

A NEW INDEPENDENT ROCKETRY MAGAZINE

extreme rocketry

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getting an FAA waiver p.30

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how to:

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About the Cover:

Photo was taken by Jeff Bundt of the Mars Lander Super Scale Kit from Tango Papa Decals.



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My name is Brent McNeely and I have OHD. My wife assures me of this fact every once in a while. You see, my wife is a schoolteacher, teaching 5th grade at a school just a few blocks from our house. Every year she tells me about all her students. She tells me that one of her students has ADD, another has ADHD, and how challenging another kid is who has OCD. I always forget and have to ask her what these letters mean. She tells me, "ADD stands for Attention Deficit Disorder, ADHD is an acronym for Attention Deficit Hyperactive Disorder, and OCD represents Obsessive Compulsive Disorder." And, when she first told me I had OHD I asked her what OHD stood for. In response, she said, "Obsessive Hobby Disorder." She explained every time I find a new hobby, I become totally obsessed with it to the exclusion of all other things. I become so extremely obsessed during any conversation, on any subject, that I slowly lose my focus on what people are talking about. At that point my eyes glaze over, and I get lost in the conversation. Needless to say, people would notice I'm not tuned in and ask me what I'm thinking about. As you can imagine, I become embarrassed and admit I'm thinking about my hobby (whatever it is at the time).

My Hobbies

Some of you have met me and know my story. For those of you who haven't, well, this is for you. What do I look like? That's me in the photo above. I'm a very tall guy in my mid-thirties. I own my own graphic design company (McNeely & Associates) and have been in business for myself for about eight years now. One of my clients is AeroTech; I designed their web site, new catalogs, and ads. I've been flying rockets for about five years now and completed my level three certification last year (with the 75mm AeroTech M1315W). Most people know me for my rocket cars. My cars have appeared in various videos shot by the Rocketman and his wife Jodi (both Delamar and Black Rock). At one point I had a small business called Hell on Wheels Rocket Cars and sold AeroTech rocket motors. I shut this business down about a year ago and shifted my emphasis to web site design. Since that time I've been putting a lot of time into learning about Linux computers and running a commercial web server. It was during this period I began forming the basic ideas of a high quality rocket magazine.

Magazine Features

My latest OHD episode revolves around this magazine. For almost a year I've been working on it in some way or another. Mostly I've been thinking about what a good rocketry magazine should contain. I like reading interviews with people and thought to myself, what would it be like to read interviews with the movers and shakers in rocketry? I wondered what was going on in the minds of Frank Kosdon, Bruce Kelly, Gary Rosenfield, Mark Bundick, Vern Estes and others. Wouldn't it be great to see published interviews with these people? The next thing I wanted to see was some sort of pull-out poster or centerfold in each issue. It seemed to me all hot rod magazines have centerfold posters which guys hang up in their garages. Why not put a centerfold poster in every issue of the magazine? Then another idea came to mind as I glanced through another hobby magazine—reader photos. I like seeing lots of photos in a publication; call it eye candy if you will. One day while reading one of my computer magazines I was browsing through a question and answer article. I thought to myself, "Hey, now that's what we need in a rocketry magazine, a good question and answer section where readers can write in and we can find someone knowledgeable to track down the answers." After many of these ideas coming about like this, I realized I had the makings of a new magazine in my head.

Space Now from Rocket Vision.

This is Rocket Science.

Rocket Vision® announces our new Space Now line: amazingly real, fully launchable model rockets based on cutting-edge private sector space technology. Our Pegasus XL and Roton* are authentic scale models built from durable aerospace materials. Check out our website at www.rocketvision.com for the latest news on release dates. And get ready to start your own space program.

The First Issue

This first issue is my best attempt out the door to give you what I think should be in a great rocketry magazine. I'm sure that I haven't covered everything you'll want in a magazine, but I've tried. We will be running lots of surveys on our web site to determine what to put in upcoming issues. So, if you want to help shape the future of this magazine, all you have to do is participate in the surveys, and send us lots of feedback about what we are doing. In the end, I hope we wind up with the magazine you will want to have in your home.

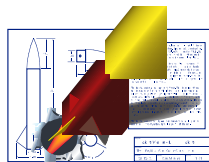
Extreme Rocketry Objectives

The objectives of Extreme Rocketry are 1) deliver the magazine on time, 2) deliver the number of issues paid for by subscribers, 3) have interesting and timely articles in each issue, 4) build an all inclusive web site to support the magazine.



- ▶ Launchable on 24mm solid-propellant motors, also available from Rocket Vision.
- ▶ Fully recoverable and re-useable.
- ▶ Assembly and painting required. Full color decals included.
- ▶ Lots of new designs on the drawing board!

*The Pegasus XL Booster is produced under license from Orbital Sciences Corporation. The Roton is produced under license from Rotary Rocket Company.



ck tvs n

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what readers think of a new rocket magazine

by our readers

Dear Extreme Rocketry,

I can't wait for your new magazine. I am so fed up with the other High Power magazine. It's never on time and even though I have a subscription, It usually gets to the local store as much as 2 to 3 weeks before mine arrives in the mail. It never has more than one or two articles in it either. Hurry so that I can drop the other magazine!

Gene Hornbuckle

Dear Extreme Rocketry,

Congratulations, in advance, on your debut of Extreme Rocketry. I eagerly await it's publication. This is one rocketeer who sucks up everything I can get about our wonderful hobby. Information is where it's at. I will contribute what I can. I am going to begin my level 1 project within a month and would be glad to document it's construction with words and pictures. Also, since I'm a relative new comer I would be glad to share the trials and tribulations of the newby. I've found that the problems I have had are not uncommon to those just starting out.

James A. Morin

Dear Extreme Rocketry,

Be BOLD, get the thing going and sign me up please. Oh... by the way, Hurry Up!
Bob Hvarven

Dear Extreme Rocketry,

Enough with the polls already. Just print the mag. My check is in the mail! You fill in the amount. Eager enough?

Brian Bellerose

Dear Extreme Rocketry,

Regarding your forthcoming magazine. We don't need no stinking subscription rates. Just sign me the freak up. Send me the bill. I'm sure your rate will be reasonable. Can't wait to see the first issue.

Best wishes,
Chuck Lahmeyer

Dear Extreme Rocketry,

I am very disappointed. You first said a sample issue would be available online. Then you post up a teaser instead of the first issue. I admit the teaser looks good. But a good looking picture and text layout

does not make a good magazine. Good content makes a good magazine. All you have shown me is that someone can do a good job of layout. I can not judge the content of the magazine from gibberish. The Santa Claus poisoned five cats when St. Louis was inundated by the great bear from the jungle of the south pole who had five wives in a shoe. What does that tell me for content?

I am going to subscribe anyway because I voted that I would do so. And I do not back out on what I say I am going to do. However my subscription decision is already skewed by your changing policy on the sample issue. Therefore if the first printed issue is not superb expect my cancellation to follow very quickly.

I feel honesty and consistency is important in any business venture. I realize that if every issue was available online you would not sell the subscription. However YOU are the one that said YOU would put the first issue online as a tool for us to judge whether we wanted to subscribe. After analyzing the first issue we would then make our decision.

I am a bit skittish about doing business with someone who changes their story as it suits them. Well, enough of my rambling, my subscription will follow. I hope for both our sakes that the magazine is a success. I feel the need is there for a new magazine to fill the gap that exists on the high "extreme" end of the rocketry spectrum.

Randy Ashley

Dear Extreme Rocketry,

Way to go! I am looking forward to the first issue! Since my entrance into high power rocketry, I have felt that we needed another "voice" in the hobby.

Gary Dickinson

Dear Extreme Rocketry,

I am delighted to know that we "rocket heads" will have yet another hard copy forum devoted to our hobby. I am anxiously awaiting the opportunity to get my subscription started and tear into the first issue! As a true "born-again rocketeer," I find it rather difficult to access all of the information available online without interruption. Printed sources are still great for ongoing reference and are indispensable to

a busy lifestyle. Thanks again for helping to fill in the gaps in what is primarily a computer-driven pursuit. I truly hope to see some good technical articles as befit the title "EXTREME," but hope as well that the beginner to rocketry (be they modeler or high-power oriented) are not overlooked, as they hold the future of our hobby in their hands and wallets. Unfortunately, my internet access is through Web TV,s1 and thus limited [because] Acrobat is beyond the scope of this system, so I will likely have to wait impatiently for the first issue to hit the mailbox (I would love to be #1 on the subscription list!) Congratulations and best of fortune to you and your publication.

Sincerely,
Michael Hickam

Dear Extreme Rocketry,

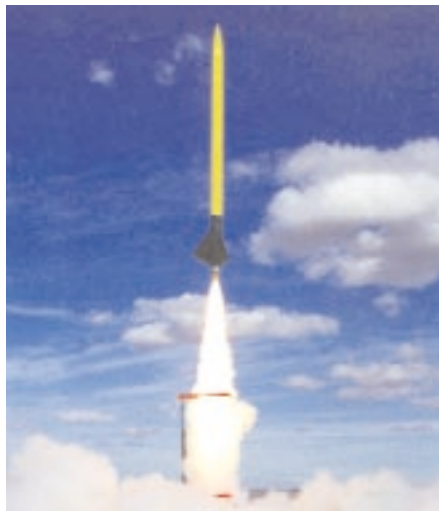
Congratulations on the new magazine. I'm looking forward to seeing more unusual rockets than usually appear in the magazines. The other magazines seem to think that the goal of all rocketeers is to make a bigger and bigger rocket. Well that just isn't the case; at least with me. I'd like to see articles on high power boost and rocket gliders (both RC and free flight). And do both scale, like the popular SR-71, as well as top performance designs. I'd like to see articles on side by side product comparisons; kind of a Consumer Reports of the Rocketry field. I'd like to see articles on light weight construction techniques like vacuum bagging and foam core parts.

To be balanced, let me tell you what I don't care to see much more of in a rocket magazine. Articles on big launches are fine but stick mostly with the odd rockets. I don't really care to see month after month an article about different guys flying their Mini Maggs on an H242. By the way, least you think I'm an experienced high power snob, I'm working on my own level one cert rocket.

Jim Pommert

we want your photos! by our readers

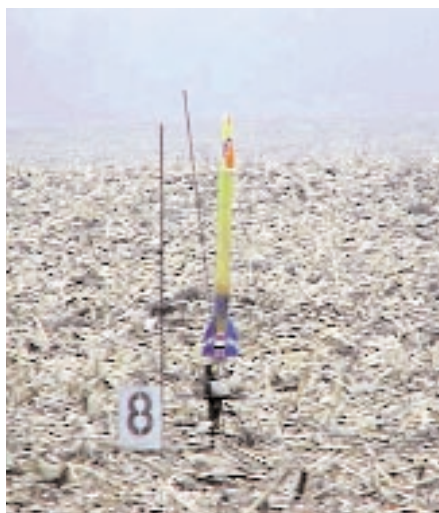
Owner: Vince Catalano
Rocket: Extreme M-1939
Height: 120 inches
Diameter: 5.5 inches
Unloaded Weight: 19 lbs.
Motor: AeroTech M1939W
Recovery: drogue & main chute
Location: Eldorado, NV
Altitude: 16,200 ft.



Owner: James Grover
Rocket: PVC scratch built
Height: 43.5 inches
Diameter: 2 inch
Loaded Weight: unknown
Motor: Econojet G35
Location: Modesto, CA
Altitude: approx. 1500 ft.



Owner: Paul Sherby
Rocket: Endeavor
Height: 48 inches
Diameter: 2.7 inch
Weight: 35 oz.
Motor: AeroTech G64
Location: Three Oaks, MI
Altitude: unknown



Owner: Mark Clark
& Robin Meredith
Rocket: Super Scale Alpha
Height: 17 feet
Diameter: 16.5 inches
Loaded Weight: approx. 100 lbs.
Motor: P class custom made
Location: Arizona
Altitude: unknown



Submit Your Photo: Do you have a great photo that you'd like to see in the next issue of Extreme Rocketry? Mail your photo to: Photos at Extreme Rocketry, PO Box 28974, Las Vegas, NV 89126. Make sure to include the caption information like you see here along with your photo. Please include contact information in case we have any questions (email addresses are preferable). Photos will not be returned and may or may not be published here.

Mr. Fiberglass

This is the second year of operation for this specialty company. It's product line is aimed at the hobbyist and professional alike with an emphasis on rocket construction.

A major product line is the West System epoxy system. West System products have been used in the boat building industry for decades, are highly regarded, and are now gaining popularity in the rocketry community. The West System product line also includes fillers, additives, tools, etc. Mr. Fiberglass also sells glass, Kevlar and carbon cloth, core materials, tools, reference materials, etc.

The new Info Pack contains good information on fiber glassing and product listings • 757-865-6281.

Advanced Rocket Components

Advanced Rocket Components has announced their new line of products. The product line includes ejection canisters and shock cord buckles. The ejection cans were created in response to the demand for an improved charge holding system. These new cans are light and simple to use. They contain a thread on the outside surface, and when used in conjunction with threaded bulk plates, the cans simply screw into place via a screw driver or by hand. They were designed to be used with Daveyfire Electric Matches. ARC also offers the threaded bulk plates or drill and tap sets for making your own mounts. Never has loading charges been safer or easier.

ARC has also released a new shock cord buckles for use with 1" tubular nylon. These new buckles eliminate sewing, gluing, or tying of the shock cord. They can be used in various ways, including securing the cord to a U-bolt, forming a loop and attaching it to a quick link, and even securing a quick link anywhere on the cord! They have been tested for strength and reliability, and are offered in both Aluminum and Steel versions. Advanced Rocket Components can also supply the 1" tubular nylon. • 203-778-6290.



dual deployment altitude package

Looking to get into dual deployment? Yank Enterprises is now offering its 'Altitude Package' which includes an altimeter bay, drogue chute, extra tubular nylon, and all extra hardware needed.

Company: Yank Enterprises
Telephone: 920-892-6722
Web: www.yankenterprises.com
Cost: \$25.00



rotary rocket kit

Coming in March 2000, under license from the Rotary Rocket Company, the Roton is the first offering in our new Space-Now line which models cutting-edge private sector space technology that comes from the minds of today's most innovative aerospace engineers. The Roton will launch on an E15-4 motor and recover on helicopter blades which are popped out by the ejection charge!

Company: Rocket Vision
Telephone: 800-568-2785
Web: www.rocketvision.com
Price: to be announced

4" g-force rocket kit

AeroTech recently released its largest kit yet, the G-Force. The new kit is AeroTech's first four inch diameter rocket kit. The rocket is equipped with a 29mm motor mount. AeroTech recommends using 'G' class motors, thus the name G-Force. This big rocket has nice slow lift offs!

Company: AeroTech, Inc.
Telephone: 702-641-2301
Web: www.aerotech-rocketry.com
Price: \$99.95



Rocket Vision

The long-awaited Custom Rocket Suite is now online and active at the Rocket Vision web site (www.rocketvision.com). This Custom Rocket Service allows customers to create their own rocket kits from a library of quality stock parts, get on-demand stability calculations, and see a graphic of the rocket as changes in design are made. Over eighty kit combinations are possible! Buy your custom designed kit and within two business days it will be on it's way in a professional kit bag with assembly instructions. Prices for custom rockets are comparable to Pro-Designed Rugged-Rockets and are based on components the customer decides to use. Prices will adjust automatically as components are added and removed. Phase Two, which will be released late this summer, will add 2 more airframe diameters, more nose cone 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. • 800-568-2785, 9 am to 5:30 pm weekdays, Pacific Time.

Consumer Hobby Division

Rocket Dyne Systems (consumer hobby division) is back and soon will be producing its legendary HPR kits once again! Mike Gillette has recently sold the consumer hobby division to Mike and John Kerrigan, TRA/NAR members. They will continue the RDS tradition to produce kits with the highest quality components available. RDS will be offering all of the past kits designed by Mike Gillette as well as the new line of mid to high power rockets ranging from G to O motors. Two stage high altitude rockets will also be available for record setting flights. On the drawing board will be cluster engine configurations, the largest production HPR kit available and several new 29 and 38 level one rocket kits. Look for our advertisement coming soon in this magazine. Web site: www.rocketdynesys.com • 800-899-7512

ron denton and his 60% scale hawk missile

by brent mcneely



Ron Denton spent months building his monster 60% scale Hawk missile. He launched the Hawk at the Tripoli Vegas and NERO Experimental launch (a Delamar event). On Saturday he put the finishing touches on the paint job and prepped it most of Sunday morning. The rocket weighed in at well over 100 pounds, making most of the rockets at the launch look like the Estes variety. Ron and crew loaded the missile in a pickup and drove it out to the far pad. It is not everyday that you see a missile launched on an O3600 motor (the motor was built by John Johnston and Rick Lore). Ron designed special internal, dual launch lugs and a special dual launch rod system. It took a while to get the missile on the rods. After extensive double checks by the crew, everyone got into the pickup truck and drove to a viewing point some distance away. It was then that they realized they forgot to hook the ignitor up. They stopped, drove back, hopped out, hooked up the ignitor and got back in the truck (hoping they didn't forget anything else).

Over the radio the countdown was made by Dave Pacheco. When Dave got to zero he pushed really hard on the launch button, and kept pushing until smoke began to drift from the bottom of the rocket. Then it began—the sparks and a little bit of flame sputtered from the bottom of the rocket. For just a second or so the simmering continued before the motor shifted into full gear. The ground shook and hearts skipped several beats as the rocket moved off the pad. It couldn't be said that the rocket really took to the air slow or fast. All that can be said is it was incredibly majestic—awesomely majestic.

The rocket climbed and climbed as photos were snapped. At apogee all four chutes deployed without a problem. One chute was for the nose, the other three for the booster. The missile grabbed a total of



9,349 feet, not bad for a big, bad missile like that. The whole rocket came down only a couple of hundred yards from where it lifted off. The giant chutes looked really great as it brought the rocket down without a scratch, scrape, dent, break or shred. The chutes even laid down in perfect formation because of the zero wind. Everyone had lumps in their throats because it was so darned beautiful.

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- The *SkyAngle Classic* series, with its unique rotation during descent, has raised the bar for quality and design in High Powered Recovery!

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ejection charges, rocket colors, piston ejection & more

by dave davis

Ejection Charge Failure

I recently traced the failure (i.e. non-ejection) of an 18mm Aerotech reload to a shifted ejection charge during descent. With the overly long ejection charge cap, the ejection charge powder has a tendency to shift forward while the rocket is coming down. This causes the ejection charge to lose contact with the delay element and not ignite. To solve this problem, place some wadding in the top of the cap to fill the void. This keeps the ejection charge in contact with the delay element and increases reliability of ejection ignition. Tapping the case to seat the ejection charge to the delay element prior to launch is also recommended. 24mm and 29mm Aerotech reloads do not seem to exhibit this problem.

Another motor combination which has this problem are 54mm motors with extended ejection charge wells. When an Estes bird lawn darts, you haven't lost too much. However, a large vehicle such as a LOC/Magnum streaming in from high altitude is a major disaster and is dangerous to anyone who might be up-range!

This case happened several years ago at a Dayton, WA launch with a LOC/Magnum powered by a J800. As the bird reached maximum altitude and started down, the ejection charge shifted forward, resulting in recovery system failure. Post mortuum inspection of the bird verified that the ejection charge had shifted away from the forward closure and the delay orifice. Expensive lesson learned.

Proper Prep of X-Form Parachutes

One of the major problems that people have when using x-form parachutes is they tangle and do not deploy properly. When an x-form is tied to the shock cord, it cannot center itself to deploy evenly. To solve x-form deployment problems, use a snap swivel on smaller chutes, or D rings on larger chutes rather than tying them on. The open mounts allow the shroud lines to move freely and not bind, eliminating the tangle. The other end of the swivel or D ring can be tied to the recovery system. Another rule of thumb is to have two or three feet of shock cord between the parachute and the nose cone/booster to relieve

opening shock. The optimal folding method for x-forms is to fold it over in half, making a pair of "pants," then folding it over into a spike. Folding from the top down will give you a compact package with all the shroud lines gathered together at one corner of the chute. This will help eliminate the parachute from turning inside out upon deployment.

Best Rocket Colors

Much has been reported about finishing and construction. However, little has been written about colors. That's right, colors of rockets and colors of parachutes. Experience has shown that certain colors work better than others in certain applications. Oftentimes this experience is gained by finding out what doesn't work.

An obvious example was the case of a LOC/Precision Graduator painted mil-spec Olive Drab (OD) Green. The bird was launched from a large green field of several thousand acres in size. Even with a solid landing vector, the bird was never found.

LESSON: NEVER PAINT YOUR ROCKET THE COLOR OF THE BACKGROUND YOU ARE LANDING IN.

This lesson was driven home when an individual flew a fluorescent orange Alpha at Kent, WA. At any other site, this paint scheme would be excellent. However, at Kent, with all the broken fluorescent orange skeet targets strewn about the ground, the bird was next to impossible to find.

Another example was the powder blue Estes Sky Raider flown on a cloudless day. Instantly, the rocket became invisible and was difficult to track until parachute deployment.

LESSON: NEVER PAINT A ROCKET THE COLOR OF THE BACKGROUND YOU ARE FLYING IN.

This lesson was driven home strong by flying a chrome colored rocket at Monroe, WA during September. Silver, gray or white rockets are very difficult to track against a cloudy background.

The same rule that applies to rocket color for background also applies to parachutes. Two of the best color combinations for parachutes is lemon and black or raspberry and black. The black is seen best in

the air while the opposing color is best seen on the ground. On recovery, the parachute is often spotted first. These color combinations are easily seen over a variety of backgrounds, especially grass.

Reds, yellows and orange are great colors if you are flying against a green background, as well as the new fluorescent (i.e. neon) yellows and greens. The bright neon green really clashes against a lawn green background and is easy to spot.

Darker colors work great in a desert environment. Avoid tans and whites as they blend into the sandy/silt background. However, darker colors absorb heat, so take protective measures for your rockets accordingly.

A rocket color is as much a part of its design as its fin shape and motor size. As there are optimum motors and optimum parachute sizes, so are there optimum colors. Grab your pallets and your paint samples and never hesitate to experiment for the optimum color for your rocket in your area.

Reliability of Piston Ejection Systems

Anybody who owns a Public Missiles (PML) kit has first-hand experience with some of the problems of a piston ejection system.

Piston jams are often caused by paint over-spray on the end of the airframe tube. To prevent over-spray, insert an airframe coupler(s) into the rocket before painting to protect the inner airframe surface. One of the major problems with piston systems is piston/body tube damage caused by rough parachute deployment. Can you say "zippered?" By switching to an external recovery system, the piston and its strap are no longer under recovery system stress, and prevents the piston from slamming back into the main airframe. To prevent piston strap damage, place a couple of squares of Estes wadding over or into the motor tube. This allows ejection pressure to pass while reducing the thermal shock to the piston strap.

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L to R: Brian Jarvis, Bob Mosley, John Lewis and Ed Mercer fly the TV camera rocket with 1.2GHz downlink on a K185 (photo: Jeff Stal)

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discovering the rocket community

by darrell d. mobley

I hope this finds you all well and ready for the year 2000 flying season. We have so much to look forward to—a new millennium to grow our hobby, the outcome of the NAR/TRA/ATF legal issue, and let's not forget, a brand new rocketry magazine! In my capacity here, I hope to share with you as many benefits as I can provide from the world of the World Wide Web.

Let me say right up front the thing that will make or break your user experience in hobby rocketry is the group experience. While it's true there is a lot of validity to the FSN factor, "fire, smoke, noise," the thing that will keep you in the hobby year after year isn't the hobby itself as much as it is the interaction you can have with others who enjoy your sport.

My introduction to hobby rocketry began back in the late '60's, when the NASA Apollo program was in full swing. As a child, I watched Alan Sheppard

aboard the Mercury Redstone Freedom 7 flight with awe, but it wasn't until Jr. High School and my involvement with two other friends that I was able to take action. I still recall the butterflies in my stomach as I perused the Estes and Centuri catalogs of the time, looking over the latest offering of what I thought were the coolest companies in the world! Little did I know, even then I had an affinity to scale models, immediately being drawn to the Mercury Redstone and Honest John models. Sure, I had my share of Alphas, but the scale models were the best.

I can still remember doing launch presentations for our science class, with all of the students huddled around one end of our school's track, awaiting us to countdown and launch. The camaraderie and group experience of those events were high, and we felt like heros. As the months turned into years, hobby rocketry was forgotten in pursuit of other cash intensive obsessions, like girls and dating, but the emotions of that period of my life will be with me forever.

When I re-discovered hobby rocketry again, it wasn't as most would assume—it wasn't an eye-opening experience which captivated me heart and soul. It was in 1993, when my son was twelve. I was looking for something we could do together as a father-son team. I recalled how model rocketry had set that special heart rhythm for me in my youth, and proceeded to buy a starter kit and a couple of other kits as well. We pounded them out in a matter of afternoons and took them back to the same place I had pressed the button so many years ago. Whoosh! "Wow, Dad!" The first one landed on the school roof. Bummer. The second one lost a fin.

My son started to lose interest when the principal appeared and scolded me for retrieving the first rocket from the school roof. I think I embarrassed him! At any rate, the event didn't have the same pizzazz as it originally did, and we packed the stuff up, where it stayed for several years. It lacked something, yet I couldn't put my finger on it.

Life went on, and in January of 1995, while on a business trip in Pensacola, Florida, I stumbled into a Books-a-Million to find some evening reading material for when I would later return to my hotel room. I had all the latest computer books and was sick of their similar content.

Disappointed with nothing new to read, I was headed for the door when I spied a "hobby magazine" section. Curious, I walked over and saw titles about model cars, model trains, RC planes and other fun things I used to be interested in. Then, one caught my eye in that unusual way—High Power Rocketry? After thumbing through maybe 1/3 of the magazine, my heart was racing so fast I had to purchase this book. Neil Davis' huge SWAT, Thirty Eight Special, LDRS – whatever in the heck that was, etc. It was all enough for me.

The rest is history as they say, as I literally read, word-for-word, every page, every ad, ever article in the magazine. I discovered a BBS for the Dallas Area Rocket Society, where I lived at the time. From the BBS, I learned about their regular launches less than 15 minutes from my house. Attending one of those introduced me to dozens upon dozens of avid hobby rocketeers who were more than willing to help me get up to speed on where the hobby had gone. Then I discovered the missing link from the previous times—interaction with people.

In my opinion, nothing either contributes more or takes more away from your experience in this hobby than interaction with people. You need to find a way to plug in. This magazine is one good way, but personal interaction will increase your value ten-fold. Clubs are another good way. But if you aren't sure where to start, try the Internet! Whether you are in some chat room, replying to a message on a discussion forum or reading the latest news on Rocketry Online, the real power of the Internet is its ability to let you interact with others of the same persuasion—rocketeers who share similar interests. There are several communities springing up in the ether world of cyberspace—find one and enjoy the interaction.

Over the coming months, I hope to share with you some of the highlights of rocketry on the Web, whether that be the latest must-see web site some crafty individual has created on his latest project, an in-depth look at the inner workings of some of today's most popular component and kit manufacturers, or just the latest buzz around the online communities—we will get to discover the wonderful world of hobby rocketry on the Internet. Until then, fly 'em high!



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questions & answers

by the rocket guru

Question – I've been looking for an effective yet inexpensive method of motor retention for my high power rockets. So far I am unsatisfied with what I've found. The systems I've looked at are either too complex or too expensive. Any suggestions?

Answer – I've had a lot of success using aluminum clips originally designed for holding screens in doors. They seem to be the perfect "L" shape, have a slightly elongated hole so they have some adjustment capability, come in different depths so they can accommodate different motor sizes, they are made from hard aluminum, and can be obtained cheaply in quantity at most any hardware store (approximately \$2.00 per dozen). I use 8-32 Allen head bolts with a steel washer bolted into a blind nut set into the rear centering ring. If you have already completed the construction of the rocket, Du' Bro makes an 8-32 threaded insert with a deep bite, self-tapping exterior thread. A little super glue and they're in for good. I've used these to fit these clips as a retro-fit and they work great. One has proven to be effective for most 29mm applications, with 2 to 3 for larger motors. I've flown them many times without a failure yet.

Question – I have an Estes kit that uses friction fitting of the D12 motor without a clip. The instructions say to wrap tape around the motor as a retainer. Is there a better way?

Answer – Some motor tubes hold the D12 motors so tightly that retention is fine even without any tape. Use tape if the motor can slip out easily. If your nosecone slips off easily, all the ejection force will be applied to expelling it and the motor will stay in place.

Question – What is the best way to fill and clean up molding dimples and flaws in a plastic nose cone?

Answer – I first scrub the nose cone with Acetone (or soap and water) to clean off as much mold release, etc., as possible. Next, I trim off any flashing with an Exacto knife, then fill SPARINGLY with Bondo "Glaze and Spot Repair" filler (in a tube like toothpaste, NOT the UV activated kind!) I then wet sand the filler carefully

with 320 grit avoiding introducing new imperfections with the sandpaper in the form of scratches. At that point, it should be ready for primer and more filler/wet sanding to remove any remaining flaws.

Question – Can a composite motor, like the Aerotech single use E15, be substituted for the Estes D motor since they are both 24mm?

Answer – Sure it can. They are exactly the same size, and as long as your motor mount construction is sound, you should have no problems (except you'll want a slightly larger flying area). I've substituted an E15-4 in my Estes Saturn V, and as far as I'm concerned, that's the only way to fly that rocket as the D12-3 hardly gets it off the ground. If you have the cash for a 24mm RMS casing, the F12-5J is a wicked motor for models designed for the Estes D engine. I fly my Mean Machine and Shadow on the F12-5.

Question – My daughter and I are building our first custom designed rocket. How do we calculate where to attach the launch lug? Is there a "rule of thumb" or is there a math formula for this?

Answer – My rules of thumb are: (1) The rocket is far less likely to bind on the rod if the Center of Gravity (CG) is within the length of the launch lug or set of launch lugs. (2) With a single lug, place the CG within the length of the lug, except (3) on light, small rockets it's a good idea to put the lug in the fin/body joint at the rear. (4) If you use two lugs, make sure the rear one is long enough to work by itself, OR figure that the rocket is "off the rod" when the front lug is. (5) The forward lug can be anywhere ahead of the CG and the rear lug anywhere behind it. I like the forward lug just ahead of the CG and the rear lug flush with the aft end of the body. These are my habits and practices however, and others may vary.

Question – Can you get AP engines without ejection charges, or can you somehow disable them? I am building a Level 1 rocket, which will carry a test guidance computer. But if the ejection charge blows, that is the end of the guidance computer. I will also need some way of firing the parachute,

which will be controlled by the computer. Is there any way of doing this?

Answer – If you use high power reloadable motors, you can get a plugged forward closure. Some people have removed the ejection charge from single use engines, although that is not exactly in the spirit of the safety codes. If you do remove the ejection charge from a single use AP motor, squirt some grease down into the delay charge well hole. Also, on Estes type engines, you can put a wrap of tape around the ejection charge and fill it with some epoxy. That should propel the ejection gases out the rear of the motor when the ejection charge goes off.

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getting level one right the first time

by tim quigg

I'm the first to admit I don't know all there is to know about high power rocketry. This is the one aspect of our hobby that intrigues me so much, learning something new at every launch. In doing so I have garnered a fair amount of knowledge about rocketry in general during my 25 years of dabbling, and a bit more about mid-power and high power rocketry within the last 6 years. During this time, it's been my good fortune to be a member of several NAR certification teams for both Level 1 and Level 2 attempts. It has been a genuine pleasure and a great learning experience helping people attain their high power user status. Unfortunately, some of these attempts have ended in failure. The majority of these unsuccessful attempts were unsuccessful due to very minor mistakes—mistakes that could have been avoided had the modeler taken a moment to reflect on what they were doing, or paid a bit more attention to detail.

As I stated earlier, I don't profess to be an expert in the field of high power rocketry. However, through this article it is my intention to share with readers some of my experiences and observations as a certification team member, in the hopes that others can benefit from mistakes which have been made (some of them my own!).

So, how does one get Level 1 right the first time? I strongly encourage those attempting Level 1 to do so with a rocket kit of proven design from a well-established, reputable manufacturer. Several of these manufacturers advertise in this very magazine. Another good source is the vendors section of Rocketry On Line on the Internet. (www.rocketryonline.com). Most of the major HPR manufacturers produce excellent kits suitable for Level 1 confirmation flights. Leave the scratch-built monster motor-eater plans on the drawing board until you get more HPR experience under your belt. Certification flights are no time for experimentation. The idea is to get it right the first time, with safety first!

Next, insure your certification vehicle is being built the right way. I've witnessed several people attempt Level 1 certifications on modified Estes model rocket kits with surface mount balsa fins. I can tell you from first-hand observations that an H128 can reach "the speed of balsa" rather quickly. Some people have beefed-up these kits using Kevlar and fiberglass reinforcement and have succeeded.

However, these people comprise the minority of the highly skilled, and are pushing the envelope to its limits. Besides, the money they spent on super-charging these models could have easily paid for a rocket kit that was already designed for Level 1

certification flights, with motor money left over!

A very good guideline for construction of your Level 1 certification bird is provided to you on the back of the NAR High Power Certification Application. A copy of this form in pdf format can be obtained from the NAR's website at www.nar.org. You can also obtain a copy via mail or fax by contacting NAR Headquarters. This checklist provides a good basis for successful certification flights. Let's look at some of these points in closer detail.

Nose Cone and Airframe

Is the nose cone or payload shoulder sufficiently tight to prevent drag separation? The nose cone or payload should not wobble side-to-side or separate from its own weight. Is a vent hole needed to relieve pressure from high altitude flight? Is the body tube thickness adequate to withstand high power flight? (typically .050 inch walls or thicker).

This is pretty straightforward. Tip the rocket upside down. If the nose cone or payload section falls off under its own weight, you need to snug it up with masking tape applied to the shoulder. I've seen egg-shaped airframe and payload couplers that create a wobble from side-to-side. To avoid this, test-fit each part during construction. If there is the slightest bit of doubt, replace the part with one of verified integrity. The extra couple of bucks now will save you lots of trouble later. Note the NAR recommends a body tube thickness of .050 or more. This pretty much rules out the typically thin body tubes produced for lower power model rocketry applications. Spend the extra few dollars for quality made, heavy-duty airframe tubing.

Launch Lugs

Are the launch lugs securely fastened to the model? Verify no cracking of adhesive joints. Is the launch lug(s) appropriately sized for the model, typically 1/4 inch or larger diameter? Will the launch lugs bind on the launch rod? Taped-on launch lugs are not permitted.

I've had a few models suffer from rod whip. Although there are several dynamics at work here, a contributing factor is a heavy rocket on a small launch rod. I use 1/4 inch launch lugs on any airframe 3 inches in diameter. For 4 inch and larger airframes I now use 1/2 inch launch lugs. I don't have near the problem now with launch rod whip that I used to. For heavy rockets 4 inches in diameter and larger, you may wish to consider incorporating Delran buttons into your design to facilitate the use of a rail launcher. You could also leave them off completely and utilize

a launch tower. I've seen launch lugs ripped off at launch. When using launch lugs, ensure your epoxy fillets are robust. Also ensure you use the right type of epoxy. I use a mid-cure 15-minute epoxy for all of my launch lugs. For the really big rockets with really big motors (4 inch or larger with 54mm motors) I use a slow-cure 30-minute epoxy. In 6 years I haven't experienced a problem with launch lugs ripping off.

Motor Retention

Is (are) the rocket motor(s) firmly restrained in the model? Check for engine mount integrity to prevent a "fly-through." Is a thrust ring used? Check for a motor hook or similar motor restraint. Carefully check the taped or friction fitted motors for tightness. Ask the modeler what adhesives were used during assembly.

Friction fitting rocket motors with masking tape is a widely accepted and practiced form of motor retention. Countless rocketry enthusiasts have used this method successfully for many years. There have also been instances where expensive motor casings (and subsequently the rocket vehicle) were lost. I don't personally expound this technique. I can't afford to purchase reloadable rocket motor casings on a regular basis. In my opinion, trusting masking tape alone to retain a reloadable rocket motor casing that can cost \$100.00 or more doesn't give me a warm, fuzzy feeling. Several years ago, a TRA Prefect showed me how to use home-made metal J hooks to retain motors when I first started out in high power. In 6 years of flying, I haven't lost a casing yet. There are also many commercially manufactured motor retention systems on the market, offered by such companies as Public Missiles and Aero Pac to name a few. In short, use an effective motor retention system other than just friction fitting alone.

Secondly, make sure the epoxy you use in construction is capable of withstanding the loading you plan to put on the rocket vehicle. I recall an enthusiast who showed up at one of our club launches several years ago with a LOC I-ROC intending to certify Level 1 that day. During the safety inspection, it was learned he had assembled the entire rocket with 20-minute finish epoxy. Needless to say, the rocket didn't fly that day. As a general rule of thumb, I use a 15-minute mid-cure epoxy on my 29mm and mid-range 38mm birds, and a 30-minute slow-cure epoxy in the upper-end 38mm and 54mm vehicles.

Fin Integrity

Are the fins fully secured to the model? Check for looseness or cracking at the fin

to body tube junction. "Through the wall" construction is recommended for high power models. Is the fin material compatible with the motor thrust range? (1/8-inch minimum plywood is recommended for high power models). Ask the modeler how his fins are mounted, what adhesives were used (epoxy is preferred) and what fin material was used.

Again, I'm sure there are people out there who have beefed-up rocket kits intended for model rocket motors, and have flown them successfully on high power rocket motors. I denied a Level 1 certification flight attempt at our range one year by an individual who had taken a stock Estes Phoenix, layered it with fiberglass, and intended to fly it on a H128. He later went to another launch site where he was allowed to fly the model. I understand it flew rather well, and he obtained his Level 1 certification. But as a general rule, this is not the norm. When considering the average rocketry enthusiast with average construction skills, this is far from the realm and capabilities of most of us. Don't kid yourself into thinking it's easy, because it's not. These people are generally the elite. I can assure you they have really done their homework, and spent many hours in research and many months in construction. Don't attempt Level 1 with a rocket that utilizes surface mount fins! Even if you did beef them up, the fin-to-airframe joint is the weakest link of the fin assembly. The only way to ensure success is to utilize through-the-wall fin mounting, with direct attachment to the motor tube, and generous fillets with an epoxy of the proper cure rate. Aircraft grade plywood or G10 fiberglass fins are preferred, and are the industry standards for most HPR rocket kits produced today. Balsa should be avoided. Even impregnating the balsa with epoxy resins or fiberglass (unless you are experienced in this field) will bring about questionable results at best. Remember that the purpose of your Level 1 certification flight is to achieve confirmation the first time, and to do it in a safe manner!

Vehicle Stability

Is the model stable? If stability is in doubt, require proof of the CG and CP locations. (Remember, CG should be forward of CP by approximately 1.0 body tube diameters). Ask the modeler to show the CG and CP locations and how they were determined. Verify that the modeler shows the CG with the motor(s) intended for flight and not a smaller motor or fewer motors (clusters). Require evidence of CP calculations if further doubt exists.

If you are not currently calculating Center of Pressure (CP) and Center of Gravity (CG) relationships on all of your rocket vehicles, you should be. There are those who take it for granted that all pre-fabricated rocket kits are inherently stable. This of course, is incorrect. A well-established HPR manufacturer in the Pacific Northwest introduced two 29mm high power rocket kits several years ago. As provided, these kits were "squirrely." It was not until sometime after their introduction to the market that a quick retrofit was announced recommending the addition of one ounce of counter weight in the nose. Stability improved, and so did sales. Never assume any rocket vehicle (kit or scratch-built) is stable until you yourself have confirmed the stability through accurate calculation of CP/CG, and it has been verified. Again, there are several sources of good quality computer software for this purpose at reasonable prices.

Altitude

Will the rocket "bust" the FAA waiver? Verify compliance by comparing model weight and power with charts and tables if available, or by calculation. Ask the modeler what the expected performance is and how he made his determination (i.e. computer simulation, similar models, etc.)

One of the most closely guarded treasures of any rocketry club is their FAA waiver. One could find themselves tarred and feathered if they intentionally exceed the maximum altitude provided for by the FAA. Ensure your prized pet rocket project will stay under the FAA waiver. If it doesn't, you may not be invited back to fly at that particular field again. Because not only will the club have to answer to the FAA, but you will too and it is not an enjoyable experience!

Recovery System

Inspect the recovery system. Verify that the shock cord is not cut or frayed and free of burns. Are the shock cord mounts securely mounted to the model? Are sharp edges present, which may cut shock cords, parachute risers and suspension lines? Is hardware (swivels, eye bolts, D rings) sufficiently strong to withstand recovery loads? Is the wadding used adequate?

I've suffered my share of separations at apogee with model, mid-power and high power rockets alike. Invariably, each failure could be traced back to my limited use of recovery wadding material. Never use fiberglass, as it is not biodegradable. The simplest technique for recovery wadding is to use at least two body diameters of fire resistant blow-in attic insulation. Also

make sure that you place a couple of sheets of Estes recovery wadding down on top of the motor tube before putting the insulation in on top. This keeps the insulation from falling down on top of the motor casing, and helps to maintain the proper depth of wadding between the ejection charge and your recovery system. Some people use a suitably sized sheet of Nomex cloth attached to the shock cord to protect the parachute. Still others find it best to eliminate the need for recovery wadding altogether and install an ejection baffle during construction. Whatever the option used, you must have some form of protection between the ejection charge and the recovery system. Some folks use a 10 to 20-foot length of 1-inch wide braided nylon strap for shock cord. Others opt for the increased strength and reliability of tubular nylon strap. And still others utilize heat-resistant Kevlar strapping. Which ever you use, ensure your shock cord is robust enough to handle the forces of ejection, and supports the dry weight of your rocket vehicle. Choose the proper size D rings for attachment points between your launch vehicle, the recovery system and the payload sections. You will find the 220-pound rated ones work best for most Level 1 applications. Take care of them, and keep the threads lightly lubricated with Teflon impregnated grease. Check the D rings periodically; they should thread smoothly and effortlessly. If they bind, chances are they have been over-stressed and are bent. Discard these and purchase new ones.

Conclusion

One can achieve Level 1 certification easily if they take their time in construction, and pay attention to detail. Oddly enough, in my experience it is usually not the catastrophic failures that nail people, but rather the small, often overlooked things. The NAR has provided each modeler some ideas and recommendations in the form of the High Power Certification Check List. If one follows the checklist during construction, I guarantee the certification process will proceed much smoother, be less stressful and more enjoyable for all involved.



Mars Lander

SUPER SCALE PROJECT

BY JEFF BRUNDT

The original Estes Mars Lander was always one of my all-time favorite kits. I remember when I was 11 years old and seeing one at a local hobby shop. I had to have it, but at that time \$9.95 was a lot of money to spend. I finally got a job doing yard work for a neighbor and saved to buy it. I was so excited when I got that kit and built it. I had it for many years but time and Mom's weekly cleaning of my room took their toll on that exotic rocket. While in college, I managed to get all the remaining pieces and cloned another kit. I even had an extra set of decals from a designer special. That reborn lander would have been enough had I not discovered high power rocketry.

With the advent of higher power motors, it now became possible to build a bigger version of the lander. I was in a vacuum of sorts. I thought I was the only one thinking of this, but after doing some searching on the web a few years ago, I found that I was one of many who shared the same dream, and they had already accomplished the task of upscaling. Then I discovered the rec.models.rockets (rmr) newsgroup last year and began hearing of rumors of a 2x Mars Lander upscale kit being offered. I had to find out about that. In turn I was led to a man by the name of Tom Prestia, proprietor of Tango Papa Decals, who was offering kits to make a 2x upscale Mars Lander. They were relatively inexpensive at \$57 plus an extra \$15 for the pre-cut centering rings. For that price you got a section of PML 7.5" body tube, two coupler rings to fit the 7.5" tube, a 3" diameter mailing tube, a balsa nose cone (made by BMS),

about 4' of kevlar cord from Pratt Hobbies, a small bottle of white fabric paint, reproduced copies of the original Estes Mars Lander instructions, 2x enlargements of all the patterns and shrouds printed on card stock, a set of 2x decals (Tom makes very high quality decal reproductions in original and custom sizes), a section of clear polyethylene tubing for the leg hinges, 4 plastic balls for the leg hinge pivots, an assortment of rubber bands, a Pratt Hobbies nomex chute protector (4" square), and a sheet of tips and hints on constructing the lander. The extra \$15 gets you a single 1/4" ply 7.5" x 38mm centering ring, three 3.00" x 38mm 1/4" ply centering rings, and several centering rings for the shrouds cut from foam core board.

The term 'kit' is really a misnomer. Basically what Tom has done is put together all the hard to procure parts and all that is left for the builder to get is the wood and finishing materials. In all fairness to Tom he has stated this is a craftsman type project. As a scratch builder myself, I can vouch for this. I had no illusions when I bought the 'kit' as to what I was getting. I was partly curious, and considering what I would have had to spend just to order the body tube alone, it was a bargain. I treated the Mars lander upscale as a scratchbuild from the very beginning. It was never my intent to double the size of all the original parts and assemble. This would never work considering the increases in forces and weights. High power construction techniques were called for.



Mars Lander

SUPER SCALE PROJECT





by jeff brundt

Extreme Rocketry

www.extremerocketry.com

Jeff Brundt's Mars Lander

Owner: Jeff Brundt

Builder: Jeff Brundt

Location: O'Fallon, MO

Rocket Name: Mars Lander

Height: 24 inches

Width: 7.75 inches

Weight: 4 lbs. empty

Motor(s): AeroTech H123W

Recovery:

(1) 54" Top Flight chute for booster

(2) 24" Top Flight chute for nose cone

Electronics: none

Features: Modular construction, spring loaded landing gear

Colors: White, Red & Black

Flight Report

Maiden flight:

November 20, 1999 at St. Louis Rocketry Assoc. HPR launch at Eisberry, MO

Number of flights to date: 4

Description of Rocket

A 2x upscale of a classic Estes kit. The lander is flown on a 38mm H123 White lightning motor. What it lacks in altitude, it more than makes up for in performance and showmanship. The rocket is constructed of various materials including balsa, plywood, styrene, posterboard, cardboard, and phenolic. Its modular construction allows disassembly to access internal parts for repair or service. The spring loaded landing gear provides a realistic shock absorption on landing. Whenever the lander shows up at a launch it is always sure to draw a crowd.



\$100 centerfold poster contest

About the Extreme Centerfold Contest

Each issue, Extreme Rocketry will feature one rocket in our centerfold. If you have a rocket, or have a great photo, please submit it to us at PO Box 28974, Las Vegas, NV 89126 for our Extreme Centerfold contest. If your photo is printed as our centerfold, you will receive \$100.

We expect the photo to be really impressive, and in some way extreme. Please include extensive details about the rocket like those listed on this page. The submission must be an actual photo rather than a digital file (transparencies are also accepted). An accompanying article is not required to win the contest.





The assembled base unit showing the motor tube, base plate, and lander legs

Base Unit/Leg Support

The first consideration to be made was for accessibility and ability to repair the lander's internals. Most people that have built an original sized version have reported the rubber bands, used to give the legs their shock absorbing spring, tend to break over time (either from hard landing or the rubber wearing out). The basic design is such that easy access to replace these items is non-existent. Others have tried to use springs instead of rubber bands to overcome the problems associated. The problem with springs is the method to mount and attach them, along with the added complexity and weight. My method has always been to keep things simple. After looking at how the lander goes together, I decided that the easiest thing to do was make the body removable. The body of the lander is not load bearing at all. The motor tube and the parachute tube are the load bearing structures. The body shroud is really for aerodynamic purposes only. Therefore my lander uses rubber bands to provide the shock absorption in the landing gear.

Second consideration had to be given to strength and durability. Tom Prestia noted on his lander models the legs had a tendency to break on a hard landing or if the model drifted upon landing. The method for mounting the legs to the motor tube is similar to the original kit, with the exception the support shafts are spaced out further from the motor tube. This causes them to experience more force acting on them. To use 1/4" wood dowel would not be adequate. I opted to use

1/4" carbon fiber arrow shaft. This material is extremely strong.

In order to allow for the lander's legs to be removable, the motor tube had to be able to separate from the base plate. I designed the assembly in two sections. First is the motor tube itself, a LOC 38mm, with the ply centering rings to support the landing gear and the parachute tube. Second is the base plate. The base plate is a 1/4" thick ply centering ring with a 38mm diameter hole in the center. Epoxied to this is one of the 7.5" coupler tube pieces that slips into the 7.5" lower body section, as well as the ply support gussets for the motor tube and the hook screw blocks. The motor tube and the base unit slip together, and are held by two 4-40 screws into blind nuts. Four ply gussets surrounding the motor tube give it the necessary support. When the base plate is removed, the four pins through the arrow shafts are slipped out, and the lander legs can easily slide out for service or repair. Also attached to the motor tube centering ring is the shock cord mount eyebolt. The 3.00" parachute tube will slip over the three centering rings and is held in place by a single screw into the eyebolt mount block.

Lander Legs

The lander legs themselves are built up assemblies. Rather than make them out of a single thickness of 1/4" ply they are made from 3/16" bass wood strips covered with 1/32" veneer ply sheeting. The basswood provides the basic frame with an internal truss for strength. This type of

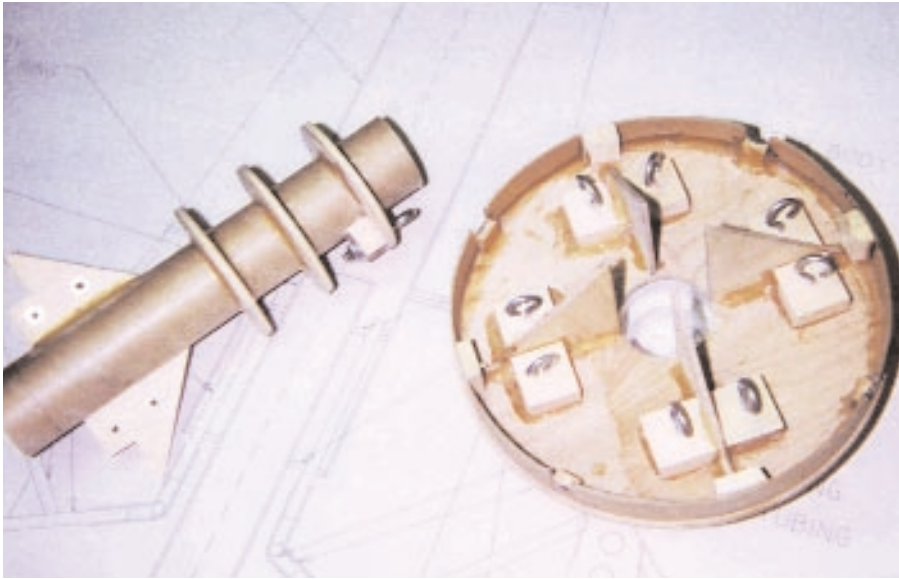
construction, while more time consuming, adds a lot of strength and weighs considerably less than a piece of solid ply. The bottom edge of the lander leg is also reinforced with a brass 'U' channel soldered to a 1/4" diameter brass tube. The wood portion of the leg fits into the channel, and in combination with the tube, provides for more strength. The remainder of the leg is finished pretty much the same as the original version would be. There can be several options for hinging the lander leg. I chose the polyethylene tube method as per the original and what is supplied with the 'kit'. Since the model has access to this area, it seemed the easiest choice. I did decide to use a carbon fiber arrow shaft for the upper portion of the leg arm pivot. Using 1/4" wood dowel seemed too risky since this is a high stress area and the carbon fiber adds no weight. The footpads are cut from 1 1/2" wood dowel with 1 7/8" cap plates glued to them. I also added a dowel section that runs through the footpad and into the inside of the brass tube of the lander leg. This provides extra rigidity and more gluing surface area. The exposed edge of the 1 1/2" dowel is finished off with a strip of corrugated plastic sheet. The shock cylinder is 3/8" brass tubing centered on the 1/4" wood dowel.

Main Body

The body shrouds were made from standard posterboard. The 'kit' included cardstock enlargements of the originals, but the larger mid-body shroud required piecing several sections together, and I preferred to have it made from one piece of material. In addition, I did not trust the Xeroxed reproductions to be accurately sized. It was much easier to lay out my own shrouds. I calculated the necessary arc lengths and radii and fabricated all the shrouds. I made a set-up table out of a piece of heavy duty cardboard so I could duplicate the center points and arcs later when I made the detail body panels. The first shroud made was the mid body. I first epoxied the 7.5" diameter coupler tube section to a foam core centering ring. This would be the base of the mid body and slip into the main 7.65" body tube. I then made three supports from balsa to set the height of the top bulkhead, which was also a foam centering ring. With these two



The main body tube and shroud assemblies.



Motor tube and base plate.

rings aligned and set I had a basic frame which to wrap the shroud around. The shroud was rolled and glued together, then slipped over the frame to set its shape. A bead of glue run around the inside edges (where the shroud and rings meet) was all that was needed.

The upper part of the ascent stage cone contains a 3" diameter body tube section like the main internal body (parachute) tube. An outer coupling ring is used to slip join the two sections together when the lander is assembled. After the paper shroud was mated to this small section of body tube, 30-min epoxy was poured around the shroud/tube joint. This has two benefits: first it makes the upper part of the tube very strong and resistant to zippering, and secondly, it adds nose weight to help in the CG/CP relationship. The nose cone shoulder extends well past this small body tube ring and has plenty of contact area with the main body tube. The two conic sections are epoxied together and ready for glassing. I used 3/4 oz glass cloth and Z-Poxy finishing resin. After it cured the weave was filled with light spackle and sanded smooth.

The lower body section, or descent stage, was marked and cut for the lander leg slots. The gear fairings were made from 3/16 balsa with a 1/32 ply veneer on them. The spiral grooves on the body tube were filled and sanded smooth. The gear fairing assemblies were then glued in place. The base plate was then positioned and mated drilled to the descent stage. Hardwood blocks, epoxied to the inside of the coupler ring on the base plate, provide something for the flush screws to bite into to hold the body tube and base-unit together. The shroud assembly is slip fit into the descent body tube, as well and held in place by two small screws. The final shroud is the descent stage shroud. This is a thin shroud that mounts to the bottom of the base plate. It too is made of paper and glassed. A foam core ring acts as the base, and a 3.00" body tube section is epoxied in the center hole. This tube will surround the PVC motor retainer threaded section.

Nozzle/Motor Retention

Initially on this model I had wanted to use the AeroPac motor retainer system. After looking at several options, and weighing the cost, I discovered that PVC fittings would work just as well. A one inch threaded adapter and coupling ring would work perfectly to hold a 38mm motor. The base of the threaded ring was attached to the ply base plate with JB Weld. The nozzle itself was made from a paper pattern, mated to a ply ring and glassed. The female portion of the coupler was attached to the ply again using JB Weld. All you need to do is slip the motor in through the male portion and the motor tube then thread on the nozzle. Simple, functional, and it looks great.

Nose Cone

The nose cone furnished with the 'kit' is made from balsa. I believe it is made by BMS. It is very nicely done and needs very little prep work. I glassed this cone using 3/4 oz cloth and Z-Poxy finishing resin. This is much easier than sanding sealer. After filling the weave, and sanding it smooth, it was ready for paint.

Body Detail/Finishing

One of the things that make the lander interesting is the detail on the body. The original Estes kit used embossed paper to provide the 3D effect. Since it was not practical to do this on my larger version, I used sheet styrene to duplicate the body panels. I used .010" Evergreen sheet styrene cut to patterns I made using the original pattern sheets and my layout board I saved for making the shrouds. The reason for this was that all of the panels contain radii to allow

them to follow the curvature of the shrouds. I was able to measure and mark on the body where all these details were to go, then glued them in place with CA glue. After all the panels were in place, I sanded everything with 400-grit sandpaper. This softens the edges of the styrene and blends them to the body. The antennas were made from wood dowel and balsa. They were located and glued into place.

The model was now ready for the sealer coat. I used a thinned version of Kilz primer to fill the wood grain and the glassed areas. While adding a bit of weight, I like the finish it produces. After several coats of the filler, the model was then prepped for initial primer coat. I used a white sandable primer. This allowed a good base and showed where I needed additional sanding and filler. One coat of primer was all that was required. The color coat was next. I used gloss white Krylon enamel for the body and gloss red for the legs. I like Krylon and have never had a problem with it. It always gives a good finish. I let the color coat dry for a day before applying the decals.

The decals provided with the 'kit' are excellent. They require trimming but this is not a problem. They are basic water slide decals and they stick very well. However, I felt there was something missing. I added placard and warning decals from various aircraft marking sets I had from my plastic model days. These are made by MicroScale and



The lander 'dry' assembled.



Detail view of the lower body. The nozzle also functions as the motor retainer.

can be purchased in most hobby shops. The ones I used were from a 1/32nd scale F-15. These add a nice touch to the finished model. After letting the decals dry overnight I sprayed all the painted parts with a clear coat. I used TopFlite's crystal clear. It comes in a spray and is compatible with Krylon. It's intended for R/C planes and is fuel proof. It may cost a little more but I think it is more durable in the long run and it does not yellow with age. I applied the clear in several light layers. This prevents the decals from reacting (curling or wrinkling). After the last light coat is dry, I sprayed a final wet coat. The lander was then ready for final assembly.

Final Assembly

The legs are first installed to the motor tube and pinned in place. This assembly is then joined to the base plate and the assembly screws are installed. At this time you can install the rubber bands for the spring action on the landing gear. Next comes attachment of the shock cord to the screw eye. In my case I am using 1000 pound test kevlar cord from Pratt Hobbies. The parachute tube is slipped on next and secured with a single small screw. The main body is then lowered in place and slipped over the base plate coupler. When this is completed it is fastened with four flush head screws and is ready to go.

The model was now ready for weight and balance check. I located the CG position (5" from base of the 7.65" body tube) and did a preliminary check with a simulated motor weight installed. The lander was a bit tail heavy. I then put in the parachute and this improved things a bit but not enough. I took a baggie and put some BB's in it and hung it from the nose. I kept adding weight until I got a slight nose down attitude. Weighing this on the scale showed I needed 6oz of ballast in the nose. Now the trick was how to get 6 ounces into the finished model. Fortunately I had a balsa nose cone of some size. I got out the spade bit and drilled out a large cavity to add ballast weight to. I added the BB's then poured in some epoxy fol-

lowed by a hardwood dowel plug. The combined weight of the epoxy, wood and BB's brought the CG to the right spot. The finished model weighs in at 4lbs ready to fly, less motor.

Flight Report

Flight day arrived and it was perfect—no wind and clear skies. I prepped the H123 motor and trimmed the delay for approximately four seconds. I opted to bring the nose cone down on a separate chute from the main lander after reading Tom Prestia's post recently on the internet. After both chutes were packed and the motor installed, I headed out for the pads. The people I passed on the way out there were amazed that this rocket was going to actually fly. I was told I had some big ones to fly this bird. I lowered the lander on one of our far pads, hooked up the ignitors and made one last check. There was nothing left to do except sit and watch. My lander was the only flight on this rack and the LCO made a special announcement for everyone to watch this flight. I crossed my fingers and said a little prayer. 5... 4... 3... 2... 1... LAUNCH! The motor lit right away and the lander boosted straight up with a slight spin. It looked gorgeous in that blue November sky. Just as the lander reached apogee the ejection fired and

deployed the chutes. The 54" main unfurled perfectly but the smaller chute for the nose cone got tangled in the shock cord. No matter. The lander was descending perfectly, with a slow drift towards the south. Everyone was wondering if it would remain upright on touchdown and they were not disappointed. The lander touched down on the soft dirt with the shock absorbers providing a little spring. Touchdown was greeted with cheers and applause from the crowd. To say I was elated would have been an understatement. A perfect first flight. All the hard work and planning paid off. I was asked if it would fly again later that day and I said more than likely it would. After several other flights, which included a perfect flight of my Saturn 1b, I prepped the lander again. I was less nervous the second time. The launch and boost were perfect, the parachute deployed right at apogee, and then disaster struck. The kevlar cord I was using as the shock cord broke. The lander tumbled down from the sky. It spun and it tumbled. The crowd gasped and I could hear the collective moan of despair. But amazingly, not more than 50 feet before impact, it straightened up and hit the dirt upright. I was not upset about it. As I said before, and will say again, I built it once, and I can build it again. To my surprise the damage was minimal. The lower descent shroud was a little crunched, two of the gear housings were damaged from the legs over-travel, but other than that the lander was fine. The main body and shrouds were undamaged and the legs had some minor paint scrapes. Since the lander disassembles, repair is already underway. It WILL fly again. My modular design approach proved its worth this day. The lander project has been fun and challenging. I was more nervous flying this rocket than my Saturn 1b. But the reward was worth every moment of anxiety I had.

*For additional photos and construction notes please visit www.geocities.com/jbrundt/
Kit Info: Tango Papa Decals, 610-252-8543 (10-7 EST) • www.tangopapadecals.com*



Detail view of internal launch lug.

How to Get an FAA Waiver

A STEP BY STEP GUIDE

by john viggiano

I'd like to share with those interested what is involved in applying for an FAA Waiver. It's not a particularly difficult procedure, and the FAA personnel I have dealt with are courteous, professional, and helpful. Don't be scared of the bureaucratic red tape, there isn't a whole lot of it.

The FAA waives, at its discretion, certain regulations, such as the prohibition that a rocket with a gross liftoff mass of greater than 1500 grams fly into controlled airspace. A waiver does not provide you with exclusive use of the airspace above your launch site. When an airplane overflies your range, you must stop launching, and wait for them to leave. Further, FAA regulations forbid the flying of a rocket into a cloud. Theoretically, you could ask the FAA to waive this regulation, but they would probably reject your request for safety reasons.

Do You Need a Waiver?

FAA regulations require a waiver if you plan to launch into controlled airspace, or within 5 miles of an airport, a rocket over 1500 grams (3.3 pounds) gross launch mass (with engine, etc.), or containing more than 125 grams (4.4 ounces) of propellant, or both. (We shall refer to these limits as the "1500/125" limits in the rest of the article.) For a number of reasons, we recommend securing a waiver whenever you exceed the 1500/125 limits, whether you plan to fly into controlled airspace or not.

If you'll be exceeding the old model rocket limits of 1 pound gross liftoff weight, and/or four ounces of propellant, but don't need a waiver, you'll still need to make a Notification. This is a topic for another article. An example of a launch which would require FAA Notification would be one which includes at least one rocket between 453 and 1500 grams gross liftoff mass. Many AeroTech kits, for example, fall into this category.

Getting Things Together

You can get the actual application from the Flight Standards District Office (pronounced "Fizz-Doe") at any airport with air traffic control. Phone the tower and ask for Flight Standards. Tell them you're interested in launching rockets, and need an Application for Waiver, FAA Form 7711-2. They should know what you want.

While you've got them on the phone, ask them with whom you should file the completed application. They may need to check on this; it will probably be with the Regional Office. Ask for the address, a contact, and fax and phone numbers.

Take a Field Trip

Now that you've requested the form, take a field trip. Get in your car, and drive to the airport. However, don't go to the passenger terminal; find where all the private general aviation planes are parked. There should be a place there for pilots to pay for fuel, buy toothbrushes and other sundry items, including maps. Your waiver application process will be much easier with a certain type of map. The type of map you're looking for is called a "Sectional Map;" they'll know what you mean. Ask them for the map which includes your launch site. If you're not near a section boundary, it should be the same map which includes the airport. (It will also be the most popular map there, and they may be out of stock.) My launch sites are covered by the Detroit sectional map, for example. Never mind that it's a few states away, and New York is closer, that's just the way they carve things up. It costs about \$12, and it's fun to look at and try to decipher.

You should also know the exact Latitude and Longitude of your launch site, to within at least 30 seconds of arc (half a minute). There are a number of ways to determine this. Longitude and Latitude information is provided on the Sectional Map, and this is how we determined these in the old days. In more modern times, a Global Positioning System (GPS) or a good map program or website, can provide accurate information very conveniently. Use at least two of these methods (location on Sectional map, GPS, and map program or website) to provide a cross-check of your launch site's location.

It is also helpful to know the elevation of your launch site, in feet above Mean Sea Level (AMSL). Elevations are printed on the sectional map. Again, a GPS can be helpful.

You should specify a maximum altitude in your application. Launch site size is one factor which determines the maximum altitude (see the Safety Code). Rocket altitudes are normally specified Above Ground Level (AGL), but aircraft altimeters read out altitude AMSL, and this is the format in which the FAA wants the maximum altitude reported. If, for example, you anticipate flights to 6000 feet AGL (and your launch site will support it), simply add this to the elevation of your field, and round up to the next highest 100 feet to obtain your maximum altitude AMSL.

You also need to know the sections of the Federal Aviation Regulations (FARs) which need to be waived for your launch. Normally, you'll need a waiver of FAR Section 101.23(b), which otherwise prohibits flying rockets above the 1500/125 limits into controlled airspace. However, it is also quite possible you'll need a waiver of at least one

other section. Locate your launch site on the sectional map. Are there any airports within 5 miles? If so, you'll need a waiver of Section 101.23(c), which addresses your proximity to an airport.

Finally, you'll need to provide a contact person at your end, and address to which the FAA should send the waiver, if your application is approved, or other correspondence, if they have questions.

Information Checklist

- Address to send completed waiver application, and contact thier
- Launch site location
- Launch site elevation
- Maximum altitude, both AGL and AMSL
- FAR sections to be waived
- Names and fax numbers of airports within five miles
- Contact at your end

Lines 1 – 3

Line 1 asks for the name of your organization. Enter the name of your club or group. Line 2 asks for the name of the individual responsible. This should be the Launch Organizer/Director/Coordinator, or whatever you call the person who is running the launch. Their address and phone number go on Line 3.

Lines 4 – 7

Enter the FAR Section or sections to be waived " 101.23(b), plus, if you're within 5 miles of an airport, 101.23(c). Line 5 asks for a detailed description of what you want to do. I usually put something like the following:

Normal operations of Model and High Impulse Rockets weighing more than 16 ounces, in strict accordance with Tripoli Rocketry Association or National Association of Rocketry Safety Codes (please see attached).

Line 6

This line asks for the location. Enter a brief description of the location, and the latitude and longitude. We launch from an airport (with permission of the owner, of course), and it has a three-character code on the Sectional Map. This is where you enter the maximum altitude, as well. Here's what I enter for the Geneseo field:

On the grounds of and directly above the Historic Aircraft Group, Geneseo, NY at Geneseo Airport (D52), 42° 48', 77° 50'. No flight will exceed 8600 feet AMSL (8000 feet AGL).

Line 7

You must provide your starting and ending dates and times, and any rain dates. It's not neces-

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sary to use Zulu Time (Greenwich Mean); you can enter local "Lima" times. Make sure to indicate what time zone you're referencing, for example "1030 EDT".

Lines 8 – 14

Fill in 'N/A' for Lines 8 through 14. These lines pertain to air shows and the like, so just put an "N/A" or two there to let them know these areas aren't blank because of an omission.

Line 15

You sign on Line 15, and have an opportunity to say a little something about how you're going to be running things. I usually write in the following, under "Remarks":

All operations will be conducted in accordance with the NAR Safety Codes (or Tripoli Safety Codes) and shall be under the control of an experienced Range Safety / Launch Control Officer. A spotter will watch for aircraft entering the operations area, and will temporarily suspend operations in this contingency.

Sending It In

Make three copies. Keep one for yourself, send your original and two of the copies to the Regional Office, or as otherwise instructed. Attach three copies of the High Power Safety Codes, because it covers rockets which will be under the terms of the waiver. If you wish, you may attach three copies of the germane portion of the section map,

if that's how you're indicating where you are going to fly. Include a short letter of transmittal.

After having some scares about the last two applications I sent in, next time I plan to include a receipt postcard. I'm going to put my address on the address side, and on the other side it will say:

Received _____ (date) an Application for Certificate of Waiver or Authorization, FAA Form 7711-2, at this office. For further information, please contact (name) at (telephone number, extension).

Bureaucrats see these things all the time, and they know what to do with them. Mail off this packet to the FAA Regional Office, to the attention of the contact you located early in the process. You need to apply at least 30 days (the form says 45 days, so be sure in advance). If you don't hear back from them in two or three weeks, give them a call. We had to do this twice; once the form was lost, and another time it was just in the "in" basket.

What To Expect

If all goes according to plan, you should get back your application, all the other stuff you sent (talk about carrying coals to Newcastle!), and the "magic" Certificate of Waiver! There will be a few strings attached. You should be instructed to inform the nearest ATC, and possibly an Automated Flight Information Service, a certain time before you start, in order to "activate" your waiver. You'll probably be instructed to contact them when you're done, too. Usually these things are not a big deal, but sometimes you get a person

who doesn't know why you're bothering them. Just tell them that you're carrying out instructions from the Regional Office to give a Notice to Airmen, pursuant to the terms of your Certificate of Waiver. A little official-sounding talk will make them feel right at home.

Further, they often request the number of a cellular phone at the launch site. Be prepared to have one available the duration of the launch.

Of course, you have to make sure all fliers are familiar with the terms and conditions of your waiver. It is a standing policy in our local club the waiver certificate and application are available for inspection by all fliers.

Afterwards

After the launch, I usually send a letter to the person who sent me the Certificate of Waiver, thanking them for their help, and letting them know we had a safe and enjoyable time. It helps grease the skids for the next waiver you want, besides being common courtesy.

It's not hard to obtain a waiver if you make your application in a professional manner, and conduct your activities likewise. There's no fee, but there is some effort involved. Finally, keep in mind that the people working on your application are people, and as such they respond to being treated courteously and professionally. I hope you find the process relatively simple and painless.



AN INTERVIEW WITH

Gary Rosenfield

BY BRENT MCNEELY

Gary Rosenfield might be considered one of the most influential people in high power rocketry. He was directly responsible for the commercial development of reloadable rocket motors used in hobby rocketry. More recently, he was the first to certify a commercially available hybrid motor system. Gary is the founder and current CEO of AeroTech, Inc., as well as CEO of Industrial Solid Propulsion (ISP), Inc. While AeroTech is the largest manufacturer of composite propellant hobby rocket motors in the world, ISP provides specialized rocket products for the commercial aerospace industry.

Where were you born and raised?

I was born in Los Angeles, California and spent about four years in the San Fernando valley. After that, my parents moved to New Jersey where my dad worked for RCA on early warning systems. A couple of years later we moved back to California. After a couple more short moves, we lived in Fullerton, California for about 10 years. My biggest chunk of time growing up was in Fullerton.

When did you get involved with rockets as a kid?

My first memory of having any kind of interest in rocketry was when I was four or five years old. My parents bought me this little toy rocket which had a spring loaded third stage. Whenever you pressed a button, the top stage flew into the air. I remember being fascinated by that. In the

early sixties my dad worked for North American on the Apollo program. My dad would bring home artifacts, samples, and all sorts of things he was working on. They were exotic materials you didn't get to see anywhere else. I was fascinated with that, too.

Later on, when I was in elementary school, I had the idea of building a rocket. My first attempt was silly, but kind of amusing. I read in a book once where you could make corn starch burn by blowing it into a candle. So, I got this idea of filling a paper towel tube with corn starch. I then punched a little hole in a bottle cap that was glued to the tube. It was a fantasy thing and I didn't know how it was going to work. I guess I figured the corn starch would come out of the bottom, ignite, and propel the rocket. My last attempt, before getting into the hobby of model rocketry, was when I got a brass tube and filled it full of model airplane fuel. I guess I was going to light the fuel and throw it. This was another one of those totally misguided attempts.

Were these both things you would NOT encourage people to attempt at home?

Correct.

When did you start into model rocketry?

When I was about 14, I got my first taste of real model rocketry. I met a friend who lived in a development across the street who actually had an

Estes rocket and motors. I grew up in California where it was very difficult to get model rocket motors. I had read about Estes rockets in books and I knew about them. I had read some of Harry Stine's book. However, I thought to myself that California is so restrictive I'll never get the stuff. I guess I just didn't have the motivation to figure out how to obtain it. Anyway, this fellow showed me his rocket and motors and it was very exciting. Just shortly after that I was in a local K-mart one day and they had a whole aisle full of MPC rockets. Now, some people might remember that Model Products Corporation brought out a line of model rockets around 1969. In fact, the molds for some of those kits were eventually used by Bill Stine in the MRC model rocket kit line (he ended up purchasing the molds for the fin units, nose cones and other parts). Anyway, I managed to get ahold of some MPC products at that K-mart—both motors and kits. I think I went hog wild and spent every dime I had earned from my paper route on these rockets and motors.

What was your first rocket?

My first rocket was an Estes Alpha which I flew with the MPC 'A' motor. I went down to the local elementary school to fly the Alpha and it worked perfectly. The parachute came out and it drifted away somewhere. Even though I lost the rocket, after that, I guess I was hooked.

Above: Gary preparing to launch a cluster modified Estes Omega at Lucerne Dry Lake, 1971. To the right: Gary standing in the AeroTech shipping room, 2000.





Gary holding a three-stage Enerjet-powered rocket with a "Mini-Cineroc" payload at Lucerne Dry Lake, c. 1973

1970. Seeing these motors in the shop really got my attention. I really liked the idea of rocket motors which used modern propellants like those in ballistic missiles. I'd had my fill of the black powder motors and I wanted to get into composite motors. We bought an F100 for about \$3.00, and some Enerjets for \$4.00 or \$5.00 each.

When did you consider yourself really hooked on rocketry?

My brother Bobby built an extended Goblin kit powered by an Enerjet E24 which he called the "E-Legal". He was into rocketry early on, but he got out of it after a few years. However, I think Bobby flew the first Enerjet motor in California. I remember seeing that first flight and I was totally hooked after that. The rocket took off like something out of a cartoon—just a puff of smoke and it was gone. Shortly after that, a number of hobby shops in California started carrying bigger motors. I ended up building and flying quite a few rockets with Enerjets. One thing I really enjoyed was flying miniaturized Cineroc movie cameras with multi-staged Enerjet powered rockets. I guess the biggest model rocket that I ever flew was a three stage design at Lucerne Dry Lake. Eventually one of my companies, Composite Dynamics, sold plans to modify the Cineroc into a "Mini-Cineroc". I also sold plans to make a three cluster 'sounding

rocket' called the 2250 that Enerjet sold in the early 1970's.

Where did the idea come from to start a rocket motor company?

There came a time in 1972 or 1973 when Enerjets were no longer widely available. Apparently it was a result of a marketing decision made by the Damon Corporation (which purchased Centuri of which Enerjet was a part). That event was more or less what gave me the impetus to start a motor company. I just knew there had to be a market for these motors, and if they weren't filling the market, I would.

After high school what were your career aspirations?

I think, like a lot of other young people, I was confused and didn't really have any clear goals. I was interested in rocketry at that time and had been since junior high school, but I never thought I would make a career out of it. I was pursuing radio and TV production at a junior college while I was experimenting with motors.

Was that a local college?

Yes, Fullerton college. I studied radio and TV broadcasting and production.

What did you do after college?

In 1976 I went directly from Fullerton college to the Air Force where I was trained as an imagery interpreter. As an interpreter, you looked at aerial photographs to determine whether they contained potential enemy targets, and what they were specifically. You had to determine if they were power plants or weapons factories, etc. and decide what targets were suitable for wartime situations. These were then incorporated into route plans for pilots. When I was finally stationed at Nellis Air Force Base in Las Vegas my job was mostly defined as making these route plans.

What did you do after the Air Force?

I joined my business partner John Davis back in Torrance where we were working on the business Composite Dynamics. (John and I met a few years before at an Anaheim Stadium Launch, and we became business partners while I was in the Air Force.) Essentially I went to work full time trying to grow Composite Dynamics into something that would support my family.

What projects did you work on for Composite Dynamics?

There was a lot of work on motors, both development and production, but the biggest project for me was the catalog. This was in the days before word processors and computers and everything was done by hand. There were a lot of hand drawings and lay-ups. It was about a 16 page catalog consisting of motors and parts.

What did you learn while working for Composite Dynamics?

I consider John Davis to be an early mentor of mine. John was about 16 years older than me and was a senior staff engineer at Hughes Aircraft in El Segundo. He designed the transmitters for one of the first Venus probes, among other things. I actually learned a lot of good things from him—both what to do and what not to do. I learned a wide variety of methodologies for making motors and how to source out certain materials and chemicals.

After you left Composite Dynamics, where did you work?

I sold my interest in Composite Dynamics to John and went to work for Bermite. At the time I

Were you involved in a rocket club as a kid?

We had a little group in high school—an unofficial "outlaw" rocket club. Dave Pacheco was one of the members of this club. In fact, today he lives in Las Vegas and is the current prefect of the Tripoli Vegas Rocket Club.

When did you get into larger rocket motors?

I always had my eye out for bigger motors. On a trip to Las Vegas one year with my folks, my brother and I were taken to a hobby shop in town. The hobby shop had FS1 F100 motors, electric matches, and Centuri Enerjets. I had seen an Enerjet catalog before—they came out around



needed a steady income which I was unable to get with Composite Dynamics.

When did the idea of AeroTech first occur to you?

I always wanted to run and grow a rocket company. It was becoming clear to me that Composite Dynamics was not going to be that vehicle. It was in the back of my mind when I left Composite Dynamics that I would start something else. I started almost immediately on the principles behind AeroTech products using some ideas that had been rejected by John Davis.

What were some of those rejected ideas?

Some of the ideas were paper cartridge loaded propellant grains and certain techniques used for making long burning motors, though John did eventually pick up on some of the long burning motor technology. The main thing was the paper cartridge loaded propellant grains which he felt were doomed to failure.

Was this what led to the reloadable motor systems (RMS) that AeroTech has today?

Well, it had something to do with it, but what really led to it was the work Dan Meyer and I did with some parachute extraction rockets several years later.

Where did the concept of long burn motors come from?

I talked to Bill Wood at a launch at the Smoke Creek Desert in the late 70s or early 80s and got one concept from him. Bill came up with the idea of the "moonburner" motor using an offset core. That was a fascinating idea and I wanted to use it.

What kind of motors did you develop for AeroTech?

I initially came up with a moonburning G motor which burned for about five seconds, which had been unknown in composite hobby motor design up to that point.

Do we see the long-burn motor today at AeroTech?

You see the pedigree carried through. The present-day version of this motor is the G25, a direct descendant of that first motor.

During this time were you working for Bermite?

Yes, I was hired as a junior engineer there. I suspect it was because I had experience with Hydroxyl-Terminated Polybutadiene (HTPB) propellant which I had been using with Composite Dynamics. Nobody at Bermite had experience with it; they had been using a propellant formula

based on epoxy resin and an older technology Polybutadiene binder.

What projects did you work on for Bermite?

I worked on the reduced smoke Sidewinder rocket motor and did some ballistic analysis for high thrust motors used in kinetic energy penetrating rockets. I also did a lot of work on gas generators for, believe it or not, oil well tools. The oil well industry needs propellants for moving mechanisms down inside of oil wells. When you think about it, you are one or two miles underground and you've got that much fluid above your oil well tools. You can't really use a standard type of mechanism. You have to use very high pressure gas generators to overcome the ambient static pressure outside the oil well tool. We were trying to develop some modern oil well tool propellants based on HTPB, which we accomplished successfully.

What was the biggest thing you gained from working at Bermite?

It was working with Dr. Claude Merrill who was hired shortly after I came there. Claude was the former head of the solid propellant plant at the Rocket Propulsion Lab at Edwards Air Force Base. Essentially I was able to corner him for several weeks during a period of little activity at Bermite. We didn't have a lot to do during that time, and I just spent a lot of time asking him questions.

Did you glean most of your rocket motor knowledge from Dr. Claude Merrill and John Davis?

I gained about 80% of my knowledge from experiences with them. The rest of it I ended up learning on my own. For example, when formulating the means to make the motors at AeroTech, I spent a lot of time wondering about the right approach to each project. I spent a lot of time rejecting ideas: this approach was wrong, another too expensive, or too complicated. I discovered that a lot of techniques and materials which were good for military use were lousy for hobby use. Some military ingredients which cost hundreds or even thousands of dollars per pound (though

superior in performance to what we use in model rocketry) were not financially feasible for model rocketry. This is still true today.

Were you working on AeroTech projects while employed at Bermite?

While I was at Bermite I was not in a position to do much with AeroTech. I sold a small quantity of the long burning G motors to Jerry Irvine which he sold under the name of "Toy Rockets" (a whole other story). At that point AeroTech was still doing basic research and development.

After you left Bermite, where did you work?

I left Bermite in 1982 and went to work for Aerojet Tactical Systems in Sacramento, California. I worked there for two and a half years. Although I learned a lot there, I didn't learn much that could be applied to AeroTech products. Mostly I learned how to set up 600 gallon mixers and formulate propellant for ballistic missiles. I got a taste of huge motor production. But, there was very little that could be applied to small motor manufacturing.

Why did you leave Aerojet?

I was working full time at Aerojet, and between Aerojet and AeroTech my work was taking up too much of my time. I could no longer do a good job for either one. At lunch time I would go off to my own facility and work on motors and then come back to work at Aerojet. After work I would then go back to my own facility again to work on motors. I was working more or less full time at both jobs. It was just too much. I was faced with making the same decision that many entrepreneurs make when they have to leave their full time job to start their own business. It is a little bit nerve racking. First of all, I had to take a 50% pay cut to do it. I had a family with one child, and another on the way. Quite honestly I don't know what I was thinking at the time (laughter). I mean, now it seems irresponsible, but at the time it seemed perfectly reasonable. Now that I think about it, I wonder if in my current mind set whether I would go back and do that again.

What did you do after leaving Aerojet?

After I left Aerojet, I stayed in Sacramento for about a year and a half continuing to develop AeroTech. We saw the beginnings of expanding AeroTech into high power rocketry. The first motors we made were the I65 and the J100. We brought out essentially the first commercial high power motors that were widely available.

Did rocket construction begin to change at that point?

One of the things I discovered was that up to that point in time rockets had been built with model rocket materials, so they weren't very strong. If you put modern day motors like the J570 or the J800 into one of these rockets, they would rip to shreds. The rockets generally were constructed with balsa or plywood fins and thin paper tubes. I developed the I65 and J100 specifically to go in these less robust rockets. Both motors were a big success.

Did this tie in with the EZI65 rocket kit?

Yes. We brought out the I65 motor at about the same time Ron and Deb Schultz of LOC/Precision introduced their EZI65 rocket kit. This was essentially a joint product introduction.

What made the I65 unique?

The I65 was a big 54mm moonburner. It burned for about 10 seconds and had a nice initial thrust spike to really kick the rocket off the pad. About two seconds into the burn it had a regressive thrust curve. As the rocket gained altitude, instead of just going faster and faster, it would end up taking the rocket to a given velocity and holding it there. The I65 ended up being a very successful product. You could use existing kit technology and fly high power motors. We introduced a whole line of motors around that concept: the I65, J100 and J125.

When did you finally move AeroTech to Las Vegas?

In 1985, in December, we moved to Las Vegas for a number of reasons. My wife at the time wanted to move back to Vegas. I wanted to as well; I liked the desert, the regulations were less onerous here, there were more places to test motors, and it was easier to get out of town to run experiments. The whole environment was just better for a rocket company. Nevada is a great state for any business and I've never regretted coming back here.

Was AeroTech a garage sized business when you came to Las Vegas?

AeroTech had graduated to an industrial facility before I left Sacramento. When we came to Vegas we purchased a house with a very large garage which we used for the business. For a short time we moved into a industrial facility similar to the one we had in Sacramento. That's when we hired our first two employees, Scott Pearce and Jim Dunlap.

When were reloadable motors first offered by AeroTech?

Reloadable motors were essentially introduced at LDRS in 1990 in Colorado Springs (Large and Dangerous Rocket Ships, the Annual Tripoli National Event). They had been demonstrated at a Black Rock launch a few months earlier, however, we had been working on them for a couple of years prior to that.

How were they received by the rocket community?

It was fantastic! I remember going to a Lucerne launch and we stayed at the Green Tree Inn in Victorville. Some people reading this will remember those times. We used to have vendor parties in the hotel rooms and AeroTech would decorate it's room with yellow and black striped crepe paper and cups. At the time we had completed some work on the reloadables. Steve Buck was one our dealers in Nevada (a name the old-timers will remember). Anyway, Steve was the first person to whom I revealed the plans for reloadable motor kits. I remember asking him, "What would you think of a motor product where the motor used an aluminum case with threaded ends, and for propellant you would receive a kit of parts to assemble into the casing, screw the ends on, fly it, empty it, clean it, and reload it again? What would you think of something like that?" He sort of looked at me, smiled, and said something to the effect of, "Sounds great! It's a great idea!" I believed reloadable motors would be accepted for a number of reasons. I thought we could bring them out at a lower price because the customer didn't have to throw away the casings (which were a very expensive component of the motor). Also, if the labor costs of assembly were removed, and if epoxy resin wasn't used, the costs should be even lower and we would be able to pass the savings onto the customer.

What is the most expensive component of a reloadable motor?

The hardware, but that is reusable. The most expensive part of the reloadable kits would depend on the motor. It is usually the propellant or the nozzle. On the larger reloads the nozzle is actually quite expensive. You have to remember we aren't making these parts by the millions. The components are ordered in the hundreds or thousands at a time. There's not a huge economy of scale in this hobby, yet. Beyond the cost factor, I believed the high power rocket people would enjoy assembling these motors. I felt the hobby could benefit from some increased participation by the rocket customer. Rather than just taking a pre-made motor and shoving it into a motor mount, now you would have more involvement in the usage. It's one of those things where I had this intuitive feeling about it. While some people still liked the single use motors, the majority liked the new reloadable motors.

Did the reloadable motor take AeroTech in a new direction?

I think it did because it took high power to the next level. Up to that point high power motors were so expensive the hobby was not very active. I think looking back, reloadables defined the point where high power started to really grow. Up to that point most of our sales were model rocket products.

After RMS technology, what do you think was AeroTech's next most important product development?

Hybrids are an important technology to have in one's quiver of tools (so to speak), and in one's technique of making motors. It offers an alternative rocket motor technology to draw on if the regulatory environment becomes too stifling. At this point hybrid oxidizers and fuels are not regulated like solid propellants are. It is important for AeroTech to maintain that technology even if it is not a big seller for us.

AeroTech at an early hobby trade show, 1984.





At AeroTech which project would you say is your favorite?

The hybrid was the most rewarding for me. It was a technology which had never been developed for the consumer market and I really felt like we were doing something new. Although HyperTek had come up with their own hybrid motor system, we came up with a fairly original design using a cardboard fuel and pyrotechnic valving system which was pretty fool-proof.

Will AeroTech be improving the Copperhead igniter?

I still believe the Copperhead is a good igniter. However, they are susceptible to a number of things like the way they are shipped and the way they are handled. Sometimes the manufacturing process is also hard to control. We have been researching an alternative igniter. Unfortunately the work we did over the last year or so to develop an alternative igniter didn't pan out. We made prototypes which had been seeded to customers and they seemed to work pretty well. However, when we began producing them, the igniter had too much variability between the time you pushed the fire button and the time they ignited. We judged them unacceptable and the project has been put on the back burner. We are currently searching for a suitable alternative igniter design, but haven't found one yet.

How many employees are at AeroTech today?

About 25.

How big is the AeroTech facility?

When we came to Vegas we had a very small industrial facility (about 800 square feet). We are now up to about 11,000 square feet and it looks like we might expand this year by another couple of thousand square feet.

What is the yearly growth percentage at AeroTech?

It has been between 10 and 20 percent each year which is manageable growth. When it gets to 25 percent it strains the organization. We have had some years where it did grow like that, but 10 to 20 percent a year is quite manageable.

What will we see from AeroTech in the near future?

I would hope you will see some additional propellants or variations on existing propellants in various reload kits. Hopefully we will have some new rocket kits. We are very pleased with the outcome of the G-Force, our new four inch kit for 'G' motors. We will probably bring out some similar kits. I also want to do some work incorporating electronics directly into the motors themselves where the motor and the electronic ejection system would be an integral unit rather than separate components. You will also see modifications to existing 29mm and 38mm reloadable motors. RMS-Plus is a redesign to the delay system (which will be completely backwards compatible with existing hardware). We feel the new design will render more accurate delays and more fool-proof assembly by the user. You'll see this about April of

this year in the new reload kits. You will also see a totally new format to the drawings in AeroTech motor instructions. We are incorporating 3-D CAD renderings instead of just 2-D cut away illustrations. We believe this will help with assembly accuracy.

Will we see any changes to the AeroTech web site?

This year we will be really using the internet to our advantage. We will expand the use of the AeroTech website as a communication and education tool for our customers. Right now we have quite a few resources up there in terms of instructions and documents. We are going to extend that idea to include multimedia. You'll be seeing that later this year.

What are your goals for AeroTech?

Our biggest goal is to continue to grow the company, especially the model rocket side. We want to increase the customer base and learn how to reach more potential customers in model rocketry because we believe that by educating and serving them we will also expand the high power side. Very few people get into high power without first going through model rocketry. We are constantly working on new products which we don't discuss with the public until their release. There are other things we are working on that we just can't talk about right now which you may see soon.

12

Range Box

ESSENTIALS

by brent mcneely

Most seasoned rocket flyers have developed their own range box, which contains all the essentials they need when they are out at a launch and far from their home-based work shop. The range box usually consists of a variety of tools, adhesives, cleaning supplies, and other odds and ends. The container is often your standard, run-of-the-mill fishing tackle box filled with these essential items. I have assembled a short list of items I consider essential when attending rocket launches.

1. All-purpose tool

Recently, the popularity of the "All-purpose Tool" has caught on in many hobbies and sports, including rocketry. If you don't already have one of these "wonder tools" I recommend you go out and buy one before your next launch. Brands such as Gerber and Leatherman produce tools which serve as knife, pliers, file, screw driver, and mini-saw all wrapped together in a single handy tool. You'll find the all-purpose tool useful in ways you never thought of, and it beats carrying around a bunch of separate tools. Some versions even come with a handy carrying case which you can slide onto your belt. In doing so, the next time you're out at the far launch pads, and you realize you need a pair of pliers, you'll have your handy all-purpose tool right at your side.

2. Masking tape

Second to the all-purpose tool, masking tape is the rocket flyer's best friend. Masking tape can be used for an amazing variety of things. Wrapping a bit of masking tape around the bottom coupler area of a nose cone can give you a tighter fit. Many rocket flyers do not use hardware for motor retention; instead they do what is commonly called a "friction fit." They take tape and wrap it around the rocket motor case until they can barely shove it into the back of the rocket. This tight fit will (in most cases) keep the motor from kicking out at apogee when the ejection charge is fired. The uses for masking tape are almost endless, making it essential for any range box.

3. Sandpaper

Like masking tape, sandpaper is one of those "must have" items. Where you use masking tape to give you a tighter fit for a nose cone or motor case, you can use sandpaper to sand down the inside of a rocket tube or outside of a nose cone to loosen a tight fit. You should consider putting a small sheet of sandpaper in your back pocket when heading out to the launch pad. You might need to sand the alligator clips on the ignitor leads to get a good electrical connection at ignition. A woman's fingernail file also works well for this purpose.

4. Adhesives

In addition to other items, adhesives like a two-part epoxy and super glue (or CA) should be in every range box. When you need to make repairs out at the launch site, you'll be glad you included them in your collection.

5. Scotch Brite scrubbing pads

Often, when your rocket won't go onto the launch rod, you can remove excess soot from the launch rod by taking a Scotch Brite pad to the rod. After a few quick strokes with the pad, you'll find the rocket will easily slide onto the rod. Along with your sandpaper, remember to stick one of these in your back pocket as you head out to the launch pads.

6. Lubricant

You'll only need lubricant if you fly reloadable rocket motors. Eventually, if you are serious enough about rocketry, you'll start flying reloadable motors just to keep the costs-per-flight down and provide some variety to your rocket hobby. Reloadable motors use a lubricant in the assembly process. Although most reloadable motors come with a little bit of lubricant, you'll want to get your own tube of the stuff. AeroTech recommends Permatex Super Lube from Radio Shack (similar to what AeroTech includes with their reloadable motor kits).

7. Cleaning Supplies

Several times I've found myself out at a rocket launch with dirty hands and nothing to wipe them on. If you ever deal with reloadable motors, you'll find it a necessity to have some sort of rag handy just for that reason. A rag can be used for everything from wiping your hands, to cleaning out your reloadable motor casings. You can also get a better grip on a tight aft or forward closure with a rag. In addition to a rag, some rocket flyers also include a container of baby wipes among their cleaning supplies. Wipes provide additional moisture to aid in the cleaning process and are disposable. Some people refer to wipes as a "bath in a bottle." I also include a spray bottle filled with over-the-counter rubbing alcohol in my cleaning supplies. Others find filling the same spray bottle with vinegar works well. Spraying reloadable motors with alcohol or vinegar helps break down the soot on the motor casings. Other rocket flyers have their own special mixtures they put in spray bottles. A toothbrush can also come in handy when scrubbing out a hard to clean motor.

8. Trash bags

I'm a big believer of leaving a launch site cleaner than when you arrived. The same goes for camping. Bringing a couple of trash bags will make picking up trash easier and you'll find others around you wanting to come past and visit just to drop some of their trash in your bag (you can

always offer them their own bag if you would rather not carry their trash out).

9. Pen & note pad

A pen and paper will come in handy in a variety of situations. You'll be glad you have them when that hot babe at the launch wants to give you her phone number, but more likely you'll want to write down statistics like altitude and motor configurations after each flight. You'll find it interesting to look back at your past launches to see what altitude you obtained with one of your favorite rockets when using a particular motor. This is especially interesting when you compare your actual flight data with computer predictions.

10. Black powder

I have a small 35mm plastic film canister in my range box, which is filled with black powder. I fill it up every five or six launches. This is a safe and handy way to carry enough black powder for ejection charges and handle most of my needs for electronic ejection charges (used in conjunction with altimeters, timers, and accelerometers).

11. Instructions

Remember to take instructions for any electronics or other complicated device you own. In most cases you'll remember how to use your altimeter or other specialized gear, however, if you forget which color wires go to various compo-

nents, you'll be glad you brought the instructions along. Often, I've had my instructions borrowed by other flyers who forgot theirs. You'll make many friends by including them in your range box.

12. Redundant backup items

I always put extra parachutes, batteries, ignitors, shock cords, small screws, bolts and nuts in my range box. All these items are backups in case the original item is damaged while you are at a launch. If you rip a parachute you'll have another one on hand. You may find your batteries are dead in your altimeter and having that extra nine-volt battery will save you a two-hour trip into town. It seems that you can never have enough extra ignitors. Sometimes a motor just won't light and you'll use three or four ignitors just to get it off the pad and into the air.

Conclusion

Armed with these 12 items, your range box will be well on its way to holding everything you need when out away from your workshop.

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For more information on registration, holds, directions, contests, vendors, site layout and more.

10

Ways to Get Extreme Altitude

by William J. Inman

I am a land surveyor by profession and an inquisitive fellow by nature, with my most recent passion being rocketry. Currently I hold four Tripoli open altitude records for rockets powered by "G" motors at 7567 ft., "H" motors at 8363 ft., "I" motors at 13,728 ft., and "J" motors at 13,448 ft. When Extreme Rocketry asked if I'd be interested in writing an article on building rockets for maximizing altitude, I was working on the nose cone for my upcoming attempt at the "F" record. (Watch out, Mark Clark!) The trick to wringing the most altitude out of a rocket is to optimize the power-to-drag ratio and to get the weight right for maximum coast. This will usually result in a coast time longer than any certified motor delay, so altimeter parachute deployment is indicated (an altimeter is needed to report the altitude for a record attempt). Obviously each of my record setting vehicles was custom designed and built specifically for its own particular record assault, but they all have a few things in common. In this article I'll share 10 ways I get more altitude out of my rockets so you can set your own altitude records.

1. Rocket Motor Choice

All my rockets used motors with as much power as possible in the smallest diameter casing available without being excessively long. (A longer motor means a longer rocket and therefore more parasitic drag.) Although a shorter, fatter motor usually won't work any better because of the increased frontal area. I use the Rogers Aeroscience software (very reasonable at \$65.00) to compare the two if there's not an obvious choice.

2. Small, Compact Airframe

All my altitude rockets are as compact as possible. This means minimum diameter airframe, small thin fins (three, never four... a fourth fin would increase fin related drag 33%), and a small parachute stuffed way up into the nose cone. It also means Kevlar shock cord doubling as 'wadding' to protect the chute. I like the "1/8 inch" tubular Kevlar from Pratt Hobbies for the size rockets I've done so far, but be careful, Kevlar is

tough stuff and will zipper an airframe if precautions aren't taken. Also, if the vehicle will be transonic or supersonic, be sure the altimeter pressure vents are the recommended four calibers below the nosecone/airframe joint. This is good practice even for 'slower' rockets. Tommy Billings of ADEPT Rocketry maintains that, contrary to a popular belief, his altimeters work fine in transonic and supersonic conditions IF THE INSTALLATION IS DESIGNED & BUILT CORRECTLY. READ THE INSTRUCTIONS! He insists that the "altimeter MACH thing" is usually just a scapegoat. From my own experience, I suspect he is right.

3. Tower Launch System

All my altitude rockets have no launch lugs, being tower launched. A typical coefficient of drag for a "lug-less" rocket is around 0.4; for one with lugs it's around 0.7. I can't afford the penalty of launch lugs so I use a 10 foot tall launch tower made of EMT electrical conduit and plywood rings held on with "C" clamps and guyed down with rebar and bailing wire. Taller means more speed when the fins take over stabilization thus less weather cocking. But what about the extra drag sliding along the tower that few extra foot? My own personal opinion: give me a more vertical flight and I don't mind that little extra momentary drag.

4. Boattail Drag Reduction

All my rockets have boattails (if possible.) The aft closure ring on AeroTech reloadables will often prevent this. Therefore I used single-use motors on 3 out of my 4 records. The one reloadable was for the "J" record (a 38mm J-350) because it slipped right into the airframe that set the "I" record the day before (the current "J" record was low enough that it would work). If I ever need to "defend" my record, I'll have to build a new vehicle dedicated for that specific mission. I would encourage AeroTech to sell an optional "factory" aft closure that is smoother and tapered to a sort-of boattail. If I machine it down to a taper myself, it is no longer an "unaltered" motor and is ineligible for any records.

5. Read Harry Stine's Book

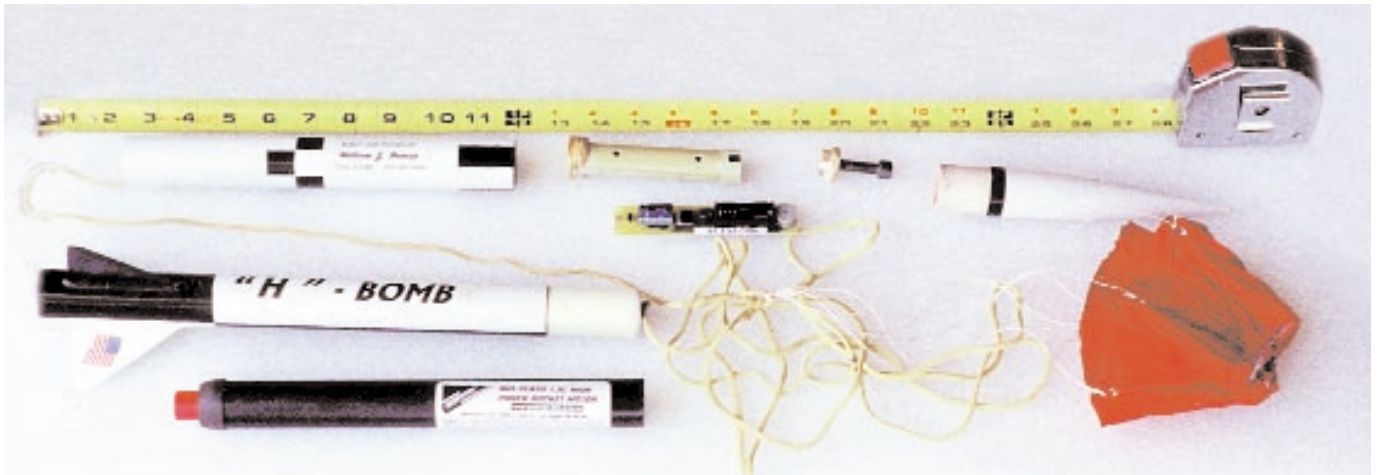
My altitude rockets incorporate tricks I learned from reading G. Harry Stine's Handbook of Model Rocketry. If you want to get some excellent information about rocketry, read this book! It tells that a fin is more efficient if the root chord is shorter, the best radius for the fin root fillet is between 4% and 8% of the root chord, moving the trailing edge of the fin one caliber forward of the tail reduces drag, shorter rockets have less drag-less "wetted area," and for stability a vehicle should be at least 10 calibers long (a wobbling rocket has more drag than one flying like it's "on a rail").

6. Computer Software Predictions

All my altitude rockets were designed using the Rogers program to compare one factor against another. I kept fiddling with the nose cone length and fin shape, running the simulation over and over until I got the fins giving the highest altitude I thought could actually be built and would actually stay on. I worked with different body lengths just to see how much difference an inch or half an inch would make (obviously the shorter the better). One note about the Rogers program verses real life is that the rocket won't actually go as high as the simulation predicts. So, I always try to get a design the program says will beat the record by a good margin.

7. Smooth Airframe Surface

All my rockets have a nice smooth "clean" surface. I would usually spend as much or more time on the finish as on the rest of the rocket. Yes I do take pride in a nice shiny rocket, but it will also have a better drag coefficient. I almost always wrap my airframes with at least two layers of three ounce fiberglass, sometimes even a wrap or two of Kevlar (especially up around the 'lip' where "zippering" might be a problem.) Then I sand it and wash it with acetone and cover the whole thing with a thin layer of BONDO "Glazing and Spot Putty" from the squeeze tube. Next, I sand it down to identify any 'holes' and add more to these low spots. Sand again and usually a third application on the few remaining areas. Then it's time for the automotive primer/filler (aerosol cans, I'm not that



A high altitude record holding rocket. Note how compact it is to minimize the vehicle's volume. Every cubic inch that displaces air adds to total aerodynamic drag.

fancy) and another light sanding (320 grit usually). Then I put on the white automotive spray primer for the next coat(s), sanding with 400 grit. This gives a nice bright base for the color coat.

8. Optimal Weight

Lighter weight is NOT necessarily better! My "I" rocket had a half a pound of lead at the forward end of the motor to get it up to optimum weight. Run the Rogers program with different weights at 0.05 lb. increments. It has a feature that will allow a batch of different weights at once. There will be an optimum weight for each rocket and motor. Too little weight and it will slow down too fast after motor burnout (2/3 of the altitude is attained during 'coast'). Too much weight and the motor won't get it going fast enough in the first place. On "F" and "G" rockets, take a close look at what MACH number it will attain. If it's got enough power to cleanly punch through the sound barrier, great! Design it for optimum efficiency in supersonic flight. But if it's going to get up to around MACH 0.95-1.05 where there is terrible drag, it may be better to add some more weight so it won't get to that high drag speed, but will coast better. Read G. Harry Stine and do lots of computer simulations! I learned most of my "tricks" from doing those two things.

9. Nose Cone Design

Use the right nose cone for the right application. For subsonic speeds, a parabolic shape is optimum. For supersonic speeds, a conical shape works best. The usual ogive shape commonly seen on high power rockets is a reasonable compromise for both subsonic and supersonic. Like the weight, there is an optimum nose cone length. Too short and it's too blunt with higher drag, too long and it starts increasing the "wetted area" adding drag. I've made my own nose cones and used factory ones. The Rogers program will show the difference in projected altitude for each.

10. Fin Design

Use the right fin shape for the right application. For subsonic speeds, an elliptical planform with high aspect ratio has lowest drag. That means the root chord should be shorter compared to the span. For supersonic speeds, a steeply swept delta or clipped delta with high aspect ratio has lowest drag. The thing about the fins on supersonic rockets or high acceleration rockets is, the more contact area with the body (root chord), the better it will stay on. This, of course, is in direct opposition to the high aspect ratio needed for lowest drag.

The less mass out towards the tip, the less "leverage" it has to break off under acceleration or from the supersonic shock wave. This is why the pointed tip delta fin design is so popular on "high performance" rockets. I've played around with different compromises on this problem. A note on the bright color. My first two altitude rockets were white with "NASA look" black blocks and checkerboards. During the hours of searching for them afterwards I cursed my stupidity. Ever look for a small white and black rocket out on a dry lake bed? Every rut, dirt clod, and old tin can begins

looking like my rocket. Dumb, Dumb, Dumb! I've got a nice Walston radio retrieval unit that I've never used.

Remember the part about being compact? No room for a 19" antenna in a 21" rocket. Running it on the outside would work but would add drag. So now I'm painting them BRIGHT! High altitude flights can be pretty frustrating, mostly wondering if you'll EVER find your rocket (I actually lost my first "H" and "I" attempt rockets. The "H" rocket was found by someone else and mailed back from Texas! Thanks, again, Will! The "I" rocket has still not been found. But a successful recovery and a new record make it all worthwhile.



Launch of the "H" powered record flight to 8363 ft. on an AeroTech H-123W at the Back Rock Desert in June of 1999. The simulation showed it reaching 1,000 m.p.h.



Club reports may be submitted to Extreme Rocketry on our web site. Please limit your club reports to 300 words or less. Long club reports may be edited down because of size limitations.

Hill Country Tripoli

Hill Country Tripoli (Austin, TX) is waiting for rain! It hasn't rained at our launch site in Eden, TX basically since August of 1999. The Paradise site is comprised of 3000 acres of Texas range land and it is BONE DRY. We are working on building up our launch equipment so when the weather starts cooperating we will have a first-rate setup to host high power launches with waivers up to 18,000'. We have recently finished building a set of 12-channel launch controllers and relay boxes. Next will be a new "Extreme" rail launch pad being designed by Jim Sekol to be capable of holding a 10' length of P1000 Unistrut rail, a 20' length of P3300 Unistrut, or regular round launch rods, 1/2" to 1 1/2" in diameter. With 8' legs this 200 pound pad should handle the largest rockets the site is likely to see!

Tripoli Idaho

Tripoli Idaho will be hosting a regional high power rocket launch called SpudRoc-5, near the small town of Mountain Home, Idaho. All flyers welcome!

Two-day event: May 20th and 21st. \$10 launch fee covers both days. 8:00 am to 5:00 pm. 11,700' AGL waiver. Lodging nearby. For directions and more information visit the Tripoli Idaho web site at: www.tripolidaho.org For questions you can call Tripoli Idaho Prefect, Vern Knowles, at (208) 939-1076, or e-mail to vern_knowles@worldnet.att.net. Large projects please contact Tripoli Idaho prior to the launch. Tripoli Idaho is a prefecture of the Tripoli Rocketry Association. Mountain Home is about 40 minutes east of Boise.

Buffalo Rocket Society (BRS), Inc.

Buffalo Rocket Society (BRS), Inc. is a new name for an old organization. In 1996 Tripoli Western New York (TWNY #85) was formed. During 1999 the members of TWNY formed a NAR section as well (NARWNY #590) and created a corporation umbrella of Buffalo Rocket Society, Inc. Our membership includes many great flyers including, well known rocketeers such as Ray Halm (Prefect), Doug Caskey (President), Roger Lipke (Vice President), Tom Broad (Secretary), Dean Oberg (Treasurer/Webmaster), Andy Schecter, Jim Sekol, Jim Livingston, Lloyd Wood, and Gene Border to name a few. 1999 proved to be a busy year for us. Together with MARS (NAR#136), BRS hosted another hot but successful NYPOWER 1999 at Geneseo, NY. Several members also participated in the Team Aries, successful 4-M1939 cluster flight at LDRS in Argonia, KS. BRS also hosted 2 model rocket launches at our Angola Airport launch site. During October we hosted 2 HPR launches at Geneseo, NY. The BRS also participated in many static and launch displays, including a launch display at the Geneseo airport for the 1941 Historical Aircraft Group's annual airshow. Ray Halm has also been busy teaching a model rocket based science program through out the Western NY area. Certifying in 1999 were: Level 1--Randy Sokolofsky, Jerry Davey and Eric Ohmit; Level 2--Rich Henn, Tom Frankowski and Eric Ohmit; Level 3--Duane Wilkey. Gene Border attempted his Level 3 with his full scale IRIS at NYPOWER 1999, but separation prevented his success. During 2000 the BRS will be co-hosting with MARS NYPOWER 2000/The NAR National Sport Launch on May 27-29 and several model and HPR launches, mark your calendar and check the official website: <www.buffalorocketociety.org/nypower>. See you in May!

Mantua Township Missile Agency (MTMA)

MTMA is a Kent/Akron Ohio based newly chartered NAR section, in fact so newly chartered that we do not have our NAR# as of this writing. NAR has assured me that our application has been accepted and is being processed, so our number should be issued soon. The club has been together for close to one year and has progressively grown from 5 initial members to the current membership of around 15 Sr members and 5 Jr members. Most of us met through the Usenet Newsgroup rec.models.rockets (RMR). Many of us post there on a regular basis. Our launch reports and announcements can be found on RMR with the acronym "MTMA" in the subject header. The text of our launch reports and other club activities can also be accessed on our main web page at <http://web.raex.com/~markdeb/rockets/mtma/index.htm>. Our gatherings are organized, informal, family-oriented "rocket-picnics". Most of us have wives and children, and they are encouraged to participate. Our main goal is to promote Rocketry as a safe family activity that is both fun and educational. We fly everything from A to K powered Rockets, so our launches are most entertaining to watch and participate. MTMA has also applied for a Tripoli Prefecture. We hope the Prefecture will be official by summer or 2000. Our goal is to fill a need for a Prefecture that can perform TRA certifications and promote high power rocketry within this area. We hold monthly launches during the Peak N.E. Ohio flying season (April 11; November) and then as weather permits during the off season. At our launches NAR level 1 and level 2 cert

Model Rocketeers of MS (MROMS)

Although not yet chartered, an informal group of BAR's and youths in the Magnolia state are known as the Model Rocketeers of MS. (MROMS) MS is Mississippi and not Michigan or Missouri. Paul Staires is the founder and likely to be chosen President. The members comprise family and friends presently but a list on the bulletin board at HobbyTown in North Jackson shows some outside interest. The area launches held by SOLAR(Baton Rouge), MSRS(Memphis), TRA Louisiana(High Cotton & Rocket Gumbo in LA), and HARA(Hunsville) have been frequented by Paul and Tommy Ladner of Madison, MS. This has caused a truly reborn spirit in these BAR's. The latest launch was at the city park in Forest, MS on Sunday, Feb. 6th. There were 4 attendees and 7 launches. The only two rockets used were an Estes Mini-patriot and an Estes Star Wars Naboo mini rocket. These were each flown on A10-#7's. The first flights were high and true with moderate altitude achieved and safe recovery from streamers in each. The light winds brought no havoc in retrieval. The new launch rod had the typical high degree of difficulty in attaching the

two pieces especially in the field without a hammer and a workbench to pound them together. So as a matter of expedience only 1/2 of the rod was used. (Don't mention this violation to anyone). The last few launches were fizzles as the motors didn't burn good or the short launch rod created a little instability off the pad if the clip wires were tight and some wild rides were witnessed. The last flight of the Mini-Patriot (nicknamed October Sky for the book/movie and the month of its birth)

Rocket/Propulsion Society at Cal Poly Pomona

Hi, my name is Nick Papaas, and I am president of a Rocket/Propulsion Society at Cal Poly Pomona. I would like to start off by saying that I am thrilled that another magazine devoted to rocketry is coming out, and to tell you the truth, it sounds much more informative as well as entertaining than the dull ones that already exist. I have been receiving your E-mails regularly, and I heard that you are looking at focusing on some clubs and small organizations. My particular group is actually designing and testing a rocket, propelled by liquid fuels, capable (we hope and are designing) of potentially breaking the existing altitude record. There are many other programs that we are working on as well, but this is one of our most interesting, as well as more developed projects. Please contact me if you would like to feature our ideas or club in your magazine. I also had one more question; I was wondering if you could somehow offer my club a discount on subscription, since we would be buying in volume. The idea is that every paying member would automatically receive your magazine upon paying dues. This would serve as a nice benefit, as well as encouragement for others to enter this fascinating field. There are many other magazines out there, but I would prefer to support an up and coming new business, basically because the industry needs new blood. Please send me your answers and comments.

The Summit City Aerospace Modelers (SCAM)

The Summit City Aerospace Modelers (SCAM) begins its 29th year of operation serving rocketeers in Northeast Indiana with some 20 members and their families on the club roster, and a full schedule planned for the year. The club operates as both a NAR Section and as a TRA Prefecture with president Joe Isca and Prefect Tom Stump taking turns running the club's monthly meetings. The club annually conducts about 6 local sport launches as well as the two-day Mad Anthony Regional NAR contest & sport launch. Under the able leadership of the late Ned Blumenschein, SCAM was able to host the four SMURFF high power launches at the AMA facility in Muncie, Indiana in 1997 and 1998. The one held in May of 1998 was also the NSL with over 300 flyers and 1277 rockets launched in four days. Unfortunately, this facility is not presently available for high power launches. SCAM is working with local authorities in Huntington, Indiana to develop a possible high power launch site there. SCAM will hold a demonstration model rocketry launch there on April 8th, to acquaint the community with a launch and to test their site. SCAM members frequently travel to participate in regional and national launches including Three Oaks, NYPower, Danville, and LDRS. At LDRS 18, Charlie Humphries achieved his level three certification. You can catch his flight on Earl Cagle's tape. For LDRS 19, Bob Hart and Tom Stump are both preparing level three projects. SCAM has developed a full schedule for 2000 with club launches at the Allen County Fairgrounds on: May 7, July 8, Aug 12, Sept 1

Pinetree Rocketry & Tripoli/Cherryfield

Greetings from the Great Slate O' Maine! Just a little blurb to let you know that rocketry is alive and launching in northern New England. We're a small but dedicated band of rocketeers based in Washington County, Maine. Other members are from New Hampshire and Massachusetts. All are welcome. Located on blueberry barrens these are easily the best fields in New England, perhaps the East Coast. These are working fields so extreme care must be taken with their use. Pinetree/Tripoli Cherryfield launches are the third weekend of every month weather permitting. Rain dates are the following weekend. Exceptions are the Memorial and Labor Day launches with no make up dates. Our standard waiver is 8000', 15000' available with adequate notice. We're still working on 20000' for the Memorial and Labor Day events. Our fields are available for Estes to "M" power. We can certify Level 1 and 2, both NAR and Tripoli. We have several members looking at Level 3 so ATTENTION TAP members. We need your participation and cooperation. We are off the beaten path but have plenty of sky and plenty of field. Check out our website at http://www.tripoli.org/tra_me/maine.html. Please call or e-mail before making the journey. Down east weather can change quickly. There are local motels and campgrounds. For those on a budget local members can offer a place to camp or crash. 2000 promises to be a great flying season and we hope you can make it to our field. Fly High and Fly Safely! Pinetree Rocketry, Michael Dow, Tripoli/Cherryfield, Richard

Willey

Utah Rocket Club (UROC)

The Utah Rocket Club (UROC) is affiliated with Tripoli Rocketry Association and the National Association of Rocketry. UROC's launch year starts in March and runs through November. It's February and everybody is getting hungry for some smoke and flame.

We elected our club leaders for 2000. Dale Dillon will be the club President, Dave Sadler will be Vice President, Dot Hunt will stay as Secretary/Treasurer, Ron Weigel will perform the equipment manager duties and Neal Baker will take over the Publicity Officer as well as stay on as web master. David Urbanek will stay on as newsletter editor, Scott Deakins is out Tripoli Prefect. Frank Hunt is the clubs NAR advisor and Fred Williams is our contest director.

We're looking forward to Thiokol performing a static test of a Shuttle SRB on February 17th. Every once in a while they test these huge motors up by Brigham City. It's scheduled for around 1:00 PM. It's worth it to take the day off and bring a lunch.

Our launch schedule kicks off the week after Springfest in Las Vegas: March 25 & 26. All our launches are two day affairs and many camp out at the launch site in tents or RVs. Our waiver is sure to be at least 6,500' AGL, but this year we're really pushing for a 10,000' AGL waiver.

Also coming in March is a NAR sanctioned Open meet called the March D'Ohpen. All D powered events. D Streamer Duration, D Super-rock duration and D Dual Egg-loft duration. Our wide open spaces and clear air has allowed a lot of records to be set at UROC launches. At our November Regional contest the record for A Division and C Division E Super-Roc Duration events were set.

If you want to launch with us, check out our website at <http://www.uroc.org> or call Neal Baker at 801-955-9308.

TRA San Diego

TRA San Diego: Ocotillo, CA: Well, we are not the biggest and the baddest, but we are definitely here. Tripoli San Diego has elevated their waiver for 2000 to 12,500'! In anyone's book this is about 2 1/2 miles and that means we can fly some pretty good altitude attempts. Konrad Hambrick did just that at the January launch, flying his Hawk Mountain "scratch kit" Nocturnal Mission to 11,300' on an AT K-700 and boy did it scream! The weather was perfect, with only mild winds both days. The newly formed Maximum Thrust Rocketry team (formerly called "Hot Rockets") of Kevin Harness and Dave Wentworth flew their newest rocket "Thunderbird" on an AT 98mm L-1500 Blue Thunder. Man those are incredible motors. Perfect ascent, perfect deployment, and gentle landing just the way we like to see 'em. Maximum Thrust also announced the upcoming "Mad Max" rocket, a 4" x 5.5" rocket, 5.4mm, which should be on demo for either the March Ocotillo Launch, or Springfest the following weekend. Jimmy Phillips flew his VBR Javelin on the new 29mm I-200 and it was a FAST flight. Darryl Kelly and son flew several rockets across the two-day weekend, Darryl becoming a newly appointed Level 2 certified Tripoli flier. Good job, Darryl. John Thompson flew his now famous "Alien With An Attitude" on an old reliable I-211, and the "Alien" came back in good shape ready to fly again. Kevin Harness also brought construction pictures of his team's 1/4 scale V2, standing in at 11.5' and with motor weighing in at about 300 lbs. Plans are to fire this at Delamar in May of this year.

METropolitan Rocketry Association #8211 (METRA)

METRA held elections for the positions of Prefect, President, Secretary, Treasurer and 4 positions on the Board of Directors in February 2000. The new officers are:

PREFECT Randy Heinz
PRESIDENT Andy Vovou
SECRETARY Rich Van Saun
TREASURER Denis Luoni
BOD Lou Ballini (existing member)
Jeff Davenport
Lewis Garrow
Bill Rossi
Jim Stanlick

Departing officers, Prefect: Denis Luoni, President: Bill Rossi, Sec/Treas: Ted Apke, are all thanked for their efforts in helping METRA build itself into the club it is today.

Information on upcoming meetings and launches can be found on the METRA web site: <http://www.users.nac.net/jdcluster/Metra.html>

Pacific Rocket Society

Interorbital Systems First Test Launch Successful: Sets Record MOJAVE, CA -- On Sunday, September 12, 1999, at 8:15 a.m., a boilerplate version of the IOS Research Series (RS-1) sounding rocket successfully lifted off at the Mojave Test Area near Koehn Dry Lake in California, setting a record for in-flight burn time on a non governmentally funded liquid rocket. Featuring a hypergolic rocket engine powered by nitric acid and furfuryl alcohol, the rocket was launched with its propellant tanks pressurized to half their design pressure. Engine performance was nominal at this low pressure, yielding approximately half of its design thrust. The rocket engine's burn time was 32 seconds. After reaching an altitude of around 8,000 ft., the rocket was recovered three miles downrange. "The smooth performance of the GPRE-500NF rocket engine at low chamber pressure (between 100 and 150 psi) proves the engine can be efficiently throttled between 150 and 500 pounds of thrust," stated Roderick Milliron, president and chief scientist of Interorbital Systems. "Throttleable engines are a key component in our plans for manned space flight." Designed to be reusable, the engine was recovered undamaged. "We're one of the few producers of liquid propulsion rocket engines in this country. We don't believe it's prudent to become dependent on engines from foreign sources or outside manufacturers," explained Randa Milliron, vice president and cofounder of IOS. All rocket hardware, including engines, is built in-house by Interorbital Systems, located at Mojave Airport in California's southeastern Kern County. A fully-fueled enhanced version of RS-1 with a regulated pressurant system will be flown in early Spring, 2000. Its design altitude is 200,000 ft. (61 km). The RS-1 is the upper stage of the RS-2 high-altitude sounding rocket (maximum altitude: 255 km) and will be flown with its booster in late Spring 2000 in the CATS (Cheap Access to Space) Prize competition. Entrants in this contest are competing for a \$250,000 purse to be awarded to the first team that flies the first non governmentally funded rocket to an altitude of 120 miles (200 kilometers), carrying a 5-pound (2.2 kg) payload. Interorbital Systems will fly the RS-2 in association with the Pacific Rocket Society and Trans Lunar Research.

At the completion of flight testing, the RS-2 sounding rocket will be made commercially available in early 2000 by IOS. Applications include: testing instruments or equipment for reliability in high G-force environments; as a ramjet accelerator; for meteorological research, environmental sampling, or micro-gravity experiments; and for military applications such as quick look surveillance and remote sensing. "These sounding rockets will accomplish several main goals for IOS: they'll fill the needs of a lucrative scientific and military niche market, thereby generating revenue and local manufacturing jobs," stated Roderick Milliron. "But most importantly, they'll serve as test beds for all the flight and ground systems we'll employ on our reusable two-stage satellite launch vehicle -- the Neptune -- projected to enter service in 2001." For more on the Neptune project, visit the IOS web site at: <http://www.interorbital.com>

The Interorbital Systems / Pacific Rocket Society / Trans Lunar Research team members include: Roderick Milliron, PRS president and designer-builder of the RS-1; Randa Milliron, Kevin Baxter, Fred Holmes, Dave Silsbee, David Miller, Kyle Martin, Rick Galinsen, Hal Duffy; Dr. Andre Lavoie, Mark Shinnick, Brian Bernhard, and Oliver Forget. Websites of interest: <www.translunar.org>, <www.translunar.org/prs>, and www.interorbital.com

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www.asp-rocketry.com

aerotech launch calendar

AeroTech has offered to sponsor the Extreme Rocketry Launch Calendar. Launches submitted to the AeroTech launch calendar at www.aerotech-rocketry.com will be printed here.

March 4

Range: New Berlin, WI
WOOSH Sport Launch
Sponsor: WOOSH, NAR #558
Contact: Dean Roth 414-228-0739
Web: <http://www.gamerz.net/woosh>
Description: Sport launch for small rockets. No waiver. See the web site for directions.

March 5

First Sunday every month
Range: Monroe, WA
Sponsor: Tripoli Puget Sound, TRAPS
Waiver: 5,000 ft AGL
Limits: Not Listed
Other: 1/4A to K welcome. All fliers welcome regardless of affiliation
Lodging: Not Listed
Contacts: Christopher Scott, cjscott@worldnet.att.net
Prefect: Bruce Johnson, (425) 228-7292
abrucj@aol.com
Web: www.northwestrocketry.com

March 10-12

Range: Richardson, TX (Dallas)
NARCON 2000
Sponsor: DARS, NAR 308
Contact: Not yet established. Watch the NAR web site, www.nar.org, for more information.

March 11

8:00AM to 12:00PM
Range: Ironwood Apache Junction AZ
Rainbow Valley
Waiver: 7,500 ft – windows to 12,000 ft possible
Limits: "MUST" come prepared to show their valid NAR or Tripoli membership card at the time of flyer registration
Fees: \$ 2.00 Members & guests of members \$ 5.00 Non-members under 18 years of age \$10.00 Non-members 18 years of age & up \$10.00 Groups (scouts, cap, school, etc.)
Contacts: see web page
Web Page: <http://www.sssrocketry.org/>
Sponsor: NAR Superstition Spacemodeling Society

March 11

Range: Bob Evan's Farms Rio Grande, Ohio
Waiver: 3,000 ft AGL
Limits: A thru J motors
Fees: Not Listed
Lodging: not listed
Contacts: Jerry Myers, cosmo-jwm@worldnet.att.net

Web Page: www.geocities.com/wvsoar.org
Sponsor: West Virginia Society of Amateur Rocketry

March 11

Range: ROC – Rocketry Organization of California Tripoli Anaheim (#48) (CA)

Range: Lucerne Dry Lakebed

Launches start at 8:00AM
Waiver: 5,300 ft AGL occasional windows to 10,000 ft
Misc Info: California Fire Marshall Approved Motors Only. ROCstock launches run half day Friday through Sunday with night launching on Friday and Saturday evenings. Proof of current membership and certification level in TRA or NAR required to fly motors over 160 N-s
Fees: \$5/Adult or Family at monthly launches
Certifications: Level 1 & 2 available at monthly launches
Level 3 with prior arrangements
Lodging: Ace Motel, 31818 Hwy 18, (619) 248-7524
Portal Motel, 31336 Hwy 18, (619) 248-7992
Contacts: Rick O'Neill, 909-427-9157 after 6PM M-F
Ron McGough, 562-867-0419
Web: rocstock.org

March 11

Range: Rio Rancho Balloon Park
Sponsors: Tripoli Albuquerque # 87, Albuquerque Rocket Society
Waiver: 8,000' AGL – 10,000' AGL
10:00AM to 11:00AM
Limits: Model and High Power motor to K, L's may be flown with prior approval (the current field is marginal for L and above)
Certifications Available: Levels 1 & 2
Web: www.arsabg.org
Contacts: Bill Cordova (Club President), (505) 897 4105
Email:rocket6343@aol.com

Mike Bernard (Club Contact Person), (505) 281 4462
Email:maberna@swcp.com

March 11

Range: Bong Recreational Area, Kenosha, WI
Directions to Launch Site: Look at a map of Wisconsin. Locate Kenosha, WI. Find Hwy 142 and head west. Bong Recreational Park will be landmarked. Ask directions to the launch site at the front gate. Once in the park and you're still lost look for a ton of cars or smoke and flame. Please watch your speed when driving through the park.
Sponsors: Tripoli Wisconsin, Tripoli Madison, Tripoli Green Bay, Tripoli Northern Illinois
Waiver: Surface to 10,000' AGL
Limits: 1/2A to M motor range. Must notify Prefect on M projects.
Certifications Available: Levels 1, 2 and 3.
Please notify us several weeks prior to level 3 flights
Fees: \$10.00 for Motors F and above -- anything less is free
Contacts: Frank Noble (262)677-2992
E-mail: Maxq3@aol.com
Dave Sutton, 414-886-6017
E-mail: dcsutton@excpc.com
Garland Granzow, (920) 568-1152
E-mail: ggranzow@compufort.com
Ed Dewey
E-mail: edewey@us-netdirect.com
Web: Wisconsin Tripoli Rocket Association
Sponsors: Al's Hobbies
Note: You must pre-order class B motors
Other: Equipment: 12 excellent high power pads this includes 2 pro-rails. Plus 9 low power pads PA system with FM broadcast and a friendly launch crew who are not afraid to say no. Know your rocket and how it will fly otherwise we will.

March 12

Range: Tuscola Airport (Just west of Tuscola on Rt 36, About half a mile)
Sponsor: Tripoli Central Illinois #059, Rocket R&D
Waiver: 10,000 ft AGL
Fees: \$5
Weather: Contact Don Reasor before attending if the weather is "IFFY" or if rain date is to be used
Lodging: Tuscola has: Super 8, Amerihost Inn, and also Holiday Inn Express
Contacts: Don Reasor, President – Tripoli Central Illinois (217) 253-2586
Paul Adam, (309) 829-5254
Gary Buck, (217) 344-2449 evenings

March 11 & 12

Range: Ocotillo California
Launch site directions: Take Interstate 8 to Ocotillo exit. Drive south on Hwy 98 for 9.8 miles. Turn west on Coyote #2 proceed 2 miles to site on right fork of Y in road. Map available at www.ins.net/dart/marpoct.html or <http://members.home.net/zdm/DART317/html/ocotillo.html>
Sponsoring Prefecture: Tripoli San Diego #5, DART
Waiver: 12,500 ft
Misc Info: California Fire Marshall Approved Motors Only
Fees: \$20 per year
Certifications: Level 1, 2 & 3 available
Lodging: Dry Camping only at site
Contacts: Kevin Harness, 2717 E. 14th St., National City, CA 91950
(619) 267-5133
Email: Kevinrc54321@aol.com
WEB Page: DART
Vendors: Ocotillo is located 10 miles north of the launch site, 95 miles east of San Diego and 25 miles west of El Centro on Interstate 8. Ocotillo offers a full range of services and amenities. Check the Ocotillo town web site for logging <http://www.cadesert.com/>

March 17, 18 & 19

Springfest – Hosted by LTR
Sponsor: Tripoli Las Vegas #26
Range: El Dorado Dry Lake Bed – Boulder City, NV
20 minutes from Las Vegas
Waiver: El Dorado – 7,500 MSL, windows to 15,000 ft MSL
Fees: El Dorado \$5 club launches \$5 per day for multiday launches
Limits: not listed
Certifications: Call Ahead
Lodging: El Dorado – Railroad Pass Hotel & Casino, (702) 294-5000
Contacts: Mike Alber, (702) 871-7712
malber@msn.com
Dave Pacheco, (702) 432-9293 dav-

epach@vegastnet.net
Steve Hedland, (702) 566-9228
CLASS7RACR@aol.com
Web site: www.mcneely.net/tripoli_vegas

March 18

Range: Dayton, Washington
Sponsor: The Blue Mountain Rocketeers
Waiver: 5,000 feet AGL
Contact: Tim Quigg, (509) 382-4176, tuquigg@innw.net
Web: <http://www.northwestrocketry.com>

March 18

Range: Alamogordo, New Mexico
launches begin at 9 AM
Sponsoring Prefecture(s):
Tripoli New Mexico, White Sands #61 and SMRA (NAR 488)
Waiver: 18,000' MSL – 13,500' AGL
Certifications: Varies by Month
Contacts: Bob Turner (TRA #647), (800) 545-4021
E-mail: space-cur@zianet.com
Web: Unavailable at this time

March 18

Range: Pickrell, NE
Weather permitting, call hotline
Breda Iowa – near Carroll, IA
Pickrell NE – So. of Lincoln, NE
Sponsors:
Tripoli Nebraska – T.H.O.R., F.O.T.F., Tripoli Nebraska THOR, and Tripoli Des Moines ISOAR
Waiver: Breda Iowa : 7,000' MSL; 5,500' AGL – Higher for Fire on the Farm
Pickrell NE – 8,000' MSL about 6,500 AGL
Limits: Give us a call for N and O motors and flights over 10,000 ft MSL
Low Power Launches – 1 lb.
Certifications Available: Levels 1, 2 and 3
Level 2 tests and TAP on site
Fees: \$10 per day – \$20 for all 3 days, only 1 fee for whole family
Low power (La Vista) – FREE
Other: Porta Poty. On site food vendor Iowa Public TV on site again this year
HAMS: Talk in frequency 146.52
Lodging: Pickrell NE:
Beatrice Inn 402-223-4074
Rooms \$33 to \$48
AARP and AAA discounts only
Breda Iowa: The Burke Inn, Carroll IA 712-792-5156 \$46.95 for a double
Super 8 – has indoor pool \$52.15 for a double 712-792-6666
Contacts: Mark Uhlenkamp, 712-663-4521, marku@netins.net
Bruce Lee, bruce.lee@tripoli.org
Larry Drake, larrydrake@tconl.com
Web Page: tripoli.org/tra_nm/nebraska.htm
Hotline: 402-896-2069 THOR c/o Larry Drake
6211 South 141 St., Omaha, NE 68137 or leave message on hotline

March 18 & 19

Event: Mick Meet 2000
Location: Perry, GA
Sponsor: SoAR, GAMMA
Contact: comments@soar571.com
Description: Mick Wilkins Memorial Sport Scale Meet 2000. A 2 day NAR Sport Scale meet. 1/4A-L motors, 10,000 ft. waiver. Prizes, points and a great time. See the website at www.soar571.com for further details!
March 18-19
Range: launch 3 miles south of Wayside, TX in the Texas Panhandle,
(approx 40 miles south of Amarillo) on 2000 acres of flat pasture land
Sponsor: Tripoli Amarillo #92, POTROCS
Waiver: 21,500' MSL, approx 18,000' AGL
Fees: \$5.00 per day
Certifications: Level 1 and 2
Lodging: Available
Contacts: Pat Gordzelik – Prefect, 806-488-2756, 806-353-4618
Email: POTROCS@aol.com
Web: www.potrocs.org

March 19

Range: Clarks Falls, CT
CATO XXV
Sponsor: CATO/NAR#581/TRA#27
Contact: Jay Calvert / jcalvert@ctol.net
Waiver: 5000'
Limits: K impulse maximum
Fees: \$5 launch fee
Web: <http://www.catorockets.org>

March 19

Range: Maddox Farms on Kamm Ave. near Caruthers, Southwest of Fresno
Several thousand acres to launch on with few obstacles
Sponsors: Tripoli Central California
Waiver: 7,500'
Limits: Not Listed
Certifications Available: Levels 1 and 2
Fees: Not Listed
Lodging: Not Listed
Contacts: Prefect, Brian Liggett
Email: brian@rocketry.com
Web: Tripoli Central California
Phone Line: 559-435-3342 the night before each launch for updates and last minute information
March 19
8:00AM to 1:00PM
Range: Saboba Indian Reservation
In the fields behind Soboba Casino, San Jacinto, CA
Some Rough Terrain
Sponsor: NAR Section #567
Waiver: 6,000 ft AGL
Limits: Motors to K
Fees: \$15 membership, \$2 range fee
Contacts: Lee Rouse, (909) 658-6581
Email: lemi@ivc.net
Ed Rodriguez, (909) 427-1683
Email: edrodman@earthlink.net
Web: <http://www.ivc.net/~lemi/>

March 19

Range: Indianola Balloon Field, Just East of Indianola Iowa
12:00 noon to 5:00 PM
Sponsor: Tripoli Des Moines
Waiver: Yes
Limits: "J" motors
Contacts: ISOAR President Email: Mike Kirkpatrick
Prefect Email: Lanie Cross
Web Page: ISOAR
March 19
Range: Argonia, KS
Sponsors: Tripoli Kansas Kloudbusters
Waiver: Up to 35,000' MSL
Limits: None
Certifications Available: Levels 1 and 2, Level 3 by request – TAP member available
Lodging: Anthony Motel, 316-842-5185
Contacts: John Baumfalk
Email: johnb@southwind.net
Web Page: www.kloudbusters.org
March 24 & 25
Event: March D'Ohpen & Sport Launch
Location: Pony Express Test Range, Utah
Sponsor: UROC
Contact: David Urbanek: urbanek@surftee.com
Description: NAR Open contest. Events are: D SRD, D DED, D SD, March 25
Event: GCSA launch of the Aquarius SLV's A to E
Location: Navarre Beach, Navarre Florida
Sponsor: Gulf Coast Space Authority and Rochella Aerospace
Contact: Contact Jordan Britt at rochella@bellsouth.net or call at 850-469-8143
Description: This will be the debut launch of GCSA's Aquarius SLV, versions A to E. All are welcome to attend. Anyone else wishing to launch are invited as well.

March 25 & 26
Range: Whitakers North Carolina
Close to I-95, 1000 acres cleared field, few trees
Sponsors: Tripoli North Carolina #40, Tripoli East North Carolina #65, Tripoli Eastern Virginia #82
Waiver: 8,000 ft AGL (12,000 ft AGL available upon call in)
Lodging: Listed at their web site: Colonial Virginia HPR
Contacts: Jim Scarpine
30 Parnell Lane
Hurdie Mills, NC 27541
Phone: 336-364-1321
Prefect: Tripoli North Carolina (TRA#40) Dennis Hill
2332 Hurt Drive
Rocky Mount, NC 27804
252/937-6294 (home)
252/450-2351 (work)

March 25 & 26

Range: Whitakers North Carolina
Close to I-95, 1000 acres cleared field, few trees
Sponsors: Tripoli North Carolina #40, Tripoli East North Carolina #65, Tripoli Eastern Virginia #82
Waiver: 8,000 ft AGL (12,000 ft AGL available upon call in)
Lodging: Listed at their web site: Colonial Virginia HPR
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March 25 & 26

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Close to I-95, 1000 acres cleared field, few trees
Sponsors: Tripoli North Carolina #40, Tripoli East North Carolina #65, Tripoli Eastern Virginia #82
Waiver: 8,000 ft AGL (12,000 ft AGL available upon call in)
Lodging: Listed at their web site: Colonial Virginia HPR
Contacts: Jim Scarpine
30 Parnell Lane
Hurdie Mills, NC 27541
Phone: 336-364-1321
Prefect: Tripoli North Carolina (TRA#40) Dennis Hill
2332 Hurt Drive
Rocky Mount, NC 27804
252/937-6294 (home)
252/450-2351 (work)

Prefect: Tripoli East North Carolina (TRA#65)
Performance Hobbies (202) 723-8257
Ed Rowe Email: edrowe@erols.com
Web: Colonial Virginia HPR

March 26

Range: Tuscola Airport (Just west of Tuscola on Rt 36, About half a mile)
Sponsor: Tripoli Central Illinois #059, Rocket R&D
Waiver: 10,000 ft AGL
Fees: \$5
Weather: Contact Don Reasor before attending if the weather is "IFFY" or if rain date is to be used
Lodging: Tuscola has: Super 8, Amerihost Inn, and also Holiday Inn Express
Contacts: Don Reasor, President – Tripoli Central Illinois (217) 253-2586
Paul Adam, (309) 829-5254
Gary Buck, (217) 344-2449 evenings-

April April 1

Location: Dallas, TX (Windom)
April Madness
Sponsor: Bob Wilson
Contact: Bob Wilson, 1337 Kesser Dr., Plano, TX 75025 or call (972)517-1434 April 2
Location: Monroe, WA
Sponsor: TRAPS
Contact: Christopher Scott cjscott@worldnet.att.net 253 858-7256
Description: Waiver to 5000ft AGL. Certified motors only up to K motors supported. All fliers welcome regardless of affiliation.
Web: www.NorthwestRocketry.com

April 2

Range: Clarks Falls, CT
CATO XXV
Sponsor: CATO/NAR#581/TRA#27
Contact: Jay Calvert / jcalvert@ctol.net
Waiver: 5000'
Limits: K impulse maximum
Fees: \$5 launch fee
Web: <http://www.catorockets.org>

April 2

First Sunday every month
Range: Monroe, WA
Sponsor: Tripoli Puget Sound, TRAPS
Waiver: 5,000 ft AGL
Limits: Not Listed
Other: 1/4A to K welcome. All fliers welcome regardless of affiliation
Lodging: Not Listed
Contacts: Christopher Scott, cjscott@worldnet.att.net
Prefect: Bruce Johnson, (425) 228-7292
abrucj@aol.com
Web: www.northwestrocketry.com

April 7, 8 & 9

Spring WELD Whitakers Experimental
April 14, 15h 16 Rain Date
Note: EXP days are experimental only, No certified motors
Range: Whitakers North Carolina
Close to I-95, 1000 acres cleared field, few trees
Sponsors: Tripoli North Carolina #40, Tripoli East North Carolina #65, Tripoli Eastern Virginia #82
Waiver: 8,000 ft AGL (12,000 ft AGL available upon call in)
Lodging: Listed at their web site: Colonial Virginia HPR
Contacts: Jim Scarpine
30 Parnell Lane
Hurdie Mills, NC 27541
Phone: 336-364-1321
Prefect: Tripoli North Carolina (TRA#40) Dennis Hill, 2332 Hurt Drive
Rocky Mount, NC 27804
252/937-6294 (home)
252/450-2351 (work)
Prefect: Tripoli East North Carolina (TRA#65)
Performance Hobbies (202) 723-8257
Ed Rowe Email: edrowe@erols.com
Web: Colonial Virginia HPR

April 8

8:00AM to 12:00PM
Range: Ironwood Apache Junction AZ
Rainbow Valley
Waiver: 7,500 ft – windows to 12,000 ft possible
Limits: "MUST" come prepared to show their valid NAR or Tripoli membership card at the time of flyer registration
Fees: \$ 2.00 Members & guests of members \$ 5.00 Non-members under 18 years of age \$10.00 Non-members 18 years of age & up \$10.00 Groups (scouts, cap, school, etc.)
Contacts: see web page

Web Page: <http://www.ssrrocketry.org/>
Sponsor: NAR Superstition Spacemodeling Society

April 8

Sponsor: ROC – Rocketry Organization of California
Tripoli Anaheim (#48) (CA)
Range: Lucerne Dry Lakebed
Launches start at 8:00AM
Waiver: 5,300 ft AGL occasional windows to 10,000 ft
Misc Info: California Fire Marshall Approved Motors Only
ROCstock launches run half day Friday through Sunday with night launching on Friday and Saturday evenings
Proof of current membership and certification level in TRA or NAR required to fly motors over 160 N-s
Fees: \$5/Adult or Family at monthly launches
Certifications: Level 1 & 2 available at monthly launches
Level 3 with prior arrangements
Lodging: Ace Motel, 31818 Hwy 18, (619) 248-7524; Portal Motel, 31336 Hwy 18, (619) 248-7992
Contacts: Rick O'Neil, 909-427-9157 after 6PM M-F
Ron McCough, 562-867-0419
Web: [rocstock.org](http://www.rocstock.org)

April 8

Range: Rio Rancho Balloon Park
Sponsors: Tripoli Albuquerque # 87, Albuquerque Rocket Society
Waiver: 8,000' AGL – 10,000' AGL
10:00AM to 11:00AM
Limits: Model and High Power motor to K, L's may be flown with prior approval (the current field is marginal for L and above)
Certifications Available: Levels 1 & 2
Web: www.arsabq.org
Contacts: Bill Cordova (Club President), (505) 897-4105
Email: rocket6343@aol.com
Mike Bernard (Club Contact Person), (505) 281-4462
Email: maberna@swcp.com

April 8 & 9

KLoudburst 10
Range: Argonia, KS
Sponsors: Tripoli Kansas Kloudbusters
Waiver: Up to 35,000' MSL
Limits: None
Certifications Available: Levels 1 and 2, Level 3 by request – TAP member available
Lodging: Anthony Motel, 316-842-5185
Contacts: John Baumfalk 316-283-7084
Email: johnb@southwind.net
Web Page: www.kloudbusters.org
April 9
Event: SOAR Monthly launch
Location: Cartersville, GA
Sponsor: Southern Area Rocketry
Contact: comments@soar571.com
Description: SOAR monthly sport launch. 1/4A-1 motors, 4000 ft. waiver. Further details at www.soar571.com. Come have fun with us!

April 9

ROC Monthly Launch
Range: Lucerne Valley, CA. Dry Lake bed
Sponsor: Rocketry Organization of California – ROC
Contact: Greg Lawson – glawson@pio-neer-usa.com
Description: Regular Monthly launch
Limits: Motors to M (CSFM approved only)
Waiver: to 5300'
Web: <http://www.rocstock.org>

April 9

Range: Tuscola Airport (Just west of Tuscola on Rt 36, About half a mile)
Sponsor: Tripoli Central Illinois #059, Rocket R&D
Waiver: 10,000 ft AGL
Fees: \$5
Weather: Contact Don Reasor before attending if the weather is "IFFY" or if rain date is to be used
Lodging: Tuscola has: Super 8, Amerihost Inn, and also Holiday Inn Express
Contacts: Don Reasor, President – Tripoli Central Illinois (217) 253-2586
Paul Adam, (309) 829-5254
Gary Buck, (217) 344-2449 evenings
April 11
ROC Monthly Launch
Range: Lucerne Valley, CA. Dry Lake bed
Sponsor: Rocketry Organization of California – ROC
Contact: Greg Lawson – glawson@pio-neer-usa.com
Description: Regular Monthly launch

Limits: Motors to M (CSFM approved only)
Waiver: to 5300'
Web: <http://www.rocstock.org>

April 14, 15 & 16

FIRE ON THE FARM Launch
April 14 is experimental day and nite launch; 6 to 8 M's already planned!!
Range: Breda Iowa
Breda Iowa – near Carroll, IA
Pickrell NE – So. of Lincoln, NE
Sponsors:
Tripoli Nebraska – T.H.O.R., F.O.T.F., Tripoli Nebraska THOR, and Tripoli Des Moines ISOAR
Waiver: Breda Iowa : 7,000' MSL; 5,500' AGL – Higher for Fire on the Farm
Pickrell NE – 8,000' MSL about 6,500 AGL
Limits: Give us a call for N and O motors and flights over 10,000 ft MSL
Low Power Launches – 1 Lb.
Certifications Available: Levels 1, 2 and 3
Level 2 tests and TAP on site
Fees: \$10 per day – \$20 for all 3 days, Only 1 fee for whole family
Low power (La Vista) – FREE
Other: Porta Potty
On site food vendor Iowa Public TV on site again this year HAMS: Talk in frequency 146.52
Lodging: Pickrell NE:
Bealrice Inn 402-223-4074
Rooms \$33 to \$48
AARP and AAA discounts only
Breda Iowa: The Burke Inn, Carroll IA 712-792-5156 • \$46.95 for a double
Super 8 – has indoor pool \$52.15 for a double 712-792-6666
Contacts: Mark Uhlenkamp, 712-663-4521, marku@nelins.net
Bruce Lee, bruce.lee@tripoli.org
Larry Drake, larrydrake@tconl.com
Web Page: www.tripoli.org/tra_nef/nebraska.htm
Hotline: 402-896-2069 THOR c/o Larry Drake 6211 South 141 St.
Omaha, NE 68137
or leave message on hotline

April 15

Range: Bob Evan's Farms
Rio Grande, Ohio
Waiver: 3,000 ft AGL
Limits: A thru J motors
Fees: Not Listed
Lodging: Not listed
Contacts: Jerry Myers, cosmo-jwm@worldnet.att.net
Web Page: www.geocities.com/wvsoar.geo
Sponsor: West Virginia Society of Amateur Rocketry

April 15

Range: Alamogordo, New Mexico
Launches begin at 9 AM
Sponsoring Prefecture(s):
Tripoli New Mexico, White Sands #61 and SMRA (NR 48X)
Waiver: 18,000' MSL – 13,500' AGL
Certifications: Varies by Tripoli
Contacts: Bob Turner (TRA #647), (800) 545-4021
E-mail: space-cur@zianet.com
Web: Unavailable at this time April 15 & 16
Range: Ocotillo California
Launch site directions: Take Interstate 8 to Ocotillo exit. Drive south on Hwy 98 for 9.8 miles. Turn west on Coyote #2 procede 2 miles to site on right fork of Y in road. Map available at www.ins.net/dart/mapoct.html or <http://members.home.net/2dum/DART317/html/ocotillo.html>
Sponsoring Prefecture: Tripoli San Diego #5, DART
Waiver: 12,500 ft
Misc Info: California Fire Marshall Approved Motors Only
Fees: \$20 per year
Certifications: Level 1, 2 & 3 available
Lodging: Dry Camping only at site
Contacts: Kevin Harness, 2717 E. 14th St., National City, CA 91950
(619) 267-5133
Email: Kevroc54321@aol.com
WEB Page: DART
Vendors: Ocotillo is located 10 miles north of the launch site, 95 miles east of San Diego and 25 miles west of El Centro on Interstate 8. Ocotillo offers a full range of services and amenities. Check the Ocotillo town web site for logging <http://www.cadesert.com/>

April 15-16

Range: Sheridan, Oregon
Blazanin IX
Sponsor: OREO
Contact: therios.pendragon@gte.net

Web: <http://www.oregonrocketry.com> for more information and maps.
Waiver: 5000'
Lots of High Power, Mid Power, and Model Pads. We use PA's for comfort and safety.

April 15-16

Range: launch 3 miles south of Wayside, TX in the Texas Panhandle, (approx 40 miles south of Amarillo) on 2000 acres of flat pasture land
Sponsor: Tripoli Amarillo #92, POTROCS
Waiver: 21,500' MSL, approx 18,000' AGL
Fees: \$5.00 per day
Certifications: Level 1 and 2
Lodging: Available
Contacts: Pat Gordzelik – Prefect, 806-488-2756, 806-353-4618
Email: POTROCS@aol.com
Web: www.potrocs.org

April 15 & 16

Sponsors: Tripoli Michigan #009, Michigan Team-1
Range: Three Oaks, MI
Waiver: 8,000' AGL
Fees: \$10 \$5 Team -1 members+ \$2 range fee
Certifications Available: Levels 1, 2 and 3
Level 2 tests TAP Member on site
Lodging: Available
Contacts: Ken Zuener, 248-348-2348
Ty Thompson, 616-842-5864
Kevin Hell, clambae@flash.net
Web: www.team1.org
April 15 & 16
Event: UROC Launch
Location: Pony Express Test Range, Utah
Sponsor: UROC
Contact: David Urbanek:
urbanek@surf.free.com
Description: General Launch with 6,500' waiver

April 16

Range: Maddox Farms on Kamm Ave. near Caruthers, Southwest of Fresno
Several thousand acres to launch on with few obstacles
Sponsors: Tripoli Central California
Waiver: 7,500'
Limits: Not Listed
Certifications Available: Levels 1 and 2
Fees: Not Listed
Lodging: Not Listed
Contacts: Not Listed, Brian Liggett
Email: brian@rocketry.com
Web: Tripoli Central California
Phone Line: 559-435-3342 the night before each launch for updates and last minute information

April 16

8:00AM to 1:00PM
Range: Saboba Indian Reservation
In the fields behind Saboba Casino, San Jacinto, CA
Some Rough Terrain
Sponsor: NAR Section #567
Waiver: 6,000 ft AGL
Limits: Motors to K
Fees: \$15 membership, \$2 range fee
Contacts: Lee Rouse, (909) 658-6581
Email: lemie@ivc.net
Ed Rodriguez, (909) 427-1683
Email: edrodman@earthlink.net
Web: <http://www.ivc.net/~lemie/>
April 16 (weather permitting)
Range: Indianola Baloon Field, Just East of Indianola Iowa
12:00 noon to 5:00 PM
Sponsor: Tripoli Des Moines
Waiver: Yes
Limits: "J" motors
Contacts: ISOAR President Email: Mike Kirkpatrick
Prefect Email: Lanie Cross
Web Page: ISOAR

April 22

Sponsor: Tripoli Las Vegas #26
Range: El Dorado Dry Lake Bed – Boulder City, NV
20 minutes from Las Vegas
Waiver: El Dorado – 7,500 MSL, windows to 15,000 ft MSL
Fees: El Dorado \$5 club launches \$5 per day for multi day launches
Limits: not listed
Certifications: Call Ahead
Lodging: El Dorado – Railroad Pass Hotel & Casino, (702) 294-5000
Contacts: Mike Alber, (702) 871-7712
malber@msn.com
Dave Pacheco, (702) 432-9293
dav-epach@vegasonet.net
Steve Hedland, (702) 566-9228
CLASS7RACR@aol.com
Web site: www.mcneely.net/ripoli_vegas

April 22

AHPRA
Arizona High Power Rocketry Assoc
Range: Rainbow Valley, AZ
Sponsor: Tripoli Paradise Valley #50 AHPRA
Waiver: 8500' MSL with windows to 11,000' MSL
Cert Levels Available: Varies by Month
Contacts: Mark Clark, 623-877-6814
markclark@starlink.com
Mark Ketchum (TRA# 2570), (602) 780-4759
E-mail: mark.ketchum@cas.honeywell.com
Web: www.ahpra.org

April 22

10 AM – 3PM
Sponsors: Tripoli Southern Minnesota #112
Range: Maple Island, MN
Located near the intersections of I-90 and I-35. Check web site for maps and directions.
Waiver: 8,000' MSL – 7,200' AGL
Certifications Available: Level 1 and 2
Limits: TRA & NAR Cert. motors, Active TRA & NAR members
Fees: \$10.00 daily launch fee for non TSM flyers
Lodging: E-mail for closest hotels
Contacts: Scott Young
9025 Elkdom Ave
Waseca, MN 56093
(507) 835-1288
Email: yous@waseca.k12.mn.us
Web Page: geocities.com/CapeCanaveral/Station/8691/tsm.html
/Station/8691/tsm.html
Web: geocities.com/CapeCanaveral/Station/8691/launch.html
Vendors: Vendors welcome on site!
Other: Restroom on site (satellite)
Working on concessions for 2000 launches
We are asking for volunteers from both Tripoli Minnesota and Tripoli Southern Minnesota to act as RSO in shifts of at least a half hour each. E-mail or call me to sign up for a time if you have a preference.

April 23

Range: Tuscola Airport (Just west of Tuscola on Rt 36, About half a mile)
Sponsor: Tripoli Central Illinois #059, Rocket R&D
Waiver: 10,000 ft AGL
Fees: \$5
Weather: Contact Don Reasor before attending if the weather is "IFFY" or if rain date is to be used
Lodging: Tuscola has: Super 8, Amerihost Inn, and also Holiday Inn Express
Contacts: Don Reasor, President – Tripoli Central Illinois (217) 253-2586
Paul Adam, (309) 829-5254
Gary Buck, (217) 344-2449 evenings

April 28-30

Event: RATS IX
Range: Cedarville, NJ
Sponsor: Garden State Tripoli
Contact: Damian Russo
drusso@njtripoli.com
Description: Roar At The Shore IX
30+ high power pads, food, restrooms and vendors on site.
Experimental only on Friday, certified motors Sat-Sunday, Waivers for 15k. For more information check our website www.njtripoli.com

April 29 April 30 EXP

Note: EXP days are experimental only, No certified motors

Range: Whitakers North Carolina

Close to I-95, 1000 acres cleared field, few trees
Sponsors: Tripoli North Carolina #40, Tripoli East North Carolina #65, Tripoli Eastern Virginia #82
Waiver: 8,000 ft AGL (12,000 ft AGL available upon call in)
Lodging: Listed at their web site: Colonial Virginia HPR
Contacts: Jim Scarpine
30 Parnell Lane
Hurdie Mills, NC 27541
Phone: 336-364-1321
Prefect: Tripoli North Carolina (TRA#40) Dennis Hill
2332 Hurt Drive
Rocky Mount, NC 27804
252/937-6294 (home)
252/450-2351 (work)
Prefect: Tripoli East North Carolina (TRA#65)
Performance Hobbies (202) 723-8257
Ed Rowe
Email: edrowe@erols.com
Web: Colonial Virginia HPR

April 30

Location: Cedarville, NJ
Event: RATS IX
Sponsor: Garden State Tripoli
Contact: Damian Russo
drusso@njtripoli.com
May 6 & 7
"SP-2000"
AHPRA
Arizona High Power Rocketry Assoc
Range: Flagstaff, Arizona
Sponsor: Tripoli Paradise Valley #50 AHPRA
Waiver: 40,000 foot waivers (Pending)
Cert Levels Available: Varies by Month
Contacts: Mark Clark, 623-877-6814
markclark@starlink.com
Mark Ketchum (TRA# 2570), (602) 780-4759
E-mail: mark.ketchum@cas.honeywell.com
Web: www.ahpra.org

May 6 & 7

"SP-2000" AHPRA
Arizona High Power Rocketry Assoc
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Web: www.ahpra.org
May 7
First Sunday every month
Range: Monroe, WA
Sponsor: Tripoli Puget Sound, TRAPS
Waiver: 5,000 ft AGL
Fees: Not Listed
Other: 1/4A to K welcome. All fliers welcome regardless of affiliation
Lodging: Not Listed
Contacts: Christopher Scott, cjscott@worldnet.att.net
Prefect: Bruce Johnson, (425) 228-7292
abruce@aol.com
Web: www.northwestrocketry.com

May 13

Range: North Branch, Minnesota
Sponsor: Tripoli-Minnesota #45
Waiver: 10,000 MSL
Contact: Richard Weyrauch, 651-430-8006
Email: rickw@mail.softcafe.com
Web: www.tripoli-minnesota.org

May 13

8:00AM to 12:00PM
Range: Ironwood Apache Junction AZ
Rainbow Valley
Waiver: 7,500 ft – windows to 12,000 ft possible
Limits: "MUST" come prepared to show their valid NAR or Tripoli membership card at the time of flyer registration
Fees: \$ 2.00 Members & guests of members \$ 5.00 Non-members under 18 years of age \$10.00 Non-members 18 years of age & up \$10.00 Groups (scouts, cap, school, etc.)
Contacts: see web page
Web Page: <http://www.ssrrocketry.com>
Sponsor: NAR Superstition Spacemodeling Society

May 13

Range: Bob Evan's Farms
Rio Grande, Ohio
Waiver: 3,000 ft AGL
Limits: A thru J motors
Fees: Not Listed
Lodging: Not listed
Contacts: Jerry Myers, cosmo-jwm@worldnet.att.net
Web Page: www.geocities.com/wvsoar.geo
Sponsor: West Virginia Society of Amateur Rocketry
May 13
Sponsor: ROC – Rocketry Organization of California
Tripoli Anaheim (#48) (CA)
Range: Lucerne Dry Lakebed
Launches start at 8:00AM
Waiver: 5,300 ft AGL occasional windows to 10,000 ft
Misc Info: California Fire Marshall Approved Motors Only
ROCstock launches run half day Friday through Sunday with night launching on Friday and Saturday evenings
Proof of current membership and certification level in TRA or NAR required to fly motors over 160 N-s
Fees: \$5/Adult or Family at monthly launches
Certifications: Level 1 & 2 available at monthly launches
Level 3 with prior arrangements
Lodging: Ace Motel, 31818 Hwy 18, (619) 248-7524
Portal Motel, 31336 Hwy 18, (619) 248-7992

insurance & legal challenges

by brent mcneely

In each issue of this magazine you'll see a different writer's opinion on this page. I'm hoping the guest writer will express strong opinions in their article, strong enough to provoke a response out of you. You may nod your head in agreement with the writer. The next magazine, a different writer may express a strong opinion you disagree with and you'll be mad and curse the day that writer was born. However, at the same time you are mad as hell, someone else, in another city, will read the same article and agree with the author on the same point that upset you. The point is, everyone has their own opinions. I can't say one person's opinion is right or wrong, after all, it's only an opinion. I've decided to get the ball rolling and write the first opinion column.

Insurance Issues

If you are on the internet and have been frequenting the news groups, Rocketry Online, and other sites you'll see big headlines about rocketry insurance issues. Both Tripoli Rocketry Association (TRA) and The National Association of Rocketry (NAR) have serious insurance issues which are being addressed. It's really strange both organizations are facing similar challenges at the same time.

Tripoli has a new insurance carrier

On February 1, 2000 Tripoli gained a new insurance carrier. In many ways the new insurance policy is far superior to the old policy. According to Tripoli, the new insurance will cover the "landowner, member, prefecture as well as spectators." For the last few years at launches I've heard many flyers complain about Tripoli's insurance, stating it did not cover much at all. The good news is the new insurance covers far more than the old policy. The bad news is the cost. The new insurance is \$30 per member more than the old insurance. But, before you gasp, the board of directors at Tripoli has decided to help cushion these costs and increase annual membership dues by \$25 instead of \$30. The net effect is membership in Tripoli has increased from \$84 to \$109 per year (with HPR magazine comprising \$39 of the fee). I encourage you to take some time and read the letter from Bruce Kelly on the Tripoli

rather than complaining about the increased costs of insurance... we should stand behind the people elected to represent us on these matters

web site (www.tripoli.org). Again, before you scream about these fees, realize Tripoli is still looking for a more cost-effective solution as you read this. If a better solution is out there, rest assured the leadership of Tripoli will find it and put it into effect. We will be carrying regular news updates on the Extreme Rocketry web site.

NAR seeking new insurance carrier

Thinking of jumping ship from Tripoli and joining NAR over the insurance issue? Think again! Mark Bundick has been making regular updates on the NAR web site (www.nar.org) about their insurance situation. Apparently, SFA was the insurance carrier for NAR as well as a number of other hobby organizations. Just recently SFA decided to go out of business and on March 3 sent a notice to NAR stating their insurance would cease on April 5, 2000. Naturally, NAR is looking for new insurance options. NAR states they have been seeking a new insurance carrier for some time and already have a number of possible solutions under way. For the latest details, visit the Extreme Rocketry web site (www.extremerocketry.com) or the official NAR web site at (www.nar.org) for details.

Tripoli and NAR file a joint lawsuit against the BATF

Not to complicate matters, but on Friday, February 11, 2000, both Tripoli and NAR jointly filed a four-count civil complaint against the US Bureau of Alcohol, Tobacco and Firearms (BATF) in Federal District Court. According to the NAR, "This action became necessary only after repeated meetings and exchanges of correspondence with BATF." They "made it clear that BATF intends to proceed with rulemaking on rocket motors that is both onerous and unnecessary." TRA and NAR claim the 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." Both organizations are seeking a declaratory judgment preventing BATF regulation of these motors, and full recovery of the costs of the litigation to resolve these issues. Full details of the suit may be found on the NAR web site (www.nar.org).

My Opinion

This is an opinion page, so I'll tell you what I think of all these legal and insurance issues. I'm a big believer in the John Wayne mentality of doing things. I like handshake business deals. I believe in following through with commitments and doing right by people. Call it too much McNeely in my blood. I believe that rather than bickering and complaining about the increased costs of insurance, or the specific actions of any single individual, we should stand behind the people elected to represent us on these matters. Bruce Kelly and Mark Bundick are intimately familiar with all these issues and are working hard on solutions for everyone. I believe we should stop complaining and ask what we can do to help. I feel we can help in several ways. First, we can lend our moral support to Bruce and Mark and financial support to the TRA and NAR legal fund. Second, be informed on these issues. Keep apprised of the situation so you are not guilty of misleading others. Refer anyone with questions on the issues to official documents and letters on the NAR or Tripoli web sites. Last, don't give up on the hobby because of these few issues. It seems rocketry is constantly facing some sort of obstacle, this is just the latest hurdle to overcome.

photo contest

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visit www.extremerocketry.com for details



extreme rocketry



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Brent McNeely and launch crew prepare the Stinger 98 for flight on the new M1315W at the Tripoli Vegas Turkey Shoot '98 launch. The Stinger flew to an altitude of 7,913 ft. and was recovered for a successful level three certification.

