

TECHNOLOGY SEMINAR - 01

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Technology is the focus of these seminars. *Technologists* can be divided into three categories; namely,

- ◆ *Scientists* – Physicists, Mathematicians, Chemists, Astronomers who ask the question *What Are Nature's Laws?*
- ◆ *Engineers* – Electrical Engineers, Information Technologists, Chemical Engineers, Aerospace Engineers who ask the question *How Can We Make Nature's Laws Discovered By Scientists Work For Us?*
- ◆ *Technicians* – Electricians, Computer Programmers, Lab Technicians, Opticians, Mechanics who ask the question *How Can We Build It From Engineer's Plans.*

Each category requires skill, formal training and experience. Educational requirements and career opportunities will be discussed.

My first presentation will focus on our national energy crisis and discuss how energy in the form of *heat* is used to obtain propulsion – first in automobiles.

1. Our starting point will be *Thermodynamics* (the science of heat [*thermo*] and motion [*dynamics*] (<http://en.wikipedia.org/wiki/Thermodynamics>) and, more specifically:
 - A. *Boyle's Law* (http://en.wikipedia.org/wiki/Boyle-Mariotte_law)
 - B. *Ideal Gas Law* (http://en.wikipedia.org/wiki/Ideal_gas_law)
 - C. *Carnot Cycle* (http://en.wikipedia.org/wiki/Carnot_cycle) .
2. Next, the focus will be on *Fuel Efficiency*

http://en.wikipedia.org/wiki/Fuel_efficiency
http://en.wikipedia.org/wiki/Internal_combustion_engine
<http://fueleconomy.gov/feg/atv/shtml>
<http://mistupid.com/chemistry/aircomp.htm>

Questions to be considered are:

- A. What percentage of energy theoretically available in motor fuel actually is available to propel a vehicle powered by a Carnot engine (<http://mb-soft.com/public2/engine.html>)?
- B. What happens to the energy that is not available for propulsion?

- C. Possible areas for Carnot engine improvement.
 - i. Remove nitrogen from incoming air stream or add oxygen source to fuel
 - ii. Increase operating temperature of engine to increase fuel efficiency
 - iii. Change configuration to increase torque at zero or low speed
- 3. The presentation will then broaden to discuss energy forms (e.g. heat, chemical, mechanical, light, etc.) and mechanisms for converting one form into another form (e.g. a fuel cell for converting chemical energy to electrical energy).

You are expected to read the INTERNET references; however, you are not expected to understand all of their contents. There will not be any test or grade. Nevertheless, this is the caliber of material you will study at good schools of engineering and science.

This Technology Seminar note is at <http://www.k9ape.com/publicservice/PSM/TS01.pdf>. The INTERNET version contains active URL links for your convenience.

If you want *first-hand* experience with college-level engineering and science courses, then search the INTERNET for *Open Course* sites at schools you are considering. For MIT, please go to <http://ocw.mit.edu/OcwWeb/web/courses/av/> . For example, see <http://web.mit.edu/16.unified/www/FALL/thermodynamics/index.html> for two courses on *Thermodynamics*.

Students will be expected to participate in experiments and presentations. The importance of public speaking, participation and cooperation with others will be stressed.

Students are welcome to ask questions about engineering schools, career opportunities and the like as time permits.

Students interested in Electrical Engineering, Computer Science and related fields are welcome to go to the American Radio Relay League website at www.arrl.org . Volunteer amateur science organizations are a valuable source for professional connections, apprenticeships, alumni recommendations and scholarships.

If you have a topic of interest to you or a question that you want to discuss, then please ask Dean Sullivan to forward it to me. You may also talk with me after the seminar.