A Simple 4mm Scale Tram Layout with Homemade Overhead

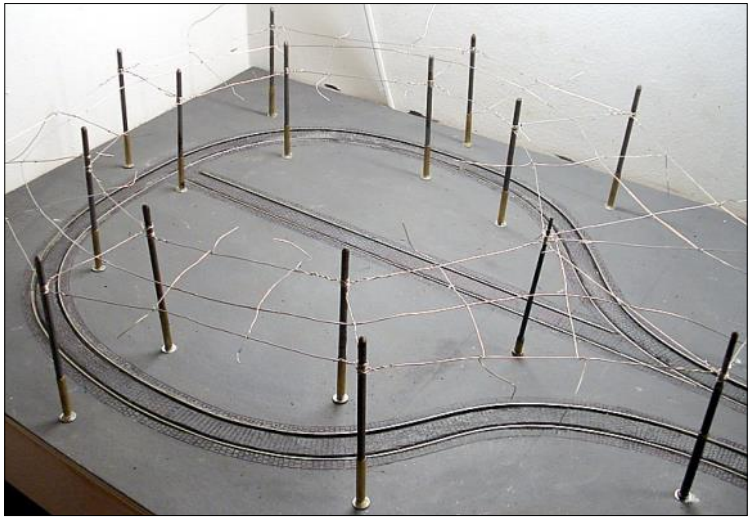
How Brian Wild developed a method using cheap bits and pieces

I am in the process of building a small tram layout but it started life as a test track where I could 'run-in' my tram models. Never one to leave things alone, I decided to go the whole hog and fit overhead wires so I could also test my homemade trolley poles. Eventually I will do the full scenics, but initially I just wanted it to work. So this is the story of my journey to make this happen, with some progress and some setbacks along the way until I got what I wanted.

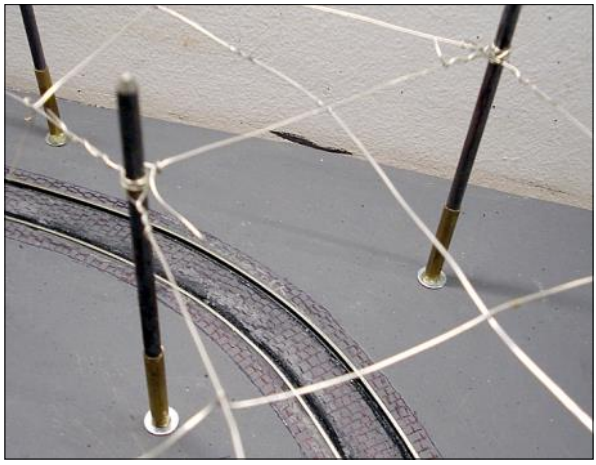
I don't have much space so have built a simple 'dog bone' layout 145cm long by 46cm wide. It sits on top of an IKEA IVAR unit which I cut down to a height of 80cm and sits in a corner of my study/work room. To allow space for traction poles, the radii of the end circles are 17cm, or about 6¾ inches in old money. I am never sure if these measurements should be taken from the inner rail, outer rail or track centre but I have chosen track centre. This means that all but my longest (or most awkward) models go round without too much trouble.

This brings me to the crux of the problem. I have been making and collecting model trams for about 45 years so have quite a lot (I am not saying any more in case my wife reads this) and therefore have a wide range of wheel profiles but crucially, also trolley poles, pantographs and bow collectors to accommodate. To give you some idea of the problem, I have at least 15 different types of trolley pole, five or more types of bow collectors and at least half a dozen types of pantographs.

Additionally, the trolley poles are of various



Above: The left-hand end of the layout showing the running wire soldered to the span wires but before final adjustment and trimming of the excess.
Below: A close-up at the same stage. *All photos: Brian Wild*



The right-hand end of the layout after adjustments and trimming.

lengths and have both fixed and swivel heads. These are fitted to a wide variety of short, medium and long wheelbase 4-wheel trams and bogie trams, both single and double-deck. Most trams have their pole/bow/pantograph fitted centrally but a few have them at one end over a bogie. In an ideal world all of these would be able to work on the layout but, in practice and so far at least, not everything does.

Fitting the track was straightforward using Peco code 100 to cope with the range of wheel profiles. When the track was laid, the layout was covered in card leaving just the cobbled areas inside and outside the rails clear. These areas were filled in with Polyfilla (the powdered version as it is softer and sands more easily) and mixed with black poster paint to give a general grey colour.

The rail groove was cut with a bent dental probe and the cobbles drawn on using a fine Sharpie black gel pen. All a bit Heath Robinson but quite quick and, from a normal viewing distance, it looks OK (well I think it does and that is all that matters really). So far so good; testing with a variety of trams found sticking points on the rails but judicious use of the dental probe and sandpaper means that most run OK, even if the groove is a bit wide in places.

I decided the overhead would have to be all span wire based. With such small radius curves, using standard bracket arm traction poles would require so many that the layout would look ridiculous. To keep the number of poles to a minimum, I planned to use backbone wires and pull offs wherever possible. However, the size of the board limited my options a bit and I still ended up with 36 poles and a total of 48 ears.

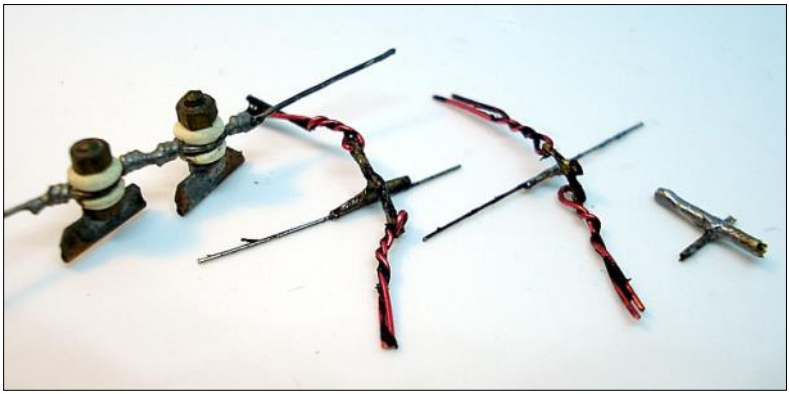
I know that you can get traction pole kits and overhead items like ears and pull-offs from several sources. They are all excellent and I have used most of them over the years. However, I didn't want anything too complicated or time consuming to erect, I just wanted a quick and simple overhead to test run my trolley poles.

Traction poles are made using 4mm steel rod from B&Q (other DIY sheds are available) inserted into short lengths of 5mm outside diameter brass tube (4mm internal diameter) to give a simple stepped effect. The top of the rod is rounded off for safety and cosmetic reasons.

The brass tube projects below the end of the steel rod and some threaded rod (also from B&Q) is cut into short lengths and glued into the tube using two-part glue for strength. An M4 washer is added and the pole put into the baseboard, and bolted up from below.

I know that 4mm rod might be considered a bit coarse but I have found on previous layouts that anything thinner has a tendency to bend if any tension is applied from span wires. I could have made the poles from various diameters of brass tube. This .might look better but is expensive; 4mm rod is cheap and does not bend. I am not sure how big a prototype pole actually is but, in scale, a 4mm rod equates to a foot diameter pole so probably not far out.

I installed the poles where I calculated they should go and then connected them together with the backbone wire (both inside and outside the curves). For this I use 15amp fuse wire (0.49mm diameter) on a roll, which looks smaller when painted black.



From left to right: Meadowcroft, Tramalan, PC/David Voice and my own attempt at ears.

I find this very easy to use. It's very flexible and strong so can be fitted under some tension and still wraps easily around the poles. Crucially, it can be bent and unbent many times without snapping so making subsequent adjustments easy. The only downside is that it is easy to kink and difficult to get completely straight but this is easily rectified by pulling between the fingers.

Having installed the poles and backbone wiring it was time to think about the ears and span wires. For the span wire I again use the 15amp fuse wire and for the ears there are a number of options. However not all options are readily available all of the time and they are certainly not all equal.

Now when they issued me with my various body parts I missed out on the three hands, acute eyesight and asbestos fingers options, so soldering ears to running wires is, I find, very difficult and to be avoided if at all possible.

This is where it started to get a bit difficult; what ears should I use? The options are Meadowcroft brass shim, Tramalan cast brass, PC Models/ David Voice etched brass, Mark Hughes etched brass ears or if feeling really brave make my own.

My choice would be for Meadowcroft ears as the running wire is a push fit through each ear, so they are fitted without soldering and are, in effect, self adjusting on the length. They are also easily adjusted laterally by adjusting the span wires, assuming you wrapped the wire round the pole and didn't solder it. The only problem is I didn't have nearly enough and they are like the proverbial rocking horse doo dahs to find. I had Tramalan ears, but not quite enough so would need to augment them with David Voice etched items, which I did have. The down side is that I find it very difficult to solder the running wire to the ears, made even more difficult with the DV items as they are so fine. Its amazing how, despite much cleaning, tinning, the liberal use of flux and enough heat to melt iron ore, the wire never wants to solder to the bottom of the ear, but is really happy to stick to the side.

I tried - I really did - and almost succeeded but when running trams with poles I was getting an unacceptable level of dewirements It only took one small adjustment in one place for the running wire to bow out of place somewhere else and what had worked fine before now did not. Another solution was clearly required.

I did try some Mark Hughes ears which are finely etched and have to be folded around the running wire before soldering to the span wire.

A close-up of the overhead and one of my trolley poles.

Top: Close-up of section of painted overhead and traction poles.
Above: A shot of the whole layout with all wires and traction poles painted dark grey.

On the face of it this seems easier and I had high hopes that the folded ear would act like a Meadowcroft ear and allow for some sliding of the running wire when folded in place.

Now I am not blaming the ears as I know it's me, but I found it very difficult to actually fold the ear round the wire when it was up in the air and despite my best efforts it would not slide on the wire. So for me they were not actually any better than the David Voice item. What I really needed was a modern version of the Meadowcroft ear, so on with the thinking cap.

Now the running wire. I, and I guess most of us, use the David Voice 0.3mm nickel silver wire. It is very strong and does not kink easily. However it has major issues as it comes coiled; no other way really if you need long lengths. It has a life of its own when uncoiled and is very difficult to control. It is also remarkably brittle and easily breaks if bent more than a couple of times, such as when fitting into a wire joiner.

My initial focus was to try and replicate the Meadowcroft ear so I researched and found that Albion Alloys do brass tube with 0.5mm outer diameter (od) and 0.3mm inner diameter (id) and also some with 0.6mm od and 0.4mm id. I decided to buy some of each as I was not sure the nickel silver wire would go through the 0.5mm option. I also bought some 1.00mm od and 0.8mm id to use for the span wires.

When they arrived I tested David's running wire and, as I suspected, it would not go through the 0.5/0.3mm tube as the clearance was too tight. However it would easily slide through the 0.6/0.4mm option.

The plan was to cut the 0.6mm tube into 5mm lengths (about the length of a Tramalan ear) and the 1.0mm tube into 7mm lengths and solder one on top of the other in a cross formation. The span wire (at 0.49mm) would easily slide through the 1.00mm tube and the running wire would slide through the 0.6mm tube. In effect, a Meadowcroft ear in principal but pared down to the minimum, with the bonus of easy sliding adjustment across the span wire.

My only real concern was if the trolley poles would snag on the 1.00mm tube covering the span wire as they followed the running wire. I did not want to go too far before proving it would all work so I put a length of track on a

piece of wood and hammered some big nails into the wood (as quick traction poles) and set up span wires across the track. I built a few of my ears (fiddly but straightforward) and threaded them onto the span wires and then fitted the running wires.

A quick run up and down with several trams with different poles proved a total success. I was absolutely amazed. So I rushed ahead and made a batch of cross-shaped ears and started to fit them onto the layout.

Now a problem arose as, once aligned, I needed to fix the 1.00mm tube onto the span wire, as I no longer needed the sideways flexibility. No problem I thought, a quick dab of solder will do the job. Oh no, nothing so easy; as soon as I touched the soldering iron to the span wire the cross assembly unsoldered itself. Too much heat and not enough heat sink.

After the usual swearing and a couple of cups of tea later, I had a 'Duh' moment. The running wire tube at 0.6mm was only double the nickel silver 0.3mm dimension. What if I got some 0.6mm wire and just soldered it onto the span wire directly with no ears at all. At prototype scale 0.6mm this is about 1.8 inches, not an unreasonable size for real overhead wire and it would look thinner if painted grey or black.

A quick Google and I discovered that 0.6mm is about 23swg (actually 23swg is 0.61mm) and luckily 20amp fuse wire is 23swg. Now this is not easy to find but an eBay search got me a spool of it. When it arrived, it actually measured 0.62mm, so no problems there.

So, fuse wire and soldering iron at the ready and a couple of hours later and it's all done. Does it work? Yes it does. It takes trolley poles very well. I tried the bows and after some sideways adjustments they just slide through. Installation was quick and lateral adjustment very easy. Basically if you can solder two wires together you can fit this style of overhead. Whilst I have not yet tested it, I see no reason why this would not work on bracket arm traction poles.

There are, as always, compromises. It is not prototypical as there are no obvious ears. I can live with that for the benefits of a simple robust system. Yes, it is all a bit coarse but paint helps to hide this. Yes, the fuse wire has some flexibility issues in that it is easy to kink, but it's also easy to straighten. At the end of the day I wanted a simple and cheap working layout and that is what I have got.

So what are the conclusions? Overhead on tram layouts need not be the problem many think and it is really easy to install using these methods. For a small outlay and some simple assembly you too can have working overhead.

If any of these ideas help others then that is great, especially if it means more layouts get built. If, however, the rivet counters think it's all too much then please don't tell me, as rule 1 applies.

For those not familiar with Rule 1 it states that 'it's my layout and I shall do as I please'.

Summary of Items used

Poles:
- 4mm steel rod from B&Q
- 4mm steel threaded rod from B&Q
- M4 nuts and washers from B&Q
- 5mm x 0.45mm brass tube, code BT5M from Albion Alloys.

Overhead:
- 15amp fuse wire for span wires and backbone wires
- 20amp fuse wire for the running wire

Note: Most of the ready made overhead parts mentioned for comparison in this article are no longer commercially available.

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