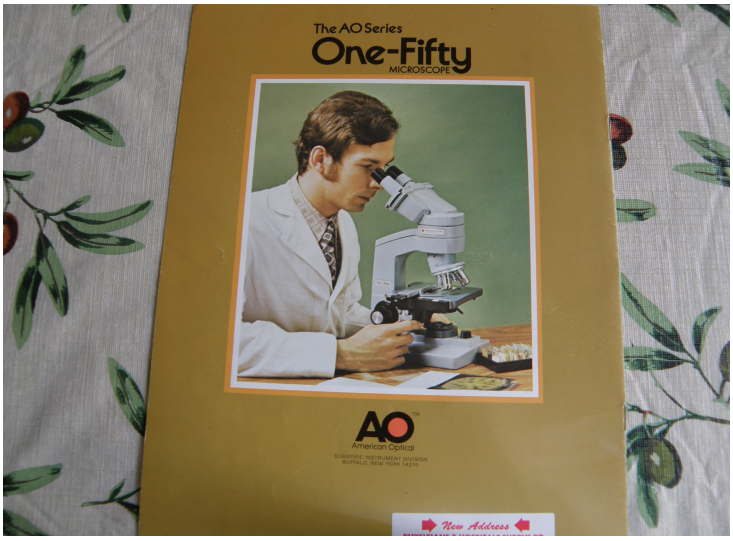
Cheap, fast and easy LED conversion to an AO 150 microscope

Bill Resch, Saint Michael MN.

In a previous article I showed how I made one microscope out of three scrapped AO microscopes. The resulting instrument is equivalent to an American Optical *One-fifty* microscope. I know this, because I still have a brochure, the company sent me in the '70s. I could not afford to buy one then. Maybe this is part of my fascination with this microscope.

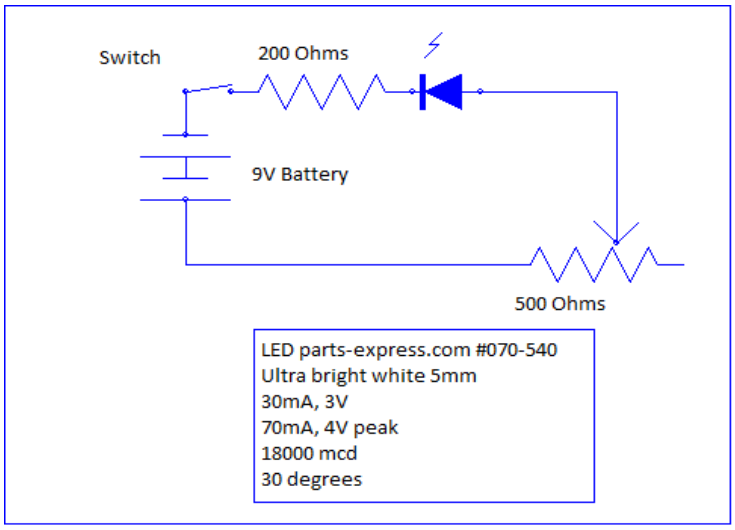


This is an excellent microscope for routine and hobby use. To make it portable and thus more useful, I decided to replace the incandescent illumination with a battery powered LED.

First, I took out the old illumination system.

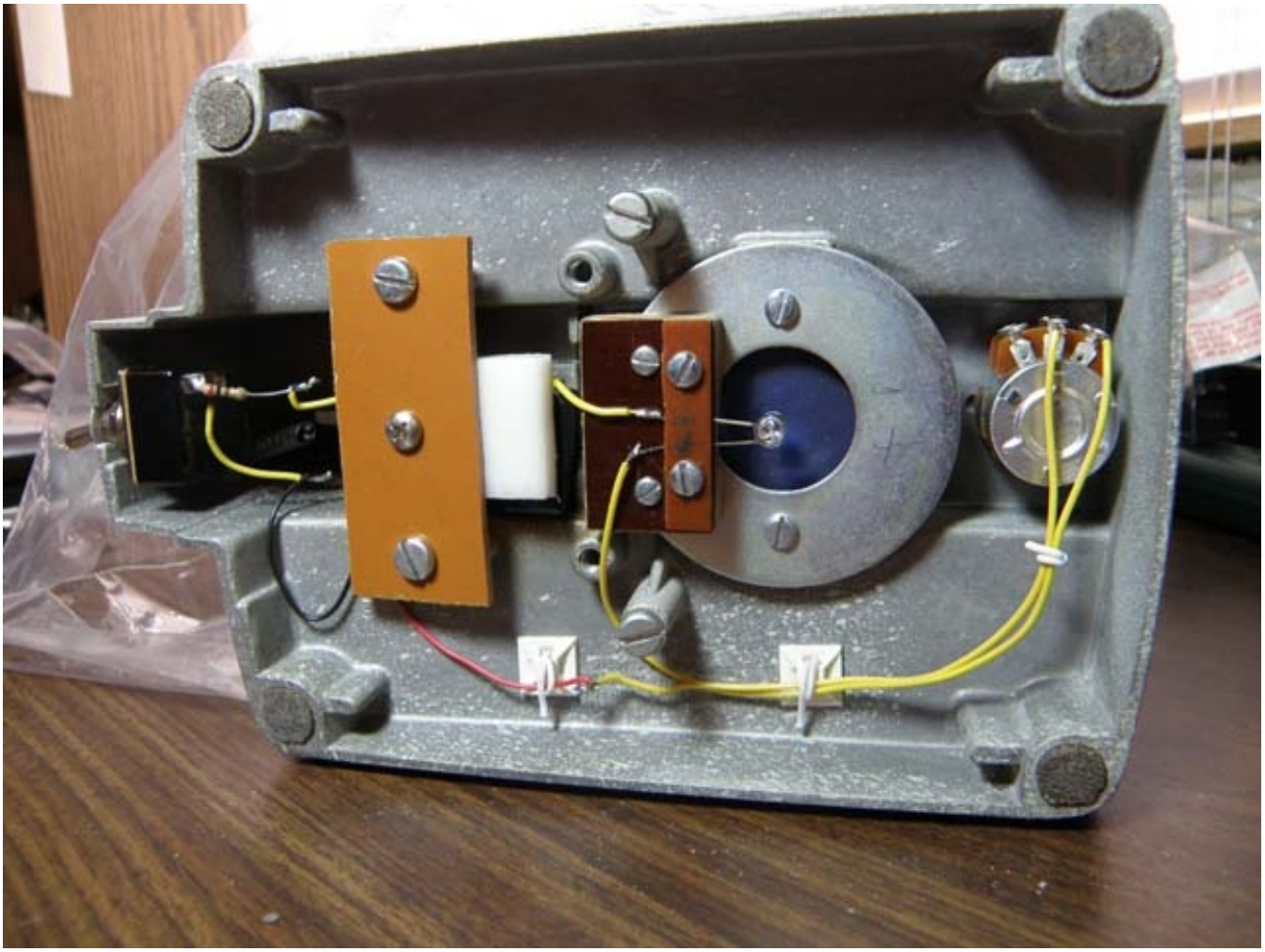
I started out with a temporary test setup, which turned out to be good enough to be permanent.
I used hand cut pieces of plastic and bolted them into the place where the old light socket used to be.

I just clamped the LED leads between two pieces of plastic and bent the leads so that the LED would point towards the bottom of the condenser. At 10mA the LED was bright enough even up to 400X. I wanted to be able to vary the current between 10mA and 30 mA. After some testing I came up with this circuit:



This circuit is pretty much self explanatory:
At 9 Volts, the 200 ohm resistor limits the current to 30mA. The 500 ohm variable resistor allows control of the current between 10mA and 30mA. At these currents, there is no danger of overheating anything. Any resistor watt rating can be used. In fact nothing gets warm when the light is turned all the way up. A typical 9 Volt alkaline battery has a 565 mA/hr capacity. At 10mA, which is plenty bright for most of my uses, the battery should last 56 hours.

I did install a switch where the power cable used to come in. I had to open this opening a bit with a file. The battery is held in place with a piece of plastic and some foam rubber.



This is the finished product. I am not proud of my handy work here, but it functions very well.

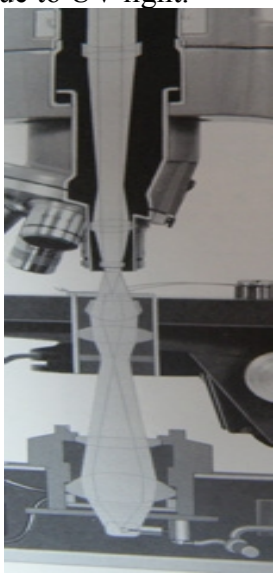
Cost of the LED was $2.-, the other parts I had on hand.

Tools needed: Coping saw, drill, screw driver, file and a soldering iron.
Parts: As shown in the schematic.

Watch the polarity of the LED, the long lead is plus!

Visually the images are great. I took some hand held camera pictures of marine diatoms, testing the LED illumination.

I could not get any info about a possible UV emission of the LED used here. Personally, I am not concerned. As seen here from the AO brochure, there is lots of glass for the light to pass through before it gets into my eyes. Glass is opaque to UV light.



The result was well worth the effort. The original illuminator could easily be reinstalled if needed.

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Amendment:

It was pointed out to me by David Walker that glass does transmit some near UV to ca 365nm and as I mentioned in my article that the UV emission of this particular LED is unknown, caution is advised. I recommend that if the UV data is not available a UV blocking filter should be used.

Bill Resch
wresch@embarqmail.com