

Brassmasters

Scale Models

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GWR Hawksworth 8'0" wide
4000 gallon tender

Prototype notes and instructions

1 Introduction

- 1.1 The purpose of this booklet is to guide the modeller in the building of the Brassmasters 4mm/ft scale kit of the GWR Hawksworth 4000 gallon 8'0" wide tender. The prototype information is not, and was not intended to be, a comprehensive history.

2 Prototype Notes

- 2.1 F W Hawksworth introduced the flat-sided tender to the GWR with his 'County' class 4-6-0 locomotives of 1945. These 30 tenders were 8'6" wide, with a capacity of 4,000 gallons of water and 7 tons of coal, and weighed 49 tons full, 22 tons 14 cwt empty.
- 2.2 107 examples of the 8'0" wide version was also built, and paired with some members of the 'Castle' and 'Hall' class 4-6-0s. 'Star' No. 4062 was also paired with one in 1950. The full weight was lighter than the equivalent for the wider tender, at 47 tons 6 cwt, but the empty weight was heavier, at 23 tons 5 cwt. These tenders also carried 4,000 gallons, but the coal capacity was reduced to 6 tons.
- 2.3 The 8'0" tenders were built in 8 lots, as follows:

Lot No.	Swindon Works Numbers	Date built
A182	4000 - 4009	10/1946 - 12/1946
A187	4030 - 4049	10/1947 - 4/1948
A188	4050 - 4069	5/1948 - 8/1949
A189	4070 - 4098	11/1948 - 5/1950
A190	4099 - 4108	5/1950 - 8/1950
A191	4109 - 4118	9/1950 - 11/1950
A192 ((part))	4119 - 4126	11/1950 - 2/1951

- 2.4 Tenders of lots A182, A188 and A190 were allocated to new 'Castle' class engines as they were built, as follows:

Engine Lot No.	Build Date	Running Numbers	Tender Lot No.	Tender Wks Nos.
357	5 - 7/1946	5098 - 5099 7000 - 7007	A182	4000 - 4009
367	5/1948 - 8/1949	7008 - 7027	A188	4050 - 4069
375	5 - 8/1950	7028 - 7037	A190	4099 - 4108

- 2.5 The other tenders were fitted to new 'Modified Hall' engines 6959 - 7928, but no details of individual allocations are known. Tenders were swapped around as engines went through works, so some ended up behind earlier members of the 'Hall' and 'Castle' classes - the only reliable source of information is a photograph of your chosen engine.
- 2.6 The last two tenders, 4127 and 4128, were fitted with coal weighing apparatus, and were used for testing purposes behind 'King', 'Castle', 'County', 'Hall' and 43xx engines as required. 4127 was built in March 1952 (lined green livery), and 4128 in February 1952 (lined black).

3 Construction - General Notes

- 3.1 The kit contains the principal components necessary to build the tender. Numbers shown in the instructions in square brackets [] are part numbers. These numbers appear on or adjacent to the parts on the frets. Certain parts, e.g., handrail wire, nuts and bolts, etc., and the castings are not numbered.
- 3.2 Because this tender is a separate kit it is not possible to provide a form of coupling to suit all the various methods employed on model locomotives to which it may be paired. The coupling arrangement is therefore left to the builder to determine.
- 3.3 The tender is designed to be constructed as two units- body and chassis, to facilitate painting. However, it may be built as one assembly if you so wish.
- 3.4 On the etched components all folds and bends are made with the half-etched line to the inside, except for the bottom sections of the axleguards on frames [38] and [39].
- 3.5 On some components it is necessary to form rivet / bolt heads from the reverse side by using a punch. We recommend the 'drop punch' as described by John Hayes in 'Model Railway Journal' issue 73 and now marketed by London Road Models.

3.6 The following components are not included in the kit and must be sourced by the modeller:

Wheels: we recommend Ultrascale or Alan Gibson's of which you will require three axles 4'1½" 12 spoke. Please remember to specify the gauge (OO/EM or P4) when ordering.

Couplings. Conventional couplings are available from several sources, the best of which are Exactoscale CH001A screw type.

Those using Alex Jackson or other forms of automatic coupling will have their own preferences for methods and materials.

3.7 Finishing materials. The following are recommended:

Primer: proprietary aerosol grey primer (available from car accessory shops).

Colours:

GWR period

Phoenix Precision GWR post 1945 locomotive green (P11), GWR post 1945 lining orange (P13).

BR period

Phoenix Precision BR pre1954 locomotive green (P100) or post1954 locomotive green (P101), and BR lining orange (P104). Both periods Humbrol satin black (85), and buffer beam red (60).

Varnishes: Humbrol Gloss Cote Satin Cote and Matt Cote (available from Squires).

Transfers: Methfix sheets 7 (GWR) or 14 (BR) from the HMRS.

3.8 Most soldering operations can be performed with 145 degree solder and Carr's 'green label' flux or similar, using a 25 watt iron. The addition of smaller parts such as lamp irons is best undertaken with solder paste and a resistance soldering unit (RSU). We recommend the RSU marketed by London Road Models. To fix white metal castings, first tin the surface of the brass or nickel silver with 145 degree solder, then fix the casting in place with 70 degree solder and 'red label' flux.

3.9 Solder flux is highly corrosive and leaves deposits on the metal surface. At the end of each work session involving soldering, wash the components / assemblies in warm water and gently apply 'Jif' or a similar cleaner using an old paint brush. Rinse the parts thoroughly in warm water and allow to dry. Do not use hot water as this may melt the 70 degree solder. Do this in a sink or basin with the plug in place so that if anything falls off it won't go down the plug-'ole!

3.10 Try to keep the amount of soldering in close proximity to the wheels' steel tyres to a minimum. It is recommended that wheel tyres be coated with a thin layer of paint to prevent corrosion during assembly, and then cleaned off when construction is complete.

3.11 The terms 'fit' and 'fix' as used in these instructions have definite and separate meanings. 'Fit' means put in place but do not secure, e.g., fit the wheelsets in the bearing units. 'Fix' means secure in place (using solder, adhesive, etc.), e.g., fix the filler dome on the tank top.

3.12 Reference to the right and left sides of the tender is made from the driver's position, looking forward from the locomotive cab (i.e., looking at the tender from the rear). For example, the fire-iron tunnel is on the left hand side.

3.13 Some of the etched components are delicate and easily damaged, so do take care in handling them. Components should be removed from the fret using a small scalpel and the tabs removed with a small fine-cut file. Any flash on the castings should be removed with a small fine-cut file and the casting polished with a fibreglass brush.

3.14 On the parts list overleaf, a number of parts are marked **NR** – these are no longer required to build the kit.

PARTS LIST

Description	Part No.	Quantity	Description	Part No.	Quantity
Etched components			Etched components (contd.)		
Running plate	1	1	Brake pull rod lever	57	2
Sides / rear	2	1	Scoop rear pull lever/ lifting lever	58	1
Inner side	3	2	Scoop front operating lever	59	1
Inner rear	4	1	Frame stay plate	60	2
Rear step	5	4	Wheelset retainer - centre	61	NR
Lamp iron	6	4	Wheelset retainer - rear	62	NR
Water gauge	7	1	Brake cross shaft - rear	63	NR
Front	8	1	Brake cross shaft - centre	64	NR
Coal door bar	9	1	Brake cross shaft - front	65	NR
Coal door	10	1	Inside frames	66	1
Coal doorway surround outer	11	1	Front stretcher (OO)	67	1
Coal doorway surround inner	12	1	Rear stretcher (OO)	68	1
Footplate support	13	4	Brake shaft bracket	69	1
Footplate	14	1	Water scoop rear shaft brackets	70	1
Locker - left	15	1	Water scoop pull rod	71	1
Locker - right	16	1	Dragbeam backing plate	72	1
Locker door - left	17	1	Bufferbeam backing plate	73	1
Locker door - right	18	1	Doublers plate	74	4
Locker top plate	19	NR	Thick axle washer	75	12
Water cock crank	20	NR	Thin axle washer	76	6
Top / coal space base	21	1	Equalising beam	77	2
Coal space back plate	22	1	Brake shoe / hanger	78	6 prs
Lifting eye plate	23	2	Brake shoe overlays	79	12
Lifting eye	24	2	Brake pull-rod halve	80	1 pr
Gusset (back of top)	25	2	Toolbox top	81	1 pr
Coal space side - left	26	1	Water valve linkage halves	82	2 prs
Coal space side - right	27	1			
Coal space side support	28	2	Other components		
Fire iron tunnel base	29	1	Buffer spring		2
Fire iron tunnel intermediate vertical plate	30	1	Buffer head		2
Fire iron tunnel end vertical plate	31	1	10BA nut		2
Fire iron tunnel - front section	32	1	10BA bolt		2
Fire iron tunnel - rear section	33	1	1mm x 1mm brass angle - 40mm		1 length
Beading strip - for back plate	34	1	Straight brass wire - 0.33mm		1 length
Beading strip - for front plate	35	1	Straight brass wire - 0.50mm		1 length
Gusset (coal space)	36	3	Straight brass wire - 0.70mm		1 length
Chassis top	37	1			
Frame - left	38	1	Castings		
Frame - right	39	1	Handbrake standard		1
Drag beam	40	1	Water scoop standard		1
Buffer beam	41	1	Tank ventilators		2
Buffer beam upper plate	42	1	Water gauge back		1
Valance overlay - right	43	1	Axleboxes		6
Valance overlay - left	44	1	Buffer bodies		2
Support bracket (end)	45	4	Front buffers		2
Support bracket (intermediate)	46	4	Vacuum brake pipe		1
Front footstep stay plate	47	2	Steam heat pipe		1
Front footstep - upper	48	2			
Front footstep - lower	49	2	Whitemetal castings		
Rear footstep - upper	50	2	Dome		1
Rear footstep - lower	51	2	Tank filler		1
Axle unit - centre	52	NR	Water scoop		1
Axle unit - rear	53	NR			
Axle unit - front	54	NR	Not included		
Handbrake lever	55	1	Wheels, axles, front coupling and rear coupling		
Brake cylinder lever	56	1			

4 Construction - Detail

- 4.1 Form the bolt heads on running plate [1], and then remove the components from within it. Check and if necessary open out the holes at the front and rear to clear a 10BA bolt, and then fix a 10BA nut over each hole.
- 4.2 Fold the tender sides/rear [2] to give a 1mm radius to the rear corners at the location of the vertical handrail holes, then fix into the half-etched location line on the running plate. Remove the components from within tender inner sides [3], and tender inner rear [4], and fix these inside, against part [2].
- 4.3 Make and fix in place the vertical and horizontal rear handrails (0.3mm wire). Fold up and fix the tender rear steps [5] and lamp irons [6] in place.
- 4.4 Fix the water gauge [7] to the half-etched recess in the tender front [8]. Fix the coal door bar [9] to the coal door [10], then the coal door to the front. Fix the coal doorway surround outer [11] and coal doorway surround inner [12] to the back face of the front. Fix the front in place between the sides, in the slots in the running plate.
- 4.5 Fold up and fix in place the footplate supports [13] to the running plate, and fix to them the footplate [14].
- 4.6 Fold up the left [15] and right [16] lockers, and fix to them the left [17] and right [18] doors. Referring to the photographs, fix the toolbox tops [81] to the top of the lockers flush with the rear and outside edges of the locker, and with the two holes for the water valve linkage running across the tender, and the holes for the water scoop / brake standards at the front inside corners. (Please note that the photos show a preserved tender with the scoop gear and standard removed). Using the holes in the top plate overlays as a guide, drill the toolbox tops 0.33mm for the water cock handles/rods, and 1.2mm for the standards. Fix the lockers in place on the footplate. Fix together the water valve linkage halves [82]. Form the water valve handles and operating rods from 0.3mm wire. Fix in place with the water valve linkages [82] at the same time. Form and fix in place the locker door handles, and the front (vertical) handrails using 0.3mm wire. Fix in place the water scoop and handbrake handle castings.
- 4.7 Form the lateral folds on the tender top / coal space base [21] and fix in place in the tender, locating on the tops of the inner sides and in the half-etched location line on the back of the front.
- 4.8 Fix the coal space backplate [22] to the slots in the top with the raised part of the etch towards the rear, then cut and fix in place the 1mm x 1mm brass angle to the tender top at the rear of the backplate.
- 4.9 With the slots towards the front, fix lifting eye plates [23] in the half etched locations in the top plate, and fit the lifting eyes [24], the tabs locating in the slots. Form the bars over drain holes from 0.33 brass and fix in place, Fix in place the gussets [25] and the castings for dome, and tank filler.
- 4.10 Form the curves in the upper sections of coal space sides [26 - left, 27 - right] to the profile of coal space side supports [28]. Fix the supports to the coal space sides at the half-etched witness marks, and then fix these assemblies in the tender, in the half-etched location lines in the top and front.
- 4.11 Fix the fire-iron tunnel base [29] in position on the left hand side, so that its front edge locates in the half-etched location line on the tender front. Fix the fire iron tunnel intermediate vertical plate [30] to the half-etched location line in the tunnel base, and the fire iron tunnel end vertical plate [31] to the half-etched location line at the rear of the tunnel base.
- 4.12 Form the curves on the fire iron tunnel sections [32 - front, 33 - rear] and fix in place over the base. The top edge of the tunnel should be level with the top of the tender side and its bottom edge should meet the coal space side, with the leading edge of the front section locating in the half-etched location line on the back of the tender front.
- 4.13 Fix the beading strips [34] to the backplate and [35] to the front plate - note that the latter has its 'overhang' over the coal space.
- 4.14 Fix the gussets [36] to the top of the right hand coal space side (at the locations shown by the half-etched witness marks), followed by the castings for the tank ventilators and (to the back of the front) the water gauge back.
- 4.15 Put the body unit aside until later.
- 4.16 Remove the components from within the chassis top [37]. Drill the two mounting holes to clear a 10BA bolt. Form the bolt heads on the forward step plates. Fold down the side valances / step plates. Fold the bends in the spring retaining plates.
- 4.17 Form the bolt / rivet heads in the frames [38 - left, 39 - right], and fold the bottom pieces of the axleguards through 180 degrees.
- 4.18 Fix the frames into the slots in the chassis top, and then remove any excess tab material to give a smooth upper surface.
- 4.19 Fold up step spacers on buffer beam backing plate [73] and fix buffer beam [41] to it. Fix in place across the back of the frames. Fix together drag beam backing plate [72] and drag beam [40] and fix in place across the front of the frames. Fix the buffer beam upper plate [42] to the buffer beam. Fix the valance overlays [43 – right, 44 – left] in place. Note – the end with 5 rivets is towards the front and the group of 3 rivets should be with the single rivet at the bottom.
- 4.20 Form the rivet heads in the end support brackets [45] and intermediate support brackets [46], then fold up and fix in place in the half-etched recesses in the frames - note that solder is best applied from the 'inside' of the frames through the holes provided for this purpose.

- 4.21 Fold up the front footstep stay plates [47] and fix between the frame sides (in the half-etched recesses) and the forward step plates.
- 4.22 Fold up and fix the front footsteps {48 - upper, 49 - lower} and rear footsteps [50 - upper, 51 - lower] to the half-etched recesses in the step plates.
- 4.23 Keeping the etch flat for the moment, prepare the inside frames [66], using a rat-tailed file, as follows:

For a rigid chassis, open all the axle holes to give a good fit on the axles, noting that the centre axle should be a good but sliding fit in the holes.

For an equalised chassis, elongate the leading axle holes to the curved etched marks above and below, and open centre slots as required so that both axles are a good sliding fit. Open rear axle hole so that axle is a free rotating fit. Those who wish for a larger bearing surface may add doubler plates [74] around equalised axle holes, and axle washers [75] around fixed axle holes, secured to the outside face of the frames (see sketch).

- 4.24 Drill out holes in the parts as follows:

0.3mm	small holes in brake pull-rod levers	[57]
0.5mm	small hole in handbrake lever	[55]
	small hole in brake cylinder lever	[56]
	small hole in scoop front operating lever	[59]
	holes for brake hanger pins in inside frames	[66]
0.7mm;	large hole in handbrake lever	[55]
	large hole in brake cylinder lever	[56]
	large hole in brake pull-rod lever	[57]
	large hole in scoop rear pull lever/lifting lever	[58]
	large hole in scoop front operating lever	[59]
	holes for equalising beams and water scoop front shaft in inside frames	[66]
	holes in brake shaft brackets	[69]
	holes in water scoop rear shaft brackets	[70]
	cranks at ends of water scoop pull-rod	[71]
	pivot holes in equalising beams	[77]

- 4.25 Fold up the inside frames [66].

For 00 gauge only, separate the two frames from the stretcher plates at the fold lines by bending back and forth. Fold up the front [67] and rear [68] 00 stretchers, and fix in place, noting that the stretchers should be flush with the top of the mainframes, and that the screw holes should be to the rear of both stretchers.

- 4.26 Push through rivets on the water scoop rear shaft brackets [70], fold down the arms and fit to the inside frames assembly, so that it projects on the right hand side, while the other bracket is between the frames (see sketch). Note that the inner bracket is vertical, while the right hand bracket is joggled inwards towards the bottom at about 20 degrees. (For a chassis with 00 stretchers, the ends of the locating tabs will project beyond the left mainframe, and may be trimmed for neatness). Trim and fix a piece of 0.7mm wire, locating in place - but not yet fixing - the water scoop rear pull lever/lifting lever [58] and water scoop pull-rod [71].
- 4.27 Fix a 10mm length of 0.7mm wire to the bracket below the front of the frames on the right hand side, perpendicular to the frames, and with 1mm projecting inwards (see sketch). Fit the end of the scoop pull-rod to the inner end, and fix first to the rear and then to the front shafts. Note that the pull-rod is best positioned just inside the frames. Fix the water scoop casting in the rebate towards the rear of the frames, ensuring that the casting will be clear of the axle. Locate in position on the centre line the scoop pull lever/lifting lever [58], and fix to the rear scoop shaft.
- 4.28 For an equalised chassis, fix the two parts of the equalising beam [77] together. Cut 2 equal size pieces of 1/16" tube so that the equalizing beam and the pieces of tube fit between the inside frames. With the equalizing beam in the middle, pass a piece of 0.7mm wire through the pivot holes in the frames, and through the tube and equalizing beam. Carefully fix the ends of the wire, and trim flush.
- 4.29 Fit the wheels and axles, using thick [75] and thin [76] washers to limit side-play as desired. Test-fit to assembled superstructure and test-run, trimming front scoop shaft, and where necessary the etchings, to avoid contact between wheels and superstructure. Dismantle before continuing assembly.
- 4.30 Fix together the brake shoe/hanger halves [78]. For the neatest effect we suggest soldering together corresponding pairs from the two handed frets (these were drawn by hand, after all!), and fitting the brake shoe overlays [79] to each side before separating the two completed shoe/hanger units, and trimming the attachment tags. Note; if additional clearance is required, the inner shoe overlays may be omitted. Open the holes at the top 0.5mm, and 0.6mm at the bottom.
- 4.31 Taking care not to fill the grooves inside the forked front ends, fix together the brake pull-rod halves [80]. Clean up, and check that the ends of cross-beams will fit the bottom holes in the brake hangers. Fix three 25mm lengths of 0.5mm wire centrally through the holes in the inside frames, and locating the pull-rods, fix the centre axle brake hangers/shoes in position. Check that there is sufficient clearance to allow for movement of wheels on an equalised chassis. Repeat for front and rear axle hangers/shoes. Test-run. When satisfied fit cross-beam ends and fix in position. Trim them and the 0.5mm wire flush with the outside of the hangers.

- 4.32 Fold up the front brake shaft bracket [69]. Due to a design error, one plate (the right) is longer than the other, so this should be snapped off by repeated bending. Using a piece of 0.7mm wire to position it adjacent to the other plate, the top should be filed to match - about 0.5mm must be removed. Sorry! Fix the brackets in the slots in the front frame stretcher, noting there is a small cut out to clear the front screw which secures the frames to the superstructure.
- 4.33 Bend the front of the pull-rods upwards, and locating - but not yet fixing - brake cylinder lever [56], fix 25mm of 0.7mm wire in place to form front brake shaft. Note that pull-rods should be between the wire and the front stretcher.
- 4.34 Fit the brake pull-rod levers [57] to the brake shaft, and locate on the forked ends of the pull-rods using 0.3mm wire. Fix in place, ensuring that pull-rods are parallel. Also fix brake cylinder lever [56], on centre line, and at 90 degrees to pull-rod levers.
- 4.35 Fix in place the hand brake lever [55] and the scoop operating lever [59]. Fix pieces of 0.5mm wire to ends of the brake cylinder lever, hand brake lever and scoop operating lever to simulate pull rods from the brake cylinder and handbrake / scoop standards. Note that a brake cylinder is not supplied as it would obstruct the equalising beam.
- 4.36 Fix the axlebox / spring castings to the frames, the buffer bodies to the buffer beam, and the front buffer castings to the drag beam.
- 4.37 Form and fix in place whatever material is required to provide the coupling to the locomotive.
- 4.38 Temporarily fit the chassis to the body using the two 10BA bolts.
- 4.39 Fix in place the vacuum brake and steam heat pipes, and rear coupling.
- 4.40 Fold up frame stay plates [60]. It is suggested that these are fixed into the half etched grooves in the inside of the frames with superglue after completion of painting, to allow easier dismantling for maintenance etc. as required.
- 4.41 Separate the chassis and body, and complete the painting, lining, application of transfers, varnishing, weathering (if required), and addition of coal.
- 4.42 Fit the buffer springs and heads, and re-fit the chassis to the body. Fix frame stretchers, and coal to coal space.

5 Reference Works

Locomotives of the Great Western Railway: Part 8 - Modern Passenger Classes, and Part 12 - A Chronological and Statistical Survey, (Railway Correspondence and Travel Society)

The GWR Stars, Castles and Kings, Part 2, by O S Nock, (David & Charles).

A Pictorial Record of Great Western Engines, Volume 2, by J H Russell, (Oxford Publishing Company) page 234. (Page 240 shows works drawing of similar 8' 6" wide tender)

Castles and Kings at Work, by Michael Rutherford, (Ian Allan).

Halls, Granges and Manors at Work, by Michael Rutherford, (Ian Allan).

Castles and Kings, A Pictorial Tribute, (Roundhouse Books).

Great Western Railway Journal No. 53 (Wild Swan) - works drawing of similar 8' 6" wide tender

Diagram showing brake and water scoop rigging

