

PROJECT NAME

CERULEAN

BASED ON

Marshall® Bluesbreaker®

EFFECT TYPE

Amp-like overdrive

BUILD DIFFICULTY

■■■■■ Easy

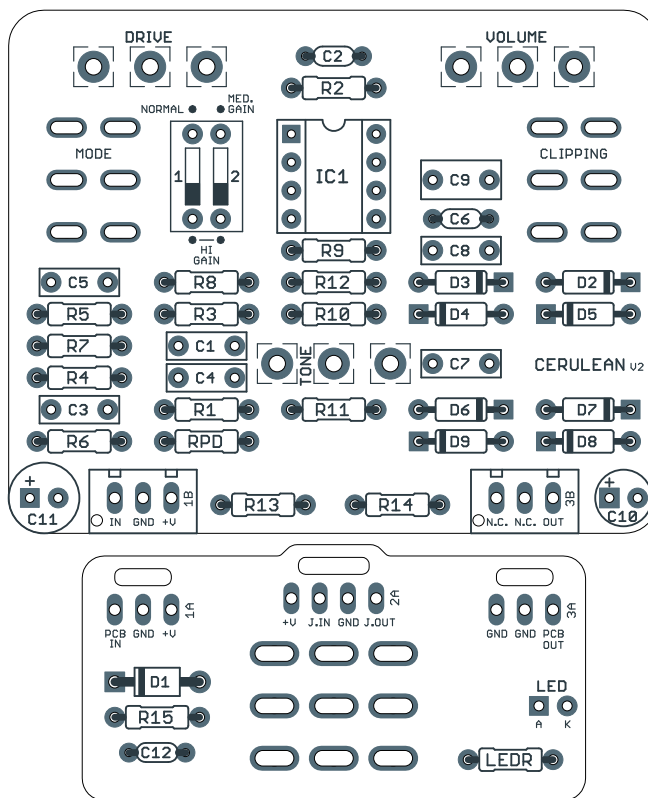
DOCUMENT VERSION

2.0.1 (2022-12-13)

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DIY GUITAR EFFECTS

PROJECT SUMMARY

A classic overdrive effect that was designed to mimic the Marshall Bluesbreaker amplifier from the 1960s. Also the source circuit for a number of high-dollar “boutique” guitar pedals.



Actual size is 2.3" x 1.86" (main board) and 2.3" x 0.86" (bypass board).

IMPORTANT NOTE

This documentation is for version 2 of the Cerulean, released on November 25, 2022. The previous version has a very different parts list. Please make sure your PCB looks like the one above before ordering parts and proceeding with the build. The Version 1 build document can be found [here](#).

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INTRODUCTION

The Cerulean Amp Overdrive is an updated version of the Marshall Bluesbreaker pedal, originally released in 1991. In 1995, Marshall moved production from England to Korea, and around this time they made some tweaks to the circuit, increasing the gain and reducing the bass. It was discontinued in 1999 to make way for the Bluesbreaker II, a redesign that is universally seen as inferior to the originals.

The Bluesbreaker is the source circuit for a number of expensive boutique pedals including the Analogman King of Tone, which is two Bluesbreakers in the same box with a few modifications. The Cerulean project borrows the expanded clipping options from the King of Tone, allowing you to select either soft clipping (stock), hard clipping, or no clipping (boost mode).

We have also added an internal DIP switch to select between three different gain range settings. Normally to increase the gain range of an overdrive, you'd just raise the value of the drive pot. However, the Bluesbreaker has a unique dual-stage gain control setup such that increasing the potentiometer value will also lower the minimum gain along with raising the maximum gain, so this method is not very useful. But by adding resistance to just the first stage, we can shift the overall gain range higher and get a lot more tones than the original pedal was capable of.

The third addition is a toggle switch to go between the pre-95 (V1) and post-95 (V2) versions. It's not a drastic difference, but there's enough lore surrounding the two versions that we thought it'd be worth including this as a setting.

The Cerulean V2 is a complete overhaul of the original Cerulean, which combined features from the JHS Morning Glory as well as the Presence trimmer from the King of Tone. The first version is no longer available, but the [legacy 1590B version](#) of the project is largely the same and will remain stocked. The King of Tone is available as the [Theseus](#) and the Prince of Tone is available as the [Achilles](#).

USAGE

The Bluesbreaker has the same control layout as most overdrive or distortion effects:

- **Tone** controls the treble response of the effect.
- **Drive** controls the amount of gain in the op-amp feedback diode clipping stage.
- **Volume** controls the overall output.
- **Clipping** (toggle switch) lets you choose between soft clipping (stock), hard clipping, or no clipping.
- **Mode** (toggle switch) changes between the V1 and V2 Bluesbreaker circuits.

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	470k	Metal film resistor, 1/4W	
R3	120k	Metal film resistor, 1/4W	
R4	27k	Metal film resistor, 1/4W	
R5	5k6	Metal film resistor, 1/4W	Switched in parallel with R4 for the V2 value of 4.7k.
R6	33k	Metal film resistor, 1/4W	
R7	3k6	Metal film resistor, 1/4W	Switched in parallel with R6 for the V2 value of 3.3k.
R8	10k	Metal film resistor, 1/4W	
R9	220k	Metal film resistor, 1/4W	
R10	6k8	Metal film resistor, 1/4W	
R11	1k	Metal film resistor, 1/4W	
R12	6k8	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	
R14	10k	Metal film resistor, 1/4W	
R15	100R	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor. Can be as low as 1M.
LED R	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	10n	Film capacitor, 7.2 x 2.5mm	
C2	47pF	MLCC capacitor, NP0/C0G	
C3	10n	Film capacitor, 7.2 x 2.5mm	
C4	10n	Film capacitor, 7.2 x 2.5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	10pF	MLCC capacitor, NP0/C0G	Optional. See build notes.
C7	10n	Film capacitor, 7.2 x 2.5mm	
C8	10n	Film capacitor, 7.2 x 2.5mm	
C9	1uF	Film capacitor, 7.2 x 3.5mm	
C10	47uF	Electrolytic capacitor, 5mm	Voltage reference filter capacitor.
C11	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C12	100n	MLCC capacitor, X7R	Power supply 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	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	1N914	Fast-switching diode, DO-35	
D9	1N914	Fast-switching diode, DO-35	
IC1	TL072	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
CLIP	DPDT center off	Toggle switch, DPDT, on-off-on	See build notes for more options.
MODE	DPDT on-on	Toggle switch, DPDT, on-on	
DRIVE	100kB	16mm right-angle PCB mount pot	Linear taper.
TONE	25kB	16mm right-angle PCB mount pot	Linear taper.
VOL	100kA	16mm right-angle PCB mount pot	Audio (log) taper.
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

Clipping switch

The clipping switch allows you to select between soft clipping (stock Bluesbreaker), hard clipping (King of Tone) and no clipping (boost mode).

You can change the function of this control by using a different type of switch.

- Use a DPDT on-on-on if you want the middle setting to be “both” instead of “neither”. However, be aware that the hard-clipping mode has a lower threshold than soft-clipping mode, so soft + hard mode will not sound much different than hard mode by itself.
- Use a DPDT on-on if you only want to have hard and soft clipping modes available.

Mode switch

The Mode switch selects between V1 (pre-95) and V2 (post-95) versions of the circuit. The only differences are the values of two resistors, R4 and R6, coming off the first op-amp stage feedback loop. In the first version, these resistors were 27k and 33k respectively. In the second version, these were dropped to 4.7k and 3.3k, which raises the gain and reduces the bass somewhat.

The Mode switch changes these two resistors from V1 to V2 values. Rather than switching between two different resistors, it adds resistors in parallel with the existing ones for the same effective value (or at least within 2%, which is well inside of the 5% tolerance of the carbon film resistors used in the original). By doing it this way, we can avoid momentarily disconnecting the feedback loop’s path to ground, which could cause an audible pop when the switch is used.

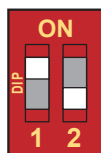
C6 capacitor

C6 is a bandwidth-limiting capacitor for the op-amp clipping stage. It’s not in the original Bluesbreaker, but when using op-amps for gain, it’s best practice to have some sort of high-frequency filtering to prevent ultra-high-frequency oscillation. This capacitor is found in several clones such as the JHS Morning Glory and Wampler Pantheon. It can be omitted if you want, but it has no impact on audible frequencies so it’s recommended to include it.

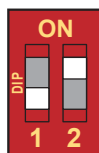
Gain range switch

The DIP switch sets the gain range of the Drive control. In normal mode, it’s equivalent to the stock Bluesbreaker circuit. Medium- and high-gain modes shift the range higher, allowing for an extended range of tones not found in the original pedal. The DIP switch settings are as follows:

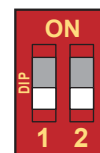
Normal



Medium

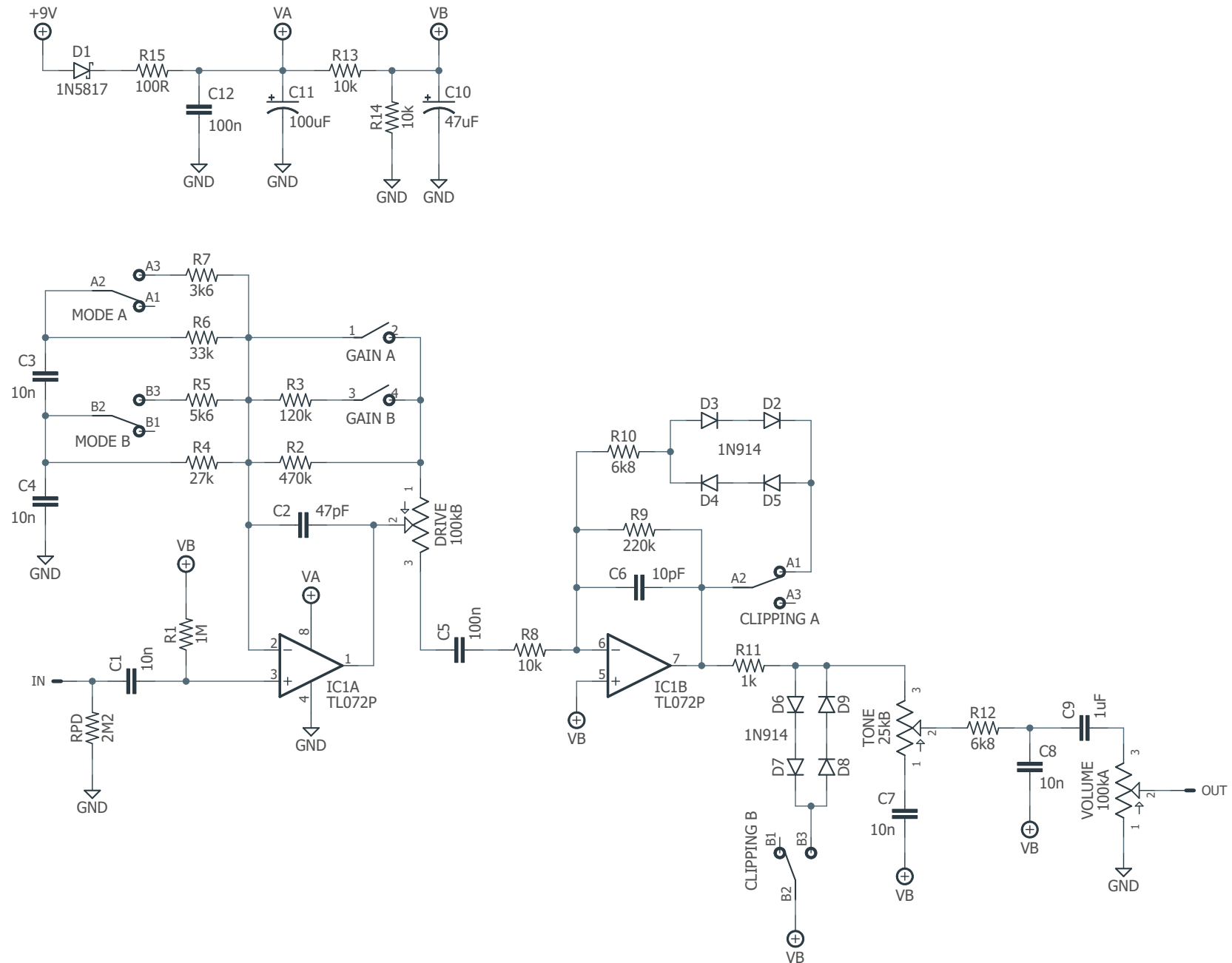


High



Note: Position 1 overrides position 2, so if both switches are in the up position, it will be in normal mode.

SCHEMATIC



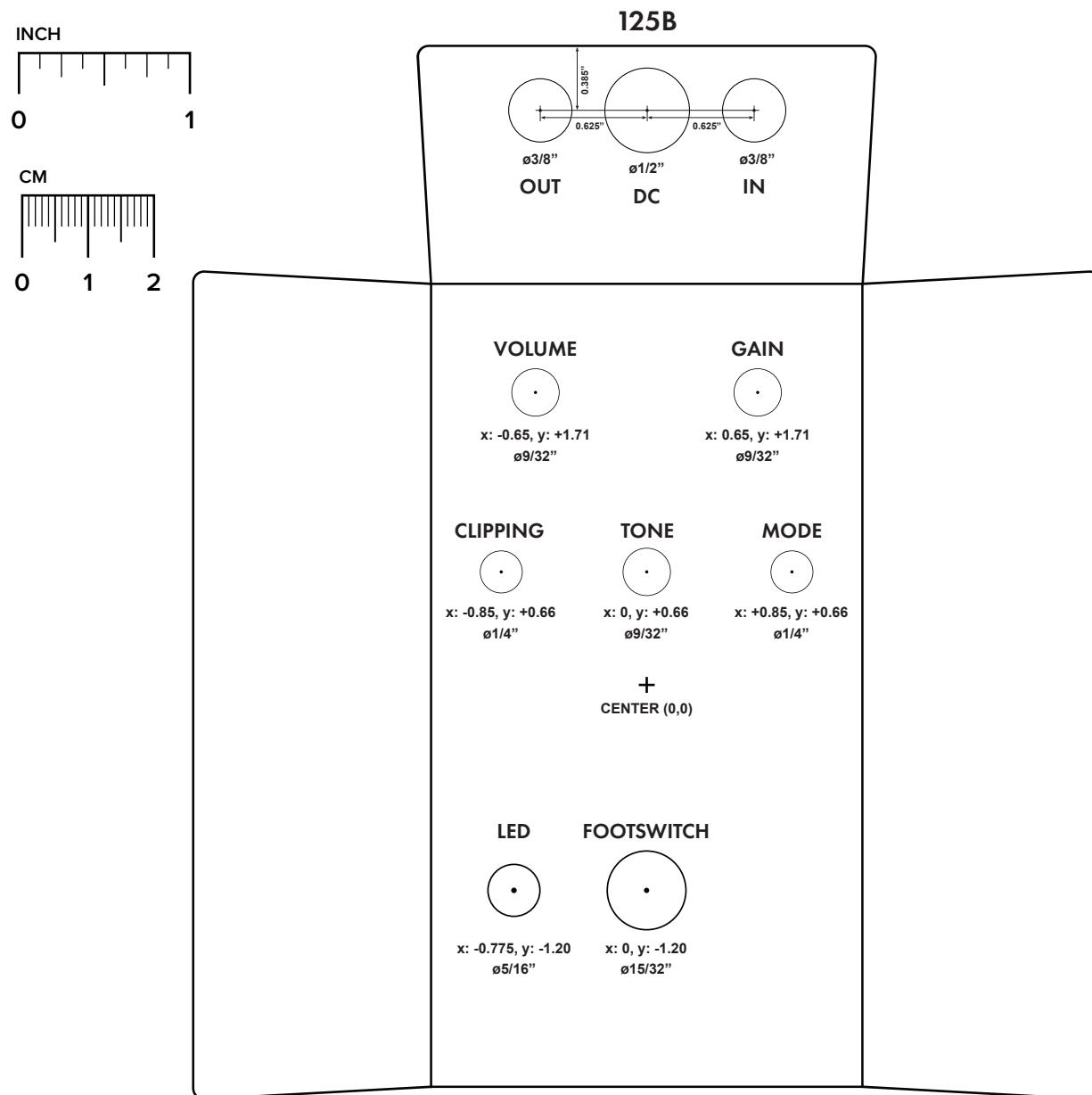
DRILL TEMPLATE

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.

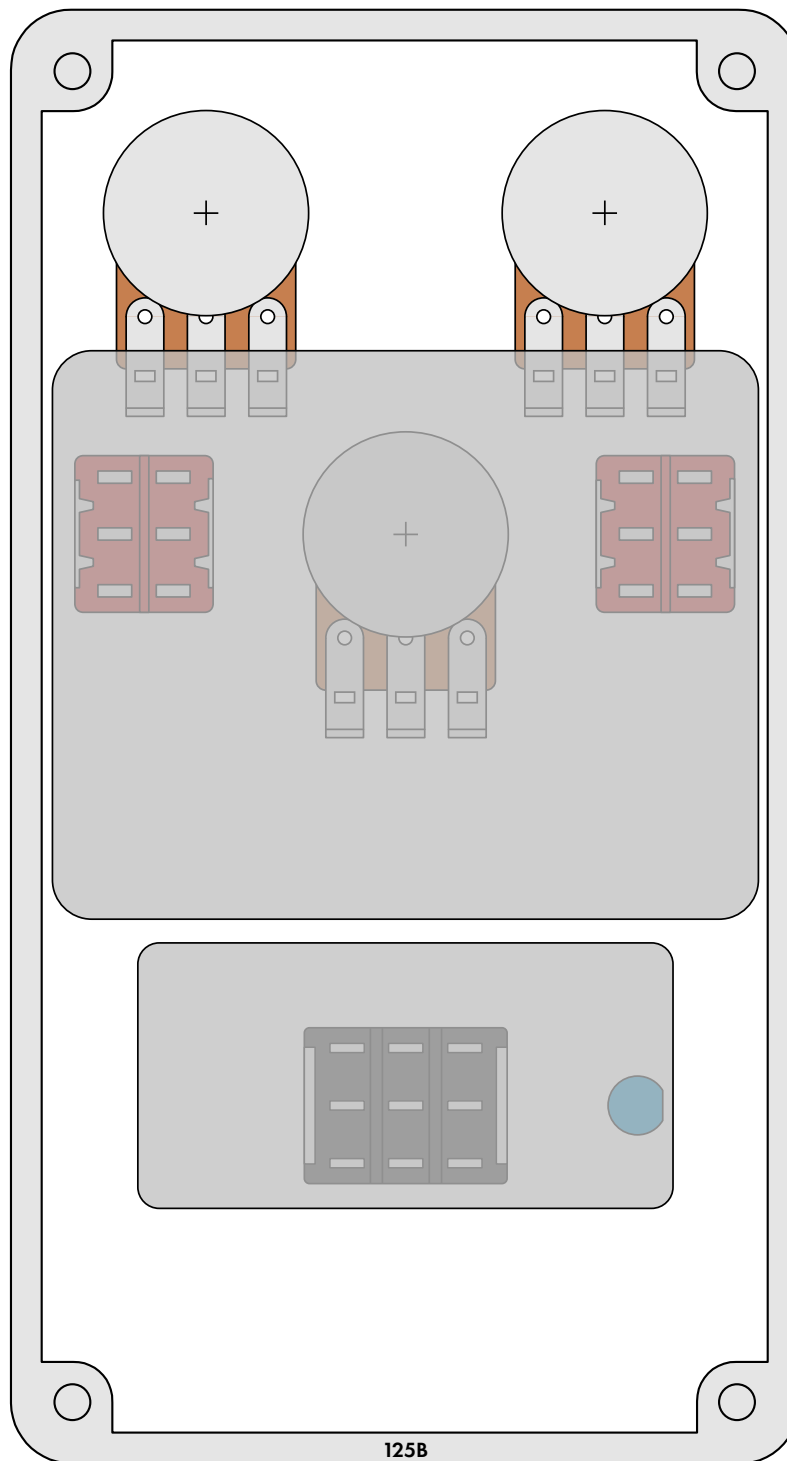
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

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.

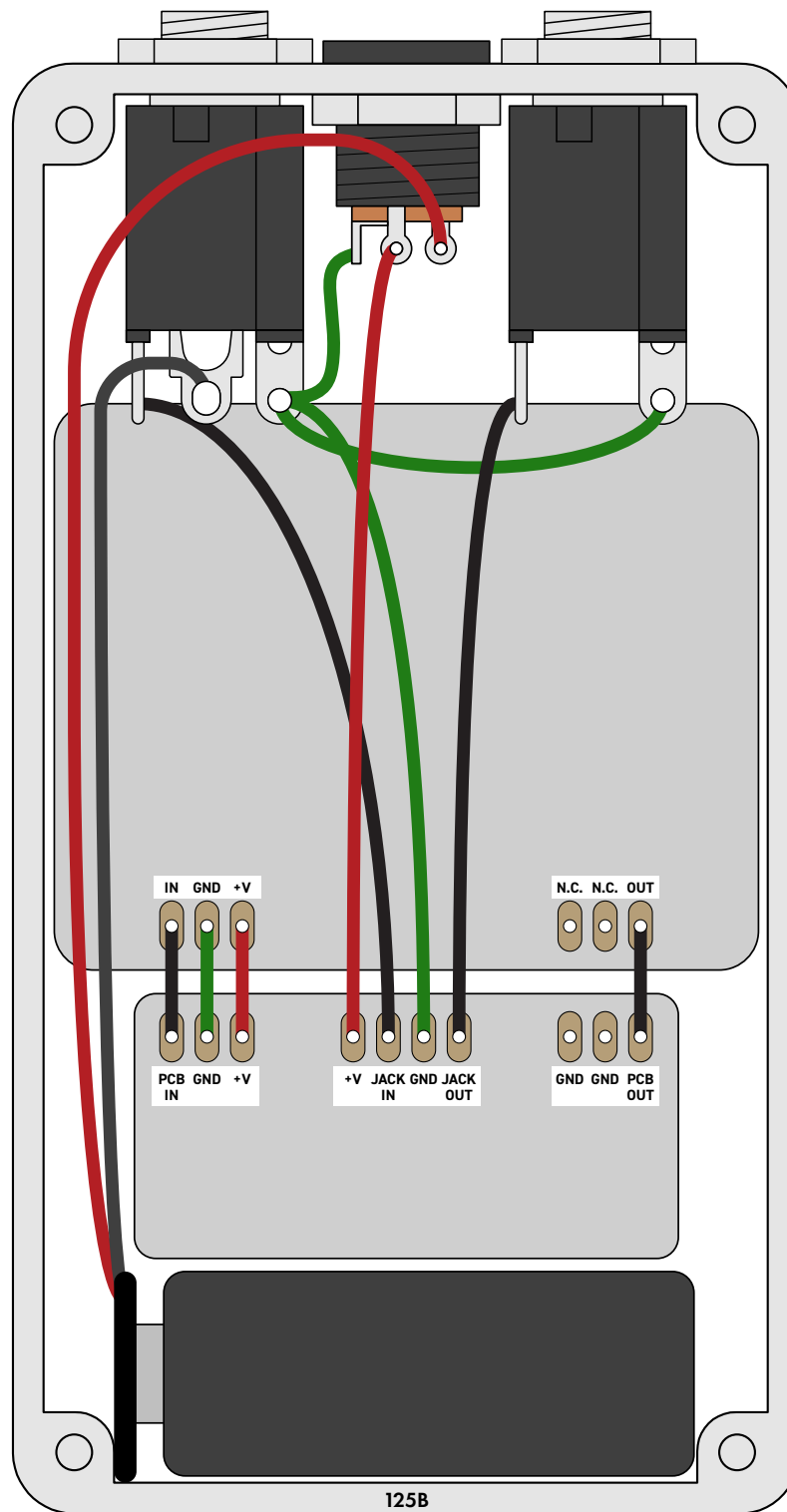


ENCLOSURE LAYOUT

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



WIRING DIAGRAM



*Shown with optional 9V battery. If battery is omitted, both jacks can be mono rather than one being stereo.
Leave the far-right lug of the DC jack unconnected.*

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

2.0.1 (2022-12-13)

- Added note about C6 being optional, and changed recommended value to 10pF.
- Corrected parts list (C10 and C11 were switched around). C10 is 47uF and C11 is 100uF.

2.0.0 (2022-11-25)

Complete circuit redesign.

- Combined soft & hard clipping into one switch.
- Added new “Mode” toggle to go between V1 and V2 Bluesbreaker variants.
- Added new internal DIP switch to select between three gain ranges.
- Removed JFET boost stage.

1.1.0 (2020-05-18)

- Changed value of C10 for consistency.
- Slight layout change, relocating D1 to footswitch board.
- Added C11 MLCC capacitor to footswitch board.

1.0.1 (2018-08-14)

Corrected parts list to specify LEDs for D6 and D7. Minor formatting adjustments.

1.0.0 (2018-07-04)

Initial release.