

# EXTRA HELP WITH LIGHTING

This short tutorial was brought about initially by a question from Simon Porter, which was then expanded upon by Allan (alleneyed).

The answers to the questions have been provided by Gary (Skuta) and I think that everyone will agree that the clarity of Gary's responses will be of assistance to anyone who has an interest in lighting up their model.

Hopefully all those interested in this subject will have also read Gary's other MSD article at

[http://www.modelshipwrightsdatabase.com/Articles/led\\_lighting\\_for\\_model\\_ships.pdf](http://www.modelshipwrightsdatabase.com/Articles/led_lighting_for_model_ships.pdf)

## **Allan's dilemma:**

I have no experience with solid-state stuff and LED's. I have read the tutorial but have some additional questions. I hope I am not the only one hesitating on such a project because I have very little idea of what to do.

**The project** -- 3 LED's for the three lanterns astern, one in the great cabin and one under the forecastle using a 9-volt battery as the power source.

## **Gary's answers to Allan's questions:**

### **1. I don't know what to buy.**

Here is a list of what you are going to need for this setup:

5 - 3mm LED's yellow with clear glass not with yellow glass, these will more than likely be 2V and 20 mA. These yellow LED's with clear glass give a much better light than white LED's - see my tutorial on MSD.

5 - Resistors 340 ohm, 0.25W, carbon.

Wire 24 AWG insulated preferably red and black

Connector for the 9V battery

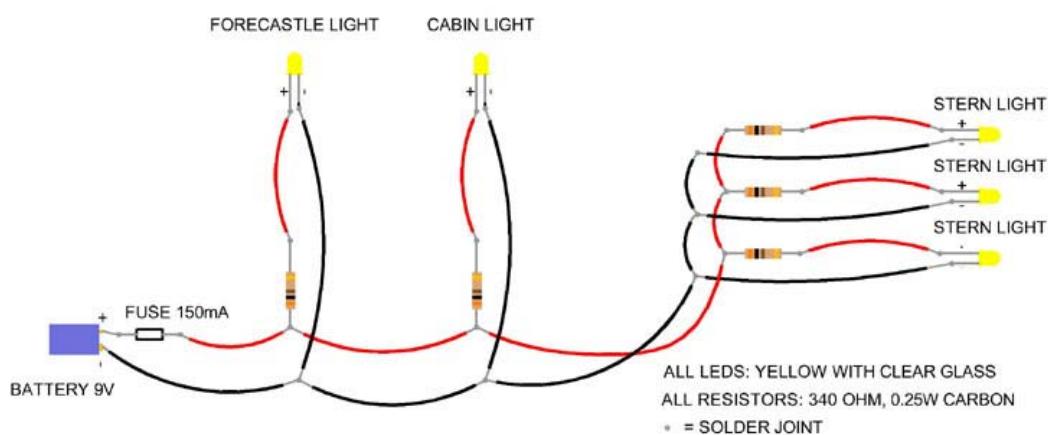
1 - small fuse 150 mA.

1 - Fuse holder suitable for the above fuse.

Heat-shrink tubing approx 3 times the diameter of the wire.

### **2. I want to have the five LED's in parallel. I will make a little 9 volt battery holder.**

Here is a sketch for your setup, the wires can be as long or as short as you like, the resistors do not have to be soldered directly to the LED's.



You can also download a PDF file of the sketch

[http://www.modelshipworld.com/userupload/986/led\\_practical\\_diagram.pdf](http://www.modelshipworld.com/userupload/986/led_practical_diagram.pdf)

### **3. The smallest LED's I can find are 3mm. I would like smaller if possible.**

2mm LED's are available but are very hard to get hold of.

#### 4. To make these guys flicker, what do I buy and where do they get soldered in the circuit?

I have been fiddling about with a circuit to make them flicker but I am not satisfied with it yet, the flicker is too regular, got to find a way to make more irregular. You can still proceed with your wiring and put this little circuit board in later, it can sit with the battery and it will probably be about the same size as the battery.

#### 5. Do I need to insulate the prongs on the LED's so they don't touch?

You can use heat shrink tubing to isolate the prongs. You thread the tubing on the wire before soldering the wire onto the prong, when the joint has cooled down you thread the tubing over the solder joint and the prong and warm it up so that it shrinks tightly around the joint and the prong.

#### 6. How do I know what wattage I need if the spreadsheet number does not match the actual LED's that are available?

You do not need to worry about the wattage, LED's work in an entirely different way from "light bulbs". If you connect the circuit as I have shown you it will work.

\*\*\*\*\*Please note that the values of the resistors and fuses shown here are for this setup only, if anybody wishes to do a different setup then they will have to do the math shown in my tutorial.\*\*\*\*\*

#### 7. Do you just solder the prongs to any old piece of wire and run that to the battery?

You can use any old piece of wire if you want.

#### 8. I read that the conductor of #24 wires is 0.021 " diameter. I assume that means the metal wire, not the insulated wire? That is huge for trying to thread through the stern lantern support tubing. What happens if I used #28 or #30 wire? Will this screw up the LED's or start a fire or?

It would be fine using 28 or 30 wire for the wires that are attached to the LED's, but I would recommend a thicker 24 wire for the "feed" wires as these will probably be longer stretching through the whole hull. By the "**feed**" wires I mean the ones running from the battery and feeding each resistor/LED branch. The thicker the wire you can use the better so try to err on the thicker side where ever you can.

The size of the wire will not cause problems with the LED's it is the fire risk that is the worry. If something short-circuits and you are using thin wires running around in dry wood then poof! Your model will look like the Cutty Sark and maybe burn the house down in the process. To be absolutely on the safe side you could put a tiny fuse in the positive wire between the battery and the red wire, in this case the fuse will have to be 150 mA (milliamp) this is very small and will blow at the slightest provocation.

#### 9. Would the rubber coating RTV that you can buy in the hardware store to coat tool handles, etc. insulate well enough in place of the shrink tubing? It can be applied super thin and stays on very well.

The rubber RTV tubing will be fine for isolating the wires just make sure there is no risk of anything short circuiting. At work we use super thin heat-shrink tubing, but maybe this is not so easy to get hold of as a consumer.

#### 10. Where do you buy this stuff?

Can't help you much here as I have no idea what suppliers you have in the United States, maybe someone can chip in with some tips.

\*\*The following supplier links were provided by Erik Nyren and Allan.....

<http://www.alliedelec.com/>

<http://www.shopled.com/index.htm>

The following link provided by Fred (Emu) is a conversion chart for different wire gauges converted to both millimetres and inches.

[http://www.modelshipworld.com/userupload/1202/wire\\_gauge.pdf](http://www.modelshipworld.com/userupload/1202/wire_gauge.pdf)

Hope this tutorial has been of some help to all of you who wish to wire up and light up your models.