

PROJECT NAME

WYVERN

BASED ON

Dinosaural® Tube Bender™

BUILD DIFFICULTY

■■■■■ Easy

EFFECT TYPE

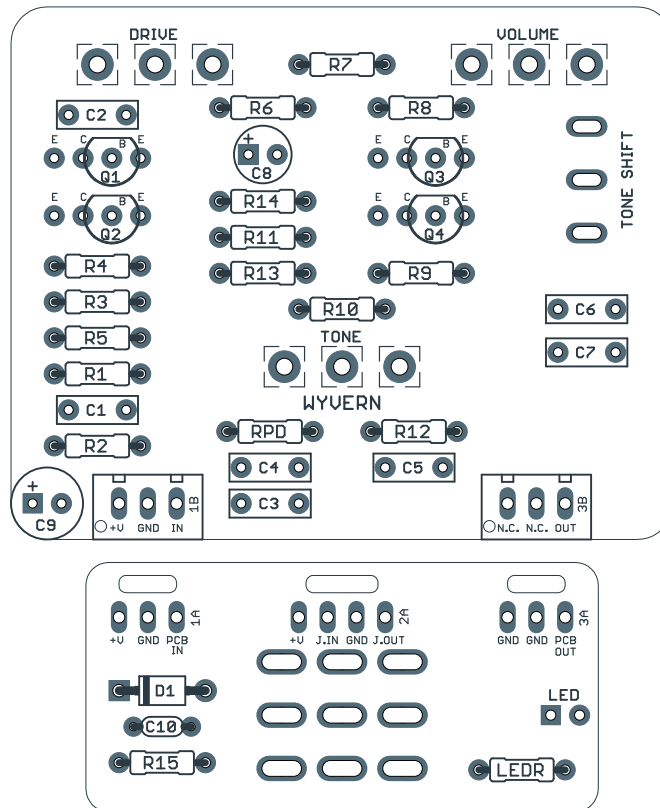
Overdrive / fuzz

DOCUMENT VERSION

1.0.3 (2020-11-30)

PROJECT SUMMARY

A reproduction of a rare silicon-transistor drive pedal designed by Dan Coggins, formerly of Lovetone, handbuilt in small quantities from 2003–2007.



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

TABLE OF CONTENTS

1	Project Overview	8	Drill Template
2	Introduction & Usage	9	Enclosure Layout
3-4	Parts List	10	Wiring Diagram
5-6	Build Notes	11	Licensing
7	Schematic	11	Document Revisions

INTRODUCTION

The Wyvern Silicon Drive is an adaptation of the Tube Bender, a silicon transistor overdrive designed by Dan Coggins of Dinosaural (and formerly of Lovetone). It was originally designed as a DIY project and kit by Guitar Magazine (UK) in February 2003.

In October of the same year, Dan tweaked the voicing of the circuit and added the “Tone Shift” switch and began building it commercially under the Dinosaural name. Around 140 of them were made before production ceased in 2007. In 2016, Dan built another 12 units using the original circuit board, parts and internal wiring, with the only difference being the black enclosure compared to the original white.

Despite the low number of units in existence, the Tube Bender found its way into the hands of several musicians and producers in the UK, including Snow Patrol who have several of them. (According to their manager, their “Eyes Open” album from 2006 made extensive use of the Tube Bender.)

As the name implies, it was designed to land somewhere in between the Tube Screamer and Tone Bender in sound, although the circuit shares nothing in common with either of them from an engineering perspective. And while the schematic does resemble other silicon fuzz circuits such as the Hot Silicon, it’s definitely not voiced like a fuzz.

The Wyvern is based on the commercial version of the Tube Bender which was traced by Aion FX in 2020. The earlier magazine version can also be built with a few parts substitutions that are provided. The only modification in the Wyvern is the use of a 3-position switch for the Tone Shift so you can have a third setting in between the other two.

USAGE

The Wyvern has three controls and one toggle:

- **Drive** controls the amount of gain from the first transistor stage.
- **Tone** is similar to a Big Muff tone control, panning between a bass emphasis on one side and a treble emphasis in the other direction.
- **Level** is the output volume of the effect.
- **Tone Shift** is a toggle switch that changes the frequency of the tone control, opening up a bigger range of available sounds.

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	1k5	Metal film resistor, 1/4W	1k2 in magazine project.
R2	1M	Metal film resistor, 1/4W	
R3	120k	Metal film resistor, 1/4W	100k in magazine project.
R4	1k2	Metal film resistor, 1/4W	
R5	2k2	Metal film resistor, 1/4W	
R6	150R	Metal film resistor, 1/4W	
R7	1k2	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	22k in magazine project.
R9	1k2	Metal film resistor, 1/4W	2k2 in magazine project.
R10	10k	Metal film resistor, 1/4W	22k in magazine project.
R11	10k	Metal film resistor, 1/4W	22k in magazine project.
R12	22k	Metal film resistor, 1/4W	68k in magazine project.
R13	22k	Metal film resistor, 1/4W	
R14	22k	Metal film resistor, 1/4W	
R15	100R	Metal film resistor, 1/4W	Power supply resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor. Can be as low as 1M.
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	47n	Film capacitor, 7.2 x 2.5mm	100n in magazine project.
C3	47n	Film capacitor, 7.2 x 2.5mm	100n in magazine project.
C4	3n3	Film capacitor, 7.2 x 2.5mm	4n7 in magazine project.
C5	10n	Film capacitor, 7.2 x 2.5mm	
C6	33n	Film capacitor, 7.2 x 2.5mm	
C7	10n	Film capacitor, 7.2 x 2.5mm	Modification that adds a 3rd Tone Shift position from the original. Can experiment with 15n or 22n here as well.
C8	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C9	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C10	100n	MLCC capacitor, X7R	Power supply filter capacitor.

PARTS LIST, CONT.

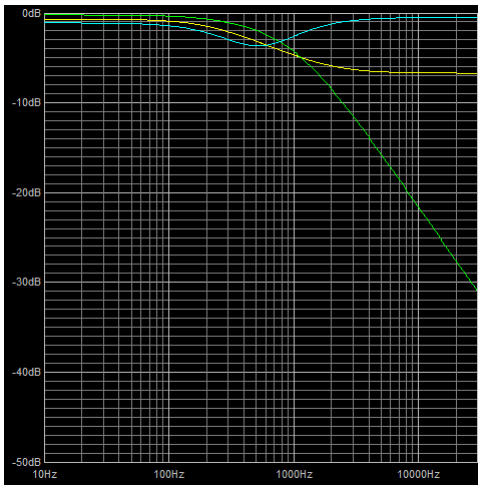
PART	VALUE	TYPE	NOTES
D1	1N5817	Schottky diode, DO-41	
Q1	2N5088	BJT transistor, NPN, TO-92	Original uses BC549C. 2N5088 is the USA standard equivalent.
Q2	2N3906	BJT transistor, PNP, TO-92	Original uses BC307B (obsolete). 2N3906 is equivalent.
Q3	2N5088	BJT transistor, NPN, TO-92	Original uses BC549C. 2N5088 is the USA standard equivalent.
Q4	2N5088	BJT transistor, NPN, TO-92	Original uses BC549C. 2N5088 is the USA standard equivalent.
DRIVE	100kA	16mm right-angle PCB mount pot	50kA in magazine project.
TONE	100kB	16mm right-angle PCB mount pot	50kA in magazine project.
LEVEL	100kB	16mm right-angle PCB mount pot	50kA in magazine project.
T.SHIFT	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

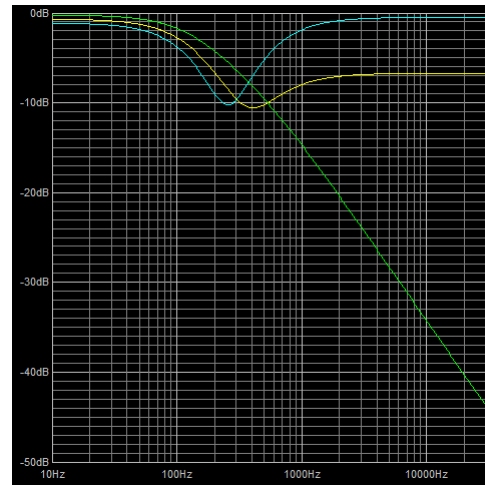
Tone Shift

The commercial version of the Tube Bender has a SPST push-button switch that adds another capacitor in parallel with C5, which sets the frequency of the bass side of the Tone control's rotation as well as the overall midrange throughout the sweep.

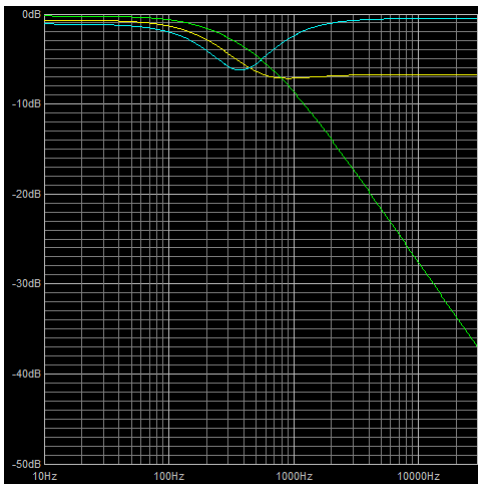
Following are some frequency charts showing the Tone control at full CCW (green), center (yellow), and full CW (cyan) in different scenarios so you can visualize what's going on in each setting.



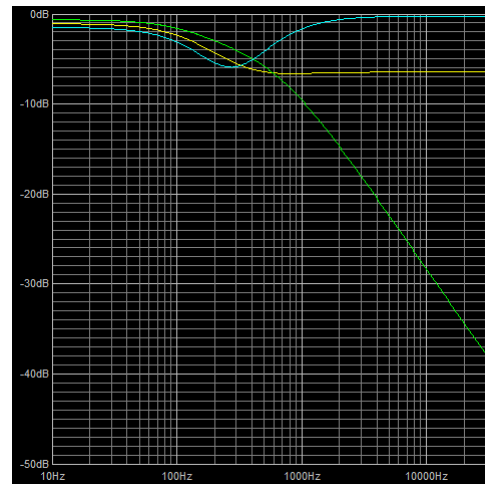
Commercial version, tone shift disabled



Commercial version, tone shift enabled



*Wyvern with commercial values,
alternate tone shift (C7 = 10n)*



Magazine version (no tone shift switch)

So as you can see, the commercial version has a relatively flat tone response, although unlike a Big Muff, the bass frequencies are relatively unchanged throughout the rotation. With the Tone Shift enabled, though, there's a steep scoop in the midrange except in the full-CCW position. The Wyvern's recommended alternate tone shift capacitor (10n) is partway between the two.

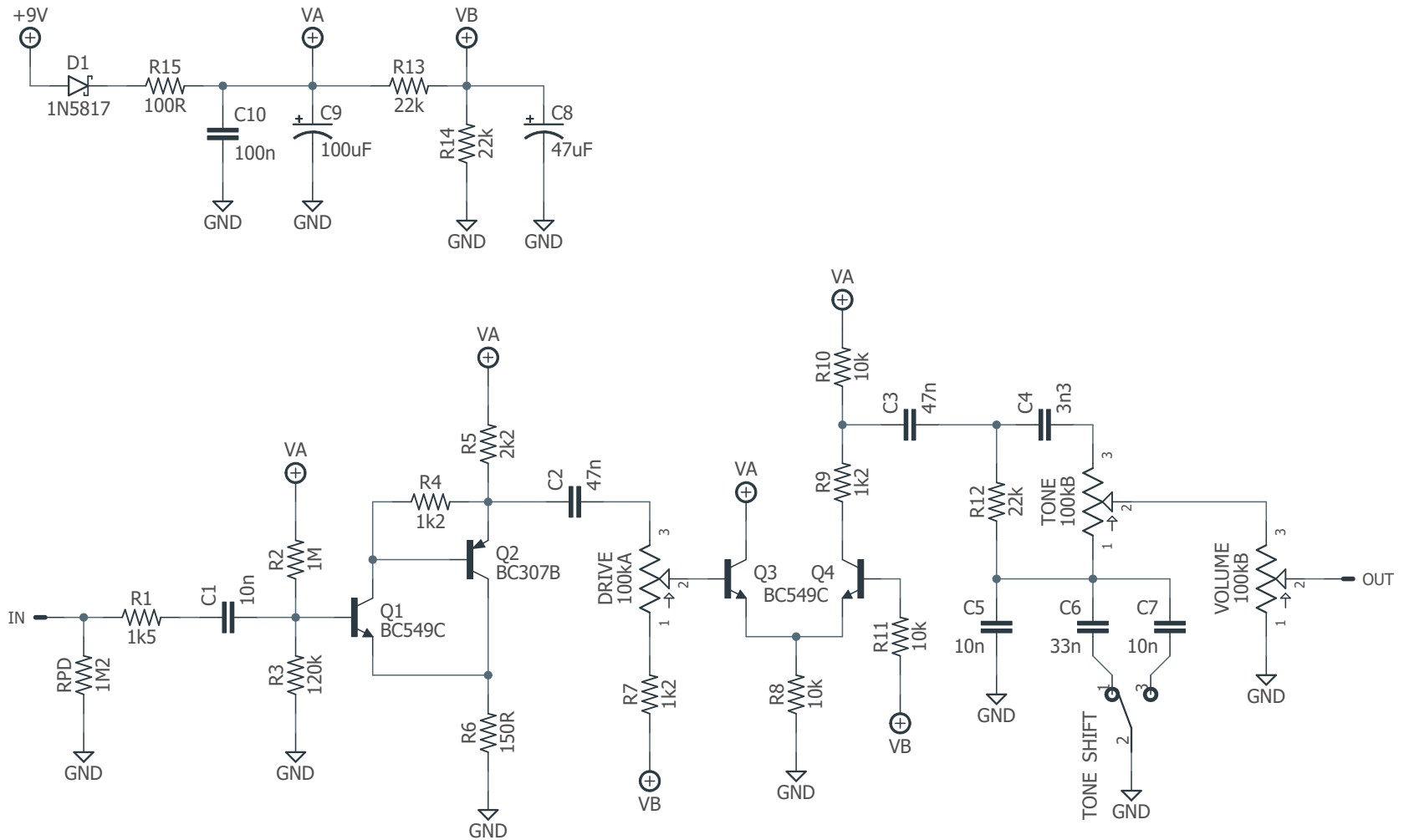
The magazine version's tone stack is closest to the Wyvern's alternate tone shift mode, although the rest of the circuit is very different so it's not going to sound the same with just that one change.

BUILD NOTES, CONT.

Transistor outlines

While the original Tube Bender used European BC-series transistors, the Wyvern PCB layout uses the USA E-B-C pinout. If you use the original BC549C or BC307B, you will need to install the transistors backwards (rotated 180 degrees from the outline). If you're not sure, check the datasheet. And if your unit makes no sound when first powered up, the transistor orientation is the most likely culprit.

SCHEMATIC



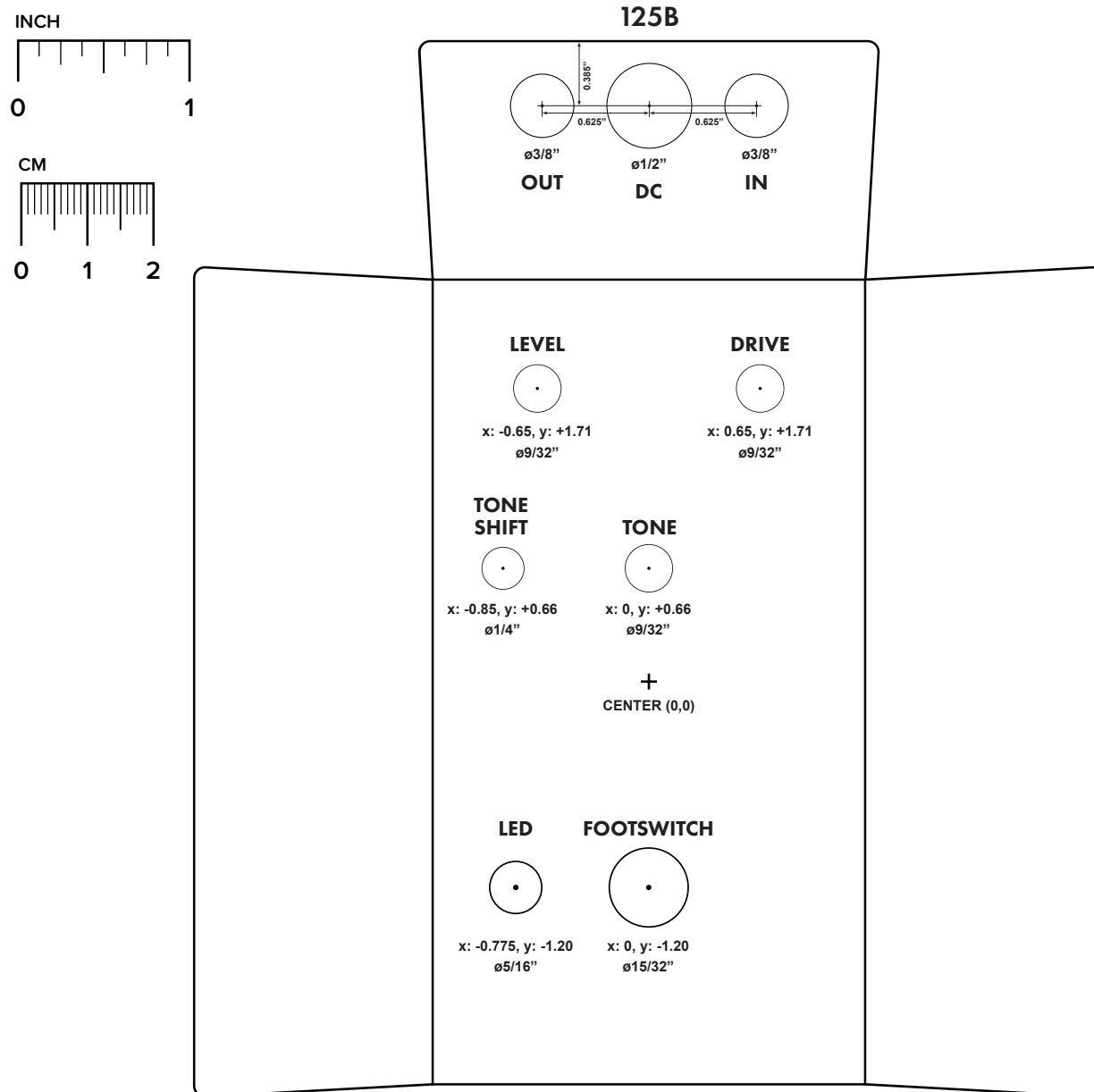
DRILL TEMPLATE

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.

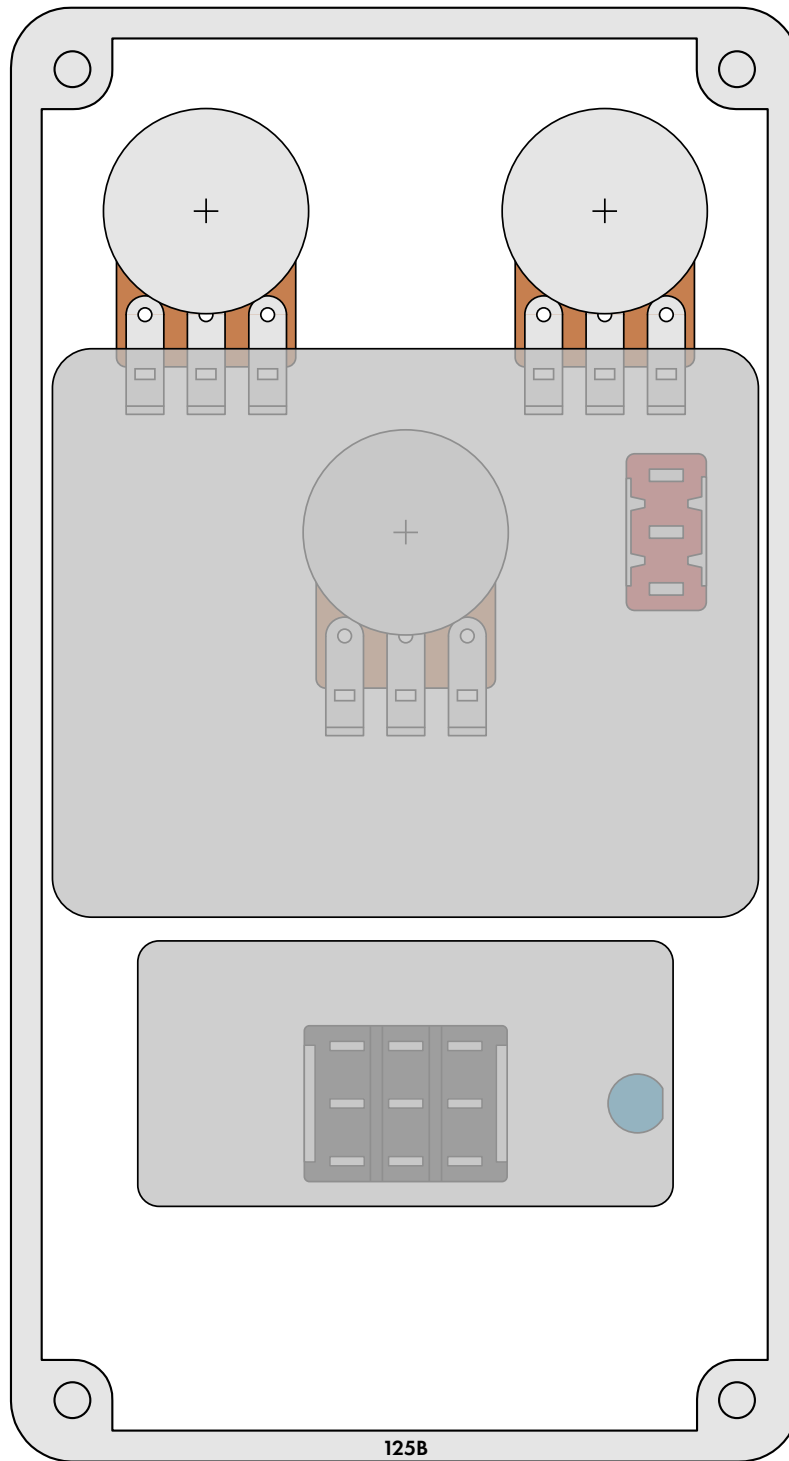
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

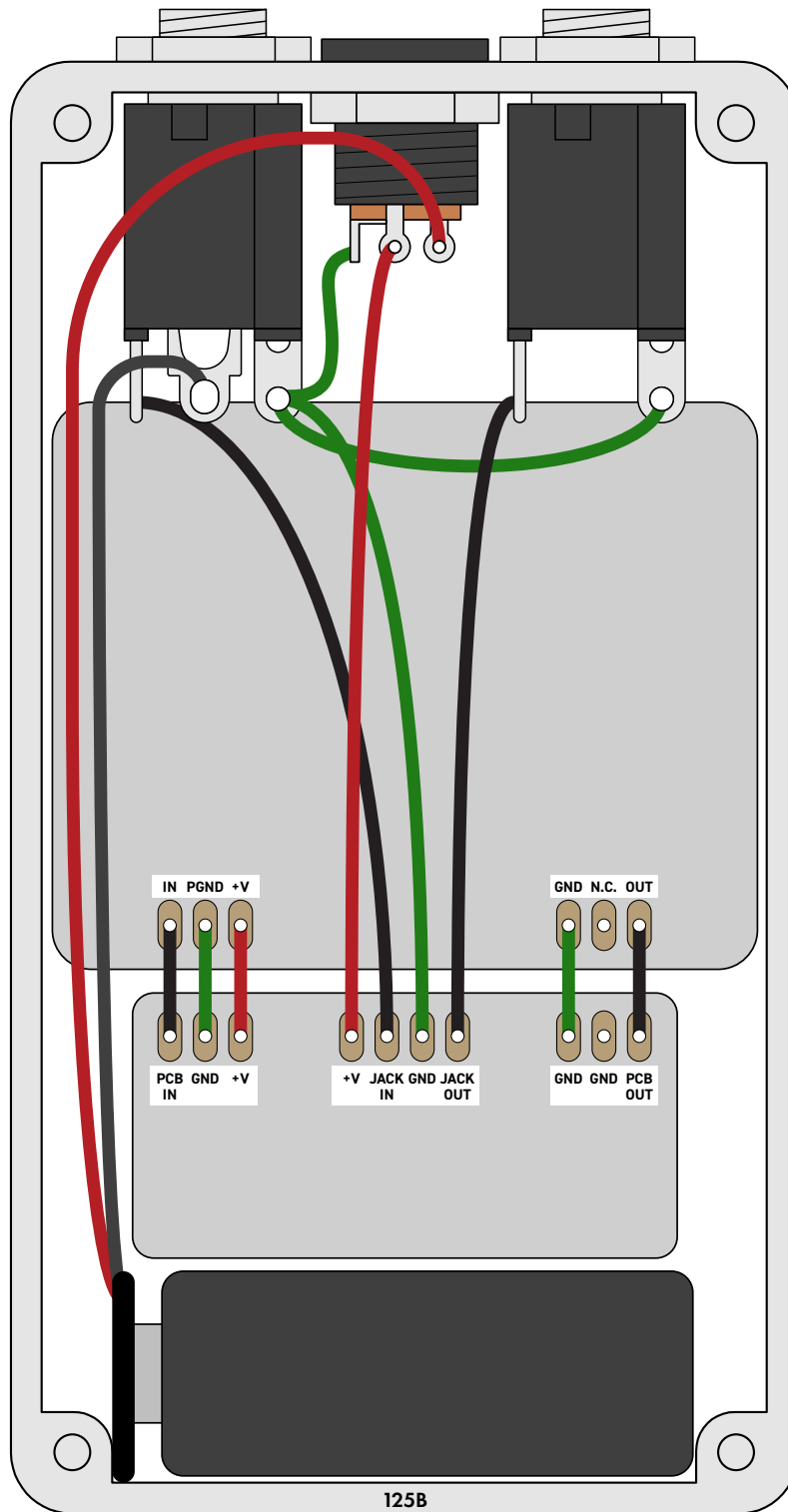


ENCLOSURE LAYOUT

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

1.0.3 (2020-11-30)

Removed Q5 from parts list which was inadvertently included.

1.0.2 (2020-09-08)

Edited description to clarify that the magazine version came before the commercial version.

1.0.1 (2020-09-03)

Added missing Tone Shift switch to parts list.

1.0.0 (2020-08-28)

Initial release.