Retrograde24

FX Type: **FUZZ OCTAVE**
Build Level: Beginner
Based On: Tycobrahe® Octavia™

Last Updated: November 21, 2024 4:27 PM

The *2024 version* of the **Retrograde** has no significant circuit changes and minor layout tweaks.

Overview

The **Retrograde** is one of a very few projects I've kept going since the beginning of madbeanpedals, and every few years I've updated the PCB design to reflect my own evolving standards. The previous version (2019) was fitted for 1590B with the transformer mounted on a breakout board. Beginning with the 2022 version I decided a 125B layout would be the more practical choice. The 2024 version is only a minor tweak of the 2022 version.

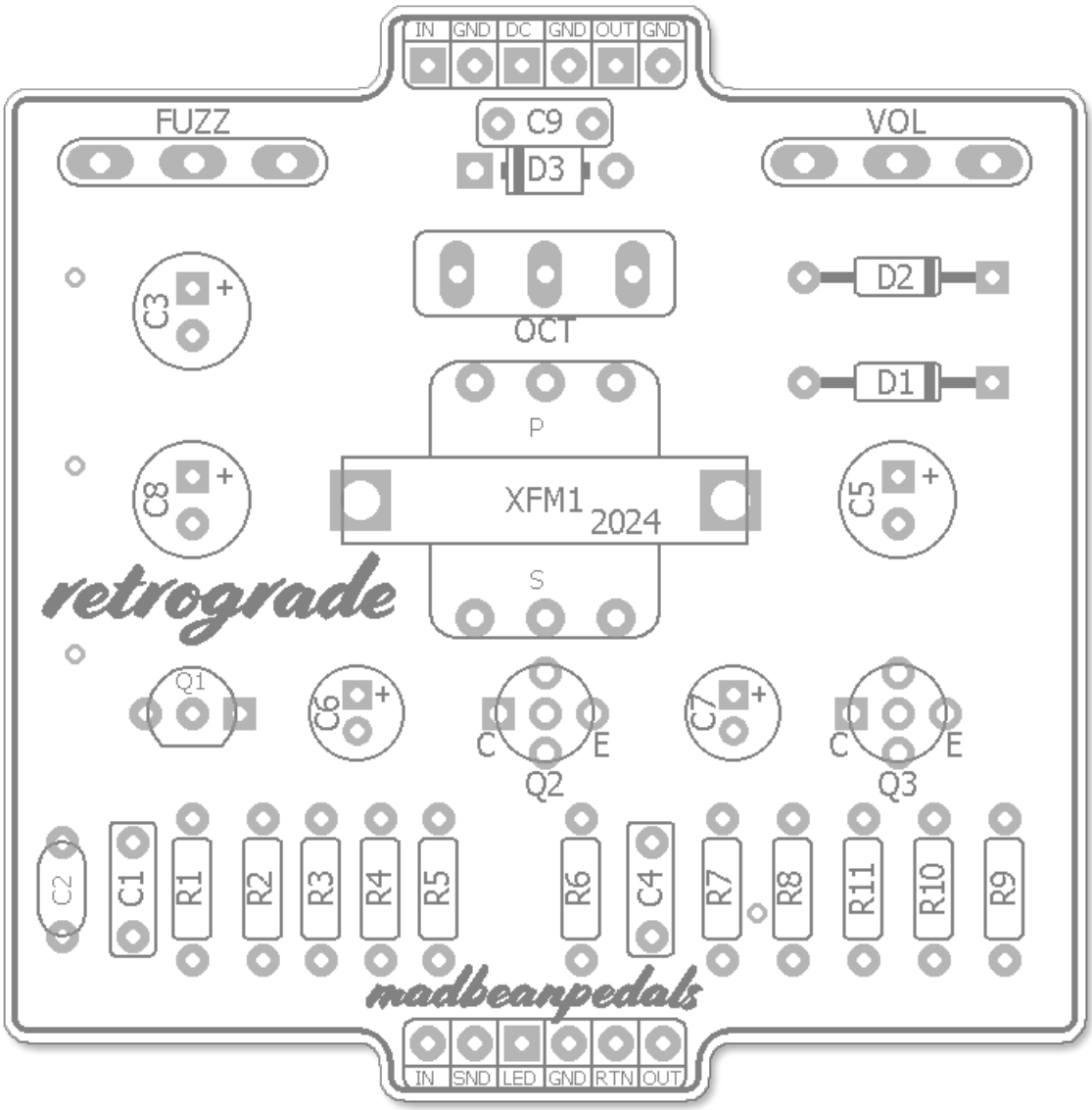
The Retrograde is a wall of fuzz, with a pronounced octave generated by an inexpensive transformer. It also features the ability to turn the octave off with the flip of a switch. Like many analog up octave circuits, the most pronounced upper octave is achieved by using the guitar's neck pickup, with the tone rolled all the way off and notes played around the 12th fret. You can also get ring modulator type sounds with chords or with the volume knob on your guitar rolled down. Best of all, you get a great "dive-bomb" effect when doing double-stop bends!

Controls

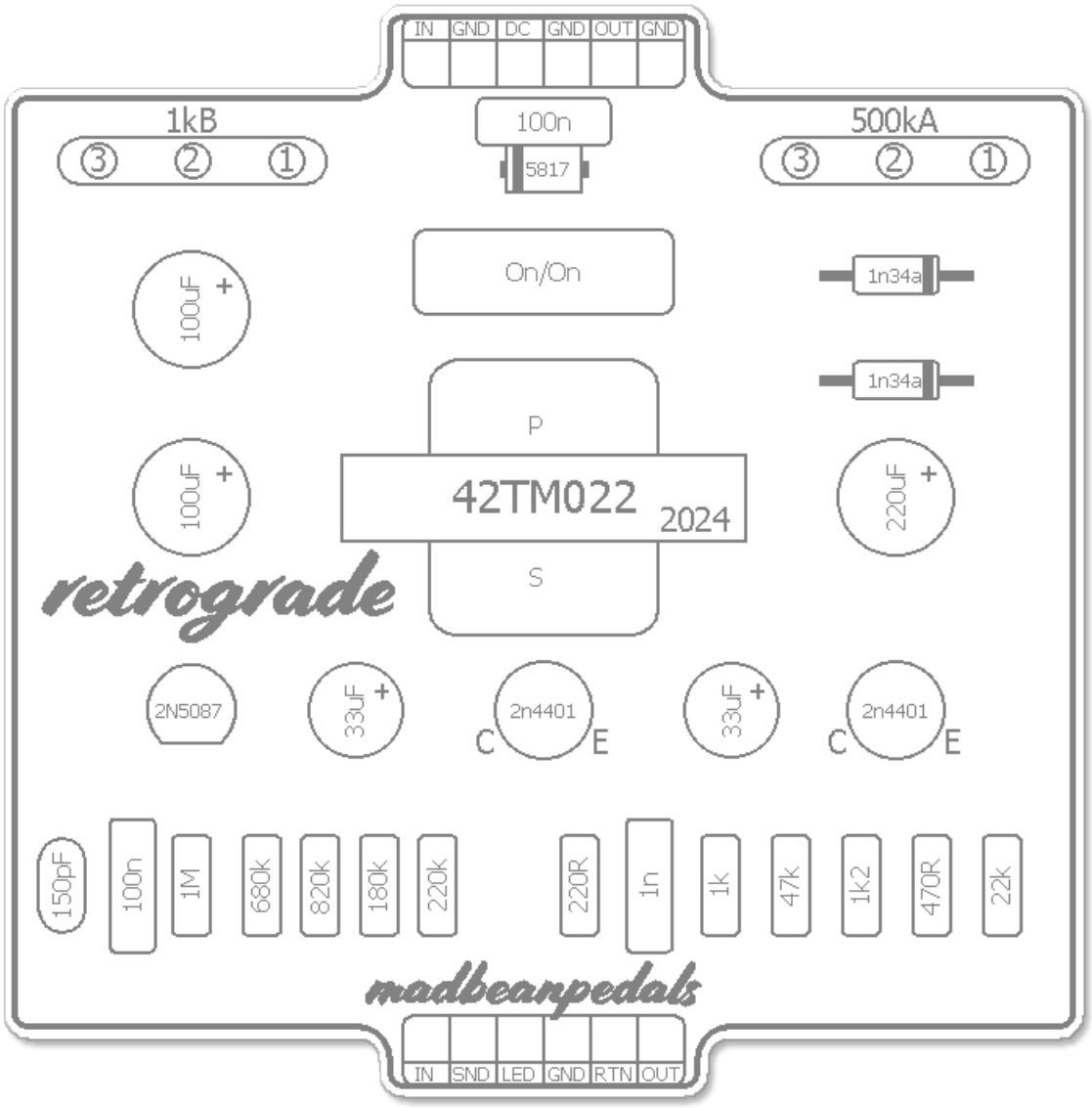
- **VOL:** Output level.
- **FUZZ:** Fuzz amount.
- **OCT:** Octave up (left position) or fuzz only (right position). The fuzz-only position *increases* the volume output.

You can read up on the circuit here: http://fuzzcentral.ssguitar.com/octavia.php

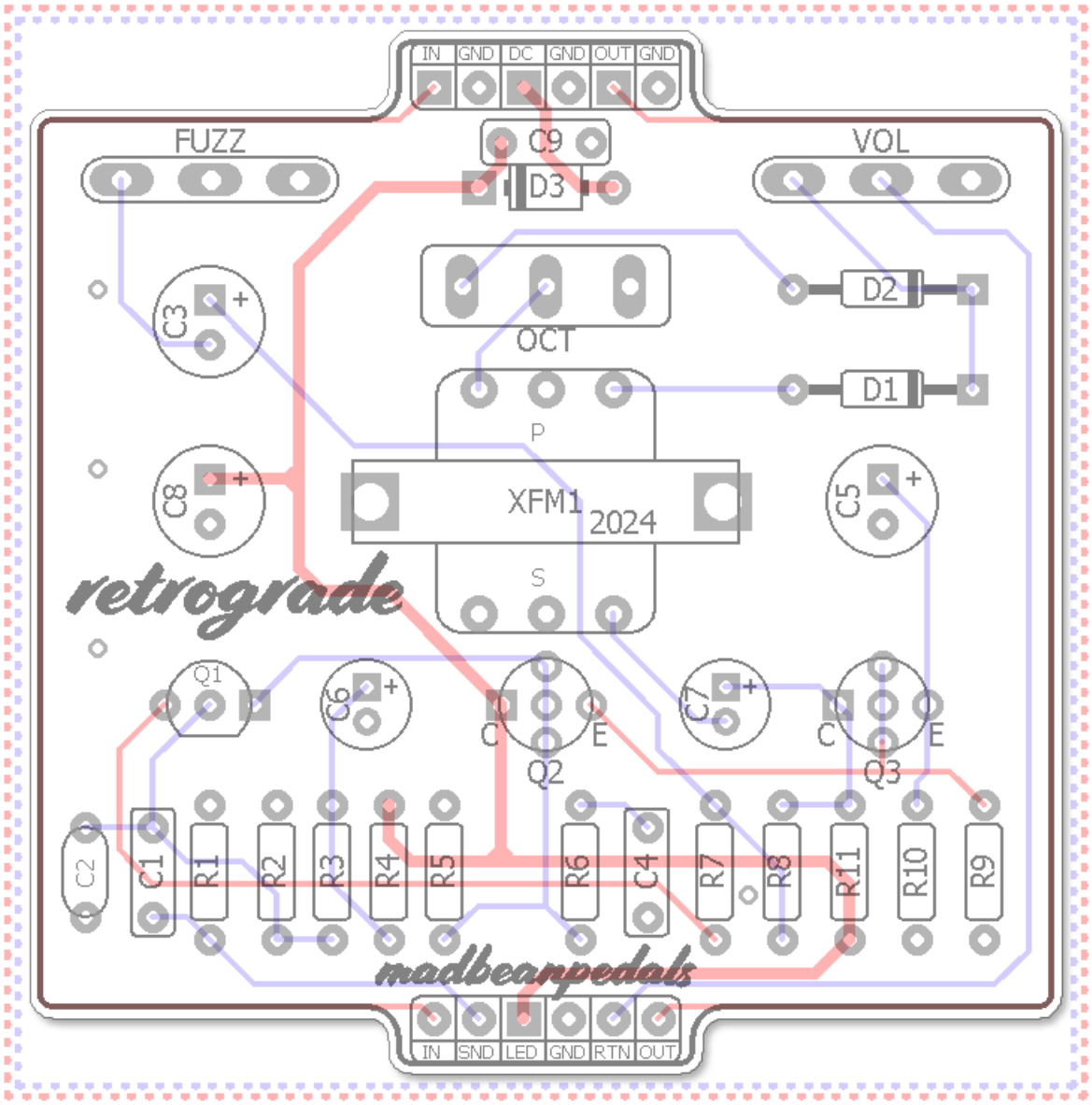
Parts Layout



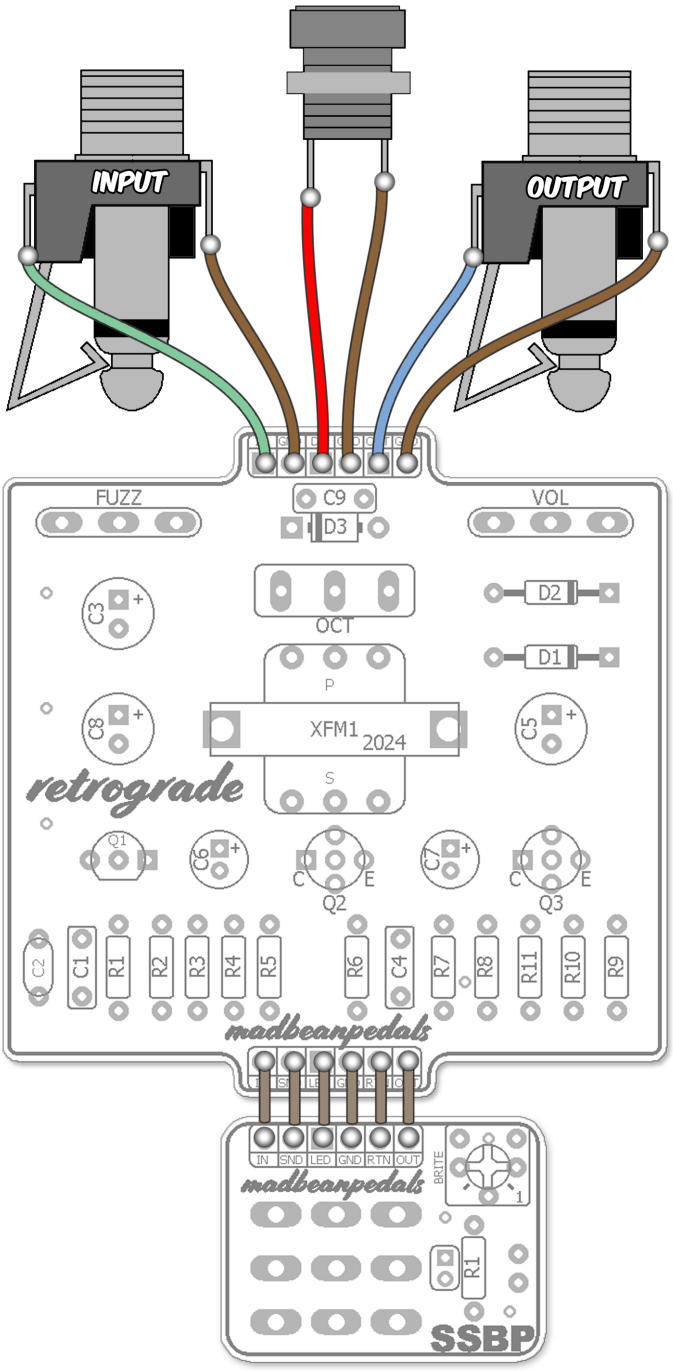
Component Values



Trace Layout



Wiring



The Retrograde24 is compatible with both the **SSBP** and **SSABP** bypass boards available at madbeanpedals. The wiring is the same for both.

B.O.M.

Resistors		Caps		Diodes	
R1	1M	C1	100n	D1	1n34a
R2	680k	C2	150pF	D2	1n34a
R3	820k	C3	100uF	D3	1n5817
R4	180k	C4	1n	Transistors	
R5	220k	C5	220uF	Q1	2N5087
R6	220R	C6	33uF	Q2	2n4401
R7	1k	C7	33uF	Q3	2n4401
R8	47k	C8	100uF	Transformer	
R9	22k	C9	100n	XFM1	42TM022
R10	470R			Switch	
R11	1k2			OCT	On/On
				Pots	
				FUZZ	1kB
				VOL	500kA

2N4401 transistors (max 300 Hfe recommended):
https://www.mouser.com/ProductDetail/512-2N4401TFR
http://smallbear-electronics.mybigcommerce.com/transistor-2n4401/

42TM022 transformer:
https://www.mouser.com/ProductDetail/42TM022-RC
https://smallbear-electronics.mybigcommerce.com/transformer-for-tycho-octavia/

Shopping List

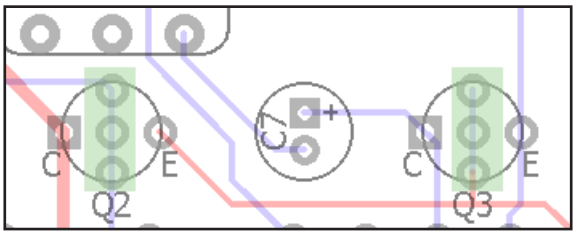
Value	QTY	Type	Rating
220R	1	Metal / Carbon Film	1/4W
470R	1	Metal / Carbon Film	1/4W
1k	1	Metal / Carbon Film	1/4W
1k2	1	Metal / Carbon Film	1/4W
22k	1	Metal / Carbon Film	1/4W
47k	1	Metal / Carbon Film	1/4W
180k	1	Metal / Carbon Film	1/4W
220k	1	Metal / Carbon Film	1/4W
680k	1	Metal / Carbon Film	1/4W
820k	1	Metal / Carbon Film	1/4W
1M	1	Metal / Carbon Film	1/4W
150pF	1	Ceramic / MLCC	16v min.
1n	1	Film	16v min.
100n	2	Film	16v min.
33uF	2	Electrolytic	16v min.
100uF	2	Electrolytic	16v min.
220uF	1	Electrolytic	16v min.
1n34a	2	or, BAT46	
1n5817	1	1k5 Primary, 600R Secondary	
2N5087	1	or, comparable PNP	
2n4401	2	or, comparable NPN	
42TM022	1		
SPDT	1	On/On, Solder Lug	
1kB	1	PCB Right Angle	16mm
500kA	1	PCB Right Angle	16mm

Additional Hardware

(1) 125B enclosure
(2) 1/4” mono jacks
(1) Slim 2.1mm DC jack
(1) Standard 3PDT footswitch
(1) 5mm LED

Build Notes

The transistor footprints are set up to accommodate a variety of pin configurations if you wish to evaluate different types from the spec'd 2n4401. While there's really no benefit in deviating from the Q1 2n5087 at the input gain stage, it might be worth your time to audition different types of transistors in the fuzz circuit (Q2 and Q3) for some tonal variety. The middle row of pads on these transistors are all connected together and correspond to the base pin of each.



I tested a few different sets of transistors and here's what I found:

2n4401 (stock). Q1 - 169HFE, Q2 - 173HFE
The stock transistors produce a pleasant octave up without being "over the top". The fuzz only setting yields a somewhat "boxy" tone. Like a lower gain Ampeg Scrambler.

BC109: Q1 - 292HFE, Q2 - 459HFE
These are much higher gain than the 2n4401. They also produce a very thick and chewy octave up as well as a somewhat smoother fuzz-only tone. I think I prefer these over the 2n4401 just for the sake of something different. However, at max fuzz these get noisy and start to oscillate a bit so the control has to be backed off about 10%. It is kinda neat, though - turning down the guitar volume actually changes the pitch of the oscillation.

2n3565 (no HFE measurements taken)
These produce a more aggressive oct up than the 2n4401 but are also a bit more "splatty". Cool, but not remarkable.

SE4002 (no HFE measurements taken)
Overall, the SE4002 are kind of in-between the 2n4401 and BC109. The fuzz-only sound is very thick and bassy (in a good way).

Circuit Voltages

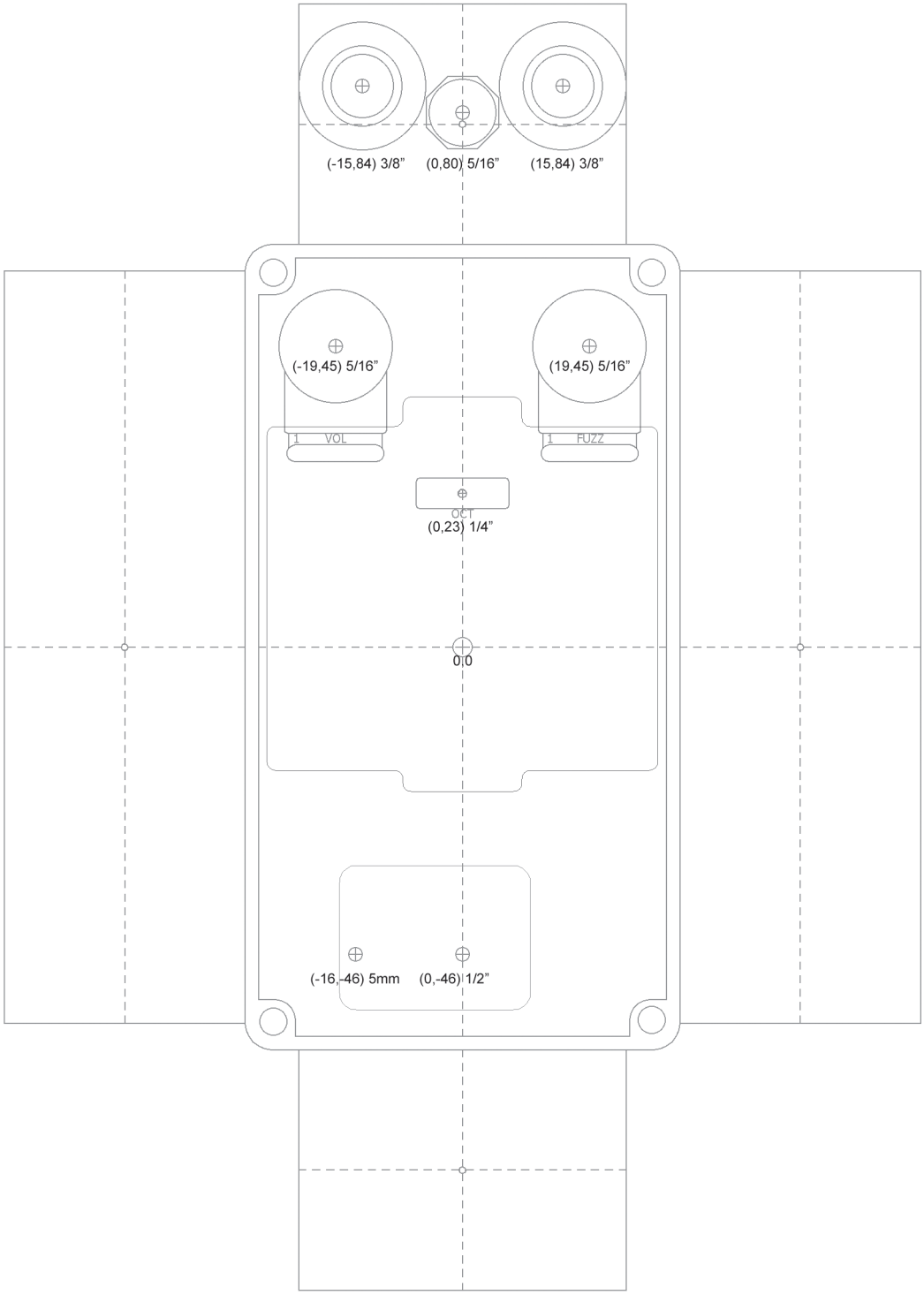
Q1	2n5087
C	2.93
B	3.54
E	4.18
Q2	**2n4401**
C	9.26
B	2.93
E	2.38
Q3	**2n4401**
C	4.85
B	3.04
E	1.73

- 9.42vDC One Spot
- Current Draw ~ 5mA

Drill Template

Coordinates are denoted in (X,Y), drill size format starting from the center (0,0) location of the enclosure.

Tayda drill template: https://drill.taydakits.com/box-designs/new?public_key=TDhaSnQvaXlxbDZ2NkJUajIwM2k4QT09Cg==

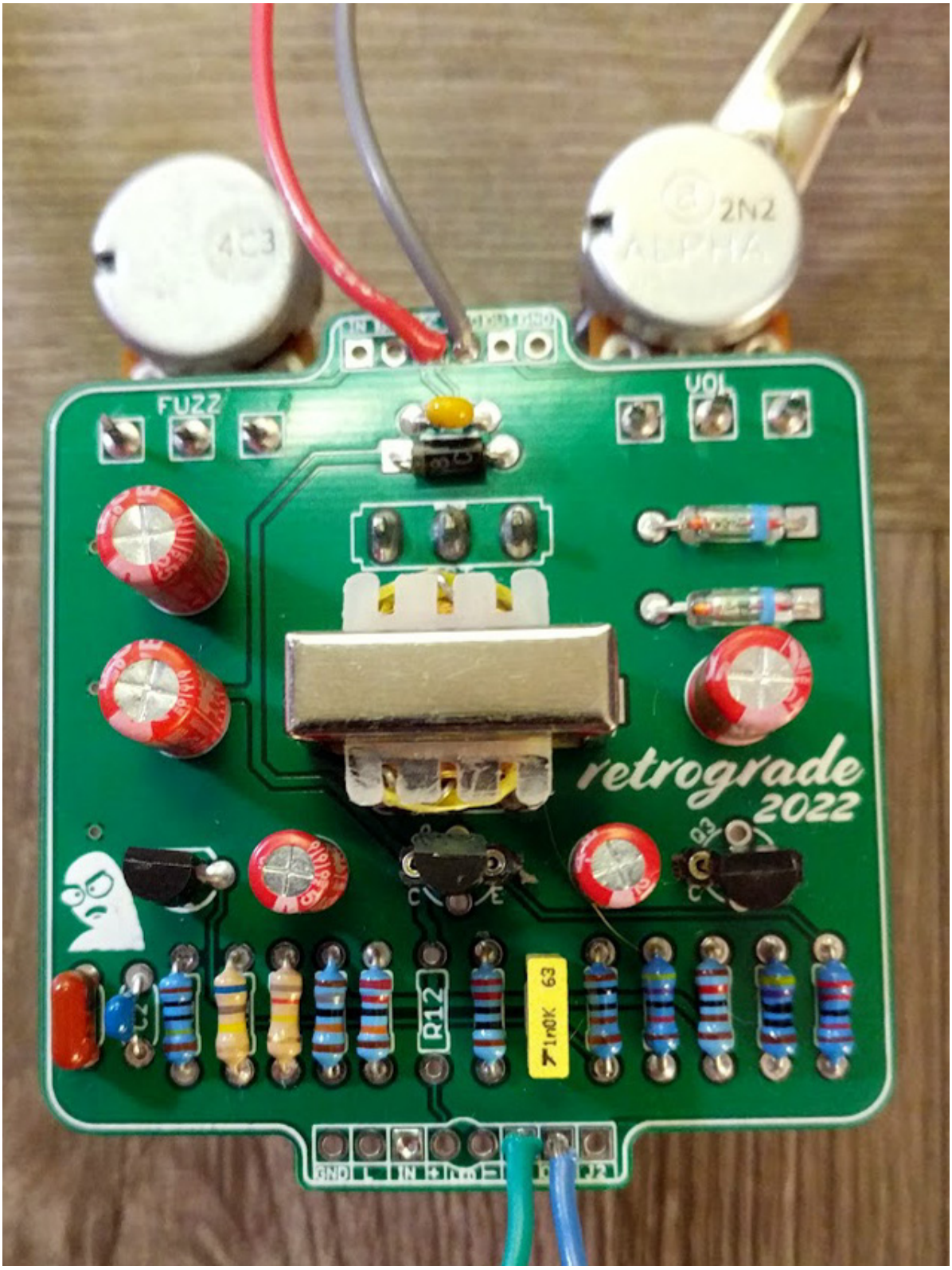


Hardware

125B enclosure
Mono jacks
Slim 2.1mm DC jack
Standard 3PDT footswitch
5mm LED

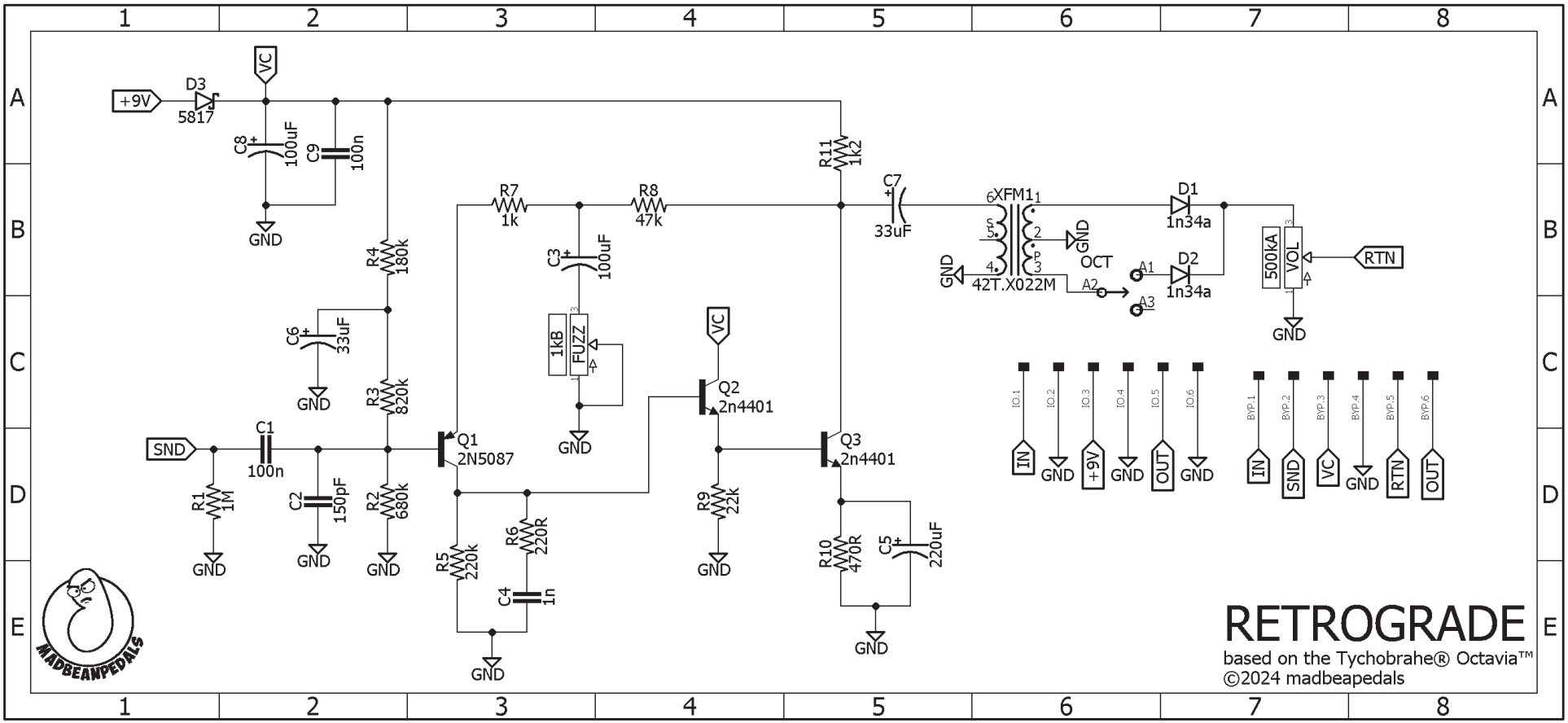
NOTE: Different 1/4” and DC jack styles may require different sized drill holes.

Build Pic



Previous version build.

Schematic


RETROGRADE
based on the Tychobrahe® Octavia™
©2024 madbeapedals
MADBEAMPEDALS
+9V
D3
5817
VC
C8 100uF
C9 100n
GND
R4 180k
C6 33uF
R3 820k
SND
C1 100n
R1 1M
C2 150pF
R2 680k
Q1 2N5087
R5 220k
R6 220R
C4 1n
R7 1k
R8 47k
C3 100uF
1kB
FUZZ
Q2 2n4401
R9 22k
Q3 2n4401
R10 470R
C5 220uF
R11 1k2
C7 33uF
XFM1
42T.X022M
OCT
D1 1n34a
D2 1n34a
500kA
VOL
RTN
IO.1
IO.2
IO.3
IO.4
IO.5
IO.6
IN
+9V
OUT
BYP.1
BYP.2
BYP.3
BYP.4
BYP.5
BYP.6
SND
VC
RTN
OUT