SNOAR NEWS

July/August 1987

THE LEADER IN SPACEMODELING

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"MR. MADDOG" REALLY EXITS!!!

EXCLUSIVE! Action Photos of the elusive Tony Williams actually flying rockets!

Maxi Pad Heavy Duty Launcher Plans

Adhesives for Rocketry

True Story: "I Was Going Senile Until I Joined The NAR!"

SNOAR NEWS

THE LEADER IN SPACEMODELING

ROCKETRY'S LONGEST PUBLISHING, MOST CONTROVERSIAL NEWSLETTER

VOLUME XIII, NUMBER 4

QUOTABLE

"But first we'd have to kill him!"

J. Pat Miller, commenting on flying an obnoxious A Divisioner, and the NAR's prohibition of live biological payloads.

COVER STORY:

Tony "Mr. Maddog" Williams really does exist! Three key SNOAR NEWS staff members (Tony, Matt and George) show they know how to fly rockets in this photo from Huntsville's city wide contest. This extremely rare photo was taken by Robyn Steele.

CREDITS:

Jim Baker portrayed by: Matt Steele, 13011 Branscomb Rd, Huntsville, AL 35803; **Jessica Hawn:** Robyn Palmer Steele; **Jim Baker's Bodyguard:** George Gassaway; **Jerry Falwell:** Chris Pearson; **Mysterious Sources that won't come forward:** Mr. Maddog (Tony Williams); **Tammy Faye:** Tammy Faye (who else could fill that role?); **The Pope:** J. Pat Miller; **The Virgin, er... never mind:** Mary Roberts; **Jimmy Swaggart:** Randy Kelling; **Oral Roberts:** Vince Huegele; **Ted Koppell:** Terry (Koppell-Sine) Lee; **National Inquirer Reporters:** Chas Russell, Chris Johnston, Dan Kafun, Jack Kobzeff, Mister Twister, Moose; **Buckwheat:** Andy Robertson; **Duped Contributors:** Bob Ferrante, Bob Kaplow, Heidi Smakula, Whoopi Goldberg, Brad Bowers, Randy Redd, Jordan Pavlov, Sammy McNully, The Honorable Wasco Schafter, J.D. McNeil, and Robert Anderson.

Send your tax deductable contributions to: The Better Way Faith Foundation, or "How to get to Heaven by Reading SNOAR NEWS" Fund, c/o Matt Steele. Screenplay by the original cast. This presentation is available on record, tape, compact disk, or 3.5" Mac disk. Void where prohibited by good taste.

Impartiality?

Once again, a sore point of contention and a resultant arbitrary ruling has arisen out of the National Contest Board. There are many who would say it was inevitable, considering Mark Bundick's appointment. To those folks, I'd have to say that they were right.

The situation concerns NIRA (IL) and NOVAAR (VA) in their annual race for the National Section Championship. There has been *(continued on page 14)*

IMPORTANT STUFF

SNOAR NEWS is published 6 times a year by the nation's most progressive club, SNOAR, NAR section #337. Subscription price is $10.00 in HARD CURRENCY. Make your checks payable to Matt Steele, please! Keep 'em coming!

Any resemblance to any persons or cartoon characters, whether dead or alive in this publication is purely coincidental. So don't make any assumptions.

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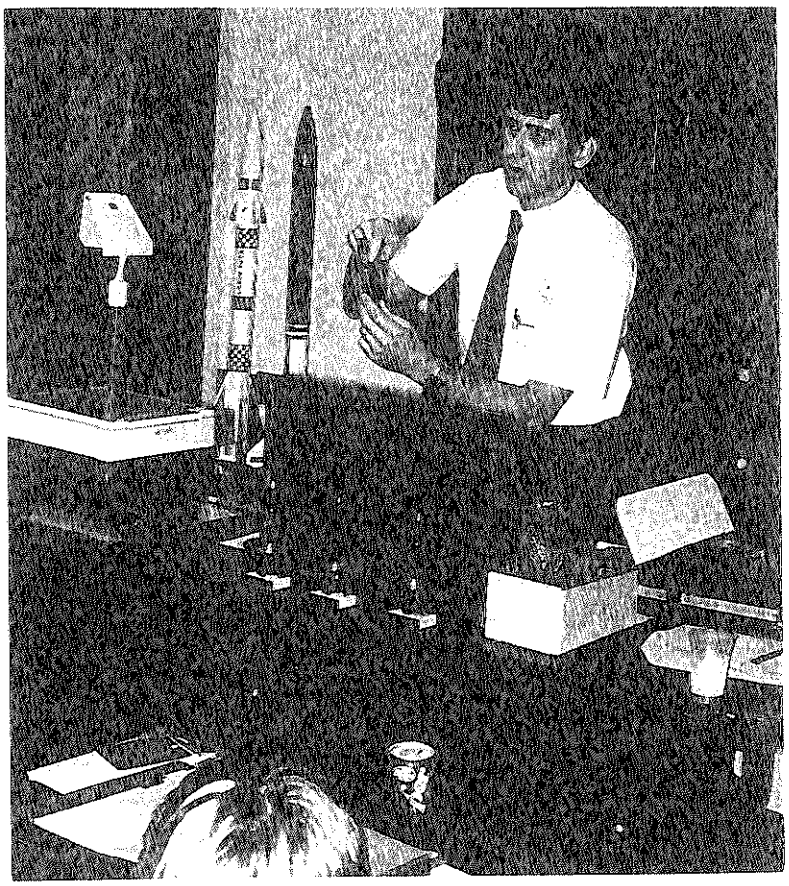
The First Annual Southwest Spacemodeling Conference

By Chas Russell

The first annual Southwest Spacemodeling Convention was held in Plano, Texas over the Memorial Day weekend. Sponsored by the Dallas Area Rocket Society (DARS), SWSC featured several noted speakers, contests, and a sport launch. The event started Friday, May 22 with participant check-in, a social hour, and films and videotapes. Herb Desind had planned to attend, but was unable to. He did send along a videotape compiled from many of his (insert astronomical number here) Cineroc flights that have awed and bored us over the years.

The activities began in earnest Saturday morning with a welcome from convention chairman Terry White. Braced with donuts and coffee, the 25 convention participants welcomed back Forrest Mims, who spoke on the "Opportunities of Model Rocket R&D". For the unititiated, Forrest was a pioneer in modroc R&D. If you own or have access to issues of the old Model Rocketry Magazine, you will recognize the name. Among his past articles and accomplishments were attempts to guide model rockets by controlling and deflection of ram-air, and a wind tunnel that straped onto your car. He has authored over 50 books on electronics (some sold by Radio Shack), and was part of MITS, a company that offered CB frequency transmitters in the late '60's and early '70's. MITS later went on to develop and market the Altair computer, the first personal computer, for which Forrest authored the operation manuals.



Above: Forrest Mims describes a ram-air guidance system he developed in the early 1970's.

Forrest related stories about his attempts to develop payloads for model rocket applications. He displayed several that he had built and some that had been commercially available. He noted that even though the weights and total impulse limits had been raised, there appeared to be less interest in electronic payloads now than in the early '70's. With miniaturization and such techniques as surface mounting components, payloads have gotten smaller while models and motors have gotten larger. He pointed out that a LED beacon could be built on the back of a battery holder using silver ink for circuitry. This led to a discussion of mounting payloads externally, or on the inner surface of a hollow plastic nose cone. Forrest concluded by expounding on several ways in which model rockets could be implemented in R&D projects given the current limits. These included the development of true sounding rockets using model rocket technology, getting educators interested through the use of active payloads, real

time video from the air, or communication line throwing for emergency or military applications, and pure science applications such as comparing dynamic testing to wind-tunnel testing.

Chas Russell followed with a discussion of high power motors and the beginning of the high power movement. He then discussed some of the differences between standard components and the advanced components, stressing the need for more robust materials and construction techniques. On display were several North Coast Rocketry models including four new for 1987. Chas then opened the floor for questions;the two main concerns seemed to be the lack of "G" class motors being certified by the manufacturers and the relabeling of motors. Forrest was a tough act to follow.

Rounding out the morning was a presentation by Martin Catt on the application of home built microprocessors on model rocketry. Microprocessors offer the flexibility over hardwired payloads through software. Construction is time-consuming and expensive, though Martin pointed out that one has the option to build, buy, or modify a microprocessor.

John Pursley opened the afternoon sessions by offering the participants the option of scale modeling or discussing AmSpam/newsletters. Scale modeling was the clear favorite and John gave the group its money's worth. With a gleam in his eye he discussed the potential for larger models within the new weight/impulse limits (idle thought; a 2X scale 2.75" folding fin aircraft rocket roughly equates to a LOC 5.56" tube). John reviewed the basics, such as obtaining data, attempting to build a single round if possible, and exploring new materials and techniques. He highly recommends reviewing model railroad magazines, as those hobbiests really stress scale detail, and such plastic model magazinces as Fine Scale Modeler. John also stressed separating the model into several sections and concentrating on one section before going on to the next. He also suggested making several copies of the same part or section at a time and selecting the best one for the model. John encouraged experimenting with different ways of making a part instead of using standard methods. Finally, he sugested the development of interpretive skills and mathematics to aid in planning of data reduction and the construction of the model.

John then passed around several parts and models that he had built or used in developing models. His prime model over the past few years has been the Saturn-V, and his detail was impressive. He discussed his technique for making wrap-arounds for Saturns and Little Joe-II vehicles. It involves melting jewer's wax into a wooden frame and then scratching, carving, or milling out details that would be raised on the prototype. Once ready, a thin coating of a good grade of polyester resin or slow-cure epoxy is poured into the mold, air bubbles workeed out, and a sheet of fiberglass cloth layed over the resin (the cloth allowing the wrap-around the flexibility to be curved without breaking easily). He also displayed a rubber mold made by pouring the uncured rubber over a built-up prototype of the part. Either method allows the mass-production of parts.

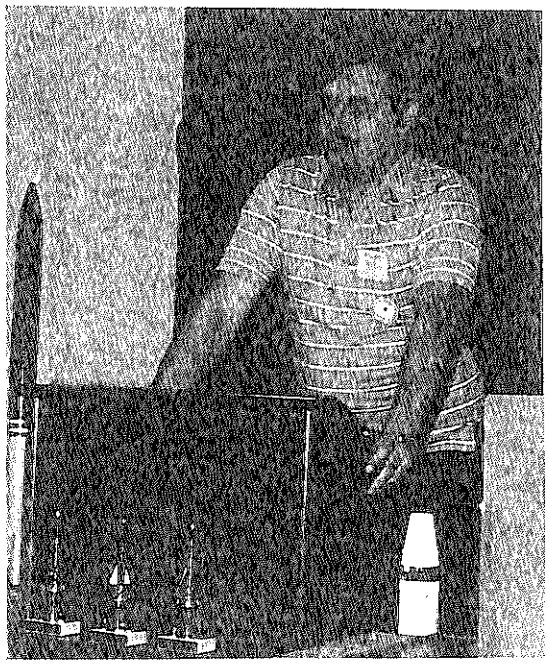
The final speaker of the day was G. Allen Wilcox, who spoke on and demonstrated the Collossus II multi-pad launch controller. In production for several years, it has several unique features such as an internal battery pack, auto-countdown with abort, and a built-in PA system. Allen pointed out that when some or all of the gee-gaws fail, Collossus II will still work through hard-wired circuits.

SWSC featured an R&D event which Ted Mahler won with hands down. Actually he was the only entrant, with his disc camera payload. He modified an Ansco disc camera for continuous operation with a 45° "look-down" angle. NAR president Pat Miller was nevertheless impressed with the project and presentation, stating that it had the potential to place at a NARAM.

The participants later met for the convention banquet and heard Forrest Mims deliver the keynote speech. It seems that Pat Miller and Forrest Mims knew each other a long time ago in Albuquerque. To make a short story long, Forrest proceeded in telling stories on Pat. Something about a laser, a library, and a rooftop, etc. The gist of Forrest's talk was on how model rocketry had made an impact on his life and career. Throughout the evening drawings were held for NARTS products, Estes kits, and MRC kits and motors (John Pursley and Chas Russell won MRC kits and then gave them to a couple of kids who hadn't won a door prize. Something about cruel and unusual . . .). At the end everyone was eligible for three special prizes. The wife on one participant won a LOC Vulcanite and Jan Wilcox receiving a LOC IV. Pat Miller authorized a deluxe NAR membership package which was won by Chas Russell (That's right Pat, First Class Mail to Belgium!). The evening closed with B.S. sessions and more films.

Sunday opened with Claude Greenlee discussing the trials and tribulations of being a science teacher. The lack of parental and administrative support along with lack of funding for lab supplies prevents teachers from utilizing rockets in the classroom. Claude discussed the NAR's teacher and school section program, which he feels has the potential to drastically increase the membership by introducing teachers and students to the NAR and section activities.

Pat Miller followed with a talk on the high power



Above: John Pursley discusses Scale.

Above: Pat Miller explains the High Power story.

issue, sort of "the other side of the story", as he called it. Pat stressed the changes to the hobby over the past 5 years. He gave some historical background and some insight into the NAR's thinking during specific events. He feels that the turning point occurred in 1978 with the development and manufacture of motors with higher specific impulse propellants and lightweight casings, as compared to the RDC/Centuri Enerjets. This allowed the manufacture of "G" motors that were DOT legal, but not defined by the NAR or NFPA. After negotiations with the manufacturers and others, the Barber commission was appointed and started work in January 1984 to perform a technical study on how a redefinition of model rocketry would affect the consumer. The NAR Board of Trustees accepted the results and in November '86 the full body of the NFPA approved the changes. Effective as of January 1st this year, NAR members can fly models weighing up to 1500 grams (3.3 pounds) with up to 125 grams of propellant (i.e. up to two G motors). In the meantime, the Barrowman Commission worked with a high power consumers group to see how the NAR could interface with the high power proponents. Based on their recommendation the NAR adopted the "no mixing" rule, where NAR members can fly non-NAR legal rockets, but under guidelines where the activities are separated by time and/or distance (more than 48 hours from the same site, or from separate sites at least 3 miles apart).

After a lunch break, it was time to head out to the flying field. Despite threatening clouds, a good crowd was on hand for the high power demo. John Dyer of DARS started out the demo with a bang as his V-2 had a D12 cato, followed by an F100 cato that trashed his FSI Black Brant-II. Chas Russell had a successful F100 flight, and a cluster of three D12's that worked as advertised. DARS had a kitbash contest at the range where participants were given a bag of parts to construct. Points were awarded for time to build and launch, successful flight, and recovery and return. Then the survivors were judged. DARS members Mike Calhoon and Bob Turner kept the crowd awed with flights of large, composite powered models. Perhaps the most impressive flight was a 4" diameter model using a chad-staged F41-0 to an F41-6. The booster ignited slowly, but had enough oomph to loft the model several hundred feet before the second motor ignited. Dyer came back from his earlier misfortunes by flying a 10'-8" model powered by two F100's. The motors were lit by flashbulbs inserted into the cores, and the boost was flawless. One motor ejected out, rendering the other motor's ejection charge useless, but the model was saved from disaster by gliding back horizontally!

Congratulations to the members of DARS on their well-organized first convention. Next year will bring bigger and better things, so plan on hearing more from this group.

NAR TOP COMPETITORS

Pre-NARAM Standings as of 7/15/87

NAME	NAR #	SEC #	POINTS	WF
A Division				
1 DON LINDER	35892	117	5,316	12
2 TIM BARKLAGE	40986	475	4,210	12
3 WILLIAM MOSER	38831	459	3,886	11
4 SAMANTHA MOSER	40761	459	2,280	9
5 JOEL LEE BURGESS	36016	203	2,076	8
6 MARY K. BURGESS	39998	203	1,830	8
7 ANDREA BAXTER	35488	IND	1,745	8
8 DAVID BAXTER	35489	IND	1,488	8
9 ERIC GANN	36583	205	982	4
10 THOMAS C. BURGESS	39999	203	950	8
B Division				
1 ANDY APEL	43230	117	3,774	9
2 JAMIE EVENSON	36669	427	1,548	3
3 JODY HANSEN	35234	453	1,488	3
4 LEE OLYNIEC	35214	403	1,448	4
5 LARRY LABOND	39976	463	816	5
C Division				
1 DAN DOMINA	50570	IND	4,998	12
2 FRED WILLIAMS	34194	113	4,019	11
3 JIM SEXTON	35936	461	3,830	12
4 LARRY B. RICE	33323	113	3,398	12
5 DONALD LINDER	35893	117	3,000	12
6 ROGER WILFONG	36404	463	2,895	11
7 DAVID MOSER	28979	459	2,484	11
8 MARK O'BRIEN	35486	463	2,481	11
9 TOM MC CANN	31967	IND	2,391	10
10 TERRY WHITE	33994	308	2,196	11
Teams				
1 ZUNOFARK	48	403	4,642	12
2 DUAL EGGLOFTERS	2	117	3,201	12
3 ODD COUPLE	85	471	2,888	6
4 HONEYMOONERS	811	461	2,858	10
5 LOU DICK	8	359	2,658	7
6 ARIANE-II	38	471	2,644	12
7 BROWN & BROWN	7	205	2,545	12
8 EAST MEETS WEST	100	IND	2,496	11
9 PEE BEES	19	461	2,073	11
10 OMEGA-ALPHA	241	203	2,032	10
Sections				
1 NIRA		117	23,823	12
2 NOVAAR		205	12,557	12
3 ASTRE		471	12,084	12
4 KYNAR		459	10,650	11
5 CAROLINA SKYWRITERS		461	9,344	12
6 HUVARS		463	9,297	11
7 VIKINGS		203	9,236	12
8 HARA		403	8,558	10
9 CSAR		113	7,787	12
10 RED STICK ROCKET SOCIETY		475	6,295	11

Only those contests received and verified by the NAR National Contest Board are included.

Mark B. Bundick, Chairman
NAR National Contest Board

MAXI PAD

by Vince Huegels

Big Launcher for Big Rockets

To launch those larger models, particularly the high powered maxi rockets that are increasing in popularity, you'll need a larger launcher. The MAXI-PAD will give you the size and stability you need to keep your rocket and launcher from wiggling in the wind. The elevated platform is an attractive support for the model, and the recessed blast deflector makes for a clean lift-off.

The launcher is made from 3/4" plywood. Mark off the measurements for the legs on the lumber and saw them out. You'll need a jigsaw for the circular platform, but you can make it as an octagon or a square if you prefer. Save the center piece you cut out - you'll need it for the blast deflector. Also cut out a strip of plywood for the deflector brace.

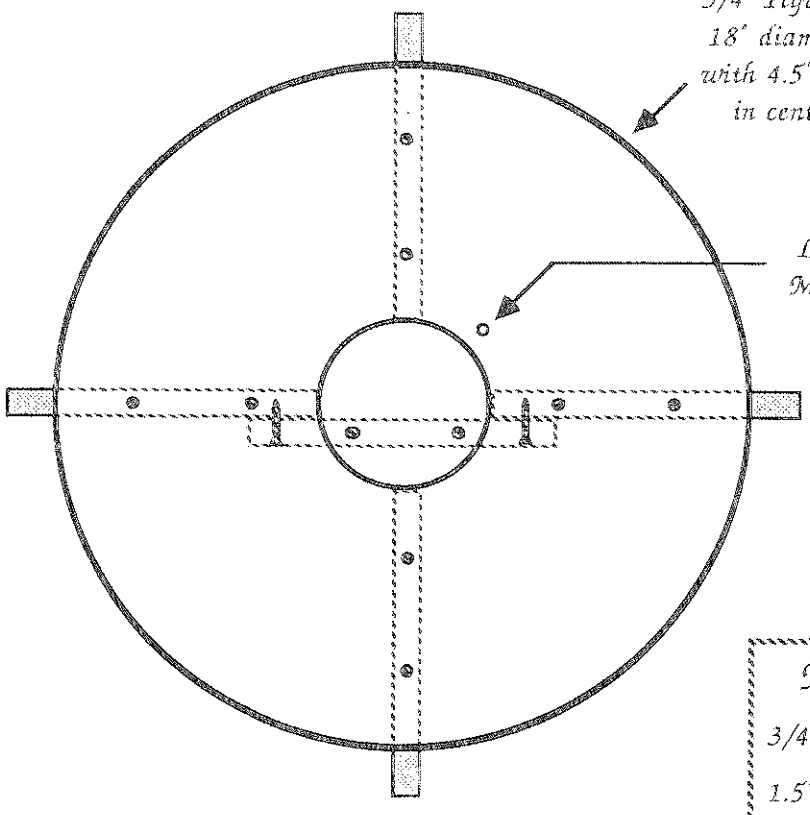
Mark off the screw locations on the lumber and drill the holes. Also drill a hole for the launch rod or its mount. Assemble the legs to the platform with the wood screws.

The small plywood disc neds a flame resistant element to function as a blast deflector. Several can lids tacked together, or a similar diameter can itself are possibilities. An inverted small ceramic flower pot, a piece of rain gutter pipe, or metal ductwork pipe could be used. Attach the deflector to the plywood disc, nail the brace to the disc, and then mount the unit between the launcher legs. Finish and paint the wood as you desire.

When launching, the ignitor clips can go up through the exhaust port underneath to the rocket, or just hook up straight across the top of the pad. You may want to anchor the clip leads on the launcher and then coil the rest of the leads around the pad like a spool for easy transportation and storage. There's even room for a battery under the platform. However you wish to utilize the design, the MAXI-PAD will give you maxi service.

MAXI-PAD

Top View

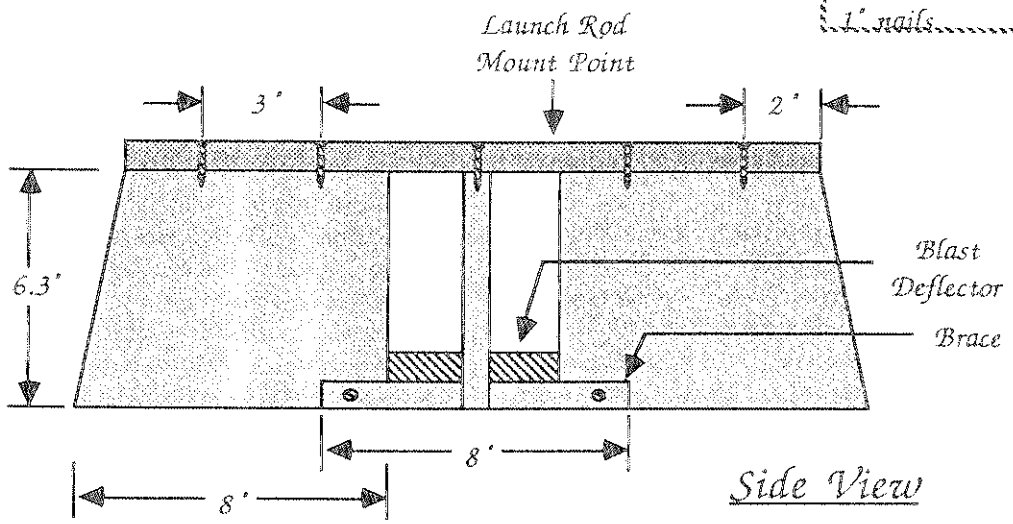


Materials

3/4" Plywood

1.5" wood screws

1" nails



Side View

MODEL ROCKET ADHESIVES

BY
CHRIS PEARSON, SCOTT DIXON AND MATT STEIB

Introduction

I'm sure that all of us who got started in rocketry early in 1960's and 70's probably used Elmer's Glue to piece together their first model rocket kit. At that time, that (and the manufacturer's equivalent such as Centuri Rocket Glue) was about all that there was. Things have come a long way since then, and whole new families of usable adhesives have become available.

It is absolutely essential that one use the proper adhesive for the right job. Common sense indicates that one doesn't use white glue to put a plastic model together, or styrene cement to glue balsa fins to a paper body tube. But it is surprising to discover just how many people at one time or another have done just that. Even today, with the popularity of high power, one can still see people gluing fins on J class rockets with Elmer's!!!! This displays a total ignorance of current technology. And, it is not that hard to research just what adhesives are right for the job at hand.

The use of proper adhesives will make the project assembly easier and faster. It will certainly make for a better and safer flying model rocket. When designing for velocities in excess of Mach 1, it is imperative that the fins to stay in place, and the motor mount doesn't shift. Having a fin fall off of a 1/2A powered competition model is not quite the same as having a three pound rocket filled with cameras and transmitters thrashing around under twin G power without fins. But both can cause safety problems. Build it correctly, and build it strong!

The following is a detailed description of the various types of adhesives available to the modeler. Some of the discussion gets rather technical when describing the chemistry. For those of you familiar with high school or college chemistry, the terms should be meaningful enough to give some insight as to how the glues work. For those of you who don't want to have to deal with the big long words, skip over the descriptions and check out the table at the end.

White Glue:

These are commonly used glues such as Elmer's, etc. They are basically a polyvinyl acetate or chloride emulsion, depending on the brand. The substance has been plasticized to some extent to allow for flexibility of the hardened product. Since it is a waterborne substance, it is soluble in water, making spills easy to clean up. If it gets on hands or clothes, it will come right off in the sink or washing machine. White glues allow considerable working time or a long "pot life" as it is commonly referred to. It is also one of the few glues that isn't harmful to get on your skin or to ingest, and the slight odor isn't harmful.

On the negative side, white glues do not have the strength of most other adhesives, and the curing process is reversible. It also takes 12-24 hours for these glues to dry. The cured adhesive is heat and water sensitive. This means it is not for use on high power rocket motor mounts. And, don't expect a model built with white glue to hold up in the rain (which always seems to happen between the time one loses a model and when it is found).

Wood Glue:

This is type of glue is an aliphatic resin such as Titebond, Elmer's Wood Glue, or SIG Bond. It can usually be distinguished from white glue by its yellow or off-white color. The difference between wood glues and white glues is that aliphatic resin glues usually have a small amount of polyvinyl acetate of polyvinyl chloride and a hydrocarbon resin mixed in for water stability. As a result, wood glues are much stronger, dry faster, and are more viscous than white glues. The bond is more heat and water resistant, and is nearly irreversible. They do take 6-12 hours to dry, though. These are good glues to build most model rockets up to D power with. Like white glue, there is only a slight odor, and it it not harmful to the skin, lungs or clothes.

A variation of this type of glue is PIC Rigid White

or SIG Super Weld. It dries faster, and is clear when completely cured. It is not as easy to sand as regular wood glues, so it isn't a good idea to fillet fins with Super Weld. But for shock cord mounts and motor mounts, it is a good choice.

Styrene Cement:

Primarily used for construction of various types of plastic models, this type of adhesive as little use in model rocketry, with the exception of flying plastic model conversions. Various brands are made by Testors, Pactra, and Sig, and they usually come with variations that are free of harmful fumes. The styrene cement is simply a solvent for the plastic, with a blend of low, medium and high boiling compounds. Typically, the tube type cement is one part di-isobutyl ketone, one part amyl acetate and one part methyl ethyl ketone, along with 15-20% pre-dissolved styrene plastic thrown in. The liquid type plastic model cement that is applied with a brush (such as Testors or Plastruct Plasti-Weld) is usually just isobutyl ketone.

It is not recommended that this type of cement be used for any routine rocket construction, as it can not provide any bond strength for balsa and paper. All types of styrene cements are highly flammable, so care should be taken accordingly. The fumes from either type are harmful, as most contain chloroform, although there are compounds added to the solvent to discourage sniffing. Always be sure to use these cements in a well ventilated area.

Wood Cement:

Made by Testors, Pactra, and the like, this is the type of cement likely to be sold next to all balsa model airplane kits. This type of adhesive is a two part cement, based on paraformaldahyde and resorcinol. When used on wood, it is strong and waterproof, but it doesn't bond well to paper. The curing process is irreversible. Wood cements have a short pot life, and are best used for all-wood assemblies such as sheeted wings and multiple fins. It takes 6-12 hours to reach full strength, and is moderately flammable. Wood cements also have a mild odor that can irritate the respiratory tract and skin.

Hot Melt Glue:

There are many types of hot melt glue and glue guns, but the type the modeler is familiar with is often found at hardware stores, and in the hardware section at discount stores. Most types of hot melt glue are high molecular weight polyvinyl acetate based. Another type is low molecular wieght polyamide (nylon), which is stronger, and has a higher melting point. These glues may be great for fixing items around the house, but the have little application for model rockets. They can be used for small (1/2A- B power) rockets, but they don't have the bond strength for anything bigger. Perhaps hot melt glue might be useful for tacking operations prior to gluing of filleting, but that's about it. The working time is very short, about 5 seconds or less. Full strength is achieved in less than a minute. Making fillets with the usual techniques of wiping down the joint with a finger would be painful, and should be avoided. There is a mild odor, but the glue itself is not harmful. There is the added danger of a hot instrument, and precautions must be taken to avoid burns.

Contact Cement:

There are two basic types of contact cement: the first type is as hydrocarbon resin, usually isobutylene rubber or butadiene based, although there are some types out that use neoprene or polychlorinated rubber dissolved in a solvent. The second type uses polyvinyl acetates or polyvinyl acrylics. Contact cements are good for bonding flexible surfaces together, like rubber, vinyl, or thin plastics. Contact cements don't have much bond strength to hold anything together on a rocket, with the possible exception of roll patterns or decorative stripes. However, it is very useful for bonding thin plastic or mylar to wood spars, and thus it is highly recommended for flexwings. Pot life is about 1 hour with full strength in 24 hours.

Contact cement is soluble in contact cement thinner or dope thinner. The fumes can be harmful, and may irritate the skin and eyes.

Ambroid:

This type of resin glue is similar to wood cement, but it has the addition of an acrylic resin dissolved in the solvent. This gives the glue greater strength, and makes it usable for gluing together paper and wood. It has great strength when cured, is water resistant, and has high heat resistance. It is irreversible, and like wood cement, is highly flammable The fumes can be harmful if inhaled for a prolonged period of time. Like most solvent based adhesives, it shrinks as it drys.

Epoxies:

Many people aren't aware of it, but there are more than 8000+ types of epoxy resin systems available on the market today. The modeler is most likely to be familiar with the various brands, such as Hobbypoxy, PIC, SIG, and Devcon. Common cure times available are the 5 minute type, 30 minute type, 60 minute type, as well as 12 and 24 hour types. Most epoxies are based on the bisphenol-A resin reaction products of epichlorhydron. They are reactive with amine, anhydride, phenol or hydroxyl groups. One to one epoxies use polyamides, which have a high molecular weight, and therefore a low linkage rate. The linkage degree of the compound is the factor that describes the resultant strength of the epoxy system. The higher the molecular weight of the epoxy, the lower the linkage rate, and thus, the lower overall strength. Most industrial epoxies have a lower molecular weight and a resultant higher strength. As a result, they also have an uneven mixing ratio, like 5:1 or 10:1. These type epoxies are much tougher than the average modeler needs; some have been qualified for space use at temperature extremes from -220^{0}F to +170^{0}F!

Most consumer epoxies are usually the 1:1 type, which is easier to measure and mix. They are made to be "forgiving" too, which means they tolerate a little sloppiness if the ratios are not exactly 1:1.

There is a common misperception that needs to be cleared up about epoxies. In most cases, the strength of the epoxy is not directly related to the cure time. What is related to the strength and cure time is the "wetting properties" of the epoxy or, in other words, how well it soaks in. Many of the longer curing epoxies have additional wetting agents incorporated to increase their bond strength. This allows the resin to penetrate better and soak or cling to the material substrate better. Short cure epoxies usually attack this problem by using a low viscosity formulation. This is usually done by adding 10% or so 2,4,6- Tri(dimethyl aminomethyl) phenol, a tiertary amine. This compound adds to the cross linking, speeding up the process and actually taking part in the reaction.

All of the epoxies available to the general consumer are non-toxic, although they should be used in well ventilated areas. PIC has recently introduced two new products that make handling epoxies much easier. One item is called Skin Shield Hand Cream, which prevents epoxy glue from sticking to hands and skin. Simply apply it like a hand cream and wash it off with soap and water when finished The other item is called Resin Wacker, which is a solvent for epoxies. It will clean up spills and even remove cured epoxy from desks, models, and even clothes! Both of these items are highly recommended for use with any brand epoxy.

Epoxy resins can cause allergic sensitization in certain individuals after prolonged exposure. Clean any resins off of the skin as soon as possible to avoid problems. Most epoxies can also be cleaned up with isopropyl alcohol. For prolonged exposures, be sure to wear gloves or barrier hand cream.

Five Minute Epoxies:

There are two basic types of five minute epoxies: Industrial and Consumer. The consumer type is mercaptan cured, and as a result, has an obnoxious, although harmless, odor. The mercaptan causes homopolymerization, that is, it acts as a reactive dilutent and a catalyst between two epoxy groups. The bonds set up very fast, making the epoxy give off heat as it cures (called an "exothermic" reaction). A general rule is that the faster the epoxy cures, the more heat it gives off. Curing times of slower epoxies can be force accelerated by adding heat (or, for those of you with chem labs at home, by adding phenolic hydroxyl bearing compounds).

The industrial type of five minute epoxy drives the reaction rate of the polyamine up with a phenol catalyst or salsalicylic acid as an accelerator. These are

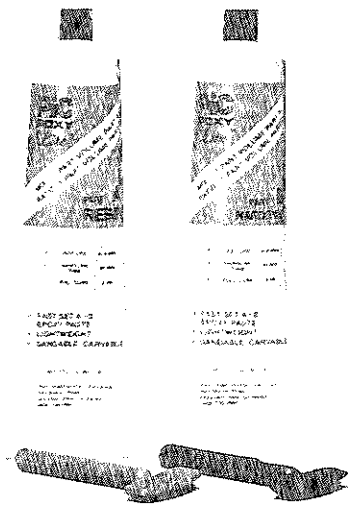
strong epoxies, but some of the compounds are toxic, and thus require special handling procedures and equipment.

Pot life on most five minute epoxies is usually 4-8 minutes, depending on how thoroughly one mixes the resins, and what temperature the mix takes place at. If there's an on-the-spot field fix, and the epoxy has been in a range box all day, expect the reaction to go a little quicker than normal.

Five minute epoxies have adequate strength to be used on all model rockets. They are a bit heavy for 1/2A - C powered birds, but are a must for anything bigger. If you get into the high power I-J class, though, you may require additional strength.

Epoxy Pastes:

These are simply epoxy compounds, usually of the five to sixty minute variety, loaded with lots of fillers such as wood or plastic. Two popular types are SIG Epoxylite or PIC Poxy Paste. They come in either a two part tube or tub, and can be mixed with either a spatula or mixing stick. One of the best uses for epoxy pastes is the filleting of fins, particularly on e, F &G powered models. They can be used to fillet all the fins at once because the epoxy paste is too thick to run. Pot life can vary, but these pastes are easiest to use if one mixes a small amounts and applies it, rather than one large amount for the whole job. These epoxy pastes can be sanded, carved, or drilled when cured.



Thixotropic Epoxies:

This type of epoxy forms a jelly like substance when mixed. Hobbypoxy manufactures the type most often seen by the hobbyist. This type of epoxy doesn't run, and is also very useful for filleting fins. Thixotropic epoxies are usually a normal epoxy formulation filled with a light to moderate amount of filler called cabosil. Cabosil is a submicron silica sand. The addition of the cabosil sets up high hydrogen bonding with the epoxy resulting in a strong bond.

Finishing Epoxies:

PIC sells a brushable epoxy called PIC Coating Poxy that comes in a two part,4:1 ratio system. This type of epoxy is great for fiberglassing or finishing body tubes, fins, and nose cones. It sands easily, and the resultant finish can be as smooth as glass. However, it is not intended to be a bonding agent, so it should not be used for fillets or structural members

Cynaoacrylates (CA's):

This type of glue, also known as super glue or just CA, has become very popular in the past fifteen years, and has revolutionized the modeling hobbies. No longer must one agonize over waiting all night for fins to dry, or worrying about misalignments or warps in the gluing process. "Hot Stuff", as modeling CA's eventually became known as, was first introduced by Bill and Bob Hunter of the "Satellite City" team. Now there are a variety of brands by PIC, Pacer, Goldberg, and others, and there are many variations of the basic type. However, there are only three companies in the world that manufacture CA's, so there tends to be very little variation between brands. CA's are available for wood, paper, plastic, foam, fiberglass, and they now have bond accelerators, super fast, slow, and gap filling types. And, the field seems to increase every year!

Application of CA's is simple. Just run a bead of glue along one edge to be bonded, and position it in place. Bonding should take place within 10 seconds for the fast CA's, 30 seconds for the medium CA's, and 60-120 seconds for the slow ones. The bond can be instant cured by hitting it with a shot of accelerator. The use of an accelerator also increase the gap filling capability of the CA. Generally, the slower the curing time of the CA, the stronger the bond will be. Fast types such as

the original Hot Stuff, ZAP, or PIC Quick Cure are great for tacking and soaking a part to reinforce it. Slower gap filling types such as Hot Stuff Super T, ZAP-A-GAP and PIC Best Choice are fantastic for almost any model rocket use. They are strong enough for models up through D power, and are a must on competition birds. It is also the best thing to have on the flying field for on the spot repairs. Slow curing CA's such as SLO-ZAP or PIC Slow Cure are great for fillets, sheeted wings, wood to paper bonds, centering ring/motor mount bonds, and anywhere where a little extra strength is required.

CA's work by reacting with moisture. The difference between the fast and gap filling types of CA is that the gap filling types have acrylic polymers dissolved in either butyl acrylate (for pliable bonds) or ethyl or methyl acrylate (for rigid bonds). These are then carried in the base product, either methyl or ethyl cyanoacrylate.

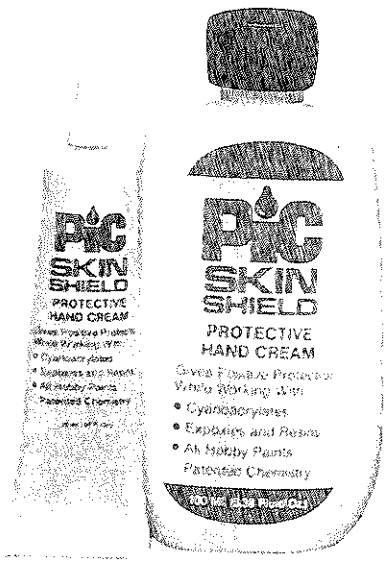
The accelerator for CA's (such as PIC Pronto, or Hot Stuff Hot Shot) is an aromatic amine catalyst (a non-reactive polymer) in a carbon tetrachloride carrier. Often, when using an accelerator, one can see the liquid boiling out. This is often MEK (Methyl Ethyl Ketone), which, along with other substances with a high vapor pressure, boil out during the curing process. This reaction exotherms quite a bit, and it is possible to get a small burn if one is not careful. The fumes generated are also irritating to the eyes and nose, as the cyano group releases chlorine during the reaction. The best idea to prevent this is to use the accelerator sparingly (it doesn't help to drench the area with accelerator) and don't use it with the thin type CA's that bond in less than five seconds.

The CA reaction is reversible because, oddly enough, CA's don't like water. It seems that if water gets into the bond interface between the adhesive and substrate, it forms a vapor layer and breaks the bond. Many of the debonding agents for CA's take advantage of this. Common ones include Pacer Tech Z-7 Debonder and PIC brand PIC APART. These water based solvents can generally unstick cured super glues on hands, models and clothing. PIC also manufactures an "anti sieze" and barrier agent called PIC Tooling Agent, that keeps pieces from bonding together (like helicopter model hinges). The Tooling Agent works well as a release agent for epoxies, too.

Because the CA's react with moisture, they like to bond to skin . It is al good idea to store the CA's in the refrigerator until they are opened (leave them at room temperature once the bottle has been opened). The accelerators will boil off in a short period of time (even through the packaging seal) so don't buy it in sizes larger than 2 ounces unless one has a really big project.

Cyanoacrylate glues can bond instantly to any part of your body, unlike any of the other adhesives discussed here. As such, a finger or a hand can be glued together before one realizes it. Use care when handling CA glues, and always keep a bottle of the debonding agent handy. Use barrier hand cream to reduce the risk of unwanted bonds. Clean up any spills immediately, using the debonding agent. Cap all bottles after use, and use only in a well ventilated area. Many of the CA glues are flammable, so keep away from open flames and cigarettes. One of the worst things that can happen is for CA to get in the eyes, so always open the bottles away from the face, and wear eye protection, if possible.

(A major American manufacturer had an accident on their assembly line where a one gallon pressure pot of CA's ruptured, blowing adhesive all over several workers, which bonded their eyelids to their eyes. It was a terrible accident that need not be repeated in the model shop.)



Summary:

There are many types of adhesives available to the model rocketeer. The trick is to pick the right one for the right job. Below is a list of suggested adhesives for different types of modelers:

Novice Sport Flyer (Estes kits) :

Medium Cure CA, CA Accelerator, CA Debonder, Skin Shield.

High Power Sport Flyer (NCR Kits):

Five Minute Epoxy, 30-60 Minute Epoxy, Epoxy Paste, Finishing Epoxy, Resin Wacker, Medium Cure CA, CA Accelerator, CA Debonder, Skin Shield, Slow CA.

Competition Flyer:

Fast Cure CA, Medium Cure CA, Slow Cure CA, CA Accelerator, CA Debonder, Skin Shield, Contact Cement, Five Minute Epoxy, Finishing Epoxy, Resin Wacker.

Of course, these are just basic guidelines. Always be sure to take the proper safety precautions for the adhesive of choice. Good building!

This report is also available as North Coast Technical Report TR-3 and is printed here as a service to SNOAR NEWS readers.

UNPAID ADVERTISEMENT

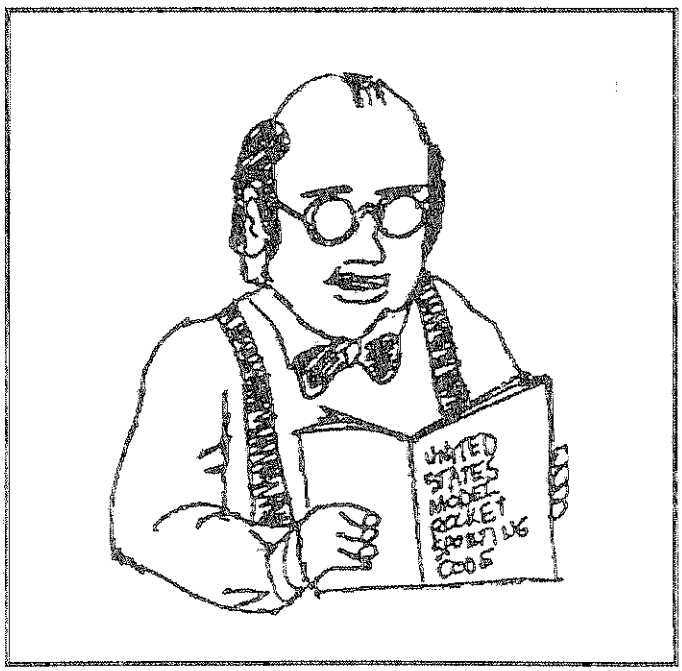
DEWITT "POPS" WALLACE, FOUNDER OF READERS DIGEST CHUCKLES WARMLY TO HIMSELF AND SAYS...

I WAS GOING SENILE...
UNTIL I JOINED THE NAR!

Frankly, my friends and family were plenty worried about me. And who could blame 'em? I kept to myself a lot.... Read old articles again and again...Bumped into inanimate objects repeatedly... Was forever giving unsolicited advice on matters that didn't concern me... *(Is this guy related to Howard Kuhn?)*... Kept a complete videotape collection of Star Trek, including "Angel" and both Harry Mudd episodes... Spent most of my free time in the workshop... Lusted after a lot of clothespins.... Laughed at the same stupid jokes for years... Folks, well, they thought I was headed straight for the looney bin...

But then I discovered the National Association of Rocketry!

There's modroc newsletters, underground songbooks, and competition and all that good stuff. Shucks, compared to most NAR " old timers", I'm not " eccentric"... I'm downright NORMAL!!! So join today, and start to enjoy life again! The NAR: We're everything mental deficiency can be! Yup, yup, yup!



Dear J. Pat:

Here's my money! Just take it! Take it all!

Name: _____ Number: _____ Etc. _____

Disclaimer: (Sign Here, boy!) _____ NAR Section: _____

From Your Sometimes Sober Editors

(CONTINUED FROM PAGE 2)

a lot a moaning and griping from NIRA the past 2 years about people from other clubs flying and competing for NOVAAR to help them win the section championship. (By the way, it hasn't helped.) NIRA's main point of contention was that club members switching over was unethical; but there would be no problem with an independent joining NOVAAR (and I can quote Bob Kaplow on that). Well, this year that happened.

I must point out at this point that I care very little who wins the championship- I have friends in both clubs and have been a member of neither. What I am interested in, however, is the fair and equal application and interpretation of the rules by the Contest Board. If it could happen to someone else, it could happen at home next.

Dan Domina, last year's C Division National Champion decided to join NOVAAR. Mark Bundick (a NIRA member who is also the National Contest Board Chairman) disallowed his NOVAAR membership on the grounds that he lived too far away. There is no precedent in the Contest Board procedures for disallowing an independent NAR member to join a section. There are no established "limits" on how far or how close one must live to be a section member. In fact, the most recently published NIRA club roster shows 5 mmebers living out of the state of Illinois, including one in New Jersey (Dan Domina's home state)!!!

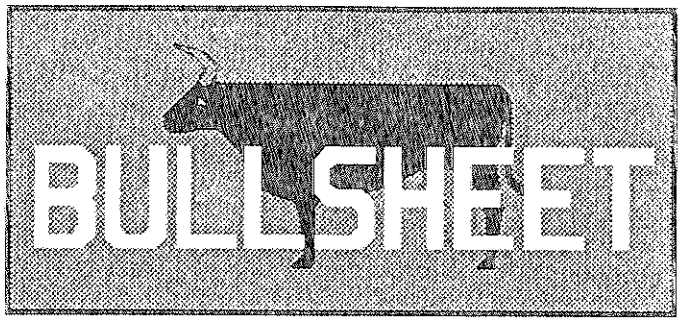
Mark Bundick made an arbitrary and unfair ruling against NOVAAR and Dan Domina because it endangered his club's chances of winning another national championship. Had it not been for the fact that Dan Domina could probably add close to 5,000 points to NOVAAR's point total, there would have been very little interest in his status. As one can see from the point standings included in this issue, it really didn't matter.

Once again, Mark Bundick has demonstrated he is not capable of fairly administering the NAR Contest Board. Instead, he uses that position to better his own personal goals, as he did in his past term by throwing out meets and by waltzing into a reserve national championship because of his failure to inform other contending competitors.

I voted against Mark Bundick's appointment at the February Board of Trustees meeting; I will continue to oppose his Chairmanship, on the grounds that he does not represent <u>all</u> the NAR members.

Just thought you'd like to know the score.

Matt & Mac SE

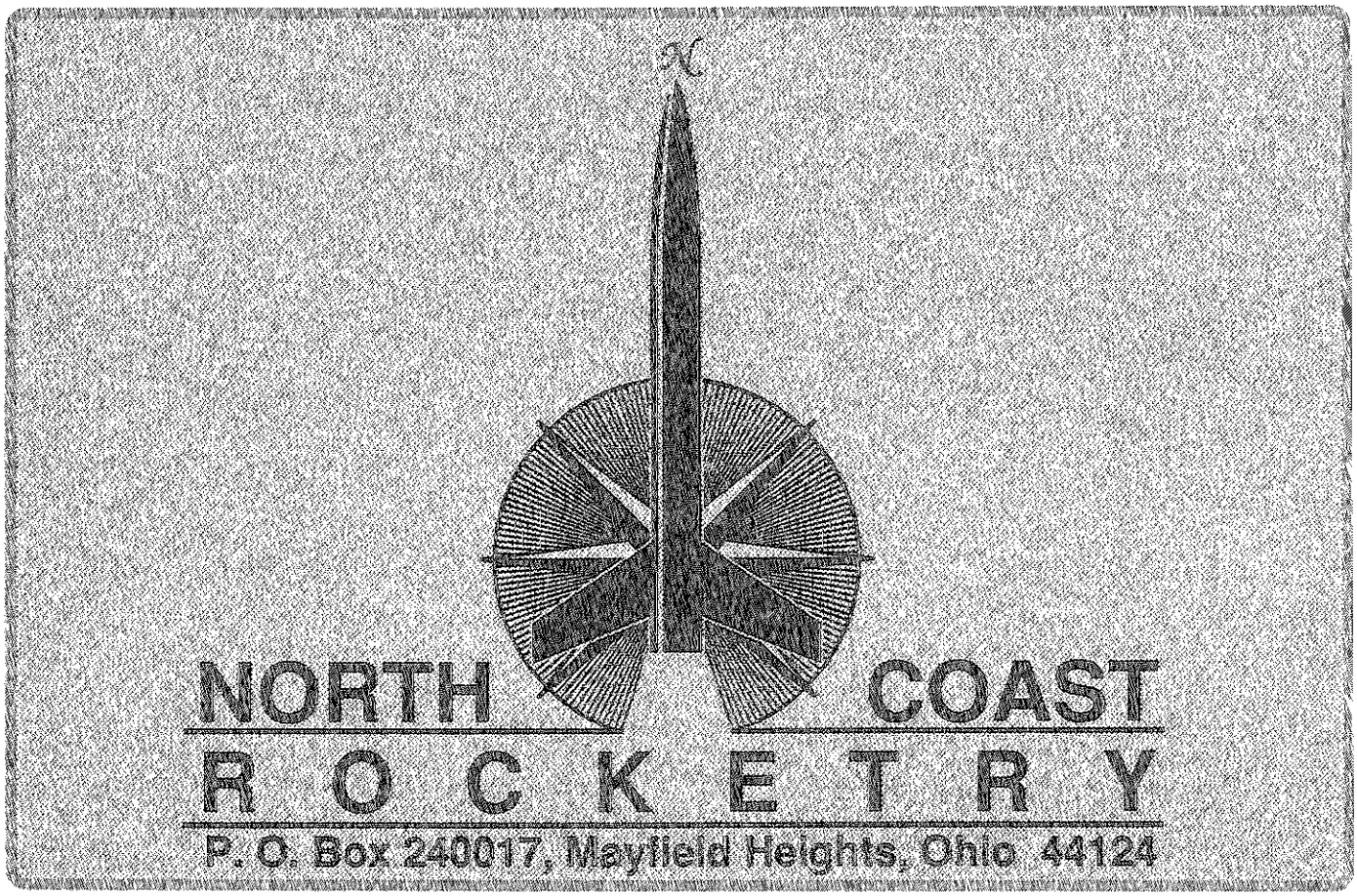


North Coast Rocketry and Vulcan Systems have teamed to provide E' Prime Aerospace with a professional sounding rockets system. This will be a 14' tall, 6" diameter, all fiberglass vehicle powered by a Vulcan Systems N5000-20 Smoky Sam motor. The vehicle is predicted to reach 17,000' and hit Mach 1.9 at burnout. Christened the "Santa Maria", the vehicle will be flown on October 14 to become the first commercial vehicle flown from the Cape. LOFT , or Launch Operations Flight Test, is intended to be a dry run for future E' Prime operations involving Scout and MX derivative vehicles. Payloads will be provided by the University of Alabama-Huntsville, Globesat, and a Georgia High School. If you'd like to come down and watch the launch from a real NASA pad, get in touch with Matt Steele, and we can get you on the VIP list. Also, Aviation Week and Space Technology is expected to publish something about the mission in the near future.

Problems with slow deliveries seem to be plaguing Aerotech. We've heard a lot of complaints about slow deliveries, and Aerotech's marketing/sales manager states that deliveries are expected to be six to eight weeks after receipt of order. We do know that in two cases, it has taken over 150 days for delivery of motors.

Enertech is the new company we were hinting about last issue. By now you've seen the ads in <u>AmSpam</u>. Seems that this is the brainchild of Lee Piester and Grant Boyd, who are well known from their days at Centuri/Enerjet. We also understand that Aerotech is involved in the deal, and the Chuck Mund has purchased a portion of Aerotech's operations. Long time high power flyer Jim Dunlap is also working for Aerotech.

And lastly, it seems as if the Steele clan will increase by one next February. Robyn and Matt are expecting a new arrival about that time. The big question is: Can a NAR number be reserved now?



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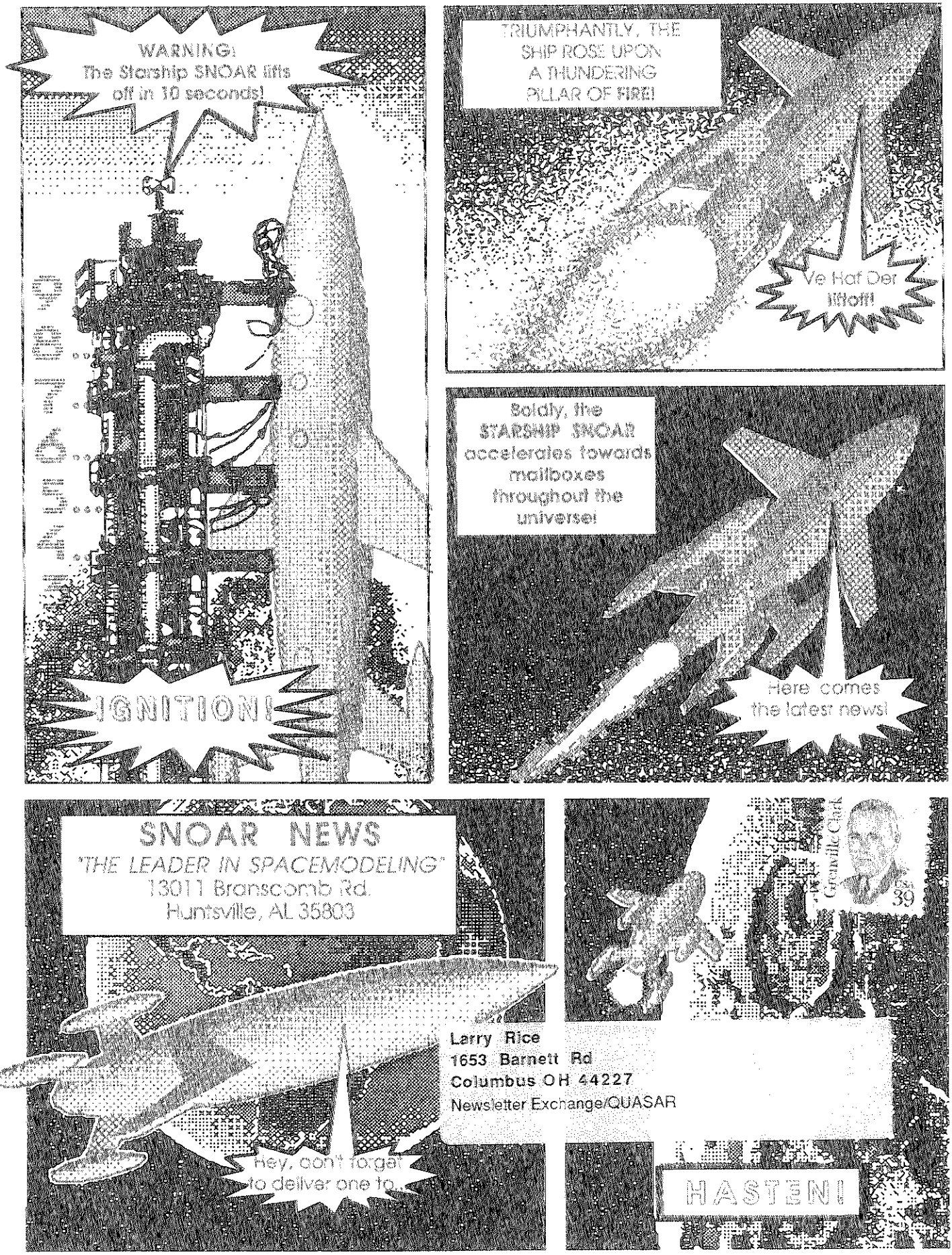
If you want performance, North Coast Rocketry has it!

North Coast Rocketry kits and motors deliver. These aren't wimpy, kids' toys. We're talking about heavy duty, advanced adult model rockets. Designed for the kind of performance you want and deserve.

North Coast Rocketry has such an outstanding performance record that it was chosen as prime contractor to supply a professional sounding rocket vehicle to E' Prime Aerospace Corporation. This vehicle will be the first commercial vehicle launched from Cape Canaveral Air Force Station!

North Coast Rocketry has also been a supplier to professionals at Penn State, NASA-Dryden, and John Hopkins Applied Physics Lab. If we're good enough for them, we should be your high power rocket supplier, too. Why purchase from someone with a questionable track record?

No one offers more to the advanced rocketeer than North Coast Rocketry. Now, we've got the most exciting motors in the hobby with our new *SMOKY SAM* line. Get in on the high powered action today!


WARNING!
The Starship SNOAR lifts off in 10 seconds!
9 8 7 6 5 4 3 2 1
IGNITION!
TRIUMPHANTLY, THE SHIP ROSE UPON A THUNDERING PILLAR OF FIRE!
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