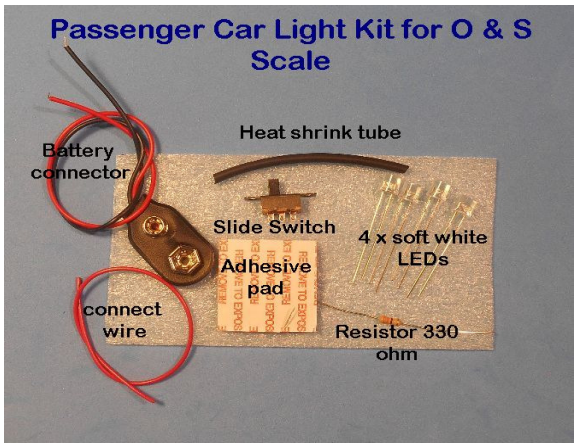
Passenger Car Lighting for O or S Scale

For passenger cars in O Scale and S Scale that don't have lighting installed here is a simple system for installing a battery operated lighting circuit using soft white LEDs along with an on board 9 volt battery and switch. The component are available in kit form from ***www.modeltrainsounds.com.***

The kit components include



- 4 LEDs soft white 5mm, flat top. Only 3 are required , the 4th is a spare just in case.
- A 330 ohm resistor.
- A 9 volt battery connector with wires.
- A slide switch.
- Heat shrink tube
- Double sided adhesive pad.
- Additional wire for connections

Items also needed include a standard or rechargeable 9 Volt Battery. A strip of clear, semi rigid, styrene plastic, obtained from packing material, on which to mount the LEDs. Adhesive putty or double sided tape to mount the lights to the ceiling of the cabin and Super Glue. Optional items include acrylic black or brown paint, and some heavy duty aluminum foil.
Tools needed will include a hobby type solder iron, solder and flux, helping hands support, needle nosed pliers, small flat end screw driver , hole punch awl or pin nail and heat gun or hair dryer. If the floor of the cabin does not have an access hole (most do) a hole 1/4" in diameter will need to be drilled to install the switch.

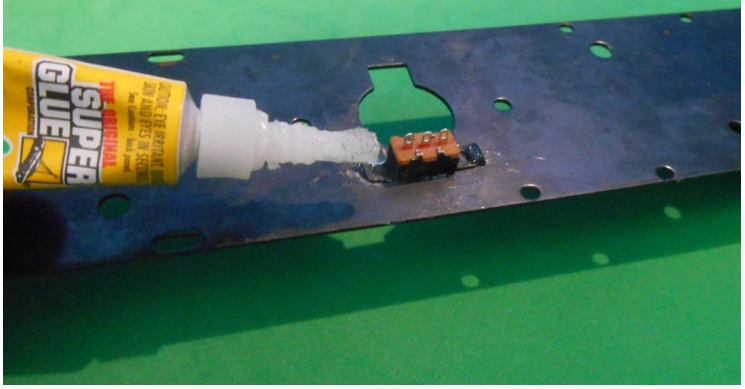
STEP 1. Disassemble the carriage.

The chassis, including the floor and truck assembly are first separated from the cabin. Various methods are used to secure the cabin and this must be determined. Using the tools described this can generally be accomplished. Once separated, the units should be cleaned of dust, debris and rust.

Cabin separated from the chassis.

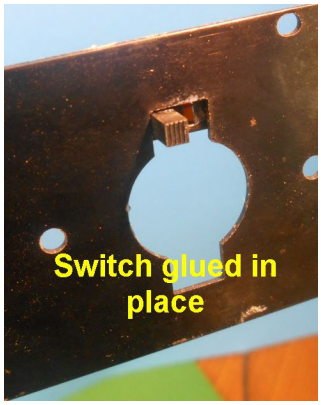
Interior of cabin painted with a dark color black or brown

The interior of the cabin can be darkened with a black or brown acrylic paint and windows, if not already installed, can be added using small strips of clear styrene plastic and a heavy duty clear adhesive packing tape. Aluminum foil can also be attached to the ceiling with super glue to reflect the light back into the cabin.



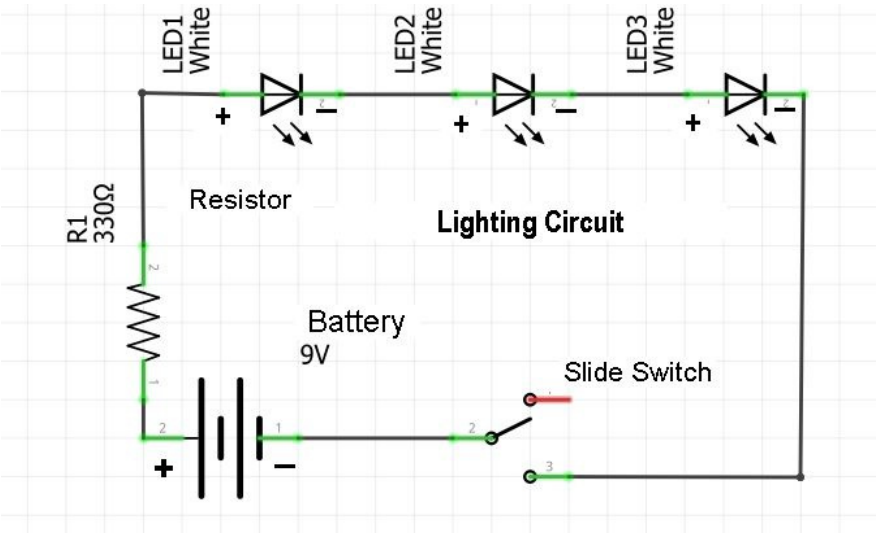
STEP 2 Install the switch

A hole in the floor of this carriage is used for the switch. On this American Flyer S Scale Circus Car a hole already existed making the installation easy. If no hole is present it will be necessary to drill a hole at least 1/4" in diameter into the floor. The switch is glued into place with a few drops of super glue. The switch lever is pointing down and out. It should be able to move back and forth freely after the switch has been glued into place.

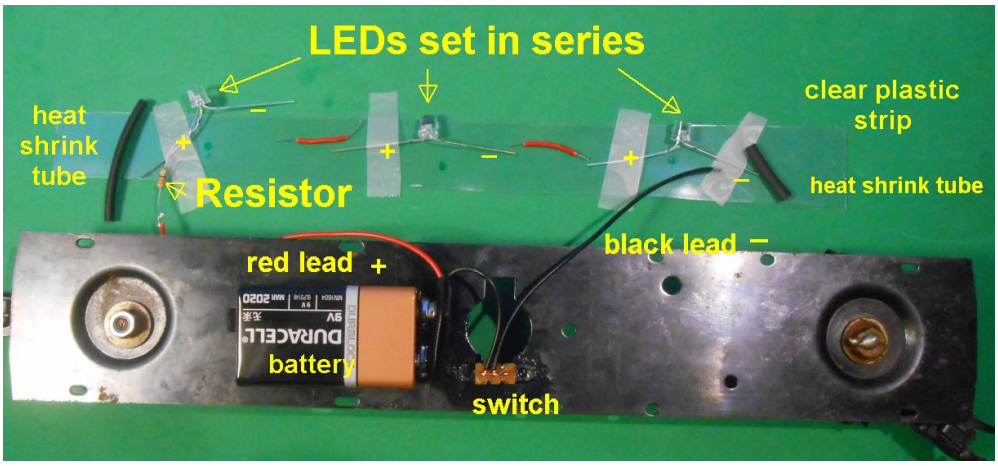


STEP 3 Assembling the Light Circuit

A schematic of the circuit is shown below.

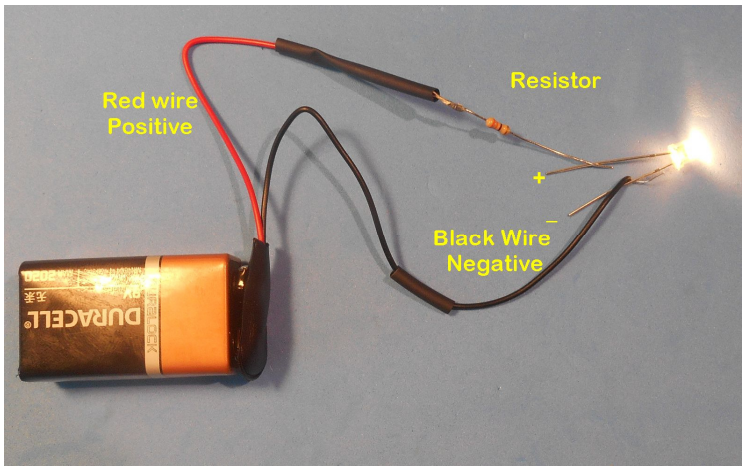


Here is the way this circuit will setup on this model.



The positive red wire from the battery will connect to the 330 ohm resistor . The resistor will connect to the positive lead of the first LED. 1 1/2" of heat shrink tube will cover this connection. The LEDs are set in series. The negative lead of LED 1 connects via a short wire to the positive lead of LED 2 and the negative lead of LED2 connects to the positive lead of LED 3. The negative lead of LED 3 is connected to the black wire coming from the switch which in turn leads back to the battery via the switch to complete the circuit. The LEDs are set into a strip of clear styrene, somewhat rigid, plastic cut from injection molded packing material. The LEDs are positioned evenly based on the size of the carriage cabin. Short strips of red wire cut from the battery red lead or additional wire provided are used to interconnect the LEDs.

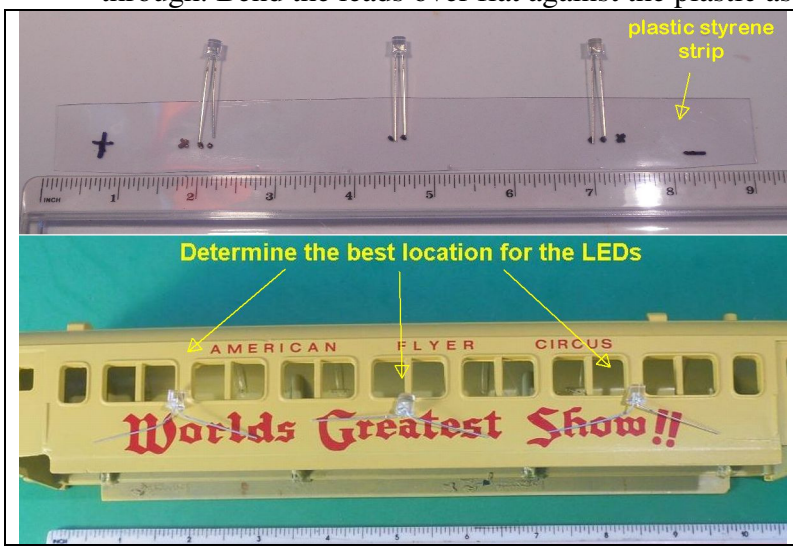
a) Build the test circuit

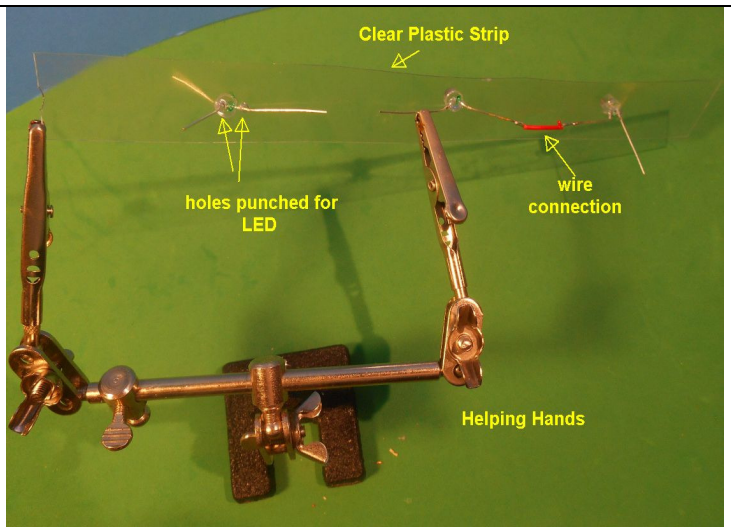


It is best to first connect the resistor to the red wire of the battery connector as this can then be used to check the LEDs and the circuit as it is being prepared. First determine how much of the red wire is needed. If it has to be shortened cut from the end, strip a small amount of insulation off the end and tin with solder. Cut 1 1/2 " of heat shrink tube and pass it onto the red wire. Now solder the end of the wire to the resistor at about 1/4 inch from the resistor body. Trim off excess resistor wire. Connect the battery connector to the battery and you can now use this for testing.
DO NOT shrink the heat tube yet.
The Positive lead of each LED is the longer lead. Being diodes, the LED will only light when current flows from positive to negative. Touch the red wire/resistor lead to the positive lead of an LED and touch the black lead to the negative lead of the LED and it should light. Reverse the leads and it will not light. DO NOT test the LEDs without the resistor otherwise you may blowout the LED. (That's why there is a spare)

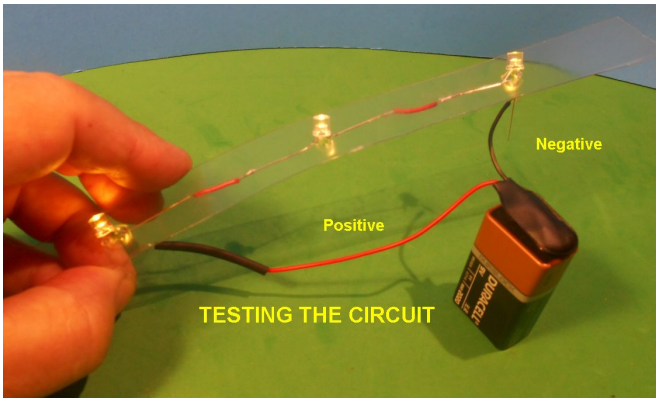
b) Finish the Light Circuit

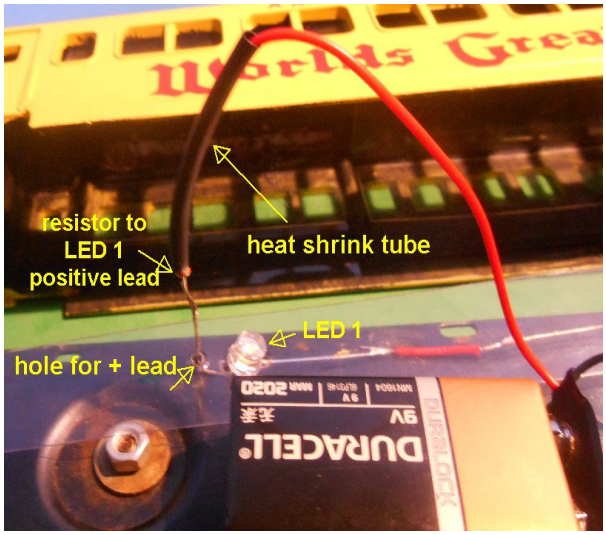
Cut the plastic styrene strip about 3/4" in width and to a length compatible with it fitting in the roof of the cabin . Mark one end with + symbol. Mark the spots where you wish to place the three LEDs. Use the cabin as a guide . Generally the LEDs are placed equidistant apart for even illumination. Punch two small holes with an awl or fine pin nail at these points so the leads of the LEDs can pass through. Bend the leads over flat against the plastic as shown below.

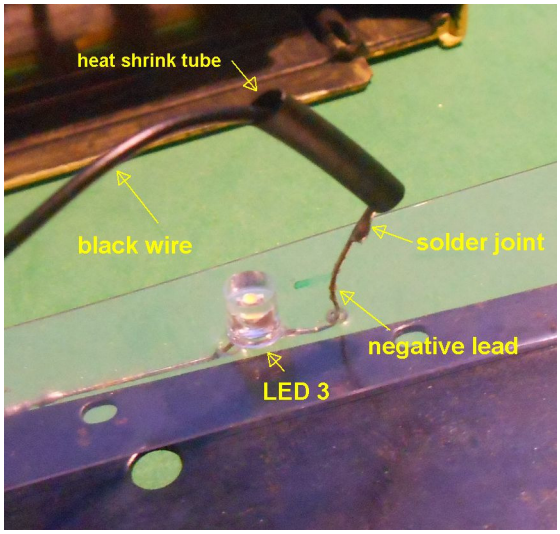




Use the extra wire to connect the wire lead of the LEDs. Connect the LEDs in series as described above. At this stage test the circuit to make sure all connections are correct.
Now punch 2 more small holes in the plastic next to the LEDs at each end and thread the free LED leads through the holes using the needle nose pliers so that the leads are pointing in the same direction as the LED bulbs, ie into the cabin.





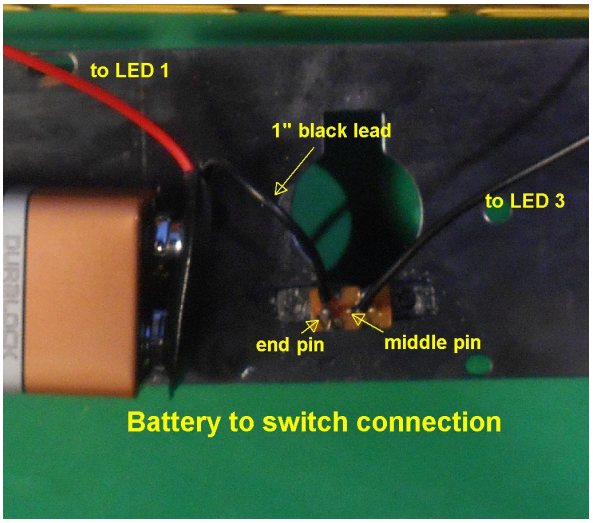


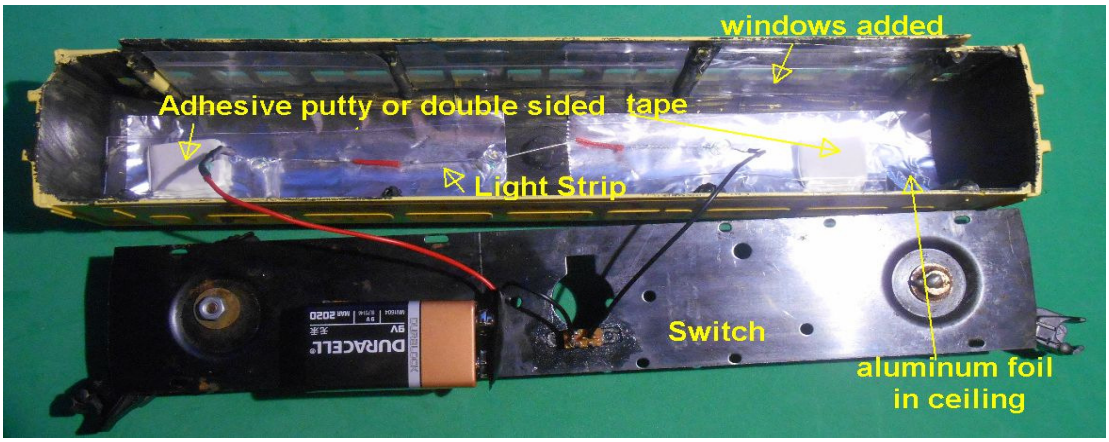
Now solder the resistor to the positive lead of LED1. Return the heat shrink tube over the resistor and this solder joint. Strip and tin the end of the black lead. Pass the rest of the heat shrink tube onto this wire and solder the wire end to the negative lead of the LED 3. Apply hot air to the heat shrink tubes covering the joints using a heat gun or hair dryer set on high until the tubing has shrunk over the wires and connections.

c) Attach the Battery wire to Switch

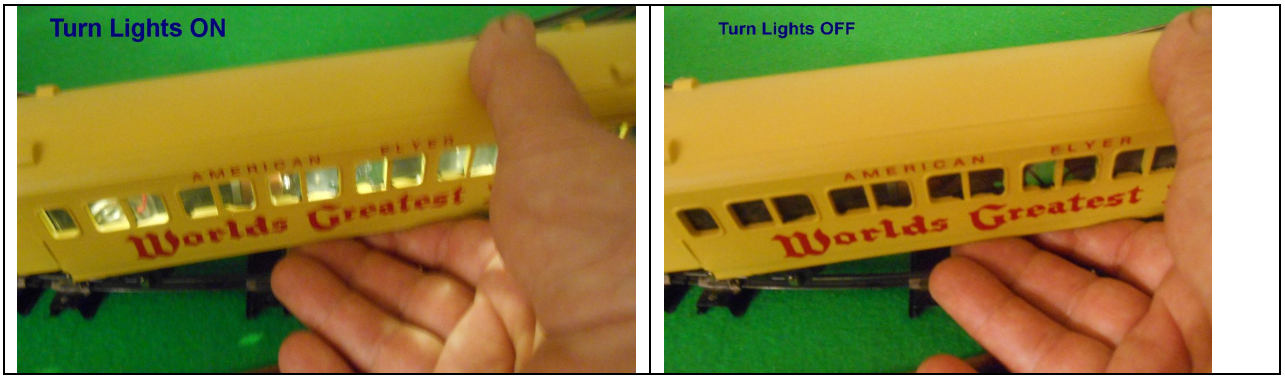
Cut the black wire coming from the battery terminal end at 1 " in length. Strip and tin the end and attach this wire lead to the closest end terminal pin of the switch. Strip, tin and solder the free end of the black wire to the middle pin of the switch. The circuit is now complete and ready to mount.

The battery can now be secured to the cabin floor using the double sided adhesive pad. Test the switch to confirm it is working.





The light strip is now attached to the ceiling of the cabin using adhesive putty or double sided tape. Note that the cabin interior has been darkened and the windows added along with aluminum foil glued to the ceiling. The cabin is now reattached to the chassis and the carriage is ready for the track.



The lights can be turned ON and OFF without removing the car from the track. Adding interior features to disguise the wires and battery might be considered. The lights will light continually for over 90 hours. from a fresh or fully charged battery. Be sure to turn Lights off when not in use.