MODEL SIGNAL ENGINEERING

MSE

Part of WIZARD MODELS

PO BOX 70 BARTON upon HUMBER DN18 5XY

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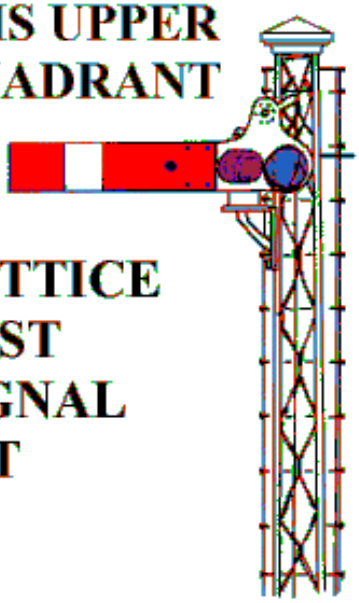
SCALE	CODE	
4 mm	S4/KM3	

LMS UPPER QUADRANT LATTICE POST SIGNAL KIT



Complete kit to build a working (un-motorised) home or distant signal in any height between 32ft6in and 42ft. Some marking out, cutting and shaping of parts is required.

The LMS used lattice posts for signals over 30ft tall (35ft after January 1944). The signal represented by this kit consists of an upper quadrant arm on a Stevens-type lattice post, with an LNWR-pattern post top and Adlake lamp. Some examples may still be in use on Network Rail today.

Parts supplied:

S0012/1 arm etc fret
S0023 lattice post & ladder fret
SC0010 post top casting
SC0011 lamp casting
30mm x 1/16" brass tube (arm bearing)
30 x 0.8mm brass rod (arm spindle)
10cm x 26swg nickel silver wire (axles, ladder struts)
300 x 0.31mm brass wire (2 pieces, operating wire, arm stop/corrugations)
60cm x 28swg brass wire (ladder rungs)
Red, yellow and blue-green glazing

ASSEMBLY INSTRUCTIONS

Ideally, the kit should be built using 50W adjustable temperature soldering iron, 188°, 145° and 70° solders and liquid fluxes, minidrill and slitting disc, various files, pliers, drills etc, and tinsnips and small scissors for cutting out the frets. In these instructions left- and right-hand mean as viewed from the front of the signal. A selection of prototype photographs will help assembly, but you may have to search for these.

Burnish both sides of the frets before removing any parts, and tin the smaller parts before removal. Parts 4, 5a, 6a, 15 and 16 on the S0012/1 fret and the platforms on the S0023 fret are not required and may be discarded. Grip the etched parts in smooth pliers when filing off tags to avoid bending them.

The Signal Arm:

Use 188° solder for this section.

Open out the spindle hole in the spectacle plate (3) to 0.80mm (no.68), and the operating wire hole to be a loose fit on the 0.31mm brass wire. For the latter, start with a no.80 drill and work up in size. If you break the etch (which is close to scale size), repair it by soldering on one of the etched washers and filing it to shape.

To model the earlier (pre-1936) corrugated arm, deeply scribe the corrugations on to its front, using the horizontal half-etched marks as a guide, and solder two pieces of 0.31mm brass wire onto the rear face at the same distances from the top and bottom edges. Unless your prototype demands it, avoid modelling a corrugated distant arm - the rear is very difficult to paint!

Solder the arm to the half-etched side of (3), ensuring the arm's half-etched bolt heads are on its front face. Solder the arm assembly to the 30 x 0.8mm brass rod spindle. To keep things square, drill a 0.8mm hole in a wood block, insert the spindle then drop the arm on to it face down. When soldering, do not press the arm at the spectacle plate end, or it will tilt. Remove the excess front spindle and file it almost flush with the spectacle plate. Leave the excess rear material for now as a painting handle. Joggle the operating wire arm back 0.5mm so the operating wire will clear the spectacle plate.

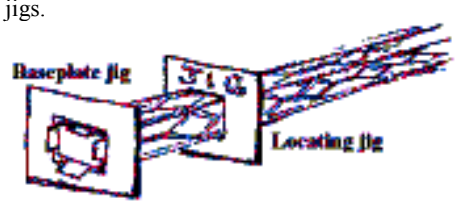
The Post:

Use 188° solder, for this section, except where stated.

The post as supplied will build into a signal 42ft tall. If you require a shorter post, build it to the full height first, and then cut to size afterwards.

Lightly tin the lattice edges on all four post sides, on both sides of the fret. Cut out the two post halves, but don't bother filing off the remains of the tags - being staggered, they help in locating the post halves when soldering. Use flat-nosed pliers to correct any distortion caused by cutting out. Accurately fold each half-post to 90°, **with the half etch being on the inside**. Solder along the inside of the bend to fill the gap as much as possible, although complete coverage is not vital at this stage.

Tin both sides of the rectangular baseplate jig (the one with the four etched slots) and remove it from the fret. Scribe a longitudinal centre line along it. Also drill two 1.0mm holes 2mm either side of the centre line, at the distance from rearmost etched slot given in the table below - these will take the ends of the ladder. *[For unlisted heights, take the post height in millimetres, subtract 1, divide by 12, add 2, and the result is the drilling distance in millimetres.]* Finally, cut out the two locating jigs.



Bring the two half-posts together, and slip on the jigs to hold them in place, ensuring the two halves are level. Place the tags on the bottom of the post into the baseplate jig and solder up, ensuring squareness in all three planes. Now make the two long joints along the post, applying light pressure from pliers to help close the gap. When done, remove the locating jigs and discard. Tidy up the joints, file the top of the post level, and file off the tags projecting underneath the baseplate. Don't worry about any remaining small gaps along the post corners - these can be filled in before painting with 145° or 70° solders, which have better gap-filling properties than 188° solder.

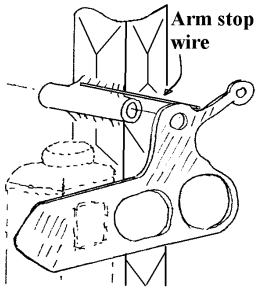
Now is the time to cut the post to length if required. Lattice posts were usually erected in one of a range of standard heights, chosen to give adequate sighting, as shown in the first column of the table below. The height given is the height of the arm centre-line above rail level, so the post cutting length given in the second column includes an allowance of 8mm and 4mm at the top and bottom of the post respectively. Non-standard cutting heights can thus be calculated from the table - don't forget to make allowance for any signal not mounted on the ground.

Height (ft/ins)	Post cutting length (mm)	Post to ladder distance (mm)
32.6	142	14.0
35.0	152	14.5
37.6	162	15.5
40.0	172	16.5
42.0	180	17.0

Attach the 1/16" arm bearing tube to the left-hand side of the post at right angles to the vertical post axis. The tube centreline should be 4mm below the post top. Use the minidrill and slitting disc to trim the bearing so it projects 1mm on both faces of the post.

Temporarily fit the arm spindle into its bearing, and solder (145°) a 0.31mm wire stop in the crook of the bearing/post joint, as shown

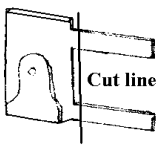
below. This will prevent the arm falling below the horizontal.



Test for free operation of the arm - you may need to file down the top of the spectacle plate or the underside of the wire to achieve this.

The Balance Weight and Post Fittings:

Use 188° solder for the start of this section.



Sweat the two balance weight levers (5) together. Add weights (6) either side to increase the thickness as desired. Open out the axle hole to no.76 (0.50mm), and the two operating wire holes to no.78 (0.40mm). Fold up the bracket (7), as shown, with the half-etched lines on the **inside** of the bends. Cut off the two side straps as shown.

Now switch to 145° solder.

Solder one of the etched washers to the end of the 26swg nickel silver axle, having first opened out the washer hole to 0.50mm (no.76) and before removing the washer from the fret. Pass the axle through the holes in (7), trapping the balance lever in the gap so that with the open jaw upwards, the weight is (usually) to the right. Solder the axle in place at the rear face of the bracket, applying sufficient pressure to the jaw to allow free operation, but removing any slop. Trim the axle so it is flush with the bracket.

Solder the bracket to the right-hand side of the post. The bearing hole should be 16mm (4ft) above the baseplate/ground level, unless the signal is in a public area, when it should be 16mm (4ft) below the arm centre line.

Consider from which direction the signal box operating wire would have approached the signal. Solder a crank (9) to the front of the bracket (8), using a nickel silver wire axle, such that when the bracket is soldered to the front or right-hand side of the butt as appropriate, a horizontal pull on the lower lever will translate into a downwards pull on the other lever. Use one of the etched brass washers to space the crank off the bracket. There is no need to make the crank work, unless it is to form part of the eventual operating mechanism. Some signals had a pulley wheel (10) instead of the crank, but this does not appear to have been very common. *[For a working crank/pulley, solder (188°) a washer on to the axle and proceed as described above for the balance lever and its bracket.]* Finally, solder the bracket to the front or right-hand side of the post, so the lowest crank hole is just above the baseplate/ground level, and the half-etched bolt-heads are facing outwards and are symmetrical about the post.

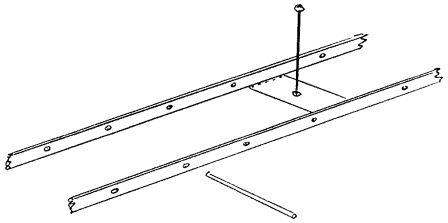
Fold up lamp bracket (11), with the half-etched line on the inside. Solder (188°) triangle (12) into the half-etched lines inside the bend; one is longer than the other to match the triangle sides. Solder the bracket to the left-hand side of the post, so its top surface is 5.5mm below the arm bearing centre line, and the shortest side of the triangle is against the post.

Add the track circuit plate (13) if needed (not on distant signals). Centre it 52mm (13ft) above the baseplate/ground level, and use 188° solder, as ladder bracing struts are likely to be added later in the same area. Two pairs of bolt holes are half-etched into the plate. Either the vertical or horizontal pair was used to fix the plate to the post; if modelling an actual prototype, check from photographs which pair is redundant and fill with solder.

The Ladder:

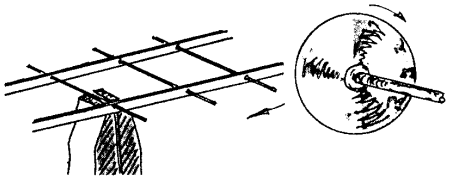
Use 188° solder for the start of this section.

To avoid mistakes, build the ladder to its full length, and cut it to size at the fitting stage. The jig incorporated in the ladder fret helps to keep the ladder aligned whilst the rungs are being soldered in place. Before removing the ladder and jig from the fret, clear the rung holes to suit the 28swg brass wire supplied. A no.78 (0.40mm) drill will suffice, or preferably a five-sided cutting broach. The holes are deliberately etched undersize to prevent failure in production and to give a fine fit to the wire.



Fold up the two side stiles with the half-etched lines on the inside, and pin the whole assembly to a balsa block, using the holes in the six jig spacers.

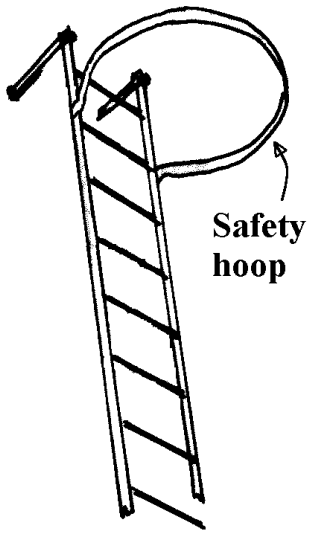
Lightly tin the outer edges of the ladder. Straighten some brass wire between finger and thumb, tin it, then cut pieces to length, just over the width of the ladder. Thread them through the holes, two or three at a time, and solder them in place from the outside. Repeat the process at the other end of the assembly, and so on until the middle is reached. It is most important to work from alternate ends as work proceeds, so that the heat from the soldering iron is dissipated along the ladder's length, eliminating any tendency to twist.



Remove the ladder and jig from the balsa block, and tidy up the rung ends using a minidrill and slitting disc. Hold the rungs in pliers as shown to avoid damage. The vibration from the drill is most useful, as it will shake apart any poorly soldered joints! Finally, cut the jig free using a piercing saw or a craft knife on a firm hardwood surface. The slitting disc may be used, but take great care not to damage any rungs.

Now switch to 145° solder.

Flatten two short pieces of nickel silver wire to form two ladder struts and solder them horizontally to the sides of the post as shown below, 1mm below the post top. They should project at least 5mm behind the post's rear face. Cut the ladder to length, so its bottom end fits in the baseplate holes, and its top end fits between the two struts (having first joggled them out to account for the width difference). Solder the ladder top and bottom; the top should be positioned 3mm from the rear of the post.



Add pairs of ladder bracing struts (17). Solder them to the ladder and post, joggling them to account for the width difference. Check their height and number with photographs. The ladder end joints should be on the outside of the stiles, and never exactly level with a rung.

Form the safety hoop from strip (14). Wrap it round a 9/32" or 7mm drill; the natural spring of the brass will open it to the correct 8mm diameter. Bend the end tags to the ladder width and solder them to the outside of the ladder stiles, 4mm below the arm bearing, as shown above. Finally, remove any excess tag or strut length and tidy up.

The Lamp and Post Cap:

Use 70° solder or glue for this section.

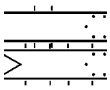
Remove any casting sprue and mould lines from the lamp and post cap. Fix the lamp to the bracket, so that in side view, the lamp body is in line with the post, and from the front, the lens falls behind the left-hand arm spectacle. Fix the post cap to the post top.

Painting:

Degrease the post and arm assemblies by washing in detergent water and leaving to dry.

Spray overall with white car primer, mounting the arm in its bearing to avoid painting the spindle and inside of the bearing tube. Detail paint as follows (but check with photographs as there is a lot of prototype variation):

Black (some parts pale grey in later BR days): – post to just above and including the balance weight and crank assemblies; ladder above the level of black on the post and any bracing struts above this; safety hoop; lamp, but not the lamp bracket; arm bearing; a band on the post 4mm deep above and below the track circuit plate; arm spectacle plate including the V-shape on its reverse; arm rear band/chevron; front chevron on a distant arm.


Full size arm painting guide

Red or Yellow: front and edges of the arm except the home's white band or distant's black chevron.

Silver: lamp lenses front and rear.

Glaze the spectacles; use red (home) or yellow (distant) in the left-hand aperture, and blue-green in the right-hand one. The easiest method is to cut a rectangle approximately to size so the whole of the aperture is covered, fix it in place using MSE's *GSA* adhesive or gloss varnish, and then trim the edges when set. Coat the front of the glazing with gloss varnish to give a better glass effect.

Fixing the Arm to the Post:

Use 145° solder for this section.

Ensure the spindle moves freely in its bearing – clean off any paint that might have crept in. Remove any excess spindle length with the slitting disc, but leave enough protruding through the bearing to solder the back-blinder on. Open out the hole in the back-blinder (18) to no.66 (0.85mm). Place an oiled paper washer over the spindle end, then solder on the back-blinder, with its reinforcing rib to the rear. Adjust its position so it just clears the lamp rear lens when the arm is horizontal, and push it sufficiently far on to the spindle to remove any fore and aft spindle motion. Wash off any surplus flux, then prime and paint black or pale grey as detailed above.

The Operating Wire:

Blacken the 0.31mm operating wire, by either priming and painting black, using a permanent marker pen, or (preferably) a proprietary metal blackening solution. Make a small hook in the top of the wire. Measure the distance between the arm hole (arm horizontal) and the inner balance lever hole (lever around 30° below the horizontal). With the short end of the hook facing you, bend the bottom of the wire 90° to the right at the measured distance. Put the hook in the arm hole so the wire is to the rear, and then the bottom bend through the balance lever hole from the left-hand side, forming a hook to retain it. It may be necessary to joggle the wire to give clearance for it to pass behind the spectacle plate.

The signal may now be installed on the layout and connected to your chosen means of operation.