THE LEADING EDGE

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

Volume 23, Number 2
March/April 2000

Club News

New Club Launch on April 2nd – Because the NAR insurance is canceled effective April 5th, NIRA is holding the first launch of the season on Sunday, April 2nd.

This will be a regular club launch at the Greene Valley Forest Preserve (see map on page 2), the only change is the date.

Regular Club Launches on Hold – Except for the April 2nd launch, all other club launches are now on hold until the NAR finds new insurance. The Forest Preserve requires us to have insurance to fly from their site, and it also protects NIRA from possible uninsured liability.

Check NIRA's web site (www.nira.chicago.il.us) for any changes to our schedule. Also call the NIRA Infoline (630-483-2468) for any last minute schedule changes.

NAR Looking for new insurance – The reason the NAR is looking for new insurance is because the insurance carrier, Sports Flyers of America (SFA), has decided to cease business – including providing insurance for the NAR.

This is because the President of SFA, Elliot Janas, collapsed and died on a business trip to Seattle. Being basically a family business and having legal issues with the Academy of Model Aeronautics (AMA), the family decided it was best to close the business.

Although the NAR is doing its best to find new insurance coverage, Mark 'Bunny' Bundick, the NAR's president, has stated that there will be a period that there will not be insurance. The NAR's web site (www.nar.com) has more information on the background and impact of this situation.

Scout Launch – There will be a launch for Boy Scouts on Saturday April 29th at the DuPage fairgrounds. Since the Boy Scouts provide their own insurance, this launch is still on. To assist, and maybe launch a few rockets, contact Bill Thiel at (847) 394-8434 or email him at wthieljr@interaccess.com.

Additional Building Session

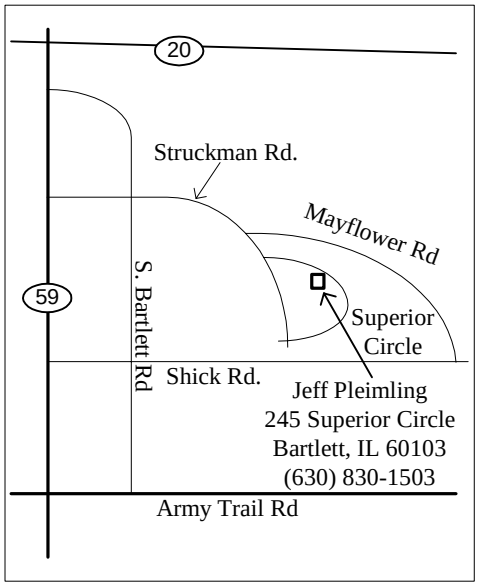
Because our normal club launches are on hold, NIRA will be having alternate activities on the same date.

The first activity is a continuation of NIRA's winter building sessions. We are looking for any ideas for any following months (if that becomes necessary).

The building sessions is an informal time to build rockets, talk about rockets, look at rockets, and just hang out.

The April session will be hosted by Jeff Pleimling, and will run from 1:00 until around 5:00 on April 16th. Being a rocket to build and some snacks/soda to share.

Jeff Pleimling
245 Superior Circle
Bartlett, IL 60103
(630) 830-1503



Map to April's impromptu building session at Jeff Pleimling's house

NAR/TRA File Suit Against ATF

By Mark 'Bunny' Bundick
(as posted to rec.models.rockets)

The National Association of Rocketry (NAR) and Tripoli Rocketry Association (TRA) on Friday, February 11, 2000, jointly filed a four count civil complaint against the US Bureau of Alcohol, Tobacco and Firearms (BATF) in Federal District Court in Washington, D.C. We have not taken this action lightly or without a full and lengthy review, with counsel, of the available options for resolving our dispute with BATF. This action became necessary only after repeated meetings and exchanges of correspondence with BATF made it clear that ATF intends to proceed with rulemaking on rocket motors that is both onerous and unnecessary.

TRA and NAR assert that BATF has no legal authority to regulate sport rocket hobby motors, which have been used safely for decades and which are already heavily regulated by other US Government agencies. We are seeking both declaratory judgment preventing BATF regulation of these motors, and full recovery of the costs of the litigation to resolve these issues. A full copy of the complaint will be posted later to our websites (www.nar.org, www.tripoli.org).

We are not at this time encouraging media coverage of this issue, but if you receive an inquiry, please refer all media inquiries to John Kyte of our Washington counsel team at 202-530-4557. We respectfully ask for your understanding that the sensitive nature of litigation requires that we limit media interaction to a single point of contact.

Mark B. Bundick, NAR President
Bruce Kelly, TRA President

THE LEADING EDGE

Volume 23, Number 2
March/April 2000

NIRA Officers
President – Rick Gaff
Vice President – Pierre Miller
Secretary/Treasurer – Ken Hutchinson
RSO – Bob Kaplow

Leading Edge Staff
Editor – Jeff Pleimling
Production – Rick Gaff

This Issues Contributors
Mark 'Bunny' Bundick,
Jonathan Charbonneau,
Norm Dziedzic, Rick Gaff,
Tim Johnson, Mark Soppet,

THE LEADING EDGE is published bimonthly by and for members of the Northern Illinois Rocketry Association (NIRA), NAR Section #117, and is dedicated to the idea that Sport Rocketry is FUN!

Articles, plans, photos, other newsletters, and news items of interest should be sent to:
Jeff Pleimling
c/o The Leading Edge
245 Superior Circle
Bartlett, IL 60103-2029
or emailed to jap@interaccess.com.
Photos will be returned, other material returned upon requested.

Any item appearing in the Leading Edge may be reprinted by Sport Rocketry Magazine with proper credit given; all other uses require prior written permission of the Northern Illinois Rocketry Association.

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's 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).

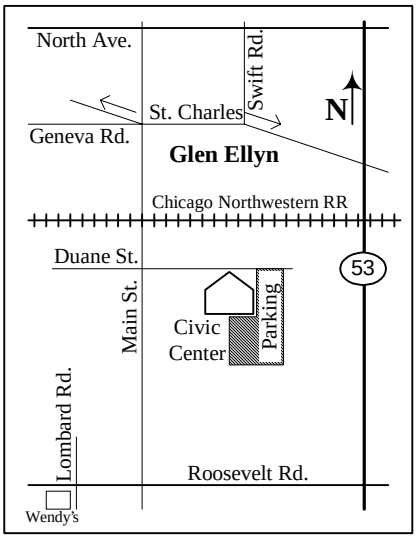
April 7

May 5

June 2

July 7

August 4



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.

April 2 – Club Launch

April 16 – Building Session (see page 1)

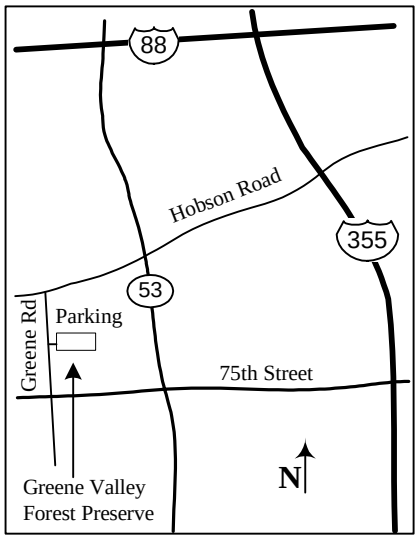
April 29 – Scouts at the DuPage fairgrounds. Contact Bill Thiel for info (847) 394-8434 (email: wthieljr@interaccess.com)

May 21 – Regular club launch. **(on hold)**

June 4 – Youth Group Launch **(on hold)**

June 17-18 – Midwest Regional Fun Fly (location TBD) **(on hold)**

July 16 – Regular club launch. **(on hold)**



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

February – Mark Soppet is the youth winner with his Estes Heatseaker (his review is on page 7) while Tim Johnson was the adult winner with a nicely finished Saturn C-2.

March – Beth Pleimling won the youth division with her Custom Rockets Freedom while the adult division was won by Ken Goodwin with his Custom Rockets Matra.

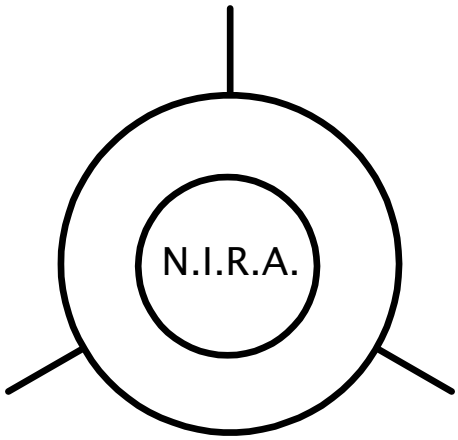
NIRA Logo Contest!

All of the entries are in, and it's time to decide on the club's logo.

There are nine entries to decide from, eight new designs and our existing logo. Tim Johnson entered five new designs with Mark Soppet, John Barret and James Kase each entering one.

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.

The person who entered the winning entry will have their NIRA membership extended for another year.



This is John Barrett's entry

James Kase submitted one with a Latin motto: 'With Smoke and Flame We Touch the Stars'

The existing NIRA logo (thanks to Kurt Schachner for supplying this version)

Mark Soppet was the only youth member to subbmit an entry.

The very prolific Tim Johnson submitted these five designs.

Your Travel Agent Recommends: Seattle Museum of Flight

by Mark 'Bunny' Bundick

While I hope it doesn't become the sole criteria for selecting cities for NAR Board meetings, our past two venues, Washington, DC, and Seattle, WA have afforded NAR trustees the privilege of visiting two excellent aviation museums on opposite sides of the country. Seattle's Museum of Flight (hereinafter abbreviated "SMF") is one of the country's newest major aviation museums. While there aren't many rockets there, you'll still get a kick out of seeing some darned fine flying machines if you take the time to visit.

A key feature of the SMF is its links to the Boeing Company. Many do not know that Boeing was originally a boat builder. Many of the early airplanes rolling out of the Everett, WA plant benefited from a good degree of skills transfer from building wooden boats. A part of SMF consists of the original "Red Barn" factory; museum officials saved the building from destruction and restored it to original condition from a rotting, cobwebbed state. It was neat to see finely crafted wood joints, and 1920's era metal working tools well displayed and well explained.

The larger part of the museum is devoted to more modern aircraft. I was pleased to see a decent collection of gliders, including a 1930's "Yakima Clipper" featuring a molded wooden fuselage. The plane dominating the display however was an SR-71 Blackbird sporting a D-21 hypersonic drone. Trustee George Rachor noted that when delivered to SMF, the bird stopped traffic for hours while it was carefully wheeled to its new home. A replica cockpit was also on display, and NAR Trustees took turns seeing what it was like sitting in the world's airplane fastest cockpit. The control column was quite large, and had massive movement in it; after some brief confusion, I glanced outside and reminded myself about how big the airplane was, and how it might make for a bad day if you ran out of control authority on final approach.

SMF has approximately 60 airplanes on display. Some are simple sport aviation classics like the Aeronca "flying bathtub", and Stinson Reliant. For you military buffs, there's an F104, A-4 Skyhawk, a MIG 21, and a F-4 Phantom painted in the markings of Steve Richie, America's only Vietnam War ace. For rockets, there's a small, but decent Apollo display on the second floor. A particularly nice feature was a 1/6th scale Lunar Module mockup built by Dave Giankosis of NASM Saturn V fame.

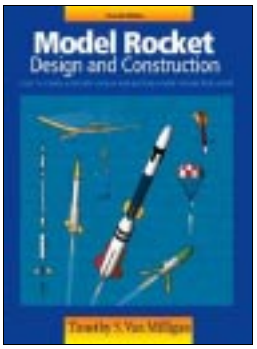
While we were visiting, the museum was also hosting a regional International Plastic Modeling Society (IPMS) contest. There were hundreds of models on hand, from hot rod cars, to tanks, to planes, and yes, even a few rockets. Most were nicely done, and the locals got a fair number of folks to stop, oggle and chat about their hobby.

Maybe NIRA should consider doing something with the Cernan Space Center or Henry Crown Museum as a winter project next year?

If you're traveling in the great northwest US sometime, keep the SMF on your short list of places to hit. There's enough there to keep the entire family, flight oriented or not, entertained for the couple of hours it'll take you serious rocket/airplane buffs to take in the important stuff. Hats off to George Rachor for suggesting we Trustees visit his part of the country, and also taking in this great aviation treasure.

Model Rocket Design & Construction – 2nd Edition

Apogee Rockets Press Release –
If you design and build your own model rockets, you'll be happy to hear that Apogee Components is taking orders for the book: "Model Rocket Design and Construction." This new 160 page book will guide you through your rocket building work – from thinking up the new creation, through the final test-flights.



Topics in the book include: Designing stable rockets, drag reduction & aerodynamics, special building tools, building techniques, making odd-ball parts, constructing high power rockets, repair techniques, recovery system selection and design, staging methods, clustering rocket motors, and a new chapter on flight testing. The improved 500 term glossary is still the most comprehensive ever created.

This new 2nd edition is 40 pages larger than the first edition and is even more packed with valuable information you need to create safe and successful rockets. Besides dozens of new photographs and illustrations, there is now also a new appendix on rocketry patents -- which you can use to get new ideas for your own creations. There is also two new recovery techniques described that you've probably never heard of before (– please – don't spoil the surprise for others by telling them – let them read the book for themselves).

The new book is now complete, and Apogee Components will begin shipping out copies on March 18. The cost is $23.95 plus $3.75 for domestic shipping. Orders can be placed by either calling Apogee Components at: (719)535-9335, or using the secure online ordering system of the Apogee Components web site: http//www.apogeerockets.com.

If you're interested in the book, but want more information, please visit the Apogee Components web site. The site contains a Adobe .pdf file of the first chapter of the book. When you download it, you'll see what information is in the book, along with samples of the quality illustrations and excellent photographs.

Tim Van Milligan
Apogee Components, Inc.
630 Elkton Dr.
Colorado Springs, CO 80907-3514
USA

Tel: 719-535-9335
fax: 719-534-9050
web site: http://www.ApogeeRockets.com

Rocket Vision Releases Mid-Power Starter Kit

Everett, WA - Rocket Vision is now selling a Starter Kit for mid-power rocketry. The kit contains a Trans-Pod Launch Pad, a Veri-Fire Solo Launch Controller, a 3' launch rod, four Flight-Star E15-7 motors, and two Rugged-Rockets of the buyer's choice. The price for the set is $174.95 - a 15% savings over buying the items separately. The Starter Kit is currently being featured on the home page of the company's web site: www.rocketvision.com.

Rocket Vision's Rugged-Rockets are renowned for their toughness and high performance. Their nonspiral phenolic airframes and G-10 fiberglass fins enable them to withstand high velocity launches and less-than-ideal recoveries. The Mach-Buster, Rocket Vision's most popular rocket, will break the sound barrier on an F or G motor. The other rocket choices for the Starter Kit include the Check-Six and Spit- Fire, both with payloads, the Solar-Venture, which has a phenolic ring fin supported by three fiberglass struts, and the Six-Pack, which has six phenolic tube fins. The Star-Fire, the sixth in the Rugged-Rocket line, is not included as an option for the Starter Kit because it is not recommended for flight on an E motor.

The unique design of the Trans-Pod enables it to function both as a launch pad and as a launch rod carrier. Two of the three PVC legs unscrew from the head unit then re-attach to the third leg, forming a carrier for rods of up to 6' in length. The Trans-Pod comes with a 12" diameter blast plate.

The Veri-Fire Solo is the only launch controller which can detect and report a short circuit. This 12-volt controller has recessed indicator lights and a side-mounted momentary firing switch with audible click feedback. It comes with an arming lock with two keys and a 30' igniter cord.

Rocket Vision products are available only through the company's website, and are not distributed to any hobby stores or dealers. Orders can be placed through the web site and paid for by credit card, check or money order, or via telephone or mail order.

Rocket Math 3: Simulations – Part III

by Norm Dziedzic (NAR 72426)

Introduction

So far in this Rocket Math installment, we have followed the format of the RASP-93 simulation method as found in *The Handbook of Model Rocketry* by G. Harry Stein. While this has provided us a simple and straightforward platform for describing model rocket simulations, there are several limitations in the RASP-93 method which are addressed by currently available simulation software. Some of these improvements are:

1. Variable Sized Time Steps
2. Thrust Curves vs. discrete thrust steps
3. Variable C_D and Mach effects
4. Cross Wind/Downrange Effects
5. Other Environmental Effects
6. Dynamic Stability Effects
7. Alternate Numerical Integration methods (4^{th} Order Runge-Kutta)

Also, it must be remembered that **all** simulators have limitations and contain assumptions which make their results vary from reality. Below we'll look at each of the above issues.

1 & 2: Again with the Time Steps?

One of the most limiting factors of the RASP-93 simulation method is the fixed time step of 0.1 sec. As we discussed in previous articles, the smaller the time step, the more accurate the results. The main problem with RASP-93 is that the time step is locked into the motor thrust data. To change the time step requires an entirely different set of motor data. Worse yet, for very small time steps you would need a huge data set, even for the simplest motors. This would be labor intensive and leave a lot of room for mistakes to be made.

The answer to this dilemma is to store the motor data in a format that is independent of the time step. Most modern simulation software uses motor data stored as a series of points on a thrust curve (These files usually have the extension . eng). For instance, our example Quest A6 motor in discrete and curve format would look like Figure 1. Both formats give the same total impulse but the curve (dashed lines) more accurately represents the actual output of the motor over time.

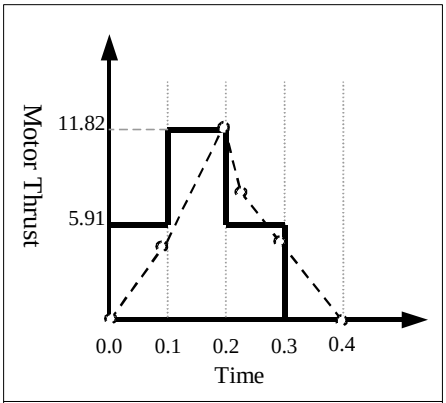


Figure 1: Quest A6 motor discrete and Curve Formats

A simulator using curve data can "look up" the thrust value at any time on the curve using a method called interpolation. This allows the simulation program to use whatever step size it or the user deems necessary without having to re-generate the motor thrust data.

3. Variable C_D and Mach Effects

Up until now, we have assumed that he drag coefficient is a constant value regardless of the speed of the model. In reality, the C_D changes with the model velocity; generally decreasing with increasing speed until the velocity approaches mach 1 (the speed of sound) where it increases dramatically and then tapers off again. Just for a demonstration, I ran a simulation of our infamous Alpha model with a G80 motor to see the predicted C_D up to and through the supersonic region. The results are seen in Figure 2 and are typical.

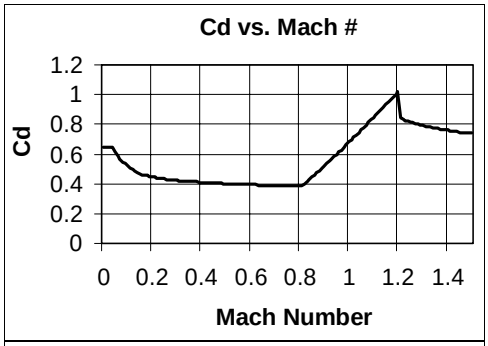


Figure 2: Typical CD vs. Mach Number

4. Cross Wind/Downrange

Seldom do we launch rockets in a zero wind situation. Modern simulation programs can take this into account to give a better approximation of the flight apogee and required delay. Remember, when wind causes your model to fly at an angle (weather-cock), the vertical component of the motor thrust is reduced, the model will not fly as high and a shorter delay may be required.

Programs can also predict how far downrange a model will fly and with the proper parachute/ streamer information, predict how far the model will drift on its way back down. Knowing this information can help you select the proper motor/delay combination for a model or even keep you from launching a model that will drift out of your flying field.

Again, this method is not perfect as wind gusts and dead pockets are not predictable. Most programs assume a constant wind speed and some will allow you to turn the wind effects on at a pre-determined altitude.

5. Other Environmental Effects

Besides the C_D, the other major factor in our drag equation is the density of air which we assumed was constant. This is not really the case as air density depends on temperature, altitude, barometric pressure and humidity. By taking into account the altitude and environmental conditions of your launch site, programs can more accurately predict the drag on your model. Also, for higher performance models, this can have an affect as an increase of 5000 ft. in altitude reduces the air density around 15%.

6. Dynamic Stability Effects

Until recently, all talk of model rocket stability could be classified as *static* stability. An analysis of static stability usually consists of calculating the rocket's *Center of Pressure* (the point on the rocket body where aerodynamic forces are concentrated) and comparing it to the model's *Center of Gravity* (the balance point of the model). Although certain assumptions are made concerning the model's flight characteristics (i.e. the model will fly with less than an 10° angle of attack), the equations consider only the geometry of the model and ignore properties relating to the motion of the model. Thus the term: Static Stability.

The latest advance in simulation software has included the attempt to analyze how the model will react to disturbances during its flight. The basic question being answered is, "What happens when the model gets hit by a cross wind?" Will it cock into the wind and then fly straight. Will it overcompensate it's angle into the wind and then oscillate back and forth with smaller and smaller sways eventually settling down. Or, will it oscillate back and forth in larger and larger fits until it becomes totally unstable… (think of balancing a baseball bat on your finger and then losing control).

In order to do this, the software must not only know what the model looks like on the outside but how it is constructed on the inside. The main concern here is not just the center of gravity, but the distribution of mass within the model. For instance, consider two models. One might have most of it's mass concentrated in a payload section near the center of the body while the other could have an empty payload but a heavier motor and nose weight. They could weigh the same and have the same center of gravity point but would react differently to disturbances during flight because of their internal mass distribution.

This exciting area of rocketry analysis is still in its infancy as suggested by this note concerning dynamic stability in the RockSim 4.0 help files:

> "To be honest, there were many many assumptions made to simplify the situation so that an attempt could be made at predicting the complicated flight path of the rocket. We cannot claim that the final results are accurate to any degree. It has been our hope to give a general indication of how the rocket would likely to behave, and what that trajectory would look like. From this, the user will be able to learn something about the design process, and what would be the "kind" of results that would occur when changes

*(**Rocket Math** continued on page 6)*

Vaughn Brothers '3FNC'
Review by Jonathan Charbonneau

"Three Fins and a Nose Cone." This phrase is commonly used to refer to a basic rocket. Be careful in using it. "Why?" you ask. Because there is a rocket kit by Vaughn Brothers that is officially given this name.

The "Three Fins and a Nose Cone," aka "TFNC" or "3FNC" is made up of the following parts: 12" and 6" lengths of BT-50, an engine block with attached steel shock cord mount cable, launch lug for 3/16" rod, tube coupler, plywood bulkplate, screw eye, shock cord, rip-stop nylon parachute, 3 G-10 fiberglass fins, nosecone, and an 18mm engine adapter.

Assembly of this kit is fairly easy. No hobby knife is needed but you will need the following: a pen/ pencil, sandpaper, CA (superglue) and accelerator. and epoxy. CA Debonder is also recommended.

The instructions in this kit are very clear on what to do. As long as you read and follow them, you'll do fine. The sanding steps should be followed since doing so allows the epoxy to bond better. CA can be used to tack the fins and launch lug on. Epoxy must be used for strength. 30 minute epoxy is best since it provides the strongest bond and makes excellent fillets. Good fillets are important not only for strength but also for drag reduction. Assembly tip: tack on each fin with one drop of CA and check their alignment. If they don't look right, reposition as neeed until they're aligned properly. Use debonder to remove misaligned fins. When you are satisfied with the alignment of all 3 fins, apply epoxy fillets.

All other assemblies can be done with CA, wood glue, or epoxy. I recommend epoxy since it is the strongest and gives you more time to get the parts in their proper place, especially the engine black. Wood glue and CA may grab too soon. As always, test fit before applying any glue.

The 3FNC can be flown on any of the following engines: A8-3, B6-4, C6-5, C10-5, D12-7, D10-7 and E15-7w. When flying a heavy payload use C5-3, C10-4, D12-5, D10-5, D21-7t or E30-7t. If you have RMS hardware, the following reloads can be used: D9-5w, D9-7w, D13-7w, D15-7w, D24-7t, D24-10t, E18-8w and F24-7w. The F24-7w will require a payload of not less then 60 grams for stability.

Vaughn Brothers '3FNC' Specs:
Length: 22"
Diameter: .976"
Weight: 3.1oz
Motor Mount: 24mm (18mm adapter)
Recommended engines: A – F (many!)
Retail List Price: $14.95

The 3FNC is a great kit. It doesn't have a fancy name, but it really has it where is counts. It has great performance and is well designed.

---

*(**Rocket Math** continued from page 5)*

> are made to the rocket. It is more of a teaching tool than a prediction of the actual flight trajectory".

I would look for this area of simulation to become more and more important as the underlying science progresses and improves. This should be especially useful for competition models where pushing the limits is the name of the game and the highest performance is usually found at the edge of instability.

7. Alternate Numerical Methods

The process we have followed of deriving the velocity data from the acceleration data is called *numerical integration.* Specifically, we have been using the *Euler method* of integration which is the most basic and assumes that over a time step, the value to be integrated remains constant. For instance, we only considered the acceleration at the start of a time step when calculating velocity even though we could have calculated the acceleration information for the next time step also.

While it might sound like a Klingon boy scout rank, the *4th order Runge-Kutta method* (RK4) is a more accurate way to integrate numerically. This method attempts to take into account the integrated value at the start, end and middle of a time step. As you might expect, this adds computational overhead to the simulation. As a general rule, the Euler method is about 10 times faster than RK4.

Although RK4 has been proven to be more accurate than the Euler method, in experimenting with a complex two stage model, I couldn't find more than ¼ % difference in the results from the Euler method vs. the RK4 method at the same time step. I guess the moral here is if your machine is fast enough you can leave RK4 turned on but if not, use the good old Euler method and don't lose any sleep over it.

Conclusions

By now, we've beat the simulation horse with the proverbial stick for about as long as is possible. I sincerely hope those who have followed along these past three issues have learned something about how and why these programs work. For a comprehensive list of available simulation software, readers should point their web browsers to the Rocketry Online web site http://www.RocketryOnline.com and look for the Software link along the left side of the page. Besides simulators, there are listings for C_p predictors, educational tools and design packages.

We want your feedback!

So far I have been flying blind, so to speak, with this column… following my own whims and interests and trying to cover topics I think might be of interest to the readers. If you can, please take the time to drop me a line at `ndzied1@interaccess.com` (or regular mail to the LE Editor) to let me know your likes and dislikes concerning Rocket Math and what you would like to see in future installments.

New high performance Xtreme Rail now available

Shawnee, KS (*ROL Newswire*) -- Looking for a launch rail with strength, reliability, affordability and flexibility? Gene Nowaczyk and Payload Specialties brings a new launch rail to market that claims to have four times the life of other rail systems at an affordable price.

The Xtreme Rail is made from 60/63 T6 extruded aluminum, is fully anodized in lengths up to 12' and measures 1.5" X 1.5" for large, heavy rockets. The rail is claimed to be able to support 300+ lbs. if properly supported. Launch buttons for this rail are 5/8" OD black Acetal delrin. A 7/8" pad attachment is available, or a custom machined mount can be made to support your own launch pad.

The Jr. Xtreme Rail is also made from 60/63 T6 extruded aluminum, is fully anodized lengths up to 12.0' and measures 1.0" X 1.0". The rail is claimed to be able to support up to 150 lbs. if properly supported and is shipped with pad attachments for up to ½" pads. Launch buttons for this rail are 7/16" black Acetal delrin.

Launch buttons are made from Acetal plastic and counter sunk for 8-24 or 10-24 machine or wood screws, with the Xtreme Rail buttons coming countersunck for additional clearance. Stainless steel machine or wood screws with inserts are provided with each set of buttons purchased.

The rail can be purchased in most lengths up to 12 feet. 6 fee is the standard length, with additional increments available by the foot up to 12 feet.

Pricing for 6 foot standard rail (1.5" X 1.5" X 6') is just $65.00. Additional 1 foot increments of 1.5" X 1.5" rail are $10.83/foot. The smaller Jr. rail in a 6 foot length is (1.0" x 1.0" x 6') is just $49.99 with additional one foot increments just $8.33/foot. Buttons are $6.00 a pair for "Xtreme" Rail and includes stainless steel machine or wood screws with inserts, while pricing for the smaller rail buttons is $4.25 a pair for "Jr. Xtreme" which also includes stainless steel machine or wood screws with inserts. Joiner assemblies for connecting sections of the rails are also available.

For further information, see:
http://www.planetkc.com/rocketman/rail.html

Bunny's NARCON Report
by Mark 'Bunny' Bundick
(as posted to rec.models.rockets)

First, my thanks and congratulations to Buzz McDermott and the DARS section for hosting an extremely fun and successful NARCON.

Those of you who thought twice and skipped are going to end up kicking yourselves for not going. Attendance was over 100 persons, and they turned folks away from the Saturday evening banquet due to lack of tickets. With three concurrent sessions, over 20 talks on topics from fiberglass to camera rockets, ample vendor participation, and all those folks around, the event looked more like the Pittcons and MITCON's of old than any convention I've attended save those two historical events. I spent some bucks, saw a lot of folks and generally had a ball.

You know your convention weekend is going to get off to a good start when (a) the hotel has your reservation all fixed up so all you have to do at checkin is sign in and (b) there's a Dell 400 Mhz computer, flat panel monitor and permanent highspeed Internet connection in the room. The folks from Rocket Vision, constrained by airline baggage space, hadn't brought stuff to sell, but after seeing the rooms, simply showed off their wares and directed people to their website. Way cool feature, folks.

Friday night opened with a smooth registration process, a quick peek thru the vendor wares and Proceedings, and yours truly's "Growing Up Wallops", a reflection on what it was like seeing all those sounding rocket launches when I was a boy. Tim Van Milligan followed with a computerized session on his RocSim product, and then it was on to the late night bull sessions and more wandering thru vendor rooms.

(Editorial Asides: (a) for those who missed the talk, Bill Spadafora and I have talked about putting out a printed version of it, sometime in the next year, and (b) someone was out there video taping it.)

(Second Editorial Aside: Thanks to the troops at the CIA section in Champaign for the idea of printing a "Proceedings"; they came up with this when they ran NARCON for the first three years.)

Saturday morning I started with Tony Reynolds' session on building competition fiberglass body tubes. I wanted to see if there were some good tips to steal for my scale birds. Tony showed off a variety of building materials, along with a hefty collection of body and nose cone mandrels. He uses a completely different technique than I do to build his models, so it was worth the visit.

Phil Eaton is a local IPMS member who the rocket folks roped into doing a session on airbrushing with acrylic paint. He covered all the equipment aspects, then showed some tips for working with acrylics (which are quite different from the enamel we're generally used to). Phil even hooked up his brush and sprayed some paint for us on a plastic P-40 he had under construction. Since he won a rocket kit in the raffle Saturday night, perhaps he'll get converted to a flying hobby and show off his skills there!

Lunch was followed by Dave Schafer's glider trimming talk. A professional charter pilot, RC flyer and free flight modeler, Dave's tips were based on some pretty deep experience. I confess to have gone it a bit skeptical, but learn a tip or two, and Dave and I had some good conversation afterwards about the differences in our respective trim techniques. He also entertained us with a live demo of his trim methods by flying two different indoor model airplanes. When they'd hit the walls of the room, their recovery demonstrated quite vividly why he trims the way he does. Neither plane missed a beat as they recovered almost immediately.

Ted Mahler's Rocketry Photography talk was my personal favorite of the convention. Wildly funny and entertaining, he's built up great experience of rocketry camera flying going all the way back to the Estes Camroc. Ted had flown 110, disc, and other cameras. I was initially surprised to see him simply epoxy a stage coupler directly to the camera. But apparently it worked fine, judging by the number of pictures he showed the group.

A Tex-Mex buffet dinner (thanks for the margarita, Steve!) was followed by Wade Gate of Beal Aerospace discussing the startup company's plans for a all new booster. Powered by 90% hydrogen peroxide and kerosene (same fuel as a Scud missile), the proposed bird is 20 feet in diameter and 235 feet high, designed to put almost 14,000 lbs into GTO. Once Wade understood the true nature of his audience, i.e., technically inclined and highly motivated by space, he really got rolling, and stayed until every question was answered.

An excellent manufacturers forum followed with Tango Papa Decals, Ring Rocketry, Lone Star Rocketry, Apogee Components, Saturn Press, and Rocket Vision touting their latest developments.

Sunday morning brought John Pursley's "Active Guidance" session. He outlined his use of RC Airplane horizon sensors coupled to a gimbaled engine mount to make sure the model keeps going straight up. John pointed out that the system is NOT designed to make stable rockets out of unstable ones, but merely to keep stable ones pointed up at all times. The system consists entirely out of off the shelf hardware, and could be easily duplicated by anyone, an action John repeatedly and highly encouraged.

I had to run a substitute session in Slot #2, and then went off to lunch with my brother, so that tapped out the discussion groups for me. I held a town hall meeting, then grabbed my bags and headed to the airport. United got screwed by weather, so arrival home was very late.

The Texas contingent did a great job with all the NARCON planning and work. They're talking about trying it again next year, perhaps in Houston, with its obvious attractions for us out of towners. Let's hope they pull it off. And if you missed NARCON 2000, don't make the same mistake and miss 2001 version!

Estes 'AGM-57X Heatseeker'
Review by Mark Soppet

The Estes Heatseeker, like their earlier Stingray, is an easy-to-build rocket that imitates a real military missile. Despite its name, the Heatseeker resembles a three-finned version of the Hawk anti-aircraft missile or the Falcon air-to-air missile. This should not matter, though, to the beginning rocketeers it is aimed towards. Mine came with an extra set of fins from the Hijax rocket for some odd reason. The real fins are marred by large ejector pin markings that should be filled in by model putty.

Estes 'AGM-57X Heatseeker' Specifications:
Length: 18.6" (47.2 cm)
Diameter: 1.0" (25.4 mm)
Weight: 1.9 oz (55 g)
Recovery: 12" (30 cm) parachute
Maximum Altitude: 800 ft (244 m)
Recommended Engines: A8-3 (First Flight), B4-4, B6-4, B6-6, C6-5, C6-7
Suggested Retail Price: $10.69

The assembly of the foolproof (but not idiot-proof) engine mount is simple enough, but if any of the tube-type cement gets on the red body tube, the paint will melt off. I repainted mine anyway, after filling in the gross spirals on the tube. There is a payload section in the kit, but it is quite small and really not good for anything. I removed the seam from my nose cone, wet sanded it, and painted it. To finish it off, just tie in the parachute, which was already assembled.

Altogether, this is a great first or second kit for the young rocketeers and adults who are rediscovering the hobby. The scale modeler should probably just steer clear of this kit unless they want to scale-bash a Hawk or Falcon. Estes deserves credit for the interesting design, but they really should reconsider the three-fin engine mount.

Space Launch Report for January-February 2000
by Tim Johnson

There were 12 space launch successes and one failure during the first two months of the year 2000. A Japanese M-5 rocket accounted for the failure. Ariane 4, Atlas 2A, and Soyuz-U provided two successes each. Six other launch vehicles flew once each. These included the first-ever Minuteman-based space launch by Minotaur, Proton's return to flight, and the year's first space shuttle mission.

M-5-4/Astro-E

A $62 million Japanese Institute of Space and Astronautical Sciences (ISAS) M-5 rocket, serial M-5-4, failed to orbit its $105 million Astro-E X-Ray observatory on February 10. Ceramic insulation on the 385,488 kgf thrust Nissan M-14 solid fuel first stage nozzle failed not long after the rocket lifted off from Kagoshima Space Center. A growing nozzle leak rendered the thrust vector control system ineffective during the final 34 seconds of the 75-second burn, causing the vehicle to enter a climbing spiral. The second and third stage solid rocket motors fired as planned. They restored flight control but were unable to compensate for the lost velocity. The 1,650 kg Astro-E spacecraft reentered before completing one orbit. It was the third M-5 flight and the first failure.

Japanese M-5 with Astro-E waiting for launch NASA Photo

Launched from an elevated sounding-rocket-style rail, the 139,000 kg M-5 screams into orbit in less than six minutes when all goes well.

STS-99/SRTM

Space Shuttle Endeavour (OV-105) lifted off from Kennedy Space Center LC 39A on February 11 to begin Mission STS-99. The orbiter carried a six person crew and a 13,152 kg Shuttle Radar Topography Mission (SRTM) payload into high inclination low earth orbit (LEO). Commander Kevin Kregel, Pilot Dom Gorie, and Mission Specialists Gerhard Thiele, Janet Kavandi, Janice Voss, and Mamoru Mohri acquired high-resolution synthetic aperture radar maps of the Earth's surface during an 11-day mission. STS-99 was the 97th Space Shuttle launch, the 14th flight of 11-year-old Endeavour, and the 72nd consecutive Space Shuttle success.

Shuttle Endeavour lifts off on Mission STS-99 NASA Photo

Minotaur/JAWSAT

The first U.S. Air Force/Orbital Sciences Minotaur, also called the Orbital/Suborbital Program Space Launch Vehicle, launched JAWSAT and several microsats on Space Test Program Mission P98-1 from Vandenberg AFB Commercial Launch Facility on January 27. This was the first Minuteman-based orbital space flight

The rocket's first three stages fired to put the vehicle on a suborbital trajectory. The Orion 38 fourth stage fired after a seven- minute coast to apogee to put JAWSAT into polar orbit. Minotaur's first two stages are refurbished solid fuel Minuteman 2 ICBM motors. Its third and fourth stages are from the Orbital Sciences Pegasus XL. Minotar's Alliant Orion 50XL third stage is a Pegasus second stage and the Orion 38 serves as a Pegasus third stage. Minotaur can put 340 kg into orbit for about $12 million,

Minotaur & JAWSAT Associated Press Photo

Two Atlas Flights

AC-138, an International Launch Services (ILS)/Lockheed Martin Atlas 2A with an 11 foot diameter payload fairing, provided Year 2000's first space launch. The rocket orbited the $200 million Defense Satellite Communications System DSCS B8 spacecraft (USA-148) for the U.S. Air Force on January 21. AC-138 lifted off from Cape Canaveral Space Launch Complex (SLC) 36A, flying a standard two-burn Centaur mission to put the 2,698 kg spacecraft into a geosynchronous transfer orbit (GTO).

AC-158, an ILS Atlas 2AS with four strap-on SRBs, launched the 3,112 kg Hispasat 1C communication satellite (comsat) from SLC 36B on February 3. This two-burn Centaur mission propelled Hispasat 1C, an Alcatel Spacebus 3000B, into a super-synchronous transfer orbit. AC- 158 was the 46th Atlas 2/2A(S), the 125th Atlas Centaur, and the 48th consecutive Atlas Centaur success.

Two Ariane 4 Flights

Ariane 42L V126 (L494) orbited PanAmSat's 3,615 kg Galaxy 10R comsat from Kourou ELA 2 on January 25. The 56.2 meter tall rocket used two liquid strap on boosters.

Ariane V127 (L495), an Ariane 44LP model with two solid and two liquid strap on boosters, orbited Japan Space Communications Corporation's Superbird 4 from Kourou ELA 2 on February 18. Like V126, V127 used a standard direct ascent with a single 13-minute HM-7B third stage engine burn to put the 4,057 kg HS 601HP satellite into GTO. V127 was the 95th Ariane 4 flight and the 53rd consecutive Ariane 4 success.

Two Soyuz-U Launches

A 2.5 stage Soyuz 11A511U (Soyuz-U) launched Progress M1-1 from Baikonur LC1 on February 1. The unmanned cargo ship automatically docked with Mir on February 3, one day after controllers undocked and deorbited Progress M-42. Progress M1-1, the first International Space Station version of the 22-year-old cargo vehicle series, reboosted Mir on February 4 in preparation for an upcoming cosmonaut crew.

The first 3.5-stage Soyuz-U/Fregat flew an 8-hour qualification flight from Baikonur LC 31 on February 8. Fregat performed two ascent burns to enter LEO, where it deployed a 1,000 kg dummy payload. After five orbits, Fregat performed two deorbit burns to test an inflatable reentry and descent technology (IRDT) system. IRDT and Fregat landed in southern Russia, but search teams only found the damaged remains of one of the two payloads.

NPO Lavochkin's 3.3 meter diameter by 1.5 meter tall Fregat is based on the 1980's Mars Phobos design. It has hexagonally arranged teardrop tanks. Two of these hold N2O4 oxidizer. Two others hold UDMH fuel. The last two house the control system. A 2,000 kgf thrust Isayev S5.92 main engine and 12 control thrusters provide propulsion. Soyuz-U/Fregat can boost 5,300 kg into LEO or 1,100 kg to escape velocity. Starsem plans to use Soyuz-U/Fregat to launch two European Space Agency Cluster 2 missions later this year.

Proton-K/DM3/ACeS Garuda-1

An ILS/Krunichev Proton-K/DM3 launched the ACeS Garuda-1 comsat into a high energy GTO from Baikonur LC81L on February 12. The rocket flew a three-burn Block DM3 mission to orbit the 4,500 kg Lockheed Martin Sunnyvale A2100AXX satellite. Block DM3 fired first to put the vehicle into a parking orbit, a second time to send the vehicle into GTO, and a third time at first GTO apogee to raise perigee and reduce inclination. This was the 13th successful ILS Proton mission in 14 attempts, and the first Proton since the October 27, 1999 failure.

Chang Zheng 3A/Zhongxing 22

China's fourth Chang Zheng (Long March) 3A (CZ3A) orbited the Zhongxing 22 comsat on January 25, following liftoff from Xichang Launch Center LC 1 in southwest China. The

third stage performed two burns to place the 2,300 kg spacecraft into supersynchronous transfer orbit. CZ-3A, an improved version of CZ-3, China's first LOX/LH2 upper stage launcher, first flew in 1994. This was the fourth CZ-3A flight and the fourth success.

Zenit-2/Kosmos 2369 (Tselina-2)
A two-stage NPO Yuzhnoe Zenit-2 boosted Kosmos 2369 into orbit from Baikonur LC45 on February 3. Kosmos 2369 was believed to be a 3,200 kg Tselina-2 signals intelligence satellite. Zenit boosted the satellite directly to LEO. This was the 25th successful Zenit-2 launch in 33 attempts since 1985.

Delta 276 starts its climb to orbit with 4 more Globalstar comsats. Boeing Photo

Delta 276/Delta Globalstar 7
After a four month absence, Boeing's Delta 2 returned to space on February 8 by orbiting four more Globalstar cellular telephone comsats. Delta 276, a 2.5 stage Delta 7420-10 model with four strap- on solid rocket motors and a 10 foot diameter composite payload fairing, lifted off from Cape Canaveral SLC 17B. The rocket's second stage fired twice before deploying the satellites into circular LEO.

Delta 276 was the seventh Delta Globalstar mission and the 86th Delta 2 success in 88 attempts.

Space Launch Report is online, in more depth, at: http://www76.pair.com/tjohnson/slr.html

Winter Building Sessions – January and February

By Jeff Pleimling (NAR 63951)

Living in the Midwest has several challenges for rocketeers but none is more daunting then winter. Although it is possible to fly rockets in the winter, NIRA has wisely decided that it's better to stay inside and build rocket rather then risk frostbite by flying them.

NIRA was planning on starting the year off with three building session, but this has been increased to four due to insurance problems.

I was able to attend the first two building sessions hosted by Bob Kaplow and Bob Wiersbe. While Bob Kaplow's basement is a standard stop for NIRA's building sessions, this was the first year that Bob Wiersbe has been able to open his basement for us.

There were about 20–30 people at each building session, with a mixture of old NIRA hands and some newer members. All enjoyed themselves, even those who decided to just talk rockets rather then build them.

A NIRA tradition is that building sessions aren't just for building, but for flying too. January was bitterly cold but several rockets were launched from Bob Kaplow's backyard (to the amusement of his neighbors watching from inside, where it was warm). February was warmer and a couple of rockets were launched from Bob Wiersbe's driveway.

I hope to see you for the (hopefully) final building session of the season on April 16th. Now I just need to start cleaning out the basement…

Sometimes the parachute can be the trickiest part of build a kit! (Jan) Rick Gaff Photo

(See the back page for photos from the February building session).

Mark Bundick trying to prove that NAR President cans can build rockets. (Jan) Rick Gaff photo

Rick Gaff, NIRA President, hooks up a tiny pyramid rocket for launch. (Jan) Not a Rick Gaff Photo

Bill Thiel working on an Estes Fat Boy. Rick Gaff photo

Confused Stages – Stage 12
by Jonathan Charbonneau

In my previous stage, I gave you tips on designing minimum diameter rockets. A minimum diameter rocket that's been carefully and optimally designed can be a record setter in duration competition. In altitude competition, however, even a perfectly designed minimum diameter rocket can still lose to a rival rocket. "How's that possible?" Tom quips. Joe cries "That's impossible!" after learning that his 'perfect' minimum diameter rocket has lost to Syed's rocket in spite of breaking the record and having a closed track. "What gives?" you ask. The answer is that Syed's winning rocket is a *boosted dart*, and that is what this stage of the series is about.

A boosted dart is a sub-minimum diameter vehicle that is optimally weighted and rides atop a minimum diameter booster. When the booster burns out, the dart separates and flies unpowered. It is superiority to a minimum diameter rocket is due to its sub-minimum diameter. The drag of the booster is gotten rid of at the end of powered flight.

The boosted dart is a challenging design to build. For starters, expertise on minimum diameter rocketry is a prerequisite because the booster of a boosted dart is a minimum diameter rocket. Another challenge is finding the optimum weight for the dart. Thirdly, the joint between the booster and the dart must be made so that the dart stays rigidly attached during non-negative acceleration, but separates easily and readily at the first instant the acceleration turns negative. Finally, the dart, like and other rocket, must have a recovery device. Installing one is the easy part; the hard part is deploying it because the dart is engineless and therefore requires the recovery device to be deployed by other means.

Booster Construction: The booster is built exactly like a minimum diameter rocket except it is to be made as light as possible without compromising reliability or safety. The booster's nose cone is designed to accept the dart on or in its front end. If using only black powder engines (e.g. C6, D12 or F100), just a paper shroud will suffice. The dart's tail fits into the front end of the adapter tube. A booster engine is used in the booster. When it burns out, the forward blow through will separate the dart and the booster will start tumbling (see figure 1).

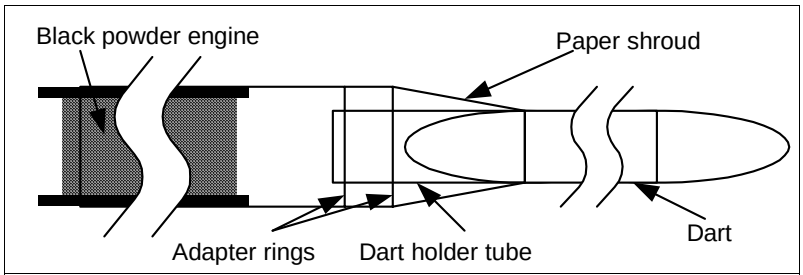


Figure 1: Boosted Dart w/Black Powder Engine (fins omitted for clarity)

If you plan to use composite engines (White Lightning, Blue Thunder[1], H-fire[2], or Hybrid[3]), dart separation will have to be made by electronic means. That is, a timer/ accelerometer and a black powder charge such as an L.E.S.[4]

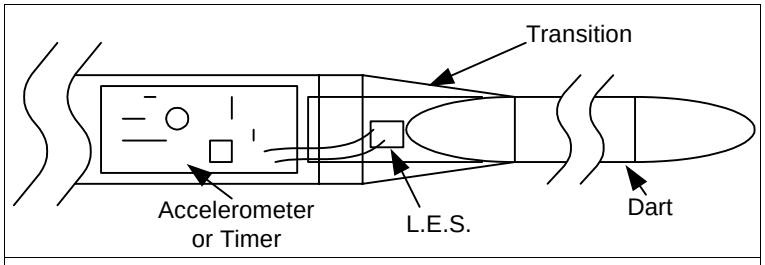


Figure 2: Dart w/Composite or Hybrid Engine (fins omitted for clarity)

Dart Construction: The dart is fairly easy to make. A sub-minimum diameter airframe is used. For maximum strength, the fins should be mounted through the wall to each other. Because the dart is engineless, a tail cone can be added. A well-designed tail cone will reduce if not eliminate base drag. In fact, an optimally designed tail cone may cause the base drag to drop below zero, which is better then no base drag. Negative base drag is thrust. This is due to the "pumpkin seed effect." It is beyond the scope of this article to discuss the pumpkin seed effect.

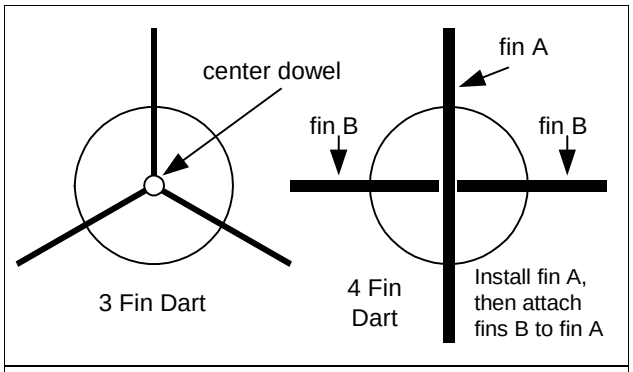


Figure 3: Possible dart fin configurations

To Deploy the dart's recovery device, there are two possibilities: CHAD[5] and electronic. **CHAD**: This method involves cutting a flap into the airframe of the dart (see figure 4). As the dart coasts, the relative wind holds the flap shut. When it has slowed down, the flap springs open, releasing the parachute or streamer. This is poor aerodynamic practice. **Electronic**: This method uses an electronic timer/altimeter to fire a black powder charge that deploys the parachute or streamer. This is the preferred method.

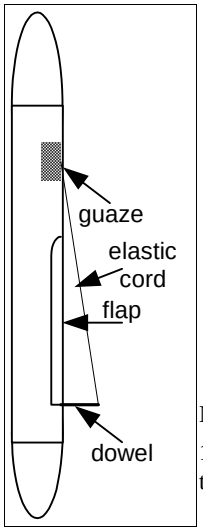


Figure 4: CHAD

Superman's words to the wise:

Just like steel tipped darts, great care and thought should be put into the design and operation of a boosted dart. If you're not careful, Mother may take it away from you. If you question what I just said, think about it! Remember the NAR rocketry safety code. With an optimally designed boosted dart, you *may* be the envy of your rivals at your next competition.

Happy Flying.

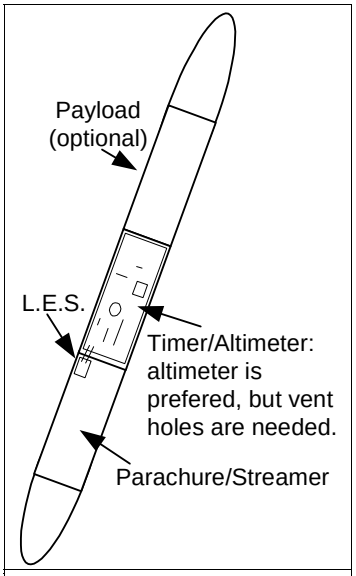


Figure 5: Electronic recovery

Notes:

1. White Lightning and Blue Thunder are trademarks of Aerotech, Inc.

2. H-fire is a trademark of Vulcan Systems. (I say H-fire instead of its full name because I, like Superman, don't swear, not even when quoting people who swear).

3. Hybrids are engines with solid fuel and liquid oxidizer. See Stage 6 of my series.

4 L.E.S stands for Loadable Ejection System.

5. CHAD stands for Cheap and Dirty.

Welcome to the Club!

Erik Christensen, Dan and Annette Cordes, Kenneth Cowan, Armando, Aida and Jackie Davila, James Gealy, Greg and Brenda Grabacki, Erol and Sara Ozgur (Grabacki), Catherine, Gregory and Lee Lannert, Ryan, Tim and Tim Jr Lenahan, Cally Soukup & Martin Maney, Anthony, Caroline, Hugh and Will Montag have all joined NIRA since the last newsletter. Welcome to the club!

Editor's Notes

I've started to make some formatting changes with this issue. Most of these changes are to make it easier to layout the issue which will mean that hopefully I can get them out a little faster (or with a few less late nights).

While I continue to make changes to the layout, I don't plan on changing the content. This is mainly because the content is decided for me – I can only print the articles that are submitted (even though I **will** bug you if I think you'd be able to write a good article).

As always, the Leading Edge needs feature articles (how-to's, contest strategy, fun stuff), launch reports, kit reviews, plans, cartoons, news clips, you name it. If you have any questions, please ask. My contact information is on page 2.

My goal is to have a rocket plan in every issue, which hasn't been the case for the last few months. If you don't have access to a drawing program, I am more then willing to redraw a hand drawn plan. Don't think the plan needs to be complicated or fancy – just interesting enough to build or inspire creativity.

Also, since this is a club newsletter, if you have something rocket related to sell or give away I'd be more then happy to put an ad in for you. Nothing commercial, however. Ad rates for commercial ads could be negotiated, however.

Mailing List
NIRA has an email list. If you have access to internet email, send an empty message to nira-subscribe@makelist.com and an email to confirm your subscription will be sent in reply. To prevent unwanted email (spam) from getting into the list, only members can send messages to the list.

The purpose of the list is to keep NIRA members informed about club events, discuss rocketry, and anything else that interest the majority of NIRA's members.

For Sale
Jonathan Charbonneau has the following items for sale. See him at a meeting or launch for further information:

- Estes Apollo XI (open but complete) $40 or best offer
- Aerotech Mantis launch pad and Interloc clip (new) $60 or best offer.

NARAM 2000 Registration Form

Finally... we've finished finalizing all the pricing and the NARAM 2000 registration form is ready. Although 'online' registration is not yet available, you can download a pdf (Acrobat Reader) or MS Word version of the form from:

http://www.naram2000.org/register.html

Please note: if you are going to register a team or family – you should fill out the first page for each member.

This same form will be printed in the next issue of Sport Rocketry (March/April).

Coming soon - the schedule of events, vendor information, more fun event information and a special 'Pre-NARAM T-Shirt' offer.

Jeff Blinn
Webmaster, NARAM 2000
http://www.naram2000.org

Rocket Vision's 'Custom Rocket Suite' now available online

The long-awaited Custom Rocket Suite is now online and active at www.rocketvision.com!

Our Custom Rocket Service allows you to create your own rocket kit from our library of quality stock parts, get on-demand stability calculation, and see a graphic of your rocket change as you make design choices. Over eighty kit combinations are possible! Buy your custom designed kit and within two business days it will be on it's way to you in a professional kit bag with assembly instructions. Prices for custom rockets are comparable to that of our Pro-Designed Rugged-Rockets and are based on the components you decide to use. As you add and remove components the price will adjust automatically.

We're putting the power of Rocket Vision's manufacturing facilities in your hand.

What's your rocket vision?
Make it a reality by visiting:

http://www.rocketvision.com/Custom_Products/Custom_Rockets/default.asp

And this is only Phase One of the Custom Rocket Service. Phase Two, which will be released late this summer, will add 2 more airframe diameters, more nosecone shapes, more fin designs, and transitions.

Thousands of unique rocket designs will be possible with these combinations. Phase Three, due in early 2001, will allow expert designers to take advantage of our computer-controlled tooling to go beyond stock components.

For more information, please see our website, drop an email to jsabrina@rocketvision.com, or give us a call at 800-568-2785 – we're officially in the office from 9am to 5:30pm weekdays, Pacific Time (but don't be too surprised if you call on an evening or weekend and someone picks up the phone).

NAR's Response to the FAA
By Mark Bundick, NAR President

At the recent NAR Board meeting in Seattle, the NAR Board reviewed and discussed the Federal Register announcement regarding small rocket licensing. Trip Barber graciously wrote an outstanding summary of the safety record of sport rocket flying in the US, outlining all critical safety provisions of our hobby, and summarizing the NAR's position on sport rocket regulations the FAA imposes on rocket flying in the United States. The text of that write-up is attached below, and has been filed on behalf of the NAR with the FAA's website.

Based on this write-up, and my discussions with FAA officials prior to the online forum becoming active, I don't believe additional regulations from FAA are forthcoming for sport rockets flown under the limits of NFPA 1122 and 1127. At this time, I'm not recommending NAR members post comments to the FAA site, though you're certainly free to do so.

Mark B. Bundick, President
National Association of Rocketry

[Editor's note: You can visit this portion of the FAA site by pointing your web browser to:
http://ast.faa.gov/publicforum/index.html
and registering to review comments made by the NAR, TRA and others.]

RockSim companion program "Motor Builder" available

Apogee Components is pleased to be the host web site of a neat little program written by Kimberly Harms. The program, called "Motor Builder," allows users to create odd-ball clusters of mixed motor diameters, so that they can be input into the RockSim software. This simplifies the process of performing simulations using RockSim.

The program combines the thrust profiles and masses of the individual motors, and creates a unified motor that is simply dropped into a .rkt file created by RockSim. This allows motors of different diameters to be used in a single simulation. And it also allows the user to specified the ignition point of each motor in the cluster, making it easy to simulate airstarted motors.

The output of the program is a standard .rasp file, so it is useful for other rocket simulation programs too.

This program is freeware, and is available from the Apogee Components web site:

http://www.apogeerockets.com.

Follow the links to RockSim, and then click on the link for neat stuff for RockSim.

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!

C/O Jeff Pleimling
245 Superior Circle
Bartlett, IL 60103-2029

February Building Session Photos

Tim Johnson and Bob Wiersbe ignore Rick Gaff as he builds a glider. (Feb) Not a Rick Gaff photo

Bob Wiersbe relaxes as NIRA invades his basement. (Feb) Rick Gaff Photo

Jonathan Charbonneau studies the instructions (Feb). Rick Gaff photo

A very busy workshop at the February Building Session. Rick Gaff Photo

Mike Ugorek kibitzes while Sabrina Ugorek builds. Rick Gaff Photo