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WEDGE OLDHAM INTERVIEW

An exclusive interview with the creator of the LDRS 20 Nike-Hercules Scale Missile.

SIX TIPS TO TAKING BETTER AERIAL PHOTOS

Want to know the secrets of taking fantastic aerial rocket photos? Read this article and learn how to improve your photos.

SCRATCH-BUILD NOSECONES FOR EXTREME PROJECTS

Find out how to build your own nosecones using everyday tools.

NEWS

Comments and photos from the AeroTech fire.

REVIEWS

Flight, My Life in Mission Control
Book Review

13

NOVEMBER 2001

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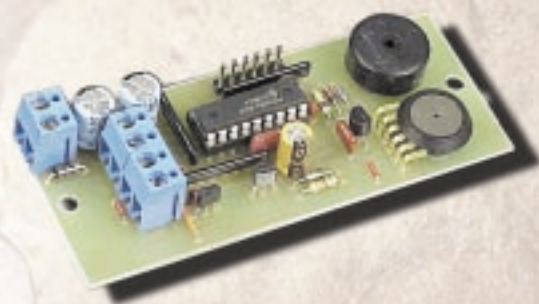
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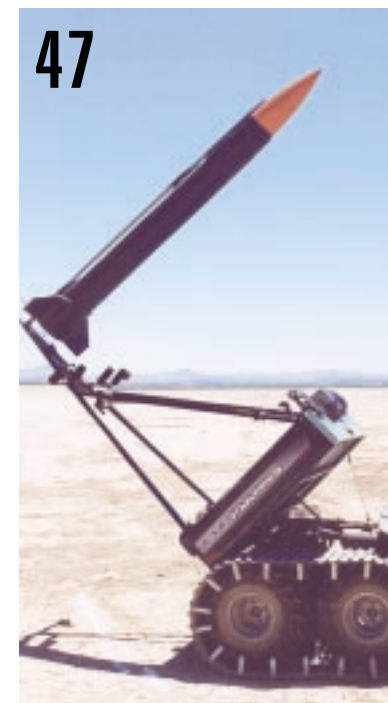
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THE MOVERS & SHAKERS

Slave Driver | Brent McNeely

1st Slave | Tim Quigg

2nd Slave | Alan Cain

3rd Slave | Scott D. Hansen

4th Slave | Brian Rosenfield

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Slave Driver | Brent McNeely

6th Slave | Brian Rosenfield

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pulp & ink | Superior Litho

label sorter | Passkey Systems

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A HOBBY IN CRISIS BY BRENT MCNEELY

September 11th means different things to different people. That Tuesday affected everyone in some small or big way. The rippling effects of September 11th impacted our hobby bringing it to a near standstill for almost two weeks. From Tuesday September 11th to Friday September 28th, the Department of Defense mandated that the FAA deny all waivers for rocket launches. During this period, the most influential people in rocketry worked closely with the FAA and a powerful US Senator to convince the Department of Defense to change its policy regarding hobby rocket waivers. On that Friday, this unnamed Senator convinced a four-star General to change the policy and allow rocket flights. But, a stern warning was given by the General that ANY violations of the specifics outlined in FAA rules for waivers or any questionable incidents would result in the ban on rocket waivers being reinstated. So, as a result, I would strongly encourage those with flight waivers to be very careful to stay within the guidelines and rules outlined by that waiver. Big Brother is watching closely right now, so please be good!

The whole event brings back many conversations that I've had over the years with various owners of large rocket companies. The worry has always been that the ATF would shut down the manufacturing of composite propellants. If this were to happen, the hobby would come to a grinding halt. It was with this thought in mind that the contin-

gency of hybrid rocket motors was created; rocket motors which do not fall under ATF control. I applaud the rocket industry for developing contingency products to save our hobby in that event. However, dealing with the FAA is a different matter. If the FAA were to decide at a future date to no longer allow waivers for rocket launches, then the hobby would be forced to adapt and evolve accordingly. Where would it go? I suspect that rocketry would continue to grow and flourish but, in the area of E, F, and G motors (what is typically called "mid-power" rocketry). Further, I suspect that variations on the theme such as rocket cars and other rocket-powered crafts would begin to emerge. Estes released its black powder powered rocket cars this year after showing them off at last year's RCHTA trade show.

In a nutshell, regardless of regulations, the hobby will survive. It will go forward in some form. I encourage everyone to enjoy the freedom which has currently been extended to us by the FAA and ATF. But, I admonish all rocketeers to be very careful to adhere to the letter of the law in all instances. We cannot afford a single "renegade" rocket launch at this point. If you have been denied a waiver for any reason, fly the small stuff and have fun with it. Don't call an "M" class motor a "G" motor and wink at your friend while doing so. The result very well could be the end of high-power rocketry as we know it.



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***Stunning* Magazine**

Oh, by the way, I just received my issue of Extreme Rocketry. Not only does the ad look good, but from cover-to-cover the issue is *stunning* in

...cover-to-cover the [LDRS] issue is *stunning* in its quality. And you [can] quote me on that.

its quality. And you quote me on that. Keep up the good work!

—Ed, Giant Leap Rocketry, Inc.

Technical Content

I think you have a great magazine in both look and content. I especially like the technical articles. I was most impressed with the article on cones and transitions in issue #8. That is exactly the type of material I like to see. I would also like to see more articles on scaling, construction and painting techniques. Keep up the good work!

—Tom Gugliotta

Cover Photo

You never printed anything about the cover photo from issue #12. Does the person on the cover work for SnapOn, or did he use SnapOn tools to put his rocket together?

—Jim Orner

We found out after we published the magazine that the rocket was owned by Duane Uhl. Rocket was a LOC Bruiser.

LDRS Article Looks Great!

Hi, just wanted to drop you a line and say that the LDRS article looks great! Nice work!

—Ray Dunakin

Great Interviews

I really enjoy the interviews that you run in ER. It is very interesting to read about those who made

the hobby, and to learn more about the human side. The interviews also serve to preserve the history. Keep up the good work!

—Steve Ainsworth

13 Year Old Fan

I am a thirteen year old child that has just started to get into the wonderful world of rocketry. My dad bought me an Estes kit for Christmas 2000, and ever since, both of us have gone nuts over the hobby! One day, while my dad was at our local hobby store buying a high power kit, he found a copy of your magazine. It was really great! I would like to compliment the whole staff at Extreme Rocketry for doing an excellent job. As soon as my dad discovered your magazine, we purchased every issue. Your magazine covers every area of rocketry very well (especially the extreme side!). I love all the excellent photos and I especially enjoy the 'extremely odd projects' section. All the projects in that section are really cool! Thank you very much for publishing a magazine that, in my opinion, is one of the greatest. Keep up the good work!

—Brandt Bennett

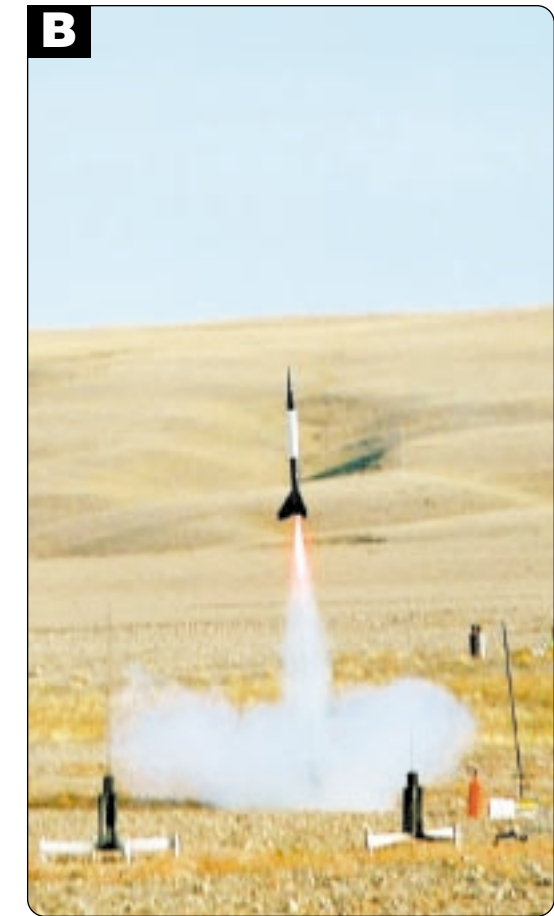
Building a Launch Controller

Weeks ago I told my son that we should build the launch controller on page 40 of the Jan-Feb 2001 issue. Well, I finally got around to doing it and both my son and I are most amazed. Construction was straight forward and easy. We opted to buy 6 ft. 16/2 extension cords for our pigtailed which worked very well. For our light bulb test pigtail we soldered a Radio Shack 12 VDC bulb assembly (2 for \$2.99 #272-332C) to one of the 6 ft. extension cords. Only one plan change is that we noted was that the part number for the piezo buzzer should be 273-060. Also, we could not buy a 510 Ohm 1/2 watt resistor therefore we bought a 180 Ohm 1/2 watt and a 330 Ohm 1/2 watt resistor and soldered them together in series to make the 510 resistor.

Although we have not yet used the launch controller for an actual launch, we have tested it. Using a small motorcycle battery (Exide battery #4L-B on sale at Pep Boys for \$11.00) we attached one Copperhead igniter to each of our 3 pigtailed, each at the end of a separate 25 ft 16/3 extension cord. All tested good for continuity. When we pushed the launch paddle all three copperheads lit instantly!

This was a great project with no headaches and fantastic success. Thanks to Extreme Rocketry and to Dave Muesing and Ed Rowe for the article. This will make our church launch this weekend much easier!

—Dick & Max Tohline



A. Doc von Karbon sent us this great black and white photo captured at Springfest 2000. The photo is taken of people standing in line at the RSO tent prior to loading rockets on the pads.

B. Andrew Longdale's successful maiden flight for his 4" Black Brant II (75" tall) on Dr. Rocket 54mm/852 hardware with a Aerotech J315R (Redline) launched to 2600'AGL at the Sullivan Lake IX launch (Roc Lake IV site) in Alberta Canada (3000'ASL). Photo courtesy of Al McCue.

Do you have a comment about our magazine? If you liked an article, or hated it, please let us know. We read every letter sent to us and we publish most letters on this page. Please send your letters or comments to us at: Comments Extreme Rocketry 109 E. Charleston, Ste. 101, Las Vegas, NV 89104 or email us at: info@extreme-rocketry.com



Sunset at Balls 2000, Blackrock, NV

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Spaceflight historian and rocket enthusiast Jack Hagerty chronicles the evolution of the spaceship during the century by examining 75 of them; some serious, some whimsical, some terrifying, and all fascinating. Each ship is described and analyzed in detail. Each entry includes a data drawing by Jon Rogers sufficient for hobbyists and/or craftsmen to build a version of their own.

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Shortly after LDRS, Steve Moore, owner of RocketSilo, was diagnosed with a degenerative and increasingly debilitating illness. While starting treatment, every attempt was made to keep RocketSilo operating. But, as a new business in a struggling economy—all attempts fell short. With the rippling effects on the economy and rocketry from the tragic events of 9/11 and Steve's increasing physical limitations, this difficult decision had to be made.

CLOSED

ROCKETMOTION LAUNCHES WEB STORE

Rocketmotion, your complete sport model and high power rocketry super shop, announces the launch of its new web store and info base. The new site, online now at rocketmotion.com, is loaded with new features. These include the expansion of many existing product lines with the addition of several new ones. PML, Aero Pack, Acme, blacksky, Kosdon by Aerotech, Restricted Access motors by Aerotech, Rocketmotion Gift Certificates and much, much more are available now.

Other features include a new and more powerful product search engine that makes finding what you need fast and easy. Online tutorials, featured products and reviews, regulatory updates and an up-to-date launch calendar make sure you stay connected to your hobby. "This site is the product of six months with no sleep" remarked rocketmotion's Jeff Steele – "After a crazy first season out, we finally found the time to get it done"

In the shipping department, rocketmotion has teamed up with UPS Online and USPS Online to provide faster more reliable service. Choose your favorite shipping method and calculate shipping costs instantly! What's next at rocketmotion? How about their very own line of high performance rocket kits and accessories. The first of these to be released VERY soon.

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YANK ENTERPRISES RELEASES NEW DECALS

Yank Enterprises is announcing the addition of vinyl decals to be included with certain kits. These decals will be much more durable than previous, and will not require clear coating. As well as decals for the kits, there will also be "Military Decal" sets available for your scale project. There is a wide range of applications for this vinyl service and decals can be made in virtually any shape, size and color.

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PUBLIC MISSILES UPDATES WEBSITE & ADDS PTERODACTYL KIT

PML has had some "families" of rockets in their line for a while now. The first was the AMRAAM series (2.1, 3.0 and 3.9" diameter), and then the Endeavour lineup (Small Endeavour, Endeavour, and Ultimate Endeavour). Well, now the Pterodactyl kits have a new baby brother, the Tiny Pterodactyl! The Pterodactyl has been a favorite for those wanting a "big kit" in their fleet, and when PML released the Pterodactyl Junior a few years ago rocketeers really took to it as well. Now the Tiny Ptero completes the "set", at 2.1" diameter, 25.5" long, with an 18" chute, G-10 fins...the standard high-quality PML parts you've come to know. The Tiny Pterodactyl flies on 29mm motors. As usual, PML has already updated our RockSim files, our KitSpecs chart and our Motor Recommendations Chart, so everything you need to know is on their website at www.publicmissiles.com. Go check out the Tiny Ptero on the Sport Fliers page.

When you go to the Sport Fliers page of the webstore to see the Tiny Pterodactyl, you'll notice that the Kits portion of the webstore has a new look! PML has updated the Kits pages with all-new photos of almost all their kits, and a slightly different page layout that should make it easier and hopefully a little more enjoyable to navigate the pages. They've also updated many of the pages throughout the entire website (not just the Kits section) to make them a little easier on the eyes for those viewing the site at 800x600 resolution.

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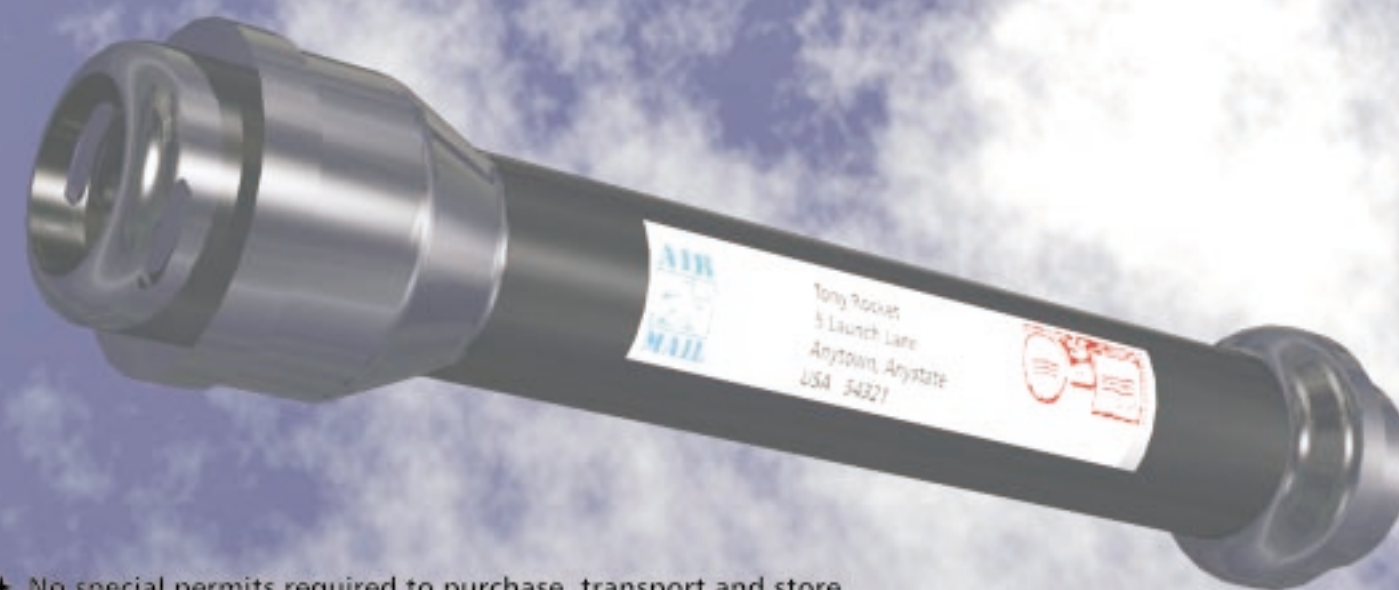
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RCS ANNOUNCES NEW PRODUCTS

RCS Rocket Motor Components is pleased to announce the immediate availability of two new products for 2001.

The first product is a new molded phenolic nozzle suitable for 98mm experimental motors. This nozzle is of the multi-throat (so-called "Medusa") variety, meaning the experimenter can use the nozzle for a variety of motor designs by simply drilling out two, three, four or all six of the plugged outer throats to the dimensions necessary for proper operation of their particular configuration. The price is \$29.95.

The other new product is a "Resource Library" CD-ROM which contains hundreds of files in PDF and MS Excel format that are useful for the experimental rocket enthusiast. Included on the CD are a series of informative NASA rocket motor technical reports, federal screw thread standards, technical information and material safety data sheets (MSDS) for popular propellant chemicals, the Air Force Chemical Equilibrium Specific Impulse (Isp) Code, helpful RCS motor design spreadsheets and federal and state regulatory references. As a bonus RCS has also included numerous videos of various experimental and historic rocketry activities including recent ground and on-board video shot by the Gates brothers. The CD sells for \$19.95. An updated order form which lists the newly released products is now available for download from the RCS website.

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ARA Press is proud to announce the release of its premier product, Spaceship Handbook. Nearly five years in research and production, Spaceship Handbook is a companion piece to Peter Alway's Rockets of the World, covering Theoretical, Fictional and famous Cancelled programs of the 20th Century.

The book goes into significant detail on each subject covering not only design details, but the motivations and influences on the designers. Its 540 pages are coated stock with full color illustrations throughout and color accented data drawings.

There are 75 vehicles total including designs from Tsiolkovsky, Oberth, Sanger, von Braun, Buck Rogers/Flash Gordon, George Pal, Thunderbirds, 2001, Wallace & Gromit, X-20 Dyna Soar, MOL, NOVA, Lockheed VentureStar and many, many more! Also available is a poster of the gorgeous cover painting on heavy art stock.

ARA Press
785 Jefferson Ave.
Livermore, CA 94550
Fax: (925) 455-1143
www.arapress.com

DG&A ROCKETRY RELEASES NEW KIT

DG&A was founded this year in Bloomington, TX. The company was named after the first letters in each of the founder's children's names. Scott Binder was responsible for getting the founders of DG&A started in high power rocketry, and has been very helpful in setting up the company. The first kit to be introduced by DG&A is the Armageddon which features four beautiful large fins. In addition, there are four canard fins on the payload section of the rocket. This rocket looks great, especially on a launch pad!

DG&A High Power Rocketry
P.O. Box 779
Bloomington, TX 77951
Phone: (361) 897-2256
www.dgarockets.com

HAVE NEWS TO SUBMIT?

If you have manufacturer's news to submit to Extreme Rocketry magazine, please edit it down to 150 words or less, and please write it in third person. We will do edits to longer submissions to make them fit, and edit others as necessary. Please provide contact information for your company so that we may include it with your news item. Notifications of deadlines are usually given via email. If you wish to be added to the email list, send an email to submission@extremerocketry.com.

The National Association of Rocketry Presents
NARCON 2002
 April 5-7 Austin, Texas Clarion Inn & Suites

The Austin Area Rocketry Group invites you to join us for for a weekend of rocketry and a celebration of the Golden Anniversary of the Dawn of the Space Age.

Saturday evening banquet - Keynote Speakers: scientist and author Frederick I. Ordway III, artist and author Ron Miller, historian and author David Portree

This year's program includes all the technical sessions you've come to expect from NARCON, model rocketry, scale techniques, high power, competition, and more - plus special sessions:

- Golden Anniversary Modeling Contest
- Airbrush Techniques Workshop sponsored by Kings's Hobbies, Austin
- Amateur Radio License examination administered on site
- Special extended track for educators

For more information, email narcon2002@austin.rr.com or see <http://www.narcon2002.org>



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NOVEMBER TIPS AND TRICKS BY TIM QUIGG



LDRS 17 at Bonneville, UT

Rocket Kits for Level Three?

Extreme Rocketry Magazine recently received an inquiry from a reader, asking if the use of a kit rocket for level three certification was acceptable. The best advice I can give you would be to check with your TAP members before you drop several hundred dollars on a rocket kit. By and large, it is acceptable to use a rocket kit to make your level three certification attempt. However, there are some TAP members who would prefer that you scratch build your certification bird; only because you will learn a great deal more by scratch building than you will by "just assembling another kit." There are several very good kits out on the market produced by very reputable dealers. Try a search on Rocketry Online in the Vendor's Section to begin your research!

Motor Retention for Tail Cones

I was recently approached by a beginning rocketeer who had just purchased a HPR kit featuring a tail cone in the design. Naturally, he was curious as to how he could achieve effective motor retention with little or no aft centering ring. He didn't feel "warm and fuzzy" about using the time-honored friction fit method either. What to do? The best way I've found to achieve positive motor retention in a design utilizing a tail cone, is with either an Aeropac motor retainer system, or the new Slimline Motor Retention System distributed by Giant Leap. Some folks have balked at the price of these systems. However, when one considers the alternative of expensive kicked reloadable motor casings and/or crashed rocket vehicles, isn't the little extra money worth it?

Passing on the Flame

We've seen it many times at club launches...kids attending their first rocket launch. They're instantly hooked and want to participate right away, but

don't have a rocket or motors with them. What do you do? Countless times I have loaned children such as these a rocket from my own fleet, and supplied them with a rocket motor, just to "set the hook." However, why not have your club provide several "community rockets" for this purpose? The Spokane Area Rocket Club (SPARC) NAR # 626 did just that. The club maintains several "loaner" model rockets that they keep on hand at their monthly club launches. When a child attending a launch for their first time expresses an interest in participating, SPARC provides a "loaner rocket" so the child can participate. I don't know of a single adult who hasn't given at least one child a model rocket motor at one time or another. Club volunteers could be used to maintain and repair these rockets as needed. A great idea, SPARC!

Transporting Rocket Motor Casings

Over the years, I've seen some interesting ways to transport those expensive reloadable rocket motor casings to and from the launch site. I've seen them wrapped in bubble wrap, even in padded, single handgun cases. Here's a neat little trick I learned from fellow rocketry enthusiast, Steve Thatcher, of Kenmore, WA. Steve uses full lengths of Phenolic motor mount tube to store and transport his casings in. He places all of his 29mm casings end to end in one tube. Next, he slides his 38mm casings inside a 38mm motor mount tube. He can then slide the 29mm motor mount tube containing his 29mm casings inside the 38mm tube containing his 38mm motor casings. An appropriate end cap on each end secures all of the casings together into one neat little package for transport and storage.

Do you have a tip or trick you would like to share with your fellow rocketry enthusiasts? Just drop us a line at Extreme Rocketry Magazine at info@extremerocketry.com with your contributions!

Rocket Kit Data Sheet

TINY PTERODACTYL



A new generation of Pterodactyls is born! Like it's parent the mighty Pterodactyl and sibling Pterodactyl Jr., the Tiny Pterodactyl was born to fly. Use an F motor for slow, graceful flights or pack it with a G motor for real excitement. We've even flown the Tiny Pterodactyl on an H-238 and amazed the crowd with a neck snapping transonic flight!*

* Nose weight was added to keep the CG forward of the CP during this flight. Some rocketeers like to keep two nosecones on hand: one weighted for higher power motors and a standard one for lower power flights.



Features Include:

- Fly great using F through H* motors
- Pre-slotted Quantum Tube airframe
- G-10 fiberglass fins
- Piston ejection system
- Multi-panel nylon parachute
- Plastic nosecone
- Thin-wall brass launch lug
- Decal sheet
- Explicit instruction

Dia.: 2.1" Height: 25.5" Weight: 18 oz.
MMT: 29mm Chute size: 18" Launch lug: 1/4"

Recommended motors and predicted altitude chart

All motors shown are Aerotech. Information displayed as Altitude in Feet, Optimal Delay in Seconds

29mm Single Use Motor	F20W	F23BM	F25W	F50T	G38BM	G40W	G80T	H55W
Tiny Pterodactyl, 29	1374,6.59	1031,6.22	1687,7.30	1820,8.70	1895,8.76	2648,9.43	2285,9.02	4432,11.51
	H70W							
	4423,12.00							
29mm Re-load kit	G75J	H128W	H238T					
Tiny Pterodactyl, 29	3348,11.41	3849,12.36	3427,12.13					
29mm Re-load kit	F37W	F62T	G54W	G104T	F22J	F40W	F52T	G33J
Tiny Pterodactyl, 29	810,5.8	841,6.42	1555,8.12	1736,9.10	1063,5.74	1639,8.39	1583,8.23	2001,8.21
	G64W							
	2629,10.33							

Other motors can also be used but some may require modifications to the kit. Always refer to the Motor Recommendations Chart at www.publicmissiles.com for the latest information.

Public Missiles Ltd. 349 Cass Ave. Ste. C Mt. Clemens, MI 48043 1-810-468-1748

MENTORING—THE NEXT STEP BY TIM QUIGG



Jerry McKinley and Les Derkovitz assemble electronics at Balls 2000

Regardless the interest level of the beginning rocketry enthusiast, a strong foundation in the basic concepts and fundamentals of rocketry are essential to personal safety and successful flights. Over the years, I've been witness to many beginners as they dive headlong into mid-power and even high power rocketry with little or no previous experience, which leads to unsuccessful flights. I have also seen perhaps just as many experienced rocketeers have failure after failure, soon becoming disgruntled and dropping out of the hobby. For those of you who have acted as mentors to some of these people, it is imperative that this problem be identified early, so that some remedial options can be presented to these

folks. Every person that we can keep in the hobby makes us just that much stronger. More enthusiasts spread the word about the hobby, which in turn brings in even more spectators and potential hobbyists. As mentors, we can help to build a strong foundation, one person at a time.

Sometimes all a beginner needs is just a little extra time and patience. Some basic concepts are often hard to comprehend; especially for those who have little or no prior rocketry experience. Center of Pressure, Center of Gravity, basic aerodynamic principles, and reloadable motor technology can often times be vexing. How can we as mentors help these folks to better understand these concepts and enjoy the hobby more? Countless clinical trials over the past decade have amassed a wealth of information on how the human mind comprehends concepts and acquires knowledge. Some people learn better by actual "hands-on" experience. Others are visual learners, benefiting most from visual aids. Still others learn more by listening and taking notes in a lecture-based atmosphere. As an accredited law enforcement instructor, I have found the simple "Tell, Show, Do" model of instruction works well for the vast majority of officers who have attend my classes. Quite simply, in order to teach a specific concept, first you tell how it's done. Next, you show the student how the task is done. Finally, you allow them actual hands-on practice. Following this instruction model, I am touching upon all three sensory areas that a person uses to gain knowledge; touch, sight and sound. As a rocketry mentor, I have adapted this model of instruction to our hobby, and it has worked very well for me over the past seven years. Here's how it works using a reloadable rocket motor as an example.

- 1) TELL:** In teaching a person how to assemble a reloadable rocket motor, I first tell them about the casing, the end closures, and about the reload kit. All of the parts and components are laid out on a table, and each part is identified for the purpose of orientation and familiarization. The rocketry enthusiast can handle each piece or part, and ask questions during this step.
- 2) SHOW:** Next, the reloadable rocket motor is assembled. I do this several times without grease or the BP ejection charge so that the reload can be assembled and disassembled several times. Again, the neophyte rocketeer asks questions. By the second or third time through, your pupil will probably be telling you how to do it!
- 3) DO:** Now it's time for the pupil to show you what they've learned. Allow them to do what you just did and dry assemble a reloadable rocket motor from start to finish. Do this several times until you are confident they know what they are doing. You can then stand by and mentor as the budding new rocket scientist assembles their first reload for flight. To facilitate such a training exercise, I have purchased a reload kit that I keep in a zip lock baggie specifically for the purpose of teaching beginners how to roll a reloadable rocket motor. It's been through many, many hands, and the cost of the reload has more than paid for itself in terms of new, safe, and competent rocketeers on the launch field.

A couple of things to keep in mind when using this or any other model of instruction:

- 1) Don't be overbearing.** The attitude of, "My way is the only, correct way to do it" can instantly turn people off. It's better to take a positive, helpful approach such as, "There are several ways of doing this, but this is the way that has worked best for me."
- 2) Be patient.** The Tell, Show, Do model of instruction is only as good as the instructor using it. Some people grasp concepts quicker than others. It may take several repetitions of a procedure before the light comes on for some people. Take the time to work with these folks!
- 3) Follow-up and reinforce.** Your job as a mentor doesn't end when your pupil certifies. Make sure he or she knows they can come to you any time in the future with questions or problems. Make it a point to let them know you are genuinely there to help.

In conclusion, I know this method of instruction works. It's the standard training model used by law enforcement agencies across the nation. Having adapted it to the hobby of model rocketry, it has served me well for nearly seven years as I have successfully introduced many hobbyists to our realm of fire and smoke.

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LAUNCH SITE COMMUNICATIONS BY TIM QUIGG

One of several key elements to launch site safety is adequate communication. Without it, how can everyone on the launch site know what's going on? How can you warn everyone to move or call for a "heads up" when a rocket is coming in ballistic? How can you get the word out to fire suppression crews if there's a fire on the range? "Rocket Fossils" such as myself can remember 25 to 30 years ago when the only way to communicate with the crowd was with a hand-held bullhorn. They were large, bulky and expensive. The only way to talk to tracking stations and recovery personnel was via old military surplus field phones, often times involving literally hundreds of feet of cable. My how things have changed!

On the launch field of today, there are wide assortments of communication devices being utilized by some very industrious and innovative folks. For smaller launch sites, a simple battery powered PA system with two or three speakers works very well. If you watch the Radio Shack ads, you can generally

PA systems and FM transmitters are great for letting the group as a whole know what is going on, but what about personal communications? If your wife or son are headed out to recover your rocket, and are straying from the proper path, how can you communicate with them to get them back on course? In the early days, we used to use the cheap child's handheld walkie-talkies. Unfortunately, these inexpensive play toys were problematic at best, and usually didn't work much beyond 1/4 mile. If you were lucky enough to have a friend or club member who was a ham radio operator, the ham portables were just the ticket. However, they were also very expensive, and required special FCC licensing to operate.

Today, the advent of technology has provided us with a simple solution to the problem of individual personal communications on the launch field in the form of the "Family Radio Service" or FRS handheld transmitters. These little jewels are just the ticket for use in a wide variety of communication



LDRS XX, Lucerne Dry Lake Bed, CA

roles at the launch site. Your event staff will wonder how they ever got along without them! Give one to your LCO, one to your RSO, your Launch Director and Pad Managers, and you have instant communication with everyone. It really makes things run faster and smoother when everyone is in the loop! The early FRS units came equipped with only two channels. The latest ones however are digital, and come equipped with many channels. This creates an even greater flexibility with these units than ever before. A group can now designate one channel for the launch staff, while other folks can go ahead

pick up one of these units for under \$100.00. Powered by a 12-volt deep cycle marine battery, or a Prestone brand "Jump It" unit, they serve their purpose quite well for those groups on a limited budget.

At some of the larger events, there are those clubs that utilize an FM transmitter, used as a stand-alone unit or operated in conjunction with their PA systems. Spectators, recovery crews in the field and fliers only need to have a small FM radio with them, or tune in on their car radios, and they can pick up everything that is being said over the PA system as it is simultaneously broadcast. Most of these systems are relatively inexpensive. Some are even offered in kit form that one can assemble themselves, which can realize additional savings. It's always wise to check into the various systems first before deciding on a particular model however, as some could require special FCC licensing.

and use the various other channels to keep track of the kids, coordinate rocket recovery operations, rocket project personnel, and other such tasks. They are inexpensive and small, and fit nicely into your range box, shirt pocket or fanny pack.

It should be noted that the use of ANY radio-transmitting device should first be approved by range management. In the past, some transmitters and stray radio signals have been known to accidentally trigger on-board electronically controlled deployment systems. You wouldn't want to be responsible for setting off an ejection charge while a rocket was on the pad, or worse...while someone was prepping the rocket for flight!

When used responsibly and correctly, FRS radios can really make life a lot easier on the range. Pick up a pair at any large department store or electronics shop, and try them out at the next launch you attend.

IT'S TIME TO BUILD YOUR ROCKET!

Rocky Mountain Rocketry is run by rocketeers, just like you. Our goal is to have everything in one place that will take you from concept to countdown.

To order from Rocky Mountain Rocketry do one of the following:
Call one of our two phone numbers: 801-808-0443 or 801-566-2965 Fax us at 801-659-2844
email: orders@RockyMountainRocketry.com

Pay with MasterCard, Visa, American Express, Discover, Money Order, or Check.
The shipping/handling charge is shown in each box for each type of item. Your shipping/handling charge will be the highest of these charges. Utah residents, add 6.6% Sales Tax.
Ron and Dave wish you happy flying!



PAPER TUBE

Tube	Coupler	Motor Tube
Size length price	Tube length price	Size length price
0.95" 34" \$2.50	-----	24mm 5.5' \$0.75
1.14" 34" \$2.75	-----	25mm 11' \$1.25
1.53" 34" \$3.75	1.53" 4" \$1.50	38mm 11' \$1.75
2.15" 34" \$4.50	2.15" 5.75" \$1.70	54mm 17' \$3.00
2.58" 30" \$3.75	2.58" 5" \$2.10	
3.00" 34" \$5.50	3.00" 6" \$2.70	
3.90" 34" \$6.50	3.90" 6" \$3.30	

All paper tubes are top quality kraft paper tubes and are compatible with LOC Precision parts. Paper tubes will also work with phenolic couplers if you want a custom length coupler.
We can cut tubes to the length you want for \$1.00 per cut.
Shipping: Single or nested tubes to 3.00' \$4.50
More than 1 tube, or tubes over 3.00' \$10.00

FLEXIBLE PHENOLIC TUBE

Tube	Coupler	Motor Tube
Size length price	Tube length price	Size length price
1.14" 36" \$5.25	1.14" 2" \$0.60	25mm 12" \$2.25
1.53" 36" \$6.25	1.53" 3" \$0.60	38mm 12" \$3.00
2.15" 36" \$6.75	2.15" 4" \$0.75	38mm 18" \$4.25
2.58" 36" \$8.00	2.58" 5" \$1.25	54mm 12" \$3.00
3.00" 36" \$8.50	3.00" 6" \$1.50	54mm 18" \$4.25
3.90" 36" \$10.25	3.90" 6" \$2.75	75mm 36" \$8.90
5.38" 48" \$22.75	5.38" 11" \$5.75	98mm 36" \$10.25
7.51" 48" \$27.50	7.51" 15" \$9.75	

All phenolic tubes are the flexible phenolic tubes popularized by Red Arrow. Full length couplers cost the same price as a body tube. We can cut tubes to the length you want for \$1.00 per cut.
Shipping: Single or nested tubes to 3.00' \$4.50
More than 1 tube, or tubes over 3.00' \$10.00
5.38" & 7.51" tubes \$15.00

ELECTRONICS

Open Advanced Electronics
FCP-MDG \$150.00
Shipping \$7.50
Express \$17.00
The MD is a complete package. Everything you need is included: cables, mounting hardware, instructions and even the battery.
Switch activated
Apogee display
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Flight data recording
Simple menus for set-up
Visual and audible indicators.
The most versatile and easy to use altimeter on the market!

CENTERING RING & BULKHEADS

OD	3/32"	1/8"	3/16"	1/4"	3/8"	1/2"
1.14"	\$0.95	\$0.95	\$0.95	\$1.10	\$1.35	\$2.20
1.51"	\$1.00	\$1.00	\$1.00	\$1.15	\$1.40	\$2.25
2.15"	\$1.10	\$1.10	\$1.10	\$1.20	\$1.50	\$2.40
2.58"	\$1.15	\$1.15	\$1.15	\$1.25	\$1.55	\$2.45
3.00"	\$1.25	\$1.25	\$1.25	\$1.30	\$1.70	\$2.55
3.90"	\$1.45	\$1.45	\$1.45	\$1.50	\$1.90	\$2.80
5.38"	\$1.95	\$1.95	\$1.95	\$2.00	\$2.40	\$3.40
7.51"	\$2.75	\$2.75	\$2.75	\$2.95	\$3.25	\$4.25

All centering are high quality birch and most are cut to order. When ordering, make sure you tell us if the inner and outer tubes are couplers or tubes and whether they're paper or phenolic.
Couplers: add \$1.00 for every hole after the first hole.
Bulkheads are \$0.50 less than centering rings of the same size.
Underlined rings are the recommended thickness for this size.
Shipping: Ring & Bulkheads \$4.50

NOSE CONES

LOC Precision (lower prices!)	Public Missiles Ltd
Size length price	Size length price
1.51" 8" \$8.25	2.15" 9.5" \$9.50
2.15" 9.5" \$9.25	2.58" 11.25" \$11.25
2.58" 9" \$9.30	3.00" 13.25" \$14.25
3.00" 11.25" \$13.25	3.90" 16.75" \$16.00
3.90" 12.75" \$15.00	
5.38" 13" \$35.00	Aerotech
5.38" 21" \$45.00	2.58" 12.5" \$10.75
7.51" 22" \$60.00	

These are all name brand, plastic nose cones.
Shipping: Up to and including 4" nose cones \$4.50
5.38" or bigger \$10.00

PRE-MADE SHOCK CORDS!

4mm Nylon Cord (light rockets)	9/16" Tubular Nylon (average rockets)
per foot \$0.15	per foot \$0.20
	10' with 2 loops \$4.00
	20' with 2 loops \$8.00
	30' with 2 loops \$8.00

3/4" Tubular Nylon (big rockets)	1" Tubular Nylon (serious mono rockets)
per foot \$0.30	per foot \$0.40
20' with 2 loops \$8.00	20' with 2 loops \$10.00
30' with 2 loops \$11.00	30' with 2 loops \$14.00

The loops are sewn in with using bar locks and heavy duty nylon thread.
Shipping \$4.50

LAUNCH GUIDES

ACME Conformal Lugs	ACME Conformal Rail Guides
Tube size rail size price	Tube size price
1.64" (38mm) 1/4" \$3.75	1.64" (38mm) \$3.75
1.64" (38mm) 1/4" \$3.75	1.64" (38mm) \$3.75
2.26" (54mm) 1/4" \$3.75	2.26" (54mm) \$3.75
2.26" (54mm) 3/8" \$3.75	2.26" (54mm) \$3.75
3.10" 3/8" \$4.75	3.10" \$4.75
3.10" 1/2" \$4.75	4.00" \$4.75
4.00" 1/2" \$4.75	6.15" \$4.75
	7.67" \$4.75

Extruded aluminum lugs & rail guide. Two per package.
This is built in standoff for use with ACME fin cans.
Nylon Rail Guides Nylon 3 piece, with extra screws \$1.00/pair
LOC Precision Lugs Paper 1/4" \$0.50/pair Paper 1/2" \$1.00/pair
Shipping \$4.50

TOP FLIGHT PARACHUTES

Round Chutes	X-Type Chutes
Size Rocket Wt price	Size Rocket wt price
9" 1 oz - 2 oz \$4.00	10" 1 oz - 2 oz \$5.15
12" 2 oz - 3 oz \$4.95	18" 3 oz - 7 oz \$9.05
15" 3 oz - 5 oz \$5.95	24" 5 oz - 12 oz \$9.95
18" 5 oz - 10 oz \$6.90	30" 10 oz - 1 lb \$13.25
24" 10 oz - 1 lb \$8.75	36" 1 lb - 1.75 lb \$17.00
30" 1 lb - 1.5 lb \$12.30	42" 1.25 lb - 2.25 lb \$18.95
36" 1.5 lb - 2 lb \$15.15	48" 1.5 lb - 3 lb \$22.75
42" 2 lb - 3.5 lb \$18.95	54" 2.25 lb - 3.75 lb \$25.60
50" 3.5 lb - 4.25 lb \$21.80	60" 2.5 lb - 4.75 lb \$28.45
58" 4.25 lb - 6.5 lb \$25.60	70" 3.25 lb - 6.5 lb \$37.95
70" 6.5 lb - 9 lb \$35.10	80" 4.25 lb - 8.5 lb \$66.95
84" 9 lb - 13 lb \$66.95	90" 5.25 lb - 10.5 lb \$69.30
95" 13 lb - 17 lb \$95.45	Colors: Pink, Orange, Black
120" 17 lb - 26 lb \$75.95	Shipping \$4.50

CHUTE & SHOCK CORD PROTECTORS FROM TOP FLIGHT

Nomex chute protectors	Nomex Shock Cord Protectors
Size tube size price	Length price
3"x3" up to 1.5" \$2.80	36" \$8.55
9"x9" up to 3" \$4.75	60" \$14.25
12"x12" up to 4" \$5.65	
18"x18" up to 6" \$8.55	
24"x24" up to 8" \$10.45	

Nomex chute protectors are a black square of chemically treated cloth and is used in the place of welding. Nomex shock cord protectors are long tubes of similarly treated cloth that covers your shock cord.
Shipping \$4.50

HARDWARE

Nylon Retainers	Quick Links
Small 24mm/29mm \$1.50	Tiny 1/8" 130lb \$1.10
Medium 38mm \$2.00	Small 5/32" 170lb \$1.20
Large 54mm & up \$3.00	Medium 3/16" 440lb \$1.35
Come with clips, T-Nuts & Screws. Not suitable for retro-fit	Large 1/4" 690lb \$1.50
	X-Large 5/16" 1540lb \$2.25

U-Bolts	ACME Nylon fin can
Small Narrow 1/4"x1" 400lb \$1.10	38mm \$25.00
Medium Narrow 5/16"x1" 610lb \$1.50	54mm \$25.00
Small 1/4"x1.5" 405lb \$1.20	
Medium 5/16"x1.5" 610lb \$1.60	These are one piece nylon fin cans that glue directly to a phenolic motor tube!
Large 3/8"x1.5" 1090lb \$2.45	

All hardware comes with all the washers and nylon lock nuts so you can install them right away.
Shipping \$4.50

ADVKE

The best place for advice is from your local NAR or Tripoli club, but we're willing to talk rockets too. We'll try to answer all your questions. Advice FREE

RON AND DAVE

Ron Wiegand is the prefect for UROC.
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ORGANIZING YOUR LAUNCH

6

SIX TIPS FOR BETTER AERIAL PHOTOS

B Y R A Y R . D U N A K I N I I I

Since 1987, I've flown camera rockets almost exclusively. Over the years, I've made hundreds of flights with various types of camera payloads, from launch sites all over the West. Recently, I've begun selling mounted 8x10 prints of my best rocket aerial photos. Here are a few tips you can use to get the best quality from your own camera payloads:

1. FILM SPEED

Film speed affects the quality of the print. Faster film is grainier than slow film. Film with a speed of ASA 100 will produce a sharper image than ASA 400. You can easily change the DX coding on a roll of ASA 100 film to ASA 400, thus forcing an automatic camera to use its fastest shutter speed. Buying the cheapest film is not always a good idea either, as the bargain brands usually have more grain or poor color reproduction. I find I get good results from Kodak Gold.

2. FILM SIZE:

The size of the negative is also a factor. The smaller the negative, the grainier the image will be when enlarged to print size. Anything smaller than 35mm will not produce the best results. APS film is only 25mm, and 110 film is even smaller.

3. SHUTTER SPEED:

Shutter speed is the next factor for shooting better aerial photos. During flight and recovery, the camera will be in constant motion. So, you'll need a very fast shutter speed in order to reduce or eliminate motion blurring. Most cheap fixed-focus cameras usually do not give you a choice of shutter speeds. Some will have a fairly fast shutter, but other models and brands can be quite slow. At the opposite end of the price range is an SLR camera. These are often capable of shutter speeds of 1/1000 or even 1/2000 of a second. However, they are very expensive, and are generally heavier and bulkier than a "point and shoot" camera. A mid-priced camera such as the Olympus Stylus Epic is a better choice; as it has a fast shutter speed, small size, light weight, and more affordable price.





4. LIGHTING:

Good lighting is also important. The best time of day is in the early morning or late afternoon, when the sun is low in the sky. The angle of the sunlight will create shadows that bring out the texture of the terrain. During the middle of the day, the lack of shadows makes everything look flat.

5. DIRECTION:

Ascent photos are often sharper and more interesting. There is relatively little movement compared to the descent, when the camera is swinging around on a parachute, so there's less chance of blurring. The ascent is also the most interesting part of the flight, with all the fire and smoke. When the rocket arcs over at apogee, you can get some great shots of the horizon.

6. TIMING:

Whether you use an electronic timer or a mechanical device to activate the camera, you should optimize the speed to match the camera's film advance rate as closely as possible. This will allow you to get the most photos per ascent, increasing your chances of getting a good shot. The film advance rate is the one drawback to using a camera like the Olympus — the auto-focus mechanism slows things down quite a bit. It takes about 2.5 to 3 seconds between each shot. Some cheap fixed focus cameras can fire off close to a frame per second. A good SLR camera can get two frames per second.





Extreme Rocketry

ABOUT THE CENTERFOLD



The centerfold photo was taken by a camera rocket owned by Ray R. Dunakin III. Photo is of an abandoned compound near Amboy, CA containing the ruins of three houses and a couple smaller structures which might have been related to salt mining on nearby Bristol Dry Lake. Amboy is located on historic Route 66 in the Mojave desert, east of Barstow.

The film was Kodak Royal Gold 100, "pushed" to 400. That means the DX code on the film cartridge was changed to fool the camera into using its fastest shutter speed.

The rocket was 1.8" diameter, about 3 feet long and weighing about 30 ounces. It was powered by an Aerotech single-use G40-7 and two D12's. It was launched in April 2000.

\$100 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 109 East Charleston, Ste. 101, Las Vegas, NV 89104 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.



Scratch-Built Nosecones for Extreme Projects

Methods Requiring No Specialized Equipment

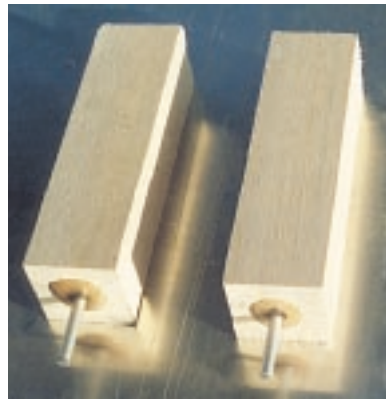
by William J. Inman, PLS



Sometimes a rocket project requires a nosecone not commercially available due to its size, shape, or other special requirement. My first encounter with such a project was my 4 1/2" diameter "Scalded Cat" experimental steam rocket. When I was flying altitude competition, special low-drag nosecones with specific shapes were needed. The methods described here use a drill press as a makeshift lathe to "turn" the blank, but an electric hand drill would work if held in a vise or clamp. The simplest way to make a nosecone is to carve it out of solid wood or Styrofoam using this technique.

Construction of a One Piece Nosecone

First, a spindle is installed into a blank piece of wood, or for bigger projects, Styrofoam. The spindle must be mounted sturdy enough and deep enough into the blank to resist flexing from side loads. I use 3/8" steel rods for small nosecones and 1/2" rods for bigger ones. Next, attaching a 35-grit belt sander belt to an 18" long 1x4 board makes a "heavy sanding tool." The tool is then held to the spinning blank, taking the diameter down quickly. It is moved by hand until the shape for the rough taper and tip profile begins to form.



Solid balsa blocks for mold plug and internal core for replacement "F" Troop-2 nose cone.



The diameter being brought down with the "heavy sanding tool" in the cross-slide vise (photo: Jeanne Hoover)



Contoured sanding block in cross slide vise taking the blank down closer to the final shape.



Core being fiberglassed using the wet lay-up process. (Photo: Hoover)

Coarse grit will get it to the rough shape fast so don't go too far and end up below the final surface.

Depending on how precise a shape is desired, it can simply be sanded down by hand, shaping by eye. Otherwise a contoured sanding block is used to control the curve. This is made by carefully cutting the nosecone profile into something that can have sandpaper attached to this curved edge while leaving a base or guide edge perpendicular to the nosecone axis. A piece of soft, knot-free 1X4 wood board works well for this. Next, 80-grit sandpaper is attached to the curved side with 3M spray adhesive and the guide edge held flat to the drill press table while lightly pushing against the spinning blank. When the blank approaches the desired shape, it is sanded with 220-grit, then 400-grit sandpaper for a smooth finish.

Carefully cut the neck for the slip joint into it being sure to keep concentric with the nosecone axis. Something clamped to the table for a hand rest will help in keeping it circular and centered. Wood grain can be filled and slightly hardened with a sanding sealer for wood finishing. Three or four applications of sealer, sanding with 400-grit between coats and 600-grit after the final coat gets it nice and smooth. At this point, the spindle is removed and final painting done. Another surfacing method is to cover it with a coat of epoxy to keep the wood grain from showing through, then sanding to a smooth finish. If you're making a Styrofoam nosecone, a fiberglass and epoxy outer shell for durability is advisable. Do not use polyester resin with Styrofoam or it will "eat" the 'foam.

For hollow nosecones, a fiberglass shell is applied to a core or male mold made with the above technique. The core's diameter needs to be a little smaller to account for the thickness of the fiberglass.

Fiberglassing Over an Internal Core or Male Mold

My nosecones had to be hollow for parachute bays so I made male molds as described above. I waxed the molds with mold-release compound, fiberglassed them, then removed the cores. The "Scalded Cat" had a Styrofoam core while the 29mm and 38mm altitude rockets used balsa.

Once the rough dimensions are reached, a contoured sanding block is used to get the actual shape. If it's going to be a removable male mold, take it on



The dark areas are the low spots (dark orange on the right). Additional bondo will be applied there and re-sanded.



Neck alignment using rod with two centering rings in airframe tube.



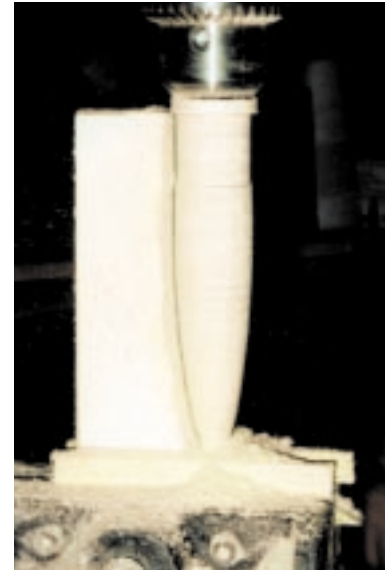
Neck alignment using board & straight edge.



Neck alignment using rollers & fixed indexes.



Black dotted lines will be the edges of the fiberglass strips. Blue dashed lines mark edges of the staggered second layer of fiberglass strips.



Latest contoured sanding block with neck built in. This Became the plug for the "new" mold.



Here you see the fit of the male mold and female mold half. The space between will be filled with the laminate. The width of the crack will be the thickness of the wall.

down to 1000-grit and then wax it up good with at least two coats of mold-release wax, and if possible, some PVA mold-release compound.

Distortion of the fiberglass cloth occurs if it is stretched, so a conscious effort is needed to avoid this. Unless the cone is close to a true conical design, it will not stretch enough to fit the compound curve, so crescent shaped strips are used for different sections of the nosecone. These are traced from paper patterns that will wrap neatly around the core and cover it smoothly. Depending on the amount of curve, it may take three or four different strips for this fit. Another set of strips are made that fit the same way, but staggered so they overlap the seams of the first layer. Short thin strips go up over the tip and between the other (crescent) layers unless it's a "pointy" tip. With the spindle inserted into a pipe clamped to the workbench for a holder, the core can be rotated as needed. The fiberglassing

then proceeds in an orderly manner, one crescent shape strip at a time, first the inner layer, then the next, etc. See "Getting Started With Fiberglassing" by Jay Ward (Extreme Rocketry July-August 2000) for more fiberglassing basics.

Once cured, it is sanded again with the contoured sanding block and 120-grit to smooth out the bumps. Cover it with Bondo "Glazing and Spot Putty," and sand again with 220-grit. If low spots remain, they get re-Bondo'd and sanded until gone. Often when the sanding block is hand held, ridges will form on the nosecone. They are removed with another contoured sander made by wrapping a piece of sandpaper halfway around the nosecone, grit side down, and applying a layer of fiberglass to the back of the sandpaper. First, wrap wax paper or Mylar around the nosecone to prevent bonding the sandpaper to it.

When cured, it will be flexible, but still retain the curve. Held to the spinning nosecone, this is effective at bringing it

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(Above) Author uses fiberglass backed contoured sander to "true up" the circular shape. (Below) Finished 29mm "F" Troop with home made nosecone before altitude record attempt



back to a smooth circular shape. The last step before core removal is trimming the base by using a steady-rest and holding a hacksaw to the spinning piece, leaving a nice, perpendicular edge at the base. If the core is wood and has been waxed and coated with mold-release, it should not be difficult to remove. A sharp twist helps break it loose. If it is Styrofoam, cut it out with a keyhole saw and scrape out the chunks with a wire brush, then sand the inner wall if additional smoothing is desired. Small squares of sandpaper glued to another Styrofoam nosecone core and spun in a drill works great for sanding the insides of nosecones. Their size and placement can be adjusted as needed. I got the inside of "Scalded Cat's" nosecone almost as smooth as the outside this way.

A regular slip joint with the airframe requires a neck. If the nosecone does not need to be hollow, the core can be left in and the neck built in as with the solid nosecone. But if core removal is necessary, building in the neck can cause problems. Therefore, with hollow designs, I attach the neck as a separate step. For a standard size, a coupler is epoxied in, but for a non-standard size, a custom

coupler is made by laying up fiberglass over a pipe or cylindrical object whose diameter will allow for the thickness of the fiberglass. If the right size pipe cannot be found, a smaller one can be built up by wrapping it with layers of paper. A wrap of wax paper or Mylar keeps the laminate from sticking. I also sand a taper onto the upper end to match the slope of the inner wall of the nosecone. This gives more contact area for the epoxy and a better fit with less of a lip to snag the parachute. Neck alignment is done with a rod or motor mount tube on two centering rings held centered in the airframe, with one end poking out the end of the airframe. The coupler that will be the neck is inserted into the airframe to the desired depth, then the nosecone is epoxied to it with the end of the rod into it's tip, holding it aligned with the rocket's axis. If the nosecone has a rounded tip, a hole for the rod can be drilled in the center of the tip. If the tip is "pointy" enough, the rod will self-center in the inside of the point. Waxing or greasing the end of the airframe prevents sticking to the nosecone or coupler.

Using Male and Female Molds for Molded Fiberglass Nosecones
After trying to wrap fiberglass cloth around the tip of a 29mm core and finding that it wouldn't stay on very well, I started looking at female molds to form the outer surface. There are several ways to make molds, including Plaster of Paris, silicone or urethane RTV, and resin with fillers. For production operations, a 2-piece laminated fiberglass mold is laid-up on a polished plug whose size is the exact dimensions of the desired object. It is then fitted with guide studs, clamping bolts, vacuum and air fittings, etc.

The thing to remember when moldmaking is to have a very smooth, polished surface to ensure release. This applies to both the plug(s) and the actual mold halves. It is also important to properly treat these surfaces with mold-release compounds; usually wax and PVA release agents or silicone products. Greases and oils can sometimes be substituted as well.

A detailed discussion of the involved process of moldmaking is beyond the scope of this article, but I have done a couple and have had some success. It was a challenging and satisfying experience when my first, and then my second, really nice molded nosecone popped out of the mold. For the latest in moldmaking, instructional pamphlets can be downloaded from Fibre Glast Developments Corp. in Brookville, Ohio.

Conclusion

The solid wood (or Styrofoam) nosecone method is the simplest of the ones discussed here and would be quite adequate for many applications. For larger projects, a fiberglass lay-up over a core would probably be the most appropriate. Rikki Rockett's, "Jurassic Kick" (Extreme Rocketry, May-June 2000), describes the lay-up method he used which was similar. The molded fiberglass nosecone is truly the Extreme technique for that very special project. In my case, it was to avoid all the sanding and Bondo while being able to make duplicate pieces, an idea resulting from losing my first scratch-built 29mm "F" TROOP nosecone without setting the altitude record and knowing I'd need another one.



New 29mm elliptical nosecone for "F" TROOP-2 in middle; internal plug on left; mold halves on either side; moldmaking plug on right. Neck was attached using rod centering ring technique.

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wedge OLDHAM

By: Brent McNeely



Where were you born and raised?

I was born in northern California around the San Francisco bay area. I am an only child. My father was a salesman, who worked for a high-tech electronics firm.

What was your first experience with rockets?

My first experience was as a kid watching John Glenn's flight. I remember sitting there watching that on the television and just being totally enthralled with the whole situation. That's my earliest recollection of my love of rockets.

What was your first experience with rocketry?

I think it was in 1968. Someone showed me an Estes catalog. It was the first time I'd ever heard of Estes; the first time I'd ever seen their catalog, and I just became totally hooked. My first rocket I ever built was the Estes Alpha. I don't remember if I flew that or not, but the first rocket I do remember flying was the Estes Midget. It flew on the short motors made by Estes, and it was a two-stage project. Flew great!

What did your friends and family think of rocketry?

I was hooked up with a couple people at school who were also into rockets. We would spend great amounts of time, either at my house or their house, talking about it. In the early days of rocketry in California, it was extremely difficult to fly rockets. We could build rockets and order rockets from the Estes catalog, but we just couldn't get any motors. So, we would spend great hours trying to get teachers involved, or the fire department involved, to somehow get clearance so we could get a motor and actually fly these things. My parents just looked on. They weren't actively involved in the whole rocketry thing. They kind of let me do whatever I wanted to. I was about 11 years old at the time.

How long did you stay involved with rocketry?

My involvement in rocketry took a little dip somewhere in the start of high school, but by the end of my high school years I was still very into Estes. We had found a place to launch and we were able to get engines by that time. By then, Estes came out with D motors. I had aspirations of working in some sort of missile or rocket-related field at the end of high school. I looked at my options and it

appeared that joining the Navy would meet all of my requirements. I wanted to move away from home, be on my own, get an education, and I wanted to travel, and the Navy provided all that. I had read many books in high school. One of them was "Ignition." It talked about the early days of rocketry and the Naval Ordnance Test Station. My hope was if I joined the Navy, I might be able to get stationed there, or working in some sort of missile capacity as a Missile Technician. So, I joined the Navy with hopes of working on missiles someday.

What area of the Navy did you participate in?

I volunteered for submarines, and enrolled in Guided Missile School. That was a combination of "A" school and "C" school. I was told that the people who graduated first in their class would have their pick of whatever "C" school they wanted. One of the choices was Missile Technician School. I worked real hard when I was in school and managed to graduate first in the class, and as promised, was given my pick. At that point in time, that's when I made a radical departure from rocketry. The missile technician program did not offer me access to the missiles that I wanted to work on. They were actually nuclear ballistic missiles, and the other school that was offered was three times longer and dealt more with electronics. So I felt it would be better for my future if I went the electronics route and became a Navigational Electronics Technician on submarines. I spent 9 1/2 years in the Navy on submarines. I worked on the submarine navigation system. That decision also signified my retirement from rocketry for a time. Once I joined the Navy I didn't fly model rockets anymore, but I was still actively interested in them. I was using all of the Navy materials that I could get a hold of to study their missiles. Walking around in Guided Missile School gave me an opportunity to see all of these missiles in person, which was really fascinating. I got to see some target drones, too, that flew over the beach and were shot down by guns, so that was a pretty exciting aspect as well.

After you left the Navy what did you do?

In 1984, I got a job working on robots. I worked for the Advanced Robotics Corporation as an Electronics Technician there, wiring up prototypes, and testing circuits and that sort of thing.



When did you get involved in rocketry again?

I was traveling around with my wife at the time. We went to a trade show or convention and there was a table there with a bunch of kids who built a rocket about four inches in diameter and about six feet long. It was definitely the biggest rocket I'd ever seen in my entire life. There was talk and rumors, almost like the city of Atlantis or unicorns, that there were bigger motors out there in the world. People were talking about remote areas out in the deserts of Nevada where people were flying F motors. Nobody had ever seen an F motor. When I

went to that convention in Ohio, they showed me this four-inch rocket that was rumored to fly on an M motor. They talked about some sort of big rocket convention; something called Large and Dangerous Rocket Ships that occurred in Ohio. I just sat there in disbelief the whole time. I just thought it was absolutely amazing. I went over to a local hobby shop and started looking around for rocket stuff and found some FSI motors. I bought the three-pack of F100 motors and have them lying on my desk still today. I never got around to building a rocket for them to fly in. I had great hopes and ambitions of entering back into rocketry, but I don't know exactly what happened. It didn't really catch on. I went shopping around for a birthday present about five or six years ago. I happened to be looking in a toy store, found some Estes rockets, and remember my love and passion for these rockets. So, I bought my son an Estes Alpha. We put it together and flew it as soon as we could. For Christmas or the next birthday, we both put together an Estes Phoenix.

Was rocketry as fun as an adult as it was as a kid?

It was definitely just as I remembered. Estes had come out with the Alpha that I put together as a kid, but they also had the plastic version, the Alpha III. I made sure I bought my son the original Alpha that has the balsa nose cone and the balsa fins and showed him how to sand the fins, taught him what sanding sealer was, taught him all about fin fillets and that sort of thing. It did bring back all the memories. Lighting off that first Estes motor after a long lapse, just the smell of that black powder, and the sound, and watching the chute come out brought back so many memories.

What did your son think of rocketry?

My son definitely seemed interested and definitely enjoyed it. After we built the Phoenix, we started looking around on the Internet and we found the Rocketry Organization of California. We started attending their launches on a regular basis. It was funny, me being divorced at the time, my son would visit about once a



month, and every time he would come down, we would take off to some rocket launch. I was totally back into the hobby. Totally, again, obsessed with it and constantly thinking about rockets. My son and I were both now totally hooked.

Going out to your first launch, how did you react to seeing that scale of rocketry?

It was absolutely breathtaking. It was amazing! As a kid, I would spend all the money I could save up by mowing lawns and various other things, to buy the \$3.25 Estes kit. Now here I am as an adult making a fairly decent salary and I find out I can spend the same amount of money, proportional wise, on rocketry as I did as a kid. It appears that as a kid the size of the rockets that we built were pretty awe inspiring and today we can build the same rockets with the same thrill factor even as an adult. The J, K, L and M motors are just absolutely incredible.

What was your first project that you purchased or worked on for high power when you got back in?

When I got back into high power the first thing I built was a LOC Hi-Tech. The construction was pretty simple. A lot of it was as I remembered. The concept really hadn't changed much. Through-the-wall fin construction was a new one for me. I flew my Hi-Tech for my level one certification and failed the first time. The chute didn't come out and the rocket just came down in a flat spin. It landed safely, so I bought another motor, loaded it up, and certified that day. That was about five years ago.

What was your level two project?

I've always been impressed with big rockets. Speed is good, altitude is good, and those are all really thrilling factors. However, for my personal preference I like big. For my level two, I decided to scratch build. That's truly where my love of rocketry is, in the actual scratch building and design of the rocket. The construction is enjoyable, but not as much as the design. So, my level two rocket was a scratch built rocket. It stood about six feet tall, four inches in diameter, and had a 54mm motor mount. I certified on a J135 and flew it the next day on a K550 flight.

What launches did you attend?

When I got back into rocketry and started going to the ROC launches, I missed the first ROC-Stock. For some reason I didn't attend that weekend. But it was about six months after that I attended





my first ROC-Stock, and to see 1500-2000 people out on the lakebed and that many rockets really is an incredible sight. The only other place I've been to launch rockets is a trip to BALLS. I believe that was BALLS 10. The Black Rock desert and the huge expanse of the playa is just incredible. It's really breathtaking to see that much flat land. I remember sitting at Bruno's when we first got there, and no one else was around. All of a sudden, this truck drives up with this man with the Q Motor Project out in his truck. I thought to myself, "WOW...that's something!"

Tell me a little about your recent projects you've been working on.

The last rocket I flew was the Nike Project. That project is interesting because it came as a direct result of my and my son's involvement in rocketry. We happened to be sitting in the living room one day and my son asked me, "Dad, what's your favorite rocket?" I remember reading an encyclopedia in the early 60's looking up missiles. I found a picture of the Nike Hercules and fell in love with it at that point. I said, "That is the perfect rocket." It is absolutely the greatest rocket ever designed. We attended a ROC launch at one time and I saw someone fly a J800 motor. We saw the rocket take off and we heard the tremendous roar of that J800 motor. We looked at each other and said, "Wow, we should build a rocket that uses one of those!" I don't know who had the idea first, but either my son or I said we ought to build a Nike Hercules and put 4 J800 motors in the booster. That's pretty much what started the Nike Project. From there we downloaded all of the files off the Internet, scaled it to the appropriate size, toyed with different scaling, and finally settled with four K700 motors in the booster, staging to an M1939.

How long ago was this when you started working on the design?

I think we started approximately three years ago. We started first by researching it, and then we tried to find an appropriate scale. One of the scale designs we had looked at stood about 7.5 feet tall, but then we found out that Andy Schechter had built one 7.5 feet tall. My son and I decided we couldn't do the same thing that Andy had done, so we'll have to go bigger than that. We toyed with the idea of half-scale. The building in which the company I worked for stood 33 feet tall, and a half-scale Nike would stand at about 22 feet. We put a mark on the side of the building, stood back and looked at it, and said that





that was too big. We settled on the 1/3 scale. I started construction about 18 months ago. I was standing at a ROC-stock, and after we got the pads set up, I looked around and thought this time next year would be the perfect time to launch the Nike. I worked very hard for those 12 months, and it turned out that I just couldn't get it done. There were just too many things to do for the Nike. Money was a major issue. So, I delayed it for another six months and was suppose to fly it at the June ROC-stock. As the June ROC-stock approached, ROC had been selected to host the next LDRS. So I figured if I was going to fly a rocket of this size, I might as well wait until LDRS.

Tell us a little about the rail you used.

The rail was an incredible surprise. I intended to build my own rail to launch the Nike. I was estimating something about 24 feet tall. It would break down into about eight sections so it could be easily loaded into a pick-up. Dave Griffith posted to our rocketry chat that he had this tower and would anyone care to use it. When I first looked at it, I thought it was a joke. I thought someone had taken a picture of a radio tower and was trying to pass it off as a rocket launcher. In communicating with Dave Griffith and Kevin Baxter, who I believe built the rail, it turns out the rail was real, and was available, and would be brought to LDRS. The rail also happened to be kept approximately 10 minutes away from my house. All these things just fell

together quite nicely. All I had to do was build special rail guides to use it. The rail is incredible. It's 60 feet tall, has it's own on-board generator, is hydraulically raised and lowered and has a pressurized water tank. It's used by the Pacific Rocket Society for launching their liquid fueled rocket.

Was Nike a level three project for you?

It started out as a level three project. I started doing an intensive amount of documentation, hundreds of AutoCAD drawings, and was putting everything together and displaying it on a website so everyone would know about it, as well as to allow TAP people to look at it and get a good idea of what the whole project is about. Somewhere after I had decided to fly the Nike, Tripoli passed a ruling that all level three projects must be a single-stage. So I decided to fly the upper stage of the Nike, certify level three on that, then the following day fly it in the two-stage configuration. About a month before LDRS, I was concerned about the fin strength of the Nike. I was worried that if the sustainer landed wrong, it could break them. If one breaks off, that would kill my level three certification, and I wouldn't be able to fly the vehicle as a two-stage. So, I made the decision to take a couple of six-inch tubes, a nose cone from a previous rocket, an electronics bay, and throw them together to create a basic bulletproof level three rocket. I called it "Necessary Evil" because the whole level three certification

was, as some people say, just a "Necessary evil, or paper work thing" in order to allow me to fly the Nike as a two-stage. We flew it on Friday of LDRS. It was a simple project that consisted of two six-inch diameter four-foot long tubes, and three fins. It stood a total of nine feet tall. I glassed it with two layers of 10 oz. fiberglass, and made the fins out of half-inch birch. Everything I did on that rocket was designed for one and only one purpose. To just get my level three certification and come back unharmed.

What did you think about the Nike once you got it out there and actually raised the tower?

The interesting thing about the Nike was that I built the whole thing on the back patio of my condo. It measures about 10 feet by 15 feet. The only way that the Nike could be fully assembled was when it was sitting on the rail. So when me and the rest of the people who were helping got the rocket on the pad, that was the first time I ever plugged the nose cone into the sustainer and it was the first time I had ever plugged the sustainer into the booster. Putting those parts together and taking a step back, I was really shocked. I had no idea that the rocket I was building was actually that big. I looked at the plans and they said 14.5 feet, but I had no idea exactly what 14.5 feet meant. When we raised the launcher to vertical I just stood there in awe. I had never seen the Nike fully assembled and to see it standing there in it's vertical state on the rail was just amazing. The thought that I built it didn't really come to my mind. I stood there and looked at the Nike just like it was any other rocket and said, "Wow, that's incredible!"

What were your thoughts of the actual launch of the rocket itself and how that went?

The launch of the Nike along with the construction of the Nike was very interesting. I was so focused on each individual part, that it was only until we put the Nike on the pad and erected it vertical that I had an opportunity to take a step back and see the overall aspect of the project. I was very concerned about lighting all four of those K700 motors. I was concerned about booster separation, ignition of the second stage, and parachute deployment. A real calm came over me when the rocket was fully assembled and when the countdown began. I just felt that everything was going to be okay. The flight was incredible. All four of the booster motors lit off, almost

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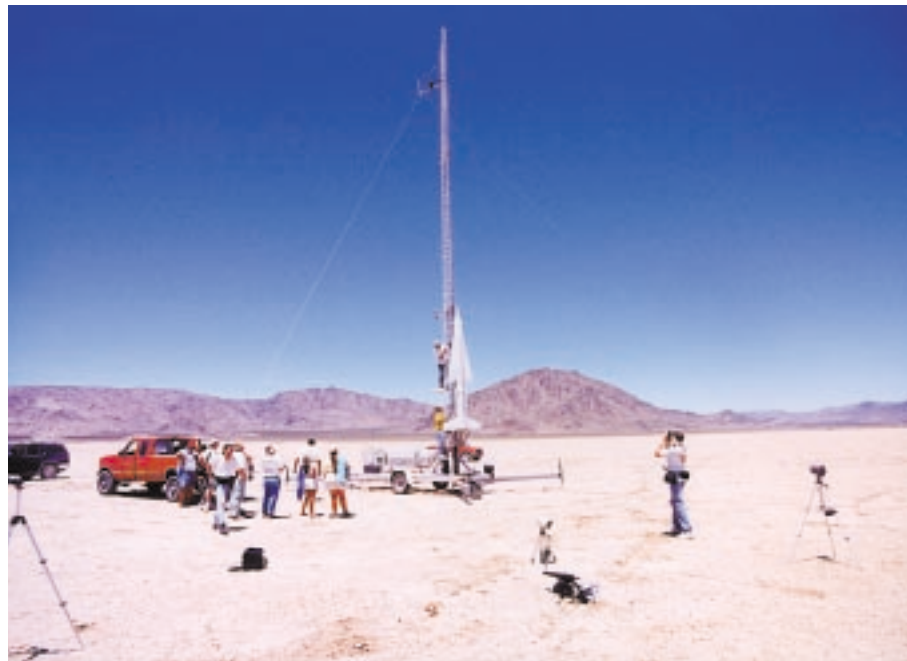
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instantaneously. It went up the rail great. Staging was perfect, actually a little early. Overall, I think the flight was a huge success. The booster chute deployed late and totally destroyed the booster section. The drogue chute burned up. The rocket free fell in. The nose cone section was totally

destroyed. The nice thing about it is that everything that went wrong for the Nike I can take full responsibility for. It wasn't an equipment failure, it wasn't a motor manufacturer failure, it wasn't a strange act of God. Everything that went wrong was something I forgot or was my fault. That's

one of the things I love about rocketry. It's an exacting science more or less. There are a lot of things to think about, and a successful flight usually means that you've thought of everything.

Do you have plans to rebuild or are you moving on to a different project?

I'm doing both. I'm definitely rebuilding the Nike. I will be bringing it to LDRS in Texas for LDRS XXI. Instead of flying it on four K700's, I'm going to fly it on four M1315's in the booster staging to a M1939, air starting four J570 motors. This will be a total of an "O" impulse. I'm going to talk to Kevin Baxter and see if I can borrow the rail again and drag that to Texas.

How was the experience for you of being on the LDRS committee for the first time?

I had never been to an LDRS. I'd heard of it before, and LDRS in my mind is an extremely special event. It is THE one event of the year. I'm sure there's other rocket launches with more numbers there, but nothing has the prestige of an LDRS. The fact that I was going to attend an LDRS was a great thrill to me. Because my club, the ROC, was selected to host it

and I was on the Board of Directors, it was an honor for me to be able to participate in hosting LDRS. My specific duties were site layout. I was responsible for the placement of the launchers, the length of the flight line, vendor row and the vendor arrangement. That was really a rewarding experience to be able to stand there at LDRS and look at the launchers, all 84 pads that we had set up, and know that I had played a part in that.

What do you like most about rocketry?

The thing I like most is that you can learn as much as you want about rocketry. You can put together a level one kit and certify with very little rocketry knowledge. You can learn all that you want on a regular basis. Aerodynamics, CP calculations, drag calculations, propellant formulations, burn rate calculations, and so on. There always seems to be something else that you can learn.

What do you like least about rocketry?

My only pet peeve is in rocketry chat lists or email groups, when I ask a specific question and get a tremendous round of answers such as "I don't know" or a vague answer. For example, one time I asked about replacing my half-inch centering rings with G-10 and inquired what would be the equivalent thickness of G-10 that would give me the same amount of strength as half-inch plywood. Some of the answers that I got back were, "Well, I use 1/8th G-10 in my rockets and they work fine." Well, that's a great answer, but it doesn't answer the question.

What recommendations would you give to somebody getting started in rocketry?

One of the things that I think has helped me the most is the ability to ask questions. That would be my highest recommendation to anyone starting out. Be smart enough to say that you don't know. One thing I know about rocketeers, myself included, is we all like to talk about our projects. You just come up to somebody and say, "I'm thinking about putting an electronics bay in my rocket, can you show me yours?" or "Can you show me how you did your electronics bay?" or "Can you show me how you did your fin can?" or something like that. Rocketeers love to talk about their projects, and you can learn a tremendous amount from other people just by asking.

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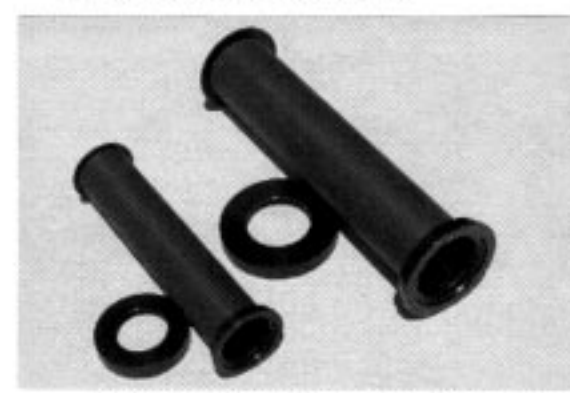
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FIRE DESTROYS AEROTECH MAIN FACILITY

BY BRENT MCNEELY



Monday, October 15th, at a little past noon in Las Vegas a small explosion in the AeroTech facility caused the evacuation of AeroTech, Industrial Solid Propulsion and nearby business neighbors. Three employees were taken to nearby hospitals, two for severe burns and one for minor. Many employees were out of the building at the time for a lunch break. The fire was thought to be contained around 4:00 pm when employees were allowed to re-enter the building to retrieve personal items. However, around 4:30 the fire flared up again and the area was evacuated. The entire building caught fire and at about 6:30 a large fireball explosion could be seen which is assumed to be the bulk of AP at the facility. At 7:00 pm it became clear the entire facility has been destroyed.

Below are some comments taken from the internet regarding the incident:

[We] wish to express our sympathy to AeroTech and all their employees affected by the loss of their facility to fire yesterday. Our thoughts and prayers are with all those affected by this tragic event. Our hope is for a speedy and full recovery for the burn victims and strength for the families of management and employees to cope with such a disaster. God Bless all of you,
—Scott & Sharon Dyben

Everyone involved in this hobby understands the power Aerotech has layed before us to make HPR commonplace at the level we have enjoyed... They aren't going anywhere. Gary and Aerotech are a monument. We will help rebuild any loss.. and give our best wishes to all at the Aerotech site... for quick recovery... and for the future of rocket science.
—Larry Silver

I think it best, at this time, that we band together to show all Americans that HPR is a good thing, a wholesome, family oriented hobby. We need to let the folks @ Aerotech know that we support them, and will continue to do so in the future. We need to put efforts into this, I have a feeling the both local and federal regulatory bodies

are going to make it difficult for them (Aerotech) to get back on their feet. Let's all work together to push HPR forward, in a positive light and help each other.
—Larry

We would like to offer our sincerest condolences to those injured and hopes for a speedy recovery. Good luck also to Aerotech the corporation in getting past this terrible blow to the business and getting back up and running again soon.
—Jerry Kolb (PML)

Kind words! I, too, have the greatest personal regards for Gary ... as well as the rest of his crew. I hope he will recover the fastest way possible. If he can find a way to get into production in a limited way, I'm sure people will buy everything he can build, I'd even pay a premium on the price to help get him back up.
—Paul Holmes

We will not let them go under. Sooner or later they will develop a recovery plan and it is our duty to support them in it.
—Theo

Best wishes to the injured, we hope for your speedy recovery. Crying shame this is. If there is anything that we can do to help, please don't hesitate to ask.
—Andrew B. Longdale

Our prayers to the injured.
—Joseph J. Pfeiffer, Jr., Ph.D.



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FLIGHT, MY LIFE IN MISSION CONTROL BOOK REVIEW

BY STEVE AINSWORTH



Flight Director Chris Kraft is the author of a new book "Flight, My Life in Mission Control." The book is a detailed look at manned space-flight from the chair of the first NASA Flight Director.

Did you know that the escape tower for the Mercury capsule was "tested" accidentally during one of the crew flights? It was the first Mercury flight with a crew. The tower was designed to pull the capsule away from a failing booster. Werner Von Braun built the Redstone (a modified V2) and told NASA that no Redstone ever burned for less than 139 seconds, so they set the event timer to jettison the escape tower after 137 seconds, which gave them a two second margin. Well Ham's Redstone was hot and safely shut down but only after 134.5 seconds, followed immediately by the automatic abort signal (booster failure) with the escape tower pulling the capsule away at 17 g's increasing Ham's altitude from the planned 115 to 157 miles!

Following the Apollo 1 fire, Apollo 7 flew in earth orbit on a Saturn 1B. The first manned Saturn V (and only the third Saturn V launch) carried Apollo 8 to the moon, and the SPS slowed it to place the ship in lunar orbit. This was a very gutsy move by NASA to beat out the Russians.

Do you remember the first Apollo to go to the moon with a Lunar Module (LM)? It was Apollo 10. Did you ever wonder why NASA did not land Apollo 10? Kraft tells us that the Apollo 10 LM was the last of the early series and was too heavy to land! Some at NASA wanted Apollo 11 to be an unmanned landing, but the gutsy folks won the day and we had two manned landings in 1969. Did you know that Aldrin wanted to be the first man to step on the moon, and, as LM Pilot should have been? Kraft was instrumental in getting Armstrong assigned as the first on the moon. Possibly that explains why Aldrin took no pictures of Armstrong while on the moon. All of the astronaut photos on the moon from Apollo 11 were taken by Armstrong and are of Aldrin! One last Apollo item, I was quite shocked to learn that one of our moon walkers suffered a heart attack as he left the moon and docked with the CSM. Later, back on earth, he died of another heart attack! I can't wait for the NASA Mission Report book on Apollo 15 to read more about that.

I discovered that I had two things in common with Chris Kraft, we share a birthday and neither of us has ever seen a NASA launch firsthand.... We have only seen them on a TV screen. I would like to change that!

Chris Kraft pulls no punches when talking about other personalities at NASA, and his comments tell as much about him as they do about the others. As humans, we seem to really dislike it when we see our own faults coming out of others. However, we rarely recognize them as our own. Hmm.

For space buffs (like me), it's a hard book to put down, and compliments the NASA Mission Reports for each mission by telling some of the same events but from the Flight Director's perspective. A good book for your space library.

REVIEW AT A GLANCE

PROS: The book contains nifty new details of the space program in its heyday, and from a very different perspective. Some of the anecdotes sound like they could have been written from conversations at Bruno's about flights at Blackrock and the associated problems. I also like the candor of Chris Kraft. He tells it like he saw it, no holds barred.

CONS: The book ends with Apollo, and even some of the Apollo missions have very little detail included. Also, I discovered a technical error. Kraft describes the handheld maneuvering unit used by Ed White on Gemini as using CO2 jets for thrust. A NASA technical paper indicates that it used oxygen through the umbilical (the Gemini IX flight used nitrogen gas).

Cost: \$25.95

Contact: Most Book Stores

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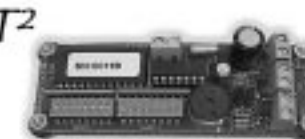
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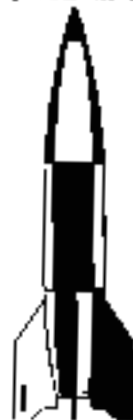
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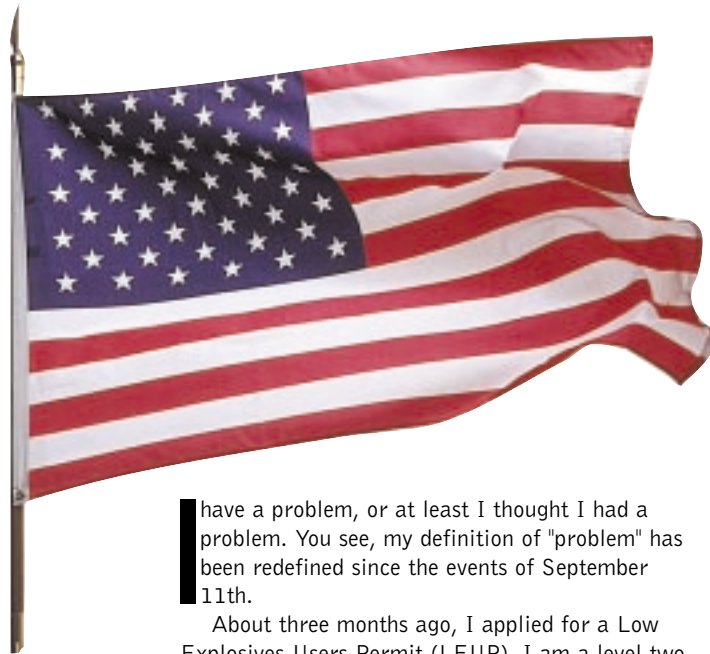
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WHAT'S REALLY IMPORTANT BY ROBB HASKINS, TRA 7770



I have a problem, or at least I thought I had a problem. You see, my definition of "problem" has been redefined since the events of September 11th.

About three months ago, I applied for a Low Explosives Users Permit (LEUP). I am a level two flyer living in Orlando, Florida. I've been in the hobby for a couple of years, and felt I was ready to take that step. I live in a home with an attached garage, and I planned to keep my storage magazine in it. I knew that the BATF granted variances for such things, so I applied. I built a good relationship with my local Fire Marshal and got his support. I had my interview with the BATF inspectors and they complimented me on the good job I'd done preparing my application materials. They thought there would be no problem in my getting the permit.

Well, there was a problem. Not by my local fire marshal, or even by the BATF. It seems that some county or city fire marshal in another part of the state wondered if there were any state laws preventing me from storing rocket motors in my garage. I knew there wasn't because I had researched the Florida Administrative Code, the Florida Fire Statute Code and talked with several of the state fire marshal's field personnel. They all assured me that there were no state laws to this affect, as long as I was compliant with NFPA 1127. I thought I'd get my LEUP by the end of the summer. That didn't happen.

Because of this inquiry, the BATF has held up my LEUP application while the State Fire Marshal's main office researches the issue. It may take weeks or months. Bureaucracy at it's red-taped best, no doubt. No LEUP for me for God knows how long, if at all. And I know several guys in our hobby from Florida who got theirs with no problem. Why was I being treated differently? I'd followed all the rules, did everything correctly, and jumped through all the hoops. I couldn't believe how inconvenienced I was by these guys. It wasn't fair!

Then September 11th happened. Through stunned tears, I saw buildings tumble, planes explode, and a country changed forever. I also saw

incredible heroics and an outpouring of love that can't be measured in words. Like all Americans, I was shaken to the core, but as a result, I was reminded with unquestionable clarity what is really important and what's not.

What's NOT important is me flying model rockets every month or the amount of AP I burn, or the size of my chutes, or what new techniques I used in building my latest rocket. What's not important is if I get a LEUP, or if I feel hassled by my state government for holding it up.

These things ARE important: having freedoms to go where I choose, to say what I feel, to achieve to my potential. Having the love of my wife, friends and family. Knowing that I live in a wonderful country, even with all its faults, and that no matter how hard some deranged, hate-filled terrorist will try, our nation won't be kept down. There are many others things that could be added to this list, but I'm pretty sure that me griping about my hassles in getting a LEUP is near the bottom of it.

As I write this, the FAA is restricting recreational airspace, canceling all launch waivers, and in essence, shutting down our hobby for the time being. Though I understand why, I'm saddened by this because I love high power rocketry. I love watching rockets take flight on a pillar of flame and smoke, kiss the sky, and return gently back to earth under parachutes that gleam in the sun.

But, I also love the people in the hobby and the friendships I've made. I love talking shop and admiring the skills of others. I love the walks, either with friends or by myself to retrieve my rockets after flight. No amount of irritation from the BATF or State Fire Marshal can erase these things, and it sure as hell isn't something any terrorist can touch.

As for my LEUP, who knows? I might get it, I might not. I'm not going to give up on it. But, either way, I'll always know what's important, and what's not. God Bless Men and their rockets, and God Bless the United States of America.

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Specifications:

- Skill Level: 3
- Length: 39"/99cm
- Diameter: 4"/10.1 cm
- Weight: 32oz/907gms (without motor)
- Recovery System: 42" Parachute
- Nose Cone: New 9oz, grey, 4:1 ogive
- Fins: 4
- Motor Mount: 29mm
- Stages: 1

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Reloadable Motor System (RMS):

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- H128W-S**
- H165R-S**
- H180W-M**
- H210R-M**
- H238T-S**

Single Use Motors (SU):

- G40-4W
- G80-4T
- G35-4W*
- G38-4FJ*

* Econojet Single Use Motors

** Easy Access RMS™ Motors

