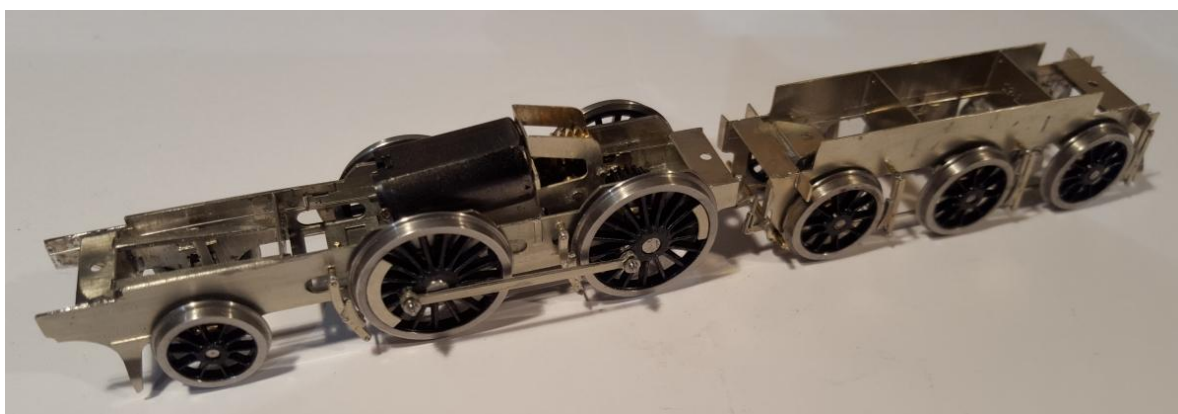


M&SWJR 2-4-0 Instructions

Intro

This chassis kit is designed to fit the M&SWJR 2-4-0 tender loco originally produced by Cotswold Models and now marketed by Nu-Cast Partners (South Eastern Finecast and Branchlines). It is intended as a modern replacement for the rather basic original and can be built in OO, EM or P4. It is designed to be sprung using CSBs, though can be built rigid if you wish.

The prototypes for the body kit are the locos rebuilt by the GWR in 1924 with standard No. 11 boilers from the originals which were delivered to the M&SWJR by Dubs & Co in 1894. The rebuilt locos were numbered 1334-36. 1334 & 1335 were withdrawn in September 1952 and 1336 in March 1954.



Suggested References

- Locomotive Kit Chassis Construction in 4mm by Iain Rice (Wild Swan)

There are many articles and books that cover steam loco chassis construction, but this is as good a place to start as any.

- Midland & South Western Junction Railway Volume 2 – Locomotives by Mike Barnsley (Wild Swan)

This contains pictures of each of the three prototypes in M&SWJR, GWR and BR days.

General Construction Notes

Please read the instructions carefully before commencing work. Beware sharp edges and make sure all connecting tags are carefully removed after each part has been taken from the fret.

There is little in the way of essential specialist tools that are required to build this chassis but a couple of tapered reamers or cutting broaches covering 1.4-1.6mm, 2-3mm and 3-4mm diameter holes would prove more than useful if you are building the chassis rigid. You will also need drill bits covering the range 0.4-1mm as well as, of course, your favourite soldering iron, flux and solder.

The loco is effectively arranged to be an 0-6-0 with the leading axle fitted to the frames like the driving wheels. The wheelbase is similar to a lot of conventional 0-6-0 locos and should present no practical problems.

For wheels you will need to use those closest to the prototype as there is no exact match. We would recommend using the following Alan Gibson wheels, especially if building the chassis sprung as these are what it is designed to use:

- 3'6" 10 spoke - leading wheel - *842
- 5'6" 17 spoke (MR Flatiron) - driving wheels - *866M
- 3'11" 10 spoke - tender wheels - *847

For OO and EM wheels replace the * in the code with a 4 (e.g. 4842) and for P4 replace the * with an S (e.g. S842).

If you wish to use Romford type wheels you will need 14mm wheels for the leading axle, 22mm for the drivers and 15.5-16mm for the tender.

If you wish to build the loco rigid you will need top hat bearings for the driving (1/8") and tender (2mm) wheels. Markits and Alan Gibson produce suitable components.

If you wish to build the loco sprung, you will need the following High Level bearings and hornguides:

- 4 pairs x 2mm Minibox
- 1 pair x 1/8" Standard hornblocks
- 1 pair x 1/8" SpaceSaver hornblocks (for the gearbox axle)

If you are building in P4 you can use 2 x 1/8" Standard hornblocks unless you are using a RoadRunner+ gearbox (see below).

The built in CSB plots use 0.012" wire for the loco and 0.010" for the tender. This wire is included with the chassis kit.

There are a few options for the gearbox and motor arrangement. I would thoroughly recommend the gearboxes marketed by High Level. If you're happy with having it horizontally in the firebox there is enough room for a Mashima 1020 motor or equivalent and you can either use a Road Runner mounted on the front axle or a RoadRunner+ off the rear axle (we used this arrangement on the test build). If you want the motor mounted vertically you can fit a Mashima 1015 with either a HiFlier mounted on the front axle or a RoadRunner on the rear. Whatever option you choose make sure the motor is mounted to avoid fouling the chassis and so that the ears on the sides of the gearbox can be removed so that the gearbox can fit inside the firebox.

If you are building the loco in OO and using High Level hornblocks then there is insufficient space to fit a RoadRunner+ gearbox, even with SpaceSaver bearings.

Both full thickness and half etched washers (10A and 10B) are provided to take out any side play in the axles. It is a good idea to allow for a little side play on the middle of the three axles on both loco and tender but try and reduce the amount on the front and rear to a minimum.

Important - All folds are through 90° with the fold line on the inside unless stated otherwise.

Some parts require half etched rivets pressing out. I use a gravity powered rivet embossing tool (as sold by London Road Models) with the part held against one of those ubiquitous green cutting mats that everyone seems to have.

Parts List - Loco

1a - Left side main frame
1b - Right side main frame

All frame spacers in OO, EM & P4
2 - Frame spacer - Front
3 - Frame spacer - Motion bracket
4 - Frame spacer - Body fixing bracket (optional)
5 - Frame spacer - Keeper plate front
6 - Frame spacer - Rear

7 - Slidebars (parts on tender fret)

8a - Leading wheelset spring carriers
8b - Driving wheel spring carriers (Standard High Level hornblocks)
8c - Driving wheel spring carriers (SpaceSaver High Level hornblocks)

9 - Coupling rods

10a - 1/8" inside diameter washers (driving wheels)
10b - 2mm inside diameter washers (leading wheels)

11 - Keeper plate (OO, EM & P4 versions)
12a - Inside spring overlay
12b - Outside spring overlay
13 - Ashpan sides - Left and right hand
14 - Ashpan spacing washer

15a - Left side main frame overlay
15b - Right side main frame overlay

16 - Brake shoes
17 - Brake pull rods & crank overlays
18 - Vacuum brake link

19 - Balance weights

20 - Romford axle nut covers

Parts List - Tender

21a - Left side tender frame

21b - Right side tender frame

All frame spacers in OO, EM & P4

22 - Frame spacer - Front

23 - Frame spacer - Middle (2 sets both the same)

24 - Frame spacer - Rear

25 - Tender wheel spring carriers

26 - 2mm inside diameter washers

27 - Brake shoes

28 - Brake pull rods & crank overlays

29a - Brake shaft crank - Handbrake

29b - Brake shaft crank - Vacuum

Parts List - Additional Parts (all on tender fret)

A - Lamp irons - Loco running plate

B - Lamp irons - Smokebox top & tender rear top

C - Lamp irons - Tender buffer beam

D - Coupling hooks

Materials List:

You will need a few items in addition to those outlined above. Eileen's Emporium are a good source for these though they can be had from elsewhere.

Wire

0.4mm (dummy loco springs and keeper plate)

0.5mm (brakes)

0.8mm (compensating beam for leading axle if building rigid)

1mm wire (brake cross shaft)

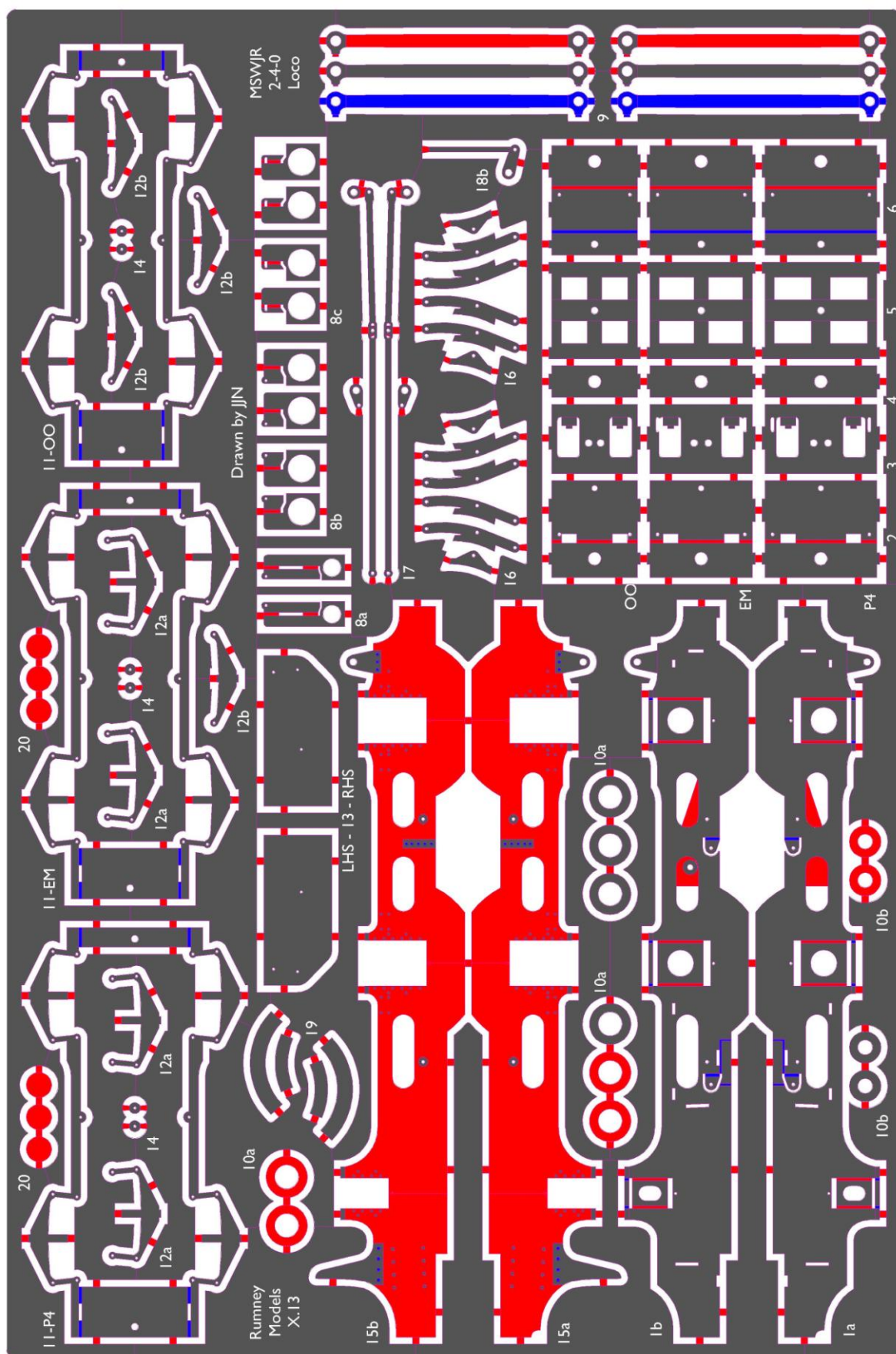
Tube

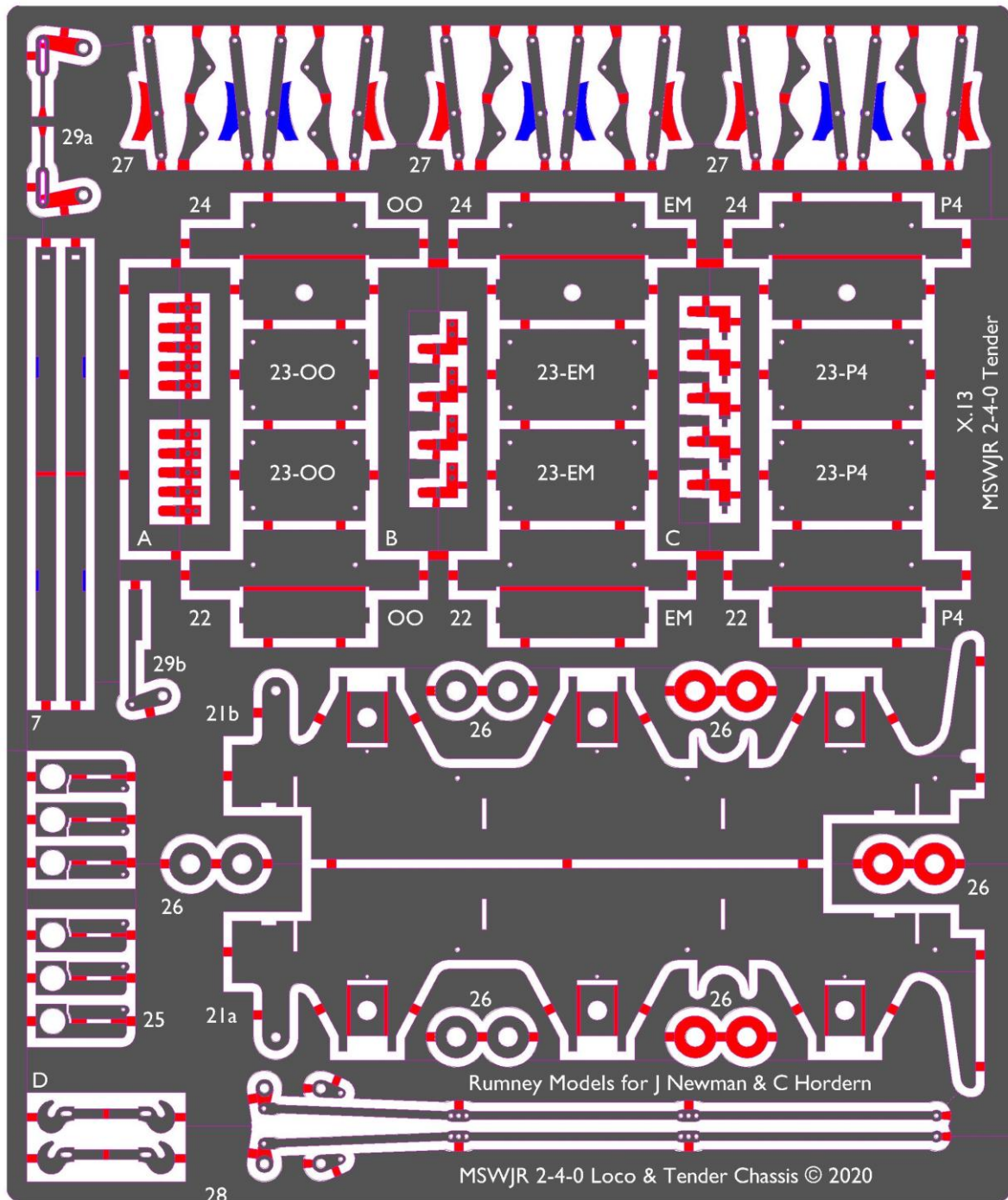
1mm x 0.5mm (brake shoe spacers if making sprung)

Bolts

10BA (loco body fixing)

14BA (keeper plate)

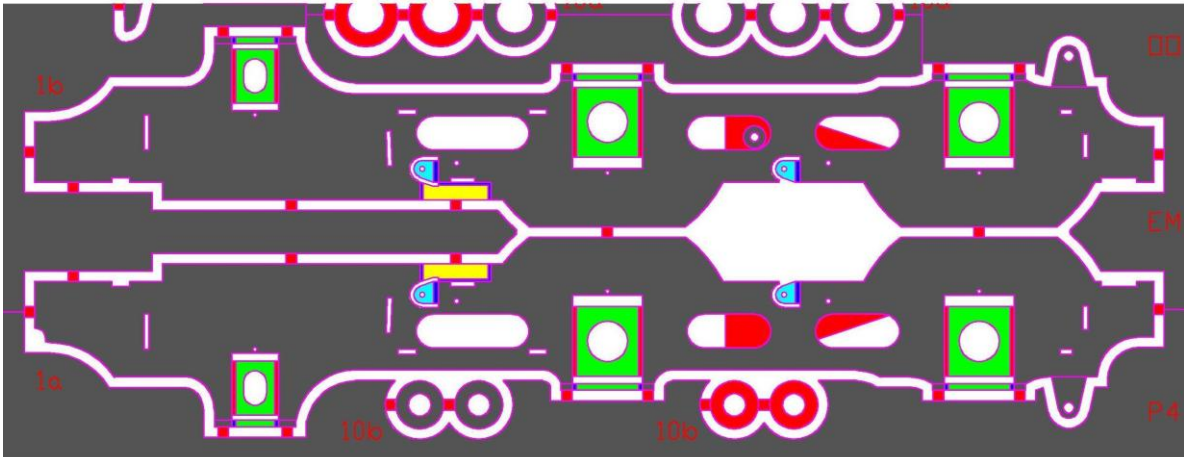




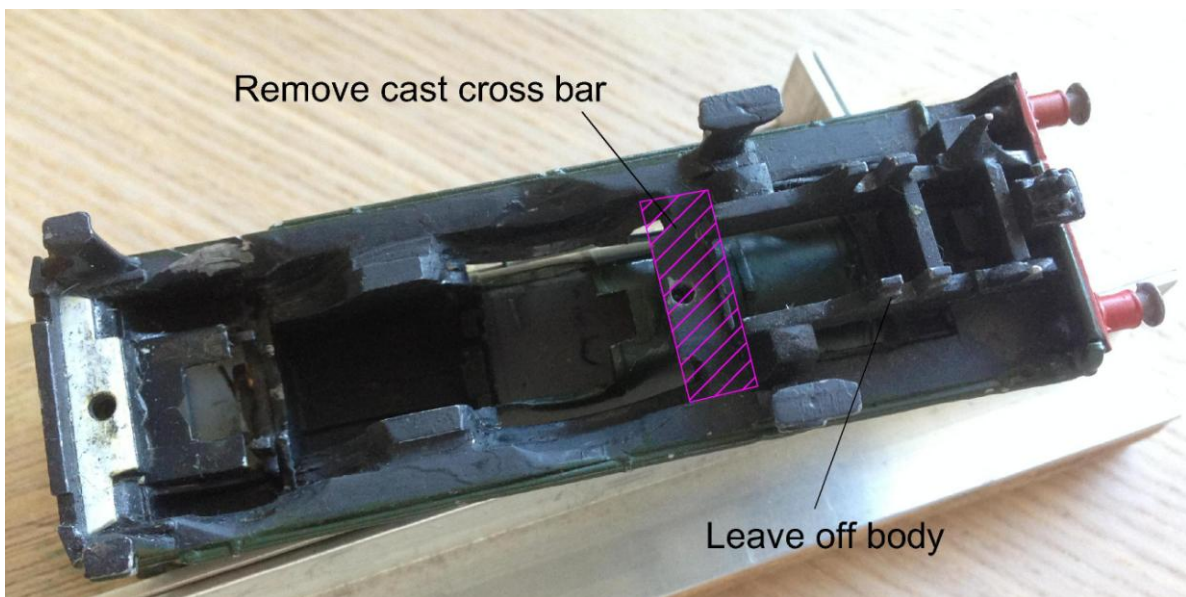
Loco Chassis Instructions

Remove the right (1a) and left (1b) side main frames for the fret. If building rigid check the fit of the top hat bearings in the axle holes. Adjust as necessary using a tapered reamer to provide a good fit and solder in place. If building sprung remove the areas around the axle holes/slot using the half etched lines as a guide and clean up with a file; these are the parts shaded green on Fig. 1.

Fig. 1



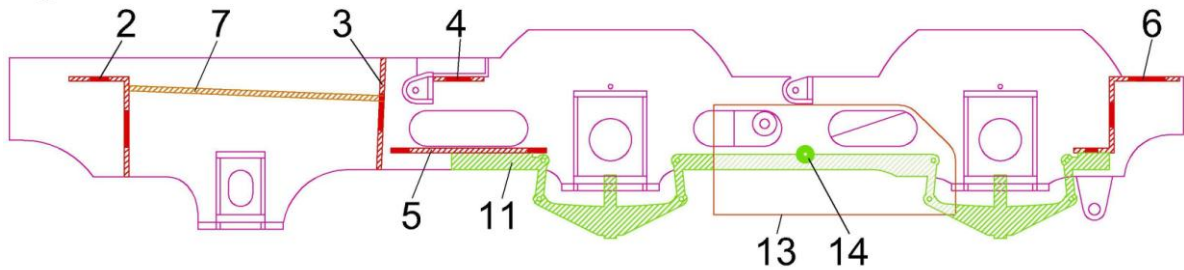
As it comes, there is a completely un-prototypical bar across the running plate on the loco body which is used to locate the original chassis. See photo below. I would thoroughly recommend removing this and arranging a new fixing bolt for the chassis in the smokebox, there is a hole in the front frame spacer to allow you to do this. You will also need to leave off the cast front frames (parts 48 and 49 in the original kit) from the body but remove the sandboxes for refitting onto the new chassis. If you want to keep this cross bar then you will need to remove the two areas shaded yellow in Fig. 1, however this will leave the chassis slightly weak in this area so I wouldn't remove them until the frame spacers have been fitted. The half etched detail overlays should then help stiffen things up.



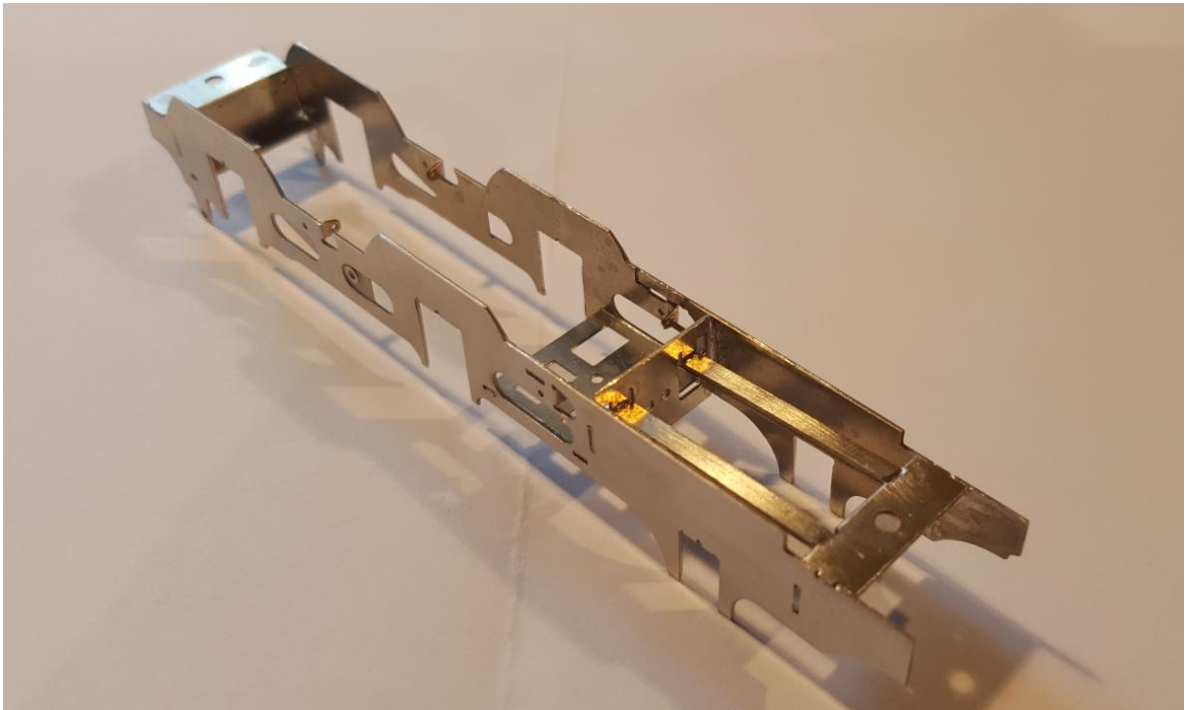
If building the chassis sprung fold out the four fulcrum points for the CSB wire and reinforce the fold lines with solder, these are the parts shaded light blue in Fig. 1.

Remove the frame spacers (2-6) from the fret. Fold up spacers 2 and 6 making sure that each fold is at 90°. Only use spacer 4 if you want to keep the cross bar on the cast loco running plate as mentioned above. Use the tabs and slots provided to locate spacers 2 and 5 onto the right side main frame (1a) and solder in place. Locate spacers 3, 4 (if using) and 6 onto the left side frame (1b) and solder in place. Make sure that spacer 3 is the correct way up when doing this, the two holes in the centre are slightly offset from the centre and should be towards the bottom of the chassis when fitted. Alternatively, the two supports for the slidebars in the main cut outs should be towards the top. Next solder the two halves of the chassis together making sure everything is square.

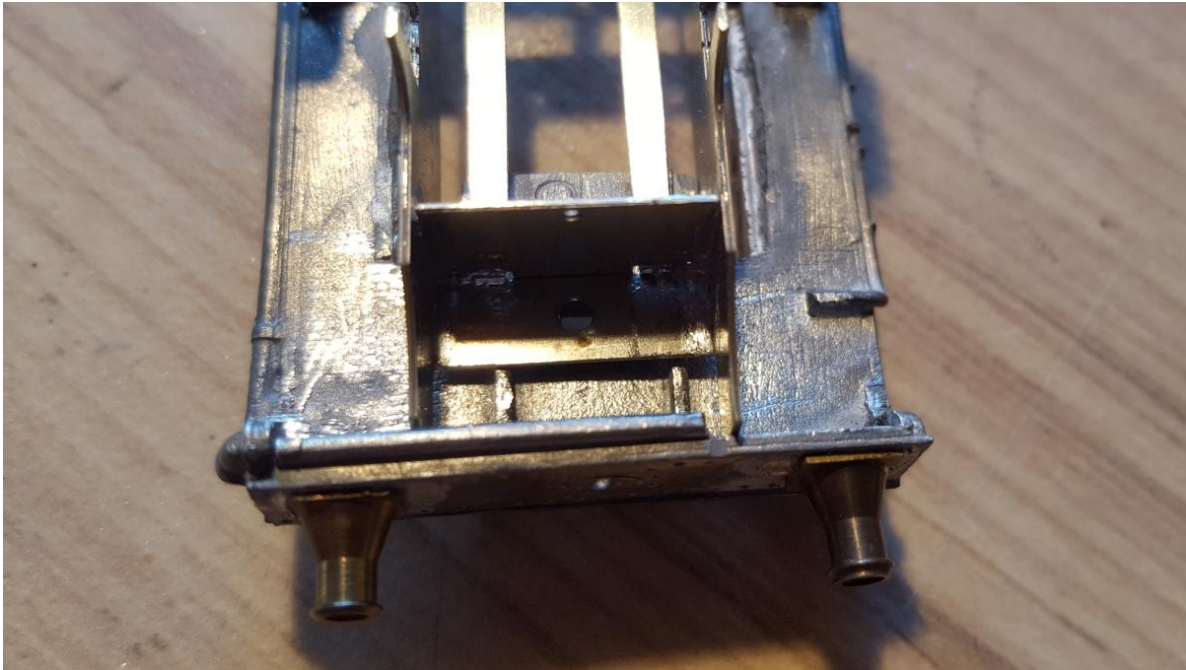
Fig. 2



I haven't made provision for cosmetic valve gear save for including a couple of slidebars (7). These are intended to simply fill up some of the space between the frames where it's most visible. Remove from the fret, fold each one double about the centre with the fold line on the outside and solder the two halves together. Note that at one end there is a small slot in one side of the slidebar. This is designed to engage with a tab on frame spacer 3. Feed the slidebars through the slots in spacer 2 making sure that the small slots in the slidebars will engage with the tabs on the slidebar supports on spacer 3. Solder in place.



Test fit the chassis to the footplate. You will need to file away the ridges under the smokebox against which parts 48 and 49 of the original kit sit.



Coupling rods

There are three layers to the coupling rods (9). One set is of full thickness and the other two are detail layers to go on either side of the full thickness set. Note that the rear set are completely half etched and the front layer have full thickness bosses with the rest half etched. They should be laminated using the holes for the crankpins to align them and then soldering together. Make sure the crankpin holes can accept the crankpins that you are using but with as little slop as possible. Use a suitably sized tapered reamer to do this.



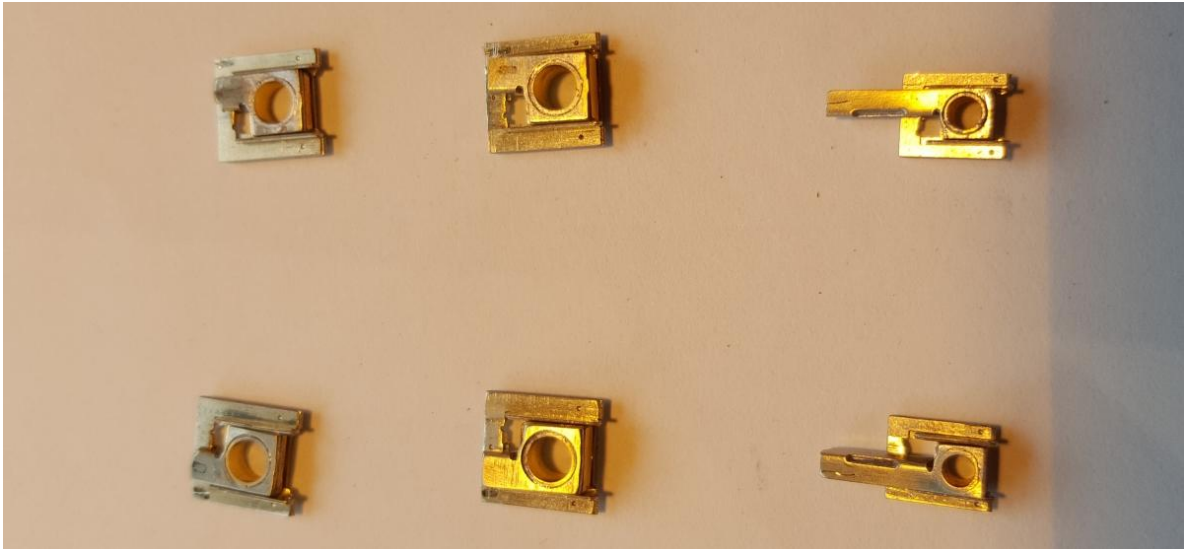
High Level Hornblocks

If you are building the chassis sprung then now is a good time to fit the High Level hornguides and assemble the spring carriers on the bearings.

Fold up the High Level hornguides and check the fit of the bearings as per the instructions. They can be fitted to the chassis using a jig and the coupling rods or you can use the small holes situated just above cut outs in the main frames to help align them. The small tabs on the hornguides should go up against the top of the cut out. Once in place make sure you find a way of labelling the bearings so that they go back in the same place if removed. This is important as swapping them about might cause running issues.

There are three sets of spring carriers for the loco, 8a for the leading wheel set, 8b for the driving wheels fitted with Standard hornblocks and 8c for driving wheels fitted with SpaceSaver hornblocks. Check the fit of the bearings in the holes in the spring carriers and adjust with a tapered reamer if required. Make sure the backs of the bearings are a good fit in the holes. Remove the appropriate spring carriers from the fret and fold up the tabs.

Make sure they are at 90° and reinforce the fold lines with solder. Solder the bearings to the spring carriers. Put to one side for the moment making sure you know which bearing goes where.



Testing the Chassis

Now is a good time to test the running chassis. You will need to fit the wheels with washers to take out any sideplay on the leading and rear driving axle, both 1/8" (10a) and 2mm (10b) washers are included to do this. If you are building the chassis rigid then there is a slot for the leading axle. This is to allow for any discrepancies in wheel diameter but you will need to find a way of keeping the leading wheels firmly on the track. There is a hole etched in the bottom of the front spacer (2) to arrange for a compensating beam made from 0.8mm wire. This should be soldered in place and bear on the leading axle so that all wheels are in contact with the rails.

If building the chassis rigid and you don't want to remove the wheels again you may want to leave this stage until the cosmetic sideframes are fitted though it will make it a bit harder to tweak things.

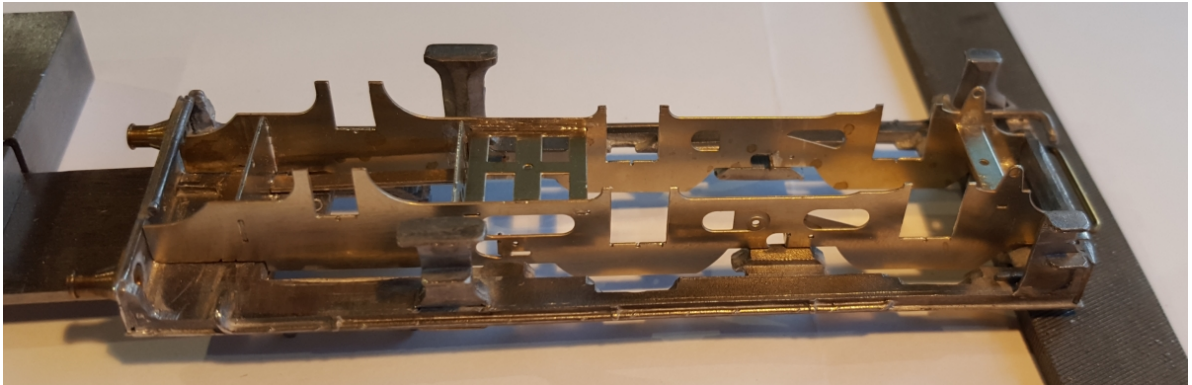
If building the chassis sprung then fit the bearings and spring carriers to the axles along with any spacing washers to take out side play and the gearbox and insert into the horn guides. Cut the 0.012" spring wire into two 95mm pieces and thread through the holes in spacers 2 and 6 along with the four fulcrum point tabs and through the holes in the spring carriers. When the body is fitted the wire will be retained by the loco buffer beams. Fit the wheels making sure the bearings go in their correct horn guide. Check the wheel quartering to make sure you have a nice smooth running chassis. If you need to adjust any of the horn guides now is the time to do so.

Also at this point you should test fit the chassis to the footplate/body. When fitting the chassis with the motor up to the body you will need to:

- a) File down the outer edges of the motor mounting holes on the gearbox so it fits through the gap in the footplate.
- b) File away the inside wall of the firebox for similar reasons. The casting is quite thick and there is sufficient room to get the motor in.
- c) File back the openings for the wheels and splasher locations, if building in EM/P4.

You may also find that the tops of the coupling rods catch the underside of the running plate. If this happens grind away the running plate at the point where the coupling rods hit to create some clearance.

When you are happy remove the wheels and put to one side while you finish the chassis.

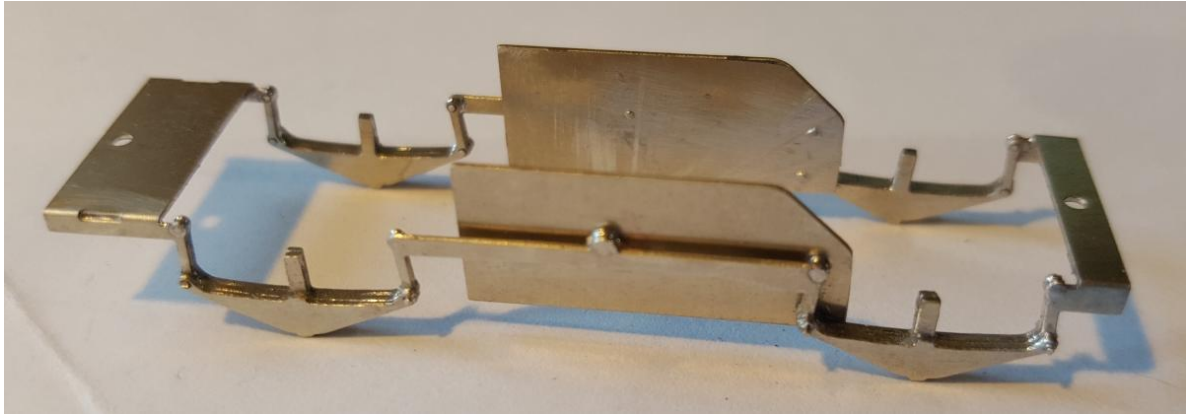


Keeper Plate

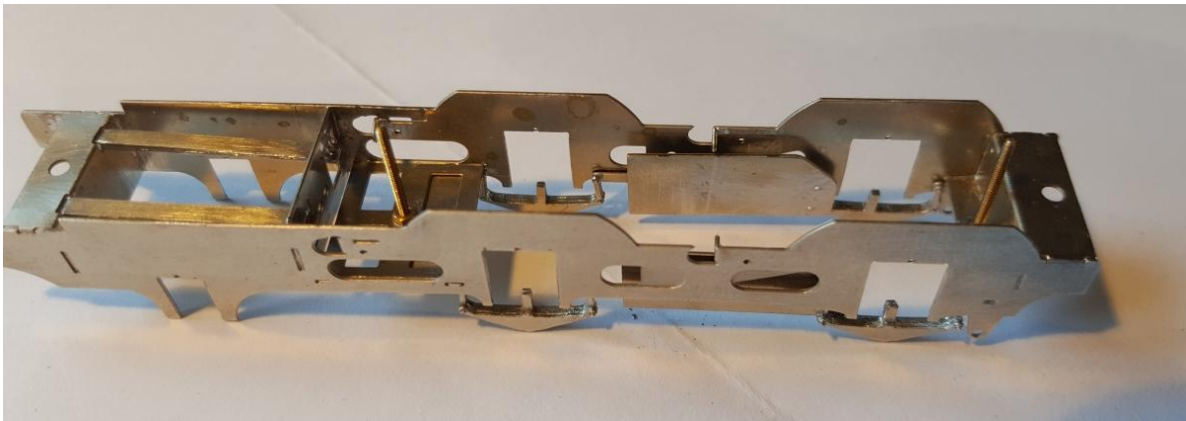
Remove parts 12a, 12b and 14 from inside part 11 then remove the correct keeper plate (11) for your chosen gauge. There are two types of spring overlay included one which goes on the inside (or the side with the fold lines) of the keeper plate (12a) and one which goes on the outside (or the side without the fold lines) of the keeper plate (12b). Springs on the real things were usually 4" deep so these overlays will help provide a bit of depth and the inside ones will help space the ashpan. Make sure all the holes can accept 0.4mm wire and then use 0.4mm wire through the various holes to align the spring overlays and solder in place. You may find it easier if these are assembled in the flat before folding up the keeper plate. Solder the ashpan washer (14) in place using the 0.4mm wire through the remaining hole to align it (if in doubt see Fig. 2 above). Then fit the ashpan sides (13) to the inside. There are right and left hand versions. This basically means that the ends of the ashpan with the chamfer in one corner go towards the end of the keeper plate with the narrower spacer. Use the holes and 0.4mm wire to align things and solder in place. Once fitted all the wire in the holes can be trimmed to represent bolt heads.



Carefully fold up the sides making sure they are at 90° in all four corners and reinforce the fold lines with solder.

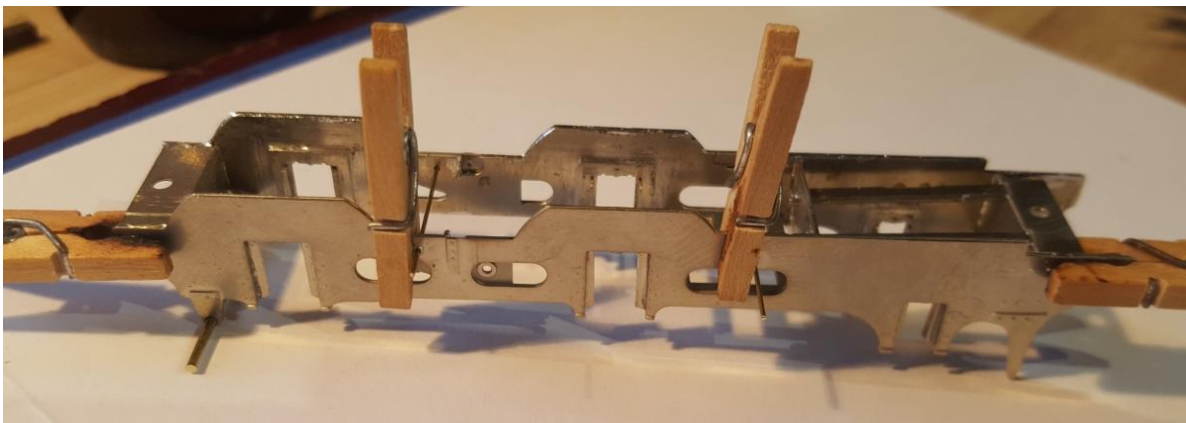


Fit to the chassis using 14BA nuts and bolts. The deeper spacer goes towards the front and fits onto spacer 5. The nuts should go above the frame spacers and be soldered in place. The keeper plate can now be easily removed by unscrewing the bolts.



Cosmetic sideframes

There are left (15a) and right (15b) side main frame overlays included which can now be fitted. Remove from the fret and press out all the half etched rivets. Use 0.5mm wire through the holes for the brake shoes and 1mm wire through the holes for the brake shaft to align the overlays on the main frames and then solder in place. Make sure the wire doesn't get soldered in place whilst doing this. Bend the guard irons at the front to align with the wheel treads.



Brakegear

The brake shoes (16) come in three parts, two full length layers and a small shoe only layer. They should be laminated together with the small brake shoe layer on the outside. Make sure the holes can accept 0.5mm wire and remove from the fret. Use lengths of 0.5mm wire through the holes to align the layers (this is easily done by drilling holes in a block of wood to use as a jig for the wire) and solder together but make sure that the wire is only soldered in place in the brake shoe hole. This piece of wire can be trimmed to represent a bolt.



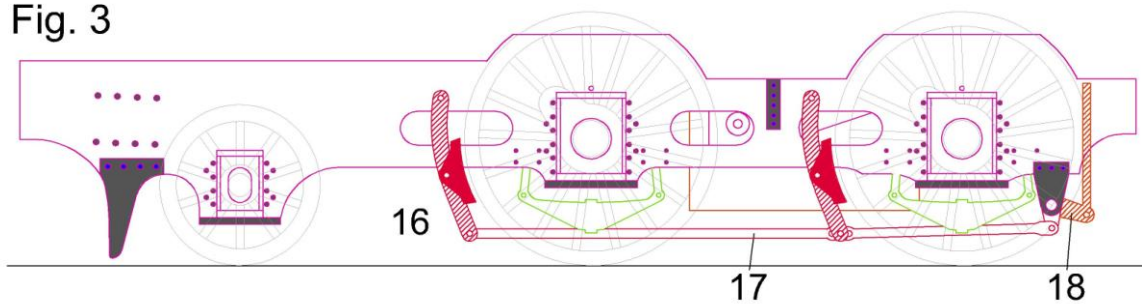
Make sure that the smaller holes in the brake pull rods and crank overlays (17) can accept 0.5mm and the larger ones 1mm wire then remove from the fret. Solder the crank overlay in place on the back of the pull rods (the side with no half etched detail) using 0.5mm wire in the smaller of the holes to align them. Trim the wire to represent a bolt.

The vacuum brake link (18) needs to be made up. This is a single layer but you should solder a piece of 0.5mm wire into the smaller hole and trim to represent a bolt. Make sure that the larger holes in the links can accept 1mm wire.

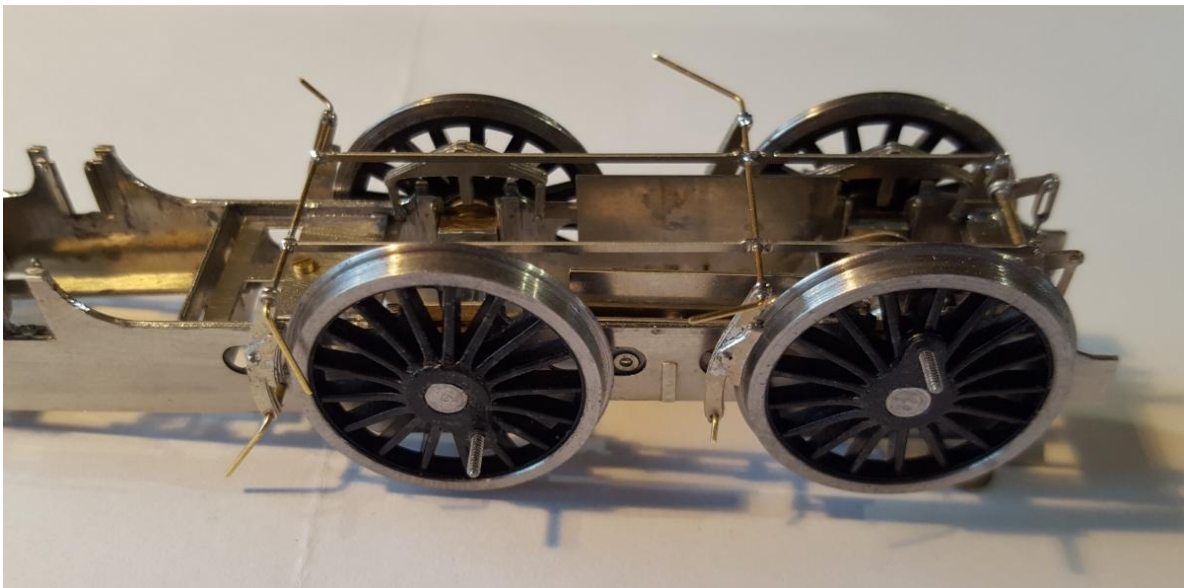


Next we need to fit the brakegear. Refer to Fig. 3 below as you go along. If you are building the chassis rigid then you will need to have fitted the wheels before the brakegear goes on. If you are building the chassis sprung refit the driving wheels and keeper plate.

Fig. 3



For rigid chassis fit lengths of 0.5mm wire through the holes in the main frames and solder in place leaving the wire proud of the wheels. Fit the brake shoes in place making sure that the brake shoe overlay is on the outside. Thread another 2 pieces of wire through the holes in the bottom of the brake shoes connecting with the brake shoes on the other side. Whilst doing this fit the brake pull rods in place. These go behind the wheels and the driving wheel springs. The wire should go through the centre of the three holes that line up with the rear set of brake shoes. Next fit the main brake shaft using 1mm wire. This goes through the brackets on the mainframes and the cranks attached to the pull rods. Whilst doing this add the vacuum brake link which is fitted along the centre line of the loco. You can put bends in the ends of the wire to help hold everything in place.



Once you are happy with where everything is and that the brake shoes are aligned with the edge of the wheels solder everything in place. You can then trim and tidy up the wire between the main frames and the outside of the brakegear.

For sprung chassis you will need to arrange for the brakes to be removable in order to get the keeper plate off and drop the wheels out. The simplest way of doing this is to fit spacers made from 1mm x 0.5mm tube between the brake shoes and the frames. Wire can be soldered inside these tubes and pass through the main frames to form a pin. When everything is soldered in place the brake shoes can be prised apart a little to release the pins and brakegear. The brakegear can pivot about the brake cross shaft.

Fit a couple of long pieces of 0.5mm wire through the holes in the frames for the brake shoes. Cut four pieces of 1mm x 0.5mm tube so that the brake shoes are in line with the edge of the wheels when the tube is placed between them and the frames. The tubes will need to be 1.5mm for P4 and 1.75mm for EM/OO. Fit the tube and brake shoes in place.

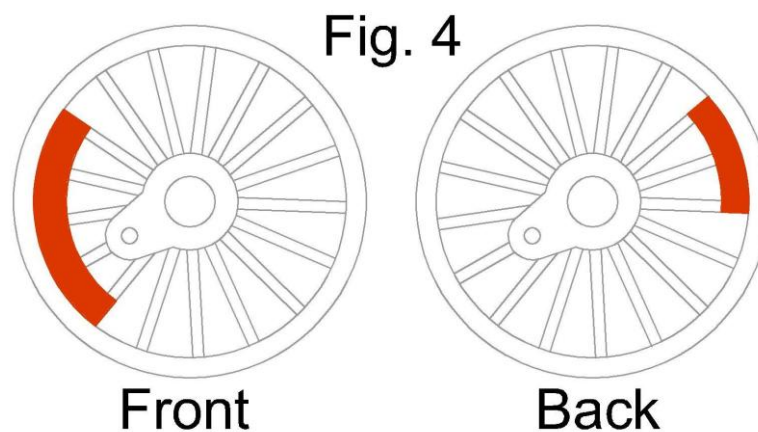
Thread another 2 pieces of wire through the holes in the bottom of the brake shoes connecting with the brake shoes on the other side. Whilst doing this fit the brake pull rods (17) in place. These go behind the wheels and the driving wheel springs.

The wire should go through the centre of the three holes that line up with the rear set of brake shoes. Next fit the main brake shaft using 1mm wire. This goes through the brackets on the mainframes and the cranks attached to the pull rods. Whilst doing this add the vacuum brake link (18b) which is fitted along the centre line of the loco.

Solder the tubes and the top wires to the brake shoes only and then solder the bottom wires to the brake shoes. Solder the brake shaft to the main frames and the brake links to the brake shaft and main frames leaving the pull rod cranks free. You can then trim and tidy up the wire crossing between the main frames and the outside of the brakegear.

Final Bits

The balance weights (19) should be fitted. Refer to Fig. 4 below for the correct arrangement.



Romford axle nut covers (20) are included for fitting if using that type of wheel.



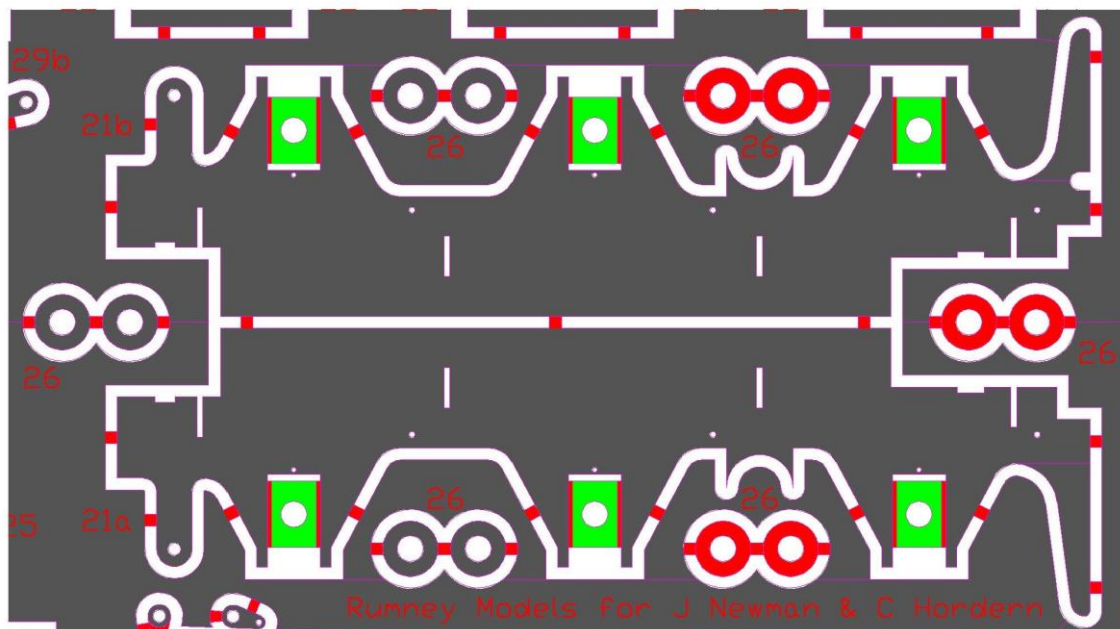
If you are building the loco sprung you will need to arrange some sort of stay to prevent the gearbox rotating as a result of the torque from the motor. There are various arrangements that can be used but the basic idea is that the motor is free to move up and down a little with the springing but not rotate. The image opposite shows the arrangement used on the test build.

Finally you will need to arrange for some pickups. There is sufficient room for pickups made from thin wire (I use 33swg phosphor bronze) either acting on the rear or the edge of the flange above the main frames and beneath the splashers. Put a couple of turns in them around something like a 1 or 1.5mm drill bit to give the wire a bit of spring. Fixing points can be arranged using thin printed circuit board attached to the inside of the main frames. Eileen's Emporium sell printed circuit board that is 0.25mm thick and ideal for the job. Alternatively the wire can be made to bear on the edge of the flanges beneath the brake pull rods and fixing points arranged on the keeper plate.

Tender Chassis Instructions

Remove the right (21a) and left (21b) side tender frames for the fret. If building rigid check the fit of the top hat bearings in the axle holes. Adjust as necessary using a tapered reamer to provide a good fit and solder in place. If building sprung remove the areas around the axle holes/slot using the half etched lines as a guide and clean up with a file, these are the parts shaded green on Fig. 5. Use the half etched line as a guide.

Fig. 5

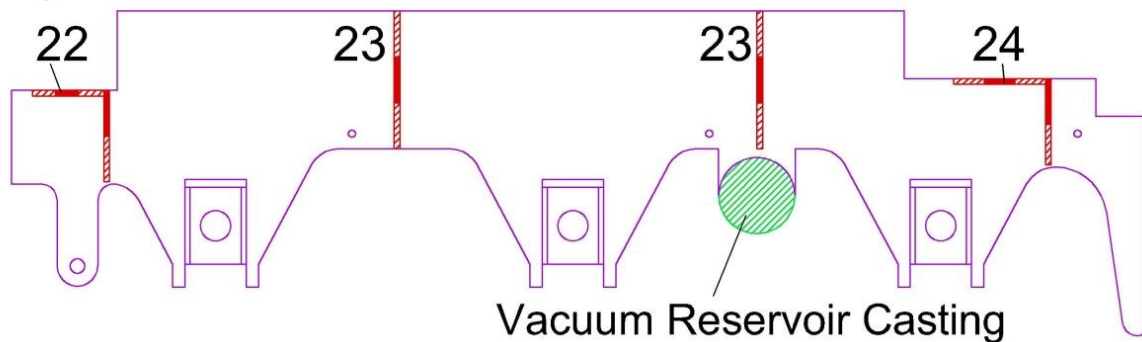


If building a tender without guard irons then remove them now flush with the bottom of the rear buffer beam. Note – it would appear that despite drawings showing guard irons on the tenders only the tender to M&SWJR No 11 appears to have had guard irons fitted. Photos of Nos 10 and 12 do not show them. It also seems to be the case that post grouping (possibly when the engines were Swindonised) the tender for No 11 (renumbered 1335) was attached to ex M&SWJR No 10 (1334) until at least the mid 1920s as pictures of this locomotive show the tender has having guard irons.

Remove the frame spacers (22-24) from the fret. Refer to Fig. 6 below as you go along. Fold up spacers 22 and 24 making sure that the fold is at 90°. Use the tabs and slots provided to locate spacers 22 and one of 23 onto the right side tender frame (21a) and solder in place. The spacer 23 on the right side tender frame should go towards the rear (i.e. the end with the guard irons). Locate the other spacer 23 and spacer 24 onto the left side frame (21b) and solder in place. The spacer 23 on the left side tender frame should go towards the

front (i.e. the end with the brake shaft bracket). Spacers 23 are symmetrical so either way up is fine. Next solder the two halves of the chassis together making sure everything is square.

Fig. 6

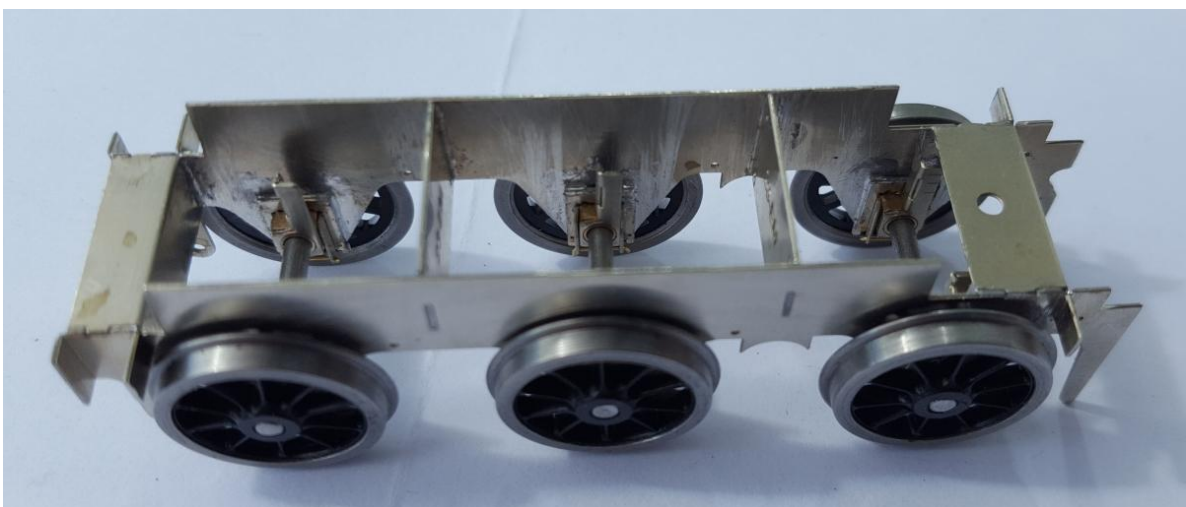


High Level Hornblocks

If you are building the chassis sprung then now is a good time to fit the High Level hornguides and assemble the spring carriers on the bearings.

Fold up the High Level hornguides and check the fit of the bearings as per the instructions. They are probably best fitted to the chassis using a jig but you can also use the small holes etched above the axle slots to align things. Use 0.4mm wire through the holes and those at the top of the High Level hornguides. Once in place make sure you find a way of labelling the bearings so that they go back in the same place if removed. This is important as swapping them about might cause running issues. If using a jig the distance between the front and centre axles is 23.3mm and that between the centre and rear axle 24mm.

Next fit the tender wheel spring carriers (25) as per the loco. Check the fit of the bearings in the holes in the spring carriers and adjust with a tapered reamer if required. Make sure the backs of the bearings are a good fit in the holes. Remove the spring carriers from the fret and fold up the tabs. Make sure they are at 90° and reinforce the fold lines with solder. Solder the bearings to the spring carriers.



You will need to fit the wheels with washers to take out any sideplay on the leading and rear driving axle, 2mm washers (26) are included to do this. If you are building the chassis sprung you can retain the axles by fitting small lengths of wire through the holes provided in the horn guides. If you remove them at any point do make sure you know which bearing goes where.

Test fit the chassis to your tender and if necessary make provision for mounting points. It may be necessary to file away some, or all, of the raised white metal U shaped casting on the inside of the front beam of the tender to allow the chassis to fit.

Brakegear

The brake shoes (27) come in four parts, two full length layers and two small shoe only layers. They should be laminated together with the brake shoe layer between the full length layers. If you want you can just use the one brake shoe layer. Make sure the holes can accept 0.5mm wire and remove from the fret. Use lengths of 0.5mm wire through the holes to align the layers and solder together but make sure that the wire is only soldered in place in the brake shoe hole. This piece of wire can be trimmed to represent a bolt.

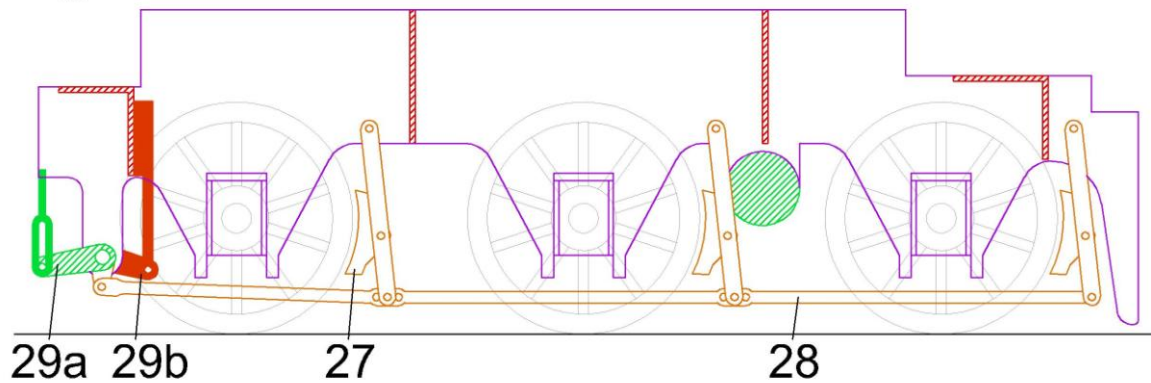
Make sure that the smaller holes in the brake pull rods and crank overlays (28) can accept 0.5mm and the larger ones 1mm wire then remove from the fret. Solder the crank overlay in place on the back of the pull rods (the side with no half etched detail) using 0.5mm wire in the smaller of the holes to align them. Trim the wire to represent a bolt.

The two brake links need to be made up. Check that the smaller holes in both the handbrake link (29a) and vacuum brake link (29b) can accept 0.5mm wire and the larger ones 1mm. Remove the handbrake links from the fret. They need to be soldered together so that the side with no half etched detail on are against each other. Use a short length of 0.5mm wire to align them and trim to represent a bolt once everything is soldered together. Next make up the vacuum brake link. This is a single layer but you should solder a piece of 0.5mm wire into the smaller hole and trim to represent a bolt.



Next we need to fit the brakegear. Refer to Fig. 7 below as you go along. If you are building the chassis rigid then you will need to have fitted the wheels before the brakegear goes on.

Fig. 7



For rigid chassis fit lengths of 0.5mm wire through the holes in the main frames and solder in place leaving the wire proud of the wheels. Fit the brake shoes in place. Thread another 2 pieces of wire through the holes in the bottom of the brake shoes connecting with the brake shoes on the other side. Whilst doing this fit the brake pull rods (28) in place. These go behind the wheels but on the outside of the brake shaft bracket. The wire should go through the centre of the three holes that line up with the front and centre set of brake shoes. Next fit the main brake shaft using 1mm wire. This goes through the brackets on the mainframes and the cranks attached to the pull rods. Whilst doing this add the vacuum brake link (29b) which is fitted along the centre line of the tender and the handbrake link (29a) which goes on the left hand side of the tender but inside the brake shaft bracket. It should line up with the brake column on the tender footplate.

Once you are happy with where everything is and that the brake shoes are aligned with the edge of the wheels solder everything in place. You can then trim and tidy up the wire between the main frames and the outside of the brakegear.



For sprung chassis you will need to arrange for the brakes to be removable in order to drop the wheels out. The simplest way of doing this is to fit spacers made from 1mm x 0.5mm tube between the brake shoes and the frames as per the loco. Wire can be soldered inside these tubes and pass through the main frames to form a pin. When everything is soldered in place the brake shoes can be prised apart a little to release the pins and brakegear. The brakegear can pivot about the brake cross shaft.

Fit a couple of long pieces of 0.5mm wire through the holes in the frames for the brake shoes. Cut six pieces of 1mm x 0.5mm tube so that the brake shoes are in line with the edge of the wheels when the tube is placed between them and the frames. The tubes will need to be 1.7mm long for all three gauges. Fit the tube and brake shoes in place. Thread another 2 pieces of wire through the holes in the bottom of the brake shoes connecting with the brake shoes on the other side. Whilst doing this fit the brake pull rods (28) in place. These go behind the wheels and the driving wheel springs. The wire should go through the centre of the three holes that line up with the rear set of brake shoes. Next fit the main brake shaft using 1mm wire. This goes through the brackets on the mainframes and the cranks attached to the pull rods. Whilst doing this add the vacuum brake link (29b) which is fitted along the centre line of the tender and the handbrake link (29a) which goes on the left hand side of the tender but inside the brake shaft bracket. It should line up with the brake column on the tender footplate.

Solder the tubes and the top wires to the brake shoes only and then solder the bottom wires to the brake shoes. Solder the brake shaft to the main frames and the brake links to the brake shaft and main frames leaving the pull rod cranks free. You can then trim and tidy up the wire crossing between the main frames and the outside of the brakegear.

Vacuum Cylinder Reservoir

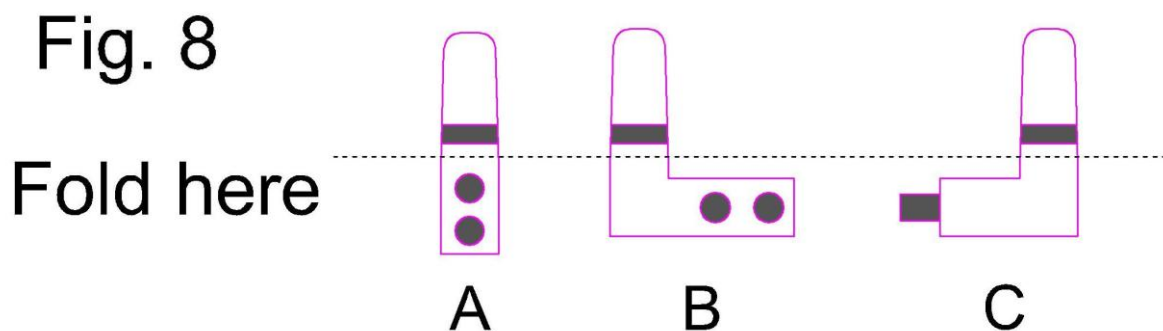
Finally you can fit the vacuum reservoir casting. There is bracket on the frames to help fit it. Refer to Fig. 6 above if in doubt.

Detailing Parts Instructions

There are a few different types of lamp iron included to finish off the model. The list below gives details of where each type is fitted:

- A - Loco running plate
- B - Smokebox top & tender rear top
- C - Tender buffer beam

Refer to pictures of the prototype for the exact locations for each lamp iron. They will need folding up before fitting, refer to Fig. 8 below. The tender buffer beam lamp irons will need to be located into a 0.5mm hole drilled into the buffer beam. You may need to shape the locating spigot on the lamp iron to get a good fit.



Finally there is a pair of coupling hooks (D) to use on the loco and tender if you wish. These are designed to be folded double about the half etched line in the centre of each coupling and soldered together. The fold should be made with the fold line on the outside. Once soldered together they can be shaped with a file to smooth off the edges.

Justin Newitt - February 2020