MODEL SIGNAL ENGINEERING

MSE

Part of WIZARD MODELS LIMITED

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SCALE	CODE	
7 mm	S7/KM5	

MIDLAND RAILWAY LOWER 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.

This kit represents the type of signal used by the Midland Railway from the 1900s onwards, through the LMS period and into BR days. Lower quadrant arms were still much in evidence in the late 1950s and it was only in 1960s that the majority of Midland posts received upper quadrant arms, while still retaining most of their earlier fittings. At least one lower quadrant arm can still be found on Network Rail today, along with several on the various preserved lines.

The kit may be built with either the earlier wooden arm, or the later corrugated steel arm. A short subsidiary arm is also included.

Parts supplied:

S7/05 arm etc. fret
S06 wooden post casting
S7/09 ladder fret
SC012/2 finial casting
SC023 lamp casting
SC041 balance lever & bracket casting
SC042/1 balance weight castings (2)
100 x 0.9mm brass rod (axles, support bearing)
250 and 4 off 50 x 0.45mm brass wire (operating rod & guide, handrails, arm corrugations)
40cm x 28swg brass wire (ladder rungs)
40 x 1.0mm brass rod (four post pegs)
Red, yellow and blue-green glazing
Baseplate

ASSEMBLY INSTRUCTIONS

Ideally, the kit should be 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. A selection of prototype photographs will help assembly; choice examples can be found in the "Midland Record" series.

Burnish both sides of the frets before removing any parts, and tin the smaller parts before removal. Grip the etched parts in smooth pliers when filing off tags to avoid bending them. Unless stated otherwise, all half-etched fold lines go on the inside of the component. Left- and right-hand mean as viewed from the front of the signal.

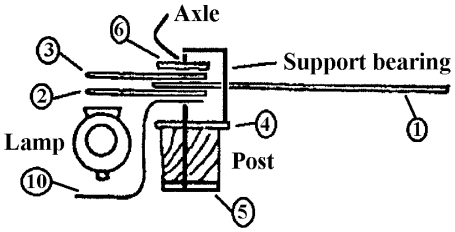
Note: Model Midland signal construction is unusual as the arm rotates on an axle fixed to the post, rather than the normal arrangement of the axle being fixed to the arm, and rotating in a bearing tube fixed to the post. To align the various arm components, use an oiled wire axle or the point of a needle (or anything else that won't take solder).

The Signal Arms:

Use 145° solder for this section except where stated otherwise.

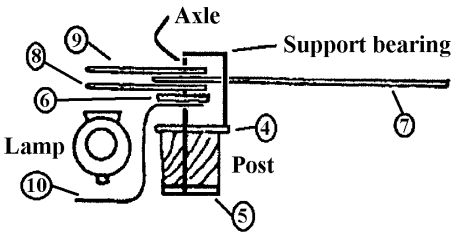
Before removing any parts from the fret, and if required for your chosen signal, score the home stripe onto the arm using the marks on the fret as a guide. To do the rear stripe, use a scriber to punch guide pips through from the front marks. If modelling a distant signal, cut the characteristic V-shaped notch in the end of arm (1) or (7).

Wooden arm:



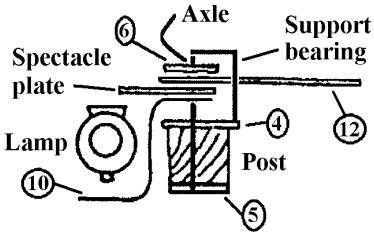
Tin both sides of the hole end of arm (1), and solder the arm on top of rear spectacle plate (2). Tin both sides of the hole end of front spectacle plate (3) and solder this on top of (1). Do not allow the gap between (2) and (3) to close up. Pop a vertical row of three rivets down the right-hand edge of plate (6), then solder it on top of (3).

Steel arm:



Solder (188°) two lengths of 0.45mm wire onto the rear of the arm to represent the corrugations, using the holes in the fret as a guide. Tin both sides of the hole end of arm (7). Solder the arm on top of rear spectacle plate (8), removing excess corrugation wire as required. Checking with photos for position, pop two rivets onto the front of front spectacle plate (9) then solder it on top of (7). Do not allow the gap between (8) and (9) to close up. Solder plate (6) onto the back of (8); this is not prototypical, but it will strengthen the operating rod hole on a working signal.

Subsidiary arm:



Tin both sides of the hole end of arm (12), and solder it on top of the small spectacle plate (unnumbered). Pop a vertical row of three rivets down the right-hand edge of plate (6), then solder it on top of (12). The operating rod hole will need re-drilling.

For all arms: Place back-blinder (10) flat on the bench, with the blinder to the left and its smaller half to the top. Bend the blinder to the right, around 4mm from the hole, then solder it to the back of the arm, aligning the hole with the arm pivot hole. Do not put the second bend in yet, so the arm can easily be fitted to and removed from the post. Open out the axle hole to 0.9mm (no.65), and the operating wire hole to 0.5mm (no.76).

The Post and its Fittings:

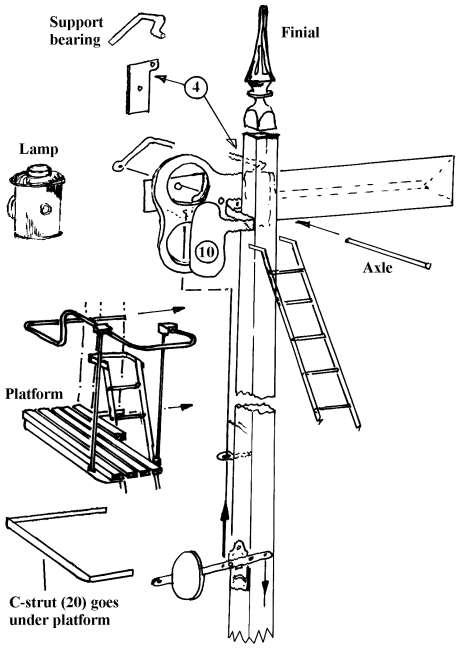
Warning: being cast in whitemetal, the post is easily melted or distorted. Handle it carefully, and ensure you have picked up the low-temperature (70°) iron before making any joints!

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 overleaf. 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 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.

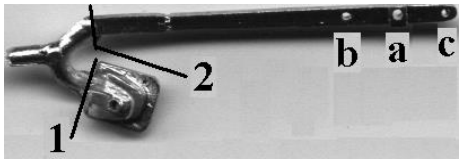
Height (ft/ins)	Post cutting length (mm)	Post to ladder distance (mm)
16.0	127.0	17.5
18.0	141.0	19.5
20.0	155.0	21.0
22.6	172.5	23.5
25.0	190.0	25.5
27.6	207.5	27.5

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.



Mark the arm axle hole on the post's vertical centreline, 8mm from the post top. Drill 0.9mm (no.65), and solder (70°) in a 0.9mm brass rod axle, leaving plenty spare on both sides. Place plate (5) over the rear axle and solder (70°) it to the post, with the V pointing downwards. Cut off the excess rear axle and file it flush with (5). Open out the small hole in plate (4) to 0.9mm. Tin (145°) both sides, place it over the front axle, and solder (70°) it to the post, with the small hole to the top left.

Tin (145°) both sides of lamp bracket (11), bend into an L shape, and reinforce the angle with solder. Solder the bracket to the right-hand side of the post, with the bracket top 5mm below the post top. (You may wish to use a 1.0mm brass rod peg to reinforce this joint, in which case the peg hole should be 6.5mm below the post top.)



Remove the casting sprue from the balance weight parts by making two cuts with a piercing saw or slitting disc as shown. Tidy up the cuts and any mould lines with files, and file flat the rear face of the bracket. Open out axle hole (a) with a 0.9mm drill, then use broaches if necessary to make it a good clearance fit on the 0.9mm brass rod. Treat the holes in the bracket similarly. Open out pull rod hole (b) to 0.5mm, and signal box wire hole (c) to suit your operating wire. Solder (70°) the two weight halves together, then solder the resulting weight to the arm, leaving around 2mm of arm projecting through the weight.

Drill 0.9mm right through left and right hand sides of the post. The hole should be on the vertical centreline and 28mm (4ft) from the base, unless the signal is in a public area, when it should be 28mm (4ft) below the arm centreline. Solder (70°) in a 0.9mm wire axle, leaving plenty of surplus either side. Wrap a piece of paper around the bottom and sides of the arm, place it in the bracket, then place both on the right-hand side axle, with the weight to the front of the post. Solder (70°) the bracket to the post, and also put a touch of solder on the axle where it leaves the bracket's outer face. Drill a 0.9mm hole in the centre of plate (5), place on the left-hand side axle, and solder (70°) it to the post, with the V pointing downwards. Remove the paper, cut off surplus axle, and smooth the bracket corners flush with the front and rear post faces.

The Platform:

Start with 188° solder for this section. Take care with the platform - it is easily twisted or broken.

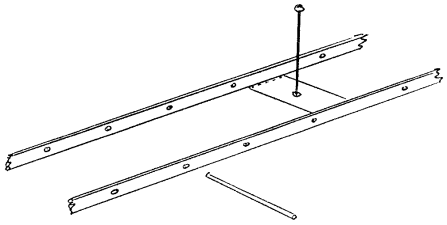
Tin strut (20) on all edges and faces, and bend it to a square C shape, with the centre portion forming the vertical of the C (i.e. ignore the two outer half-etched fold lines, and make just two bends). Solder it to the platform bottom, such that the vertical of the C is under the middle of an outer plank, and when the platform is viewed as shown, the ends of the C are to the right, and the longer horizontal is at the top. With the platform in this position, cut the plank at the open end of the C halfway along its length, and remove the bottom half (i.e. that over the shorter horizontal), together with the underlying portion of the strut. The cut-away corner is now designated the rear left-hand one, relative to the post.

Cut notches on the left and right-hand sides of the platform at both rear corners to take wire stanchions. Some signals also had a stanchion on the front right-hand corner. Solder on (145°) stanchions made from 0.45mm wire, at least 25mm long. Bend up a 0.45mm wire guardrail, to the shape shown above, but do not make the bend at the front of the platform just yet. The downward step is halfway along the platform, and 3.5mm deep. Solder (145°) the guardrail to the stanchions, 20mm above the platform.

Offer up the completed platform to the rear of the post. Bend the front of the guardrail so it sits against the rear of the post when the strut is also placed at the post rear. Solder (70°) the strut to the rear of the signal post, such that the platform treads are around 1mm from the post side, and the lower level of the guardrail is just below the lamp bracket. Solder (70°) the guardrail to the rear of the post. You will need to clamp the lamp bracket to the post when making these two joints. Trim off any excess strut, stanchion and guardrail. Some signals had diagonal bracing from the post to the two right-hand corners of the platform – check with photographs.

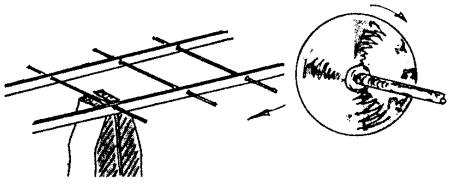
The Ladder:

Start with 188° solder for 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 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 five 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, and

remove the curved top portion. The slitting disc may be used, but take great care not to damage any rungs. Do not discard the strips in the middle of the jig, as these are used later.

If you intend to use the large rectangular baseplate to mount the signal on the layout, first scribe a longitudinal centre line along it. Orient the post with the balance weight on the right, then solder the post around 30mm from one end of the baseplate, ensuring squareness in all three planes. Drill the post and baseplate and use a 1.0mm brass rod peg to strengthen the joint.

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. 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, take the post cutting length in millimetres, subtract 10.5, divide by 8, add 3, and the result is the distance of the ladder foot from the rear of the post.

Using strip from the centre of the ladder fret, solder a C-shaped bracket around the ladder top, as shown in the diagram above, leaving about a 4mm gap between the centre leg of the C and the ladder. Cut the ladder to length, so its bottom end fits in the baseplate channel or can be soldered to the fixing wires, and the C bracket fits against the post rear just below the lamp bracket. Solder (70°) the bracket to the back of the post and the other end (145°) to the baseplate or fixing wires. The ladder should just touch the side of the platform, as shown.

Use more strips from the ladder fret to make bracing struts. 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.

The Lamp and Finial:

Use glue for this section, as soldered joints would be too close to previously assembled components.

Remove any casting sprue and mould lines from the lamp and finial. Glue the lamp to its 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 arm's top spectacle. Glue the finial to the post top. Use 1.0mm brass rod pegs to reinforce the joints as necessary.

Painting and Glazing:

Degrease the post and arm assemblies by washing in detergent water and leaving to dry. Put a drop of oil on the balance lever axle, then spray overall with red oxide (MR days) or white car primer, and spray the arm white.

Detail paint as follows (but check with photographs as there is a lot of prototype variation):

Post etc.: For a pre-1923 signal, paint all exposed parts of the post lemon chrome (Railmatch 290 ARC Mustard Yellow is a good match), with all ironwork (including the finial) and the post below the balance lever bracket left as red oxide. Post-1923, the post should be left white, with all ironwork (except the support bearing) and the bottom of the post in black. Some signals had the bottom of the ladder painted white. Don't forget a dash of silver on the lamp lenses.

Arms: Pre-1911, all arms were red on the front face and white on the rear, with a white spot on the front, and a black spot on the rear. Some distant arms had a centred black horizontal line the full length of the reverse face instead of the spot. Between 1911 and 1925, all arms had a 10" wide white vertical stripe on the front face 11" from the end, with a corresponding black stripe on the rear. After about 1925, this arrangement continued for home arms, but the front face of distant arms was painted yellow, with a black chevron both front and rear. Transfers for all these styles are available in the MSE range (*7TFR*).

Spectacle Plates: These were painted black or red oxide prior to 1923, after which they were painted white (although some photos show them to be black). Home signals should be glazed with red in the top aperture and blue-green in the lower one. Distant signals should have blue-green glazing in the lower aperture, with the top aperture having clear glazing (if the arm is red), or amber if the arm is yellow. Use gloss varnish to stick the glazing material between the two halves of the spectacle plate.

Fixing the Arm to the Post:

Clean off any paint from the axle and the axle hole. Also clean out the 0.9mm hole in plate (4). Place the arm on the axle - you may need carefully to shorten the axle or bend the back-blinder to do this. Remove any excess axle length with the slitting disc, leaving around 0.5mm protruding above the arm face. Bend up the support bearing from 0.9mm brass wire as shown above; the U bend should be a loose fit over the arm, with the final bend as close to the U as possible. Cut off surplus wire at this end, leaving around 1mm projecting.

Place the short end into the hole in plate (4), and solder (145º) the other end to the end of the axle at a frontal angle of approximately 45º to the left as shown above. Secure the plate end with glue. Carefully remove any excess wire from the axle end, then bend the bearing so it acts as a horizontal arm stop. Paint the support bearing with red oxide or white primer as detailed above.

Bend the back-blinder so its top edge is below the lamp's rear lens when the signal is on, but completely obscures it when the arm is lowered. You should find that the back-blinder arm acts as a stop to prevent the arm falling too far below the horizontal - a fall of 45-60º is acceptable. If outside these limits, adjust the back-blinder arm accordingly.

The Operating Rod:

Make a small hook in the top of the long 0.45mm wire. Measure the distance between the arm hole in plate (6) (arm horizontal) and the front balance lever hole (lever around 30° below the horizontal). With the short end of the hook facing away towards you, bend the bottom of the wire 90° to the right at the measured distance, then trim the bent portion to 4mm 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, forming a hook to retain it. Bend up one or more narrow U-shaped rod guides from 0.45mm wire, and glue them in to pairs of holes drilled in the post's front and right-hand faces, with the operating rod in the bend. These will prevent the rod from flexing excessively when the signal is operated. Small loco handrail knobs may be used instead, but remember to thread them onto the operating rod before making the lower bend. Paint the rod and guides with red oxide primer or black as detailed above.

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