

Heljan/Hattons Garratt

Converting the Heljan/Hattons Garratt to EM Gauge.

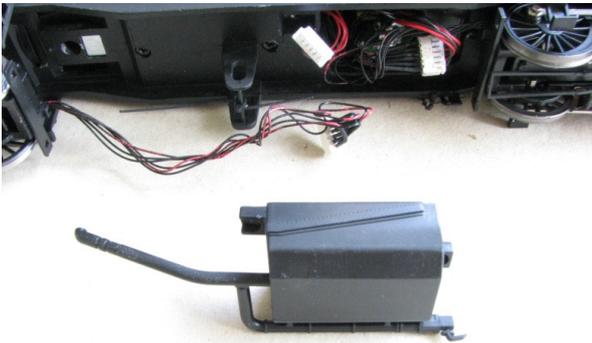


This is an account of converting this beastie. It is not a project for the faint of heart, nor the beginner....

Unlike most locos which are screwed together, and therefore unscrew into a kit of parts relatively easily, this wonder has an awful lot of glued components that have to be persuaded to part company with each other....

Anyway, let battle commence!

With the whole loco upside down, the first thing was to split the engine units away from the boiler unit. The myriad of wires from each engine unit all disappear into the ash pan underneath the cab. This actually has screws, so is an easy job to undo the two screws and remove.

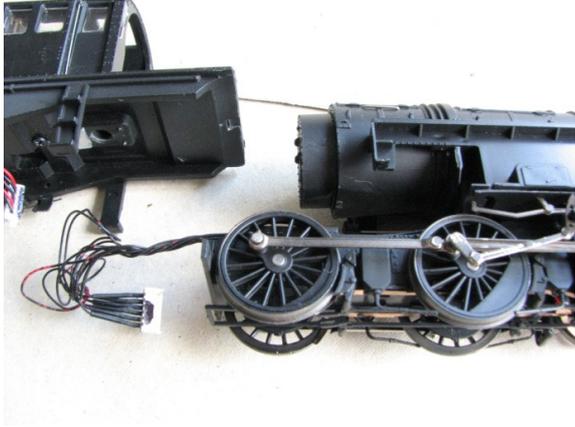


Once removed, two sets of multi pin plugs are revealed, and before unplugging these, it is a good idea to mark one pair for future reference. I used a permanent marker to do this that hopefully would not rub off. Hornby actually sell a simple tweezer like tool for gripping these plugs if you find these hard to deal with. Whatever you do, pull the plug itself, not the wires.



Hornby plug removal tool.

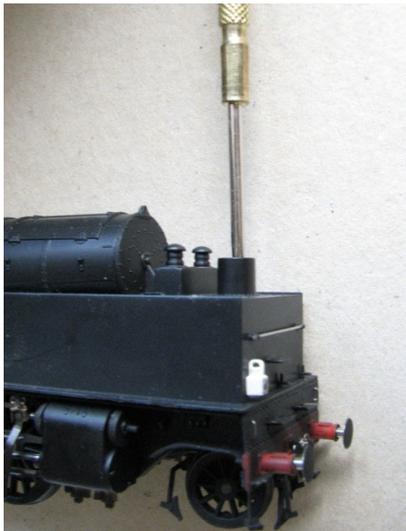
The engine units will then simply pull apart, magnets at the pivot points are all that hold the three units together.



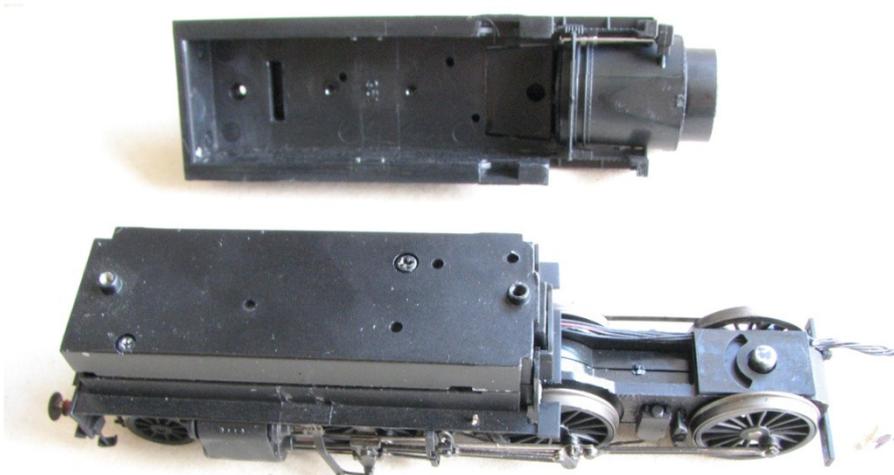
Separating the engine/boiler units.

Pick one engine unit to start the dismantling process. It matters not which, because under the front and rear bodies, both units are mechanically identical.

Both the rear bunker and the front water tank are removed in the same way. If it hasn't already fallen off, remove the water filler cap, and this reveals the screw that retains the bodywork. Remove this, and then gently tug the upper works away from the chassis...it is a bit of a shrink wrapped fit!

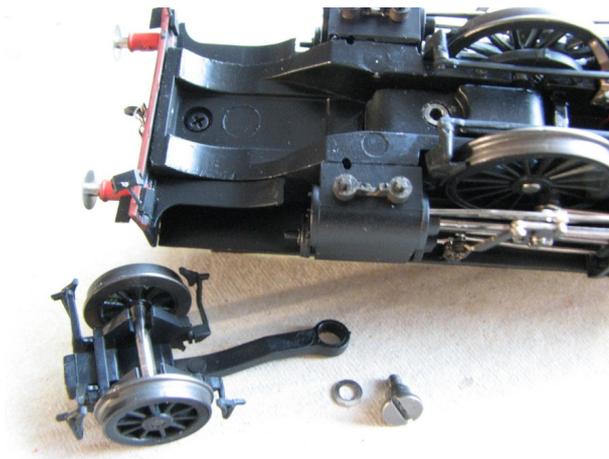


Remove body retaining screw



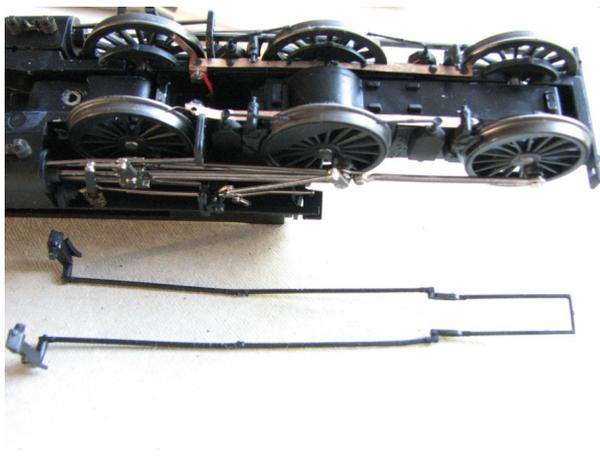
Body removed.

Next stage is to invert the engine unit, and remove the pony truck by undoing the large pivot screw. Lift away the pony truck and recover the small washer that sits between the pony truck and chassis. Store these safely until we need them later. I find little snap top poly bags ideal for this....and obtain them from that well known auction site.

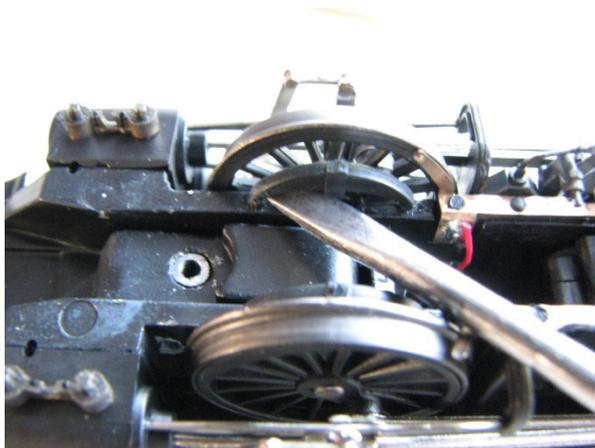


Now the real demolition begins.

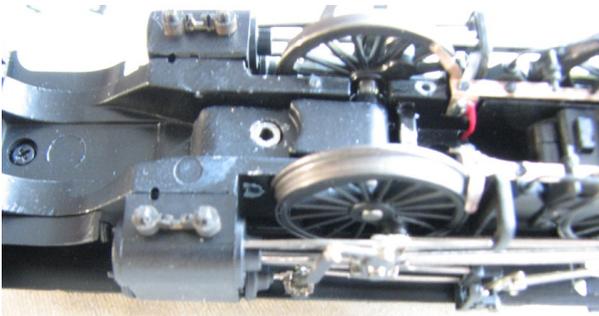
Brake rodding is removed next; this is all glued, so it's a gentle tug on the various joints to release.



Now for the leading springs, again glued over the axle slot. It requires a fair bit of leverage with a screwdriver. Try to exert direct vertical force so the plugs moulded on the spring come out of their holes.

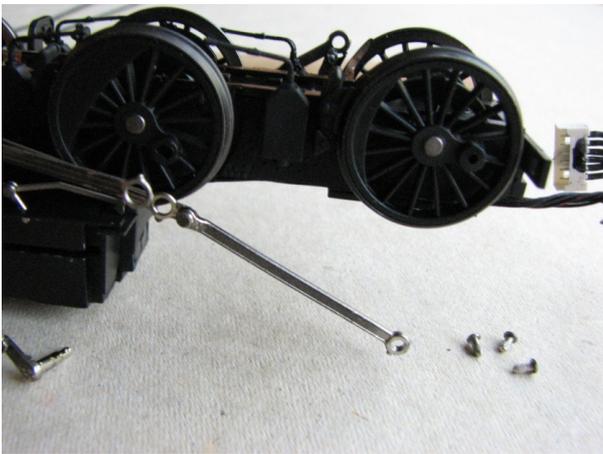


Looks brutal...it is!



Not bad, only broke one lug off.

The front axle should now come out mounted on its little block. At this point, it is a good idea to remove the coupling rods, the crankpins simply come out with a good tug....remove rear crankpins and the centre return cranks, then the leading wheels will come away with rods still attached.

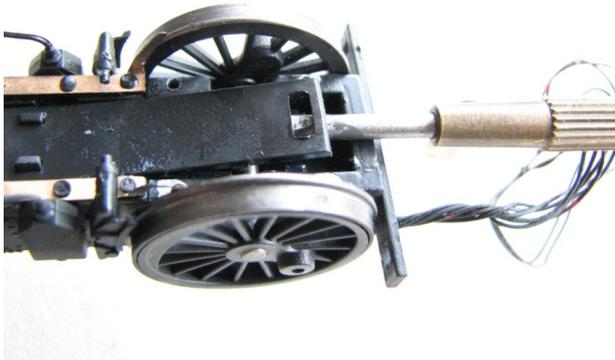


Success, well, 1/3rd of the way!

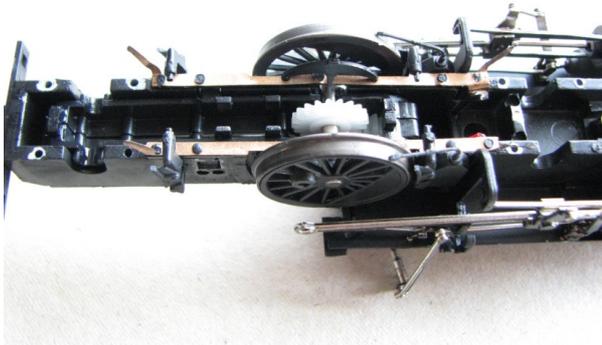
Next step is to remove the rear springs in the same way.

The centre and trailing wheels run in a separate cradle which pivots in the main chassis casting. Yes, it is compensated! Of course, this has a glued cover plate which prevents wheel removal, so this has to be gently prized off. Start at the back; insert a thin screwdriver between plate and cradle, working your way along towards the raised dome where the gear is. Then start from the front working towards the gear housing dome....it should then give in and finally ping away.

The rear wheels can now be removed.

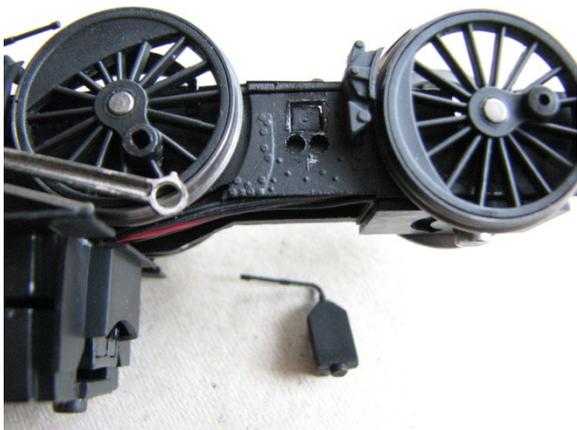


Ease your way along to release the cover plate.



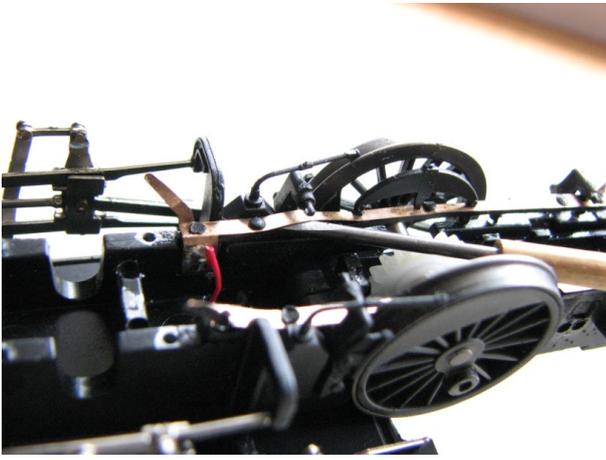
Cover plate off and wheels out, 2/3rd of the way now.

To get the remaining centre wheel set out, you can see the pick up strips need removing, and yes, these are glued to the chassis. It does help to remove the sandboxes between centre and trailing wheels to gain access to the edges of the pick up strips. These plug into the chassis side and come away easily with a thin screwdriver blade to help.



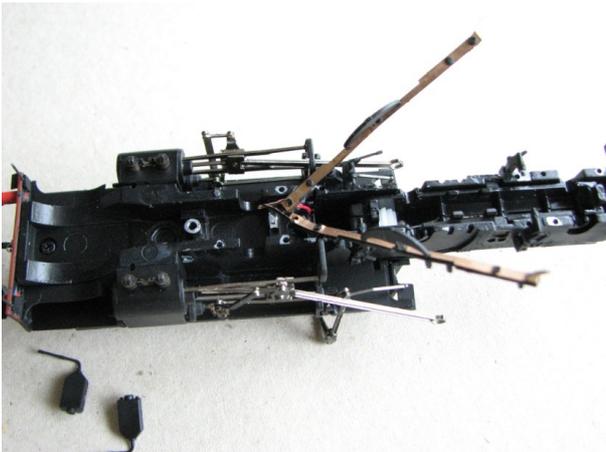
Sandbox removed.

Start at the rear of the chassis, easing a thin blade under the pick up strip, teasing its pegs out of the chassis, work your way along to the centre, and then start at the front and work rearwards. The centre springs are attached to this strip, so we can leave these in situ.



Pick ups being released.

Once released, the strips can be swung out of the way, and we can remove the centre wheels.



Centre wheels out at last!

The final dismantling tasks are to recover the gear wheel, and remove the leading wheels from their separate chassis block. For the front axle, simply twist the wheels off one end of the axle and slide the remaining wheel and axle out of the block.

To recover the gear, remove the wheels from the axle. Then stand the axle on a firm surface and using thumbs, press down and the gear should slide off. Do not twist it as there are splines on the axle which may damage the gear internally if twisted.



Gear and front axle block recovered.

This now completes the dismantling process. Time to put the kettle on!

Rebuilding.

The driving wheel axle diameter is 2.5mm, and the wheel is the very similar to the Midland 4F. The cognoscenti among you may realise that the Bachmann 4F also rides on 2.5mm axles, and those lovely folk at Alan Gibson have produced a 4F wheel with 2.5mm axles for this. Obviously you will need two packs of 4F wheels.

Our first step in re building is to modify these wheels slightly. They have a slight raised boss around the centre, whereas the Garratt has a flat faced centre, so we need to remove the raised boss carefully with a knife, without hurting your fingers! Clean up the spokes near the boss to restore their profile in this region. It sounds a lot of work, but in reality takes little time.

There is just room to use the wheels without removing the boss if you prefer.....but the leading crankpin may well need to be recessed into the coupling rod.

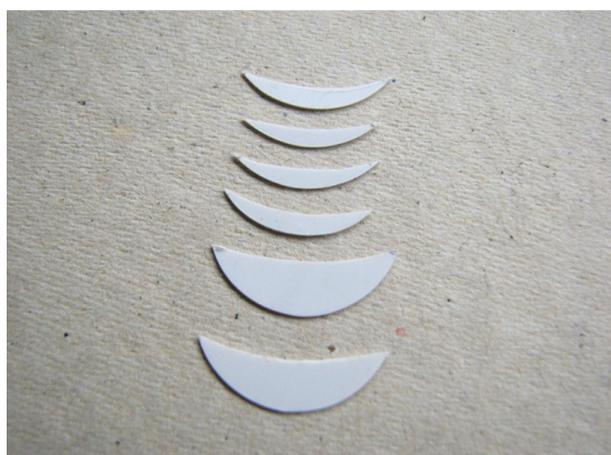


Mind your fingers!



Modified wheel on the left

Also, we can make and fix balance weights to the wheels. These are cut from 30 thou plasticard using an Olfa compass cutter to produce discs, the weights themselves being cut off these.



Balance weights from 30thou plasticard



Completed wheels

Crankpins are fitted at this point. The wheels need drilling 0.7mm for these as they come from older tooling. Gibson crankpins contain the relevant information here. Do not be put off with the need to drill the wheels, All that is needed is a pin vice and drill bit, holding a wheel in one hand and twiddle the drill with the other, doing your best to keep things perpendicular. Once fitted, if the pin looks a bit lop sided, just bend it ever so gently to the correct position. The centre wheels benefit from a drop of araldite around the top end of the screw underneath the screw head before it is fully screwed home to prevent it turning in the wheel once the return crank is fitted.

The axles need shortening to 21.5mm. If you are fortunate to own a lathe or two, this will not be a problem. However, this can be done quite satisfactorily by hand, turning the axle between fingers slightly as you file.....sounds hard, but it isn't. You do get sore finger ends though!

Also, the axle for the centre wheels needs some knurling in the centre to retain the gear. Again, it's not difficult. Take a hand file of approx 6 or 8 inches long, place the axle on a solid surface, and roll the file with edge that has teeth on it over the axle whilst pressing down hard. This will produce a knurled or splined effect, more than sufficient to grip the gear when pressed on, without any adhesive necessary. The gear should be central on the axle, not offset as is often the case.



Splined effect from the file.



Gear pressed onto the centre of the axle.

Before we assemble our wheels onto the axles, we need some spacers to allow for the wider gauge. Normally I'd use turned washers from EMGS stores or Alan Gibson. Unfortunately, there is not enough clearance for the outside diameter of these, so we need an alternative. I used thin wall brass tube with a bore of about 2.5mm. Well, it's a close fit on the axle anyway. These need to be 2.5mm in length and can be simply cut from the length of tube with a sharp knife. Yes, really! Simply mark where you wish to cut, and roll the knife applying downward pressure as you roll the tube under the knife. It will cut through, and probably ping off into the workshop's best Axminster, so you need to catch the small piece as you break through

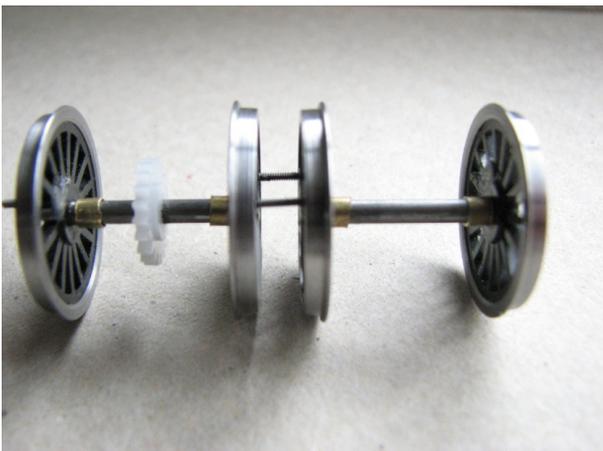


Cutting axle spacers from tube.

The leading wheels can now be assembled. Press one wheel onto the axle; add one spacer, then the small cast chassis block. Add the second spacer and then press the second wheel on. I wish I could suggest a jig to help, but as our axles are 2.5mm diameter and most jigs/presses are designed for 1/8th or 3mm.....they are not much use. I simply pressed the wheels on by hand, resting the axle upright on the edge of the bench so the crankpin dangled over the edge. Quartering is I'm afraid a squint through the spokes affair, but the spokes do line up nicely at 90 degrees.

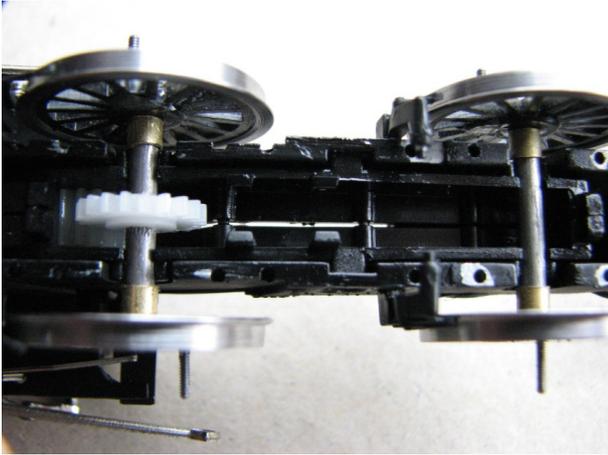


Leading wheel set assembled.



Centre and trailing wheels assembled with bushes.

Once assembled, the centre and trailing wheels can be placed into the chassis.



Centre and trailing wheels installed.

The cover plate can now be replaced over these two axles; it does just click back firmly in place, no need to glue it!

The trailing springs can be glued back into position, as well as the pickups can be all glued back into position, not forgetting to tweak the pick up wipers out a bit to allow for the wider gauge.

The leading wheels will fit, just, but the overlong crankpins are just about fouling the slidebars. As these are firmly fastened to the cylinders, which in turn are glued to the chassis, it's not practicable to remove the cylinder/slidebar assembly in order to fit the wheels and rods.

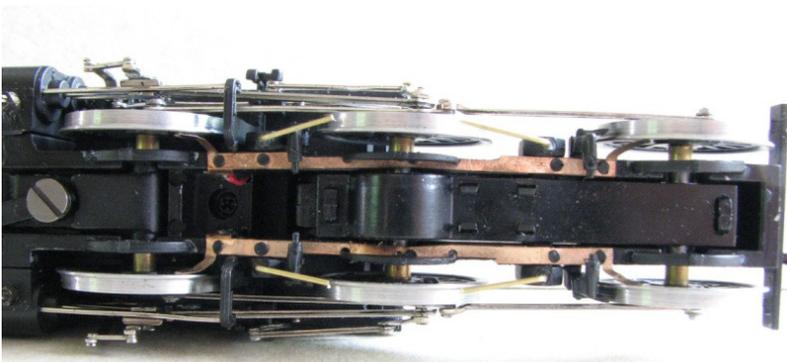
The dodge I employed was to fasten the rods to the leading wheels and trim back the crankpins, making sure the crankpin nuts are filed down quite thin. Do make sure you get the rods on the correct sides and the right way up!



Leading wheels with rods attached.

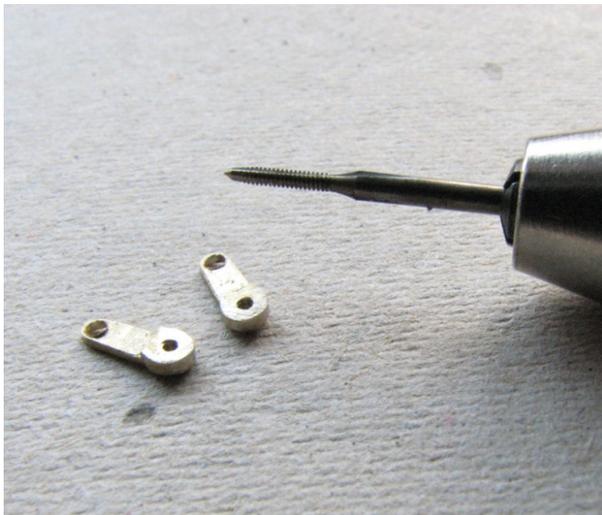
The leading wheels can now be installed, threading the rods carefully into position at the same time. The pony retaining screw can be inserted as this holds the leading wheel block in position for now.

Place the rods onto their correct crankpins and fasten in place with the trailing crankpin nuts.



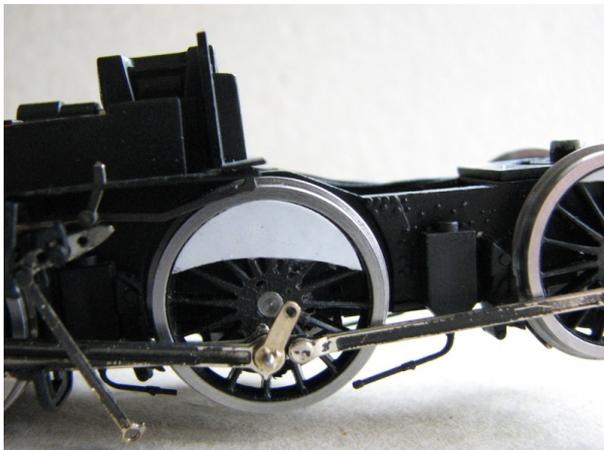
What the underside like this at this point.

Next operation is to deal with the return cranks. The Heljan ones could be reused, but would rely on a press and glue fit into the wheel, so I opted to snip through the valve gear rivet and loose them, replacing with the Alan Gibson brass casting 4M822. These require tapping with a 14BA tap to fit the crankpins, and then cutting from their sprue. Do make sure you hold the sprue and crank as you cut, otherwise the crank, inevitably, will fly off somewhere never to be found. Don't ask how I know.....



Replacement return cranks alongside 14BA tap.

These can now be wound onto the centre crankpin until tight. Usually, they go tight in the wrong position, so remove, and file a bit off the back. Replace and it, and it now tightens a bit further round, repeat the filing and by trial and error, you'll end up with them in the correct position.



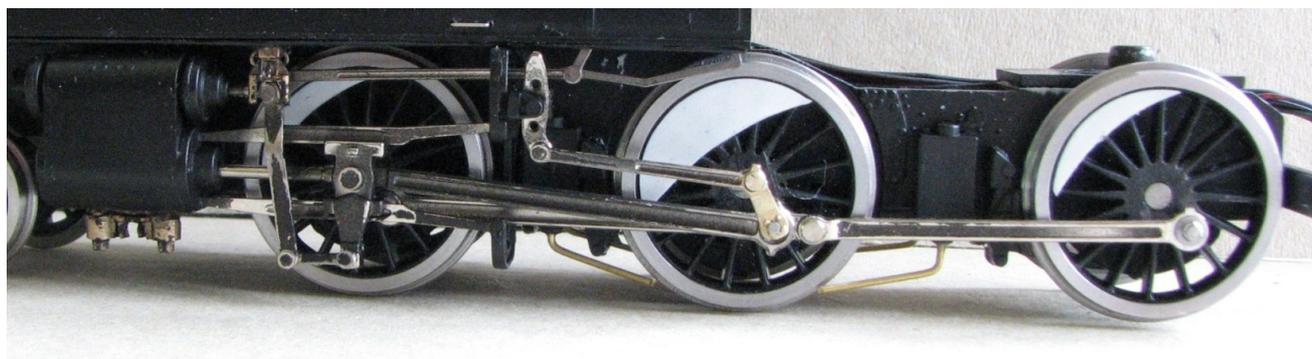
Fitting return crank.

Once this fitting process is complete, they need to be fastened to the valve gear rod, and I do this using Markits rivets as they are nickel silver and therefore easier to solder than other varieties which are mostly steel.



Preparing to solder return crank rivet.

At this point, it is useful to remove the large flat ballast weight on top of the chassis. This is held by two screws (hurray!!), and once removed reveals the motor and flywheel. This is a great help in revolving the wheels back and forth whilst winding the now attached return cranks onto the crankpins, which need moving forwards and backwards around the six o'clock position; otherwise movement is hindered by the valve gear binding.



The valve gear is now complete and should look like the above picture. You might notice that the sandpipes have been replaced by brass wire glued into suitable holes drilled in the sandboxes. The original floppy plastic ones gave up somewhere during the rebuilding!

The ballast weight can be replaced, but do make sure the driveshaft between the flywheel and final drive housing is in place and engaged correctly. This saves taking it all apart again later. There is nothing worse than when you place it on the track, only to find the motor whirrs away nicely, but the engine remains very still. Don't ask.....

The body can also be replaced at this point.

The one remaining item is the pony truck. The Heljan wheels unclip and pull out of the frame.



Pony wheels removed.

Surprisingly, it seems that all versions come with pony truck brakes. These only lasted a short while on the early versions, so they need to go. A swift application of the Zurons makes short work of disposing of these. You may also wish to shorten the NEM coupling box too, depending on your choice of couplings.

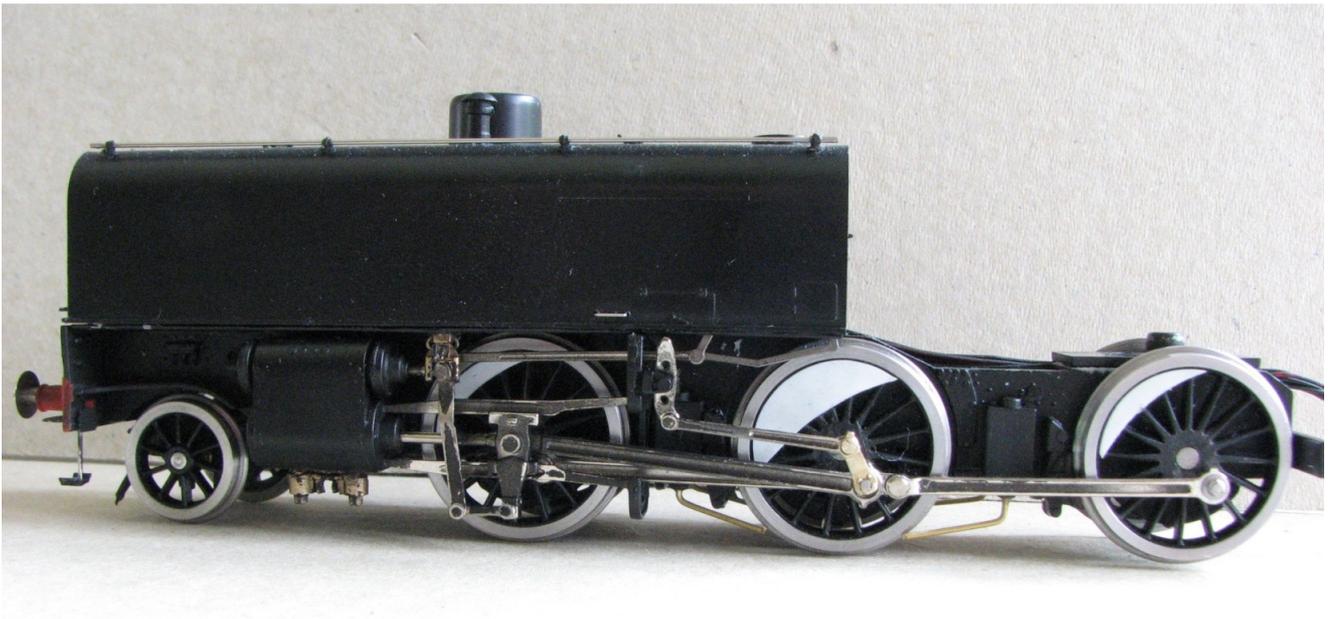
The replacement Gibson wheels are fitted, using small 2mm bore spacing washers, 2 x 1mm plus 1 x 0.5mm each side. You could of course make the pony frame wider by adding plasticard frames on the trucks outer sides....

Install the pony truck in the chassis, not forgetting the little washer that goes between pony and chassis that you carefully saved right at the start.



Pony truck showing spacers and new wheels.

And, that concludes the saga of one end, so you should have something like this...



Track testing this is an interesting challenge. Testing the one converted half means a loco that is OO at one end, EM at the other. I balanced it on two short pieces of different gauge track .At least it proved that the thing worked, even if it could only move about 6 inches in either direction. But it proved the work done, and gives you an incentive to start all over again at t'other end!





Pete Hill

July 2014