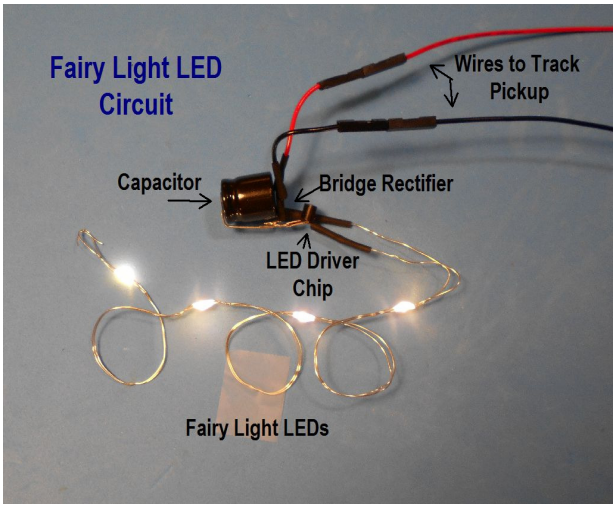
Using "Fairy" String LEDs for Lighting HO Passenger Cars

from modeltrainsounds.com *Robert J. Wilkins (Aug 2020)*

A compact, simple, lighting system for HO Scale passenger cars can be accomplished using "fairy" string LED Lights that have recently become available for use in decorative home lighting. These LEDs are gallium surface mounted LEDs, roughly the size of a rice grain. They are arranged in parallel sequence connected by thin lacquer covered wires that form a string of lights operating at a low voltage. The lighting of passenger cars can be accomplished using either a track pick-up system or using an on-board battery and switch. Four of these "fairy" LEDs can continuously light a car for several days using this battery option.

1. Using Track Pickup.

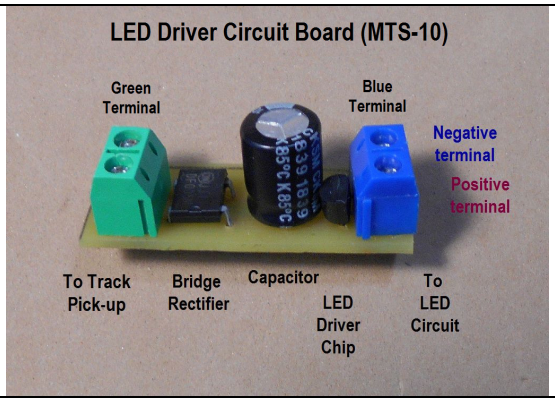
The electric circuit used here was first described in 2018, Project 3 at the website www.modeltrainsounds.com. The three components include a **Bridge rectifier**, that corrects polarity to maintain lighting for forward and backward movement of the passenger car, **a capacitor** that maintains voltage when temporary interruption of electric contact occurs and a **LED Driver Chip** that reduces to current flow to the LED circuit to a maximum of 20 milliamps. These components are used to light the LED circuit. Too high a current will burn out the LEDs.



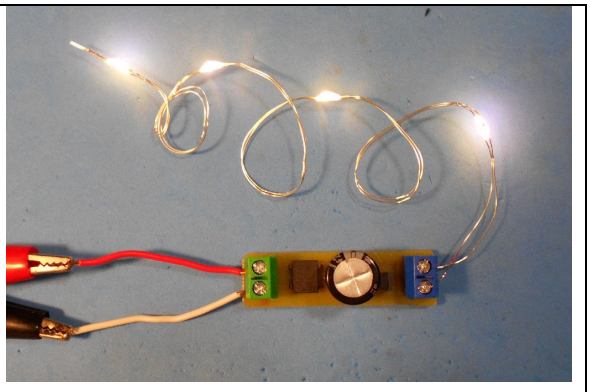
This same circuit can be used to light a string of 4 or more fairy lights. This circuit requires soldering of the components however the compact unit that can be fitted into passenger cars to which interior features such as seating for passengers will be added.

A circuit board has now been designed to accommodate the electrical components to eliminate soldering. The fairy light string of LEDs can be cut into sections of four LEDs. The end wires are exposed by burning off the lacquer. These short strips will provide good and adequate illumination for most passenger cars in HO scale. For smaller cars simply cut the string to reduce the numbers.

.

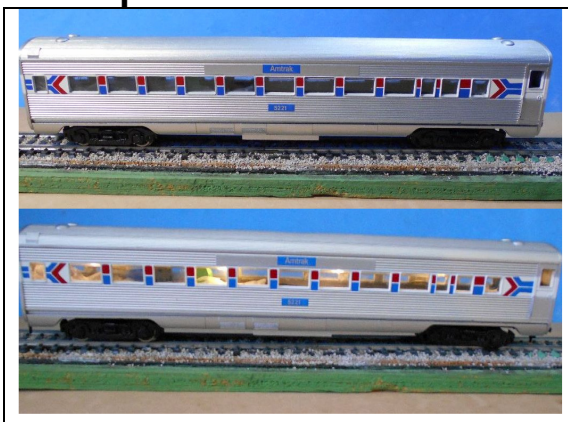


LED Driver Circuit Board for using Track electric pickup.

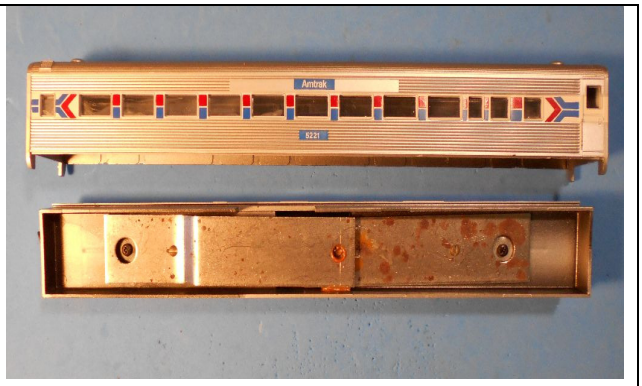


Fairy LEDs lit by using the circuit board. Tested here using a 9 Volt Battery

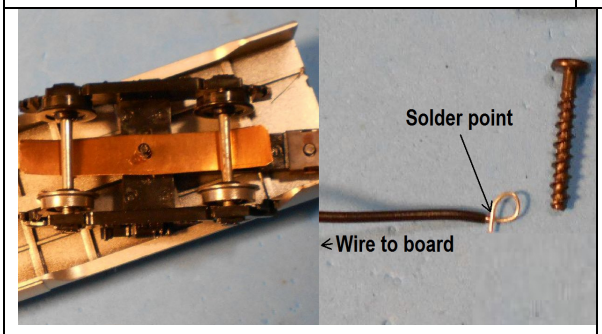
Example Installations



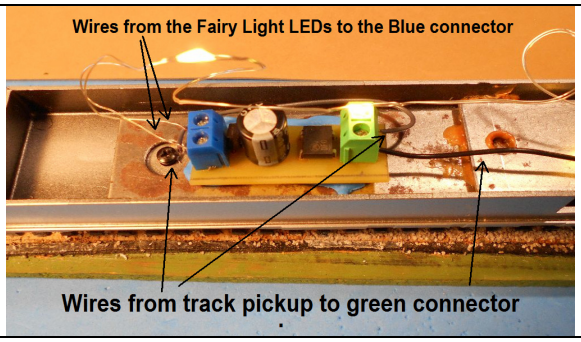
The lighting system was installed in this Ahearn HO Amtrak #5221 Streamlined Passenger car.



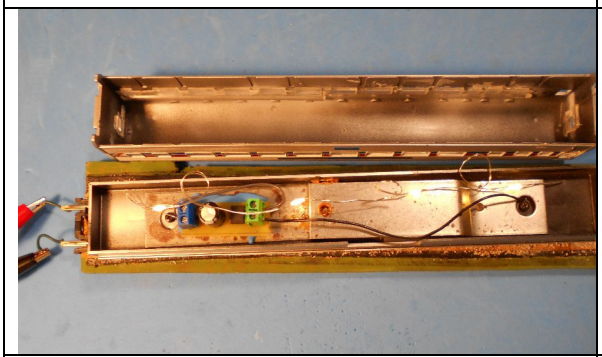
The cabin was disassembled by simply lifting it off the chassis. The Trucks were attached to the undercarriage via a long metal screw.



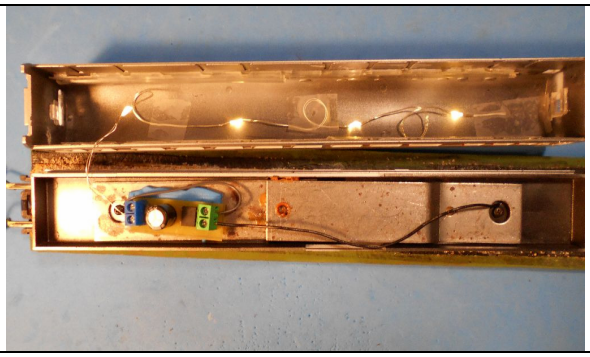
Track electric pickup was made using two wipers drawing current through the center holding screws. The connection used was solid 26G wire stripped at the ends and made in a loop. The screws were threaded through the wire circle then attached thru the floor, to each truck and the wiper.



The circuit board was seated on blue tack to insulate the board from the metal base.
The wires from both track connections were connected to the green plug. The fairy lights were connected to the blue plug. The positive wire was connected to the positive side of the blue plug labeled with a + mark.

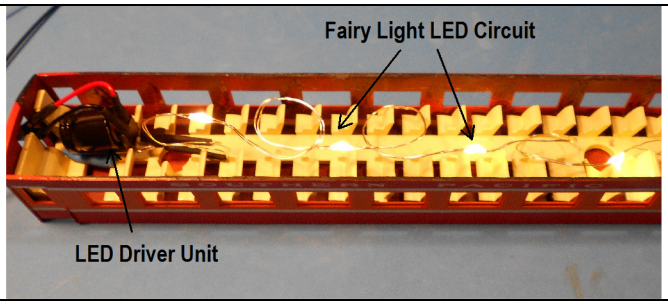


The circuit was tested on a section of HO track using a 9V battery connected to the track. If no lights check the circuit for gaps.



The lights were spaced out and secured to the roof with clear tape. The LEDs should face downward for good cabin illumination.

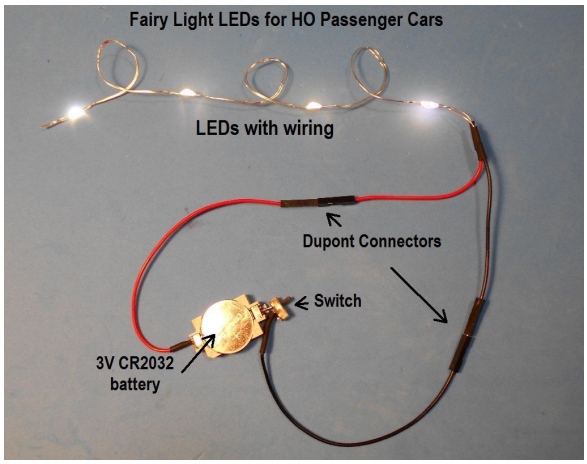
In this case passenger car seating was installed so the more compact LED Driver unit was installed and connected to the fairy light LED circuit. Here the lights was tested prior to reassembling the car.

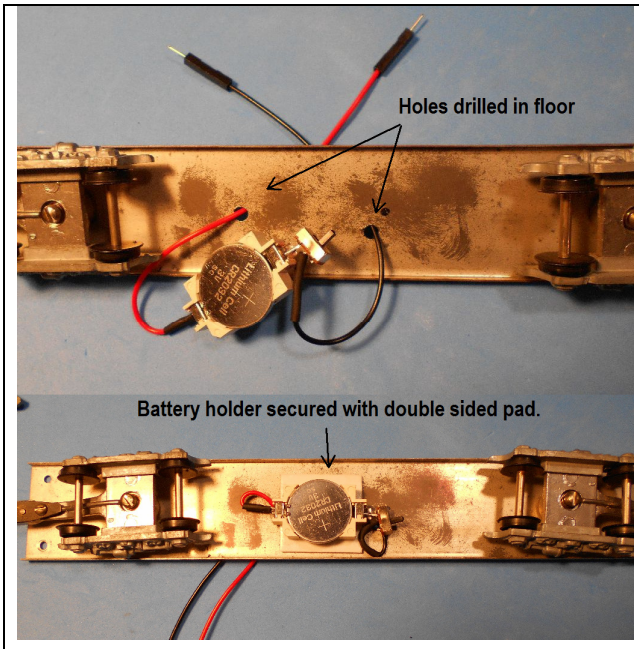


2. Using On-Board Battery *(for detailed installation instructions see Project 19)*

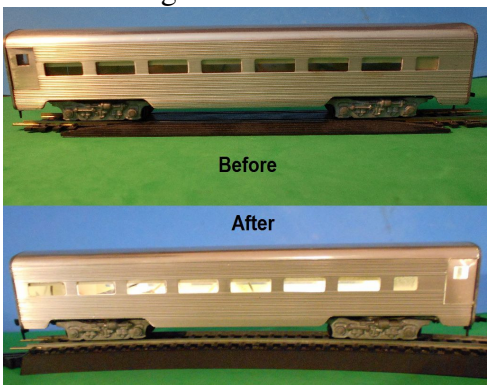
A small 3 Volt battery can also be used to illuminate 4 of these LEDs continuously for several days .

The circuit here is set up using a 3 Volt disc type battery (CR 2032) set in a low profile battery holder. A small micro-switch is attached . Wires with Dupont(R) connectors are used to link the battery to the 4 LEDs which are used for cabin illumination. This circuit is set up in the passenger car with the battery holder attached to the under carriage of the car hidden from view.

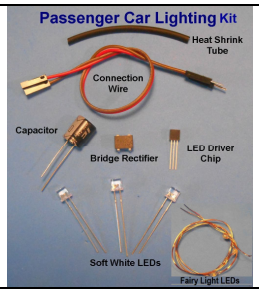




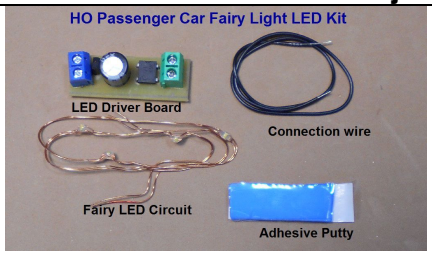
The wires pass through two holes drilled into the cabin floor. The switch is used to turn the lights on and off. The battery holder is secured to the undercarriage using a double sided pad. The switch is used to turn the lights on and off.



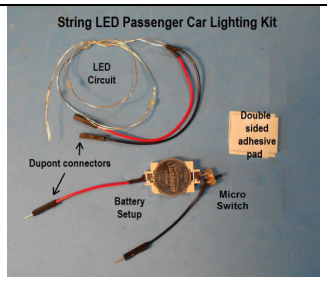
Kits available for this Project



Kit A Unassembled components



Kit B Assembled Circuit Board components



Kit C On-board battery components