

# D Star Thermoacoustic Stirling Engine



The Thermoacoustic Stirling Engine demonstrates a method of using high frequency sound waves to pump heat into a mechanical system.

## Components

Your Stirling Engine Vehicle comes with the following:

- 1 - Thermoacoustic Stirling Engine Body
- 1 - Glass tube with mesh
- 1 - Glass alcohol lamp, nozzle & wick
- 1 - Plastic filling bottle
- 1 - Bag of replacement parts and tools

## Assembly

Place the Stirling Engine Body on a solid surface and insert the open end of the glass tube into the back of the Stirling Engine. **DO NOT FORCE THE GLASS.** The fit will be snug but the glass is fragile.

## Set-Up

Thread the wick through the alcohol lamp nozzle. The wick is a little larger than the nozzle so you may need to wet the end of the wick or guide it through with the aid of a bent paper clip.

Fill the plastic bottle with either 91% or 99% rubbing alcohol. Use the bottle to fill the alcohol lamp bottle. Then place the nozzle on the bottle. The majority of the wick should be in the alcohol with only a small part of the wick (1/4") sticking out through the top.

***Never try to fill the burner while the wick is lit!***

Place the lamp in the recessed circle on the base of the Stirling Engine body.

## Operation

Using a match or a lighter, ignite the wick on the alcohol lamp. The flame will touch the glass of the Stirling Engine's thermoacoustic heating chamber.

Let the chamber heat up from the flame for a few moments. Then give the Stirling Engine's operating wheel a good spin. If the chamber has been sufficiently heated the Stirling Engine should 'kick in' and start spinning.

Once you are finished, extinguish the flame and allow the Stirling Engine time to cool down before moving it or performing any maintenance.

The Thermoacoustic Engine can be made to run faster if you clamp it to the table. This will also prevent it from 'walking' on smoother surfaces.

***Do not touch the engine or burner when they are hot.***

***Never leave the flame unattended***

## Fuel

In addition to 91% or 99% rubbing alcohol. You can also use any alcohol of 180 proof or better.

Alternatively, you can power the Stirling Engine Vehicle with Sterno. Use a metal cap filled with Sterno in place of the alcohol burner.

### **Maintenance**

Use a light machine oil (no more than 5W – knife honing oil works great) on metal parts, only if needed. Use a cotton swab to apply the oil. Do not get oil on glass or plastic parts.

If the glass gets dirty, wait for it to cool and clean it with window cleaner.

### **How does a Thermoacoustic Stirling Engine Work?**

Unlike a Basic Stirling Engine the Thermoacoustic works by the heat transference from the the metal in the glass tubing to the cooler section at the end of the tube. This transference creates high-amplitude sound waves that create expansion and compression that moves the cylinder. In a normal Stirling Engine the heat is used to produce expanding gasses to move the cylinder.

### **Are Thermoacoustic Engines used anywhere?**

Thermoacoustic engines have been used to operate refrigeration systems using the heat exchange. Thermoacoustic coolers do not require environmentally damaging chemicals, sealants, and other systems. However these systems are more expensive to build and so are not frequently used.

### **Warranty**

D Star Engines have a limited lifetime warranty. This warranty covers defects in manufacture. It does not cover any defects caused by misuse, modification, or damage.

Parts and repairs to your Stirling Engine are available at reasonable cost from D Star Engines. Please contact the number below for parts and service either in our out of warranty.

### **Other Stirling Engines from D Star**

D Star Engines produce several different models of Stirling Engine. Here are a few examples:

*Stirling Engine with LED Light:* Want to see how a Stirling Engine can make power? This model uses a built-in dynamo hat generates electricity to illuminate an LED light.

*D Star Vacuum Engine/Flame Licker* – An engine that appears to 'eat' the flame that powers it.

*Low Temperature Difference Stirling Engine*  
Want to run an engine off of a hot cup of coffee? This engine will let you do just that!

Many more designs are available!

### **Need Help?**

Need a hand getting your engine working?  
You can call 831-338-8354 or email  
[rex@dstarengines.com](mailto:rex@dstarengines.com)