

## Rumney Models - Sprung Diesel Bogie Instructions

### Notes

Please read through the instructions and the following notes before starting construction.

These etches are deigned to aid the construction of a fully sprung P4 diesel locomotive. You cannot build them to any other gauge. They will require the manufacture of a small number of components and you will need some items in addition to what I have included. These can be found in the Materials List below. Primary suspension is provided by guitar wire leaf springs and secondary suspension by homemade coil springs. The bogies are designed to reuse the RTR drivetrains in order to keep the conversion cost down.

The bogies are generally designed by type rather than specific loco class and so you should be able to use them in any loco that uses that particular bogie type provided the model has a modern central drive gear arrangement and the drivetrains are, or can be modified to be, no wider than 11.5mm in order to fit between the bearings.

I have used the bogie etches to convert the following models:

Bachmann class 37, Bachmann class 46, Heljan Hymek, Bachmann class 47

The English Electric bogies should also be suitable to convert classes 50, Deltic and DP2 depending on the drivetrain stipulations above. The Peak bogies should also fit any of the Bachmann Peak/class 40 family and the Brush Type 4 bogies the Bachmann 57 and Heljan 47/57. I have a Heljan class 47 chassis and can see no problems whatsoever fitting the bogies to them.

If you have any questions then email me.

I use Ultrascale Diesel Disc wheels on all my locomotives but you can of course use another make. They must however have an axle diameter of 2mm. It is possible to reuse Ultrascale conversion sets but if you do so you will need to thin the boss on the back of the wheels down. The bogies are designed for use with the correct diameter wheel. These are as follows:

|                         |         |                   |
|-------------------------|---------|-------------------|
| English Electric Bogies | – 3' 7" |                   |
| Peak Bogies             | – 3'9"  | Pony truck – 3'0" |
| Hymek Bogies            | – 3'9"  |                   |
| Brush Type 4 Bogies     | – 3'9"  |                   |

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

## **Component lists**

Main etched fret (see diagrams below):

- 1 – Bogie
- 2 – Secondary suspension stirrups
- 3 – Secondary suspension guides
- 4 – Axle washers
- 5 – Secondary suspension spring seats
- 6 – Secondary suspension washers
- 7 – Bolster plate

The 'kit' also contains the following items:

Etched horncheeks  
Etched spring bearers  
Special High Level skinny 2mm bearings  
Guitar wire for the primary suspension  
Suitable wire to make the secondary suspension springs.

The Peak bogies include a pair of pony truck etches instructions for which can be found separately.

## **Materials List**

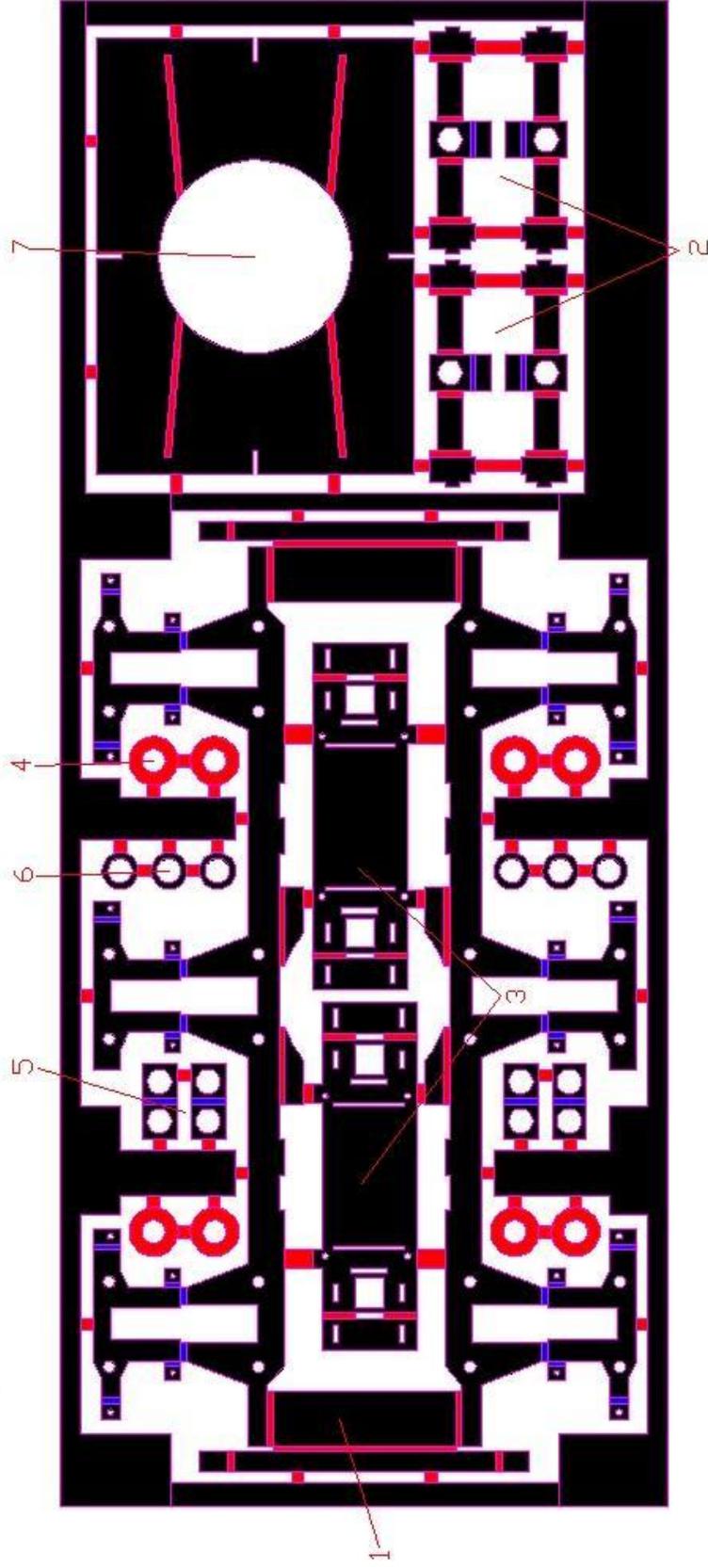
The following items will be required to complete the bogies:

- 5/8" brass tube (K&S 143)
- 3/32" square brass tube (K&S 150)
- 1mm wire for use as an aligning pin when soldering the horn guides
- 1/16" brass rod (Peak, Hymek and Brush Type Four)
- 2mm brass or 1.8mm nickel silver wire (English Electric – see notes in Primary and Secondary Suspension section)
- M2 bolts and M2.5 washers (retaining Bachmann drivetrains)

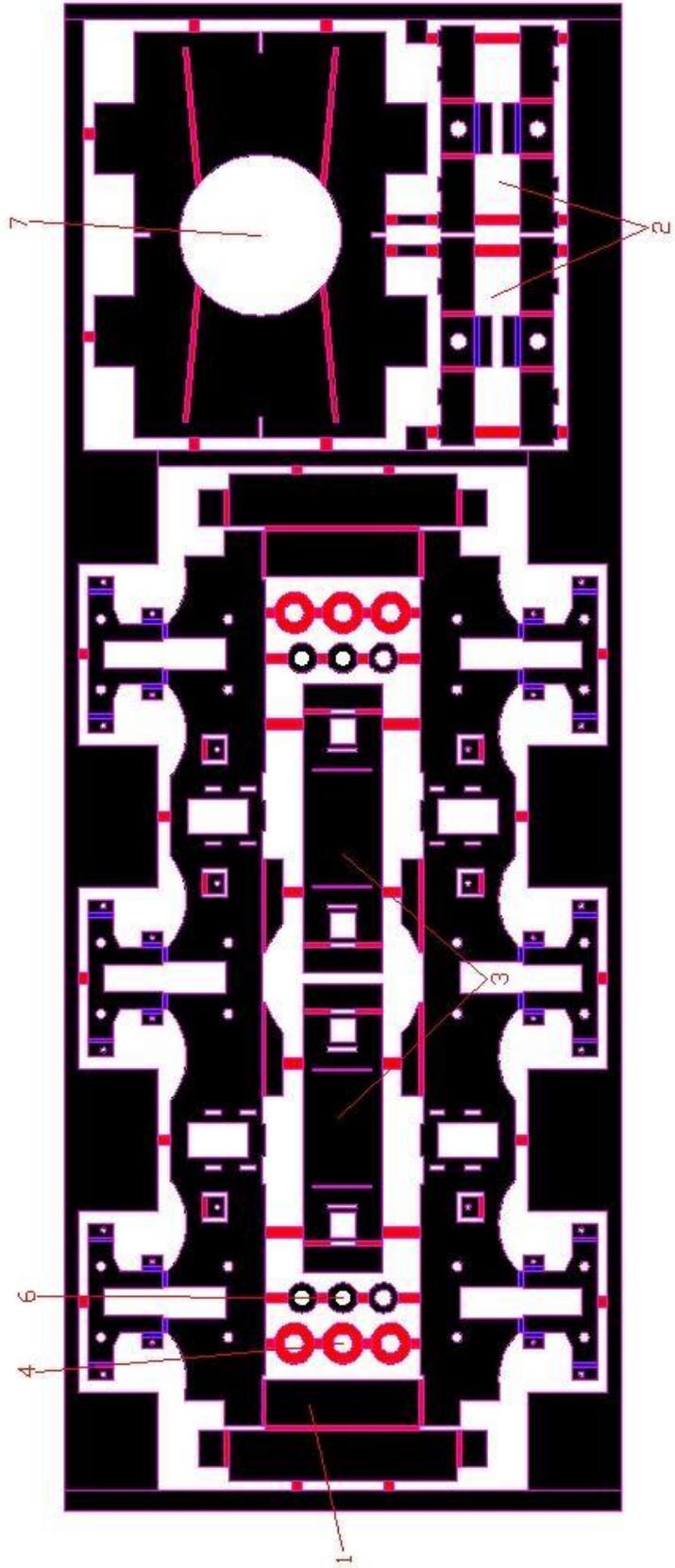
All the items are available from Eileen's Emporium. The K&S items are also available from good local model shops.

You will also require wire or shorting strips for pickups. I have included notes in the Drivetrain Modification section on how I've done it but everyone will have their own ideas.

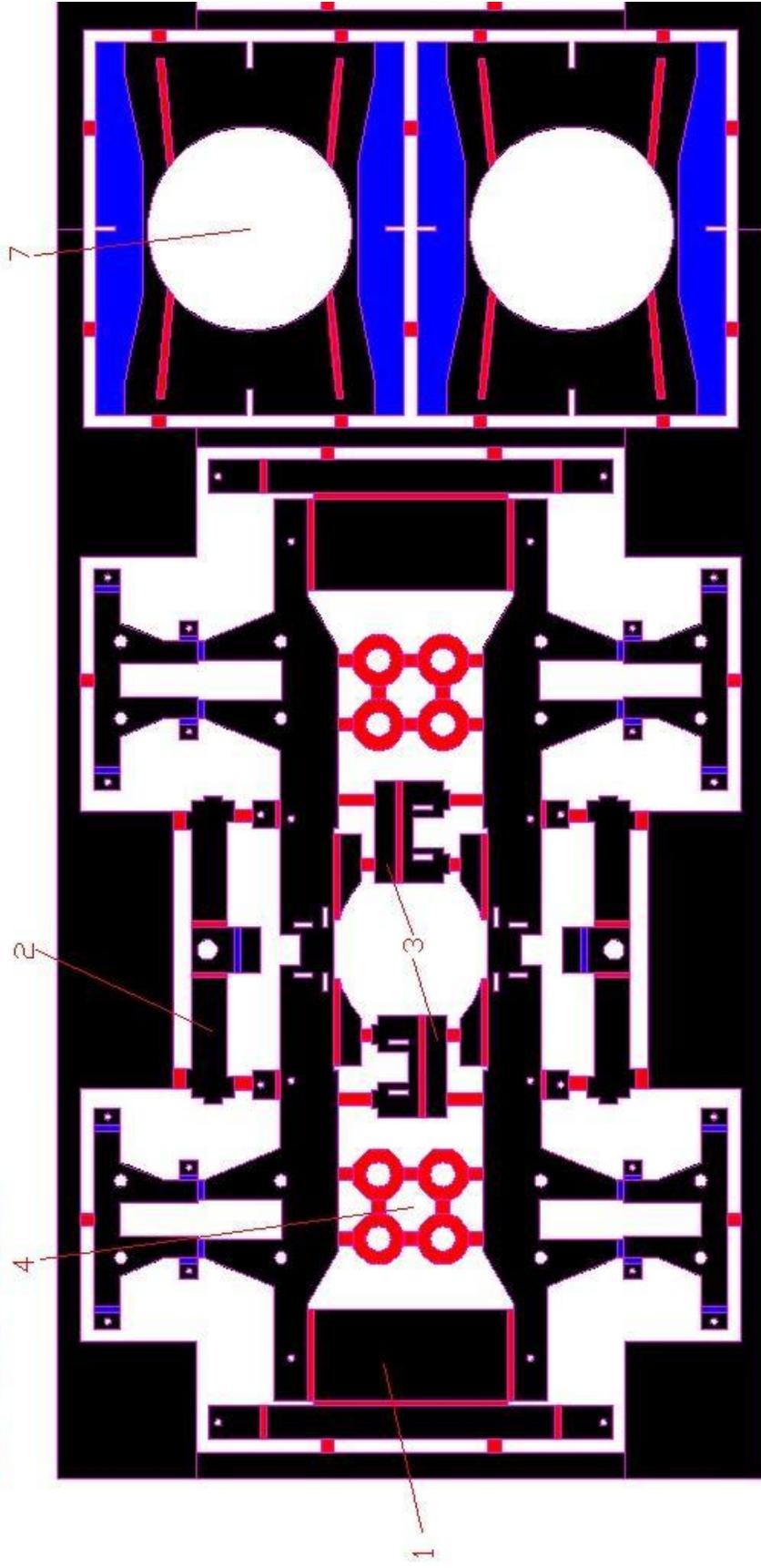
D.01 English Electric Bogie



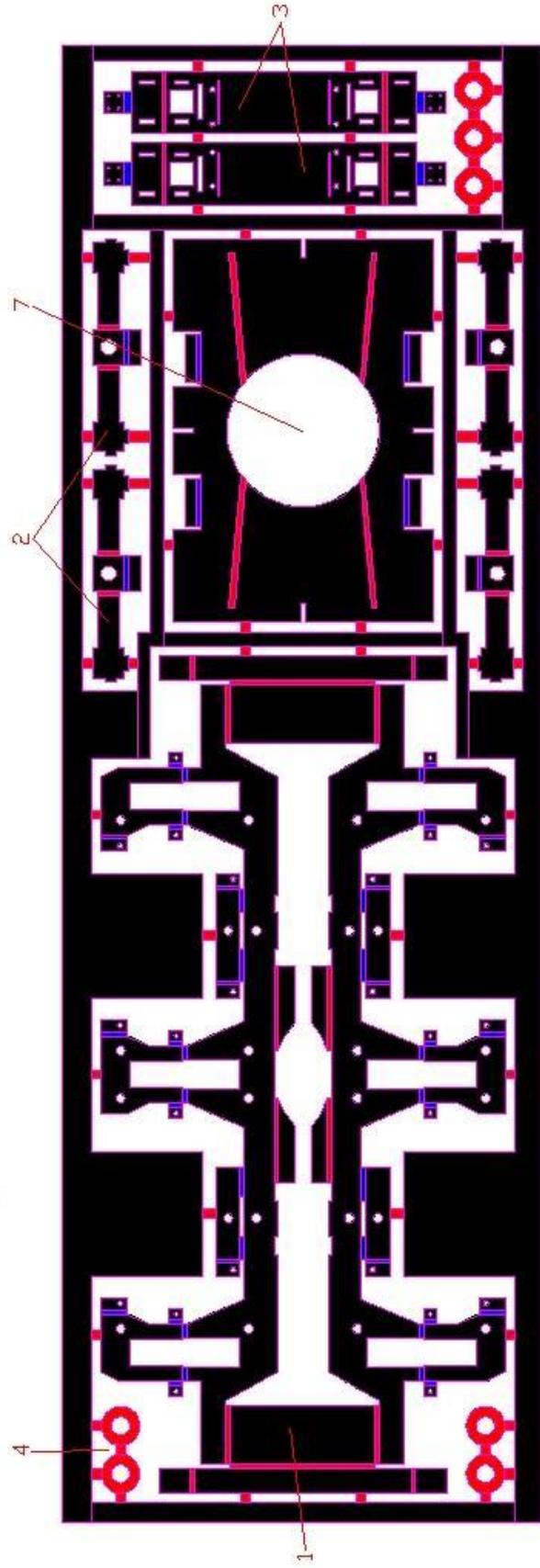
I.02 Peak Bogie



D.04 Hymek Bogies

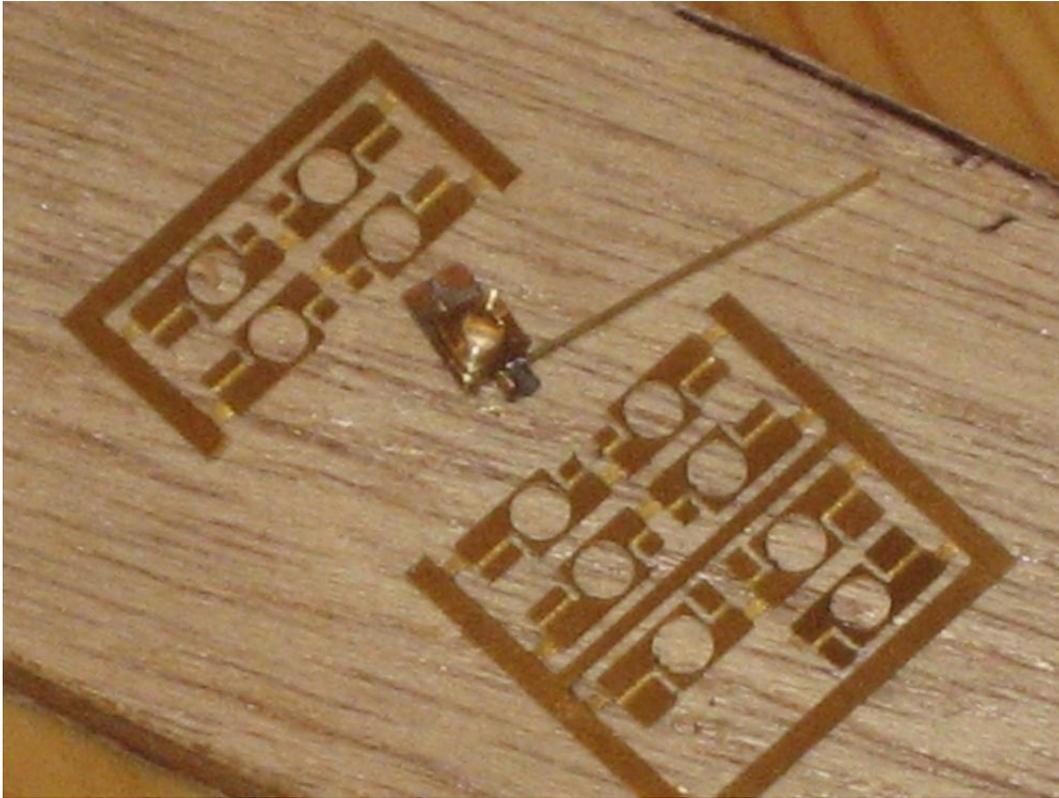


II.05 Brush Type Four Bogie



## Construction

### Bearings and carriers



The first things that need to be addressed are the spring bearers. The bearings will need to be used to tweak the horn guides and so it's a good idea to prepare them before starting on the bogies themselves. There are 12 bearers on the fret which will be sufficient for a 6 axle locomotive. They are designed to be soldered onto the back of the bearing with the small tabs folded out for the spring will rest on. Note that they are handed and there are two lengths of tabs. Table 1 will tell you which length of tabs to use on which type of bogie. Also note that the bearings themselves, despite being machined from 1/8" square brass rod, aren't an exact square. One pair of sides is longer than the other. It is useful to arrange the bearings on the spring bearers so that the wider part of the bearing goes across it rather than along it.

**Table 1**

| Type             | Spring carrier end to use |
|------------------|---------------------------|
| English Electric | Short                     |
| Peak             | Short                     |
| Hymek            | Long                      |
| Brush Type Four  | Long                      |

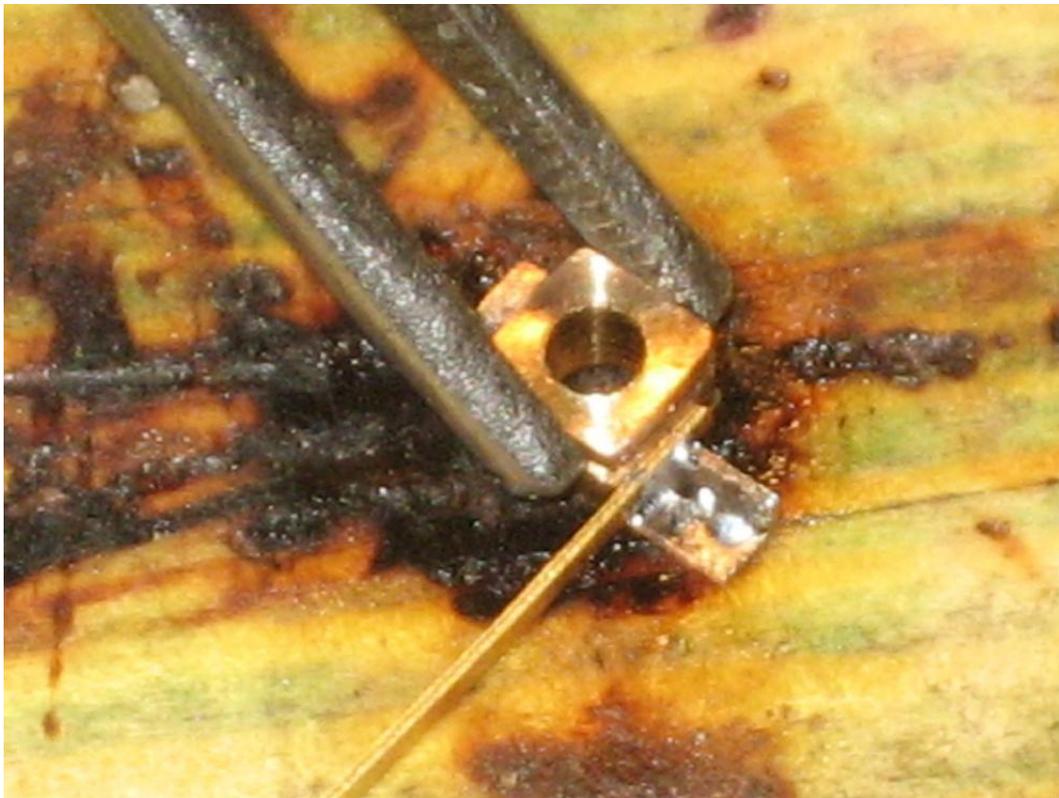
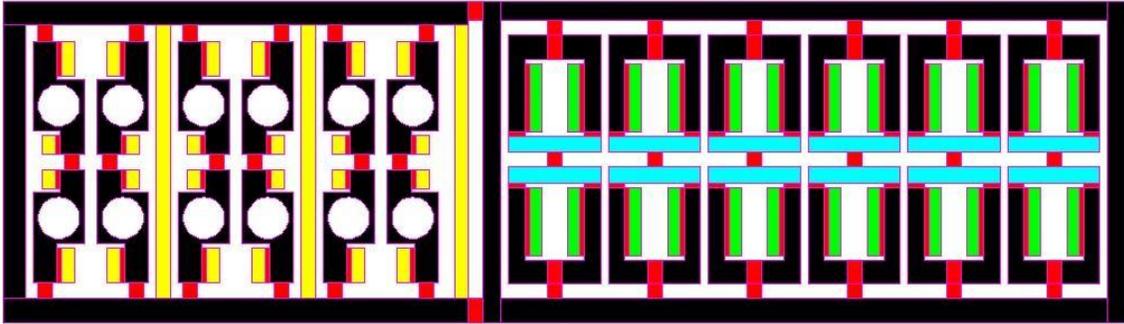
It is important that you arrange a method of keeping each bearing with its horn guide in the bogie. It's easy to think that because everything looks the same that the bearings are interchangeable. You will inevitably encounter problems if you start to swap bearings around. I know this from experience. My method of keeping everything in its right place is to mark the front of the bogie, I cut a small notch in front end, and then arrange the tabs on the bearings so that they all face towards the front. I then use a piercing saw to cut small slots on the bottom of the bearing depending on which axle it's for. My general arrangement is one slot for the 2<sup>nd</sup> axle and two for the 3<sup>rd</sup> (if required) leaving the 1<sup>st</sup>, or front, axle plain. Thus for each bogie you can immediately tell where each bearing belongs. I don't differentiate between bogies but make sure that the components for each don't get mixed up.

Whilst the spring bearers are still in the fret check that the back of the bearing will fit in the hole. If the fit needs adjusting then do so with a tapered reamer. I tend to assemble the bearings and carriers on a small block of scrap wood with a 2mm hole drilled into it. This will help make sure that the spring bearer sits flat against the back of the bearing. Remove the spring bearer from the fret, fold out the required tab and fit to the back of a bearing. Place the two components in the hole in the block of wood and solder together from the unused end of the spring bearer.



There will be a small 0.25mm gap under the tab which will need to be filled. If you don't fill this gap then the weight of the locomotive will cause the tabs on the spring bearers to bend which could result in the spring wire moving out of position and falling off the tab. I have arranged the spring bearer fret so that the parts coloured yellow in Fig. 1 are the same width. Use these pieces to fill in the gap under the tab and solder in place.

Fig. 1



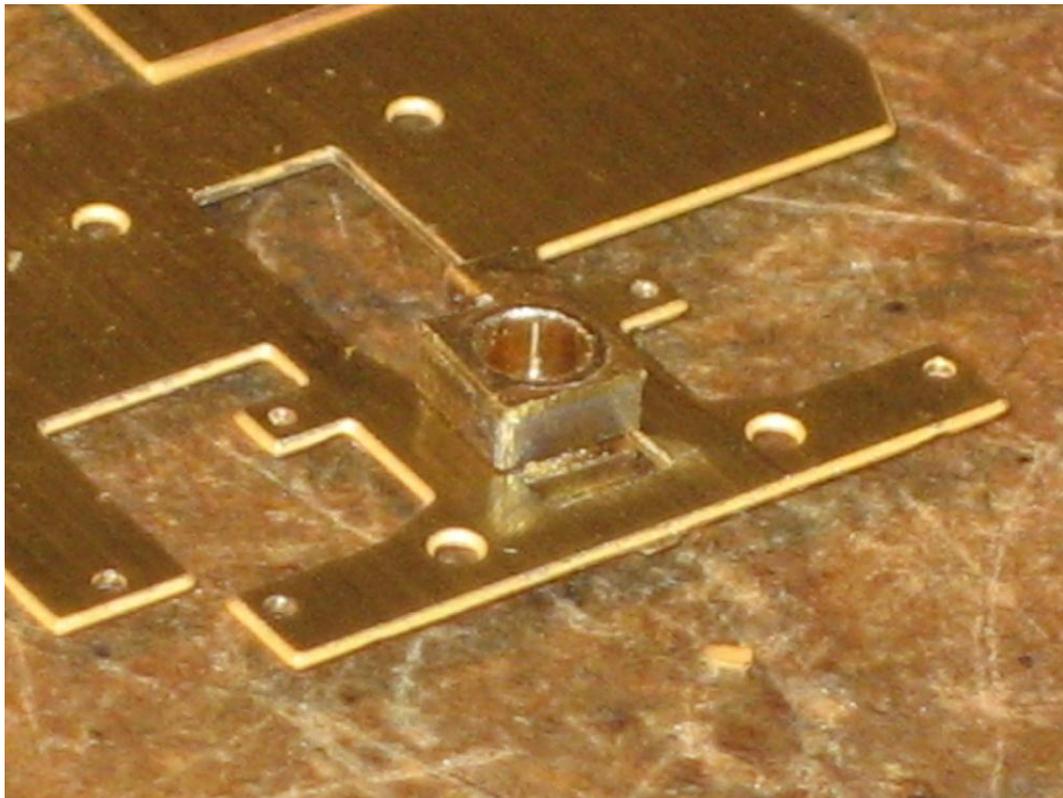
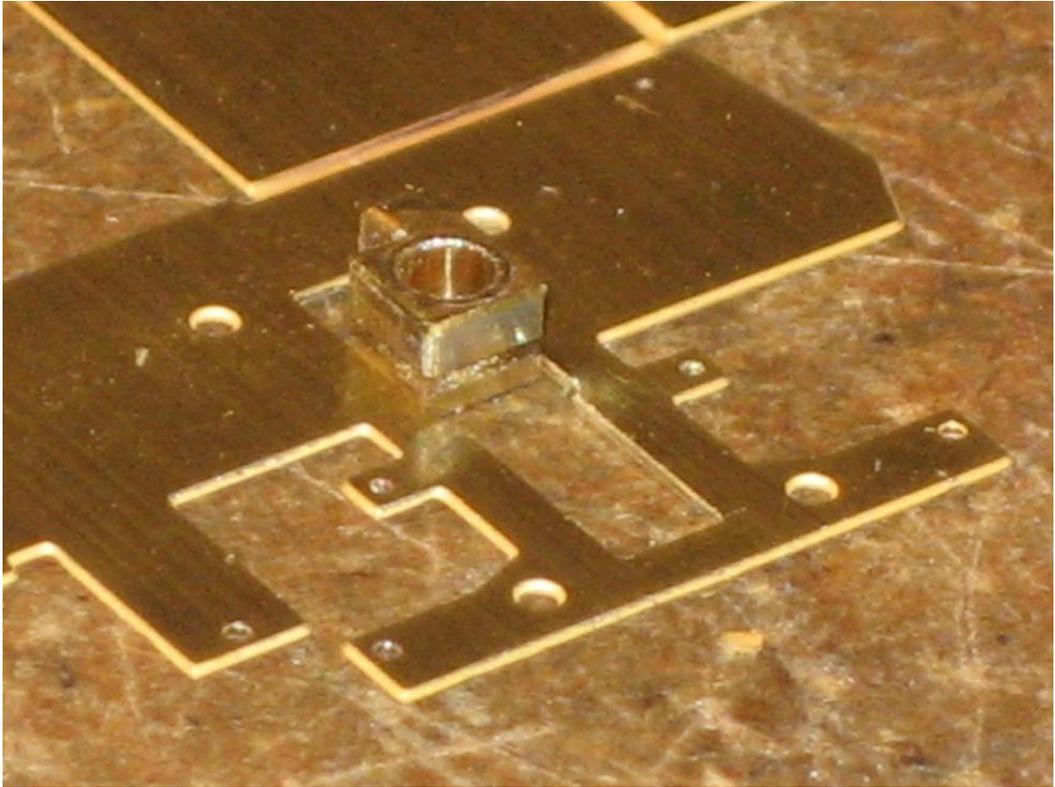


The bearing can now be tidied up. The filling strip can be trimmed and then filled flush and the unused end of the spring bearer needs to be removed and filled flush with the bottom of the bearing. Mark the bottom of the bearing with a piercing saw so you know which axle it belongs to. You will also need to check the fit of an axle in the bearing. I found that the bearings had a small section of swarf at one end that needed reaming out for an axle to pass through. Use a tapered reamer to do this taking care not to enlarge the rest of the axle hole.

### **Bogies**

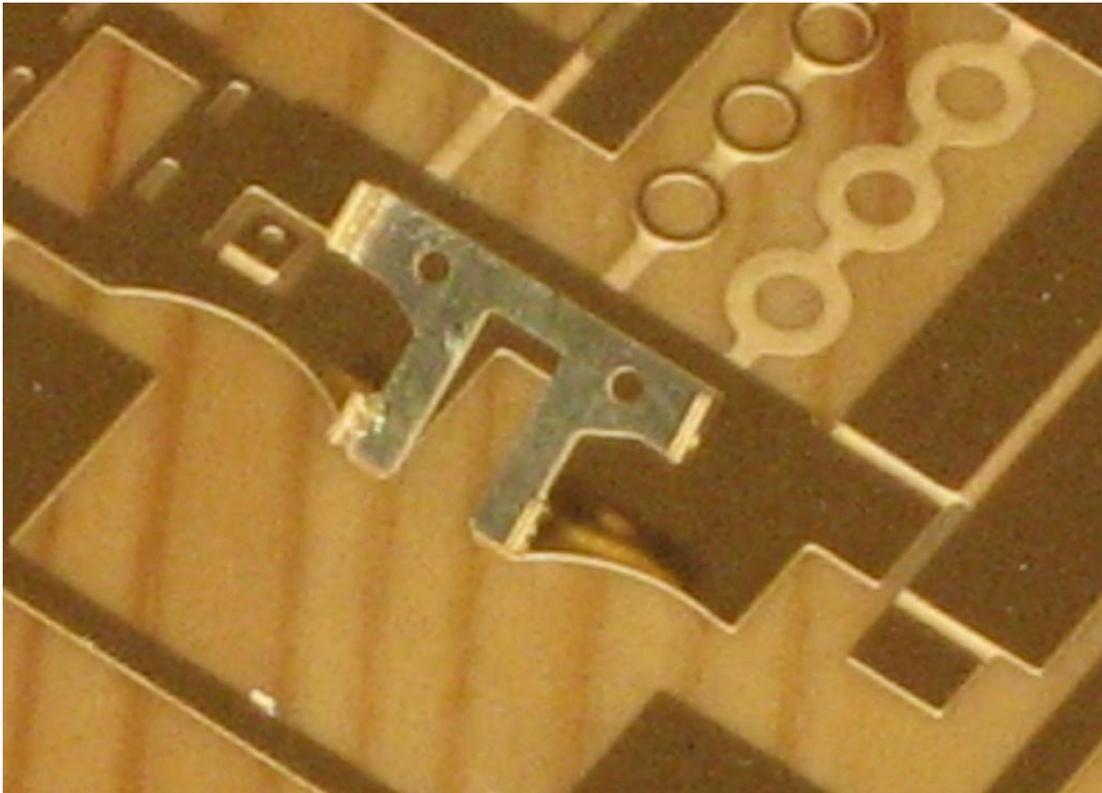
Before starting construction the bearings need to be checked in their guides.

Using a piercing saw mark the front of the bogie (1). The bogies are essentially symmetrical so it doesn't really matter which end you choose but I use the end furthest away from the bolster plate on the etch. Once this is done check the fit of bearings in the horn guides on the bogie. There are two different sized slots. The smaller one goes into the slot machined in the bearing and the larger one interfaces with the ends of the bearings. See photos below. The slots may need opening out depending on to what degree the fret has been etched. Use a fine cut file to do this. Work on each axle at a time and open out the slots on both sides of the bogie equally until a good fit is achieved. This should help to keep the holes in the axleboxes aligned and thus the axles square to the bogie. This arrangement doesn't provide a lot of bearing surface area so in the interests of longevity I have included etched horn cheeks. These will be fitted later.



Once you are happy with the fit of the bearings in each of the horn guides they can be folded up. They will be folded double and then aligned using a 1mm wire 'pin' before soldering each side together. In order to help with the 'pinning' process it is useful to drill a hole into a piece of spare soft wood into which the wire pin can be pushed after having passed through each side of the horn guides. See photos. I have included a pair of holes on most of the bogie etches but only one really needs to be used.

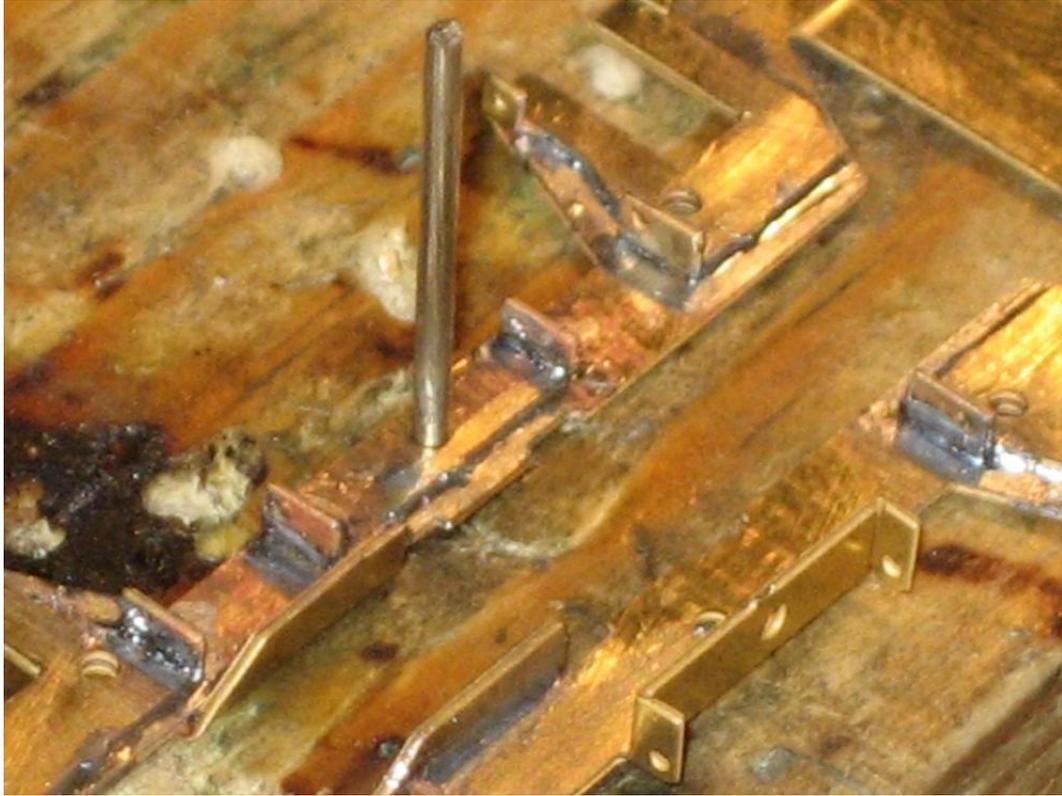
Fold out the fulcrum points for the primary suspension and the tabs for the axle retaining wire. Fold the horn guide double so that the fold between the two sections is through 180° with the fold line on the outside.



File a taper in the end of a short length of 1mm wire and then pass through the horn guide sections and into the hole in the piece of wood. The holes shouldn't need to be opened out to do this. The wire should be a tight fit. I use a pair of pliers to push the wire through the holes in the etch. If the holes are too small use a reamer to open then out a little but make sure the fit is tight. Solder the two sections of the horn guides together and reinforce the fold lines.



Once all the hornguides are done you can fold out any other parts that are on the sideframes. There are spring retaining points on the Peak and Hymek bogies and a second set of primary suspension fulcrum points on the Brush Type 4 bogies. These parts on the Brush Type 4 bogies need to be treated in a similar manner to the hornguides. The fulcrum points need folding out and then the whole section folded through 180° with the fold line on the outside. As with the hornguides a wire 'pin' can be used to make sure of the alignment when soldering to the sideframes. Reinforce the fold lines with solder. See photo below.

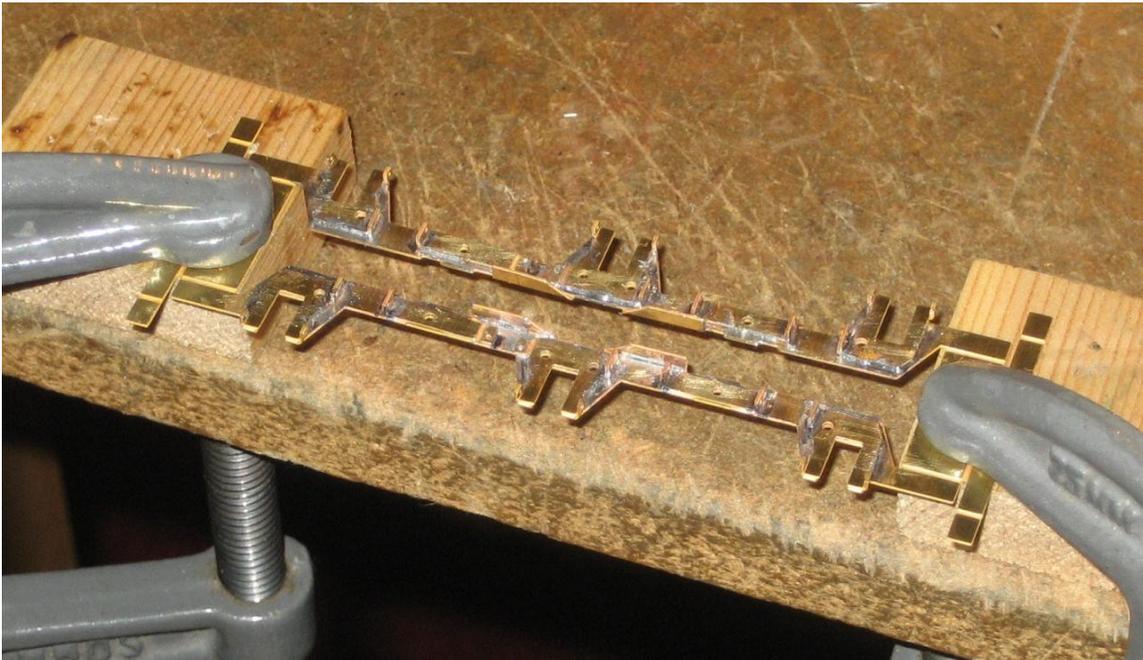


Folding up the second set of primary suspension fulcrum points on a Brush Type Four bogie.

Fold out the locating points for the bolster. These are to be found towards the centre of the bogie and have a slight curve in them. Reinforce the fold lines with solder.



The next stage is a little tricky especially if there isn't a lot to the sideframes which applies to most of the bogies apart from the Peak ones. The sideframes need to be folded at right angles to the spacer sections. To do this I clamp the bogie to a pair of wooden blocks which are the same thickness. Then using a pair of pliers to hold the points where they meet the spacer sections fold the sideframes up in stages until they are at 90°. Once one side is done the bogie can be turned around and the other side folded up. It is very important that the sideframes are exactly at 90° to the spacers or you will impart a twist in the bogie. Adjust if necessary. Fold the ends up including the outermost sections that will provide locating points for the sideframes. Again adjust until everything is square and then solder the ends to the sideframes and reinforce all the fold lines with solder. You should have something now which is starting to look like a bogie.



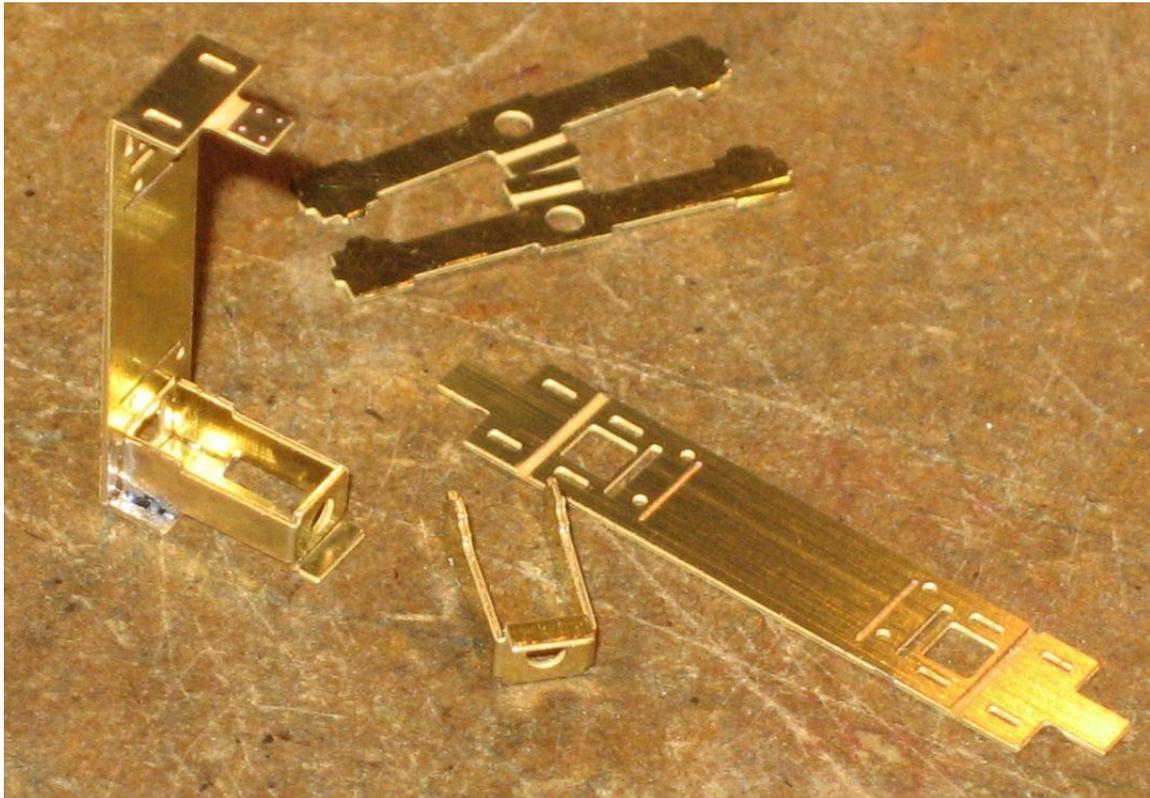


The secondary suspension stirrups (2) and guides (3) can be fixed in place next. They are slightly different so I will deal with each type separately.

English Electric and Brush Type 4 bogies:

These two types are similar. Remove the secondary suspension stirrups (2) from the fret and fold up. They need to be folded to match the prototype in shape. The sides of the stirrup on the Brush Type 4 bogies are parallel but the English Electric stirrups form a V shape with a flattened out base. Also fold up the small tab attached to the base. This is the section with the hole in it for the tail of the secondary suspension pin. See any of the construction photos that follow. This will provide another point to attach the cosmetic sideframes to the bogies.

Remove the secondary suspension guides (3) from the fret and fold the ends up. Double check that these folds are at  $90^\circ$ . The stirrups can be located to the guides using the tabs and slots and soldered in place. These assemblies can then be fitted to the bogies using the tabs and slots to locate them in place. Note that there are holes etched in the guides which will be used to retain the primary suspension springs. These should be arranged so that they are equidistant from the primary suspension fulcrum points on the horn guides. Make sure the guides are flat against the top of the bogie and solder the guides and stirrups to the bogies.



Brush Type 4 secondary suspension guides and stirrups.

The English Electric bogies have secondary suspension spring seats (5) which will need to be folded double and soldered in place but this is best left until the secondary suspension pins have been constructed.



Secondary suspension 'stirrups' and spring seats on an English Electric Type 3. In reality the stirrup is a safety loop and the seat takes the load.

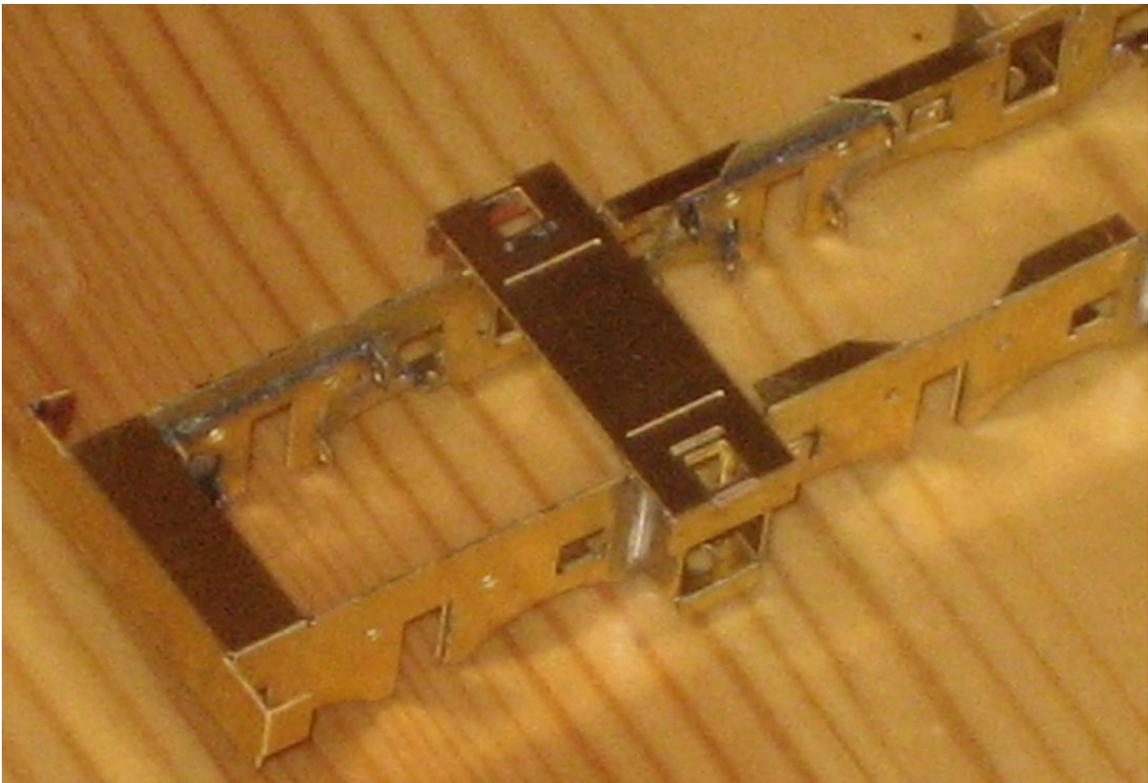
#### Peak Bogies:

Remove the secondary suspension stirrups (2) from the fret and fold them up. The sides should be parallel and square to the base. Also fold up the small tab attached to the base. This is the section with the hole in it for the tail of the secondary suspension pin. The stirrup can then be attached to the sideframes. There are tabs and slots to aid location. Solder in place once you are happy with the fit.

Remove the secondary suspension guide from the fret and fold the ends through 90°. Locate the guide onto the top of the bogie using the tabs and slots. Make sure that the guides are flat against the bogie and solder in place.



Peak secondary suspension stirrups.



Peak secondary suspension guide fixed in place.

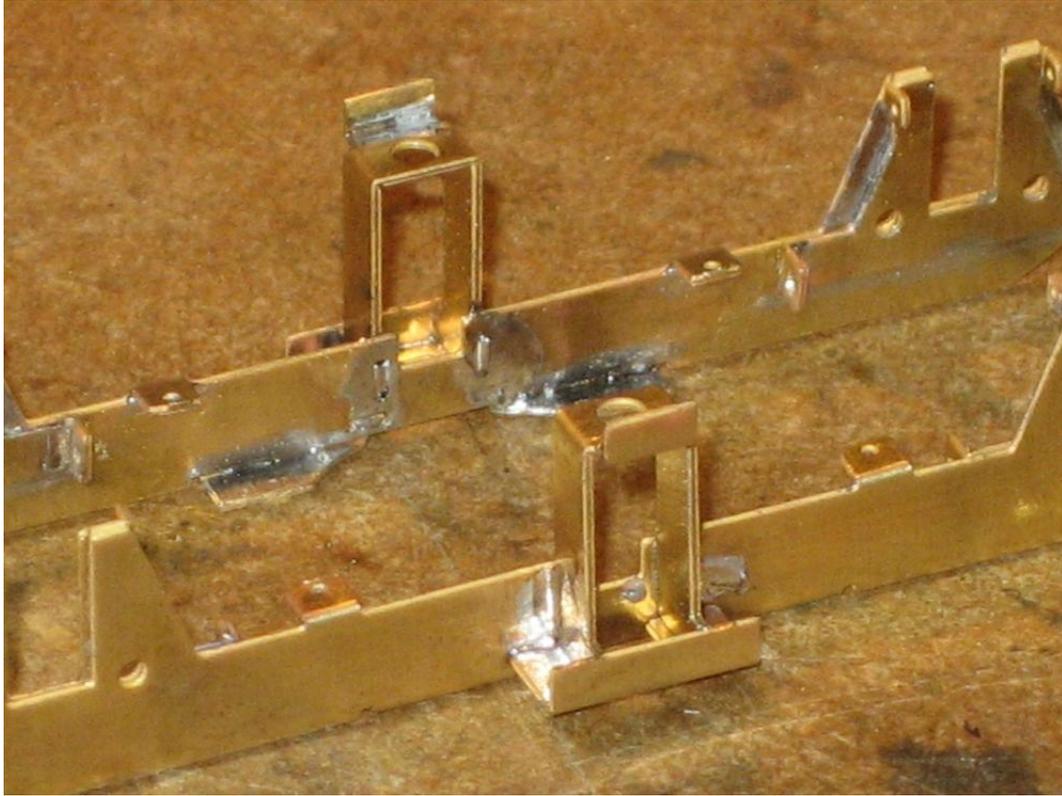
Hymek:

Remove the secondary suspension stirrups (2) from the fret and fold them up. The sides should be parallel and square to the base. Also fold up the small tab attached to the base. This is the section with the hole in it for the tail of the secondary suspension pin.

Remove the secondary suspension guides (3) from the fret and fold into an L shape. Locate the stirrup and guide together using the tabs and slots so that they are arranged as per the following photo and solder in place. These assemblies can then be fixed to the bogie sideframes using the tabs and slots provided and soldered in place.



Hymek secondary suspension stirrups and springs.



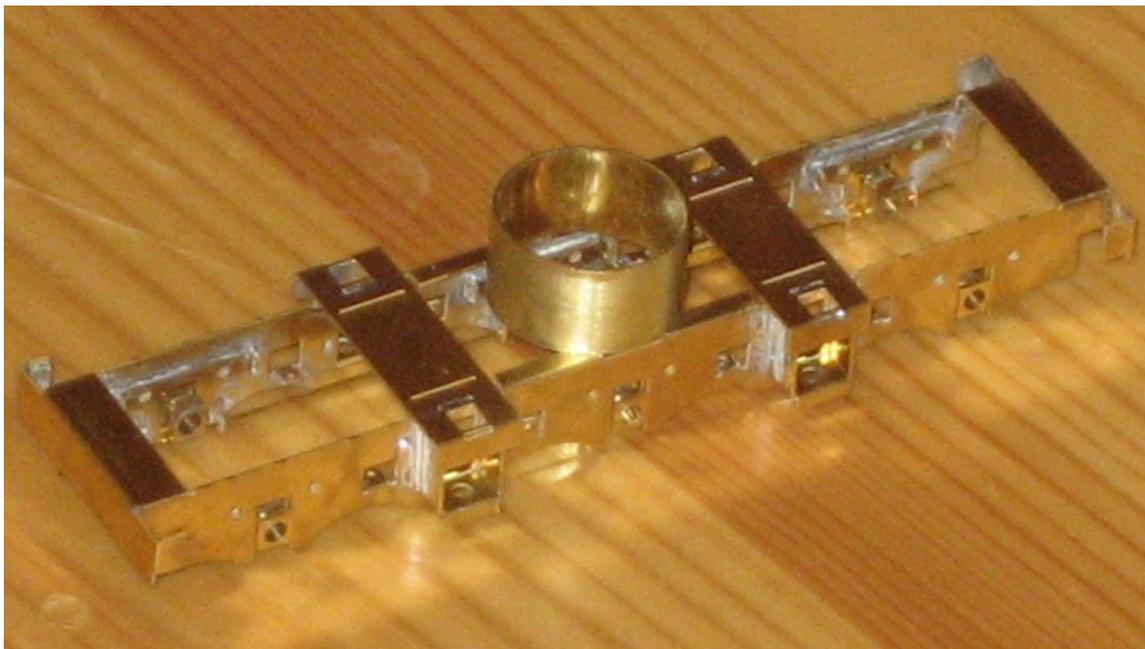
Hymek secondary suspension assemblies fixed in place.

The bolster flanges need to be fixed in place next. These need to be cut from 5/8" outside diameter brass tube so that the ends are as square as possible to the sides. They need to be about 7mm long.

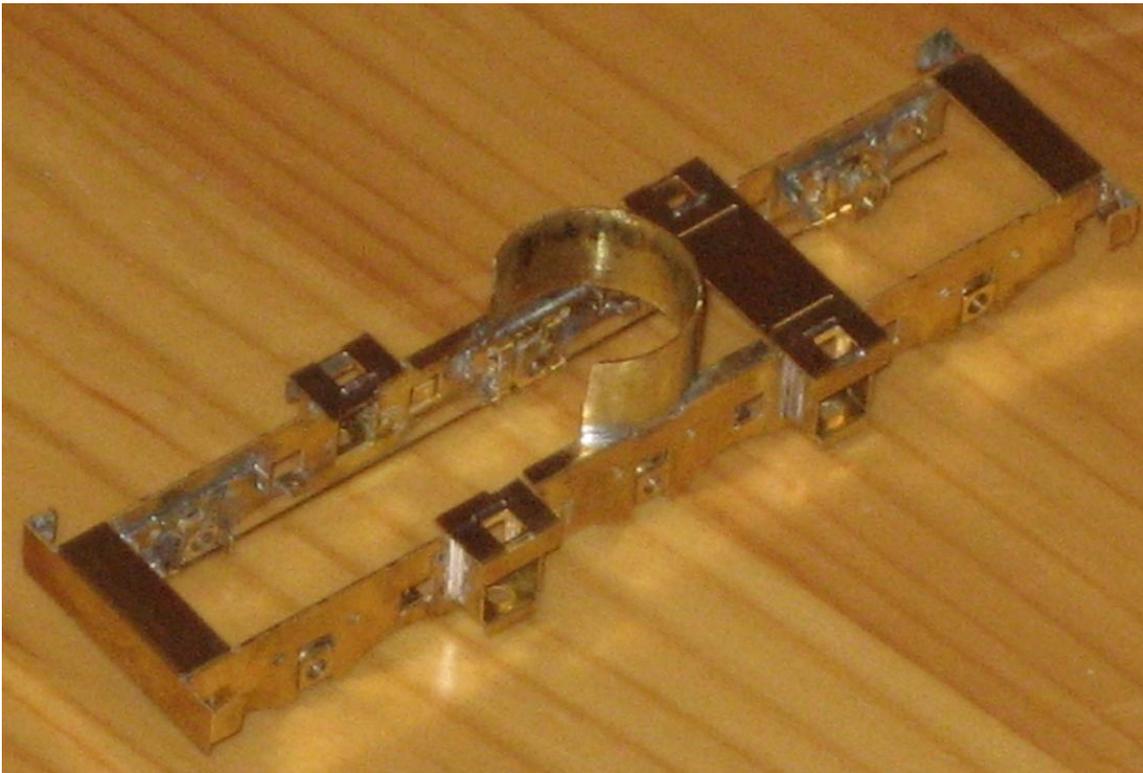
I don't have access to any fancy machining equipment and so cut them by hand. I use a rather convoluted method of marking the tube square to the sides but it's the best that I can think of. You may know of a better method. I use an engineer's square clamped to a block of wood just thick enough to lift the square clear of the tube making sure that the wood doesn't come into contact with the tube when held against the square. I then use another block of wood and a clamp to provide a stop for the tube. By holding a marking pen against the square and tube and rotating the tube you can draw a line that is square to the sides of the tube. See photo. I then use a piercing saw to cut the tube.



The bolster flanges can then be fitted to the top of the bogie using the locating points as a guide. Make sure that the tube is square to the bogie and solder in place.



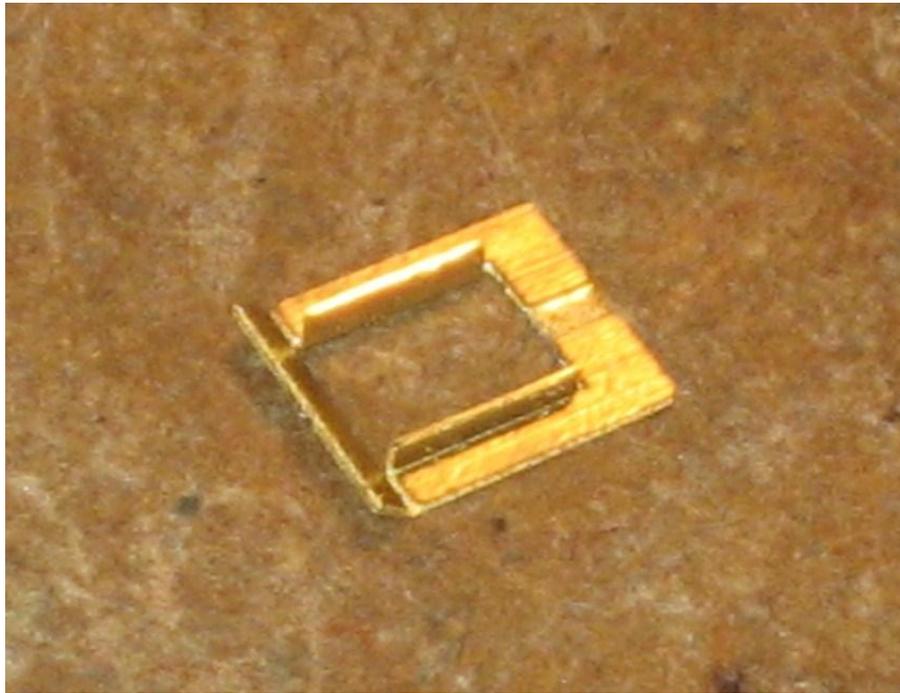
Any parts of the guides and bolster flanges that need to be removed to provide clearance for the drivetrains can be cut out now. If you are using a two axle drivetrain in a B-1 arrangement in one of the three axle bogies then you only need to remove the centre of one of the guides and half of the bolster as per the photo below. If you are using an A-1-A type drivetrain in a three axle bogie (Heljan Class 47 for example) or are building a two axle bogie then the bolster will need to be cut through completely as well as both of the guides if applicable.



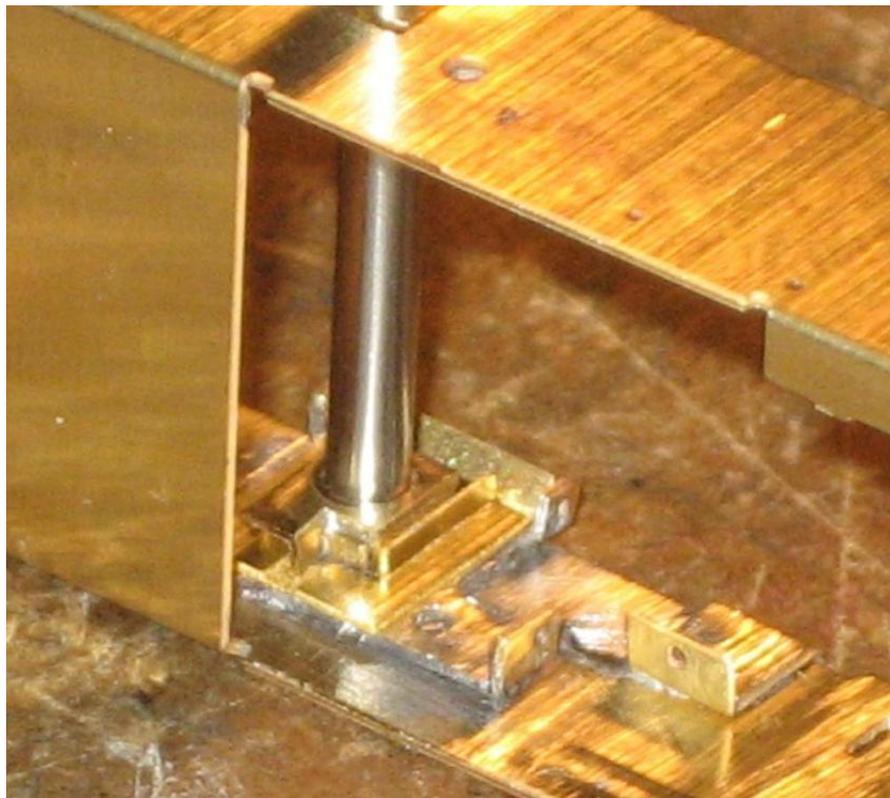
A peak bogie prepared for a two axle drivetrain in a B-1 arrangement.

The bearings can now be fitted to the bogies making sure they go back in their right places. The use of pins to align the hornguides should have made sure that all the guides are parallel and so the bearings should fit perfectly. If they are tight at all then you can adjust the guides using a fine cut file. Make sure you track down and only relieve the part of the guide that is causing the tightness.

I mentioned earlier that the arrangement of the hornguides as it stands doesn't provide much bearing surface area so horncheeks have been included and now is the time to fit them if you wish to do so. Refer back to Fig.1. Remove from the fret and fold up the actual horncheeks (the parts marked in green). Also fold the section marked in light blue through about 30°. Place the bogie on its side and fit the horncheek etch over the bearing as per the photo below. Check the fit of the horncheeks against the bearing and adjust if necessary. Feed an axle through the two bearings and then solder the horncheeks in place. Once soldered in place the section at the bottom can be removed by folding backwards and forwards. Repeat for all the other axles.



Horncheek etch folded up.



Fitting the horncheeks in place on the bogie.

Two lengths of 0.4mm or 0.31mm wire can be use to retain the bearings for now.

## Primary and secondary suspension

The construction of the bogies themselves is now virtually complete and attention can turn to the suspension.

The primary suspension springs can be cut and fitted. The following table gives details of the correct gauge of wire (which I have included) and the dimensions of the individual springs. They need to be folded into an L. The springs should pass through the fulcrum points in the hornguide assemblies and then are retained by feeding the short section of the L into its locating point which can either be found on the secondary suspension guide or on a folded out tab on the sideframes. I dislike bending the ends of spring wire in order to retain them. I have also given the weight of the loco that I have used to work out the suspension from. Unless your loco is significantly lighter or heavier then the following springs will be fine. Most modern RTR locos seem to be around the 0.5kg mark so I'd be surprised if any differed significantly from this.

### Primary suspension Table

| Type             | Weight (g) | Spring wire diameter | Approximate size (mm) |
|------------------|------------|----------------------|-----------------------|
| English Electric | 540        | 0.009"               | 20 x 2.5              |
| Peak             | 510        | 0.009"               | 20 x 2.5              |
| Hymek            | 500        | 0.011"               | 20 x 1.5              |
| Brush Type 4     | 520        | 0.010"               | 14 x 3                |



Primary suspension spring in a Peak bogie.

The secondary suspension on all the bogies is provided by home made coil springs and pins that transfer the weight of the loco to the spring. The pin consists of a head made from 3/32" square brass tube and a tail made from 1/16" diameter rod. The exception to this is the pins for the English Electric bogies. The coil springs for these should have an inside diameter of 2mm so the pins need to be bulked out to suit. You can just about drill out the 3/32" square brass tube to accept a tail made from 2mm brass rod but it is easier to drill it out to 1.8mm and use this diameter of rod. The choice is up to you. You used to be able to get 1/16" inside diameter 5/64" outside diameter tubing from K&S which would have been perfect to bulk out a 1/16" tail but sadly it isn't available any more. The holes in the stirrups for the English Electric bogies are etched to 1.8mm and so will need adjusting to 2mm if you use the larger diameter rod. There is just about enough area on the head to provide a bearing surface for the spring if using a 2mm tail but secondary suspension washers (6) are provided if you think that it's not enough. No washers are required for 1/16" tails.



The following table gives details of the other important dimensions for each of the bogie types.

### Secondary suspension table

| Type             | Head | Tail | Wire              | Turns | Finished length |
|------------------|------|------|-------------------|-------|-----------------|
| English Electric | 6.5  | 6.75 | 28 SWG soft brass | 9     | 4.7             |
| Peak             | 5.5  | 7    | 27 SWG soft brass | 12    | 6.0             |
| Hymek            | 5.25 | 7.5  | 0.4 hard brass    | 11    | 6.0             |
| Brush Type 4     | 5.5  | 7.5  | 27 SWG soft brass | 12    | 6.0             |

All dimensions are in millimetres except where noted.

These are the dimensions that I used. The most important thing when making the pin heads and coil springs is consistency. It doesn't matter if the dimensions vary a fraction from those given but they must be the same across the bogie. If you take care with this then the bogie will sit level and it will save a lot of hassle levelling things up later.

I use a Vernier calliper to check the heads while making them from 3/32" square brass rod. The heads were cut slightly oversize using a piercing saw and were then progressively filled down to the correct size. If they were too small then they were discarded. The dimension of the tail isn't so critical. You will need to add the length of the head to the length of the tail to provide the length of the rod. Thus you will need to cut a piece of 1/16" rod to 12.75mm for a Hymek to end up with a 7.5mm tail. Solder the rod and head together making sure that the rod doesn't project beyond the head. Taper the very end of the tail to remove any sharp edges.

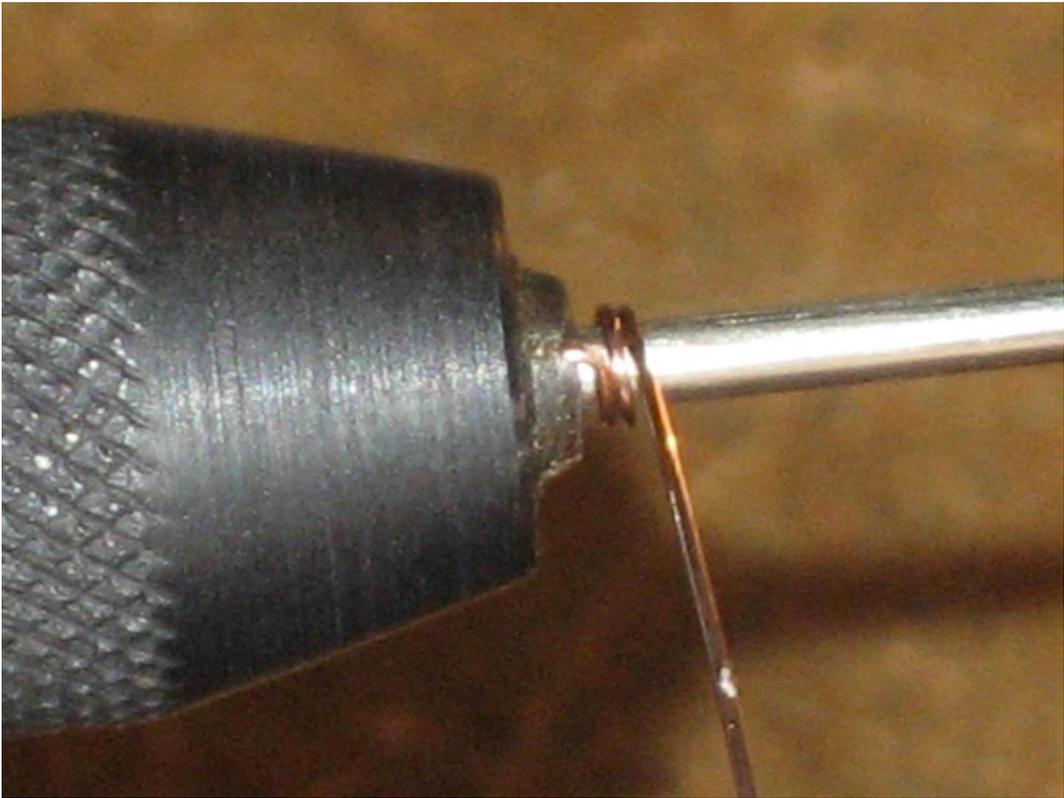
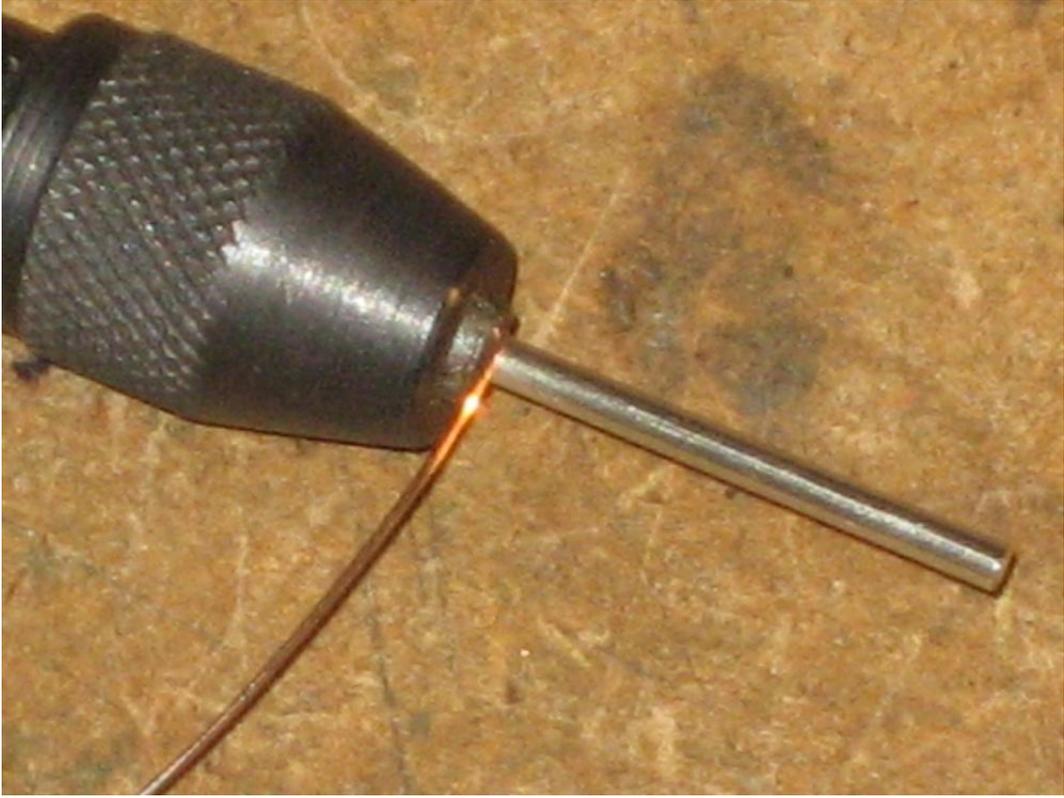
### Coil Springs

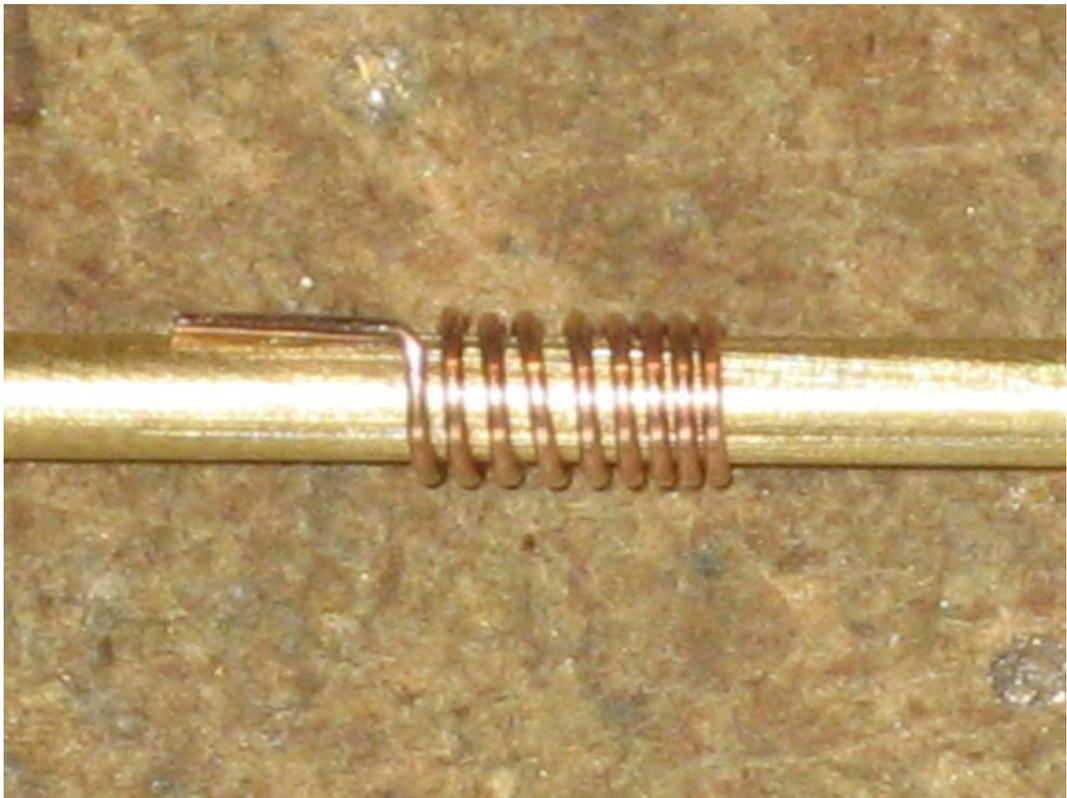
These are surprisingly easy to make and very consistent results can be achieved with a little practise. There will be the occasional duff one but given that the cost can be measured in pennies this isn't really a problem. I have seen them being made as one big long spring and then cut to size but I prefer to make them individually. The length of the wire in the springs is controlled by the number of turns. Generally I work on 2 turns per finished millimetre of spring for 27/28SWG wire. For thicker or thinner wire then this may need adjusting. The secondary suspension table above gives the number of turns and finished length of the springs I used on my bogies for each of the types.

I am right handed and so have written the instructions from that point of view. If you are left handed simply reverse things. Refer to the photos below. This is how I make them.

Take a drill bit slightly smaller than finished inside diameter you are aiming for. For 1/16" springs I use a 1.55mm drill bit and for 2mm springs I use a 1.9mm drill bit. Place the drill bit the wrong way around in a pin vice so that the shank is facing outwards. Take the spring wire and make a bend about 5mm from the end at 90° to the rest of the wire. Holding the pin vice in your left hand feed this 5mm long tail into the gap in the jaws of the pin vice pin vice. Making sure that the wire is hard up against the jaws of the pin vice hold the wire taught with your right hand. Rotate the pin vice away from you with your left hand until the required number of turns has been reached. Cut the spring from the rest of the wire. Remove the spring from the pin vice and thread it on to a length of rod the correct inside diameter of the spring. Holding each end between thumb and first finger nails gently pull the spring apart until the correct finished length has been reached. I do this a little at a time checking against a Vernier calliper to ensure consistency. Trim the tail from the spring. If you wish you can feather the ends but given that the springs will be mounted on a shaft this isn't vital.

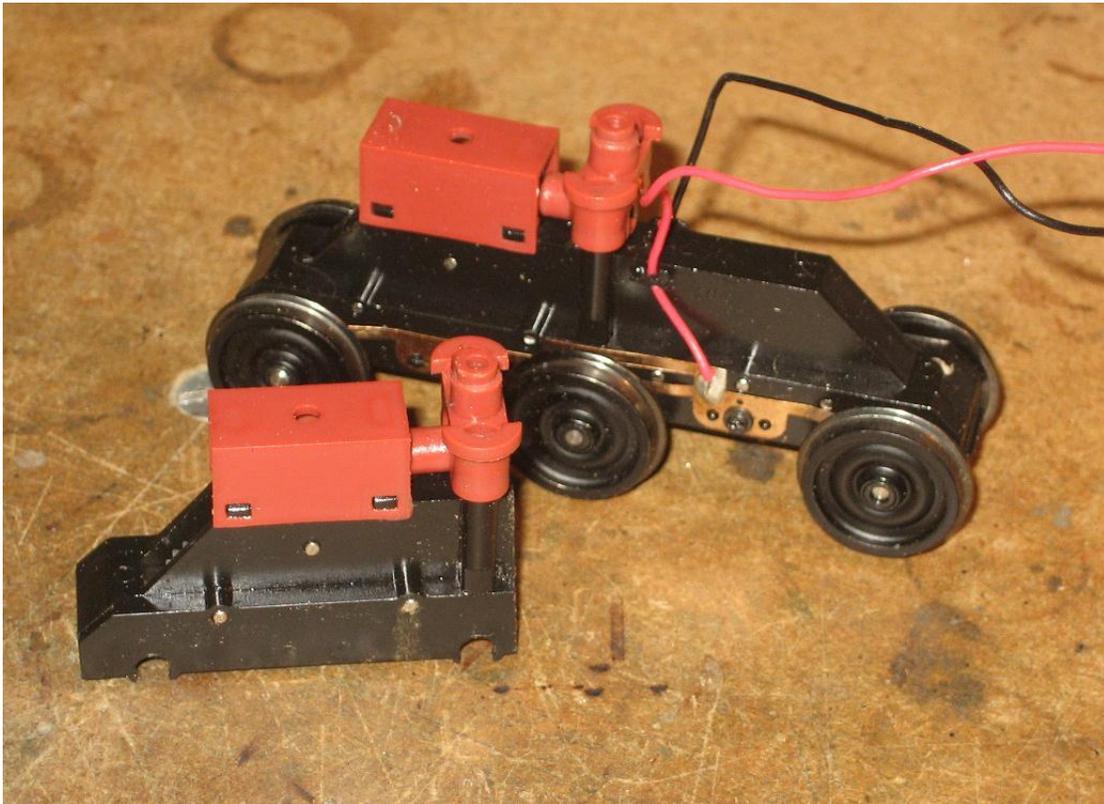






If you are constructing an English Electric bogie then the secondary suspension stirrups can be finished at this point. Open out the holes for the tail of the secondary suspension pins to suit your chosen rod diameter (either 1.8mm or 2mm). Whilst still in the fret check the fit of the tail of the pins in the secondary suspension spring seats (5) and then remove. Fold them double with the fold line on the outside. Use a suitably sized drill bit to help locate them on top of the base of the stirrup and solder in place. I find a drill bit useful for doing this just in case solder gets where it isn't wanted. You can then simply drill the bit free.

### **Drivetrain modification**



The drivetrains will need to be modified to fit the bogies. For all wheel drive and B-1 arrangement examples the drivetrain will need to be cut approximately 5mm to the rear of the centre axle. You may need to remove a gear to do this. In all cases you will also need to make sure that the ends of the drivetrains do not extend more than 5mm beyond the front and rear axles. I haven't provided any method of articulating all wheel drive bogies. It can be done though either by constructing a new spur gear train from the centre to rear axle or by making a plate to connect the two sections of the drivetrain you've cut between the centre axle and the first gear spindle. In both cases you will need to make sure that the rear section or spur gear train can twist in relation to the main part of the drivetrain. Simply make sure any bearing areas between the two sections contain a degree of slop. The coarse gears used in most RTR drivetrains can easily take this sledge hammer engineering approach.

You will need to make sure that the axles are free to twist in relation to the drivetrains. The Heljan drivetrains seem to contain enough slop as supplied but you will need to open out the brass bearings used by Bachmann. Use a tapered reamer to open them up to about 2.2mm inside diameter. Again the coarse gears will take this kind of treatment.

Check that the drivetrain fits between the bearings in the bogie. The distance between inside bearing faces is 11.5mm. You may need to adjust the width of any bearings or spacers on the plastic mouldings to get it to fit. You should be fine with Bachmann or Heljan drivetrains though.

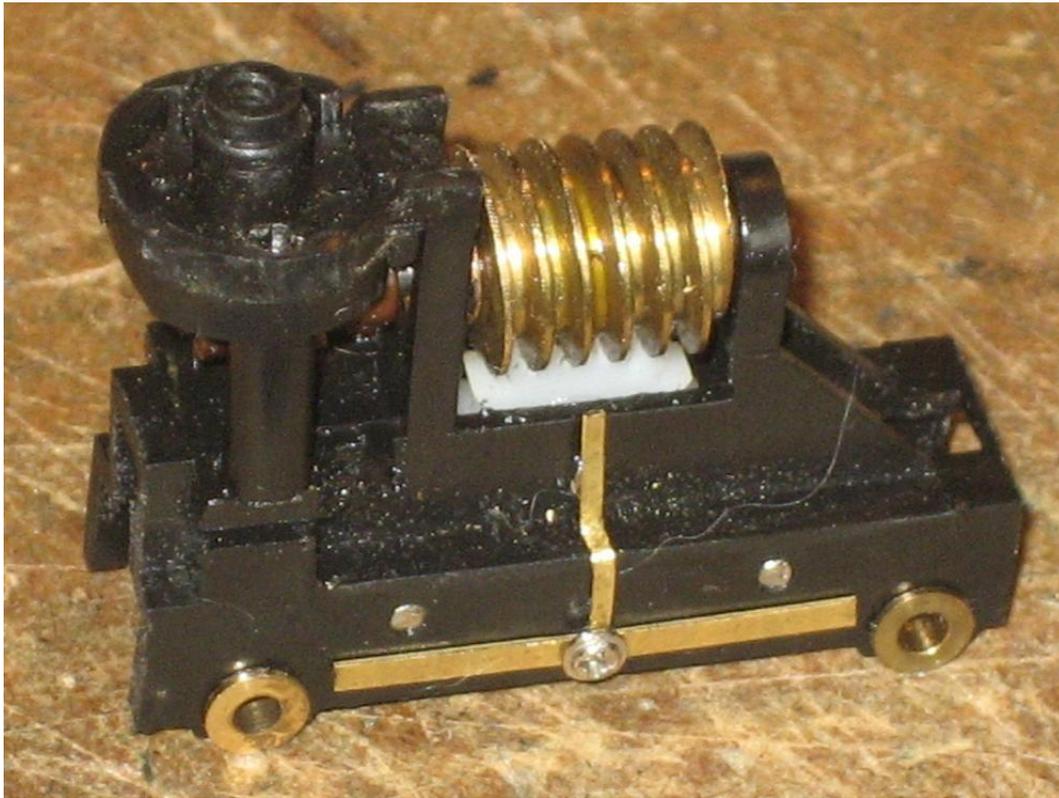
The next step is to assemble the wheels. You will need to remove the final drive gear from the RTR axles. A gear puller would be nice to do the job but I find they can be removed with just the aid of a pair of pliers and applying pressure to the side of the gears around the axle. The gear can then be fitted to the new axle. I find a short length 2mm inside diameter tube useful for pushing the gear into the centre. You can use Loctite 603 to help retain the gear making sure it is central on the axle. Everything else necessary can then be fitted to the axle. Drivetrain bearings (depending on type), bearings (making sure they are orientated correctly), spacing washers (if required) and finally wheels. There shouldn't be any side play on the front and rear axles so I have included axle washers (4) to take up any slack. A little side play is useful on the centre axle of a three axle bogie especially with the Peak bogies and their long wheelbase.

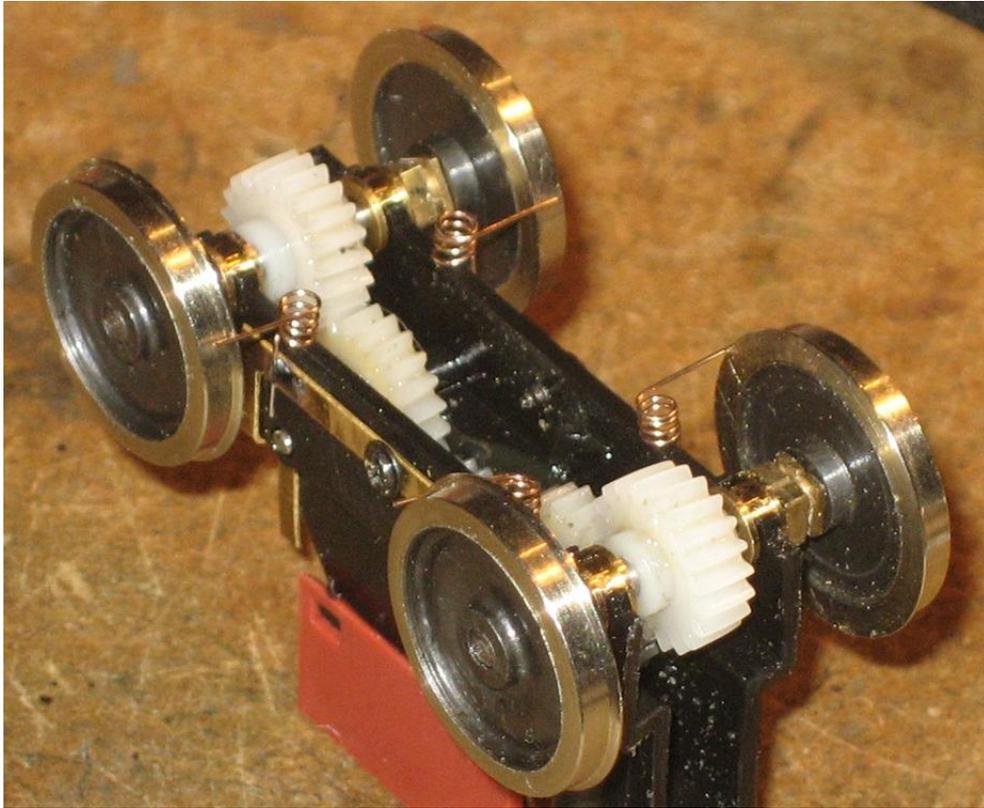


You will need to contrive a method of pick up for the electrical feed. I have success fully used two methods.

The first is depicted in the next two photos. I use a piece of scrap etch to provide a bar onto which little coil springs made of 33SWG phosphor bronze wire are soldered. These pickups then act on the flange of the wheels. The springs are made in the same way as the secondary suspension springs by winding the wire around the shank of a 1mm drill bit. 3 or 4 turns in the spring will be fine. You can then reuse the RTR wire to take the power feed to the motor.

The second is to use the American system where each bogie is live to a different polarity. I recently used this on my Dapol Western as the amount of brass in the bogies left me worried about shorting from any wire pickups. You obviously can't use this method on bogies where the bolster plate is mounted directly to the metal spine of the chassis. I used etched shorting strips on the back of the wheels to transfer the power to the axles and then soldered the power feed wire to the bolster plates on the chassis.





### **Bolster plates and chassis modification**

The bolster plates (7) are designed to be glued to the chassis and then cut out to create space for the drivetrains. They are all individually tailored to suit the model I intended to fit them to but they can be used, perhaps with slight modification, on others. If fitting to the plastic solebar moulding found on Bachmann locos then you may need to move the fixing screws that locate the plastic moulding to the chassis block. I found I needed to do this with the Class 37 but the Peak and Class 47 were ok. I reused the Bachmann screws drilling new holes slightly smaller than the screw thread to help with the fitting of them. The soft metal chassis block means that the screws are effectively self tapping.

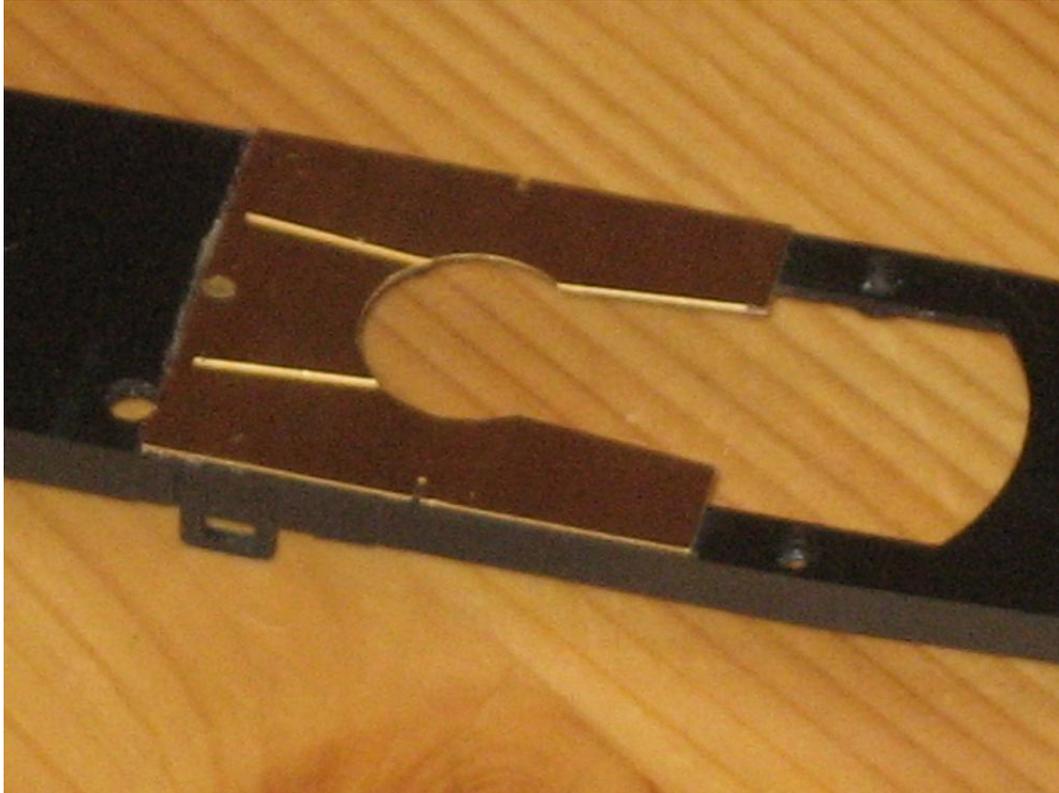
The following gives details of which locos I designed them around:

English Electric Bogies – Bachmann class 37. They should fit a Bachmann Deltic with no problems.

Peak Bogies – Bachmann Class 46. There are areas cut out on the bolster plate to enable you to fit Shawplan lifting brackets. These will help to disguise the bolster pins which weren't there on the real thing.

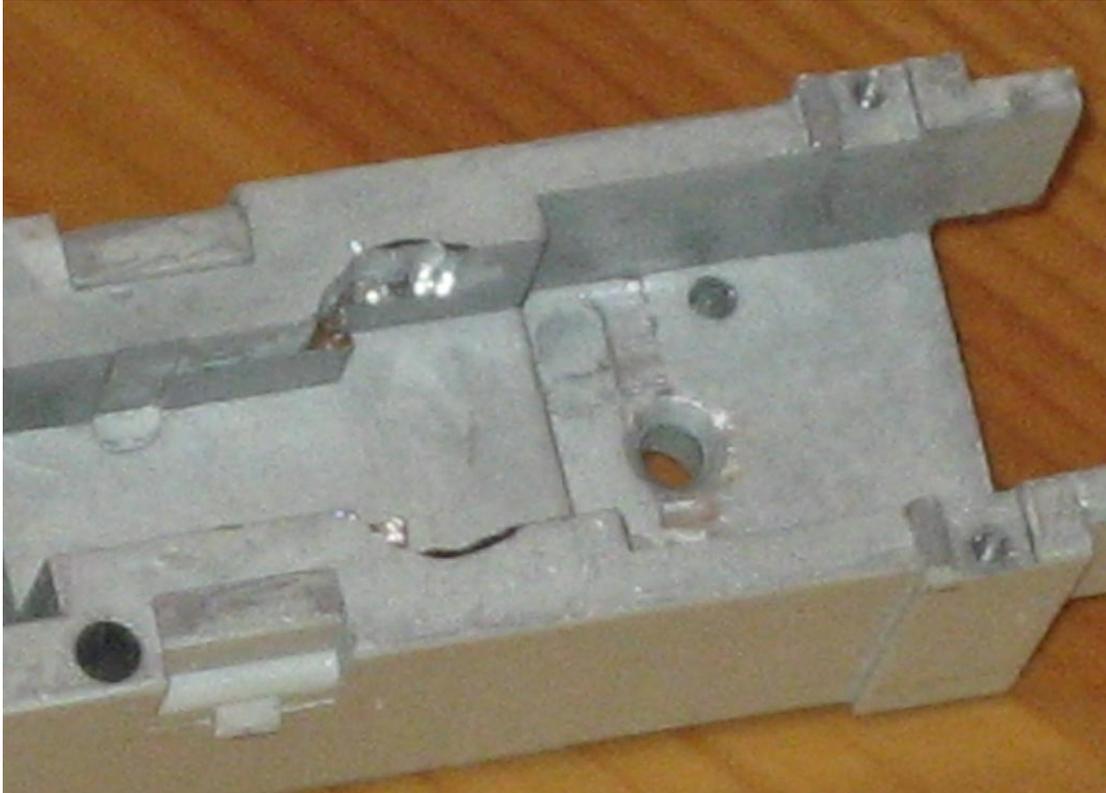
Hymek Bogies – Heljan Hymek. There are half etched areas which are designed to fit the shape of the metal chassis block. I did this to reduce the thickness of the bolster plate above the bogie as clearances are tight in this area.

Brush Type 4 – Bachmann class 47. There are fold out tabs which will help locating to the Bachmann chassis. If fitting to any other make leave these tabs alone.



You may need to remove a small amount of material from the chassis block in order to clear the bolster flanges. The only loco I've found this necessary on so far was the Bachmann Peak. I used a burr in a mini drill to create the extra space. The metal is very soft so it's not a hard job just a bit messy. See photo below.

CLAGs' website ([www.clag.org.uk](http://www.clag.org.uk)) gives details of the prototype pivot points for lots of British diesels which may help when fitting the bolster plates. There are slots etched on the edges of the bolster plate which mark the centre lines to aid fitting. Use an epoxy resin such as Araldite to glue the bolster plate to the chassis. Once the glue is completely dry cut the centre of the bolster plate out, either at the front or through both front and back, to clear the drivetrain. Use a piercing saw and the half etched guides. See above photo.



### **Bogie assembly**

If you haven't already done so fit the wheels and axles.

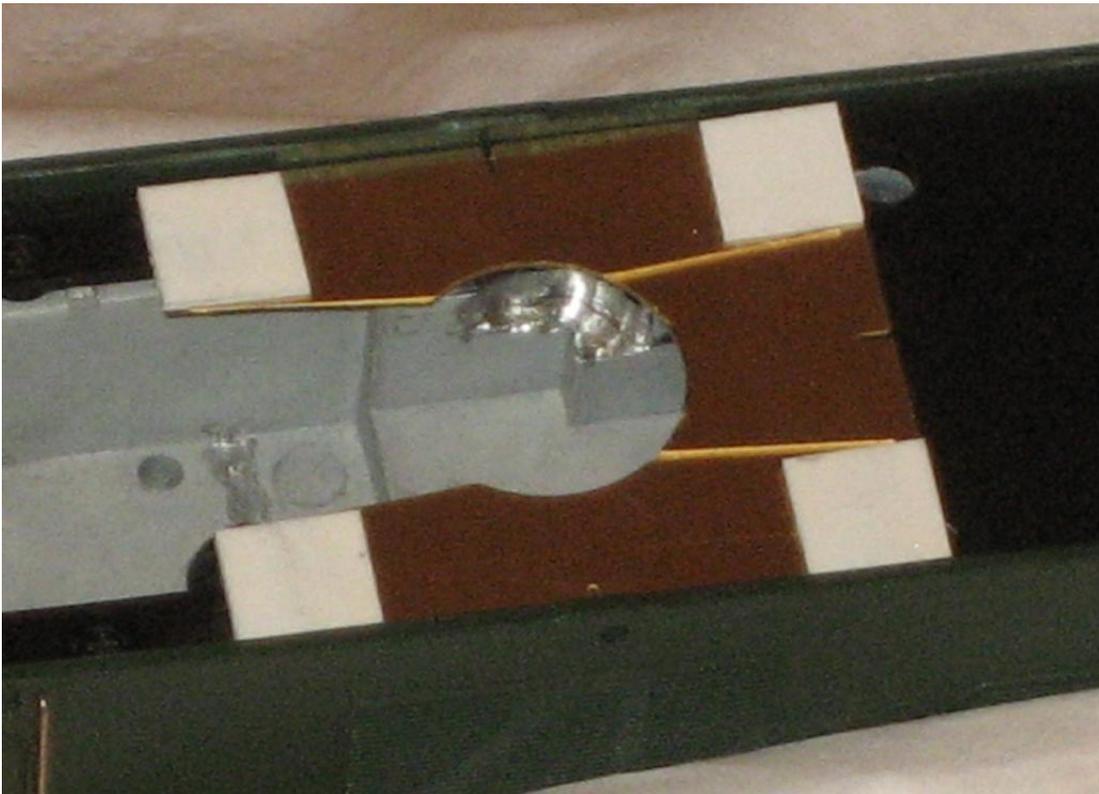
The secondary suspension springs and pins can be located in their stirrups. I have made no provision for retaining the pins in the bogie. You could do so if you wish but once the bogie is in place in the chassis and unable to fall out the springs and pins will be trapped in place. It is also useful to be able to remove the pins if they need adjusting. Beware that the springs will fall out if turned upside down until the bogie is properly fitted to the chassis. I know this sounds obvious but I still forget!

The bogies can now be test fitted to the chassis to check the ride height. The buffer centres should be somewhere around 13.8mm from the top of rail level assuming the buffers are in the right place. Everyone seems to have their own preferred buffer centres though. Some adjustment may be necessary.

For those types of where the bottom of the chassis is flush with the bottom of the body (Heljan locos for example) then the ride height needs to be adjusted via the secondary suspension pins. If the ride is too low then shim washers made from thin metal sheet can be used to effectively increase the length of the pin head or longer springs can be made. If too high then there file down the pin heads by the required amount or make slightly shorter springs.

For those types of chassis where the bolster plate is recessed (Bachmann types) then the ride height can be adjusted via pads. With these types I deliberately make the pin heads slightly short and then use pieces of plasticard, which are then finished with a layer of 0.010" brass to provide a metal to metal contact area, to adjust the ride. Make sure that each pad is the same thickness to ensure consistency.

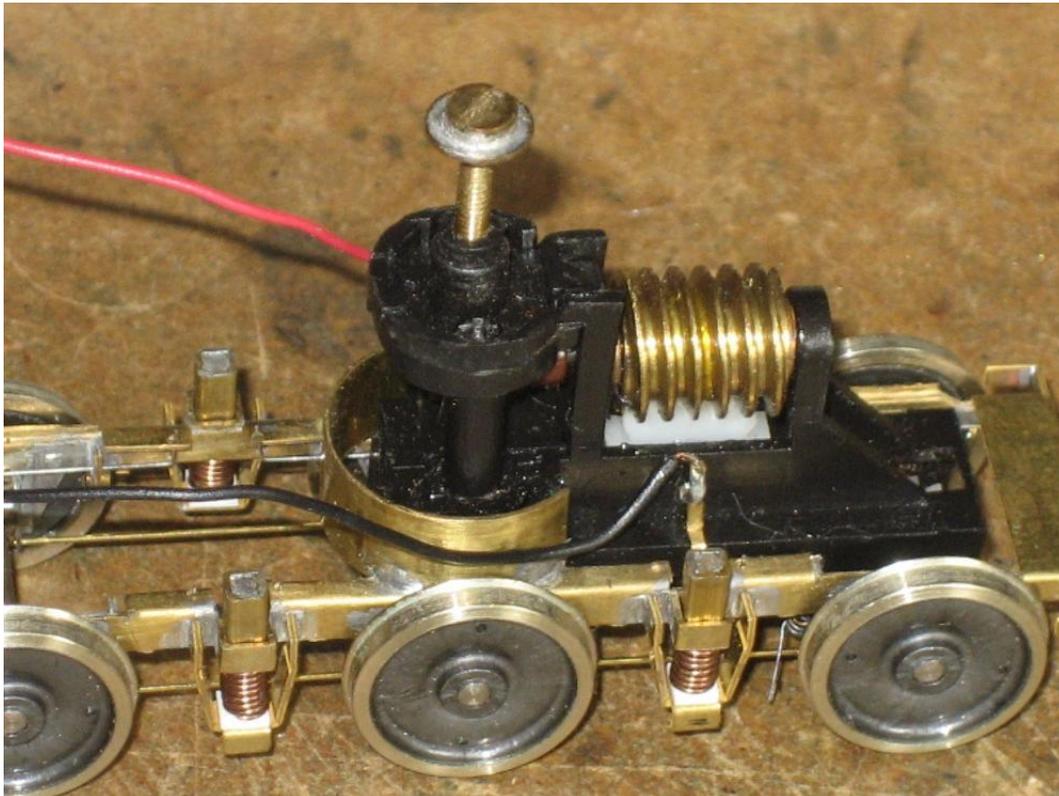
I have found that the metal chassis blocks used on Bachmann locos are very rarely flat for their entire length and seem to bow upwards towards the ends which are rather unhelpfully above the bogies. This may cause the bogies to sit at an angle as the plastic solebar will bend until it follows the metal chassis block. In such cases I have used plasticard to pack out the plastic solebar moulding until it sits flat where the bogie will sit.



The free running of the bogie can be tested at this point. If there are any tight spots now is a good time to track them down and sort them out before final assembly and fixing on the sideframes. I have yet to have to do this with any of mine so hopefully you won't either.

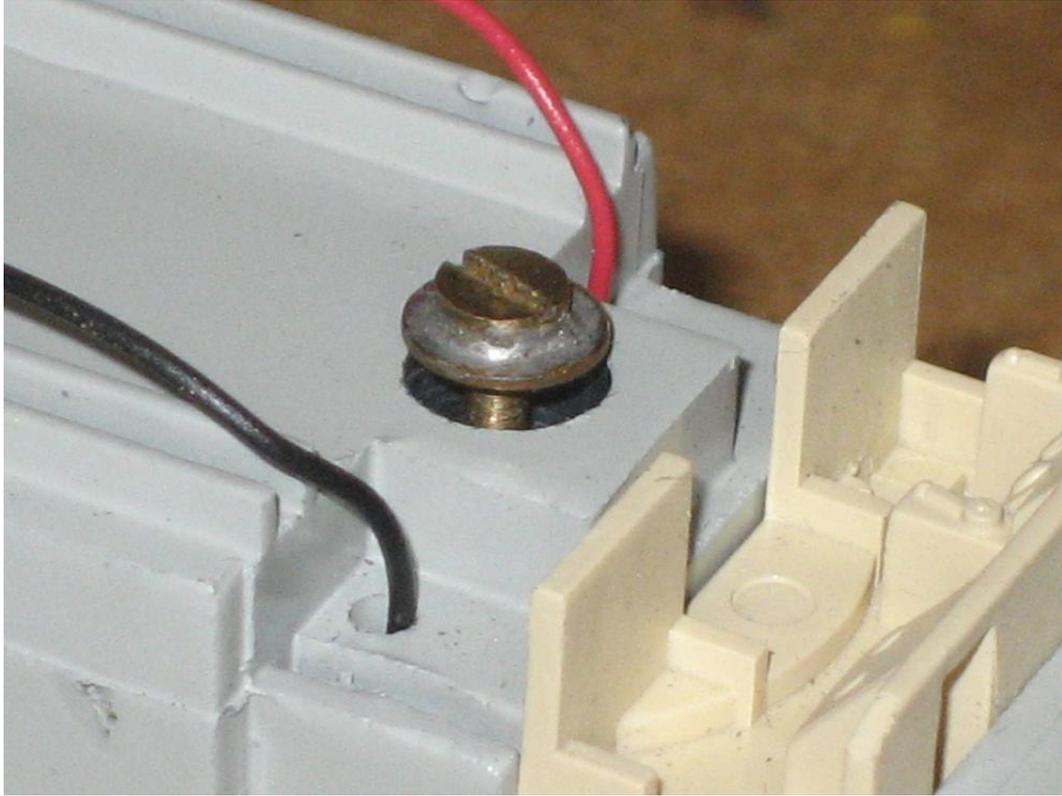
## Bogie Retention

Some method of stopping the bogies from falling out needs to be arranged. For Bachmann locos I adapt their bogie fixing method. This basically consists of a screw that passes through the chassis block and fixes into the top of the drivetrain. I use an M2 bolt with an M2.5 washer solder to it as the retention bolt. You will need to make sure that the hole in the chassis block is opened out particularly if you have moved the pivot point on the bogie. I drill the existing hole out with a 6mm drill. Also double check that no part of the drivetrain comes into contact with the chassis block and adjust the top of the drivetrain if necessary.

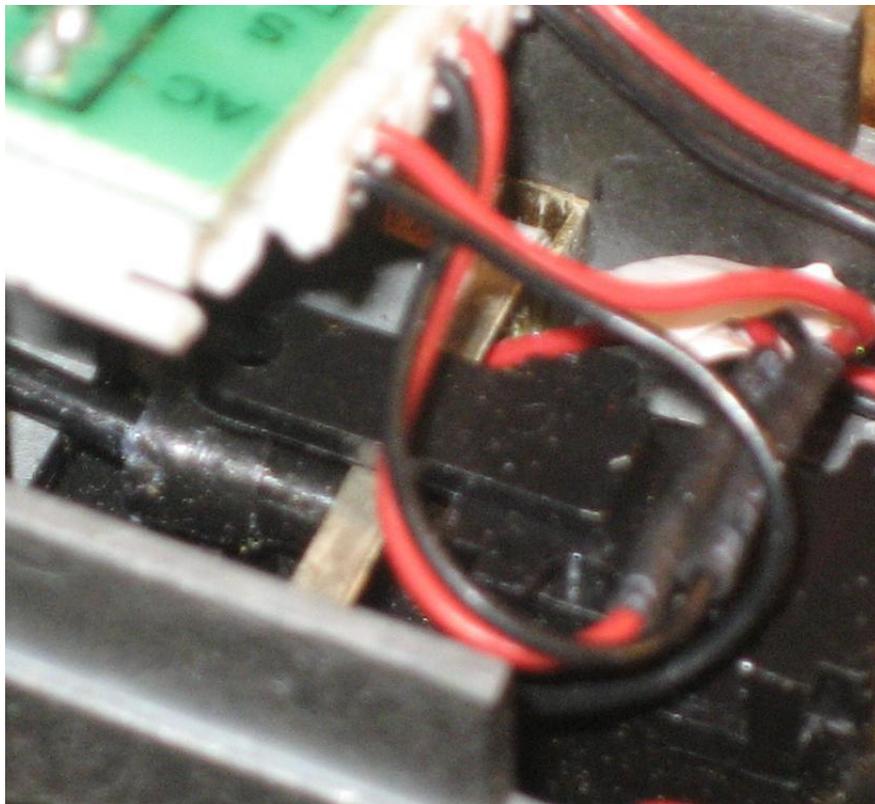


The retaining bolt fitted into a Bachmann English Electric Type 3 drivetrain.

For Heljan types I use a retaining bar that sits between the drive shaft and the top fixing plate. Ensure that there is enough space on either side of the bar for the bogie to move up and down a little. The photo below shows the arrangement on my Heljan Hymek. I used 1/8" square brass tube to locate the retaining bar into and set its' height. The bogie can be removed by simply unclipping the top plate on the drivetrain.



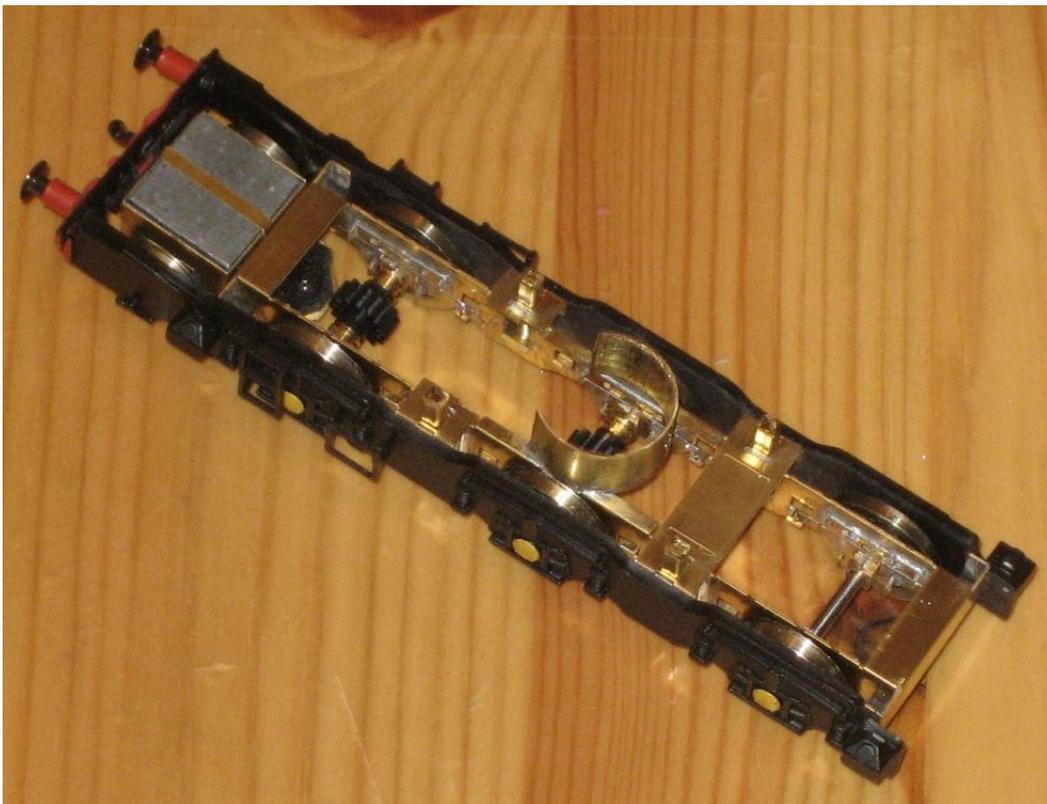
The retaining bolt on a Bachmann English Electric Type 3



The retaining bar on a Heljan Hymek.

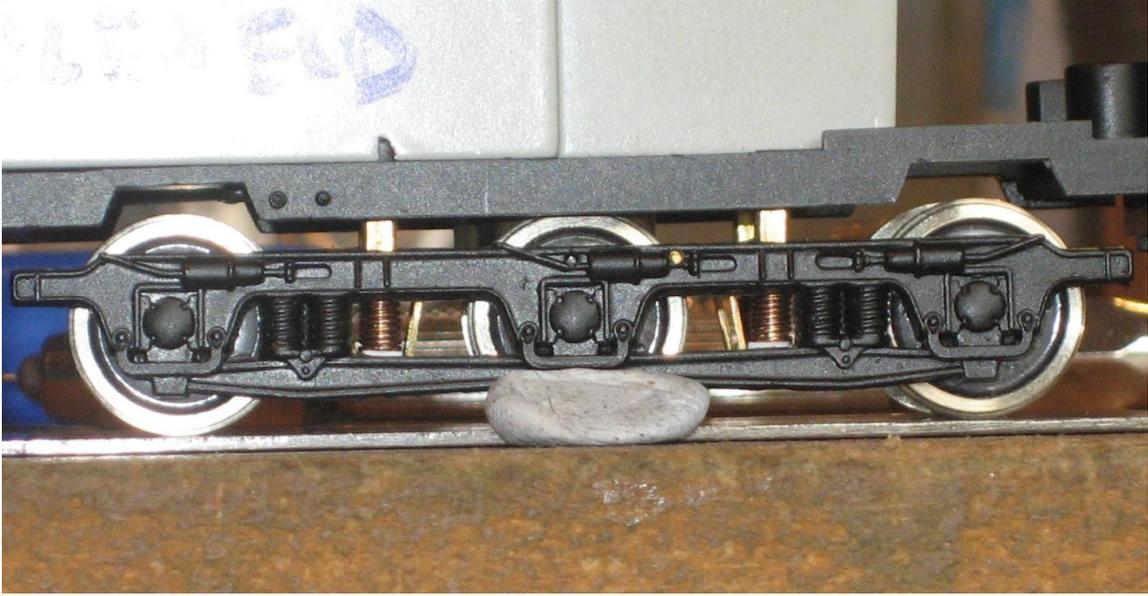
## Sideframes and final assembly

The bogies have been designed so that if the top of the bogie coincides with the top of the cosmetic sideframe then the axle centres will be in the correct place in relation to the axleboxes. It also helps with fitting the sideframes as you don't have to do it while the bogies are under load. The cosmetic sideframes can be glued to the fixing points on the bogie. Make sure that these fixing points form a flat surface across the length of the bogie. Adjust if necessary. If using the Peak bogies then you will need to make sure that the insides of the bogie moulding are free from any pips that may protrude from fittings glued in place. You will also need to remove the coupling pocket (for the pony trucks) and the small ledge that is in front of the pony truck pivot point. The Peak bogie should be a good fit in the Bachmann moulding.



A completed Peak bogie fitted into the Bachmann bogie moulding.

I haven't as yet done anything about brakegear. With some types, the Peaks mainly, this doesn't matter as you can't see it. You can reuse the plastic brakegear if that came with the loco (if it had any). I have done this with a Bachmann English Electric type 3. Etched brakegear would be nice though at some point. If I do any, and I make no promises, then I will arrange it so you can retrofit them to the bogies.



Bachmann English Electric cosmetic sideframes temporarily fitted over the etched bogie. Note the way the unpacked plastic solebar bends upwards towards its' end which I talked about in the **Bogie Retention** section.

Final assembly can now be done. Fit the drivetrains in the bogie and then fit to the chassis. This is a bit of a three handed job as the power feed wires may need to be threaded back in place and the cardan shafts need to be fitted all whilst ensuring that the secondary suspension pins don't fall out. This may not be easy but if you take it slowly then you will limit donations to the swear box. Once the bogie is in place the power feed wires can be connected up and the bogies retained by whatever method you have used. You can then stick the loco on the tracks and watch as it glides along!

Any problems then feel free to email me.

Justin Newitt 2013