# Magnus Modulus

**The Magnus Modulus is another PT2399 based DIY echo modulation effect pedal. I wanted to make a digital delay and liked the idea of adding modulation ala Echo Base. I decided to use a stage from the BYOC Ping Pong with the LFO from the Tremulus Lune for maximum modulation control. I didn't reinvent the wheel here, just a bunch of other ideas put together into one awesome effect.**

**The delay lengths are controlled via a voltage controlled oscillator in the PT2399 at pin 6. The nominal delay length is set by R9 and Delay Time pot. The modulation is coupled on top of this DC value via R10 and C13. There is no need for a variable resistor (transistor, LDR). While I had the LFO and buffers already on board I decided to add a tremolo coupled into the output amplifier stage with a J201 acting as a switch.**

**This project is intended as a DIY effect and hopefully an evolving one. This is a highly modifiable circuit, hopefully you'll find the setup you like the most. The values in the schematic and layout are my personal favourites, your taste may differ so I'll suggest a few mods. The project fits in a 1590BB if you have skills...**

**MODS: Delay filtering – I have a really hot bridge pickup in my Les Paul and it can make the delay section distort (I use both pickups and designed the pedal using the middle one, it sounds awesome) I increased the values of C11 and C18 to filter more of the highs. Capacitors you can play around with to change the filtering are: C5, C6, C11, C18. You can add a capacitor at the space I left empty at C22 in the input buffer. Some of the 100uF caps are overkill...**

**I used 240k resistors in the LFO, the original has 220k, you can add a 'fine' rate control as well.**

**The tremolo could be implemented with an LDR, I used the J201 as it is pretty common. There is a bit of charge injection that's only really noticeable with the space (or smooth, can't remember) knob is turned down, the tremolo sounds really good and smooth when that control is set properly though. To use an LDR, don't use any of the components between the tremolo switch and pin 6 of the buffer op-amp. The LDR should go from pin 6 of the op-amp to ground and have an on resistance around 5k to 10k.**

**You can use less knobs, the gain knob could be a trimmer if you don't want a booster.**

**Taking out the limiting diodes will increase the output significantly during self-oscillation and is not recommended**

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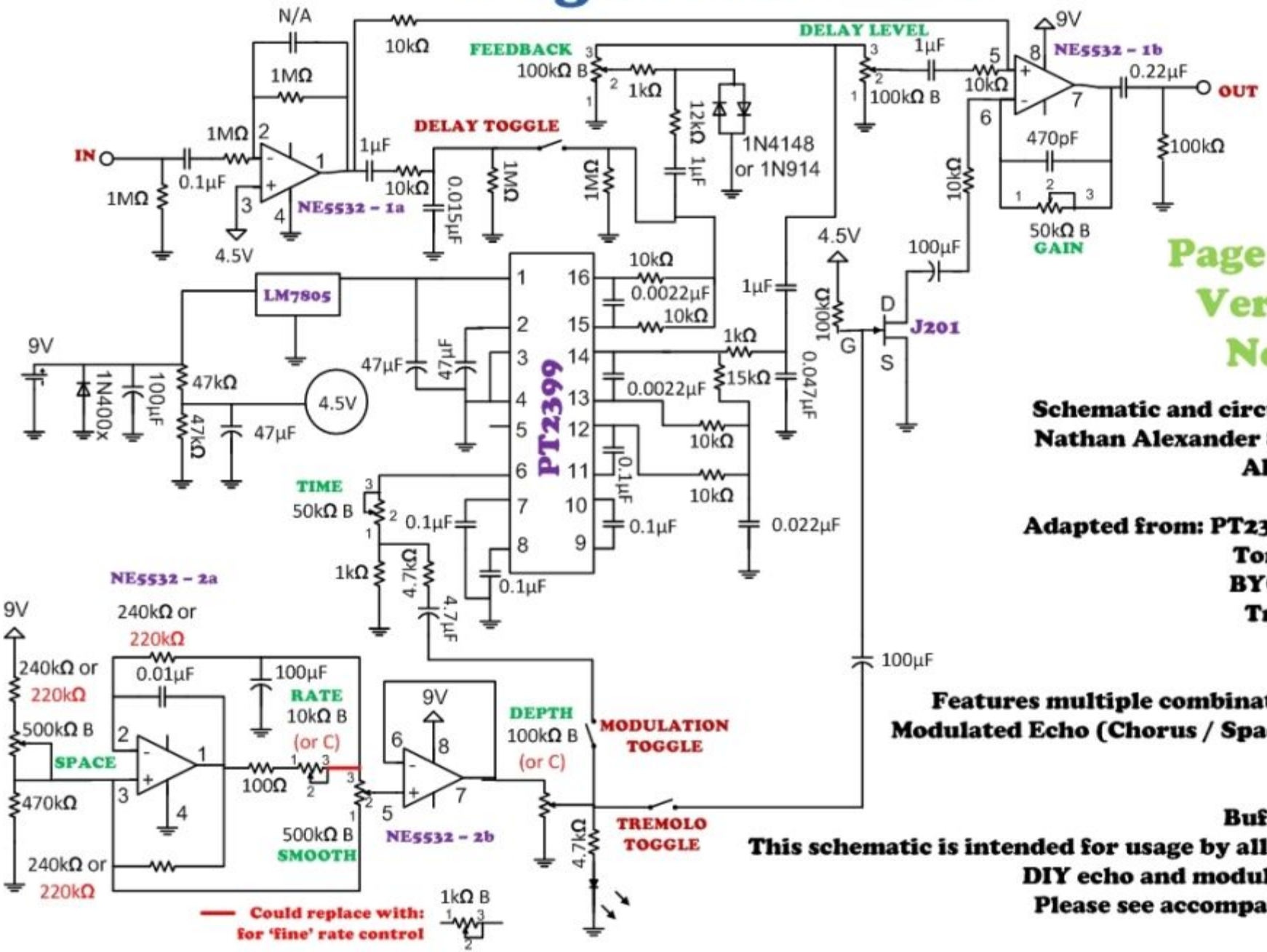


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**Version 1.0**

**Nov. 2008**


**Schematic and circuit design by:**
**Nathan Alexander Smith © 2008**
**AKA FF_Pedals**


**Adapted from: PT2399 Datasheet**
**Tonepad Rebote**
**BYOC Ping Pong**
**Tremulus Lune**
**Echo Base**

**Features multiple combinations of: Echo**
**Modulated Echo (Chorus / Spaced out echo)**
**Echo tails**
**Tremolo**
**Buffer and Boost**

**This schematic is intended for usage by all interested in DIY echo and modulation effects. Please see accompanying layout.**

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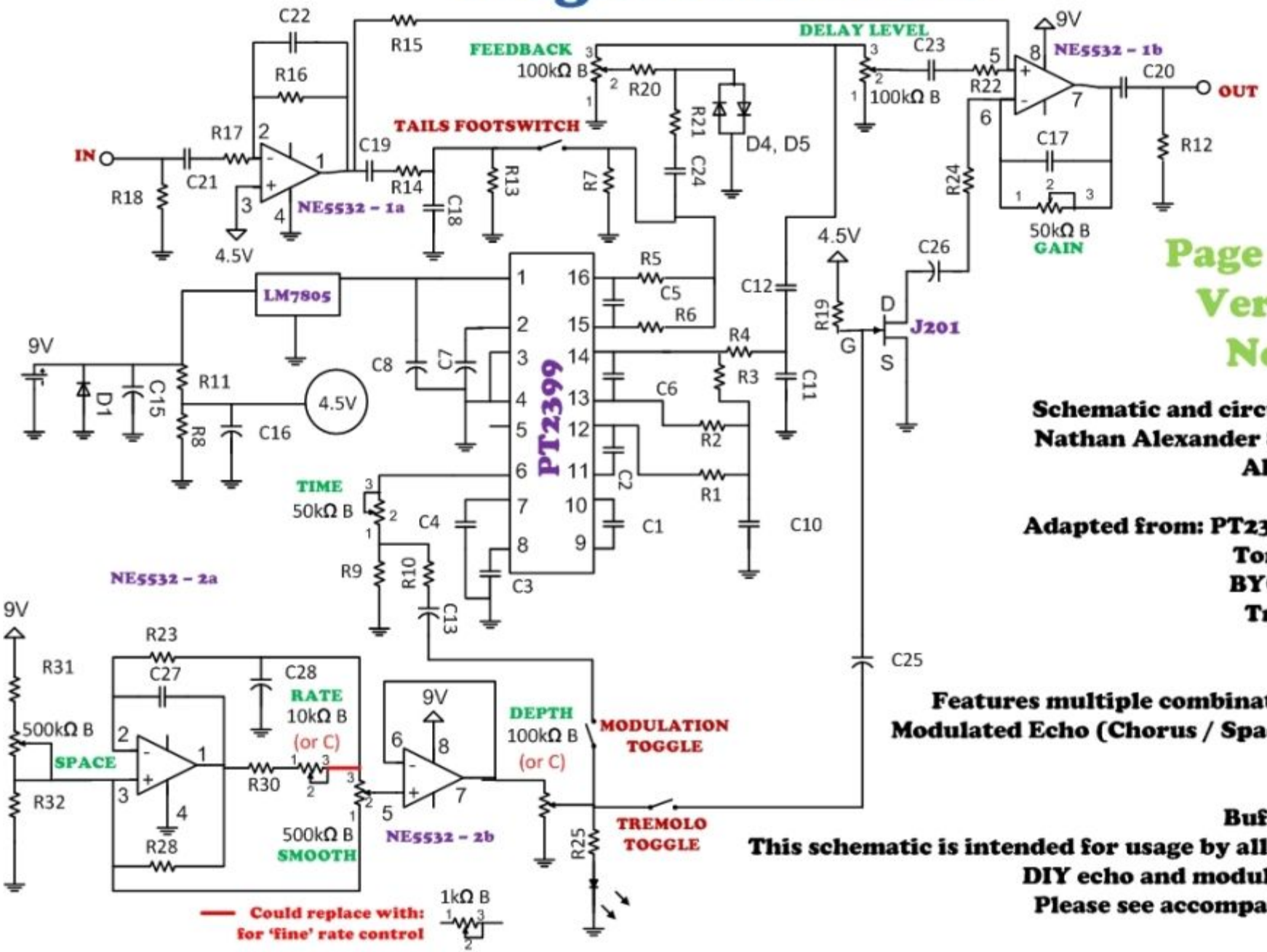


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# Magnus Modulus – Parts List

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### Semiconductors

**IC 1: PT2399 x 1**

**LM7805 x 1**

**IC2, IC3: NE5532 – x 2**
**(or other dual op-amp)**

**J201 x 1**

### Potentiometers

| | |
|---|---|
| **TIME** | 50kΩ B |
| **RATE** | 10kΩ B (or C) C probably best |
| **SPACE** | 500kΩ B |
| **DEPTH** | 100kΩ B (or C) C probably best |
| **SMOOTH** | 500kΩ B |
| **FEEDBACK** | 100kΩ B |
| **DELAY LEVEL** | 100kΩ B |
| **GAIN** | 50kΩ B |

### Resistors

R1: 10K
R2: 10K
R3: 15K
R4: 1K
R5: 10K
R6: 10K
R7: 1M
R8: 47K
R9: 1K
R10: 4.7K
R11: 47K
R12: 100K
R13: 1M
R14: 10K
R15: 10K
R16: 1M
R17: 1M
R18: 1M
R19: 100k
R20: 1K
R21: 12K
R22: 10K
R23: 240K
R24: 10K
R25: LED Resistor
R26: LED Resistor
R27: LED Resistor
R28: 240K
R30: 100R
R31: 240K
R32: 470K

Can use 220K instead of 240K

### Capacitors

C1: 0.1uF
C2: 0.1uF
C3: 0.1uF
C4: 0.1uF
C5: 0.0022uF
C6: 0.0022uF
C7: 47uF
C8: 47uF
C9: 0.1uF
C10: 0.022uF
C11: 0.047uF
C12: 1uF
C13: 4.7uF
C14: 0.1uF
C15: 100uF
C16: 47uF
C17: 470pF
C18: 0.015uF
C19: 1uF
C20: 0.22uF
C21: 0.1uF
C22: N/A
C23: 1uF
C24: 1uF
C25: 100uF
C26: 100uF
C27: 0.01uF
C28: 100uF

### Diodes

D1: 1N400x x 1 (1N4001, 1N40004 etc.)

D4,D5: 1N4148 / 1N914 x 2

3 LEDs with appropriate resistors (2kΩ-10kΩ)

### Hardware

SPST Toggle Switch (or SPDT, DPDT x 2

3PDT Footswitch x 2

DC Jack + 9V adaptor
(+)-----(.------(-)

¼" Audio Jacks (1 MONO, 1 STEREO)

**Standard values were used where possible. For parts sourcing for attached layout, use small capacitors (multi-layer ceramic, film, box).**

**ELECTROLYTIC CAPACITORS:**
**16V (smaller size)**

**LARGE VALUE CAPACITORS:**
**1uF etc...**
**are multi-layer ceramic**
**(smaller size for layout,**
**can use others if they fit)**

**Op-Amps may be substituted for other chips: TL072, etc. NE5532 sounds great**
**NJM 2068 is a good HIFI op-amp**

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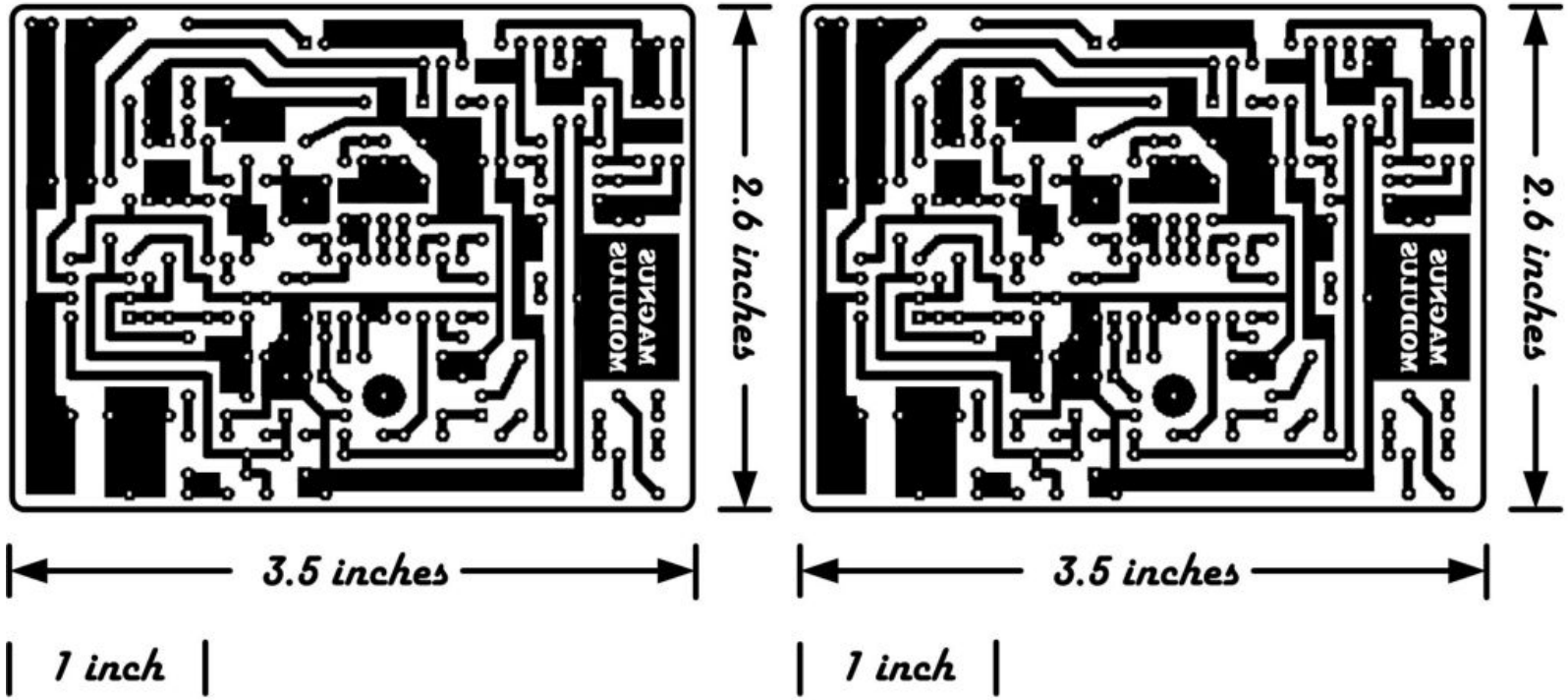


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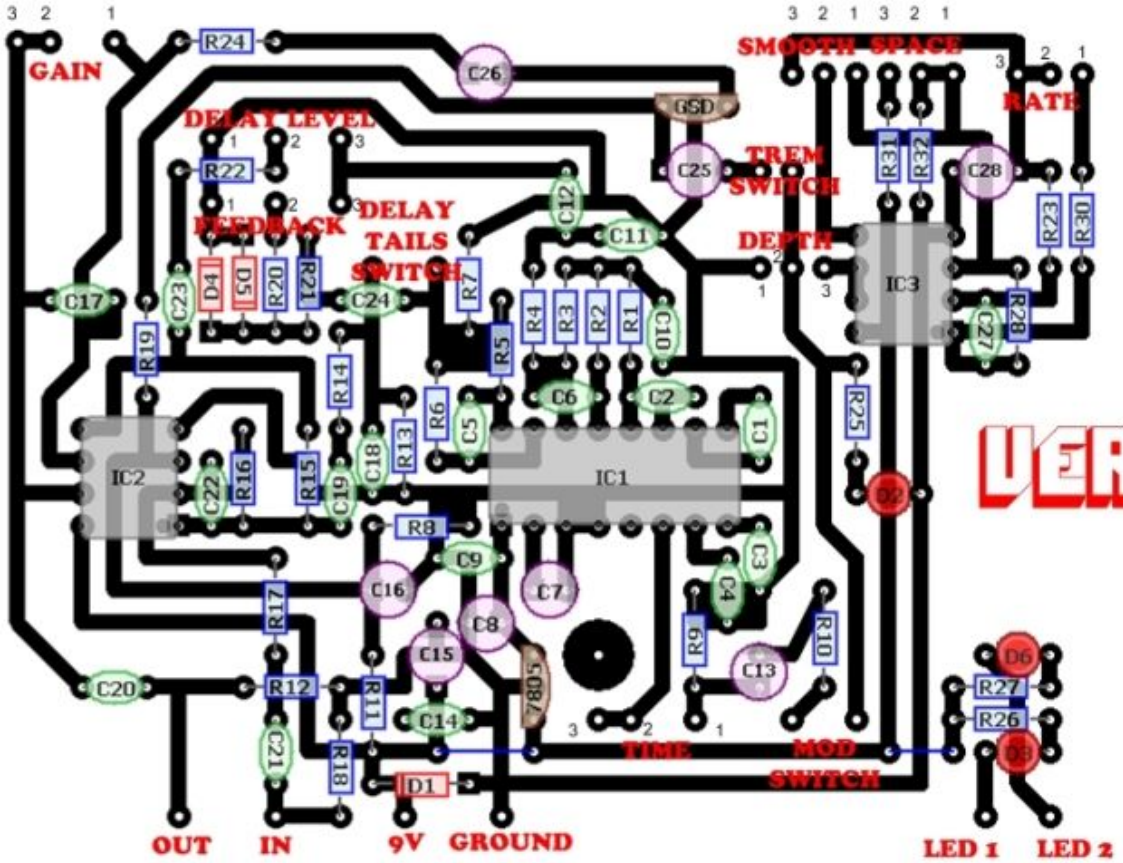


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**Please see accompanying schematic and bill of materials.**

**| 1 inch |**