

## **Build a turnout with Chris**

There are so many reasons to practice this skill but, I believe, that chief among those is how your understanding of a turnout works and the role of each piece of rail in a turnout. Talking about this is boring, let's light up that soldering iron, grab some rail and ties, and make ourselves a turnout!

Every time I build a turnout I learn a little bit more, so each one is a bit better than the one before. Making a good turnout is something anyone can do. Absolutely no part of this is difficult to do and in doing so you have a chance to practice so many fundamental model railway skills. I'll describe a process that works for me. There is no right or wrong way to do this so modify to make it more comfortable for you and to work better with the way you like to work. At the end of this article, I've included an annotated drawing of a turnout. Where I refer to a part of a turnout by name, I'll underline it.

Everyone can make a turnout through which nothing derails and no models stall.

You can do this.

I've been doing this for about twenty years now and here's my current favourite process. This process describes a method to build a turnout using soldered construction. A real railroad uses steel spikes to hold the rails to a wooden tie. We're going to use a few ties made from copper clad printed circuit board material and we're going to solder our rails to these. This skeleton of rails and copper clad ties is our basic turnout. Once it's assembled, we will fill in the spaces between copper ties with wooden ones and can add additional details, like rail braces or cosmetic spikes, and then paint and weather the turnout.

Start with a paper template that shows the location of the rails and ties for your turnout. Model railway track companies like Peco and Fast Tracks have a full library of typical turnout plans available as free turnout templates you can download and print. These are a great place to start. You can draw your own templates using software tools like Tplot or XTrakCad. If you're designing a turnout for your layout, you can even just trace over the location of the rails already in place where your turnout will fit. Once you've settled on a template, print it out. You will build your turnout directly over this template so attach it a work surface like a square of wood.

We're going to build our turnout directly over that paper template. To make it easier to keep everything in place, you can cover your template with some clear double-sided tape. Cover the template with tape.

With the paper in place and covered in tape, it's time to start with the ties. We're using copper clad circuit board ties ("PC ties"). Good soldering is done on clean metal. Now that you've got your ties ready, polish the face you'll be soldering now. If you're using a template from Fast Tracks it will be marked with the locations of the copper clad ties. Grab some PC ties and stick them onto your template in the locations shown on the template. PC turnout ties are sold in a standard length which is naturally too long for most of the tie locations in your turnout. You will need to trim them to length but to make things easiest, don't trim them now. Once the turnout is complete, we'll trim all the ties at once. Line up your ties along the curved route so they overhang on the straight side (once we're done, we'll just cut straight along this line and cut them all perfectly at once).

With the ties in place we can start soldering in the rails. Turnouts are described based on the angle of the frog. This seems like the logical place to start so the first rails we'll make are the frog rails. With those in place, we'll just build the rest of the turnout around the finished frog.

To make the frog, we just need two lengths of rail - one for each side of the frog. We'll need to file both pieces of rail. The first half we'll make is the one for the straight side. Grab your first piece of rail and file away the complete inside face of the until you have filed the rail to a wedge shape. Don't worry about cutting this length of rail to length yet. It will be easier to handle while soldering if you leave it long. It can be easily cut in place when you're done soldering.

We're going to solder this rail in place directly over the template where the rails are shown. To make sure the frog is pointed in the right direction, set a straightedge on the template and lay the frog rail you just made against this straightedge. Add some flux to the rail and solder that first rail in place. *You're on your way now!*

With that first rail soldered it can be trimmed to length. Now make up the second half of the frog using the rail. Remember to file away the opposite face of the rail and do so until it fits smoothly against that first rail. Once you're happy with the fit you can solder the second rail in place. Once this soldered one is in, trim it to length.

The next rails to solder in are the stock rails. Just as we started with the straight edge of the frog, we'll make up and solder the straight stock rail. Before we solder it into place, we need to file away a bit of the inside face where the point blade will rest when the points are set against this rail. Measure the length of how much rail must be filed away using your template as a guide.

Once soldered in place that solder joint can always be warmed up again. However moving a large length of soldered rail isn't easy. With this in mind we won't solder every tie to every piece of rail until we're sure everything is in place.

We can't proceed from this point without your rail gauge, such as an NMRA standards gauge. Now is the time to dig that from your tool box.

Using your gauge, mark the distance from the point of the frog and this will be the first point where we'll solder into location the stock rail at this point. With that solder joint complete, gauge and solder the stock rail at the very heel of the turnout. Use your straightedge to guide the position of the straight stock rail to the front of the turnout. Once you've placed it, solder it to the tie just in front of the point blade. For now, these three points are the only places we'll solder for now. Once everything is gauged and in place we can sort out the balance of the ties at the end.

Now, you're on the home stretch. Time for a fresh mug of tea and a chance to admire the great work you're doing up to now. Well done!

Between the frog and the place where we soldered in place that straight stock rail we have enough locations to solder the curved stock rail. Just as you made up the straight stock rail, make up the curved stock rail and solder it in place the same way you made the straight. All that's left now is the point blades.

We'll make the the point blades in two parts and we'll start with the frog end. This length of rail can be trimmed once it has been soldered in place, so we'll concentrate on getting its shape correct and not the length for now. Using your template as your guide, bend this rail and fit it into place. When you're content with its shape solder it in place. Now that it's soldered, trim it to length. With the first one done, make up the second and solder it into place.

Finally time to file the last two rails: the point blades. This is the longest length of rail we're going to file throughout this whole exercise. First we'll file away the back of the rail where it fits against the stock rail. Where so far we've only filed one side of the rail, on the point blades we file both the back and also the opposite side of the rail head. Doing so will make it easy for the train's wheels to move naturally from the stock rail and through the points. Where on the stock rails we didn't solder the rails in place at every tie, at the point blades we want to leave the ends free to move so only solder them into place immediately in line with those rails you've just soldered in place at the frog.

There. You're done. With a few things left to do you have a bit more work but at this point you have completed the hard parts. Well done!

Using your gauge, check around the turnout. Since many of the rails are not soldered into place it is easy to find those that need an adjustment. With those complete, work along the remaining solder joints and check the gauge often - continue adjusting as necessary.

When all of the solder joints are complete it's time to really celebrate. Grab a freight car truck and enjoy pushing it around your turnout. Imagine how well that's going to work when you've installed it on your layout.

Where these notes have focussed on how to assemble a turnout, it is time to determine how you'd like to move those point blades and hold them in place. The frog we built is electrically isolated and we can elect to power it.