ShockSoc Lab Scripts

Rex's Fuzz Guitar Pedal

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Rev 1.1

1 Introduction

This lab aims to guide the reader through the construction of their own distortion guitar pedal called Rex's Fuzz, based on a circuit by Jack Orman[1] of the same name. ShockSoc will provide all the parts for the construction of the provided circuit, but there's nothing stopping the reader from extending or modifying the design to suit their requirements.

The photo below is a photo of the prototype only. All the internals are the same, but the components given to the participants will include a stomp switch (which I didn't have available). Also, the case will be different.

Figure 1: The prototype unit

The unit consists of two 6.35" Jack sockets – one for the input one for the output – an LED that turns on when the unit is on, a foot switch to toggle the unit,

[1] `http://www.muzique.com/schem/rex.gif`

and two dials. These dials control the drive (amount of distortion) and the level (volume of output).

2 Circuit

Figure 2 shows the circuit diagram of the pedal.

Some important notes of the diagram:

- The ON LED and the associated 470Ω resistor can be omitted if the reader doesn't want their pedal to light up when in use. This will also save battery life.
- The op-amps can be from a dual circuit single-supply op-amp, hence the single power connections, one to V_cc and one to ground. An LM358[2] chip is provided for the construction, but as this will be placed in an IC socket and not soldered directly, the reader may want to upgrade theirs to a higher spec chip. However, given the low bandwidths and gain require for this circuit, and the fact that it's a distortion pedal so noise is not entirely discouraged, it may not be worth the effort and expense.

The operation of and theory behind the circuit left as an exercise for the reader, but feel free to ask if you don't understand it.

[2] `http://www.fairchildsemi.com/ds/LM/LM258.pdf`

3 Circuit construction

Provided with the components should be a piece of strip board measuring 13 strips of 24 holes. This should exactly fit into the holding slots inside the case provided.

This lab script does include a diagram for the stripboard layout, shown in figure 3. However, the reader is most welcome to ignore it and design their own.

Please read the soldering guidelines below before soldering, they are important and useful!

Figure 3 shows the suggested stripboard layout, and Table 1 shows the related component values. To explain the diagram, the red crosses are where the copper track on the board should be broken using the strip cutters in the labs (they look like drill bits with handles). The green lines are wires that connect two tracks together. Use solid-core wire for those where possible. The orientation of each component is shown where it matters (ICs, electrolytic capacitors, diodes, etc.). The black, blue or red arrows leaving the board denote wires to external components. These can be either solid- or multi-core wire.

Component Name	**Value**
R1	100KΩ
R2	1MΩ
R3, R4, R5, R6	10KΩ
R7	470Ω
C1, C5	0.1μ F
C2, C4	1μ F
C3	47pF
C6	47μ F
D1, D2	1N914
D3	1N4001

Table 1: The component values for the stripboard layout

3.1 Soldering Guidelines

Please read this carefully before soldering. They will make it notably easier and less error prone.

- Polarity: be careful about the polarity of all the relevant components. It's an easy mistake to make, but sometimes a difficult one to debug and fix.
- The op-amp chip should not be soldered directly to the board. Instead, solder the chip socket provided.
- Try and keep the components flush to the board as you solder them. This will make your circuit neater and less likely to have short circuits.
- If there is a track break (red cross) on a hole next to a component, try to cut the track *before* soldering in the component.

- Before soldering the wires that lead to the external components like the LED, potentiometers or switch, remember to slip the heatshrink tubing on. If you're unfamiliar with heatshrink tubing, this video will show you how to use it: `https://www.youtube.com/watch?v=ArtAEjgSDSU`
- If you're designing your own layout or have made a mistake and need to solder in different hole, try to avoid soldering the the edge holes on a row. This is because when the circuit is placed in the case, the slots that hold the board in place will infringe on this space.
- Make sure you've got enough length in the wires leading to the external components to allow them to be mounted in the desired place in the case.
- If you don't understand anything, ask!

4 Case construction

The case design is largely down to the reader. Listed here are the diameters of the holes needed for each component to be exposed:

Component	**⌀mm**
Potentiometer	7
Switch	12.5
LED	5
Jack Socket	8

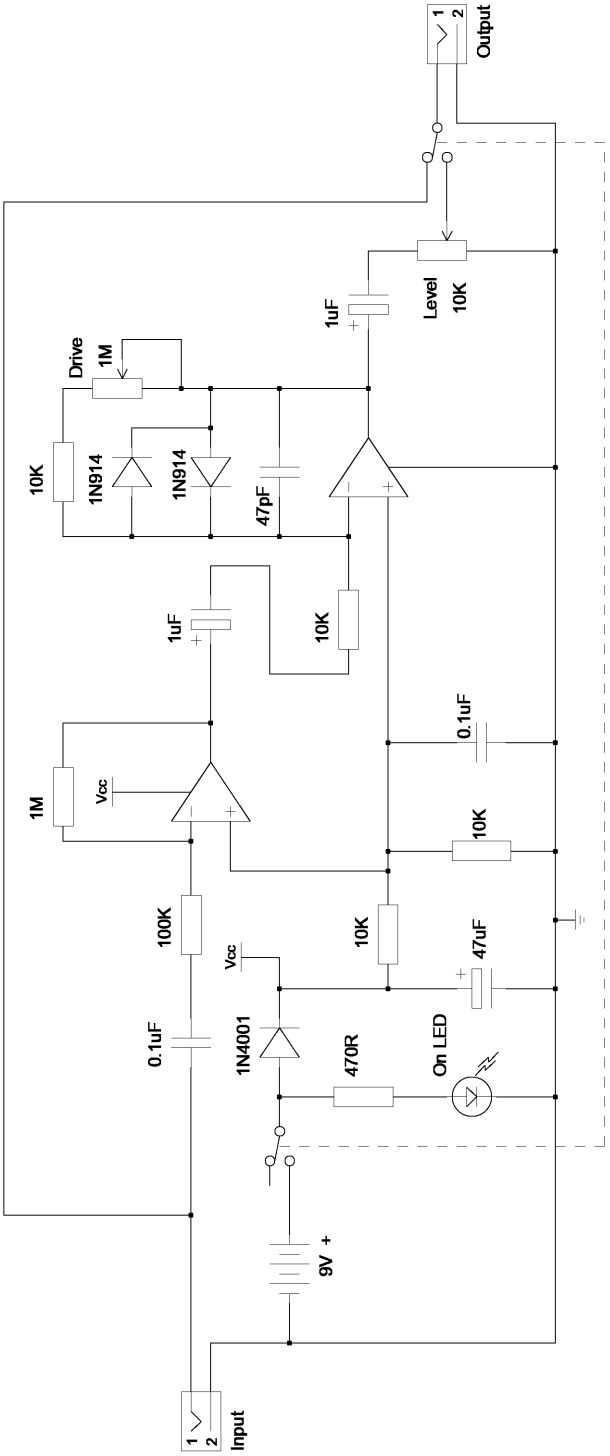

Figure 2: The circuit diagram

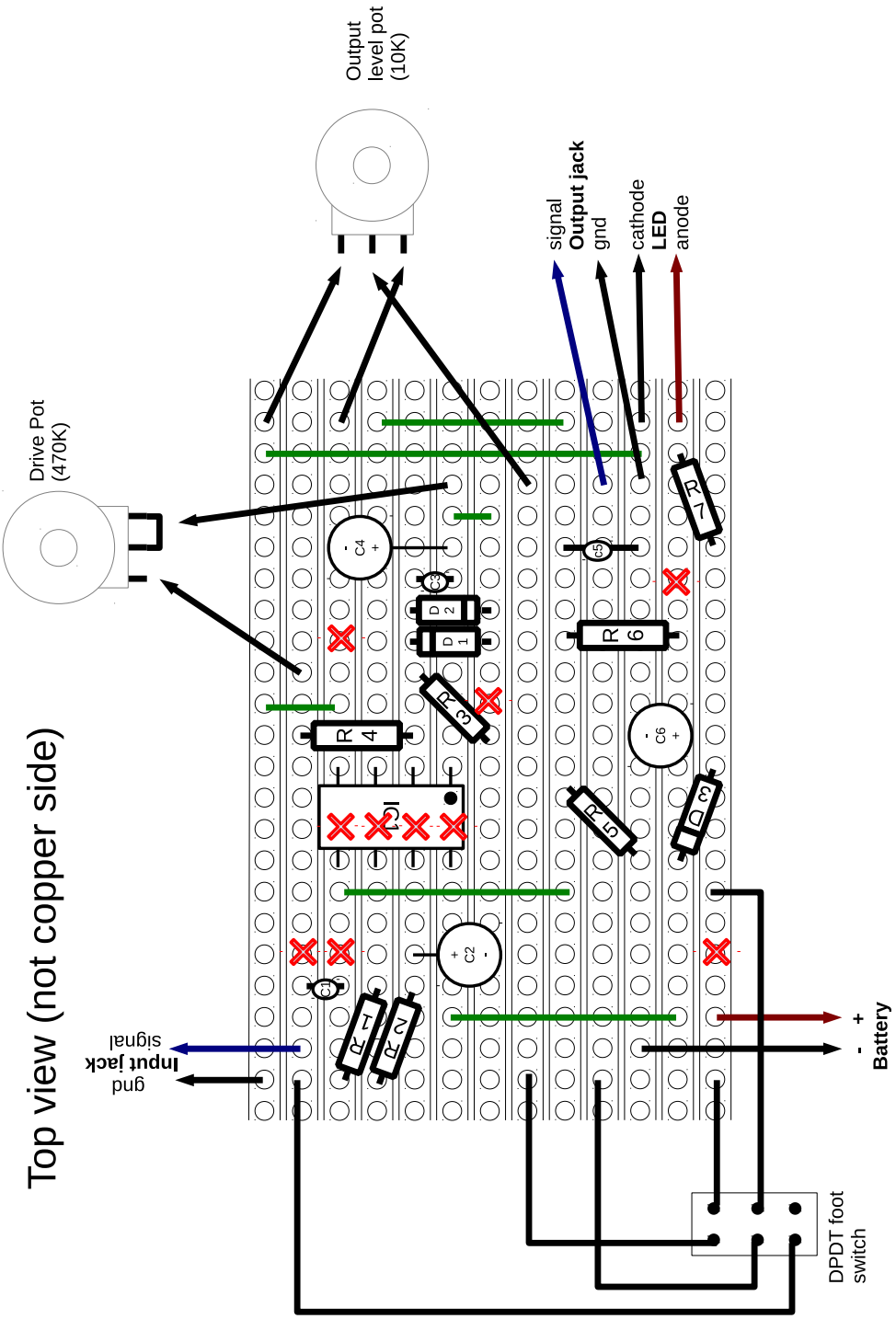

Figure 3: The suggested stripboard layout