

Boeing Employees Model Rocket Club

Sanctioned Section of the National Association of Rocketry (N.A.R.) Number 627

Newsletter for January, 2005

Location: Kent Recreation Center
 Time: 2nd Saturday of Every Month
 at 10:00 a.m.

President: Bruce Johnson
 Vice President: Abby Chang
 Secretary / Treasurer: Bob Turner
 Librarian: Mark Shelton
 Web Site: www.BEMRC.Org

News items and editorial comment in this publication do not necessarily reflect the views and opinions of the Boeing Company




Earth Atmosphere Model English Units

Glenn
 Research
 Center

For $h > 82345$ (Upper Stratosphere)
 $T = -205.05 + .00164 h$
 $p = 51.97 * \left[\frac{T + 459.7}{389.98} \right]^{-11.388}$

For $36152 < h < 82345$ (Lower Stratosphere)
 $T = -70$
 $p = 473.1 * e^{(1.73 - .000048 h)}$

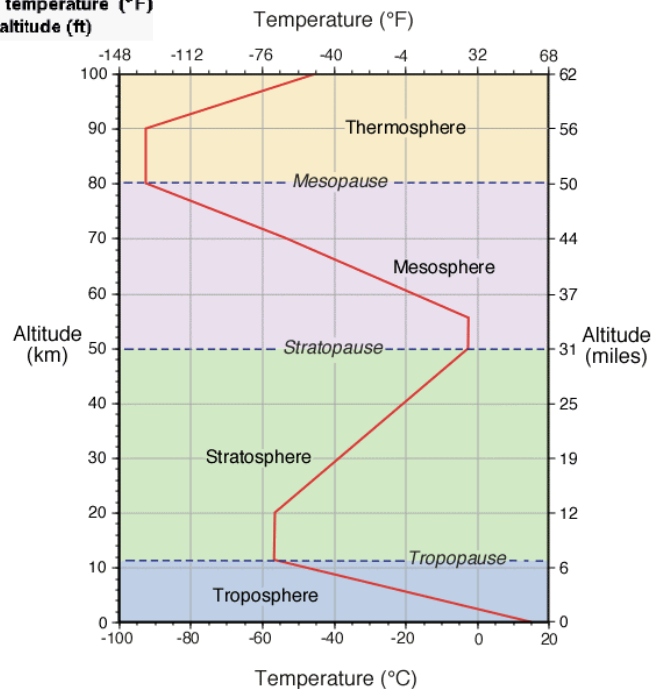


For $h < 36152$ (Troposphere)
 $T = 59 - .00356 h$
 $p = 2116 * \left[\frac{T + 459.7}{518.6} \right]^{5.256}$

r = density (slugs/cu ft)
 p = pressure (lbs/sq ft)

$$r = p / (1718 * (T + 459.7))$$

T = temperature ($^{\circ}$ F)
 h = altitude (ft)



Atmosphere Temperature Models

***** **BEMRC Launch Schedule** *****

January 8 th , 2005 (Saturday)	Kent, WA – W.S.S Second Build Session
February 12 th (Saturday)	Kent, WA – W.S.S. Third Build Session
March 6 th (Sunday)	Monroe, WA – Launch Session
March 12 th (Saturday)	Kent, WA – Fourth Build Session
March 26 th (Saturday)	Redmond, WA (60 Acres Park) – Launch Session
April 3 rd (Sunday)	Monroe, WA – Launch Session
April 9 th (Saturday)	Kent, WA – Launch Session
April 23 rd (Saturday) Session	Redmond, WA (60 Acres Park) – Launch
May 1 st (Sunday)	Monroe, WA – Launch Session
May 14 th (Saturday)	Kent, WA – Launch Session
May 28 th (Saturday)	Redmond, WA (60 Acres Park) – Launch Session
June 5 th (Sunday)	Monroe, WA – Launch Session
June 11 th (Saturday)	Kent, WA – Launch Session
June 25 th (Saturday)	Redmond, WA (60 Acres Park) – Launch Session
July 3 rd (Sunday)	Monroe, WA – Launch Session
July 9 th (Saturday)	Kent, WA – Launch Session
July 23 rd (Saturday)	Redmond, WA (60 Acres Park) – Launch Session

***** **On The Cover** *****

The Earth's atmosphere is an extremely thin sheet of air extending from the surface of the Earth to the edge of space, about 60 miles above the surface. Within the atmosphere, very complex chemical, thermodynamic, and fluid dynamic effects occur. The atmosphere is not uniform; fluid properties are constantly changing with time and place. We perceive these property changes as weather.

Variations in air properties extend upward from the surface of the Earth. The sun heats the surface of the Earth, and some of this heat goes into warming the air near the surface. The heated air is then diffused, or convected up through the atmosphere. Thus the air temperature is highest near the surface and decreases with altitude. The pressure of the air can be related to the weight of the air over a given location. Therefore, air pressure decreases as altitude increases.

The standard atmospheric model has three zones with separate curve fits for the troposphere, the lower stratosphere, and the upper stratosphere. The troposphere runs from the surface of the earth to 36,152 feet. In the troposphere, the temperature decreases linearly and the pressure decreases exponentially. The rate of temperature decrease is called the lapse rate. For the temperature Fahrenheit **T**, the equation curve for the troposphere is: $T = 59 - .00356 * h$, where **h** is the altitude in feet.

***** **Quote(s) of the Month** *****

“Last one standing, wins.” - Gimli

***** NAR/TRA vs BATF Lawsuit Update *****

ed note – The following is from the joint statement from Mark Bundick (NAR) and Ken Good (TRA)

December 22, 2004 – This message will outline the results of the 12/17/04 hearing in U.S. District Court in Washington D.C, before judge Reggie Walton and the next steps in our legal effort to remove unnecessary and illegal regulation of the sport rocketry hobby.

NAR and TRA won both pending motions before the court.

Winning these motions are important for us because we can now move forward on two key items.

Granting the first motion means we can now legally challenge the illegally promulgated "Questions and Answers Hobby Rocket Motors" document at the ATF Explosives website within the current litigation.

Granting the second motion for final judgment under Rule 54(b) means we can proceed with an appeal of Count 1 of the lawsuit. Count 1 argued that APCP does not function by explosion and is therefore not subject to BATFE regulation. A ruling from an appellate court on our appeal will determine a key point -- whether the ATF even has jurisdiction to regulate the hobby at all.

We intend to file an appeal immediately after the judge releases his written order granting our motion.

The next scheduled event will be another status hearing, January 28, 2005. BATFE has until that time to respond to our amended complaint. Upon reviewing that filing, counsel will have an opportunity to respond, most likely with a motion for summary judgment to attempt to get the court to set aside the "Questions and Answers" document.

We need your continued strong financial support for the legal work necessary around these two wins.

The appeal preparation and filing will cost a minimum of \$25,000. We estimate the total costs of remaining legal work on both the litigation and appeal will take approximately \$100,000 over the next two years.

Please donate today in whatever amount you possibly can. And thanks for your assistance to date.

Also, we again strongly recommend that members in the field report in detail any actions taking by ATF personnel in the field, particularly if they use the ATF's "Questions and Answers" as the basis for their action.

Forward to either of us the dates, times, names and offices involved, along with a complete description of your experience. Be factual and complete in your message. If we need additional information, we'll contact members individually.

Secondly, we again urge members to consider donating to the Legal Fund. Please make a donation to the Legal Defense Fund today, in whatever amount you possibly can contribute. Your support and generosity will be recognized and acknowledged, and you'll be able to say "I supported the fight for an unregulated sport rocket hobby."

As we have further developments, we'll continue to report them here and in our publications.

Mark Bundick, President
National Association of Rocketry

Ken Good, President
Tripoli Rocketry Association

***** **BATF Lawsuit Follow-Up** *****

by: Dave Davis - editorial

This latest set of rulings is another turn of events in a court fight which has lasted three years. NAR/TRA lost earlier this year when the judge ruled that APCP was an explosive. He has now allowed this ruling to be appealed to a higher court where the process starts all over again. A federal appeal typically takes 12 to 18 months to be heard with no guarantee of a positive outcome. During this time APCP is still classified as an explosive and falls under BATF jurisdiction. The second ruling on the website will now force BATF to implement NPRM 968 which will codify the 62.5 gram threshold for "H" and above motors as the web sites foundation is the 62.5 threshold. If BATF doesn't respond to implement NPRM 968 by the January hearing, the judge will probably rule to have the site removed. As again, BATF didn't follow its own process for rulemaking. The next couple of months are going to be interesting.

***** **2004 / 2005 Winter Seminar Series Update** *****

The first build session of the Estes Alpha II in December went well. However, it was very lightly attended compared to last year. We still have openings for this seasons classes, and everyone is welcome. Classes are the second Saturday of each month at the Kent Recreation complex (7-226 Building at 22649 84th Avenue South), starting at 10:00 am. in Meeting Room "C".

The classes are open to all past and present Boeing employees, their families, and to the general public. Costs to Boeing employees, is \$10 which includes 2005 membership dues with BEMRC. The class cost to the general public is \$40, which covers the cost of class materials. Class materials include the kits, plus motors, ignitors, and recovery wadding. Weather permitting, BEMRC will host launches after each class at our launch site at the south east corner of the Kent Space Center.

- December 11th - First Build Session - Estes Alpha III (**Note Change**)
- January 8th, 2005 - Second Build Session - Custom Rocket Company Grab Bag
- February 12th - Third Build Session - Multi Stager
- March 12th - Edmonds Boost Glider

***** **BEMRC 2005 Elections** *****

The following group of people, have volunteered to serve as the BEMRC Board of Directors for 2005:

- Bruce Johnson: President
- Abby Chang: Vice President
- Bob Turner: Treasurer
- Mark Shelton: Librarian

***** **BEMRC 2005 Dues** *****

BEMRC membership dues, is \$5 for 2005. If you're taking the build classes, your dues are included with the registration. Included with this months issue is a membership registration form. Just fill out the form, and send it off to Bob Turner. Make checks payable to BEMRC. The past couple of years, we haven't had a need to charge dues. However, activity is picking up and maintenance and repair costs on the GSE are increasing, as well as, costs of materials for holding the build classes. Please have your dues in by the end of January, as the membership list will be adjusted at that time to reflect paid memberships.

***** Mapping The Whetstone Part II *****
 by: Dave Davis – Project Glenda

One of the things that Project Glenda has striven for, is the development of an early warning system for tornados. Secondly, to develop a working knowledge of micro climates. This is why the Whetstone site in Columbia County is so important. It is a perfect example of a very dynamic micro climate. One of the key attributes that Glenda has targeted for measurement and monitoring has been temperature. We use multiple systems to measure this from ground stations to radiosondes. The reason why temperature is targeted to measure, is that temperature drives weather systems and temperature variances between levels of atmosphere drives the development of thunderstorms and tornadoes. As Glenda can map these layers, we have the potential to pick up pre-cursor signals for the generation of dangerous weather conditions.

In order to make the collected data viable, we need to first compare it to a "standard", then look at the variances in order to determine the impacts of external forces. We've already determined that pressure decreases with altitude and have the equations to support this. However, we have not had the equations and model for temperature. The key question to ask, is this: "At elevation/altitude X, what should the baseline temperature be, and that any deviation from this temperature is due to external forces."

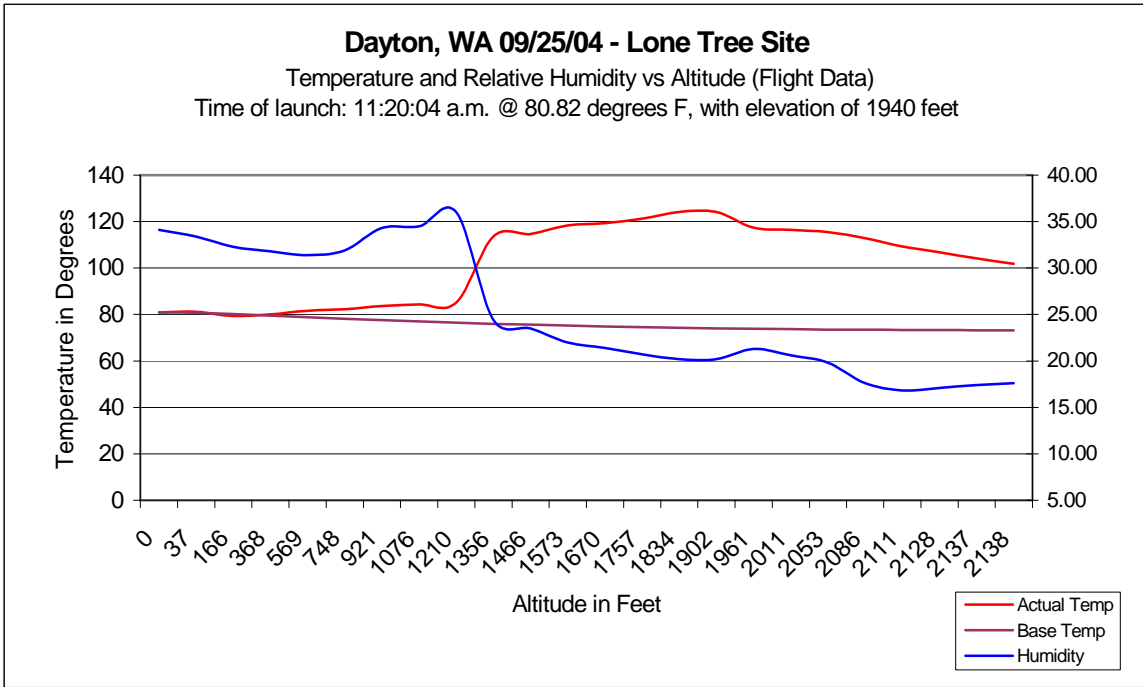
We've been conducting research on this since the September launch and now have something worth talking about. The atmosphere consists of several zones and each zone exhibits its own characteristics and has its own unique set of equations to describe the behavior. The area Glenda is interested in is called the troposphere and is the bottom layer of the atmosphere from ground level to 30,000 feet. Temperature decreases linearly with the equation $T = 59 - .00356h$, where T = the temperature in degrees Fahrenheit, and h = the elevation/altitude in feet.

The source of this equation is from NASA at, <http://www.lerc.nasa.gov/WWW/K-12/airplane/atmos.html>

With this standard temperature model, we can now determine the severity of temperature deviations and factor in ground conditions.

Modifying the equation to compensate for the site elevation, and ground conditions, we added a baseline temperature curve to the September data collected at the Whetstone site. The actual temperature tracks with the model until around 500 feet, then starts to deviate.

Now that we have a viable baseline of data to draw from and the equations to support this baseline, we can now show the dynamics of the temperature characteristics of the Whetstone site and provide an additional body of evidence in order to determine precursor signals within weather systems of potential hazardous conditions.



RAVEN METEOROLOGICAL SOUNDING VEHICLE

The RAVEN Sounding Vehicle was developed at Rocket Power, Inc. under ONR Contract NONR-3872(00). The purpose of the development of the RAVEN vehicle was to provide a reliable meteorological vehicle capable of carrying a 10 pound payload to an altitude in excess of 200,000 feet. One unique feature in the RAVEN design was the boost phase designed into the rocket motor to provide an acceleration sufficiently high to reach a velocity of 600 feet per second during the first second of flight. This greatly reduced the wind sensitivity problems and allowed the vehicle to be launched in relatively high winds. It also allowed the use of a very simple, low cost launcher. Ten vehicles were manufactured for flight tests at White Sands, New Mexico in 1963. Their fin configuration was slightly different than the production run. The rocket motor for the RAVEN was the HOPI IV.(8.5 KS 1 800). The HOPI IV rocket motor is a nominal 9 second duration 1740 pound thrust.

