

# 2700 GALLON TENDER GA

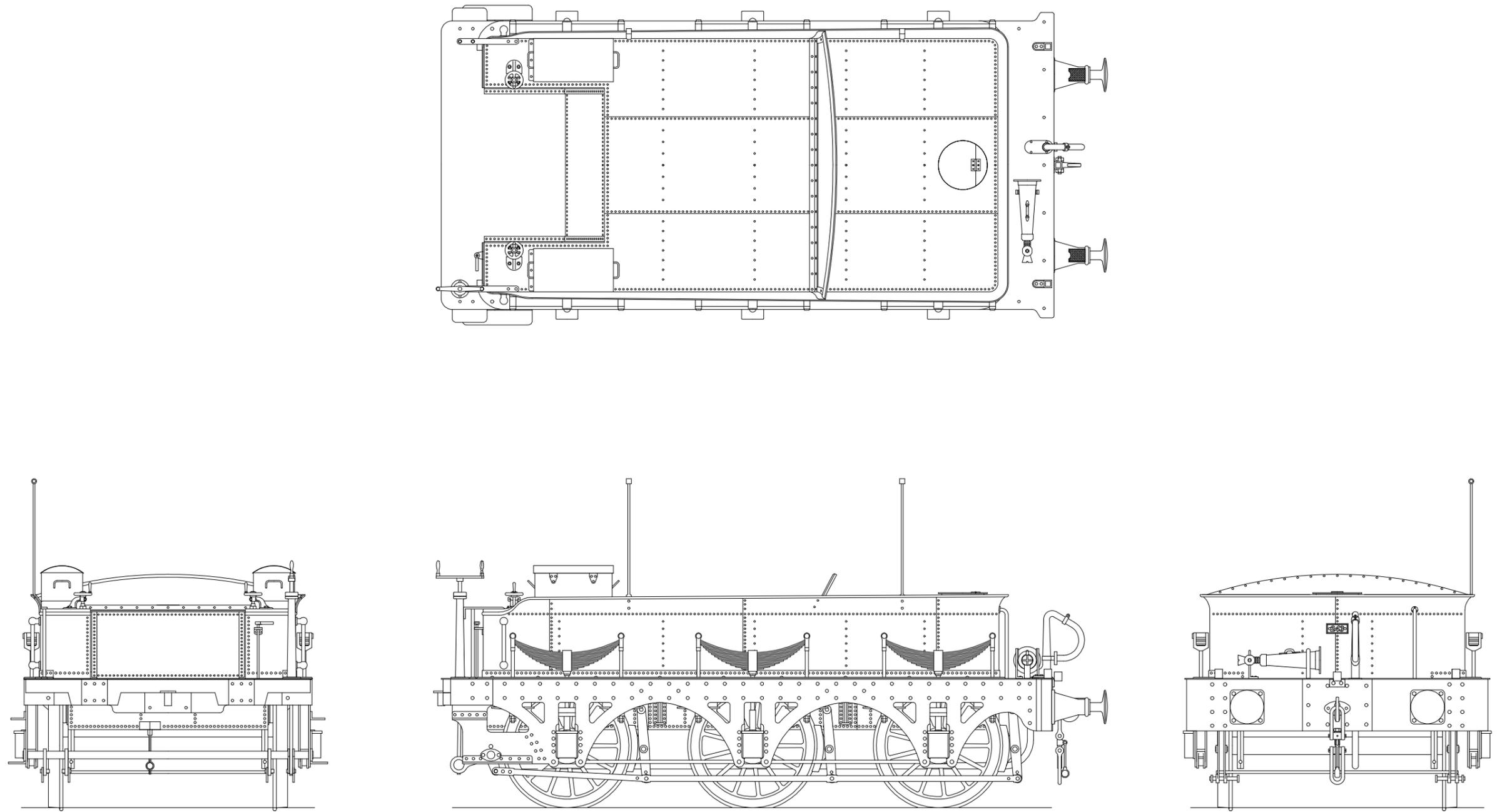


Fig 1. 2700 Gallon Tender, Circa 1890

### 3000 GALLON TENDER GA

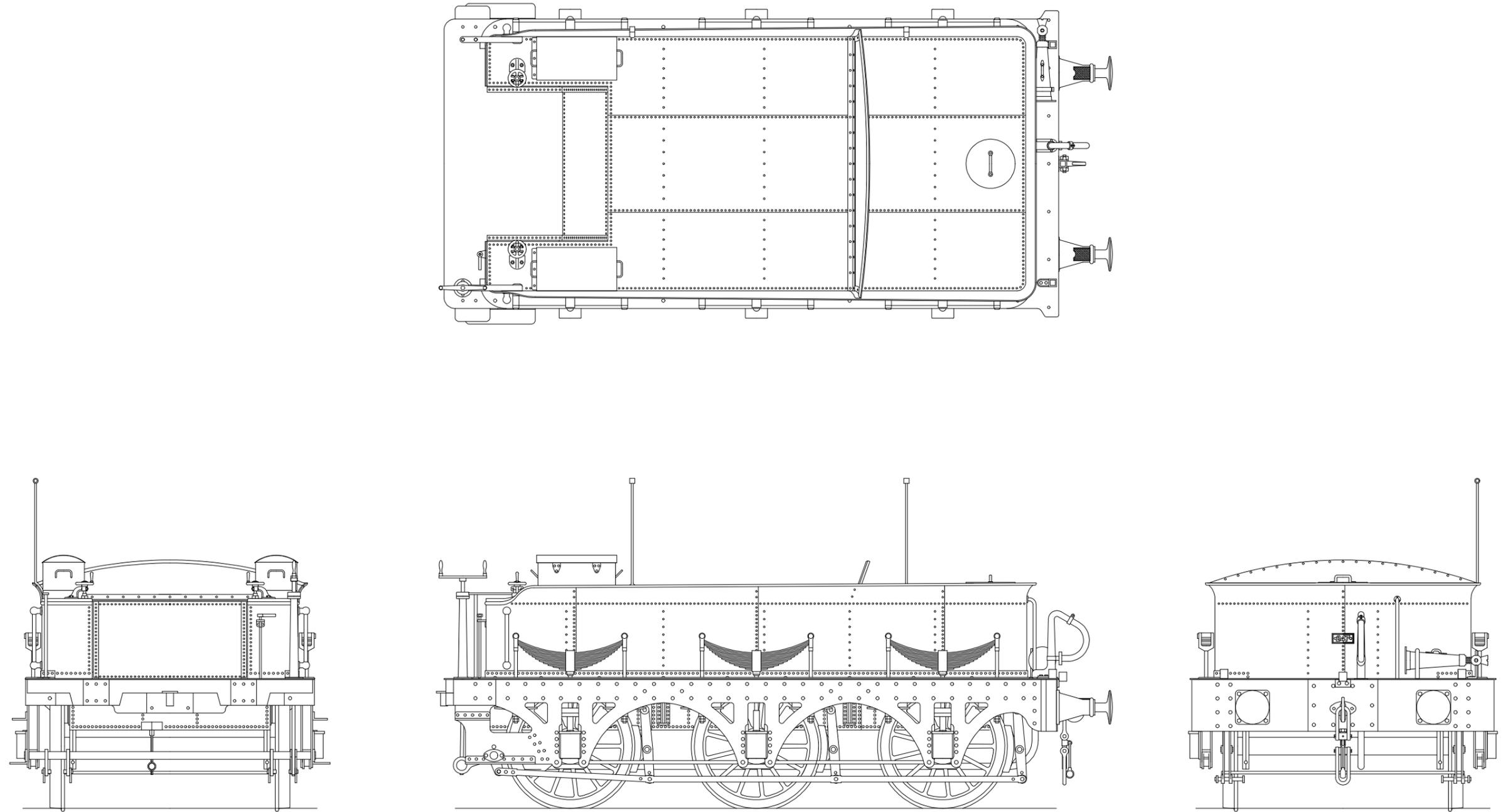


Fig 2. 3000 Gallon Tender, Circa 1890

## CHASSIS

### TENDER CHASSIS

Open up the following holes in the frames (TC1) 0.8 mm for the brake hanger pivots and 1.6 mm for the compensation beam pivot. Emboss the rivets and score to represent the joint lines between the plates as shown in Fig 3. Fold over the axle slot reinforcing plates and fold up the chassis.

Emboss the rivets on the well tank front (TC2) and the well tank rear (TC3) and fold out the vacuum pipe bracket on TC3 before soldering in place as shown below. Construct the compensation beams (TC4) as shown below. The 1.6 mm rod pivot must be made so that it is flush with the outside of the frames. The lengths of 3/32" brass are 21.8 mm long. Solder the two laminations of the compensation pivot (TC5) together and fix in place in the slot in the frames.

Temporarily fit the wheel sets and check that the chassis is level and works correctly. Wheel side control is limited by using the washers (TC6). Solder the front well tank bracket (TC7), the front well tank bracket angle plate (TC8), the rear well tank bracket (TC9) and the rear well tank bracket angle plate (TC10) in place as shown below. The compensation beam pin will be retained by TC9 & TC10. Solder 0.8 mm wire brake hanger pivots in place.

Form the vacuum pipe from 1.4 mm wire. Fold up the vacuum pipe bracket (TC11) and attach as shown. Final fixing of the vacuum pipe should be left until later as it will prevent wheel removal.

No.	Description	Sheet
TC1	Frames	1
TC2	Well tank front	2
TC3	Well tank rear	2
TC4	Compensation beam (2)	1
TC5	Compensation pivot (2)	1
TC6	Wheel washer	1,2 & 3
TC7	Front well tank bracket (2)	2
TC8	Front well tank bracket angle plate (2)	2
TC9	Rear well tank bracket (2)	2
TC10	Rear well tank bracket angle plate (2)	2
TC11	Vacuum pipe bracket	2

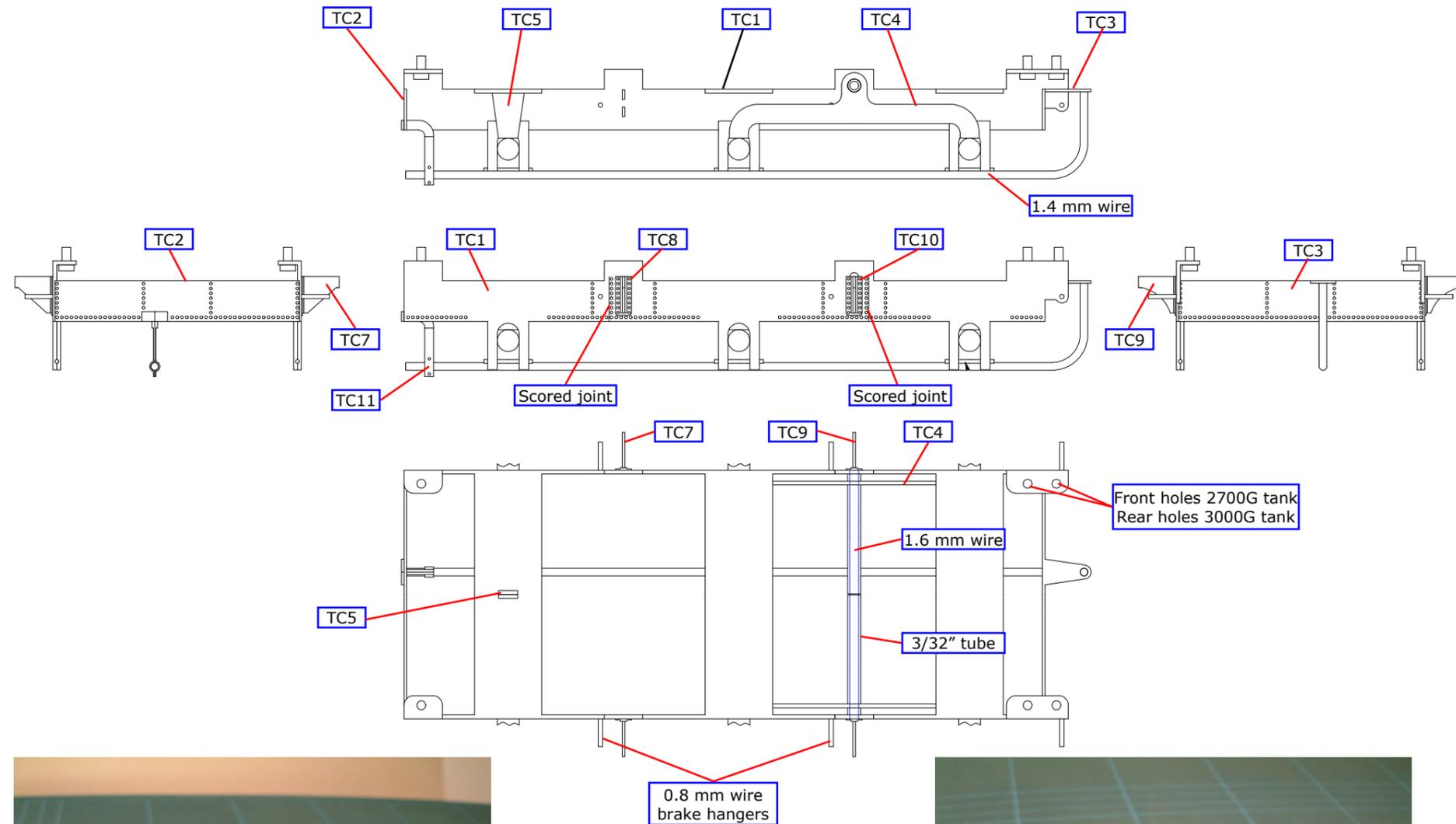
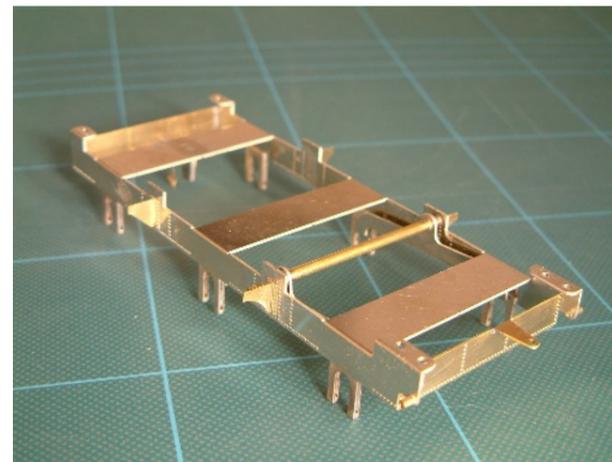
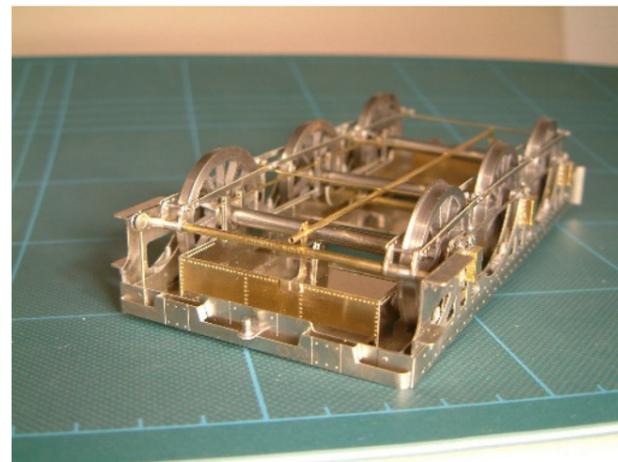
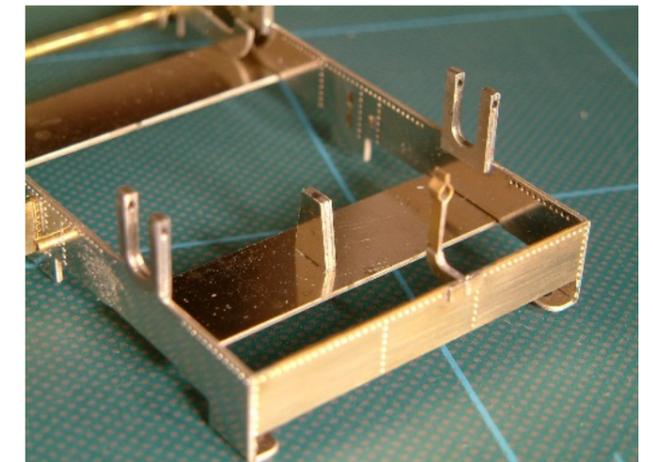
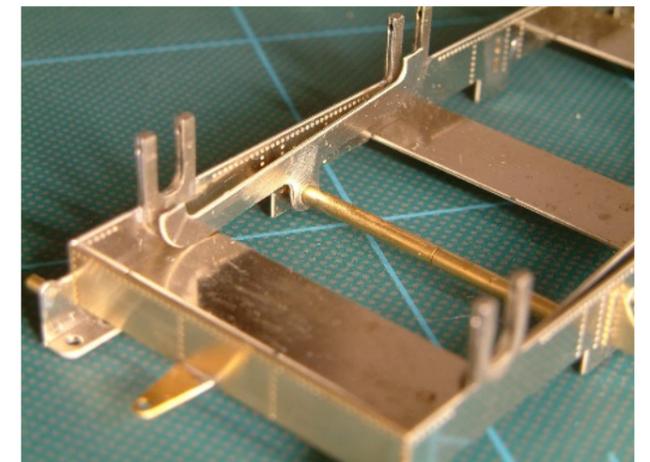


Fig 3. Tender Chassis



## BRAKES

### BRAKE SHAFT

Make up the brake shaft from a 65.6 mm long piece of 1.8 mm wire as shown. The spacing of the cranks is a little tricky. The outside crank should be 4.2 mm in from the end of the shaft. To help space the cranks apart, make short lengths (4.2 mm & 3.8 mm) of 3/32" tube, bored out to 1.8 mm.

### BRAKE RIGGING

The brake hanger/shoe assemblies are made of several laminations as shown below. These are assembled by making a jig by drilling suitable 0.8 mm and 1.0 mm holes in a small piece of hardwood or Tufnol. Use 0.8 mm drills mounted in the holes as mandrels to accurately align the laminations. A short piece of 1.0 mm wire is needed for the brake shoe pin. When the components are accurately aligned solder together. The steel drills are unlikely to be soldered to the nickel silver and can be removed after the complete assembly is taken off the jig.

When the brake hanger/shoe assemblies are complete build the brake gear as shown in the drawing. There two different tie rods - short ones made on 0.8 mm wire and long ones from 0.6 mm wire. To ease construction first build the brake rigging with the 0.8 mm wire running across the chassis. Then build in the 0.6 mm wire. Finally remove the 0.8 mm wire that sits between the two sets of brake hangers.

Locate the chassis and brake gear assembly in the frame assembly. Insert the cross shaft into the holes in the frames and clip the pull rods over the brake shaft crank pins. Solder the brake shaft to the frames on one side only - this will make subsequent adjustment possible. Add the handbrake rod from 0.7 mm wire as shown in Fig 4.

No.	Description	Sheet	
TC12	Brake hanger/shoe back lamination (6)	1	TC16 Brake pull rod (4) 3
TC13	Brake hanger/shoe second lamination (6)	1	TS16 Brake shaft crank (3) 1
TC14	Brake hanger/shoe third lamination (6)	1	TS17 Handbrake crank inner lamination 1
TC15	Brake hanger/shoe front lamination (6)	1	TS18 Handbrake crank outer lamination (2) 3

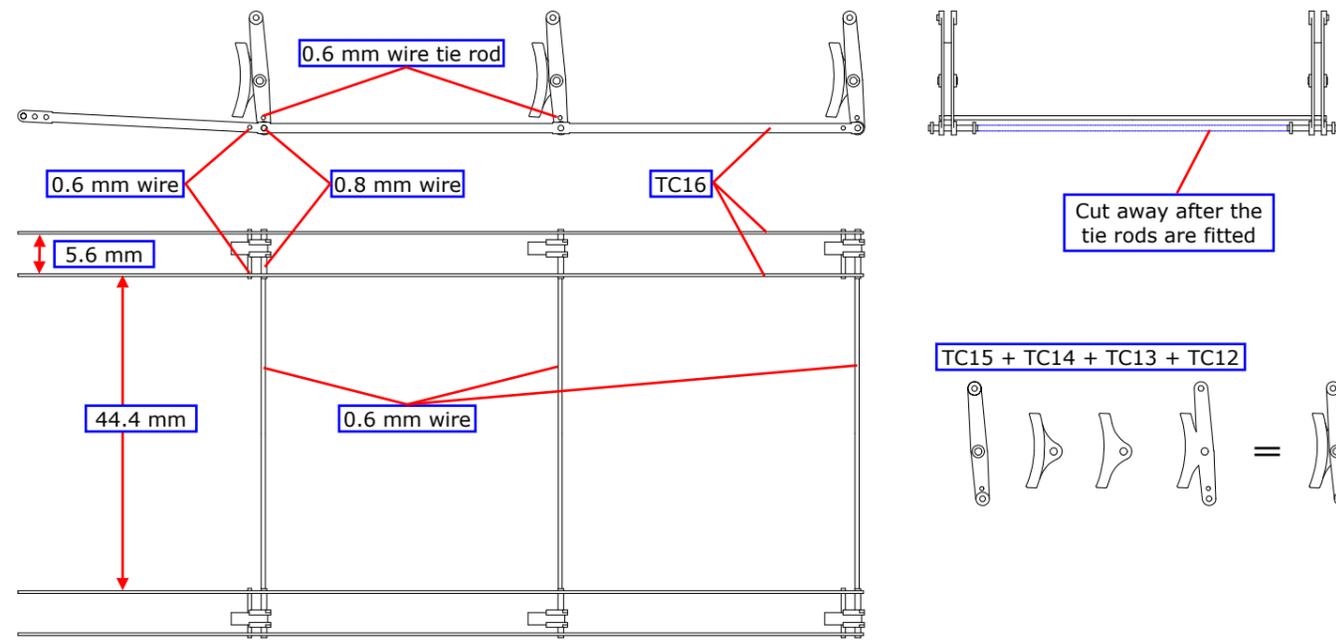


Fig 5. Brake Rigging

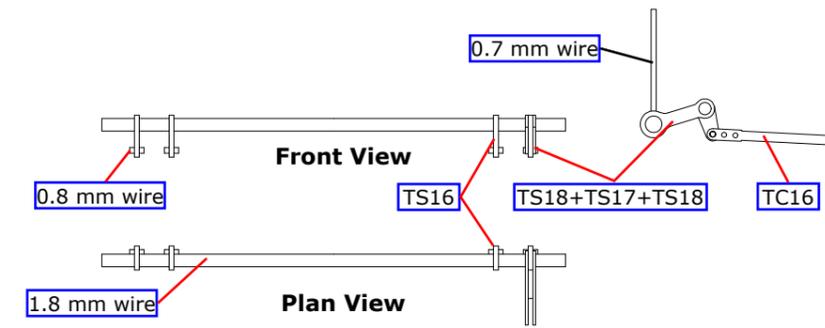
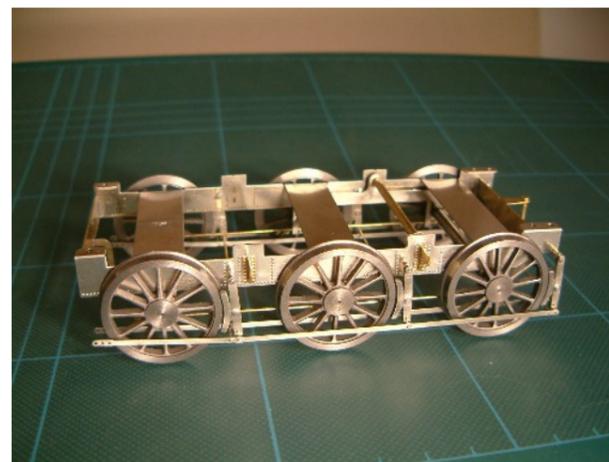
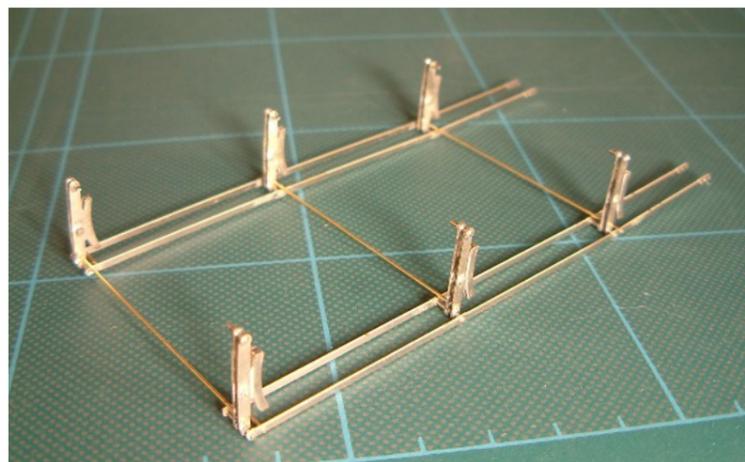


Fig 4. Brake Shaft



## FRAMES

Emboss the rivets in the inner sandwich frames (TS1) before folding up as shown below. First curve the ends of the drag beam round a 3 mm drill and fold over the ends of the drag beam buffer rubbing plates. Fold out the small brackets for the Tender spring damper (BR34 & BR35) and the axlebox sides on both sides of each frame slot. Now fold down the bufferbeam and drag beam, before folding down the frames.

Check the fit in the frame holes of the tender spring dampers (WM1). Aim to get a push fit. They do not need to be fixed in place as they will be retained when the outer frames are fitted. Prepare the outer frames, left and right (TS2 & TS3), the horn guide plates (TS4), the horn ties, front/back and middle axles (TS5 & TS6), the front steps, upper and lower (TS7 & TS8), the brake shaft bearing (TS9), tender spring damper (BR34 & BR35) as shown below before soldering in place.

Emboss the rivets on the drag beam back (TS11) and fold down the drawbar pin bracket. Solder the drawbar pin (1.6 mm wire - 3.3 mm long) in place before soldering in place in the slots in the inner sandwich frames.

Emboss the rivets on frame/drag beam corner plate (TS10), fold up, and attach as shown below. Similarly attach the buffer beam back (TS13). Emboss the rivets on the buffer beam front (TS12) and the coupling pocket (TS14). Solder the coupling pocket and lamp socket (BR18) in place then solder the buffer beam to the inner sandwich frames. Add the tie rods from 0.8mm wire. Assemble the buffers as shown in Fig 6 and fix in place.

Locate the brake gear assembly in the frames. Insert the cross shaft into the holes in the frames and clip the pull rods over the brake shaft crank pins. Solder the brake shaft to the frames on one side only - this will make subsequent adjustment possible. Add the handbrake rod from 0.7 mm wire as shown below.

No.	Description	Sheet	No.	Description	Sheet
TS1	Inner sandwich frames	3	TS9	Brake shaft bearing (2)	2
TS2	Left outer sandwich frame	3	TS10	Frame/drag beam corner plate (2)	3
TS3	Right outer sandwich frame	3	TS11	Drag beam back	3
TS4	Horn guide plate (6)	3	TS12	Buffer beam front	3
TS5	Horn tie front/back axle (4)	3	TS13	Buffer beam back	3
TS6	Horn tie middle axle (2)	3	TS14	Coupling pocket	3
TS7	Front step upper (2)	3	TS15	Buffer retaining washer (2)	3
TS8	Front step lower (2)	3			

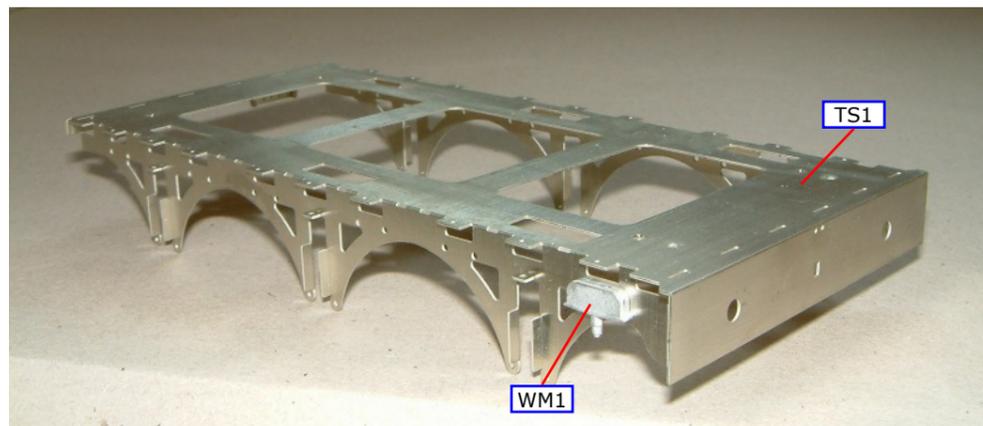
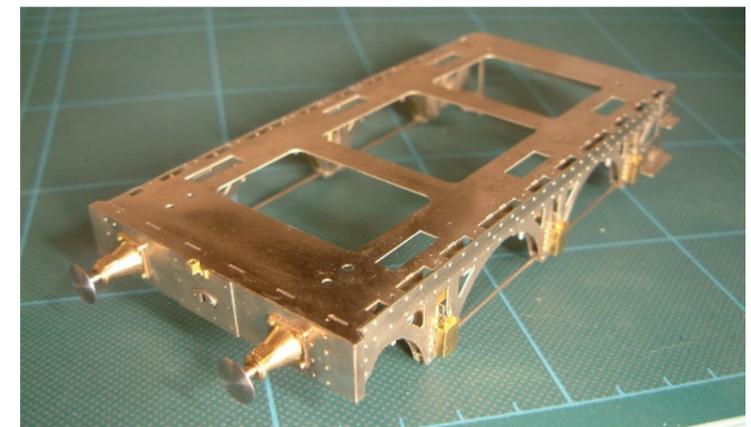
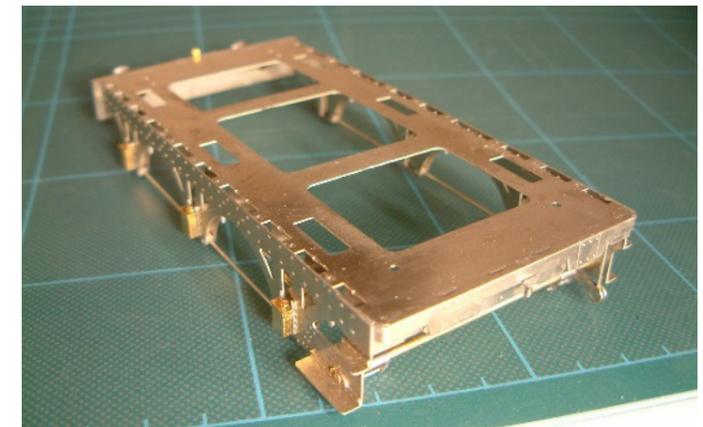
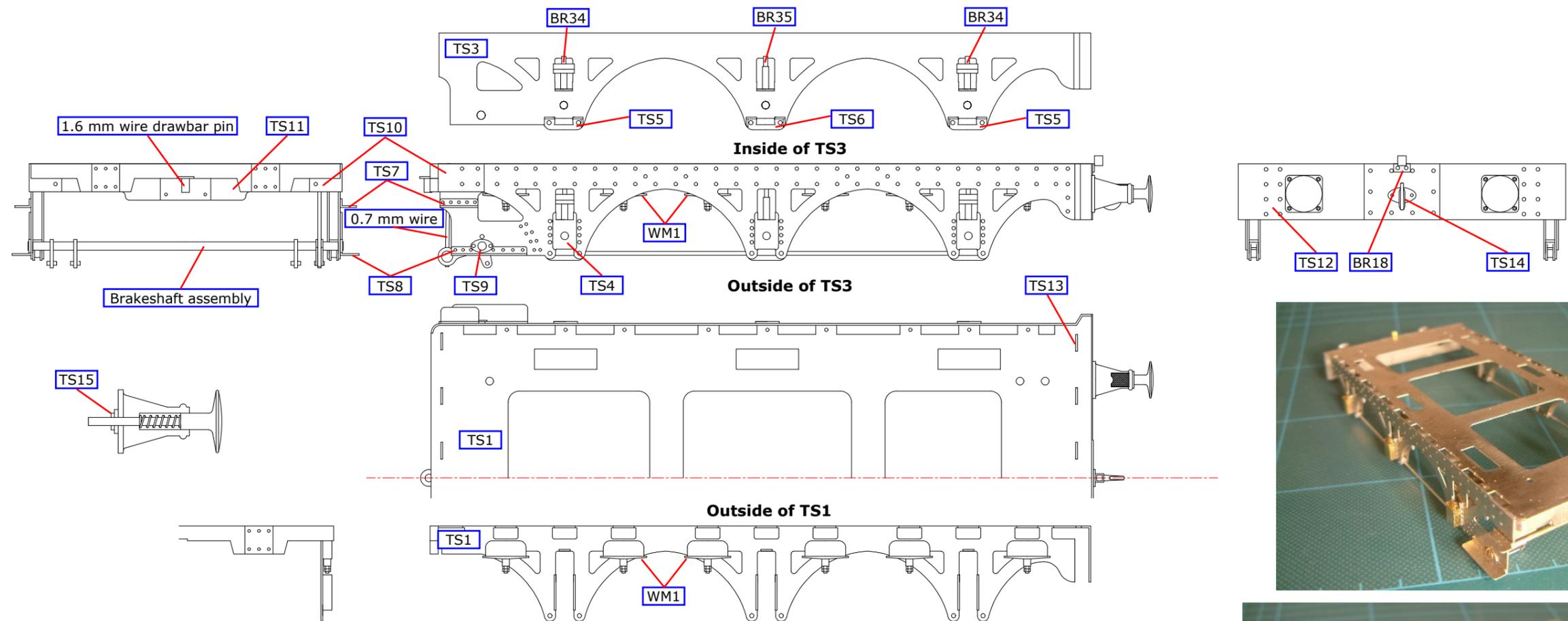


Fig 6. Frames

## TANK FLARES

The 2700 gallon or 3000 gallon tender tanks differ but the forming of the flares is the same. Start by embossing the rivets in the platform and tank former (TU15 or TU 24) and soldering the four 10BA nuts in place. Select a flat piece of thin material (MDF, hardboard, Tufnol) slightly larger than the platform as a base on which to construct the tank. Drill holes in the base to match the nuts on the platform and screw the platform to the base using 10BA screws. Fold up the flaps with the large holes as shown in to the right. They act to locate the tank sides and the tank top.

Score the plate joint lines on the tank sides and back (TU16 or TU25) as shown in red in Fig 9 & 10. The forming of the flare along the top edge of the sides is made tricky because the flare rises from the front to the back of the tender and because of the etched rivets and beading. We recommend you use the following method to form the flare. We suggest you practise on the spare tank back and sides.

No.	Description	Sheet
TU13	Template for making flare forming jig	2
TU14	Template for checking flare	2
TU15	2700G Platform and tank former	2
TU16	2700G Tank sides and back	2
TU19	Coal space sides and back	2
TU24	3000G Platform and tank former	2
TU25	3000G Tank sides and back	2

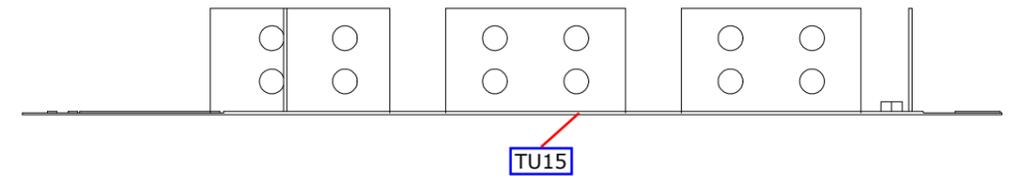


Fig 7. Platform and tank former

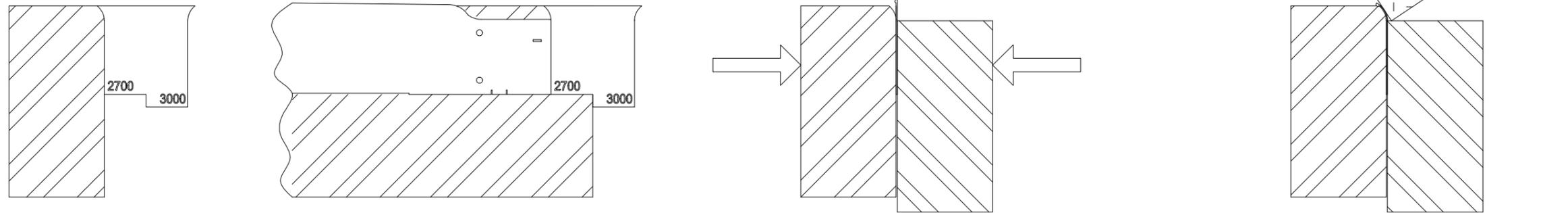


Fig 8. Flare Forming

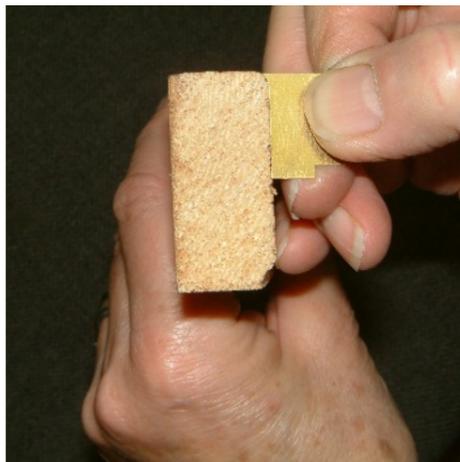
**STAGE ONE.** Obtain two lengths of 40 mm x 20 mm **softwood** 330 mm long. Round the best, knot free edge, using the template (TU13). One side of the template sets the 2700G tender, the other side sets the 3000G tender.

**STAGE TWO.** Using Sellotape attach the tank sides and back to the softwood accurately setting its' position by using the template.

**STAGE THREE.** Clamp part TU16 or TU25 and the two pieces of softwood together, either in a vice or between clamps to the bench.

**STAGE FOUR.** Obtain a **hardwood** block approximately 200 mm long.

Make sure one face of the block is smooth and the short edges on the ends are rounded off. The flare is now formed in three sections: front to rear corner - between rear corners - rear corner to front. Form the flare, working on one section at a time by hammering the hardwood block against the flare. Check the outcome by using the template for checking flare (TU14).



## 2700G TANK

Form the corner bends in tank sides and back (TU16) over a 1/8" rod or drill using the marks in the lower edge as a guide to position. Check the fit over the platform (TU15). If all is well then solder them together from the inside. Carefully form the corner bends in the rivet strip (TU17) over a 5/32" (4 mm) rod and solder in place. Form the drain pipe from 0.7 mm wire and fix in place together with the drain pipe flange (TU7) and file off flush with the inside of the tank.

Carefully curve to shape the small 'fingers' at the corners of the tank flare, fill the gaps with solder and then file to shape. Add the control handle bracket (TU1) through the slot in the platform and tank former, the control handle (BR27). We have no idea what it did.

Emboss the rivets in the tank top (TU18) and score the plate joint lines. Fold up toolbox to tank top bracket (TU6) and solder to the tank top together with the division plate angle strip (TU4) aligning with the etched dotted lines.

Emboss the rivets on and fold up coal space sides and back (TU19). Fit in place and check the fit of the tank top. Solder the coal space sides and back to the platform and tank front. Tack solder the tank top in place. Remove the assembly from the base and complete the soldering of the tank top from inside the tank.

Emboss the rivets on the division plate front lamination (TU2) and solder to to the rear lamination (TU3) to make the division plate. Solder the division plate in position setting the correct angle using the template (TU12). Add the angles between the division plate and side (TU20).

Carefully drill 0.7 mm holes in the tender springs (P19) to accept the 0.7 mm wire hangers. Solder the wire hangers in place in the platform ensuring that they are of similar length and are flush on the underside. Attach the springs.

Using a length of 0.8 mm wire and two short handrail knobs, solder the tank side handrails into place. Solder the brake standard (NS7) into place. Attach a length of 0.7 mm wire to the platform in the hole between the brake standard and the tank. Add the left front handrail bracket (TU22) over the wire and solder to the tank top and brake standard. The right hand handrail is made from two lengths of 0.7 mm wire and the right front handrail bracket (TU23).

Solder the water feed valve (BR37) into place on the tank top front. Attach the water feed valve hand wheel (BR38) to the valve.

Drill two 0.3 mm holes in each side of the toolbox (P20). Bend two short lengths of 0.3 mm wire into a U shape to form the handles of the toolbox and attach into the holes. Attach the toolboxes to the tank top butting up to the tank top bracket (TU6). Attach the toolbox padlock (TU11) after the toolbox is painted.

The water filler is made up of the base (TU5), the water filler body (P21) and the filler lid (TU21). Scribe the line shown in blue on the lid and make the hinge from a short length of 0.3 mm wire. Assemble and place in the fixing hole on the tank top.

Solder two running plate lamp sockets (BR16) into place on the rear footplate. Solder the vacuum pipe (BR36) into the hole on the rear footplate. Make up the re-railing jack cradle as shown from TU8, TU9, and TU10. Attach the re-railing jack (P22) after making up a handle from 0.45 mm wire as shown below.

The davits are made from a length of 0.45 mm wire, with a flattened end for the bracket and a short length of 1.2 mm tube on top for the rope to route through.

No.	Description	Sheet	No.	Description	Sheet
TU1	Control handle bracket	3	TU12	Template for division plate angle	2
TU2	Division plate front lamination	2	TU15	2700G Platform and tank former	2
TU3	Division plate rear lamination	2	TU16	2700G Tank sides and back	2
TU4	Division plate angle strip	2	TU17	Rivet strip (2)	2
TU5	Water filler base	3	TU18	Tank top	2
TU6	Toolbox to tank top bracket (2)	3	TU19	Coal space sides and back	2
TU7	Drain pipe flange	3	TU20	Angle between division plate and side (2)	2
TU8	Jack cradle	3	TU21	Water filler lid	3
TU9	Jack cradle strut (2)	3	TU22	Left front handrail bracket	3
TU10	Jack support	3	TU23	Right front handrail bracket	3
TU11	Toolbox padlock (2)	2			

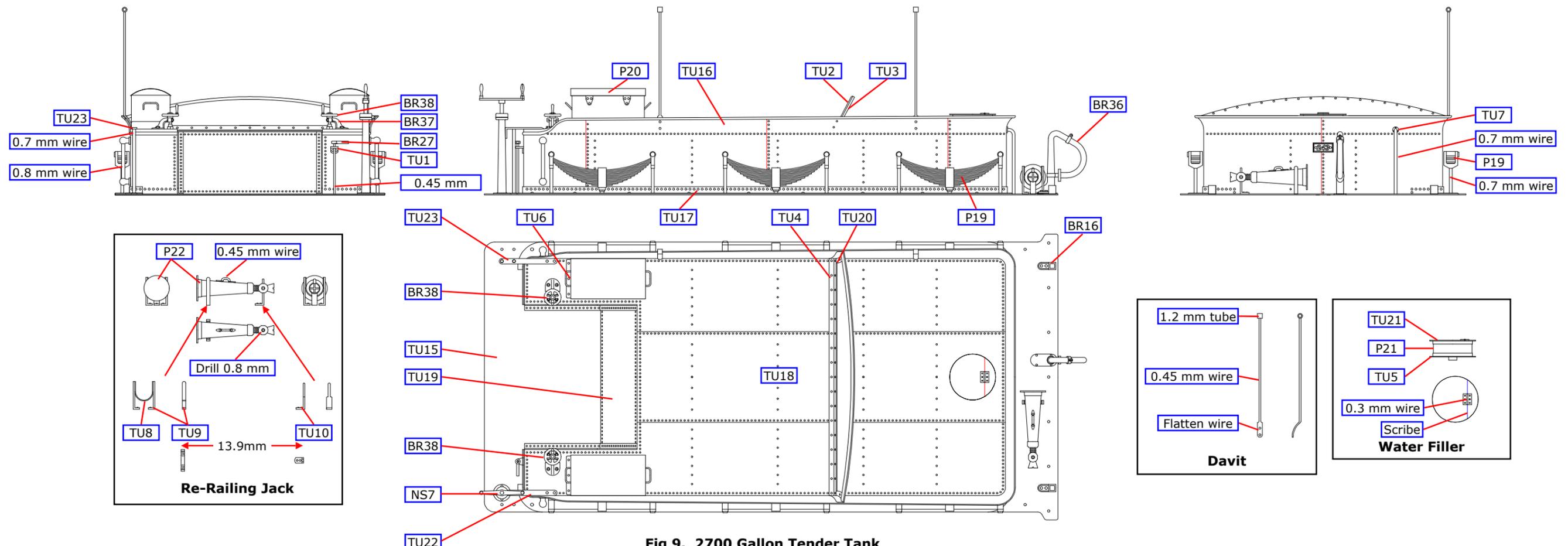


Fig 9. 2700 Gallon Tender Tank

## 3000G TANK

Form the corner bends in tank sides and back (TU25) over a 1/8" rod or drill using the marks in the lower edge as a guide to position. Check the fit over the platform (TU24). If all is well then solder the together from the inside. Carefully form the corner bends in the rivet strip (TU26) over a 5/32" (4 mm) rod and solder in place. Form the drain pipe from 0.7 mm wire and fix in place together with the drain pipe flange (TU7) and file off flush with the inside of the tank.

Carefully curve to shape the small 'fingers' at the corners of the tank flare, fill the gaps with solder and then file to shape. Add the control handle bracket (TU1) through the slot in the platform and tank former, the control handle (BR27). We have no idea what it did.

Emboss the rivets in the tank top (TU27) and score the plate joint lines. Fold up toolbox to tank top bracket (TU6) and solder to the tank top together with the division plate strip (TU4) aligning with the etched dotted lines.

Emboss the rivets on and fold up coal space sides and back (TU28). Fit in place and check the fit of the tank top (TU27). Solder the coal space sides and back to the platform and tank front. Tack solder the tank top in place. Remove the assembly from the base and complete the soldering of the tank top from inside the tank.

Emboss the rivets on the division plate front lamination (TU2) and solder to to the rear lamination (TU3) to make the division plate. Solder the division plate in position setting the correct angle using the template (TU12). Add the angles between the division plate and side (TU29).

Carefully drill 0.7 mm holes in the tender springs (P19) to accept the 0.7 mm wire hangers. Solder the wire hangers in place in the platform ensuring that they are of similar length and are flush on the underside. Attach the springs.

Using a length of 0.8 mm wire and two short handrail knobs, solder the tank side handrails into place. Solder the brake standard (NS7) into place. Attach a length of 0.7 mm wire to the platform in the hole between the brake standard and the tank. Add the left front handrail bracket (TU31) over the wire and solder to the tank top and brake standard. The right hand handrail is made from two lengths of 0.7 mm wire and the right front handrail bracket (TU32).

Solder the water feed valve (BR37) into place on the tank top front. Attach the water feed valve hand wheel (BR38) to the valve.

Drill two 0.3 mm holes in each side of the toolbox (P20). Bend two short lengths of 0.3 mm wire into a U shape to form the handles of the toolbox and attach into the holes. Attach the toolboxes to the tank top butting up to the tank top bracket (T6). Attach the toolbox padlock (TU11) after the toolbox is painted.

The water filler is made up of the base (TU5), the water filler body (P21) and the filler lid (TU30). Make the handle from 0.6 mm wire. Assemble and place in the fixing hole on the tank top.

Solder two running plate lamp sockets (BR16) into place on the rear footplate. Solder the vacuum pipe (BR36) into the hole on the rear footplate. Make up the re-railing jack cradle as shown from TU8, TU9, and TU10. Attach the re-railing jack (P22) after making up a handle from 0.45 mm wire as shown below.

The davits are made from a length of 0.45 mm wire, with a flattened end for the bracket and a short length of 1.2 mm tube on top for the rope to route through.

No.	Description	Sheet	
TU1	Control handle bracket	3	TU12 Template for division plate angle 2
TU2	Division plate front lamination	2	TU24 3000G Platform and tank former 2
TU3	Division plate rear lamination	2	TU25 3000G Sides and back 2
TU4	Division plate angle strip	2	TU26 Rivet strip (2) 2
TU5	Water filler base	3	TU27 Tank top 2
TU6	Toolbox to tank top bracket (2)	3	TU28 Coal space sides and back 2
TU7	Drain pipe flange	3	TU29 Angle between division plate and side (2) 2
TU8	Jack cradle	3	TU30 Water filler lid 3
TU9	Jack cradle strut (2)	3	TU31 Bracket, left front handrail to front of side 3
TU10	Jack support	3	TU32 Bracket, right front handrail to front of side 3
TU11	Toolbox padlock (2)	2	

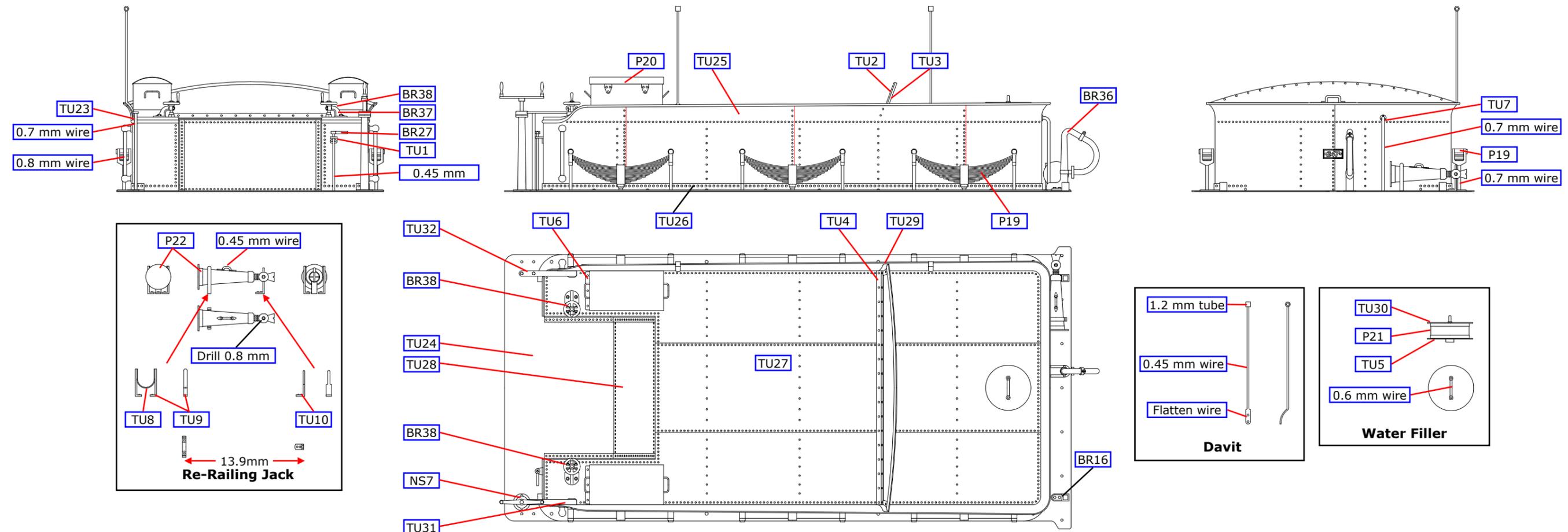
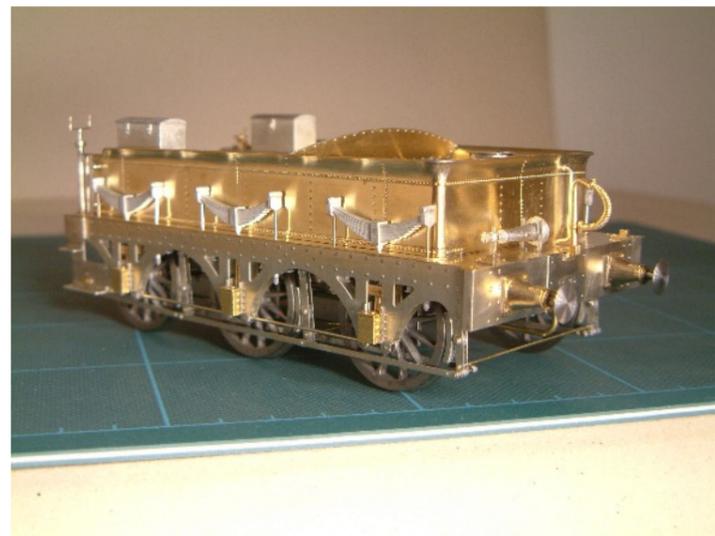
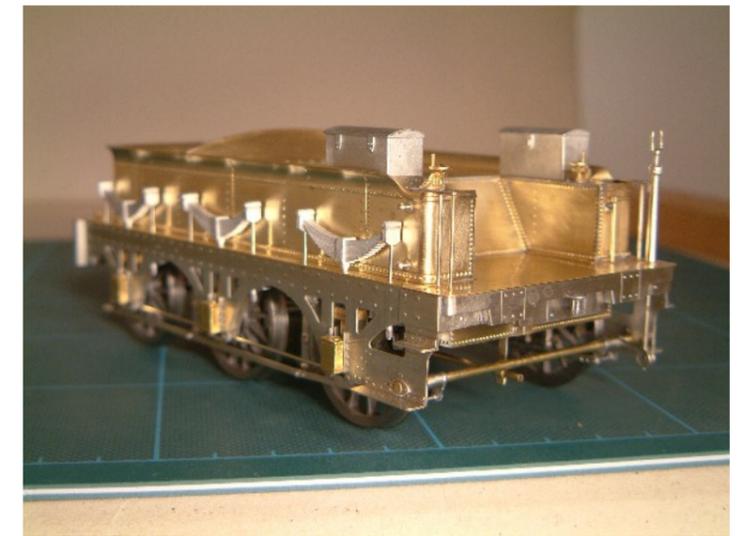
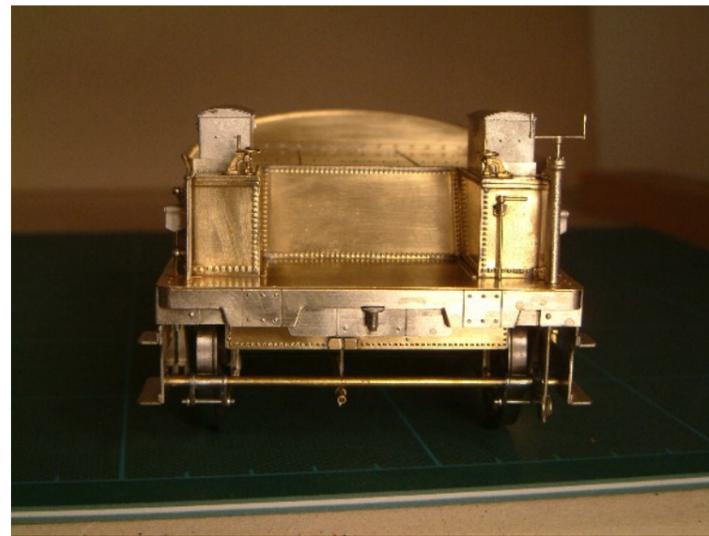
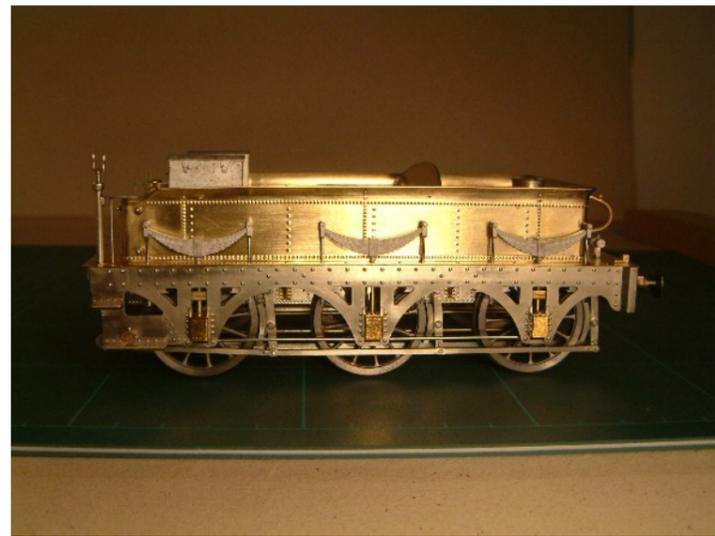
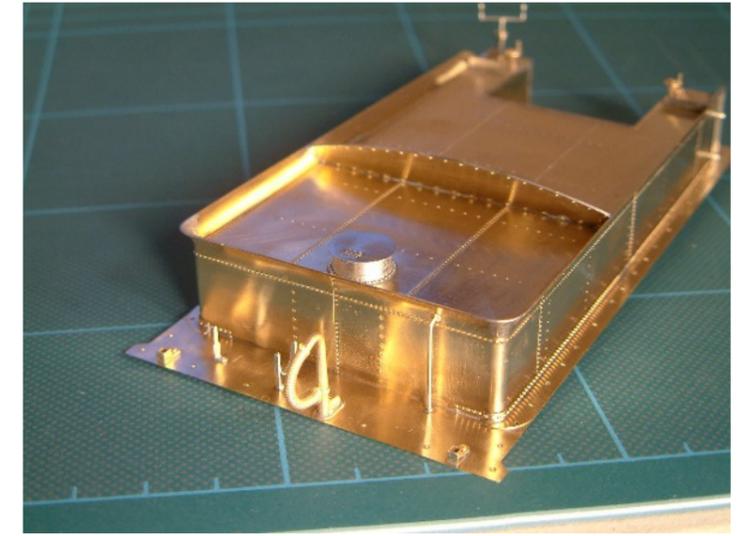
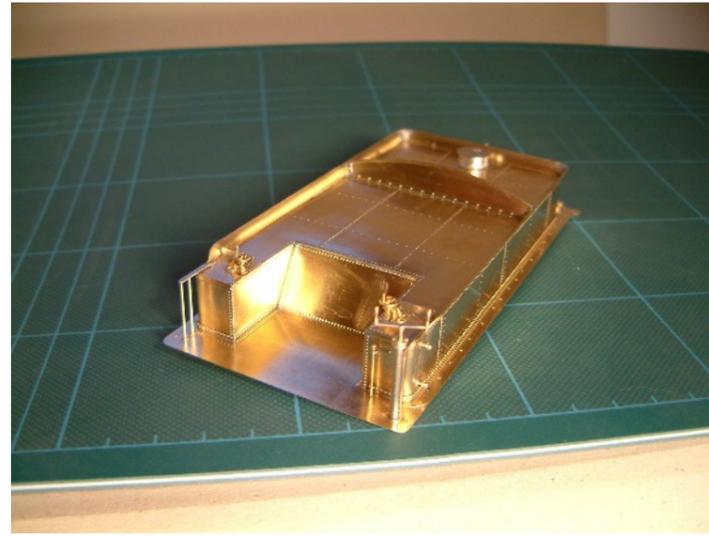
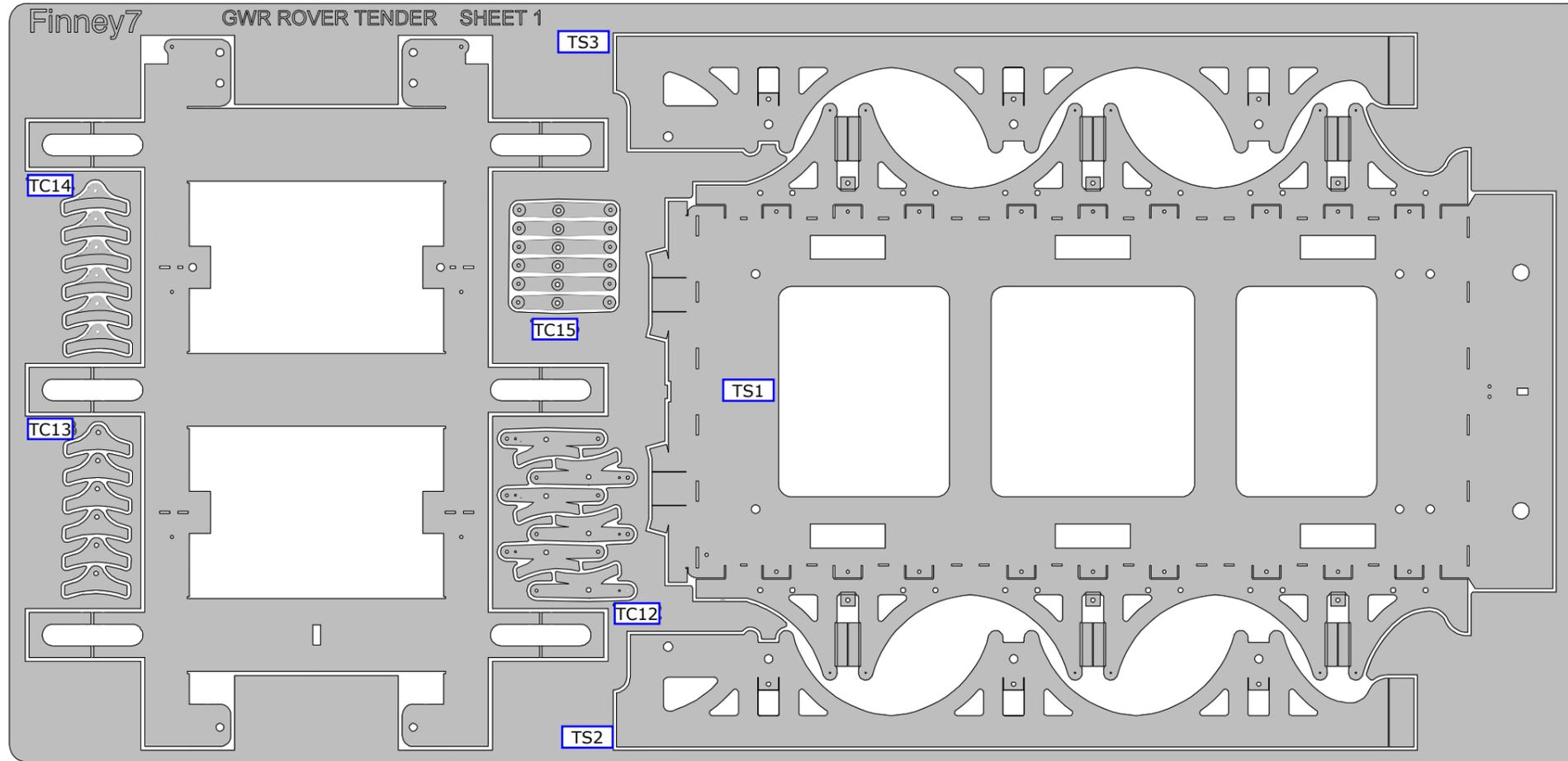


Fig 10. 3000 Gallon Tender Tank



## ETCH SHEET 1



### OTHER COMPONENTS

10 BA x 9/64" screw (4)  
10 BA nut (4)

Handrail knob, short (8)  
Buffer head and spring (2)  
CPL products screw coupling (2)

Brass tube - 1.2 mm  
Brass tube - 3/32"

Nickel silver wire - 0.45 mm  
Nickel silver wire - 0.7 mm  
Nickel silver wire - 0.8 mm  
Nickel silver wire - 1.0 mm

Brass wire - 0.3 mm  
Brass wire - 0.6 mm  
Brass wire - 1.4 mm  
Brass wire - 1.6 mm  
Brass wire - 1.8 mm

## CAST PARTS

### PEWTER - PLATED GOLD

P8 Tender axlebox cover (6)



### PEWTER UNPLATED

P19 Tender spring (6)



P20 Tender toolbox (2)



P21 Tender water filler body



P22 Re-railing jack



### WHITEMETAL

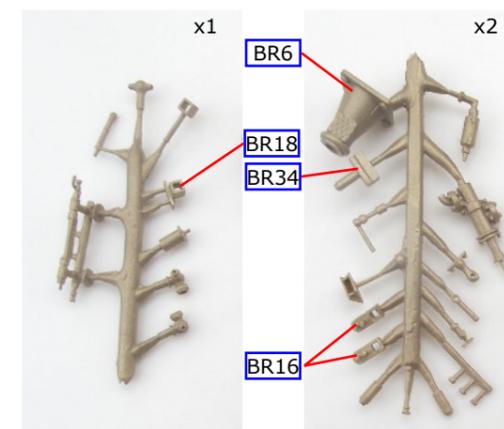
WM1 Tender spring damper (12)

### NICKEL SILVER

NS7 Tender brake standard

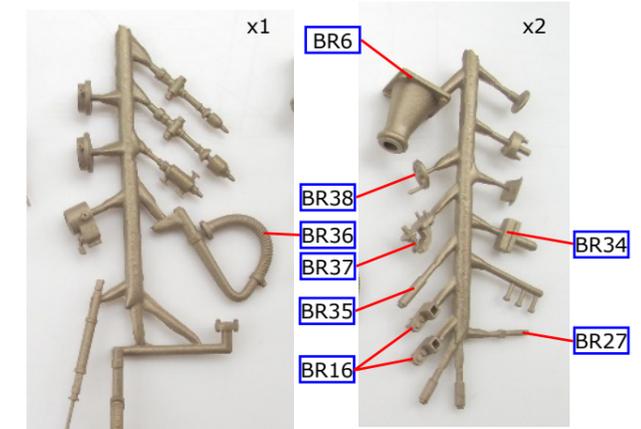


BR6 Buffer housing (2)  
BR16 Running plate lamp socket (2)  
BR18 Tender buffer beam lamp socket  
BR27 Control handle (2)  
BR34 Tender spring dampers, outer axles (4)



### BRASS

BR35 Tender spring dampers, middle axle (2)  
BR36 Tender vacuum pipe  
BR37 Tender water feed valve (2)  
BR38 Tender water feed valve hand wheel (2)



ETCH SHEET 2 & 3

