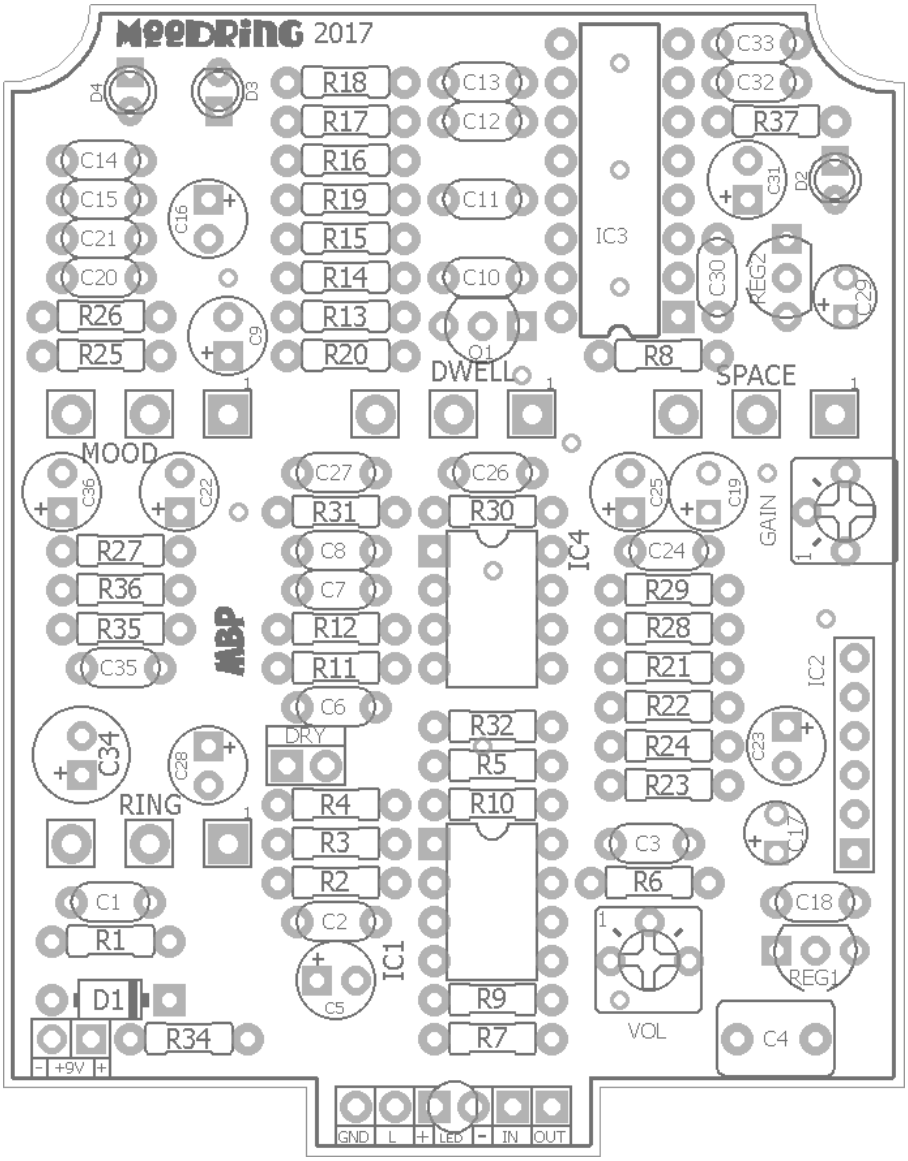
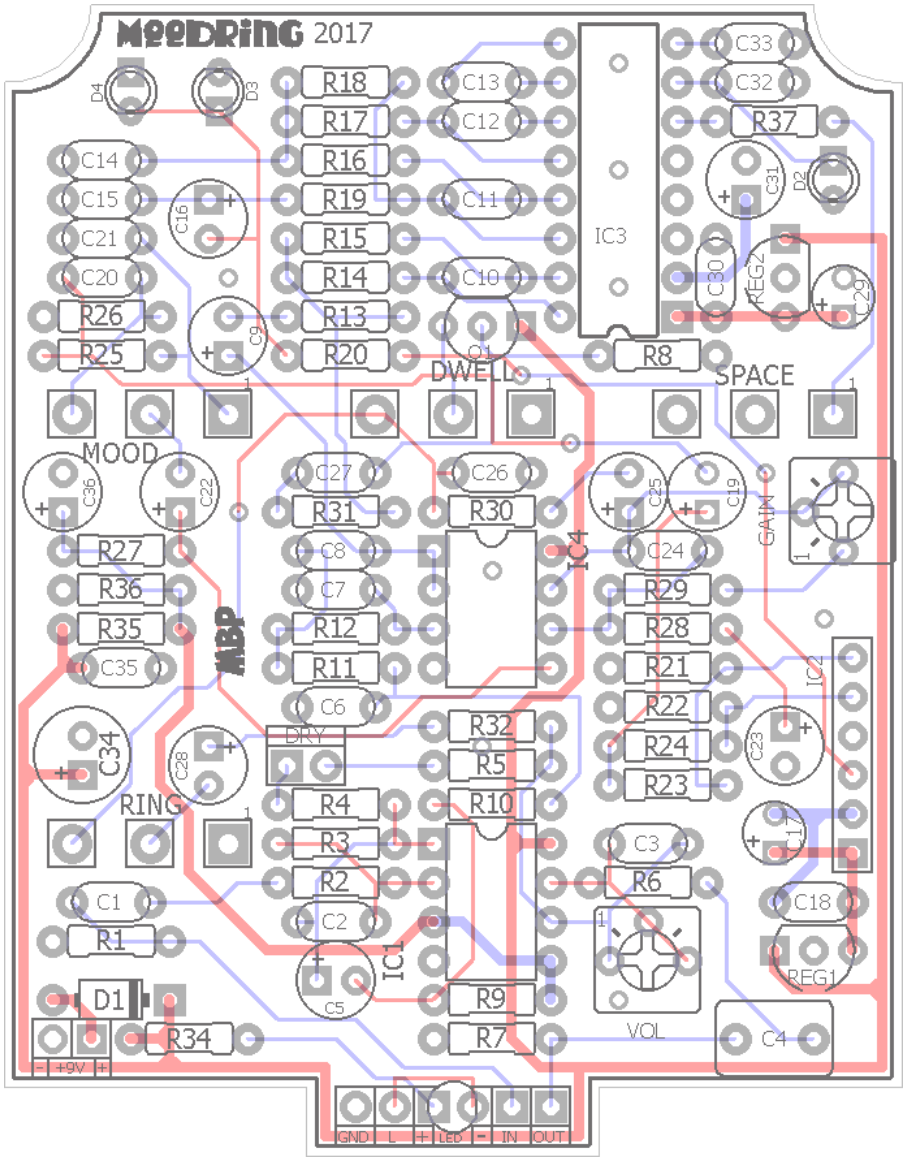
MOODRING 2017

FX Type: Reverb

2.3” W x 2.95” H




MeetDring 2017
MBP
IC1
IC2
IC3
IC4
REG1
REG2
DWELL
SPACE
MOOD
RING
DRY
GAIN
VOL
+9V
GND
LED
IN
OUT

B.O.M.

Resistors		Caps		Diodes	
R1	1M	C1	100n	D1	1N5817
R2	470k	C2	10pF	D2	Yellow
R3	1M	C3	100pF	D3, D4	Red
R4	10k	C4	1uF	**Transistors**	
R5	10k	C5	1uF	Q1	J201
R6	470R	C6	6n8	**Regulators**	
R7	100k	C7	330pF	REG1	LM78L05
R8	10k	C8	47n	REG2	LM78L05
R9	1M	C9	1uF	**ICs**	
R10	10k	C10	1n	IC1	TL072
R11	10k	C11	1n	IC2	BTDR-2
R12	10k	C12	100n	IC3	PT2399
R13	10k	C13	100n	IC4	TL072
R14	10k	C14	15n	**Switch**	
R15	20k	C15	10n	DRY	SPDT
R16	10k	C16	1uF	**Trimmers**	
R17	10k	C17	10uF	VOL	50k
R18	20k	C18	100n	GAIN	25k
R19	1k5	C19	1uF	**Pots**	
R20	33k	C20	10n	SPACE	25kB
R21	100k	C21	15n	DWELL	100kB
R22	100k	C22	1uF	MOOD	100kB
R23	1k	C23	1uF	RING	100kB
R24	1k	C24	100pF		
R25	47k	C25	1uF		
R26	22k	C26	10n		
R27	1M	C27	220n		
R28	2k4	C28	1uF		
R29	3k3	C29	10uF		
R30	1k	C30	100n		
R31	4k7	C31	47uF		
R32	10k	C32	100n		
R34	4k7	C33	100n		
R35	10k	C34	100uF		
R36	10k	C35	100n		
R37	1k5	C36	10uF		

*note – There is no R33 on this board

Shopping List			
Value	QTY	Type	Rating
470R	1	Carbon / Metal Film	1/4W
1k	3	Carbon / Metal Film	1/4W
1k5	2	Carbon / Metal Film	1/4W
2k4	1	Carbon / Metal Film	1/4W
3k3	1	Carbon / Metal Film	1/4W
4k7	2	Carbon / Metal Film	1/4W
10k	13	Carbon / Metal Film	1/4W
20k	2	Carbon / Metal Film	1/4W
22k	1	Carbon / Metal Film	1/4W
33k	1	Carbon / Metal Film	1/4W
47k	1	Carbon / Metal Film	1/4W
100k	3	Carbon / Metal Film	1/4W
470k	1	Carbon / Metal Film	1/4W
1M	4	Carbon / Metal Film	1/4W
10pF	1	Ceramic / MLCC	~16v min
100pF	2	Ceramic / MLCC	~16v min
330pF	1	Ceramic / MLCC	~16v min
1n	2	Film	~16v min
6n8	1	Film	~16v min
10n	3	Film	~16v min
15n	2	Film	~16v min
47n	1	Film	~16v min
100n	8	Film	~16v min
220n	1	Film	~16v min
1uF	1	Film	~16v min
1uF	8	Electrolytic	~16v min
10uF	3	Electrolytic	~16v min
47uF	1	Electrolytic	~16v min
100uF	1	Electrolytic	~16v min
1N5817	1		
Yellow	1	Diffused	5mm
Red	2	Diffused	5mm
J201	1	or, 2n5457, MPF102	
LM78L05	2		
TL072	2		
BTDR-2	1	*see notes	
PT2399	1		
SPDT	1	Mini Switch	
50k	1	Bourns 3362p	
25k	1	Bourns 3362p	
25kB	1	PCB Right Angle	16mm
100kB	3	PCB Right Angle	16mm

BTDR-2H:
https://www.mammothelectronics.com/products/accubell-sound-belton-btdr-2h-digital-reverb-module-horizontal?variant=31876478791

http://www.smallbear-electronics.mybigcommerce.com/belton-btdr-2h-reverb-modules/
(smallbear appears to be out of stock of these at this time)

http://www.pedalpartsplus.com/product-p/14000.htm

https://www.banzaimusic.com/Belton-Reverbs/

https://www.musikding.de/Delay-Reverb_1

You can also find them on Reverb and eBay

Note: There are three versions of the BTDR-2H; the short, medium and long. I used the short version in my 2017 build and it's what I prefer. I find that the short version still has tons of reverb on tap and seems to have a bit less of the built-in modulation (common in the Belton bricks).

Sub-Mini SPDT:
http://www.smallbear-electronics.mybigcommerce.com/spdt-on-on-mountain-10tc410/

The sub-mini switch is preferred in this build but if you cannot get it use a regular size (solder lug) SPDT. You may need to make a small adjustment to the drilling layout in order to fit a larger switch.

Bourns 3362p:
25k:
https://www.mouser.com/productdetail/bourns/3362p-1-253lf?qs=sGAEpiMZZMvygUB3GLcD7vRbQqL9uMLMqIpepdvyyRc%3D

20k (fine for 25k sub):
http://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/20k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html

50k:
https://www.mouser.com/productdetail/bourns/3362p-1-503lf?qs=sGAEpiMZZMvygUB3GLcD7vRbQqL9uMLMZgtO2Ks3Q%2F4%3D

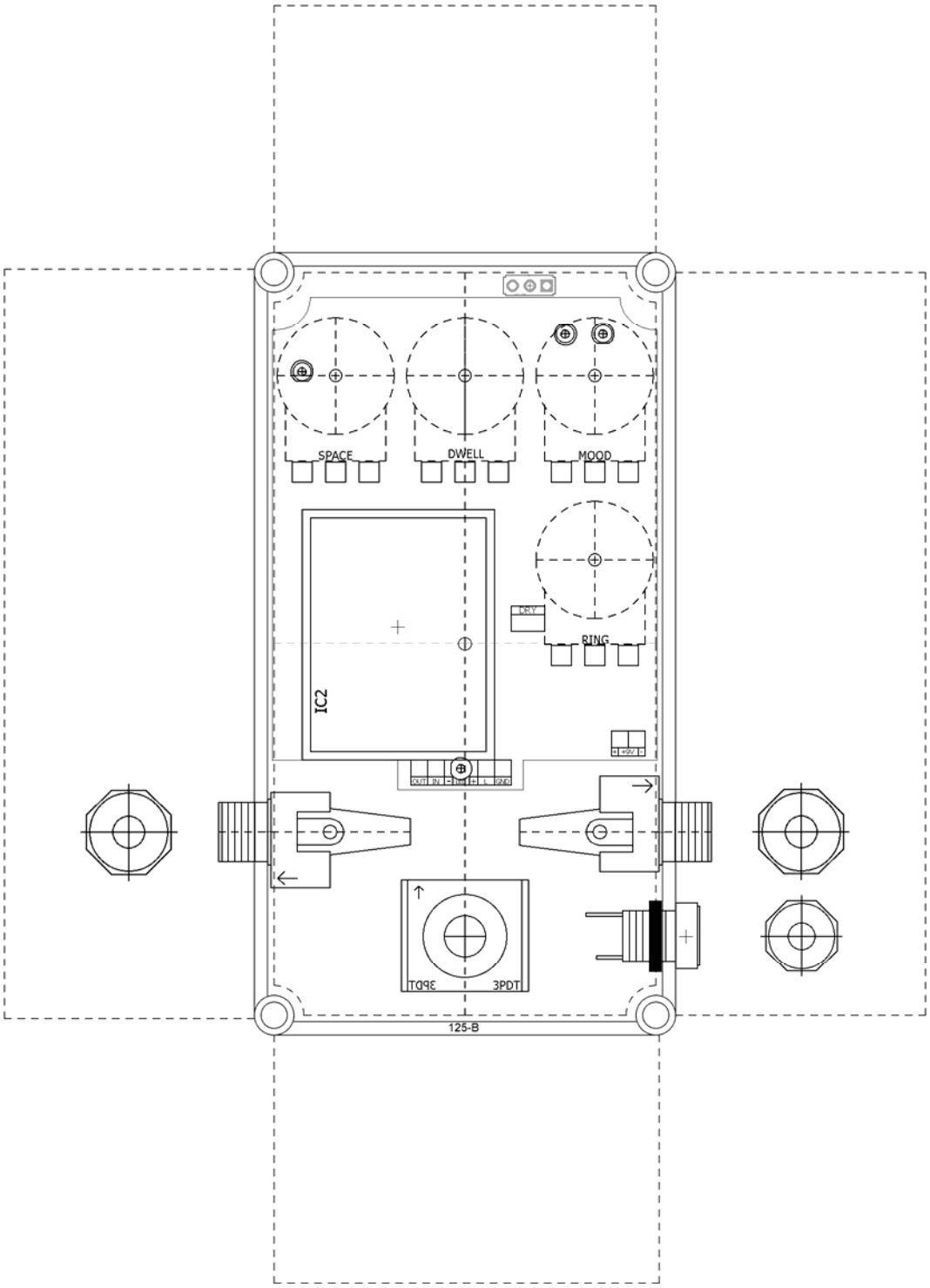
http://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/50k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html'

Other part notes:
-2k4 is a less common value of resistor for many builders. Use 2k2 if you don't have a 2k4.

-The yellow and two red LEDs must be diffused, but can be either 3mm or 5mm. These are not bypass/indicator LEDs. They are to control clipping in the circuit.

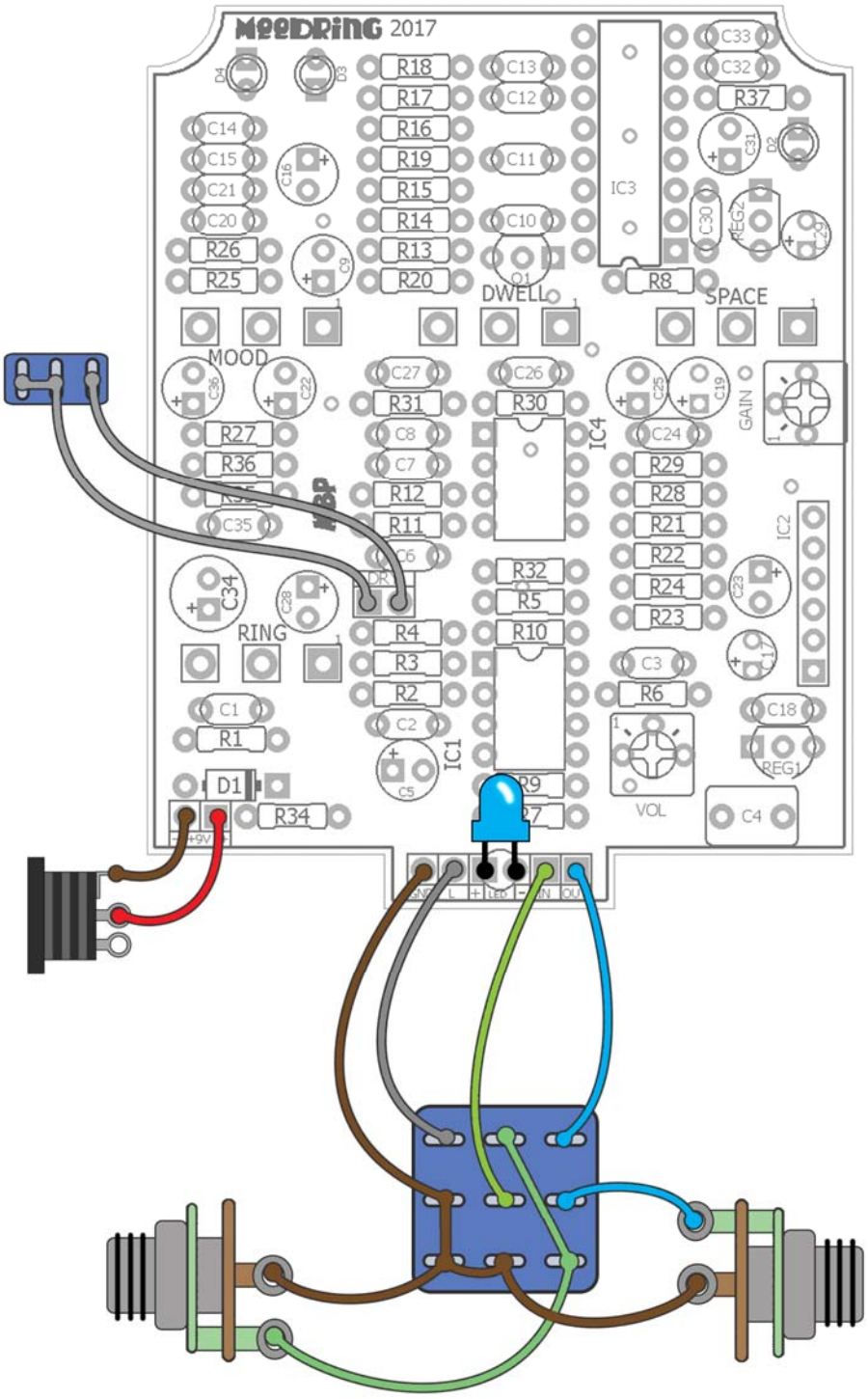
125B Drill Guide

5.52” W x 7.65” H



I use “Lumberg” style jacks on my builds, but Switchcraft style should also work fine.

Wiring Guide



Bypass LED can be soldered directly to the PCB.

2017 notes

I decided to discontinue the Moodring about a year ago thinking that I would only offer a more “deluxe” version of it using the BTDR-3 module. However, over the course of 2017 so many people asked me about spare boards that it seemed like I jumped the gun in cancelling it. So, the Moodring has been brought back. As with most projects, I can’t help but tinker with them and I have added in some small, but very useful, improvements to the design.

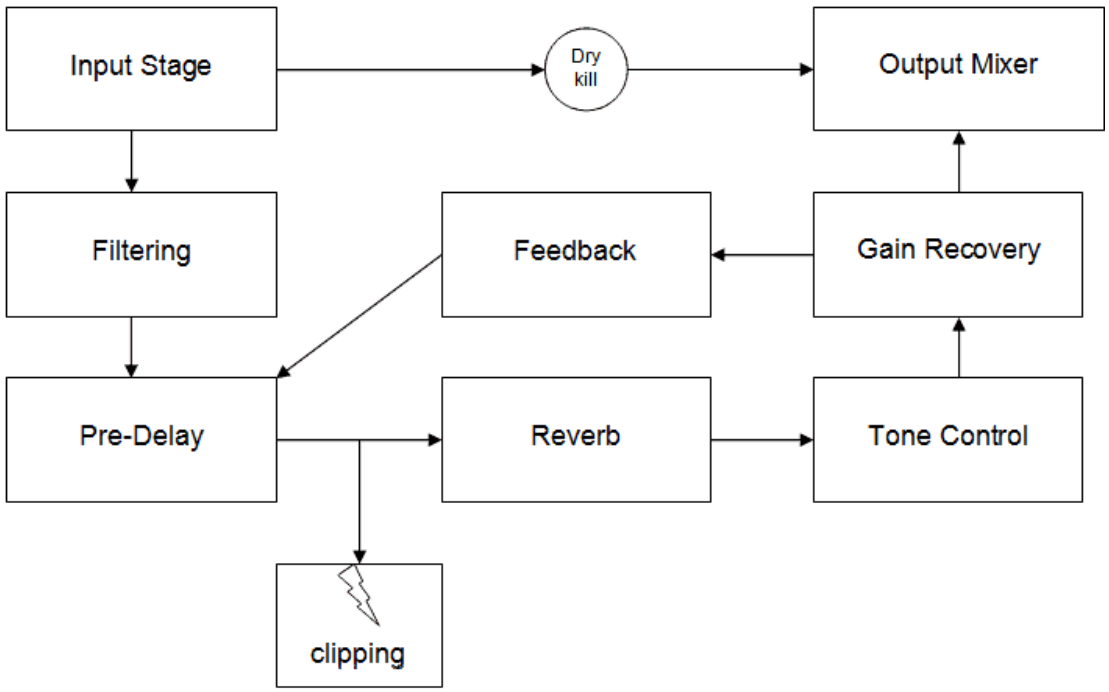
The following changes were made:

1. Added output volume trimmer.
2. Switched from one LM7805 regulator to two LM78L05 regulators (one for the BTDR and one for the PT2399).
3. Added a JFET buffer in the Dwell path (IMO, this ended up making a pretty big difference in the amount of regeneration on tap and gave it a more “ethereal” quality at high settings.)
4. Switched D2 from red to yellow. This is fairly subtle but the change of LED color seems to clip the PT2399 output slightly less and overall made the effect sound better to me.
5. Removed the “tails” bypass. This was a consequence of the added buffer in the Dwell control. High settings of the Dwell leads to lots of feedback and self/oscillation which will not work with a tails bypass.
6. A few other small value tweaks.

Controls

RING: The amount of reverb mixed with the dry signal.
MOOD: A tone control for the reverb.
SPACE: The amount of pre-delay before the reverb. This goes from a few ms to about 300ms.
DWELL: The amount of reverb fed back into the pre-delay/reverb section.
DRY: This switch lets you kill the dry signal so that you only have reverb going to the output.
T1: This is an adjustable gain stage. Stock setting is about ¼ up. As you turn it up further, the reverb gets louder. This will let you fine tune just how much reverb gets fed into the RING and DWELL knobs.
VOL: This “set and forget” trimmer is used to match the effect output with the bypass signal.

Design Breakdown



Circuit (pseudo) Analysis

Input Stage/Output Mixer: Inverted method with high input impedance low output impedance. The implementation results in a fairly flat frequency response and minimal volume change to the inputted signal.

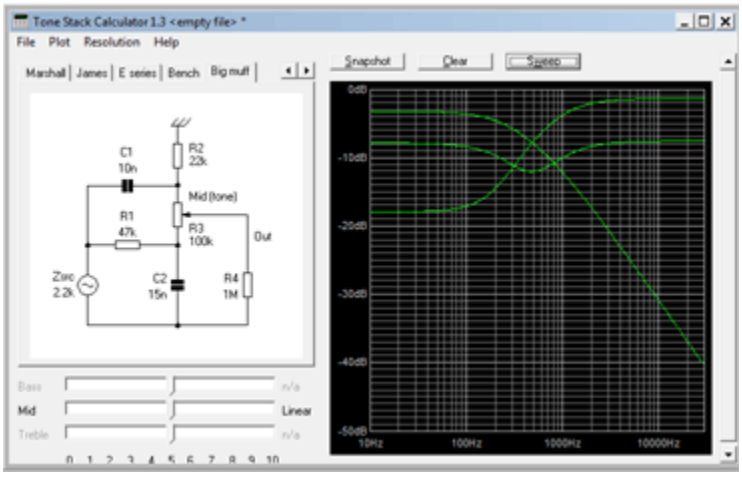
Filtering: Active filtering was chosen for the pre-emphasis portion of the reverb for convenience.

Pre-Delay: The PT2399 offers an adjustable pre-delay into the reverb section. Filtering here was kept to a minimum. The pre-delay circuit ranges from a few ms to about 300ms.

Clipping: LED clippers were used before the reverb circuit to limit excessive volume and noise from over-saturating its input. The higher forward voltage means they only begin to clip when the Dwell control is near maximum.

Reverb: The BTDR-2 was used here for availability, ease of use and size.

Tone: A Big Muff™ style tone control offered the best range of filter shaping on the reverb.



Gain Recovery: With the tone control, signal loss was a concern. Luckily, we have one-half of an op-amp left over to make a simple adjustable gain recovery stage.

Feedback: Feeding the output back into the reverb proved to offer some unique settings. It helps increase ambience and grit. It can even create drone-like settings. The Dwell and Tone control are somewhat interactive in this respect.

Dry Kill: A simple switch to remove the dry signal turns out to be a great option. Volume swells and light dynamics really shine.

Notes

The BTDR-2 is the only Belton Brick that will work with this design. The BTDR-1 and 3 are not compatible with the PCB.

The BTDR-2 has modulation built into its design, for better or worse. It cannot be "turned off" (unless you want to disassemble the module and remove a surface mount part). From what I can tell, it seems to be a triangle wave with a period of about a second…maybe a little more. The modulation did not seem to pose any problems in the Moodring. *2017 note: as I mentioned before I think the intrinsic modulation is a little less pronounced in the "short" version of the brick, which I liked in my 2017 build.*

The module itself should be soldered on the bottom side of the board with the pots. It must be soldered in the correct way to work. Pin1 is the square pin of IC2 (the BTDR-2). Since there are parts on the top part of the PCB in that area, make doubly sure that you have used the right values, soldered them well, etc. It will be very difficult to remove the BTDR module once it is soldered in place (unless you have a de-soldering gun).

IMPROTANT: the module is rather thick and runs the risk of being *almost* (but not quite) too tall for the PCB mounted pots. Keep your component leads trimmed close to the pads that are underneath the module and push the pins as far through the PCB pads as you can to avoid any problem with the module thickness.

Voltages

	IC1
1	4.54
2	4.54
3	4.54
4	0
5	4.54
6	4.54
7	4.54
8	9.08

	IC2
1	5.02
2	1.7mV
3	ignore
4	0
5	1.8mV
6	1.8mV

	IC3
1	5.02
2	2.53
3	0
4	0
5	2.84
6	2.53
7	0.69
8	0.71
9	2.53
10	2.53
11	2.53
12	2.53
13	2.53
14	2.54
15	2.53
16	2.53

	IC4
1	4.54
2	4.54
3	4.13
4	0
5	4.13
6	4.54
7	4.54
8	9.08

	Q1
D	9.08
S	0.47
G	1.4mV

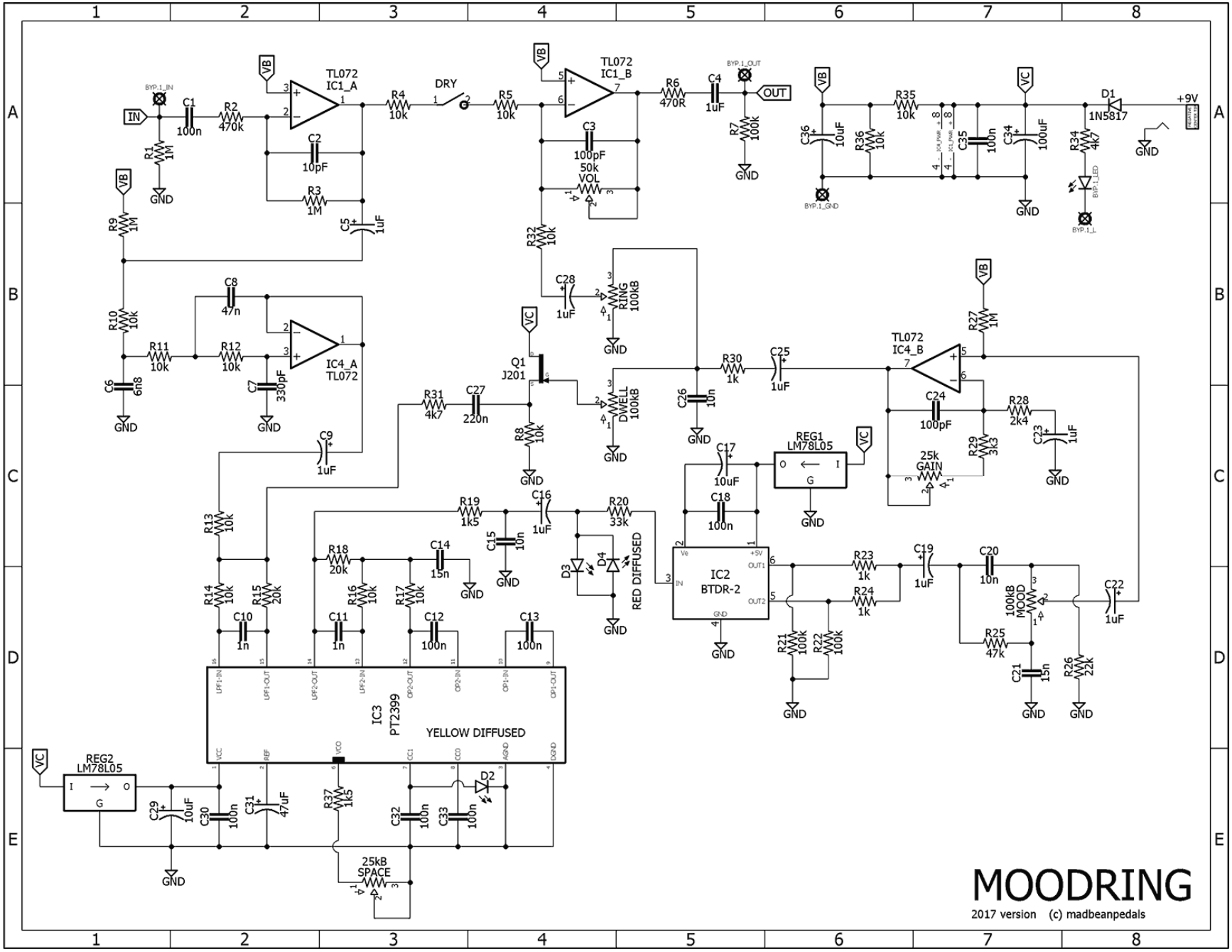
9.42v One Spot supply

Build Pic

Note: I used Function F(x) soft-touch bypass switching in this build, which is not something that is available for purchase.

youTube Demo:

https://www.youtube.com/watch?v=GhXyDXNpvH4


MOODRING
2017 version (c) madbeanpedals
TL072
IC1_A
TL072
IC1_B
TL072
IC4_A
TL072
IC4_B
IC2
BTDR-2
IC3
PT2399
YELLOW DIFFUSED
RED DIFFUSED
REG1
LM78L05
REG2
LM78L05
DRY
VOL
RING
DWELL
GAIN
MOOD
SPACE
BYP.1_IN
BYP.1_OUT
BYP.1_GND
BYP.1_L
BYP.1_LED
IN
OUT
VB
VC
GND
+9V
1N5817
J201