Etched Wagon Construction.

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At the last two Guildex shows at Telford and the recent spring event at Kettering there have been workshops run by the Technical Committee that have given the members to the opportunity to start their first steps in etched kit construction. These workshops used wagon kits as a simple and cheap entry.

All those who took part managed to get the basic parts of their wagons assembled but due to lack of time at the events did not complete them. Indeed I wonder if some of these wagons have further advanced.

Like the earlier article on plastic wagon construction this one takes the assembly of one of the etched wagon kits through to completion.

The wagon is the LNER Lowmac from the Connoisseur range. Chosen as I had one to add to my stock too.

The kit is supplied with comprehensive instructions. In some degree I am repeating these but with, perhaps, more illustration.

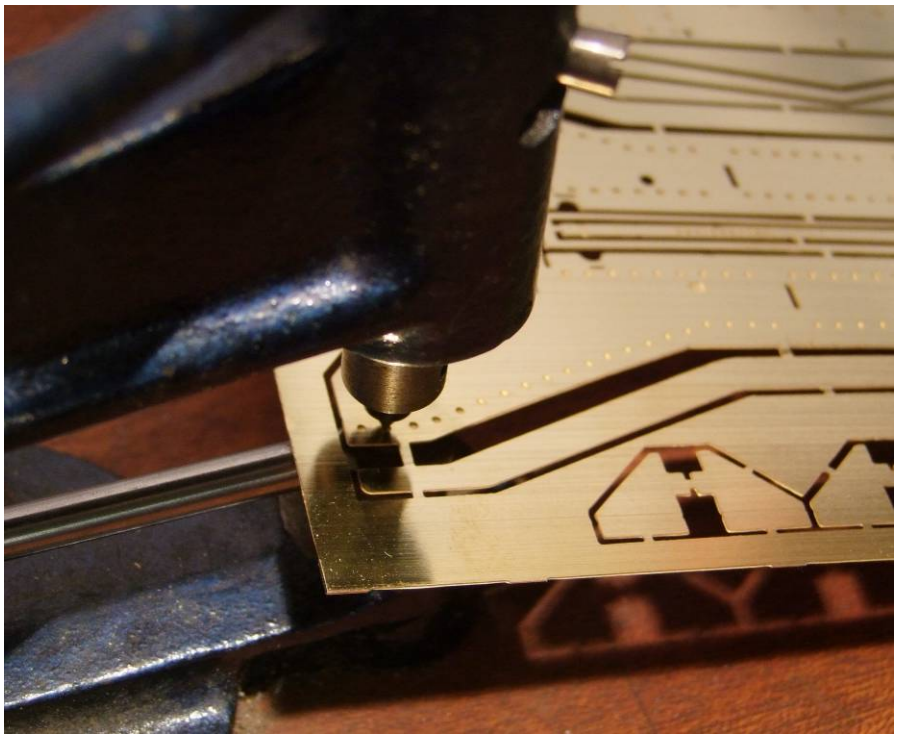
002

Take good a look at the parts and instructions to familiarise yourself with them.

The first job is to emboss all the rivet detail. This can be done, dependant on you tool, without removing any part from the main body of the etched sheet. Rivet positions are half etched dots so no guides on the tool are needed. I have a Leakey tool for embossing rivets. This I think is no longer available but similar lever action tools are available from other manufacturers. The alternative is what I call “a calibrated hammer”; this tool uses a drop weight to create a small blow to drive the tip into the etched sheet. Mine is homemade but again they can be purchased. Unlike the other tools you need a soft surface under the etch that metal can deform into. Sheet lead, several layers of heavyweight polythene or, as I have a small pad from a litho printing blanket are suitable backings for this tool.


008, 010

With press tool advance the work away from the anvil so that the embossed rivets are not squeezed and deformed by the anvil.

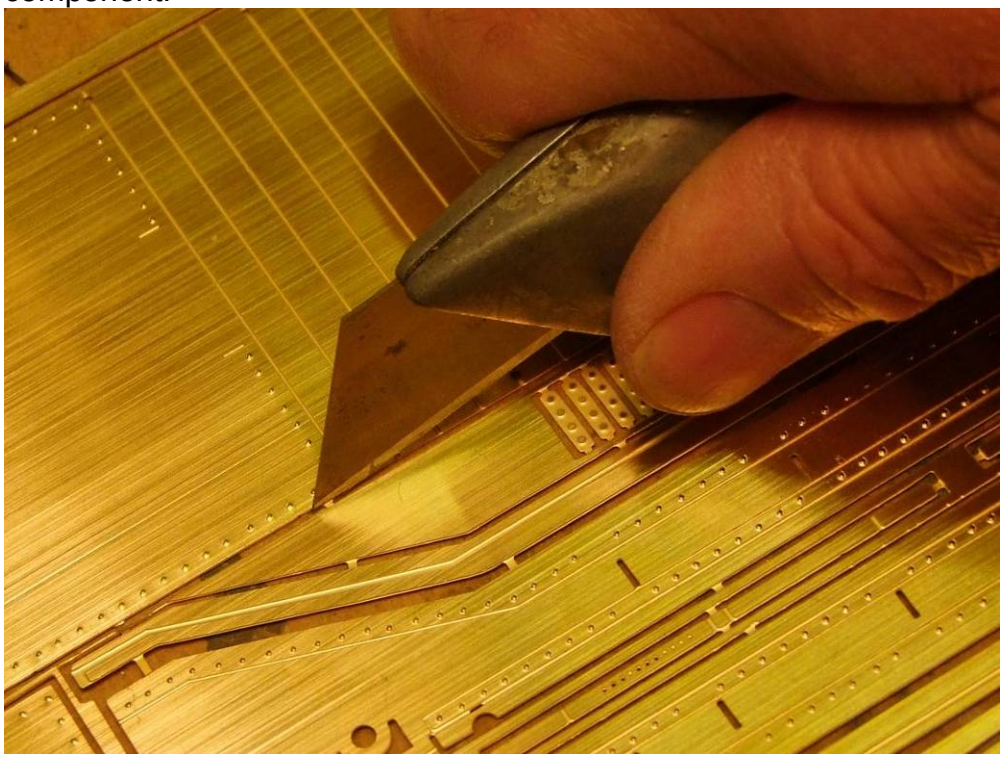


007

On long runs periodically check on the other side of the sheet that you have not missed a rivet in the run. The gap is usually obvious if you have.

Once the all the rivets are done the first component to be assemble can be removed from the fret. I usually use a Stanley knife to cut the small etched

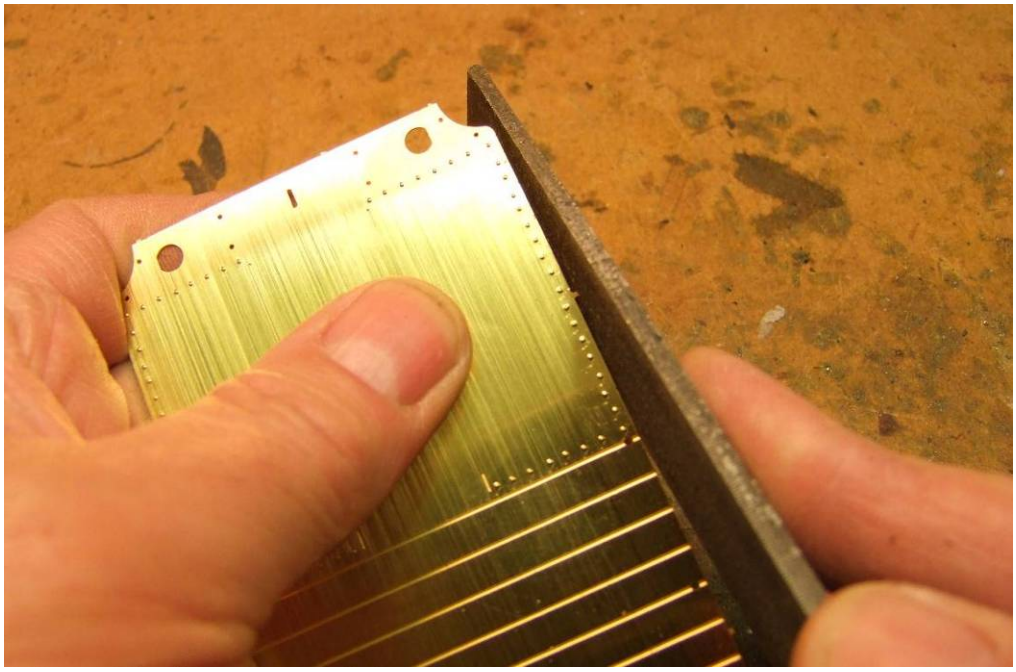
tabs. If the tab is half etched keep the half etch side upwards when cutting. This means there is a continuous surface underneath that is supported when cutting. If cut with the half etch downwards the tab is a bridge and will deform when cutting and the deformation can be carried into the edges of the component.



015

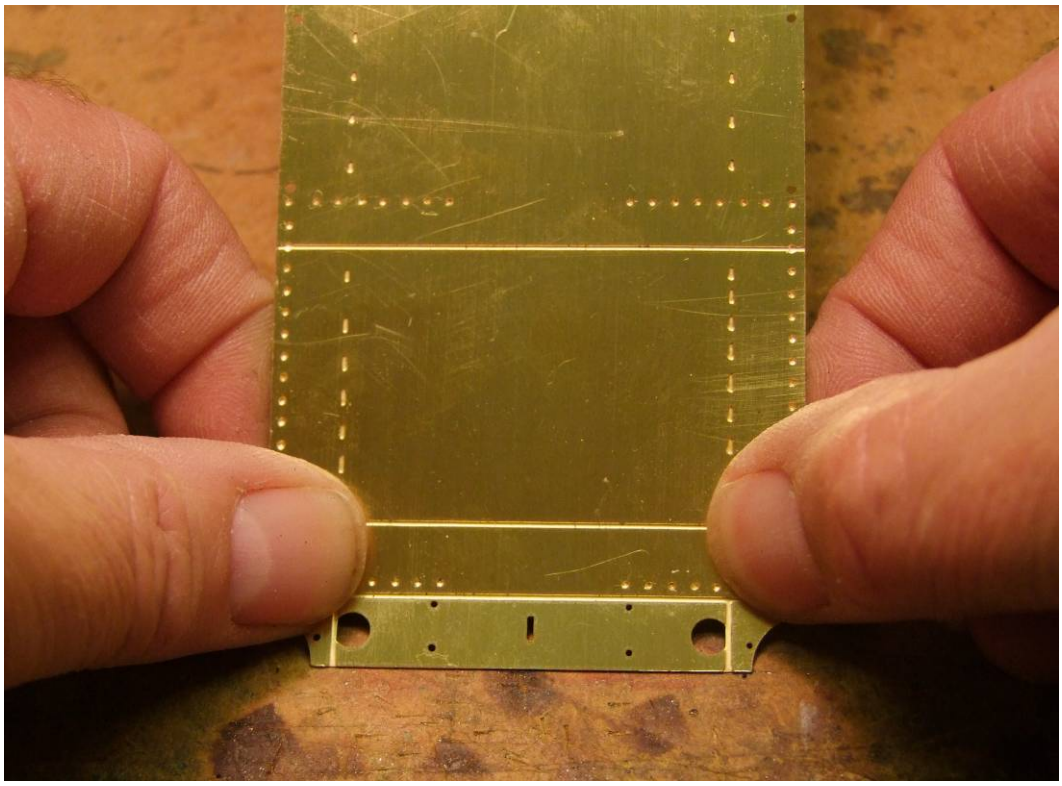
The edges of the component will need the tab registers cleaned off. I use a six inch smooth flat file with a safe edge* for cleaning up. Rather than filing across the edge I file along the edge. Once the tab has gone the surface supports the file and limits any danger of filing into the edge as would be likely with small Swiss file. Filing off the etch cusp on exposed edges is worthwhile too.

**The safe edge on the file has no teeth. This means when in a corner it only cuts one side, not both.*

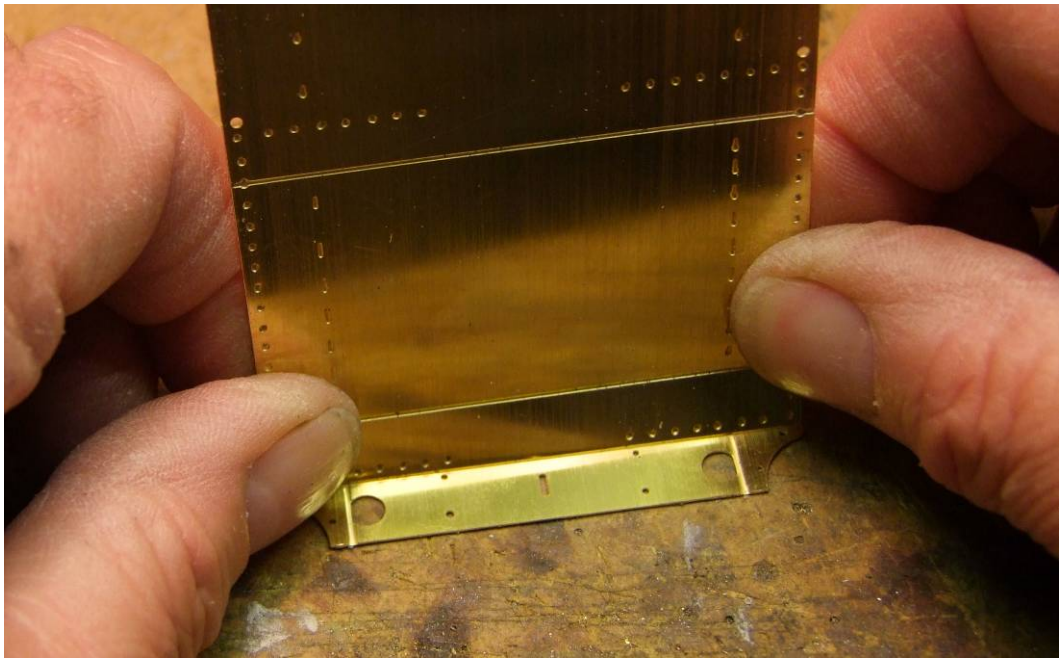


017

Once cleaned up the part has to be formed to shape; buffer beams bent down and the basic floor profile matched to the sides. The first bend is to for the buffer beam as this has to go through 90°. It is easier to achieve this first with the floor not yet bent to profile. Support the part above the bend and press down onto a flat surface to push the end around. Once the bend has started it will move easily.

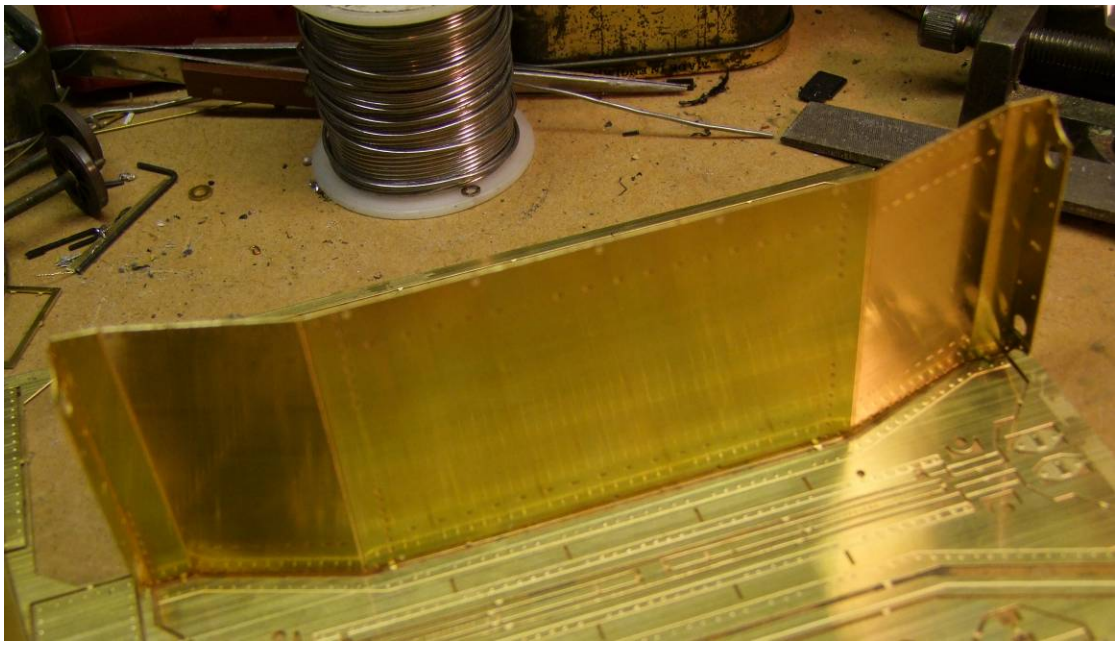


019



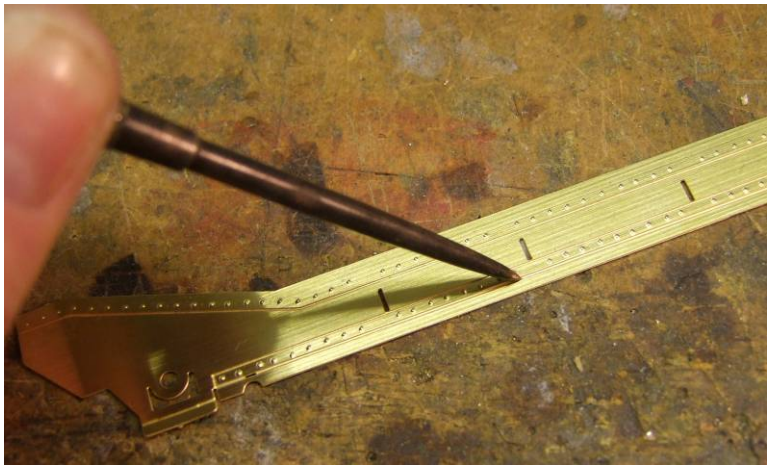
020

On this part there are three bends at each end; buffer beam and each end of the slope. The convention is that a half etched line usually folds with etch line inside. This true for the first two folds but the third one where the floor returns to horizontal uses the half etch line on the outside of the bend. As the bend is small this is not a problem. Had it been a bend of 90° then there is potential for the metal to crack. One this part there is further complications of half etch lines representing joints between planks. Care has to be taken that they do not become bend lines.



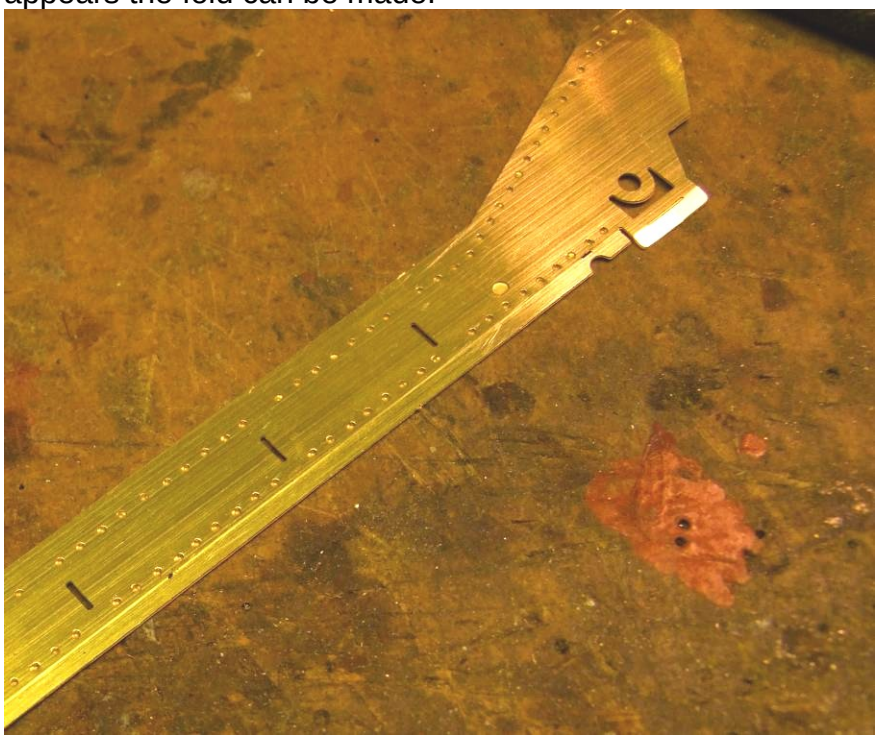
023

The profile has to be checked against the side it is to be fitted against.

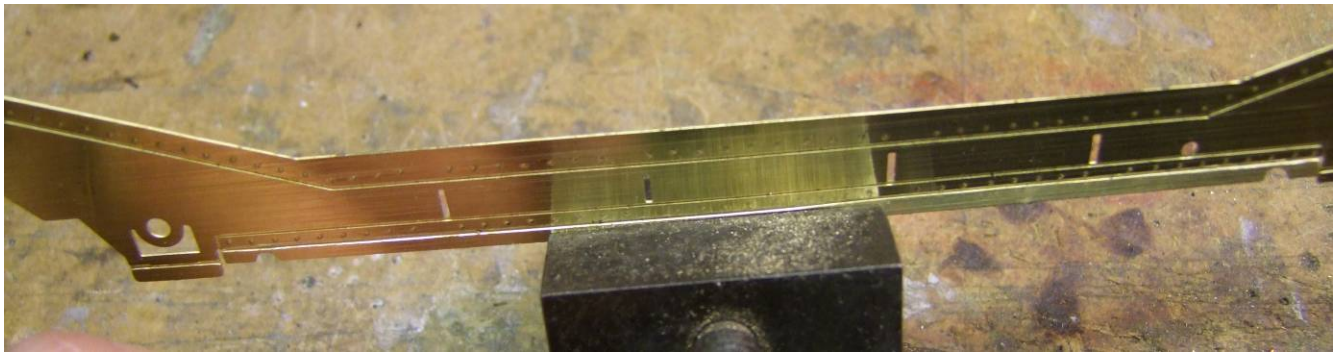


025

The two sides need a flange to be folded up along the bottom edge. The fold line is shown by the point of the scriber. There is a second half etch line just above this representing the edge of the stiffening angle along the bottom of the side. To prevent this line becoming a fold line then the first etch line must become the preferential fold line. This is done by running the corner of a three square file (triangular) along the etched line scraping out some material. On the reverse side an impressed line should also become apparent. Once this appears the fold can be made.

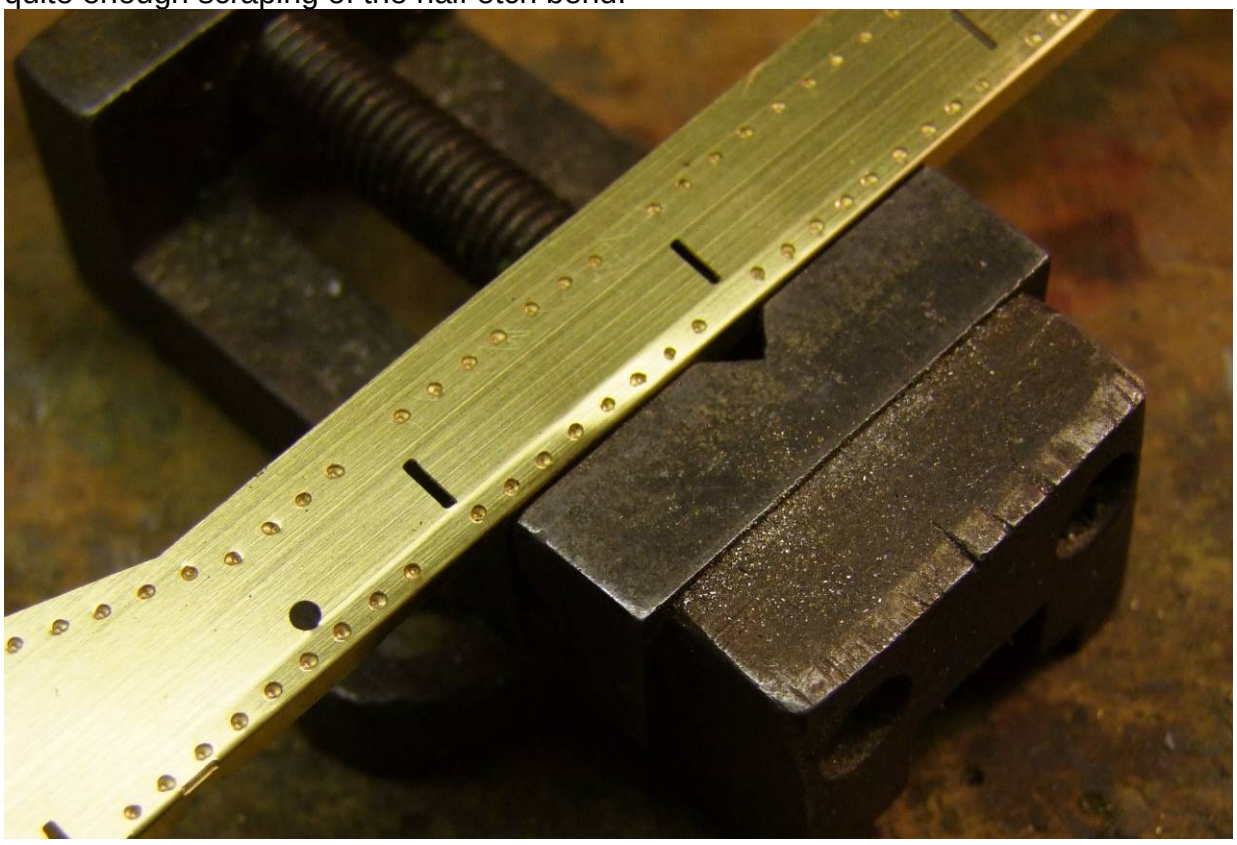


032



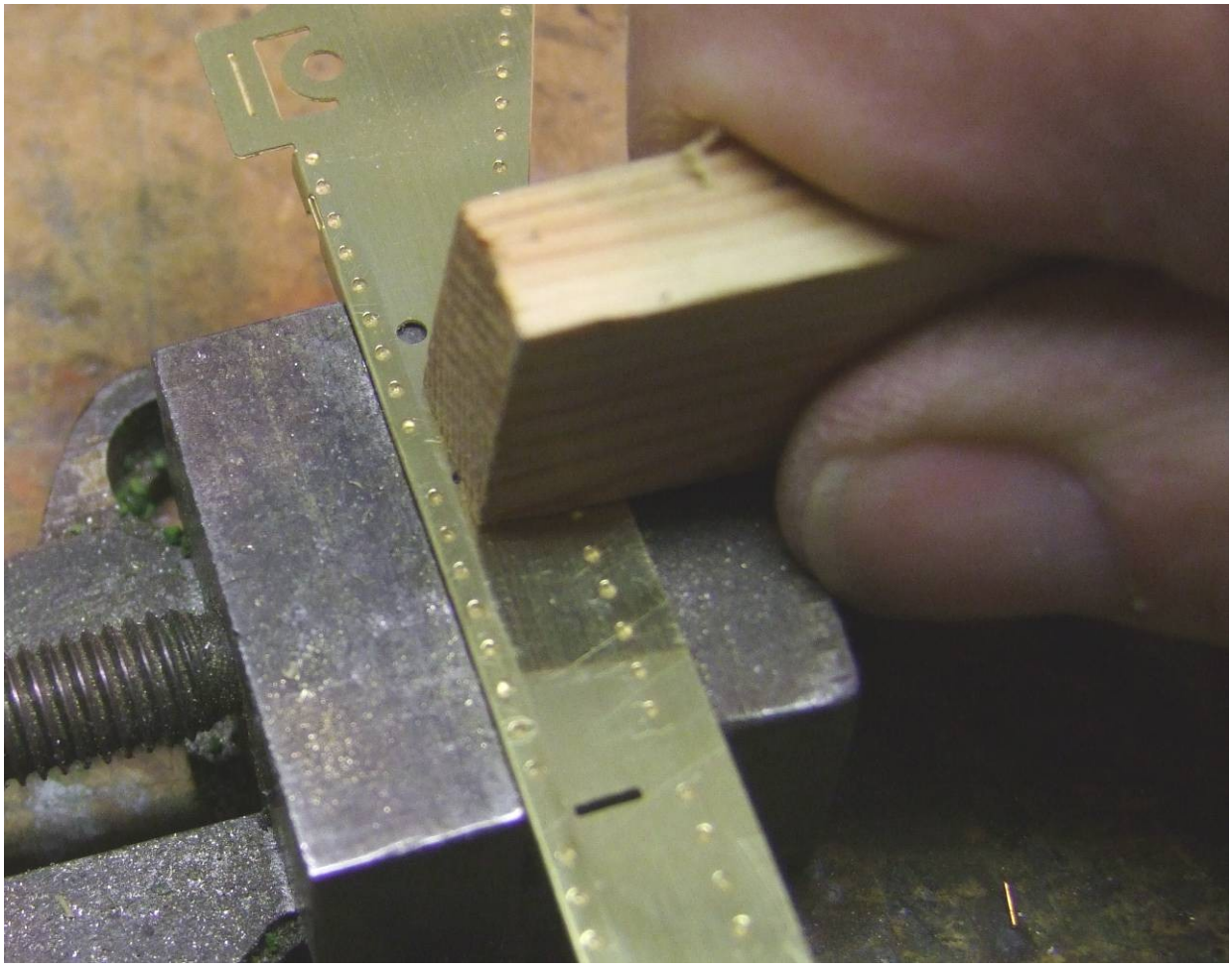
033

I have a small vice with plain jaws that is good to support parts like this when folding. As can be seen it does not fit all the way along the part. In this instance the bend was made in increments along the length. The same can be achieved with flat nosed pliers only with more steps along the length. The half etch edge line is beginning to move as the final bend was made so not quite enough scraping of the half etch bend.



034

Should the bend turn up where it is not wanted then gentle pressure applied with a piece of wood will correct this.



035

Soldering starts here.

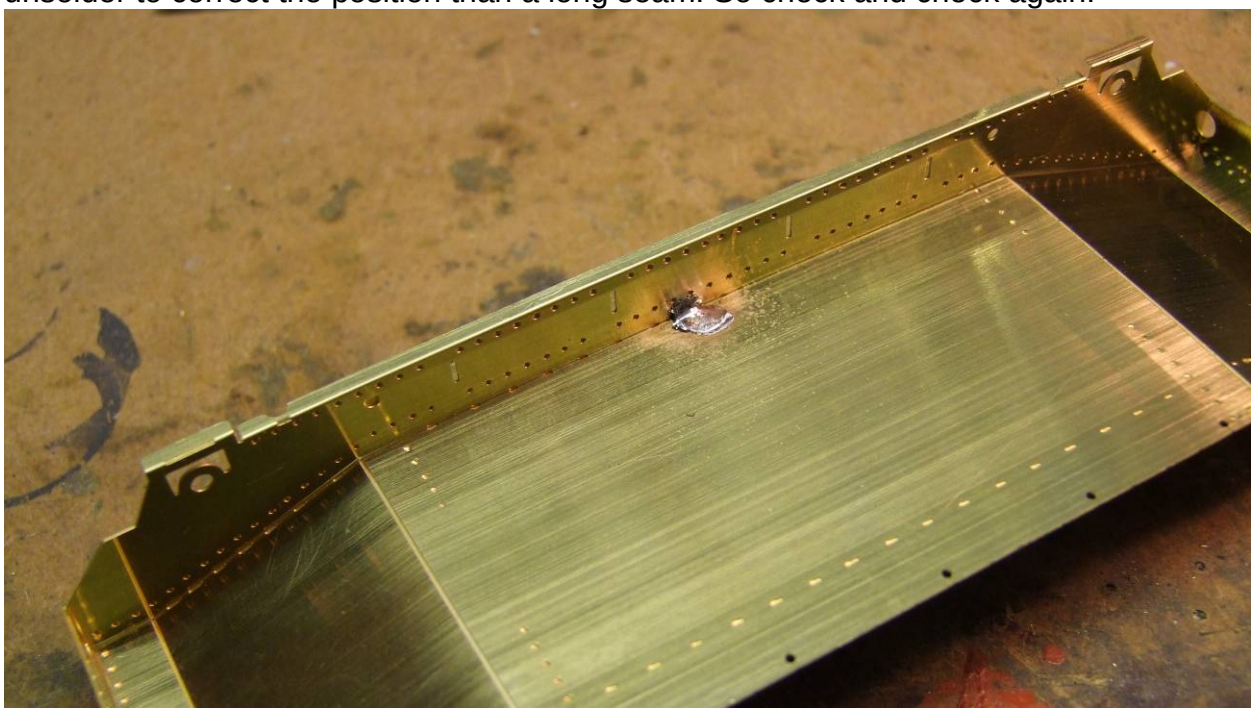
Throughout the brass construction I have used 145° solder and for the whitemetal parts 70° and have used Powerflo flux for both. Powerflo is a plumber's paste flux and like Phosphoric acid it too is an active acid flux. I choose to use it as I do not like the fumes from phosphoric acid and it has the advantage that it can be dispensed from a syringe. You will note that I have done nothing to clean the surface of any brass component before soldering. There is no need as the surface is bright and any corrosion layer is of no consequence as the flux takes care of it. Abrasive cleaning is only needed when there is considerable discolouring of the surface.

I use a temperature controlled iron. For 145° solder it is set to 365°C and for 70° to 160°C.

With the sides formed they can be added to the floor. The floor has guide lines and half etch lines in the buffer beam position the sides.

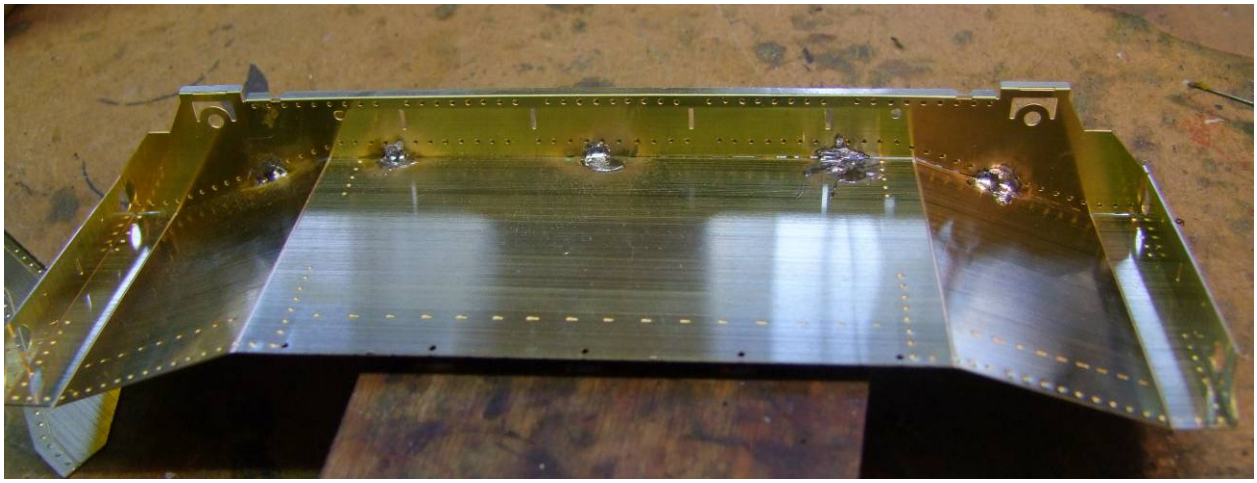
Position the first side and tack solder in place. Check that it is vertical and correctly positioned between the ends. A small tack like this is much easier to

unsolder to correct the position than a long seam. So check and check again.



037

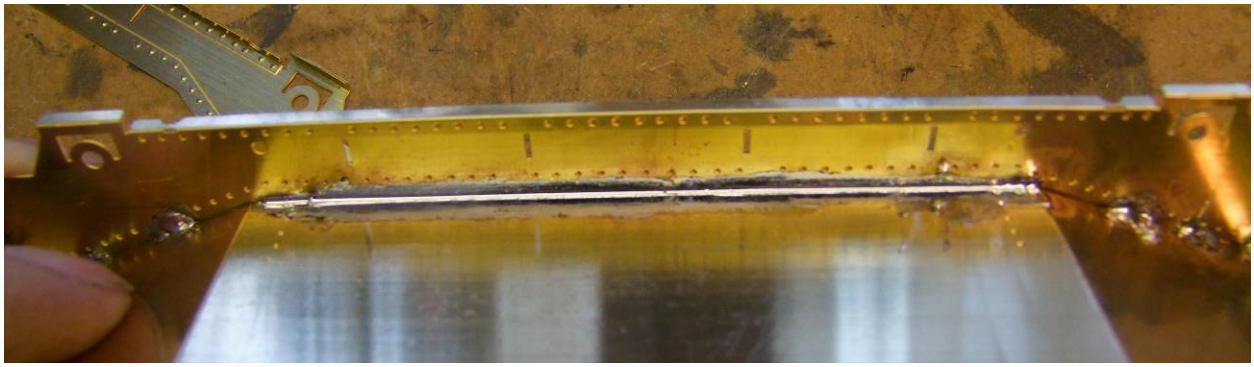
Add further solder tacks along the joint; one at the end and one between halving the gap between each time.



039

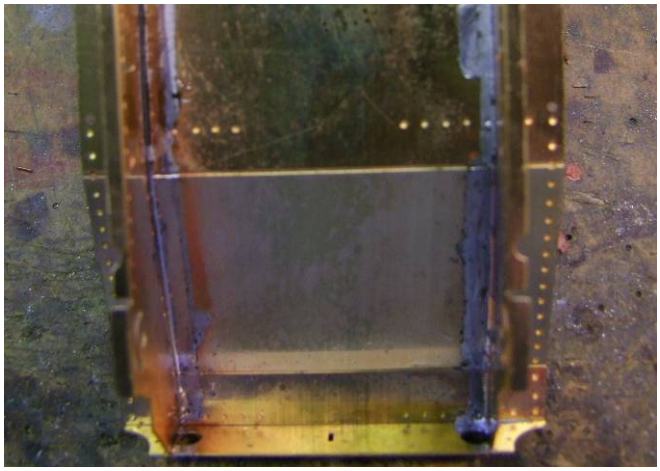
Join up the tack solder blobs by simply running the iron along the joint. There should be enough solder already in place to make the joint without adding more. Allow the solder to melt under the iron and move it SLOWLY along the joint. Too often those inexperienced in soldering expect the joint to be made instantly, often poking and prodding at the joint with the iron. Allow time for the heat move from the iron enter the joint and melt the solder then move it carry a local area of melted solder under the iron's tip.

The block that the parts are shown resting on is a particular aid to supporting the floor in this case. Without it the floor could be pressed away from the side. Have odd pieces of wood to hand for resting on and pressing with.



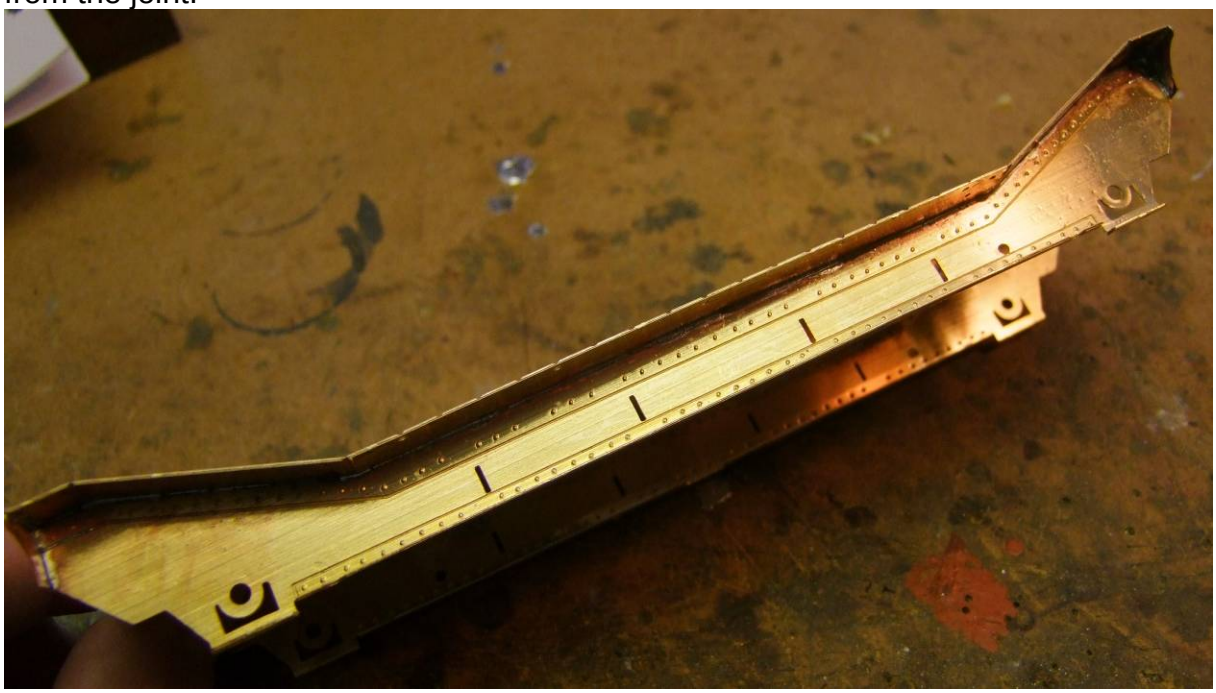
043

The second side follows in the same manner.



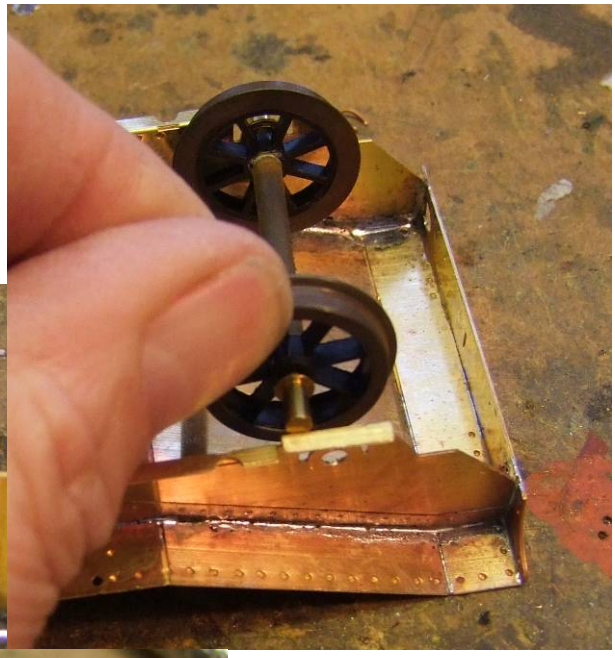
044

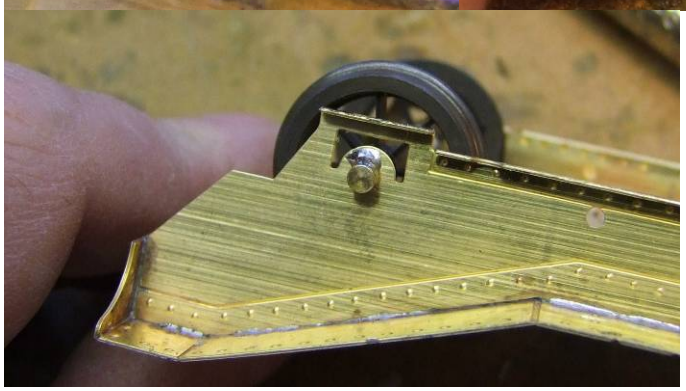
The solder can just be seen creeping from the back to front. The amount seen here is nothing to worry about and can be left alone. If there is a larger run for whatever reason, too much solder in first place perhaps, then apply the iron from behind at the offending location and allow the solder to melt then slowly run the iron away from the position carrying the solder on the tip and away from the joint.



046
The next stage in construction is to fit the wheels. Bearings are fitted into the holes provided. The holes were slightly undersize so were opened up with a cutting broach. Lacking such a tool a triangular file can be used. Like the broach it is inserted into the hole and rotated. The teeth on the file will tend to try and screw the file into the hole in one direction. Rotate in the other direction to enlarge the hole. Try the bearing into the hole regularly until it just drops in.

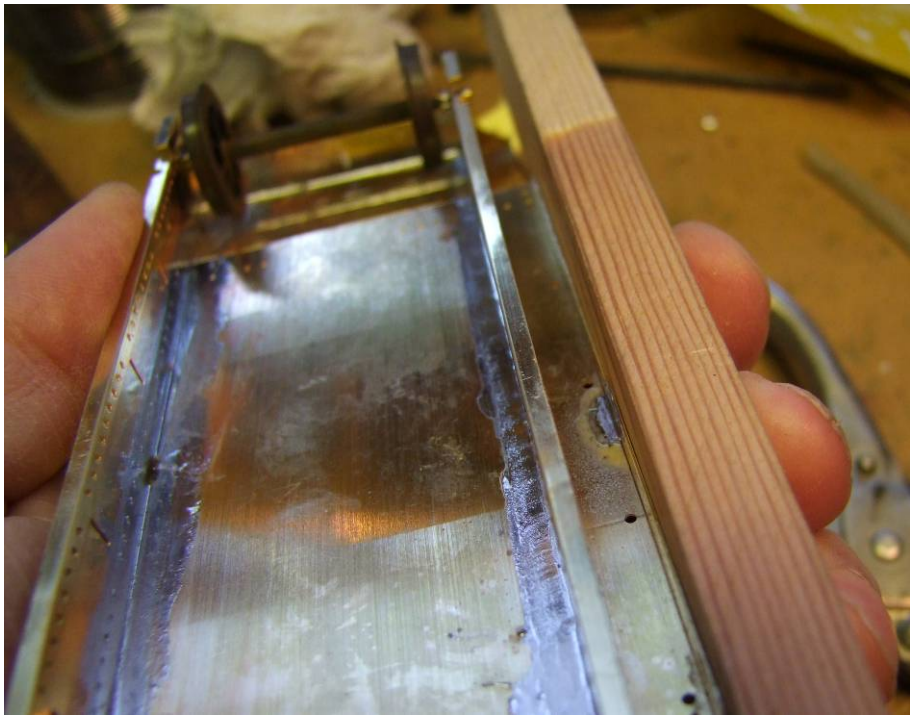
047
Insert the first bearing then add the wheelset and second bearing. The side has to be sprung to allow the bearing inside.





048, 051, 053
Press the bearings down on the ends of the axle and centre the wheelset across the wagon*. A small piece of solder secures each bearing.
With the wheelsets in place it is wise to apply a film of oil over the wheel tyre now. This will help prevent corrosion from flux fumes evolved during later construction.
**Shown are the specified Slater's wheels. These work best with the bearings hard down on the ends of the axle and parallel to the axle. The "pin point" will now work correctly and the wheels will spin freely and for a period.*

Now is the time to check that all four wheels sit on the rails or a flat surface. A glass plate is good but some Contiboard is nearly as good. An obvious twist will show easily but a subtle one is less easily seen. Put he wagon on the flat surface and tap the corners above the wheel with a finger. A click will be heard if there is a gap under the wheel. A gentle twist by hand will usually correct this. A gross twist usually means a degree of reconstruction.

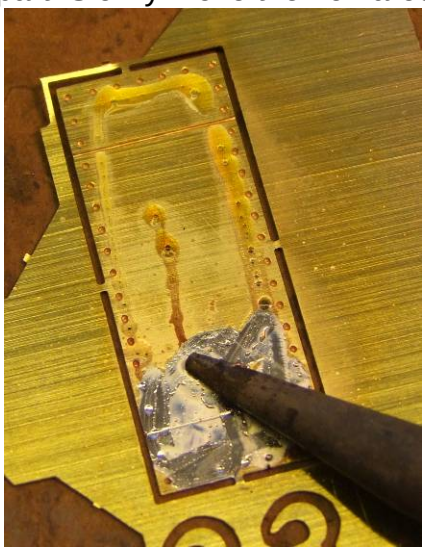


055

The side rails are now added to the edges of the floor. These are located with half etches. Holding this in place whilst soldering can be difficult. I located the side rail fully engaging the edge of the floor into the half etch and then held it in place by squeezing it with a strip of wood. Tack soldering again comes into play. Check the position after the first tack. Once happy then more tacks and then the tacks can be joined up. The second side rail is added in the same manner.

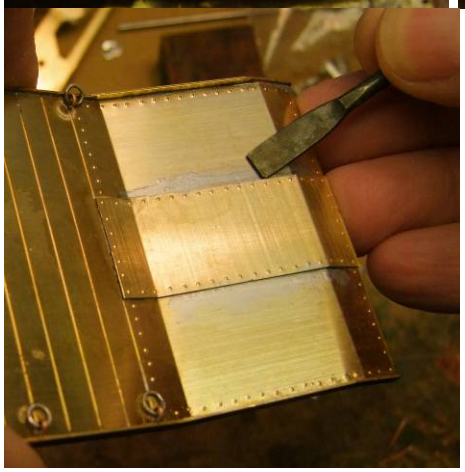
This completes the main construction of the wagon. Detailing follows.

The two doublers on the deck are added next. These were tinned whilst still in the fret as the rest of the fret makes a heat proof handle. Tinning is the process of covering the surface of the part with a coating of solder. Flux is applied to the whole area and some solder added at a convenient point on the part. Slowly move the iron around on the surface painting the solder across it.



057, 058
There are three possible ways of soldering these parts onto the surface. Both sides where the part locates are tinned; the underside to provide a heat conducting layer through the metal.
The first way is to position the doubler and introduce solder from the iron around the edges of the doubler.
The second way is to position the doubler and apply heat from the underside to sweat* the parts together.
The third way is to hold the part in place and use a blowlamp to sweat the parts together.
** Sweating parts when soldering means using the solder that tinned the surfaces to join the parts together. No extra solder is required.*





061, 060, 074
I elected to use the first method aided a little by the blowlamp. This left a slight ridge of solder around the edges of the doubler. The picture shows it being removed by scraping. The scraper is made from the broken end of a flat Swiss file. All the teeth have been ground off and the edges made square. It is pushed across the surface. The thickness of solder being removed amounted to a fraction of a millimetre.

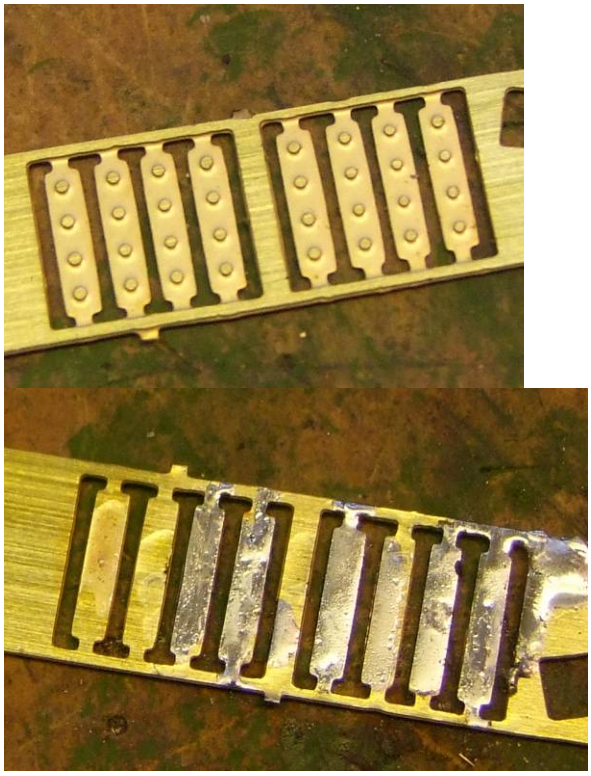
The smaller details are added. There are number of reinforcing angles to be fitted along the sides. These require a flange to be bent over. Each one was held in flat nosed pliers and the flange pushed over.

062

The tab is pushed through the slot in the side and soldered from behind. I’m holding the angle in place with a finger. The heat in the iron was sufficient to melt the solder and make the joint before the heat was conducted into my finger. If the iron did not have sufficient heat capacity then the solder would not melt at once and the heat would build up and burn. When soldering if the model gets hotter and hotter without making the joint then this is sure sign the iron is too small.

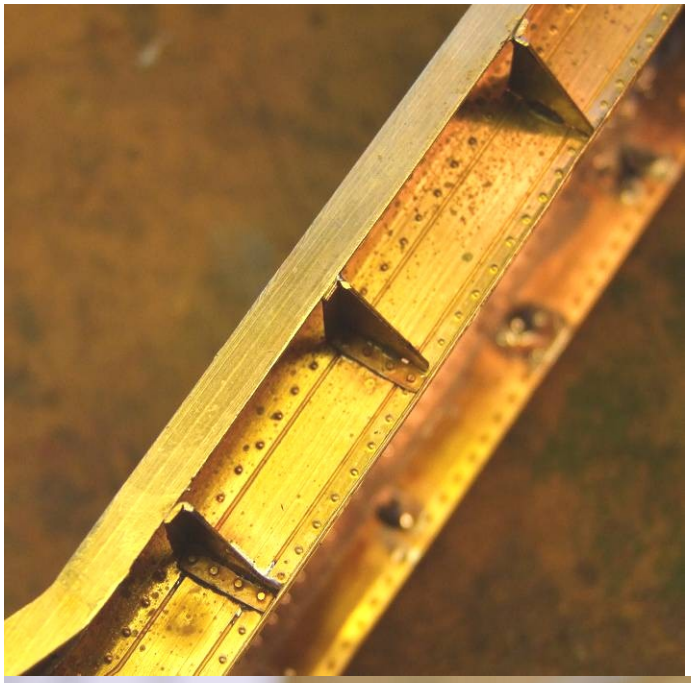
064

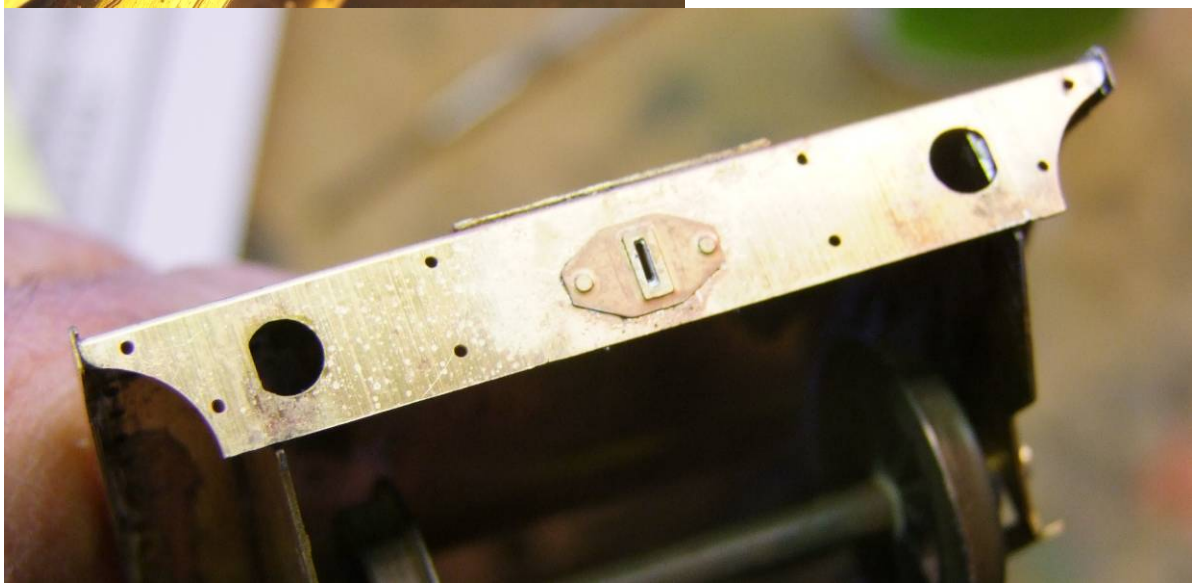
Beside each angle a small half etched plate is soldered on. These are tinned on the rear before removing them from the fret. As these parts are small it is possible to get too much solder on them. If this happens add extra flux to the margins and simply run the excess solder from the part to the main fret body.



065, 066

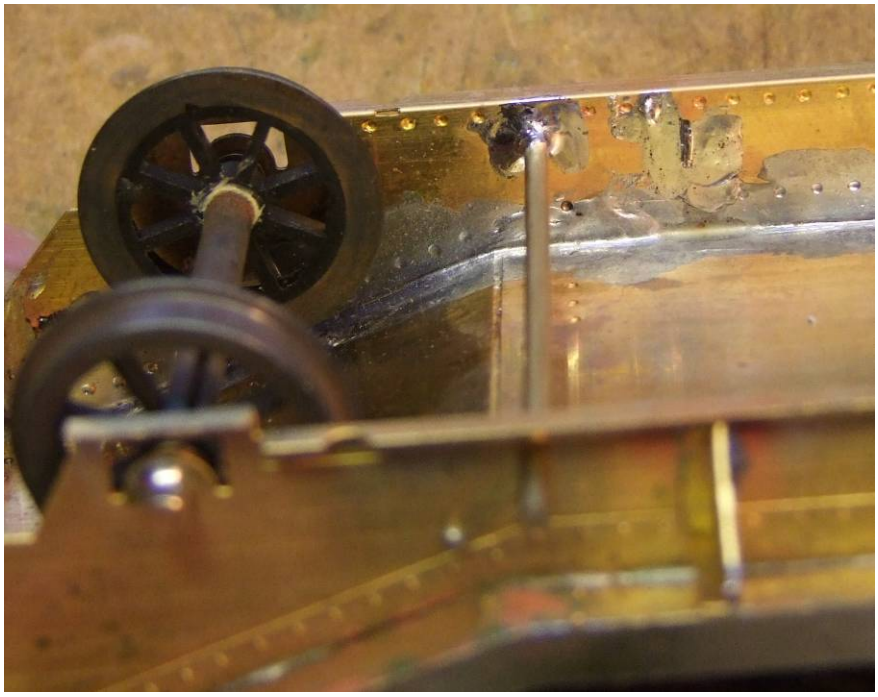
Cut the part free and place them in position. The paste flux is sticky enough to hold them in place whilst manoeuvring the iron behind the angle. Touch the iron to the solder that fixes the angle and it flows out and under the plate. The coupling hook doubler is soldered in the same manner with iron behind the buffer beam.





067, 069

The rods for the brake lever were added next. These fit through a hole and locate in a half etched recess on the opposite side. I have only soldered this where it fits into the recess. The reason for this is should it be incorrect then it is easier to unsolder just one side than two sides simultaneously. This is a technique that be used in other places on models where rods pass through two components.

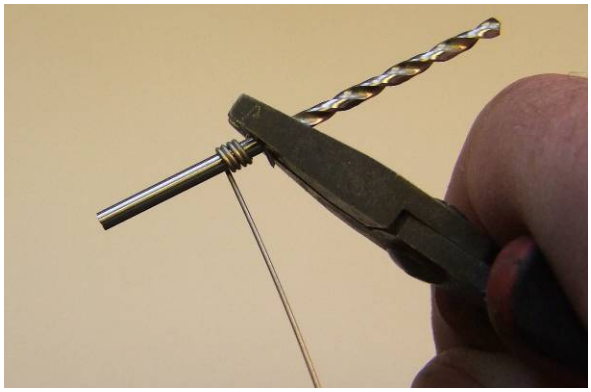


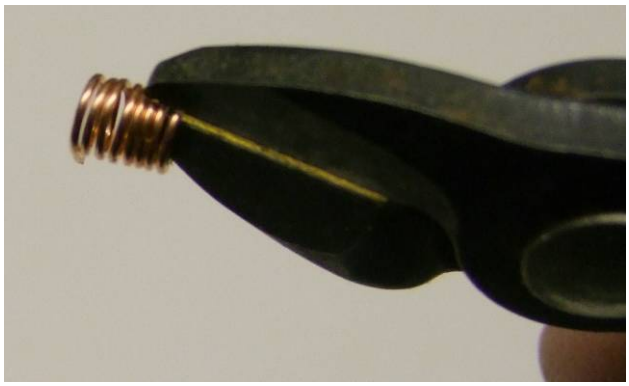
068

This wagon has a number of rings to attach the load to. Some are on running loops at the ends and others fitted in eyes. The running loops are bent from 0.7mm wire. Fortunately they are all the same so they can all be bent in the same position in the pliers. You will note the legs are of different lengths. The reason for this is that when fitting them into the body of the wagon one can be inserted before the other rather than both at the same time. This works for other wire loops like handrails too. The loops are soldered from behind. In the case of the one illustrated the ends have to trimmed nearly flush.

070, 071

The loops and the eyes need rings. The instructions give a good method. Tinned copper wire provided is wound around an appropriately sized drill shank. One end is held onto the drill with pliers and then it is wound around.

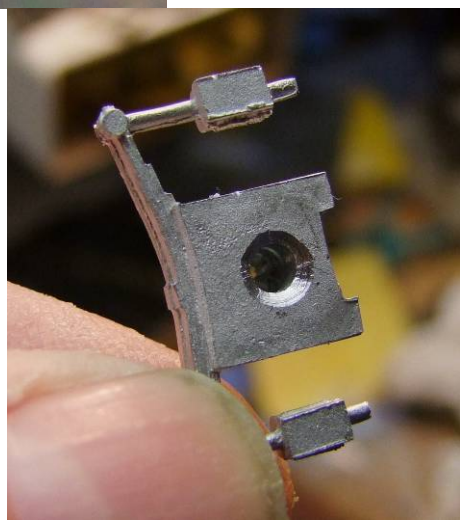




072, 094, 095

The wire “spring” is pulled off the drill and cut to make the ring. Xuron cutters are good as they do not overly distort the ring. It can be reshaped using the shank of the drill again to keep it in shape. The rings are fed over the loops and the ends closed and soldered. A task that proved impossible to photograph well! The rings along the deck can be soldered shut and then fed over the split pins before soldering the split pins in the holes provided. Excess pin is then cut off.

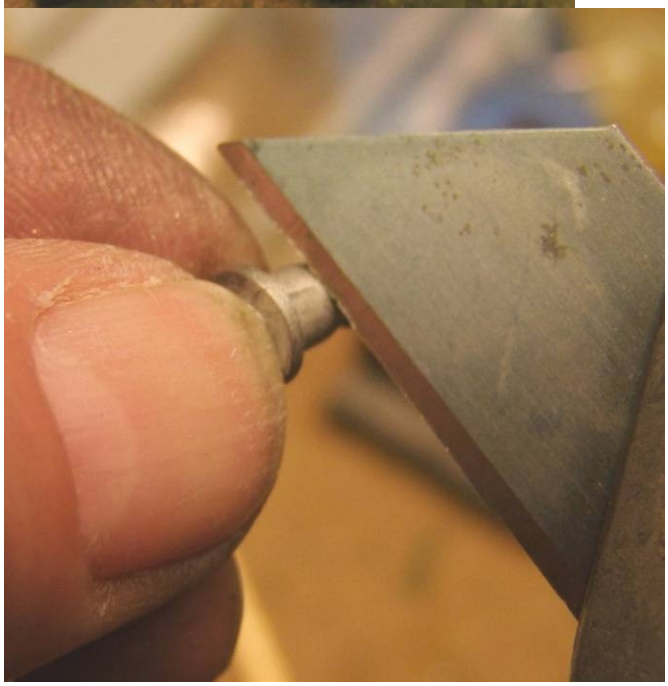
The axle box and spring castings need to be fitted next. Try them in place to see that they sit flush to the side. In my case they did not. The solder fillet holding the bearing prevented this. The solution was to add a chamfer around the hole with a large drill. Fingers are sufficient to turn the drill to achieve the chamfer shown. With the chamfer in place then try the casting again. Deepening the hole to accept the body of the bearing may be necessary too. Drill whitemetal with a slow speed on the drill and lubricate the drill. Saliva works, but beeswax is better. There is no need to clean off any residual wax. It seems to act as a flux when soldering or, if not has no deleterious effects.



071, 077, 078

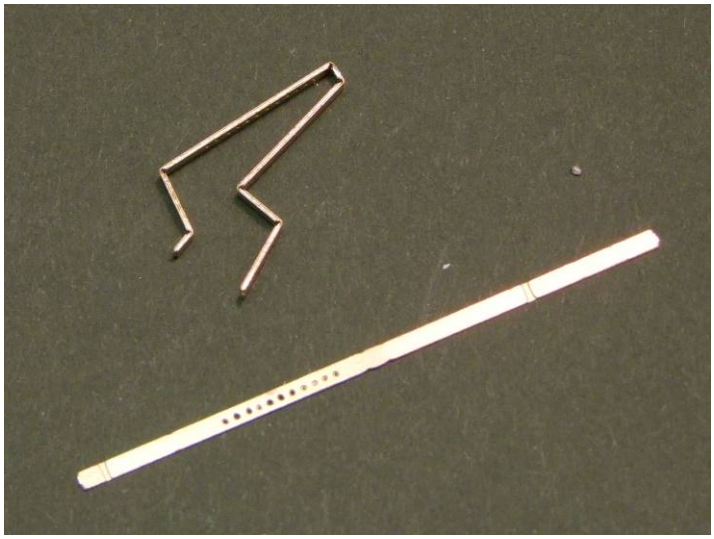
The axlebox casting is then soldered in position. Low melt 70° now comes into play. I found it difficult to get the iron into a suitable position alongside the casting to get the solder in. Superglue or epoxy adhesive would be an acceptable alternative to fix them. Even if glued the outer spring damper needs to be soldered to the side for support.

The buffer bodies come next. The whitemetal castings need to be drilled through for the buffer shank as the hole is blind. There is a register of hole at the back but three of the four lacked a hole register at the front so drilling from this end had to be done with particular care. The evidence of the mould line was removed by scraping with the Stanley knife blade. Before fitting a small flat is need son the rear spigot so that it will engage into the “D” shaped hole in the buffer beam. This was filed on resting the body in the gap in the vice jaws to steady it.



084, 086, 087
The buffer bodies are fitted into the holes and low melt soldered from behind.

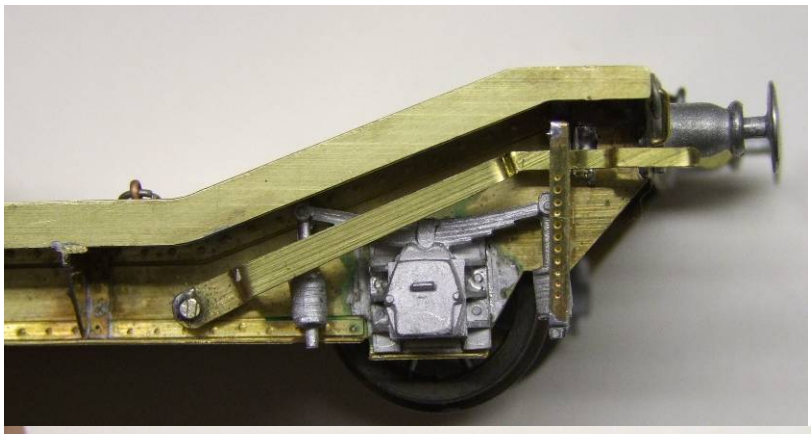
With the buffer bodies and axleboxes in place the brake lever is fitted next. The lever pin guide has to be formed and the lever has to be bent to clear the axlebox.



083
Half etch lines define the folding of the guide. Parts like this can be quite delicate and if folded too dramatically can break on the fold lines. Carefully tighten the bends to make right angles then solder inside each bend to reinforce the corner.

This is then soldered to the side holding the top joint closed just in case it wants to spring open. Though close to a whitemetal casting it is a small component so will solder normally without the heat affecting the whitemetal.

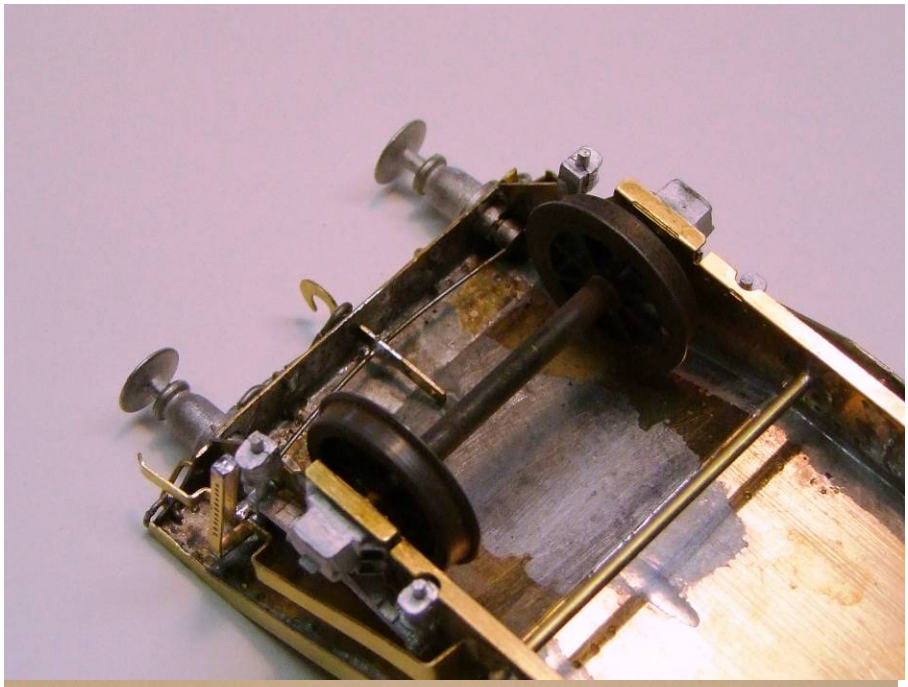
Once the guide is in place the brake lever can be bent to shape. Two half etch dots define the bends at the end of the handle but the remaining ones are formed “by eye” to create the clearance around the axlebox.

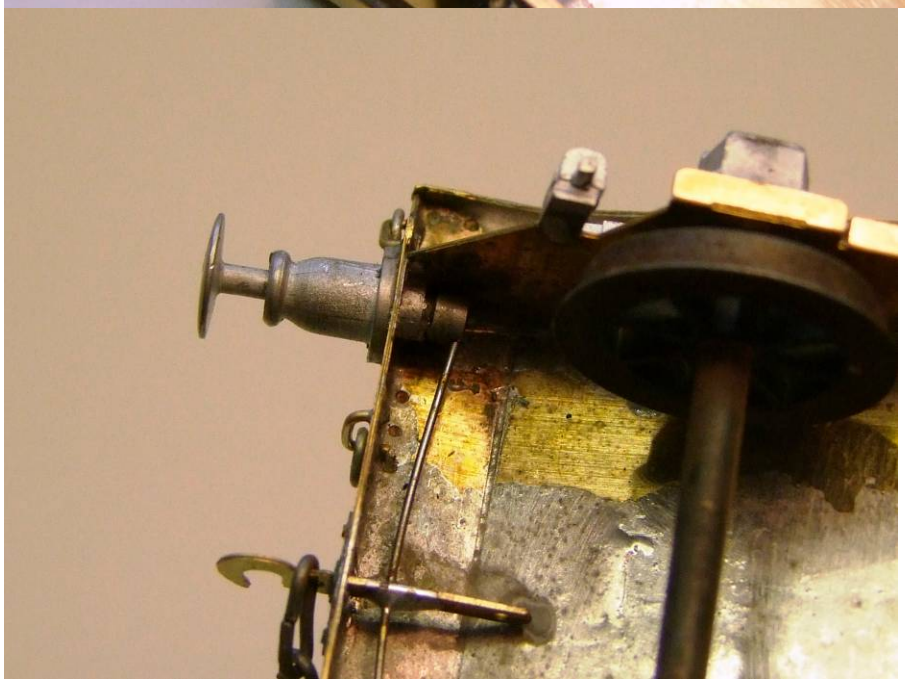


091, 092

Final part of the assembly is fitting the buffers and draw hook. The buffers are sprung in combination by a steel wire. The wire is cut to fit across the wagon just clear of the frames and is fitted through a hole in the draw hook. The ends of the wire fit into small cups soldered to the end of the buffer stem. The end of the stem needs to be shortened so that it does not gag the slot in the cup. Soldering these is on is possibly the most challenging part of the model as even with low melt it is possible to overdo the amount of solder. This again may the case for epoxy, and epoxy rather than superglue as the latter can run and glue the buffer solid.

When the cups are fixed engage the wire in the slot in the cup. Check the movement of the buffers and when happy solder the wire to the hook and solder the wire.





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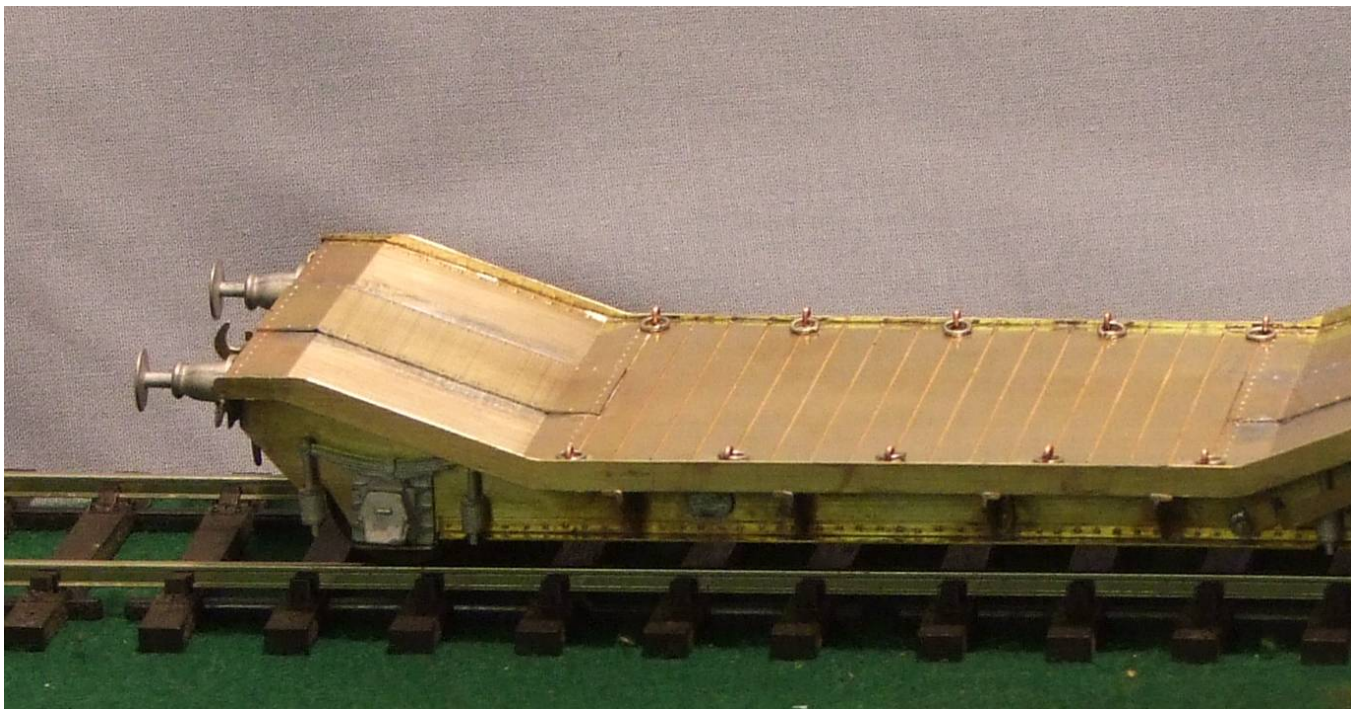
The very last part is fitting the maker’s plate. I got it wrong! The side was tinned with low melt solder and the whitemetal plate stuck to the solder with flux. In an effort to speed up the process increased the temperature of the iron to heat the solder from behind. The solder melted and so did the edge of the plate! Don’t get too cocky! Glue would have been better.

088
All that now remains is to clean off the flux residues, prime and paint. This wagon WILL be LNER grey. As this build progressed fairly rapidly I did not clean off flux as I went along, but if for whatever reason your build is protracted then clean off after ever soldering session. You will note on the pictures of the brake lever there is a green patch beside the axlebox. This is from flux reacting with the brass. With Powerflo this will occur overnight. It easier to remove it if caught early, harder if left but apart from this it not a problem.
Having tried various domestic cleaners over the years I am firmly set on one called “Bar Keepers Friend” a stainless steel cleaner (mine was purchase in ASDA). It is a powder that you shake over a wet model. Scrub the resulting paste into all the crevices and across the surface with toothbrush or other short bristle brush. The brass dulls to matt finish and the solder and whitemetal parts go grey. Rinse off in hot water. Unlike some similar cleaners the particles wash away completely.



089

An example of cleaning with Bar Keepers Friend.
Two wagon solebars. The model had been dormant for some time so the corrosion had developed. Above before; below after.

102