

## **Rumney Models – GWR Macaw B / BR Bogie Bolster C Detailing**

### **Notes**

This set of instructions covers Rumney Models Bogie Bolster C detailing kit C.05. It is designed to enhance the Bachmann Macaw B model and provides a new set of underframe trussing using brass angle as well as accurate brakegear for any of the four types used on these wagons.

You will need to decide at the beginning which of the four arrangements of brakegear you wish to model, if you haven't already. These are:

- GWR Dean/Churchward (Macaw Bs built from 1913 to 1938)
- GWR/BR unfitted lever brake (unfitted wagons built from 1939 to 1956)
- BR fitted lever brakes - Arrangement 1 (vacuum braked wagons with roller bearing fitted BR plate bogies)
- BR fitted lever brakes - Arrangement 2 (vacuum braked wagons with Gloucester bogies)

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 all the photos are of these 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.

Everyone has their own soldering methods. I now use a temperature controlled soldering iron with predominantly 145° solder and La-Co paste flux. For a long time I used an Antex 18W soldering iron on virtually everything with few problems.

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.

### **Prototype Notes**

The GWR Macaw B / BR Bogie Bolster C was something of a design success story. The GWR began constructing the 45' long 30T capacity wagons with angle trussing in 1913 and aside from the change in brakegear from Dean/Churchward to lever brakes in 1939 and some being constructed without ends to the body, the same wagon was still being built at Nationalisation. BR chose the GWR Macaw B to become their standard Bogie Bolster C and with minor changes in body construction (riveted or welded), bolsters and the types of bogies fitted, essentially the same wagon that the GWR created in 1913 was still being produced when the final examples were rolled out by Metropolitan Camel in 1962.

The detailing changes are summarised as follows:

Year	First diagram featuring changes	Changes made
1913	GWR J 14	Riveted body construction, D/C brakegear, wood bolsters, GWR Plate bogies
1939	GWR J28	Unfitted Lever brakegear, no body ends
1949	BR 1/471	Body ends reappear
1953	BR 1/473	BR Plate bogies introduced
1954	BR 1/474	Introduction of heavier steel and wood bolsters, no central bolster pockets on body side. Those built at Swindon continued to have riveted body construction; those built elsewhere had welded body construction. This arrangement continued to the end of production.
1956	BR 1/474	Central bolster pockets reappear
1958	BR 1/477	Vacuum fitted, 1 <sup>st</sup> arrangement of VB Lever brakes, roller bearing fitted BR Plate bogies
1961	BR 1/477	2 <sup>nd</sup> arrangement of VB Lever brakes, Gloucester bogies

### Materials list

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, axleguards ties, brake lever guards

0.7mm - Brake cross shafts (D/C brakegear)

0.8mm - Brake cross shafts (Lever brakegear)

Approximately 560mm of 1.2mm equal brass angle (included if you chose to have it).

0.3mm plastic rod for rivet detail, if required (Plastruct Round Section MR10).

Eileen's Emporium is again a good source for both of these.

The Bachmann model comes with GWR plate bogies. If you are happy with them these can be used for all wagons up to 1953. Plastic BR plate bogies, of both oil and roller bearing journal types are available from Cambrian Models along with the Gloucester variety.

In the spring of 2017 Rumney Models will be introducing full kits for GWR and BR plate bogies which will be eminently suitable for these models.

Vacuum cylinders for fitted wagons are the 18" type. Castings for these are available from Rumney Models (F.01).

For buffers I would recommend those produced by Lanarkshire Model Supplies. They are by far the best around and a lot of types of buffers are available pre drilled for fitting sprung buffer heads. This service is particularly useful for heavy duty buffers with their large 2.5mm shanks. The quality is excellent. GWR and early BR wagons had GWR 1'6" 6 rib self contained buffers (B023). Later BR unfitted wagons had 1'6" 2 rib self contained (the nearest I can find is B031 though the head will need changing for a 16" type). Early vacuum fitted wagons had 1'8½" self contained (B014) and later fitted wagons had 1'8½" Oleos (BP03). Check you prototype for the type you need. Metal buffer heads and springs are available from Wizard (including 1.45mm shank buffer heads for Oleos) and MJT (including 2.5mm shank heads for self contained buffers).

Lanarkshire Models also do cast swan neck vacuum pipes for the fitted wagons though I find them a little fragile and prefer to make my own from wire.

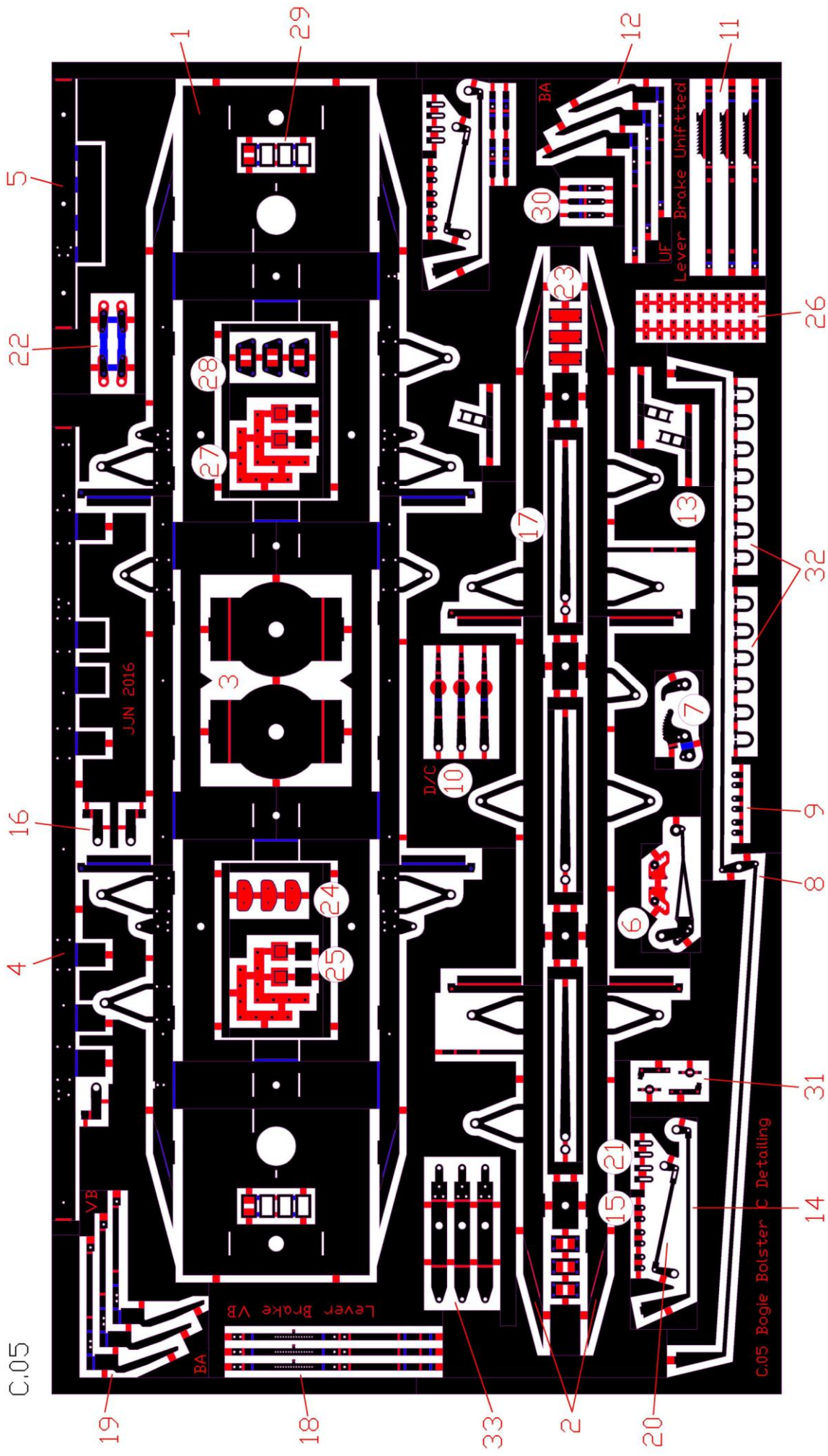
Coupling hooks (B.94) and Instantan links (B.95A) are available from Rumney Models. For links I use the Exactoscale products available through C&L Finescale. For Screw coupling I currently use the Masokits product.

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

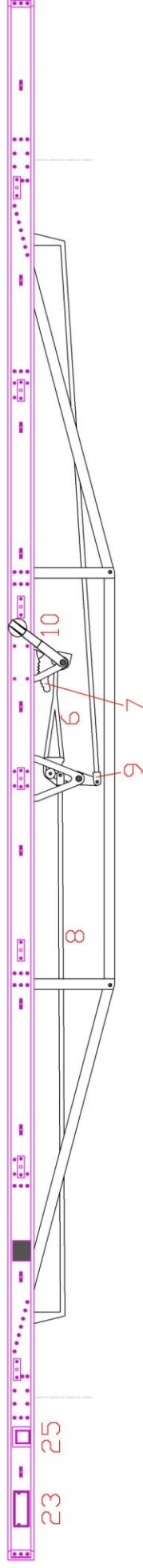
## **Parts List**

- 1 – Main trussing assembly
- 2 – Inner trussing assemblies
- 3 – Bogie pivot plate
  
- 4 – Solebar detail drilling jig
- 5 – Headstock detail drilling jig
  
- 6 – D/C brake shaft linkage & overlays
- 7 – D/C brake ratchet & pawl
- 8 – D/C brake bogie linkage
- 9 – D/C brake bogie linkage overlays
- 10 – D/C brake levers
  
- 11 – Unfitted brake lever guards
- 12 – Unfitted brake lever guard stays
- 13 – Shunter's pole rack
- 14 – Lever brake bogie linkage
- 15 – Lever brake bogie linkage overlays
- 16 – Brake lever actuators
- 17 – Brake levers
  
- 18 – Fitted brake lever guards
- 19 – Fitted brake lever guard stays
- 20 – Lever brake shaft linkage (vacuum brake wagons)
- 21 – Lever brake shaft linkage overlays (vacuum brake wagons)
- 22 – Vacuum cylinder actuators
  
- 23 – Square number plates
- 24 – D number plates
- 25 – Label clips & wooden solebar blocks
- 26 – Shackle ring base plates
- 27 – Corner plates
- 28 – Coupling pockets (trapezoidal riveted)
- 29 – Coupling pockets (rectangular welded)
- 30 – Lamp Irons
- 31 – BR swan neck vacuum pipe brackets
- 32 – Bolster pin D links
  
- 33 – Vacuum cylinder bracket

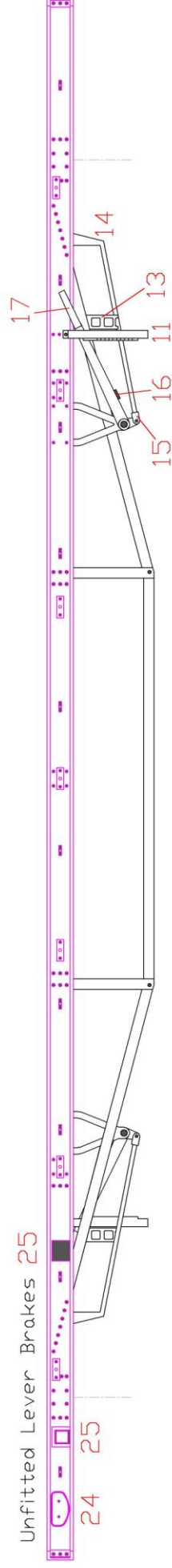
C.05



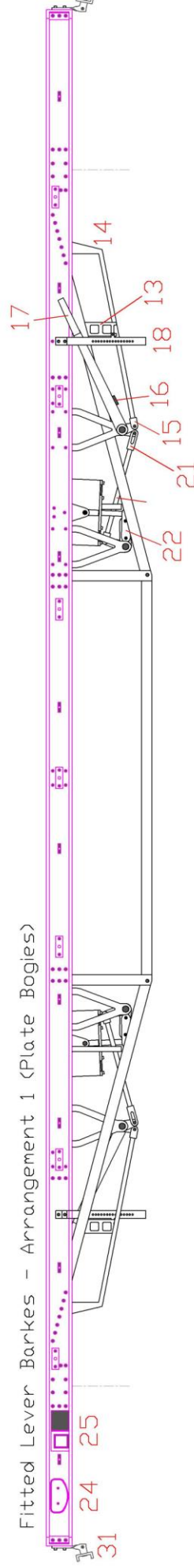
Dean / Churchward 25



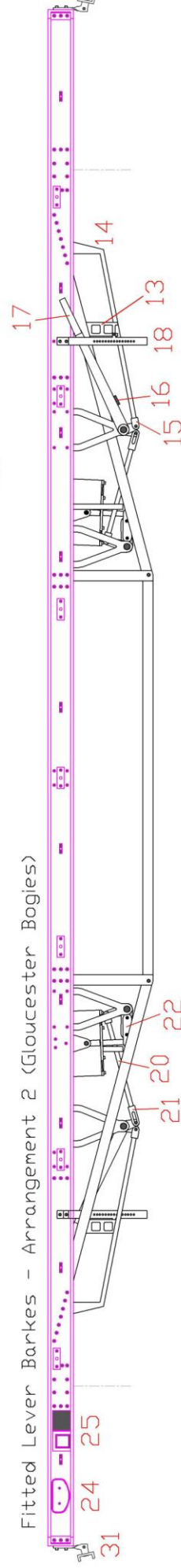
Unfitted Lever Brakes 25



Fitted Lever Brakes - Arrangement 1 (Plate Bogies)



Fitted Lever Brakes - Arrangement 2 (Gloucester Bogies)



## Construction

The first job is to prepare both the main trussing assembly (1) and inner trussing assemblies (2). This involves removing the various vees that you don't require for your brakegear. If you haven't already decided which type of brakegear you are modelling now is the time!

Referring to the colourful Fig. 2 below, mark on the fret the vees that you will need for your chosen brakegear then remove the unwanted ones with a piercing saw. Fig. 2 is arranged as the fret is when looking at it from the side with the half etched writing on it. To summarise which vees you will need:

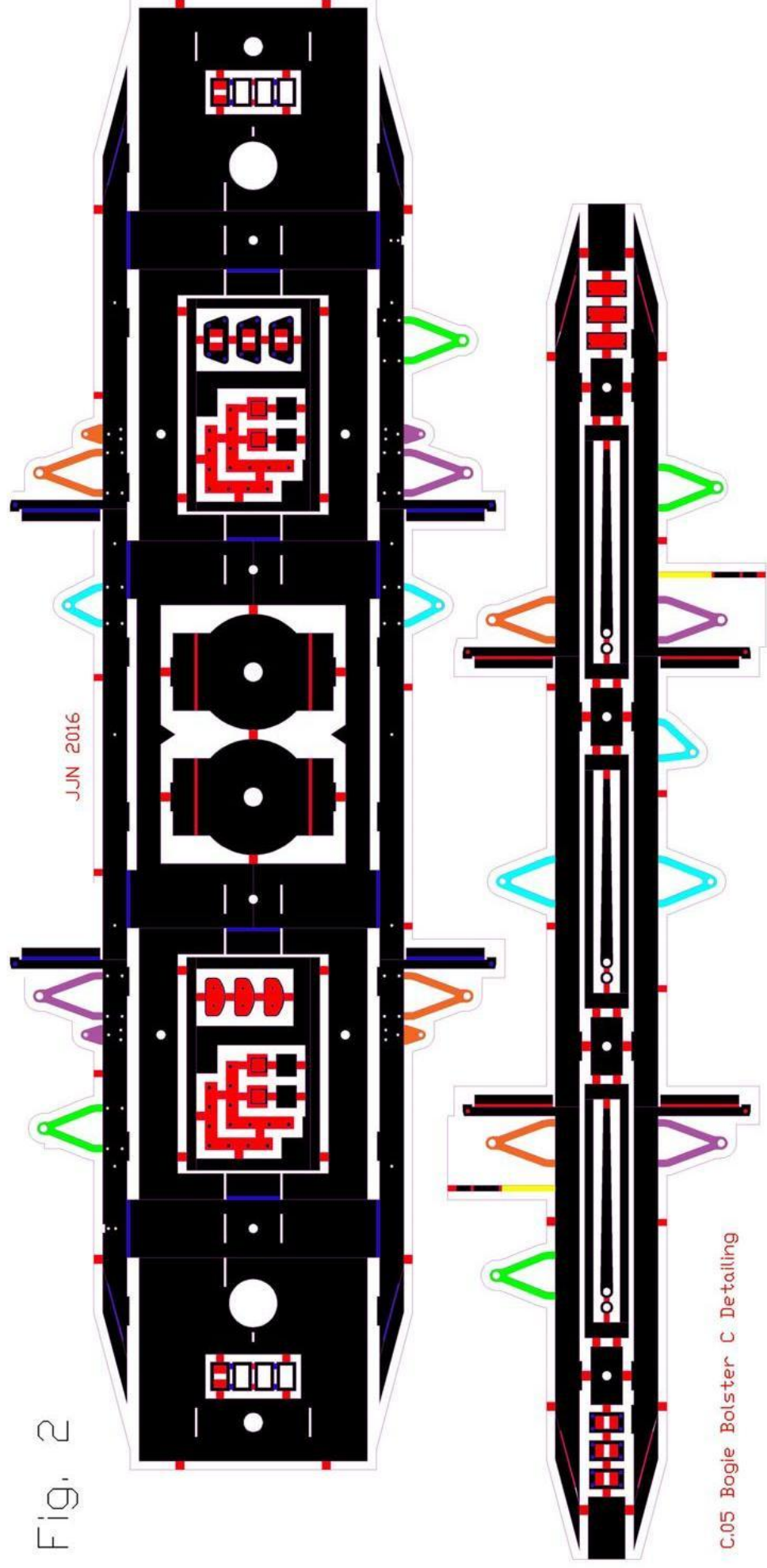
- GWR Dean/Churchward (Macaw Bs built from 1913 to 1938)  
Keep the vees coloured cyan
- GWR/BR unfitted lever brake (unfitted wagons built from 1939 to 1956)  
Keep the vees coloured green
- BR fitted lever brakes - Arrangement 1 (vacuum braked wagons with roller bearing fitted BR plate bogies)  
Keep the vees coloured green  
Keep the vees coloured magenta  
Keep the safety loops coloured yellow
- BR fitted lever brakes - Arrangement 2 (vacuum braked wagons with Gloucester bogies)  
Keep the vees coloured green  
Keep the vees coloured orange  
Keep the safety loops coloured yellow

Once you have marked the vees that you want to keep remove the main and inner trussing assemblies from the fret and cut off the unwanted vees with a piercing saw. Remove the parts from the middle of the main trussing assembly and put aside for later.



Keep for D/C brakegear  
 Keep for all Lever brake arrangements (both fitted and unfitted)  
 Keep for both VB Lever brake arrangements  
 Keep for 1st VB Lever brake arrangement  
 Keep for 2nd VB Lever brake arrangement

Fig. 2



C.05 Bogie Bolster C Detailing

On both the main and inner trussing assemblies there are 'queen posts' that need to be folded up. These ensure that the trussing sits where it should do. Firstly press out the half etched rivets at the bottom of the queen posts and then fold each one up so it resembles angle. I found the easiest way of doing this is to clasp the main part of the etch in a vice and then use a large flat file or similar to make the fold.



The trussing now needs to be added to the etched assemblies. For the main trussing you will need four 125mm lengths of angle. You will need to make two cuts 46.5mm apart as shown in Fig. 3. These cuts should be equally spaced about the centre of the length of the L section. These pieces can then be bent at the cut points and placed one at a time behind the queen posts. In order to do this consistently I created a small jig using a piece of brass C section. I cut this 45.5mm long and make a mark in the centre. I used the mark in the middle to align the jig on the brass angle and cut at each end (see photo below)

Whilst the piercing saw is out cut two more lengths of brass L section a smidge over 26mm long and place to one side.



Adjust the L section so that it matches the angle in the ends of the main and inner trussing assemblies. These are effectively alignment jigs for the truss rodding. Solder in place and repeat for the other side. Trim any excess off so that the truss rodding is flush with the base.



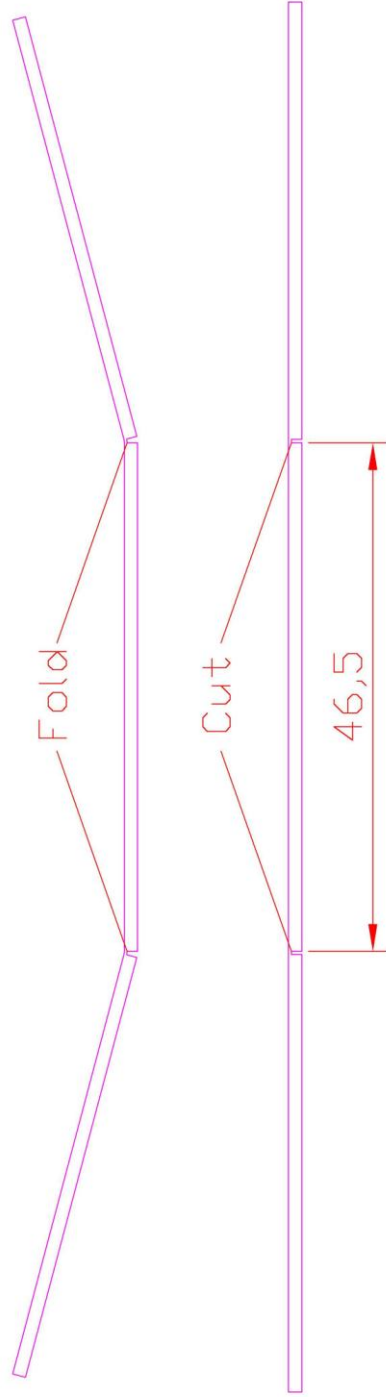
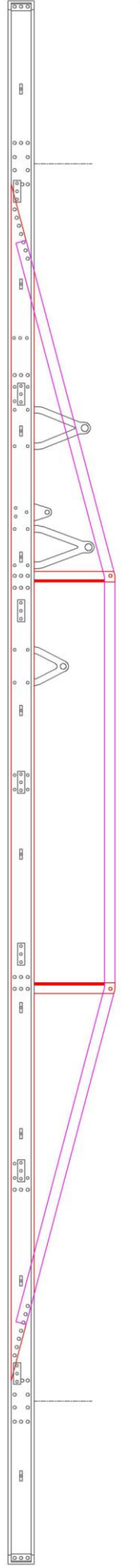
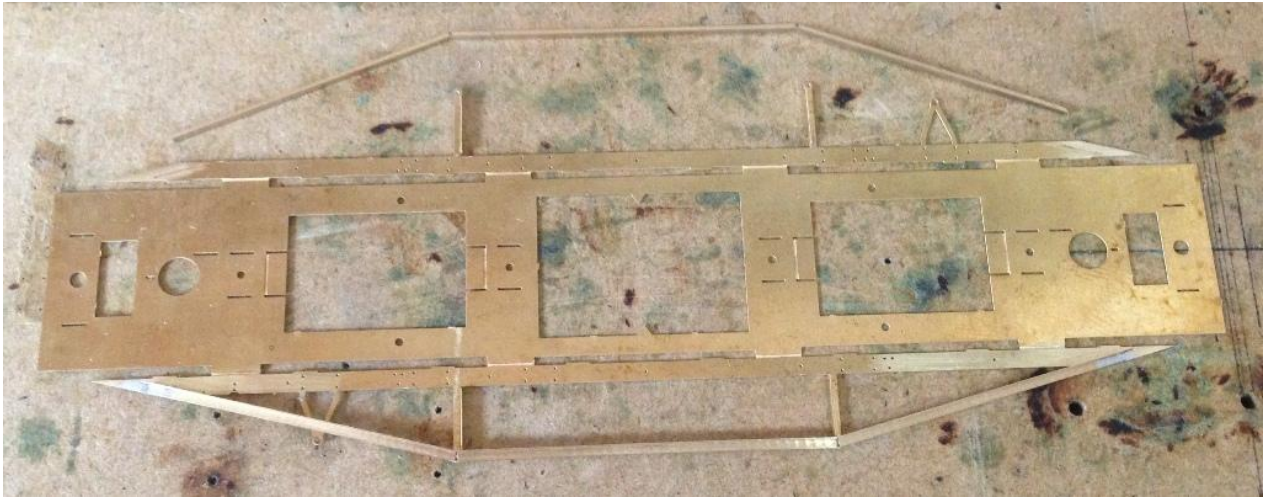


Fig. 3



Once four lengths of brass angle have been soldered in place the sides of the main assembly can be folded up. Fold out the four rectangular locating tabs along the centre line of the main vee assembly (see photo below).

The inner trussing assemblies can be fitted to the main trussing assembly. There are tabs and slots to aid this. Note that one of the inner trussing assemblies has an extra set of tabs. This should go the side with the extra slots. Solder in place. In case you are wondering, the orientation of them matters if you are constructing D/C brakegear.

If you are constructing a vacuum braked wagon now is a good time to fit the vacuum cylinder brackets (33), if required. This folds into a channel shape and can be aligned behind the vacuum cylinder vee using a length of 1mm wire to pin the two parts together.



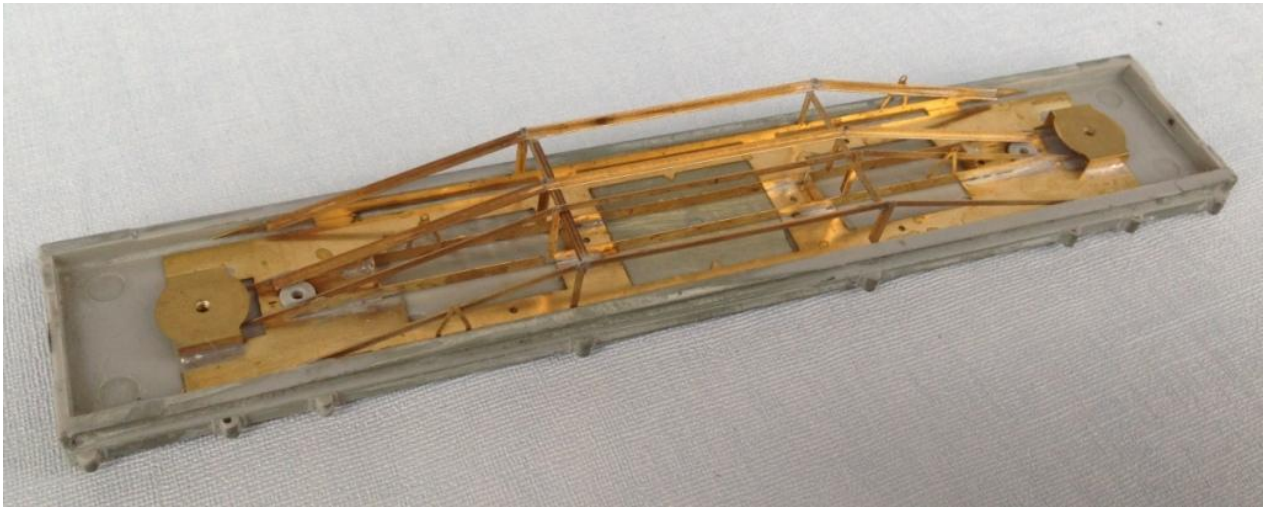


Take the two lengths of 26mm angle and solder in place at the intersection of truss rods and queen posts.

The bogie pivot plate (3) can now be fixed in place. The size of bolt that you will require will depend on the bogies that you are fitting. A nut or bolt can be soldered to the bogie pivot plate and then this can be folded into a C shape and fitted to the trussing assembly using the tabs and slots provided to locate it. The hole in the bogie pivot plate is etched at 2mm.



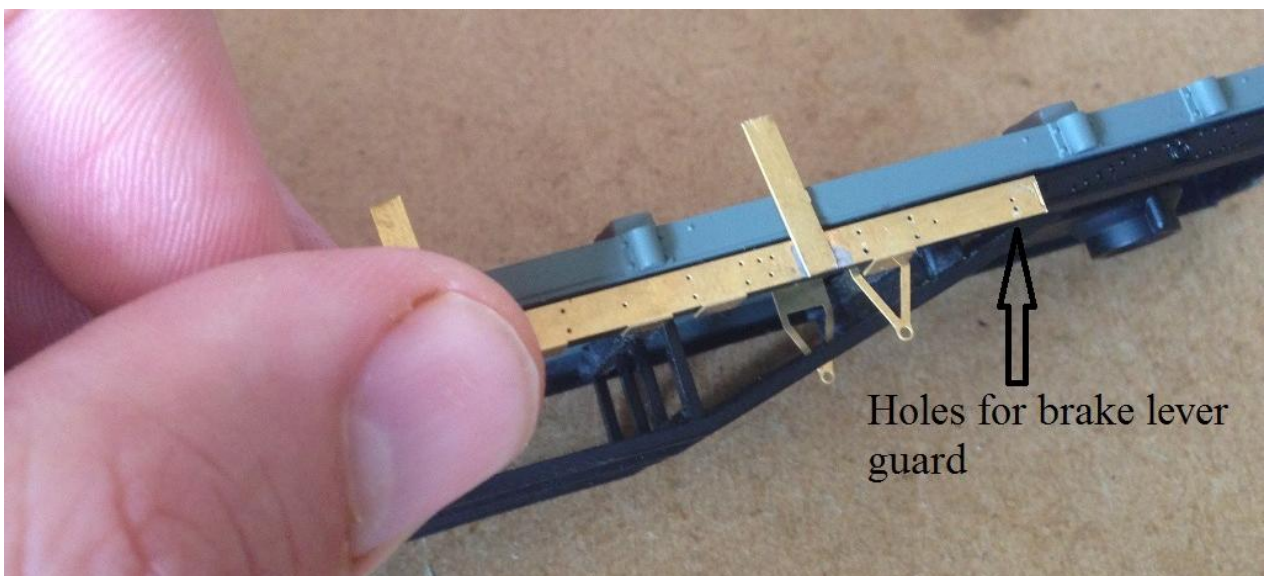
The completed trussing assembly can now be fitted to the Bachmann body. Removing the plastic trussing from the Bachmann model is a simple matter of removing the two screws that attach it to the body. If you wish to replace any of the detail along the sideframes or headstock, such as the buffers or bolster shackle rings, then now is the best time to remove it. Also if you wish to strip the body for repainting now is the best time. The completed assembly can then be glued in place (I used epoxy) with the two screw locating lugs acting as a longitudinal alignment aid.



## Brakegear

Included with the fret are two drilling jigs, one for the solebar (4) and one for the headstock (5). The purpose of these is to drill holes suitable for the brake lever guards (if constructing a fitted or unfitted lever brake wagon) and also to drill holes for creating vee rivets using 0.3mm plastic rod. The idea behind this method is to use the jig to accurately drill holes through the plastic solebar and then insert short lengths of 0.3mm plastic rod into the holes to represent rivets. If you are not worried about the rivet detail or have alternative methods of representing the rivets then don't drill the holes for the vees. You will still need to drill the holes for the lever guards of constructing a lever brake wagon.

The solebar drilling jig has numerous tabs on it. These are designed to fold up and then locate the jig on the solebar using the trussing and the vees. Due to the way that the Bachmann model is designed with the top of the solebar moulded into the body side you will need to add a couple of lengths of scrap etch to the jig to keep it upright when holding it against the Bachmann model. These should miss any holes and also the bolster pockets on the body side (see photo below).





Assemble the drilling jig and then, if you are constructing a lever brake wagon, drill out the holes you need using a 0.3mm drill bit for the brake levers. Note there are two holes. If you are constructing an unfitted lever brake wagon then drill out the bottom hole only. If you are constructing a vacuum braked wagon (of either arrangement) then drill out both holes.

If you wish to add rivet detail using the plastic rod method then drill out the holes in the relevant vees and add rivets using short lengths of 0.3mm plastic rod. Note that on the drilling jig there are drilling holes for locating the bolster shackle rings if you are replacing them.



The headstock drilling jig can be folded up and used to drill out holes for buffers and coupling hooks using a 0.6mm drill bit. These can then be opened out to whatever dimension is required. If you are constructing either of the vacuum braked arrangements you can also drill out holes for the lamp irons and vacuum pipe brackets if required.



## GWR Dean/Churchward

Check that the large holes in the D/C brake shaft linkage & overlays (6) can accept 0.7mm wire and the small holes 0.3mm wire. Solder the overlays in place on both sides of the linkage using two short lengths of 0.31mm wire matching the shape of the overlay to the outline of the linkage.



Check that the large holes in the D/C brake ratchet & pawl (8) can accept 0.7mm wire and the small holes 0.3mm wire. These need to be fitted to the brake shaft linkage. Drill a 0.3mm hole in a spare piece of wood and insert a length of 0.31mm wire. Feed the pawl onto the wire as shown in the photo below.



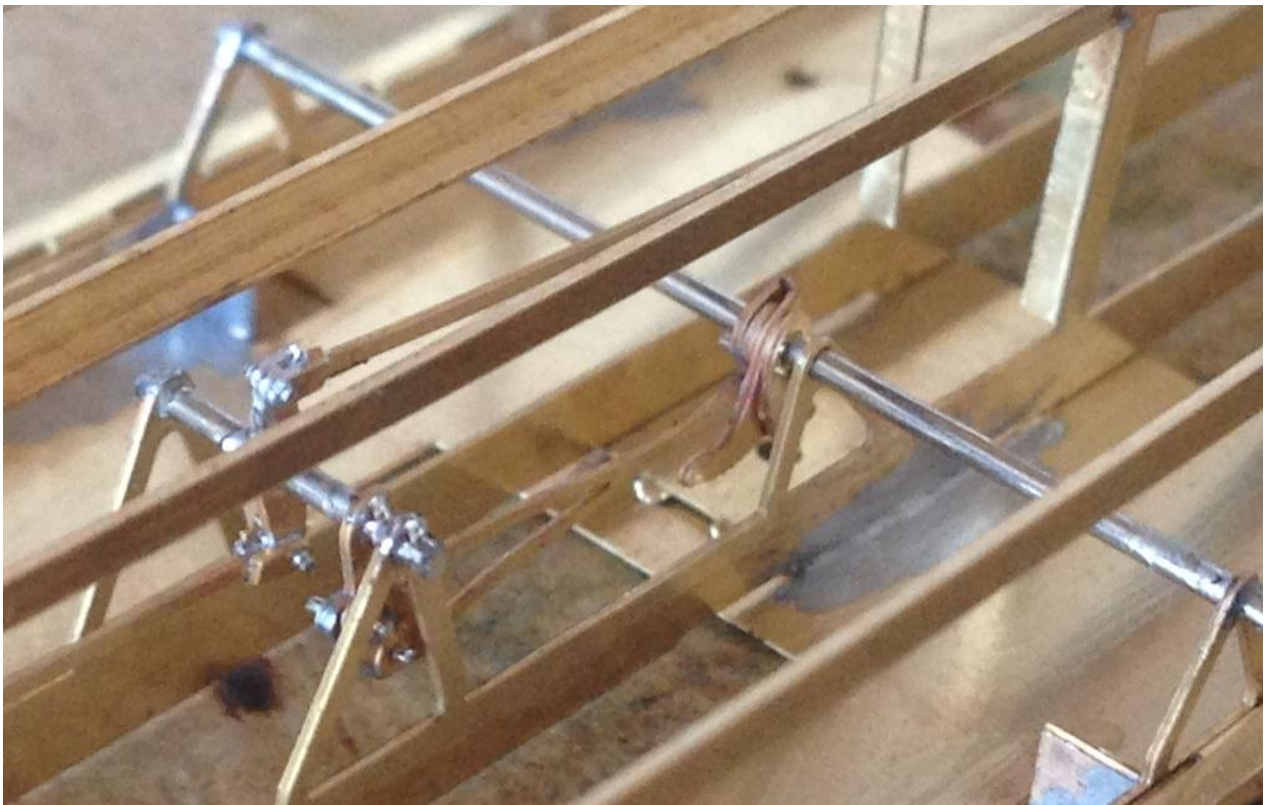
Next fold up the ratchet so that it wraps around the brake linkage with the half etched area on the inside of the fold), folding out the small tab on the ratchet whilst you are at it. Feed onto the wire and up against the pawl. Solder in place with the large holes aligning. Trim the 0.31mm wire to represent bolts.



Make sure that the holes in the D/C brake bogie linkage (8) and D/C brake bogie linkage overlays (9) can accept 0.31mm wire and remove from the fret. Attach the overlays by folding around the linkage and then using short lengths of 0.31mm wire to locate them. Solder in place and trim the wire to represent bolt heads.



Fit both the brake shaft linkage and bogie linkage to the underframe along with lengths of 0.7mm wire for the brake shafts. Make sure the 0.7mm wire extends 0.5mm or so beyond the vees. The bogie linkage goes along the centre line and the brake shaft linkage goes on the side with the two vees (see photo below).



Make sure that the holes in the D/C brake levers (10) will accept 0.7mm wire and fold up. Solder in place on the main brake shaft going across the whole wagon. Note that the position of the brake lever in the photo below indicates that the brakes are on. For the position of the lever with the brakes off, see Fig. 1.



### Unfitted Lever brakes

For unfitted Lever brakegear the first job is to assemble and attach the brake lever guards and their stays. The stays on these bogie bolsters were distinctive, heavy duty affairs made from section and this has been replicated in the kit.

Check that the holes in the unfitted brake lever guards (11) and the unfitted brake lever guard stays (12) can accept 0.31mm wire and remove from the fret. Fold up as per Fig. 4, there are half etched guides for making the rounded corners on the guard and the ratchet also needs folding out. Solder short lengths of wire to the bottom hole in the stay and the top hole in the guard.

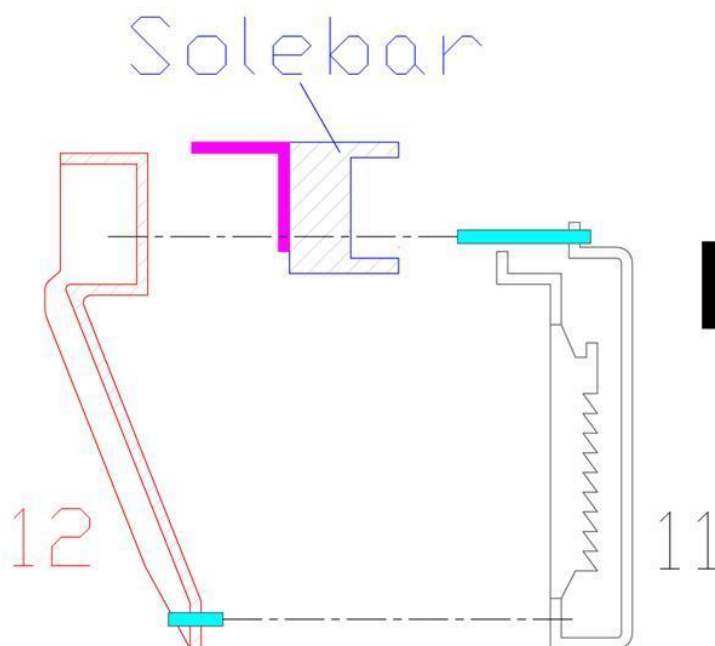


Fig. 4

0.31mm wire



The two parts need to be attached to the model and each other using the short lengths of wire and fixed in place. I soldered the two parts together very quickly using a hot iron where the wires meet the other part thus trapping the guard and stay in place. They could also be glued in place if you are worried about the plastic melting.





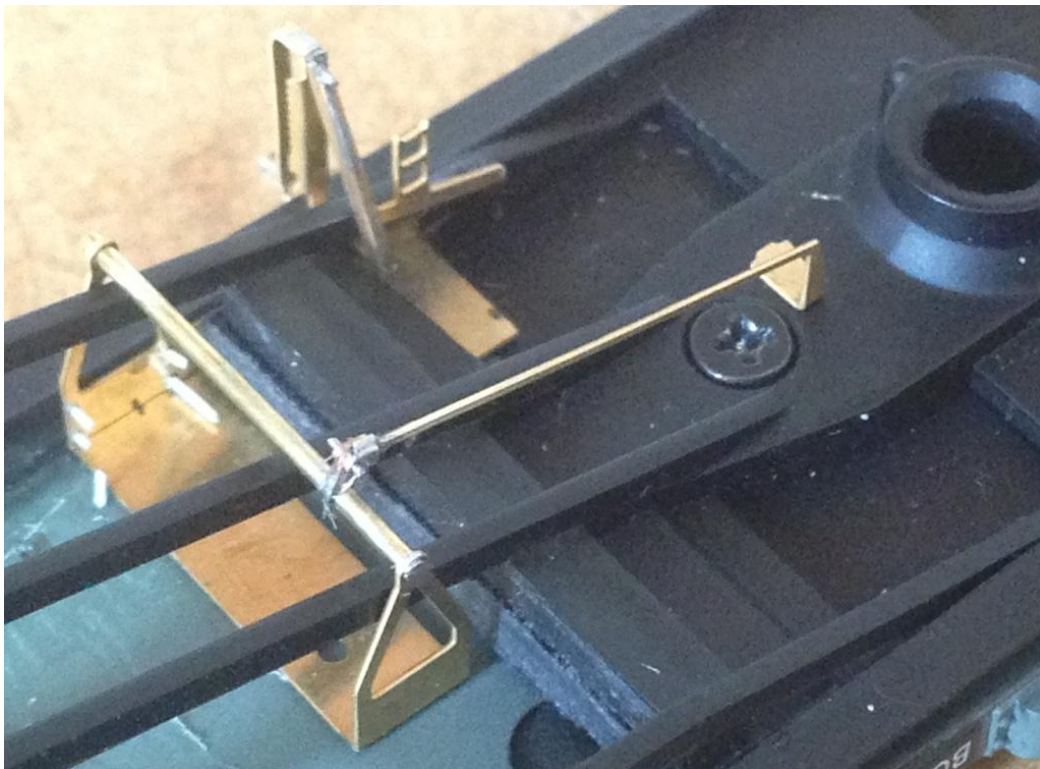


The shunter's pole rack (13) can be removed from the fret and soldered in place on the brass angle behind the brake lever guard. Leave about 1mm between the rack itself and the guard/stay.

Make sure that the large hole in the lever brake bogie linkage (14) can accept 0.8mm wire and the small holes in the lever brake bogie linkage and the lever brake bogie linkage overlays (15) can accept 0.31mm wire and remove from the fret. Attach the overlays by folding around the linkage and then using short lengths of 0.31mm wire to locate them. Solder in place and trim the wire to represent bolt heads. Do not fold over the locating tab at the end of the linkage as in the photo below.



Make sure that the holes in the brake lever actuators (16) can accept 0.8mm wire, remove from the fret and fold out the little clutch. Cut a length of 0.8mm wire so that it fits in the vees and extends 0.75mm or so beyond the vee next to the solebar. Fit the wire brake shaft in place, threading the bogie linkage and brake lever actuator onto the wire at the same time. The actuator goes behind the solebar vee with the little clutch facing outwards (this will go under the brake lever). Leave the actuator free for the moment but solder the linkage to the main trussing assembly using the tab and slot provided for location.



Make sure that the holes in the brake levers (17) and washer attached to them can accept 0.8mm wire and remove from the fret. Fold over the washer and solder in place on the brake lever. Fold up the brake lever so that it clears the solebar (see photo below). Once you are happy with the shape solder in place.

Solder the brake lever actuator in place so that the clutch is up against the bottom of the brake lever.

Repeat for the other end!



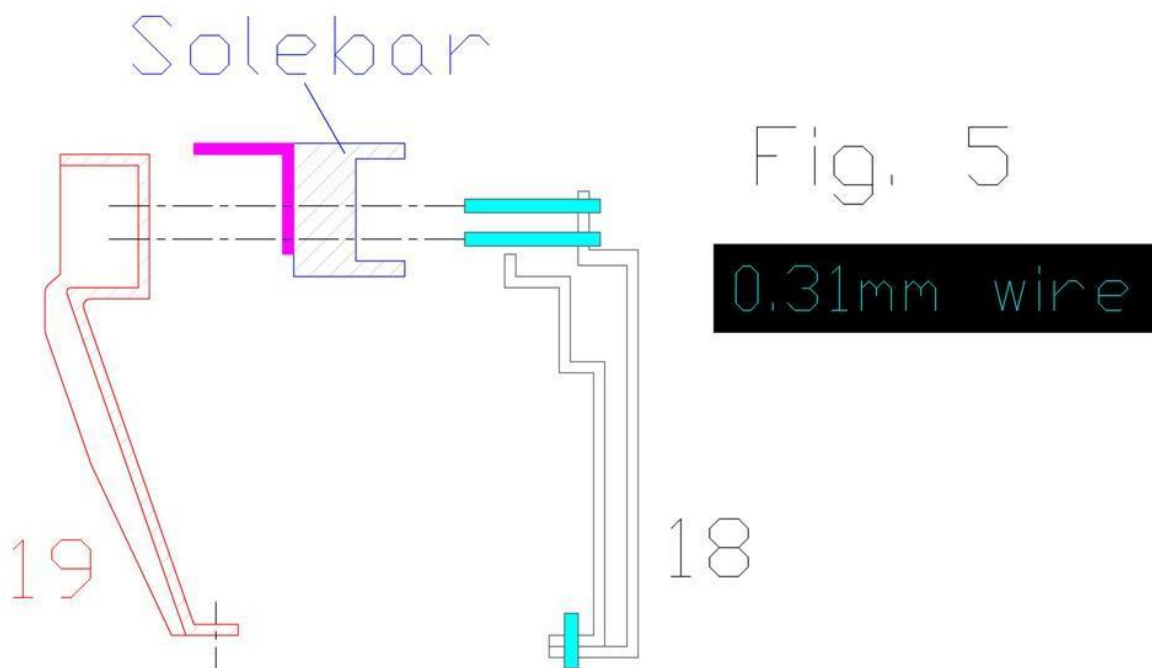
## VB Lever brakes

The brake linkages and levers/guards were the same for both arrangements of vacuum brakegear. The only difference between the two arrangements was the position of the vacuum cylinder and the subsequent arrangement of the vees for the shaft to which the vacuum cylinder was attached. Thus the following set of instructions is suitable for both arrangements.

In both arrangements the brakegear is simply an extended version of the unfitted version with a pin type lever guard in place of the ratchet version.

Check that the holes in the fitted brake lever guards (18) and the fitted brake lever guard stays (19) can accept 0.31mm wire and remove from the fret. Fold up as per Fig. 5. Solder short lengths of wire into the two top holes in the guard. It might be worth using one of the guards as a drilling jig before you fold it up, drilling two holes in a piece of wood into which the two lengths of wire can be inserted before soldering to the guard.

The two parts need to be attached to the model and each other using the short lengths of wire and fixed in place. I soldered the two parts together very quickly using a hot iron where the wires meet the other part thus trapping the guard and stay in place. They could also be glued in place if you are worried about the plastic melting. Insert another short length of wire through the holes in the bottom of the guard and stay connecting them up.







The shunter's pole rack (13) can be removed from the fret and soldered in place on the brass angle behind the brake lever guard. Leave about 1mm between the rack itself and the guard/stay.

Make sure that the large hole in the lever brake bogie linkage (14) and the lever brake shaft linkage (vacuum brake wagons) (20) can accept 0.8mm wire. Make sure that the smaller holes in both items along with those in the lever brake bogie linkage overlays (15) and lever brake shaft linkage overlays (vacuum brake wagons) (21) can accept 0.31mm wire and remove from the fret.

Attach the overlays by folding around the linkage and then using short lengths of 0.31mm wire to locate them. You will need one of the lever brake bogie linkage overlays (15) for both of the linkages and then one of the vacuum brake linkage overlays (21) for the brake shaft linkage (20). See photo below. Solder in place and trim the wire to represent bolt heads.



Make sure that the holes in the brake lever actuators (16) can accept 0.8mm wire, remove from the fret and fold out the little clutch. Also make sure that the holes in the vacuum cylinder actuators (22) can accept 0.8mm wire

Cut two lengths of 0.8mm wire for the brake shafts so that they fit in the vees and the one that attaches to the brake lever extends 0.75mm or so beyond the vee next to the solebar. Fit the wire brake shafts in place, threading the bogie linkage and brake lever actuator onto the shaft that attaches to the lever, the vacuum cylinder actuator onto the vacuum cylinder shaft and the brake shaft linkage onto both shafts. The actuator goes behind the solebar brake lever vee with the little clutch facing outwards (this will go under the brake lever). See photo below.

Leave the both the brake lever actuator and vacuum cylinder actuators free for the moment but solder the bogie linkage to the main trussing assembly using the tab and slot provided for location and the brake shaft linkage to one or both shafts.

There are safety loops attached to the inner trussing assemblies (these are the parts marked in yellow in Fig. 2) which can be folded over the brake shaft linkage now that it is in place.

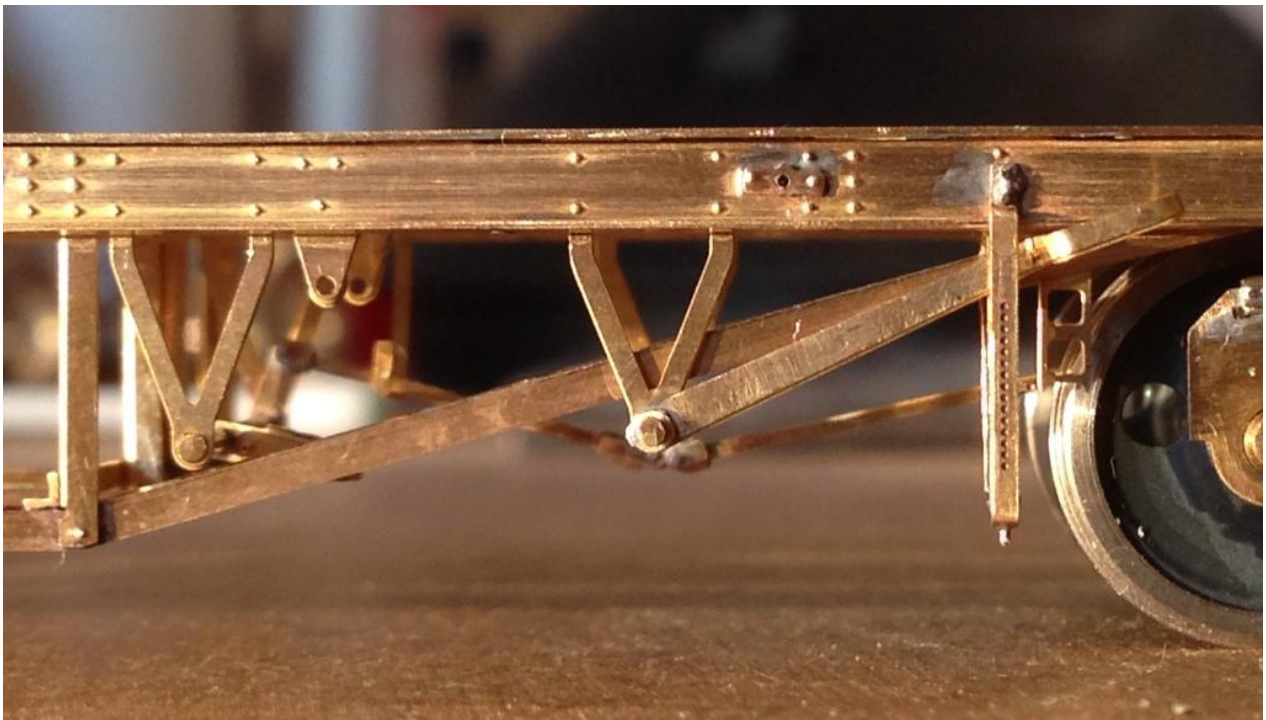




Make sure that the holes in the brake levers (17) and washer attached to them can accept 0.8mm wire and remove from the fret. Fold over the washer and solder in place on the brake lever. Fold up the brake lever so that it clears the solebar (see photo below). Once you are happy with the shape solder in place.

Solder the brake lever actuator in place so that the clutch is up against the bottom of the brake lever.

Repeat for the other end!



18" vacuum cylinders can now be fitted if you wish and the vacuum cylinder actuators soldered in place.

## Detailing Parts

There are numerous detailing parts included on the fret for tarring up the Bachmann body.

There are two types of number plates, rectangular (23) and D shaped (24). The rectangular were used by the GWR and D shaped by BR.

Label clips and wooden solebar blocks (25) are also on the fret for detailing the solebar.

Shackle ring base plates (26) are included if you want to replace the shackle ring mouldings. The rings for chaining loads down can be made from suitable wire with a tail to go through 0.3mm holes drilled in the solebar. I used 33 SWG phosphor bronze wire bent in to an L shape and formed into a ring around a 1.4mm drill bit held in a pin vice. Trim the wire so that it looks like a ring and apply a little solder to keep it all in place whilst soldering it to a base plate. You will need to make sure the holes go all the way through the solebars. The shackles can then be glued in place. The solebar drilling jig (4) can be used to aid location of the holes.

Corner plates (27) go at the point where the solebar and headstock meet.

There are three types of coupling pocket included and their general use is indicated. As with all things it's good to have a prototype to go by and work from pictures of that.

- Trapezoidal riveted (28) - Most wagons
- Rectangular welded (29) - Some BR vacuum brake wagons

For the riveted type simply push out the half etched rivets and fix in place. The welded type should be four layers deep. Fold the parts over to achieve this and solder together.

Lamp irons (30) are included on the fret. Solder short lengths of 0.31mm wire into the holes to act as pins which can be inserted into the holes drilled into the headstock using the drilling jig (5). Glue in place.

There are two BR swan neck vacuum pipe brackets (31). These are quite distinctive and come in two parts. There is a bracket which attaches to the solebar and a round head that has 'tails' that fold up.

Use the brackets with two of the holes etched out and press out the remaining half etched rivets. Remove from the fret. Twist the base of the bracket through 90° so that the interface with the head faces away from the rivets. This bracket can then be soldered to the back of the head (the side with no half etched areas). It is easiest to do this while the head is still attached to the fret. There is a small slot to help provide a positive location. Once soldered in place the assembly can be removed from the fret and the 'tails' on the head folded out. If you're brave these fold lines can be reinforced by the use of a very small quantity of solder and a very quick soldering iron. Some step soldering might be a good idea but I haven't encountered many issues with just using 145° solder.

Solder two lengths of 0.31mm wire into the holes to help aid location and to represent the rivets then locate in place on the headstock into holes drilled using the drilling jig (5).





There are D links for fitting to the bolster pins (32). Carefully drill a 0.4mm hole near the base of the bolster pins. The D link can then be gently fitted in place. You will have to prise the sides out slightly to locate them in the holes then close them up again. There are spares in case any go disappearing across the room! Some definitely will...

### **Painting**

I now use Halfords grey primer in a tin through an airbrush with cellulose thinners to prime just about everything, including plastic bodies. The primer is synthetic and has no adverse effects on the types of plastics used on RTR railway models and kits. The cellulose thinners used evaporate so quickly that they don't have time to attack the plastic. You can then put your choice of paint over the top including cellulose. Don't use the red oxide in a tin on plastic though as it won't adhere and the paint will just come off. It is recommended that you strip the model before priming.

### **Finally**

Thanks must go to the staff of The Avon Valley Railway, GWS at Didcot and the East Somerset Railway for letting me measure up and photograph at close quarters the Bogie Bolster wagons in their care which has greatly helped in the preparation of these kits.

Last but certainly not least if you haven't come across the wonderful resource for BR wagon photos that is Paul Bartlett's website then I would thoroughly recommend a visit to:  
<http://paulbartlett.zenfolio.com/>

Justin Newitt 2016

## **Suppliers List**

Eileen's Emporium  
(brass wire and supplies)  
Unit 19.12 Highnam Business Centre  
Newent Road  
Gloucester  
GL2 8DN  
[www.eileensemporium.com](http://www.eileensemporium.com)

Lanarkshire Models and Supplies  
(buffers and vacuum pipes)  
9 Nairn Avenue  
Blantyre  
G72 9NF  
[www.lanarkshiremodels.com](http://www.lanarkshiremodels.com)

C&L Finescale  
(Exactoscale wheels, bearings and couplings)  
Aran Lodge  
Severn Road  
Hallen  
Bristol  
BS10 7RZ  
<http://www.finescale.org.uk>

MJT  
(2.5mm shank 16" buffer heads for self contained buffers)  
Dart Castings  
17 Hurst Close  
Staplehurst  
Tonbridge  
Kent  
TN12 0BX  
[www.dartcastings.co.uk](http://www.dartcastings.co.uk)

Wizard Models  
(1.45mm shank 16" buffer heads for Oleo buffers)  
PO Box 70  
Barton upon Humber  
DN18 5XY  
[www.wizardmodels.co.uk](http://www.wizardmodels.co.uk)