Chiltern Model Steam Engines

Marine Twin Cylinder Model Steam Engine v2.1 Assembly Instructions v1.2

Notes:

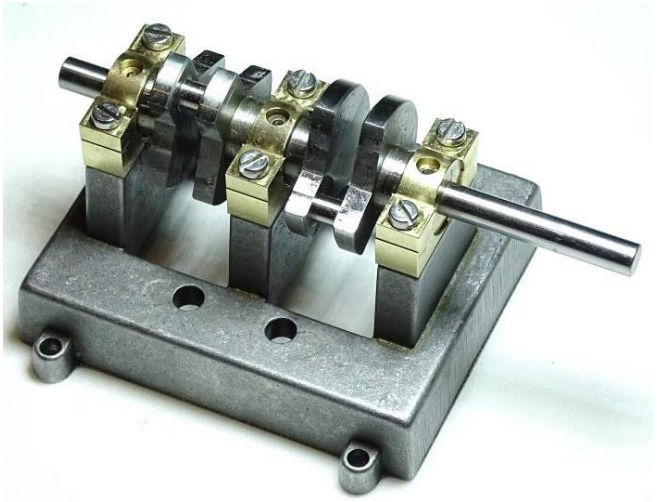
1. Model steam engines and boilers are NOT children's toys and should not be assembled or operated by children unless under close supervision of an adult.
2. If there are any questions or problems arising during assembly or operation of the engine please contact Chiltern Model Steam.
3. In overview the engine should first be assembled "dry" with no oil/lubricants, thread lock or gasket sealant applied, then disassembled, polished, painted as required, and finally re-assembled lubricating and applying thread lock and gasket sealant as applicable.
4. The engine will work properly "dry" but if it is to be run under load, it is recommended that thread lock, such as Loctite 222 Screwlock (or equivalent low strength locking compound) be used to stop the fasteners from coming loose. Also that a gasket sealant, such as Loctite Instant Gasket (or equivalent), is used on the cylinder's mating surfaces with the end plates and Chest. Both thread lock and gasket sealant can be purchased for a small sum from automotive shops or on the internet.
5. Although all sharp edges and burrs should have been removed during manufacturing, check all parts and if any sharp edges or burrs exist carefully remove them with a metal file.
6. It is recommended that the steel parts are painted to prevent corrosion. Hammerite's range of metal paint sprays work well for this application although do take a long time to harden before final assembly can be done.
7. For polishing the brass components, wet and dry paper can be used - start with coarse e.g. 280 grade to get the worst marks out of the brass work and end with very fine paper, e.g. 1500 grade and finally Brasso and a rag.
8. Be careful not to over tighten or cross thread the capscrews, use only a small and/or medium cross head screw driver. If excessive force is being used there is probably something out of alignment.
9. All parts are checked before shipping, so if a part does not seem to work perfectly try it in another orientation or position.
10. Always check www.chilternmodesteam.co.uk for the latest assembly drawing, instructions and tips. Any questions or comments good or bad, please don't hesitate to contact us via email: sales@chilternmodelsteam.co.uk.
11. We would be grateful if you would take some pictures of your completed model and email them to us for inclusion on our WEB site.
12. Tools required for assembly depend on which screws have been supplied with the kit; 1.5mm Allen/Hex Key for M3 grub screws, 3mm Allen/Hex Key for M5 button socket screws, 4mm Allen/Hex Key for M5 cap socket screws, medium slot screw driver, metal file and small pliers, M2 and M3 spanner, metal hack saw.
13. NOTE: some of the screws as provided in the kit may need to the cut or filed to length, please contact us if this presents a problem and we will work on a solution.
14. Use a light oil for external lubrication of the engine and if running the engine for an extended period install a displacement lubricator in the inlet steam line from the boiler filled with steam cylinder oil (compounded, 220 grade).

Step by step instructions:

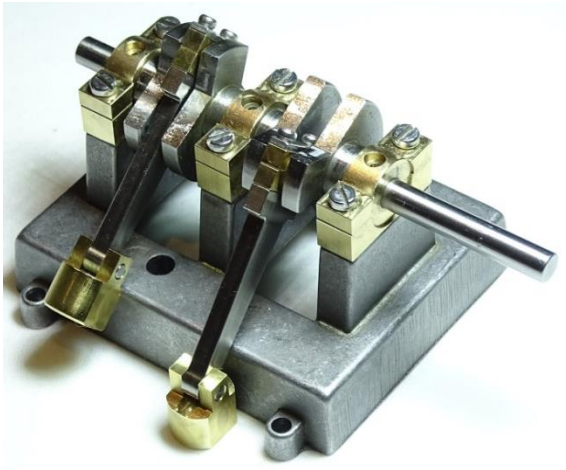
1. Locate the parts as show in the following picture and as listed on the Assembly Drawing (a copy of which will have been included with the kit but also available for download from www.chilternmodesteam.co.uk). NOTE: for shipping purposes many parts will be packed semi-assembled or in place, e.g. grub screws, bearings and eccentric rod.

2. Remove the capscrews and the Main Bearing Uppers off the Base Plate. Ensure these are later replaced in the same place and orientation as they are machined in pairs.

3. Place the Crank shaft onto the Main Bearing Lowers and replace the Uppers, as shown in the following picture. Evenly and gradually tighten the 6 capscrews whilst rotating the shaft. This will ensure the bearings centre themselves properly on the shaft. Lubricate via the hole in the Upper bearings.



4. Remove the screws holding the connecting rod bearing halves to the connecting rod and place them around the crank shaft as shown in the following picture. Insert and tighten the screws evenly and gradually, rotating the connecting rod around the shaft to ensure the bearing halves locate centrally.



5. Screw the M3 nut onto each Piston Shaft on the longer threaded end. The end of the shaft with the shorter thread is for the Piston.

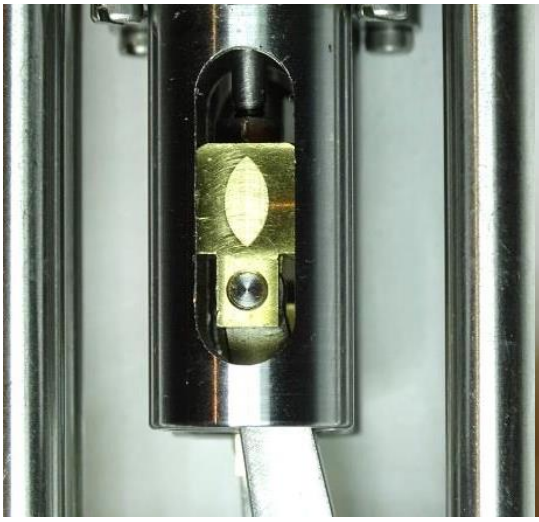
6. Screw the end of each shaft with the nut all the way into the Sliders and wind back approximately 2mm and gently tighten the nut to the Sliders.
NOTE: The Piston Shaft can be screwed out of the Slider to more accurately centralise the "throw" of the piston in the Cylinder.

7. Fix each of the 4 Columns loosely onto the Base using the M5 screws.

8. Fix the Slider Tubes to the Top Plate using the 12mm M3 capcrews.

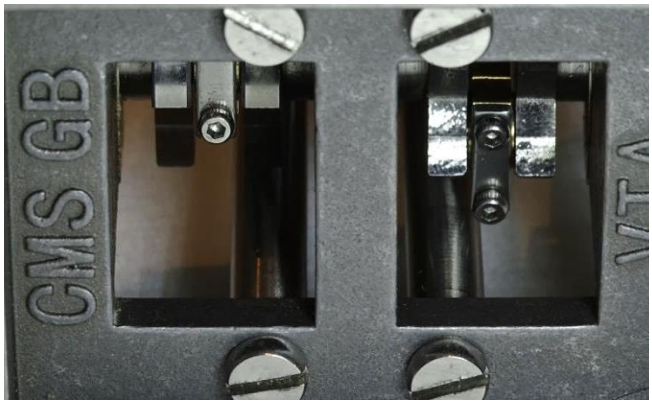
9. Check that none of the capscrews protrudes above the surface of the Top Plate. If any do remove the capscrew, file down and replace.

10. Place the Top Plate onto the Columns, insert the Sliders into their respective Tubes and fix in place with the 4 M5 screws.



11. Tighten all 8 M5 screws. Rotate the shaft and check the Sliders move freely in their respective Tubes.

12. Check that each Keep Plate on the Connecting Rods does not interfere with the Columns. If they do loosen the cap socket screws in the Base and push the columns out and then retighten. The corners of the Keep Plates can also be filed off if needed.



13. Screw each Packing Nut into the Cylinder Plate Inners.

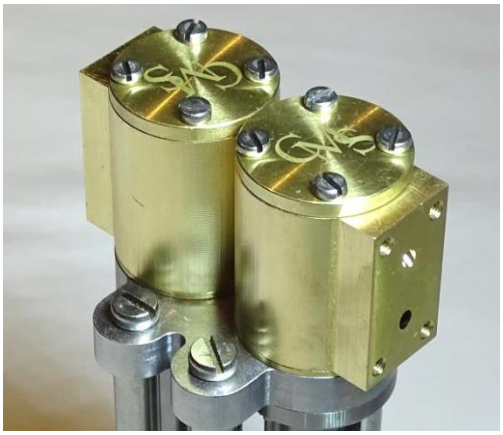
14. If it is planned to use high pressure steam - during final assembly, to improve the seal around the Piston Shaft, PTFE tape can be wrapped around the Shafts and Packing Nut thread. When tightening the Packing Nut into the plate ensure the Shaft can still move freely, that is, do not overtighten the Packing Nut.

15. Place the Cylinder Plate Inners/Packing Nuts onto each Piston Shaft.

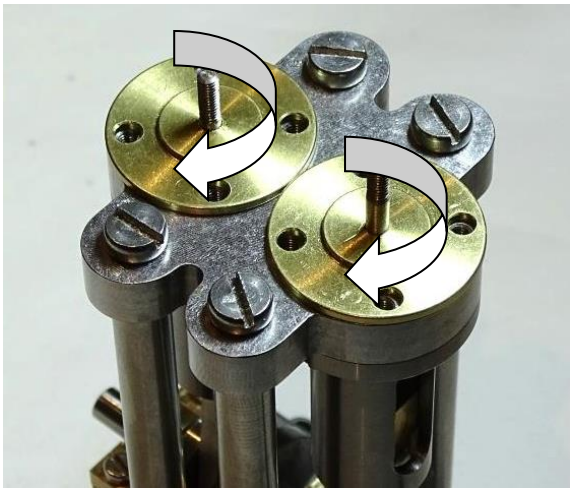
16. If not already in place, insert the 2 nylon piston rings into the slots in the piston and screw the Pistons onto each Piston Shaft. Carefully lock the shafts to the pistons using an M3 nut tightened with a spanner or small pair of pliers.

17. One at a time, place the Cylinders over the Pistons and the End Plates on top of the Cylinders. Then loosely screw them in place using the 45mm M3 capscrews.

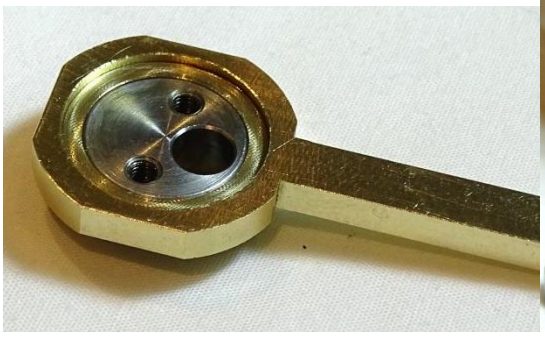
18. Before tightening the 45mm capscrews rotate the Crank Shaft to ensure the Piston can move freely in the Cylinder. There is some tolerance in the Cylinder and Cylinder Plate holes to allow them to be moved into a suitable position to allow free movement of the piston. Then gradually tighten the 45mm capscrews. Repeat for the second Cylinder.

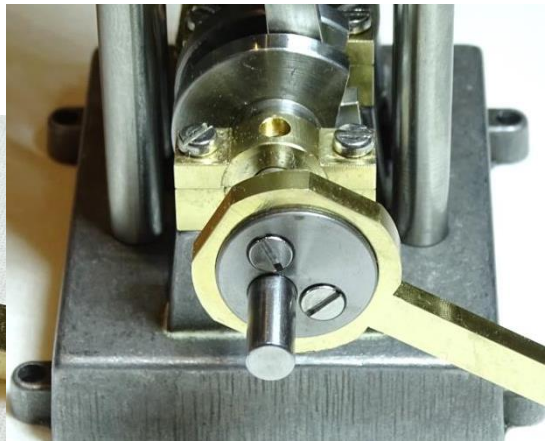


19. If after tightening the Cylinders the engine does not turn over freely try rotating the Cylinder Plates Inner by 90°. Similarly try refitting the Slides/Connecting Rods and its bearings the other way around.



20. Put the Eccentric Wheels and Eccentric Wheel Plates together with the Eccentric Rods loosely using the counter sunk M3 screws. Slide the Eccentric onto the crank shaft to ensure the wheel and plate aligns before tightening the screws, as shown in the following pictures. Then if not already in place screw a 3mm grub/setscrew into the Eccentric Wheels which will be used to lock the wheels onto the Crank Shaft.

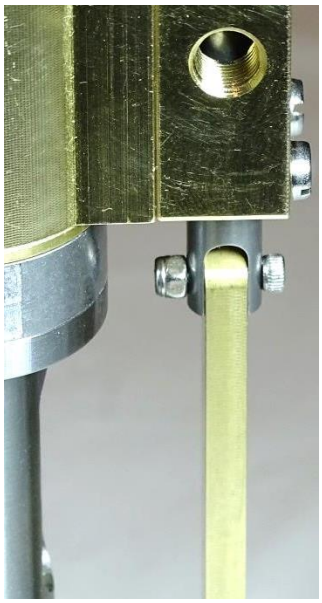




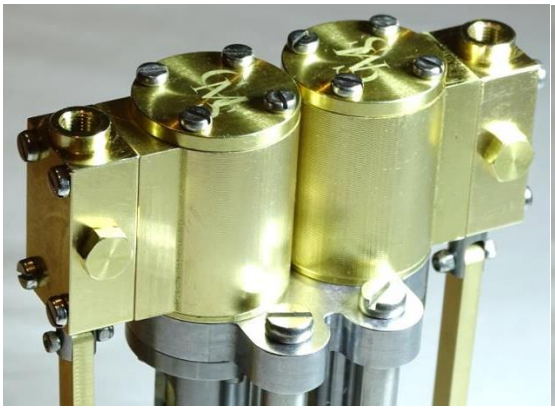
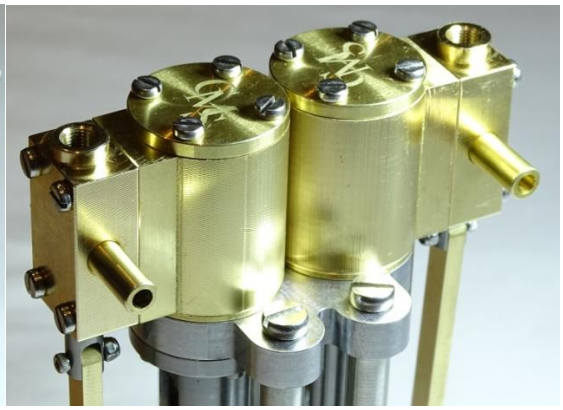
21. Connect the Valves with the Eccentric Rods using M2 10mm capscrews and lock each with a nyloc nut as shown in the following picture.

22. Push the Eccentric Wheels on to each end of the Crank Shaft and rotate the Wheels and Shaft until they are at the correct angle as shown in the following pictures.

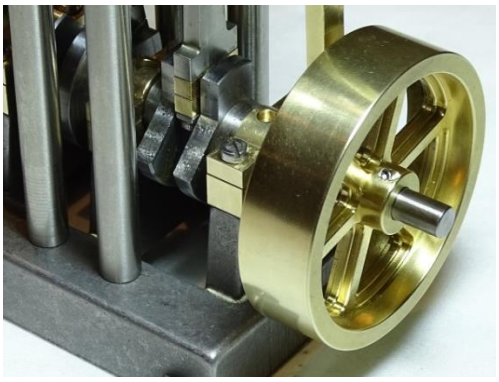
23. Insert the Valves into the Chests. The Chests can then be fixed to their respective Cylinders using 4 M3 18mm setscrews.



24. Screw the Chest Plugs and Inlet (stub) pipes into the Chests. The threaded holes in the chest are ¼" x 40 tpi ME which will accommodate the most common connection to a model steam boiler.

25. If not already in place screw the M3 grub/setscrew into the hole in the Flywheel and push the Flywheel onto the Crankshaft. Tighten the grub/setscrew.



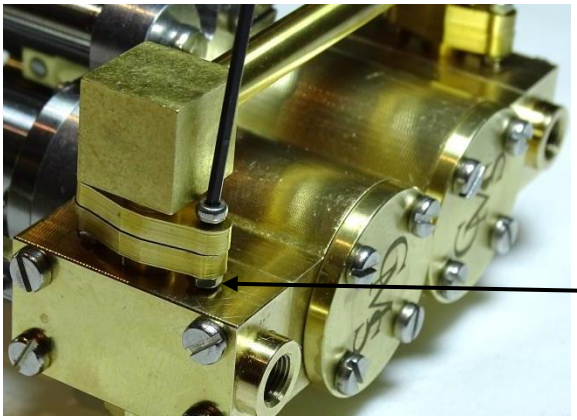
26. The Manifolds are an optional extra. Please note the Manifolds have now been updated since the photos were taken and no longer need M2 nuts as one pair of Manifolds have threaded holes, the other pair has clearance holes. 6 x ¼" brass locking nuts are now included.

27. Screw 2 Inlet Manifolds into the Chest inlet holes.

28. Place 2 cap screws in each of the remaining 2 Manifolds, as per the following picture.

29. Screw the Tee Connector to the Elbow Connector using the Link Pipe. Keeping the cap screws in place screw the 2 Manifolds into the Tee and Elbow Connectors respectively.

30. Place the Inlet Manifold/Connector subassembly on the Manifolds already installed on the Chests, aligning the Manifold holes to allow the cap screws to go through.

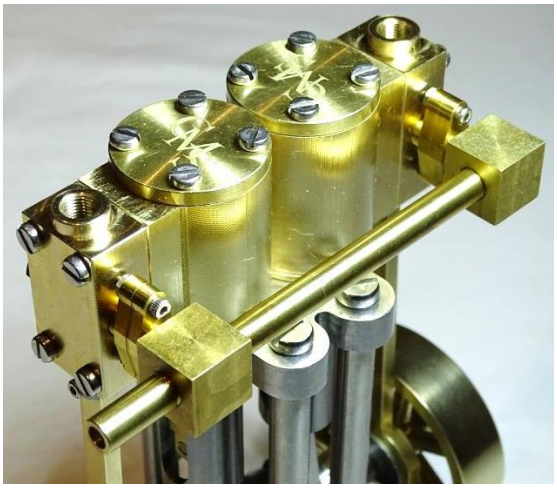


31. Some trial and error may be required to get the Manifolds to accurately mate together, i.e. screwing out or in the Link Pipe and/or Manifolds. Once aligned fix the Manifolds together using the 4 x M2 cap screws and tighten the ¼" lock nuts.
NOTE: the Cylinders/Chests also need to be level in order that the Manifolds mate accurately

together.

32. If later it is found that there is steam/air leakage from the different threads, wrap a little PTFE plumbers tape around the threads or thread sealant.

33. For connecting to an air soruce the Inlet (stub) Pipe can be screwed into the tee.



34. NOTE: The tee can be reoriented to allow a side inlet direction rather than front/back as show in the above photo or the manifold can be installed on either side of the Chest/engine with Chest Plugs on the opposite side.

35. Lubricate the engine to ensure it operates freely.

36. To test the model a compressed air source such as a bicycle stirrup pump can be used to turn the engine over.

37. Disassembly is a reverse of the above instructions. Once disassembled each component can be cleaned, painted or polished as mentioned in the notes above. See www.chilternmodelsteam.co.uk for examples of completed models.

38. Please send some pictures of the completed engine to email: sales@chilternmodelsteam.co.uk.