Brassmasters Scale Models

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EasiChas

Chassis and Detailing Kit for Bachmann MR/LMS 4F 0-6-0 Locomotive and Tender

For EM and P4 Gauges only

Instructions

Additional components available separately:

- Replacement loco splashers for P4
- Cast tender axleboxes and sprung buffers for replacement tender frames
- Coal rails for Fowler tender

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1 Introduction

1.1 The Easichas frames for Bachmann 4F locomotive, based on the original concept devised by John Brighton, have been specifically designed to allow easy conversion to EM or P4 gauge, which results in a fully sprung locomotive and tender. Furthermore, the basic conversion can be completed without the need to solder any of the main components together.

1.2 There are various levels of conversion with the builder choosing which, of any, additional detail required beyond the basic conversion.

1.3 Basic level of conversion makes use of:

fold-up mainframes, keep plate and ashpan with sprung bearings
fold-up replacement tender frame with sprung bearings.

1.4 Further components are provided to add to the detail of the conversion. These are, working from the front:

loco guard irons
replacement coupling rods
replacement reach rod
replacement brake hangers and blocks
cab and tender doors for Fowler tender
replacement tender footplate and hand rails for Deeley tender
replacement tender brake gear for Deeley tender
replacement tender coal rails for Deeley tender
early type tender front for Fowler tender
replacement tender frames, drag and buffer beams
replacement tender guard irons

1.5 The replacement set of frames buffer beam etc. replaces the lower half of the Bachmann tender giving the proper distance between the frames rather than the over wide ones on the Bachmann model.

1.6 Unfortunately it is not possible to re-use the Bachmann loco pick-ups on this EasiChas. However the tender pick-ups can be altered for re-use. A suggested method for making pick-ups for the loco has been given, which has worked very successfully on the test build, although there are many other methods which the builder may prefer to use.

1.7 Suitable wheels are available from Alan Gibson and Ultrascale. Although they do standard replacement wheel packs these are not suitable for the 4F EasiChas. This is because the EasiChas uses 1/8" axles. When purchasing wheels ensure that you state it is for the EasiChas and you will be given the correct wheels and axles.

2 General Notes

2.1 There are three etches, one for the Easichas for the loco and tender, one for the detailing kit for loco and tender and one for the replacement tender frames. The detailing etch and the tender frame etch are different depending on whether the loco has a Deeley tender or Fowler tender. Numbers shown in square brackets [ ] in the instructions refer to the etch (L or T for the Easichas etch, D for the detail etch and F for the replacement tender frames, with a prefix D or F depending on whether it is for the Deeley or Fowler tendered version) and part numbers, e.g., [**L2**] is part 2 on the Easichas etch, [FD3] is part 3 on the Fowler Detail 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.

2.6 You should look at instruction 5.1 regarding pre-preparing the wheels before commencing building.

2.7 Notes on CD

We have included a CD-rom version of these Instructions. We have taken advantage of the medium to provide more detail than we can include in traditional paper-based Instructions. In particular it has selected prototype photographs which are quick and easy to view. We hope you will find this new way of presenting our instructions helpful when building your model, and welcome your comments on it. It is an excellent way to familiarise yourself with the kit, particularly since the constructional photographs can be reproduced to a much larger size than those included below.

To start
The CD is viewed using a standard Internet Explorer browser (you do **not** have to be connected to the Internet to use the CD). Depending on which version of Windows you are running, when you insert the CD into the drive it will open up to show a file titled "4F". Double click this to reveal the files – double click the one titled "Start" to run the CD.

If the disc does not automatically start and take you to the "4F" file, then open up Windows Explorer and locate the "4F" file that way. Proceed as above.

Navigation – you can use the "BACK" button on your Internet browser and the menu on the left hand side of each page to move around the guide. Click on any of the diagrams, photographs or etches to display it full size on the page. When you have selected the picture or diagram you will see a small square in the bottom right hand corner – this is an expansion button and

allows you to “zoom in”. (If you can’t see the button at first move your mouse around this corner and the top left corner of the picture until the button appears).

Installation
The Guide will operate directly from the CD, but if you will be able to access the pages and images more quickly if you copy the material onto your hard disk. To do these simply copy the whole folder “4F” onto the C: drive of your PC and then open the Start file from there instead of the CD.

We recommend you read the notes in the “Help” section before using the CD. If you have any difficulties please email us for assistance – sales@brassmasters.co.uk

3 Dismantling the locomotive and tender

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
Back to Back wheel gauge
Plastic solvent, superglue and epoxy resin (24 hour and 5 minute)

3.2 First with pliers pull out the electrical plug under the tender and release the loco from the tender by minipulating the drawbar, plug and wires.

3.3 In all cases bag and label all small parts and source of screws **as soon as removed** (they are all different) - trust us on this one!

Dismantling the Locomotive

3.4 Unclip the brake pull rods from each brake block hanger so that the pull assembly hinges on the rear brake cylinder cross shaft. Carefully unclip this cross shaft by springing open the side frames with pliers. Unless you are very careful the end pips will break off. Place brake pull asembly aside for further use.

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

3.6 To remove the keeper plate (with brakes attached) remove the remaining screws and ease up from the rear, prise off the front guard irons which are glued on and release the front keeper plate catches that extend round and over the top of the chassis block, jiggle the sand pipes to allow the brakes and keeper plate to be removed and remove the wheels. Remove the glued-on sandboxes (by twisting with pliers) and sand pipes – the front ones are glued onto the chassis block. Store these for use later. File off the lugs in the chassis block behind where the sandboxes were fitted. The chassis now looks like this:

3.7 With the wheels removed from the chassis, unscrew the machine screws from the wheels and remove the coupling rods. Put the screws back into the wheels for safekeeping. The chassis should now look like the photo. De-grease the chassis sides.

3.8 Hold the rear wheels and with a twisting pulling motion pull off the wheels from the axle. Also, slide off the brass bush.

3.9 Place the axle with centre gear in a vice such that the gear wheel is supported on the vice sides but the axle is loose, tap the axle with a hammer or similar and the gear wheel will slide off the axle. If you do not have a vice use a pair of pliers on one side of the gear wheel, gently slide the plastic gear down and off the axle by holding the axle vertical and pressing down. It is very important not to damage this gear.

3.10 You will now have a box of bits and an invalid Bachmann guarantee!

4 Dismantling the tender

4.1 Deeley tender

4.1.1 Spring the tender side frames apart to release the brake pull rod assembly. Unscrew the two rear 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 (the handrails ‘flex’ during this process).

4.1.2 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 and the guard irons. Remove the water scoop apparatus which is glued in place and, unless you are using DCC, all the ‘gubbins’ above the footplate.

4.2 **Fowler tender**

4.2.1 Unscrew the two screws behind the front drag beam and the one screw offset behind the buffer beam. Pull the underframe downwards to release it from the tender body.

4.2.2 Spring the tender side frames apart to release the brake pull rod assembly. 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 the coupling pocket and the guard irons. Remove the water scoop apparatus which is glued in place and, unless you are using DCC, all the 'gubbins' above the footplate.

4.3 If either of the tender underframes has two metal weight plates fitted, remove the screws and one plate, shorten the screws by filing and replace with just one plate. With two weights, the balance of the tender is affected and it will not sit level (see later for how to fit additional weight in the tender, if required).

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

4.5 Carefully drill out the four rivets holding the phosphor bronze pickups in place, and then un-solder or cut off the wires. If you use an electric drill you may melt the plastic rather than cutting the rivets so either do this by hand or go very slowly, (don't unsolder the wires whilst the are touching the plastic underframe or the plastic will melt and make re-fitting the pickups difficult). Store the pick-ups for later use.

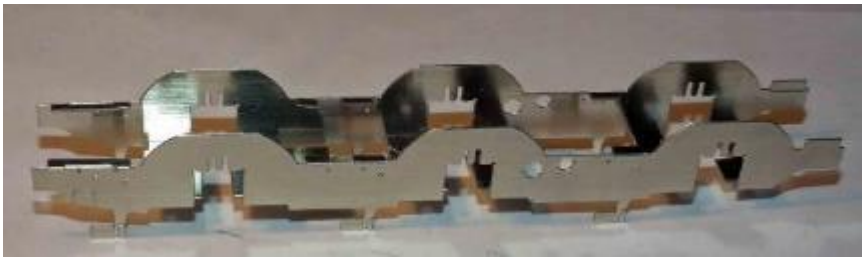
4.6 Your locomotive and tender are now ready for conversion.

4.7 Wash your hands as you will have grease on them from stripping the chassis and the etches should be kept as clean as possible.

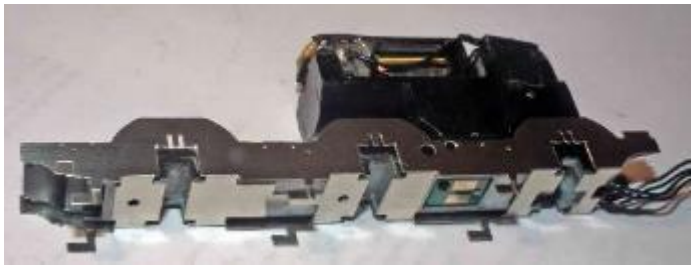
5 Basic loco conversion

5.1 If you are using Alan Gibson wheels you may need to drill the crankpin holes using a 0.65mm drill. The hole must be perpendicular to the wheel. The following will prevent problems with lose crankpins. Countersink the rear of the crankpin screw holes using a 3mm drill and half screw the 12BA screws home. Using 24 hour epoxy smear the remaining thread and screw the 12BA screws home. Smear a little epoxy over the head for additional security but there should not be a big blob that will catch on wheel rotation. Leave in a warm place for 24 hours to set. This will retain the screws and stop them from rotating. See photo (before the epoxy was applied) of a larger diameter but similar wheel.

5.2 Remove the tag [T7] from the main frame and store safely. Remove the loco mainframes [L1] and clean up the residual tabs with a small file.



5.3 Place the frames flat on the bench and with a thin metal rule fold to produce a 'U' section. Either again using a ruler or using a strong pair of pliers, fold up the small sections along the edge of the main frames at 90 degrees. File off the 'cusp' at the end of these top fold sections. See Photo



5.4 Ensure the mainframes fit over the original Bachmann chassis. The frames should sit parallel to the Bachmann frames and not be 'splayed' out at the top. If necessary file the top strips back to ensure this. See Photo. Remove the mainframes.

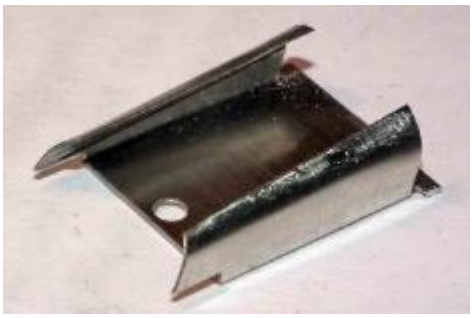
Check the fit of the brass bearings into the slots in the mainframes. If tight, using a smooth sharp file, **lightly** file away the cusp equally on both of the edges of the slots until the bearing slides up and down with no binding. It is very important that too much metal is **not** removed resulting in a sloppy fit – no side play whatsoever is the aim, just a smooth sliding fit.

5.5 Remove the keep plate [**L2**] and remove the two balance] weights [**L14**] and the tag [**T7**] and put these to one side. Fold down the three dummy springs along each side of the keep plate.

5.6 Test fit the keeper plate and the chassis to the Bachmann chassis.

5.7 Unless you are using the replacement etched brake gear fold up the 'cups' on the chassis sides that will hold the Bachmann plastic brake hangers so that they form a flat bottom gentle 'L' shape with a slight sloping upright.

5.8 Using about a 3mm diameter rod (or an axle or even the shank of a jewellers screwdriver) as a former, curve up the half-etched sides of the ash pan [**L3**] with the half-etch to the inside. Fold up the ashpan into an inverted U with the side curving in towards the middle. See photo. The ashpan is screwed under the keeper plate with the two 'ears' keeping it central. See later photos.



IMPORTANT - Carefully examine the bearings as they are not symmetrical. It can be seen that the flange on one side of the slot is wider than the other side. For EM gauge the bearings need to be mounted in the frames with the thicker flange towards the centre of the frames. For P4 gauge the bearings need to be mounted with the thinner flange towards the centre of the frames. Increased side-play on the drivers can be obtained by having the thin side of the bearings on the outside or rubbing off the circular beading round the axle hole. For EM gauge, it will be necessary to file off the raised rim on the inside face of the bearings to ensure the bearings move up and down freely.

5.9 Fit the mainframes to the Bachmann chassis, place the bearings in the slots and check for easy movement. See Photo in section 5.4.

5.10 Temporarily fit the keep plate, using the original Bachmann screws and new washers [**L7**] in the centre and rear hole. Ensure the bearings slide to the bottom of each slot in the keep plate. Note – the rear fixing hole on both the mainframes and the keep plate may need opening up slightly to ensure the screw fits correctly.

5.11 Carefully cut the brake gear off the two Bachmann keeper plates by sawing next to the main part of the centre solid section. Once the saw cut is started hold the brake block (not the bigger keeper plate) or they will ping off across the room! See photo. Keep safely for later use.

5.12 Take the new 1/8" axles and test fit them, firstly in the axleboxes (if tight ream them out to 1/8" using a reamer or, if you do not have one, a small round file, a precision drill or a broach), then place each through the axleboxes and through the "slots" in the Bachmann chassis block. If the axles catch the side of the Bachmann chassis block, file away the offending part of the block.

5.13 If you are using Alan Gibson wheels you will need to re-use the Bachmann axle gear wheel. Take the Bachmann drive gear and drill out to fit the 1/8" axle. To do this first drill out to 3mm then finally to 1/8". We do this by holding the gear in the fingers (wrapped in thin card to protect the fingers - a Gibson packet 'header' is fine) and drill out from both sides with a drill held in a hand chuck. Fit the worm wheel onto the new axle by gentle pushing the gearwheel onto the axle, ensuring that the gear wheel is offset on the axle preferably with the shoulder towards the centreline of the chassis, **it is essential that the same amount** of axle should be protruding each side of the chassis when it is fitted because clearances behind the splashers are small. See photo.

5.14 Take the axles and file the sharp edges of the end to a rounded profile. Use a drill bit of around 5mm diameter to chamfer the rear of each wheel axle hole, these two actions help the axle to 'centre' in the wheel when they are pressed on. **Mount the bearings on all axles the correct way round**, then any spacing washers required (there will be about 1.2mm lateral movement on an axle with no washers in 18.83 gauge –so not many washers are required). For 18.83mm gauge we suggest one full washer is fitted each side of all axles, and for EM one full washer on each side of the leading and trailing wheels, and finally press the wheels on the axles.

Press the wheels home with a back-to-back gauge between the wheels. This gauge should be an interference fit between the wheel backs with no 'slop'. Ensure this is so by turning each wheel through 90 degrees to check for wobble, and, if present, twist the wheel. The Gibson axles are a little shorter than the distance between wheel bosses (about 0.25mm each side) so do not press them fully home. Quarter the wheels with the right hand wheel leading the left hand wheel by 90 degrees. We do this by setting the driven axle first so a wheel spoke is horizontal on one side and vertical at the other, then each other wheelset fitted is lined up with the horizontal spoke, the chassis turned over very carefully, and the spoke on the other side lined up by eye against those on the driven axle.

5.15 Place the bearing springs over the tongues on the frames, fit the wheelsets into the main frames and attach the keep plate and ashpan. See Photo. Check that the motor turns the rear wheelset with no sign of any binding by applying power to the motor. Check the wheels spring freely with no binding and test fit to the plastic body. Remove the springs and put them safe while working on the rods and checking for free running.

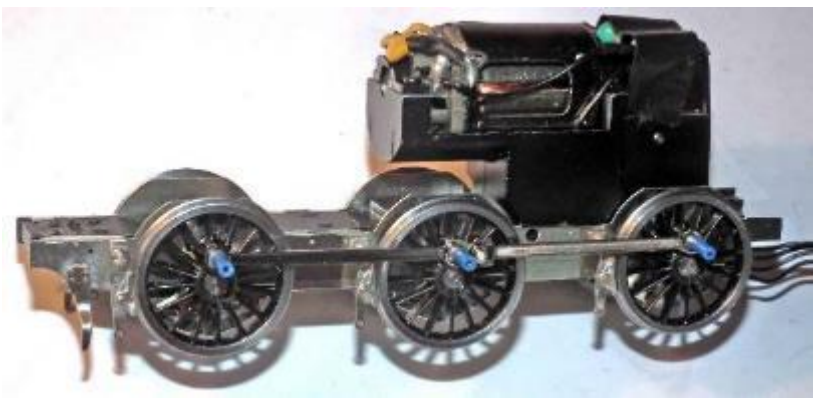
5.16 Push through the four rivets in each guard iron [**L4** and **L5**] and form to a slight 'S' shape. Glue or solder to the chassis frames immediately in front of the leading axle brake 'pockets' (there is a mark on the frames) with the curved face leading.

5.17 If you are going to fit the fully etched version of the brake blocks and hangers it is easiest to do this now so jump to section 7.2

5.18 Fit the Bachmann coupling rods with the six bushes provided. This will require each hole to be opened up to with a rat-tail round file to accept the bushes, if you are careful, these can be an interference fit. If not, the bushes have to be soldered or glued with epoxy centrally in place and if needed reamed out to take the Gibson crankpin bushes (see photo).

A finer scale solution is to solder up a new set of coupling rods, but this of course takes longer (see section 7.1).

5.19 Fit the rods and temporarily secure with a piece of electrical wire sleeve (this does not come unscrewed unlike a proper 14BA nut!). The rod with the joint (as Photo) is the trailing rod on both sides. Check that all the wheels now turn without binding when power is applied to the motor and are quartered correctly. Be careful as you tighten the retaining screws as it can distort the chassis just slightly which results in the axleboxes not sliding freely. Try adding a washer next to the screw head to spread the pressure and open out the holes if necessary. See photo.



5.20 Fit the six springs above the axleboxes to achieve a fully sprung chassis. Note that the driven axle should not drop too low to allow it to drop out of mesh with the gear above. If this is happening, solder or glue a packer onto the top of the keeper plate to stop this because it will

damage the gears if allowed to repeatedly occur. Even though theoretically impossible the front springs can disappear from a completed loco. A drop of 5 minute epoxy at their extreme top where they bear onto the chassis will secure them – trust us on this one!

5.21 Loco pick-ups. It is not possible to re-use the Bachmann pickups so you will need to fabricate your own. Many modellers have their own ideas on pickups, this is how we do it. Using a copperclad sleeper (cut to fit between the keeper plate springs) and 33 swg phosphor bronze wire (not supplied but available from Eileens Emporium), wind a 'spring' shape with extended end. We clamp a fine screwdriver in the vice and, holding the wire one end in the fingers and the other in a pair of round nose pliers, form the spring round the screw driver shaft. **Note one pickup is wound clockwise, one anti-clockwise**. Solder to the copperclad (gapping it after soldering) as per the photo.

5.22 Glue the pick-ups to the chassis keeper plate in the position shown in the photo so they gently press onto the wheel flanges. Test the polarity and direction of travel with another loco and connect together with brass wire and to the motor with wire. Test run with and without the body fitted. When happy, remove the temporary crank pins, shorten the bushes and fit the crankpin bushes (note, if you are going to fit new coupling rods as per section 7.1 do **NOT** shorten the bushes).

5.23 Re-fit the loco body.

Obtaining sufficient clearances in P4

5.24 **T**he clearances are very tight without work on the body in P4. The clearance between the Bachmann splashers in 21.9mm. Gibson wheels set to P4 gauge are 21.8mm over faces but of course these need to 'rock' to allow the springing to work. If the chassis runs smoothly off the body but does not when fitted then there is a problem. There is likely to be contact at any of the following points:

-Top of the rods (oilboxes) on footplate
-Rear of all 'inner' splashers especially the rear ones
-Back of steps (especially if replacement rods are fitted)

5.25 It is possible to file/grind away the Mazak splasher backs to 22.2mm but this is a difficult and time consuming operation only really possible with a cutting burr in a mini-drill.

5.26 Note that you also cannot run the loco to check clearances with temporary insulation retaining 'nuts' in place as these foul the footplate when the rods are 'top centre' so you have to fit the 'final' crank pin nuts and solder/glue in place before final testing (if loose they wind up one side and bind solid).

5.27 However the inner 'tongue' of the splasher sides extend inside the plastic splashers and are each 0.7mm thick. These can be removed with a burr in a mini-drill (use a 3-4mm round headed burr) by very carefully grinding the bottom edge of the tongue away where it meets the footplate (which is about 1.76mm thick). Be very careful and go slowly stopping as soon as the black plastic splasher appears. The tongue will then 'break through' just above the footplate behind the plastic splasher. The rear Mazak inner splashers extend into the cab space whereas the plastic rear ones stop at the cab front, so again care will be needed with the mini-drill.

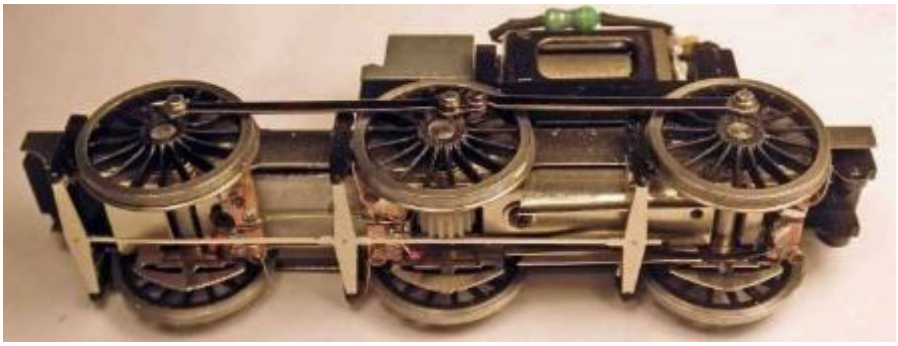
5.28 If you are fitting replacement scale size etched splashers, then the plastic splashers need replacing and there will be sufficient clearances once the tongues are removed.

5.29 The following photos shows the work required on a P4 model to increase clearances, and the extent of the grinding work. This was just sufficient to allow running. but we found it better to remove the tongues completely. This is by far the hardest part of the EasiChas conversion.

5.30 And finally with the inner Mazak splasher ‘tongues’ removed.

Brakes

5.31 Clean up the cut line on the plastic brake hangers to ensure there are no raised edges and if necessary shorten the plastic hanger back ‘studs’ (that fit in the ‘cups’) so they line up with the wheel treads. Remember the chassis is sprung and the wheels will move upwards under the loco weight. Attach the brakes to the brake hanger attachment points using cyanoacrylate glue or epoxy resin (note the photo shows them fitted onto a 3F but the principle is identical).



5.32 Open out the holes in the brake shaft bracket [**L6**] to clear the ends of the Bachmann brake shaft.

5.33 Fit the frames to the loco chassis and screw into place, then fit the assembly to the loco body and screw into place using the long front screw and a washer [**L7**].

5.34 The brake shaft bracket [**L6]** acts as the rear fixing for the chassis as well as a pivot point for the existing Bachmann tender drag beam. Fold up the brake shaft bracket with the half-etched lines (and the half-etched detail) to the outside, the fold lines are very close to the half-etched area so support fully with pliers during bending. Solder together three cleaned up washers [2 x **L7** and 1 x **L8**] with tabs removed which will fit in the oversize drag beam hole and act as the anchor point for it, fit using the original Bachmann screw to hold the rear of the chassis assembly in place. If necessary ‘drift’ the hole towards the rear with a file to allow the drag beam to fit with the bracket securing the chassis against the body. When satisfied remove and solder the washers in place on the bracket (see photo, with screw attached)

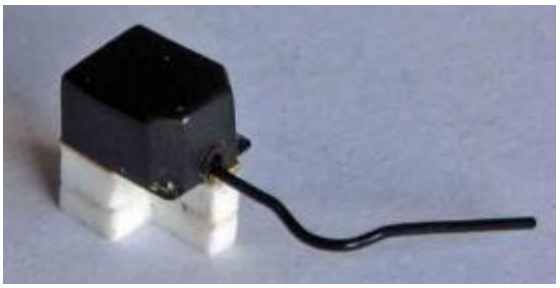
5.35 Remove the brake pull rod etch [**L9**] from the fret cutting the half-etch tabs close to the supporting fret as a lengthened ‘prong’ may be useful. Identify the three overlays representing the linkage each side of the cross shafts [**L10]** for the front fork end, [**L11**] for the middle shackle and [**L12**] for the rear shackle]. Solder or glue the top and bottom overlays to the pull rod with a piece of 0.6mm wire through the centre holes.

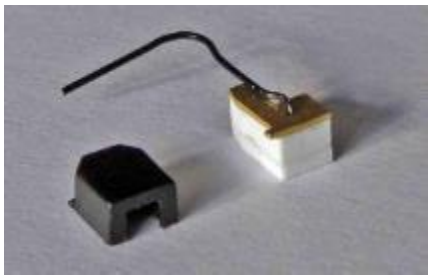
5.36 Find the Bachmann plastic pull rod assembly and cut it immediately behind the rear cross shaft and carefully file away to a ‘tongue’ so it slides into the fork of the etched brake pull rod (this may need cleaning out with a piercing saw if you have soldered the overlays on place). Clip the etched pull in the brake hangers and the rear part of the plastic pull rod in the brake shaft bracket and join the two together using cyanoacrylate glue or epoxy resin. It is just still possible to get to the rear body fixing screw (which also retains tender coupling). See photos.

5.37 Carefully remove and clean up with a file and then attach the driving wheel balance weights [**L13**] and the coupled wheel balance weights [**L14**] (two of which you removed earlier and put to one side) to the wheels, using cyanoacrylate glue or epoxy resin using the photos below as a positioning guide (see www.rail-online.co.uk for a selection of over 200 MR and LMS 4F photos) The large balance weight sits on the middle driven axles’ wheels but offset by one spoke, the two smaller weights are for the outer wheels exactly opposite to the crankpin boss.

Sandboxes

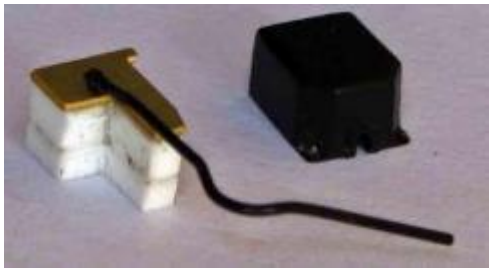
5.38 The Bachmann sandboxes are the correct shape. On the prototype there was a 'trap' just below the sandbox. This can be represented by a joint in the wire (refer to photos and drawings), or you can re-use the pre-formed and blackened Bachmann ones.





5.39 The leading sandboxes were quite wide extending beyond the face of the wheels and the coupling rods. Join a piece of 4 mm x 2 mm plastic strip to a piece of 4 mm x 1 mm and a piece of 4 mm x 0.25 mm, all 7 mm long, using solvent, to form a spacer block.

5.40 Attach the sandbox backing plate [**L15** or **DD6** or **FD9**] to the face of the spacer block using cyanoacrylate glue or epoxy resin. Cut and file the spacer block to shape (see diagram 3 - all diagrams are part of the appendixes at the end of this document).



5.41 If you have the means to drill a truly vertical hole, drill through the hole in the backing plate into the plastic block a short way using a 0.5mm drill. If you don't, just drill in a short way from the front, and then, using a spare sandbox backing plate [**L15** or **DD6** or **FD9**] positioned on the back of the spacer block, drill in a short way from the back.

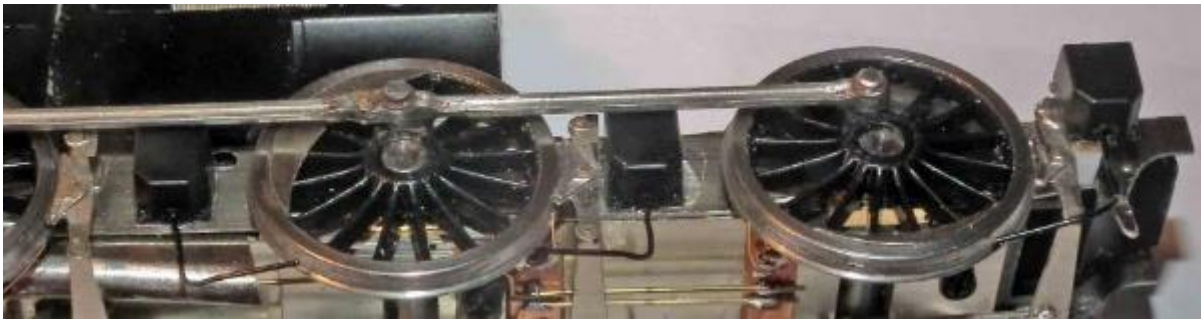
5.42 Using the wire from the leading sandboxes removed earlier, cut and bend up new sandpipes roughly to shape and secure through the hole in backing plate.

5.43 File the sides of the leading two Bachmann sandboxes so that the back edge is the same width as the front edge. Thin the boxes by rubbing the back in a circular manner on emery paper until the box is about 3.3 mm thick (if you have rubbed off the fixing lugs at the bottom you have gone too far!). Attach the sandboxes to the backplate using cyanoacrylate glue or epoxy resin.

5.44 Cut a short length of 0.5 mm wire and push into the hole in the back of the spacer block leaving a small amount protruding.

NOTE: the next two paragraphs are best completed **after all other construction work is complete** as the sandpipes interfere with the removal of the wheelsets. See photo.

5.45 Attach the leading sandbox assembly to the frames using cyanoacrylate glue or epoxy resin inserting the pin in the back into the hole in the frame. Repeat for the other side.



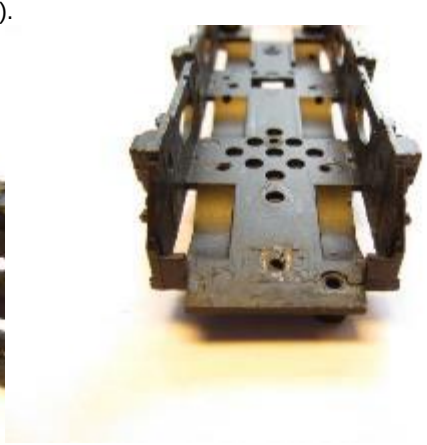
5.46 Attach the centre and trailing sandboxes to the mainframes using cyanoacrylate glue or epoxy resin. There are two small indentations on the mainframes where the top corners of the sandbox should be located; they do not sit flush with the tops of the frames.

5.47 Re-fit the loco body.

6 Basic tender conversion

This assumes that the Bachmann pickups have been removed from the tender as per section 4.5

6.1 The plastic Bachmann **Fowler** frames have to be modified to accept EM and P4 wheels. The splashers over the leading wheels need the outside edge removing so that they match the middle and trailing splashers (see photo). Secondly, the block on the inside of the frame behind each axlebox in which the Bachmann axle ends are located needs paring off with a sharp knife/scalpel. Finally, the rib around the rear needs cutting away (see photo).

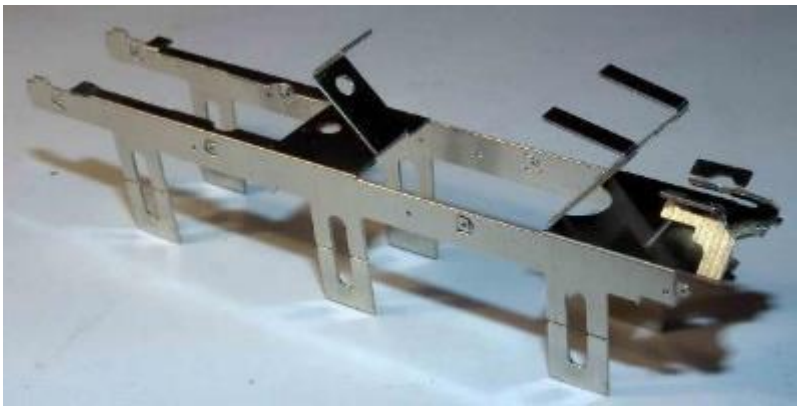


6.2 The EasiChas tender frames [**T1**] have been designed to fit both the Deeley and Fowler tenders and also both replacement etched sideframes. To enable this some pieces may have to be filed or broken off.

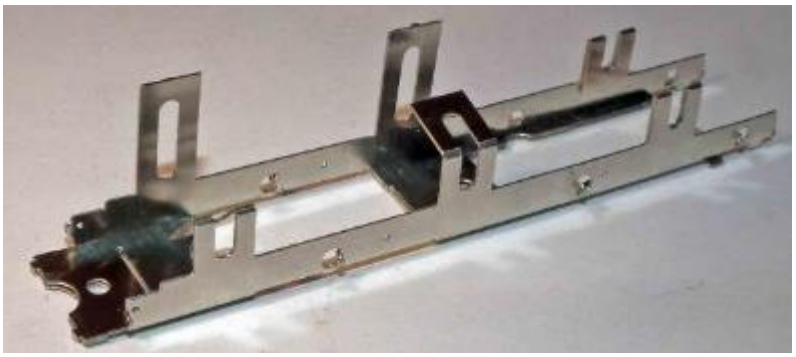
6.2.1 Firstly looking at the tabs on the front and back of the frames (see diagram 1 at end of instructions) remove the tabs according to the chart and file flush.

6.2.2 Now looking at the fold over sections (see diagram 2 at the end of the instructions) break off the parts along the fold lines according to the diagram.

6.3 Taking the EasiChas tender frames **[T1**], fold up to form a U section, taking special care with the narrow section on the bottom of the U towards the front of the tender especially around the 'D' cut-out (see Photo)



6.4 Fold over the spacing sections. Note: the folds are on the **outside** of the bends (see photo)



6.5 Open up the slots in the tender frames [**T1**] so that the tender axles slide freely without any slop.

6.6 Bend out the four small 'ears' on each side of frames at 90 degrees using a jeweller's screwdriver to start the bends.. Fold the outer half of the slotted axle bearing sections through 180 degrees back on themselves inside the frames. Note: the etched line is on the **outside** of the bend. To ensure a tight bend, squeeze the two halves together using a pair of pliers. (see photo of the process half done). This also shows the eight 'ears' bent out.

6.7 Ensure that the new frames fit into the Bachmann tender (the rear screw lug in the plastic tender needs to have been removed flush). Secure in place using the Bachmann tension lock coupler screw in the rear hole. This is sufficient to hold the new frames in place. Remove the screw and tender frames.

6.8 Fold up the six axleboxes [**T2**]. This is best done by placing the etch with the half-etched middle section perpendicular to the edge of a rule, or similar, to form a 'T' shape. Push down on each end of the etch so that it begins to wrap over each side of the rule. See photo.

6.9 Remove from the edge of the rule and push together between the fingers. Complete the bend by squeezing the two edges furthest from the bend with a pair of pliers (this is best done with a 2mm axle through the two holes which ensures two holes line up). Open out the holes so that the axles rotate freely with a very slight amount of slop.

6.10 Assemble the rear tender wheelsets by firstly fitting spacing washer(s), then a bearing, then the second bearing, then more spacing washer(s) and finally the second wheel. Sufficient washers need to be fitted between the wheel and the bearing to ensure there is minimum sideplay. For guidance, in P4 two full width washers per side is recommended on the rear axles, one on the leading and none on the centre. For EM, a single washer on the rear is sufficient. For less than 3 foot curves, less will be required.

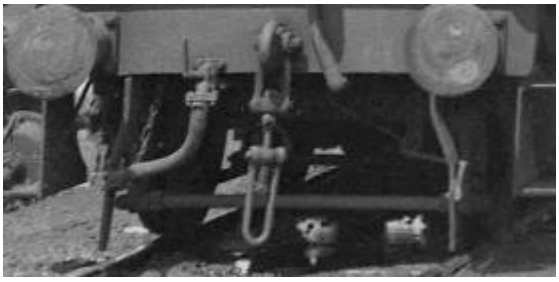
A tip to check the first wheel fitted is running true is to balance them on a steel rule holding the axle with a file and move to left and right spinning the wheels, and wobble can be corrected by 'twisting' the wheel with finger pressure and then re-checking. See Photo.

6.11 Mount the wheelsets in the 'U' slots on the frames with the axleboxes on the outside of the frame.

6.12 Put a 2 mm right angle bend in the end, cut to 75 mm long and then slide the thin 9 thou steel spring wire through the frame ears and holes in the axleboxes (this is a bit of a fiddle!).

Bend over the end of the wire to retain. Fit the wheels in place setting the gauge with a back to back gauge. If you want to reduce the float of the rear axle (only) then two full width and one half-etch washer between the wheel and the axlebox will achieve this in 18.83mm/P4 gauge. See Photo overleaf of an 8 coupled tender but the principle is identical except for the holes in the frames have been replaced by slots. The alternative is to mount all the bearings on the axles with both wheels fitted and then feed the wire through, but this is even more fiddly (see photo). Spin the wheels and adjust for any wobble as you did after fitting the first wheel to the axle.

6.13 Fold up the correct replacement guard irons, [**T3**] for Deeley tender, [**T4**] for Fowler tender, by firstly bending the two guard irons at right angles and then bend the straight sections to a lazy 'S' shape (see prototype photo of a Fowler tender with steam heating pipe). Finally file off the two small tabs between the guard irons. (see photo). Note – these tabs should not be removed if you are intending to use the replacement footplate (see section 10)



6.14 Fit the frames to the Bachmann tender, locating the guard irons in place at the rear, and refit the tender top. Ensure that the tender runs smoothly and that all the axleboxes are free to move up and down. The adjustable Bachmann tender to loco coupling is still too long so unscrew the retaining screw (be careful to catch the captive nut above the footplate which is now free) and elongate the slot forward with a rat tail file. Also cut 2mm off the rear, to it to slide further back. Adjust to suit your model curves.

6.15 Re-assemble the tender. The loco tender coupling has quite a bit of slop in it. If desired solder a 2mm washer to the bottom of the coupling link over the rear hole. This then slides onto the tender pin without slop.

6.16 To re-use the Bachmann tender pickups see section 13.

The basic tender conversion is now complete, but a significant visual improvement can be made to the Deeley tender by replacing the tender brake gear (see section 9.1), and to the Fowler tender by shortening the brake hangers (see section11.1),

7 Additional loco components

The following additional items are provided in the kit and may be used if the builder requires.

7.1 Replacement coupling rods

7.1.1 Each side is manufactured from four etches and hinged behind the centre crank pin. There are also overlays for the bosses. Most of the locos were fitted with fluted coupling rods, but the last 45 were fitted with different wheels and plain fish-bellied rods (these rods and the different balance weights fitted to the wheels are available separately from Brassmasters). The replacement rods are designed to be assembled from two parts, a full etch fluted front and a half-etched plain back.

7.1.2 Cut one pair of rods from fret [**L16** & **L17**].

7.1.3 Open the crankpin holes using a 1.5 mm drill. When complete drill a hole using the same size drill perpendicular in a scrap piece of wood. Leave the drill in the hole in the wood. Tin the mating surfaces of a pair of coupling rods and place over the drill. This holds one end of the rods accurately ready for soldering. It is critical to align the two halves exactly in order to make one rod so take some time tweaking. See photo.

7.1.4 Place a little flux along the top surface of the rod and apply heat; the solder on the soldering iron will run down between the rods and join them. The secret is to apply only a little solder at a time. Solder will fill the "cusp" and give the impression of a solid rod. See photo left. Repeat for the whole length of the rod.

7.1.5 Repeat for the other three pairs of rods [**L18 & L19, L20 & L21, L22 & L23**]

7.1.6 There are four different boss overlays for the front rods and another four for the rear rods. Working from the front of the locomotive, the half-etched boss overlay [**L24**] is fitted to the front coupling rod boss, the half-etched washer [**L25]** is fitted to the rear. The full etched centre boss overlay **[L26**] is fitted to the front of the centre boss, the half-etched one [**L27**] to the rear. The full etched fork overlay [**L28**] is fitted to the front of the forked end of the back rod and the half-etched one [**L29**] to the rear. Finally half-etched boss overlay [**L30**] is fitted to the front of the trailing and the half-etched washer [**L34**] to the rear. Using the appropriate bosses, apply each boss holding it in place with a cocktail stick and solder in place using the same technique as for joining the rods. Clean up each rod with files. Carefully blend the bosses into the front face of the rods.

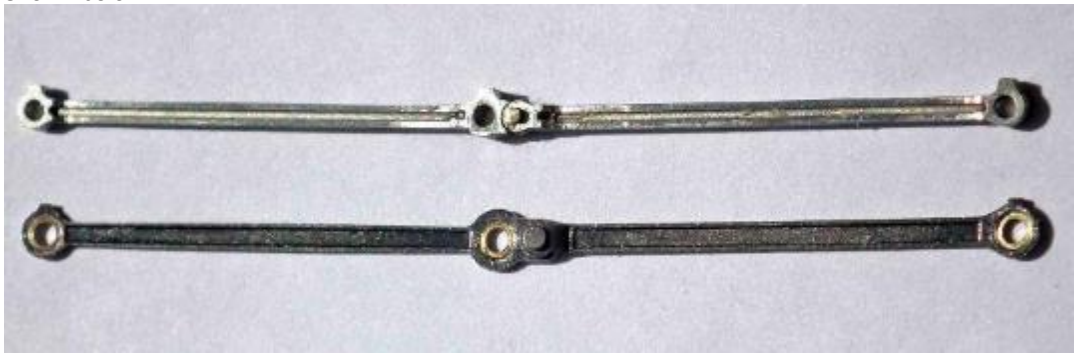
7.1.7 The rear length of each rod has a knuckle joint to be manufactured. The front and rear rods are joined with a short length of 0.8 mm wire pushed through from the front and then cropped back on the rear. leaving about 0.5 mm proud. See photo.

7.1.8 To stop solder flooding the joint apply a little oil to the surfaces not to be soldered - this will prevent the solder running into the joint. Keep the rear of the rod clean. Solder can then be quickly applied with a very hot iron to the back of the rod to fix the wire in place. Clean off excess solder leaving enough to keep a strong joint. See photo above of completed rods.

7.1.9 Repeat for the other rods on the other side of the loco using the appropriate parts.

7.1.10 Open up the crankpin holes in order that the crankpin bushes will rotate in the rod. This can be done with a reamer, broach or a fine Swiss file

7.1.11 Fit the rods to the wheels and test run. A comparison between the Bachmann rods (lower) and the replacements is shown below.



7.2 Replacement brakes and brake hangers

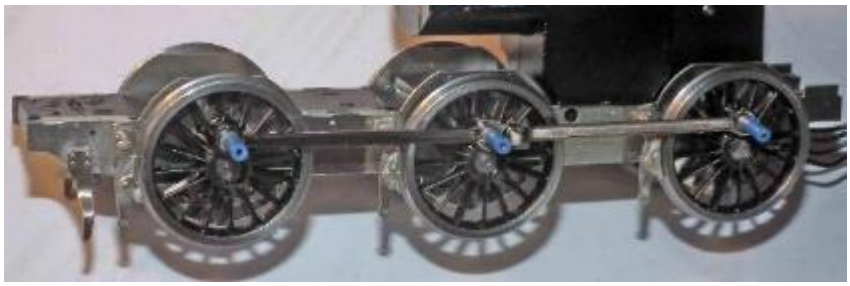
7.2.1 The plastic brakes are rather nicely moulded. However metal replacement brake hangers can be fitted if the Bachmann brake hangers are lost or a metal replacement is preferred. Remember plastic does not produce an electrical short and the wheels are sprung so move vertically!

7.2.2 Take the brake hangers [**L32**] and the left hand brake block overlays [**L33**]. Open up the holes in the top, middle and bottom of the brake hangers, the top and middle to clear 0.7 mm wire and the bottom to clear the ends of the brake pull rods [**L9**]

7.2.3 Solder together the brake hangers [**L32**] and the left hand brake block overlays [**L33**], utilising a short piece of 0.7mm wire in the centre hole to assist alignment. Trim the wire to length. Repeat for the right hand brake hangers using parts [**L32** and **L34**].

7.2.4 Remove the wheels and EasiChas from the Bachmann chassis block. Attach three pieces of 0.7 mm wire across the mainframes using the holes provided protruding and equal amount (at least 5mm) beyond the frames on both sides. Cut and file off the 'cups' and support bracket that would have been used to re-fit the plastic Bachmann brakes.

7.2.5 Slide the brake hanger bracket inner etches, [**L35**] for left hand side, [**L36**] for the right hand side, over the wire and solder to the frames with the vertical longer face leading. Re-fit the axleboxes, axles and wheels to the chassis without fitting this to the Bachmann chassis block (this is to check positioning of the etched brake blocks).



7.2.6 Attach the brake hangers to the wire, making sure that the brake blocks do not touch the wheels, which would cause a short circuit. Attach the brake hanger bracket outer etches, [**L37**] for left hand side, **[L38**] for the right hand side, over the wire on the outside of the brake hangers and solder in place. If you get flux on the treads of the wheels they will rust – we protect them with a thin bit of masking tape during this process.

7.2.7 Trim back the wire and file flush with the outside of the brake hangers.

7.2.8 Having made sure that there is a good soldered joint between the cross wire and the frames, with a piercing saw cut the brake hanger wire between the frames. As long as the first cut is made with a saw, the wires can then be trimmed back with cutters. Note – the first cut must **not** be made with **cutters**.

7.2.9 Assemble the brake pull rods as per paragraph 5.31-5.36.

7.3 Replacement buffer beams

7.3.1 A number of replacement buffer beams have been provided to cover the life of the locos, some of which can be fitted with piston rod tail covers [**DD1**, **DD2**], or [**FD1**, **FD2**, **FD3**, **FD4**]

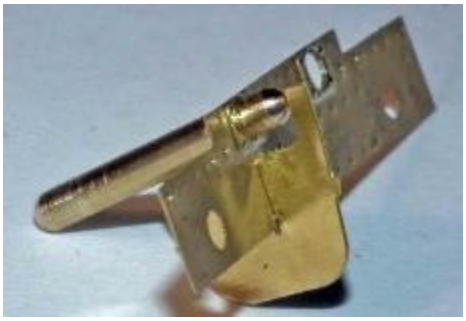
7.3.2 Remove the Bachmann buffers by gripping carefully with a pair of pliers and wriggling them until they come loose.

7.3.3 Remove the detail from the cast Bachmann buffer beam by either filing it completely flush (including the lip of the overhanging footplate at the top), or retain the lip but remove all detail below here. This latter option looks better but the holes for the buffers will need 'drifting' by about 0.5mm.

7.3.4 Taking the appropriate buffer beam overlay, press through any rivets required.

7.3.5 Piston Tail Rod covers were fitted to all locomotives except the 1937-9 build batch from new. They were mainly removed from 1933 to 1938 although at least one loco still had them in 1963! If fitting piston tail rod covers, drill through and open out the half-etched holes in the rear of the chosen buffer beam so that they are a tight fit on a piece of 2mm rod.

7.3.6 Place the piece of 2 mm rod in a mini drill and suitably round both ends. Position the rod in one of the holes in the buffer beam using the jig [**DD5**] or [**FD7**] which slides on from below and helps set the angle and length of projection – see photos. Solder in place from the rear. Cut off the rod flush with the back of the buffer beam and repeat the process for the second piston tail rod cover.



7.3.7 If refitting the Bachmann buffers, after pushing through the rivets, attach the buffer bases [**DD3**] or [**FD5**] and if appropriate, the buffer packing plates (most locos were fitted with them and they were slightly larger than the buffer bases) [**DD4**] or [**FD6**], to the buffer beam by solder or using cyanoacrylate glue or epoxy resin (if using replacement buffers attach only the packing pieces as appropriate). Note – the packing pieces are not square and the shorter side should be towards the bottom i.e. there should not be anything overhanging the bottom of the buffer beam.

7.3.8 Attach the buffer beam to the loco using cyanoacrylate glue or epoxy resin.

7.3.9 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 re-fitting.

7.4 Replacement splashers

7.4.1 The splashers fitted to the Bachmann body are overscale to accommodate 00 wheel flanges. If modelling in P4 a set of reduced size splashers is available as a separate etch from Brassmasters.

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9 Additional tender components – Deeley Tender

9.1 Replacement brake gear – Deeley tender

The Bachmann tender brake gear is moulded in line with the frames and is probably the weakest visual area of the model. Cut the brake gear away and clean up the cuts especially the inside of the 'D' cut-outs.

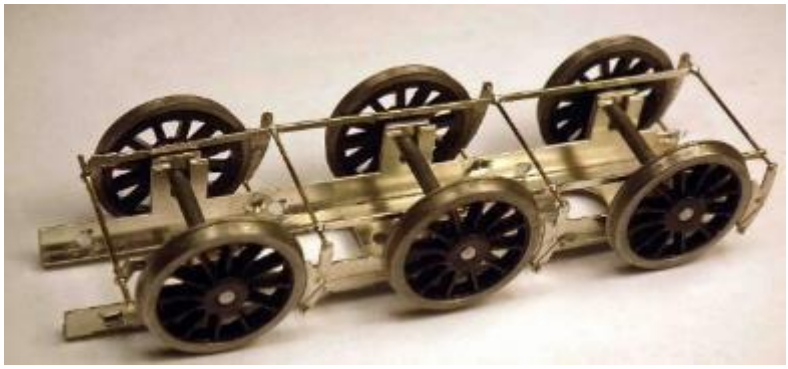
The replacement brake gear can be fitted to the EasiChas frames for EM and P4, and for 00 it can be fitted to the brake frame [**DD8**] which also represents the tender tank.

9.1.1 For a 00 model, fold up the sides of the brake frame [**DD8**] to 90 degrees. With the tender wheels removed check in position. The rear fingers of the brake frame will need to be bent to clear the Bachmann guard irons.

For both 00 and EM/P4 the remaining instructions are the same.

9.1.2 Solder 'studs' of 0.7 mm wire to the hole in the centre of each brake block/hanger [**DD9** and **DD10**] leaving 0.5mm protruding to represent the bolts, this is easiest to do with the brakes still attached to the carrier etch.

9.1.3 Solder 0.7 mm wire across the EasiChas frame/ brake frame so the ends are flush with the wheel faces, at this stage leave continuous across the frame.

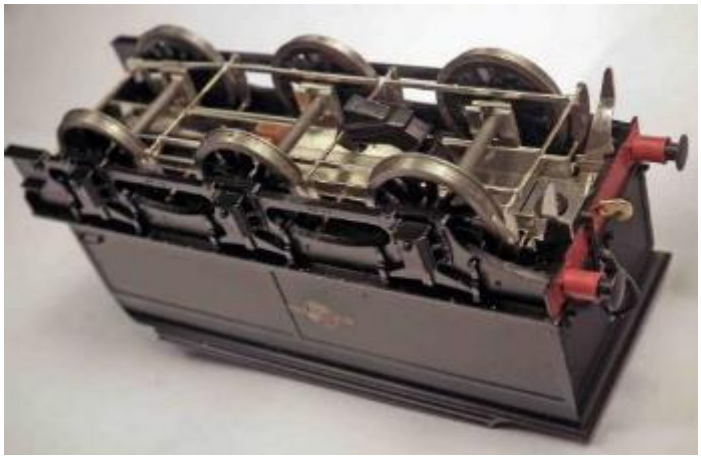


9.1.4 Remove the blocks/hangers from the etch carriers and solder to each wire cross shaft with the hanger 'short length up' in line with the wheels. Make sure that the brake blocks do not touch the wheels. Remember the wheels move up and down in the EasiChas.

9.1.5 Having made sure that there is a good soldered joint between the cross wire and the frames, with a piercing saw cut the brake hanger wire between the frames. As long as the first cut is made with a saw, the wires can then be trimmed back with cutters. Note – the first cut must **not** be made with **cutters**.

9.1.6 Place three cross shafts of 0.7 mm wire through each hanger and pull rod [**DD11**]. Solder the wire to the bottom of the brake hangers. Position the pull rods just inside each wheel making sure they do not touch the wheels. Remember to allow for side play. Solder in place.

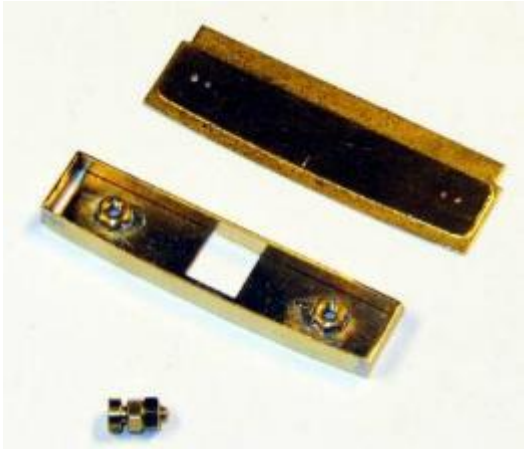
9.1.7 Cut a piece of 0.7mm wire to 24mm, open out the holes in the ends of both brake pull rods and solder the wire through the holes so the wire fits between the plastic Bachmann tender side frames.



9.2 Water Scoop – Deeley tender

9.2.1 A quick trawl through photos of Deeley tenders attached to 4Fs reveals that many 4Fs (about 60% in BR days) were not fitted with water pickup apparatus. You can tell from a photo if a scoop was fitted because there was an operating handle on the right hand side of the tender front sitting vertically behind the front vertical handrails (the left is the tender brake handle) and also they had to have tank vents (although these could be retained after the scoop was removed!). The Bachmann plastic scoop is slightly over size and positioned too far forward on the RTR tender. As a result it fouls the centre brake cross shaft if re-fitted in the same position. If you wish to fit the scoop reduce the rear plastic mount by 2mm and fit at the rear of the EasiChas hole at a slight angle with the front 'mouth' just clear of the brake cross shaft. See photo.

9.3 Replacement front footplate – Deeley tender



Note - If utilising the Brassmasters replacement tender frames, these should be built first before assembling the replacement front footplate.

9.3.1 After removing the tender body, remove the plastic Bachmann front footplate by prising the front footplate away from the tender frames using a thin blade (it may be necessary to cut through the pins holding the front footplate if the glue does not give way)

9.3.2 Bend up the back of the front footplate support [**DD12**] and then bend in the two side pieces so that they are parallel to each other.

9.3.3 Solder two 12 BA nuts in the recesses in the top of the front footplate support base (see photo)

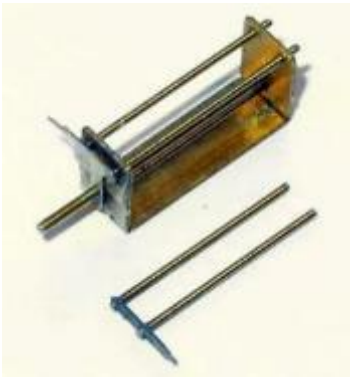
9.3.4 Curve the front footplate support front [**DD13**] to match the curve on the underside of the front footplate [**DD14**]. Ensure that it fits between the side pieces of the front footplate support [DD12] before soldering it in place. (see photo)

9.3.5 If fitting the footplate to the Bachmann frames, with the Bachmann tender body in place on the Bachmann tender frames, position the front footplate hole jig [**DD15**] at the front of the tender body. Drill two 1.3 mm holes in the Bachmann tender frames using the large holes in the centre of the jig, and four 0.5 mm holes for the hand rails using the holes in the outer edge of the jig.

9.3.6 **IMPORTANT** - If fitting the footplate to the replacement tender frames, the two 12 BA x 1/8" screws **must be reduced in length**. Screw two 12 BA nuts onto the 12 screws and cut/file the screw thread flush with the face of the screw. (see photo)

9.3.7 Check that the new front footplate assembly fits to the Bachmann tender frames using two12 BA x 1/8" screws

9.3.8 If the tender that is being modelled has a water scoop fitted, drill a 0.5 mm hole in the front footplate [**DD14**] where the inner half-etched mark is and a 0.6 mm hole where the outer half-etched mark is. (see photo)



9.3.9 Remove the front footplate support assembly and solder on the front footplate to the top.

9.3.10 Open out the holes in the end of the handrail jig [**DD16**], the four outer holes and the two inner holes 0.5 mm, the central larger hole 0.6 mm, and bend up the ends to 90 degrees. A small piece of scrap etch can be soldered across the jig between the two outer holes and the single larger hole to act as a spacer and therefore make soldering the handrails to the handrail top support easier.

9.3.11 For the hand rails on the brake handle side of the tender, cut three pieces of 0.5 mm wire 16 mm long and one piece of 0.6 mm wire 16 mm long. Thread the three 0.5 mm pieces of wire through the appropriate holes in the jig.

9.3.12 Open out the holes in the handrail top with brake handle [**DD17**] and thread it over the three pieces of wire in the jig. Make sure that the top is correctly orientated for the left hand side of the tender looking forward. With a short piece of wire protruding from the top, solder the top to the ends of the wire. File off the wire flush with the top.

9.3.13 Thread the fourth piece of wire through the jig and the handrail top and solder in place with 2 mm protruding through the top (see photo)

Note - Be careful when you remove the hand rail assemblies from the jig as they are quite delicate until they are fitted in place.

9.3.14 If the tender does not have a water scoop, cut two pieces of 0.5mm wire 16 mm long and thread through the top two holes in the handrail jig.

9.3.15 Open out the holes in the hand rail top [**DD18**] and thread it over the two pieces of wire in the jig. Solder the top to the ends of the wire and file off the wire flush with the top

9.3.16 If the tender does have a water scoop, repeat 9.3.11 to 9.3.13, this time ensuring that the top is orientated for the right hand side of the tender

9.3.17 For the handbrake and water scoop handles cut a piece of 0.6mm wire 8.5 mm long. Bend over the last 2.5 mm at a right angle. Solder centrally to the top of the brake handle wire. Repeat for the water scoop handle if fitted

9.3.18 The tops of the handrail are 14 mm above the tender frames. Drill a 0.45 mm hole in the front edge of the sides of the Bachmann tender top 14 mm from the bottom edge just over 1 mm deep.

9.3.19 If fitting to the Bachmann tender frames, extend the slots in the Bachmann tender frames that receive the hooks at the front of the tender top towards the rear of the tender so that the tender top can be inserted without tilting so far. This enables the top to be taken on and off without damaging the handrails.

9.3.20 If fitting to the Bachmann tender frames, screw the Bachmann tender top, using the original screws, and the new front footplate, using 12 BA screws, to the Bachmann tender frames. Take the handrail assembly with two rails, trim the wire to length, and fix in place in the Bachmann tender frame using cyanoacrylate glue or epoxy resin. For the handbrake/water scoop assemblies, solder to the front footplate. (see photo)

9.3.21 If fitting to the replacement tender frames, reduce the head diameter of the Bachmann body retaining screws by holding them in a pin chuck and rotating them against a file. Screw the tender top in place. Screw the new front footplate in place utilising the shortened 12 BA screws (see 9.3.3). take the handrail assemblies and solder in place in the tender frames

9.3.22 If fitted, fix the side plates [**DD19**] to the hand rails.

9.4 Tender coal rails – Deeley tender

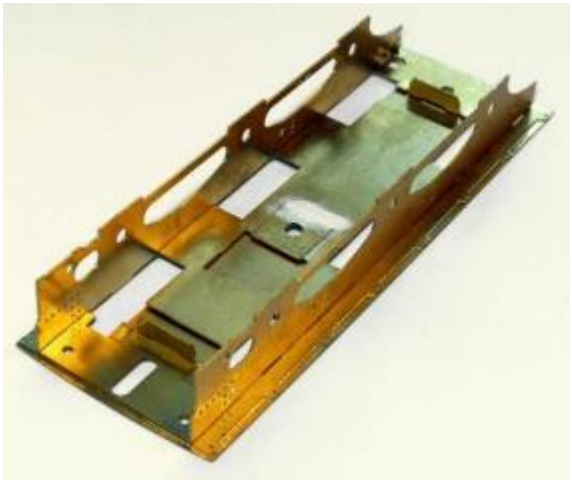
9.4.1 Carefully remove the Bachmann coal rails by cutting vertically down each side of the supports, down behind the front coal plate and horizontally across the curved end of the coal rail where it meets the tank top. (For added support of the curved end to the etched coal rails, cut the curved end level with the bottom of the bottom coal rail)

9.4.2 Cut and file the remains of the coal rails off the front of the supports but not coal plate. Gently file the remains of the coal rails off the coal plate until the replacement coal rails are in a straight line when resting against the supports and the coal plate. (If the small part of the curved rail was left at the back end, cut away the front part, so that the etched rail sits flush with the outside edge of the tender)

9.4.3 Reduce the width of the supports to match the uprights on the back of the coal rails [**DD20** and **DD21**]

9.4.4 Attach the coal rails to the plastic uprights using cyanoacrylate glue or epoxy resin (see photo above)

10 Replacement tender frames – Deeley tender



The Bachmann tender frames are spaced a lot further apart than on the prototype due to an over allowance for the thickness of 00 wheels and to the thicker frames. This results in the axleboxes being too shallow. The replacement frames, top plate, drag and buffer beams fit in place of the Bachmann originals, and in turn, the EasiChas frames fit to the underside of the replacement frames. The replacement frames still allow the tender to negotiate 3 foot curves in both EM and P4.

10.1 Push through the half-etched rivets on the tender sideframes [**DF1**]

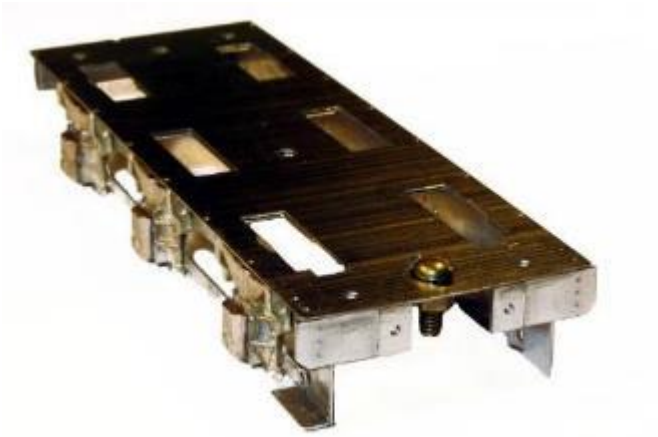
10.2 Fold over the five tabs on the base of the tender frames [**DF1**] back on themselves (see photo). Ensure they are completely flat.

10.3 Fold up the sides of the tender frames and the two locating tabs to 90 degrees

10.4 Reduce the head diameter of the Bachmann body retaining screws by holding them in a pin chuck and rotating them against a file

10.5 Push through the rivets on the underside of the tender base [**DF2**]. Ensure the four tabs on the top of the frames [**F1**] engage in the slots in the tender base [**DF2**]. Solder the two together in between the frames **not** along the side of the frame (otherwise this may affect the fitting of the rivet strip later)

10.6 Take the two pieces of the buffer beam [**DF3** and **DF4**] and push through the rivets on the buffer beam back [**DF3**]. Solder the two together.



10.7 Solder the buffer beam assembly to the tender base and frames ensuring the it is the correct way up (the buffer holes should be towards the bottom of the buffer beam when fitted).

10.8 There are two different types of drag beam, with a rounded end **DF5** and **DF6**] and the later type with an angled end [**DF7** and **DF8**]. Push through the rivets in the appropriate drag beam back [**DF5** or **DF7**] and then solder the two appropriate halves together.

10.9 If using the original Bachmann loco coupling, the drag beam will need the centre section removing. Make a saw cut to the inside of the two raised pads (see photo).

10.10 Solder the drag beam in place.

10.11 Solder the two trunnions [**DF9**] in place ensuring that there is a single rivet located to the top.

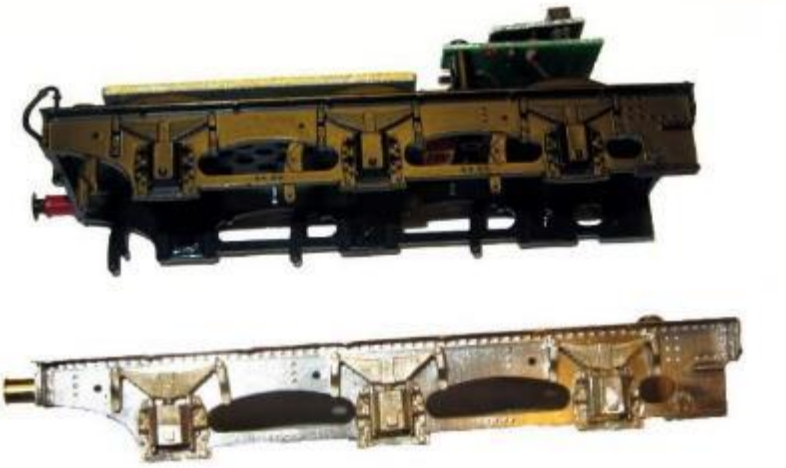
10.12 Solder the bottom footsteps [**DF10**] and the top footsteps [**DF11**] in place.

10.13 Solder the top footstep back [**DF12**] in place.

10.14 Ensure that the lower footstep backs [**DF13** and **DF14**] fit in place. File slightly to miss the trunnion if necessary. Solder in place.

10.15 Solder the rivet detail fronts [**DF15** and **DF16**] in place on each side of the frame.

10.16 Ensure that the rivet detail rear [**DF17** and **DF18**] fits in place. Trim if necessary. Solder into place (see photo right - bottom half).



10.17 Gently pull the buffers from the rear of the Bachmann tender frames. File away the spigot of the buffer housing and the buffer rod from the side until it fits in the hole in the buffer beam and misses the side frame. This will mean removing about 50% of the spigot (see photo left)

10.18 Attach the buffers to the buffer beams on the replacement frames using cyanoacrylate glue or epoxy resin.

Note - a better method is to fit brass sprung buffers – these are available separately from Brassmasters.

10.19 Gently pull the small buffers from the front of the Bachmann tender frames and attach them to the drag beam on the replacement frames using cyanoacrylate glue or epoxy resin.

10.20 Cut the axlebox and spring hanger assemblies from the Bachmann frames using a piercing saw. Trim around the axlebox and spring. Remove the raised section on the back of the moulding and then attach to the replacement frames using cyanoacrylate glue or epoxy resin (see photo above).

Note - a better method is to fit brass axlebox and springs available separately from Brassmasters (see photo at 10.16)

10.21 If using with the EasiChas tender frames, solder a 8 BA nut in the recess on the top of the tender base [**DF2**], and a nut over the rear hole of the tender base

10.22 Fit the replacement tender coupling pin (8 BA **round head** screw and nut) to the slot in the front of the tender frame. Dependent on the desired position of the screw it may be necessary to remove the half-etched semi-circle in the bottom of the front footplate.

10.23 Fold up the replacement guard irons [**T3**] by firstly bending up the two guard irons at right angles and then bend to shape. (see photo in 6.13)

10.24 Fit the EasiChas frames to the replacement frames using an 8 BA screw

10.25 Fit the guard irons to the tender frames 8 BA screw.

11 Additional Tender Components – Fowler Tender

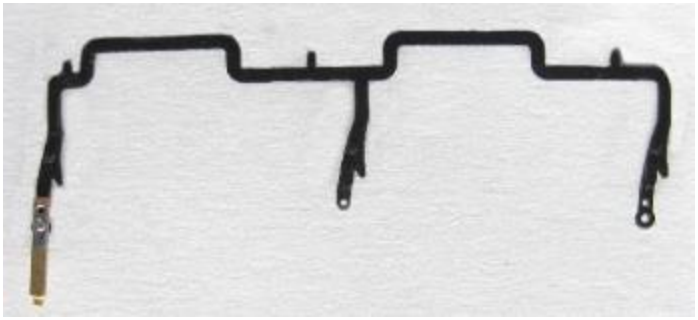
11.1 Shorten brake hangers

11.1.1 The plastic brake hangers and blocks on the Fowler tender are perfectly acceptable separate plastic units in line with the wheels except that the brake hangers are slightly too long and hang too far below the tender frames. However, they can be shortened and the pull rods refitted.

11.1.2 Remove the plastic brake hangers from the Bachmann frames by placing a sharp screwdriver between the flat section of the brake hanger moulding and the tender floor and levering gently.

11.1.3 Take the brake hanger drilling jig [FD10] open out the hole nearer the centre to 07 mm and solder a short piece of 0.7mm wire through the hole.

11.1.4 Position the jig with the wire in the in the hole in the bottom of one of the Bachmann brake hangers, ensure that the section with the upper hole is central on the hanger and drill a 0.5 mm hole through the outer hole into the brake hanger. Cut off the bottom of the brake hanger below the new hole and round the end (see photo – left, jig in position, right, hole drilled and middle, finished shortened brake hanger).



11.1.5 Repeat for all the other brake hangers.

11.1.6 Refit the plastic brake hanger assembly to the plastic underframe using cyanoacrylate glue or epoxy resin.

11.1.7 Refit the plastic pull rods, having first bent the front section downwards slightly and the levers back slightly to ensure the brake shaft fits into the holes in the plastic frames. However, a more accurate set of pull rods are provided in the kit (see 11.2)

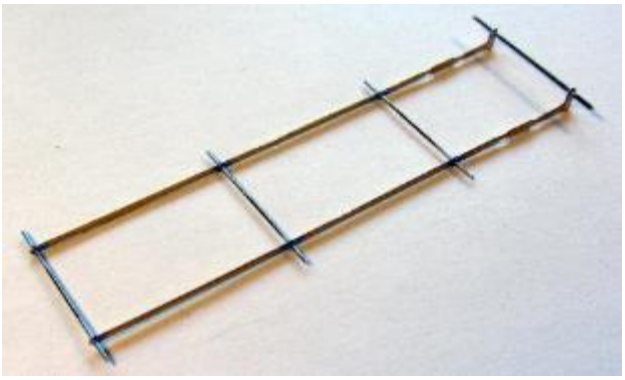
11.2 Replacement pull rods

11.2.1 The plastic pull rods are not quite the correct shape at the front end so can be replaced if required. They can also be positioned further apart than the plastic ones.

11.2.2 Cut three lengths of 0.5 mm wire 23 mm long and thread through the bottom of the brake hanger one side, through the brake pull rods [FD11] and through the other side brake hanger. Retain in position with a small piece of Blu-Tac or similar over the outside of each brake hanger.

11.2.3 Position the pull rods as far out along the wire as possible but without touching the backs of the wheels. Measure the distance between the pull rods.

11.2.4 Remove the wire and brake pull rods from the plastic hangers and assemble on the bench with the wire positioned centrally between the two pull rods and at the distance measured apart.



11.2.5 Put a piece of 0.7 mm wire 25 mm long through the front end of the two brake pull rods. Again solder centrally between the pull rods.

11.2.6 Refit to the brake hangers and check all is ok. Make sure that the brake hangers are as far apart as possible then trim the cross wires.

11.2.7 Remove the brake pull rod assembly and put to one side until all the work on the tender is complete. When it is attach the pull rod assembly to the plastic brake gear using cyanoacrylate glue or epoxy resin.

11.3 Replacement tender front

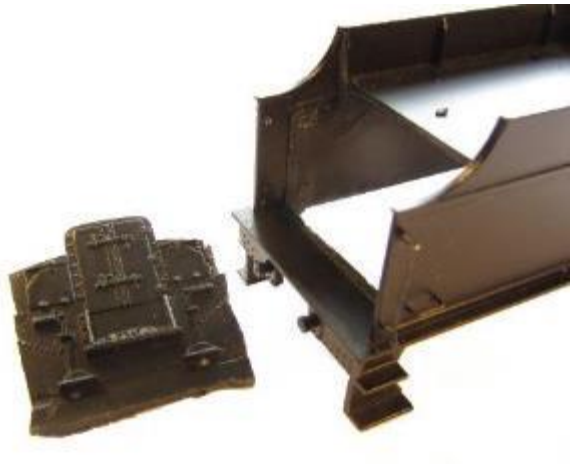
11.3.1 The Fowler tender supplied by Bachmann is a later version with coal doors. A lot of locos were fitted with the original Fowler type with a coal hole and long tool box. A conversion for this type tender is supplied in the kit.

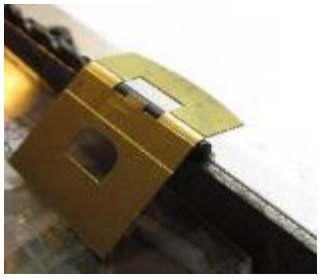
11.3.2 Having removed the Bachmann tender underframe from the Bachmann tender body, carefully remove the front platform, complete with brake pillar and water scoop pillar. This is done by carefully levering away from the tender front. Put to one side for future use.

11.3.3 Grip the water gauge, to the right of the tender front, very carefully and pull out. Put to one side for future use.

11.3.4 Drill two holes about 1.5 mm immediately behind the front coal partition and close to the outside of the coal space (see photo above)

11.3.5 Using a fairly coarse piercing saw blade, put the blade through one of the holes and mount in the piercing saw frame but with the blade facing into the frame. Cut through the front of the tender front down to the bottom but not into the platform (see photo). Remove the blade and repeat in the other hole and the opposite side of the front. Finally with the blade in the frame in the normal orientation cut across the coal space immediately behind the partition, and then just above the front platform to release the tender front. Clean up the cuts in the tender body.





11.3.6 Take the new tender front [FD12] and identify the large half-etched section where the large radius curve will be formed. This section needs to be bent around a 2.8 mm drill (available from Eileen's Emporium, Hobby Holidays etc.). We did it by sitting the drill on top of two thin pieces of plate held together. These could be held in the vice although mine was part of a plate used for soldering (see photo to get the idea). The tender front is placed over the drill with the half-etched section uppermost (i.e. with the half-etch on the <u>outside</u> of the bend). Line up the centre of the half-etched section with the drill and carefully bend the top and bottom over the drill. Check that the front is bending correctly when the bend gets to about 45 degrees. If all is ok continue to bend 90 degrees. If it is not quite correct it is possible to ease the bend into the right position before continuing to bend.

11.3.7 Once you are happy with the curve, make the right angle bend on the lower part of the front.

11.3.8 Bend up the tool box locating tab.

11.3.9 Check the fit of the front in the Bachmann body. You will probably find that where the old front was cut away the sides are thicker than the part in front. This thick part need to be cut and filed back until the front sits back so that the distance from the front edge of the tender sides to the new front is 5.66 mm and the new front is vertical.

11.3.10 Push through the rivets in the toolbox [FD13] and the tool box top [FD14]. Fold up the tool box [FD13] into a U shape making sure the bends are 90 degrees.

11.3.11 Solder the tool box top [FD14] to the tool box [FD13] with the half-etched section over the tool box front.

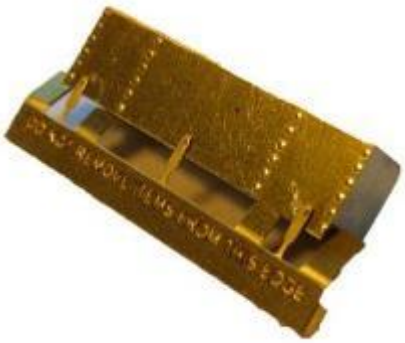
11.3.12 Solder the two tool box ends [FD15] onto each end of the toolbox.

11.3.13 The toolbox and toolbox top have been deliberately left slightly over-long, so now file them back flush with the toolbox ends. Similarly, the toolbox ends are slightly over long so the back edge now needs filing back to match the toolbox top and to allow the toolbox to sit back against the tender front.

11.3.14 Now the fun begins. It is time to solder on the hinges and the hasps and staples. We have managed to make this easier for you in the production etch than in the first test etch by attaching the components on strips with guides.

11.3.15 First remove the section of etch with the six hinges on [FD16]. Bend the two outer ends down by about 30 degrees (fold line on the outside). Check the tool box fits between the two. Then bend down the two spacers slightly (fold line on the outside). It should now be possible to position the hinges on the tool box front with the toolbox between the two ends and the spacers resting on the bottom of the toolbox. Having tinned the six hinges first, carefully solder all six in place.

11.3.16 Cut the tabs to the six hinges and clean up the cut edges.



11.3.17 Remove the section of the etch with the three hasps and staples on [FD17]. Bend the two outer ends down by about 30 degrees (fold line on the outside). Check the tool box fits between the two. Then bend down the two spacers slightly (fold line on the outside). It should now be possible to position the hasps and staples on the tool box top with the toolbox between the two ends and the spacers resting on the front of the toolbox. Having tinned the three hasps and staples first carefully solder all three in place.

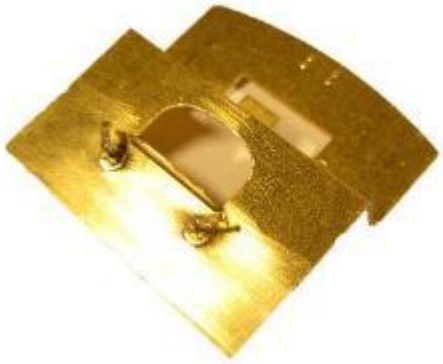
11.3.18 Cut the tabs to the three hasp and staples and clean-up the cut edges.

11.3.19 Bend the overhanging part of each hasp and staple down over the front of the tool box, ensuring it lies flat with the front (see photo).

11.3.20 Using 0.33 mm wire bend up the handrail on the top of the toolbox and solder in place

11.3.21 Fold up the coal plate [FD18] by placing a ruler between the two nibs and bending to 90 degrees.

11.3.22 File off the nibs so that the coal plate fits through the coal hole and solder in place from the rear.



11.3.23 Make a right angled bend in two pieces of 0.33 mm wire and thread through the two holes in the lower half of the tender front from the back, ensuring they are perpendicular. Solder the valve bodies [FD19] over the wire to the front of the tender front, ensuring that they are correctly orientated (see photo).

11.3.24 Bend the ends of the two handles [FD20] as seen in the photos and solder to the wire. The handles should be just under 2 mm from the tender front (see photo).

11.3.25 Push through the rivets in the top half of the new front for the fire iron bracket and, if being fitted, the rivets for the coal rails.

11.3.26 If, like us, you have managed to lose the water gauge, a replacement can be made from 0.8 mm brass wire (if you still have the plastic one, leave attachment to 11.3.30). Take a piece at least 7mm long, round off one end and mount in a pin chuck with 2.5 mm protruding. File a flat on one side of the protruding wire and then solder the wire into the hole in the replacement front with 5.5 mm showing and the flat towards the front.

11.3.27 Attach the toolbox assembly to the tender front by soldering from the rear of the new front through the hole.

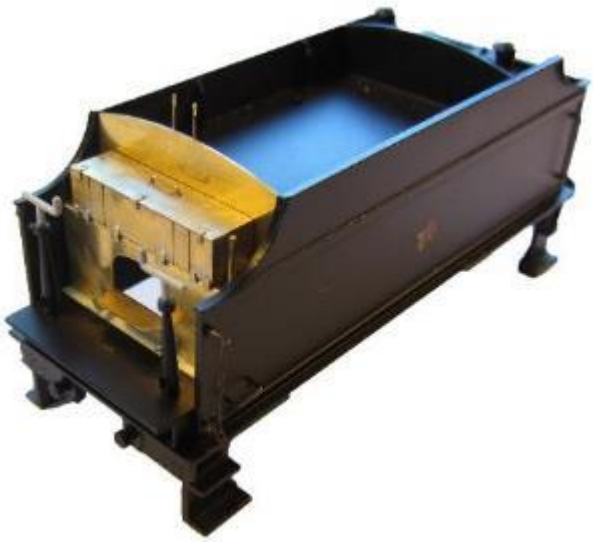
11.3.28 Take a piece of 0.33 mm wire. Flatten and shape the end to represent the fire iron bracket. Bend over the bottom so that the bracket protrudes above the coal partition by just over 3 mm. Position in the hole and solder to the inside of the partition. Repeat for the second bracket.

11.3.29 Attach the new front to the Bachmann tender body using cyanoacrylate glue or epoxy resin.

11.3.30 Attach the plastic water gauge removed earlier to the hole in the horizontal surface of the new front to the right of the toolbox using cyanoacrylate glue or epoxy resin.

11.3.31 Cut a piece of 4 mm x 1 mm and a piece of 4mm x 0.25 mm plastic strip to fit between the tender sides at the bottom of the new front.

11.3.32 Attach the plastic strips to the front of the new front using cyanoacrylate glue or epoxy resin, and then attach the front footplate, removed earlier, to the plastic strip, again using cyanoacrylate glue or epoxy resin.



11.4 Tender coal rails

11.4.1 Some of the Fowler tenders were fitted with coal rails. A separate etch is available from Brassmasters if this is required.

11.5 Loco and tender cab doors

11.5.1 Attach the loco cab doors [**FD21** and **FD22**] to the inside of the cab sides, using cyanoacrylate glue or epoxy resin, so that the join between the half-etched section and the full etched section aligns with the rear of the cab side and the bottom of the etch is level with the cab floor.

Photo of left hand side door.

11.5.2 There are two lengths of tender cab doors provided. The scale size doors [FD23 and FD24] can be used when your layout curves are very large. However, for most layouts the wide cab doors [FD25 and FD26] are better.

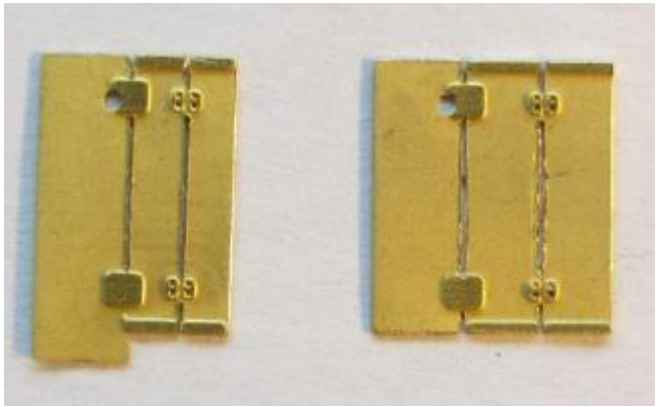


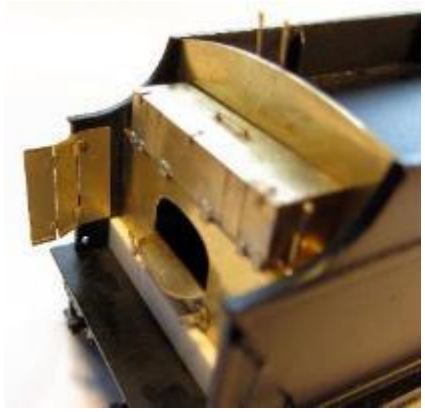
Photo showing the <u>inside</u> of the two left hand side doors, the unmodified scale door on the left and the modified wide doors on the right

11.5.3 Take the appropriate cab doors and remove the bottom half-etched part not required on this tender (see photo) (I used tin snips). Press through the rivets using a very fine point.

11.5.4 Bend the cab doors to the shape required along the fold lines with the fold line <u>outside</u>.

11.5.5 Attach the tender cab doors to the inside of the tender sides using cyanoacrylate glue or epoxy resin, placing the hole over the tail of the top handrail knob.

11.5.6 The bends in the doors may need further adjustment when the tender is attached to the loco.



11.6 Tender buffer beams

11.6.1 The ends of the Bachmann buffer beams are the wrong shape and are smooth representing the flush riveted version. Two replacement buffer beams are supplied with the correct curved ends representing the flush riveted version [FD27] and the fully riveted version [FD28].

11.6.2 Gently pull the buffers from the rear of the Bachmann tender frames. File the buffer beam flat.

11.6.3 Because the plastic footplate is over thick it will be necessary to reduce the thickness slightly at the top of the buffer beam for the new buffer beam to sit flat.

11.6.4 If refitting the Bachmann buffers, after pushing through the rivets, attach the buffer bases [FD5] and if appropriate, the buffer packing plates [FD6], to the buffer beam by solder or using cyanoacrylate glue or epoxy resin (if using replacement buffers attach only the packing pieces as appropriate). Note – the packing pieces are **not** square and the shorter side should be towards the bottom i.e. there should not be anything overhanging the buffer beam.

11.6.5 Attach the buffer beam to the loco using cyanoacrylate glue or epoxy resin.

11.6.6 Shape the ends of the plastic buffer beams to match the etched buffer beam.

11.6.7 Replace the Bachmann buffers or fit replacement buffers.

(Picture shows riveted buffer beam with Bachmann buffers. The left hand buffer has just the buffer base, and the right hand one has both buffer base and packing piece.)

12 Replacement tender frames – Fowler

Although the tender sideframes are the correct distance apart, the axleboxes and springs are still too shallow. Replacing the sideframes gives the opportunity to improve the look of the tender.

Because of the way that the Bachmann Fowler tender is constructed there are two ways in which the side frames can be assembled. The first simply uses the Bachman tender body, which includes the footplate, drag and buffer beams and footsteps, and replaces just the side frames. The axleboxes can either be cut out of the Bachmann sideframes, or a new set of whitemetal axleboxes (available separately from Brassmasters) can be fitted. The second way includes a new footplate, drag and buffer beams, and footsteps as well as new sideframes (in the same way as the Deeley replacement frames). However, this way will require the lower parts of the Bachmann tender body to be removed.

12.1 Replacing only the sideframes

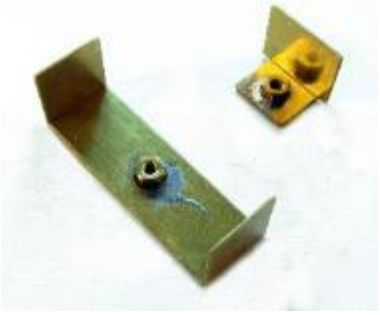
12.1.1 First assemble the EasiChas tender frames as detailed in section 6.

12.1.2 Remove the half-etched part at the front and rear of the sideframes [FF1] (see diagram 4 at the end of the instructions) and push through the half-etched rivets.

12.1.3 Fold up the sides of the tender frames and the two locating tabs to 90 degrees.

12.1.4 Fold over the five tabs on the base of the tender frames [FF1] back on themselves (see photo). Ensure they are completely flat.

12.1.5 Fold up the two locating pieces to 90 degrees. If re-using the original Bachmann loco coupling ensure that it passes through the slot in the leading locating piece and between the two leading tabs.



12.1.6 Solder 10 BA nuts to the half-etched recesses in the top of the tender sideframes [FF1] and the two mounting brackets [FF10 and FF11], then fold the mounting bracket ends at 90 degrees.

12.1.7 Using 10 BA screws, attach the brackets to the sideframes, the U-shaped bracket [FF3] at the front, the L-shaped bracket [FF4] to the rear (see photo). Using epoxy resin on the inside of the tender sides and back, attach the brackets to the tender body by positioning the assembly in the correct position in the tender body.

12.1.8 Solder the two trunnions [FF12] in place ensuring that there is a single rivet located to the top. Open out the hole in the middle of the trunnion to 0.7 mm.

12.1.9 If required, attach the brake hanger pin retainers [FF31] using cyanoacrylate glue or epoxy resin so that the disc covers the hole in the side frame (see photo)

12.1.10 Cut the axlebox and spring hanger assemblies from the Bachmann frames using a piercing saw. Trim around the axlebox and spring. Remove the raised section on the back of the moulding and then attach to the replacement frames (the photo below show the Deeley tender but the principle is the same).

Note - a better method is to fit whitemetal axlebox and springs available separately from Brassmasters (see photos)

12.1.11 Fold up the replacement guard irons [T4] by firstly bending up the two guard irons at right angles and then bend the straight sections to a lazy 'S' shape (see prototype photo of a Fowler tender with steam heating pipe). Finally file off the two small tabs between the guard irons (see photos in 6.13).

12.1.12 Refit the Bachmann brake hangers, having modified them first if required (see section 11.1), securing in place through the holes in the tender frame with cyanoacrylate glue or epoxy resin.

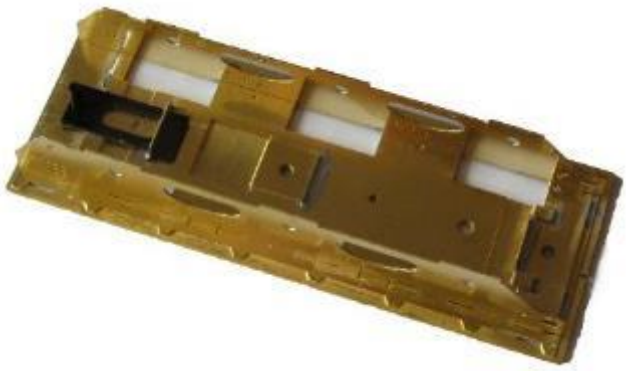
12.1.13 Assemble the new side frames and the EasiChas tender frames by using a 10 BA screw through the centre hole.

12.1.14 Position the assembly in the Bachmann tender body and attach by inserting a 10 BA screw through the guard iron [T4] and then through the assembly. Insert the Bachmann tender coupling through the forward vertical tab on the sideframes, insert a 10 BA screw through the Bachmann tender coupling washer and tender coupling and secure the front of the assembly.

12.1.15 Remove the water pickup from the Bachmann tender frames and attach to the replacements frames using cyanoacrylate glue or epoxy resin.

12.1.16 Refit the Bachmann pull rods or fit modified pull rods (see section 11.2).

12.2 Replacing the sideframes, footplate, buffer beams and steps



12.2.1 Assemble the EasiChas tender frames as detailed in section 6

12.2.2 Push through the half-etched rivets on the tender sideframes [FF1]

12.2.3 Fold up the sides of the tender frames to 90 degrees.

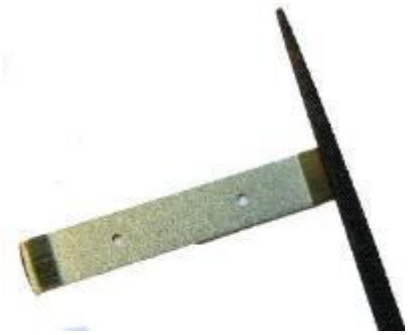
12.2.4 Fold over the five tabs on the base of the tender frames [FF1] back on themselves with the etch line on the outside of the bend (see photo). Ensure they are completely flat.

12.2.5 Fold up the two locating pieces to 90 degrees. If re-using the original Bachmann loco coupling ensure that it passes through the slot in the leading locating piece and between the two leading tabs.

12.2.6 Push through the rivets on the underside of the tender base [FF2]. Do not bend up the four tabs at this stage.

12.2.7 Ensure the four tabs on the top of the sideframes [FF1] engage in the slots in the tender base [FF2]. Solder the two together in between the frames **not** along the side of the frame (otherwise this may affect the fitting of the rivet strip later).

12.2.8 Take the required buffer beam (flush riveted [FF3] or fully riveted [FF4]) and the buffer beam back [FF5] and push through the rivets on the buffer beam back. Solder the two together.



12.2.9 Because of the problem with the footsteps described later, on the back of the buffer beam run a file along the outer edge of the raised section to square up the transition from full thickness to half thickness (see photo).

12.2.10 If necessary, open out the holes in the buffer beam assembly to suit your chosen buffers.

12.2.11 Solder the buffer beam assembly to the tender base and frames ensuring that it is the correct way up (the buffer holes should be towards the bottom of the buffer beam when fitted).

12.2.12 There are two different types of drag beam, with a rounded end [FF6 and FF7] and the later type with an angled end [FF8 and FF9]. Push through the rivets in the appropriate drag beam back [FF6 or FF8] and then solder the two appropriate halves together.

12.2.13 Repeat 12.2.11 for the drag beam.

12.2.14 If using the original Bachmann loco coupling, the drag beam will need the centre section removing. Make a saw cut to the inside of the two raised pads.

12.2.15 Solder the drag beam in place.

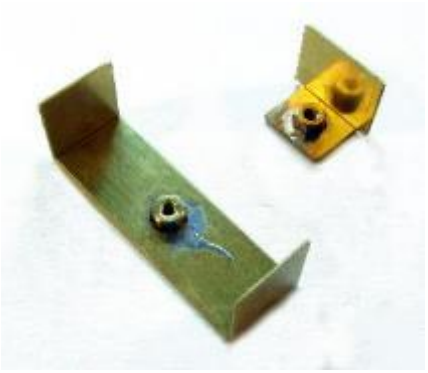
12.2.16 It is now time to modify the Bachmann body. First remove the buffers, the drag beam buffers and the vacuum pipe. Then remove the front platform, complete with brake pillar and water scoop pillar. This is done by carefully levering away from the tender front. Put to one side for future use. Now using a razor saw, cut off everything below the footplate. This includes all the footsteps, the buffer beam and the drag beam.

12.2.17 The best way to remove the footplate itself is by rubbing it on a sheet of emery paper, preferably on a sheet of glass or other flat surface, until all of the footplate disappears and you are left with the tender body.

12.2.18 Bend up the four tabs in the tender base [FF2] to 90 degrees.

12.2.19 Solder 10 BA nuts to the half-etched recesses in the top of the two mounting brackets [F10 and F11], then fold the mounting bracket ends at 90 degrees.

12.2.20 Using spare half-etched washers from the EasiChas etch [L8 or T6] between the tender base and the brackets, attach the brackets to the tender base assembly using 10 BA screws, the U-shaped bracket [FF10] at the front, the L-shaped bracket [FF11] to the rear (see photo). Using epoxy resin on the inside of the tender sides and back, attach the brackets to the tender body by positioning the assembly in the correct position under the tender body.



12.2.21 Once the adhesive has gone off, remove the tender base assembly.

12.2.22 Solder the two trunnions [FF12] in place ensuring that there is a single rivet located to the top (see photo). Open out the hole in the middle of the trunnion to 0.7 mm.

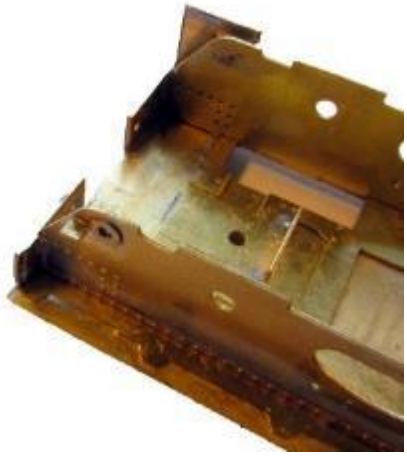
12.2.23 Solder the rivet detail fronts [FF13 and FF14] in place on each side of the frame.

12.2.24 Ensure that the rivet detail rear [FF15 and FF16] fit in place. Trim if necessary. Solder into place.

12.2.25 Due to an oversight on the production etch a half-etch edge was not completed on the rear of the footstep backplates [FF17, FF18, FF 26, FF27]. Taking a square or knife edge file, extend the half-etched edge to the top of step backplate (see photo showing modified footstep back on the left).

12.2.26 Solder the leading footstep brackets [FF17] into place in the slot in the sideframes.

12.2.27 Take the leading footstep backplates [FF18 and FF19], push through the rivet detail if required, and solder the bottom footsteps [FF20] and the top footsteps [FF21] in place.



12.2.28 Select the required footstep backs, flush riveted bottom [FF22], flush riveted top [FF23], riveted bottom [FF24], riveted top [FF25]. Attach the footstep backs using cyanoacrylate glue or epoxy resin (or solder if you are feeling brave)

12.2.29 Take the trailing footstep backplates [FF26 and FF27] and solder the bottom footsteps [FF20] and the top footsteps [FF28] in place.

12.2.30 Again selecting the required footstep backs, flush riveted bottom [FF22], flush riveted top [FF29], riveted bottom [FF24], riveted top [FF30], attach the footstep backs using cyanoacrylate glue or epoxy resin (or again solder if you are feeling brave)

12.2.31 Solder the footstep assemblies in place in the slots in the tender base.

12.2.32 If required, solder the brake hanger pin retainers [FF31] using cyanoacrylate glue or epoxy resin so that the disc covers the hole in the side frame (see photo in 12.2.38)

12.2.33 If required, attach the buffer packing pieces [FD6] to the buffer beam. Note – the packing pieces are not square and the shorter side should be towards the bottom i.e. there should not be anything overhanging the buffer beam

12.2.34 Gently pull the buffers from the rear of the Bachmann tender frames. File away the spigot of the buffer housing and the buffer rod from the side until it fits in the hole in the buffer beam and misses the side frame. This will mean removing about 50% of the spigot (see photo left).

12.2.35 If refitting the Bachmann buffers, after pushing through the rivets, attach the buffer bases [FD5].

12.2.36 Attach the buffers to the buffer beams on the replacement frames using cyanoacrylate glue or epoxy resin. (see photo in 11.6.7)

Note - a better method is to fit Maygib brass sprung buffers available separately from Brassmasters.

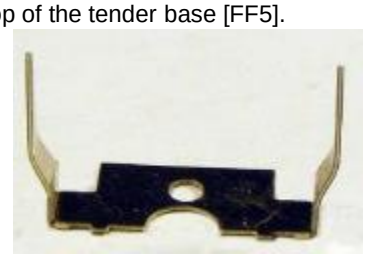
12.2.37 Gently pull the small buffers from the front of the Bachmann tender frames and attach them to the drag beam on the replacement frames using cyanoacrylate glue or epoxy resin.

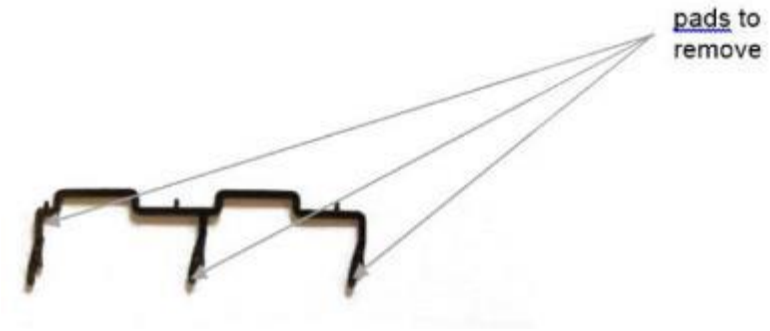
12.2.38 Cut the axlebox and spring hanger assemblies from the Bachmann frames using a piercing saw. Trim around the axlebox and spring. Remove the raised section on the back of the moulding and then attach to the replacement frames (the photo overleaf shows the Deeley tender but the principle is the same).

Note - a better method is to fit brass axlebox and springs available separately from Brassmasters (see photo).

12.2.39 If using with the EasiChas tender frames, solder a 10 BA nut in the recess on the top of the tender base [FF5].

12.2.40 Fold up the replacement guard irons [T4] by firstly bending up the two guard irons at right angles and then bend the straight sections to a lazy 'S' shape (see prototype photo of a Fowler tender with steam heating pipe in 6.11).





12.2.41 Take the Bachmann brake hangers, having modified them first (see section 11.1), and remove the pads shown in the photo. Secure the brake hangers in place through the holes in the tender frame with cyanoacrylate glue or epoxy resin.

12.2.42 The holes for the brake shaft on the Bachmann plastic frames are in the wrong position. This means that both the Bachmann plastic pull rods and the replacement etched pull rods require altering for fitting to the replacement frames.

12.2.43 If using the Bachmann plastic pull rods cut the pull rods at the point shown on the photo. Reduce the length of the two levers on the brake shaft so that they are 2.5 mm long and round the ends (see photo, nearest modified, furthest original).

12.2.44 Fit the pull rods into the brake hangers and the brake shaft between the frames and rotate the brake shaft until the arms on the shaft touch the ends of the pull rods (the pull rods may need bending down slightly at the first cross shaft to align with the arms). If necessary secure the brake shaft in position using cyanoacrylate glue or epoxy resin (although mine stayed where they were without).

12.2.45 If using the replacement brake pull rods, assemble them in accordance with section 11.2 then cut the brake shaft from the pull rods as shown in the photograph.

12.2.46 Fit the pull rods into the brake angers and the brake shaft between the frames and rotate the brake shaft until the arms on the shaft overlap the ends of the pull rods. Solder the two parts of each pull rod together.

Finally, assemble the tender as follows:

12.2.47 Fit the EasiChas frames to the replacement frames using a 10 BA screw in the centre hole.

12.2.48 Position the replacement frame assembly in the Bachmann body.

12.2.49 Position the guard irons at the rear of the frame assembly and insert a 10 BA screw through the hole and into the body bracket.

12.2.50 Insert the Bachmann tender coupling through the forward vertical tab on the sideframes, insert a 10 BA screw through the Bachmann tender coupling washer and tender coupling and into the front body bracket.

12.2.51 If required, remove the water pickup from the Bachmann tender frames and attach to the replacements frames using cyanoacrylate glue or epoxy resin.

12.2.52 Refit the pull rods.

13 Modifying the Tender Pickups

13.1 Having removed the phosphor bronze pickups during dismantling the tender (section 4.2), take one of the pickup strips and bend the two pickup fingers so that the strip is as flat as possible.

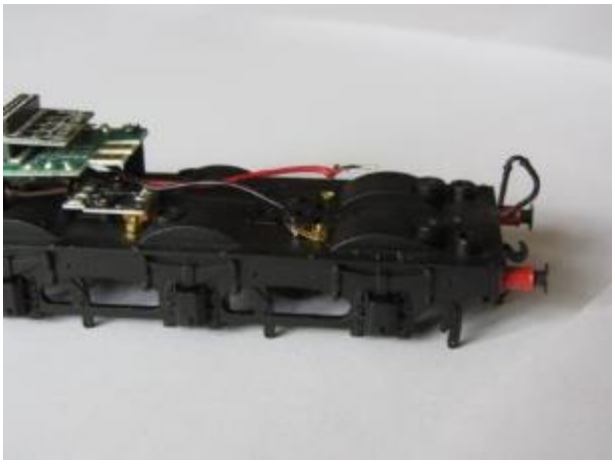
13.2 Depending on whether you have a Fowler or Deeley tender, the pickups are subtly different. Referring to the relevant diagram carefully make cuts in the pickup strip as shown in diagram 5 (in the Appendices at the end of the document) -the cut lengths are very important to ensure the pickups do not short out on the EasiChas frames. Bend up each end of the pickup strip as shown in the photo.

13.3 Using two 12 BA screws and nuts fasten the pickup strip back into position on the Bachman tender frames. Adjust the pickups so that they bear on the backs of the leading and trailing wheels. Check that there are no shorts between the pickups and the EasiChas tender frames.

13.4 Repeat for the second side

13.5 Take the two wiring tags [**T7**], shorten the two wires to the pickups and solder to the tags.

13.6 Undo the rear nut holding the on the pickups, place the tag over the screw each side and retighten.



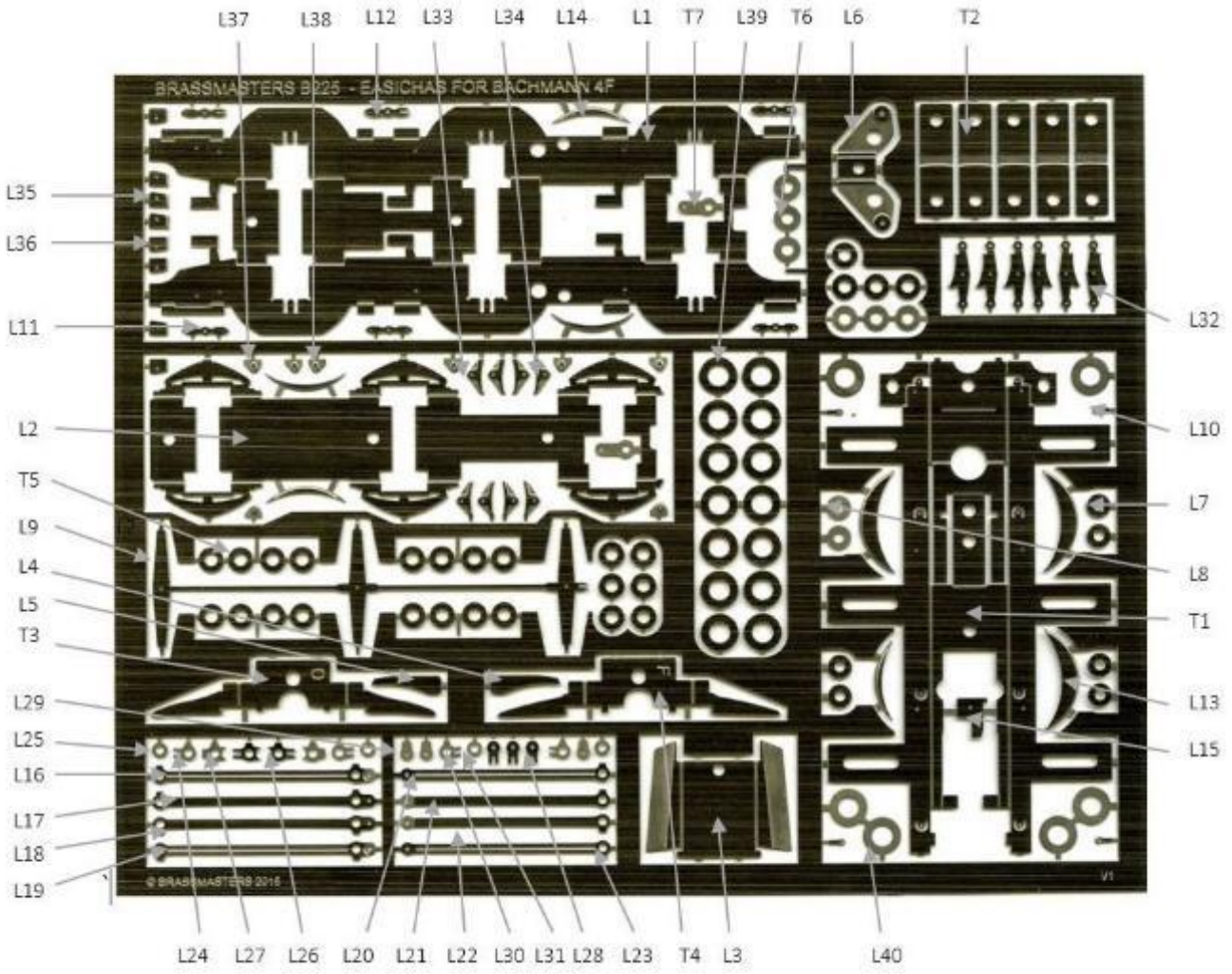
References

The “bible” on the subject is the Wild Swan LMS Locomotive Profile 10 and the accompanying Photo Supplement which contain many drawings, photographs and comprehensive background information on both the MR and LMS-built locomotives.

Another excellent source of prototype photographs is www.rail-online.co.uk

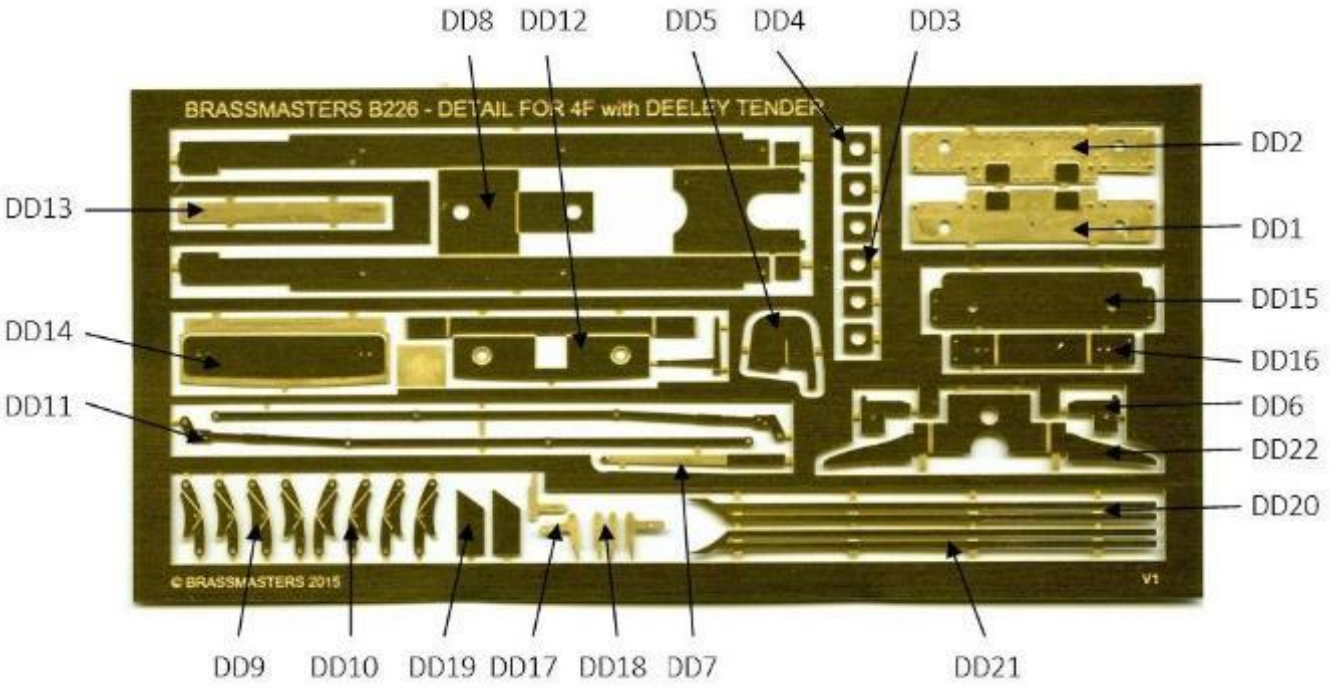
Etched Component List

Loco and Tender EasiChas



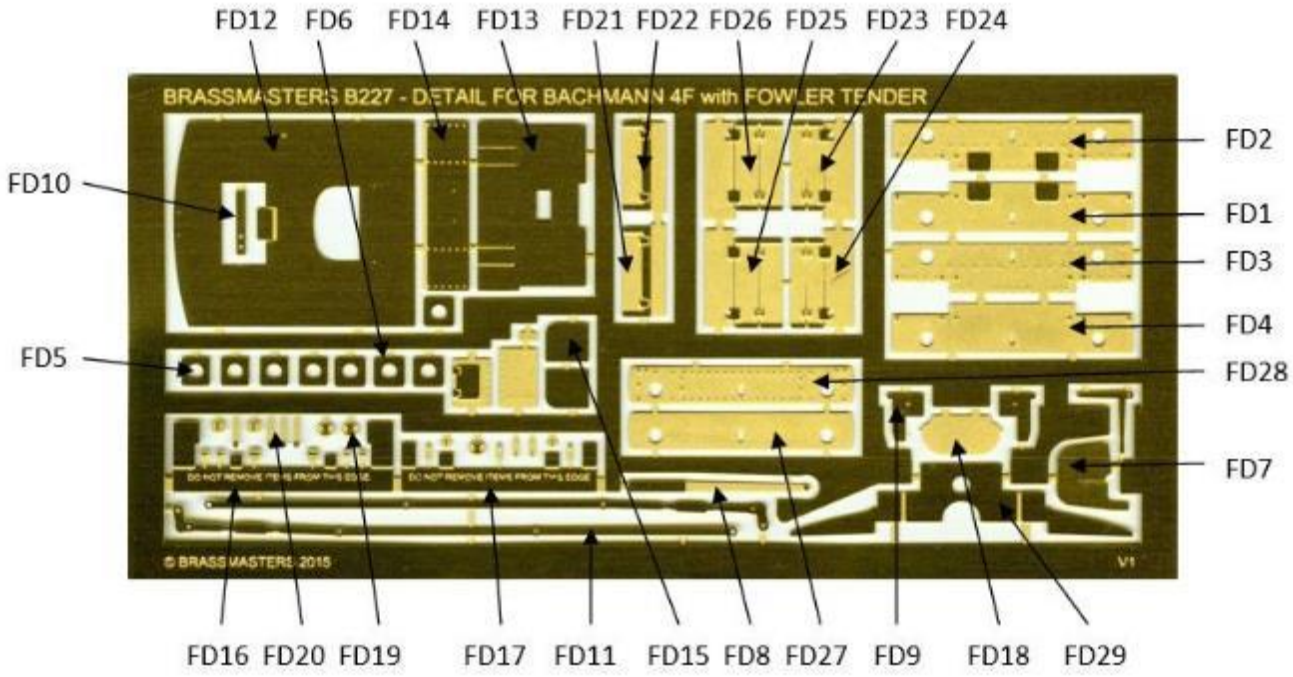
L1	main frames	L25	coupling rod boss leading inner (2)
L2	keep plate	L26	coupling rod boss centre outer (2)
L3	ashpan	L27	coupling rod boss centre inner (2)
L4	guard iron left	L28	forked joint boss outer (2)
L5	guard iron right	L29	forked joint boss inner (2)
L6	Brake shaft bracket	L30	coupling rod boss trailing outer (2)
L7	washer (3)	L31	coupling rod boss trailing inner (2)
L8	washer half-etched	L32	brake hanger (6)
L9	pull rods	L33	brake block left (3)
L10	pull rods front fork (2)	L34	brake block right (3)
L11	pull rod shackle middle (2)	L35	brake hanger bracket inner left (3)
L12	pull rod shackle rear (2)	L36	brake hanger bracket inner right (3)
L13	driving balance weights (2)	L37	brake hanger bracket outer left (3)
L14	coupled balance weights (4)	L38	brake hanger bracket outer right (3)
L15	sandbox backing plate	L39	1/8” washers full thickness
L16	coupling rod leading lh outer	L40	1/8” washers half thickness
L17	coupling rod leading lh inner		
L18	coupling rod leading rh outer	T1	tender frames
L19	coupling rod leading rh inner	T2	axleboxes (6)
L20	coupling rod trailing lh outer	T3	guard irons Deeley
L21	coupling rod trailing lh inner	T4	guard irons Fowler
L22	coupling rod trailing rh outer	T5	2mm spacing washers full thickness
L23	coupling rod trailing rh inner	T6	2mm spacing washers half thickness
L24	coupling rod boss leading outer (2)	T7	wiring tags (2)

Detailing Etch – Deeley



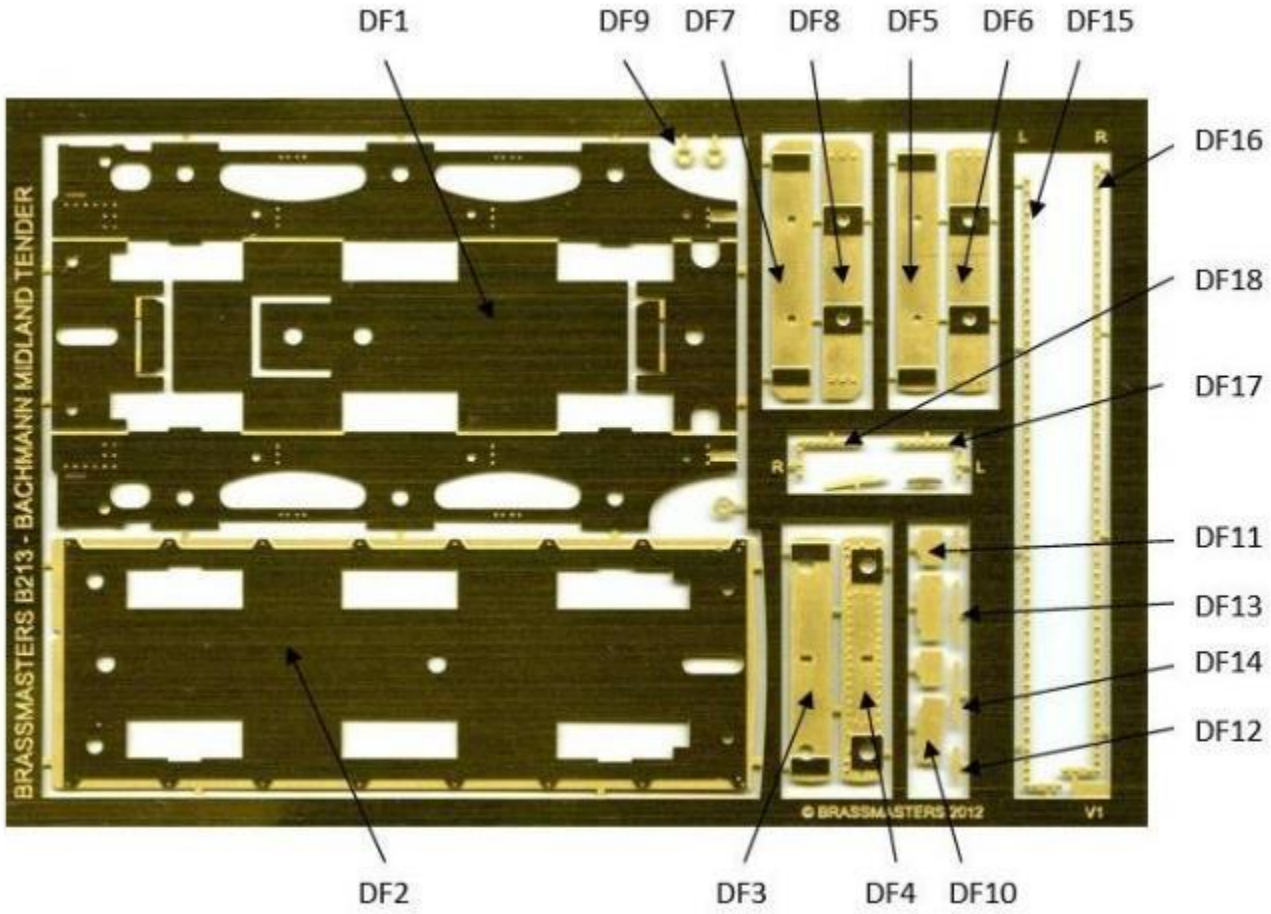
DD1	front buffer beam flush riveted with covers	DD12	front footplate support
DD2	front buffer beam fully riveted with covers	DD13	front footplate support front
DD3	buffer bases (4)	DD14	front footplate
DD4	buffer packing plates (2)	DD15	front footplate hole jig
DD5	tail rod jig	DD16	handrail jig
DD6	sandbox base (2)	DD17	handrail top with brake handle (2)
DD7	reach rod	DD18	handrail top no brake handle
DD8	brake frame for 00	DD19	side plate
DD9	brake hanger left (3)	DD20	coal rail left
DD10	brake hanger right (3)	DD21	coal rail right
DD11	brake pull rods	DD12	front footplate support
DD12	front footplate support	DD13	front footplate support front
DD13	front footplate support front	DD14	front footplate
DD14	front footplate	DD15	front footplate hole jig
DD15	front footplate hole jig	DD16	handrail jig
DD16	handrail jig	DD17	handrail top with brake handle (2)
DD17	handrail top with brake handle (2)	DD18	handrail top no brake handle
DD18	handrail top no brake handle	DD19	side plate (2)
DD19	side plate	DD20	coal rail left
DD20	coal rail left	DD21	coal rail right
DD21	coal rail right		

Detailing Etch – Fowler



FD1	front buffer beam flush riveted with covers	FD16	hinges etch
FD2	front buffer beam fully riveted with covers	FD17	hasps and staples etch
FD3	front buffer beam fully riveted without covers	FD18	coal plate
FD4	front buffer beam welded without covers	FD19	valve body (2)
FD5	buffer bases (4)	FD20	valve handle (2)
FD6	buffer packing plates (4)	FD21	loco cab doors left
FD7	tail rod jig	FD22	loco cab doors right
FD8	reach rod	FD23	tender cab doors scale left
FD9	sandbox base (2)	FD24	tender cab doors scale right
FD10	brake hanger drilling jig	FD25	tender cab doors wide left
FD11	brake pull rods	FD26	tender cab doors wide right
FD12	tender front	FD27	buffer beam flush riveted
FD13	toolbox	FD28	buffer beam fully riveted
FD14	toolbox top	FD29	00 guard irons
FD15	toolbox ends (2)		

Tender Frame Etch – Deeley



DF1	tender frames	DF10	bottom footstep (2)
DF2	tender base	DF11	top footstep (2)
DF3	buffer beam back	DF12	top footstep back (2)
DF4	buffer beam front	DF13	bottom footstep back left
DF5	drag beam round end back	DF14	bottom footstep back right
DF6	drag beam round end front	DF15	rivet detail front left
DF7	drag beam angled end back	DF16	rivet detail front right
DF8	drag beam angled end front	DF17	rivet detail rear left
DF9	trunnion (2)	DF18	rivet detail rear right

Tender Frame Etch – Fowler

FF1	tender frames	FF16	bottom footstep (4)
FF2	trunnion (2)	FF17	leading top footstep (2)
FF3	mounting bracket front	FF18	bottom footstep back – flush riveted (4)
FF4	mounting bracket rear	FF19	leading top footstep back – flush riveted
FF5	tender base	FF20	bottom footstep back –riveted (4)
FF6	buffer beam front flush riveted	FF21	leading top footstep back –riveted
FF7	buffer beam front fully riveted	FF22	trailing footstep backplate left
FF8	buffer beam back	FF23	trailing footstep backplate right
FF9	drag beam round end back	FF24	trailing top footstep (2)
FF10	drag beam round end front	FF25	trailing top footstep back – flush riveted
FF11	drag beam angled end back	FF26	trailing top footstep back –riveted
FF12	drag beam angled end front	FF27	rivet detail front left
FF13	leading footstep brackets (2)	FF28	rivet detail front right
FF14	leading footstep backplate left	FF29	rivet detail rear left
FF15	leading footstep backplate right	FF30	rivet detail rear right

Other Components

Loco and Tender EasiChas

Brass axleboxes (6)	0.7 mm brass wire	Bushes for Bachmann rods (6)
Axlebox springs (6)	0.6 mm brass wire	12 BA cheese head screws (4)
0.8 mm nickel silver wire	0.009” spring wire	12 BA nuts (4)

Deeley Detailing Etch

2.0 mm brass wire	0.5 mm brass wire	plastic strip 4 mm x 2 mm
0.7 mm brass wire	12 BA cheese head screws (2)	
0.6 mm brass wire	12 BA nuts (2)	

Fowler Detailing Etch

2.0 mm brass wire	0.5 mm brass wire	plastic strip 4 mm x 2 mm
0.7 mm brass wire	0.31 mm brass wire	plastic strip 4 mm x 1 mm

Deeley Tender Frame Etch

8 BA cheese head screws (2)	8 BA round head screw (1)	8 BA nuts (3)

Fowler Tender Frame Etch

10 BA cheese head screws (3)	10 BA nuts (3)

Diagram 1

Where a tab needs to be removed file it flush with the adjoining surface.

Where only one layer is used snap off the second layer at the bend line.

Tender Configuration	front tab	vertical tab	1st pad	2nd pad	3rd pad	4th pad	rear tab
Deeley							
- chassis fitted to Bachman frames	used	used	folded over	1 layer	1 layer	1 layer	used
- chassis fitted to etched frames and footplate	not used	remove	folded over	1 layer	1 layer	1 layer	not used
Fowler							
- chassis fitted to Bachman frames	remove	remove	folded over	2 layers	2 layers	2 layers	remove
- chassis fitted to etched frames	remove	not used	folded over	1 layer	1 layer	1 layer	remove
- chassis fitted to etched frames and footplate	not used	not used	folded over	1 layer	1 layer	1 layer	not used

Bend the layers with the etch line on the outside.

Diagram 2

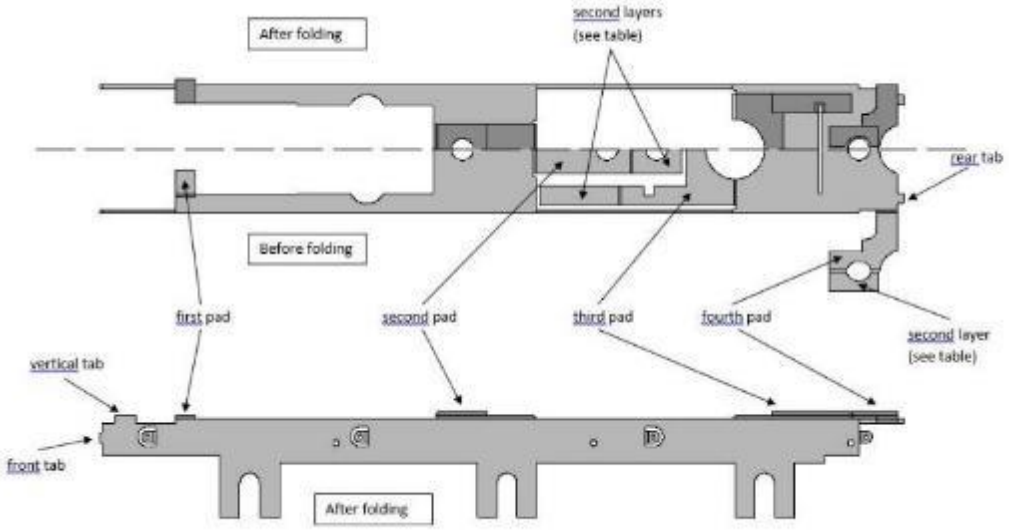


Diagram 3

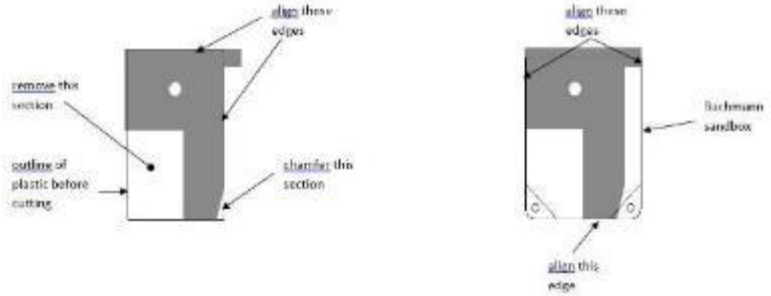


Diagram 4

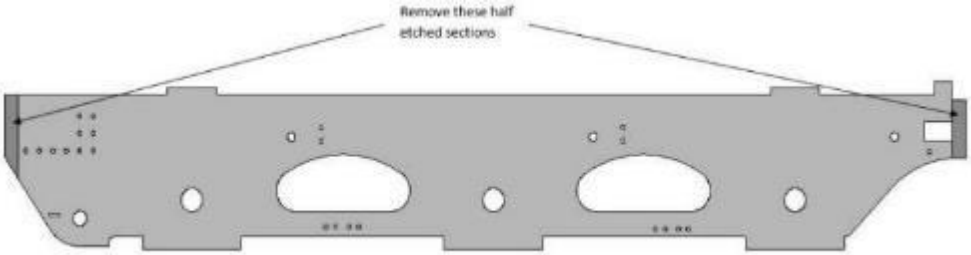


Diagram 5