

# WAVELORD

**FX TYPE:** Tremolo

Enclosure Size: 125B

“Softie” compatibility: none

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## Overview

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. If you built the Phaser or Wah project from the Tapanatorator project, the Wavelord can drive them through the external jack. Future mbp modulation projects will also allow an option to hook up to the Wavelord for Tap Tempo control.

8.2.2020 update: A new resistor (R32) has been added to the PCB. This resistor prevents the Multi pot from resetting when turned fully clockwise. Its value should be 4k7.

## Controls

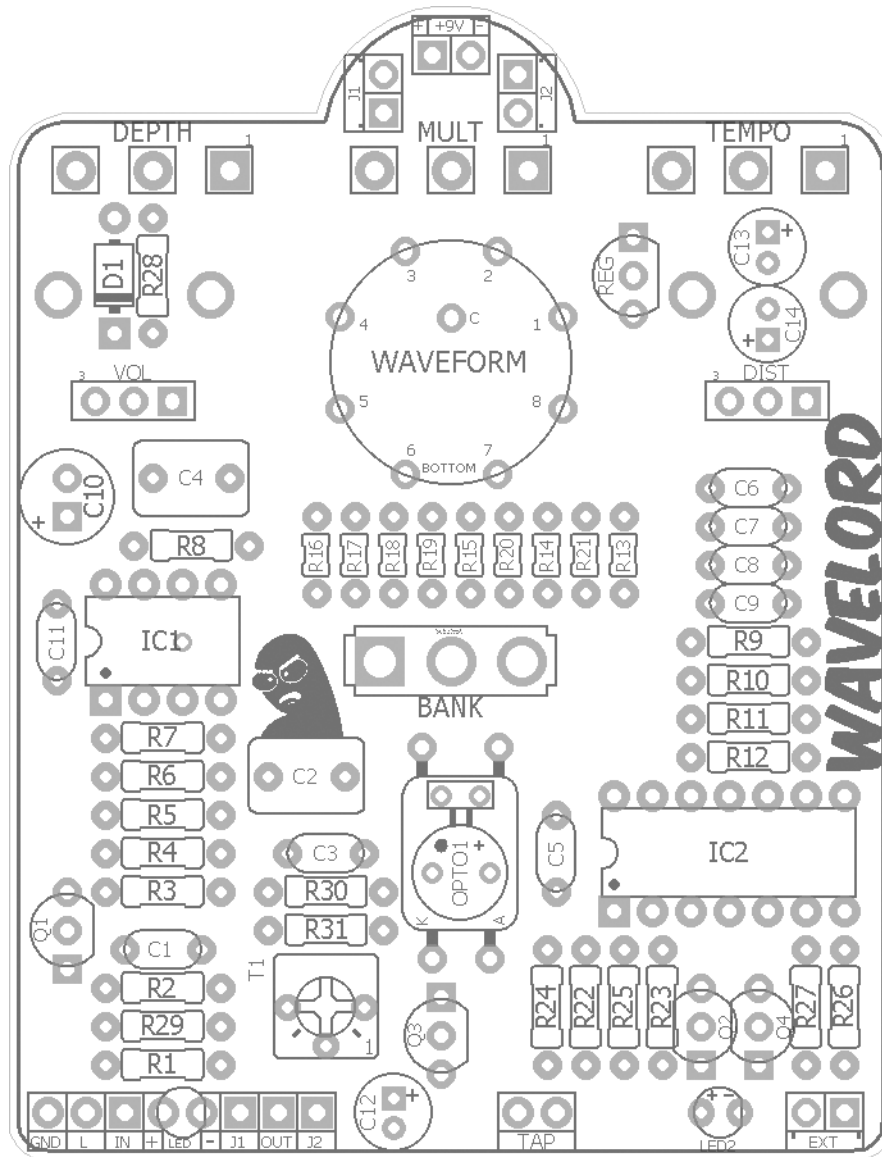
- **Tap:** Sets the quarter note pulse based on the average of two or more taps.
- **Tempo:** Sets the tempo via a pot as an alternative to tapping the BPM.
- **Mult:** The multiplier sets the quarter note pulse division. From left to right this is 0.5x, 1x, 1.5x, 2x, 3x, 4x (note some tempos at 4x speed 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. Unlike other 1p8t rotaries, the switch used in the Wavelord is continuous, meaning it doesn't stop at the 8t terminal. Rather you can keep turning it to go back to 1t (this is actually very cool since you don't have to turn it all the way back counter-clockwise).
- **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..

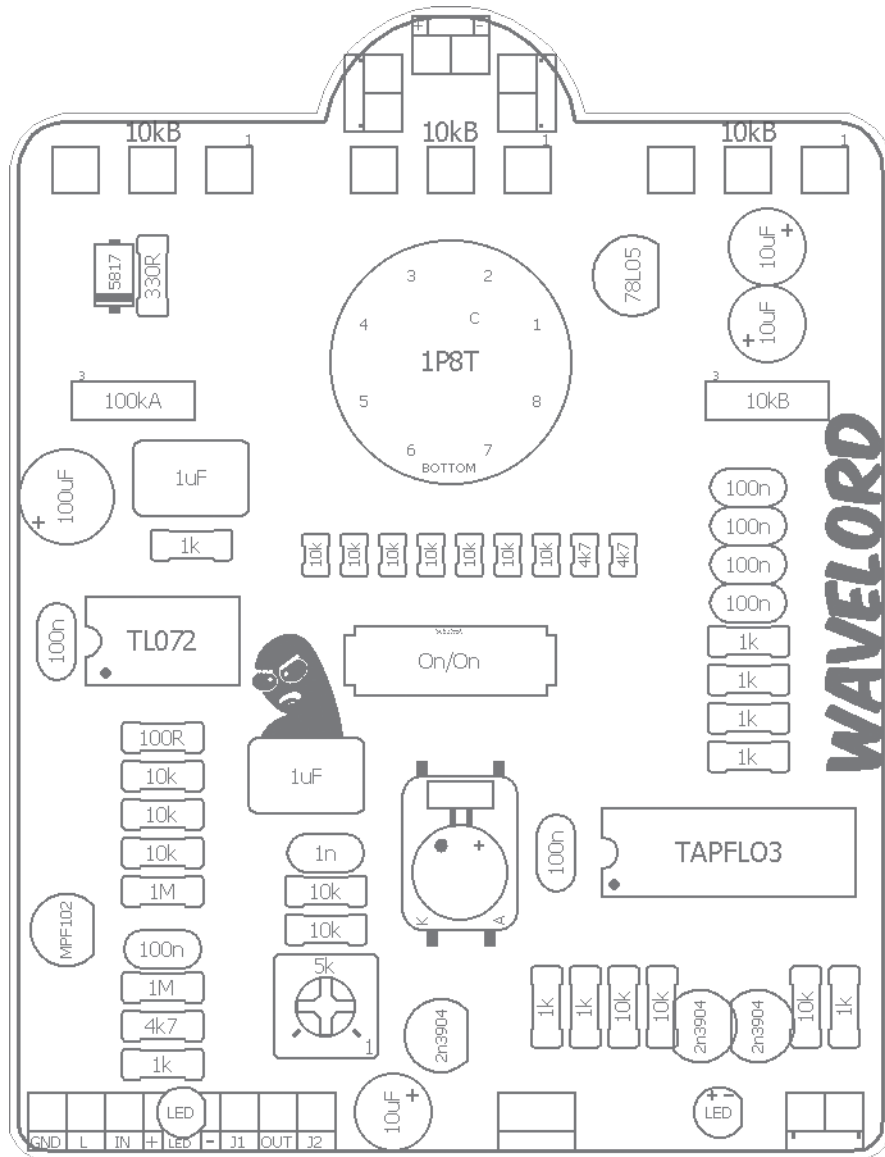
Check out the TAPLFO3 info and datasheet from our DI friend Tom over at Electric Druid!

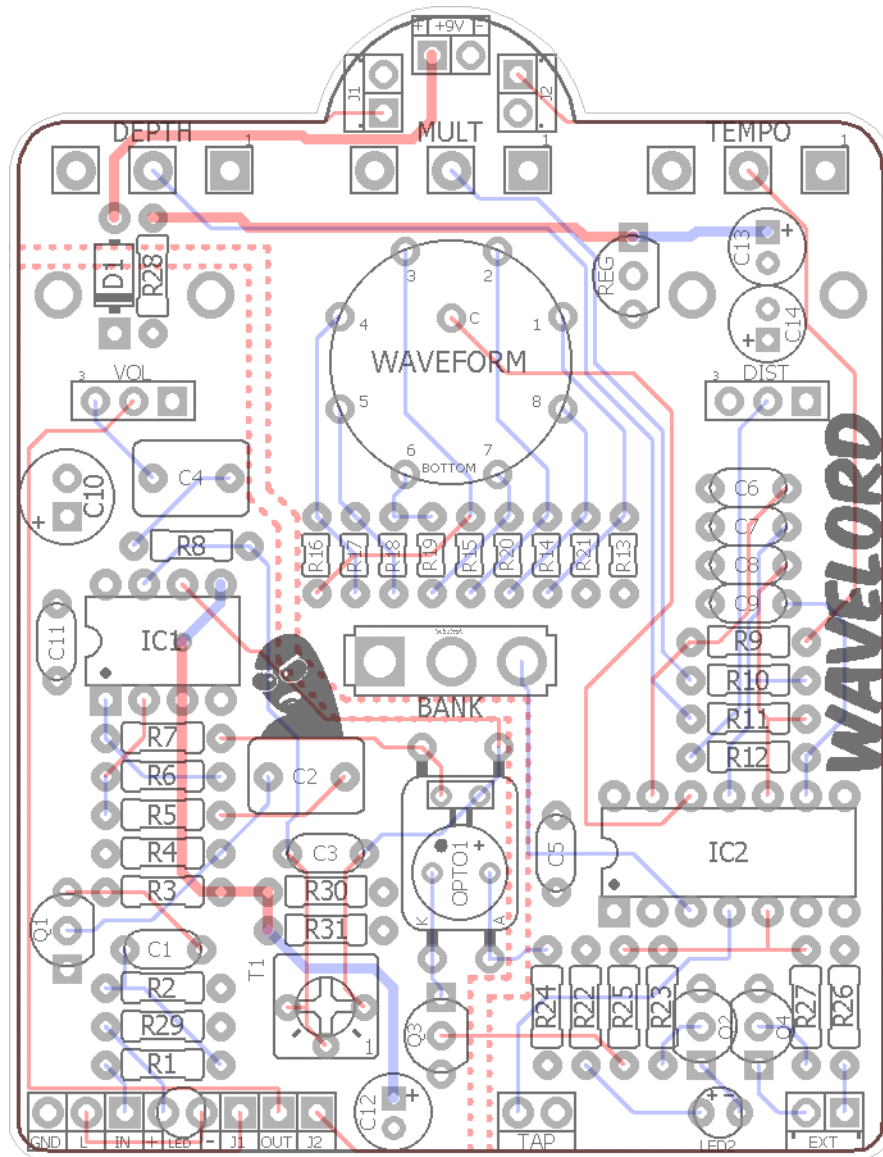
<https://electricdruid.net/product/taplfo3/>

**Terms of Use:** You are free to use purchased **Wavelord** circuit boards for both DIY and small commercial operations. You may not offer **Wavelord** PCBs for resale or as part of a “kit” in a commercial fashion. Peer to peer re-sale is fine, though.

**Technical assistance** for your build(s) is available via the [madbeanpedals forum](http://madbeanpedals.com/forum). Please go there rather than emailing me for assistance on builds. 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.







Resistors		Caps		Switches	
R1	1k	C1	100n	WAVEFORM	1P8T
R2	1M	C2	1uF	BANK	On/On
R3	1M	C3	1n	Trimmer	
R4	10k	C4	1uF	T1	5k
R5	10k	C5	100n	Pots	
R6	10k	C6	100n	DEPTH	10kΩ
R7	100R	C7	100n	DIST	10kΩ
R8	1k	C8	100n	MULT	10kΩ
R9	1k	C9	100n	TEMPO	10kΩ
R10	1k	C10	100uF	VOL	100kΩ
R11	1k	C11	100n		
R12	1k	C12	10uF		
R13	4k7	C13	10uF		
R14	10k	C14	10uF		
R15	10k	Diodes			
R16	10k	D1	1N5817		
R17	10k	LED2	LED		
R18	10k	Transistors			
R19	10k	Q1	MPF102		
R20	10k	Q2 - Q4	2n3904		
R21	4k7	IC			
R22	1k	IC1	TL072		
R23	10k	IC2	TAPFLO3		
R24	1k	Regulator			
R25	10k	REG	LM78L05		
R26	1k	Optical			
R27	10k	OPTO1	VTL5C9		
R28	100R	Jack			
R29	4k7	EXT	1/8" Jack		
R30	10k	Footswitch			
R31	10k	TAP	SPST		

2020 update: R32 added, value: 4k7

2021 update: change R28 to 100R

Value	QTY	Type	Rating
4k7	2	Metal / Carbon Film	1/8W
10k	7	Metal / Carbon Film	1/8W
100R	2	Metal / Carbon Film	1/4W
330R	0	change R28 to 100R	
1k	9	Metal / Carbon Film	1/4W
4k7	2	Metal / Carbon Film	1/4W
10k	8	Metal / Carbon Film	1/4W
1M	2	Metal / Carbon Film	1/4W
1n	1	Film	16v min.
100n	7	Film	16v min.
1uF	2	Film	16v min.
10uF	3	Electrolytic	16v min.
100uF	1	Electrolytic	16v min.
1N5817	1		
LED	1	tempo indicator	any
MPF102	1	or, 2n5457, J201	
2n3904	3		
TL072	1		
TAPFLO3	1		
LM78L05	1		
VTL5C9	1		
1/8" Jack	1	Mini Jack	
SPST	1	Momentary Footswitch	normally open
1P8T	1	Rotary (see link)	
On/On	1	SPDT, Solder Lugs	
5k	1	Bourns 3362p	
10kB	3	PCB Right Angle	16mm
10kB	1	PCB Right Angle, Plastic Shaft	9mm
100kA	1	PCB Right Angle, Plastic Shaft	9mm

**1P8T Rotary:** <http://smallbear-electronics.mybigcommerce.com/rotary-switch-miniature-1p8t/>

**TAPLFO 3:** <http://www.smallbear-electronics.mybigcommerce.com/ic-electric-druid-taplfo-3c/>

**On/On PC Mount:** <http://www.smallbear-electronics.mybigcommerce.com/spdt-on-on-pc-mount/>

**VTL5C9:** <http://smallbear-electronics.mybigcommerce.com/photocoupler-vactec-vtl5c9/>

**10kB 16mm Pot:** <http://www.smallbear-electronics.mybigcommerce.com/alpha-single-gang-16mm-right-angle-pc-mount/>

**10kB, 100kA Plastic Shaft:** <http://www.smallbear-electronics.mybigcommerce.com/alpha-single-gang-9mm-right-angle-pc-mount-w-knurled-plastic-shaft/>

**5k Trimmer (Bourns 3362p):**

<https://www.mouser.com/ProductDetail/Bourns/3362P-1-502LF?qs=sGAEpiMZZMvygUB3GLcD7pXz6c6XAR3tLU32B218z4E%3d>

or,

<https://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/5k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html>

**Momentary NO:** <http://www.smallbear-electronics.mybigcommerce.com/momentary-spst-no-soft-touch/>

**Thinline DC Jack:**

<http://smallbear-electronics.mybigcommerce.com/dc-power-jack-all-plastic-unswitched-2-1-mm/>

**Enclosed Mono:**

<http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-jack/>

<http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-switchcraft-111x/>

**Lumberg Mono:**

<http://smallbear-electronics.mybigcommerce.com/lumberg-1-4-compact-shrouded-mono-jack/>

**Optional:**

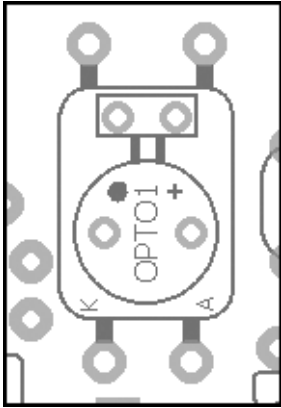
**1/8" Jack:** <http://www.smallbear-electronics.mybigcommerce.com/1-8-mono-pc-mount/>

**1/8" Plugs:** <http://www.smallbear-electronics.mybigcommerce.com/1-8-mono-straight/>

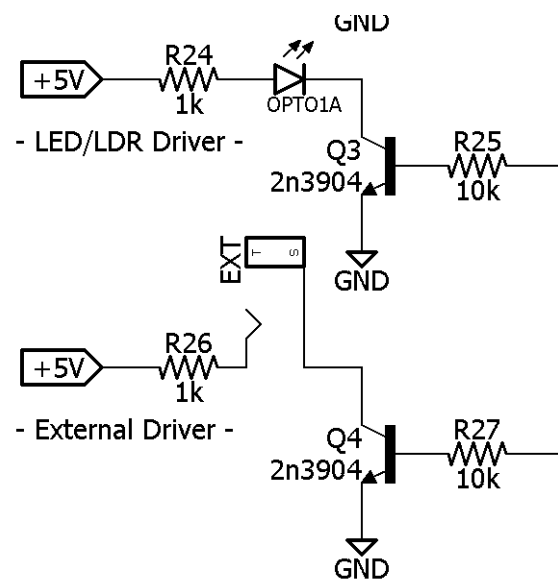
For 1/8" plugs, you can also use pre-made TRS ones. There are a number of inexpensive ones on Amazon. For most of them, the ring of the TRS plug will end up connecting to the tip of the jack. This is okay, though, since they are plastic and isolated from the enclosure.

[https://www.amazon.com/gp/product/B01N2MY88J/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o03\\_s04?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B01N2MY88J/ref=ppx_yo_dt_b_asin_title_o03_s04?ie=UTF8&psc=1)

[https://www.amazon.com/gp/product/B072TYZ89H/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o03\\_s00?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B072TYZ89H/ref=ppx_yo_dt_b_asin_title_o03_s00?ie=UTF8&psc=1)



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.



### 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 optically-based modulation effect and thus creating a "master tap" controller with the Wavelord.

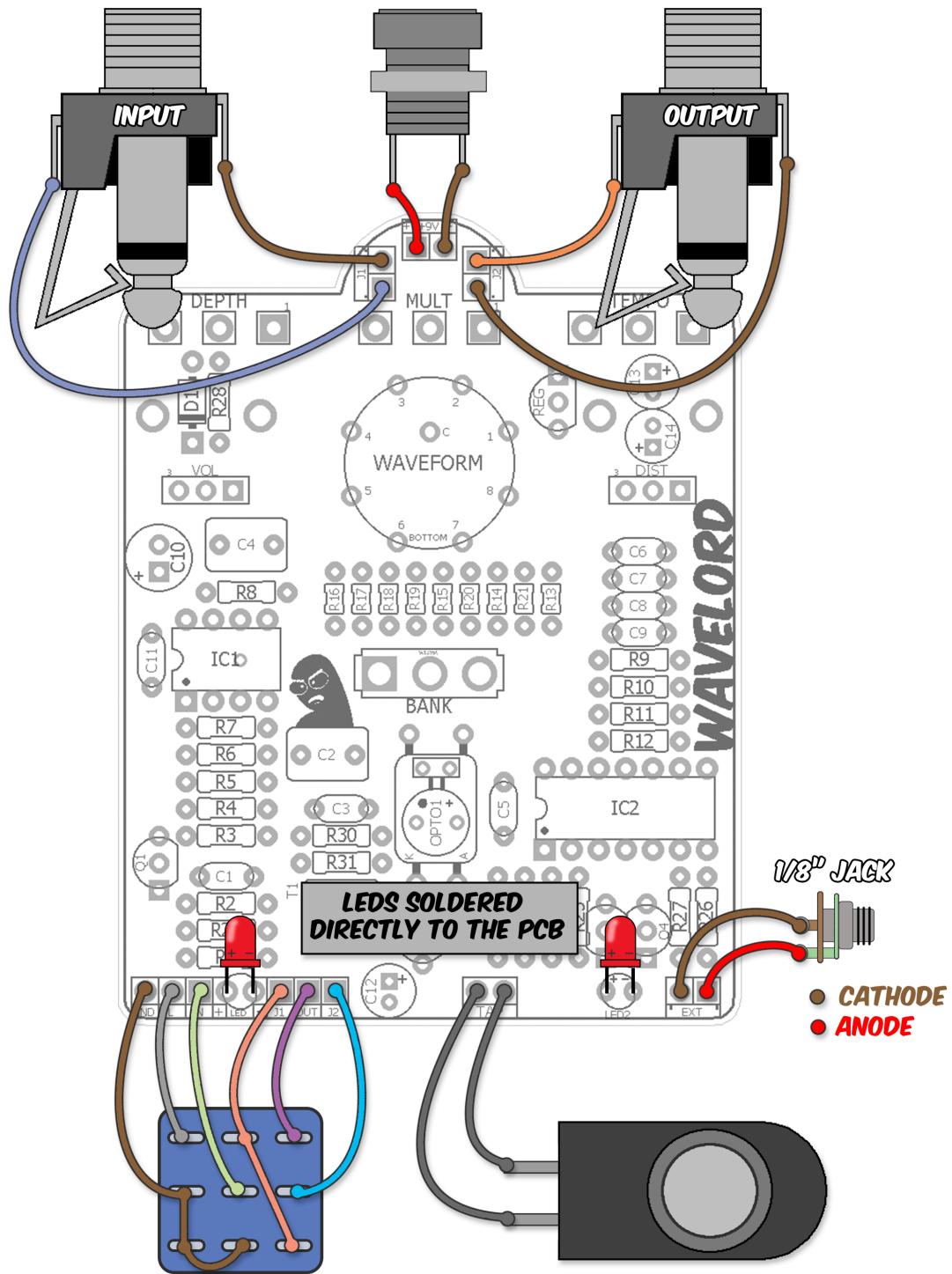
The external 1/8" jack is an optional mod and you do not have to include it. If you do not wish to use the jack omit R26, R27 and Q4.

There will be future mbp projects that interface with the Wavelord for tap tempo controlling such as the upcoming "Glasshole" phaser project. The Wavelord will also interface with the Tapanator projects from a few years ago (these included a Wah and Phaser 1590A projects).

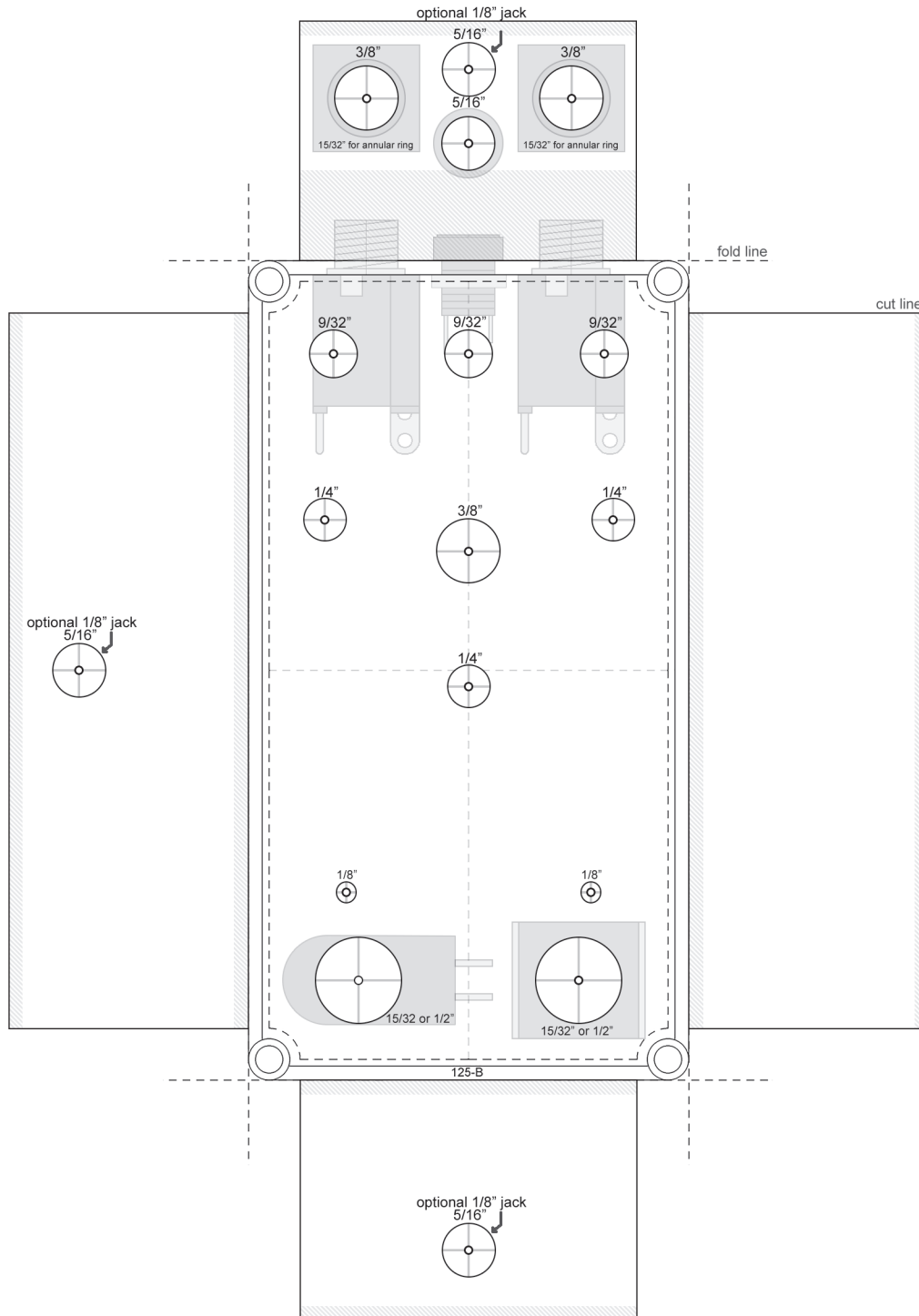
For more explanation on how to link the TAPLFO to a second device, please refer to the Tapanatorator build guide.

<http://www.madbeanpedals.com/projects/Tapanatorator/Tapanatorator.pdf>

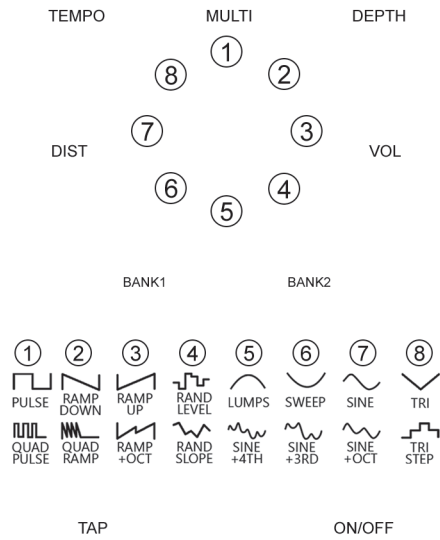




**Note:** Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.



- This template shows enclosed style jacks but should be fine for open-frame metal jacks as well as the “Lumberg” style.
- I recommend using the “Thinline” style DC jack for this build.
- It shows three possible locations for the optional 1/8” jack. Don’t drill all three!



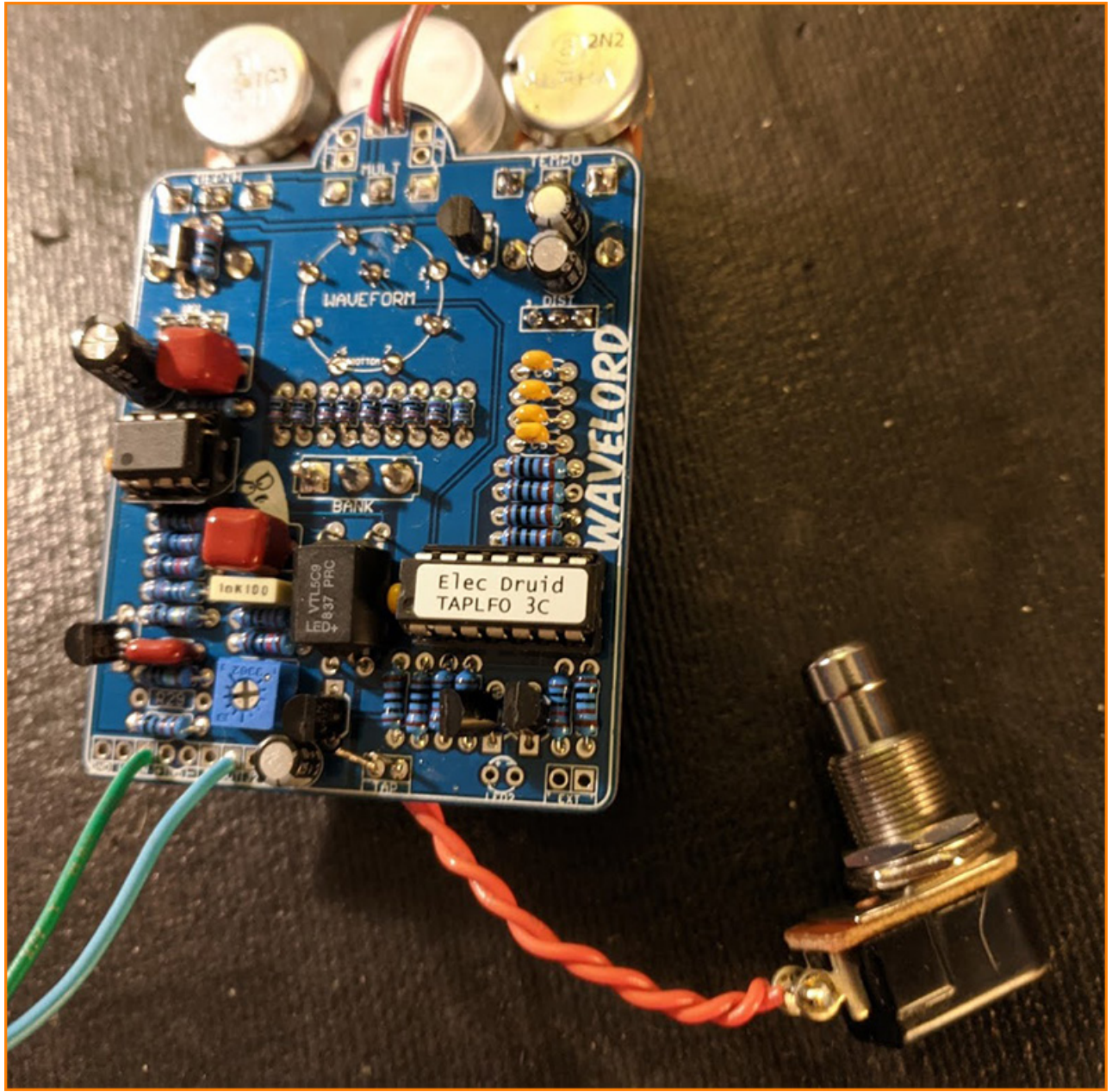
Since the Wavelord has so many options, I have created some mock artwork you can use either as a guide or print out as a label. This artwork is included in the Photoshop drill template in the Wavelord .zip file and can be changed to different fonts, sizes, etc.

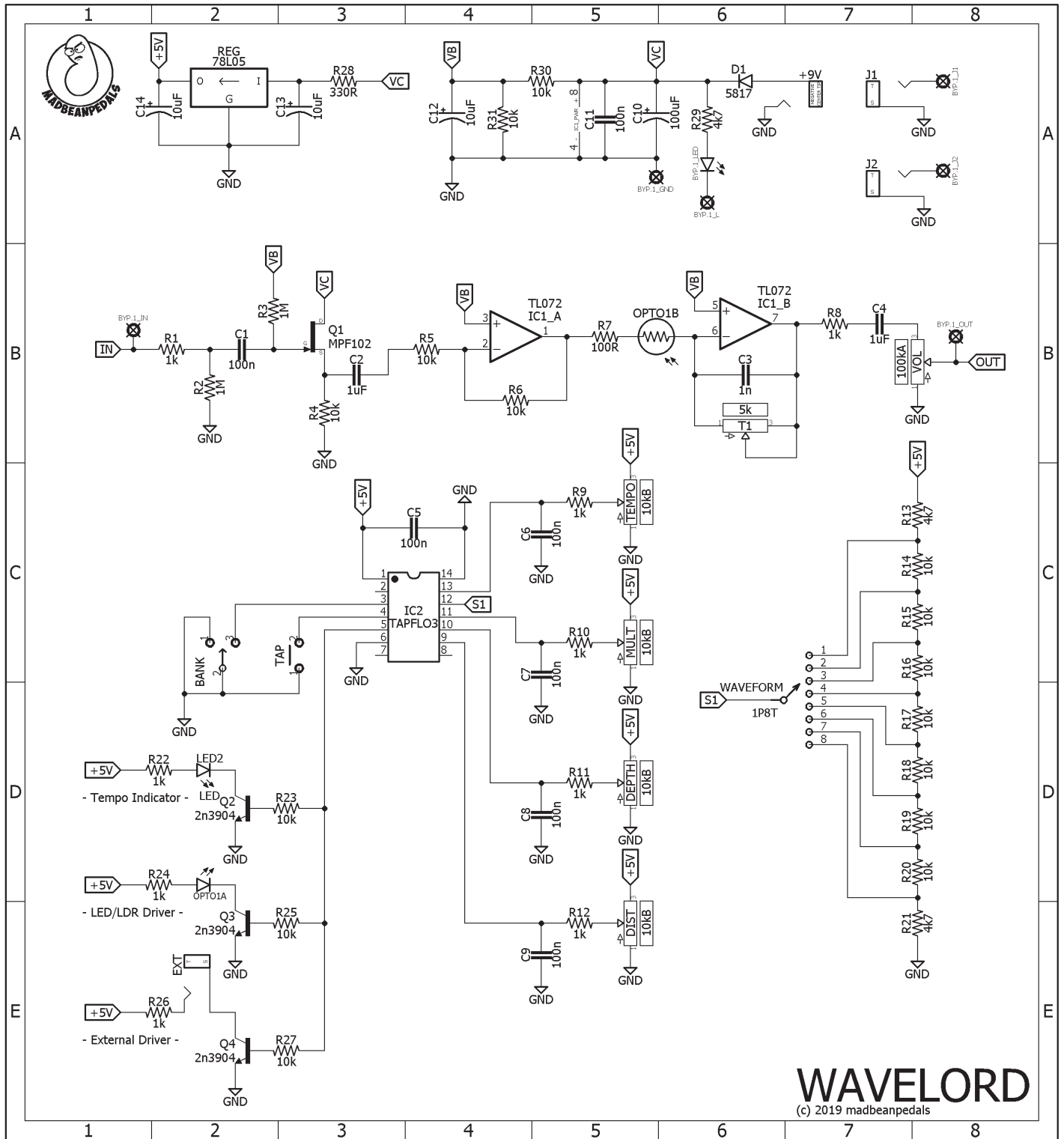
TIP: Like I said before, the 1p8t just rotates all the way back to the start position when you go from wave 8 to wave 1. Therefore, I have designated the Pulse wave as #1 because it is easily identifiable. When attaching your knob to the switch, first rotate it to the Pulse waveform then screw the knob in facing straight up.

IC1 TL072		IC2 TAPFLO3	
1	4.57	1	4.99
2	4.57	2	4.97
3	4.57	3	4.97
4	0	4	4.97
5	4.57	5	2.45
6	4.57	6	0
7	4.57	7	0.6mV
8	9.15	8	4.97
		9	2.6
		10	0
		11	0
		12	1.55
		13	0
		14	0

**Test conditions**

- 9.42vDC power supply
- Tempo, Multi, Depth at 0
- Dist, Vol at 50%
- Bank1
- Pulse waveform
- Current Draw: ~11mA





**WAVELORD**  
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2020 update: A new resistor (R32: 4k7) was added between lug3 and +5v of the Multi pot. This prevents the control from resetting when turned fully clockwise.  
 2021 update: R28 is now 100R.