

# Bachmann GWR Earl (Dukedog) EM Finescale Conversion

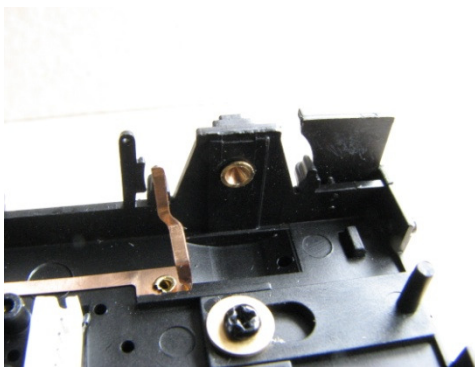


Before you start, it is a good idea to have some small containers or snap top poly bags to put screws and components in for safe keeping.....much better than crawling about on the floor trying to find lost bits!

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.

## **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. Spring out the Bachmann wheel sets carefully so as not to damage the pickup strips.
4. There are two options; one is to remove the Bachmann wheels from their axles, and replace with Gibson scale wheels onto the Bachmann shouldered axles, and replacing in the tender chassis having set the correct back to back.
5. The alternative is to place Gibson shouldered pinpoint bearings into the tender axle holes. Then mount the Gibson wheels onto the pinpoint axle provided with the wheel pack, and spring back the assembled wheel set into the tender chassis.

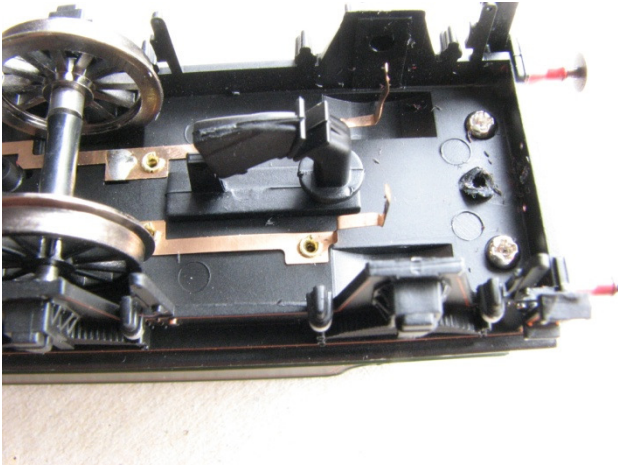


Shouldered pinpoint bearing inserted into axle hole.

6. The pinpoint method allows no side play, so depending on your layout curves, you could mix and match the above methods; for example, use pinpoints on the leading and trailing axles, but use the Bachmann axle for the centre wheels, thus giving side play where it may be needed. We choose the latter method for this example.
7. Before replacing the leading and trailing wheelsets, we need to modify the pickups so they will pick up from the Gibson wheel rims, as opposed to the Bachmann split axles.

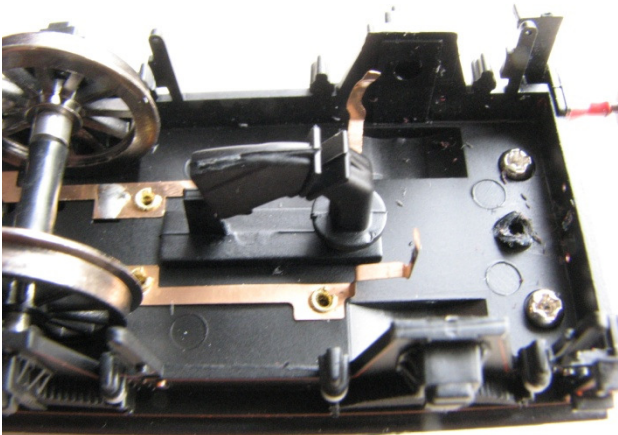
## Tender Pickup Modification.

1. We need to move the pickups through 90 degrees to bear against the wheel rim rather than the axle.

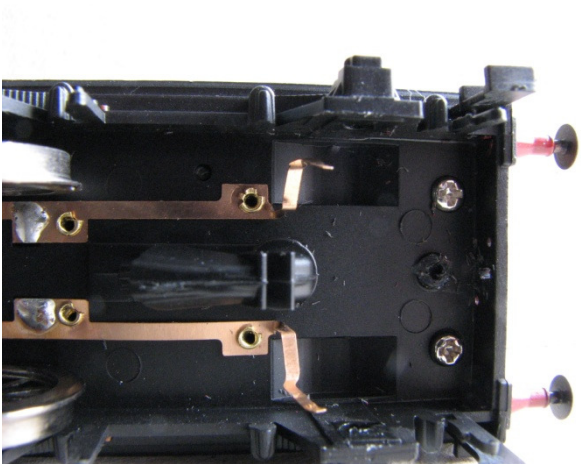


Bachmann pickups with wheels removed.

2. With a pair of fine nosed pliers, grip the pickup at the base of the thin strip near baseplate is riveted to the tender, and twist carefully through 90 degrees.

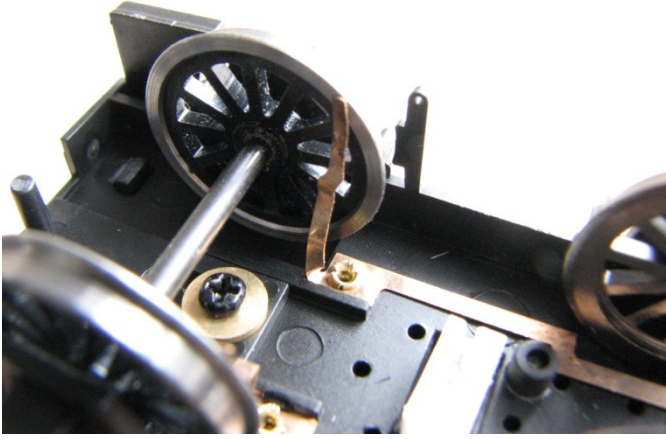


Upper pickup bent through 90 degrees.

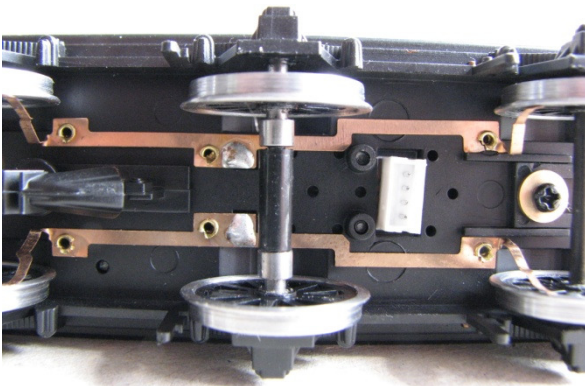


Both pickups now turned through 90 degrees.

3. Repeat for the remaining pickups.
4. Carefully insert the new wheels on their pinpoint axles. Then you can adjust the pickups by careful bending to bear on the wheel tyre backs.



Pickup bent to touch wheel tyre, and trimmed in length slightly as there is plenty of pick up material!



Another view of modified pickups.

## Loco Conversion.

1. Invert the loco having disconnected the engine/tender electrical socket and plug. We use a foam cradle – the Peco loco service cradle being ideal.
2. Unclip the brake pull rods, and undo the screws holding the keeper plate, it will lift away from the front, upwards and fold back at the rear out of the way. This exposes the wheel sets and bearings.
3. Lift out the coupled wheel sets. Undo the crankpin screws, recover the coupling rods and store safely. The crankpin screws can go into the spares box; we have no further use for these!  
Lifting the wheels out is rather tricky, as the outside brake rods get in the way. The Bachmann outside cranks can be pulled off the wheels first, and then it makes it easier to wiggle the wheels out.  
Or simply cut the offending brake rods away.....see later!





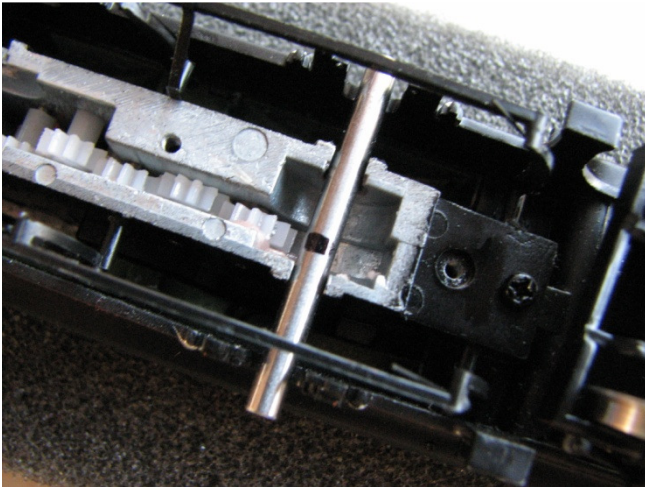
Bachmann outside cranks unplug from wheels.

4. Remove the wheels from the axle by either twisting the wheels off by hand, or punching the axle through the wheels, then recover the gear by holding the axle vertically on a firm surface and pushing the gear straight down with your thumbs – DO NOT TWIST the gear as it is held on a splined surface and twisting may well damage the bore of the gear.

Also recover the two bushes the axle revolves in and locates it in the chassis block.

5. Take one of the replacement Gibson axles, and place into the inverted chassis centre axle slot above the drive gears. Measure each side to ensure you have it centralised, and mark with a pen (we used a permanent marker) directly above the gear in the chassis that the axle gear meshes with.

It is vital that the axle is absolute centre, there is very little room spare.



Marking gear position on the axles.

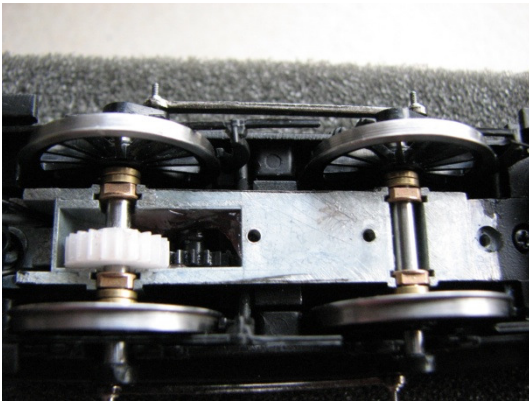
6. Place the axle onto a cutting mat or similar, take a hand file of around 6 inches in length, and using the edge of the file with teeth, roll the axle across the mat using the file and a fair degree of pressure at the point where you marked the axle. This will provide a splined effect on the axle sufficient to grip the axle gear wheel we removed from the Bachmann axle. Do not allow the file to wander as we do not want any more splines on the axle other than underneath the gear itself. The gear can be pressed onto the axle by holding in your fingers until the splined effect is reached, then hold vertically on a firm surface and push down with thumbs either side until the gear reaches the desired position. This can be simply checked by placing in the chassis and measuring if in doubt.



Gear on new axle – note boss faces chassis middle.

7. Wheel set assembly can now begin. Also you will need some spacing washers to take up side play, and we find that 2x1mm thick each side gives hardly any side play but allows free running. Place one of the Bachmann chassis bushes onto the axle, remembering that the flanged edge faces the chassis centre, then add that sides spacing washers, followed by pushing the wheel onto the axle. Do the same for the other side, and set the correct back to back, making sure there is equal amount of axle outside the wheels each side.

8. Repeat this for the leading axle, but without the gear!.



Wheels installed in chassis.

9. Once both axles are assembled and placed into the chassis, the keeper plate can be replaced and screwed down. Tweak the pickups out slightly to accommodate the wider gauge. It is always worth placing on the track and applying power gently at this point, just to ensure that all is well and we have free running of the driven axles. Remember with this loco, you will have to plug the loco chassis to the tender again to get it to work!



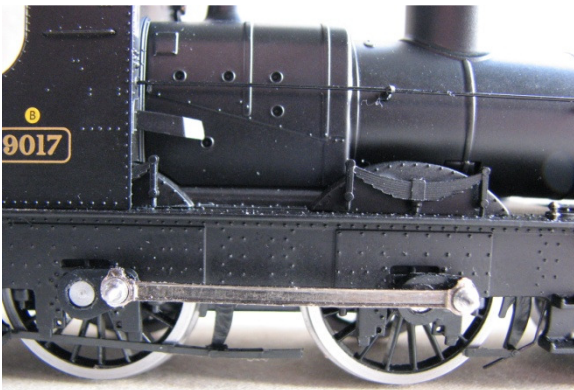
Keeper plate on and ready for the rods.

10. Next are outside cranks. It is worth checking clearances between the crank rear and the outside frames of the body at this point, as they are very tight.
11. It is possible to thin the rear of the crank in the crankpin area.....giving yourself some vital clearance. Then fit the crankpin screws.



Outside cranks.... thinned slightly on the back.

12. Push the cranks onto the axle ends, quartering is by eye, but there are only the two each side, making things a bit easier!
13. It is worth trying the loco under power gently to make sure everything revolves as it should without things hitting parts they shouldn't.
14. For once, the coupling rods need no modification at all, the holes being a good fit on the Gibson crankpin bushes.
15. Use the short crankpin bushes on all four crankpins.
16. Fit the rods over the Gibson crankpin bushes on one side of the chassis, place the correct coupling rod onto the bushed crankpins and retain with the crankpin nuts. You may wish to tighten these finally with fine nose pliers now, or later; but ensure you have firm hold of the crank so as any turning pressure from the pliers does not move the crank on the axle, thereby upsetting the quartering.
17. Repeat the previous step for the opposite side of the chassis.

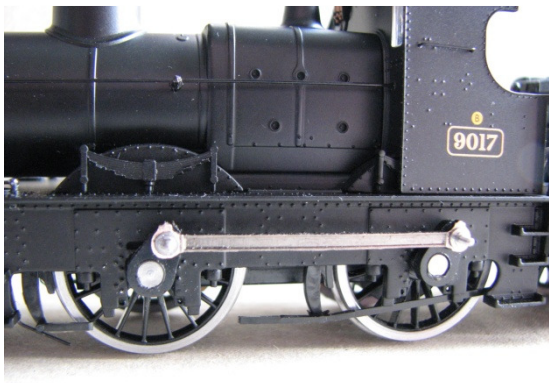


Rods fitted to loco.

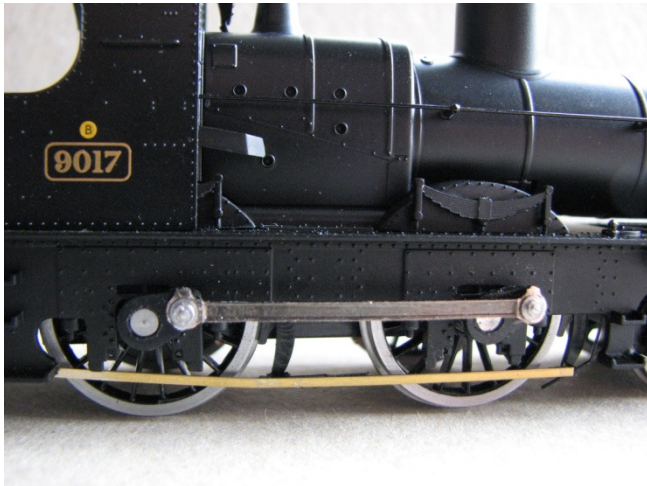
## Outside Brake Rods.

You may have noticed in the pictures above that the outside brake rods have been cut away to allow ease of axle installation. In fact, there is not enough clearance between their inside faces for the EM wheels anyway, so they really have to come off, or you could try thinning them down on their inside faces! We cut the rods so the wheels will fit, but leaving stubs at the front and centre to glue some thin 1mm flat brass strip to. It also fastens to the rear of the cab steps.





Picture shows the stubs left of the original brake rod.



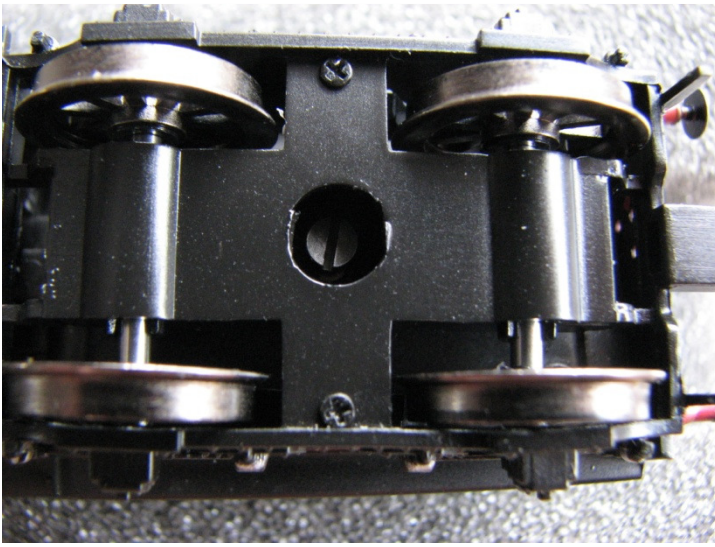
Brass strip glued to stubs and rear of cab steps.



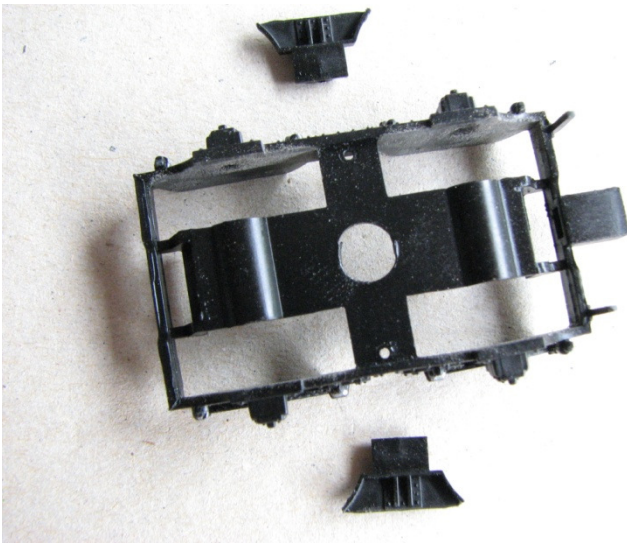
Underneath view showing new brake rods, and clearance gained.

## The Bogie.

1. First, the two small screws underneath the bogie need removing, and saving carefully as they are very tiny. This will release a small wedge shape of dummy inside detail to fall away from each side. Retain these.

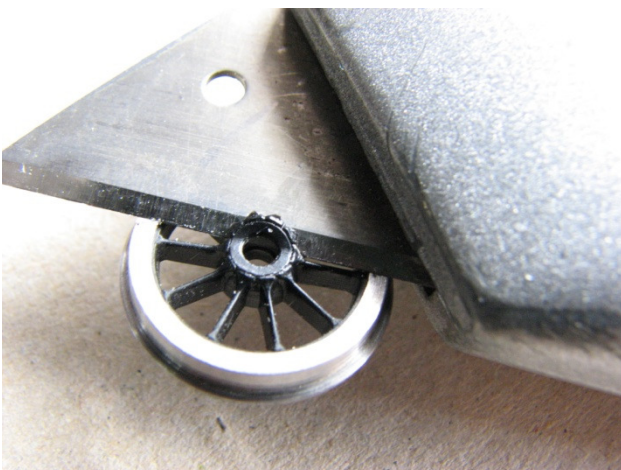


Showing two small screws!



Two pieces of inner detail that fall away. (bogie frame shown removed for clarity)

2. Remove the outside bogie frame by inserting a small screwdriver and levering upwards from underneath in the same manner as removing diesel bogie mouldings.
3. Remove the Bachmann wheels by pulling upwards and unclipping the axle from the bogie. You can also do this by twisting one wheel off the axle and pulling the remaining wheel and axle out.
4. As space is so tight inside the bogie frame, we need to remove the boss from the bogie wheels so the wheel front is flush and level with the front face of the wheel rim. A sharp knife and great care needed!



Making the wheel face flush with the rim.

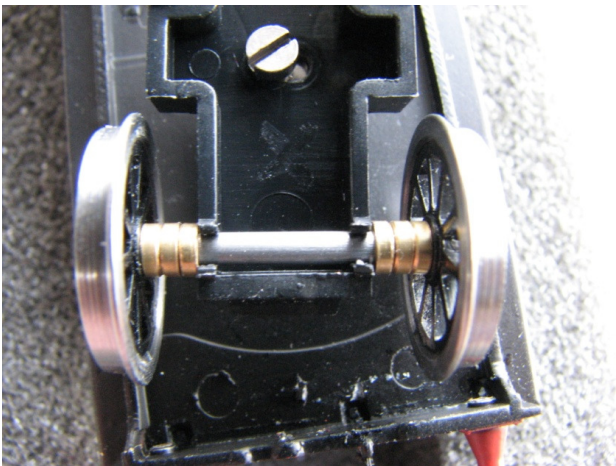


5. Assemble the modified Gibson bogie wheels onto a slightly shortened axle, using 3 x 1mm spacing washers each side.



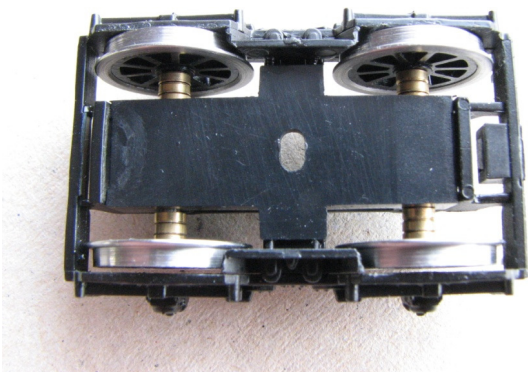
Bogie wheels assembled with spacing washers.

6. Install the bogie wheels.



One pair of wheels installed.

7. Once the wheels are in place, the bogie frame can be sprung back into place.....we also cut of the NEM coupling pocket too!
8. Then the two pieces of detail can be wangled back into position and screwed in place.



Completed bogie.

## Final Work.

1. The loco should now be plugged electrically into the tender and both placed on the track, power being applied gently to ensure all is well.
2. Once satisfied with the running, the crankpins should be re checked for security, trimmed and tidied up as required.
3. Brake gear can now be finally clipped back into place.
4. Lubricate all the new parts.



**Pete Hill**

**January 2014**