Miniature Steam Pty Ltd.

Bringing the Highest Quality Standards to Model Engineering

"Miniature Steam" Custom Steam Plant Kit

for self-assembly in

Caldercraft "Joffre" -Tyne Tug

2" Horizontal Boiler

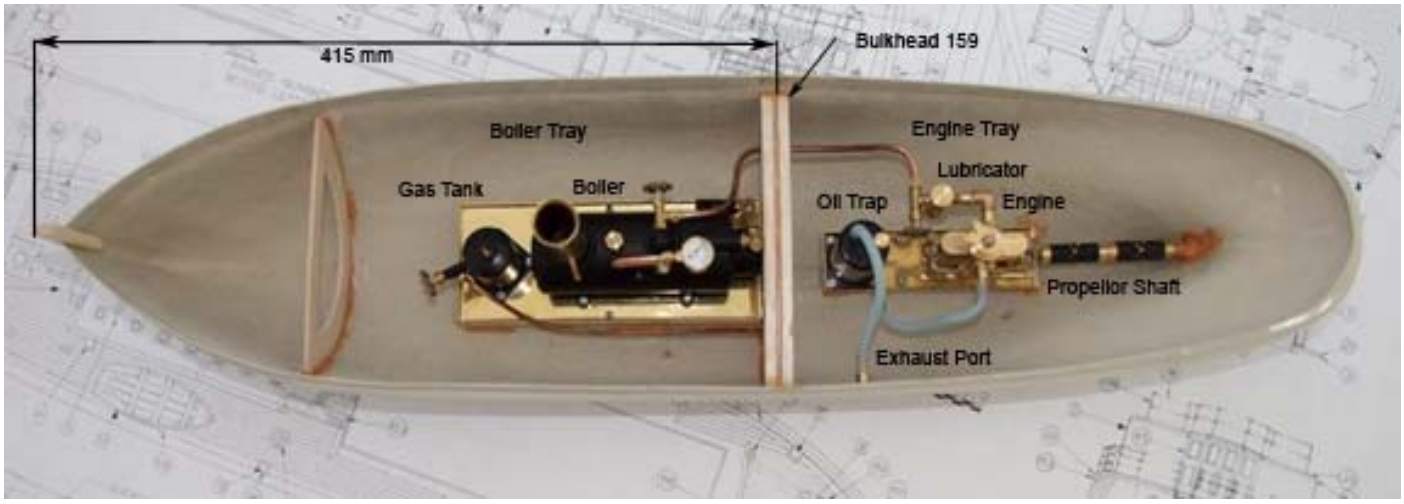
with

"Avon" Twin Cylinder Oscillating Steam Engine

Kit Assembly Instructions

Caldercraft "Joffre" With ***"Miniature Steam"*** Custom Steam Plant

Whether fitting the steam plant to a new or established Joffre model it is important that the centerline of the bulkhead (159) is precisely 415mm from the tip of the stem. Access to run the plant through openings in the deck, to fit the propeller drive shaft and the pre-formed steam line depend on this dimension being exact. This datum is also important for positioning the boiler and engine wooden mounting blocks. Do not proceed until the bulkhead is correctly positioned.

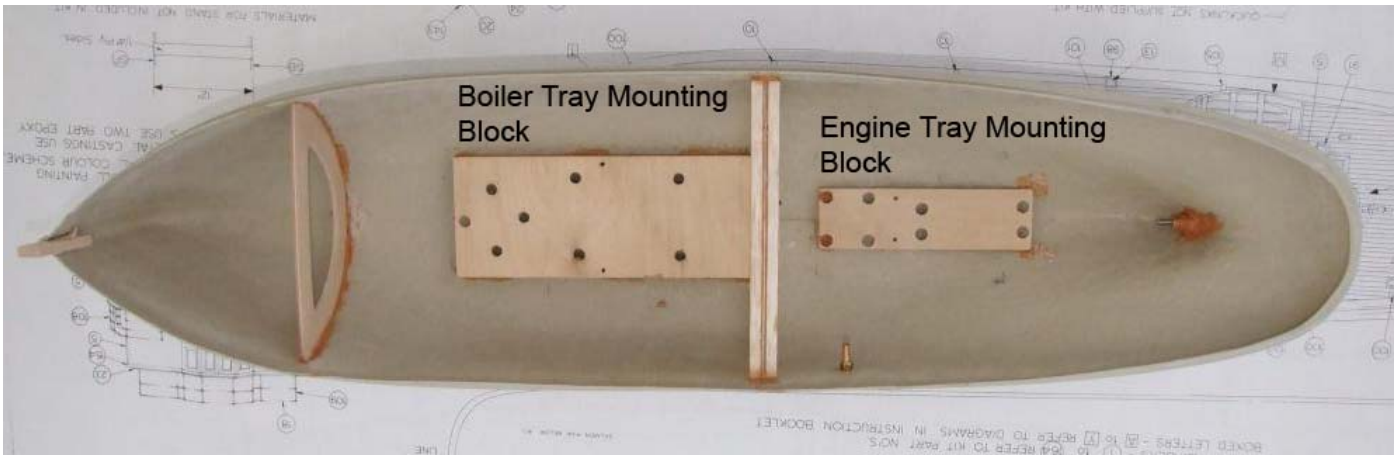


The kit is delivered in six boxes as follows:

- Refillable gas tank P/N 4271
- 2" Horizontal boiler P/N 4058
- 2" Ceramic burner P/N 4016 less gas pipe.
- Oil trap P/N 4062
- "Avon" Oscillating Engine Self Assembly Kit P/N 5027K
- Accessories: Includes propeller universal drive shaft P/N 9461 X 2, short propeller drive shaft P/N 5357, 40mm propeller P/N 1067M or 1068M, mounting blocks P/N 3001/3002, mounting trays P/N 2884/2885, steam pipe P/N 3020, gas pipe P/N 3021, pipe fittings, exhaust port bush, mounting screws

Assembly Instructions:

Step 1. Fit the tray mounting blocks



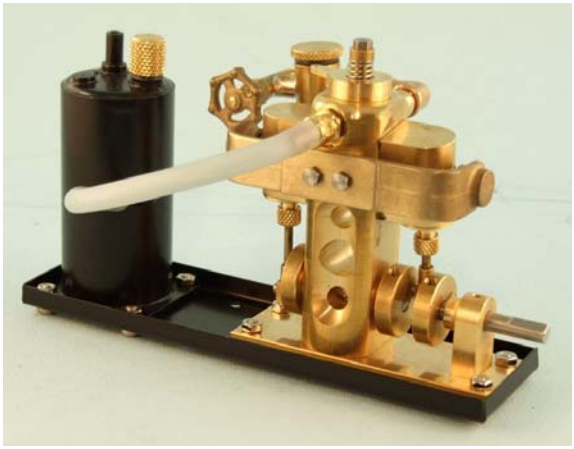
Position the Boiler Mounting Tray Block, oriented as shown above, and gently align it to the centreline of the hull with the rear end of the block square against the bulkhead. Place a mark on the hull 40mm from the after edge of the Boiler Block to establish the correct position of the Engine Tray Mounting Block as illustrated. Using Epoxy 2 Pack adhesive set the blocks in place and put aside to allow the adhesive to set.

Step 2: Assembling the Boiler Mounting Trays:

Lay out the screws and nuts. There should be at least 4 wood screws for securing the trays to the mounting blocks, 4 x 6 mm screws for securing the oil trap to its tray, 8 x 8 mm screws to secure the boiler and engine to their respective trays and 4 x 12 mm screws to establish a removable fixing for the gas tank. With the exception of the latter it is recommended that the screws be inserted from the top of the tray with the nuts on the underside of the tray. (You may find we have supplied surplus nuts or screws—just in case some get lost!)

The 12 mm screws for the gas tank should be inserted from the underside and the nuts tightened from the top before placing the tank on the screw ends (see picture opposite). This provides for easy removal and reinserting the tank during refilling operations. Filling instructions are detailed in a facts sheet supplied with the tank

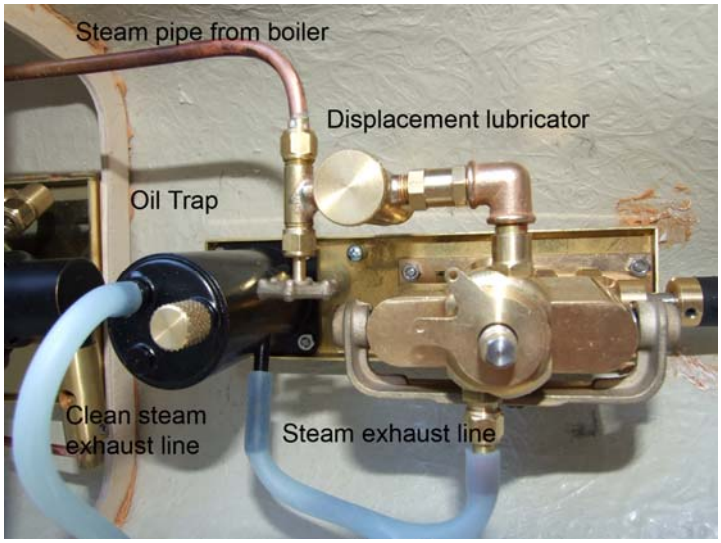
DO NOT EVER BE TEMPTED TO REFILL THE TANK WHILE IT IS IN POSITION IN THE BOAT—YOU RUN A SERIOUS RISK OF TRIGGERING AN EXPLOSION WHEN RESTARTING THE BOILER.



Assemble the engine as set out in separate instructions supplied with the engine. The lubricator is attached to the engine using two additional fittings illustrated in the picture below.

Make sure the engine is spinning freely before ***and after*** screwing it to the tray. If there is any uneven tightening the engine may stiffen and may no longer run efficiently. Secure the oil trap to the tray with the screws and nuts noted above.

The plan view opposite illustrates the plumbing required to deliver the steam to the engine as well as the piping involved in exhausting it away from the engine. The exhaust steam is delivered through silicone fuel tubes pressed on to the appropriate fittings. Vent the cleaned steam to the atmosphere by connecting the clean steam exhaust line to the brass nipple (exhaust port) fitted through the hull. The fittings between the displacement lubricator and engine are supplied in the accessories box. Be careful not to over tighten the threads. Sealants should not be required to obtain a satisfactory seal.



Step 3: Starting up the plant:

A separate document "**OPERATION OF "*Miniature Steam*" PRODUCTS IN A STEAM PLANT"** is included in the accessories box to guide commissioning of the plant.

It is recommended that the calibration and engine run in be completed before final fitting of the assembly in the boat hull

Place the two trays on a flat wooden surface and connect the steam line to both units. Using the wood screws supplied, lightly screw the two trays to the surface.

Calibrate the Ceramic Burner as per the instruction sheet supplied in the burner box:

Running the Boiler

- Remove the safety valve and, using the syringe supplied, fill the boiler with clean water to approximately 75% of full volume. The water level in the water level sight glass should be visible close to the top. Make sure you can see the water level in the sight glass. The boiler requires space above the water level to accumulate steam. If you can't see the actual water level remove some water with the syringe until you can. Replace the safety valve and lightly tighten.
- Check that the steam stop cock on the boiler is closed.
- ***If the boiler is cold***, remove the gas tank from its mounting pins and the burner from the boiler, turn on the gas valve a little, light the burner directly with a gas gun, reinsert the burner while it is burning into the boiler, replace the gas tank onto its mounting pins. Ensure the knurled nut connecting the gas pipe to the gas tank is firmly tightened before opening the gas valve fully.
- ***If the boiler is warm***, open the gas valve a little and hold a gas gun (NOT a lighted match or the sparking type of gas gun) to the top of the stack. When the burner ignites open the gas valve fully. It can seem noisy but this is normal. (A suitable gas lighter can be purchased at most Supermarkets)
- The boiler should reach its maximum working pressure of 40 psi (2.8 bar) in about 5 to 6 minutes. If it is filled with warm water this time can be reduced to 3 to 4 minutes. When the pressure gauge reaches recommended operating pressure fully open the steam cock on the boiler and adjust the steam cock on the lubricator to allow some steam to flow through to the engine to heat the steam pipe and the engine cylinders. When these are cold some condensate will blow out when the steam reaches the cylinders. This is normal.
- Adjust the lubricator steam cock to produce the power required for the engine. This setting can be retained for future running since the boiler steam cock is used as a Start/Stop valve. If the safety valve blows off after the engine reaches the desired operating speed adjust the gas valve to reduce the gas supply as well.
- Note that in the early stages of running up the boiler, the rate of gas consumption will cause the gas tank to cool down – possibly to the point where frost will appear on the outside of the tank. This is normal and in practice will cause a reduction in burner performance at the time. Don't worry – the boiler is mounted close to the gas tank and it will soon warm sufficiently to keep the tank delivering maximum gas to the burner.
- To stop the boiler, turn off the gas cock and wait for the steam pressure to drop to zero before closing the boiler steam cock ready for the next run. The lubricator steam cock should remain as set to provide the same operating power on the next run.

Before fitting the assembly in the boat hull run the plant for at least six boiler fills to remove any stiffness in the engine. This is a good opportunity to practice controlling the engine speed and boiler power adjustments.

Fitting of the tray assemblies in the boat hull:

Locate the ***boiler tray*** to butt up against the bulkhead on its mounting block. The nuts and screw heads on the underside of the tray should match the recessed holes in the mounting block. Do not secure the tray at this time. Position the ***engine tray*** so that it fits neatly on its mounting block. Connect the steam pipe from the boiler to the engine. It should allow precise matching of the nuts into the recessed holes in the engine mounting block. If there is a mismatch please make corrections as appropriate. Using the wood screws supplied, secure the trays to their mounting blocks and loosely attach the propeller shaft coupling and its related fittings to the engine drive shaft. If working with a new boat kit the standard propeller shaft tube (4) should be discarded and replaced with the special propeller shaft and propeller supplied with the steam plant. If retro fitting the plant carefully remove the existing propeller tube and proceed as follows. Fit the propeller supplied to the propeller shaft and pass the shaft through the stern such that the propeller thrust will be taken up by the propeller shaft thrust bearing and there is some longitudinal slack between the propeller shaft and the propeller shaft coupling. Secure the propeller shaft with epoxy putty and when set, tighten the grub screws on the propeller shaft components.

RC Controls & Ballast:

Before installing the deck, fit all the RC components (battery, servos & links, & wiring) in place, and conduct a buoyancy balance test. Glue appropriate ballast in positions to provide even displacement of the loaded hull. Some fine adjustments can be made later but it is better that this process is undertaken before gluing the deck in place.

Refilling the gas tank:

Disconnect the gas pipe from the gas tank and remove the tank from the mounting tray before filling as instructed in the Test Certificate. When refilling the gas tank it is normal for the tank to cool down. This may aggravate the condition noted above when starting the boiler. In very cold conditions it may be necessary to warm the filled tank to room temperature preliminary to re-fitting it into the tray.

Test certificates for each pressure vessel:

Formal Test Certificates, general safety recommendations and filling instructions for the boiler and gas tank are enclosed in each pressure vessel box. These should be read carefully and stored in a safe place for future reference.

Recommended Propellers & Drive Shafts:

To obtain maximum performance from your plant we strongly recommend you avoid using fabricated propellers. Precision cast Caldercraft/***"Miniature Steam"*** propellers and matching propeller shafts will deliver top performance from your steam plant.