Miniature Steam Pty Ltd.

Bringing the Highest Quality Standards to Model Engineering

"Miniature Steam" "Tyne"

Single Cylinder Vertical Oscillating Steam Engine

11mm Bore/Stroke

Assembly Instructions
P/N 5045

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Manual P/N 9002

General Instructions

On receipt of your product set, check that you have received the correct quantity of components as listed in the Parts List section of the two exploded assembly drawings included here. This is also an excellent way to familiarise yourself with the part numbers associated with the items, that in turn are mentioned in the descriptive material.

The kit is delivered in four parts:

Trunk with cylinder, crankshaft and crank fully assembled
Flywheel with grub screw inserted
Displacement lubricator fully assembled (not shown in drawings)
Steam exhaust assembly (not shown in drawings)

The initial assembly process is self-evident. The following detailed assembly instructions are intended to assist with any later maintenance or cleaning that you may undertake

When assembling an engine everything should come together easily. If you encounter stiffness in the assembly then backtrack and trace its origin. NEVER try to force a smooth result.

If you are concerned that “finger pressure” tightening in the following instructions is insufficient by all means use a tool but remember that the components involved should not be damaged in any way.

When tightening connections with grubscrews “wiggle” the shaft as you screw down the grubscrew to make sure the secure point of contact is centred on the middle of the flat.

Tools Required

- 3 mm hex set key (supplied)
- Small flat blade screwdriver (not supplied)
- Small adjustable spanner for connecting pressure inlet and exhaust fittings (not supplied)

Other Items Not Supplied

- General Lubricant – suggest a locally available light machine oil (see **Oils** below**)**
- Steam Oil For Displacement Lubricator – a light grade of special steam oil (Steam Engine Compound Cylinder Oil – sometimes called “Cylinder Oil”) suitable for lubricating at steam temperatures. (see **Oils** below

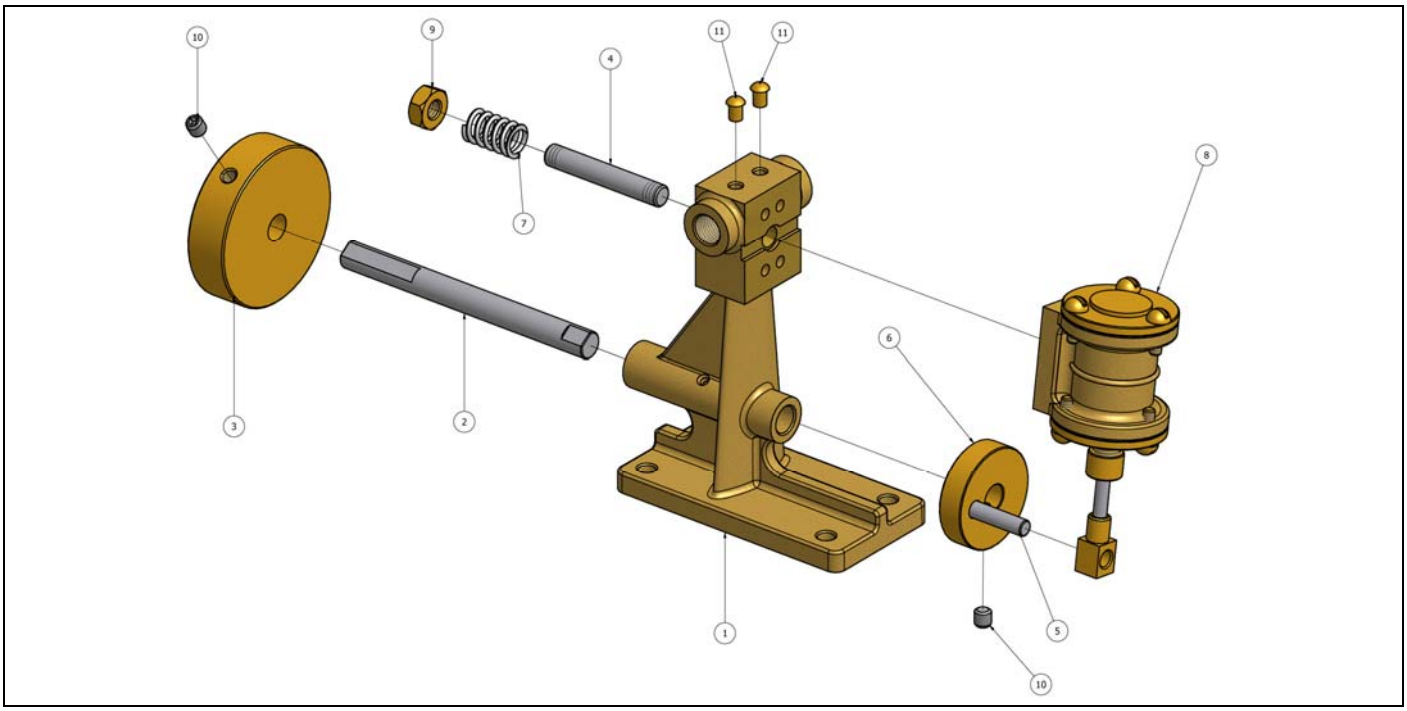
Note: The displacement lubricator is **only** for use in a steam driven system. If compressed air is used a different type of lubricator is required. Please contact us for further information

Painting:

If you plan to paint the components of the engine, please be aware that commonly available paints do not consistently adhere to the high quality bronze materials used in the casting sets we supply. To obtain a durable finish for your engine please use an “etch primer” as available in your locality to prepare the engine surfaces before applying the paint of your choice. We recommend that you paint the components before starting the assembly process.

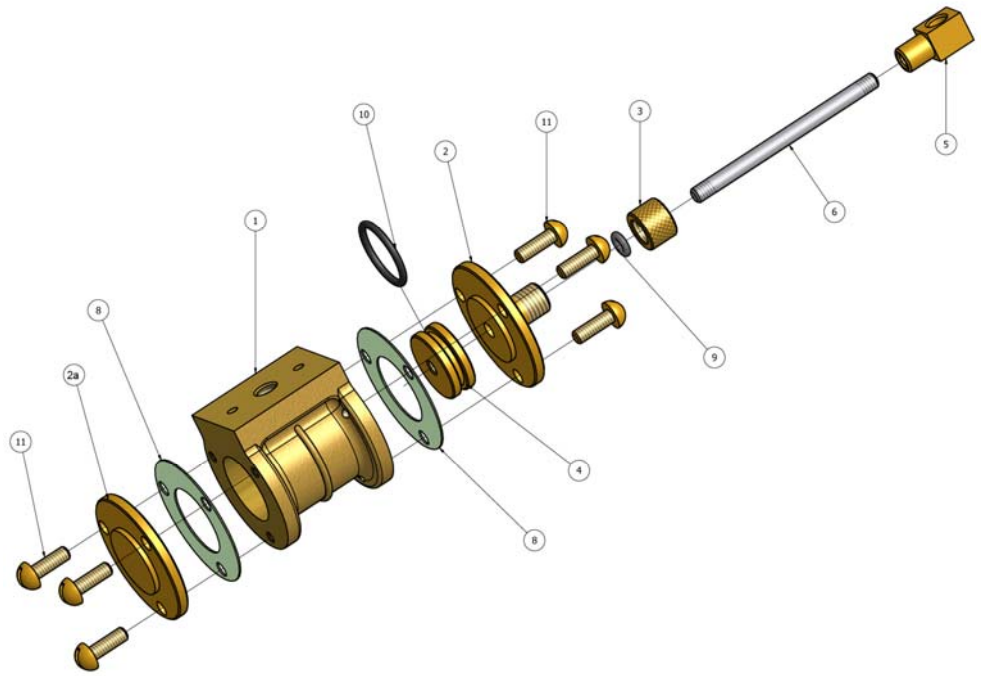
General Assembly Drawing

Please note: This drawing is a schematic only and does not show all components. It should be read in conjunction with the Cylinder Sub-assembly Drawing to explore all details of the engine. The “Packing Quantity” column of the Components List tables should be used to check the initial delivery as noted above.



"TYNE" GENERAL ASSEMBLY COMPONENTS LIST				
ITEM	**PACKING QUANTITY**	**ASSEMBLY QUANTITY**	**PART NUMBER**	**DESCRIPTION**
1 1		1	1102	Trunk
2 1		1	2831	Crankshaft
3 1		1	2830	Flywheel
4 1		1	2829	Pivot Pin
5 1		1	2107	Crank Pin
6 1		1	2109	Crank Flywheel
7 1		1	2115	Spring
8 1		1	5287	Cylinder Assembly
9 1		1	9099	4 mm Stainless Steel Nut
10 2		2	9200	Grub Screw (M3x3)
11 2		2	9716	1-16x1-4" Rivet
12 1		1	9716	4 mm SS Washer (not shown)

Cylinder Sub-assembly Drawing



"TYNE" CYLINDER SUB-ASSEMBLY				
ITEM	**PACKING QUANTITY**	**Per ITEM QTY**	**PART NUMBER**	**DESCRIPTION**
1	1	1	1106	Cylinder
2	1	1	2101	Top Cylinder Cover
2a	1	1	2102	Bottom Cylinder Cover
3	1	1	2103	Gland Nut
4	1	1	2104	Piston
5	1	1	2105	Piston Big End
6	1	1	2106	Piston Rod
7				
8	2	2	2116	Gasket
9	1	1	9130	Gland Packing
10	1	1	9599	O-Ring 8mm x 1 Viton
11	6	6	9680	Round Head Screws

Assembly Sequence

The engine is supplied in four parts that are assembled as follows:

1. Place the semi-assembled engine on a bench and proceed as below:
2. Fit the flywheel to the crankshaft. The fixing grub screw is already inserted in the flywheel. Use the supplied Allen key to tighten the grub screw onto the crankshaft. To ensure that the grub screw seats properly onto the flat section of the crankshaft, “wobble” the flywheel as you gently tighten the grub screw.

3. Fit the Displacement Lubricator to the trunk input/output port of your choice.(The engine will happily run with steam input to either port)
4. Fit the exhaust assembly to the other port and connect it to your chosen exhaust system. Generally this should include an exhaust oil separator that will collect oil in the exhaust gas stream.

Your engine should now be ready for initial power operation as described below

In the event that you need to dismantle the engine for maintenance purposes the following description advises how to proceed with re-assembly. (NOTE: If the pivot pin (2829) is separated from the cylinder (1106M) a suitable thread sealant should be used when re-assembling)

Cylinder Sub-assemblies

1. The Piston Rod (2106) is delivered pre-assembled with the Piston Big End (2105). Slide the Gland Nut (2103) followed by the Bottom Cylinder Cover (2102) onto the assembly with the long spigot pointing toward the Piston Big End. Wrap a little Gland Packing material (9130) around the shaft and lightly tighten the Gland Nut onto the spigot. Check that the shaft slides cleanly before nipping it up firmly. Reduce the amount of packing material if the shaft movement becomes noticeably stiff. It may free up with time but may require adjustment if the engine becomes sluggish

2. Screw the free end of the Piston Rod into the Piston, and, gripping the Piston firmly, twist the Piston Big End to tighten the assembly. Finger pressure alone should be sufficient to secure the threads.

3 Place the Piston “O” Ring (9599) on the Piston after lubricating it lightly.

4. Place a Gasket (2116) over the Piston and insert the Piston in one end of the Cylinder Sub-assembly (1106) (the Cylinder is symmetrical so it does not matter which end). Secure the Bottom Cylinder Cover with the screws supplied (9680)

5. Lightly lubricate the Piston in the Cylinder and the Piston Rod outside the assembly and check for smooth operation of the assembly. It may feel a little stiff but the piston should move freely through the entire stroke of the Piston Rod. Adjust the Gland Nut as appropriate.

6. Take the Top Cylinder Cover (2101), add a Gasket (2116) to the flat side of the Top Cylinder Cover and secure it to the Cylinder with the brass screws supplied (9680)

Crankshaft Assembly

1. Thread the Grub Screws (9200) into the Flywheel (2830) and Crank Flywheel (2109) so that they project slightly into the bore.

2. Lightly lubricate the Crankshaft (2831) and slide it into the Trunk (1102) with the Crankshaft flats oriented as shown in the exploded drawing above.

3. Position the Crank Flywheel, with the pivot pin facing away from the trunk, so that the end of the crankshaft is flush with the outside face of the Crank Flywheel and nip up the grubscrew as previously described.

4. Slide the Flywheel onto the projecting end of the crankshaft so that it is gently resting against the trunk and tighten the grubscrew. The Crankshaft assembly should rotate freely without noticeable sideways movement.

5. Slide the Pivot Pin of the Cylinder sub assembly into the trunk and slide the Piston Big End onto the crankpin.

6. Place the Spring (2115) on the Pivot Pin followed by the SS Washer (9175) and secure them in place with the Nut (9099). The nut should be tightened so that it binds gently on the limit of its travel and secures the assembly.

Installation & Running In

1.It is very important that the engine be installed on a firm flat surface. The engine components are built to very fine tolerances to ensure maximum performance. Any uneven pressure on the Trunk base can cause binding and reduced performance.

2. Please run the engine for at least three “standard fill” boiler sessions to run in the engine before expecting maximum performance. It is designed to run on steam pressures in the region of 30-40psi.

3. At the recommended pressures there should be no steam leakage. All steam interfaces are lapped before delivery. If leakage occurs after step 2 is complete, it may be necessary to dismantle the cylinders and clean and/or re-lap the offending surfaces. Ask us for advice if you encounter this problem.

4. Although it will work with compressed air, the engine is **NOT** designed to use this power supply for prolonged periods. The Displacement Lubricator only works with steam.

Running-In Guidelines for Factory Assembled Engine:

Your assembled engine has been carefully tested before delivery, but because of the close tolerances used in its manufacture, it may be a little “stiff” when you receive it. Before dispatch we have lubricated the piston/cylinder with a “rubber lubricant” to minimise initial stiffness. This lubricant will dissolve during early running and the special steam oil that should be used in the displacement lubricator will take over to minimise your possible frustration during the “running in” phase of your ownership. Some stiffness will remain for the first few “boiler loads” of running.

Important Note

- Steam Oil (see below) should only be used in the displacement lubricator. Do not recycle oil collected in an Exhaust Oil Separator.
- Bearings require oiling with the General Lubricant (see below) For trouble free service; ensure that all bearings are lubricated after every boiler fill. Oil holes are present in the Trunk (1012M) for the inner and outer crankshaft bearings.
- Crankshaft big end bearings (2105), and the Piston Rod (2016), should be lubricated by dripping a little oil alongside them while turning the engine over by hand.
- At the end of a days running remove all residual water and oils and lubricate all bearings as above.

Oils

We recommend the following: Steam Oil:

250ml P/N 8321
500ml P/N 8322
1000ml P/N 8323

General Lubricant:
250ml P/N 8324
500ml P/N 8325
1000ml P/N 8326

See our website http://www.miniaturesteammodels.com for details

Long Term Storage:

The engine’s cast components are made from a marine grade non-corrosive alloy; the crankshaft is made from stainless steel and the remainder of the machined components from brass. This combination provides maximum protection from corrosion during service if the engine is run regularly. However if you are planning for it not run for a prolonged period – say 3 months or more, the residual condensate that will remain in the cylinder, after a run, may cause some tarnishing of the cylinder bore. This could cause accelerated wear of the “O” rings and increase the internal friction of the engine during initial startup. In these circumstances we recommend that you remove the top and bottom cylinder covers, soak up the condensate, directly lubricate the cylinder bore (preferably with a benign rubber grease) and replace the cylinder covers before storing the engine.