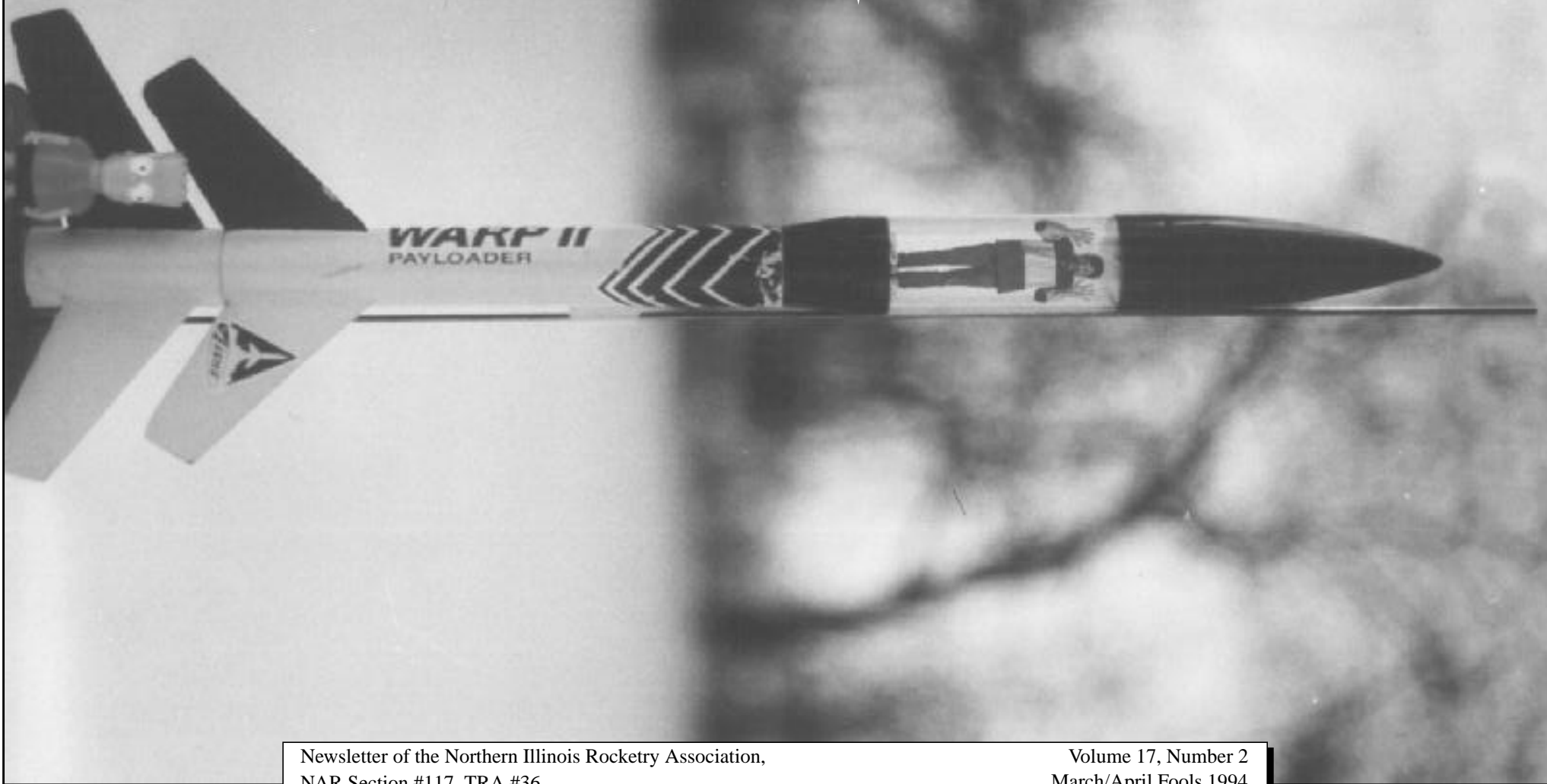




# THE LEADING EDGE



# T MINUS 1 - NIRA'S CALENDAR OF UPCOMING EVENTS

## MONTHLY MEETINGS

All meetings start at 7:30 PM, and include refreshments, entertainment and a brief business meeting. Don't forget a model for "Model of the Month" voting. We need volunteer speakers to entertain the troops after the business meeting, so call Mark Bundick at 708-293-9343 if you can help with ideas or can speak yourself.

April 1 - **Good Friday, NO MEETING!** (this is not a joke!)  
Our next meeting will be May 6th.

May 6 - Regular Monthly Meeting.

June 3 - Regular Monthly Meeting.

## OTHER ITEMS OF INTEREST

April 23, May 21 - HPR Launch, Chanute Aviation Center, Rantoul, IL. Launch begins at 9am. Call Greg Smith at (217) 352-9655 before leaving, launch dates and times are subject to change.

May 6, 7, 8 - MASCON 1994, Kalamazoo, MI. Convention with speakers, building session, launch, prizes, and lots of fun. Contact Robert Alway, P.O. Box 666, Portage, MI 49081 for more information.

May 14 - RC Airshow, Moosehart, IL. Rockets will be part of the show, contact Bob Wiersbe at (708) 690-5442 if you want to help or need information.

June 4 - Northern Illinois Modeler's Invitational, Holiday Inn, 3405 Algonquin Rd, Rolling Meadows. Contact Ed Nowak at (708) 913-5470 for more information.

July 23-28 - NARAM-36, Houston, TX. Contact Terry White, 5807 Bermuda Dunes, Houston, TX 77069-1805.

### STAFF

Bob Wiersbe - Editing Fool  
Mark Bundick - Nobody's Fool  
The Who - Won't get Fooled Again

### CONTRIBUTORS

Mark Bundick, Jim Cook, Ric Gaff,  
Ken Hutchinson, Kevin Smith, Bob Wiersbe

**THE LEADING EDGE**, published bi-monthly by and for members of the Northern Illinois Rocketry Association, NIRA, NAR Section #117, is dedicated to the idea that Sport Rocketry is FUN! Articles, plans, photos, other newsletters, and news items of interest should be sent to Bob Wiersbe, 1835 Shetland Drive, Wheaton, IL 60187 (or electronically via Internet to hrbb@ixstar.ih.att.com.) Photos will be returned, other material returned if requested. Send membership applications (dues: \$3/year, including a six issue subscription to the Leading Edge) and non-member subscriptions (\$5 per six issues) to Ken Hutchinson, 84 Jefferson Lane, Cary, IL 60013. Any item appearing in the Leading Edge may be reprinted by Sport Rocketry with proper credit given; all other uses require written permission of the Northern Illinois Rocketry Association. No clever idea for this issue.....

## 1994 CLUB LAUNCH DATES

All launches or other activities start at **2:00 PM**. BYOL (bring your own launcher). Casualty insurance required or else RSO must inspect and launch your model. Location for our 1993 launches is Community Park in Lisle. Get off Route 53 at Short and head west. If you have questions prior to any launch, call either Mark Bundick at 708-293-9343, or Mike Jungclas at 708-910-1267.

April 17: First launch of the 1994 season!

May 15: Club launch.

June 18, 19: MRFF 94! Pratts Wayne Woods, range open from 9am to 6pm on both days. Activities at local hotel on Saturday evening.

Your address label contains an item of vital information, your NIRA membership expiration date! Please check your expiration date and renew your NIRA membership before it expires. You will not receive any more newsletters after your expiration date has passed!

## MODEL OF THE MONTH WINNERS



Photo by Ric Gaff

Ron Husak's Skinny-Mini and Bob Wiersbe's D-2-D were the winners in January.



Photo by Bob Wiersbe

Ron Husak's Scrambler and Bob Kaplow's Ticonderoga Pencil were the runaway winners in February.

**On the Cover** - Picture if you will Bart Simpson. Popular TV character, a symbol of today's society, and occasionally used as the payload in a small rocket. Enter Ken Hutchinson, mild mannered, rocketeer, inventor of "Bart Lofting". Unaware of young Bart's power, until he awakens one morning to discover that their roles are reversed. WARPed? Definitely. Impossible? No. Anything can happen in..... **The NIRA Zone**.

[Photo by Image Magicians, PO Box 6718, Champaign, IL 61826]

## NAR S&T NEWS

### NEW MOTOR CERTIFICATIONS

(News Release #8)

The following motors have been certified by NAR Standards & Testing as of December 22, 1993 for use as model rocket motors. They are all certified for contest use as of March 22, 1994.

All of the following motors are Aerotech reloads with the indicated reload casing size and certified total impulse (where available).

Aerotech: 18mm x 70mm Casing: C6-3, C6-7 (10.0 N-Sec.) C12-2, C12-5, C12-7 (10.0 N-Sec.) E27-3

24mm x 70mm Casing: D15-4, D15-6, D15-8 (20.0 N-Sec.) E11-4 E18-4, E18-8, E18-10 E28-2, E28-5, E28-8 (40.0 N-Sec.) 29mm x 124mm Casing: F22-4 (65.0 N-Sec.)

### NEW MOTOR DECERTIFICATIONS

(News Release #9)

The following (additional) motors will lose contest certification on July 1, 1994 (end of '93-'94 contest year), though they are valid for contest use at NARAM 36. They remain certified for general sport flying use for three years.

Aerotech: D21-10; E15-10; E25-4,7,10; E30-10; E45-4,8,12; F14-9; F25-12; F44-20; F50-12; G40-13, G80-13.

MRC: B4-2.

### NEW MOTOR CERTIFICATIONS

(News Releases 10 & 11)

The following motors have been certified by NAR Standards & Testing as of Febru-

ary 28, 1994 for use as model rocket motors. They are all certified for contest use as of May 29, 1994.

All of the following are Aerotech reloadable motors, certified only with the indicated size casing and manufacturer supplied nozzles, end closures, delays, and propellant slugs:

Aerotech: 24mm x 70mm Casing: F24-4,7 (50.0 N-Sec total impulse, 19.0 gm propellant mass).

29mm x 124mm Casing: E16-4,7,10 (40.0 N-Sec. total impulse, 19.0 gm propellant mass). G64-4,8,10 (120.0 N-Sec. total impulse, 62.5 gm propellant mass).

NAR S&T has certified the Aerotech "Classic F25 and Classic G40" for general use effective immediately. These are made using the low-smoke propellant formulation originally developed for these designs, before AeroTech went to the smokey "White Lightning" propellant about 5 years ago. They will have performance the same as the F25 and G40 now in the certification book. There is no plan to contest certify these at this time. AeroTech does not plan to ask for contest certification.

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

Jack Kane, Chairman

## A Monster in the Making?

PRESS RELEASE - 24 February 1994

MICROBRICK, ROCKETFLITE, ENER-GON AND DANGEROUS DAVE'S ANNOUNCE THEIR CONSOLIDATION INTO MRED INDUSTRIES, INC.

Petersburg, NY -- Microbrick Technologies, Inc., Rocketflite, Energon Systems, Inc. and Dangerous Dave's Handmade Composite Stuff announced today their consolidation into a new company named MRED Industries, Inc. The new company intends to manufacture and market a complete line of hobby rockets, motors and related supplies. MRED Industries, Inc. will be operating from it's newly built facility located in Petersburg, NY.

This consolidation brings together, under one roof, some of the most talented people in the hobby rocket industry. MRED Industries' aim is to supply the consumer,

through a professional dealer network, with a full product line of quality hobby rocket products at a economical price.

The Microbrick division will continue to offer it's line of phenolic tube and Finolic (R) G-10 finned kits as well as introduce, this Spring, an economy line of kraft-paper based kits. The Rocketflite division will resume production of the ever popular large black powder and Silverstreak (tm) motors. The Energon division will manufacture a line of reliable, high-quality composite based motors. The Dangerous Dave division will continue to supply the rocket consumer with premium rocket kits and components consisting of composite (fiber-glass and carbon fiber) materials.

The Microbrick and Dangerous Dave line of products will be available in mid-March 1994. The Rocketflite and Energon lines will be available at a later date.

Inquiries should be directed to company President Michael W. Platt, MRED Industries, Inc., P.O. Box 126, Petersburg, NY 12138 or by phone at (518) 658-9132.

## Welcome to the Club!

A hearty NIRA welcome to Dave Auer, Cindy Ingram, Gary Morris, Andrew Newman, Roger Otto, and Bill Piva! These folks joined the club in recent months, so be sure and say hello to them at the next meeting or launch!

## Model of the Year Results

The Official Model of the Year Winners are:

**Ron Husak** with his *Cyclone*, and **Steve Koszuta** with his *Saturn/Skylab*!

It was a very, very close contest and the last 2 ballots decided the results. A big "Thank you!" to all who took the time to send in a ballot, we received 20 ballots in all.

The winner of the raffle is (drum roll, please).....**Bob Kaplow**!

Congratulations!

## Belker's Building Blast

by Ken Hutchinson

On the thirty second anniversary of John Glenn's first American orbital flight, the members of NIRA gathered in Judy and Bob Kaplow's basement for our annual building session. I did not remember the significance of the day, I heard it mentioned on the news on the way home. How about the rest of you?

I arrived late, a dryer malfunction having sent Lisa and I to the laundromat for the morning. Belker answered the door while Judy gave a house tour and Bob directed traffic in the basement. The basement did not disappoint those of us who knew it only by reputation, it's not called 'Bob's hobby shop' for nothing. The rocket related inventory would put most local stores to shame. Bob has a collection of his personal models that goes back to the early sixties and a well equipped workshop to boot. On building session Sunday it was all presided over by an oversized Astron Spaceman who stared serenely down from a workbench, bearing an uncanny resemblance to Pat Miller and sporting a pink flamingo applique on his shirt pocket.

People who fly as much as the Thiels of necessity build a lot also. Ed finished a Manta and made a good start on an X-Wing fighter. Bill kept pretty tight lipped about his intentions as he worked with a pile of BT-60 and 'pieces parts'. Something unusual must be in the works. Bob Kaplow also had some BT-60 birds in process. His afternoon's efforts were directed towards rebuilding his North Coast Archer, however. Last Labor Day it fell victim to an F50 cat. The damage was all internal and confined to the area in between two plywood centering rings. This makes his

task something like unbuilding an old ship and then building a new one in the same bottle. He made good progress by days end.

When he wasn't in surgery with the Archer, Bob gave some pointers to Don Vicha and his sons Zach, Alex, and their friend Ben Agosto. One of them had forgotten to bring the model he intended to work on. Luckily Bob's hobbies was having a close-out sale on some unwanted items. The boys were soon busy working on a Sizzler, an Alpha and a Pip Squeak.

Kevin Smith put Bob's belt sander to good use airfoiling the plywood fins for a Thoy Falcon. His friend Cindy, now the owner of an Estes starter set, worked on assembling a Porta-Pad. At the same worktable Ric Gaff experimented with a flying carpet boost glider design. The Sloubers were busy with Kleve working on a Nike Apache while Rosa tried to figure out what to do with all the strange looking pieces of a Galactic Taxi, a task I don't envy. In theory one of the boys was working on a Gnome, but both seemed more interested in checking out the other projects. To be honest I think we all did a lot of that, shop talk and war stories are as much a part of the event's purpose as balsa dust and CA accelerator fumes. As for me, I started the Landviper I bought from Rocket R&D at MRFF last year.

Afterwards a few of us went to the Texan BBQ in Algonquin to test our digestive systems against the 'flammable liquid' grade BBQ sauce. There were no casualties. On behalf of the club I would like to thank Bob and Judy for being our gracious hosts. Lisa and I did this one year, so I

know that it does involve some work for the hosts even though the event runs itself once it starts. If you weren't able to make it or if you have a basement you would like to offer there is always next year.

The Vicha's work on their kits from Bob's Hobbies, while balsa dust gets to Bullet Bob.



Ed and Bill Thiel doing what they do best, building lots of rockets! The Bob Kaplow Collection is on display in the background.

Photos by Ric Gaff

Lionel and Rosa Slouber work under the watchful eye of Spaceman Pat.



Kevin Smith appears to be having too much fun with the belt sander.

NIRA's newest member, Cindy Ingram, works on a starter set she received as a gift.



## Gone to Texas - NSL '94

by Bob Wiersbe

Through some unexpected good fortune, I was able to attend the National Sport Launch held in Dallas this year. I didn't know I was going to go until 2 days before the event, and had to rush to get rockets ready and make preparations.

It was a 14 hours drive to Dallas, and all in all, it wasn't a bad trip. The first thing I did was find the hotel where people were staying to find out where we would be meeting later that evening. As I was looking for the "Oak Ballroom" I came across this small boardroom where the NAR board was having a motor testing session.

As I peeked through the window in the door I saw Mark "Bunny" Bundick on the far side of the room, and he happened to glance out the window and saw me. I thought he was going to have a heart attack or something, his mouth dropped open and he pointed, so I poked my head in said, yeah, it's me, not a ghost, and I'll talk to you later. You see, I wasn't supposed to be there, and as far as Mark knew, I was still in Illinois.

The Dallas Area Rocket Society (DARS) were the hosts of this year's NSL, and a bunch of really fine folks. I knew a few of them from an Internet newsgroup I read, and it was nice to finally put a face with the name. There was a flyers meeting that night in the hotel, where we were given directions to the field and the instructions on how the range would be run.

The range opened a little late on Saturday morning due to some equipment problems, but that just gave people a little more time to get ready. The first thing I did was to visit Magnum's truck and pick up some H motors and thermalite fuse. Ross did a lot of business over the 2 days, and his truck was loaded with motors, kits, parts, and anything else folks could use.

The NSL was officially opened with a salvo launch of 10 or so Big Berthas, then the range was opened to everyone. It was a cloudy and windy day, with occasional rain. Not ideal rocket weather, but that didn't stop us from flying. My first rocket had a cluster of 7 motors, and made a less than spectacular flight. The rocket lifted off

OK, but then went unstable and pranged down range. I think it was a combination of a wind gust and outboard motors igniting at different times that caused the problem. Later in the day I successfully flew my staged Estes Nike-Apache and redeemed myself.

Bunny flew his SPEV, and wrote in the comments line "My club hates this rocket"! He also put up nice flights of his tiny scale Space Clipper and Altas-Centaur. Bunny spent most of his time politicking, but came out of the shadows when the guys from Hobbylab flew a parasitic Stealth Fighter and SR-71 Blackbird. He also seemed interested in the new E6 and E7 reloads from Apogee for RCRG birds.

One of the nicest flights of the day (in my opinion) was Gary Moore's upscaled Saturn IB. Gary says that it took him 8 years to build, and that it was based on the old Centuri kit. The rocket flew beautifully on 3 F40-4W reloads, but suffered some minor fin damage when the main chute didn't open fully.

The wind really picked up about 3:45, blowing over a tent and almost taking down the DARS tents. The RSO closed the range early at 4pm due to the high winds.

Saturday night there was a manufacturers forum and NAR town meeting back at the hotel. Gary Rosenfield of Aerotech talked about what they are doing to get their motors reclassified from UN1.3 to UN1.4, and that they are selectively restocking motors. He mentioned that they had experienced reliability problems with fiberglass casings and that's what prompted them to switch to the aluminum casings for HPR disposable motors.

One interesting comment Gary made was that Aerotech "...encourages the use of electronics" in HPR rockets since the standard 5, 10, and 15 second delays just aren't precise enough to ensure safe deployment. Gary showed us a video taken onboard from one of the Pegasus launches, it was way too cool! You could see the B52 drop plane become a tiny dot in the background, the earth's curvature, paint blister and peel from the intense heat, and got to feel what it's like to ride into space. ISP (Aerotech's parent company) makes some control motors that are used in the Pegasus, and

Gary pointed out when they ignited.

Ed LaCroix from Apogee talked about the new Apogee/Aerotech C4 and D3 disposable, and D7, E6, and E7 reloadable motors, plus some of the new kits they've developed. Apogee has come up with 2 boost gliders, one that takes 13mm motors and the other 18mm motors. The kits use a unique, swappable mount, which allows you to fly either glider with either pod. The 1/2A-A kit sells for \$13.50, the B kit for \$15.00.

Ed flew the C4 and D3 motors on Sunday, and they were quite impressive! After watching a D3 flight disappear (you could still hear the motor hissing) I wished I had more money to pick up a few. The C4 sells for \$6.50, the D3 for \$8.50. Ed claims a D3 will lift an egg 2000+ feet, but you need to launch when there is absolutely no wind. The E6 and E7 reloads are intended for RCRG fliers as an inexpensive way to get in practice flights.

Tom Blakely from Hobbylab talked about their line of rocket powered gliders, the SR-71 Blackbird, A-10 Thunderbolt, F-14 Tomcat, and MD-80 Jetliner. He also showed us a very impressive video of the planes in action. The models can be flown free flight or radio controlled, and the SR-71 can also be flown with a Cox glow engine. Tom flew the SR-71 several times over the weekend, both free flight and RC. It really was impressive, even though the flights tended to be short.

Matt Steele from North Coast Rocketry gave us the good word that they are 1 approval away from being able to ship their new F30 and G50 motors! If all goes well, the motors should be available for NAR S&T around March 8th. The F30 (4,6) will be priced at \$12.95 for 2, and the G50 (5,7) will be \$14.95 for 2.

Matt also showed us a video (NAR at the Movies Night) of NCR rockets being launched in the wastelands of Utah. When people commented on the size of the field and found out that Utah has very few restrictions (if any), cries of NARAM! were heard coming from the back of the room. Matt shook his head and said "No way! No! No! No!", which got a good laugh from the crowd.



A salvo launch of Big Berthas to open the NSL



Gary Moore's Saturn 1B at liftoff on 3 F40-4's.



Gary Moore and a better look at the Saturn 1B.



Fire & Ice - H220 Silver Streaks airstarting.



The HobbyLab SR-71 Blackbird glider.



Fire & Ice at liftoff on K550 power!



A Terrier-Sandhawk at liftoff.



The Sudden Sensation.

Last up was Mike Hellmund representing Estes. Mike said that Estes is working on composites, but that they probably wouldn't be out until the middle of next year. The next issue of Model Rocket News should be out soon, and Mike mentioned that Estes printed up 650,000 1994 catalogs! Estes is very interested in hearing about any motor problems (especially E15's), so if you do have a failure, call Estes and let them know.

Business meeting notes: Pat Miller talked a lot about the financial position of the NAR, and put an end to the rumor that the NAR was about to go bankrupt. There is funding for all of the critical projects the NAR is working on, and controls have been put in place to keep Sport Rocketry costs in line. Other items discussed were a revised Pink Book for loose leaf binders so that updates would be easier to manage, a HPR beam for Standards and Testing, and a program for NAR members to become "Certified Range Personnel". It was also mentioned that only 12 out of 62 NAR Sections have chartered so far this year.

Sunday dawned with high clouds, and NO wind. There was a breakfast at Shoney's for people who talk rocketry via CompuServe or Internet to meet each other. About 15 of us attended, and spent an hour or so talking. Somewhere between 7 and 9am thick fog rolled in over the field and visibility was down to less than 100 feet. Some very low power rockets were flown, and each one was an adventure. Since there was no wind at all, the rockets were coming right back to the pads.

The wind picked up just enough to move the fog away, and by 1pm there was nothing but high clouds and blue sky overhead! The check in line was swamped with people wanting to get their rockets up, and the DARS crews stepped up the range operations to accommodate them. They even kept the range open until after 5:30 to let everyone get their flights in.

It was a busy afternoon, and after a while it became a blur of launches. It was almost impossible to keep track of what was going up and coming down. The HPR pads got quite a work out on Sunday with 63 flights, many of them certification flights.

Some of the highlights from Sunday were

a J drag race (one of the rockets separated at ejection, but was recovered safely), an I drag race that was a tie all the way, the flight of "Sudden Sensation" with 19 G40 motors, an upscaled Space Clipper on an H motor, and a very large Terrier-Sandhawk that pranged.

I flew my staged Terrier-Sandhawk for the first time. It was nice and stable, staged perfectly, but the chute didn't deploy in the Sandhawk and it tumbled in from 1200 feet. Amazingly, there was only minor damage to 1 fin! Buoyed by this success, I went and prepped my 1/5 scale Nike-Apache. I hadn't flown this model before, and I had just finished building the electronics into the model the night before in my hotel room, so I was more than a little nervous to fly it. I used an Aerotech F50-4T in the Nike and a D12-7 in the Apache. The liftoff was fast, and had a perfectly straight boost. The Apache staged at about 400 feet, and took off into the blue Texas sky. Both stages deployed their chutes, and the crowd applauded! That flight really made my day.

One of the "fun" events of the NSL was pig lofting. The idea was to launch a pig and land it in a pig pen. There were lots of pigs being launched (my favorites were Hillary and Bill), but none of the ever landed in a pen. Every possible strategy was used, but those darned pigs refused to be put in a pen. Now if they had tried Pig Pickup Truck Spot Landing one guy would have won easily.

The honors of last flight of the NSL were given to a LOC Esoteric called "Fire and Ice". It was a beautifully finished rocket, loaded with a K550 in the core, 2 H220 Silver Streaks, and 2 F14 BlackJack motors. The K550 thundered to life, lifting the rocket arrow straight into the sky. Then the H220's kicked in with a shower of sparks, drawing oohs and ahhs from the crowd. The owner used radio control to eject the chutes, and popped them out right at apogee. It was a perfect flight to end a perfect weekend of rocket flying!

The DARS crew really did a great job running the NSL, from hotel arrangements (it was a nice hotel, even if I didn't stay there), to the flying site, to the range layout and range operations. They even took time to listen to impatient rocketeers and

explain the situation to them so they knew the whys of what was going on. Nettie and Scott Hunsicker really went out of their way to accommodate folks, and always took the time to help folks even when things were hectic. Jack Sprague and Buzz McDermott seemed to be everywhere taking care of details so that the event would run smoothly.

To give you an idea of how well run the range was, over 300 flights were made on Sunday afternoon between 12:30 and 5:30, and most of the HPR launches took place during that time. Almost 600 rockets were flown over the 2 days, which is fantastic considering the bad weather on Saturday and the fog on Sunday! The DARS club should be congratulated for hosting such a fine NSL, and for setting a new standard of excellence for future NSL's to try to achieve.

### **5-FORE!-3-2-1 or NIRA's Annual Sports Outing by Bunny**

NIRA troopers braved some cold weather to gather at the Four Seasons Miniature Golf Course on January 16 for some fun whacking at golf balls. Nine NIRA members duked it out over 18 holes in the closest finish in history. Don't get too excited; none of these players should give up their day jobs to hit the PGA Tour just yet.....

Kevin Smith emerged the winner by ONE STROKE, 46 to 47, over NIRA's perennial athlete, Kleve Slouber. Bunny finished a distant third at 51. Other folks completing the course included Bill and Ed Thiel, Rosella, Steven and Lionel Slouber, and Ric Gaff.

Rocket business followed the golfing. The troops picked up some more of the infamous Internet BT-60 order, then headed off to a local Garibaldi's for some eats. The latest issue of HPR made the rounds, and people talked of winter projects.

All in all, as good a way to spend a Sunday afternoon as watching the tube. Join us on our next "field" trip, and in the meantime, sharpen those putting skills this summer for next year's "masters" (yes, deliberately with a little M.....).

## The RSIM Story by Ken Hutchinson

If you have been to a NIRA meeting lately you probably have received or at least heard about the rocket flight simulator program RSIM. The development of RSIM marks something of a personal record for me in that over 20 years elapsed between the initial desire to do model rocketry simulations and the implementation of the idea.

My introduction to model rockets came during one of our family's annual trips to Summerdale Pennsylvania to visit my mother's side of the family tree. Just before we left for home in 1965 or thereabouts some of my cousins showed me an Estes catalog and gave a demonstration of sorts. Heedless of any safety code then or since they attempted to use a model rocket engine to "propel a device horizontally", that is, they put one in a plastic model car. The attempt ended in failure, of course, but armed with the address for Estes, my father, brother, and I were flying rockets much more successfully shortly after our return home.

After building several kits of that era, I designed and built a five engine cluster model that I still have. During the design of that model, I relied on several technical reports including TR-10 on altitude prediction by Douglas Malewicki that I used to estimate altitudes and parachute delays. By this time I was a senior in high school and had been exposed to elementary calculus which was handy since the altitude report relied heavily on integration. It was quite exhilarating to be able to understand a report that at first glance seemed hopelessly obscured by mathematical complexities. Even so the approximations needed to obtain simple closed form equations left me slightly unsatisfied. With four years of engineering school ahead of me I was sure I would soon be able to make predictions in a more rigorous fashion.

At one point my growing knowledge of physics, mechanics, and mathematics seemed to reach the critical mass required to do a rocket simulation. We were studying Newtonian mechanics in a physics class one afternoon. The calculations required to determine the path of a cannon shell or a rocket on a flat, airless world

were, by now, trivial. The curvature of the Earth was of no great concern over the distances a model rocket travels, the air was another story. Soon enough, the instructor turned to the topic of motion through an atmosphere and quickly dashed my hopes. The nonlinear nature of the drag equation made simple, general, exact solutions impossible. It was possible to calculate the motion time point by time point but the number of calculations required to achieve reasonable accuracy was staggering, at least to someone armed only with the standard student calculating engine of the day, a Post Versilog II slide rule. The ember of that particular desire began to grow cold.

Two years later when I first came into contact with the computer age at the University of Wisconsin in Milwaukee an engineering student's workload had pushed aside all thoughts of model rockets.

Some time after graduation and employment I participated in a 'real man's' hobby for a while, radio controlled airplanes. The time and cost of repairing those machines convinced me to shelve that hobby too. In the spring of 1990 I was on the verge of taking up RC aircraft again when my father decided to clean his basement in preparation for retirement to Florida. During a visit to us he handed me a box and said "Take these, you can find something to do with them." When I opened Pandora's box I saw nothing but model rocket engines.

I eventually noticed a NIRA listing in the Tribune's Friday 'Go Guide', and joined the club the following labor day. The dream of doing rocket simulations remained a distant memory until one day at work a light literally went on.

Incandescent lamps are nasty things to control with electronic circuits. A small cheap transistor can drive a lamp when it is on. When a lamp is off and its filament is cold and it has a very low resistance to electrical current. Turning on even a small lamp can require a large expensive transistor since the current will be very high until the filament heats up to its operating temperature. The time required for this to happen is small in human terms, but long enough to destroy an ill-chosen drive transistor.

I had a friend at work who was trying to

deal with this situation in the least expensive fashion. He came to me with some questions and I realized I had seen a model of a lamp published in an electronic circuit simulation newsletter. We dug it out and in a short while had it running and answering his questions. It was an interesting model in that it used circuit simulation elements to imitate the power input to the lamp, the heating effects in the filament, changes of filament resistance with temperature, energy radiation etc.

Then it struck me. All this was nonlinear, VERY nonlinear. So nonlinear we had to fiddle with it a bit to make it converge and give reasonable answers. Much more nonlinear than the rocketry equations.

Within an hour I was flying crude model rockets on my SPICE circuit simulator. It soon became apparent that a general purpose simulation tool gained its flexibility at the expense of speed. The same workstation that ran the SPICE program also had a C compiler...

I worked on the project sporadically until I bought an IBM compatible computer in January of 1993. The pace, and the scope of the project picked up quite dramatically at that point. Single stage models become multistaged, then clustered, then staged clusters. I toyed with the idea of simulating parachute performance, dismissed it as a silly idea, and then decided it might be worthwhile after all and implemented it. A brief discussion on Compuserve's Modelnet forum convinced me that it should be two dimensional. Once I started releasing samples to the 'public', NIRA members and others made additional suggestions that were implemented.

The program today is a work in progress. In the near future I intend to devote more of my free time to more traditional activities like building and flying rockets. I hope to use my Adept Rocketry altimeter this flying season to try to verify the RSIM performance predictions. If you have used RSIM and have some suggestions for improvements, let me know. About a third of the present program exists because of comments others have made about RSIM or other programs they have used.



## Mid-Winter in Michigan by Ken Hutchinson

Kevin Smith and I went to the Three Oaks launch on Saturday, February 26th. The weather seemed reasonably warm at first but after two and a half hours of watching we were quite cold. Neither of us flew anything. I kind of wish I had because the wind was nearly dead calm. I probably could have flown the J motor I bought in my Phantom 4000 and still have had a short walk to retrieve it. The Michigan Team 1 seemed like a friendly bunch. Their launch system is a single 'rack' like the ones used at Danville, Chanute, and Peoria. Its limited capacity wasn't a problem for them Saturday since the level of activity was fairly low even though a good number of people were present.

There was a slow steady stream of fliers putting up hardware. While Kevin and I were watching Ross of Magnum, Inc. pull goodies out of boxes in the back of his van someone flew what appeared to be a Bruiser EXP on a motor that really grabbed your attention. I never heard what it was, although it was louder than the K550 we watched later and the altitude was quite high for the size of the rocket. The K550 went up in a long orange rocket no more than 4 inches in diameter. It went very high. It had a dual barometric parachute deployment system to kick out a drogue chute at just after peak altitude and a main chute a little above ground level. I didn't ask but it sounds like the Adept Rocketry system. The owner used equal sized chutes for both the drogue and the main. As a result he had a rather long walk even in the light wind. If he had trusted the system more, and it did work flawlessly, he would have used a small drogue and a

larger main chute and saved himself the walk.

I missed one of the more interesting racks. The first rocket off the rack was a minimum diameter G powered number. I followed it in binoculars and was the only who could see it on the way down. I watched it all the way to the ground so the owner could have a chance of finding it. By this time the remainder of the rack had been launched, of course. The last rack we watched had a small Estes Bandit like rocket powered by an Apogee D6. I knew the owner looked familiar but it wasn't until the flight was called that I knew for certain that it was Will Safford, whom I have met only once in person even though we have had several conversations on Modelnet. Will's Copperhead ignitor failed him on the first attempt.

As Will went out to replace his ignitor we decided we were too cold and hungry to wait for the second attempt and headed for the car. All in all the launch reminded me of the Peoria launches with its friendly people, decent rural flying field, and relaxed atmosphere. If you see one scheduled for one of your free weekends and the weather looks good, it is well worth the drive.

## 1994 Estes Catalog Review by Richard Gaff

The 1994 Estes catalog recently dropped into my life and has a number of interesting new items. Probably the most important one is the reintroduction of the Model Rocket Technical Manual. This is a revised version of their earlier edition (8 or 10 years ago? I don't remember.) updated for the

90's (imagine my surprise when I realized that it had been revised by our old friends, Tom Beach and Joyce Guzik!). Like it's predecessor the new manual is slim, only 13 pages, but manages to contain an excellent overview of the hobby. Topics covered include building, finishing and flying your first rocket, stability and engine function and selection. Brief discussions of more advanced topics such as tracking, staging and clustering are also included. The manual is well written and illustrated and is an excellent guide for beginners (especially for people who's first and only exposure to the hobby is an Estes catalog). Estes is to be commended for reintroducing this valuable resource to the hobby (as well as their sensible choice of revision authors!)

Several new models have been added to the E2X series of easy to build rockets. The Manta is a styrofoam "Delta Dart" style glider that piggybacks a ride on a conventional model. At ejection the glider slips off and glides back separately from the booster. The Turbo Copter is a smaller, easier to build version of the skill level 2 Helio\*copter. The E2X series is a line of easy to build "shake & bake" models that offers the beginner easy entry into the hobby, these could be called Skill Level Zero kits.

New in the Beta series of Skill Level 1 models is the Beta-Tron. The Beta-Tron is a smaller, simpler version of the Designer's Special that Estes has had for years. The Beta-Tron is intended for beginners and includes the new marking guide, a technical manual, parts to build two BT-50 size models and 3 standard size motors. It looks like a good introduction to basic model rocket construction techniques.

Three new kits have been added to the



Michigan Team 1 - "The Friendly Bunch"

Photos by Kevin Smith



A K550 roars to life

Challenge series (skill level 3). The Maniac (BT-55, 30.8") is an easy to build inexpensive "E" powered model. A brightly colored press on decal gives the model an eye-catching "just out of the asylum" look. The Shadow (BT-80, 47.5") is a large easy to build model that will be very useful in reducing your stockpile of "D & E" motors. The Broadsword (BT-80, 36.5") is another large, easy to build model that has a striking resemblance to a Maxi-Big Bertha.

For me 3 of the most interesting new models are not even new! The old Star Wars models, the X-wing Fighter, R2-D2, and the TIE Fighter, have all been re-released! This is no doubt in response to the recent increase of interest in STAR WARS. Whatever the reason I'm glad to see these models back in production.

Last but hardly least is the new Rocket Builder's Marking Guide which Estes introduced at last years RCHTA show. The marking guide is a set of 3 plastic devices, 2 are to replace the old clumsy printed tube marking fin guides. The other is a right angle ruler to mark and measure body tubes, hold a fin or launch lug for gluing. It looks like a very handy tool and inexpensive as well! I hope there will be a review of it soon in the Leading Edge.

### **Mid Year NAR Board Meeting Report by Bunny**

The last regularly scheduled meeting of the 1991-94 NAR Board took place just prior to the National Sport Launch. A bit shorter than previous meetings, the Board still tackled a healthy agenda.

Continuing his meteoric career path, "rookie" trustee Stu McNabb, who has done a whale of a job getting the NAR's books organized and reported in English, was elected Treasurer almost by acclimation! Thanks for the great job, Stu.

Jack Kane's Standards and Testing Committee continues to plug away at certification. The Triennial Recertification of all motors is well underway, and the committee reported no backlogs. Work still needs to be done to complete the construction of a 1,000 newton capable beam and the associated electronics to test larger HPR motors. The Board later approved \$200 additional

to complete this important project.

On the regulatory front, Harry Stine, after 25 years of service, has left the NFPA Committee on Pyrotechnics, and Pat Miller will be his replacement. Trip Barber will apparently be Pat's alternated, assuring a continued strong NAR presence within NFPA. FAA rulemaking is still expected in June in response to the NAR's petition to change FAR Part 101 and increase model rocket weight limits. DOT processing for new motors is going slowly, apparently just due to "normal" bureaucratic noise, and not any further controversy regarding regulations.

Matt Steele and Contest and Records reported smooth ongoing operations, and some minor tweaking of rules. The NPRM process is working OK, and C&R will undertake a reprint of Pink Books later this year. The Pink Book will finally move to the long discussed loose leaf format.

The Membership Committee headed by Steve Tracy gave a full report on premium memberships (ex. lifetime memberships). After some review by the Board, Chris Tavares agreed to work with Steve further on these, refine the ideas and return with a full program.

Budget allocations approved after a through review of finances were as follows: Contest and Records: \$2,300 for Pink Book reprint  
Standards and Testing: \$200 for test stand completion  
Membership Committee: \$500 for premium membership benefits  
Headquarters: (a) \$200 for renewal packet rework (pending Membership Committee review); (b) \$200 for contract increase, (c) \$500 for computer system upgrades (this amount supplemented by Pursley donation of some older used 386 equipment), (d) \$300 for insurance notification letters; (e) \$500 for Trustee election ballots;  
Trip Barber: \$500 to complete reload study.

The bulk of the meeting was spent reviewing the Sport Rocketry RFP process. While the debate was long, and the Board frankly remains divided on Steve Weaver's performance, the Board voted to extend the Special Committee's life another 60 days to attempt to finalize the contract with Steve's new company. The Committee must, by April 19, be prepared to recommend a con-

tract for Board review and approval, or open the process to competitive bidding.

In the meantime, financial performance of Sport Rocketry improves. Ad revenues run ahead of projections made in Cincinnati, and production costs are coming down due to printing efficiencies and graphical changes. Stu McNabb retains a tight financial control over the process.

Finally, the Board met with Mike Hellmund, who offered some ideas about educational promotions the NAR could undertake. As a result of the discussion, the NAR will investigate attendance at regional and national educator conventions. The intent of attending is to assess how the NAR might serve the market, and sell some memberships.

The Board ends its term having dealt with major regulatory, magazine and financial issues as well as trying to fundamentally shift their management focus toward member driven, quality managed programs. The next Board elected stands to make great progress by building on the work accomplished since 1991. Get out there, learn about the candidates and vote, people!

### **Retro-rocket: NIRA in the Past from Bunny**

March/April 1984

Bunny started his "Getting Started in Boost Glide" series and his Parksley Eagle A engine BG. He also offered a report on a December 1983 visit to the National Air and Space Museum. Larry London countered with his tour of Wright Patterson's Air Force Museum, which included the storage and restoration areas. Ric Gaff reviewed the new Estes catalog which featured the BT-80 version of the V-2 and both Titan and MX sport scale birds.

March/April 1989

Bunny reports on the Winter NAR Board meeting at AMA HQ in Reston, VA. The Tower RC Field Box, "converted" to rocket use, was a feature construction article. Bunny also wrote a tribute to Al Neinast, two time national champ and glider flyer extraordinaire, who passed away that January.

## Heard On The Street

Rumors and such, with apologies to the Wall Street Journal

**Thor's Hammer and Countdowns** - Don Neuschwander is a retired Lockheed engineer who spent time at both the Cape and Vandenberg from the late '50s to the late '80s. Consider the following story about a Thor/Agna launch from Vandenberg.

The Thor is secured to its launch ring by 4 large motorized screws. At some late point in the countdown the screw motors are activated and the screws backed out leaving the Thor teetering on its launch ring for the last few seconds prior to launch. At the bottom of each screw was a microswitch which lit a light on the "Christmas Tree" in the blockhouse. For this one particular launch, the command was given to back out the screws and while everything appeared to progress normally, the Christmas Tree showed one screw still engaged. One of the test engineers (not Don) with more courage than brains, hopped in his car and drove out to the pad. Nervously he approached the 90 ft missile, all tanked and ready to go, power units humming, plumbing screaming and moaning from the cryogenic fuels, ice sloughing off the tanks and crashing all around. He plugged in his headset to talk to the blockhouse and as he was about to stick his head under the launch ring to check the switch (essentially putting his head right under the nozzle) he uttered the immortal line:

"You guys **ARE** holding, right?"

**China Breakage** - Hughes has contracted with the People's Republic of China for a second communications satellite launch. China failed to orbit a Hughes satellite last year due to a malfunction in the third stage of their booster. This had been seen as a setback to China's attempt to crack the growing world launch vehicle market. China's efforts have also been hampered by US restriction on technology exports. Those restrictions are based on China's sale of rocket technology to Pakistan.

**Smelly Switch** - Sherman Mullin, a Princeton University dropout who was the head of the Lockheed "Skunks Works" is retiring at the end of February. His tenure and background there continue the tradition of unorthodox approach to engineering projects such as the U-2, SR-71 and Polaris missile. Rocketeers may recall that Bob Parks,

RCRG pilot and designer, is a former employee of the famous facility, having done structures analysis on the F-117 Stealth Fighter.

**Open Wide and Say "Ah"** - Technicians at KSC have decide NOT to remove Endeavour's turbopumps for inspection prior to the STS-59 launch April 7, but will instead borescope them to check for cracks in welds. Assuming the pumps pass inspection, NASA has scheduled the Terminal Countdown Demonstration Test for March 24 followed by the Flight Readiness Review on the same date. If all is well, the launch date will be fixed at that time. The "Leading Edge" will bring you complete coverage courtesy of Bunny in our next issue. STS-59 reunites NAR member Jay Apt with his STS-37 crewmate Linda Godwin for a 9 day radar mapping mission.

**Manufactured News** - Inept, Inc has just announced several new products! Owner Tin Fillings has been quoted as saying "These are the best we've made yet!" The first new product is the EMS, or External Manual Stager, and is used in place of the traditional mercury switch. The EMS features a standard on-off wall switch (just like the ones at home!), a spool of kite string, and a 3 foot steel rod. Just install the switch in the side of your rocket (cutting template included), tie one end of the string to the switch, measure out the length of string equal to the altitude that you want the rocket to stage, tie the other end to the steel rod, and pound it into the ground! "Nothing could be simpler", says Tin.

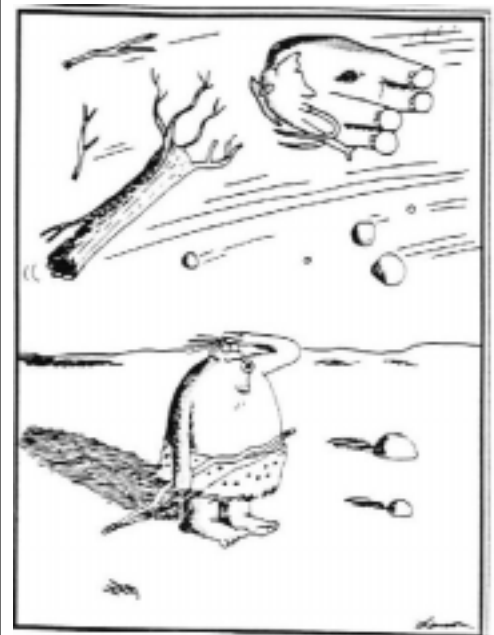
The PNDS, or Parachute Non-Deployment System, is the ultimate in non-recovery systems. This system will guarantee that your chutes will never come out! Just listen to what Prang Often has to say: "I was having serious recovery problems until I started using the PNDS. My "Full Mental Straight-jacket" worked so well, I'll never use anything else again!" This product is perfect for those models you just want to lose!

The final offering is the Sonic 1000db. This beeper is so loud that it can be heard even when buried under 10 feet of heavy Kansas soil. Prang Often tells us that, "I never would have found my "Air-oh-be" if it hadn't been for the Sonic 1000db!" (Note: there is no truth to the rumor that the earthquake in LA was caused by Prang and one of his rockets.) For information, call 1-800-ITS-AJOKE.

**More Mergers?** - Original Rockets, Inc., High Technology Flight, Wasatch Rocketry, Impulse Aerospace, Inc., Langley Autosystems, Balsa Machining Services, U.S. Rockets, and Rodgers Aerospace Software have announced their consolidation into a new company named OHWILBUR, Inc. The new company intends to manufacture and market a complete line of hobby rockets, motors, components, computers, ground support equipment, and software. OHWILBUR, Inc. will be operating from it's newly built facility located in Barnyard, OK.

When asked what prompted the merger, one owner replied "We had to do something about MRED."

In other news, it is rumored that several companies will join in response to the MRED and OHWILBUR mergers. Flight Systems Inc., LOC/Precision, Estes Industries, Aerotech, Model Rectifier Corporation, Apogee, Quest, Eagle Aerospace Systems, and THOY are rumored to be creating the new company FLEAMARQET. This new company may be in business in mid-94, and could be your source for one stop shopping at bargain prices.



The first Estes E15 is tested.

*THE LEADING EDGE*  
C/O Bob Wiersbe  
1835 Shetland Drive  
Wheaton, IL 60187

Key Attributes of the NAR VP, Mark Bundick

