

Building A Switch

Step By Step Photos

By Glenn Guerra

The cast frogs, points, and guard rails supplied by S Scale Track Works make detailed track work for less work than filing rail to make your switches. Since no jigs or fixtures are required you can build switches to fit your layout, including curved turnouts. These switches are easy to build. I'm going to show you how I build a switch using cast frogs, points, and guard rails from S Scale Track Works (sscaletrackworks.com/). These instructions are how I build a switch. If you've perfected your own switch-building method, go for it. But if not, here's a simple procedure with built-in short-circuit avoidance. After writing these instructions Dick Karnes looked them over and had some comments that I incorporated into these instructions. Thanks Dick for the help.

The castings have bolt detail on them and the spacer blocks are where they belong. The only soldering required is to connect feeder wires to some of your rails and to the frog, and the only filing required is to smooth the cut ends of rail segments.

The method described here has an electrically isolated frog. Isolating the frog allows each point to have the same polarity as its adjacent stock rail. Therefore, if a metal wheel touches both the open point and the stock rail you will not have a short circuit.

You can leave the frog with no power. But if you have any locomotives whose electrical pick-up wheelbase is shorter than the frog, you will have to power the frog with a single-pole double-throw (spdt) micro switch to change the polarity of the frog when the route is switched from one direction to another. You can use the extra contacts on most switch machines to do this; Frog Juicers will change the polarity also.

Before we begin, you'll need to gather the tools and supplies shown in the first photo. To familiarize you with the terminology for the switch components, I've reproduced an annotated image of a typical switch below as Figure 1.

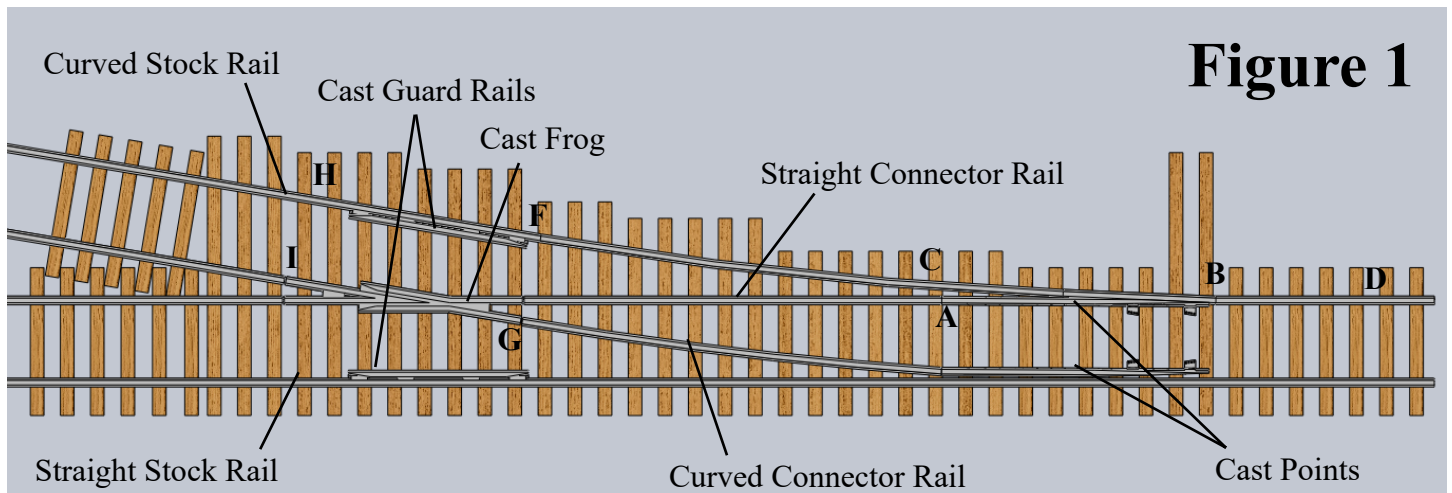
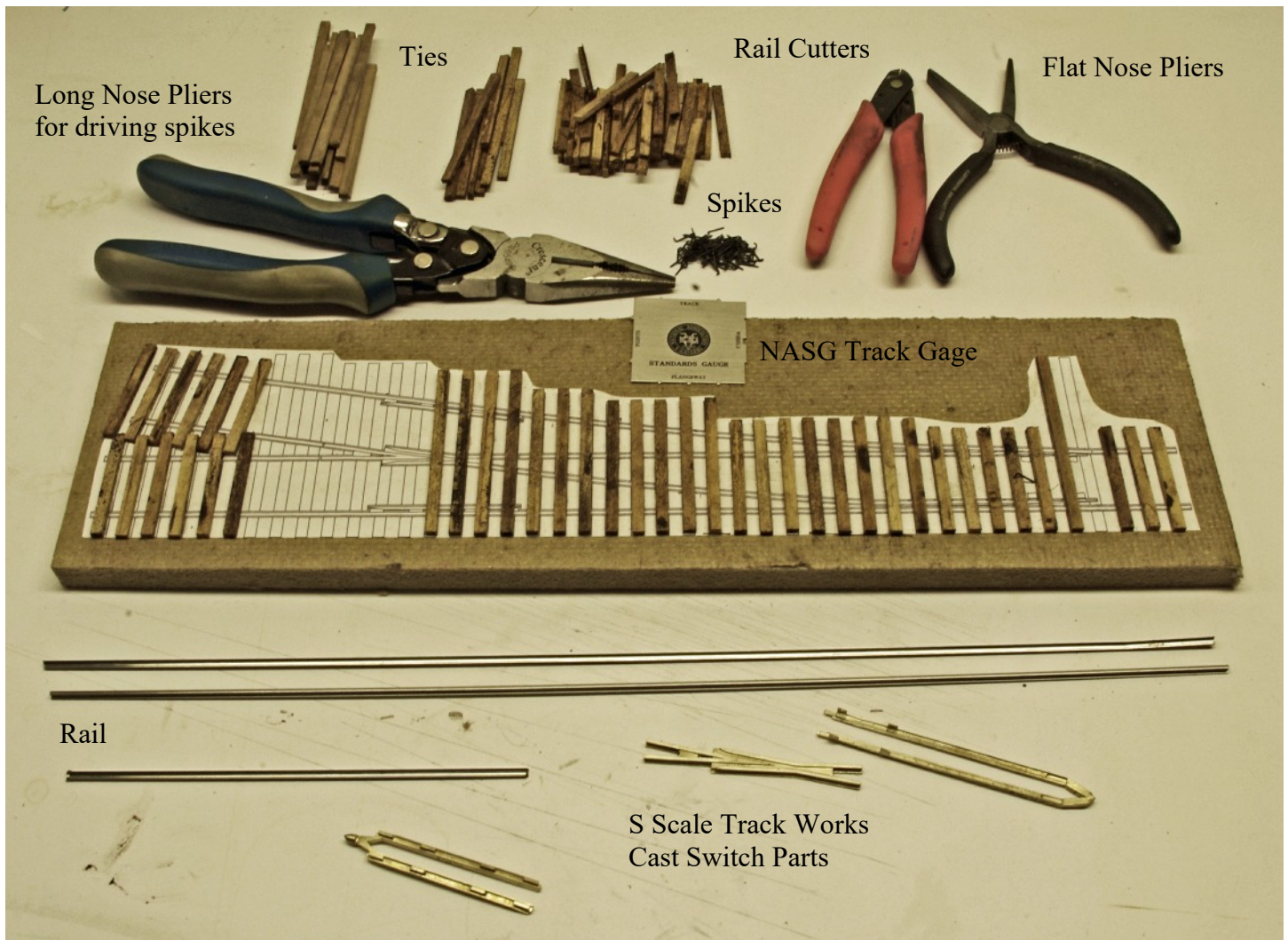


Figure 1

Let's Begin...

You can build your switch right on the layout, or on a separate piece of roadbed on your workbench, to be installed on the layout when completed. Free downloadable templates are available from the S Scale Track Works web site. If you build directly on the layout, glue your template exactly where the turnout is supposed to go. If on the workbench, glue the template to the piece of roadbed that you'll install later on the layout.

As with any hand-laid trackwork, be sure to sight down the rails often during construction to prevent kinks. Kinks are easy to make and hard to see without sighting down the rail.

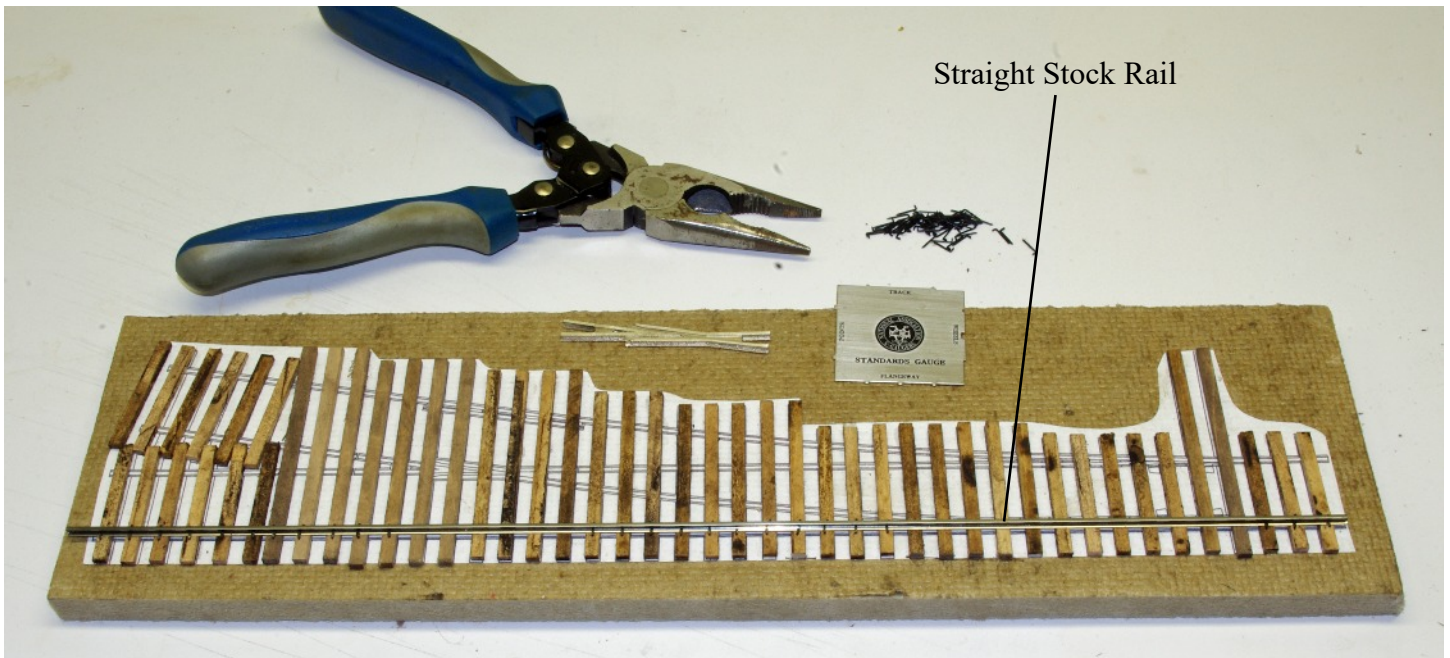


The first step is to glue your ties in place using the free templates, available on the S Scale Track Works web site, as a guide. I used white PVA glue for the template and the ties. I like to pre stain my ties. Some people like to sand the tops of the ties once they are in place so staining after they are sanded makes more sense. Do what works best for you.

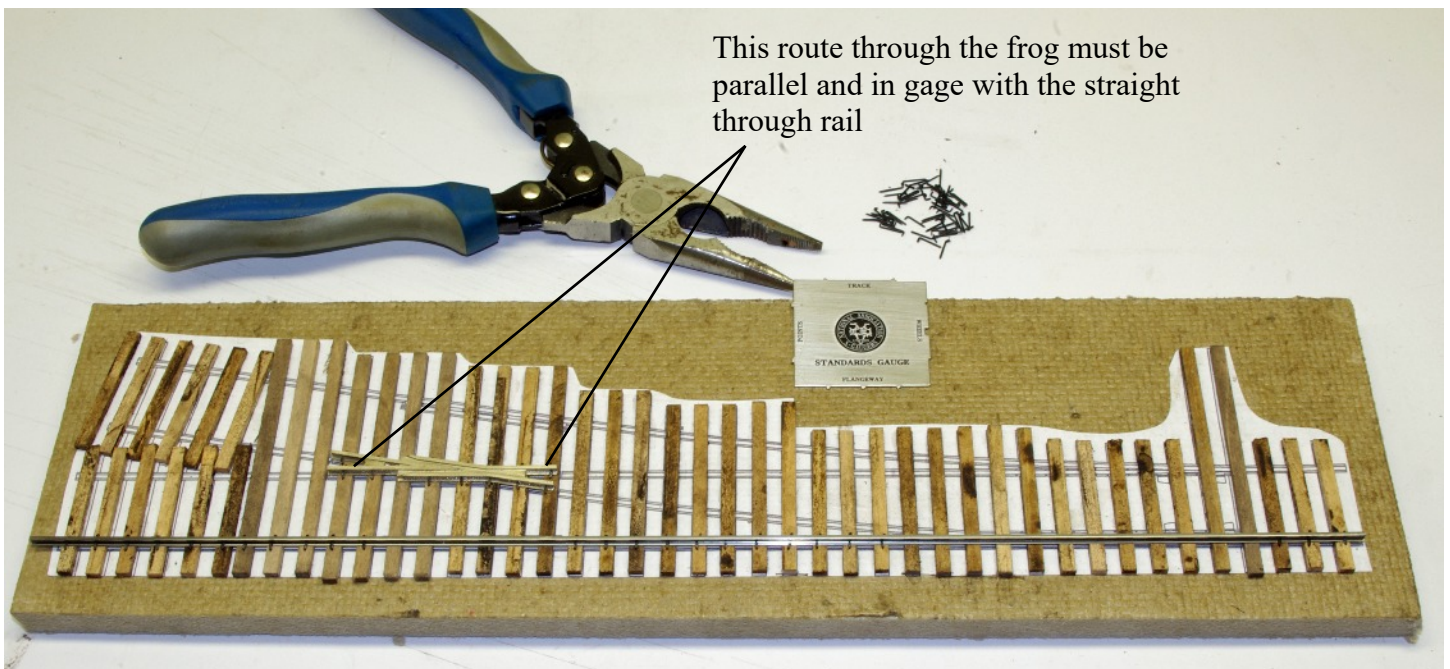
Once all the ties are in place and your glue has set, you can install the straight stock rail. The point castings are designed so that you will not have to notch the stock rails to mate with the points. If you are constructing your switch directly on your layout, this rail should be straightly aligned with the rest of your track. Thus, this rail's precise lateral alignment may vary just a bit from the template location, depending on the accuracy of your template gluing job. Don't worry about this. You'll be using the template primarily for longitudinal alignment of the switch components. Lateral dimensions will be determined by your track gauge, not by the template.

If this is your first time spiking rail, there are a few hints worth mentioning:

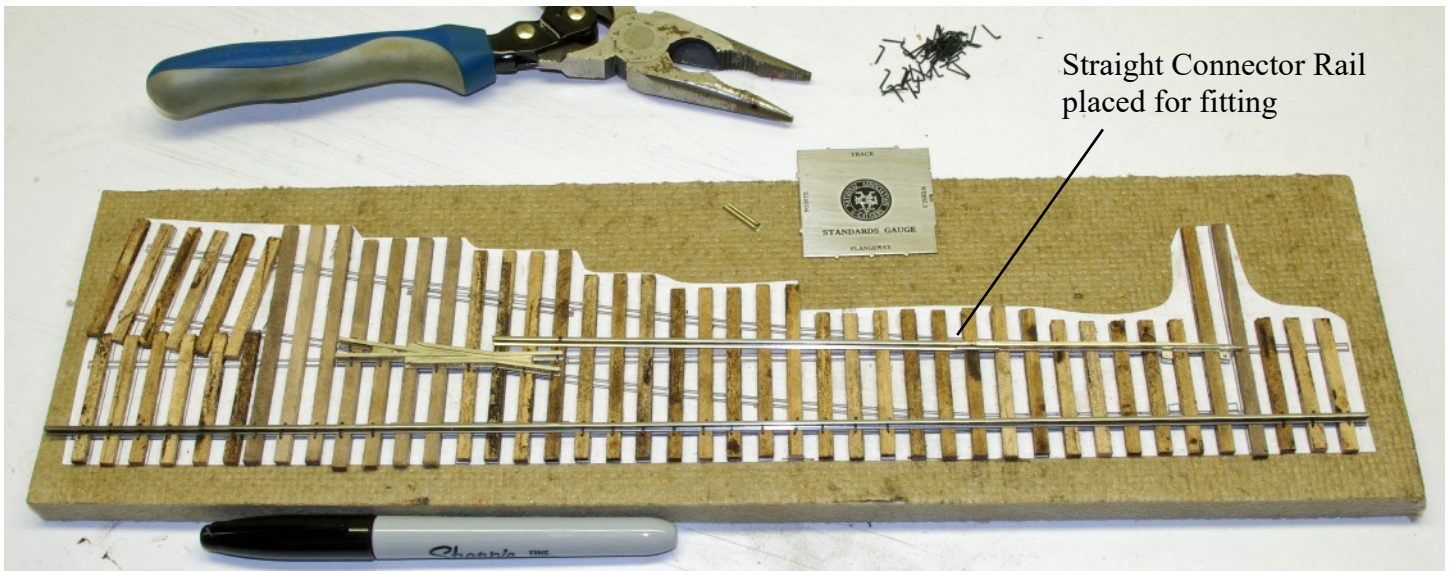
- Do not place the spike point smack against the rail base preparatory to driving your spike in. Instead, leave a tiny space between the rail base and your spike point to avoid having the spike thickness push the rail out of alignment. (It's the downward spike-head clamping force that keeps your rails in place, not any lateral forces.)
- Place your first pairs of spikes near each end of the rail. Then place another pair near the center of the rail. Place subsequent pairs of spikes centered between the previously placed spikes. This "interval-halving" procedure minimizes the likelihood of introducing unwanted curves and kinks.
- Do NOT place any spikes adjacent to the point locations and where the guard rails will be installed. Continue spiking until there are spikes in every second or third tie.



Once all the ties are in you can start putting the first stock rail in. For most applications the straight through route will be the primary route through the switch. Install this rail first. On your layout the rail should be straight with the rest of your track and as a result it may vary a bit from the template location. Don't worry about this, the template at this point is used primarily for getting the distance from the frog to the points correct. Make sure you do not spike both sides of the rail at the points or guard rails. The template will help you identify these areas. No filing or notching of the stock rails is necessary with the S Scale Track Works castings. The points are designed to fit into the stock rails like the prototype.



The next thing I like to do is locate the frog. Use the template to get the distance of the frog to the points as shown. Now gage and spike one end of the frog. Gage the straight through rail of the frog to the straight stock rail you already spiked down. The next step is to gage the other end of the frog to the straight stock rail and spike it in place. At this point you can slide the frog forward and back if you need to adjust the distance to the points. Getting the frog in place straight and in gage is important. The frog will now determine where the curved stock rail will go. When you have the frog in place and are satisfied with the location spike it to every tie. I do this even if I don't spike the other rails to each tie.

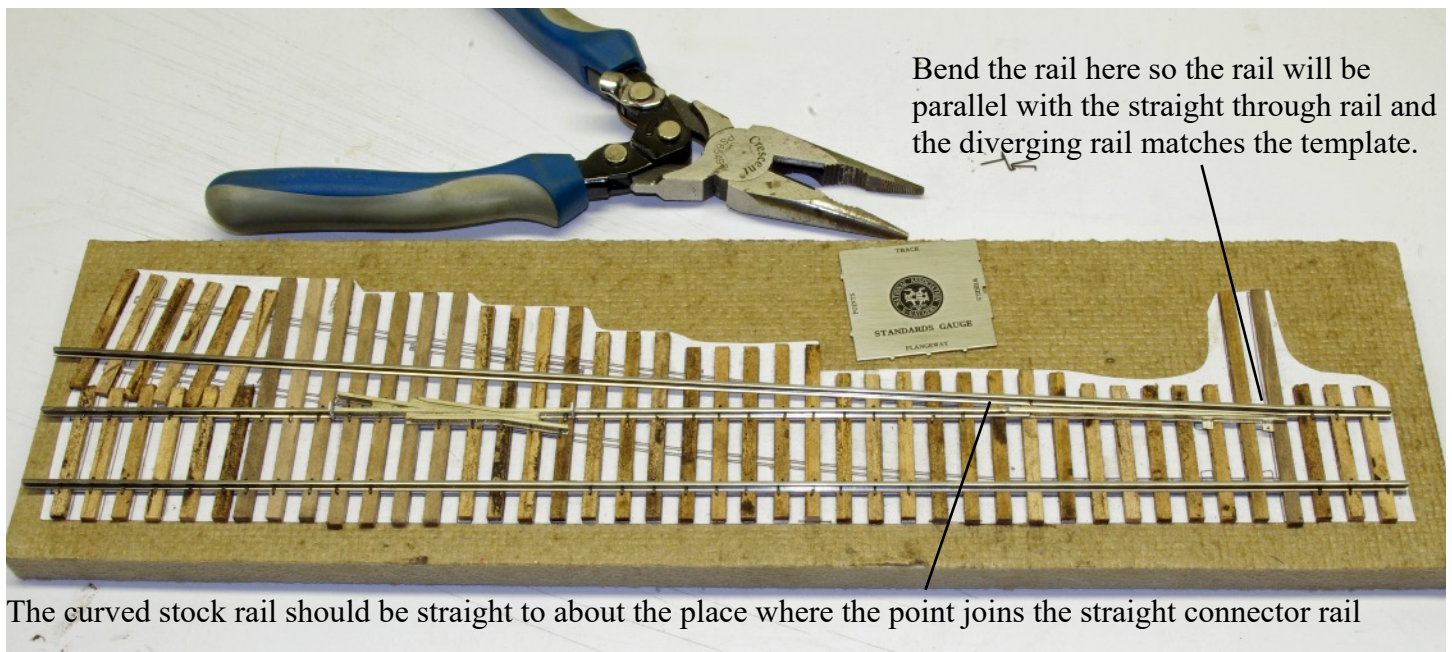


Once the frog is in, we'll work on the straight connector rail and its point. The point castings are designed to fit into the through rail and thus have a cut-out on the bottom side. Before doing anything else, test-fit both points against the stock rail, anywhere along the rail. The points will likely need a little tweaking to be sure they are straight. Clean them up with a file as necessary, especially the cut-out on the bottom of each one. File the ends flush where you cut the points off the sprue and slide a rail joiner onto each one.

For the straight connector rail, cut a piece of rail slightly longer than needed and slide the point rail joiner onto it. Now place the whole assembly in the switch as shown. The projecting tie bar tab on the point should be between the two long ties. Mark the far end of the closure rail for fitting against the appropriate frog rail, then cut the rail with your side-cutter pliers. Use your file to finish the rail end just a hair short to accommodate a .020" styrene insulation shim that you'll be cementing between the rail end and the frog.

Now you'll need to relieve the ties beneath the point rail joiner. Position the connector rail, with point and joiner in place, in position atop the ties. With your chisel blade, score the ties where the joiner sits, one score on each side of each tie that the joiner sits atop. Now remove the connector rail assembly, then chisel off the tie tops between the score lines. Your chiseled depth need be only deep enough so that the closure rail assembly will not "hump up" once spiked in place.

Spike the connector rail at the frog end first, using your track gauge for proper lateral alignment. Now spike the end by the points and gauge it to the straight stock rail. Push a tiny shim of .020" styrene between the frog and the closure rail for insulation, then push the connector rail up tight to the frog. Place a small drop of CA glue on the outside of the shim to cement it in place between the webs of the frog and closure rails. (Once dry, you may need to trim the shim flush with the top and sides of the railhead.) Now spike the rest of the connector rail in place using the track gauge (and sighting along the railhead) to assure alignment. Use the interval-halving method, and stop only when you have spikes in every tie.



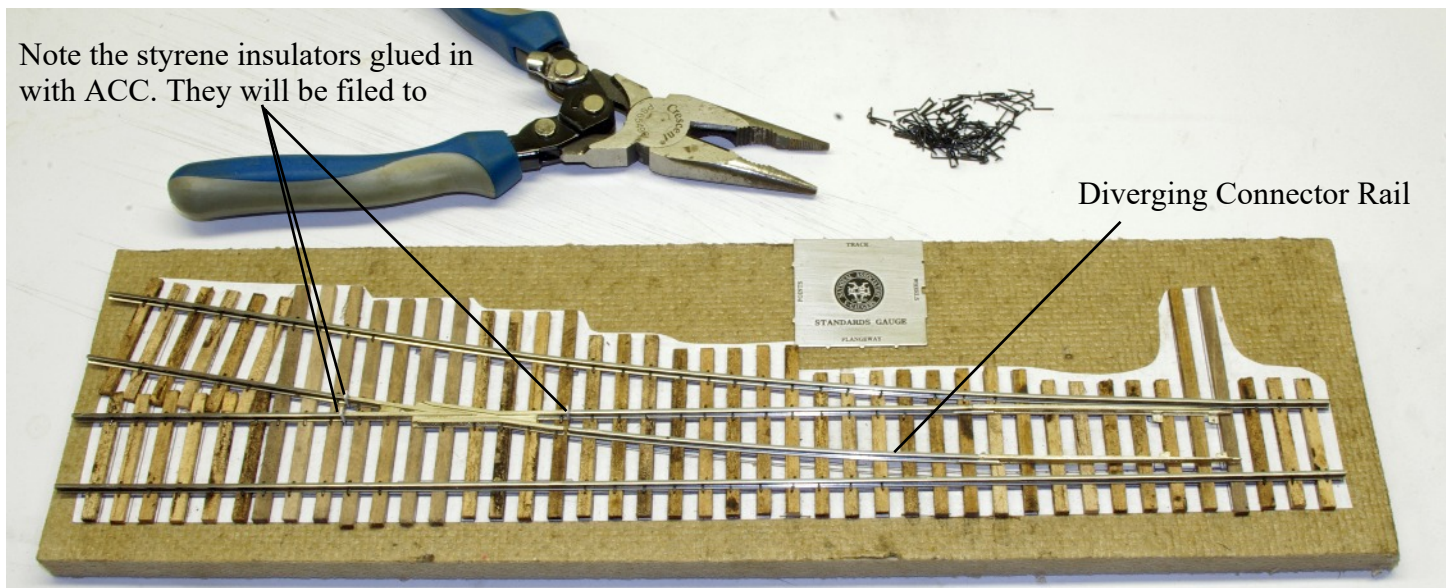
Now we're going to install the curved stock rail. The portion of this rail adjacent to the straight point needs to be straight, thus requiring a slight kink just ahead of the tip of the point. (The kink angle is very small, approximately the angle between the hour hand and the minute hand at one minute past twelve o'clock.) Use two pairs of pliers to create this kink. The curve in your connector rail must begin beyond this straight portion.

Holding your curved stock rail in both hands – one hand closing tightly around the portion that must remain straight, the other hand perhaps 12 inches away, carefully bend the rail to the approximate curve of the turnout template. You will have to slightly overbend because the rail will spring back to some extent once released. (By all means, resist the temptation to incrementally bend the rail an inch or so at a time – if you do this, the rail will wind up hopelessly kinked.) Curve precision is not particularly important at this time; you'll create the exact alignment as construction proceeds.

Now hold the curved stock rail on the template with the rail kink just beyond the tip of the straight point (B on Fig. 1). This rail should touch the point rail joiner (at A on Fig. 1) and be in proper gauge at the point tip. Check this using the flange way width portion of your NASG track gage at point C on Figure 1. Notice whether the kinked rail end splays inward or outward, and – if so – readjust the kink with your pliers until the rail end is parallel to the end of the straight stock rail. This is the lead in to your switch. Once you're satisfied, spike the point end of the curved stock rail in place using your track gauge for proper alignment. I like to spike part of the rail that will be parallel to the straight stock rail so the rail at this area will be in gage with the lead in to your switch.

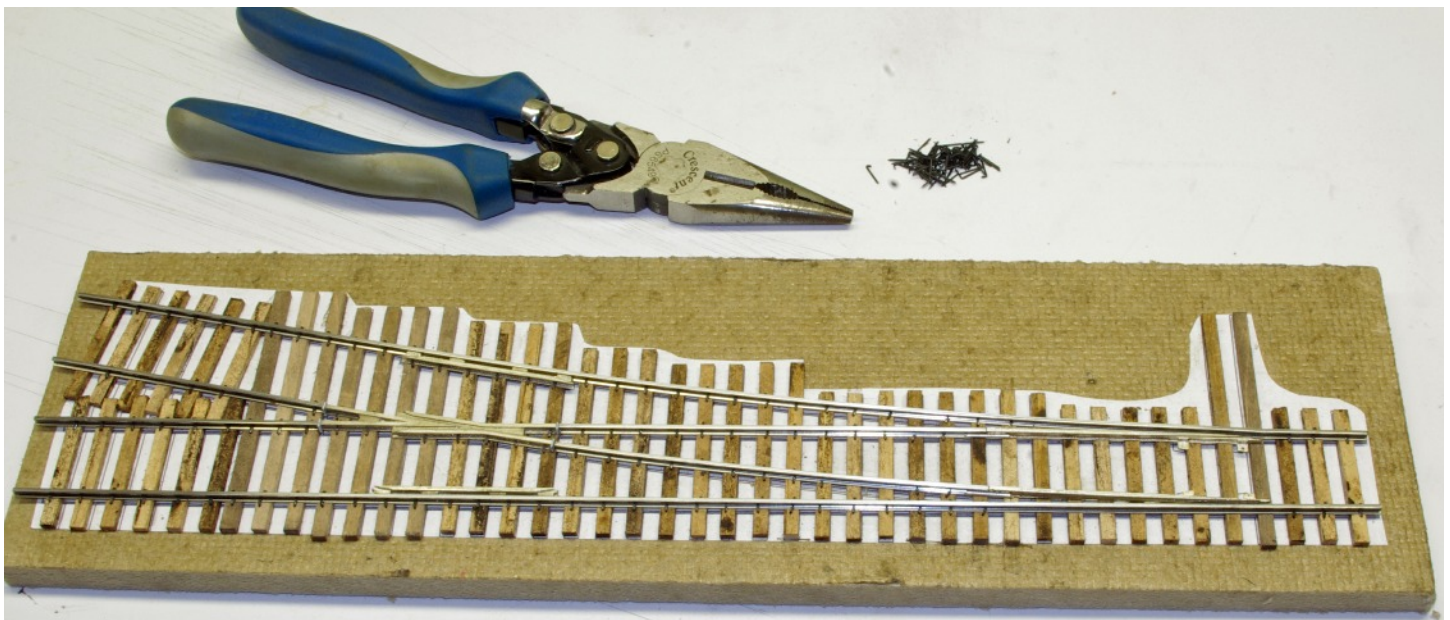
Next, spike the curved stock rail in gauge with respect to the frog's diverging rail. Drive your first spikes at locations F and H in Fig. 1, thus leaving a space for later installation of your guard rail. The curved stock rail must be straight between F and H. If it is not, reverse-bend it by hand until it is straight, then drive your spikes.

Now drive a spike at the outside of the curved stock rail at C. This rail has now automatically taken on a smooth transitional curve between C and F. Being careful not to disturb this alignment, spike the rail to the ties using the previously-described interval-halving method.



The diverging connector rail is next. You need to pre-bend the rail very slightly, using the template to get the approximate bend. Trim and fit it exactly the same way you prepared the straight connector rail. Slip a rail joiner onto the point end of the curved connector rail, then slide the point into the joiner. Place the rail/point assembly onto the switch, aligning the point tab opposite the other point tab. Relieve the ties beneath the point rail joiner, just as you did for the first point joiner.

Now spike this connector rail parallel to and in gauge with the curved stock rail. Start at the near end of the frog, remembering to place another styrene shim in the gap. Place another spike at the point end of the connector rail, then push the rail tightly against the frog and apply a small drop of CA glue to the outside of the shim. Finally, using the interval-halving method, spike the closure rail permanently in every tie, using your track gauge frequently to assure proper alignment with respect to the curved stock rail.



The next step is to spike the guard rails in place. They have cast spacers that will give you the correct flange way. I spike all along the whole guard rail. If you want, put a drop of solder on one of the spacers to make sure the guard rail stays in place.

The last steps are to install a throw bar and wire the switch. Do this the same way you do it on the rest of your layout.