Rumney Models
P22 'Herring' 20T Ballast Hopper Instructions

Notes

This set of instructions covers the Rumney Models wagon kits X.10. This kit is designed to build into an accurate model of the GWR/BR (W) 20T Herring ballast hopper. A comprehensive set of etches are included as are whitemetal castings for the springs/axleboxes, vacuum cylinder, buffers and vacuum pipes. The kit can be constructed in P4, EM and OO.

Prototype Information

In 1945 the GWR ordered a new design of ballast hopper which they coded P22. This was an updated version of the P6 ballast hopper built in the very early part of the 20th century with welded construction and featured vacuum brakegear. Build details (to the best of our current knowledge are as follows:

- Lot 1501 60016/9/23/37, 60121/46/92, 60305/9/14 (10)
- Lot 1530 Diverse numbers in the 60XXX series including 60124/216/357/489/497 (100)
- Lot 1575 50001-50/4-66/8 – 76/8 -145 (140)

A total of 250 wagons were built, with the program completed in 1949. Those built in that year and the previous one were of course built by BR but to still to GWR orders. It has been suggested that building of the P22 hoppers may have been delayed due to post war steel shortages. Paul Bartlett suggests on his website that lot 1575 wagons weren't built until 1948. Atkins, Beard and Tourret suggest that some (maybe all) were built by outside contractors. The welded construction certainly seems to be at odds with how things were generally done at Swindon at the time where riveted construction was preferred.

BR had a further batch of 50 built by Metro-Cammell in 1950. These were given BR diagram 1/582. Details are as follows:

- Lot 2214 DB992197-DB992246 (50)

The P22 hopper wagons were given the departmental telegraphic code Herring.

The above information was taken from GWR Goods Wagons by Atkins/Beard/Tourret, British Railways Wagons by Don Rowland and Paul Bartlett's photograph collection.

Image used with kind permission of Paul Bartlett - paulbartlett.zenfolio.com

Livery

The hopper would have been painted black, both hopper and underframe, when new. Lettering was yellow, at least in early BR days, which could fade to almost white.

The hoppers were usually allocated to a particular quarry and were lettered 'Empty to…', initially in GWR script; e.g. 'Empty to Coleford', 'Empty to Tytherington', etc. Later on the typeface for the lettering was simplified.

In the 1960s some hoppers were painted a kind of matt bauxite with the solebar and everything below black and with white lettering. This is very evident in colour photographs taken of the Herrings working in the forest of dean in the mid sixties. After pondering over the photos we have decided that this colour was almost certainly not the gulf red you might expect but more akin to the colour for fitted general freight stock.

Construction Notes

Read through the instructions first and familiarise yourself with the components. Drawings and photographs taken during the construction of the test etches are included to attempt to make my waffle clearer. Note that not every single photo is of this particular kit but suitably illustrate the item in question.

All fold lines are through 90° with the fold line on the inside unless stated otherwise.

I will assume that tags connecting parts to the fret will be cleaned up on removal of a part unless it is specified specifically in the instructions not to.

Everyone has their own soldering methods. I now use an Antex 50W temperature controlled soldering iron with predominantly 145° solder and La-Co paste flux.

Check all holes before removing parts from the fret. The drawing process for etching if you use a CAD program as I do is extremely accurate but the actual etching process itself not an exact science. If the fret is slightly over etched then there is no problem but if they are under etched the holes will need enlarging. I find that this is easiest to do before removing parts from the fret. The hole sizes will be noted at the appropriate points.

Tools

The following tools may be useful when constructing the wagon:

- A selection of drill bits including 0.3mm, 0.4mm, 0.5mm, 0.6mm, 1mm and 2mm.
- A selection of tapered reamers in the range 0.3mm-1mm
- A smooth jawed vice
- A 4" (roughly) engineers square
- A selection of needle files

Technical

The suspension is individual springs made from 0.008" steel guitar wire soldered to the etched spring/bearing carriers. For this you will need a suitable flux. I use Carr's Black label. If the finished vehicle is weighted to 50g with the weight evenly distributed then this will produce a spring deflection of 0.5mm. Don't be tempted to up the gauge of spring wire. Even moving up to 0.009" springs will have a significant effect on the spring deflection. Also don't over weight the wagon or the springs will not have enough upwards movement before they hit the axleguards. Think of the 50g total as an ideal weight but also a maximum. There are notes on weighting the wagon at the end of the instructions but it should be obvious from the nature of the kit where it will need to go, i.e. in the bottom of the hopper.

The chassis is designed to produce a buffer centre height, when the kit is completed and weighted to 50g of 13.8mm when using Exactoscale wheels. The Exactoscale wheels are 13.4mm (3'1½") in diameter. Different makes of wheel may slightly affect the ride height depending on their diameter.

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Materials list

Castings and 0.5mm x 0.3mm micro-tube for the hopper door handle are included but you will need several sizes of wire are needed to build the chassis. Eileen's Emporium are good source for these and they do a mixed sizes pack if you don't want to buy large quantities.

0.31mm - Most of the brakegear, tie bars, brake lever guards, hopper grab handles, end steps
0.4mm - Vacuum pipe
0.5mm - Hopper door rivets and hinges, coupling hook retention pins
0.6mm - Vacuum cylinder piston
0.7mm - Hopper door hinges if not using 0.7mm x 0.5mm micro-tube tube
0.8mm - Brake cross shafts
1.0mm - Alignment pins for the brakegear frets

0.7mm x 0.5mm micro-tube for the hopper door hinges
0.8mm x 0.4mm micro-tube for the vacuum pipe

Buffers along with axleboxes and spring castings are included but the following information may be useful.

GWR 1'6" 6 rib Self Contained buffers have been supplied to us by Lanarkshire Model Supplies and are included with the kit. If you wish to make the buffers sprung then Lanarkshire Models do this type pre-drilled for fitting sprung buffer heads (their code B022). MJT do suitable 13" buffer heads with 2.5mm shanks.

When delivered the P22 hoppers were fitted with RCH heavy duty 10"x5" cast two part oil axleboxes and these have been included with the kit. Over the course of time axleboxes got changed and any of the BR era 10"x5" oil axleboxes could be, and were, fitted; at least one wagon got fitted with roller bearings. Rumney Models do 7 leaf spring castings with BR 2 part cast HD (FN.07), BR 2 part square cast HD (FO.07), BR welded with horizontal lugs (FP.07) and BR welded with vertical lugs (FQ.07) if you wish to add some variety to your rake. Roller bearings are also available (FE.07) though we have only found one wagon so fitted. See the Rumney Models website for further details, including illustrations. They are listed under Wagon Castings in the 4mm scale section.

Coupling hooks (2 types) and Instanter links are included in the kit but plain links will be needed complete. Brassmasters now supply links for those not wishing to make their own.

Contact details for the above suppliers can be found at the end of these instructions.

You will also need 3'1½" 3 hole disc wheels form you favourite manufacturer to your chosen 4mm gauge along with bearings. If you are using pinpoint bearings a waisted type such as that marketed by Alan Gibson (their code 4M63W) would be ideal. If you are using Exactoscale products then you can also use parallel axles and either 2mm or 1.5mm parallel bearings. If you are using the later you will need some 2mm x 1.5mm tube to act as a sleeve over the bearings.

Transfers

Cambridge Custom Transfers do a numbering sheet for the wagons in the BR era with pre-1964 lettering. This is CCT code BL137 and covers both GWR and BR built examples. Cambridge Custom Transfers also do a sheet with quarry allocations in GWR script. This has CCT code BL138. Contact details can be found at the end of the instructions.

Parts List

The parts are spread over four different frets. I've tried to keep things as naturally together as possible but sometimes space prevents this. The frets are lettered α, β, γ and δ to help you locate the parts (alpha, beta, gamma and delta for those who didn't do maths beyond O level/GCSE). I've tried to number the parts in build order; it mostly worked.

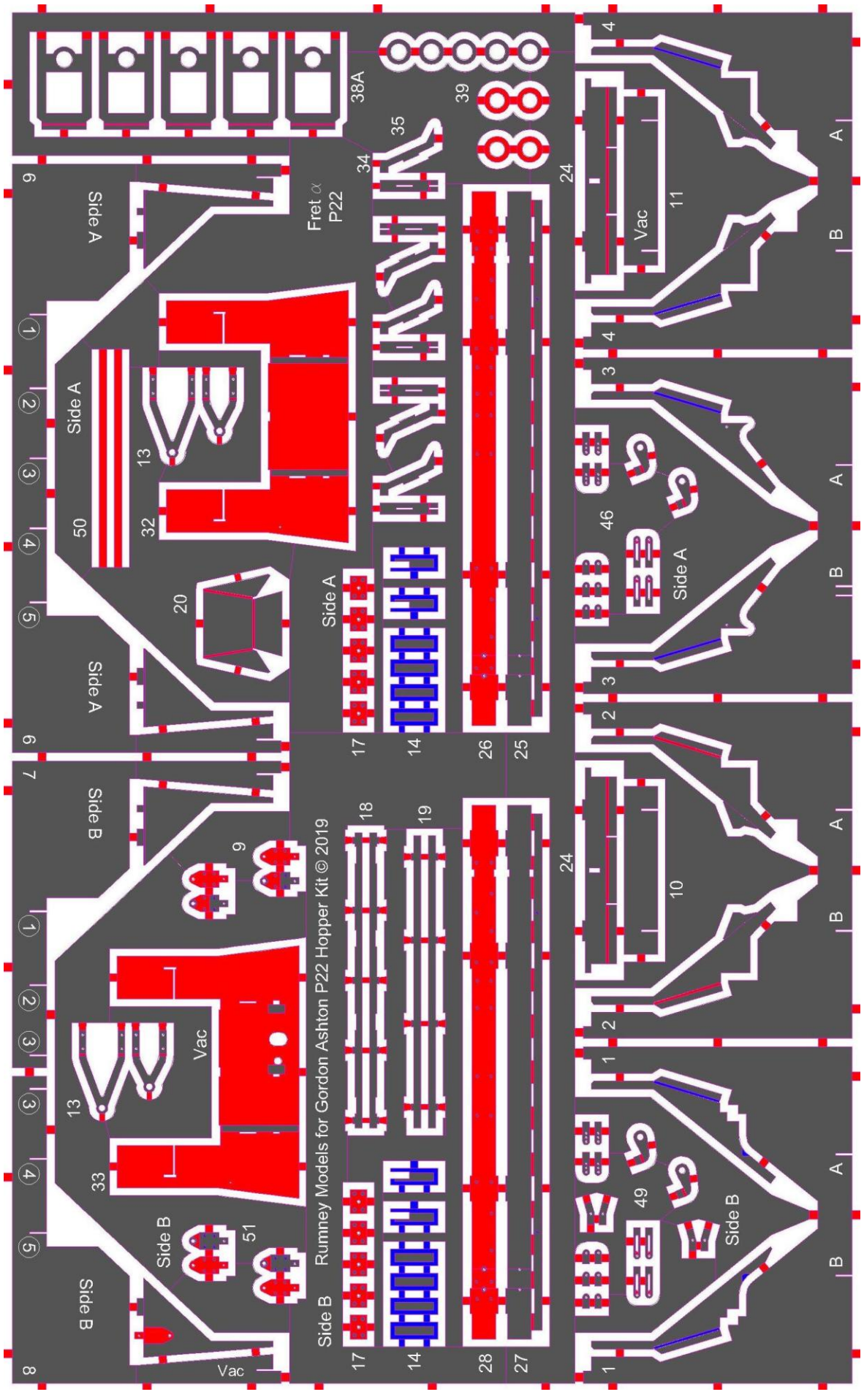
1-4 - Side stanchions	Fret α
5 - Side stanchions	Fret β
6 - End stanchions (Side A)	Fret α
7 - End stanchions (Side B - non-vacuum cylinder end)	Fret α
8 - End stanchions (Side B - vacuum cylinder end)	Fret α
9 - Vacuum cylinder bracket (end stanchion - 2 sets)	Fret α
10 - Stanchion frame strengthener (non-vacuum cylinder end)	Fret α
11 - Stanchion frame strengthener (vacuum cylinder end)	Fret α
12 - Hopper	Fret γ
13 - Hopper vees	Frets α & β
14 - Hopper door hinge overlays (upper)	Fret α
15 - Hopper top flange	Fret β
16 - Hopper door	Fret γ
17 - Hopper door hinge overlays (lower)	Fret α
18 - Hopper door angle X	Fret α
19 - Hopper door angle Z	Fret α
20 - Hopper recess for vacuum cylinder	Fret α
21 - Axleguards	Fret δ
22 - Reinforced axlebox guides	Fret β
23 - Chassis top plate	Fret β
24 - Transverse chassis angle	Fret α
25 - Solebar (Side A)	Fret α
26 - Solebar overlay (Side A)	Fret α
27 - Solebar (Side B)	Fret α
28 - Solebar overlay (Side B)	Fret α
29 - Solebar detailing	Fret β
30 - Corner plates	Fret β
31 - Coupling pockets	Fret β
32 - Chassis end plate (non-vacuum cylinder end)	Fret α
33 - Chassis end plate (vacuum cylinder end)	Fret α
34 - Hopper spreader plate stay (top - 4 sets + spare)	Fret α
35 - Hopper spreader plate stay (angle - 4 sets + spare)	Fret α
36 - Brake shoes and push rods	Fret β
37 - Brake push rods safety loops	Fret γ
38A - Spring carriers (2mm bearings)	Fret α
38B - Spring carriers (1.5mm bearings)	Fret δ
39 - Axle bearing washers (both full thickness and half etched)	Frets α & β
40 - Tiebars (2 sets)	Fret γ

41 - Brake lever guard bracket	Fret β
42 - Brake lever guard and stay	Fret β
43 - Vacuum cylinder link	Fret γ
44 - Vacuum cylinder to push rod link (Side A)	Fret γ
45 - Vacuum cylinder to brake lever link (Side A)	Fret γ
46 - Brake link overlays and brake lever actuator + spares (Side A)	Fret α
47 - Vacuum cylinder to push rod link (Side B)	Fret γ
48 - Vacuum cylinder to brake lever link (Side B)	Fret γ
49 - Brake link overlays and brake lever actuator + spares (Side B)	Fret α
50 - Brake link safety loop material	Fret α
51 - Vacuum cylinder bracket (free standing)	Fret α
52 - Vacuum cylinder stay	Fret γ
53 - Hopper door locking lever	Fret β
54 - Hopper door opening lever	Fret β
55 - Hopper door opening lever bracket	Fret β
56 - Hopper door lever hinge detail (for parts 52 & 53)	Fret β
57 - Brake levers and washers	Fret β
58 - End step	Fret β
59 - End step angle	Fret β
60 - Vacuum pipe stay	Fret β
61A - Coupling hooks (full thickness)	Fret γ
61B - Coupling hooks (recessed)	Fret γ
62 - Instanter links	Fret β
63 - Buffer springing retainers	Fret β
End bending jig	Fret δ
Side bending jig	Fret δ

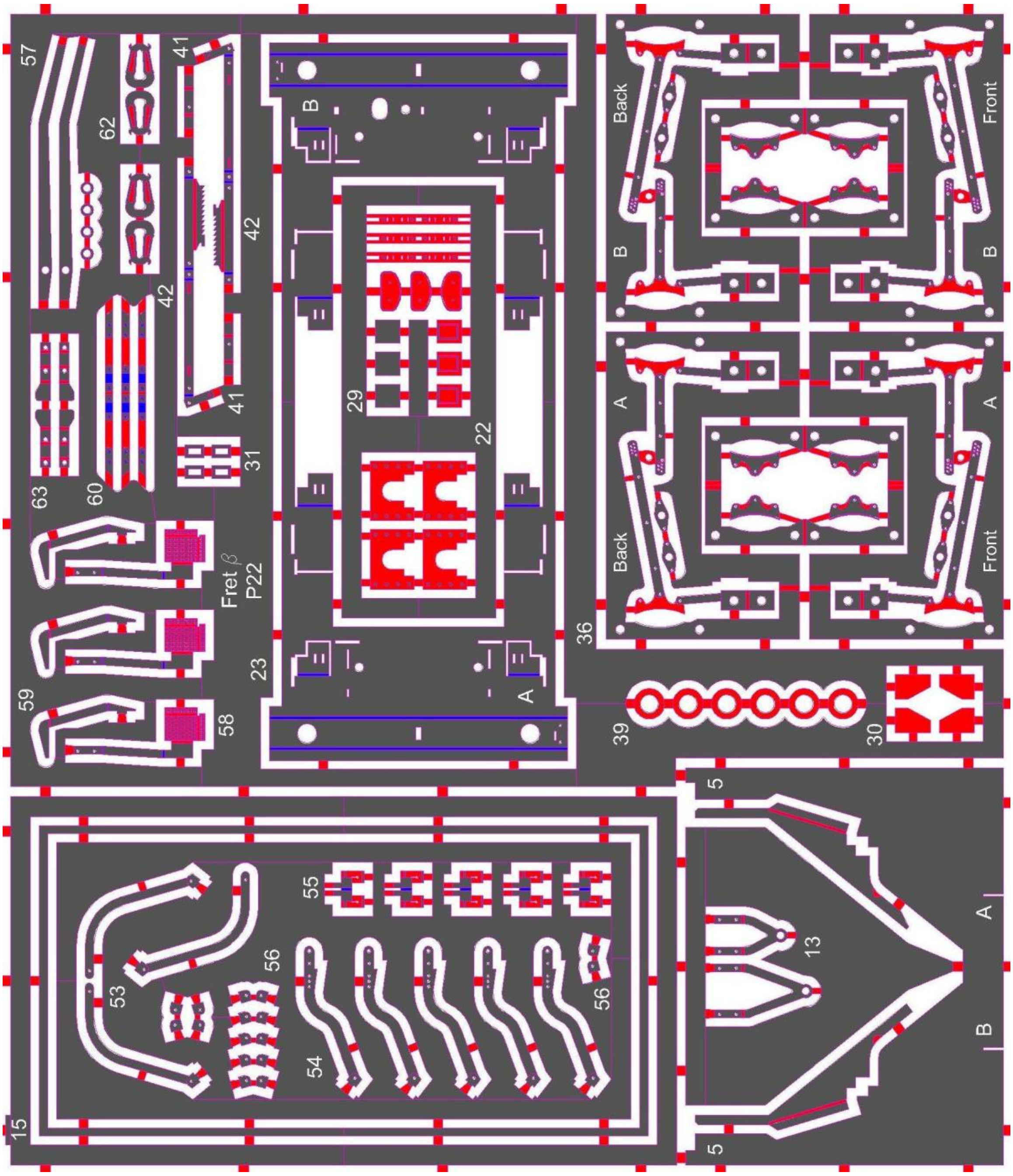
4 x RCH 2 part HD oil axlebox and 7 leaf spring castings
4 x GWR 1’6” 6 rib Self Contained buffers
2 x Upright vacuum pipes
1 x 18” vacuum cylinder

~40mm of 0.5x0.3mm brass micro-tube

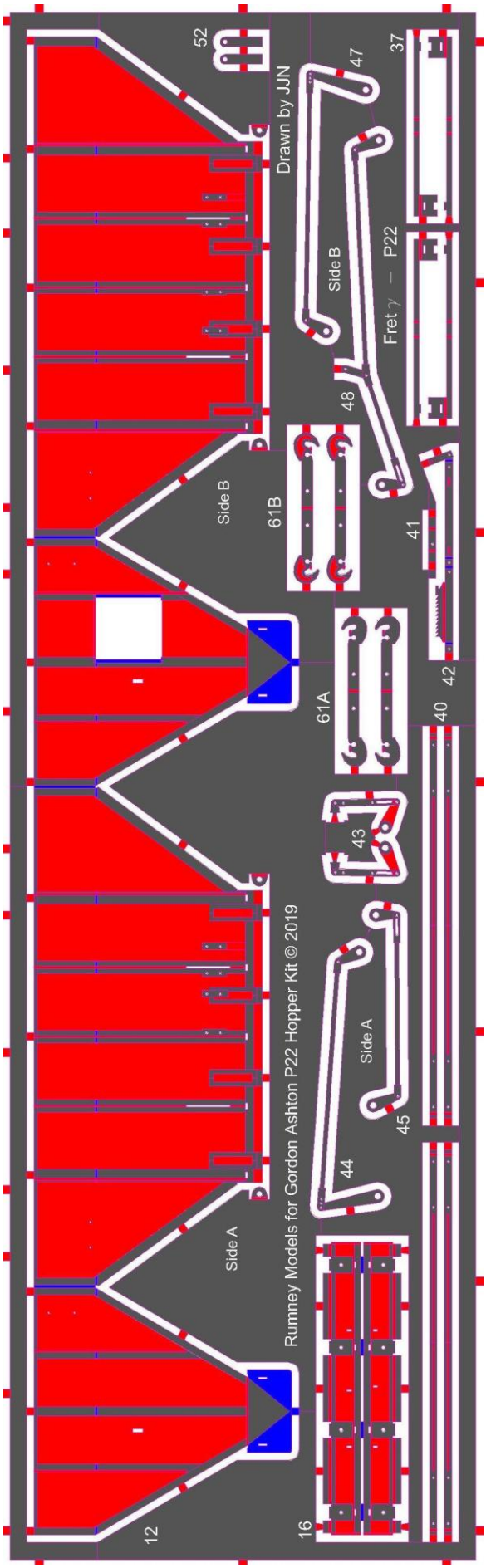
Fret α (alpha)


Fret α
P22
Side A
Side B
Vac
Rumney Models for Gordon Ashton P22 Hopper Kit © 2019

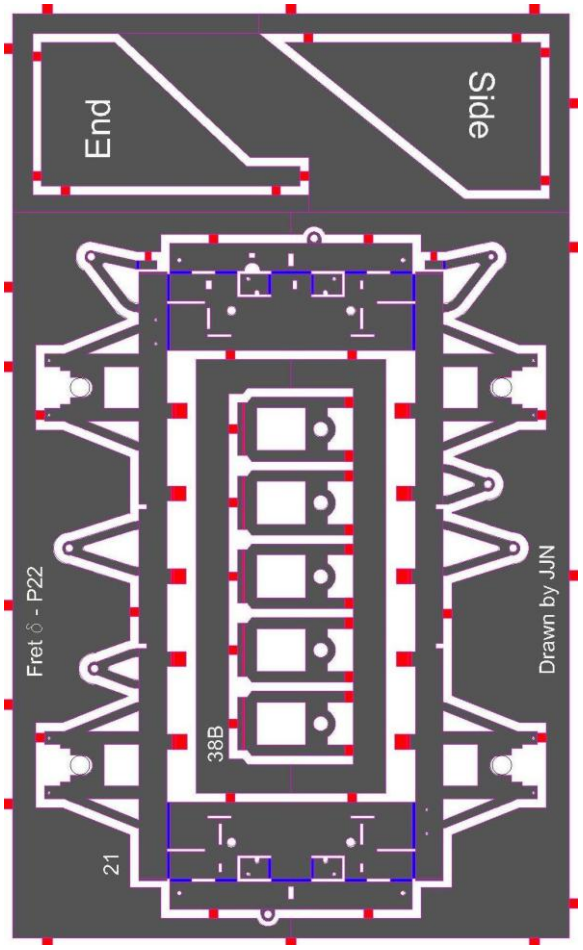
Fret β (beta)


57
62
41
42
42
41
63
60
31
29
22
B
A
23
Fret β
P22
59
58
Back
Front
B
A
36
39
30
5
55
56
53
54
13
15

Fret γ (gamma)



Fret δ (delta)



Construction

The kit is comprehensive in nature and includes just about everything that was on what was a pretty complicated prototype (in wagon terms at least). It is not quick to put together if you include all the bells and whistles. There is opportunity to speed things up a little at various points by omitting certain details, some of which you may consider would end up being lost in the underframe anyway. I will note how things could be simplified at the relevant points. If you want to get it built as quickly as possible then do consider these shortcuts as they will save time. There are no prizes for including absolutely everything on the frets. There are no prizes for completing it either (at least not from Rumney Models) but you will have the satisfaction of having got there and a lovely wagon as well!

Hopper Frame

The kit is designed to make use of a cradle into which the hopper body sits. The cradle contains the stanchions for the sides and will help set the location of them on the body. It may seem like a lot of wasted brass but the alternative (individual hopper stanchions with little positive location) is a nightmare to get right and almost always will lead to difficulties in getting the stanchions, body and underframe lined up correctly.

Remove the side stanchions (1-5) from frets α & β. This includes the etched frame around the stanchions themselves. These are labelled 1 to 5. If you are in doubt scroll through the following half a dozen photos to get the idea. Also see Fig.1 below. The stanchions themselves must stay on the frames.

The stanchions themselves were L shaped and you will need to form this L before starting work putting the frame together. You should clamp the stanchion itself in a vice and use a small file or similar to push over the parts that need folding (these are shaded green in Fig.1 opposite) always with the fold line on the inside. All the side stanchions have them but some of the fold lines are on the opposite side to the half etched writing. Try and get the fold as close to 90° as possible. You can reinforce the fold line with solder if you want but I didn't worry on the test build.

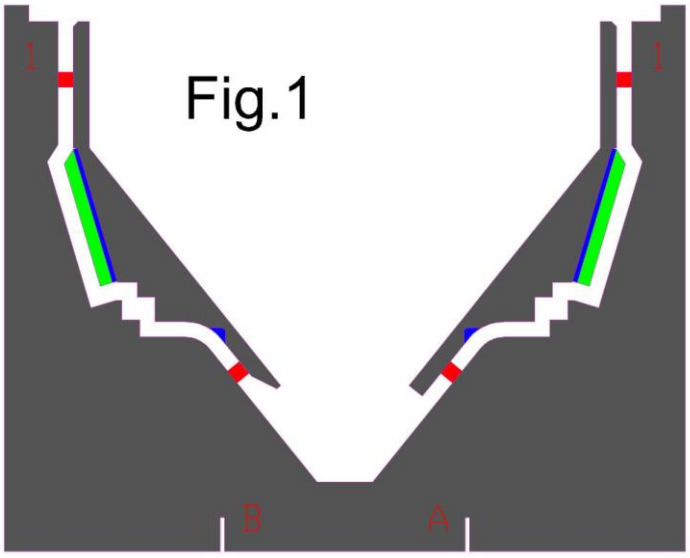
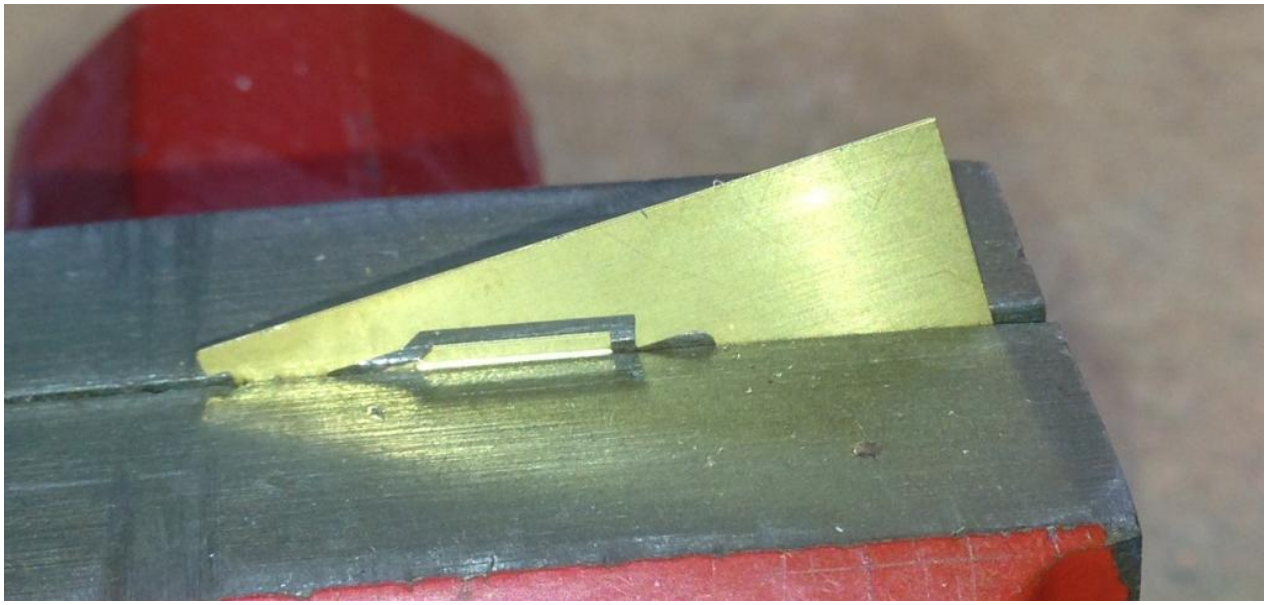


Fig.1

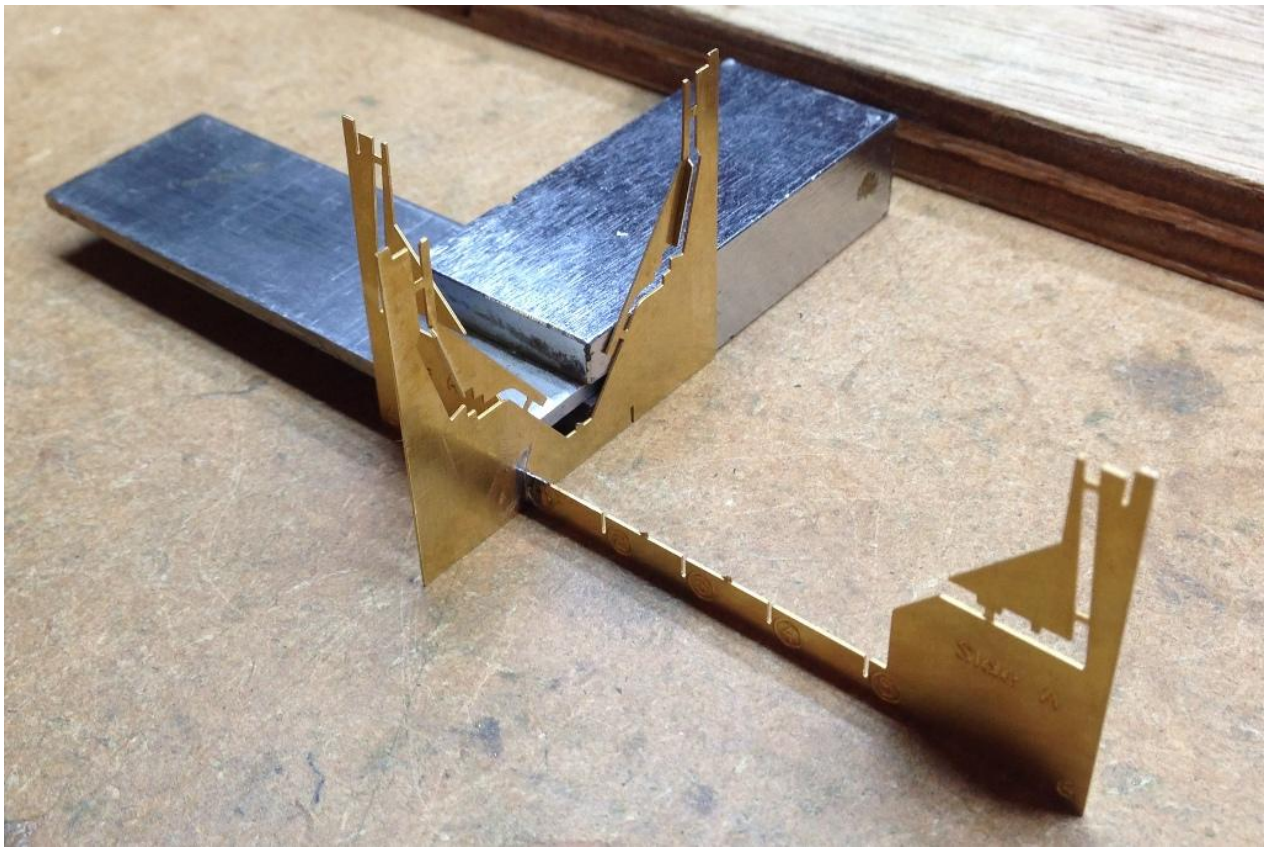


Remove the end stanchions (6-8) from fret α. Remember this includes the etched frame around the stanchions themselves. You will need to add in the brackets for the vacuum cylinder on end stanchion (8) (this is the one with Vac written on it - see image below). Use the vacuum cylinder end stanchion to drill two holes into a scrap piece of mdf or wood. The larger one should be 0.5mm and the smaller one 0.3mm. These holes will be used to help align the vacuum cylinder brackets that attach to the stanchion.

Make sure the small hole on one of the sets of vacuum cylinder brackets (end stanchion) (9) can accept 0.31mm wire and the larger one 0.5mm wire and remove from the fret. For each set of vacuum cylinder brackets there are two parts; one is almost completely half etched save for four rivets and the other is a bit more complicated. Take the more complicated one and push out the two half etched rivets. Lay the end stanchion (8) over the holes drilled in the mdf/wood so that the writing is visible and fit two lengths of wire (one 0.5mm and one 0.31mm) through the holes and into the wood. Place the more complicated of the two vacuum cylinder brackets over the end stanchion using the wire to align. See image below. Solder the bracket in place making sure that the larger piece of wire isn't solder as well. It's not very good use of a drill bit but you could use a 0.5mm drill instead of wire to prevent soldering it in place.

Remove the end stanchion from the jig and turn it over. Repeat the process for the simpler half etched vacuum cylinder bracket on the other side. If the 0.31mm wire gets soldered in place simply file it flush on both sides.

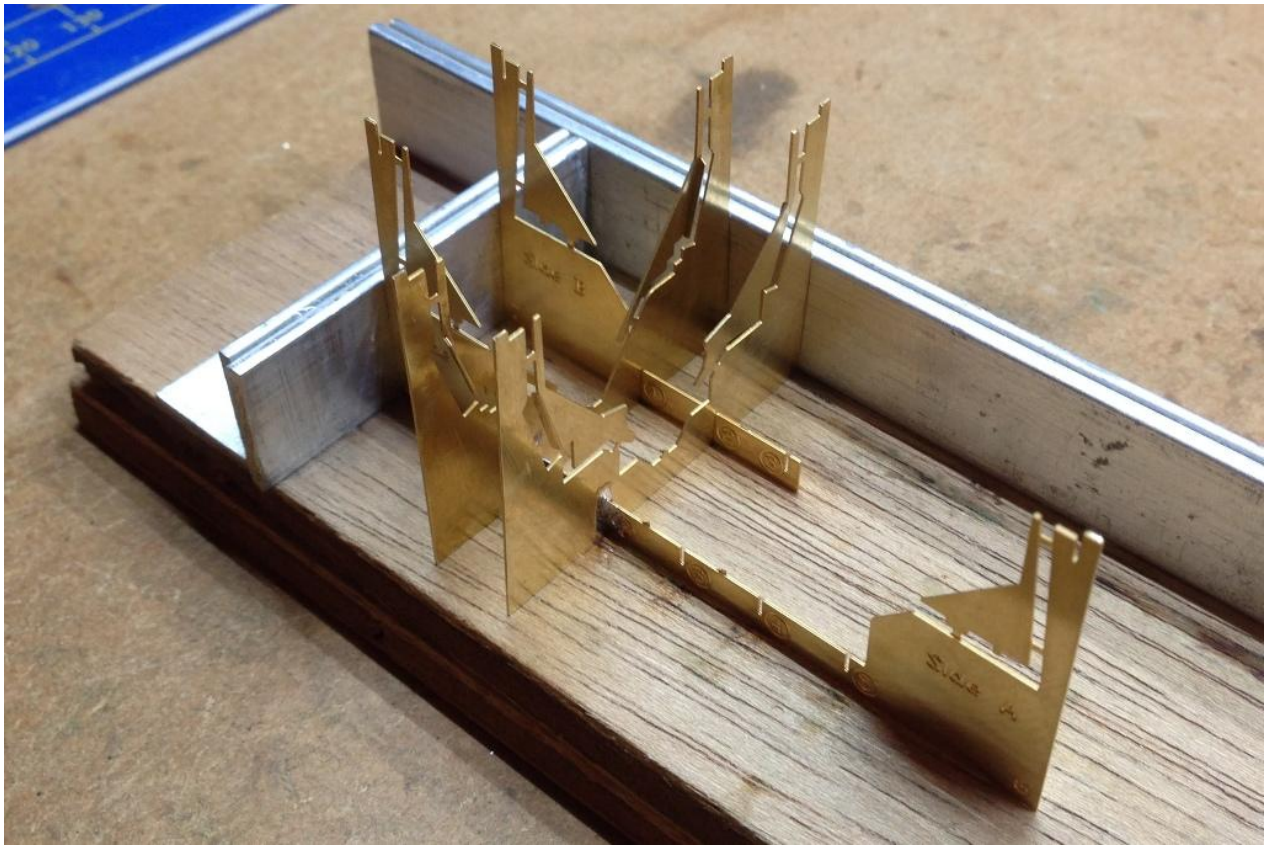
The next job is to assemble the cradle. Firstly side stanchion (1) needs to be soldered to end stanchion (6). This is the longer of the three end stanchions and is labelled ‘Side A’. Use a square or similar to make sure that the two parts are at right angles. It’s important to get these two parts soldered together as accurately as possible. They really should be at right angles to each other and also the bases completely flat. Do make sure that all trace of connecting tag is removed from the frames before assembling them. See image below. Make sure that the side and end stanchion go together at the point on the bottom labelled A on the side stanchion and 1 on the end stanchion.



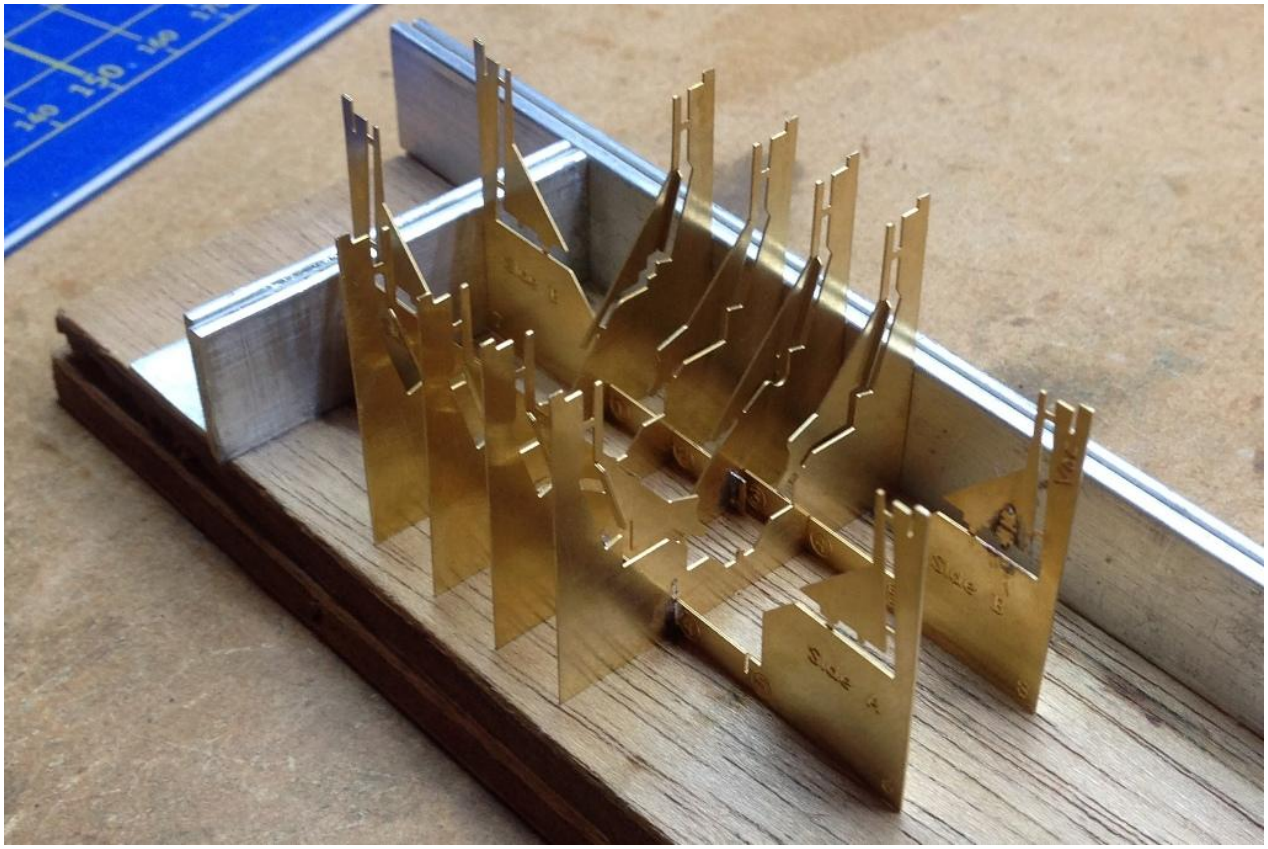
With these two parts arranged correctly it should be impossible to get the rest of the parts the wrong way around if you follow the numbering/lettering at the slots. The numbers at the slots on the end stanchions correspond with the numbering of the side stanchions and conversely the lettering at the slots on the side stanchions corresponds with the lettering on the end stanchions,

I had a jig made of a wooden base and L section aluminium sides that I use for putting coach bodies together which I used for constructing the rest of the cradle but a large square clamped to a workbench should suffice.

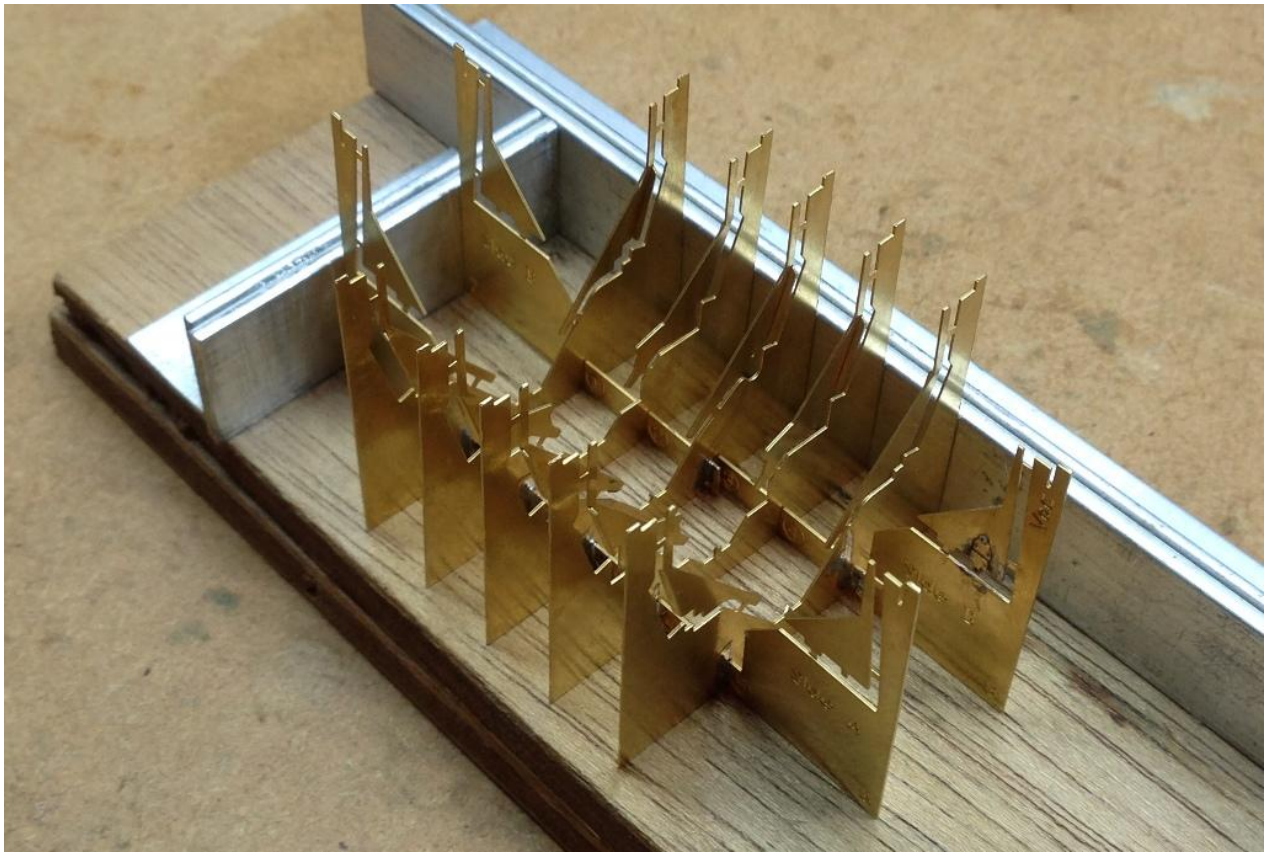
Add side stanchion (2) and end stanchion (7) (the other non-vacuum cylinder one) to the cradle. Make sure that everything is square and flat at the bottom and solder together. Side stanchion (2) should go in slot number 2 on both the end stanchions and slots A and B on side stanchion (2) should correspond with Sides A and B on the end stanchions. See image below. It’s a bit fiddly getting the first few parts of the cradle assembled but the rest should be straightforward. Hopefully you’re getting the idea with the numbering and lettering.



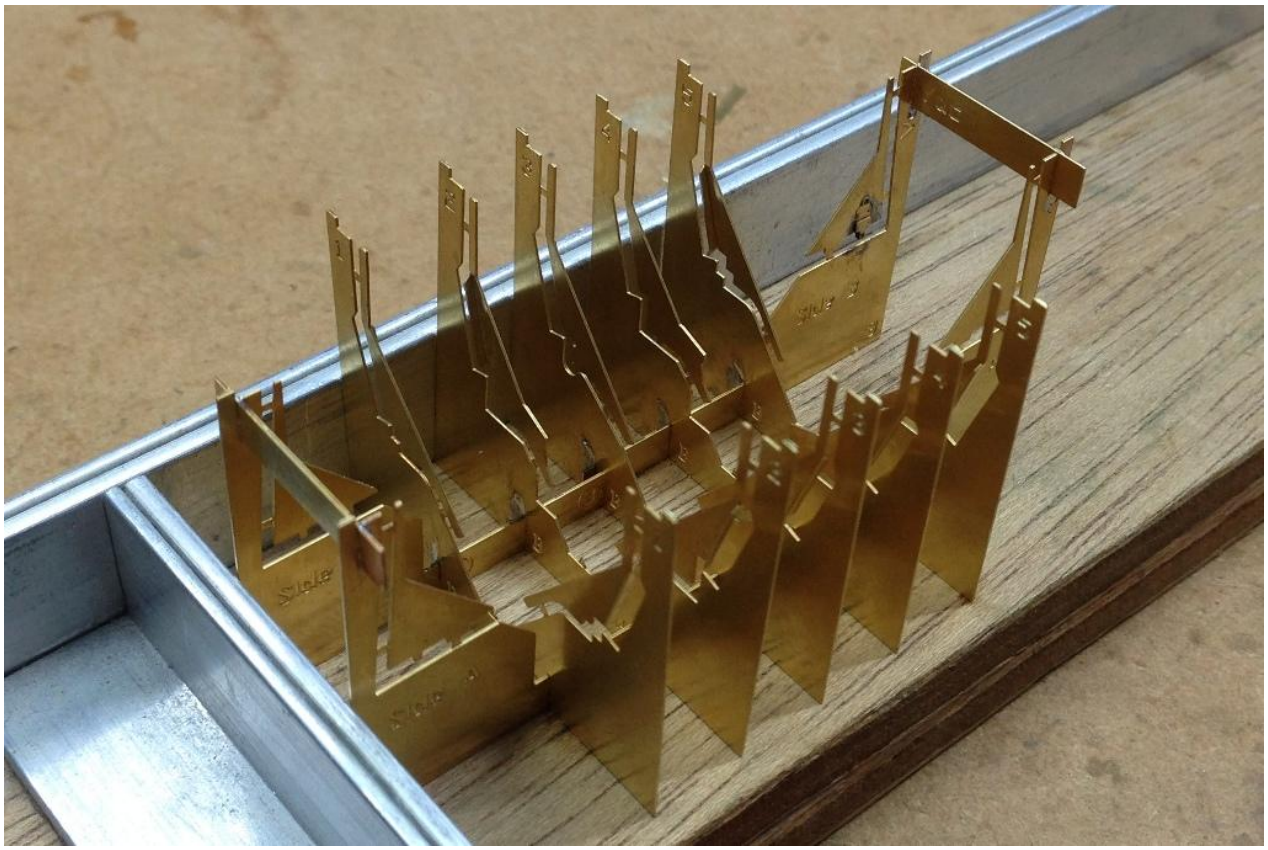
Repeat the process for side stanchions (3 & 4) and also end stanchions (8) (the vacuum cylinder one). Make sure everything is square. End stanchion (8) goes outside of end stanchion (7) and there are a pair of slots on side stanchion (3) to facilitate this.



Fit side stanchion (5) to the cradle.



With all the side and end stanchions assembled you should have something as per the photo below. You should be able to view the cradle from one corner and see all the text on the side stanchions and the end stanchions. If you can't then have a think about which part you can't see the text on, remove it and reassemble it so you can and it's in the right place.



Remove the stanchion frame strengtheners (10 & 11) and fit into the slots on the top of the end stanchions. See image above. Part 11 goes at the vacuum cylinder end, part 10 the other.

Hopper Body

The hopper body (12) is design to fold up as one piece but before you do this, it's easiest to fit detail such as the vees and hopper door hinges when everything is in the flat. This should be done with the hopper still attached to the surrounding fret. Do one side of the hopper first with vees and door hinges and then tackle the other side.

Firstly do the hopper vees (13). They come in pairs with one shorter than the other. Use a piece of mdf or scrap wood to create a jig for attaching the vees by drilling 0.3mm holes into the mdf/wood using the holes for the vees in the hopper as a guide. Insert short lengths of 0.31mm wire through the hopper and into the holes. Make sure the half etch detail on the hopper and the text on the fret is visible.

Make sure the smaller holes in one pair of hopper vees can accept 0.31mm wire and the larger ones 0.8mm wire then remove from the fret. Using the side bending jig on fret δ to set the angle, fold the vees about the fold lines. The angle is about 50° and the fold lines should be on the inside. Place onto the wires on the jig making sure the smaller of the two vees goes to the right on the side. Solder the vees and wire in place and the trim the wire to represent rivets. See image below.

The hopper door hinge overlays (upper) (14) on fret α are arranged in two groups with those for side A on the left and those for side B on the right. Remove three of the rectangular ones and one of the ones with a cut out in for the side you are working on.

There are full thickness parts to the overlays which go into half etched slots at the bottom of the hopper. The one with the cut out in goes against the more central of the two vees. Solder in place. See image above.

With the overlays in place the hinges for the hopper doors can be fabricated. There are two ways to do this with one being quicker than the other. The longer way is to cut four lengths of 0.7mm x 0.5mm tube to 2mm long for each side and to fit those to the hopper body with 0.5mm wire through them. Use another two lengths of 0.7mm x 0.5mm through the fold out tabs on the surrounding fret to align everything and solder the tube to the hopper and the wire to the tube. See image below. The quicker way is to dispense with the tube and just use 0.7mm wire through the fold out tabs on the surrounding fret to create the hinges.

Use a piercing saw to cut the wire approximately 1mm either side of the tube hinges/overlays. See image below. If using just 0.7mm wire use a finger when cutting to keep the blade against the wire and stop it from creating grooves in the hopper.

Remove the hopper door angle X (18) from the fret and use the tabs on the angle to locate it on the hopper. Solder in place. See image below.

Repeat the above for the other side. Remove from the jig and trim the wire through the vees to represent rivets.

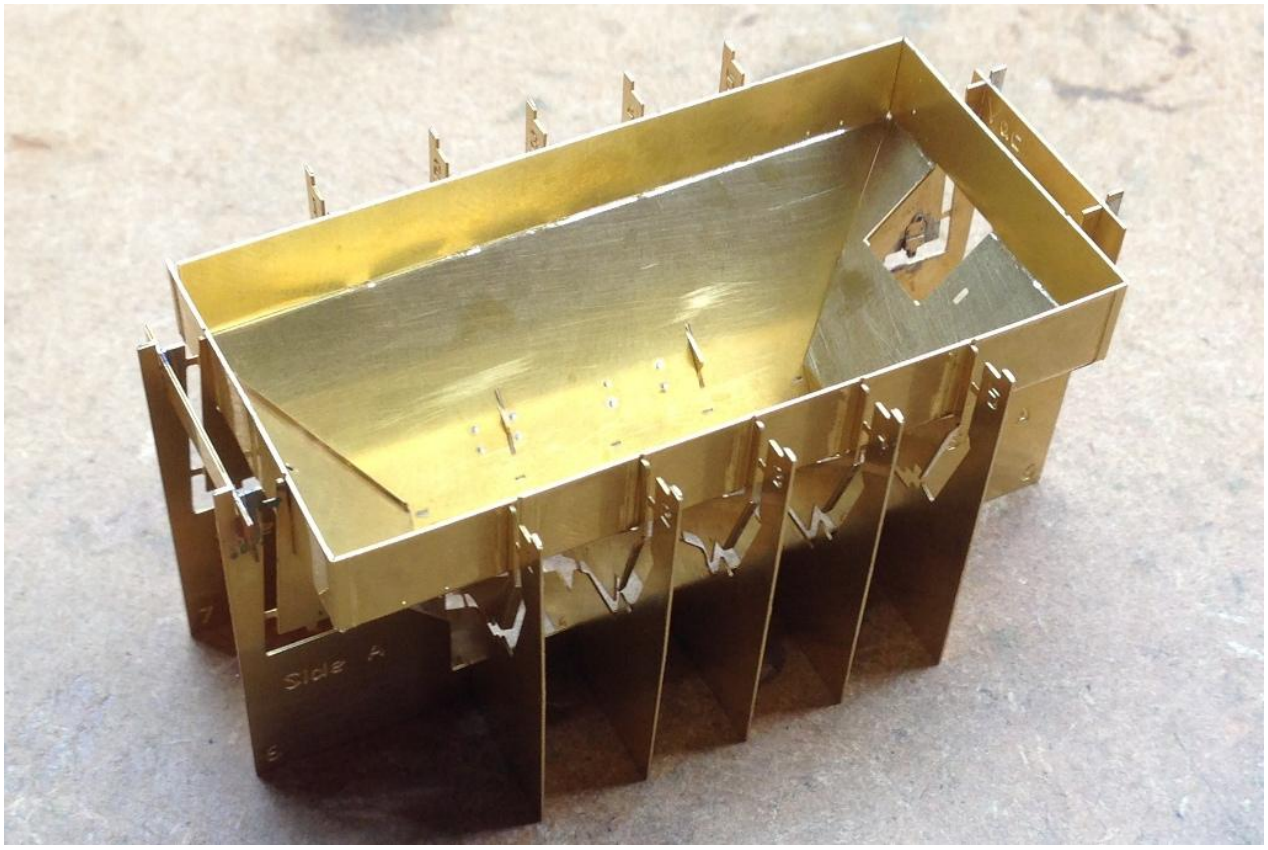
With the hopper vees fitted and the hinges constructed it's time to fold the hopper up. To do this you will need to create a fold line along the back to the hopper. There are half etched fold lines on the backs of the stanchion parts which you can use as a guide for the line. Use a strong straight edge and a scrawker type blade or stanley knife to create the fold line. Be careful if the blade is really sharp. You want to create a line the fold can follow but not cut all the way through the brass. Ideally you want to go almost though the brass to make the fold as easy as possible. Use something like track underlay to support the hopper when you do it as it's not flat on the detail side. Take you time and keep the line straight and in line with the small etched fold lines.

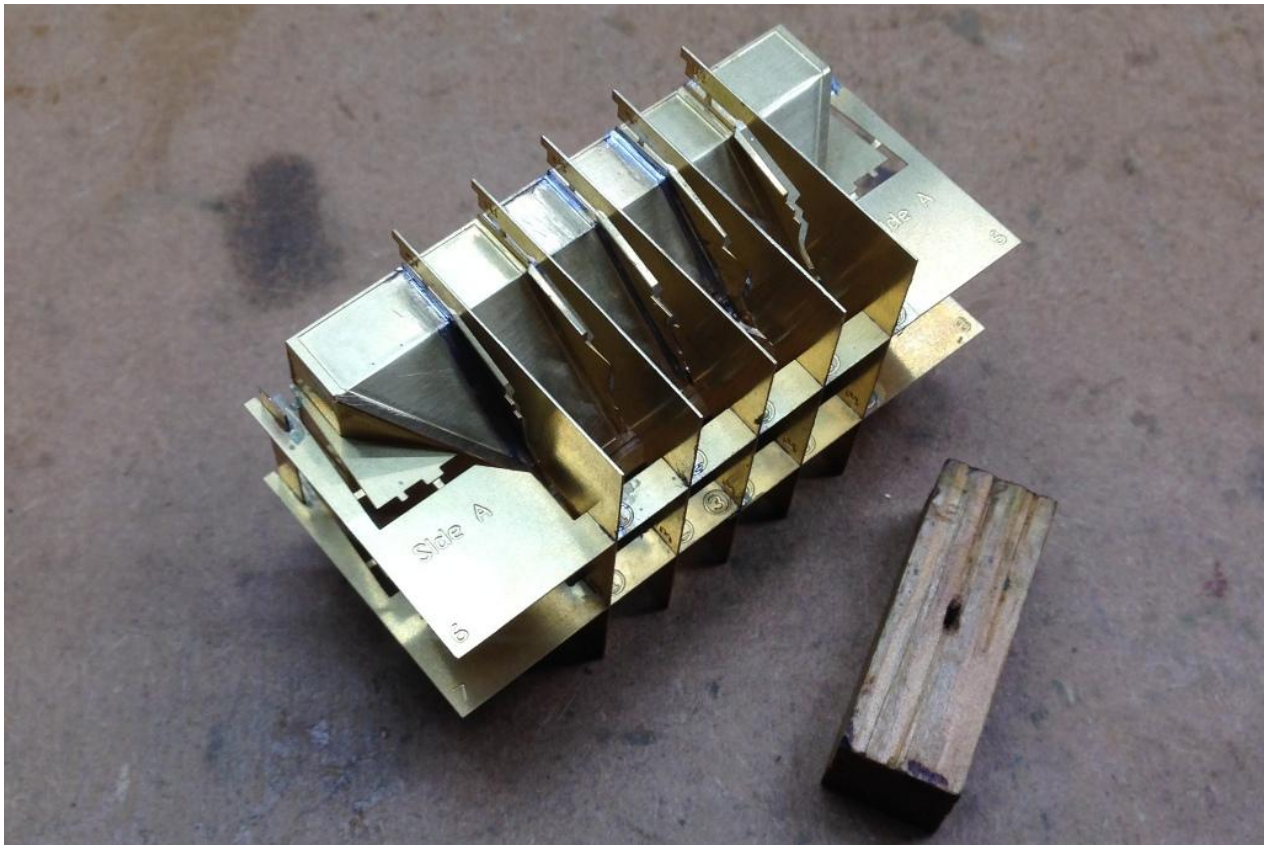
With the fold line created the hopper can be folded up. There are side and end bending jigs on fret δ to help get the fold right. The ends will also need folding at the top of the rectangular spreader plate located at the bottom of the ends. Do one part at a time. If the fold is a bit hard then consider deepening the fold line.

Double check that the sides and ends match the angles on the jigs. This is important as the closer you can get them the easier they will be to fit to the cradle.

The hopper can now be folded up into a box using the three fold lines between the sides and ends. There are two long slots in each of the hopper sides; make sure they can all accept the thickness of the brass. Use one of the jigs to make sure.

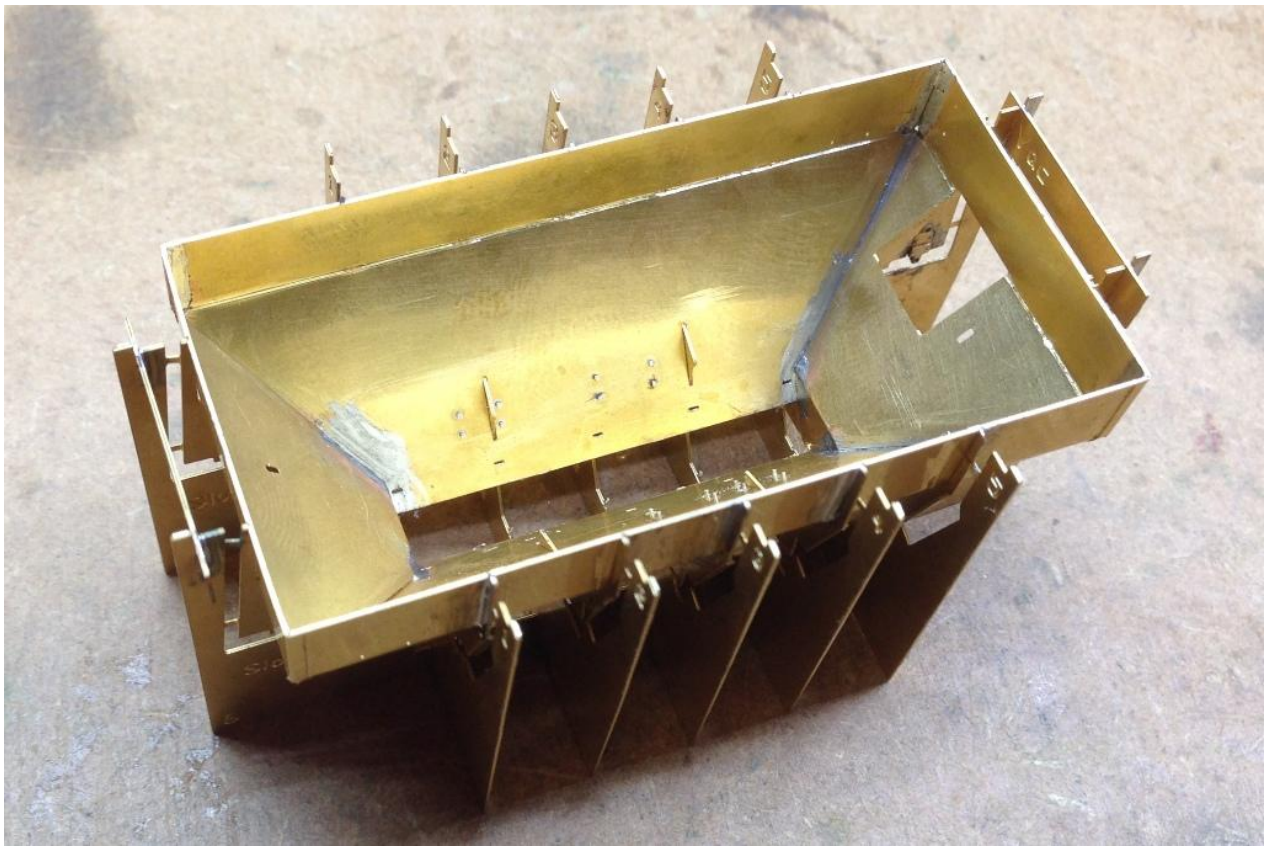
Fit the hopper into the cradle. Do this carefully making sure the stanchions on the cradle fit into the half etched slots on the hopper sides and the stanchions on the ends are outside of the full thickness parts on the hopper. There are parts on stanchions 2 and 4 that need to fit through slots in the hopper as well. Also make sure that the end on the hopper with the cut out for the vacuum cylinder goes at the vacuum cylinder end on the cradle. Make sure the hopper is fully home in the cradle so that the top of the stanchions are in line with the top of the hopper.

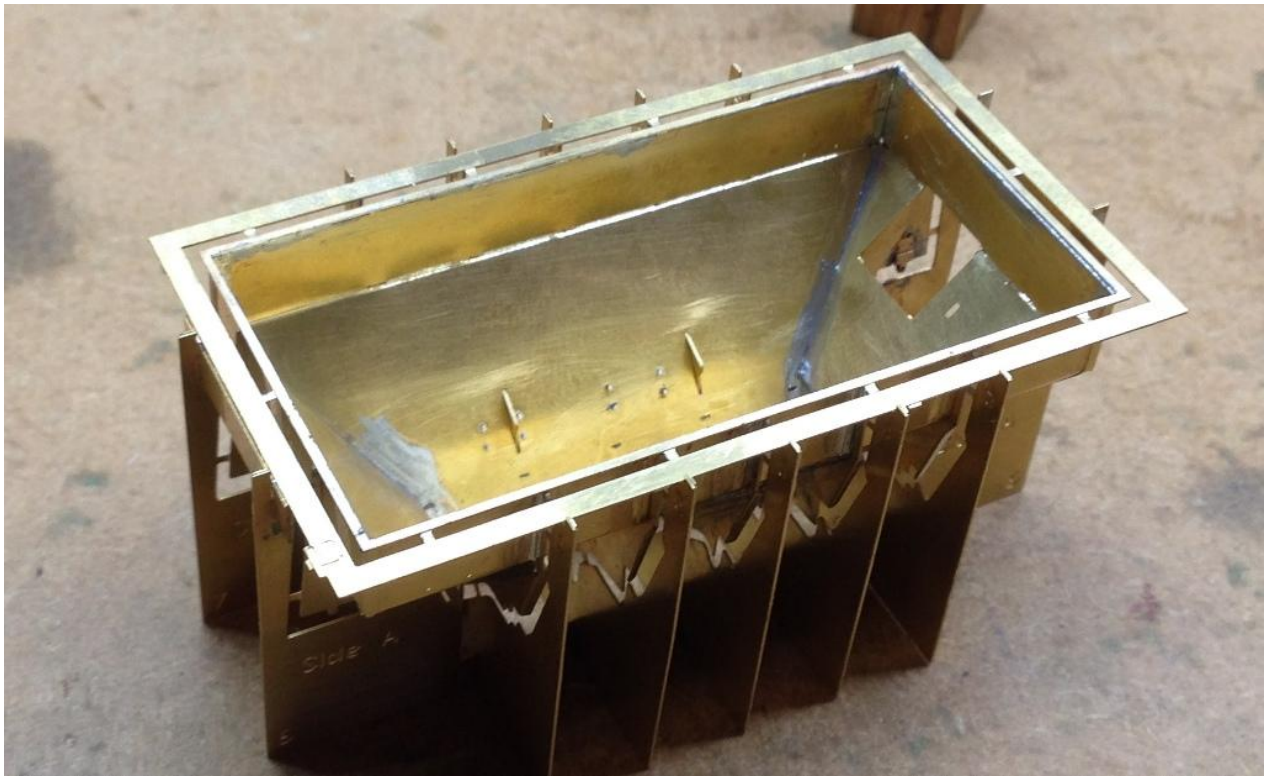




Solder the side stanchions only to the hopper. See image above. Again make sure that the stanchions are fully home in their half etched slots. Make sure the side stanchions are soldered along their complete length. This is a bit of a finger burner so use a small piece of wood or similar to hold the hopper against the stanchions. Don't solder the end stanchions in place; they will be fitted to the underframe first before soldering to the hopper.

With the hopper soldered to the side stanchions solder the hopper in the four corners. Make sure the butt joint in one corner is as good as possible. On this corner **the side goes inside the end**.

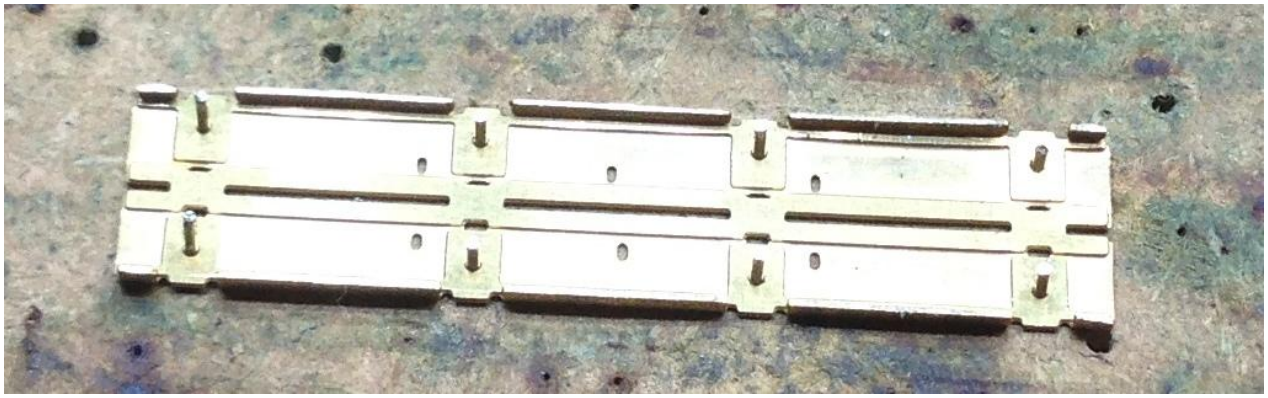




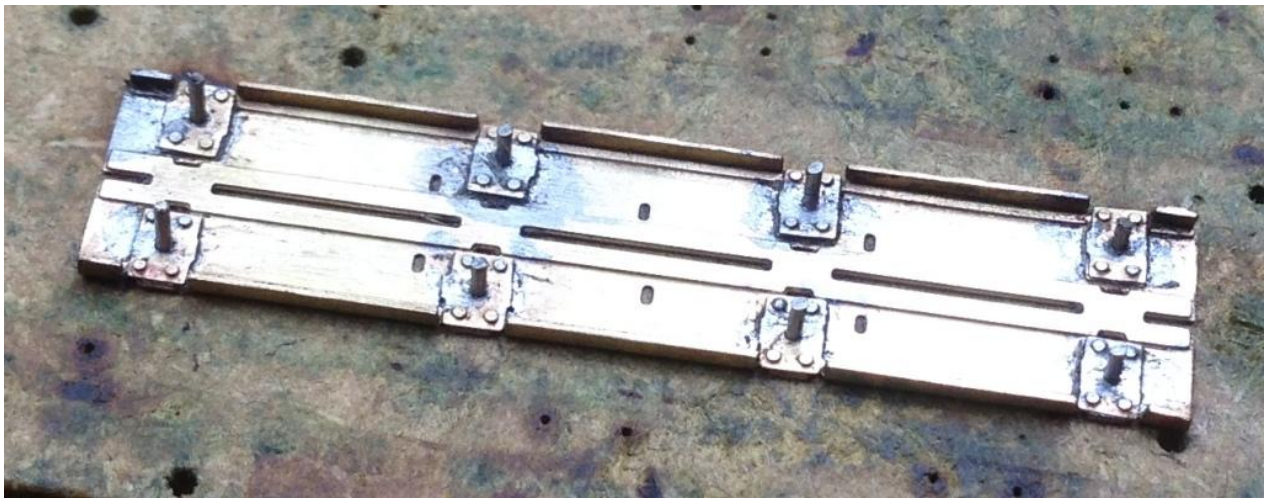
Remove the hopper top flange (15) from fret β making sure that it is still attached to the frame with the number 15 on. Remove the fret with parts 53-56 on from the middle and put to one side. The hopper top flange needs to be fitted to the top of the cradle. There is a recess in the top of the side and end stanchions into which the frame of the hopper top flange fits. See image above. Solder in place making sure that the top flange is as flush with the inside of the hopper as possible. Solder in place.

With the side stanchions and hopper top flange fitted and the hopper all soldered up it can be removed from the cradle. The material in the cradle is now sacrificial so don't worry about cutting it up to get to the tags joining the side stanchions to their frames. Remove the four end stanchions from what's left of the cradle and put to one side.

Next the hopper door needs putting together. Remove the hopper door (16) from the fret. Along the outer edges are ten short strips that need folding up. Next create an assembly jig by using a 0.5mm drill to drill eight holes into a piece of mdf/wood through the hopper door. Insert eight short lengths of 0.5mm wire through the hopper door and into the holes. See image below.

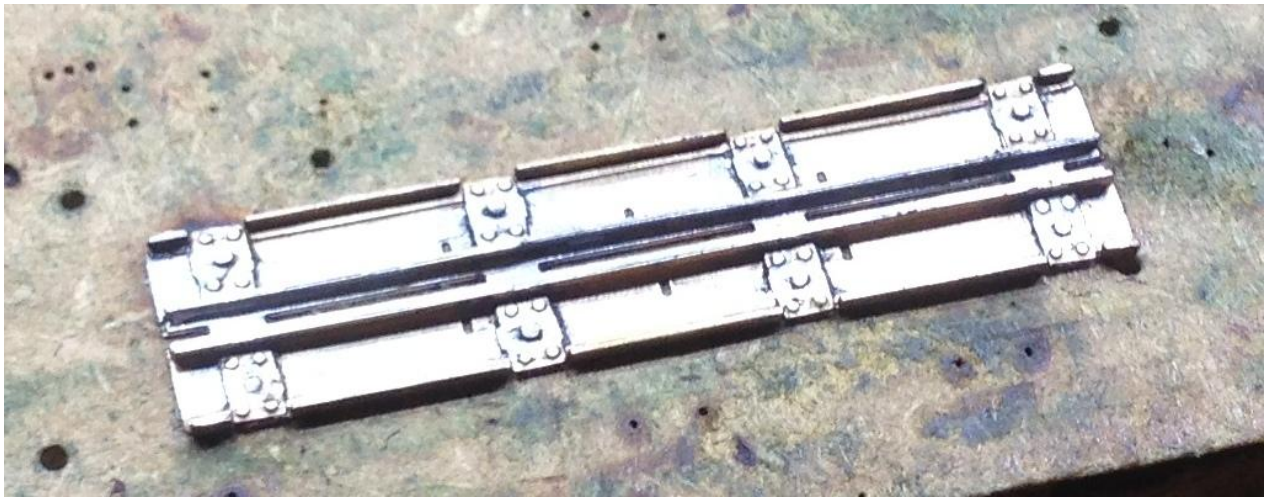


Make sure that the holes in the hopper door hinge overlays (lower) (17) can accept 0.5mm wire and remove eight of them from the fret. Thread the overlays onto the wires and then the hopper door on the jig with the rivets facing. Solder the overlays in place and the wire to the hopper doors.



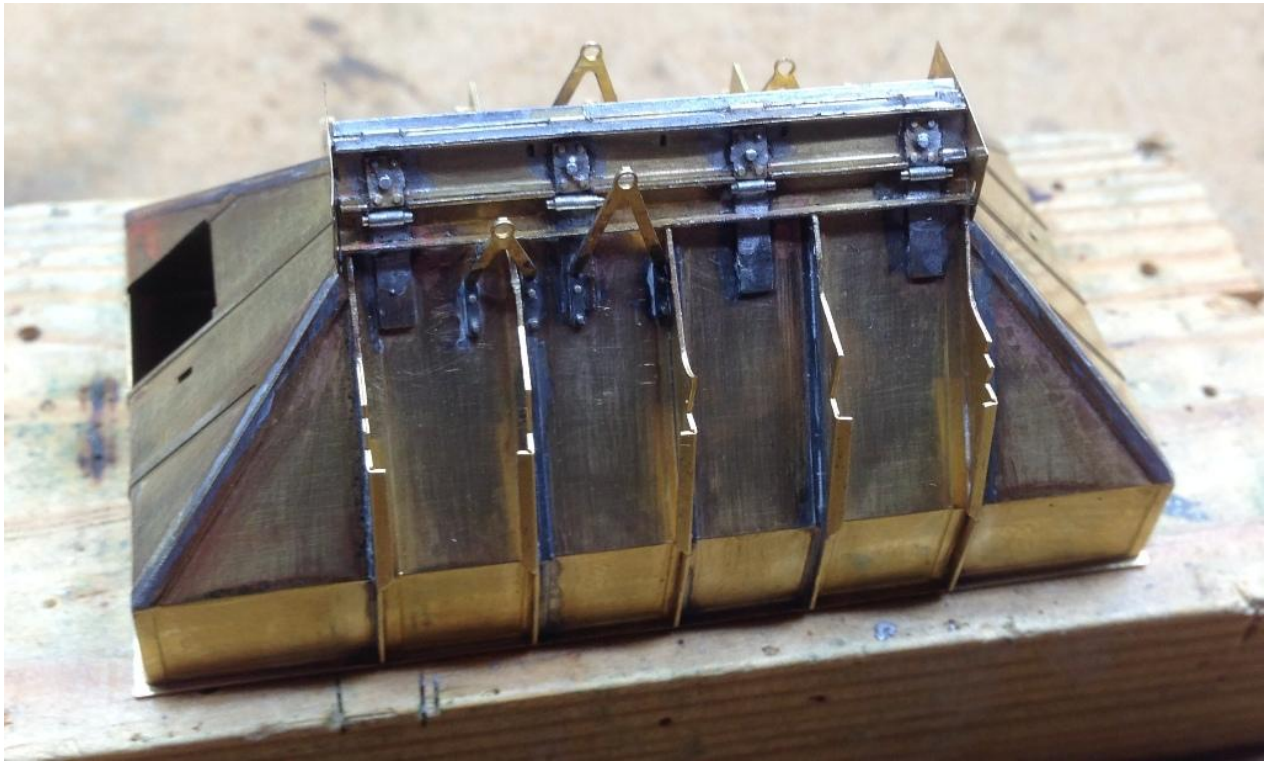
Trim the wire and file the wire back to represent a rivet in the middle of the four etched ones on the overlays.

Remove the hopper door angle Z (19) from the fret and locate into place on the hopper door using the tabs on the angle and slots on the hopper door. Solder in place.



Remove the hopper door from the jig and file the wire on the back so it's flush. Fold the hopper door to match the profile of the hopper sides. The fold lines between the two sides of the hopper door should be on the inside. Check against the hopper body and adjust if necessary.

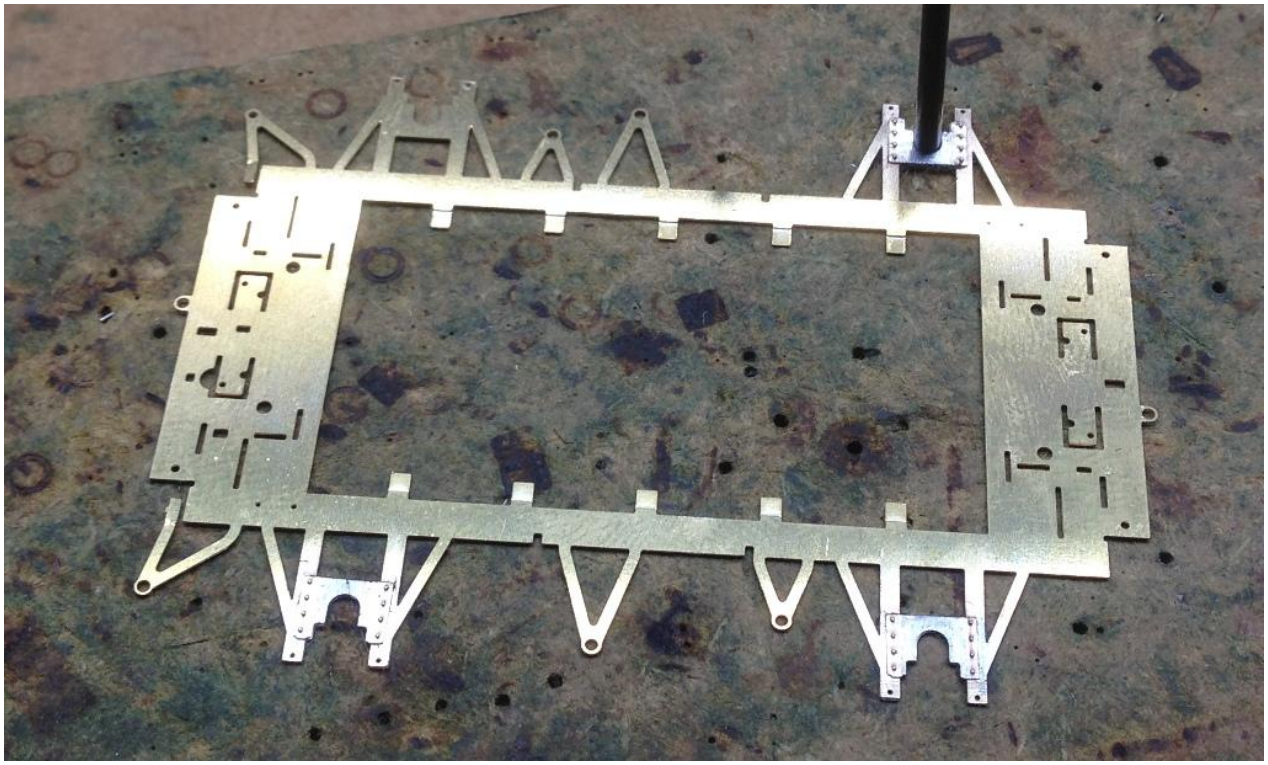
Solder the hopper door to the hopper body.



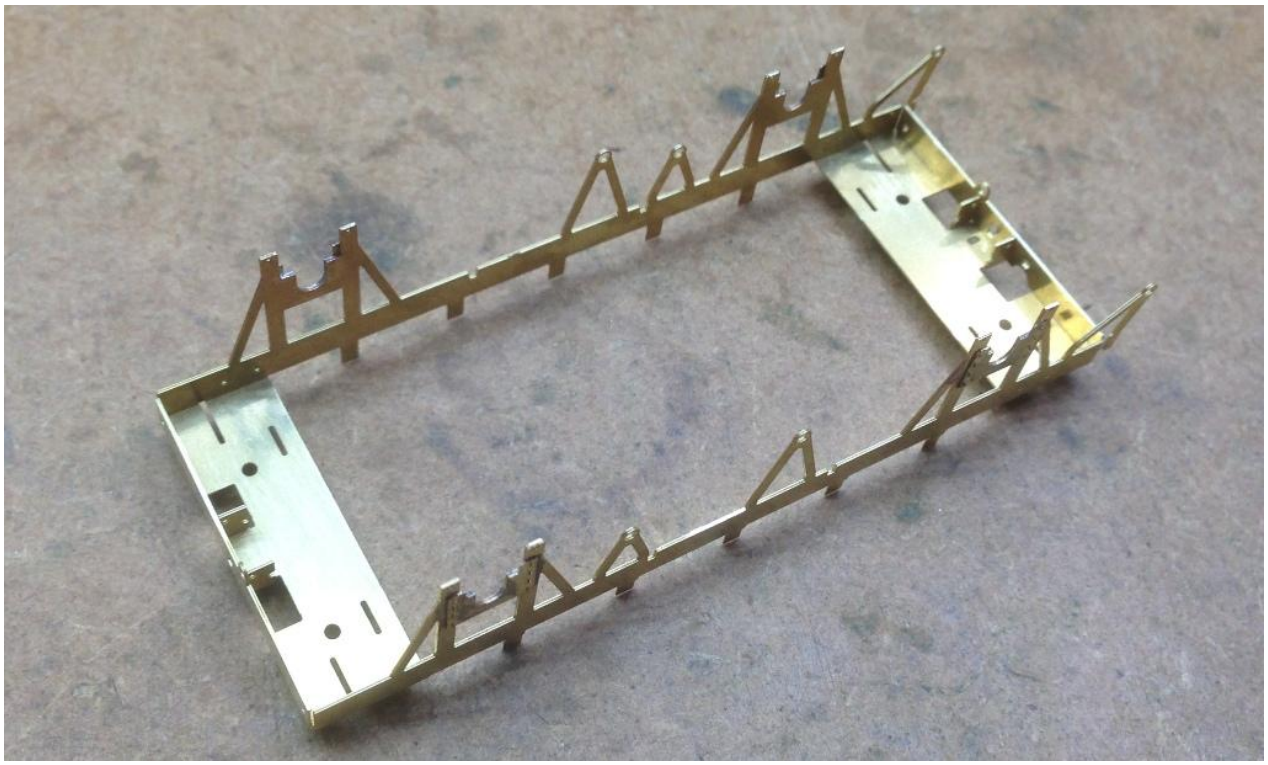
Underframe

With the hopper basically complete attention can turn to the underframe.

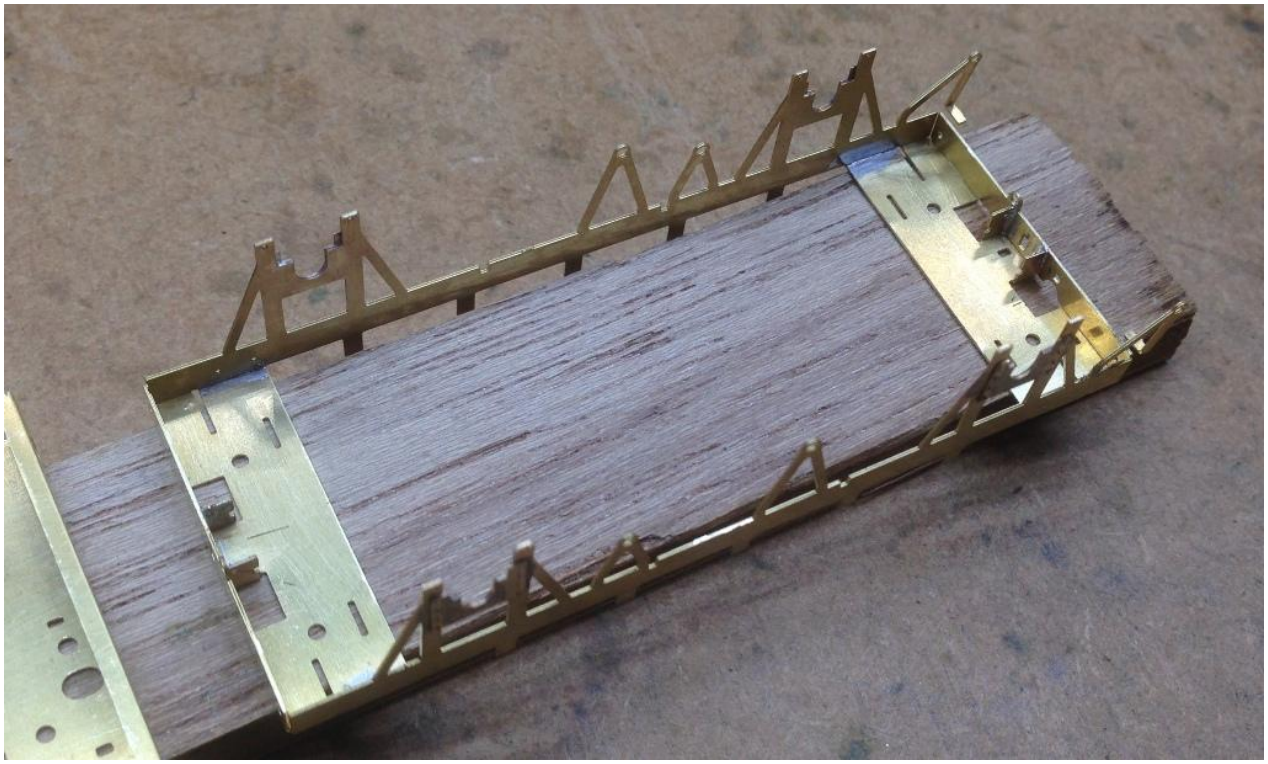
Remove the axleguards (21) from the fret along with the reinforced axlebox guides (22). Remove the fret with the spring carriers on from the middle of the axleguards. The axlebox guides need to be soldered to the axleguards. I find a length of 2mm rod (or the shank of a 2mm drill bit) inserted into a piece of mdf/wood useful to help align things. The axlebox guides go on the side of the axleguards part without any fold lines on. Solder in place. See image below.



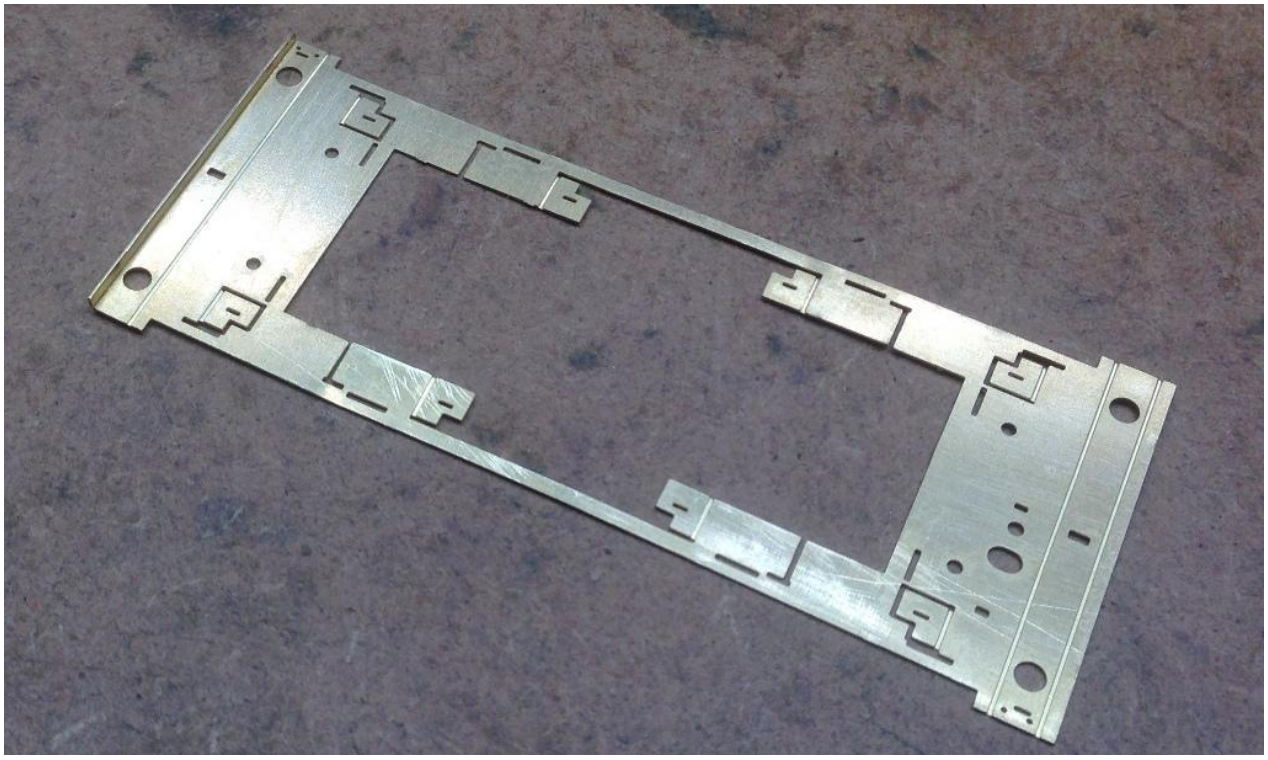
Next fold the axleguards up at the sides and ends. Make sure all the folds are at 90°. Also fold up the four tabs in the middle of the ends and the small tabs at the very ends of the two outer vees. See image below.



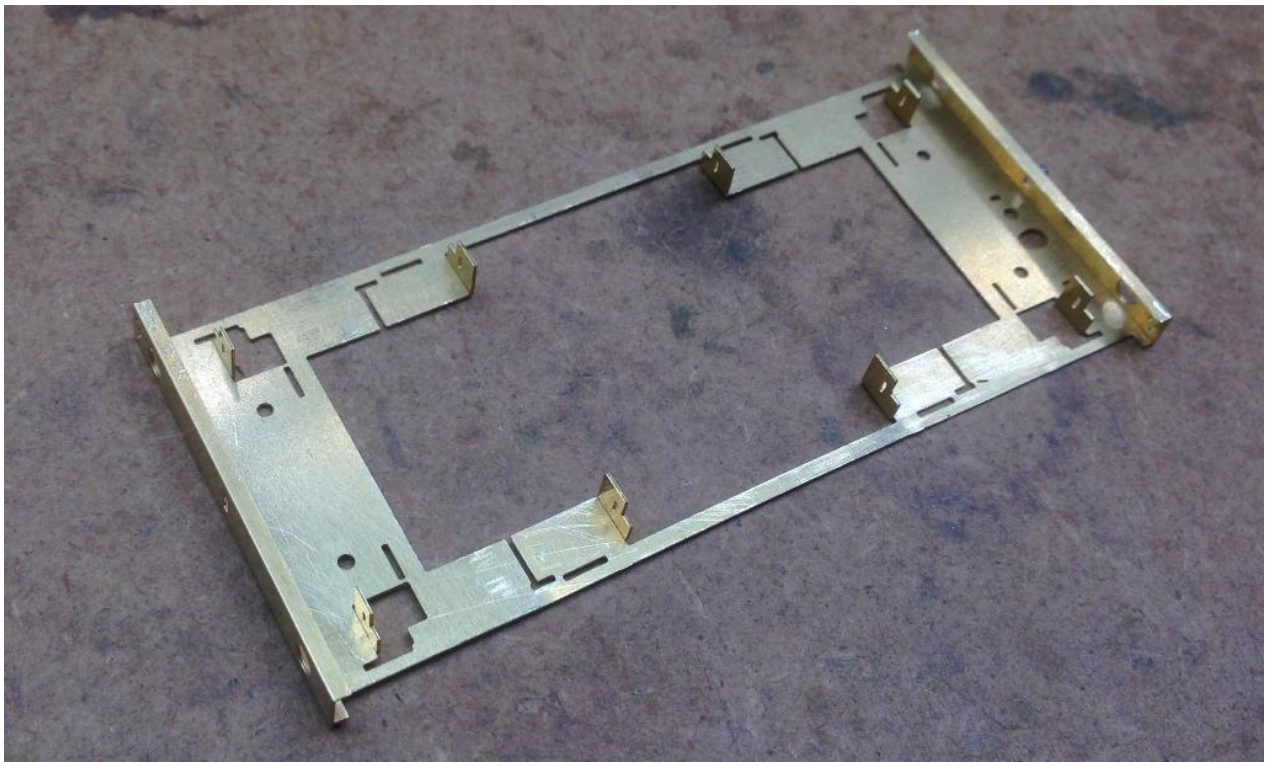
Reinforce the fold lines between the sides and the stretchers with solder.



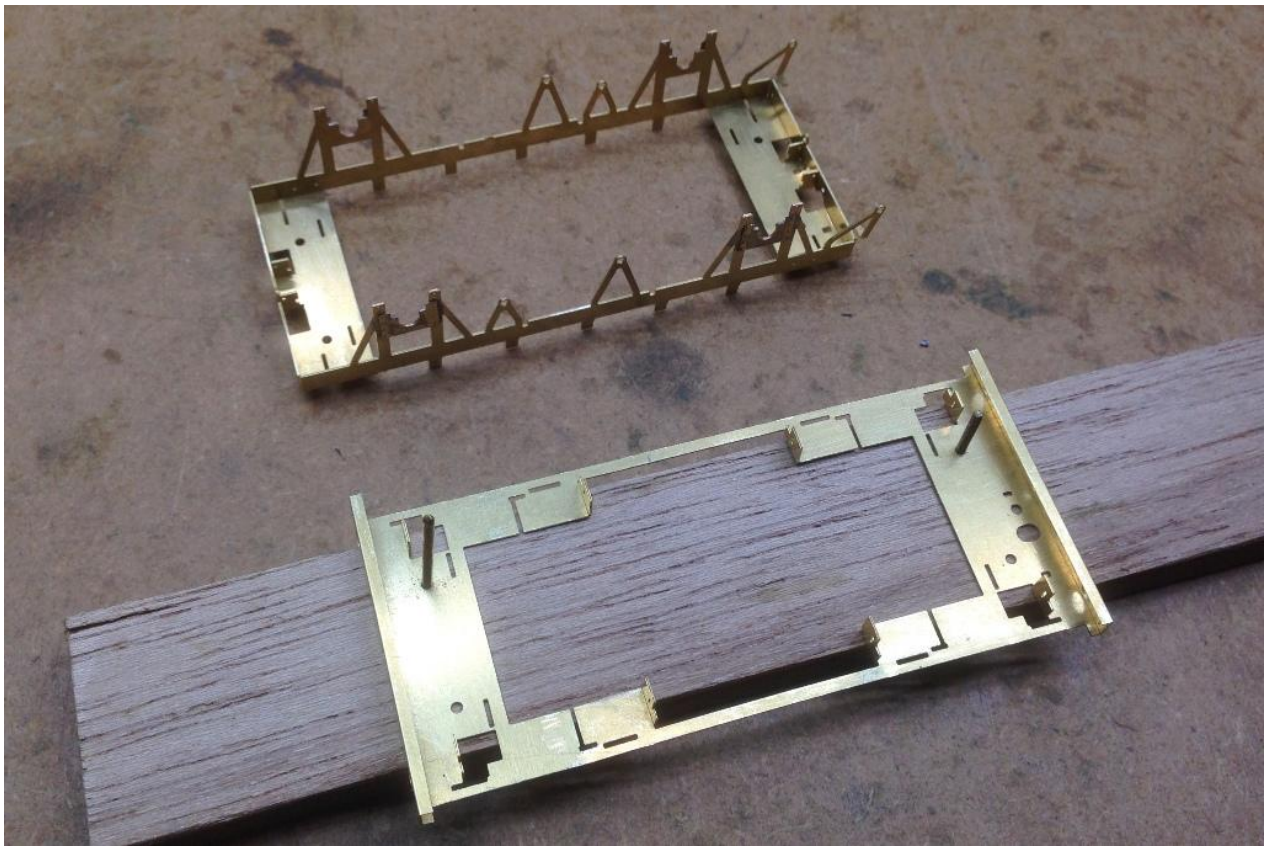
Remove the chassis top plate from the fret and remove the fret containing the solebar detailing (29) from inside the chassis top plate. Check the fit of the cast buffers in the large holes. Now is the best time to do this as it's easier to adjust the holes if necessary now rather than later. You will need to fold the ends up to form the headstocks. There are two sets of fold lines at each end and the part will need folding through 90° at each of these lines. Start at the outer ones first and then do the inner ones. Make sure all the folds are at 90°.



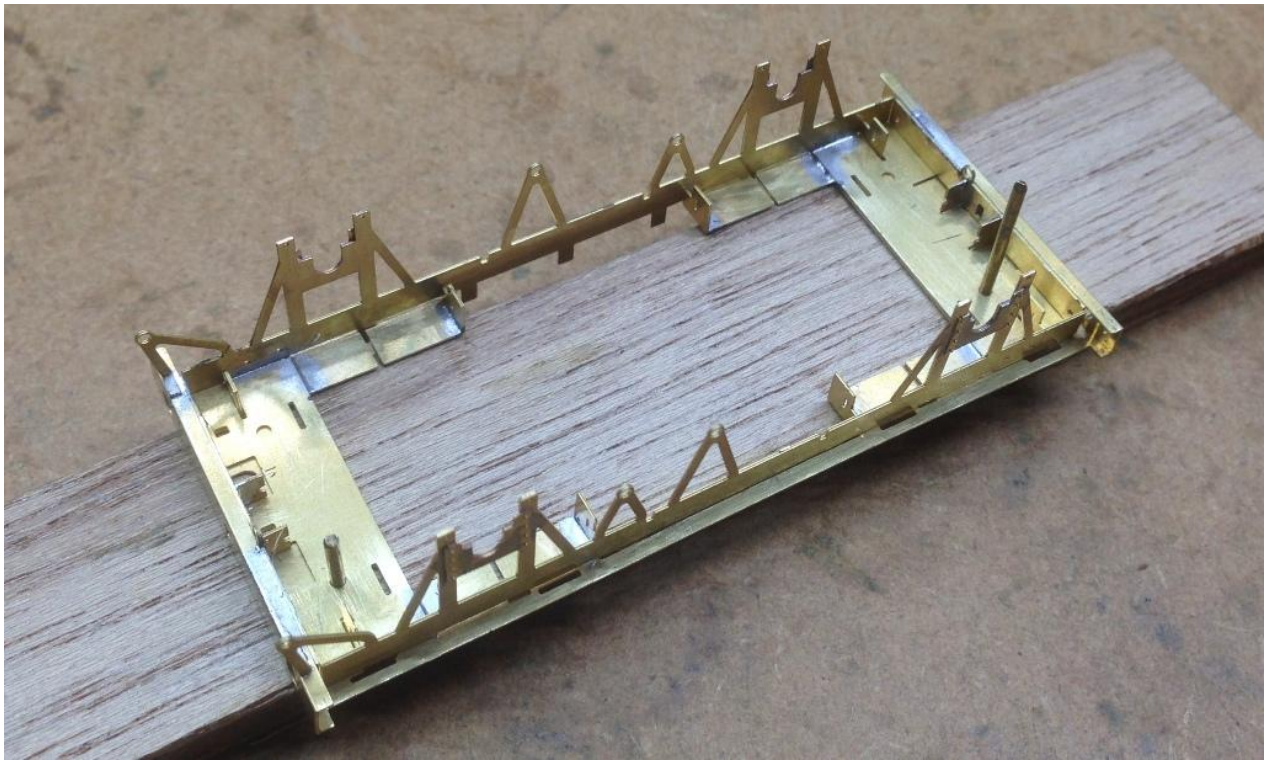
With the headstocks formed, fold out the eight small tabs with slots in that will form the fulcrum points for the springs and location for the brake shoes. See image below.



Next use the chassis top plate to drill four 1mm holes into a piece of wood that is narrow enough to allow the axleguards to sit on top of. This will mean you need a strip of wood between 15mm and 24mm wide. This will create a jig to assemble the chassis top plate and axleguards together with. Use short lengths of 1mm wire with the ends tapered slightly to pin the chassis top plate onto the piece of wood. See image below.



Place the axleguards over the top using the 1mm wire pins to align things. Make sure that the end of the axleguards with the vees on goes at the end of the chassis top plate labelled B.



Solder the two parts together including soldering the vees at the end to the underside of the headstock and the eight tabs on the chassis top plate to the axleguards.

Next you will need to put the solebars together. There are two sets, one for side A and one for side B. Do one set at a time to avoid mixing them up. It doesn't matter which way around you do them but as side A is numbered first I'll go through assembly of those.

Remove the solebars (side A) (25) from the fret and fold into an L shape. I find the best way to do this is in a vice.

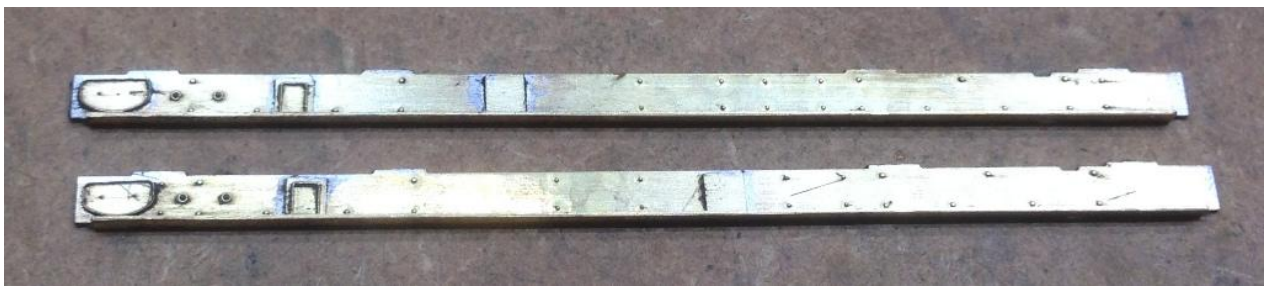
Remove the corresponding solebar overlays (26) from the fret. As a result of the etching process there should be a curve through them with the ends closer to you if looking at the rivet detail side. Carefully bend them so that the curve is reversed slightly and that the ends are further away when looking at the rivet detail. This can easily be done between thumb and forefinger but take care not to put any folds into it.

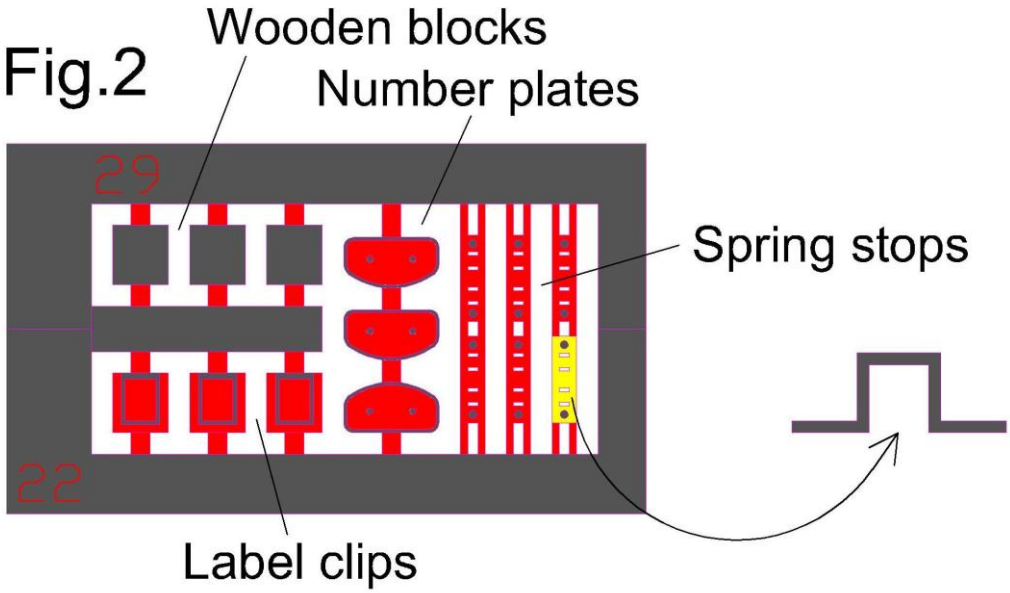
The solebar overlays are designed to fit into the slots in the solebars. The completed solebar then locates into the slots in the chassis top plate. Locate the solebar detailing overlay in the solebar and tack solder in pace. Note that there is a right round for the overlays. If in doubt the notches for the brake lever guards should be on the right with the holes for the horsehooks to the left. See image below.

Now is probably the easiest time to attach the solebar detailing to the solebars so I shall cover this now before returning to the business of assembling the chassis.

Solebar detailing

The solebar detailing (29) comes contained in the little fret that was inside the chassis top plate. See Fig. 2 at the top of the next page. On it you will find fabricated axle spring stops, D shaped number plates, label clips and a rectangle that is actually a block of wood on the real thing. I have no idea what the purpose of the last item is but it was quite common. I assume it was for pinning instructions to. The image below shows a typical arrangement of the various details but this did vary a little so check your prototype. The number plates, label clips and wooden blocks can then be soldered on the solebar.

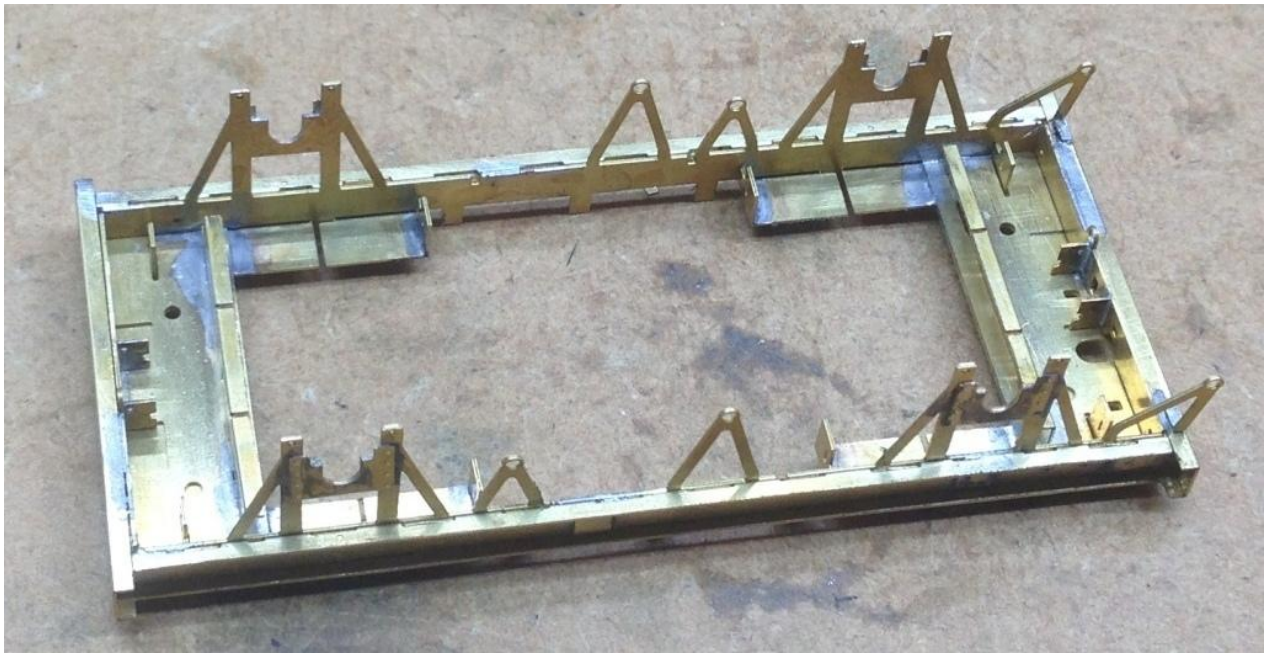




The solebar can now be fitted to the chassis. There are slots and tabs to aid location and the ends go into the channel that is the headstock. The solebars for side A go on the chassis so that the vees at the end (these are for the vacuum brake shaft) are on the right. The rivet detail will also match the vees in the middle. Solder the solebar in place.

Repeat for side B.

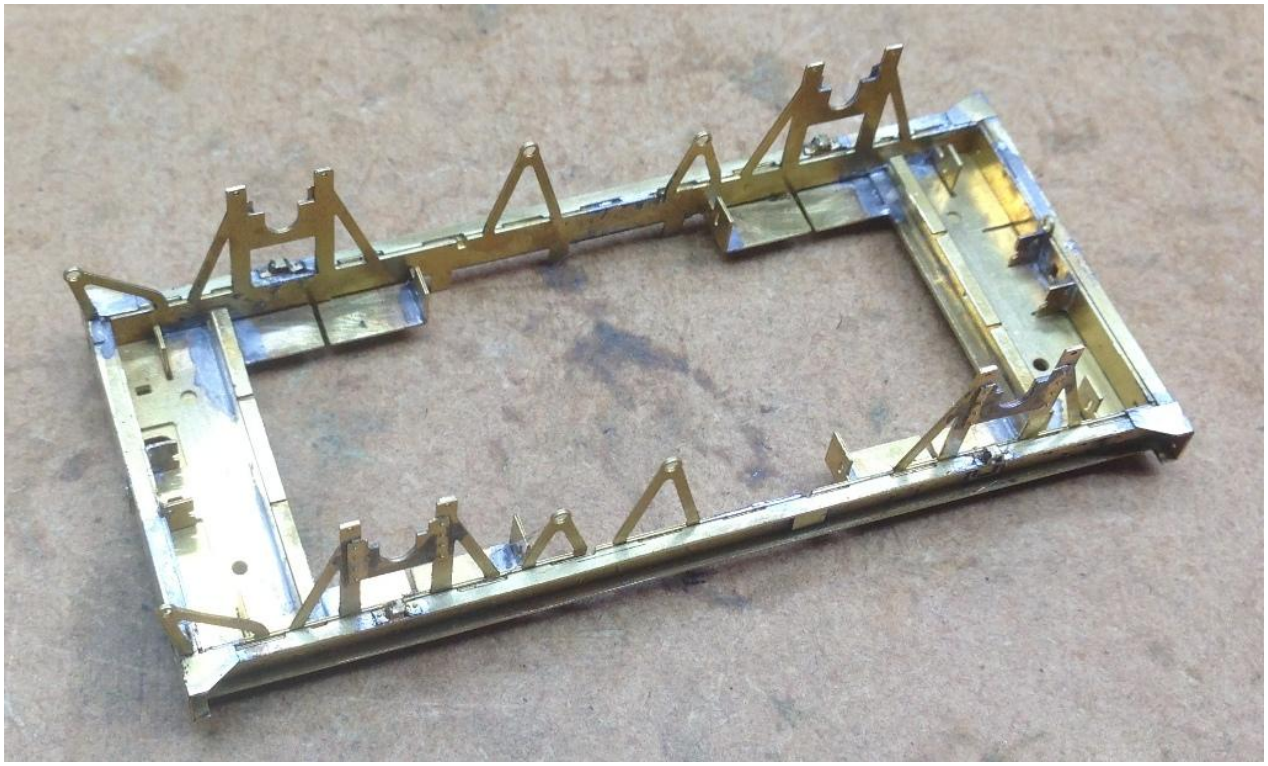
Remove the transverse chassis angle (24) from the fret and fold into an L. Fit to the chassis as per the image below with the L facing towards the middle of the chassis. There are tabs on the angle and slots in the axleguards part to aid location. Solder in place.



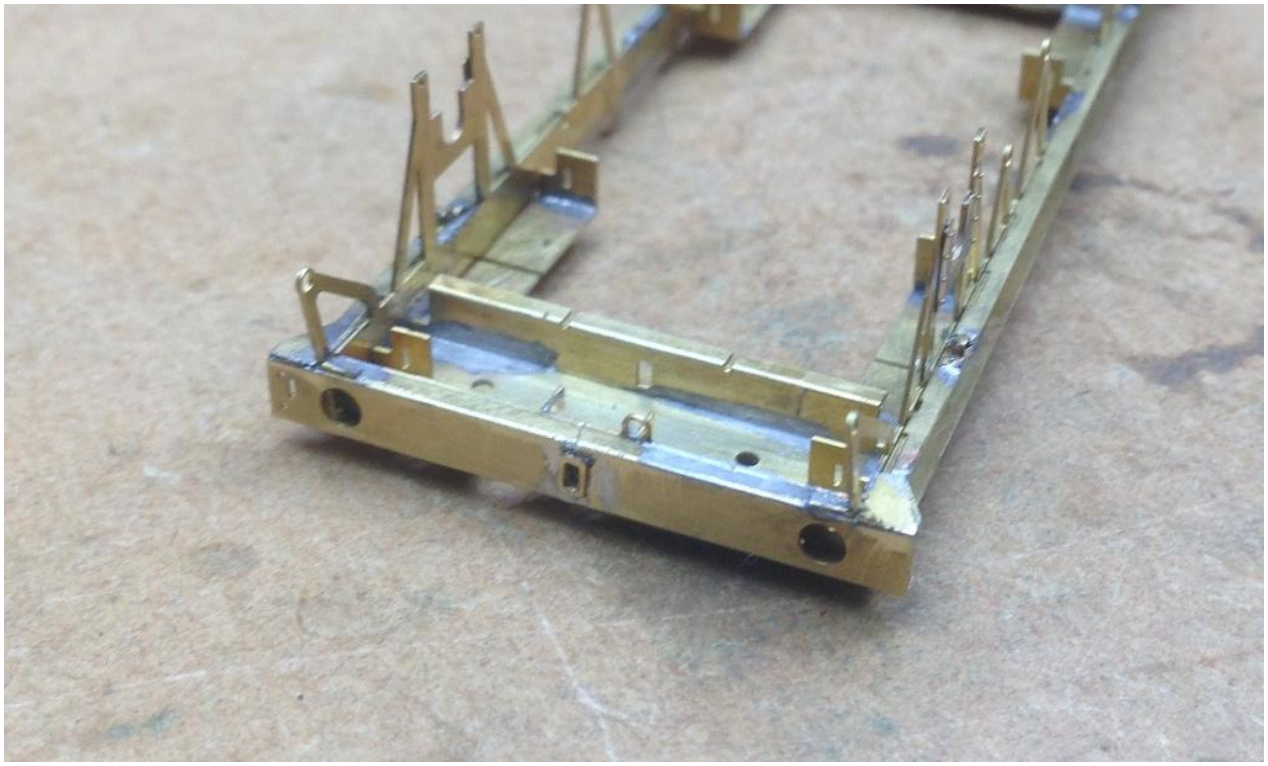
Fold up and solder the spring stops to the underside of the solebar. There are half etched circles on the bottom of the solebar to aid location. A pair of tweezers and some paste flux is useful for fitting them.

Fit the corner plates (30) to the bottom of the headstocks and solebars. See image below. The straight edges go along the outside of the headstock and the inside of the solebar.

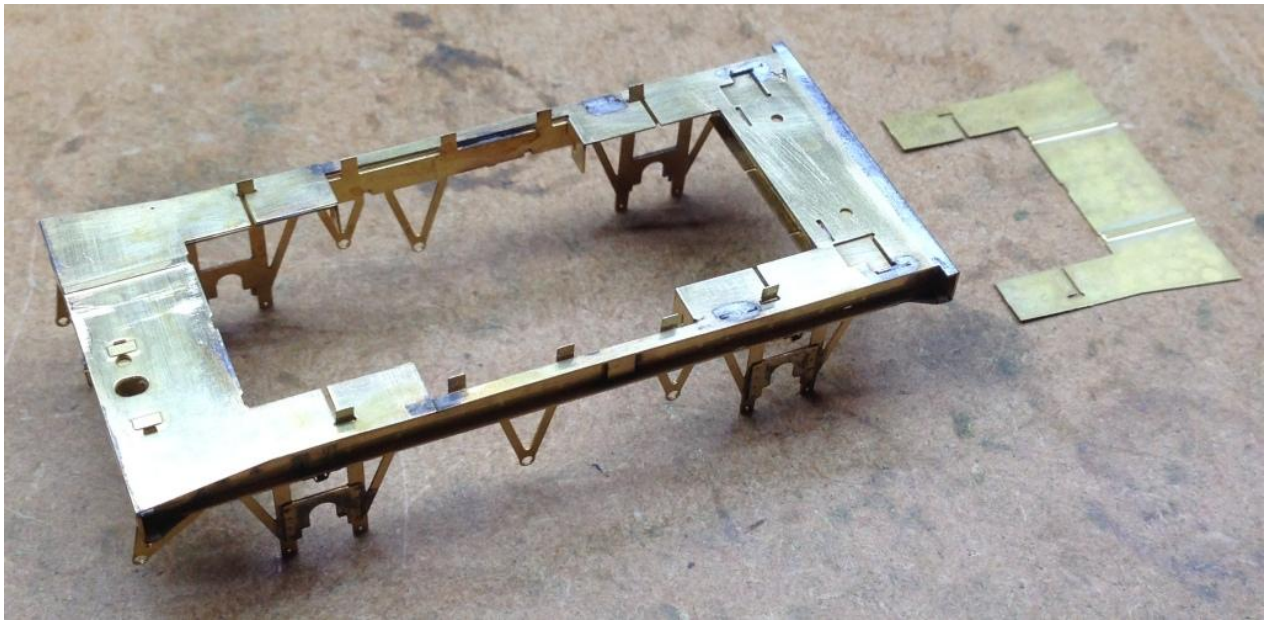
Make up two horsehooks from 0.31mm wire. This should be a C shape with the tails fitting into the pair of etched holes at the left hand end of the solebars. These tails will need to be pretty much flush with the inside of the solebars. I soldered them in place and used a chisel shaped knife blade to cut them. If you want a close up picture of them in place then see the image on page 53 in the section on the end steps.



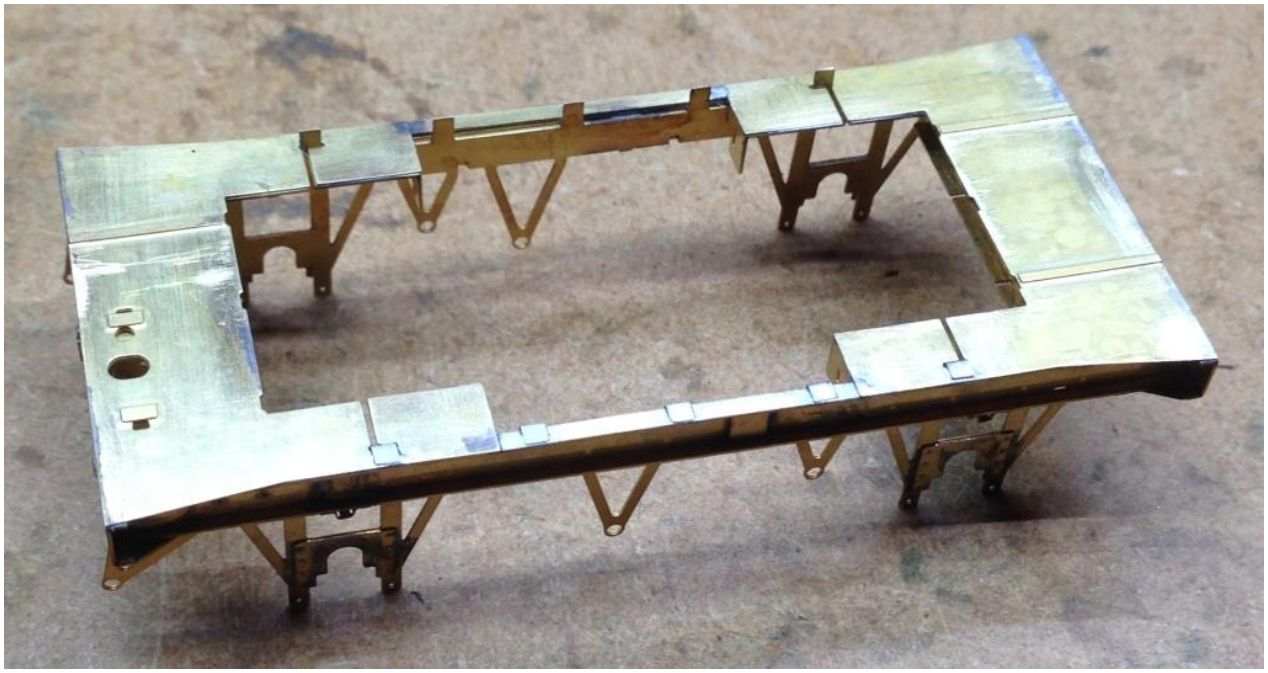
Remove and fit the coupling pockets (31) to the headstocks. I find a cocktail stick filed to the rectangular shape of the opening useful when doing this. Solder in place.



The chassis end plates will need fitting to the top of the chassis. There are two; one for the vacuum cylinder end (33) and one for the other (32). Remove from the fret and solder in place at the correct ends. The vacuum cylinder end plate will go at the end with the vees. Take care to get the plates aligned along the headstock at the ends and sides.

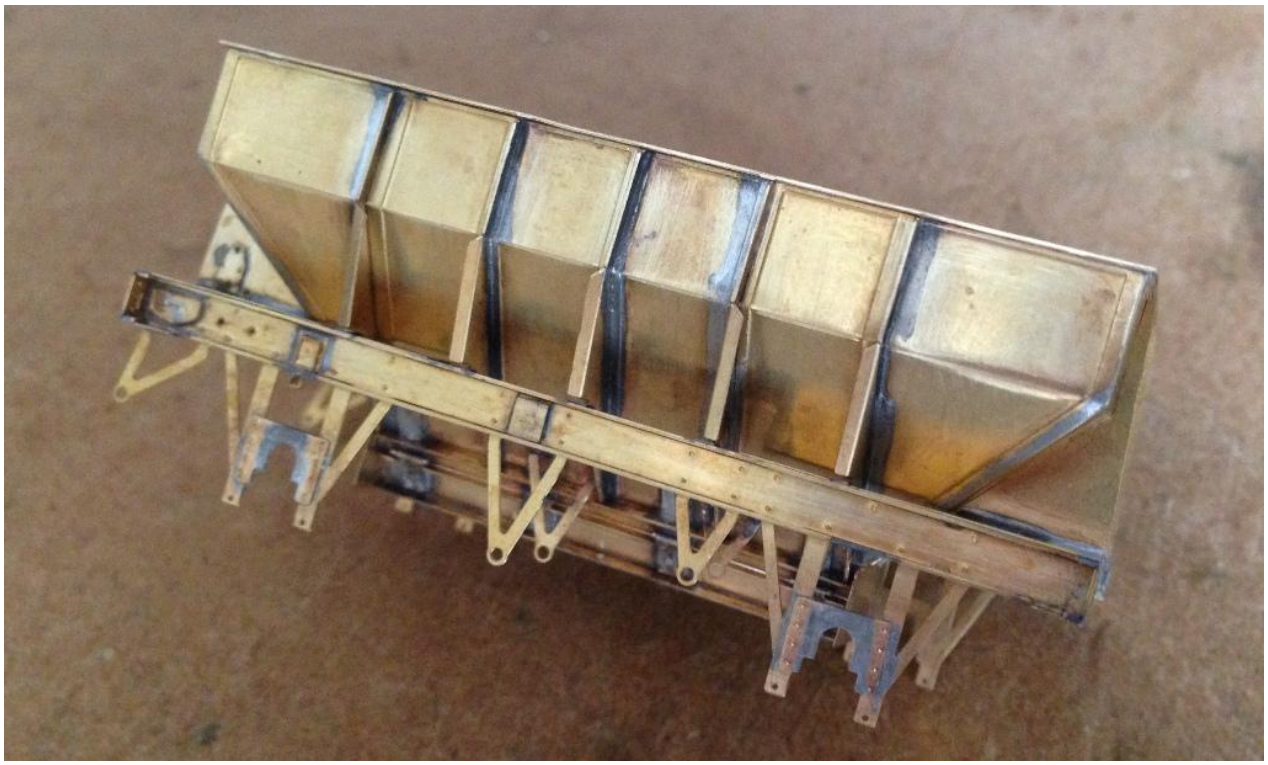


There are five protruding tabs on each side of the chassis. These need folding over hard against the top of the chassis and soldering in place. The side stanchions will sit on top of them.

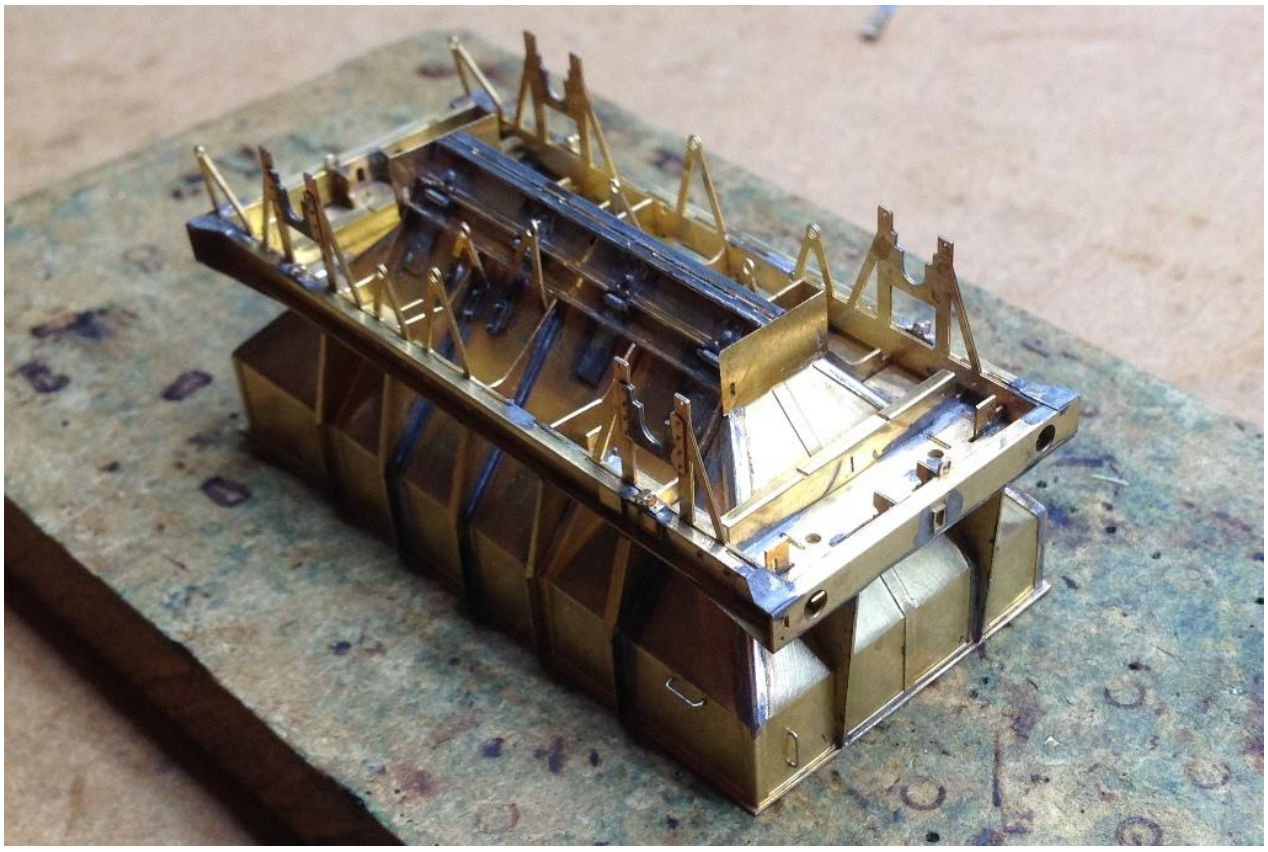


Next fit the four end stanchions to the top of the chassis. There are tabs on the end stanchions and slots on the top of the chassis to aid location. Make sure the end stanchion for the vacuum cylinder (with the brackets soldered on) goes next to the oval cut out at the end with the vees and the stanchions are fully home in their slots. Solder in place getting them as vertical as possible.

The hopper can now be fitted to the chassis. Make sure the hopper is fully home in the underframe so that side stanchions sit on top of the little tabs that you recently soldered down. Also make sure the end stanchions go on the outside of the full thickness parts on the hopper ends and of course that the end with the cut out for the vacuum cylinder goes at the right end (the end with the vacuum shaft vees).

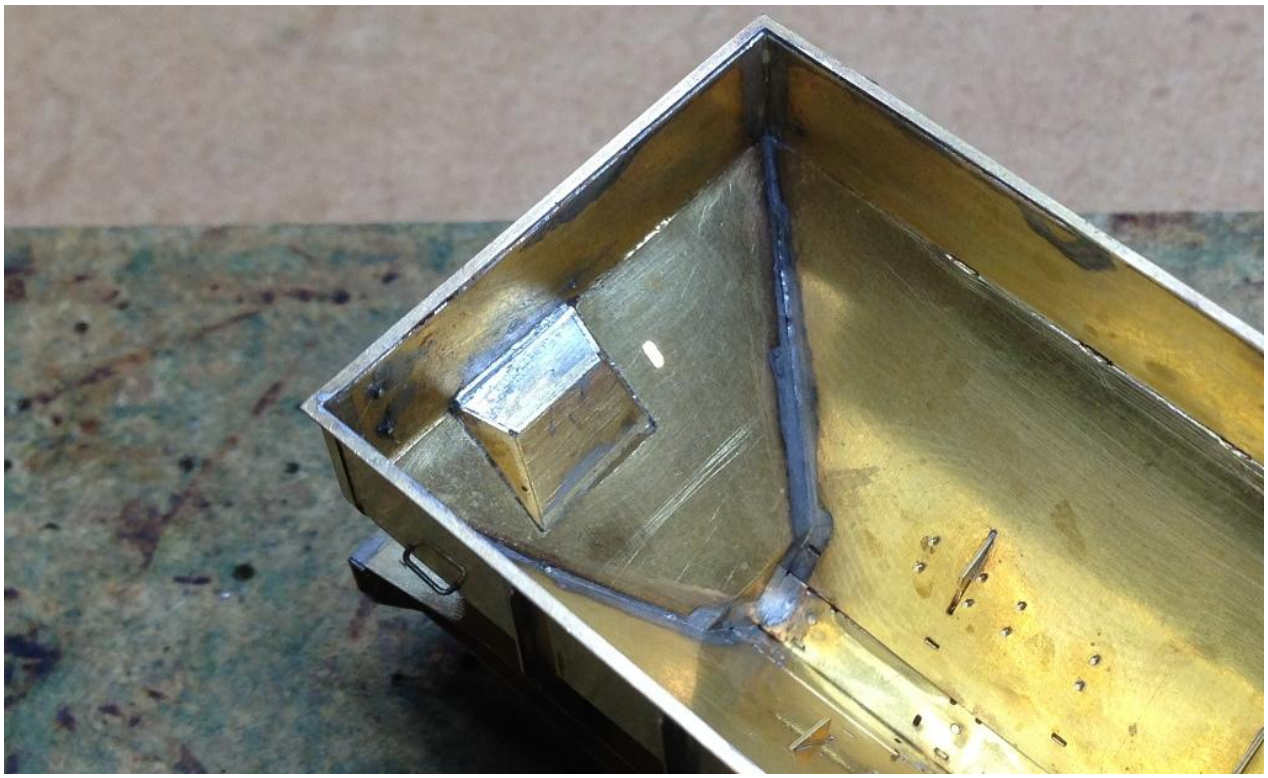


When you are happy that all is fitting properly solder the hopper in place making sure the hopper is soldered along the inside of the end stanchions. You should have something now that is starting to look like a P22 hopper.



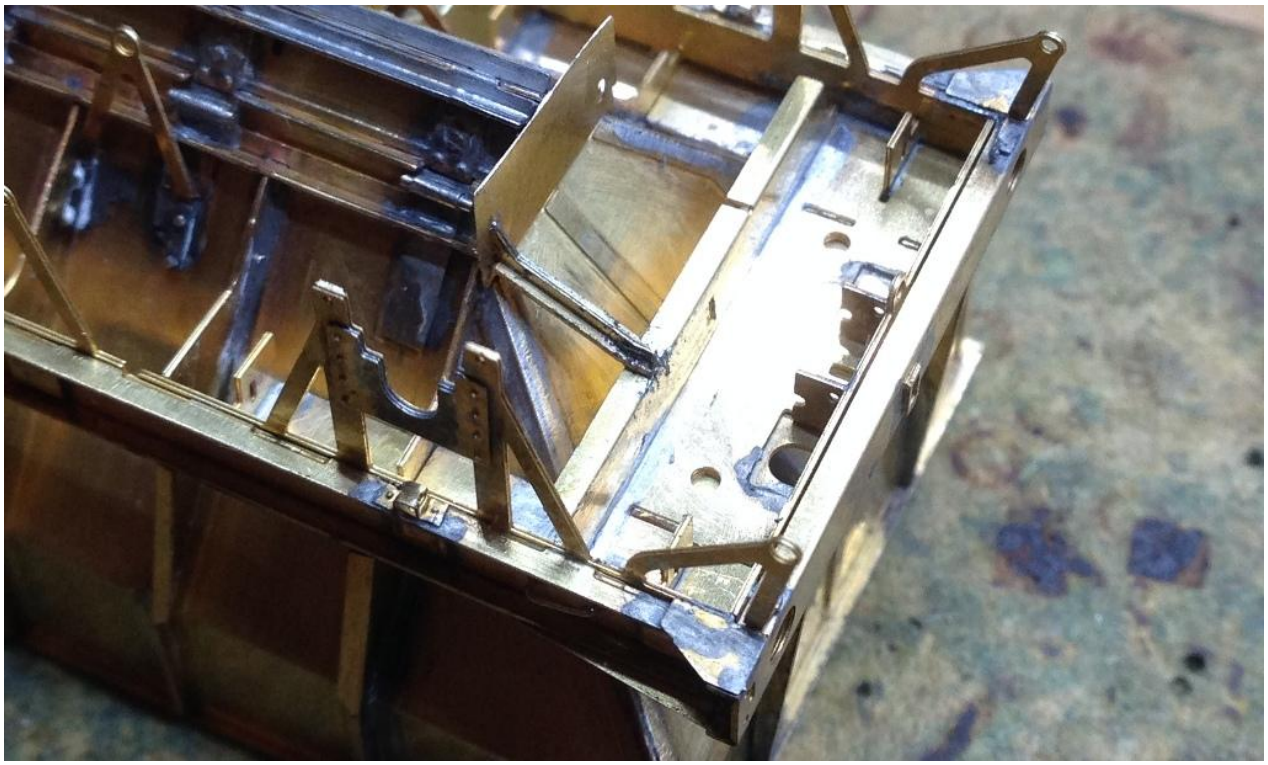
The next job is to fit the hopper handles. Make these from C shaped 0.31mm wire. They fit into holes in the opposite corners of the hopper. There is a vertical one on the end and a horizontal one on the side. See image below. Make sure you do the two corners. Solder in place and trim flush on the inside.

Fold up and fit the hopper recess for vacuum cylinder (20). This fits to the inside the cut out at the vacuum cylinder end of the hopper. The shorter side goes towards the top. Solder in place.



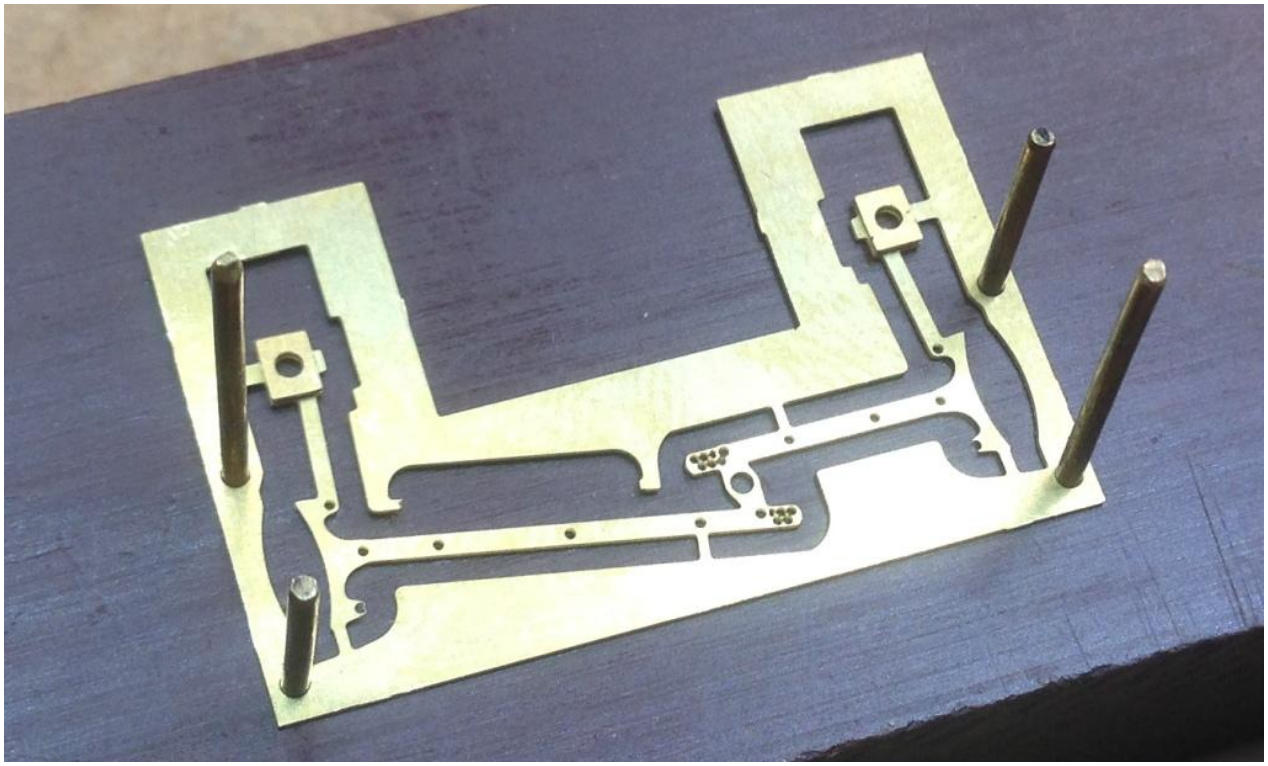
Next the hopper spreader plate stays need putting together and fitting to the chassis if you wish. These are one of those small details that could be left off if you want to speed up the build. There are two parts to each stay; a top (34) and an angle (35). There is a tab on the middle of the angle that the top is located onto. The end of the top with the slot in goes into the angle and should be bent so that it is perpendicular to the end of the angle as per the images below. The fold line on the top should be towards the angle. Solder together.

Each stay can be fitted to the underside of the chassis so that the small tab on the one end of the angle fits into a slot in the spreader plate and the other end of the angle fits into a slot in the transverse chassis angle.



Brake Shoes and Push Rods

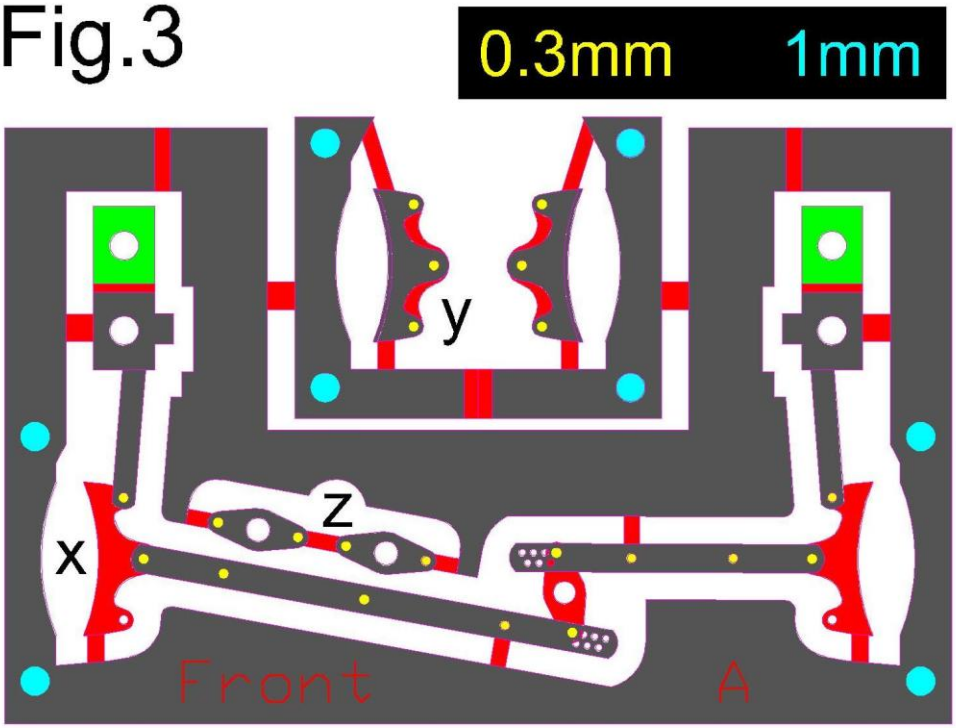
The brake shoes and push rods (36) are designed to be assembled with the main parts still attached to their surrounding frets. This is built up using 1mm wire pins to align things and 0.31mm wire for detail. When the four layers have been soldered together the brakegear can then be removed from the fret and tidied up. The front and back frets have been labelled A and B to correspond with the side of the chassis they should go.



The first step is to create a jig to aid assembling everything as per the image above. Use a suitable piece of wood or mdf and the etch as a guide. Drill through the part labelled **front** and **A** with the writing **facing** towards the wood; the larger holes are 1mm diameter and the smaller ones 0.3mm. If you are unsure which holes you should be drilling through see Fig. 3 below. You may want to make two jigs, one for each side though the two sets of brakegear are mirrors of each other so you can use just the one and assemble the other set back to front.

Carefully fold the parts marked in green on Fig. 3 through 180° with the fold line on the outside and then pin to the jig using short lengths of 1mm wire with the writing side facing down. See image above.

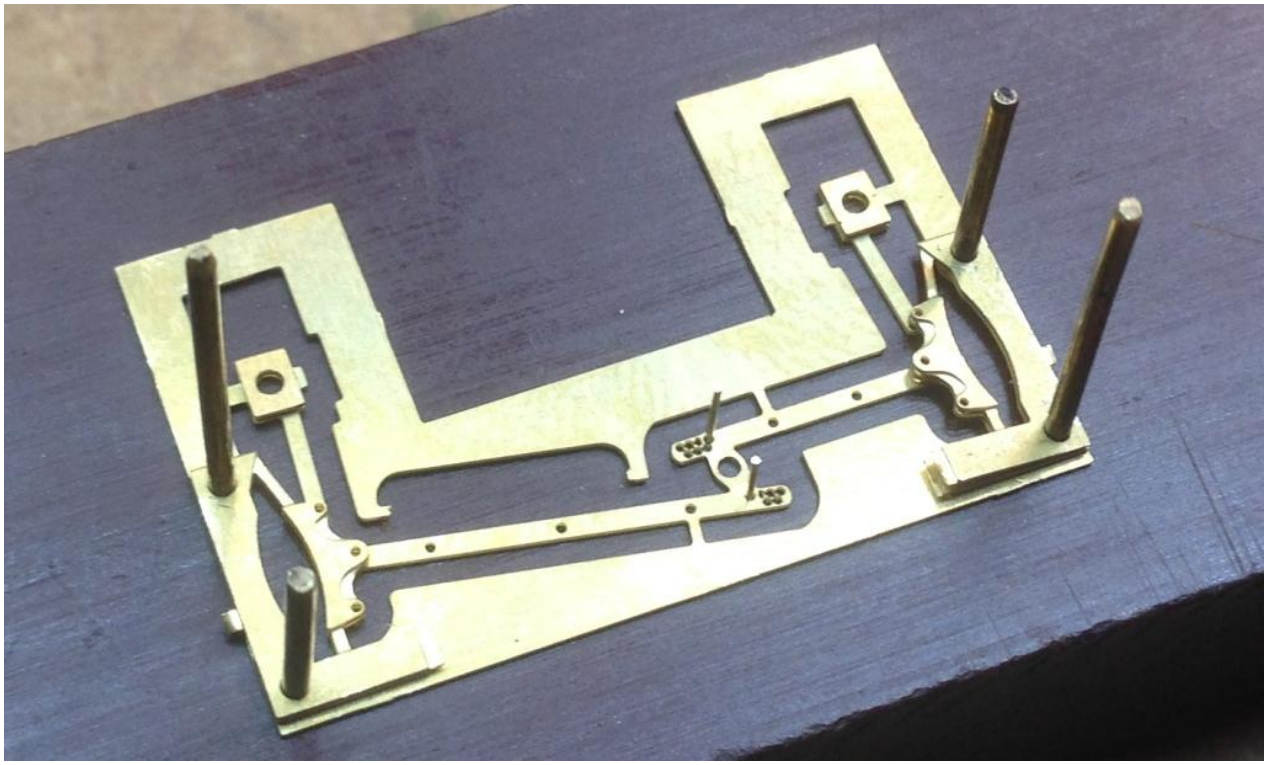
Fig.3



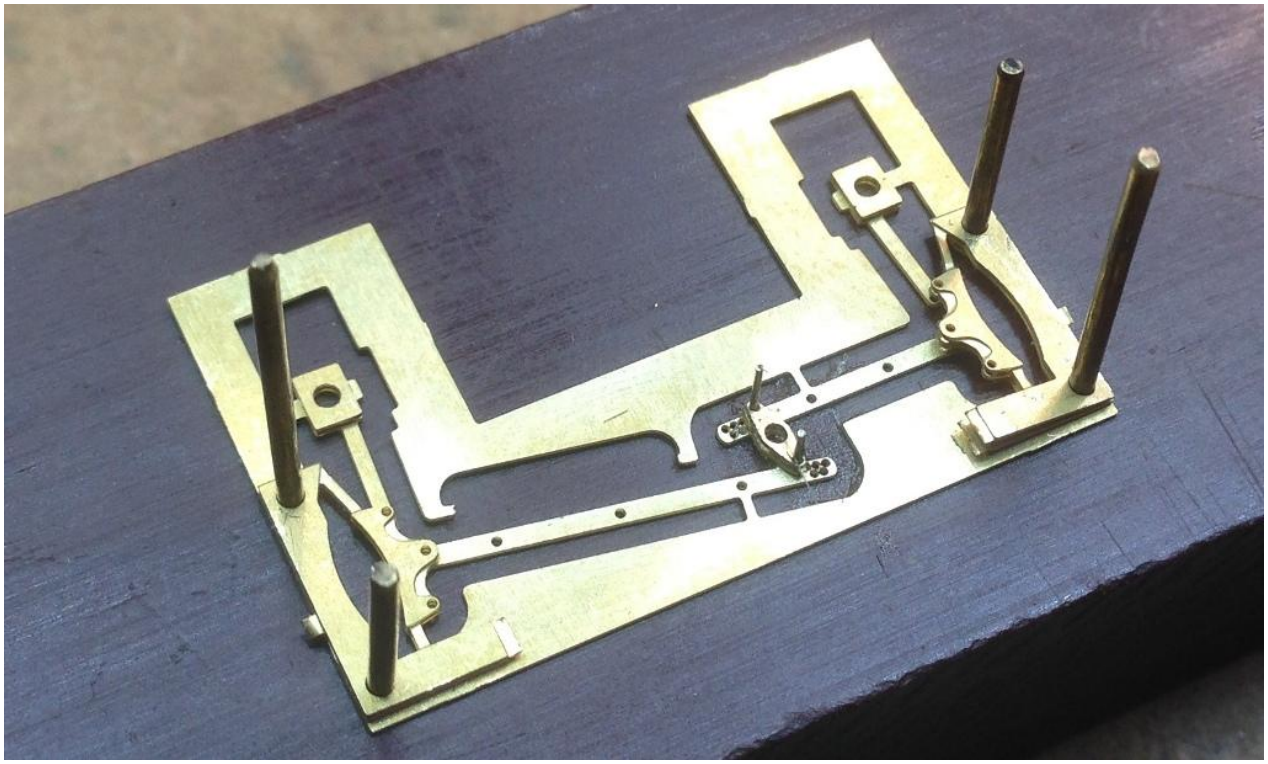
Once the jig is created you can check that the small holes in the rest of the main brakegear (x), brake shoe infill (y) and push rod cranks (z) can all accept 0.31mm wire. These are marked in yellow on Fig. 3 above. I find it easier to locate the holes on the main brakegear around the crank in the middle from the side with no writing on. Also make sure the holes in the fret surrounding the main brakegear and brake shoe infill can accept 1mm wire.

Take the brake shoe infill (y) and separate into two sets about the wider of the half etch lines. Then fold double about the small half etched line with the fold line on the outside.

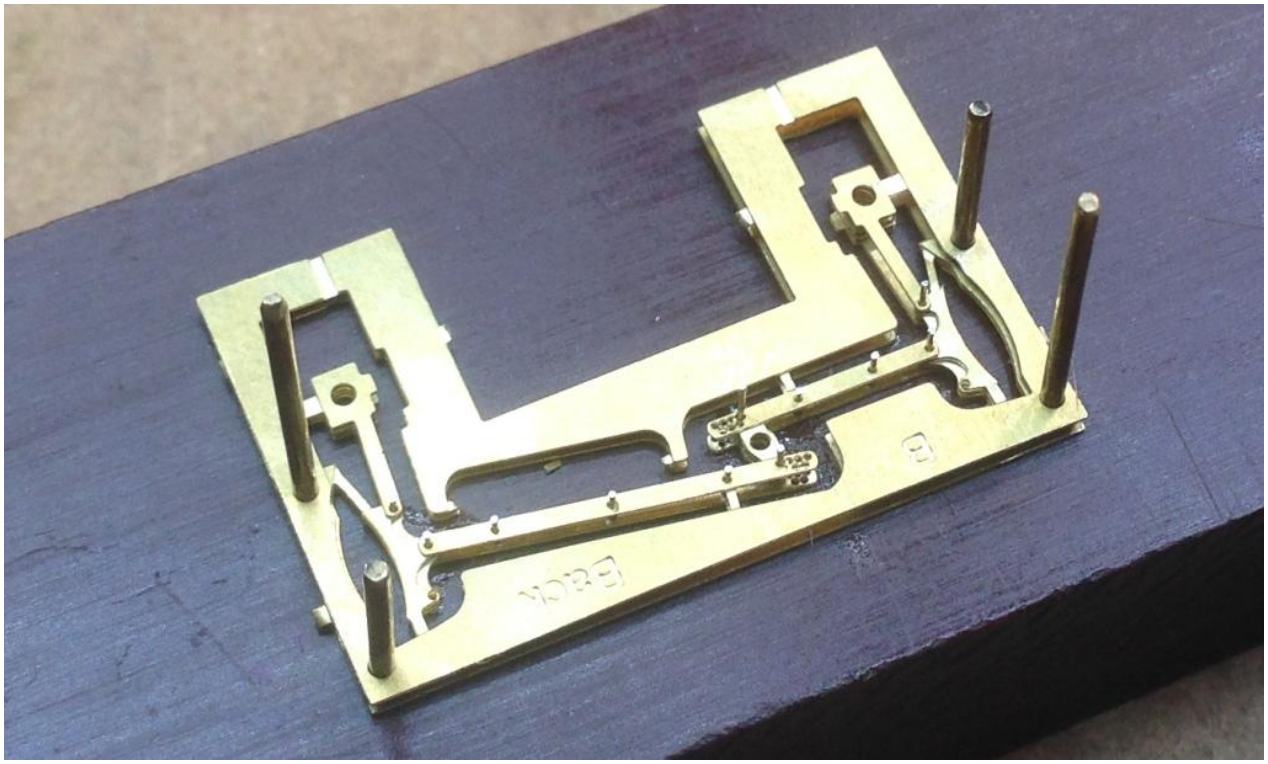
Place the brake shoe infill over the front part of the main brakegear using the 1mm wire rods to align everything. Insert two short lengths of 0.31mm wire onto the holes where the push rods join the brake shaft cranks. See image below.



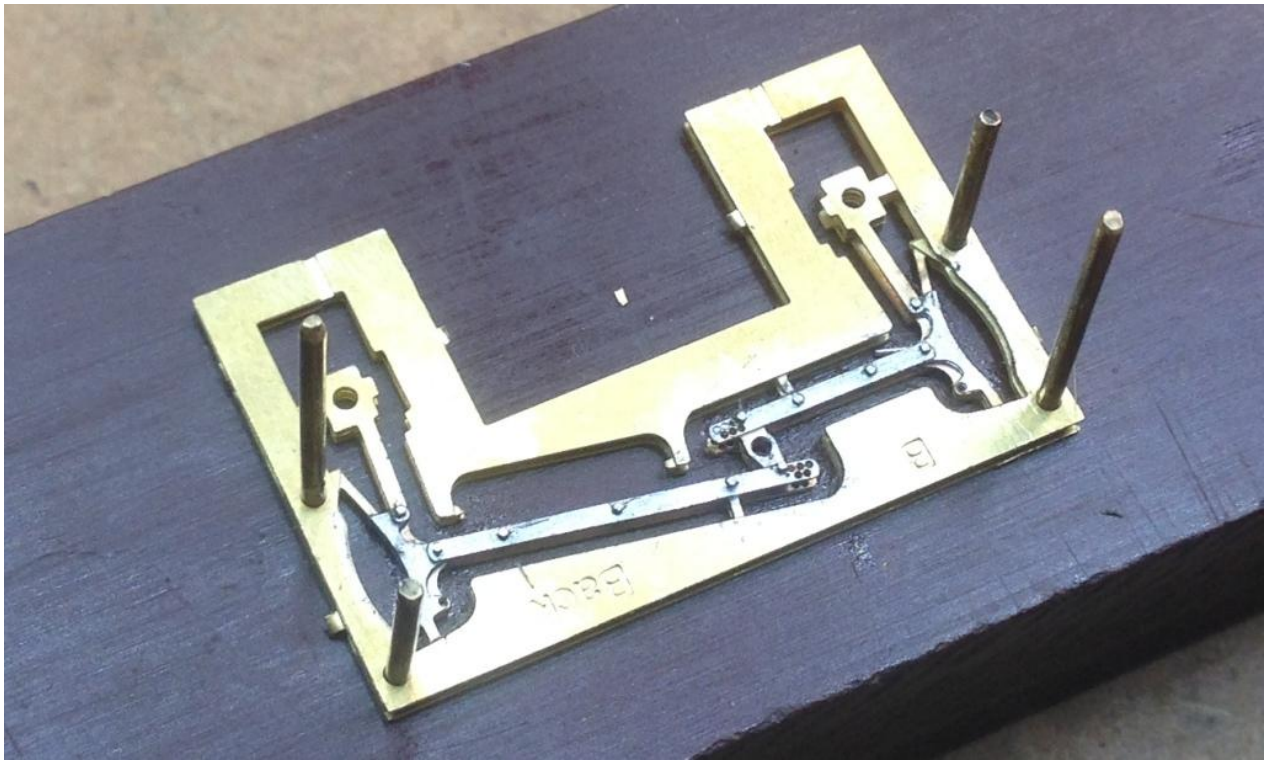
Fold up one set of push rod cranks double and place onto the two lengths of 0.31mm wire.



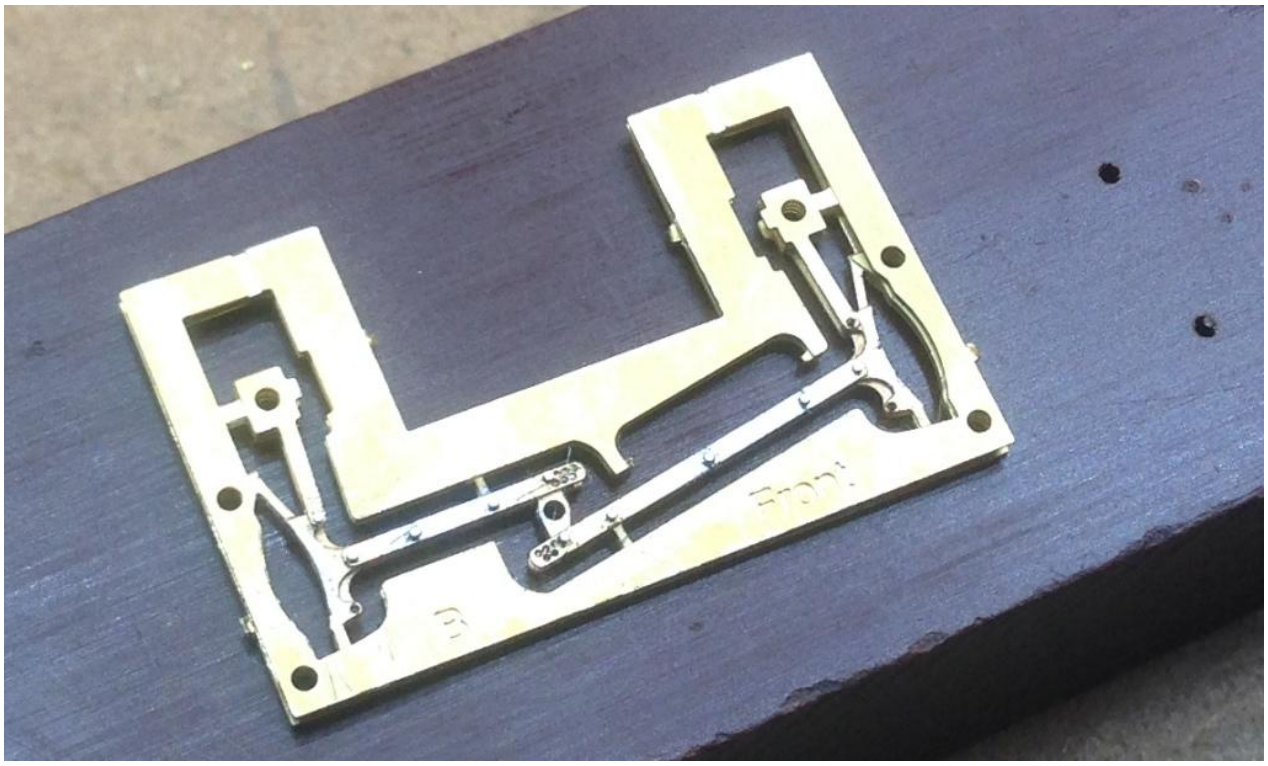
Carefully fold up the parts shaded green in Fig. 3 on the back part of the main brakegear for side A and pin onto the assembled layers with the writing visible and facing away from everything else. Make sure all the bits of wire go where they should. Fill the remaining holes with 0.31mm wire making sure it goes all the way through.



Solder the layers together paying particular attention to the brake shoes (I find it best to apply solder to the long curved edge) and the joints where the wire meets the etch. Trim and file the 0.31mm wire to represent bolt heads.



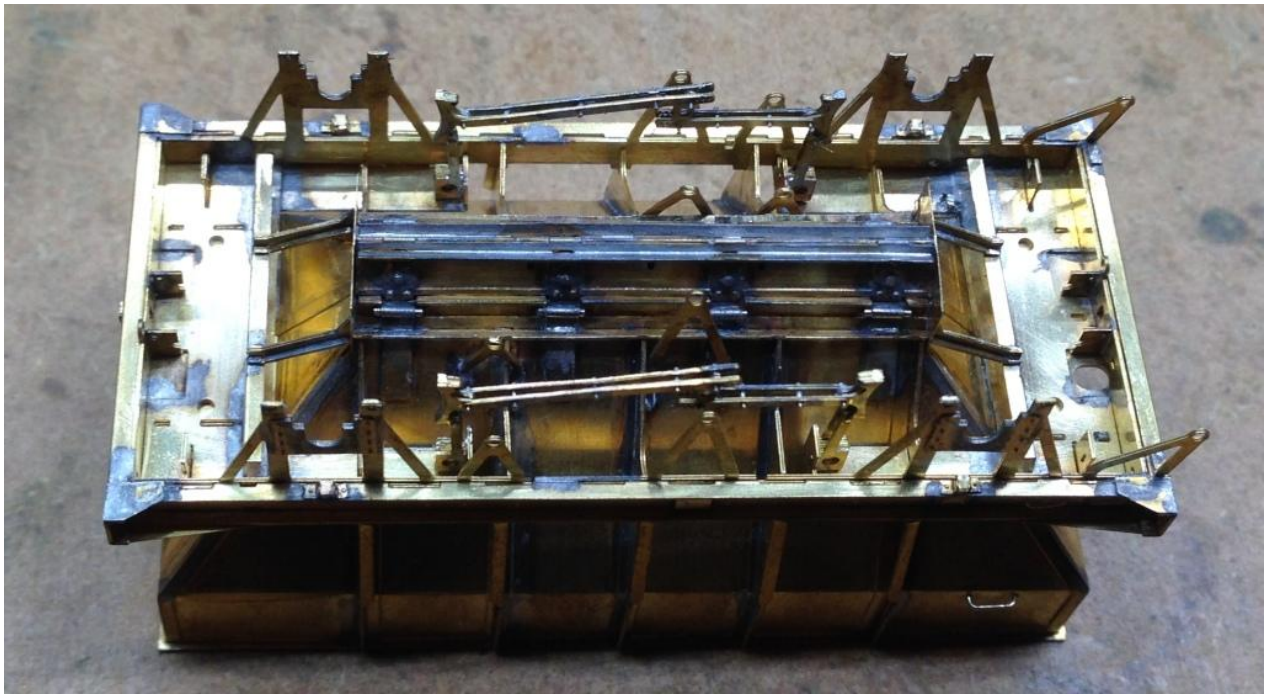
Carefully remove the brakegear from the jig and clean up the wire on the other side to represent bolts.



Carefully remove the brakegear from the fret; I use a piercing saw. Clean up any tags that are left.

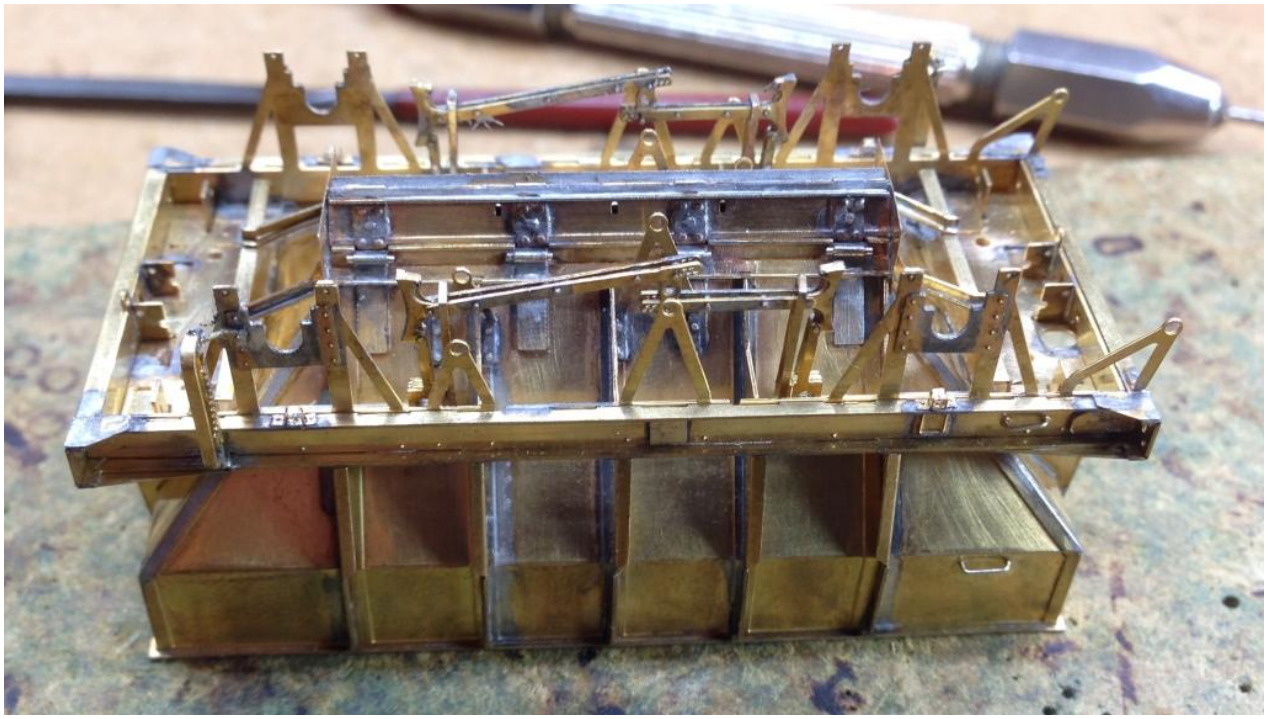
Fit the brakegear in place on side A. This is the side where the vees for the vacuum brake shaft are on the right when everything is viewed the right way up. The brakegear should always be fitted with the small tabs on the hangers to the outside of the wagon. For EM and P4 the brakegear should go on the outer slots in the tabs on the inside of each the axle; for OO the brakegear should go on the inside set of slots.

Repeat for the side B brakegear. If you don't want to create another jig, start with the back part of the main fret this time and use the same jig.



Fit the second set of brakegear in place.

Next the brake push rod safety loops (37) will need to be fitted. On each safety loop there are three fold lines each of which needs to be folded through 90°. You will end up with two pairs. They then need to be fitted round the push rods and locate onto the tabs on the brakegear that are protruding through the fold down tabs on the chassis. The safety loops should be arranged so the side closest to the slot is on the outside of the chassis. Solder in place.



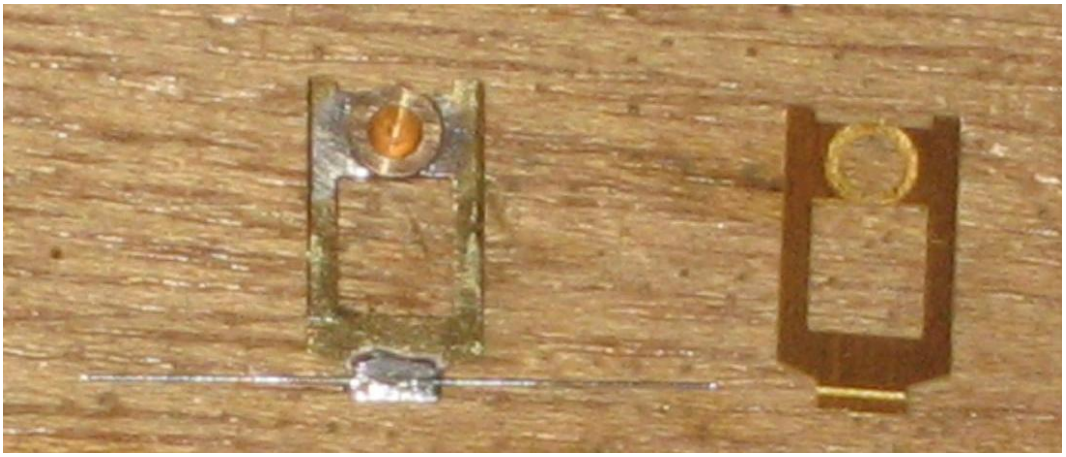
Spring Carriers

The spring carriers (38A or 38B) can now be assembled. They are designed so that the springing wire is soldered to the carrier using the half etched slot as a guide. Spring carriers 38A have 2mm holes in them which should be used for pinpoint axles and 2mm OD parallel bearings. Set 28B have a 1.5mm hole in them and have been included for use with 1.5mm OD parallel bearings. These bearings will need to be sleeved with 2mm x 1.5mm tube to fit in the slots in the axleguards.

If using pin point axles you may find that the carriers need packing out a little to take up any slop. Bearing washers (39), both half etched and full thickness are included for this purpose. There should be a good fit between the axles and the bearings with ideally no sideways movement at all. If using pinpoint axles use a waisted type of bearing to avoid having to remove any more material from the cast axleboxes than is necessary. I have used Alan Gibson waisted pin point bearings which are nice and deep so you don’t have to worry about the bearings being too tight.

Due to the removable nature of the axle guards you can easily use Exactoscale parallel axles and either 2mm OD or 1.5mm OD bearings. If doing so then you will need to pack the bearings out before soldering them in place due to the length of the axle. Use the bearing washers provided on the opposite side of the spring carriers to the bearing flange. I have built chassis with Exactoscale parallel axles and used one half etched washer and one full width washer to pack the bearing out. This leaves the outer edge of the bearing 0.25mm beyond the axleguard and provides 1mm of bearing surface for the axle. 1.5mm bearings with carriers 38B will need a short length of 2mm x 1.5mm tube soldering in place over the bearings to fit the axleguards properly.

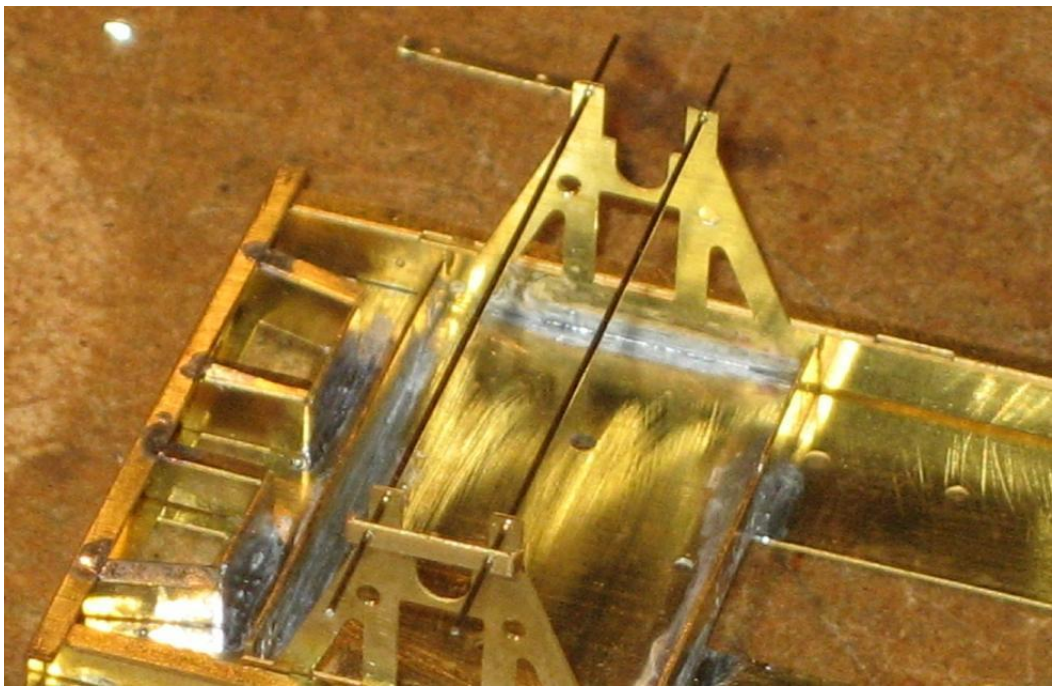
I find the easiest way to assemble the spring carriers is to make a small jig consisting of an off cut of wood with a 2mm hole (or 1.5mm if using 1.5mm OD bearings) drilled into it. The spring carrier can then be placed so that the bearing locates through the hole in the carrier and into the wood. The bearing can then can be soldered in place. The spring wire can be located in its half etched guide slot and soldered in place using a suitable flux. I use Carr's black label. The spring wire needs to extend at least 7mm either side of the point where it is attached to the carrier.



Tiebars

The tiebars (40) are designed to be removable if you wish in order to allow the wheel sets to be easily dropped out. They can of course be soldered permanently in place but either way you will need to make sure the holes will accept 0.31mm wire before removing them from the fret. Tiebars are fairly vulnerable so in order to strengthen them I have included a slot on the back into which you can solder a length of 0.31mm wire. This will make them a lot more robust.

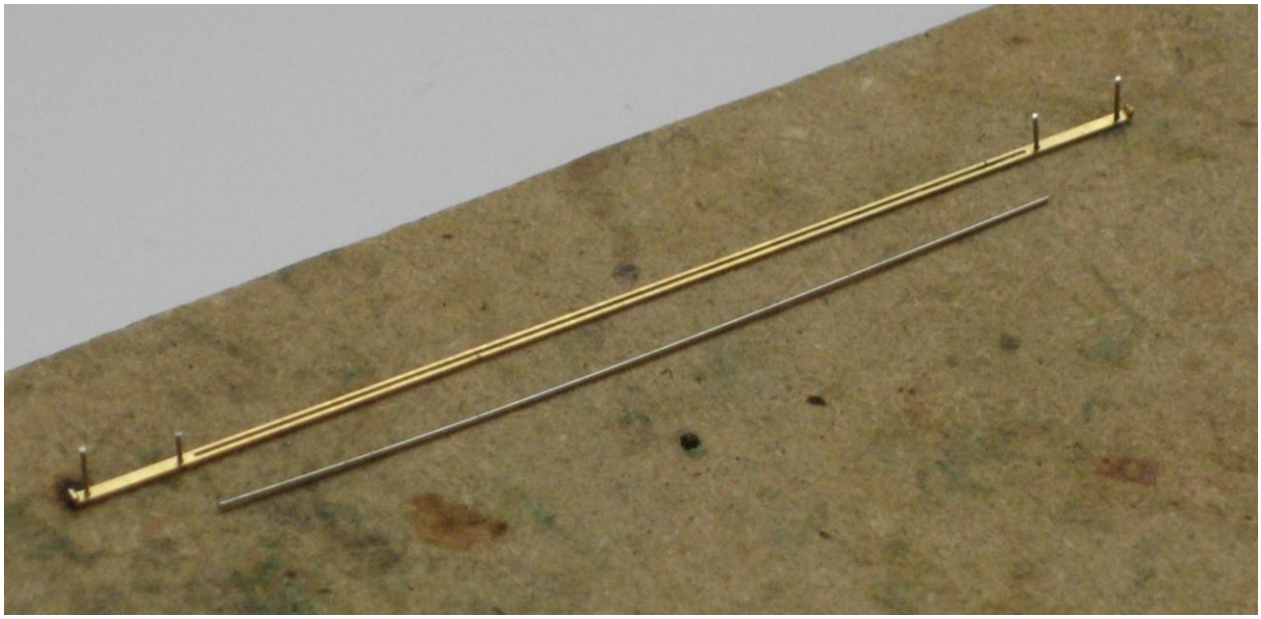
If you are not planning on making them removable then they can be pinned and soldered to the axleguards. Remove from the fret and fold the ends up. Thread lengths of 0.31mm wire through a tiebar and holes in an axleguard and then the corresponding holes on the opposite axleguard. Solder in place. Fit the other tiebar and solder in place. Trim the wire so that it represents bolt heads on the tie bars but extends approximately 0.5mm from the back of the axleguard. These pins will prevent the springs from becoming disengaged from their slots.



If you want to make them removable to allow the axles to be dropped out then you will need to solder 0.31mm pins through the holes in the tiebars. I find the easiest way of doing this is to use one pair of holes as a jig and drill a pair of 0.3mm holes into a piece of scrap wood. Short lengths of 0.31mm wire can then be threaded through the tiebar locating into the holes in the wood. These can then be soldered in place and filled back to represent bolt heads before folding up the ends.

Fold the ends of the tiebars and locate four short lengths of 0.31mm wire through the holes in the tiebar and into the holes drilled into the wood. Solder the wire in place and solder a length of 0.31mm wire into the slot in the back to strengthen the tiebar. Trim three of the wires back so that there is at least 0.75mm of wire projecting from the back of the axleguards otherwise the spring carriers will be able to fall out of place when everything is assembled. It is a good idea to leave one of the pins in the tiebar as long as possible to give you somewhere to hold them when painting. Remove from the jig and trim the other ends of the wires to represent bolt heads.

Once the tiebars and the chassis are painted they can be tack glued together on final assembly. The glued joint can be broken and the tie bars removed if you find it necessary to remove the wheels at any point.



Brake Lever Guards

Make sure that the holes in the brake lever guard bracket (41) and the brake lever guard/stay (42) can accept 0.31mm wire and remove from the fret.

Fold the toothed part of the lever guard up and then the rest of the lever guard along with the lever guard bracket referring to Fig. 4 and the photo below. You should fold the stay through 180° with the fold line on the outside whilst you're doing this. The front of the guard is curved at the top and the bottom. There are half etched markers to aid with the location of these bends. Push out the rivet and twist the end of the stay to fit against the axleguard.

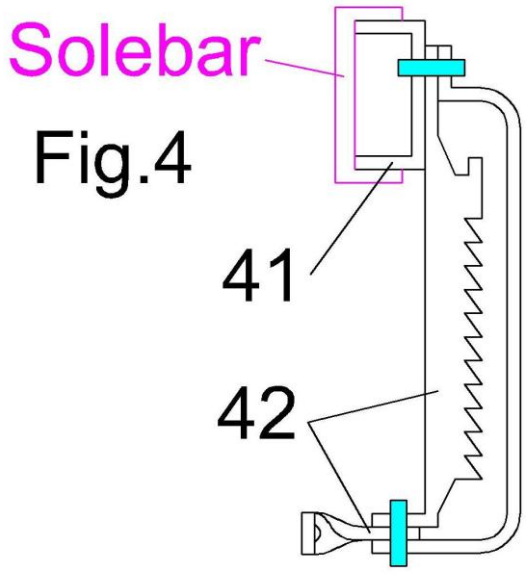
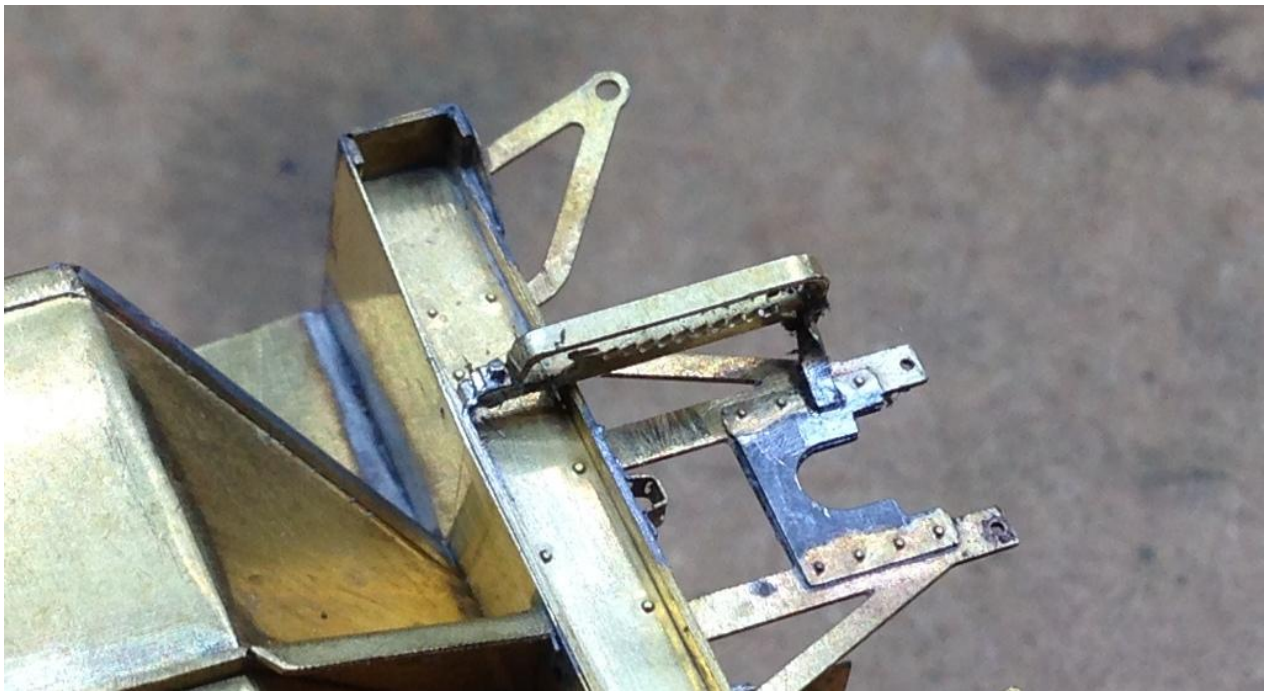


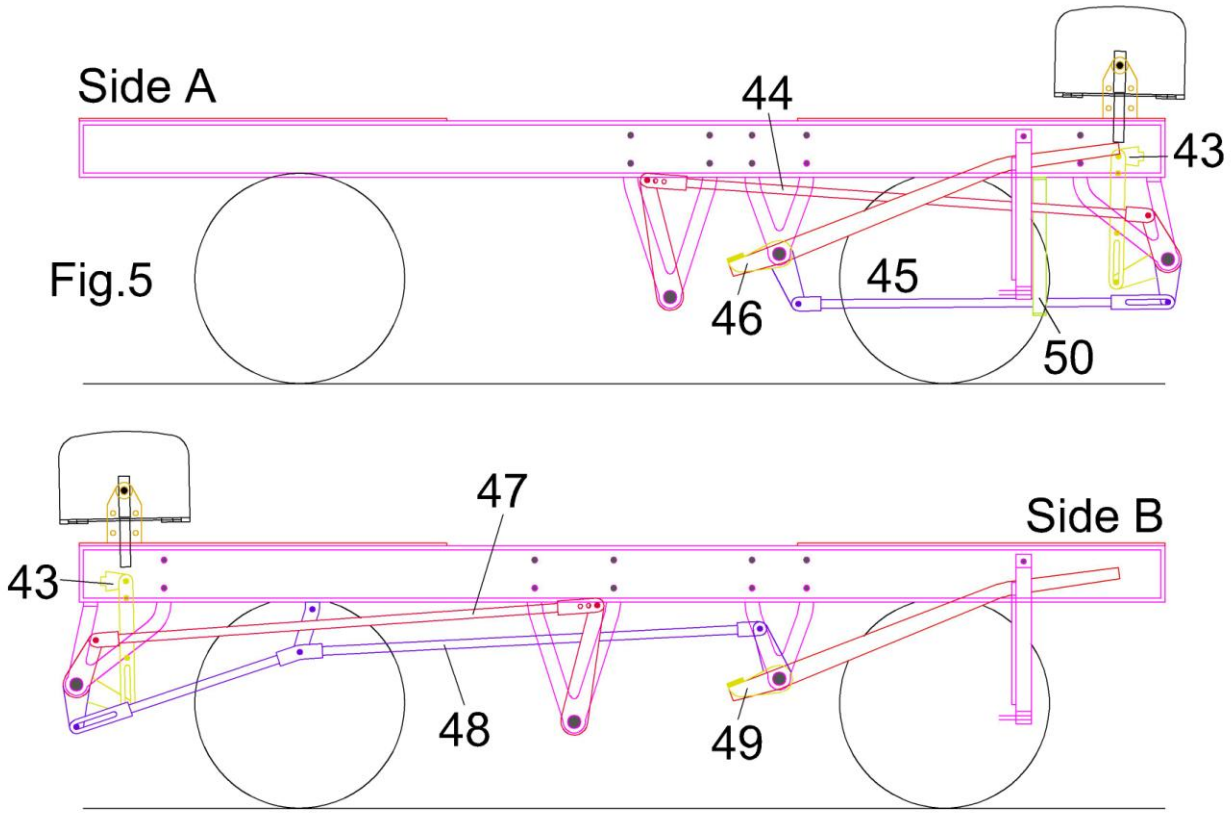
Fig.4

Solder a length of 0.31mm wire through the holes where the lever guard and stay meet to represent a bolt. Solder the lever guard and bracket together using 0.31mm wire to align them. Trim the wire on both the front and back to represent a bolt. The whole assembly can then be located in the solebar and soldered in place. There are slots in the solebar to receive the lever guard brackets.



Brake Links

Now is the time to assemble and fit the various links that go between the vacuum brake shaft, the main push rod brakes and the brake levers. This is another point where things can be simplified by leaving off the various overlays if you wish. The general arrangement of the links can be found in Fig.5. There are basically two sets for each side; one from the vacuum brake shaft to the push rods and one to the brake levers, plus a link from the vacuum brake shaft to the vacuum cylinder.



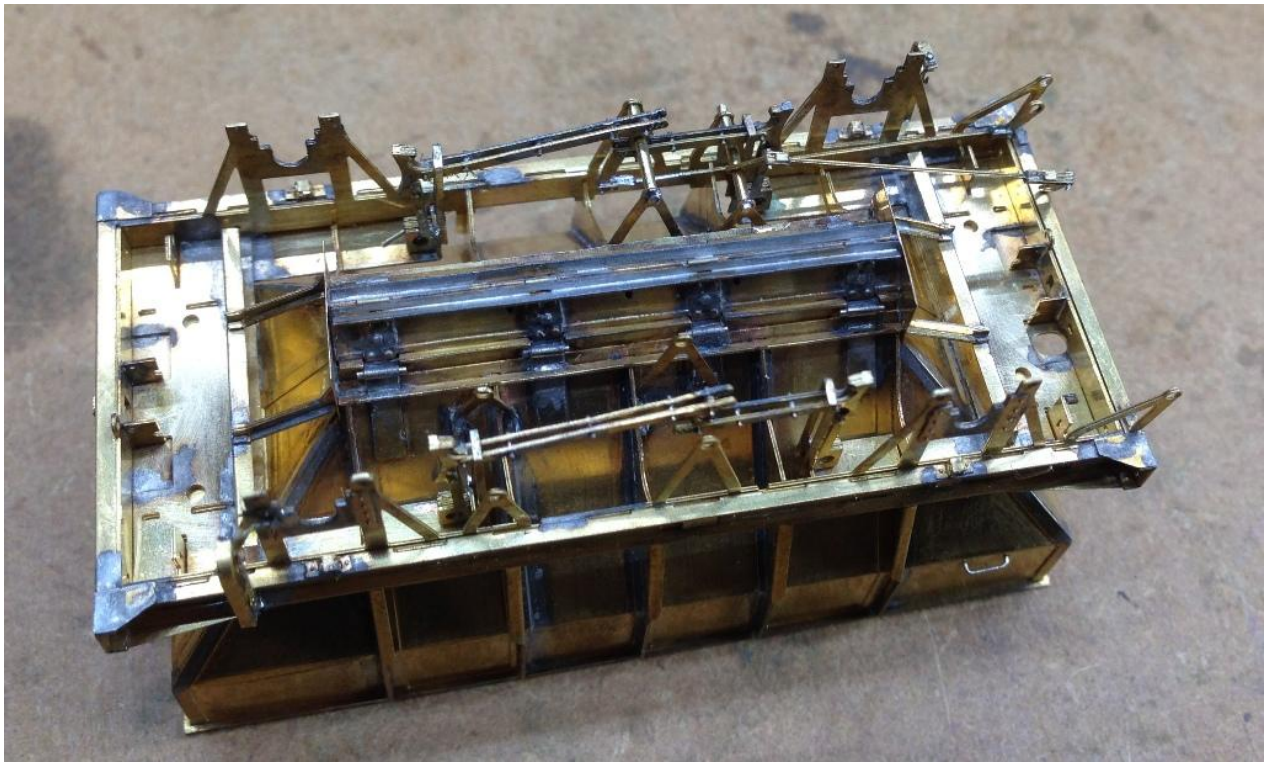
Do one side at a time which should help keep things simple. You should make sure that the smaller holes can accept 0.31mm wire and the larger ones 0.8mm before removing the parts from the fret.

The various brake link overlays (46 - Side A and 49 - Side B) are designed to wrap around the links and be soldered in place using 0.31mm wire keep them aligned which can then be filed back to represent bolt heads. The overlays should match the profile of the link at the top of the cranks. See image below. As mentioned above if you don't want to worry about the various overlays then don't fit them.

Remove the vacuum cylinder link (43) from the fret. This comes in two mirrored parts that need to be soldered together with the half etched detail on the outside Using 0.31mm wire through the smaller holes to align the two sides. Once solder together trim the wire to represent bolt heads. Put to one side for the moment.

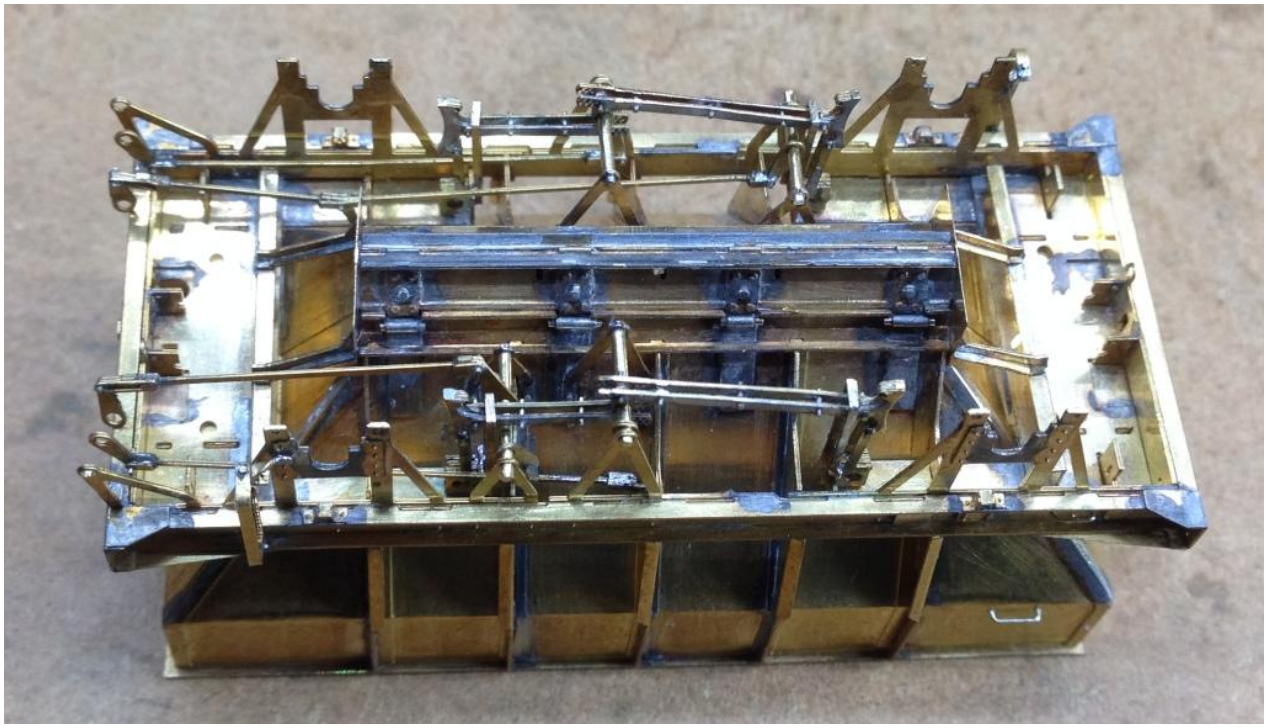
Remove the vacuum cylinder to push rod link (44) and vacuum cylinder to brake lever link (45) for side A. Fit the various brake link overlays (46) to the two links and trim the wire to represent bolts. Remove one of the brake lever actuators (46). This has a small tab on that should be folded through 90°. Reinforce the fold line with solder.

Fit the push rod and brake lever links to the underframe on side A along with lengths of 0.8mm wire for the brake shafts at the vees on the side. The shaft for the push rods should extend just beyond the outer vee but that for the brake lever should extend by about 0.75mm. Fit the brake lever actuator when you fit the brake lever shaft; this should be arranged so that the small tab faces outwards and goes just behind the vee. The push rod link goes between the push rod and the outer vee and the brake lever link goes between the push rods and the smaller vee against the hopper. See Fig.5 above for the orientation of the links.



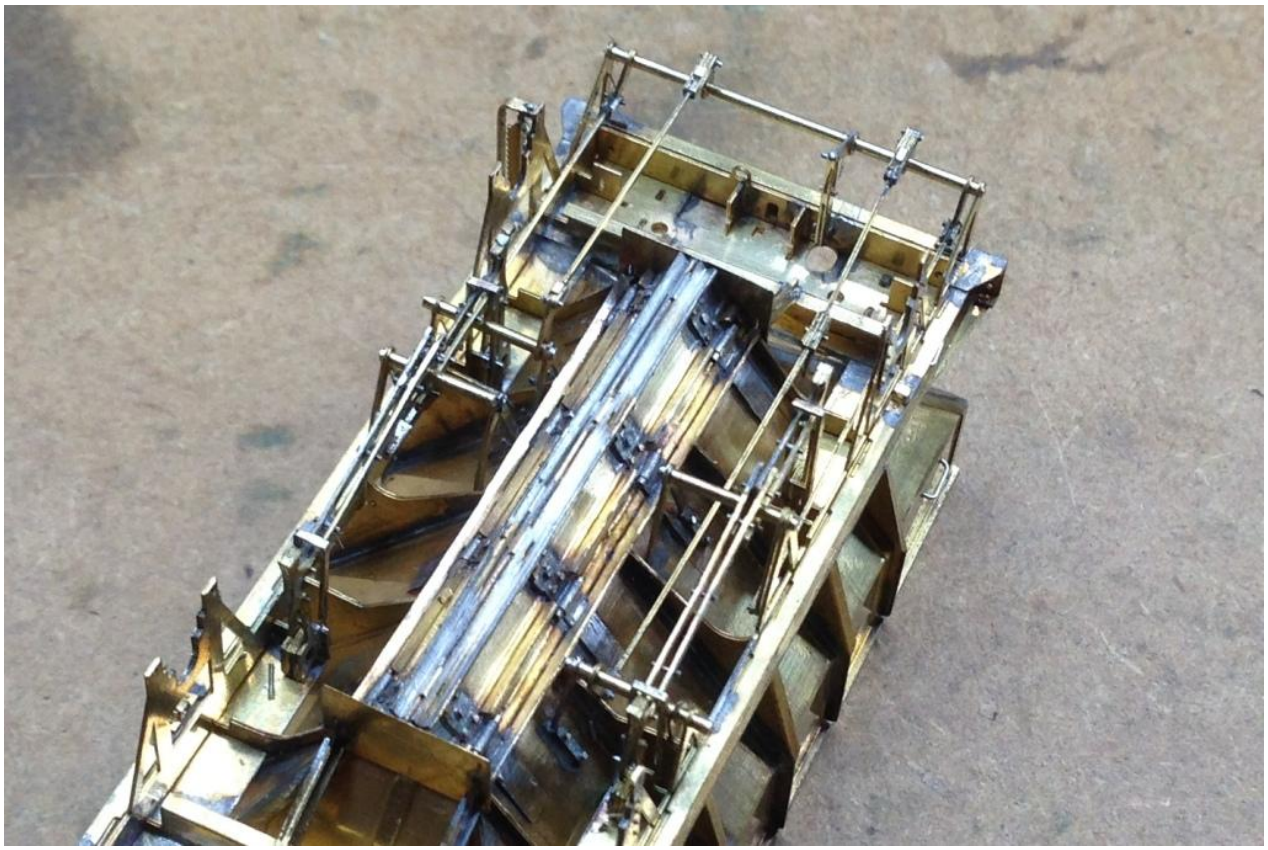
Repeat the above assembly for the vacuum cylinder to push rod link (47) and vacuum cylinder to brake lever link (48) for side B, fitting the various brake link overlays (49) to the two links and trimming the wire to represent bolts. Fold up another one of the brake lever actuators (49), reinforcing the fold line at the small tab with solder.

Fit the push rod and brake lever links to the underframe on side B along with lengths of 0.8mm wire for the brake shafts at the vees on the side. As per side A the shaft for the push rods should extend just beyond the outer vee but that for the brake lever should extend by about 0.75mm. Fit the brake lever actuator when you fit the brake lever shaft; this should be arranged so that the small tab faces outwards and goes just behind the vee. The push rod link goes between the push rod and the outer vee and the brake lever link goes between the push rods and the smaller vee against the hopper. See Fig.5 above for the orientation of the links.



The vacuum cylinder link can be fitted long with a length of 0.8mm wire for the vacuum brake shaft. The brake shaft should go through all the links and extend only a little beyond each of the vees. The vacuum cylinder link goes below the oval cut out in the chassis top. See image below. There is a small slot into which a tab on the link can be fitted.

Solder the brake shaft in place and solder the various links to the brake shaft. The links to the push rods should be just in from the vacuum brake shaft vees and the links to the brake levers should be just from the vees on the hopper. Make sure the links are straight.



There should be a safety loop for the brake lever link on side B. This if fitted to the top of the transverse chassis angle at the vacuum cylinder end. It should be similar to the push rod safety loops with feet at the base to attach to the top of the transverse chassis angle. Brake link safety loop material (50) is included to make it out of. The feet on each end should be 2/3mm long with the sides just under 8mm each and the top approximately 2mm across. Solder in place on the transverse chassis angle.

The safety loop is visible in the two images in the vacuum pipe section.

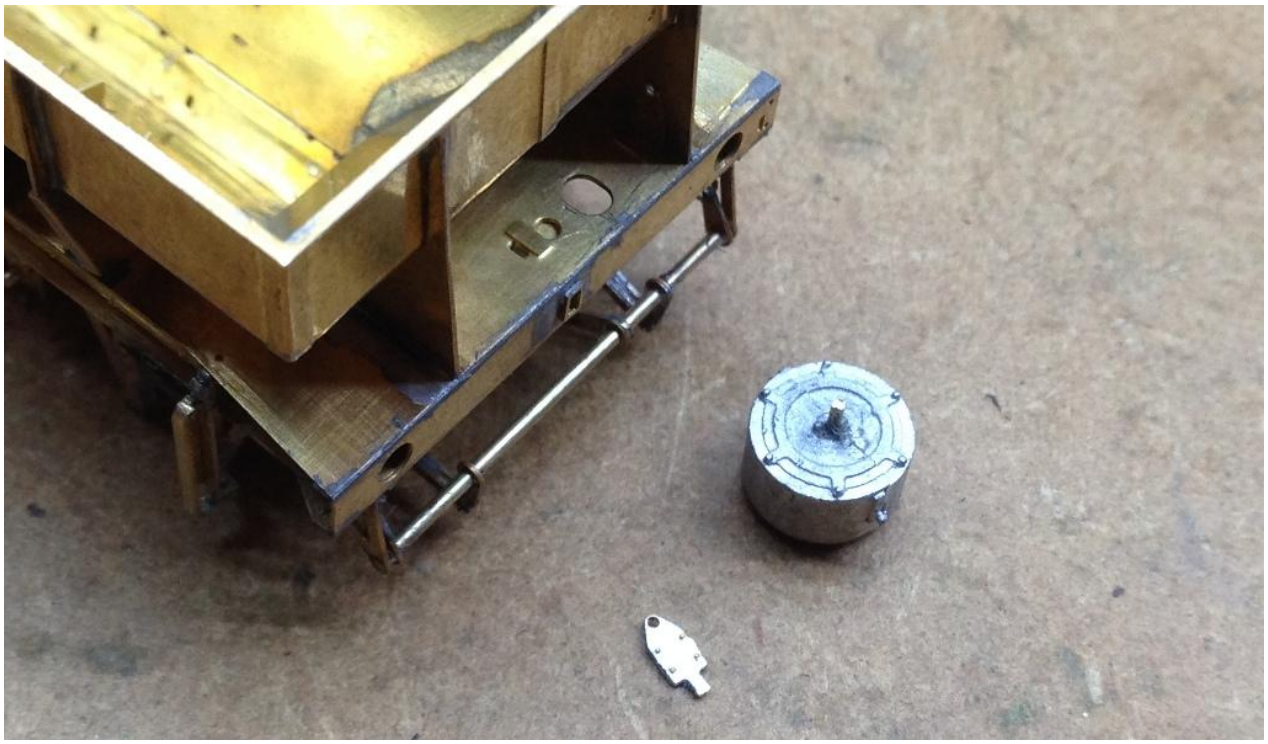
Vacuum Cylinder

The next job is to fit the vacuum cylinder and to do this you will need to make up the other bracket that holds it in place.

Remove the two parts that make up the vacuum cylinder bracket (51). These are similar to the two parts that you fitted to the end stanchion to make up the other vacuum cylinder bracket. One is almost completely half etched and the other has a full thickness area with four half etched circles on. Press out the four half etched circles to form rivets. Solder the two parts of the bracket together with the half etched detail on the outside. Use a piece of 0.31mm wire through the small hole at the bottom and a piece of 0.5mm wire or 0.5mm drill bit at the top to align things. Make sure the 0.5mm wire doesn't get soldered in place.

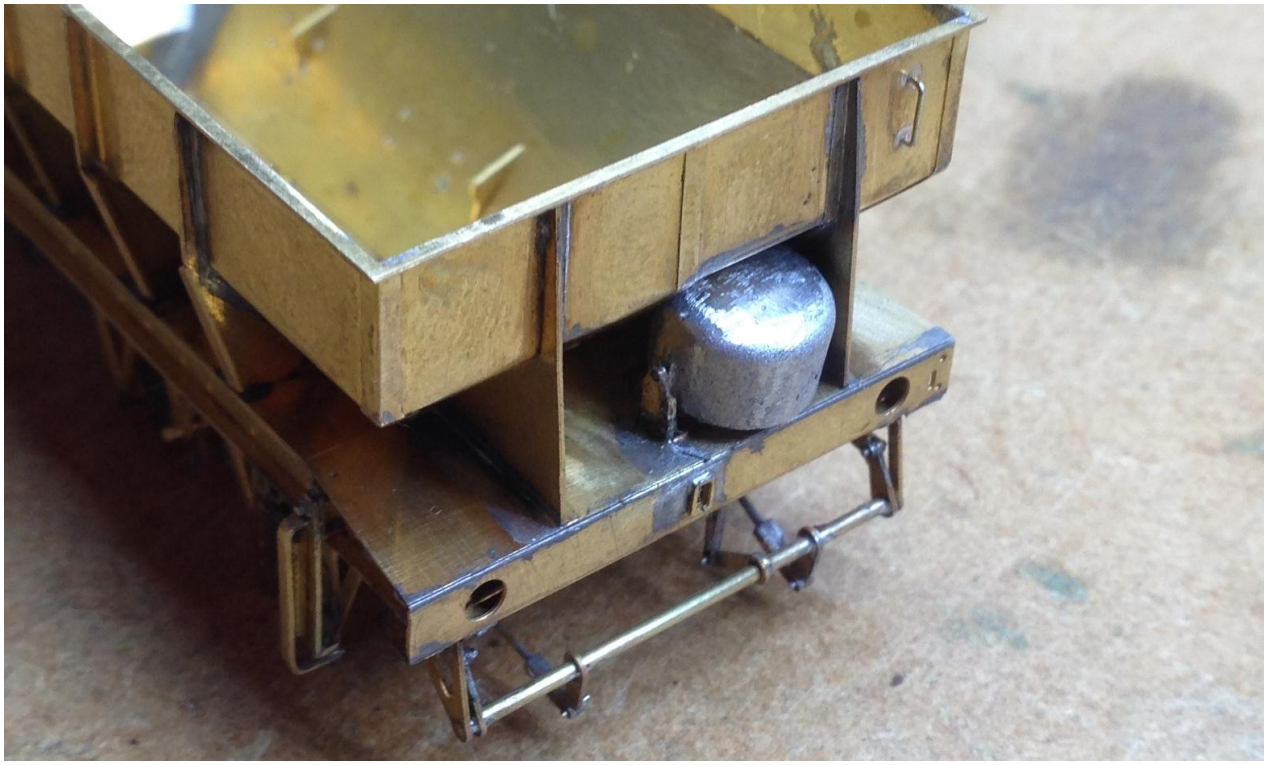
Trim the 0.31mm wire and file flush on both sides.

Use a 0.6mm drill to drill a hole in the middle of the flat end of the vacuum cylinder. Insert a length of 0.6mm wire into the vacuum cylinder to represent the cylinder piston. This should extend approximately 2.5mm beyond the flat end of the cylinder.



Fit the vacuum cylinder in place on the end with the cast spigots on the cylinder fitting into the holes in the two vacuum cylinder brackets. You may need to file a little flat on the top of the vacuum cylinder where it meets the cover on the inside of the hopper as things are a little tight here. The vacuum cylinder bracket that you've just constructed goes into a slot in the top of the chassis. Make sure it's fully home when fitting and solder in place to retain the cylinder.

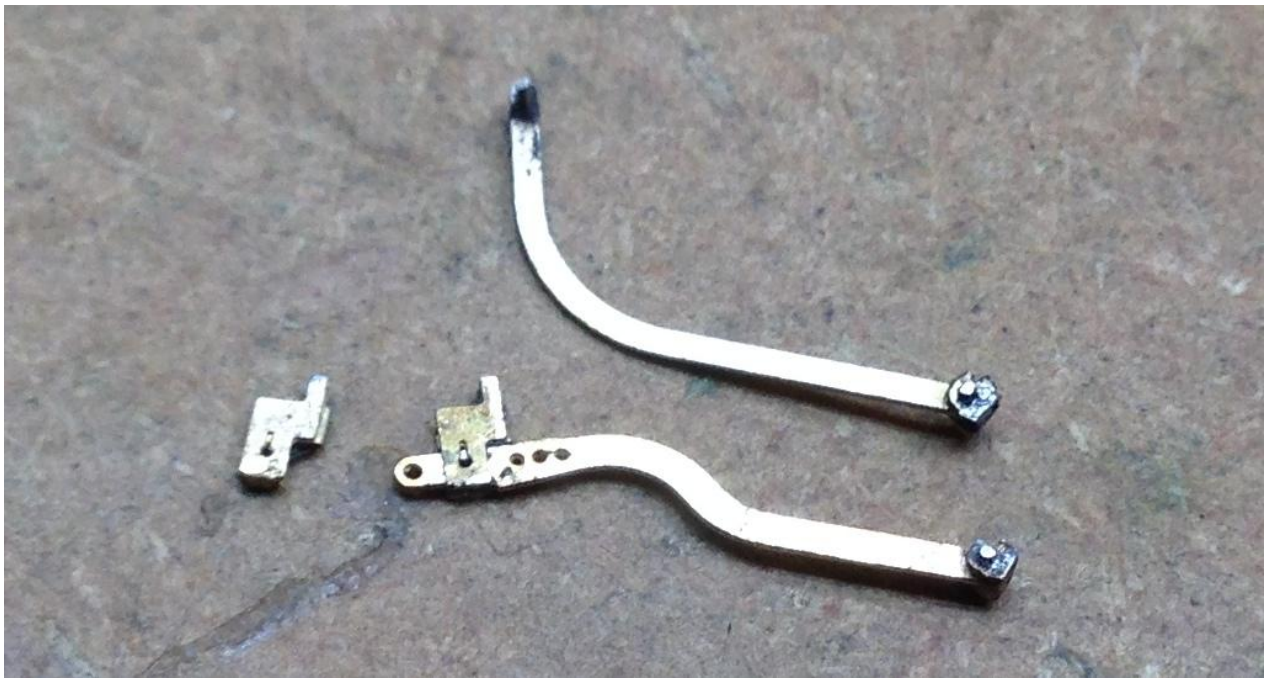
A vacuum cylinder stay (52) has been included to stop the cylinder wobbling around. This should be fitted to the underside of the chassis top with the hole locating on the vacuum cylinder piston. Solder in place with the vacuum cylinder either vertical or angled slightly inwards.



Hopper Door Mechanism

Next is to tackle the various levers that make up the hopper door opening mechanism. On each side there are three levers all of which are attached to the bottom of the hopper door by pivoting brackets. The central lever is a locking lever that connects with a hole on the central side stanchion. The outer two levers connect to the piece of bar that was used as the handle to open the hopper door. Interestingly the handle on the real thing was specified as a piece of gas pipe on the drawings. Do one side at a time before moving on to the other.

As with the brake links there are overlays for the hinge brackets which can be left off it you want. You will need to fit the opening lever brackets though as these help to locate the opening levers.



You should make sure that the small holes in the parts can accept 0.31mm wire before removing the parts from the fret. Also make sure the larger hole on the end of the opening lever can accept 0.5mm wire.

Remove one of the hopper door locking levers (53) along with two hopper door opening levers (54). Remove and fit the hopper door lever hinge detail (56) to the ends of the levers that are all the same. These are done in the same way as the overlays on the brake links with the detail wrapping around the lever and a length of 0.31mm wire inserted through the holes to keep things aligned. The wire can be trimmed to represent bolt heads once soldered in place. Solder a short length of 0.31mm wire into the hole at the end of the locking lever. See image above.

Remove two hopper door opening lever brackets (55) from the fret. These come as two mirrored parts that need to be folded double about the fold line between them. This fold should be through 180° with the fold line on the outside. These brackets should be fitted to the opening levers as per the image above using a length of 0.31mm wire to pin the bracket in place, making sure that the bracket is on as far as it can go.

The three levers can now be fitted to the hopper. The locking lever fits into the middle of the three slots towards the bottom of the hopper door and then into a small hole on the central side stretcher. Solder in place. See image below.

The opening levers should be fitted into the outer slots towards the bottom of the hopper door. The hopper door opening lever brackets fit into little slots behind the solebar. Make sure the brackets are fully home and solder in place.

Two lengths of 0.5mm x 0.3mm tube can be fitted to the hopper door opening levers on both sides to represent the opening handles. These pieces of tube should be about 15mm long.

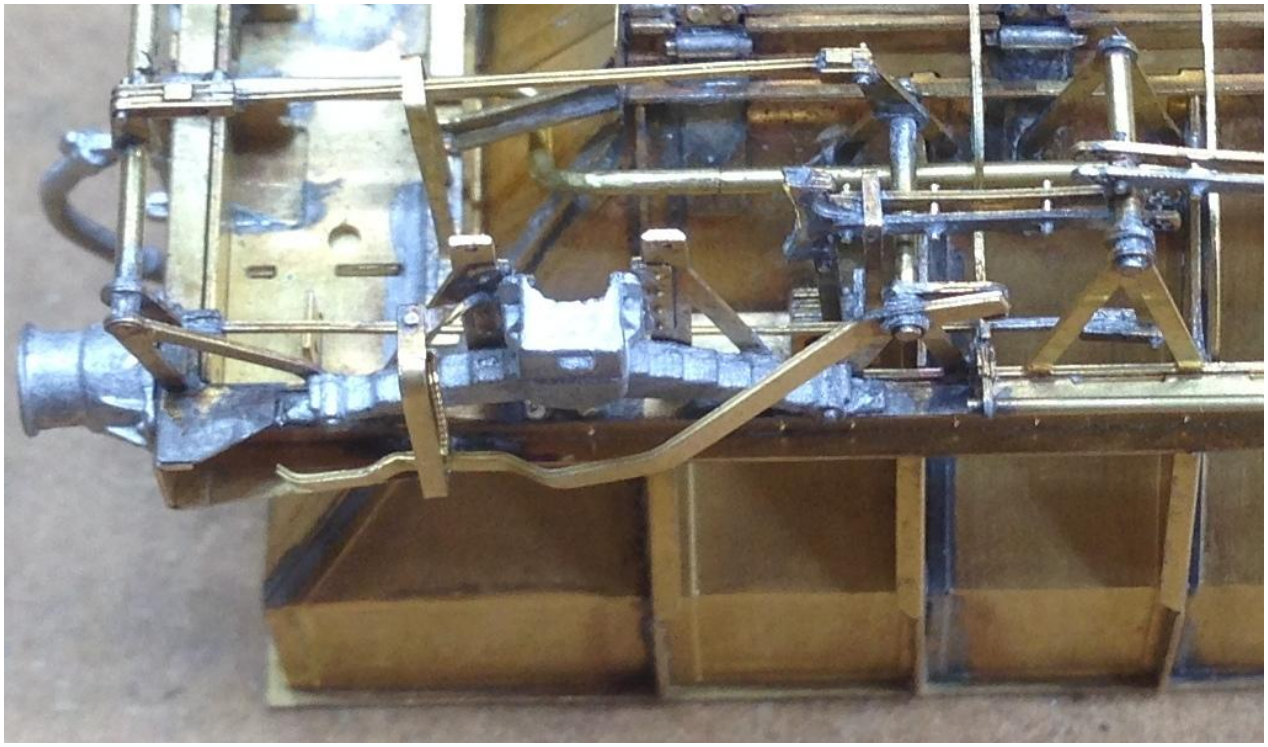
Spring/Axlebox Castings

You will need to open out the back of the axleboxes for the bearings. There is a slot in there but it is a little undersize to make sure the castings come out successfully. In order to get a 2mm slot in the back I use a high speed cutter from Dremel (#193) held in a pin vice and open it out by hand. The Dremel cutter is very useful but don't be tempted to use it on whitemetal with a power tool as it will make a mess of the casting. This slot doesn't need to be very deep when using a waisted bearing. I use a small burr or cutter in a mini drill for further clearance work. Also put a slot in the bottom of the axleboxes to help getting the bearings in if using pinpoints. Make sure you do all the work on the axleboxes whilst it is still attached to its moulding fret. When ready the fret can be removed with the aid of a piercing saw.

Solder the spring/axlebox castings in place perhaps using the bearings in the spring carriers as a location aid.

Brake Levers

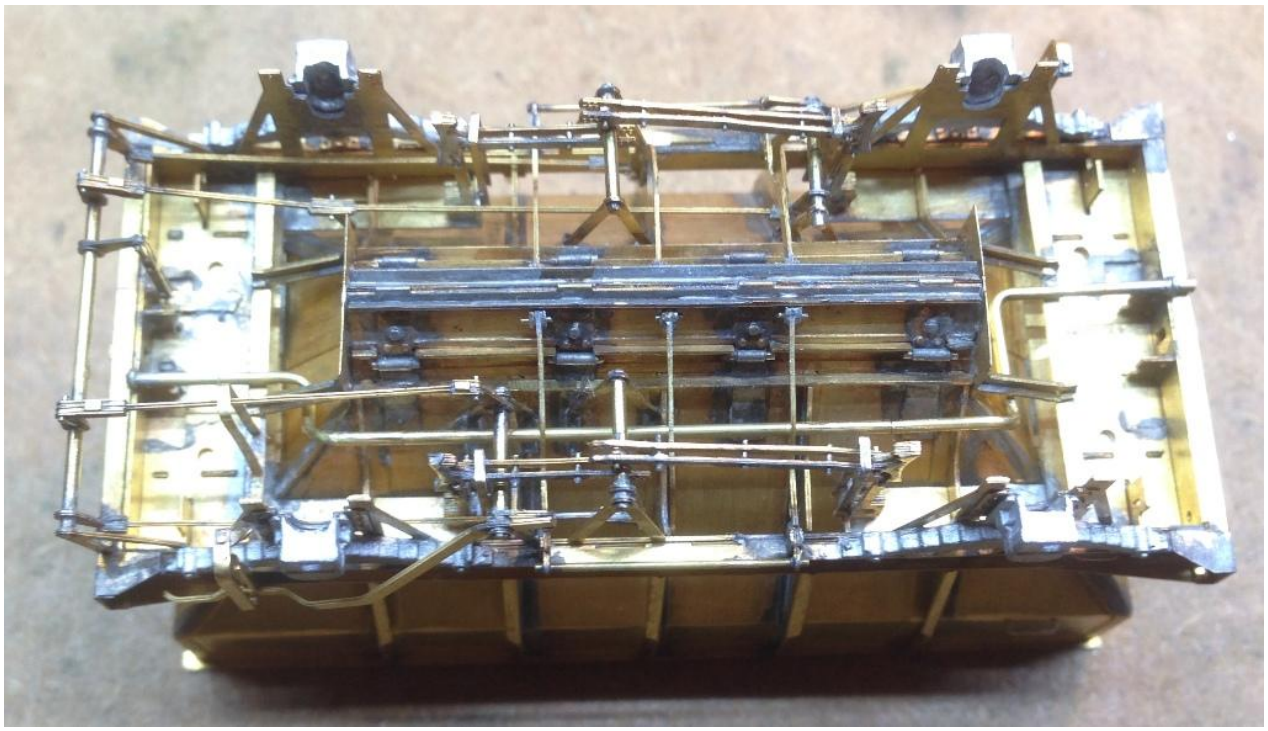
Now is a good time to bend up and fit the brake levers and washers (57). The brake levers should be bent up so that they clear the axlebox and then are cranked for the handle. I don't tend to worry about bending diagrams and measurements for this sort of thing. All the bends are there for a reason and it's simply a case of replicating them. To do this I put the brake lever on the brake shaft and mark where the fold lines should be. The first bend should be just beyond the hole for the brake shaft and then the next two either side of the axlebox with the bend for the handle just beyond the lever guide. The parts around the brake shaft, that go over the axlebox and that go through the lever guide should be parallel to the solebar. The only dimension I do check is that the flat part over the axleboxes is about 3mm from the axleguard when sat in the lever guide. The image below should give you a good idea.



Solder the brake lever in place when you're happy with the fit and then solder a washer in place over the brake lever. The brake lever actuator can now be soldered in place so that the little tab pointing outwards sits on top of the brake lever.

Vacuum Pipes

The train vacuum pipe that passes under the chassis between the two upright vacuum pipes at the ends falls into the 'can be left off if you want' category. The pipe itself is quite complicated and I constructed mine using 0.8mm x 0.4mm tube in three parts pinned together with 0.4mm wire. It's impossible to fit it in one piece as the pipe passes under the spreader plate stays and then the brake shafts on the one side. There are brackets etched on to the axleguard part of the chassis to help align things. Fig.6 below gives some details of the relevant dimensions for the pipe.



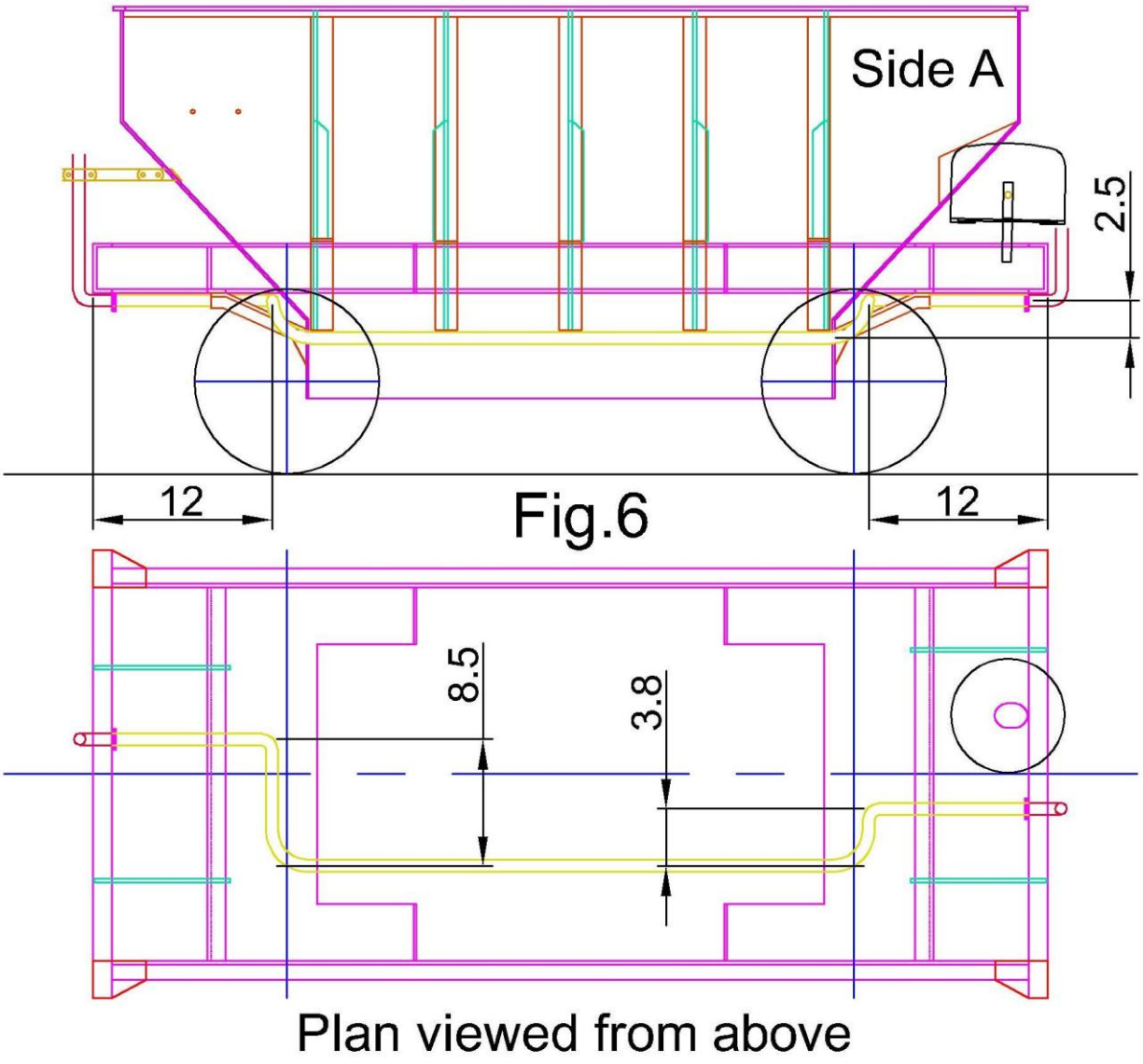


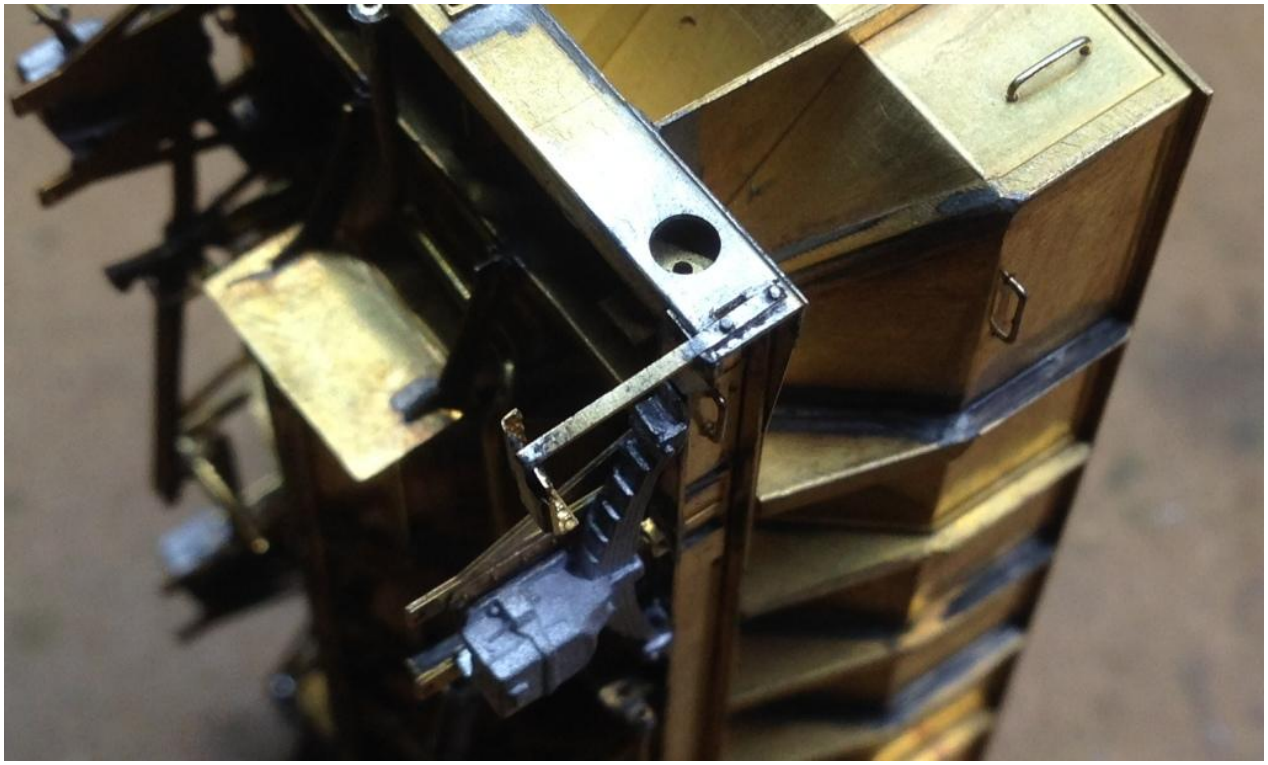
Fig.6

Plan viewed from above

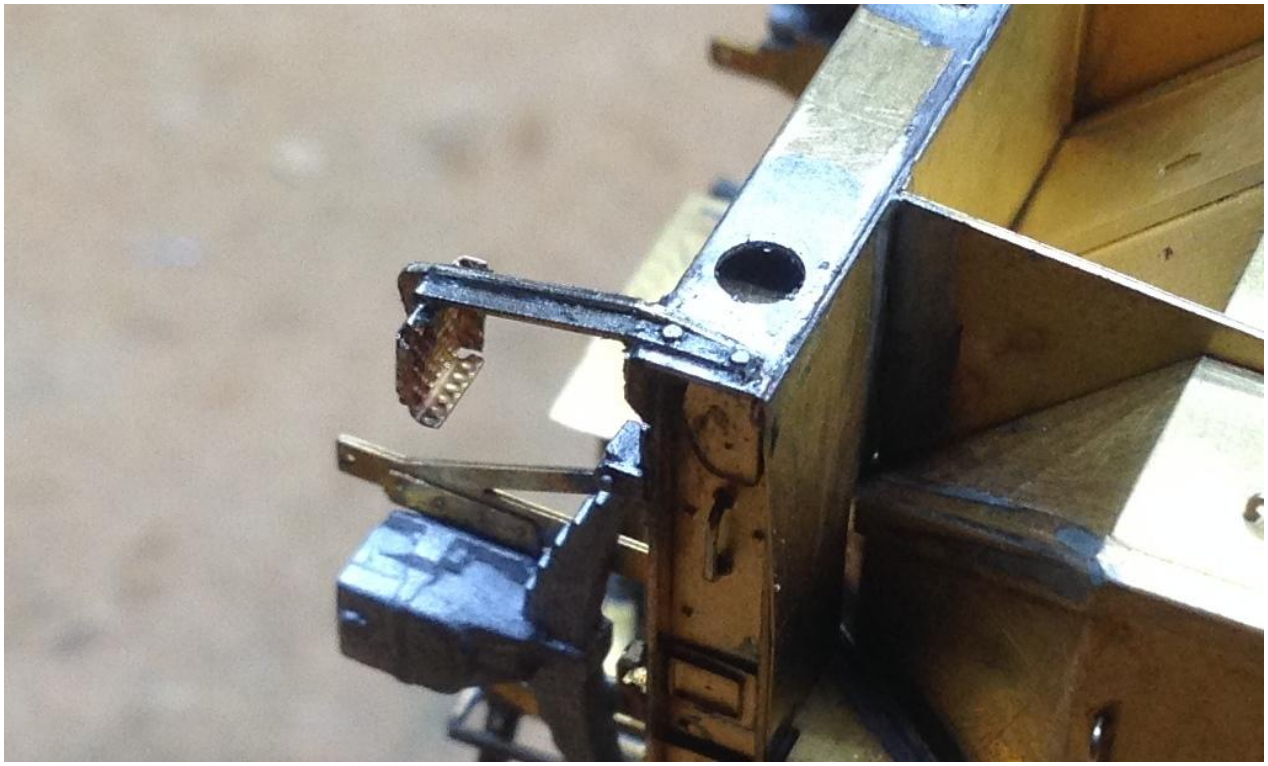
Steps

Now that the end is in sight and the risk of damaging them has diminished the steps can be fitted to the ends. These come in two parts; a part with the step attached (58) and an angle part (59). The step itself is quite a complicated shape and the bracket tapers inwards both in relation to the headstock and solebar.

Start with the ends step (58). Make sure that the two small holes can accept 0.31mm wire. Use the two holes in one of the end steps to drill a pair of holes into a piece of wood. Use these holes to solder two short pieces of 0.31mm wire into the holes. They will be used to attach the step to the headstock. File the wire down on the side with the half etched detail on the step to represent bolt heads. Trim the wire on the other side to about 0.5mm long and remove from the fret. The step comes as three parts all attached with fold lines and chequer plate etched into it. These three parts form a base and two sides. Fold them up trying to get the sides at 90°. There is then a fold line between the base of the step and the hanger which should be folded through 180° with the fold line on the outside so the first part of the hanger sits below the base of the step. Solder the hanger to the underside of the step. The next fold line should then be through 90°. There is a further fold line near the end with the wire solder in but this will be left until the angle part is fitted. Use the two lengths of 0.31mm wire to fit the step to the right hand end of the headstock and solder in place. See image below.

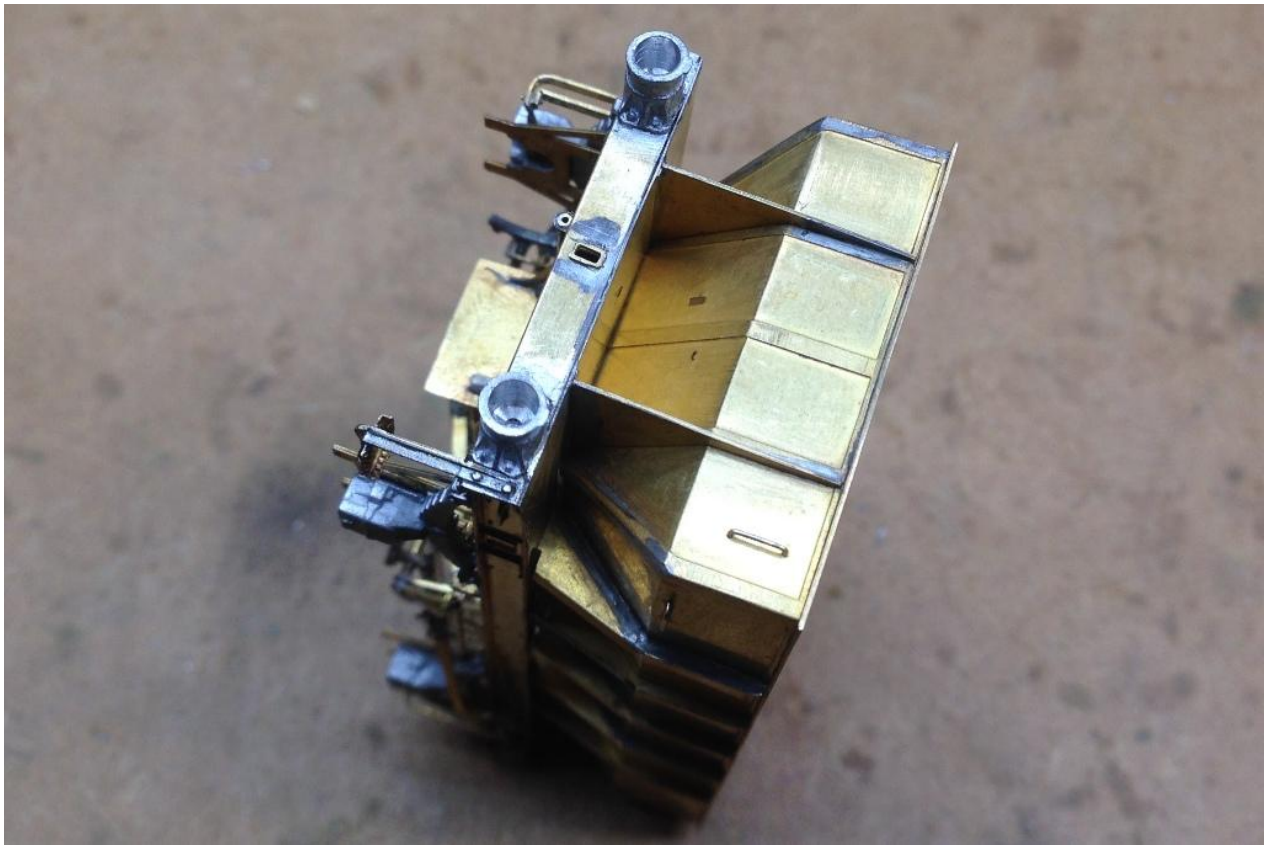


Remove the end step angle from the fret and fit to the headstock using the tab at one end and the slot in the headstock. Solder to the headstock then adjust the both parts of the end step to match the profile of the other. Solder the two parts together, especially on the underside of the step. Repeat for the other end.



Buffers

Fit the cast buffers in place. You may need to shorten the shank on the back a little. Make sure that they are the correct way up. There is a little lug on the barrel and this goes at the top. If you want to spring the buffers but don’t fancy drilling them out, Lanarkshire Models sell a pre-drilled one (their code B022).



Vacuum Pipes (Continued)

The next job is to fit the cast upright vacuum pipes. As they come they are a little long and should be carefully straightened and then bent as per the image below. Drill a 0.4mm hole into the end so you can pin it to the end of the train vacuum pipe using a piece of 0.4mm wire. The upright pipes are a bit vulnerable so a little extra effort securing them may prove beneficial in the long run.

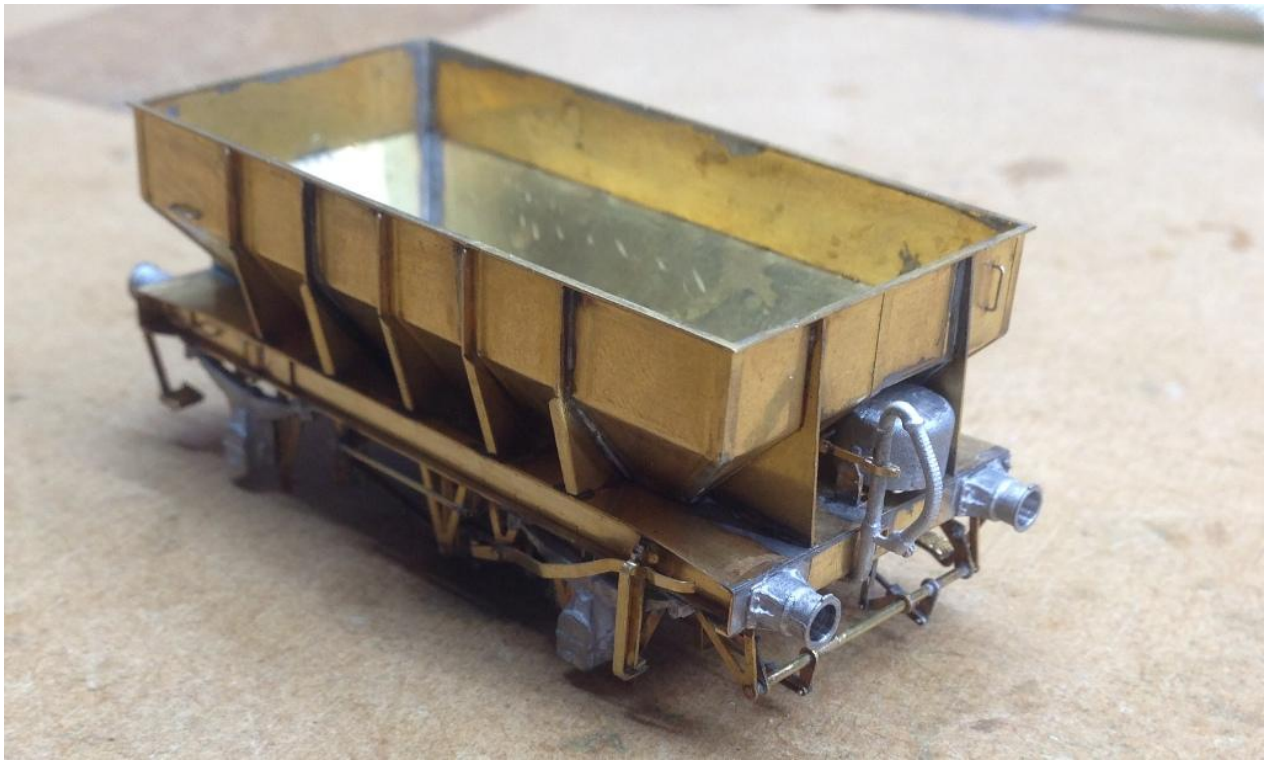
During this process you may find the whitemetal cracks. If it does cut the casting just below the bracket, drill a 0.4mm hole in the bottom and use a piece of 0.8mm x 0.4mm tube with some 0.4mm wire to replace the missing pipe. See image below.

The vacuum pipe stays (60) need to be added next. They come etched in two mirrored halves that need folding double and soldering together before fitting the pipe to the wagon.

Press out the half etched rivets and then fold the two halves in the middle about the centre fold line so that the fold line is on the outside. Don't fold completely through 180° just yet. Note that just in from this central fold line there is a half etched area on both sides which will form a slot when the two halves are folded completely against each other. The pipe should go in this slot. See image below. Note that there is a chamfer at the end of the stay. This should angle towards the top of the vacuum pipe as it will follow the profile of the hopper. Place the pipe between the two half etched areas and complete the fold through 180°.

Pinch the stay either side of the pipe to get the two halves against each other and run some solder along the stay to keep the two halves together. Don't solder the stay to the pipe just yet.

Fit the pipe in place feeding the stay into the small slot in the end of the hopper. Use 0.4mm wire inserted into the pipe to pin it to the train vacuum pipe and solder everything in place, including the stay to the hopper and the pipe.

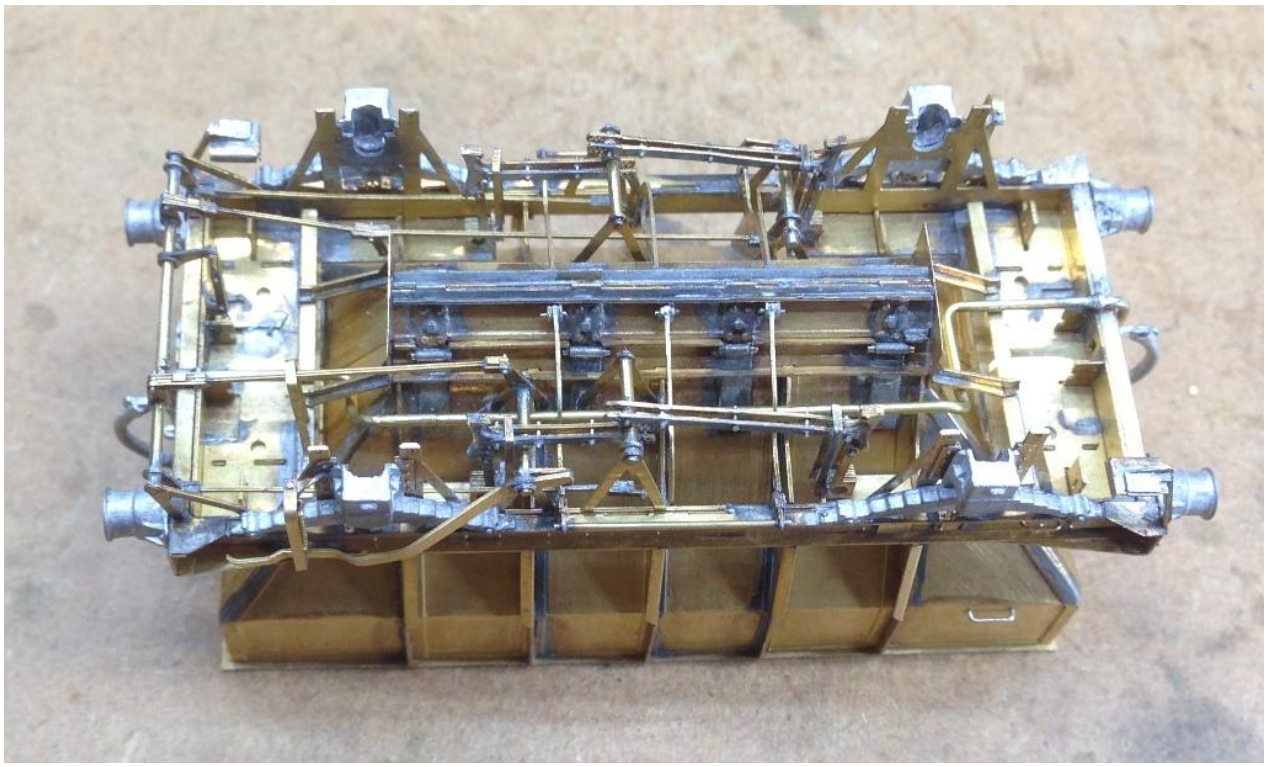


Coupling Hooks and Instanter links

There are two sorts of coupling hook provided as there was variation in those fitted to the prototype. One is the more traditional plain type (61A) and the other one with a recess in it (61B). The recessed type must have been to save weight for some reason and isn't a type I've come across on other wagons yet but they were fitted to a number of the P22s. Both sorts are designed as two halves to be folded double about the middle with the fold line on the outside, soldered together and then dressed with a file to better represent a casting.

The couplings can be retained by using a short length of 0.5mm wire through the hole in the coupling bearing on two cut outs on the folded down tabs in the middle of each end of the chassis.

Instanter links (62) are also provided. Like the coupling hooks they are designed as two halves to be folded double and soldered together. At the time of writing Brassmasters sell plain coupling links if you don't fancy making your own.



Buffer Springing Retainers

Provision has been made for using steel wire to spring the buffers. I find the majority of coil springs supplied with buffer heads to be too strong to be of practical much use so my preferred method of springing buffers is to use guitar wire leaf springs behind the headstock rather than coil springs in the buffer housing. To this end I have introduced buffer springing jigs that are suitable for most of the Rumney Models underframes (Rumney Models kits B.93A and B.93B). Due to the nature of the hopper wagon underframes it is not possible to fit this system retrospectively so the chassis includes this set up as part of it. Buffer springing retainers (63) are fitted to the buffer shanks and then a 25mm length of guitar wire spring is fed through the holes and slots next to the headstock. The wire bears on the buffer retainers. See Fig. 7 below.

To fit the buffer retainers, remove from the fret and check the fit of the buffer head shanks in the holes; adjust if necessary. Fold the buffer retainer into a C shape leaving the top unfolded for the moment. Place the buffer head shank through the buffer casting on the wagon and then slide the retainer onto the shank though the holes. Hold the retainer bottom with a pair of self closing tweezers and solder in place so that the head of the buffer should be 6mm form the face of the headstock. Use very little flux or you may encounter problems with the shank rusting. Obviously you will need to arrange things so that the buffer head is the correct distance from the headstock (see below). Once the retainer is firmly soldered in place you can fold the top over. Note that there is a correct side to fit the buffer retainers. The retainer bottom comes with a wedge on one side which should face towards the solebars. This will prevent the buffer retainer from rotating sufficiently for the wire to become disengaged.

The gauge of the spring wire necessary may vary depending on your train lengths but 0.011” is a good place to start. It maybe that you personally want a harder or softer wire in which case simply replace with a heavier or lighter gauge of guitar wire. Be aware though that the spring rate will change rapidly with the change in gauge. If you fit something like 0.008” wire then there maybe virtually no springing effect, conversely if you fitted 0.015” you may find that you might as well have made the buffers rigid. Guitar wire of suitable gauges can be had in single strings from good music shops.

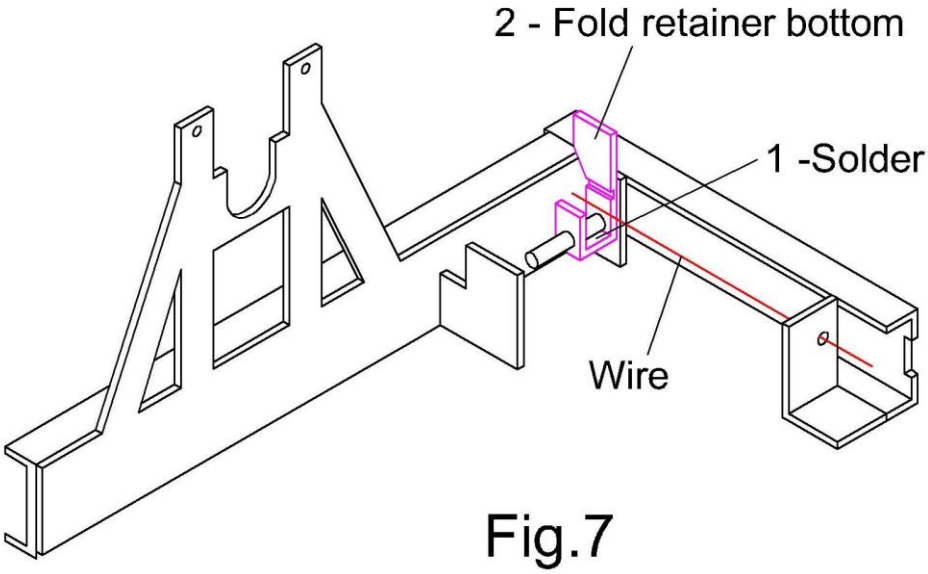


Fig.7

Finally

Firstly Thanks to Gordon Ashton for making the kit possible and also for supplying a complete set of engineering drawings for the 1950 Metro-Cammell batch.

Last but certainly not least if you haven’t come across the wonderful resource for wagon photos that is Paul Bartlett’s website (including photos of both the GWR and BR built Herrings) then I would thoroughly recommend a visit to:

http://paulbartlett.zenfolio.com/

Justin Newitt - September 2019

Suppliers List

Rumney Models (alternative axlebox and spring castings)
www.rumneymodels.co.uk

Eileen's Emporium (brass wire and tube)
Unit 19.12 Highnam Business Centre
Newent Road
Gloucester
GL2 8DN
www.eileensemporium.com

Lanarkshire Models and Supplies (pre-drilled buffers)
9 Nairn Avenue
Blantyre
G72 9NF
www.lanarkshiremodels.com

MJT (buffer heads)
Dart Castings
17 Hurst Close
Staplehurst
Tonbridge
Kent
TN12 0BX
www.dartcastings.co.uk

Brassmasters (coupling link)
PO Box 1137
Sutton Coldfield
West Midlands
B76 1FU
www.brassmasters.co.uk

Cambridge Custom Transfers (transfers)
6 Roseland Gardens
Bodmin
PL31 2EY
www.cctrans.org.uk