PROJECT NAME

CONSTELLATION

aion DIY GUITAR EFFECTS

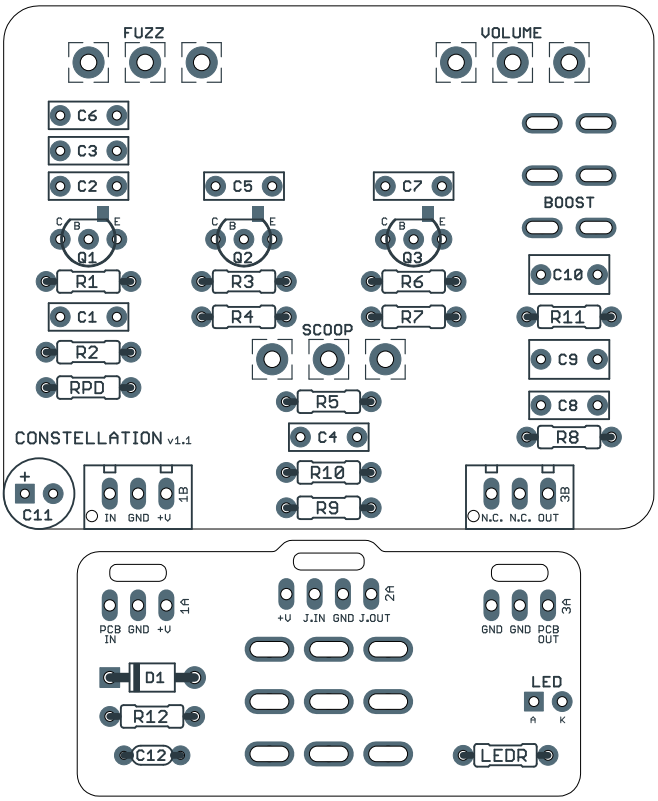
BASED ON
Shin-Ei Companion FY-2

BUILD DIFFICULTY
▮▮▯▯▯ Easy

EFFECT TYPE
Fuzz

DOCUMENT VERSION
1.1.0 (2026-07-13)

PROJECT SUMMARY
An early silicon fuzz known for its scooped-midrange tone. This adaptation is updated with a switchable volume boost stage as well as a control to dial back the scoop.



Actual size is 2.3” x 1.86” (main board) and 1.78” x 0.86” (bypass board).

TABLE OF CONTENTS

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

INTRODUCTION

The Constellation Vintage Fuzz is an adaptation of the Shin-Ei Companion FY-2, an early 1970s silicon transistor fuzz that was also re-labeled under the brand names Avora, Jax, Kimbara, Thomas and Zenta.

The FY-2 started out as a copy of the silicon Mosrite Fuzzrite, an American fuzz pedal from 1968. The two-transistor topology is nearly identical. Rather than controlling the gain level directly, the Fuzz control shifts the balance between the first transistor and the second transistor which both have a fixed amount of gain.

The main innovation from Shin-ei was the addition of a scooped midrange filter after the fuzz. So while the FY-2 and Fuzzrite schematics are very similar, the FY-2 sounds nothing like the Fuzzrite.

The FY-2 is the slightly-less-famous and often-mistaken precursor to the FY-6, which was best known for being re-branded as the Univox Super Fuzz. The FY-2 does not have the octave effect of the Super Fuzz, but it does have the same scooped midrange character.

The Constellation project is faithful to the original FY-2, with two additions: 1) a control to allow the characteristic mid-scoop to be dialed back into more of a flat EQ, and 2) an optional volume boost stage before the master volume control at the end. The original unit suffers from excessively low volume, so the make-up gain stage from the FY-6 has been adapted for this circuit. With the gain boost disabled and the Scoop control at maximum, the circuit is 100% identical to a vintage FY-2.

USAGE

The Constellation has the following controls:

- **Fuzz** controls the harmonics and texture of the fuzz tone.
- **Scoop** allows the mid-scoop to be lessened in intensity for more of a full-range fuzz. Note that the volume will decrease as this control is turned up, so the optional boost stage should be used at higher Scoop settings, but isn't as crucial if this control is dialed back.
- **Volume** is the master output volume control.
- **Boost** (toggle) enables or disables an optional gain stage at the end of the circuit.

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.

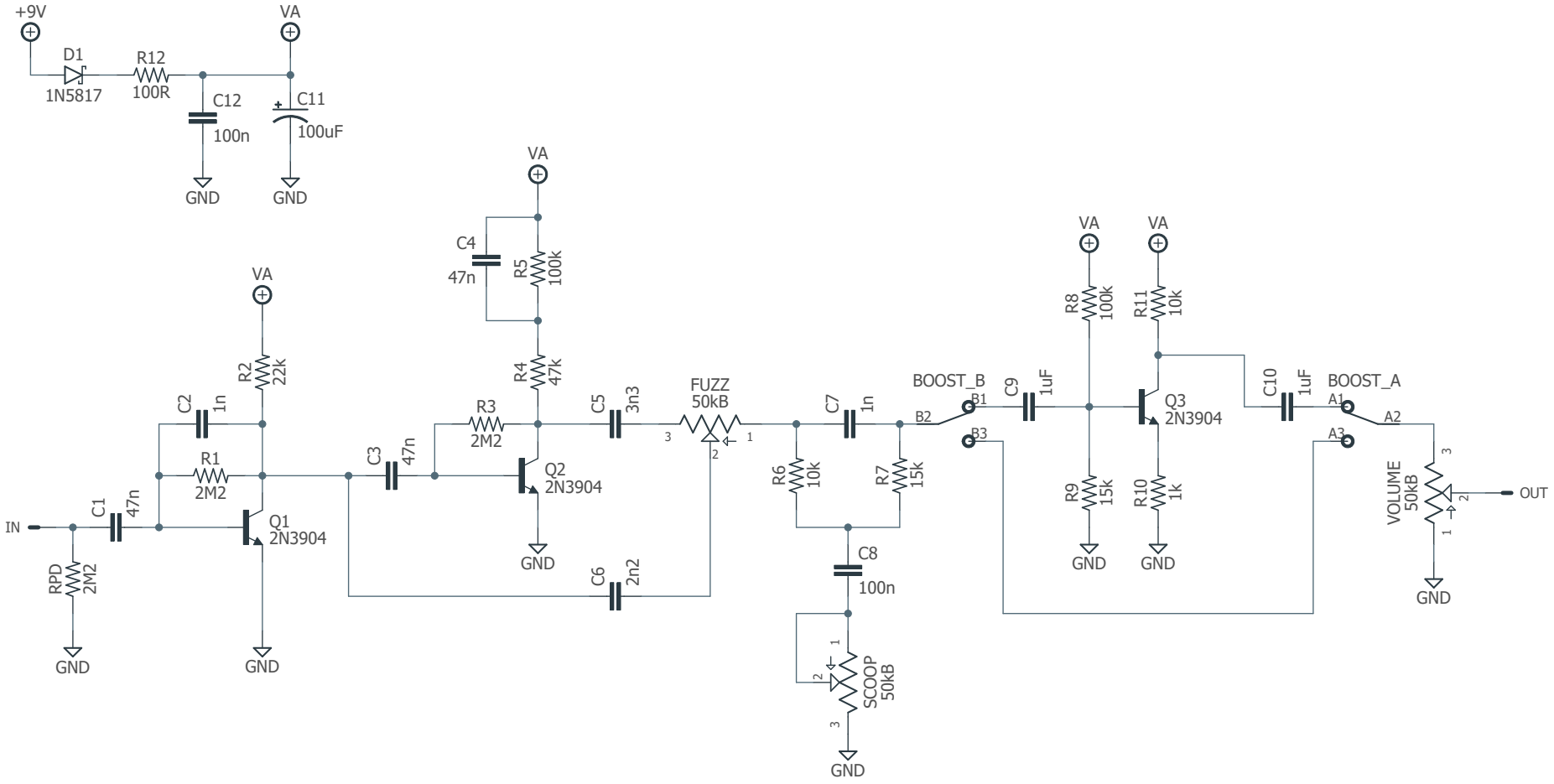
View parts list spreadsheet →

PART	VALUE	TYPE	NOTES
R1	2M2	Metal film resistor, 1/4W	
R2	22k	Metal film resistor, 1/4W	
R3	2M2	Metal film resistor, 1/4W	
R4	47k	Metal film resistor, 1/4W	
R5	100k	Metal film resistor, 1/4W	
R6	10k	Metal film resistor, 1/4W	
R7	15k	Metal film resistor, 1/4W	
R8	100k	Metal film resistor, 1/4W	
R9	15k	Metal film resistor, 1/4W	
R10	1k	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	100R	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	47n	Film capacitor, 7.2 x 2.5mm	
C2	1n	Film capacitor, 7.2 x 2.5mm	
C3	47n	Film capacitor, 7.2 x 2.5mm	
C4	47n	Film capacitor, 7.2 x 2.5mm	
C5	3n3	Film capacitor, 7.2 x 2.5mm	
C6	2n2	Film capacitor, 7.2 x 2.5mm	
C7	1n	Film capacitor, 7.2 x 2.5mm	
C8	100n	Film capacitor, 7.2 x 2.5mm	
C9	1uF	Film capacitor, 7.2 x 5mm	
C10	1uF	Film capacitor, 7.2 x 5mm	
C11	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C12	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	2N3904	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC536F (hFE 160-320)
Q2	2N3904	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC536F (hFE 160-320)
Q3	2N3904	BJT transistor, NPN, TO-92	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
FUZZ	50kB	16mm right-angle PCB mount pot	
SCOOP	50kB	16mm right-angle PCB mount pot	
VOL.	50kB	16mm right-angle PCB mount pot	
BOOST	DPDT	Toggle switch, DPDT on-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	Lumberg NEB/J 21 C 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	Available from Aion FX.
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

SCHEMATIC


+9V
D1
1N5817
R12
100R
VA
C12
100n
C11
100uF
GND
GND
VA
C4
47n
R5
100k
R4
47k
VA
R2
22k
C2
1n
R3
2M2
C5
3n3
FUZZ
50kB
C7
1n
BOOST_B
B1
B2
B3
C9
1uF
VA
VA
R8
100k
R11
10k
Q3
2N3904
C10
1uF
BOOST_A
A1
A2
A3
R1
2M2
C3
47n
Q2
2N3904
R6
10k
R7
15k
R9
15k
R10
1k
VOLUME
50kB
OUT
IN
C1
47n
Q1
2N3904
RPD
2M2
GND
GND
GND
C6
2n2
C8
100n
SCOOP
50kB
GND
GND
GND
GND

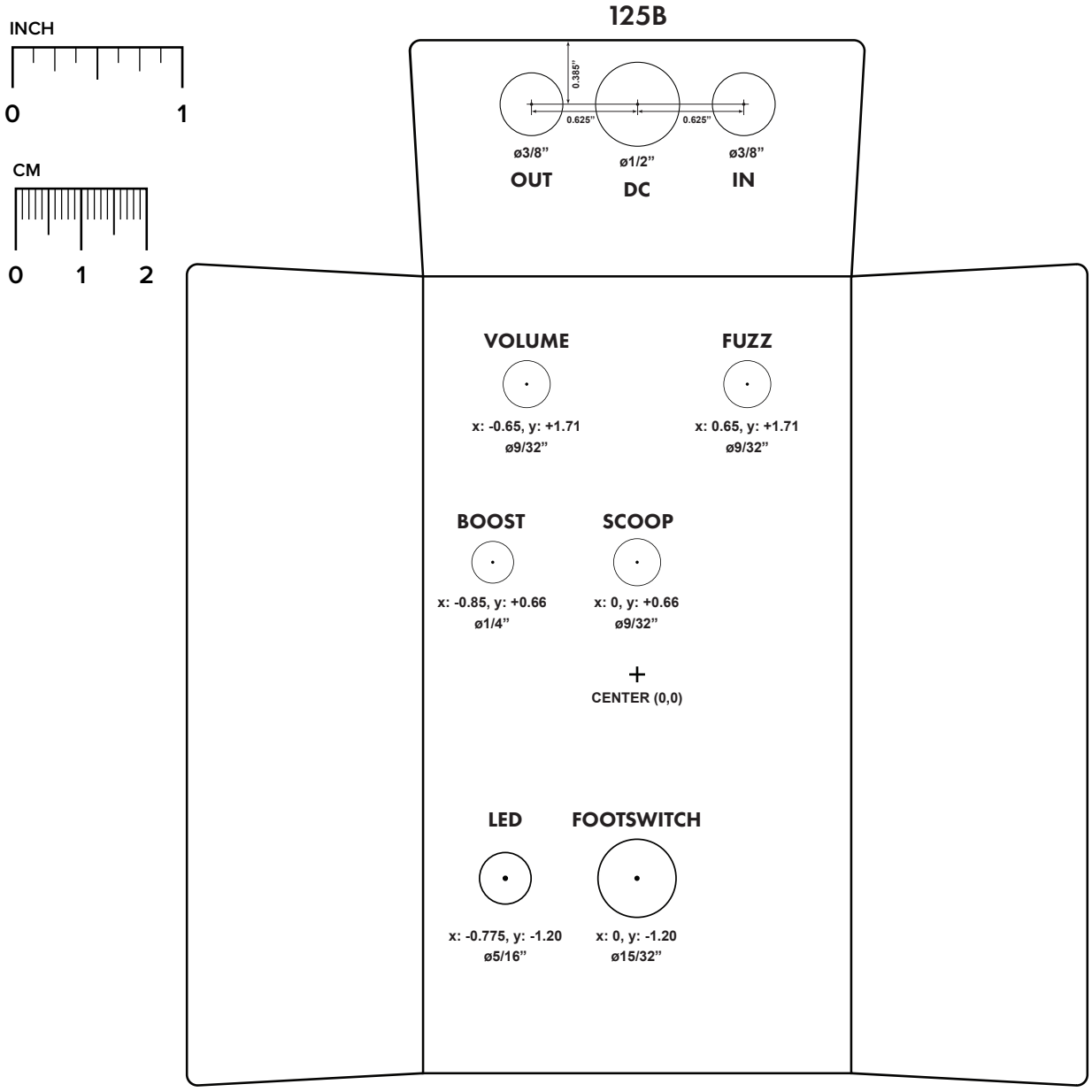
DRILL TEMPLATE

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.

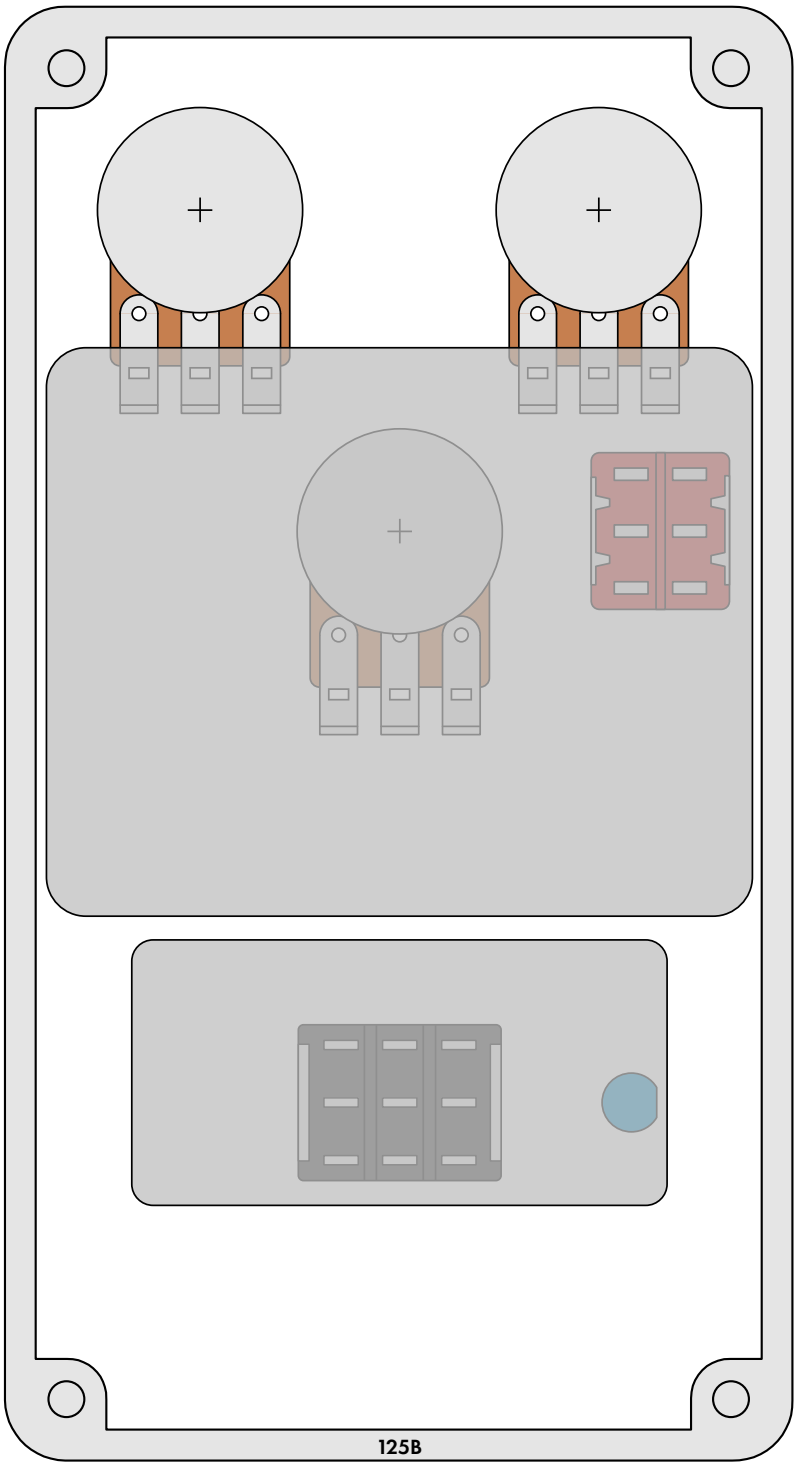
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

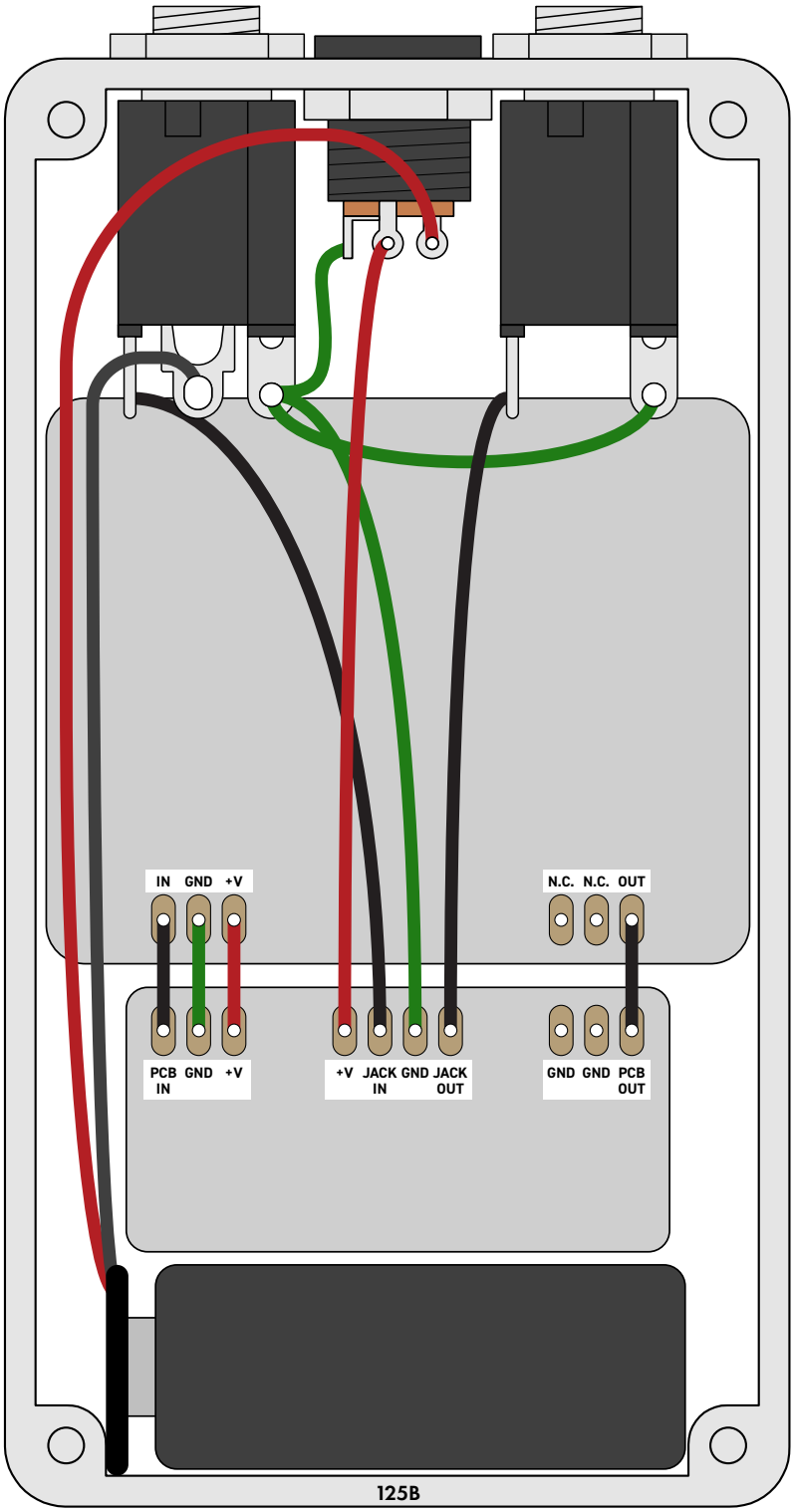


ENCLOSURE LAYOUT

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

1.1.0 (2026-07-13)

- Changed transistor outlines to hybrid SMD.
- Added space for 5mm width capacitors for C9 and C10.
- Changed LEDR to 10k to work with a wider variety of LEDs.
- Minor layout updates.

1.0.0 (2019-11-28)
Initial release.