

# Using LEDs to Model Fusees



Protect your train crews from collisions with this simple scenery detail

By John Brown • Photos by the author

**M**y journey to modeling fusees started when my brass Chesapeake & Ohio 0-10-0 steam locomotive needed a front headlight. There wasn't one on the engine when I bought it secondhand back in 1980. I checked my local hobby shop, but all the bulbs were either the wrong voltage or too large to fit the locomotive's headlight casting. Then I found the solution to my problem: Evan Designs white nano chip light-emitting diodes (LEDs).

Evan Designs produces pre-wired surface-mount LEDs in three sizes. Its

pico LED is the smallest, measuring only .5mm x .7mm x 1mm. Then there's the nano, which is .8mm x 1.1mm x 1.6mm. The chip, the biggest of the three, measures 1.1mm x 1.6mm x 3.2mm.

Evan's LEDs have a range of 9 to 18V volts and come equipped with a miniature circuit containing a resistor, which I liked. The LEDs will work on AC, DC, and DCC and have rectifiers.

I installed the LED into my steam locomotive by first drilling a hole through the brass headlight casting. I then set the LED in as far as I could. When I turned the track power on, the

LED blew. Then I realized my mistake – I had not noticed that the LED leads were bare. I had managed to touch one side of the LED to the brass headlight housing, causing it to blow. I installed another LED, this time placing white glue in the brass housing and making sure I had clearance. It fit perfectly.

I liked the LED's size and brightness and noticed that Evan Designs offered different colors, including warm white, cool white, red, yellow, green, blue, and orange. The red ones got me thinking as to how they would work on my model railroad.



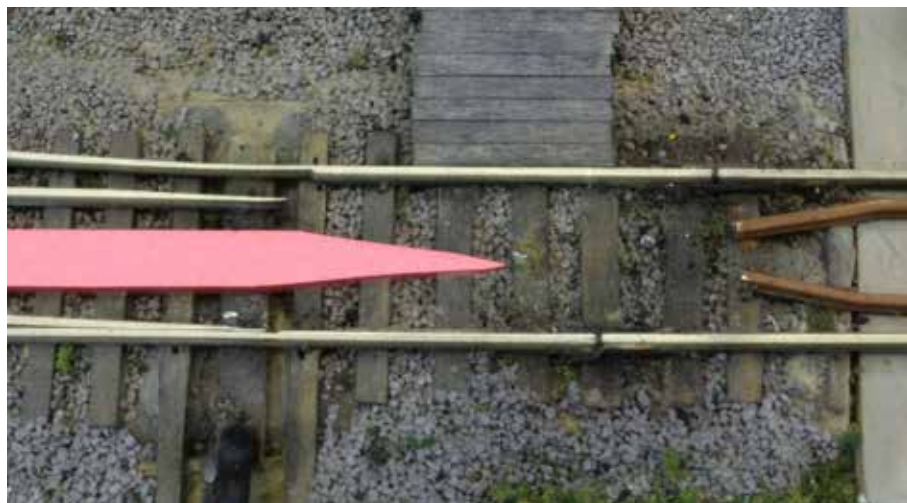
With the order board down for repairs at MA Cabin in Meyersdale, W.Va., the operator has placed a lighted fusee in the gauge of the rail to signal GP7 no. 5817 to stop. John Brown explains how he modeled this detail using light-emitting diodes.

### Solving safety issues

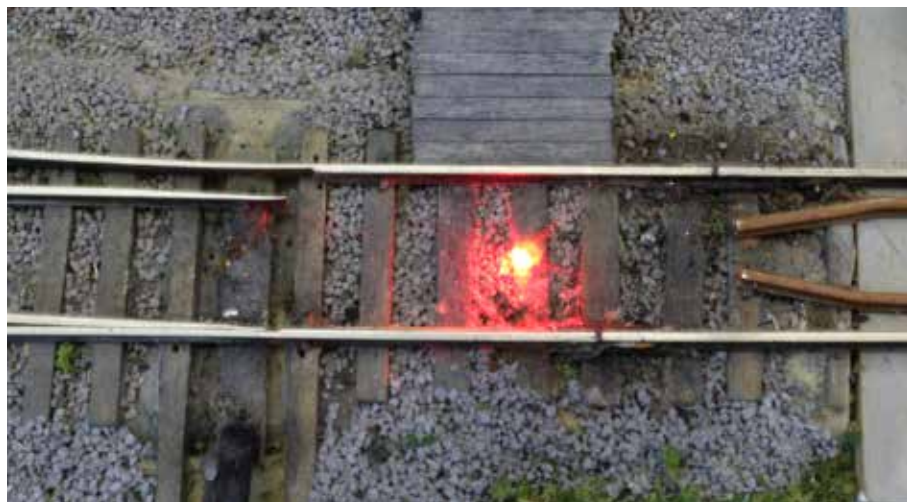
I model the Chesapeake & Ohio Ry. in the mid-1950s in the coalfields around Thurmond, W.Va. I have three freight yards and three small towns on my layout. The yards have Tomar single-head searchlight signals at their yard limits. When a train approaches the signal, the conductor calls the yardmaster. The searchlight signal changes from red to green and the train enters the yard. The yardmaster then returns the searchlight signal to red to stop other crews from entering the yard.



In the era John models, crews dropped burning fusees in the gauge of the rail to prevent collisions. This served the same purpose as a searchlight signal or order board, letting approaching trains know to stop.



Because of the LED's small size, it blends into the crosstie once it has been installed, looking more like a stray granule of ballast. John used a red arrow to point to where the unlit LED is located.



The illuminated LED is quite bright, making it easy for train crews to see under normal layout lighting conditions.



Chesapeake & Ohio 0-10-0 no. 136, fitted with an LED headlight, is stopped by the Callow Telegraph Tower for an updated switching list.

## Toning down bright LEDs

**If an LED is too bright**, add a small amount of similar colored paint. Enamel paint tones down the brightness by about 25 percent, while acrylics reduce the shine by half or more. Don't use hot glue when attaching an LED. Instead, use holding wax, Goop adhesive, white glue, or tape. – *John Brown*



John posed an HO scale conductor figure next to the LED and resistor he used for his fusee project. The LED is roughly the same size as the figure's hat.

Two of the towns, one on the main-line and one on a branch line, also have searchlight signals. Under typical conditions, the signals are green. When a freight crew is switching in those towns, the conductor changes the aspect to red to protect the train.

The searchlight signals are at the yard limits of the towns because each end of

the yard has a tunnel to convey a sense of distance and to break up the scenes. However, the tunnels restrict the crews' vision ahead of their train. The searchlight signals prevent train crews from bringing their trains into yard limits without the yardmaster's permission, potentially causing collisions or interfering with the yard switchers.

I also have one town, Rowland, W.Va., with four sidings off the main line, one of them double-tracked. All four of these switching locations are between tunnels, and a couple of times the following trains have run into the caboose of the way freights.

I wanted a solution to save the expense of another set of Tomar searchlight signals. In the era I model, crews dropped fusees between the rails to signal trains to stop. Like a searchlight signal displaying a red aspect or an order board at a station set to the "stop" position, no train was to pass a burning fusee.

## Installing the fusee

A red nano LED from my local hobby shop was the answer to protecting train crews. I installed an LED fusee on either side of the tunnels on both sides of my town and sidings. I picked a tie that was a fair distance from the tunnel portal so the engine wouldn't be idling in the portal. I then drilled a 1/8" hole through the ties, roadbed, and table.

I had to push the nano LED up from below the table because the resistor is larger than the LED. Make sure the hole is free of splinters and other debris so you don't damage the LED during installation. The LED should be seated just above tie level.

I ran wires to single-pole single-throw (SPST) on-off toggle switches at the sidings and town where crews would be switching. I applied white glue around the LED and in the hole in the crosstie to hold it in place.

In operation, when the wayfreight crew arrives and has switching work at the sidings or town, the conductor flips the toggle switch to the ON position, illuminating the red fusee in the distance. The crew can conduct its work knowing that the train has protection, since an approaching engineer should stop in advance of the fusee.

Once the crew completes its switching duties, the conductor sets the toggle switch to OFF, and the fusee goes dark.

Consider a fusee or two to protect your train crews when they're working industries on your layout. [MIR](#)

*John Brown is a National Model Railroad Association Master Model Railroader and an active member of the organization's Niagara Frontier Region. The Ontario resident is also a member of the Chesapeake & Ohio Historical Society.*