

Congratulations to your new „High Tech“ – Stirling engine. In 1816 Reverend Robert Stirling applied for a patent of his engine design. The scientist from Scotland developed his engine because he was looking for an engine that could be operated without high gas pressure and with the heat applied from outside.



Steam engines at that time were a considerable threat because of high pressures and poor materials. Many severe accidents happened due to the explosion of steam engines those days.

Robert Stirling's design and most of the following variants and copies had one fact in common: They were using combustible fuels because the Stirling principle usually requires a high temperature difference for efficient operation.

This Stirling engine although, is working at a surprisingly low temperature difference. You will notice that this engine will even run when placed on a hot cup of coffee or a similar heat source, because it was optimized to work at low temperature differentials. Allow it's lower side to warm up a little bit and then carefully swing it's flywheel.

You will probably find many heat sources around your household to operate this "High Tech" – Stirling engine. It may even run from the heat of your hand if the difference to the ambient temperature is high enough. Also, it may run all day from the waste heat of a computer monitor or any other electrical device.

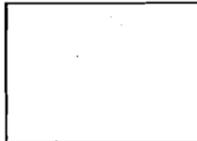
The motion process is reversible. If you place the engine on an ice cold surface, it will run backwards. It will also run backwards if you heat the upper plate.

It has been almost natural that optimizing this Stirling machine has led to a very straight forward design. Should you want to explain the Stirling principle to someone else, this engine is probably suited better than any graphics, animations or descriptions found in literature, because the side wall of the housing is made from acrylic glass. Simply turn the flywheel in 90° steps and describe, what is happening in each step. Therefore this engine is not just decorative but a great educational item for physics, thermodynamics, mechanics and engineering.

Unfortunately Robert Stirling's idea never found a real application in technology yet, because steel quality improved quickly which made the steam engine safe. With decreasing energy resources and increased environmental requirements there are several promising new applications arising for the Stirling engine today. Maybe there will be a bright future for the ingenious idea of the reverend from Scotland.

Please keep in mind:

1. It's the temperature **differential** that makes the engine run. When the lower surface is heated for an extended period of time, the upper surface may slowly heat up too due to the internal hot air exchange. In this case it is normal that engine speed decreases after a while unless the other side is cooled.
2. The brand new engine may require a little extra heat for the first few hours of operation. The more it "wears in", it will require a decreased temperature differential. A good source of heat is a hot cup of coffee, a small halogen lamp, etc.
3. Large heat sources (bigger than the engine itself) will eventually heat up the entire engine, because it is "submerged" in warm air, eliminating any temperature differential. In this case the engine will decrease in RPM or even stop. Therefore you should try to find a spot heat source.
4. Make sure not to overheat the engine, in order to avoid deformation of the displacer piston which is made from styrofoam.
5. This product is hand made. Therefore it may not look quite as perfect as a mass made product. Should you find real damages although, please just let us know.
6. Keep the cylinder and piston away from dirt or dust. Friction is increased due to any foreign dust particles. Lubricating the piston with oil will really increase friction and keeps the engine from running. Avoid touching the piston surface in case you remove it from the cylinder. Even hand grease can increase friction. Clean the piston and cylinder only if necessary and use a clean and dry paper towel.
7. The silicone tubes connecting the pistons to the rods are quite fragile. They were chosen this way intentionally to keep the bending moment to a minimum. In case one of yours gets damaged we have included an extra silicone tube here.



**Enjoy your new LTD Stirling Engine!**

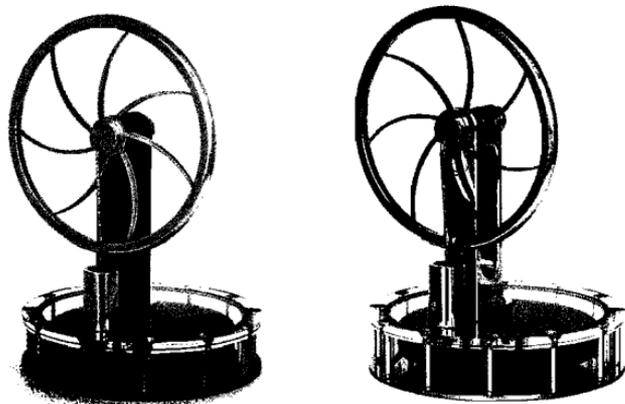
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## Additional Feature of the Solar Engine

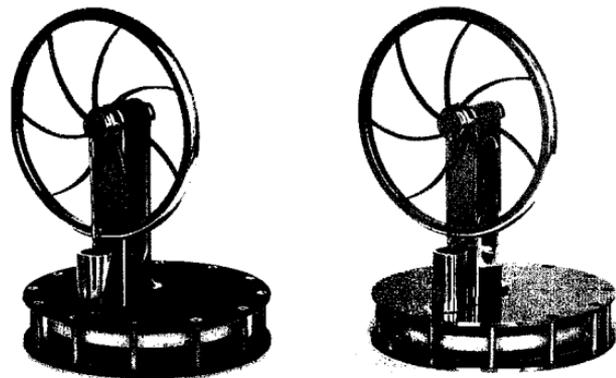
In case you have bought the solar version of our low temperature differential Stirling engine, you will be able to enjoy an extra feature: The engine will run, if placed under a bright light source, i.e. a halogen lamp or bright sun light.

The surface of the inner displacer piston converts the light into heat which continuously heats the air above the displacer piston, which again drives the engine. Of course the engine will run reverse as opposed to the standard operation when the engine is heated from below.

For continuous operation of the engine by a light source you will need a cool surface to place the engine onto in order to maintain the necessary temperature differential. If the light source is too large or too strong, it will eventually heat up the lower surface, also eliminating the temperature differential. In this case the engine will discontinue to run, which is normal. A good way to keep the lower surface cooler than the surrounding air is to place the engine on a wet surface for example.



## Instructions for the Low Temperature Differential Stirling Engine



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