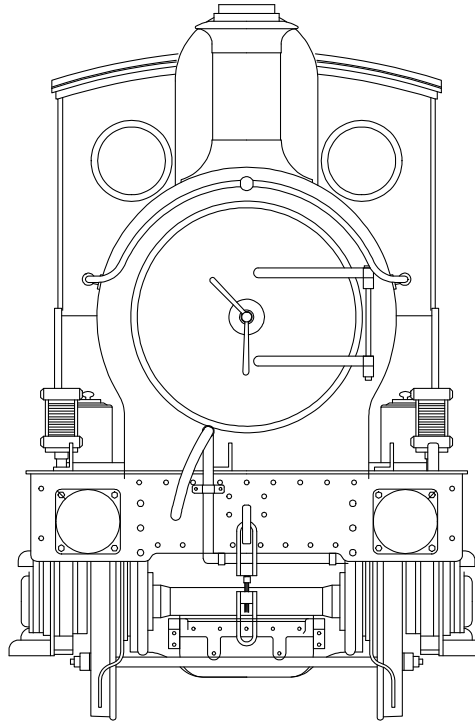


GWR 3232 LOCOMOTIVE



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.

BRIEF HISTORICAL DETAILS

For a detailed history of this the last completely new class of 2-4-0 tender engines built at Swindon, Part Four of 'The Locomotives of the Great Western Railway' published by the RCTS is essential reading.

Engine Nos.	Works No.	Lot	Date Built
3232-3241	1341-1350	90	1892
3242-3251	1381-1390	93	1893

The design of the kit used the following Swindon frame plan drawing 10129 5/1892 Lot 90/93.

The two lots appear to differ only in the arrangement of the front end framing. This affects the guard iron struts and the length of the bracket attaching the outside frame to the buffer beam. Parts are provided to allow these differences to be modelled.

The original boilers were of the 'Sir Daniel' class with the dome on the front ring (S2) with a very short smokebox. They were first reboilered with similar boilers with extended smokebox or with back dome versions of the same class (S4). All were eventually fitted with boilers with a Belpaire firebox of two quite different types, either a 'Standard Goods' (B4c) or the 'Sir Daniel' (B4).

The kit provides for the S4 and B4 boilers. To make an engine in as built condition is not difficult, a new boiler wrapper and smokebox wrapper will be needed and the S4 wrappers can be used as templates. To make an engine with the B4c boiler is, however, much more difficult as the boiler was pitched some 5" higher necessitating new smokebox, firebox and cab.

There are also many detail differences both between individual engines and as the class changed through time. For an accurate model it is important that photographs of the prototype are used and a list of sources is below.

The variations apparent from studying photographs are:

Differing rivet patterns, mostly allowed for.

The removal of the brass beading. The splasher fronts and tops and the coupling rod splasher fronts and tops are produced with and without beading.

The fitting of top feed to the B4 boiler, two different boiler wrappers are provided.

Differences in the cab front, two are provided with the different sizes of spectacle windows.

Differences in the cab roof, both the early canvas covered wooden roof and the later steel roof are included.

The kit also contains a complete set of cab side numerals so that any member of the class can be constructed.

Sources of Photographs

A Pictorial Record of Great Western Engines, Vol 1, OPC (Note the drawing on p57, fig 147 is for the 3232 class and not the 22XX class as stated)

The Locomotives of the Great Western Railway, part 4, RCTS.

GWR Locomotive Allocations 1921, Wild Swan

GWR Engine Sheds - London Division, Wild Swan

Didcot, Newbury and Southampton Railway Supplement, Wild Swan

Great Western Portrait 1913, 1921, OPC

Great Western Steam Through The Years - 2, Bradford Barton

Great Western Album Number 2, Ian Allan

Cambrian Railways Album - 2, Ian Allan

LCGB, Ken Nunn Collection

HMRS collection

TENDERS

When built the locomotives were fitted with new standard 3000 gallon tenders although there is a photograph of 3251 fitted with a second-hand Armstrong sandwich framed tender. Later some of the class acquired standard 2500 gallon tenders.

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.

Gauge.

For Finescale, where little sideplay is required, the widest spacers can be used but they will need careful filing to make their width 26.0 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. If the leading axle is 5/32" diameter then reduce the bearing diameter accordingly by fitting a sleeve from short lengths of the 3/16" tubing provided.

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. Open out holes P and fit according to the manufacturers instructions. It may not be possible to use plunger pickups if you wish to fit the inside motion because they may foul each other.

COMPONENTS NOT SUPPLIED WHEELS

Driving wheel - 6' 8½", 24 spoke, 3/16" diameter axle (2)Slater's Ref.7881W

Leading wheel - 4' 1½" diameter, 12 spoke, 3/16" diameter axle Slater's Ref.7849

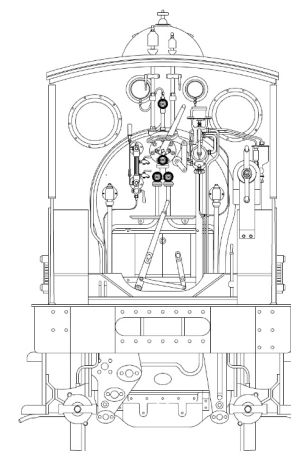
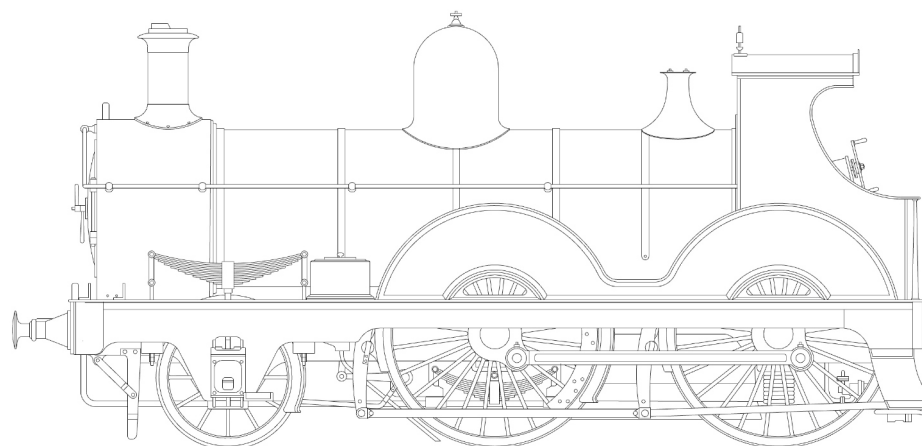
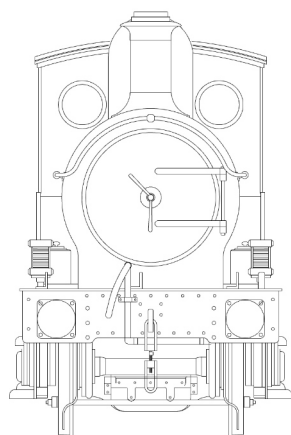
Available from Slaters' (Plastikard) Ltd'

Motor/Gearbox. A Canon motor with a SDMP 40L/15 gearbox (available from Finney7) or an alternative such as an ABC VML2 gearbox.

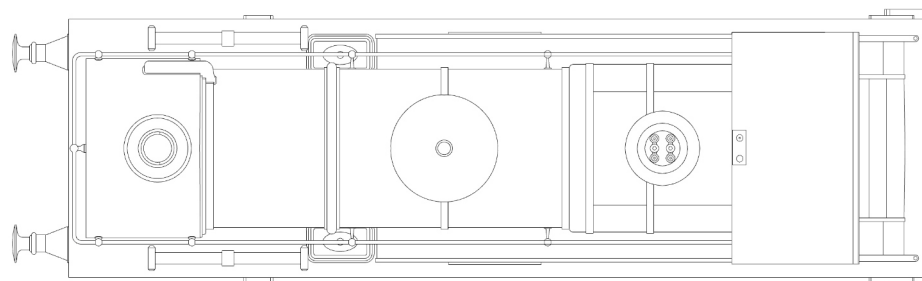
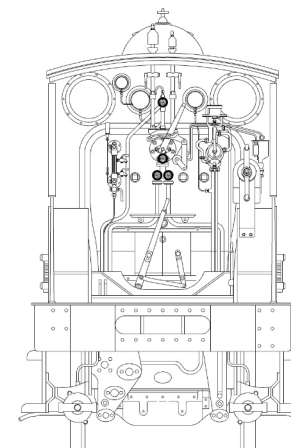
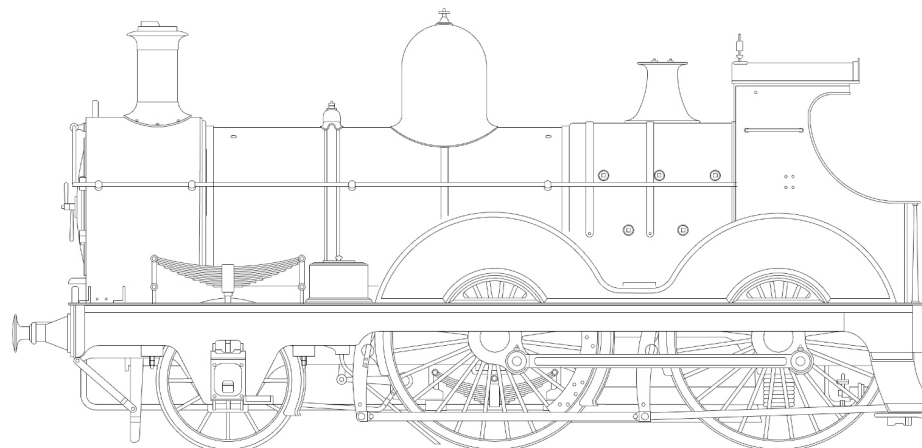
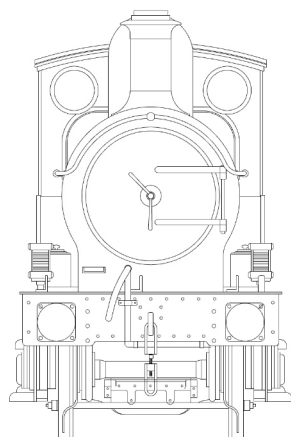
Crankpins. Steel crankpins are available from Finney7.

Inside Motion. A separate kit is available from Finney7 to construct the working inside motion.

Finney7



Round Top Firebox 3232 Class GA.



Belpaire Firebox 3232 Class GA (Lot 90)

FRAME CONSTRUCTION 1

COUPLING RODS.

The coupling rods are now made so that they can be used as a jig to align the leading coupled axle hornblocks accurately.

First drill out all the crankpin holes to a convenient size which is undersize for the crankpins. Remove all burrs caused by the drilling. Now drill 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.

Tin well the front face of all the inner laminates and the back face of the outer laminates and place them over the mandrel. 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. 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.

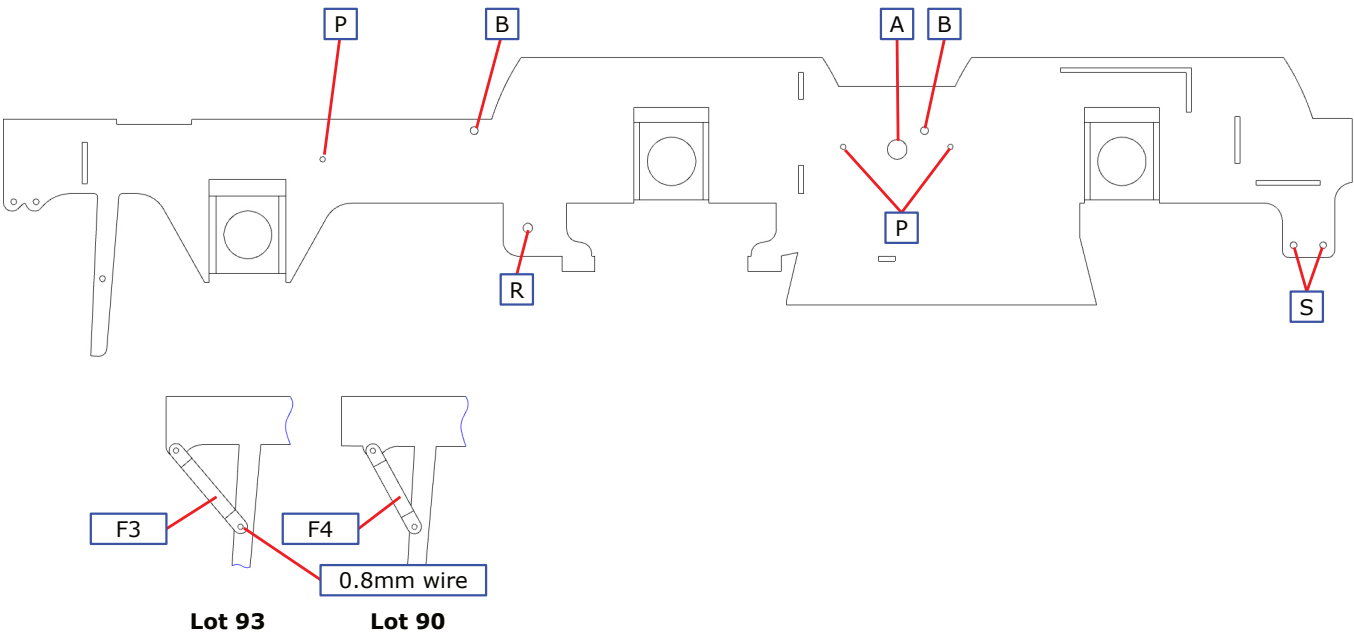
No.	Description	Sheet
M1	Coupling rod outer lamination (2)	1
M2	Coupling rod inner lamination (2)	1
M3	Compensation Beam packing strip	1
F1	Left inside frame	1
F2	Right inside frame	1
F3	Guard iron strut, lot 90 (2)	1
F4	Guard iron strut, lot 93 (2)	1

FRAMES

Having decided which chassis to construct you can now start construction by preparing the inside frames.(F1 & F2). First open up the following holes in the frames:

- P only if plunger pickups are being used
- B for brake hanger pivots - 0.8mm
- R for reversing lever cross shaft - 1.6mm
- A for compensation beam pivot - 1/8"
- S to fit the steam brake cylinders

Modify the guard iron strut mounting to suit which lot you are building and fit the guard iron struts (F3 or F4). Fold the ash pan sides along the half etched lines to match the centre frame spacer (F6). Emboss the rivets marked by half etched holes as shown on the diagram including the four rivets around the flange to the pipe on the right hand ash pan side. If you are constructing a compensated chassis fix the leading (F8) and rear (F10) hornblocks to the frames.



FRAME CONSTRUCTION 2

FRAME SPACERS AND ASSEMBLING THE CHASSIS

Fold up the front and rear spacers (F5 & F7) and the cab floor front (F11), making sure the half etched lines are on the inside of the bend. Check that all tabs on the spacers fit properly in the frame slots so that the spacer is hard up against the inside of the frames.

Now assemble the frames and spacers. Start by tack soldering the rear spacer to both sides. The cab floor fits in the half etched grooves in the frames and must be fitted at this stage. Check that everything is square and that the spacers are hard against the frames. Put an axle (a long piece of 3/16" rod would be better) through the rear bearings and place the chassis on a piece of graph paper to check that the axle is square to the frames. If all is well solder the remaining spacers to the frames. It is important to check constantly that the chassis is square and that the frames are straight.

Now fit the front coupled wheels hornblocks (F9) using the coupling rods as jigs.

Solder 0.8mm wire through frame holes B to form the brake hanger pivots and remove the sections of wire between the frames.

No.	Description	Sheet
F5	Front frame spacer	1
F6	Centre frame spacer	1
F7	Rear frame spacer	1
F8	Leading hornblocks	1
F9	Centre hornblocks	1
F10	Rear hornblocks	1
F11	Cab floor front	1
F12	Compensation beams (2)	1

FITTING THE COMPENSATION BEAMS

Cut a piece of 1/8" brass rod so that it fits through the holes marked A and is flush with the outside face of the chassis frames.

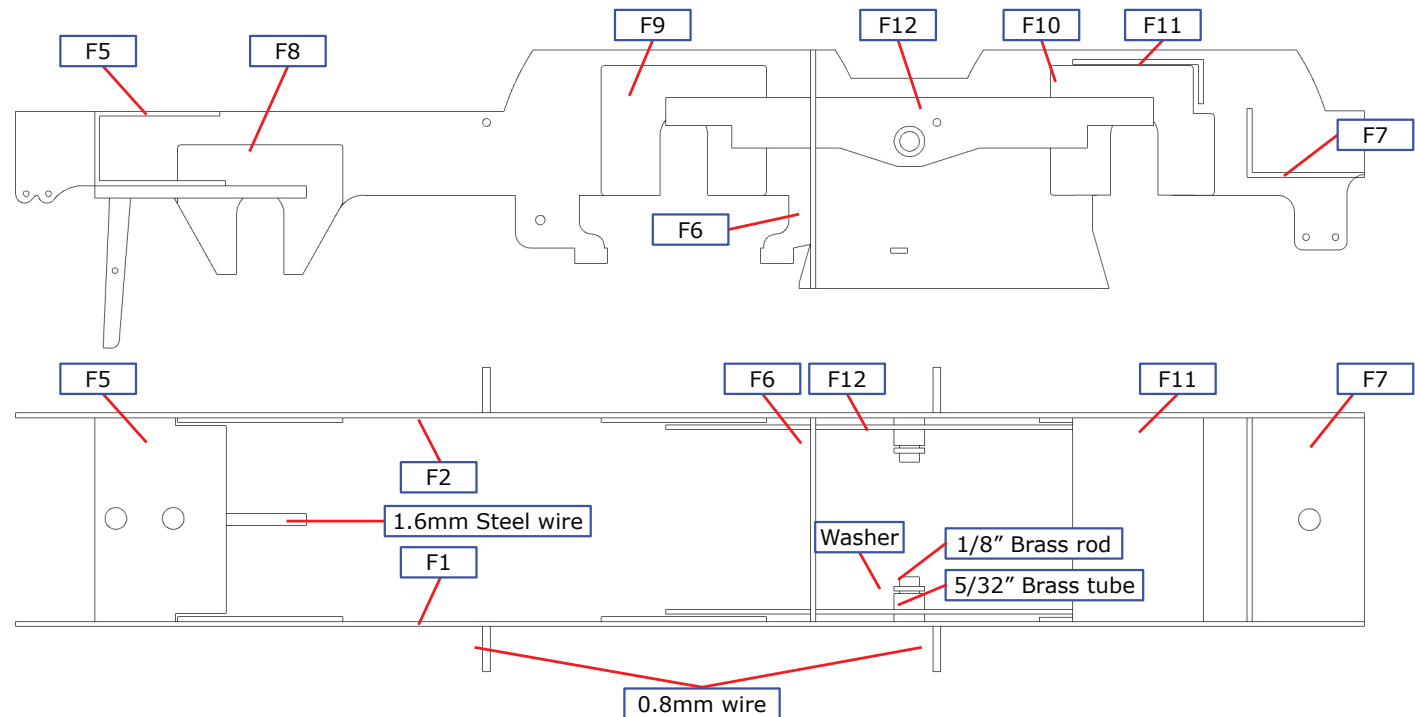
Prepare two pieces of 5/32" bore brass tube. Each should have a length of 3mm. Open up the hole in each of the compensation beams (F12) to accept the brass tube and solder the beams to the pieces of tube close to one end of the tube. Slide the rod through one frame, through a tube & beam, a paper washer, the two washers, a paper washer, a tube & beam and then through the other frame. Solder securely to each frame. Push the beam into place and then push the paper washer and brass washer in to hold the beam in place. Solder the the washer in place. Repeat on the other side. Remove the rod from between the two beam assemblies to leave space for the motor and gearbox.

The third beam is a piece of 1.6mm steel wire soldered in the half etched groove in the bottom of the front spacer and projecting to the rear. The front of the engine is supported on this beam resting on the leading axle. Fit all the wheels and axles temporarily so that the beams are resting on the axle bearings. Confirm that the compensation works properly and check if the chassis is sitting level.

Make a bracket to support the motor/gearbox from scrap brass and solder it to the rear of the centre frame spacer.

INSIDE MOTION.

If you are fitting working inside motion then build it next following the separate instructions



BRAKE GEAR AND CHASSIS FINISHING

Secure the balance weights (F32 & F33) in position using photographs as a guide to position.

Attach the left and right steam brake cylinders (BR1 & BR2) to the chassis I the holes S shown in Fig 3.

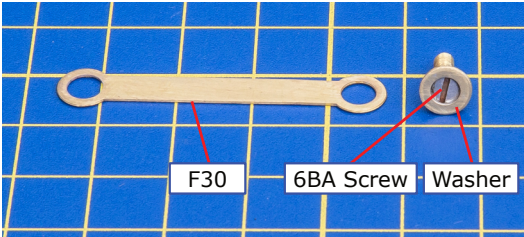
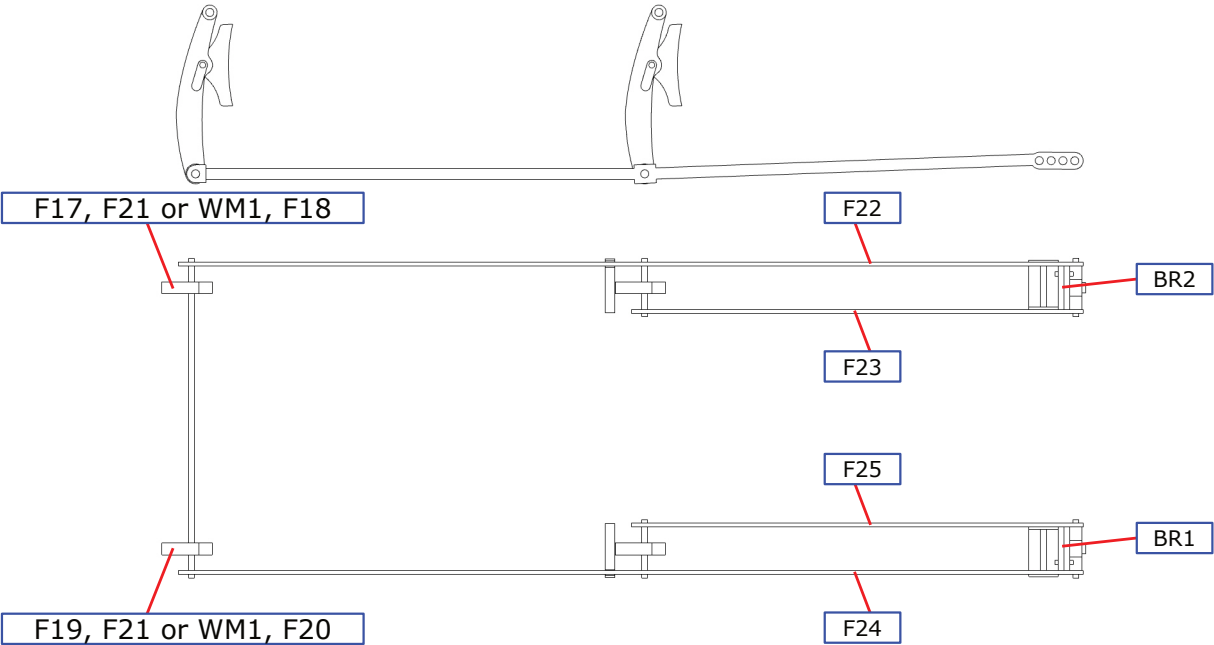
Assemble the wheels, axles, coupling rods and motor and check that all is well. Retain the rear axle bearings in the hornblocks by using the underhung volute springs (F13). Make a triple lamination of the underhung leaf springs, the outer, middle and inner laminations (F14, F15 & F16) and then secure the leading coupled axle. Use a short piece of 0.8mm wire for the front axle.

Emboss the pair of rivets on each outer brake hanger, left and right (F17 & F19). Assemble the brakes, trapping the brake shoes (F21 or WM1) on a piece of 0.8mm wire between the inner (F18 & F20) and outer laminations. Solder the brake hangers onto the brake hanger wires ensuring alignment and clearance from the wheels.

Emboss the rivets on each outside brake pull rods, left and right (F22 & F24). The inside pull rods, left and right (F23 & F25) should only extend forward to the first brake shaft so shorten them back to this point. Fit the pull rods as shown in the diagram attaching them either side of the steam brake cylinders. Form and fit the brake pull rods safety brackets (F26) through the small slots in the ashpan sides and under the pairs of pull rods.

Fit the sandbox below footplate (WM3) in place and form sand pipes from 1.2mm wire. Finally form and fit the vacuum pipe from the buffer beam mounted vacuum pipe to the rear. It's shape varies between engines so use photographs and the drawings as a guide. The vacuum pipe flange (F30) is threaded on this pipe and fixed to it beneath the front axle.

No.	Description	Sheet
F13	Underhung volute springs (2)	1
F14	Underhung spring outer lamination (2)	1
F15	Underhung spring middle lamination (2)	1
F16	Underhung spring inner lamination (2)	1
F17	Left brake hanger outer lamination (2)	1
F18	Left brake hanger inner lamination (2)	1
F19	Right brake hanger outer lamination (2)	1
F20	Right brake hanger inner lamination (2)	1
F21	Brake shoes (4)	1
F22	Left outer brake pull rod (2)	1
F23	Left inner brake pull rod (2)	1
F24	Right outer brake pull rod (2)	1
F25	Right inner brake pull rod (2)	1
F26	Brake pull rod safety brackets (2)	3
F27	Wheel spacer washers	1
F28	Washers	1
F29	Vacuum pipe flanges	3
F30	Drawbar, 2 lengths	2 & 3
F31	Trailing axle balance weight (2)	1
F32	Leading axle balance weight (2)	1



FOOTPLATE 1

For a Lot 93 locomotive file back the lower front edge of the outside frame and valance, left and right (U1 & U2) to the half etched line. Emboss the rivets in the outside frames where appropriate. On the footplate (U3) fold down the footplate edges on both sides and solder the outside frames in place ensuring the frames are flush with the footplate surface.

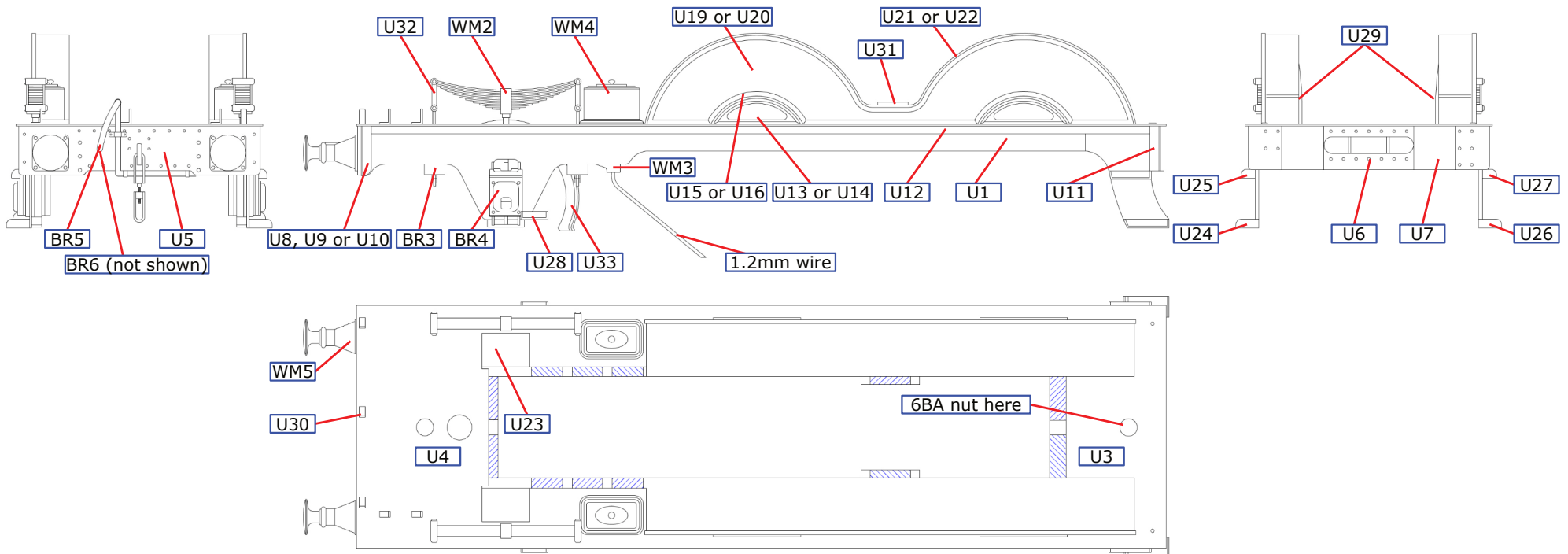
Emboss the rivets under the lamp brackets on the footplate overlay (U4) and locate over the footplate so that all common holes align. Carefully solder them together, working from the front to the back to avoid buckling. The part of the footplate that forms part of the cab floor must be narrowed if you have used other than the wide chassis spacers. Solder a 6BA nut over the rear hole in the footplate for the body fixing screw.

Emboss the rivets on the buffer beam (U5) and the drag beam parts (U6) and attach the drag beam rubbing plates (U7) to the drag beam. Solder the buffer beam and drag beam to the footplate. Fold up the appropriate frame to buffer beam brackets (U8, U9 or U10) and the frame to drag beam brackets (U11) and solder in place. Add the outside frame and valance strip (U12).

Solder the small splasher fronts, with or without beading (U13 or U14) centrally in the slots in the footplate then curve the small splasher tops, with or without beading (U15 or U16) to the correct radius and solder them in place.

Splashers With Beading. Using the number fixing jig (U17) solder the last two digits of your chosen number (U18) to the splasher fronts (U19). Solder the splasher fronts into the footplate slots and to the small splashers. Roll the splasher tops from the etched notch in the middle. The large radius curves are best rolled using a metal rod on a sheet of hard rubber. When you are satisfied with the shape solder the splashers in place. The front edge of the splasher tops, (U21) fit slightly proud of the splasher fronts by the width of the beading. The wider part of the splasher tops will need reducing in width so that the inner edge aligns with the chassis frames.

No.	Description	Sheet
U1	Left outside frame and valance	1
U2	Right outside frame and valance	1
U3	Footplate	2
U4	Footplate overlay	3
U5	Buffer beam	1
U6	Drag beam	1
U7	Drag beam rubbing plates (2)	2
U8	Lot 90 riveted frame to buffer beam bracket (2)	3
U9	Lot 90 plain frame to buffer beam bracket (2)	3
U10	Lot 93 frame to buffer beam bracket (2)	3
U11	Frame to drag beam bracket (2)	3
U12	Outside frame and valance strip (2)	2
U13	Small splasher front with beading (4)	2
U14	Small splasher front without beading (4)	2
U15	Small splasher top with beading (4)	3
U16	Small splasher top without beading (4)	3



FOOTPLATE 2

Splashers Without Beading. Using the number fixing jig (U17) solder the last two digits of your chosen number (U18) to the splasher fronts (U20). Solder the splasher fronts into the footplate slots and to the small splashers. Roll the splasher tops from the etched notch in the middle. The large radius curves are best rolled using a metal rod on a sheet of hard rubber. When you are satisfied with the shape solder the splashers in place. The front edge of the splasher tops (U22) fit slightly proud of the splasher fronts by the less than the width of the beading. The wider part of the splasher tops will need reducing in width so that the inner edge aligns with the chassis frames.

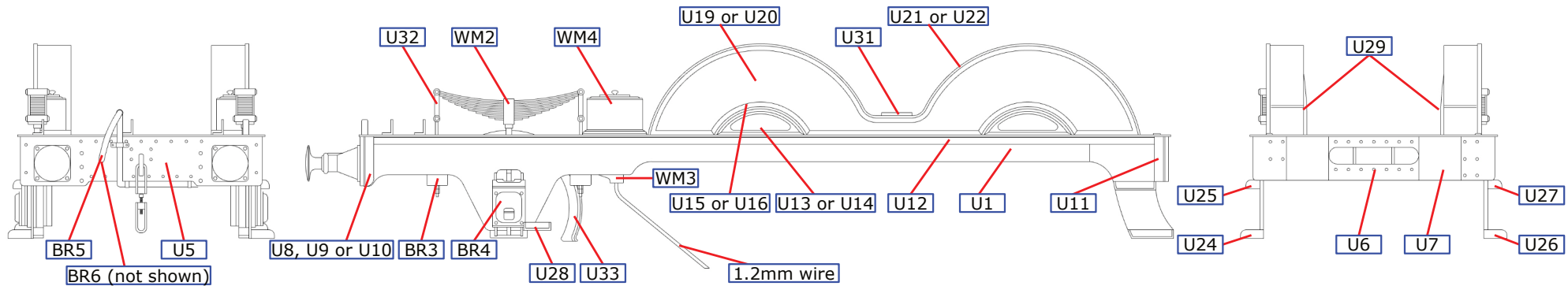
Remove the piece of brass in the centre of the footplate which has been holding everything together by cutting along the half etched lines (shown in blue below). Check the fit of the footplate on the chassis and dress to obtain a flush fit.

No. Description

U17	Number fixing jug
U18	Set of numbers
U19	Splasher front with beading (2)
U20	Splasher front without beading (2)
U21	Splasher top with beading (2)
U22	Splasher top without beading (2)
U23	Leading wheel splasher tops (2)
U24	Rear step left lower tread
U25	Rear step left upper tread

Sheet

U26	Rear step right lower tread	2
U27	Rear step right upper tread	2
U28	Step adjacent to the leading axlebox (2)	2
U29	Cab splasher side (2)	2
U30	Lamp brackets (3)	2
U31	Firebox mounting brackets (2)	1
U32	Spring shackle (12)	3
U33	Leading wheel splashers (2)	3
U34	Cylinder cover	3

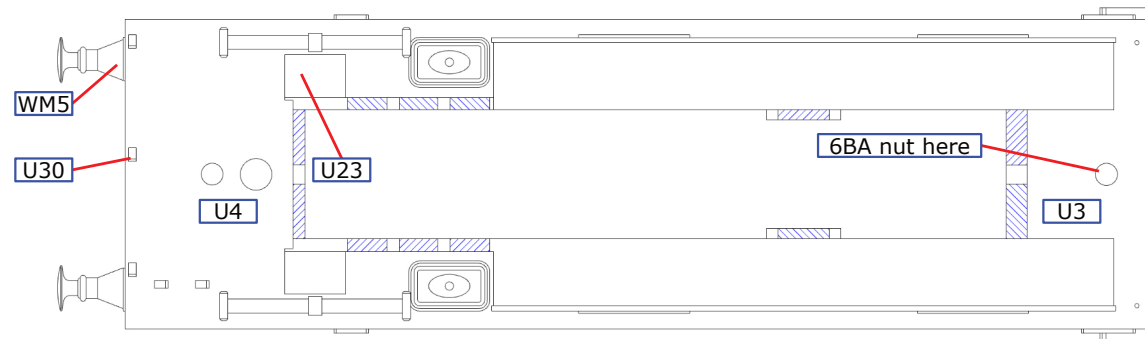


Solder in place the leading wheel splashers (U23) and fill the small gap with solder.

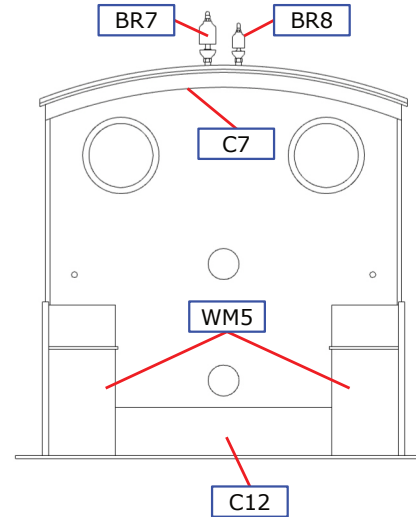
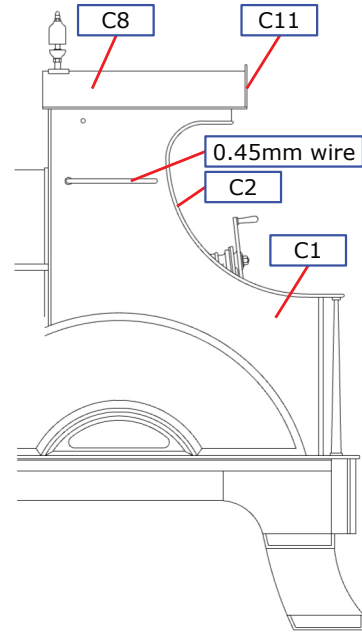
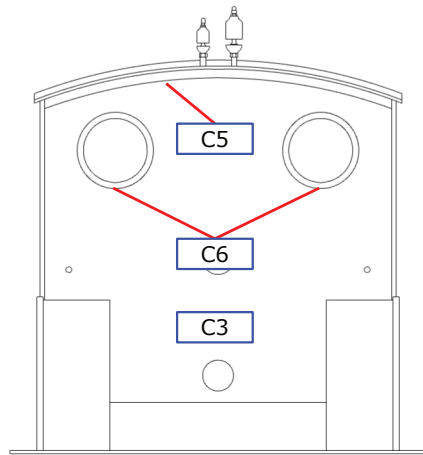
Fold up the steps (U24, U25, U26 & U27) and solder to the outside frames. These steps are specific for each position. The four holes at rear of each frame correspond to the four rivets attaching the upper steps and should be used to aid alignment. Solder in place the steps adjacent to the leading axle (U28).

Attach the cab splasher side (U29) under the inner of the splashers inside the cab; the inner face should align with the frames. Fix the lamp brackets (U30) in the small slots across the front of the footplate.

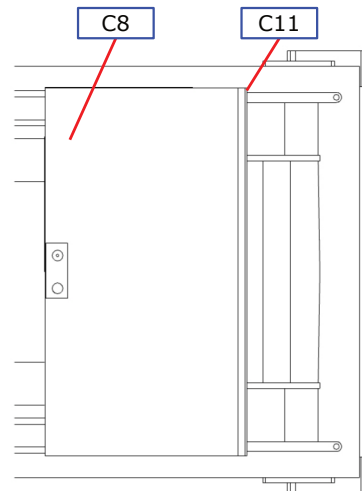
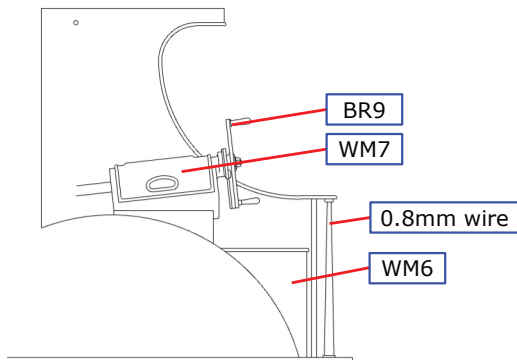
Fold up the leading wheel splashers (U33), curving the splasher cover to fit the front, and solder in place under the footplate.



ROUND TOP BOILER CAB AND WOOD ROOF



No.	Description	Sheet
C1	Cab sides (2)	2
C2	Cab side cut-out beading (2)	2
C3	Cab front round top firebox	3
C5	Cab front overlay	2
C6	Cap porthole rims, two sizes (2)	1
C7	Cab roof rear support	2
C8	Canvas covered wood cab roof	2
C12	Cab floor rear	2
C13	Fallplate	2



Prepare the cab sides (C1) by embossing any rivet detail. There are no half etched holes for guidance as every engine seems to be different! The same applies to the horizontal handrails which are absent in original condition. Drill suitable holes and fit these handrails from 0.45mm wire. Attach the cab side cut-out beading (C2) fitting the etched groove on the edge of the cab side. Solder the cabsides in position. They are correctly aligned when both the cab side handrails and the front edge are vertical. Fit the vertical handrails from 0.8mm wire.

Attach the cab front overlay (C5) to the top edge of the round top firebox cab front (C3). Solder the porthole rims (C6) in place and fix the cab front in place set back slightly between the cab sides. Solder the cab roof rear support (C7) between the rear edges of the cabsides.

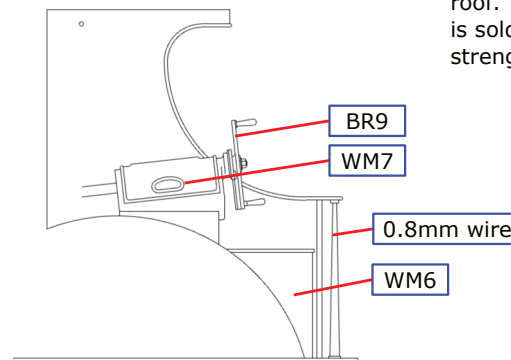
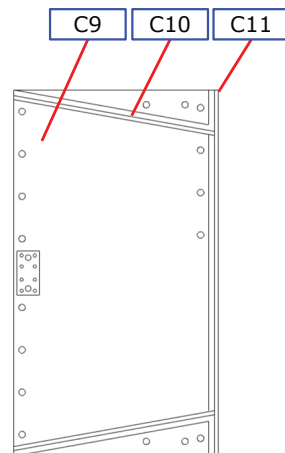
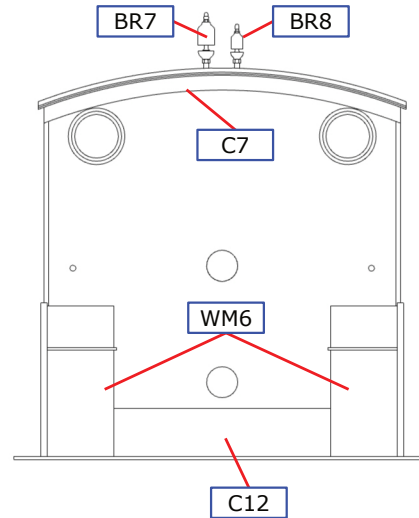
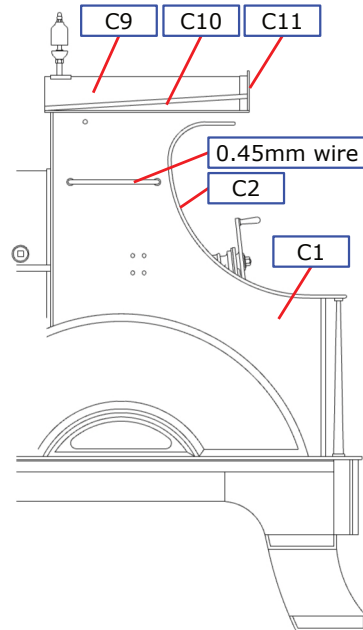
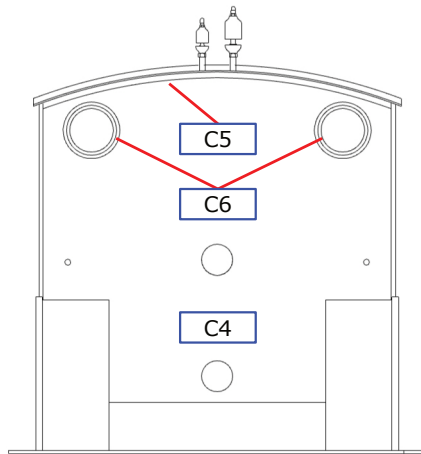
Curve the cab roof (C8). The strengthening rib across the rear of the wooden roof is represented by a piece of 0.8mm wire soldered in the wider half etched groove. Solder the cab roof in position.

Solder the cab floor rear (C12) in place. Slightly curve the fall plate (C13) and hinge it behind the floor using 'U' shaped pieces of 0.45mm wire, fitted through the holes on the footplate.

Fit the splasher extensions (WM6) to the rear of the splashers in the cab. The following steps can be done when detailing the backhead. Fit the screw reverser (WM7) on top of the right splasher. Fit the screw reverser handle (BR9).

The whistles are easily damaged so fit them just before painting. The large (BR7) goes on the left and the small (BR8) on the right.

BELPAIRE BOILER CAB AND STEEL ROOF



No.	Description	Sheet
C1	Cab sides (2)	2
C2	Cab side cut-out beading (2)	2
C4	Cab front Belpaire firebox	2
C5	Cab front overlay	2
C6	Cap porthole rims, two sizes (2)	1
C7	Cab roof rear support	2
C9	Steel cab roof	3
C10	Cab roof rain strips (2)	3
C11	Cab roof rear angle	2
C12	Cab floor rear	2
C13	Fallplate	2

Prepare the cab sides (C1) by embossing any rivet detail. There are no half etched holes for guidance as every engine seems to be different! The same applies to the horizontal handrails which are absent in original condition. Drill suitable holes and fit these handrails from 0.45mm wire. Attach the cab side cut-out beading (C2) fitting the etched groove on the edge of the cab side. Solder the cabsides in position. They are correctly aligned when both the cab side handrails and the front edge are vertical. Fit the vertical handrails from 0.8mm wire.

Emboss the rivets on the Belpaire firebox cab front (C4). Attach the cab front overlay (C5) to the top edge of the round top firebox cab front. Solder the porthole rims (C6) in place and fix the cab front in place set back slightly between the cab sides. Solder the cab roof rear support (C7) between the rear edges of the cabsides.

Emboss the rivets around the whistle holes on the steel roof (C9). Curve the cab roof. Solder the rain strips (C10) into the slots in the roof. Solder the cab roof in position. The cab roof rear angle (C11) is soldered to the rear edge of the steel roof to form the strengthening angle.

Solder the cab floor rear (C12) in place. Slightly curve the fall plate (C13) and hinge it behind the floor using 'U' shaped pieces of 0.45mm wire, fitted through the holes on the footplate.

Fit the splashers extensions (WM6) to the rear of the splashers in the cab. The following steps can be done when detailing the backhead. Fit the screw reverser (WM7) on top of the right splashers. Fit the screw reverser handle (BR9).

The whistles are easily damaged so fit them just before painting. The large (BR7) goes on the left and the small (BR8) on the right.

Finney7

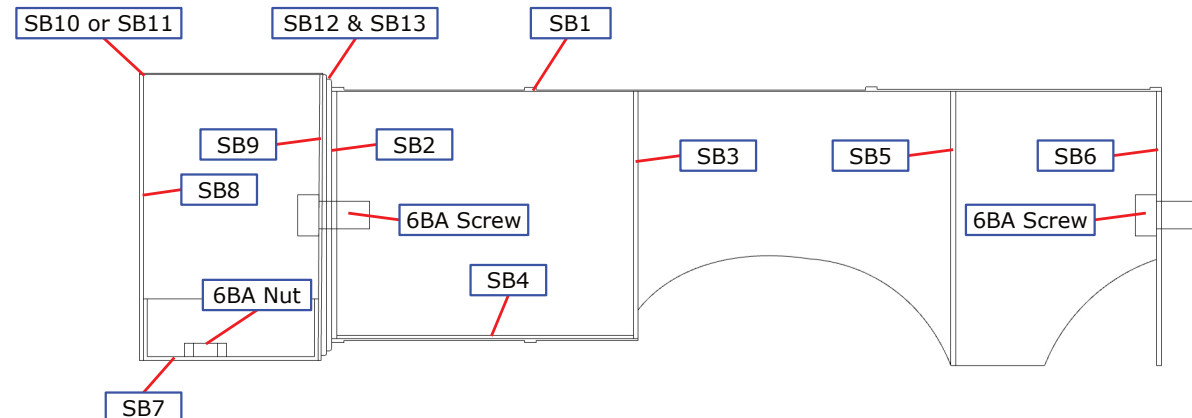
S4 BOILER

Boiler. Emboss the rivets as needed on the boiler and round top firebox wrapper (SB1) on the dome boiler band and firebox band. Form the boiler by rolling around suitable sized rod or dowel. Ensure that the fit is correct over the boiler front and rear formers (SB2 & SB3). Solder a 6BA nut over the hole in the centre of the front former to allow the smokebox to be screw fixed to the boiler. Bend the boiler band joining brackets on the boiler joining strip (SB4) and fit through the small slots from inside the boiler. If the fit is good and the formers fit, then solder the wrapper ends together with the boiler joining strip. The formers are now soldered in place flush with the back and front of the boiler section with the notch on the top of the rear former in line with the mid line of the wrapper. Solder two short pieces of 0.8 mm wire into the two holes in the rear former to act as dowels to locate the boiler and firebox.

Firebox. Fit the round top firebox front and rear formers (SB5 & SB6) in place ensuring that the firebox does not become twisted.

Smokebox. Fold the smokebox base (SB7) into an inverted tray and solder a 6BA nut over the hole for the body fixing screw. Solder the smokebox front and rear formers (SB8 & SB9) to the smokebox base with their lower edges flush with the bottom of the base. First emboss the lamp bracket rivets on the smoke box wrapper, riveted or no rivets (SB10 or SB11) and then roll to shape and solder in place with its edges flush with the front and back formers. Screw the smokebox to the boiler with the smokebox rear overlay and the smokebox and boiler ring (SB12 & SB13) sandwiched between. The rear plate protrudes slightly and the smokebox and boiler ring was originally polished brass. This can be achieved by putting it on the mandrel of a mini drill and polishing with 'Brasso'. Because it is screw fitted along with the smokebox it can be finally fitted after most of the painting is done.

No.	Description	Sheet
SB1	Boiler and round top firebox wrapper	3
SB2	Boiler front former	1
SB3	Boiler rear former	1
SB4	Boiler jointing strip	2
SB5	Round top firebox front	1
SB6	Round top firebox rear	1
SB7	Smokebox base	3
SB8	Smokebox front former	1
SB9	Smokebox rear former	1
SB10	Smokebox wrapper no rivets	3
SB11	Smokebox wrapper with rivets	3
SB12	Smokebox rear overlay	1
SB13	Smokebox and boiler ring	1



FORMING THE BELPAIRE FIREBOX 1

The photographs show the construction of a 47XX firebox. The construction of the Bulldog firebox follows the same procedures.

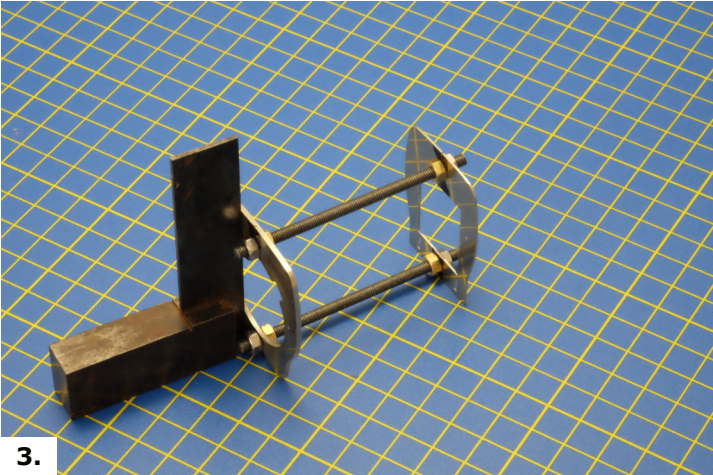
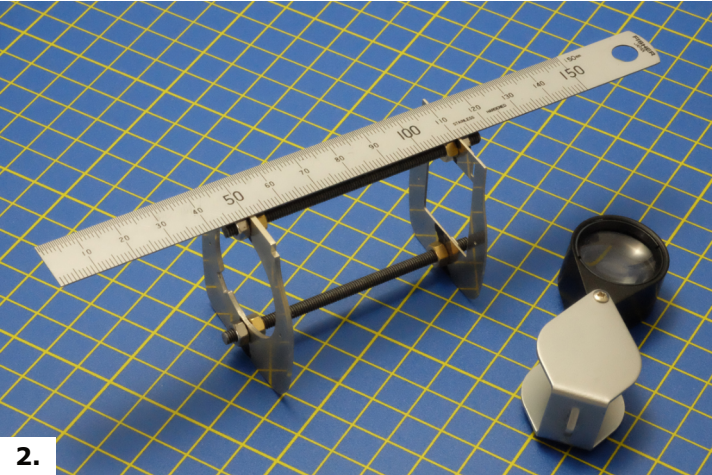
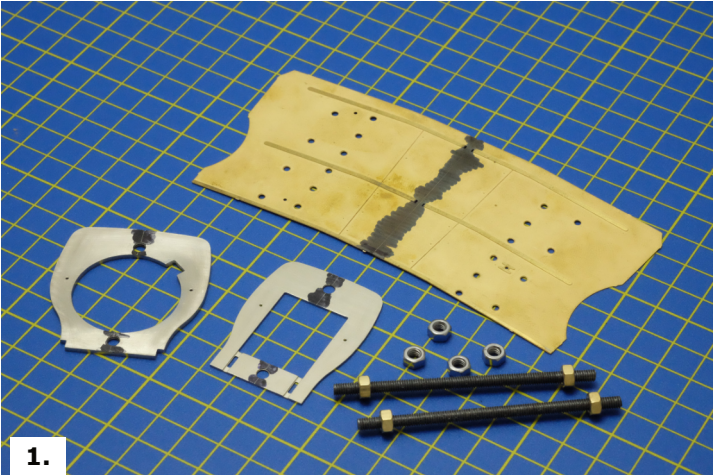
Photo 1. Solder together the two laminations of the firebox front (SB1) with top lamination (SB2). Clean the cusp off all parts, including the firebox rear former (SB3). Reduce the width of the lower faces of the firebox rear former so that it will fit between the frames in the locating groove in the footplate. Using the small dimples provided mark the centre lines on the outside and the inside of each part. Solder two 4mm lengths of 0.8mm wire into the holes on the cab front (C1)

To assemble the firebox two 100 mm pieces of 4BA studding will be required with four brass nuts and four stainless steel nuts. Thread the brass nuts on to the studs.

Photo 2. Set the two spacers on to the studs, retain them with the stainless steel nuts. Ensure the length of the assembly over the formers is 37.1mm. Always measure the distance from the bottom of the firebox; even using a steel rule and eyeglass you can get pretty close to this sort of dimension with care. Take your time, measure and check it a few times. It's easier to use a vernier or similar gauge to get a precise measurement and to check that the spacers are parallel.

Photo 3. Check that the spacers are square, both front and rear; do this on a decent flat surface. When correctly spaced apart the front will fit in the half etched recess in the footplate and the rear, pinned to the cab front, will fit with the tabs on the lower edge of the cab front (C1) in the footplate slots.

No.	Description	Sheet
SB1	Firebox front laminations (2)	A2
SB2	Firebox front top lamination	A2
SB3	Firebox rear U15	A2
SB4	Firebox wrapper	B2
SB5	Firebox band joining clips (4)	B2
C1	Cab front	B1



FORMING THE BELPAIRE FIREBOX 2

Photo 4. Tighten the stainless steel nuts up tightly and then solder the brass nuts to the spacers. A good blobby tack will be fine:

Note: From this stage the spacers form a pretty strong assembly. Any attempt to twist the assembly results in one stud tightening as the other slackens. Just make sure the nuts are tightened up and you've checked the assembly is square again before moving on to the next stage.

Photo 5. Emboss the rivets for the ends of the cladding fixing bands on the firebox wrapper (SB4).

Align the centre line marks, the top can be formed to a gentle radius. This is a simple rolling job, using a length of dowel and finger pressure. An old round file has a taper that is useful on GWR fireboxes which don't have a constant radius. Ensure that the centre lines are maintained while forming the second shoulder.

On waisted fireboxes, such as this one, start forming the concave sections; this might be easier to do off the spacers. The final job is to pull in the waisted section, by putting a gentle curve on the sides of the firebox; again this is dowelling and finger pressure. As can be seen, it's not a perfect match to the spacers, but gentle finger pressure is enough to get the wrapper to meet the spacers without distortion.

Photo 6. Tack the outside of the firebox at the centre and corners, both front and rear. Again, take care and check that the centres retain the alignment that we've worked so hard to achieve. Now work down the spacers alternating tacks left/right and front/rear to even out any expansion of the wrapper. Finally run the seams round at both ends.

With the wrapper now firmly attached to the spacers, the stainless steel nuts can be undone and the studs spun out.

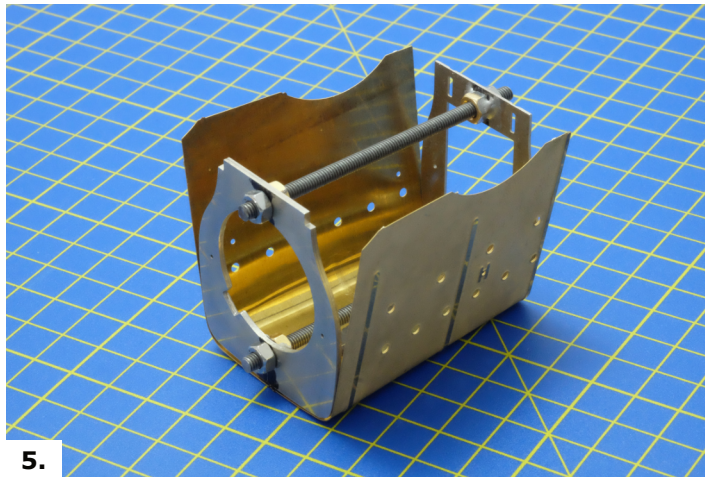
Run an extra fillet of solder into the internal front shoulders of the firebox to support the area which will be filed back. The brass nuts can be heated and removed. Remove the rear scrap section of the spacer.

The base, front and rear are now rubbed down on a sanding board to keep them flat, this will remove the cusps from the wrapper and leave the firebox ready for the final shaping and fitting to the rest of the loco. Round the front edges of the firebox with a file referring to photographs for the correct shape.

Fold the firebox band joining clips (SB5) into a 'U' shape, fit through the slots in the firebox top and solder in place from inside. Complete with a short piece of 0.45mm wire to represent the tightening bolt. Fix the mudhole doors (WM21) in place on the firebox.



4.



5.



6.

B4 BELPAIRE BOILER

Boiler. If you are not fitting top feed remove the boiler wrapper from boiler and round top firebox wrapper (SB1) by cutting behind the rearmost boiler band. This will form the boiler wrapper. Emboss rivets as needed on the boiler wrapper with top feed (SB20) on the dome boiler band and top feed band.

Form the boiler by rolling the appropriate wrapper. Ensure that the fit is correct over the boiler front and rear formers (SB2 & SB3). Solder a 6BA nut over the hole in the centre of the front former to allow the smokebox to be screw fixed to the boiler.

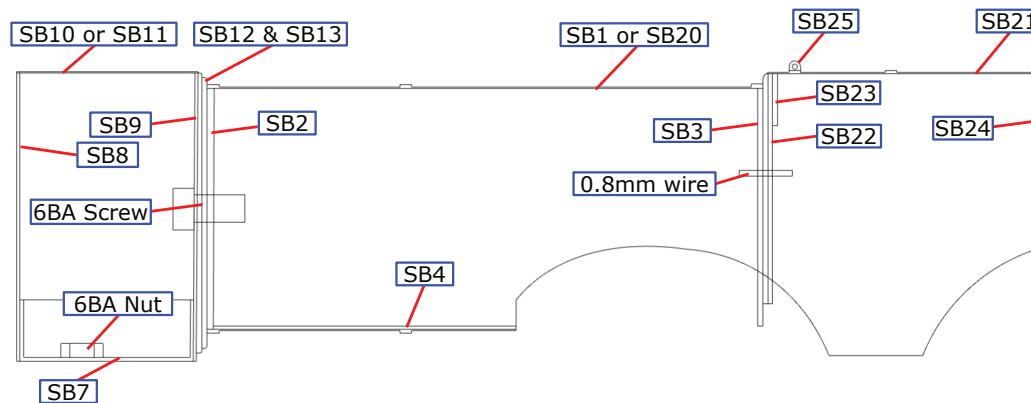
Bend the boiler band joining brackets on the boiler joining strip (SB4) and fit through the small slots from inside the boiler. If the fit is good and the formers fit, then solder the wrapper ends together with the boiler joining strip. The formers are now soldered in place flush with the back and front of the boiler section with the notch on the top of the rear former in line with the mid line of the wrapper. Solder two short pieces of 0.8mm wire into the two holes in the rear former to locate the boiler and firebox.

Smokebox. On the smokebox front former (SB8) either emboss all the rivets as on some engines in later years or just the two either side. One of the half etched holes marks the position of the steam lance cock fitted in later years. Drill out this hole if required. Emboss the lamp bracket rivets on the smoke box wrapper, no rivets or riveted (SB10 or SB11)

Fold the smokebox base (SB7) into an inverted tray and solder a 6BA nut over the hole for the body fixing screw. Solder the smokebox front and rear formers (SB8 & SB9) to the smokebox base with their lower edges flush with the bottom of the base. Roll the appropriate smoke box wrapper to shape and solder in place with its edges flush with the front and back formers. Screw the smokebox to the boiler with the smokebox rear overlay and the smokebox and boiler ring (SB12 & SB13) sandwiched between. The rear plate protrudes slightly and the smokebox and boiler ring was originally polished brass. This can be achieved by putting it on the mandrel of a mini drill and polishing with 'Brasso'. These parts can be assembled after painting is complete.

If you have fitted top feed form the pipes from 1.4mm wire.

No.	Description	Sheet
SB1	Boiler and round top firebox wrapper	3
SB2	Boiler front former	1
SB3	Boiler rear former	1
SB4	Boiler jointing strip	2
SB7	Smokebox base	3
SB8	Smokebox front former	1
SB9	Smokebox rear former	1
SB10	Smokebox wrapper no rivets	3
SB11	Smokebox wrapper with rivets	3
SB12	Smokebox rear overlay	1
SB13	Smokebox and boiler ring	1



S4 BOILER FITTING AND FINISHING

The boiler now needs careful fitting to the splasher tops by filing back the splashers as needed. Check the clearance between the boiler and the driving wheels. When you are satisfied, screw the boiler to the footplate using the body fixing screw at the front and a 6BA screw and nut through the holes in the firebox and cab front. Make sure that all is aligned correctly, with the boiler horizontal before soldering the boiler and firebox to the splasher tops. Fit the angle between firebox and cab (SB14) to represent the angle between the firebox and the cab front.

Solder the lamp bracket (SB15) through the slot in the smokebox. Emboss the hinge rivets on the cylinder cover (U33) and solder in place on the footplate at the front of the smokebox. Add the step on the smokebox front (SB16) and, if appropriate, the step on the left side of the smokebox (SB17). Fit the chimney (BR11). Fit the smokebox pipe cover (WM13) to the right hand side of the smokebox.

Fix short handrail knobs to the smokebox sides and medium to the boiler. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place. Emboss the rivets on the firebox mounting brackets (U31), visible in later years, and fix in place.

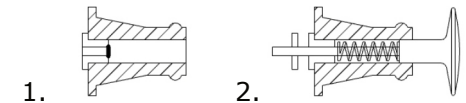
Fit the inside of the dome (WM7) and the safety valve base (WM8) ensuring that both are vertical. Polish and fit the dome (BR12) and the dome lubricator (BR13). Fit the safety valves (BR14) to the top of the safety valve base. Polish and fit the safety valve casing (BR28).

Fit the smokebox door (WM10) and the smokebox handles (BR15). Fit the smokebox pipe cover (WM12) on the right hand side of the smokebox. Fit the steam lance cock (BR16). Emboss the rivets on the cylinder cover (U34) and solder in place on the footplate at the front of the smokebox.

Form the spring shackles (U32) to a 'U' shape and solder on a short length of 0.8mm wire. Fix the shackles through the holes in the footplate, tack soldering the wire to the lower footplate edge. Attach the leading axle springs (WM2) and then solder the shackle wires permanently to the footplate overlay and cut off flush with the underside of the footplate. Attach the spring damper castings (RS1). Fit the leading axleboxes (BR4). Fit the sandboxes above the footplate (WM4).

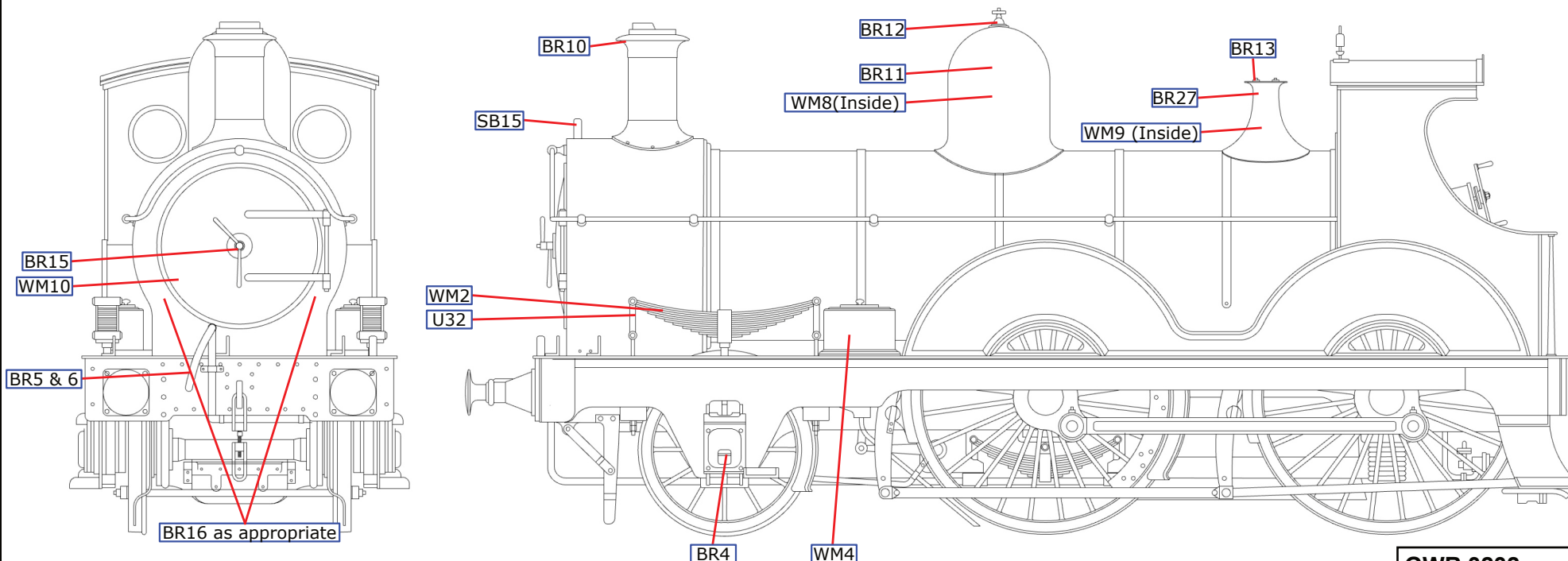
Prepare and fit the buffer stocks (WM5) as shown. Fit the vacuum pipe (BR5) and the vacuum pipe dummy (BR6).

No.	Description	Sheet
SB14	Angle between firebox and cab	3
SB15	Smokebox lamp bracket	2
SB16	Step on smokebox front	2
SB17	Step left side of smokebox	2



1. Drill the casting through 2mm. Fit the bush into the casting.
2. Fit the spring onto the buffer and place into the casting. Secure with a small (16BA) washer

Buffer Construction



B4 BOILER FITTING AND FINISHING

The boiler now needs careful fitting to the splashers tops by filing back the splashers as needed. Check the clearance between the boiler and the driving wheels. When you are satisfied, screw the boiler to the footplate using the body fixing screw at the front and a 6BA screw and nut through the holes in the firebox and cab front. Make sure that all is aligned correctly, with the boiler horizontal before soldering the boiler and firebox to the splashers tops. Fit the angle between firebox and cab (SB14) to represent the angle between the firebox and the cab front.

Solder the lamp bracket (SB15) through the slot in the smokebox. Emboss the hinge rivets on the cylinder cover (U33) and solder in place on the footplate at the front of the smokebox. Add the step on the smokebox front (SB16) and, if appropriate, the step on the left side of the smokebox (SB17). Fit the chimney (BR11). Fit the smokebox pipe cover (WM13) to the right hand side of the smokebox.

Fix short handrail knobs to the smokebox sides and medium to the boiler. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place. Emboss the rivets on the firebox mounting brackets (U31), visible in later years, and fix in place.

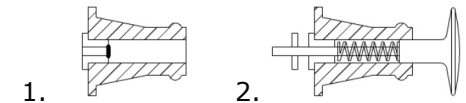
Fit the inside of the dome (WM7) and the safety valve base (WM8) ensuring that both are vertical. Polish and fit the dome (BR12) and the dome lubricator (BR13). Fit the safety valves (BR14) to the top of the safety valve base. Polish and fit the safety valve casing (BR28).

Fit the smokebox door (WM10) and the smokebox handles (BR15). Fit the smokebox pipe cover (WM12) on the right hand side of the smokebox. Fit the steam lance cock (BR16). Emboss the rivets on the cylinder cover (U34) and solder in place on the footplate at the front of the smokebox.

Form the spring shackles (U32) to a 'U' shape and solder on a short length of 0.8mm wire. Fix the shackles through the holes in the footplate, tack soldering the wire to the lower footplate edge. Attach the leading axle springs (WM2) and then solder the shackle wires permanently to the footplate overlay and cut off flush with the underside of the footplate. Attach the spring damper castings (RS1). Fit the leading axleboxes (BR4). Fit the sandboxes above the footplate (WM4).

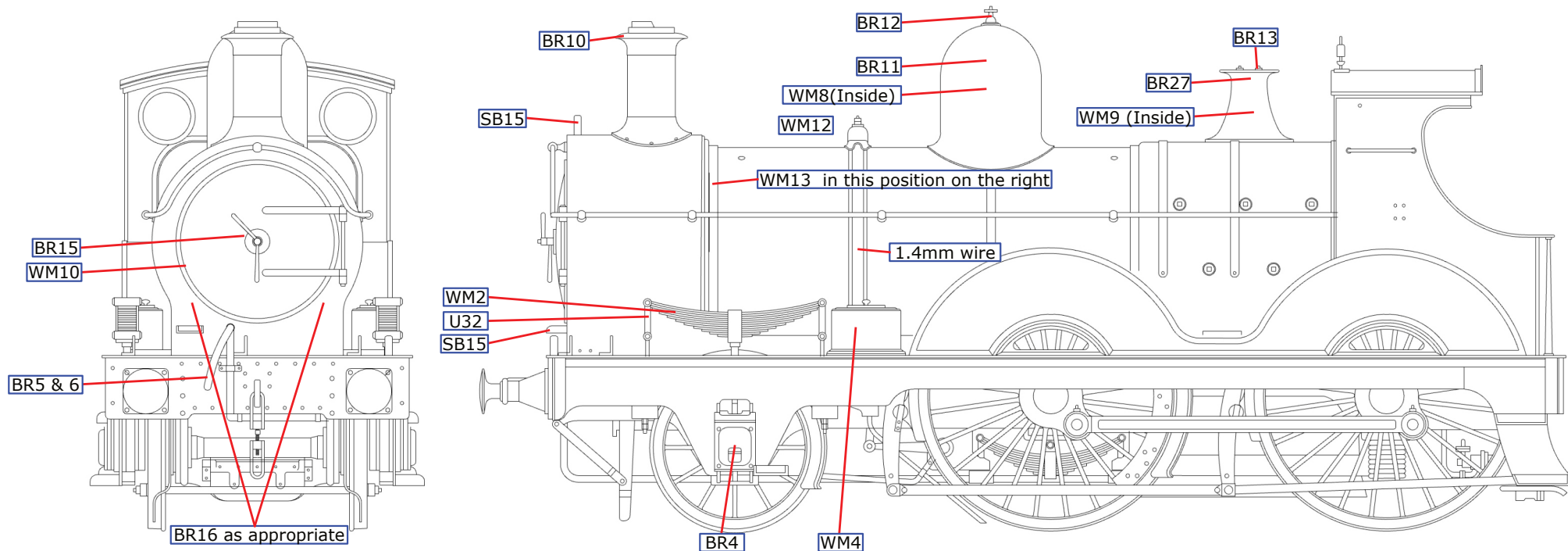
Prepare and fit the buffer stocks (WM5) as shown. Fit the vacuum pipe (BR5) and the vacuum pipe dummy (BR6).

No.	Description	Sheet
SB14	Angle between firebox and cab	3
SB15	Smokebox lamp bracket	2
SB16	Step on smokebox front	2
SB17	Step left side of smokebox	2



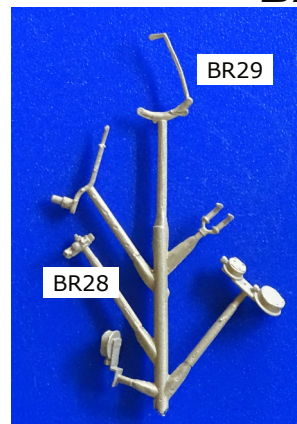
1. Drill the casting through 2mm. Fit the bush into the casting.
2. Fit the spring onto the buffer and place into the casting. Secure with a small (16BA) washer

Buffer Construction

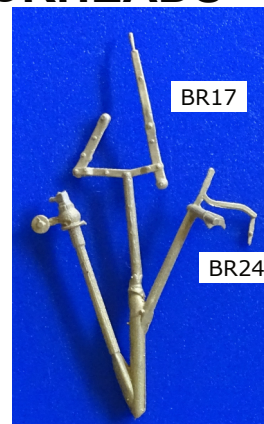


BACKHEADS

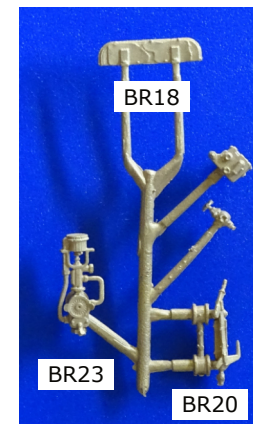
Use the drawing of the cab interior to assemble the backhead and the cab interior detail. Use copper wire of a suitable size for the pipes. Solder the backhead to the cab floor to make a removable unit.



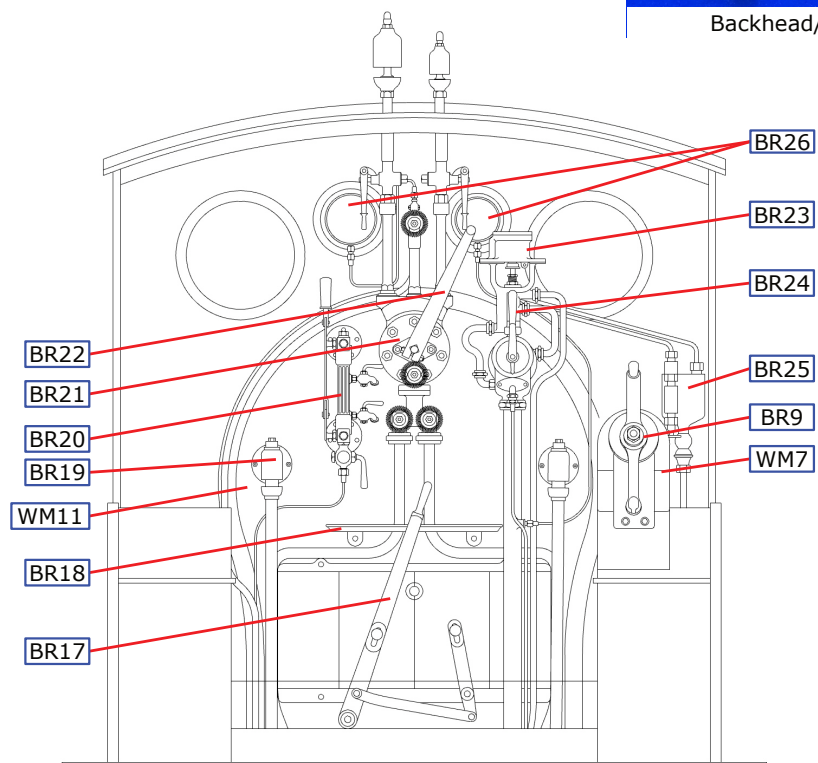
Backhead/1



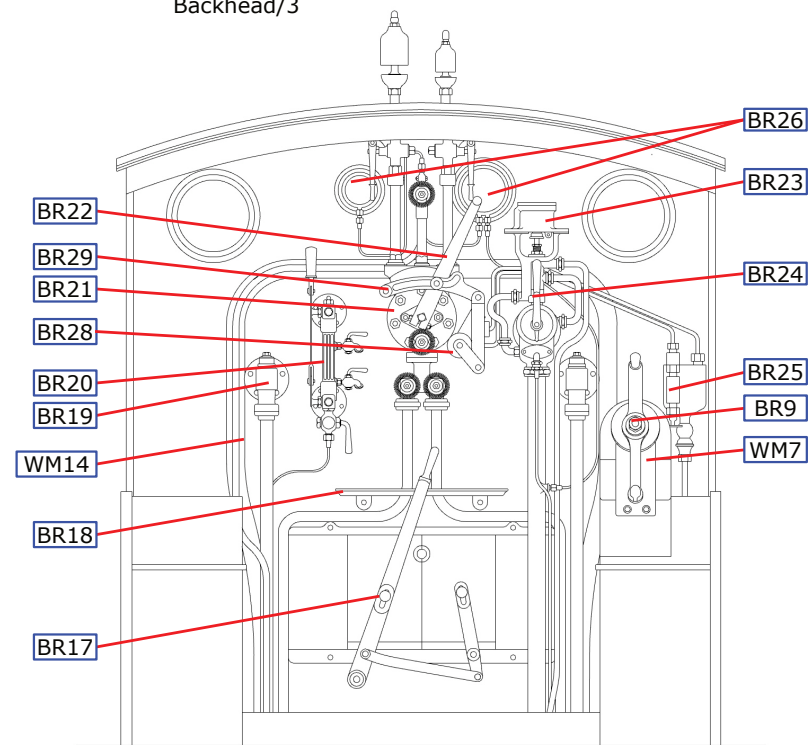
Backhead/2



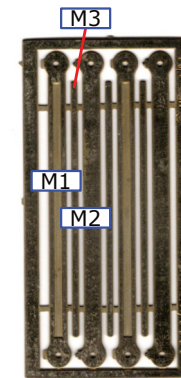
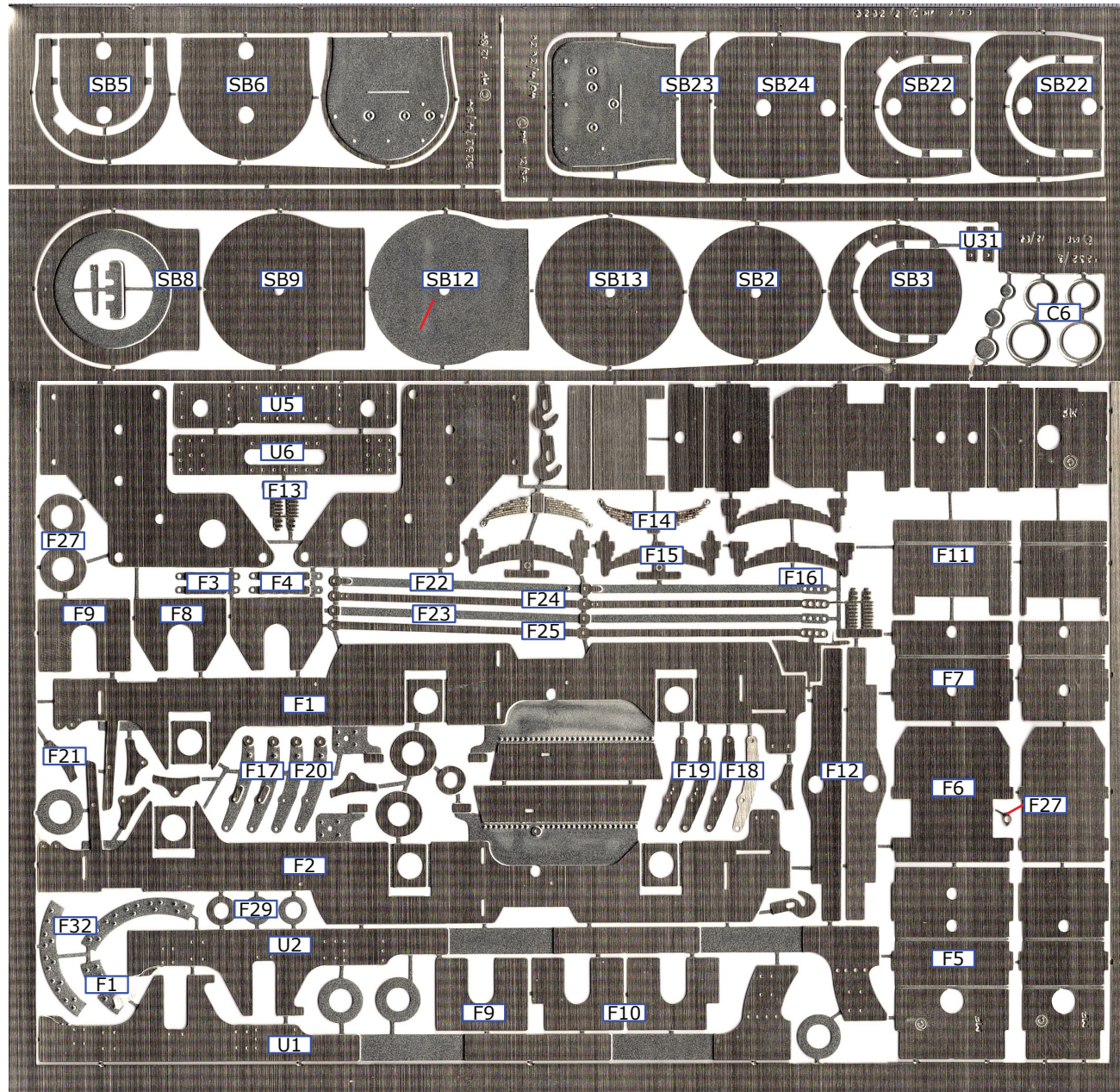
Backhead/3

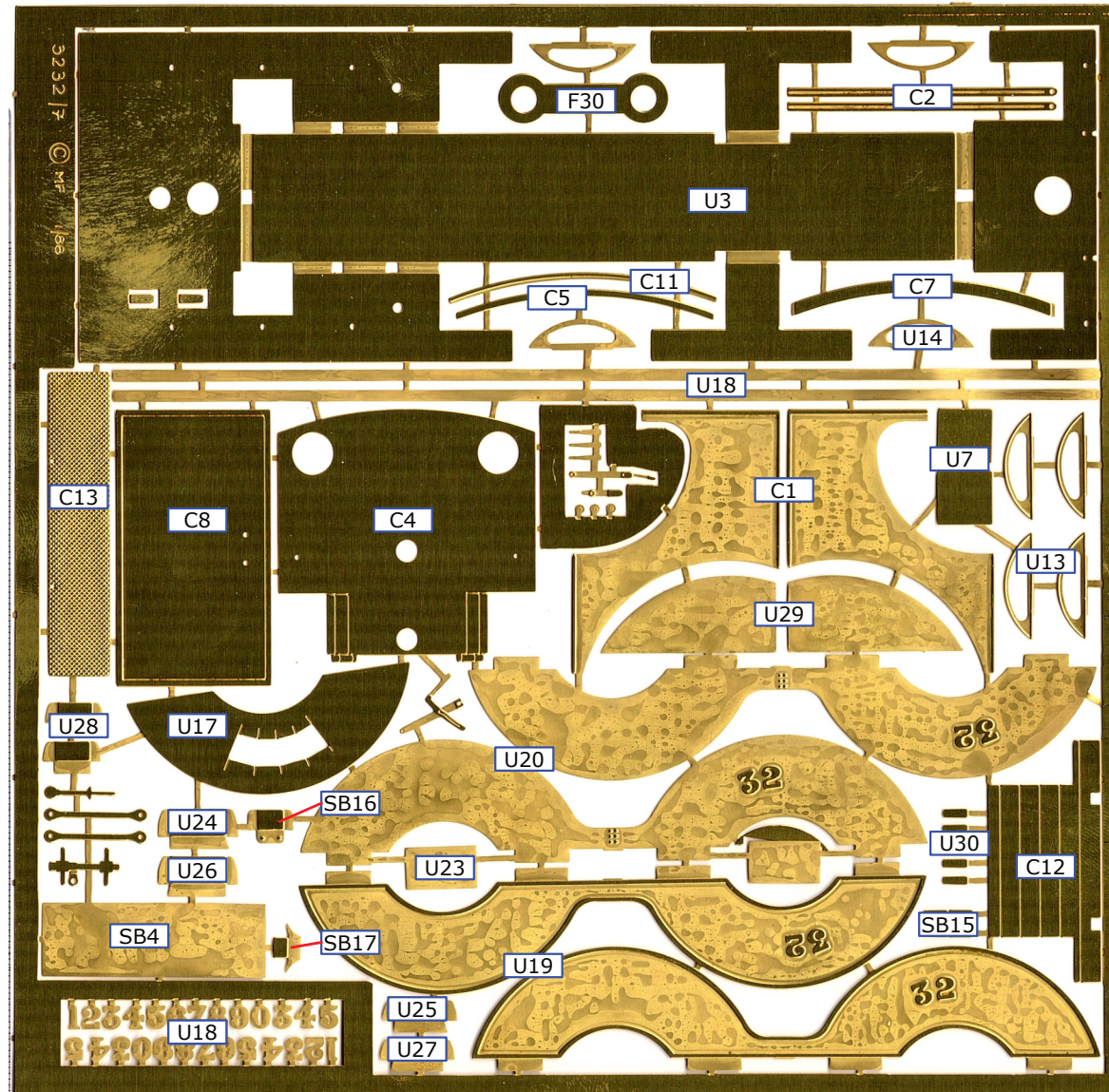


Cab with S4 Round Top Boiler

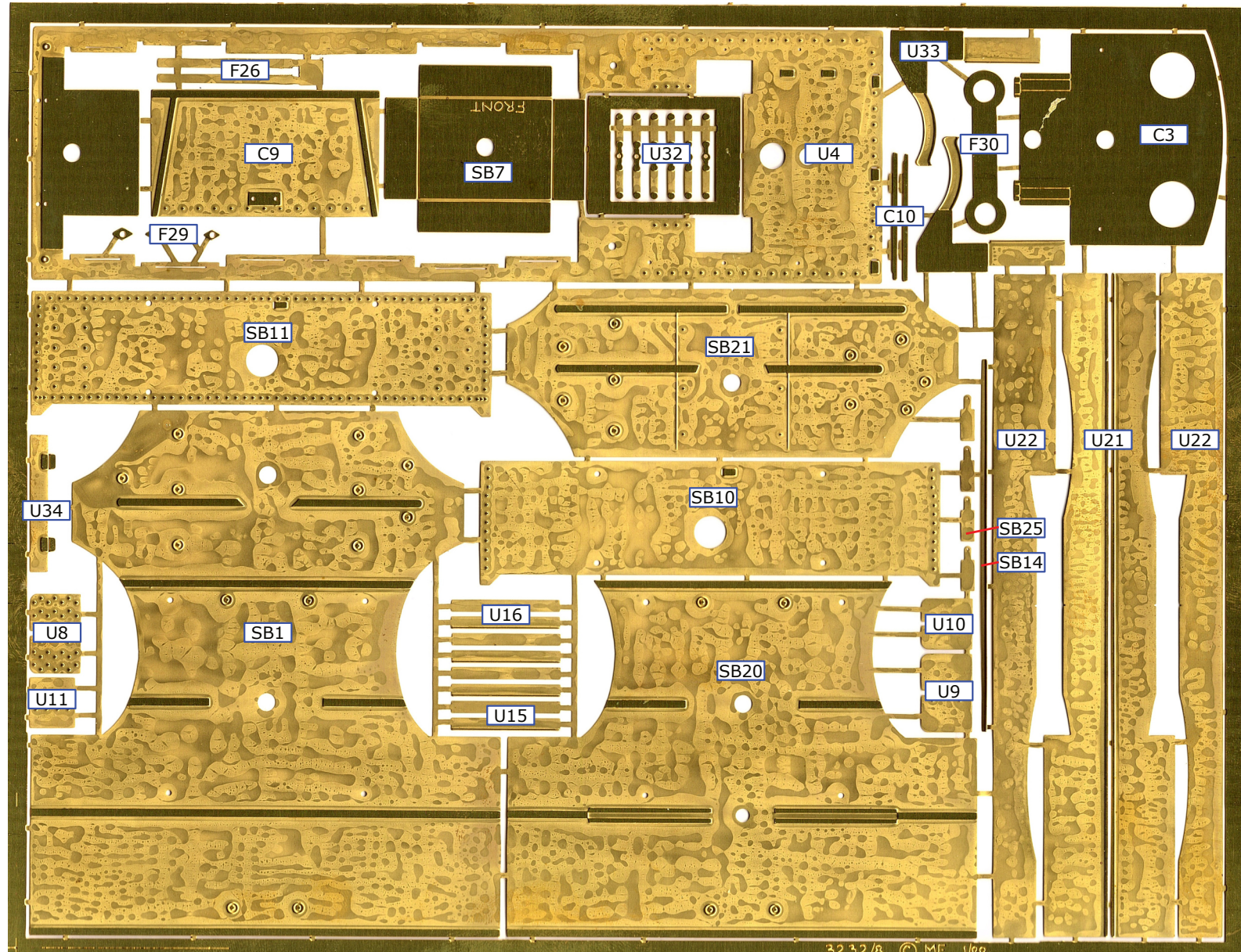


Cab with B4 Belpaire Boiler





47XX B SHEET 1



3232/B © MF 1/88

BRASS CASTINGS

CU1	Parallel chimney	Atbara/2	BR10	Chimney (parallel)	3232/1	BR21	Regulator mounting	3232/6
BR1	Left steam brake cylinder	Cab/1	BR11	Dome	3232/2	BR22	Regulator handle	3232/5
BR2	Right steam brake cylinder	Cab/1	BR12	Dome lubricator	3232/3	BR23	Combined ejector/brake	Backhead/3
BR3	Leading axle spring damper (4)	Atbara/1	BR13	Safety valves (2)	Details/1	BR24	Combined ejector/brake handle	Backhead/2
BR4	Leading axlebox (2)	3232/3	BR14	Round top firebox safety valve casing	Duke/6	BR25	Sightfeed lubricator	3232/5
BR5	Vacuum pipe	3232/3	BR15	Smokebox door handles	3232/4	BR26	Cab pressure gauges	Atbara/1
BR6	Vacuum pipe dummy	2251	BR16	Steam lance cock	Duke/3	BR27	Belpaire firebox safety valve casing	1854/2
BR7	Large whistle	Atbara/1	BR17	Firebox door handle	Backhead/1	BR28	Jockey valve	Backhead/1
BR8	Small whistle	Atbara/1	BR18	Backhead shelf	Backhead/3	BR29	Linkage between jockey valve & regulator	Backhead/1
BR9	Screw reverse handle	3232/6	BR19	Clackbox	3232/5	BR30	Injector (2)	3232/3&4
			BR20	Water gauge	Backhead/3			



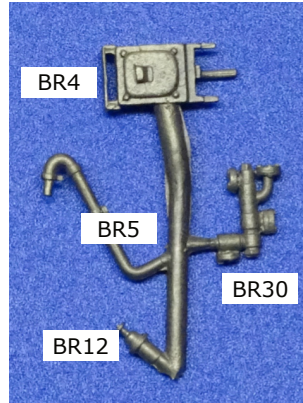
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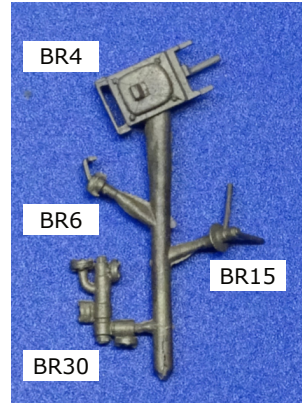
Duke/6



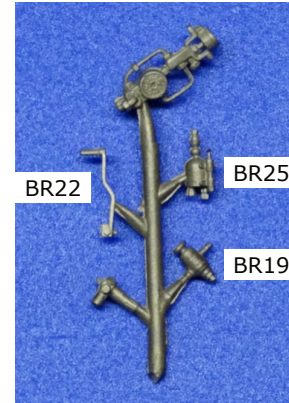
3232/2



3232/3



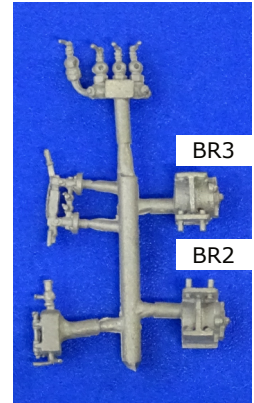
3232/4



3232/5



3232/6



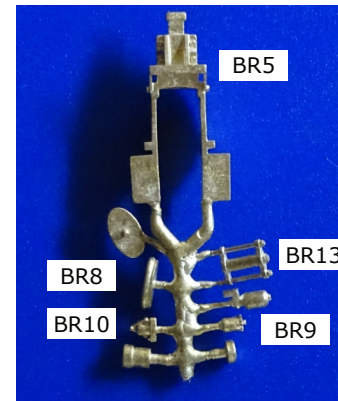
Cab/1



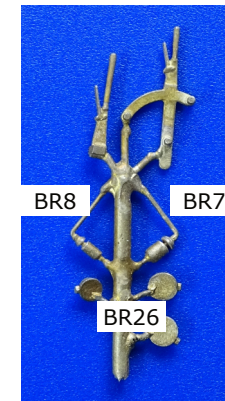
Duke/3



1854/2



Details/1

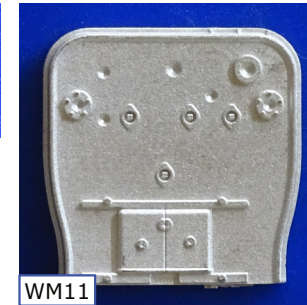
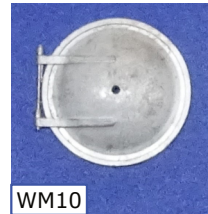
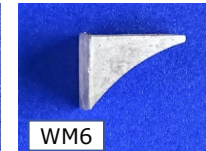
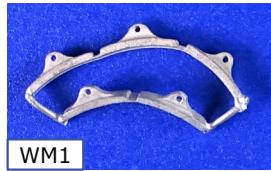


Atbara/1

Finney7

WHITE METAL CASTINGS

WM1	4	Brake shoe
WM2	2	Leading axle spring
WM3	2	Sandbox below footplate
WM4	2	Sandbox
WM5	2	Dean taper buffer
WM6	2	Splasher extension
WM7	1	Screw reverser
WM8	1	Inner of dome
WM9	1	Safety valve base
WM10	1	Smokebox door, early type with ring
WM11	1	Round top firebox backhead
WM12	1	Top feed
WM13	1	Smokebox pipe cover
WM14	1	Belpaire firebox backhead



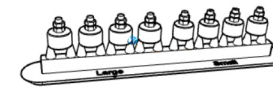
OTHER COMPONENTS

3/16" bore bearing - (6)
 3/16" brass tube - for leading axle - (2)
 6BA x 1" Cheese head screw (1)
 6BA x 5/16" Cheese head screw (2)
 6BA nuts (3)
 Short handrail knobs (12)
 Medium handrail knob (1)
 Variable length handrail knob & flange (4)
 Vacuum pipe hose
 4mm studding and nuts for firebox assembly

 1/8" brass wire for compensation beam pivot
 5/32" brass tube for compensation beams
 Steel wire 1.6 mm Steel wire 1.6 mm for front compensation beam
 Brass wire 0.45 mm for fallplate hinges and cab side handrails
 Brass wire 0.8 mm for brake hanger pivots and handrails
 Brass wire 1.2 mm for vacuum pipe & sand pipes
 Brass wire 1.4mm
 Copper wire 1.0 mm & 1.5 mm for backhead pipes
 Note. Screws may be supplied over-length and may require cutting to length.

RESIN CASTINGS

RS1 Leading small spring damper (4)



RS1

PACKING LIST 1

ETCHES

- 1 Frames 3232A7PT 78768
- 1 Valve Gear 3232B7PT 98003
- 1 Body 3232C7 PT 78785

SPRUES

- 1 MF7/3232/1
- 1 MF7/3232/2
- 1 MF7/3232/3
- 1 MF7/3232/4
- 1 MF7/3232/51
- 1 MF7/3232/6
- 1 MF7/3232/7
- 1 F7/GW/Details/1
- 1 F7/GW/Atbara/1
- 1 MF7/DUKE/3
- 1 MF7/DUKE/6
- 1 MF7/1854/2

WHITEMETAL

- 4 Brake shoe
- 2 Leading axle spring
- 2 Sandbox below footplate
- 2 Sandbox
- 2 Dean taper buffer
- 2 Splasher extension
- 1 Screw reverser
- 1 Inner of dome
- 1 Safety valve base
- 1 Smokebox door, early type with ring

- 1 Round top firebox backhead
- 1 Top feed
- 1 Smokebox pipe cover
- 1 Belpaire firebox backhead

OTHER COMPONENTS

- 6 3/16" bore bearing
- 2 3/16" brass tube - for leading axle
- 1 6BA x 1" Cheese head screw
- 2 6BA x 5/16" Cheese head screw
- 3 6BA nuts
- 12 Short handrail knobs
- 1 Medium handrail knob
- 4 Variable length handrail knob & flange
- 1 Vacuum pipe hose
- 2x 75mm 4mm studding, 4 brass & 4 stainless nuts

WIRE

- 35mm 1/8" brass wire
- 35mm 5/32" OD brass tube
- 25mm 1.6mm Steel wire
- 130mm0.45mm Brass wire
- 300mm0.8mm Brass wire
- 458mm0.8mm Brass wire
- 300mm1.2mm Brass wire
- 100mm1.4mm Brass wire
- 220mm0.8mm Copper wire
- 50mm 1.5mm Copper wire

INSTRUCTIONS