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## **EasiChas**

### **Chassis and Detailing Kit for Bachmann MR/LMS 3F 0-6-0 Locomotive and Tender**

For EM and P4 Gauges only

## **Instructions**

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## 1 Introduction

1.1 The Easichas frames for Bachmann 3F 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:  
capuchon for earlier Johnson chimney  
loco guard irons  
front footsteps fitted to some locos  
replacement coupling rods  
dummy weight shaft and lifting levers  
replacement reach rod  
sander operating linkage  
replacement brake hangers and blocks  
beading for rear splashers fitted to some locos  
beading for lower half of cab fitted to some locos  
replacement reversing lever  
replacement tender footplate and hand rails  
replacement tender brake gear  
replacement tender guard irons  
replacement tender coal rails  
replacement tender frames, drag and buffer beams

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 pick-ups on this EasiChas. However a suggested method for making pick-ups 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 both do standard replacement wheel packs neither are suitable for the 3F 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. The Ultrascale set includes a new gear wheel.

## 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. 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) and part numbers, e.g., [L2] is part 2 on the Easichas 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 "3F". 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 "3F" file, then open up Windows Explorer and locate the "3F" 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 "3F" 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](mailto: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 & 5 minute)

3.2 First with pliers pull out the electrical plug under the tender and release the loco from the tender by manipulating 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!

### 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 assembly 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 the rear, release the front keeper plate catches that extend round and over the top of the chassis block, jiggle the front sand pipes to allow the brakes and keeper plate to be removed. Cut the wires to the motor close to the tender connector. Remove the glued-on sandboxes (by twisting with pliers) and sand pipes. Store these for use later. Remove the front guard irons, again these are glued on. File off the pips in the chassis block behind where the sandboxes were fitted. The chassis now looks like this:



3.7 Remove the wheel sets 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 centre 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 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).

4.2 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 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.

4.3 Your loco and tender are now ready for conversion.

4.4 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 loose 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.

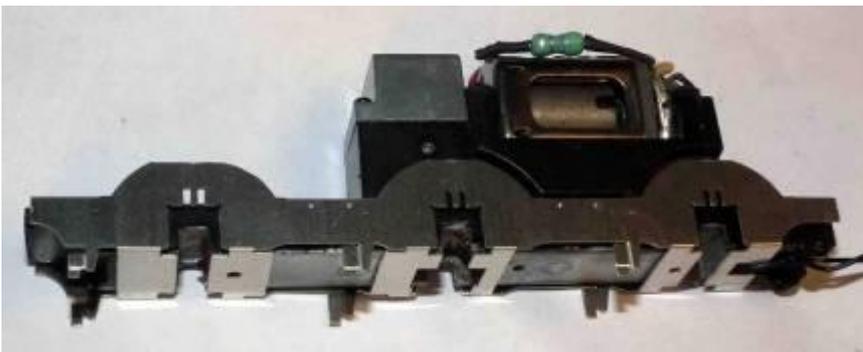


5.2 Remove the loco mainframes [L1] and clean up the residual tabs with a small file.

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. See Photo

5.3 Ensure the mainframes fit over the original Bachmann chassis. See Photo. Remove the mainframes.

5.4 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.

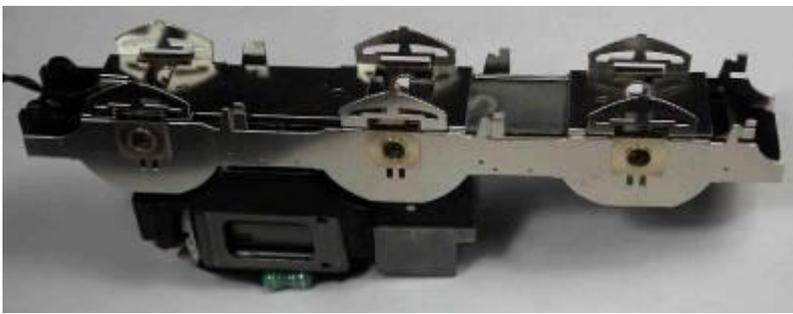


5.5 Remove the keep plate [L2]. Fold up the two U shaped pieces between the leading and centre axles. Ensure they slide between the mainframes [L1]. Fold down the three dummy springs along each side of the keep plate.



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

5.7 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 sloping upright.



5.8 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.

**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 5.6

5.10 Temporarily fit the keep plate, using the original Bachmann screws and lower keeper plate. 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.

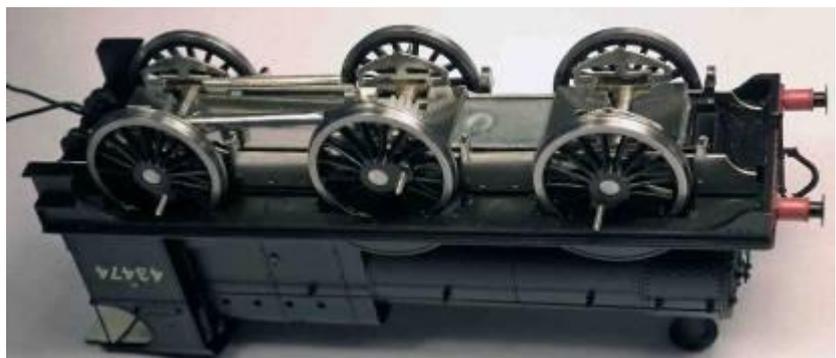
5.12 Take the new 1/8" axles and test fit them, firstly in the axleboxes (if tight ream them out to 1/8" using a reamer or, if you do not have one, a small round file, a precision drill or a broach), then place each through the axleboxes and through the "slots" in the Bachmann chassis block. If the axles catch the side of the Bachmann chassis blocks file away the offending part of the chassis 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 worm wheel is offset on the axle with the shoulder towards the centreline of the chassis, and the same amount of axle protruding each side of the chassis when it is fitted. 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 4mm 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 0.8mm lateral movement of 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, for EM one full washer on each side of the leading and trailing wheels, and finally press the wheels on the axles. Quarter the wheels with the right hand wheel leading the left hand wheel by 90 degrees.

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 centre wheelset with no sign of any binding by applying power to the motor. Remove the springs and put them safe while working on the rods and checking for free running.



5.16 Glue or solder the front guard irons [L4 and L4] to the chassis frames immediately in front of the leading axle brake 'pockets' (there is a mark on the frames) and bend to shape.

5.17 Fit the Bachmann coupling rods with the 6 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 (as fitted on the right hand boss - see photo).

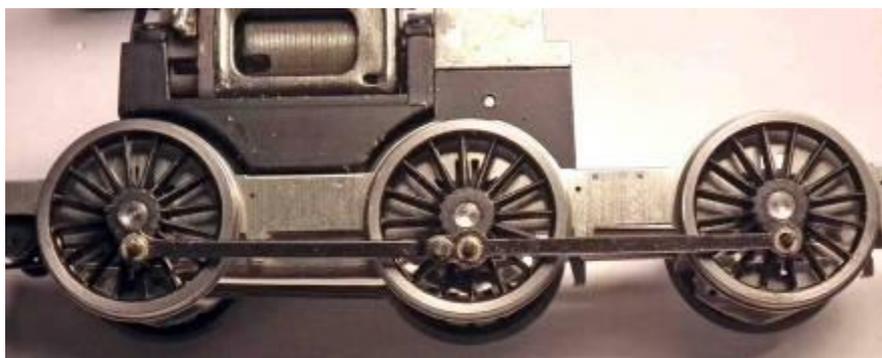
A finer scale solution is to solder up a new set of coupling rods, but this of course takes longer (see section 7.1).



Fit the rods and temporarily secure with a piece of electrical wire sleeve (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 (it is a countersunk head) to spread the pressure and open out the holes if necessary. See photo.

5.18 Fit the 6 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 as it will damage the gears if allowed to repeatedly occur.



5.19 In order for the chassis to sit properly under the footplate file off the 4 'pips' under the footplate between the splashers. See photo below – they are the 'shiny' bits.

5.20 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. I clamp a fine screw driver 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 first!) as the photo above.

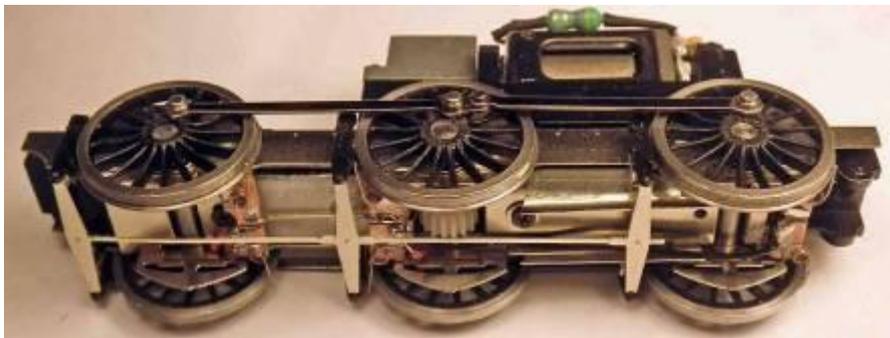


phosphor bronze wire (not supplied but available from Eileens Emporium), wind a 'spring' shape with extended end. I clamp a fine screw driver in the vice and holding the wire one end in the fingers and the other in a pair of round nose pliers, form the spring round the screw driver shaft. Note one pickup is wound clockwise, one anti-clockwise. Solder to the copperclad (gapping it first!) as the photo above.



5.21 Glue these to the chassis keeper plate in the position shown in the photo below so they gently press on the wheel flanges. Test the polarity and direction of travel with another loco and connect together and to the motor with wire. Test Run. 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).

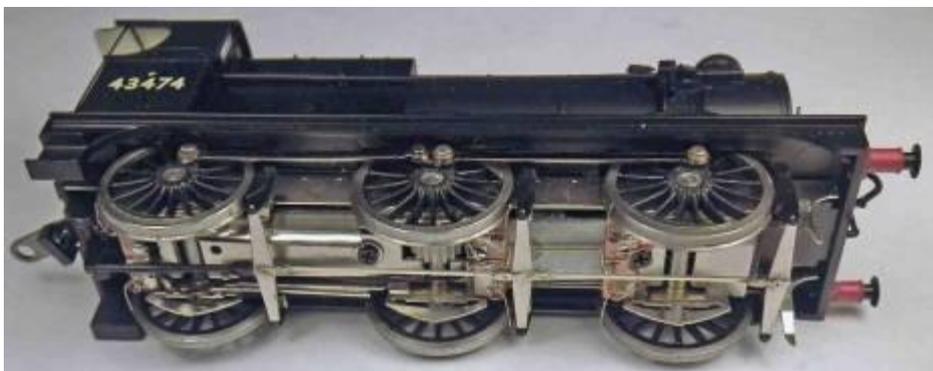
5.22 Clean up the cut line on the plastic brake hangers to ensure there are no raised edges and if necessary shorten the hanger back 'studs' (that fit in the 'cups') so they line up with the wheel treads. Remember the chassis is sprung and the wheels will move upwards under the loco weight. Attach the brakes to the brake hanger attachment points using cyanoacrylate glue or epoxy resin.



5.23 Take the brake pull rod etch [L6], identify the three overlays representing the linkage each side of the cross shafts [L7 for the front fork end, L8 for the middle shackle and L9 for the rear shackle]. Push through the rivets in the middle and back overlays [L8 and L9], then solder or glue the top and bottom overlays to the pull rod. Find the Bachmann plastic pull rod assembly and cut it immediately behind the rear cross shaft and carefully cut away a section between the two

moulded side pieces. Clip the etched pull in the brake hangers and the rear part of the plastic pull rod in the Bachmann chassis 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

5.24 Attach the driving wheel balance weights [L10] and the coupled wheel balance weights [L11] to the wheels, using cyanoacrylate glue or epoxy resin. The large balance weight sits on the middle wheels centred around the crankpin boss but one spoke anti-clockwise, the two smaller weights are for the outer wheels exactly opposite to the crankpin boss. Note that some engines has wrought iron wheels with square section spokes and their balance weights were completely different.



5.25 The Bachmann sandboxes are the correct shape. Note that they were quite wide extending beyond the face of the wheels (but clear of the coupling rods!). Take a sandbox washer [D29] and attach it to the bottom centre of the Bachmann sandbox using cyanoacrylate glue or epoxy resin. Drill a 0.4 mm hole through the centre of the washer and fit 0.45mm wire to form the sand pipes. Shape to a 'J' configuration terminating just short of the centre wheels (all sandboxes operate on the centre driving wheel). Repeat for the other 3 sandboxes. 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).



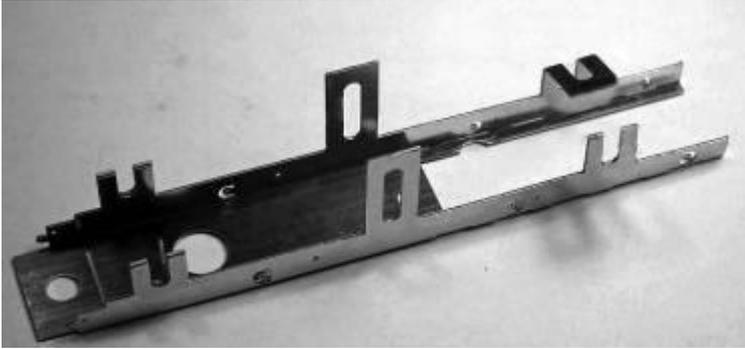
5.26 Attach the sandboxes to the mainframes using cyanoacrylate glue or epoxy resin. There are two small indentations on the mainframes where the top corners of the sandbox should be located.



Note: this paragraph is best completed after all other construction work is complete as the sandpipes interfere with the removal of the wheelsets. See photo.

5.27 Re-fit the loco body. The basic loco conversion is now complete.

## 6 Basic tender conversion



6.1 Taking the 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. Fold the outer half of the slotted axle bearing sections through 180 degrees back on themselves. 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)

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

6.3 Bend out the four small ears on each side of frames at 90 degrees.

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



6.5 Ensure that the new frames fit into the Bachmann tender. 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.

6.6 Fold up the 6 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.

6.7 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.

6.8 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.



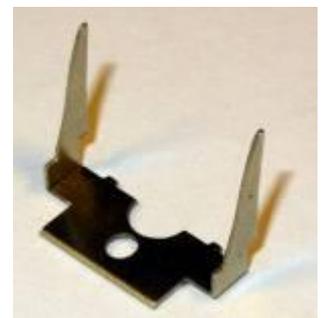
6.9 Mount the wheelsets in the 'U' slots on the frames with the axleboxes on the outside of the frame.

6.10 Put a 2 mm right angle bend in the end, cut to 79 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. See Photo of an 8 coupled tender but principle is identical except for the holes in the frames have been replaced by slots.



6.11 Fold up the replacement guard irons [T3] by firstly bending the section with a 'U' shaped cut out through 180 degrees back on itself **with the half etch bend line to the outside**. Then bend up the two guard irons at right angles and then bend to shape. Finally file off the two small tabs between the guard irons. (see photo)

6.12 Fit the frames to the Bachmann tender, locating and retaining 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 enlarge the slot with a rat tail file. Also cut 2mm off the rear to allow it to slide further back. Adjust to suit your model curves.



6.13 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.

The basic tender conversion is now complete, but significant visual improvements can be made by replacing the tender brake gear, see section 8.

## 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 4 etches and hinged behind the centre crank pin. There are also overlays for the bosses. Some locos are fitted with fluted coupling rods, others are fitted with plain coupling rods. The replacement rods are designed to have to be assembled from two parts, a front and a back. **In each case a fluted front should be attached to a non fluted back.** When these are fitted to the loco, fit the rods with the flutes to the outside for a fluted rod and flutes to the inside for a non fluted rod.

7.1.2 Cut one pair of rods from fret [L13 & L14].



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 [L15 & L16, L17 & L18, L19 & L20]

7.1.6 There are four different bosses that can be fitted to the rods depending on whether the loco has plain or fluted rods, ([L21] coupling rod boss fluted, [L22] forked joint boss fluted, [L23] coupling rod boss plain, [L24] forked joint boss plain). The coupling rod bosses are fitted to both ends of the leading rod and to the rear end of the trailing rod, the forked joint boss to the front of the trailing rod. (Spare bosses are provided on the etch). 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 manufacture. The front and rear rods are joined with a short length of 0.8 mm wire is pushed through from the front and then cropped back on the rear leaving about 0.5 mm proud. See photo.



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.



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.

7.1.8 Fit the rods to the wheels and test run.

### 7.2 Replacement brakes and brake hangers

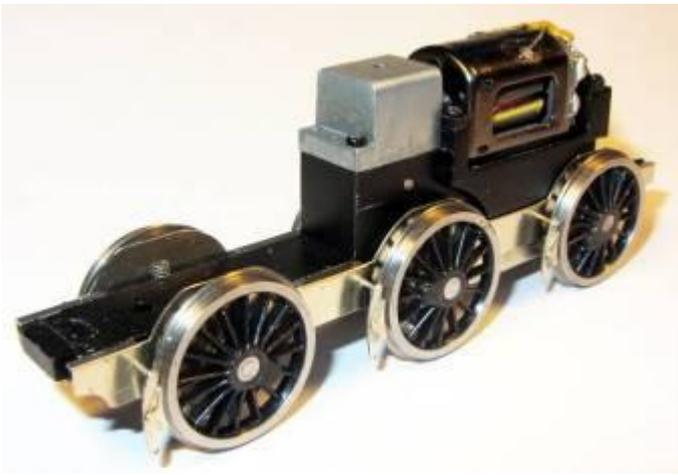
7.2.1 The plastic brakes are rather nicely moulded however metal replacement brake hangers can be fitted if the Bachmann brake hangers are lost or a metal replacement is preferred. Remember plastic does not produce an electrical short and the wheels are sprung so move vertically!

7.2.2 Take the brake hangers [L25] and the brake block overlays [L26 and L27]. 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 [L6]

7.2.3 Solder together the brake hangers [L25], the brake block overlays [L26 and L27], utilising a short piece of 0.7mm wire in the centre hole to assist alignment, making sure that you have three of each hand. Trim the wire to length.

7.2.4 Attach three pieces of 0.7 mm wire across the mainframes using the holes provided protruding and equal amount beyond the wheels on both sides.

7.2.5 Attach the brake hangers to the wire, making sure that the brake blocks do not touch the wheels, which would cause a short circuit.



7.2.6 Cut the 0.7mm wire between the mainframes to allow them to be refitted around the Bachmann chassis.

7.2.7 Assemble the brake pull rods as per paragraph 5.23



## 8 Detail Loco Components

### 8.1 Front footsteps (as fitted to some locos)



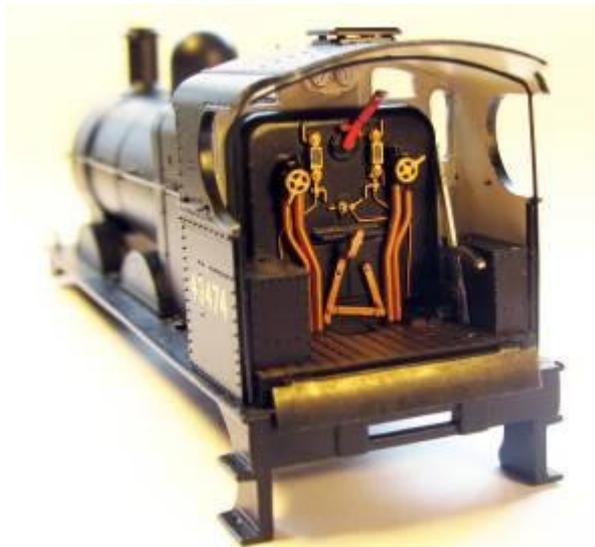
8.1.1 Bend the first bend from the top of the footstep backplate [D1] back on itself. Note bend line is on the outside. Bend the footstep back at 90 degrees at the second bend line. Ensure that the footstep fits up behind the footplate valance in the correct position.

8.1.2 Solder the upper footsteps [D2] and lower footsteps [D3] into the slots on the footstep backplate. Solder or glue the step backs [D4] and [D5] above the steps. Attach to the loco using cyanoacrylate glue or epoxy resin (see photo)

### 8.2 Dummy weightshaft and lifting levers

#### Important note: Weight shaft, reach rod and reversing lever.

Included in the additional loco components are dummy weightshaft and levers, replacement reach rod and replacement reversing lever. These can be assembled with the loco in forward gear on mid gear, by simply choosing the appropriate parts. However, due to the size and positioning of the boxes either side of the cab and the fact that the boiler backhead protrudes too far into the cab, fitting the reverser in forward gear fouls the controls on the backhead. This can be easily overcome by taking out the right hand side box and reducing its width by 2mm. Unfortunately, the moulded oil reservoir and pipes on the box need to be sanded off to fit either of the reversing levers as they are in the wrong position. Reducing the width of the box on the left hand side of the cab by 2mm gives a more balanced look and gives the correct distance between the boxes (see photo).



8.2.1 To fit the dummy weightshaft the footplate on the Bachmann body between the frames and between the leading and centre axle splashers needs to be removed. This is best done with a piercing saw after first splitting the body and footplate by undoing the screw under the smokebox and the cab floor, the cab handrails are glued into the cab front so carefully break the glue joint. (see photo)

8.2.2 Open up the holes in the weight shaft bracket components [D6, D11 –D15] to clear 0.7mm wire. Open up the holes in the lifting links [D8 and D9] to 0.5mm wire. Open up the holes in the weightshaft levers [D7] to clear 0.7mm at the large end and 0.5 mm at the small end.

8.2.2 Take the weight shaft bracket [D6] and bend up the ends to 90 degrees.

8.2.3 Cut 3 pieces of 3/64" tube 4mm long. Assemble the weight shaft by pushing a 16 mm piece of 0.7mm wire through one end of the weightshaft bracket [D6], through a piece of tube, through one of the weightshaft levers [D7], through another piece of tube, through the second weightshaft lever [D7], through the last piece of tube and through the other end of the weightshaft bracket. The two out pieces of tube may need to be shortened slightly to fit. Make sure there is an equal length of wire protruding from each end.



8.2.4 The weightshaft assembly can be built with the loco in forward or mid gear.

If building in forward gear cut a piece of 1mm tube 4 mm long and assemble it between the smaller end of the weight shaft levers using a piece of 0.5mm wire.

If building in mid gear the tube needs to be 3.5mm long. Assemble the tube with the lifting links [D8 and D9] either end between the weightshaft levers using a piece of 0.5mm wire.

8.2.5 Fit the two washers [D10] over each end of the 0.5mm wire.

8.2.6 With the weightshaft bracket sitting on a flat surface rotate the lifting arms so that they are on the opposite side to the cut out section in the base of the bracket.



If the weightshaft is assembled in forward gear the small end of the weightshaft levers should also be resting on the flat surface. Solder up the weightshaft assembly in this position. (see photo left)



If the weightshaft is assembled in mid gear the small end of the weightshaft levers should be held off the flat surface by the lifting links. Solder up the weightshaft assembly in this position. (see photo right)

8.2.7 The rest of the weightshaft bracket may now be assembled. On the left hand end slide a weightshaft bearing middle [D11] over the end of the wire, followed by a weightshaft bearing outer [D12] and weightshaft bearing end [D13]. On the right hand end slide a weightshaft bearing middle [D11] over the end of the wire followed by weightshaft bearing outer [D12]

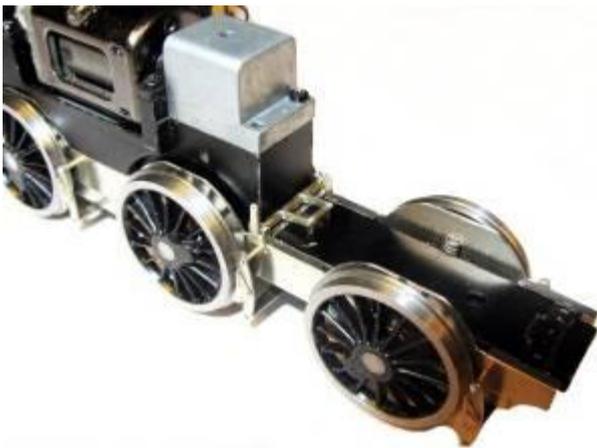
8.2.8 Solder the weightshaft bracket components together

8.2.9 Trim the 0.7mm flush with the end of the bearing at the non lever end but leave a short length of wire at the right hand for the lever. Trim the 0.5 mm wires to length.

8.2.10 Select the appropriate reach rod lever, [D14] for forward gear, [D15] for mid gear, place over the end of the weightshaft and with the Bachmann body in place, position the weightshaft assembly and lever in position (see photo)



8.2.11 Attach the reach rod lever to the inside of the plastic frame using cyanoacrylate glue or epoxy resin



8.2.12 Remove the weightshaft assembly, trim the wire at the lever end, then attach the weightshaft assembly to the top of the Bachmann chassis block using cyanoacrylate glue or epoxy resin ensuring it fits between the dummy frames on the Bachmann footplate when the body is replaced (see photo)

### 8.3 Dummy weightshaft and lifting levers – full weightshaft lever and weights

Unfortunately it is not possible to fit the complete weight shaft lever to the Bachmann model due to the chassis casting around the drive gears. However for locos other than the Bachmann 3F components are included to build the full weightshaft lever and weights

8.3.1 Take the full weightshaft levers [D16] and solder two weights [D17] either side of each weightshaft lever, using short lengths of wire to aid alignment if necessary.

8.3.2 Follow 8.2..2 to 8.2.11 substituting [D16] for [D7]. Note – the weightshaft with weights [D16] are assembled in the weightshaft assembly with the bend downwards either side of the weightshaft



## 8.4 Replacement reach rod

8.4.1 With the body in position align the reach rod [D18] with the weightshaft reverser lever and trim to length. Attach the reach rod to the weightshaft reverser lever with solder or by using cyanoacrylate glue or epoxy resin, inserting a short length of 0.5mm wire in the hole and trimming to length afterwards (see photo)

## 8.5 Replacement reversing lever

8.5.1 Before starting, see note in section 8.2

8.5.2 Take the two halves of the reversing lever [D19 and D20] for the lever in forward gear, [D21 and D22] for the lever in mid gear, and solder them back to back.

8.5.3 Open out the hole where the reach rod is attached to the lever and insert a short piece of 0.5mm wire.



8.5.4 Remove right hand box from the cab. This is best done after removing the boiler and cab from the footplate (see 8.2.1) and remove the moulded oil boxes and pipes. Reduce the width by 2 mm by cutting with a piercing saw and finishing to size with files and emery paper. Reduce the size of the left hand box, but do not remove the moulded oil box and pipework

8.5.5 Attach the reversing lever to the right hand side box with the end of the quadrant 1mm in from the rear edge of the side box using cyanoacrylate glue or epoxy resin. (see photo). Trim reach rod to length.

8.5.6 Refit the boxes to the cab (see photo)



## 8.6 Cab beading

8.6.1 For those locos fitted with cab beading, carefully remove the plastic rivets around the front bottom and rear edge of the cab sides.

8.6.2 Attach the etched beading [D23] to the cab sides using cyanoacrylate glue or epoxy resin (see photo)

## 8.7 Rear splasher beading

8.7.1 For those locos fitted with splasher beading, attach the etched beading [D24] to the rear splashers using cyanoacrylate glue or epoxy resin.



## 8.8 Johnson chimney



8.8.1 Remove the plastic top to the chimney by filling away the raised rim, and continuing until the flat area is the same diameter as the capuchon.

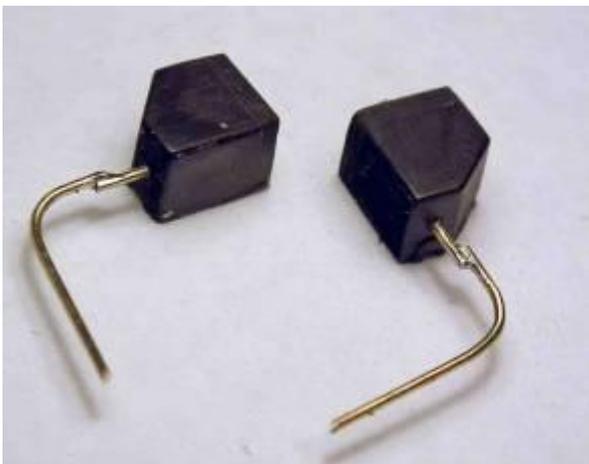
8.8.2 Solder the capuchon base [D25] to the chimney top [D26]. Carefully align the capuchon lip [D27] with the lip on the capuchon base and solder in place.

8.8.3 File the new chimney top to shape, before attaching to the plastic chimney using cyanoacrylate glue or epoxy resin (see photo)

## 8.9 Sander linkage

8.9.1 Push through the rivet from the back of the sander linkage [D28]

8.9.2 Referring to photos of the prototype, fix the linkage to the back of the right hand middle splasher using cyanoacrylate glue or epoxy resin. Trim the linkage where it protrudes inside the splasher (see photo). Note that photo shows sander linkage fitted before reverser lever.



## 8.10 Sandbox base and pipes

8.10.1 The Bachmann sandboxes are the correct shape. Note that they were quite wide extending beyond the face of the wheels (but clear of the coupling rods!). Take a sandbox washer [L12] and attach it to the bottom centre of the Bachmann sandbox using cyanoacrylate glue or epoxy resin. Drill a 0.4 mm hole through the centre of the washer and fit 0.45 mm wire to form the sand pipes. Shape to a 'J' configuration terminating just short of the centre wheels (all sandboxes operate on the centre driving wheel). Repeat for the other 3 sandboxes. 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).

**Note:** this paragraph is best completed after all other construction work is complete as the sandpipes interfere with the removal of the wheelsets. See photo.



## 9 Additional tender components

### 9.1 Replacement brake gear

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.

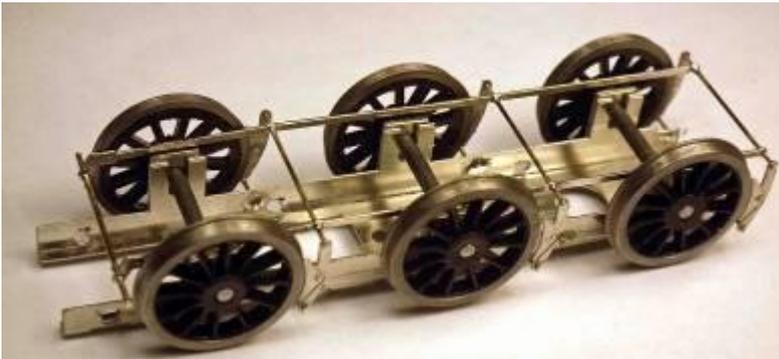
The replacement brake gear can be fitted to the EasiChas frames for EM and P4, and for 00 it can be fitted to the brake frame [D30] which also represents the tender tank.

9.1.1 For a 00 model fold up the sides of the brake frame [D30] 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 [D31] 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 & hanger assemblies 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 Cut the upper shafts flush with the inside frames.

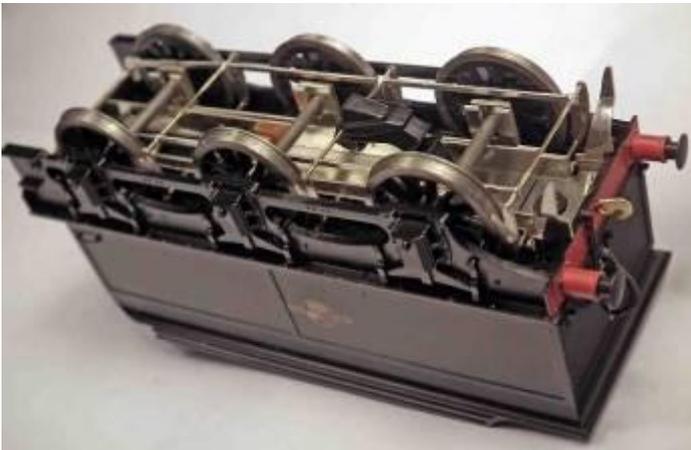
9.1.6 Place three cross shafts of 0.7 mm wire through each hanger and pull rod [D32]. Solder the wire to the bottom of the brake hangers. Position the

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 cross shaft activator angle and solder so the shaft fits between the plastic Bachmann tender side frames.

### 9.2 Water Scoop

9.2.1 Very few 3Fs were fitted with this apparatus, only those with a tender transferred from a passenger loco. You can tell from a photo if a scoop was fitted as 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). 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

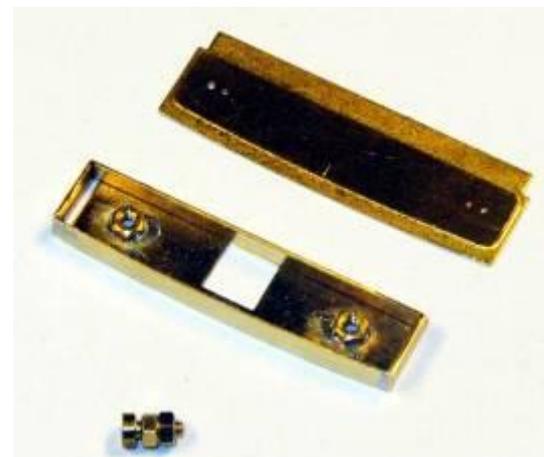
Note - If utilising the Brassmasters replacement tender frames, these should be built first before assembling the replacement front footplate.

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 [D33] 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 [D34] to match the curve on the underside of the front footplate [D34]. Ensure that it fits between the side pieces of the front footplate support [D33] 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 [D36] 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 two 12 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 [D35] where the inner half etched mark is and a 0.6 mm hole where the outer half etched mark is. (see photo)

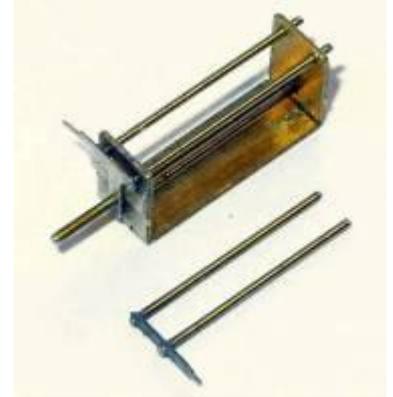
9.3.9 Remove the front footplate support assembly and solder on the front footplate to the top.

9.3.10 Open out the holes in the end of the handrail jig [D37], 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 [D38] 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 [D39] 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 9.3.10 to 9.3.12, 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 [D40] to the hand rails.

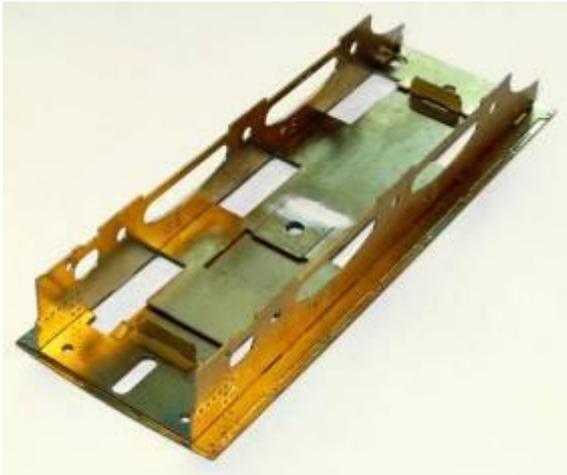
## 9.4 Tender coal rails

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 [D41 and D42]

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



## 10 Replacement tender frames

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

9.1 Fold over the five tabs on the base of the tender frames [F1] back on themselves (see photo 9.1). Ensure they are completely flat

10.2 Fold up the sides of the tender frames to 90 degrees

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

10.4 Push through the rivets on the underside of the tender base [F2]. Ensure the four tabs on the top of the frames [F1] engage in the slots in the tender base [F2]. Solder the two together in between the frames not along the side of the frame (otherwise this may affect the fitting of the river strip later)

10.5 Take the two pieces of the buffer [F3 and F4] and push through the rivets on the buffer beam back [F3]. Solder the two together

10.6 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)

10.7 There are two different types of drag beam, with a rounded end [F5 and F6] and the later type with an angled end [F7 and F8]. Push through the rivets in the appropriate drag beam back [F5 or F7] and then solder the two appropriate halves together

10.8 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).

10.9 Solder the drag beam in place

10.10 Solder the two trunnions [F9] in place ensuring that there is a single rivet located to the top

10.11 Solder the bottom footsteps [F10] and the top footsteps [F11] in place

10.12 Solder the top footstep back [F12] in place

10.13 Ensure that the lower footstep backs [F13 and F14] fit in place. File slightly to miss the trunnion if necessary. Solder in place



10.14 Solder the rivet detail fronts [F15 and F16] in place on each side of the frame

10.15 Ensure that the rivet detail rear [F17 and F18] fits in place. Trim if necessary. Solder into place (see photo right - bottom half)



10.16 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)

10.17 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 available separately from Brassmasters

10.18 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



10.19 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 (see photo above)

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

10.20 If using with the EasiChas tender frames, solder a 8 BA nut in the recess on the top of the tender base [F2], and a nut over the rear hole of the tender base

10.21 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



10.22 Fold up the replacement guard irons [T3] by firstly bending the section with a 'U' shaped cut-out through 180 degrees back on itself **with the half etch bend line to the outside**. Then bend up the two guard irons at right angles and then bend to shape. Finally file a small amount off the top of the step where the guard irons fit around the bottom of the buffer beam ( there is a small mark on the etch indicating where to file but not how much) (see photo 10.22)

10.23 The two tabs on the guard irons are not quite long enough, so solder two small pieces of scrap half etch (the centre section of the unused back of the drag beam could be used) to the back of the buffer beam in line with the two tabs on the guard irons thereby spacing the guard iron further back from the buffer beam.

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.

## Loco and Tender EasiChas etch

L1	main frames	L19	coupling rod trailing (fluted) rh
L2	keep plate	L20	coupling rod trailing (plain) lh
L3	ashpan	L21	coupling rod boss (fluted) (6)
L4	guard iron left	L22	forked joint boss (fluted)(2)
L5	guard iron right	L23	coupling rod boss (plain) (6)
L6	pull rods	L24	forked joint boss (plain) (2)
L7	pull rods front fork (2)	L25	brake hanger (6)
L8	pull rod shackle middle (2)	L26	brake block left (3)
L9	pull rod shackle rear (2)	L27	brake block right (3)
L10	driving balance weights (2)	L28	1/8" washers full thickness
L11	coupled balance weights (4)	L29	1/8" washers half thickness
L12	not used		
L13	coupling rod leading (fluted) lh	T1	tender frames
L14	coupling rod leading (plain) rh	T2	axleboxes (6)
L15	coupling rod leading (fluted) rh	T3	guard irons
L16	coupling rod leading (plain) lh	T4	2mm washers full thickness
L17	coupling rod trailing (fluted) lh	T5	2mm washers half thickness
L18	coupling rod trailing (plain) rh		

## Detailing Etch

D1	front steps backplate (2)	D22	reversing lever right mid gear
D2	front steps top step (2)	D23	cab beading (2)
D3	front steps bottom step (2)	D24	splasher beading (2)
D4	front steps top step back (2)	D25	capuchon base
D5	front steps bottom step back (2)	D26	chimney top
D6	weightshaft bracket	D27	capuchon lip
D7	weightshaft lever (2)	D28	sander linkage
D8	lifting link front	D29	sandbox base (4)
D9	lifting link rear	D30	brake frame (for 00)
D10	lifting link washer (2)	D31	brake hangers
D11	weightshaft bearing centre (2)	D32	brake pull rods
D12	weightshaft bearing outer (2)	D33	front footplate support
D13	weightshaft bearing end	D34	front footplate support front
D14	reach rod lever forward gear	D35	front footplate
D15	reach rod lever mid gear	D36	front footplate hole jig
D16	weightshaft lever with weight (2)	D37	handrail jig
D17	weight (8)	D38	handrail top with brake handle (2)
D18	reach rod	D39	handrail top no brake handle
D19	reversing lever left forward gear	D40	side plate
D20	reversing lever right forward gear	D41	coal rail left
D21	reversing lever left mid gear	D42	coal rail right

## Tender Frame Etch

F1	tender frames	F10	bottom footstep (2)
F2	tender base	F11	top footstep (2)
F3	buffer beam back	F12	top footstep back (2)
F4	buffer beam front	F13	bottom footstep back left
F5	drag beam round end back	F14	bottom footstep back right
F6	drag beam round end front	F15	rivet detail front left
F7	drag beam angled end back	F16	rivet detail front right
F8	drag beam angled end front	F17	rivet detail rear left
F9	trunnion (2)	F18	rivet detail rear right

## Other Components

### Loco and Tender EasiChas

Brass axleboxes (6)	0.6 mm brass wire
Axlebox springs (6)	0.009" spring wire
0.8 mm nickel silver wire	Bushes for Bachmann rods (8)
0.7 mm brass wire	

### Detailing Etch

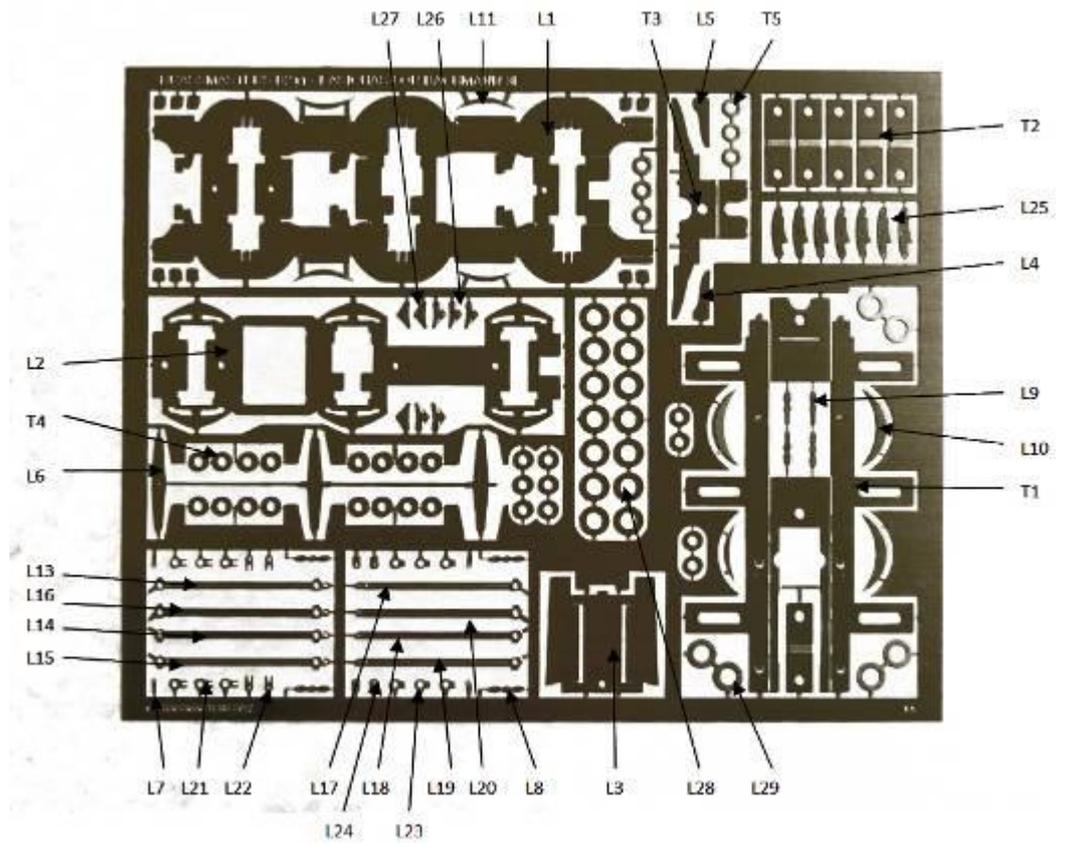
0.7 mm brass wire	3/64" brass tube
0.6 mm brass wire	1.0 mm brass tube
0.5 mm brass wire	12 BA cheese head screws (2)
0.45 mm brass wire	12 BA nuts (2)

### Tender Frame Etch

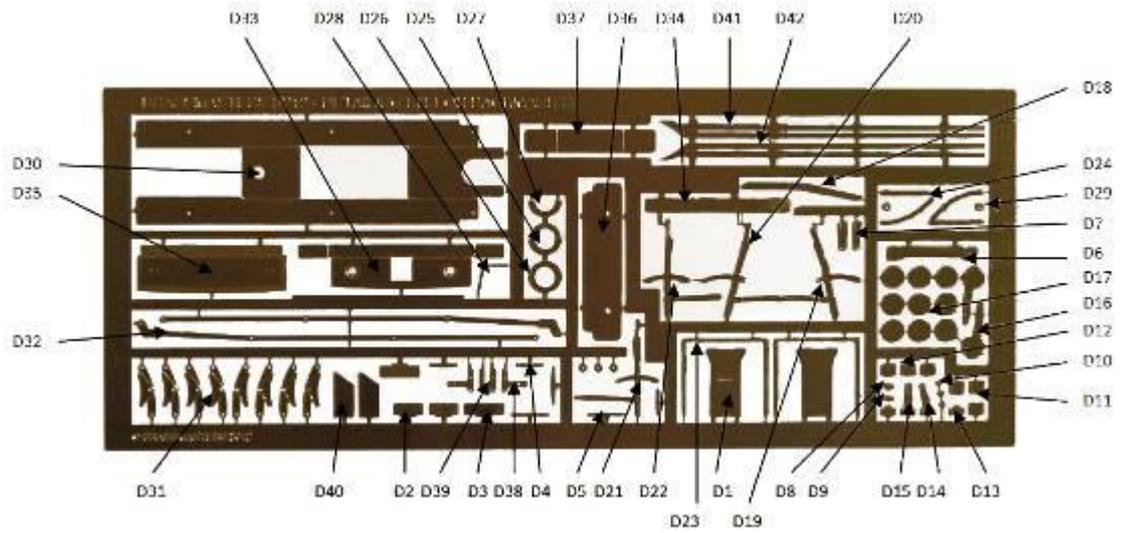
8 BA cheese head screws (2)	8 BA nuts (3)
8 BA round head screw (1)	

## Etched Components

### Loco and Tender EasiChas Etch



### Detail Etch



### Tender Frame Etch

