

Hornby GWR Star Class EM Finescale Conversion.

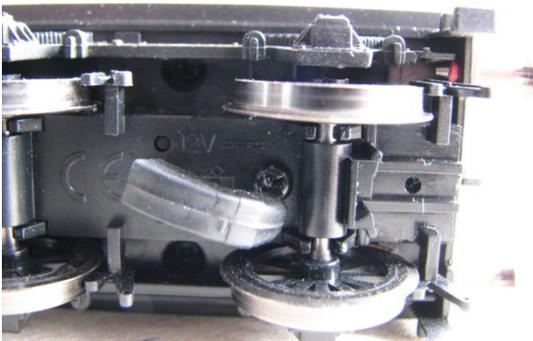


Before you start, it is a good idea to have some small containers or snap top poly bags to put screws and components in for safe keeping.....much better than crawling about on the floor trying to find lost bits!

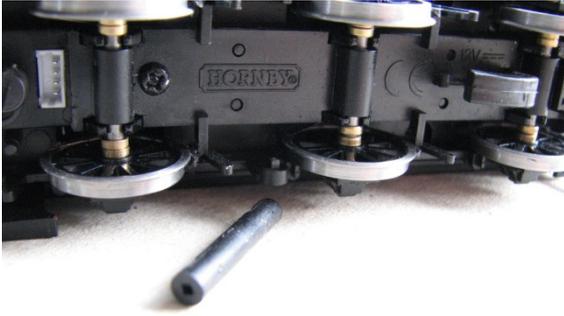
We suggest converting the tender first, as this will be needed to test the loco chassis later because of the electrical engine/tender connection plug and socket. Disconnect the two carefully before starting work.

TENDER CONVERSION

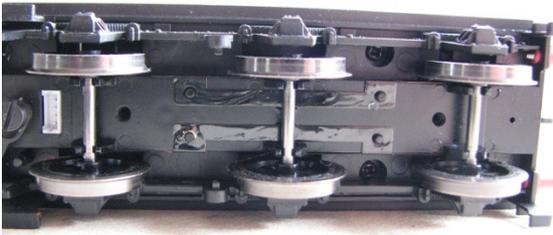
1. Invert the tender, and hold in a suitable device. We use a foam cradle – the Peco loco service cradle being ideal.
2. Unclip the brake gear, and place to one side.
3. Undo the screws holding the keeper plate – one is visible, the second being beneath the water scoop, which we were able to twist out of the way enough on our sample to undo the screw. Also spring out the cylindrical tank between the frames above the keeper plate (when looking from below).



Water scoop twisted to reveal the screw.

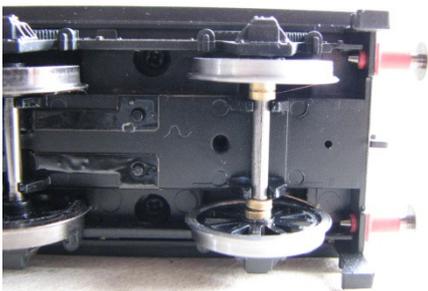


Cylindrical tank sprung out of chassis.



Keeper plate removed.

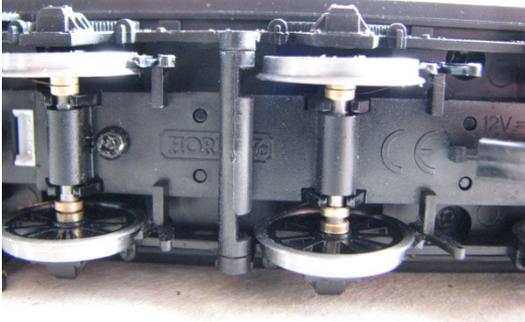
4. Lift out the 3 wheelsets.
5. Assemble the Gibson wheelsets onto the appropriate plain axle supplied with the wheels. We used 2x1mm 2mm bore spacing bushes each side to limit side play.



View showing spacers on Gibson wheelset.

6. Place wheelsets into the chassis, ensuring the pickup wipers bear against the back of the wheel tyres.
7. Before replacing the keeper plate, chamfer the back of the brake shoes with a needle file to provide clearance with the wheel tyre/flange.

8. Replace the keeper plate and screws. Push test the tender through some track work to ensure all is well.
9. If satisfied, replace the cylindrical tank back into position.

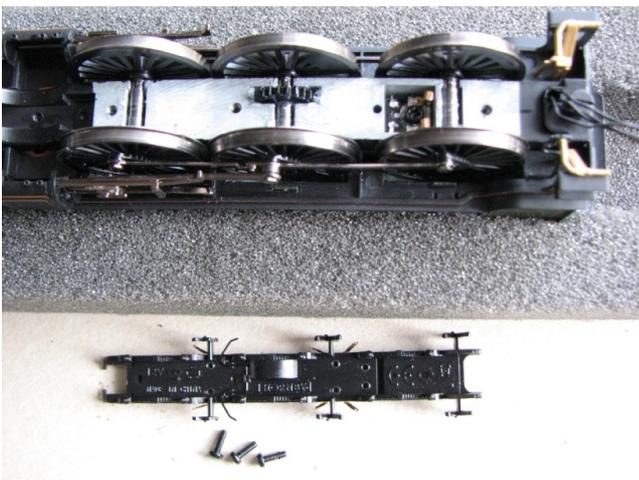


Tank replaced

10. Clip brake rods back into position.

LOCO CONVERSION

1. Remove the loco bogie by undoing the screw behind the rear of the bogie on the loco chassis, and place to one side.
2. Remove the loco body by undoing the large screw behind the buffer beam. Gently pull the chassis out by gripping the cylinders – not the wheels/valve gear.
3. Support the chassis upside down in a suitable cradle - undo and remove the loco/ tender coupling bar; place to one side safely.
4. Undo and remove the crankpin screws, remove the connecting rods and leave dangling. Recover the coupling rods and place to one side.
5. Undo the 3 cross head screws in the keeper plate - store these safely – and gently lift away the keeper plate, which simply lifts clear complete with pickups.....no wires to worry about and nothing to fall apart either.



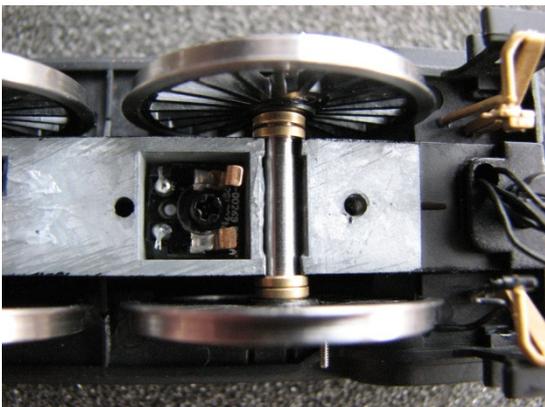
Keeper plate removed.

6. The wheelsets should now lift out.
7. Remove the gear wheel after removing the wheels from the axle. The gear needs to be pushed off. Simply support the axle end on a solid surface, pushing straight down with your thumbs. The gear should slide off. Do not TWIST the gear, as it sits on a knurled part of the axle and you may damage the inside surface of the gear bore.
8. The Gibson wheels can now be prepared. As the wheels are from older tooling, the crankpin holes need drilling from the centre pop moulded marks. We use a pin chuck and do this by hand. Full instructions are in each pack of crankpins. Crankpins themselves are inserted and any balance weights made up and glued on. We make these from 10 thou plasticard and use a compass cutter. The supplied axles were reduced to 22.25mm.



Gibson wheels fitted with crankpins.

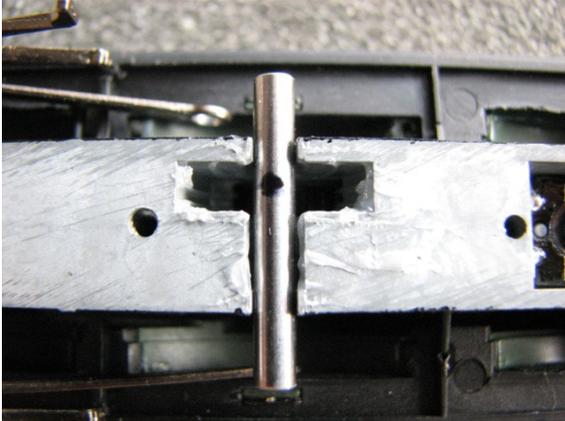
9. Now begin to assemble the front and rear wheelsets. We will need some spacing washers to take up the side play. We used 2 x 1mm thick washers each side on all three axles.
10. We use a GW Models wheel press for assembly, which will also quarter the wheels as well as press them on square.



Rear wheels in chassis – note spacing bushes.

11. These two wheel sets can now be placed in the chassis.

12. The centre axle needs to be “knurled” for the gear wheel first. We place the plain axle into the chassis, measuring the overhang each side to make sure it is central. Take a permanent marker pen, and mark the position of the gear on the axle.



The black dot marks the spot!

13. Place the axle on a cutting mat or similar. Take a small hand file, we use a 4 inch second cut file, and using the file on Edge, roll it with firm downward pressure over the axle where you marked the gear position. Do not stray away from this narrow area, as bushes run on the axle very close to the gear, and knurling in these areas won't help good running!



Not too neat....but it works!

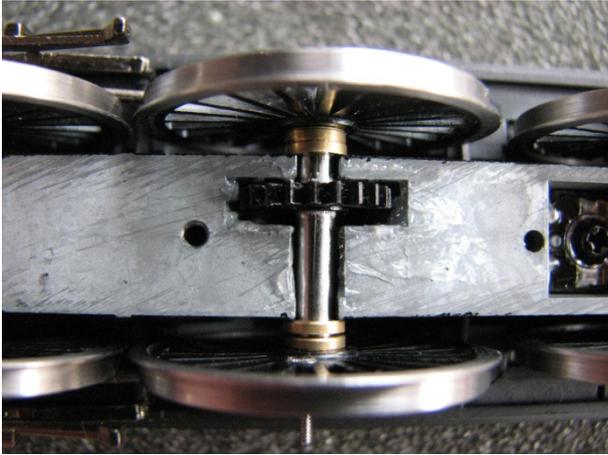
14. The gear can now be slid onto the axle and pressed over the “knurling”. We found that the side of the gear was 7.5mm from the axle end (shorter end!) Place in the chassis and check...if all is well you can slide the gear to one side, apply a little Loctite if you wish, replace and check gear is in the correct position. Leave alone to cure. In fact on this sample, no Loctite was used, the knurling being more than sufficient.

Treat yourself to a cuppa or similar if you have applied Loctite.....or deal with the bogie (see later)

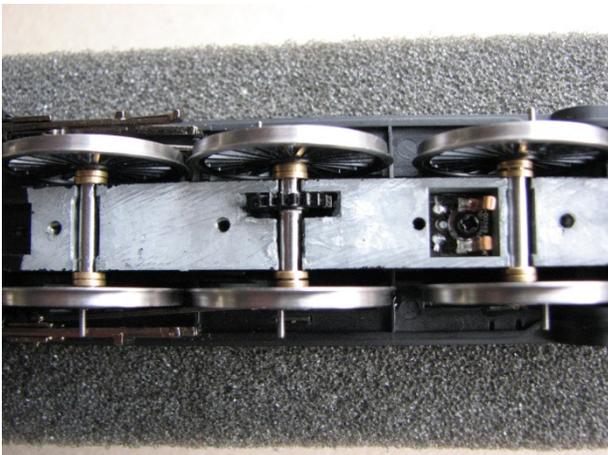


Assembled axle and Hornby gear.

15. Assemble the driven axle in the press, not forgetting the spacing bushes.



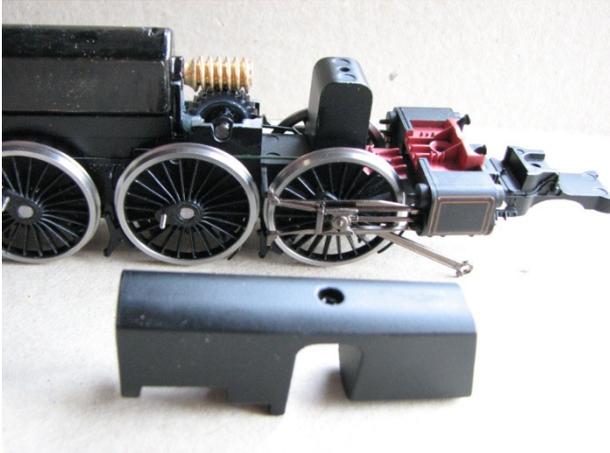
Centre axle in chassis.



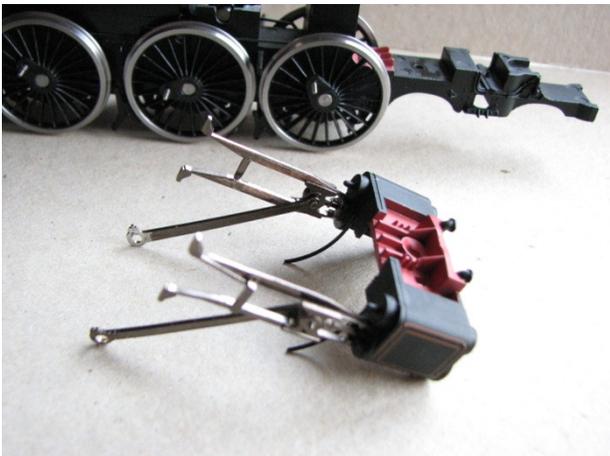
All three axles installed.

16. Lift the keeper plate back into position, having tweaked the pickups out a little for the wider back to back, and fasten down with the three screws. You can now place on the track and apply a little power to make sure the driven axle revolves freely. The brakes needed no alteration. Remember to connect the tender plug otherwise it won't work!

17. At this point it is useful to remove the cylinder and slidebar assembly in order to fit crankpin nuts and rods easily. It also helps with the connecting rods.....see later.



Worm cover removed.



Cylinders held by single screw and lift off.

18. Next we tackle the coupling rods. The Hornby holes are too large for Gibson crankpins, so we need to bush them with the Gibson bushes available just for this purpose.
First, file the plating back to the brass base metal on the rear of the coupling rods. Place a bush in the rod hole, and solder in position. Do this for all 6 coupling rod holes.
If you fill the bush completely with solder.....don't panic! As the solder sets, it contracts slightly, leaving a dimple in the centre – use this to as your centre for drilling out. A suitable drill twiddled with fingers in a pin vice is all that is needed.



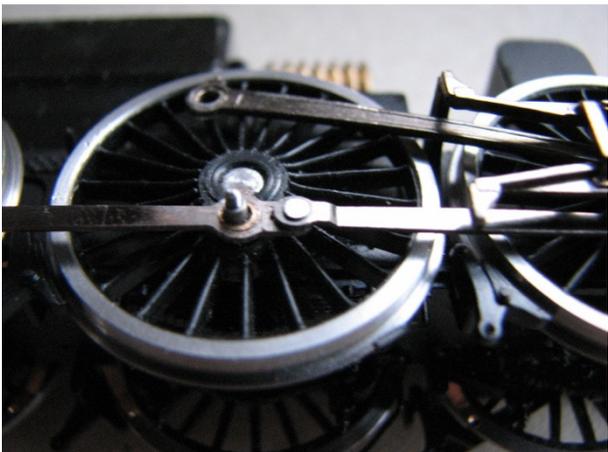
Bush in rod ready for soldering.



The resulting central dimple after over enthusiastic soldering.

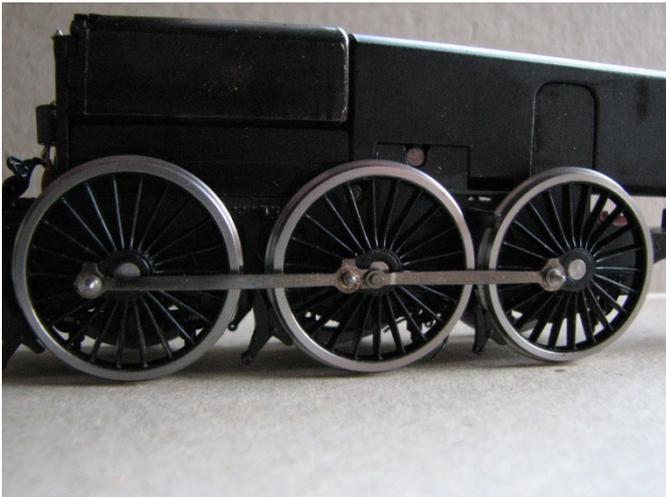
19. The bushes then need a gentle opening out to be a good running fit on the crankpin bushes....simply use a suitable cutting broach and use one of the Gibson bushes as a guide.

20. The rivet joining the rods needs its head thinning so as little as possible is remaining, whilst still retaining strength. Again, this is to provide sufficient clearance between the connecting rod and the rivet head.



Hornby rod joint rivet head filed very thin.

21. Assemble the rods onto the wheels. Use a long crankpin bush on the centre wheels, and short ones front and rear. Fasten with crankpin nuts front and rear only. Tighten and trim back the front crankpins, and file the nuts to about a third or less of their thickness, in order to give clearance for the connecting rod, which is very, very marginal!! The rear pins can be left over length for now if you wish.
22. The front bush is better thinned down to just over the rod thickness before fitting to the crankpin – this will buy a bit more clearance.
23. The chassis can be tried under power as an 0-6-0 at this point.....and if all is well, proceed to the next stage. Do not forget to have the tender plugged in!!

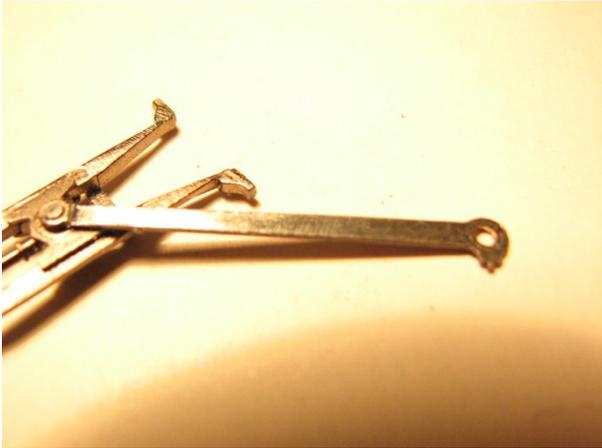


Coupling rods fitted.

24. The connecting rods appear different on this model, not brass, but some sort of alloy, well they are not magnetic! The big end holes still need to be bushed.....and the safest way is to glue these in and leave to dry thoroughly..... either an engineering type adhesive, or super glue, which we used. Works perfectly well as there are no driving forces being transmitted.
25. The rods need thinning too to help with clearance, and helpfully are fluted on their rear face as well as the front. We filed off the fluting on the rear face, leaving us with a plain rear and thinner rod.



Rod as supplied.



Rear of rod as modified.

26.Repeat for the opposite side.

27.The cylinder assembly can now be reunited with the chassis.

28.Before placing the connecting rods over the centre crankpins, we need to provide a small spacing bush on the crankpins, and one of the Alan Gibson brass coupling rod bushes is ideal. Place one over each of the crankpins, followed by the connecting rods, and finally the centre crankpin retaining nuts.



Bush to space Connecting rod from coupling rod.

29.It is worth removing the gear cover again and turning the worm by hand to check for any binds etc.....some tweaking of rods may be required.

30.Then at this point, you should be able to track test the completed chassis. Gently apply power, checking to ensure no parts are going to hit other parts or bind. If all is well, admire your chassis and tender moving around!

THE BOGIE

1. Simply twist and pull one Hornby wheel from its axle, and slide the remaining wheel and axle out the other side.



One Hornby wheel removed



Hornby wheel and axle removed.



One Gibson wheel set installed

2. Assemble one Gibson wheel onto its axle, and then slide the appropriate spacing washers on, thread through the bogie casting hole, adding the appropriate spacing washers and remaining wheel. Repeat for the second axle. We used 2 x 1mm 2mm bore brass spacing washers each side.



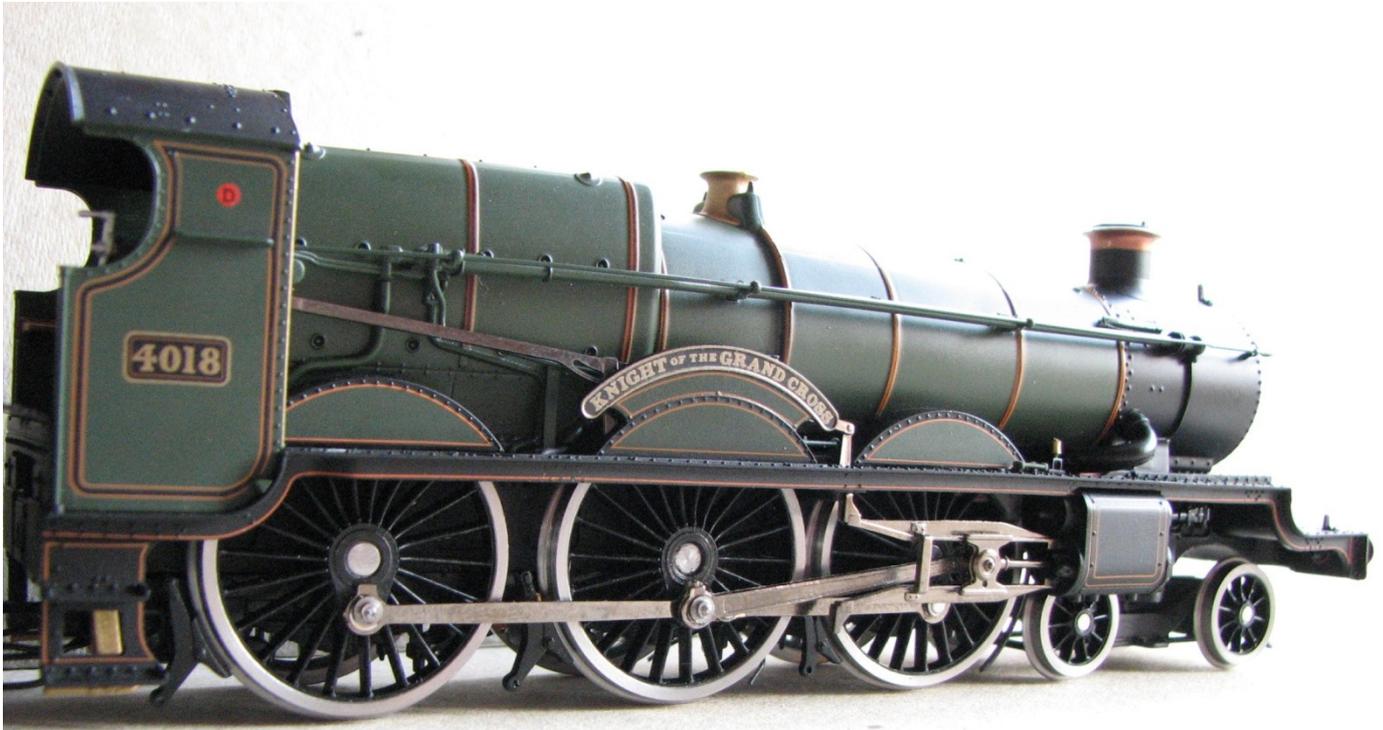
Re wheeled bogie.



Front view showing spacing bushes.

FINAL ASSEMBLY

Reassemble the chassis to body, and track test. If all is well, fasten the bogie back to the chassis, and you should have a completed loco. Don't forget to lubricate it!



Pete Hill

November 2013.

Other Parts Used in this Method

4800 Coupling rod Bushes

4M42B Crank pins

4M67/3 1/8" Spacing Washers

4M67/2 2mm Spacing Washers