88D Models – Rhymney Railway Class A

This kit was designed to be assembled by modellers with varying skill levels. Were ever possible I've tried to provide an easy solution for the more difficult or tedious bits. The kit will produce a fine model but some of you will want to upgrade it by either substituting or even fabricating small extra details, a list of suggestions appears at the end.

A great deal of care has gone into designing this kit and I have "test" built one to ensure everything fits with the minimum of "fettling" by yourselves. Therefore when cleaning off the cusp left by etching - **remove only the cusps**, otherwise the parts will be undersize.

If you are an experienced modeller, then you won't need any help, however others might find these notes useful.

The main skill to master is soldering and the choice of soldering iron is endless, I have named some options under ***Suggested Tools*** below. Whichever make and model you choose you will need a selection of "bits". I get by with 3 - a small pointed one, a small chisel shaped one and lastly a large knife shaped one.

Soldering isn't a black art, you just need to know the rules and stick to them.

1) Make sure the surfaces to be soldered are clean. Use a glass fibre stick, scratch pen or very fine "wet & dry" paper to remove any oxidation, try to avoid tearing up the surface as it might show later. Preparation is very important on brass, even though it might look clean it still needs a clean, also the etching process can leave an invisible film.
2) Flux – avoid some of the varieties used by plumbers, they can be too powerful and more difficult to clean off, I use Duncan Models for almost everything. Keep a jar of clean water to hand and a small paint brush and when you have finished a section wash off the flux, it's far harder later. At the end of each model session thoroughly clean your model with a bit of washing up liquid and warm water. I often brush over with "ViaKal" and this both neutralises the acid flux and cleans your model.
3) Solder, I use 4 sorts. Rosen cored electrical solder for high temperature items i.e. fixing steps to the back plate. 190^0 for a more durable fixing, 145^0 everything else with exception of low melt for white metal items. I also have a separate iron for low melt solder as I find it can ruin the tips.
4) Use the solder sparingly; I can't stress enough the need to keep the model clean and tidy. If you inadvertently over apply the solder, drag the surplus out to an area where it can be removed with a craft knife and then buff up with a fibre glass pen. Always take the solder to the joint on the tip of the iron, don't feed it in.
5) It is important to keep the bit clean and in good condition as you work. Get a soldering iron stand containing a damp sponge as old oxidized solder is wiped off on this before picking up fresh solder for each joint. If you haven't made a joint for some time you may find that a hard black crust has formed on the bit. Remove this with a brass wire brush (suede brush) and then feed some multicore solder onto each side of the bit to restore a bright surface (referred to as wetting or tinning the bit). If you follow these rules you should achieve success. Practice on some scrap material to get your hand in first.

If you would like more details on soldering etc. go to Jim McGeown's - **Connoisseur Models site and follow the link "PDF print out sheets", he has taken a lot trouble to provide a wealth of information on how to build a kit.**

Kit guidelines

As this is a "multi-media" kit I recommend you read the instructions carefully before you begin and I list some pointers, sorry if I'm teaching you such eggs.

a) Don't cut parts from the etched sheets until you need them. Small items get lost or are difficult to identify.
b) Remove cusp from each part before assembly.
c) All etched fold lines are on the inside unless otherwise stated.
d) Some half etched holes are to be punched out as rivets, whereas other are to provide a centre hole to allow you to drill later, example: the outer tank sides need to be bent very close to the location of a handrail, if these were holes, the metal could crease at this point whilst bending.
e) Due the process of etching, the holes will most likely be a fraction under size. These will need to be carefully opened out and this is best done using tapered broaches or if you can afford it tapered reamers. Do it a little at a time, you can take more off but you can't put it back!
f) The plastic printed parts have a reasonably high melting point but is best to finally fix in place **after all the soldering is complete**.
g) **Extreme** care is required when handle the printed parts. The very thin and small parts will not stand up to rough handling or being dropped onto a hard floor – I've been there! However once fitted to the model it won't be a problem.
h) Take the shine off the surface of plastic parts which are to be glued to give the adhesive a good grip.
i) Always tack solder parts to ensure they correctly fitted and then solder permanently.

I will point out in the instructions if an assembly step is **critical** to get right.

Damaged Parts and Shortages.

If you damage an etching during construction it is not possible to replace individual pieces, but at a minimum cost replacement frets (this will one of the sheets as originally supplied) can be supplied, unless in stock 2-3 weeks turn around.

The printed parts are more difficult to replace, the printing company has a minimum order value so the only viable way of getting replacement part is to tack it on to a set of parts for another kit. This will inevitably lead to a delay in providing the part, as with an etched sheet, I will do it as cheaply as possible.

Items required to finish Kit

ABC Mini gearbox and motor (or alternative)
3 x Slater's 7853Y – 4' 5" wheels
1 x Slater's 7842 – 3' 6" bogie wheels
1 x Slater's 7157 plunger pickups
Number Plates
Transfers
Paint

Only cut parts from fret as needed and read each instruction fully before commencement.

Do not fit any printed parts until soldering is complete, they have a relatively high melting point but better safe than sorry.

All pictures and more are available at www.88d.uk/S1/Picures.asp
The prototype differed from one loco to another and I would suggest you have a picture of your chosen loco before you start, some pictures are available at http://www.gwr813.org/gallerysw9.html.

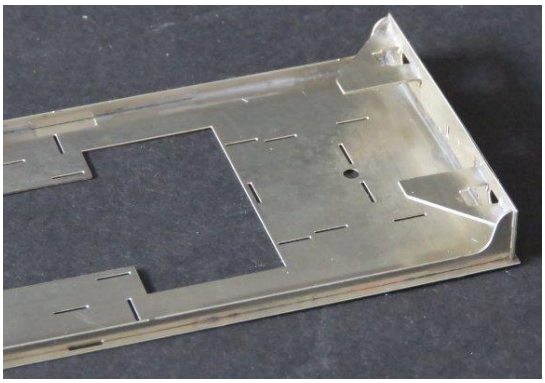
Note! *Not all of the items on the etch are required to complete this model.*

To assist with which loco had what, please find attached table. A number of holes are marked but **not drilled**, you will need to decide to before assembly.

Construction

I suggest the following sequence of actions which should ensure a stress free build.

1) Remove (1) footplate and (2) valances from sheet, detach any parts within the footplate and store safely. Clean off the cusp from the footplate and valances taking care not to bend or distort the valances.

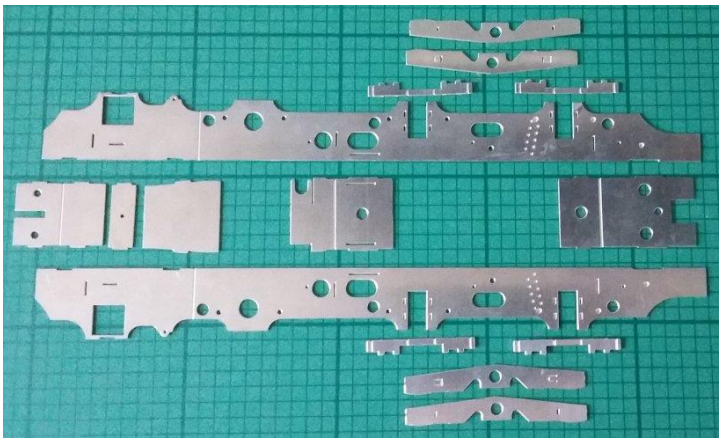


2) With footplate upside down, tack solder valances into grooves, equal distance from each end, ensure they remain at 90^0 to the footplate. When satisfied finish soldering and check again they at 90^0 to footplate.

3) Remove and clean up (3) buffer beams and punch out half etched rivet holes.

4) Solder buffer beams on to ends of valances and footplate, groove by buffer holes furthest from footplate; make sure they overhang each side of buffer beams equally. You now have box into which the chassis has to fit.

5) Remove parts (12) 4 off buffer beam stiffen plates, start by removing the cusp and bend the tabs at 90^0. Lay a pair into front corners of the footplate and measure the distance between them, they should be 25.5mm apart, if not remove material from the long facing sides equally. When satisfied solder into the corners using half etched groove as guide. Offer chassis to footplate to check it fits between stiffeners, there should be about 0.5mm clearance either side. Repeat at rear and measure, the distance should be 22.5mm, check chassis fits.

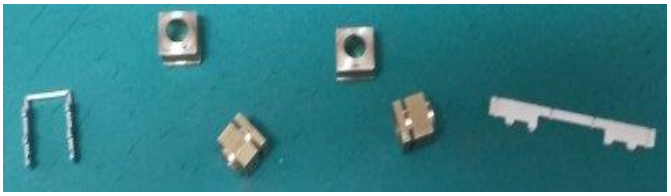


6) Locate (4) & (5) from chassis etch and remove cusp left by etching process, bolt together and offer to the footplate assembly, if they are too long remove an equal amount off each end until they fit comfortably inside the "box" of the footplate. The above action is ***very important***, both to be able to keep the chassis square and is easier done now than when the chassis is assembled. When satisfied put the footplate to one side for now.

7) Punch out the 2 rows of rivets on each frame and if the front axle is to be under-sprung – drill marked holes either sides of horn block cut-out.

8) Remove (6) 4 off horn block guides fold into U shape and dry fit into slots in frames. Ensure the horn block is a tight sliding fit, adjust until satisfied. With horn guide on the underside apply flux and solder to each tab, don't overdo it as the solder will run through and build up on the inside and foul horn block. Check that each horn block slides freely but is not sloppy, file off tabs. Note small tab on end of each leg can be folded to retain bearings.

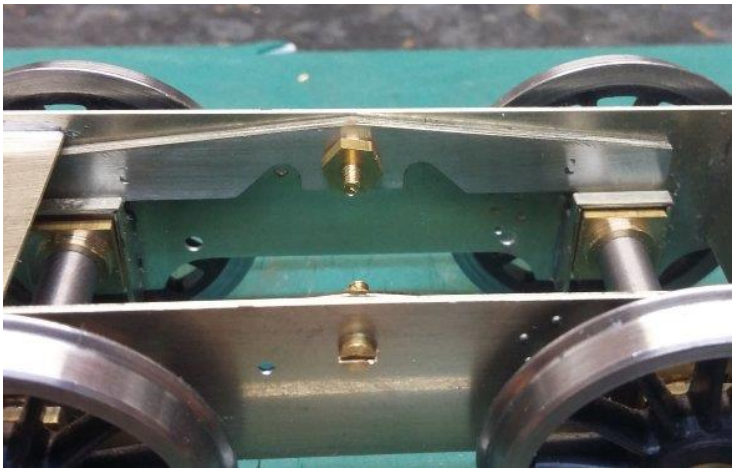
9) Joggle the frames at the rear end, lines on the inside of bends, final adjustment later.



10) Remove (7) (8) (9) (10) & (11) frame spacers, clean up cusp. Bend with the half etched lines on the inside. ***Note! All bends will have the half etched line on the inside unless otherwise stated.*** The kit is deigned to be fitted with an ABC motor/gearbox and a mounting bracket is incorporated as part of the centre spacer. Spacer (7) is at front and spacer (10) at the rear of the chassis. (11) Provides the springing for the radial axle, tap the hole 12BA, a nut can be soldered to the underside if desired.

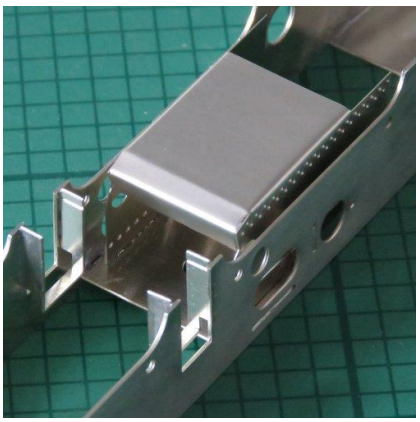
11) Dry fit all the seven parts to ensure they all slot, when satisfied with the fit, lay the chassis upside down on a flat surface and tack solder together. Check that it is still flat and square and then solder all joints fully. Check again before proceeding. See below.

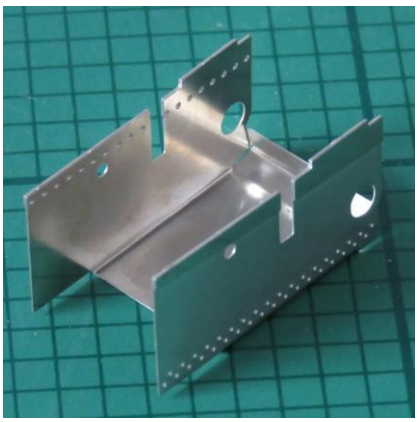
12) Locate the compensation beam parts (13) & (14) 2 pairs, bend up tabs on (13) and "tin", place (14) over tabs solder together, file off tabs and deburr all around outside. Note! There should be a slight bulge on each end of the beams where they rest on the hornblocks.

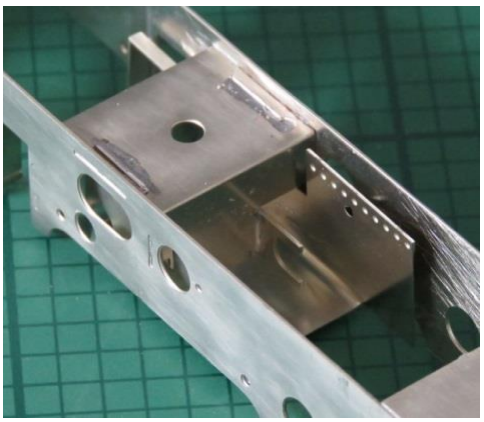


13) Using the 2 pivot bearings and 2 - 10BA x ¼ bolts secure the 2 beams to the chassis. *(The beams fit in the slot above each hornblocks)*. Check that the beams move up and down easily. **DON'T** open out hole in chassis as this will affect ride height and the degree of compensation.

14) Remove (15) (ash pan) and punch out the 2 rows of rivets, clean up and fold into a flat bottom "U" shape with the rivet detail on the outside. Then make the double fold on the base as per picture, offer up to the half etched locations on the chassis and adjust to get a good fit. Solder in place, see picture, ensure it is pushed up to the top of the location or it will foul the rear brake stretcher later.



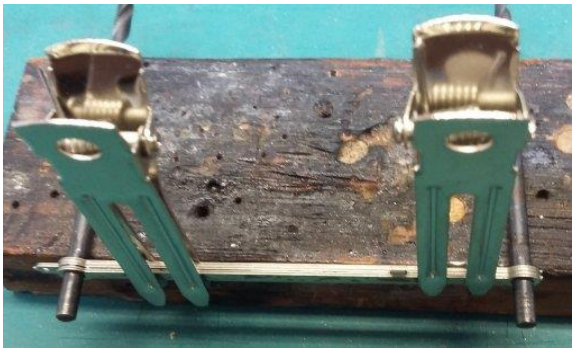




15) Take each slater's wheel and lay face upwards on a piece of 600 grade, wet and dry and with a circular motion remove and slight pips of plastic left from moulding operation. With an emery stick or similar, **kiss** each of the 4 facets on each end of the axle and then try fitting a wheel to each end. Sometimes you might find the slightest burr in hole in the wheel, if so kiss with a fine square needle file. *At all costs avoid a sloppy fit.* Now fit the crankpins as per instructions that came with the wheels.

16) Using the bearings (*and washers on etched sheet to reduce side play if needed*) fit wheels and axles to the chassis – *Do Not fit the motor/gearbox at the moment*. When all 3 wheel sets have been fitted, push along the bench or piece of spare track, the chassis should roll freely. If not determine which axle is the problem and correct it.

17) **Before removing parts (16)** coupling rods read this note fully. The three parts of the rods can be cut out as one piece and then using the tabs to keep in line, folded before soldering (*half etch of tabs on the outside of fold*), **do not** remove the cusp at this time. Use "black" 2.5mm drill(s) shank to align the holes before soldering. After soldering the parts together file off surplus solder, cusp etc. until you have a nice solid looking rod. Before joining the two halves of the rods, either coat the "tongue" with a permanent marker pen or smear with super glue and allow time to dry. Both methods should prevent the solder from penetrating the joint, use a piece of 1mm nickel silver wire to form the pin and solder on the back only, trim off excess and clean up.

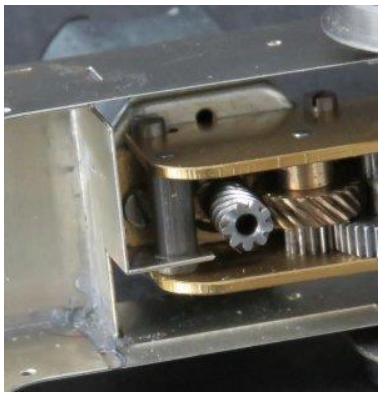
18) Fit bearings to crankpins and try coupling rods, it may be necessary to ever so slightly open holes in coupling rods, if so do it sparingly, sloppy rods = poor running. Don't worry about excess length of bearings at this stage remove excess later, fit washers, retaining nuts and roll along the bench. If there is any binding, identify where and ease the offending hole in rod and retry, repeat until chassis rolls freely.

19) Remove (17) life guards (guard irons), the larger ones go to the rear, bend to shape to align with the wheels, note the bends go in opposite direction for each pair. Study picture below. Having bent to shape solder into the half etched locations on chassis.

20) Remove the coupling rods and rear set of wheels and fit motor and re-fit wheels and coupling rods.

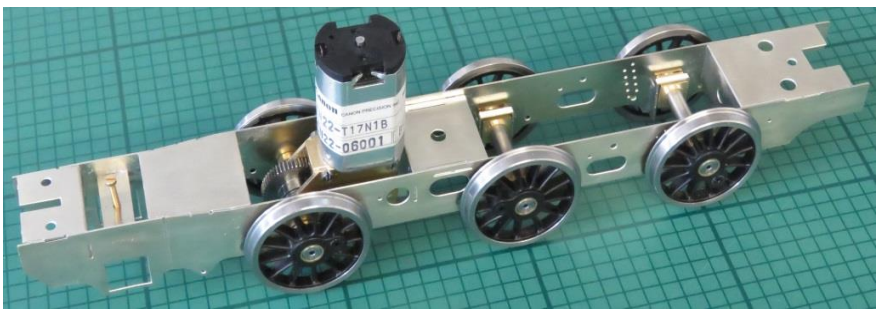
If you have pair "flying leads", you could now try out the chassis on a piece of track.

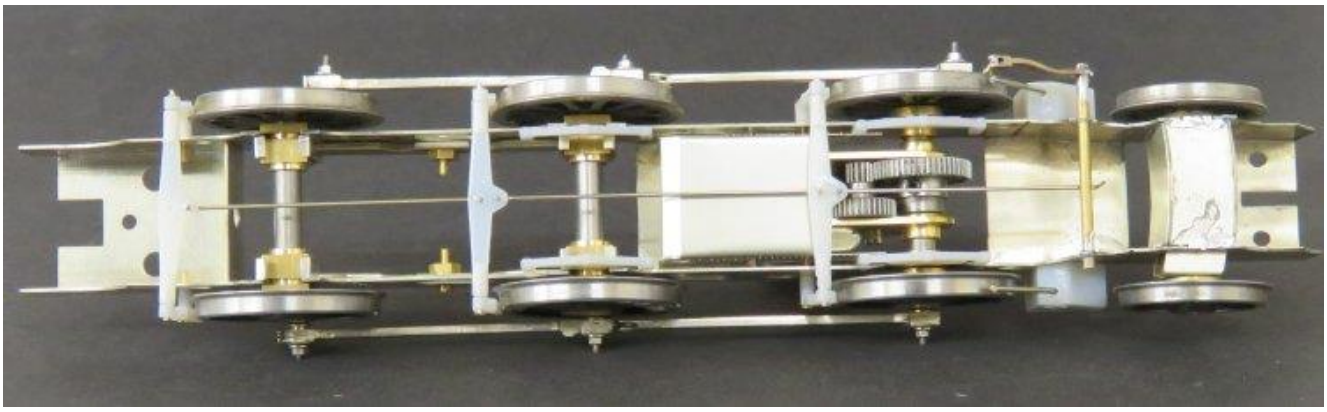
Note! Photo shows a ABC Mini motor / gearbox which is recommended.



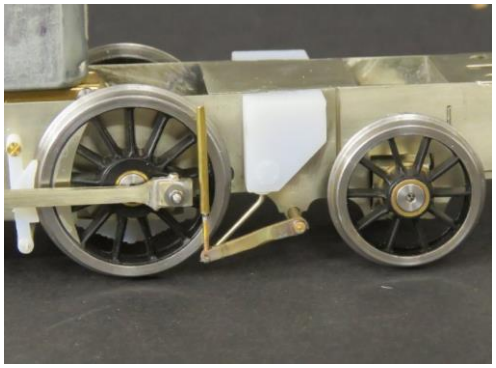

21) There are 2 ways of attaching the Brake Hangers (PP1). a) Solder a piece of 1mm wire (45mm) across chassis through the holes and glue on brake hangers. b) Drill 1.05mm and tap holes for 12BA screws to screw on brake hangers. In either case now is the time to drill and tap or solder in wires.
If you intend to screw on the brake hangers, carefully drill top holes with a 1.4mm drill bit to provide clearance for 12BA bolts. **Temporarily** fit front and rear brake hangers, if not screwing, hold hangers in place with small pieces of blue tack.

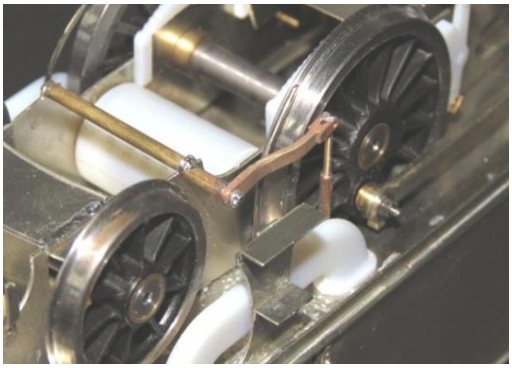
22) Depending on your chosen loco, now identify the (PP2) Sand Boxes to use, they have a tapper to fit on the joggled part of the chassis using the pips on the back to locate in holes provided. The front sand boxes fit on the footplate and have combined splasher. Taking 2 pieces of 1mm wire form sand pipes which fit into the holes on the bottom of each box, run a 1.1 or 1.2mm drill down the holes to ensure the wire will fit and the super glue can penetrate. The rear two are easy to fit, requiring just one bend, the front are more complicated and they are dealt with later.





23) A piece of 2mm rod, (trim to 42mm long) is provided to form the brake cross shaft. Thread this through brake rod brake holes on rear of chassis. Solder right end (looking from the rear and top) with 1mm poking through to outside of chassis. Locate and clean brake arm and slide on end of rod.





Next take the 14BA bolt, cut off the head and then slide the end into the brass tube and solder. Either crush the tip of bolt or file a small flat on it and slide into fork on the brake arm, then with the arm slightly below Trim top of tube level with top of chassis.

24) Take brake stretcher bars (PP3) and either glue in a short length of 1mm wire or drill 1.05mm and tap 12BA each end of stretcher. Fit stretchers between brake hangers. Using lengths of 0.7mm wire bend to length 3 pieces to form pull-rods and glue in place on stretchers. If you have screwed on your brake hanger, you can remove them as one assembly when you decide to paint.

25) Pickups – If you are not fitting plunger pickups, the easiest option, then you will need to glue some pieces of copper clad strip onto the chassis for later use to enable you to secure the wire you use for “wiper” pickups.

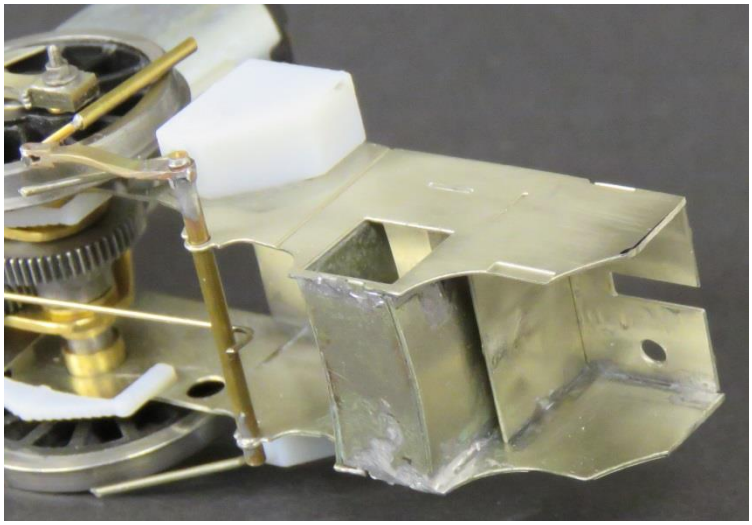
26) Taking the 4 or 6 under-slung springs (PP4) glue into place, there are pips on the springs and holes in chassis for location.

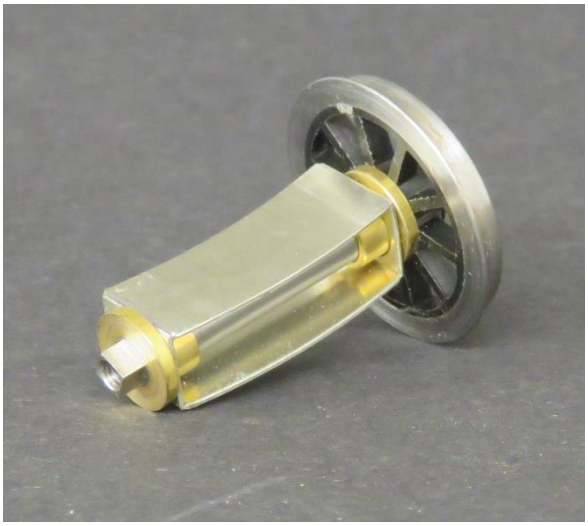
27) Having tested the fit with the footplate you can remove brake hangers, wheels, bearings and motor/gearbox. The chassis is now ready to paint.

28) Depending on your chosen loco you may or may not need to use the weights with the holes in (always have a photo of your chosen loco. Cut out parts (22*)* balance weights and clean up (there are various types), glue to wheels in correct position relative to the crankpin. Either mask wheel tread using maskol or similar and paint the whole of the wheel front or just paint the balance weights.

29) After painting re-assemble and ensure everything moves freely. Fit your wiper pickups or plunger type and wire up to the motor and test your chassis runs smoothly.

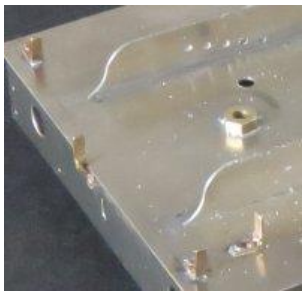
30) Bend (18) & (19) to match curve on (20), solder (18) & (19) to sides of (20) to form a “U” shape. Now fit this assembly to the chassis to form Radial axle guide. Bend (21) to form a box & solder, test in guide and fettle until it moves smoothly, place in guide and bend up tabs. Lastly fit screw in (11) and place a spring over screw to press on to (21) – it’s a bit fiddly! A place a top hat bearing in each end of box and wheels and axle.

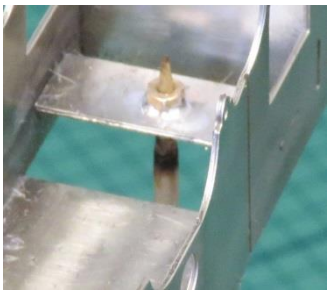




31) **IMPORTANT** - There are hexagonal half etched locations at each end of the footplate, solder an 8BA nut into each.

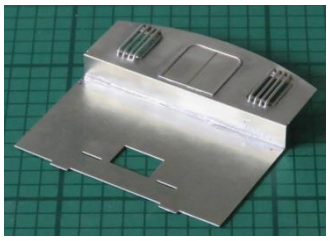
To prevent the solder from going up the thread, coat the end of a cocktail stick in light oil and screw on the nut. Pass the stick through the hole after fluxing the recess and apply solder – this is where I use Rosen cored electrical solder for the added strength. See picture right. ***NOTE!*** *Now is a good time to check the chassis fits.*

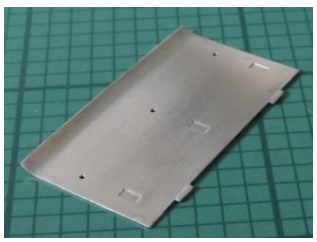




32) Locate (23) Left & (24) Right bunker sides and (25) bunker back, de-cusp and clean up. Take the bunker back bend to match profile of the sides. Locate (26) cab back, clean up, locate (27) coal doors surround and solder into the recess in centre of cab back. Fit window bezels (28).

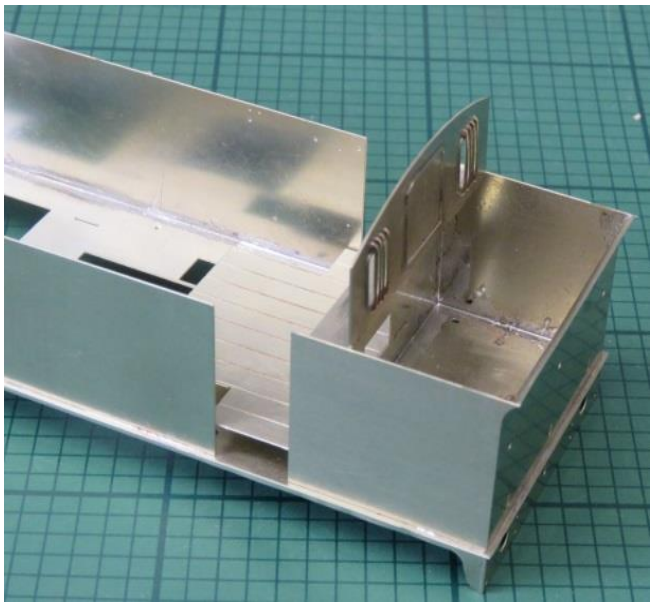
Next take a piece 0.7mm wire form the window protection bars. Using a piece of card to keep the bars at the same depth, solder in place. Cut off excess wire and file flat to produce a smooth inside to cab. Now form the 2 bends with half etched lines on inside.





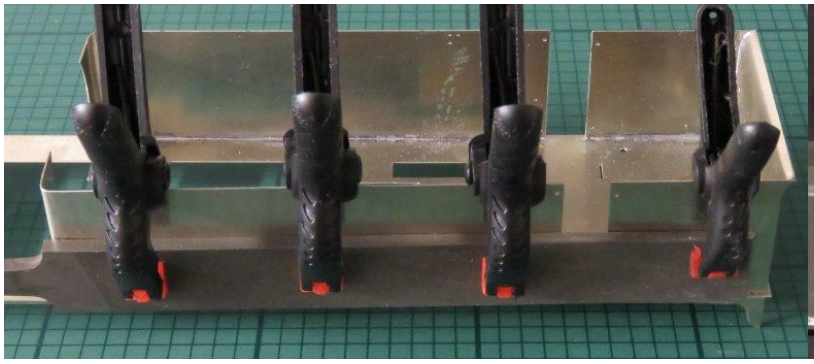
33) Tack the bunker back centrally onto the footplate, repeat with cab back, use a square to ensure they are upright.

34) Next tack one of the bunker sides in place, allowing a tiny overhang of the back. This can be filed off later leaving an invisible join. Repeat with the other side, we will solder fully later.



35) Locate (29) Left & (30) Right outer tank sides, clean up, *do not remove location tabs* and punch out rivets. The holes at front end are best left until the sides have been bent. Measure from cab end 109mm and mark a line on the inside, mark a second line at 114mm, these lines denote the start and finish of the curve (3mm radius). Using a 3mm bar (drill shank and vice) form the 90^0 bend on both tank sides, offer to footplate and adjust to get a good fit, finally check the cab opening is 13.5mm. *NOTE! Because of the etching process the tabs might be a little long and protrude below the footplate and show on finished model, check and remove excess before fixing*. Now is a good time to drill the holes for the tank front handrails, pre-formed centre marks indicate where to drill. *Tank front/boiler infill plates are provided if your prototype requires it – sheet A.*

36) With the footplate supported on a block of wood or similar to prevent bending, fit into location slots and when satisfied tack into position. Next clamp a file to the tank side and bunker side to ensure they are in alignment, when happy solder tank sides bunker sides and back fully, but *not* cab back.



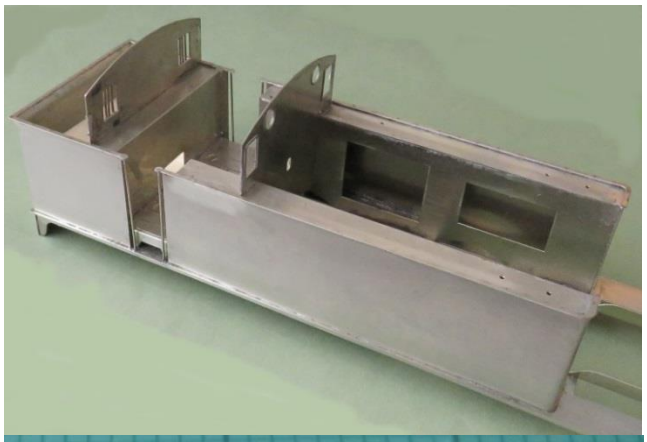
37) Remove (31) Left & (32) Right inner tank sides clean up, and fold. With the footplate supported on a block of wood or similar to prevent bending, fit to location slots and if needed clean out slots, when satisfied tack into position. Because the printed parts lack weight, now is the perfect time to add some ballast in the tanks, Lead sheet is perfect and I list elsewhere how to obtain some.

38) Remove (33) & (34) tank tops from etch they are marked left and right on the underside, tack solder in place. Check that footplate is flat and not twisted, if not correct it, when satisfied solder in place fully and check again.

39) Remove (35) the cab floor supports, fold at 90^0 on long fold and fold ends double and solder. Place in doorway on floor they should be the same width as the gap between tank rear and cab back, fettle to suit.

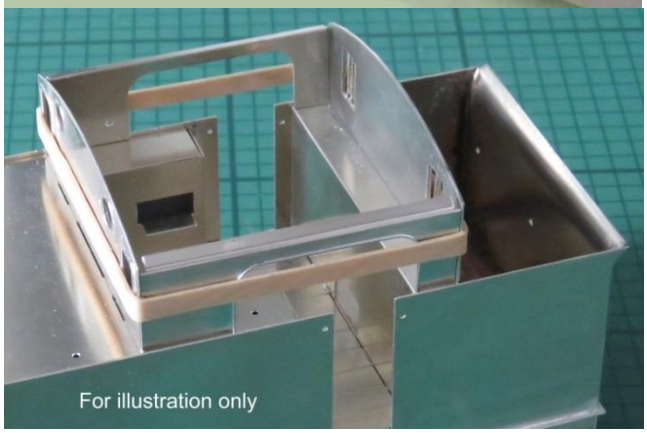
40) Remove (36) cab front and solder in place window bezels (37 & 38) and clean up.

41) Locate floor (39), take cab front and check it fits between tanks. Take cab floor and fit tabs into slots in back and rest on 35, next put base slot of front into slot in footplate and push back onto slots on floor. When satisfied tack to footplate.



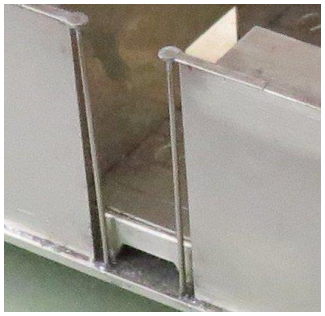
42) Remove (40) & (41) cab sides. Check that each side fits with cab front and back, now bend top of cab side over to form a double thickness. Drill out holes and fit handrail knobs and wire, file flush on inside. *Note the wire overhangs each end and is 11.5mm long*. With the sides in place use an elastic band to hold them roughly in place. The sides fit into rebate at the front and alongside the cab back, check cab is square or it will affect fit of roof. If satisfied solder in place. Solder (42) cab opening beading in place on cab sides.

43) Locate (43) the bunker floor and drill a hole in rear right corner for breather pipe (bend from 1mm wire), then put a slight bend on the fold line, fit into bunker with tongue through hole in cab back.



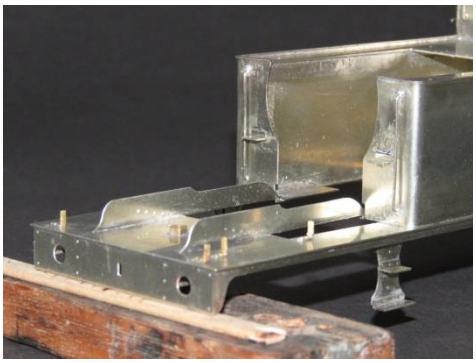
44) Locate (44) cab doorway tank beading clean side with groove whilst still attached to etch, square up ends carefully clean off the cusp from inside edges, the outer can be done later after fitting. Solder in place.

45) Remove (45) & (46) tank top beading clean side with groove whilst still attached to etch. Carefully clean of the cusp on the inside of each by gripping in a vice whilst working. The outer can be done later when fitted to tanks. Offer beading to tank top and mark where it overlaps 43, cut off surplus leaving a little to file back for perfect fit. Solder in place and then very carefully remove outer cusps, file in a direction that pushes the beading on to, rather off the model.



46) The bunker top beading (47) has a half etch guide line on the underside if your chosen loco did not have the lamp shield at that date and you wish to remove the lamp shield base. Fit beading to bunker repeating the procedure in step 45 above.

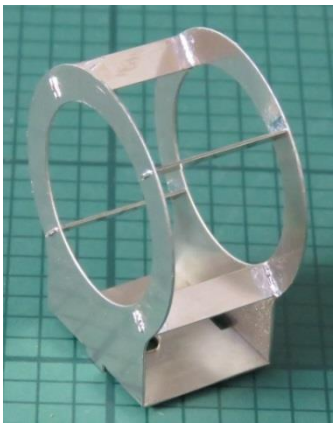
47) Drill out the 2 half formed holes in footplate and fit handrails in cab doorway.

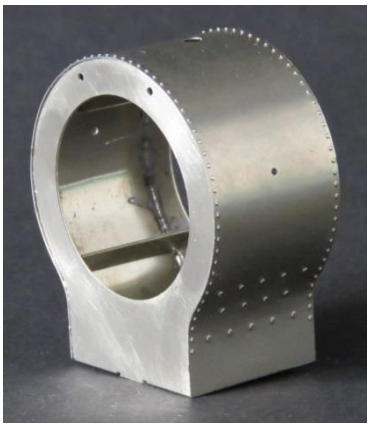


48) Remove (48) frame extensions; **carefully** clean up and form rivet detail before soldering in place.

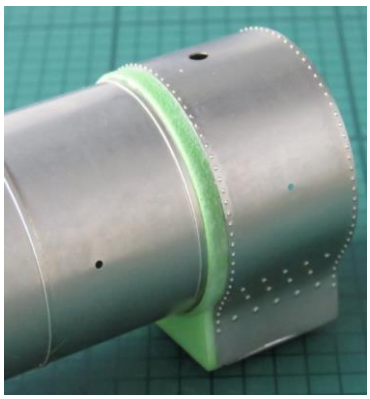
49) Locate parts (49 to 51) smokebox assembly. Clean up (50) and fold into a “U” shape, then fit the 4 parts (52) in to the slots. Adjust until square and the solder together, offer to the footplate.

50) Take item (51) and carefully form around the structure you have just made. Establish that you have the wrap the correct way, the chimney hole is nearest the cab





51) Using a couple of bits of thin packing, lay “cage” face down on these and wrap (51) around it. Holding 50 in place carefully lift and check you have the slightest recess into which you can fit (49). If satisfied with packing, lay back on packing tack one end of the wrapper flush with the base of the cage. Using clamps squeeze the wrapper into curves and pull tight around top of smokebox. The wrapper is the correct length to around the whole structure. When sure that it fits and the overhang is just enough to allow the front etch to sit in place tack solder, repeat checks and then solder fully. You can now fit (49) to the front, this is best done with a resistance soldering iron or glue, clean up the whole assembly.



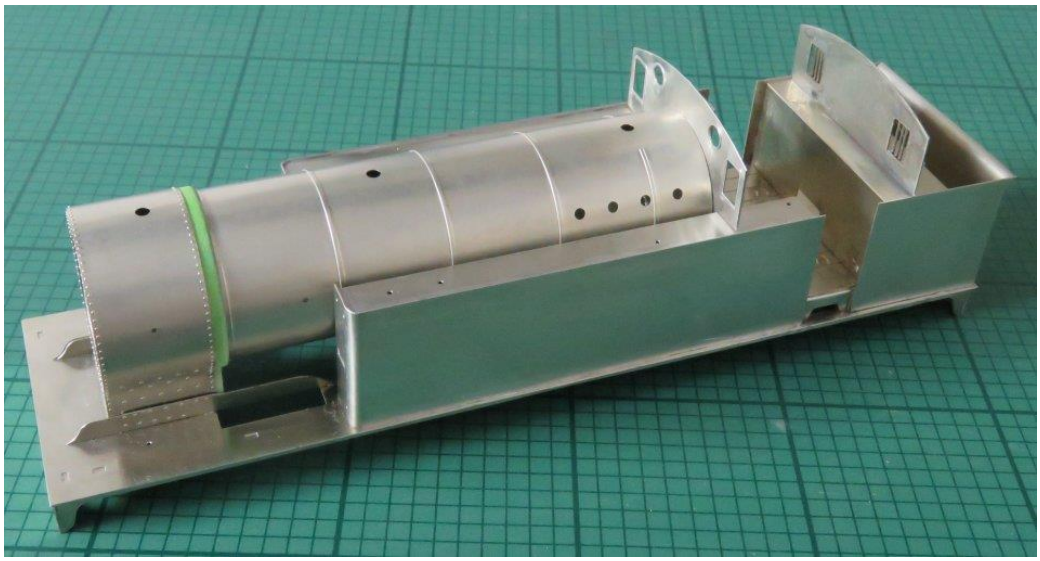
52) Locate plastic ring shaped piece (PP5) and carefully offer to the recess at smokebox rear, it should fit without adjustment, glue in place.

53) Remove (53) Boiler Barrel, roll to form a tube and offer to smokebox rear, *do not force it*. If need be file a slither off barrel diameter until it does, then solder the seam together. Now glue in place, you will have realised by now the slot in barrel and block in plastic ensures you get top at the top. Locate disc (53a) and solder in the firebox end. Set aside.

54) Remove (54) (x2) tank front steps clean, bend and solder to tank front into half etched pockets, flange uppermost.

55) Taking (55 to 58) steps & back plates. Form rivets in steps and back plates, then form folds in all parts. I personally like to solder steps to back plates with Rosen cored solder and then fix assemblies to footplate with 190^0 solder, this I find gives a strong bond whilst not having the steps fall off during the process. When you have made up your 4 sets of steps, solder the front pair to the underside footplate in the half etched pockets provided. Reinforce by soldering a strip of scrap etch onto the rear of each step.

56) Take the smokebox and barrel assembly and slide into the body, if need be adjust until everything sit correctly, then solder smokebox to footplate. Your model should like the picture below, (but with cab sides attached).



57) Locate balance pipes (PP6) fit in the holes provided.

58) Solder or glue Dome and safety valves in holes provided in boiler barrel.

59) Solder or glue a brass washout plug into each of the 8 holes on firebox crown.

60) Solder or glue tank fillers into tank top.

61) Remove parts (59) fire iron bracket, fold double and solder together, carefully remove cusps and fit into the rear hole on left tank top.

62) Take a piece of 0.7mm wire and form tank front handrails and solder into place.

63) There is a small hole in the top of the smokebox wrapper to indicate the position of the chimney, once happy with the position drop a spot of super glue down the chimney and capillary action will cause it run around the base, add a second drop if unsure.

64) Fit Hand brake handle in the hole in left tank top inside the cab.

65) Assemble and fit the screw reverser in cab on to the flap on right tank.

66) Remove (60) the cab doors and decide if you are going to have them open or shut (easiest) and after cleaning up and fettling to fit, solder or glue into place. Note they have little legs to keep them proud of the floor.

67) Remove (61) cab roof and (62) roof braces and clean up. Carefully roll the roof to match the profile of the cab front (back) avoiding any creases. Punch out the rows of rivets. With roof upside down solder the brace into position making sure it is equal distance from each side. Offer to cab, the braces go on the inside, if necessary adjust until it fits and that the overhang is equal front and back and the same at the sides. Ventilator hole is at the front.

68) Take piece of 7mm brass tube and reduce to 2mm long, solder into half etched recess on roof. Locate part (63) ventilator lid and either solder shut or open to top of tube, hinge strap at front.

69) Fix (64) the coal door in place in cab.

70) Decide if your model is to have open coal rails or the later type plated in. Locate (65) or (66) and bend to shape, are a little long where they join the cab and will need to be trimmed. When happy with the fit solder in place with the uprights hanging inside the bunker but with a gap between bunker top and bottom rail unless later type when it sits on top.

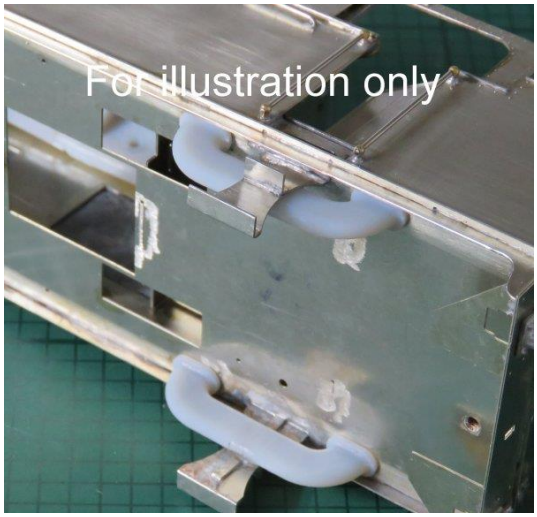
71) Using 3 hand rail knobs fit hand rail to bunker rear.

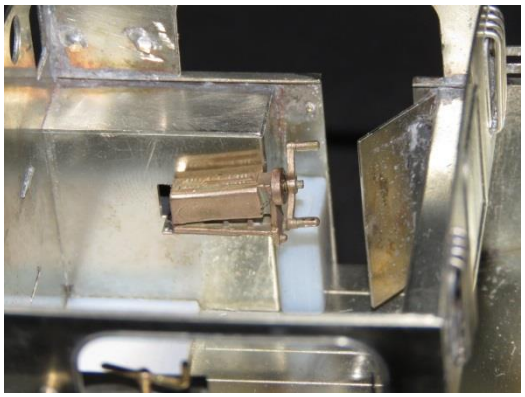
72) Locate lamp brackets clean up and fix into the pockets on front & side of footplate.

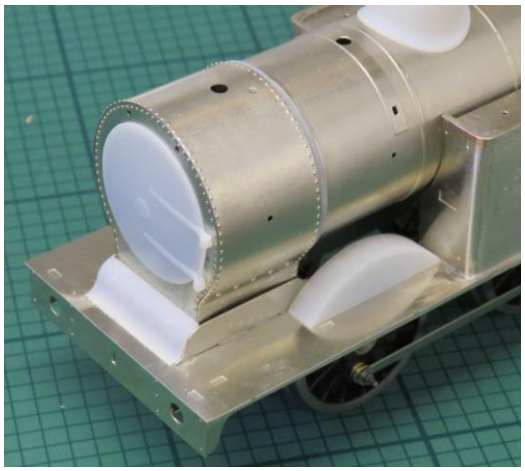
73) Similarly clean up and fix bunker lamp brackets into pockets on bunker rear.

74) Locate (67) “piano” valve chest cover, bend to shape to fit between the front frame extensions.

75) Take part (PP7) smokebox door clean up and drill a hole in the centre to accept the door handle. Now fit into smokebox front and *make sure the hinge pin is vertical*. Glue into place when you are sure it is right.







76) Now glue door handle in place, arm must be vertical and hanging down.

77) Locate the smokebox lamp bracket clean up and attach to the top of smokebox.

78) Glue front over-springs (PP8) to inside of frame extensions, they are meant to be deeper than frames.

79) Clean up front wheel splasher (PP9) (x2) and glue in place against frames and footplate.

80) Form front sand pipes and fit to underside of footplate, they need to come out and wrap around the front brake hanger see pictures.

81) Take a length of 0.7mm wire and form the front hand rail, there are 4 short handrail knobs and 1 medium, these go on the boiler sides. Note the handrail goes into the tank fronts. When satisfied with the shape glue knobs and handrail in place.

82) Clean up (PP10) and (PP11) front sandbox & splasher and glue in place against frames and footplate.

83) Having detailed and painted boiler back head, fix in place in the cab.

84) Fix buffers and coupling hooks in holes in buffer beams.

85) Paint the body, decal and number.

86) After re-assembling the chassis, bend over the tabs to hold the hornblocks in place.

Tool Kit

Generally speaking it is better to a few quality tools than a barrow load of cheap ones. I appreciate most of us don't have endless budgets, but good tools I bought 50 years ago still serve me today!

a) 80 watt temperature controlled soldering iron with bits
    a. Antex
    b. Weller
    c. Ersa
b) Flux pen & liquid flux
c) Files 150mm Flat
    a. No3
    b. No5
d) Files 200mm Flat No3
e) Files 150mm Half Round
    a. No3
    b. No5
f) Files Needle 150mm No4 or No5
    a. Round
    b. Square
    c. Flat
g) Riveting tool, *this is an you should skimp on*
h) Good quality "side" cutters
i) Smooth jawed pliers
j) Tweezers
k) Self-gripping tweezers
l) Forceps
m) Cheap plastic clamps
n) Scalpel & blades
o) Small hammer
p) Pin Chucks 0-1, 1-2 & 2-3mm capacity.
q) Drill bits 0.7, 0.8, 0.9 1.0, 1.05, 1.4, 1.8, 2 & 2.5 as minimum
r) A set of broaches
s) 1.27mm allen key (for slater wheels)

Suppliers

MSC – www.mscdirect.co.uk	Drills
Cousins – www.cousinsuk.com	Files (swiss)
Squires - Squires Tools	General bits and hand tools
Lee Marsh - Lee Marsh Models	Rivet press
Blundell - Ersa Icon IC1100-A Single Solder Station	
MetalSmith - MetalSmith Ltd	Wire, tube etc.
NMRS Models - NMRS Models	Backheads, buffers etc.
ABC Gears - ABC Home	Motor/Gearbox etc.
Coastal DCC - Coastal DCC	DCC equipment

Lead for weighting – although Lead strip is supplied in 6 metre lengths most roofing supply companies cut to the nearest metre, so pop in to yours and throw yourself at their mercy, most are really helpful.