Northern Virginia NTRAK "How-To" Article

DWARF SIGNALS FOR TURNOUTS

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BY

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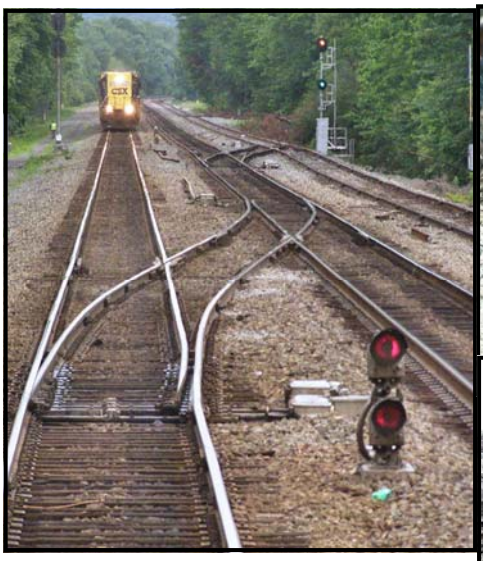


During a rail trip, I noticed dwarf signals were often used to indicate the position of turnouts. If they could be made small enough, they would be a good addition to modules with turnouts. After a little design work and a few failures, my two NTRAK POFFs now have my rendition of Dwarf Turnouts. This article shares how they were made.

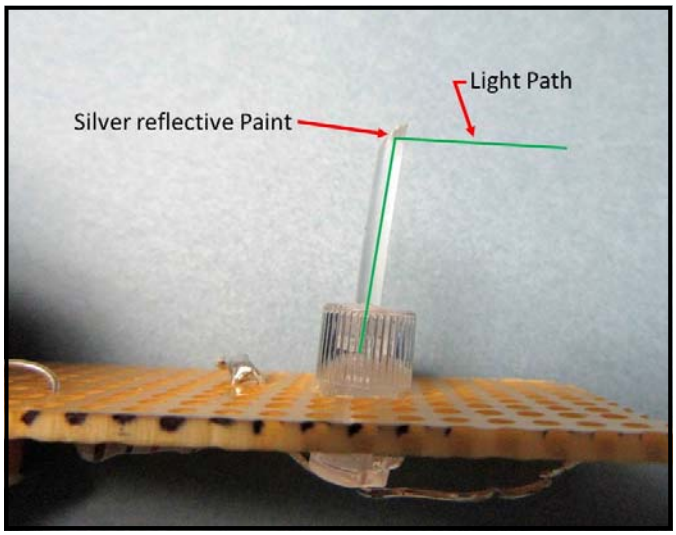
The goal was to have three ground level signals for each turnout, located on the right-hand side of the three tracks leading into the turnout. On the points side a green/yellow indication with green indicates the turnout is closed, and yellow that it is thrown. On the frog side each line would have a green/red indication, with green indicating the turnout is aligned to that track, and a red stop indicating the points are aligned for the other track. The signals also needed to be robust enough that they didn't get knocked over easily.

Failures: There were a couple of failures.

The first attempt was using 1mm surface mount LEDs. By the time I got them soldered to wires or a board, the assembly was too big to work. My microminiature soldering techniques were not very good.

The second attempt was more successful, using bicolor LEDs and a length of fiber optic cable. Since the signal needs to shine parallel to the track, the light needs to be turned 90 degrees. A tight bend will not work, but by cutting the fiber cable at a 45-degree angle some of the light is reflected through the back side. It worked on some areas of my home layout, but

Fiber Optic signal on my home layout was hard to see in well lighted areas.



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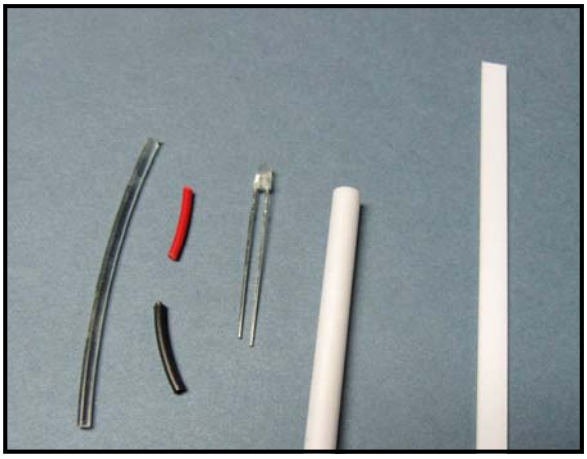
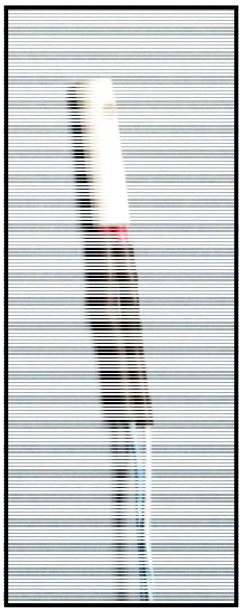
only in low light areas.

Design: The final design puts the LED in a tube at track level with a small piece of fiber optic cable to act as a lens. It provides adequate light, is directional, and rugged enough to withstand a few hits. The signal is installed so the top is below the top of the rails. It is a compromise, being a little bigger than I would like.



Construction: Construction is actually easier than describing how it is done. Materials include:

- Tubing 4.8 mm in diameter with a 3 mm hole in the middle.
- Plastic strip 5 mm wide and 1 mm thick to make a top for the tubing.
- Green/Yellow and Green/ Red T1 (3mm) bicolor LEDs.
- 2 mm Fiber optic cable.
- Sheath from 20-gauge wire to insulate LED wires.



The tubing is cut into ¾ inch lengths and a small cap is glued on the top with CA. When dry, the cap is cut and sanded to the shape of the tubing. A 2 mm hole is drilled in one side of the tubing near the top. The LED just fits inside the tube, so you need something thin to insulate the two leads. Shrink wrap is too thick to work. The Green/ Yellow and Green/Red LEDs also look the same. Different color insulation was stripped from 20 gauge wire and used to distinguish the two types of LEDs and mark which leg was the green anode.

Hook up wires were soldered to the LED leads and insulated with shrink wrap. Use whatever wire is handy; in my case it was 32 gauge twisted pairs for computer hookup cables. Put a little of your favorite glue on the top of the LED and insert it into the tube. It is a tight fit, so a little force is required.

With a razor saw cut a 1/8-inch length of the fiber optic cable and polish the ends with 600 grit sandpaper. Insert the fiber optic piece in the hole and glue it in place with CA.

Installation on the module is relatively easy. Drill a 3/16-inch hole next to the track where you want the signal. Sand the outside of the tube so glue will stick. Run the wires down through the hole. Add some glue, I used Weldbond, and push the signal down into the layout. Check to make sure the

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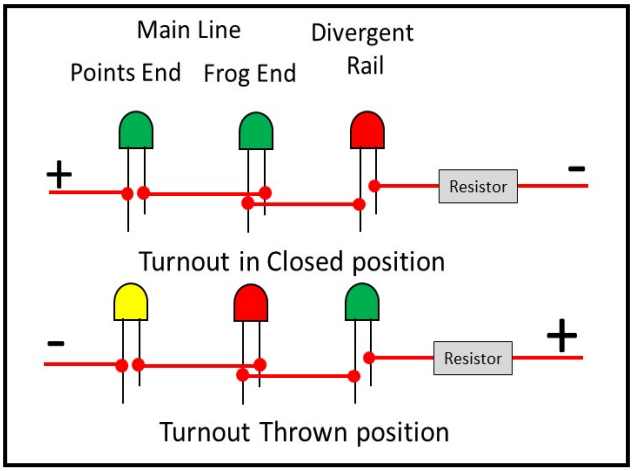
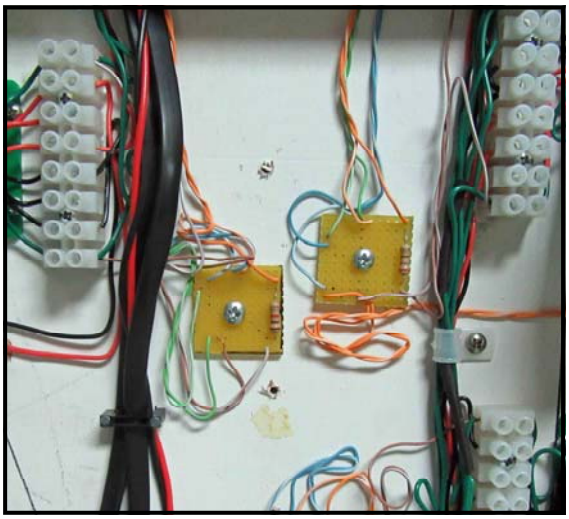
top of the signal is below tack level and the fiber optic cable is pointing in the right direction. Install the other two signals and let the glue dry before wiring the Signal.

Wiring: With the three dwarf signals installed there are now 6 wires sticking out of the bottom of the layout. My turnouts are controlled by Tortoise switch machines and power for the LEDs is taken from terminals 1 and 8 of the Tortoise. The LEDS are wired in series as shown below.

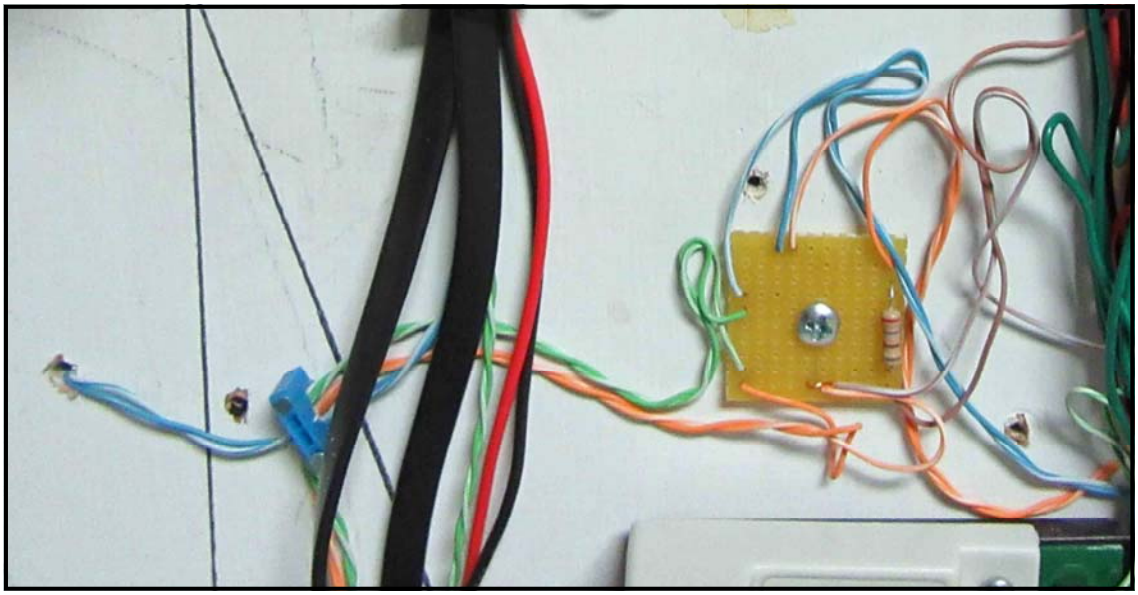
The resistor value was selected by trial and error to provide the design 2 volt drop across each LED. On my modules the power to the Tortoise is 9 volts DC and I started with a I KOhm resistor and worked down to the appropriate size.

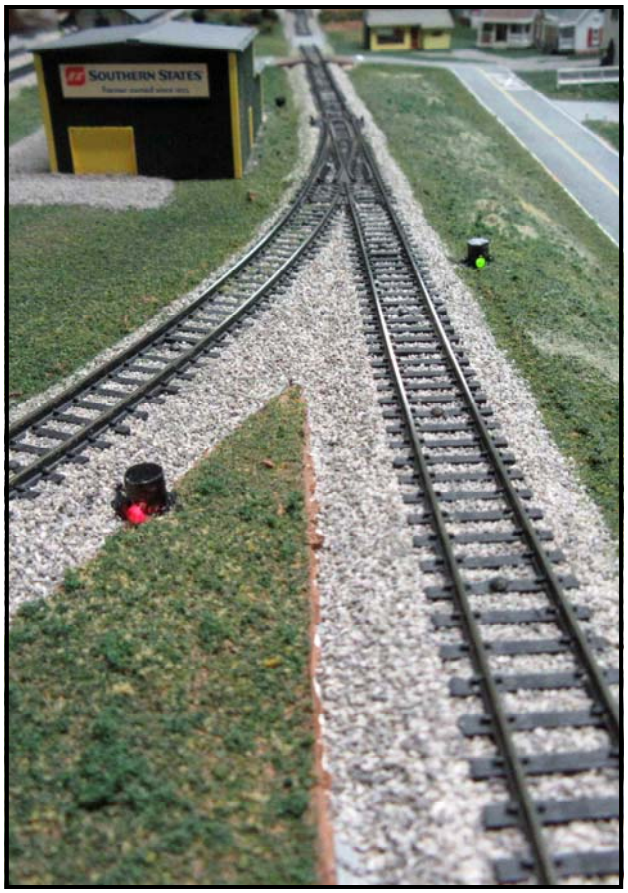


Plus on long lead for G/Y LED is green and on R/G LED it is Red which is a little confusing.



I used a small piece of PC board to organize the wires. It can get a little confusing, so initially I just twisted the wires together, tested to make sure lights were correct, then soldered the wires.

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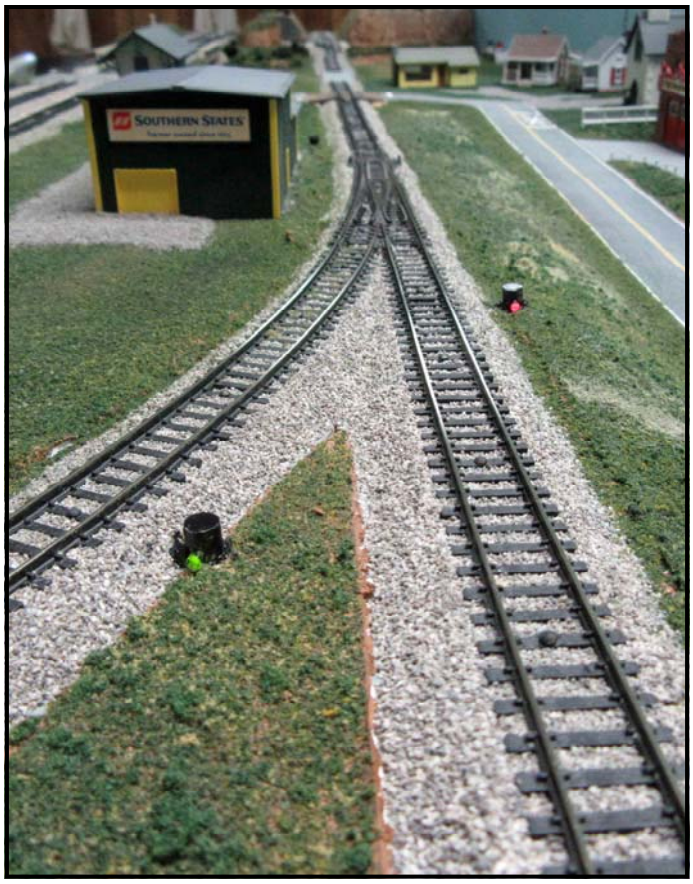
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