2.4 Basic turnout construction

For those modellers who wish to build their own turnouts, there is a range of construction materials and methods to choose from. These include: soldering rail to either copped-clad sleepers or wooden sleepers fitted with brass rivets; fitting plastic chairs to the rails and attaching them to wood or plastic sleepers with an appropriate solvent adhesive; pinning white metal chairs to wooden sleepers.

The rail sizes in common use are code 124 bullhead representing 85R rail and code 143 flat bottomed representing 113A rail. (See Table 5, Page 2-1-6) The heavier section code 200 bullhead rail and code 220 flat bottomed are mainly used for outdoor lines or to represent narrow gauge track for the larger scales.

Photo 2.24
Trackwork gauges. From the left: a commercial circular assembly gauge, a similar gauge from the Guild's set, two pressed steel gauges, a three point gauge to give automatic gauge widening and, below, two slip gauges for crossing and check rail assembly from the Guild's set. (D. Astle)

The point blades and crossing Vees can be purchased ready made either as part of a complete turnout kit or as separate 'mix and match' components to suit the particular track design or they can be made from scratch (see sub-section 2.5)

2.4.1 Equipment

In addition to the tools required, which will depend on the materials used and method of assembly, track gauges and a check rail slip gauge are needed. In the case of the track gauges, the groove or slot to fit over the railhead must be the correct width to give a good firm fit. When purchasing track gauges always specify the rail code to ensure that the gauge matches the railhead. (Photo 2.24)

Other items that will aid construction are a straight edge, a crossing assembly jig or, alternatively, a large spring paper clip with the middle of the gripping blades cut away. If an assembly jig is not available the latter will make aligning the wing rails with the crossing nose much simpler. Spring hair grips are an alternative. (Photo 2.25)

Curved metal templates are available and may be useful if the curve matches both the turnout curve and the crossing angle. Check the tables on page 2-2-23 for compatibility.

2.4.2 Preparation for Assembly

Although turnouts can be assembled in situ on the layout, it is recommended that they be assembled on the bench using a turnout drawing. Where

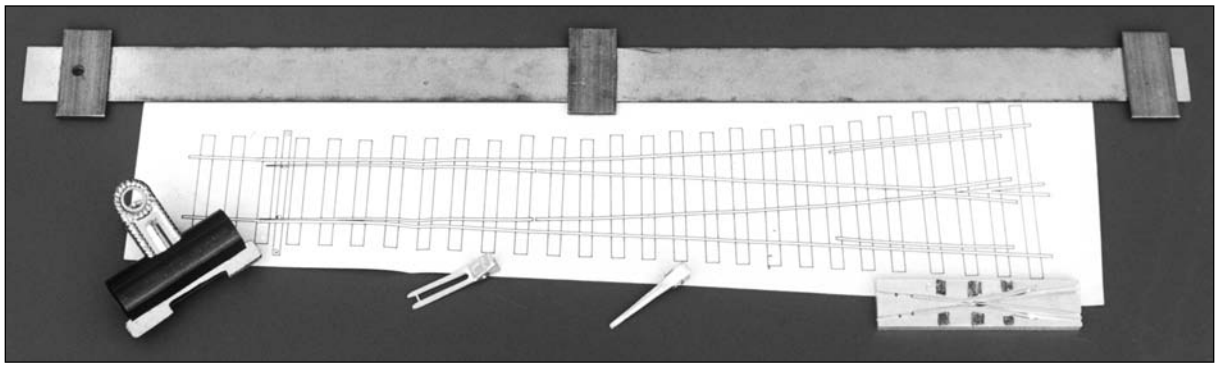

Photo 2.25
Aids to assembly. A commercial drawing of a B6 turnout with a steel straightedge 32mm wide above. The three strips of brass epoxied to it are to prevent it from falling below the rail head and into the web of the rail when assembling plain straight track. Below is a large paper clip with the centre cut away and two hairgrips which can be used to hold the components when assembling crossings. The item on the right is a Fine Standard crossing and wing rail assembly jig from the Scale 7 group. The felt pen markings show where the crossing sleepers would occur. For copperclad sleepers the assembly strips are located between the sleepers but for chaired or riveted track the assembly strips are located in line with them. (D. Astle)

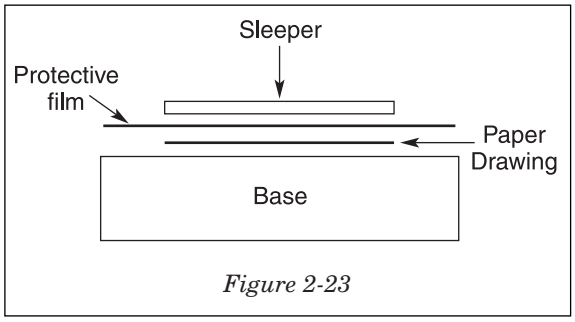

Figure 2-23

possible, it is advantageous to assemble the turnout on a sub-baseboard using a 'sacrificial' drawing, subsequently hidden by the ballasting, so that the finished article can be transferred safely on to the layout baseboard. A tracing or photocopy of the master drawing can be used for this method. The method also enables provision for the blade operating mechanism to be included before assembly starts. Consideration of the operating method needs to be determined at this stage in order to make provision for the connections to the point blades which could involve holes or grooves in the sub-base and baseboard.

By shaping the sub-baseboard to fit against adjacent formations, quite complex formations can be built away from the layout to suit a particular situation.

An alternative method, where building on a sub-baseboard is not possible, is to use a flat piece of board large enough to accommodate the drawing to which the drawing can be taped. If the drawing is to be used a number of times it can be protected by a clear plastic sheet. (See Figure 2-23). Sleepers are secured to the plastic by a low adhesion double-sided tape to avoid damage when removing the finished unit on completion of assembly.

Examine the turnout components, the crossing Vee and particularly the blades to ensure that the latter are free of burrs and twist that could affect their fitting against the stock rails. The stock rails should have a slight joggle or rebate where the toes of the point blades fit to allow a smooth passage for wheels passing over and to prevent the wheel flange from passing the wrong side of the blade toe. (Strictly speaking, this does not apply to trailing turnouts but, in the model world, most turnouts have to handle two-way traffic).

Unless they are already prepared in a kit, the first step is to cut the sleeper material to length and lay it in position on the drawing. Copper clad and plastic sleepers can be secured in position on the sub-base using double-sided tape or glue at each end of the sleeper. Copper clad sleepers need to have the insulating gaps cut to provide the electrical isolation between the two running rails. If not already provided, the locations of suitable gaps are shown in Part 8, Section 3, Figure 3-2 on page 8-3-2. Cutting to length also applies to wooden sleepered track when using pinned construction.

The assembly sequence varies slightly depending on the materials used. The simplest method is rail soldered to copper clad sleepers as it just involves rail and sleepers. Assembling a turnout using plastic chairs or simulated Pandrol clips attached to plastic or wooden sleepers involves selecting the correct type of chair for a particular sleeper.

Where rail is soldered to rivets set into wooden sleepers, sometimes referred to as the Brook-Smith method, the first step is to mark and drill the holes for the rivets, numbering the sleepers so that they can be secured either to the sub-base board or the turnout drawing in their correct positions. Note that great care is needed in drilling the rivet holes to ensure that, when laid in position, the rivets coincide with the rail locations as shown on the drawing. Laying a straight edge along the straight stock rail rivets may be helpful.

2.4.3 Assembly sequence - copper clad sleepers

1. Lay the straight stock rail in position; check that the rebate or joggle for the point blade is correctly located over its position on the turnout drawing. Using a straight edge to hold the rail in its correct alignment, secure the rail to the two sleepers before the toe and at about three or four locations along the length. Particular care should be exercised opposite the crossing location. When satisfied with the alignment, secure the rail to the remaining sleepers.

2. The crossing nose assembly is then fitted, gauged from the straight stock rail. Some manufacturers supply a complete crossing unit including the wing rails for a small range of crossing angles. Alternatively, if a crossing

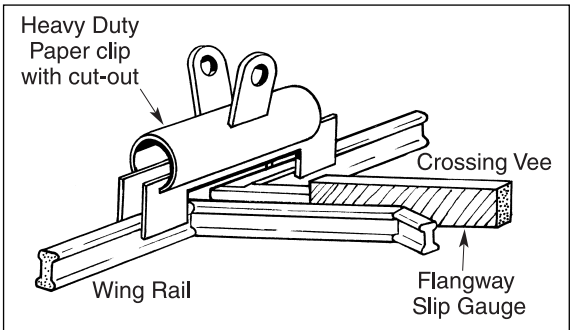

Figure 2-24

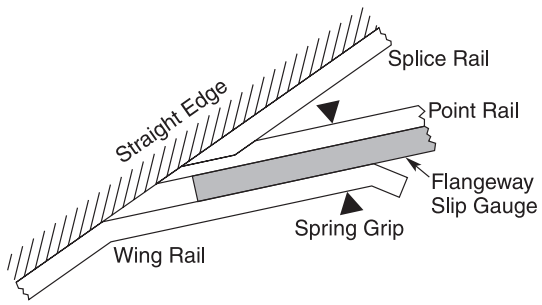

Figure 2-25

assembly jig is available, the crossing and wing rail unit can be put together. The metal strips joining the components should be located so that they fall between the timbers when the crossing is set in position on the drawing. (See Photo 2.25)

3. If the crossing and wing rails are not pre-assembled as a unit. align the curved wing rail with the crossing nose using either a straight edge or the modified spring clip and set the flangeway clearance using a flangeway slip gauge. (Figures 2-24 and 2-25). (The second wing rail can be omitted at this point if a curved metal template is to be used to align the curved closure rail).

4. Usually the point blades and closure rails are supplied as combined units. Identify the curved unit, gently bend the rail to match the closure rail curve and lay it in position on the drawing. Check that the blade fits into the rebate or joggle and lies against the stock rail for the whole of the planed length. If a snug fit is not obtained, check that the blade hasn't twisted. The combined rail should be supplied over-length so, mark the joint between the closure portion and the front of the wing rail, trim to size and, for 2-rail turnouts, leave a small gap between the closure rail and the front of the wing rail. This will provide the electrical gap and should be filled with either an insulated fishplate or epoxy to prevent accidental bridging. For cosmetic purposes, note the position where the prototype blade and closure rail join and make a narrow saw cut through the rail head to simulate this. (See Figure 2-30) At a later stage a dummy fishplate can be added. Secure the portion representing the curved closure rail in position from the blade heel to the wing rail ensuring that a smooth curve is obtained between the switch and the crossing.

5. Another type of point blade, sometimes referred to as a 'tongue' switch (Figure 2-26), was widely used by pre-grouping companies as well as in industrial sidings or narrow gauge trackwork and is often used in model work (See Peco components). In this case the curved closure rail is laid in first to establish the position of the heel and initially is only secured at its extremities. The point blade is then laid in and securing the closure rail can be completed.

6. If the crossing and wing rails were not pre-assembled the straight wing rail can now be added. It can be aligned with the crossing using either the spring clip and a flangeway slip gauge or by using two flangeway gauges. As the slip gauges do not grip the rail, hold the 'loose' wing rail in position with spring hair clips. (Figure 2-27)

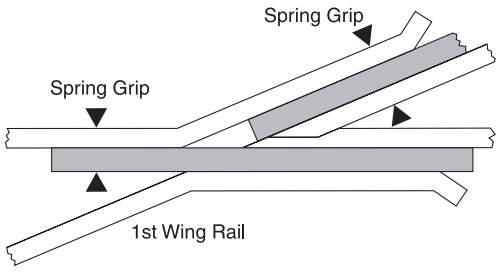

Figure 2-27

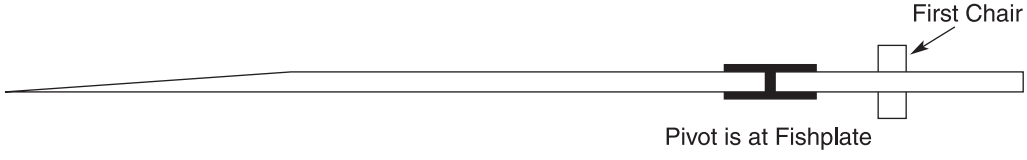

Figure 2-26

7. The curved stock rail is bent from the toe to match the planed angle of the straight point blade in order to make a snug fit against it when set to gauge. The remainder is bent to match the drawing but not secured. (Figure 2-28).

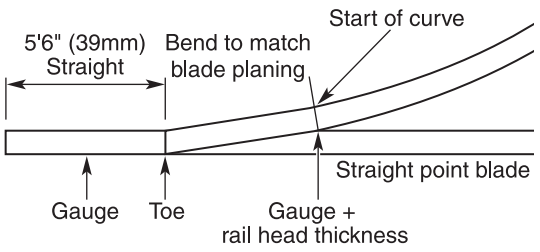

Figure 2-28 Bending the curved stock rail

8. The section of the curved stock rail in front of the toe and the straight point blade and closure rail unit are then laid in and secured, gauged from the straight stock rail. Remember to make a light saw cut through the railhead before securing to represent the joint between the point blade and the closure rail.

9. The curved stock rail is then secured commencing from the toe and gauged from the closure rail, the wing rail and the splice rail.

10. The stretcher bars are fitted at this stage, ensuring that the tips of the point blades provide the correct clearance for wheelsets entering the turnout. Set the blade opening by inserting the flangeway gauge at the smallest gap between the stock rail and the blade. This usually, but not invariably, occurs at the heel end of the planing.

11. Check rails are now fitted and the turnout is complete. Note that if these are not supplied with the kit, bull head rails are bent but flat bottomed rails are chamfered for 7.6mm at each end.

2.4.4 Assembly sequence - chaired track

The assembly sequence for track supported in chairs is generally similar to that described in 2.4.3 above. As part of the preparations the lower part of the rail ends should be slightly tapered to allow them to be easily inserted into the chairs.

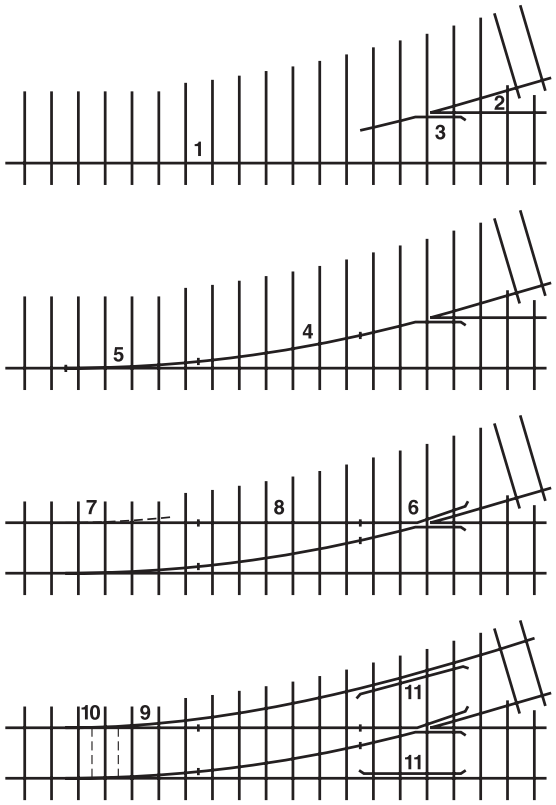

Figure 2-29
Construction sequence for building a simple turnout. The numbers refer to the steps described above.

The following notes also apply to trackwork made from code 143 rail held in plastic Pandrol clips and to code 200 rail held in white metal chairs pinned to wooden sleepers).

Most manufacturers supply chairs with the keys forming part of the moulding and are handed left and right. The general rule in selecting the correctly handed key/chair is that the direction of swing of a platelayer's hammer to wedge the key between the chair and the rail is the same as the direction of motion along the track. This was intended to prevent rail creep. However, with single track the usual practice was to insert an equal number of keys in each direction. The final selection of handed chairs will depend on the practice of the company being modelled.

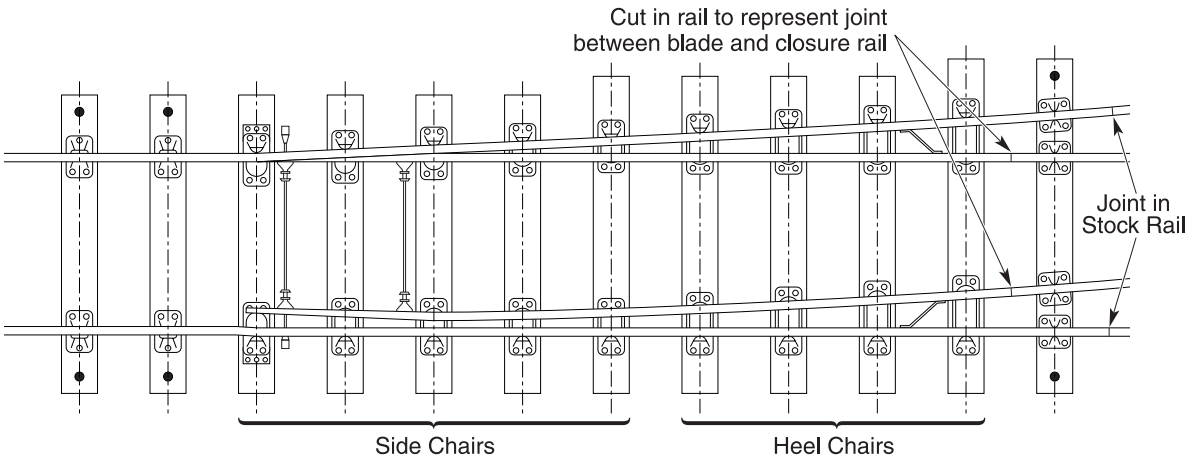

Figure 2-30 Layout of sleepering at blade end of turnout. The illustration shows a semi-curved A switch. A B switch would have six slide chairs. The dots show the initial fixing positions.

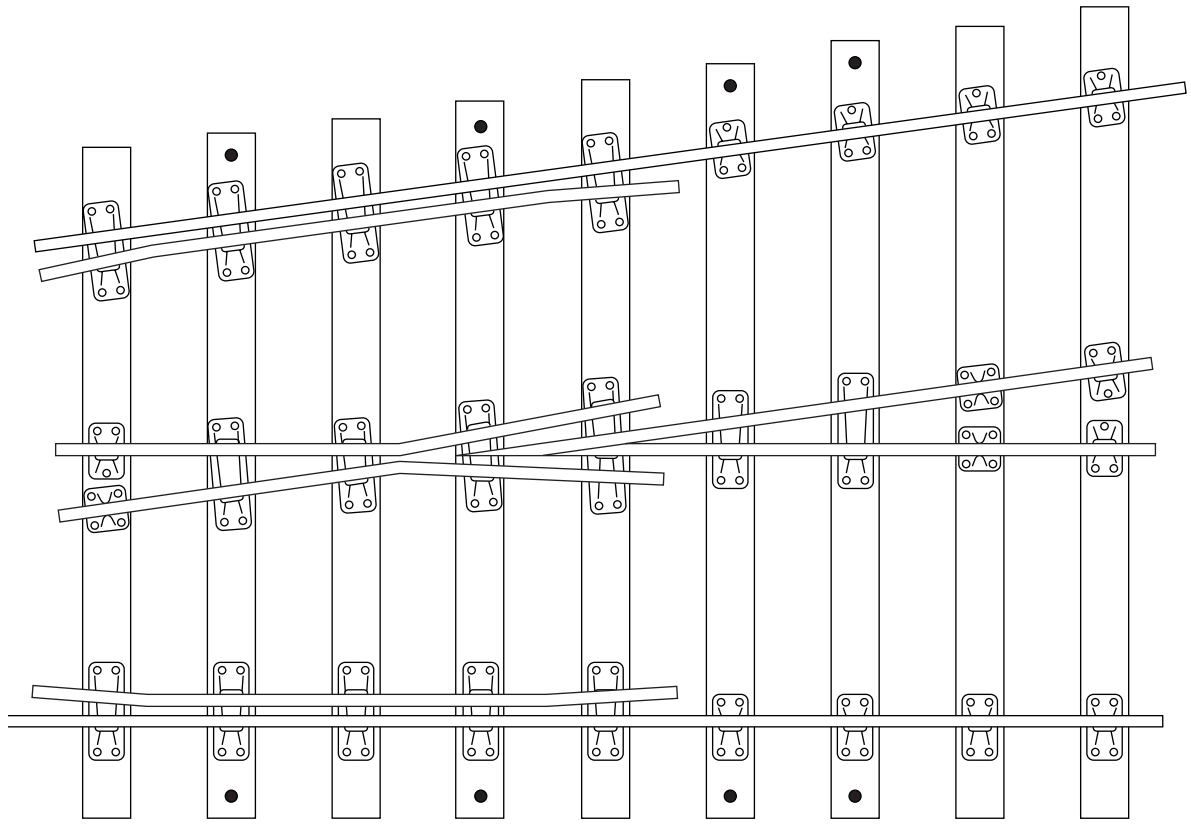

Figure 2-31 Layout of sleepering at the crossing end of the turnout. The dots indicate the location of the stock rail chairs in the check rail area. The check rails are secured with the other three chairs and the gaps inside and out are filled with half chairs cut to suit.

1 Taking the straight stock rail, slide on the required number of plain chairs less three. The reason for omitting three chairs is that these will be needed to secure the check rails in stage 11. Figures 2-30 and 2-31 show the location of the stock rail chairs to be fixed to the sleepering. Using a straight edge to hold the rail in correct alignment, initially secure the two chairs before the toe of the switch, the chair on the sleeper after the end of the switch rail, the chair just before the crossing end of the closure rail, the two check rail chairs and one or two beyond. Particular care should be exercised opposite the wing and crossing nose position. When satisfied with the alignment, secure the remaining chairs except for the three slide chairs at the switch toe. These can be temporarily omitted to allow the blade stretchers to be fitted and can be inserted afterwards.

2 The crossing nose and wing rails are gauged from the straight stock rail. They can either be pre assembled or soldered in situ, but the metal strips joining the components should be about 1mm thick to match the thickness of the chair bases and be positioned to lie on top of the sleepers. This will bring the top of the crossing rails level with the top of the stock rails. Ensure that the edges of the strips do not protrude beyond the wing rails so that cosmetic chairs can be added later.

3 As 2.4.3 step 3.

4 As 2.4.3 step 4. Having placed the required number of chairs on the blade and closure rail unit, refer to Figure 2-30. The four chairs in the heel position, with their adjacent stock rail chairs, will need trimming to allow the blade to be correctly positioned. When finally securing the blade heel chairs to the sleepers, have the blade in the open position. This will give a little more flexibility and reduce the strain on the operating mechanism.

5 As 2.4.3 step 5. The dot on the sleeper in Figure 2-30 shows a possible location for securing the closure rail.

Steps 6 to10 are as 2.4.3.

11 Each check rail has three chairs fitted and is secured in position. The gaps in the check rail chairs and stock rail chairs are filled with cut down chairs to represent the special check rail chairs of the prototype.. Note that although the majority of standard turnouts have check rails extending over five sleepers the number can vary

2.4.5 Assembly sequence - riveted track

Turnouts using the riveted method can be assembled by mixing finished components from a number of manufacturers. Being of soldered construction, the basic assembly sequence closely follows the method described in 2.4.3. The difference lies in step 2 dealing with the construction of the crossing and wing rail assembly. Because, like the chairs in 2.4.4, the rivets stand slightly proud of the top of the sleepers, the metal strips holding the crossing assembly together need to be equal in thickness. They need to be located on top of the crossing sleepers to bring the top of the crossing rails level with the top of the stock rails.

The final touch is to add the cosmetic chairs. These require the keys to be added, the position, left or right handed, depending on the turnout being modelled.