

VFE_SPS_Pinball

FX Type: **MID BOOSTER**

Build Level: Intermediate

Based On: VFE® Pinball™

Last Updated: April 28, 2024 5:35 PM

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Overview

From the [VFE Website](#):

“You have probably used a tone knob that turns clockwise for more treble & less bass, and counterclockwise for more bass & less treble. This ubiquitous EQ is called a tilt equalizer, and it is able to make quick EQ adjustments with just one knob. Until now, this type of EQ hasn’t been tunable - in other words, the frequency filters that make up the EQ have been fixed. Introducing the Pinball, the first fully tunable, precision analog tilt equalizer. Add sparkle to a dark amp, or warm up a bright amp. Get sizzle and bite from humbuckers, or fatten up a single coil. Try it on bass or synth!”

The SPS Pinball includes the TrueSoft 3.4 switching PCB with the voltage inverter. You will need additional parts and information included in the TrueSoft doc to complete all VFE_SPS projects.

Controls

- **LEVEL:** Total output. This circuit has tons of gain on tap!
- **HPF:** High pass filter control to cut low frequencies (pre-gain).
- **LPF:** Low pass filter control to cut high frequencies (post-gain).
- **BUMP/TILT:** In the Bump mode, the HPF and LPF filters are set in series and work together to set the EQ filter. In Tilt mode, the HPF and LPF are independent and the Blend control sets the resultant EQ filter.
- **BLEND:** In Bump mode, this blends the EQ filtering with the unfiltered clean signal. In Tilt mode, the Blend control pans the between the LPF and HPF settings.
- **SLOPE:** This switch determines whether the HPF and LPF act at -6dB or -12dB per octave.
- **IMP:** This trimmer sets the input impedance of the effect.
- **BUMP GAIN:** This trimmer is used for gain recovery in the Bump mode.
- **LED:** Controls the bypass LED brightness.

Further study:

https://www.youtube.com/watch?v=nrSsOMJp_yo

<https://www.youtube.com/watch?v=qGoZkEOfM0g>

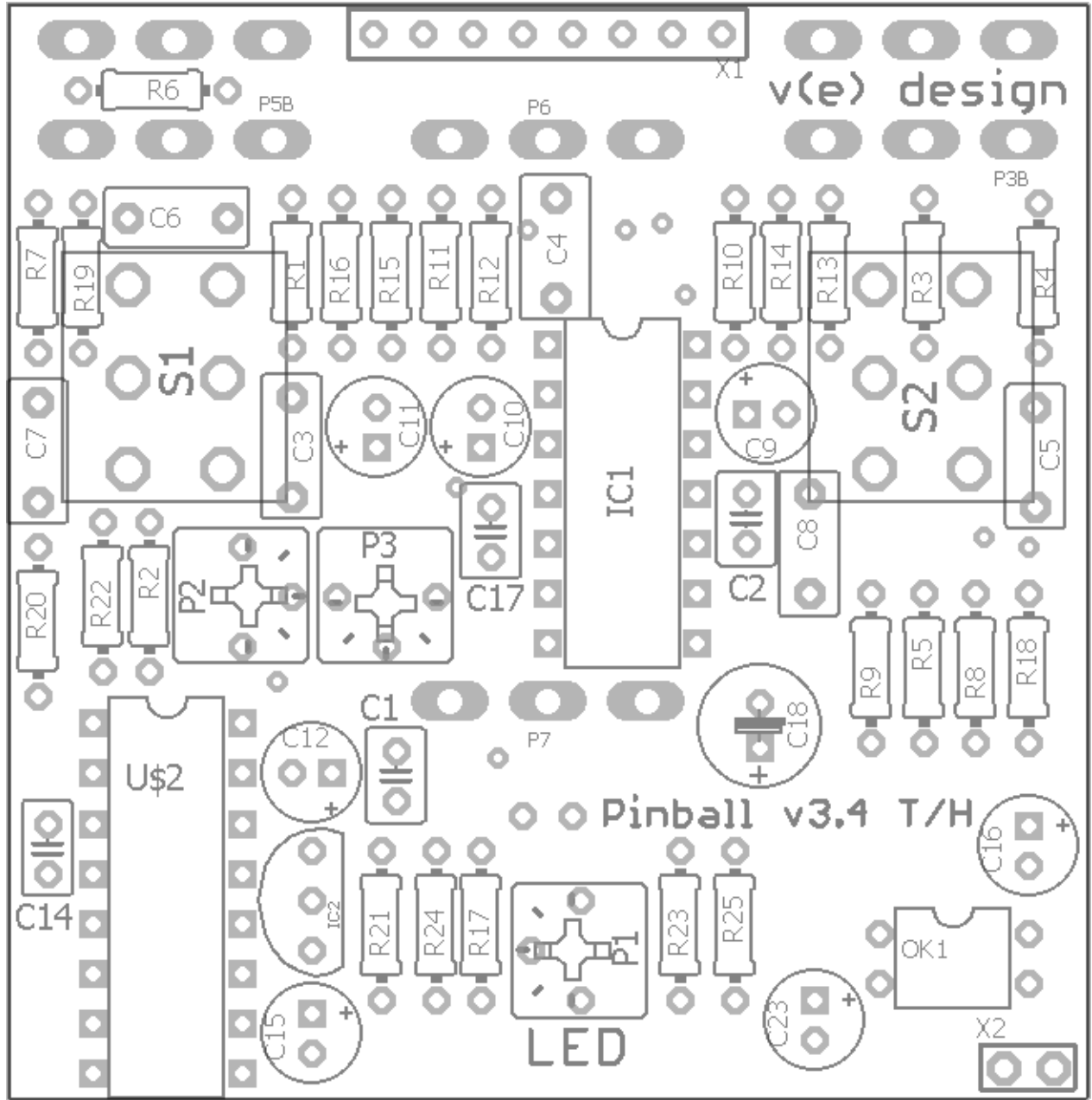
Critical Update (4/28/24): I found an issue where C18 seems to gradually charge up the voltage on pin14 of IC1. Once it hits the top rail (+9v) the circuit begins to distort. This takes between 5-20 minutes. So, **I suggest just jumpering C18** instead of using the Bi-Polar cap. It will not harm the circuit operation and seems to fix the problem completely.

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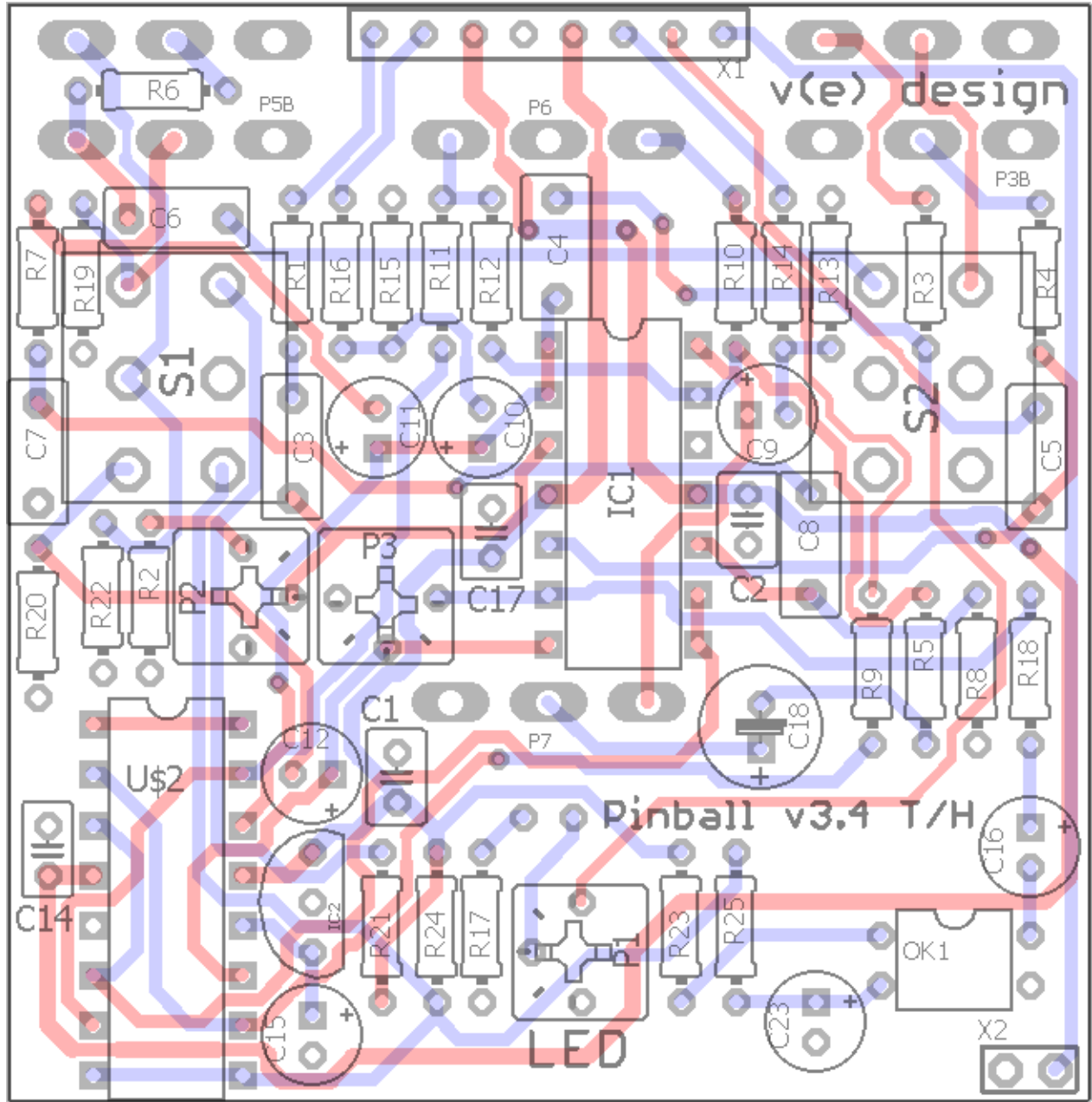
Technical assistance for is available via the [madbeanpedals forum](#). Please go there rather than emailing me for personal assistance. This is because (1) I'm not always available to respond via email in a timely and continuous manner, and (2) posting technical problems and solutions in the forum creates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

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Parts Layout



Trace Layout



B.O.M.

Resistors		Caps		Diodes	
R1	1.2k	C1	0.1u	LED1	5mm
R2	10k	C2	0.1u	IC	
R3	120R	C3	0.1u	IC1	QUAD
R4	1.2k	C4	.33u	IC2	78L05
R5	1.2k	C5	33n	Opto	
R6	120R	C6	68n	OK1	TLP240D
R7	1.2k	C7	6.8n	Switches	
R8	2.2M	C8	0.1u	U\$2	DG445
R9	1.4k	C9	10u	S1	On/On
R10	1.4k	C10	10u	S2	On/On/On
R11	1.4k	C11	10u	Trimmers	
R12	1.4k	C12	10u	P1	10k
R13	10k	C14	0.1u	P2	2M
R14	220R	C15	22u	P3	2k
R15	10k	C16	10u	Pots	
R16	220R	C17	0.1u	P3AB	C10k/100k
R17	220R	C18	47u	P5AB	C10k/100k
R18	120R	C23	22u	P6	B1k
R19	10k			P7	D100k
R20	10k				
R21	10k				
R22	10k				
R23	120R				
R24	10k				
R25	1.2k				

Shopping List

Value	QTY	Type	Rating
120R	4	Carbon / Metal Film	1/4W
220R	3	Carbon / Metal Film	1/4W
1.2k	5	Carbon / Metal Film	1/4W
1.4k	4	Carbon / Metal Film	1/4W
10k	8	Carbon / Metal Film	1/4W
2.2M	1	Carbon / Metal Film	1/4W
0.1u	4	MLCC, 2.5mm Spacing	25v min.
6.8n	1	Film	25v min.
33n	1	Film	25v min.
68n	1	Film	25v min.
0.1u	2	Film	25v min.
.33u	1	Film	25v min.
10u	5	Bi-Polar Electrolytic	25v min.
22u	2	Bi-Polar Electrolytic	25v min.
47u	1	Bi-Polar Electrolytic	25v min.
LED	1	any	5mm
Quad	1	see notes	
78L05	1		
Opto	1	TLP240D	
DPDT	1	On/On	
DPDT	1	On/On/On	
E-Switch	1	DG445	
10k	1	Bourns 3362p	
2M	1	Bourns 3362p	
2k	1	Bourns 3362p	
C10k/100k	2	PCB mount Right Angle	16mm
B1k	1	PCB mount Right Angle	16mm
D100k	1	PCB mount Right Angle	16mm

Build Notes

The Pinball uses some specialized pots which are available at Stomboxparts:

C100k/C10k: <https://stompboxparts.com/pots/16mm-dual-gang-pot-short-pcb-leg/>

D100k: <https://stompboxparts.com/pots/16mm-potentiometer-short-pcb-leg/>

- The surface mount version of the Pinball uses a OPA4134 IC, which is only available as an SMD package. You can sub in a TL074 or any other quad amplifier that can handle 18v or more.
- As mentioned in the intro, the Slope switch selects between -6dB or -12dB on the filters. However, Peter has indicated that the switch type is On/On/On. This means there is a middle position which does not seem to be well documented. From tracing the PCB, the middle position appears to be a mix: -6dB on the LPF and -12dB on the HPF (when using a “type 2” On/On/On switch). TBH - I’m not sure how useful this setting is. There’s no harm in having it, but if you want to simplify the operation, just use an On/On DPDT which should provide plenty enough variation. **Remember that you must use a pin-mount type in either case.**

“Type 2” On/On/On:

<https://lovemyswitches.com/taiway-dpdt-on-on-on-switch-pcb-mount-short-shaft/>

<https://stompboxparts.com/switches/dpdt-toggle-switch-on-on-on-pcb-pin-short-bat/>

Non-Polar/Bi-Polar Electrolytic caps:

<https://stompboxparts.com/capacitors/aluminum-electrolytic-capacitor-non-polarized-10-pack/>

MLCC caps:

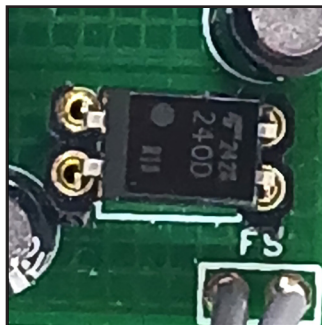
0.1u 2.5mm MLCC: <https://www.mouser.com/ProductDetail/594-K104K15X7RF53L2>

DG445:

<https://www.mouser.com/ProductDetail/781-DG445DJ-E3>

TLP240D:

<https://www.mouser.com/ProductDetail/757-TLP240DF>



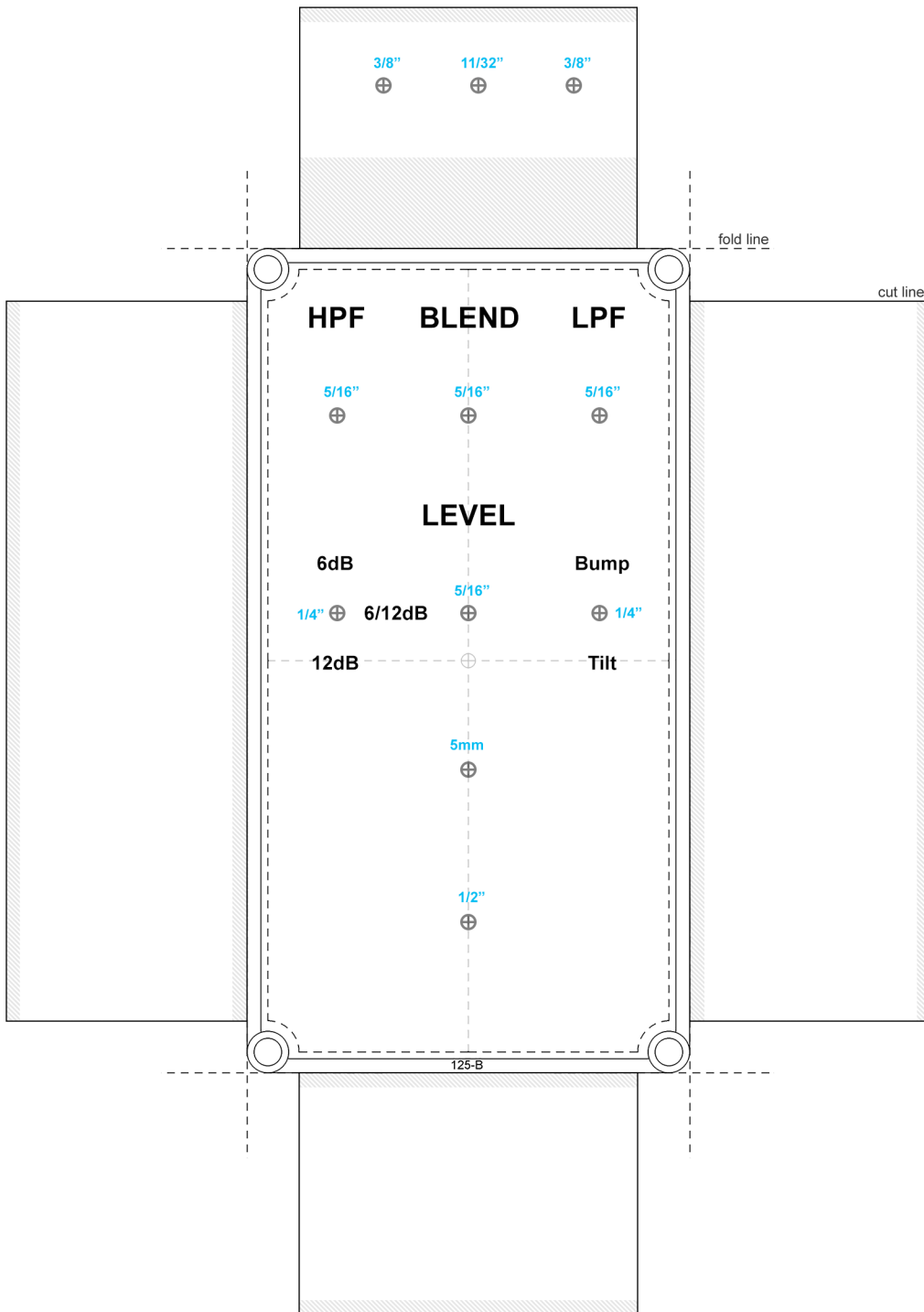
TLP240 orientation

Circuit Voltages

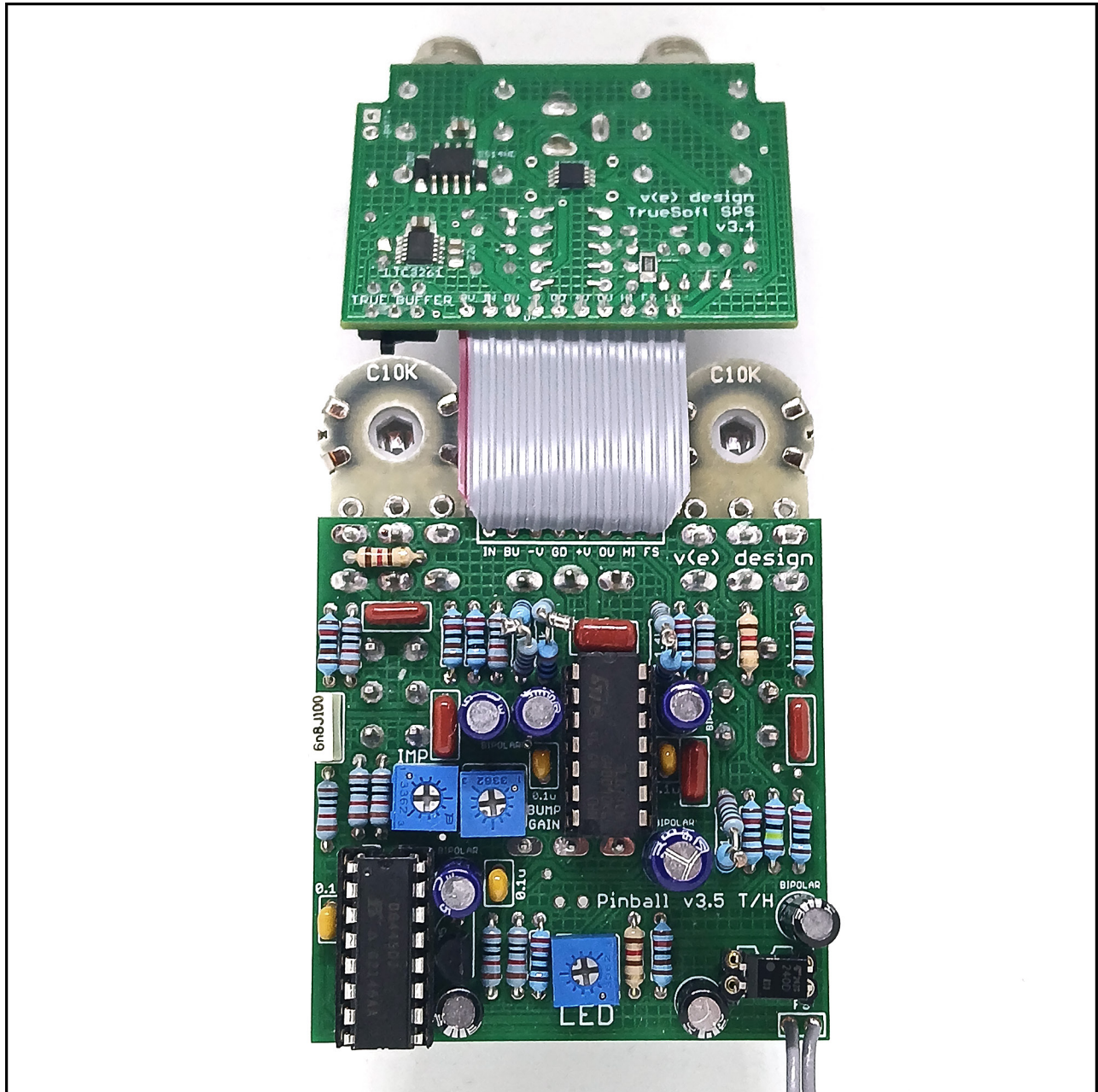
IC1	TL074	U2	DG445	REG	78L05
1	0.00	1	0.00	I	9.19
2	0.00	2	0.00	G	0.00
3	0.00	3	0.00	O	5.03
4	9.19	4	0.00		
5	0.00	5	0.00		
6	0.00	6	0.00		
7	0.00	7	0.00		
8	0.00	8	9.19		
9	0.00	9	9.19		
10	18mV	10	0.00		
11	-8.99	11	0.00		
12	0	12	5.03		
13	0	13	9.19		
14	6.15	14	0		
		15	0		
		16	0		

9.44vDC One Spot supply
Current Draw: ~53mA
Knobs @ 50%, switches down
Split-rail design

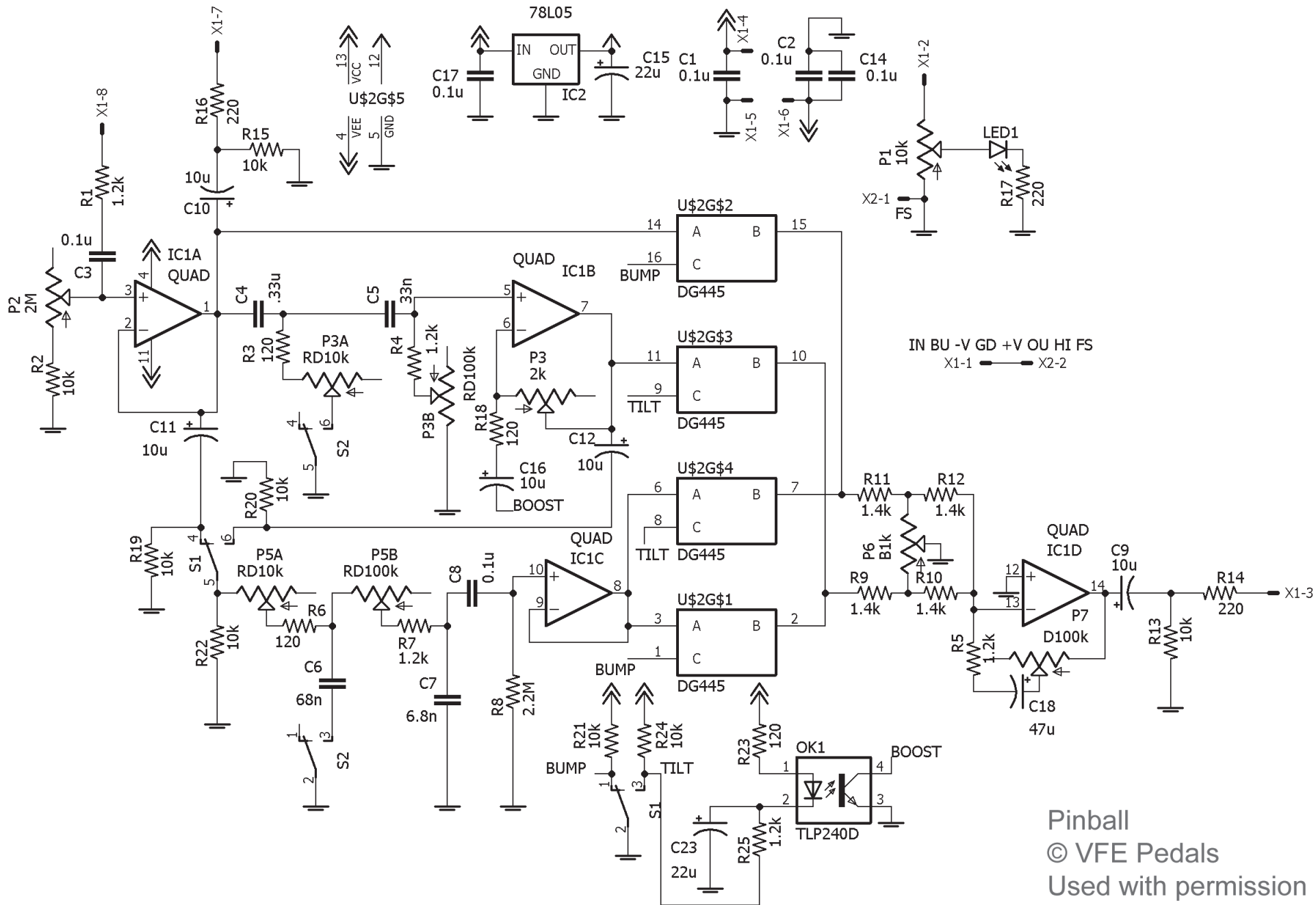
125B Drill Template



Build Pic



Schematic



Pinball
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