

Rumney Models - Warship Bogie Instructions

Notes

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

These etches are designed to aid the construction of a fully sprung P4 Warship locomotive. You cannot build the bogies 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.

These bogies are specifically designed for the Bachmann Swindon built class 42 Warship, i.e. the older model. They may well be suitable for the new class 43 Warship by Bachmann but as yet I haven't seen one to investigate this.

If you have any questions then email me.

I use Ultrastyle Diesel Disc wheels on all my diesel locomotives but you can of course use another make. They must however have an axle diameter of 2mm. It is possible to reuse Ultrastyle 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 which is 3'3½"' for the Warships.

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

Everyone has their own soldering methods. I now use a temperature controlled soldering iron with predominantly 145° solder and La-Co paste flux. Given the thickness of the brass involved with this kit I would recommend using a soldering iron of at least 25Ws.

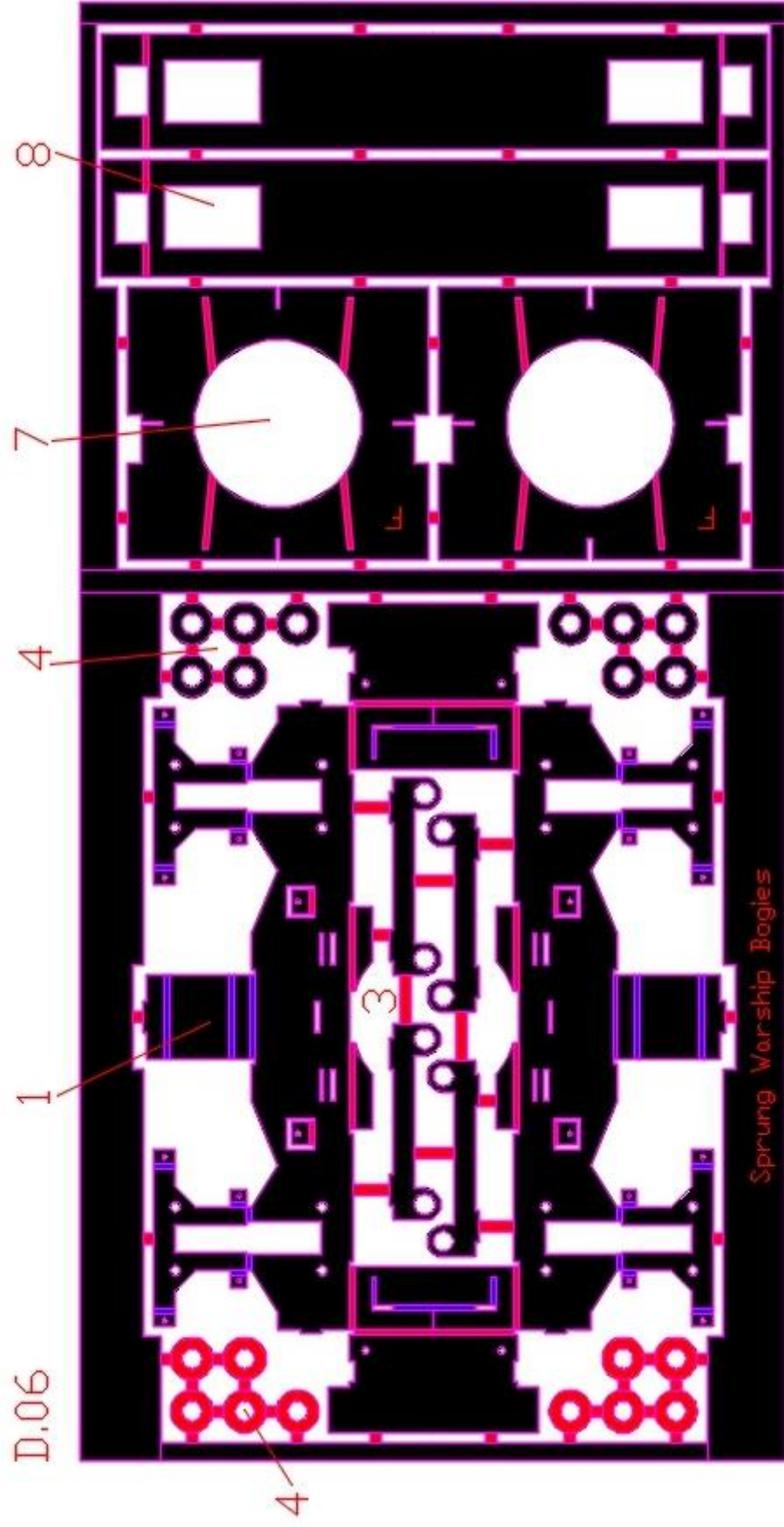
Component lists

- 1 – Bogie
- 3 – Secondary suspension guides
- 4 – Axle washers
- 7 – Bolster plate
- 8 – Keeper 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
- 1.5mm diameter secondary suspension pins

D.06



Materials List

The following items will be required to complete the bogies:

5/8" brass tube (K&S 143)

1mm wire for use as an aligning pin when soldering the hornguides

2mm x 1.5mm brass tube

0.4mm hard brass wire for the secondary suspension springs. (Eileen's sell this in packs of 12" straight lengths under the straight wire section)

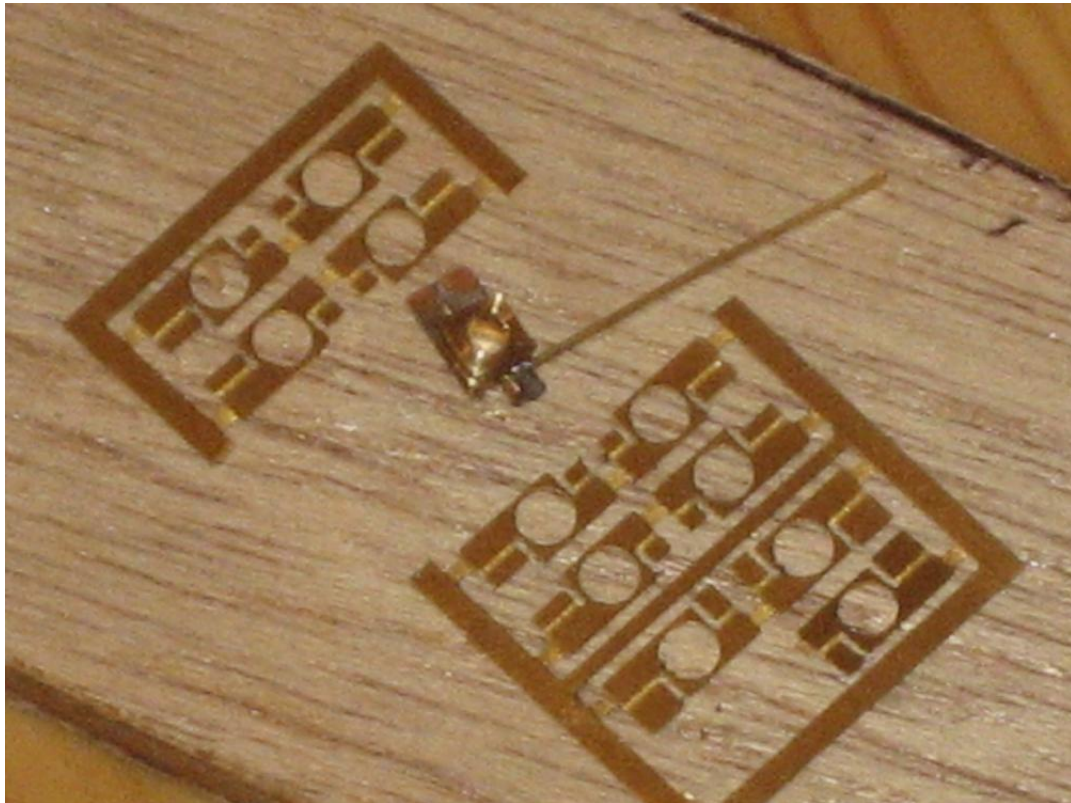
3mm x 2mm brass L section

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 for pickups. I have included notes in the Drivetrain Modification section on how I've done it but everyone will have their own ideas.

Construction

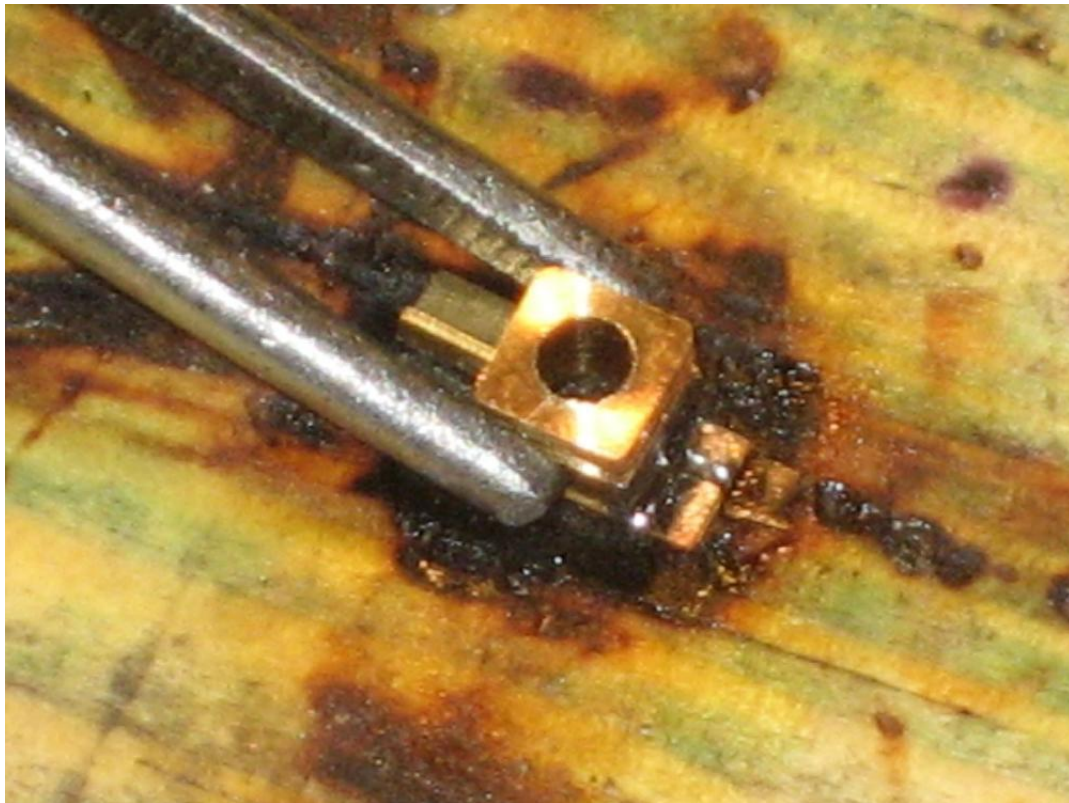
Bearings and Carriers



The first things that need to be addressed are the spring bearers. The bearings will need to be used to tweak the hornguides 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. For the Warship bogies use the long end. 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.

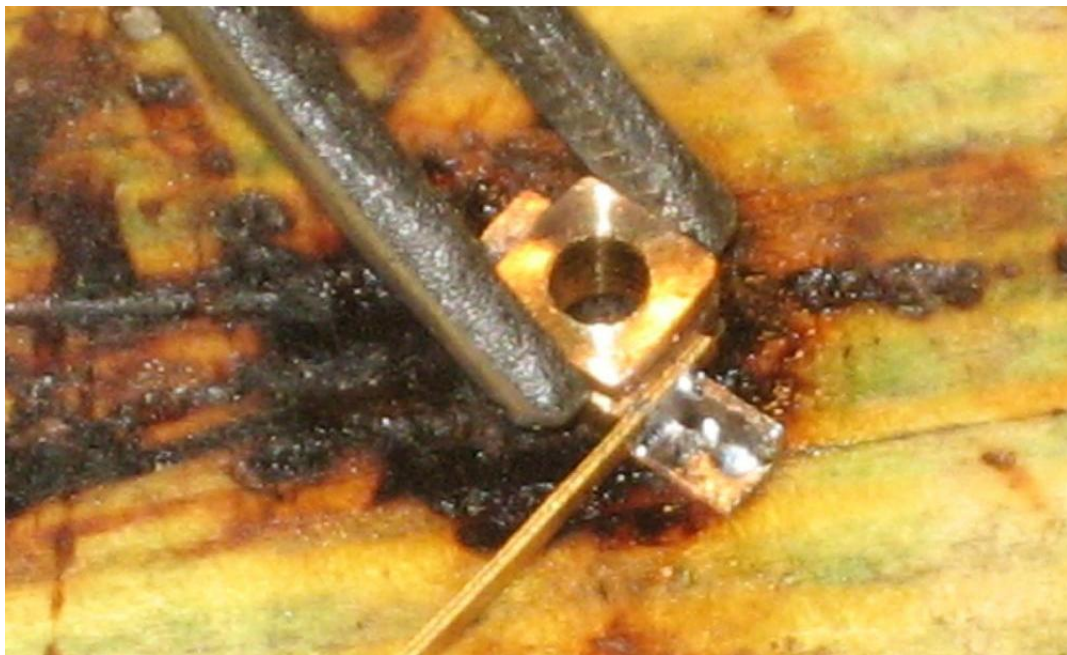
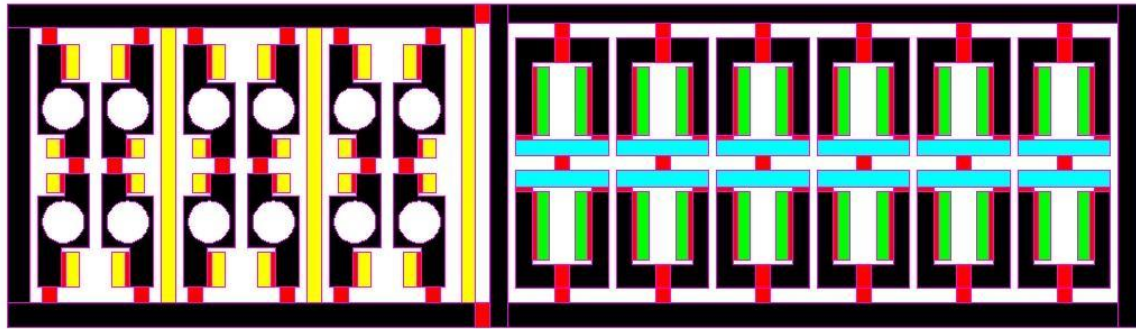
It is important that you arrange a method of keeping each bearing with its horn guide in the bogie. It's easy to think that because everything looks the same that the bearings are interchangeable. You will inevitably encounter problems if you start to swap bearings around. I know this from experience! 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 2nd axle) leaving the 1st, 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

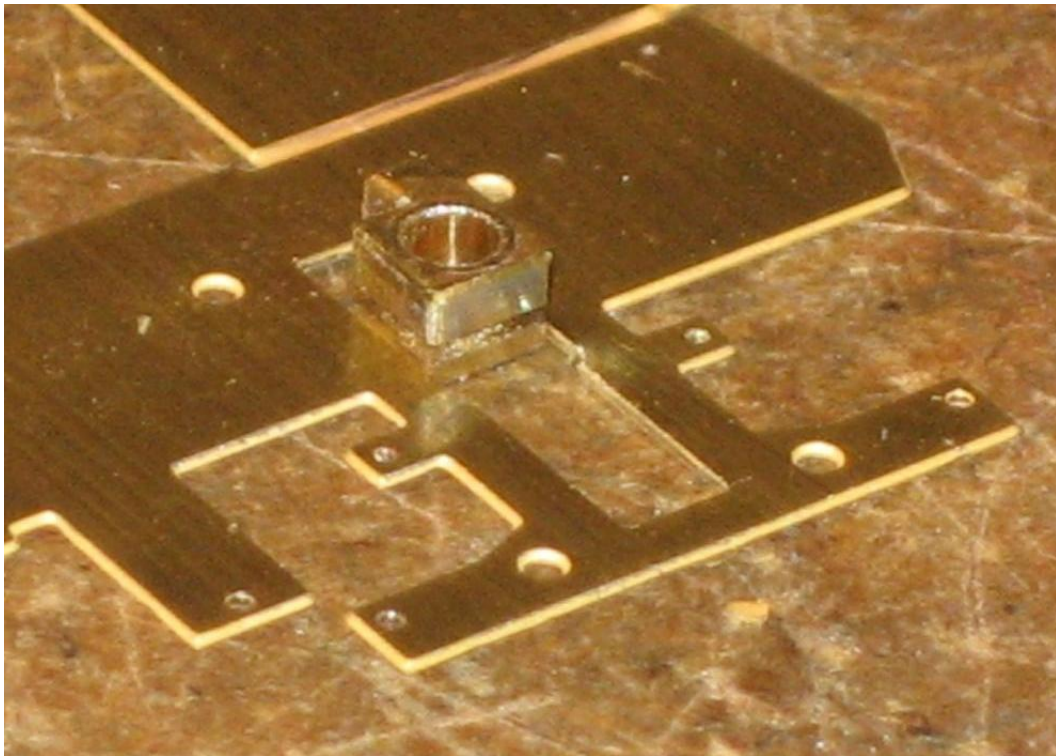


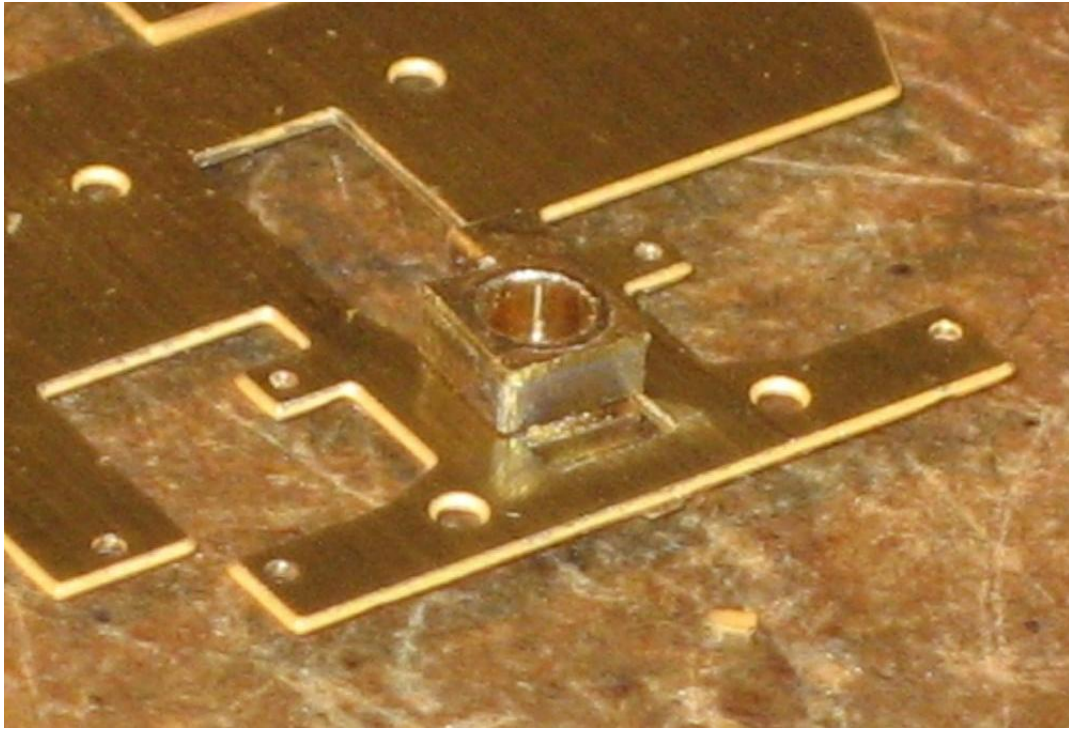
The bearing can now be tidied up. The filling strip can be trimmed and then filled flush and the unused end of the spring bearer needs to be removed and filled flush with the bottom of the bearing. Mark the bottom of the bearing with a piercing saw so you know which axle it belongs to. You will also 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. 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.



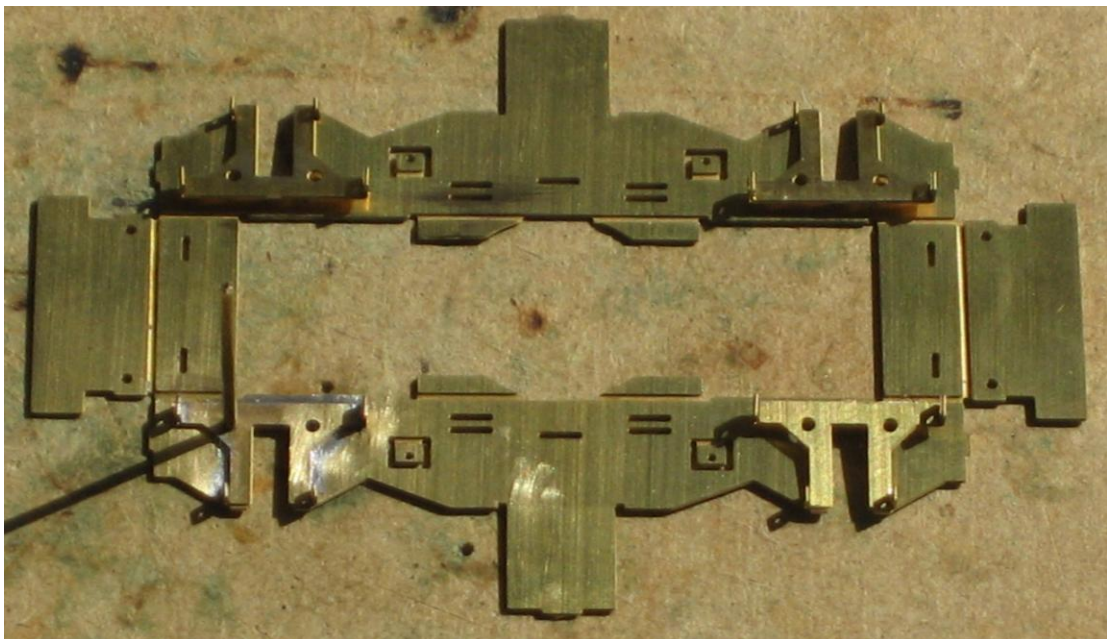


Once you are happy with the fit of the bearings in each of the horn guides they can be folded up. They will be folded double and then aligned using a 1mm wire 'pin' before soldering each side together. In order to help with the 'pinning' process it is useful to drill a hole into a piece of spare soft 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 the bogie etches but only one really needs to be used.

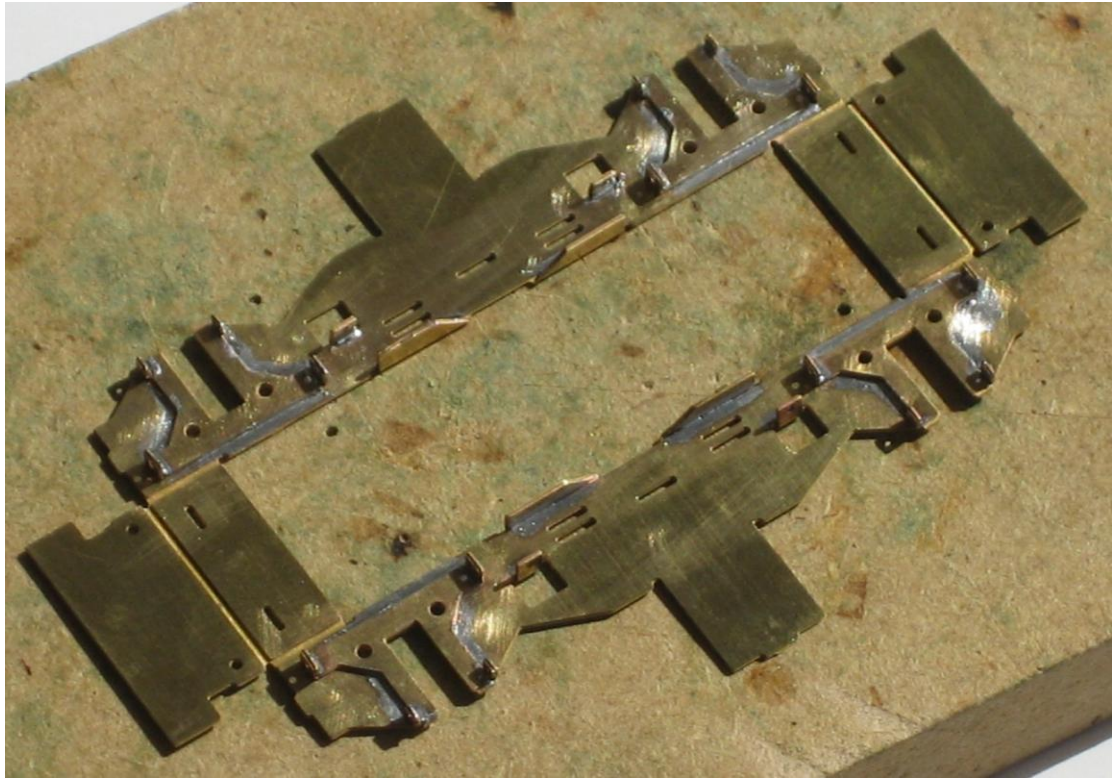
Fold out the fulcrum points for the primary suspension and the tabs for the axle retaining wire. Fold the horn guide double so that the fold between the two sections is through 180° with the fold line on the outside.



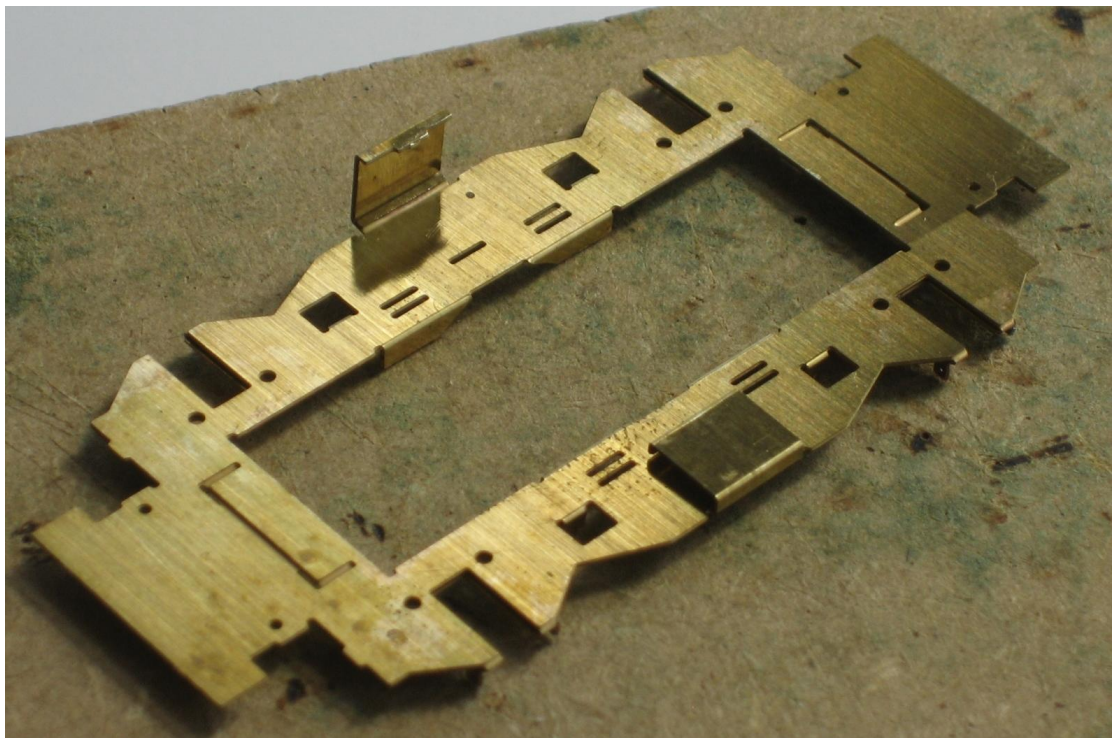
File a taper in the end of a short length of 1mm wire and then pass through the horn guide sections and into the hole in the piece of wood. The holes shouldn't need to be opened out to do this. The wire should be a tight fit. I use a pair of pliers to push the wire through the holes in the etch. If the holes are too small use a reamer to open them 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 horn guides are done you can fold out any other parts that are on the sideframes. There are spring retaining points and also the locating points for the bolster. The later items are to be found towards the centre of the bogie and have a slight curve in them. Reinforce the fold lines with solder. See photo below.



Next there are two spacing plates that need to be folded up. These are designed to space the cosmetic Bachmann sideframes the correct distance from the bogie. Turn the bogie over and start from the outer ends. See photo below. There is a tab that locates the plate into the sideframe. Solder in place.

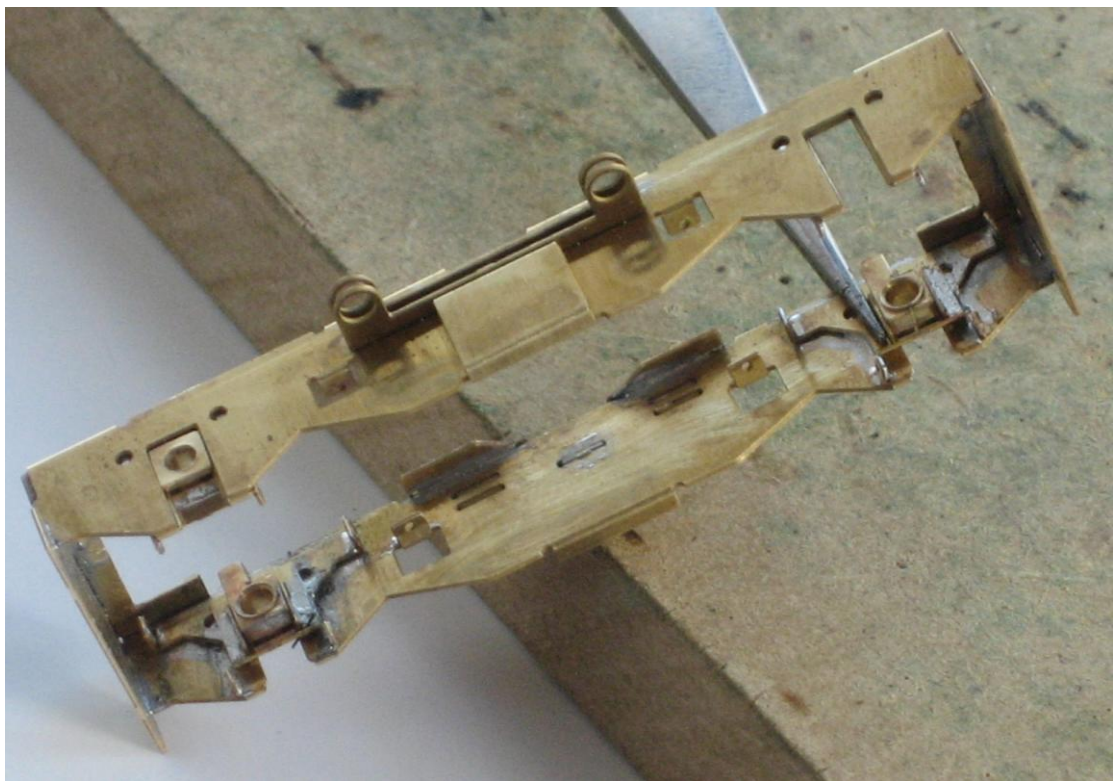


Secondary suspension guides (3) need to be added to provide a base for the secondary suspension springs. There are two per side. Locate into place using the tabs and slots provided and solder in place. See photo below.



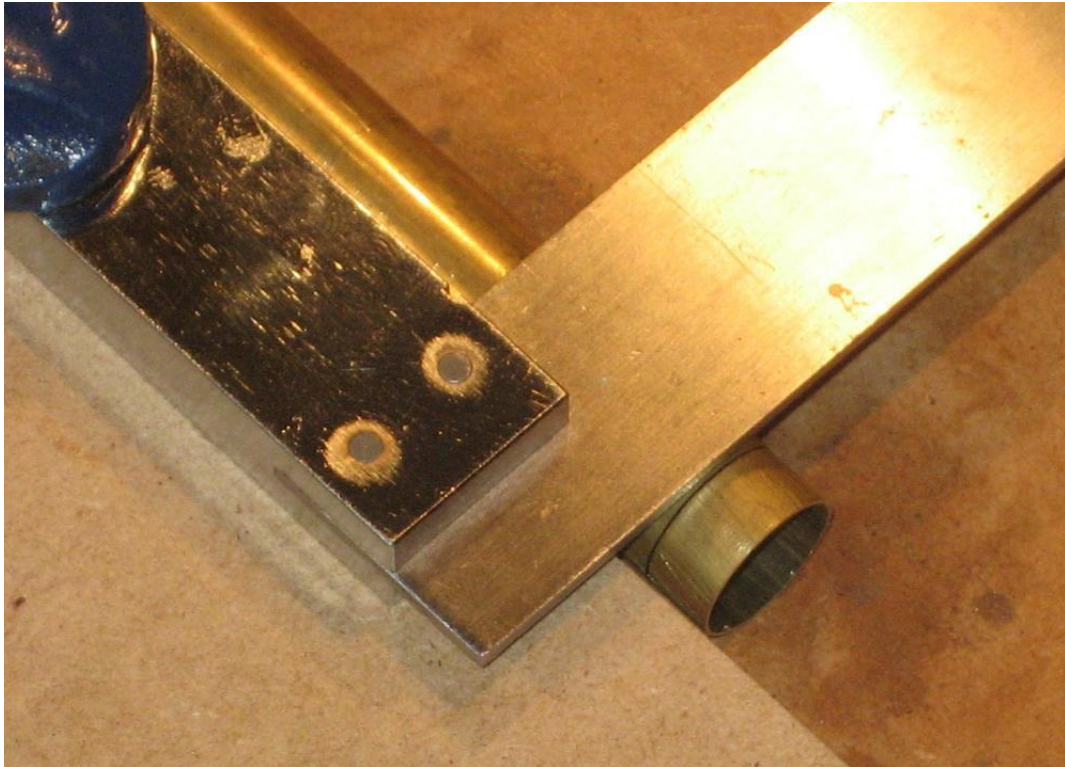
Now that all the parts of the bogie are in place it can be folded up. Make sure that the sides and ends are at 90°. There are tabs and slots to aid alignment. Solder together.

Once everything is firmly soldered together you will need to remove a small area of metal from the frame spacers at each end of the bogie to allow the drivetrain to fit into the bogie. These areas are marked with a cross in the picture above. Use a piercing saw and the half etched lines as a guide.



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 5mm 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.



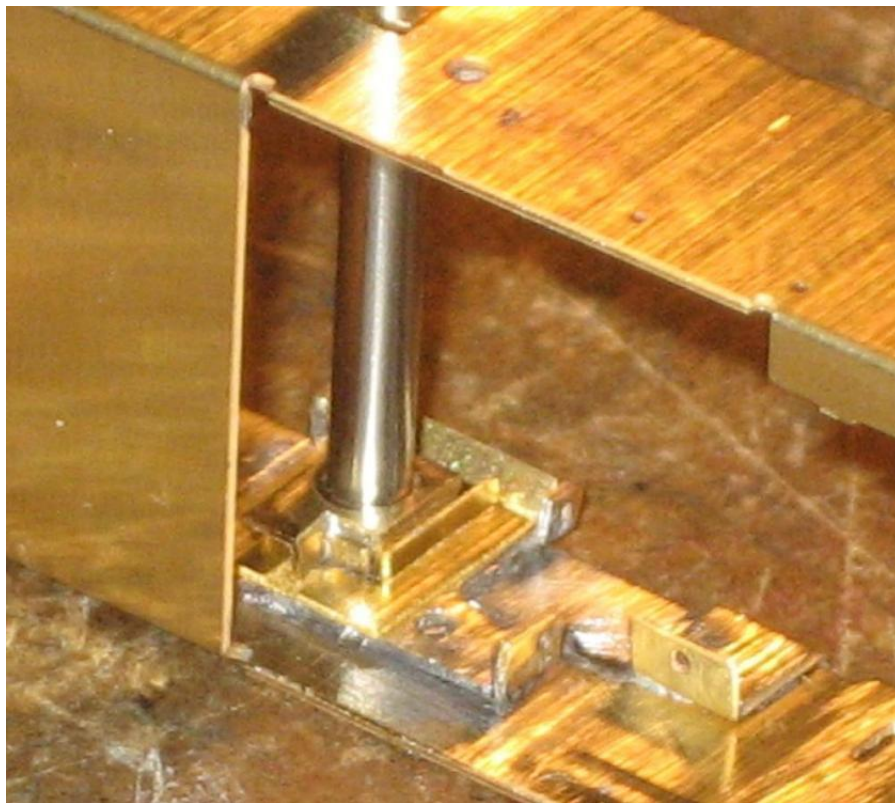
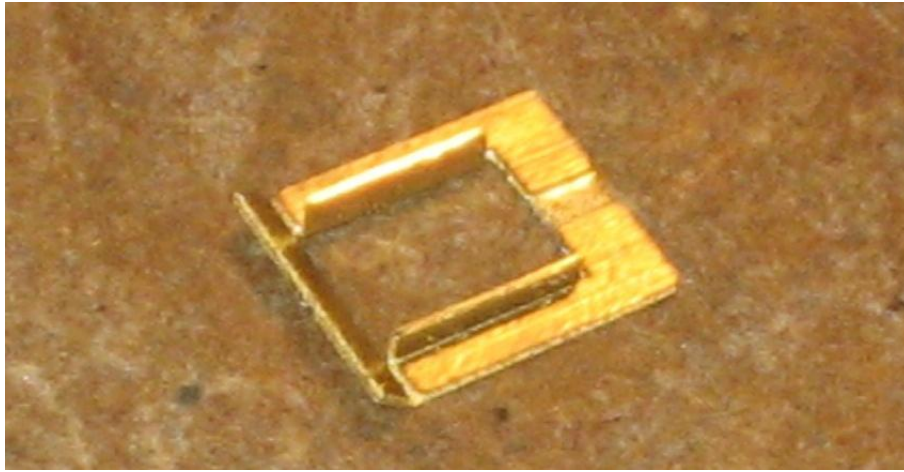
The centre of the bolster flanges will need to be removed to provide clearance for the drivetrains. Use a piercing saw and the edges of the locating points for the bolster as a guide.

Sections of 2mm x 1.5mm tubing need to be fitted to act as bearing sleeves for the secondary suspension pins. These are soldered into the holes in the secondary suspension guides. Cut the tubing into 4mm long sections and solder in place with the bottom of each tube in line with the bottom of the secondary suspension guides.



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 horn guides 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 horn guides as it stands doesn't provide much bearing surface area so horn cheeks 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 horn cheeks (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 horn cheek etch over the bearing as per the photo below. Check the fit of the horn cheeks against the bearing and adjust if necessary. Feed an axle through the two bearings and then solder the horn cheeks in place. Once soldered in place the section at the bottom can be removed by folding backwards and forwards until the joint breaks. Repeat for all the other axles.



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. These Warship bogies use 0.011” guitar wire (as supplied). They need to be folded into an L 18mm x 2mm. 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 a folded out tab on the sideframes. I dislike bending the ends of spring wire in order to retain them.



Secondary suspension

The secondary suspension on the bogies uses home made coil springs and the pins provided to transfer the weight of the loco to the bogie. The most important thing when making 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.

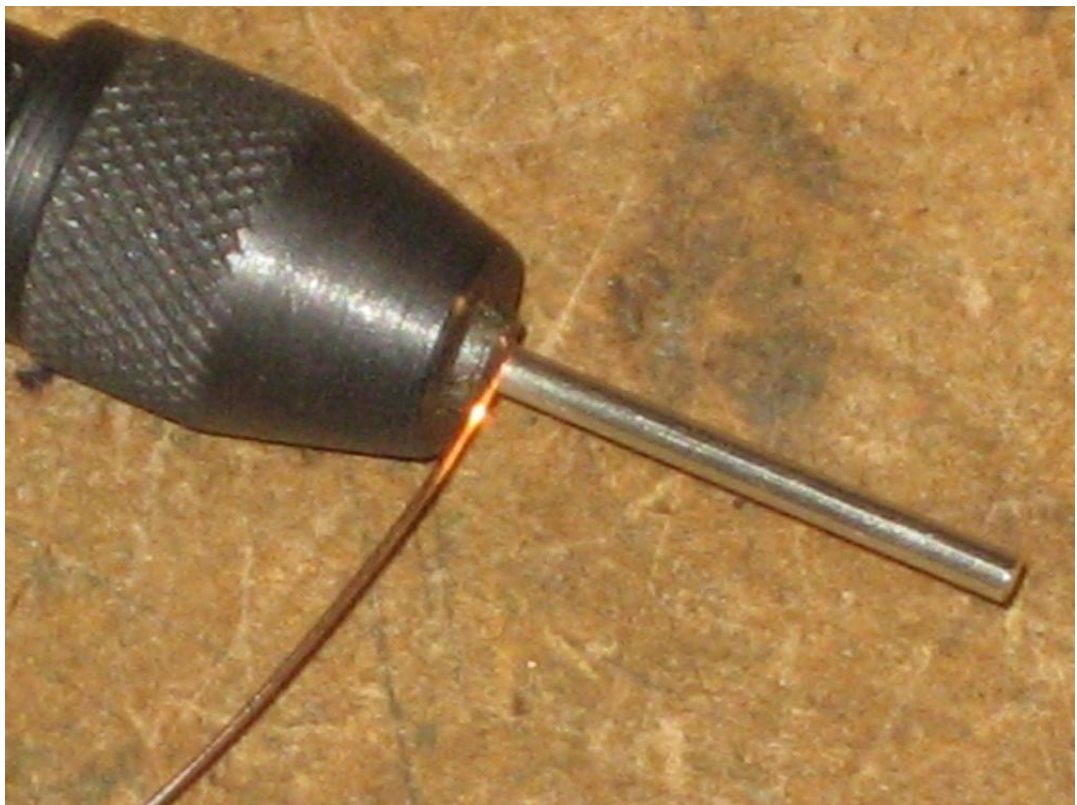
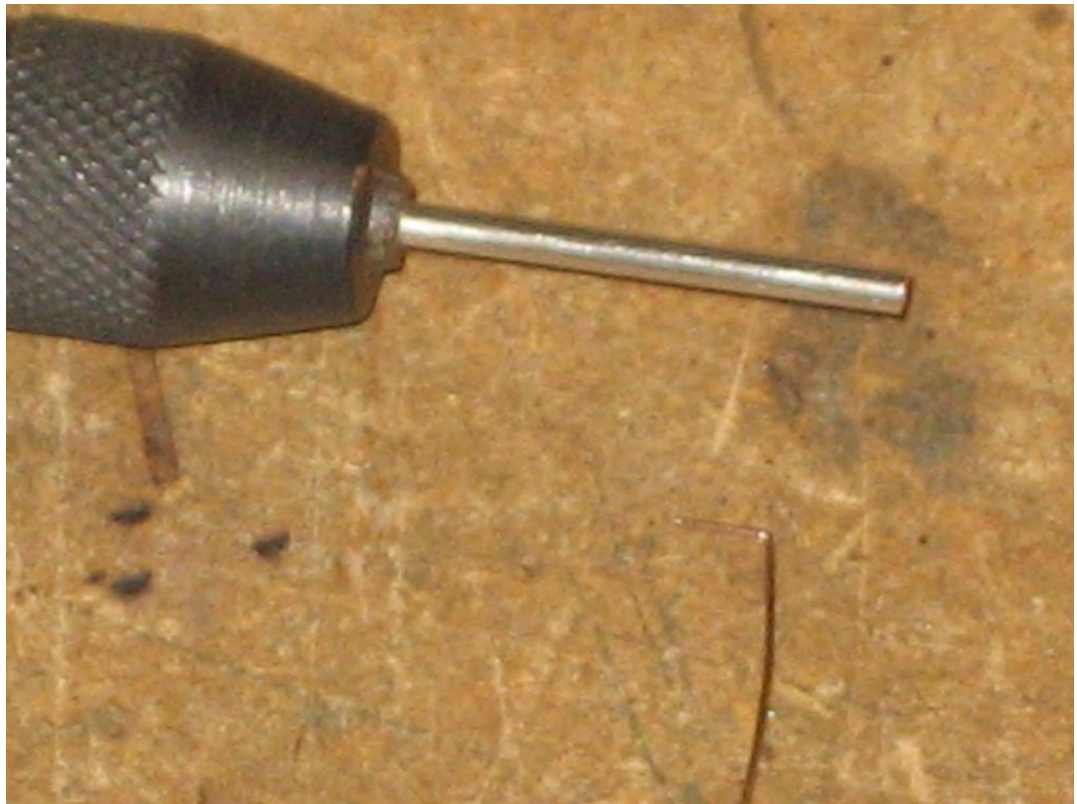
The pins provided will need trimming to fit. Cut the tails on them to 5mm long.

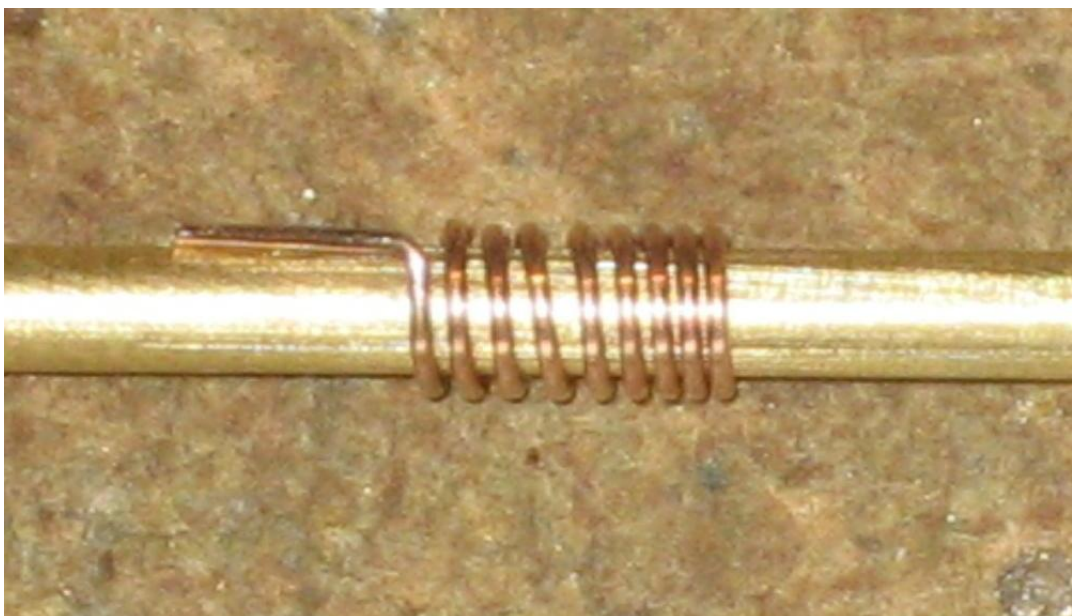
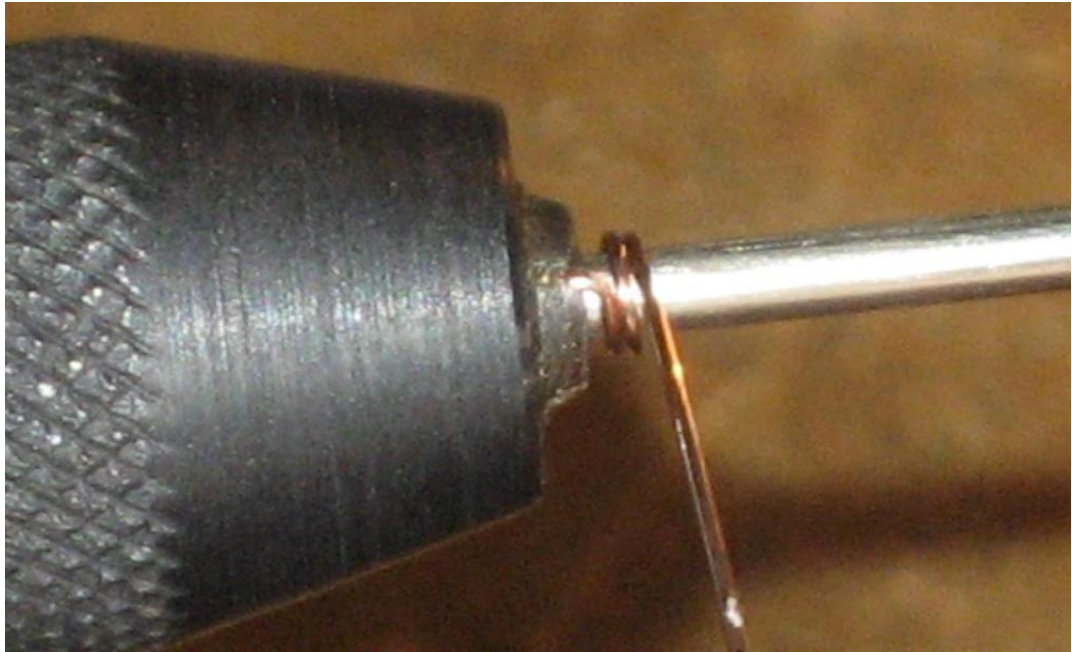
Coil Springs

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. Use 0.4mm hard brass (straight) wire coiled around a 2mm drill bit or something of similar diameter. Put 8 turns into the spring and then pull out to a finished length of 4.5mm.

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 2mm drill bit or length of rod of the same diameter. 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. Making sure that the wire is held 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.





Wheel Assembly

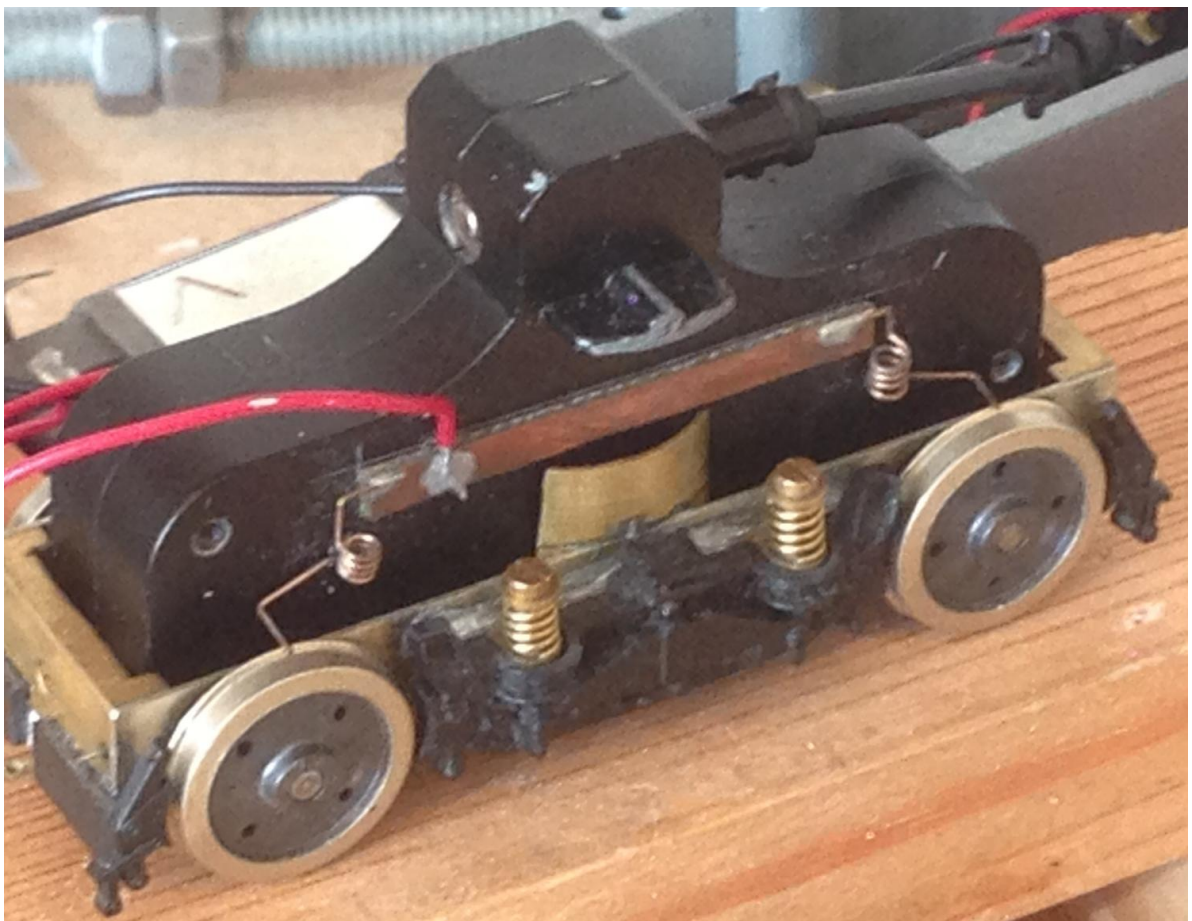
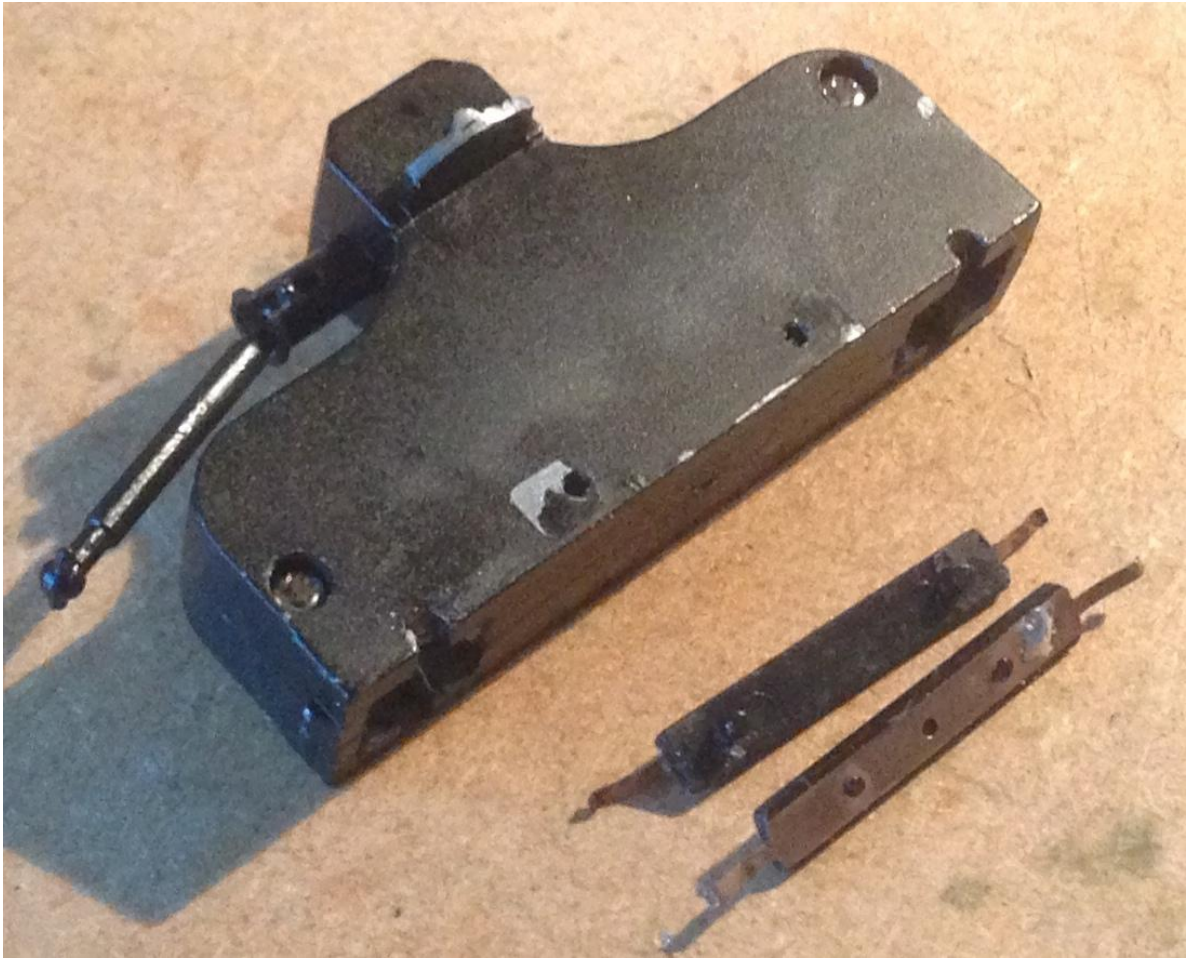
The next step is to assemble the wheels. You will need to remove the final drive gear from the RTR axles. A gear puller would be nice to do the job but I find they can be removed with just the aid of a pair of pliers and applying pressure to the side of the gears around the axle. The gear can then be 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. Bearings (**making sure they are the orientated correctly**), spacing washers (4) if required and finally wheels. There shouldn't be any side play on the front and rear axles so I have included axle washers to take up any slack.



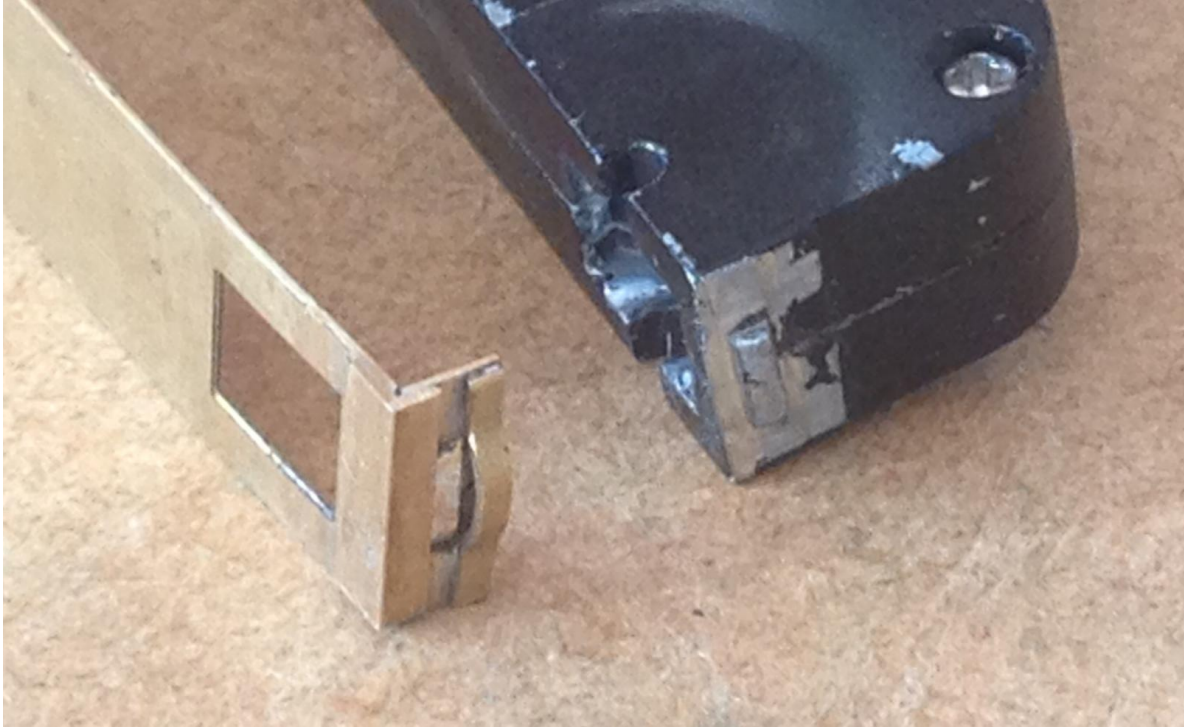
Pickups

You will need to contrive a method of pick up for the electrical feed. This is the method I used.

The original pickups will need removing as they will foul the etched bogie. They are connected by two little lugs and are easily prised off. They can be resituated higher up or a length of copper clad sleeper strip can be used as a mounting for new ones. Either way the electrical connections must clear the top of the bolster flanges. Onto this mounting I soldered little coil springs made of 33SWG phosphor bronze wire. These pickups then act on the top 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. See the photos below.



There is a new Keeper Plate (8) provided. This is designed to replace the very thick Bachmann one. Fold it into an elongated U. The folds will need some serious reinforcing so solder lengths of 3mm x 2mm brass L section to the outside of the fold lines. I soldered a small length of scrap fret onto one of the ends to give something to be able to prise them off with. See photo below. The ends of the drivetrains may need a little attention to get a good fit with the keeper plate.

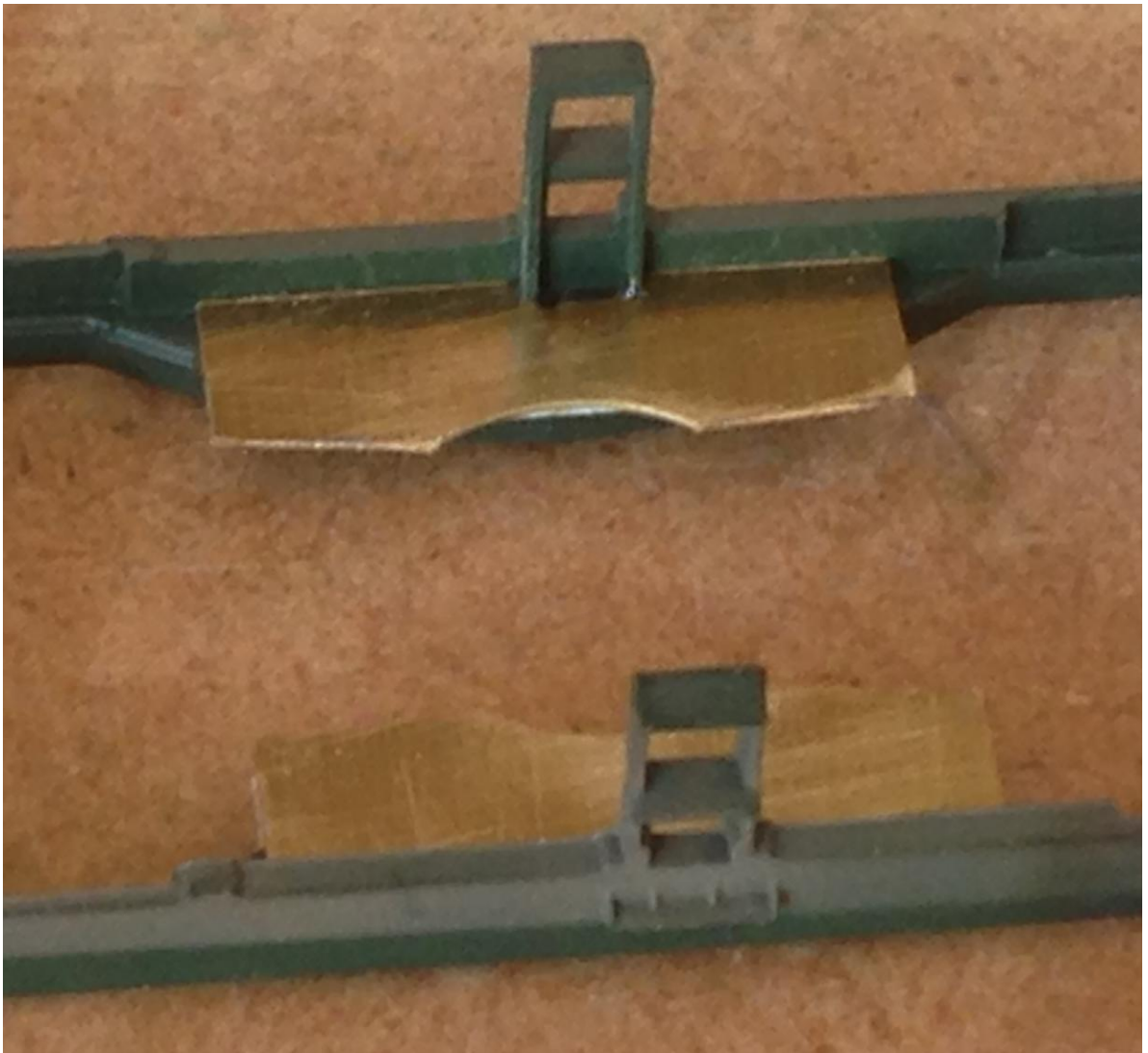


Bolster plates and chassis modification

The bolster plates (7) are designed to be glued to the chassis and then cut out to create space for the drivetrains. On the original Bachmann Warship there is a small ledge that needs filling before the brass bolster plates can be fitted. Use small pieces of 0.020" plasticard glued in place.

The bolster plates can then be epoxied in place and cut through with a piercing saw once completely hardened. Note that there are notches etched out for the cab steps. These are forward of the centre line of the bolster plates which are marked with a small line. The plates should be located so that the inside edge of them is 21.6mm from the edge of the main plastic box in the centre of the underframe moulding. This will give the correct bogie centres of 150mm.

Again see photos below.



The four tongues that retained the bogies on the chassis block will need altering as they will prevent the bogie from moving up and down. Use a heavy duty piercing saw blade to remove the inner section of the semi circular tongues. It will create a bit of mess but the Mazac is pretty soft and easy to work. You will need to arrange something to prevent the bogies from falling out. I used small lengths of 3mm x 2mm L section brass fitted just below where the Mazac tongues were. You will need to file out the Mazac buttress that supported the tongues in order to do this. Epoxy will be fine to glue them on with. They will only ever take the weight of the bogies when the loco is lifted up.



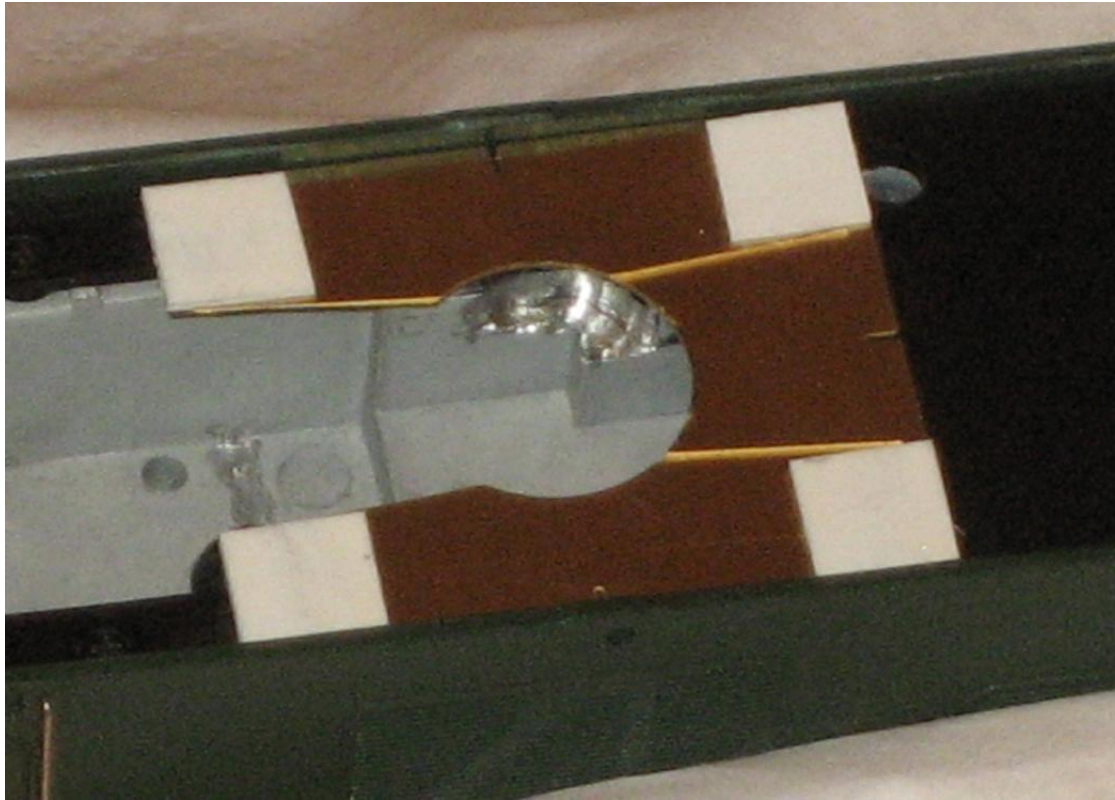
Bogie assembly

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

The secondary suspension springs and pins can be located in their guides. I have made no provision for retaining the pins in the bogie. 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 the springs need attention. 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.

The ride height can be adjusted via pads. I have deliberately made the springs slightly short as it makes things easier to adjust this way. 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 height. Make sure that each pad is the same thickness to ensure consistency.



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.

Sideframes

You will need to remove the centre section of the sideframes and the outer brake shoes from the Bachmann keeper plate. The outer brake shoe sections need splitting so that they can be widened for P4 wheels. Do this in the centre so there is as much material left as possible for gluing to the ends of the bogie. The cosmetic springs on the centre section of the sideframes will need removing and an amount of material will need removing to enable the sideframes to fit on the bogie. I used a couple of small burrs in a mini drill. You will need to be careful but there is enough material in the sideframes.



When gluing the various cosmetic parts to the etched bogie it is worth noting that the bottom of the centre sections should correspond with the bottom of the bogie at that point and the ends of the brake shoe parts should correspond with the spacing tongues on the end of the bogie.

Final assembly

Final assembly can now be done. Fit one of the bogies with its secondary suspension springs and pins into the chassis and rest on the workbench. Insert one of the drivetrains into the bogie locating the cardan shaft in place at the same time. Next comes the three handed part. You will need to turn everything upside down so you can fit the keeper plate to the drivetrain with the bogie in the middle. Once the keeper plate is in place nothing should move. This may not be easy but if you take it slowly then you will limit donations to the swear box. Repeat for the other bogie.

Once the bogies are in place the power feed wires can be connected up. 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 2016