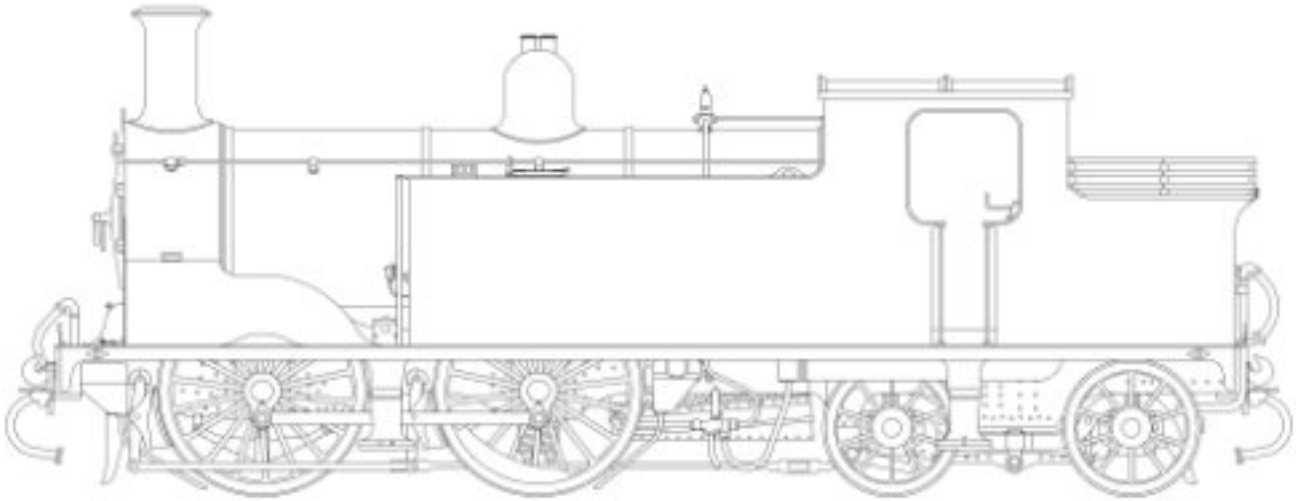
# Finney7

# LSWR DRUMMOND M7



**CAUTION.**

This product contains etched parts with very sharp edges and castings that may contain lead. Neither the Manufacturer, Distributor or Retailer can accept any liability for illness, injury or consequential damage caused when handling or building this product.

Read any instructions before assembly.  Do not eat or drink whilst handling. Wash hands after use.

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# BRIEF HISTORICAL DETAILS

The locomotives which form the subject of this kit were the first design of Dugald Drummond for the LSWR. A total of 105 locomotives were built at Nine Elms and Eastleigh under 15 Order Numbers as follows:

| Order | Numbers | Built | Frames | Reverse | Sandbox | Water Feed |
|---|---|---|---|---|---|---|
| M7 | 242-256,667-676 | 3/97-11/97 | Short | Lever | With splasher | Injectors |
| V7 | 31-40 | 3/98-6/98 | Short | Lever | With splasher | Injectors |
| E9 | 22-26,41-44,241 | 1/99-5/99 | Short | Lever | With splasher | Injectors |
| B10 | 12,318-321 | 7/00-8/00 | Short | Lever | With splasher | Injectors |
| C10 | 322-324,56,57 | 8/00-10/00 | Short | Lever | With splasher | Injectors |
| G11 | 123-C33,30,32,33 | 2/03-3/03 | Long | Steam | In Smokebox | Injectors |
| H11 | 374-378 | 4/03-5/03 | Long | Steam | In Smokebox | Injectors |
| B12 | 21, 27-30 | 1/04-2/04 | Long | Steam | In Smokebox | Injectors |
| C12 | 108-111,379 | 3/04-6/04 | Long | Steam | With splasher | Ram pumps |
| X12 | 45,104-107 | 3/05-5/05 | Long | Steam | With splasher | Ram pumps |
| Y12 | 46-50 | 5/05-6/05 | Long | Steam | With splasher | Ram pumps |
| B13 | 51-55 | 11/05-12/05 | Long | Steam | With splasher | Ram pumps |
| D13 | 56-60 | 1/06-3/06 | Long | Steam | With splasher | Duplex pumps |
| X14 | 125-C21 | 8/11-11/11 | Long | Steam | With splasher | Duplex pumps |
| A15 | 131,328,479-481 | 11/11-12/11 | Long | Steam | With splasher | Duplex pumps |

## SOURCES OF INFORMATION AND PHOTOGRAPHS


The Locomotives of the LSWR, Part II published by the RCTS.

LSWR Locomotives - The Drummond Classes, D.L.Bradley, Wild Swan.

A Pictorial Record of Southern Locomotives, J.H.Russell, OPC

Drummond Locomotives, Brian Haresnape & Peter Rowledge, Ian Allan

Locomotives Illustrated No. 73, South Western O-4-4Ts - Ian Allan

Southern Steam Locomotive Survey, The Drummond Classes, Bradford Barton


## VARIATIONS/MODIFICATIONS INCORPORATED INTO THE KIT.

**Frame Length.** The last 50 locomotives were built with a front overhang 15" longer than the earlier locomotives.

**Chimney.** The long frame locomotives were fitted with a narrower chimney.

**Reverse.** The first 55 locomotives were built with lever reverse the remainder being built with steam reverse.

**Splashers and Sandboxes.** The first 45 locomotives were built with the leading sand box neatly combined with the wheel splasher. Drummond then experimented by putting the sandbox inside the smokebox with no external filler (Order No. B10 & C10 ) necessitating the opening of the smoke box door to replenish the sand. These engines had the traditional shape of Drummond smokebox front with wing plates. The next ten engines, the first with the long frame, continued with the smokebox sandboxes which now had an external filler on the smokebox side. The smokebox sandboxes were quickly removed and replaced with boxes beneath the platform, most by mid-1907, the last being No. C33 in October 1915. When, much later, these locomotives required new smokeboxes, from May 1939, the attractive wing plates were unceremoniously removed. The last, No. 376, had its wings clipped during March 1946. Experiments complete and unsuccessful! The remaining engines were built with the original elegant arrangement.

**Water Feed.** The first 65 locomotives were fitted with conventional injectors. Drummond then built the remaining locomotives with his feed water heating system, the last 20 locomotives having boiler feed by means of two Duplex pumps. The feed water heaters were inside the side tanks and were supplied with exhaust steam through brass pipes which led from the smokebox to the front of the tanks. The tanks were clad with false plates, to prevent heat loss and blistering of the paintwork, which was extended forward at the front to cover the extra pipework, giving the appearance of having longer tanks. Whilst the system did give a slight improvement in both coal and water consumption, it was expensive to maintain and this was one of Drummond's frills which his successor, Robert Urie, removed from 1922. All the cladding was removed including that around the front pipework revealing the standard length tanks.

**Clackboxes.** Numbers 242 to 256 and 667 to 676 were fitted with boiler side clackboxes. The remainder had their clackboxes sited on the bottom of the smokebox tube plate where they were hidden by the splashers. Again Urie soon got to work placing the clackboxes conventionally on the boiler sides.

**Front steps.** The earliest locomotives were built without the footsteps between the coupled wheels.

**Handrail knobs.** When built the earliest locomotives had the forward handrail knob on the boiler some way from the smokebox. On later engines it was mounted further forward. During SR days an extra short handrail knob for the boiler handrail was fitted to the right side of the smokebox.

**Tank Brackets.** Again in SR days two brackets were fitted to the top of each tank. Towards the front the bracket tied the tank to the boiler and at the rear of the bracket was a lifting eye.

**Coal Rails.** Two extra coal rails, to increase coal capacity, were added from circa 1912 . At the same time bars were fitted over the rear cab windows. Later still the coal rails were backed by metal sheeting to stop the loss of small coal.

**Lamp brackets.** The locomotives were built with Drummond's socket style brackets. The SR standardised on a design with the socket in the lamp. Many locomotives had the Drummond brackets adapted to accept the standard lamps but gradually the locomotives were fitted with new brackets of standard design.

**Smokeboxes.** When smokeboxes were renewed the flush riveting was often replaced by visible snap head rivets. On many of the locomotives to improve the sealing of the smokebox door four clamping 'dogs' were fitted to the lower rim of the door.

**Handrails on front of tank.** During SR days a vertical handrail was fitted to the front of each tank. When the air operated auto-train control system was fitted the right side handrail was moved outwards to give clearance for the operating cylinder.

**Carriage heating pipes.** From 1901 the LSWR introduced steam carriage heating equipment. The steam pipe to the buffer beam mounted connections ran behind the right side valence. In later years this was lowered slightly and carried by five brackets along the lower edge of the valence.

**Couplings.** Most of the engines appear in their early years, from photographs, to be running with a single, long coupling link although some carry three link couplings. Later the locomotives were equipped with screw couplings together with a hook to carry the coupling when it was not required.

Brake shoes. Two different patterns are included.

Cab doors. Cab doors were fitted to the locomotives equipped with the air operated auto gear - see below.

**Balance weights.** Several different patterns of balance weight were used over the years. The last forty locomotives were built with Drummond's patent balanced crank axles which obviated the need for balance weights on the driving wheels.

## VARIATIONS NOT INCORPORATED INTO THE KIT.

**Conical smokebox doors.** Numbers 242-244 only were built with conical smokebox doors. These were removed during 1904-5.

**Ram pumps.** The first twenty locomotives built with feed water heating were equipped with Ram pumps.

**Auto train gear.** 45 locomotives were fitted from 1912 with the South Western cable and pulley gear for working auto trains. It was removed between 1928 and 1936. From 1930 thirty one of the long frame locomotives received the more practical compressed air control system.

**Superheating.** In 1921 Urie rebuilt number 126 with a superheated boiler all but identical to that being fitted to the 700 class 0-6-0 locos. This gave the loco an extended smokebox, higher boiler pitch and taller cab. Number 126 was withdrawn in 1937.

## CHASSIS OVERVIEW

Note that many of the components for both chassis and body are handed left/right and care must be taken to ensure the correct component is used. Components are not always identified left/right separately but with care and common sense no problems should arise.

Before construction can commence you have to decide which particular chassis you are going to construct. The options are:

### Gauge.

For Finescale, where little sideplay is required, the widest spacers can be used but they will need careful filing to make their width 25.7 mm. If you require your engine to negotiate sharp curves then the middle width spacers should be used.

The widest frame spacers supplied are suitable for Scaleseven and care will be needed to allow sufficient sideplay, especially in the leading axle to enable the model to negotiate moderate curves.

### Suspension.

**Rigid.** The kit is supplied with top hat bearings to build a rigid chassis. Open out the main axle holes to accept top hat bushes and solder them in place.

**Sprung.** If you are going to fit sprung horn blocks, you should open out the frame slots by cutting up the half etched lines and follow the manufacturers instructions.

**Compensated.** The simplest and most reliable suspension system is beam compensation and the necessary compensation beams are provided in the kit. Not provided are the hornblocks and bearings which are available as an extra item which includes instructions for aligning the hornblocks accurately.

**Pickups.** No pickup material is provided. The options are:

**Scrapers.** Attached to the middle frame spacer using printed circuit board.

**Plunger.** Mark out and drill suitable holes and fit according to the manufacturer's instructions. If you are opting for working inside motion the plunger pickups must be positioned so that they will not foul the inside motion.

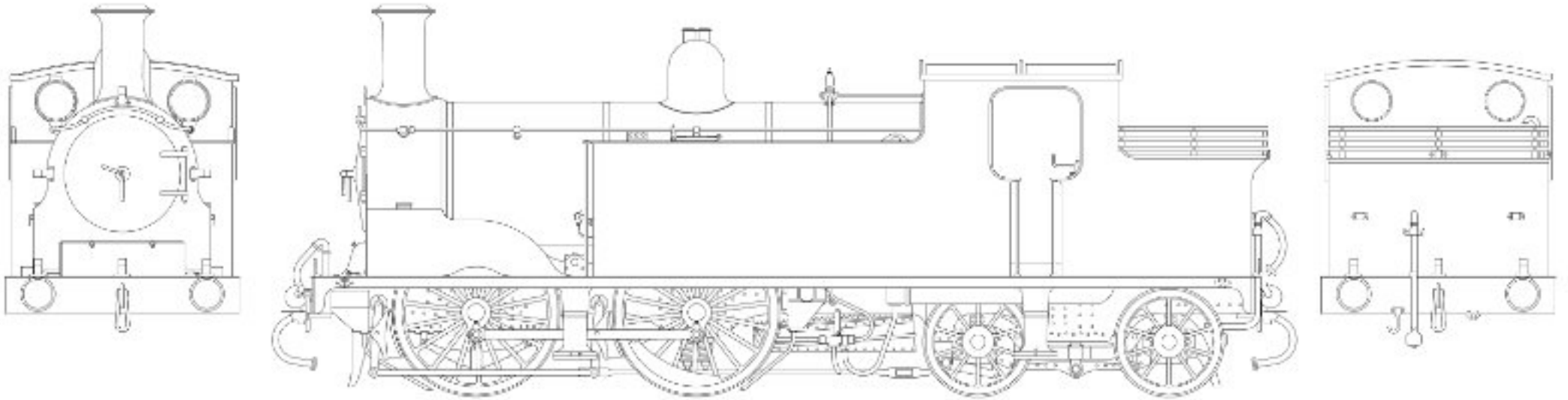
## COMPONENTS NOT SUPPLIED

### Wheels.

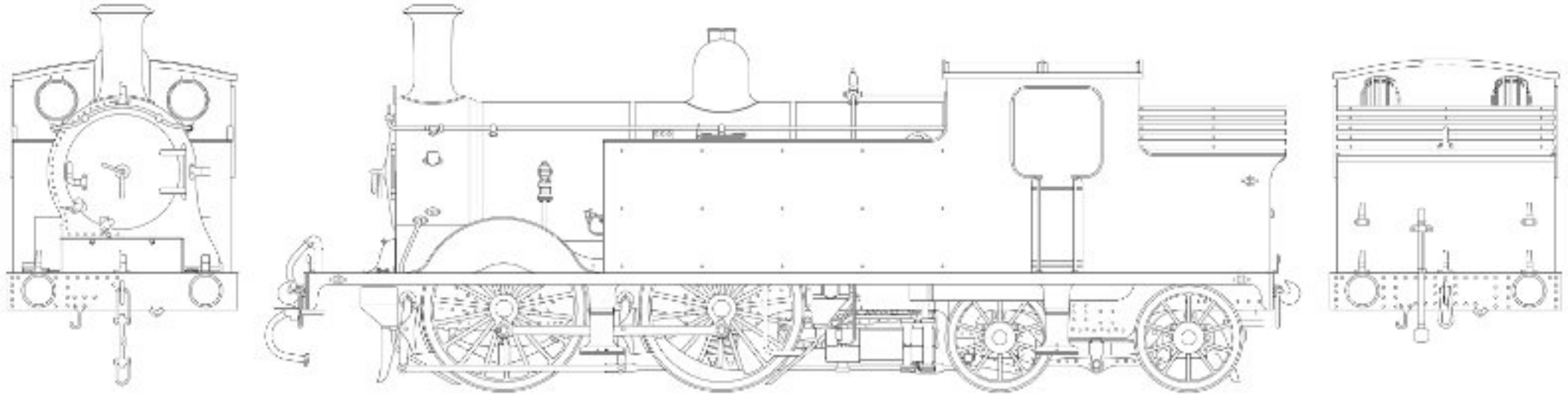
Drivers 5’7”, 18 spokes, 9” IL (Slater's 7867L) and bogie 3’7”, 10 spokes, 5/32” axle (7843SWMF).

### MOTOR/GEARBOX

A Canon 1833 motor is recommended with a SDMP 40L/15 gearbox available from Finney 7.



Short Frame Locomotive



Long Frame Locomotive

# BOGIE

**Part Numbers and Etch Numbers.** These are all displayed in the text as part number/etch number as in (B1/1). Parts on this page are on etch A2 unless detailed.

The bogie carries the weight of the rear of the locomotive and is the third balance point of the compensation system. Bogie clearance on curves is a particularly difficult problem with this prototype. The bogie is designed to be as close to the prototype as possible. Potential problem areas and possible solutions are:

Top of bogie frames foul underside of main frames - file to clear.

Wheels foul main frames - taper rear frames using alternative spacers.

Front wheels foul brake gear - use one of the alternative bogie pivots.

Front wheels foul tank balance pipes - File clearance on inside of balance pipes.

Clearly some experimenting will be required once you have decided on the gauge being used and the desirable minimum radius of curve to be negotiated.

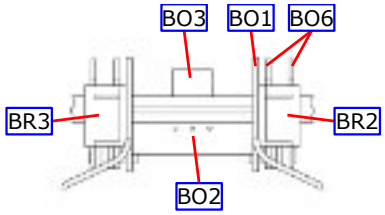
Note that if you decide to use one of the alternative bogie pivot positions the weight of the rear of the locomotive is still carried by the bogie. This means the 6BA screw is still used, with a nut to retain the bogie, but that the slot in the bogie stretcher will need opening out so that the bogie will pivot freely about the alternative pivot. You may also decide to dispense with the side control wires.

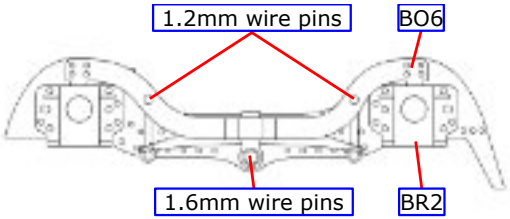
Emboss the rivets on the bogie frame (BO1) and form the guard irons to shape. Fold up the bogie stretcher (B02/B2 - use the middle width of the three) and solder in place in the slots in the frames. Note the slot for the bogie pivot bracket (BO3/B2) must be at the front. Solder the axle boxes (BR2 & BR3) in place and the wire pins from 1.2 mm wire. Carefully ream the axle holes to 5/32" diameter.

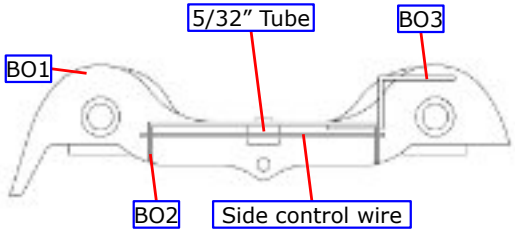
Temporarily fit the wheels to check that the bogie is running true. Use the BO7/B2 washers to control side play.

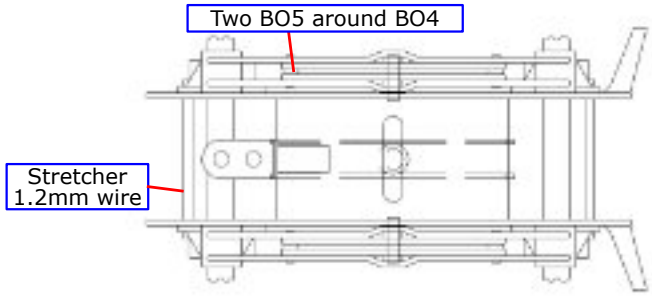
Using the bogie spring - middle lamination (BO4) as a guide, drill two 1.2 mm holes and a 1.6 mm hole into a block of wood or Tufnol and insert 1.2 mm wire into the two hanger holes and 1.6 mm wire into the pivot hole. These pieces of wire are used as a jig to accurately align the outer spring laminations (BO5 & BO4) and the bogie equalising beams (BO6). Note the equalising beams are asymmetric - select carefully! Fold over through 180° the outer strips on part BO5 (fold line on outside) before assembling all the components on the jig. Align carefully before soldering together.

Trim the wire pins to length leaving the 1.6 mm wire long at the back to enable the assembly to be located on the bogie through the 1.6 mm hole in the frames. Repeat for the other side. The side control springing can now be constructed as shown above soldering the spring wires at one end only. If appropriate, fold up the bogie pivot bracket (BO3) and solder in place.




**Cross section of the bogie**





# COUPLING RODS AND FRAME PREPARATION

## COUPLING RODS

The coupling rods (F1 and F2 on A1) should now be made up so that they can be used as a jig for fitting the coupled wheel hornblocks accurately into place.

First drill out all the crankpin holes to a convenient size which is well undersize for the crankpins. Remove all burrs caused by the drilling. Now drill a hole with the same drill into a suitable small block of wood and leave the drill in the wood with its shank projecting. This projecting shank is used as a mandrel to accurately align the two laminations of each rod.

Using plenty of solder and flux, solder the two laminates together. You should now have a rod with the bosses on each laminate perfectly aligned. Repeat with the other pair of laminates. The rods have been deliberately etched too large so that the thin etched edges can be carefully filed so that the 'laminated' effect is lost and the rods appear to be made from one piece of metal.

## FRAMES

Having decided which chassis to construct you can now start construction by preparing the frames left and right (F3 & F4 on A2). To construct the kit as designed with a compensated chassis first open out the frame slots by cutting up the half etched lines.

Now open out the following holes in the frames as shown in the drawing.

C for compensation beam pivot - 1/8

B for brake hanger pivots - 0.8 mm

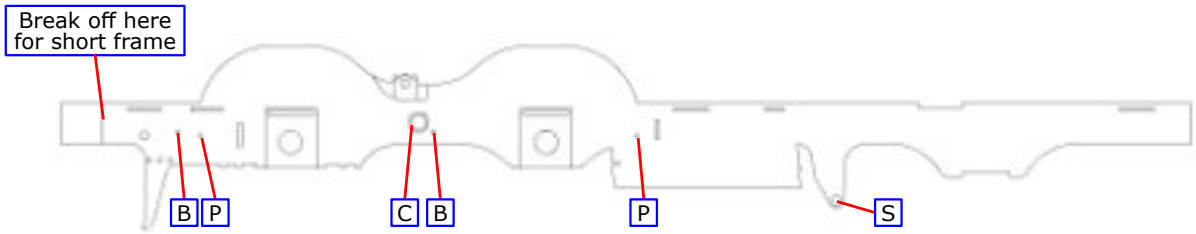
S for rear brake cross shaft - 2.0 mm

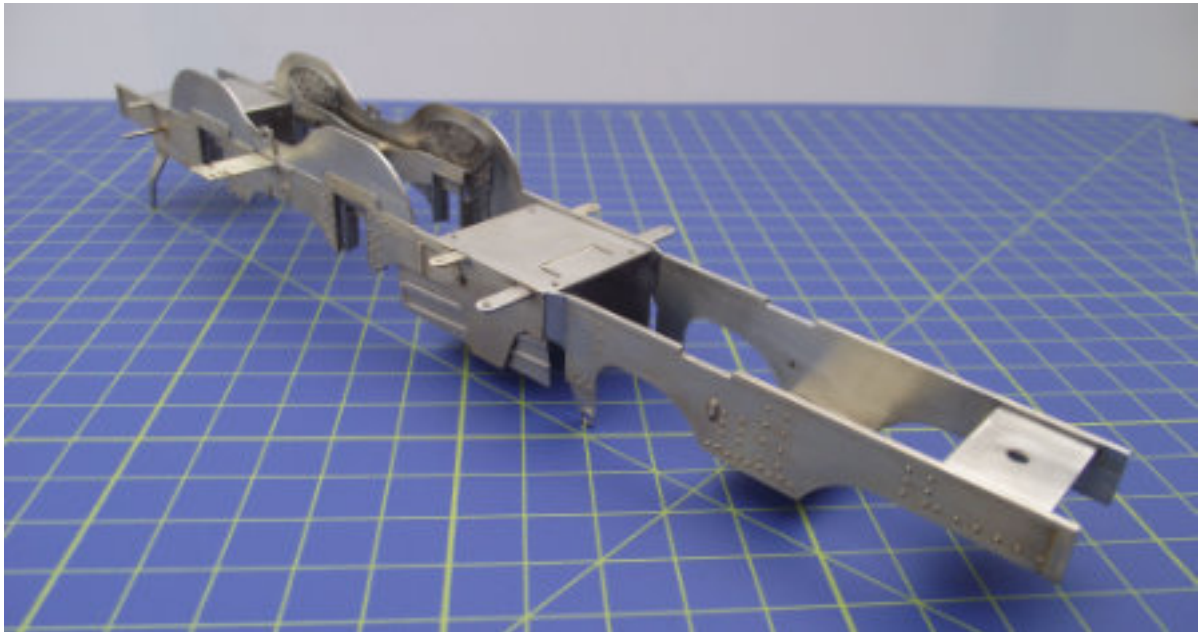
R for reverse weigh shaft - 1.8 mm

For a short frame engine shorten the frames by breaking off along the half etched lines.

Form the frame joggle to narrow the frames at the rear. Make the first bend inwards through 30° along the front half etched line and strengthen the bend with a fillet of solder. Then make the second bend outwards in the same way. Form the front guard irons to shape.

Solder one of the rear hornguides (9) to the inside of the frame aligning it with the half etched lines and with the bottom of the frame.



# FRAME CONSTRUCTION 1

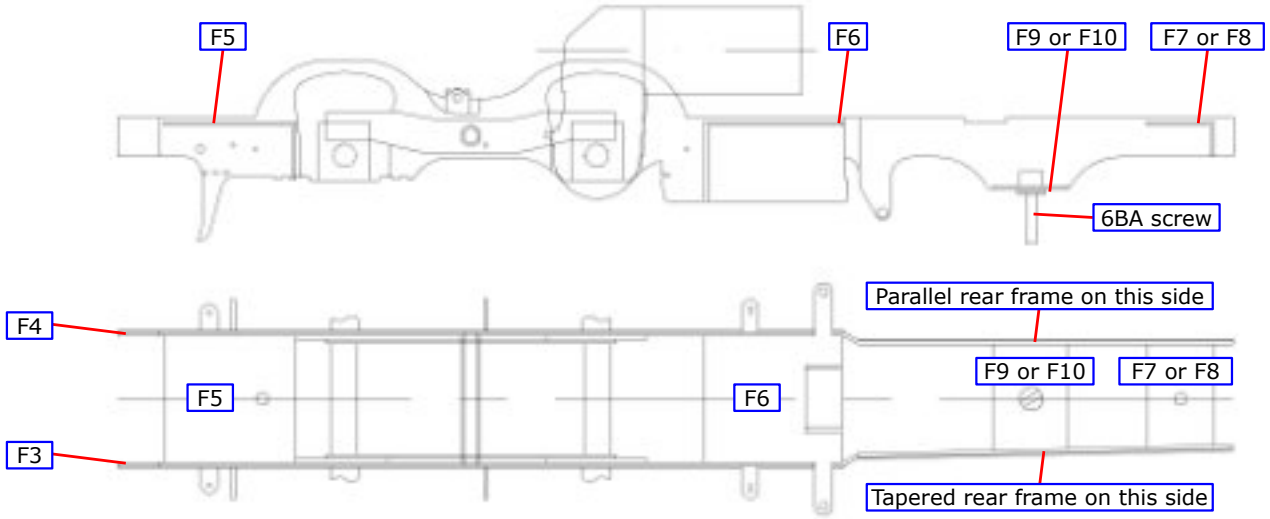
Parts on this page are on etch A2 unless detailed.

**Frames.** The prototype has a step in the frame just behind the firebox and is then parallel to the drag box. The model has the option to build up as per the prototype or to build with tapered rear frames.

Remove the spacers - front (F5), middle (F6), rear - parallel frames (F7), rear - tapered frames (F8), bogie pivot - parallel frames (F9), and bogie pivot - tapered frames (F10) to suit your chosen gauge. Fold up the spacers making sure the half-etched fold lines are on the inside and that each bend is a right angle. Emboss all the frame rivets.

Solder the 6BA bogie pivot screw in place through the hole in the bogie pivot spacer.

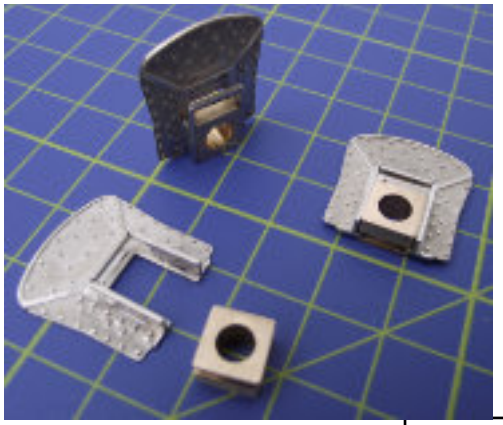
Check that all tabs on the spacers fit properly in their corresponding chassis slots so that the spacer is hard up against the inside of the frames. Now assemble the frames and spacers. Start by tack soldering part 4 to both sides. Check that everything is square and that the spacers are hard against the frames. If all is well solder the remaining spacers to the frames checking constantly that the chassis is square and the frames are straight.




**Hornblocks.** Prepare the remaining bearings and hornblocks (F11). Place a bearing into the rear hornblock that is already soldered to the frame. Slide the second rear hornblock and bearing for the rear axle over a long piece of 3/16" rod with a spring between the bearings.

Carefully compress the spring and clip the hornblock between the frames. Make sure the hornblock is square to the chassis and that its bottom edge aligns with the lower edge of the frames and that the long rod is at right angles to the frame before soldering the second hornblock in place. Fit the two front hornblocks using a stepped hornblock alignment jig and spring in the same manner as for the rear hornblock.

Slide the coupling rods onto the jig to give the correct spacing to the axle centres. Make sure the hornblock is square to the chassis and that its bottom edge aligns with the lower edge of the frames.



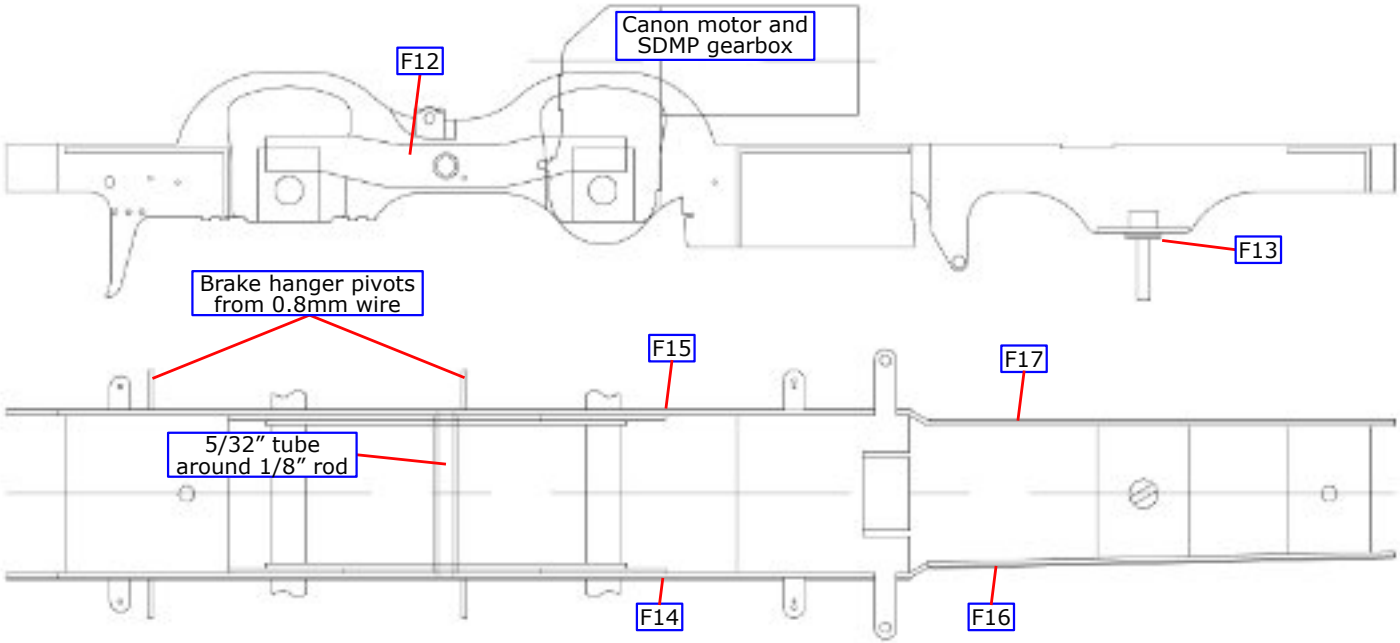
# FRAME CONSTRUCTION 2

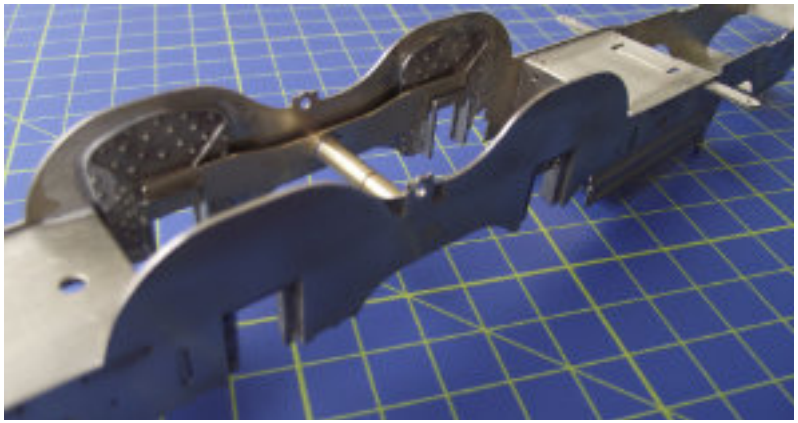
**Compensation Beams.** (Parts on A2). Cut a piece of 1/8" brass rod so that it fits through the holes C and is flush with the outside face of the chassis frames. Cut two equal pieces of 5/32" tube which together fit between the frames and solder the compensation beams (F12) to the tube close to one end.

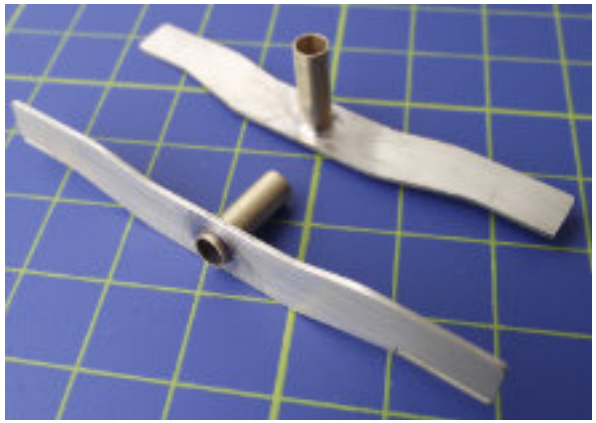
Temporarily fit the beams and all the wheels and axles and confirm that the compensation works properly and check that the chassis is sitting level. The bogie rests on a suitable selection of bogie pivot washers (F13). When correctly set up the top of the frames should be 27.5 mm above rail level.

**Frame Overlays.** (Parts on B1). Emboss all the rivets on the frame overlays - main frame overlay, left and right (F14 & F15) and rear frame overlay, left and right (F16 & F17). Fold down the brackets for the sandpipes, front steps and injector pipes as required. Those not required can be broken off.

Solder in place lengths of 0.8 mm wire for the brake hanger pivots. These then serve to accurately locate the overlays which are now tack soldered around their edges.





# FRAME DETAILING SHORT FRAME LOCOMOTIVE

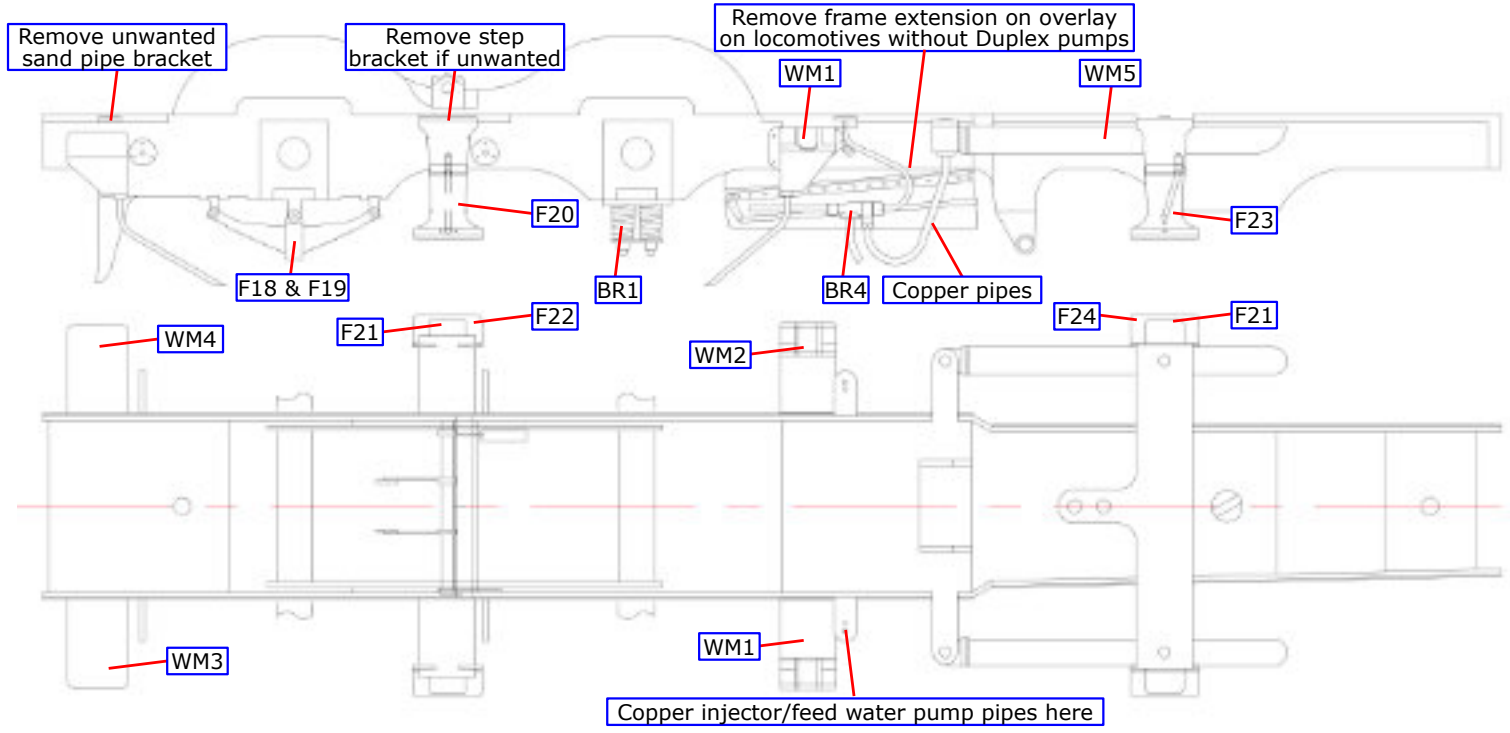
**Springs.** The front springs are made up of two outer laminations (F18/A2) around a middle lamination (F19/A2). Solder up and then clean up in the same manner as the coupling rods. Attach each spring to the inside of the frame positioned centrally on the horn slide. The rear coil springs are casting BR1 and these should be attached centrally to the rear horn slide. The axles are now retained by the springs as shown below.

**Steps.** (These parts are on B2) Assemble the steps as shown in the drawing. The front steps, if required, fit into slots in the front step back (F20). These slots take account of the different width across frames; for wide frames use the inner slots and vice versa. Fold the front step back to shape and attach the upper and lower steps (F21 & F22) to the back. The 0.8 mm wire step stay should be curved to provide clearance on the coupling rods. The fronts steps can soldered into place in the slot in the main frames.

The rear step back (F23) should be folded into shape and the lower rear step tread (F24) and upper step tread (F21) soldered in place. This assembly can then be soldered into place in the slot in the main frames. The step stays are made up out of 0.8 mm wire.

**Wheels.** Use photographs to select and position the balance weights. Fit the leading axle balance weights (F25/A2) and then the crank axle weights are a choice between the early crank axle (F26/A1), an alternative crank axle (F27/A2) and the later crank axle (F28/A2). Locos with balanced cranks have no weights on their main driving wheels.

Assemble the wheel sets, bearings and rods selecting 3/16 axle washers (F29/A1) of appropriate thickness to control sideplay. Some sideplay on the coupled wheels is desirable to assist with negotiating curves. A thorough check of all clearances at this stage is important.




**Finishing the Chassis.** Complete the chassis detailing by fitting the sandboxes (WM1, WM2, WM3 & WM4), sandpipes from 0.8 mm wire, Duplex pumps (BR5 & BR6) and tank balance pipes (WM5)as shown.

# FRAME DETAILING LONG FRAME LOCOMOTIVE

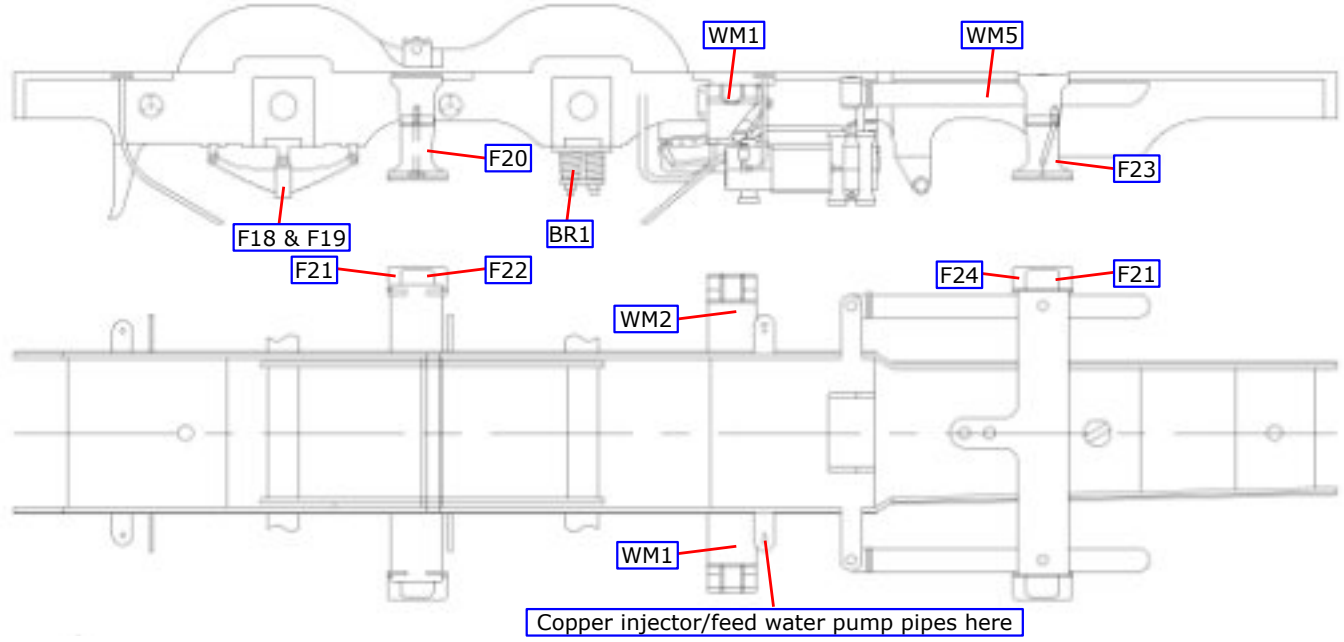
**Springs.** The front springs are made up of two outer laminations (F18/A2) around a middle lamination (F19/A2). Solder up and then clean up in the same manner as the coupling rods. Attach each spring to the inside of the frame positioned centrally on the horn slide. The rear coil springs are casting BR1 and these should be attached centrally to the rear horn slide. The axles are now retained by the springs as shown below.

**Steps.** (These parts are on B2) Assemble the steps as shown in the drawing. The front steps, if required, fit into slots in the front step back (F20). These slots take account of the different width across frames; for wide frames use the inner slots and vice versa. Fold the front step back to shape and attach the upper and lower steps (F21 & F22) to the back. The 0.8 mm wire step stay should be curved to provide clearance on the coupling rods. The fronts steps can soldered into place in the slot in the main frames.

The rear step back (F23) should be folded into shape and the lower rear step tread (F24) and upper step tread (F21) soldered in place. This assembly can then be soldered into place in the slot in the main frames. The step stays are made up out of 0.8 mm wire.

**Wheels.** Use photographs to select and position the balance weights. Fit the leading axle balance weights (F25/A2) and then the crank axle weights are a choice between the early crank axle (F26/A1), an alternative crank axle (F27/A2) and the later crank axle (F28/A2). Locos with balanced cranks have no weights on their main driving wheels.

Assemble the wheel sets, bearings and rods selecting 3/16 axle washers (F29/A1) of appropriate thickness to control sideplay. Some sideplay on the coupled wheels is desirable to assist with negotiating curves. A thorough check of all clearances at this stage is important.




**Finishing the Chassis.** Complete the chassis detailing by fitting the sandboxes (WM1, WM2, WM3 & WM4), sandpipes from 0.8 mm wire, Duplex pumps (BR5 & BR6) and tank balance pipes (W5)as shown.

# BRAKES & WEIGHSHAFT

**Brakes. (A2)** The brake arms and shoes are made up of two laminations, an inner (F30) and a choice of outer between an early (F31) and a later (F32) type. Solder the brake hanger laminations together.

The front set of brake arms are connected by 1.2 mm wire and the rear set are connected by a similar piece of wire to which a brake cross shaft is soldered (F37/B2). The front and rear sets are connected by the two brake pull rods that go outside the wheel sets. The brake pull rod (F38/B1) runs on the loco centre line to the brake shaft; this is made from a piece of 2.0 mm wire.

The brake lever part of the pull rod threads over the brake shaft before the brake shaft is soldered into position. The complete brake gear is shown in the drawing below.

**Weigh Shaft.** The weigh shaft is made from 1.8 mm wire cut to length so it is flush over the outside of the trunnions. The two lifting links (F33) go on to the shaft and are soldered 10 mm apart symmetrically about the loco centre line. The balance arm and weight (F35) is made up by folding over the parts of the lamination and soldering together. The reversing arm and reversing rod (F34) should be threaded onto the left side of the weigh shaft, the balance arm goes on the right hand side. Thread the weigh shaft onto the trunnions and solder in place. The balance arm is soldered approximately 2 mm inside of the trunnion and the reversing arm is soldered up against the left hand trunnion.

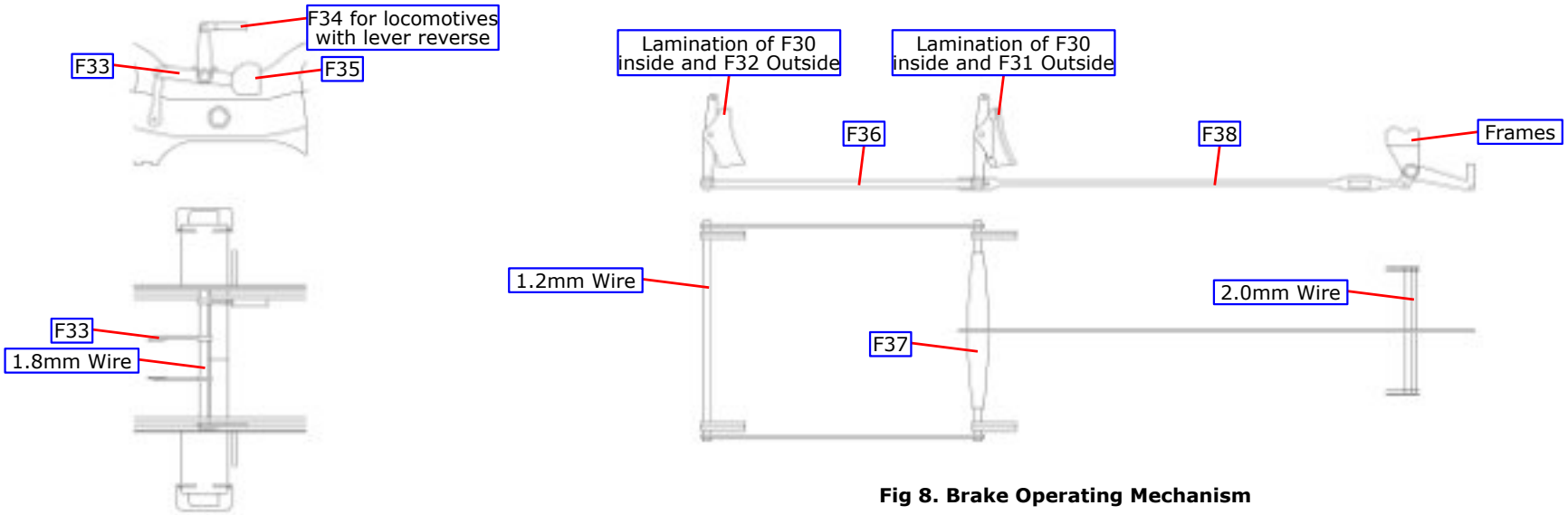



**Fig 8. Brake Operating Mechanism**

# SHORT FOOTPLATE

Shorten the footplate (U1/B2) by breaking off along the half etched line. Fold up the footplate valences followed by the cylinder cover sides, section of frames behind the splashers, coupling rod splasher front and the cab floor supports.

Shorten the footplate overlay (U2/B2). Temporarily bolt the footplate overlay to the footplate with a screw through the body fixing holes at the rear and align the sand rod pivot holes at the front. Check the alignment of the tank/bunker slots before soldering together all round. Solder a 6BA nut over the rear fixing hole. File coupling rod clearance slots in the footplate for the rear coupled axle. Make them the same as those for the front axle.

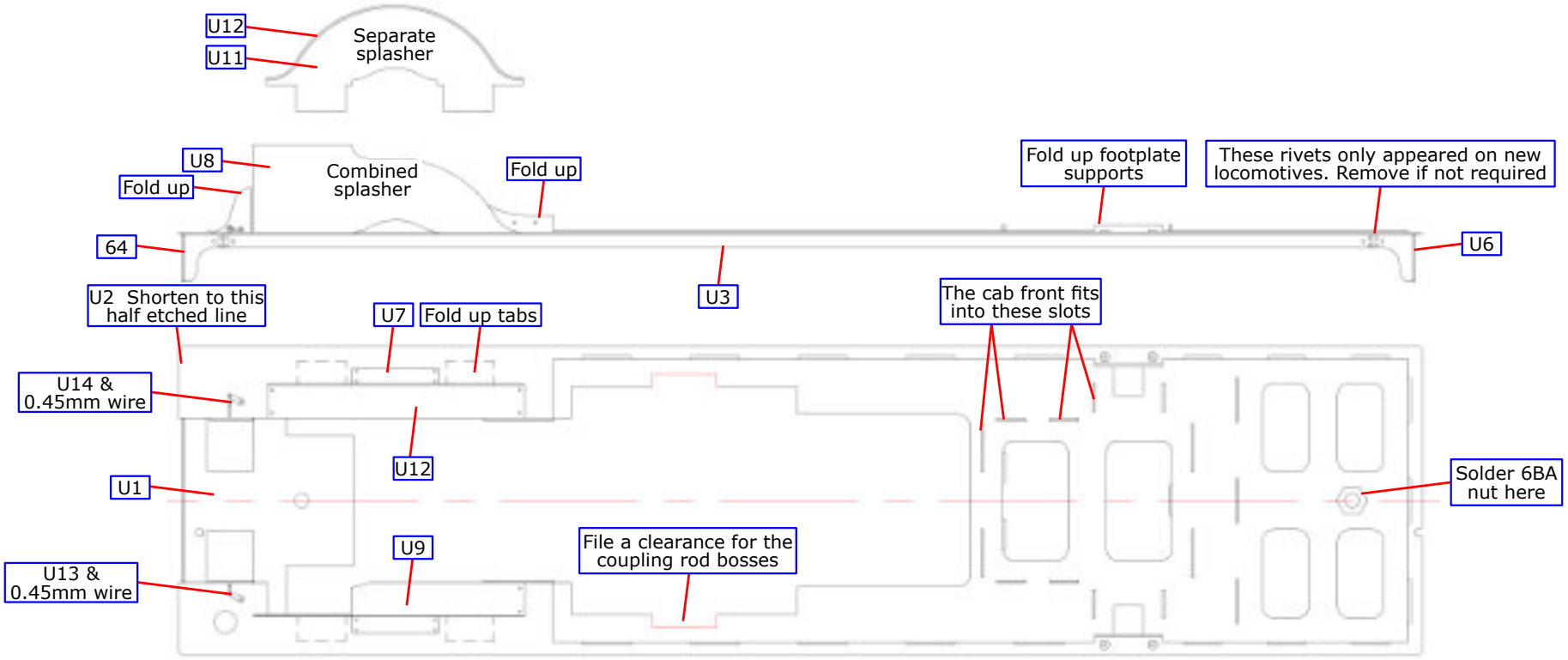
Select the appropriate valence overlays - short frame (U3/B2) or short frame, right with brackets (U4/B2). Solder into position. If appropriate, emboss the rivets on the front buffer beam (U5/B1) and rear buffer beam (U6/B1) and solder in place.

Curve the coupling rod splasher tops (U7/B1) to shape by rolling underneath a suitable rod or dowel on a resilient surface (a piece of hard rubber sheet) and solder in place in the half etched rebate along the edge of the splasher front.

**Combined Splasher.** Insert the combined splasher front (U8/B1) and bend over the aligning tabs under the footplate. Fit the combined splasher top, curved section (U9/B1 & 3). The combined splasher top, front section (U10/B2) is fitted when the smokebox is completed.

**Separate Splasher.** Insert the separate splasher front (U11/B1) and bend over the aligning tabs under the footplate. Fit the separate splasher top (U12/B3).

Attach the sanding rods left and right (U13/B2 & U14/B2) using 0.45 mm wire as pivots.



# LONG FOOTPLATE

Fold up the footplate (U1/B2) valences followed by the cylinder cover sides, section of frames behind the splashers, coupling rod splasher front and the cab floor supports.

Temporarily join the footplate overlay (U2/B2) to the footplate with a screw through the body fixing holes at the rear and align the sand rod pivot holes at the front. Check the alignment of the tank/bunker slots before soldering together all round. Solder a 6BA nut over the rear fixing hole. File coupling rod clearance slots in the footplate for the rear coupled axle. Make them the same as those for the front axle.

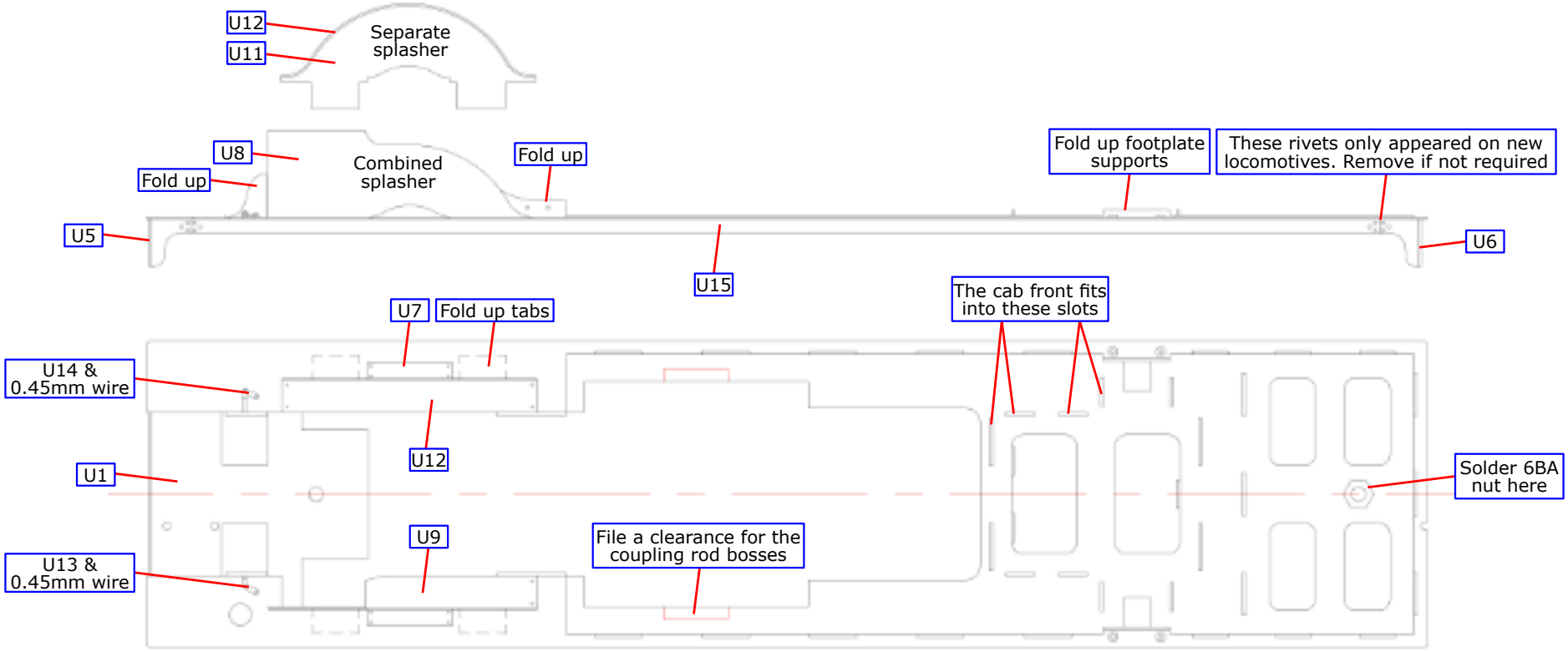
Select the appropriate valence overlays - long frame (U15/B2) or long frame, right with brackets long frame (U16/B2). Solder into position. If appropriate, emboss the rivets on the front buffer beam (U5/B1) and rear buffer beam (U6/B1) and solder in place.

Curve the coupling rod splasher tops (U7/B1) to shape by rolling underneath a suitable rod or dowel on a resilient surface (a piece of hard rubber sheet) and solder in place in the half etched rebate along the edge of the splasher front.

**Combined Splasher.** Insert the combined splasher front (U8/B1) and bend over the aligning tabs under the footplate. Fit the combined splasher top, curved section (U9/B1 & 3). The combined splasher top, front section (U10/B2) is fitted when the smokebox is completed.

**Separate Splasher.** Insert the separate splasher front (U11/B1) and bend over the aligning tabs under the footplate. Fit the separate splasher top (U12/B2).

Attach the sanding rods left and right (U13/B2 & U14/B2) using 0.45 mm wire as pivots.



# BOILER

The forward handrail knob hole has to be drilled in the boiler wrapper to suit your locomotive. The earliest locomotives had it in a rear position and later locomotives had it close to the smoke box. The dimension is either 4.4 mm or 16.6 mm from the front edge and in line with the rear handrail knob hole. Drill the hole in the boiler wrapper - either no bands (SB1/B3), so you can make your own bands, or with bands (SB2/B1).

Roll the wrapper and check the fit of the formers, the rear, middle and front (SB3/A1, SB4/A2 & SB5/A2).

Solder the wrapper ends together using the boiler joining strip (SB6/B2) and solder in the front former.

Now solder the middle former and rear formers in place with the notch in the top of the rear former aligned with the notch in the wrapper.

Represent the bolts in the joining brackets using 0.45 mm wire.

Solder two short lengths of 0.8 mm wire in place in the rear former to act as aligning dowels with the cab front.

Tap the hole in the boiler front former 6BA so that the smokebox rear plate (SB14/B1), the smokebox/boiler ring (SB7/A2) and the boiler can be screwed together.

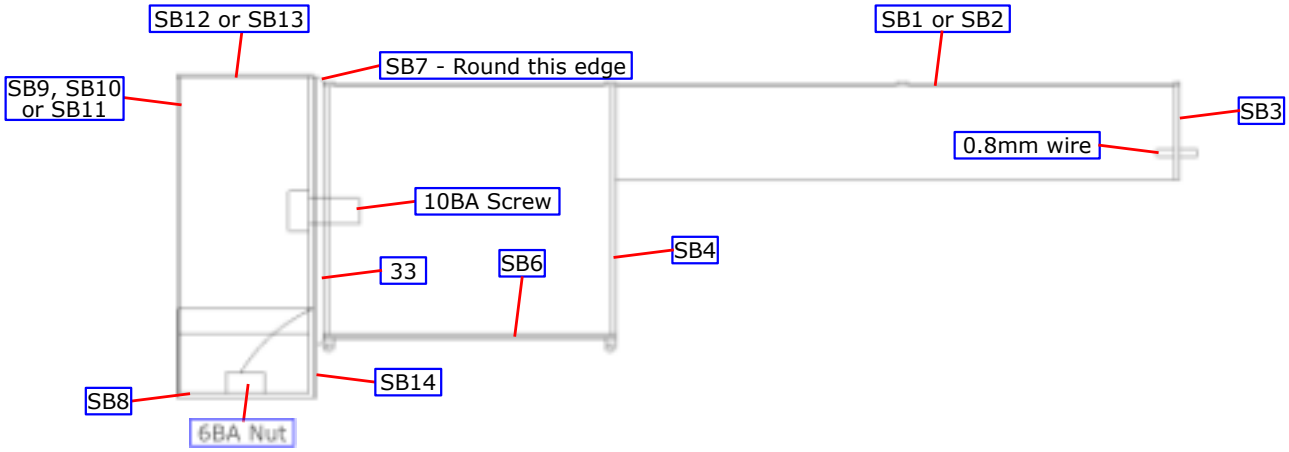
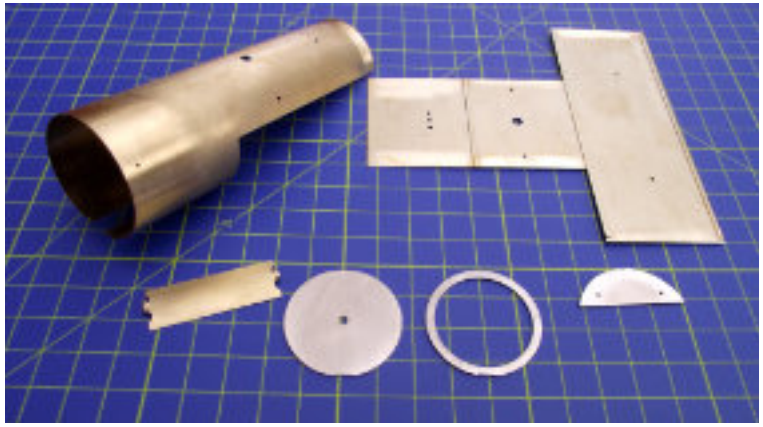
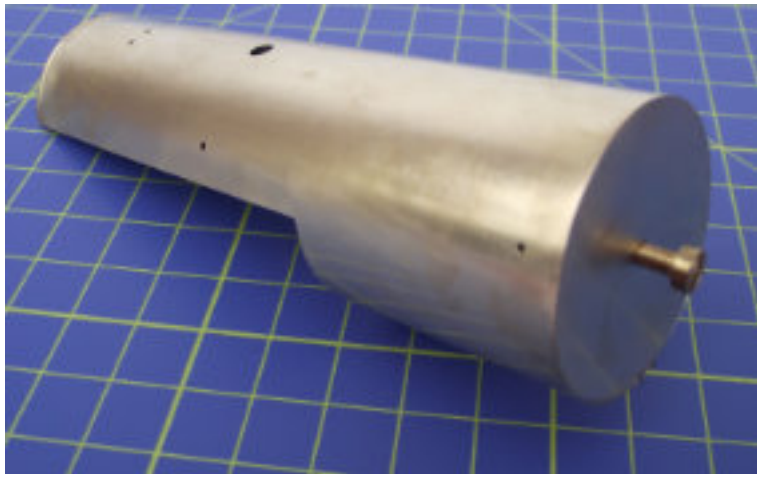



**Fig 11. Boiler and Smokebox**





# SMOKEBOX

If appropriate emboss the rivets on the smokebox base (SB8/B1) before folding up. Solder a 6BA nut over the fixing hole. If appropriate, emboss the rivets and drill holes for the smokebox door dogs (BR12) in the appropriate smokebox front - either combined with splashers (SB9/B3), wing plates sandboxes in smokebox (SB10/B1) or wing plates removed (SB11/B1) before soldering to the smokebox base.

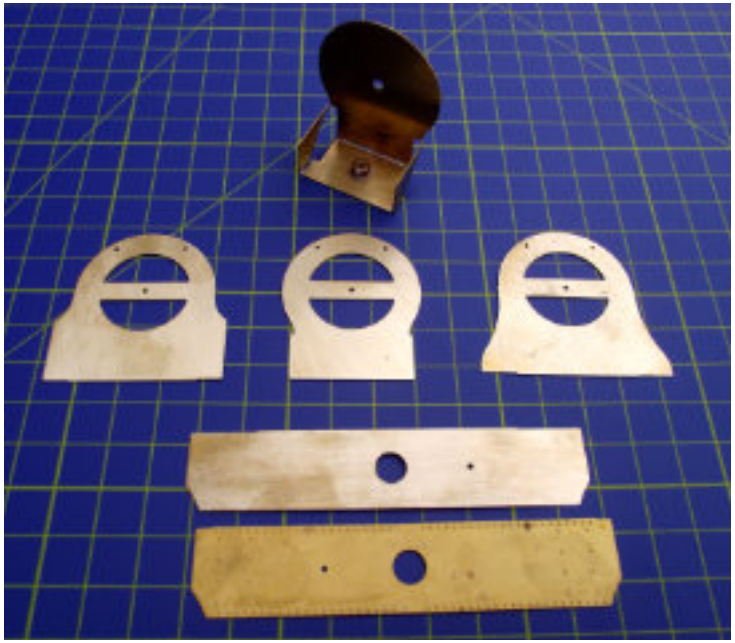
Drill any additional holes appropriate in the smokebox wrapper, no rivets (SB12/B3) or riveted (SB13/B3) using the template in Fig 13a.

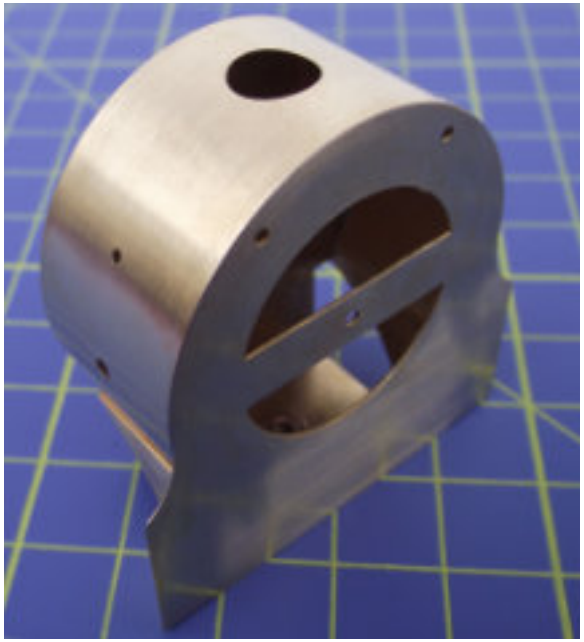
Roll the smokebox wrapper to shape. Note SB12 is designed to be used with the etched surface inwards. Now solder the wrapper in place with the lower edges inside the smokebox base. Fit the smokebox rear plate (SB14/B1). The rear face of the smokebox/boiler ring needs to be rounded as shown in the drawing.

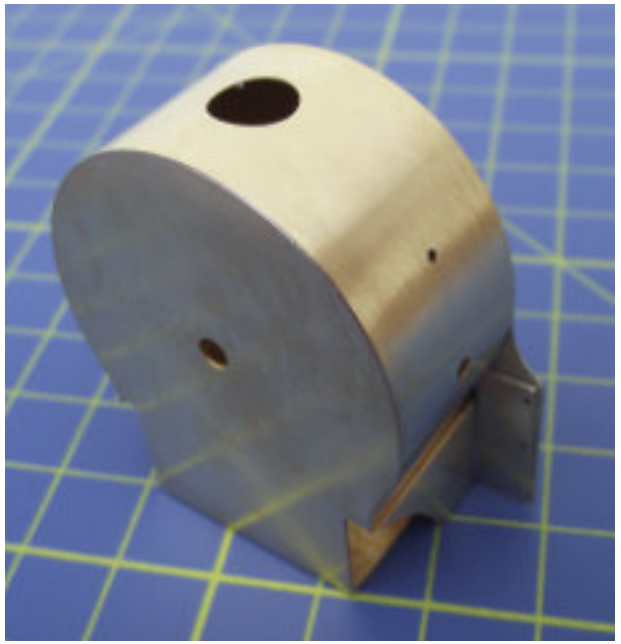
If modelling the smokebox sandboxes, the smokebox sand pipe flanges (SB15/B2) and the smokebox sandbox fillers (SB16/B2)needs to be fitted to the side of the smokebox. Also fit the smokebox sandbox filler.




**Fig 12. Smokebox Template Master**









# CAB

**Cab Front & Back.** Solder the cab spectacle window frame (C1/B2) in place on the cab front (C2/B1). If fitting steam reverse, drill out the holes for the steam reversing lever (BR27) on the left cab seat side. Fold out the cab seat sides and solder the cab front in place in the slots in the footplate.

Now check the fit of the smokebox and boiler with the cab front. If all is well continue by detailing the cab rear lower plate (C3/B2) with the coal door (C4/B2) and a handle from 0.45 mm wire. Add the coal shovelling plate side quadrant (C33/B1). Fold up and solder in place in the footplate slots.

Solder the cab floor (C5/B3) in place. The cab seat tops can now be added, the front (C6/B3) and the rear (C7/B1).

**Cab Interior.** The details of the cab are shown below and on page 17. There are some choices to be made about reversing levers. The steam reversing lever is a brass casting (BR27) which fits onto three holes on the left hand seat. The steam reverse indicator (C8/B3) fits below the casting.

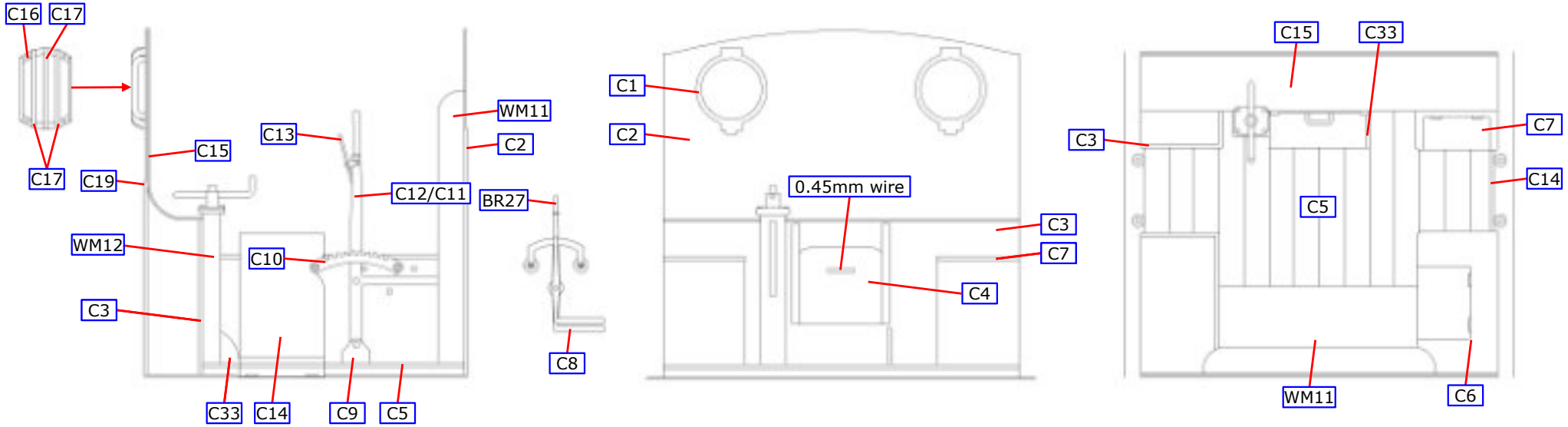
The manual reversing lever is built up from a base (C9/A1) the bottom of which folds up to form a U tray to hold the lever. Solder 0.45 mm wire into the two upper holes to mount the quadrant plate (C10/A1). There are two reversing levers, one with a ratchet release (C11/A1) and one without a ratchet release (C12/A1). Solder the lever reverse ratchet release (C13/B1) to the lever. This lever is held in the base with a piece of 0.45 mm wire. Solder the quadrant plate onto the two pins. The reversing lever can now be soldered to the cab floor.

Attach the cab doors (C14/B2) into the door way. The brake column (WM12) can be soldered into the floor and the brake handle (BR28)can be added. There is no need to fix the back plate (WM11) in place at this stage. Form the curve along the lower edge of the cab rear inner overlay (C15/B1).

If appropriate make up the cab window bars - frame and outer bars (C16/B2), centre bar (C17/B1) or intermediate bars (C18/B2) and fix in place over the rear windows on the cab rear outer overlay (C19/B1).

Solder the cab rear inner and outer overlays together before fixing in place in the footplate slots ensuring the cab rear is upright.

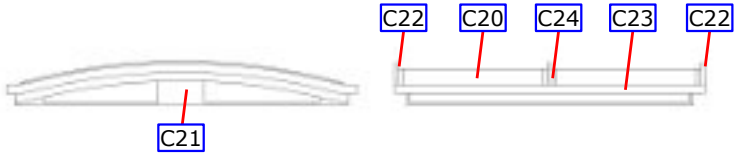
Form the tank vent pipe from 1.2 mm wire and solder in place in the half etched slot in the cab back.




**Cab Roof.** All these parts are on etch B1. Fold up the back and front of the cab roof building jig (C20) to make a solid base upon which to build the removable cab roof. Roll the cab roof (C21) to shape and solder in place on the jig with equal overhang back and front.

Add the front and rear angle (C22), the two side angles (C23) and the centre angle (C24).

Using a carborundum disc in a mini-drill cut through the unwanted part of the former and snap off the redundant parts along the half etched lines. The edges of the formers will now need cleaning up.



# BACKPLATE

Remove 1.75 mm from the lower edge of the backplate casting (WM11).

Using the drawing of the cab interior the backplate can be assembled and the cab interior detailed.

All these parts are on etch B1. Start by assembling the fire hole door using the following etches the fire hole (C25), the fire hole door flap (C28) the fire hole door ratchet (C27) and the fire hole door lever (C26). The drawing shows how to assemble the door using some 0.45 mm and 1.2 mm wire. Fit the door assembly using either solder or epoxy glue.

The main castings are the ejector/brake (BR23), the two water gauges (BR22), the early or late regulator handle (BR24 or BR25), the steam heating valve (BR26). The brake ejector handle (C29/A1) fits onto the side of the ejector/brake while the ejector handle (C30/B2) fits onto the front of the ejector brake. Fit the hand wheels (C31/B2) and the cab pressure gauges (C32/B2) as shown below The blower valve hand wheel fits on the left side main handrail extended into the cab.

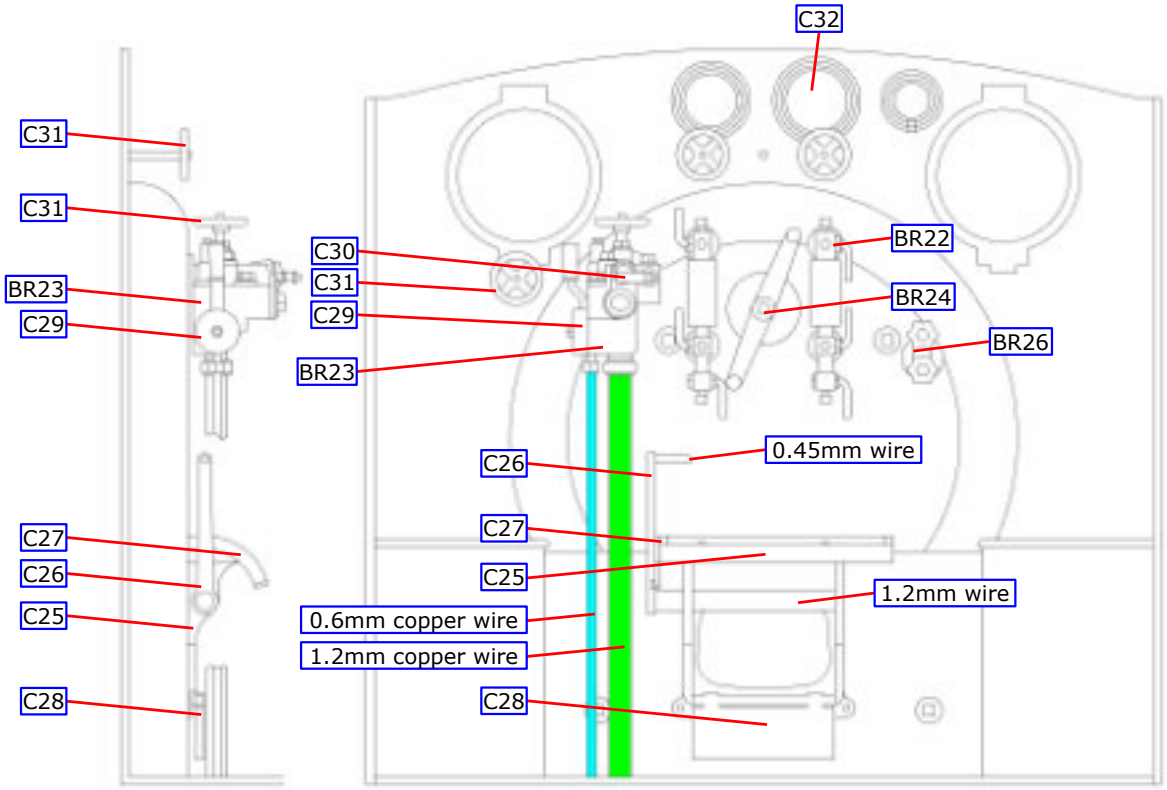
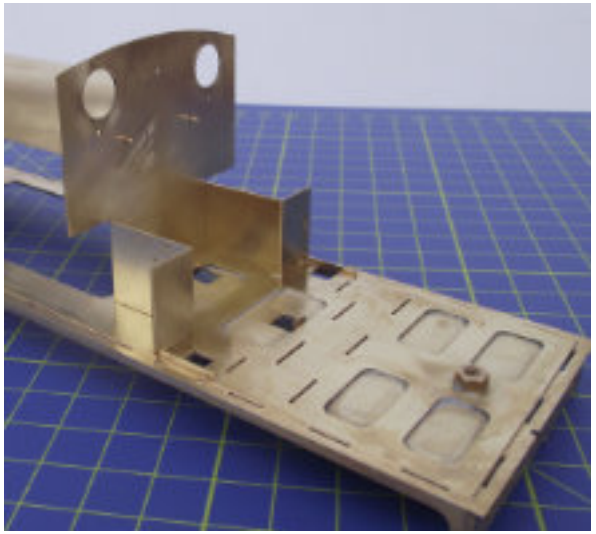
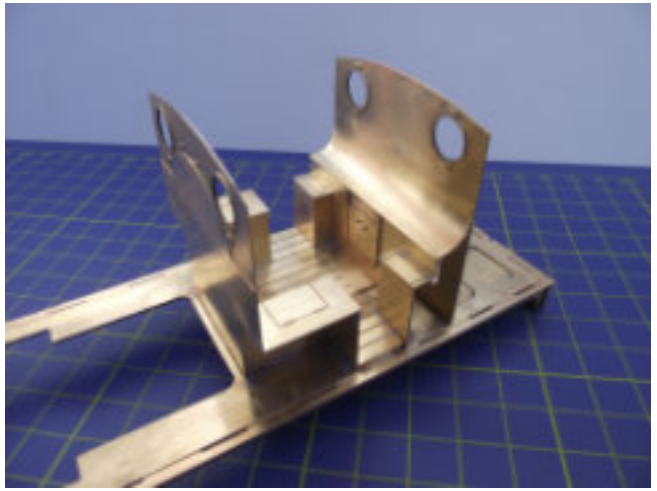



**Fig 12. Backplate**





# SHORT FRAME SMOKEBOX DETAILS

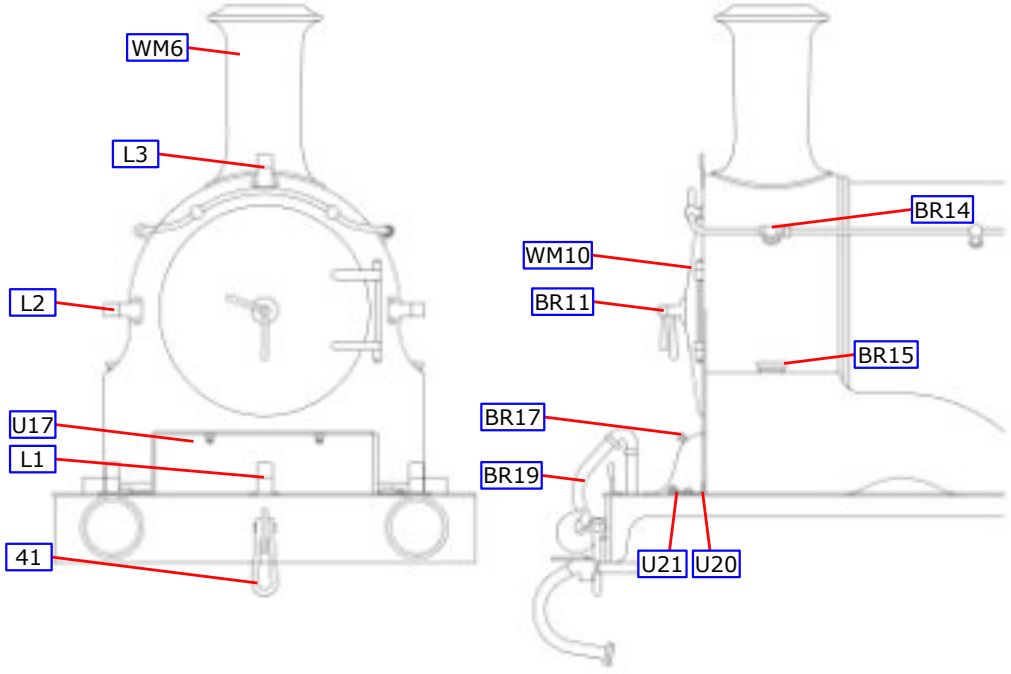
All etches on this page are on sheet B2.

Before the tanks are fitted, the boiler smokebox assembly must be permanently fixed in place. This is best done after completing as much of the detailing work on these assemblies as possible. The detailing should include the handrail and lamp brackets.

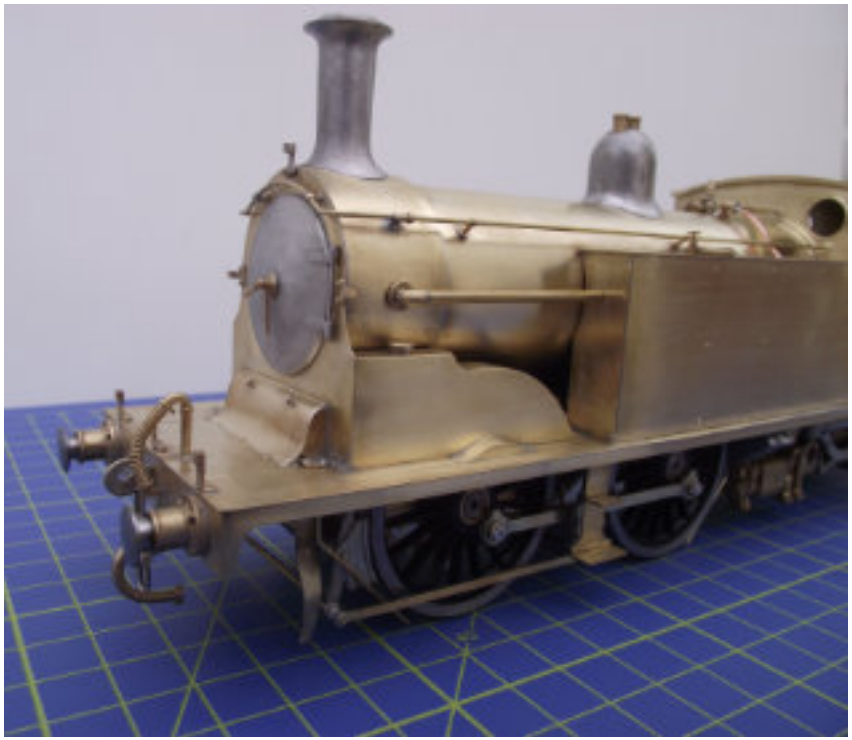
After permanently attaching the smokebox and boiler, form the cylinder cover, short frame (U17) and solder in place between the frame extensions. Add the cylinder cover knob (BR17).

Fit the sandbox lids (BR15) to the splasher tops.

**Wingplates.** Fit either the vertical angle (U18) and horizontal angle (U19) for separate sandboxes or the vertical angle (U20) and horizontal angle (U21) for combined sandboxes.




**Early Appearance. Short frames, sandboxes with splashers, front boiler hand rail knob in rearmost position.**



# LONG FRAME SMOKEBOX DETAILS

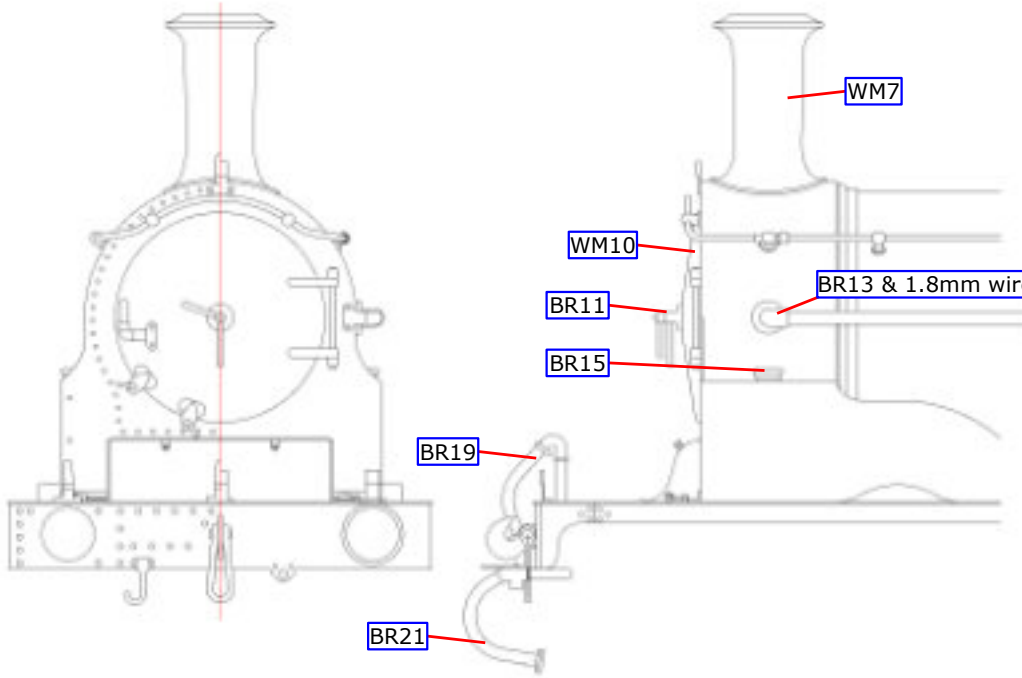
All etches on this page are on sheet B2.

Before the tanks are fitted, the boiler smokebox assembly must be permanently fixed in place. This is best done after completing as much of the detailing work on these assemblies as possible. The detailing should include the handrail and lamp brackets.

After permanently attaching the smokebox/boiler, form the cylinder cover (U22) and solder in place between the frame extensions. Add the cylinder cover knob (BR17). If required, fit the the sandbox lids (BR15) to the splasher tops.

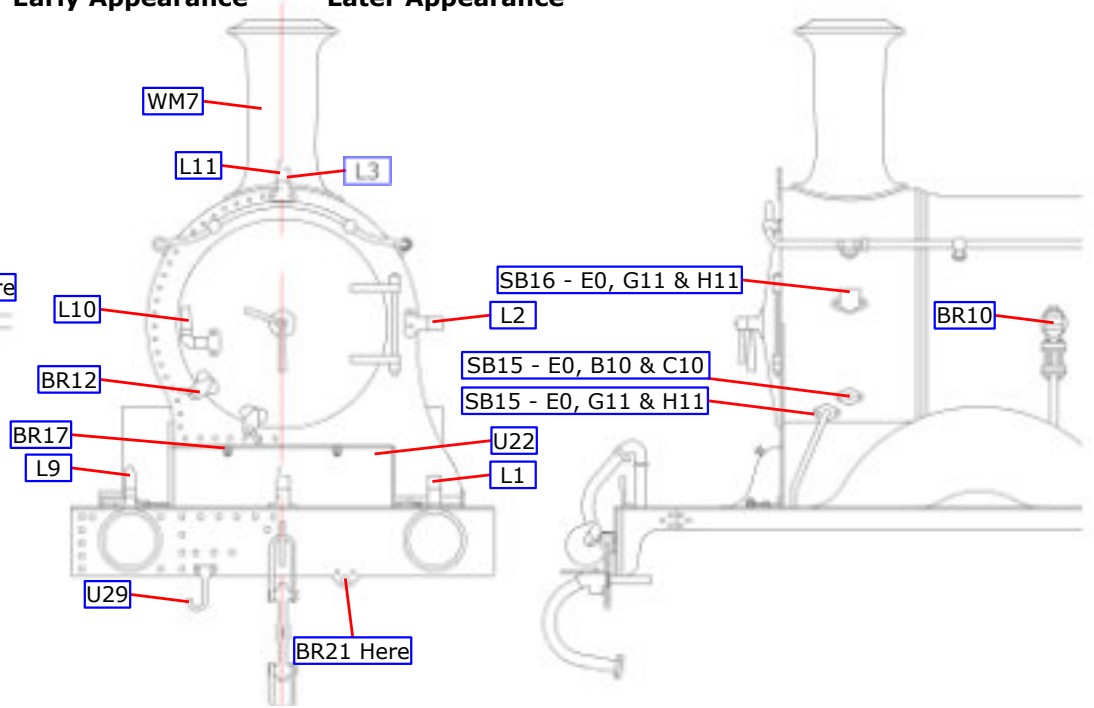
**Wingplates.** Fit either the vertical angle (U18) and horizontal angle (U19) for separate sandboxes or the vertical angle (U20) and horizontal angle (U21) for combined sandboxes.

**Early Appearance** **Later Appearance**




**Long frames, sandboxes with splashers, feed water heating.**

**Early Appearance** **Later Appearance**




**Long Frames, Separate Sandboxes, Boiler Front Hand Rail Knob in Forward Position**

# SHORT TANK WITHOUT FEED WATER HEATING

Most parts on this page are on etch B2 except where indicated.

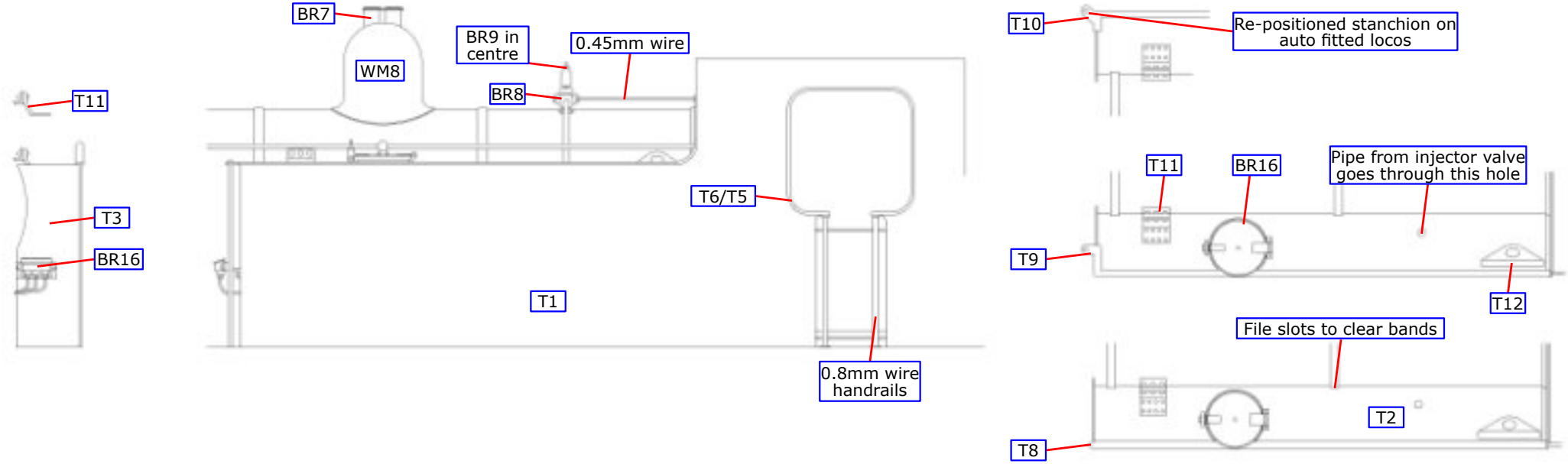
The tank sides (T1/B3) and tops (T2/B3) are the correct length for the 'long' tanks. For short tanks shorten the sides so that the front (T3/B1) fits inside the half etched recess in the side. Similarly, the tank top is broken off along the half etched line. Drill through the marked holes in the tank front to fit the tank front lubricator (BR16).

Solder the cab cut-out beading (T5/A2 or T6) in place. A tight fit is essential or it will appear to be too long.

Solder the tank front and the tank top in position on the tank side. Now remove the tie across the cab opening. Insert the tank/bunker side into the footplate slots and solder in place. Add the tank top rear angle (T7/B3) and the tank top beading.

There is a choice between plain beading (T8), beading with front hand rails (T9) or beading for the right hand side re-positioned hand rail (T10). If appropriate, add the vertical handrails the footplate holes are marked underneath. Solder the tank/boiler bracket (T11) and the tank lifting bracket (T12) into place on the tank top as shown below.

The water fillers (BR18) will need a flat filing on one side (not the lids) so that they fit inside the tank side. They must also be fitted before the main handrail.




**Short Tank Construction**

# LONG TANK WITH FEED WATER HEATING

Most parts on this page are on etch B2 except where indicated.

The tank sides (T1/B3) and tops (T2/B3) are the correct length for the 'long' tanks. The 'long' tank front (T4/B1) fits with the side inside the half etched recess in the front.

To fit the cladding plates (T13/B3) drill out all the marked holes on the tank sides with a 3/16" drill - be careful. This will enable the plates to be tack soldered in position from the inside through these holes. Drill through the marked holes in the tank front to fit the tank front lubricator (BR16).

Solder the cab cut-out beading (T5/A2 or T6) in place. A tight fit is essential or it will appear to be too long. Solder the tank front and the tank top in position on the tank side.

Now remove the tie across the cab opening. Insert the tank/bunker side into the footplate slots and solder in place. Add the tank top rear angle (T7/B3) and the tank top beading (T14). Add the tank cladding plates (T13/B3). Solder the tank/boiler bracket (T11) and the tank lifting bracket (T12) into place on the tank top as shown below.

The water fillers (BR18) will need a flat filing on one side (not the lids) so that they fit inside the tank side. They must also be fitted before the main handrail.

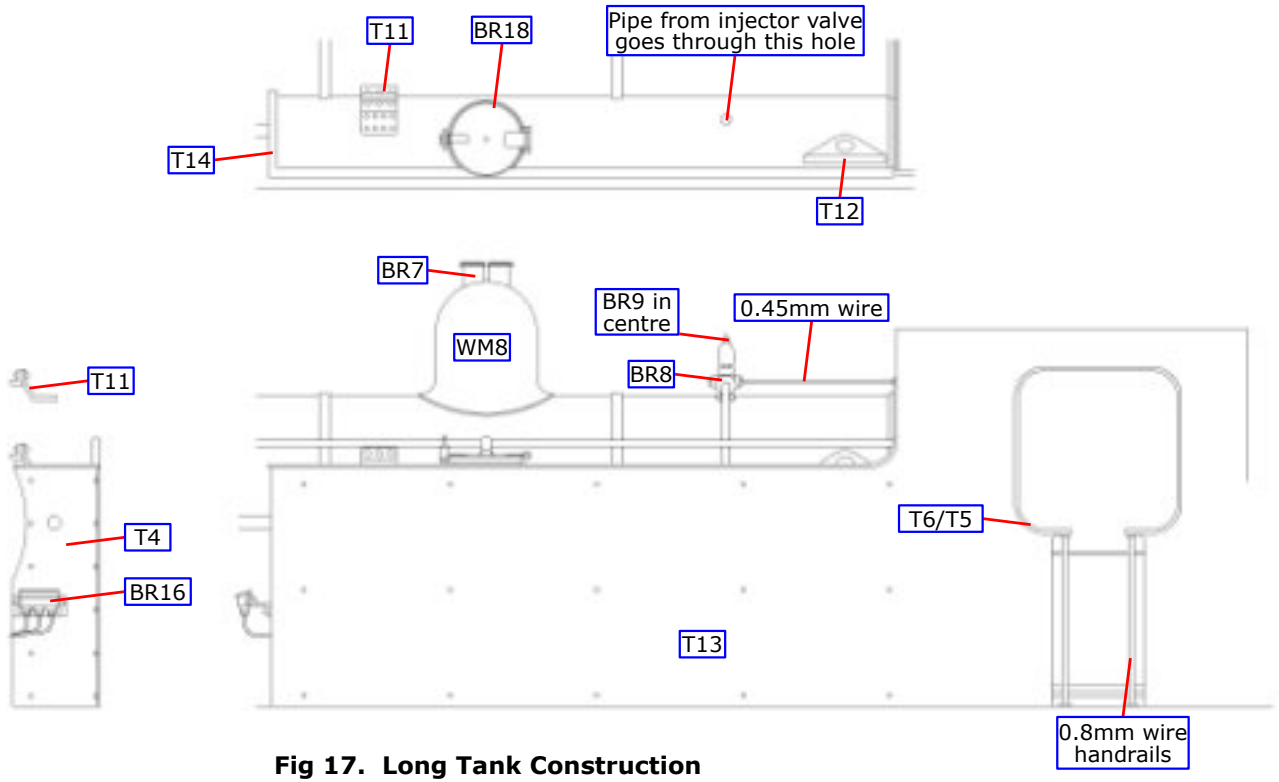
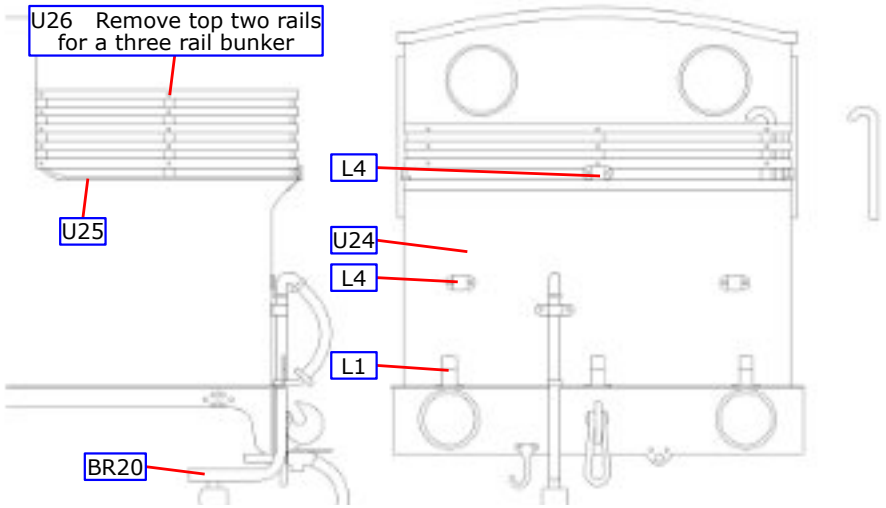


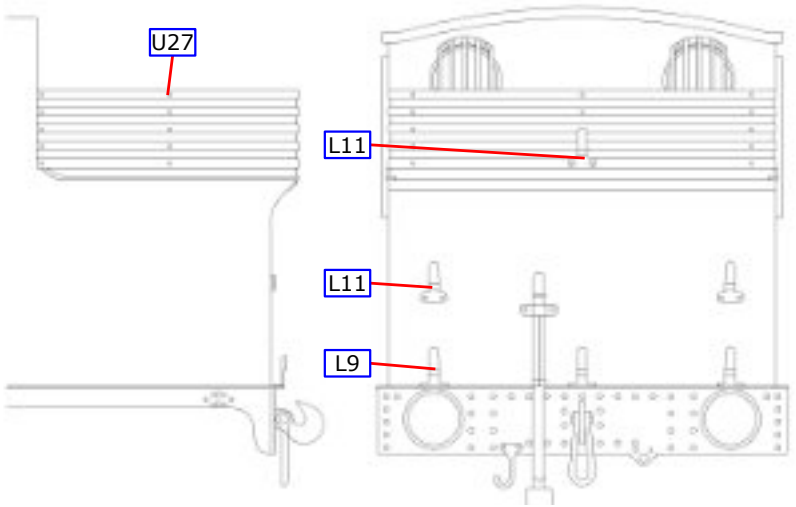

**Fig 17. Long Tank Construction**

# BUNKER

**Bunker.** Solder the bunker back (U23) in place in the footplate slots.
Form the flare at the top of bunker back overlay (U24) and solder in place.
Solder the bunker side beading (U25) in place.
Emboss the rivets on the coal rails, open or sheeted (U26 or U27) and fold over the stanchions through 180° and solder to the back of the coal rails. If necessary, remove the two top rails before folding the corners and soldering the stanchions in place inside the bunker.
Finally fit the steam heat pipes (BR21) and the steam heat pipe valve handles (U28).




**Early Bunker**



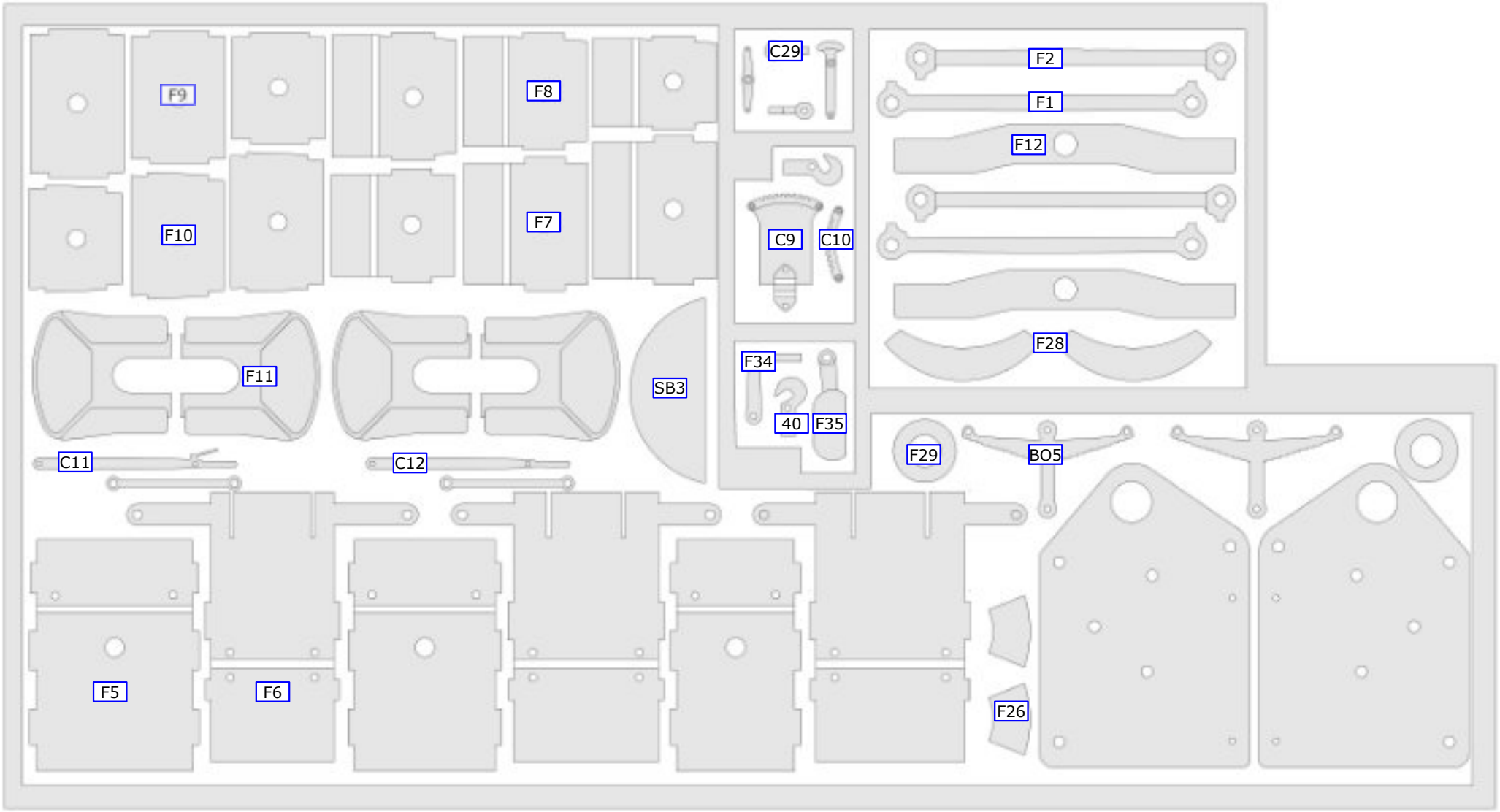

**Later, Sheeted Bunker**





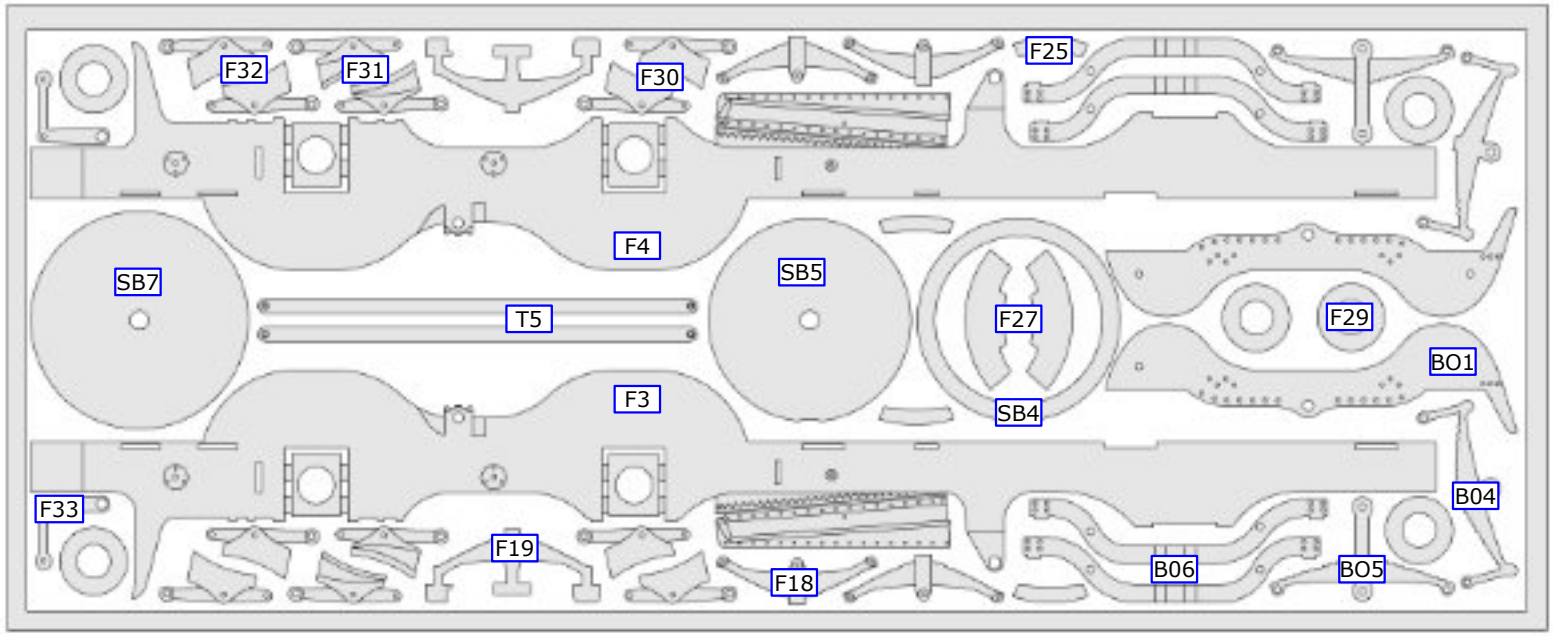
# Finney7

## ETCHED PARTS SHEET A1



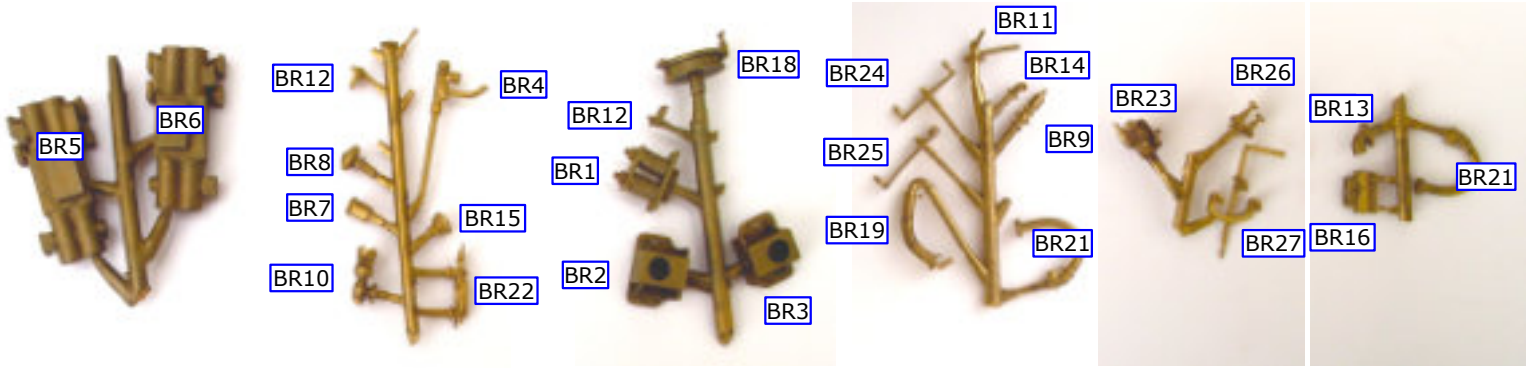
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## ETCHED PARTS SHEET A2

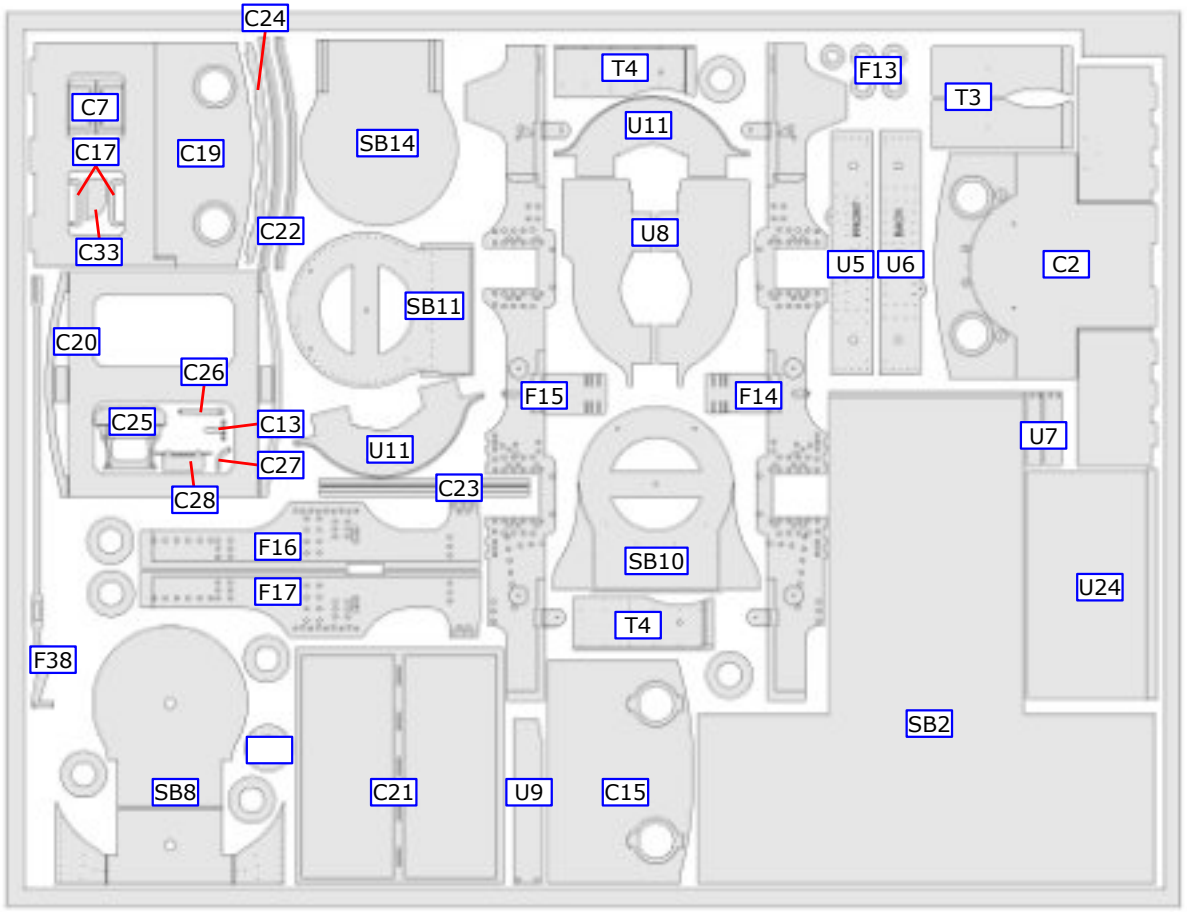



### BRASS/COPPER CASTINGS

BR1 Rear axle springs (2)
BR2 Bogie axle box, left (2)
BR3 Bogie axlebox, right (2)
BR4 Injector (2)
BR5 Duplex pump, left (1)
BR6 Duplex pump, right (1)
BR7 Safety valves (2)
BR8 Injector valves (2)
BR9 Whistle
BR10 Clack box (2)
BR11 Smokebox door handle (1)
BR12 Smokebox door dog (4)
BR13 Feed water heater pipe elbow (2)
BR14 Blower valve (1)
BR15 Sandbox lid (2)
BR16 Lubricator, tank front (2)
BR17 Cylinder cover knob (2)
BR18 Water filler (2)
BR19 Vacuum pipe, front (1)
BR20 Vacuum pipe rear (1)
BR21 Steam heating pipe (2)
BR22 Water gauge (2)
BR23 Ejector/brake (1)
BR24 Regulator handle, original (1)
BR25 Regulator handle, later (1)
BR26 Steam heating valve (1)
BR27 Reversing lever, steam reverse (1)
BR28 Brake column handle (1)



# ETCHED PARTS SHEET B1



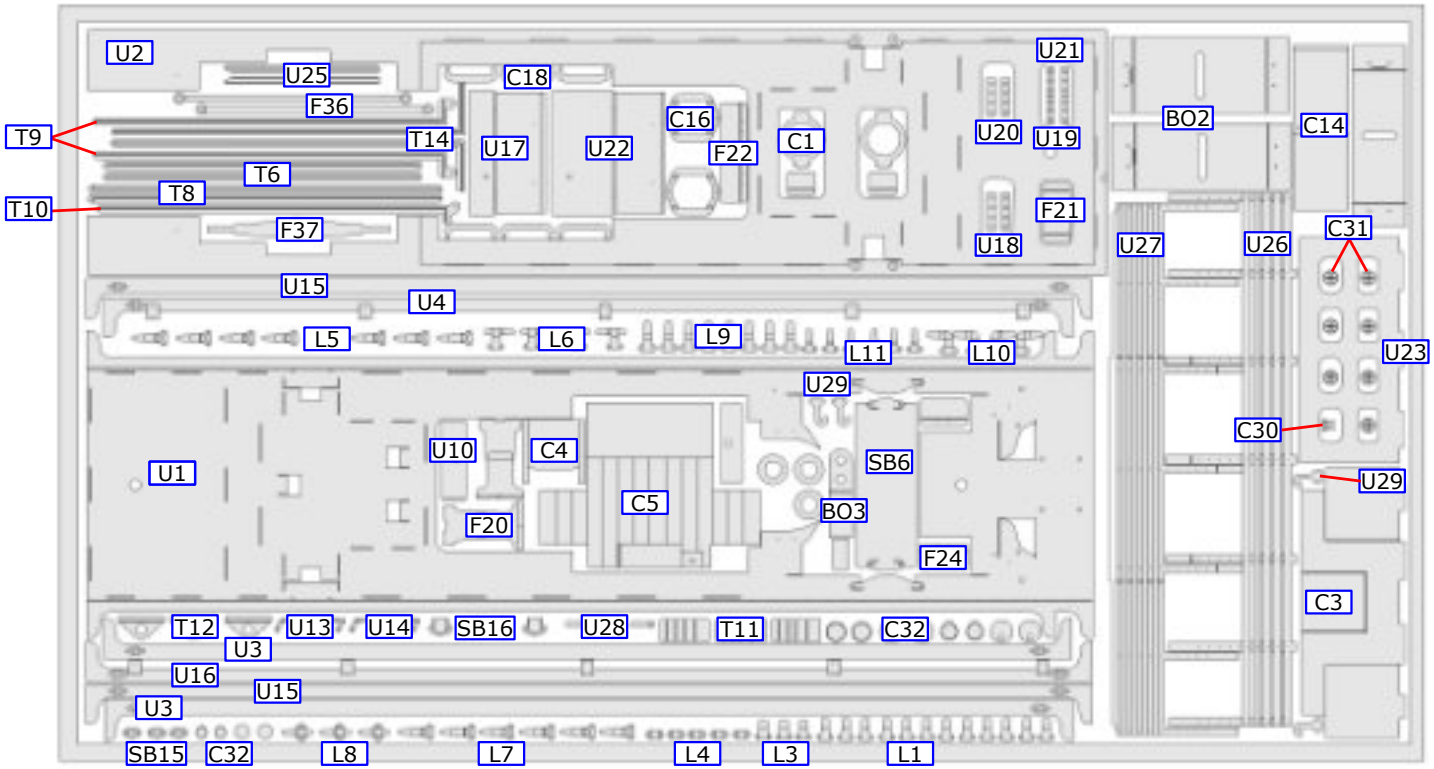

**OTHER COMPONENTS**

3/16" bearing (4)
6 BA screw (4)
6 BA nut (3)
1/8" Brass wire
5/32" OD Brass tube
0.8 mm Brass wire
1.2 mm Brass wire
1.6 mm Brass wire
1.8 mm Brass wire
2.0 mm Brass wire
0.5 mm Spring wire
0.45 mm Brass wire
0.8 mm Brass wire
1.2 mm Brass wire
1.8 mm Brass wire
0.8 mm Copper wire
1.2 mm Copper wire
Handrail knob - short (3)
Handrail knob - medium (4)

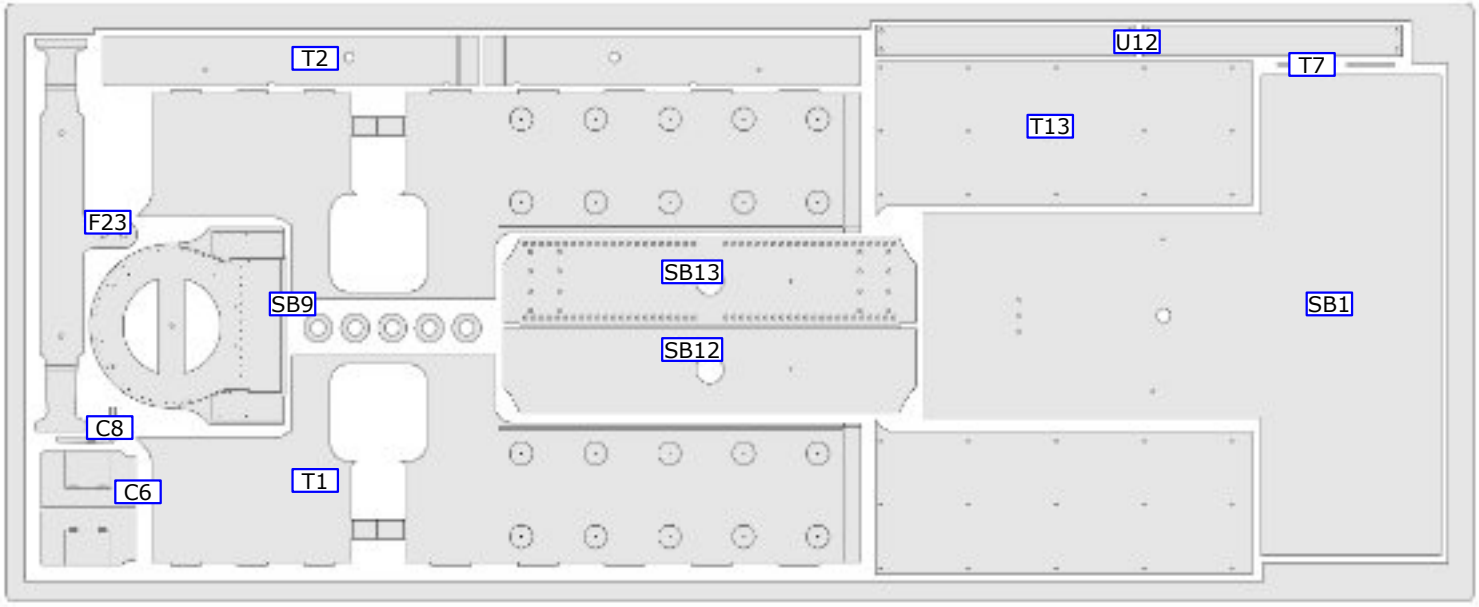
**Note.** Screws may be supplied over-length and may require cutting to length.

# Finney7

## ETCHED PARTS SHEET B2



# ETCH PARTS SHEET B3




## WHITE METAL CASTINGS

WM1 Rear sandbox, left (1)
WM2 Rear sandbox, right (1)
WM3 Front sandbox, left (1)
WM4 Front sandbox, right (1)
WM5 Tank balance pipe (2)
WM6 Chimney, short frame (Wide) (1)
WM7 Chimney, long frame (Narrow) (1)
WM8 Dome (1)
WM9 Inside of dome (1)
WM10 Smokebox door (1)
WM11 Backplate (1)
WM12 Brake Column (1)



### Bogie

| | | |
|---|---|---|
| BO1 | Bogie Frame (2) | A2 |
| BO2 | Bogie stretcher, three widths (1 each) | B2 |
| BO3 | Bogie pivot bracket | B2 |
| BO4 | Bogie spring middle lamination (2) | A2 |
| BO5 | Bogie spring outer lamination (4) | A2 |
| BO6 | Bogie equalising beam (4) | A2 |
| BO7 | Washer, bogie wheel | B2 |

### Cab

| | | |
|---|---|---|
| C1 | Cab spectacle window frame (2) | B2 |
| C2 | Cab front | B1 |
| C3 | Cab rear lower plate | B2 |
| C4 | Coal door | B2 |
| C5 | Cab floor | B2 |
| C6 | Cab seat top, front (2) | B3 |
| C7 | Cab seat top, rear (2) | B1 |
| C8 | Steam reverse indicator | B3 |
| C9 | Reversing lever base | A1 |
| C10 | Reversing lever quadrant plate | A1 |
| C11 | Reversing lever with ratchet release | A1 |
| C12 | Reversing lever without ratchet release | A1 |
| C13 | Lever reverse ratchet release | B1 |
| C14 | Cab door (2) | B2 |
| C15 | Cab rear inner overlay | B1 |
| C16 | Cab window bars, frame and outer bars (2) | B2 |
| C17 | Cab window bars - centre bars (2) | B1 |
| C18 | Cab window bars, intermediate bars (4) | B2 |
| C19 | Cab rear, outer overlay | B1 |
| C20 | Cab roof building jig | B1 |
| C21 | Cab roof | B1 |
| C22 | Cab roof, front/rear angle (2) | B1 |
| C23 | Cab roof, side angle (2) | B1 |
| C24 | Cab roof, centre angle | B1 |
| C25 | Fire hole | B1 |
| C26 | Fire hole door handle | B1 |
| C27 | Fire hole door handle ratchet | B1 |
| C28 | Fire hole door flap | B1 |
| C29 | Brake ejector handle | A1 |
| C30 | Ejector handle | B2 |
| C31 | Hand wheel (3) | B2 |
| C32 | Cab pressure gauges (3) | B2 |
| C33 | Coal shovelling plate side quadrant | B1 |

### Frames

| | | |
|---|---|---|
| F1 | Coupling rod inner lamination (2) | A1 |
| F2 | Coupling rod outer lamination (2) | A1 |
| F3 | Frame left | A2 |
| F4 | Frame right | A2 |
| F5 | Frame spacer front | A1 |
| F6 | Frame spacer middle | A1 |
| F7 | Frame spacer rear parallel frames | A1 |
| F8 | Frame spacer rear tapered frames | A1 |
| F9 | Frame spacer bogie pivot parallel frames | A1 |
| F10 | Frame spacer bogie pivot tapered frames | A1 |
| F11 | Hornguides (4) | A1 |
| F12 | Compensation beam (2) | A1 |
| F13 | Washer bogie pivot | A1 |
| F14 | Main frame overlay ,left | B1 |
| F15 | Main frame overlay, right | B1 |
| F16 | Rear frame overlay, left | B1 |
| F17 | Rear frame overlay, right | B1 |
| F18 | Front spring outer lamination (4) | A2 |
| F19 | Front spring middle lamination (2) | A2 |
| F20 | Front step back (2) | B2 |
| F21 | Front and rear step, upper (4) | B2 |
| F22 | Front step tread, lower (2) | B2 |
| F23 | Rear step back | B3 |
| F24 | Rear step tread lower (2) | B2 |
| F25 | Balance weight leading axle (4) | A2 |
| F26 | Balance weight crank axle early (2) | A1 |
| F27 | Balance weight crank axle - alternative (2) | A2 |
| F28 | Balance weight crank axle later (2) | A2 |
| F29 | Washer coupled wheel axles | A1 |
| F30 | Brake hanger/shoe inner lamination (4) | A2 |
| F31 | Brake hanger/shoe outer lamination, early type (4) | A2 |
| F32 | Brake hanger/shoe outer lamination, later type (4) | A2 |
| F33 | Lifting arm and lifting link (2) | A2 |
| F34 | Reversing arm & reversing rod | A1 |
| F35 | Reversing shaft balance arm & weight | A1 |
| F36 | Brake pull rod, front (2) | B2 |
| F37 | Brake cross shaft | B2 |
| F38 | Brake pull rod/lever, rear | B1 |

### Lamp Irons

| | | |
|---|---|---|
| L1 | LSWR Lamp bracket, footplate (6) | B2 |
| L2 | LSWR Lamp bracket, smokebox side (2) | B2 |
| L3 | LSWR Lamp bracket, smokebox top | B2 |
| L1 | LSWR Lamp bracket, footplate (6) | B2 |
| L2 | LSWR Lamp bracket, smokebox side (2) | B2 |
| L3 | LSWR Lamp bracket, smokebox top | B2 |
| L5 | LSWR/SR Lamp bracket, footplate (6) | B2 |
| L6 | LSWR/SR Lamp bracket, smokebox side (2) | B2 |
| L7 | LSWR/SR Lamp bracket, smokebox top | B2 |
| L9 | SR Lamp bracket, footplate (6) | B2 |
| L10 | SR Lamp bracket, smokebox side (2) | B2 |
| L11 | SR Lamp bracket, smokebox top & bunker rear (4) | B2 |

### Smokebox & Boiler

| | | |
|---|---|---|
| SB1 | Boiler wrapper, no bands | B3 |
| SB2 | Boiler wrapper, with bands | B1 |
| SB3 | Boiler rear former | A1 |
| SB4 | Boiler middle former | A2 |
| SB5 | Boiler front former | A2 |
| SB6 | Boiler joining strip | B2 |
| SB7 | Smokebox/Boiler ring | A2 |
| SB8 | Smokebox base | B1 |
| SB9 | Smokebox front, sandboxes combined with splashers | B3 |
| SB10 | Smokebox front, wing plates (sandboxes in smokebox) | B1 |
| SB11 | Smokebox front, wing plate removed | B1 |
| SB12 | Smokebox wrapper, no rivets | B3 |
| SB13 | Smokebox wrapper, riveted | B3 |
| SB14 | Smokebox rear plate | B1 |
| SB15 | Smokebox sand pipe flange | B2 |
| SB16 | Smokebox sandbox filler | B2 |

### Tank

| | | |
|---|---|---|
| T1 | Tank/bunker sides (2) | B3 |
| T2 | Tank top (2) | B3 |
| T3 | Tank front, no feed water heating (2) | B1 |
| T4 | Tank front, feed water heating (2) | B1 |
| T5 | Cab cut-out beading, NS (2) | A2 |
| T6 | Cab cut-out beading, brass (2) | B2 |
| T7 | Tank top rear angle (2) | B3 |
| T8 | Tank top beading, no feed water heating (2) | B2 |

| | | |
|---|---|---|
| T9 | Tank top beading, with front handrail (2) | B2 |
| T10 | Tank top beading right, re-positioned handrail | B2 |
| T11 | Tank/boiler bracket (2) | B2 |
| T12 | Tank lifting bracket (2) | B2 |
| T13 | Tank cladding - feed water heating (2) | B3 |
| T14 | Tank top beading, feed water heating (2) | B2 |

**Upper Works**

| | | |
|---|---|---|
| U1 | Footplate | B2 |
| U2 | Footplate overlay | B2 |
| U3 | Valance overlay, short (2) | B2 |
| U4 | Valance overlay, short, right with brackets | B2 |
| U5 | Front buffer beam | B1 |
| U6 | Rear buffer beam | B1 |
| U7 | Coupling rod splasher top (2) | B1 |
| U8 | Combined splasher front (2) | B1 |
| U9 | Combined splasher top, curved section (3) | B1 & 3 |
| U10 | Combined splasher top, front section (2) | B2 |
| U11 | Separate splasher front (2) | B1 |
| U12 | Separate splasher top (2) | B3 |
| U13 | Sanding rod, left | B2 |
| U14 | Sanding rod, right | B2 |
| U15 | Valance overlay, long frame (2) | B2 |
| U16 | Valance overlay, right with brackets long frame | B2 |
| U17 | Cylinder cover, short frame | B2 |
| U18 | Vertical angle, separate sandboxes (2) | B2 |
| U19 | Horizontal angle, separate sandboxes (2) | B2 |
| U20 | Vertical angle, combined sandboxes (2) | B2 |
| U21 | Horizontal angle, combined sandboxes (2 | B2 |
| U22 | Cylinder cover, long frame | B2 |
| U23 | Bunker back | B2 |
| U24 | Bunker back overlay | B1 |
| U25 | Bunker side beading | B2 |
| U26 | Coal rails, open | B2 |
| U27 | Coal rails, sheeted in | B2 |
| U28 | Steam heat pipe valve handle (2) | B2 |
| U29 | Screw coupling hook (2) | B2 |

