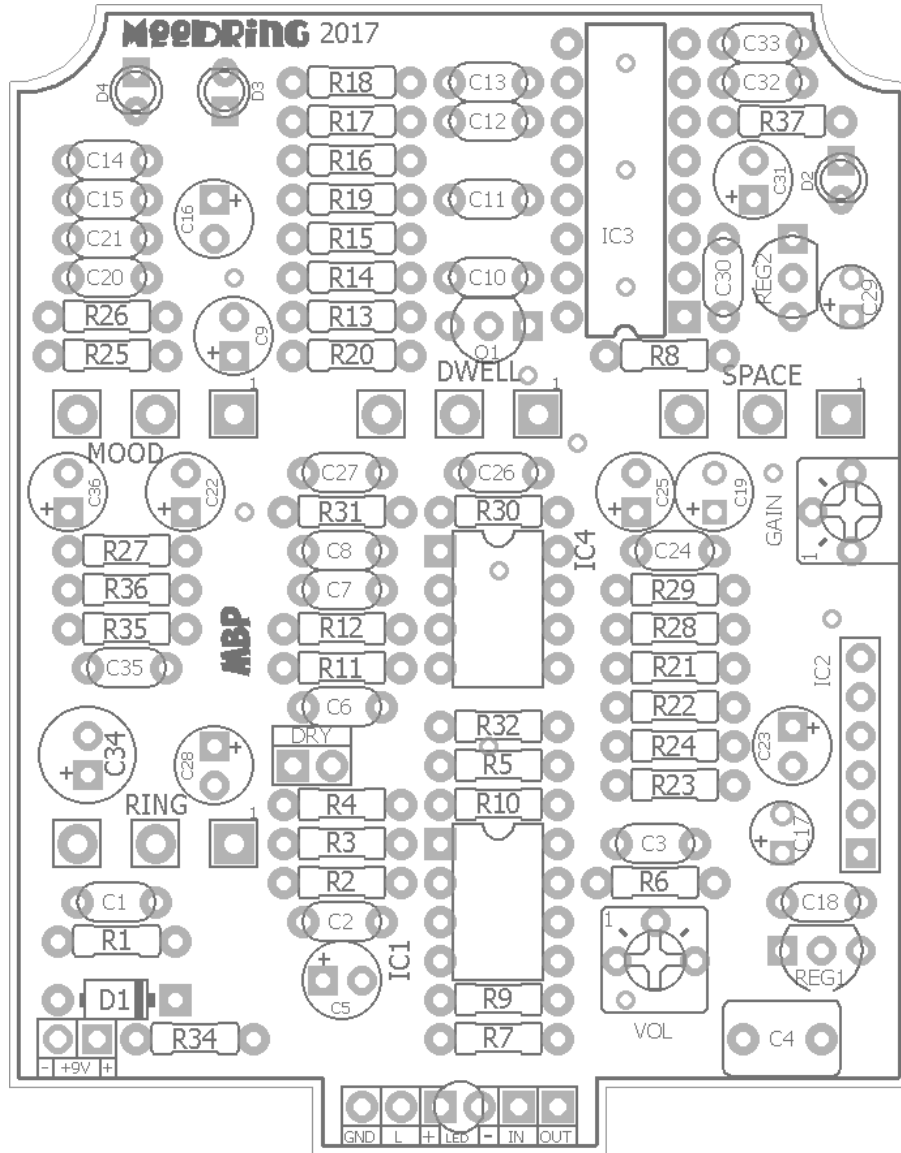


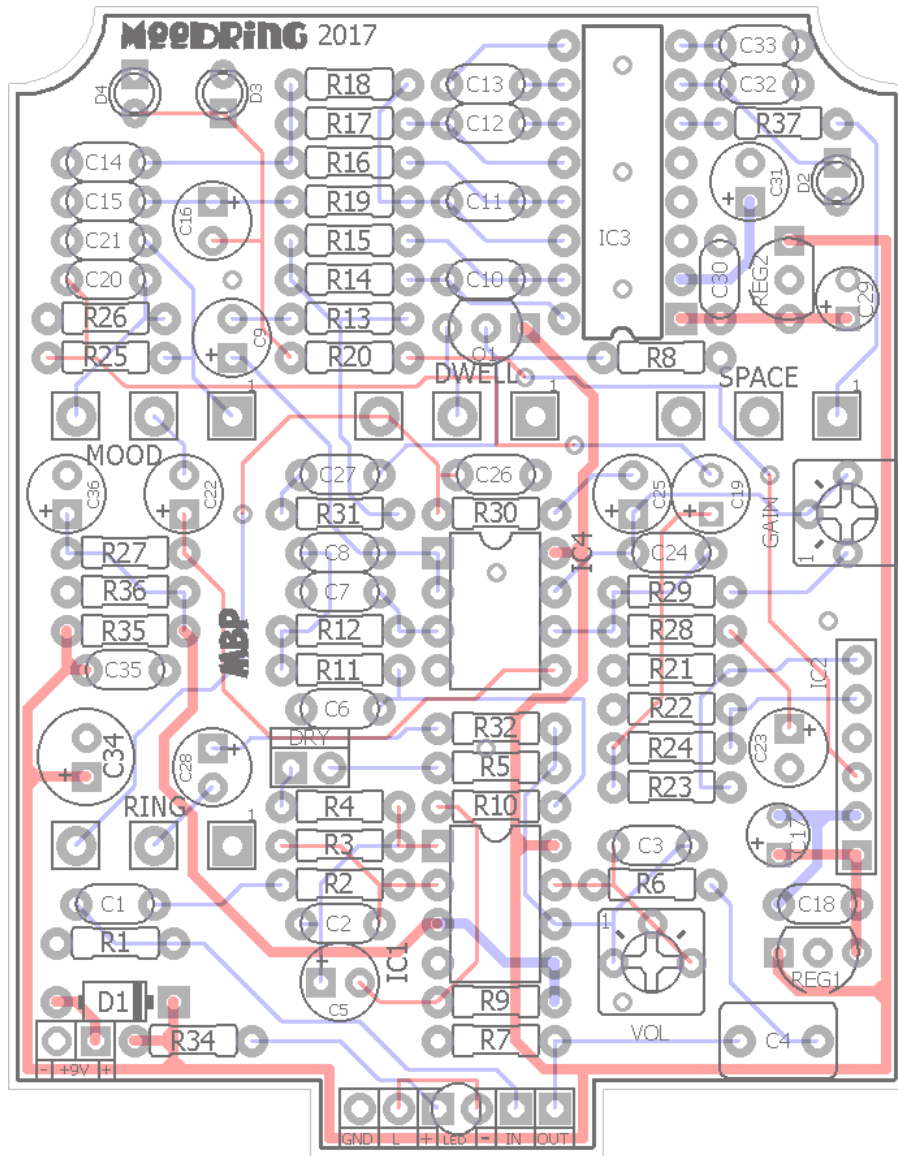
MOODRING 2017

FX Type: Reverb
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2.3" W x 2.95" H



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| 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=sGAEpiMZZMvygUB3GLcD7vRbQqL9uMLMZqtO2Ks3Q%2F4%3D>

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

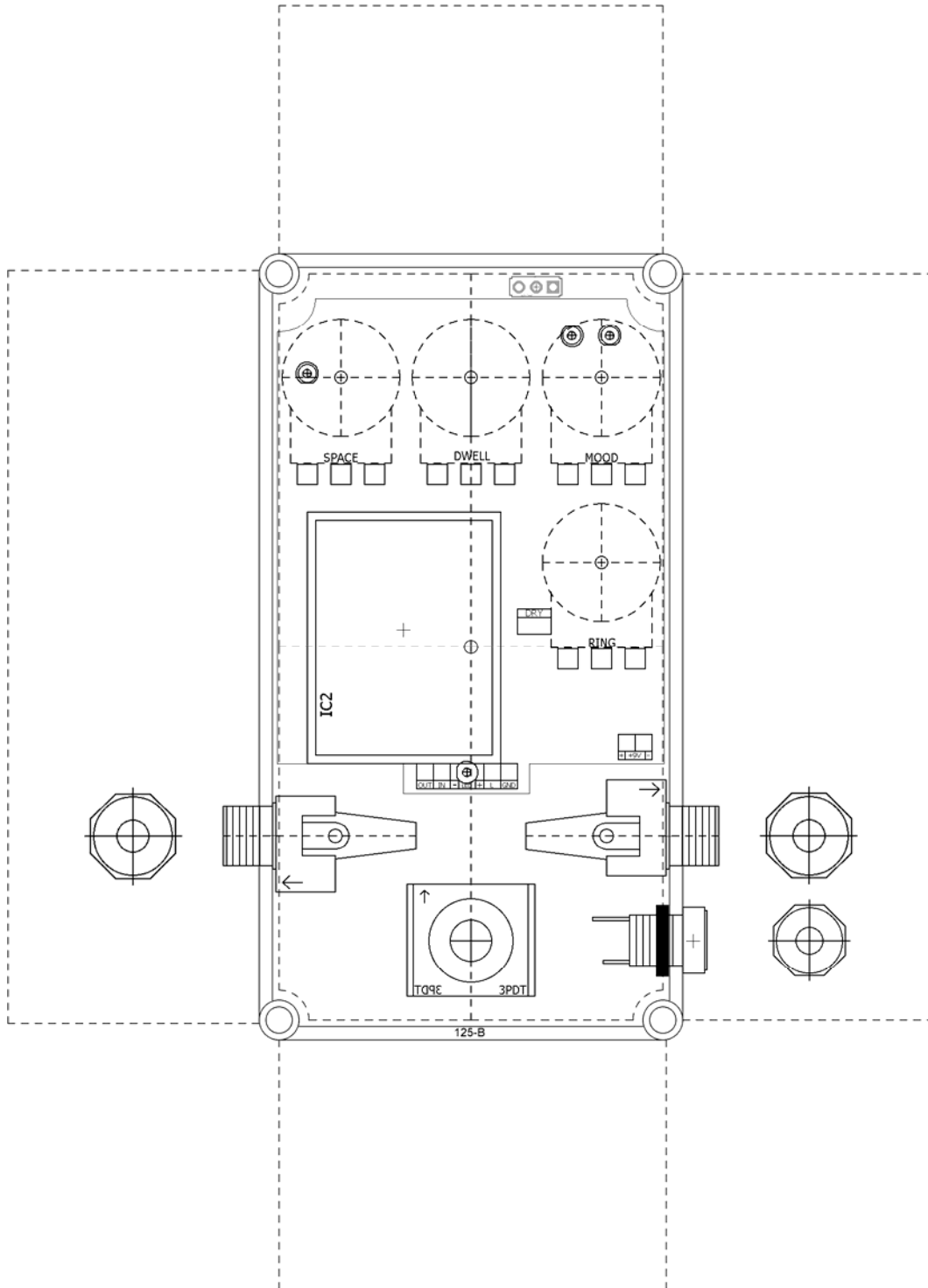
Other part notes:

-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

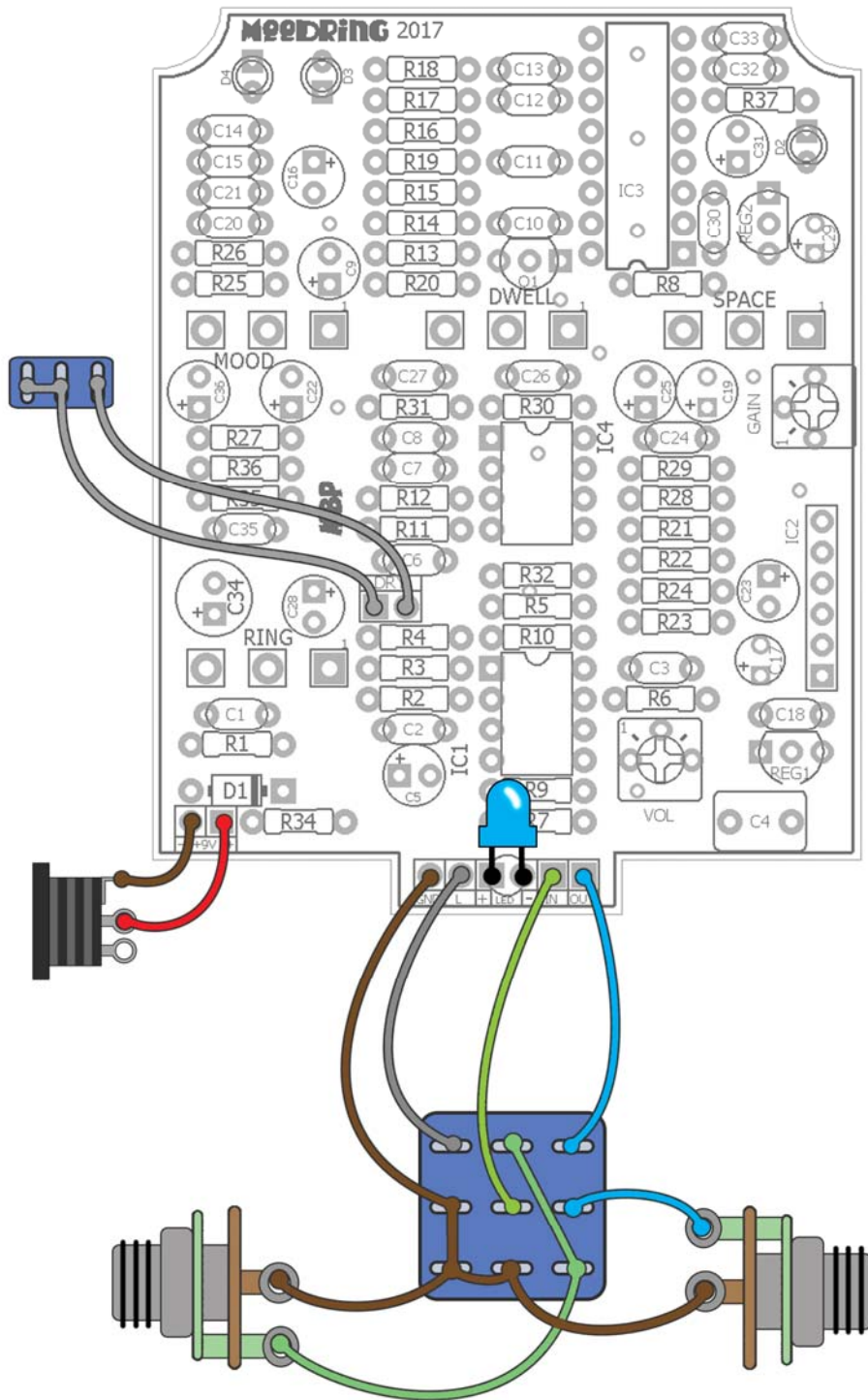
5.52" W x 7.65" H



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

Photoshop Drill Template: http://www.madbeanpedals.com/projects/Moodring/Moodring_DRILL.zip

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.

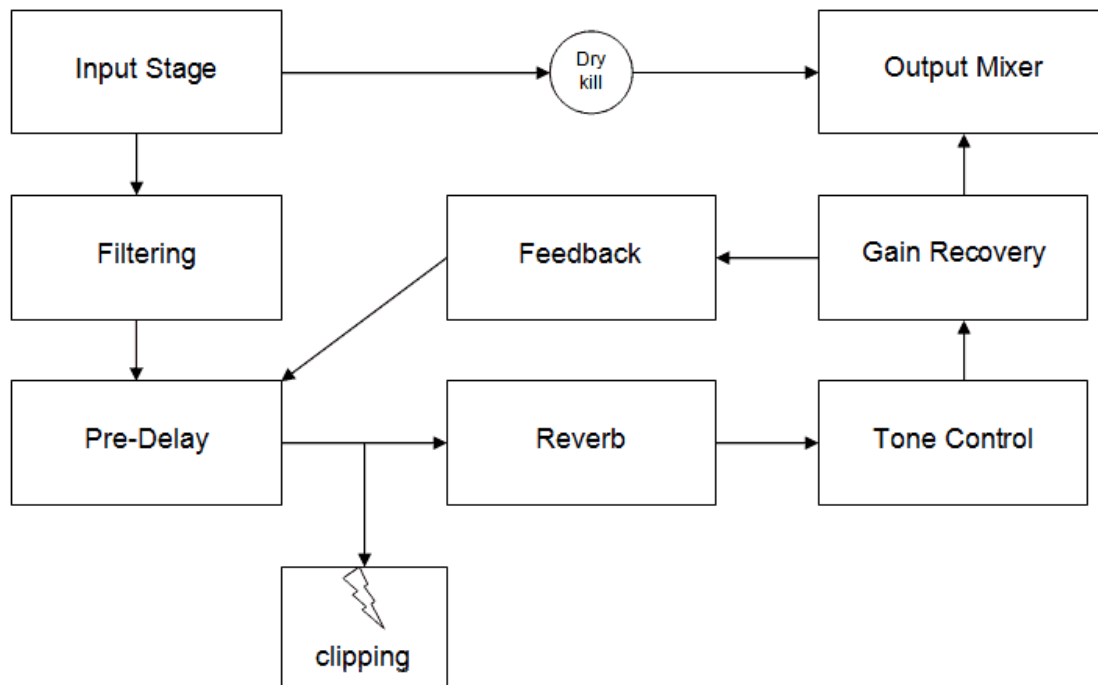
DWELL: The amount of reverb fed back into the pre-delay/reverb section.

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 $\frac{1}{4}$ 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.

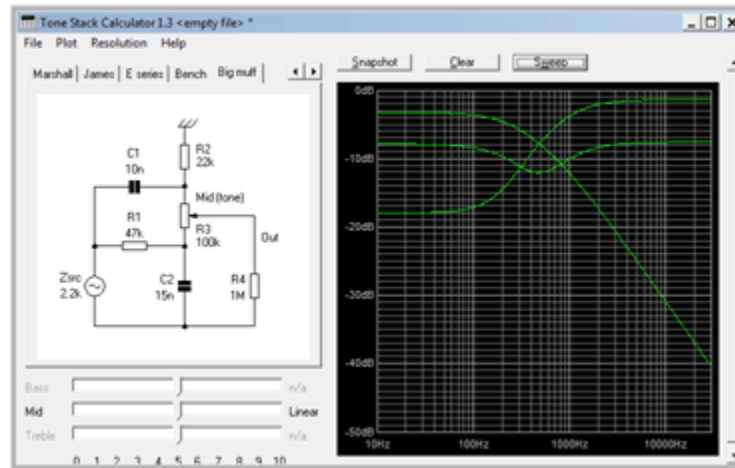
Filtering: Active filtering was chosen for the pre-emphasis portion of the reverb for convenience.

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 | | IC2 | | IC3 | |
|-----|------|-----|--------|-----|------|
| 1 | 4.54 | 1 | 5.02 | 1 | 5.02 |
| 2 | 4.54 | 2 | 1.7mV | 2 | 2.53 |
| 3 | 4.54 | 3 | ignore | 3 | 0 |
| 4 | 0 | 4 | 0 | 4 | 0 |
| 5 | 4.54 | 5 | 1.8mV | 5 | 2.84 |
| 6 | 4.54 | 6 | 1.8mV | 6 | 2.53 |
| 7 | 4.54 | | | 7 | 0.69 |
| 8 | 9.08 | | | 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 | | Q1 | |
|-----|------|----|-------|
| 1 | 4.54 | D | 9.08 |
| 2 | 4.54 | S | 0.47 |
| 3 | 4.13 | G | 1.4mV |
| 4 | 0 | | |
| 5 | 4.13 | | |
| 6 | 4.54 | | |
| 7 | 4.54 | | |
| 8 | 9.08 | | |

9.42v One Spot supply

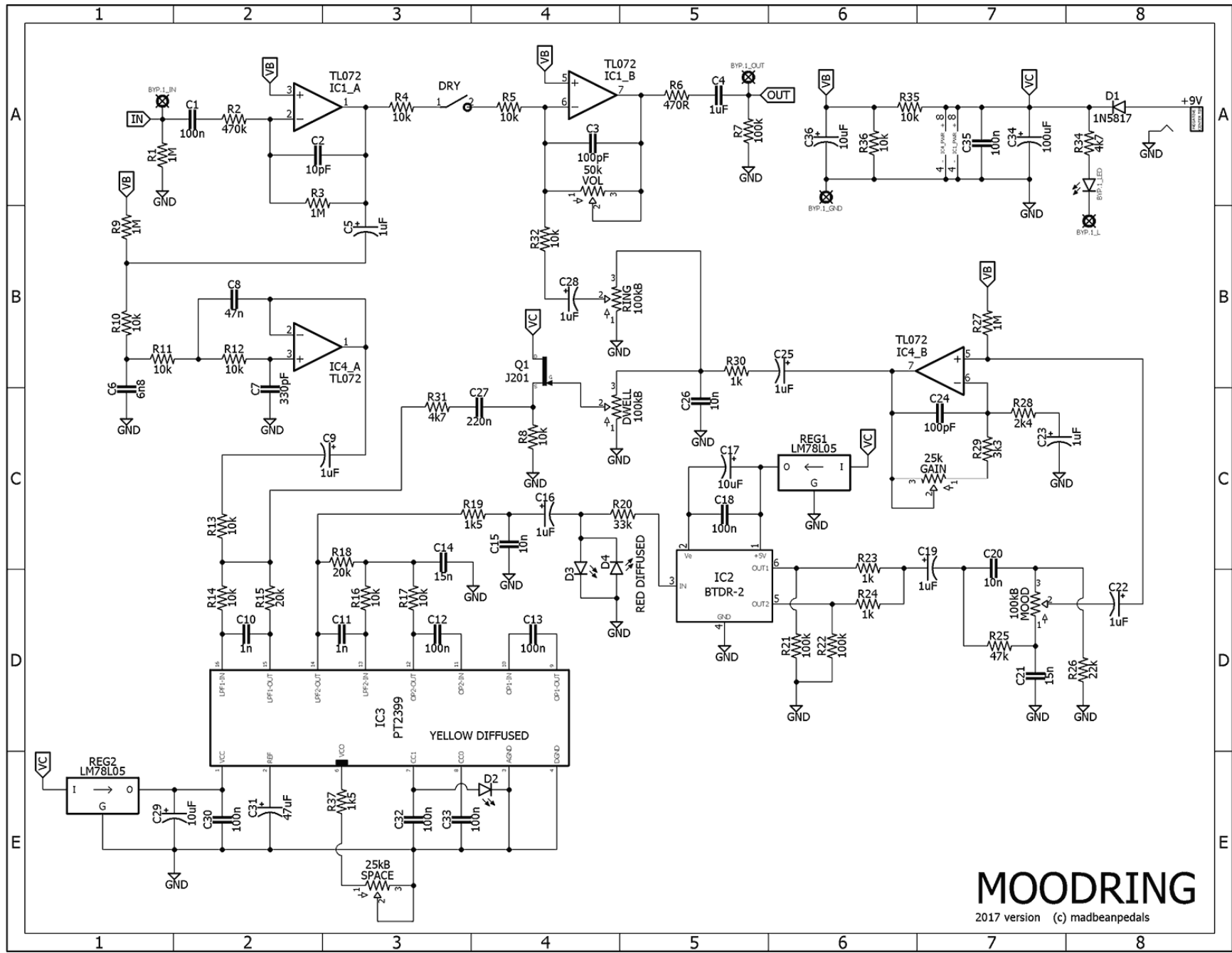
Build Pic



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