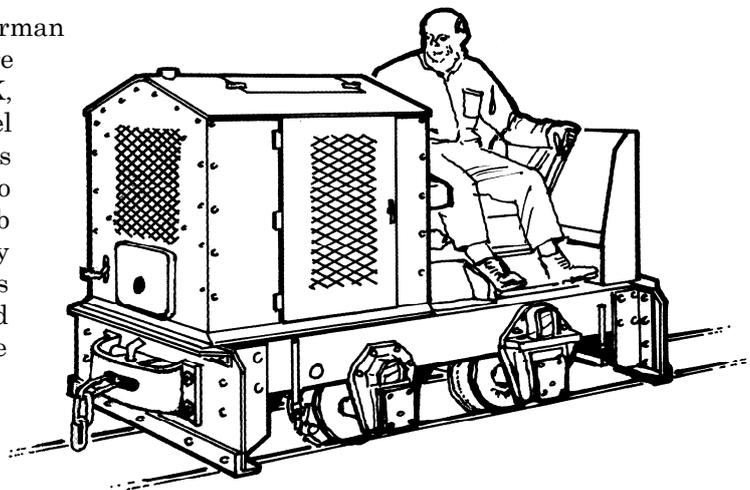


NONNEMINSTRE MODELS

INSTRUCTIONS FOR ORENSTEIN & KOPPEL RL1c 4WDM LOCOMOTIVE 7MM SCALE 1:43.5 FOR 16.5MM OR 14MM GAUGE

BACKGROUND & HISTORICAL

This product of the well-known German manufacturer Orenstein & Koppel, more commonly referred to nowadays simply as O&K, was a development of an earlier 2-speed model designated RL1b, in that it has 3-speeds (although just to confuse, the RL1c was also available as 2-speed, probably using the RL1b gearbox) Produced from the mid-1930's they were commonly found in a variety of industries up to the 1970's, such as the high quality and ruggedness of their construction. They were widely found throughout the British Isles and mainland Europe. Despite their apparent large size, they were fitted with a single-cylinder 14hp diesel engine, thus putting them in the lower power range. Gauges varied from 1'10" (550mm) up to 2'6" (762mm). Weight in working order



is around 3 tons and they could work on rail weights down to 12lb/yd. Several examples are preserved, including two at Amberley Museum in Sussex, England – one being 2' gauge and the other having been modified by William Jones Ltd (the English agents for O&K) to 3ft 2 ¼ in gauge, see Amberley's railway website at www.amberleynarrowgauge.co.uk. Some locos were badged 'Montania'.

This kit has been produced by directly scaling from the examples at Amberley Museum, plus reference to manufacturers brochures, and photographs of other examples throughout Europe. Where variations occur these are noted at the relevant construction point in the text.

GENERAL ASSEMBLY

Before commencing construction, please read through the instructions and check through the parts. A dry run is perfectly feasible, but please follow the sequence of construction. Either low-melt solder, twin-pack epoxy resin (Araldite Rapid, Devcon etc.) or cyanoacrylate adhesive (superglue) can be used – if soldering, certain small parts might still be better fitted with adhesive. Remember that low-melt solder does not take to nickel silver or brass wire – tin the wire first with suitable solder (such as Carrs 145 or 180) and then the low-melt will satisfactorily fuse with that. Carrs also now produce a '100' solder which is designed to solder brass etc direct to whitmetal but we've not yet tried it. Careful and clean construction will repay itself.

The chassis has been fitted with motor, wheels (to 16.5mm gauge) and gears, and test run without pickups. Retaining nuts have been soldered to the frame top. It will need to be taken apart so familiarise yourself with the assembly.

If any parts are missing or damaged, contact us and we can arrange replacement. We can also help if you damage any parts during assembly.

If you enjoy building kits then fork out for a copy of 'Whitmetal Locos – A Kitbuilders Guide' by Iain Rice, published by Wild Swan (ISBN 0906867770). It's well worth the pennies.

TOOLS REQUIRED

Normal modellers hand tools, such as pliers, some medium and small files, small drills and a pin chuck in which to hold them. Sizes of drill required are 1.00, 0.70, and 0.50mmØ. A sheet of finely-squared graph paper is helpful to check squareness as construction proceeds. Also handy are a flat reference surface and a small engineer's square.

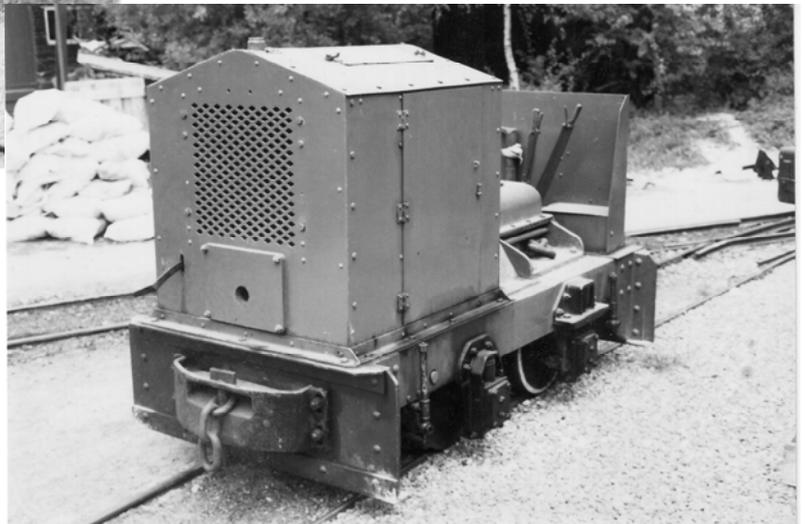
POST-BUILD CRISIS

If after any stage you suddenly decide something is amiss, don't despair! If you have used epoxy resin adhesive or superglue then dunk the whole thing in some paint stripper for a few hours and it will then fall apart! Wash well in clean water, clean up and start again. With care you can put paint stripper over a single glue seam, wait until it softens, then gently pull apart, wash and clean up, all without having to dismantle the whole thing. If you've used low-melt solder, place something non-metallic in the bottom of a small saucepan; add one kit plus water to cover well, slowly bring to the boil. It should then fall apart in the water after a gentle prod. Remove from heat, allow to cool, then clean up.

PARTS LIST – Refer to exploded view opposite

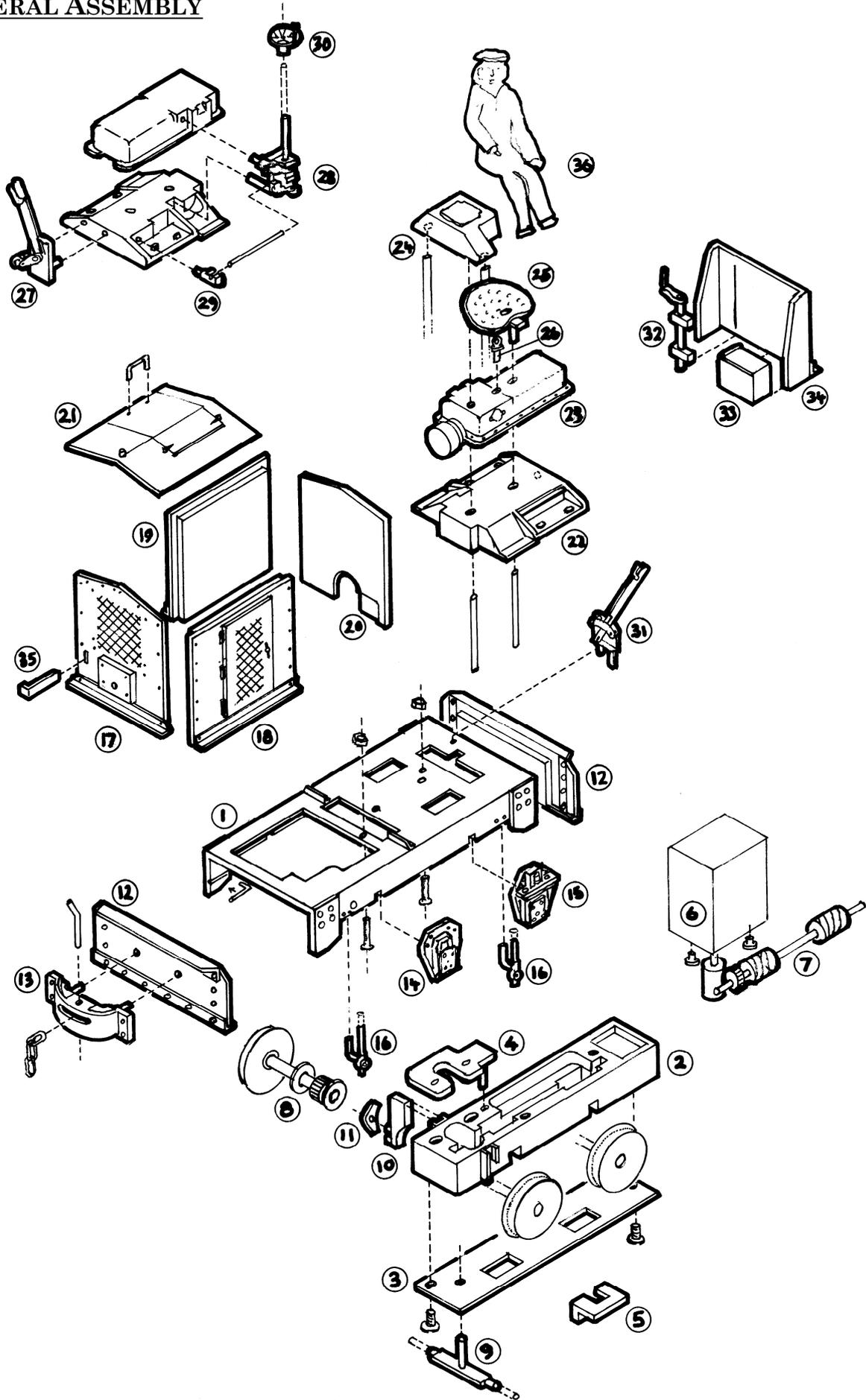
- | | | | |
|----|---------------------------|----|------------------------------------|
| 1 | Frame (1) | 25 | Seat (1) |
| 2 | Chassis block (1) | 26 | Lifting eye (1) |
| 3 | Keeper plate (1) | 27 | Forward/reverse lever (1) |
| 4 | Motor plate (1) | 28 | Gearchange mechanism (1) |
| 5 | Shaft plate (1) | 29 | Pivot (1) |
| 6 | Motor with wormgear (1) | 30 | Handwheel (1) |
| 7 | Driveshaft with gears (1) | 31 | Handbrake (1) |
| 8 | Wheelset with gear (2) | 32 | Starting handle (1) |
| 9 | Brake cross-shaft (1) | 33 | Toolbox (1) |
| 10 | Brake hanger (2) | 34 | Backsheet (1) |
| 11 | Brake shoe (2) | 35 | Decompression lever (1) |
| 12 | Endplate (2) | 36 | Driver figure (1) |
| 13 | Coupler block (2) | | - Coupling chain |
| 14 | Front Axlebox unit (2) | | - 1.00mmØ wire x 80mm (1) |
| 15 | Rear Axlebox unit (2) | | - 0.50mmØ wire x 80mm (1) |
| 16 | Oil level pipe (2) | | - 0.33mmØ wire x 80mm (1) |
| 17 | Bonnet front (1) | | - Copper clad for pickups (1) |
| 18 | Bonnet left side (1) | | - Pick-up to motor wire x 80mm (1) |
| 19 | Bonnet right side (1) | | |
| 20 | Bonnet rear (1) | | |
| 21 | Bonnet top (1) | | |
| 22 | Gearbox lower half (1) | | |
| 23 | Gearbox upper half (1) | | |
| 24 | Sandbox (1) | | |

Note: Parts 2 – 8 have been pre-assembled with all holes drilled and tapped 10ba as necessary, and 10ba nuts have been soldered to the top of the frame (1)



General views of the prototype for this kit, 'The Major' at Amberley

GENERAL ASSEMBLY



CONSTRUCTION

CHASSIS

The chassis unit has been pre-assembled and lightly tested, but will require lubrication before general use. It comprises the Chassis block (2) with Keeper plate (3), Motor mounting plate (4) and Shaft plate (5), Motor and wormgear (6), Driveshaft (7), and Wheelsets (8). **WARNING!** The Shaft plate is loose and can easily be lost if the motor is removed (it can't be fitted permanently otherwise the driveshaft would be trapped). All is screwed together – if you remove the motor watch for the tiny 1.4mm screws which are easily lost and we can't supply spares (tip: if you do lose the screws, then drill the motor holes 1.40mmØ and tap 10ba). The chassis unit has also been fitted to the Frame unit (1) to ensure correct location. The chassis can be removed from the frame by unscrewing the Keeper plate and then unscrewing the two countersunk screws now revealed (all these are 10ba). The chassis should not be run without being attached to the Frame otherwise the driveshaft can kick up and scrunch the gears. It will be necessary to make and connect pickups – here's our suggestion.

Make a lightly-sprung pickup wire from 0.33mmØ wire and solder direct to the Keeper plate. Slightly unscrew one of the motor brush holders, scrape the metal motor case clean and turn the tag downwards so it touches the motor case, then do up the brush holder. For the other, insulated side, glue a piece of copper clad to the side of the Chassis block, flush with the top edge but watch out for potential shorts. Use 0.33mmØ wire to make a sprung pickup soldered to it with a wire from the extreme front edge up under the bonnet (or where it will be) to the other motor tag – tip: spring the end of the wire through the tag so you won't have to solder it, thus making removal easier. A light touch of plastic compatible lubricant and the chassis can be track tested.

14mm gauge only

When the wheelsets are removed, push in each wheel to give 12.4mm to 12.5mm back-to-back – don't worry if the gear wheel moves as it's easy to reposition due to light grip. It is not possible to attach a piece of copperclad to the side of the frame as suggested above, so consider attaching to the Keeper plate and then devise a route for the wire from the Keeper plate to the motor. Or make a complete replacement Keeper plate from paxolin (copperclad sheet) and drill/cut/groove as necessary. We reckon that those working in 14mm gauge are a wee bit able! When doing the brakes, remove 1.25mm from the back of each Brake hanger (10). That's it really!

Attach the Brake hangers (10) to the chassis, flush with the top in the guides provided. Drill the Brake shoes (11) 0.70mmØ and attach to the **UPPER** pins on the hangers, with the shoes angled slightly away from the wheel treads to permit wheelset removal and also the avoidance of shorts. Drill the Keeper plate (3) 1.00mmØ for the Brake cross-shaft (9) – trim the cross-shaft so it fits snugly between the backs of the hangers but only attach to the keeper plate. That takes care of the chassis construction. Remove the chassis from the frame but keep handy. Now we come to the main assemblies.

FRAME

Clean up carefully the frame (1). On the underside are two bosses for the oil level pipes (16) – drill these 1.00mmØ about 2mm deep. Test fit the oil pipes and gently trim the front one so the top is flush with the top of the frame (this is the engine oil level) and trim the rear one to 1.5mm below the top of the frame (the gearbox oil level). Consider leaving permanent fixing of these towards the end of construction to avoid damage.

Clean up the Endplates (12) and fit to the frame – **IMPORTANT** ensure the tops are dead level with the top of the frame, fiddle and file as necessary. Drill the two dimples 1.00mmØ for the coupler blocks. Drill the coupling pin dimple downwards through the coupler blocks (13) 1.00mmØ and fit the couplers to the endplate – one of the holes will have to be tweaked up or down a little to get the couplers level and maybe opened out a touch. Attach the Front axleboxes (14) and Rear axleboxes (15). **Note:** there are prototype examples where the axleboxes are transposed. Bend a piece of 0.50mmØ wire to 90° and attach to the slot behind the right hand frame drop, allowing it to project 2mm out from the side to form the radiator drain.

BONNETS

Make the bonnet unit up away from the frames (but frequent checks with the frame are necessary) and ensure it is **dead square**. Attach the Bonnet front (17), Right side (19), Left Side (18), and Rear (20) to each other. When placed on the frame, the angle on the bottom of the sides should be just inside the frame edge and the angle on the bottom of the front should leave about 0.50mm of angle on the top of the frame endplate

protruding – everything must be square. It may be necessary to file the face of the front chassis retaining bolt to allow the bonnet rear to sit down correctly –there is a recess on the lower inside face for this purpose also. Try the top (21), it will need to be teased and twisted a little to get a perfect fit – make it match the ends then gently file the side edges as necessary. All joints on the bonnet are in the prototype places, so no filling is required. Drills the two dimples in the bonnet side doors 0.50mmØ and make a handle from 0.50mmØ wire to stand off about 1mm with reasonably sharp corners. The decompression lever (35) fits into the slot on the bonnet front, about 2mm protruding to the front and hanging slightly downwards. Consider fitting this at a later stage to avoid damage. Drill the starting handle hole through 1.00mmØ. When the bonnet assembly is fitted to the frame permanently it should locate tight up to the angle on the top of the frame and should just clear the chassis mounting bolt. However, don't fix permanently yet.

GEARBOX & CONTROLS

The Gearbox can be made up as a separate unit but must be fitted before the Backsheet/Starting handle/Toolbox unit and the Handbrake are fitted. On the underside of the Gearbox upper half (23) are two dimples, and three on the top. Drill right through by going in from each face 1.00mmØ, although the middle one on the top only needs to be 2mm deep. On the Lower Gearbox half (22) there are two corresponding dimples on each face – again drill right through. Now cut two pieces of 1.00mmØ wire and use to temporarily locate the two halves (use the wire later for sandpipes). Drill the two dimples on the top of the frame 1.00mmØ and trial fit the gearbox in position. Adjust as necessary to locate dead square.

Drill the dimples on the underside of the Sandbox (24) 1.00mmØ but be careful not to go too deep on the outer two for the sandpipes. Place the Sandbox on top of the Gearbox assembly and try the whole unit in place along with the bonnet assembly. It is possible that the small projection from the bonnet rear (actually the governor spindle) will prevent the gearbox going fully forward and dropping the front lip into the gap. File the governor spindle back a bit and if necessary file off the drop from the gearbox and allow it to sit about 0.50mm back towards the rear – a good compromise. Join the two gearbox halves plus the sandbox together. Remove the wire for use later.

Drill the two gearbox lower back dimples 1.00mmØ but only shallow to the left hand one – test fit the Reversing lever (27). Drill the dimple on the right hand side of the lower gearbox 1.00mmØ for the Pivot unit (29) and the upper half for the Gearchange mechanism (28).

Try the Gearchange mechanism (28) in position – it needs to be vertical so file gently as necessary. Drill the Handwheel (30) 1.00mmØ. It goes on the spindle so that the bottom of its boss is level with the top of the sandbox and with the vertical pin to the outside of the loco. Trim the spindle down to suit before fixing the wheel. It is liable to break off, if so drill down into the Gearchange mechanism where it goes 1.00mmØ about 2mm deep and use a bit of 1.00mmØ wire instead.

Fit the Pivot unit (29) into its hole with the square part to the top. Join to the lower change arm on the Gearchange mechanism using a piece of 0.50mmØ wire which goes into the slot on the top of the pivot and to the inside of it's mate on the change mechanism.

Drill the centre of the lifting eye (26) 1.00mmØ and fit to the top of the casing – countersink it a small amount if possible to clear the seat (25) when fitted. A small amount of fettling to both the eye and seat may be necessary. With the reversing lever (27) fitted, fix the whole gearbox to the frame leaving the bonnet still loose at this stage.

Make the sandpipes from the 1.00mmØ wire, passing straight down to about 1mm above the rail head, angled to suit your chosen gauge.

BACKSHEET

Attach the Starting Handle (32) to the Backsheet (34) using the scribed line as a guide and with the bottom of the handle level with the base of the Backsheet. The handle will project above the Backsheet by about 2mm.

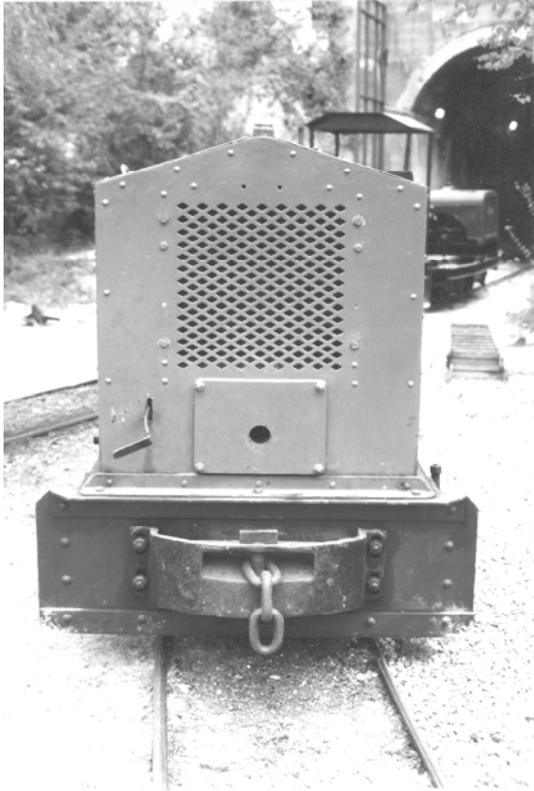
The toolbox (33) is a little too deep so file until it is 2mm deep and fit into the Backsheet corner. Test fit the Backsheet, the angle on the outside face of the Backsheet should be dead in line with outermost edge of the angle on the top of the frame end, unlike the bonnet front which locates back a small amount. Don't fit the Backsheet yet. The handbrake lever (31) requires some filing to fit. Drill it's dimple in the frame 1.00mmØ. File the area where it locates alongside the reversing lever and also where the starting handle hits it. Also you can file the lower bracket on the starting handle.

Now permanently fit the handbrake followed by the Backsheet assembly which locates dead centre. Where the handbrake protrudes below the frame it may be foul the chassis block, trim as required.

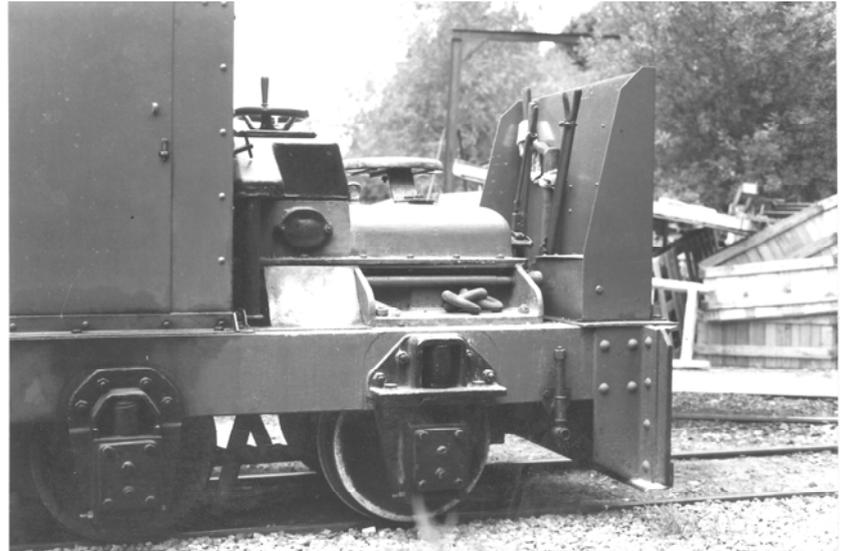
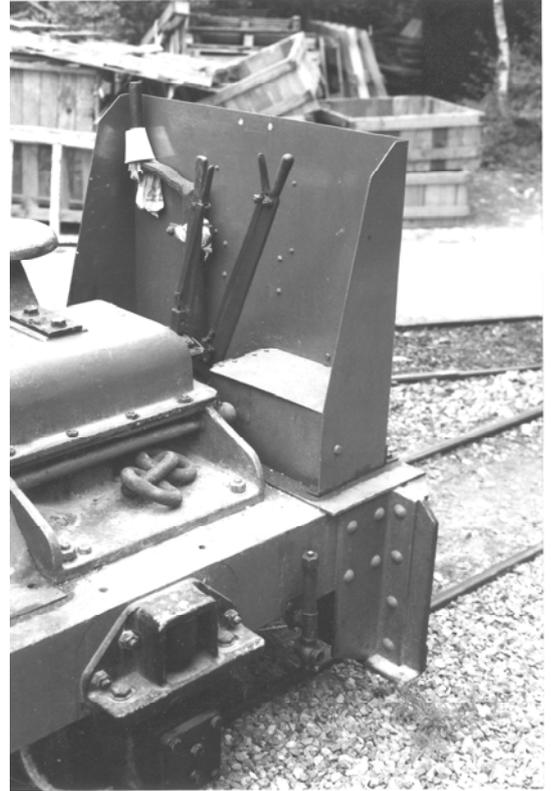
Fit the decompression lever (35) to the bonnet front as noted above, and fit any delicate parts such as oil pipes (16).

With construction finally complete, remember to give the finished model a good clean up in some powder household cleaner (Vim, Shiny Sinks etc.) followed by serious rinsing (do NOT use an ultrasonic cleaning tank on any whitmetal items as it causes the surface to erupt with any trapped air pockets) then when dry a light coat of Halfords primer or similar.

© Kit & Instructions Nonneminstre Models / Peter Smith.



Detail photographs of O&K RL1c works number 7741 built in 1937, now named 'The Major' and preserved at Amberley Working Museum. Originally supplied by U.K. O&K agent William Jones to the Dorking Greystone & Lime Co., Betchworth, Surrey.



NONNEMINSTRE MODELS, 46 HIDE GARDENS, RUSTINGTON,
WEST SUSSEX. BN16 3NP. ENGLAND
enquiries@nonneminstre.co.uk