

Class O (446) and (Z) 23 4-6-0 locomotive

Made in New Zealand by The Model Company.

Patterns by Paul Berntsen.

History.

These locomotives were built by Baldwin, they went into service in 1891. Between 1918 and 1926 the class were superheated.

In 1919 the new improved front bogies were added.

At the time of superheating, piston valve cylinders and single slide bars were fitted.

Options.

The kit has enough parts to represent any loco from new through to withdrawal, except for the version with piston valves added to the slide-valve cylinders.

Research.

I recommend the purchase of the O (446) Data Sheet as a valuable aid to detailing your model. Page 96 of 'A Compendium of New South Wales Steam Locomotives' by Alex Grunbach will be a big help in choosing a specific prototype locomotive.

General.

Please read the instructions right through and identify all parts before starting work.

Decide which detail options you want before starting work as references will appear throughout the instructions.

Wash all white metal parts in hot soapy water and rinse to remove parting agent before gluing.

Assembly options include instant glue, Araldite, white metal solder (70 degree), and low melt (145 degree) solder.

The writer uses all these methods for kit assembly, depending on the joint.

70 solder will only solder white metal so etched parts need to be tinned with normal or 145 solder to attach with 70.

The 145 solder will work for both etchings and white metal but care is needed.

For both these solders a temperature controlled iron is a good idea.

Assembly with instant glue, followed by fillets of Araldite is a good alternative method and is best for some parts, even if you're soldering the bulk of the kit.

Assembly of the etched chassis with 145 solder is easier than normal solder.

Once the Romford wheels are fitted it is best to use a paste flux like Fluxite and wash in white spirits.

I suggest building the tender first.

This loco uses engine/tender pick-up. Note that your tender wheels are insulated on one side only, put the live wheels to the left on the tender and to the right on the locomotive.

THE LOCOMOTIVE

Numbers in brackets refer to the etched parts diagram.

The Chassis.

1. Cut parts as required using a craft knife on a piece of wood. Cut out the frame sides (1), the end spacers (5) and the front and rear bottom spacers.
2. Referring to assembly fig. 1, fit the front spacer and the front bottom spacer (notch forwards) to the right hand chassis side. Note the spacers fit into etched grooves. Support the frame on a block of wood to allow the tabs to fit right through the frame. Solder the spacers.
3. Fit the rear spacer (large hole forwards) and the rear bottom spacer to the left hand frame, solder in place. Now solder the two frames together. This assembly method should give a square, flat frame. Don't proceed further until this has been achieved.
4. File down surplus tags and smooth sides, then fit axle bearings through the frame holes and solder with the flanges to the outside.
5. Solder 0.5 mm wires into the brake shoe holes in the frames and cut off, leaving 4 mm outside the frames.
6. Fit the motor mounting block to the rear spacer with it's pin through the large hole. The block fits with it's front flush with the spacer front. Drill a 2.0 mm hole in the rear spacer centrally and 14 mm from the back for the pick-up wire to go through.
7. Fit the firebox sides. These fit each side of the motor mounting block and sit on the rear spacer inside the frames. Their rear should be 4.0 mm from the frame rear.
8. Fit the spring castings to the frame. These fit outside the firebox sides and on top of the frames. The closer spaced springs go to the front. File the rear face of the springs to get a snug fit against the firebox side. Test the clearance before fitting by sliding a wheel on an axle, with two fibre washers, into the frames.
9. Fit crank pins to wheels, then fit wheels and axles to chassis. Fit the insulated wheels on the right hand side. Note the flange-less wheels go in the centre. Fit Peco fibre washers to control side play. The front axle has 3 each side, the centre axle has none and the rear axle can have 3 one side and 2 the other. Don't forget to fit the worm-wheel, which slides onto the front axle, or to quarter the wheels by setting the RH wheels 90 degrees forward of the LH ones.
10. Solder the rod fronts and backs into pairs. A tapered cocktail stick is a good aid to aligning the crank-pin holes. Clean up the rod sides and fit a piece of 0.7 mm wire at the rod knuckles. Drill the rod holes 1.0 mm and test fit to the chassis. If the rods bind, open out all the holes slightly with a round needle file, using a twisting motion. Don't do too much, then sight down the holes with the rods at the 3 o'clock position to see the offending hole. When the chassis runs freely, fit paper washers over the crank-pins **ON THE OUTER WHEEL-SETS ONLY** and fit the supplied washers. 145 solder is handy here. Clip off the surplus crank-pins and smooth the fronts.
11. ~~Locate the brake shoes, (11 and 12) and assemble into pairs. The long ones fit to the front. Open out the holes to 0.55 mm. The short brake shoes are too long and need new top holes drilled just below the present ones and the surplus metal removed. Fit the~~
 Brake shoes. new brass casting, fit into 0.8 mm holes.
12. Now the cylinders. The choice here is slide valves (square box on top) and double slide-bars or piston valves (round tops) and single slide-bars. Slide valves: Locate the

- cylinder casting and also the double slide-bar and cross-head castings. Drill the top rear dimples 0.8 for about 1 mm. Drill the piston rod holes 1.2 mm and cut the slide bars to 15.5 mm long. Cut the piston rod on the cross head to 10 mm long. Note the notch on the slide-bar boss. Fit the slide bars to the cylinders with this notch facing inwards. Now smooth the slide-bars and cross head until they fit and work smoothly.
13. Assemble the connecting rods, fit the boss fronts (10) to the outer face of the big ends. Clean up and drill the big end and the small end (outer hole) both 1.0 mm. Using a paper washer, fit the cross-head to the con rod with the supplied bolt casting. Smooth the back off flush.
 14. The cylinders mount underneath the frame. Test fit the cylinders with a 2 mm bolt and nut. Offer up the cross-heads/connecting rods. You'll find that the chassis hole needs filing forwards slightly to get the assembly to work. When the chassis runs freely, fix the cylinders to the frame and remove the bolt. Make a washer about 1.0 mm thick to space the connecting rods from the side rods. This can be a piece of tube or just a circle of wire. Using a paper washer, fit the outer washers as before.
 15. Piston valves. Locate the piston valve cylinders, the single slide bars and the single cross-heads. Drill the top rear dimples 0.8 for about 1 mm. Fit the cross-heads to the cylinders with the notch facing inwards. Cut the piston rods to 9 mm long and smooth. Offer up the cross-heads and smooth as required to get a smooth running fit. Drill the small hole in the top of the cross-head 0.8 mm.
 16. Assemble the connecting rods and boss front, then drill out the big end and the INNER little end, 1.0 mm. Cut off the surplus and, using a paper washer, fit the cross-head with the supplied cast bolt. Fit the cylinders underneath the chassis with a 2.0 mm bolt and nut. Offer up the cross-heads/connecting rods and check all runs freely. You'll find that the chassis hole needs filing forwards slightly to get the assembly to work. Mark front and back and mark 1.0 mm up the chassis sides as in fig 2. then file out to allow the cylinders to sit 1.0 mm higher in the chassis. Refit and bolt again, check for free running, then fix the cylinders in place and remove the bolt.. Make a washer about 1.0 mm thick to space the connecting rods from the side rods. This can be a piece of tube or just a circle of wire. Using a paper washer, fit the outer washers as before. Fit wire loops or pins to the cross-heads to keep in place.
 17. Make valve rods from 0.7 mm brass wire as in fig 3. Fit and fix chassis inside.
 18. Locate and fit saddle, hole to the front. Drill from underneath 2.0 mm and use 2.0 mm bolt and nut to locate and hold. This is best glued.
 19. The rear brake rigging is next. The Data Sheets drawing is a big help here. Start by fitting an 0.7 mm wire, 20 mm long, at holes 1 and 2 in fig.4. They protrude equally each side. Remove parts 19 from the etch and fit them to wire 1, between the frames. They fit 1 mm in from the frame and face vertically downwards After soldering, remove the centre portions of the wires. All the brake rigging holes are 0.8 mm. Take the long levers (15) and solder to the ends of wire 1. (Fig. 4A) Now take parts (16) and solder vertically outside the levers (15). Locate the brake cylinders on the brass sprues and clean up. The rear pin sits on top of the chassis and the centre pin fits behind parts (16). Parts 17 fit onto pin 2 and The slot fits over the centre hole of lever (15). See fig. 4B. Fit a pin through the centre hole on (15). The right side is finished at this stage. On the left side, fit part 18 to wire 2. A 0.7 mm wire fitted vertically will represent the

hand brake connection. This can be 12 mm long, but don't fit until the sandboxes are fitted to the body as it must lie outside the sandbox.

Fit 0.5 mm wire across between the brake shoes and fix. Then fit two pieces of 0.5 mm wire on top of the cross wires, running along the chassis. These bend up to meet the parts 19 on wire 1. These wires should be the same width as the frame.

21. Fix the gear to the centre of the front axle with Loctite or similar. Assemble the gearbox, Cut the worm shaft to 26 mm long and set up the worm so 8 mm of shaft is protruding from the gearbox. Fit the gearbox to the chassis. Loosen off the keeper plate screws if the unit does not work freely.
22. Cut the motor shaft to 10 mm long and fit the adapter sleeve to bring the shaft up to 2.4 mm.
23. Locate the motor mount, fold fill the fold with solder. Fit to the motor. Dry fit to the chassis, using the plastic tube supplied to connect to the gearbox. Check motor alignment, You may need to shim the mount upwards. Fix the mount to the mounting block. From now on, to remove the motor use the front screws. Attach power to the motor leads and check the unit runs OK.
24. Locate the draw-bar, also 4 headed plastic bushes. Clear the large hole to fit a bush, clear the small hole to fit the tender draw-bar pin. fig. 5 shows the assembly. Fig 5 also shows how to bend a piece of 0.4 mm phosphor-bronze wire to a U shape and solder to the draw-bar, along with the pick-up wire. Fit the draw-bar and fit the wire through it's hole and to the RH motor bush. Fit a wire from the LH motor bush to the chassis. Couple up your tender and the chassis should run. If it goes the wrong direction swap the motor wires.
25. Front apron. Locate the buffer beam, two buffers, the apron etching and the lifeguards. Fit the buffer beam to the apron, noting the apron fits flush to the front of the buffer beam and the buffer holes are closer to the top. Fit the buffers. If you want to fit a Kadee coupling, file the buffer beam to suit, otherwise fit the 3 link coupling provided. Fit the lifeguards to the buffer beam front, immediately inside the buffers and bend out to the rail width.
Fit the front apron to the chassis.
26. Front bogie. Locate the front bogie casting, the wheel-sets and the modern outer side-frames if required.
Clean up castings. If the modern outside frames are required, fit these first, Mark the centre of the bogie and the side-frames and fit with top of the side-frame mounting blocks flush with the top of the bogie at the centre.
Fit the wheels, retaining with two pieces of brass strip fitted underneath. Some filing and fiddling will be required as the bogie fits very tightly. Use a long 2 mm bolt and nut, together with the supplied spacer tube, to mount the bogie.
Wind a piece of 0.4 mm phosphor-bronze wire to make a spring 5 mm long. Solder this to the 1/8" bore washer supplied and fit between the bogie and cylinder stretcher bottom, washer bearing on bogie.
The writer subtly flattened the bottom of his piston valve cylinders to gain a little more clearance. Don't carve away too much, this bogie needs to look massive and tight fitting!

This completes the chassis, apart from some details which fit between the two units, such as steam pipes on the piston valve version and also the front apron braces.

The Body.

27. Locate the boiler, smoke box and smoke box rear. Fit the smoke box into the boiler, aligning the bottom scribe marks.
Drill the smoke box rear foot 2.0 mm and fit a 2 mm nut above the foot. This foot sits on the chassis rear spacer and the draw bar screw holds the body rear in place. The bottom of the smoke box rear will require narrowing to fit between the brake cylinders, it's a good idea to do this and test fit before fitting the rear to the boiler.
Fit the firebox rear to the boiler, noting the horizontal scribe line which aligns with the bottom edges of the motor opening portion of the boiler.
Sit the boiler on the chassis and file as necessary to get a good fit around the firebox sides. Fit the rear screw, then scribe through the front hole to locate the front screw position. Fix a 2.0 mm screw inside the smoke box.
Check the chassis still runs with the boiler screwed in place.
28. Locate the etched smoke-box front and white metal smoke-box door. Push the rivets into the front with a sharp point or use a rivet press. Fit to smoke box front.
29. Locate the cab sides and choose the ones to suit your period. Locate the cab front and back, these are the same for all periods. Check that the cab front slides along the boiler from the back. Assemble sides, front and back noting that the cab sides fit OVER the front and back. (See also stage 44, regarding injectors.)
30. Locate the etched running boards, clean up and fit under the cab, with 0.5 mm showing at sides and rear. NOTE, the running board with the longer wide portion goes to the right.
31. Locate the rear cab support and fit underneath the cab rear, with 1.5 mm from it's back to the running board rears.
32. With the boiler screwed to the chassis, the cab/running boards should slide onto the boiler, with the rear cab support front block sitting into the chassis rear rebate.
Fix cab/running boards to boiler by fixing the joint between the two at the boiler top. If gluing, allow to harden thoroughly before removing body from chassis. Handle carefully and fix underneath at the firebox rear.
Cut etch waste about 1 mm wide and make braces between running boards and boiler, two at the front and two mid-way along the running boards.
33. The sandboxes fit underneath the running boards, flush with the inside edge. The long ones go to the front. The rear of the rear ones is 8 mm from the back of the running boards, the rear of the front ones is 79 mm from the rear.
Drill the bottoms for sand pipes, at the rear of the front ones and the front of the rear ones, 0.8 mm. Don't fit the pipes until the end as they're a nuisance.
34. The 10 mm long air-tank fits to the outside edge of the LH running board, with it's rear 15 mm from the rear of the running board. The small brass air tank fits on the RH side as far to the rear as possible.
35. Locate the reversing lever on the small etch. This fits underneath the boiler on the RH side, against the motor opening and with the downward facing link 71 mm from the rear. Bend the downward link in to clear.

36. On the piston valved locos only, take the white metal steam pipes, cut off the bottom of the flange and cut to length so they fit snug on to of the saddle and to the inner top of the cylinders.
37. The top centre line on the boiler can be lightly pencilled in as an aid to fitting boiler fittings. Drill a 2.0 mm hole on the centre line 15 mm from the cab front for the safety valves and whistle.
38. The dome goes 37.5 mm from the cab front. Don't forget to drill a 0.8 mm hole 5 mm up the rear to fit the main safety valve. Fit this before fitting the dome.
The boiler and cab fittings, and particularly the handrail knobs, are best glued with 24 hr araldite. The chimney and dome can have wire pegs fitted if desired for a stronger job. The chimney centre line is 16 mm from the smoke box front.
39. The handrail knob holes are 0.8 mm. Use the longer knobs on the boiler and the shorter ones on the smoke box.
Drill the clack valve holes 0.8 mm and fit the clacks after cutting off the curved pipe.
40. Drill two 1.5 mm holes in the smoke box, 5 mm back from the smoke box front and 2.5 mm up from the handrail line. Fit the ash blow-down doors.
41. Underneath the smoke-box on the centre line, drill a 1.5 mm hole 7 mm back from the front and fit the ash doors.
41. If your loco has them, fit the headlight to the top of the smoke box at the front and the turbogenerator immediately in front of the cab.
42. Glue the Westinghouse pump 8 mm from the cab front on the right side. Sit the cab/boiler on its side and prop to ensure the pump is parallel to the cab.
43. Cab detail. A handy method of fitting some cab detail is to fit copper wires to the parts and curve the wires up to attach to the lubricator.
The reverser wheel goes to the RH side so it's wheel is central in the cab windows.
The hand brake goes on the left, 10 mm from the cab rear.
The W/H brake stand goes between the reverser and the cab rear, RH side.
The regulator goes on the firebox top centre line, 10 mm from the front, with the lubricator 9 mm from the cab back, on the same line.
44. On the J as built, the injectors fit half way into the cab front, on the line of the handrails. As the piping runs half in the cab and half out, their fitting is a bit of a snag. Either remove the front pipe, fit though from the rear and replace the front pipe, or cut the injector in half.
On later period locos, the injectors are fully in the cab.
45. Locomotive piping is to be fashioned from the supplied copper wire. Strip off the insulation and straighten with vice, pliers and a good pull!
As the piping varies to period and between locos, use the photos and Data Sheet as a guide.
46. Form and fit the handrails from 0.4 mm wire.
47. Now the final details. On the front deck, drill 1.0 mm holes 18 mm apart and 3.5 mm back from the front. Solder the deck braces from underneath and bend to fit the smoke box. Use copper wire to form the sand pipes and fit to the sand boxes
Fit the etched fall plate by fixing into the top of the cab rear opening. It can be fitted rigid as it will sit slightly above tender deck level.
Roll the cab roof and fit rain-strips from wire, fitting into the etched grooves. Either glue the roof in place or use wire 'feet' to locate it and keep removable.
48. Assemble and test run, then clean up before undercoating and painting. A Fibreglas brush or soft brass brush in good for a final finish but be sure to wash off any residues.

6

Fig. 1

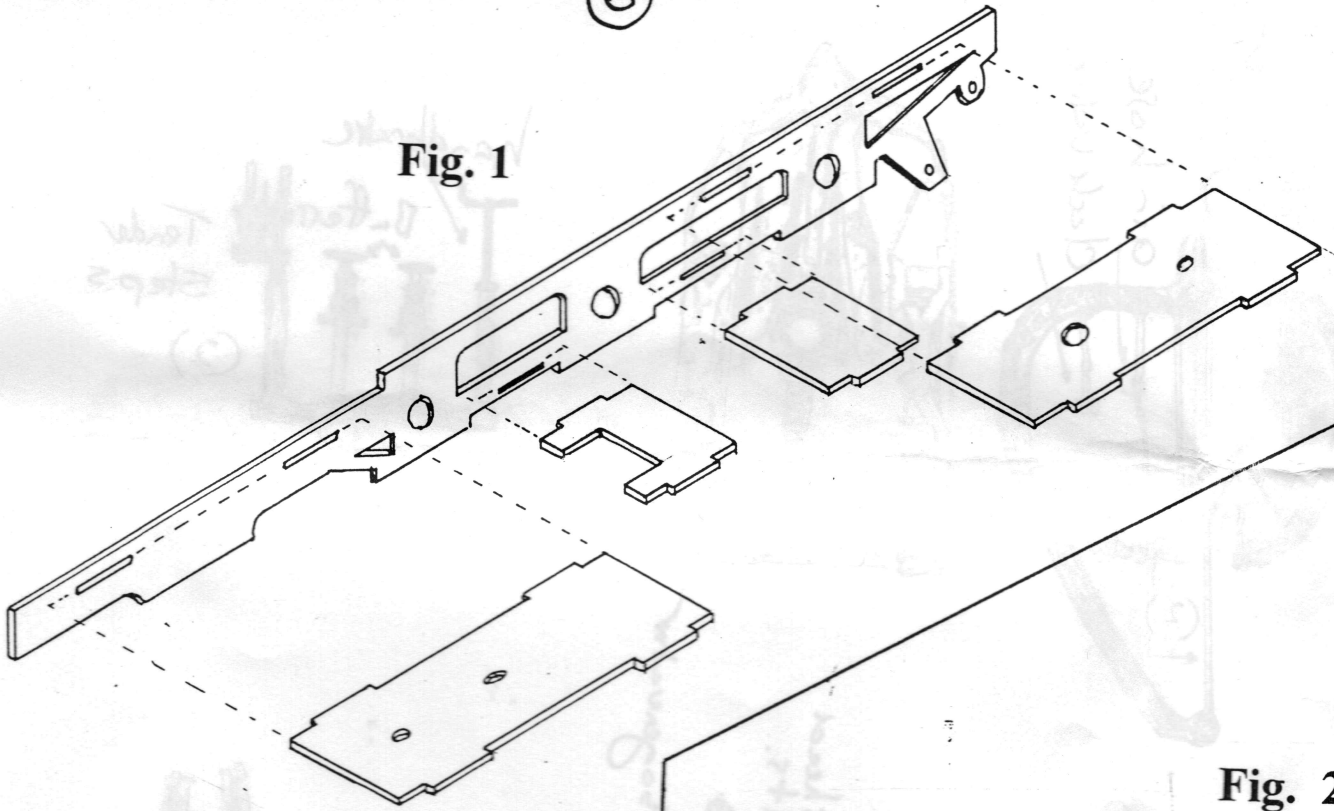


Fig. 2

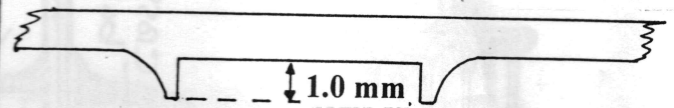


Fig. 5

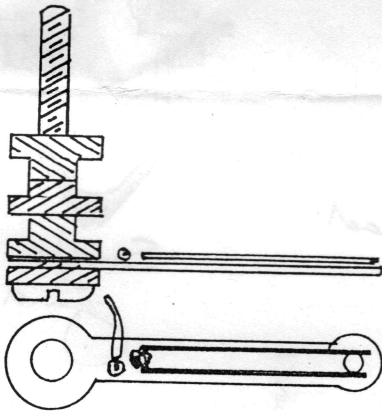


Fig. 3

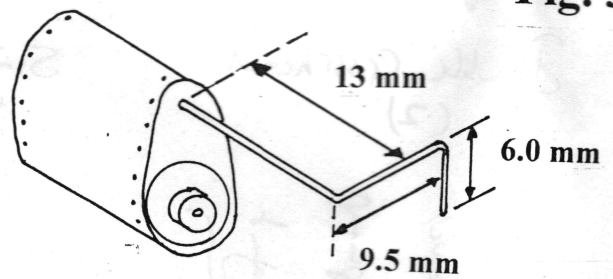
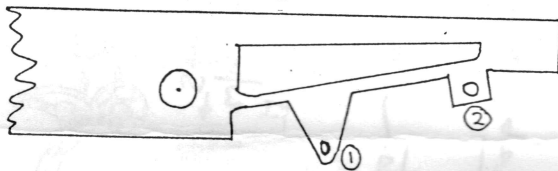
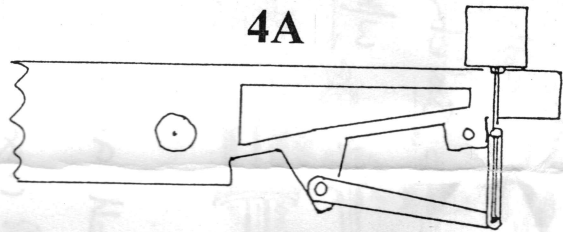


Fig. 4



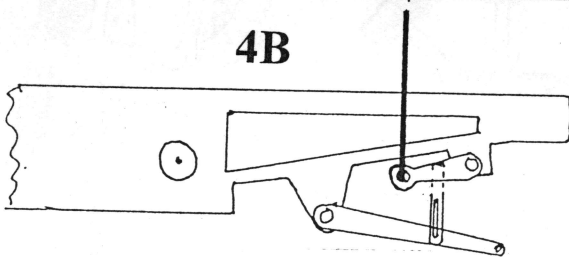
Both sides

4A



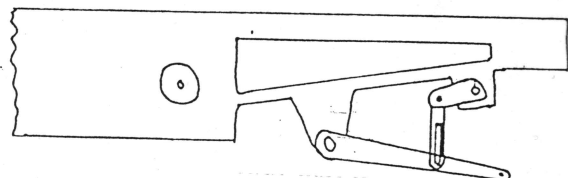
Both sides

4B



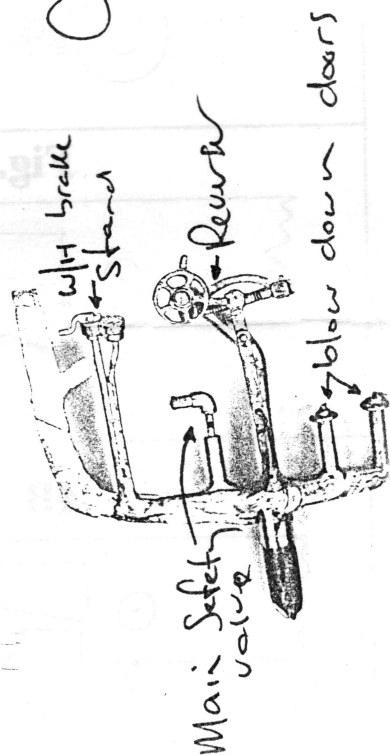
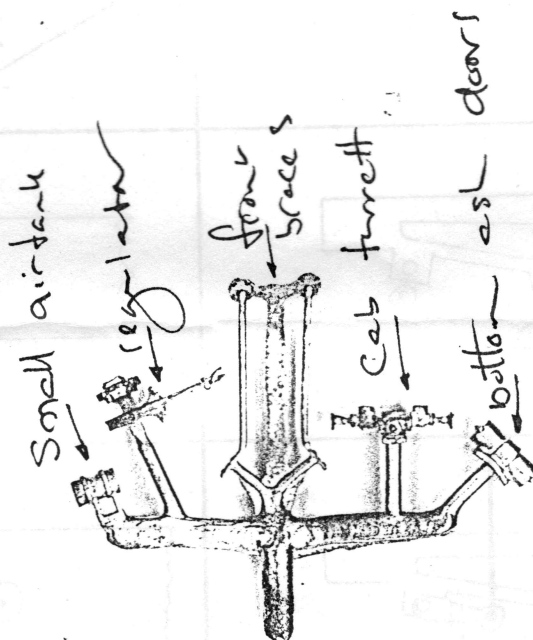
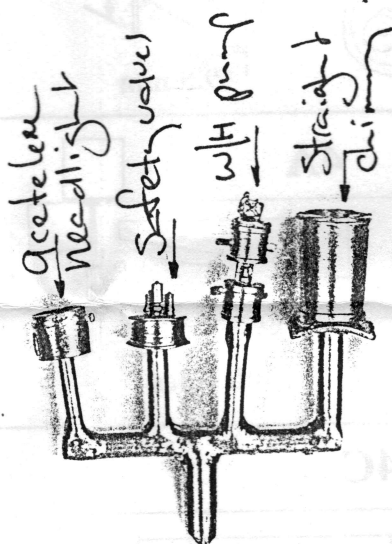
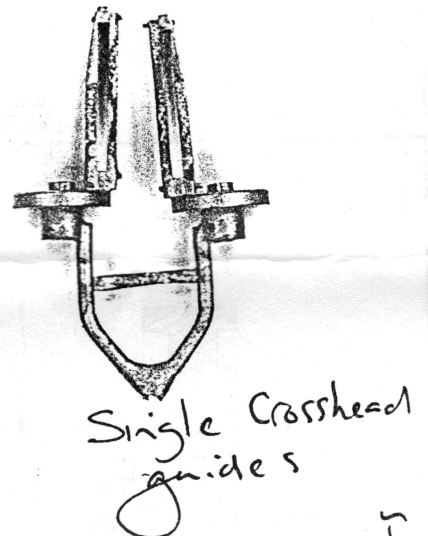
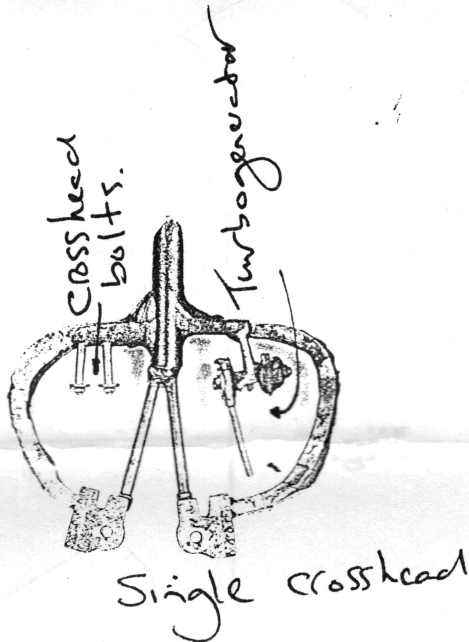
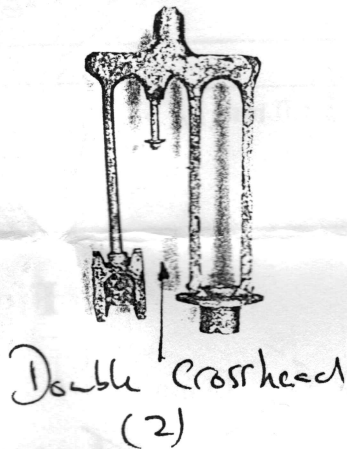
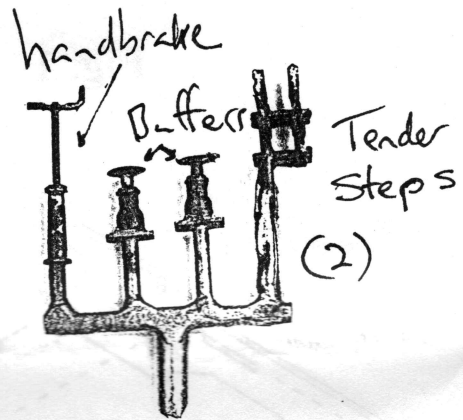
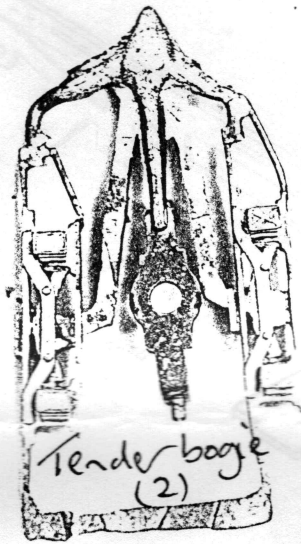
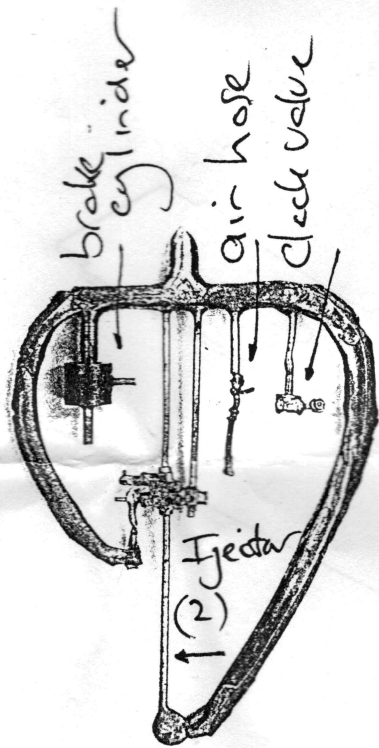
LH side

4C

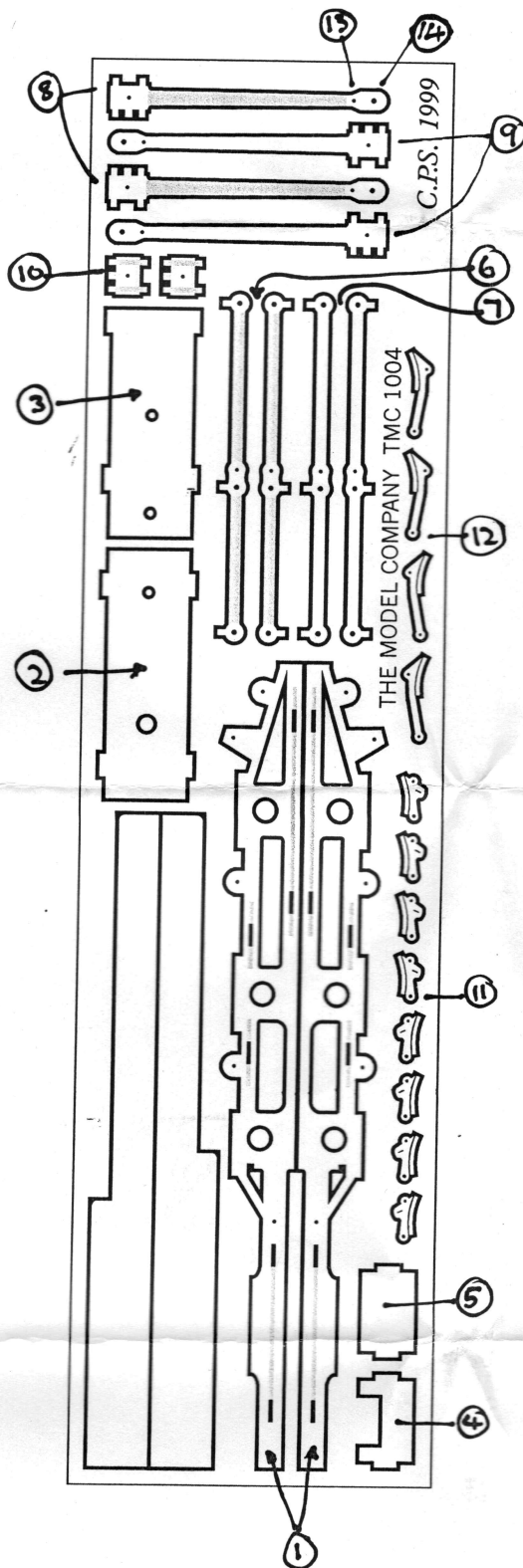
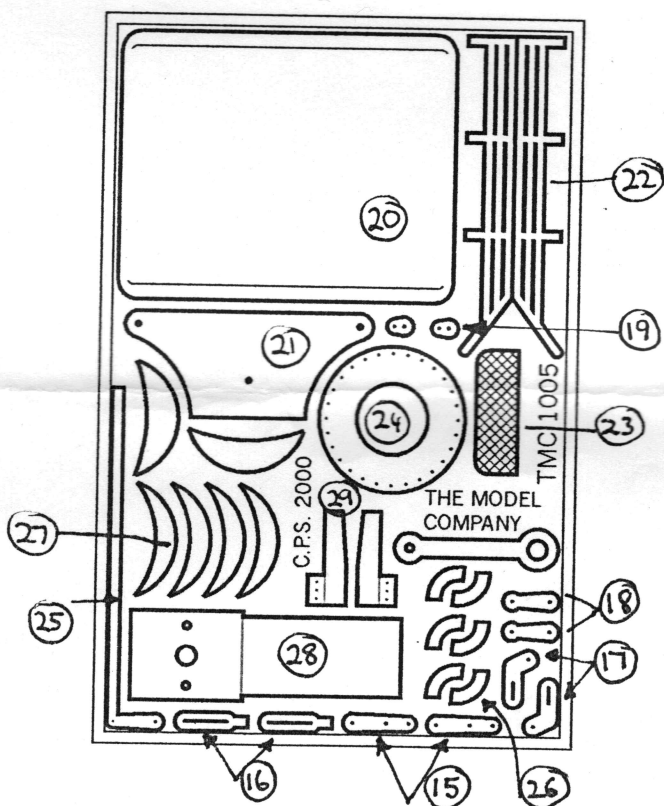


RH side (viewed from left)

(1)



1. Frame sides
2. Rear spacer
3. Front spacer
4. Front bottom spacer
5. Rear bottom spacer
6. Side-rod fronts
7. Side-rod rears
8. Connecting rod fronts
9. Connecting rod rears
10. Connecting rod boss fronts
11. Centre and rear brake shoes
12. Front brake shoes
13. Front cross-head hole
14. Rear cross-head hole
15. Brake parts
16. Brake levers
17. Angled brake parts
18. Small levers
19. Cranks
20. Cab roof
21. Front apron
22. Tender coal rails
23. Fall plate
24. Smokebox front
25. Reversing lever
26. Square counterweights
27. Crescent counterweights
28. Motor mount
29. Front lifeguards.



Berg's Baldwin tender kit.
Made in New Zealand by The Model Company.
Patterns by Paul Bernsten.

General.

This kit includes all the white metal and brass parts and fastenings to build a Baldwin tender as supplied with the J(483) and 29 class kit. The only parts not supplied are the etched coal rails. A diagram and photo show the coal rails which may be fashioned from the supplied wire.

Please read the instructions right through and identify all parts before starting work. Decide which detail options you want to fit before starting as references will appear throughout the instructions.

Wash all white metal parts in hot soapy water and rinse well to remove the parting agent. Assembly methods include instant glue, 24 hour Araldite, white metal (70°) solder and low melt (145°) solder. The writer uses all these methods. 70° solder will only solder white metal so etched parts will need to be tinned with normal solder if 70° solder is to be used to attach them to white metal. 145° solder will work on both white metal and the etchings but more care is needed. For both these solders some form of temperature controlled iron is recommended. If you have doubts about your abilities to solder white metal then it is best to glue. I use instant glue, followed by a fillet of 24hr Araldite.

The tender.

1. Bogies. Cut the bogie parts from their sprue carefully. Clear the centre hole in the stretcher 3.0 mm to fit the shouldered brass pivot screw. Dry fit the bogie parts with wheels installed before soldering or gluing. Twist the assembled bogie to allow all four wheels to touch the track.
2. Clean up the tender floor. Drill the draw bar pin hole, the coupler hole, the brake cylinder hole and the hand brake hole all 1/16" or 1.6 mm. Open out the coupler hole slightly and run a self tapping screw into it to cut a thread. Cut a 10 mm long piece of 1.6 mm brass wire and glue or solder into the draw bar pin hole. Fit the brake cylinder. Drill the buffer holes 1.6 mm and fit the buffers. I drill several large holes, about 5 mm, in the floor to allow water to drain during washing after the body and floor are assembled.
3. Clean up and assemble the sides and ends of the body. The Data sheet will show that for locos in 'as built' condition the tender sides and back will need to be cut down. The tenders were altered with increased water capacity in 1893/4.
4. Clean up the front tender top and drill 1.6 mm holes for the water legs. Fit the assembled sides and ends. Drill the rear deck 1.6 mm for the water filler and fit to the body.
5. Assemble the body to the floor. Rub the bottom of the body on a piece of emery paper on a flat surface to get a neat fit. *(etch provided in loco kits)*
6. Fashion coal rails from the supplied wire and glue or solder to the tender sides as shown. Make these up with extended vertical wires to provide a strong joint to the body.
7. Fit the water legs, water filler and tool boxes. Tool box position varies with period, check photos for your location. Once the tenders were rebuilt to the kit form the toolboxes were generally at the front of the rear deck, across the deck, sloping side forwards.
8. Fit the steps to the front platform sides, just in front of the sides.
9. Drill the hand grab and hand rail holes 0.5 mm. Note there are two hangars and two hand rails on the front. The hand rails go from the marked hole at the top to a hole in the centre of the front platform side, just in front of the step. Bend and fit these handrails from the supplied 0.4 mm phosphor bronze wire.
10. Drill the water filler holes 0.5 mm and fit a handle from 0.4 wire.
11. Fit the brake standard to the tender deck. There is a dimple on the front left tender side. Drill this 0.5 mm and fit a bent piece of 0.4 mm wire to represent a tap.
12. Lamp iron positions are marked on the tender rear. Make these from flattened wire. If desired, the bogie restraining chain hooks can be bent from wire and fitted at the dimpled

desired, the bogie restraining chain hooks can be bent from wire and fitted at the dimpled positions.

13. Fit the air hose to the rear buffer beam. None of my photos show where, but typically it should fit to the right of the coupler.
14. Wash and dry the tender, then fit the coupler of your choice. The kit is designed for Kadee 5's.

FULL SIZE FOR HO

