

# HO Scale Passenger car lighting using a string of Mini LEDs.

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The use of a compact, simple, lighting system for HO Scale passenger cars can be accomplished using a string of LED Lights. These mini LEDs are gallium surface mounted roughly the size of a rice grain. The LEDs are arranged in parallel sequence connected by thin lacquer covered wires that enables the use of low voltage. The lighting of the passenger cars is accomplished using track electrical pick-up. The number of mini LEDs in the string will depend on the length of the car being illuminated. Four LEDs are available. The electronic circuit uses a controlled current of 20 milliamps to light the LEDs in both forward and reverse direction despite variation in the track voltage from 5-16 volts and with minimal dimming due to track dead spots. This is accomplished using 3 electrical components, a Bridge Rectifier, Capacitor and LED driver chip.

## The Kit

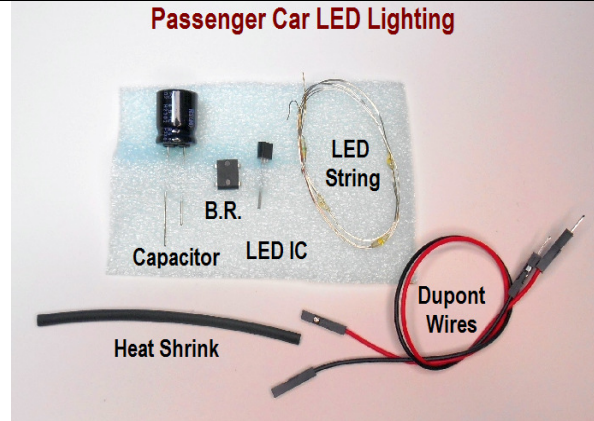
### Components

1 1000uf Capacitor  
1 x Bridge Rectifier (BR)  
1 x LED driver Chip  
1 String of 4 Mini LEDs  
1 Heat Shrink 3 inches  
2 Connection wires with Dupont M/F connectors.

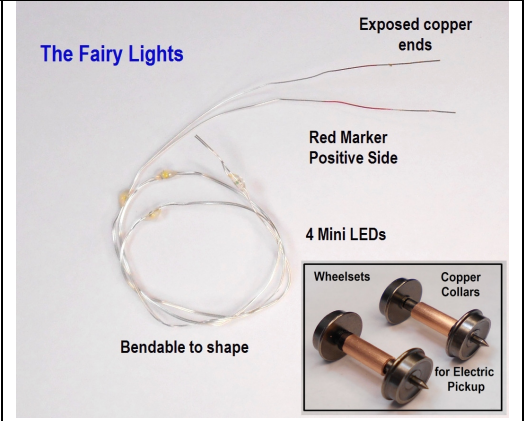
### For Track electric Pickup

2 wheel sets with copper collars are also available

### Passenger Car LED Lighting



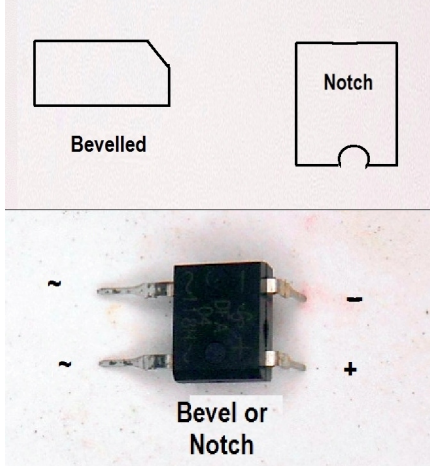
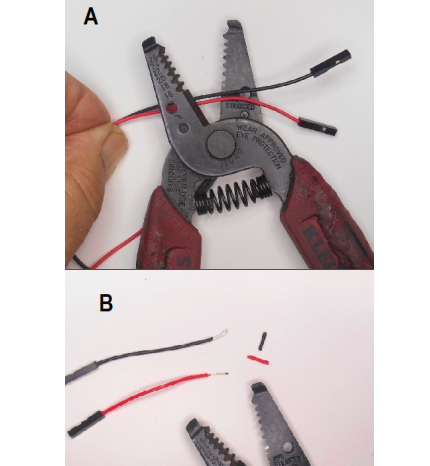
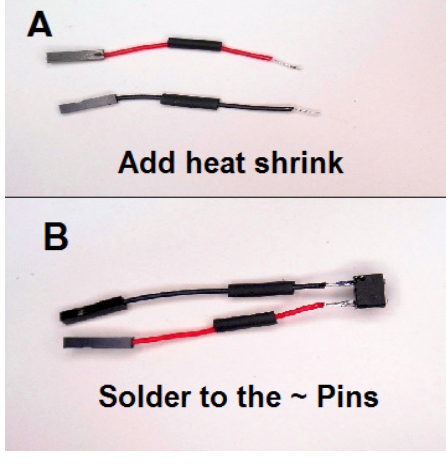
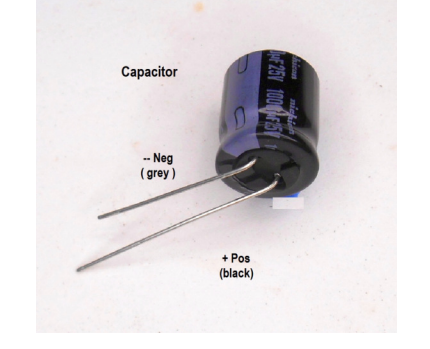
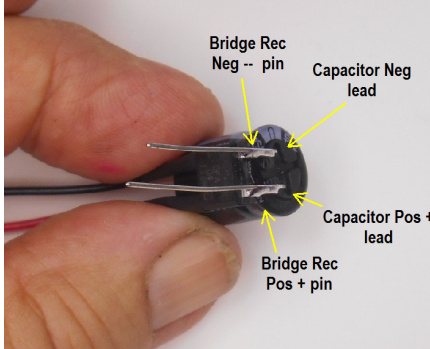
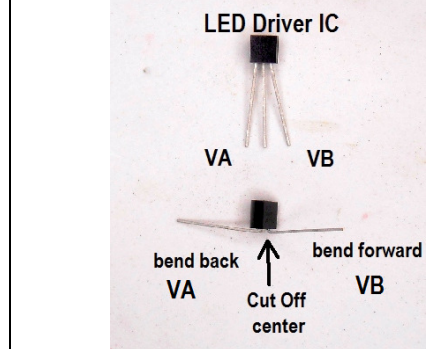
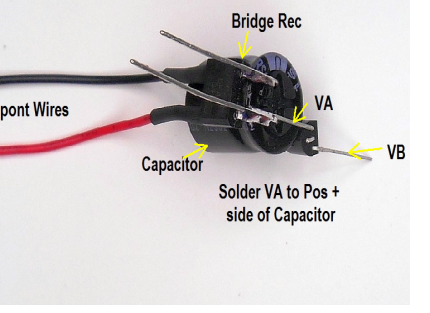

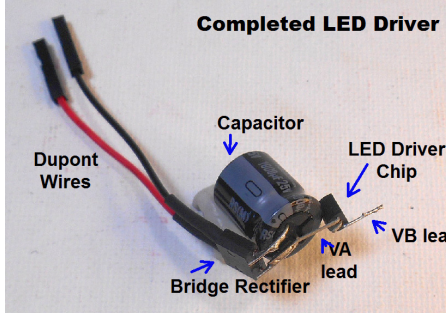
### The Fairy Lights



## 1. Selection and disassembly of the passenger car

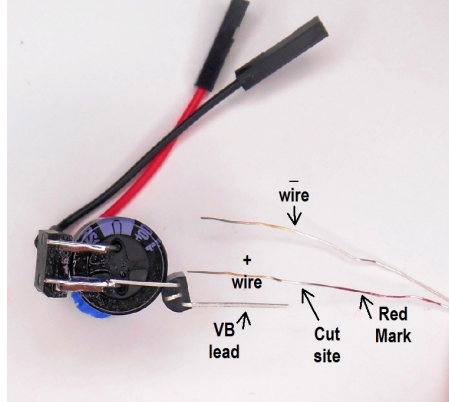
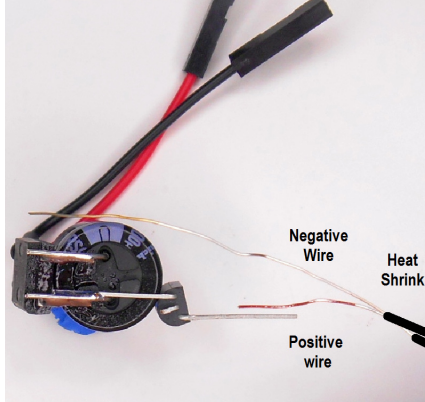
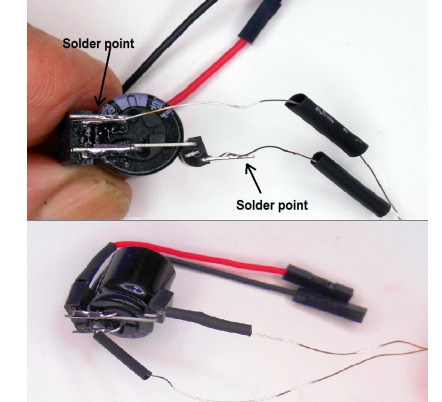
<p>Long Car - 4 LEDs</p> <p>Medium Car - 3 LEDs</p> <p>Small Car - 2 LEDs</p>	<p>Cabin and Roof</p> <p>Interior</p> <p>Weight Plate</p> <p>Chassis</p> <p>Trucks</p>
<p>Select the passenger car to be illuminated and disassemble. The number of LEDs used will depend on the length of the car size. Check documentation for instructions on how to disassemble the car. Usually tabs or screws secure the shell to the chassis.</p>	<p>In this case tabs secured the cabin to the chassis and were gently separated. If the car has a means of Track electric pickup the wheel sets with copper collars are not needed</p>

## 2. Preparation of the LED Driver unit

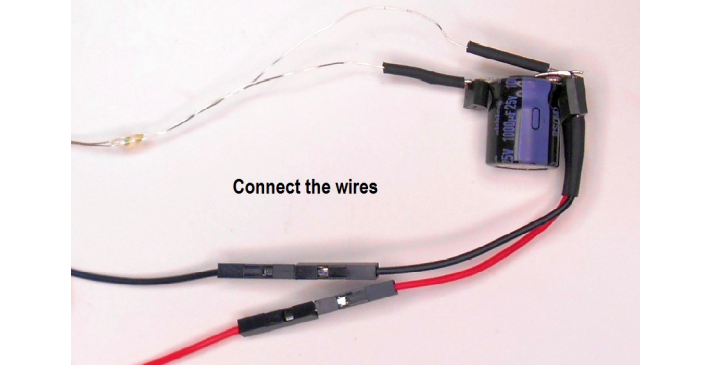
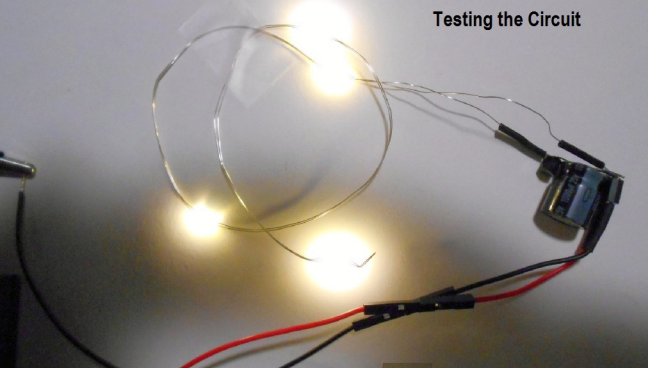
		
<p>1. Bend out both of the pins labeled with the tilde ~ symbol on the Bridge Rectifier (BR). Note the beveled edge or notch to orient the chip. Markings are present on the body of the chip.</p>	<p>2 A) Cut the Dupont wires 2" from the female plug B) Strip 1/4" off cut ends and tin with solder</p>	<p>3.A. Add 3/8" of heat shrink to the wires B. Solder the ends to the pins marked with the tilde ~ symbol. Preferably put the red wire on the pin opposite the pin marked with the + symbol for easy identification.</p>
		
<p>4. With the grey side (negative) of the capacitor facing you bend the leads of the Capacitor to the left.</p>	<p>5. Line up the Positive (long) lead of the Capacitor with the Positive Pin of the BR and solder together. Repeat with the Negative lead of the Capacitor soldered to the negative pin of the BR.</p>	<p>6. With the flat side of the LED Driver Chip facing you, identify the VA lead on the left and VB lead on the right. Bend the VA lead back and VB forward. Cut off the center lead. It is not used.</p>
		
<p>7. Solder the VA lead of the LED chip to the Positive junction of the Capacitor /BR joint</p>	<p>8. Trim off the excess leads extending from both Capacitor BR joints.</p>	<p>9. Completed compact LED Driver module.</p>





### 3. Add the Mini LED string

		
<p>10. The wires from the LED string will be soldered to the LED Driver unit. The Pos + wire to the VB lead and the Neg wire to the Negative lead of the Capacitor/BR</p>	<p>11. Cut the Positive wire so as to line up the VB lead. Burn off the lacquer from wire end to expose the wire and add 1/4" of heat shrink tube to both wire ends</p>	<p>12. Solder the positive wire to the VB lead and the negative wire to the Capacitor/BR negative junction. Cover and heat shrink the wires with heat from a lighter.</p>

### Testing

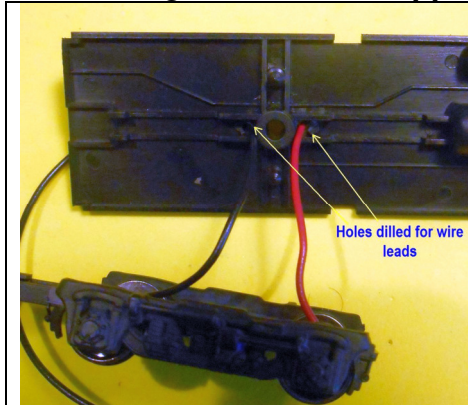
	
<p>13. Trim and tin the free ends of the wires of the male Dupont wires. These wires will be connected to track pickup. They can be connected temporarily to the female connections for testing the light circuit.</p>	<p>14. To test touch the free ends of the wires to the terminals of a 9 Volt battery. If OK proceed to the next step. If not recheck all connections.</p>

### Installing the LED Circuit and connecting to Track pickup

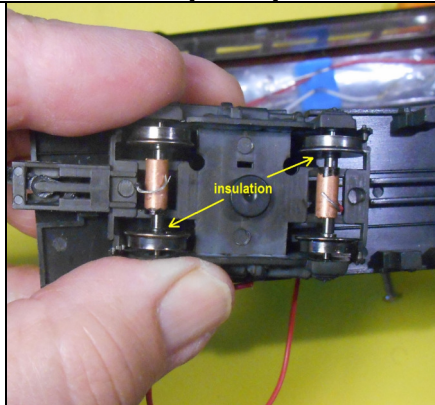
	
<p>15. You can reduce the number of LEDs to match the size of the car by cutting off the end LED along with the excess wire. Separate the cut ends so they do not contact</p>	<p>16. Curl the wires and position the mini LEDs in the roof. Attach with double sided or clear tape or glue gun. The cabin could be darkened by painting with black or brown wash. (optional)</p>



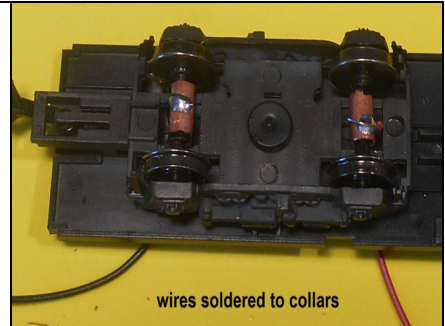
## For Passenger cars with Copper Collar Track pickup



Holes are drilled in the floor of the car near the connection point and the male wires threaded through

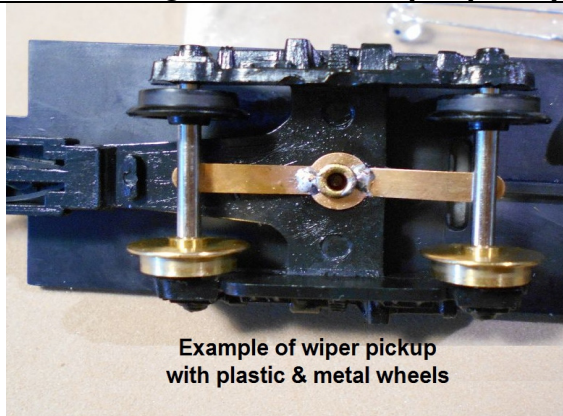


The end of the wire are set by bending over the copper collars. Note the opposing insulated wheels marked by black band .

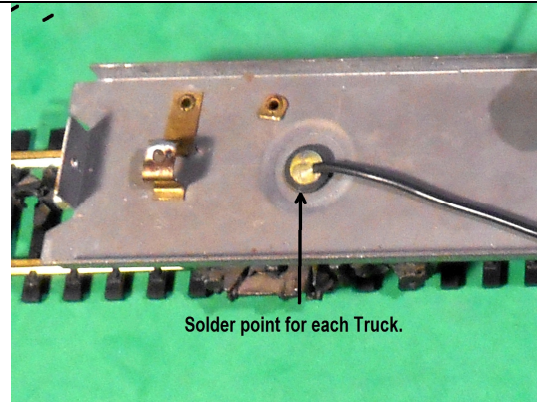


Solder the wire ends to the copper collar and reconnect the truck to the chassis. Reconnect the Dupont plugs

## For Passenger cars with Wiper pickups

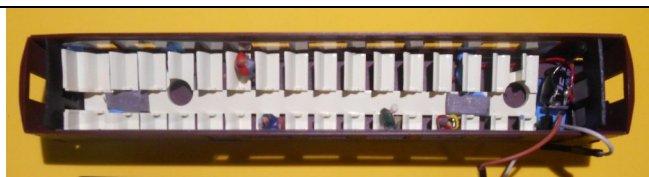


With wipers on each axle one truck picks up and other delivers current via the central pivot point.



The male wires are soldered to each of these pickup points This may require adding wire to one wire.

## Reassemble the Car



Add interior features such as seating or passengers to the car interior and position the LED driver unit in one end of the cabin. Reattach the roof with the LEDs in place. The LEDs will light when track voltage exceeds generally 4 volts.



**Kits** for this Project are available at the website [modeltrainsounds.com](http://modeltrainsounds.com) under Project These include

- 1) HO- Passenger Car with 4 Mini LEDs Lighting Kit without Track pickup
- 2) HO- Passenger Car with 4 Mini LEDs Lighting Kit with 36" wheel sets with copper collars installed
- 3) HO-Electric Pickup Wheel sets 33" or 36" wheels with copper collars installed