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BUILDING BETTER POINTWORK – it's easier than you think

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The Wisdom of Solomon

I have been building scale trackwork professionally for upwards of thirty years. I have worked on some of the most celebrated layouts in the country, sometimes `on location' at the owners' homes, more often in my own workshop in Somerset. My output is predominantly finescale 4mm and 7mm, and I provide a full service from baseboard construction right through to the ballasting, painting and wiring of the finished track. Over the years my work has regularly been featured in MRJ and other magazines - but always on other people's layouts. Whilst their owners are usually more than pleased to credit the celebrity loco-builders they have commissioned, I'm often amused to see the lengths to which they will go to disguise the fact that they haven't actually built the trackwork themselves.

When MRJ asked me to describe my methods of building and laying track, they gave me two options. One was to show ways of streamlining (I'm tempted to say Streamlining) the construction of P4 pointwork, the other was to demonstrate ways in which the appearance and function of 00 or EM gauge track could be significantly enhanced.

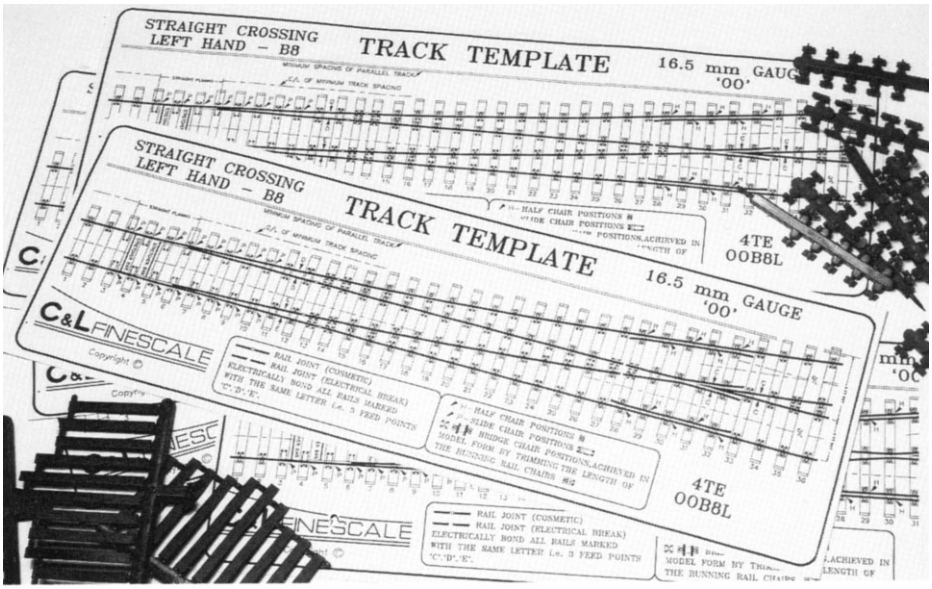
The latter seemed the more positive and professional approach - I always prefer to try and improve on what has gone before rather than finding ways of cutting corners. Using scale components in a prototypical manner goes a long way towards disguising the fact that 00 and EM track are built to an inaccurate gauge. As it happened, I had just received a commission from a customer that seemed to offer the perfect way of demonstrating not just how I work, but also how, without too much extra effort, a fairly ordinary piece of trackwork could be transformed into something on an altogether higher plane.

My customer's requirement was for a long section of finescale 00 track laid on the very gentlest of curves to avoid that 'dead-straight' look. It was a copy of a prototype formation, with two running lines (linked by a trailing crossover) and a goods loop, off which was a headshunt and the beginnings of a fan of sidings. An unusual feature was that the loop was protected not by a catch point, but by a dead end running off a double slip. The main-line track was to be laid in the chaired, flat-bottom track of the late 1950s/early 1960s, the remainder being bullhead. The section of track was to be assembled on a ply base ready to be dropped into position on my client's layout. The only other information I'd been given was a rough sketch of dimensions and track plan - in everything else (radii, crossing type, trackbed and ballasting) I had a completely free hand.

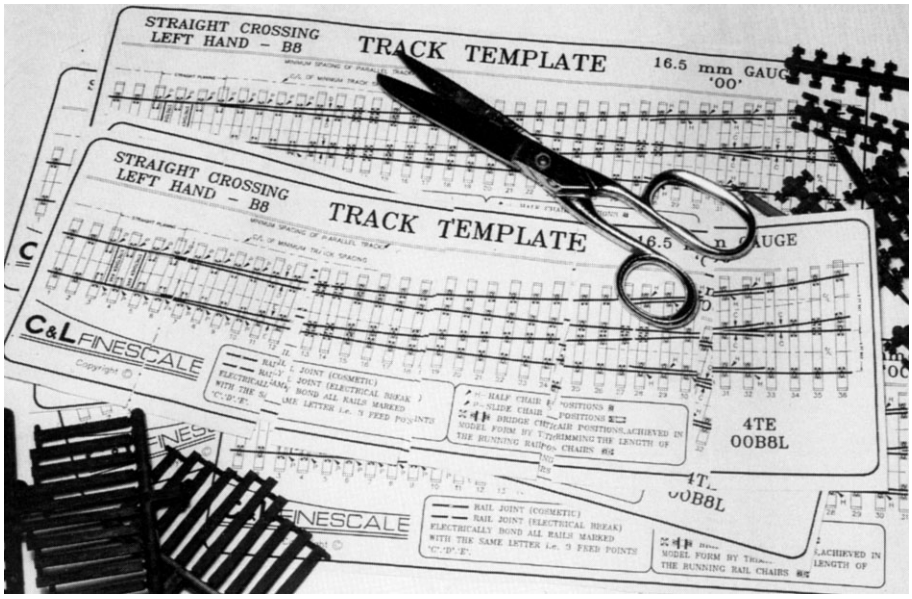
Between ourselves we decided that the best way of illustrating my track building methods would be to show the step-by-step development of one of the key elements of the formation, the trailing crossover linking up and down main lines. In fact, I only needed to demonstrate the construction of one half of the crossing, since the other was simply a repeat of the first. The double slip might be something of a virtuoso piece but it was not typical of the kind of thing most modellers like to build (I'm sure that's why so many of my customers get me to build them on their behalf!). I feel the prototypical accuracy of these formations is always slightly compromised by being built in 00, however fine the rail section.

What follows, then, is a sequential description of how I built this particular piece of pointwork. The methods used have a great universality and can be applied to many other formations. For preference I tend to use C&L or Exacto-scale components, with individual chairs attached by solvent to plastic sleepers. However, I'm sure many of the techniques - such as the checking and verification procedures, and the insistence on using the correct types of chairs in prototypical situations - will readily translate for modellers building trackwork by other means and in other gauges and scales. The first part of this article covers the building of the actual track formation. In the second instalment we'll look in detail at tracklaying and ballasting.

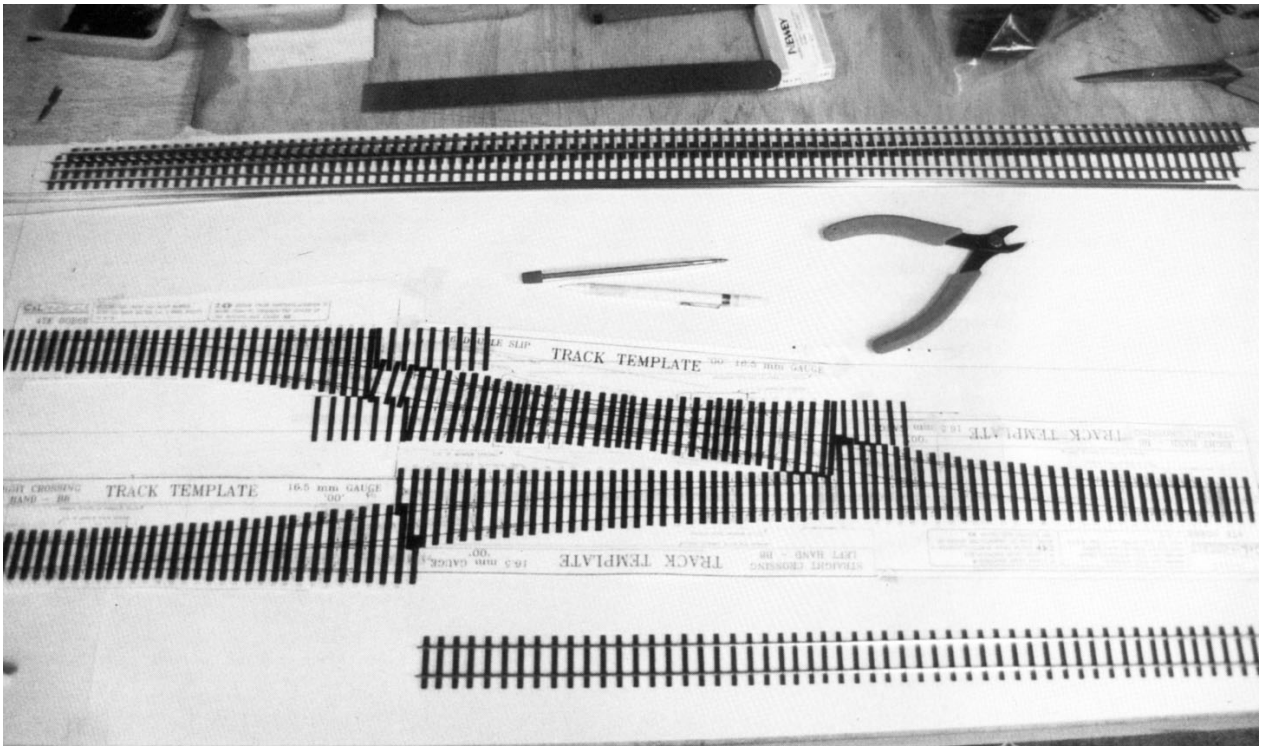
NORMAN SOLOMON is the undisputed king of finescale track-building. In this exclusive two-part feature (*combined here as one*) he uses his wealth of practical experience to show how we can all create good-looking, prototypical trackwork - even in 00 gauge.



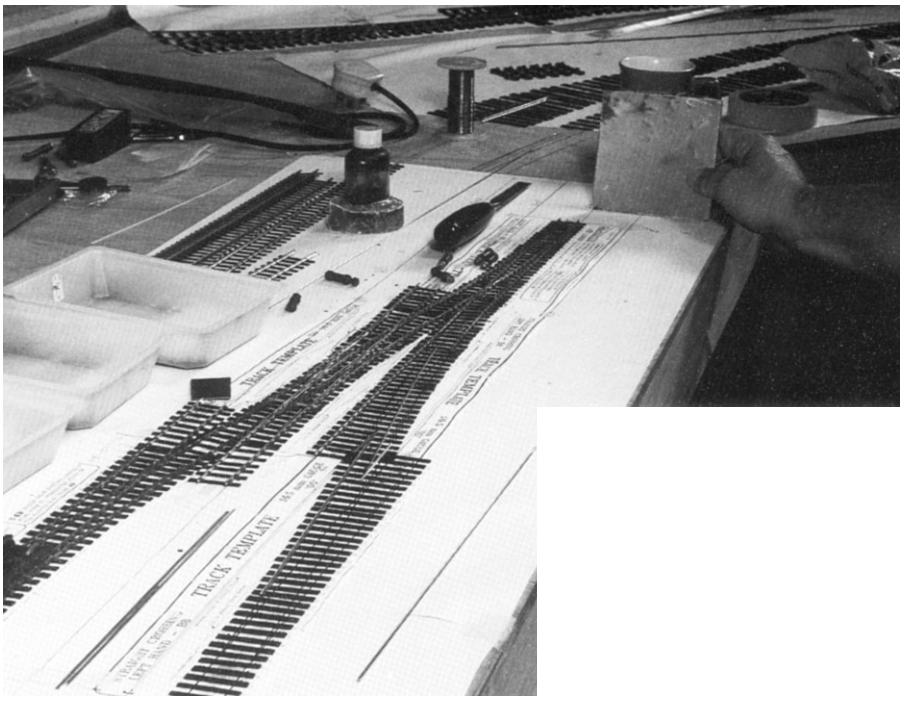
I prefer to use C&L templates for building crossings, because they've got so much information on them, such as the types of chairs to use and where the switch assembly goes. It's all based on real turnouts. I've got copies of all of them, in all the gauges. I use a fresh template for every job. If you photocopy them, you'll find that some copiers will slightly distort the dimensions and your template may not be accurate. In P4 and S7 you need something spot-on - although it's tempting to save a few bob, in the long run it makes more sense to use new templates each time. With particularly complex pieces of pointwork, where no suitable templates exist, I plot the track out by hand.



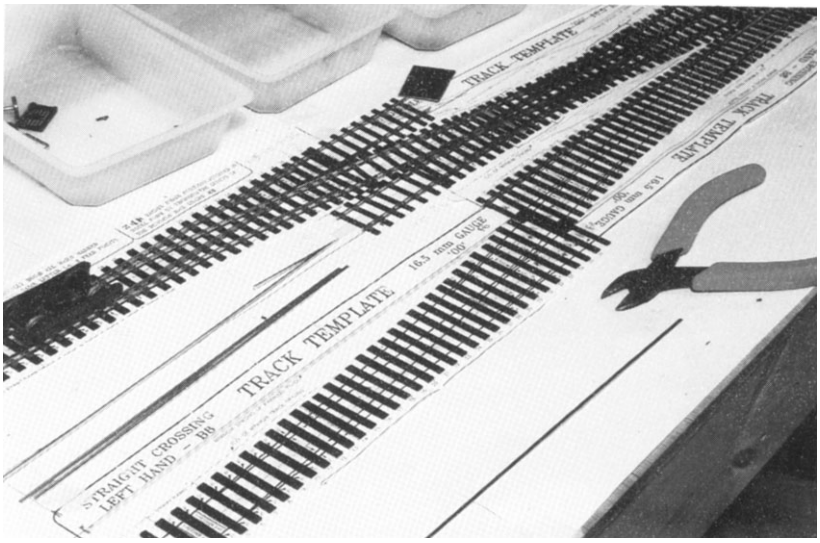
My customer wanted this stretch of track to be gently curved along its length, so I marked out one rail as a datum using a long piece of 10mm x 10mm timber. I followed the curve at the centre - the ends of a piece of wood tend to straighten out. The next stage is to get the turnout templates curved to the prevailing radius. How do you curve a straight template? The answer is, you literally cut it into man-sized chunks, maybe about six sleepers long for a B8 turnout like this. If it's a tighter curve, then cut every four sleepers or so. What you'll get is a series of straight bits which you can integrate with the curve you've laid out. We want a smooth, gentle transition so we need to set out the template with great care, avoiding any kinks and doglegs.



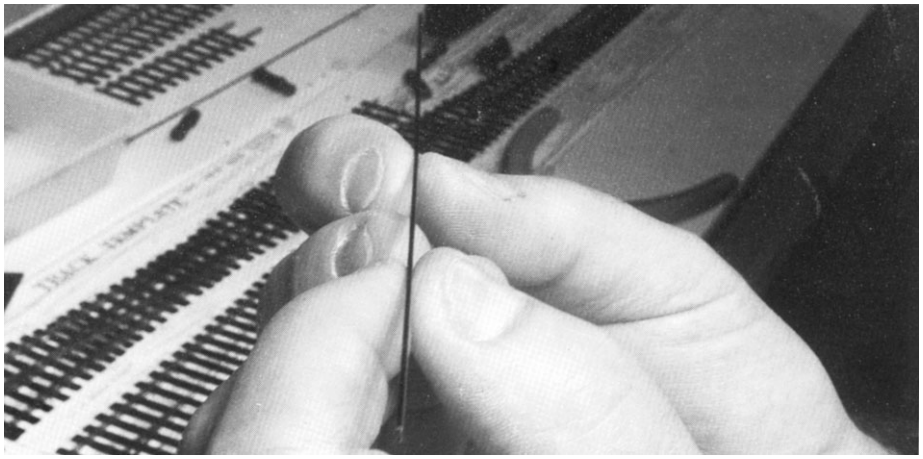
A lot of people build pointwork based on what they think a real turnout looks like, rather than how they're really built. I've been working on turnouts for the last thirty years and they've all been based on full-sized practice. If it works on the real thing, it should work in model form. Having stuck your templates down (I use small bits of masking tape) the next step is to lay out the timbering. This can be a work of art in some cases because you have to interlace the timbering throughout crossovers and complex formations. Some railway companies `blocked' the central areas of' crossovers with long timbers, but these could be very expensive so it wasn't always done. The sleepers and timbers are stuck down on the templates with a narrow strip of double-sided tape.



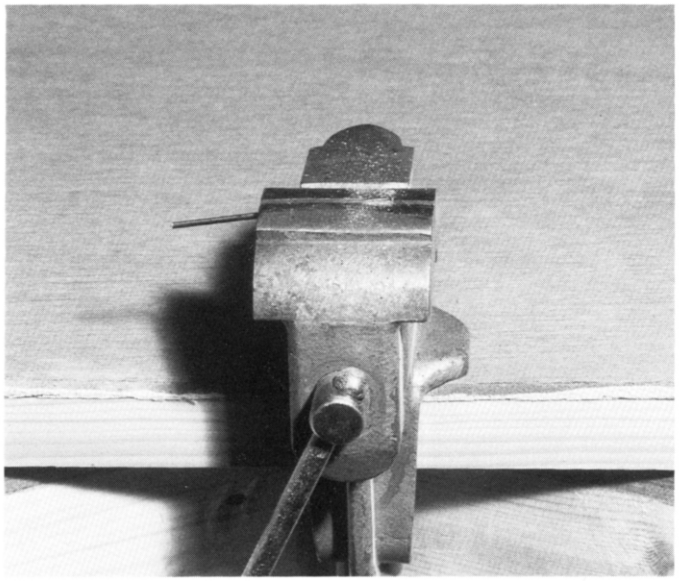
I always align curves by eye. The secret is to use a small hand mirror held at one end of the track. Looking in the mirror allows me to see the curve I've plotted without getting down to baseboard level to sight it. The gentlest of curves will be foreshortened by the mirror and any kinks that may exist will easily he picked up. In this instance I want to keep the pointwork as short as possible while using fairly generous angles. The easiest way to achieve this is to keep the 6ft way as tight as I can, but the siding needs to be 8 to 10ft away from the running line. I managed this by keeping the double slip straight while the main line is curving away from the siding. The siding is kept straight until it is the required distance from the main where it can then be curved round parallel to the main.



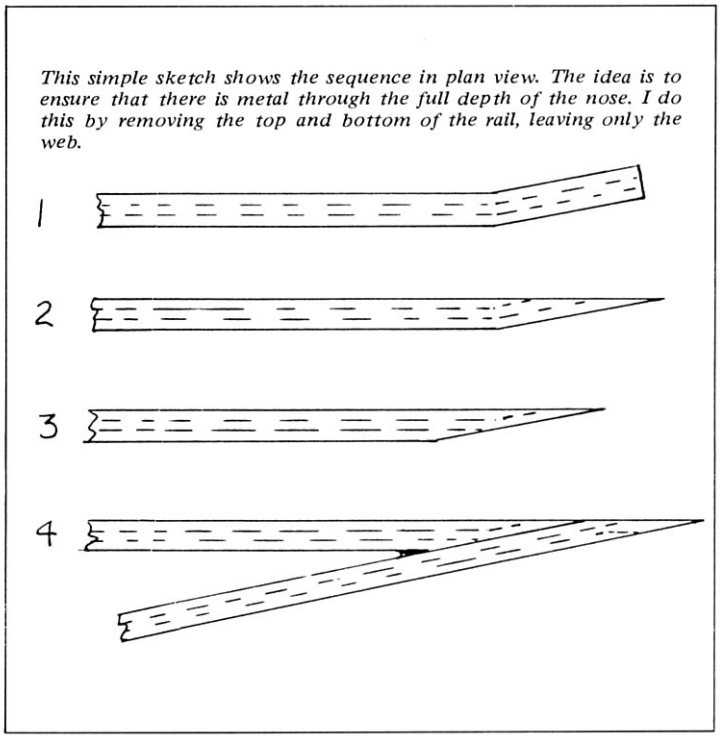
The next stage is to build up the skeleton of the turnouts. I start by cutting the rail I will need roughly to length and laying it out on the templates. There are two other points of interest here. The first is the pair of Xuron rail cutters on the right. I use these like some people use disposable razors. They cut beautifully but it's a false economy to keep using them once they’ve lost their edge. The second is the test bogie sitting on the completed turnout on the right. This is just my ordinary rigid coach bogie with one axle set to the minimum back-to-back gauge and the other to the maximum. If there's any discrepancy I can see it instantly - one wheelset or the other will not run as it should. But with the gauges used correctly there should be no problem.

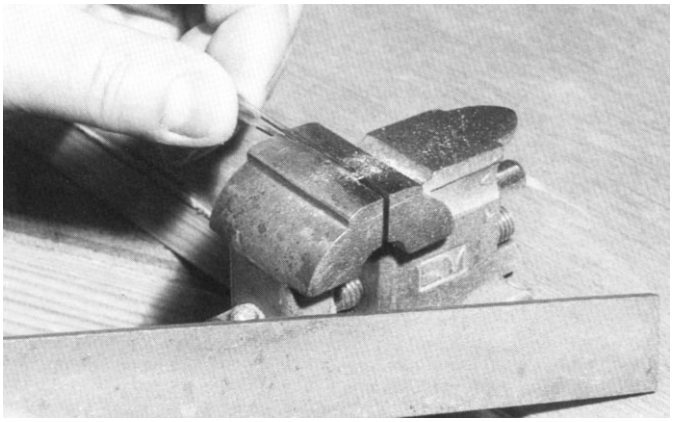


Each length of rail is sighted to make sure there are no nasty little kinks anywhere along its length. Even if it’s going to be curved later it's better if a length starts straight - this will make the curve more even. People are being fools to themselves if they only build straight turnouts. It's just as easy to build them on a curve, as they very often are on the prototype. It all comes down to plotting the track out accurately to start with. For a complex configurations you can always get a computer-plotted template but I don't have time for that, I just get it sorted out with a stick and plot by hand.

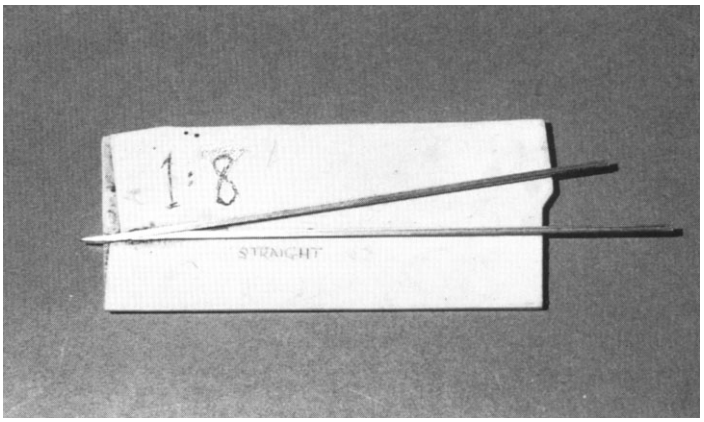


Now comes probably the most important piece to construct the vee. First I place a scrap length of rail into a small smooth-jawed vice at roughly the angle at which I want the vee to end up. Then I take the lengths of rail I want to use for the vee and put a bend 5-6mm from the end in each piece. Remembering that bullhead rail has a top and a bottom, check that the rail is the correct way up and that the bends turn away from each other.

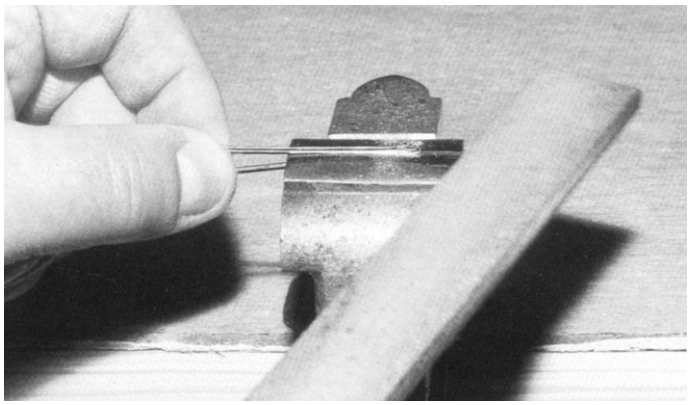




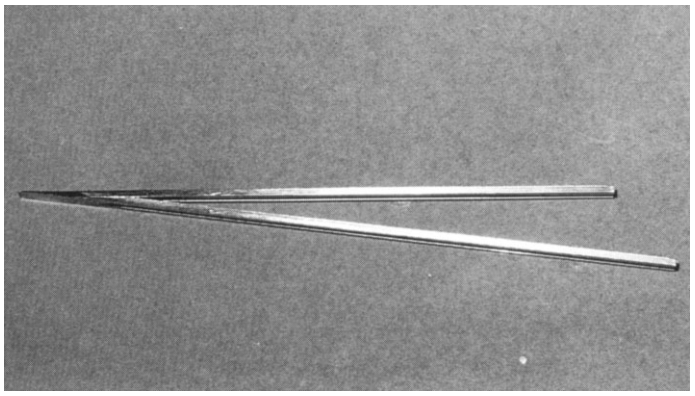
Holding the piece of rail horizontally in the vice, the bend is filed away flat. The rail is then turned over and laid on top of the piece of scrap rail that's already there - the aim is to use this as a guide so you can file off the other piece of rail at the correct angle. The second length of rail for the vee is then put through the same process.



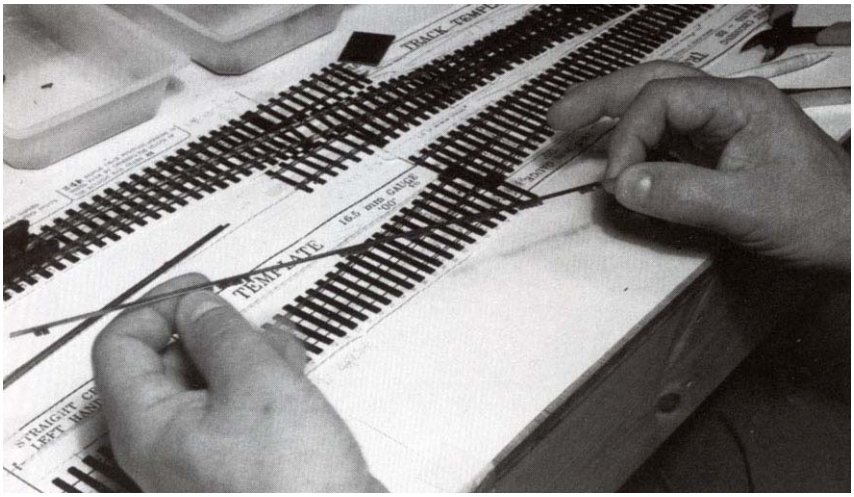
We now see the prepared pieces of rail carefully set up in one of my jigs. I sight them to ensure they form a perfect V shape and do not splay in or out at the end. Then a spot of liquid flux and a touch with the iron, which already has solder on it, makes the joint. I then remove the vee from the jig and spot a little more solder on the side where the two pieces of rail join.



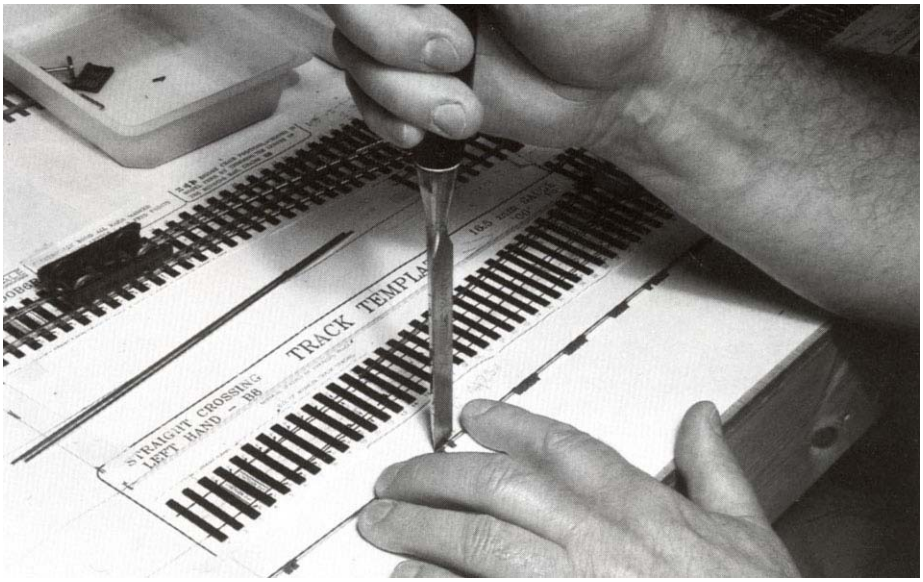
Now I put the vee back in the vice and dress the side where the solder has been used as a filter. At this stage I adjust the angle of the piece of rail in the vice so the top of the vee sits horizontally. This helps in setting up subsequent vees of the same angle.



I can now dress the raw vee by draw-filing it in my hand and putting the top radius back. The nose is also blunted slightly. The whole thing is sighted to ensure it forms a true V-shape before I use it. Once we've made our vees they can be cut and trimmed to length and placed on site precisely.

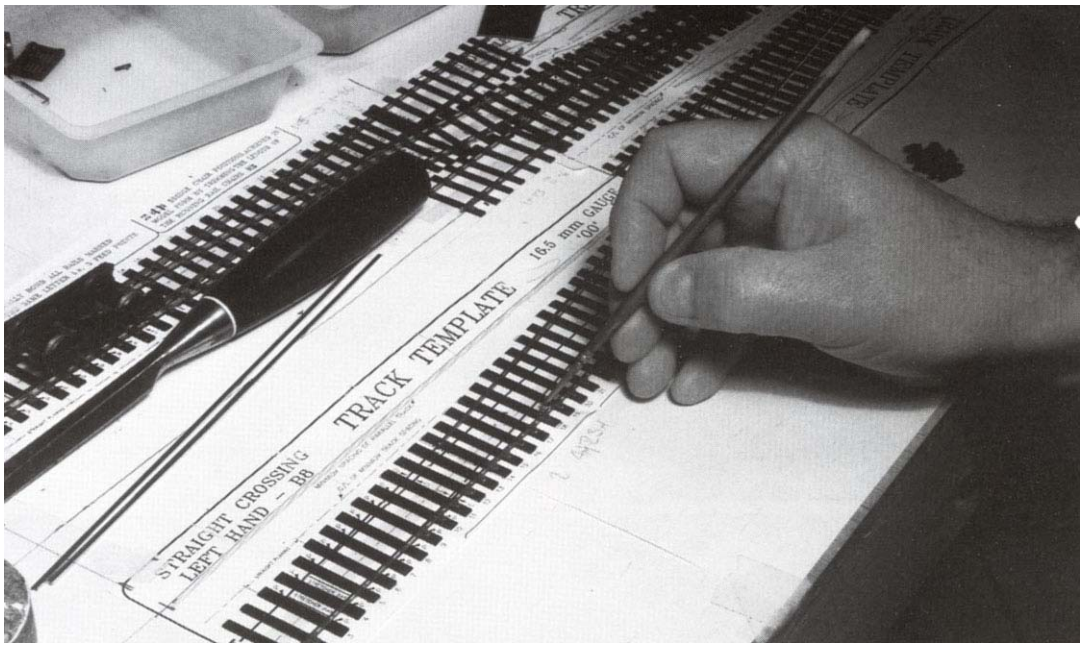


The next phase is to cut the stock rail accurately to length and load it with chairs - the type of chair you need is indicated on the template. Before chairing up a piece of rail, I make a pencil note on the template of the number of chairs I will need for each piece of rail, and also the direction the keys are facing. This is almost always facing oncoming traffic, to keep them tight - otherwise they would tend to loosen and allow the rail to creep. The rule sometimes goes out of the window on gradients, so you have to be careful. Keys also point away front fishplates so allowance is made for this where they occur on the prototype at the ends of each piece of rail. If cosmetic fishplates are added later, the keys will allow for this.

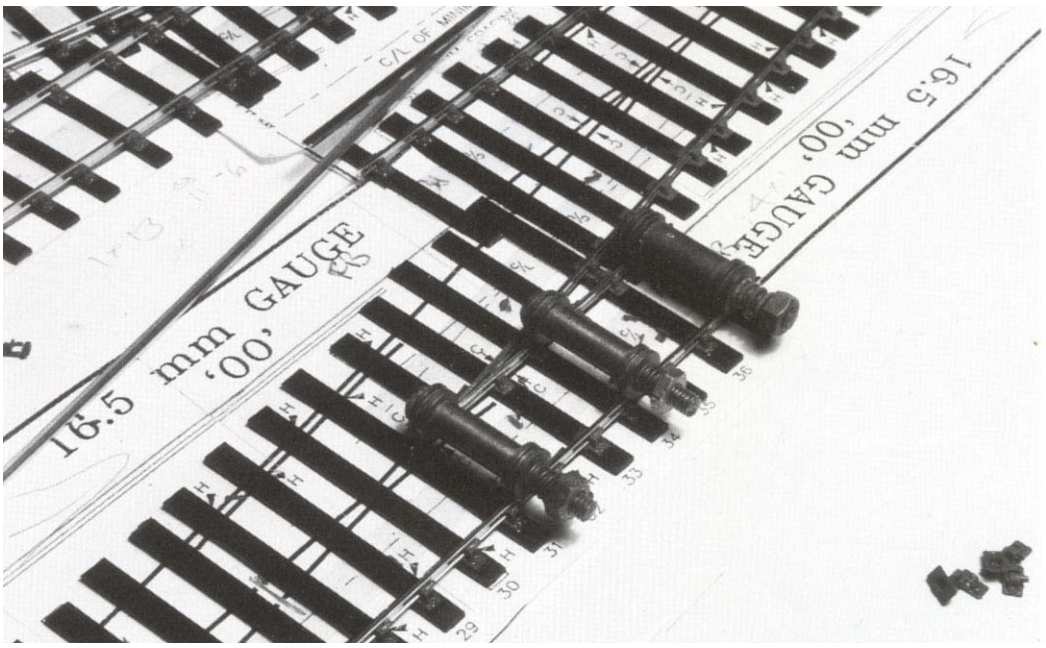


There are dozens of different chairs on a prototype turnout, which have to be represented by two or three model chairs at the most. Except for the slide chairs, most other types are represented by chopping ordinary chairs to fit. This I do with a sharp chisel. Where the closure rail meets the stock rail, the first five or six chairs are chopped progressively shorter to match the curve. I also work out where the check rail comes and chop the chairs at the back. In P4, where clearances are tighter, alternate chairs have to be used and halves added later.

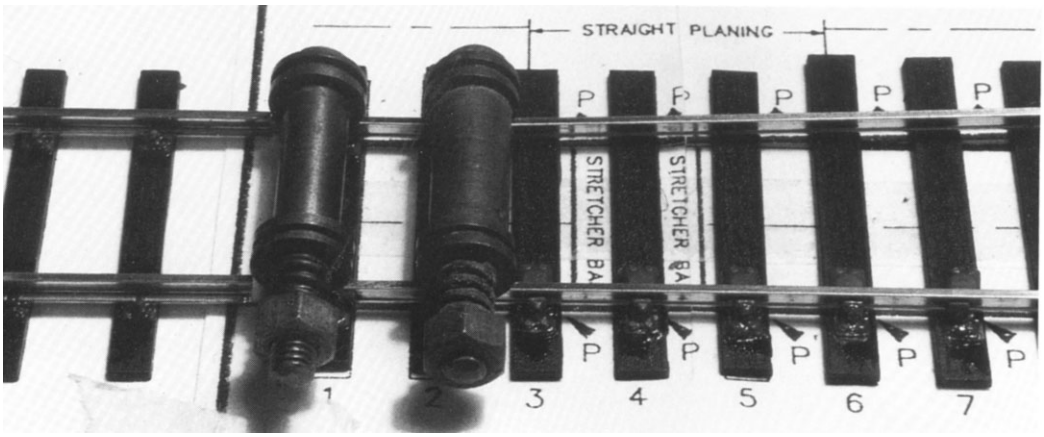
Now we come to building the turnout with the prepared lengths of rail. There isn't any qualitative difference between building a curved turnout and a straight one. The first thing is to lay the straight stock rail or, where the turnout is curved, the rail with the gentlest curvature. Whether straight or curved, this will be still sighted with the mirror. In this situation, where I need to maintain an even curve throughout the whole of the section, I'm using a length of the prepared flatbottom plain track curved to the line plotted on the plan. This means I can then sight through the lot, plain track, stock rail and all. I'll now set the stock rail up properly so it flows with the curve, again using the mirror.



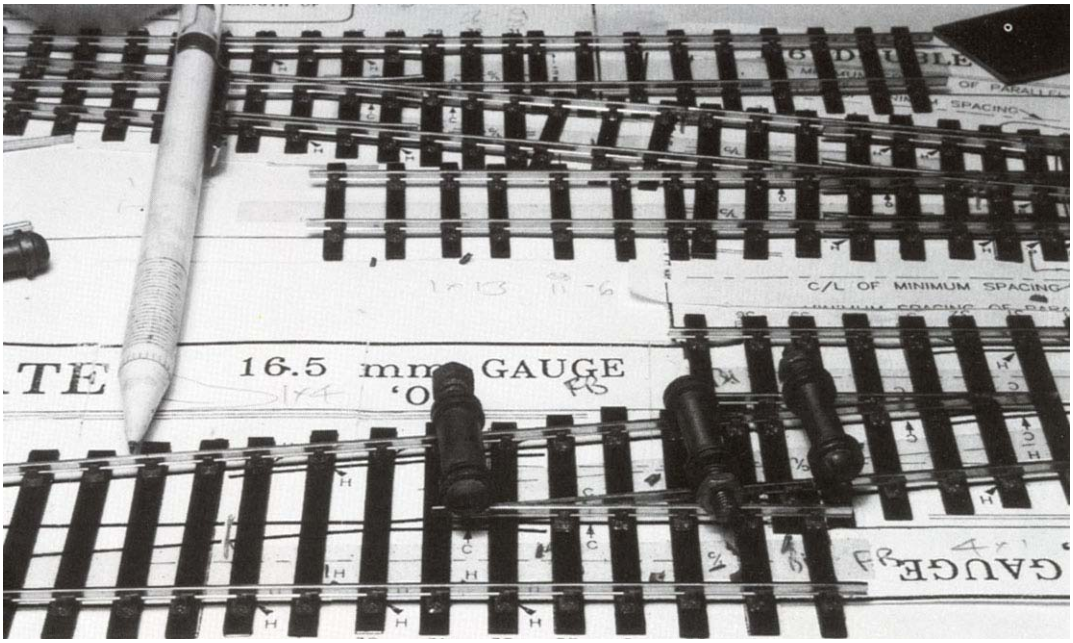
I've tacked the first two chairs in place at the toe of the point and then tacked them at the other end, in their correct position according to the template. Now I’m just tacking one in position mid-way to make sure the template curve is about right. The beauty of my method is that you can adjust things if they start to drift slightly out of alignment. You can't set a turnout up accurately if you start at one end and work towards the other. The curves simply won't set correctly and by the time you get to the other end, the Daywat will have set on the first chairs you laid.



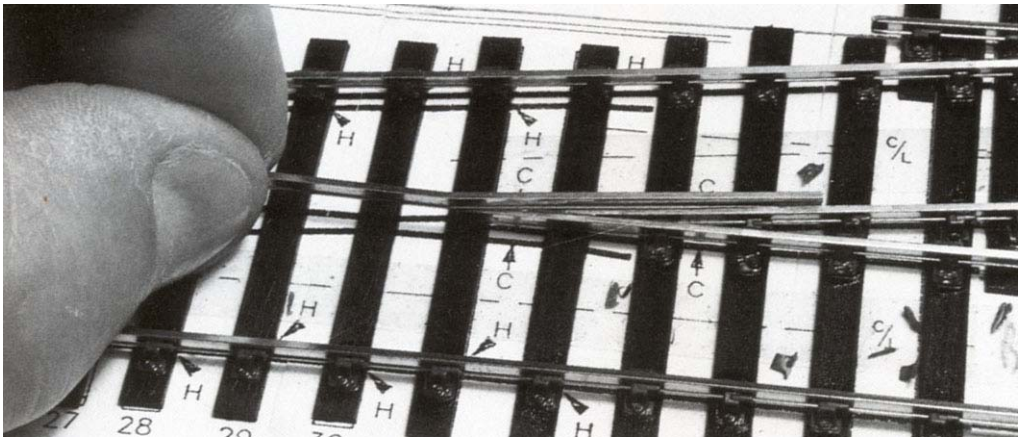
Now back to the vee. This has been cut to length but, for the crossover, has been made with one leg longer than the other. The longer leg stops just beyond the end of the wing rail on the other turnout, which makes it stronger and saves having lots of joints in the middle of the unit. This has been chaired up and chopped appropriately. The nose has been set two-thirds of the way across the timber and I've got three gauges on this. The one on the left locks the nose in position and the others hold it to gauge. At this stage I am only going to cement the straight bit - the bit that gauges to the stock rail. The rest can remain free for the time being as it has to tie in to the other vee. On an ordinary turnout you can cement both sides at this point.



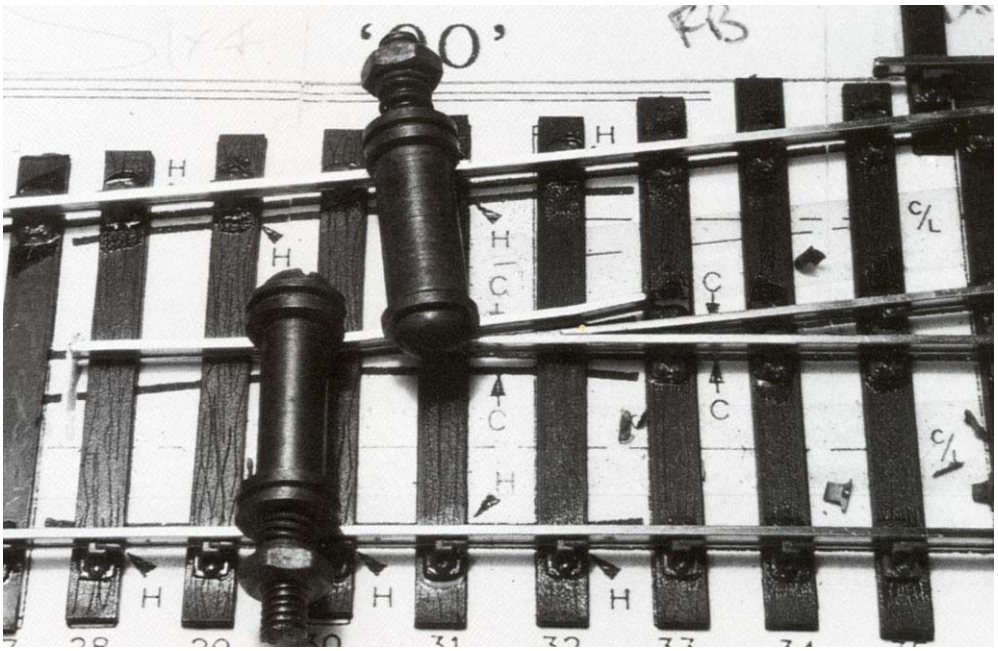
With the vee laid, I've added all the slide chairs to the straight stock rail. Now we can start to prepare the curved stock rail. This needs a slight set to allow the blade to come in, half way between the first two sleepers (you might just be able to see the pencil mark). It's probably better to overdo it than underdo it as you can always pull it back later. I've put all the chairs on the curved stock rail, but at this stage the first two will be the only chairs stuck down at that end of the turnout. I'm using two gauges to make sure everything is square and parallel to the stock rail. Everything else around the switch is left free. This is the key to setting up a turnout easily, because the blade is going to do all the work.



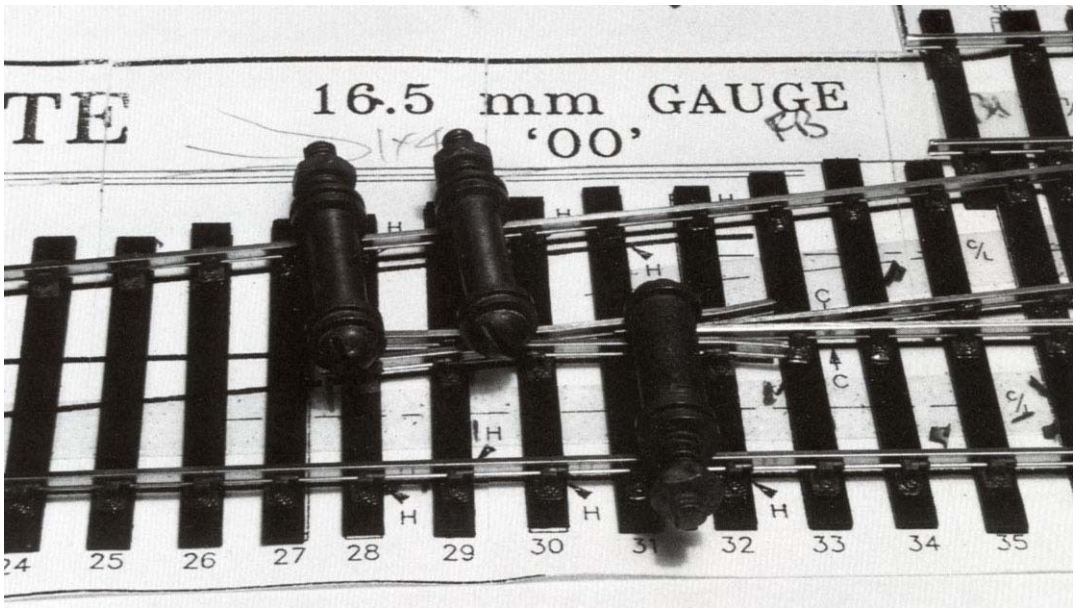
In the next stage the curved stock rail can be gauged up to the vee, which is now fixed - you have to make sure the point of the vee doesn't move around, hence the three gauges. The chairs on the curved stock rail are then cemented alongside the vee. Then I cement down towards the toe until I reach a point a couple of chairs beyond where the ends of the wing and check rails are indicated on the template. The pen marks the spot. We want a nice sweeping curve around to the toe so, this being a crossover, this piece of rail is the leg of the other vee, which is why we didn't stick it earlier. The joint between this leg of the vee and the rest of the stock rail has an Exactoscale fishplates slipped in to provide an electrical break. Of course, on an ordinary turnout, the curved stock rail is one piece. The remainder of this piece of rail is not cemented yet.



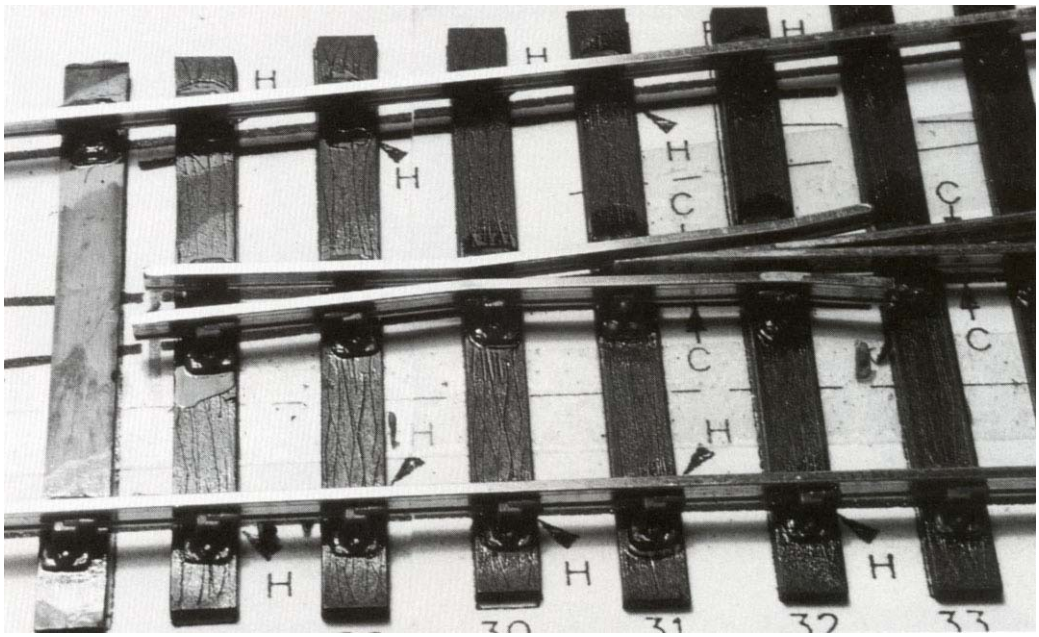
Now we've got the basic skeleton with outer rails and the vee set. If I were building a whole sequence of turnouts I would get to this stage on all of them before going any further, rather than finishing one and moving on to the next. If anything's amiss, you've only got a small area to sort out. To make the crossing, the first thing I do is take an over-length piece of rail and put a 1 in 8 set in it. Then I put it on the template, parallel to the stock rail, and look at the gap at the side of the vee. It's worth spending time ensuring the piece of rail you're going to put in is at exactly the right angle, without splaying.



The template will give me enough information to know where the knuckle should go. I've built enough track to know where it comes but I still use the gauge to set it once I've cut it to length. When setting up the crossing, you must maintain the clearances of the check rail and the two knuckles must be dead opposite each other. The whole thing must be precise, otherwise it will not run. I can then put the chairs on - one at the vee end, one where the nose of the vee comes, and three handed chairs so the keys sit correctly. These chairs are chopped so they clear the ones on the other side of the wing rail.

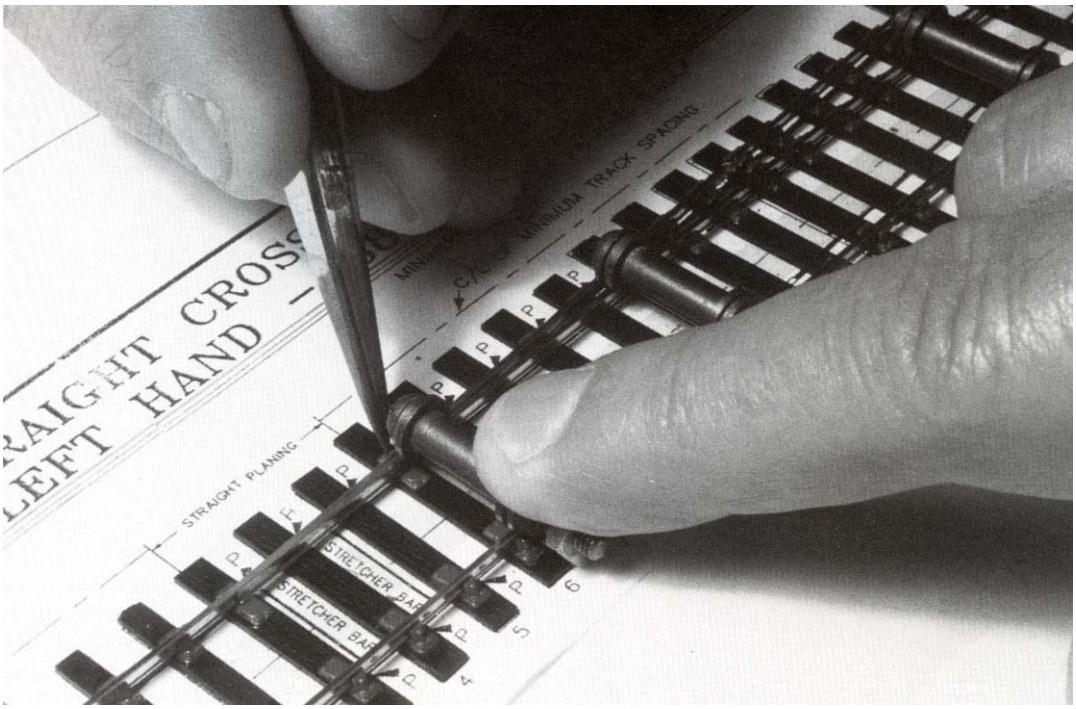


The second wing rail is made and checked in exactly the same way, but as a mirror image of the first. Actually I make this second wing rail just slightly longer, to allow for the curve. If it's anything tighter than a 1 in 8, which is what we're building here, I'll put a slight curve in the end of the wing rail, to help it flow into the stock rail. When we come to set it up for real, I use three gauges, two on the straight section and a single ended gauge at the vee. As the first one has been set up correctly, this one will too - at least 99% of the time. Once I'm happy, it can be spotted down.

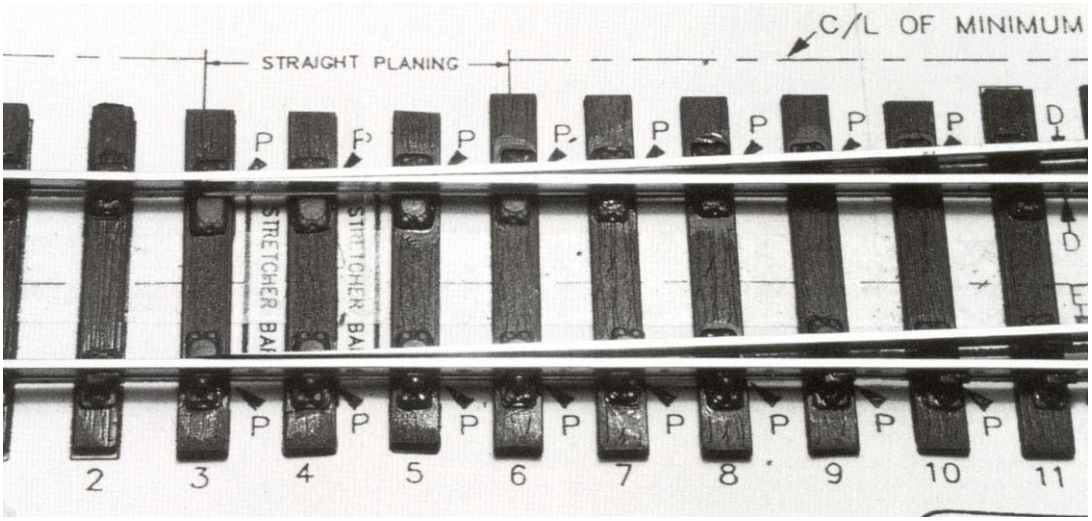


Here we have the finished crossing and you can see the chopped-off slide chair under the nose of the vee which stabilises the assembly and keeps the rails at the right height. It's not totally prototypical in appearance, but far more so than an ordinary keyed chair. Prototype bullhead rail has a spidery quality which you can recreate using finescale rail fixings. The various height differences are emphasised at this stage, with shiny rails and unpainted chairs and sleepers. Once the trackwork is weathered down, the effect of the rails being raised up off the sleepers is more subtle, but it's still worth trying to capture.

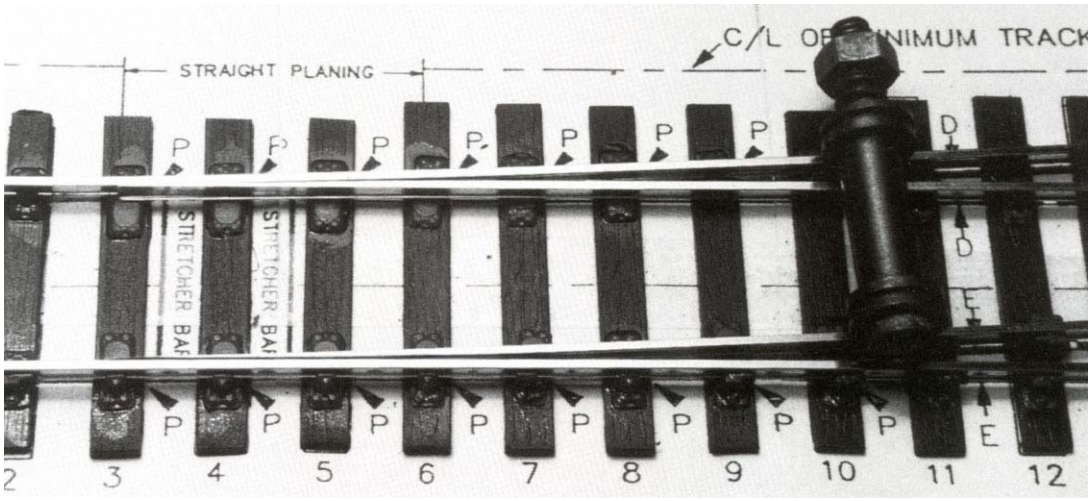
The next step is to prepare the blades. I always use C&L readymade ones, because for me it's cheaper and better quality than making my own. The blades are machined as a pair so you've still got the bottom web on the inside and they're the correct length for an A or B blade. In 4mm the planing will be 32-34mm long. Machining can tend to bend the rail up slightly and this needs to be addressed first to make sure they are straight in the flat plane. As the blades have been machined both sides, the inside running face has to be bent in where the machining finishes to make this straight also. This will then put all the planing onto the back of the blade. Only when I am satisfied that the blade is straight in both planes do I dress it with a file. The radius is put back on the top running face, and any sharpness removed from the rear bottom edge so it does not snag on the slide chairs. I file a knife-edge on the leading top corner before cutting the blade to length and loading the chairs.



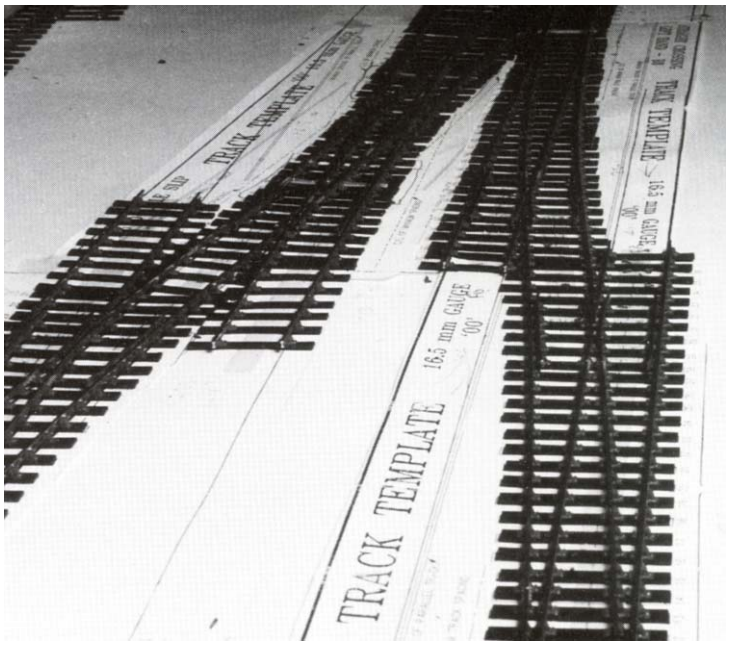
There's no great mystique to setting out the switch. There are gauges the whole length of the blade and I've used an Exactoscale locking fishplate to locate it against the wing rail. We've got a slide chair at the end of the blade to hold it at the right height, and another on the fourth sleeper, near the end of the planning. The curved stock rail, remember, is still free - none of the chairs has been glued yet. Now we use the tweezers to haul the stock rail in tight to gauge on the slide chair. If the blade isn't right, you'll see little bits of daylight but it should he absolutely flush. Check with a mirror to make sure the flow of the stock rail is correct.



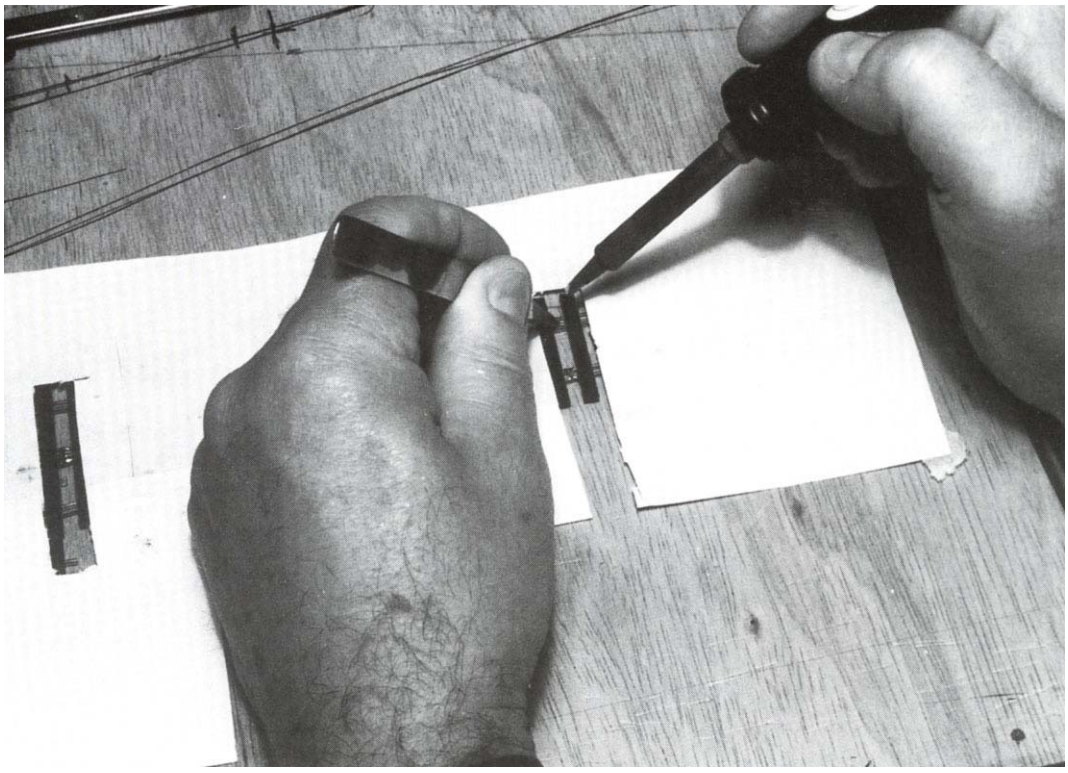
Now we've set the toe up, I can tack the stock rail in along its natural curve and put the slide chairs in, followed by the second blade. This is prepared the same as the first. Even though it's going to be laid in a curve, I straighten it first and sight it to make sure it isn't kinked. Then I put a bit of a curve in it and offer it up to ensure the end of the blade doesn't hold itself away from the stock rail. I've not got it quite right yet, and if you look between the third and fourth sleepers you can see that it stands slightly proud, so I'll just tweak it gently to get it right.



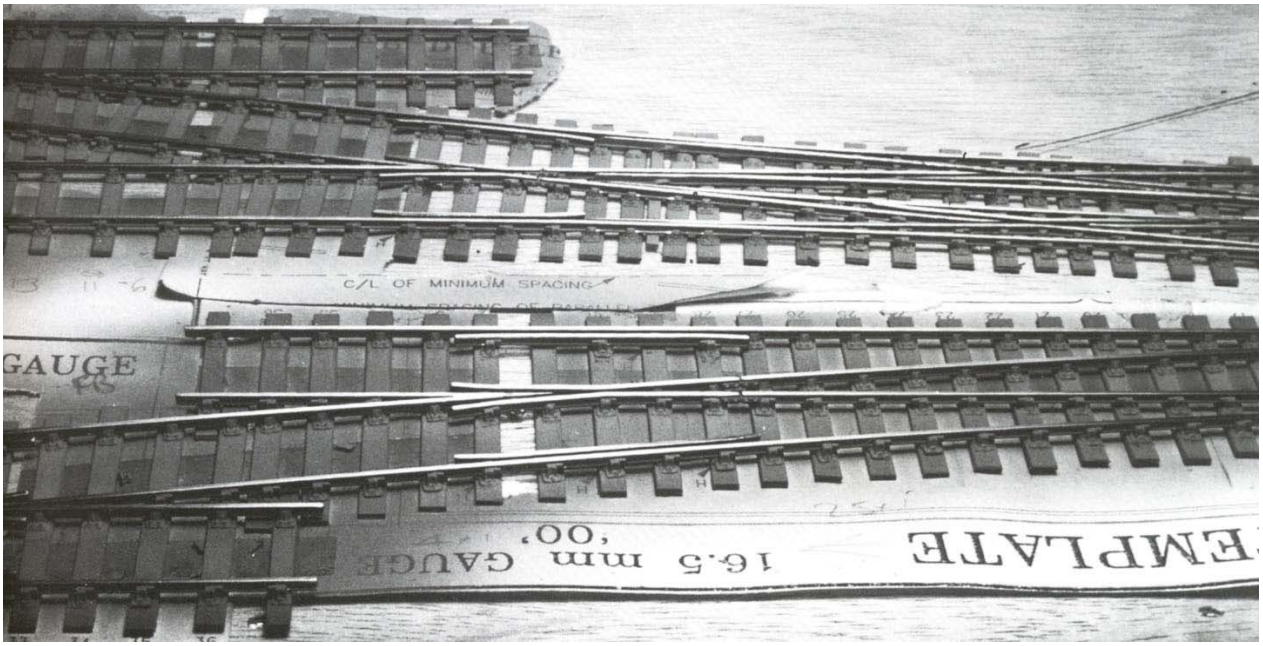
The blade now fits snugly and, since we've already done all the hard work of setting the curved stock rail, it goes in very easily with the help of the gauges. Although it's scarcely visible, I've put a radius on the very tip of the blades so the wheel is guided smoothly into the crossing without any jerks. As long as the blade is tight in against the stock rail, and you're not modelling the Great Western, you don't need any joggle or set in the blade.



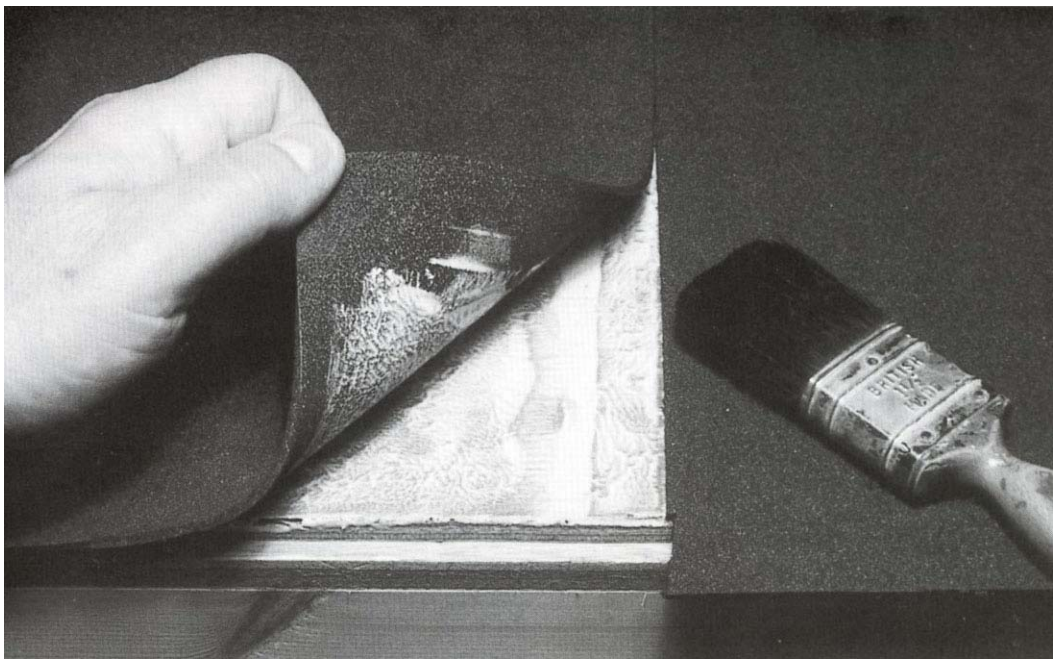
Here I've completed all the chairs and added the checkrails - as always these are positioned using the gauges but with the crossing vee as the reference rather than the adjacent stock rail. With the second part of the crossing also built, I verify everything in the mirror and run the test bogie through the crossing. The whole thing is then left to set firmly. Note the flowing line that runs right through the crossing - this looks a lot less like 00 track than much of what you see around. There's no great science involved in building pointwork to this standard - it's mostly just common sense, doing one step at a time and making frequent checks.



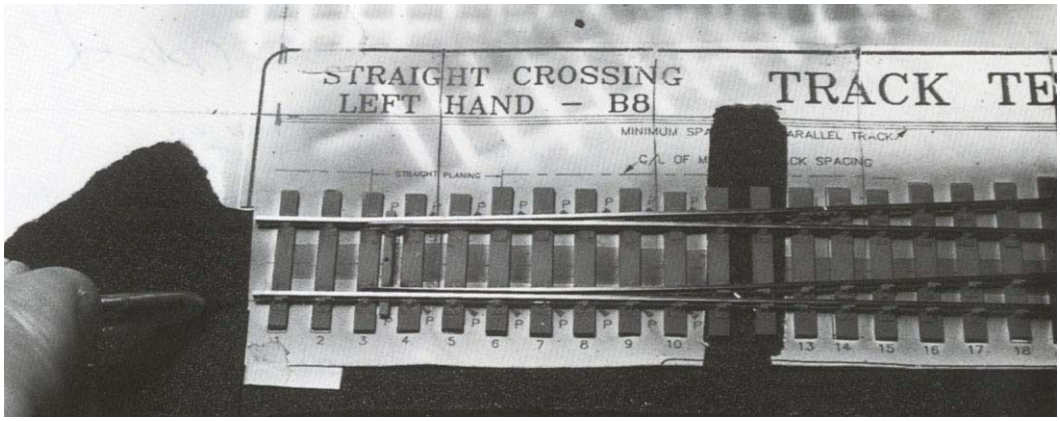
We've built the track, all the chairs are in and we've fitted the tiebars. Now I've got to put the electrical links on, and this has to be done from underneath the turnout. First I cut a hole in the template in the area where the links have to go. The main one is the crossing assembly, but we have to connect the stock rail to the switch blades. For the crossing assembly I use a length of 1mm x 0.5mm nickel silver strip. This also acts as a mechanical joint, but to make doubly sure, a thin flexible wire is added as well. For the blade-to-stock-rail connection I solder a thin piece of wire at an angle to represent the switch anchor. I use quite a hot iron so I can get the heat in and away quickly so as not to distort the chairs. Inevitably you'll touch the timbering once in a while, so just remember to chisel the malformed bit off the underside so it lies nice and flat.



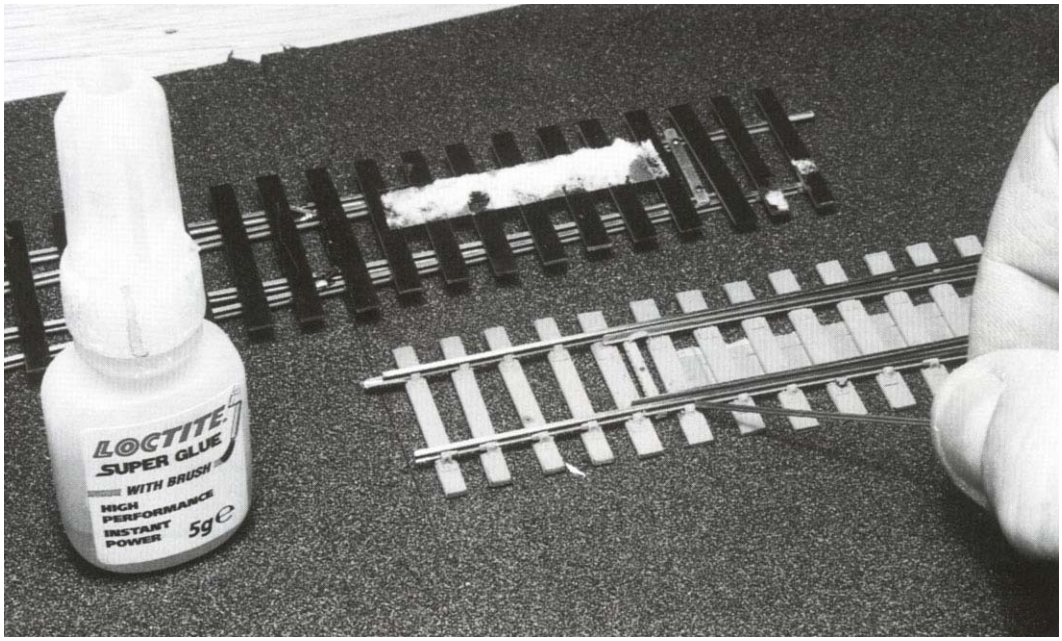
We can now move on to painting the track - not really finish painted, but just dusted with a colour to take that plastic look away. The sleepering is black but, because C&L chairs are moulded in a light brown, you can actually see a slight difference. A more critical variation is that between the sleepering and the ballast, where the distinction needs to be crisp. If you paint your trackwork after laying and ballasting you're going to get a smudged, all-over effect that isn't there in real life. That's why I always paint the trackwork separately, using a light coating drifted on with an airbrush. At this stage the turnouts are still stuck to their templates.



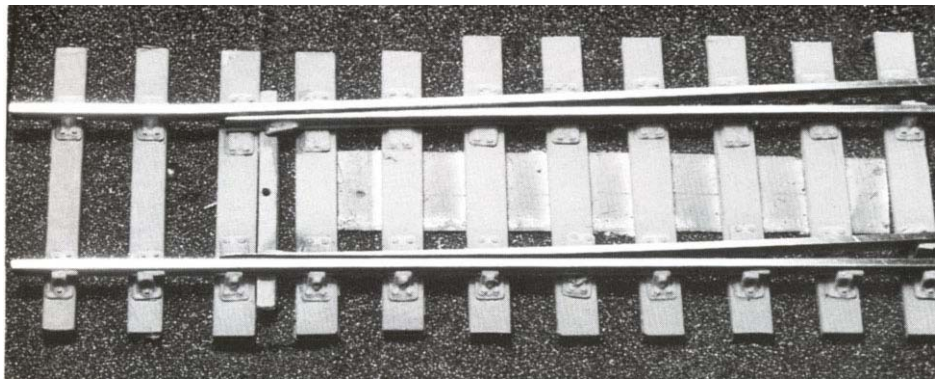
These days I prefer to lay the track on expanded polyurethane foam, 3mm thick. I buy it in bulk on a continuous roll, a metre wide, but C&L sell it in more manageable quantities. Its advantage over other foams is that it's a closed cell and therefore doesn't soak up the glue, so it retains its cushioning quality instead of going solid. I stick it down on the baseboard - ply in this case - with the same PVA glue I use for laying the track. I use the cheapest builder's mixture you can get, not posh woodworking glue, which dries hard and chippy. The stuff I buy dries slightly rubbery, so it's flexible. This comes in useful later on when I may need to lift up odd sections so I can get at the point-control mechanisms. You don't need to use too much adhesive - aim to brush on a thinnish, translucent covering rather than thick white streaks and blobs.



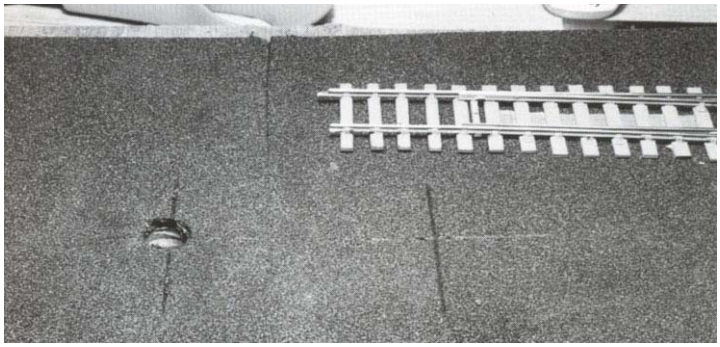
Now we come to one of the key stages. With the foam down on the board, we can have a dry run with the made-up track, so I can mark where the turnouts are going to sit on the foam. I mark the end of the rails with a little pencilled 'T' so that, when I take the turnout off its paper backing, I can put it down exactly where it was before. I also need to mark the ends of the plain track, which is especially relevant here because the running lines will be laid in a gentle, continuous curve. The final lining-up will, however, be done by eyesight alone.



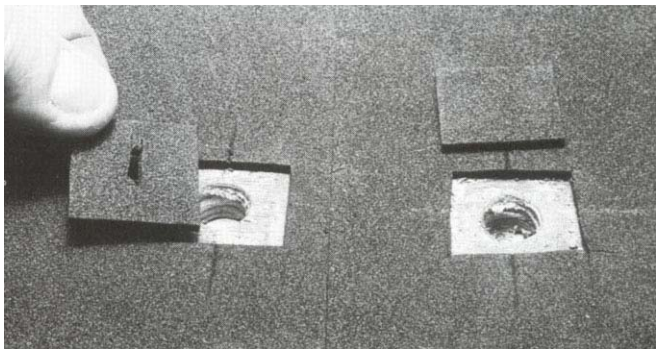
I peel the templates and the double-sided tape off very, very carefully - especially around the switch area, which is vulnerable because the slide chairs don't physically grip the rail, they're only there because they're clipped into the web. For extra insurance I always leave a little bit of tape on the back of this area while I'm still playing around with the turnout. Any chairs that look as though they're in danger of dropping off can be fixed with a drop of cyano or even a wipe of butanone.



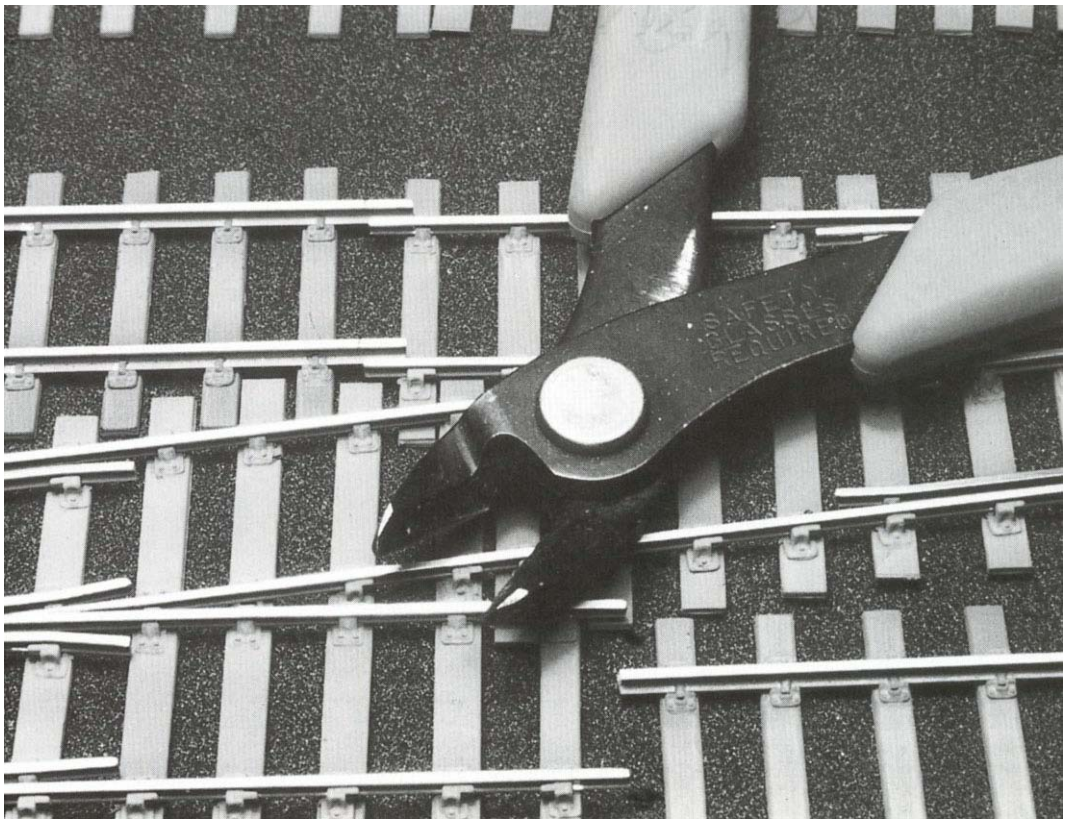
While the tape is still in place, I need to mark the position of the tiebar on the foam. I always operate my turnouts from the centre of the tiebars, with a Fulgurex motor underneath that I've adapted to drive a bit of spring wire straight up through a hole in the baseboard. Once the tiebar positions are marked, I can remove the turnouts and very, very carefully peel away the last pieces of tape.



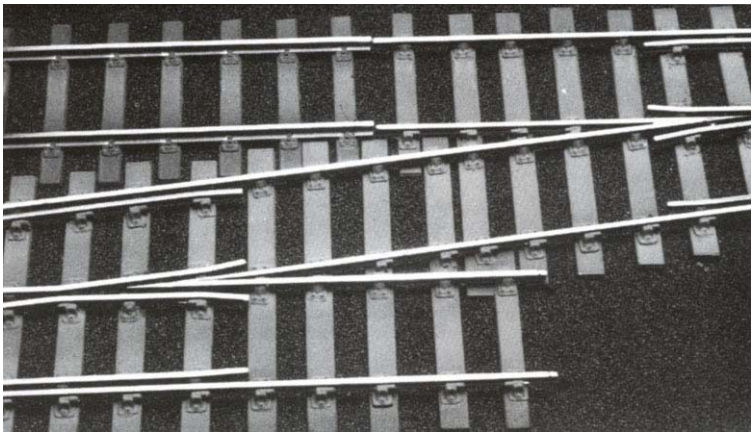
Having marked the exact centre of the tiebar position, I drill a hole straight through the foam and the baseboard. It doesn't need to be the size of the Grand Canyon but this is still quite a hefty hole, maybe around 10mm in 4mm scale, because you need more clearance than you'd think for the operating wire and to allow for any minor adjustments in positioning. Here you can see the locating marks on the right and the hole I've just drilled on the left.



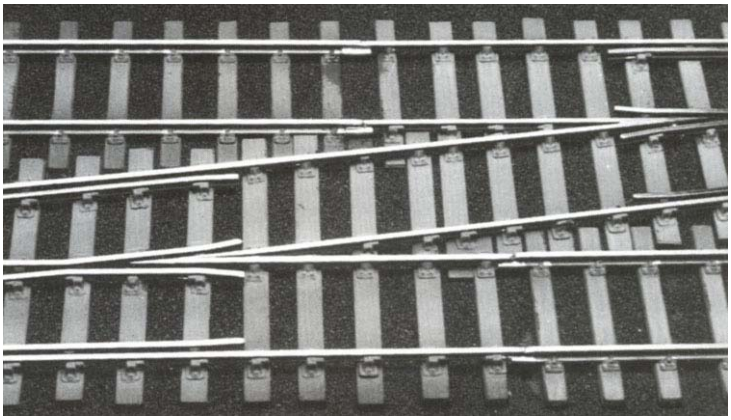
Of course we don't want to peer straight down the hole to the floor beneath, so it needs to be made less obtrusive. What I do is to remove a little square of foam around the hole, and dress the ply with a knife. Then I cut out another square of foam of similar size in which I make a slot for the operating wire to come up through. In practice, this is almost invisible. In 4mm the tiebars I use lie flat on the deck so I don't want ballast underneath - in real life the ballast is low there too. I can disguise it with a touch of paint on the black foam but in 7mm tiebars are well up out of the way so you don't have this problem.



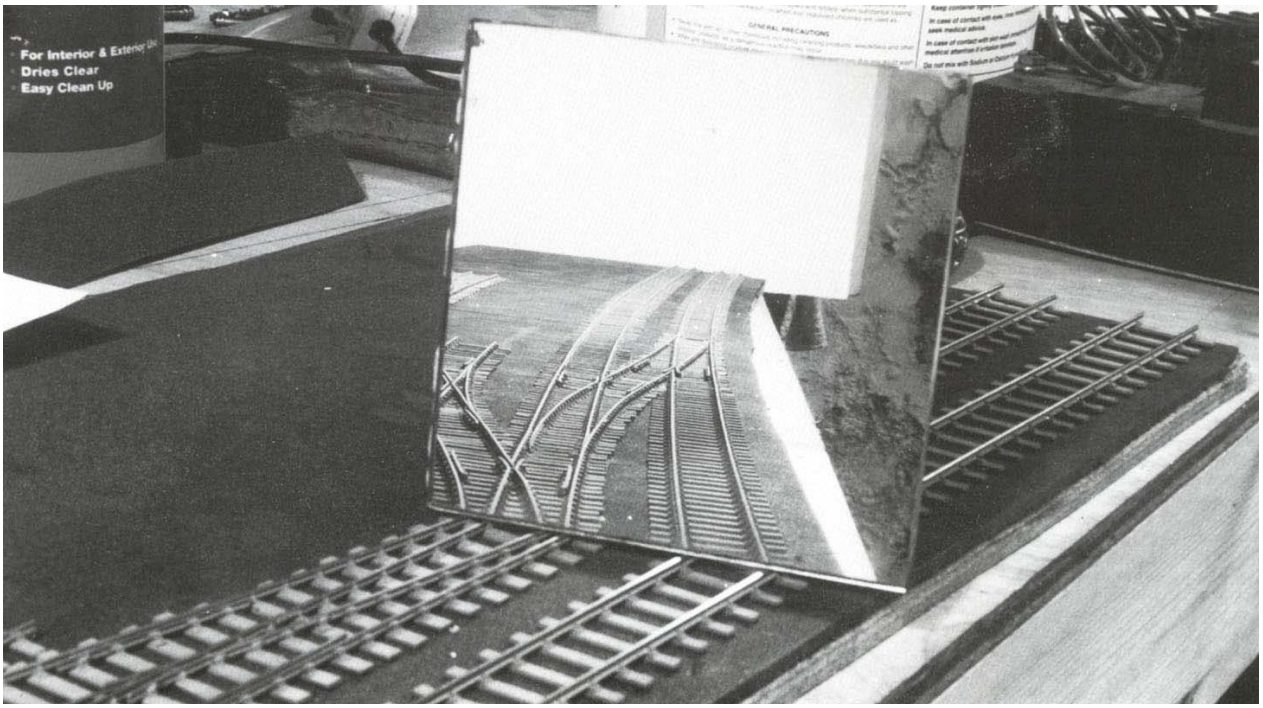
As this is quite a short board, I've decided to put all the track down in one go. The first step is to prepare the ends of the track, cutting them to a near-perfect fit with the Xuron shears and then dressing them with a file. Make sure your rail cutters are nice and sharp - as soon as they start to lose their edge they won't cut cleanly, so throw them away and get another pair. At this stage I also need to keep an eye on the sleeper spacings to make sure nothing clashes. The aim is to get everything as smooth and geometrically correct as possible, even in this dry state without glue and ballast. A bit of extra effort here will be well rewarded later.



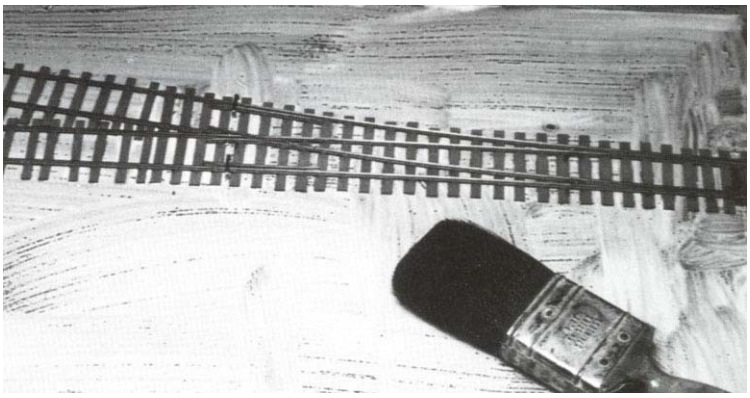
There is a lot of plain track at either end of the crossing which I'll set out dry before committing myself to laying the pointwork. This is to make sure the flow of the track is going to continue on through the crossing, which is still slightly flexible at this stage. If you lay the pointwork first and suddenly find you can't get the plain track to line up with it, you're sunk. If a piece of plain track won't go exactly where you want it at this stage, it doesn't matter so long as the joint is straight. You can always pull the rail into shape later. On the far track you can see a slight misalignment with the hand-laid flat bottom track on the running line, but it's nothing to worry about.



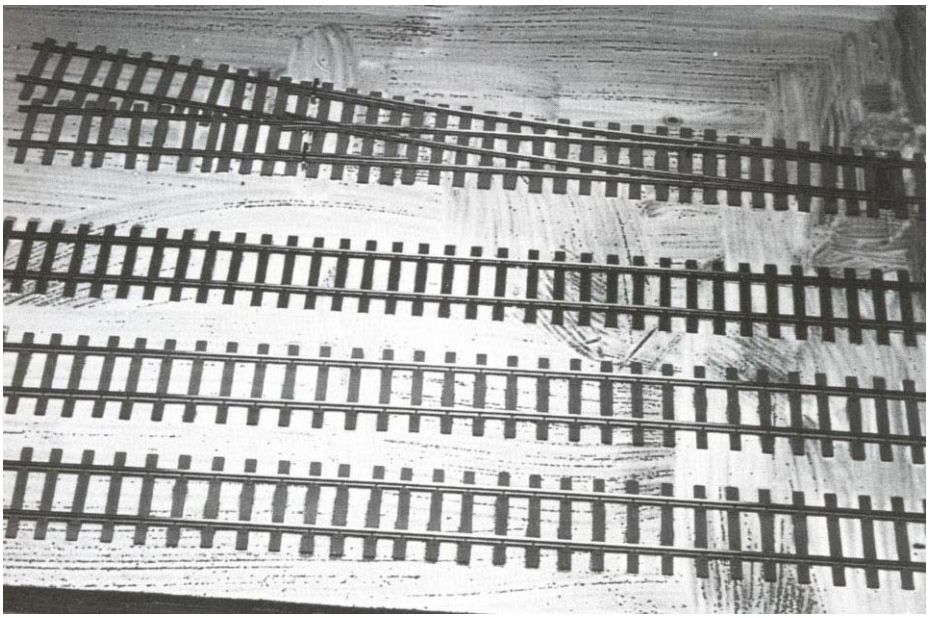
To join the rails, I normally use Z gauge joiners which have been crimped around a scrap piece of rail, whilst still on their fret, to tighten them up. Here, for flat-bottom track, I have used N gauge joiners soldered in place. Again, the secret is to use a hot, clean iron and be very quick about it. Make sure you don't get a dry joint because, once the track is ballasted, it can be very messy work trying to put it right. At the same time you want to watch you don't melt any chairs with the tip of the iron because they 're not just cosmetic – they are functional chairs that hold the rail in place. Too much heat can distort the plastic and alter the gauge.



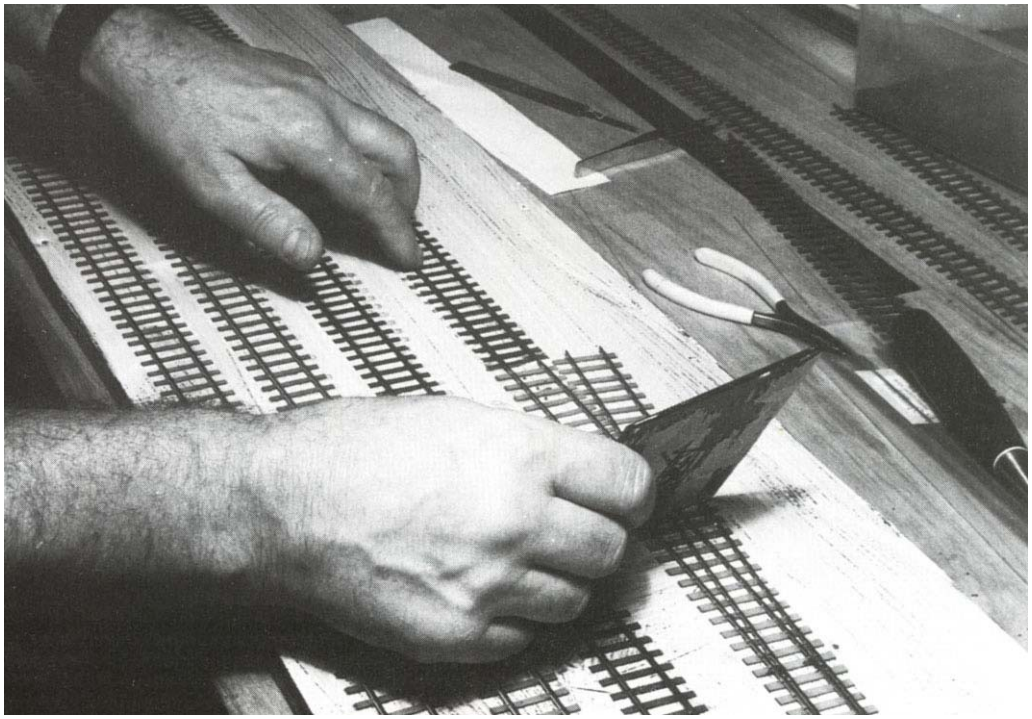
As ever, the one sure way to ensure the track flows across the join with no doglegs is to use the mirror at every stage. Put the joiners on, offer the rail sections up and look in the mirror to make sure there is a continuous flow. If there is a kink anywhere, tweak the free bit of rail at the joint until it lines up. It's usually a linear adjustment but sometimes a joint wants to kick up in the air. To rectify this, hold the joint down as you're soldering it to make sure you don't end up with nasty little joggle. Once you get a bump, the chances are you'll always have a bump unless you really stress the rail to oppose it.



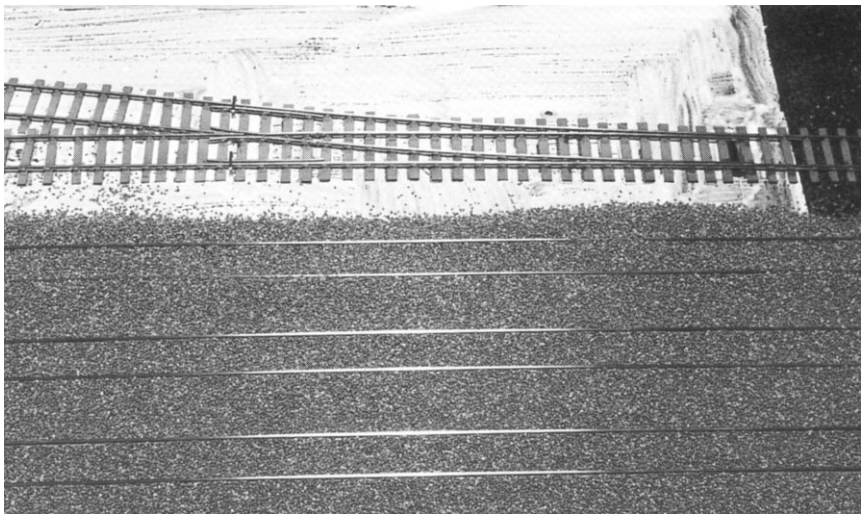
Now we come to ballasting. This is where my techniques differ from most people and also where using thin timbering comes into its own. Most articles on track construction advocate putting down the track and ballasting later using the time-honoured method. As a professional, time is the operative word for me. I have never used this system and if I did, I would probably still be ballasting the huge 'O' gauge layout I built 20 years ago. Now that we've done our dry run, put our markers in and checked that everything is as it should be, I've moved the pointwork away from the area and we'll switch to a section of plain track, which will make the ballasting process easier to follow. I've put an even, thinnish coat of glue over the foam, making sure there's none where the tiebars will go.



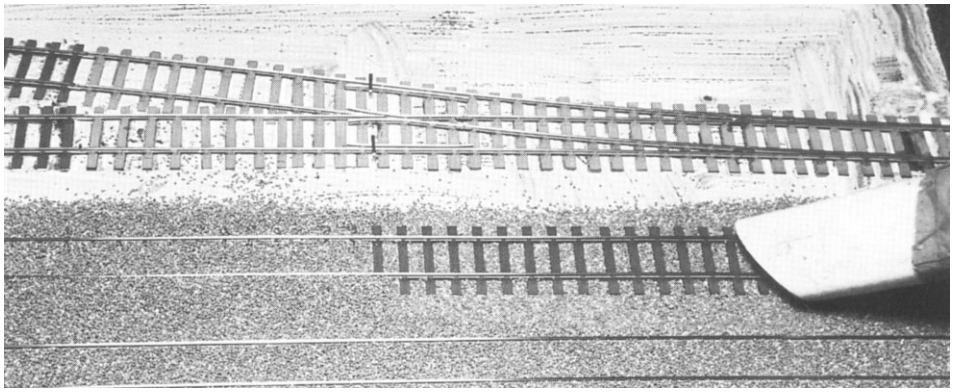
Now the track can start to go down, again using the marks I've made and checking again and again in the mirror to confirm the alignments. Using a cheap, very flexible PVA allows me a good twenty minutes or so to make adjustments. If I used Resin W it starts to go off very quickly and I'd have far less time to work in. Turnouts tend to want to sit up in the air a little - typically around the crossing - so I've put staples in, which is not for the faint-hearted, just light enough to hold the turnout flat. These are sometimes required around the switch and even on plain track once in a while, especially if super elevation is involved.



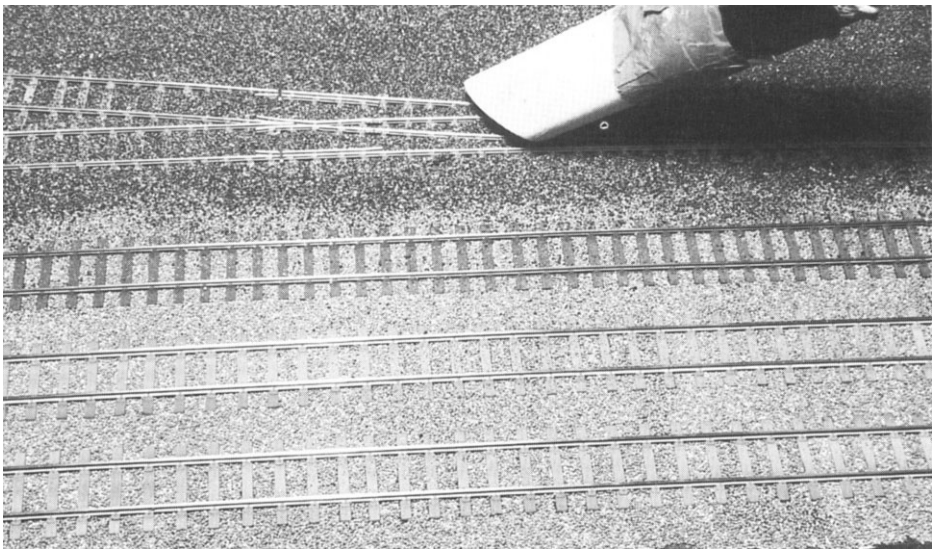
I'm moving a section of bullhead rail around in the glue, as always using the mirror to make sure it's exactly where I want it to be. Be careful, incidentally, that you don't accidentally nudge any track that you've already laid. Until now we've been in no particular hurry but this part of the process needs to happen in a fairly short space of time, so it helps to know what you're doing and to follow a system. This is where having dry run first pays dividends. If you have to stop and make major alterations to the alignments, you could be in big trouble.



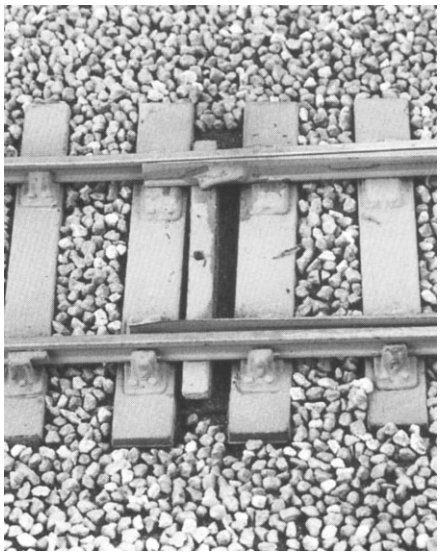
As a professional model-maker I have big old-fashioned sweet jars full of different grades and colours of ballast. The type I'm using in this instance is a mixture of Green Scene and Woodland Scenics products, which are made using a natural product, rather than crushed stone. Most ballast used on model railways is at least one scale size too large - the chips are smaller than you'd think, but they're not all the same size and they are certainly not uniform in colour, however long the ballast has been down. That's why I mix up a cocktail of different colours and grades to get that prototypically mottled look. This blend is then laid down quite thickly over the wet glue, right up to rail level so the sleepers are completely covered.



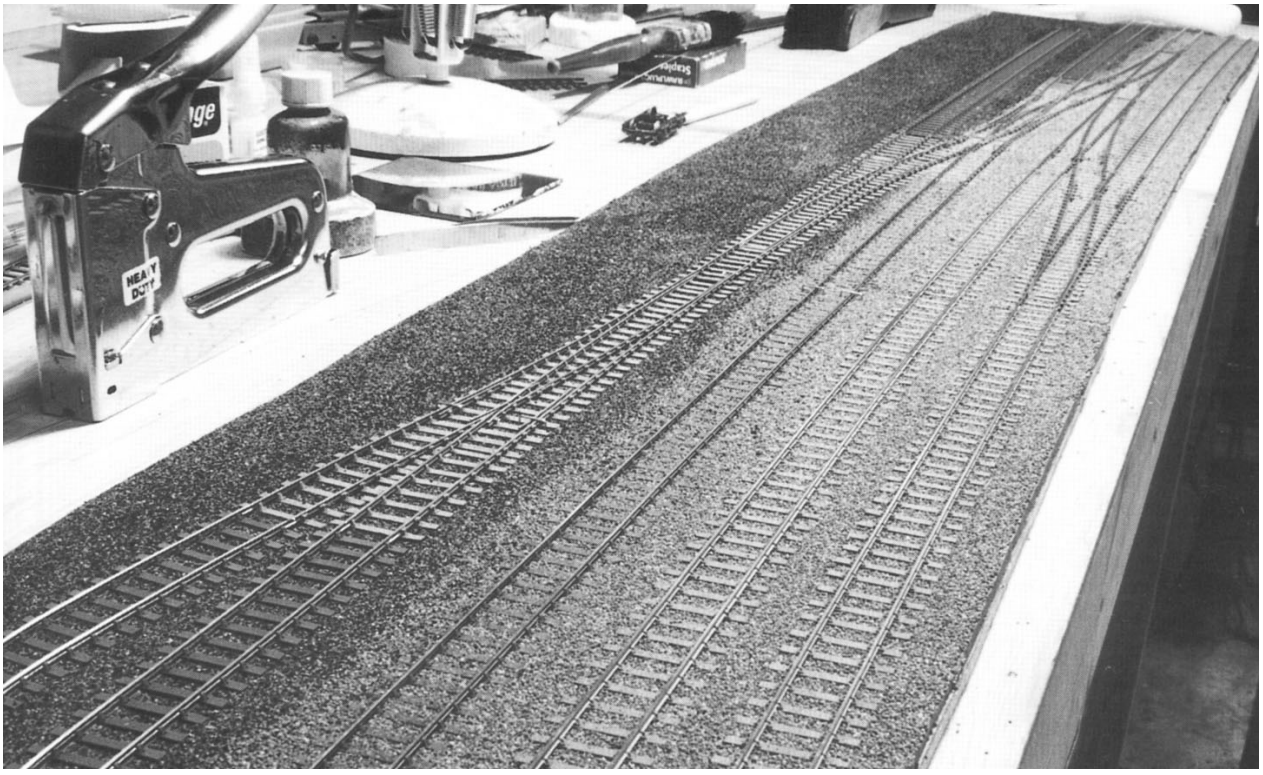
Almost immediately I get the vacuum cleaner out and gently suck up the excess. This isn't the vacuum I use around the house, but an old one used specifically when I'm track building. The bag is the old cloth type and is nice and clean inside so I can empty the surplus ballast out and recycle it. Normally, I would put a proper shoulder on the ballast but as this section of the running lines will be close up against a retaining wall, my customer decided it wasn't necessary. If a shoulder had been required, then, prior to tracklaying, I'd have trimmed the foam with a knife - it's dense enough for this treatment - and softened the top edge with sandpaper. Then the ballast would have been applied at the same time as everything else.



I'm using two different grades of ballast here. In the foreground, where we have two running lines and a loop, it's proper main-line ballasting. The other tracks are sidings, laid in ash ballast. Once again, this is poured on quite liberally and then vacuumed off, remembering to empty the first lot of ballast out of the bag first. It's ironic that, in some ways, our track is laid to a far higher specification than the prototype - sidings laid out for 100mph running, for instance. The only place where sidings are laid in beautiful manicured ballast is on a model. On the real thing, almost anything would do.



The tiebar area needs to be free of ballast, as I've said before, so it's worth just checking things every now and then to make sure it's still clear. If you paint the glue on to avoid this area, the vacuum cleaner will sweep away all the loose granules and your tiebar will operate smoothly. Later on you can come back to this stretch of track and add a drop of thin paint to help disguise the bald patch.



Even after all the ballast is laid, I've still got a good half an hour or more in which to make any final adjustments before the adhesive sets firm. Some types of flexitrack have a tendency to ripple slightly rather than flow like this piece of track does and while the ballast is drying you have the opportunity to come back and smooth those little ripples out. Once the glue has gone off, though, the track is well and truly fixed. The next day any excess ballast can be removed by vacuuming with a brush attachment. This will leave the ballast crisp and neat and not clogged up with glue.

I hope these articles will be helpful to those modelers who are about to attempt to produce scale track for themselves. Compared to the techniques I normally see advocated in modeling books and magazines, the methods I use are in many ways different and even controversial. I am, however, someone who builds track almost continuously, rather than every now and then. I am primarily looking, as my customers are, for track that looks good and works really well - two qualities that don't always go together.

I have developed my track-building methods over a fair number of years and I hope they will continue to evolve. I find they create the best result that can be achieved in a realistic time scale, without having to bill the layout owner in telephone numbers (although this can always be arranged ...). To sum up, the most important aspect of this approach - far more than the materials you use or the prototypical details of construction - lies in preparing the whole length of track dry. This gives you plenty of time to adjust everything until you're completely satisfied with its alignment. The longest single stretch of 4mm track I've built so far is a sweeping reverse curve in P4 that's over 10m long, which I messed around with for ages until I was happy with it. It was finally laid and ballasted in half an hour, with super-elevation.