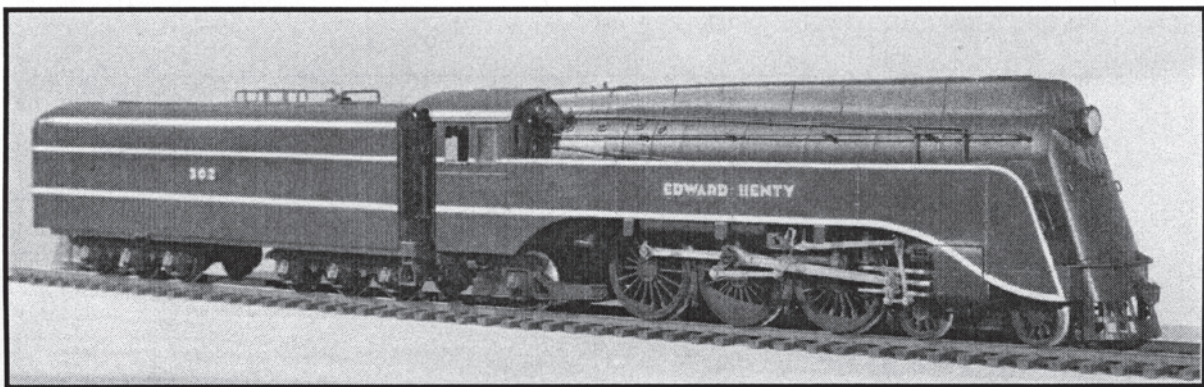




## Victorian Railways Streamlined S Class 4-6-2 Locomotive And Tender Kit



Kit Reference

# E225

'Ho' Scale

Manufactured by:

DJH, Consett, Co. Durham, England

Exclusively for: Steam Era Models,

C/-P.O. Rhyll, Vic. 3923, Australia

Ref: E225 Ho Scale (1:87)

## E225 – S CLASS

### PARTS LIST

#### ETCHINGS

E1	L/H Chassis Frame	Nickel Silver
E2	R/H Chassis Frame	Nickel Silver
E3	Chassis Spacer Plate (Bogie Mounting)	Nickel Silver
E4	Chassis Spacer Plate (Motion Bracket Mounting)	Nickel Silver
E5	Chassis Spacer Plate (Ash Pan Mounting)	Nickel Silver
E6	Chassis Spacer Plate (Tender/Loco Bar Mounting)	Nickel Silver
E7	Frame Spacer Packer x 4	Nickel Silver
E8	Frame Spacer Packer x 4	Nickel Silver
E9	Motor Mounting Plate	Nickel Silver
E10	Keeper Plate	Nickel Silver
E11	Loco Brake Pull Rods x 2	Nickel Silver
E12	Loco Brake Pull Rod Link	Nickel Silver
E13	R/H Coupling Rods	Nickel Silver
E14	L/H Coupling Rods	Nickel Silver
E15	L/H Connecting Rod	Nickel Silver
E16	R/H Connecting Rod	Nickel Silver
E17	L/H Reverse Rod Link	Nickel Silver
E18	R/H Reverse Rod Link	Nickel Silver
E19	Balance Weight (Central Wheels) x 2	Nickel Silver
E20	Balance Weight (Leading & Trailing Wheels) x 4	Nickel Silver
E21	R/H Upper Ashpan Side	Nickel Silver
E22	L/H Upper Ashpan Side	Nickel Silver
E23	Lower Ashpan Side	Nickel Silver
E24	Speedo Mounting Bracket	Nickel Silver
E25	Speed Rod Mounting Bracket	Nickel Silver
E26	Valve Gear Washer (0.018") x 4	Nickel Silver
E27	Valve Gear Washer (0.009") x 2	Nickel Silver
E28	Tender Rear Guard Iron x 2	Nickel Silver
E29	Tender rear Bracket Detail x 2	Nickel Silver
E30	Tender Rear Step	Nickel Silver
E31	Cab	Brass
E32	Cab Front Door	Brass
E33	Cab Floor	Brass
E34	Cab Fall Plate	Brass
E35	Cab Rear Plate	Brass
E36	Tablet Catcher Lever	Brass
E37	Loco/Tender Connector Bar	Brass
E38	Loco/Tender Connector Bar (Close & Coupled)	Brass
E39	Bogie Keeper Plate	Brass
E40	Trailing Truck Keeper Plate	Brass
E41	Loco Marker Disc x 2	Brass
E42	L/H Loco Footplate Side Sheet	Brass
E43	R/H Loco Footplate Side Sheet	Brass
E44	L/H Loco Brake x 3	Brass
E45	R/H Loco Brake x 3	Brass
E46	Reverse Rod	Brass

E47	Cow Catcher	Brass
E48	R/H Tender Side	Brass
E49	L/H Tender Side	Brass
E50	Tender Back	Brass
E51	Tender Buffer Plate	Brass
E52	Tender Rear Deck Support Plate	Brass
E53*	Tender Oil Tank Front Support Plate (Oil Burner only)	Brass
E54	Coupling Mounting Plate	Brass
E55	Tender Deck	Brass
E56	Tender Deck Rear Partition	Brass
E57*	Tender Deck Coal Space Partition (Coal Burner only)	Brass
E58	Tender Front Plate	Brass
E59	Tender Coal Hopper Door	Brass
E60	Tender Front Floor	Brass
E61	Tender Front Coal Space Plate	Brass
E62	Tender Lift Bracket x 2	Brass
E63	Tender Bogie Keeper Plate x 2	Brass
E64	Tender Bogie Brake x 4	Brass
E65	Tender Bogie Brake x 4	Brass
E66	Tender Bogie Brake x 8	Brass
E67	Tender Brake Cylinder Linkage	Brass
E68	Tender Brake Cylinder Linkage	Brass
E69	Tender Front Floor Supports x 2	Brass
E70	Tender Marker Disc (Folded)	Brass
E71	Tender Marker Disc	Brass
E72	Tender Rear Ladder	Brass
E73	Tender Floor	Brass
E74	Tender L/H Coal Hopper Side	Brass
E75	Tender Deck/Side Supports x 2	Brass
E76*	Tender Deck Coal Space Partition (Oil Burner only)	Brass
E77	R/H Smokebox Plate	Brass
E78	L/H Smokebox Plate	Brass
E79	Footplate Valance Fixing Plate x 6	Brass
E80	Front Footplate Valance Fixing Plate x 2	Brass
E81	L/H Cab Side Detail Plate	Brass
E82	Motor Mounting Lower Bracket	Brass
E83	Axle Covers x 6	Brass
E84	Loco Front Handrail Bracket x 2	Brass
E85	R/H Tender Side Fillet	Brass
E86	L/H Tender Side Fillet	Brass
E87	Cab Roof Panel	Brass
E88	2mm Dia. Bogie Washer	Brass
E89	2.5mm Dia. Bogie Washer	Brass
E90	Tender Oil Tank R/H Handrail	Nickel Silver
E91	Tender Oil Tank L/H handrail	Nickel Silver
E92	Tender Oil Tank Walkway	Nickel Silver
E93	Tender Oil Tank Front Handrail	Nickel Silver
E94	Tender R/H Coal Hopper Side	Brass
E95	Tender center sills x2	Brass
E96	Steam Generator Mounting Plate	Brass

## **LOSTWAX CASTINGS**

- L1. R/H Crosshead
- L2. L/H Crosshead
- L3. R/H Return Crank
- L4. L/H Return Crank
- L5. L/H Motion
- L6. R/H Motion Bracket
- L7. Regulator
- L8. Screw Coupling
- L9. Screw Reverser Handle
- L10. Tender Solebar Fittings x 2
- L11. Pump Governor
- L12. Rear Safety Valve
- L13. Screw reverser Unit
- L14. Brake Hose
- L15. Tender Handwheel
- L16. L/H HandWheel Fitting
- L17. Leading Safety Valve
- L18. Ashpan Door Release Mechanism
- L19. Slidebars x 2
- L20. Draincocks x 2
- L21. Tender Steps x 2
- L22. Smokebox Linkage
- L23. L/H Marker Light
- L24.\* Oil Tank Valve (Oil Burner only)
- L25. Air Filter
- L26. Backing Up Light
- L27. R/H Marker Light
- L28. Whistle
- L29. Speedo Fitting
- L30. L/H Slidebar Support Bracket
- L31. R/H Slidebar Support Bracket

## **WHITE METAL**

- W1. Upper Tender Buffer Plate Spring Detail
- W2. Tender Under Floor Fitting
- W3. Tender Water Filler
- W4. Tender Toolbox
- W5. Tender Buffer Plate Fairing
- W6. Tender Bogie Sideframes x 4
- W7. Tender Side Supports x 2
- W8. Lower Tender Buffer Plate Spring Detail x 2
- W9. Tender Brake Cylinder
- W10. Tender Under Floor Tank
- W11.\* Sandbox (Oil Burner only)
- W12.\* Oil Tank (Oil Burner only)
- W13.\* Oil Tank Filler (Oil Burner only)
- W14.\* Oil Tank Fixing Plate x 2 (Oil Burner only)
- W15.\* Oil Tank Fixing Brackets x 4 (Oil Burner only)
- W16.\* Oil Tank Sump (Oil Burner only)

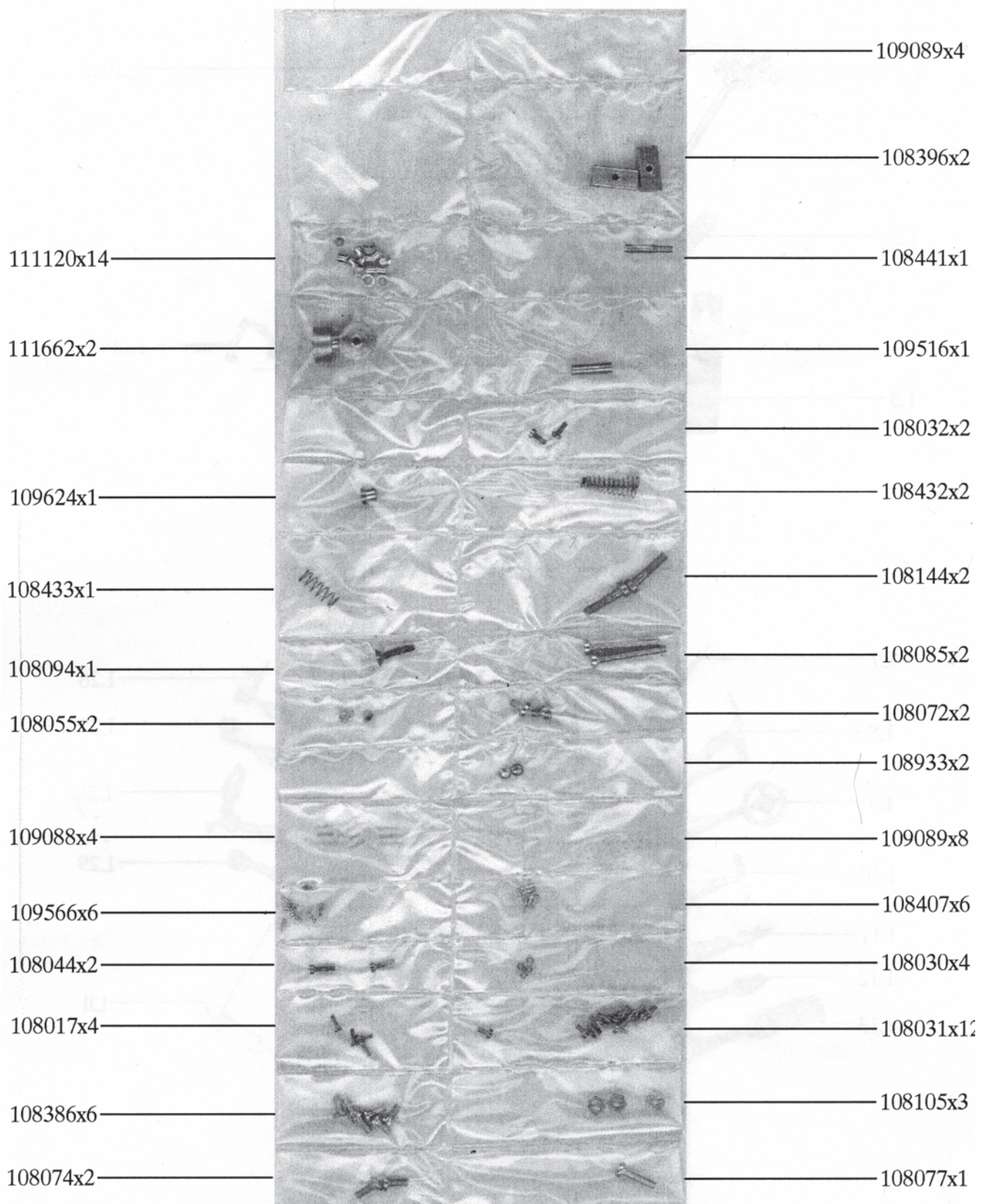
W17. R/H Sandbox  
 W18. L/H Sandbox  
 W19. Valve Guide x 2  
 W20. R/H Cylinder  
 W21. L/H Cylinder  
 W22. Bogie Frame x 2  
 W23. Bogie Body  
 W24. Trailing Truck Fixing Bracket  
 W25. L/H Trailing Truck Frame  
 W26. R/H Trailing Truck Frame  
 W27. R/H Trailing Truck Rubbing Plate  
 W28. L/H Trailing Truck Rubbing Plate  
 W29. Steampipe x 2  
 W30. Pump  
 W31. Steam Reverser  
 W32. Loco Under Footplate Tank x 2  
 W33. Steam generator  
 W34. Coupling Mounting  
 W35. Coupling  
 W36. L/H Lower Firebox  
 W37. R/H Lower Firebox  
 W38. Fireman's Seat  
 W39. Drivers Seat  
 W40. Cab Detail  
 W41. Cab Roof  
 W42. Streamlined Boiler  
 W43. Streamlined Smokebox Front  
 W44. Front Footplate  
 W45. Main Footplate  
 W46. Bogie Fillets x 2

### **Fittings**

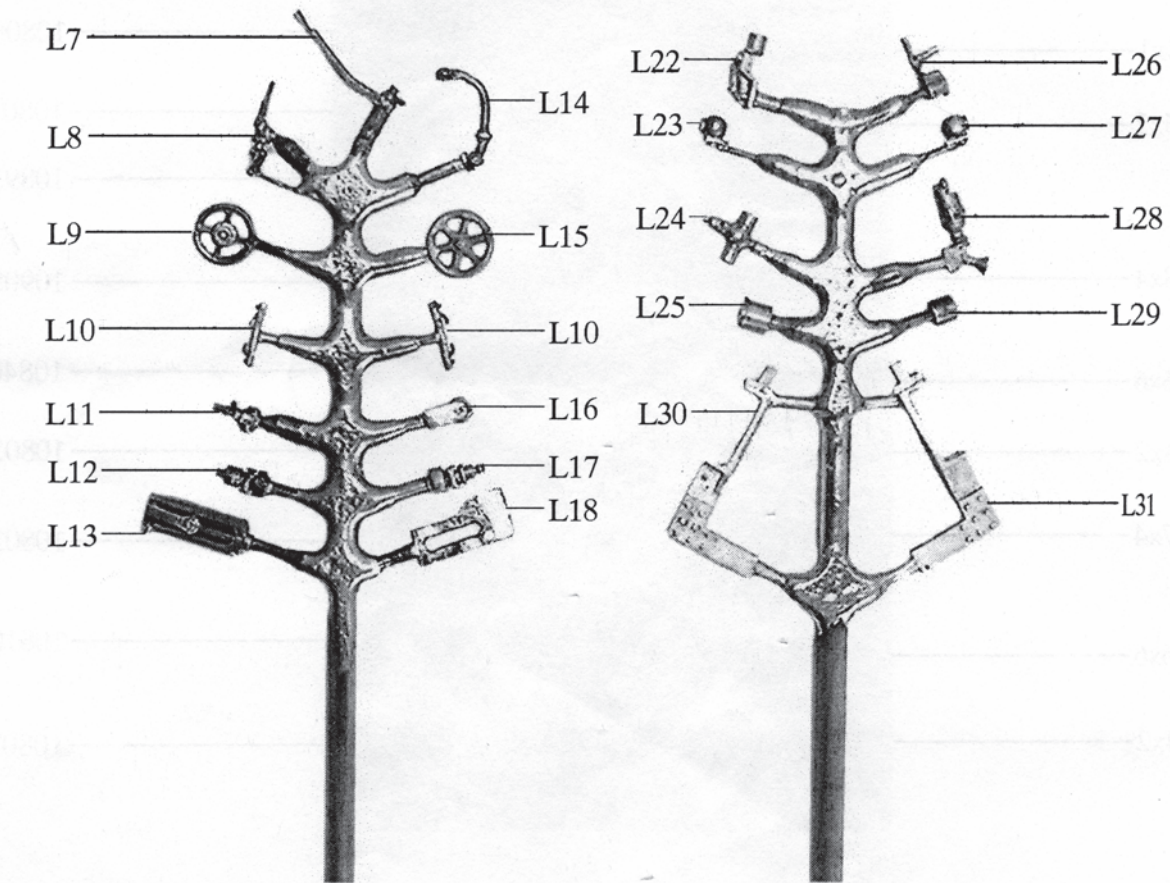
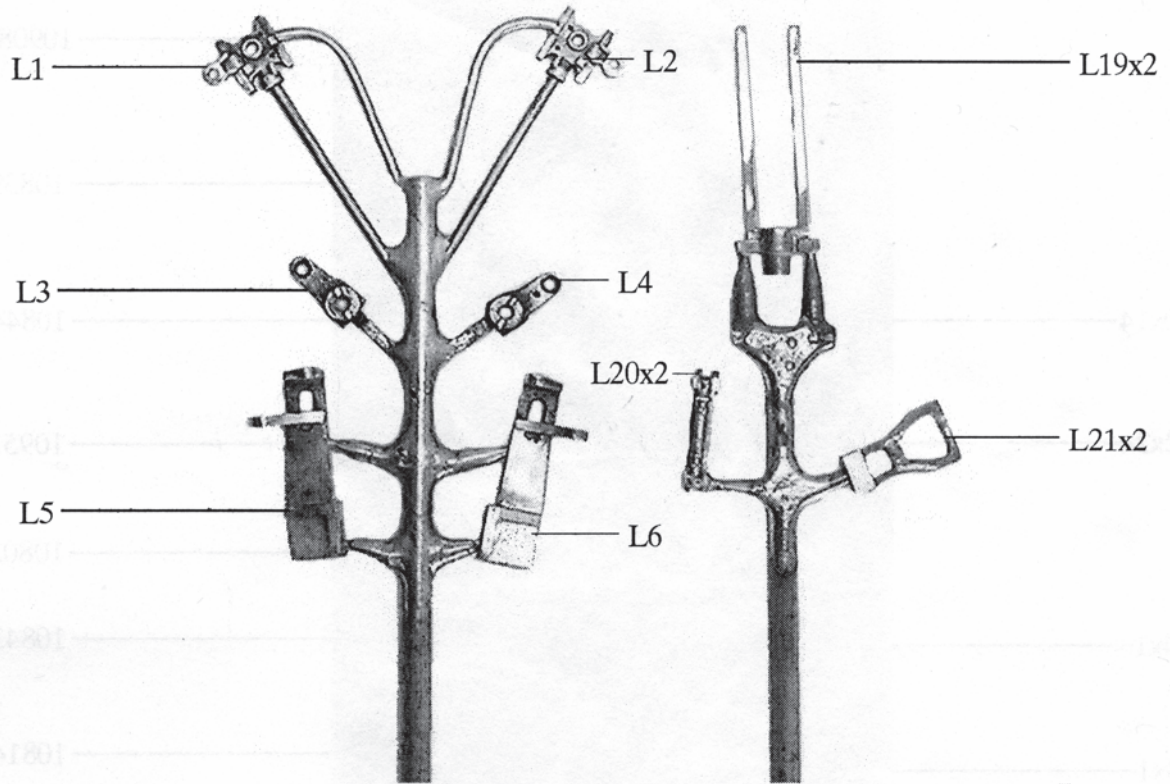
108032	12 BA 1/8 CH Screws	x 2
108055	12 BA Nut	x 2
108072	M2 x 3mm CH Screws	x 2
108085	M2 x 16mm CH Screws	x 2
108094	M2 x 8mm CS Screw	x 1
108144	8 BA Shouldered Screws	x 2
108077	M2 x 8mm CH Screw	x 1
108074	M2 x 5mm CH Screws	x 2
108105	M2 Nut	x 3
108386	Spacer Screw Brass CZ121	x 6
108396	TEC 10mm Long Spacer Square	x 2
108031	12 BA x 3/32" CH Screws	x 12
108044	12 BA 3/16" CH Screws	x 2
108017	14 BA 1/8" CH Screws	x 4
108030	14 BA Nuts	x 4
109566	Short Handrail Knobs	x 6
108407	Long Handrail Knobs	x 6
108432	Small Dia. Spring	x 2

108662	Motor Sleeve	x 1
108433	Large Dia.Spring	x 1
108441	Tender/Loco Pin	x 1
109516	Bogie Sleeve	x 1
109624	Bush	x 1
111120	Pinpoint Bearing	x 14
109088	Plastic Pins	x 4
109089	Plastic Washers	x 12
111662	Tender Bosses	x 2
108933	Motor Screws	x 2
109056	Wire 0.4mm Straight Cut 300mm	x 5
109057	Wire 0.5mm Straight Cut 150mm	x 4
109058	Wire 0.7mm Straight Cut 150mm	x 3
109060	Wire 1.0mm Straight Cut 150mm	x 1
109065	Insulated Wire 400mm	-
E116/1717	Pick-up Strips	x 4
SEM	Mashima MH 1626 motor	x1
SEM	Romford driving wheel – main	x 2
SEM	Romford driving wheel – leading and trailing	x 4
SEM	Driving wheel axle – with gear	x 1
SEM	Driving wheel axle – plain	x2
SEM	Driving wheel axle nuts	x 6
SEM	Hex head crank pins	x 4
SEM	M4 grub screw –crank pin spanner	x 1
SEM	Leading bogie wheelset	x 2
SEM	Trailing truck wheelset	x 1
SEM	Tender bogie wheelset	x 6
SEM	North Yard 36:1 idler gearbox	x 1

## E225-FITTINGS



E225-LOST WAX CASTINGS





# Victorian Railways Streamlined S Class 4-6-2 Locomotive and tender kit

Ref.E225, Manufactured by DJH exclusively for Steam Era Models

## Introduction

The first S class heavy passenger locomotive entered service in March 1928 and was allocated the number 300. Extensive testing of the new locomotive followed and the design was modified before a further three locomotives entered service in February 1929, April 1929 and November 1930. S 300 was subsequently modified to bring it into line with the other members of the class. Designed by the V.R. drawing office under the leadership of A.E. Smith, the C.M.E. at the time, the S class was intended to reduce the amount of double heading necessary on the heavy interstate expresses, especially the 'Sydney Limited'. The North-East line was strengthened to support the 23.5 ton axle load of the S class and except for special runs during 1937 the North-East line was where the S class remained.

The S class were the first locomotives in Australia fitted with three cylinders and 'Gresley-Holcroft' conjugated valve gear. Although the design was possibly inspired by the success of the LNER pacifics, much of the locomotive followed contemporary USA practice, being fitted with bar frames, power reverse, rocker grate, auto' couplers and 'Delta' cast steel trailing truck. Various modifications were made to the class over the years, being fitted with the V.R. 'Modified Front End' in 1935, as well as large smoke deflectors and a plain chimney. The most drastic modification was the fitting of streamlining and a large twelve wheeled tender for the introduction of the 'Spirit of Progress' train in 1937. At this time S 300-303 were named Matthew Flinders, Sir Thomas Mitchell, Edward Henty, and C.J. Latrobe respectively. In the mid 1940s new tenders were constructed with the internal stays riveted to the side sheets, to overcome problems with welded connections failing. The streamlined valance was cut back at the front in the late 1940s and in 1951-52 all four locomotives were converted to oil firing.

Tragically, all four of the S class were scrapped in 1953-54 when B class diesel-electrics took over hauling the 'Spirit of Progress'.

**Please read instructions carefully before commencing assembly.**

## Assembly methods

The two main construction methods are:

- i) Low-melt solder. Low-melt solder is an excellent medium to use with white metal kits. It is quick and provides a stronger joint than can be achieved with glue. Joint strength is achieved as soon as the solder solidifies, enabling the next step in construction to be undertaken without waiting for adhesive to set. It has the added advantage of allowing repairs to minor casting flaws, and because of the relatively low temperature, many parts can be held in the fingers while soldering. To join white metal to brass it is first necessary to 'tin' the brass with normal solder. The white metal casting can then be attached to the tinned brass with low-melt solder. Low-melt soldering requires the correct type of soldering iron (e.g. Dick Smith T2000). These irons have temperature control, as low-melt solder only requires around 150 degrees Celsius. Do not use the same iron for low-melt and normal solder as solder mixed in this way has poor strength. Suitable low-melt solder and flux is available from Carr's. ***Do not attempt to solder white metal castings with a standard soldering iron.***
- ii) Glue. Superglue and five minute Araldite are two types of adhesive suitable for use with this kit. Some modellers prefer to superglue major joins first and then fillet the joint with Araldite. Small detail parts are best attached with superglue. Solder must be used for electrical connections such as the wiring from the pick-ups to the motor.

Whichever method you choose, 'dry fit' all parts to ensure a good fit before attaching them permanently.

## CONSTRUCTION

It is important that all cast parts are free of "flash" – (excess metal along the part line.) and fit properly. Flash may be removed from the white metal castings by scraping gently with a sharp knife. Files are required for cleaning up the brass and nickel silver detail castings.

All locating holes for wire piping and fixing details should be drilled prior to assembly. It is often simplest to drill holes in etched parts while they are still part of the etch sheet. "Tinning" of etched parts (eg. where they are required to be attached to white metal castings) can also be done while the part is still attached to the main sheet.

Etched items can be removed from the sheet by placing it on a scrap of hard timber (eg masonite) and cutting the tabs with a large Stanley knife. Take care not to distort the parts while cutting them free. Trim the remains of the tab off the part with needle files. All etched parts feature a “cusp edge”. This cusp may require smoothing with needle files to allow parts to fit accurately. Etched parts requiring folding incorporate half etched lines to locate the bend. As a general rule, the half etch line goes *inside* the fold.

Always check the fit of the parts prior to fixing. Adjust as necessary before fixing them in place. In many cases it is possible to solder details from *behind* the surface to which they are fixed. When attaching white metal castings with low melt solder use plenty of flux. The flux acts as a heat transfer medium and helps the solder to penetrate the joint.

The following drill sizes are required: 0.4mm, 0.5mm, 0.6mm, 0.7mm, 0.8mm, 0.9mm, 1.0mm, 1.2mm, 1.5mm, 1.6mm, 2.0mm and 2.1mm.

During construction refer to the drawings at all times. Parts should be as drawn on the illustrations, so be careful that you have the right part.

**Parts are identified on the drawings with a prefix:**

<b>W</b>	<b>for White metal castings,</b>
<b>L</b>	<b>for Lost wax brass or nickel silver castings</b>
<b>E</b>	<b>for Etched parts.</b>

The instructions sometimes refer to the right-hand (**R/H**) and left-hand (**L/H**) sides. This is taken as viewing the model from above and looking forward.

To minimise the risk of losing parts, do not remove them from the etched sheets or plastic packing until they are required. It is recommended that construction start with the tender, to develop your skills before tackling the locomotive.

**SAFETY FIRST** These models are not toys and are not suitable for young children.  
**White metal castings and solder contain LEAD and modellers are advised to wash their hands after working on construction.**  
**When using superglue, solder or when spray-painting, ensure the work area is well ventilated.**

## **TENDER**            **Refer to drawings 1 to 4**

The tender may be built with a coal bunker, or an oil tank. Alternative parts are provided and construction of both types is described below. Care needs to be taken to use the appropriate parts for whichever version is being constructed.

### **Bogies**

Insert the bearings 11120 into the holes in the back of the bogie side-frames. Make sure that the bearings are pushed all the way into the holes. Secure with a touch of low-melt solder.

Drill 0.5mm at the marks on the top and bottom of the outer brake levers E64 and 65. While parts E64, 65 and 66 are still attached to the fret, lightly tin the ends of the brake levers and the area by which they will attach to the side-frames. Fold E66 to shape and locate against the lugs on the backs of the side-frames. Secure with low-melt solder.

Attach the side-frames to the bogie stretchers E63 using the 12 BA x 3/32”cheese-head screws 108031.

**DO NOT** over-tighten the screws or they will strip the thread in the side-frames. Slacken off the screws and install the 10.5mm spoked wheels with the pinpoint axles. Also add the outer brake shoes E64/65 with lengths of 0.5mm wire spanning from one side-frame to the other. Tighten the screws and check that the wheels turn freely. Secure the brake shoes with low melt solder.

Cut lengths of 0.5mm wire x 20mm long and install them in the holes in the bottom of the outer brake levers. These wires represent the brake beams of the prototype and reinforce the brake shoe/lever etching. Solder the wires to the levers so that approximately 0.3mm of the wire projects beyond the face of the lever. Cut the centre section out of the upper wires so that they don’t interfere with the coupler at the rear end and the draw bar pin at the front end.

### **Underframe and ends**

Solder the bogie pivots 111662 to the tender floor E73. Fold the underframe side sills down along each side and then fold the headstocks down at each end. Attach the draw bar pin 108441 and trim flush on the top surface. Insert the tags on the centre sill sections E94 in the slots in the underframe and solder. Bend the coupler mounting plate E54 into a 'U' shape and locate the tag on the front edge in one of the slots in the underframe. Two slots are provided to allow the coupler to be placed under the end buffing plate, with just the knuckle projecting, or further out, with the entire coupler projecting beyond the buffing plate. Select the desired slot and solder the mounting plate to the underframe. Drill the ends of the brake cylinder W9 0.6mm. Locate its spigot in the hole on the R/H side of the underframe and the air reservoir W10 and triple valve W2 in their holes in the L/H side of the underframe. Secure these parts with low melt solder from the top surface. Tin the ends of the brake levers E67 and E68 and secure to the brake cylinder with low melt solder, and to the centre sills with standard solder. Add the towing hooks L10 to each side of the underframe, soldering from behind. Locate the front steps L21 behind the front corners of the underframe and solder from behind.

Solder the tender back E50 and the rear deck support plate E52 to the underframe. Make sure that the rear stands at 90° to the underframe. Add the details to the rear of the tender, including the marker lamps L23 and L27, the back up light L26, the tail disc E70 or 71, the rear bracket details E29 and the rear ladder E72, after forming the stiles into a gentle 'S' at the top and bottom.

Fold the upper section of the tender front E58 over at 90° and then fold the small tags in the central opening forward at 90°.

For a *coal tender*, drill the small marks in the coal doors E53 0.4mm diameter and add 4 small handles formed from 0.4mm wire. Form the coal doors into a shallow vee and solder them *behind* the opening in the tender front. This part is not required on an *oil tender*.

Form the tops of the crew lockers by bending the tags on the tender front coal space plate E61 at 90°. Locate the tags on the tender front in the slots in the bulkhead and solder.

Locate the tags on the bottom of the tender front in the slots of the tender underframe and solder the front in place. Make sure the front is standing at 90° to the floor.

Form the tender front floor supports E69 to shape and locate the tags in the slots in the tender front. Bend the rear tag in the tender front floor E60 up at 90° and add the floor to the tender front. Secure these parts by soldering the tags *behind* the tender front.

Solder the lift brackets E62 in place at the top corners of the tender front.

Drill the handbrake gearbox L15, 0.7mm at the mark. Solder a 14mm length of 0.7mm wire into this hole. Thread the wire through the notch in the tender footplate and locate the handbrake gearbox in the hole in the tender front. Solder from behind the tender front.

## **Tender deck**

Form the tender deck E55 into a shallow 'S'. Insert the tender deck side supports E75 through the slots in the deck from below and solder from underneath. Bend the rear partition E56 to shape and locate the tag in the slot in the tender deck. Solder the tag from below.

***Bunker for coal tender:*** Locate the coal partition E57 in the slot closest to the upper fold and solder from below.

Locate the tags on the bunker sides E74/94 in the slots in the bunker floor. The half etched lines in one surface of each side should be orientated to face away from the bunker. Locate the spigot on the toolbox W4 in the hole immediately behind the coal partition and secure with low melt solder from below the deck.

***Bunker for oil tender:*** Locate the half etched dimple in the bottom face of the deck, immediately behind the etched slots used to locate the rear bulkhead. Drill 2mm diameter at this mark. Locate the tag on the rear partition E76 in the rearmost slot behind the bunker fold and solder from below. The oil tank will cover the forward slot when it is installed later. Bend the upper section of each bunker side E74/94 over at 90° at the half etched line. Trim the rear part of each folded section so that these side plates can be added to the bunker, with the folded sections flush with the rear section of the deck. Solder the side plates to the bunker floor and then add the oil tank front support E53, locating its tag in the slot in the bunker floor. Locate the spigot on the toolbox in the drilled hole immediately behind the rear partition and secure with low melt solder from below.

***Water filler: Oil and coal tender.*** Locate the spigots on the water filler W3 in the holes towards the rear of the deck and secure with low melt solder from below. Drill 0.4mm holes on the marks in the lid and add a handle formed from 0.4mm wire. Add the buffer plate spring W1, also soldering from below. Solder the side supports W7 to the top of the underframe and towards the rear with low melt solder.

Now install the top deck/bunker on top of its supports and between the ends. When you are happy with the fit solder the deck to the tender rear, and the bunker floor and sides to the tender front.

**Oil tank for oil tender:** Drill 2.0mm diameter holes at the marks on the top centre and towards the front on the bottom surface and add the filler W13 and sump W16, ensuring that W13 is orientated as shown on drg.2. Drill a 0.4mm diameter hole on the mark of the filler and add a 'U' shaped vent from 0.4mm wire. Drill a 0.7mm hole at the mark on the front surface of the sump and through the oil valve L24. Bend a piece of 0.7mm wire into an 'L' shape and thread the valve onto the wire. Test fit the tank on the tender, and adjust the lengths of the wire so that it locates in the sump and in the hole in the tender footplate. Secure the valve to the wire and the wire in the sump. Drill two 0.4mm holes at the marks on the sand box and add a handle from 0.4mm wire before soldering the sand box to the floor of the bunker, at the front and to the left of the coal opening. Install the oil tank in the tender, and secure it with low melt solder to the section of deck in front of the rear partition. Make sure that the tank is central. The brackets W14 and W15 can be added with super glue.

Use a scriber or Olfa 'P' cutter to enlarge and deepen the half etched lines on the underside of the platform E92. The etched openings in the top surface of the platform make this section quite fragile and it is difficult to make the necessary folds if the etched lines are not made deeper. Fold the sides of the platform down at 90°. Fold the railings E90/91 at 90° at the half etched line and solder them to the platform. The legs on E90/91 should be flush with the bottom edge of the platform framing. Solder the front railing E93 to the front of the platform and then add the platform to the oil tank, locating the front edge of the framing in the slot in the tank. The platform may be secured with super glue.

### **Tender Sides**

The rivet/bolt detail on the top, overhanging, section of the sides should be removed if the model is to be a *coal tender*. Remove the raised dots carefully with a file and then polish off any file marks with fine emery paper. Bend the end section of each side E48/49 out at the half etched line by about 5°. Bend a curve in each filler section E85 and E86 and test the fit in the opening at the rear of the tender. Carefully bend and fettle the parts and the opening until a good fit is achieved and then secure with solder. Smooth the join with a file and then polish with fine emery paper.

Offer up the tender sides to the underframe/ends/top deck subassembly and check the fit. The half etched step in the back of the bottom edge of each side locates against the underframe. Solder the sides to the underframe and to the ends and also solder the prongs on E75, which project from the top deck of the tender, to the overhanging sections of the sides. Form handrails from 0.4mm wire and solder to the tender front. The top leg is secured to the top face of the lockers, hard up against the sides. The bottom leg is secured on top of the underframe, in front of the side sheets.

### **End details**

Locate the guard irons E28 in the slots in the headstocks and secure with solder from behind. Attach the brake hose L14 in the same way. Add the buffers W8 and secure with low melt solder from behind the headstocks. A short ladder is incorporated in the headstock etching, but this can be replaced, if desired, with a separate nickel silver etching E30. Tin the inside face of the buffing plate E51. Remove the centre section from the bottom of the fairing W5, so that this part is just an inverted 'U'. Attach the fairing to the buffing plate with low melt solder and then attach the buffing plate to the end of the tender. The bottom edge of the buffing plate can be soldered to the projection of the underframe above the coupler.

### **Final assembly of tender**

Attach the bogies to the underframe with the shouldered M2 screws 108144 and half sections of spring 108432. Attach a Kadee #5 or #58 coupler to the bracket at the rear of the tender with an M2 x 5mm pan head screw 108074.

## **LOCOMOTIVE**

### **Chassis**

(refer to drawings 6&7)

### **Driving wheels**

Carefully inspect the back face of each Romford driving wheel and remove any burr or flash that will prevent the square end on the driving axle from entering the square hole in each wheel. Put a horn block onto each end of the main axle with the gear fitted, so that the thicker flange is towards the end of the axle. Push the main drivers with the 3/32" crank pins fitted onto the driving axle. Align the R/H crank pin 90° forward of the L/H crank. Strictly speaking this difference should be 120°, because the S was a three cylinder locomotive, but it is not possible to see both sides of the locomotive at once so the error is not obvious. Repeat the exercise with the other driving wheels and their axles. In each case the square horn blocks are orientated so that the thicker of the two flanges is against the driving wheel hub. Secure the driving wheels with the round M1.6 nuts. Tighten the nuts with a special Romford screwdriver, or

make one by filing a slot 1.7mm wide in the end of a small screwdriver. Add the balance weights E19 and E20 and the covers for the axle nuts E83, which can be secured with super glue.

## **Frames**

Bend the tags 90° at the rear of the chassis sides E1 and E2. Also bend two joggles at about 45° towards the rear of each frame and bend joggles of about 20° in the guard irons at the front. Reinforce the bends with a fillet of solder. Fold each square spacer E7/8 to form a packer that is 0.7mm thick. Assemble the chassis with the 2mm cheese-head screws 108386 and tapped spacers 108396, with a square packer E7/8 inserted between the frame and the spacer on each side. Before tightening the screws, fit the etched cross members E3, E4, E5 and E6. The arrows on E3 and E5 face forward. Align the spacers so that the cross-holes are vertical and tighten the screws.

Temporarily install the driving axles in the frames, so that the slot in each horn block goes into the axle slot in the frame. Check that the driving wheels revolve freely with minimal side clearance. If the drivers do not turn freely, disassemble the frames and give each square spacer E7/8 a rub over some emery paper. Reassemble the frames.

When the drivers rotate freely, solder the plates E3, 4, 5 and 6 to the frames.

Oil the thread on an M2 screw and use it to attach an M2 nut 108105 over the hole in the forward spacer E3.

Carefully solder the nut to the frame spacer. The oil on the thread will prevent any solder getting to the screw, so that it can be removed.

Fold the motor mount E9 to shape and reinforce the bends with solder. Attach the motor to the mounting bracket with short 2mm screws 108933. Bend the lower motor mounting bracket E82 into a 'U' and then bend the small tags at front and back down at 90°. Insert these tags in the slots in frame spacer E5 and solder from below. Attach the motor in its bracket E9 to the lower bracket E82 with M2 x 3mm screws 108072.

Form a bend of about 45° in each ashpan side E21 and E22. Insert the tag on the lower edge of each side in the slot in frame spacer E5 and solder from underneath. Bend the lower ashpan E23 into a 'U' and locate the tag in the centre into the slot at the front of spacer E5. Solder the ashpan to the chassis side plates.

Tin the face of the frames at the rear end, as well as the piece bent at 90°, so that the trailing truck rubbing plates W27 and W28 can be secured to the frames with low melt solder. The top of each casting is flush with the top edge of the frame etching.

Make a 45° bend in a short length of 1.0mm wire and solder one end to the brackets hanging below the back end of the frames. Solder the other end to the bottom edge of the rear of the frames, just behind the rearmost 45° joggle. These wires represent the injector overflow pipes.

Place a drawbar E37 or E38 over an M2 x 5mm screw 108074. The short drawbar provides close, scale coupling distance and the longer drawbar should be used for an operating model. Add one half of a spring 108432, push the screw through the hole in the spacer E6 and secure with an M2 nut 108105. Tighten the screw until the end of the screw is just flush with the nut and then secure the nut to the screw with a touch of solder.

Tin the inside faces of the chassis and add the sand boxes W17 and W18, securing with low melt solder. Note that Drg 7 shows the R/H or fireman's side sand box, which should be attached to the R/H chassis plate so that the front of the box is flush with the front edge of the bracket projecting from the top edge of the frames.

## **Gearbox**

Fit the thrust washers and bearings onto the worm shaft as shown on drg6 and lubricate with a little plastic compatible oil such as LaBelle 108. Fit the worm shaft/bearing sub-assembly and idler gear to one side moulding, lubricate with plastic compatible grease and then fit the other side with four M1.4 x 5mm long screws. Do not over-tighten the screws, which are designed to self-tap into the moulding. Make sure there is a little end float in the worm shaft, and that an axle placed in the axle slots is at 90° to the worm shaft.

Bend the six tags that represent the pedestal keeps on the keeper plate E10 down at 90°. Install the driving wheels in the frame with the geared axle in the centre slot. Check that the wheels turn freely and attach the cover plate with two M2 pan head screws.

Lower the gearbox onto the geared axle, then screw on the cover with two M1.4 x 5mm long screws. If necessary, trim the worm shaft to length so that motor and worm shafts are in straight alignment with just a small gap between them. Connect the motor and worm shafts with the rubber tubing supplied. Connect a power supply to the motor and check that the centre driving axle will rotate smoothly and steadily.

## **Brake Rigging**

Cut six lengths of 0.7mm wire, each about 25mm long. Drill 0.7mm holes at the two points marked on each brake shoe E44 and E45. Thread three of the 0.7mm wires through the holes in the cover plate and thread the brake shoes onto the ends of the wires. Solder the wires centrally to the cover plate. Solder the shoes to the wires so that each shoe is flush with the face of the adjacent driving wheel. Use flush cutting clippers to trim the wires so that about 0.3mm of wire projects through the brake shoe. The bottom wires will be fixed *after* installing the pick-ups and wiring.

## **Pick-ups and wiring**

Remove the cover plate. Fold the tag on the pickup E116/1717 at 90 ° and attach the pick-ups to the cover plate with the plastic fixings 109088 and 109089. ***Make sure that the pick-ups can NOT touch the cross wires of the brake rigging.*** Secure the plastic fixings by melting the pins with a warm soldering iron. It may also help to put some superglue around the plastic fixings to ensure that they cannot move on the keeper plate. Install the keeper plate on the chassis and bend the wipers to rub on the backs of the driving wheels. Cut off the excess wiper.

Cut two pieces of hook up wire and strip about 6mm of insulation from one end of each. Twist the ends together and solder. Cut this soldered piece back to about 3mm long and solder to the tag on the *rear* pick-up. Be quick to avoid melting the plastic fixings. Poke one wire through the hole in the rear of the cover plate. Run the other wire forward, trim to length, strip the insulation and solder the end to the forward pick-up. Repeat this step for the other side. The wire from the R/H side goes to the + motor terminal.

Now that the wiring is in place, thread the remaining three lengths of 0.7mm wire through the holes in the bottom of the brake levers, and through the brake pull rods E11 and levers E12. Space the wires so that an equal amount projects through each brake lever and solder the levers to the wires. Space the pull rods about 3mm from the backs of the driving wheels and solder to the cross wires. As before, trim the wires so that about 0.3mm projects from the face of each lever.

## **Rods and Valve Gear**

Now remove the motor and gearbox while the rods and valve gear are assembled. Check each stage of assembly for free movement before going on to the next.

The connecting and coupling rods E13/14 and E15/16 respectively are to be laminated in two layers, to produce scale thickness. Tin the mating surfaces of these parts and remove them from the sheet, but ***do not*** remove the tags connecting the front and back halves. Fold the front half over the back half and align the holes and edges. Place the parts face down on a hard surface such as a ceramic tile and sweat the two layers together. As you solder, press the layers together with a pointed probe. After soldering, clean up the cusp edges of the parts and polish with a fibreglass burnishing brush.

Place one 0.009" spacer washer E27 over each main crank pin and attach the coupling rods to the leading and trailing driving wheels with hex head crank pins. Use the M4 grub screw provided as a wrench, and be careful that the axis of the screw is perpendicular to the plane of the wheel. ***DO NOT over tighten the crank pins.*** Check that the wheels rotate freely. If necessary, enlarge the crank pin holes in the coupling rods with a round needle file. Remove only a very small amount and ***check often.***

The crossheads L1 and L2 have been pre-assembled with part of the valve gear. Check that each crosshead can move freely up and down a slidebar casting L19. It may be necessary to smooth and polish the piston rod, the grooves in the crosshead, the faces of the slidebars and/or the hole in the centre of casting L19. Once a pair is running smoothly keep them together. Tin the end of each casting L19 and secure it to the appropriate cylinder casting W20 or W21 with low melt solder. Also add the valve guide W19 and the drain cocks L20 to the cylinders. Drill a 0.7mm hole in the end of each valve guide. Solder the assembled cylinders to the frames with low-melt solder.

Solder the guide support brackets L30 and L31 to the frames, but ***not*** to the slidebars. Solder a length of 0.4mm wire to run from the cylinder drain cocks to the bottom of the guide support bracket on each side.

Attach the R/H connecting rod to the R/H crosshead with a 14 BA screw and nut 108017 and 108030. Solder the nut to the screw and file off the excess screw. Add two washers E26 onto the main crankpin, and then thread the crosshead into its guide and the valve spindle into the valve guide. Check that the connecting rod and crosshead move freely and adjust as required. It may be necessary to trim the end of the piston rod so that it doesn't strike the end of the cylinder.

Drill a 1.0mm hole in each motion bracket L5 and L6, where the slotted expansion link will pivot. Drill a 0.7mm hole through the boss on top of each of these parts. Fix the motion brackets to the chassis spacer E4 with 12BA x 1/8" cheese head screws and 12BA nuts 108032 and 108055. Attach the return crank to the main crank pin with a 12BA x 3/16" cheese head screw 108044. Check that connecting and coupling rods can still move freely. It may be necessary to countersink the face of the connecting rod a small amount and/or file a small amount from the ends of the lugs on back of the eccentric crank L3/L4.

Thread a 14BA screw 108017 through the motion bracket, slotted expansion link and the end of the radius rod. The end of the radius rod goes *behind* the centre of the expansion link. Thread a 14BA nut 108030 onto the screw, tighten, but not too tight, as the parts need to be able to move freely, solder the nut to the screw. Once the nut has been soldered, most of the head of the screw can be filed off, to give a good appearance from the outside of the motion bracket.

Thread a length of 0.7mm wire through the bosses on top of the motion brackets. Place the rear hole in each reverse rod link E17 and E18 over the wire on the L/H and R/H side respectively. Thread a second length of 0.7mm wire through the lifting link etched as part of L/H radius rod, through the reverse rod E17, across to the other side through E18 and the R/H lifting link. Solder the various parts to the wires. *After* soldering, clip and remove the central section of the forward wire – between E17 and E18. The wire should also be trimmed so that only about 0.3mm projects from the face of each lifting link.

### **Leading Bogie**

Assemble the leading bogie frame from castings W22 and W23. Make sure that the axle slots in these parts are closely aligned when they are soldered together. Install the 10.5mm spoked wheels with flush axles and check that they can turn freely. If necessary, rub a 2.0mm drill up and down the slots to remove anything that might be hindering free movement. Secure the wheels in the bogie frame with the keeper plate E39 and two 12BA x 3/32" cheese-head screws 108031. If the model is to have the full depth footplate valance, add the castings W46 to each end of the slot in the bogie frame. These parts limit the movement of the bogie behind the valance. Attach the bogie to the chassis with M2 x 16mm screw 108085, washer E88, sleeve 109516, etched washer E89 and spring 108433. Orientate the bogie so that the front of the bogie is towards the front of the locomotive. This places the leading axle slightly further forward of the cylinders.

### **Trailing truck**

Insert the brass bearings 111120 in the trailing truck side-frames W25 and W26. Ensure they are seated correctly and secure with low-melt solder. Fold etching E40 into a 90° angle and assemble the truck frame with this etching and two 12BA x 3/32" cheese-head screws 108031. Slacken the screws and install the 12.25mm spoked wheelset. Tighten the screws and check that the wheels turn freely. If tight, remove the wheelset and file a small amount from the end of each axle point. Slacken the screws again and add the trailing truck fixing bracket W24 between the sideframes. Tighten the screws and secure W24 with low melt solder. Attach the trailing truck to the chassis with the M2 x 8mm screw 108077 and spacer bush 109624. The screw goes through the rear hole in the keeper plate and into the rear square spacer 108396.

## **Locomotive Body    Refer to Drawings 5, 8, 9 & 10**

### **Cab**

Fold the cab E31 to shape along the half etch lines and solder the floor which is incorporated in this etching to the cab side sheets. Solder the detail plate E81 behind the opening in the lower left side of the cab. Solder the front door E32 on the fireman's side of the cab front and drill a 0.4mm hole at the mark near the lower R/H corner of the window. Make an 'L' shaped door handle from 0.4mm wire.

Drill 0.4 mm holes for the handrails on the rear wall E35 of the cab. Make horizontal handrails to go just below the cab rear windows. The vertical handrail on the fireman's side runs from the top of the rear wall down to the top of the section below the bottom cut-out, as shown on drg5. The driver's side handrail only runs down to just above the staff exchanger cutout and incorporates a joggle about half way along its length, as shown on the driver's side elevation on drg10. Solder the handrails from inside the cab rear. Dress any projecting wire flush with the inside surface. Solder the rear wall into the cab, so that the back wall fits between the cab side sheets.

Bend the tags at the front of the fall plate E34 down at 90°. Poke these tags through the opening in the rear wall of the cab and trap them with the cab floor E33. Solder the floor in place taking care not to affect the ability of the fall plate to hinge up and down. Use a minimum of solder, along the edges only.

Drill the backhead 1.5mm for the regulator L7 and 1.2mm for the reverser L13. Drill the centre of the hand wheel L9 and solder it the reverser. Attach the reverser and regulator to the backhead with low melt solder or superglue. Leave the backhead separate for now.

Drill a 0.4mm hole in the staff exchanger apparatus, incorporated in the L/H seat W39, and form a staff exchanger horn from 0.4mm wire. Solder the seats W38 and W39 to the L/H and R/H sides of the cab, respectively. Solder the staff exchanger lever E 32 to the bottom corner of the staff exchanger, angling up at 45° across the cab rear. Check the fit of the cab roof on the cab. Clean out any flash from the grooves in the bottom edge so that the roof is a neat press fit on the cab. It will help with painting and glazing the cab later if the roof is left loose for the time being.

### **Boiler and Footplate - Drilling**

Drill 0.8mm holes in the boiler at the places marked for handrail knobs, 1.1mm in the top of the firebox for the safety valves, 0.9mm for the whistle, 1.0mm in the side of the smokebox for the superheater damper, 1.5mm in the side of the boiler for the power revers and 0.6mm in the R/H side of the firebox for the turbo generator bracket.

While in drilling mode, drill the R/H side of the footplate 1.2mm for the handwheel fitting, 2.0mm for the air pump and 0.6mm on the L/H side of the footplate for the reverse rod.

### **Main Assembly**

Attach the boiler to the footplate with the M2 x 8mm countersunk screw 108094 and an M2 nut 108105 placed in the smokebox. Adjust the screw until the rear of the firebox is flush with the step in the footplate.

Temporarily install the boiler and footplate on the chassis. Attach the body with an M2 x 16mm screw 108085 through the chassis into the smokebox. Solder the steam pipes W29 to the smokebox and footplate so that they are aligned with the centre line of the cylinders.

Bend the bracket for the turbo generator E96 so that the included angle is about 50°. Check the fit against the boiler and attach it when the top platform is level. Attach the turbo generator to the bracket. The turbine portion, which is thinner than the generator section, goes closest to the cab. Drill a 0.4mm hole vertically at the back of the generator and make a short exhaust pipe from 0.4mm wire.

Add the whistle and safety valves, L28 and L12/L17 respectively to the recesses in the top of the boiler. It is simplest to secure these parts with super glue. Similarly, attach the superheater damper L22 to the side of the smokebox, orientated as shown on drg9.

**Drill the front of the power reverse cylinder 0.6mm to allow the end of the reverse rod E46 to be inserted. Drill the central recess at the back 0.5mm and then attach the cylinder to the boiler with super glue. Position the reverse rod E46 in the hole in the power reverse cylinder, with the front end in the hole drilled in the footplate. Secure with a touch of low melt solder from underneath the footplate.**

### **Cab Assembly**

Check the fit of the cab and solder the cab to the firebox and footplate. This can be done from underneath the cab and inside the firebox, so the solder won't show. Solder the backhead into the cab with some low melt solder over the top of the backhead casting. Temporarily install the cab roof and tin the back of the cab roof panel E87. Carefully solder E87 to the cab roof with low melt solder so that the back edge of E87, with the rivet detail, is on the cab roof and the front edge is up against the hatch detail cast on top of the boiler. Now the cab roof can be removed and set aside.

Run a length of 0.5mm wire from the hole in the back of the power reverse back to the lower hole in the cab front.

Run a second 0.4mm diameter wire from the power reverse to the upper hole in the front wall of the cab, as shown on drg10.

### **Streamlined front.**

Temporarily install the boiler/footplate back on the locomotive chassis with the M2 x 8mm screw at the front and two M2 cheese head screws 108386 through the back wall of the cab under the fall plate. Drill 0.4mm holes at the marks on the streamlined front W43 and add handrails formed from 0.4mm wire.

Form the cowcatcher E47 to shape so that the top edge fits neatly on the rebate on the bottom of the front casting. The cowcatcher has quite a complex shape, so take your time with this stage. When completed, the sides are vertical and the bottom edge forms a rounded vee shape. Tin the back of the cowcatcher and tack it to the front casting with low melt solder. Check that there is a neat fit between the etching and the casting and that everything is symmetrical.

When satisfied, complete a strong joint with low melt solder, applied from behind the joint.

Offer the front casting/cowcatcher up to the boiler and check the fit. The top of the cast front should be flush with the top of the skyline casing and the slotted grille in front of the funnel should align across the two sections. There is a step on the back of the front casting that will rest on the footplate to help keep the casting level. Tack the front to the boiler casting with a little low melt solder. Now stand back and look at the locomotive from all directions and check that all is as it should be. If not satisfied, break the tack joint and repeat the exercise. Only complete the soldered joint when you are completely satisfied with the appearance.



Tin the back of the R/H smokebox plate E77 and then attach it to the junction of the boiler and streamlined front on the R/H side of the smokebox with low melt solder. Repeat with E78 on the L/H side.

### Air pump

Drill 0.5mm holes into the air pump for the steam supply and exhaust as well as the suction pipe and strainer. Drill a 0.5mm hole through the pump governor L11, thread it onto a length of 0.5mm wire and secure with a touch of solder. Drill a 0.5mm hole in the top of the air filter L25 and solder it to a length of 0.5mm wire.

Insert the peg on the bottom of the pump through the hole drilled in the footplate earlier. Secure with low melt solder from under the footplate. Form the wire soldered into the suction strainer into a 'P' shape and trim to length. The bend in the pipe allows the strainer to be placed on top of the footplate in front of the steam supply pipe to the cylinders, as shown on drg10.

Form the supply pipe to shape as shown on drg10 and run the wire along the boiler to the cab front, just above the turbo generator. The pump governor is on the steam supply pipe, just to the left of the pump. Add a second 0.5mm wire to represent the blower supply pipe and run it along the boiler beside the air pump supply. Bend the second pipe to shape as shown on drg10. The front section of this pipe runs behind the smokebox plate E77. Secure both pipes to the boiler by drilling 0.35mm holes above and below the pair of pipes and then making clips from 0.3mm wide slivers of 0.005" phosphor bronze. Form the strip of phosphor bronze into a 'U', poke the legs into the holes above and below the pipes and secure from inside the boiler. Space the clips 12, 38, 63, 85 and 95 mm from the cab front. The exhaust from the top R/H side of the air pump also runs over the top of the steam supply pipe to the cylinders, down at 90° and then behind the plate E77.

### Headstocks

For a model with cut-back valance, trim the lower section from below the headstocks at either end. For full depth valance leave the casting as is. ***Please note that a model with cut-back valance will be able to negotiate 24" radius curves, but with full depth valance the minimum operating radius is about 36"***. Add the coupler pocket W34, drill a 0.4mm hole down from the top through the pocket and secure the coupler W35 with a short length of 0.4mm wire.

Position the headstock casting behind the streamlined front and below the footplate and then attach with low melt solder from behind. Add the marker discs E41 to the headstocks on either side of the cowcatcher.

Drill 0.5mm holes at the marks near the top of the cowcatcher and check the fit of the handrail brackets E84. Bend a length of 0.4mm wire into a curve, thread the brackets on and attach them to the cowcatcher etching. Secure the ends of the wire on top of the headstock casting.

### Valance

If the model is to feature the cut-back valance, trim the parts E42 and E43 according to the templates on drg8. Tin the back of the valance plates E42 and E43 in the area where they will attach to the footplate. File the cusp edges off the brackets E79 and E80 and solder these brackets to the back of the valance. There are half etched recesses in the back of the valance that locate them. Add small 'U' shaped handles formed from 0.4mm wire to the front edge of each valance plate, located by the half etched recesses on the back face.

With the boiler/footplate installed on the chassis, offer the valance up to the footplate. The brackets on the back of the valance will sit down on top of the footplate. Push the valance up against the front wall of the cab and check the fit around the cylinders. It may be necessary to file a very small amount from the front edge of the cut out to allow the valance to fit down over the cylinders. The bottom edge of the cut out can be bent out slightly and it will also help if a bevel is filed in the back of this cut out. Check often, until a good fit is achieved between the bottom of the valance and the cylinders.

The prototype also had a slight bulge in the valance immediately in front of the cylinders and the back of the valance has been partly etched away in this area, to assist with forming this shape. Put the valance face down on a firm, but slightly yielding surface, such as a vinyl place mat. Use a rounded instrument like a blunt 'F' grade pencil to press down on the valance and form this bulge. The bulge is quite shallow, so take care not to overdo it, and check progress often. In fact, it would not be very obvious if this step was omitted.

The headstock is narrower than the main part of the footplate, so it is also necessary to bend the valance inwards slightly to follow the profile of the front section of the footplate. A shallow bend is needed about a vertical line spaced 5mm back from the front of the valance. Check the fit against the footplate and adjust as necessary.

Also check for any footplate casting projecting below the bottom edge of the valance. It may be necessary to file some material off the bottom of the footplate in the area of the step behind the cylinders.

If the valance is full depth, form the lower section to follow the profile of the fillets either side of the cowcatcher. Take your time and check often. Because the front section narrows in to meet the headstocks, it may be necessary to make a slit in the brass, bend the shape, and then solder up the slit.

When a good fit is achieved with both valance plates, separate the body from the chassis and solder the footplate to the valance with low melt solder, working along the underside of the footplate from the cab end to the headstocks.

### **Final details**

Attach the air reservoirs W32 to the underside of the footplate on each side with low melt solder, so that the front of each reservoir is 29.5mm behind the step in the footplate. The outer edge of each reservoir locates against the valance.

Fold the speed recorder drive support E24 to shape and reinforce the bends with solder. Drill 0.6mm holes at the marks on the bottom face of the footplate, tin the top ends of parts E24 and E25 and attach them to the footplate with low melt solder. Drill a 0.4mm hole centrally in the speed recorder gearbox L29 and solder a 35mm length of 0.4mm wire into this hole. Thread this wire through the bottom hole in E25 and solder the gearbox to the bottom of E24. Bend a slight joggle in the end of this wire and secure it to the back of the lower cab side sheet. Add a length of 0.4mm wire from the hole in E24 above the gearbox, to the upper hole in E25. Solder the wire in position and trim it flush with E25.

Attach the lower firebox sides W36 and W37 to the underside of the footplate, locating the back face of each part against the pegs cast on the underside of the footplate. Secure with low melt solder. Drill a 1.2mm hole in the bottom edge of the L/H lower firebox, tin the top of the ashpan door release mechanism L18 and solder it to the lower firebox with low melt solder.

Thread three short and three long handrail knobs, 109566 and 108407 respectively, onto a 120mm length of 0.4mm wire. Apply a little superglue to the spigots and insert the short knobs in the holes closest to the cab and the long knobs in the next three. Secure the handrail to the knobs with a touch of superglue and trim any wire projecting flush with the front knob, and so that about 2mm projects beyond the knob closest to the cab.

### **Painting and Finishing**

Disassemble the body from the chassis and remove the motor and gearbox. Wash the model in warm soapy water and give it a scrub with an artist's bristle brush and 'Ajax' liquid or similar. Rinse and allow it to dry. ***Do not touch the model with bare skin after cleaning it.*** Disposable rubber gloves will prevent oils from the skin from being transferred to the model.

Spray the tender tank and locomotive body with black etch primer. Allow it to dry and spray on a coat of diesel blue enamel. Paint the inside of the headlight silver. Remove the chosen numbers from the brass fret and spray them with diesel blue enamel.

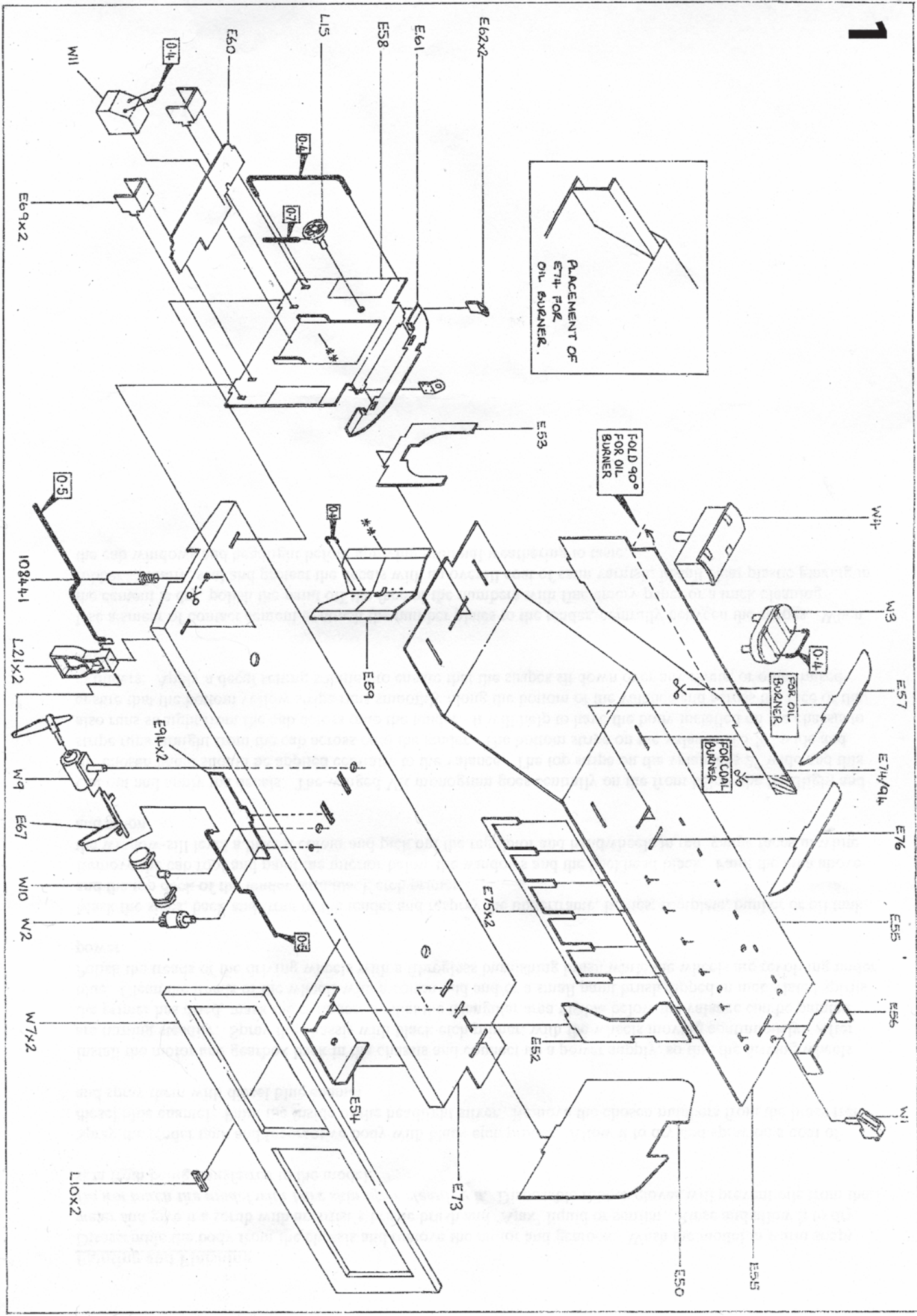
Install the motor and gearbox back in the chassis and connect up a power supply, so that the driving wheels are turning steadily. Spray the chassis with black etch primer, with the wheels moving continuously. After the primer has dried, mask the cylinders so that the triangular area visible below the valance can be painted blue. Clean the treads of the wheels with a cotton bud and/or a small paint brush dipped in methylated spirits. Polish the treads of the driving wheels with a fibreglass burnishing brush while the wheels are revolving under power.

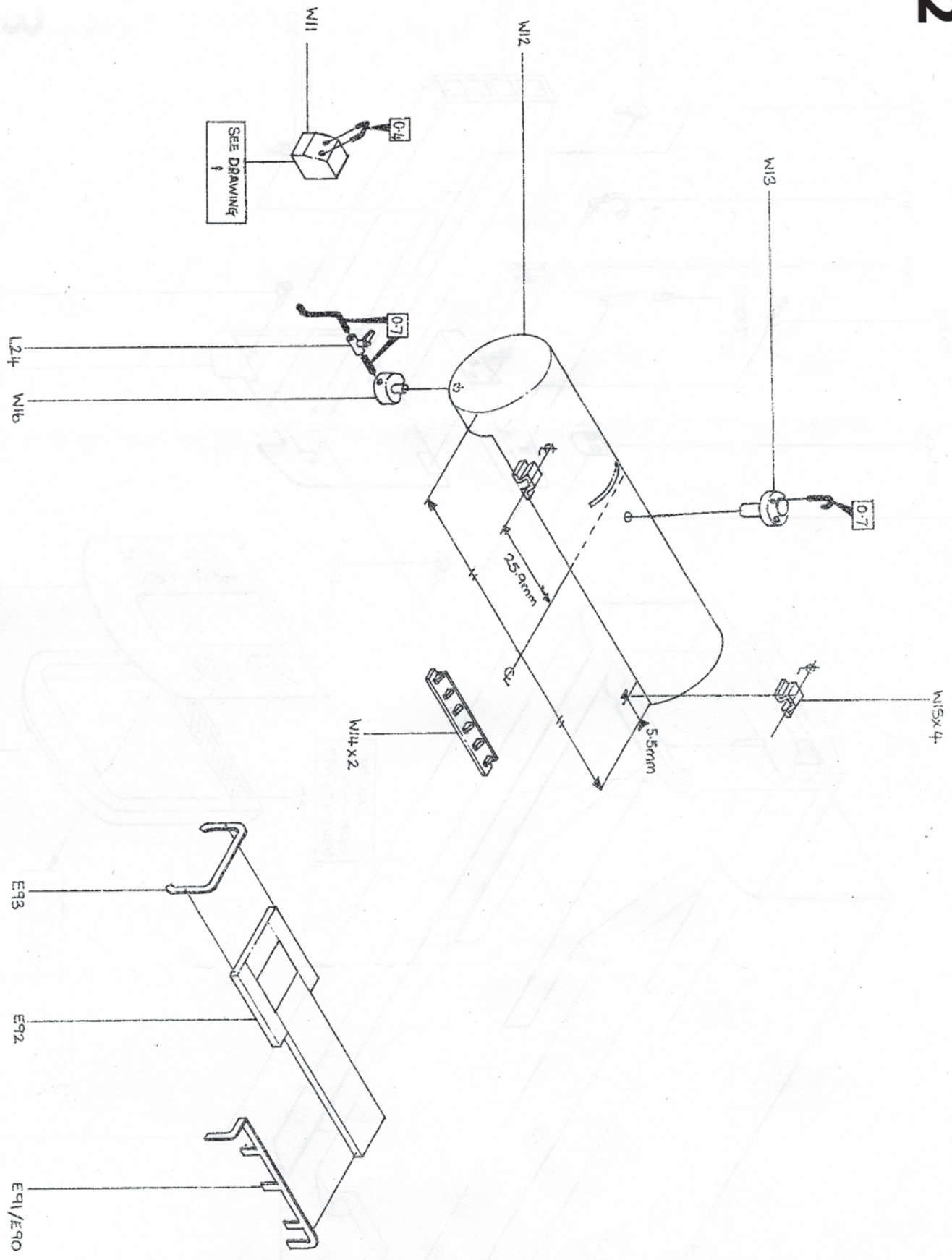
Mask the sides, back and front of the tender and respray the underframe, bogies, footplate, bunker or oil tank and the top deck of the tender with black etch primer.

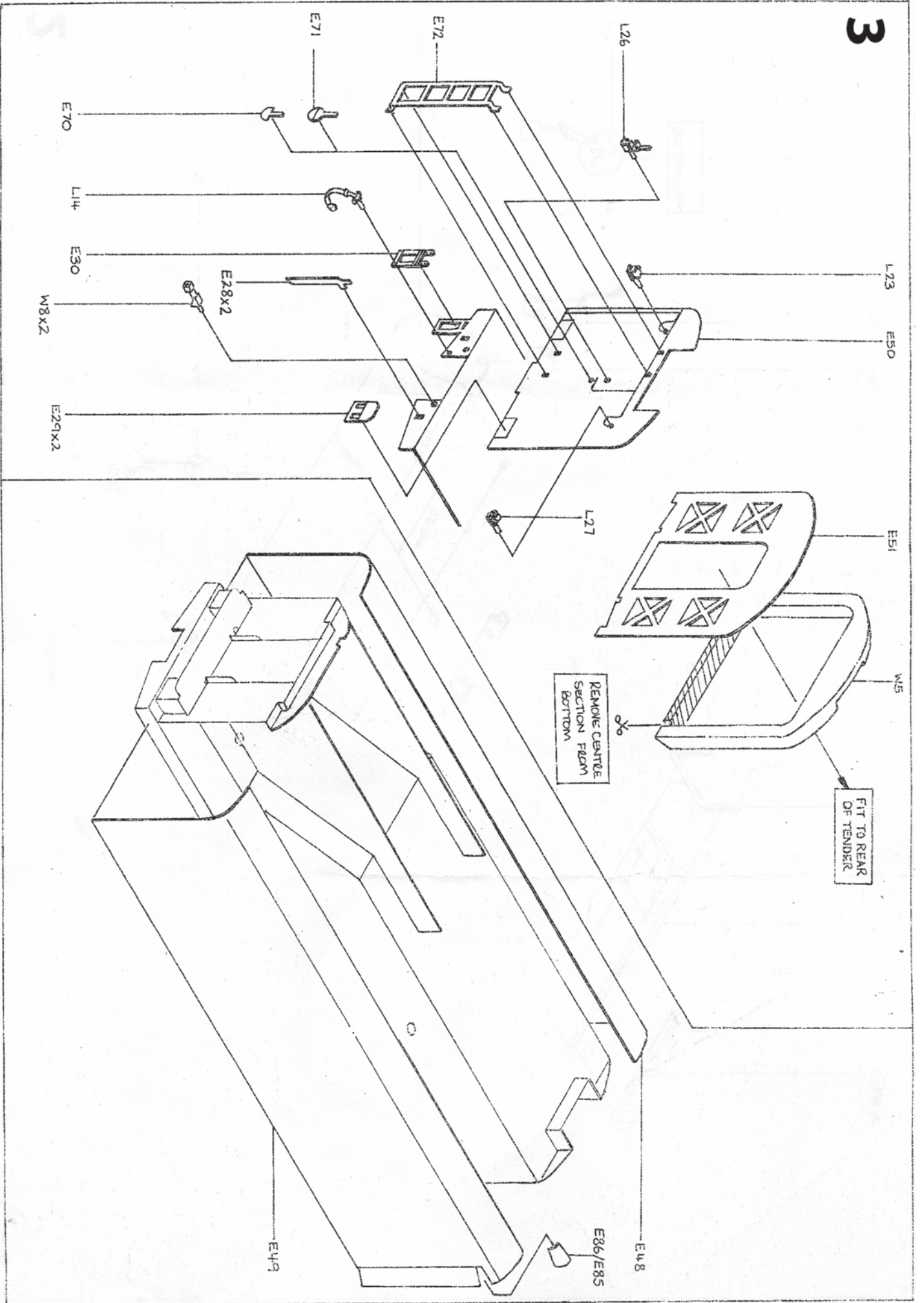
Remove the cab roof and paint the interior below the windows and the backhead black. Paint the area above the window-sill level a biscuit colour and pick out the regulator and handwheels in red, gauge faces in white and so-on.

Cut out and apply the decals. The winged VR monogram goes centrally on the front below the headlight and the chosen name should be applied centrally to the valance. The top stripe on the valance is 2" wide and this stripe runs straight from the cab across onto the tender. The bottom stripe on the valance is 3 1/4" wide and also runs straight from the cab across onto the tender. It will help to have the body installed on the chassis to ensure that the bottom yellow stripe runs smoothly along the bottom of the valance and across the face of the cylinders. Apply a decal setting solution to ensure that the stripes sit down over any rivets, or other raised detail.

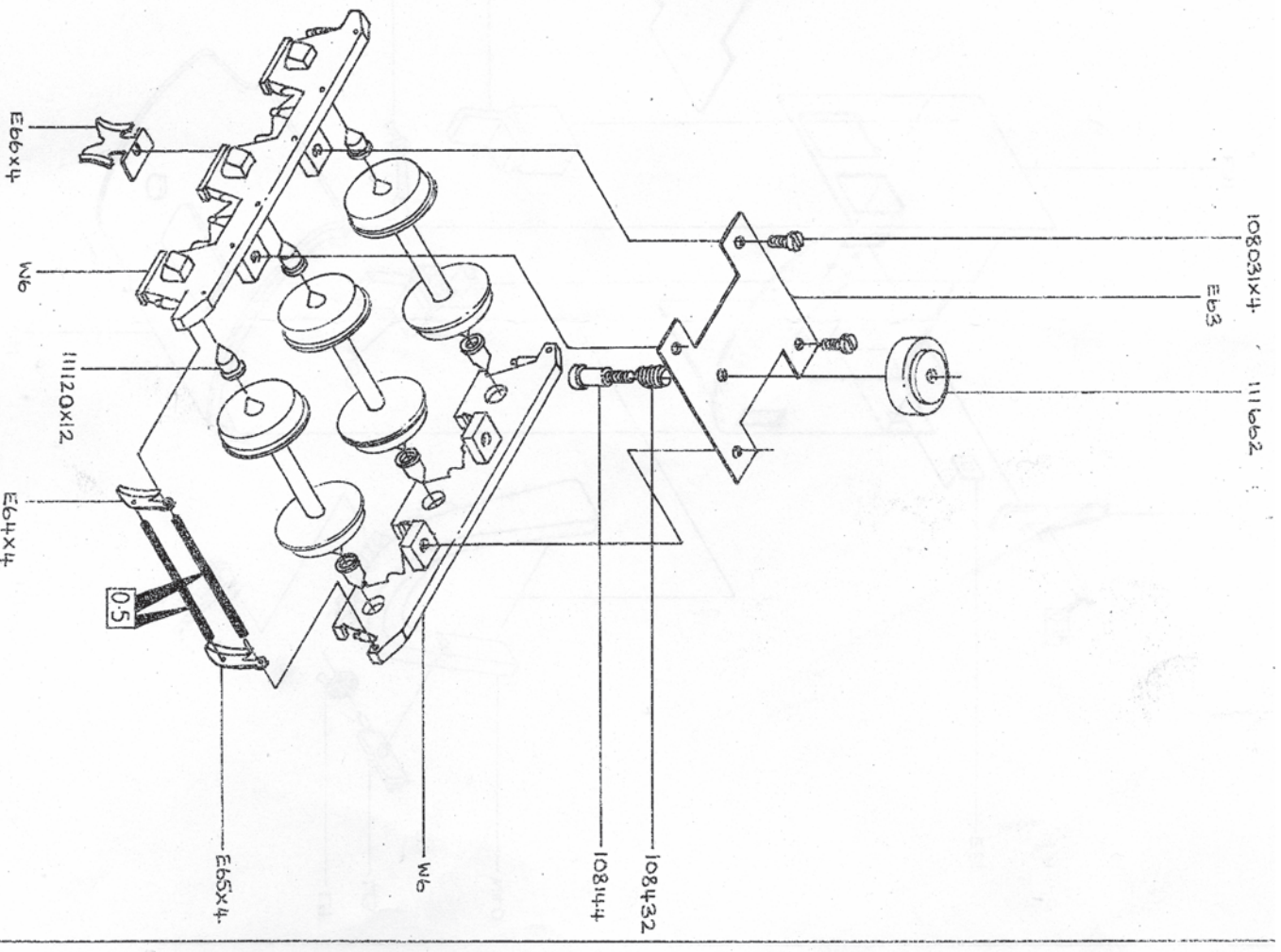
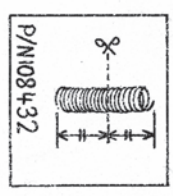
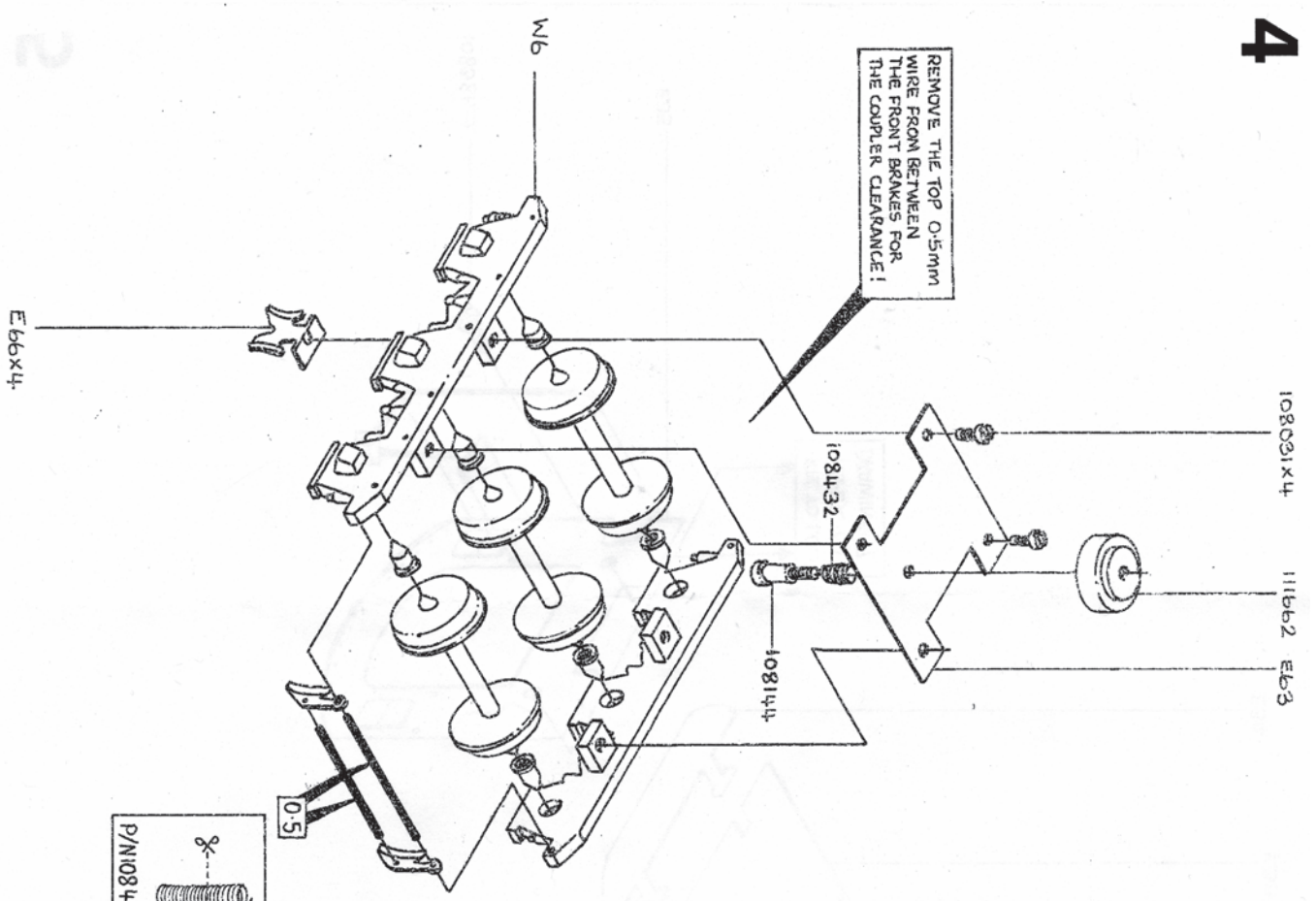
*Use a smear of contact cement to attach the number plates to the tender, centrally between the stripes. When the cement is dry, polish the paint off the face of the numbers with fine emery paper or a track cleaning rubber. Finally, seal and protect the decals with an overall coat of satin varnish, install clear plastic glazing in the cab windows and headlight before applying minimal weathering to taste.*

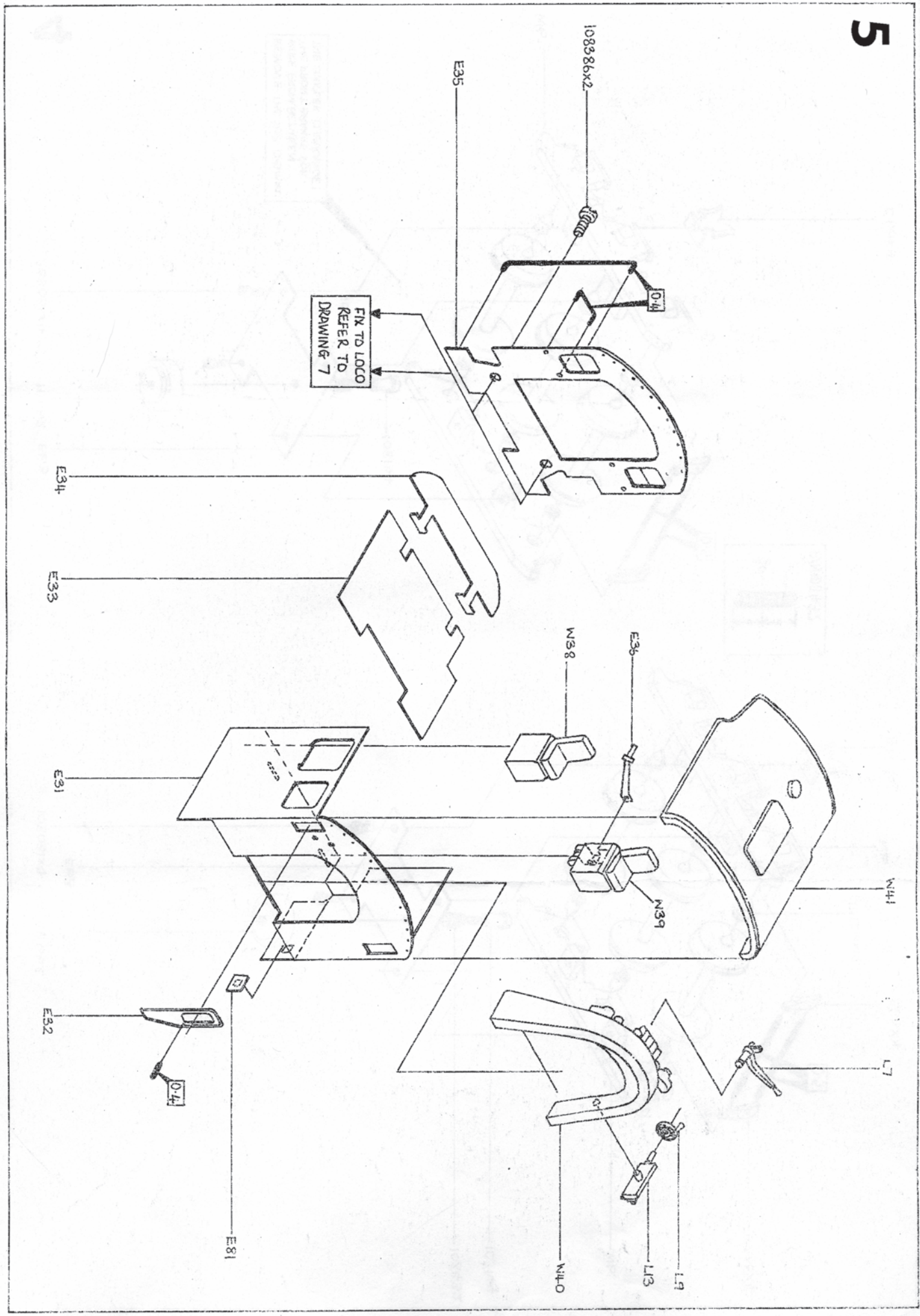






REMOVE THE TOP 0.5mm WIRE FROM BETWEEN THE FRONT BRAKES FOR THE COUPLER CLEARANCE!







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