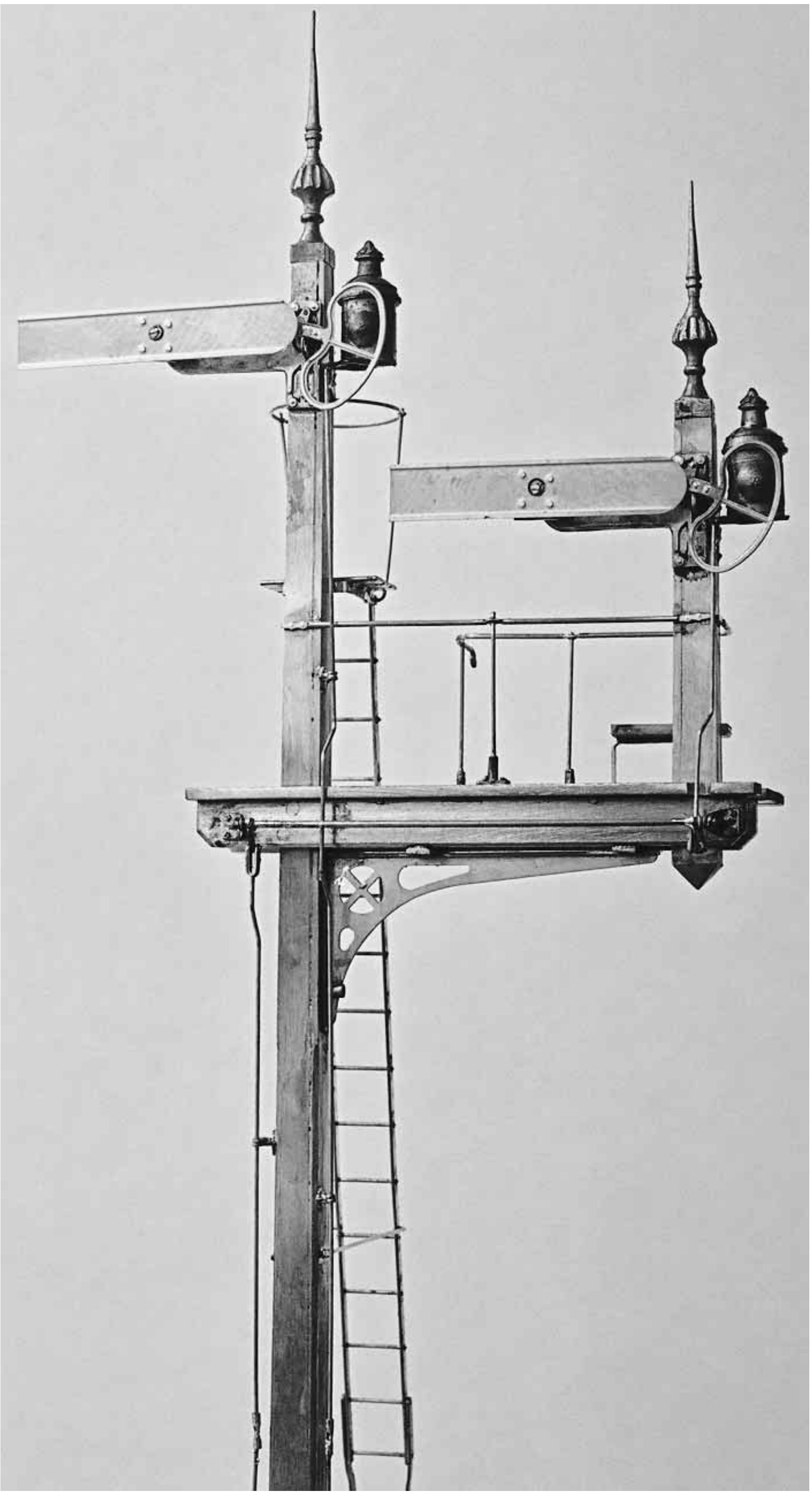
All photographs and illustrations by Lawrence Boul



modelling Semaphore signals

Lawrence Boul shows how you can get the most from New Zealand Finescale's signal kits.

THE 1:64 SCALE New Zealand Finescale semaphore signal kits have been on the market for a while now, and I have just about introduced all of the mechanical signalling products that I intend to. Judging by sales, these paragons of aerial Victoriana are quite popular, so it is probably a good time to admit to some techniques and tips that you will not find in the instructions. Basic assembly is covered there, so this article is confined mainly to these little extras.

The basic kit (KS001) makes up into a single armed signal. The double signal kit (KS002) comprises two single kits plus extra bits such as longer ladder, double rod guides, platform parts and the like. There is a further product (ES011) which contains additional parts needed for standard bracket signals – pictures accompanying this article show signals built from a combination of all of these. Mixing and matching these products makes it possible to model almost all semaphore configurations with minimal recourse to scratchbuilding. A key feature of the products is that they are designed to work. This is not dead easy to achieve, but it need be no harder than loco valve gear. There are some dodges, described below, that should make life easier still. In the half dozen or so mechanisms that I have built, I have yet to solder a linkage solid.

Advice on where the signals should go and a good selection of photographs appears in the 'Signals for dummies' series (*NZMRJ* October 1999 to August 2000).

The post

The foundation of the signal is the post. Standard post sizes are given in the side bar, but it appears that there may have been further variations in practise. The kit supplies instructions and bits to assemble these from styrene sheet. This works admirably, except that all bits hung on the post need to be fixed using CA glue. I have built signals this way very successfully, but for my portable layout I wanted the most robust unit possible. I therefore built the posts using the same principle only from nickel silver sheet. This allowed me to use solder throughout. Assembly from sheet (metal or plastic) results in a post that is a tapered square section tube. This makes it simple to achieve an even taper, but also makes drilling holes and soldering easy, as the mass of a solid post is avoided. Photo 1 (opposite) shows the base of a 36 ft post intended for my Brunner layout. A turned spigot has been added to make fixing and handling a little easier. A little mock-up showing the method of construction is also included. It is not pretty, but it does not have to be, as all the mess is removed as the post is cleaned up.

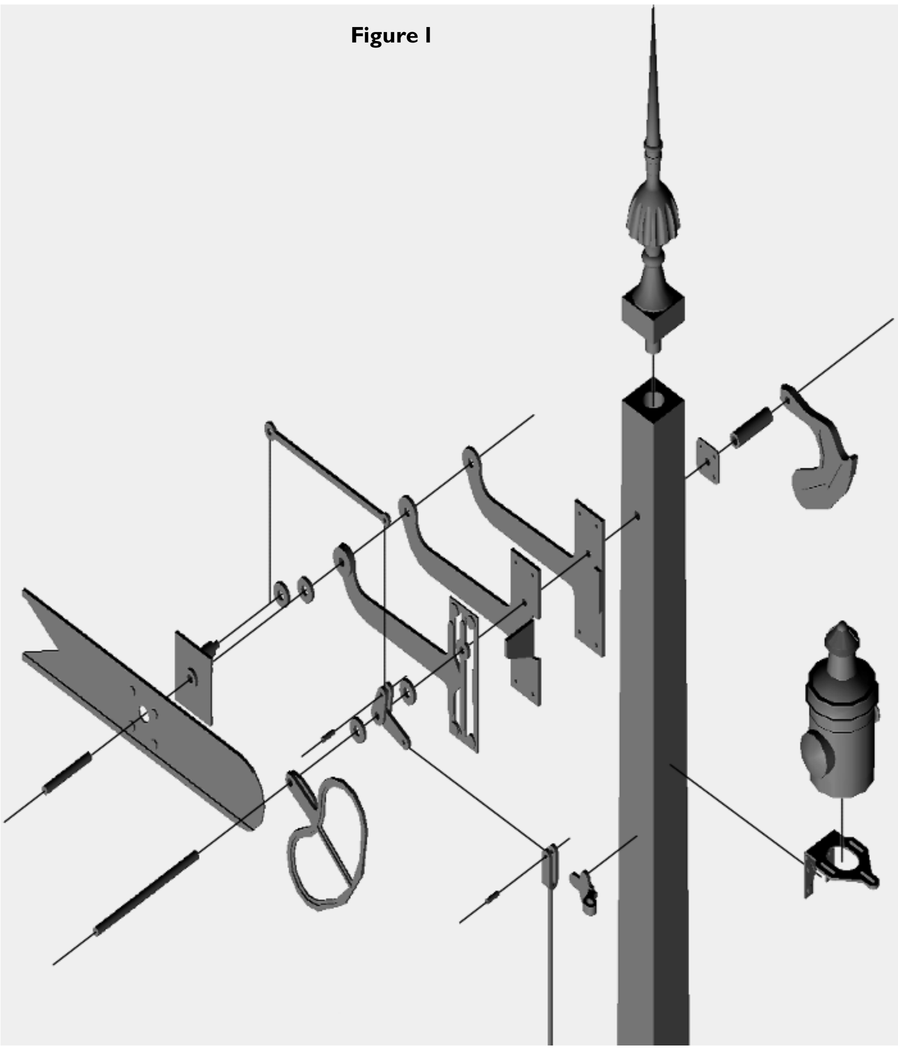
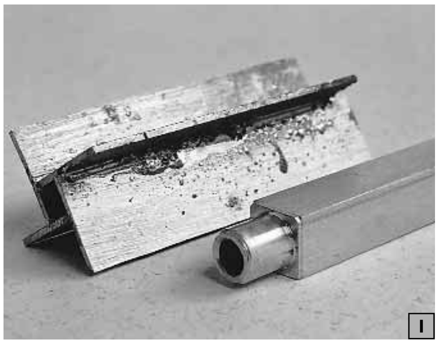


Figure 1



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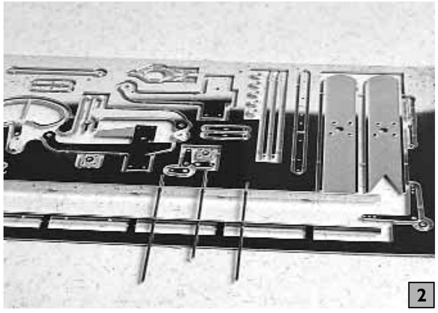

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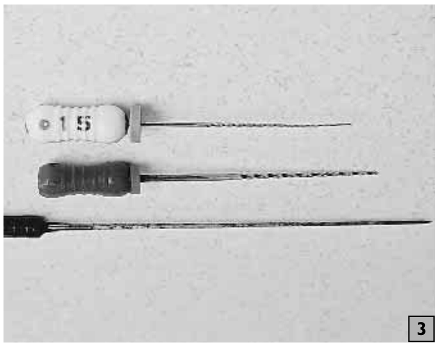

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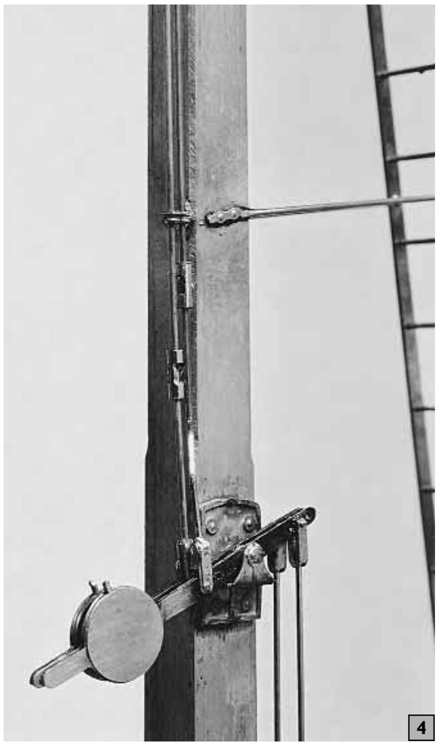
Ironwork

The finial and arm back plate are supplied as brass castings, while the remainder of the ironwork is built up from folded and laminated etchings. Wherever possible, things fold and slot. An exploded diagram of the trickiest bits is shown in figure 1 (above). The ladder is formed in a fold up jig that guarantees straightness, as shown in photo 2 (right). For the etched parts I generally use the resistance soldering unit I described in the October 1999 *NZMRJ* to join the parts. It is quite feasible to use an ordinary soldering iron though, and this is my choice for the ladder, clevis parts and indeed all joints that are not flat. Detailed descriptions for assembly are contained in the instructions and need little elaboration here.

Free movement

There are a few tips for achieving free movement that are worth passing on, and that have application wider than semaphores. The first is the opening of fine holes. It's fairly old hat now to use jeweller's tapered broaches. These are like a fine tapered reamer. My set goes down to 0.5 mm, but there is a finer set available. Barry FitzGerald alerted me to a possibly even more useful tool, however, – the dentist's root canal reamer. A pair of these is shown in photo 3 (right) along with the 0.5 mm broach for comparison. The reamers are obtained second hand, and free, from your local house of pain. They work extremely well on softer metals like brass and nickel silver and are very useful for easing the holes in etchings, should these prove a little tight. The points are very fine and you can clear holes much less than 0.3 mm – should you find a need. It takes but a minute or so of twiddling to clear all the holes for a semaphore ladder.

The second trick is the use of prototypical forked, or clevis, joints in operating linkages. Typically these are difficult, and most signal builders simply bend the operating rod at right angles to engage a hole in a crank. My limited experience is that this is a cause of erratic operation in a mechanism, and it looks rather crude. For somersault signals such as these the complexity of the linkages really demands a better-engineered solution. The kits provide little etched clevis parts that are folded over the end of the rods to make a prototype joint very easy (photo 4, right). The problem, however, is how to connect things without inadvertently soldering the whole mass into a solid, immovable lump.



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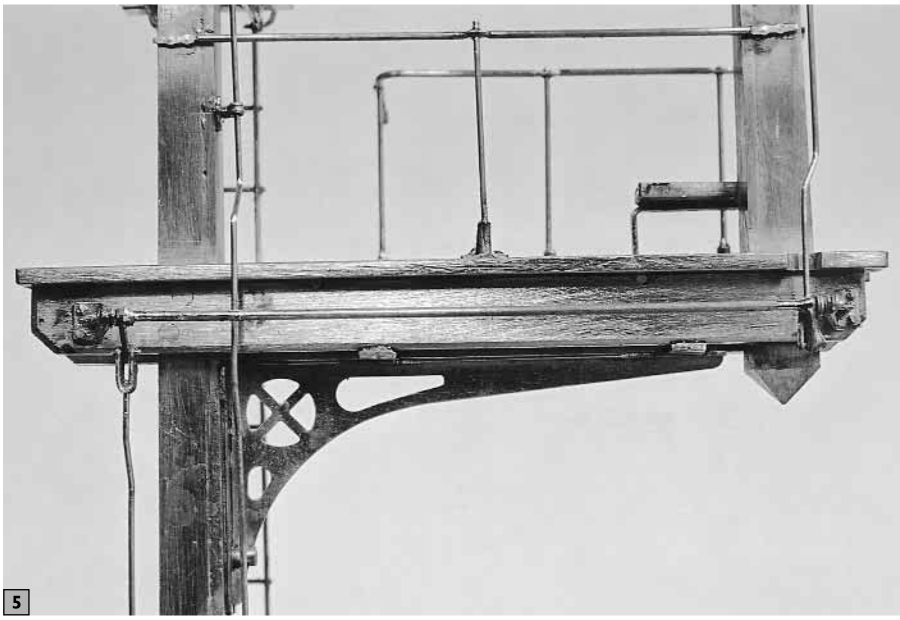
My first suggestion here is to use Carr's 188 solder paint. This allows very sparing application of solder that immediately reduces the potential for lump formation. The next step is to make sure that the holes



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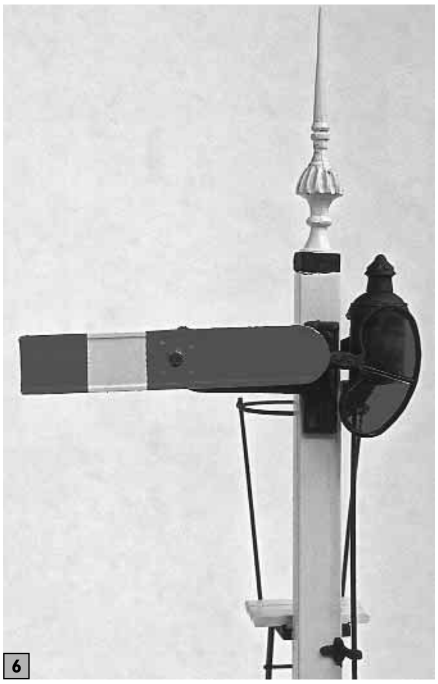

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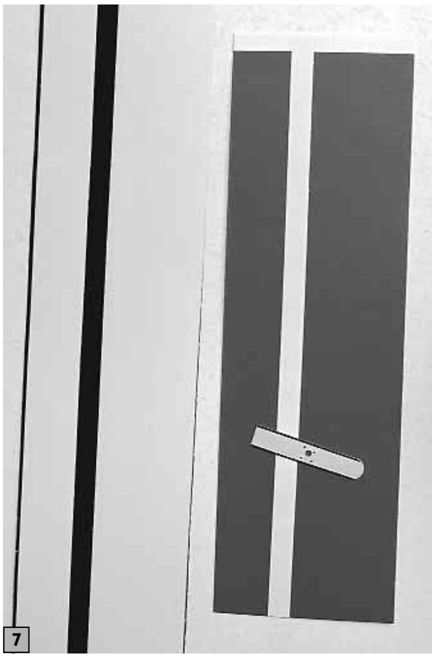

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in the clevis are a good fit for the pin, while the hole in the crank is less tight. Free movement is essential for smooth operation. The big trick, however, is to thoroughly clean the crank part and to blacken it with liquid gun blue prior to soldering. Solder will not take to the blued surface and you are guaranteed a free joint. Once or twice I have had a worried moment when joints have come out solid, but gently forcing them breaks the weak bond between the solder and blued brass and frees them up immediately. The old idea of oil-soaked cigarette papers is just too much of a fiddle to be contemplated on these linkages.

Bracket semaphores are generally difficult because there are more cranks and rods involved. Fortunately, NZR sometimes used a torsion bar operating arrangement for brackets. These are far easier to achieve in a model, and the bracket signal etch contains the appropriate parts. Photo 5 (above) shows such a linkage on one of my models. Of course, if you would rather struggle with cranks, the etch contains these too. In most of these photos the models have been photographed before cleaning up and painting to make the details of construction show a little more clearly. Some of the excess solder that is in evidence will be removed before the models are finished.

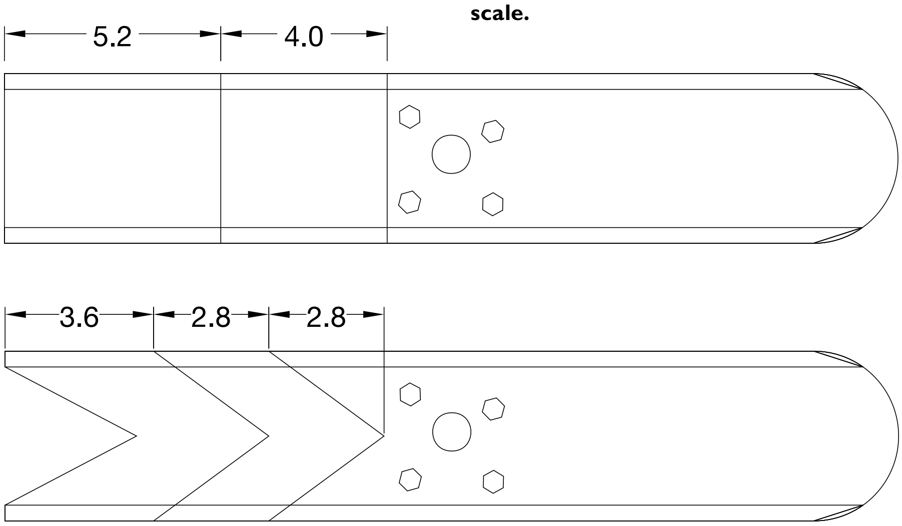
My last piece of advice is to think carefully about the order of assembly. If possible, leave small fiddly joints until after heavy soldering tasks are done. That way you avoid the risk of re-melting the wee bits. I do not actually fix the arm plate to its axle at all. I just clip the axle off with side cutters. The resulting slight burr usually serves to retain the arm, but when it does not, the arm shows little inclination to slide off as the linkage retains it.

Spectacle stop filing and other adjustments

If you plan on building a working signal – and you should – then there are some issues of practicality that take precedence over issues of scale. All the etched parts are as close to scale as the process permits – which is very close. It is very difficult to assemble the model with scale tolerances however, with the result that the model linkages will always have a little slop. This accumulates with each new joint and can result in there being insufficient travel at the counterweight arm to get full signal arm movement.

I take care over three areas to solve this. Firstly, make sure that the spectacle plate stop is filed back so that the arm can sit horizontal in the off position. Secondly, file or tweak the counterweight-mounting bracket to maximise the travel on the counterweight arm. A little here achieves a lot. Finally, consider drilling an extra hole for fixing the vertical rod to the counterweight arm, to generate more rod travel. In my experience this is not absolutely neces-

Figure 2. Position of semaphore arm markings. Dimensions in mm for 1:64 scale.



sary, but it is inconspicuous and easy to do prior to assembly. If it is not needed then no great harm has been done, but it is very difficult to do retrospectively. This third hole is provided in later versions of the basic etch.

For a couple of signals I turned up little turnbuckles and joined the operating rods prototypically. I have since used suitably shaped sections of 22 gauge hypodermic needle slipped over the rods and made the join at the clevis. This results in a nice straight operating rod, which is hard to achieve with the original method. It is also much easier and the turnbuckles look nearly as good (photo 4, page 7).

Painting signal arms

The signal is relatively easy, if time consuming, to paint, as the scheme is basically white with black details. I found using a bit of 'gunmetal' in the black let it down a little and made it more convincing. Note that the bits that were painted black on the prototype seemed to vary enormously. The arms are a trickier proposition as very accurate stripes and chevrons are needed to make a convincing job. Home and starter signals are red with a white stripe on the front, and white with a black stripe on the reverse. Rather than measure the position of this, note that the stripe is hard up to the arm back plate. Distants are yellow with a black chevron, and white with a black chevron on the reverse (Figure 2, opposite). I made my own decals for home and starter arms, the results of which are shown in photo 6 (opposite) – here's how:

- Paint the arms white. I do not fit them until after painting, which makes life easier.
- A strip of clear decal film is sprayed signal red, except for a masked strip 4 mm (scale 10 in) wide, left clear.
- Trim a portion of this and apply to the front face of the arm.
- A black strip decal, 4 mm wide, is made in similar fashion for the reverse of the arm.
- Doing this once will result in sufficient decals for all the signals on a layout as shown in photo 7 (opposite).

For distants I would do things similarly, but cut the chevrons from black decal film rather than trying to mask them. Note that, according to diagram s9372, the angle of the enamelled chevron and the fishtail of the blade are quite different.

Handrails and braces

The various handrails and braces to be found on the signals were wrought iron. For fixing to posts the generally circular section metal is flattened to take two coach screws. In the single signal kit the entire ladder brace is provided as an etched part, but while this captures the flattened end quite well, the brace is flat instead of circular. For these parts I tend to substitute 0.3 mm wire and add the etched flattened ends separately (photo 8, page 10). On the bracket signal etch, a number of end parts are separately provided for this purpose.

On the double and bracket signals the handrails become complex. Stanchions consisting of a cast base and a 0.3 mm stem

Notes on the dimensions of semaphore signal posts

Based on drawing S210 (28 February 1901). Semaphore posts must have been a costly item, and thus for any location the shortest post consistent with appropriate visibility would have been used. Posts were square in section and tapered to 7 in x 7 in at the top to fit the finial. In reality the post top was rebated so that the finial fitted as a cap. In these notes measurements are quoted to the base of the finial. All measurements from signal arms are from the centreline of the arm. The dimensions (in millimetres for 1:64 scale) are also shown in the drawing.

Single arm signals

For all posts the arm was 1 ft 3 in below the top of the post. The corners of the post were chamfered from 5 ft above ground level to 2 ft 9 in from the top of the post. Other post dimensions are given in table 1.

Table 1: Dimensions of single arm posts

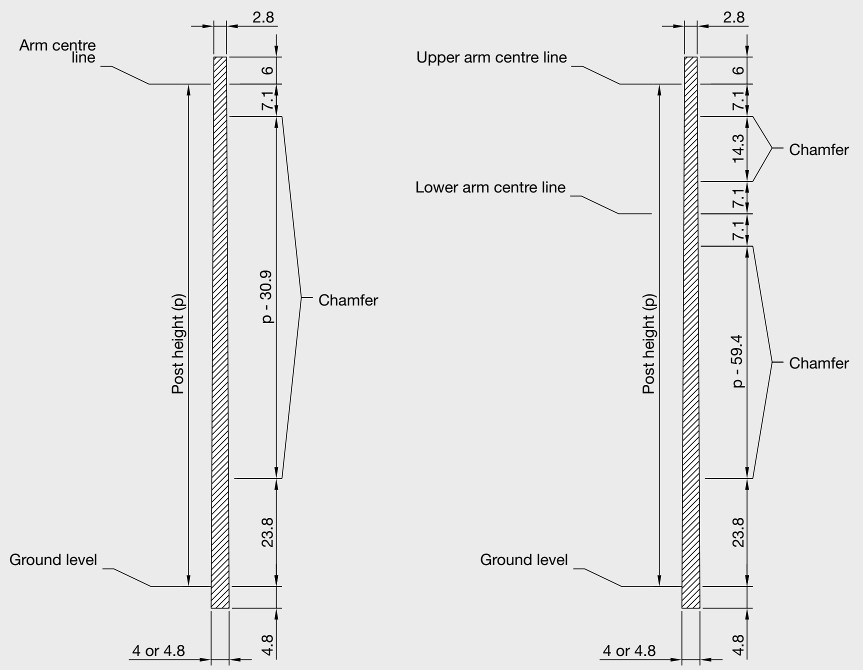
Post	*Height of arm centreline above ground (1:64 scale)*	*Dimension of post 1 ft below ground level*
Post A No 1	18 ft (85.7 mm)	10 in x 10 in
Post A No 2	23 ft (109.5 mm)	10 in x 10 in
Post A No 3	28 ft (133.3 mm)	10 in x 10 in
Post A No 4	32 ft (152.3 mm)	10 in x 10 in
Post A No 5	36 ft (171.4 mm)	12 in x 12 in
Post A No 6	40 ft (190.4 mm)	12 in x 12 in

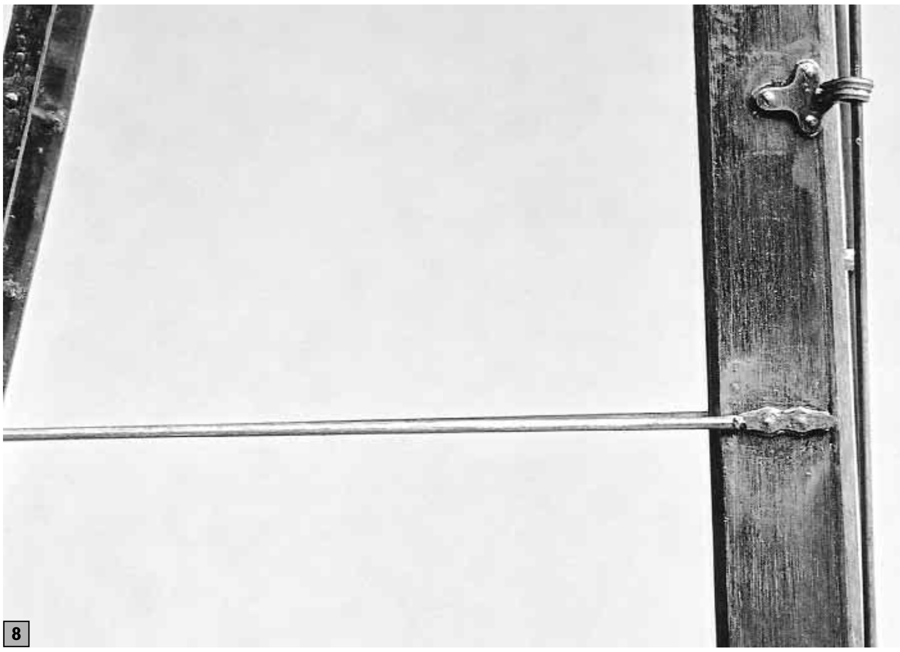
Two arm signals

For all posts the top arm was 1 ft 3 in below the top of the post. The lower arm was 6 ft below the upper. The corners of the post were chamfered from 5 ft above ground level to 1 ft 6 in below the lower arm and from 1 ft 6 in above the lower arm to 1 ft 6 in below the upper arm. Other post dimensions are given in table 2.

Table 2: Dimensions of two arm posts

Post	*Height of arm centreline above ground (1:64 scale)*	*Dimension of post 1 ft below ground level*
Post B No 1	23 ft (109.5 mm)	10 in x 10 in
Post B No 2	28 ft (133.3 mm)	10 in x 10 in
Post B No 3	32 ft (152.3 mm)	10 in x 10 in
Post B No 4	36 ft (171.4 mm)	12 in x 12 in
Post B No 5	40 ft (190.4 mm)	12 in x 12 in





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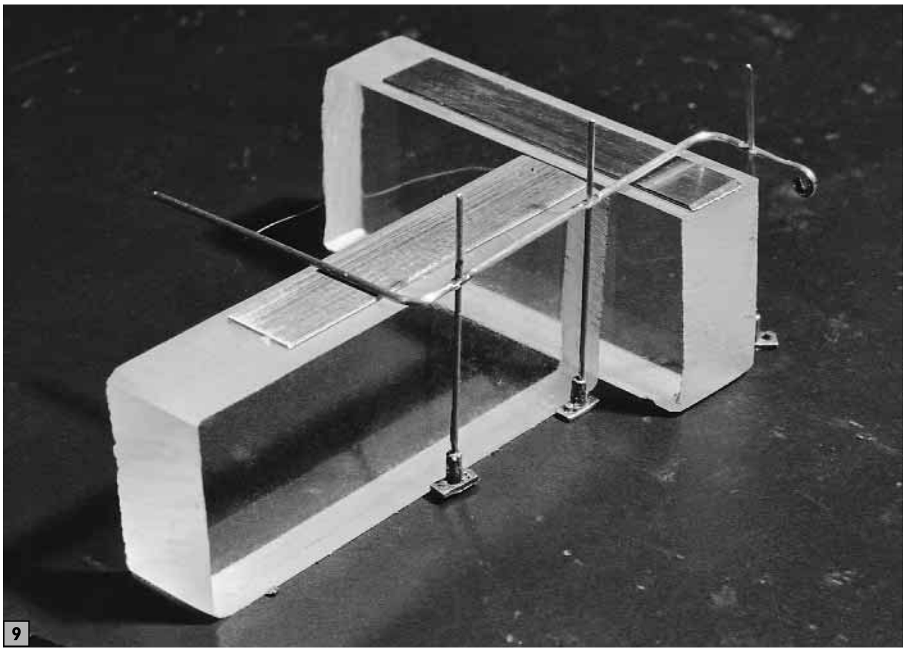

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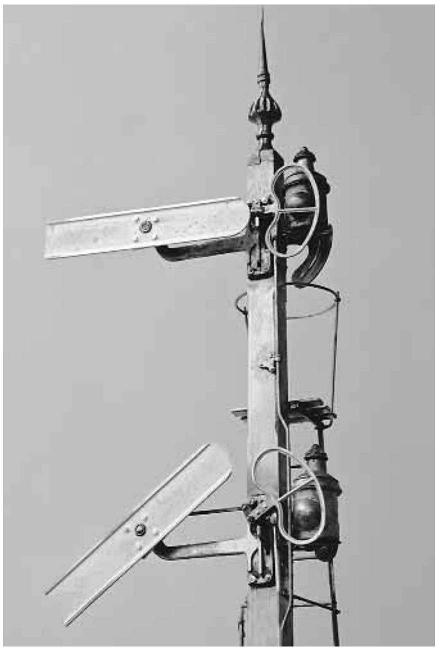

support them. The tricky bit is that the stem passes through an eye in the handrail. This leaves you with two options. The first is to fudge matters and simply solder the stanchion to the handrail. The second is to follow the prototype. Predictably, I do the latter.

I form the handrail from 0.4 mm wire. The eye is made by first forming a flat in the handrail. I do this by belting the edge of a piece of 0.9 mm steel (actually a 300 mm rule) into the brass. It is then not too difficult to drill a 0.3 mm hole to take the stanchion. For the bracket signals the handrails involve a bit of bending. Photo 9 (left) shows the use of some little spacer blocks to get everything at a constant height.

Ideas for lighting lamps

Although I have not been particularly interested in lighting the lamps in my signals, I have investigated some possibilities. The lamp is supplied as a lost wax brass casting. To take a microbulb, this will need to be drilled out to make it hollow and the cast lamp lenses similarly removed. I experimented with inserting short lengths of optical fibre in the lens apertures, and holding them next to, but not touching, a soldering iron to warm the fibre ends and let them form a lens. They give effective illumination when a microbulb is lit in the housing, as shown in photo 10 (left). Wiring could easily be made unobtrusive by running it inside the hollow post.

Operation

How to make them work? An innovative solution has been developed, and an article is in preparation!

Our thanks to Brian McKenzie for his help with the production of this article.