

Building Attock 49 foot carriage kits

Part 2: superstructure

DAVE CARTER continues his 4mm scale model...



Having completed the chassis in part one of the article (see *Magazine 247*) we now turn to construction of the bodywork. The prototype notes opposite provide useful background and operational details.

Detailing the sides and ends

Fit the 0.5mm brass wire pieces into the half etched grooves between the windows. They have to be 2.4mm long, and there are a lot of them so I made up a simple guillotine with a stop to chop them off (photo 1). Have a box to catch them as they fall. A smidge of solder cream in the groove will retain the wire until soldered. The instructions recommend use of an electric cooker hot plate; I used a Resistance Soldering Unit (RSU). This is a transformer which puts out low voltage, high current to a carbon rod probe. The return is via a second lead with a clip to grip the metal being soldered. As soon as the solder is seen to go silver, take your foot off the switch and keep the probe in place till the solder cools (photo 2).

Clamp the body side between a length of angle iron and a piece of 3/4" (19mm) dia. bar with the windows below the angle, hold this in the vice and with a solid straight edge, push the tumble home against the bar.

The drop lights (door windows) are next to be fitted, these have two small side tabs which are the two upper door hinges, and three tabs to hold the glazing in place (photo 3). The hinges are very short and have to bend out to the left hand side. To make the brass bend more easily, try annealing it, (posh word for getting the metal hot and letting it cool). I also bought a metal folding jig, which holds the hinges firmly and enables the drop light to be bent to 90°.

The hinges have to fit through two slots in the body side; this also locates the droplight correctly. Bend the three tabs 90° the other way. These parts may now be soldered to the inside of the body side, a good application for the RSU. Small etchings are provided to bend to 90° for the lower door hinge and these fit through the bottom slot and solder in place.

Door and grab handles come next, the etched grab handles seemed OK providing they are bent correctly. Again, before separating them from the main etch, hold them over a cigarette lighter flame to soften them, then a clean up with a glass fibre brush and bend the legs to 90°. One leg is slightly longer, this should be the lower one (sketch 1). These legs fit through slots in

the body and solder in place.

The door handles from the etched sheet are not very good so I have used machined brass items. Blacksmith Models, Eileen's Emporium and Wizard 51L all sell them. The handles should be in the correct closed position, horizontal. I made a simple jig to hold the handle horizontal and vertical to the body during the soldering process. If it was a one-off job I wouldn't bother but with sixteen on a full third a jig gives consistency.

The bottom flange stiffens the lower body side. The top edge of the side is only 0.012" brass and quite flimsy. To reinforce this area and avoid a wavy side I used a length of 1.5 x 2.0mm brass angle as a cantrail (sketch 2). On real carriages, the cantrail is where the roof joins the side. Above each door a hole locates the cast white metal ventilator casting - using the 1.5mm flange to the carriage side avoids these holes. Repeat for the other side.

Both ends are laminates with an inner and outer etching. One end has slots to accept the footsteps needed for access to the roof. Bend the steps at right angles and check they freely pass through the slots so both etches fit properly, and solder in place. The plain end has the emergency brake equipment. On the model, the horizontal operating rod fitting through the two lugs is 0.5mm brass wire. The emergency valve cover is made up from some 1.5mm square bar, slotted to fit over the horizontal rod, and drilled 0.55mm to take the branch pipe down to the vacuum brake pipe swan neck (sketch 3). This is also from 0.5mm brass wire. The ends of the operating rod, outside the lugs, were filed to half thickness and the nickel silver disc soldered in place horizontally (sketch 4). The discs were punched from 0.005" sheet. Tin the sheet first, before punching out; it's just not possible afterwards! At the opposite end is the gas lighting valve control rod, this is soldered centrally, just below the bottom step.

Assembling the body

The next stage is assembly of the body. As well as the two ends, I prefer to make a central partition from scrap 0.3mm brass. Make it the same width as the ends to fit below the cantrail angle, with the bottom corners radiused to match the tumblehome. The hardest part of accurate assembly is holding everything in place to solder up. Using a length of 1.0mm square nickel silver bar, bend part way round a 25

mm diameter bar to get a curve to match the tumblehome curve (sketch 5). Trim to length, hold in place with aluminium hair clips, and set in from the carriage end 0.3mm, (use the tail end of a vernier gauge) and solder the bar in place. This provides a stop for the coach end and reinforcement of the soldered joint. With the end fitted in place square to the side, CHECK, if all is well, tack solder in place. The central partition can also be fitted at this time to one side. Repeat with the other side, again, tack solder until everything is OK. Finally, solder the four corners properly.

The bottom flange of the body has eight tabs that should fit through eight slots in the chassis, they do not line up! The solution is to drill eight 1.3mm holes from the chassis into the bottom body flange. Clamp the body in place, centrally and drill one hole, fit a 12BA x 1/8" screw and nut. Repeat with the other seven holes. Carefully run solder round the nuts to fix them to the body flange, take care not to solder the screw as well! (A dirty steel screw usually resists solder). I did think that I could use the drilling jig to hold the body sides in place and fit the ends to the sides but the sides were too close together!

Give the body a clean up and wash before fitting the white metal ventilator castings above the doors with adhesive, I used Poly Zap. If you are feeling really keen, the casting could be filed to represent the air inlet at the ends.

Fitting the roof

Finally, to the roof, some kits have the main roof sheet pre-curved, in others it's flat. If yours is flat, the first job is annealing, it's very springy as supplied. This can be done either with a gas flame from a torch, or on the hotplate of a ceramic hob. To curve the roof, I used a sheet of hard rubber 1/8" thick on a hard surface with a solid bar 3/4" diameter. Place the sheet face down onto the rubber and use the bar like a rolling pin to form a curve in the roof sheet. I finished up standing on the bar! But the desired curve was obtained in the end. Because the roof is largely half etched from 0.012" sheet, the bulk of the roof is only 0.006" thick, (a beer can is 0.004") so there has to be some reinforcement to prevent distortion. Using the coach ends, I determined that the roof radius was 7' 3" or 29mm. Using 3mm x 1mm flat brass strip, I rolled two carlines to fit just within the ends. (Carlines are the arched parts that span from cantrail to cantrail, and support the roof).

A few notes about prototype carriages...

Carriage door locks

On the real thing, railway companies were rightly concerned about passengers falling out of their trains! The carriage door lock has two parts, a bolt and a plunger. If the door is properly closed, the plunger allows the bolt to fully enter the mortise and the handle will be in the horizontal position. If the door is not fully closed, the handle will be at the ten to four position. Platform staff were, and still are, instructed to observe trains leaving the station to ensure the safety of passengers.

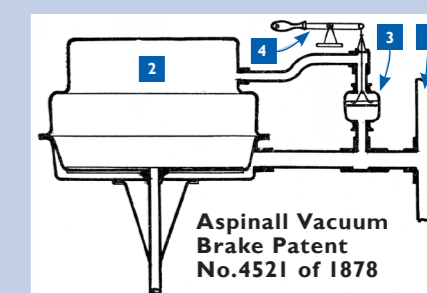
Braking systems

From the late 19th century Board of Trade braking requirements were that the brake must apply on all vehicles in the train and be operable by the driver, the guard and by passengers. It also had to operate automatically in the event of train division.

A length of cord outside the window did not meet these requirements, so a change was made to the familiar internal cord on both sides

of the carriage, fixed at one end and connected to a crank on a cross rod at the other end. Pulling the cord rotates the rod 90°. At the centre of the carriage end is a valve connected to the train pipe by a small pipe. This admits air to the vacuum train pipe and applies the brakes. Also on the rod is a disc, normally horizontal, which rotates to vertical when the cord has been pulled. This enables the guard to easily see in which carriage the communication cord had been pulled. The lines which used the far superior Westinghouse air brake had a similar system, except the valve lets air out of the system to apply the brakes.

Aspinall patented the arrangement which came into general use (No. 4521 of 1878) and an explanatory diagram is illustrated. The battle between the Westinghouse air brake and the vacuum brake was intense and, at times, bitter. Aspinall ended up in court successfully defending an alleged patent infringement in an action brought by George Westinghouse in 1883.



Train pipe 1 is connected directly to the bottom of brake cylinder 2 and via non-return valve 3 with the top of the cylinder. When a vacuum is formed in the train pipe it is also formed in the top and bottom of the cylinder. If the driver admits air to the train pipe it flows to the underside of the piston but is prevented by valve 3 from getting above the piston. The piston ascends and the brake is applied. When the vacuum is reformed the piston falls by gravity and releases the brake. If the engine is disconnected air enters the pipe and the brakes are applied. They can be released using handle 4 to open the non-return valve 3.

Two lengths of 1.5 x 2.5mm brass angle were cut to length to fit between the carlines and fit between the cantrails and soldered in place. At each step, check that everything fits.

I was quite pleased with progress so far, but, a steel rule showed a sag in the centre of the roof! Further inspection showed that the sides were trying to bow out; the roof was flatter in the centre. This was overcome by making three arc shaped pieces of 1/32" brass to fit over the centre and two between the centre and ends. At this point the roof was now perfectly formed and very rigid. Fitting these items needs some force to ensure that the roof sheet is in contact over the full arc (sketch 6 and photo 4).

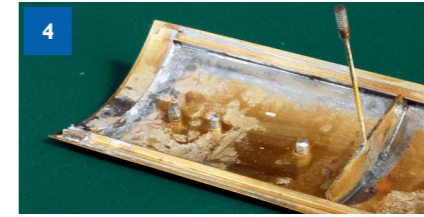
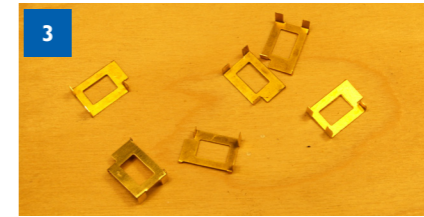
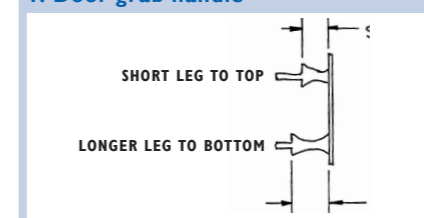
I prefer to make models in sub assemblies; this makes painting and fitting out easier. A length of 10 BA screw was drilled 0.8 mm and a length of 0.8 mm brass wire soldered in. The other end was soldered to the roof carline between the 2nd and 3rd compartments. Repeat between the 6th and 7th compartments. A 1.7mm hole was drilled to take the 10 BA rods, two nuts now hold the roof firmly in place.

Detailing the roof involved making and fitting the grab handles (to help lamp men up on to the roof). The cast whitmetal lamps were Araldited in place, and left to set. Either side of the gas lamps are two gas pipes, represented by 0.6mm dia. nickel silver wire, (which resists bending better than brass). The two pipes are angled at the ends and join each other. Clean the two wires between a piece of wet and dry, tin the underside and bend the angle. To solder two pieces together accurately, it's easier to draw out on card in pencil and tape down the two wires in place and solder the joints. This can now be laid onto the etched blocks (with a spot of solder cream) and using the RSU a dab on each support block ensures a quick, neat joint. The outer compartments (Smokers) have a torpedo type ventilator, the ones supplied have very thin shanks and were replaced with ABS cast whitmetal vents.

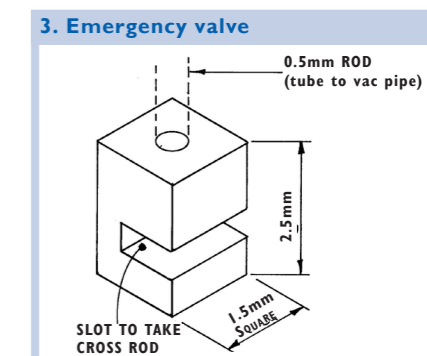
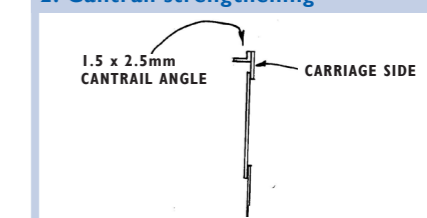
The coach is now ready for cleaning up and preparing for interior finishing and the paint shop which will form the final part of the article.

These kits were originally produced by Bill Brown for Micro Rail, Alan Gibson bought the range, and now David Geen sells them. They are now 28 years old and kit design has moved on but it still produces a reasonable model.

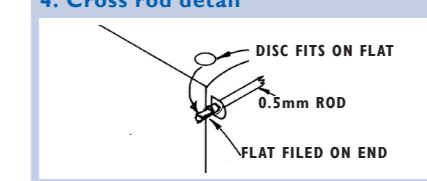
1. Door grab handle



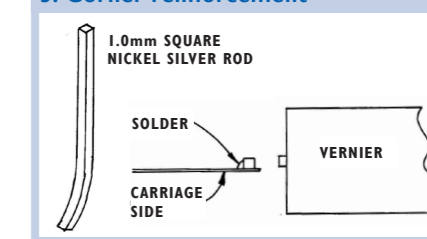
2. Cantrail strengthening



4. Cross rod detail



5. Corner reinforcement



6. Inner roof supports

