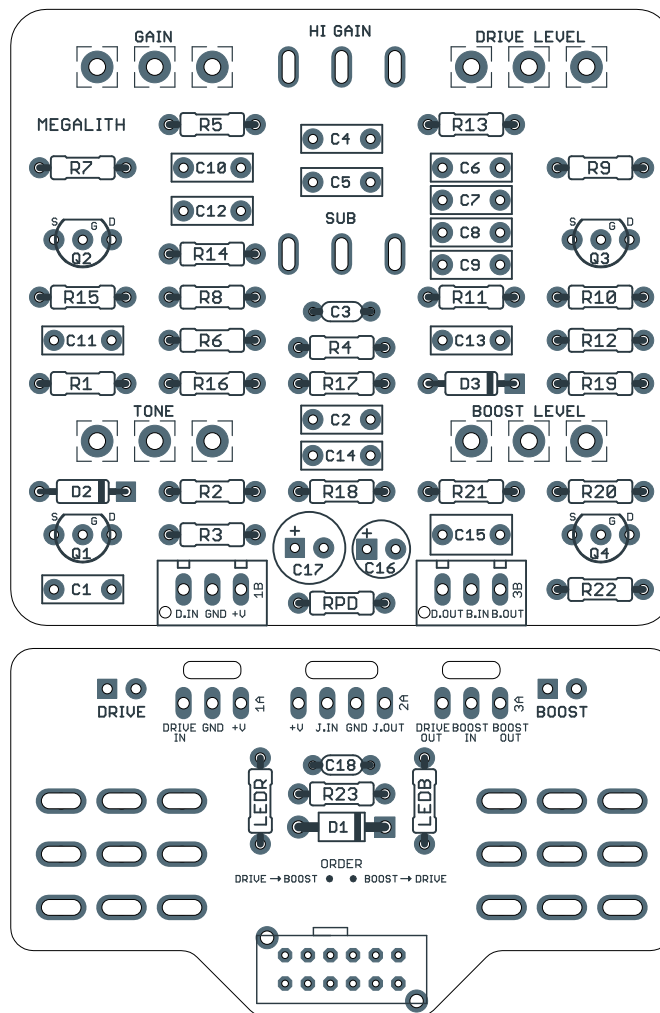
Amp-like overdrive / distortion

DOCUMENT VERSION

1.0.1 (2022-01-10)

### PROJECT SUMMARY

A two-channel drive composed of cascaded MOSFET boost stages. The drive channel and boost channel can be combined or selected independently.



Actual size is 2.3" x 2.14" (main board) and 2.3" x 1.28" (bypass board).

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## INTRODUCTION

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The Megalith Dual Drive is a hybrid of the ZVEX Box of Rock and Distortron, two similar pedals composed of cascaded SHO boost stages.

The Box of Rock came first in 2006. In addition to the three cascaded stages, it also includes a fourth SHO stage at the end for switchable volume boost. The Distortron followed in 2009 as part of the lower-cost “Vextron” series (which also included the Mastotron). The Distortron omits the boost, but adds two toggle switches for gain (low or high) and “subs” or bass (3 different settings).

By combining the Distortron’s switches with the Box of Rock’s extra boost stage, we can have the best of both worlds. The Megalith is a touch-sensitive low- to medium-gain pedal that overdrives naturally and responds very well to the guitar’s volume knob.

The Box of Rock was designed as a 2-channel effect, with the SHO as the “always on” clean foundation to which the drive channel can be added (as seen in Zvex’s original demo video). The boost comes after the drive when both are engaged. This is a reasonable way of using it, but it won’t work with every rig.

Because of this, the Megalith adds an internal slide switch allowing the order to be changed so that the boost comes before the drive. In this mode, the boost stacks with the drive and adds to the gain rather than just boosting the volume, as in the default ordering.

Note that since the gain stages are identical to individual SHO circuits, the two gain controls (the main circuit gain and the boost level) exhibit the characteristic “crackle” of the SHO when they are adjusted, since they are directly biasing the MOSFETs. This is normal.

## USAGE

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The Megalith has four knobs, two toggles, and one internal slide switch:

- **Gain** controls the amount of gain in the first stage of the drive section.
- **Tone** is a Big Muff-style “balance” control that pans between treble and bass emphasis.
- **Drive Level** sets the overall output of the drive signal.
- **Boost Level** controls the gain of the boost stage.
- **Gain** (toggle) selects between three different gain modes.
- **Sub** (toggle) selects between three different bass cutoff frequencies after the third drive stage.
- **Order** (internal slide switch) changes the order so that drive comes before boost (default operation) or boost comes before drive.

## 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	1M	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	5k1	Metal film resistor, 1/4W	
R4	470k	Metal film resistor, 1/4W	
R5	1M	Metal film resistor, 1/4W	
R6	1M	Metal film resistor, 1/4W	
R7	180R	Metal film resistor, 1/4W	
R8	5k1	Metal film resistor, 1/4W	
R9	1M	Metal film resistor, 1/4W	
R10	1M	Metal film resistor, 1/4W	
R11	5k1	Metal film resistor, 1/4W	
R12	330R	Metal film resistor, 1/4W	
R13	390R	Metal film resistor, 1/4W	
R14	47k	Metal film resistor, 1/4W	
R15	82k	Metal film resistor, 1/4W	
R16	9k1	Metal film resistor, 1/4W	10k in original. See build notes.
R17	9k1	Metal film resistor, 1/4W	10k in original. See build notes.
R18	1M	Metal film resistor, 1/4W	
R19	1M	Metal film resistor, 1/4W	
R20	1M	Metal film resistor, 1/4W	
R21	5k1	Metal film resistor, 1/4W	
R22	47k	Metal film resistor, 1/4W	
R23	82R	Metal film resistor, 1/4W	
RPD	1M	Metal film resistor, 1/4W	
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
LEDB	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	22n	Film capacitor, 7.2 x 2.5mm	
C3	470pF	MLCC capacitor, NP0/C0G	
C4	22n	Film capacitor, 7.2 x 2.5mm	
C5	56n	Film capacitor, 7.2 x 2.5mm	
C6	47n	Film capacitor, 7.2 x 2.5mm	

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C7	470n	Film capacitor, 7.2 x 3.5mm	Original uses 820n for C7. If you can find one, omit C8 and C9. See build notes for more info.
C8	330n	Film capacitor, 7.2 x 3mm	
C9	22n	Film capacitor, 7.2 x 2.5mm	
C10	22n	Film capacitor, 7.2 x 2.5mm	
C11	100n	Film capacitor, 7.2 x 2.5mm	
C12	2n2	Film capacitor, 7.2 x 2.5mm	2n in original. See build notes.
C13	2n2	Film capacitor, 7.2 x 2.5mm	2n in original. See build notes.
C14	100n	Film capacitor, 7.2 x 2.5mm	
C15	1uF	Film capacitor, 7.2 x 3.5mm	
C16	10uF	Electrolytic capacitor, 5mm	
C17	100uF	Electrolytic capacitor, 6.3mm	
C18	100n	MLCC capacitor, X7R	
D1	1N5817	Schottky diode, DO-41	
D2	1N5239B	Zener diode, 9.1V, DO-35	
D3	1N5239B	Zener diode, 9.1V, DO-35	
Q1	2N7000	MOSFET, N-channel, TO-92	
Q2	2N7000	MOSFET, N-channel, TO-92	
Q3	2N7000	MOSFET, N-channel, TO-92	
Q4	2N7000	MOSFET, N-channel, TO-92	
ORDER	4PDT slide	Slide switch, 4PDT	E-Switch EG4208
TONE	100kB	16mm right-angle PCB mount pot	
GAIN	5kC	16mm right-angle PCB mount pot	
D. LVL	100kB	16mm right-angle PCB mount pot	
B. LVL	5kC	16mm right-angle PCB mount pot	
HIGAIN	SPDT cntr off	Toggle switch, SPDT on-off-on	
SUB	SPDT cntr off	Toggle switch, SPDT on-off-on	
D.LED	5mm	LED, 5mm, red diffused	
B.LED	5mm	LED, 5mm, red diffused	
IN	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X 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.
D.FSW	3PDT	Stomp switch, 3PDT	
B.FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

## BUILD NOTES

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### C7 capacitor

C7 is an 820n capacitor in the original. While these are still produced, they are only available from a small number of manufacturers and may be hard to find. Presumably ZVEX chose this value after experimentation since 1uF is a lot more common.

The Megalith PCB adds footprints for three capacitors in parallel (C7, C8 and C9) so you can mix and match values to add up to 820n. The easiest combination is 470n/330n/22n (822n total), and this is what is used in the parts list as the default. However, you could also use other combinations such as three 270n capacitors or 470n/220n/120n, both of which add up to 810n.

### 2-pole filter values

Between the tone control and drive level, there is 2-pole filter formed by R16/C12 and R17/C13. In the original Box of Rock, the two resistors are 10k and the two capacitors are 2n.

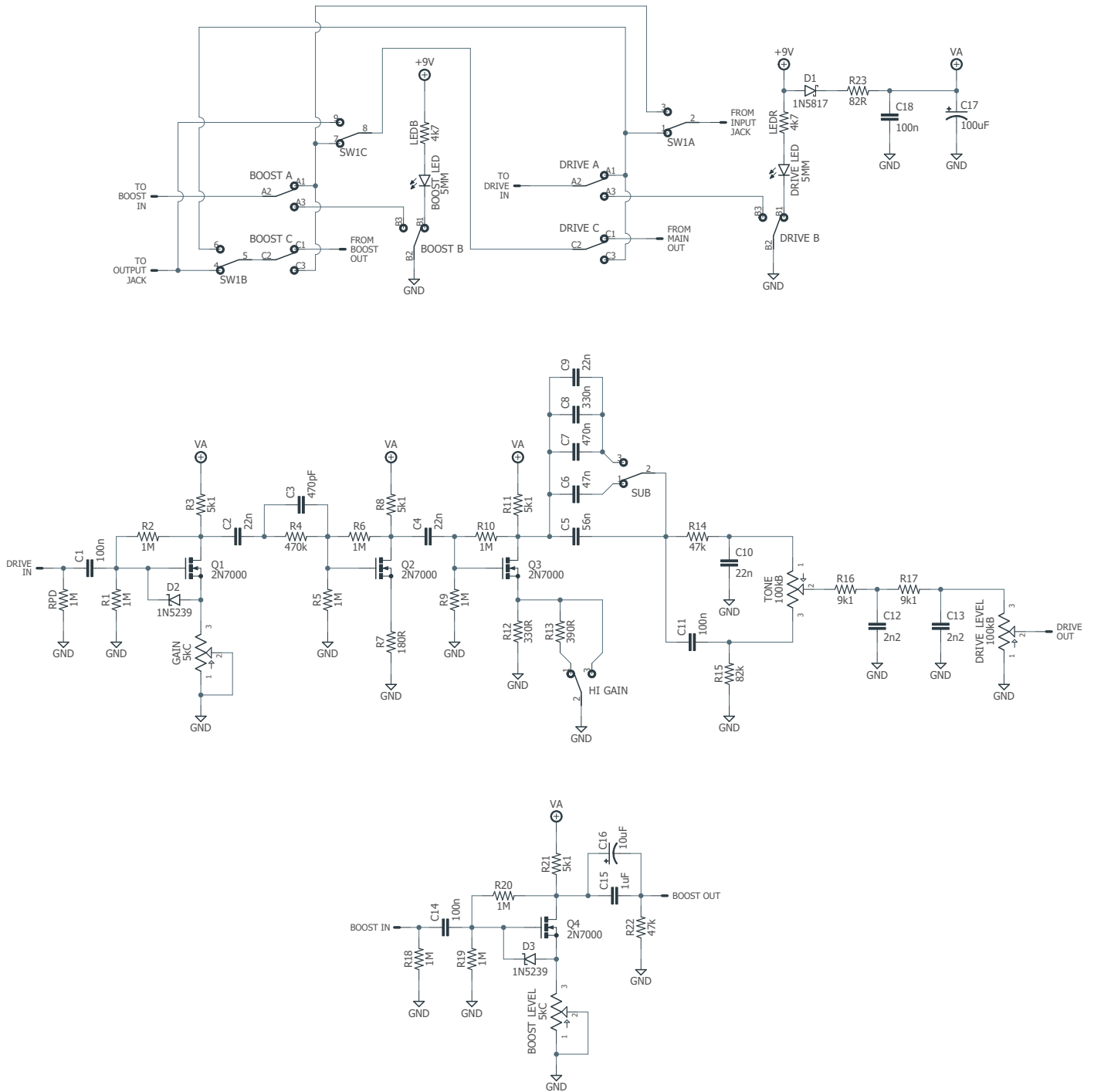
2n is no longer a standard value of capacitor, typically only available in green mylar “chiclet” types. If 2n2 capacitors are used for C12 and C13, then the resistors need to be 9k1 to preserve the same frequency response. This is the default arrangement in the parts list.

If 2n capacitors are used for C12/C13, then R16/17 should instead be the original 10k.

### MOSFET selection and pinouts

The original Box of Rock uses BS170 MOSFETs. These are identical in specification to the 2N7000, but with the major difference that *sometimes* the pinout is different. Some manufacturers use D-S-G and others use D-G-S, while the 2N7000 is always D-G-S. Therefore, it's recommended to use 2N7000 when building this project.

# SCHEMATIC



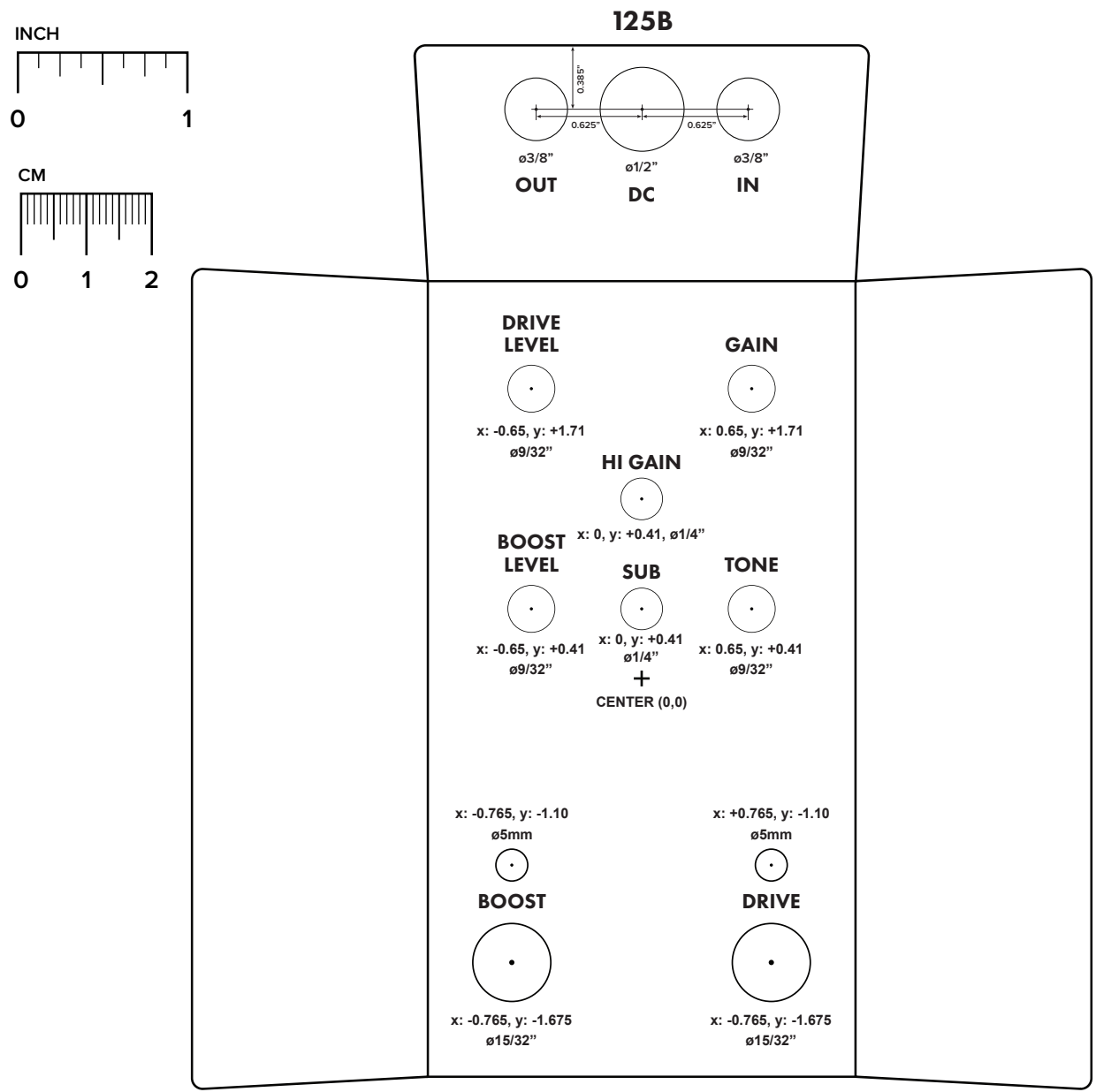
# DRILL TEMPLATE

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.

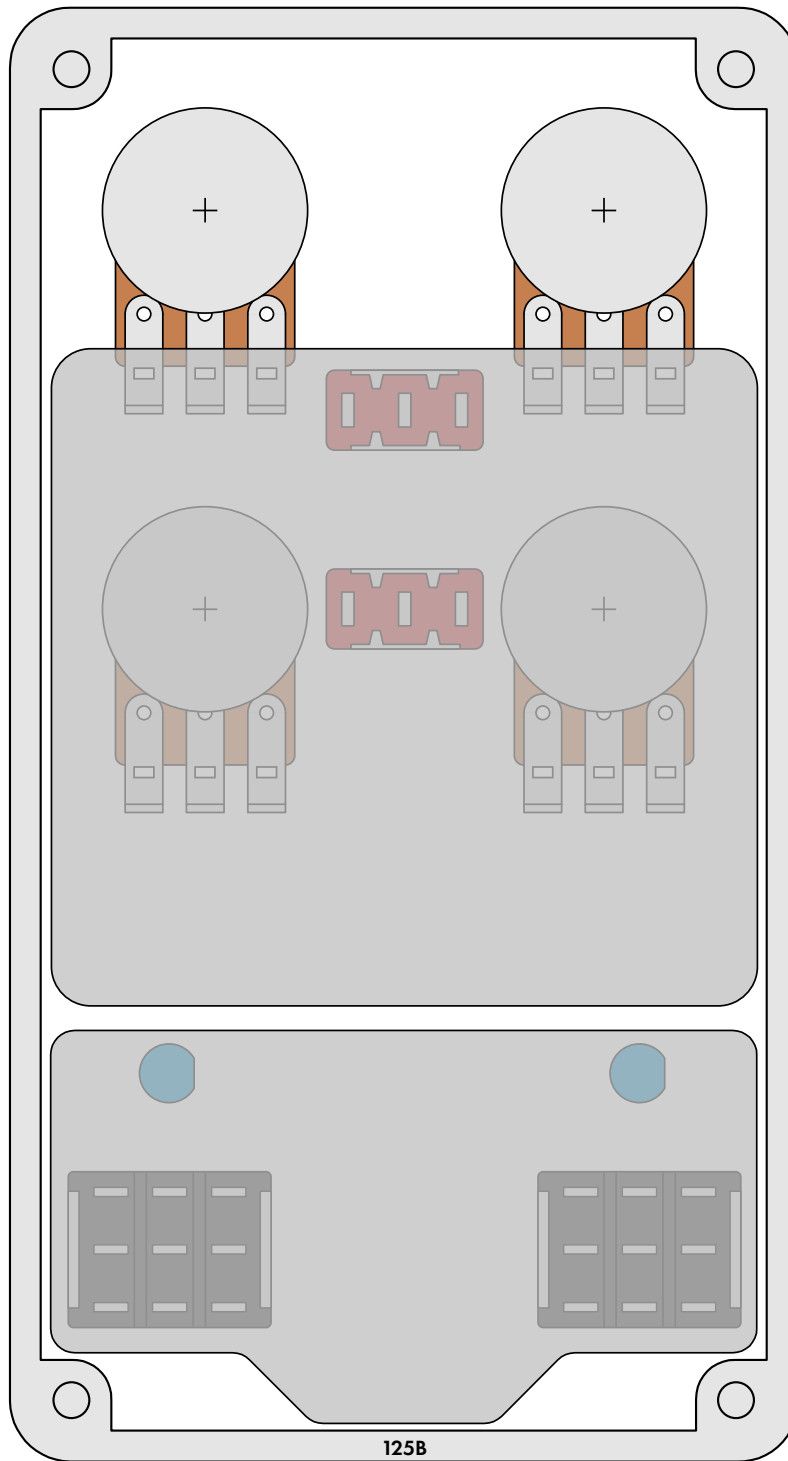
**LED hole drill size** assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



# ENCLOSURE LAYOUT

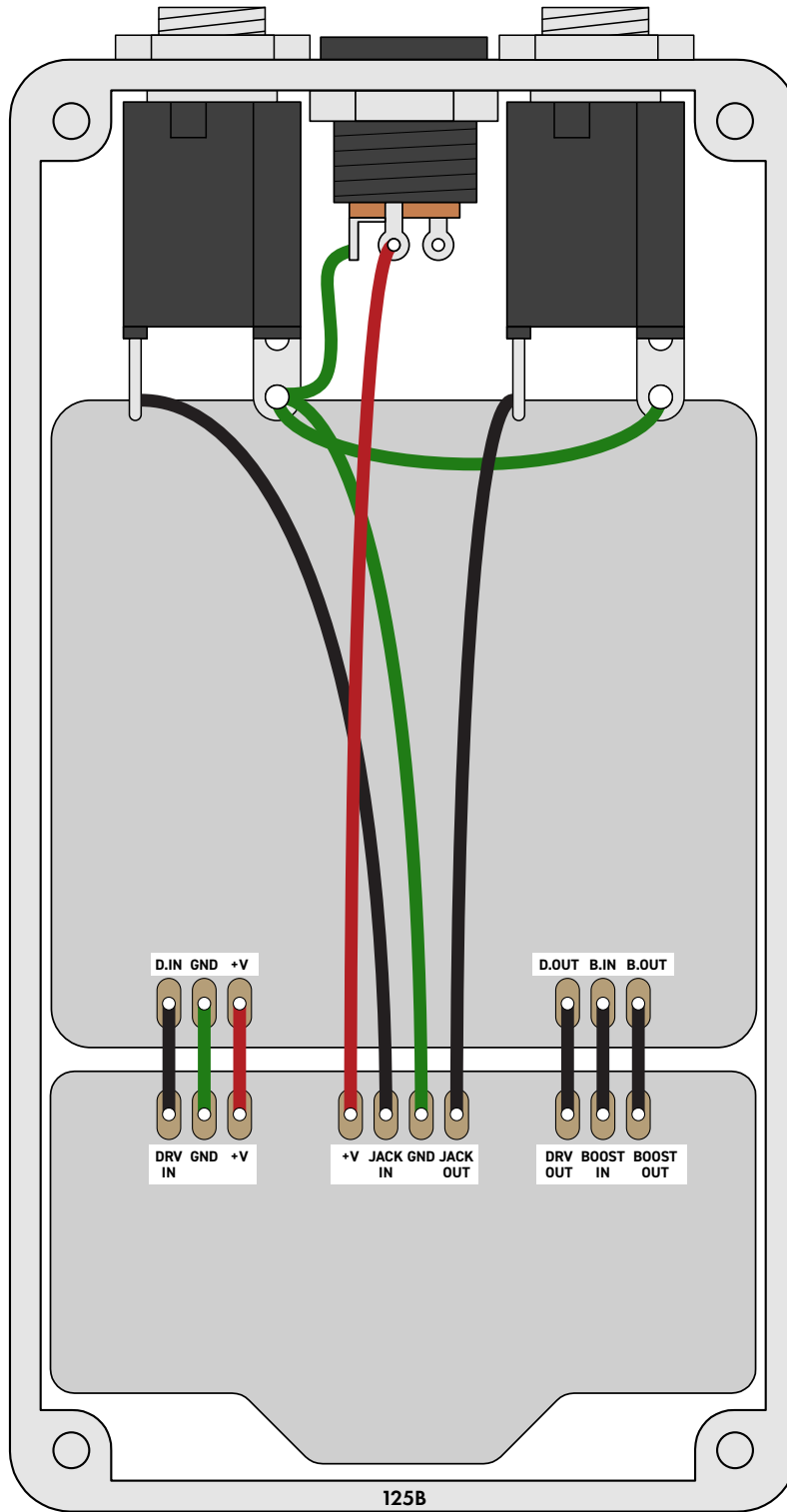
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Enclosure is shown without jacks. See next page for jack layout and wiring.





# WIRING DIAGRAM



## LICENSE & USAGE

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**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

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### 1.0.1 (2022-01-10)

Added information about MOSFET selection and pinouts.

### 1.0.0 (2021-11-12)

Initial release.