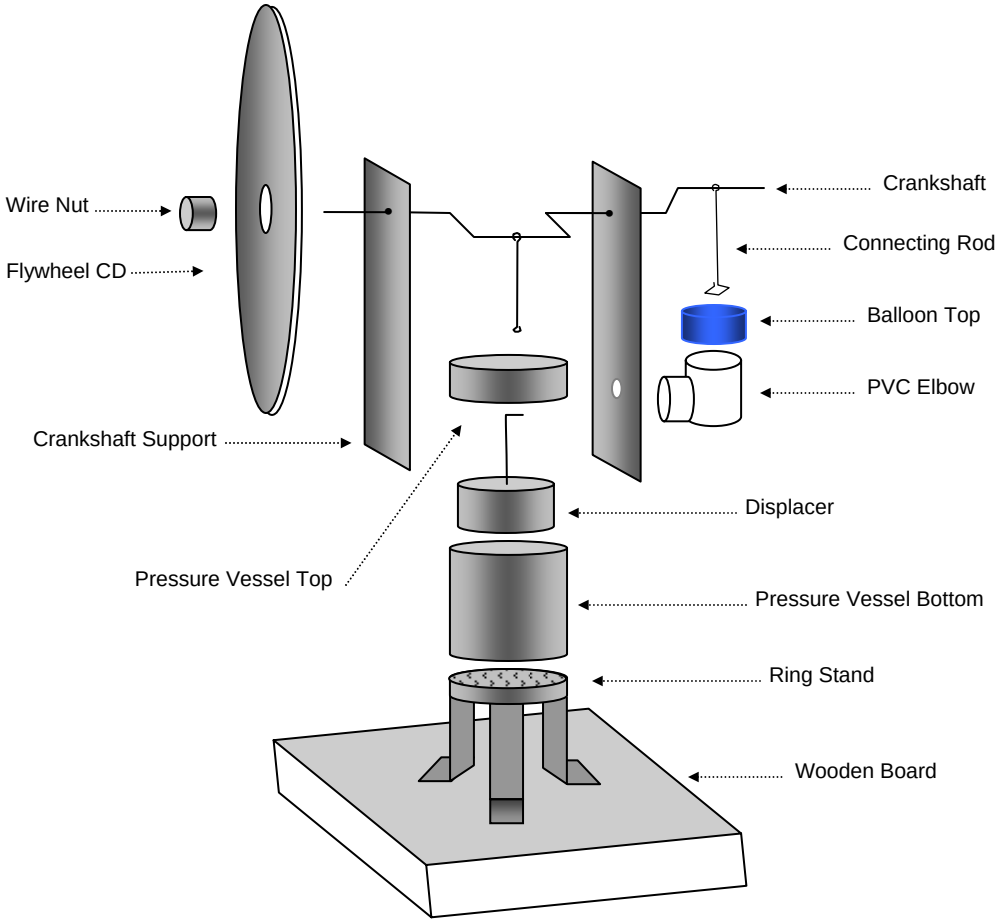
SFA Stirling Engine Project



Parts List

» Three diet shake tin cans (e.g. Slim Fast, Adkins, etc.)

» Three soft drink aluminum cans
(one of which is a taller 12 oz can if available)

» JB Weld Epoxy

» Red High-Temp RTV Silicon Gasket Maker

» 2" or longer straight pin (e.g. yarn darner)

» 3/4" to 1/2" PVC Elbow
(outer diameters are 1-1/4" and 1" respectively)

» Small balloon

» Flat washer and nut

» Metal coat hanger

» Old CD

» Wire nut to connect coat hanger to CD (optional)

» Wooden base and wood screws (optional)

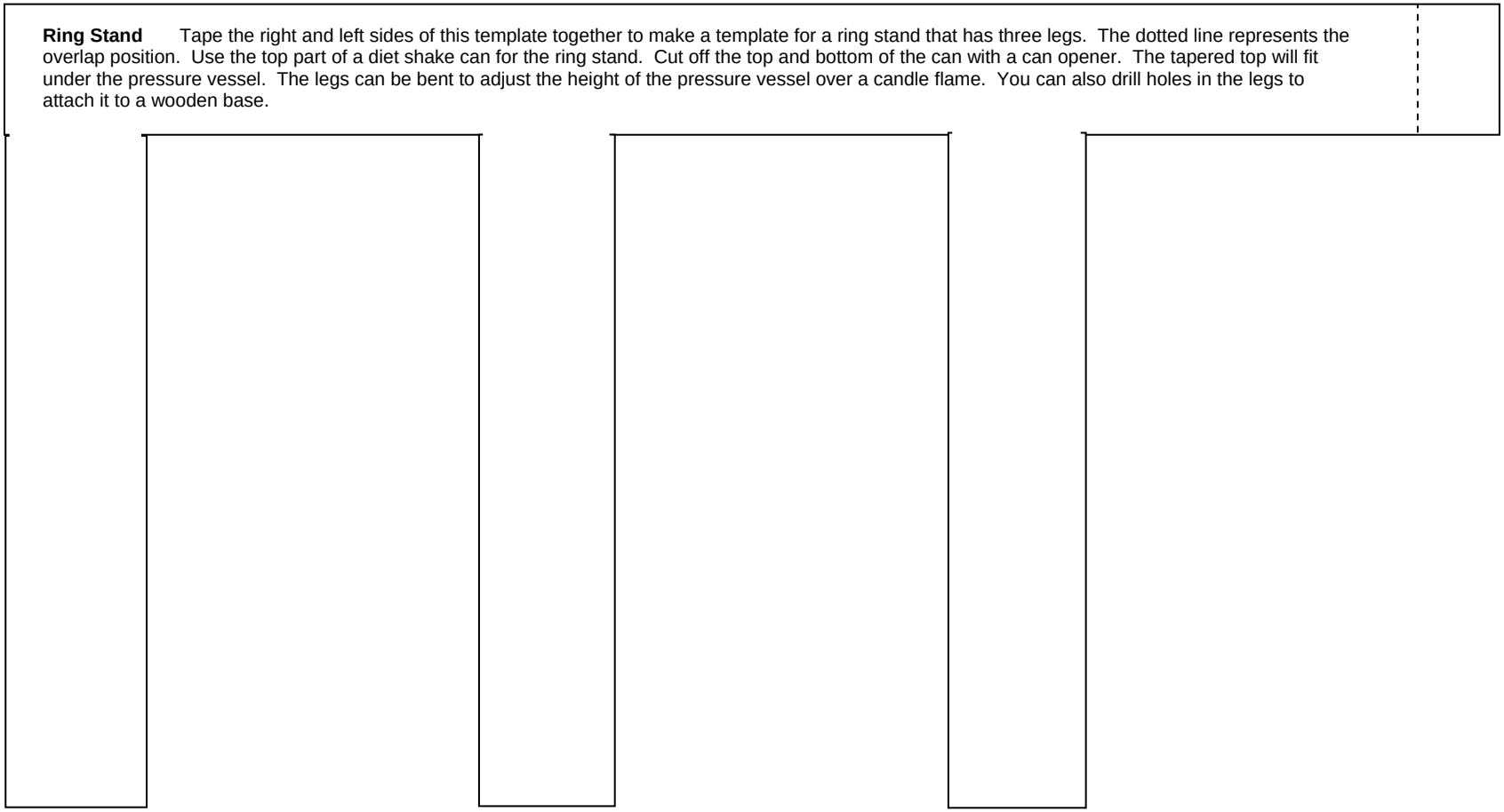
» Tin snips or stainless steel scissors, pliers, can opener, hammer

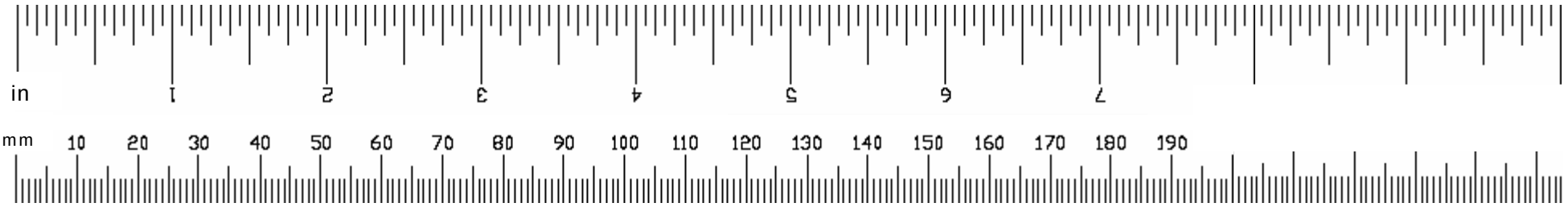
This project is part of an engineering course team project at Stephen F. Austin State University. The latest version of these plans and more information can be found at http://www.physics.sfasu.edu/astro/courses/teamwork/StirlingEngine/stirling.html. This work was inspired by TheRecentPast and is a modified version of the plans found at http://www.geocities.com/therecentpast/.

SFA Stirling Engine Templates

Cut our each of the templates below to help you make the metal parts for this Stirling engine. Use diet shake cans (e.g. Slim Fast, Adkins, etc.) and soft drink cans as the material for these parts.

Ring Stand Tape the right and left sides of this template together to make a template for a ring stand that has three legs. The dotted line represents the overlap position. Use the top part of a diet shake can for the ring stand. Cut off the top and bottom of the can with a can opener. The tapered top will fit under the pressure vessel. The legs can be bent to adjust the height of the pressure vessel over a candle flame. You can also drill holes in the legs to attach it to a wooden base.





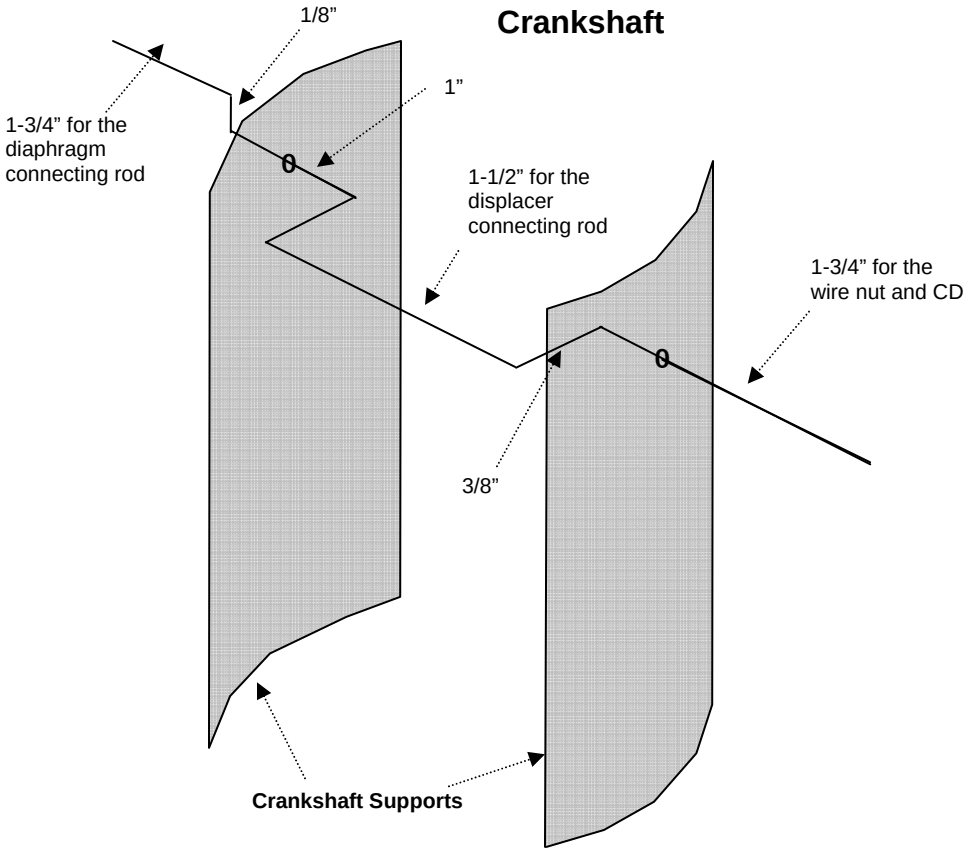
Pressure Vessel Top

Tape the right and left sides of this template together to make a template for the pressure vessel top. The dotted line represents the overlap position. Use the bottom of a soft drink can for this part that is 1" high. The tapered bottom of this can will fit into the pressure vessel bottom. This part can hold ice to make the engine run faster.

Displacer - The displacer should have a total height of 1¼". There should be no air leaks into the displacer. The displacer should be smooth and fit inside the pressure vessel with about 2 millimeter clearance when centered inside the can.
Method 1: This can be the bottom of a tall 12 oz that has a circumference that is about 10mm less than a soft drink can. Keep the bottom. The bottom of a soft drink can is trimmed to just fit inside the top of the displacer dish side in. Do not glue until a 2" straight pin is inserted through the displacer top.
Method 2: This part can also be made using the wall of soft drink can with the top and bottom cut off. The can is cut vertically and glued (with hi-temp epoxy) together to form a 1-1/4" high cylinder with a diameter of about 95% of its original diameter. When the can is glued to form a cylinder, the overlap will be about 10 millimeters (assuming a 65 mm diameter can). The bottoms of 2 aluminum drink cans are trimmed to just fit inside the displacer and will be glued into place (one end dish side in, the other end dish side out). Do not glue until a 2" straight pin is inserted through the displacer top.

Pressure Vessel Bottom

Use the bottom of a diet shake can for this part that is 2½" high. The ¼" hole should be drilled about ½" from the top to allow air to enter into the PVC elbow. The candle flame will be in contact with the bottom of this can.



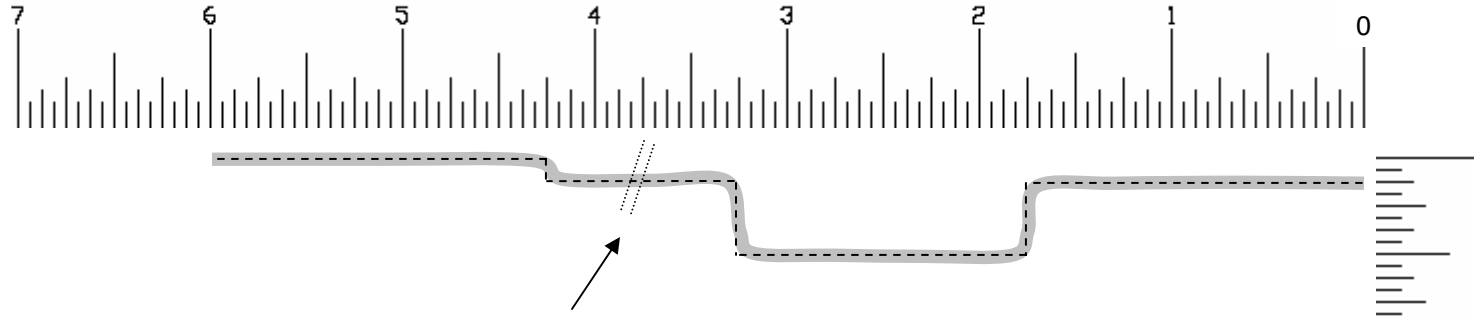
3/32” hole for crankshaft

Crank Shaft Supports

Use a vertical strip of a diet shake can for this part. You will need two of these crank shaft supports that are 12cm high and 3.4cm wide. The hole for the crank shaft should be drilled about ½” from the top.

Drill a ¼” hole that is 1 inch from the bottom of one support. This will line up with the hole in the pressure vessel.

The lower 1½” of the supports will be glued to the pressure vessel (i.e. below the dotted line above).



Crankshaft - Make sure there is a 90 degree angle between the displacer and power diaphragm connections. That is, the displacer is 90 degrees out of phase with the power diaphragm as shown in the 3D sketch above. Use 7 inches of coat hanger wire (or equivalent) to make the crankshaft.