
Chapter 3

Lighting an Egg

Information on Globes
Light Emitting Diodes
Using Fibre Optics

Basic Lighting Kit
by Roger Williams

LIGHTING AN EGG

Adding a light to a design introduces a special magic to egg artistry. Whether you choose a simple light in the top of a diorama, blinking lights on a Christmas tree or more advanced ideas like the use of fibre optics, the resulting design is sure to intrigue everyone.

The basic principle of a lighting kit involves connecting a light globe, a switch and a power source together. In most designs a battery is the most appropriate power source to use. However, depending on the length of time you are likely to have the light on and the brightness required, an AC power pack may be more practical.

All the components required for a lighting kit can be purchased from an electronics store or a model railway shop. Also keep your eyes open for fantasy flower lights or other lighting ornaments from cheapy shops or trash & treasure outlets. These can be modified to make them suitable for installation in an egg.

Globes

Many types of globes are available, ranging from 1.5 volt to 12 volt, depending on the type of application you wish to use them for.

Note: Never use a power supply with a voltage greater than the voltage of the globe you intend to use, otherwise you will burn out the globe.

Grain of Wheat globes are available in a variety of voltages, they have fixed leads and are suitable for most applications in egg artistry.

Advantages: These globes are cheap and come with long leads which can be taken down into the base of the design without the need to extend the length.

The globes are small enough to be inserted into a clear bead to make chandeliers or light fittings.

Disadvantages: Replacing the globe if it is faulty, without damaging the egg, is difficult and in some cases, may not be possible.



Plate 3 - Grain of wheat globe



Plate 4 - Edison base

Screw Base globes

Known as an Edison base these globes are available in a full range of voltages and are also reasonably priced.

Advantages: The screw-in globe is easier to change if the need arises.

Disadvantages: Screwing or unscrewing the globe can be difficult in a confined space.

Double Pin Globe & Base

Push-in globes (this is my description, not the technical name) are the most practical type of lighting fixture for installation in an egg.

Advantages: Installation of the base in more unusual places is possible as the globe can be changed using a pair of long nose tweezers rather than fingers.

Disadvantages: These globes are more expensive and although the globes are available in Australia from electronic outlets, you may need to purchase the bases or complete units from

There are a couple of alternatives to normal globes, which can be used to create interesting lighting effects, including fibre optics and LEDs (light emitting diodes). Although neither produce as much direct light as grain of wheat or screw globes, their use is very effective in the right design.

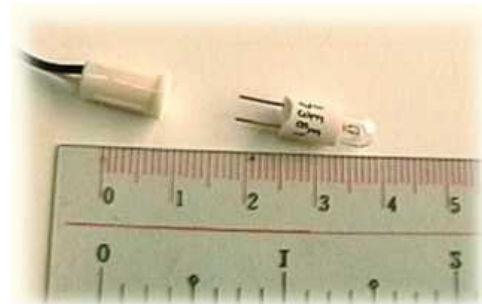


Plate 5 - Push-in globe & base

LED's (Light Emitting Diodes)

LED's can be a great alternative light source to globes (bulbs) because of their variety and low power drain. LED's don't generate heat like globes so they're better suited for delicate areas of egg artistry.

LED's are available in many shapes, sizes and colours, you can even buy LED's that flash on and off.

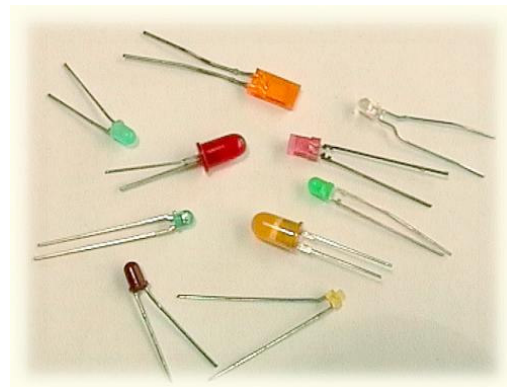


Plate 6 - Selection of LED's

A LED has two leads coming from it, known as an anode and a cathode, the anode is the longer of the two. You can use LED's with either power adaptors or batteries. Like globes, LED's are polarity sensitive, that is, they require a positive and a negative lead from the power source.

LED's will operate with very little voltage, such as a single AA battery (1.5 volts) However, to achieve an acceptable brightness with different power sources you may need to use a resistor in conjunction with your LED.

A resistor is a small ceramic cylinder with a lead either end. As the name suggests, they resist some of the voltage coming from your power source to ensure the correct power is supplied to your LED. A resistor's value is determined by several coloured bands on it.

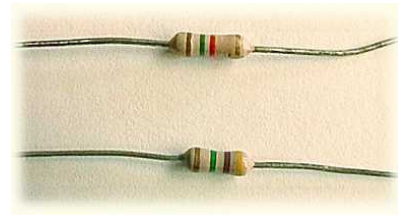


Plate 7 - Resistors

A table of resistor values for different voltages is shown on page 15.

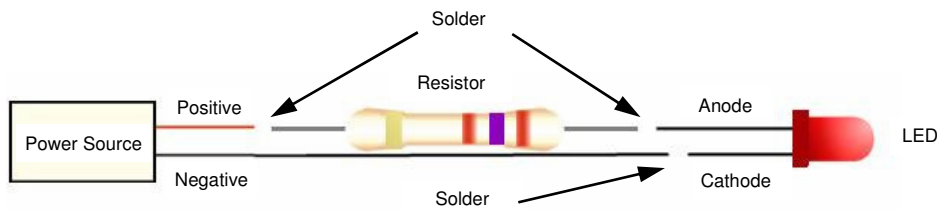


Diagram 5 - Wiring Diagram using a LED & Resistor

The maximum voltage a LED can operate on is around 2 volts, so any power source rated higher than 2 volts (battery or power adaptor) will require a resistor. A typical wiring diagram is shown above.

It is preferable to solder all connections. However if you don't have access to a soldering iron you can use terminal connection blocks.

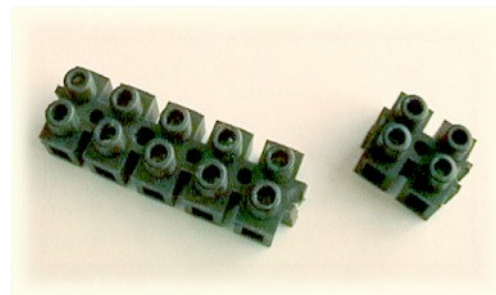


Plate 8 - Terminal Connection Block.

The blocks allow access for wires from both sides, with screws to tighten down onto the wires forming a connection.

The blocks are normally sold as a unit with ten connectors all insulated from each other. Terminal blocks come in various sizes, you will need the smallest. The blocks can be cut to suit your needs.

A wiring diagram with blocks cut into fours is shown below.

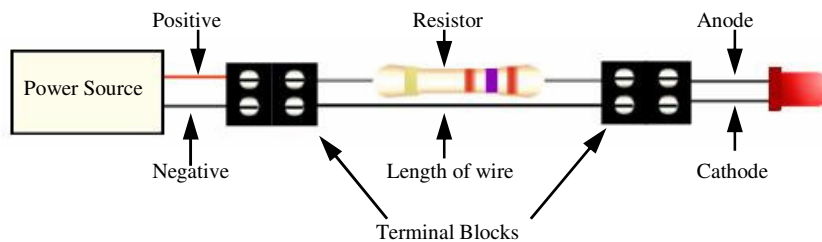


Diagram 6 - Wiring Diagram using Terminal Blocks

Power adaptors come in different voltages, some with selectable voltage i.e. 3V, 6V, 9V and 12 Volt. If your adaptor is a single voltage unit it will be one of the aforementioned voltage. Using power sources above these voltages is not recommended. See your local hobby electronics store for more information.

All the components shown here are normally available from hobby electronics stores - i.e. Dick Smith Electronics, Tandy's, Radio Shack.

Table of Resistor Values.

	<u>1st three colours</u>	<u>Last colour band</u>
For 3 volts use 70 ohm resistor.	Black, Violet, Brown	Silver
For 6 volts use 220 ohm resistor.	Red, Red, Brown	Silver
For 9 volts use 390 ohm resistor.	Orange, White, Brown	Silver
For 12 volts use 560 ohm resistor.	Green, Blue, Brown	Silver

Advantages

- No heat generation
- Low cost
- Multiple colours
- Extreme long life
- Various sizes & shapes
- Reliable
- Low safe voltage
- Several can be used on a circuit
- Operate on different voltages (with resistor)

Disadvantages

- Little ambient light (best viewed head on)
- Soldering (solder joints are best)

Using Fibre Optics

In the late 70's to early 80's Rog & I used fibre optics in our model railway layout with spectacular results. With this in mind it seemed only natural to introduce this lighting alternative into egg artistry.

Fibre optics are very fine fibres, which are hollow in the centre. The process involves transferring light through bundles of these fine fibres by means of internal reflection.

As the fibres are flexible they can be positioned in any configuration, as long as one end of the fibres are grouped directly over a light source, thus allowing the light to travel through the length of the fibre optic, resulting in a pin-prick of light.

To achieve a larger concentration of light you need to group more strands together.



Plate 9 - Fibre Optics

To achieve a variegated light a colour wheel can be placed between the ends of the fibres and the light source. A small motor can be used to rotate the colour wheel, thus producing alternating colours at the visible end of the fibres.



Plate 10 - Closer Concentration of Fibres

Some of you may remember the old fibre optic (or fantasy) lights from the 1970's with the silver ball and the spray of fibres. If you are lucky you can still pick these up from Trash & Treasure places for around \$2 each.

The only problem is the size of the base required to house the mechanics, but by pulling the light to pieces, you can remove some of the spacers to reduce the height.

To give you an idea of how we used them in the model railways, among other uses, they became headlights and tail lights in mini cars, as the destination board in a bus etc. In the case of the cars, a tiny hole was drilled through each headlight and tail light and a single strand of fibre optic was threaded through each hole in the lights then secured together (2 for white and 2 for red) and passed down through the baseboard of the layout.

Under the baseboard the grain of wheat lights (very small lights available from an electronics outlet like Dick Smith Electronics or Tandy) were housed in a tube to condense the light source and the fibre optics were secured into the tube. This allowed the light to travel up to the cars and showed up as realistic headlights and tail lights. The same principle was applied to the destination board on the bus, only in this case, more of the fibres were secured together to outline numbers etc.

I'm sure you are all familiar with the gaudy flowers available from cheapy shops today. These have pin-pricks of light along the edge of the petals and leaves. If you pull one of these apart you will find a core of fibre optics approximately 1/2" round, which goes down through the base to a light, sometimes with a flashing unit. When activated, the light flashes on and off, thus making the rim of lights around the petals flash on and off as well.

In egg artistry, this concept works really well with a tiny Christmas tree. By using a small motor and a colour wheel over the light you can position groups of fibres situated at different places on the tree so different colour lights on the tree will twinkle when the motor turns the colour wheel.

Points to Remember

A single fibre will only give a pin-prick of light - if you want a greater concentration you will need to group more fibres together. One end of the fibre must be positioned directly over the light to ensure it travels to the end of the tube.

Due to the heat produced by a light source, be sure to allow plenty of air flow to disperse the heat out through the base. Also be aware heat will soften epoxy if used in close proximity to the source.

Advantages

When working with miniature scenes, a tiny pinpoint of twinkling light can add a magic touch. Being able to use a single fibre makes this possible.

Disadvantages

As the fibres are brittle and will break if bent, careful placement is essential. Make sure you maintain a gentle curve of the fibre from one end to the other to avoid this happening.

BASIC LIGHTING KIT

by Roger Williams

The following instructions show the basic principles on how to construct a simple lighting kit suitable to install in an egg. There are different types of globes and power supplies available, depending on the individual design requirements

You will need

12 volt grain of wheat bulb
 Battery connector
 Push button switch
 Length of shrink tube

Tools Required

A craft knife
 Small scissors
 Candles or matches

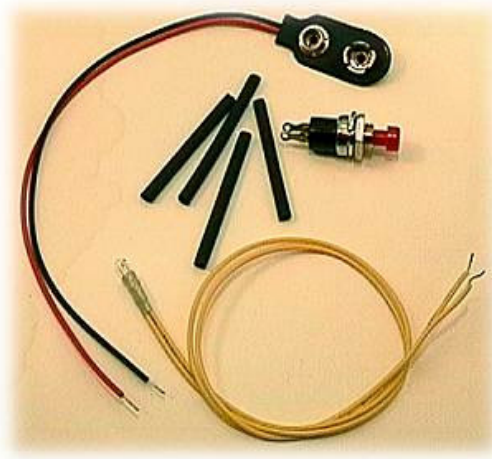


Plate 11 - Components for a Basic Lighting Kit

Procedure

1. If the ends of the globe wire have been tinned or prepared for soldering, remove the ends with a small pair of scissors, as solder isn't required in this project.
2. To bare the wires use a craft knife and gently cut around the insulation about 25 mm (1") from the end.
3. Remove the insulation and twist the wires together.
4. Repeat the procedure on the wire of the battery connector.
5. Cut a piece of shrink tube approximately 22 mm (1") and slide over one of the globe wires. Take the globe wire and the black wire from the battery connector and twist securely together. Slide the shrink tube up over the join.
6. Light the candle and hold the covered join above the flame. The heat from the candle will shrink the tubing, making a secure, insulated connection.
7. Cut two more pieces of shrink tube and slide them over the remaining wires. Attach the wires to the terminals of the switch by feeding them through the holes and twisting them together. Attach one wire to each terminal. Slide the shrink tubes up the wires and over the terminals.
8. Hold each covered join above the candle to shrink as before.
9. Connect the battery to the connector (it will only go on one way) and test your light by pushing the button the switch

*These step-by-step instructions are available on video cd,
 together with power and switching alternatives.*

Visit our web site - <http://www.eggersp.com/diamondinnovations.htm>