

# DRAGONBEARD

## FX TYPE: Distortion

Based on the Bixonic® Expandora™

Enclosure Size: 1590BB

"Softie" compatibility: Softie2

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## Overview

The Dragonbeard is an Expandora™ project designed for knob enthusiasts. The Expandora™ is a heckuva distortion circuit. Think of a doubled-up Rat with dynamic envelope control. That's the essence of the 'dora. Some of you may have heard the story about Billy Gibbons using 6 of these in series. I think he probably confirmed that at some point but I can only imagine how that might sound. And, I don't know if that MEGAPANDORA is present in any actual ZZ Top recordings. What I do know is that the Dragonbeard has some great tones, lots of knobs to twirl and is basically incapable of producing a bad sound. Unless you are...bad to the bone. Then, maybe.

What the Dragonbeard adds: original slide switch options (I think some versions had internal dip switches) are combined into a single rotary switch, a "Trim" knob similar to the "Sweep" control on the mbp Slow Loris, clipping options, and some optional blinky lights.

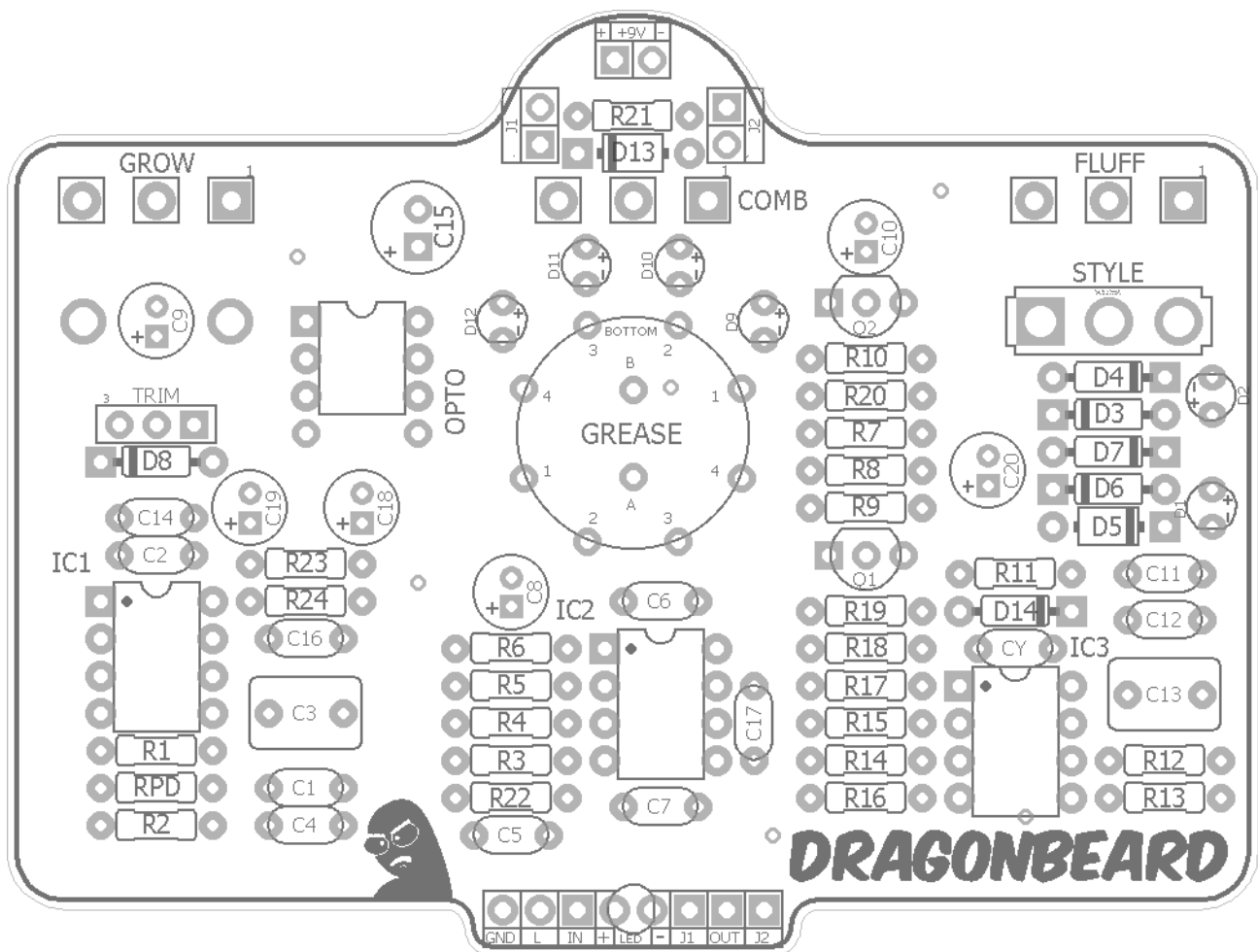
## Controls

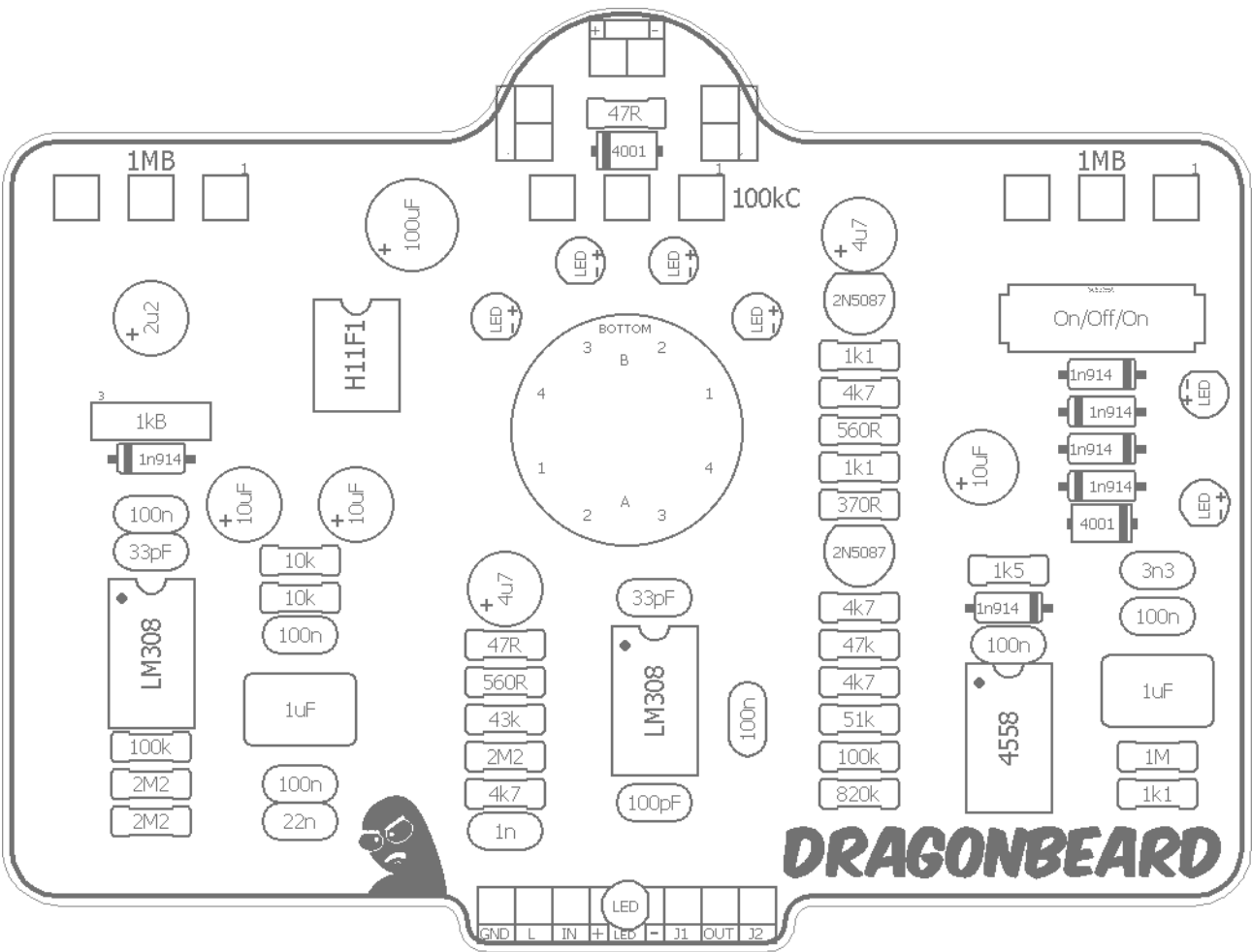
- **GROW:** Input gain/Distortion amount.
- **COMB:** LP Filter.
- **FLUFF:** Output gain/Volume
- **GREASE:** The Expandora has slide switches to select between the Crunch, Overdrive, Distortion and "Forbidden" modes (totally off the rails). The Dragonbeard makes all these options operate from a 2P4T rotary. The other half of the rotary is used for some blinky LEDs if you like that sort of thing (more on that in the Notes section).
- **TRIM:** This is the same as the "Sweep" control in the mbp Slow Loris. It lets you dial in more bass tones at lower gain settings. At the highest distortion settings its setting is pretty much negligible.
- **STYLE:** Three clipping options. The 1n914 are stock to the Expandora. The two added options are asymmetrical clipping and LED. The LED clipping is VERY LOUD.

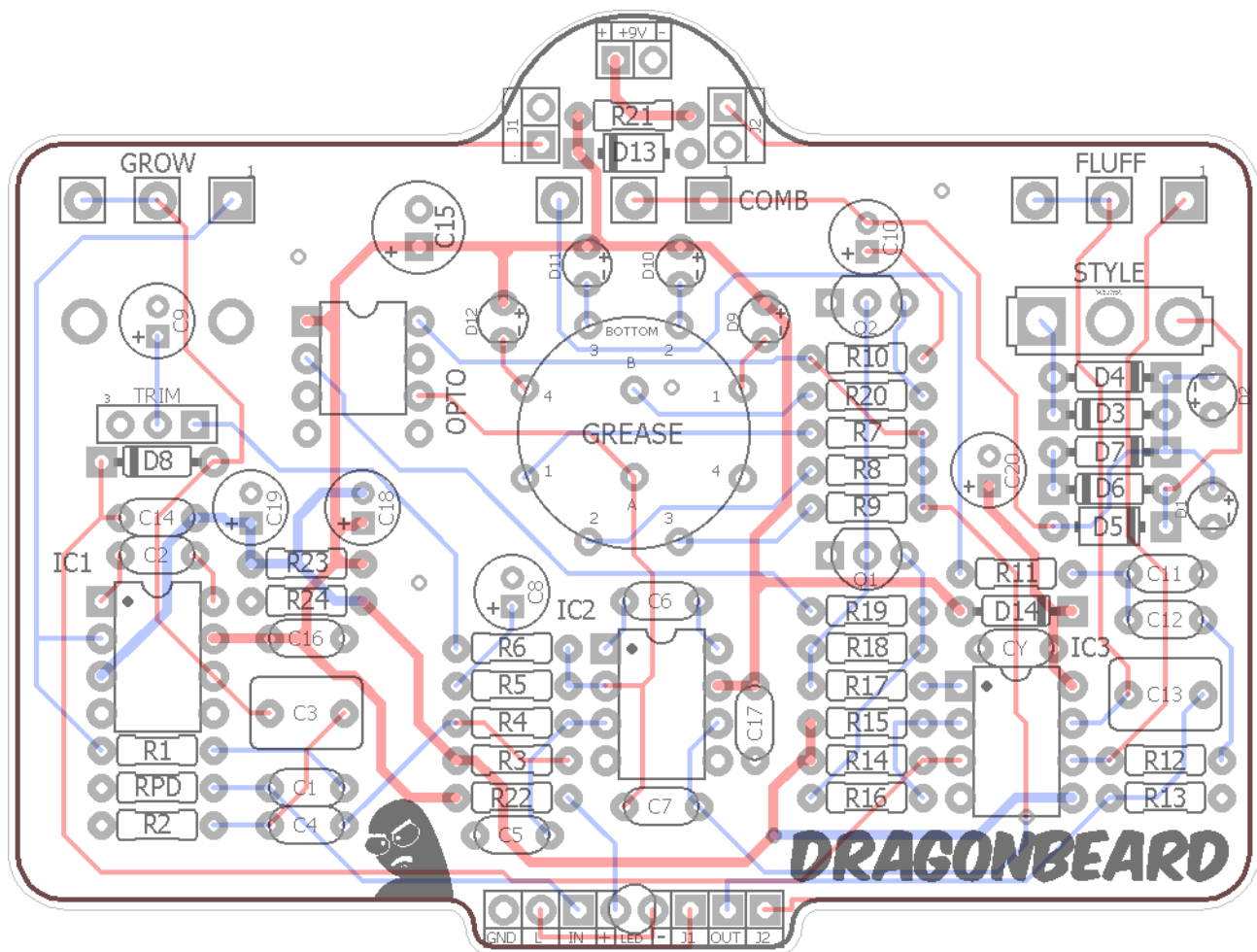
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**Technical assistance** for your build(s) is available via the [madbeanpedals forum](#). Please go there rather than emailing me for assistance on builds. This is because (1) I'm not always available to respond via email in a timely and continuous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







Resistors		Caps		Diodes	
R1	100k	C1	100n	D1, D2	LED
R2	2M2	C2	33pF	D3, D4	1n914
R3	2M2	C3	1uF	D5	1N4001
R4	43k	C4	22n	D6-D8	1n914
R5	560R	C5	1n	D13	1N4001
R6	47R	C6	33pF	D14	1n914
R7	560R	C7	100pF	Transistors	
R8	1k1	C8	4u7	Q1	2N5087
R9	370R	C9	2u2	ICs	
R10	1k1	C10	4u7	IC1, IC2	LM308
R11	1k5	C11	3n3	IC3	4558
R12	1M	C12	100n	Optical	
R13	1k1	C13	1uF	OPTO	H11F1
R14	100k	C14	100n	Switches	
R15	51k	C15	100uF	GREASE	2P4T
R16	820k	C16	100n	STYLE	On/Off/On
R17	4k7	C17	100n	Pots	
R18	47k	C18	10uF	FLUFF	1MB
R19	4k7	C19	10uF	GROW	1MB
R21	47R	C20	10uF	COMB	100kC
R22	4k7	CY	100n	TRIM	1kB
R23	10k			Optional	
R24	10k				
RPD	2M2				
				Q2	2N5087
				D9 - D12	LED
				R20	4k7

Value	QTY	Type	Rating
47R	2	Metal / Carbon Film	1/4W
370R	1	Metal / Carbon Film	1/4W
560R	2	Metal / Carbon Film	1/4W
1k1	3	*included with PCB	1/4W
1k5	1	Metal / Carbon Film	1/4W
4k7	3	Metal / Carbon Film	1/4W
10k	2	Metal / Carbon Film	1/4W
43k	1	*included with PCB	1/4W
47k	1	Metal / Carbon Film	1/4W
51k	1	Metal / Carbon Film	1/4W
100k	2	Metal / Carbon Film	1/4W
1M	1	Metal / Carbon Film	1/4W
2M2	3	Metal / Carbon Film	1/4W
33pF	2	Ceramic / MLCC / MICA	16v min.
100pF	1	Ceramic / MLCC / MICA	16v min.
1n	1	Film	16v min.
3n3	1	Film	16v min.
22n	1	Film	16v min.
100n	6	Film	16v min.
1uF	2	Film	16v min.
2u2	1	Electrolytic	16v min.
4u7	2	Electrolytic	16v min.
10uF	3	Electrolytic	16v min.
100uF	1	Electrolytic	16v min.
LED	2	Red, Diffused	3 or 5mm
1n914	6		
1N4001	2		
2N5087	2		
LM308	2		
4558	1		
H11F1	1		
Rotary	1	2P4T, Mini	
SPDT	1	On/Off/On	
1kB	1	PCB Mount, Plastic Shaft	9mm
100kC	1	PCB Mount, Solder Pin	16mm
1MB	2	PCB Mount, Solder Pin	16mm
Optional			
2N5087	1		
LED	4	Any	3mm
4k7	1		

- The (3) 1k1 and (1) 43k resistors are included with the PCB.
- The 370R is also a non-typical value. Suggest you just put a 220R and 150R in series for it. That's what I did on my build.

**LM308:**

You can use either the LM308AN (standard IC package) or UA308hc (metal can package). I used the metal can since that's what I have. While they have more mojo they are more expensive. I'm not sure if smallbear has the AN version. They are currently down due to COVID-19. You can find them on eBay, though.

308hc: <http://smallbear-electronics.mybigcommerce.com/ic-ua308hc/>

**H11F1:**

<https://www.mouser.com/ProductDetail/512-H11F1M>

**2P4T:**

This rotary has a knurled shaft but it is on the small side. I recommend using a standard set-screw knob.

<http://smallbear-electronics.mybigcommerce.com/rotary-switch-miniature-2p4t/>

**SPDT (On/Off/On):**

<http://smallbear-electronics.mybigcommerce.com/spdt-short-lever-center-off/>

**9mm Plastic Shaft Pots (1kB):**

<http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-9mm-right-angle-pc-mount-w-knurled-plastic-shaft/>

**16mm Right Angle Pots (100kB, 100kC):**

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

**Thinline DC Jack:**

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

**Enclosed Mono:**

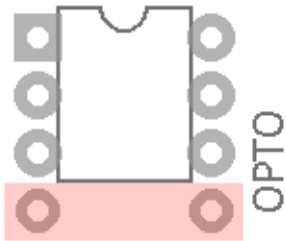
<http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-jack/>

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

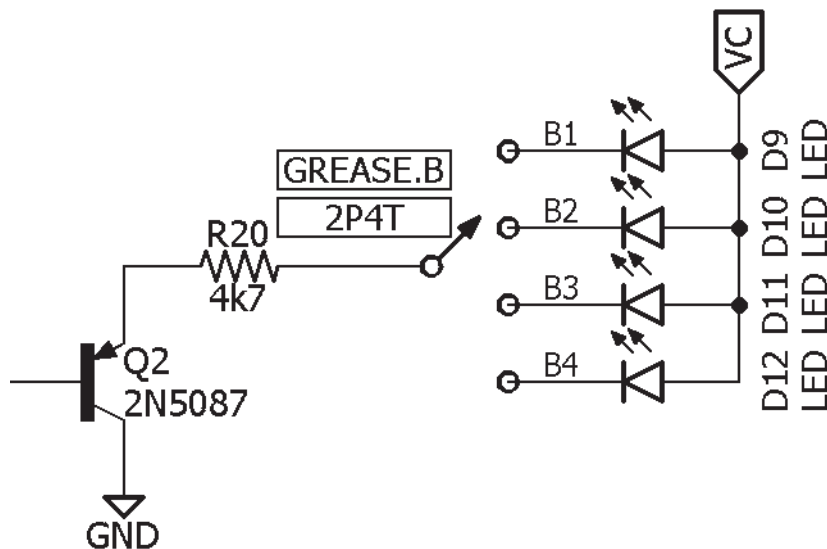
**Lumberg Mono:**

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

**02.21 - Corrected link for the 9mm plastic shaft pot**

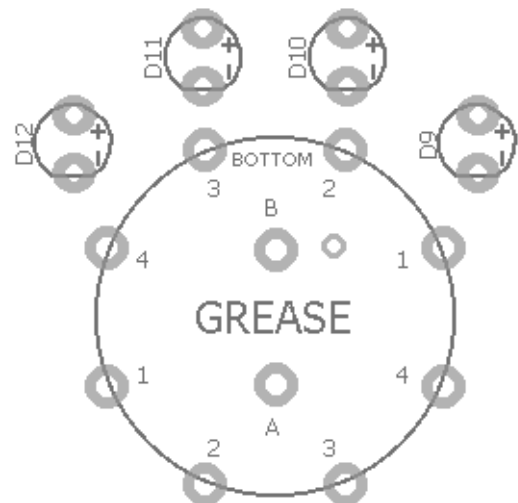


The H11F1 is housed in a 6-pin IC package. I've added two additional pins below it so you can use a standard 8-pin IC socket. The actual device should be inserted in the top three rows, with the highlighted area left empty.

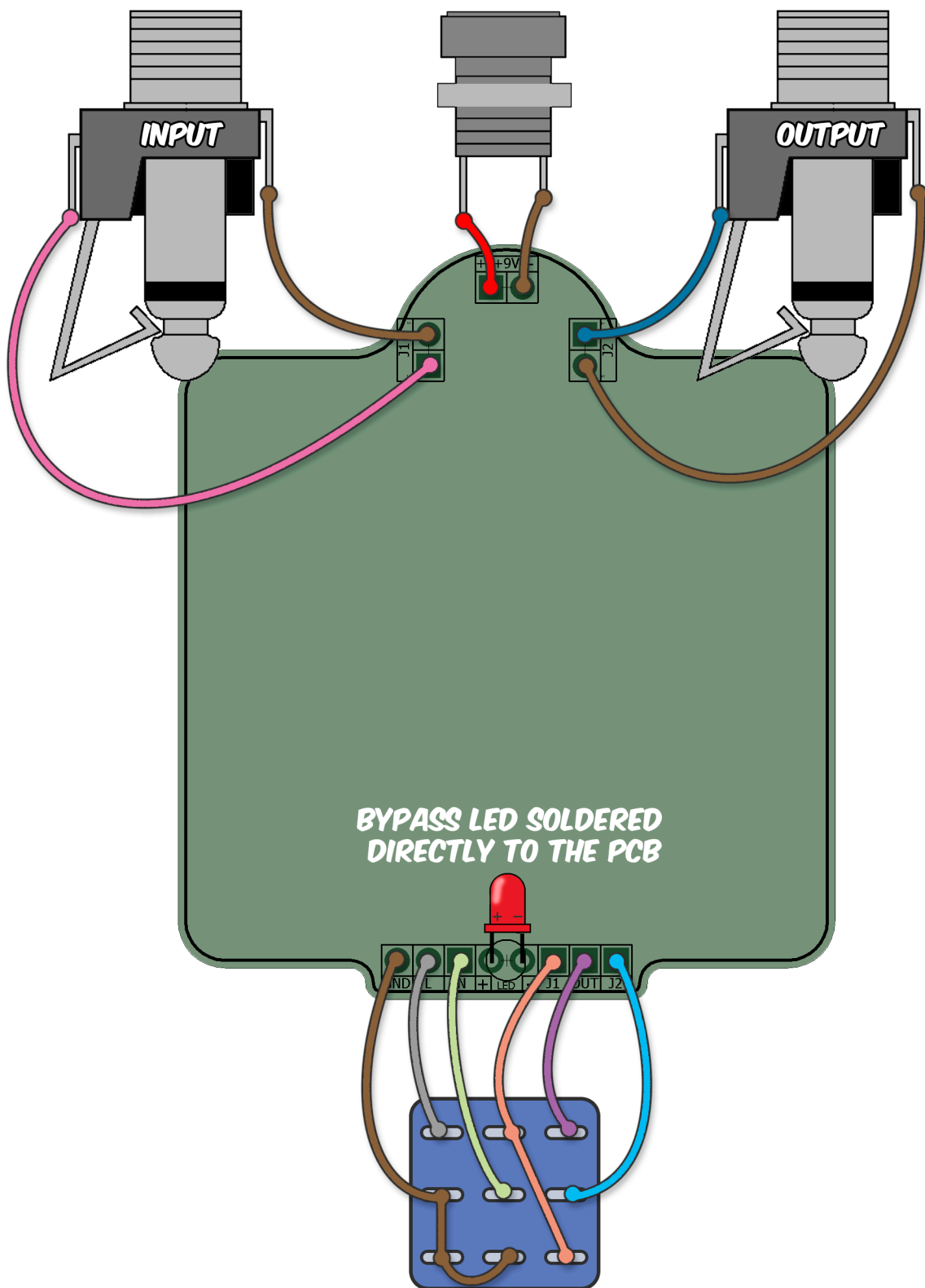


This portion of the circuit is optional. It uses the second half of the 2P4T switch to add some extra LEDs. Each setting on the Grease control will light up its corresponding LED. As you play, the LED will dim in the same fashion as the internal LED of the H11F1. If you don't care about having a light show, then just omit Q2, R20 and the four LEDs.

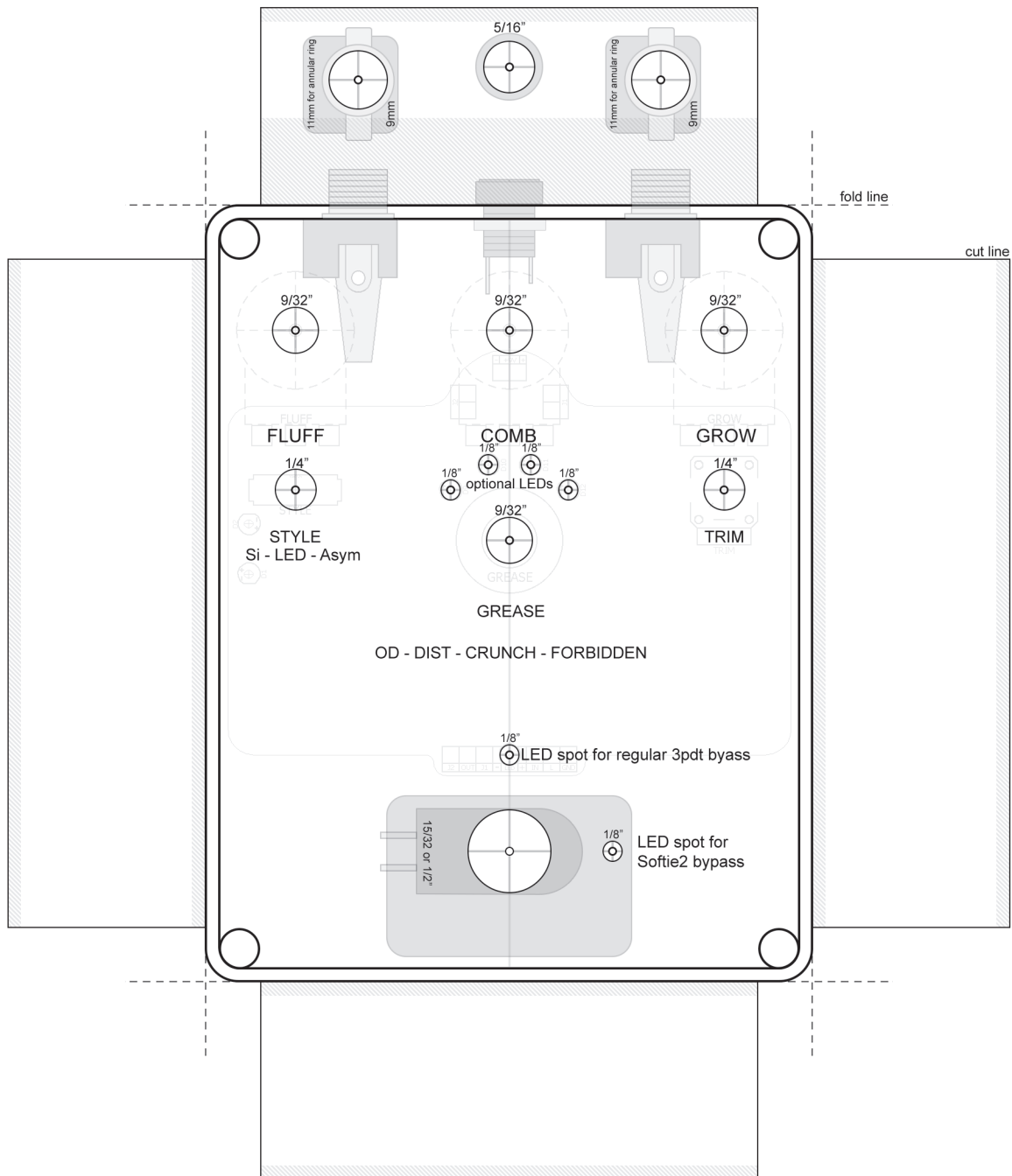
Bottom view of the switch. As positions 1-4 are selected clockwise D9 - D12 will light in turn. Word of warning: whatever knob you use for this switch isn't going to line up perfectly with the LEDs. I just did not have enough room to make their spread cover the 170 deg (or whatever it is) rotation of the four switch spots.







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

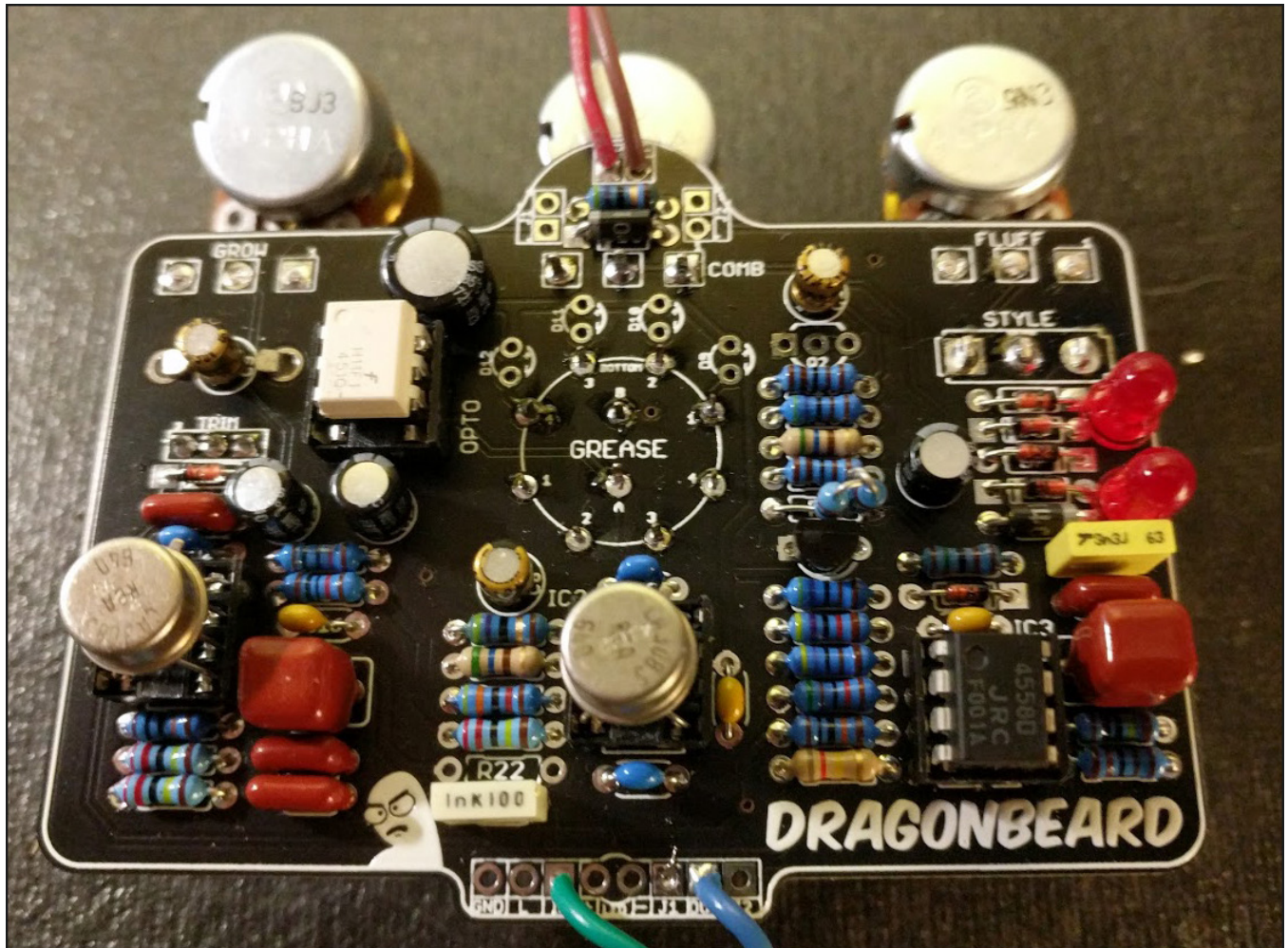


- Shown with Softie 2 relay bypass. Use the same drill spot for 3PDT switch or move to your desired location (using a bypass board switch will require moving the drill spot down). Drill only one LED spot! The LED drill hole size will depend on what size LED you are using. 1/8" is just a general guide.
- Lumberg style jacks are shown but you should be able to fit any type of jack in this build.
- You could also use side jacks if you prefer but you'll need to mark out your drill spots.

IC1	LM308	IC2	LM308	IC3	4558	Q1	2N5087	OPTO	H11F1
1	8.67	1	8.64	1	3.95	C	0	1	9.23
2	4.57	2	4.58	2	4.59	B	3.9	2	7.87
3	4.58	3	3.82	3	4.53	E	4.6	3	ignore
4	0	4	0	4	0	Q2	2N5087	4	4.58
5	ignore	5	ignore	5	4.59	C	0	5	4.38
6	4.58	6	4.58	6	4.59	B	3.9	6	4.58
7	9.2	7	9.2	7	4.58	E	4.6		
8	4.58	8	4.66	8	8.58				

Measurements taken with the optional parts/LEDs included and the rotary switch in the CCW position.

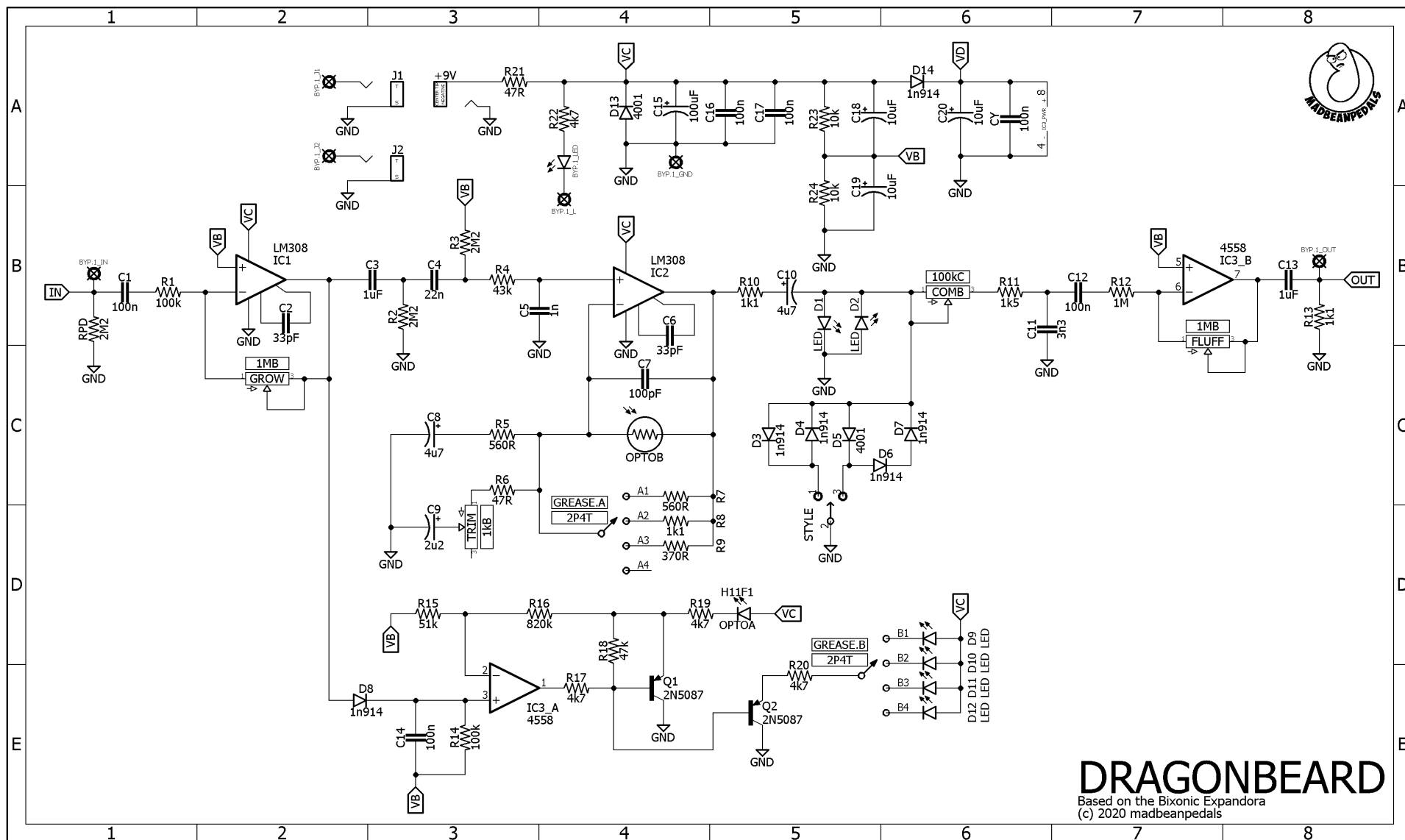
- 9.42vDC One Spot
- Current Draw ~ 5mA



Oh dear. My J1 pad needs a little attention before I move on.

## Schematic

## Dragonbeard



Some versions of the Expandora do not have R17 present.