

Introduction and general notes

This kit is designed for the experienced modeller, for use on EM or 18.83mm gauges. Alternative parts are also included to enable construction for 00 gauges although modification will be necessary for closer than scale frames and tight curves, and to allow for overscale wheel flanges. The basic design follows the prototype as closely as possible, and therefore clearances in some cases are very tight. Different materials are used as appropriate for the detail and strength of the individual components.

RESIN

The smokebox/boiler/firebox are cast in polyurethane resin, which is both durable and capable of accurately reproducing complex parts to a high level of fidelity. It can be glued using high viscosity superglue or two part epoxy, and can be worked much like polystyrene, being easily cut with a razor saw or modelling knife; fine wet and dry paper and any epoxy based filler can be used for finishing.

NOTE; DO NOT WORK ON THE RESIN CASTINGS NEAR A NAKED LIGHT, BECAUSE THE PRODUCTS OF COMBUSTION ARE HIGHLY POISONOUS

Before painting, a vinegar wash can be used (for approximately 20 minutes) to degrease; alternatively, "flash" liquid, in warm (not boiling) water, is very effective, although it may be advisable to wear gloves. A ½" paintbrush will help to clean the nooks and crannies which cannot otherwise be reached. All paints may be used, including cellulose, although enamels are easiest. We recommend an acrylic primer (that supplied by Halfords is very effective), and very light coats with an airbrush to achieve the best finish and retain the fine detail of the casting.

BRASS CASTINGS

These are supplied on sprues, generally grouped together by use, e.g. oil boxes, plumbing etc. Individual components can be cut from the sprue with side cutters, or a small saw (e.g. junior hacksaw), and cleaned up with a fine file. Final polishing with a glass fibre brush will bring sheen to crossheads, valve spindle guides, safety valves etc.

WHITE METAL CASTINGS

Whitemetal is a softer material, which is easier to clean to a smooth surface than brass castings and is ideal for those smaller parts that require good surface detail, but no great mechanical strength, such as chimney and dome. We have avoided whitemetal for parts that will require soldering, and would suggest cleaning well before fixing with superglue.

ETCHINGS

Nickel silver has been used throughout for all etches, since it is much easier than brass both to solder and to paint.

In designing this kit allowances have been made for variations in the etching process and all cusp from the etches should be removed prior to assembly.

Wherever possible, spares of small component parts have been included to allow for those, which refuse to be parted from their hiding places in the carpet. Half etch fold lines, are *unless indicated*, are on the inside of the bend; where the metal is to be bent through 180 degrees they are on the *outside*.

NOTE; Most rivets on this model are depicted by the use of half-etched overlays, but some require embossing from the rear. Although a rivet embossing tool may be used to form the push-through rivets, the variable spacing sometimes makes this a little difficult. We recommend resting the etched sheet on a piece of lead flashing (available from builders merchants) or hardboard, and embossing with a blunt compass or needle.

The terms "Fit" is used to indicate initial non-permanent attachment and "Fix" is used to indicate final permanent attachment.

We have included as many detail parts as possible, such as cab controls, tip-up seats, etc. but many of these may be omitted to speed assembly.

Our philosophy in designing this kit has been to provide a detailed and accurate model, which is a pleasure to build. Whilst a lot of time will be required to complete this kit, this will be probably be no more than for other kits on the market, since the need to correct sub-standard or badly designed/manufactured component is obviated. But the finished result will make the effort worth while.

Assembly Notes

The following will be found useful before starting.

14BA tap (required if spring hanger assembly is to be removable)
10BA tap
0.3mm drill
0.7mm drill
0.8mm drill
1.00mm drill
1.50mm drill
Selection of taper broaches

Wheels

The preferred wheels are by Ultrascale and the prototype model was fitted with the Duchess wheels, which are the correct size.

a) Frame spacers

We have included three widths of frame spacer in this kit. Although labelled 00, EM, and 18.83, their use is probably more dependant on the wheels used, and the amount of side-play required, rather than the actual gauge. Assuming that the supplied axleboxes are used, the minimum widths outside the axleboxes are:

14mm (00),
16.10mm (EM),
16.75mm (18.83).

Note also that the axleboxes are reversible, but please see note below (hornguides). Depending on the amount of side-play required; one face the thinner is 0.4mm thick plus a point 0.2mm boss round the axle hole, while the other is 0.6mm thick with a 0.2mm boss. Additionally washers of 0.015" (0.38mm) and 0.0075" (0.2mm) are included on etch B. it is suggested that a set of wheels is fitted to their axles, set to the correct back-to-back and the distance between the wheel bosses measured.

Calculations and test model show that on a curve of 42" radius, an offset of approximately, 0.5mm is required at the centre of the wheelbase. This can be achieved by allowing side-play on the centre axle only, or by allowing 0.25mm on the centre and rear axles only. We recommend the front axle should have a zero side-play due to limited clearances behind the slidebar/cross head assembly.

b) Suspension

Before starting, it must be decided whether the chassis is to be built sprung (as designed), rigid, or adapted for equalisation/flexichas (beams supplied).

Sprung Chassis

The sprung chassis uses machined brass axleboxes in separate hornguides, the springs being strong enough to ensure the weight is spread evenly and the axleboxes do not "bottom". This has proved to be reliable and efficient in our previous kits. Movement of 0.5mm is allowed on each axlebox (far more than scale) thus providing for up to 1mm of variation in track level – more than should be needed even for badly laid track. Modifying the chassis to

allow greater movement is possible, but will require excessive variations from scale to provide sufficient clearance.

Beam Compensation

Using beam compensation will require some modification of the chassis spacers.

Rigid Chassis

If wishing to build a rigid chassis, "top hat" type 1/8" axle bearings are required. (not supplied, but are available from South Eastern Finecast). These are fitted into the round holes in the frames, after first fitting the hornguide overlay (see hornguides). We recommend the slots around the bearing holes be first filled with solder, to prevent distortion when the bearings are fitted.

c) Motor installation

A Portescap motor (16 x 16 or 16 x 24) can be fitted most easily to the driving (centre) axle with a minimal omission of certain spacers or part spacers. Driving on the rear axle is also possible, but again may require modification.

Other motors may be fitted.

d) Hornguides

A radical departure in our latest kit is the inclusion of adjustable hornguides; these have been designed to allow a small adjustment of the wheelbase when setting up the coupling rods. Although based around conventional hornguide systems the hornplates are designed to be fitted from the outside of the chassis in the etched area around the axle holes however in 18.83 the axleboxes should be fitted with the thinner face to the outside of the chassis

General assembly, key issues

Great care has gone into the design of this locomotive kit and whilst there is nothing radical that has not already been tried before several of the components are inter-related and depend on each other in the forming of key structural parts. All etch cusp should be removed and tab and slots should be checked for a good fit.

Whilst most kits can be assembled in any order this kit has been designed to follow a certain order to help in building a kit that is square and fits well together. Before folding up the motion bracket and cylinder assembly, the footplate must be part completed, this is to allow folding of the slide bar support brackets, to the correct width. Certain overlays need to be put in place at the correct time in assembly.

There are certain areas where on the real loco clearances were tight, in 4mm they are even tighter. The mainframe and spacers are only tack soldered together until all frame spacers are in place and the spring hanger assembly is also fitted. The spring hanger assembly is removable to allow future maintenance and easier motor/gearbox removal.

Chassis Assembly

Mainframes

Cut the mainframes [A-1] taking care not to bend the frames at this stage they are quite fragile. Emboss the rivets, do not over emboss the rivets as this could lead to distortion of the metal. At this stage do not remove the half etch hornguide. Remove front and rear frame spacers [A-2 and 6]. If using sprung buffers as supplied in the kit remove the half etch cut out for the buffers in the front buffer beam. Fold up spacers and check for fit and that all slots and tabs are not distorted, **do not solder in place yet**. Remove required buffer support brackets [C-14] and fold up. (a metal 12" ruler was useful here). Note the orientation of the buffer beam support bracket and slide into the frames. Tack solder only, spacer 2 and 6 in to the mainframes, ensuring everything is kept square. The brake hanger rods are 0.7mm and could be used to assist in keeping the chassis square.

Remove spacers [A-3-4] and fold up etch 4 check fit of both spacers and tack solder in to place, the location of the spacers is indicated by a half etch line on the inside of the mainframe. Ensure that the spacers do not bow the mainframes. Remove the bogie support plate [B-5], check fit and tack in to place.

Remove the spring hanger assembly from the fret [B-7] and fold in the spring hangers, the replica springs and hangers are on the inside of the fold. Check that the assembly is a sliding fit in the chassis once satisfied that the assembly slides freely in the chassis fix in place the outside face of the spring hangers. For the masochists amongst you we have included brackets for the steam sanding pipes, if they are not required remove and clean up bracket with a file. Clean up any over-flood of solder and ensure that the hanger assembly sits flush with the bottom of the chassis. It should be noted that the assembly will be proud between the centre and rear wheels, ignore this for the time being and keep the assembly in one piece.

Remove the spring hanger spacers [B-9] and check for fit inside chassis. Lightly tack the spring hanger assembly in place (you will have to undo the joints after the spacers have been fitted). Fit all the spring hanger spacers in place lining up the holes in each spacer with the corresponding hole in the spring the hanger assembly. By using a combination of fine paper and oil you should be able to solder the spacers up without soldering everything up solid.

Remove the spring hanger assembly from the mainframes. Open up the holes in the spring hanger assembly for a clearance fit on the 14BA bolts. Tap the holes in the mainframe spring hanger spacers 14BA. Leave to one side whilst the inside ashpan is fitted

Remove ashpan [A-16a-16b-17a-17b] from the fret the half etch folds are on the outside on parts 16 a,b, fold over and check fit and fix into place, in the half etch recesses in the mainframe sides.

Remove the spacing between the centre and rear driving wheels on the spring hanger assembly and re-fit both parts into the chassis using the 14BA bolts trimmed to size. Remove the holding bolts on one side of the chassis only between the centre and rear drivers and fix the bottom part of the ashpan in place pushing the ashpan up against the spring hanger, repeat on the other side. An option is use a piece of scrap etch to fit in place at the front of the ashpan.

Check and spring fit in to place spacer etches [A-5a-7b]. Optional spacers are [A-5b-7a], dependant on motor fixing type, and should be fitted after motor installation. See fitting of hornguides and axleboxes

Hornguides and axleboxes

Remove hornguides and axlebox support brackets from [A-8-9] and check the fit of the half etch notch in the outside of the mainframes. There should be a very small perceptible amount of movement of the hornguide in the recess. If building the chassis rigid solder the hornguides in place without the axlebox support bracket and fit top hat bearings.

If building the chassis with sprung compensation carefully remove the centre of the hornguide this item has only been lightly etched to facilitate removal but it is still advisable to remove with a piercing saw to avoid distortion. Check and fix in to place axlebox support using the axlebox as a guide taking care not to solder the whole lot up solid, ensure that the axlebox is a smooth and sliding fit in the guide. When satisfied with the fit, keep axlebox and hornguide as one unit and it is suggested that the bearing be individually marked for later fitting in the mainframes. Complete all six hornguides and axleboxes.

Fitting of hornguides and axleboxes

It is suggested that the coupling rods be made now to use as a jig, to maintain the correct wheelbase in relation to the chassis, when fitting the hornguides to the mainframes.

Remove the required pattern coupling rods from the motion bracket etch the square shaped section is for early built Scot's. Each coupling rod is in three pieces a front middle and back and attached to the front and back overlays are the coupling rod bosses. If building the model in 18.83 due to restrictions it is not possible to use the bosses at the front of the coupling rods and these can be discarded. Each coupling rod has also been designed to have the correct forked joint and have can be fitted with a small piece of wire to represent the oil box fillers/covers. Build the coupling rods using a piece of 0.45mm wire a slight squeeze on the wire will allow it to fit centrally in the centre coupling rod until both front and back have been soldered on. Assemble front and back rods and clean up excess solder, clear any remaining solder out from the forked joint and using a medium rivet joint the two rods. Ensure that the rods move freely.

Once satisfied with the coupling rods open up the holes to 1.5mm as the rods have been designed to use Ultrascale crankpins, at this moment it best to keep the rods tight on the jigs whilst assembling the hornguides to the chassis.

Remove spring hanger assembly from chassis and with a piercing saw remove the central section of each hornguide, the axlebox support and assembled hornguide should be a free fit in the central section. Tack left and right hornguides into position using a longish piece of 1/8 rod through the axleboxes as a guide to ensure the hornguides are square in the mainframes.

Using commercially available coupling rod jigs and the coupling rods fix the remainder of the hornguides into the chassis.

Replace the spring hanger assembly, it may be necessary to trim the bottom of the hornguides to obtain a snug fit.

It is now possible to decide which is the best motor fixing, check fit of spacers [A-5b-7a]. If possible try to use spacer 5b by cutting at the half etch line or even if there is still not enough room for the motor, solder a scrap piece of wire across the spacer and remove the surplus to allow fitting of the required motor. The rear of the motion bracket will also rest on this spacer. Fit re-enforcing spacer [B-6] for bogie support plate the half etch hole is for the bogie pivot bolt. Insert 10BA bolt from the top of the bogie support plate and fix in place.

Dependent on scale remove surplus metal from [D-21] rear spacer, fold is against the half etch. The folded back piece is designed to fit between the chassis, prior to fixing solder 10BA nut to underside of spacer at the centre hole at rear of spacer, this is for the coupling bar.

Fold down rear steps backing plate.

Remove [D-24] front step backing plate, trim for scale and fix to front of chassis in half etch cut out. Fold down supports for front and rear steps and fix steps. Front steps are parts [D-25-26], rear steps parts [D22 -23]. Use 0.45mm and fit front brake support brackets. Fold up and fix brake cylinder support brackets and overlays, [D-64-65-66]. Note orientation. Once satisfied that the chassis is square solder in all spacers, fit front inspection covers [C-52], and clean up chassis.

Driving Wheels

The wheels, with crankpins can now be fitted to their axles, along with the springs placed over the locating lugs in the hornguides. Locate the motor and gearbox in place. Wheel scraper or any other type of pick-up can now be fitted, and wired up. **Note that because of tight clearances there should be no side play on the leading driving wheels.** It has been found that removal of the lip around the axle hole gave sufficient side play to the centre and rear driving wheels. Open up the holes in the coupling rods as necessary and fit in place with retaining nuts. Test-run the chassis. The front driving wheel crankpins need to be recessed in to the coupling rod.

When satisfied that the chassis is running well, remove the coupling rods and open up the outer etch only front coupling rod boss hole to suit Ultrascale recessed crankpin. It is possible to reduce the diameter of recessed Ultrascale crankpins by putting in a hand drill and carefully reducing the diameter with a file. Refit coupling rods and trim crankpin. Test-run the chassis. We have supplied balance weight for known variations within the class, remove from etch c, as required and fix in place.

Brake gear

Whilst it is possible to locate and fix the brake hangers with the wheels in place, it is far easier to do so with the wheels removed. If not already done, open up the brake rod holes in the chassis 0.7mm, taking care with the hole between the centre and rear drivers where the ashpan has partially covered the hole.

Remove and emboss brake hangers [C-35]. Fold up the brake hanger brackets and open up holes 0.7mm.

Remove the brake actuating levers [C-33], and brake blocks [C-34] from etch. **Note the actuating levers are handed.** Join front and rear actuating levers together with the raised central section to the outside face. Join front and rear brake block overlays together at the front face only with the half etch to the inside. Slide brake blocks over actuating levers and temporarily hold in place with 0.45mm wire through the pivot, crimp ends of wire to prevent loss of the blocks whilst assembling brake units.

Fix in place 0.7mm wire through brake hanger holes in chassis, locate brake hangers and brakes to wire and fix hangers to chassis, leave brake actuating levers and blocks loose for the moment.

Replace the wheel sets and fix actuating levers vertical to the chassis and the brake blocks as close as possible to the wheels without causing shorting.

Check the brakes do not foul the wheels, not forgetting to allow for compression of the springs. Do not allow excessive wire to protrude from the brake hanger support bracket on the front driving wheels as it may foul the motion bracket.

Remove the two halves of the brake pull rod [C-36], fix together and including the knuckle joints and dummy adjusting screw. Clean up sides. Insert required brake tie rods [C-37] in to brake pull rod, fix in place brake tie rod between front brake actuating levers, and fix in place complete brake pull rod assembly. Fix in place brake cylinder 16. Solder together the two halves of the brake crank [D-67-68] spreading apart the ends into a forked joint, fix in place with 1.0mm wire and fix to brake cylinder and brake pull rod.

Slide bars and cylinders

Remove slide bars [A-15] fold up and solder together with a high melting point solder. Time spent cleaning up the slide bars will be worth the effort in appearance and mechanical operation. Remove cylinder stretcher [A-11] and trim to scale. The cylinder stretcher is quite complex but does allow the cylinders to fit square and level at the top edge of the chassis.

The correct inclination of the cylinders is achieved by folding and the way the stretcher has been designed. Clean up all cusp from the etch and fold into shape, whilst folding down the front and rear faces insert the slide bars but do not solder in place yet, the notch at the top of the slide bar and fits in to the slot in the cylinder stretcher. Check fit of cylinders in chassis.

Put both chassis and cylinders to one side, the footplate will now have to be part completed to assist in the forming of the motion bracket.

Footplate

Remove footplate [C-1], at this stage the footplate is very fragile. Fold down rear footplate and drag beam and locate tab and slots, tack solder in place. Carefully fold down the valance on both sides and fold in the tabs at the ends of the valances which locate in the rear drag beam and front buffer beam half etch cut outs. Fix rear of valance to rear drag beam. Remove [B-1], front buffer beam and mainframe, fold up and fix to front of footplate locating the tabs and slots, the valance front fitting in to the rear of the buffer beam half etch cut outs.

Remove [C-12] front footplate overlay and fix in position. Remove left and right front footplate overlay, [C-4-5-6-7], (the overlays with small steps are fitted when smoke deflectors are used), shape and fit overlays to front of footplate. Remove the front buffer beam [C-15], emboss rivets and fix in place. Fit the buffer stocks in place, heads and springs should be put to one side for later fitting. Fit the small steps [C-56] to the top of the buffer bodies.

Photographic evidence shows that early re-built Royal Scots were fitted with a reinforcing plate [A-27] behind the stocks.

Remove [D-55 or 56] centre cylinder cover (identify which cover is to be used, photographic evidence available indicates certain locomotives were fitted with an inspection plate. If using the cover with an inspection plate, a small piece of wire 0.45mm needs to be soldered in to the hole to represent the opening knob). Rivet cover plate from behind to represent bolt heads above the steps. Fold cover plate and check fit, the tongue at the rear of the cover plate locates in the slot at the front of the footplate spacer and should be flush for the smokebox saddle.

Remove centre cylinder flange plate [D-58] the centre cylinder tail rod is represented with a piece of 1.00mm wire, fix in place flange and trim wire 3mm. Fix cover plate to footplate front. The front lifting re-enforcing flange [D-57] can also be fitted at this stage. Remove front centre steps [D-59] fold down sides and fix in to centre cylinder cover.

Fold up driving wheel splasher fronts. Remove splasher tops from fret [C-21] are the front and centre tops, parts [C-22] are slightly smaller and are for the rear diving wheel splasher. Curve the splasher tops to shape and fit to the top edge of the splasher front, the half etch sits in the half edge cut out under the footplate. Clean up and file a very small chamfer the edge of the splasher face and top edge.

Remove the rear footplate overlay [C-13] bend in to shape and fix to rear of footplate. Fold up edge only of sandbox filler plate at the half etch line and leave plate in position at this stage, it may be necessary to bend slightly upwards to clear the chassis when testing for fit.

Remove footplate overlay [C2-3]. In order to achieve a snug fit of the firebox cladding at a later stage, remove the rivets at the inside edge and 1mm of the raised overlay between the centre and rear driving wheel splasher. Emboss all rivets and clear any cusp that is present around the inspection covers at the front of the overlay. Fold up rear angle iron joint fix overlay to footplate leaving about 0.25mm overhang at the front of the footplate. Remove required valance overlay [C-8-9-10 or 11]. (Check photographic evidence some locomotives still had a beaded valance in BR days). Fix valance in place. Check fit of footplate and chassis, a small amount of metal may have to be removed from the rear spacer where it enters the footplate. This is acceptable as the chassis has been designed to slide in behind the front buffer beam and held in place with a piece of scrap etch. When satisfied with the fit cut a small piece of scrap etch 12mm x 2mm. Fit chassis in place and fix piece of scrap

behind the front buffer beam to hold the chassis in place, taking care not to solder all together.

Motion bracket

Remove required motion bracket [D-1] and rear support bracket [D-2-3], trim for scale, bend down tabs to 90 degrees on front bracket (2) and fix together, the tabs face forward and locate in the half etch cut out in the motion bracket. Fold down the sides of the motion bracket, the front edge of the sides has a slight angle to give the correct angle to the slide bar support brackets. Fold slide bar support brackets at 90 degrees to the half etch, there is just enough metal to achieve this. When both folds have been made the half etch on both sides needs to be folded round a 1/8" bar and the brackets folded down against the motion frame sides. This will give a rough shape to the motion bracket. Check the slide bar support bracket clears the front wheel brake hanger. Fix slide bar support bracket overlays in place [D-8-9-10-11], the half etch cut out in overlays 8-9 fit at the front of the turned down bracket sides.

Check fit of motion bracket side overlays [D-5-6] and fix in place. Using the chassis and footplate as jigs check fit of motion bracket and fix in place rear support bracket. The motion bracket sides should just slide inside the footplate valence. When satisfied with the fit fix in place the reversing shaft brackets [D-4], these are fitted in the half etch cut out in the rear motion support bracket.

Return the motion bracket and cylinder stretcher to the chassis and check fit of slide bars, they should be approximately 4mm apart. Tack solder slide bars in place inside the cylinder stretcher.

Clean up crossheads and drill out for piston rod 1mm, and using 1mm wire make up the crosshead and piston. The piston length is 14mm long. Remove connecting rods from the [motion etch part 7], using a piece of 0.45mm wire for the oil box filler solder rods together, including the bosses. Clean up the coupling rods and connect to the crossheads with the 16BA nuts and bolts. Drill the "big end" to suit the crankpins. Check for fit of crossheads in slide bars and clean up as necessary.

Remove cast brass piston glands [bc-6] from the sprue and open up holes to 1.05-1.10mm and the piston rod is a smooth sliding fit in the gland. Check fit between slide bars and rear face cylinder and the crosshead and piston are free to move freely in the slide bars.

Cylinder Wrapper

From building the prototype model experience has shown that the clearance between the top of the cylinders and the footplate valence is very tight and the following guidelines might be helpful.

Check clearance between top of cylinder stretcher and footplate valence and it may be necessary to remove a small amount of metal from the outside radius at the top of the cylinders, use the wrappers as a guide. In order to line up the etched rivets on the wrapper in their correct location it is necessary to remove a small amount of metal at the tongue end of the wrapper. In practice it was found that drawing a line between the two rivet holes nearest the tongue and removing metal either side of the tongue proved to be enough. A spare wrapper has been supplied for testing.

Emboss rivets in the wrapper and starting at the top, curve and solder the wrapper in place keeping it square. Removing surplus metal according to scale being modelled at the bottom of the wrapper, half etch lines have been used as guidelines.

Remove front cylinder cover [A-13], emboss rivets and trim to shape and fix in position along with valve chest cover [bc-5]. Trim and fix rear cylinder cover [A-14], piston gland [bc-6].

Remove valve spindle guides [bc-3] from sprue, **note that the castings are handed**, and should be used so that the outside face depicts either cast (one piece) or fabricated spindle

guide. Reference to photographic evidence should be made as to the prototype being modelled. Drill out 1mm guide hole and clean up. Remove valve spindle [bc-4] sprue, drill out block 0.7mm and check for a smooth and sliding fit in the valve spindle guide. Fix valve spindle guide to rear of cylinder.

Return cylinders along with the motion bracket to the chassis. Check the clearances with the driving wheels, crossheads and sidebar. When satisfied solder the slidebars to the motion bracket. The slidebars/motion bracket can now be removed as one unit to complete assembly of valve gear, and for future maintenance.

Remove sidebar support brackets and sidebar packing pieces [D-12-19], note lower support brackets parts 14-15 are handed, the longer side of the bracket is folded around the lower support bracket. Fix in place and check crossheads are still free to travel in the slide bars.

Using drain cock casting mark holes required on the centre line at the bottom of the cylinders, drill holes 0.8mm and fix in place drain cock castings. Cut pipes to length after reference to photograph. With reference to photographs fix cylinder inspection covers [D-61] in position.

Drain cock operating levers and crank have been supplied [D-69-72]. Fold over crank and fit over short piece of 0.33mm wire taken from the rear of the drain cock, locate the more tapered end of the actuating rod to the long end of the crank with a piece of 0.3mm wire. Locate blunt end of actuating rod to a piece of scrap wire that has been soldered to the front of the curved motion bracket; trim rod at footplate level.

Fit cast brass, front and rear cylinder relief valves, [bc-18-19].

Bogie

If sprung as recommended the bogie operates in the same way as the prototype, with the frame mounted on the bottom of the chassis without any vertical movement, the weight being transferred to the wheels through the equalising beams and springs from the bottom of the locomotive mainframes.

Components are also included for the bogie wheel splasher and are easily fitted before fitting the bogie in place. However, unfortunately it will probably be necessary to omit the splashers for adequate clearance with some types of wheels or some curves. If fitting curve and fix wheel splasher top [C-39], add splasher front [C-40] and dummy fixing flange [C-41] to outside of mainframe. If dummy flange has been fitted, it will be necessary to remove a small amount of metal at the bottom of the motion bracket. Check that the motion bracket still seats level with the mainframe tops.

Remove either bogie stretcher [B-2 or 3], the larger of the two stretchers is to scale width and may again cause difficulties with certain wheels and curves. Fold up the two sides with the fold lines on the inside. Check hole in the bogie centre casting clears the 10BA bolt supplied and gives a working not loose fit. Fold up the front of the centre stretcher and solder in place. Insert centre casting and fold up fix the rear end of the stretcher. Cut pieces of 0.9mm wire and fix in holes at the ends of the frames to act as tie rods, and solder in place, checking for squareness. For an AWS fitted locomotive, fold up fix AWS shoe mounting plate and bracket [A-23a-23b-24a-24b].

If necessary pass a 1.00mm drill through the frames to clear the holes on the centre casting. Fix the lateral springs using 1.00mm rod through the frames locating the small steel springs and the centre casting. Trim the wires flush at the outside.

Fold up the etched equalising beams [B-4], and solder the folds to strengthen them. Fix cast brass beams in place [bc-23], between the etching. Drill tops of the assemblies 1.15mm to clear the plungers. Cut the plungers to give a shaft length of 8mm and remove any swarf or burr from the end.

Assemble the bogie with the wheels, placing half washers between the beams and mainframes, and washers to remove the side-play between the wheels and beams. If necessary, the holes in the side frames for the axles may be opened slightly to allow the axles to move freely in the vertical plane (although movement should not be sloppy). Fit the springs and plungers to the equalising beams, and fit the assembled bogie to the 10BA bolt in the chassis. Secure the bogie with a 10BA nut, which has been thinned down to half thickness. Stand the chassis on a piece of track and trim and bend the guard irons to shape. Fix AWS shoe casting [wmc-13] if required.

Valve gear

The kit includes all the parts required to produce outside Walschaerts valve gear. Where the prototype uses rods with forked ends, we have done the same, using two layers of 0.010mm nickel silver and the components secure by 0.7mm wire. Some may wish to simplify the assembly by using only a single layer, in which case it will be necessary to use track pins or rivets to secure the components. We would recommend Peco fine track pins, since they have a thin shaft that will pass through the pivot holes without difficulty.

A diagram is included to show the names of the components and sketches to indicate their relative positions.

The prototype model has been designed to make the reversing gear partially work (i.e. the valve rod slides up and down in the expansion lever); alternative expansion levers are provided to provide a simplified operation.

Connecting link

Solder together the connecting link halves [motion parts – 11], the prototype model used the half etch links) leaving a forked joint at each end, open up the holes 0.7mm.

Combination lever

Remove combination lever from the [motion parts – 10], the shorter of the lever is scale length, join both front and back levers. Form a joggle in the lever from 2.5-3.5mm below the second pivot hole from the top, clean up the edges and open up the holes 0.7mm.

Valve rods

Fold back valve rod [motion parts – 8], and re-enforce around the slotted end, note one doubler is slightly longer at the forked end and has half etch lines to assist in forming a forked joint. Clean up the edges and open up the holes 0.7mm.

Expansion lever

Remove the slotted expansion levers [motion parts – 12] from the fret and fold up ensuring that the folds are square and tin the outside faces. Remove the overlay plates [motion parts – 13], and fix medium rivet in to the half etch hole and recess. File head down on rivet flush with overlay plate.

Fix a piece of 0.7mm wire in the centre hole of the valve rods and trim so that only a little about 0.3mm projects at each side. The easiest way to achieve this is to drill a 0.7mm hole in a piece of scrap etch and put the wire through hole and file flush. Test the fit of the valve rod in the expansion lever and ensure it slides freely up and down the slot and no metal protrudes beyond the outer face of the expansion lever. Leave in position.

Remove packing pieces [motion parts – 17] and fold back against the half etch line, clear the holes with a 0.3mm drill. Insert packing piece between the expansion lever at the lower holes; insert 0.3mm wire through both expansion lever and packing pieces. When satisfied that the lever is square fit overlays to the expansion lever locating with the 0.3mm wire and carefully solder overlays in place. Trim wire to represent bolt heads. If required the upper bolt heads

can be represented by drilling out the top holes and fitting the packing pieces. In reality these will not be seen.

Eccentric rods

Assemble eccentric rods [motion parts – 9] and insert oil filler cap if required with a piece of 0.45mm wire. Clean up the edges and open up the holes at the expansion lever end 0.7mm and the holes at the return crank end 0.8mm.

Return cranks

Join together two return cranks [motion parts – 14], extra return cranks have been included to increase the thickness of the cranks if required. Two patterns of crank overlays have been included to suit the modeller.

Assembly

Using short rivets fix the eccentric rods to the outside faces of the return cranks and required overlay with the rivet heads to the outside.

Locate the other end of the eccentric rod between the two sides of the expansion lever and fix with a short piece of 0.7mm wire. Trim the wire. Place valve rod through motion bracket, fit pivot spacers to expansion link and fit inside motion bracket sides, assembly has been helped with a slot on the inside bracket. The expansion lever is held in place in the motion bracket with washers [etch d] parts not identified on etch but near parts 3-4 or 25-26. Trim outside pivot and fix required motion bracket flange [D-7-7A].

Assemble crosshead arm, union link, and combination lever and valve spindle guide by using 0.7mm pieces of wire. Finally fixing combination lever and forked joint of valve rod with a 0.7mm piece of wire.

Opening the holes to suit, pass a piece of 0.9mm through the weightshaft bracket, locating and fixing the reversing link motion parts 16. Open the holes in the lifting link 0.9mm at the larger end and 0.7mm at the smaller end. Locate one side of the lifting link in the weightshaft bracket with 0.9mm wire and 0.7mm through the slot in the valve rod, assemble the outer side of the lifting link and fix in the desired position. It is important that the lifting links are parallel and kept square to the shaft.

Fix strengthening support gusset [D-20] at the front of the motion bracket.

Final chassis assembly

Re-fit the motion assembly to the chassis and solder the return cranks on the ends of the centre crankpins. Trim crankpin and fix crankpin overlay. An alternative method of fixing the return crank is to tap the centre hole of the return crank 14BA and trim the crankpin sleeve to allow the return crank to tighten down on the sleeve in the correct position. Remove footplate support brackets [D-75-76] fold over and fix in position.

Fix live steam injector [bc-8] behind left step; fix exhaust steam injector [bc-9] to bottom of footplate support.

In the prototype design of this model it was decided to include pipe brackets [D-80] fitted to the rear drag beam. However on assembly it was found that the pipe work would have to be kept loose to allow the chassis and footplate to be separated. In order to keep the brackets with the chassis it is necessary to mark the position of the brackets at the rear frame spacer and notch the frame spacer to accept the brackets and clear the rear-drag beam. Fix brackets in the frame spacer and include any plumbing as required.

Fix damper levers [D-79], to footplate support and add rods from 0.45 wire, trim flush with the top of the plate.

Superstructure

Cab

Remove cab inner frame parts [D-27-28-29]. Leave in position, the cab roof support beam on part 29. Before starting any work on the inner cab and cab front overlay it is necessary to alter the slots for the reverser reach rod. The slots should be 2.5mm lower than at present. With the sides of a small drill bit in a mini drill carefully extend the slots downwards 2.5mm and fill the existing slot with a small piece of scrap etch and clean up. Fold in the cab rear 'turn in' tabs. Fold cab to shape starting with the sides, then the floor. Fold the sides at 90 degrees to the front ensuring that the narrow section of the front window support is not distorted. After folding up the floor, fold down the rear floor support. Curve roof support, the half etch cut outs at the corners are on the inside of the cab. Check fit of inner support piece in both upper and lower tabs and slots and when satisfied with fit, fix cab inner frame, roof and support together using half etch lines as a guide, ensure the cab remains square. The roof support can now be soldered in position but note the inner support will be removed and should only be tack soldered to the cab sides.

Fix cab front overlay [D-30], and trim sides of overlay flush with sides of the cab.

Remove the cab overlay [D-31] and carefully remove etching tabs and emboss rivets in roof vent runners. Fix cab overlay from top centre using the guide line, working outwards fixing a small amount on each side both at the front and rear. When all is fixed, tin and fix in place roof reinforcement strip [D-39], rain strips [D-40-41] and left and right cab side beading [D-33-34]. Remove the cab roof ventilator [D-42] and curve to shape. Fix in the desired position.

Removal of the inner support, using a broken or blunt and useless drill bit in a mini drill, cut out the support at the half etch line and remove. Clean up all edges and inside of cab.

Check fit of cab with footplate and when satisfied fix in position.

Boiler, firebox and smokebox

Clean up the one-piece boiler, firebox and smoke box casting as necessary.

Test fit the one-piece resin casting to the footplate. It will be necessary to remove a small amount of resin from the splasher cut outs in the firebox to achieve a snug fit over the chassis splashers. Depending on motor choice, it may be necessary to remove part of the rear lower boiler to clear the motor and gearbox, or to remove material from inside the firebox to clear the motor. Check fit of firebox against the cab front. (It may be more preferable to leave removing any excess material from inside the firebox until the resin casting and the footplate have been permanently joined).

When satisfied with the fit of the one piece casting, hold together with the footplate and mark holes in smokebox saddle from underneath the footplate at the two elongated slots. Drill holes at these marks 1.3mm, and tap 10BA.

Drill holes for handrails with 0.8mm drill and clear the holes for top feed, dome covers, safety valves and whistle, if required also clear the holes for the water feed pipes at the bottom of the cover plates.

Temporarily secure footplate to resin casting with 10BA bolts.

Detailing

Boiler

It is easier to fit certain parts if the one-piece resin casting is removed. If necessary, remove casting and fix in place lubricators (wmc10), drill out end 0.33mm and insert 0.33mm wire fix [D-62-63] oil pump actuating lever. Spares have been included. Fix small oil box [bc-16]. Fix the front splasher small oil box [bc-17], after identifying the correct position from the prototype being modelled. Fix atomiser [bc-15]. Fix in position nameplate bracket [C-23]. It is worth noting that the top feed water pipes run behind the nameplate bracket and on the prototype model it was necessary to remove the resin casting several times to form the water feed pipes until the correct form had been achieved.

When satisfied, if required, and the water feed pipes have been fitted, return the one piece resin casting to the footplate fix with 10BA bolts and superglue or epoxy glue the firebox and front of the cab. Check fit of lower firebox cladding [wmc-19] and when satisfied fix in place. If not already done so, remove excess material from inside the firebox and rear lower boiler to clear motor and gearbox.

Fix in place safety valves [bc-14], double chimney [wmc-1], dome cover [wmc-5] and chosen top feed cover [wmc-2 or 3]. Open up holes in the smokebox door for the handrail knobs and door handle and fix to boiler front with adhesive. Fix in place brass door handle. Also add oil atomiser cover [wmc-18] and steam cock [bc-21]. Check fit of steam pipe covers [wmc-11], it may be necessary to remove a small amount of metal at the rear of the cover where it joins the smokebox and smokebox saddle.

Fold up sandbox backing plates until touching boiler and fix sandbox filler caps [bc-20] making sure the pipes do not foul the chassis.

Cab

Remove rear cab floor support [C-38] and fold to shape, half etch lines have been made to assist in forming the curved shape at the edges. Remove required fall plates both diamond and dimpled have been included [C-44 or 45]. (Whilst not a definitive, page 5, The Book of the Royal Scots shows a dimpled fall plate. Photographic evidence of 46115 Scots Guardsman shows a chequered fall plate). Wrap fall plate tags around a piece of 0.33mm wire to form a hinge. Remove wire and place hinge tags through slots in rear cab support, replace wire in hinge and check fall plate moves freely, when satisfied fix tags to underside of fall plate.

Form the rear cab 'turn-ins' [D-35-36], check fit of 'turn-ins' and rear cab footplate support, fix in place. Emboss rivets on cab footplate and fix in place.

Form the cab rear beading and tack to the edge of the rear cut out. Locate handrail wire in the two holes of the beading and adjust the beading so that the handrail is vertical and parallel to the cab rear when satisfied fix beading in place. Fix handrails in place with short handrail knobs at the bottom of the cab 'turn-ins'.

Fold up reverser support box [D-51] and fix front overlay [D-52]. Fold up drain cock operating lever pivot, fix reinforcing plate [D-54] to top of reverser support box insert drain cock operating lever [D-53] through slot and secure with 0.45mm wire at the pivot point. Remove fireman's seat/toolbox [A-6], emboss rivets and fold up, if required fix riveted strap [D-60] around toolbox. Fix reverser support box to the front left of cab and toolbox to left rear of the cab. Fix fireman's/toolbox support bracket [C-51] to half etch cut out in toolbox and cab 'turn-in'.

Fix screw reverser [bc-12] on top of support box and in line with the cut outs for the reversing lever.

Test fit cast firebox backplate [wmc-6] at the front of the cab. When satisfied with the fit, fix the firehole doors [wmc-7] in position. Drill the mounting holes 1.00mm and fix regulator handle [wmc-9] in place. Test fit steam manifold [wmc-8] and fix in position. Add etched control wheels [D-78] as required. Each wheel can be mounted on a piece of 0.33mm wire and super-glued in place.

Fold the cab seat [C-49] in half and solder in a piece of handrail wire at the fold. Fold up the seat brackets [C-50] and passing the handrail wire through the holes. Trim the wire to length. Note the seat can be either down or folded up against the cab side. Solder the seat brackets in to the half etch cut outs in the cab side.

Remove the cab doors [D-37-38] and emboss the rivets. **Note orientation, the half etch is at the bottom of the door to represent draft excluding rubber.** The hinge straps should be formed around a piece of 0.45mm wire. Two pieces of wire, with the ends joggled slightly, should be used to attach the doors to the inside of the cab 'turn-ins'.

Fit handrails to the firebox, boiler, smokebox sides and smokebox door, with 0.45mm wire. Short knobs on the firebox, the first knobs on the boiler nearest the cab front and smokebox door. Medium knobs used elsewhere. Also fit short handrails to the running plate below the front steps.

Remove reverse reach rod [C-16] and extension [C-16a]. Emboss rivets on extension and fold to form fork with reach rod and fix together. Fold over round boss and fix to increase thickness of boss.

Remove reversing reach rod support bracket pieces, bracket [C-20] front face [C17], gusset [C19], footplate [C18]. Fold the bracket at 90 degrees and solder gusset in slot and fix to the footplate with the edge flush to the front face. Emboss rivets on front face and fold back the tabs at the half etch lines, insert the reach rod between the bracket and rear of front face and fix front face to the bracket. Fix the reach rod to actuating lever [C-57] insert lever into footplate and forked end of the reach rod into cab front; fix support assembly to footplate. Check the fit of actuating lever in footplate, trim and adjust to clear motion bracket. Add vacuum ejector [bc-10], the pipe for which is made from 1.2mm wire and secured with split pins, for which holes must be drilled in the boiler.

Drill out footplate sandboxes 1.5mm [wmc-12] and fit sandbox filler caps [bc-20]. Fix sandboxes to footplate.

Fit front steps [C-24], lamp brackets [D-74] to the running plate and [D-73] to the smokebox door.

Smoke deflectors

Remove smoke deflectors [D-44-45] to avoid any distortion only lightly emboss the rivets. Referring to photographs check location of small handrail position and open up holes accordingly. Either fix the etched flat beading [D46-47] or solder 0.33mm wire around the front/top/rear edges to simulate beading. For additional realism, file the wire half flat before fixing. Check fit of smoke deflector against front running plate and footplate, depending on the amount of overhang of the footplate overlay it may be necessary to slightly notch the deflector to achieve a good fit against the overlay.

The model has been designed so that the smoke deflectors can be bolted to the footplate. Examination at the front underneath of the footplate it will be noticed that there are two holes on both the left and right side of the footplate. If required drill through the footplate overlay and open the holes up for a clearance fit on the 16BA bolts supplied. Using the smoke deflector template bend the deflectors to shape. Trim and fix in position joining plate [D-48-49] and handrail. Fix smokebox deflector hand covers [bc-22]. Bend and form top fixing clips from

[D-50] and fix in position over the rivet holes at the top of the deflector. Trim and form a lazy Z from the remaining mounting brackets and fix in position on the deflector, the other end of the bracket is not fitted to the smokebox but allowed to rest against the smokebox sides. In order to hide the holes that were used for embossing the rivets on the inside of the deflectors 'fill in' the half-etch holes with solder and clean up.

Mark the inside of the smoke deflectors where the 16BA will be fitted, remove head from bolt and solder to lower edge of deflector, trim to length when fastened to footplate with nut.

Final details

Fix rubbing plates to the rear drag beam [C-26-29] note the smaller plates are fitted nearest to the drag beam. Fit coupling assembly [C-30-31]. Fix if desired, cab window side screens [D-43].

If it is to be fitted emboss the rivets and fold up the AWS guard plate and fix to the bottom edge at the centre of the front buffer beam. From photographic evidence fit small and large reservoirs to footplate.

Tender footplate

Parts have been supplied to replace the footplate as fitted to our 4000 galls tender. Fold up and replace as necessary. [C-53-55]

Additional parts have been used to complete the prototype model, but have not been included in the kit.

- 0.33mm soft copper wire (pipe work)
- 0.45mm soft copper wire (pipe work)
- 1mm x 0.25mm flat strip (steam sanding brackets)

The copper wire is available as spares from the billings boat kits sold at model shops and the flat strip is by mail order from John Flack.

Etched Parts

Etch A 0.015"-0.38mm Nickel Silver

1	Mainframes	Left and Right	
2	Front spacer and buffer beam		00/EM/18.83
3	Inside cylinder spacer		00/EM/18.83
4	Centre frame spacer		00/EM/18.83
5A	Horizontal spacer		00/EM/18.83
5B	Horizontal spacer		00/EM/18.83
6	Rear spacer		00/EM/18.83
7A	Small spacer		00/EM/18.83
7B	Small spacer		00/EM/18.83
8	Hornguide plates	x6	
9	Hornguides	x6	
10	Compensation beam	x2	
11	Cylinder stretcher		
12	Cylinder wrapper	x2	plus spare
13	Cylinder front cover	x2	
14	Cylinder rear cover	x2	
15	Slide bars		
16A	Ashpan large left		
16B	Ashpan large right		
17A	Ashpan small left		
17B	Ashpan small right		
18A	Coupling rod centres front		Early
18B	Coupling rod centres front		Late
18C	Coupling rod centres rear		
19	Lifting link		
20	Lifting link overlay		
21	Reversing lever bracket support plate		plus spare
22	Fireman's seat/tool box		
23A	AWS shoe mounting plate		Large
23B	AWS shoe mounting plate		Small
24A	AWS shoe plate flange	Large	
24B	AWS shoe plate flange	Small	
25	Tender Coupling		
26	Tender coupling washer		
27	Buffer stock re-enforcing plates	x2	plus spare

Etch B 0.015"-0.38mm

1	Front superstructure and buffer beam		
2	Bogie stretcher	(large)	
3	Bogie stretcher	(small)	
4	Bogie axle plates	x2	
5	Bogie support spacer		00/EM/18.83
6	Bogie mounting plate		00/EM/18.83
7	Spring/hanger assembly		00/EM/18.83
8	Spring/hanger overlay		
9	Fixing plates		00/EM/18.83
10	Rear coupling rod centre	(spare)	
	Axle washers	x8	
	Axle washers		
	(half etch)	x8	
	Bogie washers	x8	
	Bogie washers		
	(half etch)	x8	

Etch C		0.010"-0.25mm	
1	Running plate		
2	Running plate overlay left		
3	Running plate overlay right		
4	Front running plate with deflectors left		
5	Front running plate without deflectors left		
6	Front running plate with deflectors right		
7	Front running plate without deflectors right		
8	Valence overlay with beading left		
9	Valence overlay with beading right		
10	Valence overlay left		
11	Valence overlay right		
12	Centre running plate overlay		
13	Rear footplate overlay		
14	Front buffer beam support brackets		00/EM/18.83
15	Front buffer beam		
16	Reversing lever		
16A	Reversing lever extension		
17	Reversing lever bracket		
18	Reversing lever bracket		
19	Reversing lever bracket		
20	Reversing lever bracket		
21	Splasher tops	x4	Front and middle
22	Splasher tops	x2	Rear
23	Name plate bracket	x2	
24	Front running plate steps	x2	small
25	Front running plate steps	x2	large
26	Rear buffer beam rubbing plate left, large		
27	Rear buffer beam rubbing plate right, large		
28	Rear buffer beam rubbing plate left, small		
29	Rear buffer beam rubbing plate right, small		
30	Coupling assembly		
31	Coupling assembly		
32	Brake hangers	x3 left plus spare	
33	Brake hangers	x3 right plus spare	
34	Brake blocks	x6 plus spare	
35	Brake hanger support brackets	x6 plus spare	
36	Brake pull rods	x2	
37	Brake cross beams	x3	
38	Cab rear footplate support		
39	Bogie splasher top	x2	
40	Bogie splasher flange	x2	
41	Bogie splasher overlay	x2	
42	Bogie sideframe overlay	x2	
43	Balance weights		x8
44	Fall plate chequered	x2	
45	Fall plate dimpled	x2	
46	Not required		
47	Cab beading	left	
48	Cab beading	right	
49	Drivers seat		
50	Drivers seat bracket		
51	Fireman's toolbox bracket		
52	Chassis inspection covers		
53	Tender footplate conversion		
54	Tender footplate overlay		
55	Tender footplate support brackets		x2
56	Buffer steps		
57	Reach rod actuating lever		

D Etch 0.010"-0.25mm

1	Motion bracket		00/EM/18.83	
2	Motion bracket rear support		front	
3	Motion bracket rear support		rear	
4	Reversing shaft bracket		left and right	
5	Motion bracket side overlay		left	
6	Motion bracket side overlay		right	
7	Motion bracket flange	x2	early	
7A	Motion bracket flange	x2	late	
8	Motion bracket overlay top		left	
9	Motion bracket overlay top		right	
10	Motion bracket front overlay bottom		left	
11	Motion bracket front overlay bottom		right	
12	Slide bar support bracket top		left	
13	Slide bar support bracket top		right	
14	Slide bar support bracket bottom			left
15	Slide bar support bracket bottom			right
16	Slide bar support bracket packing piece top			left
17	Slide bar support bracket packing piece top			right
18	Slide bar support bracket packing piece bottom		left	
19	Slide bar support bracket packing piece bottom		right	
20	Motion bracket gusset	x2		
21	Rear frame spacer and step support			
22	Steps rear top	x2		
23	Steps rear bottom		x2	
24	Front step support bracket			
25	Front step top	x2		
26	Front step bottom		x2	
27	Cab inner			
28	Cab roof inner			
29	Cab inner support			
30	Cab front overlay			
31	Cab side/roof overlay			
32	Cab roof support			
33	Cab side beading			left
34	Cab side beading			right
35	Cab door support overlay			left
36	Cab door support overlay			right
37	Cab door		left	
38	Cab door		right	
39	Cab roof reinforcing strip			
40	Rainstrip		left	
41	Rainstrip		right	
42	Cab roof ventilator			
43	Side window frames			
44	Smoke deflector			left
45	Smoke deflector			right
46	Smoke deflector beading			left
47	Smoke deflector beading			right
48	Smoke deflector joining plate		left	
49	Smoke deflector joining plate		right	
50	Smoke deflector mounting brackets			
51	Screw reverser mounting box			
52	Screw reverser front mounting box overlay			
53	Drain cock operating lever			
54	Reinforcing flange			
55	Centre cylinder overlay			
56	Centre cylinder overlay with inspection cover			

57	Front lifting re-enforcing flange	x2	
58	Centre cylinder flange		
59	Centre cylinder overlay steps	plus spare	
60	Binding strip for fireman's seat/toolbox		
61	Cylinder inspection cover		
62	Oil pump actuating lever	plus spare	
63	Oil pump actuating lever	plus spare	
64	Brake vacuum pump bracket		
65	Brake vacuum pump bracket overlay		left
66	Brake vacuum pump bracket overlay		right
67	Brake pull lever		left
68	Brake pull lever		right
69	Cylinder release lever		left
70	Cylinder release lever		right
71	Cylinder release actuating lever		left
72	Cylinder release actuating lever		right
73	Smokebox door lamp iron		
74	Lampirons		
75	Footplate support bracket		left
76	Footplate support bracket		right
77	AWS guard iron		
78	Selection of backhead wheels		
79	Dampers		
80	Pipe brackets for rear buffer beam		

Motion etch

1.	Centre coupling rod	early pattern
2.	Coupling rod overlay	early pattern
3.	Centre coupling rod	late pattern
4.	Coupling rod overlay	late pattern
5.	-	
6.	-	
7.	connecting rods	
8.	Valve rods	
9.	Eccentric rod and doubler	
10.	Combination link and doubler	
11.	Connecting link	
12.	Expansion lever	
13.	Expansion link overlay	
14.	Return Crank	
15.	Return Crank overlay (various)	
16.	Spacing washers	
17.	Expansion bracket packing pieces	

Template

- Smoke Deflector

Lost Wax Brass Fittings

1	Crossheads	Early	Left and Right
2	Crossheads	Late	Left and Right
3	Valve spindle guides		Left and Right
4	Valve spindle		x2
5	Valve chest cover		x2
6	Piston glands		x2
7	Cylinder drains		Left and Right
8	Live steam injector		
9	Exhaust steam injector		
10	Vacuum ejector		
11	Vacuum pipe		
12	Screw reverser		
13	Whistle		
14	Safety valve		x2
15	Atomiser		
16	Oil box small		x2
17	Oil box small (splasher)		x2
18	Relief valves front		x2
19	Relief valves rear		x2
20	Sandbox filler		x8
21	Relief Valve smokebox		
22	Deflector hand cover		x4
23	Bogie Equalising beams		Left and Right

White Metal Castings

1	Chimney		
2	Top feed	cover	early
3	Top feed	cover	late
4	Smokebox door		
5	Dome cover		
6	Firebox backplate		
7	Firehole doors		
8	Steam manifold		
9	Regulator handle		
10	Lubricator		x2
11	Steam pipe cover		x2
12	Sandboxes		x2
13	AWS pick-up shoe		
14	AWS small reservoir		
15	AWS large reservoir		
16	Brake cylinder		
17	Bogie centre casting		
18	Oil atomiser cover		
19	Firebox cladding		

Machined parts

1	Axlebox	x6	
2	Axlebox spring	x6	
3	Bogie side control spring		x4
4	Bogie spring	x2	
5	Bogie sprung plunger	x2	
6	Short hand rail knobs	x10	
7	Medium hand rail knobs	x8	
8	Buffer stock	x2	
9	Buffer spring	x2	
10	Buffer head	x2	
11	Split pins	x2	
12	Smoke box door handle		
13	Valve gear rivets medium		x4
14	Valve gear rivets short	x2	
15	16BA x ½ cheesehead	x4	
16	16BA nut	x4	
17	14BA x ½ cheesehead	x12	
18	10BA x ½ cheesehead	x6	
19	10BA nut	x4	
20	1.15mm dia. brass rod	4"	
21	1.0mm dia. brass rod	6"	
22	0.90mm brass wire	2"	
23	0.70mm brass wire	6"	
24	0.45mm brass wire	12"	
25	0.33mm brass wire	3"	

For more details of Brassmasters kits and parts why not visit our web site
www.brassmasters.co.uk.