

# **Borders Model Boat Club**

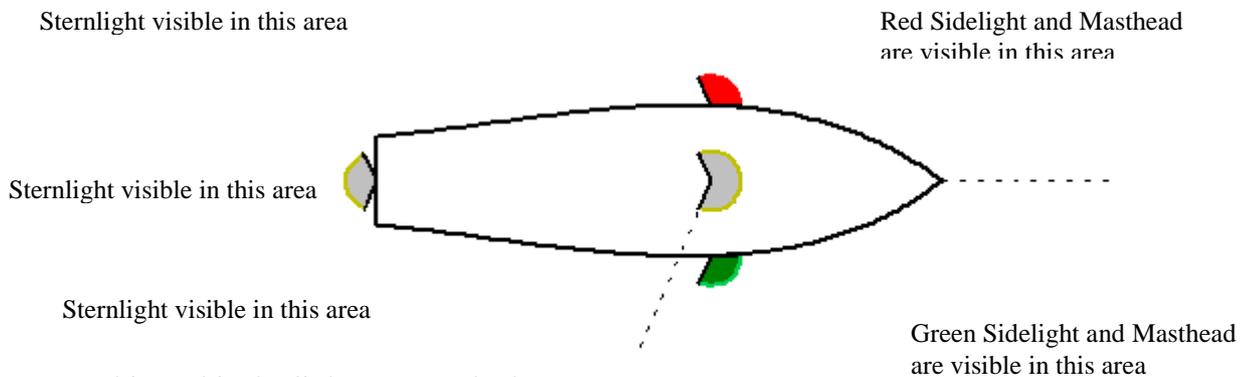
[www.bordersmodelboatclub.yolasite.com](http://www.bordersmodelboatclub.yolasite.com)

## **Fitting Lights to your Model**

When you have got your boat going with the balance, steering, and motor control working to your satisfaction, you may start looking for enhancements to your model. Often this will be fitting lights.

The most common configuration consists of 4 lamps, Red and green port and starboard sidelights, a masthead light and a stern light. Some vessels, eg tugboats, often have more than the basic setup.

The basic requirement for navigation lights are: Sidelights, red (port) and green (starboard) and shine from dead ahead to 112.5° aft on either side, masthead lights are white and shine from 112.5° on the port side through dead ahead to 112.5° on the starboard side and must be above the sidelights, stern lights are white and shine aft and 67.5° forward on each side. (Thus, the sidelights and stern light create a full circle of light.)



To achieve this the lights are masked.  
Smaller vessels may have a mast light visible for 360°, and have no stern light,

The sidelights are often mounted in a box structure, where the walls provide the masking to achieve the required visibility. The inside of the port (left) box is painted red, and the starboard one, green.



### **Lanterns**

Many kits contain metal lanterns into which light bulbs may be fitted. Light Emitting Diodes (LEDs), which have now virtually superseded the “grain of wheat” filament bulbs, are compact light sources which will fit inside them. These are devices available in many sizes and colours with levels of brightness from 20mcd to over 8000mcd. To be visible in daylight, the brighter ones should be used, red, green and “warm white”, which is less dazzling than “White”..

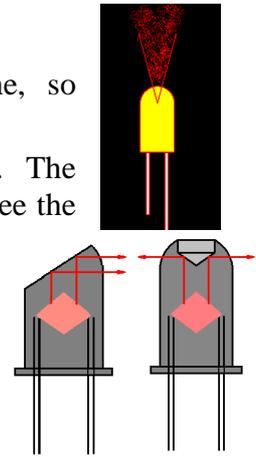


For more information about LEDs, see the article “About LEDs” on [www.bordersmodelboatclub.yolasite.com](http://www.bordersmodelboatclub.yolasite.com).

The light from LEDs is highly directional, usually forming a 20° cone, so modifications may be required when using them in models.

To produce all round illumination, drill a shallow hole in the top of the LED. The light will then be reflected sideways. The devices are transparent so you can see the works inside. Be careful not to drill too far.

Alternatively to give a directional sideways beam, file a flat at 45° and polish the cut with a liquid metal polish, such as “Brasso”. There is no need to paint the cut as the polished surface will act as a prism and give total reflection.



**Wiring LEDs**

Not all LEDs are the same. It is necessary to look at their properties when using them. The properties usually quoted are the operating current (in milli-Amps) and the forward voltage drop (in Volts) As an example, these might be quoted as 20mA and 2.7 Volts.

What these figures mean is that the optimum operating current of the device is 20mA, and the voltage drop across it when operating is 2.7 Volts.

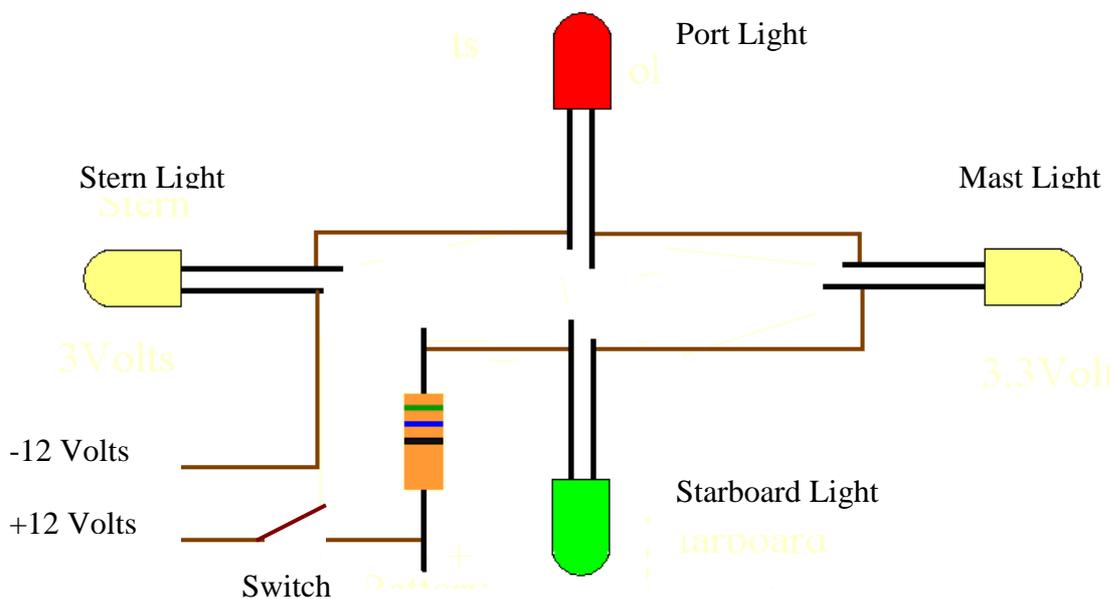
It is usual to use a resistor to regulate the current passing through the device. LEDs may be wired singly, each with its own regulating resistor, or in a group wired in series sharing a single resistor. The number which can be wired in this way depends on the battery voltage. If you have a 6 volt battery you can wire two LEDs in series, or four if you have a 12 volt battery.

The diagram below represents a typical circuit for a 12 volt system. The properties of the LEDs are:

Colour	Voltage Drop	Current
Red	2.1 Volts	20ma
Green	3.3 Volts	20ma
Warm White	3.3 Volts	20ma

The total Forward Voltage Drop through the LEDs is  $2.1 + 3.3 + 3.3 + 3.3 = 12$  Volts

Since the actual voltage produced by a nominal 12 Volt Lead acid battery is 13.4 volts a series resistor of 56 Ohms has been used to regulate the current. For details of the calculation, see the article “About LEDs” on [www.bordersmodelboatclub.yolasite.com](http://www.bordersmodelboatclub.yolasite.com).



Single colour LEDs have two leads. The longer is the +ve one. The connecting wires (shown in brown) only carry a small current (20ma) and so can be fairly light weight. If the wiring is hidden, flexible multi-strand such as 7/0.2mm equipment wire (1.2mm o.d.) is preferred, but single core 0.25mm Kynar wrapping wire, available on Ebay, can also be used. The wires should be soldered to the LED leads, and the joint supported by heatshrink sleeving.

Recently, E-fashions have come on the scene, and the “Conductive Thread” used to sew LEDs and other electronic components to garments could be used as rigging ropes when wiring mast lights. This also can be obtained on Ebay.



The switch enables you to turn the lights on or off. It may be a conventional switch or a “switcher”, a relay controlled by your transmitter. for information about Radio Controlled switches see the article “Switcher Circuits” on [www.bordersmodelboatclub.yolasite.com](http://www.bordersmodelboatclub.yolasite.com).

### **A Simple Installation**

The picture shows a simple modification to the S.H.G. King Midas kit.

The moulded lamp in the port side navigation lamp has been cut away, and a 5mm hole drilled through the cabin roof. A 5mm red led has been pushed into position from below.

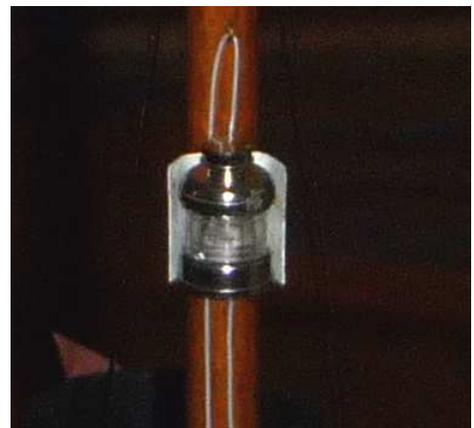


Similarly a green LED has been placed on the starboard side.

### **A Masthead Light**

The picture shows the masthead light installation on an Aeronaut Kalle kit.

A 3mm warm white LED has been placed inside the masthead lantern. The rigging ropes have been replaced with white Kynar wire to supply the 20ma current. A pin has been soldered to the back of the mask plate to fasten the lamp to the mast so that no stress is applied to the wires.



GCH August 2018

The information given in this data sheet is given in good faith and is believed to be correct. However no liability can be accepted for any damage caused by following any advice given in the sheet.

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