



Mark's Model Works

Dub's A
NZR 0-4-0
Locomotive Kit

Mark's Model Works
47 Raukawa Street
Stokes Valley
Lower Hutt 5019
New Zealand
www.vccmodels.co.nz
mmandrews@clear.net.nz
04 9715398

NZR Dubs "A" Class Locomotive

This kit is a representation of a NZR 0-4-0 A class locomotive originally built by Dubs & Co of Glasgow in 1873

I have always wanted one of these tiny locos and with my discovery of how to make etched brass parts as well as the manufactured parts that are available outside of New Zealand it became achievable. Originally this was to be a scratch building aid, so it started life as just an etch. While attending the 2008 MRC it became clear that there was a gap in the market for a kit such as this. The kit you now hold has all the pieces you need to make up this great little loco. My prototype version now has a DCC sound chip installed and this just finishes it off.

The basic design was derived from a Cedric Green drawing, prototype photos, the book "the Revival of Dubs A62", Maurice Lennard's painting and A64 at The Plains Railway in Tinwald.

The CD in the kit includes all of the pictures I have taken of the prototypes and the building of the pilot models.

Brief Prototype History

There were 14 locomotives in this class, 12 on the Hurunui Bluff section and 2 on the New Plymouth section. They all had various road numbers over the years and were all sold or written off by 1905

Described as "a most absurd-looking dwarf" or "a mere mite, a veritable toy Locomotive", they did surprisingly good work in branch-line and shunting duties. Once written off by NZR, they were put to good use by collieries, timber mills, freezing works, and harbour boards. Perhaps some of the hardest work entrusted to an 'A' was working for the Taupo Totara Timber Co's daily mixed train between Putaruru and Mokai in 1905-6; the 50 mile line abounded in 1-in-30 grades and 1½-chain radius curves along which the little 'A' gamely struggled, trailing a string of timber-laden flat cars with an old Wellington horse tram bringing up the rear.

Also in the 'A' Class were three E.W. Mills locomotives and one Alexander Shanks 0-4-0 T engine, all classified 'A'

For numbering information and history see the register on the next page.

4 of the A class have survived into the present day;

Jack Ryder Museum, Auckland - A 62/196, Dubs #656 Stored

Plains Railway, Asburton - A 64, Dubs #651 Operating

Otago Railway & Locomotive Society, Gore - Stored A 66, Dubs #648 Display

Ocean Beach Railway, Dunedin - A 67, Dubs #647 Operating

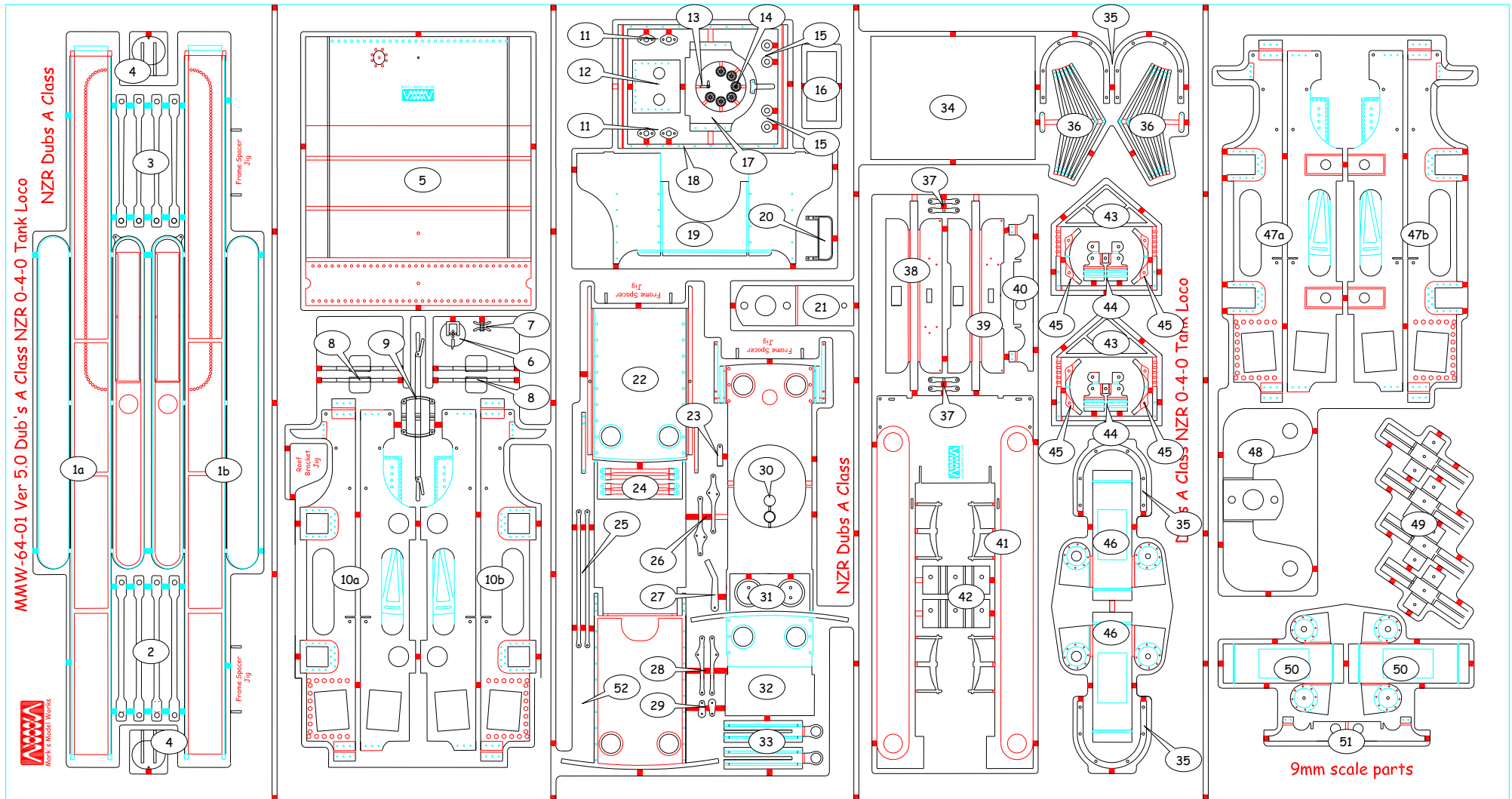
Any of these you will find to be a great source of information so go crawl around one and take some pictures.

(Information from http://www.trainweb.org/nzsteam/a_class.html)

A Class 0-4-0 T Register

Road No.	Builder	Builders No.	Year Built	Name	Date in Service	Withdrawn	Disposal	Remarks
5	Dubs	647	1873			1896	Sold to Lovells Flat Coal Co. 1897-1906; Real Mackay Coal Co. Milton 1906-1907; Bruce Railway & Coal Co. Milton 1908-1921; Milburn Lime & Cement Co. Milburn 1921-1968.	See A 67
60	Dubs	655	1873					Numbered A 3 in 1882, then A 193 in 1890
61	Dubs	650	1873					Numbered A 5 in 1882, then A 161 in 1890
62	Dubs	656	1873		1.1.75	3.2.06		See A 196
63	Yorkshire	256	1875				Sold 1891 to New Plymouth Sash & Door Co., Ngairi £500. 1909-1918 Lyttelton Harbour Board. 1918-1920 Westland Sawmilling Co. Marsden.	Renumbered A 41 in 1886 then A 237 in 1890.
64	Dubs	651	1873		1.1.75	1890	Sold to Canterbury Frozen Meat Co. Ltd. Fairfield 1891-1960; In regular service at Plains Railway	
65	Dubs	653	1873		12.6.75	1896	John Harrison, Aratapu 1896-1901; White Pine Sawmilling Co. Naumai 1902-1917; Stuart & Chapman Ltd. Ross 1918-1936	
66	Dubs	648	1873		1.2.75	1904	NZ Pine Co. Colac Bay 1904; Dunedin City Corporation Gas Works, Dunedin 1904-1947; On loan to Otago Harbort Board, Dunedin 1913-1920;	Now owned by Otago Railway & Locomotive Society and stored at Gore.
67	Dubs	647	1873		2.2.75	1891	Hokonui Coal Co. Hokonui 1891-1892; Returned to NZR as A 5 in 1892. In regular service at Ocean Beach Railway	
68	Dubs	652	1873		1.6.75	1900	Sold to Black & Stumbles, Timaru 1900-1901; Timaru Harbour Board, Timaru 1901-1907; Ellis & Burnand Ltd. Manunui 1908-1929	
69	Dubs	654	1873					Numbered A 1 in 1882 then A 220 in 1890
70	Dubs	649	1873					
71	Yorkshire	255	1876		15.12.75	1905	Sold £450 to Taupo Totara Timber Co. Putaruru 1906-1921; NZ Farmers Fertiliser Co. Ltd. Te Papapa 1922-1930	
161	Dubs	650	1873			1904	Sold to Canterbury Frozen Meat Co. Ltd. Pareora 1904-1954; Canterbury Frozen Meat Co. Ltd. Belfast 1954-1955	Numbered A 61 in 1878, then A 23 in 1882, then A 161 in 1890.
192	Dubs	646	1873	<i>Fox</i>	6.74	12.89	Sold to Manawatu County Council, Sanson Tramway 1889-1910	Numbered A 43 in 1878, A 21 in 1882 and A 192 in 1890.
193	Dubs	655	1873			1894	Sold to Gear Meat Co. Ltd. Petone 1893-1915; Thomas Borthwick & Sons Ltd. Paki Paki 1915-1930	Ref. A 60
196	Dubs	656	1873		1.1.75	3.26	Placed on display outside Otahuhu Workshops circa 1929. Then to Jack Ryder's Museum. Now owned by Ian Insley, Avondale	Ref. A 62
215	Dubs	645	1873	<i>Ferret</i>	6.74	1896	Sold to Kaihu Valley Railway Jan 1888. Taupiri Coal Co. Ltd. Kimihia 1896-1919; Taupiri Coal Co. Ltd. Rotowaro 1919-1937	Purchased from Kaihu Valley Railway 1.1.93. Numbered A 44 in 1878, A 22 in 1882, then A 215 in 1890.
220	Dubs	654	1903			4.91	Sold to Nelson Brothers Ltd. Tomoana 1891-1901; Nelson Harbour Board, Nelson 1901-1907; Taupo Totara Timber Co. Ltd. Putaruru 1907-1914; Gamman & Co. Ohakune 1915-1919; Wellington Farmers meat Co. Ltd. Waingawa circa 1920; Ellis & Burnand Ltd., Ongarue 1923-1925.	
237	Yorkshire	256	1875			10.91	Sold to New Plymouth Sash & Door Co. Ngairi 1891-1909; Lyttelton Harbour Board, Lyttelton 1909-1915; Dominion Cement Co. Ltd. Whangarei 1915-1916; Westland Sawmilling Co. Marsden 1916-1920; Malfroy & Co. Hokitika Ltd. Houhou.....T. Wall & Co. Houhou; Westland Boxes Ltd., Houhou, 1925-1950.	Ref. A 63

Parts Layout



Parts List

Etched Parts

1. Side Tanks
2. Connecting Rods
3. Coupling Rods
4. Water tank lid (type 1)
5. Boiler
6. Firebox Door
7. Washout plug bracket
8. Foot Steps
9. Reversing Lever
10. Chassis Side Frames (type 1)
11. Cylinder Gland Packing Flange
12. Valve Chest Front
13. Smoke Box Door Handle
14. Valve Handles
15. Crosshead washers
16. Front Footplate
17. Smoke Box Front
18. Roof Bracket
19. Cab Front/Sand Box
20. Firebox Shelf
21. Motor Mount (type 1)
22. Cab Rear Wall
23. Reversing Lever Bottom Half
24. Brake Crank Connecting Rods
25. Brake Connecting Rods
26. Brake Hangers Rear Wheel
27. Hand Brake Operating Arm
28. Brake Hangers Front Wheel
29. Brake Crank
30. Pressure Gauge
31. Water Tank Lid (type 2)
32. Cab Front Wall
33. Crosshead Guides
34. Cab Roof
35. Boiler Frame Brackets
36. Cowcatchers Bars
37. Side Chain Eyes
38. Rear Headstock
39. Front Headstock
40. Crosshead Bracket (type 1)
41. Body Floor
42. Coupler Pockets
43. Cowcatcher Frame
44. Crosshead
45. Brake Shoes
46. Cylinders (type 1)
47. Chassis Side Frames (type 2)
48. Gearbox
49. Horn Block Guides
50. Cylinders (type 2)
51. Crosshead Bracket (type 2)
52. Pressure Relief Valve (added to Ver 5.1)

Cast Parts

- A. Balloon Funnel Top
- B. Smoke Box Door
- C. Whistle
- D. Balloon Funnel Body
- E. Oiler
- F. Funnel Base Flange
- G. Brake Handle
- H. Late Era Funnel
- I. Early Era Funnel
- J. Dome
- K. Oil Can
- L. Head Lamp (2)
- M. Back Head
- N. Steam Valves
- O. Coupler Surround (2)

Other Parts

- Mashima Motor M1015
- M1.0 x 3 Motor mounting screws (2)
- 40:1 Gear Set
- Driving Wheels (4)
- Split Axle Female Half (2)
- Split Axle Male Half (2)
- Split Axle Bush (2)
- Axle Bearings (4)
- Crankpins (4)
- 0.3mm Brass Wire (2x150mm lengths)
- 0.4mm Brass Wire (150mm length)
- 0.5mm Brass Wire (3x150mm length)
- 1.0mm Brass Wire (100mm length)
- 2.0mm Brass Tube (100mm length)
- 1/32 inch Brass Tube (25mm length)
- 3/16 inch Brass Tube (25mm length)
- 1.0mm Stainless Steel Rod (100mm length)
- M1.4 Machine Screws (4)
- M1.0 Machine Screws (4)
- 1.0mm simulated nuts (2)
- 14BA Machine Screw
- 1/32" PCB Strip
- 1/64" PCB Strip
- Hook up Wire

General construction notes

The order these instructions are in is not necessarily the right order.

It only follows a logical progression

When I have built up my prototype models I have swapped between the body and the chassis and I tend to build both concurrently

Have a good read through the instruction first and pick and choose the pieces you feel comfortable starting on.

This loco kit is one step away from scratch building and there are a number of parts that are fabricated from flat etched pieces, take your time with these and work out how you are going to do each component. I have used a lot of jigs and aids I built to help.

It is a good idea also if you feel the soldering is going to be your challenge. Start with the easy soldering jobs then as you build up your skill you will feel more comfortable tackling the more complex jobs

There are a number of extra bits on the etch, for example the cylinders have two versions so if you want some practice at the rolling, folding and soldering use the 9mm/fine scale parts (50) to do this.

Also because of the mistakes I made in the rod lengths on the main etch you get two sets of side frames and rods; use these to practice laminating, just remember which ones are the right ones.

I hope you enjoy building this kit, I know it has been a personal challenge for me.

If you are having any problems send me an email or drop a line and I'll try to help you out.

I look forward to seeing lots of very nicely built A's at the next convention and meeting up with all of you.

Chassis Construction

The etch has 2 designs for the chassis, one for fixed axle bearings (10) and one for compensated axles (47,48,49). Which of the designs you choose to build is up to you but Both chassis are designed to be split axle pickup with double sided PCB used as frame spacers.

Side Frames

Remove both the side frames (10a,10b) from the etch, remembering to leave the tabs between the front and back halves.

Punch the rivets on the brackets and the axle boxes.

Bend by hand the front and rear brackets.

Apply a small amount of solder paste to the inside surface. The amount shown in the photo below is a bit much



Bend the pieces 180 degrees together and clamp them together. You can use any type of clamps, they just need to be able to stand the heat.

Heat the clamped side until the solder has flowed to the outer edges.

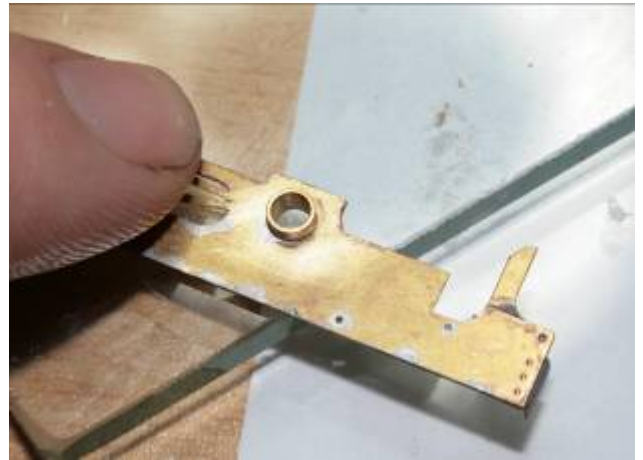
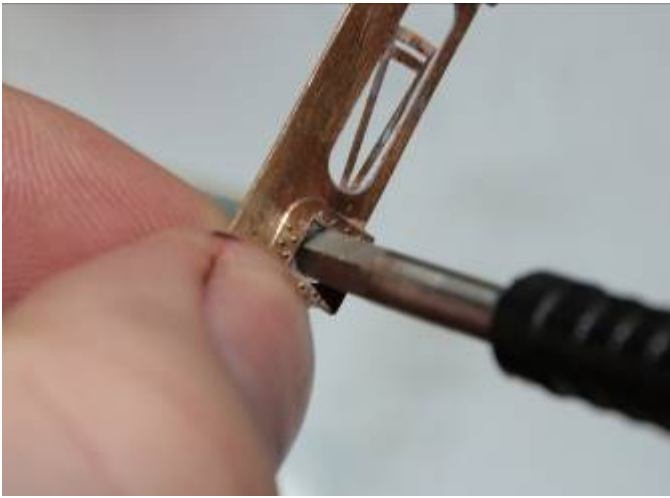
Remove from the heat and allow to cool.

Wash in water to clean off the flux from the solder paste.

Clean off the excess solder and file the edges to remove the laminated look.

Fixed bearings

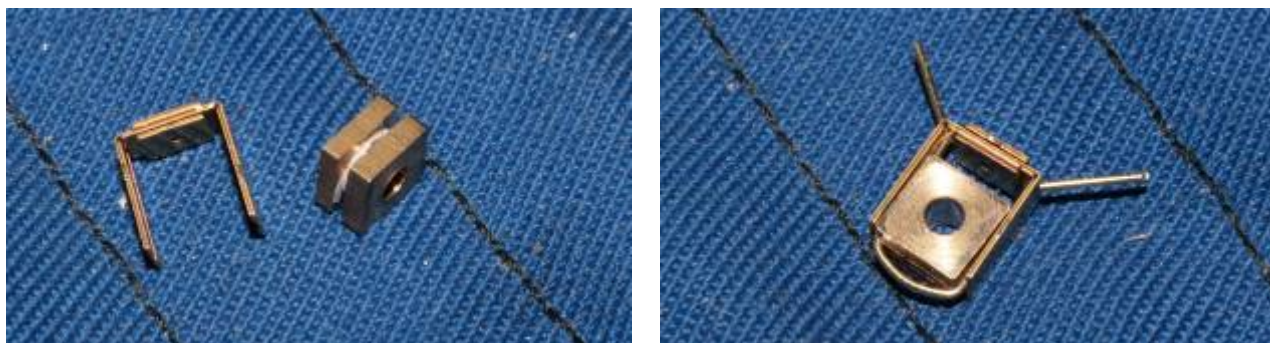
Northyard top hat bearing are provided as fixed bearing, the bearing holes need to be opened up a little using a tapered reamer and the bearings soldered into the side frames



Lay the side frame down onto a flat surface to ensure the bearings remain square during soldering

Compensation

The side frames for the compensated chassis go together in the same manor. Either full compensation using horn blocks or single rocking axle can be used.



For full compensation the axle holes are removed along the half etched lines. The horn block guides (49) folded up and soldered in place. Horn blocks are required to be turned out of 5mm square rod. Tap the hole in the top of the horn block guide to 1mm. Make up a hoop of 0.5mm wire to fit inside the horn block guides along the half etched lines and out the holes in the top. Insert a 1mm machine screw, then slide the horn block onto the hoop and the hoop into the horn block guide. Bend the 0.5mm wire over to retain the horn block. Once the wheels and axles are in place, add phosphor bronze wiper springs, then adjust the screws to ensure the model sits level.

For single rocking axle compensation the rear axle holes on part 10 are enlarged to allow the bearings to move up and down by a small distance. A pivot point for the axle is soldered onto the under side of the PCB spacer.

Note: I have not constructed a compensated version of the chassis myself so all of the above is just theory. Sorry I can't be of more help but you are on your own here.

If you are building a compensated version I would be very happy to add your ideas and photos to the next set of instruction.

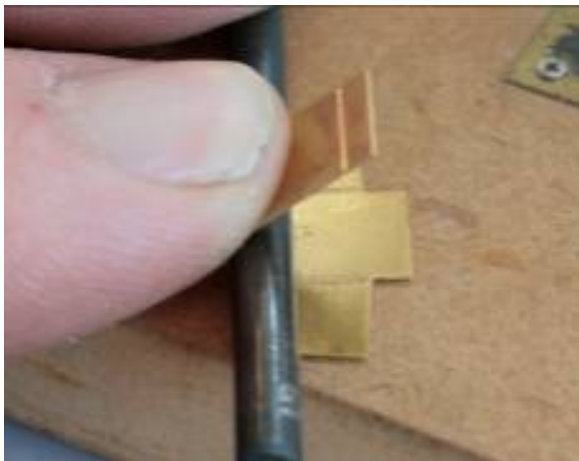
Cheers Mark Andrews

Cylinders

The etch has 2 designs of the cylinders one for Sn3½ scale (46) and the other for 9mm scale (50). The difference is the distance away from the side frame that the crosshead has to be in order to clear the wheel and crankpin. With Proto64 wheels you may be able to use the 9mm parts, I have not tried this and the wheels and crankpins provided with the kit are all designed for Sn3½.

Remove the cylinders (46) from the etch.

Punch the rivets/bolt heads around the cylinder



Using the shank of a 4mm drill as a former gently bend the cylinder wrapper, work it around until the half etch lines on the ends of the cylinder wrapper clip into the holes in the side frames.

Bend one cylinder end up 90° and check the edges meet, adjust the cylinder wrapper with the end of a drill.

Run a bead of solder around the inside of the cylinder, give it a quick wash and clean up the join with a file, be careful not to file any of the rivet/bolt heads

These can be clipped into the side frames and left unsoldered for now.

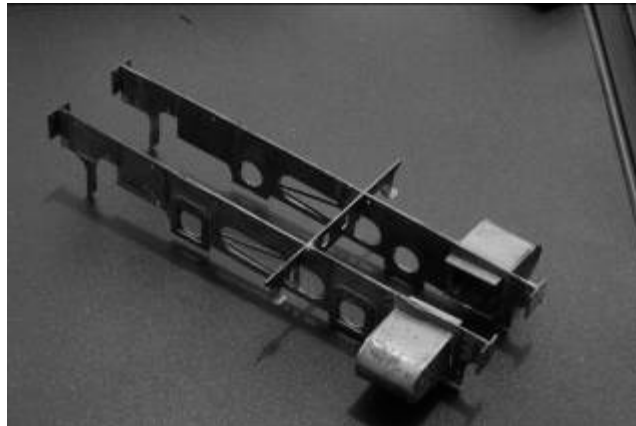


Chassis Spacing and Electrical isolation

The chassis is designed for split axle pickup and needs to be rigidly held together but remain electrical isolated at the same time

Remove the motion bracket from the etch and emboss the rivets on the motion bracket

Fit the motion bracket into the slots in the top of the side frames, the slots on the motion bracket are designed to be $1\frac{1}{2}$ times the thickness of the brass so they should fit tightly over the main frames, if the fit is too tight then use a little wet and dry sandpaper on the outer side of each slot only. Fit the motion bracket into the slots and check that it is flush with the top of the frame, rest it on a mirror tile and checked to see it does not rock over the bracket. If necessary cut the slots deeper with a fret saw or track saw. Be careful not to make the slots any wider.



Check the motion bracket is fitted the right way around, the half etched line in the centre of the bracket should be facing the front.

Frame spacer jigs have been provided in the waste etch around the fret these are designed to temporarily hold the frames parallel while the motion bracket and PCB spacers are soldered in place.

The slots are designed to be $1\frac{1}{2}$ times the thickness of the brass so they should fit tightly over the main frames, if the fit is too tight then use two pieces of waste etch and ease the slots. Fit them on the bottom of the frames beside each horn block detail.

Use two 3mm rods to ensure the bearings are aligned. I used 3mm drill shanks but old axles, brass rods or tubes will do fine as well.

Rest the chassis on its top side on a mirror tile, this will ensure that all the pieces are true and the finished chassis will not rock

Solder the motion bracket in place on the front side only

Tack solder the frame spacing jigs

Cut a 3mm long piece of the 0.4mm PCB spacer, solder it to the motion bracket through the holes provided and the other side to the side frames. Now give it a wash.



Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

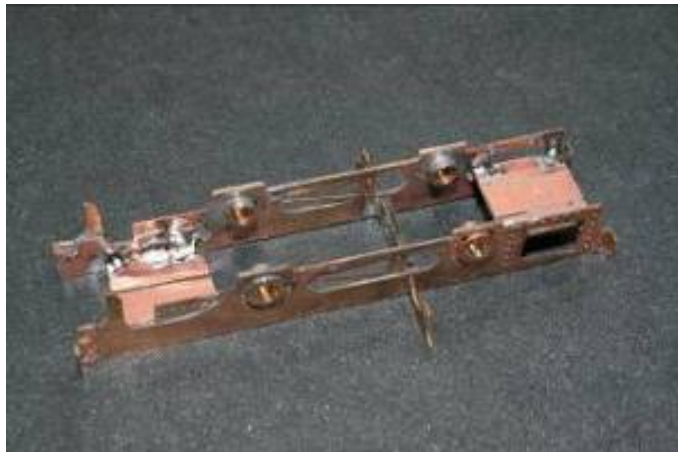
File the motion bracket in half along the half etched line, be sure to cut through the brass and the copper layers down to the fibreglass substrate of the PCB, repeat this on the other side of the PCB.

Make frame spacers from the strip of 0.8mm double sided PCB,

Sand the PCB to 12.5mm wide by rubbing the sides of the PCB over a sheet of wet and dry or along the length of a second cut file. Check the fit between the frames regularly to make sure you don't get it too narrow

Divide the copper into two equal strips, scribe a line, then with a triangle or knife, file carefully remove the layer of copper until the PCB fibreglass substrate shows through.

Position one 12mm long spacers just below the brake hanger holes under the cab 3mm from the end of the frame, solder in place. The second 12mm long spacer is positioned half way across the cylinder holes 0.3mm from the end of the frame. Use a piece waste etch to gauge this, it is not super critical but err on the short side as we can file it back later. Solder it in either end of the cylinder holes on both sides of the PCB. Now give it a wash



Remove the chassis spacing jigs by breaking the soldered joints.

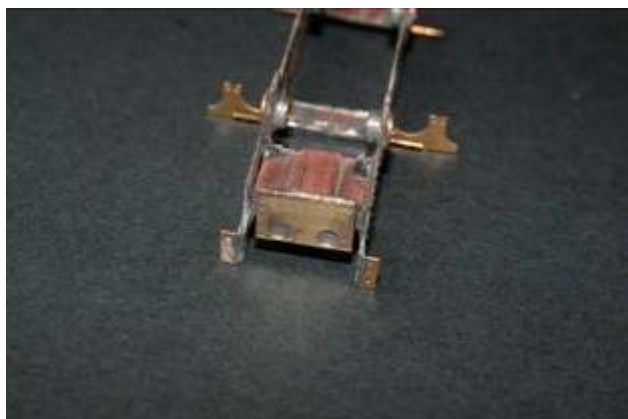
File the top hats flanges on the bearings back until they are flush with the horn block details. Check the back to back distance over the bearings this should be less than 14.2mm this measurement is essential for the clearance between the crankpin heads and the crosshead.

Cut the valve chest front (12) down to the top of the soldering holes, then punch the rivet/bolt heads and solder this to a piece of 0.4mm double sided PCB through the holes. Now give it a wash.

Cut and file the PCB until it is flush with the sides of the valve chest front.

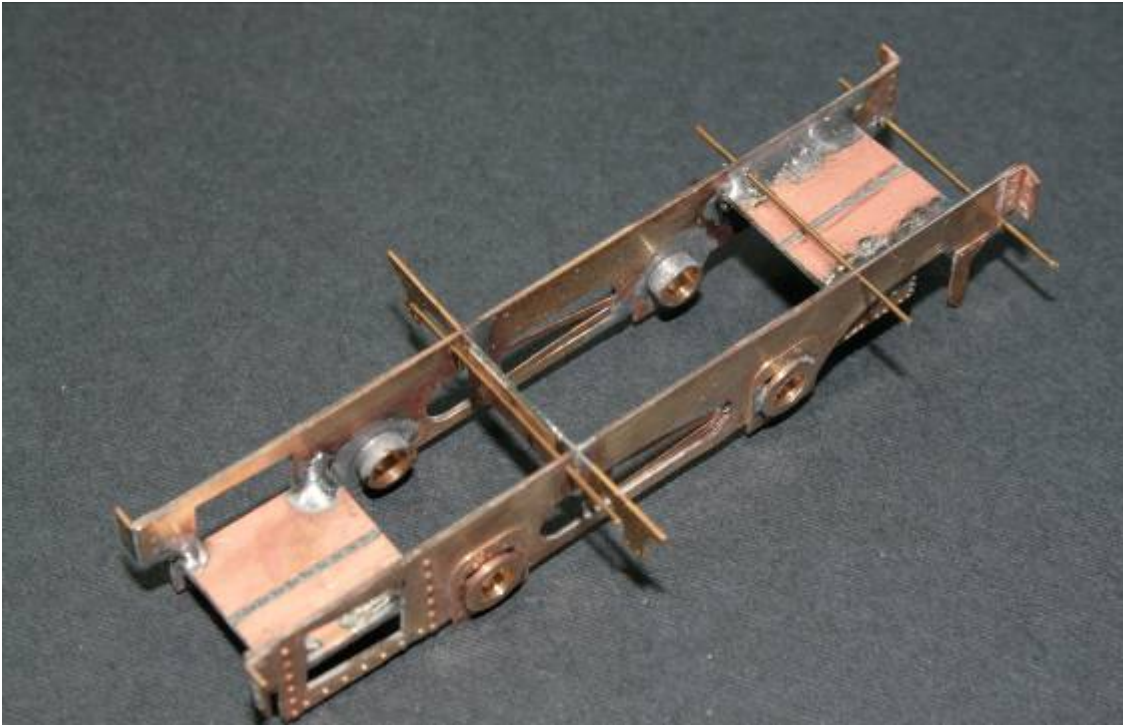
Divide the back of the PCB into 2 strips the same as the chassis

Place the whole assembly between the front of the frames, this should fit between the frames without the touching them and sits flush with the under side of the frames, then solder the PCB together at the back. Now give it a wash.

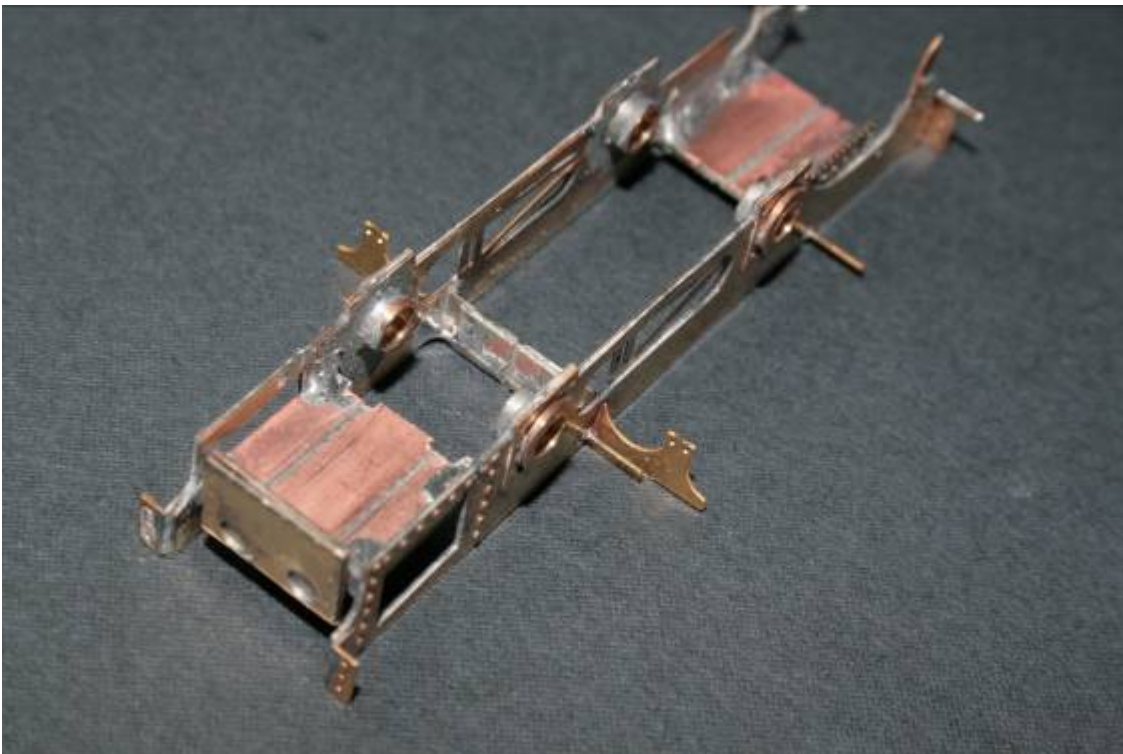


Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Now we can add the brake hanger pivots. Open out the 0.5mm holes with a broach or the tip of a round file to fit the 0.5mm wire. Place three lengths of wire through the two holes at the top of the frames and one through the hole at the cab end and leave a 5mm overhang out each side of the frame.



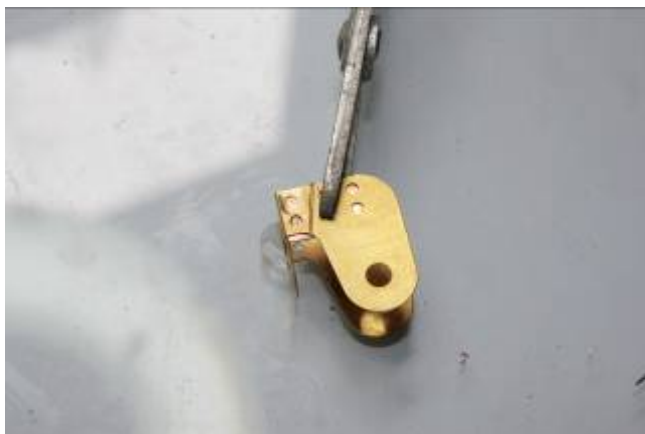
Solder the wires on the inside of the frame and across the PCB spacers then cut the wires to provide electrical isolation again. Now give it a wash. Check the electrical isolation.



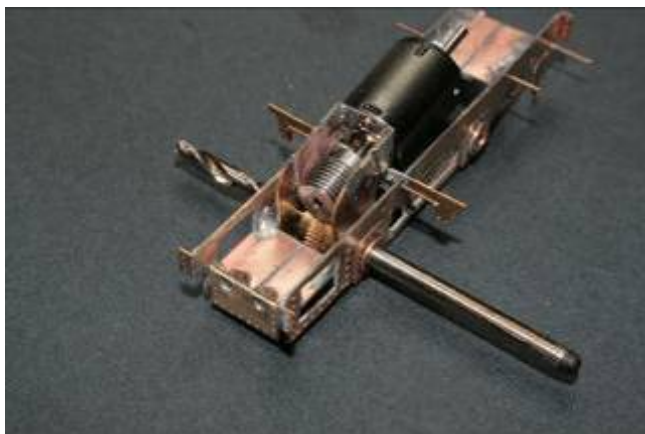
Gearbox

There are two motor mounts on the etch one for the fixed axle chassis design and a gearbox for the compensated chassis design. The gearbox requires a little extra work to make it work with the split axle pickup but can be used for both fixed and compensated chassis. It was originally designed to allow the installation of DCC sound in the loco as it allows the motor to drop a little and leaves room in the top of the boiler for the ESU Loksound Micro decoder. This is an awesome feature in a loco this tiny and sounds great.

Prepare the gearbox (48), fold the sides 90°, solder a 5x10mm piece of 0.4mm PCB on the inside at the top of both sides over the holes and now cut the brass and copper layers on the outside at the half etched line. Another fillet of solder can be added between the inside copper of the PCB and the motor mounting plate. Now give it a wash. Check for electrical isolation between all three parts.



Mount the motor in the gearbox, fit the worm to the motor shaft, using the shank of a 3mm drill or another axle fit the gear between the axle holes and check the meshing of the worm. Run electrically, the Romford gear set is noisy but you can run the worm with a little Brasso and oil to where it in check for noise the gear should purr quietly, All of this is necessary as once the motor is mounted and the gearbox is in place you can't get to the bottom motor mounting screw, so make sure you are happy before proceeding.

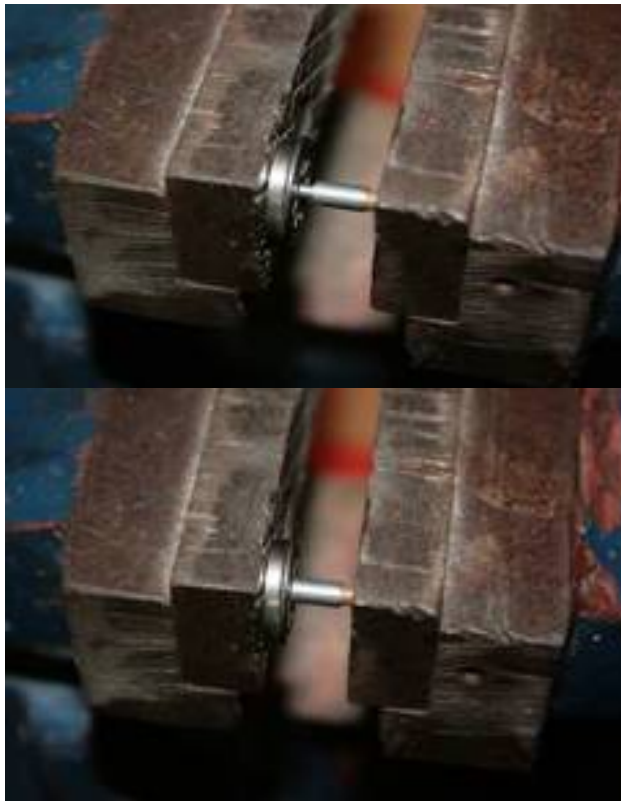


The gearbox can be mounted on either axle facing forward or backward. If you are building a compensated chassis and wish to make the axles/bearings/wheels removable then mount the gearbox on the rear axle.

Wheels, Axles and Gearing

The wheels are metal and designed to be a press fit onto the axles.

To insert the axles use a short length of K&S brass tube. 3/32 tube will fit into the female half of the axle and over the male half. This ensures the split axle is not damaged when it was forced into the wheel



Line up the wheel and half an axle in the jaws of your bench vice and squeeze the part together until the 2mm turned end is pressed home into the wheel

Check each half axle is free running in its bearing, the top hat bearings need to be eased

The wheels should spin freely given a flick.

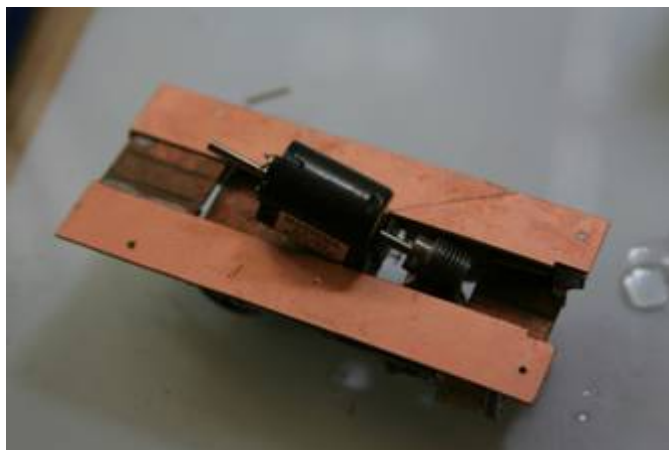
Fit a wheel to the end of each half axle, fit the isolating bush to the female axle, place the rear axle halves into the frames and press the male axle into the bush. Check the quartering. The right hand side should lead.

Place the axle halves into the frames, the gearbox (if used), the insulating washers and the gear, make sure the female half has the gear's grub screw and the gear is only on one half to the axle. The gear is wider than the separate parts of the axle, this has been allowed for by turning the grub screw end of the gear to 3mm ID and the opposite shoulder is 3.15mm ID for isolation. Add some nail polish or varnish to the inside of the gear for extra insurance.

Now you have the wheels, axles and gearbox mounted, check the rolling chassis by removing the worm or wiring up the motor and running electrically.

Motor mount (Fixed)

For a fixed axle chassis design you can use the fixed motor mount. To position the fixed motor mount you will need to add another PCB spacer just above the inside motion details. Make this spacer from 0.8mm PCB, divide one side into three equal pieces and remove a 1.0mm strip of copper from the edges of the other side only. Mount the motor onto the mounting bracket and adjust the angle to get the worm and the gear to mesh correctly, remove the bracket and motor and run a filet of solder along the bend. Now give it a wash.



Use the bracket to mark out the position of the mounting holes on the PCB and drill 2 1.5mm holes. Tap the holes in the motor bracket to 1.4mm and counter sink the holes in the under side of the PCB. Using a piece of waste PCB drill a 1.5mm hole and insert one 1.4mm screw through the PCB and into the motor mount then file off the extra length until the screw just protrudes through the brass, this screw is for the front mounting hole as the full length screw will hit the motor

Remount the motor and insert two 1.4mm screws through the PCB into the motor mount, check the gear meshing, oil and run.

Side Rods

The side rods are design to be laminated, with details of the locking wedges being filed out of the tabs and bolts made of 0.3mm wire.

Cut the tabs holding the rods (2) to the etch in the centre leaving half the tab on each rod, the outer tabs can be cut as long as possible

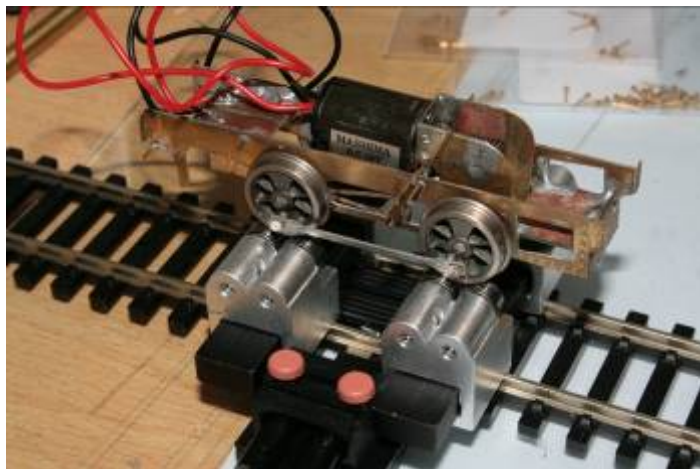
Make up a simple jig with a piece of MDF and two short lengths of the 1mm stainless rod provided. Cut two pieces of rod about 15mm long. Drill a 1mm hole into the MDF and insert a length of rod. Use the side rod to drill the second hole.

Laminate the pairs back to back, with the half etch lines on the inside facing each other to form holes.

With the rods soldered together file the cut tabs back to represent the wedges for holding the crankpin



Clear out the holes formed by the half etched lines to 0.3mm and pass a short length of 0.3mm wire through each hole. Add some flux to each wire and heat this should be enough to sweat solder the wire in place. Trim the wires back to represent bolts.



Open out the crankpin holes to fit the Northyard crankpins, these are 1.6mm in diameter. The best tool for this job is a cutting broach.

Test fit the rods to the wheels. Check the rolling chassis.

The crankpins on the front wheels need to be as close to the wheel as the rod will allow, and as supplied they stand proud by too much. Using a 1.6mm drill recess the crankpin holes in the wheels until the rod still moves freely but is almost locked by the crankpin. Do this in small bites and check the fit regularly. The lower the profile of this crankpin the more clearance you will have between it and the crosshead with less chance of these binding.

Remove the rods and put to one side while the brakes are added.

Brakes

Remove the brake hangers (26, 28), rods (24, 25), cranks (29) and shoes (45) from the etch.

Fold the brake shoes 180° so there is a pocket formed in the back of the brake shoe. Solder the shoe together



Open out the top mounting hole to 0.5mm and the bottom hole to 0.4mm.

Use a piece of 0.5mm wire through the brake shoe and the hanger, then use electronic solder with no extra liquid flux, solder the rod to the back of the brake shoe. By using the resin cored electronic solder the solder is less likely to flow into the joint allowing the shoe to pivot on the hanger. To make this job easier use the good old hole in the MDF block to hold the 0.5mm wire while soldering

Trim back the rod leaving a good blob of solder on the back and file the front down so it is just proud of the shoe

Repeat this of all the other hangers and brake shoes, but remember to make opposite pairs for each side, last thing you want is that big solder blob on the outside where it can be seen



Place the front hangers onto the 0.5mm pivots and align the shoe up against the wheel, now solder the front hangers to the pivots.

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions



Fold the brake rod (24) 180° and laminated the two halves, this forms a pocket at each end where the rods are mounted to the crank and hangers. Insert a 0.3mm wire through the rear hole and the short crank (29), then thread the crank onto the rear pivot and insert a second piece of 0.3mm wire through the front hole and the rear brake hanger. Solder the wire to the back of the brake rod with resin cored solder, trim the wire off the back and file the front side back to represent the pins

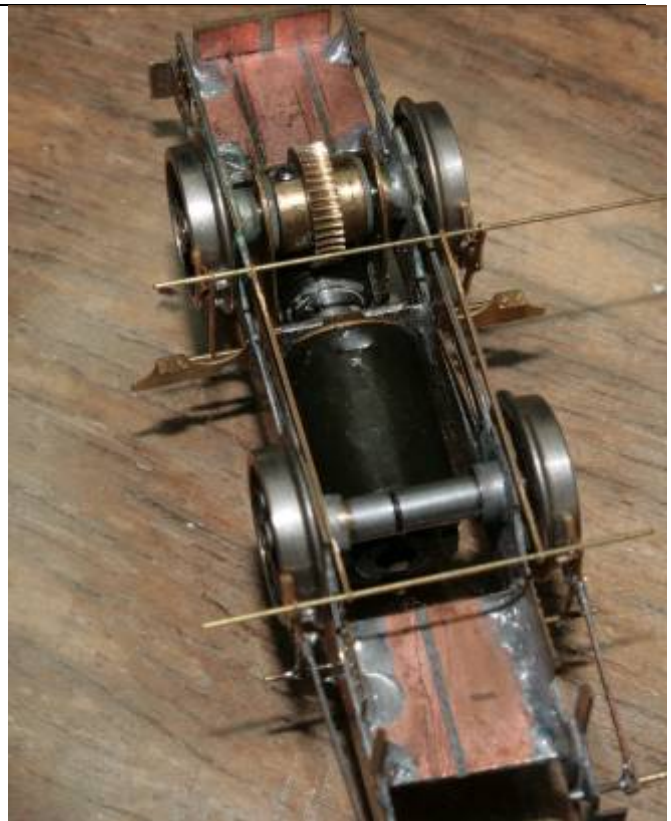
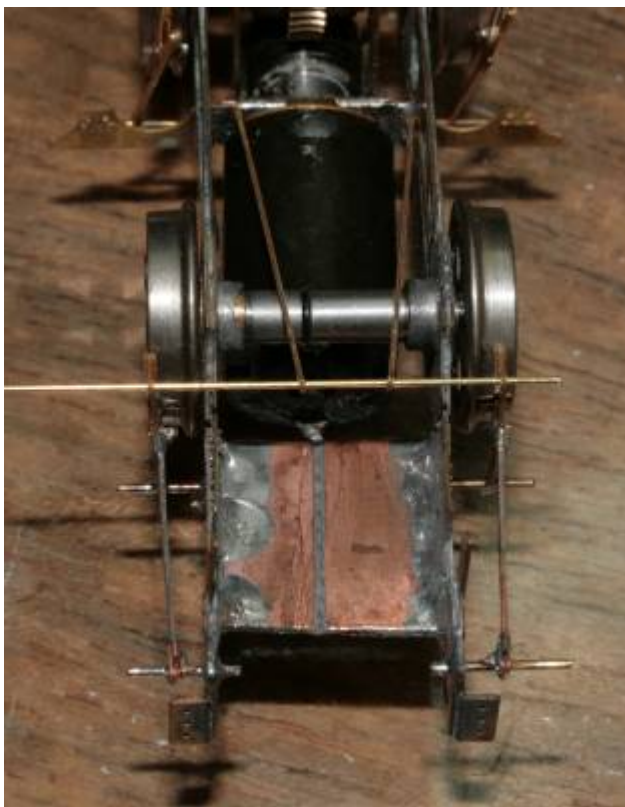
Check the travel on the rear crank before you solder the pin in place, use a jewellers saw to cut the rear pocket deeper and file the crank to allow it to fit between the supports



Place the rear hangers, brake rods and crank assembly onto the 0.5mm pivots and align the shoe up against the wheel

Check for clearance between the brake shoe and the wheel. Don't worry if the brakes are touching the wheels as the split axle design allows this to happen. Just ensure there is no drag. File back the inside of the shoe if there is

Now solder the hangers and cranks to the pivots



Take the long connecting rods and open out the holes to 0.45mm

Thread a length of 0.4mm wire through the rear brake hanger on one side then through each connecting rod then through the other brake hanger. Tack solder the rod to one hanger

Place the front hanger on their pivots and tread another length of 0.4mm rod through the hangers and the brake rods. Tack solder the front on one hanger. Line up the brake rods with the chassis just behind the wheels and solder in place. Line up all the hangers and solder in place.

Keep the solder to the rear of the joint and make sure you have a fairly descent amount of solder on the joint. Trim off the excess rods and file the outside back.

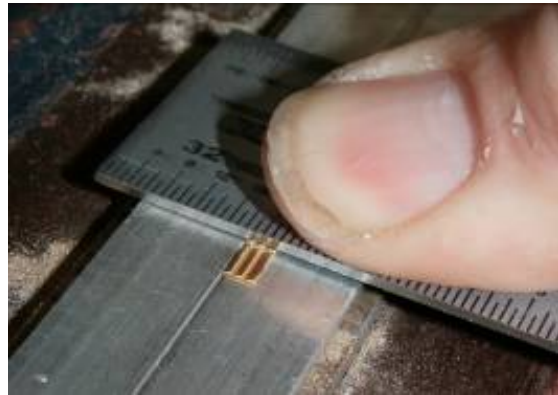
Trim off the pivots and operating rods back to the hanger. Leave about 1.0mm of rod outside the hanger

Cut the 0.4mm wire about 2.0mm inside the connecting rods to allow for electrical isolation.

Crossheads

The crosshead is a fairly complex looking set of folds but follow these easy steps and it goes together very nicely

The Crosshead is designed to fold into an I shape, the folding sequence is as follows:



The key to folding the crosshead is to get the centre folds at right angles.

Step 1: clamp the crosshead at the third line and fold to 90° hold it tight and press the fold flat

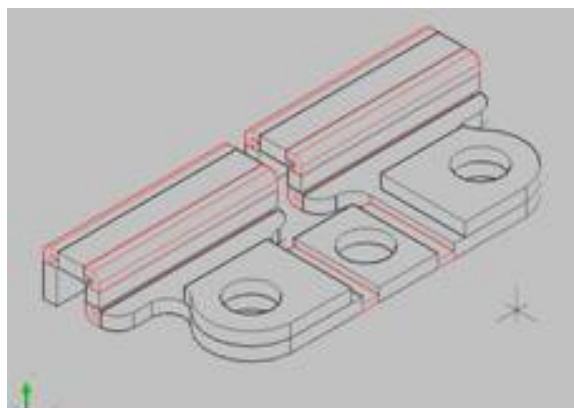


Step 2: Clamp the crosshead at the first fold against something thin, a 6" steel rule which is about 0.5mm thick is good, fold the next section up 90° while forcing into the first fold, don't be gentle, these folds need to be 90° opposite each other.

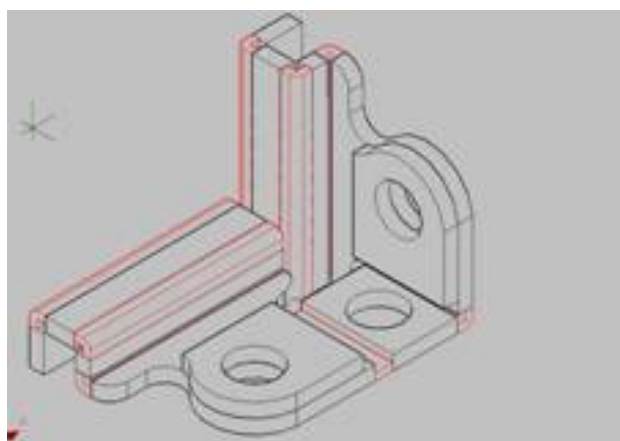


Step 3: Fold the top section down 90° to form the U section, by holding the top section at the fold line with pliers and using a steel rule to fold against, each section can be done separately. This does not need to be right down to 90° as it will get finished off in the final step

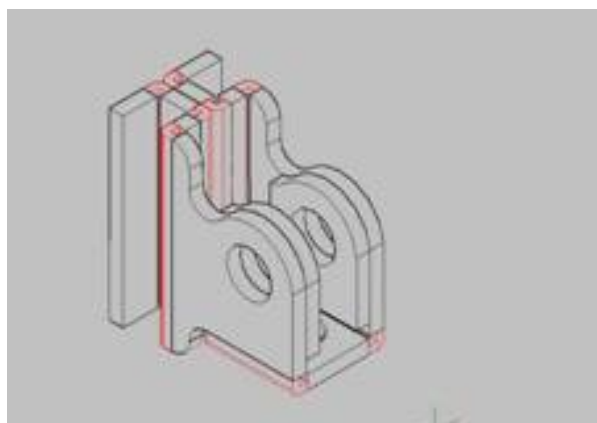
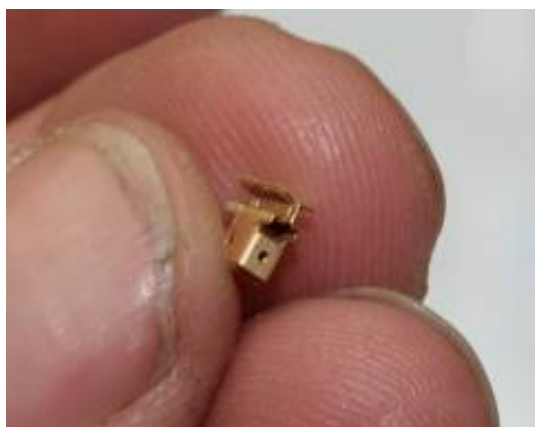
Then turn the whole piece over



Step 4 - Bend up the bottom sections with the hole to give a double thickness around the main rod connection bolt



Step 5 - Bend the sides up 90°, the 2 U sections should end up back to back forming the I section and the crosshead



Reinforce the whole crosshead with a little solder and then give it a wash.

Crosshead guides

Remove the crosshead guides (33) from the etch, fold the bottom of the bars over 180° and laminate them together.



Fold the mounting bracket down 90° and reinforce the fold with a good fillet of solder.



Clean up guides and test fit the crosshead, you will need to file both parts to get them to fit together. Make sure you file evenly along the whole length of the guides and also make sure the guides don't bend outwards. Check the fit regularly

Cylinder details

The cylinder details are basically scratch built. Take the 2.0mm tube and cut two lengths 9.5mm long. Using the 1.0mm stainless steel rod as a guide, thread a piece of the 2.0mm tube and two packing glands (11) onto the rod, then thread two short lengths of 0.3mm wire through the holes in the packing gland and about 2-3mm down the outside of the tube, this is not critical as you are going to file them back soon. Make a jig by drilling 1mm and 0.35mm holes into the MDF using the packing gland as a guide.



Solder all the brass parts together, use a little oil on the stainless steel rod, it should remain unsoldered and slide out of the tube. Now give it a wash

Cut the 0.3mm wires back to represent the gland packing bolts and file the wire back along the tube.

Now comes the tricky bit, slide the crosshead guide onto the tube and the crosshead into the tube, add a little oil to the 1.0mm rod of the crosshead to help make sure the solder won't take, align all the parts and solder the crosshead guide into position about 0.5mm behind the gland packing, be sure to do this quickly as you don't want to unsolder any of the other parts. Now give it a wash.



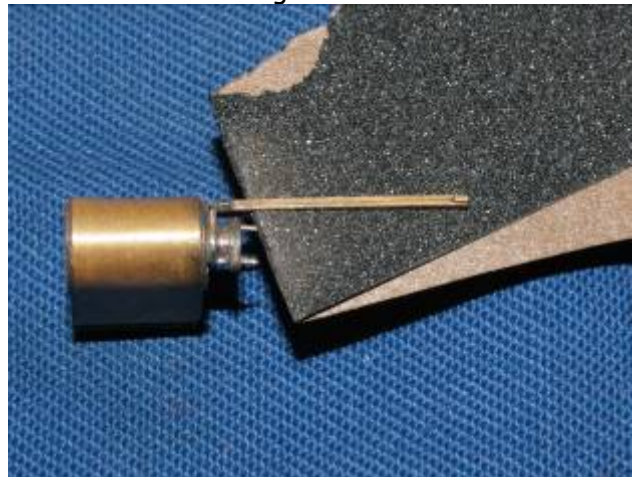
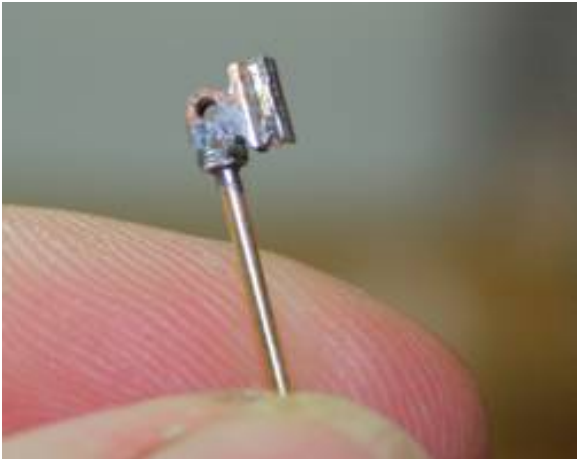
Remove the cylinders from the side frames. Insert the crosshead guide and crosshead assembly into the cylinder, the extra length on the crosshead rod should poke up the front of the cylinder. Hold the extra length in a MDF block to allow you to line thing up before soldering

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Align the top of the cylinder with the top of the crosshead guides and solder the tube into the cylinder on the inside of the cylinder. Now give it a wash.

Drill out the hole in the front of the crosshead to 1mm then cut a length of 1.0mm rod 50mm long, place two of the washers (15) onto the end of the rod and the rod into the 1.0mm hole in the front face of the crosshead, this should be a snug fit and the pieces should hold together, slide the washers up to the crosshead and check everything is aligned then solder the rod and washers to the crosshead. Now give it a wash.

Use the cylinder assembly as a jig to ensure the crosshead and rod are aligned



Extra detail can be added to the crosshead. The oil cup and the nuts on the top can be represented by short sections of brass rod. Clean up the whole assembly with files, sand paper and fibre glass brush

Use a piece of wet and dry sand paper to finish the inside of the cross guides and check that the crosshead slides in and out without binding

Ream out the piston hole to get a nice free motion

Clip the cylinder back into the side frames and check the crosshead guides line up with the motion bracket. Now mark the crosshead rod to cut it to length, push the rod into the cylinder as far as it will go and mark the rod where it comes out of the cylinder, then pull the crosshead out until it touches the motion bracket and mark the rod where it enters the cylinder, now remove the crosshead and cut the rod between the two marks



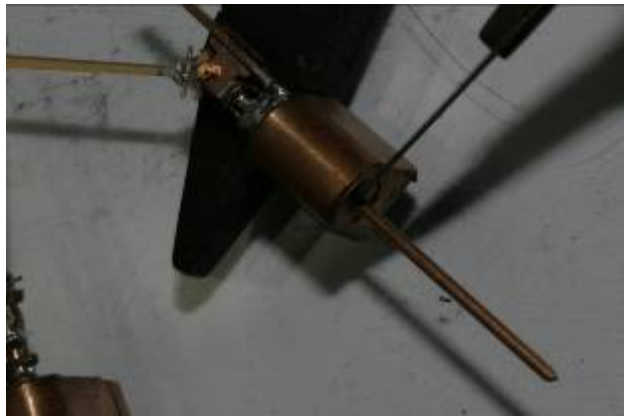
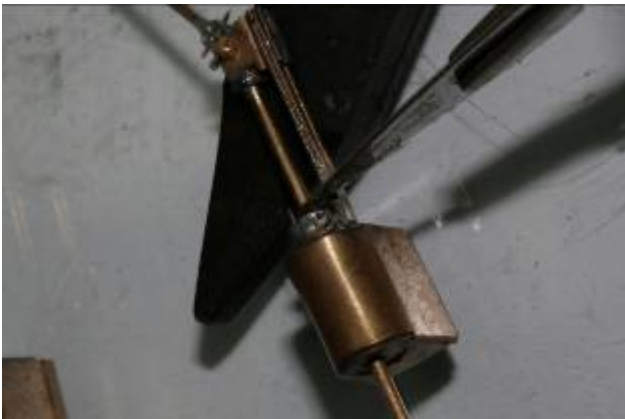
Connecting rods

The connecting rods (3) are put together exactly the same way as the side rods, once you have them laminated, the wires inserted, the wedges formed and the crankpin hole opened up, you can connect them to the crosshead and the rear driver.



Insert the 1.0mm simulated nut through the crosshead and the connecting rod. Solder the pin to the rear of the crosshead with electronic solder then file the soldered end back until it is almost flush with the crosshead

Repeat for the second crosshead but remember to make sure it is put together opposite



Cut the piston rod to length, mark the rod at both extremes of travel



Cut the piston rod to length between the two marks

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions



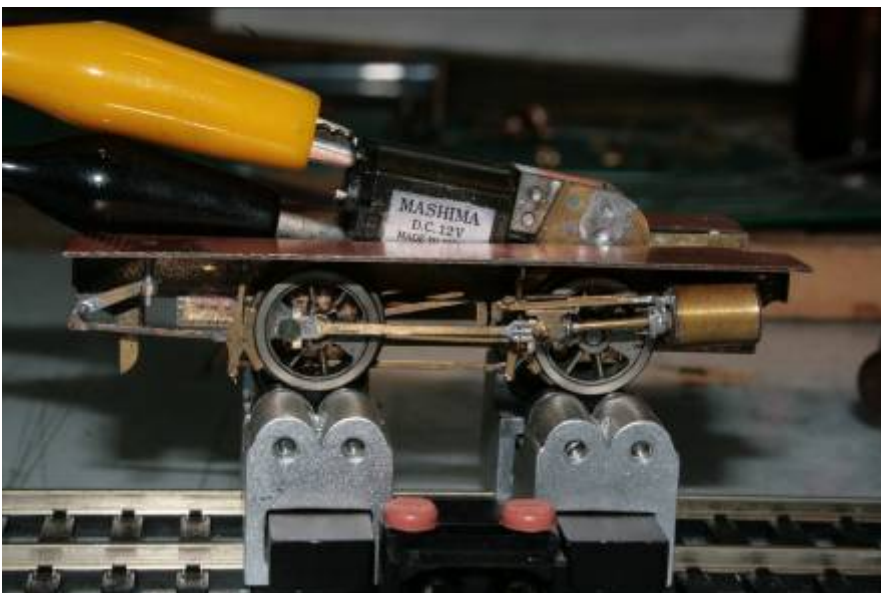
Using the off cut from the piston rod to represent the end cap.

Don't use too much solder as it will cover the detail and is hard to clean out.

Tin both the rod and the end with a little solder, insert the rod just into the end of the cylinder, then add flux and heat to finish. Cut and file the rod back. Clean off the solder and give it a wash



Insert the cylinders into the chassis bend the ends of the cylinder tabs out to retain the cylinder. Check the clearance between the crosshead and the crankpin.



Replace the side rods and mount the connecting rod on the rear crankpin. Check all the parts move freely and test run.

This about as far as you can go on the chassis until the body needs to be mounted.

Body work

Tanks

Remove the tanks (1a, 1b) from the etch, take care with the top and bottom folds as these are very thin and break very easily.



Form the rounded ends of the tanks by working them around the shank of a 5mm drill, the curve around the 5mm drill is a little tight so only go far enough to get the ends to meet. The mating ends are designed to interlace.



Gently fold up the top of the tank and check the radius of the curves on the ends. The edges of the sides, top and bottom have a half etched line that is designed to let the two face mate closely

Solder the mating ends together and adjust the tank to match the top, tack solder around the top then run a fillet the whole length of the join

Do not do anything with the bottom of the tank yet

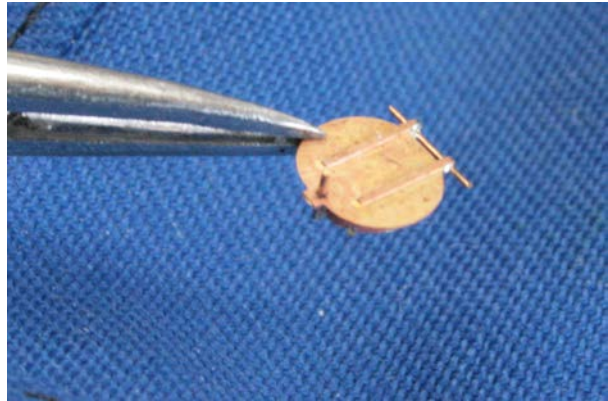
Remove the tank lids (4, 31) from the etch, you have a chose of two types, the early handle type and the later hinged type. Check your prototype and era information.



Cut a 2mm length of the 3/16 tube and solder it to the back of the lid

The handle type needs to have a handle loop formed from 0.3mm wire. The hinged type needs to have a knob added to the front using 0.4mm wire

The hinge is formed around the shank of a small drill or broach then pass the a piece of 0.3mm wire through and crimp it.



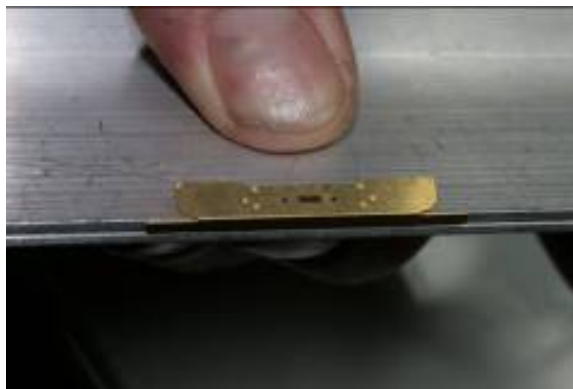
With the lid upside down position the hole in the top of the tank over it, be careful to check the lid is facing the right way, and then solder it on through the hole. Work quickly and brace the tanks and lid so nothing moves

Tin the edges of the bottom and sides then fold the bottom into place. Run a little solder around the outside of the join. Now give it a wash and clean off the excess solder with files and fibre glass brush



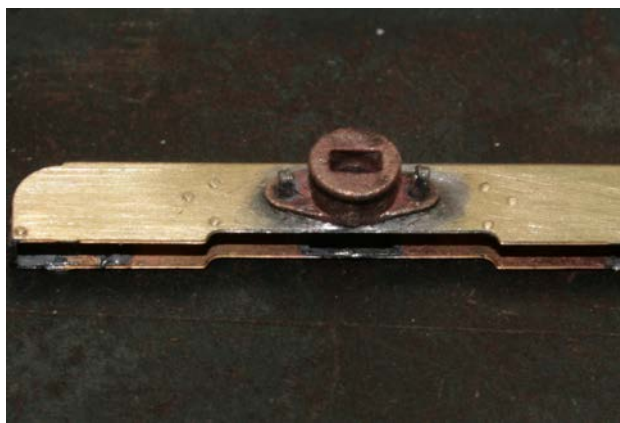
Headstocks and draft boxes

Remove the headstocks from the etch (38, 39) keep the tabs on the rear headstock as these are used to locate the headstock on the footplate. The headstocks are supposed to be wood, to represent this gouge a few lines into the outside surfaces. Punch the rivets on the headstocks then fold the front and back 90°, then using the curve on the ends as a guide roll the ends up.



Run a fillet of solder along the joins on the inside of the headstock. Clean up the solder and gouge in a few more wood lines

Remove the waste from the draft box front casting, clean up the back surface and tin with solder. Tin the headstock around the area where the casting is going to sit



Fold the side chain eyes (37) 180°, file the edges off the pegs until they fit into the holes in the headstock and insert one through each side of the casting and into the headstock then solder all the parts in place from the inside of the headstock. Now give it a wash



The headstocks are designed to fit either the MMW or NZF couplers, if you desire to fit another type then you will need to modify the headstocks to suit. The simplest means of mounting the coupler is to insert a short length of 1mm rod through the coupler mounting hole inside the headstock this will lock the coupler in but allow it to move around freely, alternately with the MMW coupler you can solder a 0.4mm wire into the slot in the coupler and use this to mount the coupler onto the body.

Cab front and sand box

The cab front is designed to fold up concertina style with the two half etched detail areas on the outside.

Remove the cab front (32), leave the tab at the front of the sand box lid to form the catch. Carefully fold the sand box lid 90° along the half etched edge, now coat both sides of the inner layer with a small amount of solder paste and carefully fold the outside front back 180° and the inside front forward 180° leaving the half etched details on the outside. Clamp the pieces and heat until they are soldered together.



Remove the pressure gauge (30) and fold 180° leaving the tab between the two halves to form the pipe union. Position the gauge in the centre of the base between the windows on the cab front and again with a small amount of solder paste sweat the gauge into place



Punch the rivet details on the roof brackets, now bend the roof brackets back 180° then form the roof brackets to shape using the roof bending jig as a guide, don't worry too much about getting this right at present. To form the angle iron edges of the cab, clean up the edges of the laminate and fold the side angles forward 90° to cover the laminated edge. Solder everything in place. Now give it a wash.

Carefully file off the bending tabs on the roof bracket with needle files and sand paper

Remove the sand box (19) fold the upper edge back 180° and flatten along its length. Punch the rivet details.



Fold the sides back 90°, be careful not to flatten the rivet details, hold the inside piece in a pair of long nose pliers right against the fold line and then gently eased the side up by flattening it on to the bench



Now you can put the sand box and the cab front together, the front should be a tight fit and stay where you position it, if it is loose gently squeeze the sand box sides together. File the sand box lid to fit the radius of the sand box sides.

Align the cab front with the rear row of rivets, the sand box sides and the cab side angles should line up to form a close butt joint. File the cab sides and square off the edge of the cab front angle to get the nice flush joint.

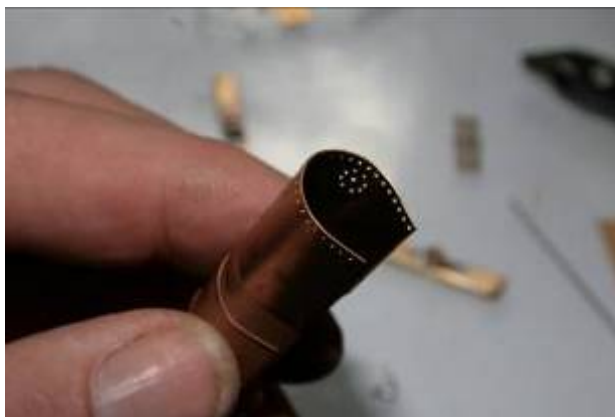
Once you are happy with the position of the cab front and the sand box lid solder around the inside of the sandbox and the front of the cab. Now give it a wash.

Boiler

The boiler has two etched through lines along each side these are designed to allow the boiler to wrap around to form a complete cylinder, this is really only an option for the 9mm version of this etch and the lines are a cutting guide for 1/64ths.



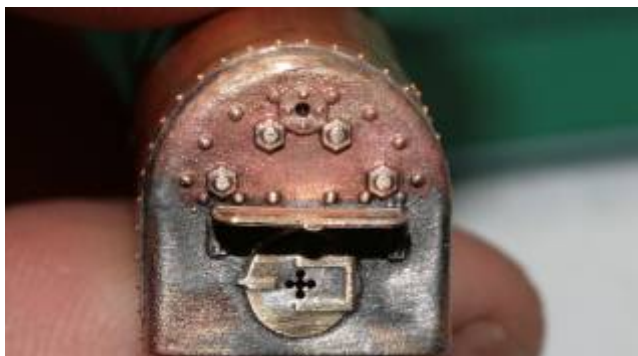
With a sharp knife cut along the guide line and remove the extra piece from each side of the boiler (5). Punch the rivet details along the back edge and around the washout plug. Progressively roll the boiler using a round bar then the shank then a 10mm drill to form the boiler into a "U" shape, check the shape by fitting into the cab front - sand box and onto the backhead



Give the step around the edge of the back head a good cleaning with files and sandpaper and then tin this with solder. Place the back head inside the rear of the boiler. This has been designed so the boiler wrapper sits into the step. Take care to get these two parts to fit cleanly then solder the back head in place from inside the boiler.

Solder the fire door (6) over the hole in the back head.

Take the fire box shelf (20) punch the rivets and fold the brackets 90° then solder this to the back head just below the line of rivets. Clean the bottom of the oil can and tin it, then solder the oil can to the shelf.





To form washout plate clamp (7) leave it attached to the fret and fold it 180° back on itself then solder it together. Clear the hole through the centre to 0.35mm, remove from the fret, then thread a short length of 0.3mm wire through the clamp and solder it in place. Place the washout plate clamp through the hole in the centre of the wash out plate. Solder it in place from the inside of the boiler



Clean up the steam valve casting, drill out the holes in the nuts to 0.5mm, insert 3 short lengths of 0.5mm wire and solder into each nut, enlarge the hole in the top of the boiler at the half etch location, bend the wire pipes to fit down either side of the boiler and solder in place.

Add valve handles (14) to the steam valves.



Floor/Footplate

The footplate is designed with two half etched areas where the side tanks are to be mounted. Tin this area and the bottom of the side tanks. Line up the side tanks over the half etch areas on the footplate turn over and tack solder the tank onto the footplate through the hole at one end. Check the alignment of the tank then sweat solder along the length. Repeat for the other side tank.

Place the sandbox cab front assembly between the tanks and through the tab slot. Tack solder in place at the tab slots.



Fold the springs up 90° behind the side tanks and reinforce the folds with a fillet of solder. Run a fillet of solder along the inside of the cab assembly.



Test fit the boiler by feeding it into the hole in the cab then letting it rest up between the side tanks. File the inside of the cab hole until the boiler fits up and the top is parallel to the side tanks

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Remove the smoke box front (17) and punch the rivet details along each side and on the head lamp bracket.

Clean up the smoke box door casting (B) with files and sand paper and tin the rear of the castings. Drill a 0.3mm hole through the centre of the door. Insert a piece of 0.3mm wire and solder in place from the inside. Take the door handles (13), thread over the wire and solder in place. Trim the wire back to form the spigot of the door handle.

Insert the door into the boiler front plate and solder it in place from the rear



Position this between the side tanks, it should line up with the step in the floor and the rib on the side tanks. Check for square and solder the smoke box front in place from the back.



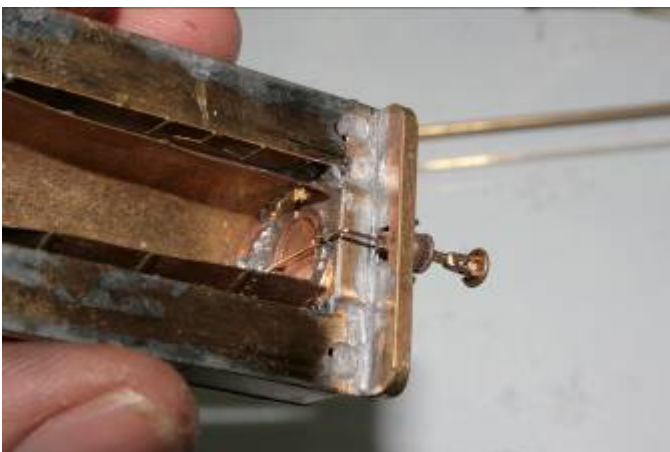
Position the boiler so it lines up with the outer edge of the smoke box front. Solder the boiler in place from the back of the smoke box front inside the boiler.

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Align the front headstock with the front of the floor, clamp in place and solder along the back of the headstock. Place the tabs on the rear headstock through the holes in the floor, this should line the headstock up with the indentations for the cab rear angles, solder in place.



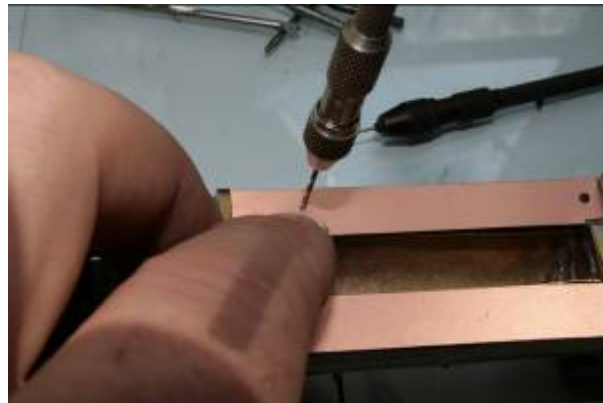
Remove the front plate (16) and from bends in both ends until the plate fits into the gap at the front of the footplate and into the front headstock. Once the shape fits correctly solder it in place from underneath. Give it a wash and file back the end until they are flush with the footplate.



A MMW coupler mounted on a piece of 0.5mm wire which is soldered into the slot in the coupler then soldered to the under side of the body

Body - chassis mounting

Now in order in line things up between the cab and the under frame we need to mount the body onto the chassis.



Measure the distance between the head stocks and cut a length of 0.4mm PCB to fit on each side of the floor under the side tanks. Cut to shape around the step at the front of the boiler. The PCB should be about 0.5mm back from the edge of the floor and leave a gap into the boiler big enough for the chassis to sit in but still rest on the PCB for the whole length of the frames. Decide where to drill the mounting holes with the chassis in place there is room in front of each cylinder and just behind the rear wheels, the screws to be used for this need to come through the floor inside the side tanks, mark the position and remove the chassis and PCB. Drill four holes at the positions marked and carefully counter sink each hole so the head of the screw is isolated form the copper. Make sure of this by removing a ring of copper around each hole. There are two sets of screws provided with the kit 1mm and 1.4mm decide which size you are going to use.



Reposition the PCB on the body and mark the hole positions on the underside of the floor, use a 1.0mm drill to do this by gently making a starting mark on the brass. Remove the PCB and drill four holes to be tapped at the marked positions, tap these holes to M1 or M1.4. Screw the PCB to the under side of the body and align the chassis so there is an equal gap between the headstock and the side frame brackets at each end.

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Tack solder the under frame to the PCB at one point and check the alignment before tacking in the opposite corner, then solder the frames to the PCB the whole way along. Fill the gap between the frame brackets and the headstock with pieces of waste PCB and file back around the bracket



Cab details

Insert two lengths of 0.3mm wire through the eye in the cab end of the side tanks and then through the hole in the floor. Solder the handle rail in place and file the hand rail flush with the under side of the floor.



Take the reversing lever bottom half (23) and thread it onto a short length of 0.5mm wire. Solder the lever to the wire, use a simple jig for this to ensure the wire remained square by drilling a 0.5mm hole into a piece of MDF, place the lever over the hole then thread the wire through the lever into the hole. Pass the wire into the lever pivot hole in the chassis side just behind the fire box on the left hand side. This should leave the free end resting on the mounting PCB. Solder this in place and then solder the wire into the chassis side. Trim off the extra wire.

Now give it a wash



Take the reversing lever (9), punch the rivet details at the handle and rack ends. Fold the lever 180° and solder it back to back, this should leave a rack on either side of the lever and a tiny flat on the bottom. Position the lever on the left hand side between the tank and the boiler, check with the bottom of the lever and align the two halves then solder the lever to the cab floor.



Take the hand brake operating arm (27) and the 14BA screw. From the pivot nut from the flat end of the operating arm by carefully wrapping it around the 14BA bolt. Check the length of the thread, it needs to be 90° to the PCB with the end of the operating arm on the short brake crank adjust as necessary and solder the thread to the mounting PCB.



Now guess the approximate position of the thread and drill a 1.0mm hole in the cab floor above this. Dismantle the body from the chassis. Mount the brake handle (G) into the hole and solder it in place from under the floor.

Mark's Model Works NZR 0-4-0 Dubs A Class Locomotive kit instructions

Form the steam regulator handle from a length of 0.5mm wire with a 90° bend in each end and solder this into the hole at the top of the back head from behind.

Or if you feel up to the challenge scratch build a regulator handle out of some waste etch



Here is my effort; I started with two 0.5mm holes at approximately the right distance apart. Cut around them to a ruff shape then attacked it with a file, added a couple of bits of 0.5mm wire and vela



If you want to install the cab mounted whistle, start by drilling a 0.55mm hole through the cab front between the windows

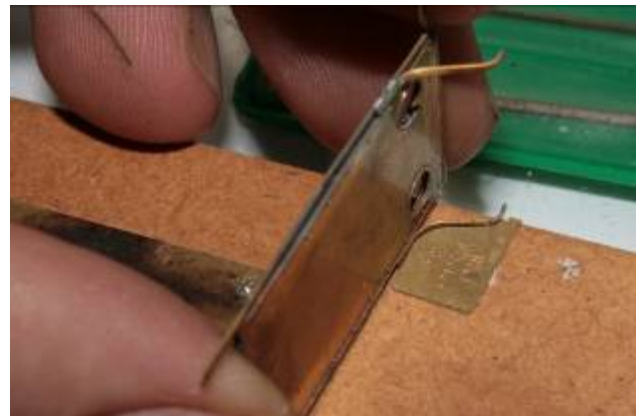
Form a piece of 0.5mm wire to fit into the top of the steam valves and through the cab front. Solder to the front on the inside of the cab. Leave the wire overly long on the front of the cab until you get to mount the whistle (this is completed after the roof is in place)



Cab rear

The cab rear folds up the same as the front did concertina style with the two half etched detail areas on the outside.

Remove the cab rear (22) punch the rivet details on the roof brackets and the angle irons. Coat both sides of the inner layer with a small amount of solder paste and carefully fold the outside front back 180° and the inside front forward 180° leaving the half etched details on the outside. Clamp the pieces and heat until they are soldered together.



The roof brackets need to be bent 180° back onto the side angles then shaped to the roof bending jig profile. It pays to solder these to the side angles now.

To form the angle iron edges of the cab, clean up the edges of the laminate and fold the side angles forward 90° to cover the laminated edge. Use a steel rule to ease the angle around.

Now give it a wash.



Carefully file off the bending tabs on the roof bracket with needle files and sand paper. Place the cab rear onto the back of the floor, the side angles should fit into the cut outs in the rear edge of the floor and sit flush on the rear headstock. Very lightly tin the areas of the headstock where the angles are and tin the back of the angles.



Tack solder the cab rear to the floor inside the cab and check that all the parts are aligned then tack the other side.

Check again all is square and sweat solder the angles to the headstock and then run the fillet along the cab floor join.

Now give it a wash.

Cab roof

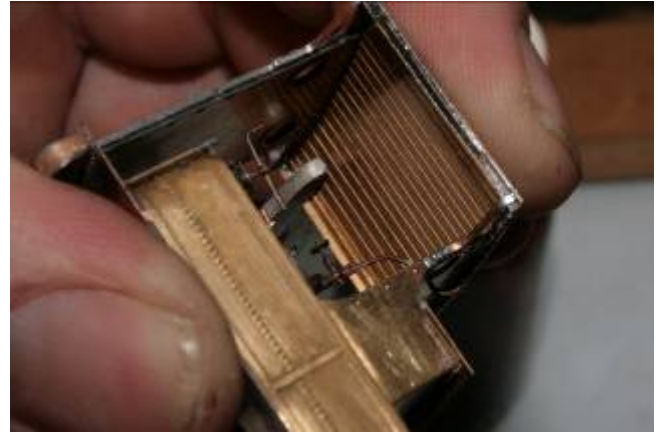
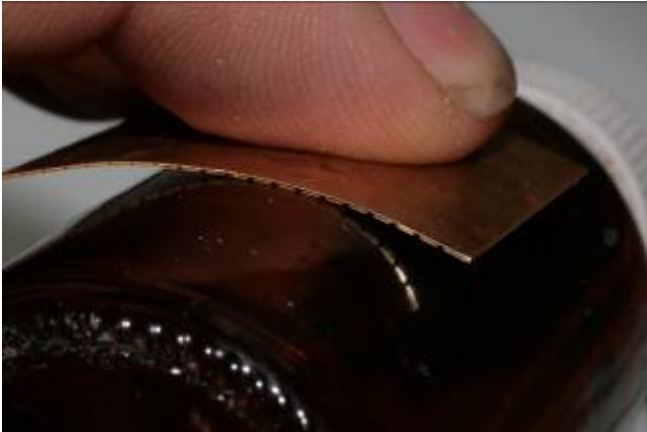
Take the roof frame (18) punch the rivet detail around the frame and fold the side angle irons 90°. Gently bend the roof frame around something round with your fingers and thumb until you get the right curvature for the frame to sit on the cab front and rear walls.



Solder the frame at the corners and make final adjustments to the roof brackets then solder the roof end in place to the side angle of the roof frame. Now give it a wash.



Gently bend the roof (34) until you get the correct fit on the roof frame. Now you need to decide if you want to add the window glazing now or later after painting, as once the roof is soldered on the glazing is trapped or make the roof removable by using 0.4mm wires to fit into the edges of the glazing slots.



Bend the whistle pipe around and check the length against the whistle casting. Trim the bottom of the whistle casting and drill a 0.55mm hole into it.



Trim the whistle pipe and check the fit of the whistle, the bracket should rest just under the roof. When you are happy with the fit clean and tin the whistle bracket then place in position and solder.



Take a length of 0.5mm wire and bend it to fit from the hand rail hole in the side angle to the hole in the floor. Check both sides are the same and solder in place.

Funnel and Dome

There are three funnels included in the kit and the choice is up to you, check your prototype and era. All three funnels have a common base flange which is designed to be joined to the upper funnel to make the final part. If you have access to a lathe then you can have the option of drilling and tapping the funnel tops so they can be interchangeable.



Before removing the funnel base flange from the sprue drill a 1.0mm hole through the centre and a 0.4mm hole in the edge of the flange for the smoke box oiler. Cut the feed web out of the underside of the flange. Clean up the funnel top casting with sand paper.

Clean up the mating surfaces of both parts of the funnel and butt solder them together, take care to line them up.

Carefully remove the waste from the oiler casting, using a fine half round needle file, remove the main feed line first and file the oiler body round as you go, then file away the two small feed lines on either side of the slide valve, then cut away from the main waste. This is a difficult job so take your time as this part is very fragile.



Insert the oiler into the 0.4mm hole and solder in place.



Enlarge the hole in the top of the smoke box and attach the funnel by soldering from the inside of the boiler. Tack solder through the hole and check alignment before soldering completely.

Note in the pictures I start with the dome first, not following my own instructions but it is for easier to align the funnel first and then ensure the dome aligns correctly with this.



Remove the waste from the steam dome and clean up the bottom surface and tin with solder. Using a fine needle file carefully file a small flat on the back of the dome just in the narrowest point and tin with solder.

Place the dome in position on the boiler and mark the edge. Remove the dome and drill two holes in the boiler between the marks and the top. Enlarge the holes to 3 or 4mm with a tapered reamer

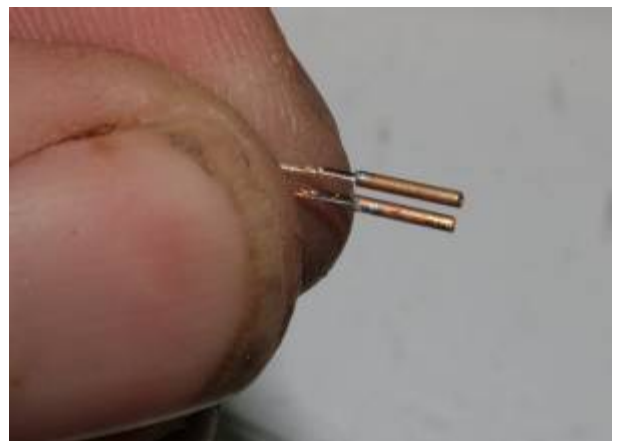
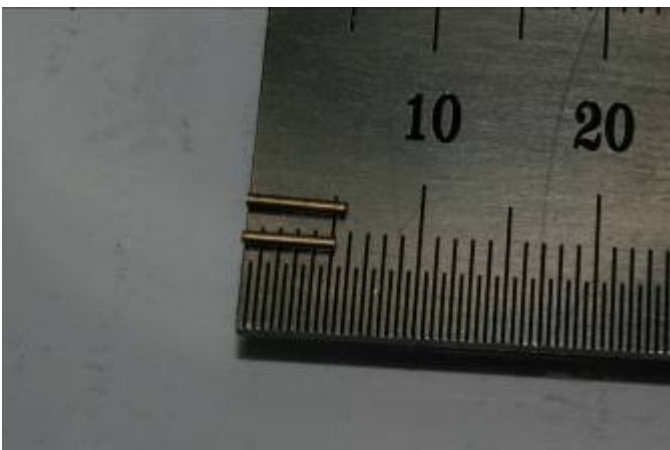
Position the dome onto the boiler, making sure it is aligned then tack solder through one hole inside the boiler. Check alignment again and if it is OK solder the other side through the hole

Pressure Relief valve

Take the pressure relief valve (52) and, solder it to the flat filed on the back of the dome earlier. Gently fold the levers out 90°. Then very carefully twist the ends of the pressure relief valve through 90°.



Take the relief spring bracket (53) and solder a 5mm length of 1/32nd tube to each end. Bend each tube end up 90°.

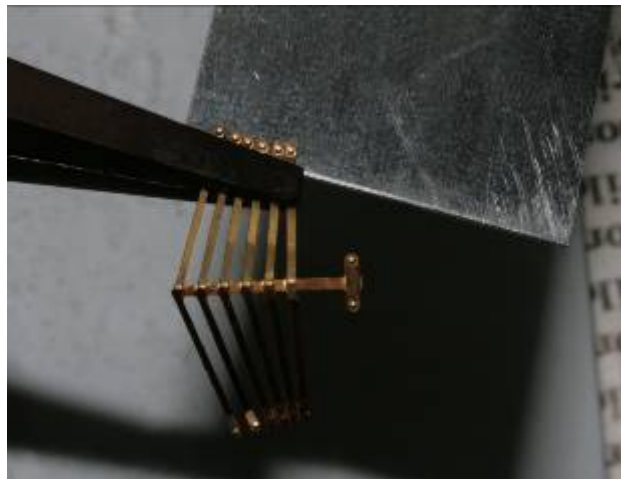
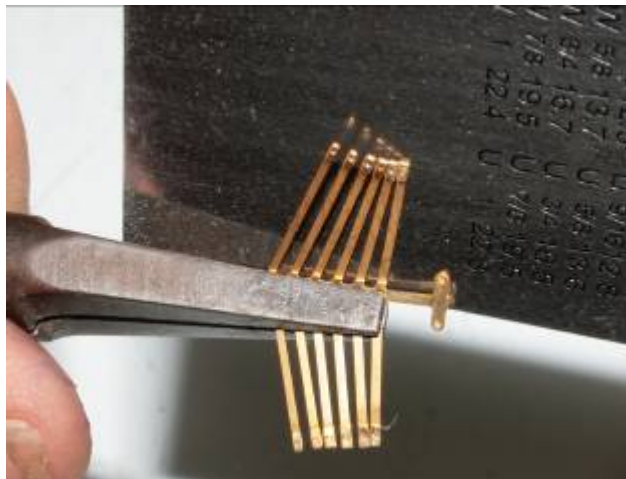


Insert short lengths of 0.3mm wire through each pressure relief arm and into the 1/32nd spring tube. Carefully solder all the parts together and solder to the boiler.



Cowcatcher

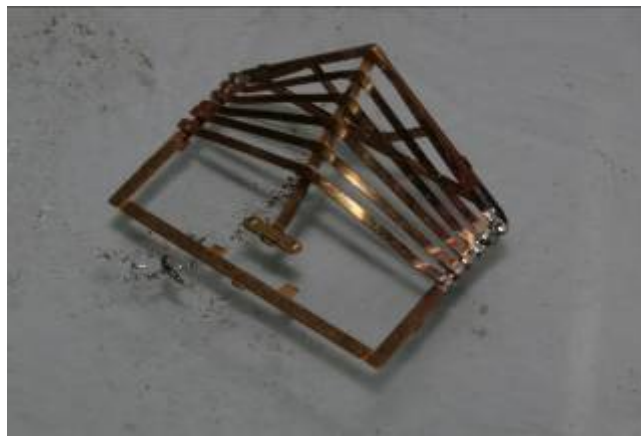
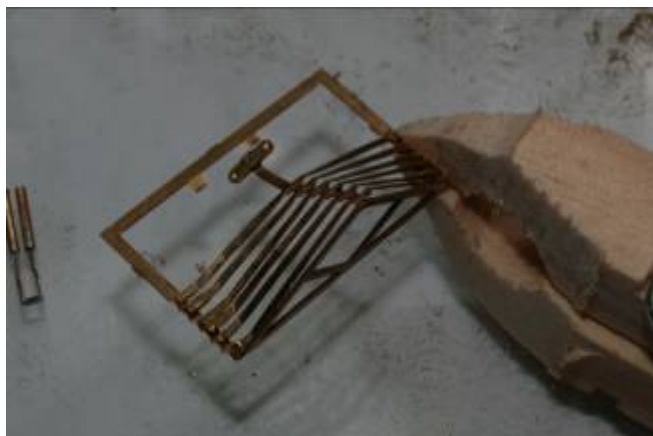
Parts for the cowcatcher have been provided if you wish to attach this, again it is up to you, your prototype and the era you are modelling, a lot of these A's went without cowcatchers.



The Cowcatcher is design in two parts, the outer bars and the frame. The outer bars should all be separate but due to the limitations of the etching process the first three bars will need cut apart with a very sharp knife.

Bend the outer bars to the shape of the frame at the bottom then each successive bar up is bent slightly less until the top has almost no bend at all.

Bend the end of the bars back so they rest flat



Fold the bottom of the frame up 90°.

Clamp the bars in place then solder to the front edge.

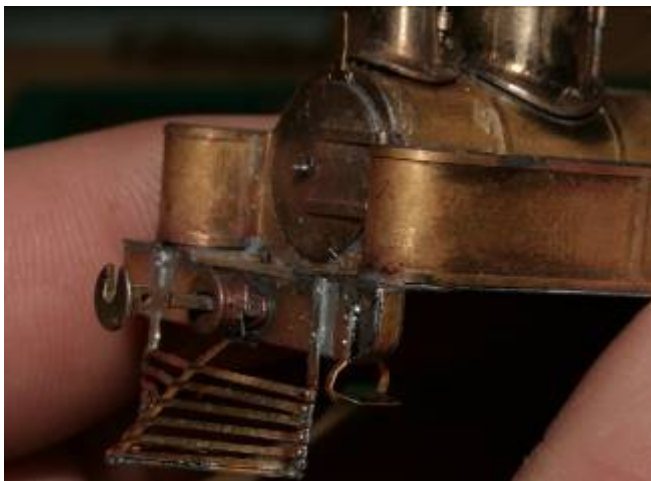
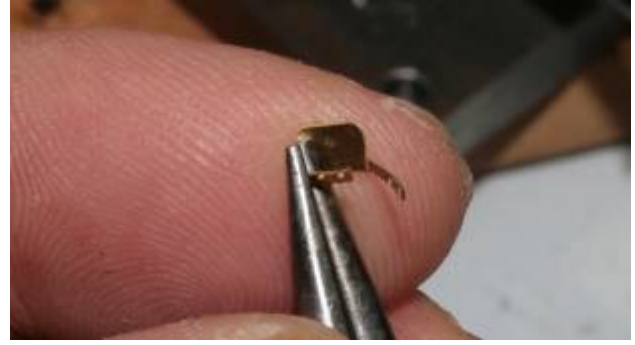
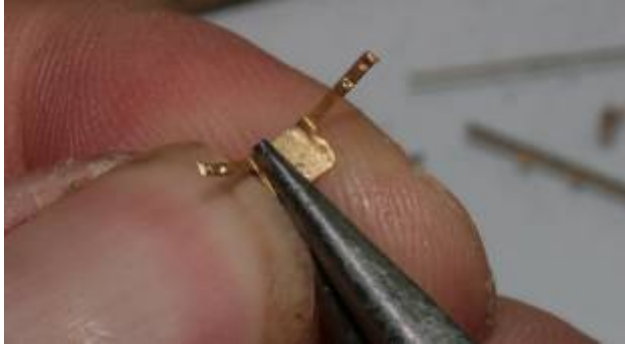
Align the ends of all the bars into the half etched sections in the sides of the frame and soldered in place

Remove the top bracing bar by cutting at the half etched lines. Tin the back of the frame, bend the centre bar under the headstock and solder in place. The rear catcher with need to be eased around the outside of the cab angles.

Steps

Steps were a feature most of the A's had fitted. Punch the rivet details on each step (8)

Use round nose pliers to bend to shape, check prototype photos for the shape.



Solder the steps either side of the headstocks front and rear.

Solder the lamps to the rear of the cab and the lamp bracket on the smoke box front.

The End

This kit should give you all the basics parts to finish a Dubs A with a high level of detail

I hope this kit has provided you with an enjoyable experience, an introduction to etched brass and scratch building. I also hope you are as please with your Dubs A as I am with mine