

the strap and solder it to the underside of the base plate. Repeat at the far end of the strip. Then the two pins on either side of the centre, and then alternate pins to the ends. Repeat with the side strips so that the plastic is held down to the roof by these pins. Cut away the projecting pins before you scratch yourself too extensively.

Completion

27. Now is the time to assemble all the bits. Start by fitting the buffer blocks using epoxy resin glue. Then fit the bogies using the M2 screw from underneath with the washers, described in instruction 6 above. I suggest that you use a touch of Loctite on the screw threads to prevent the screw from coming loose. Screw the this up to close it and then back off half a turn, to allow some rocking movement.
28. There is a danger that on sharp curves the wheel flanges may touch the chassis spine member. Following a suggestion I saw elsewhere, it would be a good idea to put a patch of superglue on the point where touching may occur. Selotape sounds good, but will dry out and fall off.
29. The van body can now be screwed to the chassis using the M2 screws and nuts provided. Put **all** the screws in loosely first and then tighten them up.
30. The brake should be made up from a length of wire with part 29 soldered to it, and 2 short lengths of wire soldered to the outer holes to act as handles. If you use offcuts from the pins, these can be driven into a piece of softwood using part 29 as a jig, and then holding the wire vertically while it is all soldered together. Trim off the handles to about 2.5mm, and the wire to leave a small boss. The brake rod may then be threaded through the brackets on the body and chassis to a point opposite the centre of the vehicle. A scrap of brass may then be formed to act as the brake lever from the centre of the vehicle (sorry nothing got etched for it, but as it is hidden all that is needed is to locate the bottom end of the wire.
31. I suggest that the roof be fixed in position with superglue.
32. Finally paint the van with an etch primer followed by a coat of red oxide paint. Transfers should be available soon, with numbers to suit the bogie van series.

I am indebted to David Churchill of the Darjeeling and Himalayan Railway Society for information and photographs of the prototype wagons.

MODEL RAILWAY DEVELOPMENTS

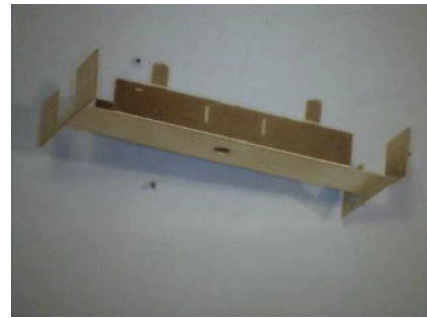
www.emardee.org.uk

19. The side ribs (**parts 15** – there are 16 of these, of which 6 are on the roof fret) are slotted in and the tabs bent over alternate ways for each pair. The same is done for the ends with parts 16. The end for **part 13A** has an angled slot on the side of the corner plate. **Part 17** goes over this and **part 18** which is doubled over goes through from the inside, with its ends opened out. The procedure is the same as in instruction 16 above.
20. On this end you will also find 2 holes for the brakesman's handrail. Bend up some brass wire and solder it though these holds for the handrail.
21. Press out the rivets around the edges of the doors (**part 19** – on the roof fret) and cut out and clean up the edges of the door dishes (**parts 20 and 21**). These should then have the edges bent over, using a rounded edge on a piece of softwood, so that the dish is formed, and the slots at the corners close up. The dishes should be closed up so that they fit the slots in the doors without the tabs being deformed. You might find it useful to complete the shape by gently squeezing the edges in a vice. Now you will see that the doors are handed, as are the dishes. The ones with a single slot about half way up the edge opposite the hinge fit on the left side of the van, whereas those with 2 slots fit on the right.
22. Solder the dishes from the inside and sparingly let the solder run around the outside edges. Add the door catch bracket (**part 22**) on the right hand doors through the slots on the left hand doors. Fold over the locking pin bracket (**part 18**) and solder from the inside.
23. Fold up staples from the brass wire to form the hinges of the doors (you will need 8), and solder these on the inside, with the door hinges threaded through on the outside. With the doors then adjusted for position. Solder the hinge strips against the top and bottom edges of the dishes.
24. Fit the vertical locking bars to the right hand doors and wrap the hasps (**part 23**) around the bars with the slots over the catch bracket. The tops of these bars should project about 1mm above the tops of the sides. A small off cut of wire can be used as a locking pin. If you wish to operate these locks, be careful as to where the solder goes!

Roof

25. Originally these vans had a roll top roof, but these rusted and the vans were covered with a corrugated sheeting, as provided for here. The spine and base plates (**parts 24,25 and 26**) are cut out, cleaned up and the baseplates folded with the edges downwards, and the ends turned up. The small lugs projecting out of the sides of part 25 should remain horizontal and locate with the locking bars of the doors. The spine has the side folded down and the tabs are slotted through the plates and turned over. With everything checked for fitting and aligned, the assembly is soldered up. The projections at the sides are folded up and over so as to land in the recesses of the top of the spine where they are soldered to provide ribs for the underside of the roof covering.
26. Now mix up a generous quantity of epoxy resin of the 24 hour type (original Araldite if possible – or at least the repositional type) and smear this along the spine and the side ribs. Position the corrugated plastic roofing over this, and using rubber bands to hold it position the central strap (**part 27**) and drill through the end hole so as to go through the spine and baseplate below. Use a 0.6mm drill. Push a brass pin through

12. Assemble parts 6 on either side of part 7, and then add parts 8 – do this before you fix them to the floor, or you won't get them in. You can fold over the end tabs of parts 6, but do not solder them. Now offer up the spine to the chassis plate and ease each of the tabs into the slots. Turn the assembly over onto a flat surface and bend the tabs over so as to hold everything tightly together.

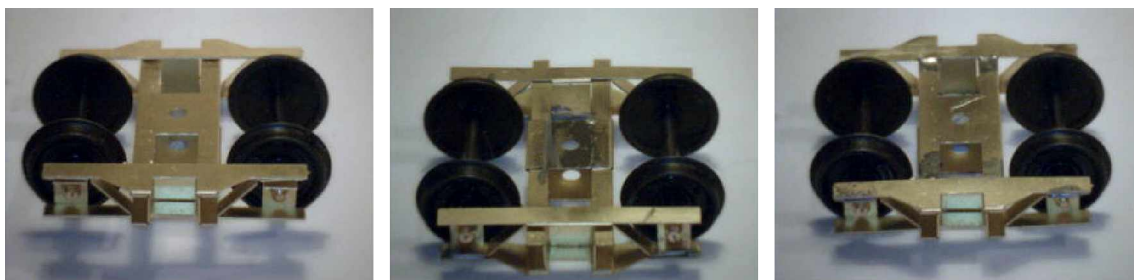


13. Now fold the sides down, work slowly backwards and forwards a little at a time ensuring a nice fit with the outer edges of parts 7 and 8 – you should see the rib slots line up. If not ease the spine assembly until they do line up. You can now fold the end plates in to complete the main chassis assembly.
14. Prepare the ribs – (**parts 9,10, and 11**) and working methodically set each in position with the tags through the slots and bend the tags over alternate ways, with the half etched bit on the inside of the bend. Note that all the ribs follow the same pattern, ie with the top tag to the left and the bottom to the right (or vice versa depending how you look at it). At this stage it is worth soldering the ribs from the back as they are easily bent if not soldered now, and the tags will not take too many adjustments before they fall off.
15. The brakesman's platform (**part 12**) slips through the slots at corner A of the chassis, and one tag is bent down, and the other left horizontal. There is only one of these (a spare is included on the fret).
16. On the same side of the chassis, beside the third rib from the right, there is an angled slot near the top. **Part 17** goes over this and **part 18** which is doubled over goes through from the inside, with its ends opened out. You can hold this together with a pin through the hole on the outside. Flux the assembly from within and remove the pin, press the assembly up tight with pincers and apply the solder from within. It should run through to hold the plate in position as well as the bracket. **Part 28**, the lower door locking plate has the long tabs folded to go through the 2 small holes near the top of the sides. If the doors are to open, you may file off the top of these, as that is the plate which stops the doors coming open.
17. Now check that the top of the chassis is still flat, turn it over and run the solder round all the edges of the spine assembly, but do not solder the tags on the top of the chassis. Instead you can break these tags off so as to leave a smooth surface to mount the main van body onto.

Van Body

18. By now you will be familiar with the boredom of pushing rivets through the etchings, but you should now do this again on the 2 side/end panels (**parts 13**). Then fold down the bottom flanges, and after cleaning up the edges of these and the floor (**part 14**) you should assemble the main body. This may be soldered up. The technique is to apply flux to each of the large holes in the flanges. Then holding the sides down firmly, apply a tinned soldering iron to each hole until you see the solder sucked away. Recharge the iron as you proceed, then remove the tabs from beneath the floor.

you should fit the short bogie pivot bolt, with a washer under the head, into the upper plate and run the nut onto it with the second washer under it.



Bogie assembled, and soldered underneath, on top and at the bearing plates.

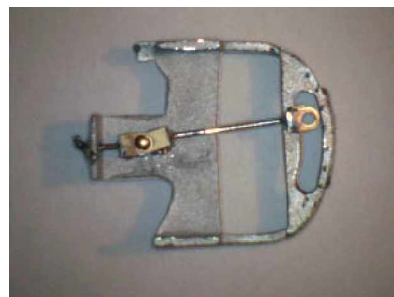
7. Fit the two halves of the bogie, and bend the two central tags around the centre of the bottom plate so as to secure it. Now check that the top plate lines up with the bottom plate, and switch on your soldering iron. Flux the two tags you have just folded over to lock the plates together on the underside, and also the top plates which folded over on top on each side. A well tinned iron will lock these joints to produce a rigid cross beam. Now ensure the straightness of the three layers that come together at the top of a bearing, flux and apply solder. Make sure that you use the minimum amount so that the three plates remain distinct at the edges – no blobs! Repeat on the other corners, checking that the bogie sits on its four wheels on a level surface. This is not as difficult as it may sound – you must just take it carefully and keep checking the alignment of the parts.
8. Now repeat on the other bogie. Give each bogie a good rinse and a touch of micro-oil on the inside of the bearings. The four cast axleboxes may be cleaned up if necessary and super-glued over the bearings, and the spring castings glued in the centre of each side. These castings should be trimmed at the top to ensure that they are slightly below the top plate of the bogie, and will not interfere with the chassis above.

Chassis

9. The chassis (**part 5**) is removed from the fret and the edges cleaned up. Now using a rather worn or blunted scribe, old school compasses or some other favourite implement start pushing the rivets through from the back. Use a backing of hardboard or mdf and work steadily making sure you don't miss out those on the ends (the ends are different as you will see).
10. On either side fold down the narrow flange square to the side panels, this is best done along the edge of the mdf in short sections. The ends of the chassis are folded so that on the four corners the extreme outside tabs are folded up, the main part is folded down and under through 180°. The central tab is also folded the same way so as to stiffen the opening over the coupling. The sides may also be part folded down at this stage, but as they have to wrap around the sides it is better not to complete this fold until the sides have been folded down.
11. **Parts 6,7, and 8** are prepared next. It is probably easier at this stage to solder a nut over the hole in parts 8 to take the bogie bolt. Use the minimum of solder so that it does not creep up into the threads of the nut – or use a stainless steel M2 bolt to hold the nut in place. Now fold up the ends of parts 7 and 8 so that the extreme outer edge will match the lower edge of the chassis side.

touch with a solder laden iron onto the pre-fluxed pin) cut the pin off and file down to a smooth neat joint.

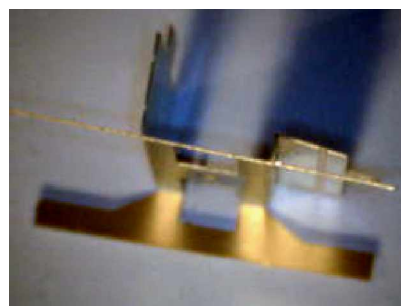
3. Drill the buffer casting with a hole of about 0.8 - 1mm dia, in the centre of the inner upright panel, and fit the coupling. You could add a short spring (a short length of old ballpoint pen spring) and with a washer, or offcut of brass to secure it behind the buffer casting. As before do not rely on solder alone, but bend the pin so as to form a mechanical anchorage.



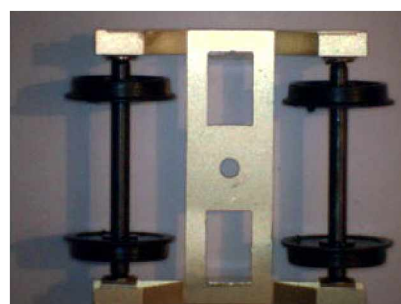
Bogies

4. The bogies are tackled next. This has been the most troublesome part of the kit to design. But hopefully you will not have too much trouble with the assembly. **Parts 3 and 4** are removed from the sheet, and the remains of the tabs are cleaned of with a file, or emery board. (This applies to all parts, but in this case the tabs to the inner rectangles in Part 3 must be removed to allow the spring backplate to fold through them).

5. **Part 3** is the upper part and needs careful folding. The end view in the photo shows the lower plate folded by about 90°, it has to fold through 180°, while that in the foreground is edge on. The sides are then folded through 90°, as on the left, and the next fold up is folded back in the reverse direction. The next stage is to finish the first fold by gently squeezing the metal with square ended pincers so as to make it the full 180° to represent the lower flange of the channel section. Now fold the upper flange 90° in the outward direction and finally the 2 short flanges down by 90°, although they will be turned over to lock the lower plate in due course. It only remains to complete the fold of the side members so that they lie flat across the top.



6. **Part 4**, the lower part has the outer edge folded back on itself by 180°, and the four axle bearing plates folded up on the inside, together with the spring backplate, which goes through the rectangular hole. The diagonals (as seen from the side) are folded up and the axle bearing plates have their top flange bent over a further 90° and the diagonals bent to seat onto them. Now comes the four handed tricky bit, insertion of the wheels. If you don't do this now then you will not be able to get these in later on. So to minimise what has to be held, I suggest that you glue the bearings in with super glue smeared onto the back of the flanges – you could solder them in with a touch of solder paste. With these in place twist the frame slightly so that you can insert the axles. At this point



Instructions for the Assembly of the DHR Bogie Van



Contents: 3 No. large etched brass sheets of 10 thou brass.
4 No. axles of 10mm dia disc wheels to 16.5 mm gauge
8 No. brass bearings
8 No axlebox castings
2 No. buffer block castings
40 No. brass lacemaker's pins
200mm 0.6 dia brass wire
Corrugated plastic roof
Safety chains and hooks

The kit provides a coupling based on that used by the DHR. This consists of a slotted link which is held by a removable pin to a short bar. This bar swivels beneath the wagon. The buffing block is made from a piece of steel channel curved around and fixed beneath the floor and behind the headstock. The channel has a rubbing plated riveted to the face and a curved slotted plate above to reinforce the channel. On the model, this assembly is now represented by a casting with fabricated links. If you wish to fit automatic couplers such as Kadee, then these should be fitted to the castings, at the appropriate height, and you should skip to paragraph 4 below.

Couplings

1. The first job is to make up the coupling and to fit it to the buffer casting. **Part 1** is folded up, without cutting the side strips off, and a brass pin is threaded through the centre holes. The pin should be bent at right angles before it is cut off at the second knuckle. It is suggested that the pin is bent after making the first fold, but that the second fold should then be made at each end before soldering. It is then locked with solder at both ends after which the side strips may be removed. Remember the whole train will be pulled through this link. The inner knuckle (**part 2**) is made up with another pin through the centre hole.
2. A further pin is passed vertically between the knuckles and is soldered to one knuckle. In order that the whole lot does not solder up solidly, slip a piece of paper between the parts of the joint and then push the pin through this. Whilst the 2 parts may be alternated, it is better to squeeze one end with pliers, or in the vice so that it fits between the other part. After soldering (a quick

