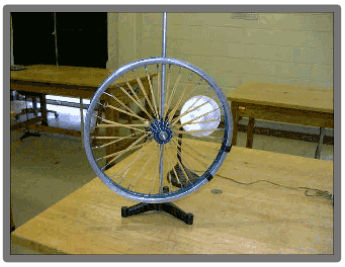
11B Lab 11: Heat Engines



Shine a heat lamp onto the rubber bands on one side of the heat engine. As the rubber bands are heated, they contract, moving the center of mass away from the center of rotation. This causes the engine to rotate!

Warm-up:

With the system provided, create and graph on the PV diagram, a process which is:

A.) Isothermic
B.) Isobaric
C.) Isochoric
D.) Adiabatic
Note: Command+L will save files so we can overlay them on one graph. Attach this graph. Label each curve.

Procedure:

1.) Your task is to make and characterize an Ericsson heat engine.

2.) Perform this cycle with your system. Record this data with Logger Pro.

3.) Draw a diagram of your cycle. Show on your diagram when heat is added to the system and when heat is taken out with red arrows. Label when work is done with blue arrows. (Note: Our convention is that an arrow pointing in represents energy flowing into the system.) Label the point on the P-V graph with the largest pressure and lowest volume as point a.

3.) Complete the following chart when done:

Cycle Step	Pressure (KPa)	Volume (mL)	Temp (C)	Temp (K)
a				
b				
c				
d				

3.) Verify that the first law of thermodynamics holds.

4.) Calculate the efficiency of your heat engine. Two ways:

- Using the Logger Pro numerical integration to find the $W_{net.}$
- Using the theoretic formula in the class notes.

5.) Calculate the Carnot efficiency for the given temperatures.

6.) Compare the efficiencies of all three.