PROJECT NAME

XIPHOS

aion DIY GUITAR EFFECTS

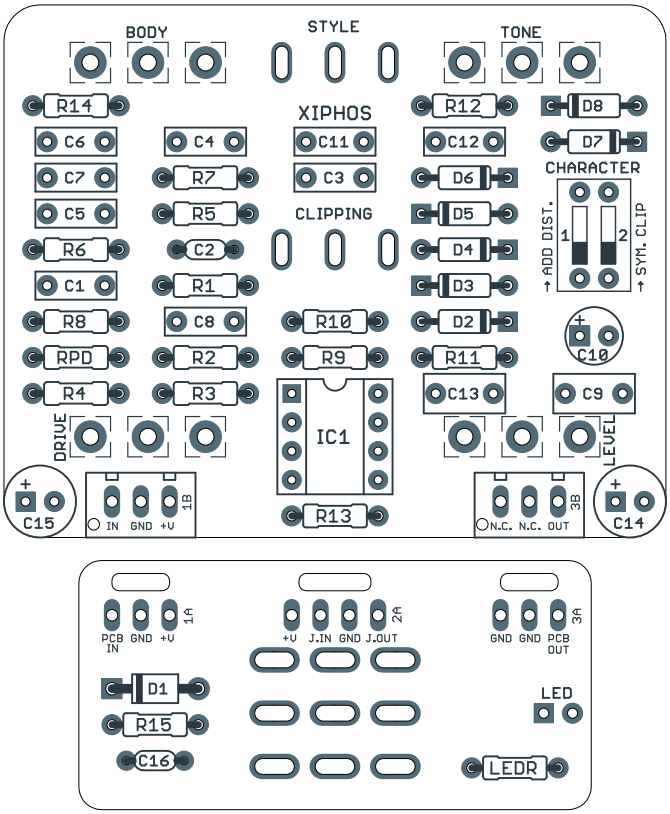
BASED ON
King Tone Heavyhand

BUILD DIFFICULTY
▮▮▯▯▯ Easy

EFFECT TYPE
Amp-like overdrive

DOCUMENT VERSION
1.0.2 (2025-04-06)

PROJECT SUMMARY
A single-channel adaptation of side B of the popular Duellist dual pedal, based on a Marshall Bluesbreaker with hot-rodded features.



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

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INTRODUCTION

The Xiphos Amp Overdrive is based on the King Tone Heavyhand, traced by Aion FX in 2022. First released in 2021, the Heavyhand (sometimes rendered as Heavy Hand) is side B of the Duellist dual pedal, derived from the Marshall Bluesbreaker overdrive circuit but with several added modifications and switch options.

However, it's not an exact copy of what's inside the Duellist. While it does share the core circuit in common, the Duellist is capable of some modified tones that the Heavyhand can't match, and vice versa. Notably, the Heavyhand adds an additional Body potentiometer, a new diode selector switch, and swaps out the "Fat" toggle mode for a new "Edge" mode.

The Xiphos unifies these two circuits, porting the features from the Duellist that were not on the original Heavyhand. An additional diode has been added in one direction on a DIP switch, making the stock clipping mode asymmetric when active. It also has an option for diode-to-ground hard clipping, also via an internal DIP switch. Note that since the hard-clipping mode has a low clipping threshold, the external diode selector switch won't have as much audible effect when the hard clipping is enabled.

USAGE

The Xiphos has six external controls:

- **Drive** controls the amount of gain going into the op-amp feedback diode clipping stage.
- **Body** controls the low-end response of the effect before the clipping.
- **Tone** controls the treble response after the clipping via a passive filter.
- **Level** controls the overall output.
- **Clipping** (toggle switch) selects between two different diode combinations (Stock and Comp) or a diode-lift mode (Open) in the center.
- **Style** (toggle switch) selects between Edge, Stock and Glass modes, which set the pre-clipping treble response.

There are also two internal DIP switches. (These switch labels are reversed in v1.0; see build notes.)

- **Hard Clipping** adds a second set of diodes for hard-clipping mode, similar to the King of Tone. Engaged when the DIP switch is "on".
- **Asymmetric** adds another diode in series with the first set for asymmetric clipping in stock mode. It has no effect in the Comp or Open modes. Engaged when the DIP switch is "off".

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	133k	Metal film resistor, 1/4W	
R3	OMIT		Use 360k if using a 250kB drive pot. See build notes.
R4	OMIT		Use 22k if using a 250kB drive pot. See build notes.
R5	4k7	Metal film resistor, 1/4W	
R6	28k7	Metal film resistor, 1/4W	
R7	30k1	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	
R9	220k	Metal film resistor, 1/4W	
R10	5k6	Metal film resistor, 1/4W	
R11	1k	Metal film resistor, 1/4W	
R12	9k53	Metal film resistor, 1/4W	
R13	47k	Metal film resistor, 1/4W	
R14	47k	Metal film resistor, 1/4W	
R15	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	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	10n	Film capacitor, 7.2 x 2.5mm	
C2	100pF	MLCC capacitor, NP0/C0G	
C3	10n	Film capacitor, 7.2 x 2.5mm	
C4	4n7	Film capacitor, 7.2 x 2.5mm	
C5	10n	Film capacitor, 7.2 x 2.5mm	
C6	10n	Film capacitor, 7.2 x 2.5mm	
C7	47n	Film capacitor, 7.2 x 2.5mm	
C8	100n	Film capacitor, 7.2 x 2.5mm	
C9	1uF	Film capacitor, 7.2 x 3.5mm	Not in original unit, but recommended to use instead of C10.
C10	OMIT		4.7uF electrolytic in original. See build notes.
C11	10n	Film capacitor, 7.2 x 2.5mm	
C12	10n	Film capacitor, 7.2 x 2.5mm	
C13	1uF	Film capacitor, 7.2 x 3.5mm	
C14	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C15	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C16	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	Original uses BA282 diodes. The BAS33 is the closest available diode currently available. See build notes.
D2	BAS33	Switching diode, DO-35	
D3	BAS33	Switching diode, DO-35	
D4	BAS33	Switching diode, DO-35	
D5	BAS33	Switching diode, DO-35	
D6	BAS33	Switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	1N914	Fast-switching diode, DO-35	
IC1	RC4558P	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
CHAR.	2-pos. DIP	DIP switch, 2-position	
DRIVE	150kC	16mm right-angle PCB mount pot	Can also use 250kB with tapering resistors. See build notes.
BODY	500kC	16mm right-angle PCB mount pot	
TONE	25kB	16mm right-angle PCB mount pot	
LEVEL	100kA	16mm right-angle PCB mount pot	Original uses linear taper, but audio taper will provide better control.
CLIP	SPDT cntr. off	Toggle switch, SPDT on-off-on	
STYLE	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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Clipping diodes

The Heavyhand uses BA282 diodes, which clip at a slightly higher threshold than standard silicon diodes such as 1N914 (approximately 0.82V compared to 0.7V). These diodes are out of production and hard to find in the old-stuck market.

Now, the closest option is the BAS33. These clip at around 0.8V, still significantly higher than the 1N914 and only slightly lower than the BA282. We've compared the curves on a Peak DCA75 and confirmed that they closely match the BA282 across the current test range.

The only problem is that the BAS33 went end-of-life in early 2022. Availability is still high, but eventually they'll join the ranks of the others.

Drive potentiometer

The Drive pot is 150kC in the original, which is an odd value (though not impossible to find). R3 and R4 have been added as tapering resistors to approximate the value and curve of a 150kC using a 250kB pot. If you use 250kB, then use **360k** for R3 and **22k** for R4. This method is far from exact, though, so try to use a 150kC if you can find one.

C9/C10 capacitor

C9 has been added as a film cap alternative to the 4.7uF electrolytic used in the original. Film caps are better quality for signal coupling, and 4.7uF is much higher than necessary in this position, so it's recommended to use C9 and omit C10.

Knobs

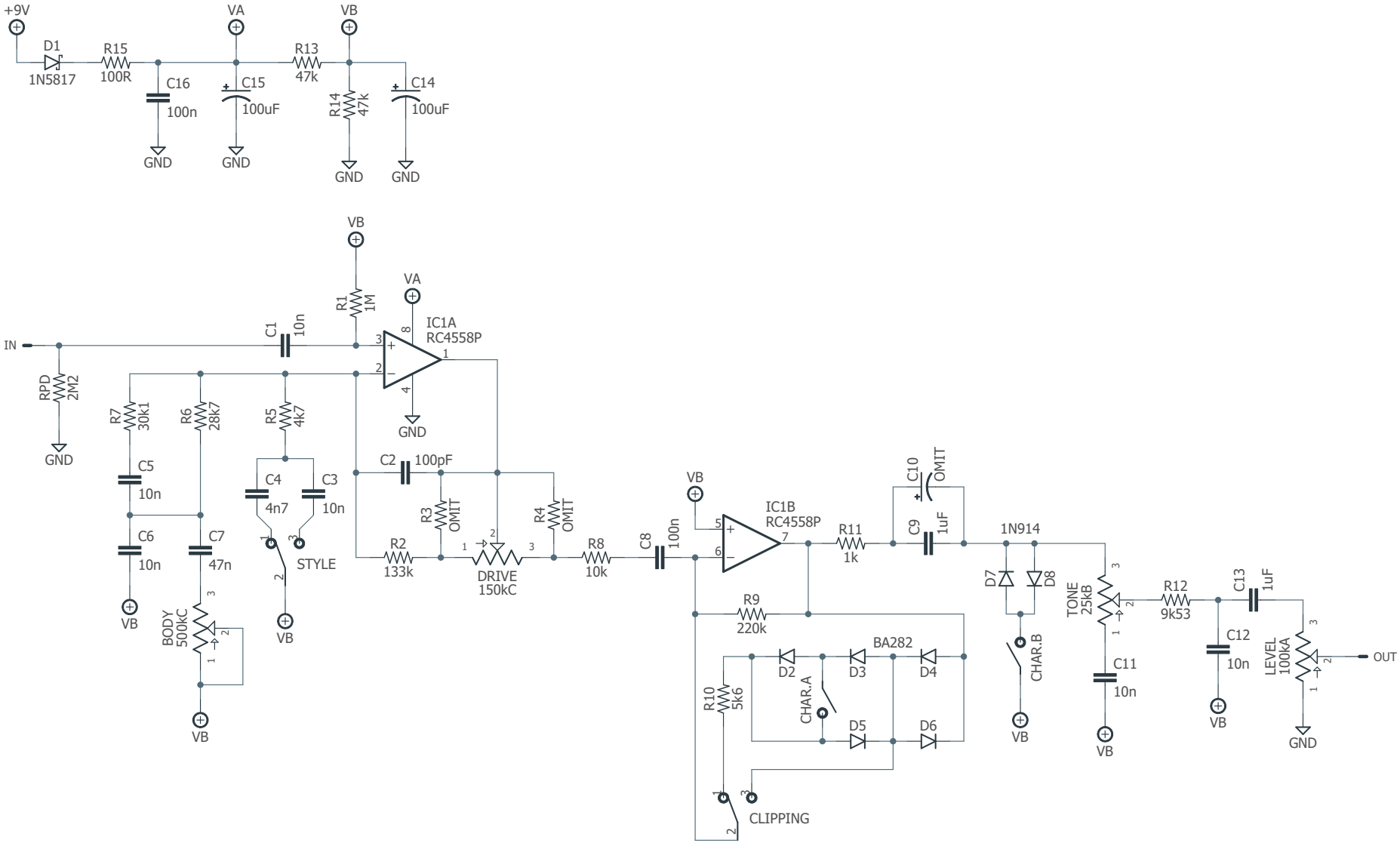
Since the two lower pots are very close to the lower toggle switch, it's recommended to use 1/2" knobs for these two. The upper two knobs can be 3/4". This is the cosmetic look we used for the Penumbra Bass Fuzz, which uses the same drill template.

DIP switch labeling

The PCB silkscreen for the DIP switch shows "Add Dist." on the left and "Sym. Clip" on the right. These labels were inadvertently reversed in the original layout and we didn't catch it for a few years. Symmetrical clipping is actually engaged with the left-side switch and hard clipping is engaged with the right-side switch.

This will be fixed in the next revision when we reorder the PCBs, but for the current version, be aware of this reversal.

SCHEMATIC


+9V
D1
1N5817
R15
100R
C16
100n
GND
VA
C15
100uF
GND
R13
47k
VB
R14
47k
GND
C14
100uF
GND
VB
R1
1M
VA
IC1A
RC4558P
C1
10n
IN
RPD
2M2
GND
R7
30k1
R6
28k7
R5
4k7
C5
10n
C6
10n
C7
47n
C4
4n7
C3
10n
STYLE
VB
BODY
500kC
VB
C2
100pF
R3
OMIT
R4
OMIT
R2
133k
DRIVE
150kC
R8
10k
C8
100n
VB
IC1B
RC4558P
C10
OMIT
C9
1uF
R11
1k
1N914
R9
220k
BA282
D2
D3
D4
D5
D6
CHAR.A
R10
5k6
CLIPPING
D7
D8
CHAR.B
VB
TONE
25kB
C11
10n
VB
R12
9k53
C12
10n
VB
C13
1uF
LEVEL
100kA
GND
OUT

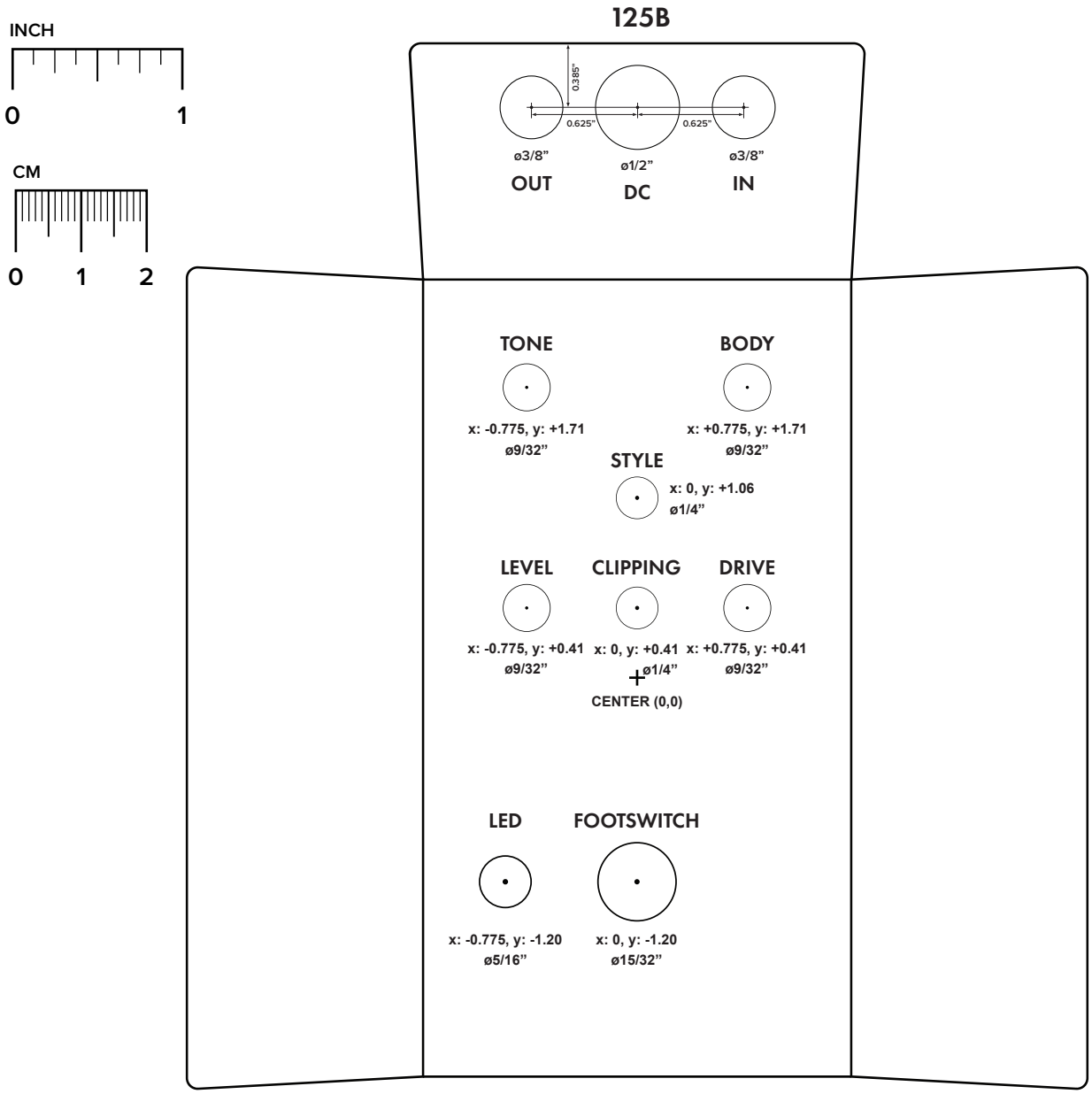
DRILL TEMPLATE

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.

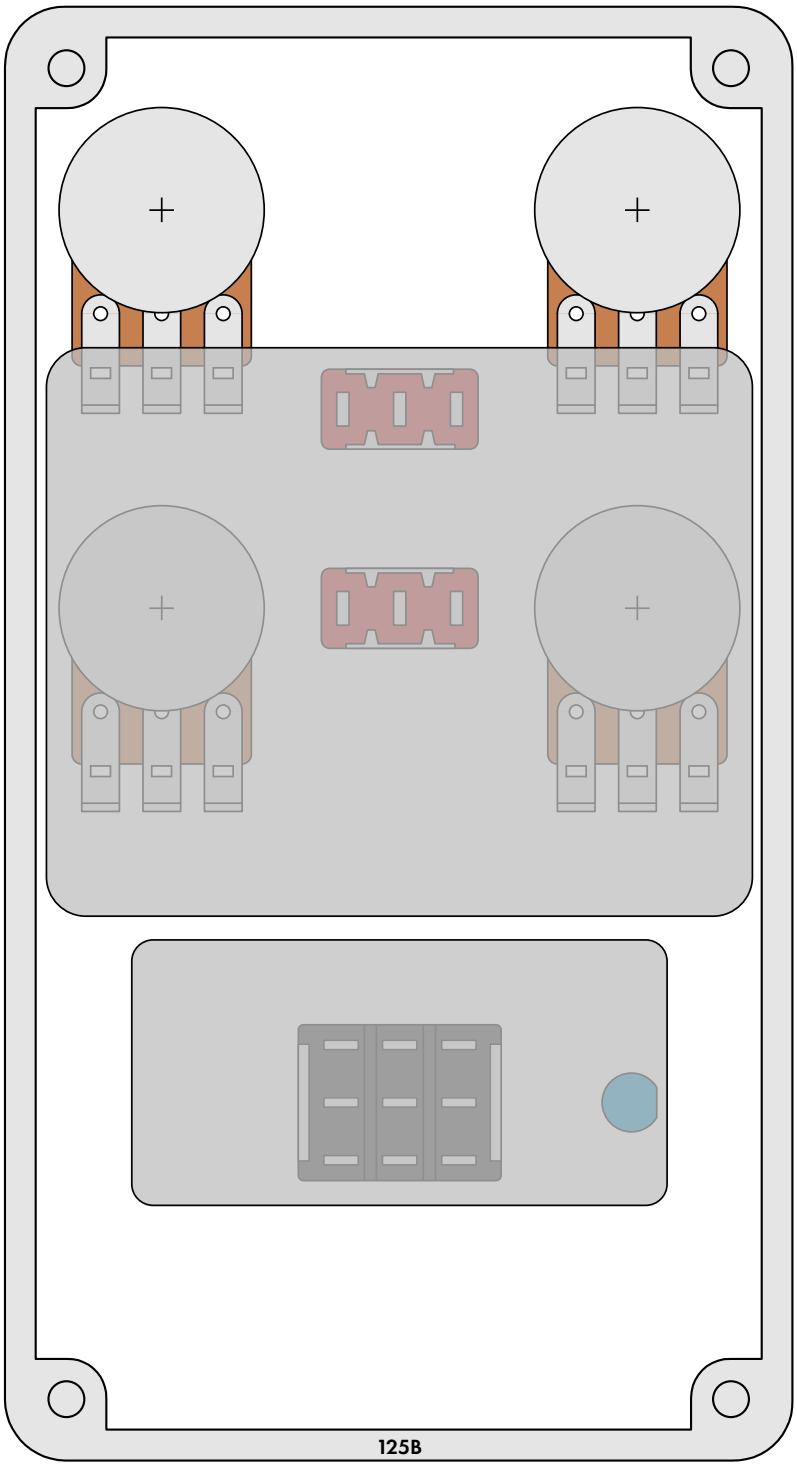
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

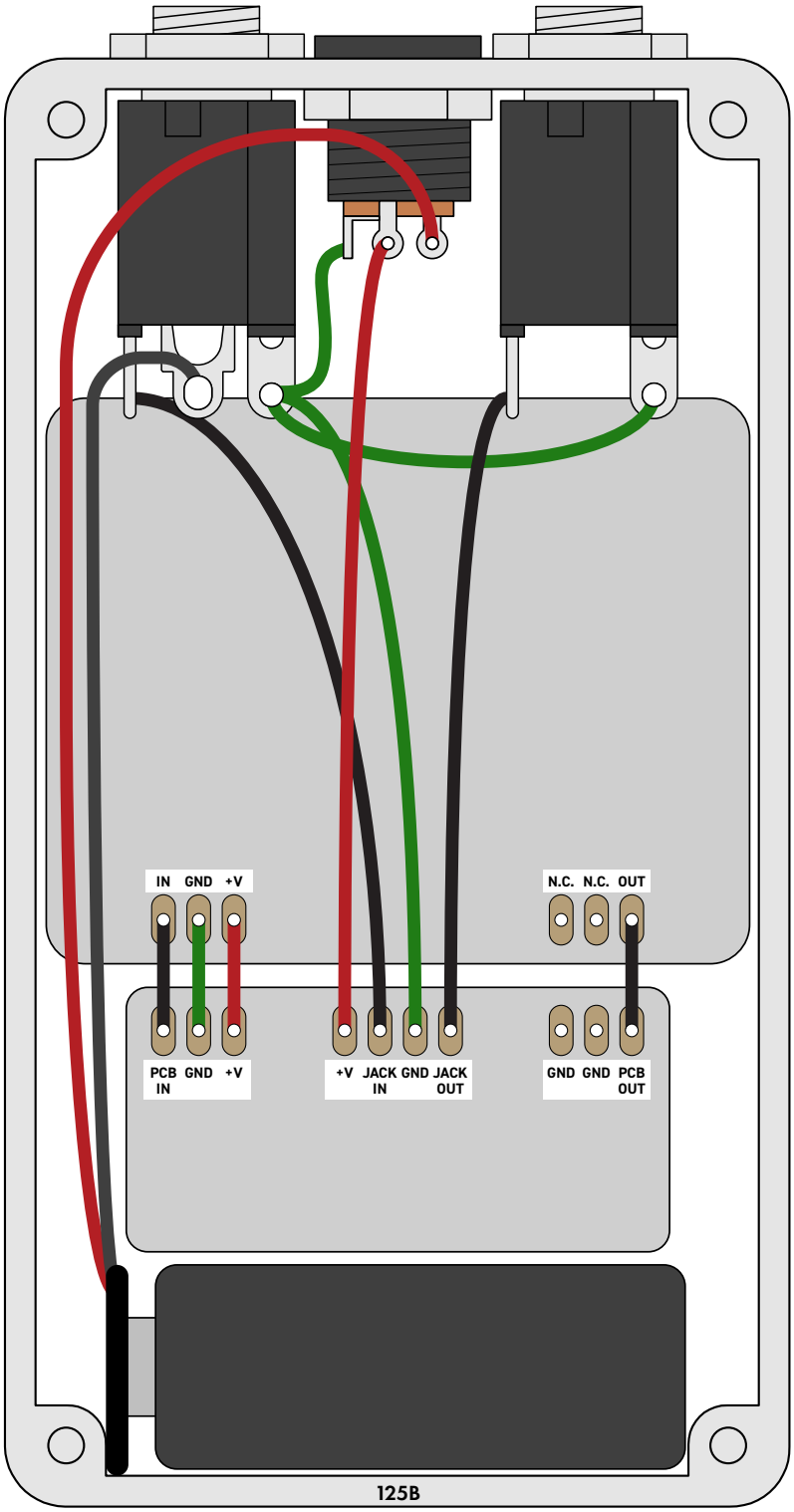


ENCLOSURE LAYOUT

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

1.0.2 (2025-04-06)
Added note about DIP switch labeling being reversed in v1.0 PCBs.

1.0.1 (2022-05-18)
Corrected description of asymmetric diode switch function.

1.0.0 (2022-05-13)
Initial release.