

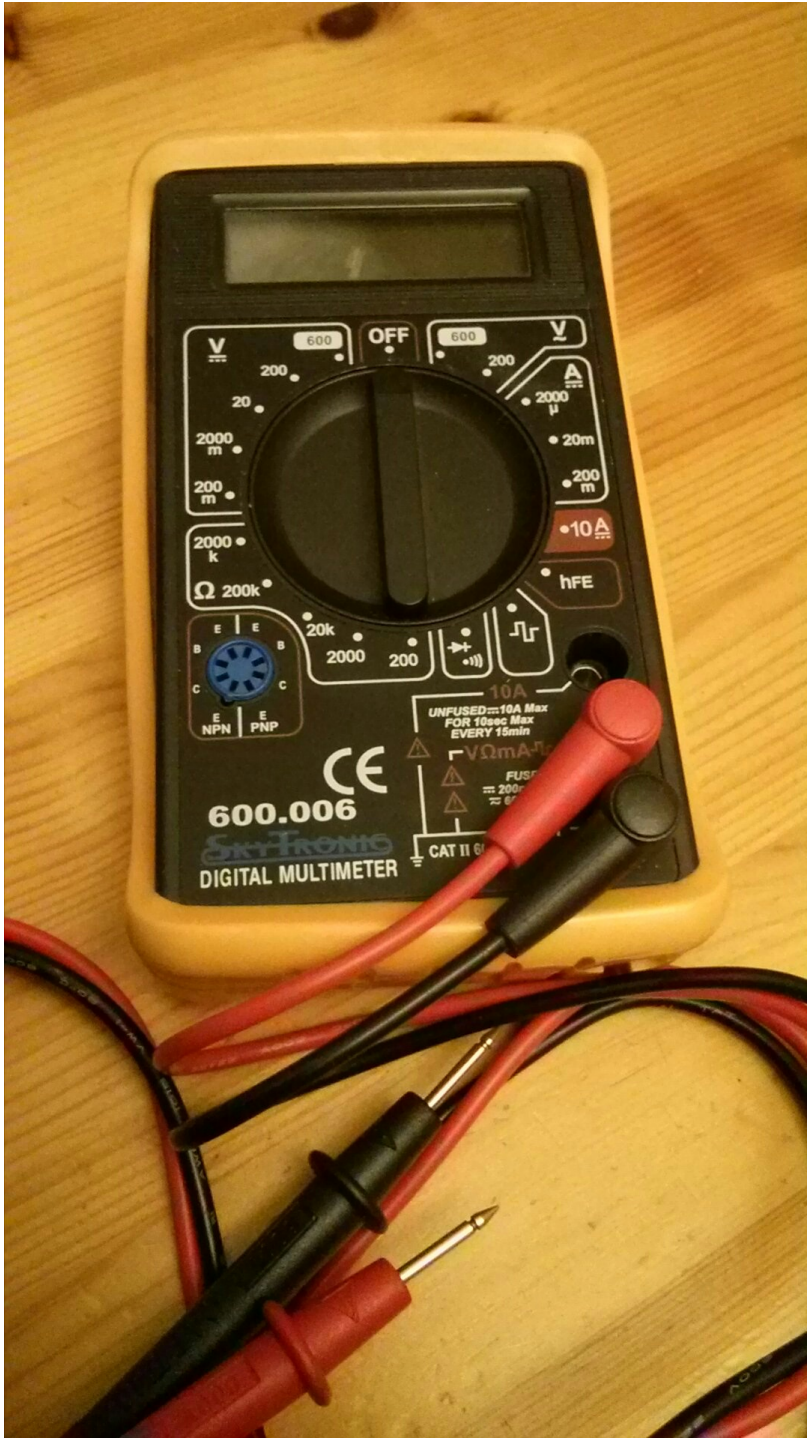
Tutorial - Making Light!

Just a few starting tips for brining light to terrain and modeling projects.

Hope it helps! Comment, feedback, abuse, etc. to my plog on YakTribe please:
<https://yaktribe.org/community/threads/takunderhands-down-hive-alchemy-lab.3328/>

First things first, essential equipment

I recommend getting your hands on a multi-meter (also known as a Volt Meter or DVM (Digital Volt Meter)). Nothing fancy, something from ebay is fine. Here's a pic of mine:



This is going to help us make our circuits, and test them too!

Next up, some reading - the book

Get hold of Getting Started in Electronics by Forrest M. Mims, III. It's well out of copyright, so get it from google docs:

<https://docs.google.com/file/d/0B5jcnBPSPWQyaTU1OW5NbVJQNw8/edit>

In this tutorial, where I want to refer to this book, I'm just going to call it **the book**.

Read a bit, do a bit. Read some more, do some more. Repeat until genius in electronics.

Getting started?

Yes, well, here we go then. Simplest LED circuit, no soldering. You will need:

- LED - means Light Emitting Diode (see **the book**, page 44, and page 66)
- Resistor (**the book**, page 28)
- Batteries (in a holder)
- Terminal block (also known as Choc-block, because it looks a bit like a chocolate bar)
- Screwdriver (to fit the terminal block)
- Wire stripper (or use wire cutters, or use a knife)
- Wire cutters (or use a knife)



The first thing to know about LEDs is that they only work connected one way around to the battery. This is because they are Diodes, and, well, that's what Diodes do (you did read **the book** page 44, right?).

The second thing to know is that you can overload them with too much current. If this happens, they'll either burn out very quickly, or slowly fade over time.

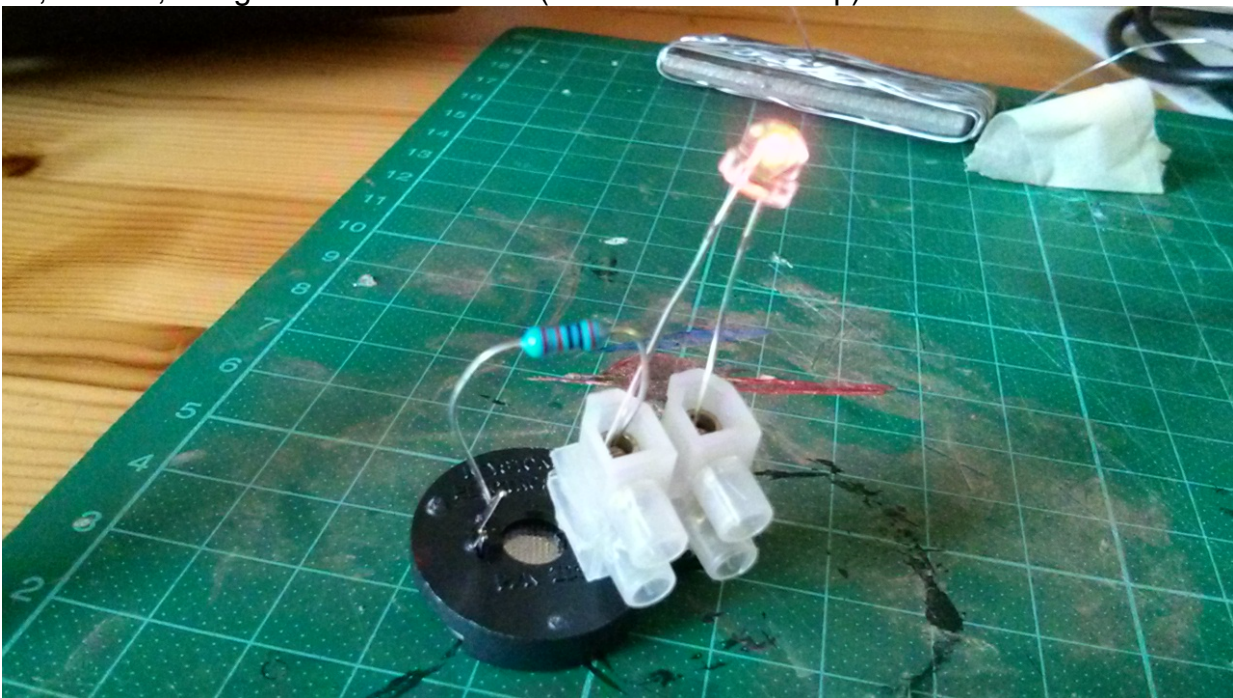
Neither option is that dramatic (no explosions or sparks, sorry). Better not to though, as it will kind of spoil your project.

We use the Resistor to limit the current, and stop this happening.

Let's just show the setup, before blinding anyone with the sums:



Or, smaller, using “coin cell” batteries (from the Pound Shop):



So what's going on here?

The battery has a voltage. The voltage pushes current through the circuit. The LED turns the current into Light. The resistor stops too much current going through the LED.

You can use lots of LEDs, but make sure that they are in parallel (**the book**, page 20). And make sure that each has a series resistor.

What value resistor?

For this circuit, the value doesn't have to be too precise. We're just making sure that there's not too much current.

For the explanation, I can't put it better than **the book** page 69. I'll only add that it makes sense to use a slightly higher value, if you are not sure:

- You can always make the LED a bit brighter by selecting a lower value later.
- But if your first value is so low you pop the LED, there's not a second chance!

Use the DVM to measure the resistance of your resistor, if unsure.

What battery?

Some modern LED's won't work reliably from 3V (especially the white ones). You may need a 6V or 9V supply. Be sure to increase the resistor value to compensate.

Doesn't work?

- Check the Battery - use the DVM on the DC Voltage setting.
- Is the LED the correct way around? For this simple circuit you can just reverse the battery without doing any harm.
- Are all the connections done up tight, and clamping the wires?

Some other info:

<https://yaktribe.org/community/threads/terrain-question-led-lights.3366/>