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## CL01 Caledonian Railway Class 498 0-6-0 Dock Tank.

C.R. numbers 498,499, 527-538

L.M.S. numbers 16151-16164

### Building instructions

#### Parts required to complete

- |   |                      |   |
|---|----------------------|---|
| 1 | Motor                | Mashima 1620 "can" or similar recommended.  |
| 2 | Gearbox              | High Level Loadhailer Compact+ with 60:1 or 80:1 gears recommended.<br>[High Level Kits, 14 Tudor Road, Chester-le-street, Co. Durham, DH3 3RY.<br><a href="http://www.highlevelkits.co.uk">www.highlevelkits.co.uk</a> ] |
| 3 | Driving Wheels       | 4'0" diameter, 14 spoke   |
| 4 | Paint and transfers. |   |
| 5 | Couplings.           |   |

#### Part 1. Parts list

Please check the contents of your kit and inform me of any shortages. If for any reason you wish to purchase parts separately, I can give you a quote for any part unless it is on an etched fret. Normally complete frets only are available.

The supplied parts, together with these instructions, assume that you are building the kit with a compensated chassis. If you are **not**, please return the compensation pack to me unopened with a note of your name and address. I will then be happy to forward the required bearings and modified instructions to enable you to build a rigid chassis.

N.B. Numbers in brackets following a part name are the quantity supplied when other than 1; numbers preceding a part name are identification numbers which will be found along side the part on the appropriate etch.

- 1 Body etch containing :-  
1 Footplate, 2 Footplate valance (2), 3 Left-hand cab side, 4 Right-hand cab side, 5 Cab front, 6 Cab rear, 7 Bunker rear, 8 Bunker front, 9 Cab roof, 10 Cab roof stanchions (3), 11 Cab roof side lips (2), 12 Cab aperture beading (2), 13 Front spectacles (2), 14 Buffer beams (2), 15 Boiler bands (4), 16 Smoke box front, 17 Smokebox saddle, 18 Smoke box wrapper, 19 Frame extensions (2),

- 20 Front splasher sides (2), 21 Front splasher tops (2), 22 Tank sides (2), 23 Tank fronts and rears (4), 24 Steps (2), 25 Upper steps (2), 26 Coal rail supports (3)
- 2 Chassis etch containing :-  
1 Chassis frames (2), 2 Cylinder unit, 3 Cylinder wrappers (2), 4 Cylinder end covers (2), 5 Brake blocks (6), 6 Brake hangers (6), 7 Brake pull-rods (2), 8 Wheel balance weights (9), S1- S3 Frame spacers (1 each of OO, EM and P4)
- 3 Motion etch containing :-  
Motion bracket, Left-hand coupling rod front inner, Left-hand coupling rod front outer, Left-hand coupling rod rear inner, Left-hand coupling rod rear outer, Right-hand coupling rod front inner, Right-hand coupling rod front outer, Right-hand coupling rod rear inner, Right-hand coupling rod rear outer, Left-hand connecting rod inner, Left-hand connecting rod outer, Right-hand connecting rod inner, Right-hand connecting rod outer, Crosshead guides (2), Crosshead guide strengthening pieces (4)
- 4 Lost wax cast fittings :-  
MacIntosh chimney, Stovepipe chimney, Dome, Front sandboxes (2), Rear sandboxes (2), Smokebox door, Backhead, Ramsbottom safety valve, Ross pop safety valve, Crossheads (2), Tank fillers (2).
- 5 Turned brass fittings :-  
Buffers (4), Handrail knobs (3), Whistle
- 6 Miscellaneous parts:-  
Hornblock Pack, Boiler tube, 0.45mm wire (2), 0.3mm wire, Brake hanger wire and small bore tube, Copper-clad strip, Phosphor-bronze strip, 10BA nuts (2), 10BA bolts (2), 1mm "T" section brass (50mm), 1mm "L" section brass (30mm), Insulated wire, 14BA nuts and bolts (2), 1mm bore brass tube and brass rod.
- 7 "The Braby Pug"—prototype notes by J. Sinclair

## **Part 2. Motor and gears**

While I recommend a High Level Loadhauler Compact+ gearbox with 60:1 or 80:1 gears driving to the rear axle with the motor concealed in the tanks this is by no means the only way do do it. Driving the rear axle using rearward projecting gears as in the above arrangement keeps everything pretty well hidden but whatever you choose, choose at the outset, some aspects of the construction may require modification for a particular motor or gearbox and it is far easier to do this as you go, referring to the parts concerned, than trying to shovel everything in after construction.

## **Part 3. General**

- 3.1 Read the instructions and identify all the parts.
- 3.2 Always refer to a photograph of your chosen prototype as you build the model. Small differences did exist between members of the class, especially as they got older.
- 3.3 Soldered construction is recommended. I use a 25W Antex iron with CARR's 188 solder and CARR's green label flux. Note that it is often easier to tin small parts before they are removed from the fret. Electrical work requires ordinary multicore solder.
- 3.4 Some parts are more easily fixed if glued and either Superglue or Epoxy is recommended.
- 3.5 You will find the following tools useful :-

- a) Soldering iron & solders as outlined in 3.3 ,
  - b) Fibre-glass brush and refills for cleaning the brass prior to soldering,
  - c) Craft knife or large scissors for removing parts from the frets,
  - d) Needle files for filing off the remains of the tags,
  - e) Small, cheap paintbrush for applying flux,
  - f) Set of small taper broaches for gently enlarging small holes,
  - g) A map-tack for pressing out rivet detail from the rear,
  - h) A small hobby drill or pin-vice and assorted bits,
  - i) Axle/hornblock alignment jigs
  - j) Small piercing saw
  - k) Small blowlamp (see 3.7 below),
  - l) Carr's Solder Mask to keep solder from going where it shouldn't.
- 3.6 A half-etched line is provided where you are required to fold up parts. Unless otherwise stated by the specific instruction, this line goes to the **INSIDE** of the fold and all folds are at 90°.
- 3.7 Sometimes in the instructions you will find the advice "easier if annealed". To do this, which is **never** essential, heat the metal with a blowlamp until you see the oxide colour of the surface change colour. There is no need to heat the brass to "red hot", but it doesn't matter if it is. Let the metal cool slowly and naturally—it will now be very soft and easy to bend. Working the metal, by bending or filing etc makes it hard again. Clean any annealed parts well before soldering them.
- 3.8 Before tinning any parts clean them with the fibre-glass brush.
- 3.9 It is most important to thoroughly clean the cast brass parts before attempting to solder them. If you have any difficulty soldering such parts it is probably due to a build up of oxide on the brass. Scrape with either a file or knife blade and then polish with the fibre-glass brush to ensure cleanliness.
- 3.10 Thoroughly clean each sub-assembly using an old toothbrush and warm soapy water as you go and clean the model after **EVERY** work session.

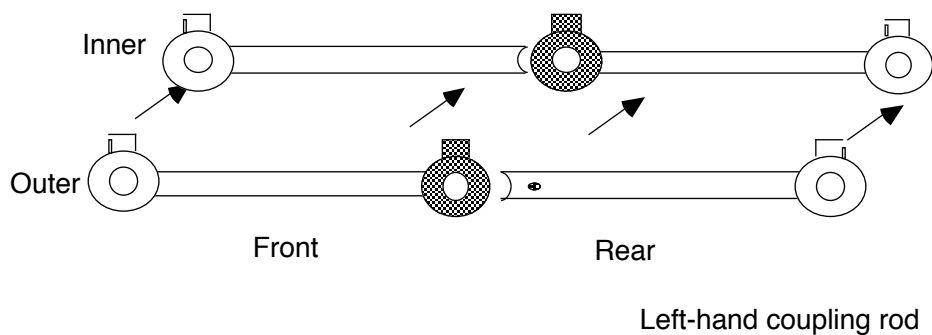
#### **Part 4. Footplate**

- 4.1 Remove the footplate (part 1) from the body etch, remove and store carefully the sub-fret containing parts 18, 24 and 25 from within it.
- 4.2 Solder the footplate valances (part 2) into the locating grooves on the underside of the footplate, Checking that the footplate overhang is equal front and rear.
- 4.3 Solder the buffer beams (part 14) to the footplate valances.
- 4.4 Solder a nut to the top of the footplate at each of the chassis mounting points.

#### **Part 5. Coupling Rods**

- 5.1 The coupling rods and other motion parts are made from steel for maximum authenticity but they require very careful cleaning after assembly as any trace of flux (or indeed water) left on them is bound to cause rust.
- 5.2 Each coupling rod is etched from a total of four parts as shown diagrammatically below. They are designed to pivot about the centre crankpin to allow the movement necessary for a flexible chassis.
- 5.3 Solder each coupling rod outer to its inner aligning on either the front or rear crankpin holes as appropriate. Note that the sections with two holes are the front outers and the rear inners. Each

section is single thickness at the centre crankpin boss (shown in grey below) and the simulated knuckle is in the rear section of the rods.



- 5.4 Open out each crankpin hole until it is just a sliding fit on the crankpin of the wheels you intend to use.

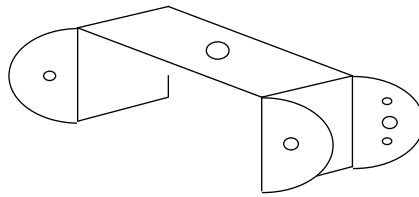
## Part 6. Chassis

- 6.1 Remove the sideframes (part 1) from the fret and decide which is to be the driven axle. For simple flexichas this can either be the front or the rear and for the recommended motor and gears it is the rear. Remove the sections around each of the **other** axleholes along the half-etch lines in the following manner. Thread a piercing saw blade through the slot between the “spring” and the frame, secure the top end of the blade and saw up the half-etched line. It helps to keep the saw edge close to the end of the work bench at all times, and press down hard on the frame with your fingers. Keep the saw vertical and let the blade do the work on every down stroke. Saw up to the top of the line only. Work the blade back to the spring end and then saw across the top of the spring. Next saw up the other vertical. Release the blade and remove it. Using a pair of pliers, push the sawn part back (folding it on the top half etched line) and waggle it until it breaks off cleanly
- 6.2 Assemble four  $\frac{1}{8}$ " bore sub-hornblocks as detailed in the separate instructions in the pack.
- 6.3 Check that the flexichas bearings can easily slide up and down in the sub-hornblocks. If not, gently and carefully open the slots until this can be achieved. Take extreme care not to overdo this as a bearing that is able to slide back and forth in its block is not conducive to good running. It is a good idea to pair bearings and hornblocks as small manufacturing differences can be present in either.
- 6.4 Select the frame spacers appropriate to your gauge. Bend spacers S1 and S3 to “L” forms but break S2 along the half-etched line and use the bottom section only. Locate the spacers S1 to S3 in the appropriate slots on one side frame and solder. The horizontal plate of S3 goes to the top of the frames. Now solder the other sideframe to the spacers.
- 6.5 Locate the top-hat bearings in place for the driven axle, opening up the holes slightly if necessary. Take care to keep the holes circular. Use an axle/hornblock alignment jig to check the alignment of the bearings and when satisfied solder the bearings to the sideframes. Leave the jig in place.
- 6.6 Using the previously assembled coupling rods and a set of axle/hornblock alignment jigs fit the hornblocks and bearings as follows :-
- Locate the hornblocks and bearings for the centre axle, using the spring of the jig to hold them in place,
  - For each side, slip the appropriate section of the coupling rod over the spigot of the jig in the fixed axle bearings and over the spigot of the jig in the centre axle bearings adjusting as required,

- c) Once happy with the alignment of both sides, solder the hornblocks to the sideframes,
  - d) Repeat from a) using the other sections of the coupling rods and the center axle as the reference point for the other axle.
- 6.7 Remove the coupling rods and jigs and solder a keeper wire across the bottom of the slot in each sub-hornblock or alternatively bend over the guide wire above the slot on the hornblock if the representation of the spring on the frame isn't doing the job adequately.

## Part 7. Motion and Brakes

- 7.1 File about 0.5mm off the front of the chassis frames until the chassis is an easy fit between the buffer beams.
- 7.2 Fold down the cylinders on either side of their stretcher plate (part 2) and fold out the cylinder end plates thus :-

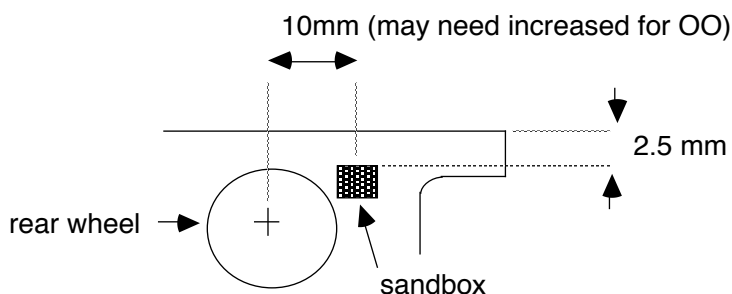


Reinforce the bend lines with solder.

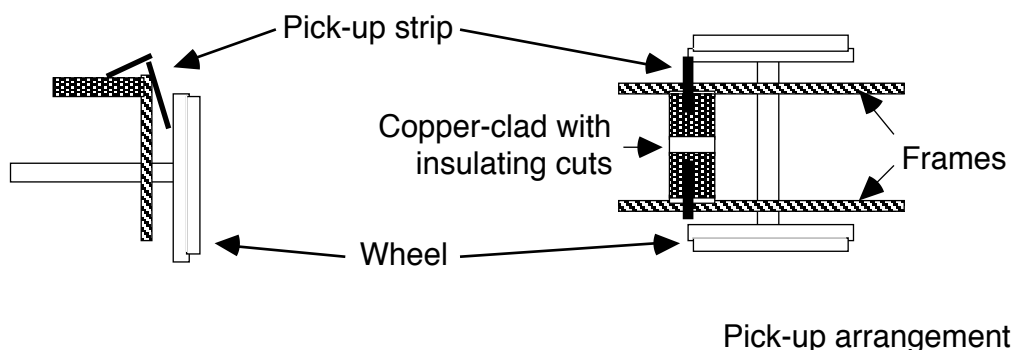
- 7.3 Bend each of the cylinder wrappers (part 3) to rough "D" shapes (easier if annealed first). Engage the tab of each into one of the slots on part two and solder in place. Seam solder the wrappers to the end plates.
- 7.4 Push out the rivets on the cylinder cover plates (part 4) using a map tack or similar. There are some practice rivets on the body fret so practice until you get the pressure right.
- 7.5 Tin the rear of the cylinder covers and solder onto the front cylinder end plates (the one with only a central hole) aligning the central holes.
- 7.6 Solder a short piece of brass rod into the hole to represent the tail rod covers. It should protrude only 1mm or so into the cylinder assembly and project 1.5mm.
- 7.7 Offer up the cylinder assembly to the main chassis and trim the cylinder wrappers so that the frames fit between them. Solder the assembly to the chassis centrally in the recess at the front of the chassis (align the bolt hole in the stretcher with the one on the front chassis spacer).
- 7.8 Take the motion bracket and file a small notch about 0.75mm wide each side at the top to the depth of the footplate valance such that the bracket can fit snugly between the valances and butt up to the underside of the footplate.
- 7.9 Solder the motion bracket into its slot in the chassis taking care that it is central and when firmly fixed cut away the link between the frames.
- 7.10 Open out the crankpin holes on the coupling rods to be generously oversize on the crankpin bush. Use a 5-sided tapered broach to ensure you keep the holes circular.
- 7.11 If you are compensating the chassis, note that the middle brake hanger doubles as the compensation beam pivot. Cut a length of the 0.5mm bore tube to the width **over** the frames and a length of the 1mm bore tube to the width **inside** the frames. Drill out the appropriate brake hanger holes to 1mm, insert the 0.5mm bore tube from one side, thread on the other tube and pass into the hole on the other side. Insert an overlength piece of 0.5mm wire into the tube and solder both wire and 0.5mm bore tube to the outside of the frames. Some Carr's solder mask smeared onto the ends of the 1mm bore tube prior to assembly should ensure that it doesn't get soldered solid.

Use a length of brass rod as the compensation beam and solder it at right angles such that it is able to bear onto the centre of the rear and middle axles.

- 7.12 Solder locating wires for the other brake hangers to the sideframes.
- 7.13 Remove the rear sandboxes from their sprues, clean up and drill out the holes on the bottom faces to accept 0.45mm wires as sandpipes.
- 7.14 Solder the sandboxes to the chassis frames as indicated in the sketch and solder lengths of wire into the holes.

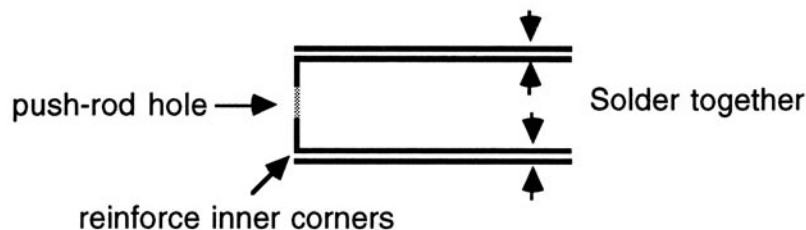


- 7.15 Clean the chassis thoroughly at this point and paint. Leave the motion bracket bright metal and try to avoid getting paint on the brake hanger wires and the rear face of the cylinders as there is more soldering to be done in these areas. Ream any paint out of the axle bearings.
- 7.16 If following the recommended motorising course, fix the motor onto its mounting bracket and locate the assembly in place in the chassis using the rear axle, don't forget to mount the gearwheel as I did !
- 7.17 Mount the worm on the motor shaft and mesh the gears. Undo the grub screw on the gear so that the axle can revolve freely afterwards.
- 7.18 Cut three strips of the copper-clad fibre-glass to be a tight fit between the frames. Remove a little of the copper at each edge to make sure of insulation from the frames.
- 7.19 Glue the strips to the inside to the chassis level with either the top or bottom edge of the frames, as allowed by the motor etc., in line with one edge of each wheelset. Then solder a phosphor bronze strip to the strip in line with one edge of the wheel. Stick a small piece of insulating tape over the edge of the chassis and then bend the pickup strip over the chassis and down (or up) the face where it will bear on the back of the tyre. (See diagram.) Pickup can be improved by soldering a small piece of brass (or gold!) wire to the business end of the phosphor bronze strip where it bears on the back of the wheel.



- 7.20 Link the three strips together and to the motor with fine insulated wire.
- 7.21 Position the other axles in the chassis and assemble the wheels onto them, packing with shim washers as necessary. The ride height of a compensated chassis may be adjusted by tweaking the ends of the beam up or down.

- 7.22 If you are using Sharman wheels you will need to trim back the boss with a sharp craft knife to allow the distinctive balance weights (part 6) to sit snugly. Glue the balance weights in place on the wheels, opening out the crankpin hole as required (especially on Romford wheels) and taking care not to cause a short between tyre rim and axle.
- 7.23 Solder the brake blocks (part 3) to the brake hangers (part 4) and pass the hangers onto their locating wires. Adjust until there is no danger of a short, solder in place and cut the wires back flush.
- 7.24 Quarter the wheels as follows (unless you are using Romfords!) :-
- a) Starting with the driven axle adjust all the wheels to approximately the correct quarter aligning by eye to the nearest spoke,
  - b) Fit the coupling rods and bushes to the driven and centre wheels,
  - c) Freewheel the chassis up and down and feel for binding,
  - d) If binding occurs, adjust **only** one wheel on the **centre** axle  $\frac{1}{2}$  a spoke clockwise,
  - e) Again freewheel the chassis up and down, repeatedly adjusting the quartering **anti-clockwise** on the **same** wheel until no binding occurs,
  - f) Fit the coupling rods between the centre and rear axle and repeat the process from c), adjusting **only** the quarter of one of the **rear** wheels.
- 7.25 Assemble each of the connecting rods in a similar manner to the coupling rods, aligning on the crankpin holes.
- 7.26 Open out each crankpin hole on the connecting rods to be generously oversize on the crankpin bush and the hole at the other end until it clears the boss on the rear face of the crosshead.
- 7.27 Open out the hole on each crosshead to accept a 14BA bolt.
- 7.28 Assemble the connecting rods onto the crossheads using 14BA bolts passed through the holes in the crosshead from the rear. Secure with a nut making sure that there is enough slack to allow movement. Trim the bolt and secure the nut with a touch of solder.
- 7.29 Open out the holes in the crosshead supports to accept the crosshead push-rods. Bend the supports to a "U" form and reinforce the bends with a small fillet of solder. Solder a reinforcing piece to each of the upper and lower surfaces.



Crosshead guides

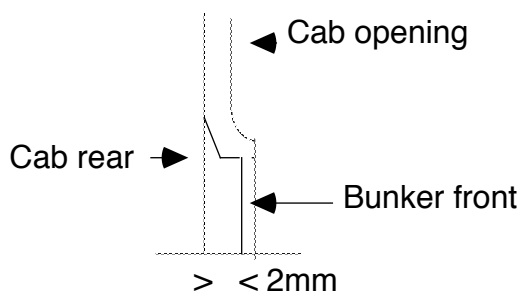
- 7.30 Smear the push-rods with Carr's Solder Mask and assemble the crossheads into their guides. Put the open end of the "U"s in place on the motion bracket opening out marginally if required.
- 7.31 Using the push-rods to align the holes, solder the crosshead guides to the rear face of the cylinders.
- 7.32 Connect the connecting rods into the center crank pins and check the action of the motion. Trim the length of the push-rod as required to allow full travel of the connecting rod.
- 7.33 Solder the open end of the "U"s to the motion bracket and trim off the excess length flush with the motion bracket.
- 7.34 Solder a length of wire between the holes at the bottom of each pair of brake hangers. Clip the

pull rods (part 5) on the wires and solder. Secure the rear of the pull rods with a length of wire passed between the pull rod anchoring points towards the rear of the chassis through the rear holes in the pull rods.

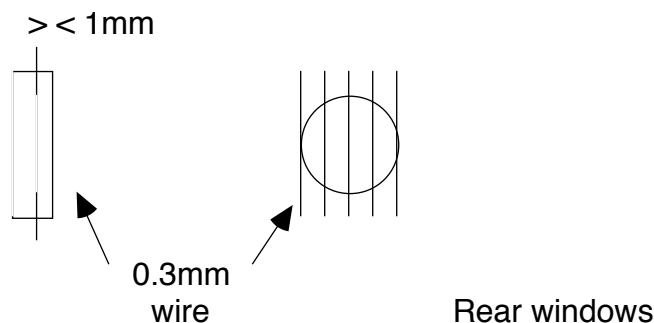
- 7.35 Bend the sand pipes to shape.
- 7.36 Clean up and paint the brake gear and cylinder rears using a fine brush.
- 7.37 Tighten the grub-screw on the gear wheel.
- 7.38 Your chassis is now complete.

## Part 8. Body Modules

- 8.1 It is useful to build the main modules of the body separately and then assemble them onto the footplate.
- 8.2 Solder the cab rear (part 6) to one of the cab sides (part 3 or 4) taking care to get them square to each other.
- 8.3 If you are working to OO gauge, remove the cut-outs indicated by the half-etch lines from the cab front (part 5) and solder to the same side and then solder on the other cab side.
- 8.4 Bend the top lip of the bunker rear (part 7) to shape using the profile of the bunker side as a guide and solder to each of the sides.
- 8.5 Shape the bunker front (part 8) by bending to 90° at the first bend line and then back at 45° at the second as per the sketch. Solder to the cab rear inside the cab.



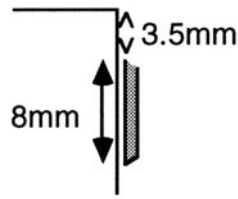
- 8.6 Solder the spectacles (part 13) to the cab front around the window apertures.
- 8.7 Using 0.3mm wire, bend rear window guard rails to fit the pairs of holes above and below the rear windows and solder in place.



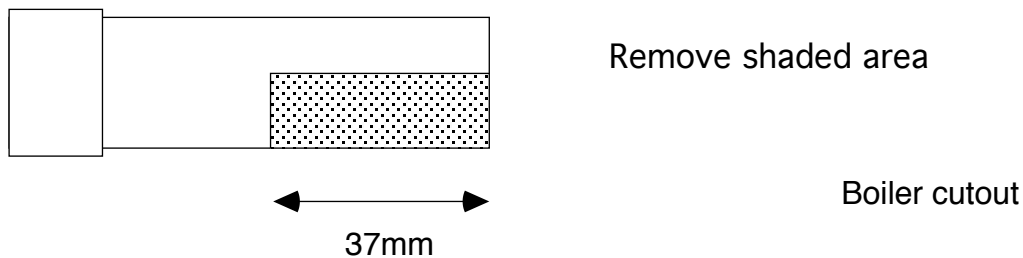
- 8.8 Solder the beading (part 12) around the cab aperture. The easy way to do this is to bend the beading to a right angle just behind one of the handrail holes such that it fits the rear lower corner. Bend roughly to shape of the next two corners. Solder at the rear lower corner and push into the next corner. Work round the aperture like this, soldering as you go.
- 8.9 Cut two 8mm lengths of "T" section brass. File off the ends of the centre legs to 45° and solder



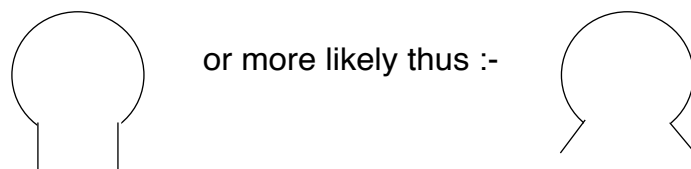
to the outside of the cab rear wall, 3mm either side of the centre line and starting 3.5mm below the height of the apex of the roof line.



- 8.10 Solder the backhead in place, centrally to the inner wall of the cab front.
- 8.11 Shape the cab roof (part 9) by bending over a suitable pipe until it fits the shape of the hole left in the fret after removing one of the roof stanchions (part 10). (Easier if annealed first.)
- 8.12 Solder one of the roof stanchions to the beading in the middle of the roof. Then solder the other stanchions to the front and rear edges. Any minor discrepancies in the shape of the roof will be ironed out by this process.
- 8.13 Solder the roof side lips (part 11) to the roof and stanchions at each side.
- 8.14 Solder the boiler bands (part 15) to the boiler, one behind the smokebox, one at the rear of boiler and one each at distances 21 and 42mm from the front of the boiler.
- 8.15 Make a cut out in the boiler to suit your chosen motor and gearbox . I suggest cutting 37mm from the rear of the boiler to half the boiler depth and then along each side of the boiler to remove piece shown below but this can be adjusted to suit as required.

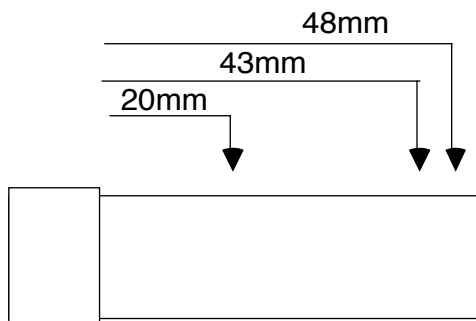


- 8.16 A photograph of your prototype is now essential. If you are modelling later LMS or BR days then the smokebox is probably riveted. If so, push out the rivets from the rear on the smokebox wrapper (part 18) and front (part 16) using a map tack.
- 8.17 Solder the smokebox front to the boiler, checking that the cut-out in the boiler is level.
- 8.18 Form the smokebox wrapper round the boiler, or preferably a slightly smaller tube (easier if annealed first). Don't worry if it doesn't keep a circular shape—it will tend to spring back a little. Pull the last 5mm at each end back at about 45° to the curve so that the wrapper ends up thus:-



- 8.19 Tin the inside of the wrapper and the front section of the boiler.
- 8.20 Solder the bottom of the wrapper to the bottom of the smokebox front at one side and continue round the smokebox front, seam soldering the two parts together.
- 8.21 Solder the smokebox saddle (part 17) to the bottom rear of the wrapper at each side and to the boiler.

- 8.22 Place the assembly in a vice (it can get rather hot). Apply flux to the rear smokebox /boiler junction and heat the wrapper with a dry iron. When you see liquid solder at the junction, remove the heat and allow to cool. Remove any solder that has leaked out afterwards.
- 8.23 Clean up and tin the rear of the smokebox door casting and then solder to the smokebox front.
- 8.24 Drill the smokebox centrally for the chimney and drill the boiler on its centre line for the dome, safety valve and whistle as indicated :-



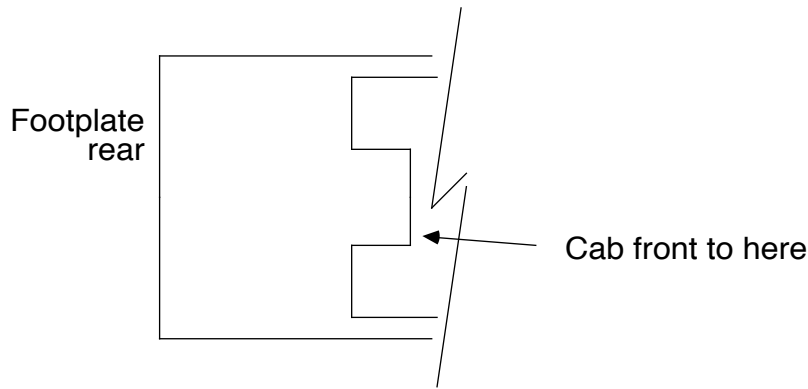
All measurements are from the rear of the smokebox wrapper to hole centre.

#### Boiler fittings

- 8.25 Solder the chimney and safety valve of your choice in place together with the dome and whistle.
- 8.26 Using one of the tank fronts/rears (part 23) as a guide, mark the position of the bend on the inside of the tank sides (part 22). If unsure of your marking/bending abilities, err on the side of generosity on the tank side length—the important thing at this stage is to make a bend parallel with the tank bottom in approximately the correct place.
- 8.27 Bend the tank sides to shape as follows :-
  - a) Clamp the tank side in the vice such that the tank top projects,
  - b) Bend the tank to a right angle using finger pressure only.  
You will find that the use of finger pressure has meant that the bend is not a sharp right angle but nicely radiused as we require. Once more annealing makes the brass easier to work.
- 8.28 Solder the tank fronts and rears to the sides, again removing the cut-outs indicated by the half-etch lines if you are working to OO gauge, and trim the bottom of the tank sides to length if required. Leave the tank tops overlong at the moment.
- 8.29 Drill locating holes for the tank fillers 7mm from the rear of the tank and 4mm in from the front face of the tank (see G.A. drawing). Solder in place.

### Part 9. Body Assembly

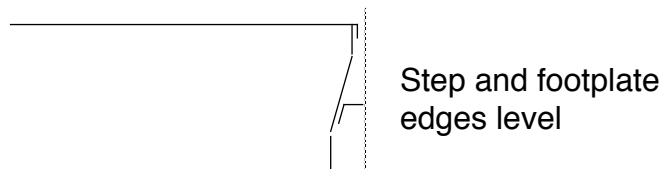
- 9.1 The cab alignment is important as it determines the fit of the other main modules. Position the cab centrally on the footplate such that the front of the cab is in line with the projection of the floor into the wheel/motor well and solder in place.



- 9.2 Solder the boiler assembly to the front of the cab (from underneath) and to the footplate at the front. Again take care that everything is central and level.
- 9.3 Offer up the tanks to the boiler and footplate. mark and cut at the tank/boiler junction position such that the tank flairs into the boiler. Err on the side of generosity—you can always cut off more but it is difficult to replace metal once cut ! Thin the edge so that there is no marked step and solder the tanks in position when happy.
- 9.4 Tin the inside of the frame extensions (part 19), position against each side of the smokebox saddle, fronts level with the footplate front, and solder in place.
- 9.5 Bend the splasher tops (part 21) to shape and solder onto the splasher sides (part 20). Remember to make a handed pair.
- 9.6 Temporarily mate the body and chassis, position the front splashers and solder them to the footplate.

## Part 10. Fittings

- 10.1 Drill locating holes for the front sandboxes 10mm in front of the tank fronts, 7mm from each footplate edge and solder to sandboxes to the footplate.
- 10.2 Drill holes to take 0.45mm wire immediately below the handrail holes in the cab beading and solder a wire between each set of holes.
- 10.3 Bend the lower step of the front steps (part 24) to 90° and bend up the step edges to about 30°. Fit the upper step (part 25) 5mm above it after forming.
- 10.4 Solder the steps to the inside of the footplate valance directly below the cab doors. Crank the steps inwards such that the outer edge of the steps is level with the footplate thus :-



- 10.5 Drill holes for the handrail and handrail knobs as follows :-
  - a) Both sides of the smokebox 17mm above the footplate and 6mm from the smokebox front,
  - b) Centrally on the smokebox front, 1.5mm from the top of the smokebox,
  - c) On each tank front, 17mm above the footplate and 7mm from the tank edge.
- 10.6 Thread the 3 handrail knobs onto a length of 0.45mm wire, form the front handrail as per the G.A. drawing and solder in place.

- 10.7 Fit short lengths of "L" section brass to the inside corners of the bunker as coal rail supports. Similarly fit short lengths of "T" section brass 7mm from each corner. All four supports should project about about 10mm.
- 10.8 Form the coal rails from 0.45mm wire and solder to the supports and to the bunker sides at the junction with the cab rear. Heights are 1mm and 2.5mm above the top of the bunker. Trim the supports as required.
- 10.9 Fit the buffer bases front and rear. The heads are probably best left off until after painting as is the cab roof.

## **Part 11. Final Assembly**

- 11.1 Thoroughly clean the body to remove all trace of flux etc.
- 11.2 Paint, line and letter according to your chosen prototype and period.
- 11.3 Glaze the cab spectacles and then fit the cab roof by glueing in position.
- 11.4 Fit the sprung buffer heads, adjusting the fixing nuts until the projection of the heads is correct.
- 11.5 Mate body and chassis using the supplied 8BA bolts. The front one may require trimmed to length.
- 11.6 Your loco is now ready for service.

## **Part 12. Livery Information**

Being but humble dock tanks these locomotives were always black, relieved by lining only in C.R. days but always with vermilion buffer beams.

C.R. goods lining was white inside red with the background black showing between. Boiler bands, splashers, tank sides and ends, cab, bunker sides and rear, valance, steps, buffer casings and cylinders were all lined out. Buffer beams were given a black edging whose inside was lined in white. The letters C.R. appeared on the front buffer beam to the left of the hook and the number to the right in gilt with a black shading. The number also appeared in gilt on the bunker rear. The crest was applied to the tank sides flanked by the letters C and R. An oval cast numberplate with a black background was fixed to the bunker sides, lined red inside white on the bunker panel. Sometimes, after 1919, white lined tyres were to be seen. Cab interiors were painted a light buff shade and the inside of the frames, axles and cranks were vermilion.

In LMS days, prior to 1928 the locomotive number was carried in large gold leaf figures on the tank side with the letters LMS carried on a small vermilion panel on the bunker side. The figures were either 18" or 14" high and originally the panel had cut-out corners (type 1) which later gave way to a round corner design (type 2). Smokebox numberplates were generally fitted during this period. Confirmed liveries are :-

|              |                            |
|--------------|----------------------------|
| 16151/2/6/63 | 18" figures, type 1 panel, |
| 16164        | 18" figures, type 2 panel, |
| 16154        | 14" figures, type 2 panel. |

1928 saw a change of livery policy which placed the number on the bunker in 10" figures and LMS on the tank, 14" high and normally at 27" spacing. Smokebox numberplates were officially dispensed with at this time and the "2F" power classification mark began to appear in 2.25" figures. This was generally placed on the cabside midway between the cut-out and the cab front at about tank top height. Originally gold shaded with black transfers were used but these were superseded in about 1937/8 by yellow

shaded with red transfers. Wartime repaints were often hand lettered in yellow over the outline of the old transfers. Matters are further complicated by St. Rollox receiving instructions to use up stocks of the old 18" transfers on tank engines with the effect that the livery change was a long time in coming for many 498s. Many were to be seen throughout the '30s with 18" figures and a type 2 panel, however confirmed examples of the latter livery are :-

|              |                      |                      |
|--------------|----------------------|----------------------|
| 16153/5/8-60 | Gold/black insignia, |                      |
| 16163        | Yellow/red insignia, |                      |
| 16151-2/4+/6 | Plain yellow.        | + stovepipe chimney. |

For further details of LMS liveries, volumes 1 and 3 of "LMS locomotives" by Jenkinson and Essery should be consulted.

The B.R. livery continued the placing of the number on the bunker, now executed in cream figures, with the crest on the tank side. Smokebox number plates were once again carried and the power classification usually appeared in small cream figures over the number on the bunker side. Only 56154 and 56158 received the second (1958) version of the crest.

### **Part 13. Acknowledgements**

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*Jim Smellie*

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