

THE LEADING EDGE

Newsletter of the Northern Illinois Rocketry Association,
NAR Section #117

Volume 22, Number 6
November/December 1999

Club News

Club Elections – At the January meeting, NIRA holds an election to decide the club officers for the year.

At the November meeting, the current club officers were nominated for another term of service, with no other nominations being offered. If you would like to run, or nominate someone else, nominations can still be made at the December meeting.

The following is the current club leadership that was nominated for reelection:

President – Rick Gaff
Vice President – open (no nomination)
Secretary/Treasurer – Ken Hutchinson
RSO – Bob Kaplow

Club Logo Contest – Some club members feel it is time to update the club logo. As a result, we're holding a contest to decide on a new design (or to retain the existing one). See page 6 for all of the details.

Leading Edge Wins the LAC Trophy – At NARAM 41 the Leading Edge was presented with the LAC trophy as the best NAR section newsletter.

Newsletter content is more important than editorial style, so the award is really for all of the contributors to the Leading Edge as well as the editors. Special thanks go to Bob Wiersbe who edited the newsletter through the first half of the contest year and who left a large legacy behind.

Although this happened a couple of months ago, the announcement was accidentally left out of the last issue – there goes winning again next year...

Winter Events – A Holiday Party and three building sessions are planned for the winter months. Information on the Holiday Party and the first two building sessions are on this page. The map to Bob Wiersbe's house for the February building session is on page 10, while the location for March hasn't been decided yet.

NIRA Holiday Party

In December NIRA holds its annual Holiday Party. This year it's being held in a new location – the Piette family will be our host this year.

Call Steve or Jane at **630-513-9620** to find out what kind of munchies you can bring and let them know how many are attending.

For those interested in bringing visual entertainment, the Piettes can display VHS, LD, and DVD.

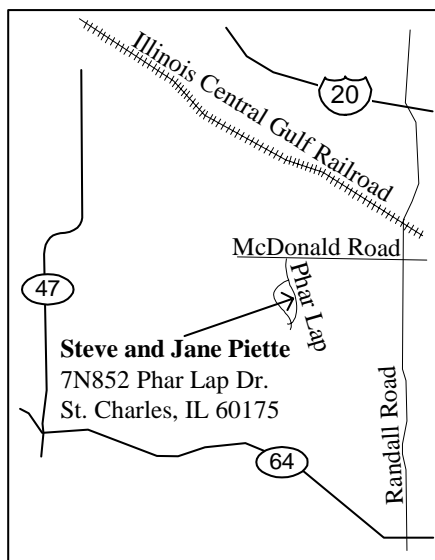
Where: Steve & Jane Piette
7N852 Phar Lap Drive
Saint Charles, Illinois 60175

When: Sunday, Dec 19th 1999, 4 pm to 8 pm

Bring: A dish to pass and whatever you are drinking.

RSVP: By 12/12/1999 @ 630-513-6920

Special thanks go out to the Bundick family who hosted the Holiday party for **many** years!



Map to the Holiday Party at Steve and Jane Piette's house.

Winter Building Sessions

These are informal sessions to build rockets, talk rocket, look at rockets, or just hang out. Bring your favorite snacks and a rocket to build.

January Building Session

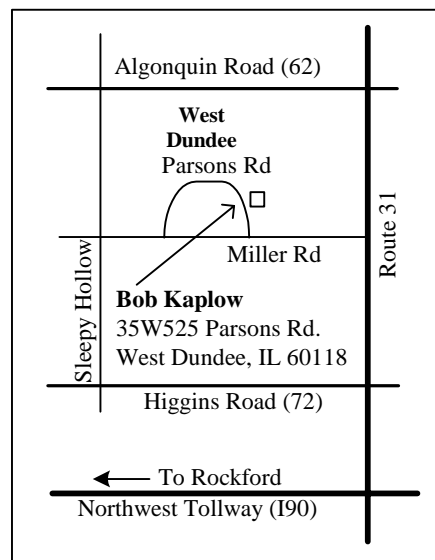
Bob Kaplow
35W525 Parsons Rd.
West Dundee, IL 60118

Usually once a year NIRA has a building session at Bob Kaplow's. "Bob's Hobby Shoppe" is worth the trip, as he has a basement full of various power tools, rocket supplies, built rockets, unbuilt rockets, ...

February Building Session

Bob Wiersbe
0N066 Easton Ave.
West Chicago, IL 60185

Bob Wiersbe has volunteered to host a building session at his new home in West Chicago on the southwest corner of Lester and Easton. Please only park along the **west** side of Easton, or along the **south** side of Lester.



Map to January's building session at Bob Kaplow's house.



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Leading Edge Staff

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Bob Wiersbe

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Articles, plans, photos, other newsletters, and news items of interest should be sent to:

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Bartlett, IL 60103-2029

or emailed to jap@interaccess.com.

Photos will be returned, other material returned upon requested.

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Send membership applications (dues: \$6 per youth, \$8 per adult, \$12 per family, including a six issue subscription to the Leading Edge), non-member subscriptions (\$10 per six issues), and change of address notification to:

Ken Hutchinson
82 Talcott Avenue
Crystal Lake, IL 60014-4541

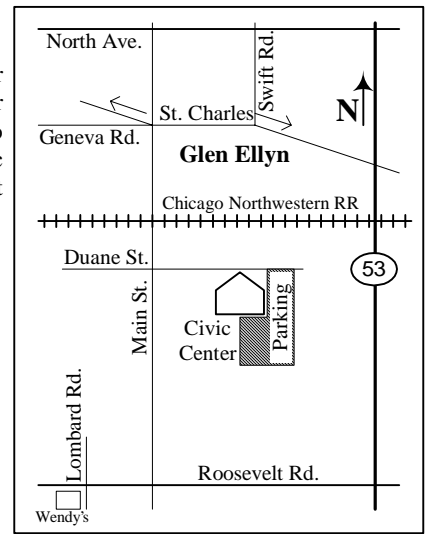
NIRA web site is at: <http://nira.chicago.il.us/>



CLUB MEETING DATES

All meetings start at 7:30 pm. Bring a model for 'Model of the Month.' We always need volunteers for pre-meeting lectures, contact Rick Gaff if you want to schedule a date. The location is the Glen Ellyn Civic Center, 535 Duane Street (usually the 3rd floor, but check the board in the lobby).

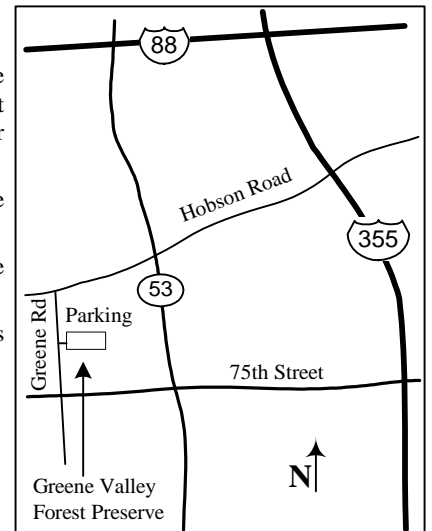
December 3
January 7
February 6
March 3
April 7
May 5
June 2



CLUB LAUNCH DATES

Launches are BYOL (bring your own launcher). The location for our launches is the Greene Valley Forest Preserve (see map at right). Call the NIRA hotline for pre-launch information: 630-483-2468.

December 19 – Holiday Party at the Piette's house (see map on page 1).
January 16 – Building Session at Bob Kaplow's house (map on page 1).
February 20 – Building Session at Bob Weisrbe's house (map on page 10).
March 19 – Building Session (location TBD)
April 16 – Regular club launch.
May 21 – Regular club launch.
June 4 – Youth Group Launch (at Greene Valley)
June 17-18 – Midwest Regional Fun Fly (location TBD)



Model of the Month Winners! (photos by Rick Gaff)

September – Youth winner Mark Soppet displays his Quest Delta Clipper. Ron Kaminski displays his nicely done four color fade on an Aerotech Initiator.
October – October's youth winner is Andrew Kramer with his all black Estes SWAT and the adult winner is John Barrett with his Launch Pad Matra "Magic" R.550.
November – Adult winner is Joe Nowak and his scratch-built Scud missile. Joe build this rocket from Launch Pad plans and rolled all his own tubes and cones. No youth entries this month.

Hobby Show Report – 1999
by Bob Kaplow (NAR 18L)

Deviating from my usual order, here are the rocket and non rocket news from RCHTA 1999, in reverse alpha order.

Quest had their full line on display, but nothing really new. Plenty of Micro Maxx stuff, which is now showing up in stores besides Toys-R-Us. They really ought to set these things up and fly them at the show. Most wouldn't hit the ceiling. I really like the design of their 9V pistol grip launcher. Mine has worked much better than I expected for a mass market launch controller. And the Flying Saucer is almost as much fun as a food container! Dane was so hoarse I couldn't really chat with him. Quest was the only rocket company handing out new (Y2K) full catalogs this year.

PML had their usual collection of perfectly finished rockets. They were promoting the relatively new Lunar Express, Small Endeavour, Bull Puppy, and X-calibur, Quantum tube, and others. Frank was manning the booth with Kym? and I don't recall seeing Jerry this year. Their new



Frank of PML showing off their smaller rockets
Photo by Leo Ringwald

catalog is a poster that will look great on my office wall next to "Rockets of the World".

Holverson was there with lots of kits, some old, some new. Sport models, Sci-Fi designs, staged models, gliders, and even a helicopter. All feature laser cut parts. I hope he does well filling in the gap Estes is leaving. He even talked with me about the possibility of having batches of motors made to fill in discontinued holes. He was particularly interested in the MRC ignitors, so I brought him a sample.

Estes had their booth in the heart of RC land, far from the rest of the rocket companies. I heard they pulled strings with RCHTA a few years ago to relocate because they didn't want to invite comparisons.

Estes had nothing new except for some RTF Mighty Mites, all for mini motors. Under the headline of "defend your neighborhood" is a plastic Cruise Missile. The fins fold out for display and back for launch. Expect plenty of these to be flown



The Estes line of Mighty Mites
Photo by Bob Kaplow

with fins deployed resulting in unstable flights. Two new Mighty Mite 2-packs. Maverick/

Harpoon and Ninja/Sliver. No the Ninja doesn't look at all like the old Ninja, it's yet another recycled rocket name. The model looks more like a miniature Moondog.

Nothing from NCR at all. When I asked someone (later identified as CFO Brian Alleman) what the status of NCR was, he responded with threats of physical violence against me. The only solid answers I got is that the NCR line would continue to grow and that they had shipped 2000 motors out this fall. [Note that the BP motor production runs about a million a month making this a drop in the NCR bucket. My recent searches of several Chicago area stores has turned up 2 of these 22D9B dated motors and lots of empty pegs]. This guy makes Barry Tunick seem nice. I'll believe him when I see new NCR products.

And nothing from Star Wars in sight in the Estes booth. Several independent sources tell me Estes lost lots of money on the Star Wars licensing this year, to the extent that it may be limiting their new product development. >From what I've seen in retail stores, so did everyone else except for Lucas.

The teaser was five classic D powered kits that may be produced if they get enough orders.

They include Super Big Bertha, Maxi-Alpha-3, Honest John, V2 (2.6") and Titan IIIIE. All the display models and packaging were originals, not new production, and are not supposed to be available until next summer. In the case of the V-2 and Honest John they appeared to not even be the recent reissues. So save your holiday cash, they will run \$30-65.

The Estes catalog won't be out until after Y2K, if there is one.

On the Cox side there was an RC XB-29 Airlifter. 2 channel RC that does nothing more than on/off the 2 electrofan motors. You control it the way they flew the DC10 that crashed in Iowa City a few years ago. A charge gives you about a 3 minute motor run time, more flight time if you find lift. Uses 27.145mhz.

And the big name on the Estes/Cox booth was CENTURI CORP.

Interestingly enough I ran into Lee Piester just outside the Estes booth. I think he smiled a bit when I asked him about the Centuri name displayed there. He was particularly interested that there were web sites devoted to Centuri and the nostalgia around his old company.

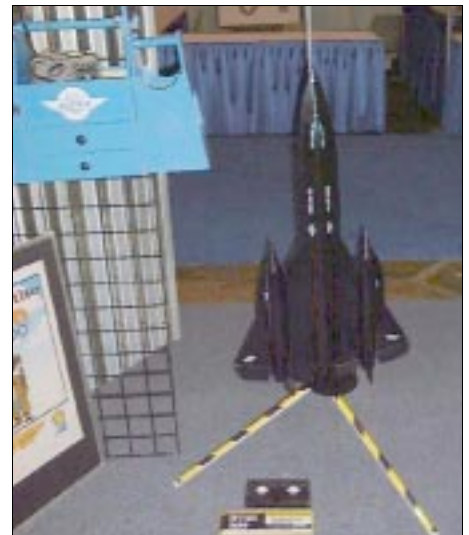
Aerotech had their existing large model rocket line, plus the new 4" G-Force, which should be available soon at just under \$100. Also on hand were the Black Max Econojets F23 and G38 demoed at NSL this year. These look to be lots of fun. There were also rumors of improvements to the 29mm and 38mm delay units.



Aerotech's G-Force – their first 4" kit.
Photo by Bob Kaplow

Ed LaCroix was not there, and I've confirmed with Phoenix locals that he has left AeroTech. I'm sure he will be up to something interesting soon.

Ace RC is the latest home for the Hobbylabs SR-71. The basic model is now \$30, and complete with RC \$90.



Ace RC's newly acquired SR-71.
Photo by Bob Kaplow

Other neat new products

Xuron had some nice tools, including a #9180 high durability scissors specifically designed for cutting things like kevlar, carbon fiber, or fiberglass. Another scissor is optimized for mylar and similar films.

Bob Smith adhesives has a neat new black CA that is flexible called IC-2000. Slow 20-40 sec

(Hobby Show Report – 1999 continued on page 5)

**Rocket Math 3:
Simulations – Part I**
by Norm Dzedzic (NAR 72426)

Introduction

With the proliferation of the personal computer, the rocket hobby community has enjoyed a tremendous growth in the use of *simulation* software to predict all aspects of a rocket's flight. Indeed, with today's availability of 'cheap' CPU power and commercial software, the average model rocketeer can perform analyses that early rocket scientists could only dream of.

You may have wondered how these programs are able to predict how high or fast your model will go. This series of articles will attempt to shed some light on the underlying concepts and methods which these programs use to help the intrepid rocket scientist design better and safer rockets.

Disclaimer

The information in this article is not meant to be a replacement for using a commercial or independently validated simulation software package. Use of this information for other than educational purposes is not warranted by the author or the publication within which it is printed.

The Basics

1. A Step in Time

All simulations start with what we know about a system at a point in time, usually designated t_0 (read "T-zero"). Then the physical laws or equations which govern the system are used to predict what will happen as time elapses. The simulation progresses in a series of steps where the results from each step become the known values for the subsequent step.

This breaking up of the simulation time line is called *discretization*. Since the rocket does not jump from point to point in time but moves smoothly or continuously, this is only an approximation of the real system. Fortunately, if the time steps are chosen small enough, the effect of this approximation becomes negligible for most systems. To understand this concept, compare Figure 1 which is the thrust curve for an imaginary rocket motor with that of Figure 2 which is this same curve discretized for use in a simulation.

The first widely available simulation program, RASP (**R**ocket **A**ltitude **S**imulation **P**rogram),

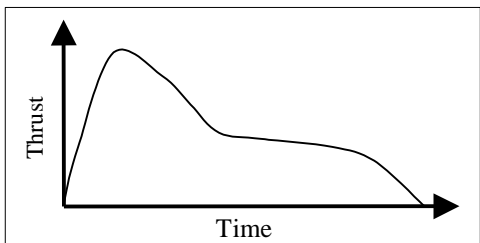


Figure 1: Continuous (Analog) Signal

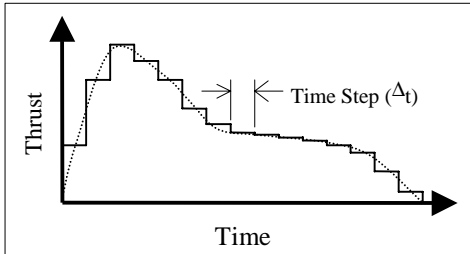


Figure 2: Discrete Signal

was written in BASIC and used a time step of 0.1 seconds or 10 steps per second. At the time, there were no graphic printers so all output was in the form of tables of numbers with values printed for each time step. This 0.1 second step size gave useable results and allowed the output to be printed on a manageable amount of paper.

With the computing power available today you might think that this step size has been reduced to miniscule levels. However, there is a point of diminishing returns to step size reduction where the change in results from using one step size to a smaller step size is less than the other errors which enter the simulation through approximations or even the error of the calculations in the CPU itself. For most hobby rocketry pursuits, a time step of 0.01 or 0.001 seconds (100 or 1000 steps per second) is more than adequate.

The basic idea to grasp here is that for each time step, the simulation program uses the current values of the system parameters (i.e. velocity, acceleration, altitude, motor thrust, model mass, etc.) and calculates the values for the next time step. These results or outputs then become the inputs for the next step. Thus, the simulation steps its way through time, tracking aspects of the rocket flight such as altitude, velocity, etc.

2. Where Am I? ... and How did I get Here?

The main question asked of simulation programs is, "How high will it go?" In order to answer this, we need to study the motion of the model through space and time. This field of science is known as *kinematics*.

The three main variables in kinematics are position, velocity and acceleration which are each defined below:

Position: *The distance from a fixed reference point.* Position is measured in units of length such as feet (ft) or meters (m). For rocket purposes, the reference is usually the launch pad and the distance is measured up so we call it *altitude*. The variable s is used to denote position.

Velocity: *The rate of change of position.* Velocity is measured in speed units (distance over time) such as miles per hour (mi/hr), feet per second (ft/sec) or meters per second (m/sec). Whenever a body is moving, it has a velocity. If the velocity of a body is zero, it is standing still. The variable v is used to represent velocity.

Acceleration: *The rate of change of velocity.* Acceleration is measured in units of velocity per time such as feet per second per second or as a factor of the acceleration of gravity (g). The

variable a is used for acceleration. This "feet per second per second" unit seems strange but a description and example should clear things up.

Whenever the velocity of a body is changing, i.e. the body is speeding up or slowing down, it has acceleration. The slowing down part is also called deceleration. If a body is moving at a constant speed or standing still (a constant speed of zero) then there is no acceleration.

As an example, imagine you launch a rocket and in the first 1.0 second of flight, its velocity changes from 0 ft/sec (standing still on the launch pad) to 100 ft/sec. So in 1 second the rocket's velocity changed by 100 ft/sec. If the model keeps accelerating at this constant rate, every second will add 100 ft/sec to its velocity. After 2 seconds it will be traveling 200 ft/sec and after 3 seconds, 300 ft/sec, etc. So we say the rate of change in velocity is 100 ft/sec per second. When read together you get, "One hundred feet per second per second." Since this sounds like stuttering and can be confused with velocity if the second, "per second" is dropped, acceleration is usually specified in units of distance over time squared such as (ft/sec²) (read "feet per second squared"). This actually makes sense since each "per second" is equivalent to (1/sec) so multiplying the units out gives:

$$\frac{\text{ft}}{\text{sec}} \cdot \frac{1}{\text{sec}} = \frac{\text{ft}}{\text{sec}^2}$$

Figure 3 shows a graph of the Acceleration, Velocity and Position for this constant acceleration example.

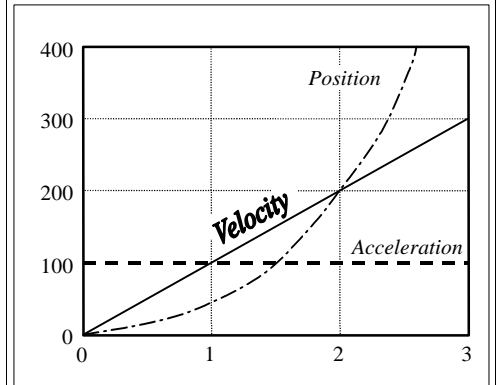


Figure 3: Constant Acceleration Motion

This can even be taken another step further to the rate of change of acceleration which is called Jerk. This is actually one of the more intuitive names in kinematics as everyone can envision what "jerky" motion is. When the acceleration of a body changes quickly, the motion will be jerky and the jerk will have a high value. If you've followed the pattern so far, you will know that the units of jerk are distance over time cubed such as ft/sec³. Although rarely used in model rocket analyses, jerk would definitely be a concern with a human or other delicate payload.

As you may have noticed, the three parameters, position, velocity, and acceleration relate to each

(Rocket Math continued on page 6)

(Hobby Show Report - 1999 continued from page 3)

ond cure time. The RC car guys are using it to glue tires to wheels. Don't know what the rocket uses might be, but I got a bottle to try out.

Revell Monogram adds a re-release of the Mercury Gemini duo I had as a kid, now as a Gus Grissom special.



Revell Monogram's reissue of Gus Grissom's Mercury and Gemini spacecraft.

Photo by Bob Kaplow

Precision Hobby Tools showed a small battery operated reciprocating tools, a mini-Sawsall. Looks like a good companion to any rotary tool for sawing, filing, sanding, etc. \$100 for the base tool, \$140 with a bunch of accessories. I just wish it didn't mean yet another battery pack and charger in the shop :-)

Peck Polymers is still the source for jap tissue, including the hard to find black.

Micro Format had an ink jet decal paper that had several rocketeers drooling. Visit them at www.paper-paper.com

K&S now has stainless steel rod, initially in 12" lengths, but expect 36" to follow later.

Inland has expanded the line I saw previously, now with several tools that all use the same power pack. They include a drill press, band saw, table saw, lathe, and shaper table. Since they run from a power pack, they can be used wet or dry for hobby stuff. But don't expect these smaller hobby tools to replace stuff like Delta bench top tools.

Gyros adds a safety shield for rotary tools to their line of miniature saws and cutters. www.gyrostools.com

Foredom has some new Typhoon structured tungsten carbide burs. I've described these cutters before as looking like a miniature mace. I've got a set of these before they added the new coating and they are the absolute nastiest most aggressive cutters I've ever used in a rotary tool. My older set of 5 was about \$45 from a discount tool house. The new set of 6 will retail for \$70 and IMHO is well worth it.

Airfix has 2 plastic models from the Wallace and Gromit series, The motorbike and sidecar, and the airplane (Judy bought me this earlier this month for my birthday). I, of course, requested the moon rocket.

National Sports Launch 2000 by Ray Halm (posted to r.m.r.)

Here is some info on NYPOWER 2000/The National Sport Launch. This years launch will be held in May instead of July so please plan accordingly. The reason for this change is that we did not want to conflict with LDRS being held in July and because we are we incorporating the NSL with NYPOWER 2000 we can still keep a NYPOWER launch for the year 2000 that does not conflict with any other launches. The NYPOWER 2000 / NSL launch will be the same great launch as usual, hopefully this time with much cooler weather. If you plan on attending book you rooms early. Rooms will be limited come March & April.

Date: May 27-29, 2000

Location: Geneseo, NY

Event: NYPOWER 2000/The National Sport Launch

Sponsors: MARS, NAR 136, & Buffalo Rocket Society Inc., NAR 590/TRA 85

Contact: Lloyd Wood 716-334-5429 email at Actionxprs@aol.com

Waiver: 8000 ft AGL

Host Motel: Rochester Marriott Thruway 5257
West Henrietta Rd
Rochester, NY 14602-0561
716-359-1800

Note: More info and a brand new website will be coming soon.

Holverson Designs 'Zoomie' Review by Bob Wiersbe (NAR 44588)



The Zoomie is declared to be "the world's simplest boost glider!" (by its creator, Holverson Designs). I haven't built enough gliders to say if that's true, but it was certainly simple to build and fly. I have built several parasite gliders, but I must admit that this was my first ever boost glider kit (I've never been good at getting things to glide).

The Zoomie has only 7 parts, a BT-5 body tube, nose cone, launch lug, and 4 laser cut balsa pieces for the wings. Also included in the kit are some very cute decals and a packet of clay to trim the glider. The balsa is 1/8" thick, which makes for a very sturdy glider.

Assembly was very simple. The only cutting required was to remove the wing tips from the main wing. The instructions leave it up to the builder whether they want to sand the edges of the wings at all, stating that the extra drag of an unsanded wing will make the rocket more stable. I rounded the leading edges of the wings and tips on my Zoomie.

The root edges of the wings are sanded to a slight angle and the two wing halves are glued together. The body tube is glued into the valley of the wings (sounds like the title for a bad B movie), and the launch lug is glued to the opposite side on the peak.

The balsa nose cone is partially hollowed, so I coated the hollowed portion with glue to prevent any burning ejection particles from lodging in the nose and causing it to smolder.

Trimming the glider was very easy, and actually quite fun. The instructions are clear on how to do it, and after adding a little clay to compensate for the glider being nose heavy I could get it to glide nicely with a hand toss.

The only motor recommended for the Zoomie is the 1/4A3-3T. I flew mine four times with these motors, with an average flight time of about 10 seconds. The conclusion I came to was that the 3 second delay was about 2 seconds too long. The glider is way past apogee when the motor ejects, leaving little airspace for the glider to fly in. The Zoomie does live up to its name on liftoff though, you have to be quick to see it after it leaves the pad!

I have to confess that I tried it with a 1/2A3-4T, with predictable results. The delay was just too long. I didn't have any 1/2A3-2T motors to try it with, but I think the glider should be able to handle the higher thrust and the delay should be much better.

The finished glider is 6" long with a wing span of 8.35". This looks like a great kit for small fields and demo launches. The price is right too, only \$5.49. You can check out the Zoomie on-line at <http://www.pionet.net/~holvrson>. Timeless Hobbies at Danada Square East in Wheaton also carries Holverson Design kits, and you can order one through them.

Holverson Designs 'Zoomie' Specifications:

Length: 6" (13.3cm)
Diameter: .544" (14mm)
Span: 8.35" (21.3cm)
Net weight: .2oz (5g)
Motor Mount: 13 mm
Recommended engine: 1/4A3-3T
Retail List Price: \$5.49

(Rocket Math continued from page 4)

other through increasing orders of time (or 1/ time). This increasing or decreasing dependence on time can be seen in Figure 3 where the acceleration is constant and doesn't depend on time at all, the velocity is a straight line and thus is proportional to time and the position is parabolic and so is proportional to time squared (t^2).

Therefore, going back to our idea of the time step, if we know the acceleration for a specific step and the duration of the step, we will know how much the velocity changed during the time step. Then, knowing the velocity of that step, the change in position can be found. This is the basic idea behind what the simulation programs do.

3. The Long Arm of the Law(s)

The basic laws which govern the motion of a body were published by Sir Isaac Newton in 1687 and apply to all objects moving significantly slower than the speed of light. No lawyer can help you violate any of them. Newton's three famous laws of motion are:

1. *Inertia*: An object in motion will continue moving in a straight line, at a constant velocity unless acted upon by an external force.
2. *Acceleration*: When a body is acted upon by an external force, its resulting acceleration (remember, rate of change in velocity) will be proportional to, and in the same direction as the external force.
This law leads to the fundamental equation of kinematics: $F = m \cdot a$ Where F is the resultant force acting on the body, m is the mass of the body and a is the acceleration of the body.
3. *Reaction*: When two objects exert forces on each other, the forces have the same strength, are opposite in direction and act along a straight line.

Of main use to us is the 2nd law and its corresponding equation: $F = m \cdot a$. When the simulation begins, we know the mass of the model and the thrust (force) of the motor so the whole shebang starts with finding the initial acceleration of the system from Newton's 2nd law.

Conclusion

In this article, we've covered the basic concepts employed by all simulation programs. Although heavy in definitions, we have tried to gear the explanations toward model rocketry and hinted at the next steps required to turn this knowledge into an understanding of the inner workings of simulation programs. Next time we'll quickly examine all of the forces acting on the rocket and perform a few time step calculations to give a feel of what these programs are doing.

NIRA Logo Contest!

We're having a contest, but you don't need a rocket for this one!

Several club members have suggested that we might want to consider a new club logo. John Barrett has put some thought into this, he writes:

"I wonder if anybody has taken a close look at our Club Logo recently. As you know it consists of an outline of the state of Illinois and a rocket taking off. Although I am sure that the logo has a long and interesting history, I would suggest that with the coming of the new millennium we should take this opportunity to consider whether this is a suitable time to redesign the Logo.

I would propose therefore that we have a competition, open to all readers of The Leading Edge, to redesign the Logo. The top four or five entries, as judged by the editor, could then be published in the newsletter, and the members could then vote for their favorite. The old Logo would be automatically entered into the final voting so that those members who wish to retain it could have an opportunity to do so.

With the new Logo (or the old one if it wins) we could then consider having it placed on patches, caps, T shirts etc."

Unless there is an absolute flood of entries, all entries will appear in one of the next two issues of the Leading Edge. All entries need to be to the editor by the deadline for the March/April issue (March 3rd, at the club meeting).



Voting will take place at the regular May meeting. Two rounds of voting will take place, the first round will select the top three entries and the second will select the winner from the three finalists.

As John suggested, the current NIRA logo (shown above) is automatically entered in the contest.

Entries should be submitted to the editor of the Leading Edge and can be either in a standard computer graphics format (emailed or on floppy), or can be submitted on paper. Entries should be suitable for use when enlarged or shrunken (for patches, T-shirts, etc).

The winner will receive a one-year extension on their NIRA membership and, hopefully, lots of thanks from NIRA members.

NARAM 41 Sport Range Correction by Ken Hutchinson

I don't know how it happened. In my mind's eye I can STILL see that Mercury Redstone demonstration flight at NARAM going up, arcing over, and crashing into the trees as I reported earlier in my NARAM sport range article. Trouble is, that isn't how the flight ended at all. I got some email a while back from Bob Sanford who made the demonstration flight. We traded notes and determined that no matter how clear the memory was in my mind, it was wrong. The flight recovered normally, Bob even had a picture to prove it! Well there is a silver lining in every cloud and in this case our email exchange allows me this opportunity to fill in some of the details I was unable to supply in the earlier article.

Neubauer Rockets is the manufacturer of the Mercury Redstone kit which is 4" in diameter and 59" tall. If you do that math that makes it 1/17th scale. It features a molded Mercury capsule and escape tower parts. The model has a 50" nylon parachute and a 29mm motor mount tube for flights on an AeroTech G80-4 motor to an altitude of 400-500 ft. There are vinyl pre-cut decals for the roll pattern on the Redstone along with other details. This is an all NEW kit, not a re-issue of any previous model. The kit is \$149.95 (Shipping is an additional amount) and it is available only through Discount Rocketry (www.discountrocketry.com).

It is a very nice model of a historic prototype and while this correction will probably reach you too late for Christmas, I bet you have a birthday coming up! Meanwhile does any one know where I can get extra memory chips for a 1952 model human brain?!



Bob Sanford's Mercury-Redstone after a successful flight (notice the nearby gravel road – ouch!)

Photo courtesy Bob Sanford

Help Us Fight Oppressive Regulation
by Mark Bundick, NAR President (From www.nar.org)

I need your help to win our battle against the Bureau of Alcohol, Tobacco, and Firearms.

Many of you have been extremely interested in helping NAR fight unnecessary regulation of high-power rocketry (HPR). Finally, the time has come that there's a role for you to play. It's not glamorous. It won't take any volunteer effort. But your help will be absolutely indispensable.

It's time to act now, and we need your help to fill a legal warchest.

As NAR President, I never thought I'd be sitting here telling my membership, "we have to take someone to court." But, in my opinion, the BATF has no other incentive to grant the HPR community any regulatory relief.

We need additional funding to support our upcoming legal battle. Our lawyers are excellent litigators. We have a strong legal case. But money will be required to finish what we're starting.

To explain to you why we are sure we're on the right track, I've got four topics to cover with you.

Then I need you to send in that donation.

Reviewing The History

In August 1998, BATF published a Final Rule notice in the Federal Register. They indicated that further regulation of the HPR activity was forthcoming in a future Notice of Proposed Rule Making. In February 1999, I visited informally with BATF staff with Bruce Kelly, TRA President, and Pat Miller, our NFPA representative. We attempted to outline our concerns and better understand why BATF felt a need to impose further regulation. That meeting was, from our perspective, unsatisfactory.

In May 1999, leadership of NAR, TRA, and hobby industry representatives met in Culpeper VA to review this situation. At that time, we agree to secure counsel from Egan and Associates, a Washington, DC law firm lead by Joe Egan, an attorney who successfully secured changes to FAR Part 101 for the NAR back in 1994. Joe's staff began the detailed legal research required to better support our position. In August 1999, Joe led our team into a second meeting with BATF to outline that position, and to secure BATF's agreement to review our legal position. That position is outlined in our September 7, 1999 letter to BATF.

On October 15, 1999, we met for a third time to obtain a verbal response to that September 7 letter. BATF rejected two of our three arguments, asked for further time to review the third, and refused comments on the status of six members' Low Explosives User Permit (LEUP) applications or magazine inspections. We obtain assurances that BATF would respond in writing to our September 7 letter.

Reviewing The Legal Game Plan

a. The Trigger: The positions taken by BATF in their upcoming response letter are critical to determining our next step. If, as we were told on October 15, BATF wholly rejects our September 7 letter, we would have grounds to go to court to challenge BATF's positions. BATF's lawyers clearly understood what it meant when we asked for such a letter. Our counsel believes BATF now understands they're headed for a lawsuit.

b. The Case Approach: The case we'll take to court would likely be a request for a declaratory judgment. Such cases aren't typically lengthy and generally involve more legal arguments than other civil cases you're likely to be familiar with (e.g., personal injury). We'd expect to get on a Federal district court calendar for a hearing within six months, with a ruling two months after the hearing is over.

c. The Potential for Appeal: Rulings from Federal district courts aren't always final. Either party could file an appeal to a Federal circuit court. If BATF loses, they would not make a decision on appeal. Instead, the Solicitor General, the litigation lawyer for the US Government, would review the case and independently determine whether to seek an appeal. If a party loses at a Circuit level, any additional appeal would go to the

Supreme Court. However, very few cases go that far, approximately 80 per year.

In any case, we'd expect to file our suit sometime around January 15, and get a ruling around Labor Day.

The Odds and the Issues

a. How We Look vs. Other Cases: We reviewed the legal basis for our case prior to our October 15 meeting. Counsel is unmoved in their assessment of the soundness of our legal argument. Egan and Associates typically takes in cases with much less of a legal case than ours for their corporate clients, and BATF has no justifiable arguments to support their legal position.

b. How BATF Looks: The inconsistent manner in which many LEUP applications and inspections have been undertaken, along with the lack of good internal procedures for training field inspectors, strengthens our position in court. This behavior means we can claim "arbitrary and capricious" action on the agency's part. And judges take dim views of Federal agencies acting in such a manner.

c. The Risk: A court will not be willing to grant relief if they are convinced that there is a public safety issue here. Notwithstanding the lack of credible evidence, BATF will likely contend that ammonium perchlorate (AP) propellants are low explosives, represent a potential public safety risk, and should be subject to the existing explosives laws requiring permits, proper storage and adequate tracking documentation.

In addition to the legal arguments already delineated, we have to show two things to head off BATF's argument.

First, we have to show the BATF doesn't have standardized methods for determining what things go on or stay on the explosives list. In our discussions with BATF regarding the methods for generating items for the list, it's pretty clear to me that the procedures at best are ad hoc. I am confident that we can demonstrate this to the court in our filings. BATF will have to counter with evidence of standardized methods to analyze either their own tests or tests done by others, and I'm doubtful that they can do that consistently.

Our second job is to show AP propellant doesn't detonate and cannot, in the form used for HPR motors, be used to make a bomb. We need to further substantiate our technical case in this regard by, for example, using industry leaders and/or an expert witness to help the court understand our evidence.

If you have ideas about persons with outstanding technical, professional and educational qualifications who can provide this sort of expert testimony, please let me know. Our counsel will review their credentials and contact them directly.

The Costs and the Funding

a. Income to Date: Our funding has come from NAR and TRA, each providing \$30,000 of general funds to pay for the legal work done so far. As of September 30, 1999, we had \$14,000 remaining in our accounts with which to work.

The total cost of the litigation is estimated to be \$100,000 -- \$25,000 of that for expert testimony, and \$75,000 for legal work. This means we need, over the next few months, to find \$86,000 to fund the effort.

b. The Need For Donations: In reviewing this need with the NAR Board, I've stressed to them that we also have other pending financial commitments. At the February 2000, Seattle, WA Board meeting, I intend to ask the NAR Board to fund, for an initial one-year test, two new specialty publications for members. These would be a quarterly HPR oriented one- or two-color newsletter, similar in format to the Model Rocketeer, and a similar publication for Junior members. To be certain of the funding, we need to keep some financial reserves aside, and thus cannot fund our legal effort to the extent we have done up until now.

c. The Matching Program: The NAR Board is committed to finding ways to continue to support the NAR membership. We have agreed to set up a system to match donations from members.

(Help Us Fight Oppressive Regulation continued on page 11)

Space Launch Report for September-October 1999

by Tim Johnson

September and October saw 14 space launch successes and one failure. Krunichev's Proton-K served up the failure, its second of the year. Russian/Ukrainian rockets accounted for seven good launches, however, including four by Soyuz-U. Arianespace continued its launch surge with three missions, matching the entire U.S. total during the same period. China conducted one launch.

Boeing's Delta 3 and Lockheed Martin's Atlas remained stalled by the now six-month-long RL-10 failure investigation while NASA scrambled to fix space shuttle wiring flaws. U.S. satellite manufacturers had more success. Of the 23 satellites launched during the period, all but 7 were built in the U.S. Fully half of the Russian/Ukrainian launches carried U.S.-built satellites.

First Commercial Sea Launch Zenit 3SL

On September 10, Sea Launch conducted its first commercial Zenit 3SL launch. The company's Ukrainian/Russian rocket successfully injected the 3,447 kg HS-601HP DIRECTV 1-R satellite into geosynchronous transfer orbit (GTO) about an hour after liftoff from launch platform Odyssey in the Pacific near the equator at 154 degrees West longitude. It was the second successful Zenit 3SL launch. The first orbited a dummy payload on March 27, 1999.



The Direct TV payload before being mated to the Zenit rocket. Photo from Boeing

Zenit 3SL weighed about 458,960 kg at liftoff. Its four-chamber Energomash RD-171 first stage engine provided 740,136 kgf thrust during the first 146 seconds. The Energomash RD-120 second stage engine then took over, providing 93,832 kgf vacuum thrust for nearly 400 seconds. Zenit's Energia Block DM-SL third stage engine then provided 7,982 kgf thrust for about 7.5 minutes to push itself and the payload into an elliptical parking orbit.

The vehicle coasted across the Mid-Atlantic, climbing to an 4,323 km apogee where the second Block DM-SL burn began at about the 50 minute mark. The burn lasted 3 minutes 9 seconds, injecting the payload and stage into GTO.

Sea Launch partners include Boeing, Kvaerner Maritime a.s., of Oslo, Norway, RSC Energia of Moscow, Russia, and KB Yuzhnoye/PO

Yuzhmash of Ukraine. The company now has an 18-satellite backlog, 13 of which are Hughes satellites.

Three Ariane 4 Successes

The 119th Ariane rocket, an Ariane 42P model with two solid rocket boosters, successfully put Koreasat 3 into GTO on September 4. Arianespace flew the mission as V120 (L488), having assigned V119 to the yet to fly Ariane L504 mission.



An Ariane 42P waiting to put Koreasat 3 into orbit. Photo from Arianespace

Ariane V121 (L489) orbited Telstar 7 on September 25 for Loral Skynet. The 418,000 kg, 56.2 meter tall Ariane 44LP, the version with two solid and two liquid strap on boosters, injected the 3,790 kg Loral FS-1300 satellite into a 59,955 x 200 km x 7 deg supersynchronous transfer orbit (STO).

Ariane V122 [L490], another 44LP, put the 3,814 kg Loral Skynet Orion 2 (FS-1300) satellite into STO on October 19.

L490 was the 48th consecutive Ariane 4 success. After V122, Arianespace had a 43-satellite backlog.

Two Proton Successes, One Failure

After being grounded for two months by a launch failure investigation, Proton K successfully returned on September 6 with the launch of two 1,360 kg communication satellites, Yamal 101 and 102, for AO Gazkom of Moscow. The Block DM-2M fourth stage boosted the satellites to geosynchronous orbit 6.5 hours after liftoff from Baikonur. The launch succeeded, but ground controllers lost contact with Yamal 101 after it reached orbit.

A Proton-K/DM3 orbited the first Lockheed Martin Intersputnik communications satellite (LMI 1) for International Launch Services (ILS) on September 26. The 691,740 kg rocket rose from Baikonur LC 81L (Pad 23). LMI-1, a 3,740 kg A2100 LockMart Sunnyvale satellite,

separated into a high-energy GTO about 6.5 hours after liftoff.

The third Proton, a Proton-K/DM-2, suffered a second stage failure 220 seconds after its October 27 liftoff from Baikonur Cosmodrome, Kazakhstan. It was the second Proton K failure in four months. The rocket and its Express A1 communications satellite fell to earth in the Karaganda region.

Four Soyuz-U Launches

Russia's military launched two Soyuz-U missions from Plesetsk Cosmodrome in September. The first, on September 9, put the Foton 12 microgravity research satellite into low earth orbit (LEO). The second, on September 28, boosted a Resurs F1M remote sensing spacecraft to LEO.

Both 6,400 kg spacecraft were based on the Zenit-class Soviet photoreconnaissance design that also served as the manned Vostok capsule. Their 2.2 meter spherical re-entry capsules were sandwiched between a separable forward battery pack and an expendable aft service module that housed a solid fuel retro-rocket. Foton 12 returned to earth on September 24. Resurs F1M returned on October 22.

The fourth and fifth Starsem Soyuz-U/Ikar rockets orbited eight more 450 kg Globalstar cellular telephone satellites on September 22 and October 18 from Baikonur Cosmodrome LC 1. The launches increased Globalstar's constellation to 44 of a planned 52, allowing the company to offer interim service in October. The latter mission was the 11th Soyuz-U launch of 1999, putting the Semyorka-based booster one up on Boeing's Delta 2 as the year's most-often used launcher.

Atlas 2AS Returns

After having been sidelined for more than five months by the RL-10 investigation, by a launch pad lightning strike, by Hurricane Floyd, and by Tropical Storm Harvey, Lockheed Martin's Atlas Centaur returned on September 23. AC-155, an Atlas 2AS, orbited Dish Network's Echostar 5 from Cape Canaveral SLC 36A. The ILS mission was the third Atlas launch of 1999 and the 44th consecutive Atlas success.

The 237,230 kg rocket's Rocketdyne MA-5A 222,222 kgf LOX/RP1 liquid propulsion engine was augmented at liftoff by the 87,075 kgf combined thrust of two ground lit Castor 4A solid rocket boosters. AC-155 rose slowly into the night, rolled to its flight azimuth, and, at T+15 seconds, began to pitch downrange. After 54 seconds the ground lit SRB pair burned out. The air lit pair ignited four seconds later. To meet range impact constraints, the ground lit pair did not jettison for another 18 seconds. The air lit pair jettisoned soon after burning out at T+113 seconds.

About 2 minutes 44 seconds after launch, Atlas's twin engine booster package shut down and fell away. 38 seconds later, the 14-foot payload fairing jettisoned. The sustainer shut down at about T+5 minutes. Centaur separated and its

Apogee Components 'Micro V-2'

Review by Norm Dziedzic (NAR 72426)

twin Pratt & Whitney RL10A-4-1 LOX/LH2 engines deployed nozzle extensions before starting 18 seconds later. Centaur provided 20,187 kgf thrust for about 4.5 minutes to reach a 156 x 475 km x 28.2 deg parking orbit.

Centaur coasted for almost 15 minutes before restarting as it neared the equator between the African Ivory Coast and Ascension Island. The 1.5 minutes second burn exhausted all propellants to achieve a maximum apogee 45,822 x 166.8 km x 26.6 deg orbit. The Space Systems Loral FS-1300 3,602 kg satellite separated about 29 minutes after liftoff.

Athena 2/Ikonos

LM-7, a Lockheed Martin Athena 2, launched the Ikonos imaging satellite from fog-enshrouded Vandenberg SLC-6 on September 24. Athena's Primex 4th stage injected the 1,600 lb Ikonos spacecraft into a 680 km x 98.2 deg sun synchronous orbit 58 minutes later. Ikonos is the first commercial satellite to perform one-meter resolution Earth imaging. LM-7 marked Athena's return after the April 27, 1999 failure caused by a faulty payload fairing separation.

Delta 275/GPS 2R-3

Delta 275, a 3.5 stage Boeing Delta 7925-9.5, orbited GPS 2R-3 from Canaveral SLC 17A on October 7. The rocket put the LockMart Sunnyvale 1,075 kg satellite into a 196 x 20,285 km x 38.98 deg transfer orbit. GPS 2R-3 later maneuvered to a 21,000 km x 53.1 deg operational orbit.

Long March 4B/Ziyuan-1/SACI-1

China Great Wall Corporation's second CZ-4B (Long March 4B) successfully orbited the 1,450 kg China-Brazil Earth Resources Satellite Ziyuan-1 (or CBERS-1) and SACI-1, a small 60 kg Brazilian satellite, on October 14. The three-stage rocket lifted off from Taiyuan Launching Center in central China. 22 minutes 40 seconds later, Ziyuan-1 separated from the rocket's third stage in a 732 x 745 km x 98.6 deg sun synchronous orbit. SACI-1 separated about 48 minutes after lift off.

Hurricane Floyd Menaces Cape

Hurricane Floyd, a category 4 storm with 140 mph winds brushed past Cape Canaveral on September 15, causing little damage. The Cape was buffeted by 50-70 mph winds and 90 mph gusts. Four NASA orbiters, International Space Station Hardware, two Atlas 2A vehicles, one Delta 2, and one Titan 4B all rode out the storm in structures designed for 105- 120 mph winds. NASA plans to reconsider hurricane plans after Floyd's "near miss".

Floyd also threatened historic space hardware at KSC and Cape Canaveral museums. The winds toppled and destroyed or heavily damaged a Mercury Redstone that had stood on LC 5, site of the first two U.S. suborbital launches. The damaged rocket was a real Redstone with a mockup Mercury capsule.

The Apogee Micro V-2 model kit is exactly what its name says: A micro size sport scale version of the venerable V-2 rocket. This model is based on a BT-20 sized body (18mm) and has a 10.5mm motor mount for use with the Apogee micro motors. The fins, nose cone and boat tail are of balsa with the fins being laser cut.

This was my first experience with laser cut fins and I was impressed. When they cut the fin shapes, they leave a few very small uncut sections so the fins remain in the balsa sheet and don't rattle around in the kit bag to be damaged. The fins were easily removed from the sheet with a hobby knife and sanding off the little nibs was a breeze. The edges were darkened, presumably from the heat of the laser but these are to be covered with paint so no big deal. For this model, the big advantage of laser cutting the fins is a perfect match with the V-2 boat-tail.

Due to the small size of ... well, just about everything on this rocket, the instructions include templates for a fin alignment guide to hold the fins perpendicular to the body while the glue dries and a fin positioning guide to ensure proper fin spacing around the boat tail. These aid tremendously in construction but you have to supply your own 1/16" thick balsa stock for the alignment guide. Another benefit is that this alignment guide can be used for any other rockets with 1/16" thick fins. The instructions suggest cutting the positioning guide from card stock but I used the 1/16" balsa for this also.



The instructions were clear and concise and the model built up pretty quickly. One snag in my assembly came when I didn't test fit the 10.5mm motor mount tube all the way into the boat tail before attempting to glue it in place. When gluing the motor mount into the boat tail, the fit was so tight that it stuck half way into position. To save the boat tail, I pulled out the motor mount before the glue dried but damaged it in the process. Using some sandpaper wrapped around a dowel rod, I opened up the hole in the boat tail and used some 10.5mm tubing I had on hand to replace the motor mount. Remember, the three steps to assembly: 1) test fit, 2) test fit again, 3) glue.

The model comes with a kevlar shock cord which is attached to the top of the motor mount tube with a motor stop block. An 1/8" launch lug, plastic streamer and generous amount of clay for weighting the nose complete the parts for the Micro V-2.

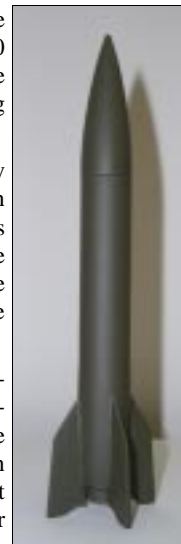


I flew my model at the October, 1999 NIRA launch on a 1/2A2-4. The boost was perfect and the delay right about apogee. Several onlookers helped me spot the model as it streamered back to earth from a predicted altitude of 400 ft. It may not have achieved this due to a strong breeze but with a model this small, you'll appreciate all the spotters you can get. I have a feeling that on the full A2-5, this thing is a goner.

Apogee products are only available directly from Apogee. Their web site, including on-line ordering, is at <http://www.apogeerockets.com/> or get a catalog by sending your name, address and \$2.00 to:
Apogee Components
630 Elkton Drive
Colorado Springs, Colorado 80907-3514.

Apogee 'Micro V-2' Specifications:

Skill Level: 2
Length: 6.75" (17.15cm)
Diameter: .736" (18mm)
Weight: .35oz (10g)
Recovery: Streamer
Motor Mount: 10.5 mm
Recommended engine: 1/4A2-2 (first flight),
1/4A2-4, 1/2A2-2 (breezy), 1/2A2-4, A2-3
(breezy), A2-5
Retail List Price: \$6.25



Hobby Show Rocket Make-it Take-it

Every year NIRA (with the help of our friends from WOOSH and SCAM) staffs the Rocket Make-It Take-It at the Chicago Hobby Show. This year Estes provided us with 1500 kits – most of them were Quicksilver kit in Blue, Green, and Silver coloring.

This year the hobby show was on Halloween weekend again. Because of this, Saturday was the busiest day for building with well over half of the kits being built. Sunday was much slower, with kids more interested in trick-or-treating than building rockets. Even with this, all but about 40 of the kits were built!

The Quicksilver kit, being mostly plastic, was different than the kits we usually have for the hobby show. Cheri Chaney and others spent the preparation time before the show on Saturday tracking down plastic cement since the wood glue we had wouldn't work on these models.

Thanks to everyone who helped with the hobby show! Besides being a fun event, it helps bring kids and parents into our hobby.

Hobby Show Launch Report by Bob Kaplow (NAR 18L)

Today (Nov 7th) was the launch for the kids (and adults) who built rockets at last weekend's RCHTA show. You couldn't expect a better November afternoon in Chicago, 60s, sunny and almost calm.

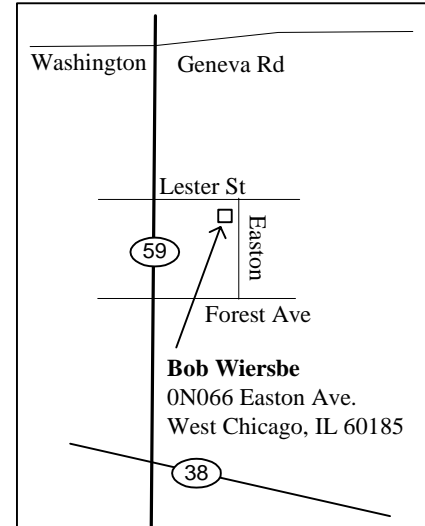
But we did have some problems. The A8-3s for the launch never showed up. Mike Jungclas provided them from his stash. We also couldn't locate a critical component for our rack, so had to use individual launches. Things got a bit hectic, but we got everything flown.

We had about a hundred RCHTA rockets flown in 3 hours, and probably a similar count of NIRA rockets. Most of the rockets flew pretty well. We only had one separation and IIRC one prang. The only rocket I recall getting lost was a reflight with a C6-7!

Other highlights: Someone flew a Minie-Magg on a G125 for a low but nominal flight that got the crowd's attention. Cal flew an AT Arcas on a G that woke up everyone. We had several other E and F flights to entertain the crowd. I flew my Happy Meal, American Pie, Pumpkinik, and triple-Quicksilver, all successfully. And while I didn't fly it, I showed off my new magnetic

apogee detector, straight from the RMR kit and the pages of Sport Rocketry.

Thanks to the following people for helping with the launch: Jonathan Charbonneau, Adam Elliott, Ric Gaff, Ken Hutchinson, Cal Jestice, Mike Jungclas, Bob Kaplow, John Kouns, Jeff Pleimling, Leo Ringwald, Martin Schrader, Bob Wiersbe. And thanks also to anyone missing from the above list!



Map to February's building session at Bob Wiersbe's house.

Confused Stages – Stage 10 by Jonathan Charbonneau

"That rocket's too heavy," Tom quips. "No, it's too light!" exclaims Joe.¹ Who's right? That depends upon the rocket's weight and its optimum weight. "Optimum weight?!" you ask. Yes, optimum *weight*. This stage will settle the confusion.

Optimum weight is the weight at which a rocket performs best, and it depends on several factors. Everybody knows that too much weight hurts performance. What many rocketeers don't realize is that it is possible to have too little weight. Why? Because a rocket's flight has two distinct phases; powered flight and coasting flight. It is desirable to have minimal weight during powered flight, since that allows the rocket to get more acceleration, and hence more speed. During coasting flight however, it is desirable to have as much *weight* as possible. This is because during coasting flight the only forces acting on the rocket are gravity and drag.

Gravity incurs the exact same speed loss on each and every rocket regardless of weight. This is due to Newton's second law: $F = ma$ where F is the force, m is the mass and a is the acceleration. The force due to gravity is equal to a constant times the mass. With the ratio between gravitational force and mass being fixed and $a = F/m$, the acceleration due to gravity or g as it's called, is constant regardless of weight. The small gravitational force that acts on the Estes

Mosquito is all the force required to slow the Mosquito as fast as a full sized Aerobee 350 get slowed by the big gravitational force acting on it. Therefore, given the rocket's speed and altitude at burnout, the losses due to gravity are fixed and cannot be reduced. However, just as a glass that is half empty is also half full, the fact that gravitational losses during coasting flight are fixed also means that they cannot be made any worse either.

Drag, on the other hand, is determined by the shape, size, and smoothness of finish on the rocket as well as the rocket's speed. It varies directly with the square of the rocket's speed. It's affect on the rocket varies inversely with the rocket's mass. Double the rocket's mass, the affect of drag is halved. Here is an experiment in which you can see for yourself how more weight reduces the affect of drag.

Materials

- 1 payloader (Vaughn Brothers '3FNC')
- 1 C10-6 (from Apogee)
- 1 D21-7 (from Aerotech)
- Scale (grams or ounces)
- Sand
- 2 Trackers with theodolite
- Launch Pad
- Flying Field

Procedure

Prep the rocket for flight with the C10-6 engine. Weigh it on the scale and record its weight. Fly it and have it tracked for altitude. For the second flight, use the D21-7. Prep rocket with this

engine and weigh it on the scale upright with the nosecone on the scale next to the rocket. Fill the payload section with sand until the scale reads a weight of twice what the rocket weighed on the first flight. Fly it and have it tracked for altitude.

What to Expect

You should find that flight #2 has greater altitude. This is due to the fact that although the thrust to weight ratio is the same for both flights and so is the duration of powered flight, the mass is twice as great on flight #2, causing the drag force, which is the same for both flights to have only half the affect on flight #2 that it had on flight #1.

The optimum weight for a rocket is the ideal compromise between having the absolute minimum weight (best during powered flight) and having the maximum weight (best during coasting flight). An easy way to remember is a feather cannot be thrown as far as a hammer.

The experiment I've mentioned in this stage can also be done with any payloader that accepts 29mm engines (e.g. Aerotech Aereaux). If going this route, use an F22-5J reload for flight #1. For flight #2 use a G33-5J and fill the payload section with enough sand to bring the weight to 1.5 times the weight it had before flight #1. Flight #2 should still fly somewhat higher than flight #1.

¹ Dispute between Tom and Joe by anonymous

Welcome to the Club!

Chris, Jon, Mark and Paula Bidlake, Dale Chrystof, Bryan, Carolyn, Greg, Brian and Lucille Douglas, Claudia, Gracie, Jack and Rockey Flintermann, Andrew and Jon Gilfillan, John, John Richard, Mary Elizabeth, Mary Jane, Veronica Jane and Victor Edward Hojek, Ben Jakubowski, Charles and Matthew Kolmann, Andrew and Mike Kremer, Eusebio Marchosky, Alex and John Miles, Marla Rainey, Paul Regan, Anthony, Matthew, Mike and Shannon Reiskis, Andy, Bob, Jennifer, Julie, Lauren, Shari and Steven Smid and Gary, Joe and Mike Vimont have all joined NIRA since the last newsletter.

Welcome to the club!

NARAM 2000 Hotel Update

NARAM 2000 is sizing up to be the biggest and best NARAM ever! The headquarters hotel for NARAM 2000 has already sold out. We have made arrangements with a second hotel nearby to accept reservations under the "NARAM 2000" designation. We recommend room reservations are made as quickly as possible. Call the Best Western in Canon City at 1-800-231-7317 and make sure you designate "NARAM 2000".

Find a buddy or bring your family to the best event of the year. Visit our web site at <http://www.naram2000.org> for more details about the event, available activities, and alternate lodging and camping.

NAR Standards and Testing News

R59: NAR S&T MOTOR DECERTIFICATIONS

NAR Contest Decertifications

The following motors will lose their certification for NAR contest use effective July 1, 2000 but are certified for use at NARAM 42. They remain certified for general sport flying for a period of three years, until July 1, 2003.

Estes

F62-4,6,9

G70-5,7,10

Quest

A6-4

B6-0,2,4,6

C6-5,7

R60: NAR S&T MOTOR CONTEST RECERTIFICATIONS

NAR Contest Recertifications

NAR contest certification for the following motors is now restored. It was previously announced in NAR S&T news release R59 that certification for use in NAR model rocket contests for these motors would expire at the end of the present year. According to a manufacturer spokesperson, "Please be advised that we have been and are continuing to ship North Coast Rocketry F62 motors. We will continue to produce and ship F62's as long as they continue to sell well. There has been some disruption in shipping due to some production problems but those problems appear to have been solved."

These motors are now certified for use in NAR contests indefinitely.

North Coast Rocketry (by Estes)

F62-4,6,9

R61: NAR S&T NEW MOTOR CERTIFICATIONS

The following motors have been certified by NAR Standards & Testing for general use as model rocket motors effective October 15, 1999. All are certified for contest use effective December 14, 1999.

Rocket Vision Flight-Star:

24mm x 70mm:

E15-4,7 (40.0 Newton-seconds total impulse, 17.8 grams propellant mass)

24mm x 124mm:

F72-5,10,15 (80.0 Newton-seconds total impulse, 36.8 grams propellant mass)

24mm x 177mm:

G55-5,10,15 (125.0 Newton-seconds total impulse, 62.5 grams propellant mass)

Jim Cook, Secretary for
NAR Standards & Testing
<JimCook@AOL.COM>

Jack Kane, Chairman

(Help Us Fight Oppressive Regulation continued from page 7)

We are prepared to set aside an additional \$10,000 to match member contributions at a 50% rate. That is, if NAR members contribute \$10,000 to the legal fund, NAR general fund will add \$5,000. If members contribute \$20,000, the full \$10,000 would be added to the legal fund. Any donated funds above this amount will further help strengthen our legal effort.

- d. The NAR's Relative Contribution: Before you assume that the NAR Board is somehow underfunding the litigation or otherwise shirking its commitment to you, consider this. Assuming we receive \$20,000 in donations from you, the NAR Board would have allocated a total of \$40,000 to the legal fund. That \$40,000 represents: the largest single project funding in the history of the NAR, and an NAR General Fund contribution of approximately \$40 per certified member, a per capita rate far in excess of the contribution of other associations or industry groups.

When you make your contribution, you're also welcome to suggest other funding vehicles for us to use. I'm open to any and all suggestions, and promise you that I will review all those submitted to the NAR Board for discussion at our next meeting. I'm also working with Bruce Kelly and others to secure long term sport rocket industry support for funding this battle. When I have solid feedback on that, I'll let you know.

- e. Other Financial Issues: Some of you have asked about whether this effort jeopardizes the NAR's nonprofit status. It does not. These expenses are for litigation, not lobbying. There are no IRS restrictions on money spent for legal expenses.

Your donations are fully tax-deductible. You'll receive a written letter from me thanking you for your donation. That letter will be suitable for your 1999 tax records.

The Big Picture

As I mentioned earlier, I don't believe the BATF is going to grant the HPR community any regulatory relief without being pushed into it. They're unlikely to change their procedures in the field anytime soon to make the process systematic and consistent. Again, in my opinion, you, the NAR HPR member, are likely to continue to face burdensome inspections, arbitrary enforcement, and inconsistent treatment from inspectors.

If you want to secure a long term, unregulated future for HPR flyers and suppliers, we have to go to court to obtain that future.

Now it's time for you to decide and act.

At the end of this web page is a form you can use to make your donation. You can pay by credit card. I've suggested some amounts for you to consider, or you can fill in your own amount.

Making a contribution today will give the NAR and you, the NAR HPR flyer, the best chance, maybe the only chance, we have to continue to have our safe, educational and fun hobby free from unnecessary regulation.

Remember, all your contributions help, regardless of size. For you, it's fully tax-deductible. And for every \$2 you contribute, the NAR Board provides an additional \$1. Please fill out this form and mail in your contribution today.

For your hobby.

For the future.

Please donate.

Can I count on your support today?

Pay forward. Aim high.

Mark B. Bundick

This may be your last newsletter! Check your label for the expiration date.
If it says Membership Expired or Membership Expiring, this will be your last newsletter!



Bob Hart, coming over from Indiana to assist, talks a group of kids through building their rockets. Photo by Leo Ringwald



At the Hobby Show Launch, a LOC Minie-Magg descends after wowing the crowd with a 'G' engine. Photo by David Rutchik