

# Wavelord24

FX Type: **MODULATION**

Build Level: Intermediate

Based On: madbeanpedals original

Last Updated: August 20, 2024 4:17 PM

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## Overview

The *2024 version* of the **Wavelord** has no circuit changes and a brand new layout. It now uses 16mm pots for all controls and includes a bypass board.

The **Wavelord** is tremolo implementation of the Electric Druid TAPLFO3 chip. It features many options preferred by tremolo users such as tap tempo and multiple tweak-able waveforms (including some very unusual and not often heard ones). The Wavelord also features an external jack for linking to another optical effect allowing you to use the TAPLFO3 engine to drive a second effect.

## Controls

- **Tap:** Sets the quarter note pulse based on the average of two or more taps.
- **Tempo:** Sets the tempo via a pot as an alternative to tapping the BPM.
- **Mult:** The multiplier sets the quarter note pulse division. From left to right this is 0.5x, 1x, 1.5x, 2x, 3x, 4x (note some tempos at 4x speed will simply be too fast for the opto device to respond so it will do nothing).
- **Depth:** Intensity of the tremolo effect.
- **Dist:** Changes the duty cycle to push the peaks or valleys of each waveform to the beginning or end of the cycle. Zero distortion is at 50%.
- **Vol:** Sets the output volume of the Wavelord.
- **Waveform:** This rotary switch selects between 8 waveforms per bank.
- **Bank:** This switch toggles between bank 1 and 2, giving you a total of 16 possible tremolo waveforms.
- **T1:** This trimmer sets the gain recovery after the LDR in the opto device. This is set by turning the Depth knob to zero, Vol to about 2/3rd then adjusting T1 for unity gain with bypass. This setting should produce minimal distortion at the output and allow for a bit of boost when you turn VOL all the way up..

Check out the TAPLFO3 info and datasheet from our DI friend Tom over at Electric Druid!

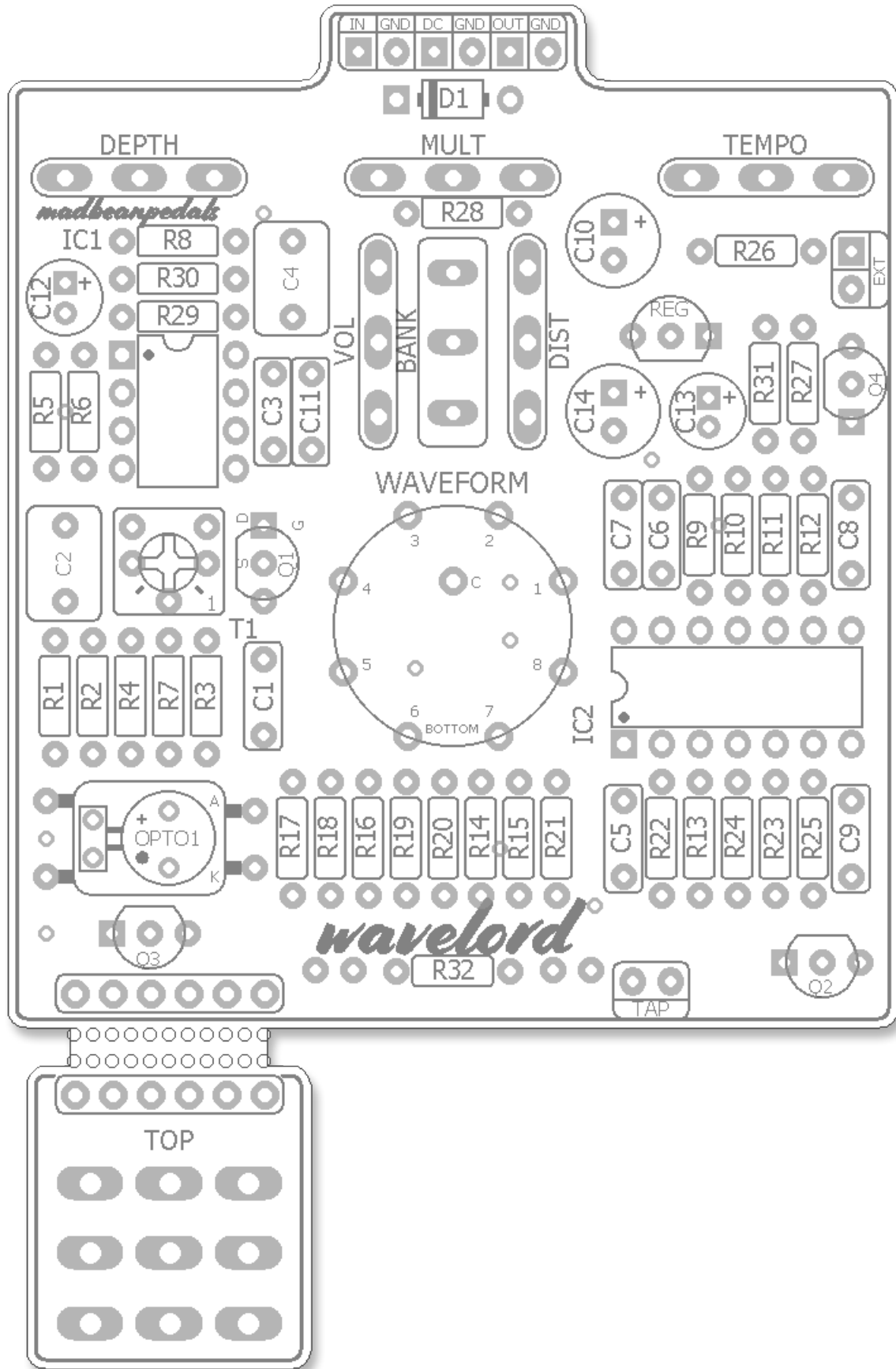
<https://electricdruid.net/product/taplfo3/>

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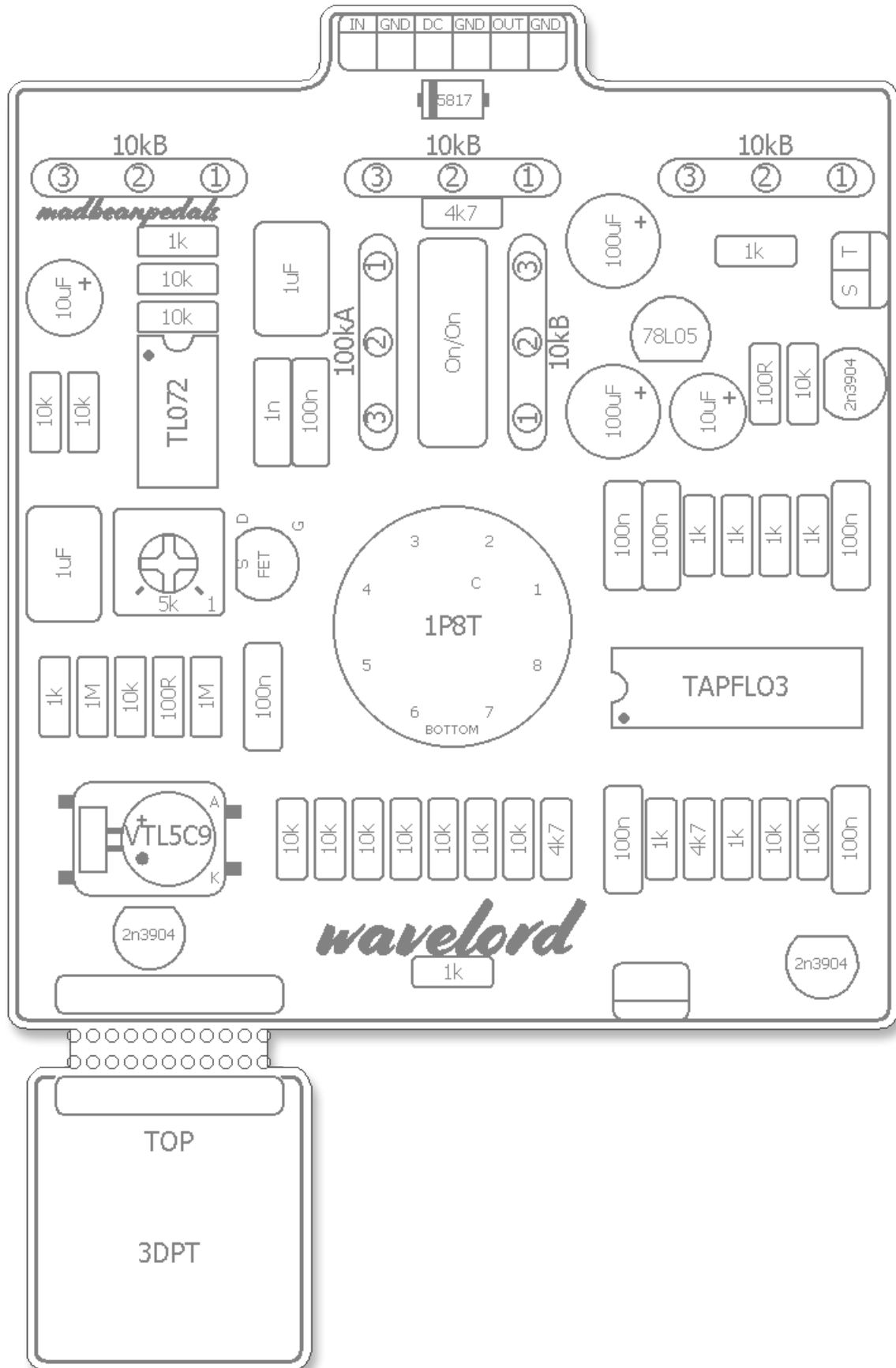
**Technical assistance** for is available via the [madbeanpedals forum](#). Please go there rather than emailing me for personal assistance. This is because (1) I'm not always available to respond via email in a timely and continuous manner, and (2) posting technical problems and solutions in the forum creates a record from which other members may benefit.

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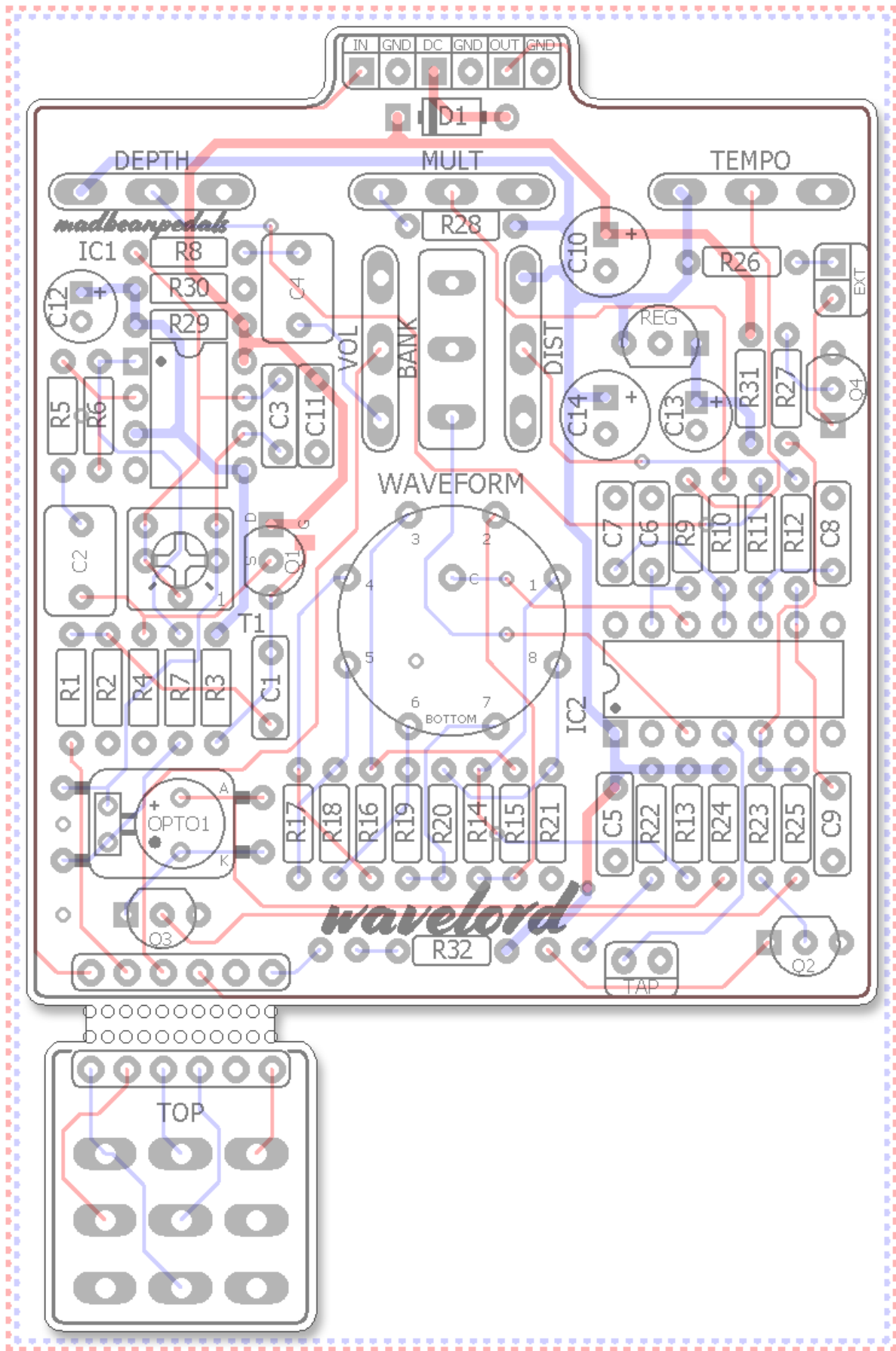
# Parts Layout



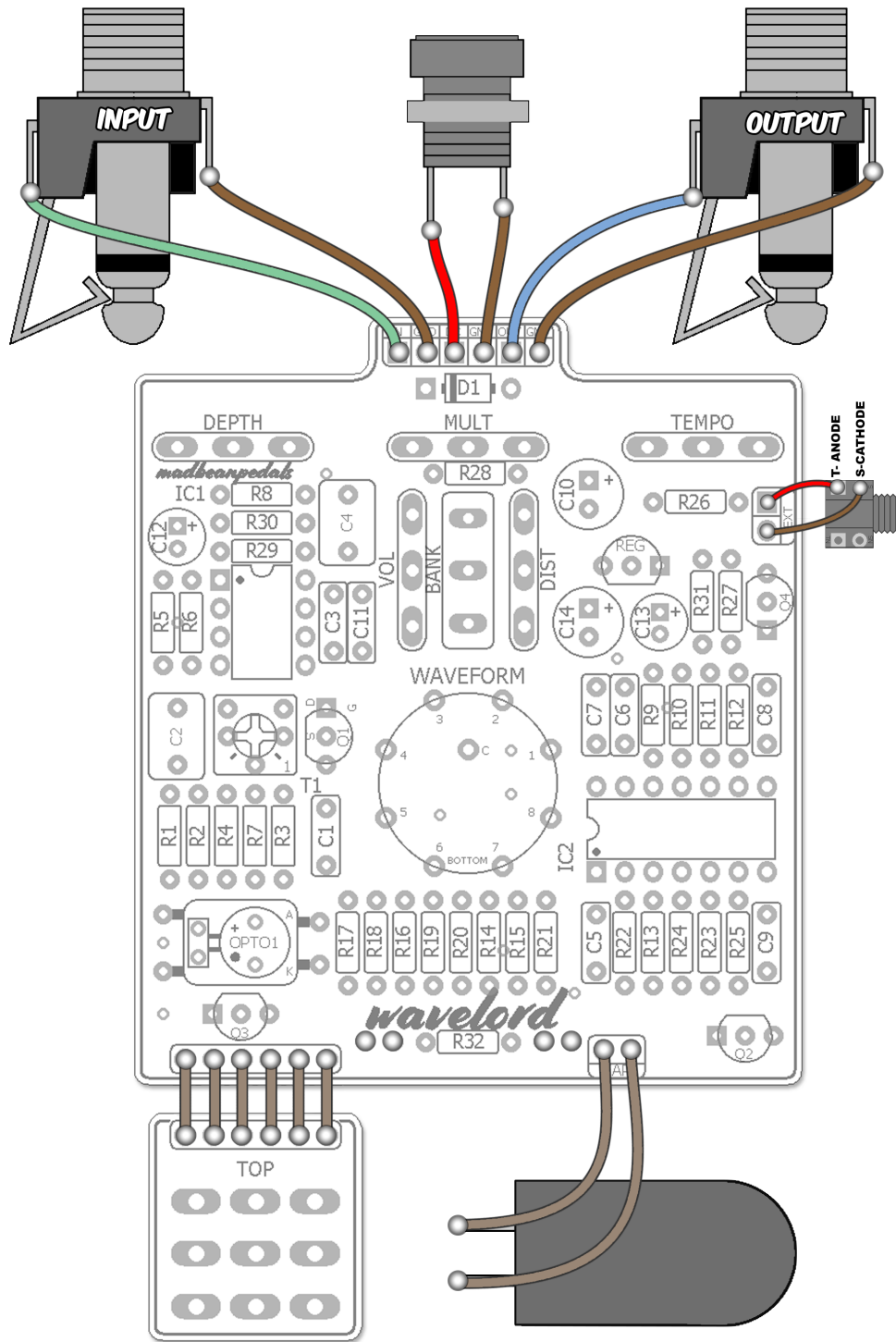
## Component Values



# Trace Layout



## Wiring



The 2024 version comes with its own bypass board and should be wired as shown above. The bypass and tap tempo LEDs are soldered directly to the bottom of the main PCB (on either side of R32).

## B.O.M.

Resistors		Caps		Diodes	
R1	1k	C1	100n	D1	1n5817
R2	1M	C2	1uF	LED1	any
R3	1M	C3	1n	LED2	any
R4	10k	C4	1uF	<b>Transistors</b>	
R5	10k	C5	100n	Q1	FET
R6	10k	C6	100n	Q2	2n3904
R7	100R	C7	100n	Q3	2n3904
R8	1k	C8	100n	Q4	2n3904
R9	1k	C9	100n	<b>ICs</b>	
R10	1k	C10	100uF	IC1	TL072
R11	1k	C11	100n	IC2	TAPFLO3
R12	1k	C12	10uF	<b>Regulator</b>	
R13	4k7	C13	10uF	REG	78L05
R14	10k	C14	100uF	<b>Optical</b>	
R15	10k			OPTO1	VTL5C9
R16	10k			<b>Switches</b>	
R17	10k			SW	3DPT
R18	10k			TAP	SPST
R19	10k			BANK	On/On
R20	10k			WAVEFORM	1P8T
R21	4k7			<b>Jack (optional)</b>	
R22	1k			EXT	mini jack
R23	10k			<b>Trimmer</b>	
R24	1k			T1	5k
R25	10k			<b>Pots</b>	
R26	1k			DEPTH	10kB
R27	10k			DIST	10kB
R28	4k7			MULT	10kB
R29	10k			TEMPO	10kB
R30	10k			VOL	100kA
R31	100R				
R32	1k				

1P8T Rotary: <https://stompboxparts.com/switches/1p8t-mini-rotary-switch/>

VTL5C9: <https://stompboxparts.com/vtl5c9-vactrol/>

1/8" Jack: <https://smallbear-electronics.mybigcommerce.com/1-8-mono-pc-mount/>

TapLFO3D: <https://electricdruid.net/product/taplfo3/>

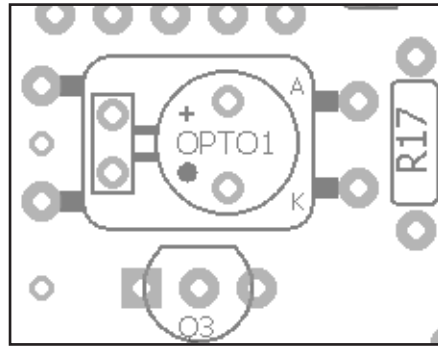
## Shopping List

Values	QTY	Type	Rating
100R	2	Carbon / Metal Film	1/4W
1k	10	Carbon / Metal Film	1/4W
4k7	3	Carbon / Metal Film	1/4W
10k	15	Carbon / Metal Film	1/4W
1M	2	Carbon / Metal Film	1/4W
1n	1	Film	16v min.
100n	7	Film	16v min.
1uF	2	Film	16v min.
10uF	2	Electrolytic	16v min.
100uF	2	Electrolytic	16v min.
1n5817	1		
LED	2	any	5mm
JFET	1	J201, 2n5457, MPF102	TH or SMD
2n3904	3		
TL072	1		
TAPLFO3	1		
78L05	1		
VTL5C9	1	or, NSL32R3	
3DPT	1	footswitch, solder lug	
SPST	1	momentary, normally off	
SPDT	1	On/On, Solder lug	
1P8T	1	rotary switch	
Jack	1	TS 1/8" jack	
5k	1	Bourns 3362p or 6mm	
10kB	4	PCB Right Angle	
100kA	4	PCB Right Angle	

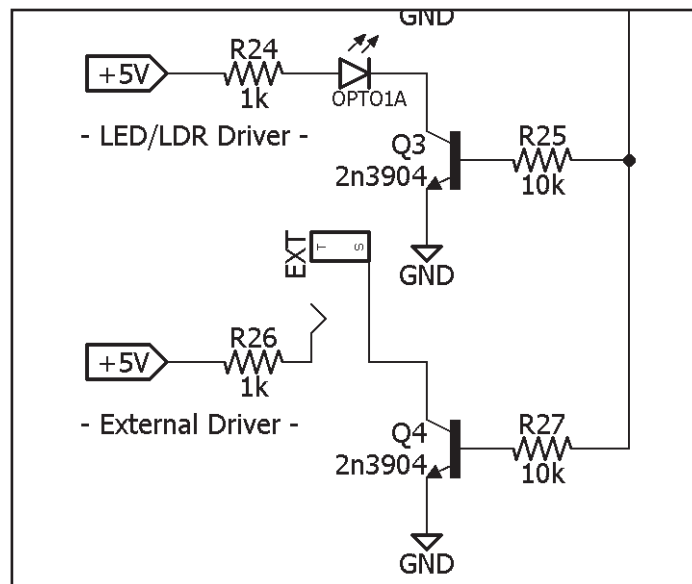
### Additional Hardware

- (1) 125B enclosure
- (2) 1/4" mono jacks
- (1) Slim 2.1mm DC jack

## Build Notes



Opto1 has solder pads for both the VTL5C9 and NSL32. I recommend using the 5C9. It is a more expensive parts, however, having tested both devices in this build the 5C9 does a better job of pulling out finer detail in some of the more esoteric waveforms in Bank2. If you cannot get the VTL5C9, use the **R3** version of the NSL32. UPDATE: after using the NSL32R3 for the 2024 version, I was completely happy with it.



### External Jack:

The external jack option is a copy of the Opto1 driver but the LED is replaced with a 1/8" jack. This allows you to connect the Wavelord to another effect and thus creating a "master tap" controller with the Wavelord. The jack should be connected to an external LED or opto device in the same way it is used in the Wavelord.

The external 1/8" jack is an optional mod and you do not have to include it. If you do not wish to use the jack omit R26, R27 and Q4.

NOTE: Although I have indicated a 1/8" jack for the external connection, you could actually use a plastic DC jack and then just use a DC cable connected to it. However, you will probably want to make it a different style of jack than the one used for your effect power, so they will not be confused.



## Circuit Voltages

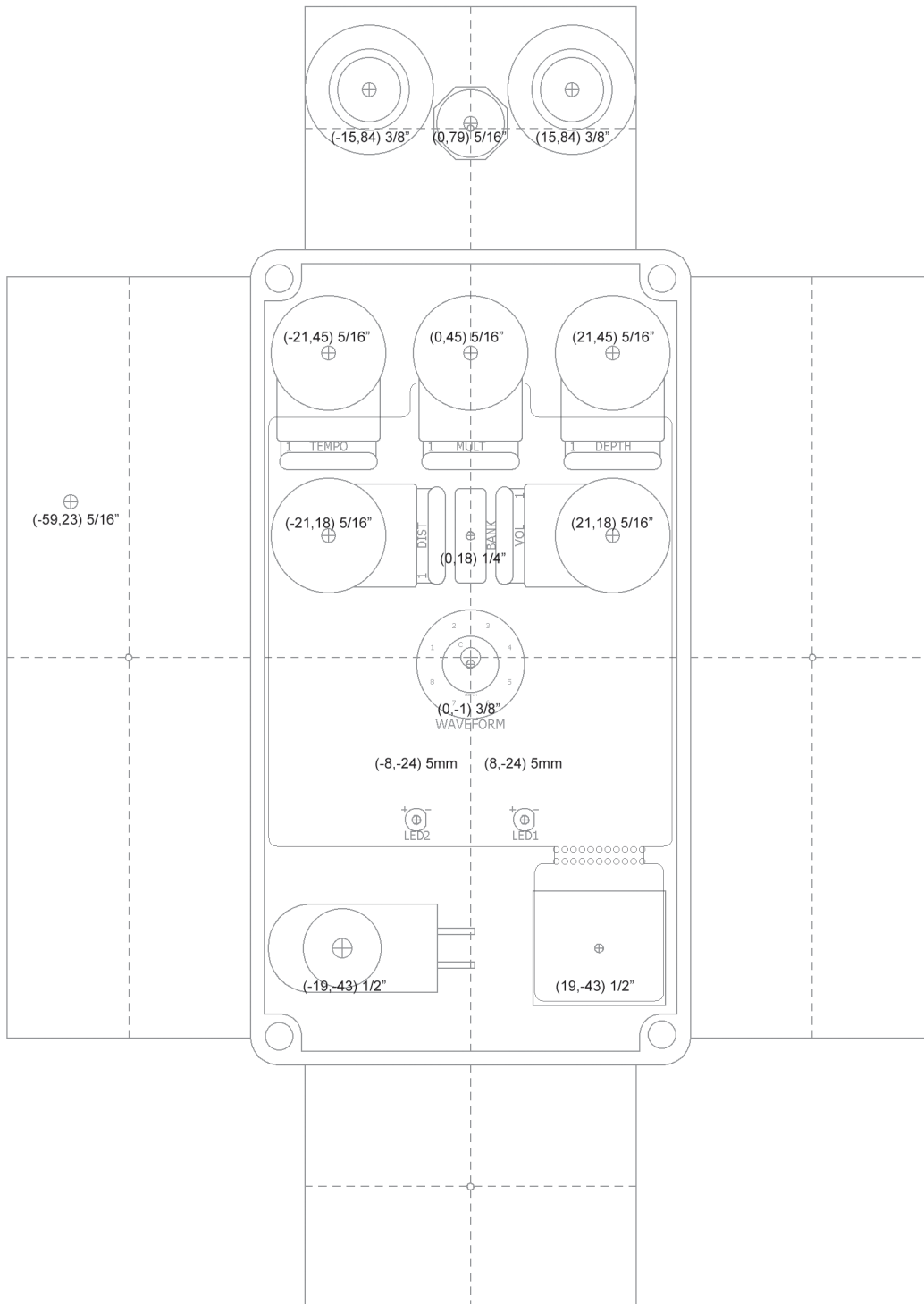
IC1	TL072	Q1	FET
1	4.61	D	9.23
2	4.61	S	4.78
3	4.61	G	4.23
4	0	<b>Q2</b>	<b>2n3904</b>
5	4.61	C	varies
6	4.61	B	varies
7	4.61	E	0
8	9.23	<b>Q2</b>	<b>2n3904</b>
IC2 TAPLFO3		C	varies
1	5	B	varies
2	ignore	E	0
3	5	<b>Q2</b>	<b>2n3904</b>
4	5	C	varies
5	varies	B	varies
6	0	E	0
7	ignore		
8	ignore		
9	3.3		
10	5		
11	0		
12	521mV		
13	3.67		
14	0		

- 9.42vDC One Spot
- Current Draw: 15mA
- Testing Conditions: Pots @ 50%, Rotary @ 1st pos., switch down.

## Drill Template

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

Tayda drill link: [https://drill.taydakits.com/box-designs/new?public\\_key=aHNvc2FPNUtocWxGSmNGRFZCNWJEQT09Cg==](https://drill.taydakits.com/box-designs/new?public_key=aHNvc2FPNUtocWxGSmNGRFZCNWJEQT09Cg==)

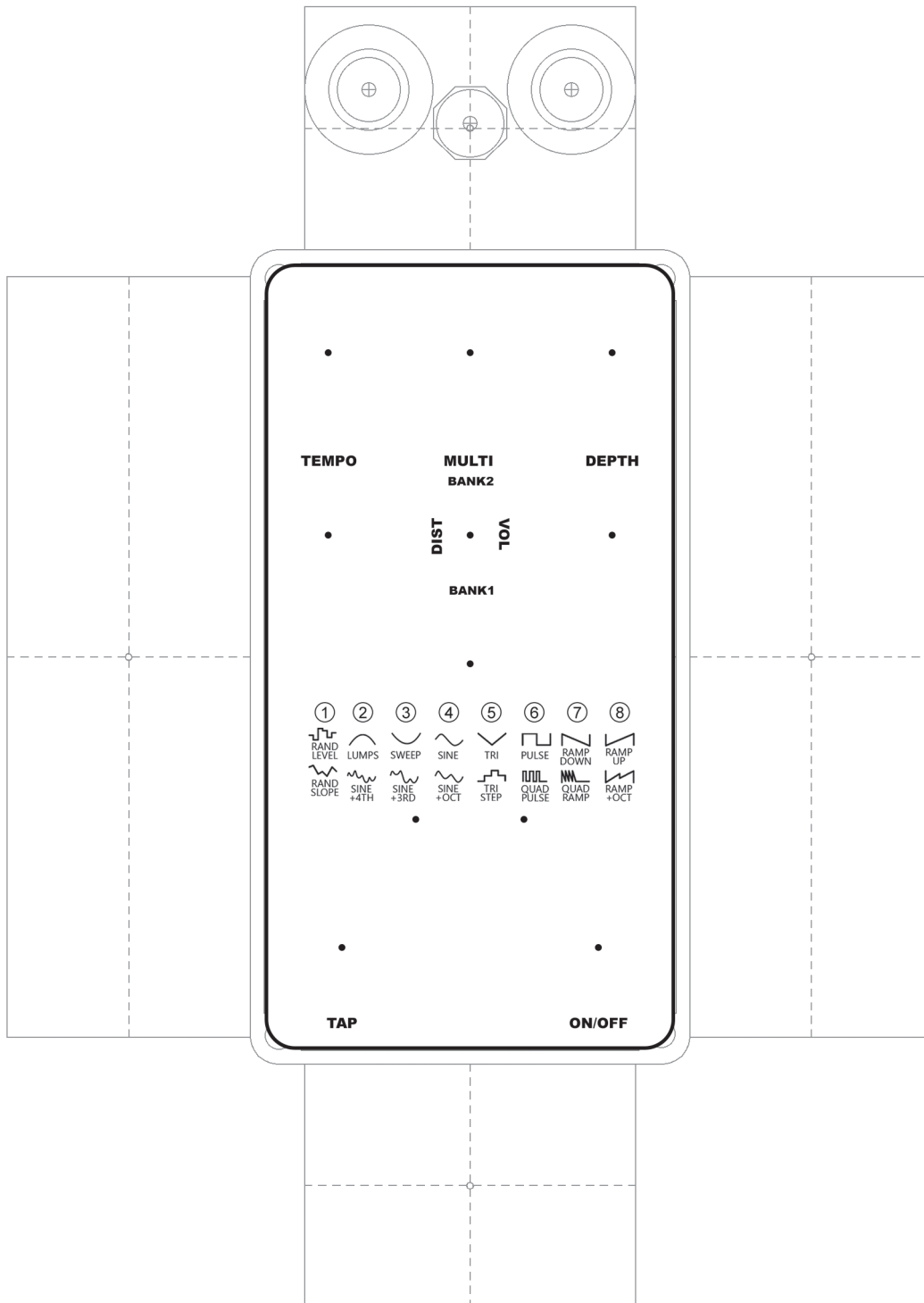


### Hardware

- 125B enclosure
- 1/4" mono jacks
- Slim 2.1mm DC jack
- Standard 3PDT and NO momentary footswitches
- 2x 5mm LEDs

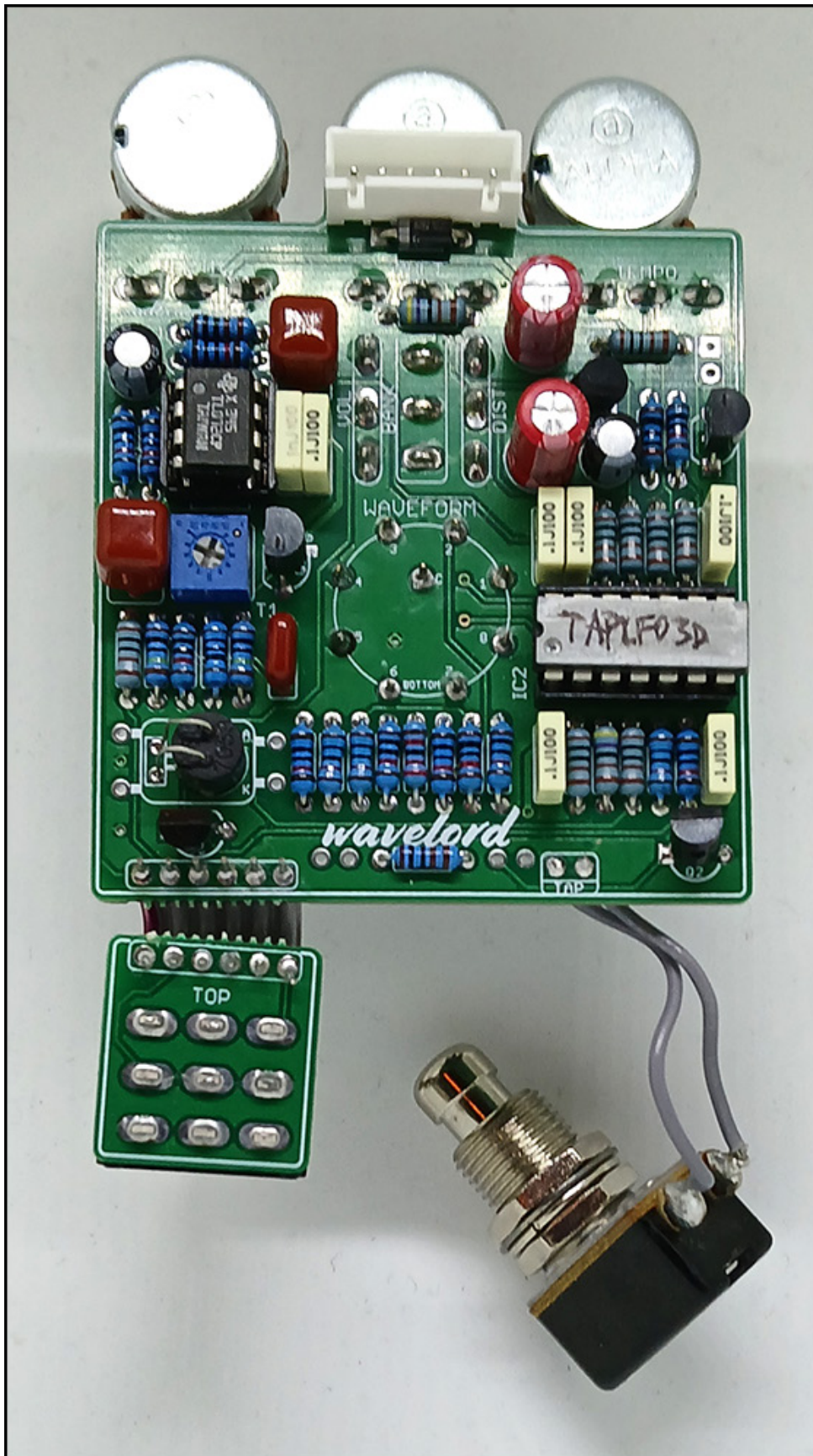
**NOTE: Different 1/4" and DC jack styles may require different sized drill holes.**

# Artwork



Since there is so much going on with this build, I've created simple mock artwork you can use for the 125B enclosure. The .psd file is included in the .zip file for this project.

## Build Pic



I noticed after this pic I had used two wrong resistor values. Can you see which ones? Once corrected, everything finally worked properly.

