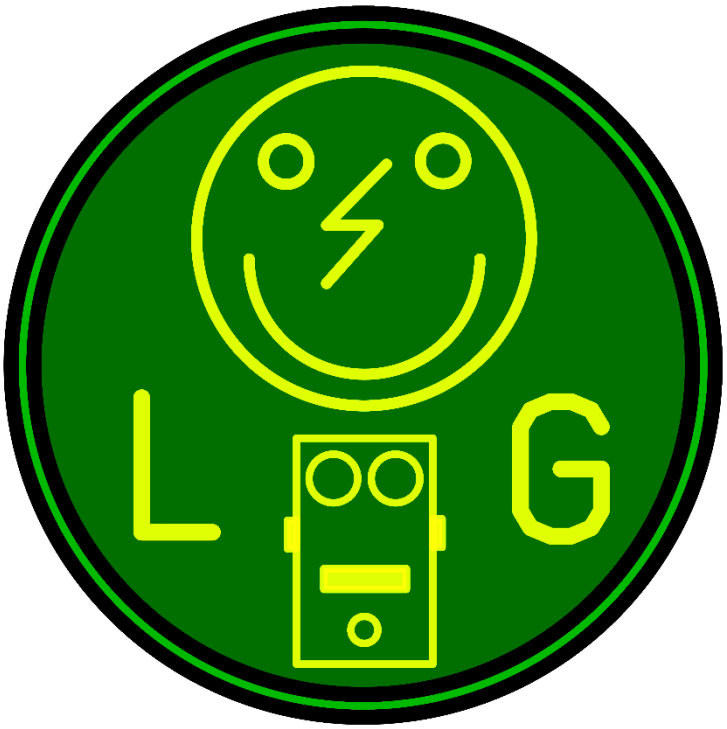
# Klon-ed Buffer

# Building instructions

# V1.1

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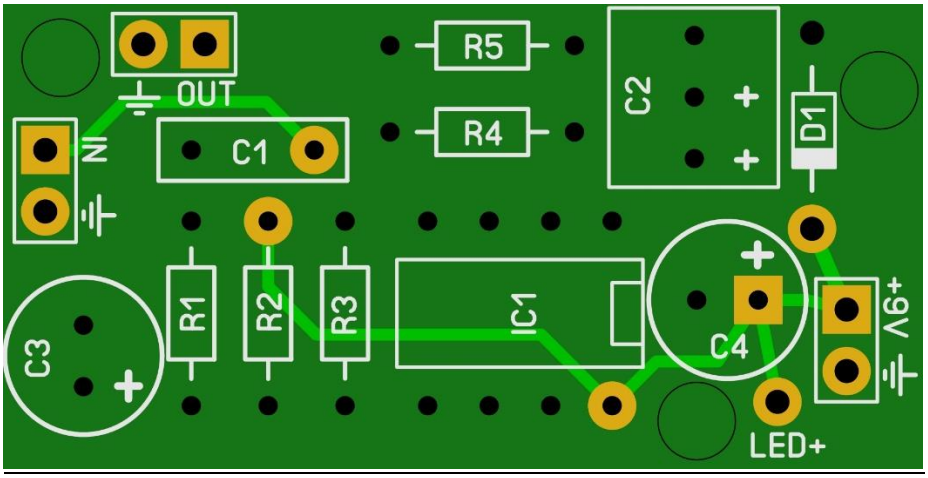
Read this entire manual thoroughly before you start building!

Last update: 16-05-2016

# Components

| Name | Value | Comment |
|---|---|---|
| **C1** | 100n | MKT/WIMA/SMF |
| **C2** | 4u7 | Electrolytic 10V+ |
| **C3** | 47u | Electrolytic 10V+ |
| **C4** | 47u | Electrolytic 10V+ |
| **D1** | 1N4742 | Zener 12V |
| **IC1** | TL072 | |
| **R1** | 1M | 1% metalfilm |
| **R2** | 27k | 1% metalfilm |
| **R3** | 27k | 1% metalfilm |
| **R4** | 100k | 1% metalfilm |
| **R5** | 560R | 1% metalfilm |

# PCB layout




Besides the components mentioned in the components table on this page, you will need:

- **2 input jacks**. 2 mono jacks if you are not going to use a battery but only the 9V adapter. 1 mono (for output) and 1 stereo jack (for input) if you will be using both a 9V battery and the 9V adapter.
- **3PDT footswitch** (9 pins). I also sell an easy off board circuit for true bypass.
- **2,1mm DC jack** (isolated).
- **9v battery clip** (optional).
- **22 gage stranded hook-up wire.**
- **1 x 3mm LED** as status LED.
- **Hammond 1590A** case (or similar) in your favorite color.

# General building tips

It is advised to socket the IC1 using a DIP-8 socket so it can be easily replaced in case it breaks or if you want to test other Op amps. Start by soldering the resistors, the diode, then the DIP-8 socket and finish by soldering the capacitors.

There is some discussion on the internet about the right way the buffer should be designed. To prevent me from taking any sides, I incorporated all versions in this built. If you use all components on the PCB you will get as close as possible to the "original" Klon buffer™ with all capacitors and diode as used in the original schematic. On the other hand, most other versions do not use **C4** and **D1** and use 100k resistors for both **R2** and **R3**, as well as a 1uF non polarized MKT/SMF/Wima for **C2**. You can decide for yourself which side you are on and build accordingly. I never noticed any sound difference.

Another thing. Most designs use a TL072 dual Op amp as they are cheap and almost all DIY fanatics have bins full of them. But the design only uses 1 of the Op amps. Potential problem is that the unused Op amp will introduce noise and extra power consumption. To prevent this I tied the unused negative input of the second Op amp to Vref and the positive input to the output of the second Op amp. This will prevent any problems (see article below). And yes… I could have designed it using a single Op amp (eg. TL071), but a lot of purists do not want that as the original uses a TL072.

For some reading on the technology:

Manticorefx – Why all Klon buffers are wrong

Texas Insturments – What to do with unused Op amp

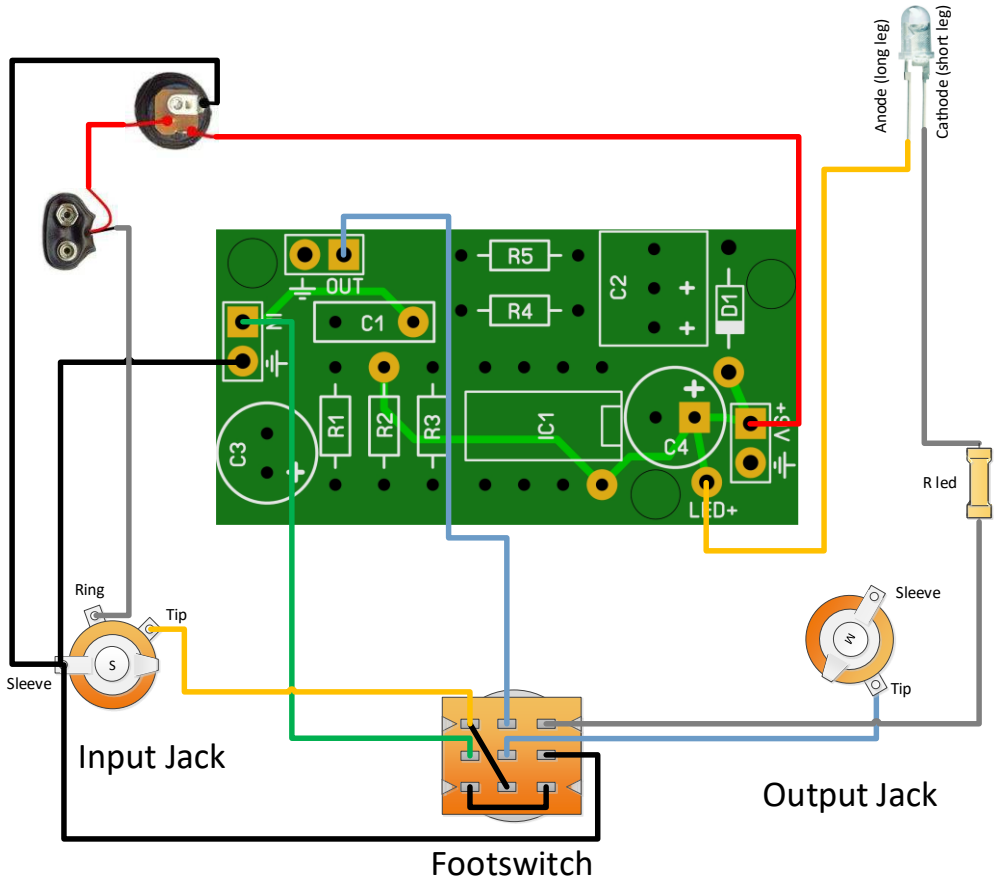
# Troubleshooting

All PCB's have been 100% factory e-tested and out of every batch I receive I build an effect to double check, so there should not be a connection problem on the PCB itself.

The board is not working (at all), what now?

- Check if your 9V is plugged in correctly (and/or soldered correctly on the PCB).
- Check that you oriented the capacitors, IC's ,transistors and diodes the right way. SMF, MKT capacitors and resistors do not need to be oriented.
- Check if you used the correct values of the components. For resistors you can look here: http://www.diyaudioandvideo.com/Electronics/Color/
- Double and triple check your soldering! A loose or cold solder can be really bad for your board.
- Replace the IC's and transistors, one might be defective. Before doing that, first unplug the 9V and wait 5 seconds.
- Check that you have good/high grade components. A lot of Chinese sourced parts are fakes (especially high end op-amps, vintage diodes and transistors) so be careful that you source your parts from reliable suppliers.

## Off board wiring




**R led** can be 3k3 or higher depending on your taste. Note that this wiring is based on star wiring and requires that the output jack is making good electrical contact with the enclosure. When testing is outside the enclosure please make sure you connect the output sleeve to ground!!

## Schematic