
Track & Turnouts

Prototype Notes

Real industrial narrow gauge railways were often transitory in nature. In addition, almost without exception they were built as economically as possible, the equipment being treated as 'plant' - a tool to get the job done. As a result the track bed was hurriedly formed and near non-existent on some lines. Permanent earthworks were avoided if at all possible and only undertaken if the railway was expected to be especially remunerative or if there was no other option! The gauge that became virtually universal was 24 inches. Manufacturers offered two-foot gauge material from stock - other gauges were to special order only.

To allow the ready laying and movement of track a rigid portable system was developed, the leading British manufacturer of which was Robert Hudson of Leeds. This comprised pressed metal sleepers bolted to short lengths of rail. In its lightest form the panels of portable track were easily picked up by one man and repaid to suit. These light tracks were only suitable for wagons pushed by men or drawn by horses. Later, when small locomotives were introduced and loads became larger, a more robust form of semi-portable track was devised. This retained the fixed geometry and moveable nature of the earlier product but was stronger and heavier. Our track parts represent this latter type.

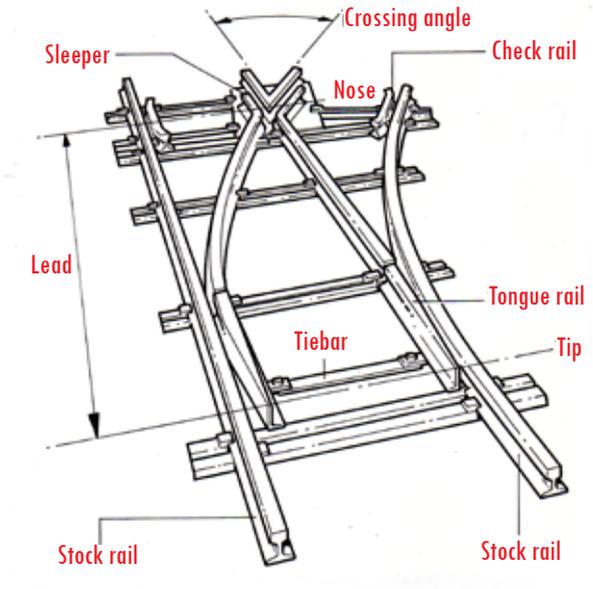
As the years passed a British Standard for portable track evolved. The last full set of such standards was issued in April 1934 as BS 536-1934. There were three types of portable railway track dealt with, all 24 inch gauge. Radii were given measured to the inside face of the outer running rail. Straight sections were either 15ft (with five sleepers) or 18ft (with six sleepers) long. The three versions of track were -

- Type 1 - Fixed radius curves of 13ft 3ins.
Segments of curved track were 22.5 or 45 degrees.
Turnouts were 9ft long with a 1 in 1 $\frac{3}{4}$ crossing angle.
- Type 2 - Fixed radius curves of 37ft 0ins.
Segments of curved track were 22.5 degrees.
Turnouts were 15ft long with a 1 in 3 crossing angle.
- Type 3 - Fixed radius curves of 65ft 0ins.
Segments of curved track were 11.25 degrees.
Turnouts were 18ft long with a 1 in 4 crossing angle.

Flatbottom rail was used in all types, either 14 or 20 lb per yard section. Rail ends were joined by simple fishplates (four hole) and sleepers were either plain or corrugated steel pressings. A wide variety of accessories beside just turnouts were available at various times. Amongst these were small turntables, climbing turnouts, car transfers etc.

Parts Nomenclature

The correct terms given by Robert Hudson (Leeds) Ltd. are shown in the drawing. Standard 'portable' turnouts were described as 'steel rails riveted onto pressed sleepers. The tongues are machined both sides and the frog rails are also machined. Guard rails have their flangeway clearances made to suit our standard locomotives and wagons'.



Track Laying in Model Form

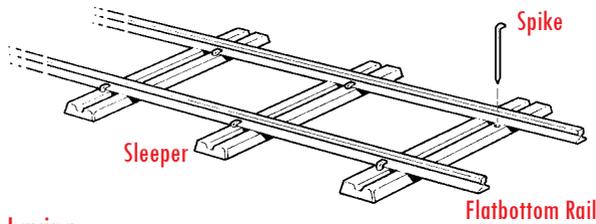
Preliminaries

The track & turnout components rely on a steel spike so a suitable baseboard material must be used. We recommend 'Sundeala' board, about 6mm thick. This material has been found to be ideal for track laying as it holds pins and spikes very well. Other materials can be used but avoid softboard and hardboard, the former does not hold spikes at all well and the latter is too hard. Certain particle boards will take spikes if they are driven in with care.

The base material chosen should be well supported and flat. It is assumed that the track and turnout positions will have been marked out either using paper templates (photocopies of drawings) or by drawing guide lines direct onto the baseboard. If drawing direct then determine the centre lines first, adding outer guide lines to aid in locating the sleepers. As portable track has a rigid, fixed geometry marking out is fairly easy. Take care to avoid any baseboard support members when positioning turnouts. Try to think ahead as rail is laid. It is much easier to solder on a feed wire neatly to the underside of the foot before spiking in place than after.

Making A Start

Begin by laying all the sleepers, both for the turnouts and the adjacent track. On a small layout it is advised that sleepers are completed before laying any rail at all. Being plastic we have found that solvent adhesive is a good way to fix them in place. Plain sleepers have holes at both ends to correctly set the gauge to 14mm. Note that the turnout sleeper has spiking holes at one end only. These must be laid with the holes ready to accept the straight stock rail.



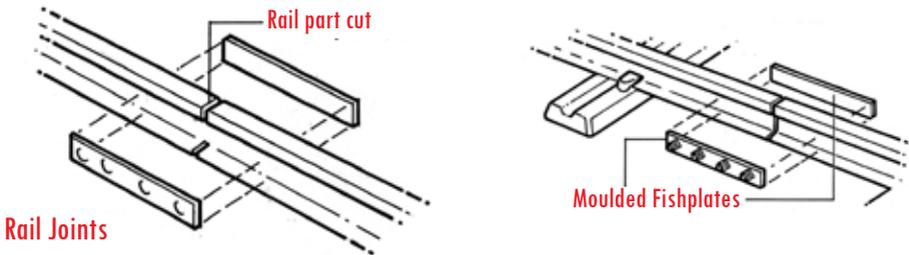
Basic Track Laying

The upper surface of the sleepers should be quite flat and uniform. If for some reason it is not then fine wet and dry paper on a flat block (which spans five or more sleepers minimum) may be used. In our experience this should not be necessary except where severe changes of gradient occur or the baseboard is not as flat as might originally be thought.

Laying The Rails

There are two distinct approaches that can be adopted here, each have their strengths and weaknesses. The prototype rail lengths are quite short, either 9ft, 15ft or 18ft. You can cut scale lengths of 63mm, 105mm or 126mm, but remember to allow some extra for curved rails.

Alternatively longer rail lengths can be used providing they are multiples of the standard section measurements. Rail gaps can be created at the correct intervals by two fine saw cuts, top and bottom. In either case the joint is 'dressed' with cosmetic plastic moulded fishplates. These are provided 24 to a sprue, 12 with nut detail (outside) and 12 with a bolt head (inside).



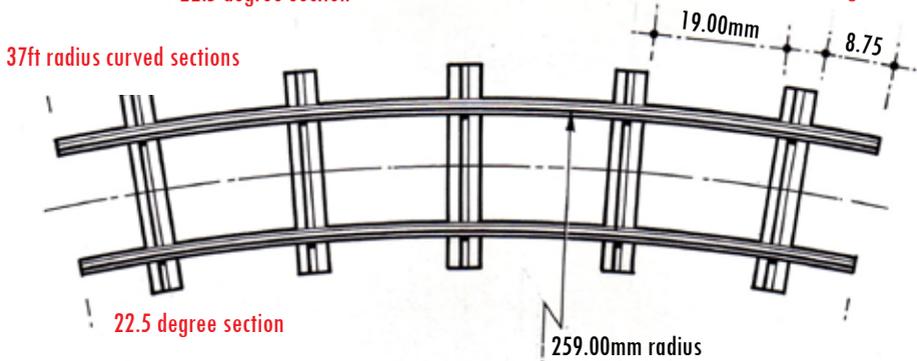
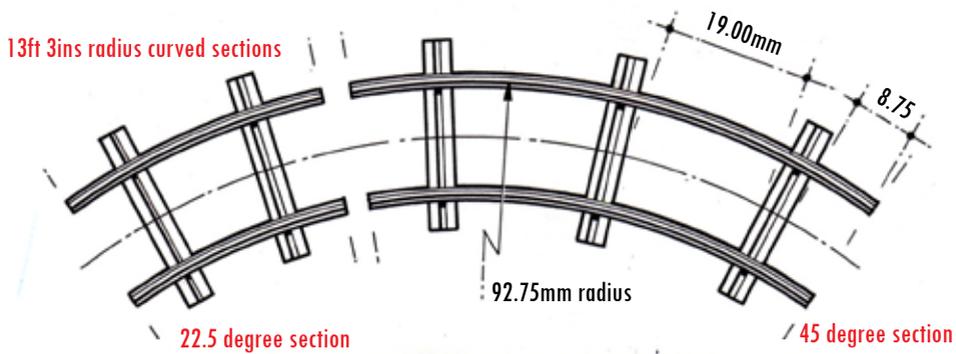
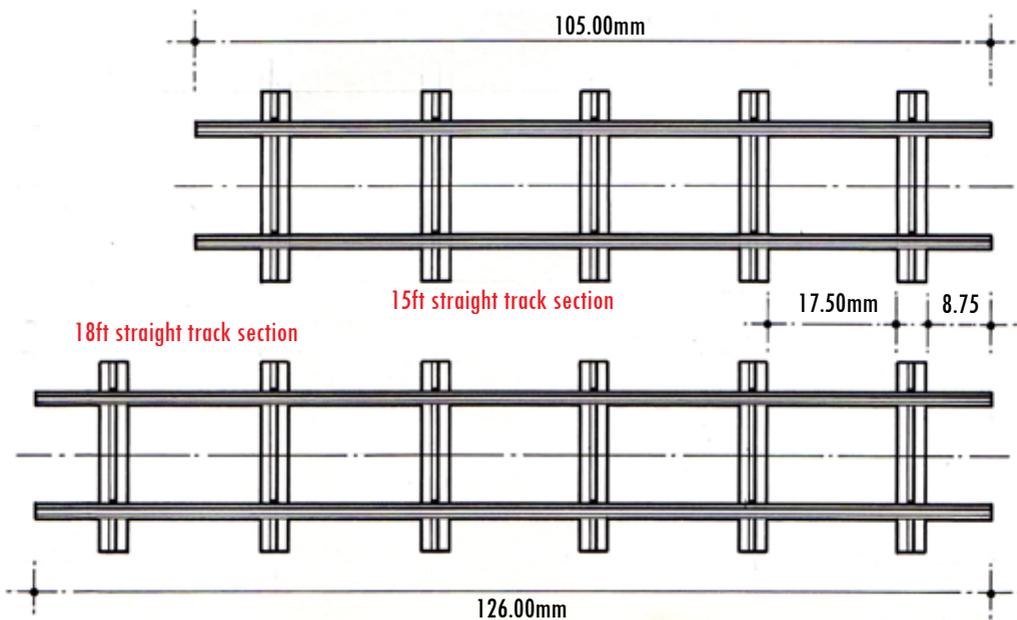
The recommended rail to use is Peco IL-83 flatbottom section. This has an very good profile and is readily obtainable. Otherwise any flatbottom section with a foot 1.80mm wide and code 55 - 82 will suffice. Use fine nosed pliers to push spikes in place to hold rail.

The pattern of holes in the sleepers are arranged as per the prototype. They should be aligned so that in any single panel of track the sleepers are all the same way round. This ensured that sleepers could not move out of square with the rails - thus ensuring the panels were rigid and kept their gauge.

Note: In describing portable track in model form we have tried to adhere to prototype dimensions wherever practicable. One deviation is the use of a slightly heavier rail section. This is prompted by availability. The Peco IL-83 rail we recommend is a good section and can be obtained without too much difficulty from most good model railway shops or by mail order.

Straight and Curved Section Drawings.

The drawings on the opposite page are for 7mm scale - 14mm gauge. These drawings can be photocopied and cutout for layout planning. Always check that they have been printed at the correct size.

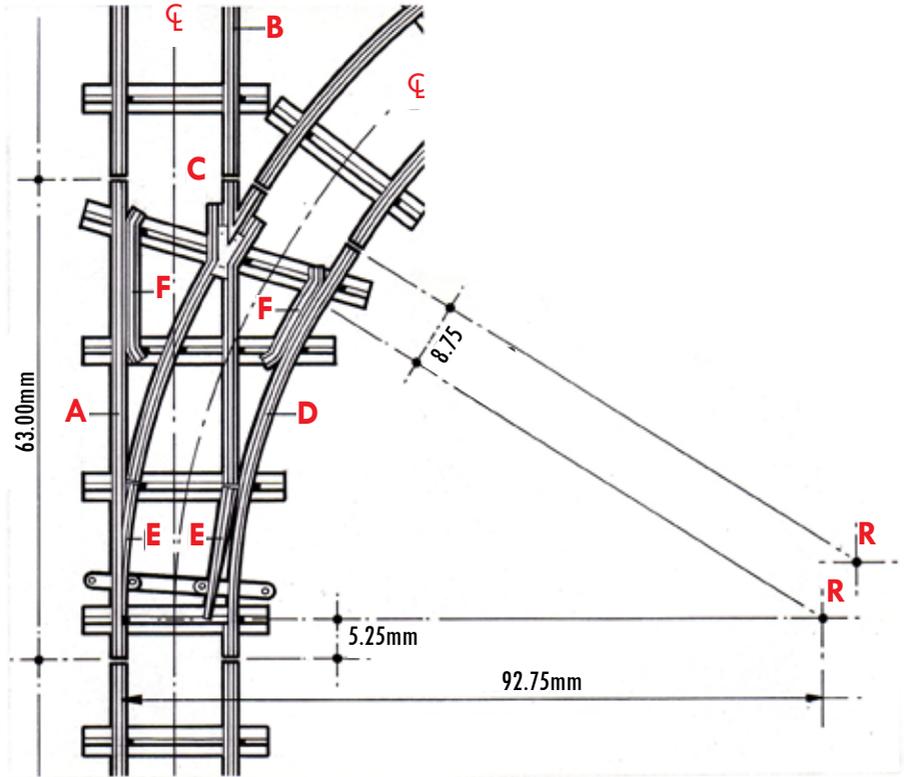


Note: The sleepers are always spaced evenly.

Turnout Construction

Laying A Turnout

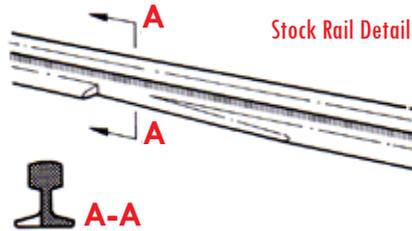
This description covers a 13ft 3ins radius Type 1 turnout but the technique is suitable for all other types though the stock rail lengths and other dimensions must be increased accordingly - see templates. All the sleepers for the turnouts and surrounding track should be in place before laying any rails.



Stock Rails

These need a small portion of the inner foot of the rail section removing to accommodate the tongue rails. Do not remove any of the rail head. On the prototype a minimum of machining was undertaken and this practice should be followed in model form. Lay the straight stock rail A first. Remember to drill any holes for wiring at this stage.

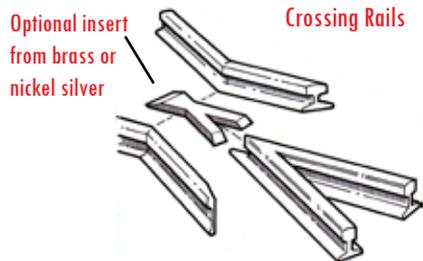
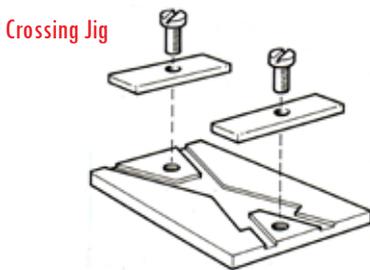
Cut a length of rail 387mm long (18ft + 9ft + 18ft). Make the two false joints as shown with a fine razor or piercing saw. Place on the sleepers to determine the position of the cut away foot required to receive the tongue rail (see stock rail drawing). Shape using a fine file or milling cutter and spike in place. If you need a feed wire, add it before spiking. Use needle nosed pliers to hold and push in the spikes.



Next cut a rail length of 162mm and spike down in position B. This is the second rail on the panel of plain track leading out of the turnout and is used to position the frog/crossing unit. So far all the rails laid have been spiked in place using the preformed holes.

Crossing

The crossing unit (frog) C should be made up using a crossing jig (these include full instructions). The jigs are aluminium so solder does not stick. If using acid based flux clean the jig thoroughly immediately after use. As it comes from the jig the frog can be used for a turnout of either hand. Cut back the 'vee' rails to the correct dimension (8.75mm for Type 1). Curve one of the approach rails according to which hand is required. Cut both approach rails so that the ends come central on a sleeper. The crossing unit always needs a feed wire so add one now. Position the crossing using a track gauge, with rail B as an initial locator. Great care must be taken not to locate the tip of the 'vee' too close to the blade end of the turnout.



The exact position of the tip can only be located with a length of rail tacked temporarily in position D. Once located correctly, drill holes through the sleepers (0.70mm dia) and spike the crossing in place. Take care to match the staggered spike positions of the plain sleeping.

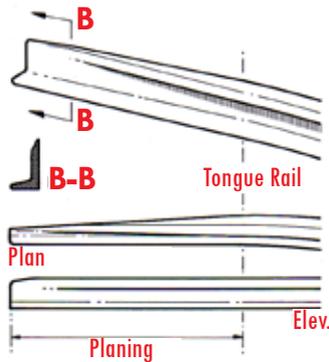
Curved Stock Rail

The curved stock rail D can now be added, cut a length of rail longer than that for the straight stock rail first. Curve the rail using a rail bender. Remember that there is a small straight section opposite the frog. Cut dummy joints, shape to accept the tongue rail and add a feed wire. Spike down to the plain approach and exit track sleepers.

Using a track gauge, position drill and spike through the turnout sleepers. Take extra care at the crossing to maintain the correct gauge of 14mm. You should now have the basis of an accurate turnout. Check using skip chassis or similar. (Note: The correct wheel back to back is 12.40mm minimum to 12.50mm maximum. The smaller setting is better for the sharp radius Type 1 turnouts. Otherwise set to 12.50mm).

Tongue Rails

The prototype tongue rails, often called 'blades' by modellers, are required to be strong enough to support the load as the wheels transfer their weight from the stock rail to the diverging route. At the very tip the weight is still on the stock rail so the section can be thin. The full section of the rail needs to be gained as soon as practicable however and this results in the tongue rails being formed as shown. In 7mm scale the form shown, even on the smallest radius is reliable and smooth. Partly this is due to the tongue rail forming a transition between the stock rail and the diverging route. Remember the tongue rail planing is straight, not curved. Material is taken from both sides of the tongue rail resulting in a section as shown at B-B. The whole of the inner foot section is retained to provide a strong position for attaching the tiebar lugs.



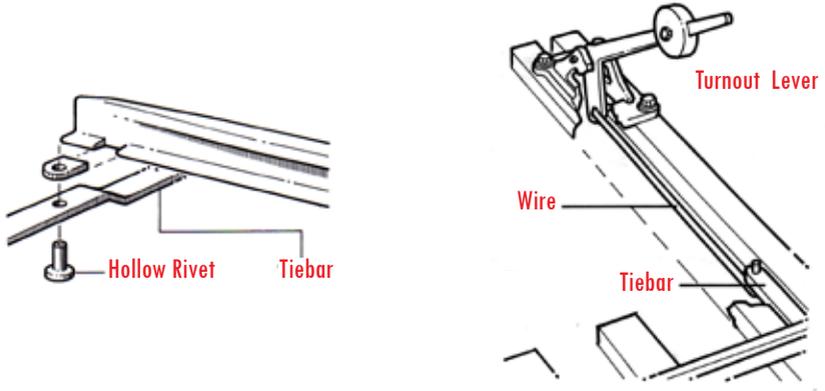
Pivots

Having shaped two tongue rails E as described above cut to length so as to fit between the rail ends leading from the crossing (frog) and the rebates in the two stock rails. Drill the sleeper at the pivoting end for two spikes. The outer holes should be drilled right through the baseboard.

To form the tongue rail pivots, take some hard brass wire (0.70mm dia or similar) and make a 'spike head' at one end. Cut to a length that passes through the sleeper and baseboard plus 10mm. Solder the 'spike head' to the outer foot of the tongue rail. Push the wire through the outer drilled hole in the sleeper and locate with a track spike in the inner hole. Leave the spike loose so that the tongue rail pivots on the brass wire. Underneath the baseboard solder a brass washer onto the protruding wire. Any wiring may be soldered to the washer.

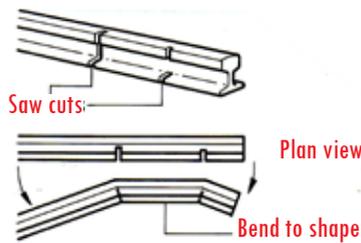
Tie Bar

Make the tiebar from 2mm x 1mm brass strip. Two lugs made as per the drawing can be soldered to the tongue rails, solder these to the base of the tongue rails. Use hollow rivets as pivots. The tiebar should extend outside the stock rails just enough to allow attachment to a turnout lever.



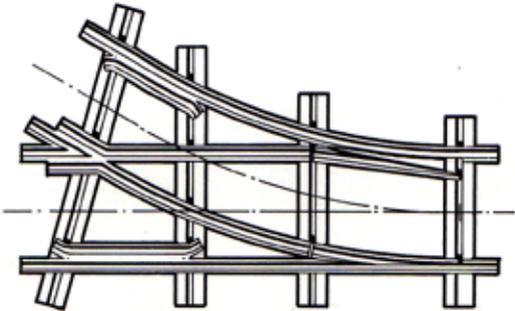
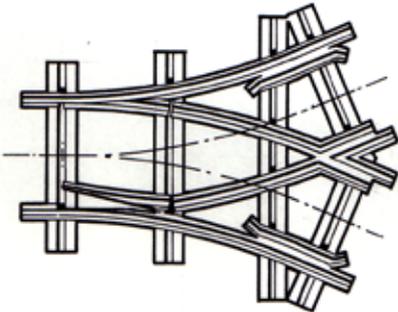
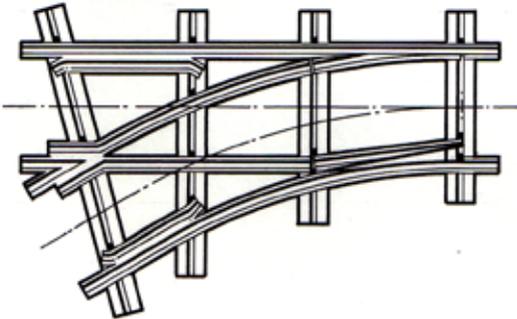
Check Rails

The check rails F are made from lengths of rail sufficient to span two sleepers either side of the frog. Lengths will vary depending on type of turnout and sleeper layout. Bending the ends can be eased if the rail is half sawn through using a very fine piercing saw blade. The gap will close up and become invisible after bending and subsequent painting. Each check rail needs to be butted up, foot to foot, against the stock rail in order to obtain the correct check rail gauge (use the standards gauge). As the spikes holding the stock rail in place will prevent this it is necessary to relieve the check rail to allow close fitting. Mark where the spikes foul and nick the foot of the check rail with a file. Once positioned correctly drill and fit spikes on the outside only.



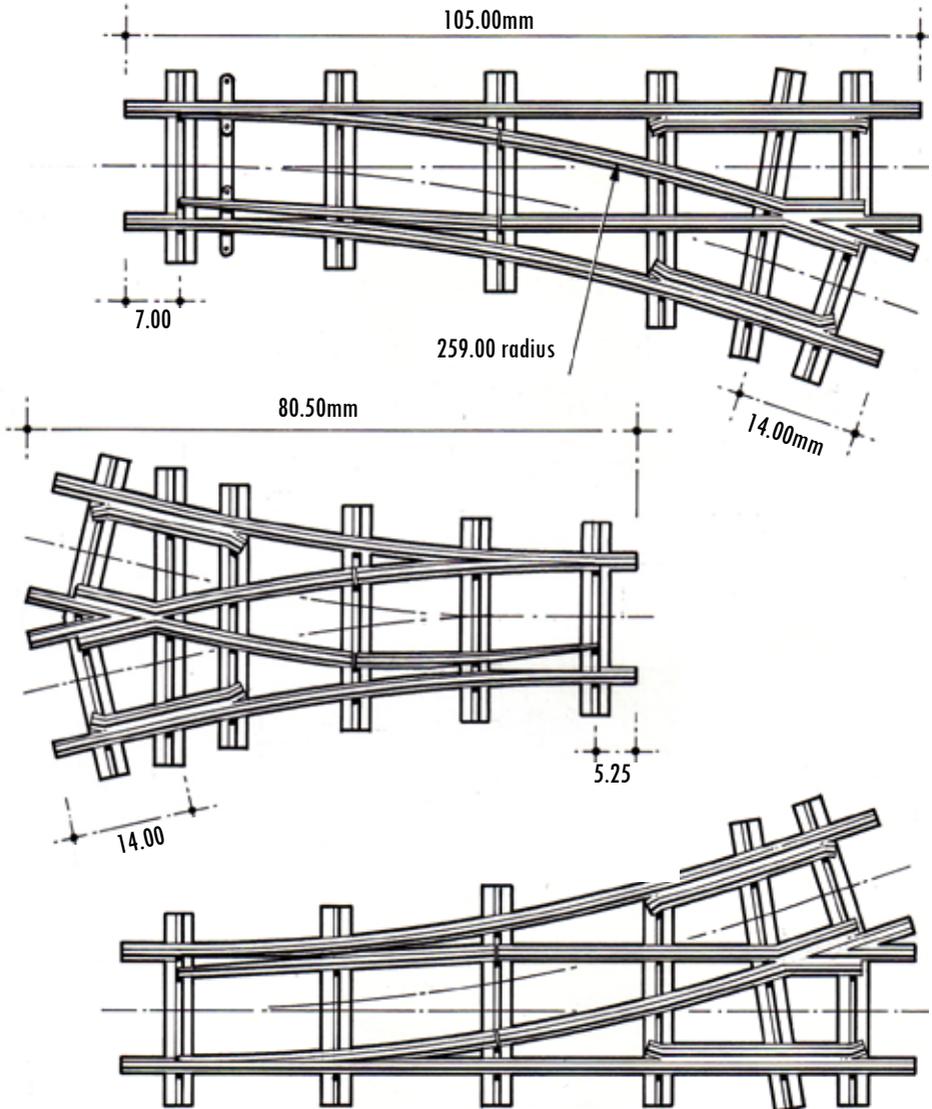
Type 1 Turnouts

The overall length of the right and left hand turnouts was 9 ft. The 'Y' turnout was shorter at 7ft. Either draw the centre lines etc., direct onto the baseboard or photocopy the drawings on this page and paste directly in place, laying the sleepers and rails on top. The section at the crossing was straight on either road of all three turnouts. The radius only ran between the tongue tip and crossing nose. The straight portion before the commencement of the curve at the blades was 9 inches (5.25mm). At the crossing end the straight section was 15 inches (8.75mm).



Type 2 Turnouts

The overall length of the right and left hand turnouts was 15ft. The 'Y' turnout was shorter at 11ft 6ins. The section at the crossing was straight on either road of all three turnouts. The radius (37ft) only ran between the tongue tip and crossing nose. The straight portion before the commencement of the curve at the tongue tip was 12 inches (7.00mm) for the RH & LH turnout and 9 inches (5.25mm) for the Y turnout. At the crossing end the straight section was 24 inches (14.00mm) for all configurations.



Finishing

After the track and turnouts are laid, wired and thoroughly tested it is time to consider painting. By far the quickest method is to use an air brush. As both rail and sleepers represent steel (and go rusty) the whole may be given an overall coat of suitable colour. Painting by brush is nowhere near so quick but is just as good as long as the paint is applied sparingly. In either case the railheads should be wiped clean before the paint hardens using a lint free cloth pad lightly soaked in suitable thinner. Always read the precautions on paint and thinners before using.

Once the base coat has hardened use lighter and darker shades of rust colour paint to add character to the trackwork. Pay particular attention to the 'fishplate' joints where a little 'drybrushing' will bring out the detail. Make the rust shade darker on older track and light where conditions are damp or fresh damage might occur. Test the brickwork again after painting. Once the track is ballasted corrections will be very difficult.

Ballasting

Hopefully you have now reached the stage where all your track is neat and operating perfectly. The final stage is to add the ballast. Most industrial narrow gauge ballast had little in common with the standard gauge product. Usually the bare minimum of stone was used and much reliance was made on locally available materials. So do not ballast your track uniformly, try to logically vary the texture and grain sizes in a realistic manner.

Dress your ballast mass into shape around the sleepers and rails using a soft brush. Make sure to keep the particles clear of moving parts in turnouts etc. When satisfied with the effect saturate the ballast with diluted PVA adhesive using an eye dropper. A single droplet of detergent added to the water will aid wetting of the loose material. Try not to disturb the ballast mass and leave to set. When dry the ballast will be found to have retained its 'loose' appearance but be firmly bonded in place. Depending on the material used the ballast may be left in its natural colour or painted.

At this stage the track can be made to look more decrepit by adding tiny clumps of commercial 'weed' material in and around the rails. Trim to clear rolling stock.

Further Information

Please contact us if you have any questions , or wish to discuss any of the details in this information.



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