MODEL SIGNAL ENGINEERING

MSE

Part of WIZARD MODELS

PO BOX 70 BARTON upon HUMBER DN18 5XY

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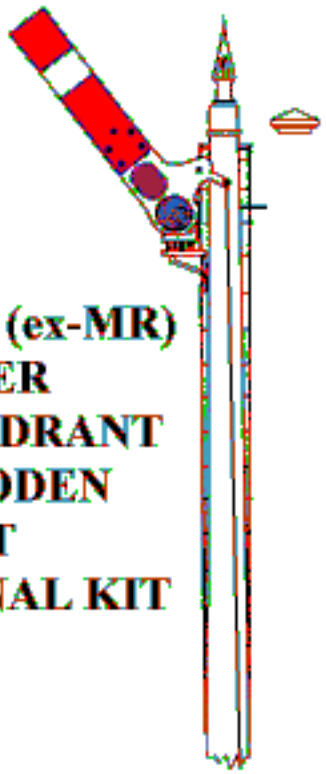


LMS (ex-MR) UPPER QUADRANT WOODEN POST SIGNAL KIT

Complete kit to build a working (un-motorised) home or distant signal in any height up to 27ft6in. Some marking out, cutting and shaping of parts is required.

Midland Railway signals usually comprised a tapered wooden post, a lower quadrant arm, a round-case lamp (with lampman's platform), and a spiked finial. After the grouping, the LMS modernised many of these signals by fitting upper quadrant arms and a new lamp (as the lamp moved to the opposite side of the post, the lampman's platform was redundant, and was usually removed). Many signals also received the ex-LNWR design of post cap, and this revised design was used for both new installations and renewals until the advent of tubular steel posts in the mid-1930s. Some examples are still in use on Network Rail today.

Parts supplied:

S012/1 arm etc fret
S06 wooden post casting
S09/5 ladder fret
SC010 & 12/2 post cap/finial castings
SC011 lamp casting
30 x 2mm brass tube (arm bearing)
30 x 1.0mm brass rod (arm spindle)
30 x 0.9mm brass rod (balance weight axle)
30mm x 22swg nickel silver wire (crank axle)
250 and 3 off 50 x 0.45mm brass wire (operating wire, arm stop & corrugations)
20 x 1.2mm brass rod (post pegs)
Red, yellow and blue-green glazing
Baseplate

ASSEMBLY INSTRUCTIONS

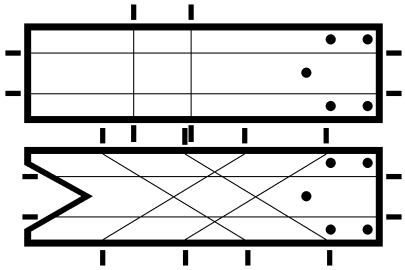
The test kit was built using 50W and 25W (low temperature) soldering irons, 188°, 145° and 70° solders and liquid fluxes, minidrill and slitting disc, various files, pliers, drills etc, and tinsnips and small scissors for cutting out the frets. In these instructions left- and right-hand mean as viewed from the front of the signal. A selection of prototype photographs will help assembly, and these should be easy to find, as this type of signal was fairly common, particularly with the LNWR post cap.

Burnish both sides of the frets before removing any parts, and tin the smaller parts before removal. Parts 4, 5a, 6a, 15 & 16 on the S012/1 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 no.61 (1.0mm). Using the half-etched lines as a guide, scribe painting lines on both sides of the chosen arm – home (1) or distant (2):



To do the rear side, punch guide pips through from the front marks.

To model the earlier (prior to 1936) corrugated pattern of arm, deeply scribe the corrugations on to the front of the arm, using the horizontal half-etched marks as a guide, and solder two pieces of 0.45mm 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!

Punch out the five bolt heads in the chosen arm, then solder it to the half-etched side of (3), ensuring the arm's half-etched bolt heads are on its front face. Remove some of the corrugation wires so the arm will fit to the plate. Solder the arm assembly to the 30 x 1.0mm brass rod spindle. To keep things square, drill a 1.0mm hole in a wood block, insert the spindle then drop the arm on to it face down. When soldering, avoid tilting the arm. 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 1mm so the operating wire will clear the spectacle plate.

The Post:

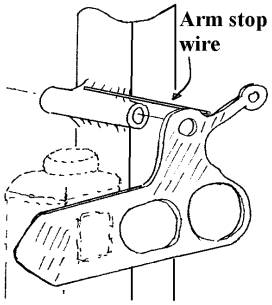
Warning: being cast in whitemetal, the post is easily melted or distorted. Handle it carefully, and ensure you have picked up the low-temperature (70°) iron before making any joints!

Wooden posts usually came in one of a range of standard heights, chosen to give adequate sighting, as shown in the first column of the table. 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 13mm and 7mm 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. Note that a platform starter is typically 16ft high.

Height (ft/ins)	Post cutting length (mm)	Post to ladder distance: high/low (mm)
16.0	132.0	17.0/15.0
18.0	146.0	18.0/16.0
20.0	160.0	19.0/17.5
22.6	177.5	20.5/19.0
25.0	195.0	22.0/20.5
27.6	212.5	23.5/21.5

Having chosen your post height, cut the post to the length shown in the second column of the table, removing the excess from the top end of the post - MR signals always seemed to have a "chunky" appearance, and the cast-on details are not required. Remove any flash and mould lines, file off the bearing, lamp and balance weight brackets and square the post ends. Always try to file along the length of the post rather than across it, so any file marks look like timber grain. Straighten the post using gentle finger pressure if it has become distorted.

Square off one end of the arm bearing tube. Solder (188°) a length of 0.45mm brass wire parallel to the length of the tube, so it projects around 4mm beyond the squared end. This wire forms an arm stop, to prevent the arm falling below the horizontal. Clamp the tube to one side of the post so the wire falls in the crook of bearing and post as shown.



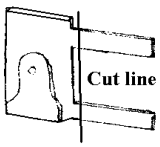
The tube centreline should be 6mm below the post top, and the end should project around

1.5mm in front of the post. Solder (70°) the tube to the post. Use the minidrill and slitting disc to trim the rear of the tube so it projects around 1.5mm behind the post. Test fit the arm in the bearing, and trim the stop wire. You may need to file down the top of the spectacle plate or the underside of the wire to give a free motion.

If you intend to use the large rectangular baseplate to mount the signal on the layout, first scribe a longitudinal centre line along it. Drill a no.56 (1.2mm) hole on the line, around 25mm from one end. Solder (188°) a short 1.2mm brass rod peg into the hole. Drill a corresponding hole in the centre of the post base. With the greater part of the baseplate facing away from you, orient the post with the bearing on the left, place it on the peg, and solder (70°) it to the baseplate, ensuring squareness in all three planes.

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.65 (0.90mm), and the two operating wire holes to no.77 (0.45mm). 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.

Insert the 0.9mm brass bearing wire into the bracket, trapping the balance weight arm in the bracket such that the weight points to the right. Oil the balance weight arm bearing, then solder the wire on both sides of the bracket. Drill no.65 (0.90mm) right through the side of the post. The hole should be on the vertical centreline and 28mm (4ft) above the baseplate/ground level, unless the signal is in a public area, when it should be 28mm (4ft) below the arm centre line. Insert the axle into the hole from the right-hand side, and solder (70°) the bracket to the post. Remove excess wire and tidy up the joints.

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 the nickel silver wire axle, such that when the bracket is soldered to the front or right-hand side of the post 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°) the axle into the bracket, add a brass washer, then the crank or pulley, a paper washer, then solder (145°) a second brass washer on top.] 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 9.5mm below the arm bearing centre line, and the shortest side of the triangle is against the post.

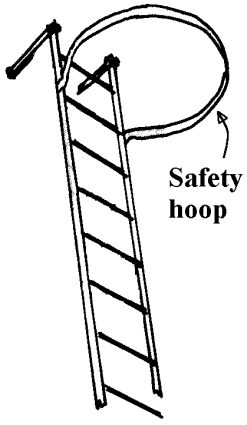
Solder (70°) on the track circuit plate (13) if needed (not on distant signals). Centre it 91mm (13ft) above the baseplate/ground level. Two pairs of bolt holes are half-etched into the plate. Either the vertical or horizontal pair was used to fix the plate to the post; if modelling an actual prototype, check from photographs which pair is redundant and fill with solder.

The Ladder:

Two typical ladder attachment heights are seen: 2mm below the post top ("high"); and around 10mm below the arm bearing ("low").

Use the minidrill and slitting disc to form a 10mm long channel in the baseplate, perpendicular to the centre line. The distance from the post depends on the post height - see the last column of the height table, the first figure referring to a high ladder, and the second to a low one. If not using the baseplate, solder pieces of scrap wire either side of the post which are long enough to reach the ladder end. For non-standard post heights and a high ladder, take the post cutting length in millimetres, subtract 2, divide by 12, add 6, and the result is the distance of the ladder foot from the rear of the post. For a low ladder, subtract 24, divide by 12 and add 6.

Remove the end rung from the ladder S09/5; for a 27ft 6in post and a high ladder, this should be the rung nearest the *9/5* part number etched into the fret. Bend the side stiles over at around 105° just above the new top rung, with the half-etched side on the outside of the bend. Cut the ladder to length, so its bottom end fits in the baseplate channel or can be soldered to the fixing wires, and its top end fits around the post at the chosen height. Solder the ladder top (70°) and bottom (145°); the top bend should be positioned 7mm from the rear of the post.



Add pairs of ladder bracing struts (17). Solder them to the ladder (145°) and post (70°), 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 15/32" or 12mm drill; the natural spring of the brass will open it to the correct 14mm diameter. Bend the end tags to the ladder width and solder (145°) them to the outside of the ladder stiles, 7mm below the arm bearing centre line. Remove any excess tag or strut length and tidy up.

The Lamp and Post Cap/Finial:

Use glue for this section, as you will be working very close to previously made 70° joints.

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

Glue the finial or post cap to the post top. You may wish to strengthen the joint with a 1.2mm wire peg.

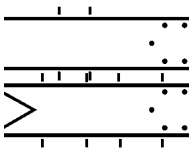
Painting:

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 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 assembly; 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 7mm 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.

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



If the primer has filled your scribed guide lines, here is a full-size template for marking out again:

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:

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.61 (1.0mm). Place an oiled paper washer over the spindle end, then place the back blinder on the spindle, 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. If the blade is too high to cover the lens, cut off the right-hand half, and solder (188°) it to the bottom of the left-hand half, thus increasing the depth. Once correctly in position, solder (145°) the back blinder to the spindle. Wash off any surplus flux, then prime and paint black or pale grey as detailed above.

The Operating Wire:

Make a small hook in the top of the long 0.45mm brass wire. Measure the distance between the arm hole (arm horizontal) and the outer 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, then trim the bent portion to 2mm in length. Put the hook in the arm hole so the wire is to the rear, then pass the bottom bend through the balance lever hole from the left-hand side, forming a hook to retain it. The wire can pass in front of or behind the track circuit plate - both are found on the prototype. Prime the wire and paint it black, or to avoid the risk of gumming up the works, paint it before fitting or use a permanent marker pen instead.

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