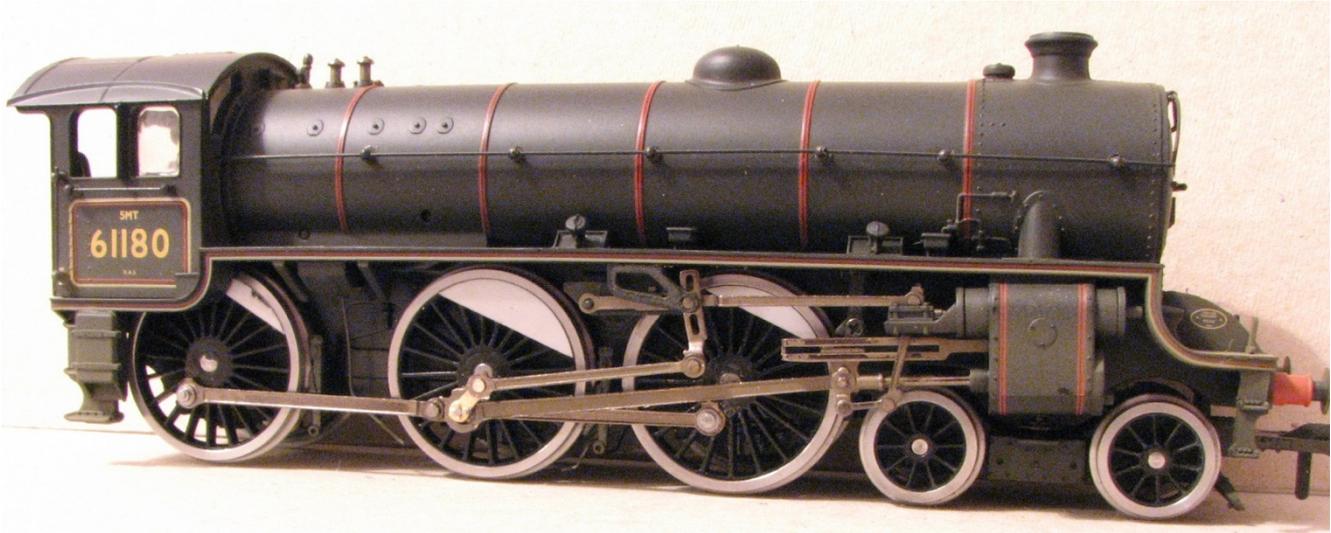


Bachmann B1 EM Finescale Conversion



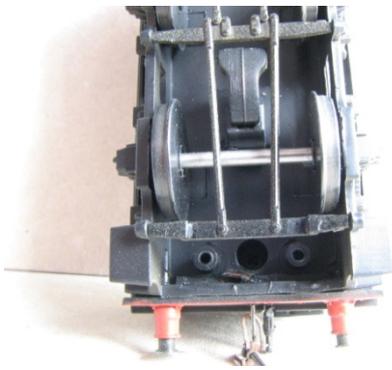
Alan Gibson B1 Conversion Pack

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.

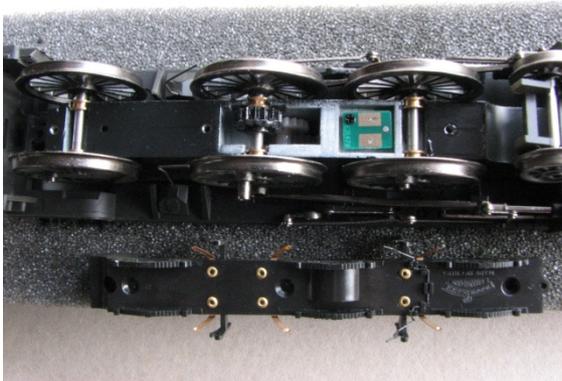
1. Invert the tender, and hold in a suitable device. We use a foam cradle – the Peco loco service cradle being ideal.
2. Unclip the brake gear, and place to one side.
3. Spring out the Bachmann wheel sets.
4. There are two options; one is to remove the Bachmann wheels from their axles, and replace with Gibson scale wheels onto the Bachmann 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.
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. Test by pushing around layout curves, and once satisfied with the running, clip the brake gear back into position.



Scale wheels fitted to Bachmann axles..

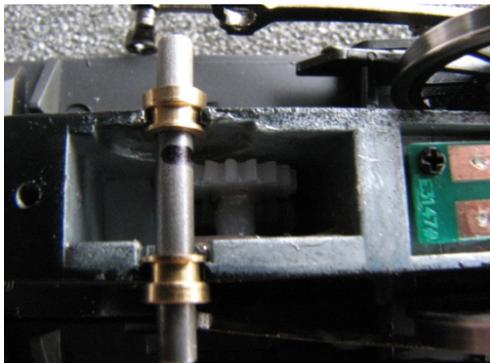
Loco Conversion.

1. Invert the loco in a suitable support. 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 and unhook from the back of the chassis. This exposes the wheel sets and bearings.



Keeper plate removed exposing axles and bearings.

3. Undo the crankpin screws, remove the return crank and connecting rod; leaving them resting where they droop as it were! Recover the coupling rods and store safely. The crankpin screws can go into the spares box; we have no further use for these!
4. Lift out the wheelsets. 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.
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.



Marking axle for gear position.

- Place the axle onto a cutting mat or similar, take a hand file of around 4 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. We found the plain side of the gear needed to be approx 7.5mm from the axle end.



Axle "knurled"



Gear on new axle – note boss faces chassis centre.

- The new wheels can now be prepared. Insert crankpin screws and apply balance weights if desired. We use 10 thou plasticard and a compass cutter to make these.



Balance weights cut from plasticard.



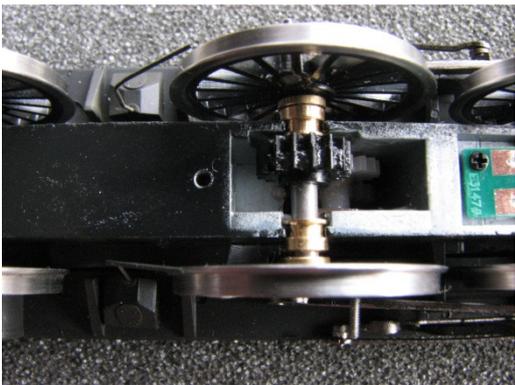
Wheel preparation.

8. Wheel set assembly can now begin. We use a GW Models wheel press and quartering jig for this. You will need to make new pins to suit the axle diameter, or press on using a small vice. Also you will need some spacing washers to take up side play, and we find that 1x1mm thick +1x0.25mm each side gives zero side play, but allows free turning of the axle on the leading and trailing wheels; and 1x1mm each side on the centre driven axle. So push the axle just into one wheel, add one sides spacing washers, then the new axle bushes with the thicker flanges outermost (that is with the thin flanges back to back!), followed by the opposite side set of spacing washers. Then place in the jig or vice with the other wheel and press on the wheels fully, the jig taking care of quartering at the same time. Using the vice method will mean quartering will have to be by eye, sighting trough the spokes which line up remarkably well at about 90 degrees.



Leading/ trailing wheelset with spacing washers and bushes.

9. Repeat this for the remaining axles.



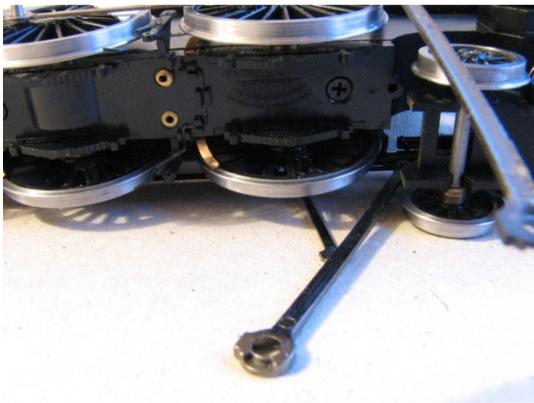
Driven axle with spacing washers placed in chassis.

10. Once all 3 axles are assembled and placed into the chassis, the keeper plate can be replaced and screwed down. 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 axle.
11. Next are the coupling rods. The Bachmann rods require their large holes reducing in size by bushing. First, clean the rear of the rods around each hole by filing all plating off to expose the base metal. The Gibson rod bushes may require the rod holes to be opened a bit further with a taper broach to allow the bushes to be pressed in. This also cleans the inside of the hole prior to soldering from the back of the rod. Solder each bush in turn. If you accidentally fill the bushes solid with solder, don't panic! Allow all to cool, and you should notice in the middle of your filled in hole there is a slight depression in the centre – use this as your centre mark to run a drill through – simply hold a drill in a pin vice and twiddle away with moderate pressure on a firm surface – not the polished dining table preferably!

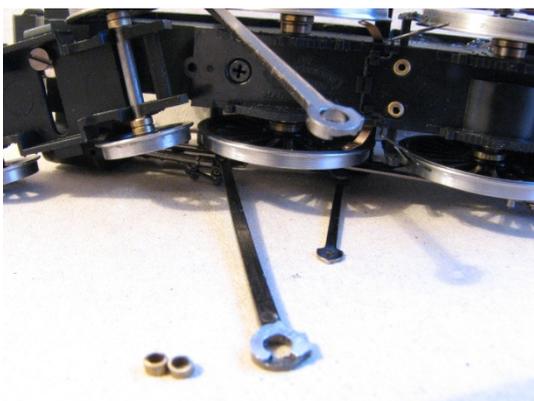


Bush inserted into rod ready for soldering.

12. The last job on the rods is to make sure the bushed holes are a fairly slack fit over the Gibson crankpin bushes – ream out as required with a cutting broach.
13. Place a short Gibson crankpin bush over front and rear crankpins, place a long one on the centre pin on one side of the chassis. Place the correct coupling rod onto the bushed crankpins and retain with the crankpin nuts on the front and rear pins only. Tighten these finally with fine nose pliers now, but ensure you have firm hold of the wheel so as any turning pressure from the pliers does not move the wheel on the axle, thereby upsetting the quartering. Trim off the excess pin and clean up on the leading axle. The trailing one may be left over length for now if you prefer.
14. Repeat the previous step for the opposite side of the chassis.
15. We now need to modify the big end of the connecting rod, which has a large lump on its inner face at this end. Lay the chassis on its side, with the rod sticking out, but laying flat on the work bench. File this lump away leaving a parallel rod, which is still very thick, but will now sit over the centre crankpin bush.

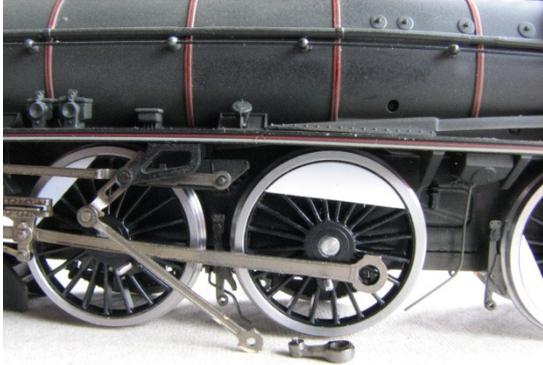


Connecting rod showing the “lump” that needs removing.



Modified connecting rod plus two bushes cut from brass tube.

16. The big end holes are too large for Gibson crankpins, so we need to bush them. Cut a short slice from a suitable piece of brass tube. Remember it needs to fit over the crankpin bush, and inside the rod at the same time.....so if there is a bit of slop between tube and rod it is not critical.
17. The Bachmann cast return crank will not fit the Gibson crankpins, and it too needs changing. Cut the Bachmann crank from the rod by snipping through the rivet head.....averting eyes from flying rivet heads!



Return crank separated from rod.

18. We used Gibson brass casting 822 to replace these cranks. They will need tapping 14BA, and it is easier to hold them to do this with the castings still on the sprue. Use the tap in a pin vice. Open out the hole at the little end of the crank to suit a valve gear rivet.



Packet of castings with a prepared pair alongside the tap.

19. Wind one of the cranks onto one of the centre crankpins, and naturally it will go tight and stop in the wrong position! Undo, and file a small amount from the rear face of the crank boss, and try again. It will now be tight at a point further round; so by trial and error, we get it to tighten at the correct angle. Repeat for the opposite side, then remove, but make sure you know which one fits which side.
20. Lay the chassis on its side, so that the rod is pointing away from the chassis. Place a valve gear rivet into the rod hole. Then place a small piece of paper over the rivet, with the correct return crank on top of that. Solder the rivet to the crank, and then tear out the piece of paper. Hopefully, the crank will be free to revolve.....

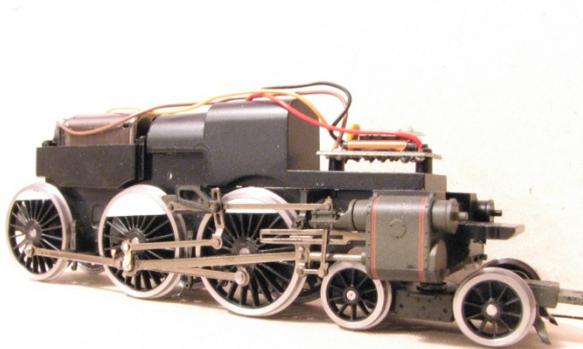


Rod placed over rivet.



Paper placed between rod and crank prior to soldering.

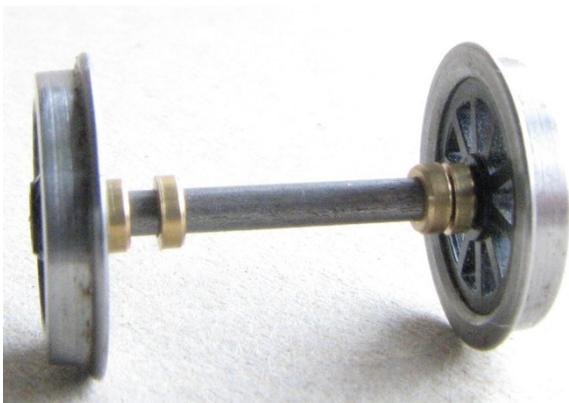
21. Clean up the excess rivet and solder.
22. The connecting rod should be lifted onto the crankpin and bush, placing the brass tube bush in the con rod big end, and the return crank can now be wound on and tightened. This is easier to accomplish with the wheels rotated so that the crankpins are halfway between six and seven o'clock.....so that the attached valve gear can move about without binding as the crank is tightened.
23. Repeat for the opposite side, and remember to move the wheels so the crankpins are at the six to seven o'clock position. You can gently, repeat gently! move the wheels the small amount required under power.



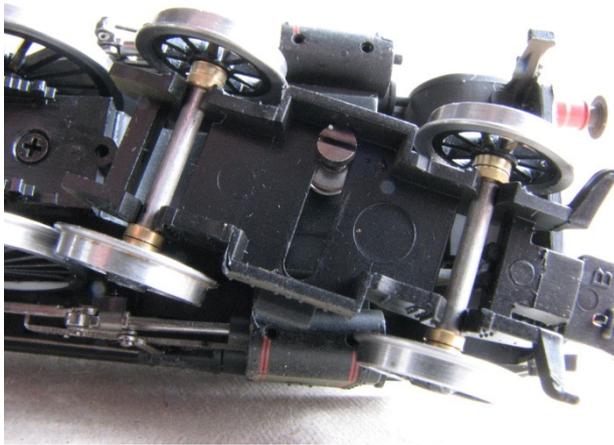
Completed valve gear.

THE BOGIE

24. The remaining job is to re wheel the bogie. The Bachmann wheels will spring out of the bogie moulding, and are replaced with Gibson wheels made up using 2 x 1 mm brass spacing bushes of 2mm bore.

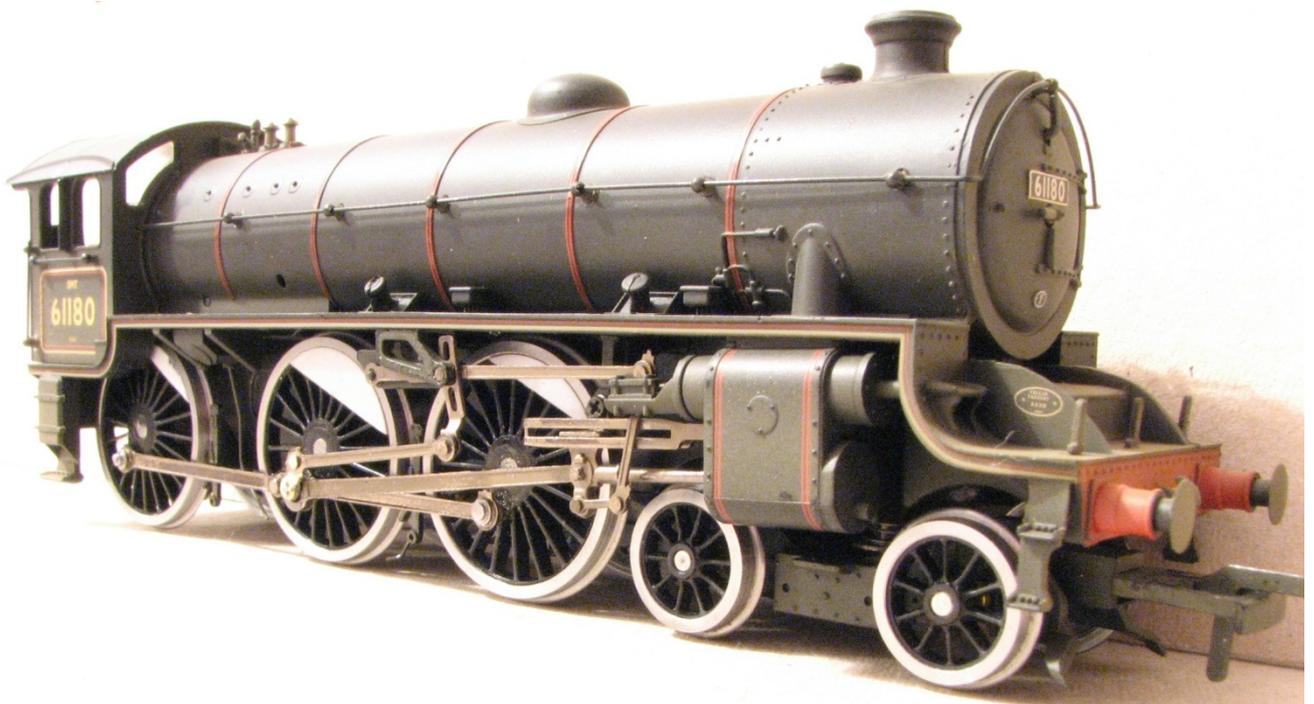


One pair of bogie wheels assembled with spacers.



Re wheeled bogie.

Congratulations! If you have reached this point, then you should now be able to track test the completed chassis. Apply power gently and ensure nothing is binding, if all is well increase power slowly. Don't forget to lubricate the new bearings!



Pete Hill, January 2013.

Other Parts Used in this Method

4800 Coupling rod Bushes

4M42B Crank pins

4M822 Return Crank

4M67/2 2mm Spacing Washers

Valve Gear Rivets, ours are steel and difficult to solder, we do intend to produce a brass one in the near future, in the meantime Markits produce a Nickel Silver type

Fibre Washers

Loctite, Pete uses some of his precious stock of 601 and we wouldn't want to comment on the suitability of other products.