PRACTICAL SIGNALS FOR DC BLOCK CONTROL LAYOUTS

BY

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Practical Signals for DC Block Control Layouts

CN4700 heads out of Marlayna Yard passing under the Signal Bridge after getting the Green light to enter the main track heading West to the Ariel Grain Terminal

DCC is a wonderful development in the Model Railroad Hobby, but not all long standing model railroaders are using it. Perhaps there are not many good reasons for this, but the most credible relate to cost of converting all of our pre-existing equipment to DCC, and the time it takes to do it. OK so this is just laziness, but until we get around to converting we can still think analog cab control is more realistic and faithful to the prototype, at least on the dispatcher end. How many real locomotives have a remote control DCC device inside?

Of course there are many disadvantages to analog DC and conventional block control. One of these is keeping track of which direction (Polarity) each block is set to, especially if you are running more than one train. My railroad, the Spiritwood Subdivision of the CNR, has thirty electrically isolated blocks, each controlled by an Atlas #220 Controller, divided among three separate control panels (see page 10). This allows individual direction and cab control of each block. As one can imagine, it is sometimes difficult to remember which direction the polarity is set to for each block. This is where “Practical signals for DC Block control layouts" might be useful.

I have each block wired to a track signal which lights green for a train heading into the block if the polarity is correct for that train to do so, or lights red if the polarity of the track in the block is set against the direction the train is heading. Of course a train leaving one block and entering an adjacent block with opposite polarity, will stop as the train enters said block, causing a short circuit. If the track signal shows red as the train approaches the block, the operator simply switches the direction control (polarity) switch on the Atlas Controller supplying that block. The signal changes to green and the train proceeds uninterrupted on its journey.

PRINCIPLE OF OPERATION

If the right side of the track is positive voltage and the left side is negative, the motor in the locomotive moves the engine forward. If the polarity of the track is reversed, the locomotive moves backward. The signals are built using standard LEDs. An LED is a Light Emitting Diode that will only allow current to pass through it (lighting the bulb) in one direction, from cathode to anode. Using two LEDs for each signal, one green and one red, the LEDs are wired to the track so that when the polarity is such as to allow forward passage of the train, the Green LED lights, and when the

polarity of the track is opposite, the Red LED lights (but not the green). The operator knows if his locomotive is approaching a block facing a red signal light, he has to switch the polarity of that block, using the Atlas Controller, (and thus changes the signal to green) prior to entering that block. Sounds just like the prototype to me!

TRACK DIRECTION (POLARITY) INDICATOR

See the schematic diagram Fig.1 below for how to wire the LEDs.

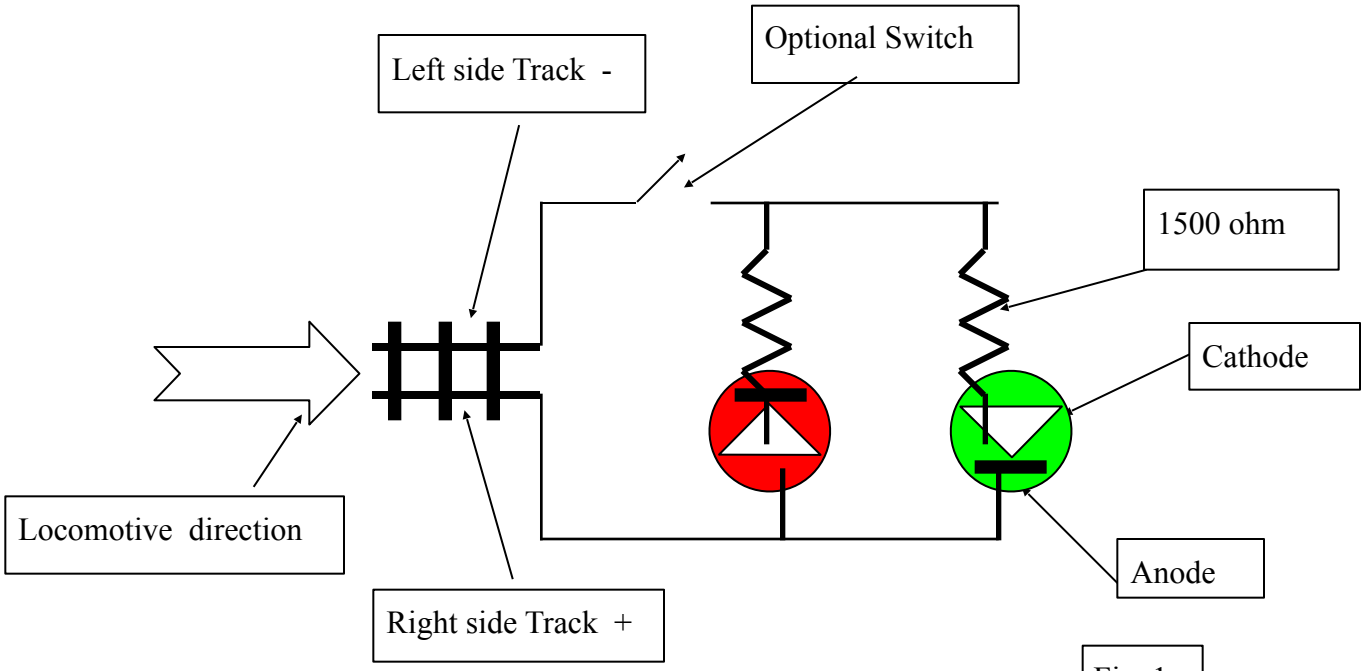


Fig. 1

LEDs have a current and voltage rating which determines how much resistance is required to precede the LED in your circuit to keep it from burning out. For this project I used 5 mm LEDs rated 3500 mcd. These LEDs have a 3.5 voltage drop and are rated to handle 30 ma current. If the track voltage approaches 17 to 18 volts, and the LED has a 3.5 voltage drop, using Ohm's law R = V/ I, then R = (17-3.5)/.030 = 450 ohms of resistance required to precede each LED. I find the LEDs to be very sensitive to the track

voltage (and bright) and so use more than double this resistance in the circuit to safely protect the LED from burn out. I use two 1500 ohm ½ watt resistors connected in series with each LED. To aid in lessening the confusion when wiring your constructed signal to the track, standardize the wiring to the LEDs by using yellow wire to the cathode, and black wire to the anode of each LED. Place a small piece of green masking tape on the wires to the green LED. Place the green LED at the top of the signal face, and the red LED at the bottom. Note that the short lead on the LED is the cathode. It helps to bend the short lead a little to make for ready identification of the cathode lead when wiring. Use pliers as a heat sink to protect the LED when soldering.

BUILDING THE SIGNAL

Make the signal face out of one end of a wooden tongue depressor. This works well for HO Scale. Round both ends of a 2 inch length. One end will already be rounded for you. Drill 13/64 inch holes at either end of the signal face through which you will insert a green LED at the top and a red LED at the bottom. I use Evergreen Scale Models Strip Styrene, 010x.250" (1/4), around the periphery of the signal face to give it 'depth' and use .010x.156" to make the sun shades over top of each LED. For N scale you might try constructing this with a Popsicle stick? See Fig.2.

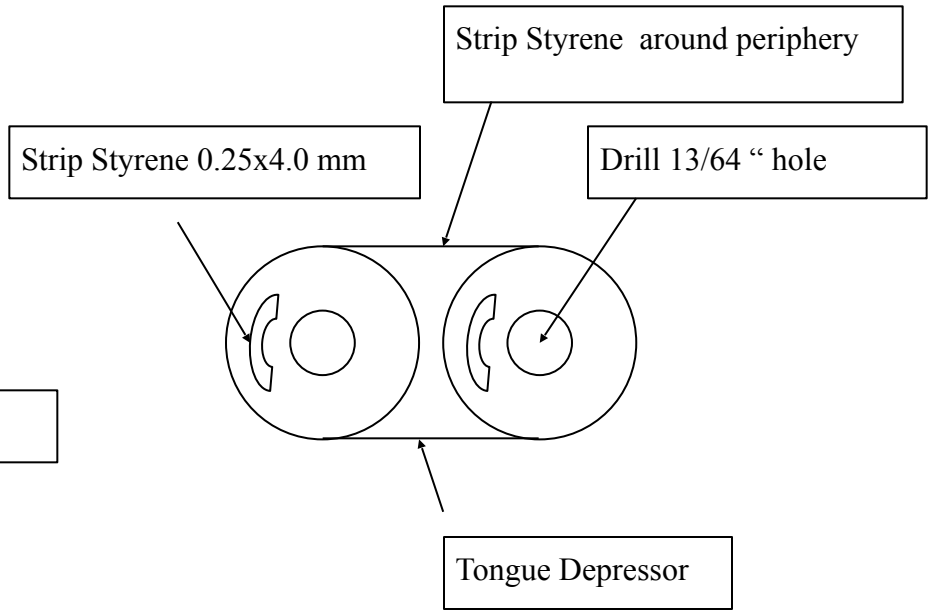


Fig. 2

Use a heat gun to fasten these strips to the wood signal face. The excess glue will simulate a weld. Paint the assembly black prior to inserting the LEDs. Using 5mm LEDs and 13/64" diameter hole in the signal face gives a snug fit to the LED without having to glue it, making replacement of the LED easier if necessary. Most likely the LEDs will last forever! These signals are slightly larger than HO scale but are a practical size to hold the LEDs and to visualize from a distance when operating your railroad.

The signal faces are mounted on aluminum tubing serving as the signal posts. I used KS Engineering 5" lengths of 1/4" x.014 aluminum tube (Stock # 106) or use 3/16" x .014 (Stock #104).

To each LED's cathode solder a 5" length of yellow 22 G wire and to each anode a 5" length of 22 or 24 G black wire. Label the wires from the green LED with a small piece of green masking tape. Insert each LED into the predrilled holes of the signal face, green on top and red on the bottom. Wrap each LED wire with black electrician tape to prevent shorting. Using two pairs of pliers, hold the LED wires at the base of the LED and bend the wires to 90 degrees to vertical. Wrap black electrician tape around wires at the

base of the signal face prior to inserting the wires into the aluminum tube. Push the tube all the way over the column of black taped wires right to the base of the signal plate. See Figures 3 and 4.

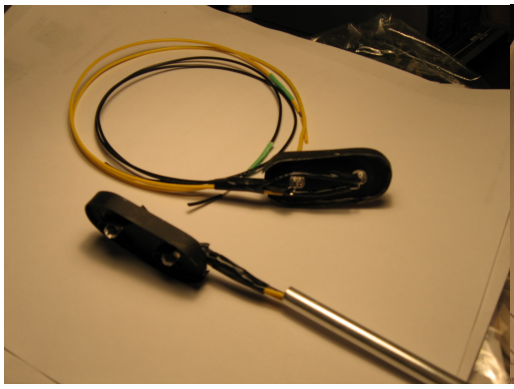


Figure 3

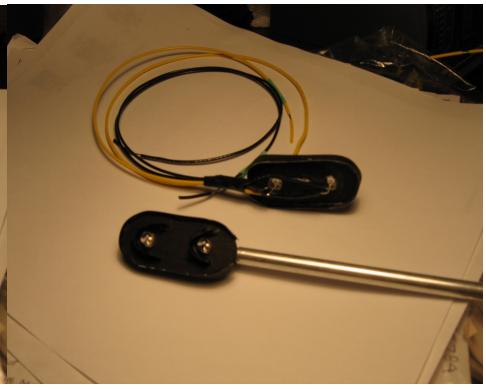


Figure 4

You now have a completed signal ready to wire to your track. There will be 4 wires, 2 yellow and 2 black, with one pair labelled with green masking tape indicating these supply the green LED. Wire according to the schematic diagram. (Fig.1) You can pre test prior to final soldering to make sure you have the direction/polarity indication correct for where you want to place the signal. You may wish to make ladders to attach to the signal posts.

The second included wiring schematic (Fig. 5) is that of a Switch Alignment indicator using Atlas Snap Relays and the same principles for connecting the LEDs as in the direction signals. In this case, the LEDs are all wired the same way to the snap relay terminals, as there is no polarity reversing to be concerned about. The LEDs are wired in each signal such that the signal face over the aligned track lights green while the signal over the non aligned track lights red.

I hope this project lights up your railroad and your day just as it did mine!

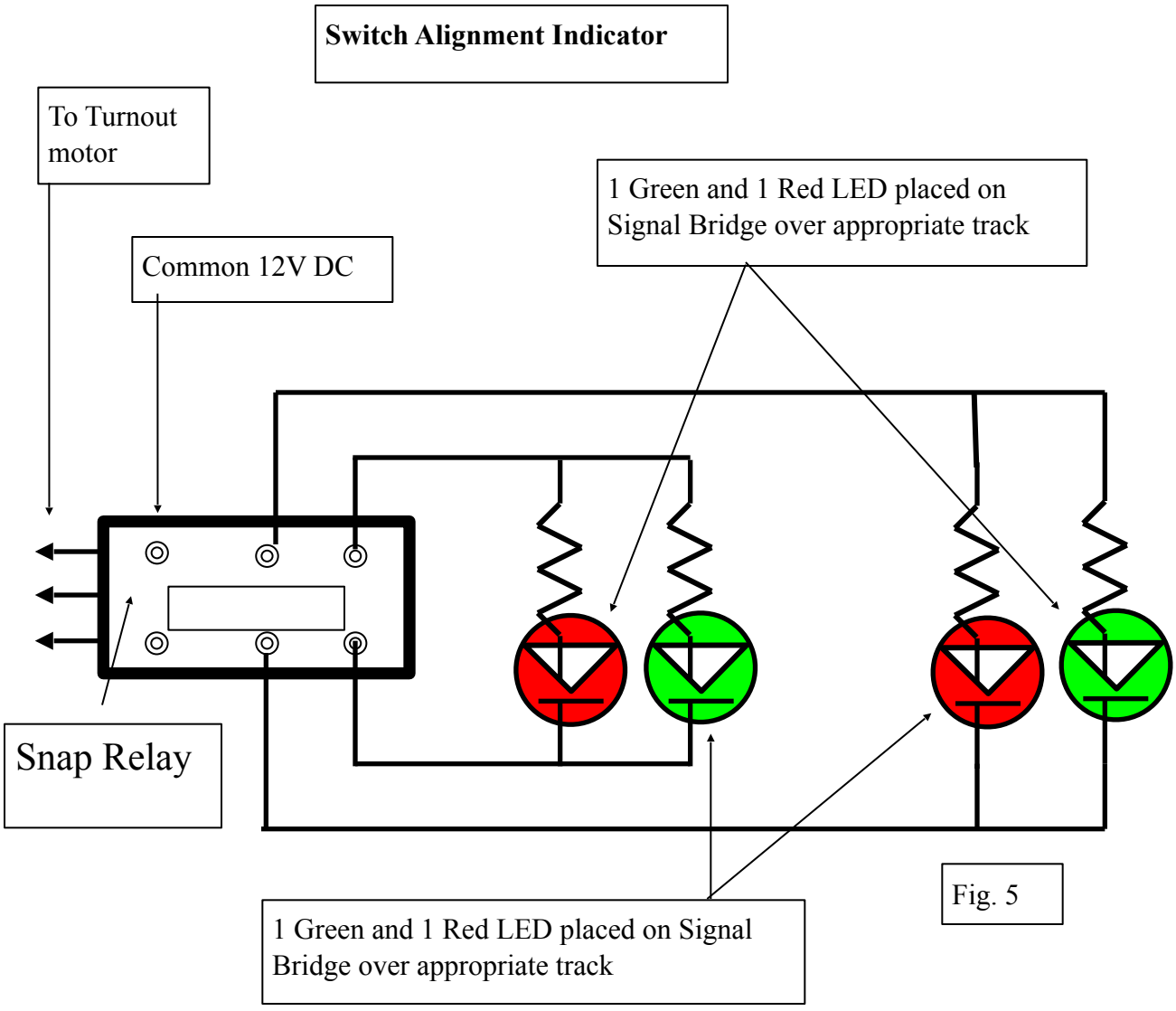


Fig. 5

PARTS LIST:

Evergreen Scale Models Kirkland WA, 98034

Styrene Strips: Item #109 .010x.250” (1/4) (0.2 x6.3mm)
Item#107 .010x.156” (0.25x4.0mm)

K & S Engineering Chicago:

Rd Aluminum Tube ¼ x .014 (6.35mm x .355 mm)
Stock # 106

Rd Aluminum Tube 3/16 x .014 (4.76mm x .355 mm)
Stock # 104

Electronic Parts:

LED Red 3500mcd 30 DEG 5mm
LED Green 3500mcd 5mm

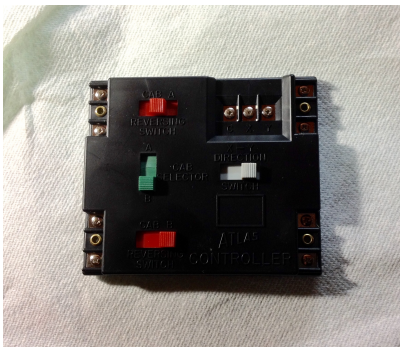
Resistors ½ watt 1.5 K ohm

#22 GA Hook up wire Yellow
#24 GA Hook up wire Black
#18 GA Hook up wire Red

Mini Toggle Switches SPST

Miscellaneous:

Wooden Tongue Depressors
Black Paint
Heat Glue Gun
Black Electrician tape
Soldering Iron



THE ATLAS #220 CONTROLLER

ONE OF MY CONTROL PANELS

CN3533 APPROACHES MAXWELL LAKE CURVE UNDER SIGNAL CONTROL

MEANWHILE CN4700 EMDGP38-2 WAY FREIGHT TO YOUBOU, BLINDED BY AFTERNOON SUN, WAITS FOR TRACK CLEARANCE AND SWITCH ALIGNMENT AT THE SQUAMISH INTERCHANGE SIDING

Cover: CN3533, 2-8-2 Mikado Steam Freight, with the green signal races up Maxwell Lake curve en route to Squamish yard. Shot with an iPad 3 with driver wheels spinning on a 2.5% grade.

ABOUT THE AUTHOR

Doug Dyer is a retired Radiologist who has been a model railroader in HO scale since receiving an American Flyer train set at age 6 under the Christmas tree from Santa Clause. He is currently CEO of his own Canadian National Railway, Spiritwood Subdivision. He and his wife Jan have six grandchildren and live in Victoria, British Columbia.