

## Passenger Car LED Lighting-Quick Tips

Dec 2022

This assumes you are installing 12VDC strip 3528 led lighting in the roof of a typical Lionel, MTH, K-Line or similar passenger car that is already equipped with dual pickup rollers. And that you will be using a constant current lighting module, either hand built or purchased from a source such as Hennings. You will need enough modules to do the intended car set, one per car, plus approx. 2.5 to 3 meters of strip leds (60 leds per meter), plus misc tools including a good soldering station and 63/37 rosin core .032" electrical solder. Suitable 12V 5m 300 led reels are available inexpensively on ebay or Amazon.

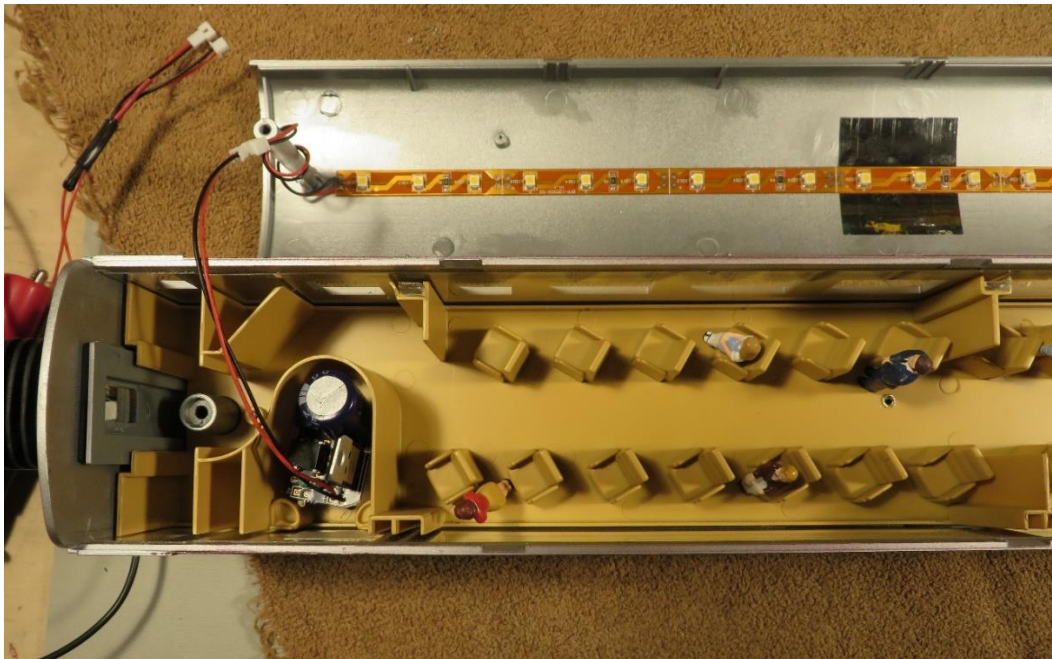
It's a good idea to preset all modules for the same output of 3-3.5ma current per segment; or about 20-30 ma for the whole strip. Each led segment is 5 cm long and has 3 leds and a series resistor like below. Warm white leds look right in most 20<sup>th</sup> century cars, whereas bright white looks good in modern Amtrack, Metroliner or subway cars. It's also best to start with a standard coach before tackling more complex vista domes or observation cars.



1. Open up the car by removing the roof or floor as required. Most ABS cars have two small screws that attach the roof to the body, one each end, accessible from the underside. ABS body Railking cars will then usually pop open at the roofline by grasping both ends of the car and *judiciously* twisting.
2. Premier ABS cars and other metal body cars typically have metal floors removable from the upper body with 4 screws from the underside. Some cars have the interior seating section affixed to the floor with screws. You will need to remove the floor to access the wiring underneath, like below. Silhouette window cars have no interior details to worry about.

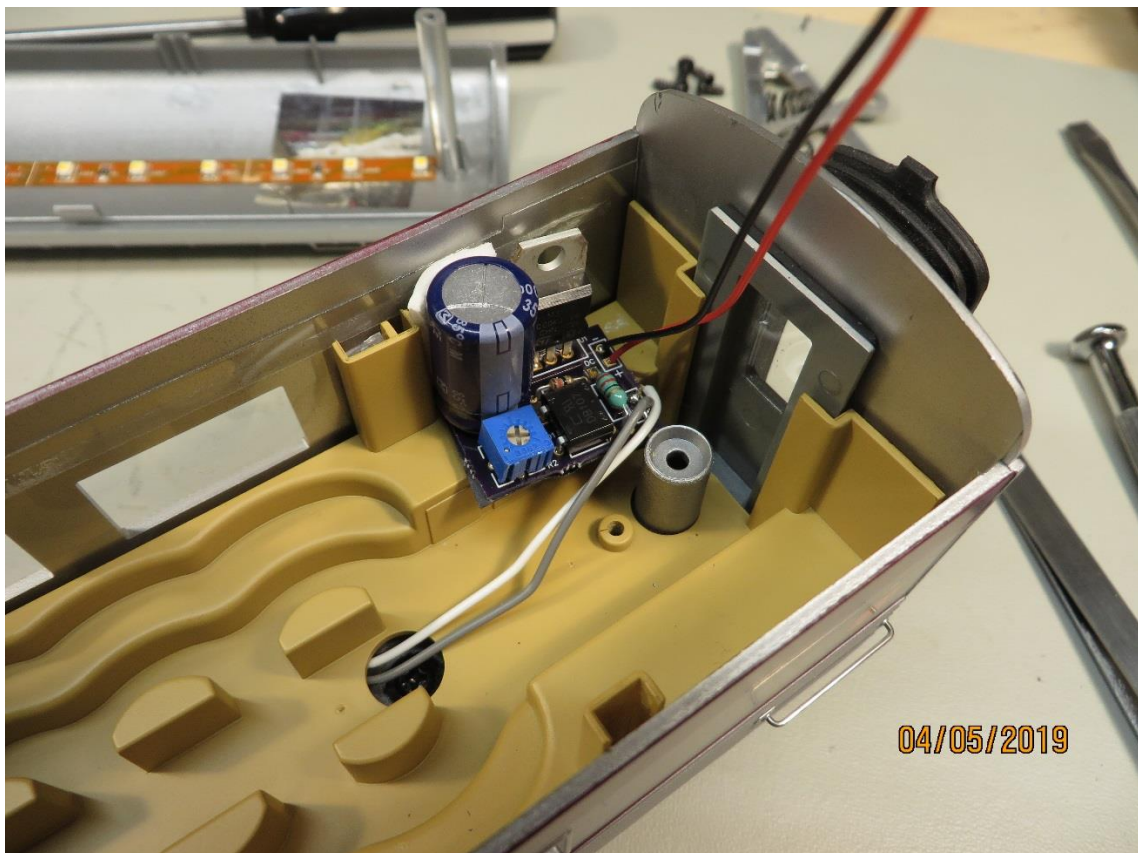


3. Select a suitable location for the lighting module, usually in an end vestibule, washroom, service corridor, or other inconspicuous area. Strip out all the old lighting but save one pair of track power wires long enough to reach the module location. These wires will be soldered to the AC input of the module later.



Note the common parallel hot wire between the power pickup rollers should remain intact for power to the module as detailed later.

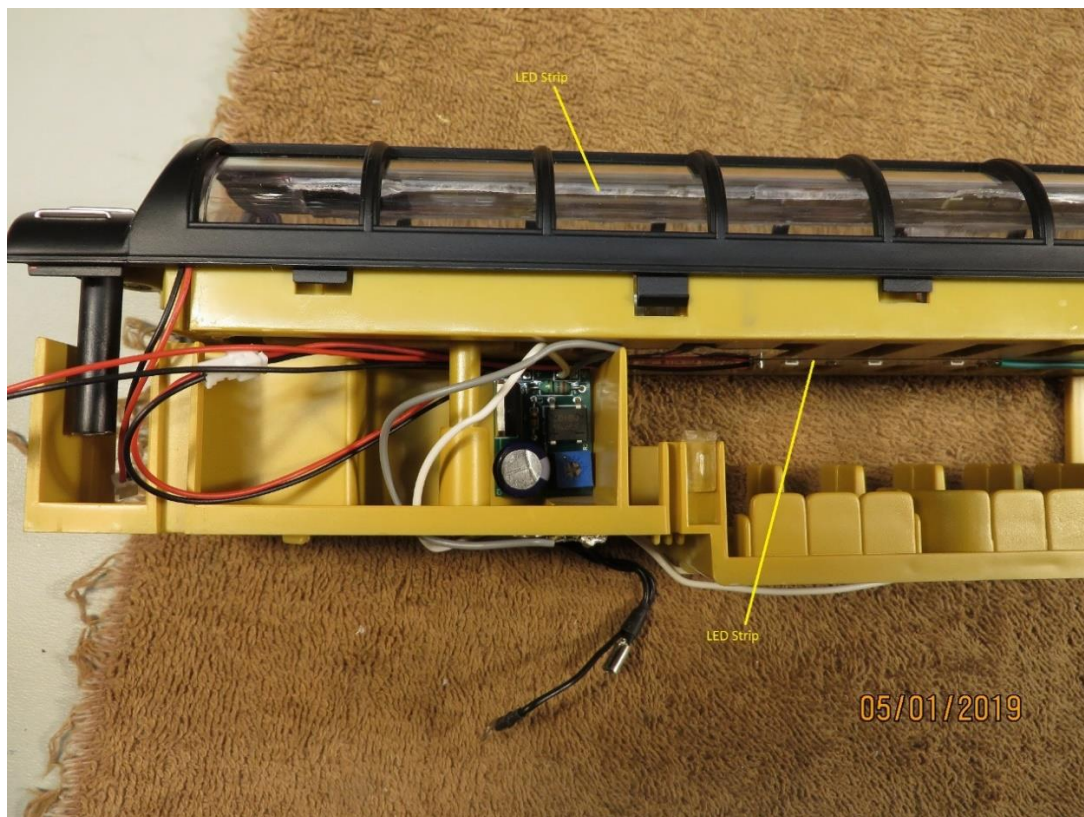
4. Measure the roof length where the lighting will be attached and cut a suitable length strip of leds, in 5 cm increments. Solder a wiring pigtail to one set of end pads. JST PH 1.25 series 2 pin M/F connectors are recommended. One connector is soldered to the led strip and the mating connector is soldered to the DC board output. Observe DC polarity. Apply the led strip along the center of the inside of the roof.
5. Drill a small hole in the interior seating assembly if required, and run the AC power wires up to the module location, one from dual roller hot and one from frame ground. Trim and solder the power wires to the board, either from bottom or top. Polarity of these connections is not critical. See below. Once the connections are done, affix the module in place using double sided foam tape or suitable glue. Note that the LM317 tab should not touch anything plastic as it gets quite warm.  
**IMPORTANT:** Do not affix the LM317 tab to anything metal that is grounded to the frame, unless you use an insulating kit. The tab **must not** be grounded. Nor should any part of the solder connections on the bottom of the board be in contact with anything metal.



6. Connect the M/F pigtail ends together before car re-assembly. This is a good time to apply AC power to one of the rollers and the truck frame to make sure the leds light up. Adjust intensity if needed using the small blue pot. If all is well and the light intensity looks right, close up the car. The excess pigtail wire length can be taped or tie-wrapped in an inconspicuous spot.

That's it, first car is done! Have a beer to celebrate. ☺

7. Repeat the process for the remaining standard cars, including diner and sleeper. Note that a sleeper generally has a full length corridor with a wall that is offset from car center and separates the hallway from the berths. It's a good idea to offset the led strip from roof center so it's roughly centered above this wall, so both the hallway and the sleepers will be lit.
8. For vista domes and full vista cars it's best to light the entire roof length above the seating in the dome, plus the windowed seating areas on the lower floor. This will usually require 2-3 more led sections than a standard car. Increase the module output linearly to allow for these extra sections, otherwise your dome car may look less bright than the others.



Behold:



9. A typical observation car will have red side marker bezels and a taillight bezel, either red or white. These can be lit by using 3 flat top 3mm white leds wired in series with a suitable 220-330 ohm resistor. This circuit can be soldered to a convenient set of copper pads on the main led strip for power. Then bend the led leads with pliers to align the led face right at the inboard end of each bezel.

A simple circuit board makes the job of wiring and installing these leds much easier, as shown below:



10. Lighting the baggage car is optional if desired. Most baggage cars ran dark except when stopped in a station.

11. The whole job will be more efficient if you pre-set all the modules, and solder the pigtails to them at the same time. Also cutting and pigtailing the main leds strip lengths all together will save time overall.

