

**Brassmasters**

**Scale Models**

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**GREAT WESTERN RAILWAY**

**28xx 2-8-0  
LOCOMOTIVE KIT**

**Designed by Martin Finney**

**4MM SCALE  
OO - EM - P4**

**INSTRUCTIONS  
AND PROTOTYPE NOTES**

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## SECTION 1: BRIEF HISTORICAL DETAILS

For a detailed history of this long lived class Part Nine of 'The Locomotives of the Great Western Railway' published by the R.T.C.S. is essential reading. From this kit any of the 28XX class (2800 - 2883) with the full cone D4 boiler can be built from circa 1907 to the present day.

In designing the kit I have used the following Swindon Drawings:

21437	2/1903	Lot 139	Frame plan
21438	1/1903	Lot 139	Cross sections
41157	3/1910	Lots 181/86/90	Frame plan
55622	11/1917	Lot 210	Cross sections
110766	12/1937		Arrangement of motion
110819	12/1937	Lot 321	Cross sections
109101	2/1938	Lot 321	Frame plan

Drawing 110766 is reproduced in G.W.Engines - Vol 2 by J.H.Russell on page 216 as are some useful photographs to which I shall refer.

The locomotives were built over a period of 16 years under 8 Lots as follows:

Lot numbers	Numbers	Built	Original boiler as built	Top feed plate	Front drop as built	Pony truck
139	2800(97)	1903	D2	no	straight	DS SL
153	2801-10	1905	D2	no	straight	DS SL
155	2811-20	1905	D2	no	straight	DS SL
160	2821-30	1907	D2/D4	no	straight	DS SL
181	2831-35	1911	D4	no	curved	SS SL SB FA
186	2836-45	1912	D4	yes	curved	SS SL SB FA
190	2846-55	1912-13	D4	yes	curved	SS SL SB FA
210	2856-83	1918-19	D4	yes	curved	SS CS SB FA

Pony truck codes:

Suspension

- Single spring each side - SS
- Double spring each side - DS

Side Control

- Swing links - SL
- Cartazzi slides - CS

Stretcher bars - SB

Frame angle - FA

As the half cone, D2, boiler is not included in the kit the earliest authentic model that can be constructed is one of Lot 160 that was built with the full cone, D4, boiler (Nos. 2822/23/24/25). All the other variations above and the many detailed below are possible using the components in the kit.

### Other Variations/Modifications

Chimneys: 2 different types provided.

Smokebox: originally quite short and later front and back rings had snap head rivets.

Rear sandboxes: originally filled from inside cab and later from circa 1915 a new pattern filled from outside.

Front sandboxes: Lot 210 had a larger pattern and entirely different operating rods.

Cab roof: early canvas covered wood - later steel with two designs of rainstrip.

Cab spectacles: later plated over.

ATC equipment: fitted to the entire class between 6/30 and 10/31.

Buffers: originally Dean taper type later Collett types.

Brake hangers: originally double type later cast design.

Crosshead: 2 different designs provided.

Extra boiler support: fitted to Nos. 2800 – 2830

Lamp bracket: later moved to smokebox door

New cylinders: from 1934 onwards, with outside steam pipes and also involved fitting curved drop plates to some of the early engines.

Vacuum pipe: originally tall - later a shorter pattern introduced.

Injectors: originally between frames with pipes to top feed largely obscured later moved outside the frames and pipes rerouted along edge of valence.

Lubricators: journal lubricators fitted from circa 1920 onwards.

Pony truck spring cover: 2 types provided.

Front struts: fitted from 1908 onwards.

## Tenders

The early engines were paired with 3000 gallon tenders of standard design. Starting with Lot 181 in 1911 3500 gallon tenders were used and this tender subsequently became general for the class and has remained so ever since, although some engines kept 3000 gallon tenders until after the Great War.

## SECTION 2: CHASSIS DETAILS

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. I have not always identified left/right components separately but with care and common sense no problems should arise.

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

1. Gauge 00, EM or 18.83.
2. Suspension Rigid, sprung, compensated.
3. Pickups Scraper, plunger or the 'American' system.
4. Whether you wish to fit the working valve gear

No pickup material is provided. The options are:

Scrapers attached to printed circuit fixed between the frames.

Plunger - drill holes P and fit according to the manufacturer's instructions.

The 'American' system with the wheels on the loco are shorted out on one side and the tender on the other. Bill Bedford produces some etched shorting strips with work well. The drawbar between the loco and tender can be used to carry the current.

It is not possible to use plunger pickups with the working valve gear because they will foul one another.

## SECTION 3: FRAMES

Having decided which chassis to construct you can now start construction by preparing the frames (parts 1 & 2). For a rigid chassis open out the main axle holes to accept 1/8" top hat bushes (not provided) and solder them in place. If you are going to fit sprung horn blocks, you should remove the axle holes by cutting up the half-etched lines, leaving a standard 6mm wide slot and then follow the manufacturer's instructions.

To construct the kit as designed with a compensated chassis:

Remove all the axle holes as described above. Carefully widen the slot in the rear hornblocks (part 8) until the Flexichas bearings are a good fit. I find a significant variation in the bearings and once I have fitted a hornblock to a bearing I mark the bearing and hornblock so that they can be later assembled together. A good fit between hornblock and bearing is essential if the chassis is to run well.

Note that the hornblocks differ as follows:

- Two have a small slot (to clear part 6) - use on leading axle
- Two are narrower (to clear part 4) - use on third coupled axle

Solder the rear hornblocks to the inside of the frames aligning them with the slot and with the bottom of the frames. The square bearings mean that they do not rotate.

Now open out the following holes in the frames:

- B for brake hanger pivots - 0.45mm
- R for reversing shaft - 0.9mm
- A for compensation beam pivot - 1/16"
- S for sanding lever cross shaft (Not Lot 210) - 0.3mm
- V for valve rock shaft bracket to fit rivet - 0.8mm
- C for brake cross shaft - 0.9mm

Bend the valve rock shaft brackets along the half-etched fold lines at right angles and strengthen with a fillet of solder. Similarly bend the brackets for the front sandpipes. Fold over the tabs on parts 54 & 55 and solder in place in the appropriate slots in the frames.

#### **SECTION 4: FRAME SPACERS AND ASSEMBLING THE CHASSIS**

Remove the spacers (parts 3, 4, 5, 6, 7 & 56) to suit your chosen gauge. Fold up the small tabs on the pony truck pivot spacer (part 6) and solder the 10 BA pony truck pivot screw in place. Check that the side control wire fits through the holes in the tabs and through the screw slot.

Fold up parts 3 & 7 making sure the half-etched fold line is on the inside and that each bend is a right angle. Check that all tabs on the spacers fit properly in their corresponding chassis slots so that the rest of the spacer is hard up against the inside of the frames. Bend the frames inwards slightly along the fold lines in front of the cylinder opening using part 7 as a guide.

Now assemble the frames and spacers. 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 1/8" 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 checking constantly that the chassis is square and the frames are straight.

#### **SECTION 5: COUPLING RODS**

The coupling rods are now made so that they can be used as a jig to align the remaining hornblocks accurately. First drill out all the crankpin holes to a convenient size which is well undersize for the crankpins and the fork joint holes 1mm so that the 1mm nickel silver wire is a tight fit. Remove all burrs caused by the drilling. Now drill the drill used for the crankpin holes into a small block of wood and leave the drill in the wood with its shank projecting. This projecting shank is used as a mandrill to accurately align the laminations of each rod.

Tin well the front face of the inner laminates and the rear face of the outer laminates and place them over the mandrill. Using plenty of solder and flux solder the two laminates together. You will now have rods with the crankpin and fork joint holes 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.

The crankpin holes now need carefully opening out until they just fit, with no free play, the ends of the hornblock alignment jigs (available from London Road Models or Markits).

The fork joints are now pinned using the 1mm nickel silver wire. Retain the pins, which should be a tight fit, by lightly soldering on the inner face of the rods. The correctly assembled rods should now have a completely flush inner face.

#### **SECTION 6: FITTING THE FLEXICHAS HORNBLOCKS**

Prepare the remaining bearings and hornblocks as described in section 3 and slide them over the hornblock alignment jigs with the springs between the bearings. Carefully compress the springs and clip the hornblocks between the frames and place the

prepared coupling rods over the ends of the jigs. Make sure the hornblocks are square to the chassis and that their bottom edge aligns with the lower edge of the frames and then solder them in place.

### **SECTION 7: FITTING THE COMPENSATION BEAMS**

Cut two pieces of 1/16" brass rod so that they fit through the holes A and are flush with the outside face of the chassis frames. For the front beam cut a piece of 1/16" bore tube to fit between the frames and solder the two laminations (part 12) to it centrally. Cut two equal pieces of tube which together fit between the frames and solder the rear beams (part 13) to them close to one end. Modify the flexichas bearings on the two rear axles as shown in the drawing and temporarily fit the beams.

Temporarily fit all the wheels and axles and confirm that the compensation works properly and check that the chassis is sitting level.

### **SECTION 8: FRAME OVERLAYS**

Emboss all the rivets in the frame overlays (parts 52 & 53). Fold the rear step supports and for EM and 18.83 shorten their length - EM first half etched line - 18.83 the second. Solder in place lengths of 0.45mm wire for the brake hanger pivots. These then serve to accurately locate the overlays which only need tack soldering around their edges and adjacent to the brake hanger pivots. When the overlays are attached trim the brake hanger pivots flush with the inside of the frames.

### **SECTION 9: PONY TRUCK**

Chose the appropriate parts (26 & 28 for 00 or 25 & 27 for EM/18.83). Open up the axle holes to accept the 2mm top hat bearings and the mounting hole to accept the 10 BA top hat bearing.

The folding of the frame is quite complex as some of the folds are 90° with the fold line on the inside and others 180° with the fold line on the outside. First fold the lower frame sections and the guard irons over through 180°. The remaining folds can now be made as shown in the diagram forming the half etched diagonal struts at the front last. Check all the bends for squareness and solder all the pieces together. Form the guard irons to shape and solder either parts 29 or 30 in place with the 2mm top hat bearings. Drill out all the small holes to accept short pieces of 0.45mm wire to represent the frame bolts.

If you are fitting the swing hangers (part 31 or 32) drill out the mounting holes in the upper frame to accept the 0.7mm wire. Bend the upper frame to shape folding the rear stays over through 180°. Fit the swing hangers, back and front, if appropriate and solder the two parts of the frame together. If needed solder two lengths of 0.45mm wire as stretcher bars in the grooves on the underside of the frame. Fit the wheels and form the rear of the frame and the struts so that when fitted to the chassis over the pivot the frame is level. Lastly solder in place, if appropriate, the frame angles (part 69). Bend the pony truck side control wire to shape so that when fitted it clears the underside of the front spacer and fits into the hole in the rear of the upper frame.

### **SECTION 10: CYLINDER ASSEMBLY**

Open out the piston tube and valve chest holes in part 20 until the tubing fits snugly. If you are building an EM or 18.83 chassis reduce the width of the inside cylinder faces to the etched lines provided so that the cylinders are a good fit in the slots in the frames. Fold up the cylinders making sure they are square.

Fit the piston tube, flush at the front and with 2mm projecting at the rear. Fit the rear cylinder cover (part 153), overlay (part 154) and gland (part 155) over the projecting tube, pass short lengths of 0.45mm wire through to represent the fixing studs and solder in place. The slide bar holes will need a little easing outwards with a small file so that they align with the holes in the cylinders.

Emboss the rivets in the slide bar laminations (parts 143 & 145) and solder to the slidebars (parts 142 & 144) aligning the front ends. The appearance of the slidebars is much improved by carefully filing the edges smooth and tapering the outer surfaces at the rear. Open up the oil cup holes in the upper slidebars and solder in short lengths of 0.7mm wire. Attach the valve rod slide casting (part B10) using short lengths of 0.45mm wire to both aid alignment and represent the fixing bolts. (See Russell fig.556 which is a 28XX class not a 2884 class as credited).

The completed slidebars may now be inserted and at first tack soldered in place. After checking all is square and parallel they are permanently attached. Clean of the cylinder fronts flush and attach the front covers (part 152). Drill out the relief valve holes, back and front, 0.9mm and solder in short lengths of 0.9mm wire rounded at the end to represent the valves.

Prepare the valve chest tubing - curved drop plate 18mm long - square drop plate 17mm long. Fit the rear cover (part 39) and for the curved drop plate the front cover (part 38). File the covers flush with the tubing and attach the valve chest in place with equal amounts protruding for the curved drop plate and with 1mm less protruding at the front for the square drop plate.

Fold the crosshead slippers (part 146) through 90° on the half etched lines, insert the spikes through the crosshead back (part 147) with the half etched boss on the inside and solder together. Select the appropriate crosshead front (part 148 or 149), emboss the rivets and drill the hole 0.7mm together with the hole in the back. Mount the 0.7mm drill vertically in a block of wood to act as a mandrel and thread the front over the slipper/back assembly. Ensure all is square and carefully solder together. Check the crosshead for fit between the slide bars.

Cut a 2mm piece of piston tube and solder to a piece of the steel piston rod. Bend in slightly the small projections at the front of the crosshead so that the 2mm tubing is a tight fit between them. Place the piston rod in the piston and slide the crosshead in place with the 2mm tubing between the projections. (not too far or it will foul the small end of the connecting rod). Now solder the crosshead to the piston rod and the result should be a perfectly aligned and free moving assembly.

Solder together the connecting rod laminations (parts 139 & 140) and add the rod boss laminations (part 141) to the big end back and front. Drill the big end to fit the crankpins and the small end 0.7mm. Fit the connecting rod to the crosshead using 0.7mm wire for the pin. Carefully solder the pin from the rear and file flush. The early pattern crosshead front on the right side is detailed with part 150 - see Russell fig.556.

Emboss the bolt heads in the front motion brackets (part 21) and solder to the rear brackets, back to back. Fit them to the slide bars checking the crossheads for free movement. Form the wrappers (part 75) to shape and solder in place making sure the drain cock holes are on the bottom centre line.

Attach the drain cock castings (part B9) and solder the linkage (part 68) in place behind on the small spigots - see Russell fig.556. If appropriate attach the splashers (part 63) behind the slidebars ensuring they do not foul the crossheads.

Bend a piece of .020" steel wire, for the valve spindle, through 90° and solder to the valve rod (part 151) through the front hole. Solder another piece of wire through the rear hole so that it protrudes inwards by 1.5mm. If you are not building the working valve gear the valve rod can now be fixed in place.

The cylinders will be fixed in place when the body is attached but if you require a separate fixing then two 10 BA bolts can be used through the outside holes and into tapped holes in the spacer part 7.

If you are fitting working valve gear build it next, following the separate instructions.

## **SECTION 11: COMPLETING THE CHASSIS MECHANICALLY**

Fit the crankpins to the wheels making sure the screw heads do not project, countersinking them if necessary. The flush type is used on the leading axle. Attach the balance weights to the wheels using photographs as a guide to the appropriate weight and its position. Assemble the wheel sets, bearings and rods (quartering the wheels by eye) selecting 1/8" axle washers of appropriate thickness to control side play. A thorough check of all clearances at this stage is important especially between the leading crankpin/ crosshead and connecting rod/crankpin on the second axle. The crankpin nut on this axle will probably need reducing in thickness.

When you are confident of the clearances assemble the rear axle with the motor in place and quarter the wheels as follows. First quarter and fix (with Loctite) the wheels on the leading axle. (Carefully set the back-to-back measurement with a gauge). Attach the rods omitting the crankpin bushes on the third and fourth axles. Adjust the quartering on the second axle until the first two axles rotate freely with no binding. Fix the wheels to the second axle. Place the crankpin bushes on the third axle fix the rods again and quarter the third axle. Similarly quarter the rear axle. You should now have a mechanically acceptable chassis. Now connect the motor to your pickups and test run.

## **SECTION 12: FINISHING THE CHASSIS**

The axles are now retained by the springs (parts 9, 10 & 11). The leading spring is attached together with the pony truck compensation beam (part 15) together with part 16 as shown in the diagram. Check that part 16 clears the pony truck side control wire.

Assemble the brake hangers (emboss rivets - use 0.45mm wire as pins) and attach to the pivot wires. Solder the brake cross shafts (part 61) to the pull rods (part 14) aligning the pull rods with the holes in the cross shafts. Fix this assembly to the brake hangers. Complete the brake gear by fitting the rear cross shaft and levers (parts 71 & 72) as shown in the diagram.

Complete the chassis detailing by fitting rear sandboxes, sandpipes and injectors.

### SECTION 13: FOOTPLATE & FIREBOX

Prepare the footplate (part 77) as follows:

For an engine in early condition (before circa 1923) with the injectors mounted 'inboard' remove the brackets, 3 each side, along the edge.

Emboss the rivets on the rear steps and vacuum pump bracket.

If required emboss the rivets on the splasher fronts.

Fold the edges then the splasher fronts followed by the step at the front. The small step brackets should be removed for a square drop plate. For all but Lot 210 fold down the sandbox sides. Lastly fold up the lamp brackets and cab floor supports.

Prepare the footplate overlay (part 78) by embossing the rivets under the lamp brackets, cab side angles, reversing rod support and if required the small sand rod bracket. For the square drop plate solder part 104 in place and file the front edge of the footplate to the shape shown in the diagram.

Place the overlay in place and temporarily join to the footplate with screws through the body fixing holes front and rear. Now solder together all round and solder a nut over each fixing hole. For all but Lot 210 remove the footplate overlay between the sandboxes. For the curved drop plate form the curve in part 79 and solder in place. For the square drop plate trim the rear edge of the drop plate to fit and solder in place.

Now open up the required holes in the footplate from underneath as follows:

Front struts - pony truck (2-way) lubricator - oil cups - sandbox lids - sandbox spindle Lot 210 - top feed pipes (outboard injectors). Make the oil cups from short lengths of 0.7mm wire.

Fold the vacuum pump bracket to shape along the fold lines (Russell fig.554). Drill the pump rod hole, 0.5mm, in the end of the vacuum pump (part B8) and fix a piece of 0.45mm wire to the crosshead bracket. Test fit the body to chassis to assess the vacuum pump position and then remove the body to solder the vacuum pump in place. The pump rod must be trimmed as short as possible so that the body can be removed by a slight movement forward.

Solder the valence overlays (parts 80, 81 & 82) in place carefully curving the valence as it narrows at the rear.

Emboss the rivets on the bufferbeam (part 33) and dragbeam (part 34) and solder in place. Add the brackets part 93 and coupling hook part 37.

Curve the splashers (part 92) to shape by rolling underneath a suitable rod or dowel on a soft surface - a piece of rubber sheet or carpet - and solder in place (for flush riveted splasher use with the rivets down). The splasher tops with one row of rivets are for the rear.

Emboss the rivets in the smokebox saddle (part 103), fold to shape and solder in place on the footplate.

For Lot 210 drill a hole in part 22 so that the sanding rod passes through. Emboss the rivets in parts 22 & 23 and solder together and then add the bolt overlays (part 74). Check the fit of the motion bracket in the footplate slots - **it must sit down tight on the footplate to ensure correct boiler fit later**. When satisfied, solder in place.

Solder together the two laminations of the firebox front (part 45). For all but Lot 210 have the lamination with the small rectangular hole for the sanding rod to the front and then open up this hole through the inner lamination. The firebox front and rear (part 44) must now be spaced apart by using suitable long bolts and washers through the pairs of holes in both front and rear. I use some old brass chassis spacers joined together with studding. When correctly spaced apart (35.1mm outside), the front will fit in the half-etched recess in the footplate and the rear together with the cab front will fit against the half-etched cab base.

Emboss the rivets for the ends of the cladding fixing bands on the firebox wrapper (part 94). In pencil mark the wrapper centre on its inside and outside. Using the notch in the top of the formers as a guide centre the wrapper and mark in pencil the position of the top bends. Form the bends over a suitable rod held in a vice. When happy with the forming, solder the wrapper to the formers ensuring a large fillet of solder around the front join. Check the fit on the footplate and then remove the temporary

spacers and cut out the lower piece of the rear along the half etched lines so that the motor gearbox can pass through. Round the front edges of the firebox with a file referring to photographs for the correct shape.

Fold the firebox band joining brackets (part 95) by bending near the small hole and solder in place from inside. Complete with a short piece of 0.3mm wire to represent the tightening bolt. Solder part 96 around the rear edge of the firebox and trim of the excess. Solder the mud hole doors in place on the firebox corners and then solder the firebox in place on the footplate.

Now attach the sanding rods and reversing rod as shown in the diagrams and add the handrail above the vacuum pump bracket using two short knobs.

#### **SECTION 14: BOILER & SMOKEBOX**

Form the coned section of the boiler (part 97) by rolling and check for fit around the formers (parts 46 & 47). Bend the boiler band joining brackets on part 98 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 part 98 and fit the formers so that they are flush with the ends. The cut-outs in the formers are to clear part 98 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 0.45mm wire into the holes in the rear former to act as dowels to locate the boiler and firebox. Check the boiler/firebox fit. Represent the bolts in the joining brackets using 0.3mm wire.

Check the fit of the motor through the firebox front/boiler rear and open out the holes as necessary. Aim for an easy fit to be sure the body will fit once the boiler is fitted. The motor wires pass through the notch in the boiler rear/firebox front.

If you are building in early condition without the top feed then solder the missing boiler band (part 100) in place. It can be temporarily bolted in place through the safety valve hole. Do not solder the section which will be under the safety valve casing to the boiler and when the overlay is located remove this section by cutting through with a sharp blade. Similarly for the top feed engines, solder the overlay (part 99) in place and attach the top feed casing (part W3). Form the top feed pipes from 0.8mm wire and solder in place in the 'slot' in the overlay.

Prepare the smokebox wrapper (part 101) as follows:

Shorten the smokebox to the half etched line for the early condition.

Rivet the front and rear rings by embossing together with the other rivets - look at photographs of your chosen prototype to see if this is appropriate.

Drill through the front strut holes 0.7mm.

Roll the wrapper and check fit it on the formers (parts 49 & 50). Solder the wrapper ends together using part 102 and solder in the formers flush with the back and front with the notch in the bottom of the front spacer aligned with the wrapper join. The upper hole in the front former is for the handrail knob and the other two holes for alternative positions for the steam lance cock. Emboss the four rivets on the smokebox front (part 50), 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 (part 85A) after first embossing the rivets and solder in place under the smokebox front.

Tap the hole in part 47 10BA and open out the hole in part 48 to clear 10BA so that the smokebox and boiler can be screwed together. Now check fit the boiler/smokebox to the firebox and saddle. Remember the bottom of the boiler is horizontal and so parallel to the footplate. When happy with the alignment solder the smoke box to the boiler permanently. Now tack solder the smokebox to the saddle and once again check. If all is well complete soldering of smokebox to saddle and boiler to firebox.

Fit the front struts (0.7mm wire) together with the plates parts 35 & 36. Solder the smokebox lamp bracket in place (part 105 or 106). Solder four small knobs in the holes in the firebox and six medium knobs in the boiler/smokebox holes. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place. Note the 0.45mm wire is not long enough and is joined on one of the front firebox knobs.

#### **SECTION 15: CAB**

Emboss the rivets on the cab front. The spectacle windows can be blanked off using part 112 or part 43 can be fitted from inside. Attach part 109 to the upper edge and if required part 110. Solder the window frames (part 111) in place on the inside and solder the cab front in position behind the firebox.

Prepare the cab sides (part 113) by embossing the rivets along the lower edge and any extra rivet detail you wish and attaching the cut-out beading (part 114), fitting the etched groove over the edge of the cab side. Form and fit the cab side handrails from

0.3mm wire. If required assemble the cab seats (part 126) which are designed to be working. Now remove the seat from the bracket and solder the bracket to the inside of the cab side.

Solder the cab sides in position. They are correctly aligned when the cab side handrails are vertical and they slightly overlap the cab front. Bend the floor support (part 123) to shape and fit on the cab base between the sides.

Solder part 115 between the rear edges of the cab sides ensuring the cab roof line will be horizontal. Curve the cab roof (part 116, 118 or 120). Part 116 is the early canvas covered wood type - solder the strips (part 117) over the half etched lines to represent the fixing battens. Attach the rainstrips (part 119) to part 118. Solder the roof in place and fix part 122 to the rear edge to represent the strengthening angle. For roof part 120 fix the rainstrips (part 121) to the edge of the roof.

Bend the firebox backhead profile on part 124 through 90° and check fit in place on the floor supports. Remove 3mm from the bottom of the lever reverser (part W27) and fix in place in the slot in the cab floor so that it is flush underneath. Slightly curve the fall plate (part 125) and hinge to the floor as shown in the diagram. The cab floor is not fixed in place as it must be removed to allow the motor gearbox to enter the cab when the body is being fitted to the chassis.

## **SECTION 16: FINAL DETAILING**

Fold up the steps (parts 83, 84 & 85) and solder in place.

The extra boiler support (part 57), fitted to 2800 - 2830 only, is best soldered to top of the middle chassis spacer (part 56). First solder the bolt overlay (part 73) to the rear edge.

Drill two holes in the firebox top (2mm from the cab front) to mount the whistles. The steam pipes can be represented with 0.3mm wire.

Attach all the remaining castings using the drawings and photographs as a guide to position.

Using the drawing of the cab interior the backhead can be assembled and the cab interior detailed. Use copper wire of a suitable size for the pipes. The drawing is for the later 2884 class circa 1938 but is typical of a 28xx class at this date.

Differences for an engine in earlier condition could be:

No seats - Gauges not bracket mounted - No regulator lever balance weight extension - no ATC bell.

I have included a steam heating valve (part W31) as I believe some of the class may have been so fitted particularly in BR days.

This is my fourth kit and the first prototype I have a real acquaintance with from my train spotting days. The 'twenty eights' were firm favourites of mine then and were generally recognised to be the best freight engine to work in Britain. I hope like me you enjoy the challenge of building your 'twenty eight' and that it gives you many years of service as did the prototype. If you have any problem with the kit or any criticisms or suggestions please feel free to contact me.

Finally I must thank Guy Williams for the loan of much information, David Geen for photographs of 2818 (the only surviving square drop plate engine) and Tony Reynolds for some exquisite patterns for the castings.

Best wishes

Martin Finney  
April 1990

If you have any problem with the kit or any criticisms or suggestions please feel free to contact Brassmasters.

**ETCHED COMPONENTS - .018" brass**

1	Frame - left	58	Balance weight - (6)
2	Frame - right	59	Brake hangers - later cast type - front - (8)
3	Spacer - rear	60	Brake hangers - later cast type - rear - (8)
4	Spacer - firebox front	61	Brake cross shaft - (4)
5	Spacer - motion bracket	62	Draw bar - 3 different lengths
6	Spacer - pony truck pivot	63	Slide bar splasher - (2)
7	Spacer - front	64	Reversing shaft arm - lower end
8	Hornblock - (8)	65	Washer 1/8"
9	Spring - centre lamination - (6)	66	Washer 2mm
10	Spring - centre lamination - leading axle -(2)	67	Washer 10BA
11	Spring - outer lamination - (16)	68	Cylinder drain cock linkage - (2)
12	Compensation beam - front - (2)	69	Pony truck frame angle - (2)
13	Compensation beam - rear - (2)	70	Rear sandbox angle bracket - (2)
14	Brake pull rods - (2)	71	Lever - brake shaft to vacuum cylinder - (2)
15	Beam - transverse - pony truck compensation	72	Lever - brake shaft to pull rod - (4)
16	Beam lamination - pony truck compensation - (2)	73	Bolt overlay for part 57
17	Brake hangers - early double type - front - (8)	74	Bolt overlay for part 22 - (2)
18	Brake hangers - early double type - rear - (8)	75	Cylinder wrappers - (2)
19	Brake shoes - (8)	76	Coupling
20	Cylinders	77	Footplate
21	Motion brackets - (4)	78	Footplate overlay
22	Motion bracket/boiler support	79	Footplate overlay - front drop plate
23	Overlay for part 22 - (2)	80	Valence overlay - (2)
24	Balance weight - (10)	81	Valence overlay - square drop plate - (2)
25	Pony truck frame - EM/18.83	82	Valence overlay - curved drop plate - (2)
26	Pony truck frame - 00	83	Rear step - lower - (2)
27	Upper pony truck frame EM/18.83	84	Rear step - upper - (2)
28	Upper pony truck frame 00	85	Step - vacuum pump bracket
29	Pony truck spring - early double spring - (2)	85A	Step - smokebox
30	Pony truck spring - later single spring - (2)	86	Sanding rod - rear - early Lots
31	Pony truck swing hangers - EM/18.83	87	Sanding rod - forward - early Lots
32	Pony truck swing hangers - 00	88	Sanding rod - Lot 210
33	Front buffer beam	89	Support bracket for part 88 - (2)
34	Rear drag beam	90	Sanding rod - transverse - Lot 210
35	Front strut plate - footplate - (2)	91	Front sand box spindle overlay - Lot 210 - (2)
36	Front strut plate - smokebox - (2)	92	Splasher tops - (8)
37	Coupling hook	93	Valence to buffer beam bracket - (2)
38	Valve chest - front - (2)	94	Firebox wrapper
39	Valve chest - rear - (2)	95	Firebox bands joining bracket - (4)
40	Regulator lever extension :	96	Firebox to cab front angle strip
41	Backhead shelf	97	Boiler wrapper
42	Cab gauges	98	Boiler joining strip
43	Cab spectacle window frames	99	Top feed pipes rivet strip
44	Firebox rear former	100	Boiler band
45	Firebox front former - (2)	101	Smokebox wrapper
46	Boiler rear former	102	Smokebox joining strip
47	Boiler front former	103	Smokebox saddle
48	Smokebox rear former	104	Vertical plate - square drop plate
49	Smokebox front former	105	Lamp bracket - smokebox top
50	Smokebox front overlay	106	Lamp bracket - smokebox door
51	Washer 1/8"	107	not used
52	Frame overlay - left	108	Cab front
53	Frame overlay - right	109	Cab front rivet overlay
54	Rear frame detail - left	110	Whistle riveted plate
55	Rear frame detail - right	111	Cab window frames - (2)
56	Frame spacer - middle	112	Cab spectacle window blanking plate - (2)
57	Frame spacer - middle - extension	113	Cabside - (2) (cont'd)

## 28XX LOCOMOTIVE KIT COMPONENT LIST (cont'd)

### ETCHED COMPONENTS - .018" brass

- 114 Cab cut-out beading - (2)
- 115 Cab roof rear frame
- 116 Cab roof - wood
- 117 Wooden roof transverse strip - (2)
- 118 Cab roof - steel - sloping rainstrip
- 119 Rainstrip for part 118 - (2)
- 120 Cab roof - steel - rainstrip on edge
- 121 Rainstrip for part 120 - (2)
- 122 Cab roof rear angle
- 123 Cab floor support
- 124 Cab floor
- 125 Fall plate
- 126 Cab seats - (2)
- 127 Top feed pipe unions - (10)
- 128 Steam fountain/blower handles - (4)
- 129 Water gauge handle
- 130 Ejector/brake handle
- 131 Bracket - vacuum gauge
- 132 Bracket - pressure gauge

### ETCHED COMPONENTS - 0.020" nickel silver

- 133 Coupling rod - front - (2)
- 134 Coupling rod - front - fork joint - (2)
- 135 Coupling rod - centre - inner lamination - (2)
- 136 Coupling rod - centre - outer lamination - (2)
- 137 Coupling rod - rear - inner lamination - (2)
- 138 Coupling rod - rear - outer lamination - (2)
- 139 Connecting rod - inner lamination - (2)
- 140 Connecting rod - outer lamination - (2)
- 141 Connecting rod boss lamination - (4) I
- 142 Slide bar - lower - (2)
- 143 Slide bar - lower - lamination - (2)
- 144 Slide bar - upper - (2)
- 145 Slide bar - upper - lamination - (2)
- 146 Crosshead slippers - (2)
- 147 Crosshead back - (2)
- 148 Crosshead front - early pattern - (2)
- 149 Crosshead front - later pattern - (2)
- 150 Crosshead - vacuum pump rod bracket detail
- 151 Valve rod - (2)
- 152 Cylinder cover - front - (2)
- 153 Cylinder cover - rear - (2)
- 154 Cylinder cover - rear overlay - (2)
- 155 Piston rod gland - (2)
- 156 Reversing rod
- 157 Reversing rod fork joint
- 158 Reversing rod support bracket - (2)
- 159 Reversing shaft arm - mid gear setting
- 160 Reversing shaft arm - fore gear setting

### WHITEMETAL CASTINGS

- W1 Chimney - parallel
- W2 Chimney - tapered
- W3 Safety valve base - top feed
- W4 Safety valve base - without top feed
- W5 Safety valve springs - (2)
- W6 Pony truck spring cover - original type
- W7 Pony truck spring cover - later type
- W8 Valve rock shaft housing - (2)
- W9 Vacuum pump lubricator
- W10 Lubricator - axle journal
- W11 Lubricator - pony truck
- W12 Outside steam pipes - (2)
- W13 Buffer - early Dean type - (2)
- W14 Buffer - later Collett type - (2)
- W15 Rear sandbox - original type - (2)
- W16 Rear sandbox - later type - left
- W17 Rear sandbox - later type - right
- W18 Sandbox lid - (2)
- W19 Smokebox door
- W20 Smokebox saddle bolt strips - (2)
- W21 Steam lance cock
- W22 ATC shoe
- W23 Backhead
- W24 Single cone ejector/brake
- W25 Regulator handle
- W26 Water gauge
- W27 Lever reverser
- W28 Lever reverser handle
- W29 Firebox door handle
- W30 Sight feed lubricator
- W31 Steam heating valve
- W32 ATC bell
- W33 ATC battery box
- W34 Snifting valve - (2)
- W35 Smokebox pipe cover - early
- W36 Smokebox pipe cover - later
- W37 Valve chest cover - left
- W38 Valve chest cover - right

### BRASS CASTINGS

- B1 Safety valve casing - no top feed
- B2 Safety valve casing - with top feed
- B3 Smokebox door handles
- B4 Vacuum pipe - tall - early
- B5 Vacuum pipe - short - later
- B6 Injector - exhaust steam - left
- B7 Injector - live steam - right
- B8 Vacuum pump
- B9 Cylinder drain cocks - (4)
- B10 Valve rod slide - (2)

## 28XX LOCOMOTIVE KIT COMPONENT LIST (cont'd)

### OTHER COMPONENTS FOR CHASSIS

1/8" Flexichas bearing - (8)  
2mm top hat bearing - (2)  
10BA clearance top hat bearing  
Brass 10BA C.H. screw – (3)  
Brass 10BA nut - (3)  
Nickel silver wire - 1mm - for coupling rod fork joints  
Brass wire - 1/16" - for compensation beam pivots  
Brass tube - 3/32" outside diameter - for compensation beams  
Brass tube - 1/16" outside diameter - for piston tube  
Steel wire - 1/32" - for piston rod  
Steel wire - 0.020" - for valve spindle  
Brass tube - 3/16" outside diameter - for valve chests  
Brass wire - 0.45mm - for brake hanger pivots & pony truck  
Brass wire - 0.7mm - for oil cups  
Brass wire - 0.9mm - for brake shaft  
Spring wire for pony truck side control

### COMPONENTS NOT PROVIDED

Driving wheels + crankpins  
(prototype - 4' 7 1/2" - 14 spokes, 15" throw, pin in line with spokes)  
- Ultrascale  
- Alan Gibson  
- Markits  
Pony truck wheels (1 pair)  
(prototype -3' 2" diameter 10 spoke)  
- Ultrascale  
- Alan Gibson  
- Markits  
Motor and gearbox  
- Hi-Level  
- Branchlines  
- Portescap 1219 (available second hand only)  
Suitable pickups

### OTHER COMPONENTS FOR BODY

Brass wire - 0.45mm - for handrail  
Brass wire - 0.3mm - for cab handrail  
Brass wire - 0.7mm - for front struts  
Brass wire - 0.8mm - for top feed pipes  
Whistle – (2)  
Handrail knob - short - (6)  
Handrail knob - medium - (7)  
Mudhole doors - (4)  
Buffer heads, bushes and springs - (2)