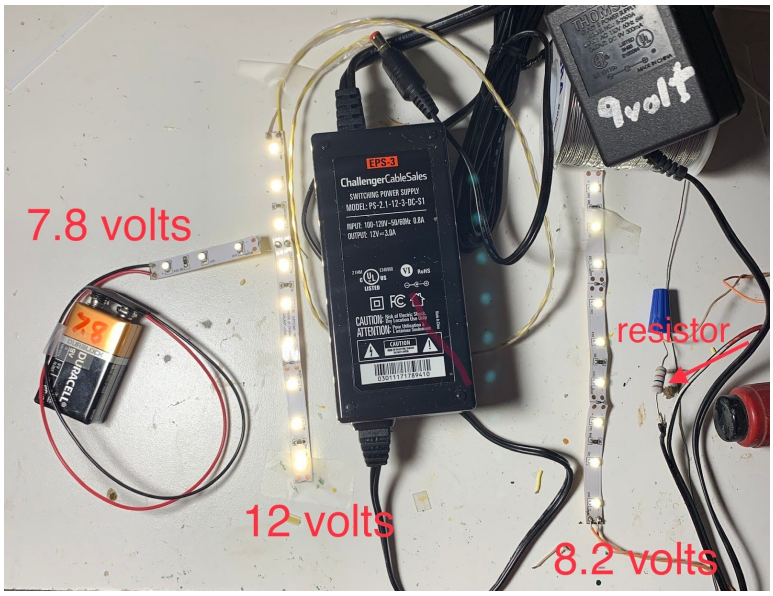
LED Lighting

12 volt strips

12 volt LED's come in 3 light strips with built in resistors. While designed for 12 volts DC, lower voltage is preferable for models. A 9 volt battery can supply ample power for about 90 hours. Three levels of illumination are illustrated below for a rough relative comparison of brilliance related to voltage.

1) The battery is down to less than 8 volts so the lights are dim.
2) A good 12 volt transformer supplies power to three strips, a total of nine LED's.
3) Similarly, a 9 volt "wall wart" transformer is supplying 8.2 volts to another nine LED's.



"Wall warts" are notorious for producing higher than labeled output voltage. A 1000 ohm resistor is spliced into the wire to get the 14 volts down to 8.2 volts.

These strips are also good in passenger cars with this NMRA lighting circuit.

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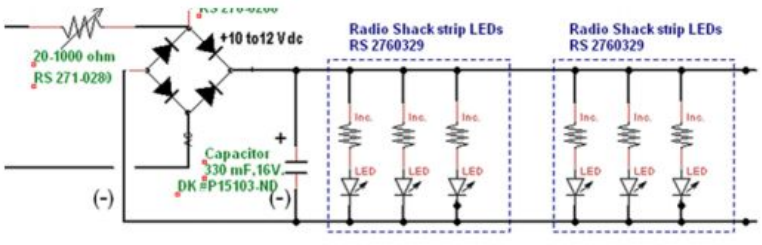
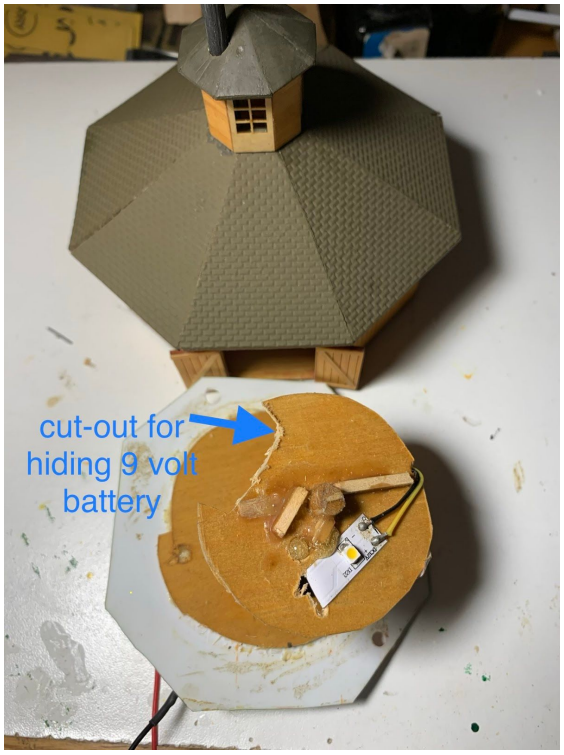
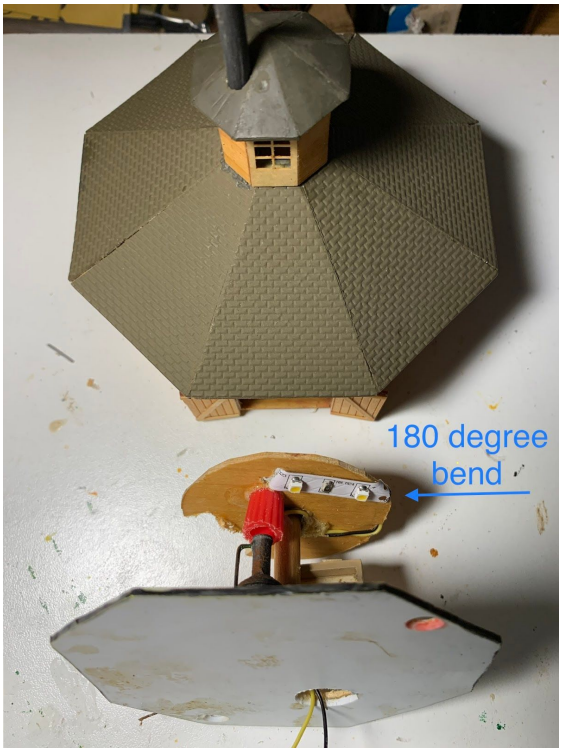


Lighting Schematic for Radio Shack Strip LEDs

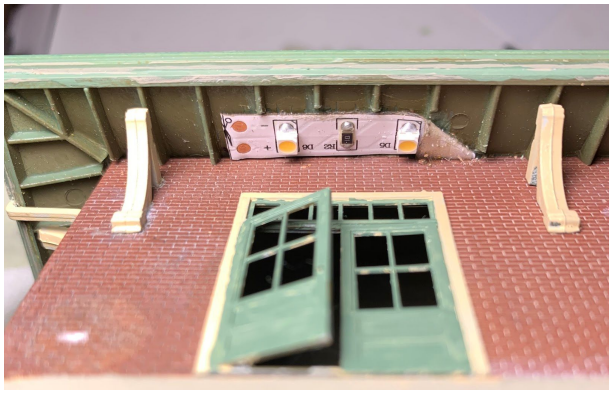
Here's the round barn with one three light strip.





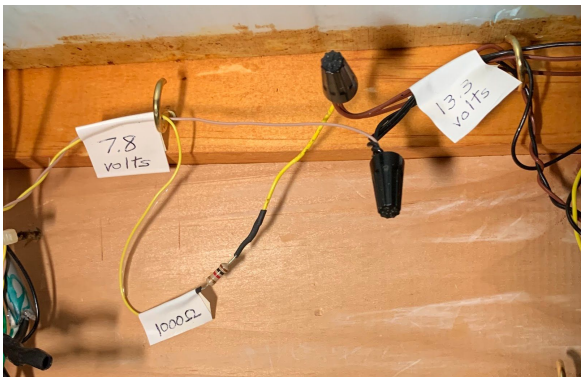
The cupola is illuminated by having one LED pointing up. This is done by bending the strip 180 degrees around the ceiling. Originally a 9 volt battery was inside, now the structure plugs into a power bus. There's a moonshine still inside.

Another example of bending the strip is used in this passenger station.



The two lights beneath the roof overhang provide exterior door lighting. The first fold is a combination 45 and 180 degrees to direct the strip inside. The second fold is 90 degrees over the wall. Gorilla glue provides strain relief to the soldered connections.

Here's an engine house with two strips inside.



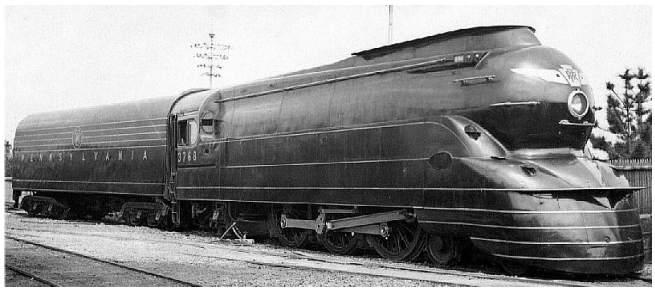
The lights are getting 7.8 volts thanks to the 1000 ohm resistor dropping 13.3 volts, seen in this underside view.

Single LED's

Most LED's like 3 volts. Anything more will burn them out. Evans Designs makes ready-to- go headlight LED's for AC or DC. (up to 19 volts) A small module illuminates the LED regardless of voltage or polarity.

At low speed DC locomotives with LED headlights are full brilliance. The streamlined steam locomotive in these pictures compares the original incandescent with an LED.

The locomotives are running in reverse against the back of the engine house to get these pictures. Fortunately, the sturdy styrene walls held against the forces of these powerful giants. A picture of the streamlined K4 at the 1939 World's Fair:



1939 streamling by Raymond Loewy , who also designed the Air Force One paint scheme in 1962.

The 99 cent LED tester is two 1.5 volt batteries wired together to get 3 volts. One 5 millimeter bright white LED is powered with the batteries and one 3 mm warm white LED from Evans Designs is powered with AC from a transformer. At the top of the picture is an Evans Designs LED rectifier . One of these rectifiers powers the LED in the streamlined steamer. The LED also doubles as the headlight lens.

In conclusion...

More ideas and detailed information is available in this magazine article: “The Magic of Lighting” 2014 LED article O Scale Resource , author Daniel Dawdy answers questions like “What’s a Kelvin ?” and “How do LED’s work ?”.