



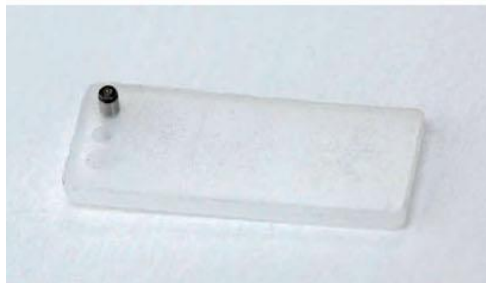
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1.

ALIGNING PIN ASSEMBLY

To press in the small aligning pins, use the white plastic plates with the 3 boreholes. Push the aligning pin into a bore hole, now you can easily hold and position the plate. Using pliers with parallel surfaces, the pin can now be carefully pressed into an aligning angular position for drilling. Stay away from sliding guide surfaces with the pliers, otherwise there is a risk that the part will be destroyed by the pliers' imprints.



2.

GLUE BEARINGS

Degrease ball bearing around the circumference (outer diameter) with a cloth moistened with ethyl alcohol. Then put the bearing aside. To prevent injury when dealing with superglue, wear safety glasses and thin gloves. Keep the adhesive out of reach of children. Dispose of the adhesive after use so that your children are safe! (There are also commercially available ball bearing adhesives available, such as Loctite). Dip a toothpick into the superglue (several times until the surface of the toothpick absorbs and binds with the glue and absorbs the excess on the surface). Insert the toothpick in the hole so that the adhesive can be applied thinly. If a drop (too much) forms, use a

cloth to (touch) carefully „absorb“ it. Then guide the side part quickly downward with the right side (see diagram) over the bearing. The gap is correct when the side part rests directly on the table. After a short time the bearing is fixed.

Once the adhesive is in the ball bearing, it is NO longer usable!

ATTENTION: Superglue is very dangerous!! Work only with safety goggles and protective gloves! Discard after use! Keep out of reach of children! You can find the safety data sheet in the webshop on the bottom left next to Downloads Instructions.



3.

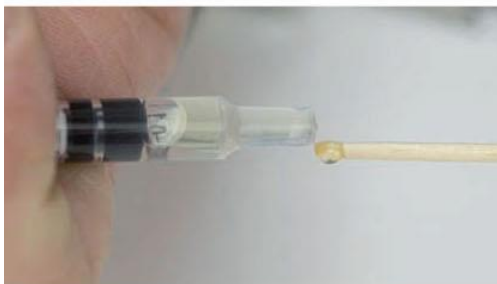
DISPLACEMENT AXLE + CRANKSHAFT OILS

Finished models are lubricated ready and must not be lubricated. For newly assembled models lubricate as follows.

We use AeroShell Fluid 12 as the type of oil (you can get it in our shop). Do not use any other oil. This warranty is void if foreign oil or other lubricants are used.

The engine cannot even start if there is too much oil on the displacement axle and too much ceramic paste on the working piston. If this happens, it must be partially disassembled and cleaned. Oil may only be applied after the first trial run on the displacement axle (oil droplet diameter 1mm). DO NOT regrease!

The bearings must NEVER be lubricated! In crankshaft models, it is recommended that after prolonged use, the 4mm axle in the centre between the aluminium flanges, where two rods on the axle are located, be lubricated with a drop of our oil (1mm diameter)! This works wonders! Do not use more oil! Many customers do not perform piston cleaning and use too much oil; they are then surprised when the model no longer runs. Please clean your working pistons regularly and do not relubricate the model unless the engine is completely disassembled and rebuilt.



4.

ALIGNING PIN DISASSEMBLY

Place the punch directly on the aligning pin on, tap the pin out carefully with a small hammer. In displacement axles, please move into the cylinder as far as possible and then first tap - otherwise damage may occur to the displacement axle.



5.

APPLY CERAMIC PASTE

The ceramic paste is relatively viscous and dry. This is by design. The syringes are just a means of transport. To open, use a side cutter and clip the front open.

The ceramic paste should only be applied after the first dry trial run (the trial run without lubrication is only to show you that the model works) then please apply very thinly (barely visible). Using too much ceramic paste means that the engine will not start. See photos for a better understanding of the amounts.

If the engine does not start after lubrication, it has been lubricated too much!



6.

MAINTENANCE - PISTON CLEANING on Stirling engine

Over time, black abrasion dust builds up in the friction bearing (piston/cylinder) which settles in the cylinder and makes the model run more poorly even resulting in a standstill. You must therefore (after 1-2 hours battery life) regularly clean the inside of piston and cylinder on the sliding surfaces. Scoring is normal (friction bearing).

Remove the piston and clean the piston and working cylinder with a dry cloth. Clean the brass cy

linder inside down to the bottom. Reassemble dry **WITHOUT** lubricant. See photos for better understanding.

Basically, Stirling engines are to be kept oil-free with working pistons





MAINTENANCE PISTON CLEANING for vacuum engines SE 22 + SE 24

In these models, a lot of contamination forms. *The cylinder (inside) and the working pistons must therefore be cleaned after each tank filling and then re-oiled with Aeroshell fluid 12.*

Squeaking with flame lickens (SE 22 + SE24), this is normal due to the friction bearing. If it should become too annoying, loosen the working piston from the piston holder and twist it by about 30°, then retighten it with the fork wrench 5.5mm so that the piston has a different angular position.

The use of other lubricants and fuels will void your warranty!

Go for help on Point 6, Point 7 or Point 9 (engine does not start).

8.

SURFACE OXIDATION AND AGING

The brass will tarnish which is intended. Your model will get a patina and this will darken with time. Fingerprints can be seen but will also darken. Oxidation is no reason to make a complaint. Brass is subject to natural oxidation processes. Avoid contact with sweaty palms, water and moisture. The brass can be polished with standard polishes! Allow the models to age normally. After a few years, they have the desired brass patina.

9.

GENERAL TIPS

For instructions on all models, see the webshop at the bottom left).

The ceramic paste is only used once in a new engine to insert the piston during operation and then no longer. It remains with dry friction bearings and the one to two-hourly maintenance (Point 6) through the cleaning of the piston and the cylinder wall inside.

Never lubricate bearings! The biggest mistake you can make is to reoil!

The connecting rods must be able to be easily shifted laterally and not jam. The connecting rod can be bent to fit flush.

Tighten the screw slightly to 4-5 cNm. Otherwise the connecting rod can get jammed with a crushed black sleeve. Please work carefully. The engine will thank you. Always look for resistance. The model cannot start if there is resistance.

SE9 + SE10, make sure that the rocker arm

can move and swing freely (remove rods for testing). Any frictional resistance can cause the model to stop!

Make sure that the gap between flywheels and ball bearings is approximately 0.2 mm in size in order to prevent a braking of the ball bearings.

O-rings age in UV light and become porous: avoid exposure to sunlight.

You can always reorder O-rings, see Point 8.

The models are not built for continuous operation! Filling with ethyl alcohol is sufficient for a demonstration; the engine should then cool completely before attempting to restart.

Since the models are delicate, take the necessary care!

Only use 94% alc methylated alcohol. Never use paraffinic fuels such as oil or tea lights! This leads to extreme contamination and standstill.

10.

SPEED AND OPERATION

The rotational speed depends on the length of the wick and the vertical and horizontal distance from the heating cylinder. The wick should protrude adequately: 4-5 mm is good and it should be pressed widely (bushy). The models require a proper flame, then you can reduce the speed and experiment with it.

The engine runs faster at the beginning and then slows down because the temperature difference is smaller and ergo the power.

The engine must be operated with new ethyl alcohol (94%). (English name: denaturated alcohol, methylated alcohol, the percentage must be at least 94% or higher.

Check the laws and rules for open fires which are binding.

Continued on the next page

10.

SPEED AND OPERATION

Never leave ethyl alcohol bottles open. Close after filling and remove far from the demonstration area. **Keep out of reach of children!!! ONLY FOR USE BY ADULTS!**

When using other flammable liquids such as e.g. The use of lamp oil/paraffin oil/candles voids the warranty.

Tea lights are not suitable in any case! They soot the engine. Likewise the required temperature is not achieved meaning that the model can not run!

Never replace the pistons or displacement axles in multi-cylinder models.

Each cylinder has its own is measured piston and displacement axle (is a coordinated team).

Scores can form in brass cylinders. This is normal for a friction bearing.

As already described, clean the piston and cylinder with a dry cloth. This is very important, because the abrasion dust must be removed, otherwise the model will run more and more poorly until it stops!

The sound level of individual models may vary considerably, especially with flame lickers, ringing, whistling, squealing are normal and no cause for a complaint.