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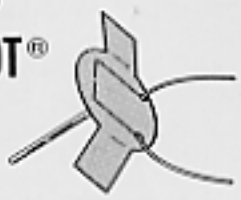

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Model Rocketry

Volume 3, No. 5
February 1971

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This month's cover shows a Polish Soyuz entry being prepared for flight at the International Competition in Yugoslavia. The model, by Janecki Zygmint, placed 8th in the overall competition. For complete results of this international contest, see the coverage beginning on page 19. (Photo by Dr. Gerald Gregorek.)

From the Editor

Quite regularly, over the last two years, we have received letters from readers asking "Why aren't there more pages in **Model Rocketry?**", or "Why don't you print more Competition Designs?", or "Scale Articles?", or "Contest Results?", or "more Technical Articles?" Well, the reason is certainly *not* because of a lack of material. In fact we continually receive about three times as much *good material* — material which we would like to publish — than we can fit into each issue of **MRm.**

The answer to why **MRm** is not bigger is, of course, lack of sufficient advertising to allow it to be expanded. Quite simply, it's the advertisers, not the readers, who pay most of the bills to operate a magazine. Take a look at the other hobby magazines. A typical issue of one of the model airplane magazines contained 40 pages of advertising in a 92 page magazine, an advertising density of 43%. On the average, **Model Rocketry** contains 8 pages of advertising in a 40 page magazine, an advertising density of only 20%. In fact, to even support a magazine of the size we are now publishing, we should have *double the present amount of advertising*. To expand to 92 pages, and bring to you the readers most of the good material being submitted for publication, would require five times as much advertising as we presently have.

Just recently an amateur radio magazine ran an announcement which read: "Tell our advertisers you saw it in XXXXXXX XXXXX . . .even if you didn't." The object was to get readers to write letters to their advertisers and potential advertisers, and tell them that their advertising brings a response.

We know that rocketeers use tools, balsa wood, spruce, paints, glue, and numerous other hobby supplies — just the things which are advertised in the other hobby magazines. In fact, if you were to sit down and write up a list of the modeling materials you use in the construction of your rockets, I'm sure you'll find, as we did, that the same products used in model airplanes, model trains, and other hobby fields are used in model rocketry. But the manufacturers of these products — tools, glue, paints, wood,

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by George Flynn

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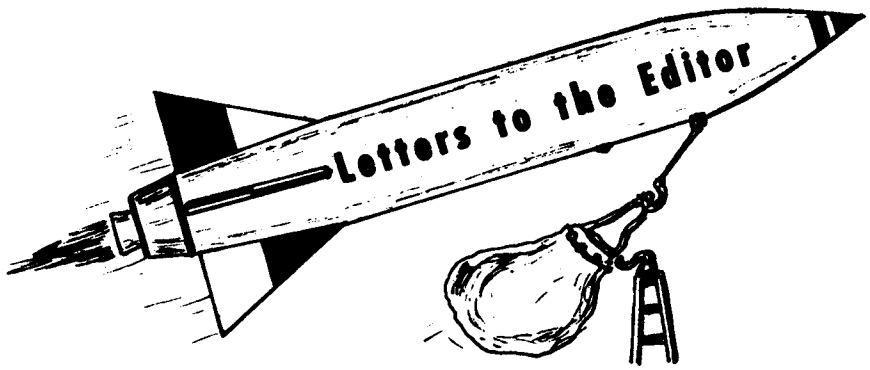

Closed Breech Launcher

This is in rebuttal to the letter that Bruce McReynolds wrote about Washington State banning the closed breech launcher. Holy Hanna! Washington State did not ban the closed breech launcher; the Washington State Model Rocket Association is the culprit for the prohibition of this altitude increasing device. It doesn't make any difference now, though, because the WSMRA has been dissolved. The reason the WSMRA banned the closed breech launcher was the worry about safety. They were concerned about the possibility of something getting stuck in the launcher and causing an explosion.

That was really neat of you to mention our newsletter — *The Modroc Flyer* — in your *From the Launching Pad*, but I feel I must correct you on the name of my Section. The correct name is the "South Seattle Rocket Society". This is the name as it stands in our constitution. We didn't put the word "Model" in this group's name.

Tony Medina
Seattle, Washington

NARAM-12 Correction

In reading through the November issue of **Model Rocketry** I found a small error on page 21, bottom center. You report that Chas. Russell's Tomahawk was the only Leader Space Systems entry to land in the target area. It was *not!* My Asp model also made it, but not by much.

Christopher Williams
Worcester, Mass.

Sorry Chris!

Computer Comments

My father has an IBM Mag Card Selectric typing system in his office. As a result, I have found the computer articles you have been printing recently very interesting.

The Mag Card system is connected to a Western Telematics communications box which is connected to an IBM 360 computer. The computer uses BASIC as a language. I have been working with the computer for the last two years. When I saw your programs, I decided to try changing them from FORTRAN into BASIC so that I could run them on the computer.

Since the second and third stage equations are the same in your multi-stage program, I made some modifications to save on computer time. I put all the variables into one and two dimensional arrays, and used several loops so that any number of stages can be calculated

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with one set of equations. The statements that add up each stage's altitude limit the number of stages in the program, so I set mine up for a maximum of ten stages. The print out only prints for the number of stages being calculated, so little computer time is wasted.

Jeffrey Risberg
Allentown, PA

Winter Launches

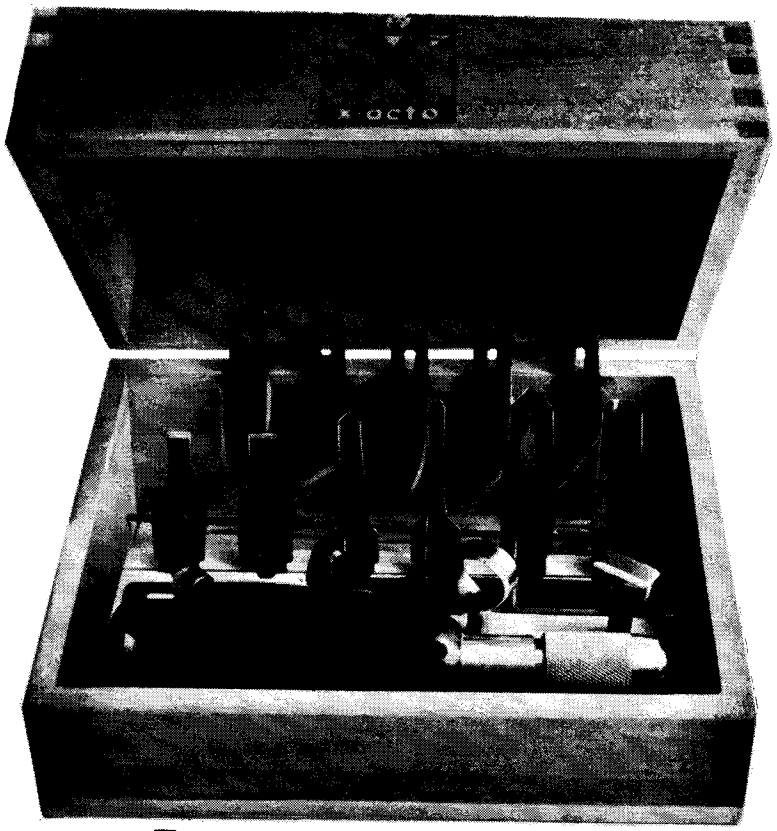
I would like to complain about your *From the Editor* in the November '70 issue where you said that there are few model rocket winter contests. I seriously doubt that this is true. I know that even our small, new club is holding a winter contest. It is planned for January. I am sure that if our small club can put on a winter contest, many other larger clubs will also have winter contests. Also, the members of our club plan to win that 1/100th scale Saturn.

Louis McCoy
President, MMRA
West St. Paul, Minn.

Great! We're glad to hear that your club is planning a winter launch. For those other clubs who want to get in on our contest, remember that **Model Rocketry** *will award a 1/100th scale Saturn kit to the club or individual who can document having launched in the lowest temperature this winter. There are still a few weeks to go in the winter. Get out there and start flying if you haven't already entered our contest. Sorry to all our readers in the Southern states. Possibly we can start thinking about a contest for the rocketeer who launches in the hottest weather this summer?*

Propulsion Projects

I am working on a number of interrelated projects in model rocket propulsion (i.e., closed breech launchers, tandem engines, thrust augmentation, fluid injection into the exhaust, engine internal ballistics, etc.). I would like to hear from anyone who is working in similar areas so that we might exchange data and ideas. I would also like to have a copy of the report



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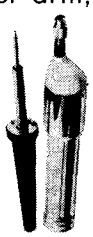

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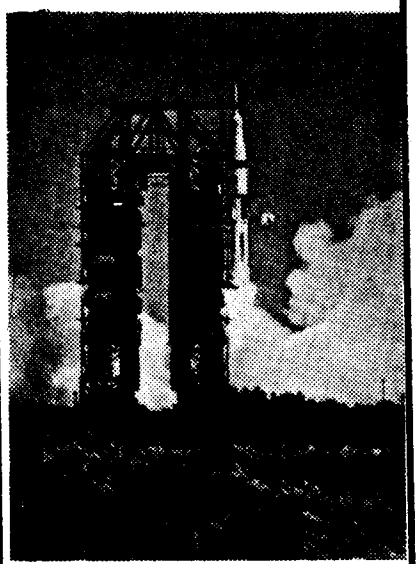

This magnificent photograph of a most historic moment in the history of spaceflight was obtained by **Model Rocketry** editor George Flynn from an advance position not accessible to most Kennedy Space Center visitors. Showing the moment of liftoff, this 7 by 8 inch full-color print will make an inspiring addition to the album of any space enthusiast.

Full-color copies of the photograph, which is reproduced in black and white above, may be obtained by sending 50¢, or $1.00 for 3, to:

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from anyone who has done a project in this field for a NARAM R&D. For this last, I am willing to pay the expenses for duplication and mailing.

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Elkins Park Club

In the June issue of **Model Rocketry** you included an announcement about our club, then called the Elkins Park Spitfires, in your *Club Notes* section. The result of this announcement was 12 new members for our club. With the addition of these members our club membership has reached an all time high. This announcement also brought us an adult sponsor, Mr. Donald A. Byerly who is head of the Science Department at our high school. Thank you.

Jonathan Rains
President, Elkins Park Orbiters
409 Shoemaker Road
Elkins Park, Pennsylvania

Construction Materials

I have read some speculations on the strength of certain construction materials in **MRm** and am writing to let you know about some of the projects I've recently undertaken. First, I have built a styrofoam B/G with a wing area of 44.5 square inches and weighing only 28 grams (in glide configuration). The glider seemed fairly sturdy, and promises to glide well when properly trimmed. Second, I have modified a "Big Bertha" to accept the Estes D engine. On its maiden flight in was tracked to 1210 feet. Third, I have designed and built a 3 D-engine cluster rocket from scratch parts. The model is 43" high, 3.25" diameter, and weighs only 14.25 ounces including engines. It has been tracked to an altitude of almost 1,000 feet. So far, I have launched it 5 times and have had 100% ignition with a relay launch system and Sure Shot igniter combination. It is very impressive in flight, making enough noise and smoke to impress even the most experienced modeler. Right now, I'm working on a 4 D-engine cluster rocket which will carry a radio in the payload.

Terry Neely
Meadville, PA

Coming Next Month in MODEL ROCKETRY:
Plastruct Asp Launcher Plans
The "Valkyrie" Parasite B/G
PVARM-2 Contest Report

Plastic Pulverizers Beware

How To Go Plastic Modeling

How To Go Plastic Modeling, By Chris Ellis, 167 pages, Patrick Stephens Limited, $4.95.

Plastic nose cones, plastic fin assemblies, plastic adapters. . . a quick glance through the current catalogs of the major model rocket manufacturers should convince even the most diehard "balsa butcher" that plastics are fast becoming an integral part of our hobby. No longer will plastics be confined to Plastic Model Competition, as exemplified by the inroads plastics are already making in Scale, Egg Loft, Altitude, and Spot Landing events – to say nothing of plastic scientific payloads and sport rockets.

Although most model rocketeers are familiar with plastic model *assembly*, the majority will probably fall under the classification of "plastic pulverizers" when it comes to true plastic *modeling*. There is, however, a valuable tool currently available to assist the rocketeer in improving his plastic craftsmanship. Chris Ellis, editor of **Airfix Magazine**, a British monthly devoted exclusively to plastic modeling, has recently written a complete guide, **How To Go Plastic Modeling.**

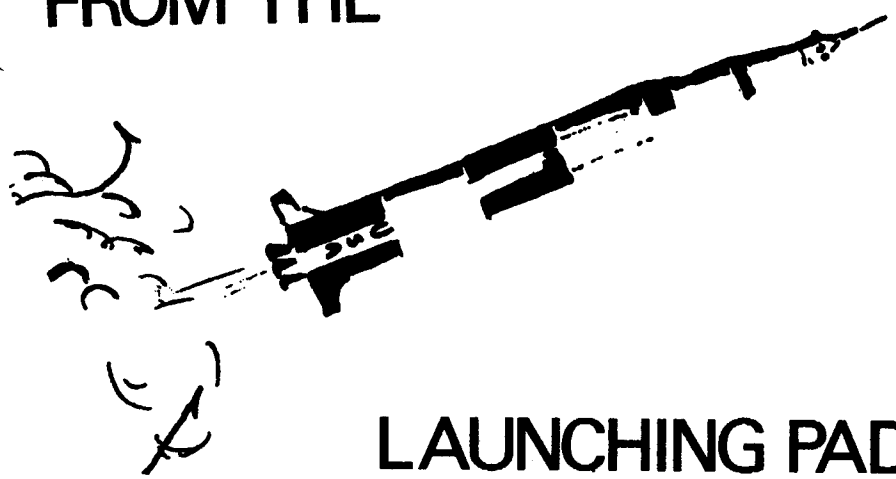
The book describes in detail the early history of plastic kits, required tools for plastic modeling, plastic adhesives and materials, and the techniques of basic kit assembly. Model rocketeers should examine Chapter 4, "Detailing, Improving, and Converting", for it refutes the dictum that a modeler has no control over the scale detailing of a plastic model. The sub-division devoted to popular scales, working surfaces, research, painting, markings, showcases, and dioramas should be of interest to plastic and balsa modelers alike. Appendices include a glossary, addresses of main kit manufacturers and material suppliers, and a list of specialized societies.

There is no direct reference to rockets in this book, the main emphasis being placed on aircraft, the most popular form of plastic modeling. The author is illustrating modeling techniques, which tend to be similar whether modeling an RAF Spitfire fighter aircraft or a NASA Saturn-V rocket. A good investment for a rocketeer interested in improving his workmanship, and a must for the library of the serious modeler.

– Jon H. Randolph

(Ed. Note.: ***How To Go Plastic Modeling*** *is a British publication, available in the United States at only the largest hobby shops specializing in plastic models. It may be mail ordered from The Squadron Shop, 23500 John M. Hazel Park, Michigan 48030 at $4.95 plus 60¢ postage.)*

FROM THE



LAUNCHING PAD

George Pantalos has provided some more information on his scale model Delta 76 flown in the International Meet last September. In December we reported that George had just barely completed the model before leaving Columbus on his way to Yugoslavia. As it turns out, the model wasn't finished nearly that early. In the true model rocketeering tradition (we'll entertain comments on whether it's a good tradition or not at some future date), the TAD was not completed until minutes before the judging began. But we'll let George Pantalos tell his own story.

"There is a dreadful mistake (which was probably a misinterpretation of my chicken scratching) in the December report on my scale bird. It was not completed when I left Columbus, New York, Luxembourg, Frankfurt, Budapest or Belgrade. When I left Columbus all of the parts had been turned and finished, but NOT assembled or painted. In Frankfurt I completed making the "76" insignia. At a restaurant, somewhere between Luxembourg and Frankfurt, I got some soda straws to use for detailing. At the hotel in Belgrade I began assembling the parts of the strap-ons and gluing the major body sections together. The final long haul began at about 2 p.m. the next day when we arrived at the dorm in Vrsac. After a brief (but calorie and wine filled) lunch, I returned to my room to be seen by only a few human eyes for the next 18 hours. As you can imagine, I used just about everything in sight that I could. As the sun went down, I braced myself for what was to be one of those usual nights before the big meet when your scale bird is still long from being finished. I carefully ran back and forth from my room to the men's bathroom to paint the pieces. By the grace of whoever the patron saint of model rocketry is, my fourth and last can of paint ran out just as I finished giving the last part (a strap-on) its final coat. Then, slowly, I assembled the pieces while intermittently taking a sip of Coke (which of course was warm) and refueling myself with some brownies a friend made for me before I left Columbus. As the sun rose, I was completing the assembly by gluing on the strap-ons and adding the final paint markings. Somehow, I fell asleep about 5:30 a.m. (by then, the sun had already been up for more than an hour) and was abruptly awakened at 6 a.m. by Dr. G. and Mr. Sivcev (my roommate). There I was lying on the floor (the beds were covered with rocket stuff) trying to figure out who I was, where I was, and why the heck I was there. (You must realize that the days and night previous to this were spent working on the rocket and often did not end until 2 a.m.) After about half a minute I was fully revived and back to my senses (somewhat!). I completed what was left to do on the bird and got it to the judging room at 7:50 – ten minutes before the

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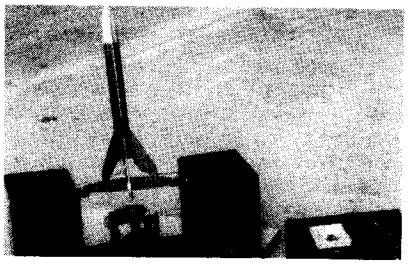

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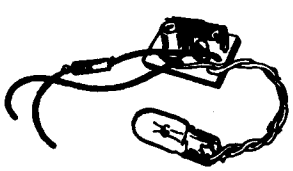

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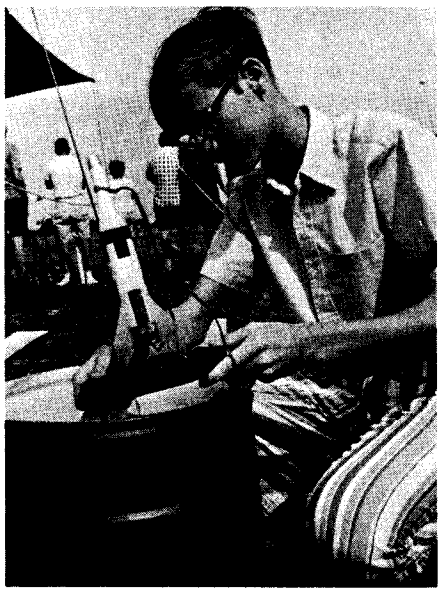
judging was to begin. After a quick bite to eat, Dr. G. and I headed to the flying field for the PD event."

So that's the "inside" story on the U.S. scale entry at Vrsac! For more details on the competition, we have a complete article on this International Contest beginning on page 19 of this issue of **Model Rocketry.**

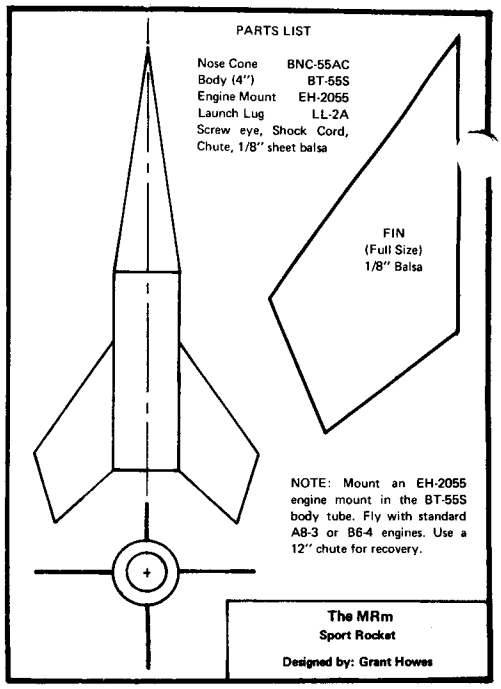
It's good to know that someone out there is building the models described in **Model Rocketry.** At a recent competition sponsored by the Broward County (Florida) Model Rocketry Association, Jim Bunce captured second place in R&D with a spectacular underwater Polaris launching (**MRm**, October 1970). According to Bob Thurlow of the BCMRA the crowd was thrilled as the Polaris streaked skyward on a flawless flight. Well, that's the second Polaris model to be launched successfully from Florida. The one by Bob Parks which appeared on the October cover was also flown from that state. Is there a water shortage in the rest of the country? Or are other Polaris flights around the country being classified "SECRET"?

For those of you who didn't yet notice, that's the Centuri Engineering "Centurion," a new futuristic kit design, on the cover of the December 1970 issue of *Science & Mechanics*. The issue of *S&M* features an article on the model rocket hobby, describing how to get started, and what kits are available for the beginner. Their article brought the model rocket hobby to the attention of 360,000 readers across the country. This is the type of good publicity for the hobby which will cut down on the public impression, still prevalent in some areas, that model rocketry is a dangerous sport.



Jim Bunce prepares his semi-scale Polaris for an underwater launching.

It used to be that "all rockets looked the same", and even among boost/gliders there were only a few common designs being flown at contests. However, rocketeers seem to be going out of their way to be "different" these days. At MARS-V (see contest report elsewhere in this issue) Geoffrey Forden of NARHAMS had an unusual rocket/glider design. It looked like a round plate attached to the rear of a boom???? The design, it turns out, had been discovered in *"The Great International Paper Airplane Book"* – published after the **Scientific American** paper airplane contest in 1967 – and modified to fly as a model rocket. Actually "fly" is not quite the appropriate word, since it went unstable on boost, but it looks like the addition of more noseweight (for boost stability) and a small forward canard (to insure a good glide angle of attack) would turn the "paper airplane" – constructed of cardboard or balsa for modroc use – into a flying rocket/glider. Anyone interested can find the plans in *"The Great International Paper Airplane Book"*, as plane number 15. I hesitate to say "it will never fly," because I'm sure someone will have a working version in the air within a few weeks!



Well, someone has finally gone out and done it. Built a "semi-scale" model of the rocket silouette featured on the cover of each issue of **Model Rocketry.** That rocket, which was originally drawn by Tom Milkie, has been the **MRm** trademark since it appeared on the cover of the May 1969 issue of this magazine.

Now we've received a letter from Grant Howes, a rocketeer from East Leroy, Michigan, indicating that he has built a model of that rocket. His plans for the model, appropriately named the "MRm", are reproduced at left. He recommends flying the "MRm" with either an A8-3 or a B6-4 engine.

We have to call Grant's model "semi-scale" because he apparently made no attempt to duplicate the bend in the nose cone on the rocket as it appears on the **Model Rocketry** cover. I wonder if Tom had any idea when he drew up that rocket that someone would actually go out and build it?

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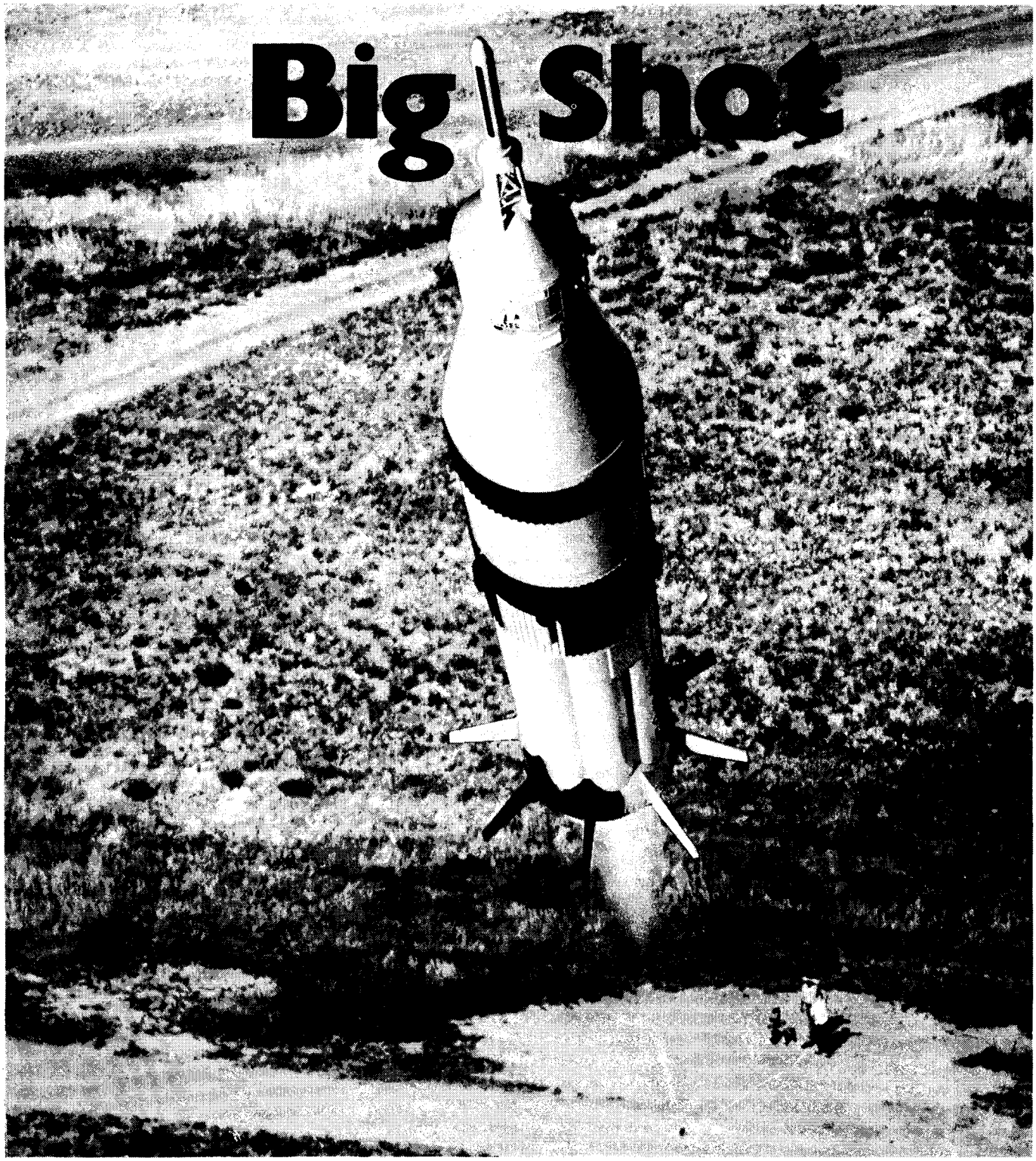

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The first big meet to fly DRAG EFFICIENCY, ROCKET/GLIDER and STREAMER DURATION.

MARS·V

by George Flynn

For the second year in a row the annual Mid-Atlantic Regional Shoot, an NAR Sanctioned regional meet sponsored by the Star Spangled Banner Section of Baltimore, Maryland, got off to a start without even the threat of bad weather. The site was the same field adjacent to Kirk Army Hospital at the U.S. Army Aberdeen Proving Grounds which had served as the launching field for MARS-IV last fall. MARS is traditionally the last big meet on the fall schedule, but this year there was an added attraction – MARS was also the first big meet for rocketeers in the D.C. area to try out the *new events* in the revised NAR Sporting Code. On the MARS schedule were new Class I Drag Efficiency, Class I Streamer Duration, and Sparrow Rocket/Glider competitions, as well as contests in Class II Parachute Duration, Robin Egg-Lofting, Open Spot Landing, and Condor Boost/Glider.

As has become traditional, the Army went out of its way to make things run smoothly. Advance preparation between the Contest Director – Howard Galloway – and LtC. W. Kilby, Chief of the Plans Office at Aberdeen, assured that Army support equipment would be available for the *155 contestants*, making MARS-V the largest Regional ever held. Under the direction of Cpt. J. Dilk and SgM.G. Barber the range was set and ready to go well ir advance of the scheduled starting time.

The opening ceremonies began with a welcome by Col. Jones of the Aberdeen Proving Grounds. With PD being the first event on the schedule, the weather was beautiful. Surprisingly there seemed to be some thermal activity – unusual for a fall meet. One rocketeer hand tossed an 18" chute with a nose cone attached, and got a duration of over a minute! There was little or no wind, so even the long duration flights remained visible and were recovered. The best flight of the day was a spectacular 670 second duration (yes, over 11 minutes!) turned in by Randy Black for the C Division title. In A Division Joe Minniuch turned in a 396 second flight for first place. All in all, in great PD flying weather, a total of 12 over four minute durations were recorded.

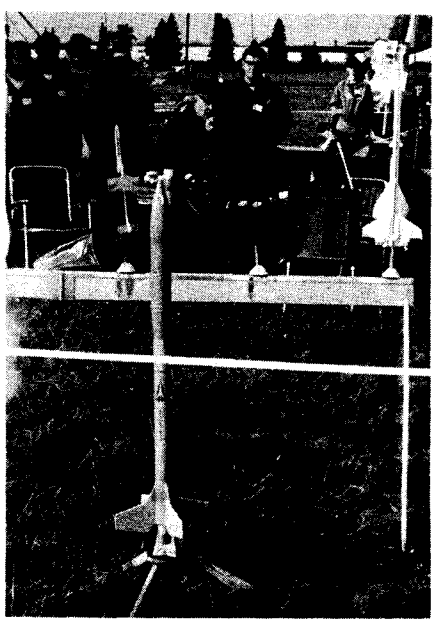
Then came one of the new events – Class I Drag Efficiency. The object of this event is to design and build a rocket of a given weight (60 to 65 grams) and total impulse (2.51 to 5.00 nt-sec) which will achieve the highest tracked altitude, and consequently have the lowest drag. A quick look at the Malewicki charts will give some idea of what's good in this event. For a 62 gram rocket powered by a B4 engine and using a BT-20 size body tube, the following rough figures apply:

C_D	Alt.
0.9	187 meters
0.7	206 meters
0.5	220 meters
0.3	250 meters

A good C_D would be in the 0.45 to 0.55 range, so the winning altitude should be on the order of 220 meters. Unfortunately, as you can see from the table above, maximum altitude in this weight and total impulse range is *relatively insensitive to large changes in the drag coefficient*. The standard 10% tracking tolerance is enough to change a winning 0.5 into a non-spectacular 0.7.

The Kuhn team topped the MARS Drag Efficiency event with a 205 meter tracked altitude. Next in line were Bill Werre's 200

Not everything was completely assembled when the rocketeers arrived on the scene Friday night. After a few hours of work, however, most everyone had a model to fly. Even some of the Condors were subjected to on-site construction.



The meet was opened by Col. Jones of Aberdeen Proving Grounds who successfully launched the first rocket.

meters, and Peter O'Neill's 196 meters. These seem to correspond to C_D's in the 0.7 range, but if you examine the Malewicki charts a small increase in weight (by only about 2 grams) will change the altitudes by almost 8%. Thus, over the five gram weight range the maximum altitude will vary as much as 40 meters, while a C_D change of from 0.7 to 0.4 only causes an altitude change of 30 meters. The weight tolerances seem to mask the drag variation effects!

Robin Egglofting – the smallest Egglofting event in the new rules, restricted to rockets powered by 5.01 to 10.00 nt-sec engines – was the last altitude event on the schedule. There weren't any really spectacular flights, but the performances were consistent. In the B Division, only 3 meters separated the Tammy Benson's first place 170 meters from the third place 167 meters. Overall, Doug Dotson topped the field with a flight to 193 meters, barely edging out Brian Sadler with 189 meters for the C Division trophy. The designs in this event were quite standard, but most of them were carrying the CMR plastic egg capsule which seemed to render the egg almost indestructable.

Communications problems early in the day hampered the tracking, and slowed down the first day's flying considerably. As a result, the sun was going down by the time the range was cleared. The standard MARS banquet followed the flying. Afterwards CD Howard Galloway showed slides of his recent visit to the Brazilian sounding rocket installation, and Dick Fox presented the first sound-CINEROC film (shot at NARAM-12).

Sunday was the big day with Condor B/G and Sparrow Rocket/Glider on the schedule. By eight o'clock in the morning over 50 contestants were out in the range area, Mantas, Bumble-Bees, FlatCats, Disasters, etc. – all *enlarged* of course – were being glide tested... most of them *unsuccessfully*. The event had been scheduled early in the morning "to get it over with before the crowds arrive," according to Dottie Galloway, but the CD hadn't anticipated that quite so many people would enter the event.

The first Condor off the pad was a test flight, not part of the contest, flown by Tom Milkie. This F7 bird was slightly underpowered and the delay was a bit long... consequently it went up... and over... and down... and the pop pod deployed heading straight down. The glider beat the pod to the ground! Impact was in a clear area across the road from the launch site. Actually the performance wasn't much different from what every rocketeer has seen an A or B powered B/G do in a developmental flight (or sometimes even in competition). It's just that when it happens with something as high-powered as a Condor it attracts a lot more attention.

MARS V RESULTS

Class II Parachute Duration

A Division	1st	Joe Minniuch	396 sec.
	2nd	Sue Zucci	203 sec.
	3rd	Mark Hopkins	175 sec.
B Division	1st	Peter O'Neill	210 sec.
	2nd	Tom Burris	209 sec.
	3rd	Carroll Yung	201 sec.
C Division	1st	Randy Black	670 sec.
	2nd	Doug Dotson	320 sec.
	3rd	Jimmy Johnson	279 sec.
D Division	1st	Jim Sparks	209 sec.
	2nd	George Meese, Sr.	189 sec.
	3rd	Sheila Duck	172 sec.

Class I Drag Efficiency

A Division	1st	Mark Hopkins	182 meters
		Alan Lane	182 meters
	2nd	George Meese, Jr.	147 meters
	3rd	Julius Hyatt	125 meters
B Division	1st	Peter O'Neill	196 meters
	2nd	Jim Kerley	176 meters
	3rd	Clinton Winchester	149 meters
C Division	1st	Andrew Bennett	162 meters
		David Graves	162 meters
	2nd	Jim Threatte	157 meters
	3rd	Robin Barket	149 meters
D Division	1st	Kuhn Team	205 meters
	2nd	Bill Werre	200 meters
	3rd	Donald Larson	182 meters

Robin Egg-Lofting

A Division	1st	Rod Simons	185 meters
	2nd	Tam Joines	154 meters
	3rd	Steve Honecker	147 meters
B Division	1st	Tammy Benson	170 meters
	2nd	Matt Johnson	169 meters
	3rd	Jimmy Wright	167 meters
C Division	1st	Doug Dotson	193 meters
	2nd	Brian Sadler	189 meters
	3rd	R. Thompson, Jr.	180 meters
D Division	1st	Paul Conner	186 meters
	2nd	Fox Team	166 meters
	3rd	Kuhn Team	163 meters

Class I Streamer Duration

A Division	1st	Dale Windsor	50 sec.
	2nd	Jonathan Javitch	38 sec.
	3rd	Steve Honecker	37 sec.
		Mark Hopkins	37 sec.
B Division	1st	Stephen Easley	88 sec.
	2nd	Mark Lennihan	66 sec.
	3rd	Jimmy Wright	49 sec.
C Division	1st	Joe Quigley	132 sec.
	2nd	David Graves	53 sec.
	3rd	Cherney Pollock Team	50 sec.
D Division	1st	Bob Parks	54 sec.
	2nd	Barrowman Team	49 sec.
	3rd	Sipes Team	47 sec.

Sparrow Rocket/Glider

A Division	1st	Rod Rivera	20 sec.
		(no other qualified flights)	
B Division	1st	Carroll Yung	33 sec.
	2nd	Tom Burris	30 sec.
	3rd	Jimmy Wright	28 sec.
C Division	1st	Doug Plummer	40 sec.
	2nd	Steve Kranish	23 sec.
	3rd	Burzynski Fornshill Team	8 sec.
D Division	1st	Bill Werre	19 sec.
		Donald Larson	19 sec.
	2nd	Fox Team	17 sec.
	3rd	Blackistone Smith Team	7 sec.

Open Spot Landing

A Division	1st	Joe Minnich	12'1"
	2nd	Richard Townsend	13'2"
	3rd	Jeff Biggs	23'2"
B Division	1st	Mark Lennihan	14'6"
	2nd	Tammy Benson	19'9"
	3rd	Jim Kerley	20'1"
C Division	1st	Brian Sadler	10'10"
	2nd	Ira Perlow	15'9"
	3rd	Jim Threatte	25'5"
D Division	1st	Irvin Philmon	10'1"
	2nd	Mike Keys	12'2"
	3rd	Bill Werre	26'5"

Condor Boost Glider
(Results of those Flown)

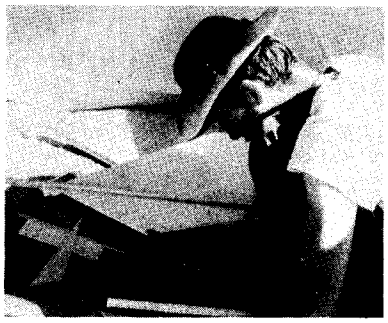
A Division		(no qualified flights)	
B Division	1st	Glen Shive	30 sec.
		(no other qualified flights)	
C Division	1st	Jodie Hobson	126 sec.
	2nd	Steven Karr	102 sec.
	3rd	Roy Rosenfeld	38 sec.
D Division	1st	Fox Team	86 sec.
		(no other qualified flights)	

OVERALL POINTS

A Division	1st	Rodney Rivera	90 points
	2nd	Roderick Simons	87 points
	3rd	Mark Hopkins	84 points
B Division	1st	Carroll Yung	102 points
	2nd	Peter O'Neill	90 points
	3rd	Tammy Benson	84 points
C Division	1st	Doug Plummer	93 points
		Doug Dotson	93 points
	2nd	Dave Graves	78 points
	3rd	Brian Sadler	60 points
		Andrew Bennett	60 points
D Division	1st	Bill Werre	132 points
	2nd	Donald Larson	114 points
	3rd	Fox Team	102 points

SECTION STANDINGS

Overall	1st	NARHAMS	315 points
	2nd	Gemini	276 points
		NOVAAR	276 points
	3rd	NARCAS	255 points
	4th	MARS	240 points
	5th	Annapolis	216 points



Bruce Blackistone does an on-the-field assembly job on his Condor B/G. This canard wing glider was an almost exact duplicate of the one he flew at NART-1. This time, however, it didn't get a chance to fly — the glue wasn't yet dry when the event was canceled.

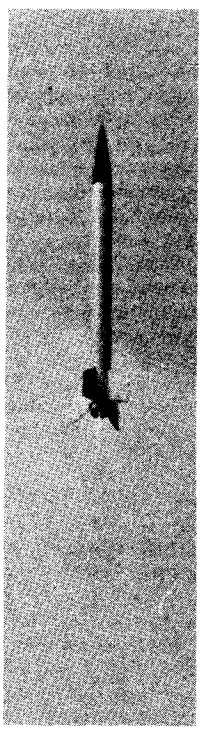
Jim Barrowman's Rocket/Glider, an unusual design reminiscent of the rear-engine boost/gliders.

Bill Werre's entry in the Drag Efficiency event was this tower launched, standard design model. His trick to a second place in the new event was good finishing for low drag, not any new design innovation.

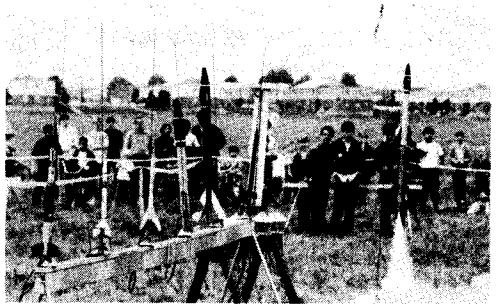
Doug McMullen preps his "Uprated Bumble Bee" for the Condor event. The model is a scaled up version of the Hornet B/G featured in the December 1969 issue of MRm.

Carl Guernsey's Condor entry was a top and bottom pod "flop-wing". At ejection the wings extend, doubling the glider's wing area.

The Kennedy-Gibbs Condor entry had to be one of the biggest Falcons ever built. In many cases the Condors were just scaled up versions of proven designs.

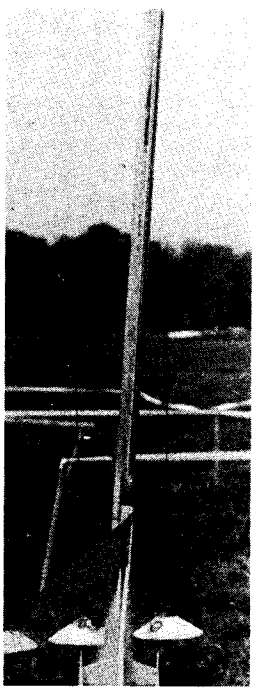


One of the demonstration models — an F-powered bird by Ted Coughlin — turns in a spectacular flight.

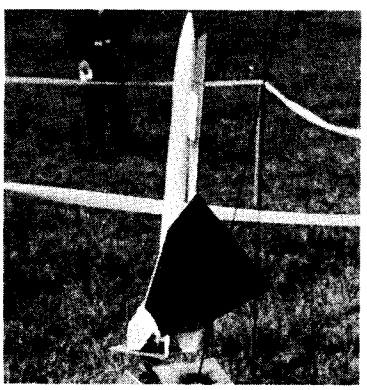


In the demonstration flying, a rack of three Estes Cinerocs was flown simultaneously — the object to have one rocket photograph the other in flight.

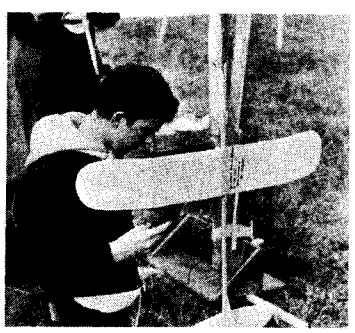
The Fox Team — Dick Fox (left), Dave Crafton (center), and Alan Stolzenberg (right) examine their parasite Condor entry. Dick holds the booster while Dave holds the Nighthawk glider after its 86 second flight.



Trip Barber's Condor, an "uprated" Falcon, lifts off from an 8 ft C-rail launcher. The model employed MonoKote covered wings to prevent shattering, but the high initial thrust caused them to fold at the wing/fuselage joint.



Glenn Johnson's Condor entry was a large Manta strapped to the side of a Bertha.



Ted Coughlin's Condor was a much enlarged, standard-configuration boost/glider. One of the few Condors to turn in a successful flight, Ted placed 4th in C Division with 29 seconds.

One of the most unusual Condors seen on the MARS pads was this entry by the Sipes Team. The parasite Manta (normal size) was strapped to the side of a ring-stabilized booster powered by a cluster of four D4-6's . . . not quite enough power for a straight boost.

Mike Coxen of NARCAS displays his Condor B/G. This glider used swing wings folded back during boost (as above), and extended for glide. Unfortunately, this was one of the Condors not given an opportunity to fly.

Next off the pad were two competition Condors which didn't fare much better. Both were DQ'ed when their F-powered pods separated from the gliders during boost. The third competition Condor was a bit more spectacular. RSO Jim Barrowman described it as "the first really successful Condor B/G ever," and it was. Flying a standard design, Steve Karr succeeded in turning in a 102 second flight!

That success was followed by an equally spectacular modroc failure. This one, described by the PA commentator as the first model rocket ever to make a successful "touch and go" landing, was an F7 powered Orbital Transport. The model was just too heavy for an F7. It lifted off, power pranged leaving some parts on the ground, and took off again somewhat uncontrollably.

There were many more Condors at MARS than there had been at NART-1, and consequently many more failures. Glenn Johnson employed a large Manta strapped to the side of a standard Bertha. Unfortunately, the Manta fell off at T + 1 second, turning in a three second duration. Trip Barber flew an "Uprated Falcon." The wings of this enlarged version of the Estes Falcon were covered with Monokote to keep them from shredding – a frequent problem in the Condor event. Instead of shredding, the wings folded up, and the Condor pranged just after burnout. The Sipes team flew an unusual parasite vehicle. The glider was a standard Manta, however it was attached to a loop stabilized carrier rocket. Power was provided by a cluster of four D4-6 engines. That just wasn't enough power to lift the vehicle on a stable flight. . . it climbed to 40 feet, and then fell out of the sky. Bill Werre's Manta, powered by an F7-4 engine, boosted beautifully. . . straight up. . . and fell perfectly straight down with the ejection charge going off only a foot above the ground.

In between the failures there were a few successes. The Fox Team – Dick Fox, Alan Stolzenberg, David Crafton, and other Steel City rocketeers not present at MARS – had a variation on the Lieberman-Crafton NART Condor winner. This time it was a Nighthawk parasite glider strapped to a core vehicle. The boost was good, and the well trimmed Nighthawk turned in an 85 second flight.

Jim Barrowman prepares his Condor B/G for flight. The glider, housed in a normal rocket body, is a 40° parawing ejected at apex.

Dorothy My Trinh and Thai Duc Trinh are assisted by several rocketeers in constructing their first model rocket. Their father, Thong Duc Trinh of the Voice of America UN Branch, was on the scene at MARS-V to report on the rocket activities for the VOA.

The best flight of the day came from Jody Hobson's Condor, a standard-winged glider trimmed for a very tight circle. It boosted straight to about 750 feet, then went into an almost spiraling glide for a time of 126 seconds – certainly the best Condor time on record.

After numerous failures, including a few flights which got a little too close to the housing development which borders on the launch area, the CD decided to cancel further Condor flying for the day. The Aberdeen field just wasn't sufficiently isolated to continue with the R&D flights on new and untried vehicles. This caused some disappointment on the part of rocketeers who had built Condors which were not allowed to fly, but served to point out that a *large* field is necessary for any event in which high total impulse engines are being flown.

The next event on the schedule was Sparrow Rocket/Glider, a new event just added to the Sporting Code. Essentially R/G is a boost/glide event with the added restriction that *everything* which goes up with the rocket must come down as part of the glider – no engine ejection, no pop-pods, etc. are permitted. Being a new event, none of the contestants had any prior experience to aid them in designing their birds. But creativity among rocketeers was at its best for this event. . . even if many of the designs failed to perform as planned. Generally the rocket/gliders which *worked* were those which were *mechanically simple*. Those using numerous interlinked deployment mechanisms generally failed.

To almost everyone's surprise, the first R/G off the pad worked! The model looked like a slightly oversize Falcon which had been trimmed to glide with a spent engine in place. And glide it did, though not spectacularly, to give Rodney Rivera first place in A Division with a 20 second flight.

Tom Burris' rocket/glider entry was a variation on the popular Manta design. He used a standard Manta with a *moveable* engine pod – the CG shift changing the glider from boost to glide trim. Tom's model turned in a 30 second duration.

Steve Kranish's entry in the R/G event was a standard flop-wing (**MRm**, September 1970) employing a shift in the CP, rather than the CG, when the wings extend to go from boost trim to glide trim. In the R/G event, Steve's trim was a little off, and the model only turned in a 23 second duration. Later he flew the same model in Spot Landing and got a beautiful glide of about 40 seconds duration, carrying the model several hundred yards away from the Spot Landing target.

All in all, there were only 11 successful rocket/glider flights out of 46 attempts. Not bad for a first try at a new and different event. Many of the unsuccessful designs showed enough promise to merit further development, since, as with any new event, you can't expect them to work on their first test.

Class I Streamer Duration, another new event, also offered several different strategies. Some rocketeers thought the object of the event was to stuff the rocket full of streamer until it was full and then put it on the pad. In fact one contestant went so far to this extreme that his streamer was so long it had not fully deployed when the model hit the ground. Other contestants went to the other extreme, treating Streamer Duration as an altitude event and cutting the streamer to a bare minimum to save weight. Neither of these strategies proved totally successful. In fact almost all the winning entries used "reasonable length" streamers — from 3 feet to 6 feet of one to three inch wide material. The best time in the event was Joe Quigley's 132 seconds, followed by Stephen Easley's 88 seconds, and Bob Parks 54 seconds.

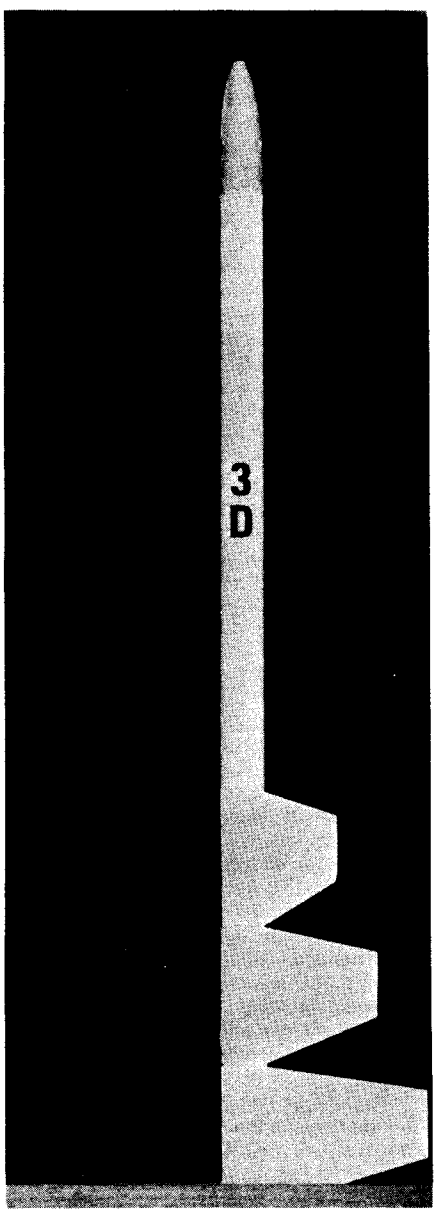
In the Open Spot Landing event, last on the schedule and "subject to cancellation if it starts to get dark before the meet is over," nothing spectacular was done. In fact some of the contestants seemed to be trying to make Steve Kranish's R/G attempt look good! The best distance was 10'1" in the D Division by Irvin Philmon. Fortunately, the event ended before dark, and there was time for the awards ceremony.

As is now becoming traditional at MARS, the sun set during the presentation of awards. But everyone managed to find their way back to their cars, and shortly after sunset MARS V came to a successful close.

FOR OPEN PAYLOAD COMPETITION

3D PAYLOADER

Designed by George Pateman



The *3D Payloader* was designed specifically for use in the new NAR "Open Payload" competition. The rule change last summer reducing the number of payloads carried from four to two made all previous Open Payloaders obsolete. So it was back to the drawing board . . . and after a few hours of thought and doodling the *3D Payloader* emerged.

The allowable total impulse in Open Payload is from 40.01 nt-sec to 80.00 nt-sec. Within this range two competing strategies for the competition have emerged – use of the single stage F100 powered bird, and use of a three stage D-powered model. The four stage D-powered model, though permitted by the total impulse restriction, is ruled out by the provision that no model may employ "more than three operable stages." A cluster of two D's in the booster of a three stager is possible, but staged-clusters get tricky. The idea behind the F100 powered Open Payloader is that it will fly reliably while not going high enough to get a "track lost" in normal visibility. The *3D Payloader,* on the other hand, will go *out of sight* on all but the clearest of days . . . but on those days you'll see a fantastic peformance.

To be of any value as a competition model, the *3D Payloader* just had to get *tracked.* So trackability was the prime consideration in its design. First off, it had to be large enough to be seen at peak altitude . . . so an 18 inch length of body tube was chosen for the upper stage. Second, it had to fly high, so the drag had to be minimized. Weight was only a third consideration, since almost all payloaders are so far *over* optimal weight that the addition of a gram or two doesn't affect the performance significantly.

A quick look at Centuri TIR-33 will convince you that *no fins* are necessary to insure *static stability* – CP behind CG – of the upper stage at the low angles of attack considered in that report. Those two lead weights up front really move the CG forward. What TIR-33 doesn't tell you, however, is that it will in all likelihood not fly at those low angles of attack without fins. The large fins on the *3D Payloader* are there to insure *dynamic* rather than *static* stability. Without fins, the rocket would "cone", assuming a non-zero angle of attack to the airstream . . . and significantly increasing the effective frontal area (and consequently the drag). Acutally its not the fin size as much as the degree of airfoil on the fins which will determine the drag of the model. So don't panic about the size, just spend a few extra minutes duplicating the airfoil on the plans and you'll have a high flying payloader.

CONSTRUCTION

Three D's will really push this model through the sky, so normal construction techniques and materials are not adequate. Assembly of the *3D Payloader* requires both Ambroid glue and an epoxy glue such as Hobbypoxy Formula II. Since the bird will be carrying two lead payload weights pretty high over the launch area, safety considerations dictate that it be well assembled, and that you give it a thorough checkout before each flight.

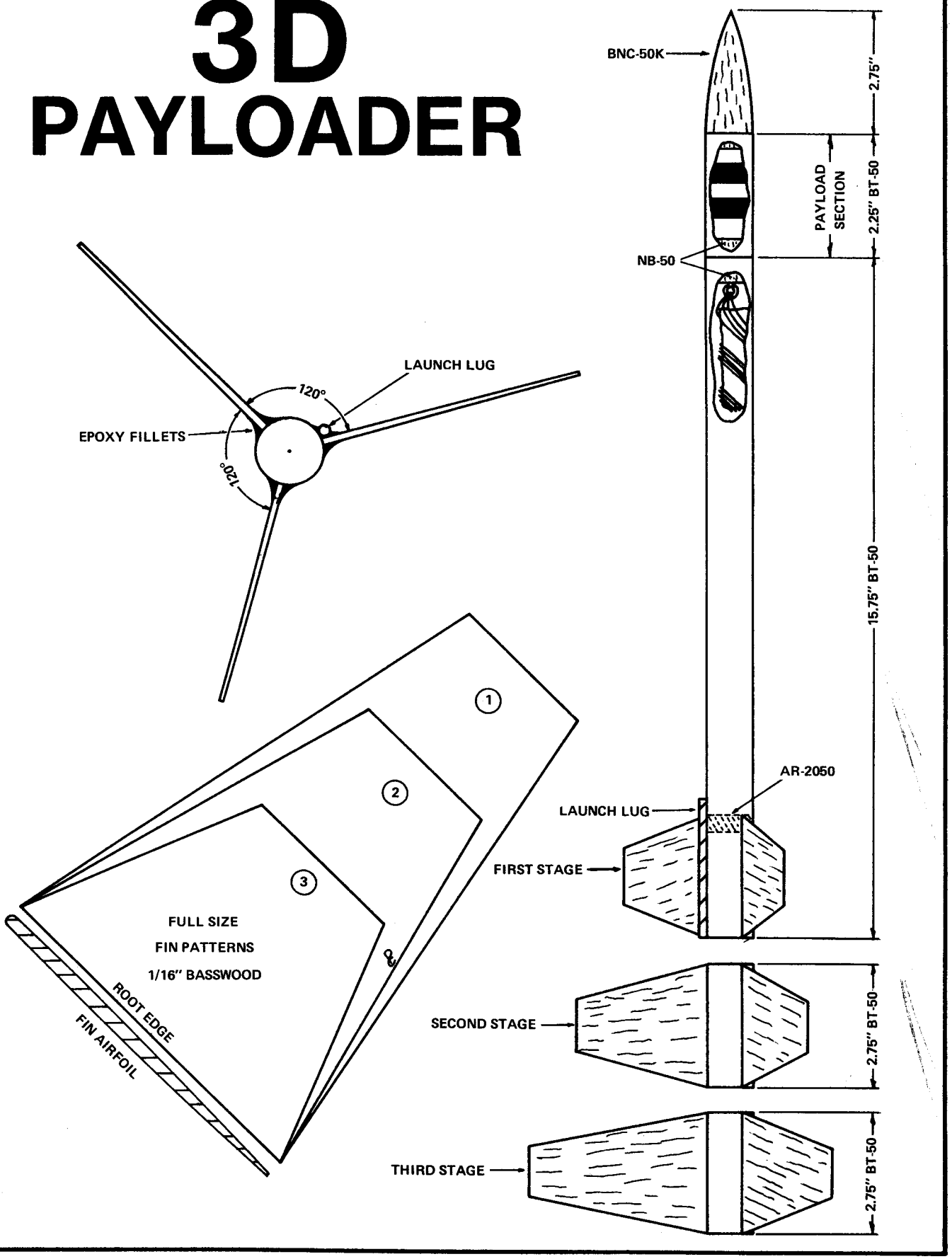
FINS

The fins are cut from 1/16" thick *basswood,* not balsa. Basswood, which should be available from your local hobby shop, is much stronger though also heavier than balsa. It will survive many flights, and you will have no trouble putting a good airfoil on it. (If you can't find basswood in your hobby shop, its available by mail from Orange Blossom Hobbies, Dept. MR, 1975 NW 36th St., Miami, Fla. 33142.)

Cut out the fins as shown in the plans (three for each stage). Sand the surface lightly with fine sandpaper, using a sanding block. Then airfoil the fins to the shape indicated. A good, airfoiled fin will have considerably less drag that a sloppy one. Do not sand the root edge of each fin.

After airfoiling, use a piece of extra-fine sandpaper to smooth out the surface. Brush on one coat of balsa fillercoat – a sanding

3D PAYLOADER



sealer with balsa dust or talcum powder suspended in it. Use extra fine sandpaper to sand the surface smooth again. If all wood grain is not filled in, repeat the procedure until a good finish is obtained.

BODY

Cut a 2.5" length of BT-50 from the 18" body tube. The 2.5" section will be used as a payload tube. Glue the NB-50 nose block into the rear of the payload section using epoxy. The nose block should stick ½" out the rear of the payload section. Finish a BNC-50K nose cone in the normal manner, and slip it into the BT-50 payload section to check the fit. If the fit is not tight, wrap a layer of cellophane tape around the base of the nose cone and try again. It is important that a considerable force be required to remove the nose cone, or it may fall off allowing the two payloads to fall free at parachute deployment. Attach a screw eye to the rear of the nose block, and apply some epoxy glue around the base of the screw eye.

Glue an AR-2050 adapter ring 2.75 inches into the rear of the upper stage body tube. This ring serves as an engine block for the upper stage D engine.

Fasten three fins 120° apart on the upper stage using Ambroid glue. Ambroid is a quick drying cement, so you will not have to hold the fins in alignment for too long. (It's almost impossible to glue fins on straight when using epoxy, since they must be held in perfect alignment during the entire setting period.) When the Ambroid is dry apply epoxy fillets to the fin/body tube joints. Use the same procedure to attach three fins to each of the 2.75" long booster tubes.

After the fillets have dried, glue a 4" length of launch lug into one of the fin/body tube joints. The lug starts at the rear of the upper stage and continues forward in front of the fin. Use epoxy to fasten the lug securely.

Soak a strip of gauze with epoxy. Tie a 20" piece of fishing line around the gauze, and insert it at least 2.5" into the front end of the upper stage tube as a shock cord mount. Allow to dry thoroughly, then test it for secureness by pulling on the line. If it shows any signs of weakness, add another strip of epoxy soaked gauze to the top.

The *3D Payloader* should be painted for visibility. One black and two orange fins on each stage will help, and a half-harlequin black and orange paint pattern on the upper stage will increase its trackability.

FLIGHT PREPPING

Tape three Estes D engines together, using a single strip of cellophane tape at each joint. Then wrap the upper stage engine with sufficient tape to insure that it will not be ejected from its rocket. Slide the upper stage on the engine assembly. Wrap the middle engine with tape, and slide the 2nd stage fin unit onto the engine. Make sure the fins are aligned. Do the same with the first stage. Add an igniter, and the *3D Payloader* is ready for flight. Use at least an 18 inch chute on this model if you are flying it with two payloads in place.

The *3D Payloader* was designed to be used as an Open Payload model, however many other payloads can be flown with little or no modification. As a CAMROC carrier, it's really great. But be sure you have plenty of open recovery area or you're sure to loose the CAMROC. You can build an adapter using one TA-5050 and a BT-60J body tube to allow your CINEROC to fit on top of the *3D Payloader.* Just think of the spectacular CINEROC movies you'll get from that flight . . . liftoff, . . . stage one falls away, . . . stage two falls aways, . . . stage three burnout, . . . coasting, . . . arc over at more than 1000 feet up, . . . chute deployment, . . . and the payload drifting down. The *3D Payloader* with an extended payload section, just an extra length of BT-50, can be used as a carrier vehicle for model rocket telemetry systems, beacon tracking lights, and other experimental devices.

3D Payloader Parts

1 Body Tube 18"	**BT-50**
2 Booster Tubes 2.75"	**BT-50J**
1 Engine Block	**AR-2050**
1 Nose Cone	**BNC-50K**
1 Nose Block	**NB-50**
1 Launch Lug	**LL-2C**
2 Payload Weights	**PL-1**
1/16" Basswood Fin Stock	**----**

Paint, Glue, Tools, Sanding Sealer, Parachutes, etc.

(Estes Industries part numbers)

Boeing Model Aeronautics Scholarship Contest

The Boeing Management Association has announced that they will once again host BMA Model Aeronautics Scholarship Contest. The grand prize, in the contest open to anyone less than 19 years of age as of July 1, 1971, is a $1,500 scholarship to any college in the United States. The 1971 contest is scheduled for July 19 and 20, 1971 at the Boeing-Kent Space Center south of Seattle, Washington.

As with last year's contest, there will be a series of events selected from the normal AMA and NAR competition codes. The winner will be selected on the basis of consistently good performance in a number of events. Full details of this year's contest will be announced in a few weeks. Last year's event included Quadrathon and Swift Boost/Glide rocket events.

Prospective contestants should write to:

The Boeing Management Association
P.O. Box 399
Seattle, Washington 98124
ATTN: Mr. Herman Clegg
Organization 1-1835
Mail Stop 85-48

for additional details and application forms.

NEWS NOTES

East Coast B/G Meet

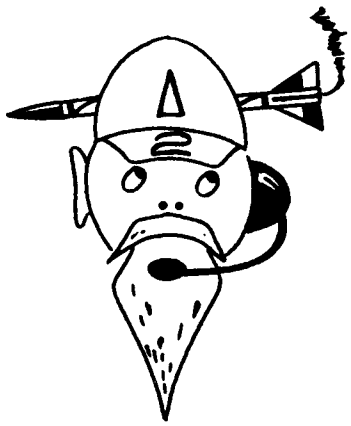
The ABM NAR Section of Bethlehem, Pennsylvania has announced plans to sponsor the first East Coast Boost/Glide Championships on April 24-25, 1971. The event, an NAR Sanctioned "Record Trials", will be open to all NAR members. All NAR B/G events will be flown. The ABM Section plans to award prizes to the winners in each category. Site of the Championships will be the Lehigh University Saucon Valley Field. Interested rocketeers should contact:

Douglas List,
ABM NAR Section
38 West University Ave.,
Bethlehem, PA 18015

etc. — are not aware of the widespread application of their products in model rocketry.

When these potential advertisers realize the applications of their products in this hobby, they will advertise. And when that comes about, we'll be able to bring you those good articles which are now accumulating in our file cabinets.

What can you do? As you can see, there is no simple approach to the problem . . .no easy way to increase the number of pages in the magazine. Perhaps if *each reader* were to sit down and make a list of the products you use in building rockets, and call these lists to the attention of the manufacturers of these products, you could speed up their recognition of the size of the model rocket hobby.



The Old Rocketeer

by G. Harry Stine NAR#2

The Legend of "Honest Ivan"

Breathes there a man with soul so dead that never to himself hath said: "Gee, I wonder how big a model rocket I could build?"

This strange malady affects all beginners in model rocketry, and it was roaring away in pandemic or plague fashion back in 1957 and 1958 because *all of us* were beginners then! We had not yet developed the criteria of 16 ounces gross weight, and the FAA didn't get around to imposing the weight limit until 1961. So we could build them as big as we wanted to . . .

Not quite!

We were limited in the amount of propulsive power available to us. We had one (count it, *one*) model rocket engine type, the Model Missiles, Inc. Type A, which would be equivalent to the modern Type A3-3. And all of you know just about how much weight can be lobbed off the end of a launch rod with a Type A engine today.

We needed more thrust.

So we needed a bigger rocket engine, we thought. Somebody in the *pre-NAR* MMI Flight Test Crew in Denver, Colorado got hold of 6 big skyrockets of the type normally called "one-pounders." We discovered they are called "one-pounders" because of the British pyrotechnic and gunnery standards; the "one pound" skyrocket motor was the same diameter as a one-pound ball of lead. No kidding!

The sticks were removed from said "solid propellant rocket engines." The star pellets were removed from the conical nose cone. And the One Pound Skyrocket engines were coverted into big model rocket engines. These biggies were somewhat larger than the current Centuri Mini-Max engines. But they were not at all reliable . . . or repeatable. And they did not have any time delays to speak of. Ron Gotch and Chuck Olson made a big model rocket out of a mailing tube with a balsa nose cone and balsa fins. This was *"Texan."* We attempted to fly it several times at Green Mountain Proving Ground west of Denver during the month of May 1958. Sometimes we would get a blow-through at liftoff, and the nose cone would go higher than the model. The one good flight we got is recorded for posterity on 16-millimeter color movie film by yours truly . . . except that flight decided *not* to eject at all, whereupon it

Except we didn't do it so well on the first try.

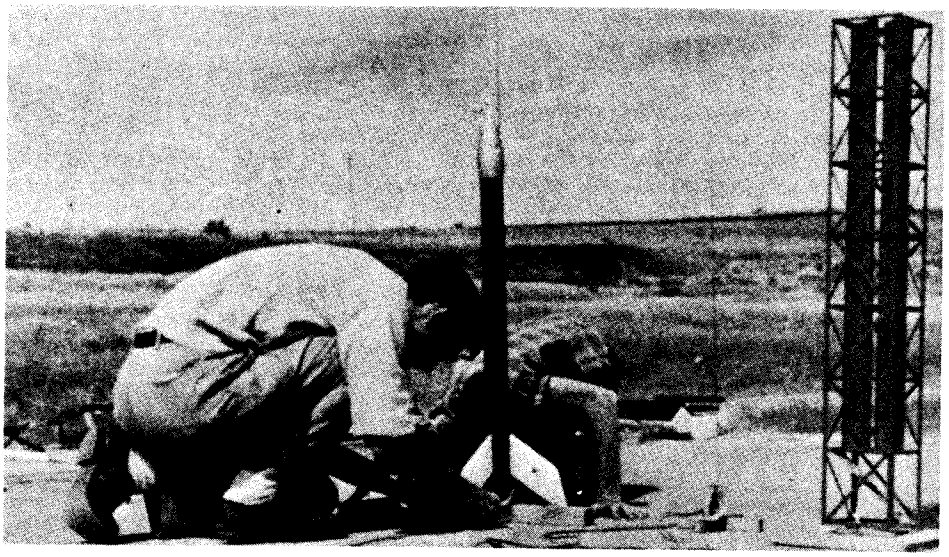
It just so happened that a cluster of three model rocket engines would fit inside the tube that came from a roll of paper towels. So Del Hitch, NAR #3, built a model rocket called TFB-1 with a paper towel tube and cluster of three engines. There are only a few people in the world who know what TFB stands for, and pranged about three feet from me after descending like a streamlined anvil from about 500 feet.

My advice is: *Don't use skyrocket engines.* Firstly, you can't get them. Secondly, they ain't reliable. Thirdly, you can buy much, much, *much* better large model rocket engines today, some 12 years later.

Thwarted in our progress toward larger models with higher thrusts, we decided to take a page from the book of the pros. Dr. von Braun and his Huntsville team were then designing a big, million-pound-thrust booster called Saturn-C; it would use a cluster of 8 Jupiter IRBM engines operating together. If von Braun could do it, we could do it too!

Chuck Olson and Ron Gotsch prepare "Texan" for its maiden flight at Green Mountain in May 1958. It was at that time the biggest model rocket flown and utilized a one-pound skyrocket for propulsion. Spectacular but highly unsuccessful.

Del Hitch, NAR#3, poses with the first successful cluster-powered model rocket, TFB-3, at Green Mountain in June 1958. Unpainted test booster was made from paper towel core into which three engines would fit; upper stage was well-used Aerobee-Hi with cut-down fins.



Del Hitch, NAR#3, and Norm Mains, NAR#61, prepare Honest Ivan for its first test flight at Green Mountain on September 20, 1958.

the secret will go with me to my grave! At any rate, Del tried to fly TFB-1 in May 1958 using our standard electrical igniter of those days: a two-inch length of Jetex wick folded like today's igniter and with the ends stripped back to reveal the copper wire core. These little jewels required about 5 amps before the copper wire would get hot enough to set off the flammable coating on the wick, which in turn would ignite the model rocket engine whose nozzle was full of folded Jetex wick. This was state-of-the-art until Vern Estes developed the first nichrome igniters along about NARAM-4 time.

Needless to say, if you think you have trouble getting a 3-engine cluster to go with today's igniters, you can imagine what happened when Del tried to get TFB-1 off the pad using three jetex igniters. He got one engine going, and it made a nifty little pinwheel. Back to the Drawing Board!

The next attempt with TFB-2 used a hold-down method with a piece of thread running from the model under each of the engine nozzles to a thumb-tack on the launcher. Theoretically, the bird would not take off until all three engines were going and burned all three hold-down threads. But all the theories in the world don't always work. TFB-2 didn't work, either. One engine went, and that burned through all three threads. Del had another pinwheel.

Rather than risk more models in flight, Del resorted to static testing. He worked out the tried-and-true original method of cluster ignition: a two-inch length of Jetex wick jammed into each engine nozzle, all lengths brought together and their free ends wrapped around an electrical igniter. The electrical igniter starts the wicks burning, and if you have done things right one engine will light off, but by the time the model clears the rod all engines are running. The initial test was done at night in back of the MMI plant in Denver. It worked. Then it worked again. And again. A Method Was Born!

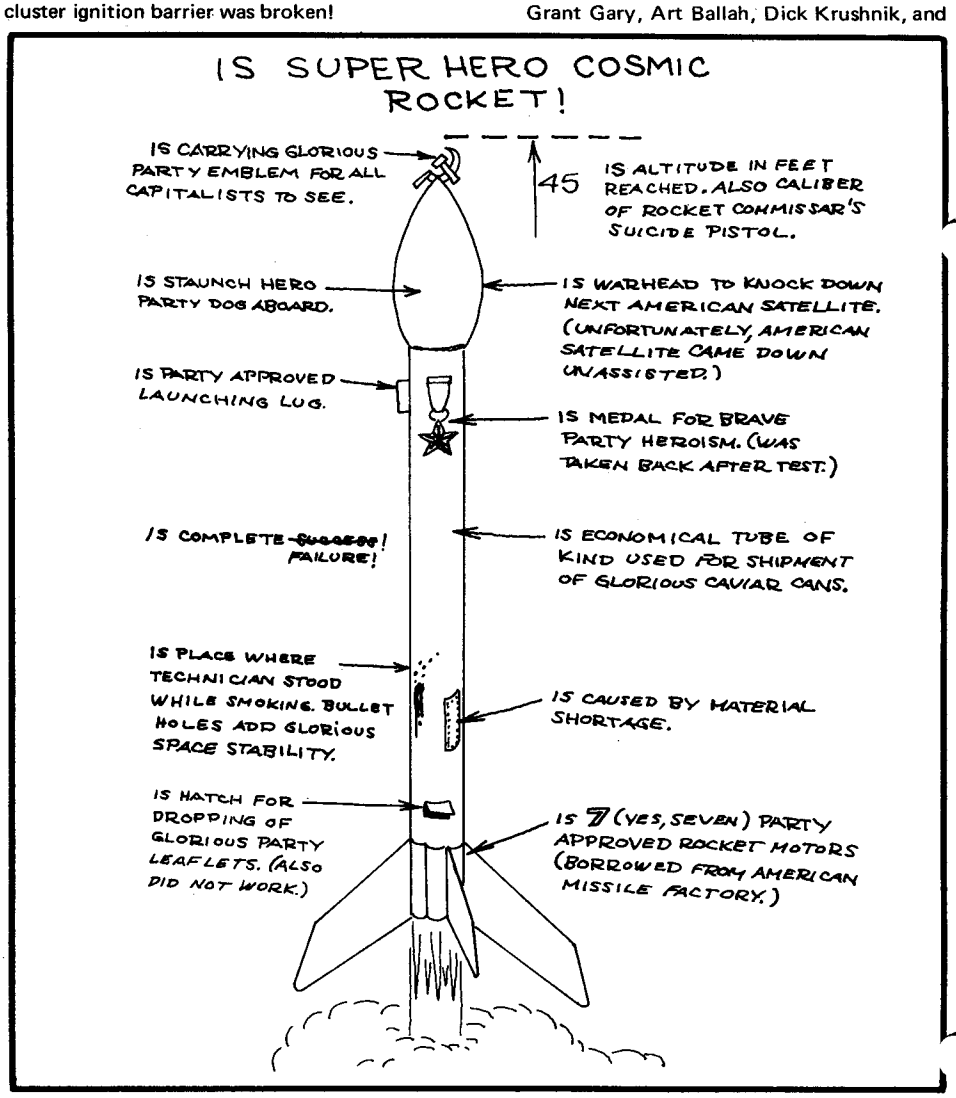
TFB-3 was a garbage rocket, a lower stage booster made from a paper towel tube and powered by a cluster of A3-0's. Upper stage was a highly modified MMI Aerobee-Hi model with rectangular fins that was left over from some engine tests. It was launched in June 1958, and the first flight was a thundering success. The cluster ignition barrier was broken!

Next question: How big can you make it? How many engines can you ignite at once? . . . 5? . . . 7? . . . 10?

We found another mailing tube. It was big enough that 7 engines could be clustered in it. Somebody turned a big nose cone shaped like a Greek Orthodox church spire or something from the Kremlin . . . and Honest Ivan was born.

You must remember that in 1958 the Soviets were rubbing our nose in it when it came to space. They had lobbed up three big Sputniks about a hundred times heavier than anything we could orbit with Jupiter-C or Vanguard launch vehicles. They had used their prowess in space as a political tool, and the USA was caught flat-footed by this *coup d'etat* of technological warfare. Those of your who did not live through those harrowing days of 1957-1958-1959 during the Soviet hey-day in space have no idea of the sheer frustration felt by most Americans who were technically and patroitically minded. It hurt so badly that all we could do was laugh so that it wouldn't hurt so much. Our 7-engine cluster model was the biggest thing we had ever tried to launch. Hence, some wag on the MMI Flight Test Crew tagged it as "Honest Ivan, the Russian answer to the American model rocket."

Grant Gary, Art Ballah, Dick Krushnik, and



Norm Mains sat up all one night drawing a cartoon about it.

On September 20, 1958, Honest Ivan went on the pad at Green Mountain Proving Ground. It weighed about one pound. It took two cans of Jetex wick to prepare the igniters. We used a /16" diameter launch rod 6 feet long. The parachute was a 36-inch plastic para-kite that was being sold in toy stores at the time; it was stronger than the red polyethylene chutes we were flying in the smaller stuff.

Del Hitch and Norm Mains prepped the monster for flight. The magic moment came. The count down. *Zero.* A ball of fire under Honest Ivan as the electrical igniter started the jetex wick. A heart-rending couple of seconds that seemed like eternity while we watched 7 strands of jetex wick sparkling under the bird. Then . . .

Liftoff! With a thunderous roar, Honest Ivan jumped into the air and drove for the blue Colorado sky. I got a picture, which was blurry because I was trembling and half-obscured because my finger was in front of the lens.

At peak, the nose popped and the big chute came out. Amid cheers from the ground, Honest Ivan floated to a perfect landing. Didn't even bend the hammer-and-sickle on the tip of the nose cone!

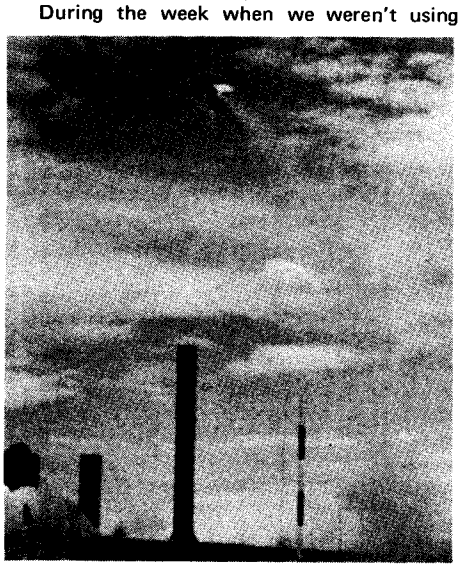
We were so impressed by our success at clustering and the spectacular performance of Honest Ivan that we awarded it a genuine Hero Medal that hung on little lugs on the nose cone.

Honest Ivan's second flight took place on November 8, 1958. It was the first anniversary of Green Mountain Proving Ground. Bill Roe and his club from Colorado Springs came up for a day of sport flying. (We did not yet have contests. They were not to come until May 1959.)

Again, Del and Norm prepped Honest Ivan. This time, I got a better photo of the liftoff.

But our luck did not hold. Only 4 out of 7 engines ignited. Furthermore, those 4 engines were all together on one side of the rocket. Honest Ivan headed west in nearly horizontal flight and pranged under power.

During the week when we weren't using Green Mountain for flying model rockets, it was the sole province of a herd of horses. Horses are part of the ecology of the West. They eat the grass, then they fertilize it . . . sort of a micro-ecological cycle. Honest Ivan temporarily interrupted that cycle. It landed right in the middle of a fresh pile of them road apples, friend, and further distrubed the ecology by throwing them in all directions as it dissipated the energy of the impact.



This hysterical . . . er, historical . . . photo shows the liftoff of Honest Ivan for its second flight on November 8, 1958 at Green Mountain. Only 4 engines ignited . . . all on one side of the model!

Following the first successful flight of Honest Ivan on September 20, 1958, the MMI Flight Test Crew who were the original NAR members awarded the model a hero medal which is here seen on the side of the nose cone. Left to right, kneeling: Norm Mains, Art Ballah, unknown, Lee Erb. Standing: Dick Krushnic, Grant Gray, John Wong, unknown.

Whne we stopped laughing, we sent Norm Mains out on recovery. He had installed the ignition system.

Somehow, Honest Ivan got repaired because it was too impressive to junk. Also, it was an historical and hysterical "first". It sat around my basement until July 1959 when we decided to have it on hand for NARAM-1.

Honest Ivan figured prominently in NARAM-1 as a demonstration bird. It was part of a rather grand spoof that was staged for the benefit of the spectators. Unhappily, that sort of thing isn't done at NARAM's any more because we are now too intensely serious about model rocketry, we have become overly impressed with ourselves, and we know better than to try a 7-engine cluster in a demonstration.

As the flight demonstration was well under way on the final afternoon of the meet, Bill Meller came storming out of the judges tent dressed in a rented Cossack costume complete with sabre. He was waving Honest Ivan in the air, yelling in fake Russian accent that he demanded that the glorious motherland be represented in this American (ptui!) model rocket contest. He grabbed a beat-up old model out of the hands of Norm Mains (by prearrangement), threw it to the ground, and cut it to pieces with his sabre while he reviled the small, low-powered American model rockets that couldn't lift any payload to speak of. We agreed to let Honest Ivan fly, and Del hooked it up. (This time, Del had wired up the ignition system. He also used two pages of the Denver **Post** as wadding.) When time came for the countdown, Meller yelled that he wanted it tracked only by Tracking East, that he didn't believe any data from Tracking West. "The West is no good. We want only the East to track it!"

Came the countdown. Happily, Honest Ivan's last flight was recorded on 16-millimeter movie film taken by the Air Force which I still have in the archives. At zero, there was the biggest fireball I have ever seen under a rocket as the jetex wicks lit off. They went fast, and Honest Ivan lifted off only a fraction of a second later with all 7 engines thrusting. Right straight up. Popped the chute over the launch area. And drifted gently back to the ground. Success. Cheers from the 300 spectators. A sigh of relief from yours truly.

Honest Ivan was retired after its third flight. It had achieved a reliability of 0.6666, 2 flights out of 3. We felt we might be stretching our luck to attempt to fly it any more. It was hairy, friend! Besides, it was beginning to get just a tad beat-up. It held a position of honor in my basement until June 1960 when I moved to the East Coast and gave it to Del Hitch. I don't know whether or not Del still has it after all these years.

I suspect it has gone where all good model rockets go . . . where there are no misfires and the CP is always behind the CG . . . where all engines have ejection charges and chutes never get burned . . . where rocket-eating trees have all been cut down or satiated with radio-controlled model airplanes . . . and where all drag coefficients are negative.

Be that as it may, Honest Ivan became a legend . . . why, I do not know. It was a beast. It didn't fly very high. It was hairy to fly. And I don't recommend that anybody who reads this try to duplicate it.

Maybe Honest Ivan is nothing more than a happy memory from the childhood days of model rocketry. And I think we're all wise to leave it now exactly where it is: a happy legend.

Reader Design Page

HI-FLYER

This month's Reader Design was submitted by Marvin Hein, Jr., of the Randallstown Rocket Society in Randallstown, Maryland. The swept-fin sport model stands 23.5" tall and weighs in at 1.3 ounces. It can be flown with a B6-4 or C6-5 engine. Standard parachute recovery is employed.

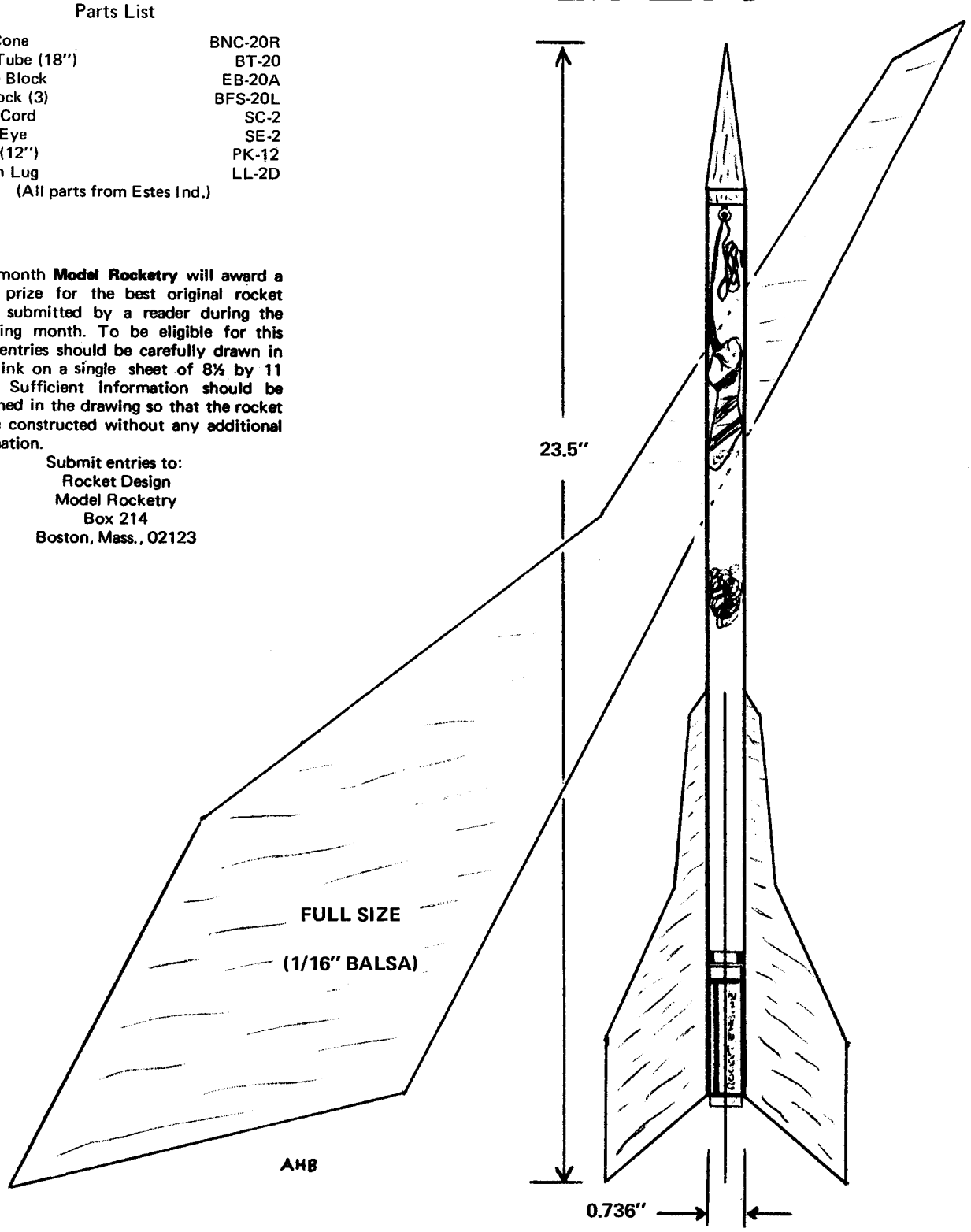
Parts List

Nose Cone	BNC-20R
Body Tube (18")	BT-20
Engine Block	EB-20A
Fin Stock (3)	BFS-20L
Shock Cord	SC-2
Screw Eye	SE-2
Chute (12")	PK-12
Launch Lug	LL-2D

(All parts from Estes Ind.)

Each month **Model Rocketry** will award a $5.00 prize for the best original rocket design submitted by a reader during the preceding month. To be eligible for this prize, entries should be carefully drawn in black ink on a single sheet of 8½ by 11 paper. Sufficient information should be contained in the drawing so that the rocket can be constructed without any additional information.

Submit entries to:
Rocket Design
Model Rocketry
Box 214
Boston, Mass., 02123



CLUB CORNER

by Bob Mullane NAR 4157

Club Activities

Last month I discussed the whys and hows of forming a club. But now that you have gotten this new group organized, what does it do? What type of activities will keep your members interested. Most of the successful rocket clubs in existence today offer their members a large variety of both flying and non-flying activities. Such a mixture makes for a group that has a lot of fun (which is why most people come to rocketry in the first place) and is also quite beneficial for its members. This month, I'll try to describe some of the activities with which many rocketry clubs have had success. Of course, I can't tell you all of the possible things you can do with rocketry (most of them haven't been done yet), but these will get you started.

The most basic activity is a *"plain old launch."* This is probably why you organized the club in the first place. A launch is usually informal – anyone can launch whatever he wants (within the limits of safety, of course). Launches give each member a chance to show off his new designs and get a variety of opinions on why they failed. Launches (no matter where they are held) attract crowds of passers-by and may bring new rocketeers into the club and new people into the hobby. If the club has special equipment (tracking scopes for example), it can be brought out to provide members an opportunity to use the equipment. As with all club gatherings, an adult should be present. Launches should be held frequently, at least monthly, to keep up member interest.

Meets are a special type of launch where all the participants (contestants) fly in certain events under certain rules. The rules can either be taken from an existing source (*"Model Rocket Contest Guide"* contains a whole set of rules and information for meets and is available from Estes Industries for 50 cents, catalog # BK-14; the NAR also has a set of rules and procedures for running meets) or you can make up your own events and rules. The December 1970 **MRm** shows an example of an entry in a "Non-Rocketlike Event" invented by a Maryland club on its cover. Use your imagination in making events and have a ball. The meets should be well organized and can be held just for fun, or prizes can be added to liven up the competition. (NAR sanctioned meets award points leading up to the awarding of National Championships each year). A meet gives you a chance to go out and prove that "My rocket is better than yours."

Business meetings of the club must be held to keep it running, but why should they be limited to only administrative matters? Slide shows and movies (of your group's happenings or from other clubs) can add excitement to your meetings. Write to NASA, the Army, or Air Force, or to companies in the aerospace industry and ask for a list of the movies they have available. You'll find many films of interest to rocketeers. Lectures and discussions can also add life to your meetings and knowledge to your members. These talks can be given by another rocketeer, on a topic about model rocketry, or you may get someone from the aerospace industry to talk. You'll discover an increase in attendance at meetings when you have more to offer than "Treasurer's Reports" and parliamentary procedure.

Building sessions give you a chance to share techniques and new discoveries. They also give the newer members a chance to learn from the experienced rocketeers in the group. You may want to go as far as to run a series of classes for the new members to help them along and show "the right way to do it."

If there is a museum, aerospace plant, observatory, NASA facility, or any other place in your area which may be of interest to rocketeers, why not try to organize a *field trip* to it? Most companies and organizations are usually happy to allow a tour of non-classified facilities to an interested group. Contact their Public Relations Department or (in the case of a museum) the group tour manager for information about tour arrangements. Some facilities require a certain minimum number of people to be in a group before they will organize a tour. You may also find that some places cannot be toured on a weekend (which can create a serious obstacle to your plans). You'll also have to organize transportation to the trip. Work out the arrangements for a field trip well in advance of the tour date.

How about a *group research project*, or the construction of a large piece of research equipment? Let's see, how about building a static test stand inside a wind tunnel using 12 channels of telemetry and three high speed movie cameras to do "the" defining project on the Krushnic Effect? *That* would keep you busy for a while!

Your club may want to run a *one-day seminar* on a particular topic of model rocketry for all interested rocketeers within easy commuting distance. Pascack Valley held such an event in November covering problems in the field of Scale and Research & Development (more on that in a future column). This type of "Mini-Convention" can be run by a small club and attract rocketeers within about a hundred miles. A larger club might try to hold a complete convention for an entire weekend drawing participants from an entire region of the country. Most of the country has never had such a convention. If your club is big enough, and has the experience, what are you waiting for? If you're still too small to run a convention, try a seminar, or keep the idea of a convention in mind when you grow larger.

To spread the word about model rocketry and draw new members into your club, use every chance you can get to set up a *display* or give a *flight demonstration.* Country fairs, sporting events, libraries, museums, shopping center and airport display cases, hobby store windows, and many other places are interested in rocketry displays. They won't come to you; you have to go out and talk to them about displays! Don't overlook the possibility of a demonstration launch for the local newspaper or TV station.

Finally, don't limit your activities to rocketry only. Get to know the members of your club. Have social events – parties (we had a "Dress as a Rocket Party" in December), pot-luck dinners, theatre parties, picnic launches, anything you might do with a group of friends. Your fellow members are your friends, why should you limit your contact to the firing range and meeting room?

Again these are only a few of the things that have been done by other clubs. You can think of many more. The above descriptions are very general because of space limitations in this column. I could write an entire article about each of them – as a matter of fact, I will do exactly that in future issues. Don't wait for that, start your activities now and keep **MRm** informed of what you plan and what you've done. Plan your activities well in advance and send a notice to "Modroc Calendar" (see instructions elsewhere in this issue). An active club will have no trouble attracting and keeping new members.

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World Championship Report

by Dr. Gerald Gre[illegible] and George Rancitelli
Photos by G. Gregorek, G. Rancitelli and J. Bra[illegible]

Over a half a year of excitement in anticipation of the first World Model Rocket Championships abruptly came to an end for eight NAR modelers in late August when a telegram from Yugoslavia brought the news that the FAI had canceled the meet sanction. Because of an insufficient number of participating countries, it appeared that much work by guys like Jim (Casey) Kukowski, G. Harry Stine, and John Worth of the NAR as well as the support of the model rocket manufacturers had gone "down the drain". However, the Yugoslavs, with great foresight, had scheduled their Sixth National Championships at the same time as the Internationals. The original plan was to allow their modelers and all the foreign competitors to get together and trade rocket talk; now their Nationals could serve as an Unofficial World Championships. All International teams were invited to come even though the official sanction was gone.

In response, the Bulgarians, Czechs, Poles, and Romanians showed up with full teams — three men for each of three events: 5 nt-sec P/D, 5 nt-sec B/G, and scale. The Yugoslavs had more than sixty contestants formed into 19 teams for their equivalent of our NARAM. The U.S. had *us*! Although both of us were on the U.S. Boost/Glide team (along with Jim Kukowski) we'd prefer to refer to ourselves as the U.S. representatives rather than the U.S. team. However, we did compete (George in P/D, B/G, and Scale and myself in P/D and B/G), we did make a lot of friends, and these are some of our impressions and photographs of our encounter with the "other side".

The field of battle, just north of Vrsac, Yugoslavia, was perfectly flat. This beautiful site was more than two miles square, bordered on the east by a mountain and on the west by a cornfield and with more fields to the north and south. Tents with two teams assigned to each tent were available for prepping the birds. We shared our tent with the Yugoslav team from Osijek. The Bulgarians and Czechs were in one tent and the Poles and Romanians another. Each pair of teams was assigned to a launch pad right in front of the tent — talk about convenience! Watching over each lane were two experienced officials who timed the birds and recorded the data.

George, in a Belgrade hotel, works on his Thrust Augmented Delta (TAD) 76 scale bird. Although not part of the original U.S. scale team (that was Mike Poss of California, Scott Layne of Ohio, and Al Kirchner, Jr. of New York), George decided to enter scale so that the U.S. would have at least one scale entry in the competition. With less than three weeks to complete his model, George worked continually along the route, coming up with a truly internationally built bird: scaled and roughed out in the U.S., painted through Germany, and finally detailed and completed in Yugoslavia — 15 minutes before the entry deadline.

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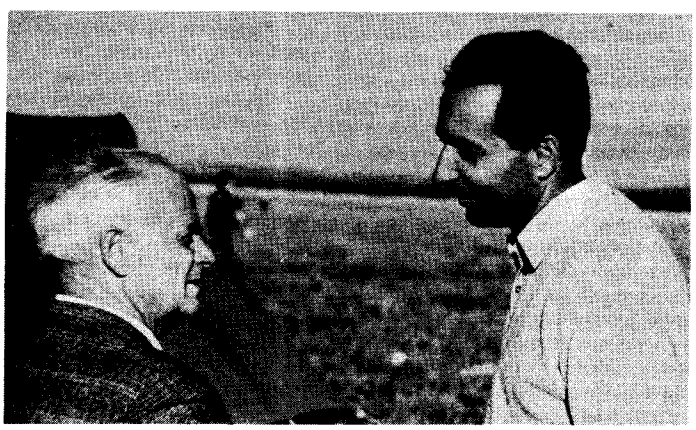

Kosta Sivcev (left) and Gradimir Rancin confer at the start of the competition. Sivcev, a pilot and aeronautical engineer, is the FAI representative for Yugoslavia. He was one of the contest judges. Rancin was the Contest Director; he's the Secretary of the Yugoslav Aeronautical Union, the organization that sponsored the Championship. The two did a great job; the contest went very smoothly. P/D was flown Wednesday morning, B/G Wednesday afternoon. Scale was judged Wednesday and flown Thursday morning.

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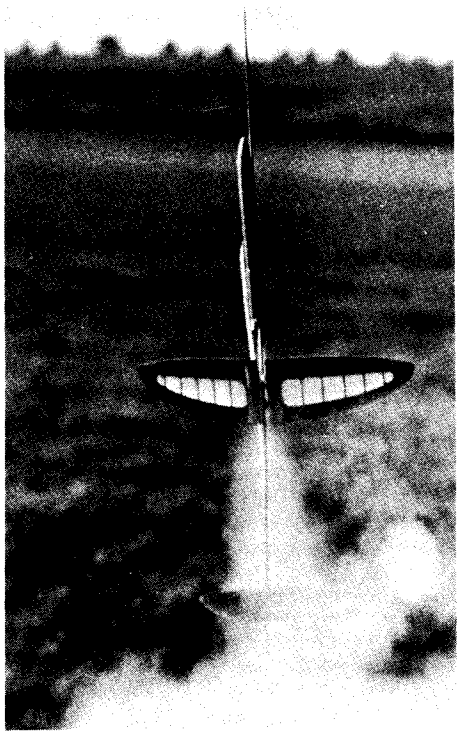
Divis and Saffek of the Czeck B/G team check for thermals and organize field recovery and spotting crews.

Saffek's B/G (not a "Jiskra") takes off. It up one of the last of the spotty thermals and was lost after more than 5 minutes.



Dr. G.'s B/G, Ellipse '70, leaves the launch rod on the last official B/G flight of the day. The late flight wasn't planned strategy, it was just that everything had gone wrong earlier. On a test flight at the start of the B/G event — made to test the Yugoslav launch gear — the heavy ignitor clips used at the contest caught the glider and ripped off the stabilizer. After repairing the stab and other damage, there was time for only a few test glides before the first official flight had to be taken (we were flying in rounds, so you lost the opportunity to fly if you didn't get your bird off in the allotted time interval). The first official flight went as you'd expect after a quick repair of a major component. A good boost put Ellipse up over 500 feet, but when the pod dropped, the glider entered a steep bank and spun to the ground in just 31 seconds. Before committing to the last official flight, we wanted a test flight so we moved to a corner of the field and launched Ellipse on an A5-2. We almost blew it again as the bird toyed with a light thermal and took off toward the mountain in a stiff breeze. Luckily, the glider fell out of the thermal and after more than three minutes, touched down about 3/4 mile downrange. Back at the launch site, it was 4:45 p.m. by the time the bird was prepped for its second flight. By then all thermal activity was over. On launch, Ellipse again went straight up to about 500 feet. The pod dropped off and the glider slowly began to circle high above the launch area. Looking up several hundred feet and seeing those bright orange translucent wings stamped on the deep blue sky made the trip and its trials worth it! Ellipse landed less than 100 yards from the launch site after 217 seconds — not quite 4 minutes. That was good enough for sixth place figured with all 68 B/G entries or fifth place counting only the International competitors. The top B/G time was turned by Bozan of Bulgaria, 290 seconds. This put the Bulgarian B/G team first, followed by the Poles and the Czechs.

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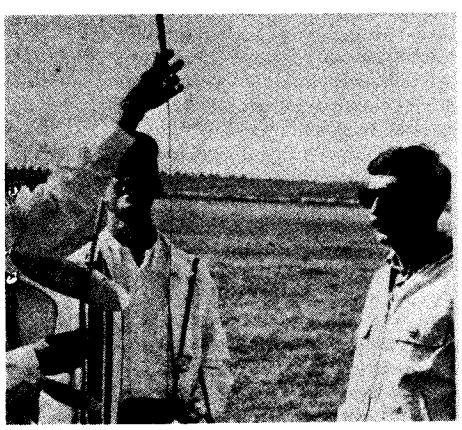
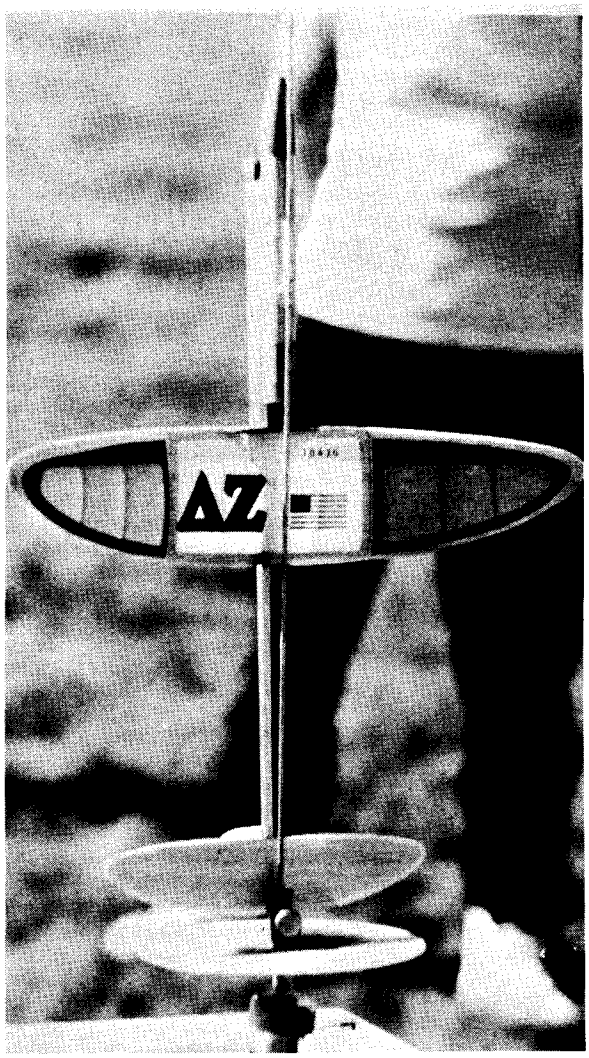


:he strain of world competition as Dr. G. readies curious gentleman at the right is Srdjan Pelagic, ı lane official. Pelagic spoke perfect English and life-saver as an interpreter for us. A former odel rocket champion, Pelagic is now an ıngineer; his latest project is the instrument sou ı rocket to be launched to a 70 Km. this y...



George's Delta Zeta B/G, on the pad, ready to go. Both of us used cut-out wings covered with Jap tissue to cut the weight of our B/G's. This novel design feature caused a little stir among the competitors. We also were the only ones that used a slip pod to get rid of our engines; all the other contestants used a fixed nose mount and ejected engines with streamers. Some of the Czechs said they had tried slip pods, but they felt they were unreliable. We didn't have any trouble, though (not even one Red Baron!).

nship Report

Divis and Saffek of the Czeck B/G team check for thermals and organize field recovery and spotting crews.

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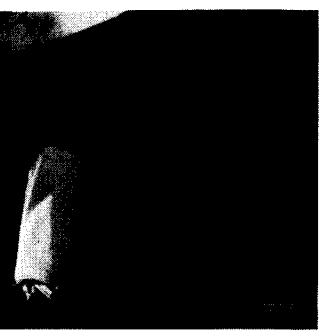

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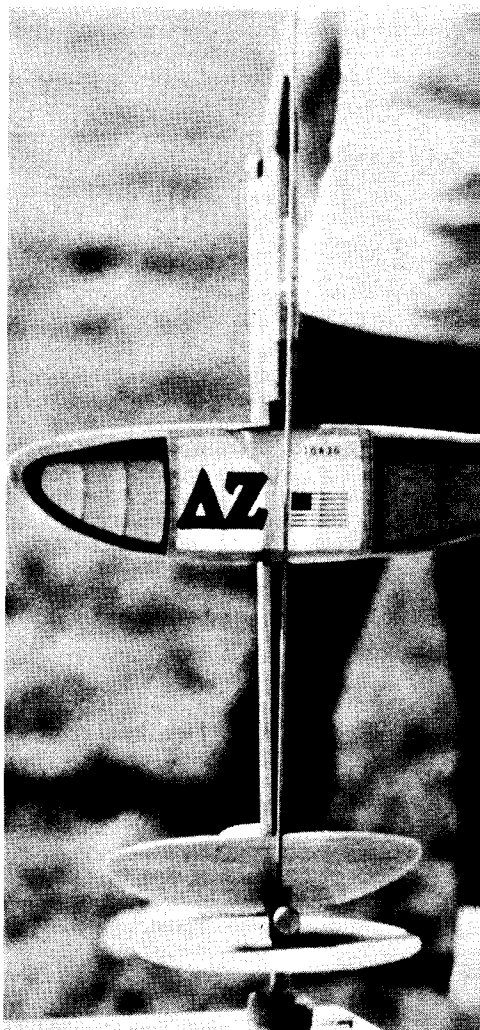

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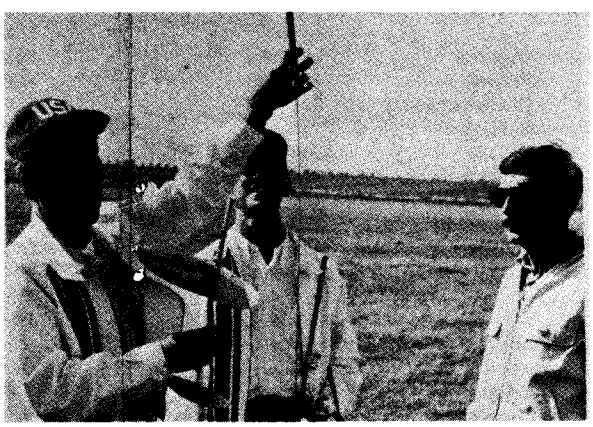

We show the strain of world competition as Dr. G. readies his B/G. The curious gentleman at the right is Srdjan Pelagic, our timer and lane official. Pelagic spoke perfect English and was a real life-saver as an interpreter for us. A former Yugoslav model rocket champion, Pelagic is now an electronics engineer; his latest project is the instrument pac of a sou rocket to be launched to a 70 Km. altitude later this y...

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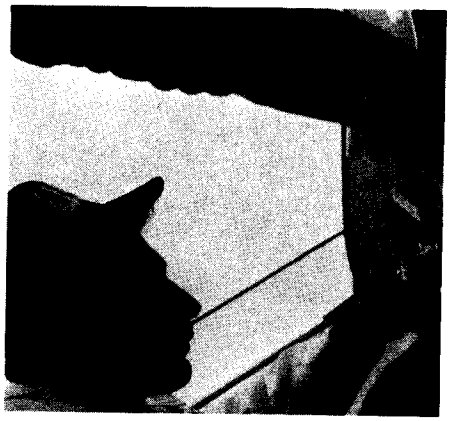
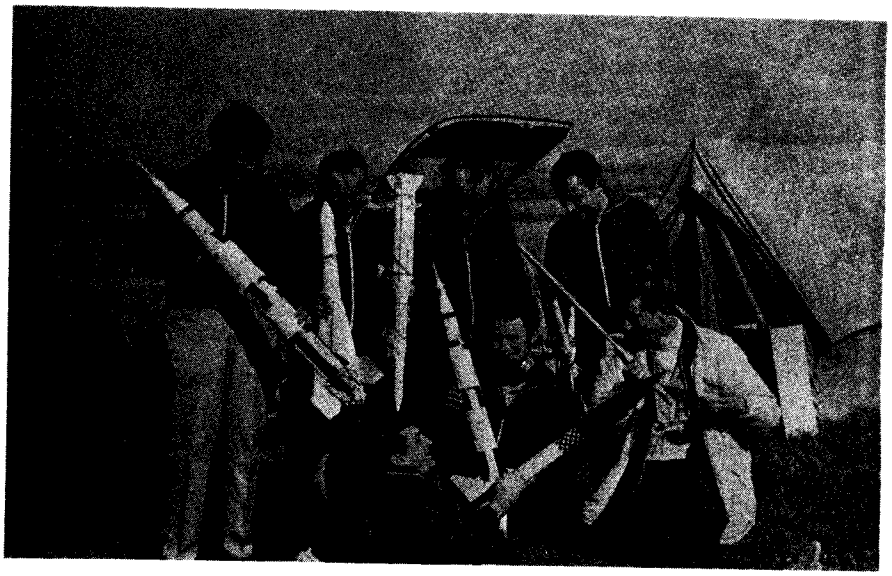
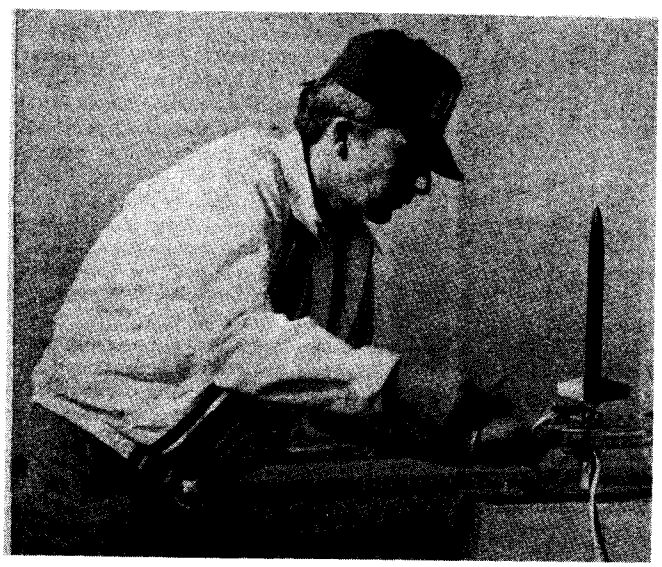


Inside our tent we had a small table to help us with our parachute packing. About the only thing we lacked in on-site accommodations was a red carpet – ours was yellow! Here, Dusan Madzarac helps Dr. G. pack his 36 inch aluminized mylar chute into his P/D bird. Mylar was new to the Europeans and they were all anxious to get their hands on the stuff. We gave away all our mylar before we left.



Scale flying on Thursday morning started with a picture taking session. Here the Czech team hams it up for the photographers. (Left to Right) Saffek (Saturn V), Klein (Diamant), Ing. Jelinek (Viking), (sitting) Indruck (Saturn V), Horvath (2-stage model), and Divis (Honest John).



Dr. G. preps his PD model on the pad just outside of the tent. Without the aid of thermals, the model turned in a 270 second flight.

The rocket was recovered, and returned to the range area. However the duration couldn't match the time of Roumanian Professor Radu's bird – a fantastic 1066 seconds! That performance gave the PD Championship to the Roumanians.

World Championship Results

Parachute Duration (5 nt-sec)

1st	Prof. Radu N. Jon	Roumania	1066 sec.
2nd	Janecki Zygmunt	Poland	687 sec.
3rd	Witkowski Jerzy	Poland	476 sec.
4th	Anton Ilie	Bulgaria	457 sec.
5th	Briacek Vladimir	Yugoslavia	452 sec.
6th	Prof. Leu Dimitru	Roumania	415 sec.
7th	Jarovczvk Juliusz	Poland	374 sec.
8th	Dusan Madzarac	Yugoslavia	328 sec.
9th	Ottakar Saffek	Czechoslovakia	325 sec.
10th	Botusan Jon	Roumania	307 sec.

Boost/Glider (5 nt-sec)

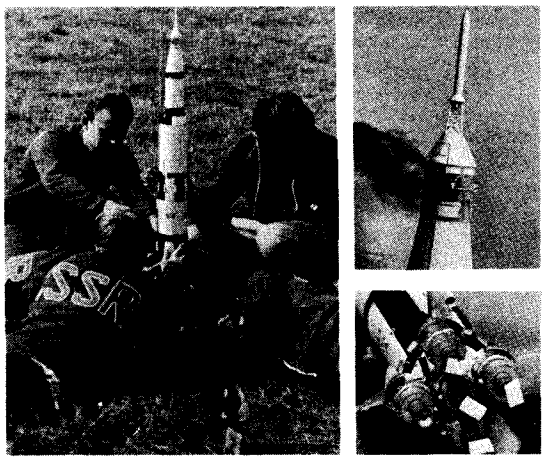
1st	Bojan Paraskevov	Bulgaria	290 sec.
2nd	Meller Henryk	Poland	268 sec.
3rd	Milan Jelinck	Czechoslovakia	260 sec.
4th	Witkowski Jerzy	Poland	223 sec.
5th	Jerry Gregorek	U.S.A.	217 sec.
6th	Dusan Madzarac	Yugoslavia	180 sec.
7th	Nikola Milanov	Bulgaria	177 sec.
8th	Briacek Vladimir	Yugoslavia	132 sec.
9th	Aleksandar Madzarac	Yugoslavia	119 sec.
10th	Egebij Ermenkov	Bulgaria	88 sec.

Scale Modeling

1st	Otakar Saffek	Czechoslovakia	Saturn V
2nd	Aleksandar Madzarac	Yugoslavia	Saturn 1B
3rd	K. Jarabek	Czechoslovakia	Vostok
4th	Meller Henryk	Poland	Saturn 1B
5th	T. Indruch	Czechoslovakia	Saturn V
6th	Dusan Madzarac	Yugoslavia	Redstone
7th	Jarencyzvk Juliusz	Poland	Diamant
8th	Janecki Zygmint	Poland	Soyuz
9th	Borovac Pavel	Yugoslavia	Vostok
10th	Prof. Radu Jon	Roumania	Vostok

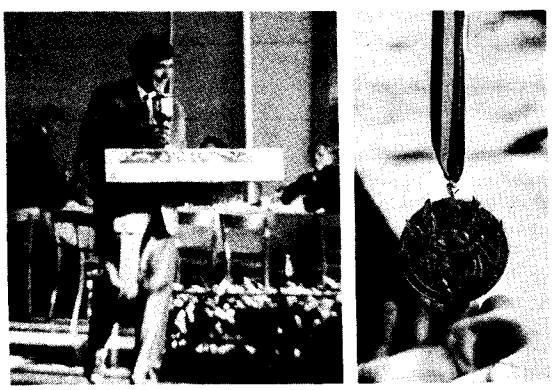
Acting a little more formal than the Czechs are the Madzarac brothers, Aleksander (left) and Dusan. Aleksandar's second place Saturn 1B had fine detail and a perfect finish. A four-engine-cluster lifted Dusan's Mercury Redstone, with a highly detailed Mercury capsule, on a beautiful flight and a sixth place in the event.

The Polish team flew an international collection of scale models. J. Jarencyzuk flew a model of the French Diamant to a 7th place. H. Meller's highly detailed Saturn 1B placed 4th. The Soyuz by Z. Janecki took 8th place.



Otakar Saffek of Czechoslovakia and his fantastic Saturn V. Saffek is one of the world's leading model rocketeers; he represented his country in all three events in this International meet. The Saturn V was in construction for 6 months. The finish was flawless and the detail as shown by the insets was hard to believe. The nozzles, piping, and pumps of the five F-1's were all duplicated. Before inserting the 5 Adast engines, Saffek removed red dust covers protecting the bell mouths just as on the real engines – with scale handles and white DANGER lettered on the covers!

Unfortunately, the nostalgia of Cape Canaveral and Vanguards a la 1957 was relived during the U.S. scale flight attempt. Not only did George construct the model in a relatively short period of time (about 3 weeks), he also had problems getting it off the ground and keeping it in the air. At left, during the pre-flight picture sessions that preceded most scale flights, the model (the rocket, that is) is displayed by Gordana Stanojlovic of the Yugoslav club, ARK, Belgrade. Top center shows truly a scene of international cooperation as we were aided in prepping my bird by a Yugoslav, who provided an igniter and larger launch lugs, and some Czechs, who provided their launching system. The photo at right shows one of the detailed parts of the bird – red, white and blue TAD 76 insignia. Following ignition of the D18, the model rose beautifully for about 15 to 20 feet (note: stable without fins!), then arched over and nosed in after the engine finished thrusting. After someone administered the "last rites", George walked away with the wreckage smiling (and in transical shock).



For the finale of their meet, just as at our NARAMs, an awards banquet (and we do mean banquet!) was held in the dining hall. Here pictured is Otakar Saffek receiving his awards for scale – a silver cup (which was quickly filled with white wine) and, somewhat ironically, a Revell 1/96 scale Saturn V kit. Instead of trophies, the Yugoslav National Champions receive Olympic-like gold medals.

Unfortunately, Capt. Thompson (who along with Dr. G. and Paul Conner were the original U.S. P/D team) was held over in the Azores and did not arrive in Vrsac until the evening following the competition. The next morning, however, he did fly the pictured Cox plastic Saturn 1B for the attending competitors.

When we returned from Yugoslavia, with us came many souvenirs. Among the souvenirs pictured here are some European engines (which we exchanged for our Estes Centuri and F.S.I. engines), George's pin-studded team ball cap, our European B/Gs and P/Ds (left to right Bulgarian, Czech, and Yugoslav), the "world famous astronaut" and CSAR mascot Snoopy, and a Yugoslav liquid propellant called Slivovitz.

the Escape Tower

BY BOB PARKS

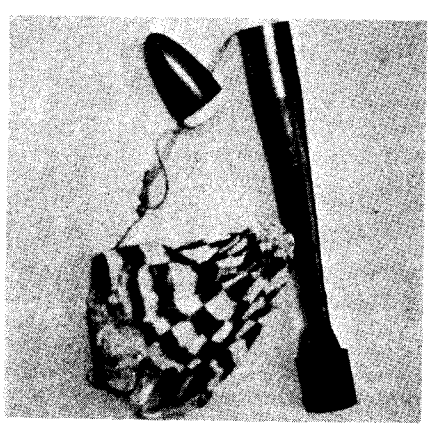
Closed-Breech Egglofter

Breech launchers seem to bear an amazing resemblance to the weather, everyone talks about them but nobody ever does anything! This month's creation came from just one of those "talk" sessions. No, it is NOT a cloud seeding rocket! It is, however, a *Robin class, breech-launched egglofter*!

An egglofter is really a rather good subject for breech launching. It is heavy, and normally would have a slow liftoff, so it can get the most benefit from the added acceleration a breech launcher provides. With all the weight of the egg up front, it can get by with reasonably small fins. Boattailed egglofters are normally very difficult to fly from rods or towers because their unusual shape requires stand-offs or tail rings, both of which add a lot of drag.

Since I wanted to keep frontal area down for reasons of low drag and also launcher efficiency, I decided to use the new 45mm body tube and vacuum formed plastic nose cone from Space Age Industries. The nose cone is just about the smallest thing you can fit a regulation egg into. Even without padding, the nose cone provides enough protection for the egg so it won't break in anything short of an all out prang, and you're disqualified for one of those anyway so a broken egg doesn't matter any more. Putting the egg in a plastic bag is good insurance anyway.

A ring fin was used for stabilization since it could be done in a small diameter. Four supports were used originally, but initial flight tests showed rather poor dynamic stability (moderately severe coning). The addition of four more supports cured the problem. Alignment is still very critical so build carefully.



The ring fin on the closed-breech Egglofter looks a bit strange at first. But, by making the ring fin the same diameter as the payload compartment you get a good fit in the tube.

The long boattail is important to the stability of this design so don't try to shorten it any. It is mandatory that the airflow remain attached to the body, or else there is no airflow over the fins. It is also important to leave the launcher at as high a velocity as possible, so don't try to fly this model without the breech launcher.

I haven't had a chance to get any tracking data yet. However, this rocket leaves the launcher considerably faster than a normal egglofter. Performance should be at least equal to, and possibly better than, a good conventional design.

Construction

Construction is pretty much normal. However, due to the marginal dynamic stability, *accurate alignment is very important*.

Since no adapter rings are commercially available, you will have to cut your own. The best way to do this is to clamp an X-Acto knife in a standard compass. Cut at least three rings from cardboard. Cut a 10½" piece of 19mm body tube. Align and glue two adapter rings to the tube. One ring should be flush with the end of the tube and the other should be 1" from the same end. Allow plenty of time for the glue to dry.

Cut a 3" piece of 45mm tube. Sand the rings until they fit smoothly inside the tube. Apply glue to the inside of the large tube and slide the adapters into place. Alignment should be checked by slipping a piece of 45mm tube with a ring in place over the end of the small tube. Set the assembly on a flat surface and roll it back and forth. If there is a misalignment, the nose or tail of the model will lift off the table when rolled to a certain angle. Continue checking and realigning until you are completely satisfied that the rocket is perfectly aligned. Now leave it alone until it is completely dry.

The shroud should be made out of light cardboard or heavy paper. A large index card or a file folder will do nicely for a source of material. Cut the shroud according to the pattern. Roll it up and then test fit it onto the model to determine the proper amount of overlap to use. Glue the seam, and then attach the shroud to the rocket.

Cut EIGHT fins from 1/16" balsa. Sand to a streamlined cross section. The tips of the fins should be left squared off. Mark the fin placement on the body tube using the spacing guide shown in the drawing. Glue the fins in place, again checking alignment carefully. Cut a 2" length of the 45mm tube for the tail ring. Carefully sand the fins until the ring fits *perfectly*. The ring must be parallel to the body tube.

Now apply whatever finish you are using. A few coats of balsa fillercoat should be applied to the inside of the ring, with light sanding between coats. The plastic nose cone doesn't really need painting, however if you wish to paint it use enamel because dope will attack the plastic.

Glue the ring in place. If you used a dope finish just use a glue such as Ambroid to attach the ring. Otherwise you may need to scrape off some of the paint to obtain a strong joint. Check alignment by rolling on a flat surface as before.

Cut a ¼" hole in the base of the nose cone. The shock cord is attached to the inside of the nose cone itself (not to the base!) using a Centuri shock cord fastener. I used a little bit of plastic cement around the edges of the fastener to make it more secure. Attach the other end of the shock cord to the inside of the rocket. An 18" chute should be tied on near the middle of the shock cord.

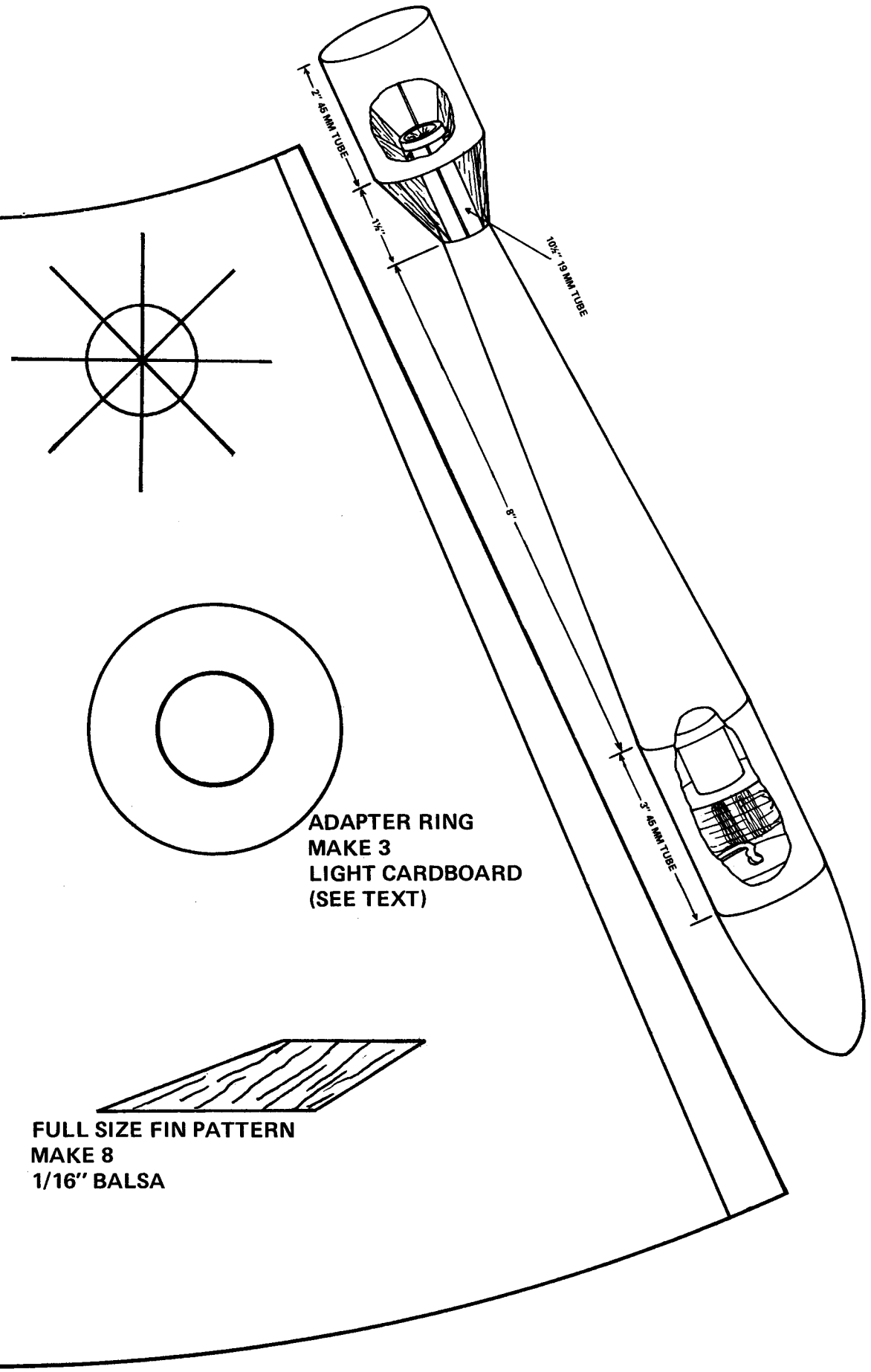
The rocket is now finished!

The Launcher

Finding all of the parts for the breech launcher may be somewhat of a problem, especially for those of you who don't live in or near a large city. If you can't find a specific part, do the best you can. Try looking up metal and plastic suppliers in the yellow pages of your phone book.

Ideally the tube should be made from 1/8" wall aluminum tubing. The inside diameter for this rocket should be 1-7/8". The tube that I used was about 4 ft. long. A ¼" wall phenolic tube could also be used, but it would not last as long as aluminum. Edmund Scientific Co. (300 Edscorp Bldg., Barrington, N.J. 08007) has an aluminum telescope tube part no. 80,081 for $5.75 postpaid, that is the right size but has a 1/16" wall thickness. This is actually thick enough to launch a rocket out of, but it is somewhat marginal as to explosion resistance if the rocket should accidentally become stuck inside the tube. This problem could be overcome by building a box of at least ½" plywood around the launcher. The box should be well built and at least 1' by 1' by the length of the tube. All of the above figures are for engines up to 10 Newton-seconds. For larger engines the tube thickness should at least be doubled.

Another way to improve the safety of a thinner tube is to design the bottom cap of the tube to be noticeably weaker than the rest of the tube. A piece of 1/16" phenolic or plexiglas epoxied in place as the cap should serve this purpose nicely.



ADAPTER RING
MAKE 3
LIGHT CARDBOARD
(SEE TEXT)

FULL SIZE FIN PATTERN
MAKE 8
1/16" BALSA

Hooking up the ignition leads provides somewhat of a problem. The system I used is somewhat crude but it works reasonably well. Cut a 5' length of #18-2 wire (standard ignition system 2 conductor wire). Drill a hole, just large enough to fit the wire through, in the bottom cap. Tie a knot in the wire about 6" from one end. Now, feed the other end of the wire through the hole and down the inside of the tube. After the wire is pushed, shaken and otherwise coerced down the tube, tie a knot in the other end so it can't come all the way out again. Attach a micro-clip to each lead. Remove about ½" of insulation from the end of each of the outside leads.

Prepare the rocket as normal, using a B or C engine. Install the igniter using much wadding and tape so it won't fall out. By means of gentle persuasion (shaking, prodding, using a sledge hammer on it) coax the clips out the front and attach them to the igniter. Insert the rocket into the tube, and while holding it rightside up, at about a 45° angle to the vertical. Pull the clip leads out the bottom very slowly, allowing the rocket to slide to the bottom. Keeping the clips from shorting is somewhat of a problem, but wrapping them with masking tape so that they are well covered but can still open helps considerably. Using one of the Cox igniters and clips could just cure the problem entirely. I have sealed the hole in the base with a wad of clay for my launches, and it has worked rather well. However, my launches have been conducted in subfreezing temperatures. In warmer weather, the clay would probably be ineffective, but some other type of putty should be ok.

I did not use a piston of any type because I had a reasonably close fit between the rocket and tube. For cases where there is more than 1/32" clearance between the tube and rocket, or where you are trying for absolute maximum performance a piston should be used. The piston should have a smooth but close fit inside the tube, should allow the exhaust through, and should drop off as soon as the rocket leaves the launcher.

After you get your closed-breech egglofter working for the next contest, how about a bazooka with launcher for super-scale. . . .

New Product Notes

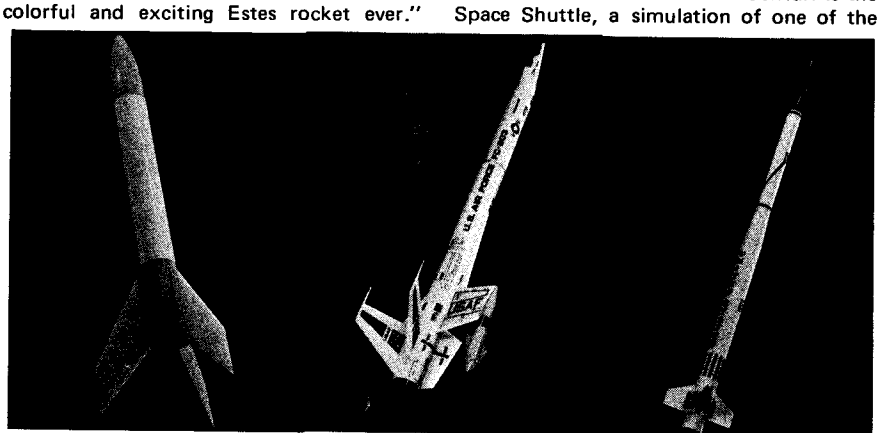
Three new rocket kits, making selective use of plastic parts, have been introduced by Estes Industries. The first is an easy-to-build, and easy-to-fly model rocket kit, the Alpha III. The Alpha III joins the long popular Astron Alpha as one of the beginner's first choice models. Construction of the all new Alpha III has been made even easier than the Alpha by substituting plastic for balsa wood in the nose cone and fin section. Describing the kit, Estes President Vernon Estes says: "Our Alpha III is part of a new generation of Estes models using up-to-date methods and techniques for the benefit of the rocketeer. We feel that the selective use of plastic components for the Alpha III will make model rocket building that much more interesting for the youngster who is just getting started." The Alpha III (kit 711-K-56) sells for $1.50, and will be included with the Estes Porta Pad Starter Kit (701-KS-7, priced at $7.00), the Beginner's Special (701-KS-2, priced at $2.25), and the Electro Launch Starter Kit (701-DSK-75, priced at $7.50).

Also new from Estes is the Interceptor, a spectacular model rocket making selective use of plastic parts and including two large four-color decal sheets to make it "the most colorful and exciting Estes rocket ever." Designed by Wayne Kellner, a member of the Estes Product Development Staff, the Interceptor can be seen on the front page of the 1971 Estes catalog. It employs carefully detailed plastic wing pods, nose cone, and tail cone to achieve the impression of an "exotic rocket of the future." The 26 inch long Interceptor (kit 711-K-50) retails for $4.95.

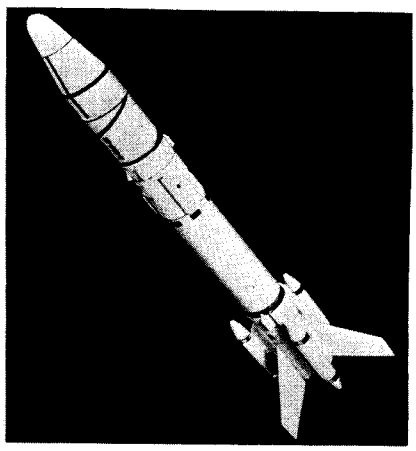
The third new kit from Estes is the Saros, a "scale-like" model developed by Mike Dorffler of the Estes Product Development Staff. The Saros, engineered for easy construction, features an embossed metallic press-on finish, as well as an attractive decal set. The 22½ inch tall model (kit 711-K-54) sells for $2.95.

Two more new kits have been introduced by Centuri. The first, the Orion Interplanetary Explorer, is one of the largest single stage sport rockets available. Measuring 22.5 inches tall and 2.04 inches in diameter, the Orion is an impressively detailed futuristic model. It employs the new Centuri Baffle Ejection System, eliminating the need for parachute wadding. This impressively detailed model (kit KC-8) retails for $4.95.

The second new kit from Centuri is the Space Shuttle, a simulation of one of the proposals under study by NASA. The shuttle boosts are attached to a power pod and carrier ship. At ejection the Shuttle begins gliding flight, the power pod containing the spent engine detaches and returns to earth on a streamer, and the carrier ship then glides earthward for a landing. The carrier ship measures 15 inches long, and has a body diameter of 1.64 inches. The shuttle craft, which weights only 0.67 ounces, is 8.9 inches long and has a body diameter of 1.34 inches. The entire kit (KC-6) sells for only $3.50.



Three new model rocket kits featuring the selective use of plastic components have been introduced by Estes Industies. (Left) The new Alpha III beginner's model, (center) the Interceptor, and (right) the Saros.



Centuri's new Orion Interplanetary Explorer is one of the largest single engine sport models available.

Jigform is a combination jig and working platform developed to facilitate the sawing of small, delicate parts and pieces with a jeweler's or hobbycraft saw. When clamped to the edge of a workbench, table or desk (with a standard hobby C clamp) it serves as both an ideal support for the material being sawed and as a useful guide in sawing it to the desired form. Jigform's unique keyhole slot, having both straight and curved edges, permits sawing a great variety of materials (wood, styrene, lucite, aluminum, brass, etc.) to any shape. Simply by varying the position of the work with respect to the "keyhole" as required, sawing even the most complex shapes is reduced to a routine procedure. Jigform, priced at $1.98, is available from better hobby and craft shops or direct from the manufacturer, Broz Engineering Co., P.O. Box 207R, Scranton, Pa.18501

Technical Report:

The Effect of Aerodynamic Drag On Altitude Lost Due to Early (or Late) Ejection

by Douglas Malewicki and James Anderson

Introduction

In most instances, the theoretical coast time to peak one finds from either Estes TR-10 or Centuri's TIR-100 does not quite correspond with available engine delay times. Thus, the parachute, in reality, is ejected *just before reaching or slightly after passing* the peak altitude. Until now no method has been published to account for how much altitude is lost *by not being able* to eject *right* at the peak.

The graph on the following page allows you to take into account the time *difference* between the actual delay charge of an engine and the theoretical coast time to peak in order to give a more accurate altitude prediction. The method is designed to be used directly in conjunction with either Estes's TR-10 or Centuri's TIR-100.

History

Jim Anderson, NAR 16236, of Wichita, Kansas has been interested in solving this very problem for several years now. His 1969 Science Fair project summarized his early research in this area. That work earned Jim a second place regional award – a five day trip to San Diego, California on behalf of the Navy. In addition, Jim's interests in model rocket theory have also earned him three NASA awards, a Kansas Junior Academy of Science Award, and a third place Regional Science Fair Award. Jim has been building and flying model rockets since 1963. He is now 16 and attends North High.

Jim, I'm proud to say, does one heck of a lot to dispute the general public's stereotyped concept of the weirdo scientist type (thick eye glasses made from Coke bottles, etc.). Among other things, Jim is a modern rock trumpeteer with the very active *Majestic Mood* Group of Wichita. His musical talents also earned him a 10 day trip to Tokyo, Japan in 1969 – via non-stop jet over the North Pole no less (sigh!). The All Kansas Lions International Band, which he was a member, competed against 80 other Lions bands at the convention in Tokyo – and won first place for the third year straight. Jim is also a licensed ham radio operator (WAOZAW) who, of course, looks forward to conversing with similarly inclined model rocketeers.

Jim's research originally began back in the summer of 1968 with the idea of finding a simple relationship between the total drag-free height altitude, including the engine's delay and the actual altitude a rocket could reach with drag. When completed for the 1969 Science Fair, the report had 16 graphs to predict actual altitude for a given rocket. At that time Jim's method already had an advantage over TR-10 or TIR-100 in that it accounted for the delay. In addition, it was considerably easier to use than the step-by-step numerical altitude methods presented in the June 1964 issue of Estes' *Model Rocket News.*

Jim was in the process of submitting his report to **Model Rocketry** magazine when we finally met. Our early discussions led to Jim's *first revision* of the report to make it more general. That turned out to be a major task and Jim enlisted the aid of Steve Howell and Gary Mastin of the North High Science Club (both who just happened to be taking a free computer programming course offered by Wichita State University to high school students).

A month later, a ten inch thick pile of IBM data cards was run through the computer successfully. Out poured 50 or so feet of output answers which Jim had to then plot up by hand (ugh!) to see what kind of sense they made. After about two months of spare time plotting and writing, Jim had his new 35 page report with 17 graphs in hand ready to go.

I had an idea of what Jim was up to and, of course, prior to the report's completion had discussed the problem with Jim on several occasions. Wouldn't you know it, just as soon as Jim brought the report to show me the new graphs made the old gears unconsciously start churning. We tossed some new ideas back and forth, dragged out TR-10 and, within an hour, together discovered that the whole thing could be replaced with only four graphs. This new method was a bit confusing and tricky to follow, but it did work.

Jim called me the very next night and gave me a complete new method to replace yesterday's new method – which reduced the number of graphs required to only two. I checked it out and yes it worked and was also far simpler to use.

A week or so passed to run all the new equations and data through a computer. Upon plotting the results, it became obvious that early and late ejection data did not require separate presentations – all the data fits very nicely on the single graph presented here.

After this turn of events, Jim and I felt a bit stupid inasmuch as any decent thinking person would have anticipated in advance that the zero drag line represents the old artillery shell problem introduced in elementary physics. A shell in a vacuum takes the same exact time when retarded by gravity alone to stop its vertical progress from a given altitude as it takes the shell to fall back down to that initial altitude. Of course, in the real world aerodynamic drag on an artillery shell traveling at several times the speed of sound can amount to significant reductions in altitude and range capability *just* as it does with model rockets traveling at subsonic speeds.

The Ballistic Coefficient

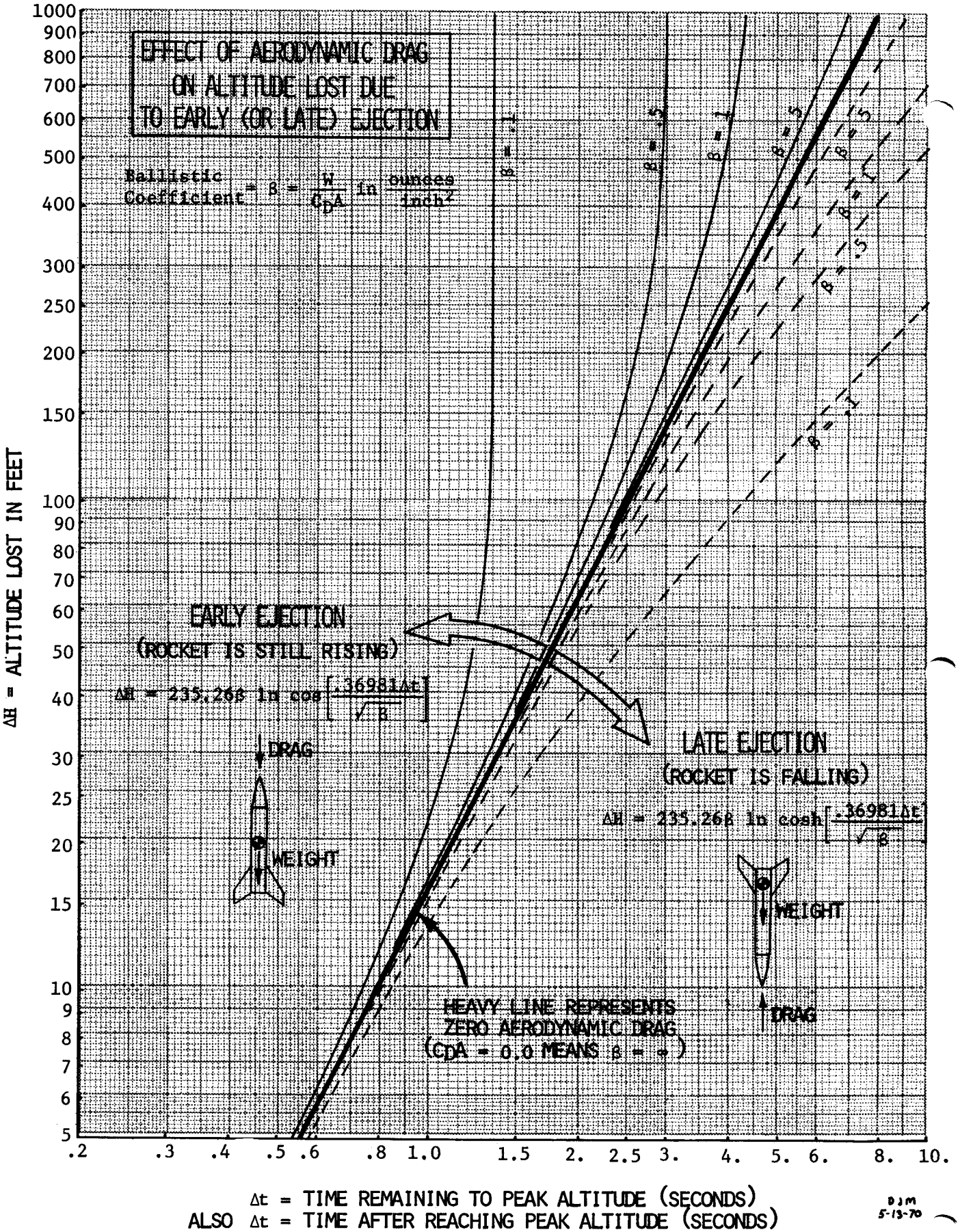
The key to the simplification of the Altitude Lost graph was the introduction of the Ballistic Coefficient as denoted by the Greek letter beta (β).

$$\text{Ballistic Coefficient} = \beta = \frac{W}{C_D A} = \frac{\text{weight during coasting}}{\text{aerodynamic drag factor}}$$

As you may know, the Ballistic Coefficient was discussed and used as the basic trajectory parameter in Estes TR-10. The *higher* the Ballistic Coefficient of an object, the *less* the earth's atmosphere perturbs the flight from the zero drag situation (where *only* gravity influences the motion of the object). The Altitude Lost graph presented here vividly shows this to be true. Whether your model rocket is rising or falling, the larger its Ballistic Coefficient (β) the closer its altitude versus time relation approaches flight in a vacuum.

If this is your first exposure to the somewhat impressive term "Ballistic Coefficient", don't let it frighten you from making use of the graph. The coefficient is merely a mathematical term to let you know how well a given object "penetrates" through the air.

If you think about it a bit, you'll realize you already have an intuitive feel for "Ballistic Coefficients". Imagine that you have a bunch of 1 foot by 1 foot by 1 foot cardboard boxes. They all have the same reference frontal area ($A = 1\ FT^2$) and also will have the same drag coefficient inasmuch as their shapes and surface smoothness are all identical ($C_D = 1.0$ for a cube). Thus, the Drag Form



Δt = TIME REMAINING TO PEAK ALTITUDE (SECONDS)
ALSO Δt = TIME AFTER REACHING PEAK ALTITUDE (SECONDS)

DJM
5-13-70

Factor of each and every cardboard box is also identical (C_DA = 1.0 FT^2). This tells us that at any specific velocity that the drag force will be identical on all boxes.

Next, in order to obtain a wide variety of weights, we load the boxes with the various assorted materials as shown in Table 1. Then we carry them up to 10,000 feet in one of those reliable Cessna twins (Ed: Hey Doug, watch those free plugs). All the boxes are then kicked out of the door simultaneously. The subsequent falling flight of each box as you know is retared to some degree by aerodynamic drag.

The ranking of the various boxes according to their Ballistic Coefficients gives you just what you would intuitively expect. The higher the Ballistic Coefficient of a given box, the closer its flight will approximate a zero drag situation and the sooner that box will impact the ground.

TABLE 1

CARDBOARD BOX DROP TEST COMPARISON*

MATERIAL IN THE BOX	TOTAL WEIGHT (LBS)	BALLISTIC COEFFICIENT β (LB/FT^2)	BALLISTIC COEFFICIENT β (OZ/IN^2)
EMPTY	.5	.5	.05
STYROFOAM	4	4	.4
BALSA	9	9	1.0
HARDWOOD	34	34	3.8
WATER**	63	63	7.0
ALUMINUM	176	176	19.5
TITANIUM	295	295	32.8
STEEL	390	390	43.3
LEAD	706	706	78.0
GOLD	1210	1210	134.0

* C_DA = 1.0 ft^2 for all the boxes.

** In a thin plastic bag to prevent leakage.

If it is so obvious, do we really need to even bother computing something like a Ballistic Coefficient? Yes, Yes, and again Yes! That was a very simplified example! Do you think you can say anything intuitively about a comparative drop test for a 20 pound four-foot cube versus a 5 pound one-foot cube versus a 10 pound two-foot diameter sphere??

I couldn't — *until* I computed the Ballistic Coefficient for each one as shown in Table 2. A simple mathematical tool is what it is all about — and as usual — its something we probably wouldn't bother learning if we weren't so absorbed in model rocketry.

TABLE 2

OBJECT	WEIGHT (LBS)	C_D	REFERENCE AREA (FT^2)	$\beta = \frac{W}{C_DA}$ (LB/FT^2)	$\beta = \frac{W}{C_DA}$ (OZ/IN^2)
4-FOOT CUBE	20	1.0	16	1.25	.139
1-FOOT CUBE	5	1.0	1	5.	.555
2-FOOT SPHERE	10	.5	3.14	6.37	.707

As you can see from the Ballistic Coefficient values, the 10 pound sphere would reach the ground first, the 5 pound cube second, and the 20 pound cube last!

Hopefully, the previous example has helped clarify the need for our having to bother with Ballistic Coefficient calculations. We can now get back to model rockets.

One of your first questions should be, "What are typical Ballistic Coefficient values for a model rocket?" Table 3 was prepared for a variety of Estes kits for this exact purpose:

TABLE 3

TYPICAL MODEL ROCKET BALLISTIC COEFFICIENT VALUES

MODEL	WEIGHT W (OUNCES)	REFERENCE DIAMETER (INCHES)	DRAG* FORM FACTOR C_DA ($INCH^2$)	BALLISTIC COEFFICIENT $\beta = \frac{W}{C_DA}$ (OZ/IN^2)
MARS LANDER	4.50	3.80	5.80	.8
NIGHT HAWK B/G	2.43	**	2.25	1.1
LITTLE JOE II	2.40	2.22	2.00	1.2
SATURN V	11.50	3.94	6.05	1.9
GEMINI TITAN	4.60	2.22	2.00	2.3
BIG BERTHA	2.65	1.64	1.05	2.5
ALPHA	1.16	.98	.38	3.0
STREAK	.65	.72	.20	3.2
COBRA	4.55	1.64	1.05	4.3
SCRAMBLER***	6.10	1.80	1.27	4.8

* Assumes an aerodynamic drag coefficient of C_D=.5

** Based on a reference wing surface area of 42.5 in^2

*** Includes 2-ounce egg

The first conclusion is that there is no obvious way to tell the Ballistic Coefficient (β) of a model rocket just by looking at it. As an example, the fact that the heavy Saturn V has a *lower* Ballistic Coefficient than the ultra-lightweight Astron Streak may surprise some readers.

The table does tell us, however, that the β values for today's model rockets are fairly limited and range from β = .8 up to β = 4.8 ounce per square inch. It also tells us that the β = .1 lines on the graph were unnecessary.

How To Use The Altitude Lost Graph

Keeping this range of typical model rocket Ballistic Coefficient values in mind we can proceed to describe how to use the graph.

1. Find both the peak altitude and the coast time to peak altitude from either Estes TR-10 or Centuri TIR-100.
2. Next, note how much the coast time differs from delay time of your engine. If the times match exactly, you are done — meaning that the TR-10 or TIR-100 altitude is a valid prediction. If the times do not match, then the graph presented here is needed.
3. If the coast time is *greater* than the delay time, the recovery system will be activated while the rocket is still on its upward flight. The time increment Δt (pronounced delta tee) remaining to peak altitude will be:

$$\Delta t = \text{Coast time} - \text{Engine Delay time}$$

4. If the coast time is *less* than the delay time, the rocket will have already passed the peak altitude and is on its way down when ejection occurs. Here the time increment Δt after reaching the peak will be:

$$\Delta t = \text{Engine Delay time} - \text{Coast time}$$

5. Next, determine the Ballistic Coefficient of the model rocket.

$$\beta = \frac{W}{C_D A} \text{ in } \frac{\text{ounces}}{\text{inch}^2}$$

Note that the proper weight to use is the burnout weight of the vehicle which is found by subtracting all the propellant weight from the initial lift-off weight.

6. Use the graph to establish the amount of altitude lost. First find the time increment Δt for your rocket along the bottom scale. Then go straight up until you find the Ballistic Coefficient value for your rocket. (Be sure to be on the proper side of the zero drag line — RISING or FALLING as the case may be). Finally, read off the Altitude Lost (ΔH) on the left-hand scale.
7. The true height of the rocket at the time of ejection is then found by simply subtracting the altitude lost (ΔH) from the maximum predicted height found using TR-10 or TIR-100.

EXAMPLE PROBLEMS

PROBLEM #1

Given: Astron Sky Hook
Empty Weight = .65 ounces
BT-30 Body tube of diameter .765 inches
B4-2 engine

Find: Maximum Possible Altitude
True Altitude at Ejection

Procedure: Liftoff Weight = Rocket Weight + B4-2 Engine Weight
= .65 ounce + .70 ounce
= 1.35 ounce

Frontal Area = $.785\,(DIA)^2 = .785\,(.765\text{ in})^2 = .46\text{ in}^2$

Drag Coefficient = .5 (assumed)

Drag Form Factor = $C_D A = .5\,(.46\text{ in}^2) = .23\text{ in}^2$

TIR-100 gives:

MAXIMUM ALTITUDE = 1140 feet
COAST TIME = 6.5 seconds

Using the 2 second delay B4-2 engine means that ejection occurred *before* the peak at:

$$\Delta t = 6.5 - 2.0 = 4.5 \text{ seconds}$$

Next we compute the Ballistic Coefficient (β) during coasting:

$$\text{Weight during Coasting} = \text{Liftoff Weight} - \text{B4-2 Propellant Weight}$$
$$= 1.35 \text{ ounce} - .294 \text{ ounce}$$
$$= 1.056 \text{ ounce}$$

Thus,

$$\beta = \frac{W}{C_D A} = \frac{1.056 \text{ ounces}}{.23 \text{ inch}^2} = 4.6 \frac{\text{oz}}{\text{in}^2}$$

Using the graph, we find that for $\Delta t = 4.5$ seconds before peak and $\beta = 4.6$ that the altitude lost would be approximately:

$$\Delta H = 390 \text{ feet}$$

meaning that the

$$\text{True Altitude at Ejection} = \text{Maximum Possible Altitude} - \text{Altitude Lost}$$
$$= 1140 \text{ feet} - 390 \text{ feet}$$
$$= 750 \text{ feet}$$

This represents a 35% loss in potential altitude capability!

PROBLEM #2

Given: Mars Lander
Empty Weight = 3 ounces
Body Diameter = 3.8 inches
B14-7 engine

Find: Maximum Possible Altitude
True Altitude at Parachute Deployment

Procedure: Liftoff Weight = Empty Weight + B14-7 Engine Weight
= 3.0 ounce + .73 ounce
= 3.73 ounce

Frontal Area = $.785\,(DIA)^2 = .785\,(3.8\text{ in})^2 = 11.3\text{ in}^2$

Drag Coefficient = .5 (assumed)

Drag Form Factor = $C_D A = .5\,(11.3\text{ in}^2) = 5.6\text{ in}^2$

TIR-100 gives:

MAXIMUM POSSIBLE ALTITUDE = 140 feet
COAST TIME = 2.4 seconds

Using the 7 second delay B14-7 engine means that ejection will occur *after* the peak at:

$$\Delta t = 7 - 2.4 = 4.6 \text{ seconds}$$

Next we compute the Ballistic Coefficient (β) during coasting:

$$\text{Weight during Coasting} = \text{Liftoff Weight} - \text{B14-7 Propellant Weight}$$
$$= 3.73 \text{ ounces} - .22 \text{ ounce}$$
$$= 3.51 \text{ ounce}$$

Thus,

$$\beta = \frac{W}{C_D A} = \frac{3.51 \text{ ounces}}{5.6 \text{ inch}^2} = .63 \frac{\text{oz}}{\text{in}^2}$$

Using the graph, we then find that for a $\Delta t = 4.6$ seconds after peak and a $\beta = .63$ that the altitude lost would be approximately:

$$\Delta H = 215 \text{ feet}$$

meaning that the

$$\text{True Altitude at Ejection} = \text{Maximum Possible Altitude} - \text{Altitude Lost}$$
$$= 140 \text{ feet} - 215 \text{ feet}$$
$$= -65 \text{ feet}$$

This immediately tells us that the Mars Lander would have *impacted* into the ground before the recovery system was ever deployed if the 7 second delay engine was used.

PROBLEM #3

What would happen if we used the 5 second delay B14-5 engine for the Mars Lander instead?
The Maximum Altitude of 140 feet and the coast time to peak of

2.4 seconds, of course, will not change. With the 5 second delay engine we now would have chute deployment occurring after the peak at

$$\Delta t = 5 - 2.4 = 2.6 \text{ seconds}$$

Using the falling part of the graph with this time increment and a β of .63 ounce per inch^2 we find that the altitude lost would be:

$$\Delta H = 88 \text{ feet}$$

meaning that:

True Altitude at Ejection	=	Maximum Possible Altitude	−	Altitude Lost
	=	140 feet	−	88 feet
	=	52 feet		

While the result is borderline, it is not as critical as using the longer delay which would have allowed the Lander to crash.

Limitations Of The Theory

1. The main thing to keep in mind is that the rocket has momentum and does not *stop* instantly just because the ejection charge has pushed the nose cone and the rolled up parachute out of the body tube. It will take *some* time and *some* distance to decelerate. This distance is a random variable that doesn't lend itself to analysis. A giant chute that snaps open instantly will surely decelerate the rocket differently than a chute which has been packed so tightly that it really never even unfurls. The problem is also incurred in Boost Glider Analysis. How much altitude increment is involved in the transition to steady glide depends strongly on the individual glider

2. The NAR allows the manufacturers a whopping ± 15% tolerance on the engine delay time. In other words, an engine that is coded to have a 5 second delay will be acceptable for NAR certification if the engine causes ejection anywhere from 4.25 to 5.75 seconds after thrusting ceases. Fortunately, responsible manufacturers strive for a much closer tolerance. Thus, going through an "Altitude Lost" analysis will be more meaningful in terms of obtaining practical results.

3. In most cases the available choice in engine delay times allows you to come quite close to the desired peak. As you can see from the graph, whenever the time increment is within plus or minus two seconds of the peak, there is very little deviation from the zero drag value. (Note that we have excluded the $\beta = .1$ line as being too low for typical model rockets). What this tells us is that the rocket is already traveling so *slow* that the drag (which is proportional to velocity squared) is essentially negligible compared to the acceleration of gravity ($g = 32.2$ ft/sec^2). Thus, a reasonable method for estimating altitude lost due to early or late ejection is the simple no-drag formula:

$$\Delta H = \tfrac{1}{2} g (\Delta t)^2 = \tfrac{1}{2} (32.2) \Delta t^2 = 16.1 (\Delta t)^2$$

Of course, as the time increment becomes larger than plus or minus two seconds, this approximation loses its usefulness.

Pittsburgh Spring Convention – March 19-21, 1971. Sixth annual model rocket Convention sponsored by Pittsburgh's Steel City NAR Section. Open to all rocketeers. Featuring: Discussion Groups, Two Banquets, Manufacturers' Displays, Launch, Lectures, and Films. Information from Alan Stolzenberg, Convention Chairman, 5002 Somerville St., Pittsburgh, PA 15201.

MIT Convention – April 3-5, 1971. Convention sponsored by the MIT Model Rocket Society. Open to all rocketeers. Featuring: Computer Demonstration, five Discussion Group Periods, R & D Presentations and Contest, Launch, Banquet, Films. Information from Trip Barber, MIT Model Rocket Society, Box 110, MIT Branch Post Office, Cambridge, MA 02139.

ECRM-5 – April 16-18, 1971. Regional meet sponsored by NARHAMS NAR Section, open to NAR members from Maryland, Virginia, North Carolina, Delaware, West Virgina, and Pennsylvania. Events: Scale, Sparrow B/G, Swift Rockety/Glider, Class I PD, Class II Streamer Duration, Hawk B/G, and Parchute Spot Landing. Site: Camp A.P. Hill, Va. Contact: J. Barrowman, 6809 97th Place, Seabrook, MD 20801.

Buckeye II – April 17-18, 1971. Area meet sponsored by the CSAR Section of Columbus, Ohio. Events: Scale, Sparrow R/G, Sparrow B/G, Robin Eggloft, Class O Drag Efficiency, Class O Parachute Duration, Class 2 Parachute Duration, and Open Spot Landing. Contact: Lee Streett, 196 East Beaumont Road, Columbus, Ohio 43214.

East Coast Boost/Glide Championships – April 24-25, 1971, Boost/Glide Record Trials sponsored by the ABM Section of Bethlehem, Pennsylvania. Open to all NAR members. Events: All NAR Boost/Glide events will be flown. Site: Lehigh University Saucon Valley Field. Contact: Douglas List, 38 West University Ave., Bethlehem, PA 18015.

PRANG-II – May 1-2, 1971. Regional Meet sponsored by Pittsburgh's Steel City Section. Events: Super Scale, Scale, Sparrow R/G, Sparrow B/G, Robin Eggloft, Class O Drag Efficiency, Design Efficiency, Class O Parachute Duration, and Open Spot Landing. Contact: Alan Stolzenberg, 5002 Somerville St., Pittsburgh, PA.

SIAM-71 – May 22-23, 1971. Area Meet sponsored by the Hilliard, Ohio NAR Section. Events: Class 1 Scale Altitude, Sparrow B/G, Hornet B/G, Robin Eggloft, Plastic Model, Class 1 Parachute Duration, Class 2 Streamer Duration. Contact: Fred Long, 256 Bigelow Drive, Hilliard, Ohio 43206.

MMRR-71 – June 26-27, 1971. Regional Meet sponsored by the CSAR Section of Columbus, Ohio. Events: Scale, Swift B/G, Hornet B/G, Sparrow R/G, Robin Eggloft, Predicted Altitude, Plastic Model, Class O Parachute Duration, Class 2 Streamer Duration. Contact: Dr. Gerald Gregorek, 4451 Danforth Rd., Columbus, Ohio 43224.

Tri-State Competition – June 1971, an open meet for rocketeers in the Amarillo, Texas and neighboring states area. Contact: Amarillo Rocket Modelers Society, 4219 Summit, Amarillo, Texas 79109.

Canadian Convention – July 2-4 1971. Second National Canadian Model Rocket Convention, sponsored by Montreal's ARRA club, and open to all rocketeers. Discussion groups, films, speakers, competition, and a banquet. Full information from: Atmospheric Rocket Research Association, 7248 2nd Avenue, Montreal 329, Quebec, Canada.

Southwestern Model Rocketry Conference – July 20-23, 1971. Third annual convention for rocketeers in the Southwestern U.S. Featuring a flight competition, discussion groups, speakers, films and banquet. Sponsored by the ARC-Polaris Rocket Club, Portales, New Mexico. Write for information to: ARC-Polaris, Drawer 89, Portales, New Mexico 88130.

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Mail notices of your contests at least 90 days in advance for listing in Model Rocketry's "Modroc Calendar":
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Boston, Mass. 02123

THE MODEL ROCKETEER

NATIONAL ASSOCIATION OF ROCKETRY, Box 178, McLean, Virginia 22101

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Model Rocketry 'IDEAL THERAPY'

by Mrs. Darla B. Welch and the staff of the "Goddard News"

For the past two years model rockets have been used at the Sharpe Health School in Washington, D.C. as part of their program for handicapped youngsters. Mrs. Darla B. Welch, a fifth and sixth grade teacher at the Sharpe School for physically handicapped children, has termed model rocketry an "ideal therapy" for her classes.

Because Sharpe students come from a wide variety of home environments, with a variety of scholastic and physical abilities, Mrs. Welch finds model rocketry an especially valuable teaching aid. She finds that *all* of her students can play some part in building a rocket. In addition, they all receive additional motivation from the thrill of launching their own rockets when their projects are complete.

Each year the children from the Sharpe School gather at the NASA Goddard Space

NASA Photo

Mrs. Darla Welch, science teacher at the Sharpe Health School, helps some of her students prep their rockets during a launch from NASA's Goddard Space Flight Center in June.

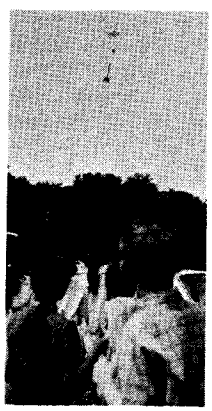
NASA Photo

Michael Keys (sun glasses) of the Rock Creek Section assists several Sharpe School students with their rockets. Rocketeers from Star Spangled Banner, Rock Creek, NARHAMS, and Wheaton Sections helped set-up and run the range.

Flight Center to launch their rockets. Their last launching, from the Goddard Antenna Range, took place on June 9, 1970. During this meet nearly 100 youngsters, including the members from four NAR sections who were the hosts for the launching, participated in the successful firing of over 200 rockets.

The program is assisted by NAR Sections under the direction of Dottie and Howard Galloway and rocketeers from their Star Spangled Banner Section. Also participating in the launchings are the NARHAMS, Rock Creek, and Wheaton NAR Sections.

After working with model rockets for two years, Mrs. Welch observes that such programs can serve to channel the enthusiasm of the youngsters in her class into a learning experience. "Since all children tend to be curious, explorative, restless, imaginative, and abounding in energy," she observes, "it is often quite a challenge for a science resource teacher to discover meaningful, successful learning experiences for children with the wide range of abilities present in the classroom. One particular activity encompasses all these considerations in teaching young children in general, and the physically handicapped in particular. That activity is model rocketry." The success of the program at the Sharpe School can best be demonstrated by citing the case of one student, "a devilish imp who has no time for the study of nature, fossils, or sound. Yet, last year, he chased his rocket the length of the firing field, while he contends he cannot walk the school corridor to physical therapy. Each child involved in the program seems to compensate individually for his handicap under this motivation."



NASA Photos

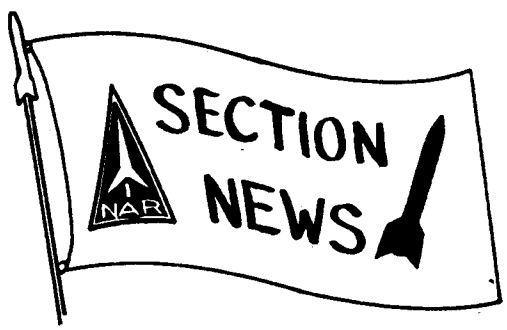
Susan Zucchi of the Star Spangled Banner Section assists a Sharpe student in readying his rocket. (Right) Students watch as the rocket drifts down.

It seems that this is another "dry" month for news. This gave us an opportunity to run the long-awaited section roster which has grown to nearly unmanageable size. I have not received any news from the Contest Board or Records Subcommittee in quite a while. Records Subcommittee has just been transferred from Harry Stine to Howard Galloway. Howard was contest director of NARAM-7 in Aberdeen, Maryland and is also Section Advisor to the Star Spangled Banner Section of Baltimore. In a short time we will resume publishing NAR and FAI records each month. Jim Barrowman has nearly completed a computer program for the Contest Board which will compile the top twenty point holders in each age division and the top ten NAR Sections automatically. This information will also become available in *The Model Rocketeer*.

Jerry Gregorek, Chairman of the Standards and Testing Committee is busy testing the multitude of new engines being produced. Jerry reminds us that an engine loses its *Contest Certification* just as soon as it is removed from the market although it remains *safety* certified. This rule allows modelers to compete only with engines that are available to all of them.

I have received tentative word on the real NARAM-13 site (not Nome, Alaska) but cannot release the information until it becomes confirmed. I hope to have details in next month's issue.

– *Carl Kratzer*



By Charles M. Gordon

The Pascack Valley Section (New Jersey) held its first North Eastern Technical Symposium (better known as the Mini-Convention) on November 21, 1970 in Hillsdale, N.J. Included in the program were lectures, demonstrations, and discussions covering Drawing Plans (for R&D and scale), R&D pitfalls, report presentations techniques, new R&D presentations, new R&D topics, and methods of obtaining data.

* * * * * * *

More and more NAR Sections are being formed throughout the country. The following is a list of areas where sections are now being formed and the person to contact if you are interested.

*NORTH ST. LOUIS AND ST. LOUIS COUNTY, MISSOURI – Contact: Don Binaman, 3001 Solway Ave., St. Louis, Missouri 63136.

*PUEBLO, COLORADO area – Contact: Glenn McCloskey, 1524 Saratoga, Pueblo, Colorado 81001.
*UNIVERSITY OF ALABAMA area – Contact: Mark Barkasy, P.O. Box 2564, University, Alabama 35486.
*BROOKLYN, NEW YORK area – Contact: James Enny, 88 Tehama St., Brooklyn, New York 11218.
*KENTUCKY State area – Contact: Greg Bright, Rt. 1, Campbellsville, Kentucky 42718 *or* Terry Dean, Lot 138, Morgan St., Radcliff, Kentucky 40160.
*ROSLYN, NEW YORK area – Contact: Ken Sosne, 165 Birch Drive, Roslyn, New York 11576.
*OKLAHOMA CITY, OKLAHOMA area – Contact: David Silberman, 5700 NW 82nd, Oklahoma City, Oklahoma 73132.

In September the Model Rocketeers of Lodi (New Jersey) Section demonstrated another way to accumulate funds for section activities. After receiving donations from an elderly couple in their neighborhood and from parents of members, the section held a "Garage & Yard" sale in which the proceeds, $75, went into the section treasury.

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An NAR Section is being formed in North St. Louis and St. Louis County, Missouri. All interested people should write to Don Bingaman, 3001 Solway Avenue, St. Louis, Mo. 63136.

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Craftsmanship Event

The NARHAMS Section (Seabrook, Maryland) has developed its own "Craftsmanship Event – to increase the level of workmanship as a whole within the section." Each month this event is flown, judged by modelers chosen by the section president, with modeling ability, experience, and availability as their qualifications. Vehicles must be of a certain pre-designated type. The complete rules for the NARHAMS "Craftsmanship Event" are printed below:

NARHAMS CRAFTSMANSHIP EVENT – RULES

Purpose – To increase the level of workmanship as a whole within the club.
Object – Through judging to choose the model with the highest level of workmanship submitted in the event.

1) The Craftsmanship Event is to be held at the monthly NARHAMS launch, starting with the November launch. All NAR members may compete.

2) To qualify:

   A) The contestant must submit a rocket vehicle which conforms to the designated type as specified by the judges. The type of vehicle required will be chosen one month (if possible) before the date of the contest. The type of vehicle is to be discussed and approved by the Club membership.

   B) All vehicles must be in flying condition when submitted and will be flown the day of the event in view of the judges unless prevented by weather or other similar causes. If the vehicle is unstable for design or construction reasons, it will be disqualified from the event.

   C) All vehicles must conform to all current NAR rules.

   D) Once a specific vehicle has won the event once, it will not be allowed to compete again. The records of each winning vehicle are to be kept by the club secretary and the records will be made available at the launch.

3) Judging:

   A) The judges will be chosen by the following qualifications:

      1. modeling ability
      2. experience
      3. availability

      The judges will be chosen by the club president and will be approved by the club membership. The number of judges will be a minimum of two (2) but a recommended number of three (3).

   B) Judging will be on the quality of workmanship alone. Degree of difficulty will not figure in the judging. The method of judging will be as follows: All judges will inspect each model individually and then will judge the entries against each other. All judges will observe each flight of the entries. From the resulting facts they will make a decision. In case of a split decision among three judges, the vehicle with the majority will win. In the case of a tie, there will be awarded duplicate prizes.

4) Eligibility:

   After winning the event two times, the contestant becomes ineligible for a period of two months. After the waiting period is over, if the same contestant wins a third time, he will enter a period of ineligibility of three months. From each time on, when the same contestant wins the event each time he will be ineligible for the next three months. During this ineligible period the contestant can be used as an event judge.

5) Awards:

   A) The winner of the event each month will be given an award chosen by the club and approved by the club treasurer. The award will be something to do with the hobby of model rocketry (a kit, supplies, etc.) and will be of reasonable cost.

   B) After a certain contestant has won three times, his name will be placed on the NARHAMS Craftsmanship Award Plaque. The plaque is to be kept by the club's Contest and Records Committee and is to be brought to meetings for display.

(Reprinted from *Zog 43*)

NAR Sections and members in Kansas and Missouri have a new contact with the appointment of USAF TSgt. Larry Loos, SNR #7127, as department head for both states from his "home" at Richards-Gebaur AFB, south of Kansas City. Larry expects to work with groups, hobby dealers, and schools to develop NAR Sections. His additional public relations/aerospace education duties with Civil Air Partol means that he will assist CAP units. Larry has also been asked to help organize an MR committee within CAP's North Central Region, an eight state area. Write or Phone: AFCS-CMR Box 711, RGAFB, MO 64030, AC816-331-4400, Ext. 3417.

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The Tri-City Cosmotarians (Gladstone, Oregon) report of two more methods of supplementing the club treasury. ONE way in which they were able to add to the section "Kitty" was through project "Plum Picking," where Cosmotarians earned $10 for the club by doing just that, picking plums. The SECOND was when, at the beginning of September, Cosmotarians delivered 2700 pamplets for a local hardware store and recieved $88 for their efforts which all went into the section treasury.

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The Steel City Section (Pittsburgh, Pa.) reports of increased use of the now famous FOXMITTER as seen in their September 29 launch in which 3 people flew a total of 6 transmitter flights including a Spin Rate Sensor, a Humidity Sensor, a Pressure Sensor, the Sound Cineroc, a Microphone flight, and a Temperature sensor. Beep. Beep. Beep.

******

The Virginia Rocket Center Section (Richmond, Virginia) held a launch on October 29, 1970. Over 400 modelers and spectators were reported present to witness the launch of over 200 model rocket flights. The launch was reported by local TV news and newspapers. The VRC invites any modelers or interested persons in the area to contact them at 4010-A Glenside Dr., Richmond, Va. 23228.

* * * * * * *

The Monroe Astronautical Rocket Society Section (Victor, New York) reports that the "Purple Book is Ready!" Persons interested in acquiring copies of the "FREEK MEET" rule book should send 25¢ to MARS, 2424 Turk Hill Road, Victor, N.Y. 14564.

* * * * * * *

The South Seattle (Washington) Section's newsletter *Modroc Flyer* is doing something really different. It is offering its readers the opportunity to buy a ready-made name for a model rocket ("guaranteed original") for only one "All American Dime." How about that?

* * * * * * *

All members of the Lodi (New Jersey) Section, to work in the "Help Beautify America" program and to accumulate funds for section equipment and projects, participated last fall in the Ballantine Brewery can reclamation project by picking up discarded cans from streets and empty lots in their area. Nice going Lodi and Thanks.

* * * * * * *

The NAR would like to welcome the following new sections to the Association:

HORNETS NEWS (MRC) SECTION
c/o Richard J. Taner
5012 Valley Stream Road
Charlotte, North Carolina 28209

MODEL ROCKETRY ASSOCIATION OF AUGUSTA, GEORGIA
MRA c/o Hobby House
603 Georgia Avenue
North Augusta, South Carolina 29841.

* * * * * * *

KEYSTONE MODEL ROCKET SOCIETY SECTION
Ronald D. Claar
RD 1, Box 366 F
Duncansville, Pennsylvania 16635

SHAWNEED ROCKET ASSOICATION SECTION
Joe Hamon
P.O. Box 548
Rosiclaire, Illinois 62982

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The editor of N.A.R.S.N. would like to thank the following sections for sending in news and/or correspondence for this issue. Sorry we couldn't get yours in but keep it coming and good flying: NARCAS SECTION (Camp Hill, Pennsylvania), DELTA-V SECTION (Palo Alto, California), NORTHWESTERN INDIANA ROCKET ASSOCIATION SECTION.

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NAR SECTION NEWS appears each month as a regular feature in the MODEL ROCKETEER. Those sections wishing to have news and/or information of their activities printed in this column should submit such material to:

NAR SECTION NEWS EDITOR
Charles M. Gordon
192 Charolette Drive, Apt. #2
Laurel, Maryland 20810

CHANGE OF ADDRESS

NAR members, when you move, please send your change of address to NAR HEADQUARTERS - not to Model Rocketry Magazine.

Don't allow your insurance to lapse!
Renew your
NAR Membership Now!
NAR, Box 178, McLean, VA. 22101

NAR Section Roster

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Anchorage, Alaska 99504

ANNAPOLIS ASSOCIATION OF ROCKETRY
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Use this list to locate an NAR Section in your area

(Club Notes, cont.)

Gonzolez was third. In Spot Landing Timothy Martin took first with 31 feet 4 inches, while Mark Catt took second. Lt. Tom Scharenbrock serves as chairman of the rocket club. Interested Colorado Springs rocketeers can contact Scharenbrock at 596-8877.

About 300 spectators and contestants gathered at York Memorial Stadium in York, Pennsylvania for a contest in late October. Sponsored by the York club, the Skyraiders, the contest saw prizes awarded for the following performances: Altitude for a single-stage model, 1230 feet; Altitude for a two-stage model, 1190 feet; Parachute Duration, 249 seconds. The meet was highlighted by the launching of a scale Saturn V model.

A model rocket club is being organized in Poland, Ohio. Interested rocketeers should contact Joe Armeni, Jr., 536 N. Main Street, Poland, Ohio 44514.

Michael Turner is attempting to organize a model rocket club in Fredericksburg, Pennsylvania. Interested rocketeers should contact him at RD #1, Fredericksburg, PA 17026.

Two Senior NAR members, Bill DeHart (#4626) and Jack Komorowski (#4619), are looking for NAR members in the South Jersey area for the purpose of starting an NAR Section. Interested rocketeers can contact Bill DeHart, 111 Deptford Rd., Glassboro, N.J., or Jack Komorowski, 33 Chestnut Ave., Apt. 279, Vineland, N.J.

The latest issue of *Modroc*, newsletter of the Jaycee Jr. Rocket Program in St. Francis, Wisconsin, reports that that club is planning a candy sale in order to increase the club's treasury. The club also plans a paper drive as a fund raising effort. Profits from the two projects will be used to prepare a club membership kit, and to finance a CINEROC research program.

The Rim Dodgers Rocket Club is looking for new members from the Billings, Montana area. Interested rocketeers are asked to contact Jim Meiss at 2730 Palm Drive, Billings, Montana 59102. The Rim Dodgers club has been operating for over a year and has its own multi-position launch system.

The new Civil Air Patrol Rocket Club in Bossier City, Louisiana, got off to a good start with a rocket launch on Tuesday, November 25th. During the launch, thirteen rockets were flown including a 1:100 scale model Saturn V and an Astron Delta carrying a Camroc. Thirteen CAP members attended the launching. The club has scheduled additional launches for the winter months.

A new model rocket club is being formed in the Oklahoma City, Oklahoma area. The club will be called the Okie Model Rocket Club, and will meet every two weeks. Rocketeers desiring more information should contact Larry Ball, 3500 N. Broadway, Oklahoma City, Oklahoma 73118 or call 524-9593.

A model rocket club is being formed in Salt Lake City, Utah. Any interested rocketeers should contact David Pratt, 4720 Sycamore Drive, Salt Lake City, Utah 84117 or phone 277-4904.

The latest issue of *Emanon* reports that the YMCA Space Pioneers of New Canaan, Connecticut, gave a public demonstration launch on September 13th to stimulate interest among prospective new members. Among the models flown were a 1/45th scale Little Joe II, Vostok, Asp, and several Tomahawks. In order to give the spectators a cross-section view of the hobby, the club also flew a F-powered model, egg-lofters, B/G's and PD models. As a result, the club attracted 12 new members into its training program.

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Club Spotlight:
Kennedy Space Center Contest

The Kennedy Space Center Amateur Rocket Society hosted their semi-annual contest on October 24th, 1970, at the Jackson Junior High School grounds in Titusville, Florida – just across the river from the Kennedy Space Center. The meet was dominated by Chris Connolly who tied Leon Davis and Herb Rice for the title of *SCARS Rocketeer of the Year.* Though Davis and Rice had accumulated their 12 contest points for the year at both semi-annual contests, Connolly's first place in Class II altitude, and Spot Landing allowed him to win without having flown at the earlier meet. In building up his commanding lead, Chris did not resort to fancy staging or clustering techniques. Instead he concentrated on workmanship to produce simple and reliable competition models.

Perhaps the biggest surprise of the day came in the glider event – open to boost/gliders of any engine power. Leon Davis, who needed only one more point to win the *Rocketeer of the Year* award free and clear, had long dominated the club competition in this event. But a newcomer, Phil Havens, showed up with a Flat-Cat glider, and turned in two beautiful flights. The best, an 84 second flight boosted by a C6-3 engine, gave him undisputed first place in the event. This dropped Leon's 41 second Orbital Transport flight to second place, and denied him the undisputed *Rocketeer of the Year* award.

The most spectacular rocket of the contest was flown by Jim Cottle. Cottle's F-engine "Mighty Rat" stood a full 8-1/3 feet fall but weighed only 14 ounces. Unfortunately for Jim, a gust of wind hit the rocket just as it cleared the launcher, and blew it into a nearby fence. Dismayed but not defeated, Jim vowed that the Mighty Rat would rise again.

In the sport flying session after the contest Dick Trissel flew a C6 powered semi-scale Minuteman I. Flown without plastic fins, this model even "programmed over during the flight" in a "planned" simulation of the actual Minuteman's trajectory.

SCARS CONTEST RESULTS

B/G Duration	1st	Phil Havens	FlatCat	C6-3	84 sec.
	2nd	V. Leon Davis	Orbital Trans.	C6-3	41 sec.
Parachute Dur.	1st	Ray Beaudoin	Cetin	C6-4	165 sec.
	2nd	Louis Casagrande	Zenith 2 Pay.	C6-0, C6-5	150 sec.
Spot Landing	1st	Chris Connolly	Avenger	B3-3	51 feet
	2nd	Mark Trett	Lambda	B6-4	57 feet
Altitude (20-30 n-s)	1st	Mark Trett	Goblin	D13-3	*
	2nd	Justin Molloy	Cherokee-D	D13-7	*
Altitude (0-10 n-s)	1st	Chris Connolly	Arcon	C6-7	*
	2nd	Dick Trissel	Aerobee	C6-5	*

* (Due to error in baseline, only unofficial altitudes available.)

Chris Connolly (left) was named SCARS Rocketeer of the Year at the semi-annual meet. Jim Cottle (right) displays his "Mighty Rat", an 8 foot tall modroc.

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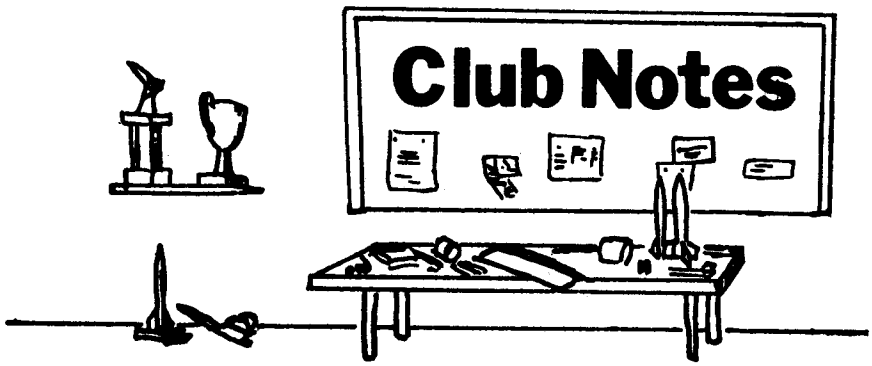

A model rocket club has been organized in Queens, New York. The club presently has 15 members, grouped into intermediate and advanced levels. The club's launch support equipment includes two relay systems, car batteries, and launchers. The intermediate group is currently working on oddball designs, while the advanced group is investigating underwater launching. They are interested in corresponding with other clubs, who can write to Michael Roeder, 40-30 73rd Street, Woodside, New York 11377.

The Pikes Peak Area Section of the NAR held a competition on November 8th featuring competition in Class I PD, Open Spot Landing, and Drag Race. The Ent AFB Junior Officer Council organized and ran the event. Rocketeers from the Colorado Springs, Colorado area wanting more information on the club should contact Lt. Tom Scharenbrock at 596-8877.

The first meeting of the Middle School Rocket Club in Highland Park, New Jersey, took place on October 22nd. Organized by John Frankosky, a teacher at the school, the club has 20 members. In order to allow individual attention to be given to each participant, the membership was restricted. "Although our members are young," Frankosky reports, "our goal is to prepare to enter several events in the annual Spring contest sponsored by the Central Model Rocket Club. One requirement is that all of our members join the National Association of Rocketry. Perhaps other sponsors of school rocketry clubs would like to share their ideas with us. They can write to John Frankosky, Middle School Rocket Society, Mansfield and South Fifth Avenue, Highland Park, New Jersey 08904."

The Dundalk, Maryland, YMCA has organized a rocket club. Under the supervision of Murf Kief, the club's advisor, the group – limited to rocketeers 17 years of age or under – has a formal launching each month. Rocketeers in Dundalk can contact Mr. Kief at 284-6666.

A new rocket club, the Madison Model Rocketry Association, has been organized by two hobbyists in Madison, Wisconsin. The club, which already has 30 members, was organized last summer by Bill Johnston and William Salzwedel. Interested rocketeers can contact Johnston at 2501 Monroe St., Madison.

Members of the North American Rockwell, Space Division's Explorer Post 864-E on tour of the Seal Beach facility of Ocean Systems Operations, where they had the chance to see at first hand the deep-ocean submerisible Beaver Mk. IV.

Post 864-E is co-ed and composed of science students from the local high schools. The members that are pictured here are all members of the Space Div. sponsored "Space Explorers, Model Rocket Club". Which will soon open to all local model rocket fans.

The Elementary School of Rhinebeck, New York staged a model rocket demonstration in late November. Staged by the Rhinebeck Rocket Club, the object was to promote rocketry and stir up interest in the club.

Maryland's Annapolis Association of Rocketry and the Star Spangled Banner NAR Section teamed up to provide a model rocket exhibit at the annual Sci-Tech exhibit in Annapolis last November. Included in the display was the new Annapolis wind tunnel, which was used to explain the difference between stable and unstable rockets to the Sci-Tech visitors. Modelers from both clubs were on hand to explain the basics of model rocket design, and construction to interested potential rocketeers.

A model rocket club, under the supervision of Bill R. Johnston, has been organized in the Madison, Wisconsin area. Presently the club has about 30 members, but is interested in expanding. Interested rocketeers in the Madison area can contact Johnston by sending a postcard to him at 2501 Monroe Street, Monroe, Wisconsin.

A model rocket club has just been organized in the Ridgmar area of Fort Worth, Texas. Interested rocketeers should contact Richard Ness, 1813 Saxony Rd., or Lee Larimore, 1200 Montego, both Ft. Worth, Texas 76116.

Warren Musselman is attempting to form a model rocket club in Ewing Township near Trenton, New Jersey. Rocketeers in that area can contact him at 85 Nancy Lane, Ewing Township, Trenton, New Jersey 08638.

The Apollo 11 Rocket Club of Lake Oswego, Oregon plans an all CINEROC and Camroc rocket launch as soon as the winter weather permits. Rocketeers in that area can contact the club through the secretary, Joe Felzman, 19271 S.W. Benfield Ave., Lake Oswego, Oregon 97034.

Last January the Memphis University School Model Rocket Society became a NAR Section, the first in the state of Tennessee. The club has sponsored a number of club launches and expects to schedule a sanctioned competition later this year. A construction workshop is also planned. Presently the club has 18 members. Interested rocketeers in the Memphis area are invited to contact Morris Jones, MUSMRS President, 4288 Charleswood Rd., Memphis, Tenn. 38117.

Mark Catt of Colorado Springs, Colorado, placed first in the PD competition and second in Spot Landing to win the contest sponsored by the Colorado Springs NAR Section. The club, sponsored by the Ent AFB Junior Officers Council, holds launches approximately every two weeks. In the PD event Mark Catt's duration of 97 seconds took first place, while Timothy Mosher came in second, and Ermilo

(Continued on page 38)

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