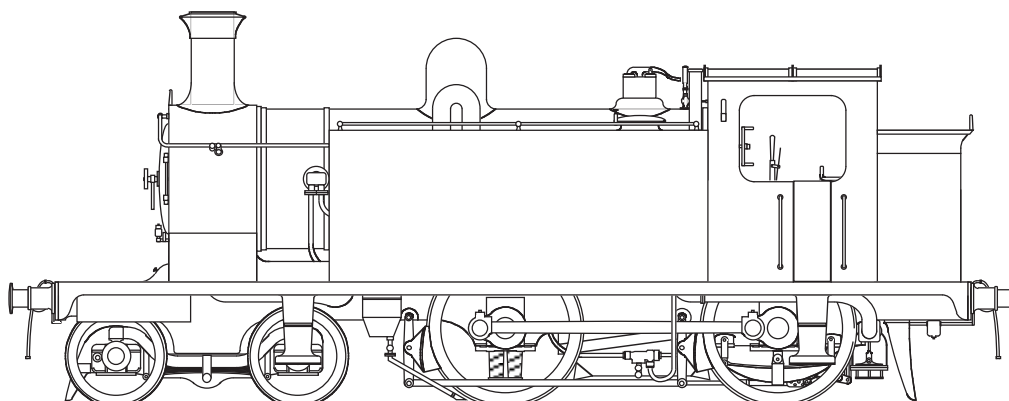


Caley Coaches Ltd

'True Line' kits in etched brass

15 Tay Crescent, Bishopbriggs, GLASGOW, G64 1EU

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Building Instructions for kit CL06 Caledonian Railway Class 1 4-4-0T

C.R. numbers 1-12;
L.M.S. numbers 15020-15031

Parts required to complete

- 1 Motor Mashima 1220 "flat can" or similar recommended.
- 2 Gearbox High Level RoadRunner+ and D2 DriveStretcher recommended.
[High Level Kits, 14 Tudor Road, Chester-le-street, Co. Durham, DH3 3RY.
www.highlevelkits.co.uk]
- 3 Wheels 3'2" diameter 9 spoke bogie wheels,
5'0" diameter, 16 spoke driving wheels [crankpin in-line with spoke]
- 4 Paint and transfers.
- 5 Couplings.

Section 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 cast hornblock guides and bearings 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 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 Loco body etch containing :-
 - 1 Sub-footplate
 - 2 Footplate
 - 3 Upper step treadplate (x4)
 - 4 Lower step treadplate (x4)
 - 5 Smokebox rear
 - 6 Smokebox front
 - 7 Cab front
 - 7a Cab rear (not numbered on etch — OK I admit it, I missed it when I was numbering the parts on the drawing!)
 - 8 Cab sides (LH and RH)
 - 9 Cab opening beading (x2)
 - 10 Cab-side lamp irons (x2)
 - 11 Cab interior (1 each OO, EM and P4)
 - 12 Cab doors (x2)
 - 13 Cab spectacles (x4)
 - 13a Alternative rear cab spectacles for use when window guard bars fitted (x2)
 - 14 Cab roof
 - 15 Smokebox inner wrapper (rolled)
 - 16 Outer smokebox wrapper
 - 17 Boiler band (x3)
 - 18 Tank side/top (LH and RH)
 - 19 Bunker
 - 20 Bunker coping and beading
 - 21 Bunker coping in-fill (x4)
 - 22 Cab roof side strip (x2)
 - 23 Cab roof stanchion (x3)

- 24 Reversing lever (LH and RH)
- 24(!) Washer
- 25 Reversing lever quadrant overlay (x2).

2 Loco chassis etch containing :-

- 1 Mainframe (LH and RH)
- 2 Firebox (LH and RH)
- 3 Brake rod hanger (LH and RH)
- 4 Bogie side (LH and RH)
- 5 Bogie compensation beam (dummy) (x2)
- 6 Bogie spacer (1 each OO, EM and P4)
- 7 Compensation beam
- 8 Brake Hanger (LH and RH) (x2)
- 9 Brake Block Overlay (LH and RH) (x2)
- 10 Brake pivot rod washer (x4)
- 11 Brake pull rod (x2)
- 12 Brake pull rod and "A" frame
- 13 Small brake crank
- 14 Large brake crank
- 15 Wheel balance weight (x2)
- 16 Compensation beam pivot washer (x2)

The following parts are supplied in each of OO, EM and P4, the narrowest being for OO etc.:

- S1 Front frame spacer
- S2 Frame spacer / front body mounting plate
- S3 Frame spacer / bogie mounting plate
- S4 Frame spacer / compensation beam retaining plate
- S5 Frame spacer / motor mounting plate
- S6 Frame spacer / rear body mounting plate

3 Motion etch containing :-

- 1 Coupling rod (Front and Rear x2)

4 Cast fittings :-

- CL6/1 Chimney
- CL6/2 Dome
- CL6/3 Ramsbottom safety valve
- CL6/4 Smokebox door
- CL6/5 Smokebox door dart
- CL6/6 Cylinder lubricators
- CL6/7 Steam chest cover
- CL6/8 Westinghouse reservoir (x2)
- CL6/9 Sandbox (x4)
- CL6/10 Tank fillers (x2)
- CL6/11 Backhead
- CL6/12 Westinghouse pump
- CL6/13 Brake stanchion
- CL6/14 Tank balance pipe
- CL6/15 Vacuum injector pipe elbow
- CL6/16 Leaf spring (x2)
- CL6/17 Coil spring (x2)
- CL6/18 Westinghouse pipe (x2)

CL6/19 Steam pipe (x2)
CL6/20 Tall vacuum pipe
CL6/21 Underslung vacuum pipe
CL6/22 Condensing gear front pipes (x2)
CL6/23 Condensing gear top pipe (x2)
CL6/24 Condensing gear vent (x2)
CL6/25 Single clack box (x2)
CL6/26 Double clack box (x2)
CL6/27 Injector (x2)
CL6/28 Balance pipe sump.

5 Turned brass fittings :-

Buffers (4),
Short handrail knobs (3),
Medium handrail knobs (6),
¹/₈" bearings (2),
2mm bearings (4),
Whistle.

6 Miscellaneous parts :-

Boiler tube,
0.45mm wire (4),
0.3mm wire,
0.9mm wire,
Phosphor-bronze wire,
Small bore tube,
Copper-clad strip,
Phosphor-bronze strip,
Nuts (3),
Bolts (3),
14BA nuts (2),
14BA bolts (2),
Insulated wire,
Hornblocks (2).

7 Printed matter :-

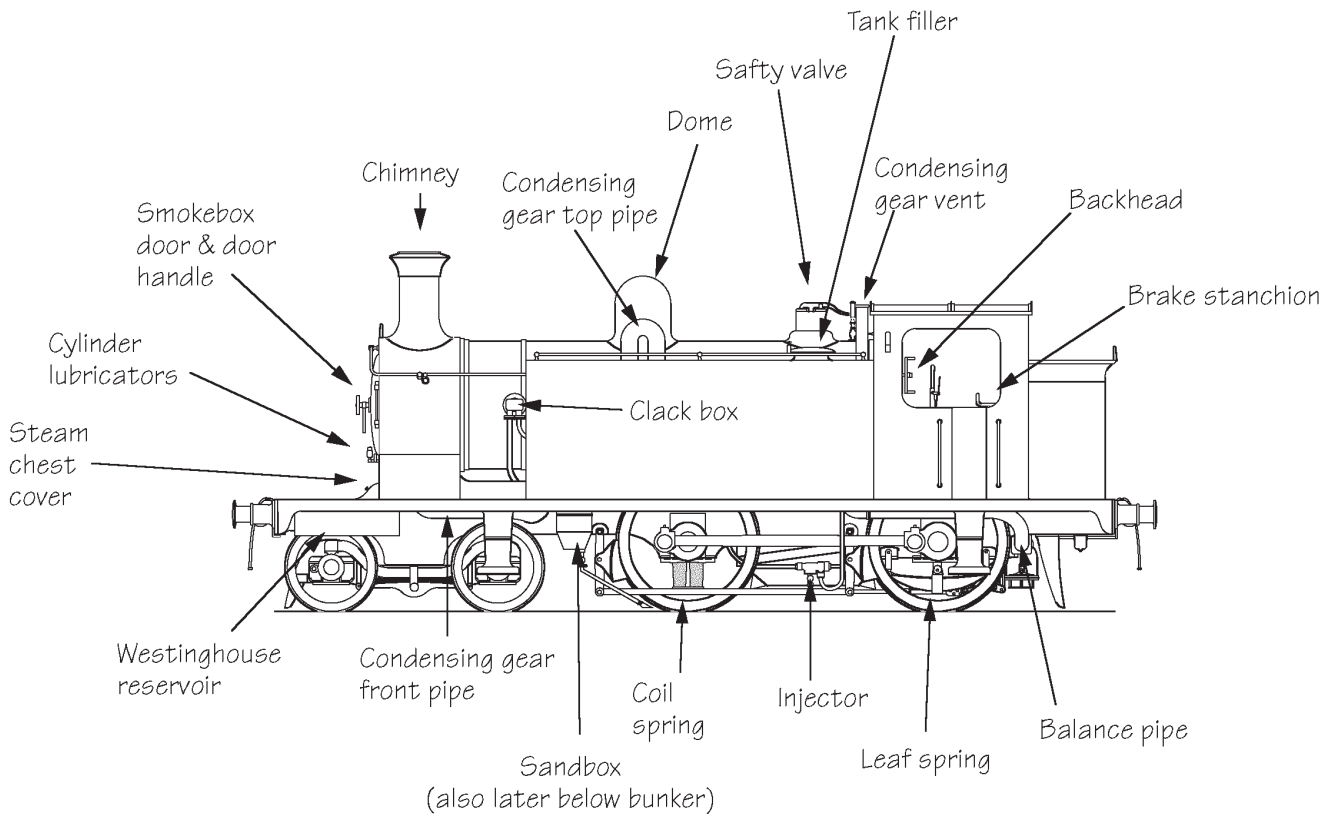
Prototype notes,
General building notes,
CL6 building instructions (this document !)

Section 2 Motor and Gears

The recommended gearbox combinations allows the rear [fixed] axle to be driven in true Flexichas fashion with the motor hidden 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.

Section 3 General

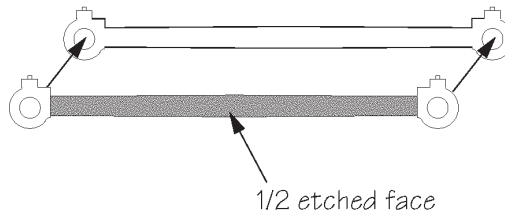
- 3.1 Read the instructions and identify all the parts — the part numbers on the etch together with the following sketch should help with this (not shown are the Westinghouse pump and the vacuum injector pipe elbow — these are shown on the G.A. drawings contained in the prototype notes) :



- 3.2 Always refer to a photograph of your chosen prototype as you build the model. Differences did exist between members of the class, especially as they got older.
- 3.3 Please study the General Building Notes if you are not familiar with etched brass kit construction in general and *Caley Coaches* products in particular.

Section 4 Coupling Rods

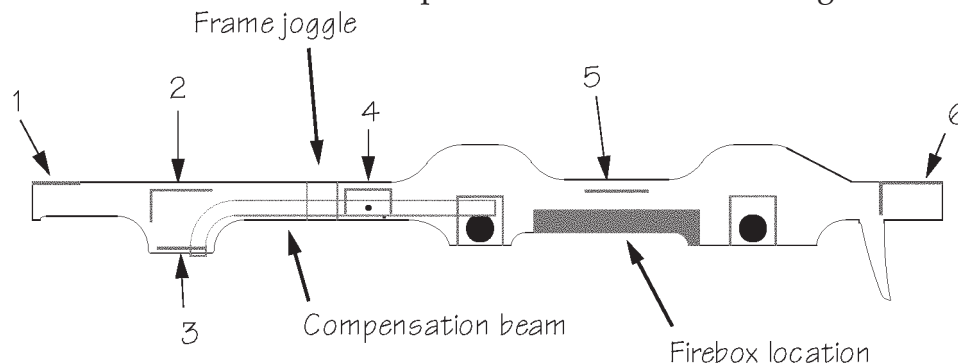
- 4.1 Each coupling rod is assembled from a front and rear section from the N/S etch as shown below.



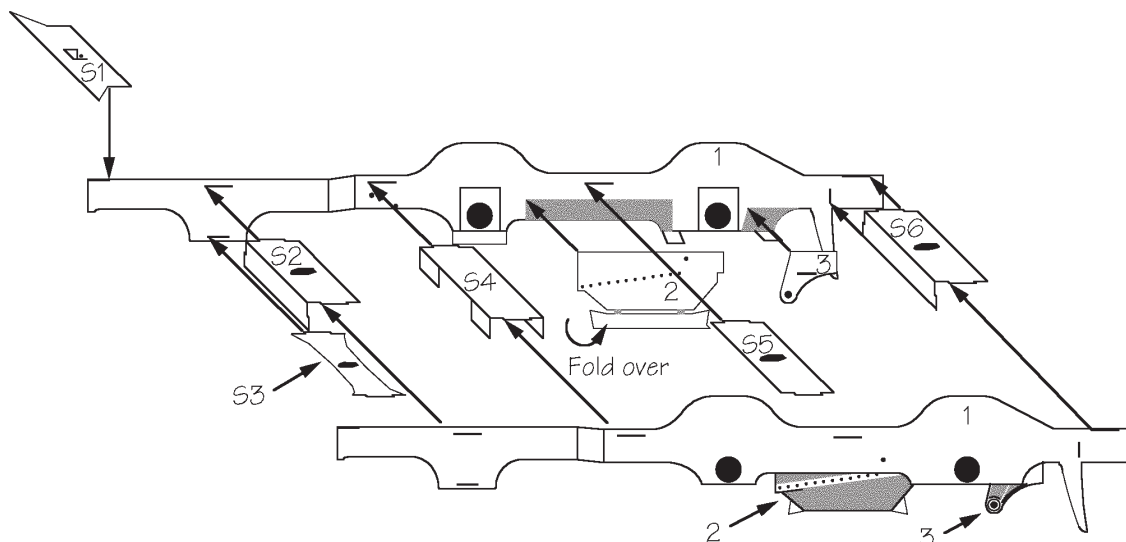
- 4.2 Solder each coupling rod outer to its inner¹/2 etched face outwards, aligning on the crankpin holes.
- 4.3 Open out each crankpin hole until it is just a sliding fit on the crankpin of the wheels you intend to use.

Section 5 Chassis

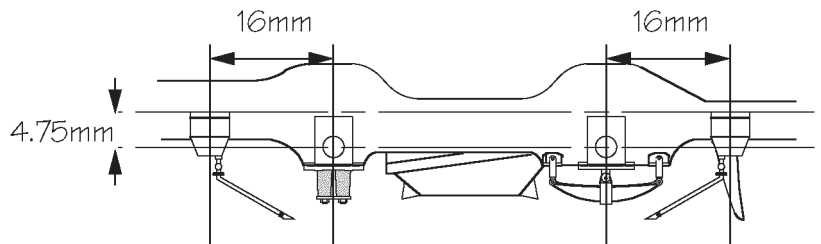
- 5.1 Remove the mainframes (part #1) from the fret and decide which is to be the driven axle as discussed in Section 2 above. Remove the sections around each of the **other** axleholes along the half-etch lines using a piercing saw. It helps to keep the saw edge close to the end of the work bench at 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 then 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.
- 5.2 Fold up the spring casting location plates below each axle to 90°.
- 5.3 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.
- 5.4 Select the frame spacers (parts #S1-S6) appropriate to your gauge. Fold up spacers 2 and 6 to a right angle and spacer 4 to form a U shaped piece. Fold down the bogie centring wire location plate on spacer 1. Solder a small bolt to spacer 3 with its head flush against the spacer.



- 5.5 Press out the rivet detail on the two firebox sides (part #2), tin the bottom section then fold the underlays back to 180° on the inside of the pieces and solder in place ensuring that the holes remain clear. File the joining tabs on the lower edge flush.
- 5.6 Solder the firebox assemblies and the brake rod hangers (part #3) into the half etched recesses on the inside the mainframes.

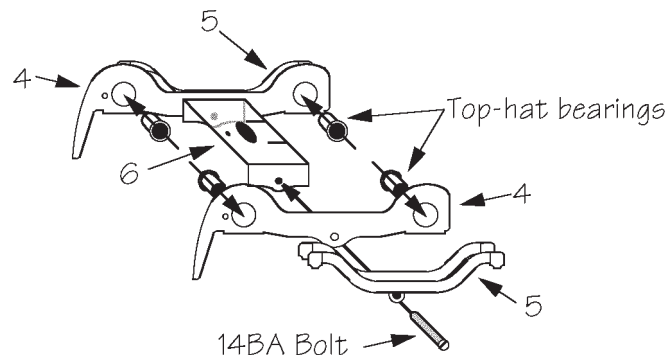


- 5.7 The mainframes have a slight joggle to allow a little more swing behind the bogie—this is formed as follows: Solder spacers 4 and 6 to one mainframe and spacer 5 to the other. Bring the two frames together and ensuring everything is square solder the 3 spacers to the other mainframe. Bend each frame in at a slight angle at the half-etched line just ahead of spacer 4 and then back out parallel at the line about 4mm ahead of that. You are aiming to “lose” about 1mm a side. Trap spacers 2 and 3 in place (the bolt soldered to spacer 3 points down towards the track) and solder to the mainframes.
- 5.8 Solder spacer 1 in place at the front of the mainframes with the bogie centring wire location plate pointing down.
- 5.9 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 mainframes. Leave the jig in place.
- 5.10 Using the previously assembled coupling rods and a second axle/hornblock alignment jig fit the hornblocks and bearings as follows :-
- Locate the hornblocks and bearings for the other axle, using the spring of the jig to hold them in place,
 - For each side, slip the coupling rod over the spigot of the jig in the fixed axle bearings and over the spigot of the jig in the other axle bearings adjusting as required,
 - Once happy with the alignment of both sides, solder the hornblocks to the mainframes,
- 5.11 Remove the coupling rods and jigs.
- 5.12 Solder the spring castings (coil on front, leaf on rear) to the spring location plates below each axlebox.
- 5.13 Solder locating wires for the brake hangers to the mainframes. The one for the leading axle requires cut away inside the frames otherwise it will foul the compensation beam.
- 5.14 Solder the sandboxes to the mainframes as shown below.

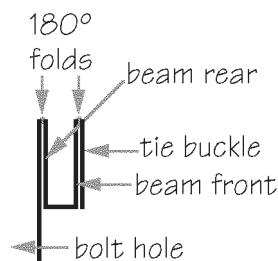


- 5.15 Splay the rear guard irons slightly such that their lower outer edge will be in line with the wheel rims once they are mounted.
- 5.16 Add the injector casting either side of the firebox together with its associated pipework which should be made from wire. I would suggest making the pipe which goes outside the coupling rods and disappears through the footplate as part of the body.

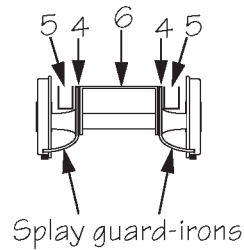
Section 6 Bogie



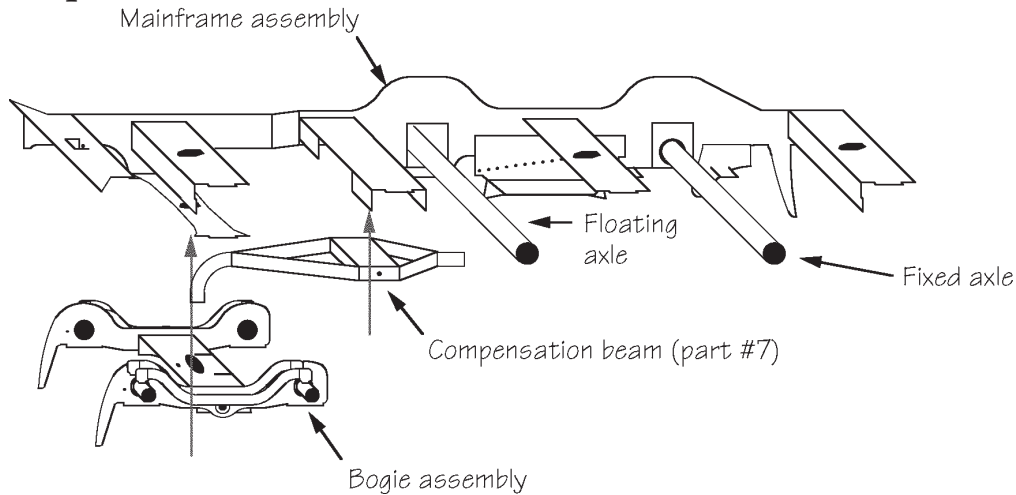
- 6.1 The bogie is designed to be flexible but may be soldered solid if so required — it will hold the track much better if you don't.
- 6.2 Fold up the dummy bogie compensation beams (part #5) by folding the inside beams at 180° back onto the locating plate, fold the spacer at 90°, fold up the front beam at 90° to the spacer and finally fold over the tie bracket at 180° as shown in the cross-section sketch below. Reinforce the folds with a fillet of solder.



- 6.3 Solder a compensation beam to the outside of each of the bogie sideframes (part #4) aligning on the hole in the centre lower side of the sideframe which should be kept clear.
- 6.4 Fold up the required bogie spacer (part #6) into a "U" shape. Reinforce the folds with a fillet of solder.
- 6.5 Insert a 14BA bolt into the hole in the bogie sideframe assembly such that it projects through to the inside of the frame. Place the spacer over the bolt, noting that the small hole in the spacer goes towards the guard irons, and do up the nut on the inside. The sideframe should be able to pivot around the spacer. Repeat for the other sideframe.
- 6.6 Insert a top-hat bearing into each of the axle holes in the bogie sideframes **from the inside**. The body of each bearing should project through to the outside.
- 6.7 Using a set of the bogie wheel you intend to use as a gauge, adjust the bearings such that the projections are equal all round and do not project so far that they will foul the wheels once they are mounted. Solder the bearings in place.
- 6.8 If you find that the compensation beam inhibits all rocking of the sideframes, file back the parts which bear on the axles until there is a little easy movement.
- 6.9 Bend out the guard-irons as shown in the drawing — they will require trimmed back for the narrower gauges.

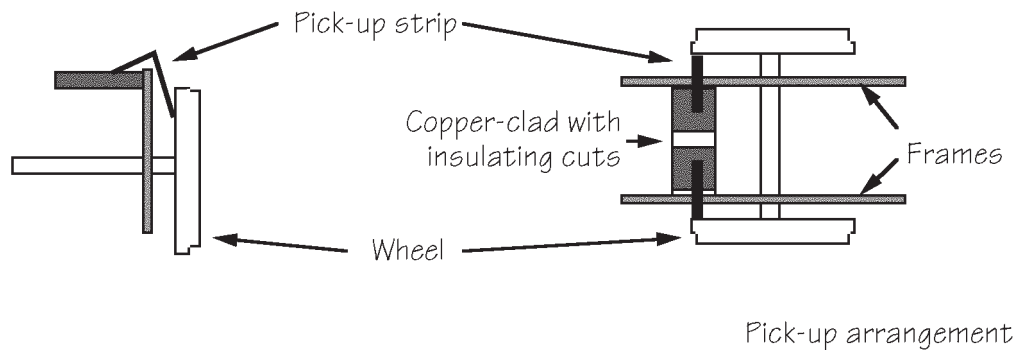


Section 7 Compensation



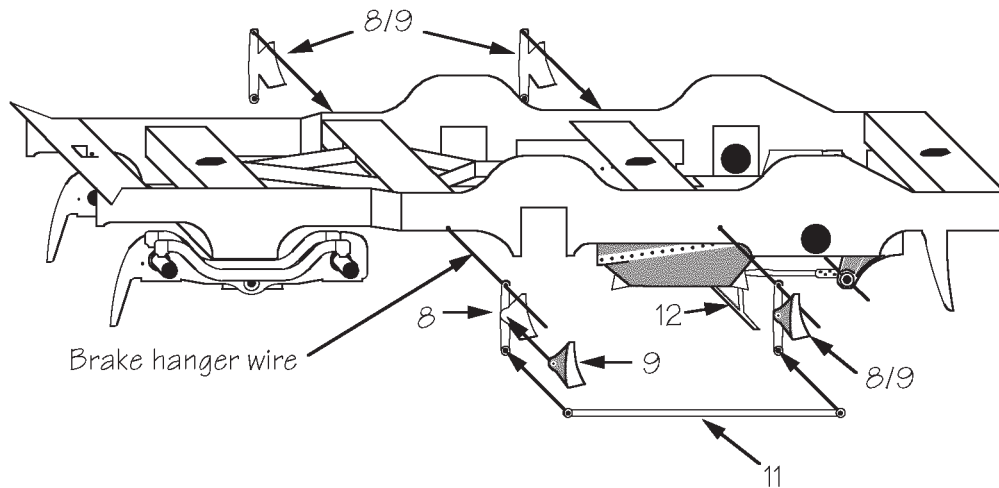
- 7.1 Fold up the central section of the compensation beam (part #7) into a box-like structure then tin the inside of the arms projecting front and rear. Fold the ends out a few degrees along the half-etched lines then fold the arms in at the central box until the end sections meet and solder together.
- 7.2 Turn the chassis assembly upside down and place the compensation beam into the channel formed by spacer 4 — the curved arm goes to the front of the loco and points up as you are working upside down. Thread a length of 0.9mm wire through the compensation beam pivot hole below spacer 4. Tread a washer (part #16) onto this and pass it through the compensation beam and then another washer before threading the wire out through the other mainframe. Solder the wire to both mainframes. Push the washers up against the compensation beam and solder their outsides carefully to the wire such that the beam is constrained laterally but can still pivot.
- 7.3 Clean the chassis thoroughly at this point and paint. Try to avoid getting paint on the brake hanger wires as there is more soldering to be done in these areas. Ream any paint out of the axle bearings.
- 7.4 Mount the driven axle in its bearings, locating the gears or motor/gearbox in place at the same time.
- 7.5 Mount the other driving wheel axle in its bearings and mount the driving wheels.
- 7.6 Fix the motor in place if required.
- 7.7 Cut two strips of the copper-clad fibreglass 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.
- 7.8 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 pick-up strip over the chassis and down (or up) the face where it will bear on the back of the tyre. (See diagram.) Pick-up 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.

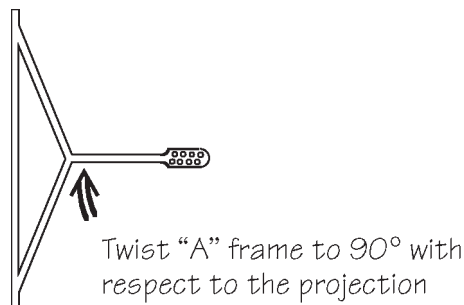


- 7.9 Link the strips together and to the motor with fine insulated wire.
- 7.10 Glue the balance weights (part # 15) in place on the wheels taking care not to cause a short between tyre rim and axle.
- 7.11 Quarter the wheels as follows (unless you are using Romfords!) :-
- Starting with the driven axle adjust all the wheels to approximately the correct quarter aligning by eye to the nearest spoke,
 - Fit the coupling rods and bushes to the driven and the other wheels,
 - Freewheel the chassis up and down and feel for binding,
 - If binding occurs, adjust **only** one wheel on the **non-driven** axle $\frac{1}{2}$ a spoke clockwise,
 - Again freewheel the chassis up and down, repeatedly adjusting the quartering **anti-clockwise** on the **same** wheel until no binding occurs,
- 7.12 Mount the bogie axles and wheels, thread the bogie onto the bolt projecting from spacer 3 and secure with a nut. The bogie requires perhaps 2mm of vertical freedom so don't do the nut up hard. The nut may be soldered to the bolt to ensure it stays put or, more flexibly, secured with a nut securing compound as used in the motor trade.
- 7.13 Place the chassis on a level surface such as a sheet of glass and check that it is sitting level — tweak the plate on the bogie spacer which the front of the compensation beam rests against either up or down until a level chassis is achieved.
- 7.14 Take a length of phosphor bronze wire and bend the end over 90° to form a small hook. Pass this hook into the hole in the bogie spacer from above and thread the other end into the hole in the projection sticking down from spacer 1. Secure this end with solder. This wire server to centralise the bogie and help it to “steer” into curves.

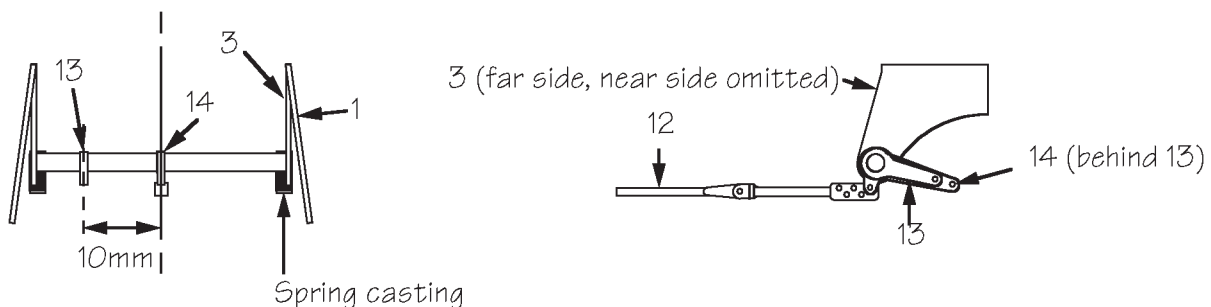
Section 8 Brakes



- 8.1 Solder the brake block overlays (part #9) to the brake blocks (part #8) — remember you require two left hand and two right hand.
- 8.2 Solder the brake block assemblies, each followed by a washer (part #10) to their locating wires such that they are sufficiently clear of the wheel rims not to cause a short — remember to allow for the movement in any floating wheel.
- 8.3 Twist the “A” frame of part #12 to 90° with respect to the pull rod and spring into place between the rear brake blocks.



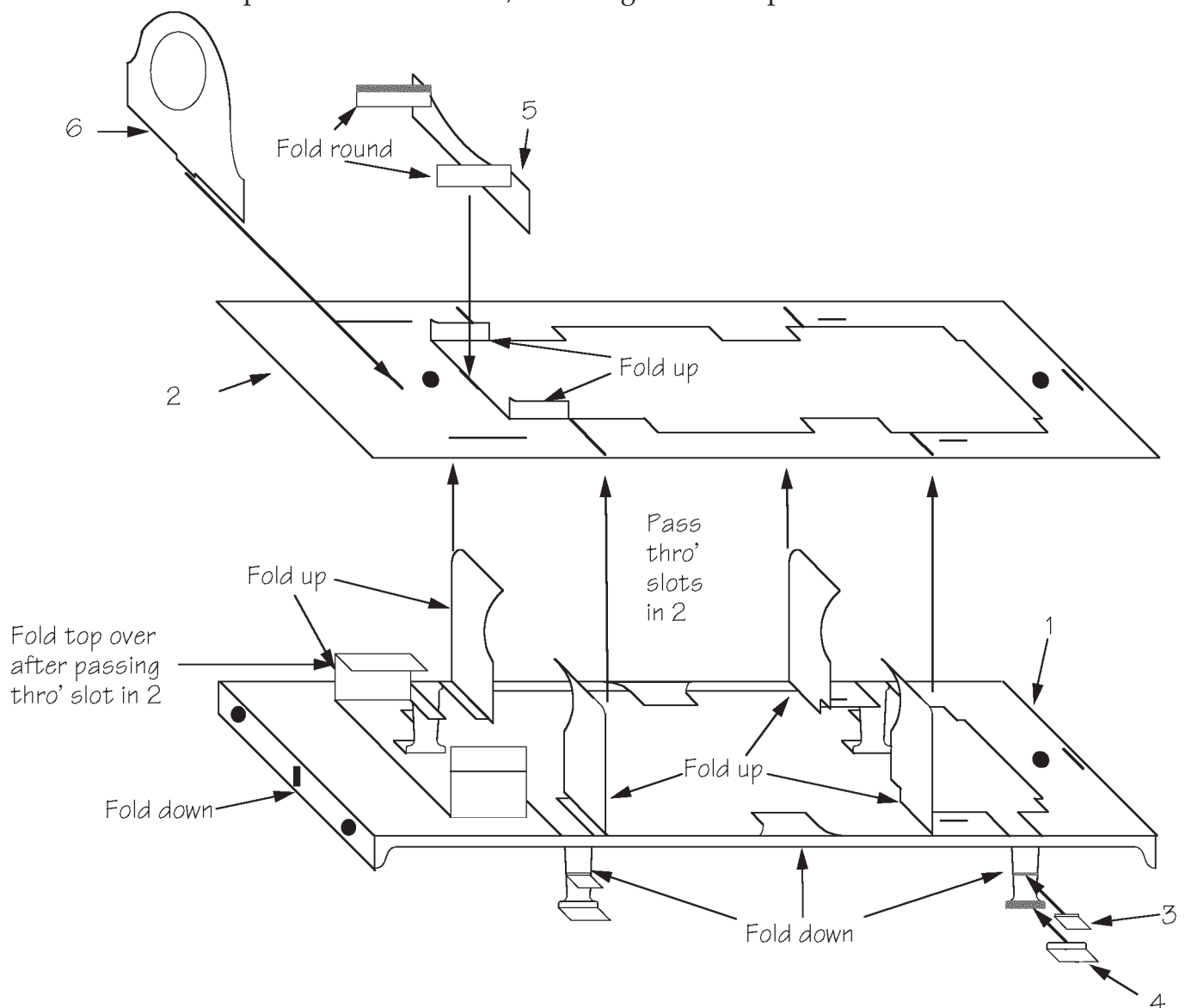
- 8.4 Pass a length of brass rod into the hole on part #3, thread on the cranks (parts #13 and 14) as shown below and pass the rod into the hole at the other side. Solder the rod in place and trim back flush.



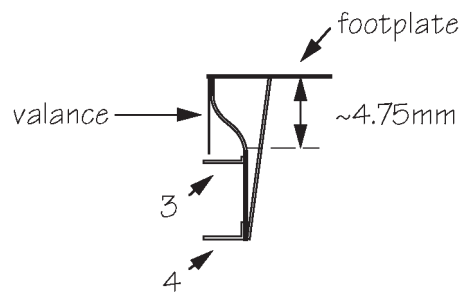
- 8.5 Pass a wire between the lower holes of the front brake hangers then thread the front brake pull rods into this and the projection of part #12 (**outside** the wheels) and solder in place.
- 8.6 Solder lengths of wire into the appropriate holes in the sandbox castings to represent the sand pipes and bend to shape.
- 8.7 Your chassis is now complete.

Section 9 Footplate

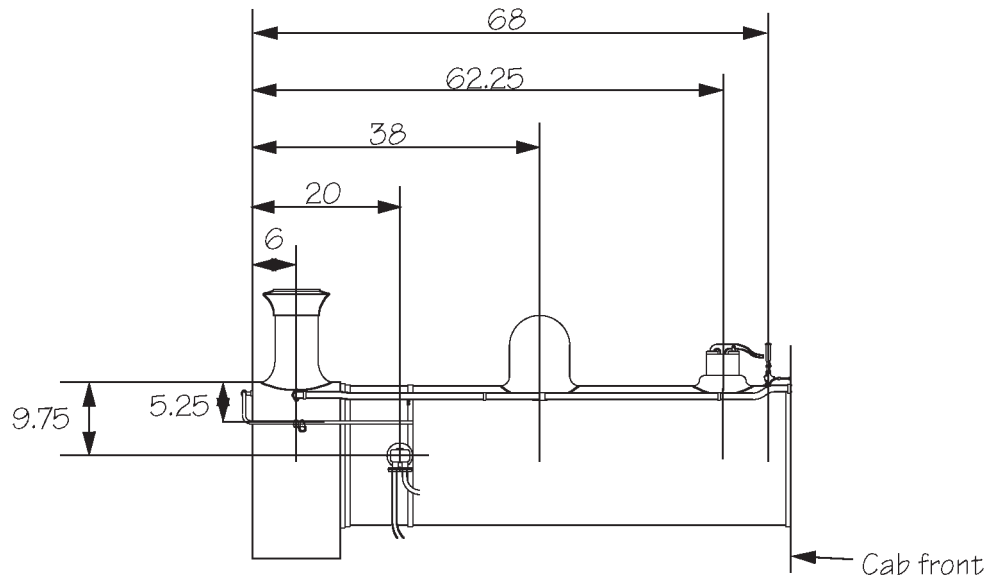
- 9.1 Remove (and store carefully) the various parts found within the footplate (part #2) and sub-footplate (part #1) — do **not** remove the steps or tank sides from the sub-footplate.
- 9.2 The footplate (part #2) fits over the sub-footplate (part #1). First fold down the valances and buffer beams from the sub-footplate. Reinforce the folds with solder. Next fold up the front box (do not fold over the top yet) and tank sides and then fold down the steps. On the footplate fold up the dummy front frames then fit the footplate over the front box and tank sides and solder to the sub-footplate aligning all holes etc.
- 9.3 Solder a nut to the top of the footplate at each of the chassis mounting points.
- 9.4 Solder the smokebox front (part #6) to the footplate and front box.
- 9.5 Fold over the front box tops and solder to the smokebox front.
- 9.6 Fold the “wings” on the smokebox rear (part #5) round to 90° and tin the half-etched portions on the inside. Fit in place as shown above, soldering to the footplate and front box sides.



- 9.7 Bend the steps as shown in the diagram below and fit the treads (parts # 3 and 4) after folding each into an L shape. Reinforce the rear of the sub-footplate/step joint with a fillet of solder. The prototype had a brace rod as shown which may be simulated with a length of wire.



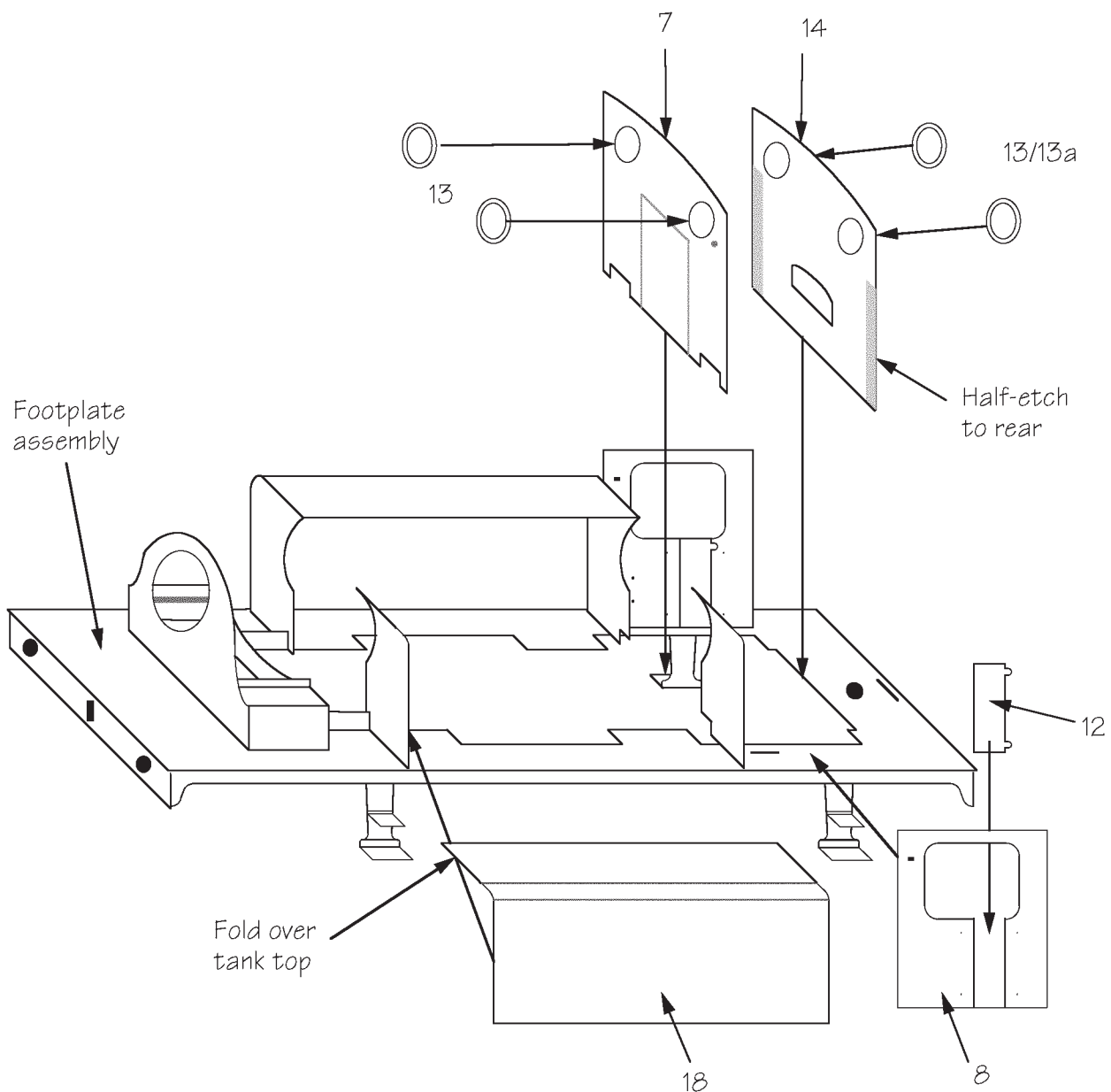
Section 10 Boiler



- 10.1 Place the footplate assembly onto the chassis and using this as a guide make cut-outs in the boiler tube to clear your chosen motor and gears.
- 10.2 Tin the inside of the smoke box inner wrapper (part #15) and the front section of the boiler.
- 10.3 A photograph of your prototype is now essential. If you are modelling later LMS days then the smokebox is probably riveted. If so, push out the rivets from the rear on the outer smokebox wrapper (part #16) using a map tack.
- 10.4 If you are modelling a loco fitted with vacuum brakes, you will require to fit a vacuum injector pipe which "sprouts" from the smokebox. The arrangement varied from engine to engine and should be confirmed from photographs but there is a half-etched marker on the inside of the outer smokebox wrapper for the most typical position. If appropriate to you drill this out now.
- 10.5 Form the outer smokebox wrapper round the boiler, or preferably a slightly smaller tube after tinning it on the inside. Don't worry if it doesn't keep a circular shape — it will tend to spring back a little.
- 10.6 Place the two wrappers in position on the boiler aligning on the chimney hole and tack to the front edge of the boiler tube. Continue round the smokebox front, seam soldering the parts together. Remove any excess length from the wrappers if you are using a motorising scheme which requires the underside of the smokebox to be cut away.
- 10.7 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.

- 10.8 Drill the boiler tube to accept the chimney, dome, safety valve, whistle, handrail knobs, vacuum injector pipe elbow (if appropriate) and clack valve as shown in the sketch (all dimensions are in millimetres).
- 10.9 Fit the boiler to the footplate assembly springing it into place against the tank sides and resting it on the smokebox sides (upwards projections of part #5). Ensuring everything is square, solder to the smokebox front and rear and to the tank sides (solder on the inside as much as is possible). Apply flux then run a dry iron along the smokebox / smokebox side joins.
- 10.10 Solder the boiler bands (part #17) to the boiler — one just in front of the tank and one at the cab / boiler joint.

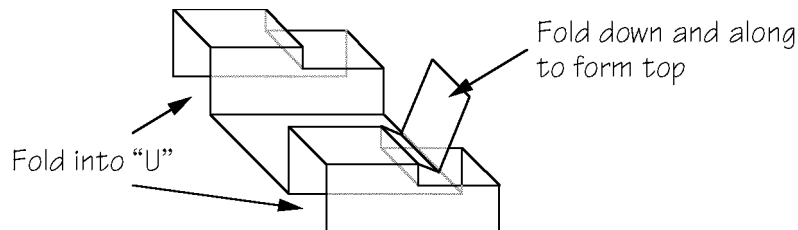
Section 11 Body



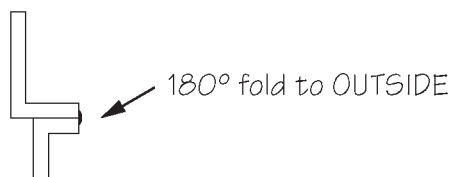
- 11.1 Solder the spectacles (part #13) to the cab front (part #7) around the window apertures.
- 11.2 If required, remove the centre portion of the cab front (denoted by half-etched lines) to clear the your chosen motor / gearbox.
- 11.3 Slot the cab front assembly into the slot in the footplate and solder in position making sure that it

is square.

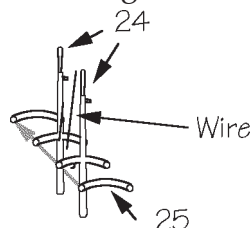
- 11.4 If you require condensing gear, drill out the half-etched holes on the inside of the tank wrappers (part #18) prior to forming.
- 11.5 Fold over the tank tops on the tank wrappers using the tank ends as templates. Any “edging” which occurs on the rounded portion of the tank can be cured by filling the half etched lines with solder then lightly dressing the outside with a file.
- 11.6 Tin the half-etched portion of the inside of each tank where it will meet the boiler then solder in position to each of the ends. Apply flux then run a dry iron along the tank/boiler junction.
- 11.7 Solder the cab doors (part #12) in place on the cab sides (part #8) — these doors open out the way but would normally be closed when the loco was in motion — then solder the cab sides to the footplate and cab front.
- 11.8 Select the cab floor (part #11) appropriate to your gauge. Firstly remove the central portion indicated by the half-etched lines if you have a Portascope gearbox to clear then fold up to form the floor and rear splashes.



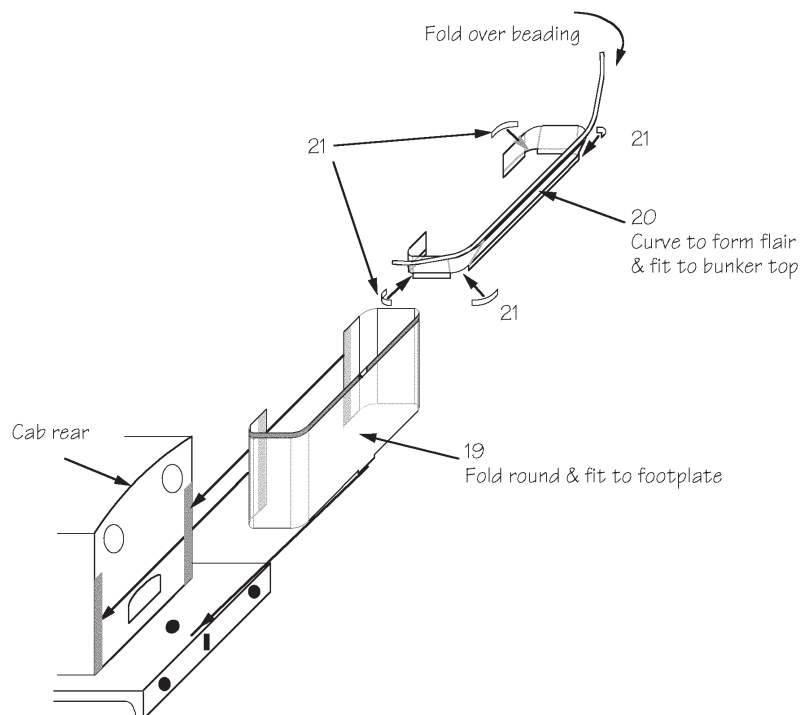
- 11.9 Solder the floor/splasher unit in place inside the cab — a little judicious filing may be required to get a snug fit.
- 11.10 Solder the backhead in place, centrally to the inner wall of the cab front.
- 11.11 Solder the beading (part #9) around the cab apertures. Mark the centre of the strip and align with the centre of the cab opening at the upper edge: tack solder in place at this point locating the side in the half etched groove. Work from the centre round one side pushing the beading into shape and securing with solder. Repeat for the other side.
- 11.12 Fold up the cab lamp irons (part #10) as shown and solder to slots in the cab side sheets from the inside.



- 11.13 Assemble the reversing lever from parts #24 and 25 from the chassis etch as shown in the sketch. Trap a piece of wire in the groove in the mating faces of part #24 to simulate the latch.

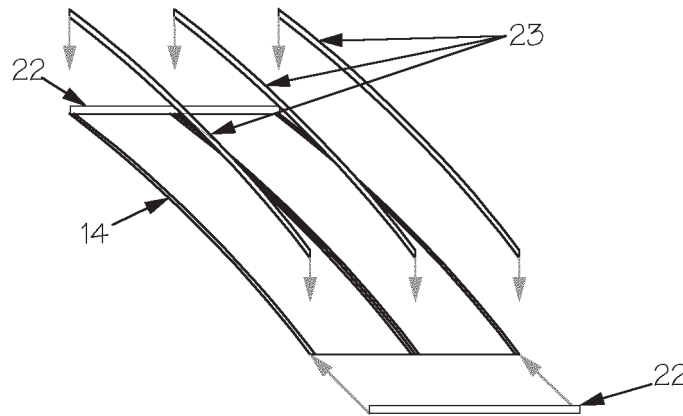


- 11.14 Solder the reversing lever assembly hard against the left hand splasher inside the cab 8.75mm from the cab front.
- 11.15 Drill a hole in the left hand splasher 18mm from the cab front and 10mm from the cab centre line to accept the brake stanchion casting and fix the casting in place.
- 11.16 Fold up the cab-side handrails from 0.45mm wire in fit in place soldering from the inside.
- 11.17 Using either part #13 or #13a (if fitting window bars), solder the spectacles to the cab rear (part #14). Solder the assembly in place to the footplate and side-sheets — note that the half-etched portions go to the rear.
- Tip : if using part #13a bend up some 0.3mm wire into “U” shaped “staples” to fit the holes, thread part #13a on them and then thread the legs into the holes on the cab rear. Only then solder in place from the inside of the cab and trim off the legs of the wire. This way you won’t block the holes with solder!
- 11.18 The bunker is unfortunately the most tricky part of the kit but if you take care it isn’t all that difficult. Bend the bunker sheet (part #19) as shown in the diagram above to form 2mm radius 90° bends with the relieving lines to the inside. Again any “edging” which occurs can be cured by filling the half etched lines with solder then lightly dressing the outside with a file.
- 11.19 Tin the half-etched portions on the cab rear and on the bunker sheet (both front and top) then solder the bunker sheet to the footplate and to the cab rear.
- 11.20 Bend the lower portion of the bunker coping out at 45° with the half-etched line to the outside and tin the inside of this portion.



- 11.21 Place the coping in position on the rear of the bunker using the centre “key” as a guide. Solder in place along the back then gently form each corner into a conical shape until the lower portion of the coping is lying against the upper section of the bunker side sheet and solder in place.
- 11.22 Similarly form the front corners of the coping but note that there is no inclination on the front section of the coping and solder in place.

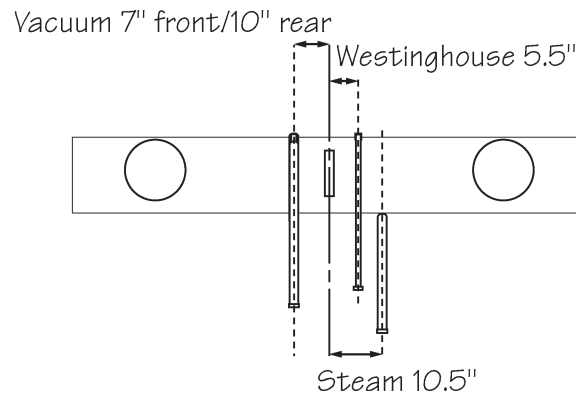
- 11.23 Tin the inside of the coping beading and fold over at 180° such that it lies flat on the outside of the coping. Working from the centre rear solder the beading in place forming the corners as you go. Dress off the retaining tags when you have finished.
- 11.24 Form the in-fill pieces (part #21) into 90° arcs and solder in place as shown in the diagram.



- 11.25 Curve the roof (part #154) to match the profile of the cab front. Fit the stanchions (parts #23) and the roof side strips (parts # 22) as shown in the diagram. The roof is probably best not fitted in place until the final assembly.

Section 12 Fittings

- 12.1 Thread a short handrail knob onto a length of 0.45mm wire and fold the wire to match the profile of the handrail at the smokebox. On either side, thread on another short handrail knob. Fit the ends of the knobs into the holes and fix in place — a dot of solder paste placed in the holes prior to locating the knobs can be useful here.
- 12.2 Solder the chimney, dome, safety valve, clack boxes (either single or double according to your prototype and period) and whistle in place using the previously drilled holes in the boiler.
- 12.3 Solder the tank fillers and, if required, the condensing gear top pipes and vents in place.
- 12.4 Form and fit the tank side handrails using 0.45mm wire noting that the rail curves round the tank fillers.
- 12.5 Solder the smokebox door in place and then solder the dart to it.
- 12.6 Fit the steam chest cover centrally to the footplate at the smokebox front/footplate junction.
- 12.7 Solder the cylinder lubricators in place on the smokebox front.
- 12.8 Below the footplate, solder the Westinghouse reservoir and, if required, the condensing gear front pipe in place.
- 12.9 Fit the buffer bases front and rear. The heads are probably best left off until after painting.
- 12.10 Fit the Westinghouse and steam pipes together with the vacuum pipes if appropriate to your model. The diagram below shows their arrangement.



- 12.11 Fit the Westinghouse pump to the cab side as shown in the G.A. drawing.
- 12.12 If appropriate to your period, bend up an appropriately shaped vacuum injector pipe, fit the cast elbow and fit in place on the model. The modifications drawing shows a typical arrangement of this pipe but a photograph of your prototype is your best guide.
- 12.13 Determine an appropriate location for the tank balance pipe sump — the centre should be located 3.5mm left of the centre line of the loco when looking from the rear but in this position it will foul the frames in OO so in this case position it as far left as possible. Cut the balance pipe appropriately and mount the sump in place. Now temporally mate the body and chassis, position the tank balance pipe and solder to the chassis (otherwise you will not be able to dismantle the model when required).
- 12.14 Bend up the injector pipe which goes outside the coupling rods from 0.45mm wire and solder to the underside of the footplate.

Section 13 Final Assembly

- 13.1 Thoroughly clean the body to remove all trace of flux etc.
- 13.2 Paint, line and letter according to your chosen prototype and period.
- 13.4 Glaze the cab spectacles and then fit the cab roof by gluing in position.
- 13.5 Fit the sprung buffer heads, adjusting the fixing nuts until the projection of the heads is correct.
- 13.6 Mate body and chassis using the supplied bolts.
- 13.7 Your loco is now ready for service.

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Jim Smellie

