Y.A.L.L.S.

Yet Another LED Light Source.

By Michael Race.

Confronted with a stand but no mirror or light, it was decided to find a quick solution in order to be up and running in minimum time. The unit described below is widely available and really contains everything needed to be changed into a microscope light source. Unfortunately they are much more expensive than their quartz-halogen counterparts, although perhaps with time prices will moderate.

Now 12 volt Quartz-Halogen ceiling down lights are very popular but are being replaced with 3 watt LED modules. Brief study showed that many of these LED units can be run from AC or DC and from 7 volts to around 28 volts. Now I really did not want yet another power plug stuck to the wall, and no more power cords up to the lab' bench. So I tested a 3 watt down light LED using 8 re-chargeable AA cells (12 volts). Result? Well it lasted for several hours. So the battery of 12 volts plus the LED current control unit were assembled into an old plastic project case which now sits neatly at the back of the bench feeding lamps for two microscopes.

Fig.1.

Fig.1 shows the LED down light before surgery. The case or heat sink has varying patterns depending upon the manufacturer, but they all seem to be similar in construction. Beam angles are found to vary from 30° up to 90° so I chose the smallest angle, since this lamp is going to be very close to the microscope condenser, and I didn't want bright light splashed around unnecessarily.

Fig.2.

Fig2 is the LED unit disassembled showing individual parts all held together with only three

tiny screws. The pieces comprise the finned body including LED, front bezel with plastic lens retainer, the collimating lens, three screws and the rear shroud which contained the current regulator and connexion pins. The LED module is glued to the heat-sink casing, so I had to work around it by using glue for the locating peg. See below.

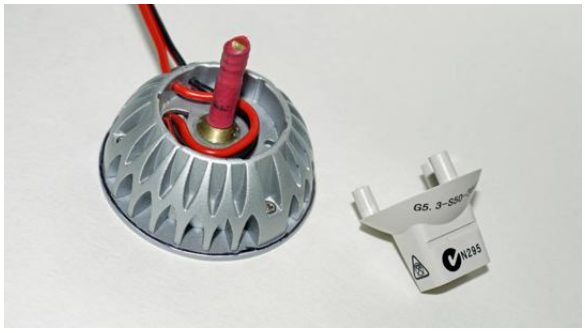


Fig.3

Fig 3 shows the back of the unit. The two wires have been connected to the diode and passed out of the case via two small holes newly drilled. A brass wood screw covered with a piece of heat shrink tubing is used as a locating peg, in this case 6mm diameter, to fit in place of the microscope mirror. This had to be glued in place because of the location of the diode module. I used 5 minute Araldite and it's been in use for the past six months without falling off.

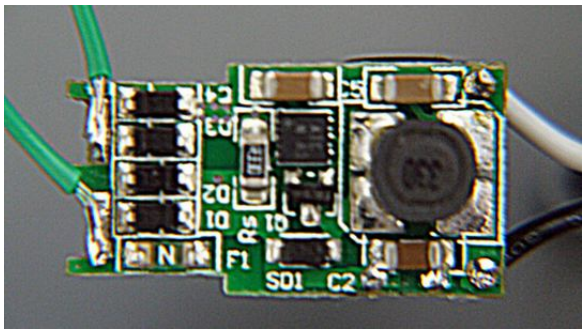
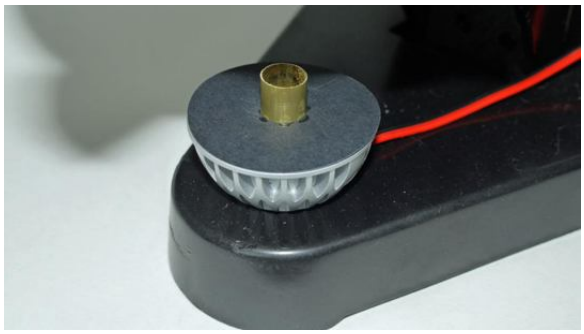


Fig.4.

Fig 4 is the tiny current control unit which was tucked into the lamp base, along with two connecting pins (now removed) which were soldered to the tags now occupied by the two green wires. The white (+ve) and black (-ve) wires go to the diode. This unit is housed in a small project box along with the battery.

Fig.5.

Fig 5 shows the LED light source in place on the microscope stand. However, I find that the light caused quite a lot of glare, so a cardboard stop of 3/8 inch (10mm) diameter, with short tube cut from thin walled brass tubing is used to reduce this annoyance. Three drops of PVA glue worked well here.
Realising that perhaps a lot of light is wasted in the above set-up due to the relatively wide beam angle of the LED, it was decided to try to affect improvements with some glass. I found an old Yashima eyepiece field lens from a student 'scope; this is a particularly short unit and nearly an inch in diameter, so when placed on the LED instead of the cardboard stop, I get a much more concentrated beam of light with no glare. I'll probably stay with this configuration for the future .



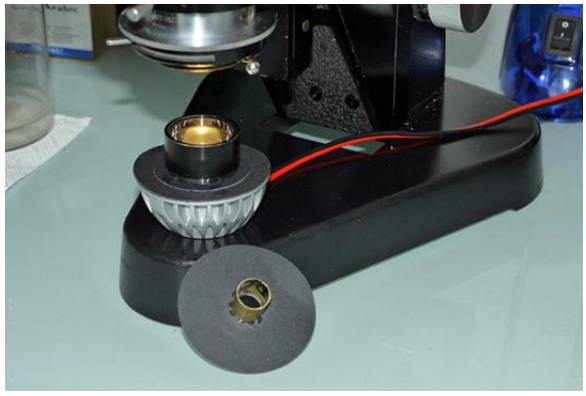


Fig.6. Fig.7.

LED down lights are not the cheapest form of illumination, so it pays to shop around, but they do make for a neat light source. Brightness can be controlled with either a devoted unit or a pair of crossed polars, or even old camera neutral density filters. I use an ND4 which is very quick, cheap and simple, as well as saving on additional electronics.

Fig.8.

Fig.8. This is the control box which actually has two LED current control units. The one shown on the left is the original from the down light, the right hand unit is a variable control sold as a dimmer, but actually is a brightener. That is to say it drives more current through

the LED to increase brightness, thus the dimmest position is the normal LED current; usually around 350 mA or so for a 1 watt unit. These units are useful, but are likely to over-run the LED thereby shortening it's life of eleven years - perhaps by as much as a few days !

In use I find the lamps are frequently on for only a few minutes at a time so the battery shows little sign of wilting since the LEDs will work down to around 6 volts. Following observation, there is usually a change of slides, preparation of the next, and much more time spent looking for something I put in a safe place.

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