

## PROJECT NAME

# CEPHEUS

## BASED ON

Cornish CC-1 / GC-1

## EFFECT TYPE

Overdrive

## BUILD DIFFICULTY

■■■■ Intermediate

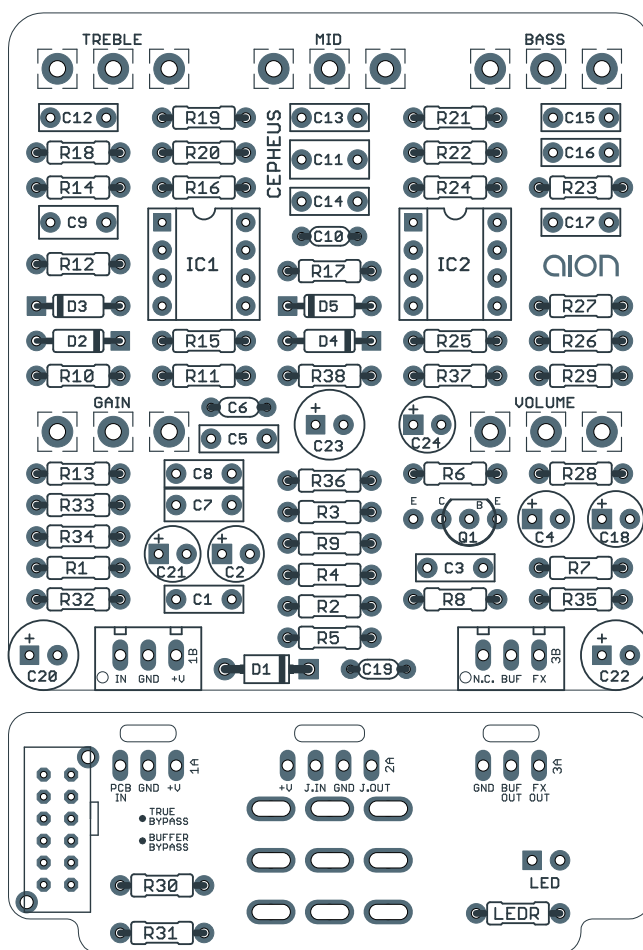
## DOCUMENT VERSION

1.0.3 (2023-10-06)



## PROJECT SUMMARY

An original design by the legendary Pete Cornish featuring two soft-clipping stages followed by a 3-band EQ for a natural and tweakable crunchy overdriven tone.



Actual size is 2.3" x 2.43" (main board) and 2.3" x 0.87" (bypass board).

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## INTRODUCTION

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The Cepheus Amp Overdrive is adapted from the Pete Cornish CC-1, [traced by Aion FX in 2020](#), and the GC-1 which [we traced in 2023](#). The GC-1 claimed to be an original circuit, but we found it to be identical to the CC-1 other than changes in component values.

Cornish pedals are best known for being extremely expensive. There are two reasons for this. First, the build quality and reliability is unmatched. Second, the mysterious nature of them, partially due to the fact that the circuit is obscured and partially because of the A-list of clients such as David Gilmour, Brian May and Pete Townshend.

Like the [OC-1 Optical Compressor](#), the CC-1 is a fully original circuit that's not based on anything else. It's designed primarily with op-amps, beginning with two feedback clipping stages, each with resistors in series with the diodes to soften the effect. The two-stage stacked clipping gives a very amp-like feel that responds naturally to playing dynamics or increased input signal levels.

After the clipping section, there's a three-band active tone control adapted from manufacturer application notes (see [figure 7 on this page](#)), essentially a Baxandall with an extra band for midrange. There is also a gain boost so the output level can be compensated if the tone controls are cut.

The Cepheus is a faithful reproduction of the CC-1/GC-1 circuit, but with one major addition: an internal slide switch allowing the pedal to be used in true-bypass mode instead of buffered bypass. As with the Klon KTR, the buffered mode is "almost always better", but you can determine for yourself.

## USAGE

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The Cepheus has the following controls:

- **Gain** controls the amount of gain in the first op-amp stage.
- **Bass** boosts or cuts frequencies by +/-13dB at 70 Hz (CC-1) or 50 Hz (GC-1).
- **Mid** boosts or cuts frequencies by +/-15dB at 1.5kHz (CC-1) or 950 Hz (GC-1).
- **Treble** boosts or cuts frequencies by +/-16dB at 5kHz (CC-1) or 4kHz (GC-1).
- **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	10M	Metal film resistor, 1/4W	
R2	1k	Metal film resistor, 1/4W	
R3	120k	Metal film resistor, 1/4W	
R4	120k	Metal film resistor, 1/4W	
R5	200k	Metal film resistor, 1/4W	
R6	7k5	Metal film resistor, 1/4W	
R7	10k	Metal film resistor, 1/4W	
R8	51R	Metal film resistor, 1/4W	
R9	10M	Metal film resistor, 1/4W	
R10	1M	Metal film resistor, 1/4W	
R11	51k	Metal film resistor, 1/4W	GC-1 uses 150k.
R12	22k	Metal film resistor, 1/4W	Jumper for GC-1.
R13	1k2	Metal film resistor, 1/4W	GC-1 uses 470R.
R14	51k	Metal film resistor, 1/4W	GC-1 uses 15k.
R15	22k	Metal film resistor, 1/4W	
R16	100k	Metal film resistor, 1/4W	GC-1 uses 47k.
R17	51k	Metal film resistor, 1/4W	GC-1 uses 39k.
R18	1k8	Metal film resistor, 1/4W	
R19	1k8	Metal film resistor, 1/4W	
R20	3k3	Metal film resistor, 1/4W	
R21	3k3	Metal film resistor, 1/4W	
R22	11k	Metal film resistor, 1/4W	
R23	11k	Metal film resistor, 1/4W	
R24	11k	Metal film resistor, 1/4W	
R25	10k	Metal film resistor, 1/4W	
R26	1M	Metal film resistor, 1/4W	
R27	51R	Metal film resistor, 1/4W	
R28	10k	Metal film resistor, 1/4W	
R29	51R	Metal film resistor, 1/4W	
R30	91R	Metal film resistor, 1/4W	

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
R31	51k	Metal film resistor, 1/4W	
R32	100R	Metal film resistor, 1/4W	
R33	10k	Metal film resistor, 1/4W	
R34	10k	Metal film resistor, 1/4W	
R35	100R	Metal film resistor, 1/4W	
R36	100R	Metal film resistor, 1/4W	
R37	10k	Metal film resistor, 1/4W	
R38	10k	Metal film resistor, 1/4W	
LED	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	4.7uF	Electrolytic capacitor, 4mm	
C3	1n	Film capacitor, 7.2 x 2.5mm	
C4	22uF	Electrolytic capacitor, 5mm	
C5	10n	Film capacitor, 7.2 x 2.5mm	GC-1 uses 100n.
C6	470pF	MLCC capacitor, NP0/C0G	
C7	470n	Film capacitor, 7.2 x 3mm	GC-1 uses 1uF.
C8	4n7	Film capacitor, 7.2 x 2.5mm	Omit (leave empty) for GC-1.
C9	220n	Film capacitor, 7.2 x 2.5mm	GC-1 uses 470n.
C10	470pF	MLCC capacitor, NP0/C0G	
C11	1uF	Film capacitor, 7.2 x 3.5mm	
C12	10n	Film capacitor, 7.2 x 2.5mm	
C13	4n7	Film capacitor, 7.2 x 2.5mm	GC-1 uses 3n3.
C14	22n	Film capacitor, 7.2 x 2.5mm	
C15	10n	Film capacitor, 7.2 x 2.5mm	
C16	1uF	Film capacitor, 7.2 x 3.5mm	
C17	1n2	Film capacitor, 7.2 x 2.5mm	GC-1 uses 220pF (MLCC).
C18	22uF	Electrolytic capacitor, 5mm	
C19	100n	MLCC capacitor, X7R	Power supply filter capacitor.
C20	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C21	22uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C22	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C23	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C24	22uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
Q1	2N5088	BJT transistor, NPN, TO-92	Substitute. Original uses BC549C.
IC1	TL072	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	TL071	Operational amplifier, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
GAIN	50kC	16mm right-angle PCB mount pot	
BASS	100kB	16mm right-angle PCB mount pot	
MID	100kB	16mm right-angle PCB mount pot	
TREBLE	100kB	16mm right-angle PCB mount pot	
VOL.	10kA	16mm right-angle PCB mount pot	
TB-BUF	4PDT slide	Slide switch, 4PDT	E-Switch EG4208 (4mm lever) or EG4208A (6mm lever)
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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

## BUILD NOTES

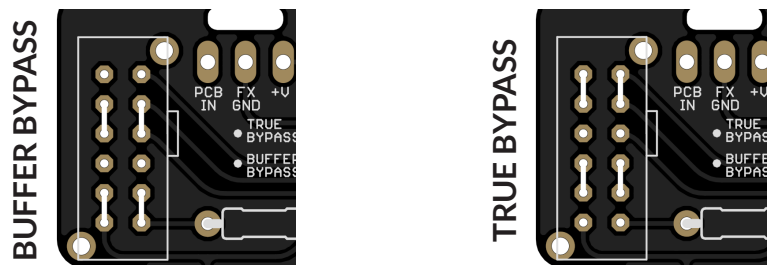
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### Transistor selection

The original CC-1 uses a BC549C transistor in the buffer. The pinout on the Cepheus PCB is for the USA “E-B-C” convention, e.g. 2N3904 and 2N5088. The 2N5088 will operate identically to the BC549C, but if you do want to use the original transistors, just note that the pinout is different. Typically they would need to be rotated 180 degrees, but check the datasheet for your brand as they do vary.

### Bypassing the true bypass / buffer switch

The E-Switch EG4208 slide switch used for the true bypass/buffer selector is available from Mouser Electronics but may not be accessible to everyone. If you are unable to obtain it, you can hard-wire the switch to either true bypass mode or buffered mode by soldering jumpers to the switch pads.



## CEPHEUS AMP OVERDRIVE



## CEPHEUS AMP OVERDRIVE





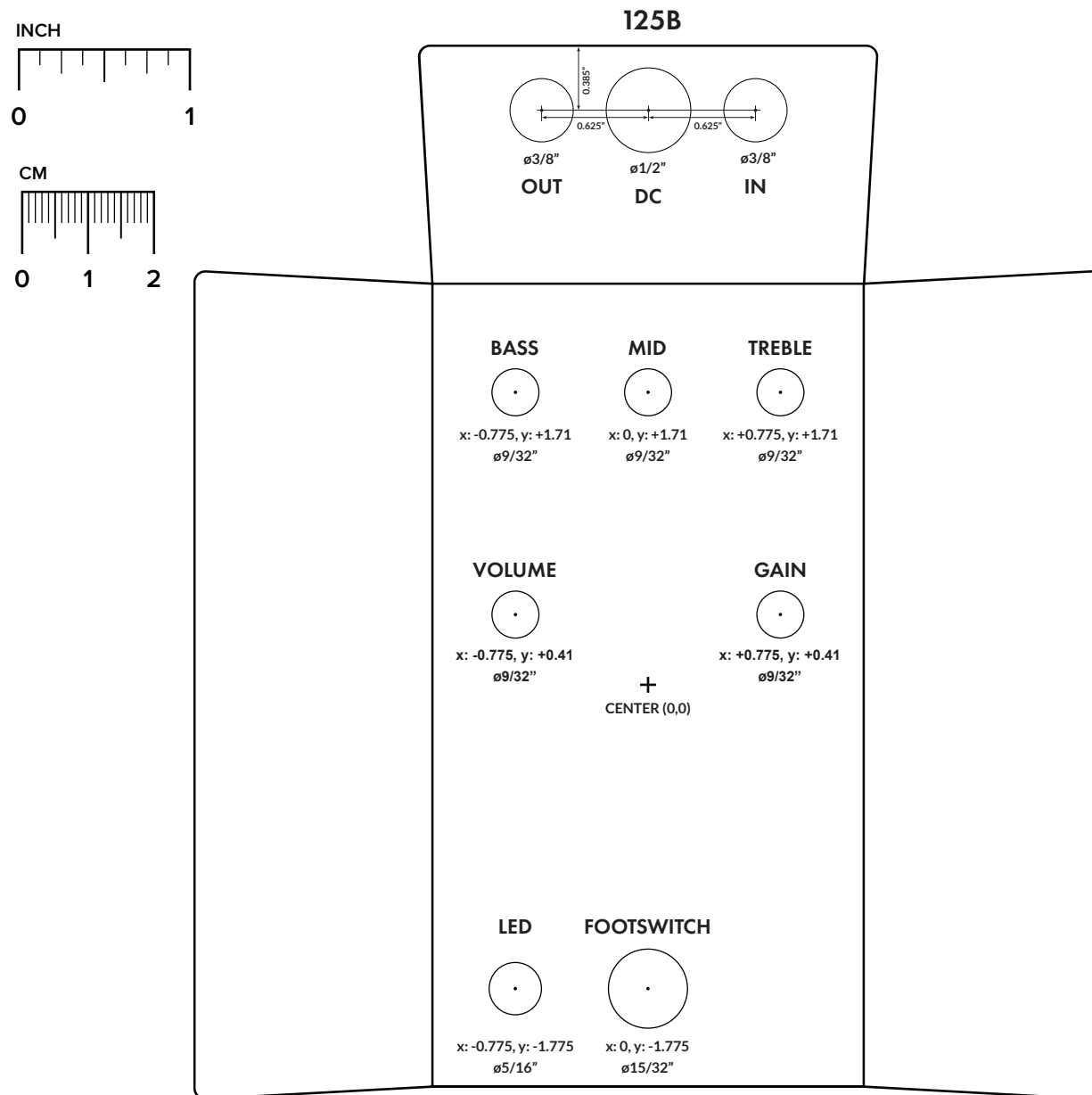
# DRILL TEMPLATE

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** requires the use of closed-frame jacks like the [Switchcraft 111X](#). Open-frame jacks will not fit in layouts with 5 or more knobs due to the placement of the DC jack.

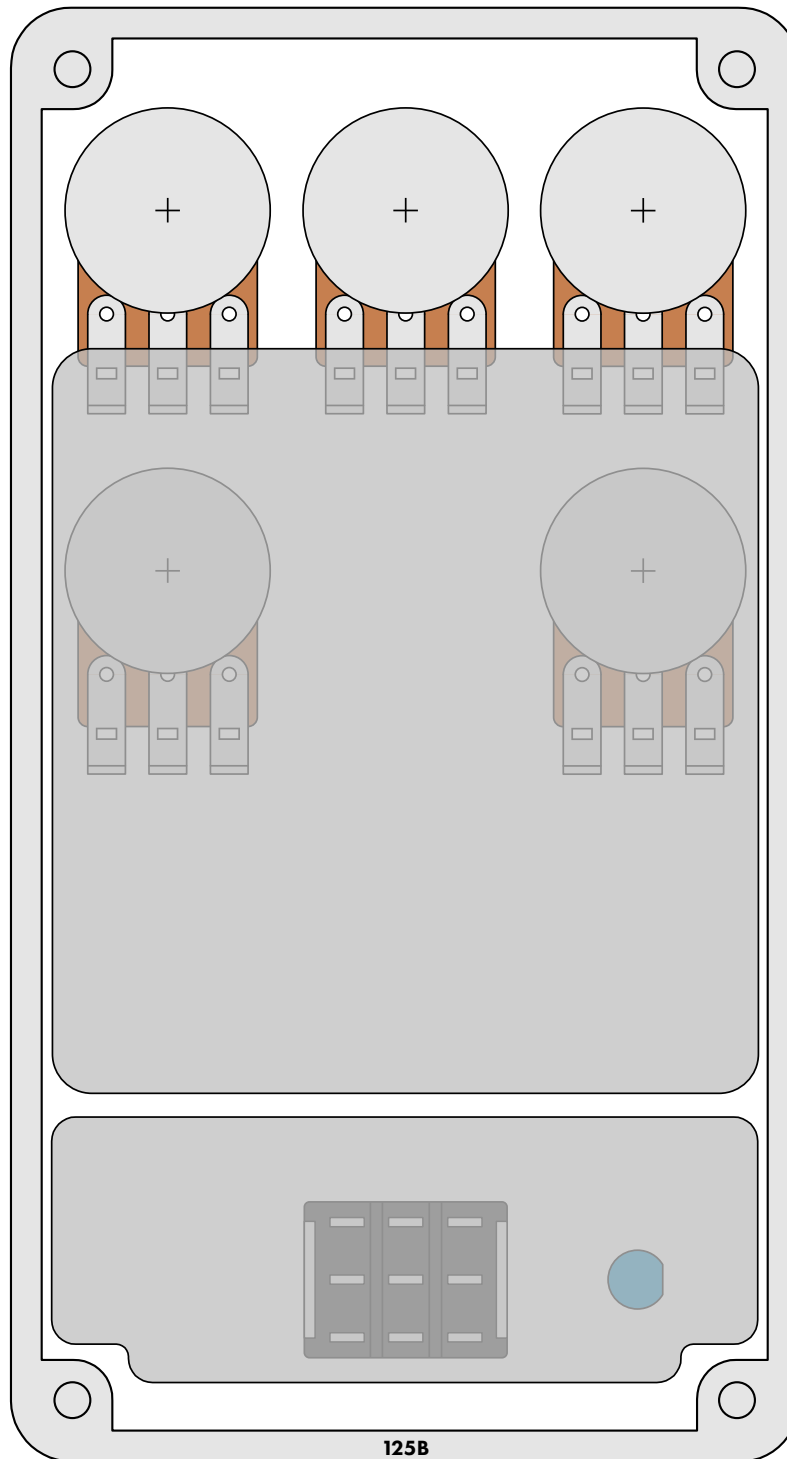
**LED hole drill size** assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



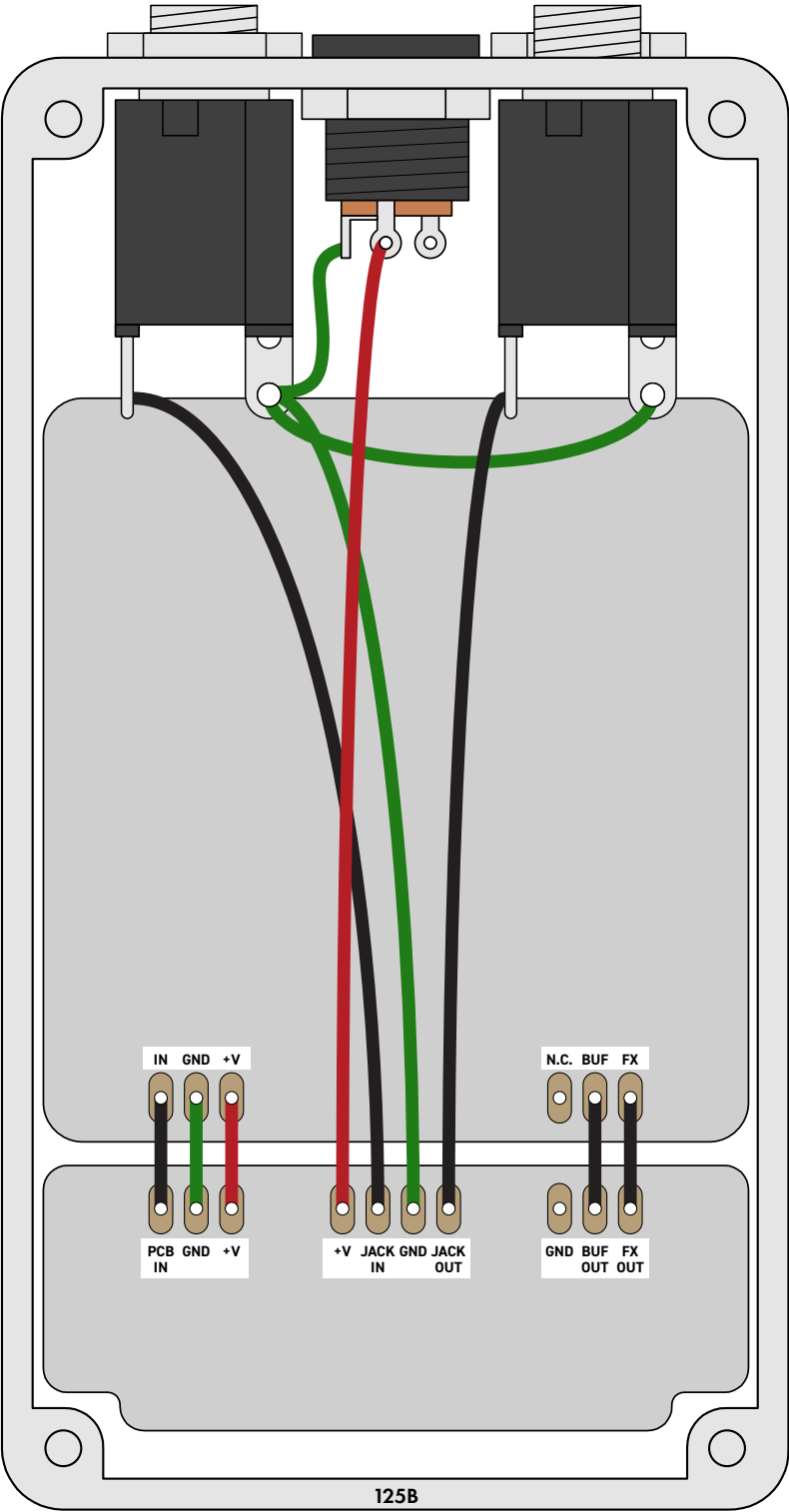
## ENCLOSURE LAYOUT

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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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### 1.0.3 (2023-10-06)

Added alternate part values for the Cornish GC-1 based on our trace.

### 1.0.2 (2022-10-11)

Updated drill template. The Gain and Volume knobs were about 0.1” higher than on the actual PCB.

### 1.0.1 (2021-09-16)

Corrected R22, R23 and R24 to 11k based on reevaluation of the original trace.

### 1.0.0 (2020-09-11)

Initial release.