

# WINDBAG

**FX TYPE: Delay/Reverb**

Based on the VFE® Yodeler™

Enclosure Size: 125B

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## Overview

The **Windbag** is a re-design of the *original* VFE Yodeler Delay/Reverb project. It's been converted to a 125B layout with top-mounted I/O. Both the audio and switching circuitry are included on a single PCB (the Windbag does not require the SB3 board used in other VFE projects on madbeanpedals). The parallel/series switch has been made into an external control, as well.

## HOW THE YODELER CAME TO BE

*From the VFE website:*

My experiments with the Springboard design led me to wonder what sonic landscapes could be created if you just had control over the delay time within the BTDR-3H brick. The only problem was that the brick was huge, and a delay takes a lot of space...I had to fill every conceivable nook & cranny in the circuit board to fit all the circuitry needed to put a delay and reverb inside our compact pedals.

The Yodeler was everything I expected and more. You can set it up as an infinite or even self-oscillating reverb with control over the pre-delay. You can use it as just a great, analog-voiced delay. You can use it a spring-ish style reverb. Or feed the reverb from the repeats of the delay, making each echo splash into the reverb.

## Controls

(This section has been modified to conform to the control names used in the Windbag)

**DELAY:** Sets the delay time, from around 25ms up to 580ms. Set a lower delay time and then blending the reverb in can create a longer, more spacious sounding reverb.

**FDBK:** Sets the amount of feedback/repeats in the delay. Cranking the FDBK knob will send the delay into self-oscillation...which is even crazier when some reverb is added onto it.

**D.MIX:** Sets the volume of wet delay mix. With the R.MIX off, this functions like a standard delay mix control.

**R.MIX:** Sets the volume of wet reverb mix. How the reverb blends will depend on the P/S switch.

**HI/LOW DAMP:** Sets the length of the decay of the brighter/darker trails (resp.) of the BTDR-3H reverb.

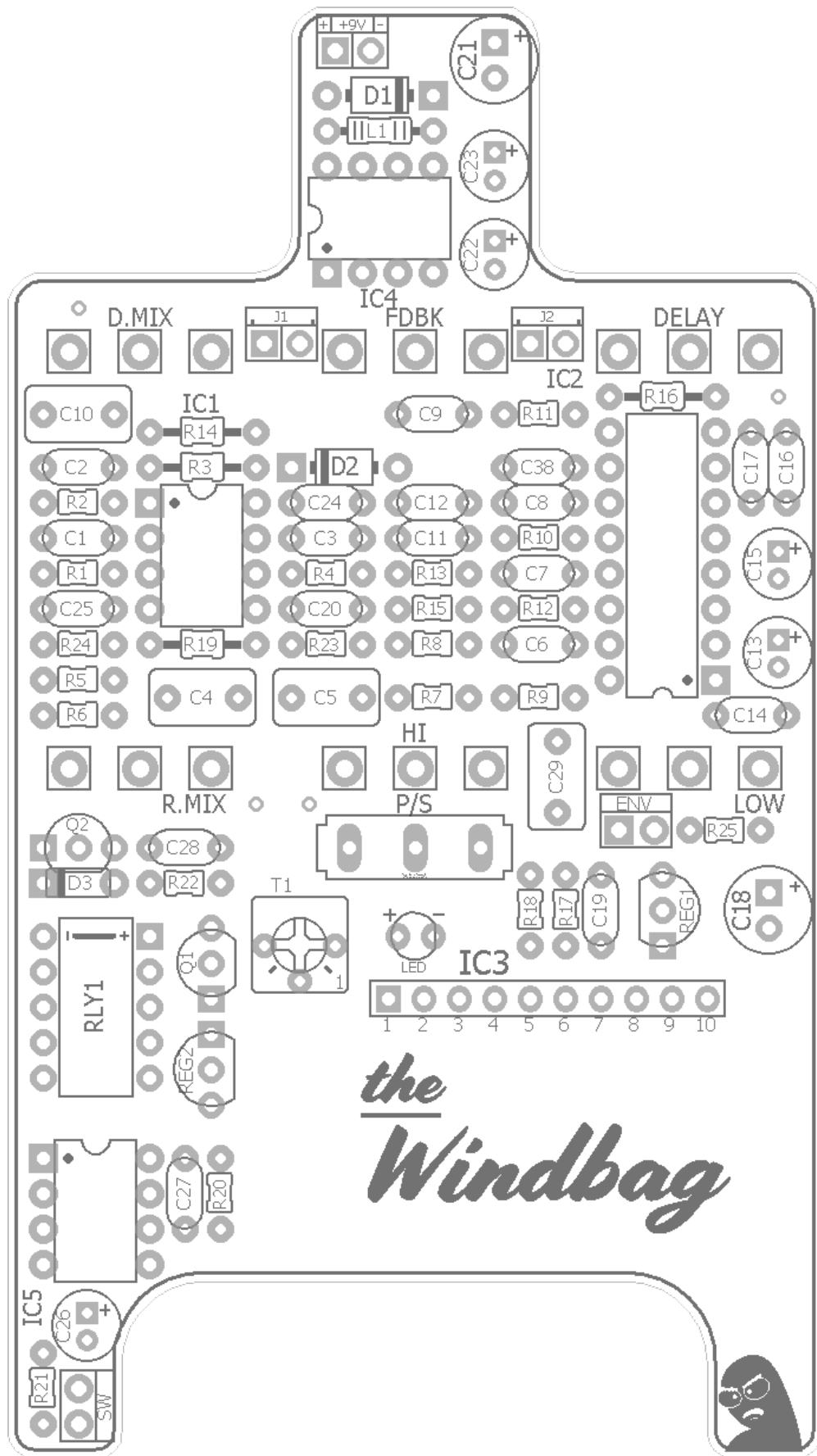
**P/S:** This switch selects whether the reverb is parallel (left) or in series (right) with the delay. Setting the reverb parallel to the delay makes each independent of the other. Setting the reverb in series gives you control over its pre-delay (via the DELAY knob), but when blended with the delay it adds reverb to each delay repeat.

**ENV:** This optional switch enables envelope driven modulation of the delay. It comes directly from Deadastronaut's envelope mod trick posted here: <https://www.diystompboxes.com/smfforum/index.php?topic=128518.0>

This same modulation trick is used on the mbp Cave Dweller 2022 project: <https://www.madbeanpedals.com/EP/index.html>

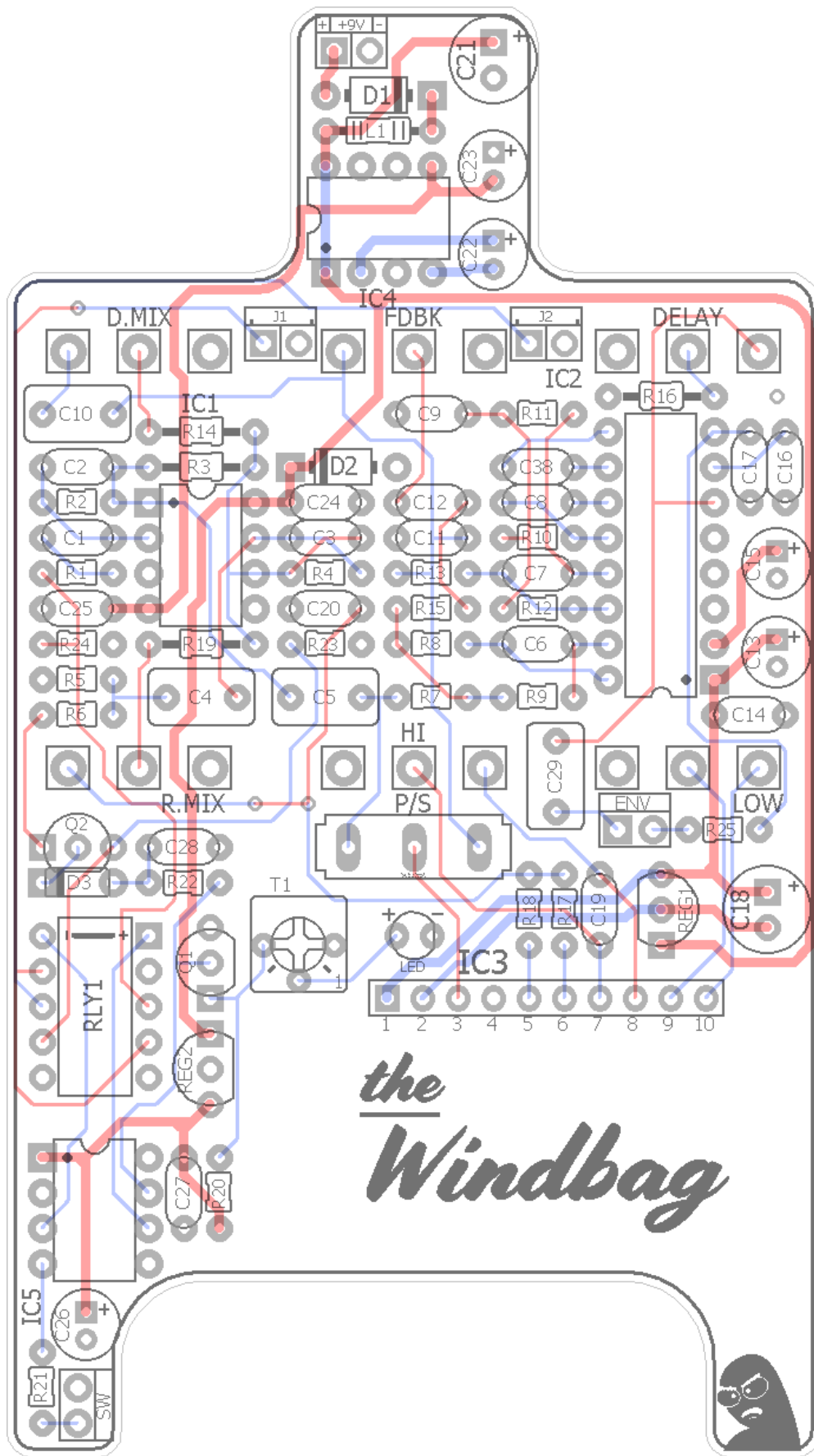
**Terms of Use:** You are free to use purchased **Windbag** circuit boards for both DIY and small commercial operations. You may not offer **Windbag** PCBs for resale or as part of a "kit" in a commercial fashion. Peer to peer re-sale is fine, though.

**Technical assistance** for your build(s) is available via the [madbeanpedals forum](https://www.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.



*the*  
**Windbag**





*the*  
**Windbag**

Resistors		Caps		Diodes	
R1	220K	C1	100n	D1	1n5817
R2	390k	C2	22pF	D2	12v Zener
R3	15k	C3	220pF	D3	1n914
R4	10k	C4	470n	<b>Inductors</b>	
R5	100k	C5	470n	L1	jumper
R6	1k	C6	2n7	<b>Transistors</b>	
R7	10k	C7	3n3	Q1	BS170
R8	10k	C8	82n	Q2	J175
R9	10k	C9	15n	<b>Regulators</b>	
R10	10k	C10	470n	REG1, 2	LP2950
R11	10k	C11	22n	<b>Relays</b>	
R12	22k	C12	220n	RLY1	TQ2-L-5v
R13	1k	C13	47uF	<b>ICs</b>	
R14	10k	C14	100n	IC1	OPA2134a
R15	6k8	C15	47uF	IC2	PT2399
R16	470R	C16	100n	IC3	BTDR-3
R17	1k	C17	100n	IC4	TC7662B
R18	1k	C18	100uF	IC5	PIC12F509
R19	6k8	C19	22n	<b>Switches</b>	
R20	1k	C20	22n	P/S	On/On
R21	1k	C21	100uF	ENV	On/On
R22	100k	C22	47uF	SW	SPST/Momentary
R23	100k	C23	47uF	<b>Trimmers</b>	
R24	10M	C24	100n	T1	20k
R25	1M	C25	100n	<b>Pots</b>	
		C26	4u7	R.MIX	10kB
		C27	100n	HI	20kB
		C28	100n	LOW	20kB
		C29	470n	D.MIX	50kB
		C38	82n	DELAY	50kB
				FDBK	100kB

Value	QTY	Type	Rating	Value	QTY	Type	Rating
470R	1	Carbon / Metal Film	1/8W	1n5817	1		
1k	6	Carbon / Metal Film	1/8W	Zener	1	12v, 1W	
6k8	2	Carbon / Metal Film	1/8W	1n914	1		
10k	7	Carbon / Metal Film	1/8W	BS170	1		
15k	1	Carbon / Metal Film	1/8W	J175	1		
22k	1	Carbon / Metal Film	1/8W	LP2950	2	or, LM78L05	
100k	3	Carbon / Metal Film	1/8W	TQ2-L-5v	1	or, TQ2-L-4.5v	
220K	1	Carbon / Metal Film	1/8W	OPA2134a	1		
390k	1	Carbon / Metal Film	1/8W	PT2399	1		
1M	1	Carbon / Metal Film	1/8W	BTDR-3	1	Belton Reverb Unit	
10M	1	Carbon / Metal Film	1/8W	TC7662B	1	or, TC1044SCPA	
22pF	1	Ceramic / MLCC	25v min.	PIC12F509	1	<b>*included with PCB</b>	
220pF	1	Ceramic / MLCC	25v min.	SPDT	1	On/On, Solder Lug or Pins	
2n7	1	Film	25v min.	SPDT	1	On/On, sub-mini	
3n3	1	Film	25v min.	Momentary	1	SPST foot-switch	
15n	1	Film	25v min.	20k	1	Bourns 3362p	
22n	3	Film	25v min.	10kB	1	PCB Right Angle	16mm
82n	2	Film	25v min.	20kB	2	PCB Right Angle	16mm
100n	8	Film	25v min.	50kB	2	PCB Right Angle	16mm
220n	1	Film	25v min.	100kB	1	PCB Right Angle	16mm
470n	4	Film	25v min.				
4u7	1	Electrolytic	25v min.				
47uF	4	Electrolytic	25v min.				
100uF	2	Electrolytic	25v min.				

**BS170:**

[https://www.mouser.com/ProductDetail/512-BS170\\_D74Z](https://www.mouser.com/ProductDetail/512-BS170_D74Z)  
<https://stompboxparts.com/semiconductors/bs170-mosfet-transistor/>  
<https://www.taydaelectronics.com/bs170-bs170lr-1rag-mosfet-n-channel-60v-0-5a.html>

**J175:**

<https://www.mouser.com/ProductDetail/512-J175D26Z>

**LP2950:**

<https://www.mouser.com/ProductDetail/595-LP2950-50LPRE3>

**TQ2-L-5v:**

<https://www.arrow.com/en/products/tq2-l-5v/panasonic>  
<https://www.newark.com/panasonic-electric-works/tq2-l-5v/signal-relay-tq-series-latching/dp/59M2844>

**OPA2134a** (sub: TL072, 4558, 4580D, etc):

<https://www.mouser.com/ProductDetail/595-OPA2134PA>  
<https://www.taydaelectronics.com/opa2134pa-opa2134-ic-op-amp.html>

**PT2399:**

<https://smallbear-electronics.mybigcommerce.com/ic-pt2399/>  
<https://stompboxparts.com/semiconductors/pt2399-digital-delay-ic/>

**BTDR-3:**

<https://stompboxparts.com/semiconductors/belton-btdr-3h-reverb-ic/>

**TC7662B** (sub: TC1044**SCPA** or MAX1044**CPA**):

<https://www.mouser.com/ProductDetail/579-TC7662BCPA>

**On/On:**

<https://smallbear-electronics.mybigcommerce.com/spdt-on-on-short-lever/>  
<https://lovemyswitches.com/taiway-spdt-on-on-switch-solder-lug-short-shaft/>

**On/On Mini:**

<https://smallbear-electronics.mybigcommerce.com/spdt-on-on-mountain-10tc410/>  
<https://lovemyswitches.com/taiway-sub-mini-spdt-on-on-switch-pcb-mount-long-shaft/>

**SPST Momentary:**

<https://lovemyswitches.com/pro-grade-spst-momentary-foot-switch-normally-open-soft-touch-solder-lug/>

**Bourns 3362p (20k):**

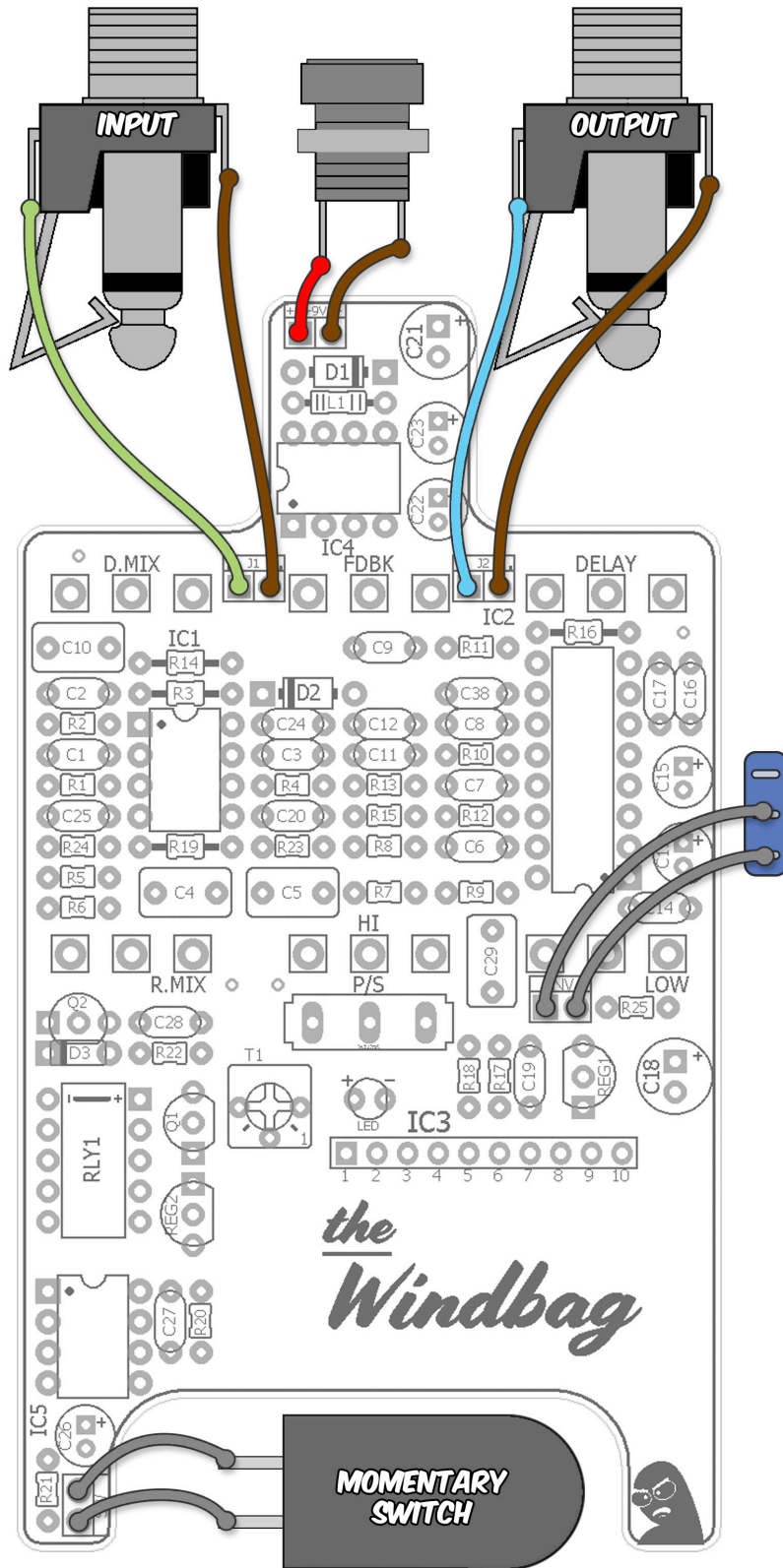
<https://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/20k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html>

**16mm Pots:**

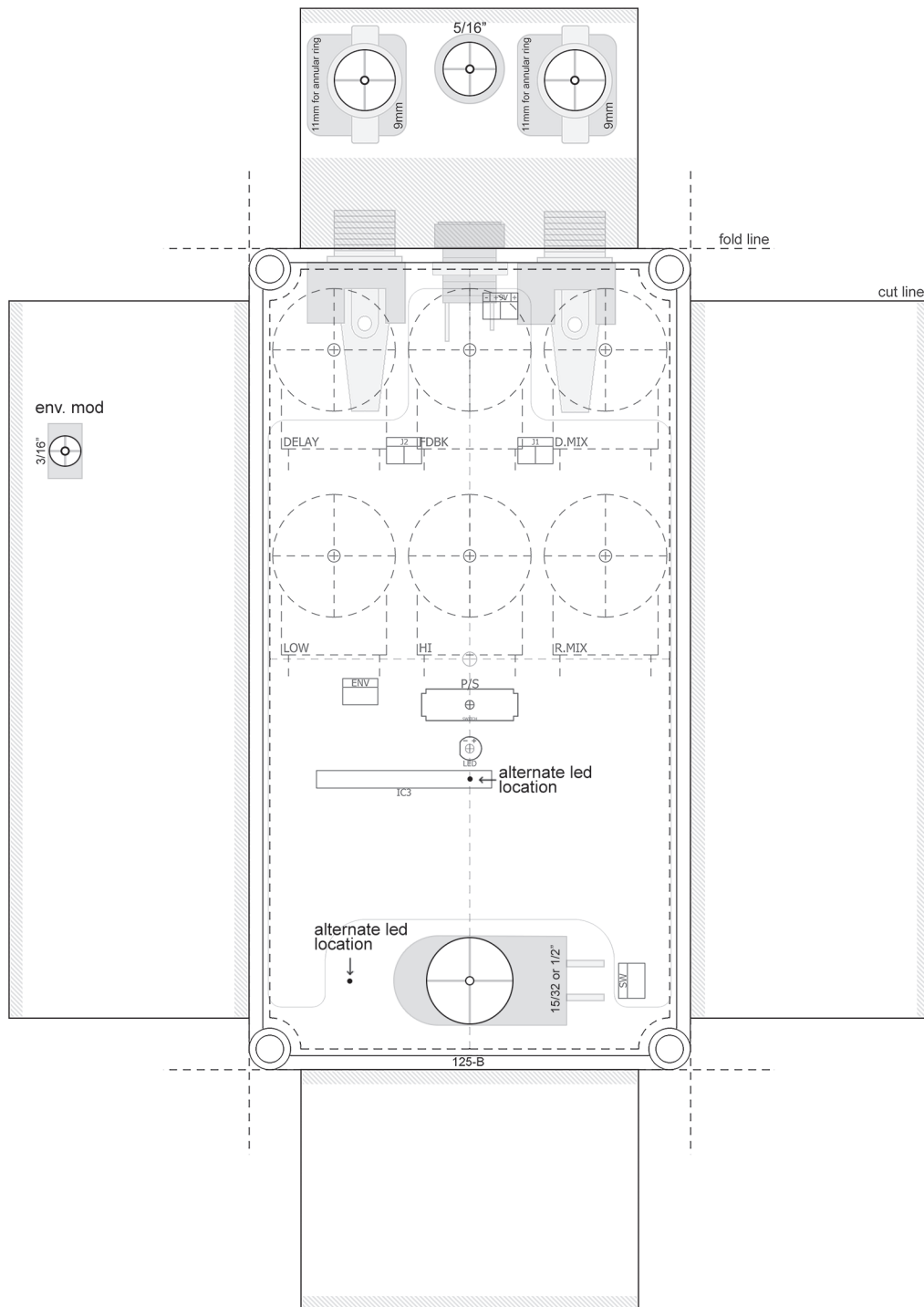
<https://smallbear-electronics.mybigcommerce.com/alpha-single-gang-16mm-right-angle-pc-mount/> <https://stompboxparts.com/pots/16mm-potentiometer-short-pcb-leg/>

- **The L1 inductor should be jumpered.** In my build, it resulted in a significant voltage drop in the DC supply (over 2v). IMO, it's better to just omit it and use a jumper instead.
- This should be a much easier build than the 1590B version of the Yodeler. It does require 1/8W resistors like the original but avoids the super cramped spacing, stacked parts, etc. *The BTDR-3 will cover the foot-switch when soldered to the top of the board.*
- If you do not wish to use the envelope modulation mod, simply omit C29, R25 and the mini SPDT toggle switch.
- If you do plan on including the envelope mod, the switch must be mounted on the side of the 125B enclosure.
- R25 sets how much the modulation responds to dynamic input (IOW, your pick attack). I indicated 1M on the BOM which produces a subtle but noticeable effect. You can increase the modulation response by lowering this value. Anything from 470k to 1M should produce pleasant results so you may want to socket this resistor. Below 470k and the modulation will warp into pitch bends. You could use a potentiometer as a variable resistor to control the amount, but you will still need to use the switch to turn it off completely. There is no way to combine the two into a single control (that I know of).
- In retrospect, the bypass LED location was a bad choice on my part. It's too close to the P/S toggle switch. I've added a couple of alternative spots to relocate the bypass LED on the drilling template. Not sure what I was thinking with that!
- In parallel mode (left position) the delay and reverb circuitry will act...well, in parallel. This means the dry signal is reverberated and not the delay signal. In series mode (right position) one might think that it behaves like delay and reverb pedals placed in series but this is not the case. In this mode, only the delay wet signal is fed to the reverb brick, and without the dry signal. This means the Delay control becomes a "pre-delay". IOW, it sets the length of time the dry signal is delayed before the reverb is applied.
- You can sub 25k $\Omega$  for the two 20k $\Omega$  16mm pots, if needed. You can sub 25k for the 20k Bourns trimmer as well.
- I suggest soldering in the wires needed for J1, J2 and +9v *before* soldering the FDBK pot on the PCB.





If you are not using the envelope mod, omit the second toggle switch, C29 and R25.



The default LED position is very close to the toggle switch so two other locations are suggested. The top middle one allows you to still solder the LED to the PCB, but you will need to bend the leads to make it fit. The second position by the switch is for a wired LED.

The optional envelope mod switch will need to be mounted on the side of the enclosure. Use a mini SPDT.

IC1 OPA2134		IC3 BTDR-3		Q1 BS170	
1	11mV	1	5.03	D	4.76
2	0	2	0	S	0
3	0	3	2.51	G	0
4	0	4	0	Q2 J175	
5	0	5	0	D	0
6	0	6	0	S	0.89
7	-11mV	7	2.55	G	0
8	9.13	8	2.52	REG1 LP2950	
IC2 PT2399		9	2.54	I	9.13
1	5.03	10	2.52	G	0
2	2.51	IC4 7662B		O	5.03
3	0	1	9.14	REG1 LP2950	
4	0	2	5.31	I	9.13
5	2.68	3	0	G	0
6	1.75	4	-3.66	O	5.01
7	1.66	5	-8.8		
8	1.68	6	4.18		
9	2.51	7	5.59		
10	2.51	8	9.17		
11	2.51	IC5 PIC			
12	2.51	1	5.01		
13	2.51	2	0		
14	2.53	3	0		
15	2.51	4	4.99		
16	2.51	5	5.01		
		6	0		
		7	0		
		8	0		

Current Draw: ~100mA

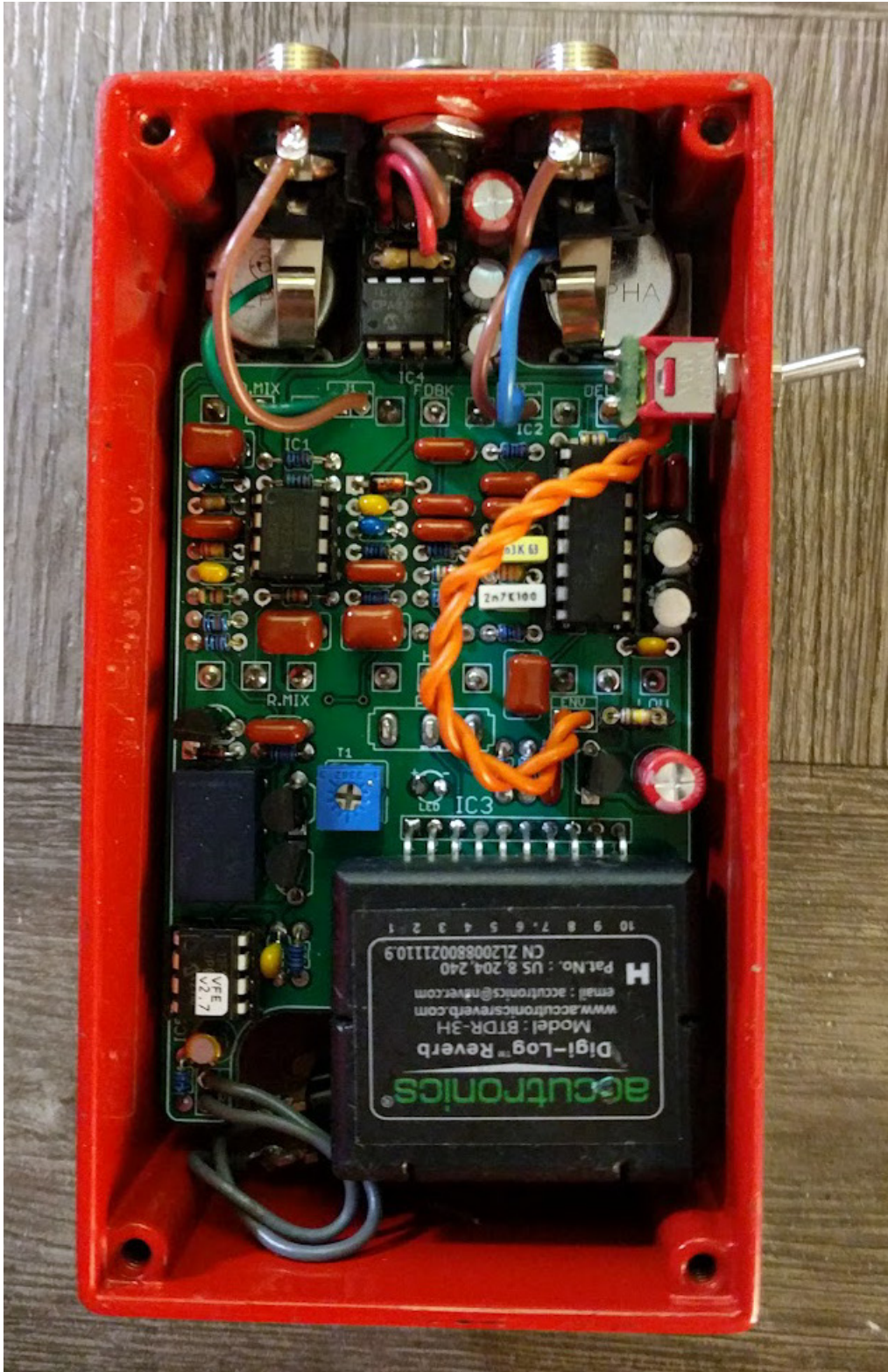
DC Supply: 9.42v One Spot

All knobs @ 50%

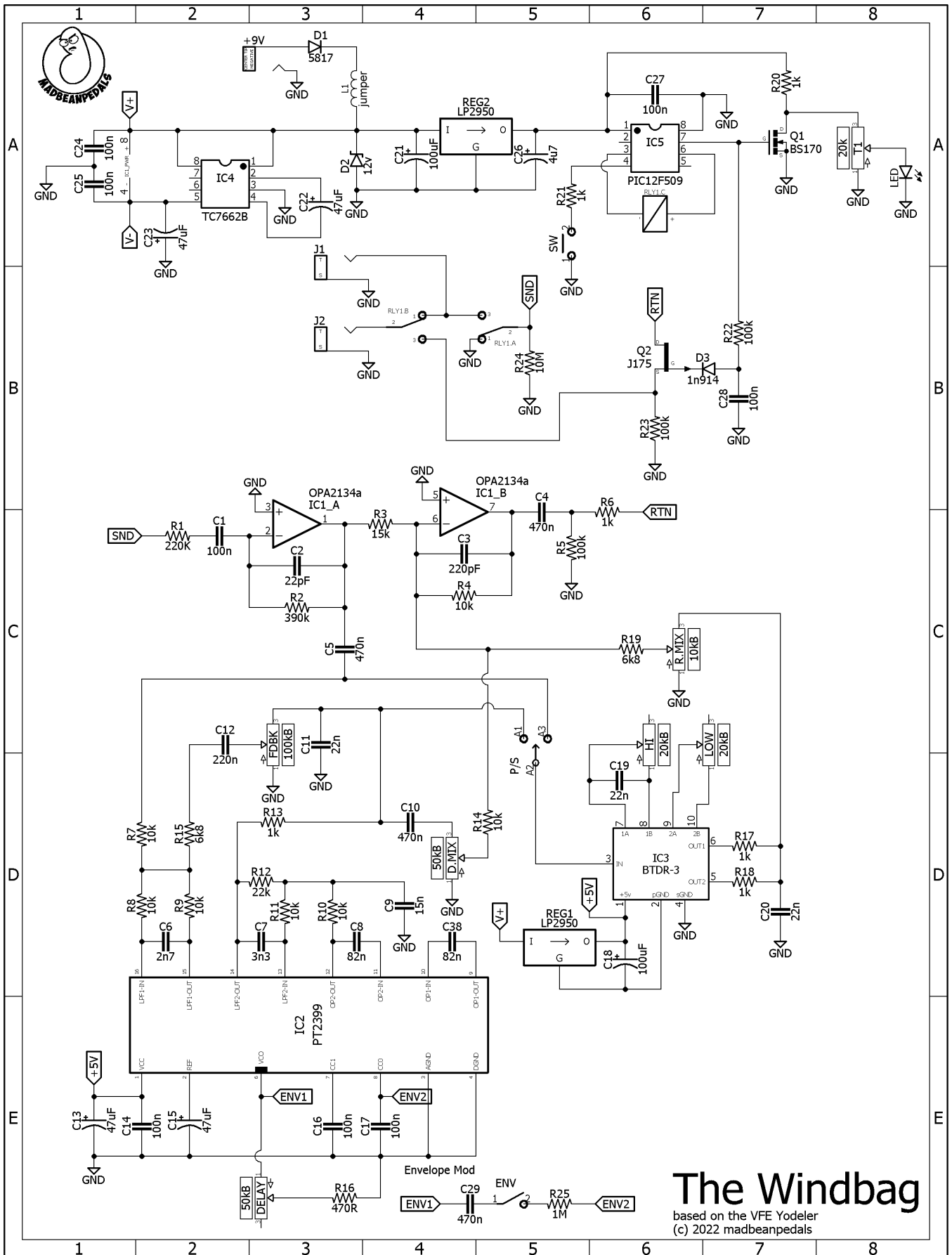
P/S: Left position

Env: Off

Pedal in its "on" state



I suggest using Lumberg style jacks for this build. The 100uF decoupling cap at the top may make jacks with a wider footprint hard to fit.



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