



VFE PINBALL

FX TYPE: Tilt EQ

© 2018 [VFE](#) and [MADBEANPEDALS](#)

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!

- True bypass with buffered bypass option via internal switch
- Tone knob "tilts" EQ by blending between HPF & LPF
- Wide range EQ for use with any gear setup
- Filters can be 6dB or 12dB for more extreme EQ settings

INPUT IMPEDANCE: 1.8M-ohm

CURRENT DRAW: ~15ma off, ~45ma on @ 9V, ~25ma off, ~55ma on @ 18V Downloadable PDF docs:

Parts List* - <https://www.dropbox.com/s/grjn4avn7c4au1k/Parts%20Matrix.pdf> (includes links to purchase components)

Schematic - https://www.dropbox.com/s/old838fzcu5qtza/pinball_schematic.png

PCB layout & mod sheet - <https://www.dropbox.com/s/azlo7e12eq6kmp2/Pinball%20layout.pdf>

Link to buy pre-drilled 1590B2 enclosure from Pedal Parts Plus - <https://www.pedalpartsplus.com/ProductDetails.asp?ProductCode=1590B2VFE>

The drill template for the Hammond 1590B2 enclosure is quite precise. Because of this, we recommend getting a pre-drilled enclosure from the link above. Here is the link to a hand-drawn list of measurements - <https://www.dropbox.com/s/fyiq00oc-16qzduk/10-Hole%201590B2.pdf>

Peter's How-To Guide for building the Pinball, Dragon and Standout:

<https://www.youtube.com/watch?v=Z5uwB45FI8>

Reverb demo of the Pinball, Dragon and Standout:

https://www.youtube.com/watch?v=QVI_Z43amII

Mike Herman's demo of the Pinball:

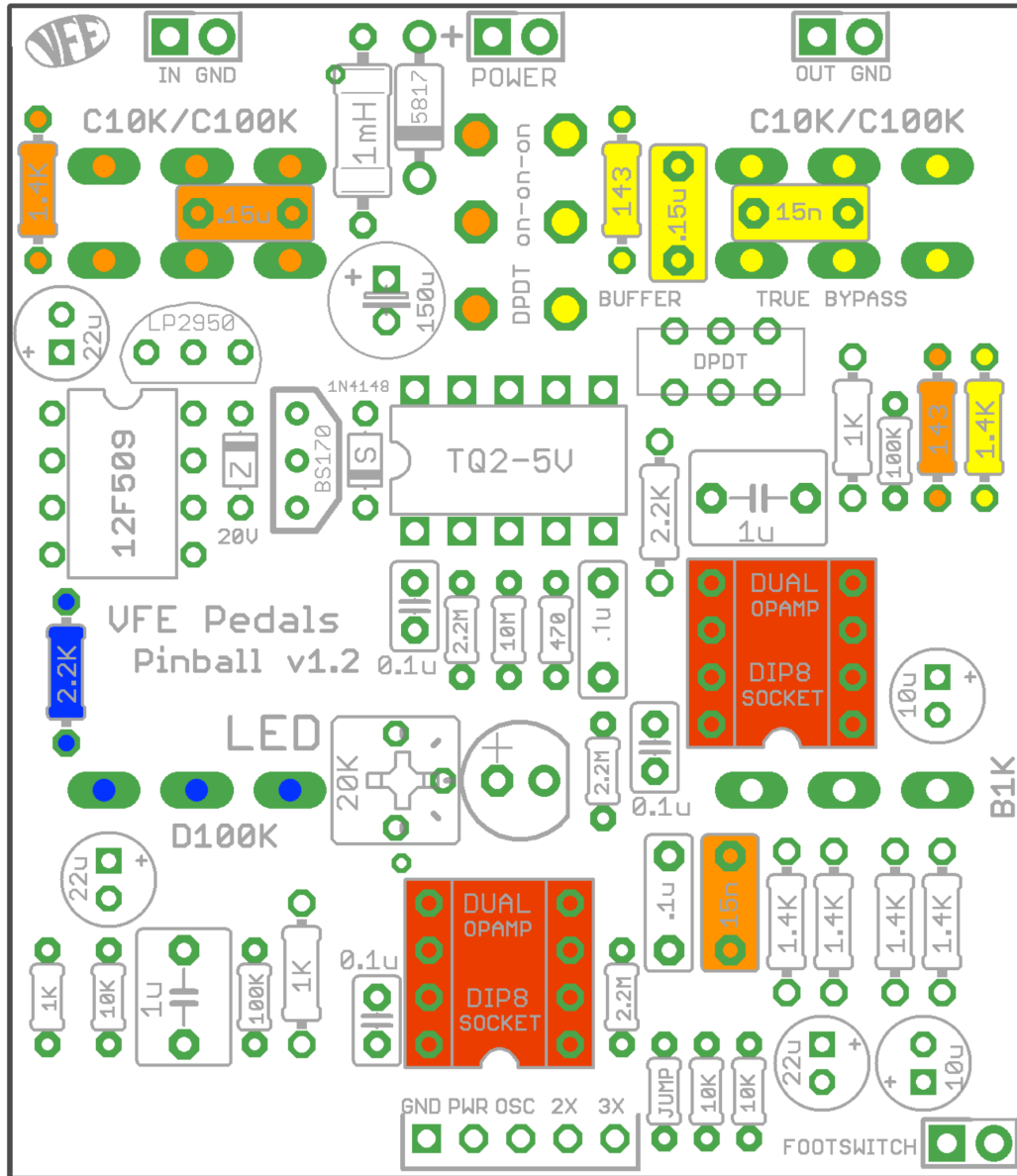
<https://www.youtube.com/watch?v=b-rKFPVeHFU>

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



Pinball PCB Layout

For optimal results, install components in the exact order listed.



- 1 x 12F509
- 1 x DPDT slide
- 1 x 1N4148
- 1 x 470 1/8W
- 1 x 1K 1/8W
- 3 x 10K 1/8W
- 2 x 100K 1/8W
- 3 x 2.2M 1/8W
- 1 x Jumper
- 1 x 10M 1/8W
- 1 x 20V Zener
- 2 x 143 1/4W
- 2 x 1K 1/4W
- 6 x 1.43K 1/4W
- 4 x 2.2K 1/4W
- 3 x 0.1u yellow
- 1 x 1N5817
- 1 x 1mH
- 2 x JRC4580
- 1 x DPDT relay
- 1 x 20K 3362P
- 2 x 15nF 5mm
- 2 x 0.1uF 5mm
- 2 x 0.15uF 5mm
- 2 x 1uF 5mm
- 1 x LP2950
- 1 x BS170
- 2 x 10uF bipolar
- 3 x 22uF
- 1 x 150uF

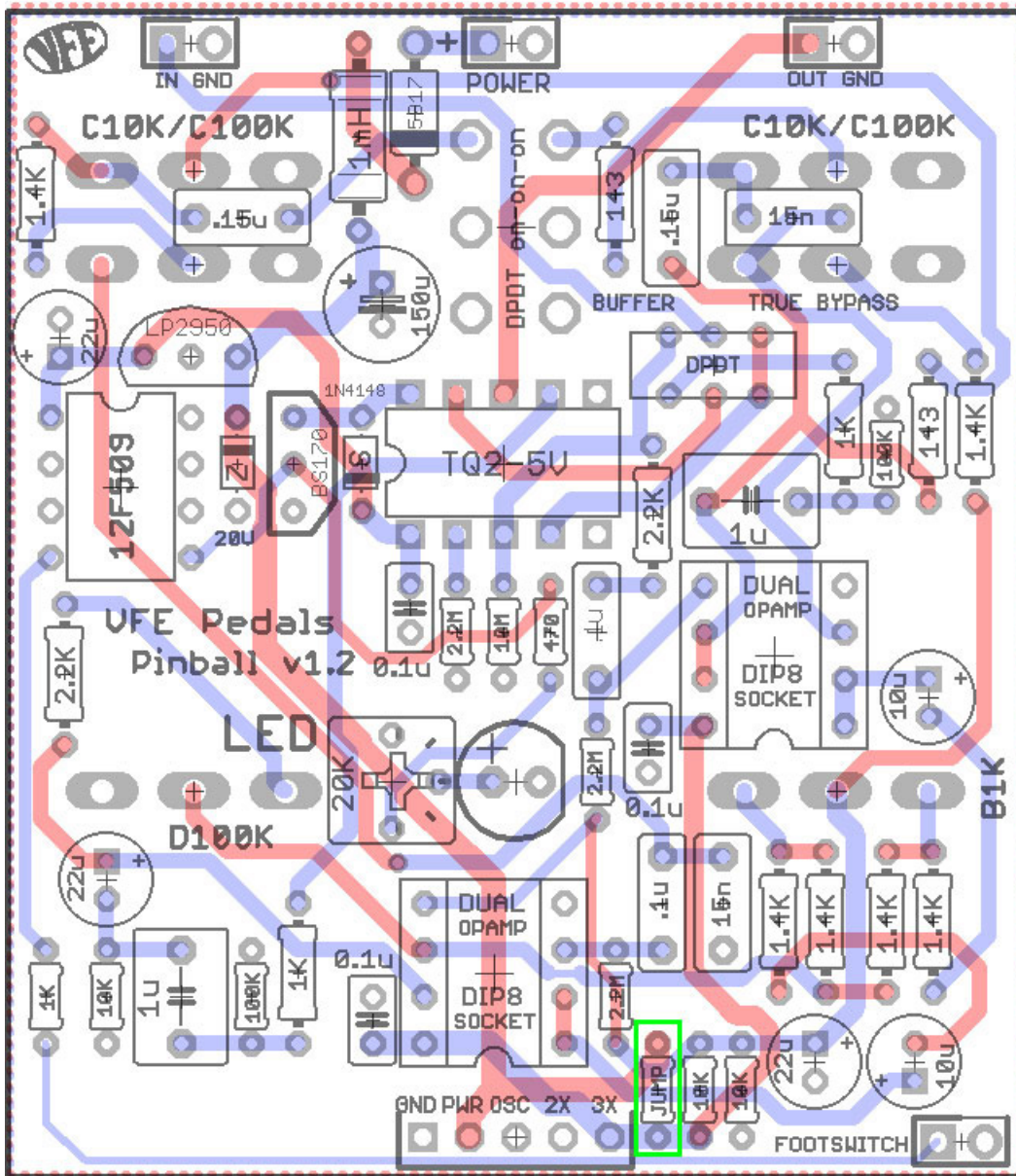
Red - JRC4580 op amp, but you can experiment with any dual op amp in DIP8 packaging

Orange - These components set the frequency range of the LPF

Yellow - These components set the frequency range of the HPF

Blue - These components set the output volume range

Dimensions: 2.17" W x 2.49" H



Note: solder a jumper in the green box labeled "jump".

Shopping List

QTY	Value	Type	Rating	Primary Source	Alternate Source
Resistors					
2	143R	Metal / Carbon Film	1/4W	Mouser	
2	1k	Metal / Carbon Film	1/4W	Mouser	
6	1k43	Metal / Carbon Film	1/4W	Mouser	
4	2k2	Metal / Carbon Film	1/4W	Mouser	
1	470R	Metal / Carbon Film	1/8W	Mouser	
1	1k	Metal / Carbon Film	1/8W	Mouser	
3	10k	Metal / Carbon Film	1/8W	Mouser	
2	100k	Metal / Carbon Film	1/8W	Mouser	
3	2M2	Metal / Carbon Film	1/8W	Mouser	
1	10M	Metal / Carbon Film	1/8W	Mouser	
Caps					
3	100n	MLCC	2.5mm	Mouser	
2	15n	Film	5mm	Mouser	
2	100n	Film	5mm	Mouser	Smallbear
2	150n	Film	5mm	Mouser	Smallbear
2	1uF	Film	5mm	Mouser	Smallbear
2	10uF BP	Bi-Polar	2.5mm	Mouser	
3	22uF	Electrolytic	2.5mm	Mouser	
1	150uF	Electrolytic	2.5mm	Mouser	
Diodes					
1	1N4148	or, 1n914		Mouser	Smallbear
1	1N5817			Mouser	Smallbear
1	20v	Zener		Mouser	
1	LED	*your choice color	3mm	Smallbear	
Transistors / Regulators					
1	LP2950		5v	Mouser	
1	BS170			Mouser	Smallbear
Inductors					
1	1mH	Inductor		Mouser	
Switches					
1	DPDT	Non-Latching Relay		Mouser	
1	DPDT	Slide		Mouser	
1	DPDT	On/On/On		Smallbear	
Op-Amps					
2	4580DD			Mouser	
Pots					
1	20k	Bourns 3362p		Mouser	
1	100kA	PCB Right Angle	16mm	Smallbear	
1	1kB	PCB Right Angle	16mm	Smallbear	
Hardware					
2	Jacks	Mono		Smallbear	LoveMySwitches
1	Jacks	DC		Smallbear	LoveMySwitches
1	Foot-Switch	Momentary		LoveMySwitches	Smallbear
1	Enclosure	1590B2		PedalPartsPlus - PreDrilled	PedalPartsPlus - Undrilled
4	Knobs	*your choice		Smallbear	LoveMySwitches
Included w/ Purchase					
2	C10k/C100k	Custom PCB Dual Gang	16mm		
1	12F509	Micro_Controller	DIP8		

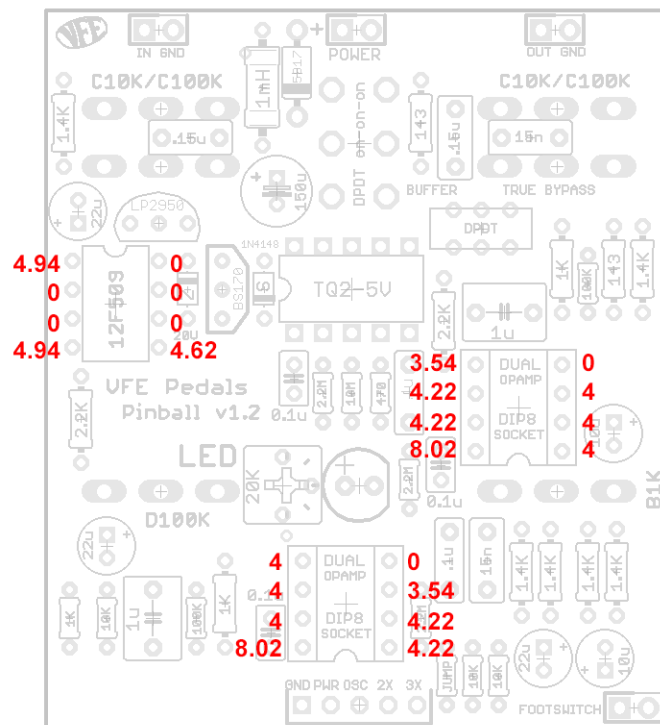
Red indicates see notes!

BOM Notes

- You can use 150R in place of 143R and 1k5 in place of 1k43.
- You should be able to use an LM78L05 in place of the LP2950.
- The relay for the Dragon, Pinball and Standout is the non-latching version of the same relay used in the other VFE projects. Be sure to use the included Mouser link to get the right part!
- Peter uses enclosed mono jacks on his builds, but I recommend using the Lumberg style linked. The reason is the pre-drilled enclosures from PPP do not seem to take this into account, and enclosed jacks will not fit.
- Peter also uses an expensive momentary switch that has a soft click (the smallbear link). I used the much cheaper ones from LoveMySwitches and had no problem with them.
- The 100kD is a custom pot which is not available for the Pinball. It's simply a 100kA with 10% tolerance instead of 20%. Use a 100kA instead. I actually used a 50kA in my build as this had more than enough boost function for me.
- PedalPartsPlus does offer pre-drilled 1590B2 boxes for these projects. They are a bit more expensive but worth it, IMO. They are bang on for the pots/switches layout he uses on these boards. Just remember to use the Lumberg mono jacks. Also, the hole for the LED on the PPP enclosures is overdrilled. A 3mm will fall through so you'll need to solder it in place so it sits correctly. You can use a 5mm, but the hole is actually too small to fit through! A small inconvenience, but not a big deal.

Pre-made cart for all the Mouser items listed in the Primary Source column:
<https://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=b0c373a0bc>

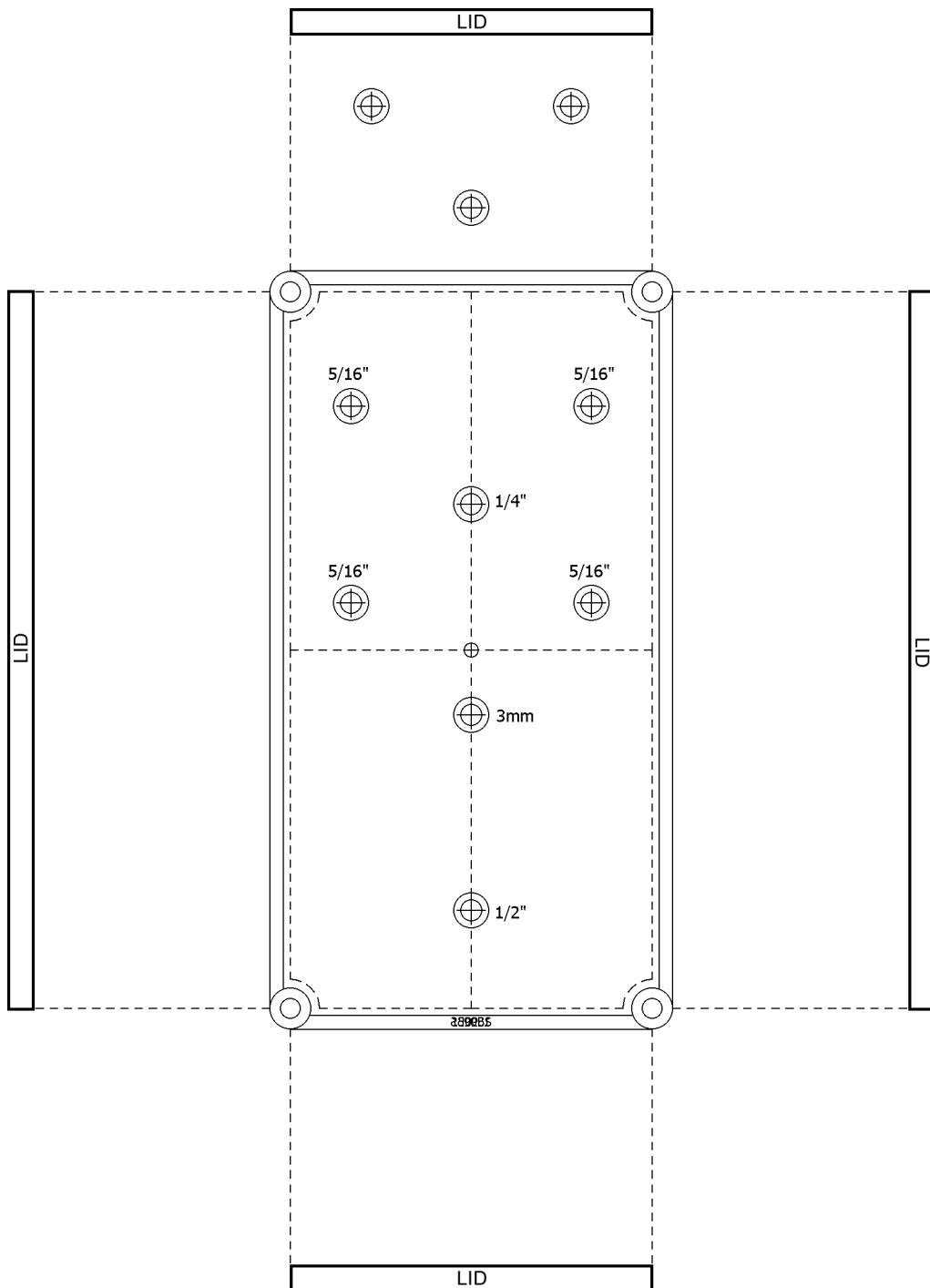
Voltages



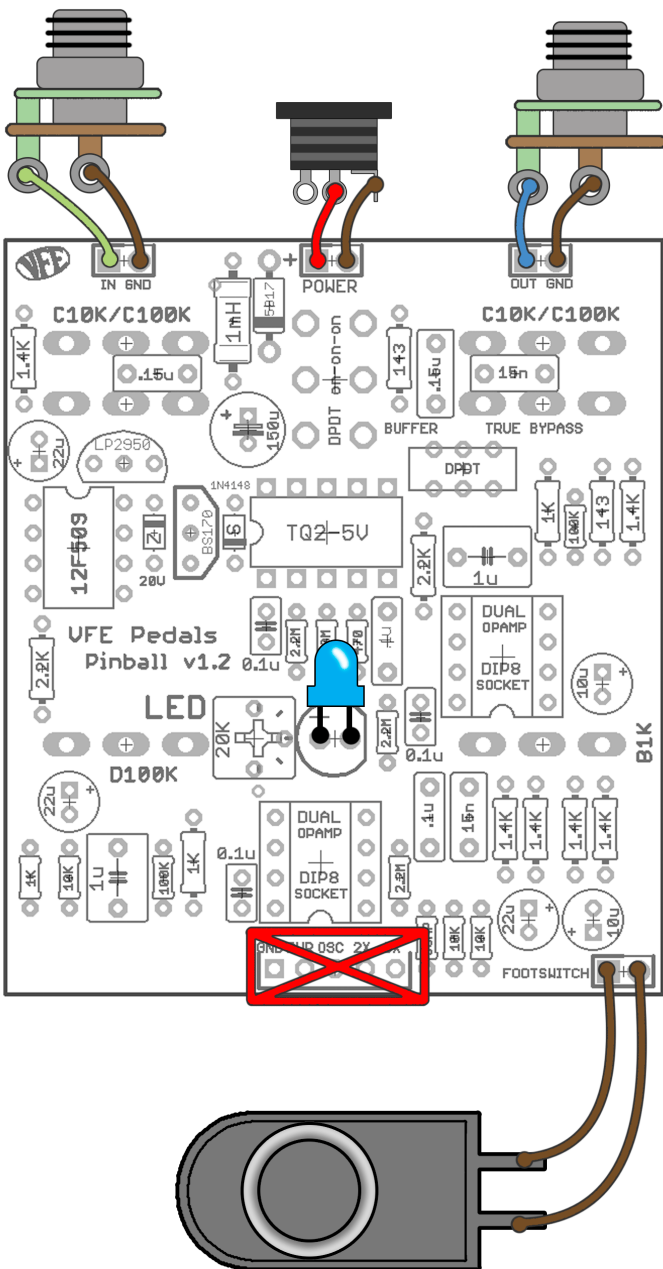
9.42vDC One Spot. Voltages taken from “pedal on” state.

1590B2 Drill Guide

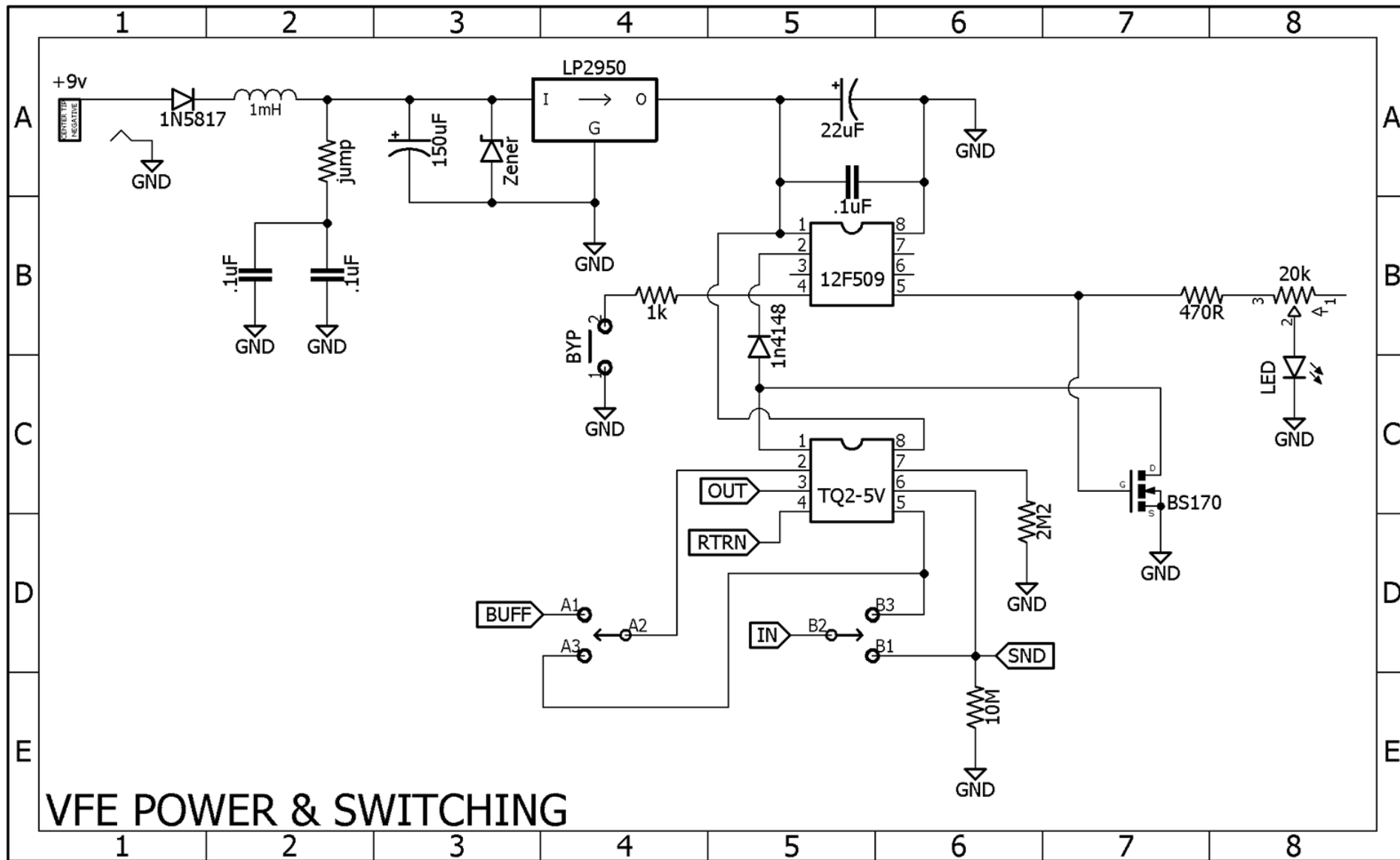
5.3" W x 7.34" H



Wiring

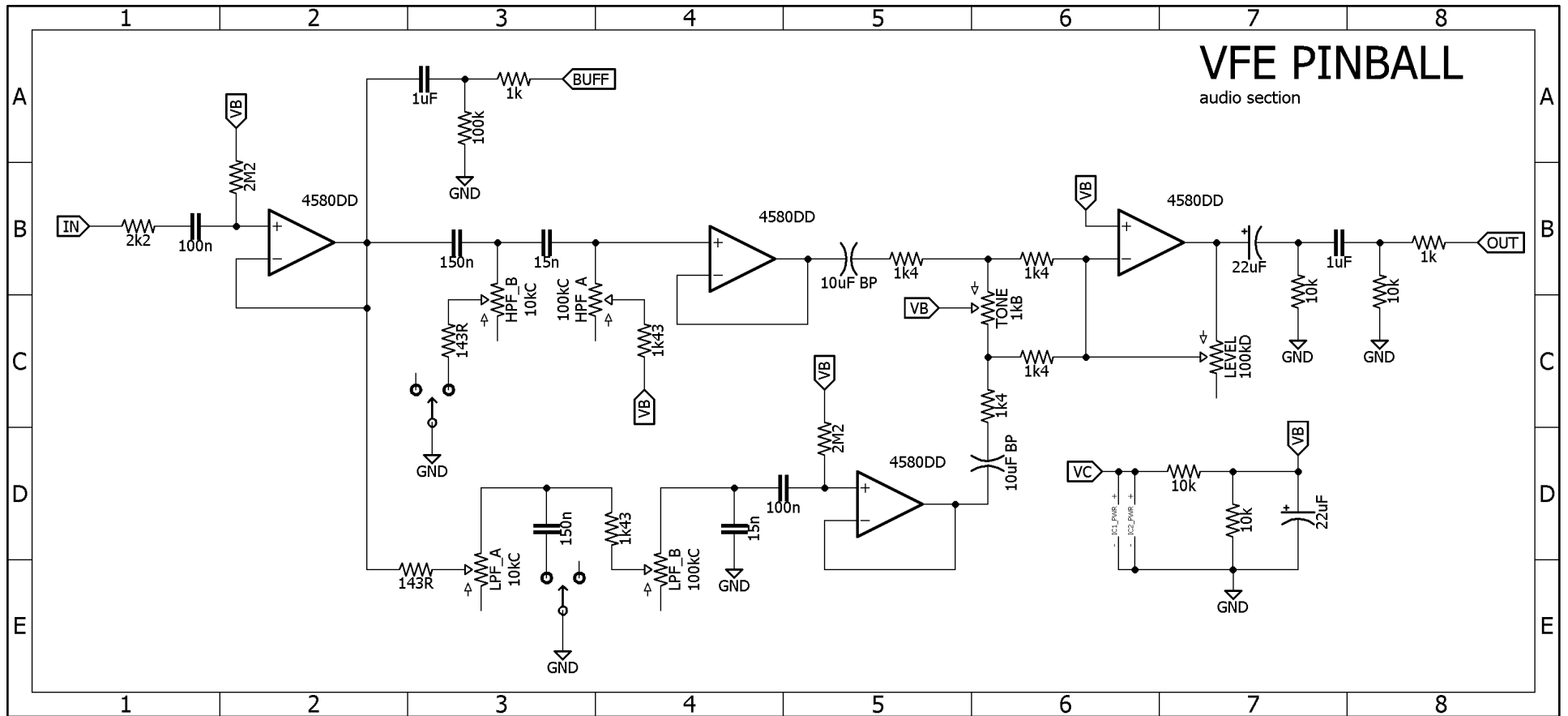


All the pads in the red “x” area should be left unconnected.



Power and Switching are the same for the Pinball, Dragon and Standout.

Schematic



Build

