DCC Friendly Turnouts

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When DCC systems came on the market, we were told that they would make wiring of new layouts easier and were compatible with existing railroads. On existing layouts, all you had to do was remove the DC power supplies and replace them with the DCC system.

Then the problems began to arise. First, and probably the most important, is that common rail systems are NOT compatible, in most cases. Common rail systems use isolated power sources and DCC systems are not isolated.

Next, with most DCC systems, when an electrical short occurs, the power is immediately shut off to the track. DC systems, however, have a long delay in their short protection circuitry allowing the train to "roll through" intermittent shorts.

Most of us have realized that turnouts are a prime electrical short source. With DCC systems, we see that mostly when "non-friendly" turnouts are used. Having used both types on DC systems, I originally called the "non-friendly" turnouts power routing. These can be identified by turnouts with solid rail from the points through the frog. In fact, one way of hand laying turnouts is to lay out those rails, soldering them at the frogs. The power is directed to frog through the points when they contact the stock rail (the outside rails of the turnout). Figures 1 and 2 show such a turnout in the straight and diverging positions. An advantage of power routing turnouts is that sidings will not be powered unless the turnout is aligned for them.

Because both points are connected at the frog and usually with point conducting bars, the polarity of the points is opposite from the stock rail that the point isn't contacting. When a metal wheel flange, locomotive or rolling stock, passes between the point and the stock rail, intermittent contact between the two may occur. As stated earlier, this is probably no problem with DC systems, however, DCC systems may shut down, stopping the train.

To eliminate this problem, DCC friendly turnouts are used. What makes them different? The polarity of the point rail is always the same as the adjacent stock rail. Though that sounds simple, additional modifications are needed to get proper operation. No longer can the turnout be power routing. Now additional power leads and gaps are needed to control power in our siding.

Before we go further, let’s mention tools. For soldering, I use a pencil soldering iron or a resistance soldering unit. You need to be careful not to melt the plastic ties or reposition the rails. Use high quality electronic rosin core solder and soldering flux. To cut the rail and tie bar gaps, a Dremel cut off wheel works great, but even here, you have to be careful not to melt any plastic. Sometimes it is helpful to use a multimeter with ohm's scale to verify wiring continuity. After applying power (I prefer DC for this), a light bulb of proper voltage with leads can also be used.

Figure 3 shows one way of isolating the points. Since the point location is critical, I solder PC ties (Printed Circuit board strips with copper coating) across the points and close to the swivels of the points and throw bar. Keep some space between the PC and turnout ties so that the points can still shift with no binding. After making a good solder joint and verifying point shift, cut the copper of the PC tie away between the two points being careful not to cut through the fiberglass board material. The idea here is to insulate the two points but retain enough copper to keep the spacing. Only after that operation is done would you want to cut the original conducting tie bars. It doesn't make any difference which side of the rivet you cut the bar, just cut only one side of each. I like to cut opposite sides near each rivet so that the points stay together even if the solder joint fails. This should allow the points to be located and shift as before, but be insulated.

Next, gaps are needed at the frog. These can be cut close to the frog or anywhere between the points pivot point and the frog. You just need to be sure the gaps aren't so close that a metal wheel can bridge between the two point rails. You will need a gap on each point rail. Since we may be disturbing the strength of the turnout, I like to fill the gap with epoxy and grind it down after it has cured. I usually cut all the gaps and fill them at the same time using JB Weld. Then let the turnout sit for 24 hours so the epoxy to cure thoroughly.

The next two gaps on the other side of the frog are optional. One could use insulating joiners at the end of the turnout to accomplish the same thing. However, unless you are powering the frog, small locomotives will stall when they cross the frog, especially if the distance between the gaps is long.

Now that we have the gaps finished, we need to connect the point rails to the stock rails. Carefully solder small lengths of wire between the rails as shown on Figure 3 somewhere between the points and the gap. If you want, you could use longer lengths of wire and drop them through the layout table top, but I'd rather do as much of this work on a workbench where I don't have to worry about other track and scenery. Depending on your layout wiring, you may need similar connections between the stock rails and the rails exiting the frog. Usually an additional set of wires is needed between the stock rails and the frog rails on the far side of the frog unless the track is also wired. This could also be accomplished by placing jumpers across the insulated frog.

Sometimes the points don't connect to the point rail real well. This can be resolved by soldering a length of flexible wire between the point and its point rail. Make sure you leave some slack in this wire as the points have to move.

This completes the "friendly" conversion.

As mentioned earlier, you may want to power the frog. The easiest way to do this is to use a switch machine with auxiliary contacts and running a wire from the frog and the two stock rails to the appropriate contacts. If you can see the contacts, the center contact is connected to the frog and the other two are each connected to a stock rail. If you find you have a short when metal wheels go onto the frog, you selected the wrong contacts for the stock rails. Just switch them.

Are you having trouble with stalling on your commercial DCC friendly turnouts? It's probably because of a break in the connection between the stock rail and the point rail. Atlas turnouts are very prone to this problem and can be easily fixed following the above instructions.

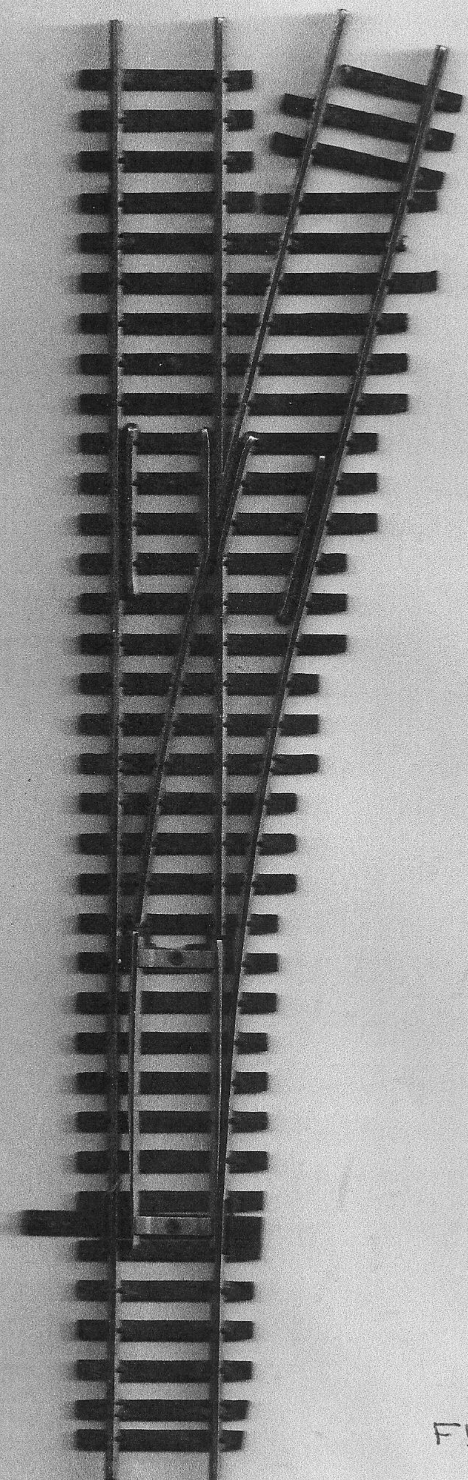

FIG. 1

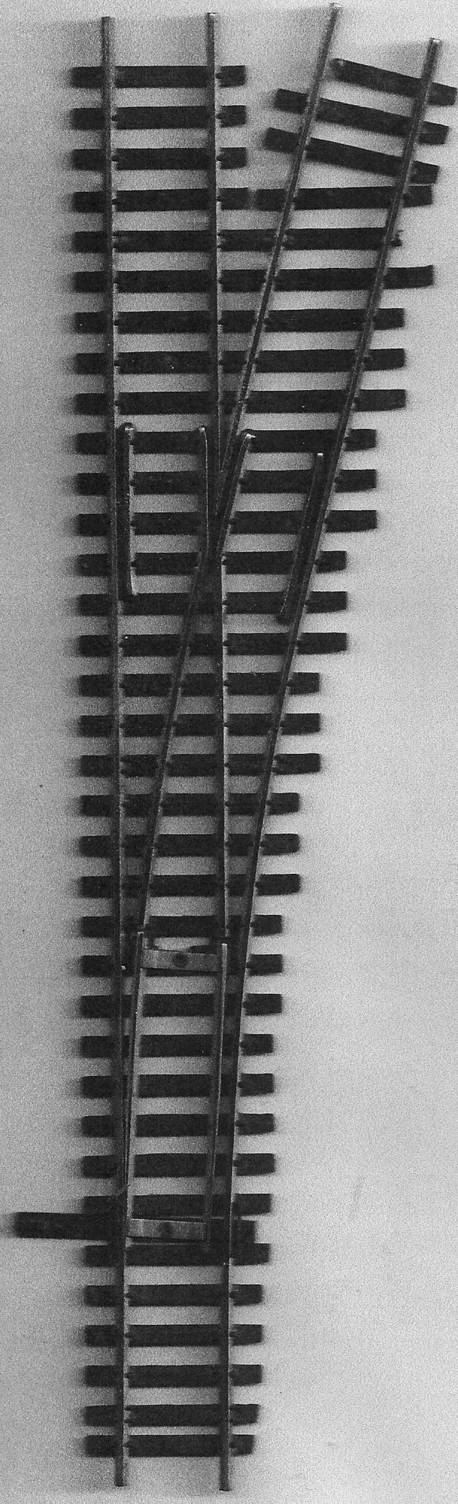

FIG. 2

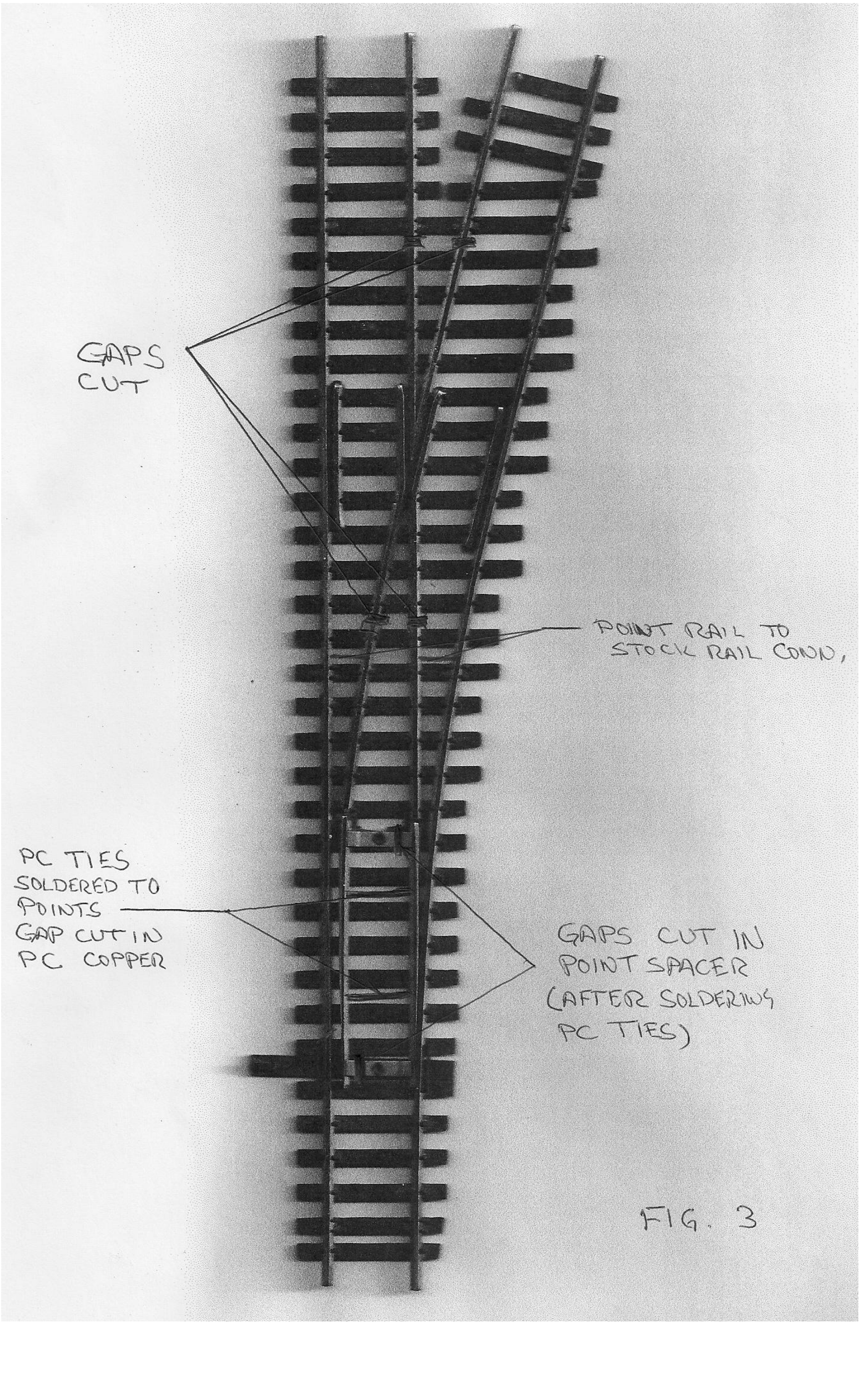
GAPS CUT
POINT RAIL TO STOCK RAIL CONN,
PC TIES SOLDERED TO POINTS GAP CUT IN PC COPPER
GAPS CUT IN POINT SPACER (AFTER SOLDERING PC TIES)

FIG. 3