PROJECT NAME

OCTAGON

aion DIY GUITAR EFFECTS

BASED ON
Tycobrahe® Octavia

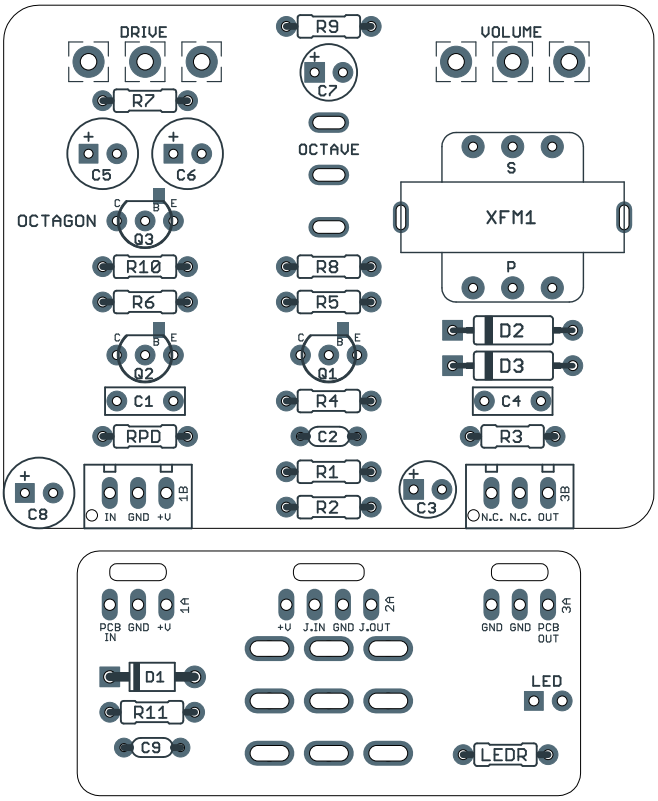
BUILD DIFFICULTY
▮▮▯▯▯ Easy

EFFECT TYPE
Octave fuzz

DOCUMENT VERSION
1.0.0 (2024-07-04)

PROJECT SUMMARY

The very first octave-up fuzz effect, originally invented by Roger Mayer for Jimi Hendrix and later copied by Tycobrahe for a commercial release.



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

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INTRODUCTION

The Octagon Octave Fuzz is based on the Tycobrahe® Octavia, a transformer-based octave fuzz pedal originally released in 1973.

The circuit itself was designed by Roger Mayer for Jimi Hendrix and dates back to 1967. He designed somewhere between 15 and 20 iterations for Jimi between 1967-69, some of which only lasted a week before being tweaked again. The Octavia was never sold commercially, so there was no standard version of the circuit, but units were made for several other guitarists such as Syd Barrett and Peter Frampton.

One of these units was sent to the Tycobrahe Sound Company in California for repair. (Accounts vary as to whose unit it was, but it wasn't Jimi's.) They traced out the circuit and later released a commercial pedal in 1973, also called the Octavia since Roger had only used the name informally and never commercially. It was accompanied by a wide advertising campaign, but ceased production in 1976.

Roger Mayer was never satisfied with any of the transformer versions and by 1970 he had redesigned the circuit to use all silicon transistors with no transformer. Even though he invented both circuits, today the transformer Octavia is more closely associated with Tycobrahe since they were the first to release it commercially, and the transistor Octavia is called the "Roger Mayer version". Jimi did play one of these new versions before his passing, but it has not been linked with any actual recordings.

All in all, it's a complicated history that has caused a lot of confusion in the past fifty years. The two Octavias don't have much in common and don't sound alike, but both are worth building if you like octave fuzz. The transistor Octavia is available as our Octahedron project.

The Octagon is a direct adaptation of the original Tycobrahe circuit, with the only addition being a toggle switch that disables the octave for a more traditional fuzz effect.

USAGE

The Octagon has two knobs and one toggle switch:

- **Sustain** is the overall distortion or fuzz level of the effect.
- **Volume** is the output volume at the end of the effect.
- **Octave** (toggle switch) selects between octave, no octave (original) and no octave (modified). See build notes for information on the modified non-octave mode.

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	820k	Metal film resistor, 1/4W	
R2	180k	Metal film resistor, 1/4W	
R3	680k	Metal film resistor, 1/4W	
R4	220k	Metal film resistor, 1/4W	
R5	220R	Metal film resistor, 1/4W	
R6	22k	Metal film resistor, 1/4W	
R7	470R	Metal film resistor, 1/4W	
R8	1k	Metal film resistor, 1/4W	
R9	47k	Metal film resistor, 1/4W	
R10	1k2	Metal film resistor, 1/4W	
R11	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor.
C1	100n	Film capacitor, 7.2 x 2.5mm	
C2	150pF	MLCC capacitor, NP0/C0G	
C3	33uF	Electrolytic capacitor, 5mm	
C4	1n	Film capacitor, 7.2 x 2.5mm	
C5	220uF	Electrolytic capacitor, 6.3mm	
C6	100uF	Electrolytic capacitor, 6.3mm	
C7	33uF	Electrolytic capacitor, 5mm	
C8	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C9	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	BAT46	Schottky diode, DO-35	The original Octavia used Ge diodes, but BAT46 will perform better.
D3	BAT46	Schottky diode, DO-35	The original Octavia used Ge diodes, but BAT46 will perform better.
Q1	2N3906	BJT transistor, PNP, TO-92	
Q2	2N3904	BJT transistor, NPN, TO-92	
Q3	2N3904	BJT transistor, NPN, TO-92	
XFM1	42TM022	Transformer, 1.5KCT/600RCT	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
TONE	1kC	16mm right-angle PCB mount pot	Reverse audio (reverse log or antilog) taper.
VOLUME	500kA	16mm right-angle PCB mount pot	Audio (log) taper.
OCT SW.	SPDT center off	Toggle switch, SPDT on-off-on	
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

Octave switch

The octave in this effect is generated by splitting the signal into two, one in-phase and one out of phase, and then rectifying the signals to cancel out half of the waveform of each. The signals are then combined back together which emphasizes the octave overtone.

The octave switch lets you disable half of the phase splitter to cancel out the octave effect. However, the non-octave signal still passes through a series diode which introduces something called “crossover distortion”. While this crossover distortion is part of the sound of the Octavia, it sounds very good without it as well and justifies having its own setting.

As a result, the octave switch has been modified to have Octave, No Octave (original) and No Octave (modified) settings.

Diode selection

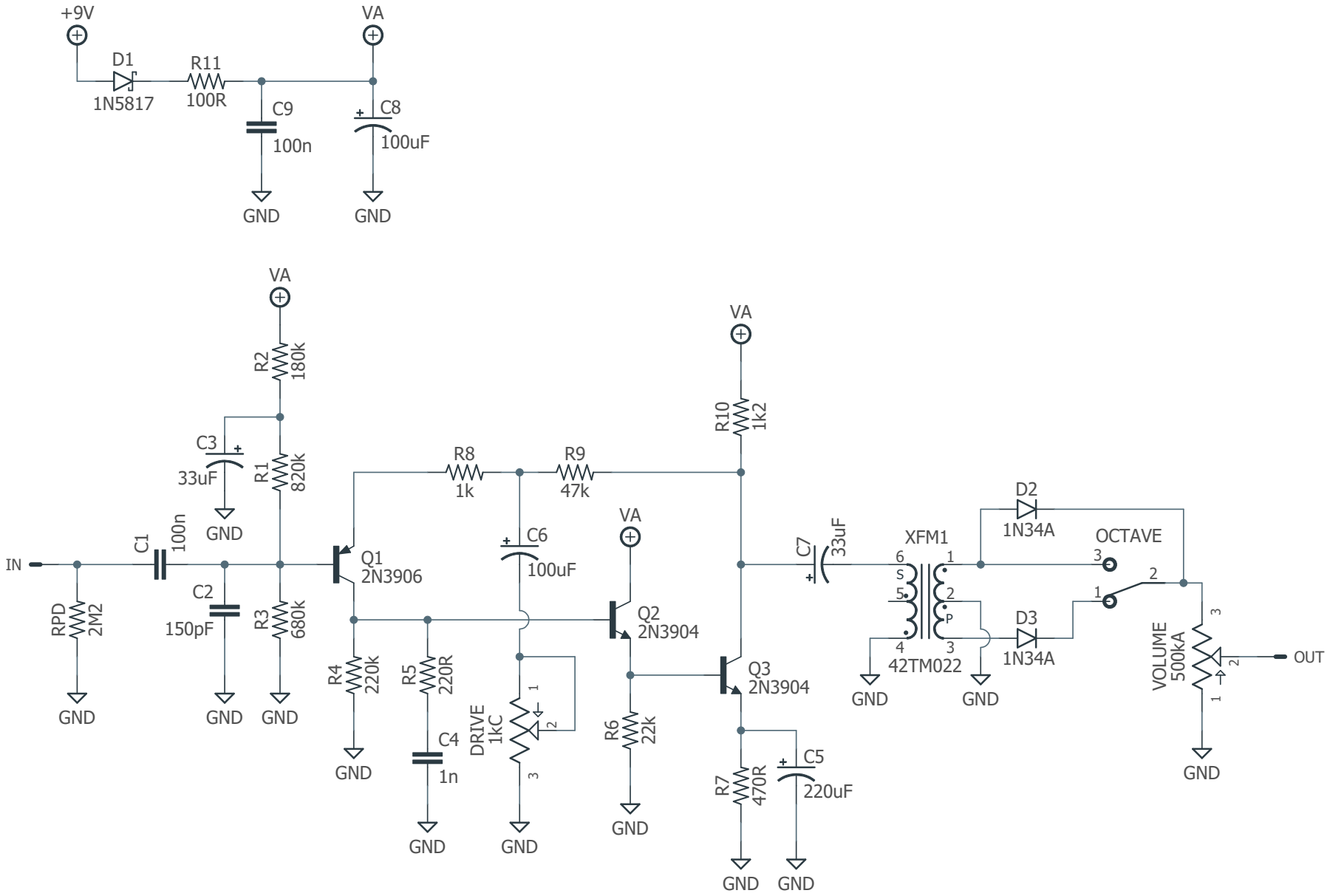
As with many other octave effects, the Octavia used germanium diodes due to their low voltage drop compared to silicon. However, germanium diodes are expensive and have very loose tolerances, as well as being temperature sensitive.

It’s recommended to use BAT46 diodes as an alternative that will sound the same but be more reliable in the long run. However, the PCB footprint is sized for the larger germanium diodes if you do want to use those instead.

Transformer selection

The 42TM022 is a 1.5K:600R transformer available from Mouser. It has been used in almost every Octavia clone in the past 20 years and found to perform identically to the type used in the original.

SCHEMATIC


+9V
D1
1N5817
R11
100R
C9
100n
GND
VA
C8
100uF
GND
VA
R2
180k
C3
33uF
GND
R1
820k
IN
C1
100n
RPD
2M2
GND
C2
150pF
GND
R3
680k
GND
Q1
2N3906
R8
1k
R9
47k
C6
100uF
R4
220k
GND
R5
220R
C4
1n
GND
DRIVE
1kC
GND
VA
Q2
2N3904
R6
22k
GND
VA
R10
1k2
Q3
2N3904
R7
470R
GND
C5
220uF
GND
C7
33uF
XFM1
42TM022
D2
1N34A
D3
1N34A
GND
GND
OCTAVE
VOLUME
500kA
GND
OUT

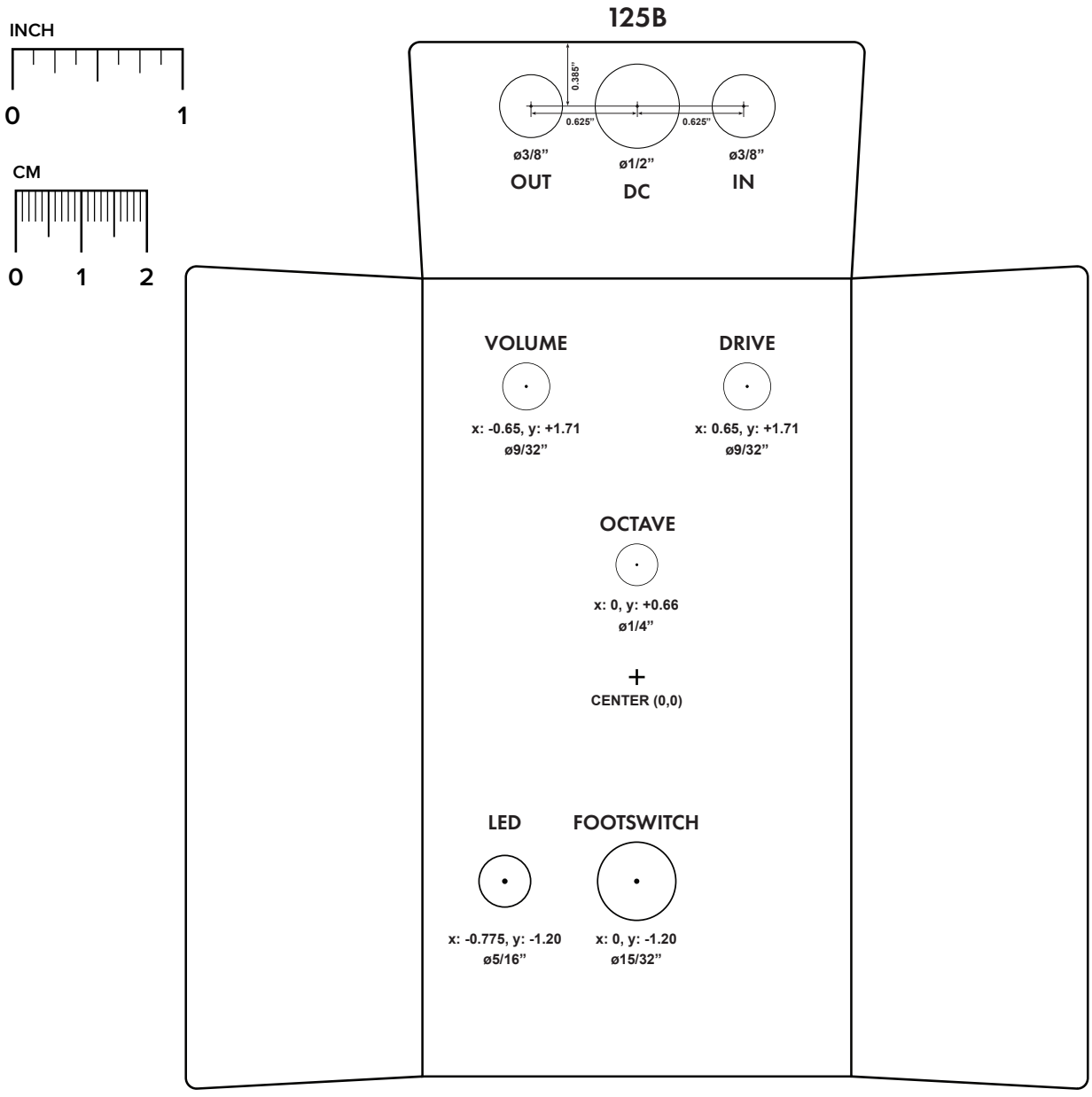
DRILL TEMPLATE

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.

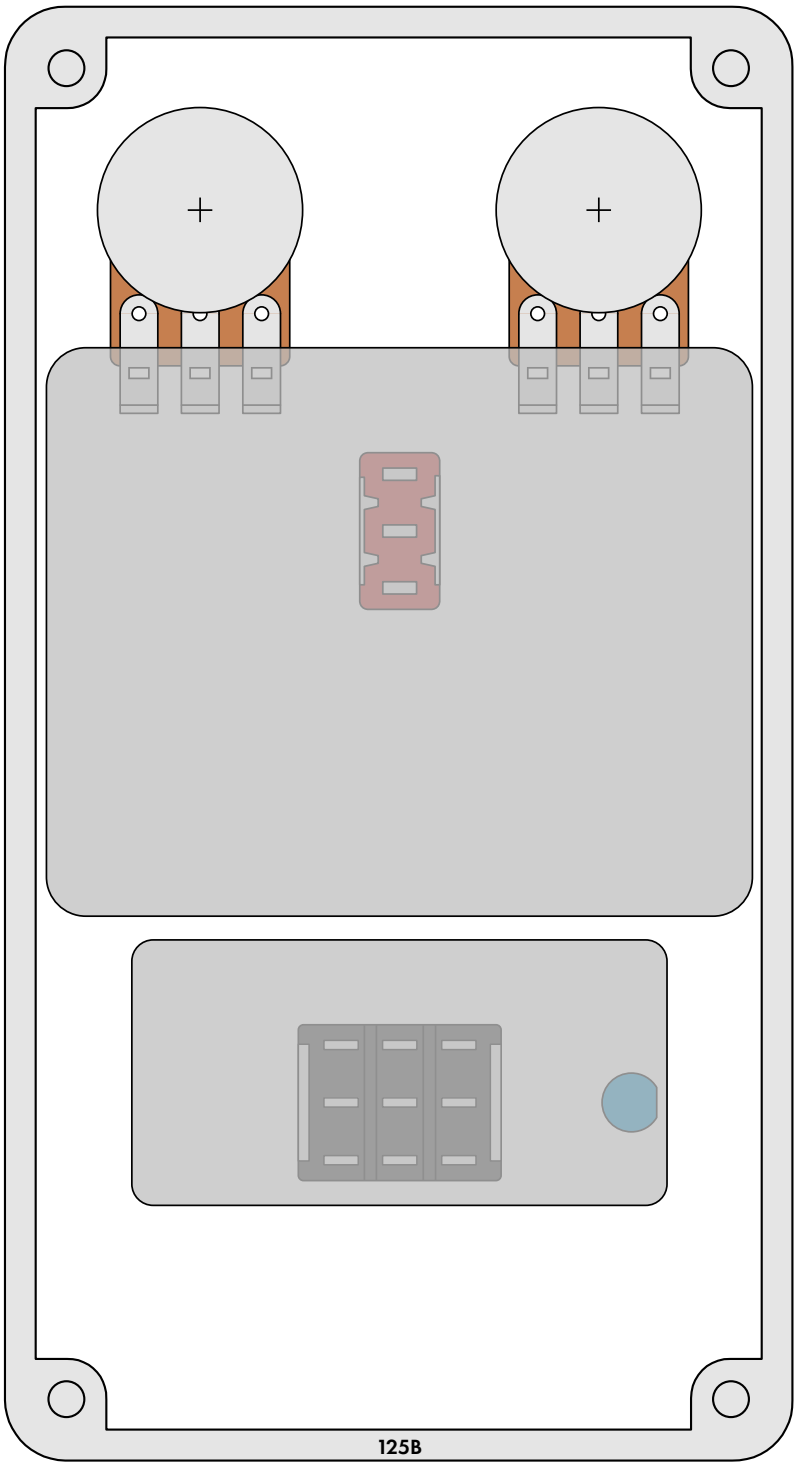
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

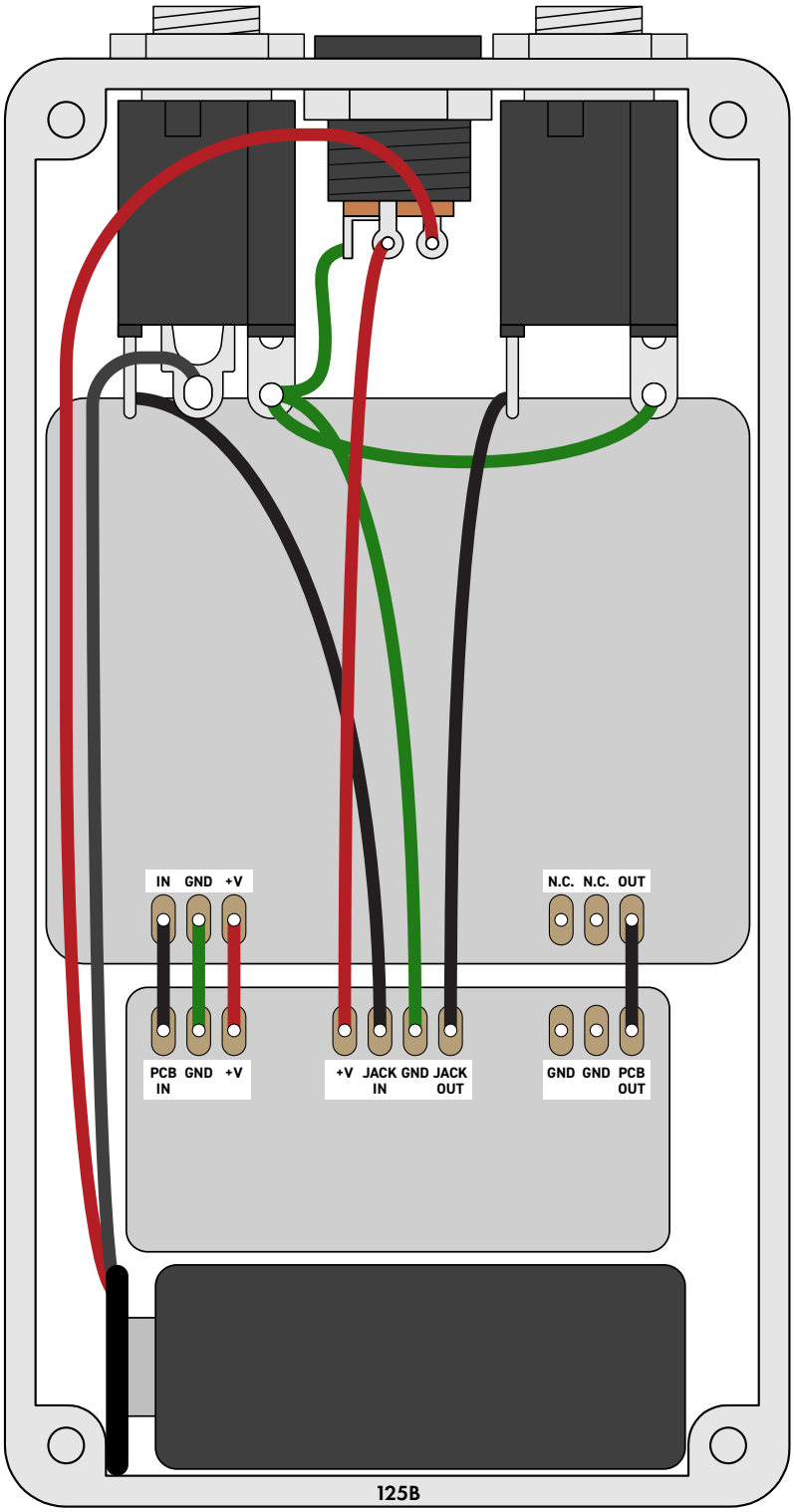


ENCLOSURE LAYOUT

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



WIRING DIAGRAM



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

Tycobrahe® is a registered trademark of Chicago Iron.

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 cannotbe 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

1.0.0 (2024-07-04)

Initial release.