

Brassmasters

**Scale
Models**

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Detailing kit for Bachmann LNWR/LMS G2 0-8-0 and Tender

Instructions

Additional components available separately:

- 3-piece early pattern coupling rods
- Jointed later pattern coupling rods
- LNWR chimney
- LNWR buffers

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1 Introduction

1.1 The detailing kit was designed as part of the Brassmasters EasiChas frames for the Bachmann G2 locomotive. The EasiChas concept, which was devised by John Brighton, is to allow easy conversion of ready to run locos to EM or P4 gauge, which results in a fully sprung locomotive and tender. Furthermore, the basic Easichas conversion can be completed without the need to solder any of the main components together. It was realised that the detailing etch within these kits is just as suitable for those modellers wishing to enhance the model without converting to EM or P4.:

1.2 There are a number of options in the detailing kit. These are, working from the front:

- replacement smokebox handwheel
- replacement buffer beam
- locomotive guard irons
- drain cock operating linkage
- replacement reach rod - both original and strengthened valve gear
- sander operating linkage
- cab floor
- replacement cab doors
- replacement tender brake gear
- replacement tender guard irons
- replacement tender coal rails
- lamp irons for engine and tender
- replacement rear footsteps for tender cab locomotives

Locomotives that can be built using the Bachmann G2 model and the Brassmasters' detailing kit

The history of the LNWR 0-8-0 is long and complicated, so rather than try to include it all here, these notes deal only with the history as it affects the locomotives that can be built from the Bachmann model and Brassmasters' detailing kit. For the full history, 'Eight-Coupled Goods engines' by Edward Talbot is essential reading.

There are two different basic versions of the Bachmann locomotive, plain cab side and cab side fitted with sandbox filler, and three different versions of the tender, plain tender, tender cab without rear steps, tender cab with rear steps. The only limitation of locomotives that can be modelled is that the cab side sand filler was not introduced until 1946 and then only on locomotives fitted with tender cabs and rear steps to replace the withdrawn 0-8-4 tanks at Edge Hill and Buxton, and later for other locations.

Apart from the limitation above, the Bachmann G2 can be used as a basis for any G1, G2 and G2A once fitted with Belpaire boiler and cut down cab, both appearing from about 1924, except those fitted with steam brake.

The later batches of G1 (built in 1914 onwards) and the G2 were all built with vacuum brakes. From 1924 strengthened brake was introduced on vacuum fitted locomotives. The strengthened brake gear consisted of a second brake cylinder in front of the firebox operating the linkage on the leading two wheelsets, with the original cylinder under the cab operating the linkage on the trailing two wheelsets. The modification commenced with the locos that had been built with vacuum brakes (G1 – LMS 9225 onwards, all G2s). As locomotives were converted from steam brake to vacuum brake most were fitted with two cylinders and the majority were converted in the next 10 years. However, some retained steam brakes until scrapped.

The G2s were built with a modified motion with a direct drive. This was mounted higher in the frames and resulted in a cranked reach rod in place of the straight reach rod for those locos fitted with indirect drive. From the early 1920s G1s began to be fitted with 'strengthened motion' as it was known.

At the start of our period of interest, the G1s were fitted with three-piece rods and the G2s were fitted with one-piece jointed rods. As time went on more locomotives were fitted with single-piece jointed rods.

G2A locomotive that appeared from 1935 were G1s that were fitted with a 175 lb/sq.in. boiler and nominally strengthened brakes and direct motion. Some locomotives were already fitted with one or both but converted locomotives often lacked one or the other.

Various changes were introduced during the life of the locos and the most noticeable were parallel buffers (1933 onwards), smokebox handles in place of wheel (early WW2 onwards), strengthened buffer beam (1942 onwards) and Stanier chimney (1944 onwards). Fitting was not necessarily fast and not all locos were fitted during their life.

As for the tender, once the locos were converted to vacuum brake the locos were only paired with one of the last two designs of Bowen Cooke tender. The Bachmann model is of the last type of Bowen Cooke tender (BC4), but the previous type (BC3) had the same body, but with Whale type frames. The first tender cabs were built in WW1 but only one was fitted to a BC3 tender. The tender cabs in 1946 and later were fitted only to BC4 tenders and they also had steps at the rear of the tender.

So, with this number of variations, a picture of the locomotive you wish to model at the right period is necessary to get the detail right.

All these variations can be built using the appropriate Bachmann model, the EasiChas kit and several additional items:

Indirect or direct reach rod
Three piece rods – available separately from Brassmasters (ref C105)
Single piece rods – available separately from Brassmasters (re C106)
LNWR buffers – sprung buffers available separately from Brassmasters (ref A217)
Parallel buffers – on Bachmann model or sprung buffers available separately from Brassmasters (ref A101)
Smokebox door wheel
Smokebox door handles – on Bachmann model or available separately (ref A022)
Original or strengthened buffer beam
LNWR chimney – whitemetal one available separately from Brassmasters (ref A251)
Stanier chimney - on Bachmann model or whitemetal one available separately from Brassmasters (ref A252)
BC4 tender frames – Bachmann model
BC3 tender frames – available separately from Brassmasters (ref B244)
Rear tender steps to footplate

2 General Notes

2.1 There is one etch for detailing the loco and tender. Numbers shown in square brackets [] in the instructions refer to the etch (D refers to the detailing kit) and part numbers, e.g., [D2] is part 2 on the etch. The part number appears on the separate etch diagrams. Certain parts, e.g. bolts, wire, springs, are not numbered.

2.2 Some of the parts are small and easily damaged, so do please take care. Parts should be removed from the sheets as and when needed by use of a small scalpel etc., and the tabs and etch cusp removed with a small fine-cut file.

2.3 All folds and bends are made with the half-etched line on the inside unless otherwise stated.

2.4 On some parts it is necessary to emboss rivet / bolt heads from the reverse sides by use of a punch.

2.5 There are half etched test rivet holes on the back of the etch edging strip. Use these to get used to forming uniform rivets.

3 Dismantling the locomotive

3.1 Tools Required

- A selection of cross head and normal miniature screwdrivers
- Small pliers
- Small plastic bags and labels to identify parts & screws when dismantling
- Small files
- Soldering iron (for electrical connections)
- A steel rule
- Plastic solvent, superglue and epoxy resin (24 hour & 5 minute)

3.2 Remove the electrical plug from the tender and separate loco and tender.

3.3 Unscrew the front and rear screws (below the cab floor hidden by wires), pull the chassis vertically to remove the chassis from the body.

4 Dismantling the tender

4.1 Unscrew the two screws behind the buffers. The front is secured by two clips that extend vertically from the front tender bulkhead down through the tender floor/platform (chassis top). Some have suffered from stray glue so need pressure from below to free them. With the rear screws now removed lever up the rear of the tender and the front clips will release the body.

4.2 Spring the tender side frames apart to release the brake pull rod assembly. Spring the tender side frames apart to release the brake pull rod assembly. Again, spring the tender side frames apart to release the wheels. Remove the rear tension lock coupling (put a screwdriver below it and twist) to reveal the screw holding the coupling pocket. Remove this.

(note sections 5 and 6 are not used here)

7 Locomotive components

7.1 Front guard irons

7.1.1 Push through the rivets in each guard iron ([D1] for left hand side and [D2] for the right hand side) and form to a slight 'S' shape. Glue, using cyanoacrylate glue or epoxy resin, to the frames, with the curved face towards the rear, to the chassis immediately behind the buffer beam bracket.

7.2 Rear Sandboxes

7.2.1 The Bachmann rear sandboxes are the correct shape if the locomotive has the sandbox fillers in the cab side sheets. If the locomotive has the original fillers inside the cab, new sandboxes have to be made.

7.2.2 For the original design of sandbox, take two pieces of the 2.5mm thick plastic strip just over 6mm long and glue together. Take the sandbox template [D3] and file the blocks of plastic to shape. Make a second sandbox in the same way.

7.2.3 Take a sandbox bottom flange [D4] and fit to the bottom of the sandbox with the centre 1.5mm in from the outside edge using cyanoacrylate glue or epoxy resin. Repeat for the other sandbox making sure they form an opposite pair.

7.2.4 Drill through the hole in bottom flange to take 0.7mm wire.

7.2.5 Mount the sandboxes on the Bachmann chassis so that the top is level with the underside of the footplate and the front edge is level with where the original sandbox was removed using cyanoacrylate glue or epoxy resin.

7.2.6 Make new sandpipes from 0.7mm wire and bend to shape. Attach using cyanoacrylate glue or epoxy resin.



7.3 Cylinder drain cock mechanism and operating lever

7.3.1 Take the cylinder drain cock operating linkage [D5], place it on the chassis block with the extension piece to the front and file a semi-circular hole centrally to clear the chassis screw. Bend up each side (see photo). **Be careful when handling this etch** – hold at the ends otherwise the rods distort – guess how we know!

7.3.2 Attach the etch to the chassis block with the extension piece towards the front with the front edge just under 3mm (2.75mm) from the buffer beam, using cyanoacrylate glue or epoxy resin.

7.4 Replacement buffer beams

7.4.1 The locomotives were fitted with two types of buffer beam, the original [D7] and the strengthened [D8] fitted to some locomotives from mid-1942.

7.4.2 Take the locomotive body and remove the Bachmann buffers by gripping with a pair of pliers and wiggling then until they come loose.

7.4.3 Remove the detail from the cast Bachman buffer beam with a file (We actually use a burr in a mini-drill for removing the buffer bases). Now is the ideal time to solder replacement coupling hook to the etched replacement buffer beam – we use a Brassmasters one! (ref **MC005**)

7.4.4 If refitting the Bachmann buffers, after pushing through the rivets, attach the buffer bases [D9] to the buffer beam by by solder or using cyanoacrylate glue or epoxy resin.

7.4.5 Attach the buffer beam to the locomotive using cyanoacrylate glue or epoxy resin.

7.4.6 Replace the Bachmann buffers or fit replacement buffers. Undoubtedly you will have damaged the Bachmann red paint so it is probably best to remove this from all the buffer body **before** refitting.

7.5 Replacement reach rod

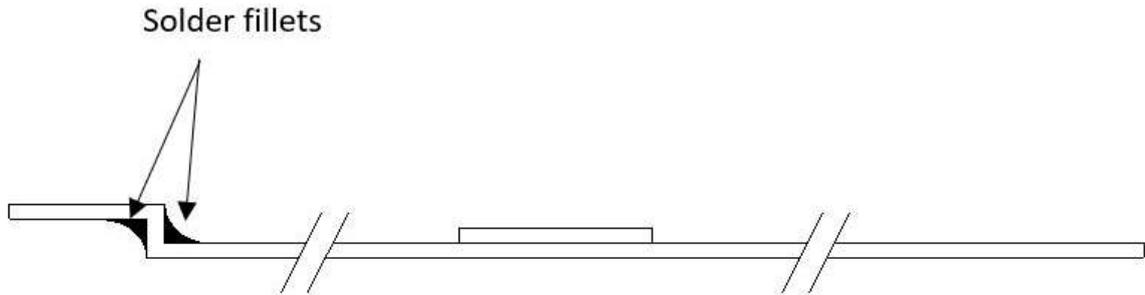
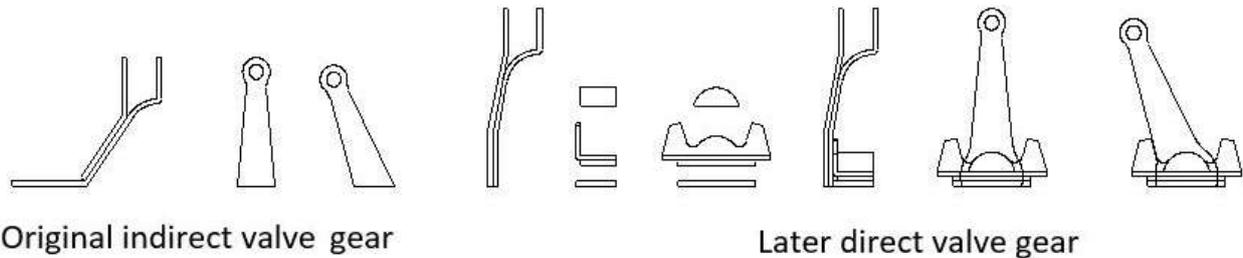
7.5.1 The prototype locos were fitted with two versions of Joy valve gear, the original indirect drive, and the later direct drive, each type having a different reach rod and weighbar lever. The indirect drive can be identified as the reach rod is straight, on direct drive it is cranked (the bend is behind the second splasher sand box). By the 1930s direct drive was far more common. If you need to study photographs, 9204 on p117 of LNWR Eight coupled locomotives is indirect drive, 9061 p106 is direct. As well as providing for the different reach rods and weighbar levers, the kit also provides for the valve gear to be in the mid position or the full forward position.

7.5.2 Remove the boiler and cab from the footplate by undoing the screws underneath the footplate under smoke box and under the firebox backplate. The backplate can then be removed and the boiler/cab assembly can be lifted off. Remove the cab handrail for safe keeping.

7.5.3 Remove the reach rod by cutting behind the sandbox and cutting between the rod and the bracket on the third splasher. Do not damage the bracket as it is used with the new reach rods.

7.5.4 The sandbox on the second splasher is too wide to allow the reach rod to pass down the back. Reduce the width of the sandbox from the back by 0.5mm (the prototype did this too).

Weighbar levers and direct reach rod



Earlier indirect valve gear

7.5.5 In this version of the valve gear, the weighbar was mounted low down in the frames. Firstly chose whether the valve gear is to be in mid position or full forward.

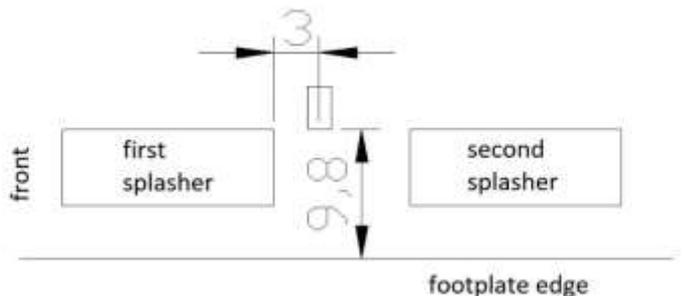
7.5.6 Select the appropriate weighbar lever front and back (for mid gear [D10] lever front, [D11] lever back, for forward gear, [D12] lever front, [D13] lever back).

7.5.7 Open out the two upper holes to clear 6mm wire then carefully bend the lever front and lever back as shown in the diagram (there is a half-etched dimple where the outer rod needs to be bent at the bottom). A piece of 6mm wire passed through the holes needs to be parallel to the footplate. When satisfied solder together.

7.5.8 Take the indirect each rod [D14], open out the hole to clear 6mm wire and push through the rivets for the joint from the back. Attach the joint plate [D15] to the back of the rod behind the rivets.

7.5.9 The weighbar lever is attached to the footplate in the position shown in the diagram, using cyanoacrylate glue or epoxy resin. However, if you are going to fit replacement sander levers (see section 7.6) it is best to attach the reach rod and weighbar **after** these.

Position of indirect weighbar bracket



7.5.10 Trim back the reach rod at the cab end so that it clears the cab front when in position. Using the washers [D16] between the reach rod and the back of the weighbar lever, **Make sure the rod will sit in the correct position** out from the boiler, thinning the back of the bracket on the splasher if necessary.

7.5.11 Place the reach rod in position and insert a short length of 6mm wire through the joint with the weighbar lever. Secure the reach rod in position behind the bracket on the third splasher using cyanoacrylate glue or epoxy resin.

7.5.12 Solder or glue the joint wire in position and trim to length.

7.5.13 If not fitting the replacement sander operating rods, re-assemble the boiler, cab and footplate.

Later direct valve gear

7.5.14 In this version of the valve gear the weighbar was mounted level with the top of the frames. First chose whether the valve gear is to be in mid position or full forward.

7.5.15 Take the bearing base [D17] and carefully bend at right angle along the back of the full etched piece (see photo of a direct weigh bar). Attach a spacer [D18] to the bottom.

7.5.16 Select the appropriate weighbar lever front and back (for mid gear, [D19] lever front, [D20] lever back, for forward gear, [D21] lever front, [D22] lever back).

7.5.17 Open out the two upper holes to clear 6mm wire then carefully bend the lever front and lever back as shown in the diagram. A piece of 6mm wire passed through the holes needs to be parallel to the footplate. When satisfied, solder together.

7.5.18 Solder the weighbar levers to the back of the bearing base (see photo).

7.5.19 Take a piece of 2.0mm wire and file the end 4mm into a 'D'- shape, such that the 'D' is slightly less than half the original diameter (0.8mm). Cut two lengths 1.5mm long.



7.5.20 Attach one length to the top of the bearing base (see photo).

7.5.21 Make the bearing for the opposite end of the weighbar by taking two spacers [D18] and soldering them together. Attach the second piece of the D shaped wire to the top (see photo).

7.5.22 Take the direct reach rod [D23] and open out the hole to clear 6mm wire and push through the rivets for the joint from the back. Attach the joint plate [D15] to the back of the rod behind the rivets.

7.5.23 Make two bends at right angles in the reach rod at the half-etched bend lines. Apply a generous fillet of solder to the inside of both bends to represent the shape of the rod at this point (see diagram above)

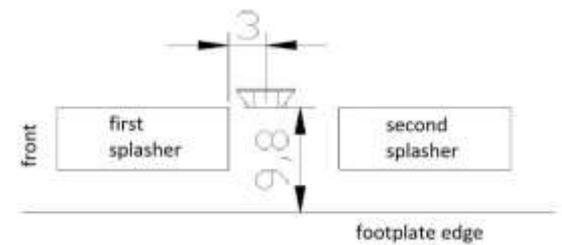
7.5.24 The weighbar lever and opposite bearing are attached to the footplate in the positions shown in the diagram, using cyanoacrylate glue or epoxy resin.

7.5.25 Trim back the reach rod at the cab end so that it clears the cab front when in position. Make sure the rod will sit in the correct position out from the boiler, thinning the back of the bracket on the splasher if necessary.

7.5.26 Place the reach rod in position and insert a short length of 6mm wire through the joint with the weighbar lever. Secure the reach rod in position behind the bracket on the third splasher using cyanoacrylate glue or epoxy resin. However, if you are going to fit replacement sander levers (see section 7.6), it is best to attach the reach rod and weighbar **after these**.



Position of direct weighbar bracket



7.5.27 Solder or glue the joint wire in position and trim to length.

7.5.28 If not fitting the replacement sander operating rods, re-assemble the boiler, cab and footplate.

7.6 Replacement sander operating rods

7.6.1 If not already done so, remove the boiler/cab assembly as in 7.5.2. This is what you are aiming for.

7.6.2 Carefully cut off the plastic sander operating mechanism below the lever and behind the bracket on the splasher (see photo). File the top of the mechanism flat – you will need to leave about 1.35mm of the upstand present. If you leave too much, the mechanisms foul the boiler cladding. Strangely, the right hand side of the Bachmann boiler seems



closer to the sandboxes than the left – be aware of this when you are making these mechanisms and try a 'dry run' of fitting the boiler **before securing these mechanisms**. Also, it will be necessary to carve the back of the bracket on the splasher until it is slightly thinner.



7.6.3 Drill a 0.35mm hole vertically in the centre of each sander valve (see photo)

7.6.4 Drill a 0.35mm hole horizontally through the sander bracket on the splasher (see photo)

7.6.5 Take four sander levers [D30] and reduce the overall length to 2mm to help clear the boiler cladding. Ensure the holes clear 0.33mm wire.

7.6.6 Drill a 0.33mm hole vertically in a piece of wood, insert a short length of 0.33 wire in the hole, place a sander lever over the wire and solder in place. Trim the wire on one side of the lever almost flush.

7.6.7 Repeat for the other three levers.

7.6.8 Take the two sander operating rods ([D31] left hand side and D32] right hand side) and make sure the holes in the bottom clear 0.33 wire.

7.6.9 Using the same piece of wood, insert a short length of 0.33 wire in the hole, place a sander operating rod over the wire and solder in place. Trim the wire on the inside of the rod almost flush.

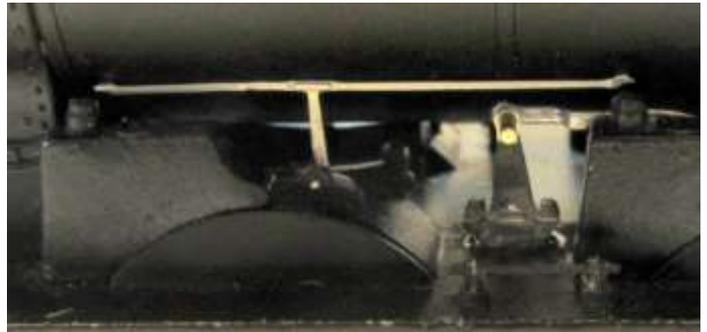
7.6.10 Repeat for the other sander operating rod.

7.6.11 Place two of the sander levers in the left hand sandboxes and inset the left hand operating rod [D31] into the back of the bracket on the footplate.

7.6.12 Carefully adjust the position of the levers and rod so that the rods are horizontal and the two levers are in the correct position. Secure in place using cyanoacrylate glue or if you are brave a tiny dab of solder between the lever and the rod.

7.6.13 Repeat for the right hand sander rod and levers.

7.6.14 Replace the boiler and cab assembly on the footplate by reversing the sequence in 7.5.2.



7.7 Cab footplate floor

7.7.1 Check that the cab footplate floor [D33] fits in position before attaching using cyanoacrylate glue or epoxy resin.

7.8 Lamp irons

7.8.1 The lamp irons provided on the locomotive are plastic and are therefore too thick. Etched replacements are provided for the footplate ones and the one on the top front of the smokebox.

7.8.2 Remove the plastic lamp irons on the Bachmann footplate by carving them off and fill any resultant holes with filler.

7.8.3 Take three footplate lamp irons [D34] and bend them at right angles where the upright joins the base. Glue in position on the footplate using cyanoacrylate glue or epoxy resin. The centre one should be offset to the right (looking at the locomotive front) by just over 0.5mm (0.67mm) and the same distance back from the front edge of the footplate. The other two are in line with the buffers and again just over 0.5mm (0.67mm) from the footplate edge. Remember, the vertical part of the bracket is furthest away from the buffer beam with the section with two bolts to the front.

7.8.4 If you are going to fit a replacement whitemetal LNWR chimney, jump to section 7.10 as it is safer to do that now. The top lamp iron is quite respectable especially if carefully thinned with a file. **Be careful not to damage the rivets on the smokebox top.** To fit the replacement brass smoke box top lamp iron [D35] requires the handrails to be removed and this means that the three handrail knobs on the front of the smokebox have to be pulled out. This can be done quite easily by putting the points of a pair of tweezers either side of the handrail knob from the outside of the smokebox and levering very gently on the smokebox door (We put a piece of cardboard over the door to lever on so as not to mark the door). Remove the handrail by pulling it out of the knobs down the left hand side of the locomotive and out of the hole on the right hand side of the locomotive.





7.8.5 Carefully remove two knobs from the short end of the wire. Put one carefully away, but the other will need to be mounted in a pin chuck with the base outwards. This is best done by mounting the hand rail on a short piece of wire, putting the wire into the chuck between the jaws and then tightening the chuck on the knob.

7.8.6 Using the wire to orientate the knob, file flats on each side of the knob spigot at right angles to the wire until the slot on the lamp iron [D35] slides over the spigot. File a similar flat on what will be the top side of the spigot to ensure the lamp iron sits down on the knob far enough. Finally, reduce the thickness of the knob base by filing around the spigot.

7.8.7 Cut off the top plastic lamp iron and file the top of the smokebox smooth. **Be careful not to damage the rivets on the smokebox.** Carefully carve off the representation of the lamp iron base on the smokebox front. Don't forget that the smokebox door opens. Clean up any over enthusiastic application of glue by Bachmann round the other holes.

7.8.8 Remount the removed handrail knobs on the wire, the centre one first and in the correct orientation. Refit the wire handrail to the loco, being careful that the knobs do not fall off the end of the wire as you do so (We thought we had lost one of ours!). Push the knobs into place into their original holes.

7.8.9 Pull each of the outer two knobs out in turn, carefully apply a small spot of glue to the spigot and push back in. Apply a small spot of glue to the rear of the top lamp iron, pull the centre knob out slightly, position the lamp iron and push the knob into place. We used cyanoacrylate for this, but epoxy resin would also work.

7.9 Smokebox Door Handles



7.9.1 Some Bachmann models come with twin smokebox door darts (a wartime fitting and far from universal) also the plastic wheel is quite heavily moulded anyway.

7.9.2 To replace either the outer handle or the wheel, remove the plastic handle or wheel. Take the smokebox door wheel [D61] and open up the centre hole to accept 0.3 mm wire. Solder a piece of 0.3 mm wire through the hole. Drill a 0.3 mm hole in the centre of the inner handle and glue the wheel in place using cyanoacrylate glue or epoxy resin.

7.10 LNWR chimney

7.10.1 All the Bachmann models come with Stanier chimneys, which were not fitted until the late 1930s and did not become common until the 1950s. A replacement cast whitmetal LNWR chimney is available from Brassmasters (ref **A251**).

7.10.2 Cut off the plastic chimney with cutters finishing off with files and fine emery paper. It is essential that a smooth smokebox top is formed.

7.10.3 Clean up the whitmetal chimney and shorten the base stub which fouls on the Bachmann weight inside the smokebox. Drill out the top to a deeper level as this improves appearances.

7.10.4 Fit chimney to the top of the smokebox using cyanoacrylate glue or epoxy resin, ensuring the capuchin is to the front and the chimney is vertical when looking from the front.



8 Tender components

8.1 Replacement brake gear

The Bachmann tender brake gear is moulded as part of the frames and is perhaps the weakest visual area of the model.

The replacement brake gear can be fitted to the brake frame [D36] which also represents the tender tank. However, the assembly is very fiddly.

Photographs in this section show the components fitted to an EasiChas. The brake frame is exactly the same but without the parts to hold the wheels.

8.1.1 Cut the brake gear away from the openings in the side of the tender and clean up the cuts, **especially the inside of the 'round ended' cut-outs**.

8.1.2 Cut off the plastic pillar which held the tension lock coupling at the rear of the Bachmann tender frames.

8.1.3 Remove the A frame towards the rear of the Bachmann tender floor and also remove the plastic frame behind the leading frame openings. The body retaining clips on the Bachman tender body at the front of the tender need to be reduced in width to clear the brake frames using a craft knife or file

8.1.4 Fold up the sides of the brake frame [D36] to 90 degrees. With the tender wheels removed, check in position.

8.1.5 Bend up the front brake shaft bracket [D37] and solder in position across the top of the brake frame with the centre tongue engaging in the frame cut-out. These brackets should be immediately behind the tender frames, the plastic frames are further apart than prototypical so adjust the bends (there is a second half-etched line above the 'V') so they are in this position.

8.1.6 Solder the brake shaft bracket overlays [D38] in position on the outside of the rear brake shaft brackets on the EasiChas frames with the bolt heads in a square configuration (like ::) bolts parallel to the track.

8.1.7 Identify the handbrake lever [D39], the handbrake pull rods [D40] and the vacuum brake lever [D41] and open out the holes in the end to clear 0.6mm wire. Also ensure the holes in the two brake shaft brackets will also clear 0.6mm wire.

8.1.8 Cut two pieces of 0.6mm wire long enough to go across the two brake shaft brackets and be flush on the outside.

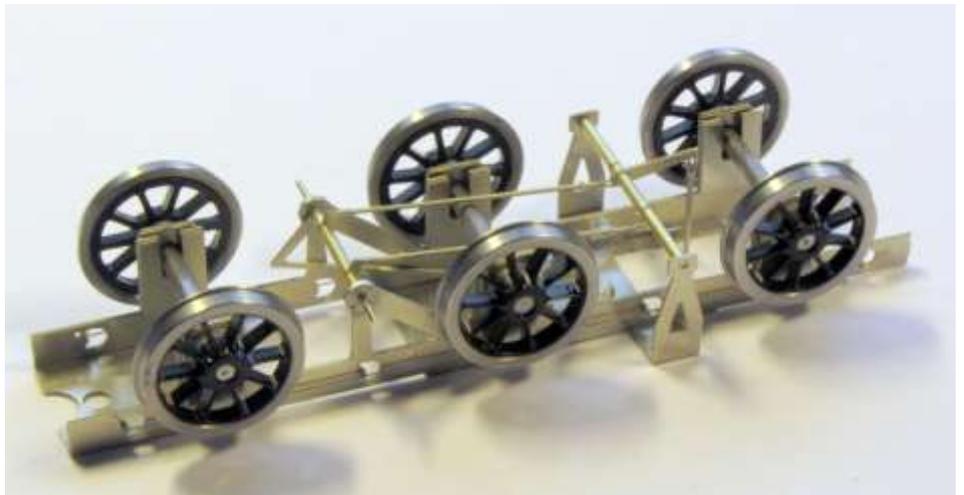
8.1.9 For the rear brake shaft cut three pieces of 1.2mm x 0.6mm inside diameter tube, 1.8mm, 6.8mm and 2.2mm long.

8.1.10 Place a piece of 0.6mm wire through the rear brake shaft bracket and position the handbrake lever [D39] over the wire and then push the wire through the opposite bracket. Hold the handbrake lever against the inside of the right hand frame (left hand when looking from below) and with the end against the base of the EasiChas, solder in position at the base end. **DO NOT SOLDER TO THE WIRE.**

8.1.11 Pull the wire back so that it just goes through the bracket and handbrake lever and then assemble the rear brake shaft by first mounting the 1.8mm piece of tube on the wire, then one of the handbrake pull rods [D40] (the end with the slot is towards the front - see photo to get the correct orientation), then the 6.8mm piece of tube, then the second joining rod and then 2.2mm piece of tube. Finally push the wire through the opposite side bracket. Check that the tube does not cause the brackets to splay out sideways.

8.1.12 For the front brake shaft cut, four pieces of 1.2mm x 0.6mm inside diameter brass tube 8.0mm, 5.6mm, 0.8mm and 8.0mm long.

8.1.13 Now assemble the front brake shaft by putting the wire through the left hand side bracket (again the right when looking from underneath) and then mount the 8.0mm piece of tube, then the free end of the first joining rod, then the 5.6mm piece of tube, then the vacuum brake lever [D41] with the piston rod towards the front, then 0.8mm piece of tube, then the free end of the second joining rod, then the 8.0mm piece of tube. Finally push the wire through the opposite side bracket. Check that the tube does not cause the brackets to splay out sideways. The assembly should then look like this (see photo of the similar assembly on the EasiChas frames, although the rear wire here has not been cut flush).



8.1.14 Push the wire on the rear brake shaft slightly out through the bracket and apply a small drop of oil, then push it slightly out of the opposite side and apply a further drop of oil. Now with the brake shaft wire flush at both ends, carefully apply solder or glue to the rear shaft (the oil will prevent the wire and tube being soldered to the bracket).

8.1.15 Repeat for the front brake shaft, ensuring the brake cylinder spindle is vertical.

8.1.16 Remove the handbrake linkage assembly by springing the brackets apart.

8.1.17 The prototype tender brakes and their actuation linkages are a horribly complicated assembly with four pull rods situated both sides of each wheel. Study the drawing Appendix 1 at the end of these instructions and print it off. This kit follows this faithfully and will test your modelling skills. Open out the holes in all the brake pull rods [D42] and [D43] to clear 0.5mm wire. Note that the one on the bottom of the etch has no centre hole (left hand end) – keep this separate as it needs to be the inside pull rod

8.1.18 Prepare the brake hangers and blocks ([D44] left hand front, [D45] right hand front, [D46] left hand, [D47] right hand) by pushing through the half-etched rivet in the middle of the brake block from the rear. Then open out the holes in the top and bottom of the brackets to clear 0.5mm wire and the hole near the bottom to clear 0.6mm wire.

8.1.19 Open out the hole in the link that protrudes at the rear of the front brake hanger and blocks ([D44] and [D45] to clear 0.5mm wire.

8.1.20 Remove the assembly jig for the etch frame. Open out the holes to clear 0.5mm wire and bend the jig into a 'U'- shape.

8.1.21 Push two 25mm lengths of 0.5mm wire through the two holes.

8.1.22 Place the upper hole of a left brake hanger [D46] over the lower 0.5mm wire on one side of the jig and rest it against the upper wire. Repeat with a right brake hanger [D47] on the opposite side. Inset a piece of 0.6mm wire through the lower of the two exposed holes in the brake hanger and solder each end in place. We use blue tack to hold the wire in place and mini clothes pegs to hold the brake hangers in place during soldering (removed for the picture as they obscured the jig).



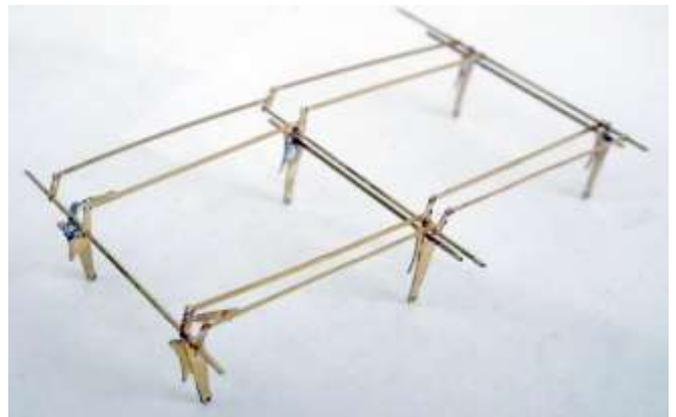
8.1.23 Push a 30-40mm piece of 0.5mm wire through the upper exposed hole in one brake hanger, then through the single hole of two brake pull rods ([D40] and [D41]) with the detail side face to face. Ensure that the rods are correctly orientated. Finally push the wire through the opposite brake hanger. Make sure that an equal amount is showing either side of the brake hangers and solder into place to the brake hanger only (not the pull rod at this stage).

8.1.24 Remove the lower wire from the jig and remove the assembly.

8.1.25 Place the second pair of brake hangers in the jig and again solder a piece of 0.6mm wires between the lower of the exposed holes.

8.1.26 Repeat 8.1.21, this time putting the wire through the appropriate holes in the centre of the pull rods, again ensuring correct orientation (see photo below and diagram Appendix 1).

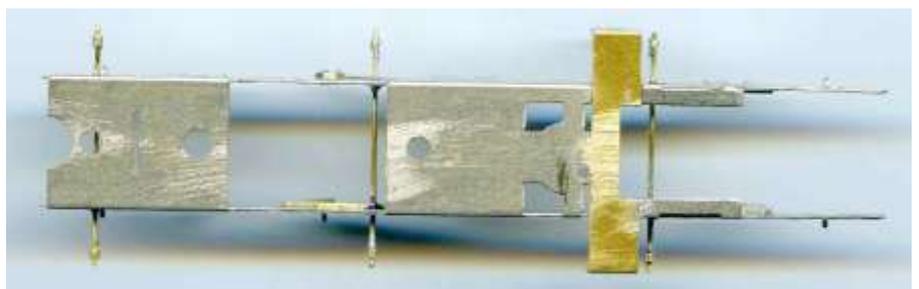
8.1.27 Finally mount the two leading brake hangers [D44] and [D45] in the jig and solder a piece of 0.6mm wire between the lower of the exposed hole.



8.1.28 Repeat 8.1.21, this time putting the wire through the appropriate holes in the front of the rods, again ensuring correct orientation (see photo/diagram).

8.1.29 With the wheels and handbrake linkage assembly removed, place three pieces of 0.5mm wire 25mm long through the holes in the EasiChas frame and solder into place in both frames, making sure an equal length protrudes from both side of the frames.

8.1.30 Take six pieces of 1.0mm x 0.5mm diameter tube about 1.0mm long and solder one piece on each end of the wire with the outside edge the same distance apart as the jig size used in paragraph 8.1.8.



8.1.31 Fit the brake frame into the Bachmann chassis, replace the wheels and then assemble the brake gear by mounting the brake hanger assemblies over the ends of the support wires.

8.1.32 Mount the remaining brake pull rods ([D42] and [D43]), with the detail side outermost, over the ends of the 0.5mm wire, and position the correct distance out from the face of the wheels to ensure that the wheels do not touch the rods when the wheels are at their fullest amount of side play, but also still narrower than the tender side frames.

8.1.33 Pull the brake gear off the wheels to ensure that the brake blocks do not touch the wheels and solder the brake pull rod to the 0.5mm wire. Check the position of all brake hangers and solder all the remaining brake hangers to the pull rods.

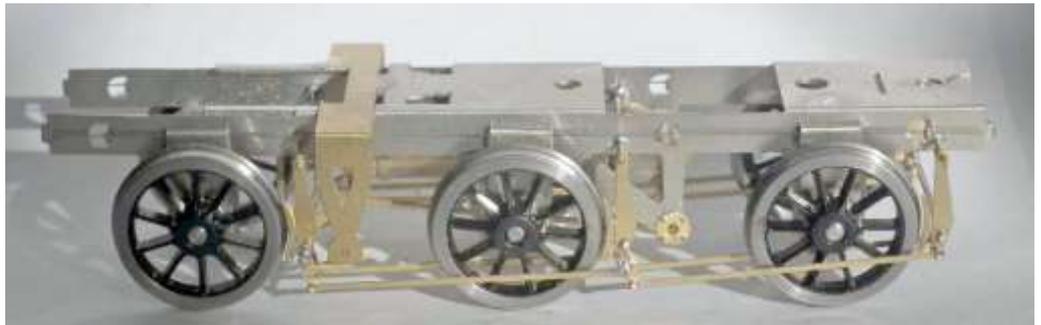
8.1.34 Position the pull rods that are loose on the 0.5mm wires between the brake hangers so they do not touch the wheels when the wheels are at their fullest amount of side play and solder in place on the 0.5mm wire.

Note the vertical brake activation lever is on the incorrect side in this photo of the similar EasiChas assembly— see correct picture in 8.1.11.



8.1.35 Remove the brake gear by springing the top of the hangers off the support wires. If you have used an active flux, remove the wheels and clean thoroughly to remove any flux.

8.1.36 The brake gear now needs to be finished off. Mount short lengths of 0.5mm wire through the remaining holes in the brake pull rods and solder in position. Please note that there is **no hole in the link** at the bottom of the front brake hangers but a short piece of wire still needs soldering through the outer hole.



8.1.37 Trim the outer ends of the 0.6mm cross wire so it is flush with the face of the brake hanger and trim all the ends of the short wires to represent bolt heads.

8.1.38 The 0.5mm cross wire now needs to be cut between the inner brake hangers frames but **DO NOT USE CUTTERS TO MAKE THE FIRST CUT** because it will distort the brake gear. Make the first cut with a saw or triangular file, then cutters can be used to trim the wire back the brake hanger.

8.1.39 The complete brake gear, including the handbrake linkage assembly can now be mounted on the frames (see photo of the completed brake gear on the EasiChas).

8.2 Vacuum reservoir

8.2.1 If you have not already done so, bend down the four tabs in the base of the brake frames to 90 degrees.

8.2.2 Cut the 8.0mm tube to 10.2mm long.

8.2.3 Form the tender straps [D48] into a circular shape around a suitable round object (pin vice?) and solder at 0.7mm and 7.7mm from one end of the tube (the leading end).

8.2.4 Glue or solder the tube to the supports, with the leading end towards the front, so that the front edge of the tube is 12.0mm in front of the centre axle. (see photo above in the similar EasiChas).

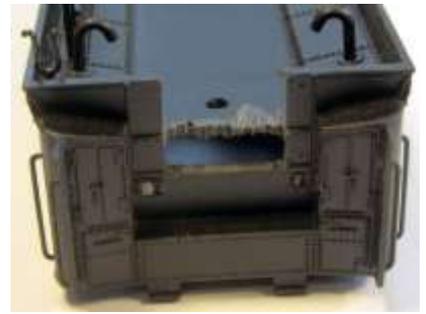
8.3 Coal compartment doors

8.3.1 Take the coal space doors [D51] and, with a square or triangular file, cut a groove through the centre of the door on the half-etched side, using the gap in the beading top and bottom as a guide, so as to form a bend line. Bend the door with groove innermost to a gentle 'V' angle that measures 11mm from outer edge to outer edge.

8.3.2 Solder the door centre [D52] in the groove formed with the file in the centre of the door with the angle end at the top, with the edge against the doors (i.e. not flat against the doors).

8.3.3 Remove the two plastic handles (Water scoop and Brake) and their support box to save from damage, by holding the box behind the wheel with a pair of pliers and pull. If you are lucky the spigot will pull out the tender front; if not, it will break off. Store them carefully.

8.3.4 Carefully make two saw cuts down the front of the coal space about 10mm apart and equidistant about the door centreline and about 9mm down from the top edge. Join the bottom edge of the two saw cuts by sawing across.



8.3.5 Make a series of holes with a drill in the coal space floor just behind the front wall between the saw cuts. Open up between the saw cuts so that piece falls out.

8.3.6 With files, carefully widen the opening to 11mm wide and down to the bottom edge of the moulded line.

8.3.7 The door can now be glued in place using cyanoacrylate glue or epoxy resin.

8.4 Replacement fire iron rails

8.4.1 The part of the fire iron rails along the top of the tender fender is missing. Also, the fire iron rails that are there on the Bachmann tender are a plastic moulding and over thick and over tall. Provided in the kit are a straight etch for the uprights along the tender edge and a replacement etch for the main curved rails. The straight etch can be used with the plastic original curved rails or with the replacement curved rails.

8.4.2 The uprights on the prototype were 'T'-shaped steel and need fabricating. Take the straight fire iron rails [D49] and solder 0.3mm wire into the grooves in the front of the uprights on the same side as the full etch base. **Make sure the wire is no longer than the grooves.** You will see just beyond the end of the groove a small etched dot. Don't confuse this with the end of the groove as the dot indicates a bend point, so the wire must stop short of the dot

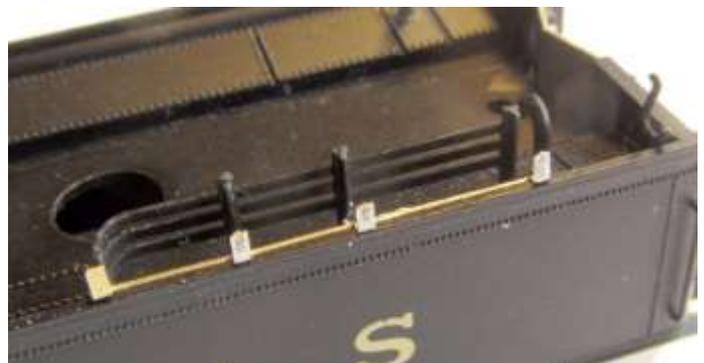


8.4.3 Turn the etch over and fill the groove in the back of the upright with solder.

8.4.4 With the fully etched strip towards you, bend the uprights on the straight fire iron rails where they meet the fully etched part away from you until they are at right angles, then bend them back again at the bottom of the wire to form an 'S'-bend (see photo). Check that they sit over the top edge of the tender fender.

8.4.5 If you are fitting these uprights with plastic curved rails a corner needs to be filed off the lower edge

of the end of the curved part of the plastic rails so that it fits over the etched foot. This is not easy and requires the plastic part to be forced over the edge of the tender and held with pliers whilst filing. Fortunately, the plastic is so pliable it will take this abuse. (Unfortunately, there is no picture of this as we didn't have enough hands to work the camera as well!!)



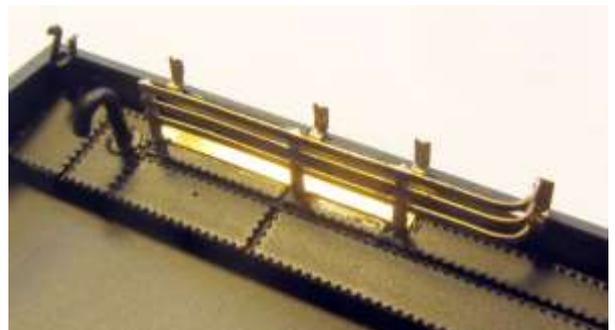
8.4.6 Attach the uprights etch to the top inside of the tender using cyanoacrylate glue or epoxy resin.

8.4.7 Take the curved fire iron rails [D50} and solder 0.3mm wire into the grooves on the back of the uprights. You will see just beyond the end of the groove a small etched dot. Don't confuse this with the end of the groove as the dot indicates a bend point, so the wire must stop short of the dot.

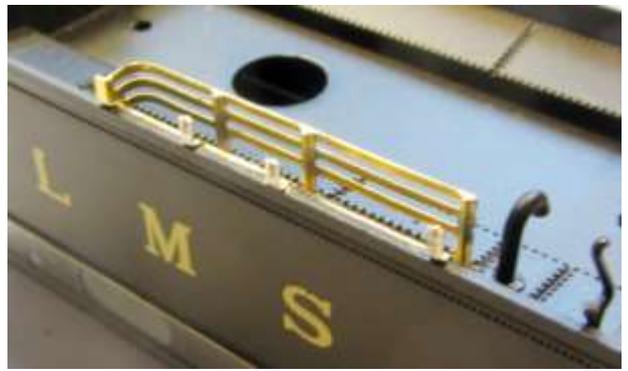
8.4.8 With the wire side towards you, bend the curved rails along the row of dots at the bottom of the uprights towards you until the resulting angle is less than 90 degrees (see photo). Ensure that the rails sit vertically. Adjust the bend if they do not.

8.4.9 Again, with the wire side towards you, bend the end of the curved rails around a 4mm drill through 90 degrees towards you (see photo).

8.4.10 Carefully cut the base of the uprights of the plastic curved rails and discard the rails, carve any remnants flat and then carve off the



rivets on the tender top where the base of the etched curved rails will be. Attach the curved rails to the tender top using cyanoacrylate glue or epoxy resin. Note that the curved rail joins the edge of the last upright on the straight rails on the side nearest the next upright (see photo).



8.5 Replacement lamp irons

8.5.1 The lamp irons provided on the tender are plastic and over thick, and there is no lamp iron provided on the top rear of the tender. Etched replacements are provided for the footplate ones and also for the top one.



8.5.2 Remove the plastic lamp irons on the Bachmann tender by carving them off.

8.5.3 Take three footplate lamp irons [D34] and bend them at right angles where the upright joins the base. Glue in position on the footplate using cyanoacrylate glue or epoxy resin. The centre one should be offset to the right (looking at the tender rear) by just over 2mm (2.17mm) and flush with the rear edge of the footplate. The other two are in line with the buffers and just under 1mm (0.92mm) from the footplate edge. Remember, the vertical part of the lamp iron is nearest to the edge of the footplate.

fender below the lip (see photo).

8.5.4 Take a fender lamp iron [D55] and the fender spacer [D56] and solder the spacer to the back of the lamp iron. Attach the lamp iron to the centre of the tender

8.6 Handbrake and water scoop handwheels

8.6.1 The original drawings of the Bowen Cooke tenders show larger handwheels fitted. The only known photo of the front of a tender in service is shown in the book 'The North Western at Work' and shows large wheels with turned knobs.

8.6.2 If you have not already removed them, we found it easier to replace the handwheel if the complete wheel and box assembly are removed. Hold the box behind the wheel with a pair of pliers and pull. If you are lucky, the spigot will pull out the tender front, if not it will break off.

8.6.3 Remove the original Bachmann plastic handwheel by cutting immediately behind it.

8.6.4 Drill down through the centre of the plastic boss on the box with a 0.6mm drill.

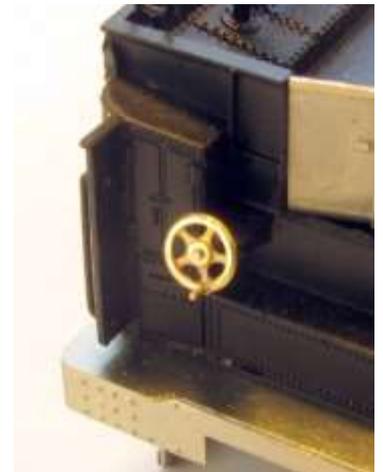
8.6.5 Drill out the hole in the back of the rim of the handwheel [D57] to clear 0.4mm wire.

8.6.6 Use a file to remove the cusp around the outside of the wheel and then round off the outer edge, then solder a 1.75mm length of 0.4mm wire to form the handle.

8.6.7 Mount a length of 0.6mm wire in the box using cyanoacrylate glue or epoxy resin and cut back so about 0.6mm is left protruding.

8.6.8 Attach the handwheel to the spindle using cyanoacrylate glue or epoxy resin.

8.6.9 Re-attach the assembly to the tender front using cyanoacrylate glue or epoxy resin.



8.7 Guard irons

8.7.1 Take the left hand guard iron ([D53] and, holding the base part in a hand vice or pliers, bend over to a right angle (**making sure you are bending it away from the side with the half-etched rivet holes**) (see photo). Then bend the lower part into an 'S'-bend leaving 1.5mm at the tip of the guard iron straight (for the second bend, we used round nose pliers).

8.7.2 Repeat for the right hand guard iron [D54].

8.7.3 Push through the rivets from the rear and fix in position on the **inside** of the Bachmann tender frames using cyanoacrylate glue or epoxy resin.

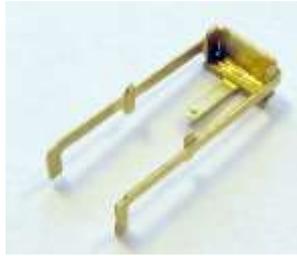


8.8 Replacement tender cab steps

8.8.1 The steps fitted to the Bachman tenders with tender cabs are plastic and are therefore too thick.

8.8.2 Remove the Bachmann originals if fitted.

8.8.3 Take the left rear footstep [D58] and heavily scribe a line across the etch as shown in the photo. Then, with the corner of a square file, file a groove across the etch as shown in the photo.



8.8.4 Similarly, take an upper footstep [D59], scribe a line then file a groove 6mm in from the edge (see photo). Fold the footstep along the groove line.

8.8.5 Fold up the sides of the footstep along the half-etched line and then fold up the back of the footstep along the groove.

8.8.6 Solder the upper footstep between the footstep supports.

8.8.7 Bend the leg of the footstep support with the two etched rivets into a slight 'S'-shape, using the half etched dots as bend points, **making sure that both supports are now the same length** (see photo).



8.8.8 Bend over the tops of the supports either side level with the rearward facing tab and towards the front of the locomotive.

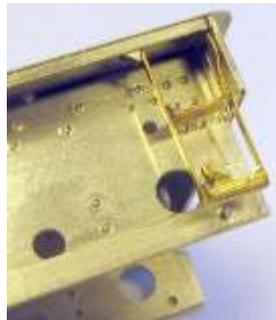
8.8.9 Reduce the length of the rear support by 1.0mm, then bend it back at about 24 degrees and bend the last 0.6mm over so that it lies flat against the frames.



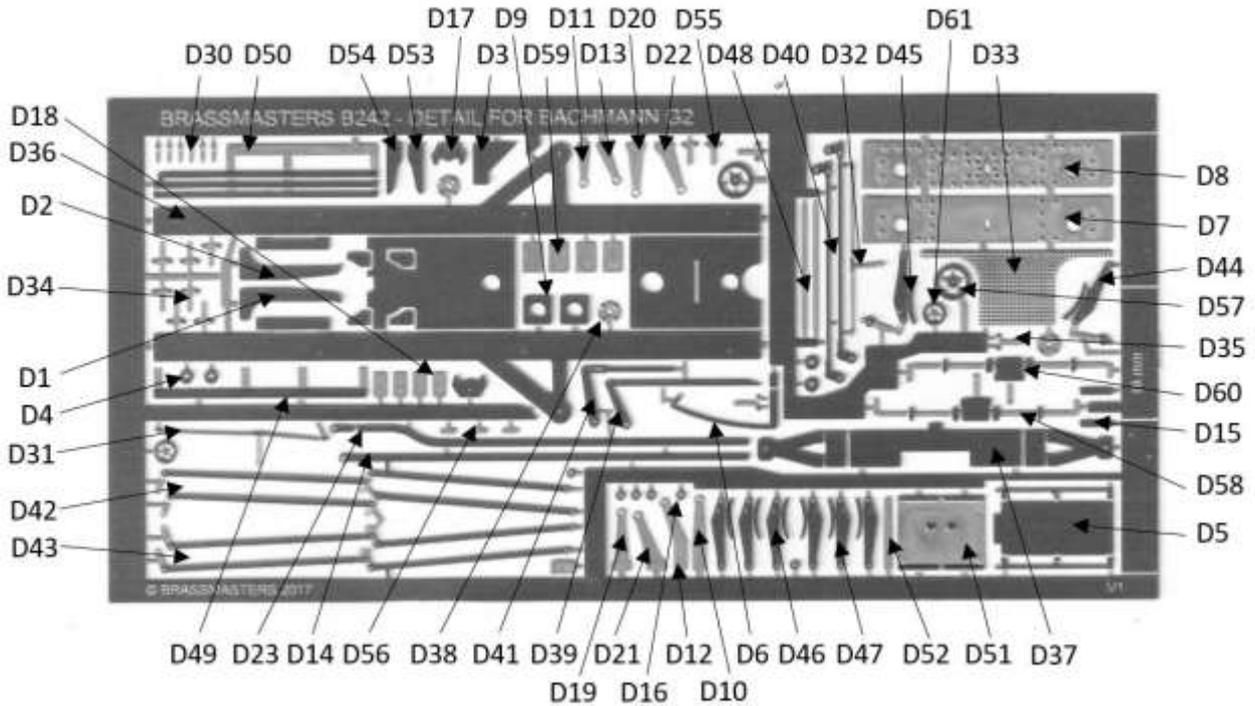
8.8.10 Repeat for the footsteps on the other side using the right rear footstep [D60] and another upper footstep [D59].



8.8.11 Attach the steps to the frames using cyanoacrylate glue or epoxy resin (see photos of the steps fitted to the similar replacement frames)..



Detailing Etch



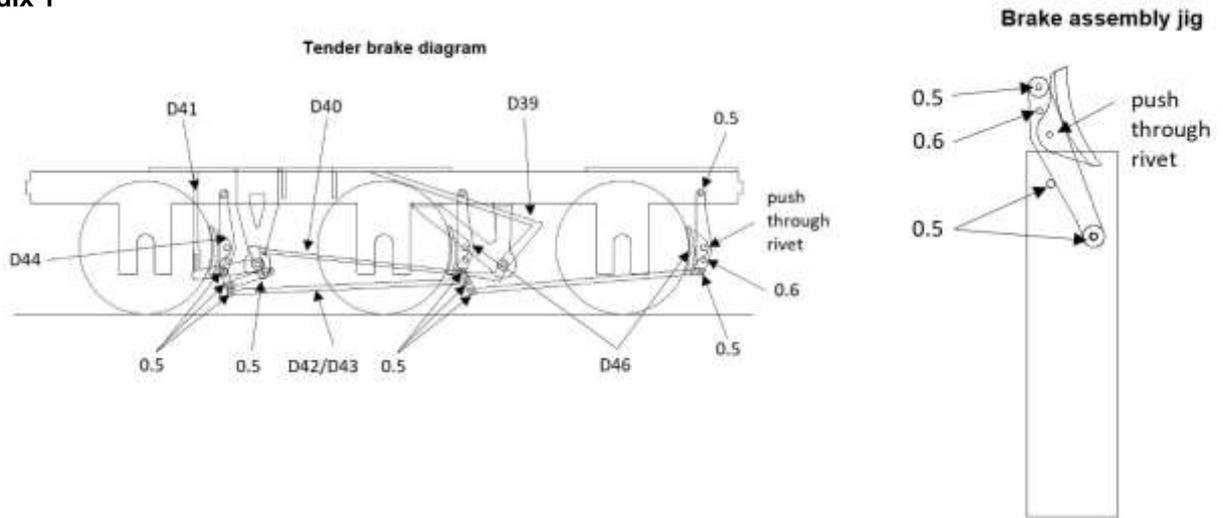
D1	loco guard iron left	D34	footplate lamp iron (6)
D2	loco guard iron right	D35	smokebox lamp iron
D3	sandbox template	D36	00 brake frame (not used)
D4	sandbox bottom flange	D37	brake shaft bracket
D5	drain cocks	D38	brake shaft bracket overlay (2)
D6	drain cock operating rod	D39	handbrake lever
D7	buffer beam original	D40	handbrake pull rod (2)
D8	buffer beam strengthened	D41	vacuum brake lever
D9	buffer bases (2)	D42	brake pull rod 1 (2)
D10	indirect valve gear lever front (mid gear)	D43	brake pull rod 2 (2)
D11	indirect valve gear lever back (mid gear)	D44	brake hanger and block left front
D12	indirect valve gear lever front (fore gear)	D45	brake hanger and block right front
D13	indirect valve gear lever back (fore gear)	D46	brake hanger and block left (2)
D14	indirect reach rod	D47	brake hanger and block right (2)
D15	reach rod joint plate	D48	vacuum reservoir straps (2)
D16	washer	D49	fire iron rail straight
D17	bearing base	D50	fire iron rail curved
D18	spacer	D51	coal space doors
D19	direct valve gear lever front (mid gear)	D52	coal space doors centre
D20	direct valve gear lever back (mid gear)	D53	tender guard iron left
D21	direct valve gear lever front (fore gear)	D54	tender guard iron right
D22	direct valve gear lever back (fore gear)	D55	tender top lamp iron
D23	direct reach rod	D56	lamp iron spacer
	D24-D29 not used	D57	tender handwheels
D30	sandbox levers (4)	D58	rear footstep left
D31	sander operating rod left	D59	upper footstep
D32	sander operating rod right	D60	rear footstep right
D33	cab floor	D61	smokebox door wheel

Note – the brake hangers on the main etch did not all etch correctly and so additional parts have been provided on a supplementary etch.

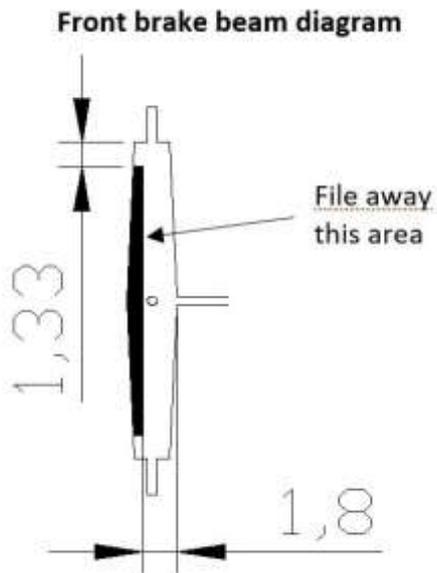
Other Components

brass axleboxes (8)	1.0mm x 0.5mm brass tube
axlebox springs (8)	1.2mm x 0.6mm brass tube
0.33mm brass wire	1.2mm x 1.0mm brass tube
0.4mm brass wire	5/16" brass tube
0.5mm brass wire	2.0mm x 6.3mm plastic strip
0.6mm brass wire	2.5mm x 6.3mm plastic strip
0.7mm brass wire	rivets for replacement rods (4)
0.9mm brass wire	bushes for Bachmann rods (8)
1.0mm brass wire	
2.0mm brass wire	10 BA cheese head screw
0.008" spring wire	10 BA nuts

Appendix 1



Appendix 2



Appendix 3

