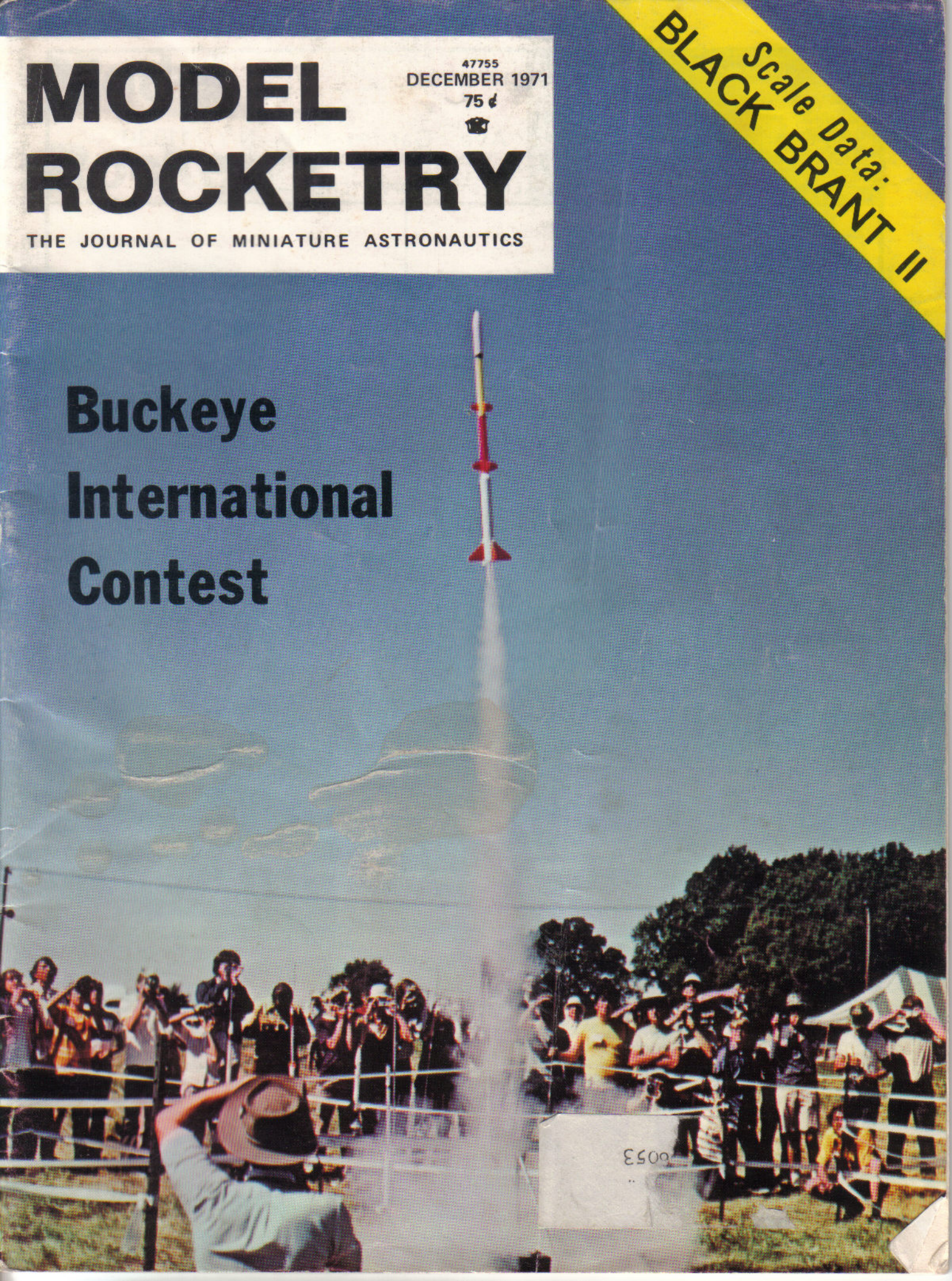
MODEL ROCKETRY

47755
DECEMBER 1971
75¢

THE JOURNAL OF MINIATURE ASTRONAUTICS

Scale Data: BLACK BRANT II

Buckeye International Contest



Rocket Equipment Co.

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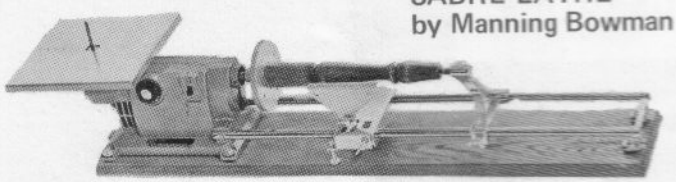
TOOLS — WALKIE TALKIES — STOPWATCHES — MORE!

SABRE-LATHE
by Manning Bowman



Sabre-Lathe Home workshop ideal for turning nose cones, cutting fins, and for use as a finishing machine. This precision wood lathe, complete with a three-speed motor, is an entire rocketeer's workshop. Entire unit–sabre saw, lathe, and grinding attachment--comes mounted on a wooden base for easy portability and stability. Ideal for the club workshop. Wt. 18 pounds.
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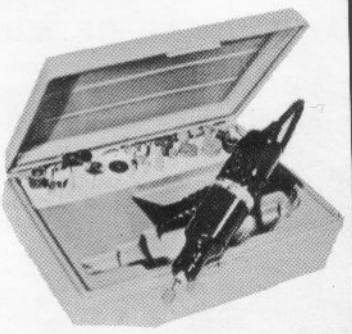
by Dremel



The Dremel Moto Tool is invaluable for plastic conversions, hollowing nose cones, and super-detailing your scale models. The kit includes attachments for grinding, drilling, carving, sanding, engraving, and deburring. The motor produces 30,000 RPM. Wt. 3 pounds.
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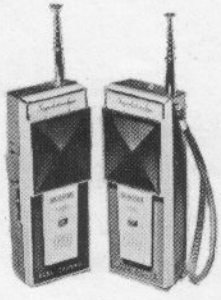

For on the range communications and to receive Foxmitter and Transroc signals, the "Saturn" walkie-talkies have 100 mw output to give 1¼ mile range. Has separate volume, push-to-talk, and call alert controls. Pair of walkie-talkies, complete with channel 11 crystals. Wt. 2 pounds.
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Quantity	Cat. No.	Description	Price

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Model Rocketry

Volume IV, No. 3

December 1971

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Cover Photo

This month's cover shows the liftoff of Howard Kuhn's scale Javelin at NARAM-13. This model is the subject of a flight performance analysis in this month's *Current Comments* beginning on page 21. (Photo by Len Fehskens.)

From the Editor

The purpose behind many of the competition events we are flying at today's contests is to pose an *engineering problem,* and see how well the competitors can solve it. In some cases the problem is quite involved, and there are many different solutions. The eggloft event offers a good example for consideration.

In eggloft, there are two distinct problems. First, the vehicle design must be optimized in order to achieve the maximum altitude. Second, the egg must be recovered in such a a manner as to keep it unbroken. Some proposed solutions to the second problem cause difficulties with the first. For example, the egg could be lofted inside a very large capsule containing a great deal of padding. However, a large capsule has high drag, thus decreasing the total altitude.

This event has stimulated quite a bit of *serious research* by model rocketeers. To minimize drag and maximize protection of the egg Howard Kuhn developed a small two piece balsa cone, not much larger than the egg itself, which could survive a mild landing shock. This capsule has evolved into the plastic egg capsule now marketed by CMR. Some rocketeers have said that to fly eggloft with an indestructable capsule "takes all the fun out of the event," but it certainly is a solution to the engineering problem which the event posed.

To increase performance still further, other rocketeers have investigated various shrouds and boat-tails to reduce drag still further. Investigations into tower launchers, pop-off lugs, closed breech launchers, and other "improved efficiency" launchers can increase egglofter performance. Theoretical studies into the relative merits of one large engine or multi-staging with two or more smaller engines also contribute to success in this event.

It isn't often recognized by the "theory minded" model rocketeers that the competition modeler may do as much in optimizing his designs to advance the state-of-the-art as does the theoretician. Perhaps the reason that the accomplishments of most contest modelers go unrecognized is that they seldom

(Continued on page 47)

The "High-T" Sport Model 10
Complete plans for the "High-T", a three engine cluster using two mini-engines in the side pods and a standard sustainer for high-flying performance.
Designed by Kent Fischer

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by George Pantalos

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by G. Harry Stine

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by George Flynn

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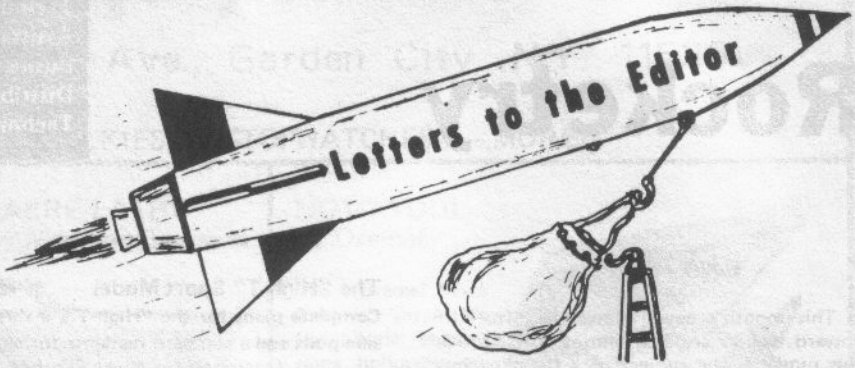


Plastics in Model Rocketry

Help! Save us serious rocketeers from being overcome by the disgraceful "plastic revolution." Extra fine detailing scale models, plastic conversions, and even plastic payload sections and nosecones are sensible, but pre-built plastic rockets....pitiful!

Instead of designing more rockets for the technically-minded rocketeers, many companies are coming up with kits to appease the beginners which offer no challenge to build at all. This results in a regression in building skills, starting at the novice level. When it reaches the point where some beginners don't know what a fillet is, you can see that something is wrong.

Let's not let this get out of hand. Save us from those plastic advocates!

Ronald Mitnick
Eddy Polakoff
Randallstown, MD

Model airplane builders heard the same protests when the first ready-to-fly model airplanes were introduced two decades ago. We can look to their experience to see that the level of modeling skill in the model airplane has not decreased. Quite the contrary, by making it easier for beginners to get involved in the hobby, the introduction of plastic ready-to-fly airplanes has attracted a greater number of beginners to the hobby and has allowed it to grow.

None of the manufacturers have decided to discontinue balsa parts. In fact, as long as you and other rocketeers continue to buy them, they will continue to be available. Plastic parts are being made for those rocketeers who like their convenience.

Sandhawk Scale Data?

I have built a model of the Sandhawk and it flies beautifully. I would like to enter it in scale or superscale. I would appreciate it if you could send me photos, plans and any other information you may have on this rocket.

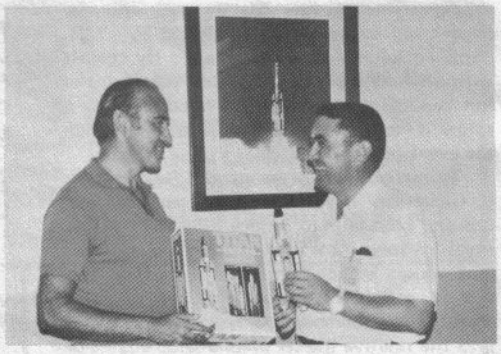
Fred Shecter
East Meadow, NY

Model Rocketry *has nothing in our scale*

MPC Titan Presented

During a recent trip to Cape Kennedy, MPC's model rocket consultant G. Harry Stine presented some MPC Titan-IIIC model rocket kits to an old friend, Timothy H. Hanrahan, civilian chief of the Titan-IIIC program at Cape Kennedy. Stine and Hanrahan worked together many years ago at White Sands in New Mexico. Today, Hanrahan heads the operations of the USAF's big space booster program, Titan-IIIC.

Stine and Gil Lutz, head of the MPC model rocket program, were treated to a complete guided tour of the Titan-IIIC ITL (integrate-transfer-launch) facilities at Cape Kennedy. Stine's comment at several points during the tour, "Gee, the drawings were correct!" The MPC Titan-IIIC model is 1/-100th the size of the real bird. Stine and Lutz had the opportunity to inspect the real Titan-



IIIC at very close range. "We laid hands on the real hardware, looked through inspection hatches, and saw everything we wanted to see. I was very pleased to note that MPC got the Titan-IIIC model right on the button insofar as scale details go," Stine remarked. The MPC model of the Titan-IIIC can be built either as a superdetailed static scale model or as a flying model rocket propelled by the MPC Type C6-4 model rocket engine. It sells in hobby stores for $4.00.

files on the Sandhawk. We have advised all model rocket manufacturers that we would be glad to print the scale substantiation data for any scale kits they have on the market. Thus far articles in this series have included the Astrobee-D data which can be used with MPC's kit (MRm, November '70) and the D-Region Tomahawk data for the CMR kit (MRm, June '71). Thus far, however, we've had no word from Estes indicating that they want the data used in preparation of their Sandhawk kit published.

Egg Capsules

I have been watching quite a few launches lately and have taken special notice of the egg lofting event. I have decided to construct my own egglofter, but I've had trouble locating a company that sells egg capsules. Where can I get an egg capsule?

Seth Eisner
Rockville, MD

Specially designed egg capsules are currently marketed by only one company — Competition Model Rockets. Their egg capsules are available by mail order. Price and shipping information can be obtained from their catalog, available for 25 cents, from: CMR, Box 7022MR, Alexandria, VA 22307.

Foxmitter Modifications

The Foxmitter - 2 and the Foxmitter - 3 circuits are almost ideal in basic design. However, they both suffer from one small design defect, namely the method of establishing the DC operating point for the Darlington cascade. A single resistor from the base of Q2 to point A is used on both designs. This makes the voltage at point D extremely dependent on the DC beta (gain) of the transistors in the cascade. The standard remedy for this is the use of a voltage divider arrangement as the bias source for the Darlington circuit. This voltage divider consists of one resistor from the base of Q2 to point A and one resistor from the base of Q2 to point C. These resistors should have values of approximately 1.5 Megohms (to A) and 220,000 ohms (to C). A divider arrangement such as this one is much less dependent on the transistor characteristics than is the single resistor bias arrangement.

I question the use of the "pseudo-integrated circuit" in a device of this type. The catalog price of this item has varied from about $3.50 to over $16.00 in unit quantities, and it appears that the job can be done with two of the newer high-gain economy epoxy case audio transistors at a greatly reduced cost. For example, the 2N3391 transistor, which has been used in the Foxmitter circuit, has a current catalog price of 48 cents each. The critical parameter of the Darlington cascade is the DC beta; the 2N998 specified for the Foxmitter - 3 has a minimum beta of 1600. Two 2N3391's connected in cascade have a minimum effective beta of over 62,000.

I am presently working on a double - sided printed circuit board which will allow the Foxmitter to be housed in approximately five inches of 0.69 inch body tube (Estes BT-20 or Centuri Series 7). This construction requires components to be mounted on both sides of the board.

It should be pointed out that substitutions can be made for the coils in the original Foxmitter if the self-resonant frequency of the substitutes is above the operating frequency. Unfortunately, not all electronics catalogs include this information. Acceptable substitutes appear to be the WEE-10 and WEE-47 Nytronics inductors. The higher

the self-resonant frequency, the better, In addition, the Nytronics inductors are shielded for improved stability.

Philip Spray
Amarillo, Texas

Micro-Joe II

I really enjoyed your September '71 issue, especially the article on the Micro-Joe II. However, the author suggests using the same capsule to build a 1/200th scale Saturn-V which can be flight converted. I've flown mine several times, and it flys beautifully. The kit is included in the AMT "Man is Space" kit which also contains a Mercury Redstone, Mercury Atlas, Gemini Titan, and Saturn 1B.

Tom Cave
Sedalina, MO.

A flight conversion of the AMT 1/200th scale Saturn-V appeared in the July 1971 issue of **MRm**. *The Saturn-V is available separately from the "Man-in-Space" kit for rocketeers who only want to build the single model. The kit is priced at $2.50, and is available from Spacemaster Enterprises, Dept. MR. P.O. Box 424, Willoughby, Ohio 44094.*

For those readers who especially enjoyed the Micro-Joe II, **Model Rocketry** *will be including in the soon to be released* Model Rocketry Contest Code *complete rules for a Micro-Scale event – an event limited to* small *scale missile models. We hope this challenging event will stimulate many rocketeers to give small scale birds a try!*

National Aerospace Education Council

At our recent NAEC Board Meeting in Denver in September, Dr. Mervin D. Strickler, Jr. brought to our attention the fact of your support of NAEC in listing advertisements for membership in our organization in your publication.

I want you to know even though Cessna has a program of our own in air age education we are vitally interested in the success of this national organization and I personally want to compliment you on your efforts and hope that you will continue to support NAEC in the immediate future. The crucial time for the success of the organization is now, if we are ever to sustain a national effort in aerospace education and your support is sincerely appreciated.

Frank G. Mitchell, Manager
Aviation Education
Cessna Aircraft Company

The National Aeroapace Education Council (NAEC) is a non-profit, non-governmental organization of educators who are interested in the inclusion of aviation and space concepts in the curricula of our schools. The membership is composed primarily of teachers, librarians, counsellors, and administrators but also includes representatives of the aerospace industry and of national and state aviation and space agencies.

The objectives of the NAEC are to aid and encourage teachers and students to gain a knowledge of aviation and spaceflight and of their impacts on society and to provide information related to exploration of space, avia-

tion and career opportunities.

Membership in the NAEC, including two periodicals and various teaching aids, is available to aerospace educators who may request an application from NAEC, Suite 310, 806 15th Street NW, Washington, D.C. 20005.

Engine Interchangeability?

In regard to the new mini-engines marketed by MPC and Estes, an interchange- of the two types would be desirable. Although the Estes engines are shorter and lighter than MPC's, MPC makes a B-engine while Estes does not.

To allow use of both MPC and Estes engines in the same mini-model, I offer the following suggestion. The engine block should be glued in place at the required depth (2.25") for the MPC engines. A stage coupler can then be cut to the correct length (0.50") and inserted in the model ahead of the Estes mini-engine. This easy method allows interchangeability of both brands of mini-engines in the same model.

George Kirby
Jamaica, New York

Ground Hog-16

I decided to write and tell you how pleased I was with the September issue of **Model Rocketry.** As always, I gained many ideas from the contest reports and construction articles. I was particularly intrigued by the article on the Ground Hog boost/glider. In spite of the warning that only experienced B/G builders should try this swing-wing, I built one. It was the second glider that I ever built. I have built three more gliders since then, but the Ground Hog is the only one that flew! It made a big hit at a recent Indianapolis meet since it was the only one of its kind. It turned in a very short duration (7 seconds) due to high winds, but it did prove to me that I could build a glider that could fly. Congratulations to Jon Robbins for a fool-proof design.

Gary Bannister
Muncie, Indiana

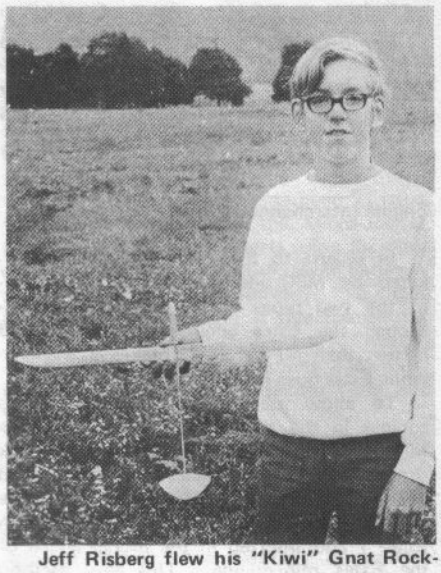
Foxmitter III

This letter is in regard to the Foxmitter-3 illustrated in the September issue of Model Rocketry. The schematic shown does not use an integrated circuit. It seems to me that you have instead illustrated the schematic for the Foxmitter-2. Is it possible that you have made a mistake? If so would you please send me the schematic and plans for the Foxmitter-3 as I would like to build it.

Bob Hunsicker
Ada, Ohio 45810

*The part designated in the schematic as Q2 is an integrated circuit "Darlington" amplifier which replaces the three transistors (Q2, Q3, and Q4) of the Foxmitter 2 circuit. If you compare the Foxmitter 2 schematic (***MRm***, June '70) with that of the Foxmitter 3 (***MRm***, September '71) you will see how the use of this integrated circuit allows a significant reduction in the number of parts while maintaining the same performance.*

FROM THE LAUNCHING PAD



Jeff Risberg flew his "Kiwi" Gnat Rocket/Glider to a 15.6 second duration at PVARM-3.

PVARM-3 demonstration flight Jeff's Kiwi R/G turned in 15.6 seconds, the highest Gnat R/G duration yet reported.

Model rocketeers and other high school students throughout the United States will have an opportunity to participate in NASA's Skylab project through a program recently announced by NASA. Students will have an opportunity to propose experiments to be carried on the Skylab mission, and the most promising experiment will be selected for flight.

"The National Aeronautics and Space Administration has selected the National Science Teachers Association, Washington, D.C. for negotiation of a contract for management and operation of the Skylab Student Project. The Skylab Student Project is designed to stimulate interest in science and technology by directly involving students in space research.

"The National Science Teachers Association will provide the personnel, materials, facilities and services necessary for notification of the student and educational community of the opportunity and method of participating in Skylab, develop procedures for evaluation of proposals based on educational value and develop certificates of participation and an awards system for entrants. The Association will also develop plans and procedures for final selectees whose proposal ideas have been selected by NASA, and plan, organize and conduct a Skylab Student Education Conference for 25 national selectees at the Kennedy Space Center, Fla., at the time of the Skylab launch.

"In this program, activities proposed by students would be conducted by the astronauts on board Skylab in the course of Sky-missions. Experiments in crew recreation and other aspects of living in weightlessness will be considered along with student scientific proposals. A limited number of student proposed experiments will be selected for development by the National Aeronautics and Space Administration from the 25 national selectees. The program is open to all students in grades nine through twelve in U.S. public, private, parochial, and U.S. overseas schools.

"Skylab is an Earth orbital space laboratory to be launched in 1973 to conduct scientific, technological, and biomedical investigations from the vantage point of space. The first manned mission will last up to 28 days or twice the duration of any previous U.S. mission. The second and third three-man missions are planned to last up to 56 days. The Skylab program will test Earth resources remote sensing equipment and techniques to gather information on Earth's ecology, oceanography, water management, agriculture, forestry, geology and geography. Astronomy experiments will substantially increase knowledge of the Sun and its effects on man's existence on Earth. Habitability, biomedical, behavioral, and work effectiveness experiments will further evaluate man's capabilities in space flight."

Model rocketeers interested in further information on this program should have their science teacher contact the National Science Teachers Association for more information.

Last month I mentioned two rather spectacular Gnat B/G Flights. This month it is a Gnat *Rocket/Glider* which has turned in an impressive performance. The model, a swing-wing R/G powered by a ¼A3-2 mini-engine, was designed and built by Jeffrey Risberg. It was quite light, using two 1" x 12" wing panels each 1/16" thick and slightly undercambered by warping the wing. During a

Rainy weather on the East Coast this year has caused problems for several contestants at major contests this year. It began in August at NARAM, when a sudden rainstorm trapped Ed Pearson's car on the range. By the time he drove the 1000 feet to the road, his car had sunk deep enough into the muddy field that he couldn't move. Pat Stakem drove his car to the rescue, and also got stuck. It took more than a dozen rocketeers to push each of them out of the mud.

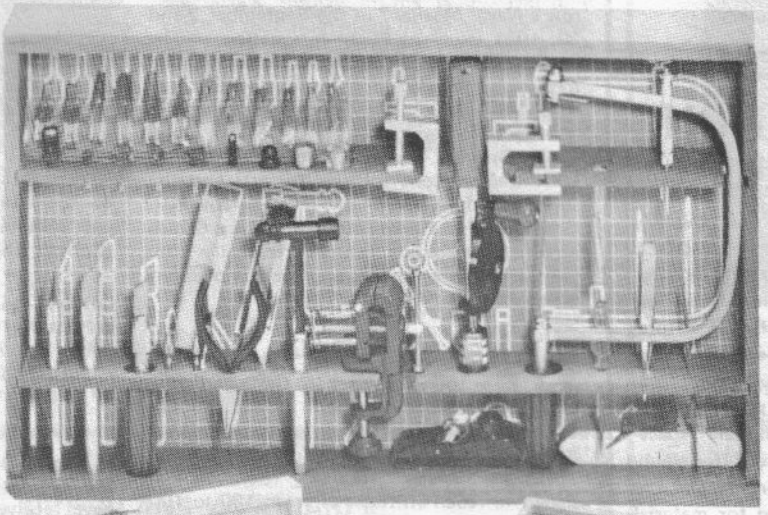
In September, at GERM-1, CMR president Howard Kuhn met a similar fate while trying to drive his car onto the field for the second day's flying. Towing the "range store" trailer made things even worse, and a 10 man "rescue squad" was necessary to push him out. Later that same afternoon the father of one of the GERM contestants needed a tow truck to remove his car from the increasingly muddy field.

By October everyone thought the "rainy

The 1971 contest season has been plagued by rain at almost every major contest, and at least one car has usually ended up stuck in the mud. Here GERM-1 contestants rescue CMR president Howard Kuhn's car from the mud at Gettysburg.

Just because you're a hobbyist doesn't mean you have to use amateur tools.

X-acto tools look like professional tools because they are. They're precisely-made and precision-balanced to help a hobbyist turn out models with a professional touch. Whatever your hobby may be—model boats, airplanes, railroads or cars—you'll find X-acto knives and tools that are just right. Why settle for anything amateur? X-acto tools are reasonably priced, packaged in attractive gift sets and sold at leading department, art and hobby stores.



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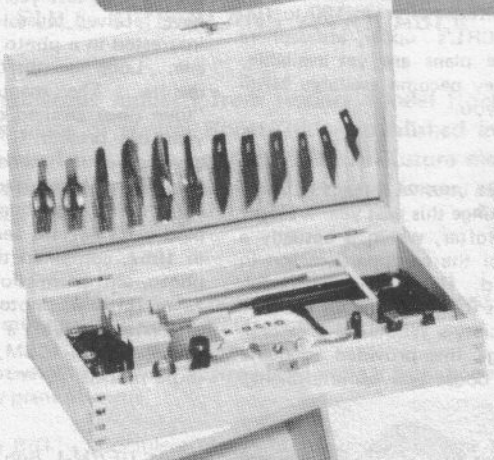

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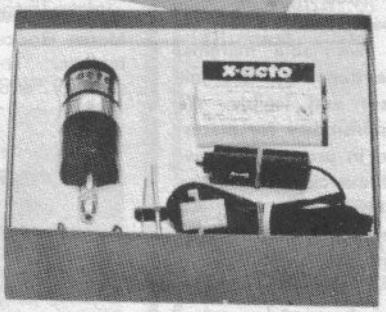

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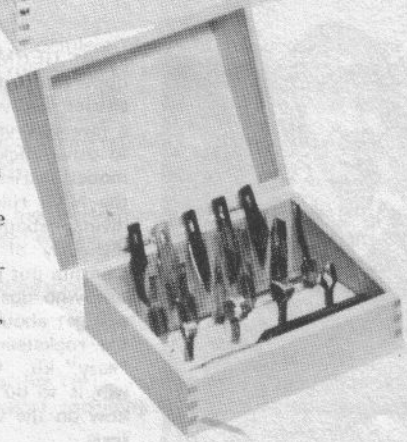

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SOLICITATION OF MATERIAL

In order to broaden and diversify its coverage of the hobby, MODEL ROCKETRY is soliciting written material from the qualified modeling public. Articles of a technical nature, research reports, articles on constructing and flying sport and competition models, scale projects, and material relating to full-scale spaceflight will be considered for publication under the following terms:

1. Authors will be paid for material accepted for publication at the rate of two dollars ($2.00) per column inch, based on a column of eight-point type thirteen picas wide, for text, six dollars fifty cents ($6.50) for drawings, and two dollars ($2.00) for photographs accompanying text. Payment will be made at the time of publication.

2. Material submitted must be typewritten, double-spaced, on 8½ by 11 inch paper with reasonable margins. Drawings must be done in India ink and must be neat and legible. We cannot assume responsibility for material lost or damaged in processing; however our staff will exercise care in the handling of all submitted material. An author may have his manuscript returned after use by including a stamped, self-addressed envelope with his material.

3. Our staff reserves the right to edit material in order to improve grammar and composition. Payment for material will be based on the edited copy as it appears in print. Authors will be given full credit for published material. MODEL ROCKETRY will hold copyright on all material accepted for publication.

Those wishing to submit material should send it to:

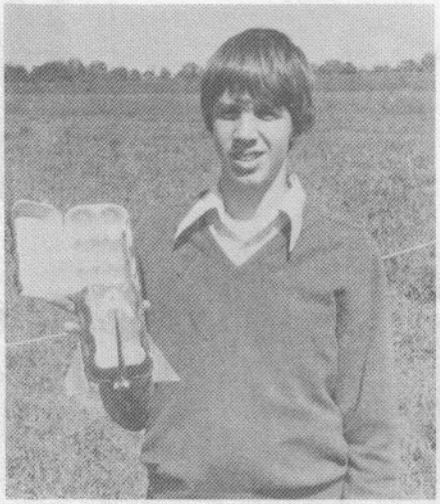
Model Rocketry Magazine,
Box 214,
Boston, Mass. 02123

season" had ended, but the second day of flying at PVARM-3 had to be cancelled because of heavy rains. When Contest Director Gary Bossong drove out to pick up the range equipment his car and U-Haul trailer sunk in the mud. Unfortunately, Gary didn't have a dozen rocketeers to push him out of the mud. With only 6 people pushing it took over two hours to free him from the "swamp" and it was long since dark before Gary got started on the long trip home. Perhaps 1972 will bring better "rocket weather."

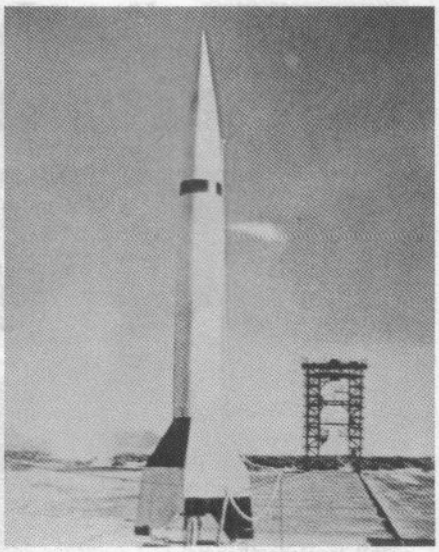
Scale modelers should check their libraries for copies of the two part article *"Tomorrow's Naval Missiles"* in the September 2 and 30, 1971 issues of **Flight International**. The text describes those sea based tactical guided missiles under development for deployment through 1980. The article also includes photos of several missiles: the Sea Dart, Great Britain; Masurca, France; RIM-66A, USA (replacement for the Tartar); and the surface-to-air version of the Sparrow III, Great Britain. **Flight International** is a British aerospace magazine which frequently contains articles on missiles and rockets of interest to scale modelers.

A new sounding rocket, the Ute-Tomahawk, is under development by the Thiokol Chemical Corporation for use by the U.S. Air Force's Cambridge Research Laboratory. The new two-stage sounding rocket is designed to reach altitudes of from 160 to 190 miles carrying CRL's upper atmosphere probes. No scale plans are yet available, but as soon as they become available **MRm** will bring them to you.

One of the most unusual models to show up on any rocket range this past year is Roger Powell's sport egglofter, which is actually a flight conversion of the cardboard carton in which eggs are sold. Roger flew the model, containing two eggs for symmetry, at the MIT Model Rocket Society's WESNAM-2 in September. The large fins provided adequate stability, and the boost was quite straight,



Roger Powell's unique sport egglofter was made from the packing box in which a dozen eggs are sold. The box was flight converted and flown with two eggs in place at the top.



The Convair MX-774 test missile is shown on the White Sands Proving Ground launch pad minutes before its launching in 1948. (Convair photo.)

however failure to eject the chute spoiled a perfect flight. This unique egglofter is certainly no "low-drag" model, but it certainly did attract attention at the WESNAM launch.

Since Centuri first put out their semi-scale MX-774 kit last year, we at **Model Rocketry** have received several letters from rocketeers interested in a photo of the MX-774 test missile. Long months of searching brought no results. The manufacturer, Convair, had "long since cleaned out our files on this 20 year old project." Since the MX-774 was never a popular model with scale builders, no one had data or photos on it in their scale collections. But finally months of searching paid off. An old aerospace book, published in 1957, contained the sought after MX-774 photo, and permission was quickly obtained to reprint the photo. So all those modelers interested in flying a scale MX-774, predecessor the Atlas ICBM, can now get busy on those models.

At GERM-1 Bob Otlowski and I had the opportunity to static judge the plastic model entries, and we had the opportunity to make a few observations which may prove helpful to other rocketeers who are planning plastic model entries at future contests. The way the NAR rules are set up, static points are divided about equally between the inherent difficulty of the conversion and the workmanship put into the model. Thus the rocketeer who does a sloppy job on a hard model will get about the same number of points as the rocketeer who does a good job on an "easy" kit. Of course the only sure way to win is to do a good job on a hard kit, but how do the various kits rate on a difficulty scale.

There were only a dozen plastic models at GERM, but they varied over the entire difficulty spectrum. The simplest was the MPC "Vostok", since the kit contains all the parts and directions for a flight version. Next up the scale was the Hawk Corporal, which

requires only the addition of a body tube and parachute for flight adaptation. On the Airfix Lunar Module the rocketeer had to cut away plastic bulkheads to add an engine tube and add clear plastic fins for stability. The most difficult conversion was the MPC Pilgrim Observer, a space station which required extensive internal ducting tubes to channel the exhaust gases from the three engine cluster.

Where do other models fit in on this scale? The AMT Saturn V, converted in the July '71 **MRm**, requires removal of some bulkheads, addition of a central body tube and engine mount, as well as the addition of plastic fins. Certainly it's more difficult than the Corporal but not more so than the Lunar Module. On the other hand the Aurora Space Clipper, **MRm** January '71, requires the main body to be cut, tube ductwork for the exhaust gas, and addition of plastic fins. It would probably be rated as more difficult than the Lunar Module but certainly easier than the Pilgrim Observer. So remember next time you're selecting a plastic kit for flight conversion that you have to pick out a difficult model as well as doing a good job on it in order to really pick up those contest points.

As I mentioned last month, the Phillipsburg (New Jersey) Area Rocket Club is planning a special Christmas Contest — Tannenbaum-1. One of the events they have scheduled is Class 5 Parachute Duration. Since they haven't yet announced the rules, we can only guess; but I presume they are planning on F-powered chute duration models. Using the Centuri F67 Enerjet, the most powerful model rocket engine on the market, a one pound rocket can fly to more than 1800 feet. Just how much chute can you put into a one pound rocket? The engine weighs 4 ounces, and the rocket another 3 or 4 ounces. That leaves about 8 to 9 ounces for the chute.

Aluminized mylar in ¼ mil thickness weighs about one ounce per 40 square feet of area. Thus a 9 ounce chute would be about 360 square inches, giving a 22 foot diameter circular chute. That should really make a spectacular display in the sky! The only catch is that aluminized mylar sells for about $1.00 per 10 square feet. That puts a $36 price tag on the "super chute."

If anyone decides to give it a try, we'll have a complete report in **MRm**'s coverage of Tannenbaum-1 early in 1972.

George

FULL SIZE PLANS AVAILABLE

In response to numerous requests from readers, Model Rocketry is making available full size plans of several Boost/Gliders published in back issues of the magazine, many of which are now sold out. In future months we expect to announce the availability of scale plans from past issues, as well as reprints of the most popular articles.

Bumble Bee B/G - An elliptical wing Hornet B/G which has turned in contest performances of over two minutes. Full size plans 50 cents.

Wasp B/G - A lightweight Hornet or Sparrow B/G using a balsa boom. Popular contest performer. Full size plans 50 cents.

Dove III Flop-Wing B/G - Complete plans and instructions for the Dove III flop-wing Designed as a Sparrow, this rocket can be scaled up to higher power events. Full size plans and complete instructions $1.00.

Thunder-Bird B/G - A popular and reliable fixed-pod contest bird for Hawk and Eagle B/G. Full size plans 50 cents.

Space Dart B/G - A small, high-performance glider for Hawk B/G. Sturdy enough to go for high altitudes, yet still light enough to glide well. Full size plans 50 cents.

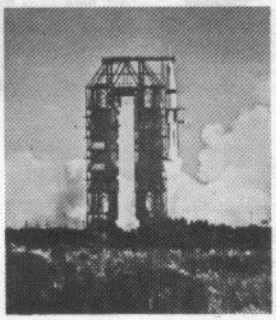
Bat B/G - An attention-getting sport glider with unusual wings. For ½A through B engines. Full size plans 50 cents.

TAD Scale Plans - Plans for the Thrust Augmented Delta satellite launch vehicle (a Thor-Delta with three solid strap-ons), including details on dimensions, lettering, and coloring. Plans only 50 cents.

Order from: Model Rocketry, Box 214, Boston, MA 02123

SPECIAL OFFER!

Beautiful, full-color photograph of the Apollo 7, Saturn 1B liftoff of October, 1968



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.

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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:

Saturn Photo
Model Rocketry
Box 214
Boston, Mass. 02123

A High-Flying Sport Model For Series-T Miniengines . . . . . .

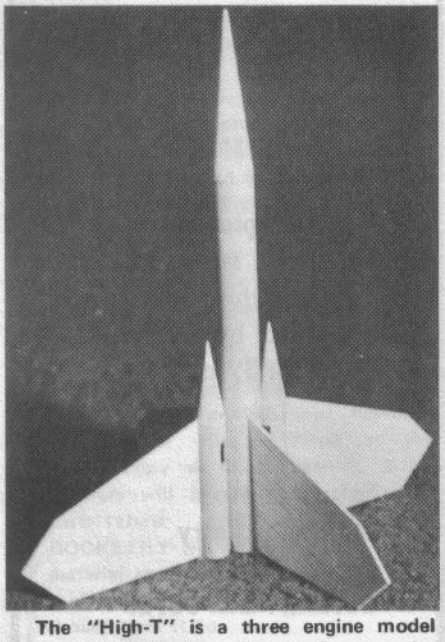
THE 'HIGH-T'

Designed by Kent Fischer

The *"High-T"* is a high-flying sport model designed to use two new Estes T engines along with a core Series I engine. For really high altitude flights a C6-7 can be combined with two A3-4T engines for a flight right through the clouds. Don't plan on getting it back, however, since this engine combination will put the *"High-T"* more than a quarter mile into the sky. For smaller fields an A5-4 can be combined with two ½A3-4T's to keep the model down to 600 foot altitude.

Construction

The *"High-T"* is built entirely from commercially available parts, making it a good project even for beginners who want a challenge. To give it a sleek look all the nose cones are pure conical taper. The model is proportioned to resemble the Air Force Titan III C satellite Launcher, but you'll have trouble convincing anyone that this is a scale model.



The "High-T" is a three engine model using a standard core engine and two series T mini-engines in the side pods.

Construction begins by cutting two 2.25" lengths of BT-5 body tube for the side pods. Using the tube and fin placement guide in the plans, mark the fin and tube locations on each piece of BT-5. Using a sharp X-Acto knife, cut a slit ¼" wide x 5/8" long in each BT-5. The slits start 1/16" from the top end of the tube (see diagram A). Glue an EB-5B engine block 1½" from the bottom edge of the BT-5, and set the side pods aside to dry.

Cut a 6.5" length of BT-20 to serve as the core body. Place this tube on the fin placement guide (see plans) and mark the fin and tube locations on the BT-20. Glue an EB-20A 2½" up the inside of the BT-20, and set the side pods aside to dry.

When dry, glue the two BT-5 side pods into place on the sides of the BT-20 core tube. Be sure the guide lines previously marked on these tubes are carefully aligned. Fillet the body tube joint for additional strength.

Cut out the fins from 1/16" thick sheet balsa. Align the wood grain parallel with the leading edge of the fin, and use the full size template given in the plans to mark four fins. Using 400 grit sandpaper, sand both surfaces of the fins, round the leading edge, and taper the trailing edge. Glue the fins in place on the body tubes using the lines previously marked on the tubes as placement guides. When dry, fillet the fin/tube joints for strength.

Glue two BNC-5S now cones in place on the BT-5 tubes. These cones are firmly attached to the tubes, and the ejection gases are vented through the exhaust ports. Only the core engine contributes to ejection. Attach the screw eye to the BNC-20R nose cone, and attach a 14" shock cord to the core body and the screw eye. Add a launch lug to the main tube.

Sand, seal, and paint all balsa parts. A high-visibility paint pattern, such as orange and black, should be used to insure tracking of this high-flying bird.

Flying

The *"High-T"* can be safely flown with a single 12" chute, and almost any reasonable combination of engines. Select any "upper-stage" (long delay) engine for the core, and use any two shorter delay T-series engines in the side pods. To insure ignition of the three engine cluster use a fuse type igniter (such as the Centuri Sure-Shot) in each engine. Connect the igniter leads in parallel and always launch with at least a 12 volt battery.

The *"High-T"* is a high flying model, so choose the engines to fit the field. If you are using a small school yard, don't use anything larger than an A in the core and ½A's in the pods. Even on larger fields, the C and 2 A's combination should only be used on calm days, unless you like chasing your models a half-mile or more downrange.

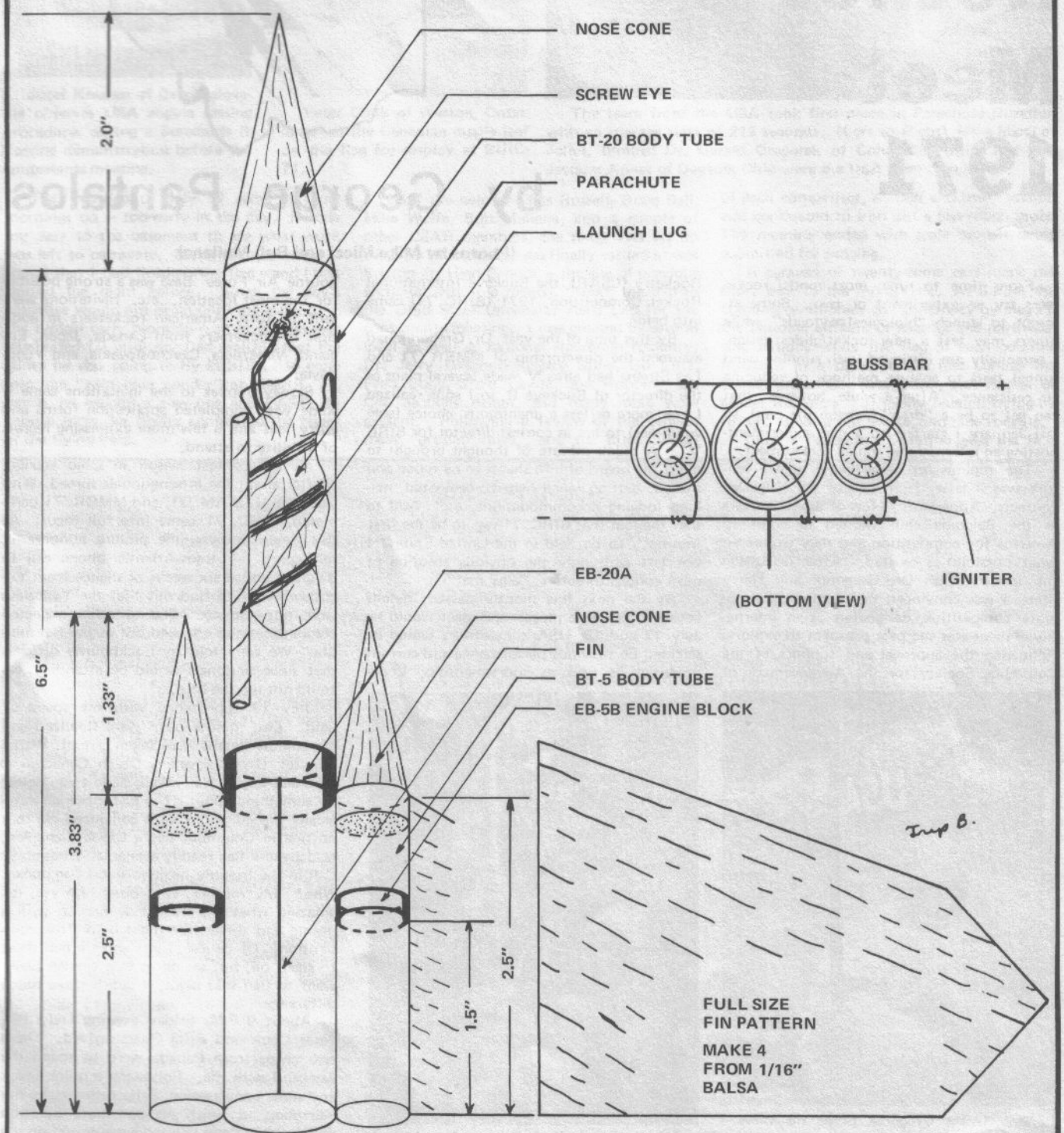
Good flying!

Parts List

Side Engine Blocks	**6½" BT-20**
Side Tubes	**2½" BT-5 (two)**
Main Nose Cone	**BNC-20R**
Side Nose Cones	**BNC-5S (two)**
Main Engine Block	**EB-20B**
Side Engine Blocks	**EB-5B (two)**
Launch Lug	**LL-2B**
Screw Eye	**SE-2**
Parachute	**PK-12**
Shock Cord	**SC-1**
1/16" Fin Balsa	**BFS-20**

(All Parts Available From Estes)

'HIGH-T'


NOSE CONE
SCREW EYE
BT-20 BODY TUBE
PARACHUTE
LAUNCH LUG
2.0"
BUSS BAR
+
–
IGNITER
(BOTTOM VIEW)
EB-20A
NOSE CONE
FIN
BT-5 BODY TUBE
EB-5B ENGINE BLOCK
6.5"
1.33"
3.83"
2.5"
1.5"
2.5"
FULL SIZE
FIN PATTERN
MAKE 4
FROM 1/16"
BALSA

A "behind the scenes" report of the first international rocket meet to be held in the USA.

Buckeye International Rocket Meet 1971

by George Pantalos

(Photos by Mike Micci and Bob Mullane)

From time to time, most model rocketeers try an experiment or two. Some attempt to launch "biological payloads", while others may test a new rocket/glider design. I personally am intrigued with running wind tunnel tests to analyse methods of reducing air resistance. After a while, however, that can get to be a "drag" (pardon the pun), so last January I started on a new experiment-hosting an international model rocket meet.

The impetus for undertaking such a venture was a letter from one of my Yugoslav contacts. Apparently, a few of the rocketeers in the Belgrade club wanted to come to America for competition and they wondered what possibilities existed. After discussing the inquiry with Dr. Gregorek and Harry Stine, I was convinced that setting up a separate competition designated as an international meet was the best prospect to explore. Following the approval and support of the Columbus Society for the Advancement of Rocketry (CSAR), the Buckeye International Rocket Competition, 1971 (BIRC '71) came into being.

By this time of the year, Dr. Gregorek had assumed the directorship of MMRR '71 and Lee Streett had already made several plans as the director of Buckeye II, so I soon realized I was more or less a unanimous choice (sole volunteer) to act as contest director for BIRC '71. A quick minute of thought brought to mind the hoard of info sheets to be typed and mailed, getting range help co-ordinated, making lodging accommodations, etc. Add to that the fact that BIRC '71 was to be the first Internat's to be held in the United States. I was left with only the obvious emotion of most contest directors, "Why me!"

As the next few months passed, details began to fall into place: the meet would be July 17 and 18, USA competitors would be selected on previous performance and current potential as well as sportsmanship, Lockbourne Air Force Base was a strong possibil- for the meet location....etc. Invitations were sent to forty American rocketeers in addition to rocketeers from Canada, Japan, England, Venezuela, Czechoslovakia, and Yugoslavia.

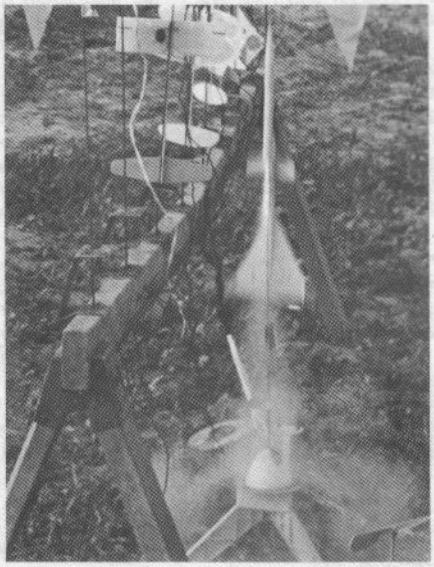
Slowly, replies to the invitations came — some with completed application forms and entry fees and a few more expressing regrets of inability to attend.

As the contest season in Ohio started, chatter about the internationals spread. With Buckeye II, SIAM '71, and MMRR '71 completed, BIRC '71 came into full focus. At this time, however, the picture temporarily fell apart. A trans-Atlantic phone call to Belgrade ended six weeks of silence from Yugoslavia only to find out that the Yugoslavs were not coming. Several other expected competitors also checked out at the last minute. We were told by Lockbourne officials that since nationals would be attending, we could not use the base....*

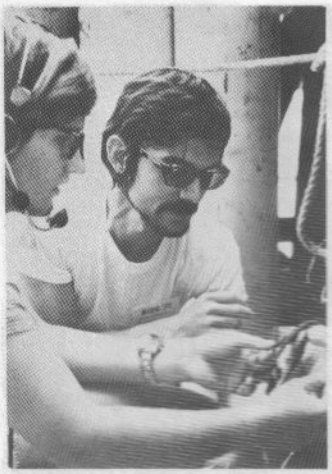
July 17 approached with the speed of light. Last minute plans were finalized and last minute details were taken care of. Wait a minute! Do we have any Czech, Canadian, or Japanese flags? NO! Well, hadn't you better do something about it? YES! Several strategically placed phone calls convinced me that no one in Columbus had a Czech, Canadian, or Japanese flag readily available. What now? Call in the friendly neighborhood flag maker. Who? My mother, who else? Ah yes, it's amazing what the little lady can do with a needle and thread the night before the competition. Of course, I was short a bed sheet to sleep on, but seeing as that I never really went to bed that night, it didn't make much difference.

About 9 P.M. Friday evening (July 16), Peter Cook and Fritz Gnass arrived. These two chaps from Canada were to spend the weekend with me. Following a quick snack and some conversation, Fritz retreated to my workshop to finish his parachute duration rocket while Peter painted a maple leaf on the Canadian Flag.

Dr. Gerald Gregorek preps his Class 1 Parachute Duration model which took first place with a 4 minute 52 second flight.



Harry Stine's Delta-Katt took second place in Boost/Glide with a 122 second duration.



Jozef Krasnec of Czechoslovakia observes USA engine testing procedures during a Standards & Testing demonstration before the contestants meeting.

Peter Cook of Weston, Ontario paints the Canadian maple leaf on the flag for display at BIRC-71.

The team from the USA took first place in Parachute Duration with an average time of 212 seconds. (Left to Right) Mike Micci of Joliet, Illinois; Dr. Gerald Gregorek of Columbus, Ohio; and Col. Jacques Adnet of Dayton, Ohio were the USA team members.

The morning of July 17 came as most mornings do – too early in the day. I made my way to the basement to see what work was left to complete. Much to my surprise, I found that I had finished the flag stand I had started the night before. Since the day's activities would not begin until the afternoon, the typical early morning rush of a meet was eliminated (?) until my Dad realized that the glider he was going to fly at BIRC had gone into the "wild blue yonder" at MMRR '71, hence, he needed a new one and FAST. In typical form, he finally completed the glider at the flying field.

With the help of Chas Russell, Doug Ball, Mike Wolfe, Bob Mullane, and a couple of other CSAR members, the range was set up by 3:30 (the location we finally settled at was Britton Jr. High School – the site of previous sectional and area meets). Next, the trip to the Ohio State University Aero Lab for the contestants meeting. I was greeted by several local as well as national figures in rocketry. Dr. Jerry Gregorek, Harry Stine, Gil Lutz, Fred Long, Scott Layne, Jon Robbins, Lt. Col. Jacques Adnet, and many more were present. Following a review of the general meet "ground rules", and the introduction of each competitor, a "bull and beef" session was conducted to iron out a few rough spots. The meeting ended with scale models being submitted for judging.

A caravan of twenty-some cars made the short trek to the flying field. At 5 P.M. the opening ceremonies got under way by playing the national anthem of each of the participating nations while the flag of each country fluttered in a slight breeze just behind the launch area. G. Harry Stine, the "Father of Model Rocketry", officially opened flying by firing a salvo of red, white, and blue rockets.

Class I Parachute Duration was the first

BIRC '71 Results

Class 1 Parachute Duration

Individual Competition

1st	Dr. Jerry Gregorek (Columbus, Ohio, USA)	4:52.4
2nd	Jon Randolph (Cleveland, Ohio, USA)	4:15.2
3rd	Jon Robbins (Bryan, Ohio, USA)	3:24.75

Team Competition

1st	USA Dr. Gerald Gregorek (Columbus, Ohio) Lt. Col. Jacques Adnet (Dayton, Ohio) Mike Micci (Joliet, Illinois)	3:32
2nd	JAPAN Yasinori Kobayashi (Tokyo, Japan)	1:59
3rd	CANADA Fritz Gnass (Bath, Ontario) Peter Cook (Weston, Ontario)	0:55

Sparrow Boost/Glide Duration

Individual

1st	Jim Kasper (Mansfield, Ohio, USA)	2:35
2nd	G. Harry Stine (New Canaan, Conn, USA)	2:02
3rd	George Pantalos (Columbus, Ohio, USA)	1:51

Team Competition

1st	USA (average duration) Dr. Gerald Gregorek (Columbus, Ohio) Jon Robbins (Bryan, Ohio) George Pantalos (Columbus, Ohio)	1:00.5
2nd	CANADA Peter Cook (Weston, Ontario) Fritz Gnass (Bath, Ontario)	0:43.5
3rd	JAPAN Yasinori Kobayashi (Tokyo, Japan)	0:15

Class II Streamer Duration

Individual

1st	G. Harry Stine (New Canaan, Conn, USA)	1:24
2nd	Charles Russell (Hilliard, Ohio, USA)	1:21.7
3rd	Jon Randolph (Cleveland, Ohio, USA)	1:19

Team Competition

1st	CZECHOSLOVAKIA (average duration) Jozef Krasnec (Brateslava, CSSR)	1:08
2nd	USA Gilbert Lutz (Perrysburg, Ohio) G. Harry Stine (New Canaan, Conn.) Jon Randolph (Cleveland, Ohio)	0:54
3rd	CANADA Peter Cook (Weston, Ontario) Fritz Gnass (Bath, Ontario)	0:46.7

Scale

1st	Jon Randolph (Cleveland, Ohio, USA) entry-D Region Tomahawk scale- 1:4.85	912 pts.
2nd	Scott Layne (Dayton, Ohio, USA) entry-Little Joe II scale- 1:30	903 pts.
3rd	Fleischer-Person Team (Cleveland, Ohio, USA) entry-RD 107 Vostok scale- 1:58.82	788 pts.

An impromptu meeting was held on the range to decide what to do about the Sparrow B/G event when the farmer who owned the BIRC-71 field asked everyone to leave.

event scheduled to fly. Most of the rocketeers had designed their P-D birds around the new MPC Mini-jet A3-4m's. It was intended that flying in the evening of the day would help reduce the chance of models drifting a great distance due to the lack of thermals and moderate winds. The idea was nice, but the Minijet's reduction in weight and frontal area made several rockets fly too well as some entries headed a mile or so southward into a cut hay field.

Several rocketeers were fortunate enough to find their models, while other rocketeers were not so lucky and only found an angry soybean farmer. The two hours of flying ended with the "return" and "no-return" card piles being just about the same height-ugh! (Darn soybeans!) Jerry Gregorek, a 1970 USA-FAI P-D team member, recalled his abilities as a high school trackman to chase his bird nearly two miles for the winning flight of 4:52.4. Close behind in lane No. 2 was Jon Randolph with a time of 4:15.2 while Jon Robbins clocked in third after 3:24.75. In the team competition, the USA team of Jerry Gregorek, Mike Micci, and Jacques Adnet had an average time of 3:32, well above the Japanese at 1:49, the Canadians at 0:55, and the Czechs at 0:40.

Sparrow Boost/Glide Duration was next up on the line of events. Several different designs were used for this event. The crew from MPC loyally used Delta Katts while the MASA contingent flew the new DB Industries styrofoam wing kits. Other designs ranged from Mike Micci's built-up wing Bumble Bee to Jon Robbins' "Groundhog No. 16." Unfortunately, the beginning of the B/G flights also marked the changing of the wind. Instead of heading southward to an open field, most models veered West to a corn field about one hundred yards away. After emerging from the corn field with my recovered B/G, I was met by a "Who's in charge here?" Ah yes, it must be the corn farmer, I thought. RIGHT!! Following a fifteen minute lecture on how some mini-bikes had plowed-up his corn and soybeans, it became very evident that he did not want us around. (Amazing, since we had *always* been welcomed at this launch site in the past.) A meeting of the contest board and anyone else who had something to contribute to the discussion finally came to conclusion that Sparrow Boost/-Glider should be postponed and re-flown at an alternate site the next day. This was a difficult decision to make, but at the time it was the best we could do.

Saturday evening was used for unwinding and that we did at a local Howard Johnsons restaurant. By the time we had all filed in, the waitress had put six or seven tables together to accommodate everyone. The conversation was the typical bull – engines, designs, scale, cars, women....etc.

Flying Sunday morning got under way a little late, but the rapid pace of firing quickly made up the difference. Jim Kasper of MASA flew his DB Industries styrofoam wing kit to a 2:35 victory. Harry Stine re-trimmed his Delta Katt for a 2:02 flight while the Contest Director called on his "Easy Glider" of the Delta Zeta series to bring a third place time of 1:51.6.

The MPC B3-5m's were the favorite engine to fly with in Class II Streamer Duration. Crepe paper and aluminized mylar were the most popular types of streamer materials used. Just about any legal length to width ratio could be found among the streamers. As with the P-D birds, the streamer duration birds performed very well. In fact, many entries nearly went out of sight of the timers (in altitude) which at times made keeping track of the birds quite difficult. In a very close finish, the "Ole Rocketeer" posted a winning time of 1:24 over Chas Russell's 1:21.7 and Jon Randolph's 1:19.

Doug Ball preps Bob Mullane's Sparrow B/G, one of the new DB Industries styrofoam wing kits.

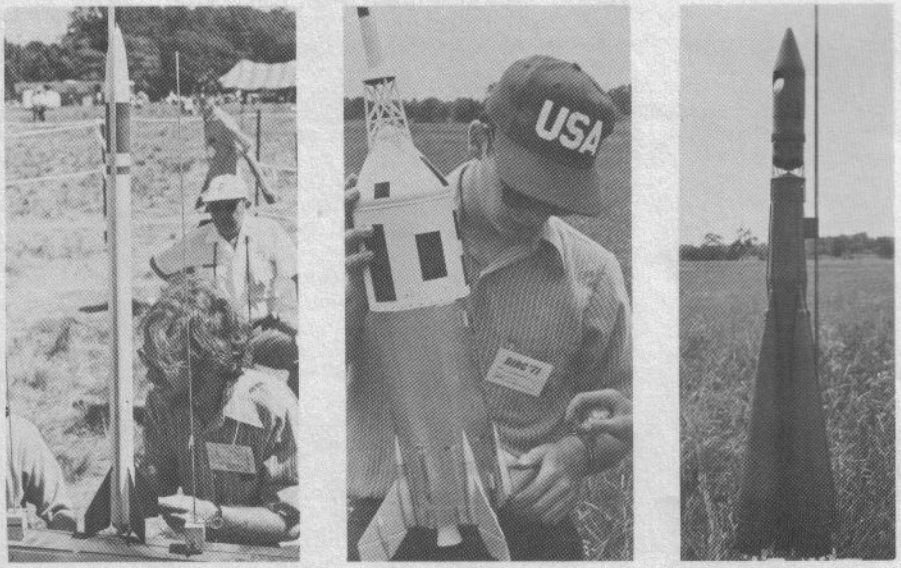
Between the flying of the streamer duration models and the scale models, several of the participants gave demonstration flights. Jon Robbins demonstrated one of his many Groundhogs, Groundhog No. 49. This Groundhog, one of his more recently constructed models, was designed to be flown in the Condor B/G event. The model boosted beautifully, the wings deployed as planned, and Groundhog No. 49 was not about to "bite the dust" as it took off and away – last to be seen approaching Port Columbus at five hundred feet!

Bob Hagedorn of D-B Industries next flew his new styrofoam wing kit on one of its many excellent flights at BIRC '71. Unlike previous styrofoam wings, this new D-B Industries kit has a wing with a 3 inch chord and ¼ inch thickness that has proven to be aerodynamically efficient and structurally sound.

Harry Stine and Jozef Krasnec wound up the demos with an MPC Nike-Smoke that was powered by a Czechoslovakian "Widow Maker." The Widow Maker is a ten newton second engine (C type) with a very high initial thrust spike. The model soared nearly out of sight before returning on streamers.

The scale model flying was quite impressive. While some of the models were rather large and highly detailed, others were average size and there was even one mini-scale entry. Doug Ball acted as chief scale judge. The flight characteristics of the models were carefully judged by Bob Mullane and Lt. Col. Adnet. As it turned out, flight points would be a major factor in determining the winner, for Scott Layne and Jon Randolph were tied at the end of the static judging with 815 points.

Jon Randolph's D-Region Tomahawk took off and arched over slightly before parachutes blossomed and returned the model unharmed – 97 flight points. After one unsuccessful attempt to ignite the F100-8 engine, Scott's Little Joe II roared off the pad. What seemed to be a "longer than advertised" delay charge was followed by only



In the first head-on test between Jon Robbins' D-Region Tomahawk and Scott Layne's Little Joe II, Jon took first in Scale by only a nine point margin with 912 points to Scott's 903 points. The Fleischer-Pearson "Vostok" took third place with 788 points.

the booster parachute opening. The command module and launch escape tower free-fell and incurred some damage – 88 flight points Randolph had won the duel by 9 points. Finishing third was the Fleischer-Pearson team entry of a very nicely done RD 107 Vostok.

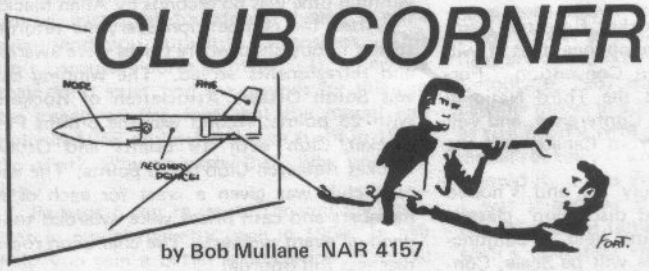
As scale flights ended, several of the contestants helped clean up the launch site as I tried to clean up the final point tallies and determine who had won what.

The awards banquet was held at the Green Meadows Country Inn just north of Columbus. Following a delicious "family style" meal, the presentation of awards ceremony started. The flags of the four represented nations provided a colorful background as the gold, silver, and bronze medals sponsored by Estes, MPC, and Mac's Tom Thumb Raceway were awarded to the winning individual and international team members. Of course, there was a little levity added to the situation – Jon Randolph was presented with a Saturn V for winning Scale and Harry Stine was awarded a Model Rocket Science Set for winning Streamer Duration; both prizes were provided courtesy of Cox.

George Pantalos presides at the BIRC-71 awards banquet, with the flags of all nations represented (Japan, Czechoslovakia, USA, and Canada) hanging in the background.

In closing, G. Harry Stine, FAI Liaison, offered his praise of the endeavor and expressed his desire for the furthering of international rocket competition. The Contest Director thanked the many people whose cooperation made BIRC '71 possible. He then briefly summarized the experiment and added that he would like to try it again in 1973.

CLUB CORNER



by Bob Mullane NAR 4157

The Organizing and Running of Technical Symposia

Since the first Pittsburgh Spring Convention in 1966, model rocketeers have gathered each year in several areas to hold conventions. These conventions usually fill an entire weekend with lectures, discussions, demonstrations, and launches. They also provide a great learning experience (not to mention a lot of fun) for model rocketeers. But, unfortunately many rocketeers cannot attend a convention because they live too far from one, can't afford the time or expense of convention, or have other committments that weekend. What can they do? This problem was considered by several members of the Pascack Valley Section last year and the outcome was NETS, the North East Technical Symposium.

NETS would last one day (November 21, 1970) rather than an entire weekend and limit itself to two topics – Scale and Research and Development – instead of the wide variety of subjects covered at a large convention. By limiting itself in this way, NETS hoped to attract a group of about 25 rocketeers from a limited area who would be interested in a specific topic. It was hoped that a group like this could remain together for the entire day (rather than breaking into smaller groups) and discuss the topics involved. It worked. NETS demonstrated that a small "mini-convention" could be run by almost any club (all the pre- and post-convention work was done by only two people). Since these symposia can be run quite easily, there is no reason why several can't be held each year by every club on a variety of topics. Here are a few hints to help you in organizing a mini-convention.

The first step is to choose a chairman to run the symposium, a date, site, and the topic(s) to be covered. If the convention is to be announced in **MRm**, this should be done at least four months before the proposed date. If the symposium will be announced only in (and limited to) your own club, this can be done as little as a few weeks before the event. Now that you have a site and a date and have sent out announcements, you can begin the detailed planning. Who will lead the discussion groups? What will the discussion groups cover? Will lunch be provided to the participants? Will there be a launch? These and many other questions must be answered.

An application should be sent to everyone who responds to the announcements and should include such additional information as cost, time, exact topics of discussion groups, etc. Be sure to set an early enough application deadline to allow a map to be sent to all participants and an exact count to be made to allow advance arrangements (such as the size of the room) to be made.

On the day of the symposium, allow time for an informal discussion after all groups. A rough time table for NETS is as follows:

Launch	10:00–11:00
First Lecture	11:15–12:00
Lunch and Informal Discussion	12:00– 1:00
Second Lecture	1:00– 2:00
Informal Discussion	2:00– 2:30
Third Lecture	2:30– 3:00
Informal Discussion	3:00– 3:30
Fourth Lecture	3:30– 4:30
Discussion & Clean Up	4:30– 5:00

It was discovered that three (instead of the four held at NETS) Lecture-Discussion Groups might allow for a more leasurely pace and also permit more leway when the schedule begins to slip (as all schedules eventually do). The "Informal Discussion" was a time for everyone to get up from their seats and mingle with the group. This allowed a brief rest and also permitted those who may be too shy to ask a question during the formal session to talk to the group leader or someone else who may have made a point of interest. These brief "bull sessions" were welcomed by everyone.

Since NETS was devoted to R&D and Scale, four topics were chosen which would be of interest to R&Ders and/or Scalers. They were: "Pitfalls of R&D" (given by NETS chairman Lindsay Audin), "New Topics in R&D" (Joe Persio), "Drawing Rockets" (Bob Thayer, Jr), and "Obtaining Scale Data and Report Presentation" (Bob Mullane) The topics for a symposium on B/G's might include: Aerodynamic Theory, Construction of B/G's, Rocket Glider, Variable Geometry, Rules of Thumb for B/G Design, etc. Other topics for a symposium on R&D might include: Instrumentation, Electronic Data Reduction, Test Equipment Design, etc. The possible topics for both discussion groups are limitless, but always keep one thing in mind when choosing topics – don't try to cover too much in a one day symposium. On the other hand, if you can't seem to fit all you want to do into one day, why not try running a whole convention?

This has been only the briefest of outlines on running a symposium like NETS. A booklet containing the complete story of NETS including outlines of all discussions and suggestions for improving the format is available for $.75 from Bob Mullane, 34 Sixth Street, Harrison, NJ 07029.

UPDATE CANADA

c/o Atmospheric Rocket Research Association, 7800 des Erables Ave., Montreal, 329, Quebec

IT'S TAKING SHAPE

Things are looking good here in Canada for the future development of model rocketry as a hobby. There are a lot of interesting events that show great promise for 1972.

We have word from the Canadian Association that major changes in their administrative system are soon to be announced. As far back as January of this year Peter Cook wrote up a Canadian Model Rocket Sporting Code, which the Canadian Association of Rocketry has been examining for the past year.

As for a national competition. The Canadian Association of Rocketry has told us that as soon as administrative changes are completed and sporting code adopted, talks would then proceed for holding a national competition. Perhaps by next year at this time something such as CARAM will be a household word.

In Montreal, the Atmospheric Rocket Research Association plans another Canadian Convention for July of '72. They are trying to come up with something that will be most exciting and draw a large crowd. It is hoped that the home where Canadian rocketry got its major start will come up with something to please all rocketeers.

Toronto moved into the big league scene this year with the Toronto Regional Rocket Meet. It was a great success. Drew large crowds of competitors and spectators. It is hoped that the host club of the Toronto Regional, the Canadian Rocket Society, will also open their B/G Trials to the public, which we have heard so much about.

In Ottawa, the Ottawa Rocket Research Club has added the Ottawa Regional Rocket Meet to the Canadian scene. It is hoped that they too will continue in '72.

Western Canada has along come into swing with model rocketry. One of the original Canadian modroc events, the Annual Alberta Regional Meet, was this year held for the second time by the Edmonton Rocketry Club. And, in B.C. the Burnaby Model Rocket Club hosted the B.C. Centennial Invitational. These two clubs have organized model rocketry in the west, and soon perhaps in a national meet sponsored by C.A.R., east will have a chance to meet west in competition.

On a smaller scale in Montreal, Richard Carmel is trying to organize a club with the City of Montreal. It is hoped that people will be able to teach model rocketry properly, and place total model rocket facilities at their disposal. Richard will be writing soon to describe what he is trying to do and how it is going to be done.

All in all, you can't say you're not involved because there is nothing to get involved in. All the people mentioned above, plus others not mentioned, are all doing a lot of work. So, why don't you get out there and support in 1972.

Best wishes for the new year and happy flying.

Steven J. Kushneryk

1972 Canadian Convention

Steve Kushneryk (left) of the ARRA will head the 1972 Canadian Convention.

The Atmospheric Rocket Research Association would like to announce that it will again host the Canadian Convention. Formally it will be called the Third National Canadian Model Rocket Conference, and will be open to rocketeers from Canada and the United States.

It is scheduled for July 7-9, and is hoped to have vastly improved discussion classes. Events in the competition held in conjunction with the conference will be Scale, Condor and Sparrow B/G, Hawk R/G, Open Spot Landing, and Class O Parachute Duration.

If anyone is interested in receiving complete information and entry forms she/he may do so by writing:

Canadian Conference 1972
c/o Steven J. Kushneryk
7800 des Erables Avenue
Montreal 329, Quebec
Canada

Rideau-St. Lawrence Rocket Meet

On Wednesday September 1 model rocketeers from the area around Smiths Falls Ontario gathered at the Hobby and Variety Centre in Smith Falls to prepare for the meet. The meet was a team effort with three teams in all. Smiths Falls Rocket Club was the host club and there were two teams from nearby Ottawa; the South Ottawa Association of Rocketry was represented by six members while the Ottawa Rocket Research Club had a team of three. After the last minute purchasing of engines, ignitors and other parts, the contestants made their way to the launch site. The weather was perfect with near cloudless skies and high temperatures.

The first event flown was fixed streamer duration. In this event each entrant is given a streamer of 32 by 2 inches and the best duration wins. All events were flown with A engines with the exception of Hornet B/G. The best time in fixed streamer was 38 seconds turned in by Alex Arif of S.O.A.R.

Alex Arif also took first place in streamer duration with 41 seconds. Streamer duration saw several prangs because of tightly packed streamers into too small body tubes.

In Hornet B/G, Bill Bourne of S.O.A.R. had a 120 second flight with a Wasp before it went out of sight. Bill chased it and managed to bring it within the 20 minute time period allotted to return all rockets.

The Mini-Bat came through again for a first place in Sparrow B/G. Barry Nicolle's Mini-Bat turned in 83 seconds. An interesting swing-wing design was flown in Sparrow but unfortunately it didn't glide as well as was hoped.

In parachute duration two well-streamlined models were lost on good altitudes but using oversized chutes for the size of the field. One was tracked for seven minutes before disappearing and the other for about six. The winning time was 65 seconds by Allan Mackie.

After the competition everyone returned to the hobby shop where prizes were awarded and refreshments served. The winning club was South Ottawa Association of Rocketry with 23 points; second was the Smiths Falls Rocket Club with 19 points and Ottawa Rocket Research Club had 8 points. The winning club was given a crest for each of its members and cash prizes were awarded to individual event winners. The champion rocketeer was Bill Bourne.

The meet was very successful and we look forward to next year's competition with enthusiasm.

Barry Nicolle

Youngstown Contest

The Rocketry Association of Youngstown, Alberta, held a very successful model rocket competition Sunday, October 10. Known as CARM-1 (Central Alberta Regional Meet) the contest attracted 44 contestants, 15 from Regina, 4 from Edmonton, 9 from Hanna and 16 from Youngstown. Four events were flown in both Junior and Senior categories. Winners were: Streamer Spot Landing Jr., Arthur Mackee, Edmonton; Sr., Richard Barks, Regina; Streamer Duration Jr., Wade Schmaltz, Hanna; Sr., Harold Pym, Regina; Parachute Duration Jr. Vern Mark, Hanna 3 min. 36.7 sec.; Sr., Wayne Kautz, Hanna 3 min. 48.5 sec.; Swift Boost Glide Jr. Kevin Lynch, Edmonton 32 sec., Sr., Allen Ausfor, Edmonton 57 sec.

First place winners were presented with trophies with the Launch Pad Distributors trophy for grand aggregate winner won by Allen Ausfford of Edmonton. Second place finishers received prizes of rocket kits presented by the L.M. Cox Co. and Launch Pad Distributors who provided Centuri kits.

Over 140 spectators were present from as far away as Calgary, with a bus load of future rocketeers from Beisecker and another group from Oyen. Plans are now underway for CARM-2 to be held in 1972.

The Old Rocketeer

Letter to a Young Rocketeer

by G. Harry Stine NAR#2

(This article is an answer to a letter from Bill Kust of Pittsburgh, Pennsylvania who wrote me asking for a parts' list for the 7-engine cluster model, "Honest Ivan," which was featured in my article about the history of clustering in the February of 1971 **MRm.***)*

Dear Bill:

Thanks for your letter. I'm very sorry to tell you that it is impossible for me to send you a parts' list for Honest Ivan. I can't even send you authentic dimensions. This isn't because I don't want to. It is because they don't exist, and the reasons for this can be traced to the fact that the model was built in 1958 and made its last flight in 1959. So what? Why no parts' list? Why no drawings?

Perhaps I can re-create for you the situation in model rocketry back in 1958. It may help you gain a better appreciation of model rocketry today. I am sure that many model rocketeers don't realize how young model rocketry really is and what the state of affairs was in those ancient, long-ago, and ofttimes forgotten "early days."

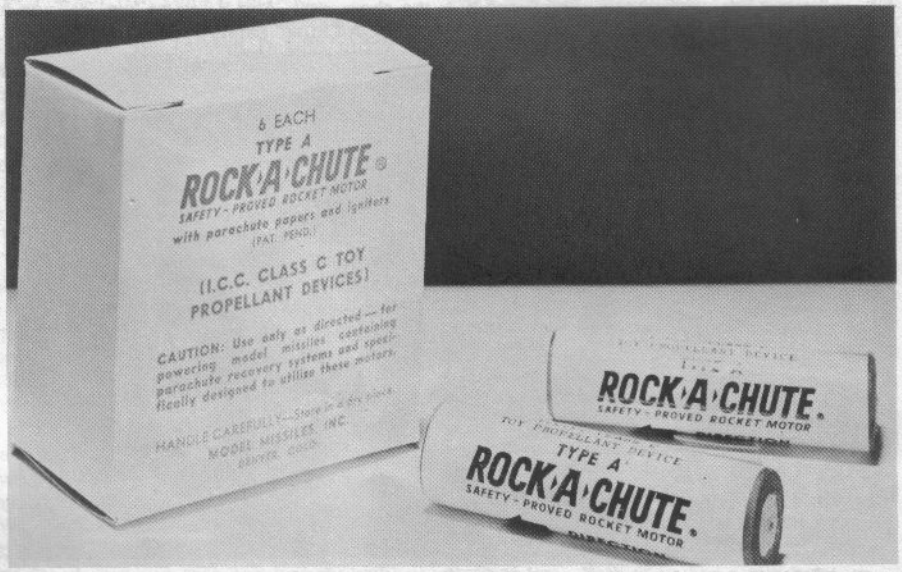
In 1958 when Honest Ivan was built, we had no model rocket catalogs from which to select the parts to build our model rockets.

That statement may sound incredible today, but it is true.

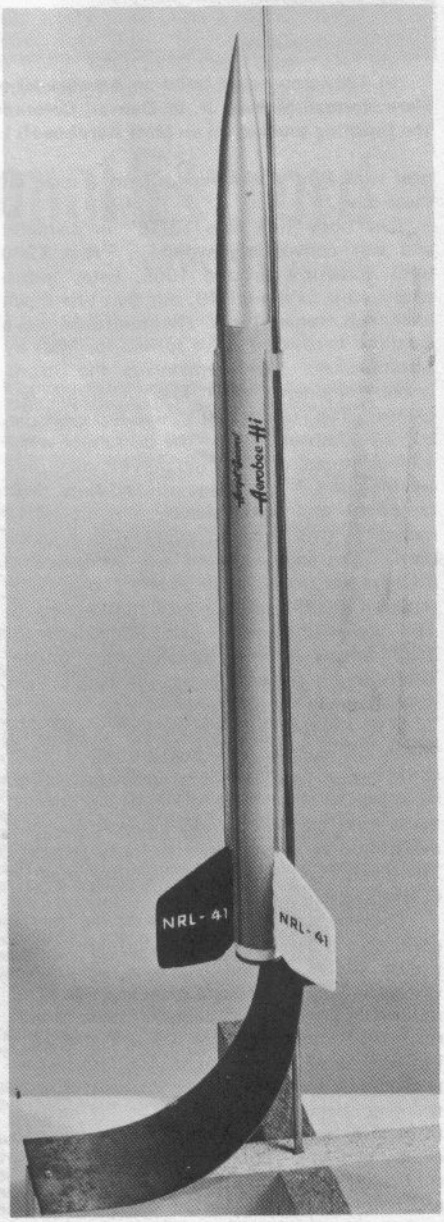
When Honest Ivan was built, none of the model rocket manufacturers you know today existed at all. Estes Industries, Centuri Engineering, Flight Systems, Competition Model Rockets, and Space Age Industries all lay in the future.

There was only one model rocket company. It was Model Missiles, Inc. located at 1159 California Street, Denver, Colorado. I went back this year, and the building had been torn down for a parking lot. MMI doesn't exist any more, and even its first offices are gone. The company was formed on October 6, 1957 and consisted of a group of us who threw in a thousand or so dollars each as risk capital with the dream of making safe model rocketry available to anybody who wanted it. I was President. In January 1958 I was joined by Richard D. Keller (NAR No. 4) and his father, Skip Keller. That was MMI's operating staff. Involved in MMI as other officers and investors were Orville H. Carlisle, my father-in-law, and my brother-in-law. We were under-capitalized, understaffed, under-paid, and under pressure.

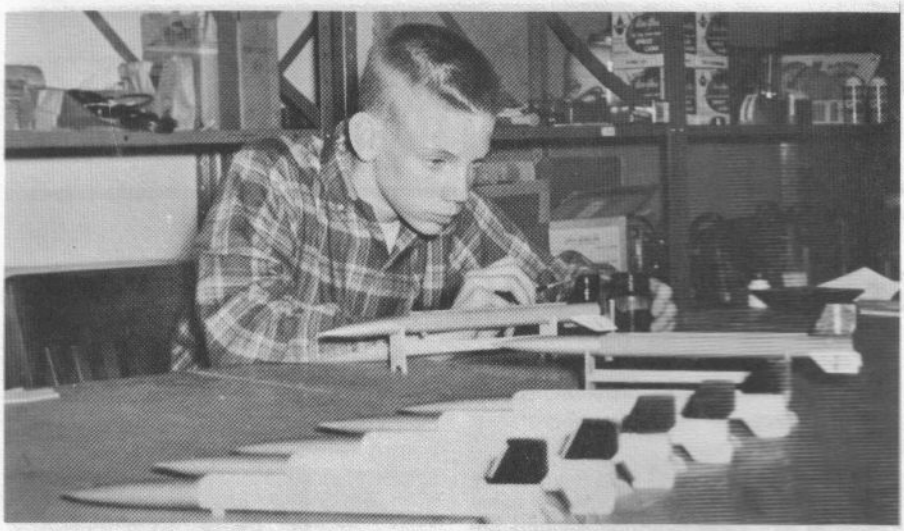
In April 1958, MMI produced the first model rocket kit in the world, the MMI "Aerobee-Hi" Model 001. It was supposed to be a scale model of the U.S. Navy's RV-N-13c Aerobee-Hi rocketsonde, but it didn't have a booster and it would come nowhere



In 1958 we had our choice of engines -- the MMI Rock-A-Chute Type A shown here with its package. No choice of delay time, no choice of power, just this one engine designed for the MMI Aerobee-Hi.



This was it! The very first model rocket available in kit form was the Model Missiles Inc. Aerobee-Hi with its launcher. This model was the first one put together with the commercial kit parts, and is currently in Stine's Model Rocket Museum destined for the Smithsonian.



In 1957 you could build an Aerobee-Hi or an Aerobee-Hi....not much choice in those days. Here Norman Maines, Jr. of Denver, Colorado, the first (1959) U.S. National Champion, puts the finishing touches on an MMI Aerobee-Hi kit.

near what you would expect from a scale kit these days.

The body tube was 13/16" in diameter and was convolutely wound. From 1960 until sometime around 1965, Estes Industries sold it as the BT-40, but that was much later than Honest Ivan. The nose cone was a 5-caliber hardwood ogive turned for MMI by Strombecker. Who remembers the Strombecker wooden model kits of trains and planes? The Aerobee-Hi's three fins were die-cut 3/32" sheet balsa. The parachute was a 12-inch square of 1-mil red polyethylene, and we included 4 kite-twine shroud lines, four tape discs, and a snap swivel. The kit had 12 inches of 1/8" contest rubber for a shock cord. The engine mount was an embossed affair made from thin aluminum sheet (later replaced in 1959 with a plastic motor mount). The launch lugs were two ¼" lengths of 3/32" diameter thin-wall aluminum tubing. There was a screw eye for the base of the nose cone.

MMI Kit No. 001-A came with a launcher which was a base, a 36-inch length of 1/8" steel wire, and a steel jet deflector. The steel jet deflector from the MMI Aerobee-Hi kit is now the oldest model rocket part still available. It is now sold as Estes Cat. No. 701-BD-1. Get your order in; they may be in short supply!

The original Aerobee-Hi kit No. 001-A contained 6 Type A "Rock-A-Chute" Safety Proved Model Rocket Motors. They were the same size as today's standard 18 x 70 millimeter engines, and their performance was equivalent to today's Type A3-3. The igniters included were 1-inch lengths of Jetex wick, and instructions were given on how to use them as electrical igniters. The kit instructions also included directions on building an electrical firing system using two-conductor rubber-covered lamp cord, a doorbell button, and two paper clips in lieu of micro clips.

Infact, the entire instruction manual was extremely complete, detailed, and easy to follow. It was a booklet. It was deliberately patterned after the Heathkit electronic kit instructions where assembly proceeds step-by-step with complete illustrations and a check-off as one completed a step. This was done because we discovered that most people who wanted to build and fly Aerobee-Hi had never before built a flying model of any sort; this was their first exposure to the world of operating models, and we wanted to make sure they got started right. Safety was uppermost in our minds as we put together that instruction manual.

The final paragraph in the instruction manual pointed out that you could have some fun if other people in your neighborhood had Aerobee-Hi's, too. You could run a contest to see whose Aerobee-Hi could stay up the longest under its little red parachute. (The first official NAR model rocket contest was not held until May 1959.)

There were several different versions of the Aerobee-Hi kit that were introduced as time progressed. The Kit No. 001-A contained 6 engines and sold for $7.95. Later in 1958, we introduced the Kit No. 001-B with 3 engines selling for $6.45. It wasn't until early 1959 that Kit No. 001-C was brought out with no engines, just an airframe kit. All three kits were boxed. The A and B kits had a box 38 inches long because of the one-piece launch rod. The C kit introduced the two-piece launch rod and was smaller.

You could buy extra engines for your Aerobee-Hi. The MMI "Rock-A-Chute" Type A engines came 6 to a box with igniters and the wildest mess of parachute packing material you can imagine. Price was $1.95.

There was a parts list for the Aerobee-Hi, but no attempt was made to sell the parts separately. If somebody wrote in and wanted a part, it was sent to him. But parts were not included in the catalog sheets that were sent to hobby jobbers and dealers. There was no consumer catalog.

That was it. Period. That is all that 1958 model rocketeers had to work with. If they could find it. Which was difficult.

Of course, those of us at MMI had gobs of Aerobee-Hi parts to work with. One body tube size. One nose cone. And all the other little parts. You would be surprised at how many different model rocket designs you can make from one body tube and one nose cone!

But if we wanted to make a model rocket using a different body tube or a different nose cone, we had to make it. Literally. Or we had to find it.

Nose cones we could turn down on a lathe from hard wood dowel (preferred in those days) or from block balsa. I learned to work a lathe.

We continually made "shopping trips" to junk yards, dime stores, toy shops, hobby stores, and other stores looking for things that could be used for model rocket parts. Carlisle had used a plastic pencil sharpener for a nose cone. We discovered a couple more of these. We also snitched parts from fireworks, particularly the plastic nose cones and plastic tail assemblies from skyrockets made in Texas. The nose cone from the Adams (now IPC) Honest John plastic kit made a good model nose and was used on some of the first Little Marks (which later became the Astron Mark in 1961).

So Honest Ivan had no parts list. It wasn't "designed." It happened. There were no dimensions. We never bothered to measure. There was this old mailing tube laying around the shop, see? And 7 (count 'em, 7) Type A "Rock-A-Chute" Safety Proved Model Rocket

The early model rocket pioneers of 1957 were limited in the number of available parts, but tackled the problem of finding new uses for them with great enthusiasm and the sort of intense seriousness that has characterized the hobby ever since.

Richard Krushnic, discoverer of the infamous Krushnic Effect, puts the finishing touches on an MMI Aerobee-Hi model in the MMI shops in late 1957.

Motors happened to fit into it....

I turned a nose cone from a block of balsa on the lathe.

We put on three of the biggest fins we could cut from the 3-inch sheets of 3/32" balsa we had aroung the plant for Aerobee-Hi fins. They were cut so that they looked slightly Russian in appearance. Nobody bothered to measure them. There were no Barrowman CP calculations in those days; we used the cardboard cut-out method. We sort of figured that Honest Ivan had enough fin area to be stable. After all, it looked all right. Today's safety officer would be appalled by this sort of thing! It was a miracle that we got anything to fly!

The parachute was a 36-inch diameter parachute kite then being sold in the local toy stores. It was made from heavy, stitched polyethylene, and we figured it ought to be strong enough to withstand the opening shock of the big bird. We didn't have the one-pound weight limit in those days (it came in 1961), and I don't think we ever bothered to weigh Honest Ivan.

To keep the shock cord from breaking, we put in 6 feet of 1/8" contest rubber....

To strengthen the spongy cardboard of the body tube, we covered it with model airplane Silkspan and doped it. This made it plenty strong, boy!

In short, Honest Ivan was built, man. Really built! From scratch! Not from prefabbed parts, but from the raw materials themselves. No die-cut fins. No body tube part number. No pre-turned balsa nose cone.

That should give you some indication of the difficulties facing a model rocketeer in 1958. Go down to the local hobby shop and buy Nose Cone Number 34B? Nonsense, it couldn't be done in 1958! Send off mail-order to get a body tube? It didn't exist anywhere and could not be bought for any price.

When we built model rockets whose design differed from the one body tube and one nose cone available, we had to make the parts if we couldn't find them being used for something else.

We never threw away a paper tube of any sort, especially the tube core from a roll of paper towels because that was just the right size for a cluster of three engines, sort of a pre-BT-60. We saved dry cleaner's plastic garment bags for parachutes. If we couldn't find the proper size mailing tube, we made our own body tubes. One of the early NAR Technical Reports was concerned with all the details of making your own body tubes – the type of paper to use, the type of glue best suited for the work, and how to convert your lathe or Shopsmith into a tube-rolling machine. Bill Roe worked this out and must have rolled thousands of different tubes for us, and this was considered a tremendous breakthrough!

We never threw away an empty engine casing, because we could cut them into thrust rings for future models!

There were no super-light -weight parts. We were happy to get *any* part that would work. The Aerobee-Hi built from a kit with a Type A engine in it weighed 1.6 ounces.

Primitive? Sure! But, boy, we sure had fun! Model rocketry was not a mass market. It was a very small, elite group of ardent enthusiasts (or "nuts" if you will) who knew each other, who liked each other, who got together to fly for fun (even in competitions),

The Model Missiles kits were the subject of a Congressional Record report in 1959.

Congressional Record

United States of America — PROCEEDINGS AND DEBATES OF THE 86th CONGRESS, FIRST SESSION

Vol. 105 — WASHINGTON, MONDAY, FEBRUARY 16, 1959 — No. 25

Wonders of the Universe: Safe Rocket for Young Scientists

EXTENSION OF REMARKS

OF

HON. JAMES G. FULTON

OF PENNSYLVANIA

IN THE HOUSE OF REPRESENTATIVES

Thursday, January 15, 1959

Mr. FULTON. Mr. Speaker, we need to develop promptly safe rocket and space equipment for the young people who are so deeply interested in outer space and flight problems.

Likewise our U.S. agencies and scientists should cooperate with our amateur and home-kit experimenters for the protection and the development of the legitimate interest of these part time and zealous pioneers on the rapidly widening space front at home.

To call attention to this need, I enclose an article that I believe to be a start or pointer in this direction of safety and adequate participation by the amateurs of all ages in the wonderful and exciting new space age:

[From the Pittsburgh Post-Gazette, Feb. 2, 1959]

WONDERS OF THE UNIVERSE: SAFE ROCKET FOR YOUNG SCIENTISTS

(By Dr. I. M. Levitt)

Here's a tip for youngsters experimenting with homemade rockets.

In tinkering with explosive fuel mixtures you can avoid danger and also have an almost guaranteed successful series of flights by using a model rocket perfected by C. Harry Stine, a rocket expert who has spent most of his professional career at the White Sands Proving Grounds and with the Martin Co. in Denver.

To get first-hand experience with the Stine rocket, my son Peter and I spent an afternoon in a Philadelphia park launching the rocket many times to heights of hundreds of feet. Both of us had a wonderful time learning how well the rocket operates and planning further experiments.

The rocket is completely safe. In talking to Stine at the annual meeting of the American Rocket Society in New York last November I learned there had been 10,000 models fired without a mishap.

An expert in full-scale rocketry, Stine developed the rocket knowing that countless youngsters in the United States, unable to get proper chemicals, were experimenting with dangerous materials—match heads, say. There has been a growing toll of injuries and even deaths from these experiments.

Stine's rockets give teenagers a motor unit with excellent thrust combined with the utmost in safety. But there is also another advantage.

The units can be combined to allow youngsters to learn at first hand the design requirements of multithrust rockets.

For instance, my son and I have designed a model of the Viking Rocket weighing considerably more than the Aerobee-Hi model. We plan to cluster four of the rocket motors together to power the model. Special wiring will be required and here we face the same problem professional rocket makers are confronted with in clustering Jupiter motors to achieve a thrust of 1½ million pounds.

Once the tiny motors ignite perfectly, Peter and I will watch our miniature Viking zip upward to a yet undetermined altitude. Yet the rocket will not be lost, because of the parachute device in the nose cone.

TEACHES ABSORBING SCIENCE

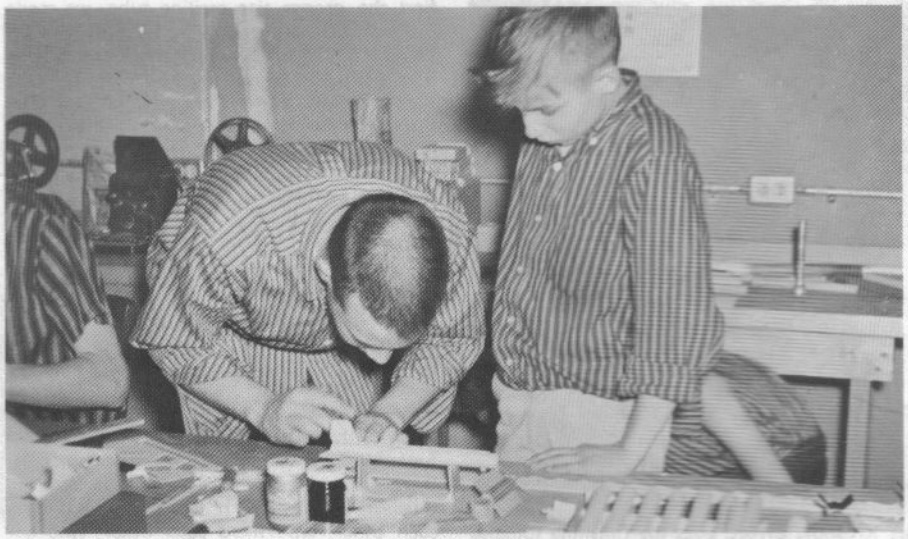
Parents should be grateful to engineers like Harry Stine who invest time and capital to work out the details for safe rockets.

While this rocket is a toy, in practice it teaches the teenager many facets of this most absorbing science.

He can, for example, use telescopes to find the height of the rocket and in so doing improve his knowledge of arithmetic and trigonometry. If he is a ham radio operator he can design a small transmitter to telemeter information to the launching site. He can exercise his ingenuity in designing various rocket shapes.

These are just several of the bonuses accruing from the use of Stine's toy.

Interested parents should get in touch with Mr. Stine at 1165 South Cherokee Street, Denver 23, Colo.



Two early model rocketeers assemble Aerobee-Hi models in the MMI shops on California street in Denver.

who freely and gladly exchanged information on what they were doing, and who had a glorious dream. The dream came true.

I'm glad. I am not super-nostalgic. I am not trying to say, "We model rocket pioneers had it rough! You young punks are johnny-come-latelies and don't appreciate what you've got!"

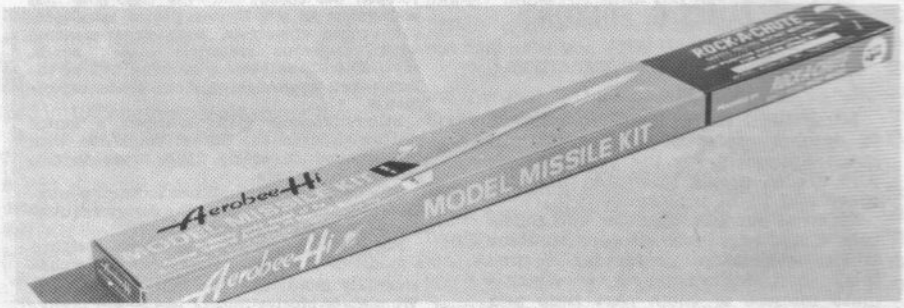
I *am* trying to say, "Look what *all* of us have built! Look at what we started with and what it grew into! Here's some perspective with a time dimension to help us gauge where we are and where we ought to be going. Certainly, we've got problems, but problems seem to be the inspiration for progress in model rocketry."

The good old days? They weren't so good, Bill. I enjoy model rocketry more today than I ever did. Because of what the free enterprise system has done for model rocketry in America, there is much greater freedom of choice, much greater freedom of design, much greater freedom to try things out.

Yes, Bill there *was* an Honest Ivan. But there will *never* be another one. Nobody ever measured it, so nobody can ever build an exact duplicate. It was one of a kind.

Honest Ivan didn't have a parts list.

Sincerely yours,
G. Harry Stine



This is one of the original MMI Aerobee-Hi Kit 001-B packages photographed in late 1958. The 001-A kit was the same except that it included 6 Type A engines instead of 3. The long box was necessary because the kit included a one-piece 36 inch launch rod.

MODEL ROCKETRY MAGAZINE TECHNICAL PUBLICATIONS

TN - 1 $ 0.60 **Advanced Model Rocket Aerial Photography** - by Richard Fox and George Flynn: 6 pages, covering improving the Estes Camroc with a glass lens and a haze filter and using it for color photography; with many drawings.

TN - 2 $ 1.25 **Boost Glider Performance** - by Douglas Malewicki: 14 pages, covering the theory of boost-glider performance and prediction of durations, with many graphs.

TN - 3 $ 0.50 **Drag Reduction by Boat-Tailing** - by George Pantalos: 4 pages, covering the theory (with experimental verification) and techniques of drag reduction by the use of conical boat-tails.

TR - 1 $ 2.50 **Fundamentals of Dynamic Stability** - by Gordon Mandell: 30 pages. A complete description of the theory governing the motions and stability of model rockets in flight, including information on designing to optimize stability. With many graphs and drawings.

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MODROC CALENDAR

Tannenbaum-1 – December 28-30, 1971. Open to all NAR members, sponsored by the Phillipsburg Area Rocket Club, Events: Condor B/G, Condor R/G, Sparrow B/G, Sparrow R/G, Robin Eggloft, Roc Eggloft, Class 2 PD, Class 2 SD, and the following "unofficial" events "Scale Christmas Tree", "Class 5 PD", "Ping Pong Ornamental Spot Landing", "B-Engine Multiple B/G", "D-Engine Feather B/G", and "Garland Duration." Contact: David Klouser, 383 Warren St., Stewartsville, NJ 08886.

XMC-1 – January 15, 1971. Mini-convention featuring 4 discussion groups, possible R&D contest, NASA films, etc. Contact: Paul Porzio, 245 Windsor Pl., Brooklyn, NT 11215.

SPOOCC-1 – January 28-30, 1972. Record Trials open to NAR members. Events: Pigeon Eggloft, Ostrich Eggloft, Scale Altitude, Eagle B/G, Hawk R/G, Gnat R/G, Plastic Model, Class 1 PD, Class 2 SD, and night launched Class 3 SD. Contact: Robert Otlowski, 16 Gable Hill Rd., Levittown, PA 19057.

Toronto Regional – June 1972. Open meet and seminars sponsored by the Canadian Rocket Society. Competitions and presentation of the Diamond Award in Rocketry. Science teachers and their students especially invited. Contact: CRS, Adelaide St. P.O. Box 396, Toronto 1, Ontario, Canada.

Third National Canadian Model Rocket Conference – July 7-9, 1971. Convention and competition open to all model rocketeers from Canada and the United States. Events: Discussion Groups, contests in Scale, Condor B/G, Sparrow B/G, Hawk R/G, Open Spot Landing, and Class O PD. Contact: Canadian Conference 1972, c/o Steven J. Kushneryk, 7800 des Erubles Ave., Montreal 329, Quebec, Canada.

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Current Comments

by Bernard Biales

Although more ballistic charts are on the way, it might be fun to look at a trick which allows you to figure altitudes and other variables by using the *"wrong"* engine charts. Since a calculation using the Bernoulli equations takes half an hour or more, any trick to get back to the graphical format, which takes a couple of minutes even with the extra calculations required, is worthwhile. After presenting this method, a few trajectory problems will be discussed in a particular way: it is sometimes possible to make fearful simplifications in the face of limited time or data or theory and still come out with useful information. Naturally, it is necessary to keep in mind the limitations of such "plausibility arguments" while recognizing their power.

First the trick. If we start out with J. Random Rocket lifting off, then double the thrust, drag, and weight (and mass) the acceleration must remain the same:

$(a = T/m - g - \frac{1}{2}\rho\, C_D A/m\, v^2 = 2T/2m - g - \frac{1}{2}\rho\, 2C_D A/2m\, v^2)$

Since the velocity and altitude are obtained by integrating acceleration with respect to time, if we also double propellant consumption, the velocity and altitude profile will remain unchanged. Therefore once we find a Malewicki chart with *correct burn time* we can scale any single stage model up or down on paper to fit that particular chart *no matter what total impulse the engine(s) has.* The system works well with the Estes "Altitude Prediction Charts TR-10". The terminology used here is the same, but the superscript "rr" will refer to the values for the real rocket and the superscript "s" for the Malewicki chart being used for the simulation.

Begin with the total weight of the rocket including engine (W_I^{rr}), the total impulse of the model's engine(s) (I^{rr}), and the amount of propellant the model starts off with (W_p^{rr}). Now I dump into your lap the tough problem of calculating the drag factor C_DA. Gerry Gregorek has written an extensive report for Estes on this problem which is unfortunately not out yet. Hoerner's **Fluid Dynamic Drag** is a good reference. (Well, OK. Usually a C_D of 1 won't get you in trouble.) Calculate the ballistic coefficient during boost:

$$\beta T = (W_I^{rr} - \tfrac{1}{2}W_p^{rr})/C_DA$$

Now generate a scaling factor S using the impulse I^s of the chart engine: $S = I^s/I^{rr}$. To get the initial weight you will feed into the chart calculate $W_I^s = (W_I^{rr} - 1/2 \cdot W_p^{rr}) \cdot S + 1/2 \cdot W_p^s$. This assures the drag free acceleration term in the equations used to generate the graphs is properly satisfied by the scaling. Now we can go in with our ballistic coefficient and scaled initial weight to get out the burn out altitude and velocity. Since the coast calculations have no further dependence on engine parameters we can go back to the burn out ballistic coefficient of the model to calculate coast altitude and time.

This system can not be used with the Centuri form of the charts (TIR-100). The old version of these charts is now out of print, but as they are very nice charts, I include the following approximate fudge factors:

$C_DA^s = C_DA^{rr} \cdot S$: and W^slift-off $= (W_I^{rr} - 1/2 \cdot W_p^{rr}) \cdot S + .4W_p^s$

As an example, I will use a B/G design I am in the process of constructing and plan to fly with a Centuri Enerjet E24:

$W_I^{rr} = 5.4$ oz.
$I^{rr} = 40$ newton seconds
$W_p = .767$ oz.
$C_DA = 3$
$\beta_T = (5.4 - 1/2 \cdot .767)/3 = 1.67$
$\beta_c = (5.4 - .767)/3 = 1.54$

The E24 has a burn time of 1.6 seconds which is close — admittedly not the same, but close — to the 1.7 second burn time for the C6 engine.

$I^s = 10$ newton-seconds
$1/2W_p^s = .22$ oz.
$S = 10/40 = .25$
$W_I^s = (5.4 - .767) \cdot .25 + .22 = 1.25 + .22 = 1.47$

From the Charts:

$S_B = 500$ feet = burn out altitude
$V_B = 430$ fps = burn out velocity
$S_C = 520$ feet = coasting altitude
$t_C = 4.4$ seconds = coasting time
$S_B + S_T = 1020$ feet = total altitude

Doing the same calculations using the Centuri charts and the fudge factors, I get $C_DA^c = .75$, $W^c = 1.43$, Altitude = 960 feet, and Coast = 4.2 seconds. The Estes D13 charts assume a burn time of 1.48 seconds, slightly shorter than 1.6 seconds in opposition to the C6 simulation. It yields $S_B = 410$ feet, $V_B = 480$ fps, $S_C = 540$ feet, $t_c = 4.4$ sec., and altitude = 960.

It would be possible to produce a universal set of ballistic charts for any engine ever likely to be made by systematically covering the range from, say, .1 seconds to 12 seconds of burn time at ten or fifteen percent intervals — about thirty burn times in all. Interpolation for two burn times bracketing the correct value is useful in some cases if you are a perfectionist. Another approach which would be enlightening would to generate error functions to correct for small differences in burn time.

Oh yes — since I did these calculations I ran a test flight of the rather flimsy booster portion of the B/G. The engine performed beautifully (the smokeless Enerjets always seem a little bit like magic) and left a large cloud of confetti floating across the gentle autumn sky. What model rocketry needs is some structures charts.

Let's see how this trick can be imbedded in a more complex problem-solving exercise.

Howard Kuhn's outstanding Javelin received more points in Scale static judging than any other at this year's NARAM. Powered by two of the D18-4's, this monster lifted off beautifully, went over the top at a rather low altitude — by now everyone was holding their breath — and fell in sideways a second or two before ejection. The model was not crunched as badly as you might expect, but it must have been a big disappointment to Col. Kuhn. (The D18's may be renamed D5's in order to better reflect their long burning time — see pp. 17 and 21 of the October **MRm**.)

I happen to know that the model lifted off at about 15 1/2 ounces. Our Fearless Editor said it was 4 feet long. I have access to a couple of photos Len Fehskens took, including a telephoto shot close to apogee: you can see that one engine is into the delay train but the other hasn't (quite) burned out. Several years ago Doug Malewicki was kind enough to send me a set of charts similar to the Estes ones, but for Centuri engines. Included is a 4.4 second burning E, near the 4 seconds for the D18. (A different form of these charts is in TIR-100.)

What kind of stew comes out of this motley selection of rough informational tidbits. For a C_DA, 6 seems like an excessive value, but it is better in this case to estimate the drag too high rather than low. In fact, at low velocities the drag factor might approach this value. Without writing down all the rigamarole involved in converting the 15 1/2 ounce 40 newton second model to the 25 newton second chart, the results are: The vehicle burns out at 340 feet going 132 fps and coasts 3.1 seconds to a peak of 525 feet (3.1 seconds and 490 feet if I use TIR-100). According to the table on late ejection (Malewicki and Anderson in the February **MRm**) it would take 6.3 seconds for the model to fall back even if we cut the drag factor in half for the

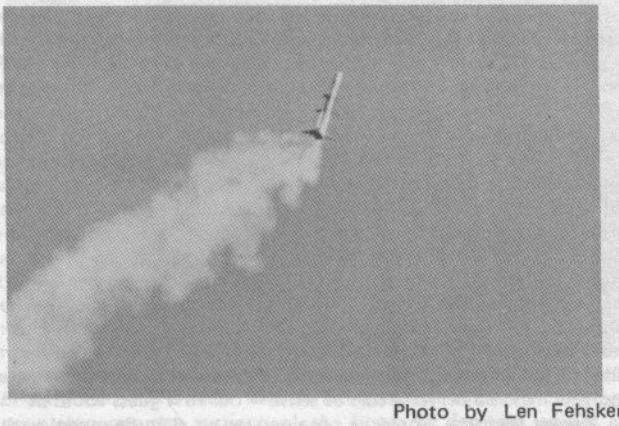


Photo by Len Fehskens

Photo shot almost at apex was used to determine the maximum altitude reached by Howard Kuhn's scale Javelin.

fall (again we are looking on the gloomy side – in fact if it continued to fall on its side it would take considerably in excess of 10 seconds to fall back). What really happened?

A quicky photoanalysis with the help of Len Fehskens (he will write up a method for a future column) indicates an apogee of about 100 feet. With the uncertainties of the measurement it might be better to say "somewhere between 70 and 140 feet." From this range of altitudes it would take 2 1/2 to 5 seconds for the Javelin to fall back. Thus 100 feet is not a good place to be, especially if the engine delay train runs the least bit long. How can we square theory with the Javelin's broken fins?

Of course the photos show us that the engines did not burn exactly simultaneously, but the difference is small and perhaps swallowed up by the fact that our simulated engine burns .4 seconds longer than the real. Further, there is the everpresent fact that real engines do not burn with constant thrust as the charts assume – a large initial peak with a long low sustainer is a substantial deviation. We can quickly look at what would happen in the imaginary and outrageously extreme case in which the impulse is delivered instantaneously at lift-off followed by a 4 second coast BEFORE the delay cuts in. In that case the burn out altitude is zero and the burn out velocity is simply the total impulse divided by the mass: 249 fps. with the model coasting to 340 feet in 3.8 seconds and falling back in 4 seconds or more. Still way too high. The photo does indeed say that the sustainer was low. In order to come virtually to a standstill under power, the engines must have been putting out less thrust than the weight of the vehicle.

Finally we reach a few conclusions. The crash can not be explained by a failure in the simulation, but rather by the engines delivering less than rated total impulse. The sustainer thrust must have been less than 1.9 newtons per engine.

There are a few footnotes to this flight worthy of mention. In spite of the safety disqualification of the flight, the judges went ahead to award second place to the model. It is clear that the letter and intent of Section 11 of the Pink Book provides that such flights may not place in competition. (The Javelin could have been permitted another flight under the catastrophic failure rule.) When queried about this, one of the judges provided an explanation having to do with his sympathy for the modellers who had done so much work. Such a judging failure should never happen again.

As a demonstration of the usefullness of the charts, I would guess that the time spent on the entire analysis of the Javelin flight was slightly more than the time it would have taken to calculate one trajectory by the raw equations.

While I am using plausibility arguments to talk about trajectories, there are a couple of points to make about two R and D presentations given at NARAM. The discussion is based on the abstracts in the October **MRm**.

Mike Micci did a "Computer Analysis of B/G Design Optimization". The purport of this report seems to be that: for the chosen glider weights held constant for a given engine, using various assumed aerodynamic coefficients chosen to be consistent with the usual (Renger type) configuration, and for vertical trajectories, the maximum still air duration occurs for rather small wing areas. A revised version of this report is in the pipeline.

It is possible to demonstrate one of the problems of this approach by doing an even better, albeit incomplete, simulation. The improvement is to use constant wing loading instead of constant weight: as the glider gets smaller it gets proportionately lighter – not perfect, but not too bad an assumption. I will of course assume parameters that are somewhat unfavorable to my argument, so that if I'm off a bit, the conclusions may still stand. Looking at a "punyjet" (MPC minijet or Estes minibrute) A3 engine; if the pod weighs 3 grams and has a drag coefficient of 1, then even at burnout when the engine mass is just over 4 grams, the ballistic coefficient will be .25 oz/ $1 \cdot .23''^2 = 1.1$. For the glider portion a low .015 drag coefficient on wing area and a moderately low wing loading of .0125 oz/in^2 gives a ballistic coefficient of .83 no matter what the wing area. What happens then is, as we add wing area to the glider, the combination of pod and glider will increase in drag and weight and decrease in ballistic coefficient. These conditions contribute to decreased altitude. For this kind of oversimplified analysis, the sink rate may be held constant for the given wing loading. Then the duration (altitude/sink rate) must decrease with increased wing area. The "optimum" glider in our improved optimization isn't there at all: zero wing area. And this makes a perverse sort of sense – our first guess could be that the longest duration would be obtained by an altitude model with a super tiny parasite glider on it. It may be worthwhile mentioning the optimum flight times suggested by the report are very pessimistic. Observed flights indicate the suggested durations can be achieved with much larger gliders. Any adequate B/G simulation involves more complex factors than can be covered in this brief essay.

Brian Beard's abstract of "Model Rocket Flight Simulation" suggests that "The effect of engine variations (due to manufacturing tolerances)....[is] that 'altitude prediction as a competition event, as well as all altitude events, is pretty much luck in getting the right engine.' " With slight reservations, I believe this to be a very sound conclusion. A simple demonstration: Gordon Mandell recently confirmed for me a suspicion – that for small total impulse variations, the variation in the resulting altitudes is proportional to the relative difference in total impulse. Therefore the officially allowed variation of ± 10% would imply the altitude could vary about 20% from the lucky to the unlucky competitor flying otherwise identical models. This is a very difficult handicap to try to control by making your model 20% better than everybody else's. It becomes laughable in Predicted Altitude: at NARAM a couple of firsts resulted from little more than guesses while some people with thoroughly tested models did rather poorly (like +30% above the tested mean). In this context it must be said that Drag Efficiency is poorly designed because the weights chosen tend to make it harder to tell which model is better. To do this a weight near the optimum for the given impulse should be chosen, but then the event is essentially the same as pure Altitude. Better in designing the event to choose a drag oriented criterion such as a minimum body diameter. In duration events the superior model has more of a chance because any edge going up is *multiplied* by any edge coming down (for calm air flights)...also there is more room for optimizing in B/G.

Appendix

The following table lists some close approximations for engines for which no charts are presently available. The italicized charts are especially close. In some cases for which no italicized value is given, two engines bracketing the real value are shown. If you wish to do a simple interpolation where st_B^s is the short burn time and lt_B^s the long, calculate the two altitudes or velocities or coast times and, using the short burn variable SV and the long variable LV, compute $V_{ave} = SV + (LV - SV) \cdot (t_B^{rr} - st_B^s)/(lt_B^s - st_B^s)$. For most purposes this is unnecessary. In fact the burn times can usually vary quite widely without grossly affecting the final altitude or coast time. You may want to convince yourself by plugging various combinations of drag factor and weight into the B4, B6, and B14 charts of TR-10 or TIR-100. For black powder engines (all except the Enerjets) $W_I^s = W_I^{rr} \cdot S$ is quite adequate for casual calculations.

Engine*		Real t_B	Recommended Engine Chart	
			TR-10 (Revised Nov. '70)	TIR-100***
Centuri	E24	1.6	*C6, D13*	C6
	F52	.9	*B6*	B6, D17, F44
	F67	1.2	*B4,* D13	B4, D17
Cox	A6	.42	A5, A8, B14	B14, A8
	D8	1.87	*C6*	C6
FSI**	A4	.7	A5, B6	A5, B6
	B3	1.8	*C6*	C6
	C4	2.5		D7
	D4	2.9		D7
	D6	2.0	**	
	D18	4.		E6
	E5	4.5		E6
Estes	¼A3t	.18	¼A3	¼A3
	½A3t	.36	*B14,* A8	B14, A8
	A3t	.86	*B6*	B6, F44
MPC	½A3m	.43	A5, B14	A5, B14
	A3m	.91	*B6*	B6, D17
	B3m	1.86	*C6*	C6

*Refer to manufacturers specifications and the ballistic tables for full information.

**At one time there was a set of Malewicki charts for FSI engines. It is partly outdated but still useful. The D6 can be simulated by the 2 second C in the old TR-10 (1967) or the present C6.

***TIR-100 incorrectly lists the burn time of the A5 as .42 seconds. It is .32 seconds.

Czechoslovakian Design:

Rubis III

Swift Boost/Glider

BY JAROSLAV DIVIS —— A high-performing Swift Boost/Glider using the advanced techniques employed by Czechoslovakian contest flyers. Designed for use with ADAST B-engines, but able to fly with any B6-4, the Rubis III is a contest winning design.

For several years I have been interested in the design of boost/-gliders. I have observed the flight of many different designs, including those from the U.S. which eject their engine pods after boost. My own experimentation has included variations on glider shape as well as the use of dethermilizers. However, one of my favorite contest birds is the RUBIS III, a good performing model which is easy enough for most rocketeers to build. It was designed to be built from parts available in Czechoslovakia (thus all wood thicknesses are given in millimeters) and flown with an ADAST 5 nt-sec engine with a 3 second delay. Substitutions to use parts available in the U.S.A. should cause no difficulty.

Basically the RUBIS III is an elliptical winged B/G using a fixed engine pod for increased reliability. The wing is made in four sections, glued together to form a polyhedral wing. The span is 344 mm and the length is 455 mm. When fully assembled the RUBIS III should weigh about 21 grams.

Assembly Instructions

The fuselage on the original RUBIS III was cut from 4 mm thick lima wood, however hard balsa wood can be substituted. Both the stabilizer and wing are glued to the bottom of the boom, so sections of the boom must be cut away as shown in the plans to allow these parts to be fitted into place.

The pylon should also be cut from 4 mm thick hard balsa. Using a wood cement, the pylon is glued to the boom and allowed to dry.

The indentations mark the locations of the stabilizer and wing on the lower edge of the boom. Using fine sandpaper the boom should be rounded to the elliptical shape shown in sections B-B and C-C on the plans. Do *not* round the bottom edge of the boom in the areas where the wing and stabilizer are to be attached.

The engine tube on my RUBIS III was hand made by wrapping a paper-glue mixture around a wood form. A three or four layer tube works fine. The tube is then sanded and varnished three times to provide a smooth finish. Final finishing should be done on a horizontal drilling machine as described in the December 1970 **MRm**. For ease of construction, you can use a paper tube from Estes, Centuri, or MPC, having an 18 mm inner diameter.

The nose cone was hand turned, and can be duplicated by turning a cone from balsa on a drill. Again, much time can be saved by selecting a similar cone from one of the manufacturers.

The rudder is cut from 2 mm thick sheet balsa to the pattern shown in the plans. Both sides of the rudder are shaded smooth using fine sandpaper, and the leading edge is rounded. The "trim tab", indicated by dotted lines on the plan, is cut on the top and bottom edges and bent to provide a cricling glide.

Both halves of the stabilizer are cut from 3 mm thick sheet balsa. Using fine sandpaper, the stabilizer sections are airfoiled to the shape shown in the plans.

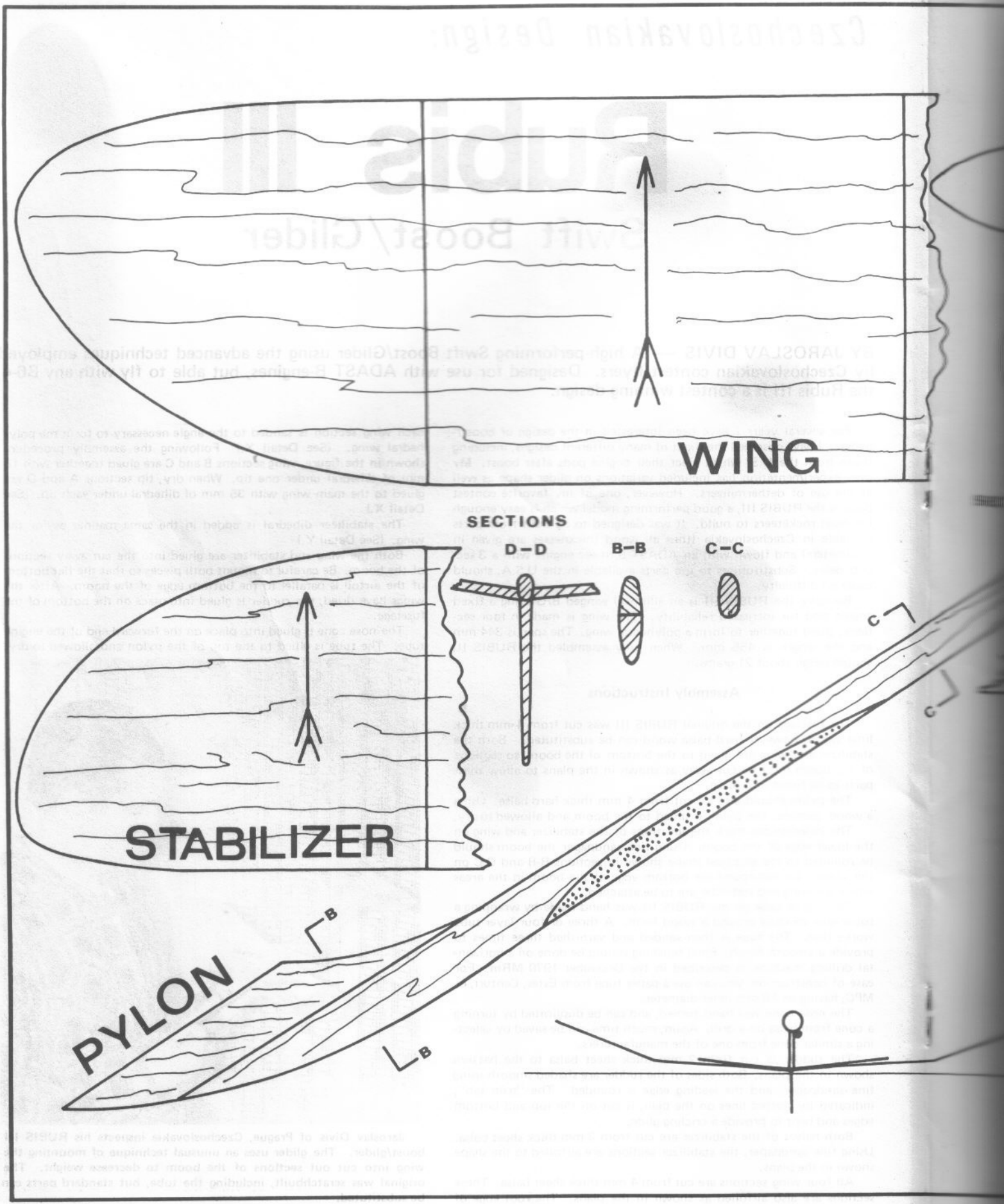
All four wing sections are cut from 4 mm thick sheet balsa. These sections are also airfoiled as shown in the plans. The root edge of each wing section is sanded to the angle necessary to form the polyhedral wing. (See Detail X.) Following the assembly procedure shown in the figure, wing sections B and C are glued together with 15 mm of dihedral under one tip. When dry, tip sections A and D are glued to the main wing with 35 mm of dihedral under each tip. (See Detail X.)

The stabilizer dihedral is added in the same manner as for the wing. (See Detail Y.)

Both the wing and stabilizer are glued into the cut away sections of the boom. Be careful to mount both pieces so that the flat bottom of the airfoil is parallel to the bottom edge of the boom. After the wings have dried, the rudder is glued into place on the bottom of the fuselage.

The nose cone is glued into place on the forward end of the engine tube. The tube is glued to the top of the pylon and allowed to dry.

Jaroslav Divis of Prague, Czechoslovakia inspects his RUBIS III boost/glider. The glider uses an unusual technique of mounting the wing into cut out sections of the boom to decrease weight. The original was scratchbuilt, including the tube, but standard parts can be substituted.


WING
SECTIONS
D–D
B–B
C–C
STABILIZER
C
C
PYLON
B
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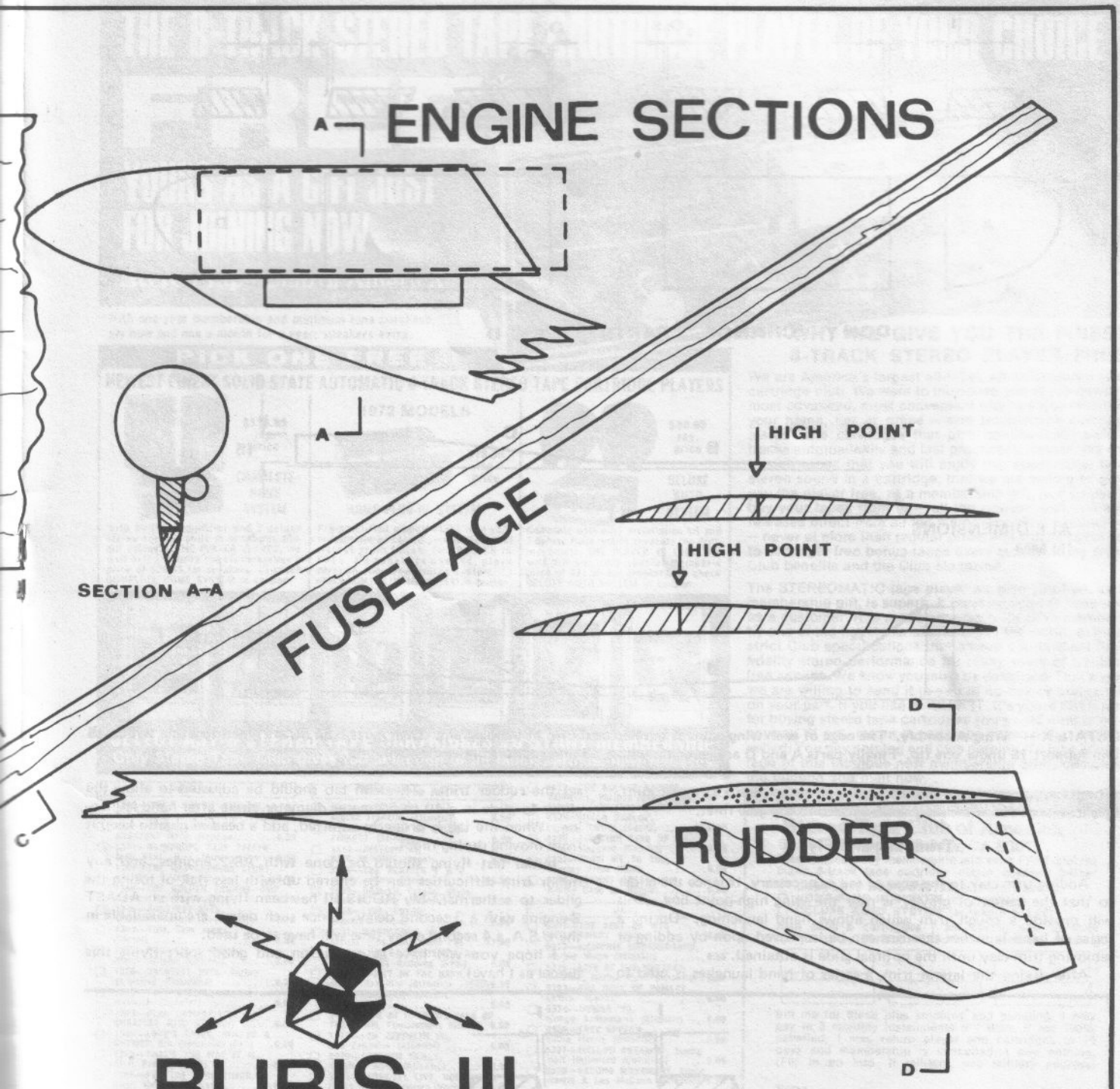


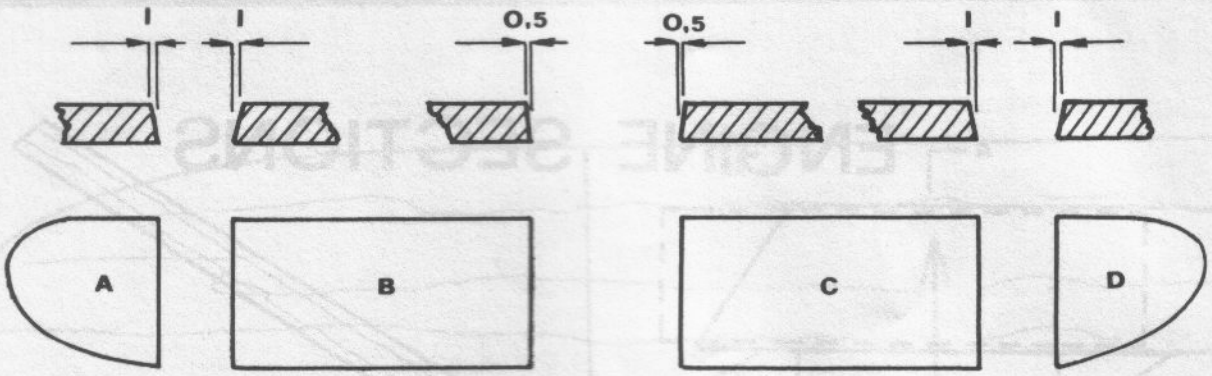
RUBIS III

DESIGNED BY JAROSLAV DIVIS
PRAGUE CZECHOSLOVAKIA

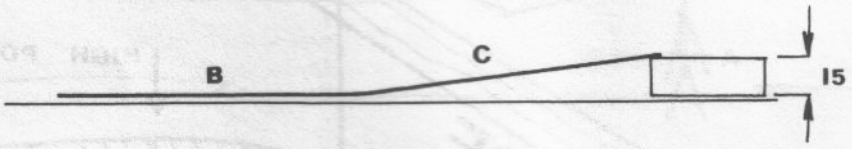
DRAWN BY E.VANĚK

WING SPAN	344 MM
LENGTH	455 MM
WEIGHT	21 GR

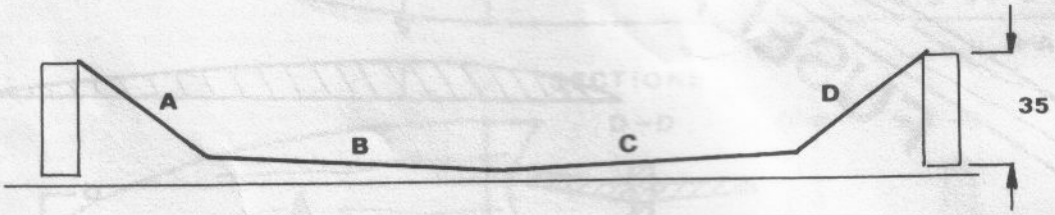
FULL SCALE



DON'T CHANGE PARTS A B C D



ALL DIMENSIONS IN MM



DETAIL X —— Wing Assembly. The edge of each wing panel is beveled as shown in the diagram. Then parts B an dC are glued together with a 15 mm support 15 under one tip. Finally parts A and D are glued on with a 35 mm support under each wing tip.

The tube/pylon joint is filleted with glue to provide a stronger joint. A short length of launch lug can be added to the glue fillet.

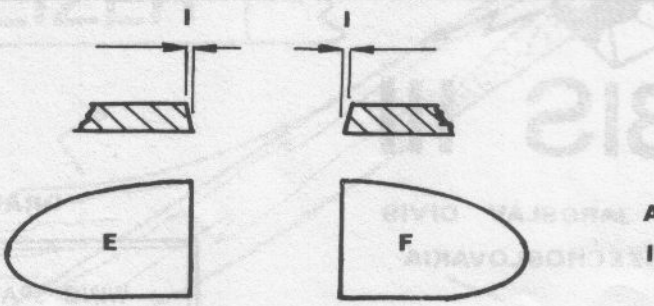
Trimming and Flying

Adding trim clay to the nose or tail as necessary, balance the glider so that the center of gravity is near the wing high-point line. This will provide a rough trim which allows hand launching. During a series of hand launches the trim can be improved upon by adding or removing trim clay until the optimal glide is obtained.

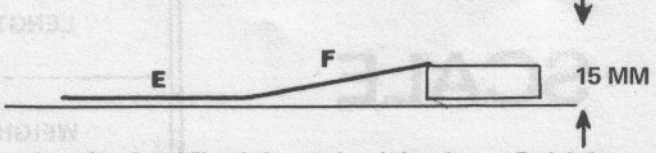
After fixing the lateral trim, a series of hand launches is used to set the rudder trim. The trim tab should be adjusted to allow the glider to glide in a 40 to 50 meter diameter circle after hand launching. When the tab is properly adjusted, add a bead of glue to keep it from moving during flight.

Initial test flying should be done with A8-2 engines, and any minor trim difficulties can be cleared up with less rick of losing the glider to a thermal. My RUBIS III has been flying with an ADAST B-engine with a 3 second delay. Since such delays are unavailable in the U.S.A. a 4 second delay time will have to be used.

I hope you will have as much fun and good sport flying this model as I have!



ALL DIMENSIONS IN MM



DETAIL Y —— Stabilizer Assembly. The root edges of both stabilizer halves are beveled as shown. Both halves are glued together with a 15 mm support under one tip.

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FLIGHT TEST

by Jon Randolph

DB Styrofoam B/G

This month *Flight Test* will examine the K-25, one of a series of competition boost gliders recently introduced by DB Industries, early pioneers in foam wing production. Priced at $2.50, the kit comes complete with all the materials necessary to build a Hornet (1.25 newton-second) B/G.

The glider is a variant of the Renger Flamingo type, differing most obviously in the use of significant decalage in the stabilizer and the more forward position of the pod. Presumably, the decalage (angle between wing and stabilizer) is intended to accelerate the transition from boost to glide with the more forward pod position compensating for the decalage during boost.

Upon opening the K-25 you will notice that there are two sets of instructions. The first set covers the construction of the parachute and nose cone, while the second explains construction of the glider and pod. Although the latter *will* enable you to assemble the glider, the frequent departures from conventional English usage make them difficult to follow. Hopefully, DB will correct this in future releases.

All DB gliders use a pre-airfoiled expanded polystyrene foam wing, requiring special considerations during construction. *Flight Test*'s experience in cutting the pre-marked eliptical wing planform indicates that it is best done with the extra foam backing piece still in place. The wing scratches quite easily so remember to place it on a smooth surface when sanding with 360-400 grit paper. The wing in the kit has a more than adequate airfoil, so don't worry if this is decreased in sanding. If you wish to paint the finished wing, use paints intended for styrofoam — *others, including dope and other laquers, will dissolve it.* Most glues also dissolve foam; consequently, use only adhesives such as Titebond, Se-Cur-It, or epoxy when making the dihedral and attaching the wing to the fuselage.

The remainder of the glider is built from conventional materials. The spruce fuselage is pre-cut to an unusual stepped design. Although somewhat weak in appearance, it held up fine on our test models. The rudder and stabilizer are pre-marked on 1/16" sheet balsa.

The pod is of "piece x" design incorporating a balsa pylon, CMR tubing and vacuum formed nose cone, and a 6" ½ mil polyethylene parachute. Although the pod will hold both ¼A and ½A shorts (18 x 45mm), the ½A6-2s should be used in competition flights.

Three K-25 prototypes were constructed for evaluation. The first two, by Bernard Biales (of B/G fame) and David Thurber (of tracking fame), were built "as is" from the kit. The third, constructed by myself, was modified by decreasing the airfoil, reducing the rudder area, lightening the stabilizer, rounding the fuselage, shortening the nose, and adding a pod to accommodate the ½A3-3m Minijet.

At the launch site both Biales and I watched our gliders "red baron" on their initial flights. Thurber, however, had learned from our mistakes and sanded his "piece x" so that the glider just barely remained attached when the pod was inverted, accordingly turning in a one minute first flight with a ½A6-2s. From subsequent flights it became obvious that one minute durations (no thermals) can be expected from the K-25 with no more than casual balancing. Two minute flights are attainable through more careful trimming, making the K-25 a highly competitive glider.

Next up was my modified version, Biales' glider having been pilfered in the interim by a spectator. Up, and I mean *up* with a ½A3-3m, it went....clean pod separation....good transition to a beautiful circling glide. All the modifications paid off in increased performance with a loss of only one thing - my glider! It was still in that circling glide when it left the area and disappeared from sight.

If the K-25 is unavailable at your local hobby shop, you may order it direct (including 25 cents for shipping) from:

DB Industries
Box 2835, Dpt B,
Mansfield, Ohio 44900.

See you next month.....

Cape Kennedy Area 'Moonwalk Festival' Modroc Display

by Trip Barber

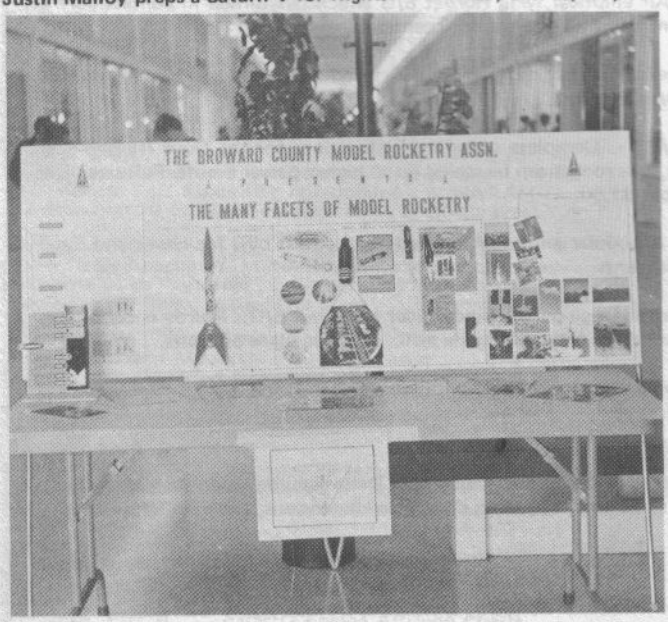
G. Harry Stine watches as Mark Trett and Justin Malloy preps a Saturn-V for flight.

Model rocketry played a major part in the "Moonwalk Festival" activities in the Kennedy Space Center area during the week before the launching of Apollo 15. Visitors to the Cocoa Beach-Titusville area found over 100 special events including a parade scheduled during the festival week. The Space Center Rocket Society, assisted by several other Florida clubs, provided a week long model rocket exhibit at the Searstown Mall. A demonstration launch two days before Apollo 15's flight attracted many spectators to the mall.

The Space Center Rocket Society, the Broward County Model Rocketry Association, and the Modroc I and Modroc II clubs of Cocoa Beach cooperated in a joint model rocket exhibit and demonstration launch. The exhibit, filling over 25 tables and including more than 200 rockets as well as photographs and literature was installed in the Searstown Shopping Mall in Titusville, Florida, on July 18, 1971, and remained in place until the day before the Apollo 15 launching. The shopping center is located just across the Indian River from the Complex 39 Apollo launch site, so many people in town to view the liftoff came by to see the exhibit.

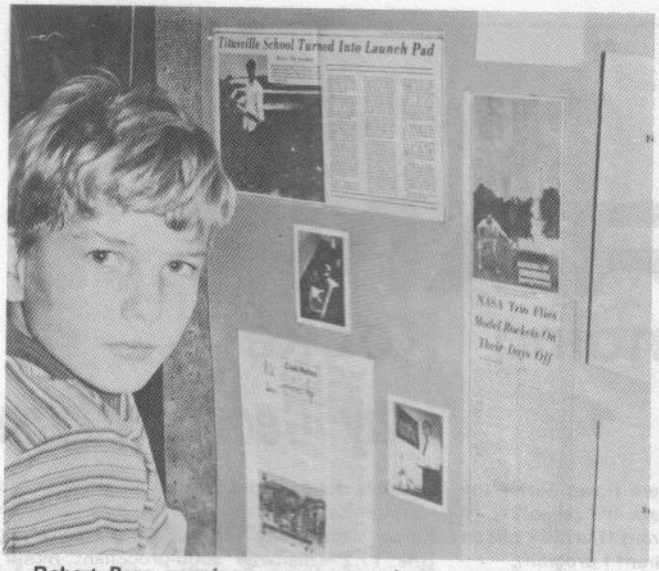
A special model rocket information table was set up in the middle of the mall to display literature relating to the hobby. The information table was manned by a club member during hours that the mall was open and, in addition, each evening an SCRS member sat at the table and assembled a model rocket from a kit. The kit builders answered many questions from shoppers, and often were so busy talking about model rocketry that they had difficulty completing the assembly of a simple kit in the evening's allotted time.

The display included rockets from Cox, Estes, Vashon, Lectronics, MPC, and Centuri. Most manufacturers also supplied literature for distribution. A Saturn V scale model standing near a semi-scale gantry was espe-

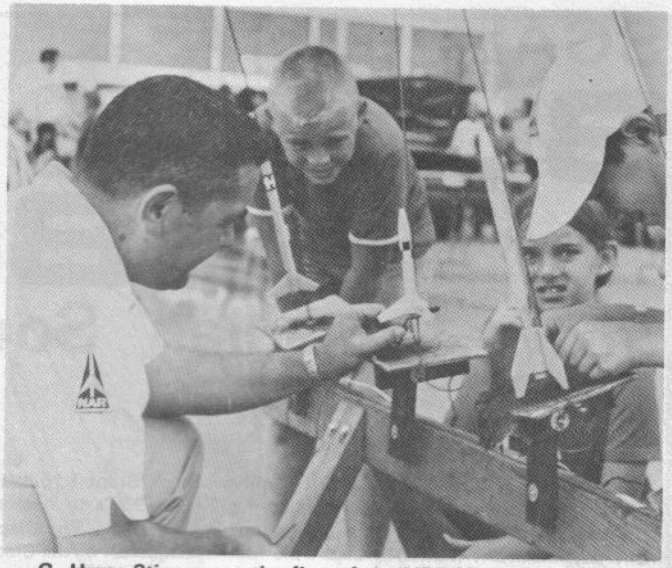


The Broward County Model Rocketry Association provided a display illustrating the various stages of model rocket flight.

Shoppers at the Searstown Mall examine one of the 35 tables of exhibits provided by the Space Center Rocket Society and other clubs from Florida as part of the "Moonwalk Festivals" celebration. Floyd Lundy (wearing glasses, behind display), Design Engineer for Saturn V pneumatic ground support equipment, examines the display.



Robert Page examines newspaper and magazine clippings about Florida area rocket activities. This display, assembled by Leon Davis, was one of about 30 exhibit tables at the display.



G. Harry Stine preps the first of the MPC Minirocs flown at the "Moonwalk Festival," as a number of Florida area model rocketeers look on.

cially popular with the Apollo minded visitors.

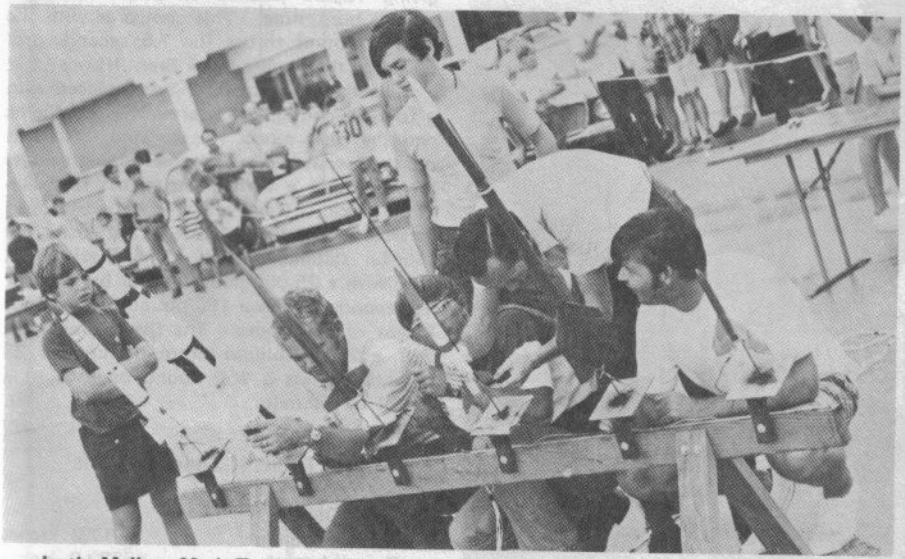
The real highlight of the exhibit was a model rocket demo launching on July 24th - just two days before the lift off of Apollo 15. Though the day was cloudy, as was the entire week before Apollo 15's successful liftoff, a crowd of over 200 spectators gathered in the shopping center for the launchings. Several of the club's most active members, Kennedy Space Center workers, were unable to participate in the launching since they had to finish final checkout of the real bird only 20 miles away.

The Saturday morning launch day arrived with a clear sky, interrupted only by a few white billowy clouds — perfect flying weather. However as launch time drew closer and the rockets were moved from the mall display to the parking lot launch area the entire sky became overcast and the clouds got darker. The first few rockets went up without a hitch, but then the storm hit with full fury. Several balsa models were damaged by the rain, but launching was resumed as soon as the clouds passed.

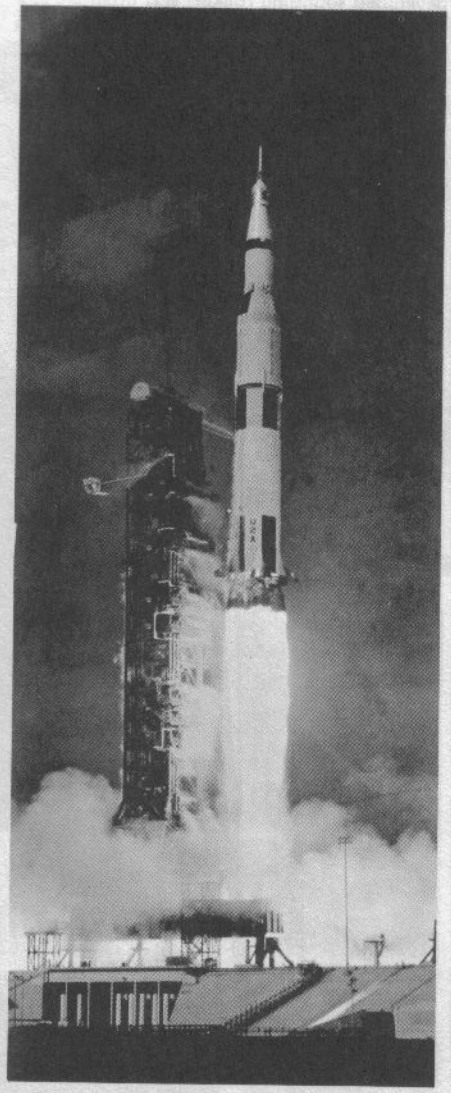
After several beautiful flights by conventional modrocs, the microphone was turned over to G. Harry Stine, who together with Gil Lutz gave a demonstration of the new MPC Minirocs.

The little Minirocs, making their first public appearance in the Southeast, really didn't look like rockets as Harry Stine prepped them. Too small!, was the reaction from those rocketeers in the crowd. But that reaction quickly changed as the first Miniroc lifted off. The first one went right up through the cloud layer, and the others followed right after it.

During the week that the Space Center Rocket Society manned its "Moonwalk Festival" display it was viewed by many thousands of shoppers. Questions asked and answered proved the success of this effort in exposing model rocketry to public attention and attracting new rocketeers.



Justin Malloy, Mark Trett, Bill Connolly, and Phil Hovens adjust their rockets as the first rack of the SCRS "moonwalk Festival" demonstration launch. Chris Connolly (rear), the SCRS 1970 Model Rocketeer of the Year, watches the proceedings. Spectators line the edges of the Searstown Mall shopping center.



Two days after the close of the "Moonwalk Festival" modroc display NASA's Apollo 15 left the launch pad just across the river from the shopping mall. Many of the spectators drawn to Cape Kennedy for the moonshot viewed the SCRS display.

SCALE DATA:
BLACK BRANT II
Canadian Sounding Rocket

by George Flynn

Development of the Black Brant family of sounding rockets began in 1956, when the Canadian Armament Research and Development Establishment (CARDE) began the formulation and production of high-performance solid-propellent rocket motors. The CARDE designed Black Brant I, the first Canadian developed sounding rocket, was intended as a single-stage propellent test vehicle. Thirteen Black Brant I rockets were flown during the late 1950's to demonstrate the reliability of the motor. The Black Brant II vehicle was an outgrowth of the Black Brant I program.

Black Brant II

Black Brant I test studies indicated that the CARDE developed motor in a rocket of suitable design could provide an efficient and economical research tool for the Canadian upper atmosphere research program. Using the 17.2" diameter solid-propellent motor, the new vehicle was to have the capability of carrying a 150 pound instrument package to 100 miles.

Design studies for the Black Brant II sounding rocket were begun in 1959 by Canadair and CARDE. The configuration was generally similar to the Black Brant I, however the II version incorporated an 11½ degree conical nose cone (rather than the shorter 15 degree nose cone on the BBI) giving it a payload volume of 6.2 cubic feet compared to 4.0 cubic feet in the earlier rocket. The nose and forward body section were cast from EZ 33A magnesium-zirconium.

The original version of the Black Brant II employed a three-fin stabilizer. Each fin had an EZ 33A main structure with phenolic asbestos leading and trailing edges. Only a few Black Brant II's were flown in the three-fin configuration. Early test rounds were launched from a special launcher at the Canadian range at Fort Churchill, Canada. In addition, one rocket was flown from the NASA tubular launcher at Wallops Island in 1961.

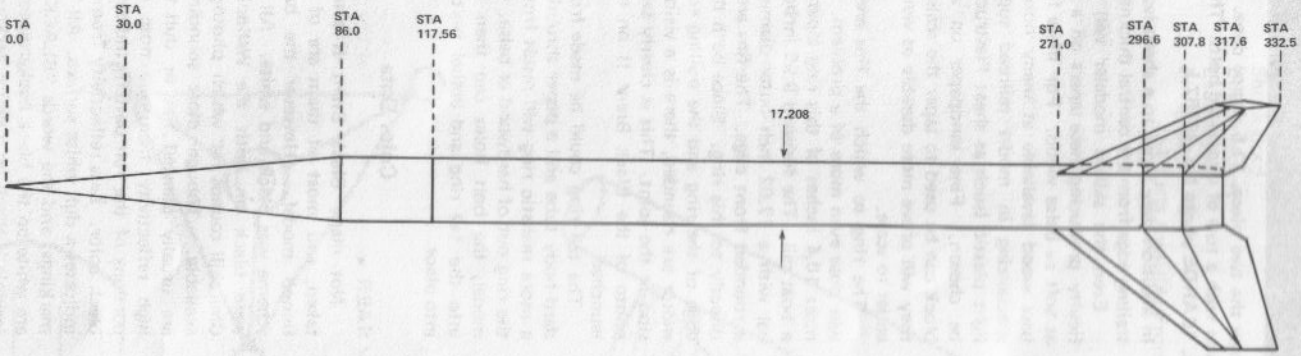
These early Black Brant II's used a motor giving 16,000 pounds of thrust for a 25 second burn time. This compares with the 10,800 pound thrust for 7.5 seconds produced by the smaller Black Brant III.

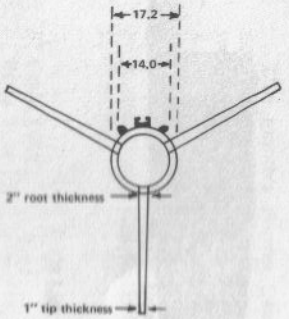
The three-fin stabilizer was replaced with a four-fin configuration after the test flights and the basic motor was uprated. The fins on this version are 8 degrees single wedges incorporating a lightweight matrix and aluminum skin. There are now two developed versions of the Black Brant II, both using the four-fin stabilizing unit. The Black Brant IIA, with a 25,000 pound motor burning for 15 seconds, carries a 150 pound payload to a height of 100 miles. The Black Brant IIB, with a 20,000 pound motor burning for 23 seconds, carries a 150 pound payload to a height of 150 miles.

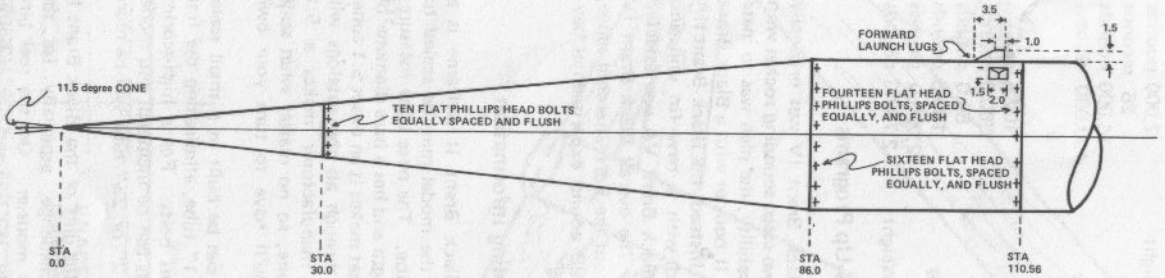
C.A.R.D.E. Black Brant II on NASA launcher at Wallops Island prior to 1961 development launching. Note the roll pattern and markings including "CC IIA IG" stenciled on the fins. (NASA photo L-61-8226.)

Black Brant II Specifications

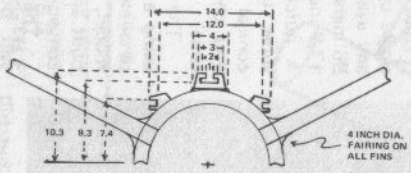
DIMENSIONS		
Outside Diameter	17.2	inches
Overall Length	332.0	inches
Nosecone Length	86.0	inches
Forebody Length	24.56	inches
Fin Semispan (C.L to Tip)	39.0	inches





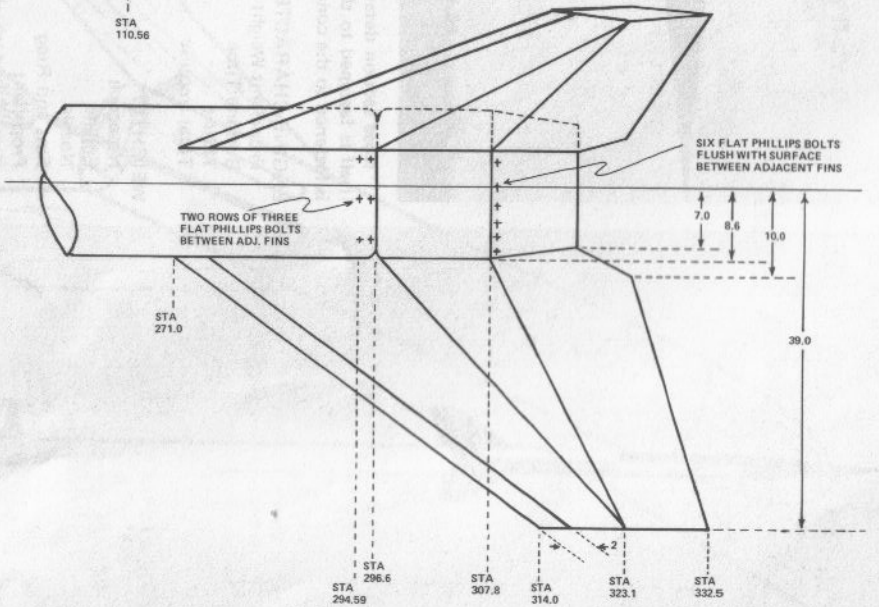


All dimensions in inches.



REFERENCES

CARDE DWG. NO. 590717C
CARDE PHOTOS NO. 24467, 18722, PRO 163
NASA PHOTO NO. L-61-8226

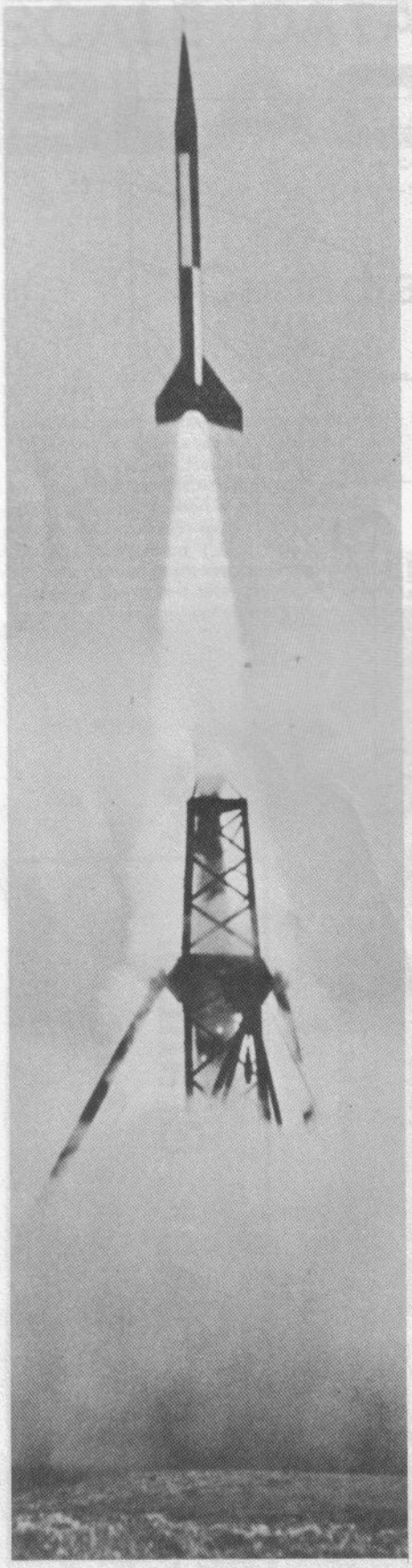


CARDE Black Brant II

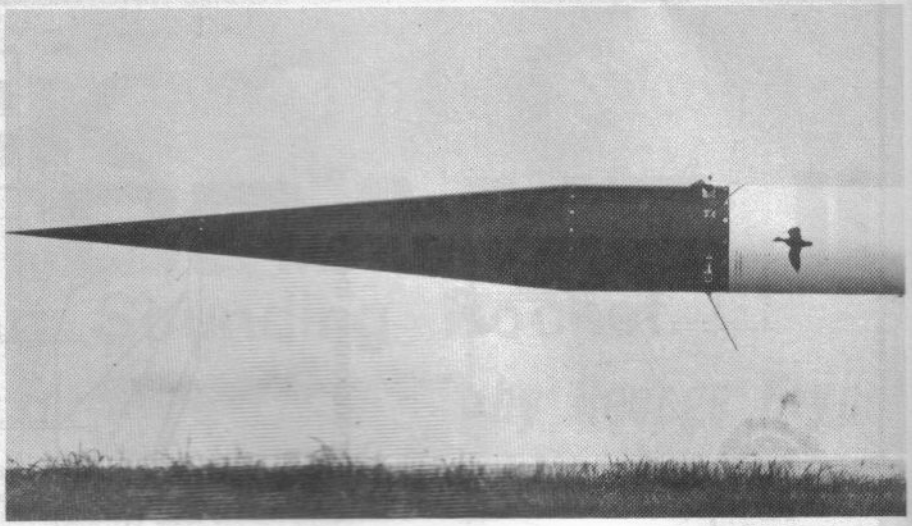
Canadian Sounding Rocket

Drawn by G. Flynn

11/1/71



Liftoff from the Canadian Fort Churchill launch site of a test flight of the Black Brant II. Note the different roll pattern from the Wallops flown rocket. (CARDE photo No. 18722.)



Nose section detail of the Black Brant II shows the two piece, 11.5 degree cone. The cone itself is fastened to the cylindrical payload section with a row of unpainted bolts. The nose tip is fastened to the cone with another ring of bolts. (CARDE photo No. 24467.)

ENGINE CHARACTERISTICS:	
Propellent Weight	2,000 pounds
Burning Time	26 seconds
Thrust	16,000 pounds
Total Impulse	420,000 lb.-sec.

WEIGHTS:	
Nosecone	107.5 pounds
Engine	360.0 pounds
Nozzle	50.0 pounds
Fins and Ring	169.8 pounds
Propellent	2,095.0 pounds
Total Filled Weight	2,782.3 pounds

Follow-Up Programs

When the Black Brant IV was originally suggested as a two-stage sounding rocket with high-altitude capability, the plan was to mate the Black Brant II booster with a Black Brant III upper stage. Instead, the Black Brant IIA motor combined with a new fin unit and designated the Black Brant VA was selected as the booster. The overall Black Brant IV vehicle, flown from the Fort Churchill range, has carried a 108 pound experimental payload to 431 miles.

Modeling Information

Since the Black Brant II airframe is a single cylinder, the model may be scaled to any available tube. The nose cone measures 86 inches in length and has a base diameter of 17.2 inches. That makes it an exact 5:1 cone. A quick look through all the catalogs will show that no manufacturer makes a 5:1 conical nose cone, so no matter what scale you choose you'll have to turn your own cone.

The model can be built in a small scale, using a ¾" or 1" tube, eliminating the fine detailing such as bolts. For a high-scoring model, the bolts can be included, and model built around a 2" or 2½" tube will be more convenient.

The entire fin unit of the Black Brant II will pose a challenge, especially for the beginning scale modeler. On the real bird the fin assembly, tail ring and fins, is bolted to the rear of the motor unit. The fins themselves taper slightly from the root to tip. In addition they taper to a sharp leading and trailing edge from the central thickness.

Even the skilled modeler will have difficulty producing these tapers on a material as soft as balsa wood. For these fins either bass wood (available at many hobby shops specializing in model railroad supplies) or light plastic (such as sheet Plastruct) should be chosen. Fine sandpaper on a sanding block can be used to taper the scale fins, and they will prove more durable as well as being easier to scale.

The ring to which the fins are attached will pose even more of a problem. The rearmost 10.4 inches of this ring tapers forming a boat tail. The forward 9.95 inches is conical with a 17.02 inch outer diameter and a a rounded front edge. The fins are fastened directly to this ring. Since both the leading edge of the ring and the trailing edge of the motor are rounded, there is a visible depression at the joint. This is clearly seen on the photo of the Black Brant II on the NASA launcher.

The tail ring could be made from a standard body tube and a paper shroud, however a more realistic ring will result from turning the ring out of hardwood or balsa. On a large model, the bolt holes can then be drilled into the tail ring and actual bolts inserted into place.

Color Data

Not many Black Brant II photos were taken, and most of them are of the four-finned model. However the basic paint scheme was black and white. All three fins were black on both the Wallops and Ft. Churchill rounds for which photographs are available. Though most sounding rockets are usually painted flat or dull black, the high reflectivity from the nose and black portions of the roll pattern indicates a gloss black color. Less reflectivity from the white indicates a dull white surface. All "CARDE" markings, and the words "BLACK BRANT" are white on the black background. The bird insignia is black on a white background. The heads of all bolts, which are countersunk flush with the surface, are left unpainted metal on most Black Brant II rounds.

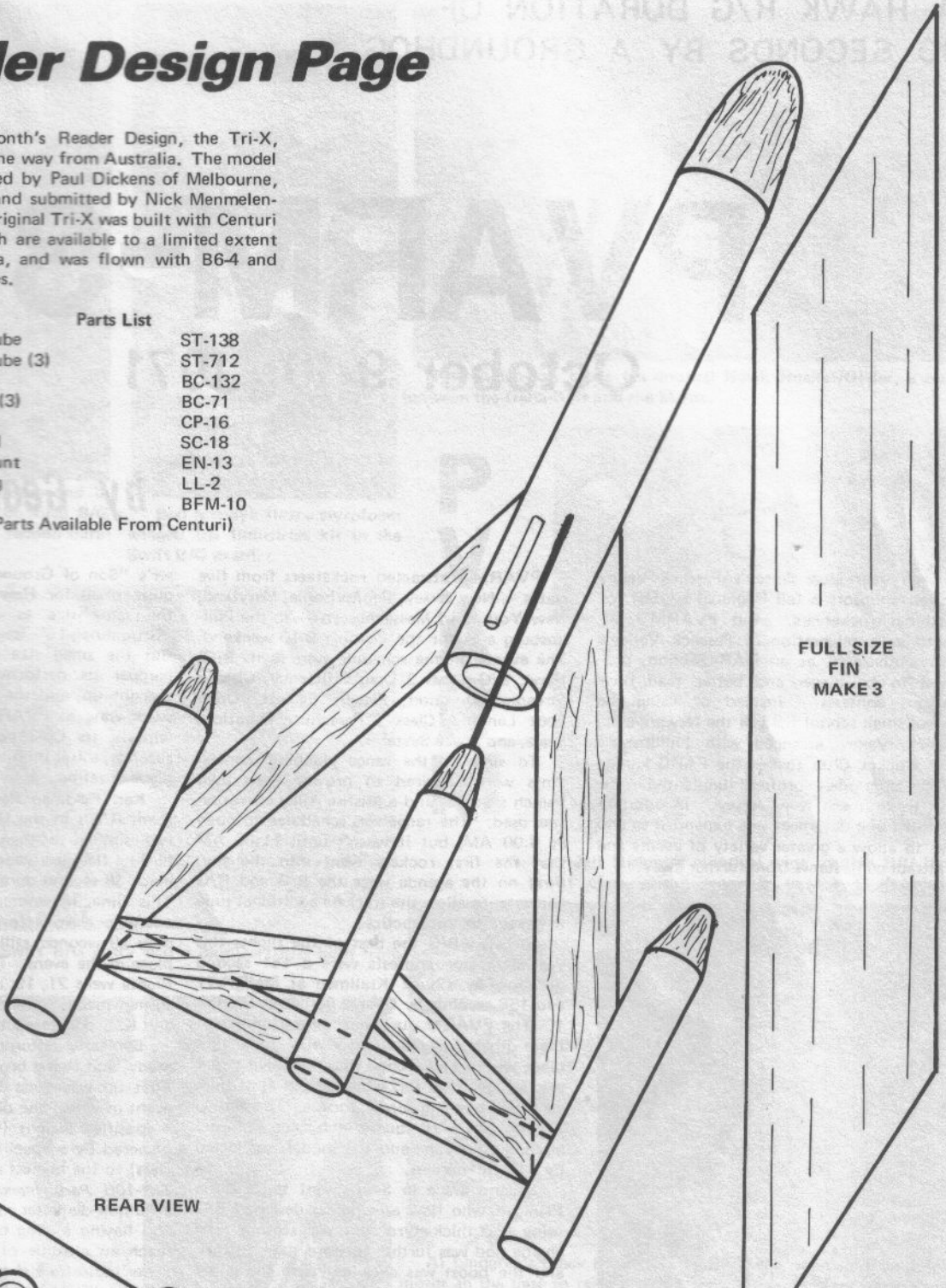
Reader Design Page

This month's Reader Design, the Tri-X, comes all the way from Australia. The model was designed by Paul Dickens of Melbourne, Australia, and submitted by Nick Menmelengas. The original Tri-X was built with Centuri parts, which are available to a limited extent in Australia, and was flown with B6-4 and C6-5 engines.

Parts List

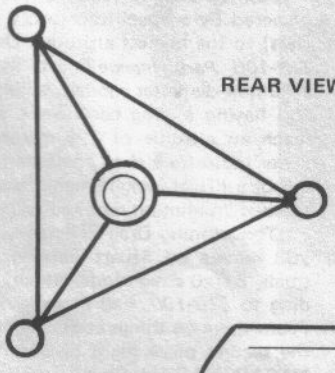
8" Body Tube	ST-138
4" Body Tube (3)	ST-712
Nose Cone	BC-132
Nose Cone (3)	BC-71
Parachute	CP-16
Shock Cord	SC-18
Engine Mount	EN-13
Launch Lug	LL-2
Fin Balsa	BFM-10

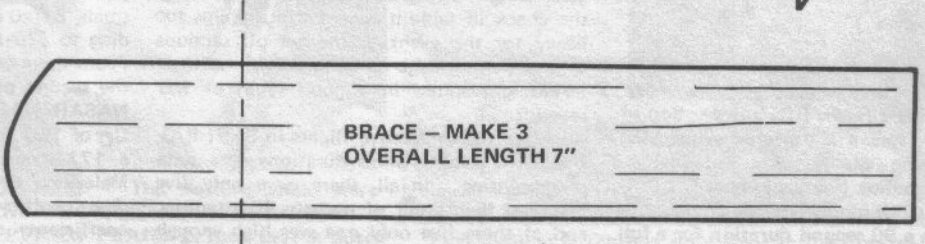
(All Parts Available From Centuri)



FULL SIZE FIN MAKE 3

REAR VIEW





BRACE – MAKE 3
OVERALL LENGTH 7"

A HAWK R/G DURATION OF
90 SECONDS BY A GROUNDHOG . . . . .

PVARM-3

October 9-10, 1971

by George Flynn

Each year New Jersey's Pascack Valley Section sponsors a fall Regional contest for Northeast rocketeers. But PVARM-3, arranged as a celebration of Pascack Valley's 10th anniversary as an NAR Section, promised to be bigger and better than their previous contests. Instead of using the normal small school field in the Newark area, Pascack Valley arranged with Phillipsburg Area Rocket Club to use the PARC launch field, a large open cornfield (unplanted in the fall), in southern New Jersey. In addition the usual one day meet was expanded to two days to allow a greater variety of events and to attract contestants from further away.

Dave Klouser's Hawk R/G entry -- Son of Groundhog -- was a C-powered swing-wing about the same size as Jon Robbins' A-powered Groundhog (see September '71 MR-m for plans). The model boosted straight up, and turned in a 90 second duration for a full one minute lead over the second place entry.

PVARM-3 attracted rocketeers from five states — New Jersey, Pennsylvania, Maryland, New York, and Massachusetts — to the Phillipsburg area for the October 9-10 weekend. The events on the schedule were Swift B/G, Hawk B/G, Class 2 Drag Efficiency, Class 2 Streamer Duration, Pigeon Eggloft, Open Spot Landing, Class 2 Parachute Duration, Scale, and Space Systems.

To simplify the range planning, contestants were required to provide their own launch systems, and a Misfire Alley operation was used. The range was scheduled to open at 9:00 AM, but it wasn't until 11:00 AM that the first rockets went into the sky. First on the agenda were the B/G and R/G contests, to allow the trackers additional time to get set up and practice.

In Swift B/G the best of the flights this year at major contests were a 141 second duration by Chuck Krallman at MMRR-71 and 158 seconds by George Purcell at GERM-1. The PVARM durations were in line with these others, as Bernard Biales took first place with a 158 second duration. His glider was an ejectable flex-wing carried aloft by a clamshell opening carrier rocket. The gliding portion was a 78 square inch wing of ¼ mil aluminized mylar, and the model was lofted by a B3-5m minijet.

Second place in Swift went to Chris Flanigan who flew an original designed B/G using a ¼" thick styrofoam wing section. The engine pod was further forward than normal, and the boost was excellent with the glider turning in a duration of 125 seconds. In third place was Dave Hendricks who flew an original design using a double boom and rectangular wings. When Dave brought the glider to the check in table it weighed in 3 grams too heavy, for the event, so he cut off sections of the trailing edge of both wings. A little trimming resulted in a good flight of 107 seconds.

After the impressive flights in Swift B/G, the Hawk Rocket/Glider durations were quite disappointing. In all, there were only five qualified flights out of perhaps 40 attempts, and of these five only *one* was high enough to be significant. That flight was Dave Klouser's "Son of Groundhog." The model was quite small for Hawk R/G measuring about the same size as Jon Robbins' Sparrow "Groundhog-16" (see September '71 MRm). But the small size of Dave's glider didn't hamper its performance. The boost was straight up, and the model became the first swing-wing at PVARM to fully deploy both wings. Its C6-3 powered flight lasted 90 seconds, a full minute longer than the second place duration.

Karl Feldman flew another of his styrofoam R/G's in the Hawk event. The model was similar to the delta-winged styrofoam bird he flew last year, at PVARM-2, to a first place 38 second duration in Swift R/G. This This time, however, the model, which used operable elevons for trim change, turned in only 23 seconds; still good enough for second place in the event. The other three qualified flights were 21, 19, and 16 second durations turned in by Shirley Lindgren, Al Lindgren, and K. Brodie respectively.

By early afternoon the trackers were ready, and flying began in the altitude events. First up was Class II Drag Efficiency — an event in which the object is to fly a model of a specified weight (100 to 110 grams) and powered by a specific category of engine (C class) to the highest altitude. Using Centuri's *TIR-100 Performance Charts* as a reference, a 20 mm diameter model weighing 100 grams and having a drag coefficient of 0.5 should reach an altitude of 325 meters. Anything lower indicates a drag coefficient higher than 0.5 or a liftoff weight higher than the advantageous "minimum required weight."

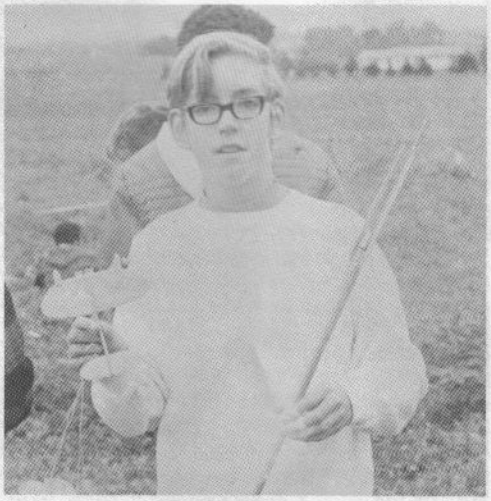
The winning Drag Efficiency flight was to 283 meters by Stuart Zaharek. He used a small, BT-20 sized model which, again according to *TIR-100*, had a tracked C_D of 0.86. From there on things start getting worse, with the second place flight of 244 meters by the NASAR NARAM Squad corresponding to a C_D of 1.3. Third place in D Division went to a 177 meter flight which goes far off the Malewicki C_D charts. This corresponds to a drag coefficient of 3.3. These high drag coefficients can only be explained by assuming static or dynamic problems during

PVARM

Dave Hendricks took second in Swift with his double boomed B/G which turned in a 107 second duration.

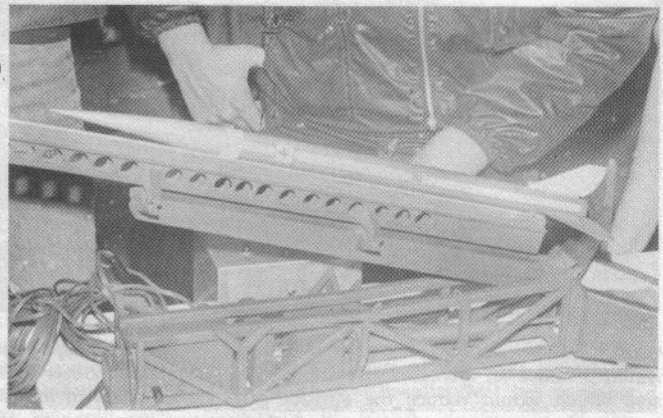
Bob Mendyk flew a styrofoam winged DB Industries kit in the Swift B/G event.

Tom Ackerman preps his unusual Hawk Rocket/Glider, a cross between the Delta-Katt and the Manta.

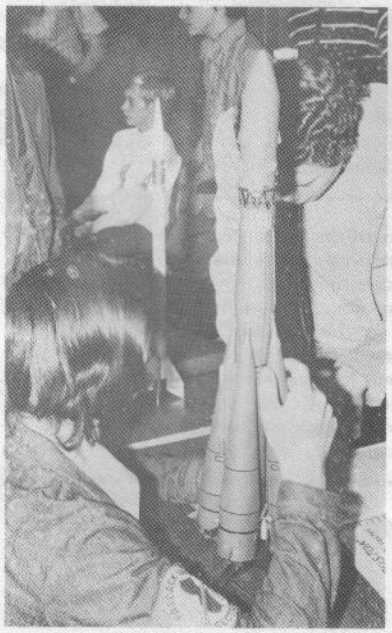


Jeff Risberg's elliptical wing, canard B/G flew out of a piston launcher in the Swift event.

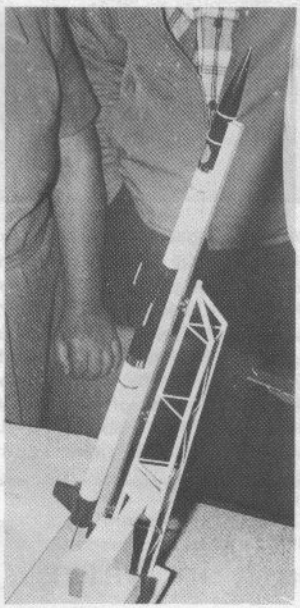
Mike Heidenberger's Swift B/G entry was a Sky-Dart B/G built from the Estes kit.



Al Lindgren's Black Brant III, on a launcher with a self-contained motor in the base to raise the rocket to firing position, took second place in Space Systems.



Stuart Zaharek's ill-fated NARAM scale Vostok was repaired for PVARM and took first in C Division Scale.



The Bossong-Dricks Aero-High, second place model at PVARM-2, took first in Space Systems at PVARM-3.

First place in D Division scale went to the Bossing-Dricks Team's model of the U.S. Navy Phoenix.

PVARM-3 Results

Swift Boost/Glide

A Division		
1st	R. Szelter	41 sec.
	(no other qualified flights)	
B Division		
1st	Greg Lindgren	73 sec.
2nd	Frank Mendyk	32 sec.
3rd	B. Crawford	25 sec.
C Division		
1st	C. Flanigan	125 sec.
2nd	S. Zaharek	68 sec.
3rd	T. Mendel	66 sec.
D Division		
1st	B. Biales	158 sec.
2nd	D. Hendricks	107 sec.
3rd	R. Dolan	106 sec.

Class 2 Design Efficiency

A Division		
	(no qualified flights)	
B Division		
1st	Frank Mendyk	190 m.
	(no other closed tracks)	
C Division		
1st	Stuart Zaharek	283 m.
2nd	NASAR-NARAM Squad	244 m.
3rd	James Horton	242 m.
D Division		
1st	Joseph Osborn	219 m.
2nd	Shirley Lindgren	192 m.
3rd	Karl Feldmann	177 m.
3rd	Robert Dolan	177 m.

Hawk Rocket/Glider

A Division		
	(no qualified flights)	
B Division		
	(no qualified flights)	
C Division		
1st	Dave Klouser	90 sec.
2nd	K. Brodie	16 sec.
	(no other qualified flights)	
D Division		
1st	Karl Feldmann	23 sec.
2nd	Shirley Lindgren	21 sec.
3rd	Al Lindgren	19 sec.

Class II Streamer Duration

A Division		
1st	Tom Ace	29 sec.
2nd	Leslie Lindgren	18 sec.
3rd	R. Gezelter	4 sec.
B Division		
1st	P. Korzon	59 sec.
2nd	S. Smargassi	42 sec.
3rd	B. Crawford	37 sec.
C Division		
1st	P. Covell	75 sec.
2nd	P. Giguere	72 sec.
3rd	R. Mendyk	64 sec.
D Division		
1st	Gardenghi/Severn Team	75 sec.
2nd	Al Lindgren	42 sec.
3rd	J. Frankenfield	41 sec.

Scale
(Static Judging Only)

A/B Division		
1st	Greg Lindgren	755 pts.
2nd	Peter Korzon	701 pts.
3rd	Leslie Lindgren	648 pts.
C Division		
1st	Stuart Zaharek	785 pts.
2nd	Tony Mendel	658 pts.
3rd	Mark Newfeld	654 pts.
D Division		
1st	Bossong-Dricks Team	844 pts.
2nd	Al Lindgren	790 pts.
3rd	Shirley Lindgren	662 pts.

Space Systems
(Static Judging only)

All Divisions		
1st	Bossong-Dricks Team	1165 pts.
2nd	Al Lindgren	1033 pts.
	(no other entries)	

boost. Either "coning" or severe oscillations would produce an increased effective frontal area which would reduce the altitude achieved. At all the contests at which Drag Efficiency has been flown the drag coefficients obtained by using *TIR-100* are at or above 0.8, though wind tunnel testing and theoretical calculations indicate that drag coefficients in the range of 0.4 are possible.

By late afternoon the effect of getting started two hours later than planned began to show. The sun was only about 20 degrees above the horizon as the Egglofting event got underway, giving less than 1½ hours to complete the event. As it worked out, almost 50% of the rockets were still unflown when the trackers called in to report that it had gotten so dark that it was impossible to follow the birds. This resulted in the postponement of Egglofting until Sunday morning.

Static judging of the Scale and Space Systems models took place all day Saturday. The variety of models was much greater than has been seen at other meets, even though the number of entries was quite low. At the end of the static judging the Bossong-Dricks Team led D Division with 844 points for their model of the Phoenix. This model of the U.S. Navy surface-to-air missile stood about 16 inches tall, and was highly detailed right down to the markings. In second place in D Division was Al Lindgren with 790 points for his scale model of the U.S.A.F. Falcon air-to-air missile. This model was scaled around a tube of just under 2" diameter, and was modeled after a production version Falcon loaned to Space Age Industries for dimensioning of their kit.

In C Division Stuart Zaharek led after the static judging with 785 points. His model, a

Next month in MRm:

MARS-V Contest Report

Russian Vostok, was the same one which pranged at NARAM-13 when the FSI D18 didn't put out enough thrust to keep it moving. The model had been rebuilt after NARAM to repair some of the damage, and this time he planned to fly it with an Estes D13. Greg Lindgren's huge model of the Boosted-Arcas led the static judging in A/B division. This model, which netted 755 static points, stood almost 4 feet tall and must have been close to the upper weight limit.

In Space Systems there were only two entries, both relics of PVARM-2. Quite surprisingly, they finished in the opposite order than at last year's meet. This time the Bossong-Drick Team's Aero-High netted 1165 points. Al Lindgren's model of the Black Brant III, launched from a standard Nike launcher, was awarded only 1033 points.

On Saturday evening a special event was planned for PVARM contestants — a paper airplane contest. There were two categories, duration and distance of flight, and only one rule. "We have several thousand obsolete NAR flyers," Bob Mullane announced, "and your planes must be made out of them." First place in the duration event went to Glen Beer with 3.9 seconds, while Henry Henderson took first in the distance event. However the rainstorm which interrupted paper airplane flying foreshadowed things to come.

It was raining quite heavily on Sunday morning, and the weatherman wasn't too optimistic about any improvement during the course of the day. A contestants meeting was held and, after a discussion of the alternatives available, it was decided to terminate the contest and award trophies for those four events which had been completed on Saturday. There was some disappointment among those contestants who had traveled considerable distances to the contest, but the continuing rain was quickly turning the field to mud and most everyone agreed that continuing the contest would have been difficult.

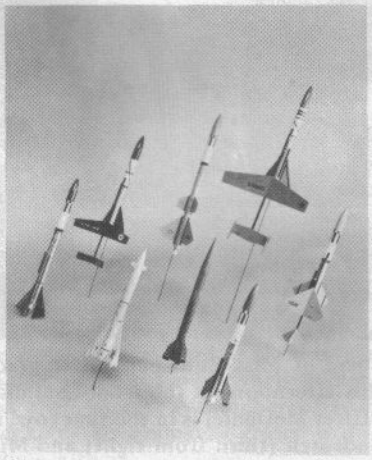
Sunday's rains canceled the Eggloft event, though many models were flown on Saturday. Glen November's three stager using a CMR capsule was one to make a successful flight....

....and the Gardenghi-Severn Team's two stage model was another which flew. But when Saturday's flying was closed by darkness, more than a dozen models were still unflown.

New Product Notes

Estes Industries has announced it had started manufacturing at its Penrose, Colorado, plant the complete line of cold-propellant model rockets developed by Vashon Industries. A subsidiary of Damon Corporation, which is also Vashon's parent company, Estes is the world's leading manufacturer of model rockets and supplies.

"These cold-propellant rockets will not compete with the Estes line of solid-propellant models," says President Vernon Estes. "We are simply adding a new type of product to make model rocketry activities more interesting and challenging, and help rocketeers discover new ways to have fun." Estes now will offer some 80 model rocket kits.



The new Estes cold-propellant rocketry line.

Estes cold-propellant model rockets are powered by RP-100 Propellant, a gas that is non-flammable, non-explosive, and non-toxic. It produces no odor, or heat, so that prelaunch checkouts can be safely conducted indoors. *No special permit or license is required to use RP-100 Propellant anywhere in the USA.*

Like any other Estes birds, the basic, parachute-recovery, cold-propellant models are easy — and fun — to build and fly. They have a nose cone made of styrofoam or balsa wood, a cardboard body tube, balsa fins, and an aluminum engine that holds the propellant. They can be launched mechanically or by remote electrical control, and they will reach altitudes of up to 1,000 feet, leaving behind them a realistic jet trail.

The new Estes line also includes two "jet airplane" models, also powered by RP-100 Propellant, that are hand-launched. They climb, loop, roll, and dive in spectacular fashion, then gently glide back to earth.

Upon request, Estes Industries (P.O. Box 227, Penrose, Colorado 81240) will send, free of charge, its cold-propellant model rocket catalog.

Recover Systems (471 Philadelphia Ave., Massapequa Park, NY 11762) has introduced several specialty items of interest to model rocketeers. Aluminized mylar streamers, one side silver and other side your choice of red, blue or gold, sells for $1.35 for 3 plus 25 cents postage. The styrofoam nose cone used for the "Sputnik", an odd-ball design described in an old Estes "Model Rocket News", is priced at $1.25 plus 25 cents postage. A Fin Alignment Tool is also available at $1.25 plus 25 cents postage.

Several new official NASA publications dealing with rockets and satellites are now available through Rocketlab/MR (Post Office Box 5636, China Lake, Calif. 93555). These books include *This New Ocean*, an official NASA history of Project Mercury including many photos. This 681 page hardbound book sells for $6.00. *Project Gemini*, a 308 page book dealing with the two-man earth orbital program sells for $3.25. *Exploring Space With a Camera*, a 214 page collection of photos of the earth, the moon, and the planets ranging from early sounding rockets photography to the Mariner Mars photos, sells for $4.75.

In addition, Rocketlab/MR has available collections of NASA photagraphs of the Apollo project. A series of 37 color and black and white photos, some 8" x 10" and others 16" x 20", detailing the Apollo 11 moon landing mission, is available for $8.25. A similar collection of 10 Apollo 12 photos sells for $2.00.

A collection of 12 8½" x 11" photos of the Apollo 15 mission is available from Space Arts (PO Box 5366, Titusville, Fla.). The collection includes a crew photo and pictures of the lunar mountains, LM, CSM, Lunar Rover, Hadley Rill and more. The set of 12 prints is priced at $2.50. A complete catalog of space items is available for 25 cents.

THE MODEL ROCKETEER

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

The Model Rocketeer is published monthly in **Model Rocketry** magazine by the National Association of Rocketry, Box 178, McLean, Virginia 22101. The National Association of Rocketry, a non-profit educational and charitable organization, is the nationally recognized association for model rocketry in the United States. **Model Rocketry** magazine is sent to all NAR members as part of their membership privileges. NAR officers and trustees may be written in care of NAR Headquarters. All material intended for publication in *The Model Rocketeer* may be sent directly to the editor.

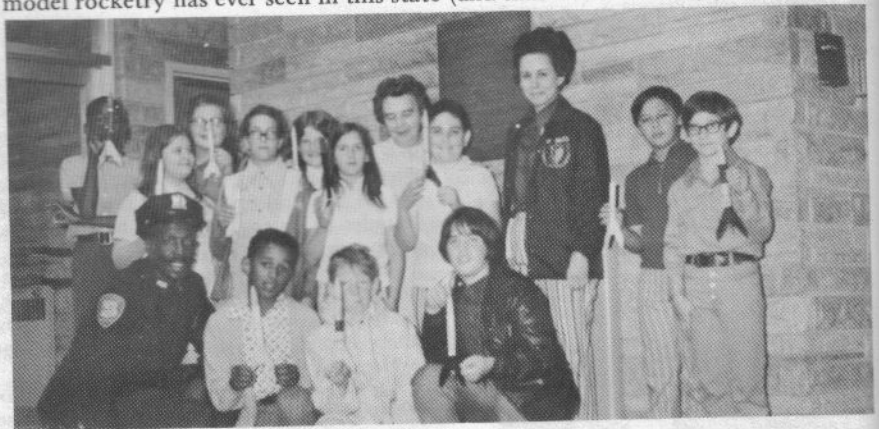
The Cop Who Loves Rockets

by Bob Mullane

(Bob is the former president and newsletter editor of the Pascack Valley Section in New Jersey. He has also served as LAC Chairman, and he is presently working with the publications committee.)

How often has your club met with legal troubles causing you to think, "If only we had a cop interested in rocketry..."? Well, in our area (north-eastern New Jersey) we do. Not only is he interested in model rocketry, but he's become one of the most active rocketeers and boosters of the hobby we've seen in many a year. His name is Officer James McDaniel, and he's assigned to the Police-Community Relations Bureau of the Elizabeth, N.J. Police Department.

Officer McDaniel became interested in rocketry after his son started building rockets as a result of the cover story in the December, 1970 **Science and Mechanics**. Jim started writing letters, and one to the Goddard Space Flight Center brought Jim my name and me a call from him. That started the greatest boost model rocketry has ever seen in this state (and that boost has only just begun).



Officer Jim McDaniel poses with the members of Miss Bodzioch's fifth grade class at school 23 in Elizabeth. Jim spent his afternoons at the school building rockets with the students for two weeks. Officer McDaniel is in the first row, at the far left. In the second row are Miss Bodzioch (third from right) and Miss Thompson (fifth from right), the school's principal. (Photograph by Bob Mullane.)

Jim loves kids and is always trying to do more for them. He sees model rocketry as one of the greatest things a kid can do. In 1957, Jim received the PAL (Police Athletic League) award for outstanding service to children, and in 1958 he was Elizabeth's "Policeman of the Year". In 1967, he was one of three policemen sponsored by the Elizabeth Human Relations Commission to attend a week long institute directed by the National Conference of Christians and Jews. In 1970, the Human Relations Commission presented Jim with the Dr. L. Greeley Brown Award. Jim had just been appointed to the newly-formed Police-Community Relations unit when he was given this award.

As soon as he came to a Pascack Valley Section meeting, Jim started dragging me with him to a head-spinning series of lectures and meetings. A number of great programs for model rocketry have resulted from these meetings (and from a large amount of groundwork laid by Jim prior to the meetings).

Jim's been making the rounds of the schools (both public and private) in Elizabeth and the surrounding towns, usually on his own time, and showing the students his collection of rockets while explaining model rocketry and the space program. Jim's presentations are usually followed by rocket building sessions (sometimes, an hour or two a day has been set aside in the school for building rockets). On any evening Jim's office is packed with kids building rockets, and Jim is often forced to lock the door to prevent overcrowding. When a launch is held, Jim's camper arrives and unloads a capacity crowd of kids of all shapes and sizes. At other times, Jim can be seen driving to the nearest hobby shop with a carload of kids. In addition to schools, lectures have been given to the Boy Scouts of America and the Pioneer Boys of America. In October, a demonstration was held at a Boy Scout encampment that was attended by more than 1000 Scouts. Local industries have been given demonstration launches, tentatively agreed to donate large sums of money (mind bogglingly large sums!) for a program which Jim is setting up through the Union Council of the Boy Scouts for ghetto (or, in the current euphenism, "inner city") kids. In the spring Jim approached the program director for the Newark Archdiocese Catholic Youth Organizations (CYO) with a "great new program" and proceeded to create a modroc program for the CYO Summer Day Camps (and a job for me in an otherwise austere summer).

Jim introduced Dr. Howard Bueschel, the Director of Aerospace Education for the New Jersey Department of of Education, to model rocketry (Dr. B. is a long time airplane modeler), and Dr. Bueschel is now using model rocketry in his presentations to schools and PTAs. At Dr. Bueschel's invitation, Jim and I attended the formative meeting of the NEW Jersey Aerospace Education Association (NJAEA) and became charter members. Jim was elected to the executive committee of the NJAEA.

Sounds fantastic? Well, it is, and Jim says, "I haven't even started yet." I can't wait to see what'll happen when he gets started! Jim believes in pushing two aspects of rocketry, education and recreation. He believes that rocketry can stir the interests of poor students and offer greater opportunities for the good student. He also believes that rocketry is *just plain fun!* (And what better way is there to learn than when you are having fun? It's about time our educators realized that it's unnatural for kids to sit in unmoving silence, and that kids can learn much faster and much more material when allowed to have fun and work on their own.) A number of teachers are starting to hold rocketry programs as either a direct or indirect result of Jim's efforts.

Jim believes in fun and is a jolly fellow, always smiling and punctuating every other sentence with a hearty belly laugh. He believes in treating all people with respect; when asked if he finds police work a dangerous profession, Jim replied, "It's all in the hands of That Man (pointing towards the heavens). If He's ready for you, there's nothing you can do. But, if you treat everyone as you'd like to be treated, you'll get along OK."

Jim is a ham radio operator (Station W2YGF) and loves to travel, as does his entire family. The McDaniel family (Jim, his wife Bernice, his 14-year-old daughter Suzzette, and his 11-year-old son Jonathan) have seen much of this country in their camper, and this year's vacation just happened to put them in the vicinity of Cape Kennedy on the morning of the Apollo 15 launch.

Jim has been on the police force since 1953, and in that time he has completed courses in salesmanship (you should see him sell model rocketry) and working with young people. (the kids all love him). Since Elizabeth has a Spanish-speaking population of over 35,000, Jim learned to speak Spanish and is referred to in the Latin community as "Jimmy el policio". Under a federal grant, the Police-Community Relations unit is obtaining a television production facility to aid in its work, and Jim will be one of three officers trained to use the equipment. (His first production will be on model rocketry.)

Today, as attacks on police increase, Jim has none of the fear of the inner city that police are purported to have. After riding through Elizabeth in a patrol car with Jim, I've come to the conclusion that everyone in the city knows (and loves) him. At almost every stop, the car is given a love pat by crossing pedestrians, and they call out "Hey Jim" or "Hey Mac" and are acknowledged with a burst of laughter and a robust greeting from the driver's seat. Often Jim stops the car and jumps out to chat with someone. Jim does his job in the field: he doesn't believe in working behind a desk; he believes in "getting out and rapping with the people." And now the herculean effort Jim has given to improving the policeman's image is also being applied to model rocketry. And he says he hasn't even begun!

Postscript. A case in point: as I sit here pounding out this article, I've just returned from a Boy Scout Camp-O-Ree where Jim gave a modroc demonstration. When a model got caught in a tree Jim sent a call to the fire department. Chief Ross responded and decided that since the tree was dead, it was too dangerous to place a man on a ladder against it. So the Chief called for a fireman with a bridge gun (used for shooting a line great distances). After the branch above the rocket was pulled down, the Chief started to work on the branch with the rocket, but the line snapped, and the effort had to be abandoned. As Chief Ross was packing his gear, Jim was heard to say, "I think I'll call the Park Commission and tell them they have a dead tree that should be removed (and tell them to save the rocket for me.)"

Personal Notes

(This is a new column which will appear from time-to-time if the reaction to this initial entry is favorable and if sufficient material is received. We are beginning the column because we feel that the NAR is an organization made up of people, and if the people in the NAR get to know each other a little better, perhaps the regional differences will become less significant and the organization will become stronger. The Model Rocketeer *editor would appreciate any comments on this feature, and, of course, any material for inclusion in it; i.e., any news about the activities and achievements of NAR members.)*

Ed Pearson, editor of the *NARlett* and a long-time mem-

ber of NARHAMS in Maryland, married Diane Darcy (who has been serving as *NARlett* typist) on September twenty-fifth. Our best wishes to them both.

Sam Atwood, a member of the Annapolis Association of Rocketry in Maryland and son of Mr. Robert Atwood (NAR Trustee and Friendly Director of Section Activities), is the President of Enlief, an organization at Annapolis High School devoted to arousing public interest in environmental problems and to providing some solutions to these problems. The group has helped in the collection of material for the Annapolis Reclamation Center. Sam even got his picture in the newspaper, in an article about the group. Congratulations to Sam; the cause is certainly a most important one.

Joel Berez, Marvin Lieberman, and Alan Stolzenberg, all members of Pittsburgh's Steel City Section (Alan is LAC Secretary, and both he and Marvin have helped in the running of the Pittsburgh Spring Conventions) have been named National Merit Semi-Finalists. Congratulations to all three of them.

Voice Your Opinion on By-Laws

by Manning Butterworth, By-Law Committee Chairman

The By-Laws Revision Committee would like to know your opinion on the following issues.

1) Recently an amendment was proposed which would permit persons in other countries to join the NAR if there were no similar organization in their own country. We would like to know if you feel any U.S. *resident*, whether a U.S. citizen or not, should be able to join the NAR, thus permitting visiting professors, foreign exhcange students, and so on, to join.

2) Do you feel junior members should be allowed to vote? Please state why you feel they should or should not.

3) Since the right to vote is the primary difference between the privileges of juniors and leaders at present, should the junior and leader divisions be combined in the event that juniors are given the vote? Note that this would very likely mean that juniors would then have to pay the same dues as leaders.

The above questions are merely current areas of investigation of the Committee, and neither their content nor wording necessarily reflects any final proposals. Please direct your reply to any of the By-Laws revision Committee members; their addresses appear below:

Douglas Ball, 786 Forest Drive, Mansfield, Ohio 44905

William D. Boggs, 730 E. Dartmouth Street, Gladstone, Oregon 97027

Manning Butterworth, Room 315, 5540 Hyde Park Blvd., Chicago, Ill. 60637

A. W. Guill, 32 Gerdes Road, New Canaan, Connecticut 06840

Bernard Russell, 14155 Labrador, Lot 96, Houston, Texas 77047.

Changes in Personnel

* By-Laws Revision Committee: Mr. William Hall has found it necessary to resign from the By-Laws Revision Committee due to insufficient time left over from his other duties. Mr. Doug Ball has been appointed to fill the vacancy. The Committee presently comprises Doug Ball, William Boggs, Manning Butterworth (Chairman), A.W. Guill, and Bernard Russell. Mr. Ball's address is 786 Forest Drive, Mansfield, Ohio, 44905.
* Mountain State Region: Mr. and Mrs. Mel Severe have resigned as Regional Managers for the Mountain States. They will be succeeded by Dr. Edna Hinman. Her address is 1241 South Seventh Street, Las Vegas, Nevada 89100. Dr. Hinman is the principal of the CVT Gilbert School in Las Vegas.
* Public Affairs Committee: Carl Kratzer has resigned as chairman of the Public Affairs Committee. Mr. Norman J. Ward has been appointed to take over as Chairman. Mr. Ward's address is 1891 Massachusetts Avenue, McClean, Virginia 22101.

1971-72 LAC Newsletter Award

The LAC Newsletter Award Chairman this year is Andy Elliott. He is not a LAC member, but is serving as Chairman because the LAC is trying to involve more people in LAC projects. Andy was the editor of *ZOG 43* the year that it became the first newsletter to win the contest, so he is a most suitable chairman.

All sections wishing to enter the Newsletter Contest should send *one copy of each issue of their newsletter published after NARAM-13* to:

LAC Newsletter Contest
c/o Andy Elliott
10203 Leslie Street
Silver Spring, Maryland 20902

Issues which have been sent to Elaine Sadowski will be forwarded to Andy.

The judging criteria for the contest are given below. Editors must keep in mind that these criteria are not a "cookbook" for turning out a section newsletter. The criteria are *flexible*, and originality is quite important.

LAC Newsletter Award

The LAC newsletter award is given annually to the section whose newsletter best conveys information and promotes section spirit. The following criteria are to be used in judging:

Group I - weighted most heavily

These are the criteria that are most important insofar as they relate to the purpose of the contest more than the others.

(1) frequency and regularity of issue
A newsletter that is issued infrequently or irregularly does not provide current information.

(2) club news
Point totals, contest results, reports of meetings, schedules, etc. are included here. These should be current and accurate. If such news is conveyed by other means (such as letters from the president) include these with entry.

(3) other news of interest to section members
Such things as activities of other clubs, "consumer reports", changes in legislation regarding model rocketry, and reports on NASA activities are included here.

(4) editorials and other commentary
Letters to the editor (and the amount of section involvement and interaction with the newsletter that they can indicate) are considered here.
(5) special features
These are things such as stories (fictions , humorous accounts of meets, etc.), cartoons, etc. where there is much room for creativity and originality.
(6) Is the newsletter a club effort, with contributions from many members, or does it look as though it was done entirely by one or two people?
(7) Is the newsletter well-balanced? Does it contain things of interest to all members of the club (scale data, H and D, "fun" articles, competition hints, etc.)? Each issue need not contain everything.
(8) originality
Is the material contained in the newsletter original and reflective of the section, or is it a copy of that in last year's winning newsletter?

Group II - carrying medium weight

Those criteria, although quite important, are not as important as those in Group I.
(1) quality of technical material
(2) quality of scale plans and data
(3) quality of original designs
In (2) and (3), the quality of drawings should be considered. They should be clear and neat. All three of these criteria are in Group II because although technical and scale materials are important a section newsletter is not a technical journal or a scale or design book, and therefore such things should not be rated with Group I criteria in importance. Also, sections made up largely of junior members may not be able to produce technical material of the same quality as those with leader or senior members who are active in R and D.
(4) appearance
Although not every section has access to printing equipment, and not every section may have a talented artist, a pleasant appearance is within the reach of all newsletter editors. Neatness, layout, etc. are considered here.
(5) Are articles written with a concern for good grammar, clarity, and accuracy?

Group III - carrying the least weight

(1) distribution
Is an attempt made to circulate the newsletter to as many people outside the section as possible?

The above criteria are flexible. Editors should try to produce newsletters that serve the needs of their sections. The judges have the power to give special honorable mentions to newsletters with certain outstanding characteristics. These will be awarded at the discretion of the judges. There are no fixed categories of special honorable mentions.

ECRM-6 to Be Held

ECRM-6 will be held April 8-9, 1972. Attendance will be limited to 125 contestants. All NAR members in Maryland, Virginia, Pennsylvania, West Virginia, North Carolina, and Delaware are invited. If you are interested, please send a post card with your name, address, and NAR number to:

Judy Barrowman
6809 97th Place
Seabrook, Maryland 20801

by January 31, 1972.

The following events have been tentatively scheduled: R&D, Scale, Hawk Boost/Glide, Swift Rocket/Glide, Pigeon Egg Lofting, PeeWee Payload, Class 0 Parachute Duration, and Class II Streamer Duration.

Record Attempts

Hornet Boost/Glide
Division C
Randy Ticolet, NAR 13100, 29 August 1971, Place: Creve Coeur, Mo.

Sparrow Rocket Glider
Division A
Kerry Mechtly, NAR 16799, 28-29 August 1971, Place: FLAM.
Division C
Michael McMasters, NAR 20826, 29 August 1971, Place: Darby Dan Farm, Ohio.

Hawk Rocket Glider
Division D
Randy Thompson, NAR T pend., 12 September 1971, Place: GERM-1, Gettysburg, Pa.

Class III Streamer Duration
Division C
Sanchez-Yurfest Team, NAR T017, 9 August 1971, Place: Aberdeen Proving Ground, Md.
Division D
George Meese, Sr., NAR 12973, 9 August 1971, Place: Aberdeen Proving Ground, Md.

Roc Egg Lofting
Division D
Gary Cole, NAR 18962, 11 July 1971, Place: Olethe Naval Air Station.

NARAM-13 LAC Meeting

by Alan Stolzenberg, LAC Secretary

(Note: Two LAC meetings were held at NARAM-13, but the business discussed at the first meeting, held on August 8, was brought up again at the August 12 meeting, along with, of course, some other things. For that reason, an account of the second meeting only is given here. Those present at the August 8 meeting included the following: Trip Barber, Andrew Bennett, Bernard Biales, Robert Cherney, Andrew Elliott, Guppy (Harold Youngren), Richard Malecki, Robert Mullane, Charles Russell, Elaine Sadowski, Paul Sanchez, and Pat Stakem.)

The meeting was called to order on August 12, 1971, at 8:04 P.M. by Bob Mullane in one of the rooms of the Tuckaway Manor Motel. The following people were present: Jay Apt, Sam Atwood, Lindsay Audin, Doug Ball, Trip Barber, Andrew Bennett, Stephen Bryson, Brian Dolezal, Andrew Elliott, Mark Griffith, Rich Grosberg, Guppy, Steve Kranish, Marvin Lieberman, Richard Malecki, Robert Mullane, Doug Plummer, Chris Pocock, Charles Russell, Elaine Sadowski, Scott Snyder, Connie Stine, Ellie Stine, and Alan Stolzenberg. Due to the crowded condition of the room and the air conditioner's failure, the meeting was moved out onto the lawn.

Bob Mullane started the business by reviewing the election results and welcoming all the new LAC members. A report of the LAC's activities in the past year was circulated among those present. Bob explained the system of open letters used to convey information among LAC members.

The next order of business was the election of the new officers of the LAC. Chas Russell was nominated and elected to the post of chairman. Wanda Boggs, Connie Stine, and Alan Stolzenberg were nominated secretary. Alan Stolzenberg was elected. Outgoing chairman Bob Mullane and outgoing secretary Elaine Sadowski then turned the meeting over to the new officers.

A discussion of present projects was the next item on the agenda. The results of the membership survey were passed around. Both Elaine Sadowski and Guppy suggested computerization if the survey continues. Chas Russell agreed and suggested that Wanda Boggs remain in charge. Next to be discussed was the cataloging of space films available to clubs. The slide show project was then discussed. This project (carried out in cooperation with the Publications Committee) involves making several sets of slide trays and a taped narration available to groups to use for public relations or membership drives. Elaine then explained the Newsletter Contest and its purpose. She recommended that Andy Elliott be appointed chairman of the contest. Richard Malecki's idea for a lottery was next to be brought up. The basic idea is that each section would contribute to a pool of money. The winning section would use the money to send a representative to NARAM. It was felt that more thought is needed on this project. Richard will continue working on it.

At 8:30, after a blitz by the Aberdeen mosquitoes, the meeting was moved back into the motel room. Chas Russel explained his Malfunctioning Engine Statistical Survey (MESS). This project would help the Standards and Testing Committee to better evaluate engines. A form will be made available to NAR members to be used for recording relevant engine data. This form will then be sent to the MESS Chairman. Finally the Pink Book revision was discussed.

New business was next on the agenda. Trip Barber proposed that an R&D summary publication become a LAC project. It would be similar to the one at MIT and at this year's NARAM except that all entrants in NAR R&D competition during the year would be required to submit an abstract. The problems and benefits of the project were discussed, and it was decided that it would be worthwhile to investigate. Trip was put in charge of the project.

The site of the Thanksgiving weekend LAC meeting was brought up. Site suggestions ranging from Harrison, New Jersey to Columbus, Ohio were discussed. Due to its more convenient location and the availability of meeting rooms, Columbus was selected.

It was suggested that a kit testing committee be established in conjunction with the Standards and Testing Committee. Doug Ball pointed out that it would be a good opportunity to involve the general membership in a LAC project or to help under-privileged children. These objectives could be accomplished by letting young Junior NAR members or under-privileged children build the kits, and having LAC members look out for any difficulties that they might encounter. The effectiveness and function of the committee were questioned and discussed. It was decided that a more concrete proposal must be worked out before any decision can be reached on the matter.

The discussion of the *Section Manual* had been held off until Lindsay Audin finished judging R&D. Lindsay explained what has been done so far. A rough copy of the *Section Manual* was passed around. Several of the new chapters need to be revised. The contest chapter will be held off until the new Pink Book is available.

Lindsay had also been working on the slides and tape project. He gave a general run down of the purpose of the project and what had been done. It was suggested that technical reports be done using this medium. Lindsay also approved the appointment of Andy Elliott, although he is not a LAC member, to the position of Newsletter Contest chairman, agreed to act in an advisory capacity during Andy's first year as chairman.

The meeting was adjourned at 10:40. Lindsay then showed the first slide and tape set, which he and Bob Mullane had put together, to the people who remained.

The names and addresses of the LAC members follow:

Charles Andres,	Home:	RFD 2 North Berwick, Maine 03906
	School:	5461 North Campus No. 5 Cornell University Ithaca, New York 14850
Doug Ball,	Home:	786 Forest Drive Mansfield, Ohio 44905
	School:	415 Houck House 61 Curl Drive Ohio State University Columbus, Ohio 43210
Trip Barber,	School:	MIT Branch PO Box 121 Cambridge, Mass. 02139
Wanda Boggs,	Home:	730 East Dartmouth Street Gladstone, Oregon 97027
Charles Russell,	Home:	3480 Cemetery Road Hilliard, Ohio 43026
Connie Stine,	Home:	127 Bickford Land New Canaan, Conn. 06840
	School:	Box 30374 Texas Christian University Fort Worth, Texas 76129
Alan Stolzenberg,	Home:	5002 Somerville Street Pittsburgh, Penn. 15201

Super Space Systems Competition

by Gregory P. Kennedy, NAR 12874, Lr.

This is a suggestion for a new competition event in the Scale category. As it stands now, we have scale, super scale and space systems. (Please note that I am deleting scale altitude.) Space systems is the most complex of these, requiring a scale model, a scale launcher, an altitude prediction, and spot landing. Also, the space systems bird must carry a one ounce payload weight.

What I am proposing is a super space systems event. In this event, the one ounce weight would be replaced by an

strumentation package. Under this event, the package would have to yield some type of useful information. The contestant would have one hour after his launch window to turn in his flight data.

I can hear the protests now; "What about the younger members, those who can't build a transmitter, etc." Remember, the rocket need only return *some type of information.* This doesn't require a transmitter. An accelerometer that that anyone can use is made by one of the model rocket manufacturers. A smoke cloud could be deployed to measure winds aloft. A recording thermometer could be launched. The possibilities are limited only by the imagination of the contestant. To eliminate any unfair advantage that an electrical telemetry package might have over a non-electric one, points could be awarded for the *amount* of data returned, rather than *how* it was returned.

(The opinions expressed in this column are those of the author alone. "Loudly from a Broken Soapbox" is designed to allow NAR members to sound off. Anyone wishing to comment on the above topic or to express an opinion on anything else concerning the NAR or model rocketry should write down his opinion and send it to the Model Rocketeer *editor.)*

This is NAA

Perhaps you have noticed the words "Affiliated with the National Aeronautic Association" on NAR literature and stationary and wondered just what the NAA is. The following article, prepared by the NAA, explains the organization and its activities.

The National Aeronautic Association is the oldest non-profit aviation organization in America. Originally organized in 1905 as the Aero Club of America, it was incorporated in 1922 as the National Aeronautic Association. From the very outset NAA has been the sole representative in the United States of the Federation Aeronautique Internationale (FAI) which was organized in 1903. The FAI is the world authority for the official certification of all aerospace records. The FAI also sponsors all world sport aviation championships and is the international body that groups together the National Aero Clubs of more than 65 member nations.

NAA operates at six levels: international, national, record certification, institutional, aviation education, and general and sport aviation activities.

Internationally, NAA represents the United States in the Council of the FAI and on FAI international sport and technical aviation committees at their periodic meetings in the Paris headquarters.

Nationally, the function of NAA is to represent all phases of sport aviation whose activities bring them under the aegis of FAI, or who represent the United States in world aviation championships abroad. World record attempts in the United States must be sanctioned by the NAA to be recognized by the FAI. The administration and regulation of such attempts are handled by NAA's Contest and Records Board.

NAA also sanctions and occasionally sponsors major aviation gatherings at times where various foreign nations are represented. Similar activities include the sanctioning and regulation of national air race events and other sport aviation competitions.

At the institutional level, NAA provides services which are not within the province of or desired by other aviation organizations. NAA is not a lobbying organization nor does it represent any specific aviation group. It does represent all phases of American aeronautics, and therefore has the responsibility of sponsoring projects useful to or required for national aviation education and better public understanding of aviation.

The aviation education division of NAA is the National Aerospace Education Council, whose officers and directors are largely men and women from our leading colleges and universities, dedicated to the aviation education of America's youth. NAA's major Divisions and Affiliates include the Academy of Model Aeronautics, Aerobatic Club of America, Air Mail Pioneers, Antique Airplane Association, Balloon Federation of America, Experimental Aircraft Association, National Aerospace Education Council, National Association of Rocketry, National Pilots Association, Professional Race Pilots Association, Soaring Society of America, and the United States Parachute Association, as well as chartered aero clubs from coast to coast, and members-at-large.

Many members of the Divisions and Affiliates are also individual members of NAA. The others are indirect members by being a dues paying member of a franchised NAA Division. All of these groups total more than 100,000 men and women whose interests are served by NAA.

The National Sport Aviation Council was formed in 1968 as an NAA committee to coordinate the needs of NAA Divisions and Affiliates concerned with all phases of sport aviation disciplines.

NAA works closely with its Division organizations in promoting interest and participation in sport aviation, whether it be soaring, aerobatics, parachuting, aeromodeling, or racing, by encouraging and aiding local regional and national competitors at which participants for world championships are selected.

DEALER DIRECTORY

Hobby shops desiring a listing in the **Model Rocketry** Dealer Directory should direct their inquiries to Dealer Directory, **Model Rocketry** magazine, Box 214, Boston, MA 02123. Space is available only on a six month contract for $18.00, or a twelve month contract for $35.00, payable in advance.

CALIFORNIA – Brea
North Orange counties largest stock
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SCOTTS SPORTS-HOBBIES
145 East Garvey Ave.
Mail Orders Accepted Phone 280-6090

CALIFORNIA – Mt. View
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SAN ANTONIO HOBBY
413 San Antonio Rd.
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9:30 to 5:30 Daily Thurs. till 9 PM

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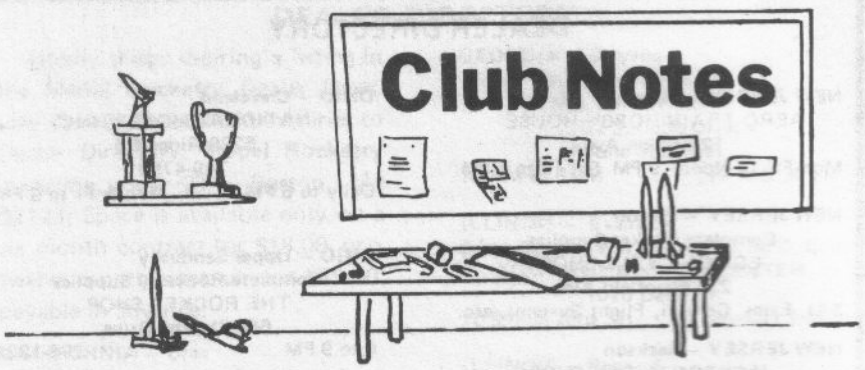
G.J. Flynn/Publisher

PS FORM 3526 JULY 1971

(From the Editor, cont.)

make the effort to communicate their successes. The theoretician who comes up with a good idea sees as his purpose the communication of his new knowledge. The competition modeler many times fears that if he talks about his new discovery someone will use it to beat him at the next contest!

Nonetheless, these advances are taking place. Take a look at the models at your next contest. Compare them with what was being flown two years....five years....and a decade ago. The hobby is advancing, and the credit for much of that advancement belongs to the contest modelers. Now we can only hope that more of them will choose to communicate these advances to all rocketeers.



Houston's Apollo-NASA club plans an active schedule for 1971-1972. Contests, to be held at the Houston Baptist College, are scheduled for the 4th Sunday of each month from March to May. The March 26th contest will be Quadrathon, Plastic Model, Open Spot Landing, Scale, Pigeon Eggloft, Class O Parachute Duration and Class 1 Streamer Duration. At the April 23rd contest Quadrathon, Scale, Sparrow B/G, Sparrow R/G, and Open Spot Landing will be flown. The May 28th contest will include Plastic Model, HawkB/G, Scale, Robin Eggloft, Pee Wee Payload, Open Spot Landing, and Predicted Altitude. In addition a Southwest Regional contest is planned for June 23-25, 1972. Interested rocketeers in the Houston, Texas area can contact Gary King, 13903 Barryknoll, Houston, Texas 77024.

The Aurora Rocket Society, recently organized in Aurora, Colorado, held its first contest — Mini-Meet — on October 9th. The meet featured two low powered events — Class 1 Streamer Duration, and Class 1 Spot Landing. Lynn Law won the streamer event with a duration of 56 seconds. There were no winners in the Spot Landing event as "no one came close to the target." A highlight of the contest was a fantastic Cineroc flight by Norman Anderson. Rocketeers interested in joining the Aurora Rocket Society should contact Steve Sande, 15301 E. 11th Ave., Aurora, Colorado 80010.

The Atmospheric Rocket Research Association of Montreal, Canada, has announced that it will again host the Canadian Model Rocket Conference in 1972. The event, scheduled for July 7-9, 1972, is open to rocketeers from the United States and Canada. The Conference will include a series of discussion groups and a contest with the following events: Scale, Condor B/G, Sparrow B/G, Hawk R/G, Open Spot Landing, and Class O Parachute Duration. Rocketeers interested in complete information should write to: Canadian Conference 1972, c/o Steven J. Kushneryk, 7800 des Erables Ave., Montreal 329, Quebec, Canada.

Results of the EVA-3 contest held September 12, 1971 are reported in the first issue of the new newsletter of the Lehigh Valley Rocket Club. The events flown were: Class 2 Streamer Duration, Robin Eggloft, Swift R/G, Sparrow B/G, and Quadrathon. The day was rainy and the Saucon Valley Field muddy as Frank Osborn took first in Streamer Duration with a surprising time of 78 seconds. Rich LaBarre captured first place in Eggloft with 156 meters, while Frank Osborn topped the Quadrathon field with 516 points. In Swift R/G Tom Ackerman turned in a 95 second duration for first place, while Joe Osborn won Sparrow B/G with 93 seconds.

Maryland's Annapolis Association of Rocketry, assisted by several members of the Star Spangled Banner Section, staged a successful model rocket exhibit and launching at the annual Sci-Tech display in the Annapolis Junior High School. Held on the 15-17th of October, the display explained how a model rocket works and was designed to to attract new members to the club.

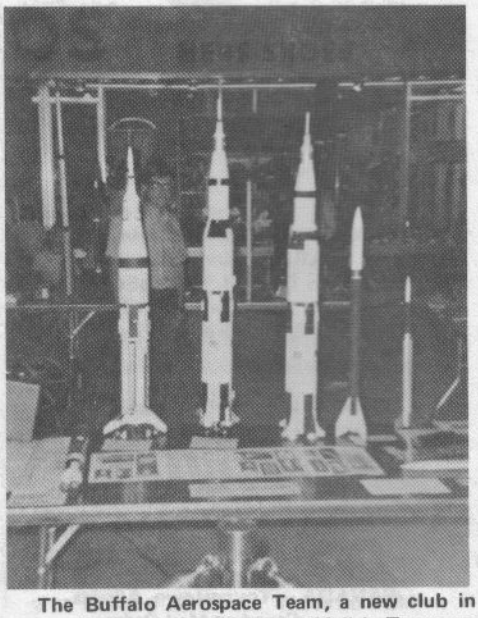
Florida's Broward County Model Rocket Association held their Summer Meet on August 15th. The number of entries was small, since many club members were away on vacation at the time, but this did allow those who were present sufficient flying time for second flights in some events. The results of the contest, as reported in the latest issue of the *BCMRA Capcom* are as follows: Hornet B/G, 1st Bob Parks (47.0 sec.); Spot Landing, 1st Bob Thurlow (33'8"): Superscale, 1st Steve Peretz (Natter); Robin Eggloft, 1st Bob Thurlow (380 ft.); Swift R/G, 1st Bob Thurlow (47.55 sec.); and R&D, 1st Greg Browning.

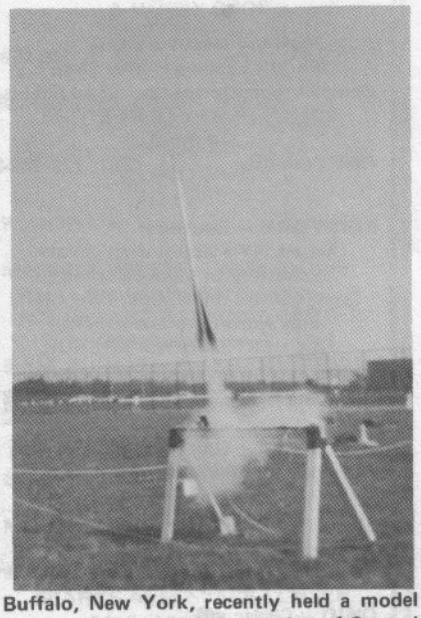
A new model rocket club is being formed in the Southwest Missouri area. Interested rocketeers should write Jeffery Estes, Route 1, Box 40, Marble Hill, MO 63764.

A new model rocket club, "The Space Pioneers," is being formed in Camillus, New York. Interested rocketeers should contact Dana Peters, 109 Heather Lane, Camillus, NY.

Houston's Apollo-NASA Section held a contest for club members at Houston Baptist College on October 24th. Entrants in the Quadrathon event were hampered by "lost tracks", but first place went to Andrew Donoho (A/B Division), Mark Wargo (C Division, and Joe Hatfield (D Division). In the scale event Mark Wargo and David Scott both tied for first place with 945 points. David Scott took first in Parachute Duration with a 189 second duration. In Sparrow Boost/Glide Joe Hatfield took first place with a 44 second flight. The Pigeon Eggloft event was won by Jim Needham with a flight to 326 meters. The contest was covered by Channel 11 TV News, which presented films of the PD event on the six-o'clock news. Local rocketeers interested in more information on Apollo-NASA should contact Gary King, 13903 Barryknoll Lane, Houston, Texas.

Buffalo Modroc Display





The Buffalo Aerospace Team, a new club in Buffalo, New York, recently held a model rocket display at the Boulevard Mall in Tonawanda. The display included a number of Centuri Enerjet models and a complete set of Estes scale models (left). The display attracted a number of non-rocketeers who were surprised to learn of the organized rocketry activity in the Buffalo area. Club launches are held at the Erie Community College Field (right). Interested rocketeers can contact the Buffalo Aerospace Team through Gary Griffin, 17 Rochelle Park, Tonawanda, NY 14150.

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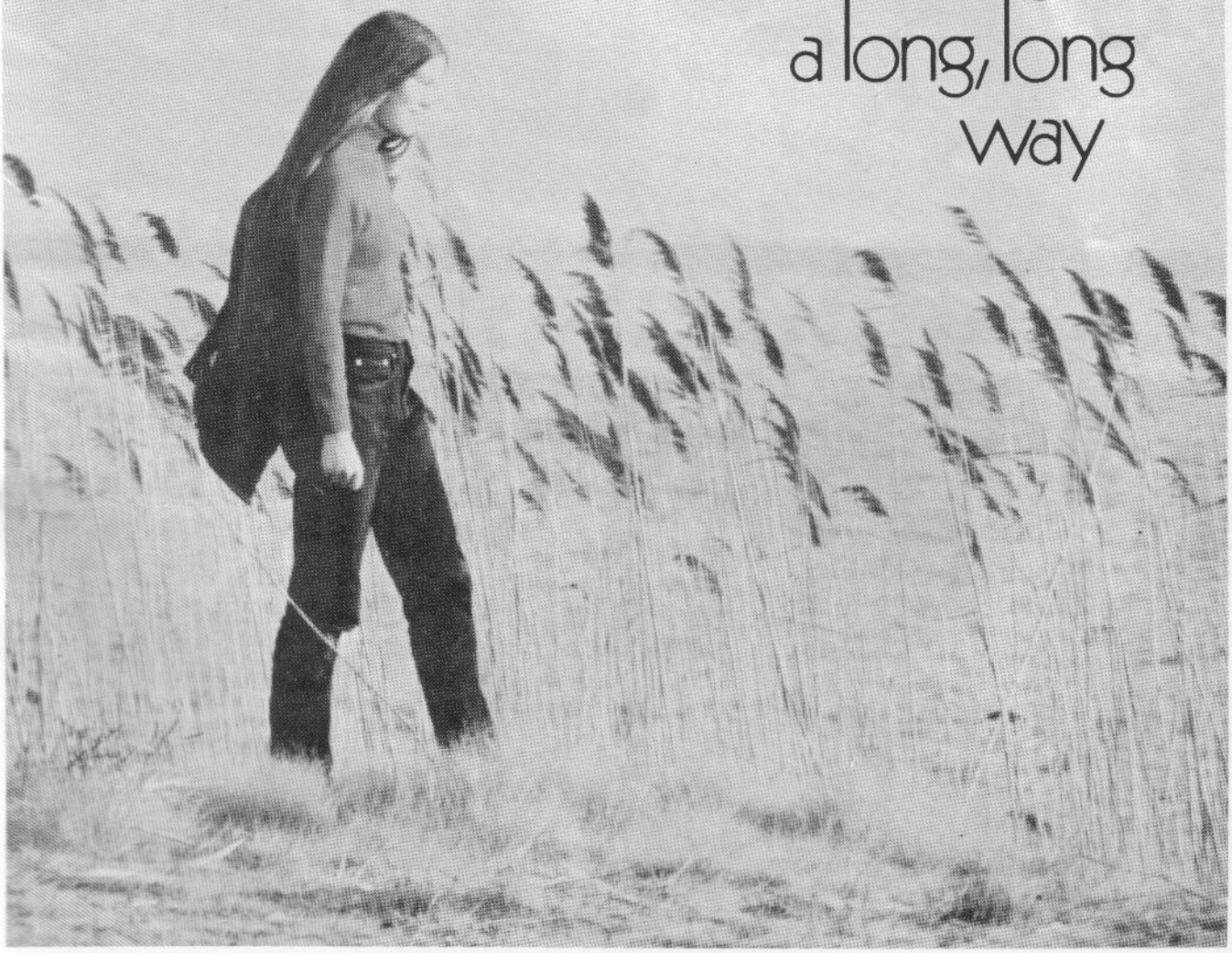

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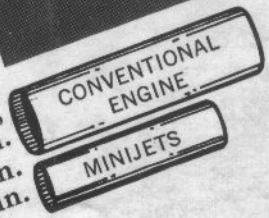

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