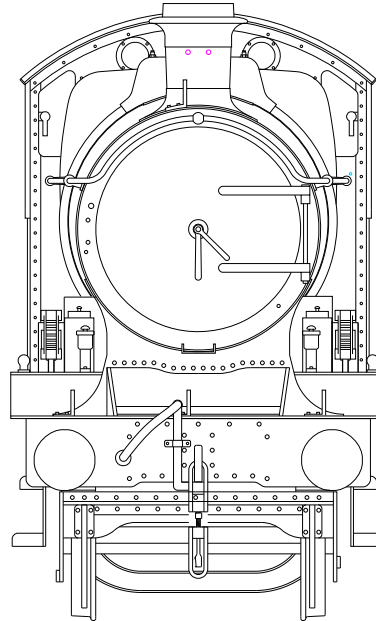


Finney7

GWR CITY



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 prototype of this most famous of GWR 4-4-O classes was the 'Atbara' class engine Mauritius rebuilt with the larger Standard No. 4 boiler in September 1902. Ten new engines followed in 1903 and nine more 'Atbaras' were similarly rebuilt in 1907-9.

For a detailed history of these classes, Part Seven of 'The Locomotives of the Great Western Railway' published by the RCTS is essential reading. Also useful are G.W.Engines Vol 2 by J.H.Russell, Standard Gauge G.W. 4-4-Os by O.S.Nock & Locomotives Illustrated 50 GWR double-framed 4-4-Os.

The following Swindon drawings were used to design this kit:

17849	3/1901	Lots 126,141	General arrangement
115623	10/1940		Inside motion

The locomotives were built under two Lots as follows:

Lot	Original Numbers	New 1912 Numbers	Built
126*	3400-3409	3700-3709	1902-9
141	3433 - 42	3710 - 19	1903

* Nos. 3400-3409 were rebuilt between 1902 and 1909 from Lot 126 Atbara locos which became members of the City class

Variations Possible With the Kit

Chimneys. Two different types are provided.

Safety valve casing. Caters for with or without top-feed.

Bogies. Many rebuilt to 'De Glehn' type without swing-hangers and fitted with strengthening patches. Some built with beaded bogie splashers.

Coupling Rods. These locomotives were built with fluted rods but many were subsequently fitted with plain rods.

Frame strengthening. The locomotives acquired frame strengthening plates surprisingly quickly, probably during their first major shopping around 1904-1906. They were first fitted with separate plates for each axle. Later larger, one piece plates were fitted to some of the class.

Smokebox. Originally quite short. Later front and back rings had snap head rivets.

Smokebox saddle. Early flush rivets, later snap head rivets.

Sandboxes. Originally fitted below the footplate on the leading coupled wheels only. Later larger sandboxes were fitted above the footplate on all driving wheels.

Cab roof. Initially a canvas covered wood affair, later changed to steel with two designs of rain strip.

Splashers. Initially built with beading, later the beading was removed and rivets were visible.

Leading coupled wheel splasher. Originally the locomotives were built with a beaded splasher, below the footplate, on the leading coupled axle which was gradually removed up to WW1.

Cab spectacle windows. Plated over during the late 1920s.

Vacuum pipe. Originally tall, later a shorter pattern was introduced.

TENDERS

When built the 'Cities' were fitted with standard Dean 3000 gallon tenders. Subsequently some acquired Churchward 3500 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.

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 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.

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 wheels - 5' 8", 18 spoke, 3/16" diameter axle (2). Slater's Ref. 78680/C

Until the Finney7 cranks are available we recommend fitting the MOK outside cranks.

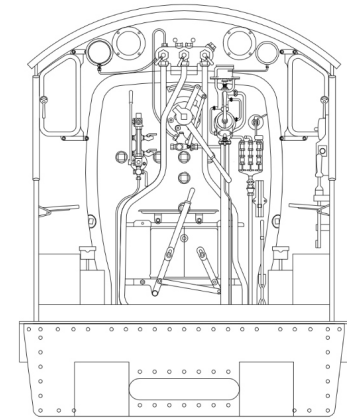
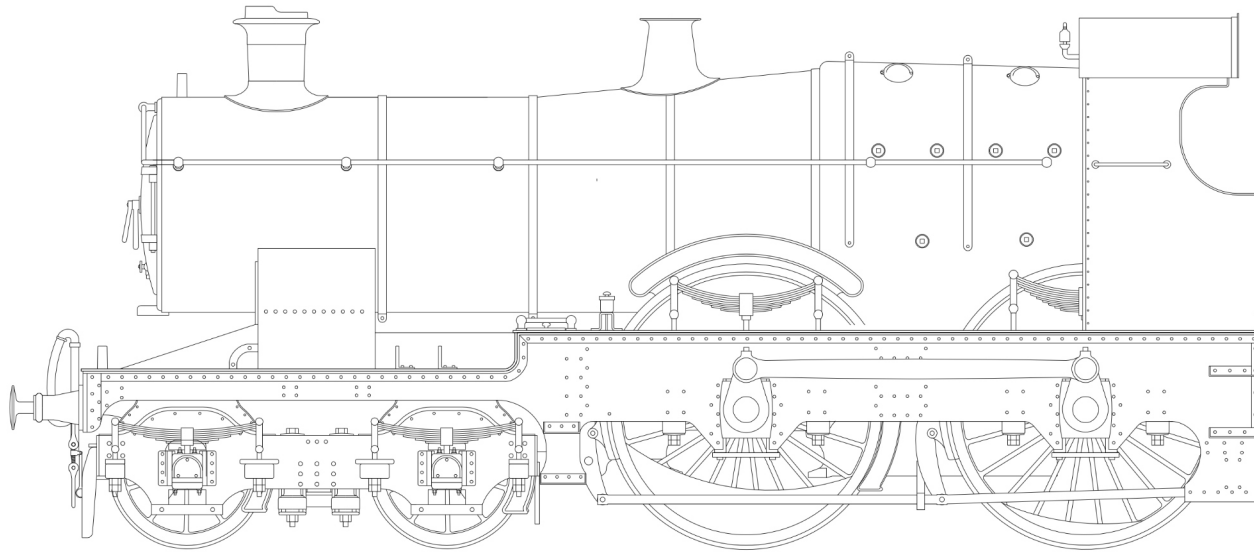
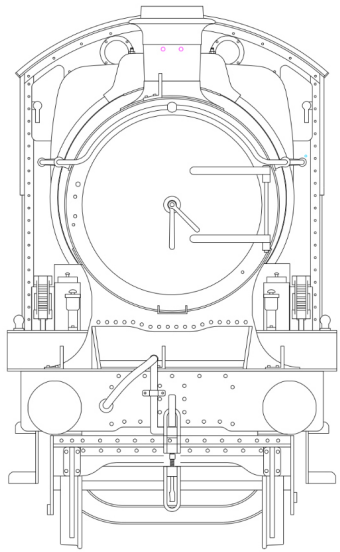
Bogie wheels - 3'7", 10 spoke, general pattern. Specify 2mm outside journals when ordering. Slater's Ref. 7843MF

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

Crankpins. Heavy duty crankpins are available from Finney7.

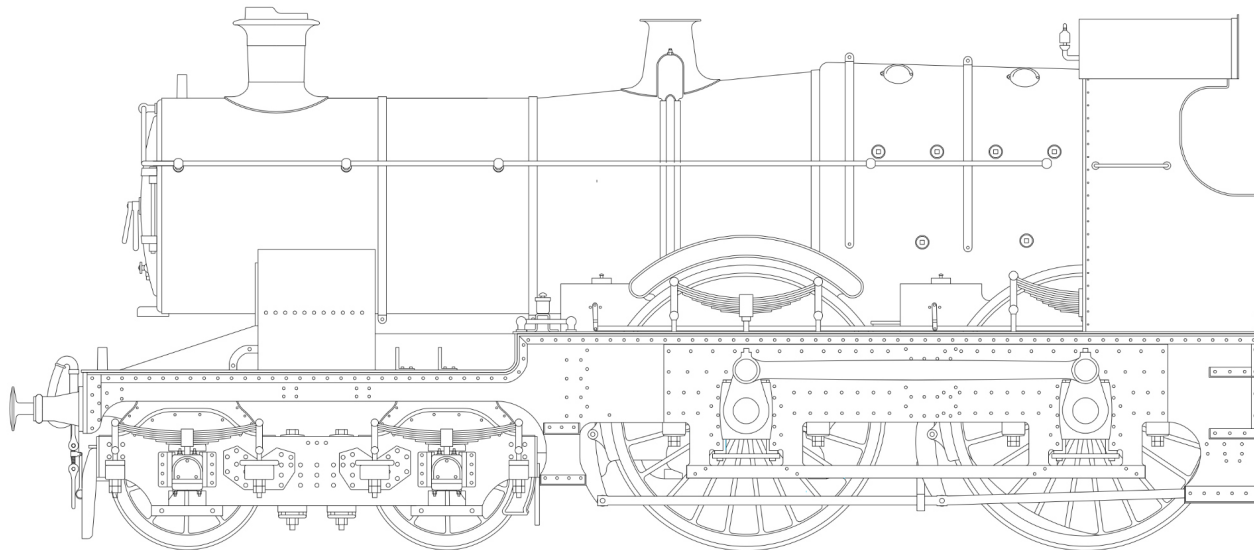
Inside motion. A separate kit is available from Finney7 to construct the working inside motion.

Finney7



City Class Locomotive GA as Built.

No top feed, splasher behind the leading coupled wheel, original bogie with splashers and full beading, high vacuum pipe, sandbox below the footplate.



City Class Locomotive GA as Running in the 1920s.

Top feed, one piece frame strengthening patch, large sandboxes above the footplate, copper capped chimney, deep frame bogie with strengthening patches, low vacuum pipe.

Finney7

BOGIE

There are several bogie options available and careful study of photographs is needed before you start. The options are:

Deep frames or shallow frames - remove the metal marked by the half etch line on the inside face.

Different rivet patterns - emboss those wanted.

Bogie frame patches (B3).

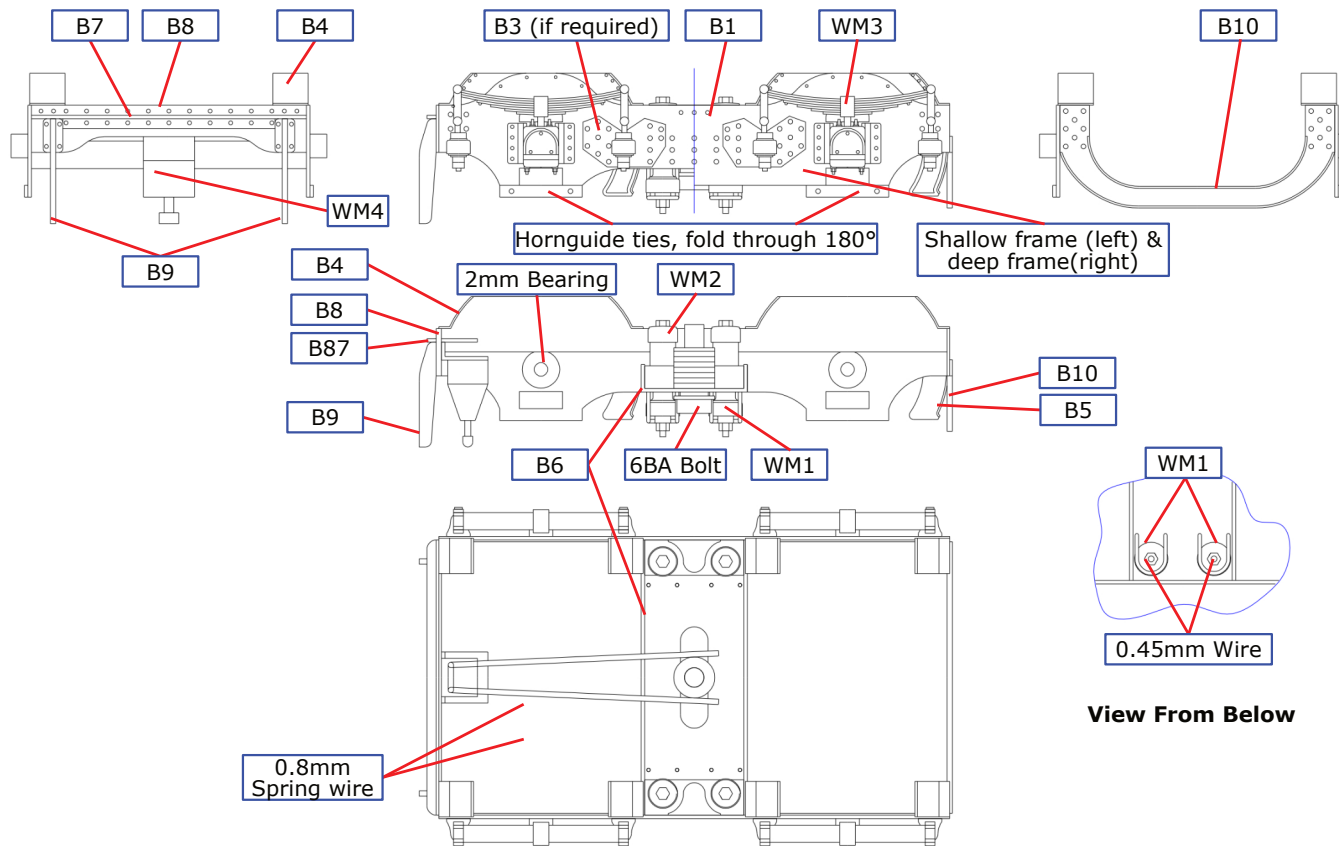
Splashers below the frame - remove for later period.

Swing hanger suspension or De Glehn type - omit the swing hanger castings for the De Glehn type.

First emboss all appropriate rivets including those in the hornguide ties. Fold over the hornguide ties through 180° and attach the strengthening patches (B3) if needed. Solder in the axle bearings. Form the splashers tops (B4) to shape. First mark a fold line 2.0 mm from one end, then fold to the required angle using the frame side as a guide and solder in place removing any excess from the top edge. If you have left the lower splashers in place solder the splashers rear cover (B5) to the rear splasher.

Fold the stretcher (B6) into a 'U' section and solder it to one frame locating it in the half etched groove. Now solder the second frame in place remembering to have the wheelsets in place at the same time. Check that the bogie is square and level.

No.	Description	Sheet
B1	Bogie left frame	B2
B2	Bogie right frame	B2
B3	Frame strengthening patch (2L & 2R)	A2
B4	Splashers tops (8)	B2
B5	Bogie splasher rear cover (2)	B2
B6	Bogie stretcher	B2
B7	Bogie front angle strip	B2
B8	Bogie front stretcher	A2
B9	Bogie guard iron (L & R)	A2
B10	Bogie rear stretcher	A2
B11	Bogie pivot washer (6BA)	A1



Insert the front angle strip (B7) through the slots in the front stretcher (B8) and attach the guard irons (B9) likewise. Solder the complete front stretcher in place. Repeat for the rear stretcher (B10).

Form the spring wire for the bogie side control as shown in the diagram, thread it through the two outer holes in the projecting tab in the front crossbeam and solder it in place. The side control wire will then act on either side of the bogie pivot and can be adjusted by bending the wire suitably.

Attach the lower swing hanger castings (WM1) through the larger holes in the spacer and make flush with the upper surface of the spacer. Attach the upper swing hanger castings (WM2) and the axlebox/spring castings (WM3). Form the safety brackets from 0.45 mm wire and solder in place through the small holes in the spacer.

Lastly if you are modelling the ATC gear attach the shoe (WM4) under the tab projecting from the front stretcher.

COUPLING RODS AND FRAME PREP

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. Choose between fluted (M1 & M2) or plain (M3 & M4) coupling rods.

First drill out all the crankpin holes to a convenient size which is undersized 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	Fluted coupling rod outer lamination (2)	A1
M2	Fluted coupling rod inner lamination (2)	A1
M3	Plain coupling rod outer lamination (2)	A1
M4	Plain coupling rod inner lamination (2)	A1
F1	Left main frame	A1
F2	Right main frame	A1

Frame Preparation. Having decided which chassis to construct you can now start construction by preparing the inside frames (F1 & F2). Form the frame joggle to narrow the frames from the rear of the bogie forward. Make the first bend inwards through 30° along the rear half etched line and strengthen the bend with a fillet of solder. Then make the second bend outwards in the same way.

Now open up the following holes in the frames, as shown in Fig 4:

P only if plunger pick-ups are being used

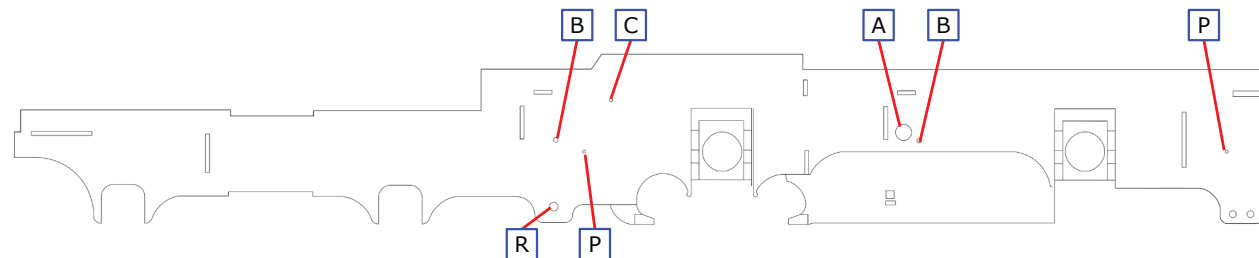
B for brake hanger pivots 0.8 mm

R for reversing lever cross shaft 1.6 mm

A for compensation beam pivot 1/8"

C If required, for mounting the steam reversing cylinder in the inside motion kit.

The last job on the frames is to emboss the rivets marked by half etched holes.



Frame Preparation

INSIDE FRAMES CONSTRUCTION 1

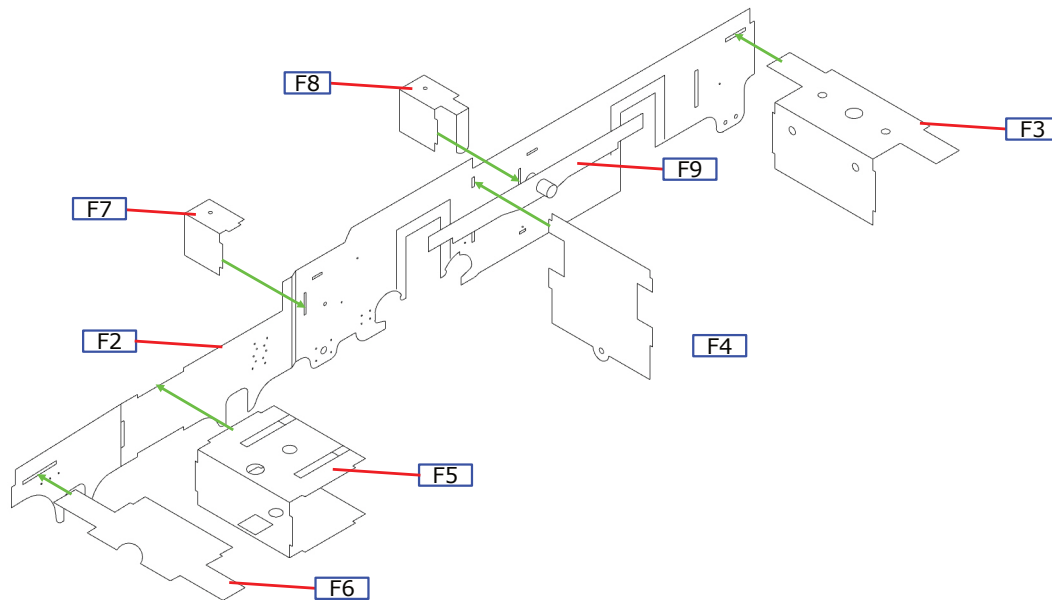
Frame Spacers and Assembling the Chassis. Remove the stretchers, rear (F3), firebox front (F4), cylinder block and bogie pivot (F5) and the front (F6) to suit your chosen gauge. If you are fitting inside motion open up the slots in the cylinder stretcher to the rear edge using the half etched lines as a guide and check the fit of the 3/32" brass cylinder tube in the slots. Tap the cylinder fixing hole 6BA.

Solder the 6BA bogie pivot nut in place on the cylinder block and bogie pivot stretcher. Fold up the cylinder block and front stretchers carefully, making sure that the half etched fold line is on the inside and that each bend is a right angle. Check that all tabs on the stretchers fit properly in their corresponding chassis slots so that the edge of the spacer is hard up against the inside of the frames. Match the shape of the frames to the front stretcher.

Now assemble the frames and stretchers. Start by tack soldering the rear spacer to both sides. Now check that everything is square and that the spacers are hard against the frames. Put an axle (or better a longer piece of 3/16" rod) 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.

Select the appropriate outside frame stretchers (F7 & F8) (those marked 18.83 if you have used the widest spacers or those marked EM if you have used the middle width spacers) and fold along the half etched line. The long tab on the rear stretcher folds down, after it is soldered in place, to retain the compensation beam

No.	Description	Sheet
F3	Rear frame spacer, 3 widths 9	A2
F4	Firebox frame spacer 10	A2
F5	Cylinder block frame spacer 11	A2
F6	Front frame spacer 12	A2
F7	Outside frame front spacer (2) 50	B1
F8	Outside frame rear spacer (2) 49	B1
F9	Compensation beam 15	A2
F10	3/16" Half etched spacer washer 47	B3
F11	3/16" Spacer washer 152	B3



INSIDE FRAMES CONSTRUCTION 2

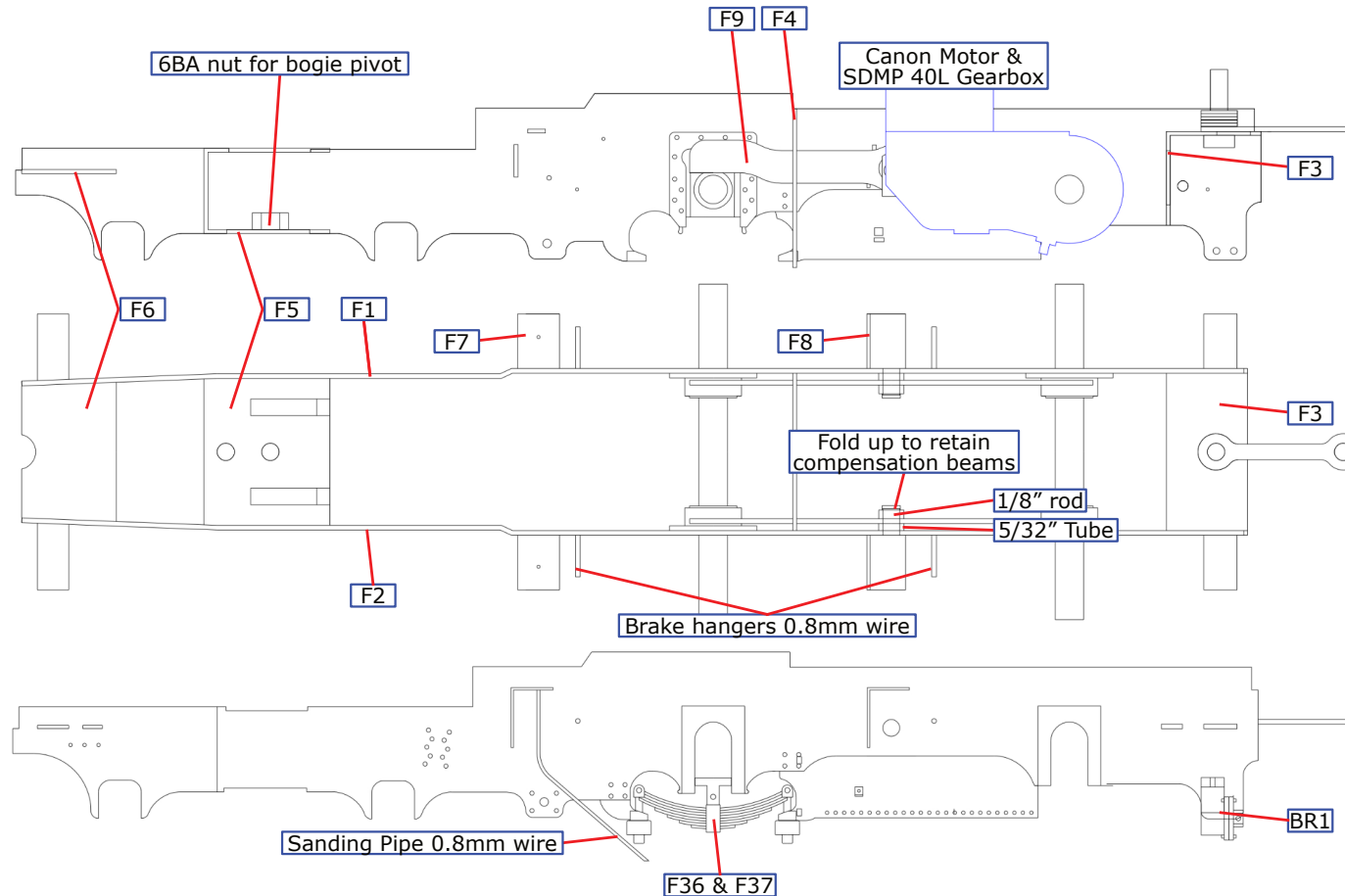
Fitting the Compensation Beams. Cut a piece of 1/8" brass rod so that it fits through the holes A and is flush with the outside face of the chassis frames.

Prepare two pieces of 5/32" brass tube. Each should have a length of 4.5mm if you have used the widest spacers or 3mm if you have used the middle width of spacers. Open up the hole to accept the brass tube in each of the compensation beams (F9) and solder the beams to the pieces of tube 1mm from one end.

Fit all the wheels and axles temporarily so that the beams are resting on the axle bearings and the bogie is mounted on its pivot supported by a suitable number of spacer washers (B12). Confirm that the compensation works properly and check if the chassis is sitting level.

To retain the beams first dismantle the chassis and then solder the pivot rod securely to the frames. Cut away the centre section of the pivot rod so that the beams will fit with the rod flush. The beams can now be retained, by folding down the tabs on the centre outside frame spacer.

No.	Description	Sheet
F3	Rear frame spacer, 3 widths	A1
F4	Firebox frame spacer	A1
F5	Cylinder block frame spacer	A1
F6	Front frame spacer	A1
F7	Outside frame front spacer (2)	B3
F8	Outside frame rear spacer (2)	B3
F9	Compensation beam	A1
F10	3/16" Half etched spacer washer	A1
F11	3/16" Spacer washer	B2



Inside Motion. If you are fitting working inside motion, build it next following the separate instructions.

OUTSIDE FRAME CONSTRUCTION

If you are fitting the frame strengthening plates (F14) the outside frames (F12 & F13) will need the rivets and horn block detail removing from behind where the strengthening plates will sit. Then widen the hornblocks so that the outside frame axleboxes will clear the outside frames to slide in the strengthening plates. The separate strengthening parts as shown in the drawing are made from F14.

Fold the outside axle boxes (F15) through 180° with the fold line outside and carefully solder together. Open out the axle holes to be a sloppy fit on the cranks/axle. These axle boxes are simply cosmetic. Check that these axle boxes are an easy fit in the slots in the outside frames, or the strengthening plates if these are to be used, and ease if necessary.

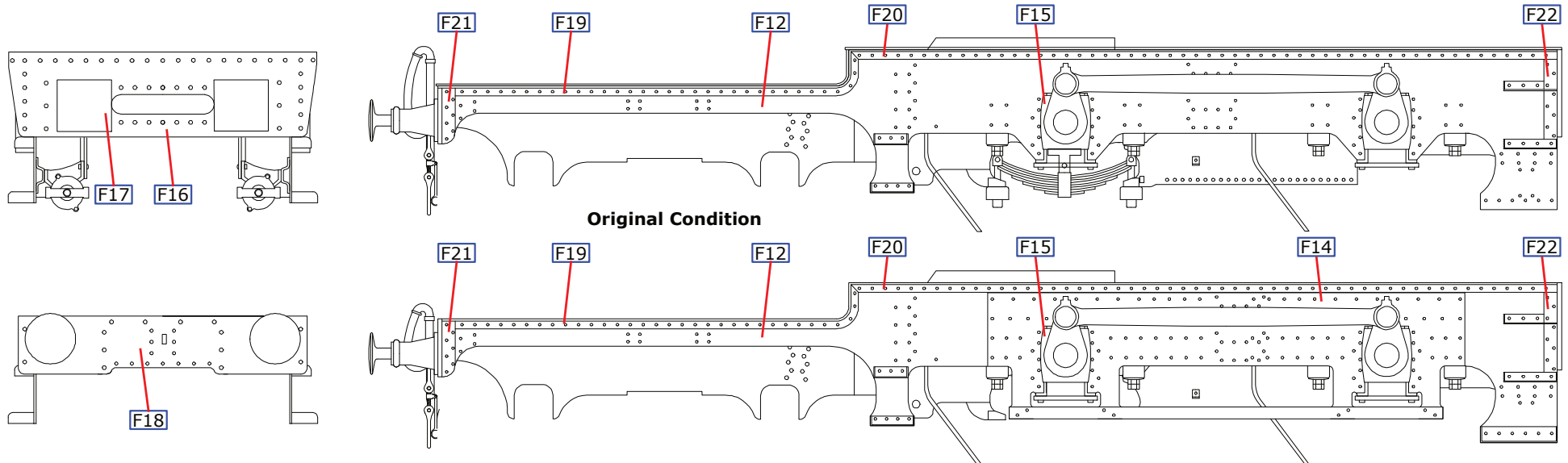
Emboss the rivets on the drag beam (F16) and attach the rubbing plates (F17). Solder the buffer beam (F18) and the drag beam to the inside frames locating the frames in the half etched slots with their upper edge .018" (0.45mm) above the upper edge of the frames. This will ensure that the frames fit the footplate. Any piece of .018" material placed on top of the frames will help ensure correct alignment.

Attach the outside frame rivet strips, front and rear (F19 & F20) to the top of outside frames. Solder the strengthening plates in position carefully checking that each one is in the correct position by trying the outside frame in place over the outside frame axleboxes. Solder short lengths of 0.8mm wire to the inside lower edge of the outside frames at each spring damper position to mount the spring dampers later. The positions are given by the distinctive rivet patterns.

Align the top of the outside frame with the buffer beam and drag beam and tack solder in place. Fit the axles and outside frame axleboxes and ensure the axles move freely. Attach the frame to buffer beam angle bracket (F21) between the frame and buffer beam and the frame to drag beam angle bracket (F22) between frame and drag beam.

Now fit and assemble the axles, wheels and motor. Retain the axleboxes in the horns with lengths of 0.8mm wire. Check that everything moves freely. When satisfied fit the cranks (BR1) to the axle ends. Fit the coupling rods and confirm that everything still moves smoothly.

No.	Description	Sheet
F12	Left outside frame	A1
F13	Right outside frame	A1
F14	Outside frame strengthening plate (2)	A1
F15	Outside frame axlebox (4)	A1
F16	Drag beam	B3
F17	Drag beam rubbing plate (2)	B3
F18	Buffer beam	B1
F19	Outside frame rivet strip front (2)	B1
F20	Outside frame rivet strip rear (2)	B1
F21	Frame to buffer beam angle bracket (2)	B3
F22	Frame to drag beam angle bracket (2)	B1



Later Condition, With One Piece Strengthening Plate

FINISHING THE CHASSIS 1

Assemble the brake hangers (F23) first embossing the rivet on each lamination. The front of each hanger is detailed with the brake hanger safety bracket (F24), as shown in the diagram, one of the small holes in the back of the safety bracket locating on the previously embossed rivet. Attach the hangers to the pivot wires.

Attach the steam brake cylinders, left and right (BR1 and BR2) to the frames. Note the cylinders are handed. Emboss the two rivets on the outer brake pull rods (F26) and fit together with the inner pull rods (F27) using 0.8mm wire as shown in the diagram. They are also attached either side of the steam brake cylinders.

Form and fit the brake pull rods safety brackets (F25) through the small slots in the ash-pan sides and under the pull rods.

Secure the balance weights in position using photographs as a guide to position.

No.	Description	Sheet
F23	Brake hanger & shoe lamination (8)	A1
F24	Brake hanger safety bracket (4)	B3
F25	Brake pull rod safety bracket (2)	B3
F26	Outer brake pull rod (2)	B3
F27	Inner brake pull rod (2)	B3
F28	Original front balance weight (2)	B3
F29	Original rear balance weight (2)	B3
F30	Balanced crank front balance weight (2)	B1 & B3
F31	Balanced crank rear balance weight (2)	B1 & B3

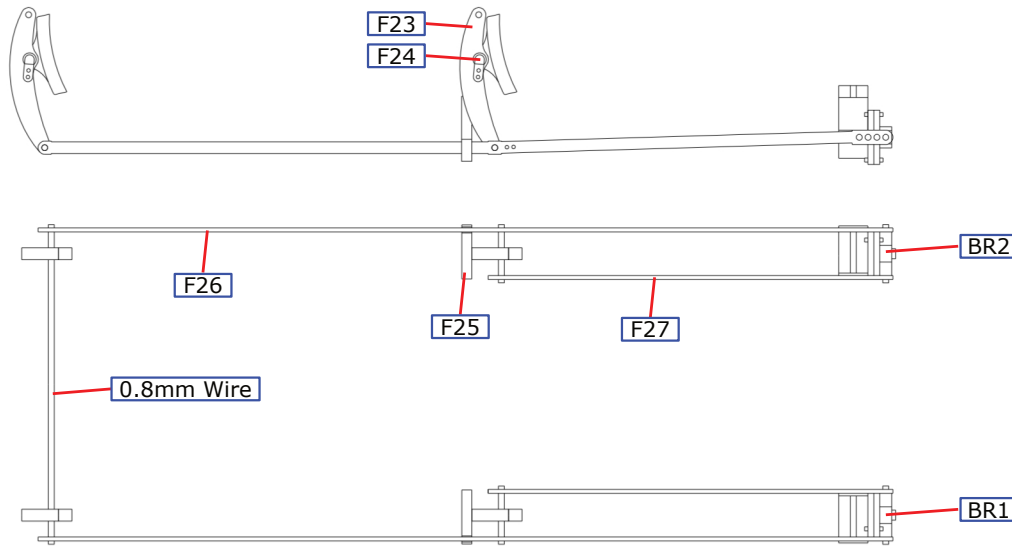
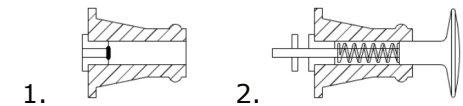
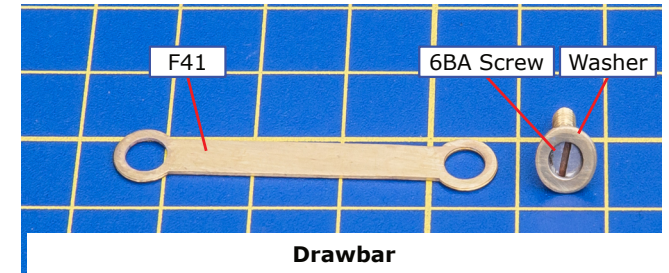


Fig 7. Brake Construction



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

FINISHING THE CHASSIS 2

Fold up steps (F32, F33, F33, F34 & F35) and attach to frames. There are four holes to align with the rivets on the upper step.

Fix the spring dampers, leading (small, RS1) and trailing (large, RS2) in place on the previously fitted wires.

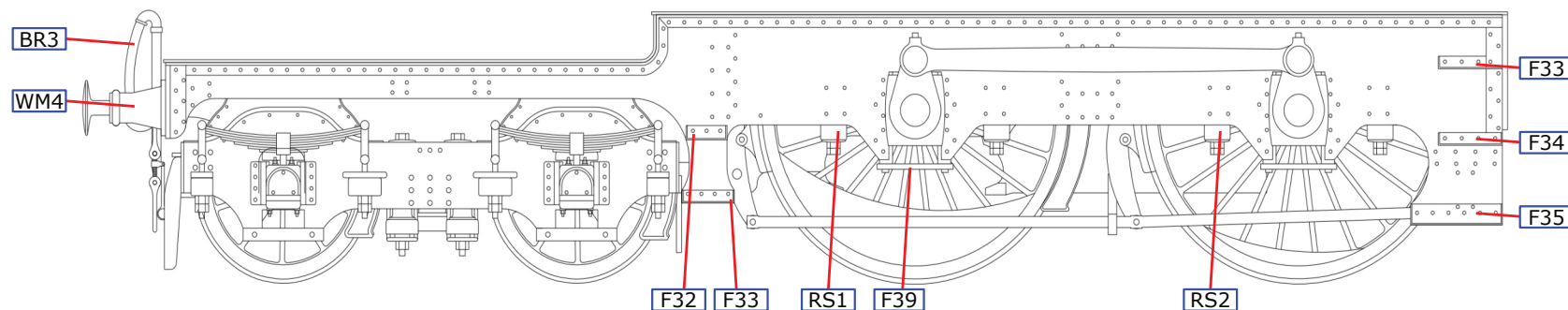
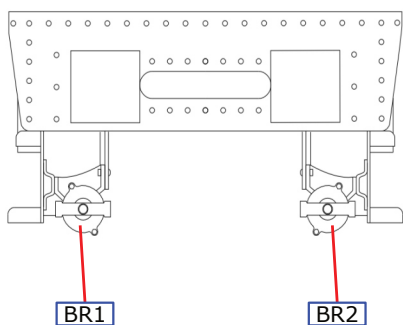
If appropriate fold up the leading wheel splasher (F38) and solder in place on the front of the outside frame front spacer.

Emboss the rivets on the outside frame hornblock tie (F39) and attach to the frames under the horn guides. If you have fitted strengthening plates fit the tie bar between frame strengthening plates (F40).

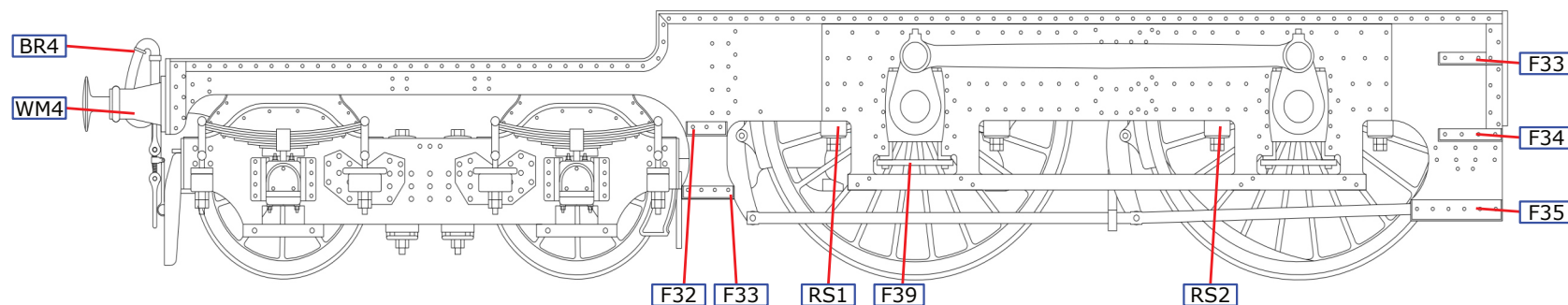
Form sand pipes from 1.2mm wire and attach through the holes in the outside frame spacers. Note: before the fitting of large sandboxes the engines only had sanding to the leading wheels.

Buffer Beams. Fit the either the early tall vacuum pipe (BR3) or the later short vacuum pipe (BR4). Fit the dummy (BR5) to the front buffer beam. Construct and fit the Dean buffers as shown below (WM4).

No.	Description	Sheet
F32	Front step upper tread	B3
F33	Front step lower tread	B3
F33	Rear step upper tread	B3
F34	Rear step middle tread	B3
F35	Rear step lower tread	B3
F36	Spring inner lamination (2)	A1
F37	Spring outer lamination (4)	A1
F38	Leading driving wheel splasher (2)	B3
F39	Outside frame hornblock tie (4)	A1
F40	Tie bar between frame strengthening plates (2)	B3
F41	Drawbar (3 lengths)	B3



Frame Detailing - Original Condition



Frame Detailing - Later Condition

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FOOTPLATE 1

Emboss the rivets on the footplate (U1) inside frame extensions.

Fold down the drop plates (valances) on the footplate and then fold the footplate step ensuring that the front drop plates sit outside the rear drop plate. Solder the corners and the drop plates where they overlap at the step. The four 'legs' on the rear side edges ensure that the footplate will stand level on a flat surface during construction. Solder the footplate strengthening plates (U2) to the drop plates. The half etched slots will accommodate the springs and spring hangers later so ensure the plates are accurately aligned. File off the top edge of the strengthening plates flush with the surface of the footplate.

Fold up the inside frame extensions, the front angle, the cab floor support and the lamp brackets.

No.	Description	Sheet
U1	Footplate	B3
U2	Footplate strengthening plate (2)	A1
U3	Footplate front overlay	B3
U4	Footplate rear overlay	B3
U5	Splasher face with beading (2)	B3
U6	Splasher face with rivets (2)	B3
U7	Plain front splasher top (2)	B2
U8	Plain rear splasher top (2)	B2
U9	Riveted front splasher top (2)	B2
U10	Riveted rear splasher top (2)	B2
U11	Cab floor support	B2

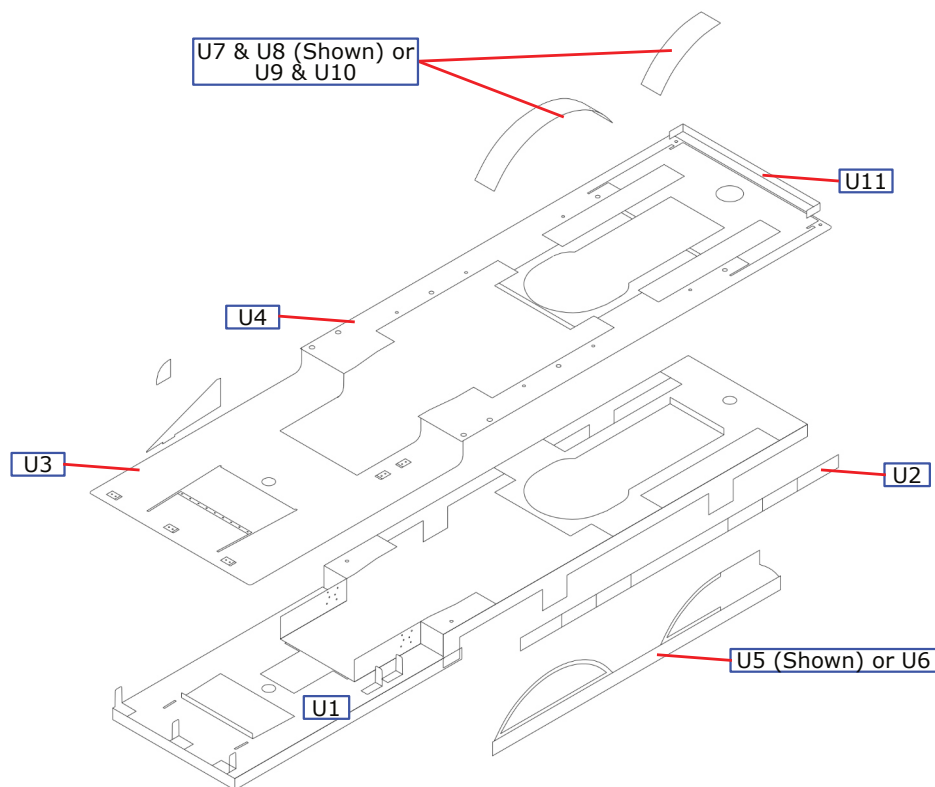


Fig 9. Footplate Construction

Prepare the footplate overlays (U3 & U4) by embossing the rivets under the lamp brackets and folding up the cab floor supports. The curve in the rear of the front overlay is formed over a 3.5mm drill shank. Place the front overlay over the footplate so the lamp brackets pass through the holes provided and the body fixing hole aligns and solder them together all round. Similarly solder the rear overlay in place.

If you are fitting inside motion remove the section of footplate under the smokebox saddle. This is marked by a half etched line on the underside of the footplate. (We have no drawing.) This opening must then be widened by 3.0mm on each side. (We assume that the line is in the wrong place and would welcome confirmation.)

Solder the splasher faces, beading or riveted (U5 or U6) inside the footplate edge so that their bottom edge is level with the bottom edge of the footplate side.

Curve the splasher tops, plain or riveted (U7 & U8 or U9 & U10) by rolling underneath a suitable rod or dowel on a piece of rubber sheet. Solder in place.

Solder a 6BA nut over the rear body fixing hole and reduce its thickness so that the cab floor will fit. Solder the cab floor support (U11) in place.

Now build the cab and boiler before returning to this page for the final detailing.

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FOOTPLATE 2

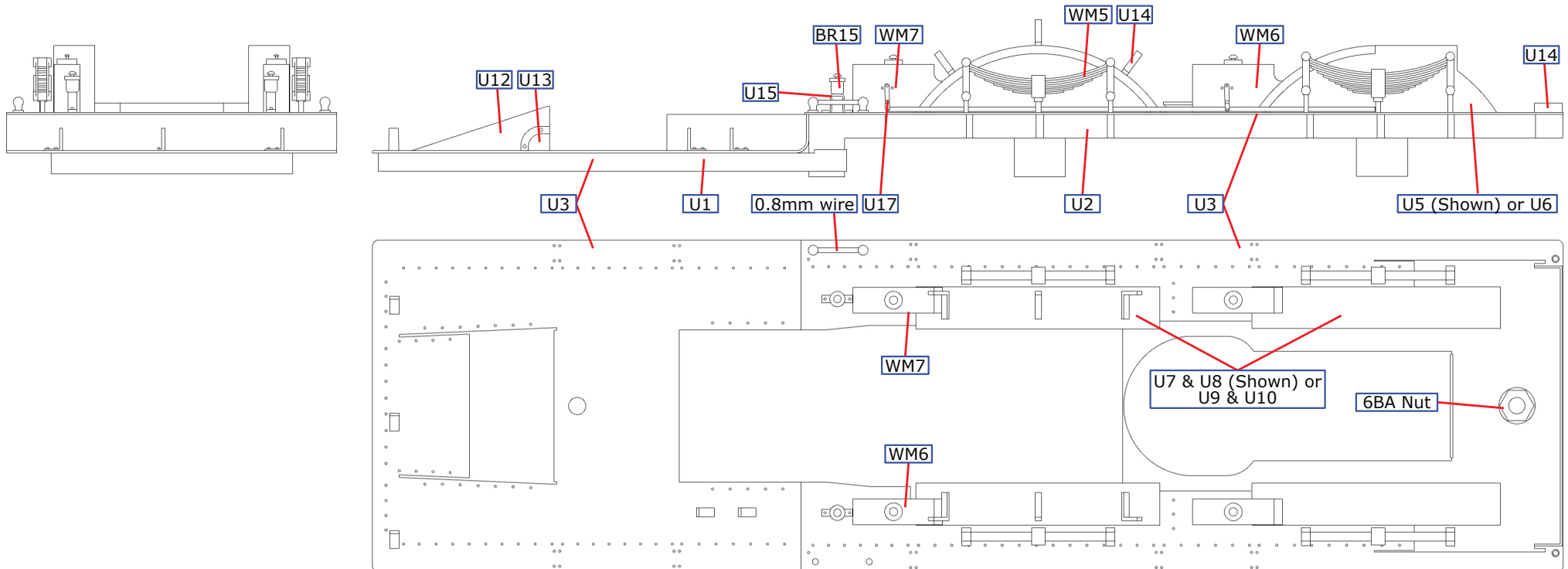
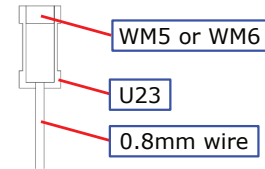
Final Detailing. Emboss the rivets on the footplate front frame extensions (U12) and solder to the front of the footplate. Then attach the cylinder cover overlays (U13).

Springs. Form the spring shackles (U23) and solder on a short length of 0.8mm wire. Fix the shackles through the holes in the footplate soldering the wire in the grooves in the footplate strengthening plate. Attach the small leading springs (WM5) and the large trailing springs (WM6). The 'legs' on the footplate edge should now be removed.

Solder the nameplate brackets (U14) in place. Bend up the footplate mounted lubricator bracket (U15) and attach; fit the lubricators (BR6).

Make the footplate mounted handrails by using short handrail knobs and 0.8mm wire. Either fix the sandbox lids (BR8) to the footplate behind these handrails or mount the the large sandboxes, left and right (WM6 & WM7) on the footplate as shown below. Fit the operating rods (U17).

No.	Description	Sheet
U12	Footplate front frame extensions	B1 & B3
U13	Cylinder cover overlay (2)	A1
U14	Nameplate bracket (6)	B3
U15	Footplate mounted lubricator bracket	B3
U16	Spring shackle (6) (Not required)	B1
U17	Sandbox operating rod (2)	B2



Footplate Details

CAB 1

Emboss the rivets on the cab front (C1). From the inside fit either the porthole window frame (C2) or the porthole blanking plates (C3). Attach the window frames (C4) on the inside. The whistle plate (C5) appears on photographs of locomotives in later life; if required, solder in place. Solder the cab front in position.

Prepare the cab sides (C6) by embossing any rivet detail you wish to have. Attach the cut-out beading (C7) fitting the etched groove over the edge of the cab side. Form and fit the cab side handrails from 0.45mm wire and file off smooth on the inside. Assemble the cab seats (C8). They are designed to be working. Now remove the seat from the bracket and solder the bracket to the inside of the cab side. Refit the seat of leave until after painting. Solder the cabsides in position. They are correctly aligned when the cab side handrails are vertical. Fit the vertical handrails from 0.8mm wire. Solder the cab roof rear support (C9) between the rear edges of the cab sides.

Canvas Covered Wooden Roof. Curve the cab roof (C10) and solder in place with the front edge in line with the cabsides. Solder the battens (C11) between the half etched lines. Solder the side mouldings (C12) to the cab side under the roof. Solder the rear moulding (C13) to the roof rear support under the roof.

Steel Roof. Curve the cab roof (C14) and solder in place with the front edge in line with the cabsides. Solder the rear angle (C15) to the rear edge of the roof. Solder the rain strips (C16) to the side edges of the roof.

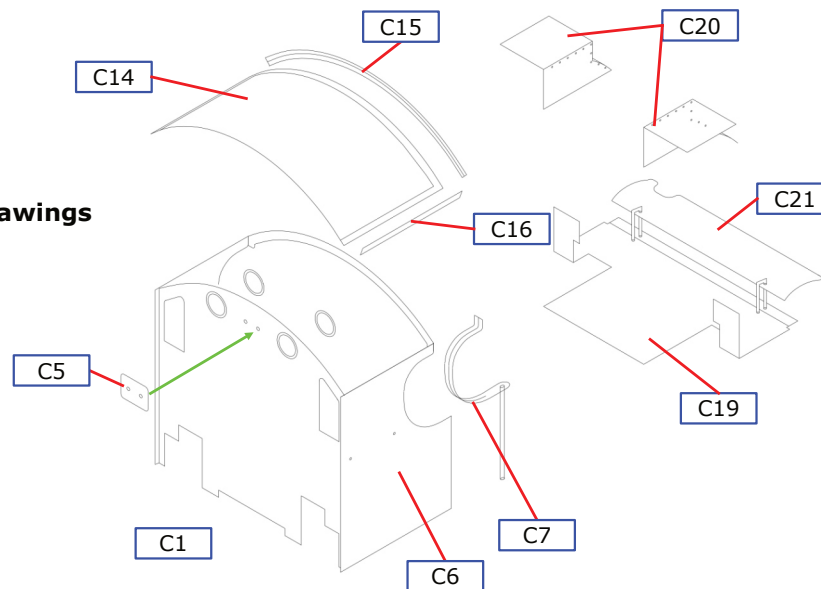
Steel roof with sloping rain strips. Curve the cab roof (C17) and solder in place with the front edge in line with the cabsides. Solder the rear angle (C15) to the rear edge of the roof. Solder the sloping rain strips (C18) into the slots in the roof.

Fold up the cab splasher rear section from the cab floor (C19). Fold up the cab splashers (C20) and then solder in place. Slightly curve the fall plate (C21) and hinge it to the floor as shown in the diagram before soldering the floor in place.

Fit the whistles, large and small (BR8 & BR9) to the cab front, the large whistle is on the left.

No.	Description	Sheet
C1	Cab front	B1
C2	Cab porthole window frames (2)	B3
C3	Cab porthole blanking plate (2)	B3
C4	Cab window frames (2)	B3
C5	Whistle plate	B3
C6	Cab side (2)	B3
C7	Cab side cutout beading (2)	B3
C8	Cab seat (2)	B1
C9	Cab roof rear support	B1
C10	Canvas covered wooden roof	B3
C11	Wooden roof battens (2)	B3
C12	Wooden roof side mouldings (2)	B3
C13	Wooden roof rear moulding	B1
C14	Steel roof	B3
C15	Steel roof rear angle	B3
C16	Steel roof rain strips (2)	B3
C17	Steel roof with sloping rain strips	B3
C18	Sloping rain strips (2)	B3
C19	Cab floor	B3
C20	Cab splashers (2)	B3
C21	Fall plate	B3

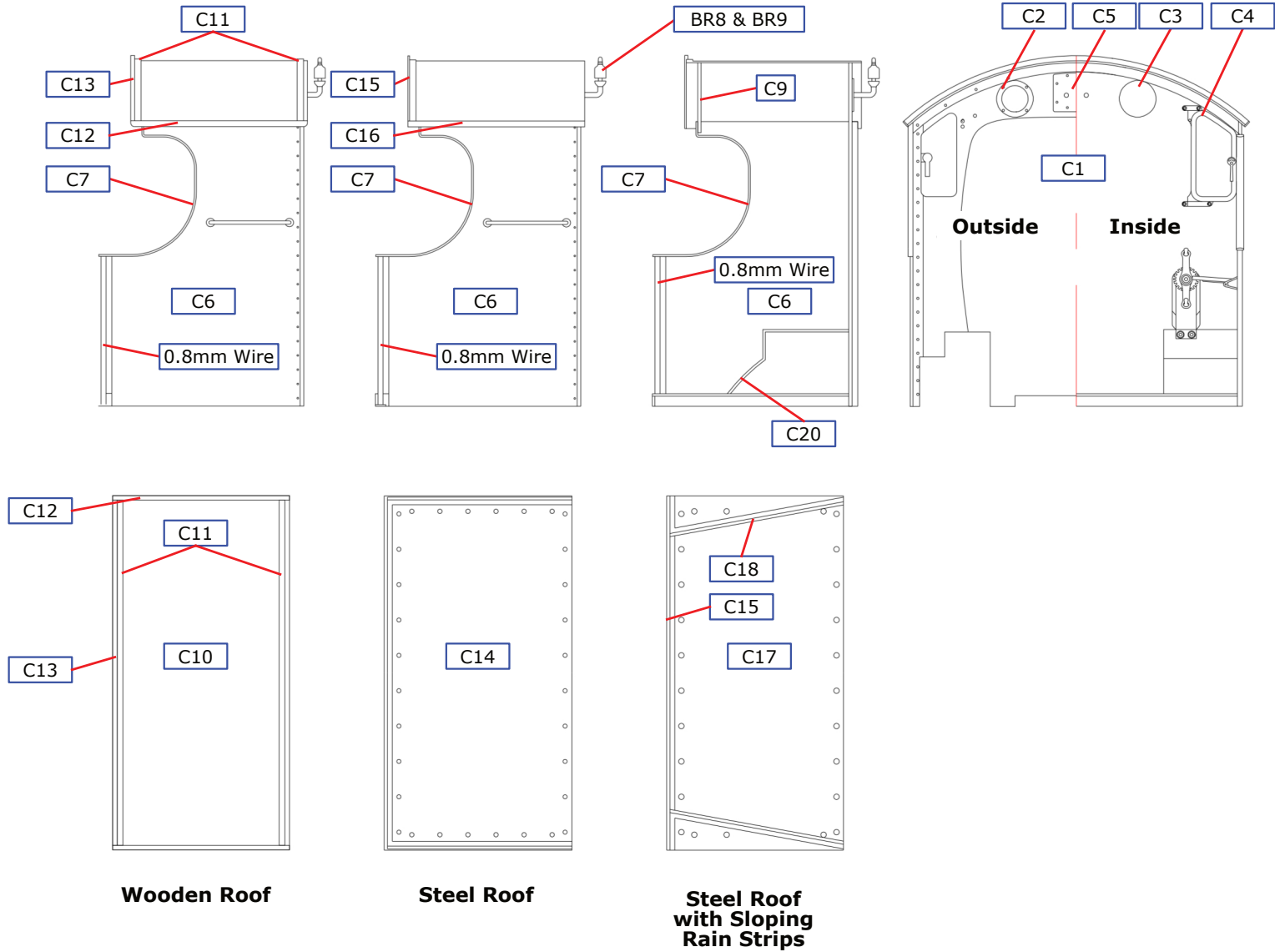
See page 15 for more drawings



Cab Construction

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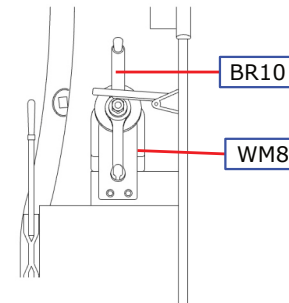
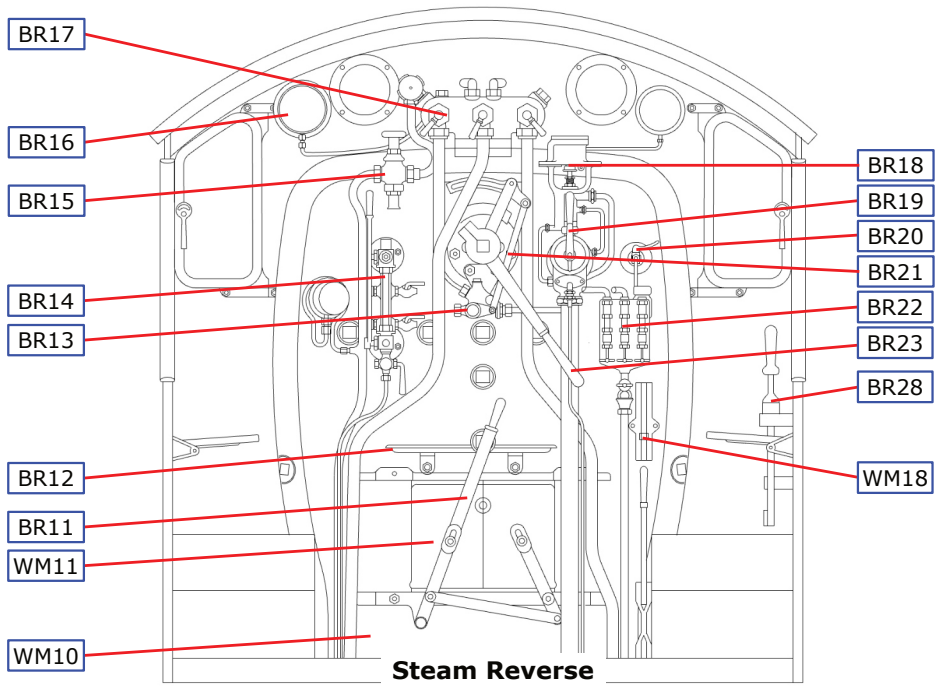
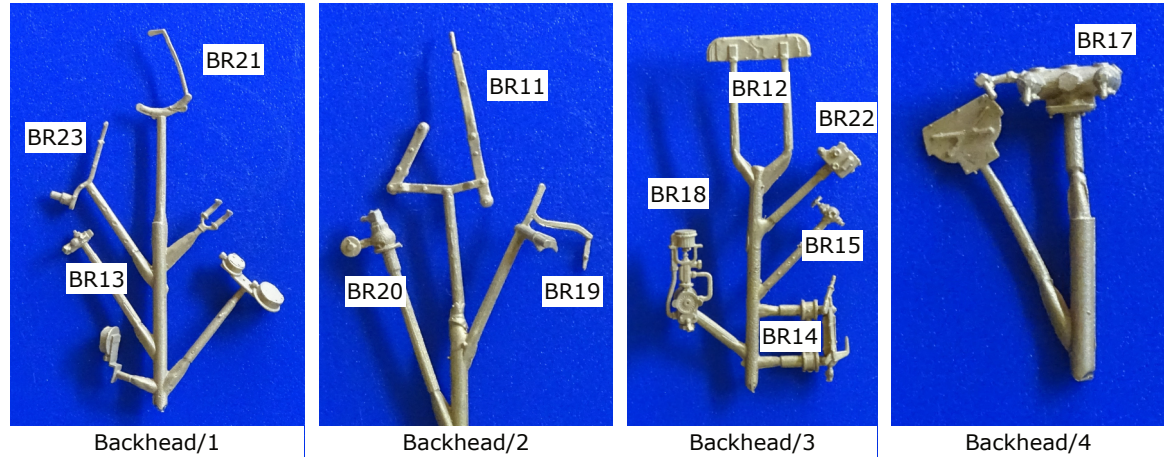
CAB 2



Cab Construction Details

CAB BACKHEAD

Backhead. The cab interior is largely based on the photograph in A Pictorial Record of Great Western Locomotives Vol 2. This shows an engine with steam reverse; parts are supplied to fit screw reverse (WM9 & BR10). Use the photograph and the drawings below to build the backhead. Use copper wire of a suitable size for the various pipes.



Screw Reverse

Fig 11b. Backplate Construction

FORMING THE BELPAIRE FIREBOX 1

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

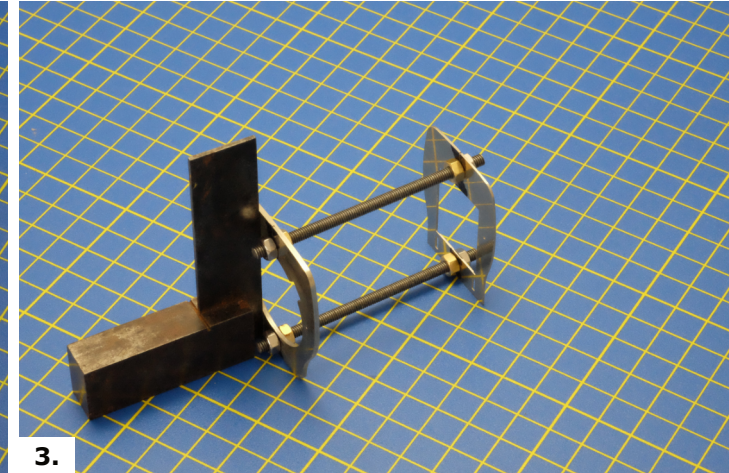
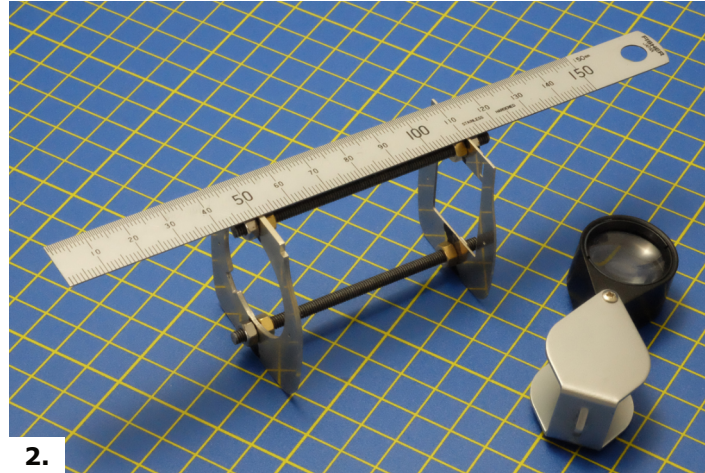
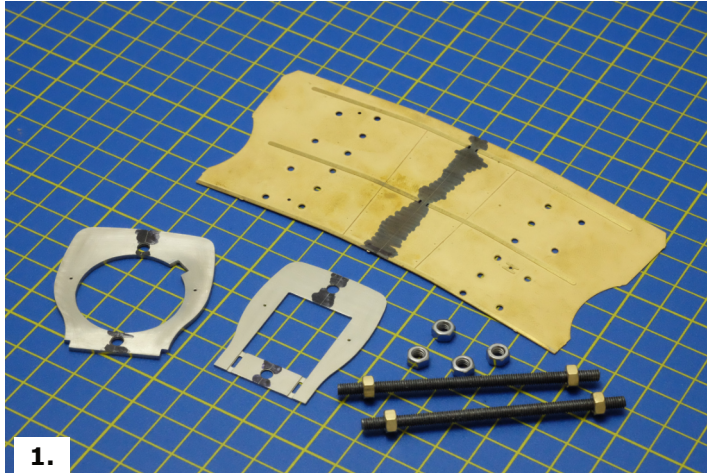
Photo 1. Solder together the two laminations of the firebox front (SB1) with top lamination (SB2). Clean the cusp off all parts, including the firebox rear former (SB3). Reduce the width of the lower faces of the firebox rear former so that it will fit between the frames in the locating groove in the 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 46.4mm. 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.

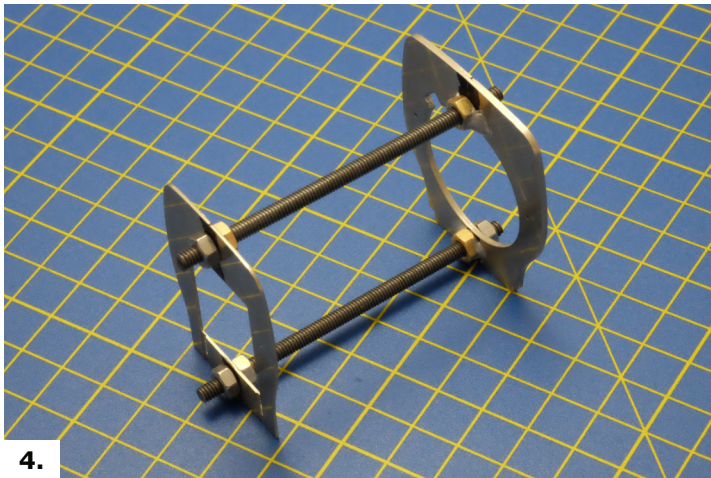
Photo 6. Tack the outside of the firebox at the centre and corners, both front and rear. Again, take care and check that the centres retain the alignment that we've worked so hard to achieve. Now work down the spacers alternating tacks left/right and front/rear to even out any expansion of the wrapper.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

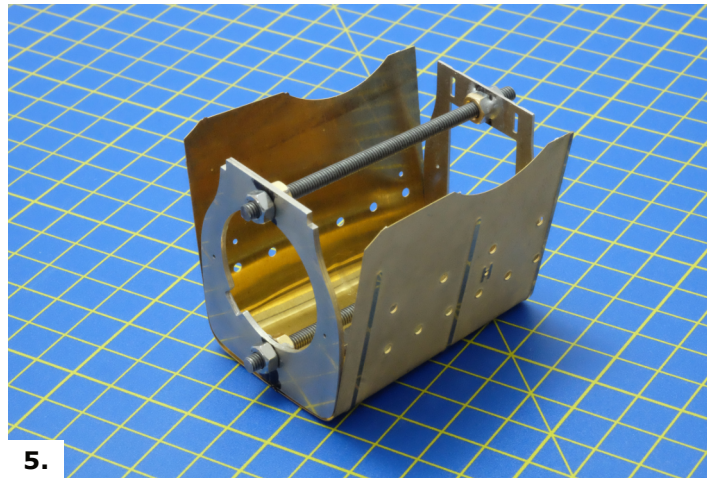
Run an extra fillet of solder into the internal front shoulders of the firebox to support the area which will be filed back. The brass nuts can be heated and removed. Remove the rear scrap section of the spacer.

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.

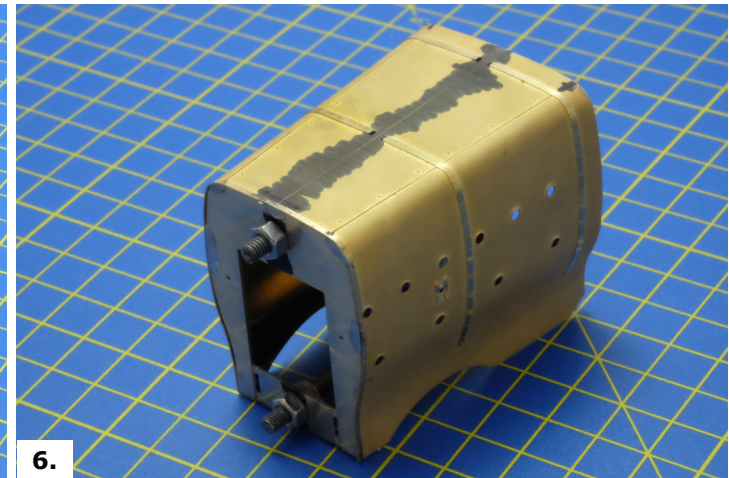
Fold the firebox band joining clips (SB5) into a 'U' shape, fit through the slots in the firebox top and solder in place from inside. Complete with a short piece of 0.45mm wire to represent the tightening bolt. Fix the mudhole doors (WM23) in place on the firebox.



4.



5.



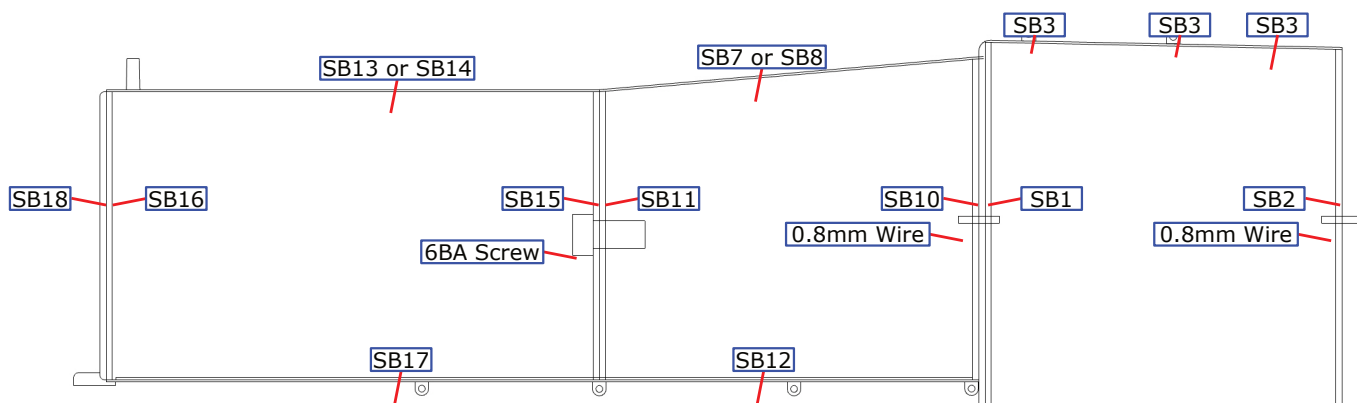
6.

BOILER AND SMOKEBOX 1

Boiler Cone. Before rolling the coned section of the boiler (SB7 or SB8) the boiler washout plugs can be drilled out and separate boiler washout plugs (SB9) used if you prefer. Emboss the rivets alongside the top feed pipes on SB7. Roll the boiler and check for fit around the formers, front and rear (SB10 & SB11). Bend the boiler band joining brackets on the coned boiler jointing strip (SB12) 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 jointing strip. Solder the formers in place so that they are almost flush with the ends. The cut-outs in the formers are to clear the jointing strip and the etched notch at the top of the rear former must align accurately with the notch in the wrapper. Solder two short pieces of 0.8mm wire into the holes in the rear former to act as dowels to locate the boiler and firebox. Check the boiler and firebox fit. Represent the bolts in the joining brackets using 0.45mm wire.

Smokebox and Boiler. For the early (non-superheated) condition prepare the smokebox/boiler wrapper (SB13) by shortening the smokebox on the wrapper by 5.25mm and then drill two new handrail knob holes 2.9mm from the front edge. Roll the wrapper (SB13 or SB14) and check the fit on the formers, front and rear (SB15 & SB16). Solder the wrapper ends together using the jointing strip (SB17) representing the fixing bolts with 0.45mm wire. Solder the formers flush with the back and front. The upper hole in the front former is for the handrail knob and the other two holes are for the alternative positions of the steam lance cock. Emboss the four rivets on the smokebox front overlay (SB18), drill through the appropriate lance cock hole and attach to the front of the smokebox aligning the handrail and lance cock holes. Bend up the smokebox step (SB19) after first embossing the rivets and solder in place under the smokebox front.

Tap 6BA the hole in the coned boiler front former and open out the hole in smokebox and boiler rear former to clear 6BA. With a 6BA screw, bolt the two boiler sections together and fix the boiler to the firebox by soldering the wire dowels to the firebox from inside.

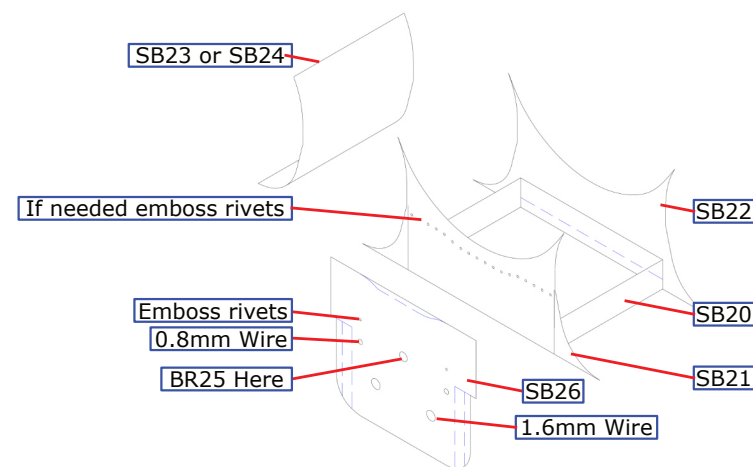


No.	Description	Sheet
SB7	Coned boiler wrapper with top feed	B1
SB8	Coned boiler wrapper without top feed	B1
SB9	Boiler washout plugs (4)	B3
SB10	Coned boiler rear former	A1
SB11	Coned boiler front former	A1
SB12	Coned boiler jointing strip	B3
SB13	Plain smokebox and boiler wrapper	B2
SB14	Riveted smokebox and boiler wrapper	B2
SB15	Smokebox and boiler rear former	A1
SB16	Smokebox and boiler front former	A1
SB17	Smokebox and parallel boiler jointing strip	B3
SB18	Smokebox front overlay	A1
SB19	Smokebox step	B3
SB20	Saddle spacer	B2
SB21	Saddle front	A1
SB22	Saddle rear	A1
SB23	Plain saddle side plates (2)	B1
SB24	Riveted saddle side plates (2)	B1
SB25	Lamp bracket (2)	B3
SB26	Cylinder front plate	B2

Saddle. Bend up the smokebox saddle spacer (SB20). If required, emboss the rivets on the saddle front (SB21), they appeared in later years. If you have fitted inside motion, remove the section below the half etched line on the saddle rear (SB22). Solder the saddle together with the spacer centrally positioned. Solder a 6BA nut over the hole on the saddle spacer.

Attach the saddle to the footplate with the 6BA mounting screw. Locate the boiler on the firebox and check the smokebox and saddle fit and alignment. Remember the bottom of the boiler is horizontal and so parallel to the top of the frames and the rear of the saddle is in line with the rear of the smokebox. When satisfied with the alignment tack solder the saddle to the smokebox and the footplate and then tack the firebox to the footplate. When you are satisfied with the alignment complete the soldering.

Attach the smokebox saddle side plates, plain or riveted (SB23 or SB24). Note the rivet patterns are not symmetric, study photographs for correct fitting.



Saddle Construction

BOILER AND SMOKEBOX DETAILS

Fix medium handrail knobs in the six holes in the boiler and smokebox and four small knobs in the holes in the firebox. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place.

Detail the cylinder front plate (SB26) as shown below and attach it to the saddle front with its top edge level with the top of the front frame extensions. The snifting valve (BR25) goes in the central hole towards the top of the plate.

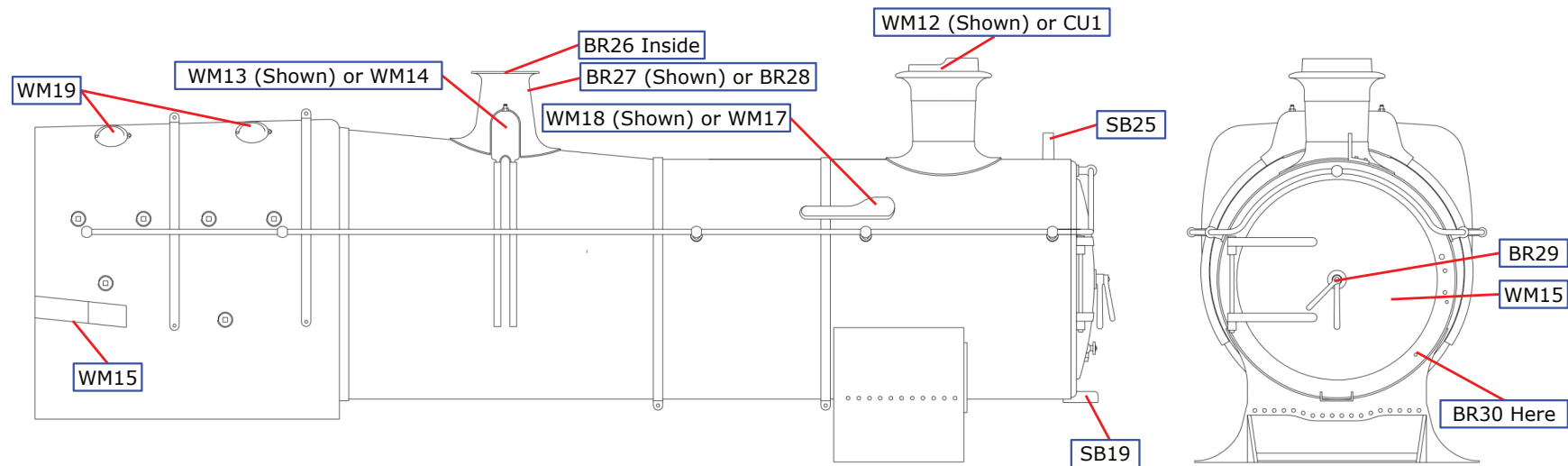
Fit the choice of chimney, either the original cast iron chimney (WM12) or the parallel copper capped chimney (CU1). Like wise fit either the safety valve base with top feed (WM13) or the safety valve base no top feed (WM14); form the top feed pipes from 1.4mm wire. After painting fit the safety valves (BR26) and then fit the polished safety valve casing with top feed (BR27) or the safety valve casing no top feed (BR28).

Fit the Smokebox Door (WM15). Fit the smokebox door handles (BR29) and, if required, the steam lance cock (BR30).

Fit the firebox screw reverse cover (WM15) and either the early smokebox pipe cover (WM17) or the late smokebox pipe cover (WM18).

No.	Description
SB19	Smokebox step

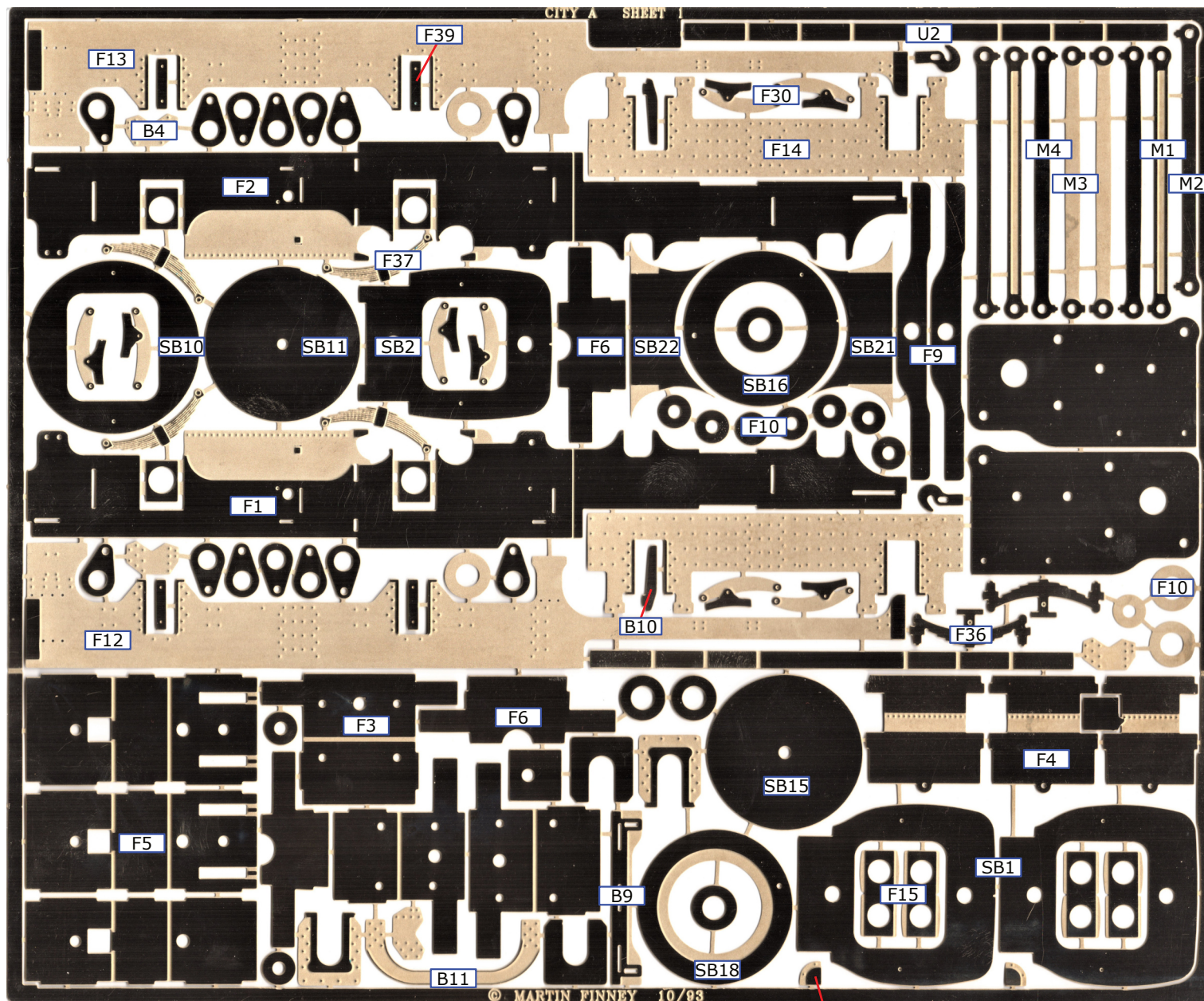
Sheet
B3



Boiler, Firebox and Smokebox Detailing

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CITY A SHEET 1

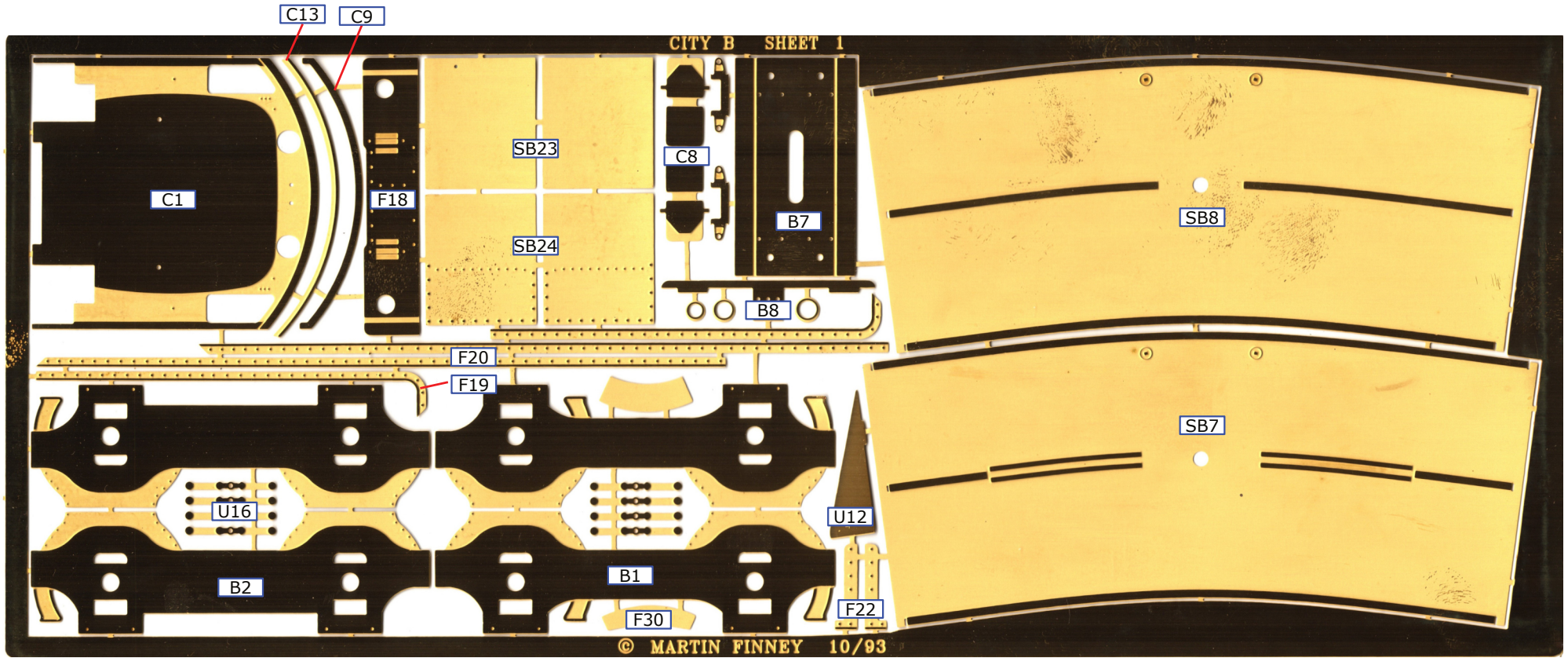


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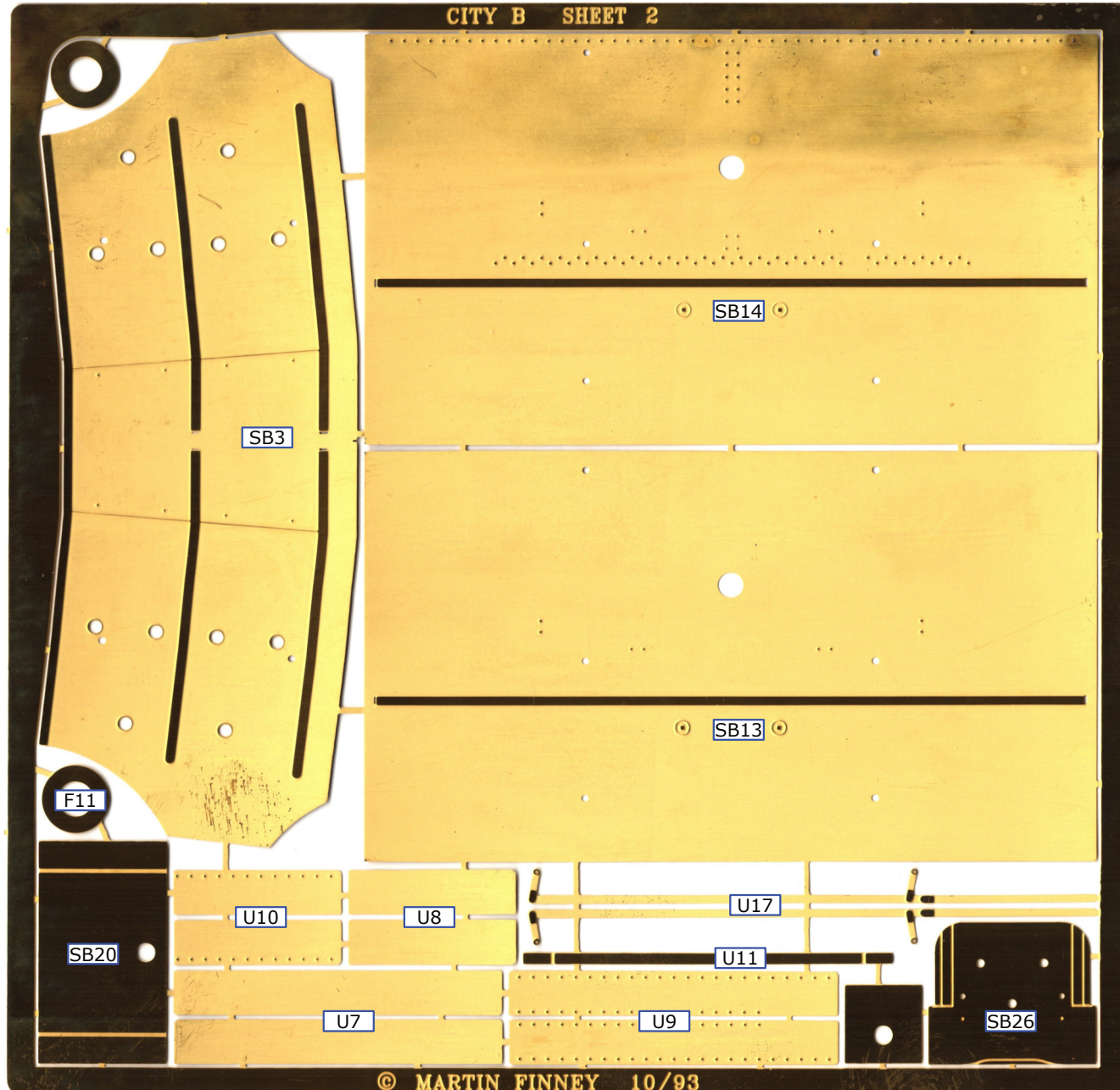
U13

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CITY B SHEET 1

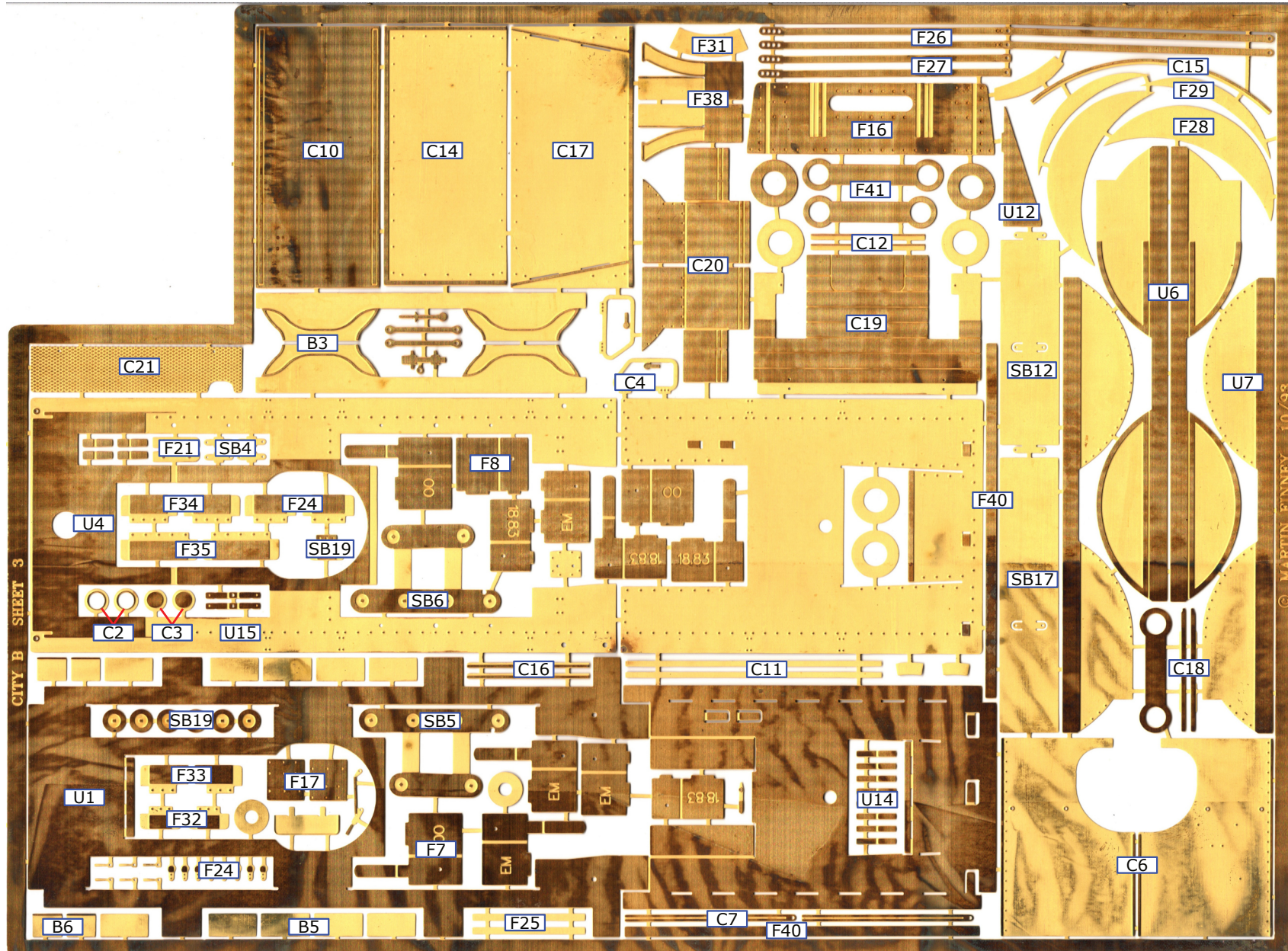


CITY B SHEET 2



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CITY B SHEET 3



CITY B SHEET 3

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BRASS CASTINGS

CU1	Parallel chimney	Atbara/2	BR10	Screw reverser handle	Bulldog/2	BR21	Jockey valve & regulator linkage	Backhead/1
BR1	Left steam brake cylinder	Cab/1	BR11	Firebox door handle	Backhead/2	BR22	Sightfeed lubricator	Backhead/3
BR2	Right steam brake cylinder	Cab/1	BR12	Backhead shelf	Backhead/3	BR23	Regulator handle	Backhead/1
BR3	Tall early vacuum pipe	47XX/3	BR13	Jockey valve	Backhead/1	BR28	Steam reverse lever	Atbara/1
BR4	Short later vacuum pipe	Bulldog/2	BR14	Water gauge	Backhead/3	BR25	Snifting valve	Details/1
BR5	Vacuum pipe dummy	Bulldog/2	BR15	Steam heating valve	Backhead/3	BR26	Safety valves (2)	Details/1
BR6	Vacuum pump lubricator (2)	Details/1	BR16	Cab pressure gauges (3)	Atbara/1	BR27	Safety valve casing with top feed	Bulldog/3
BR7	Sandbox lid (2)	Details/1	BR17	Steam fountain	Backhead/4	BR28	Safety valve casing, no top feed	Bulldog/1
BR8	Large whistle	Atbara/1	BR18	Combined ejector/brake	Backhead/3	BR29	Smokebox door handles	Loose
BR9	Small whistle	Atbara/1	BR19	Combined ejector/brake handle	Backhead/3	BR30	Steam lance cock	Bulldog/2
			BR20	Blower valve	Backhead/2			



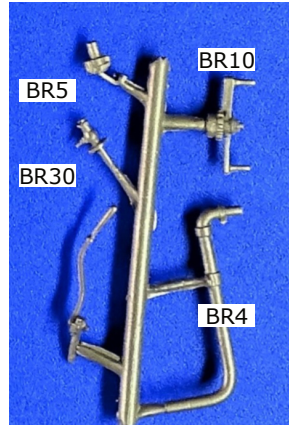
Atbara/2



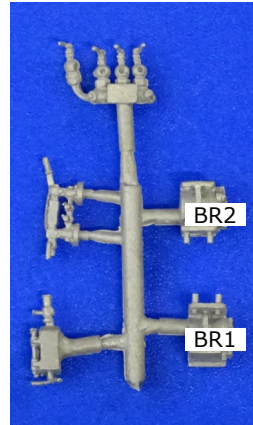
Bulldog/1



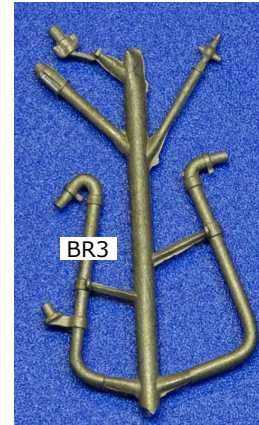
Bulldog/3



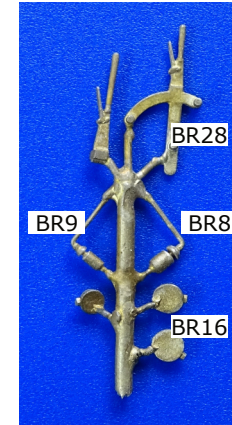
Bulldog/2



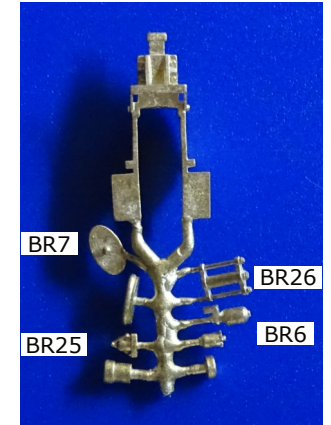
Cab/1



F7/47xx/3



Atbara/1

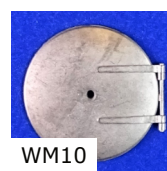


Details/1

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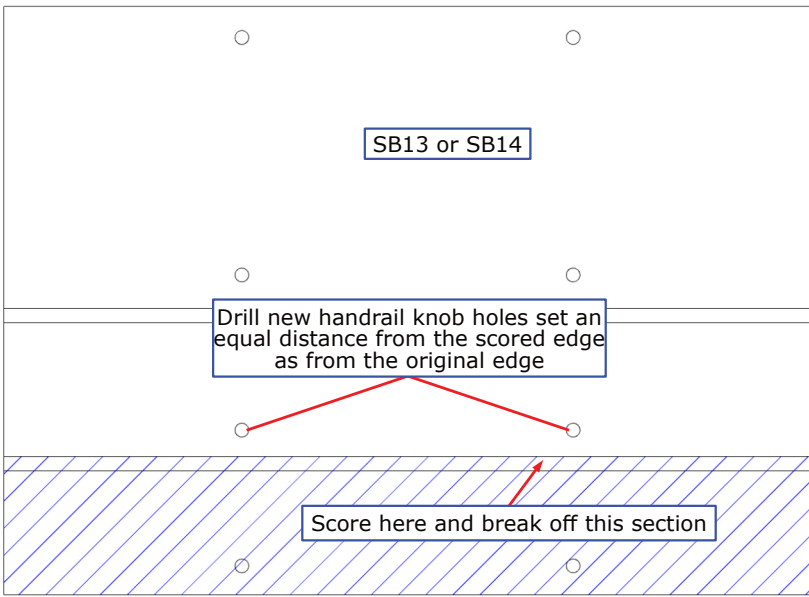
WHITEMETAL CASTING

- WM1 2 Bogie upper swing hangers (2)
- WM2 2 Bogie lower swing hanger (4)
- WM3 4 Bogie axlebox & spring (4)
- WM4 2 Dean taper buffer
- WM5 2 Sandbox, left
- WM6 2 Sandbox, right
- WM7 4 Spring
- WM8 1 Backhead
- WM9 1 Screw Reverser
- WM10 1 Smokebox Door
- WM11 4 Mud hole doors
- WM12 1 Original cast iron chimney
- WM13 1 Safety valve base with top feed
- WM14 1 Safety valve base no top feed
- WM15 1 Early smokebox pipe cover
- WM16 1 Late smokebox pipe cover
- WM17 1 Firebox screw reverse cover
- WM18 1 Steam reverse indicator



OTHER COMPONENTS

- 3/16" bearing (4)
- 2mm Bore bearing for bogie (4)
- 6BA x 3/4" Brass screw (2)
- 6BA x 5/16" Brass screw (2)
- 6BA nut (3)
- Short handrail knob (8)
- Medium handrail knob (7)
- Buffer head, bush, washer and spring (2)
- Vacuum pipe hose
- 4mm studding and nuts for firebox assembly
- 1/8" brass wire for compensation beam pivots
- 5/32" brass tube for compensation beams
- 0.8mm steel spring wire for bogie side control
- 0.45mm Brass wire for fall plate hinges and cab side handrails
- 0.8mm Brass wire for brake hanger pivots and hand rails
- 1.2mm Brass wire for sand pipes
- 1.4mm Brass wire for top feed pipes
- 0.8mm & 1.5mm Copper wire for backhead pipes
- Note. Screws may be supplied over-length and may require cutting to length.



Boiler/Smokebox Wrapper Modification

PACKING LIST

ETCHES

- 1 Frames CityA7PT 98004
- 1 Body CityB7PT 98005

SPRUES

- 1 MF7/Bulldog/1
- 1 MF7/Bulldog/2 minus 3500g tender parts
- 1 MF7/Bulldog/3
- 1 MF7/47XX/3
- 1 F7/GW/Atbara/1
- 1 F7/GW/Atbara/2
- 1 F7/GW/Details/1
- 1 MF7/GW/Backhead/1
- 1 MF7/GW/Backhead/2
- 1 MF7/GW/Backhead/3
- 1 MF7/GW/Backhead/4

WHITEMETAL

- 4 Bogie suspension lower swing hangers
- 2 Bogie suspension upper swing hangers
- 4 Bogie axlebox & spring
- 2 Dean taper buffer
- 2 Leading (small) spring
- 2 Trailing (large) spring
- 2 Left sandbox
- 2 Right sandbox
- 1 Screw reverser
- 1 Backhead
- 2 Firebox door
- 1 Original cast iron chimney

- 1 Safety valve base with top feed
- 1 Safety valve base no top feed
- 1 Smokebox door
- 1 Firebox screw reverse cover
- 1 Early smokebox pipe cover
- 1 Late smokebox pipe cover
- 4 Mud hole cover

OTHER COMPONENTS

- 4 3/16" bore bearing
- 4 2mm bore bearing for bogie
- 2 6 BA x 3/4" Brass screws
- 2 6BA x 5/16" Brass screws
- 3 6 BA nuts
- 2 Dean Taper buffer head, bush, washer & spring
- 8 Short handrail knobs
- 7 Medium handrail knob
- 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
- 100mm 0.8mm Spring steel wire
- 150mm 0.45mm Brass wire
- 2x 458mm 0.8mm Brass wire
- 120mm 1.4mm Brass wires
- 50mm 1.5mm Copper wire
- Instructions