

DEMONSTRATION

The Basics of LED Lighting

by Luci Hanson, Grants Pass, Oregon

Luci has been teaching dollhouse lighting classes for over 8 years at shows and clubs. Her free seminars in tools, soldering and electrification have been a popular event at the NAME Houseparties and Conventions.

Like most people, I was fascinated by the appearance of LED lighting but ignored it as a form of lighting my miniatures because it seemed too complicated to learn. The Quarter Connection online convention of 2010 had a seminar on LED lighting presented by Judith Andracka. It piqued my interest so I decided to do more research. I contacted Shelly Jamison of Evan Designs in Colorado to see if I could visit her on the way home from NAME National in Cleveland, Ohio.

The visit with Evan Designs and subsequent conversations and email exchanges rendered me totally enamored with the subject of LED. I had taught dollhouse lighting many times before so switching to LED was not going to be all that difficult. It wasn't long before I was completely sold on the benefits of LED lighting.

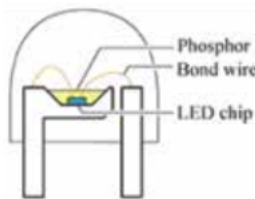
LED vs. Incandescent

It helps to know the difference between incandescent lights and LEDs.

Incandescent lights produce light by heating a filament wire to a high temperature until it glows. The hot filament is protected from oxidation in the air with a glass enclosure that is filled with inert gas or evacuated.



An LED light is made up of a semiconductor chip that emits light when electricity is applied to it. The chip emits very little heat when the electricity flows through the chip.



Benefits:

- It takes fewer watts for an LED light to achieve the same brightness as an incandescent light.
- 12v incandescent light draws 60 milliamps of power
- 16v incandescent light draws 45 milliamps of power
- 1.5v incandescent light draws 35 milliamps of power
- LED's draw 20 milliamps of power
- With a 3-volt coin type battery you can run up to 10 LED's.
- 6 LED's will run approximately 40 hours on one coin cell.
- With a 9-volt battery you can run 50 LED's for 4 hours, or run 5 LED's for 36 hours per battery.
- With a plug in 12-volt supply of 1 amp you can run 50 LED's for 10 years continuously.

Light types:

LED lights come in a lot of sizes and shapes. Below is a list of just some of the most common LED lights to come on the dollhouse miniature scene.

LED's (9-13V)



5mm, 3mm & 1.8mm



12V incandescent light, Lg chip & nano chip

The lights above are the most commonly used lighting in dollhouse miniatures.

The 5mm can be used for spot lighting or ceiling canister lighting. It can be powered by either 9V or 12V power supply. Notice the lump on the left hand wire of all of the solid LED's? That is a resistor. The resistor is installed in the wire to allow the light to be safely powered by 9V or 12V of power.

Lighting decisions:

First priority is to know how much light you need and how you will power it.

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LED Lighting

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If you are going to use battery power you need to ask yourself “do I want to use 3 volts or 9 volts battery power. That will determine the type of light you need. If you are going to use a 12-volt system with an AC power supply I recommend the regulated transformer with the power jack connector found at Evan Designs.



Red and black wires:

LED lights are wired differently from the incandescent lights. They each have a positive and a negative side. In the most common LED lights you will find that the RED wires are connected to the positive power source and the BLACK wires are connected to the negative power source. The lights will not work if the connections are reversed. Revers-

ing the contacts will not harm the light if done for a short time.

Basic Applications:

Let's put all that information to work. To make it simple I selected a 3-volt 1.8mm light bulb in warm white with a coin cell connection; (however, the same principles apply when using any other lights or power systems).

The LED light has a red and black wire and so does the coin cell holder. To connect the two:

- Slip a heat shrink tube on each of the two wires attached to the battery holder.
- Form a hook on each end of the 4 wires.
- Hook the two red wires together and crimp to form a tight bond between the two.
- Do the same with the black wires.
- Insert the battery in the holder with the plus sign (+) on the battery matching the + sign on the holder.
- If the light does not go on and there is an inline switch on the holder, press the switch button.
- If there is no inline switch and the light still does not come on, check the connections of the wires.
- Always make sure you are using a fresh battery.
- Assuming the light does illuminate, turn off the power by the switch or removing the battery.
- Slide the heat shrink tubes down the wires to cover the connections.
- Using a heat gun or lighter, heat the tubes to shrink around the connection.

This is the basic principal of LED lighting:

- Know what power system you want to use...battery or transformer.
- Know where you want to place the lighting...ceiling, walls or accessories.
- Select the proper LED lights for the power type.
- Know how to connect the power to the lights.

That in a nutshell is all there is to LED lighting. LED lighting has been around for many years. It has been used in our flashlights, headlights, emergency lighting and in many common lighting applications in our every day life. It has just recently been recognized as a form of lighting in our dollhouse miniatures. Two of the primary factors in the delay of using LED lighting in our miniatures and domestic lighting has been the cost and bulb sizes. LED lighting has made great strides in the past few years in its development and as a result the price has been drastically reduced as well as the size of the bulbs themselves. Without a doubt it will soon become the primary source of lighting for our miniatures and our homes. It is safer to handle, safer for our treasured miniature scenes, consumes far less power and lasts a lot longer.

Thanks to Shelly Jamison of Evan Designs for all her expertise and advice and council. For more answers to your questions about LED lighting visit her website at <http://www.modeltrain-software.com/leds-for-minis-tips.html>.

