MODEL ROCKETRY

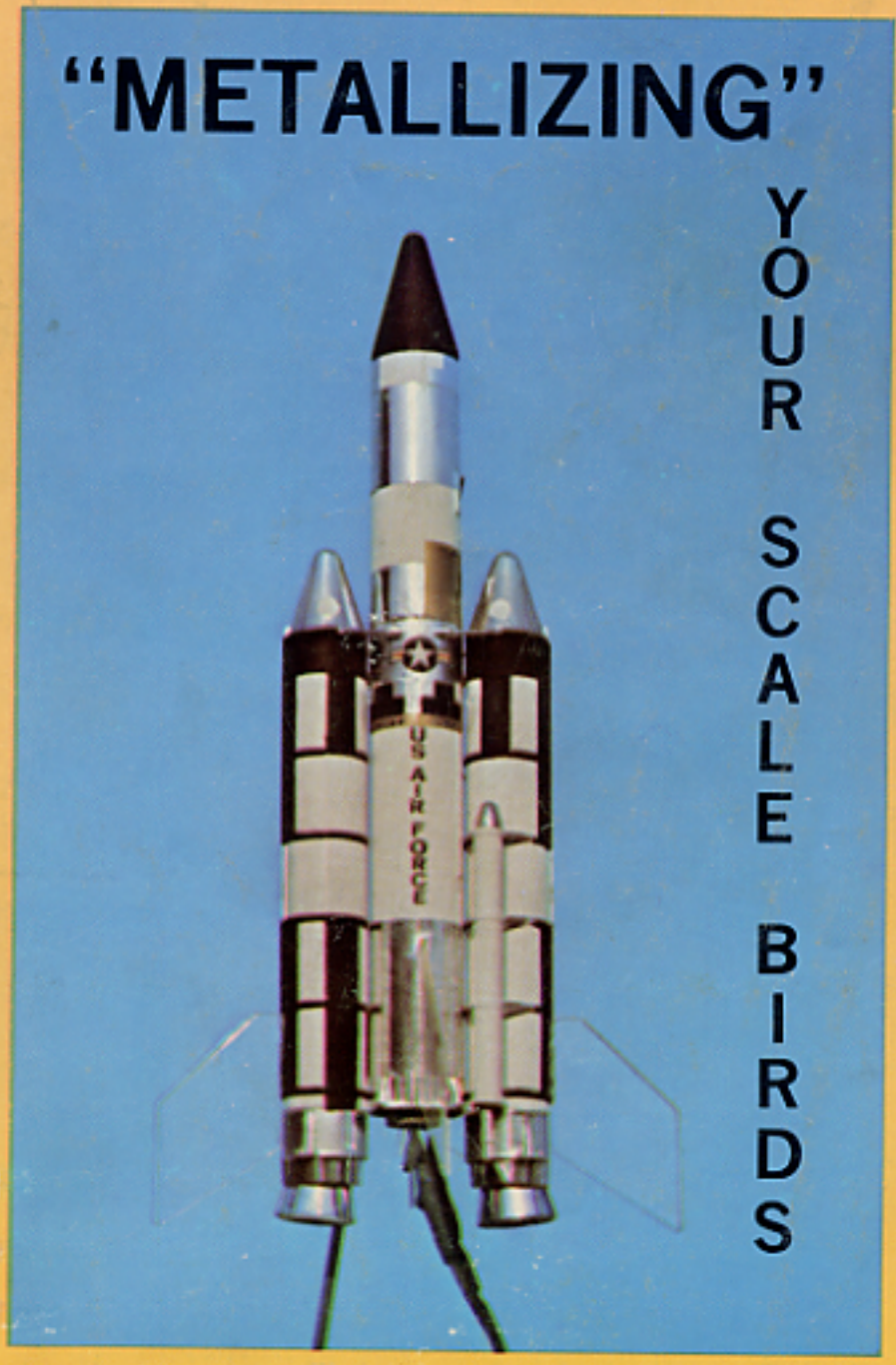
APRIL/MAY 1971

The Journal of Miniature Astronautics
Incorporating THE MODEL ROCKETEER

The "SPACE DART"
Hawk B/G

"METALLIZING"

YOUR SCALE BIRDS



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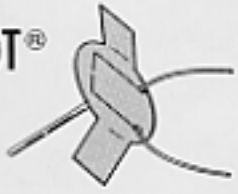

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Model Rocketry

Volume III, No. 7
April/May 1971

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Technical Correspondent	George J. Caporaso

COVER PHOTO

This month's cover shows a metallized MPC Titan IIIC model. Assembled from the MPC kit, and metallized according to the instrustions given on page 24, this kit gives quite an impressive looking rocket.
(Photo by George Flynn.)

From the Editor

By now you have probably noticed that the cover proclaims this as the April/May 1971 issue of **Model Rocketry**. To answer your first question, NO we haven't gone bi-monthly. However, arrangements to make **Model Rocketry** available to many more rocketeers make necessary the change in cover months. Beginning with the next issue of **Model Rocketry**, the June 1971 issue, we will be increasing our newsstand distribution from the current 2,000 copies per month to approximately 30,000 copies per month. **Model Rocketry** will be on sale at the same newsstands as the other major hobby magazines. Model rocketeers now launching alone or in small isolated clubs will be made aware of the exciting aspects of competition flying, scale building, and R&D.

When **Model Rocketry** magazine was organized three years ago, our purpose was to improve communication in a hobby where there was very little communication. By making this magazine available through newsstands throughout the nation, we hope to encourage even greater communication in the hobby. The once isolated rocketeer will become aware of what is happening across the nation, and we will become aware of the projects he is undertaking.

The cover month change was necessary because newsstands like to place a magazine on sale several weeks before the month indicated on the cover. So the first issue to be given general newsstand distribution will carry the cover date of June 1971. It will be mailed, however, at the time that the May 1971 issue would have been mailed. Subscribers need not worry. Adjustments have been made so that you will not loose an issue.

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Material submitted for publication should be accompanied by a self-addressed, stamped envelope if return is desired. Model Rocketry can assume no responsibility for material lost or damaged, however care will be exercised in handling. Articles accepted for publication will be paid at the rates current at the time of publication. Letters, contest information, news, announcements, etc. are assumed to be submitted gratis.
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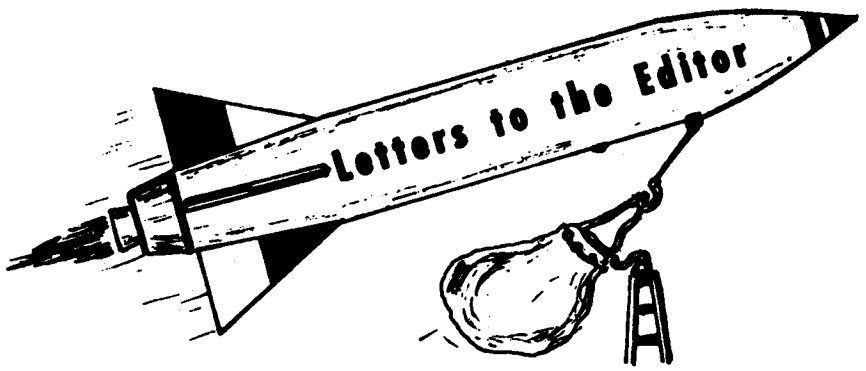


I eagerly read Bob Mullane's article *Club Corner* in the January issue of **MRm**. Our club has been in existance for a year and a half, and currently has seven members. We have one problem though. This problem is maintaining interest at our meetings.

No one in our club has a movie camera to film launches, so showing movies at the meetings is out. At our last meeting I presented the basic B/G construction rules; but everyone acted as if it were Greek or just plain uninteresting. I would appreciate it very much if you could give me some ideas for meetings. All our members are from 14 to 16 years of age.

Greg Rose
Fort Wayne, Indiana

We hope you enjoyed the second installment of "Club Corner" on organizing club activities (February 1971 **MRm***). Perhaps discussion of a field trip will stir up interest at your club meetings. Movies of the Apollo program and other space activities are available from NASA and the aerospace contractors. Planning a contest will also turn a dull meeting into a heated discussion session.*

Modroc Guidance

In the January issue of **MRm** I noticed a letter on "Modroc Guidance" which interested me. I too am working on a "modroc internal guidance" project for our science fair. I have completed my research, all that remains to be done is the actual building.

My gyroscopes (there are two, one fore and one aft of the CG at equal distances) are not gimbal mounted or linked to control surfaces Rather, guidance is achieved by placing the gyro's axes parallel with the body tube and the line of flight.

It has long been known that when a gyro is spinning it takes a force to push its axis in any direction other than the one in which it is pointing. The faster the gyro spins, the more force it takes to push the axis off line.

Anyone who has seen an F100 lift off knows how fast that rocket moves out after ignition. I thought of this when I was pondering the problem of how to spin the gyros. My design harnesses this speed which is generated by the F100 and puts it to use f guidance. The gyros are spun by the air passing over miniature turbine fans. The fans will, of course, cause drag, but never-the-less the rocket will be guided by something other than fins.

The rocket will not have fins, but for safety sake, it will be a two stage job. The booster stage will have fins so that if something goes wrong with the gyro mechanism, the rocket will not go unstable near the ground. This extra thrust will also boost the speed of the gyros, so that by the time the second stage fires

(and looses the stabilization provided by the booster fins) the gyros will already be spinning.

D. Bingaman
3001 Solway Ave.
Jennings, MO 63136

Technical Articles

Your October 1970 issue was the first issue of **Model Rocketry** I have seen since December 1969. I hope that in the interim period you haven't let the quality of your magazine decline. I would like to see more theoretical articles done on a high level. My favorite articles since issue number one have been the stability series by Mandell, most of the articles by Caporaso, and the Foxmitter series.

Dan Henson
Fort Bliss, Texas

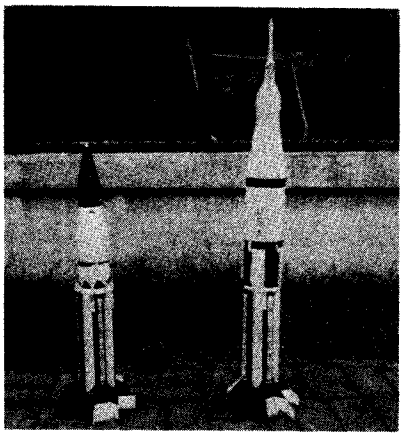
Well, reader Henson wants more technical articles. And letters from other readers ask for less technical material, or more scale, or more beginner's designs, or less elementary material! It seems that it will be impossible to totally please all of our readers with the content of each and every issue. We're trying, however to provide a balance of articles from all fields of model rocketry. Thus, we hope that each reader will find articles of interest in each issue.

Saturn 1 Scale Model

Enclosed is a photograph of my scale model Saturn 1 (SA-5) which was built by modifying an Estes Saturn 1B kit (also shown). The model is powered by a pair of FSI F7 engines to achieve a relatively realistic launch. It flew to a height of about 500 feet, not very high for this type of engine since its a heavy and draggy bird.

Which brings me to my subject – weight! It is a shame that the weight limit for modrocs is only a pound. It is quite difficult to build a good scale model in a size large enough to allow much detailing while staying within the one pound weight limit. I suggest that many modelers have come across this problem when trying to build a good scale model. The weight limit effectively eliminates some types of rockets from scale competition. I know this is an FAA rule and not just an NAR one, but the state of the art has reached a point where larger models can be built safely.

Thomas Kuechler
St. Louis, MO



Saturn 1 scale model built by Thomas Kuechler was converted from the Estes Saturn 1B kit (shown at right). The model is powered by two F7 engines.

Computers in Rocketry

I would like to congratulate you on the many informative technical articles that have appeared in your magazine recently. I have especially enjoyed the article "Automatic Computation for Rocketeers" which appeared a few months ago.

Would it be possible to publish an article concerning altitude prediction for more power-

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ful engines and larger rockets? The method used by Charles Andres is acceptable for small engines since the mass change is small and the thrust time is short. This type of calculation would seem to be incorrect for larger engines because of the greater change in mass.

I feel that these more powerful engines are becoming more popular as rocketeers turn towards bigger payloads and high altitude experimentation. Presently I am working on a simple guidance system for F-powered rockets.

David White
East Aurora, New York

Finagle's Law

I just noted in your January 1971 issue the letter from Peter Clay commenting on the application of "Finnagle's Law" to model rocketry. I believe you have incorrectly named this law. "Finnagle's Law" is actually 'Finnagle's Factor" – a variable used extensively by high school chemistry students.

The correct law, first stated by Edsel Murphy, is known as "Murphy's Law". This law states that: "If anything can go wrong, the failure will occur during a demonstration."

Several of the corrolaries to "Murphy's Law" are listed below:

1)Mathematics–
- a) All constants are variable.
- b) A decimal point will always be misplaced.
- c) In any given computation, the figure most obviously correct will be the source of the error.
- d) Fractions will always be inverted.

2)Prototyping and Production–
- a) Any object cut to length will be short.
- b) Tollerances will accumulate unidirectionally, towards the maximum difficulty of assembly.
- c) The availability of a component is inversely proportional to the need.
- d) A dropped object will always land where it can do the most damage. (Also known as the Law of Selective Gravitation.)

George J. Dolicker
Katonah, New York

Thermal Sensor

In Doug Malewicki's article on "Drag Coefficient Measurements" in the April 1970 issue, Doug requested assistance in locating an article on an electronic "thermal detector" he had seen in an old airplane magazine. In looking through some old airplane magazines, I came across an article titled "An Air to Ground Thermal Sensor." The article was published in the March 1969 issue of **Flying Models**.

The sensing device described should be applicable as an airborne "thermal detector" on large RC Boost/Gliders. The sensing device is a bi-directional flowmeter. It consists of two thermistors connected back to back in a small tube. One end is connected to a pressure reservoir, while the other end is open to ambient air pressure. Because the air pressure decreases with height, air flows from the reservoir to equalize the pressure when the system is raised. When the system is lowered the flow direction reverses.

The thermistors are heated about 30° higher than ambient air temperature by batteries. Inside the tube, the flowing air cools one thermistor more than the other because of the blanketing effect of the other thermistor. When the airflow changes direction, the air cools the other thermistor more. The two thermistors form half of a Wheatstone Bridge acting as a voltage divider. When one thermistor is cooled the output voltage is positive, when the other is cooled the output is negative. Sensitivity is quite good. When properly adjusted the "thermal detector" can sense a rise or fall of 3 inches per second.

There are several transmitters which can be used with this unit. The MITS transmitter uses a voltage controlled oscillator, so the sensor could probably be connected directly to it. The Foxmitter relies on a variable resistance sensor, so some modification to this circuit would be necessary. (Dear Dick, I am anxiously awaiting your instructions on how to do it....) The 6 meter miniature transmitter described last year in **73** magazine might also have possibilities. Incidentally, if you use a transmission frequency of about 51 MHz you can use an unmodified Radio Shack "Police Band" receiver.

Here are a few notes on the application of the "thermal sensor" to RC Boost/gliders. First the transmitter and receiver should be on different bands, such as 51 MHz for the "thermal sensor" transmitter and 27 MHz for the RC control unit receiver. If they must be on the same band, not only should they be on different frequencies, the audio tones should be adjusted so that they don't interfere with each other. This is especially important when using super regen units since they tune so broadly. The Bentert receiver has a high frequency tone filter built in. Tone filters should be added to the Albin or other similar receivers. The Ace Micro Gem has the best selectivity and rejection, but is also the heaviest and most expensive.

When using the sensor, a rising tone means that the glider is rising. If there is a sharp gradient, you will know that you are in a thermal and should put the glider into a very tight turn to remain in the updraft. A steady tone means that the glider is staying at a constant altitude, and that the glider should be flown in large circles to look for a thermal.

A falling tone means that the glider is in a downdraft, and should be flown out of that area. The same sensor could also be used on an RC parachute assembly to maximize PD times.

The pressure reservoir should be at least 4 fluid ounces in volume. One fluid ounce is 1.8 cubic inches, so 10 inches of BT-50 tube would do nicely. To simplify things it can be made 12 inches long and the transmitter unit can be sealed inside it. The tube could either be slung under the glider body or used as the fuselage structure.

The sensor can also be used in an autopilot configuration, without a transmitter or receiver. For this you need only the sensor, an actuator, and a switch. For the switch you could use a relay, but it would be preferable to use a transistor amplifier and an SCR. The system should be adjusted so that when the sensor indicates that the glider is rising it will spiral in a tight circle, and when the glider is falling it will fly in a large circle seeking a new thermal.

How much of this have I actually done? Unfortunately, almost none because of lack of funds. However I hope this letter will stimulate some readers to investigate this area.

Stephen P. Conners
Graysville, PA

Copies of the issue of **Flying Models** *describing the thermal sensor are available from Flying Models Back Issues, Dept. 5, 31 Arch Street, Ramsay, New Jersey 07446. The price for the March 1969 issue is 60 cents, and the supply is limited.*

Product Reviews

I would like to see in **Model Rocketry** a regular section that rated and tested new and useful products. The same type of product review that many car, photography, and other hobby magazines do. It could give readers an idea of how well a new product would work and what it could be used for if you bought it.

Tracy Hardman
Lake Oswego, Oregon

Just wait till next month. Beginning in the June issue, **Model Rocketry** *will feature a new column called "Flight Test." In this monthly column Jon Randolph will evaluate and review new products of interest to the rocketeer. His evaluation will include, as the name implies, an in depth "flight Test" as well as a description of the manufacturer's specifications.*

Computer Programs

What in heavens name happened to your high-class math problems and computer flow charts??? I miss them greatly. I have everything in the way of math and computer problems on program cards for my school's IBM 360/40, and I wish I had something else to program besides my chemistry, physics, and calculus. Please save my sanity before its too late!

Barrett Bailey
Anaheim, California

Have no fear! Charlie Andres' bi-monthly "Automatic Computation for Rocketeers" will return this month. Unfortunately we have had so many good articles for publication in the last few months that there has not been enough room to include this computer feature.

Winter Night Launching

After reading about the "Winter Contest" in the November issue I brought my thermometer out to four launches. At the first three the temperatures were 19^{o}, 15^{o}, and 10^{o}. I thought I would never be able to get a lower temperature. Every time the temperature was down to 5^{o} or 6^{o} it was snowing or the wind was too strong.

Finally I decided that the only way I could get a lower temperature was to have a launch in the night time. This was made possible by the CMR "Blinkin' Beacon" tracking light. The flight went perfectly in a temperature of 7^{o} below zero. This is the lowest temperature in which I have ever launched a rocket.

William Welch
Genoa, Ohio

First 1971 Launch

Tom Sullivan puts forth the claim of launching the first rocket of 1971. At 12:00.01 Eastern Standard Time on New Years day a Payloader II rocket powered by a C6-5 engine was launched. The rocket was not recovered. The flight was witnessed by Pat Sullivan, Mike Sullivan, and Mrs. T. Anderson.

Pat Sullivan
Shreveport, LA

Book Review:

MODEL ROCKET SAFETY: A Technical Report

by G. Harry Stine, Model Products Corp., 36 p., ill., $1.00.

A comprehensive technical report on model rocketry, including descriptions of exhaustive tests of the safety of model rocket engines, has been issued by Model Products Corporation, Mt. Clemens, Michigan. Prepared by MPC consulting engineer, G. Harry Stine, the report comprises two parts — a general section on the "how and why of model rocketry" and a section describing the results of extensive safety and durability tests of MPC model rocket engines.

The first section takes the form of commonly asked questions about model rocketry and the answers, many of which are illustrated by photographs and diagrams. Some of the topics covered in this section are: definitions of model rocket, how a model rocket engine operates, the extraordinary safety record of model rocket engines, and the position of various government and aviation agencies with regard to model rocketry.

According to G. Harry Stine, "In the second part of the report we concentrated on the most apparent hazard, the model rocket engine itself. At MPC, we conducted a series of specific, controlled, repeatable tests designed to determine what could and could not be done with a model rocket engine, whether or not it would explode and under what conditions, what it took to cause accidental ignition, and what fire hazards existed during shipment, storage and use." In his introduction to the report Mr. Stine concludes that the test results indicated a "much higher level of safety than we had imagined."

Some of the tests reported on include, pounding the engine with a hammer, running over it with an automobile, firing a rifle bullet into it, cutting it with a band saw, putting it into a gasoline fire and applying the flame of an acetylene torch to it. The tests are fully documented by photographs. The second section of the report also includes technical information on the manufacture, testing and certification of MPC model rocket engines.

This impressive document on the safety of model rockets and model rocket engines should go far to answer the questions frequently asked by public officials. Any club or individual seeking the support of his city or town should have a copy of this new MPC publication. It provides a factual refutation of many of the objections frequently raised.

The report is available for $1.00 from MPC, Dept. R, 126 Groesbeck Highway, Mt. Clemens, Mich. 48043.

PAR-II — April 3-5, 1971. Pacific Area Regional Meet open to all NAR members in California, Oregon, Nevada, Alaska, Hawaii, Arizona, and New Mexico. Sponsored by the Titan NAR Section and the Parks Department of West Covina, California. Events: Scale, Super Scale, Cl. 0 PD, Cl. 0 Streamer Dur., Sparrow B/G, Hornet B/G, PeeWee Payload, Robin Eggloft, and Cl. 0 Drag Efficiency. Site: Galster Park, West Covina, CA. Contact: Norm Wood, 1444 W. Garvey Ave., West Covina, CA 91791.

New England Area Meet — April 11, 1971. Area meet for rocketeers from Massachustees, Rhode Island, New Hampshire, and Connecticut. Events: Condor B/G, Pigeon Eggloft, Dual Payload, Hornet B/G. Contact: New England Rocketry Federation, c/o Partick Griffith, Legion St., Milford, MA 01757.

Buckeye II — April 17-18,1971. Area meet sponsored by the CSAR Section of Columbus, Ohio. Events: Scale, Sparrow B/G, Sparrow R/G, Robin Eggloft, Cl. 0 Drag Eff., Cl. 0 PD, Cl. 2 PD, and Open Spot Landing. Contact: Lee Streett, 196 East Beaumont Road, Columbus, Ohio.

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

Rochester NY Area Meet — April 24-25, 1971. Area meet open to NAR members in the upstate NY area. Events: Hornet B/G, Cl. 1 PD, Cl. 00 Altitude, Open Spot Landing, and Cl. 1 Streamer Dur. Contact: Greg or Lee Howick, 2424 Turk Hill Rd., Victor, NY 14564.

St. Louis Section Meet — April 25, 1971. Section meet, sponsored by the NAR Gateway Arch Section, open to all NAR members in the St. Louis, Missouri area. Events: Hornet B/G, Sparrow B/G, Open Spot Landing, Cl. 2 PD, and Drag Race. Contact: Randy Picolet, 3236 Janurary St., St. Louis, MO 63139.

GCMRA Record 1 — April 25, 1971. Record Trials open to all NAR members. Events: All NAR/FAI Boost/Glide classes. (Entry fee, $4.00 including photos.) Site: Tamiami Regional Park, Florida. Contact: Lynn Fletcher, (305) 633-2522.

South Seattle Record Trials — April 25, 1971. Record Trials in Seattle, Washington, open to all NAR members from Washington State. Contact: South Seattle Rocket Society, 15824 43rd Ave. South, Seattle, Washington 98188.

PRANG-II — May 1-2, 1971. Regional meet sponsored by Pittsburgh's Steel City NAR Section. Events: Super Scale, Scale, Sparrow R/G, Sparrow B/G,Robin Eggloft, Cl. 0 Drag Eff., Design Eff., Cl. 0 PD, and Open Spot Landing. Contact: Alan Stolzenberg, 5002 Somerville St., Pittsburgh, PA.

Boston Area Rocket Meet — May 8, 1971. Area meet open to NAR members from Maine, New Hampshire, Rhode Island and Connecticut (east of Hartford). Events: Quadrathon, Swift B/G, Contact: MIT Model Rocket Society, MIT Br. PO Box 110, Cambridge, MA 02139.

SIAM-71 — May 22-23, 1971. Area meet sponsored by the Hilliard, Ohio NAR Section. Events: Class 1 Scale Altitude, Sparrow B/G, Hornet B/G, Robin Eggloft, Plastic Model, Cl. 1 PD, Cl. 2 Streamer Dur. Contact: Fred Long, 256 Bigelow Dr., Hilliard, Ohio 43206.

New England Rocketry Federation Section Meet — May 22, 1971. Section meet open to all NAR members in the Boston area. Events: Class 00 Altitude, Class 0 PD, Class 1 Streamer Dur. Contact: Patrick Griffith, Legion St., Milford, MA.

GCMRA Area Meet — May 30, 1971. Area meet open to NAR members in the Southern States. Events: Class 1 Altitude, Single Payload, Streamer Spot Landing, Class 2 PD, Class 3 Streamer Dur., Scale, Swift R/G, and Hawk B/G. Site: Tamiami Regional Park. Contact: Lynn Fletcher, (305) 633-2522.

Toronto Regional — June 1971. Open meet for rocketeers' from the Ontario, Canada area. Sponsored by the Canadian Rocket Society. Science teachers and their students are especially invited. Contact: CRS, Adelaide St., PO Box 396, Toronto, Ontario, Canada.

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

Texas Wing Meet II — June 12, 1971. Open model rocket competition, sponsored by the National Aerospace Program Sherman-Denison Squadron, for rocketeers from the five state area adjoining Texas. Events: Parachute Duration, Stremer Duration, Boost/Glide, Eggloft, and Payload. Contact: Oscar R. James, 403 W. Burton, Sherman, TX 75090.

Phillipsburg Annual Convention & Record Trials — June 18-20, 1971. Convention open to all rocketeers. Events: Discussion Groups, Manufacturers Displays, Lectures, Films, and Banquet. Record Trial Events (limited to NAR members): Hawk R/G, Condor B/G, Eagle R/G, Cl. 0 and Cl. 3 Streamer Dur., Hornet B/G, and Hornet R/G. Contact: David Klouser, 383 Warren St., Stewartsville, NJ 08886.

North Georgia Regional Meet — June 18-19, 1971. Regional meet, sponsored by the Metro-Atlanta Society for Educational Rocketry, open to rocketeers from the Southeast. Events: Eggloft, B/G in Sparrow through Hawk catagories. Site: near Atlanta, Georgia. Contact: Richard Wallace, 4676 Kingsdown Road, Dunwoody, GA 30338.

Blackhawk Regional II — June 19, 1971. Regional competition sponsored by the Blackhawk NAR Section of Rock Island, Illinois. Open to NAR members from Indiana, Ohio, Illinois, Iowa, Wisconsin, and Minnesota. (Advance registration before April 10, 1971 is required.) Events: Drag Race, Sparrow B/G, Hornet B/G, Cl. 2 PD, Cl. 1 Streamer Dur., and Pigeon Eggloft. Contact: Glenn Scherer, 1427 Seventh Ave., Rock Island, Ill.

Burnaby Invitational — June 26-27, 1971. Contest in Burnaby, British Columbia, open to both Canadian and US rocketeers. Events: Class 0 Altitude, Open Spot Landing, Sparrow B/G, Class 1 PD, and Robin Eggloft. Features: Guest Speakers, Manufacturers Displays, Planetarium Visit, Banquet, Trophies, etc. Contact: BCC-RM Contest Director, 6714 Hersham Av., Burnaby, British Columbia, Canada.

MMRR-71 — June 26-27, 1971. Regional meet in Columbus, Ohio, open to NAR members from the Midwest. Events: Scale, Swift B/G, Hornet B/G, Sparrow Rocket/Glider, Robin Eggloft, Predicted Altitude, Plastic Model, Class 0 PD, and Class 2 Streamer Dur. (Advance registration required.) Contact: MMRR-71, 1191 Shanley Dr., Columbus, Ohio 43229.

Texarea II — June 26-27, 1971. Area meet sponsored by the Apollo-NASA Section and open to NAR members from the state of Texas. Site: Manned Spacecraft Center, Houston. Contact: Gary King, 13903 Barryknoll Lane, Houston, Texas 77024,

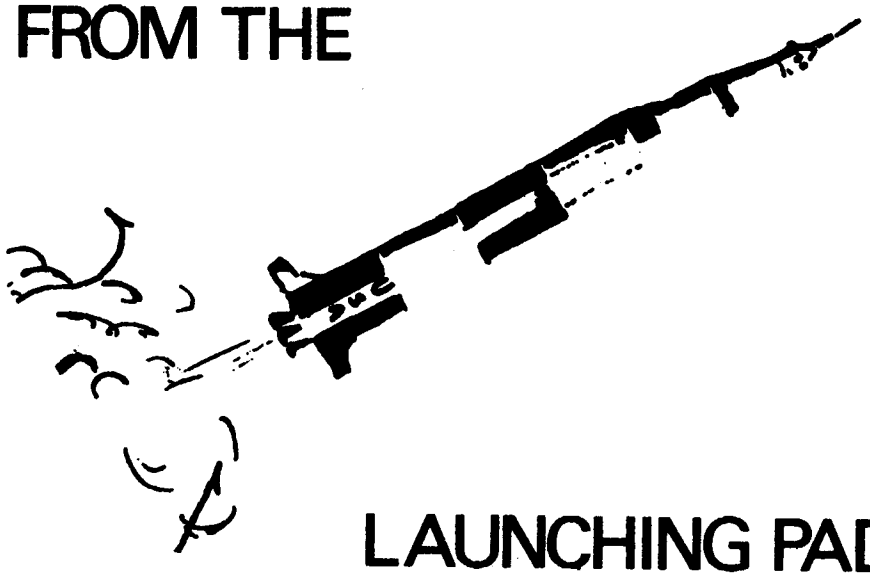
Canadian Convention — July 2-4, 1971. Second National Canadian Model Rocket Convention, sponsored by Montreal's ARRA club, and open to all rocketeers. Discussion groups, films, speakers, competition, and a banquet. Full information from: ARRA, 7248 2nd Ave., Montreal 329, Quebec, Canada.

Southwestern Model Rocketry Conference — July 20-23, 1971. Third annual convention for rocketeers in the Southwestern US. Featuring: flight competition, discussion groups, speakers, films, and banquet. Sponsored by the ARC-Polaris Rocket Club, Portales, New Mexico. Write for information: ARC-Polaris, Arawer 89, Portales, N. Mex. 88130.

Montreal Eggloft '71 — September 18, 1971. Regional Egglofting competition in Montreal, Canada. Site: Maisonneuve Park complex,, Montreal. For rules and information write: ARRA, 7800 des Erables Ave., Montreal 329, Quebec.

ATTENTION CONTEST DIRECTORS
Mail notices of your contests at least 90 days in advance for listing in Model Rocketry's "Modroc Calendar" to:
Modroc Calendar
Model Rocketry Magazine
Box 214
Astor Station
Boston, MA 02123

FROM THE



LAUNCHING PAD

On the International Scene, the CIAM Space Models Subcommittee is undertaking a worldwide effort to popularize the model rocket hobby. At present, the hobby has developed in Australia, Bulgaria, Belgium, Canada, Czechoslovakia, Poland, Rumania, Sweden, the U.S.S.R., and Yugoslavia as well as the United States. There has been little development in Western Europe, South America, or Asia and Africa. In fact, several Western European countries prohibit model rocketry.

Acting through the FAI, the Space Model Subcommittee has distributed a letter to each of the National Aero Clubs seeking their assistance in promoting the spread of model rocketry. In calling their attention to this new hobby, the Subcommittee writes:

"We believe that this new catagory of aeromodelling should be seriously investigated by all National Aero Clubs because of its excellent safety record, because of its relevance to mankind's new capacity to fly into space, and because of its unique educational usefullness in teaching young people about the technical and scientific subjects of aeronautics and astronautics."

To help promote rocketry throughout the world, the CIAM Space Models Subcommittee has established a Secretariet to answer inquiries from those National Aero Clubs seeking assistance and information in establishing the model rocket hobby in their countries. In addition, the Secretariet will sponsor a series of model rocket demonstration/seminars to acquaint leading hobbyists in each nation with model rocketry.

In the US, such a demonstration will be held on September 20, 1971 following the World Championships for Radio Control in Doylestown, Pennsylvania. The expectation is that many of the European RC competitors will view the demonstration and return to their countries better informed on the rocket hobby.

Across the boarder in Canada, rocketry is now developing at a brisk pace. Last year saw two major national events – the Convention in Montreal and the Regional Meet in Alberta. This year, both of these events will be repeated, and joined by at least two more. The Canadian Rocket Society in Toronto will sponsor a Regional Meet in June, and Montreal's ARRA has scheduled a Regional Egglofting Championship for September. (Details of both these events will be found in this month's *Modroc Calendar*.) To encourage the development of model rocketry in Canada, **MRm** will begin a

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Model Rocketry Magazine
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monthly "Canadian Corner" next month. We hope to provide a forum for Canadian rocketeers to exchange information about contests, projects, and other topics.

Members of the South Seattle Rocket Society went out on New Years Eve to launch the first model rocket of 1971. According to the report in the *Modroc Flyer*, newsletter of the SSRS, Tony, Mike, and Jess Medina gathered together their gear and journeyed to the Boeing Space Center launch field. Although the launch system checked out perfectly prior to departure, it refused to work at the field. Undaunted, the SSRS rocketeers rushed home to get two other launch systems. By 12:40 AM things were set, and Mrs. Medina launched the first SSRS rocket of '71. Unfortunately, the shock cord pulled out from the side of the rocket, leaving a hole in the body, and leaving the SSRS rocketeers wondering if this flight was a sign "of things to come in '71."

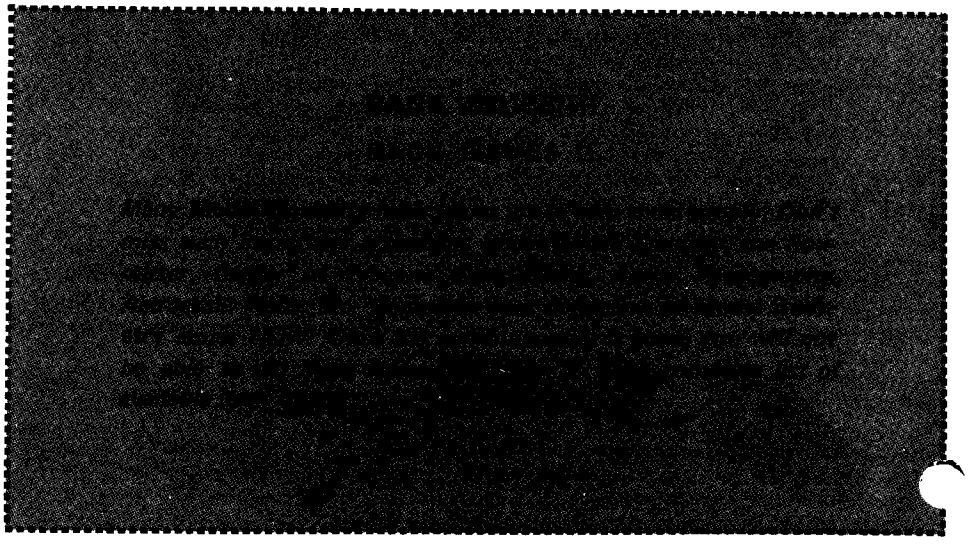
A new technique for balsa finishing has been developed by John Walker of the Triple R Rocket Society of Riverside, California. The method is quite simple and inexpensive. Common aquarium sealer is spread over the entire sanded fin or nose cone and allowed to dry. The rubber covering dries in 48 hours (a little too long for those "last minute contest builders") and leaves a smooth surface for painting. The same rubber sealer is also used on fin/body tube joints. Either Enamel or Butyrate Dope will cover the rubber sealer with only two coats, making a smooth finish easy to obtain.

Rocketeers unfamiliar with the basic operation of the model rocket engine would do well to read the January 1971 issue of Estes *Model Rocket News*. In this issue Ed Brown presents a thorough description of what the engine is and how it works. This Estes Technical Note titled "Model Rocket Engine Performance" details the propellant characteristics, grain design, and nozzle functioning of typical model rocket engines. Using diagrams, graphs, and simple equations, the report clearly explains the essential details which have gone into the design of a typical engine. Copies of the report, contained in Vol. 11 No. 1 of Estes *Model Rocket News*, are available for 10 cents each from Estes, Dept. 31M, Pentose, Colo. 81240.

Beginning next month, with the June 1971 issue, we will be expanding **Model Rocketry** to 48 pages, improving the cover format, introducing several new features, and making other changes we feel will please you, the readers. This effort is part of **Model Rocketry's** expansion program, designed to bring our hobby to the attention of many more potential rocketeers. We will be placing greater emphasis on newsstand distribution to attract these new readers. Presently, only 2,000 copies per month of **Model Rocketry** are shipped to newsstands for distribution. Beginning next month, this will be increased to 30,000 copies per month. We hope you will be pleased with these changes and will keep us informed of your opinions on the content of the magazine. Keep using those Reader Survey forms!

If you believe the schedule of events published in the latest issue of *Missile Epistle*, NARCAS seems to have done it again in selecting events for the NART-2 Record Trials. They have managed to select the most amazing, and perhaps most terrorizing, events in the new Contest Code. Last year NARCAS became the first Section to schedule Condor Boost/Glide at a major NAR meet. You'll recall the results from our coverage of NART-1 in the August 1970 issue of **MRm**. This year, Condor B/G returns to the schedule, accompanied by the as yet untried Condor Rocket/Glider event. For those rocketeers who want something small, NARCAS has also scheduled Hornet B/G and Hornet R/G. For small PD fans there's Class 1 Parachute Duration, and for those rocketeers who want more power Class 3 PD is on the schedule. Unfortunately, if I recall the field correctly from last year, it's a bit small for Class 3 PD. Also on the schedule is a Stream Duration contest, Class 3, to be flown at night. If we survive, we hope to have a NART-2 report in the August 1971 issue of **MRm**.

George



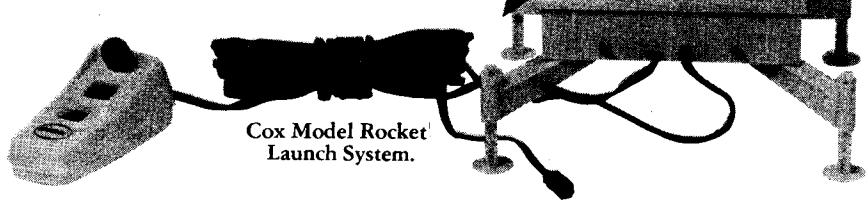
Be nice to your scratch-built rocket.

You've invested a lot of time and energy in your beautiful bird, not to mention some pretty tedious work. If you want it to perform to match your craftsmanship, you won't try to fly it with second-rate engines and accessories. You'll use the best: the Cox family of model rocketry components. See them and our line of fine, beautifully detailed, ready-to-launch model rockets at your favorite store.

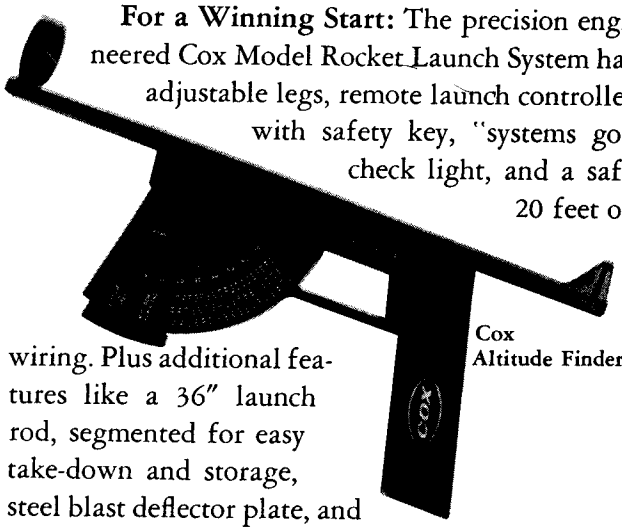
Cox Solid Fuel Engine and Cox Safety Igniter.

Premium Fuel: It may be rated in newton-seconds instead of octanes, but it's still the best. Why? Because Cox Solid Fuel Engines provide a better power-to-weight ratio in the standard .69" x 2.75" casing than any other manufacturer's. Which means that you get more usable power out of a lighter package. And this year, Cox is introducing the most potent member of the line: the D8. The D8 produces 50% more power than was previously available in standard .69" x 2.75" casing. All Cox engines feature dense, highly visible tracking smoke.

Positive Ignition: Cox Safety Igniters* provide fail-safe arming because the igniter is plugged into the electrical circuit prior to insertion into the engine. No "micro clips" or groping around the base of an armed rocket required.


Cox Model Rocket Launch System.

For a Winning Start: The precision engineered Cox Model Rocket Launch System has adjustable legs, remote launch controller with safety key, "systems go" check light, and a safe 20 feet of wiring. Plus additional features like a 36" launch rod, segmented for easy take-down and storage, steel blast deflector plate, and the launch base holds 8 "D" cells (not included) for dependable single engine ignition time after time.



Cox Altitude Finder.

High Performance Requires Fast Tracking: Cox's ready-to-use Altitude Finder is a quick, easy way to pinpoint the angle and height of your rocket's apogee. As the rocket reaches maximum height, the Altitude Finder's trigger is released, locking the direct readout gauge in position. The rocket's altitude is read directly in feet with no immediate calculations or trigonometry tables required.

Power Brakes: Cox Parachutes come pre-cut with shroud lines and snap-swivels attached. An elastic shock cord is included to guarantee that your favorite bird won't do a pancake landing from 800 meters. In 12", 16" and 20" diameters.

COX

L. M. COX MFG. CO., INC., a subsidiary of LEISURE DYNAMICS, INC.
1505 East Warner Ave., Dept. MR-4, Santa Ana, California 92705

*pat. pend.

New Products at the 1971 HIAA Trade Show

by George Flynn

The 1971 Hobby Industry Trade Show, held in Chicago during early February, afforded an opportunity for **Model Rocketry** to look over most of the new hobby products to be introduced in the upcoming year. Even a quick look at the model rocket displays indicated that you'll be seeing a lot of new products this year. More interesting, however, is the trend towards "mass merchandising" which will introduce model rocket products to more stores in 1971 than ever before. All of the major manufacturers introduced new packaging, designed for this type of sales. As a result, more youngsters will be attracted to the hobby in 1971 and upcoming years. The tool, paint, and construction materials manufacturers also unveiled a few suprises which should prove interesting and useful to rocketeers.

The biggest news of the show, however, was the announcement of another merger in the model rocket field. Just before the show opened, the Damon Corporation completed the final details for their aquisition of Centuri Engineering and Vashon Industries as well as the Centuri subsidiary Enerjet. Damon already owns Estes Industries. Initial information indicates that all three companies will continue to operate independently of each other, with each retaining its own product line.

Model Rocket Products

In April Estes Industries will introduce their "Citation Line", a series of five colorful models designed to appeal to both beginners and experienced modelers. These rockets are intended for the mass merchandising market, and will be packaged in multicolor boxes. They will be sold only in complete kits, including the rocket, two engines, igniters, and recovery wadding. The Citation Line consists of a beginners kit, three sport models, a boost/glider, and a launch pad.

The Quasar, a model similar in design to the Alpha III, is the easy-to-build beginners rocket in the Citation Line. This model, standing 13" tall, features all plastic, pre-metalized, fin and nose cone assemblies, and a pre-printed body tube wrap-around decoration. The Quasar requires no painting, and will retail for $2.50.

The Red Baron, a sport model designed with "fun flying" in mind, is an attractive 14" long model using a 1.8" diameter body tube. The Red Baron uses die-cut balsa fins and a plastic nose cone to allow easy assembly. A large custom decal sheet makes finishing easy – the entire rocket is painted with a base coat and decorations are added from the decal sheet. No masking is needed. Retail price on the Red Baron will be $3.25 in a kit including two engines.

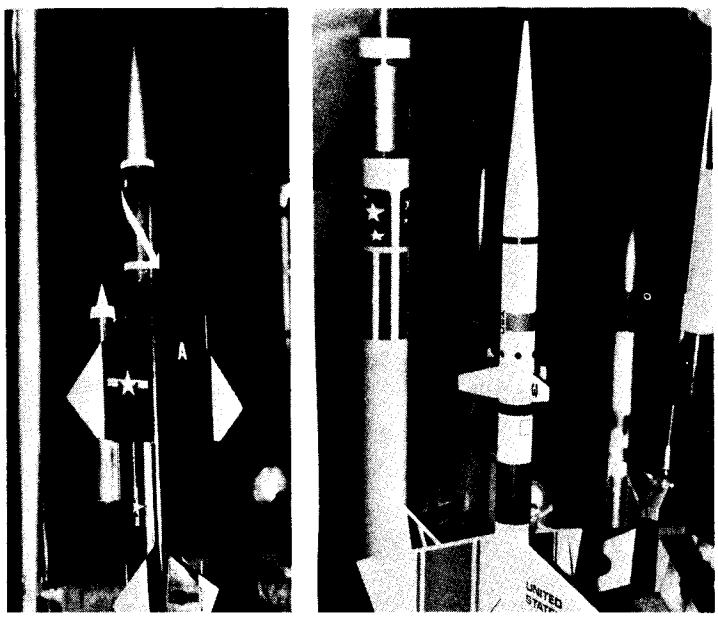
The Patriot, standing over two feet tall, uses a 1.6" diameter body tube. This sport model will employ die-cut balsa fins and a plastic nose cone. As with the other kits in the Citation Line, a big, colorful, decal sheet is included. The price will be $4.25.

The 20" tall Starship Vega is the 'futuristic' model of the new line. This kit uses a balsa nose cone and die-cut balsa fins, and employs "landing legs" on the rear to achieve the "spaceship" effect. The Starship Vega comes complete with a three color decal sheet and wrap around foil trim. Retail price will be $5.25.

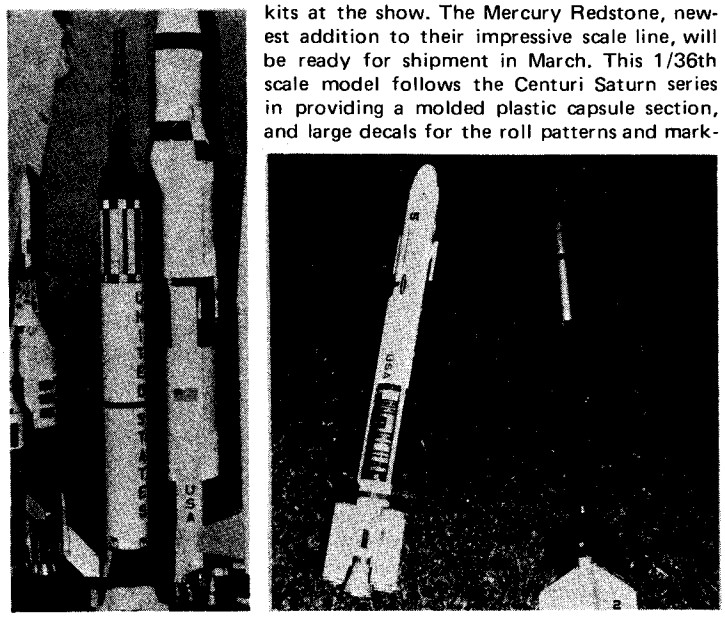
The final rocket in the Citation Line is the first scale boost/glider ever marketed – a 23" long version of the USAF Bomarc. The fins and wings are die-cut balsa, while the nose cone is plastic. Wrap-around aluminized mylar panels are supplied to simulate the metal on the prototype. The Bomarc will eject its power pod at apex, and the missile will return in gliding flight while the pod descends by chute. The Bomarc will retail for $6.50 complete with two engines.

Estes will introduce a new launch system, an attractive silver plated version of the Estes Porta-Pad system, for the Citation Line. The launch control system will sell for $8.50. A delux starter kit will also be introduced late in the year. If sales on the Citation Line are as expected, three new models may be introduced before the end of 1971. Kits in this line will be on sale in hobby shops and other retail stores.

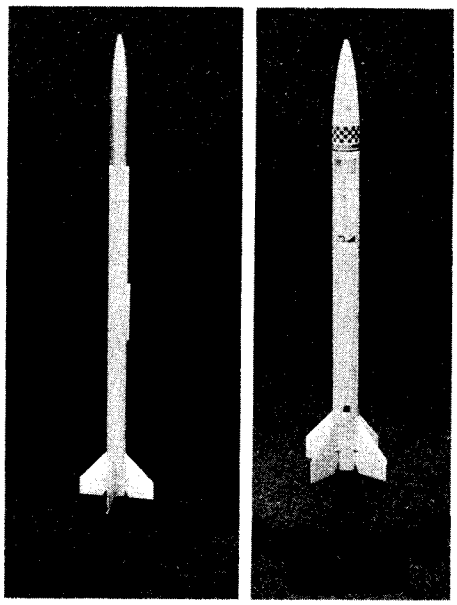
Centuri Engineering announced several new kits at the show. The Mercury Redstone, newest addition to their impressive scale line, will be ready for shipment in March. This 1/36th scale model follows the Centuri Saturn series in providing a molded plastic capsule section, and large decals for the roll patterns and mark-



Two members of the Estes "Citation" line, the Bomarc (left) scale model boost/glider and the futuristic Starship Vega (right), will be available in stores beginning in April.



From Centuri, the Mercury-Redstone scale model is now ready for shipment. The Warp 11 (left) and the unnamed futuristic design (right) will be available in kit form in early spring.



MPC's semi-scale replica of the Sandia Tomahawk (left) features a flush fit fin unit. The slip-on fin unit is exact scale, and incorporates the engine mounting. The payload section uses the new MPC 20 mm plastic coupler. The Starhawk (right) features a one piece fin unit. Without engine it weighs only 21 grams, and serves as both a beginner's kit and a serious altitude model.

ings. The Mercury Redstone, using a 2" diameter body tube, stands 29" tall, and sells for $4.95.

Also new from Centuri is the Warp 1, a two stage model using the Centuri "passport" staging system. This sport model, designed by Larry Brown of the R&D Department, will be ready for sale in early spring.

Another new, as yet un-named, sport model will be introduced at the same time. This futuristic design which stands approximately 2 feet tall uses a tube stabilization system. The model includes a highly detailed engine section, viewed through a clear plastic rear body tube, and multicolored decals. A simulated nozzle increases the attractiveness of this futuristic space ship.

The Servo Launcher, a Centuri R&D development, attracted the attention of many dealers at the show. Some, however, expressed disbelief that a launcher using only two D photo-flash cells could provide reliable ignition. By using an air actuated servo system, the Centuri launcher has proven itself reliable in actual tests. The complete Servo Launcher, which converts into a display stand when not in use, retails for $5.50.

Centuri has several items "under development" in their R&D Department. In the testing stage is a blinking light flasher which fits into their series 8 plastic nose cone. Also under development is a transmitter line which will fit into the series 7 tube.

Beginning immediately, Centuri will be shiping their improved "Sure-Shot" igniters with all of their regular series engines. Centuri also plans a series of new boxes which will be attractive to the mass merchandising market. These four color boxes will be introduced for retail store sales of the beginner's kit, several older kits such as the Laser-X, and many new designs.

Model Products Corporation introduced three new kits for 1971. The first kit, a 1/12 scale model of the Sandia Tomahawk, uses a 20 mm body tube and stands 18½" tall. The Tomahawk uses a plastic fin section with all the rivet and fin airfoil detail molded into the single piece, slip on unit. This kit, an easy to assemble, scale bird will fly with A3-2, B3-3, or C6-4 engines, and will sell for $2.00.

Also new from MPC is the Star Hawk, an attractive sport model which will also supplement the Pioneer as a beginners kit. It uses the same single piece fin unit as the Tomahawk and stands 13" tall. Since this fin unit is flush with the body tube, the Star Hawk should be a good competition model for altitude and PD events. The Star Hawk sells for only $1.00.

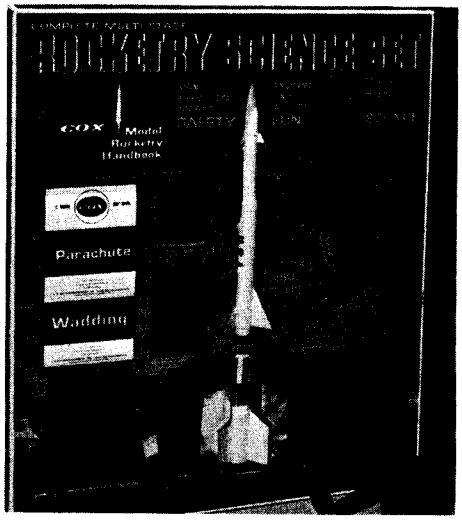
The third addition to the MPC Astroline series is the Nike-Patriot, a 22½" tall, single stage sport model. This kit uses a Nike-type, one piece, slip-in fin unit on a 35mm tube. The Nike-Patriot will fly with a B6-4, or C6-6 engine.

Also on display from MPC was their new line of ready-to-fly model rockets. The first two MPC ready-to-flys, now available, are the Nike-Clipper and the Yankee 1. The 16" tall Yankee 1 is a futuristic design with a blue nose cone, white body, and orange fins. The Nike-Clipper stands 18" tall and uses pre-colored nose cone and fin sections. Both models feature the MPC "Protect-O-Liner."

The big news from Cox was the announcement of a new engine — a D in the standard 18mm X 70mm, "A, B, C-type," caseing. The D's — a D8-0 and a D8-3 — are expected to be available before summer. The total impulse of the new Cox engine is 15.00 newton seconds, making it a mid-range D. The engine has an average thrust of 8 newtons and a burn time of 1.87 seconds. Total weight is 24.2 grams for the booster and 26.2 grams for the D8-3. It is designed to power the Cox Saturn 1B and Saturn V models, but the D8-3 should find applications in high-performance boost/gliders.

The Cox Saturn V is now available for sale at your local hobby shop. Shippments on this impressive ready-to-fly were scheduled to begin in mid-February. The Saturn V stands 32" tall and weighs approximately 14 ounces. The model can be boosted by two D8-3's or two C's. Retail price is $11.00.

Cox has also packaged two model rocket starter sets, the "Model Rocketry Science Set," and the "Beginner's Set." The Model Rocketry



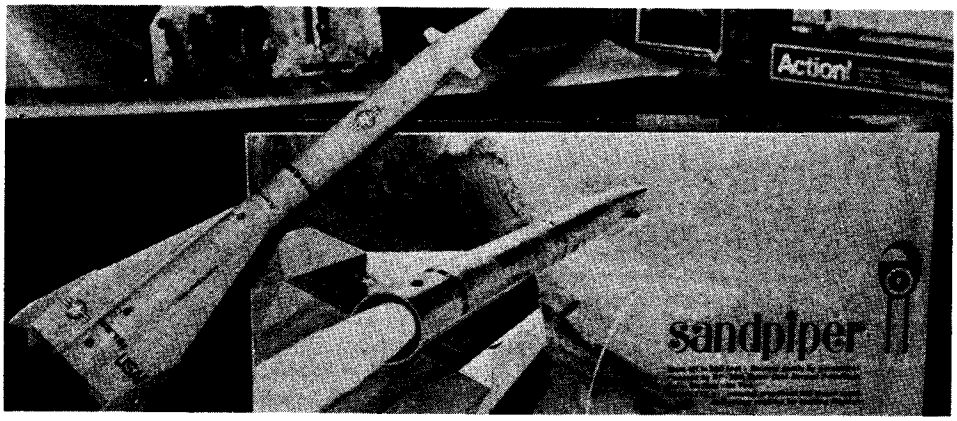
The new Cox "Model Rocketry Science Set" includes the Nike-Zeus rocket, launcher, tracker, engines, and two booklets.

Science Set includes the ready-to-launch Nike Zeus two-stage model rocket, the Cox Altitude Finder, a Launch Control System, six engines, and the Cox "Handbook of Model Rocketry," and "Rocketry Science Workshop." The Handbook introduces the rocketeer to the basics of rocket prpoulsion, elementary stability, altitude tracking, and the history of space flight. The Workbook provides an outline of experiments the rocketeer can conduct.

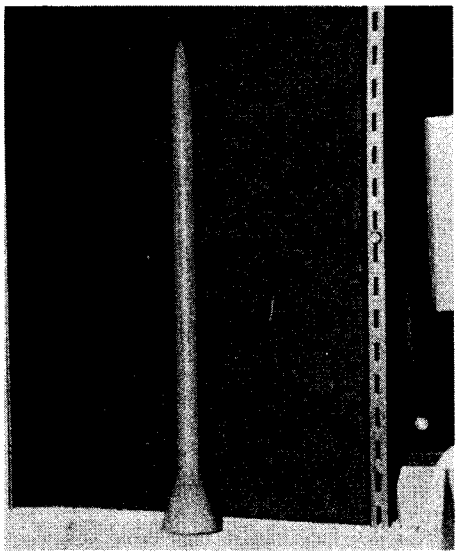
The Cox "Beginner's Set" includes the Honest John ready-to-launch model rocket, six engines, igniters, chute, and Launch Control System. The Cox "Handbook" accompanies the set.

From Vashon Industries comes the first cold propellant scale model. The Sandpiper, a model of the USAF target missile, stands 13 inches tall. The kit, which includes the Vashon V-2 cold propellant engine, comes complete with recovery systems, RP-100 propellant, and launcher. The complete kit, in an attractive new box, retails for $11.00.

The X-13 Rocket Plane, a parasite glider strapped to the side of the Valkyrie 1 cold propellant rocket, uses a special release system unique to Vashon. The kit includes Monokote finishing material to simplify finishing of the wings and fins. The X-13 sells for $11.95.



Vashon's latest addition is the Sandpiper, a semi-scale model of the USAF target missile. The Sandpiper and a scale model of the US Army Sergent are the first two cold propellant scale models. Both use the same engine unit as the Valkyrie II.



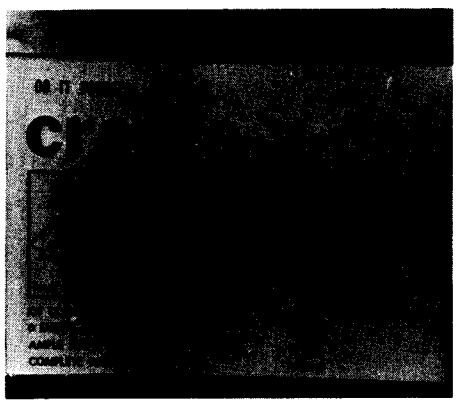
SAI's newest kit, the finless Vulcan sport model, was adapted from plans published in Model Rocketry. Though it looks unusual, flight performance is quite good.

The Viking is Vashon's first entry into the two-stage field. This multi-stage model, using a special cold propellant staging system, stands 20" tall. The Viking is capable of flights to almost 1,000 feet. The complete kit, including launcher, and propellant will sell for $15.95.

The newest kit from Space Age Industries is the Vulcan, a 15" tall finless rocket. The Vulcan is a "tail cone" stabilized model using a 19 mm body tube and balsa nose cone. This kit, adapted from the Arcturus design published in **MRm**, sells for $1.50.

Soon to be kitted by SAI is a sport model and a new scale model. The Whirley Bird is a unique two-finned design which uses spin fins to assure stability. This kit flys on the same principle as the two finned "air and water" rockets which have been popular for a decade. The Whirley Bird will sell for $1.25. Also planed for introduction by SAI in 1971 is a scale model of the Black Brant V. This single staged model, scaled to a 19 mm tube, will retail for $1.50.

Also new from SAI is Creat-A-Cal, a new material which can be used to make your own decals. The Creat-A-Cal kit includes special decal paper and a coating material. You can draw, paint, or write on the paper with any ink, paint, or other material which is not water soluable. The artwork is then painted over with the transparent liquid coating, and transferred to the model in the same manner as any ordinary decal. Creat-A-Cal will allow scale modellers to make decals of those intricate patterns and markings frequently found on scale birds. The sport modeler can paint elaborate decorations and transfer these to his models. The complete Creat-A-Cal kit, with enough materials for 60 square inches of decals, sells for $2.00.



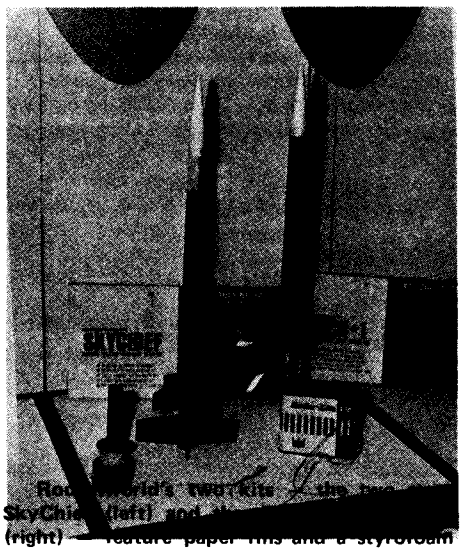
Creat-A-Cal from SAI allows the rocketeer to make his own decals for scale models or to decorate sport birds.

Rocketworld, the newest model rocket company, has come up with a series of new and different ideas which will appeal to the beginner as well as the advanced modeler. Initially, Rocketworld will introduce two kits – the Mach 1 and the Sky Chief. Both kits come complete with everything needed to assemble the model.

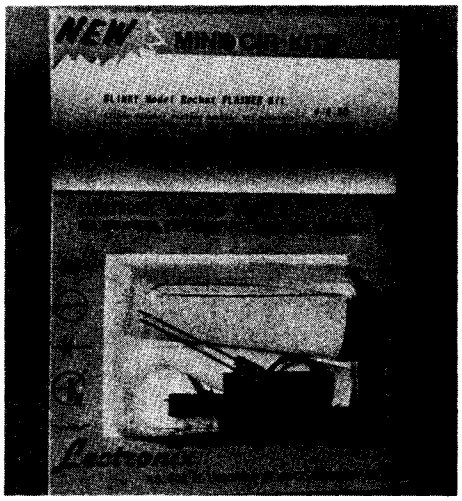
The Mach 1 is a single stage beginners model featuring pre-cut, pre-colored, heavy paper fins. These paper fins are as strong as balsa, and look like they will survive many flights. The body tube, a standard fibre tube, is also pre-colored, so no painting is necessary. The nose cone is a molded styrofoam unit. The Mach 1 should prove especially popular with teachers and other individuals supervising model rocket programs since it is an easy-to-build kit requiring no materials other than those contained in the box. Retail price is $3.00.

The Skychief is Rocketworld's two-staged model. The fins and tube are pre-colored paper as in the Mach 1. The Skychief also has a 2" long clear plastic payload section. Retail price is $4.00.

The Rocketworld Launching System also shows quite a bit of originality. It uses an "audio alert" system rather than the normal continuity light. All spectators are made aware that the pad is armed by a loud siren noise. The launch rod mounts directly to a terminal of a 12 volt lantern battery to minimize the amount of range equipment required. The weight of the battery is quite sufficient to keep the rod from tipping over. Use of a 3-piece launch rod, each section only 12" long, allows



Rocketworld's two kits, the SkyChief (left) and the [illegible] (right) feature paper fins and a styrofoam nose cone. The Mach 1 sits on the special Rocketworld launcher, an adapter which mounts directly to a lantern battery.



The Lectronix Blinky Payload Kit contains all the parts necessary for a transistorized light flasher, including the nose cone and payload tube.

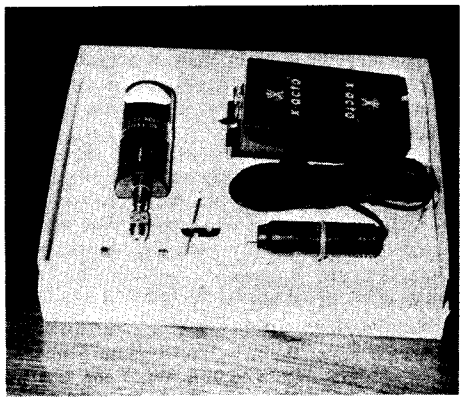
the entire launch system – battery, launcher, and control unit – to fit in the average range box, which should make the unit especially popular with beginners

Lectronix, a firm involved in the manufacture of basic electronic kits, has entered the rocket field with the introduction of their Blinky Model Rocket Flasher Kit. The payload kit, complete with a vacuum formed plastic nose cone and battery compartment, includes all components necessary to build a night tracking flasher. The unit measures 6" long, and operates on two 1½ volt batteries. The kit sells for $4.50. Lectronix also makes an FM transmitter kit, with a range of several hundred feet, which will fit inside a BT-50 tube.

From Simpliway Products comes news of their Electronic Ignition System, announced at last year's show but delayed in production. This unit allows ignition from 150 feet or further from the pad. The hand held controller is supplied with 60 feet of cable. Retail price is $ 9.95.

Tools

X-Acto has introduced a "Mini-Drill," a portable hobby drill which operates from a 12 volt battery, which should be ideal for on the range construction and repair projects. Working



X-Acto's new Mini-Drill will operate on the range using an auto battery or lantern cell for power.

The Ambroid Jet-Pak can spray any liquid paint, and will give a finish at least as good as a spray can with less cost. It also lets you spray military flat paints and many other colors not available in spray cans.

from a battery, either an automobile or lantern unit, the drill provides approximately 8,000 RPM and will accept bits to ¼". An adapter to allow use of the "Mini-Drill" on AC house current is also available. A small version of the "Mini-Drill" will sell for $10.95 while the larger version will sell for $18.95.

Dremel Manufacturing has expanded the line of accessories available for their Moto-Tool. At current count they have 24 High Speed Steel Cutters, 12 Tungsten Carbide Cutters, 9 Small Engraving Cutters, 27 Emery Wheel Points, 12 Silicon Grinding Points, 28 Plain Shaped Wheel Points, 3 Wire Brushes, 3 Bristle Brushes, 6 Router Bits, and 6 Polishing Wheels. A complete description of all accessories for the Moto-Tool is contained in the new Dremel catalog.

The Ambroid Jet-Pak is an inexpensive, portable paint sprayer. This unit, which will spray any liquid paint,should be great for range use. The modeler who doesn't want to invest in a high-priced compressor unit will also find the Jet-Pak good for general painting. One can of propellant, priced at $1.79, will spray approximately one quart of solution. The Jet-Pak retails for only $2.95.

The new Mini Spray Gun from Badger may be the answer for the rocketeer who wants a more expensive and more versitle unit. The Badger Mini Spray Gun should encourage many rocketeers to switch to spray painting. The unit, operating from a "propel" can rather than a compressor unit, will spray smoother than the normal spray can of paint. The spray is adjustable, and the unit can be used to spray with lacquer, enamel, water base, latex, shellac, and other paints. Retail price is $9.00.

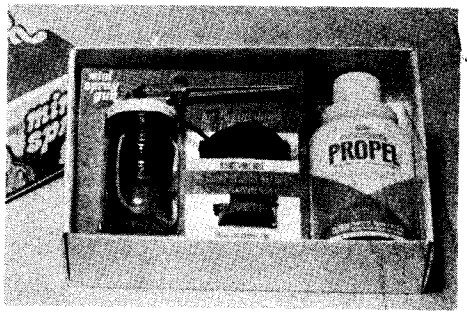
From the Griffin Manufacturing Company comes a new use for an old tool. The Grifhold "Pounce Wheel" serves as a "rivet simulator," allowing the modeler to make rivet projections on thin plastic surfaces. Running the No. 10 Pounce Wheel over a sheet of thin plastic, such as the 0;015" or 0.030" sheet stock sold by Plastruct, will give 15 equally spaced indentations per inch. Turn the plastic sheet over, and you have 15 "rivet projections." The No. 9 Pounce Wheel gives 21 rivets per inch. Each is priced at $1.65.

Finishing Materials

Flourescent paints, to ease the tracking problem, have been introduced by several manufacturers. Pactra Industries announced their "Hi-Glo" Flourescent Paint Kit. Priced at $1.49, the kit consists of seven ¼ ounce bottles of paint — Red, Blue, Orange, Green, Yellow, Pink, and Thinner — plus a brush. Also new from Pactra is a line of "Aero-Glo" flourescent fuel proof dopes. Available in "space age" colors — Saturn Yellow, Mercury Red, Gemini Green, Apollo Orange, White Undercoat, and Thinner — the Pactra dope will sell for $.39 in 1 ounce jars or $1.00 in 4 ounce jars.

IMS Corporation introduced their flourescent paint in both bottles and spray cans. Their line of "Luna Glo" acrylic tempra paint is packaged in 7/8 ounce bottles and sold in an assortment of six colors. The package containing Pink, Blue, Orange, Yellow, Green, and Red paints retails for $2.79. The flourescent "Luna Glo" spray paint is packaged in 6 ounce spray cans and priced at $2.98 per can. It is available in the same colors as the acrylic paint.

"SLICTAC" is a new, monokote like, covering material introduced by Citizen-Ship. Slictac is a heat sealing, shrink type, covering material for use on built-up or cut-out B/G wings. The surface is non-porous and smooth so it requires no finishing. A 30" X 72" roll of clear Slictac retails for $4.95, and can be colored with a single coat of dope.



The Badger Mini Spray Gun is a miniature version of the spray painting units used by professional modelers.

Model Accessory Company will soon introduce a new, ultra-light-weight, covering material. This ½ mil thick mylar material will heat shrink and adhere like the current covering materials, but it weighs only 25% as much. This material, as yet unnamed, is designed for lightweight gliders and should be great for small B/G's. Prices, colors, etc. will be announced later.

Martin Krasel Studios has expanded their line of Micro-Scale decals. Though designed for aircraft, many of the decals listed in their catalog are useful on scale models. Their Super Micro Set decal setting solution will be especially attractive to scale modelers who have trouble getting decals to conform to the rivet detail on finely detailed models. The decals sell for $.75 to $1.50 per sheet (depending on size) and the decal setting solution is $.75.

Lancer Industries has added to their line of expanded foam plastic suitable for B/G wings. Their high-density (3.3 lb. per ft^3) foam is available in 3" and 6" wide sheets, 1 foot or 3 foot long, and in thicknesses of 1/16", 1/8", 1/4", 1/2", 1", and 2". The low-density (1 lb. per ft^3) is now available in 3", 6", and 12" widths, 1 foot and 3 foot lengths, in 1/4", 1/2.., 1", 2", 4", and 6" thicknesses. Their price list also includes colored foam covering material and the Marvel Maker foam cutter.

Plastic Models

There were quite a few new plastic model kits on display at the show — fire engines, trucks, cars, and a few airplanes, but no new rockets. The rage to capitalize on the Apollo interest has subsided, and plastic spacecraft kits seem to be fareing as well as the national space program.

Though not on display at the show, there is one new foreign kit release worthy of note. Airfix, the British plastic model manufacturer, has introduced a 1/144 scale model of the Russian "VOSTOK" booster. The 103 piece kit, slightly smaller than the MPC "VOSTOK," includes parts for construction in the 'Sputnik,' 'Vostok,' and 'Soyuz' configurations.

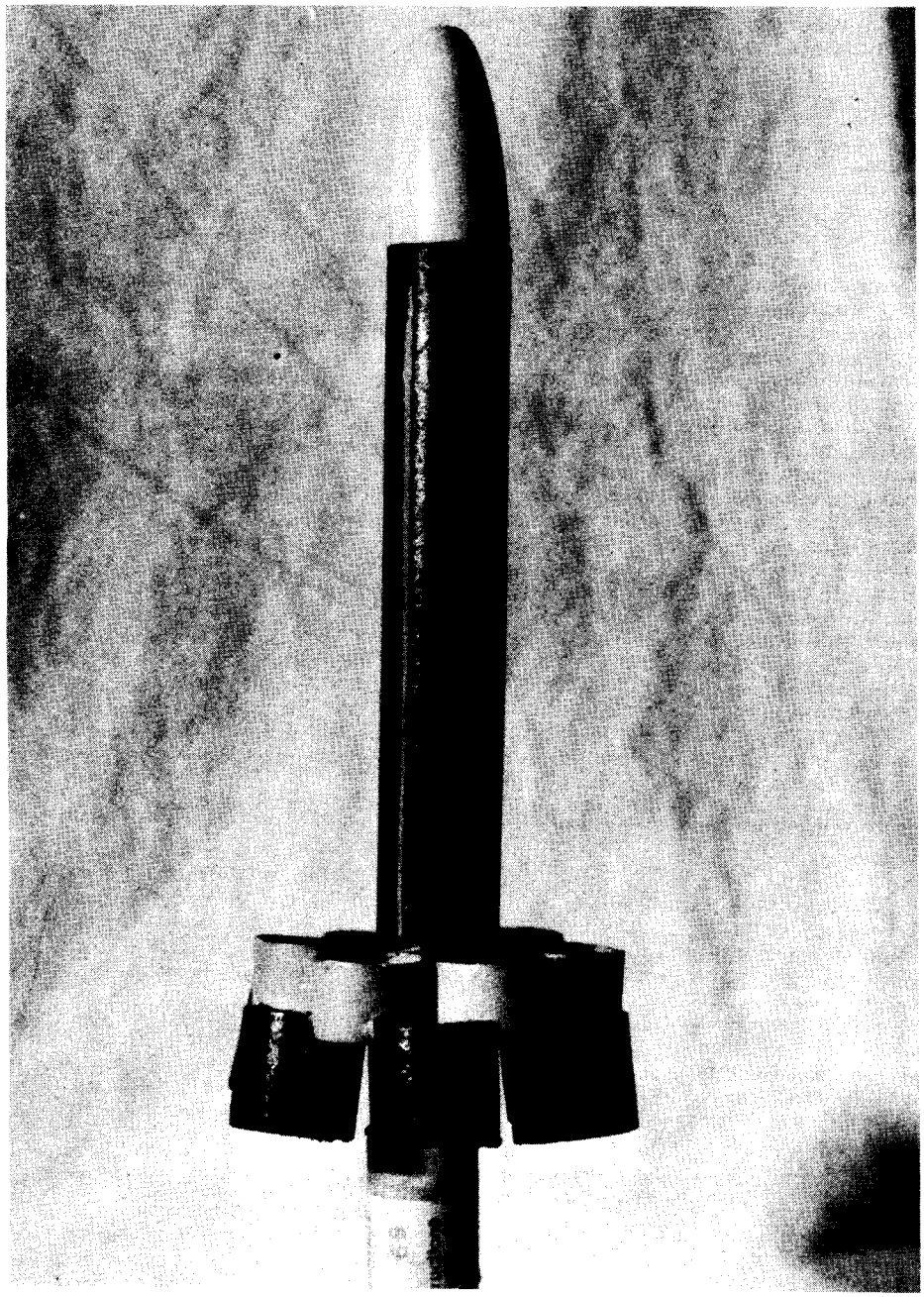
The HIAA Trade Show occupied six rooms on two floors of the hotel, so there are probably quite a few useful items we've missed. In answer to the many letters received after last year's Trade Show report, we are printing the complete names and addresses of all companies listed in this article.

Directory of Firms

ESTES INDUSTRIES, Dept. 31M, Box 227, Penrose, Colorado 81240. (Catalog 25 cents.)
CENTURI ENGINEERING, Dept. M-31, Box 1988, Phoenix, AZ. 85001. (Catalog 25 cents.)
MPC, Dept. S, 126 Groesbeck Hwy., Mt. Clemens, Mich. 48043. (Catalog 25 cents.)
L.M. COX, Dept. MR-4, 1505 E. Warner Ave., Santa Ana, CA 92705. (Catalog 25 cents.)
VASHON INDUSTRIES, Box 309G, Vashon, Wash. 98070. (Catalog 25 cents.)
SPACE AGE INDUSTRIES, Dept. MR, Highland Park, NJ. (Catalog 25 cents.)
ROCKETWORLD, 1417 N. 7th St., Phoenix, AZ. 85006. (Catalog 25 cents.)
LECTRONIX, Box 42R, Madison Hights, Mich. 48071. (Catalog 25 cents.)
SIMPLIWAY PRODUCTS, 6 E. Randolph, Chicago, Ill. 60601. (Data Sheet 25 cents.)
X-ACTO, Dept. 4, 48-41 Van Dam St., Long Isl. City, NY 11101. (Catalog free)
DREMEL MANUF' CO., 4915 21 st., Racine, Wisc. 53406. (Catalog 25 cents.)
AMBROID, Dept. MK, 99 Broad St., Boston, MA 02110.
BADGER,Dept. Z, 9201 Gage Ave., Franklin Park, Ill. 60131.
GRIFFIN MANUF. CO., Dept. J, 1661 Ridge Rd. East, Webster, NY 14580.
PACTRA INDUSTRIES, Dept. R, 6725 Sunset Blvd., Los Angeles, CA 90028.
IMS Corporation, Dept. V, 34-15 Vasser Drive, NE, Albuquerque, New Mexico.
CITIZEN-SHIP, PO Box 297R, Westfield, Ind., 46074.
MODEL ACCESSORY CO., Dept. G, 7875 Anita Dr., Philadelphia, PA 19111,
MARTIN KRASEL STUDIO, Dept. X, 5914 Blackwelder, Culver City, CA. (Catalog 50 cents.)
LANCER INDUSTRIES, Dept. MR, 1402 Norman Firestone, Goleta, CA. (Price List 10 cents.)

ODDBALL DESIGN: The "ZNT"

BY DOUGLAS PLUMMER — The ZNT is an amazing take-off on the loop stabilization system...since it uses a double series of loops! From the rear, this model looks like the unassembled contents of your "junk box." But the ZNT really flys! And it even has a purpose. It's high-drag stability system makes it the ideal bird for "Spot Landing" competition, as well as a real attention getter at your next contest.....



The ZNT uses two sets of BT-20 rings for stability. The foward set are ½" long and are placed parallel to the main tube. The rear set are each ¾" long and located a few degrees to the main tube.

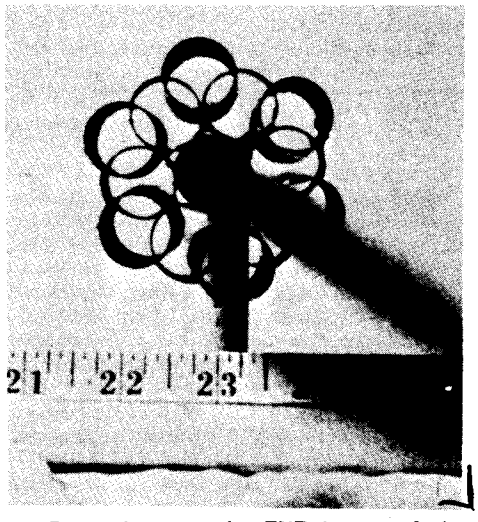
I can read your mind now, you are thinking: "What the heck is a ZNT??!" "Is it a badly mutated infinite loop? A bad joke? Or a refugee from the 'Escape Tower'?" Well, my friend, the ZNT is none of these. It is a creation right out of my own junk drawer. The ZNT is a sweet little monster ready to give you plenty of enjoyment (and probably some ridicule) on the flying field. I should know, since I flew the prototype ZNT in Spot Landing at NARAM-12. It sure attracts attention!

The ZNT is fairly easy to build and finish (no fins to seal), and can be put together in in practically no time at all.

What about flight performance? I haven't any idea where to begin in calculating the center of pressure. However, flight performance indicates that it is behind the center of gravity. As for drag, the ZNT has all the drag of a brick flying broadside. Just right for spot landing!

The ZNT can use just about any engi you can fit into it, but don't stick in a ¼ and expect it to clear the rod by much. I don't know what a D or larger engine would do to a scaled up version of the ZNT but it might be worth a try. Even in BT-20 size, this model will be quite an attention getter and it's great for making a safety officer's stomach feel quesy.

Now, lets get down to the construction.



From the rear, the ZNT is one of the most un-rocket-like objects ever to come out of your junk box. Careful alignment of th loops will, however, produce a good fly demonstration model.

Gather together the parts specified in the Parts List. There are 12 stabilizer tubes. Six are cut ½" long, and the remaining six are cut ¾" long. All stabilizer tubes are cut from BT-20 tube. For ease of cutting, I recommend you use a CMR Body Tube Cutter; but you can use the "time-honored" method of inserting a stage coupler inside the tube and cutting by hand. Whichever method you choose, cut out the stabilizer tubes and a 5" main body tube.

Cut a slit in the main body tube, 2.25" from the bottom of the tube. The slit should be large enough for attachment of the engine holder. Glue the engine holder onto the body tube using a rectangular section of thin paper saturated with white glue to hold the engine holder to the side of the tube. The engine holder should project ½" from the rear of the body tube to allow easy insertion and removal of the engine.

Next come the stabilizing tubes. The smaller lengths are glued flush with the rear end of the body tube. Begin by glueing one tube to the body tube and letting it set. The first tube should be next to, but not directly on top of, the engine holder. When this glue sets, glue the second tube adjacent to the first one. Glue should be applied to the stabilizer tubes at two points — the point of contact with the main body tube, and the point of contact with the adjacent stabilizer tube. Continue this process until all of the remaining small tubes are in place.

The six remaining stabilizing tubes are glued under the others but at a slight angle to the vertical axis. To increase the glueing surface these pieces are mounted in three slits on the underside of the first set of stabilizing tubes. Each of these stabilizing tubes is centered under two of the other stabilizing tubes. Locate the tube in place, then mark the slit locations. Using an X-Acto knife, cut a shallow slit at each intersection, and slide the tube in place. Once you have checked the location of the slits, enlarge them to approximately 3mm deep. Repeat this process for the remaining five tubes.

Add glue to the stabilizer slits, and insert the tubes into place. When the six tubes are dry, carefully fillett all joints.

Mount the shock cord to the inside of the body tube. Attach a screw eye to the base of the nose cone, and add a streamer. Finish and paint, add a launch lug (on a 1/16" dowel standoff), and you're done!

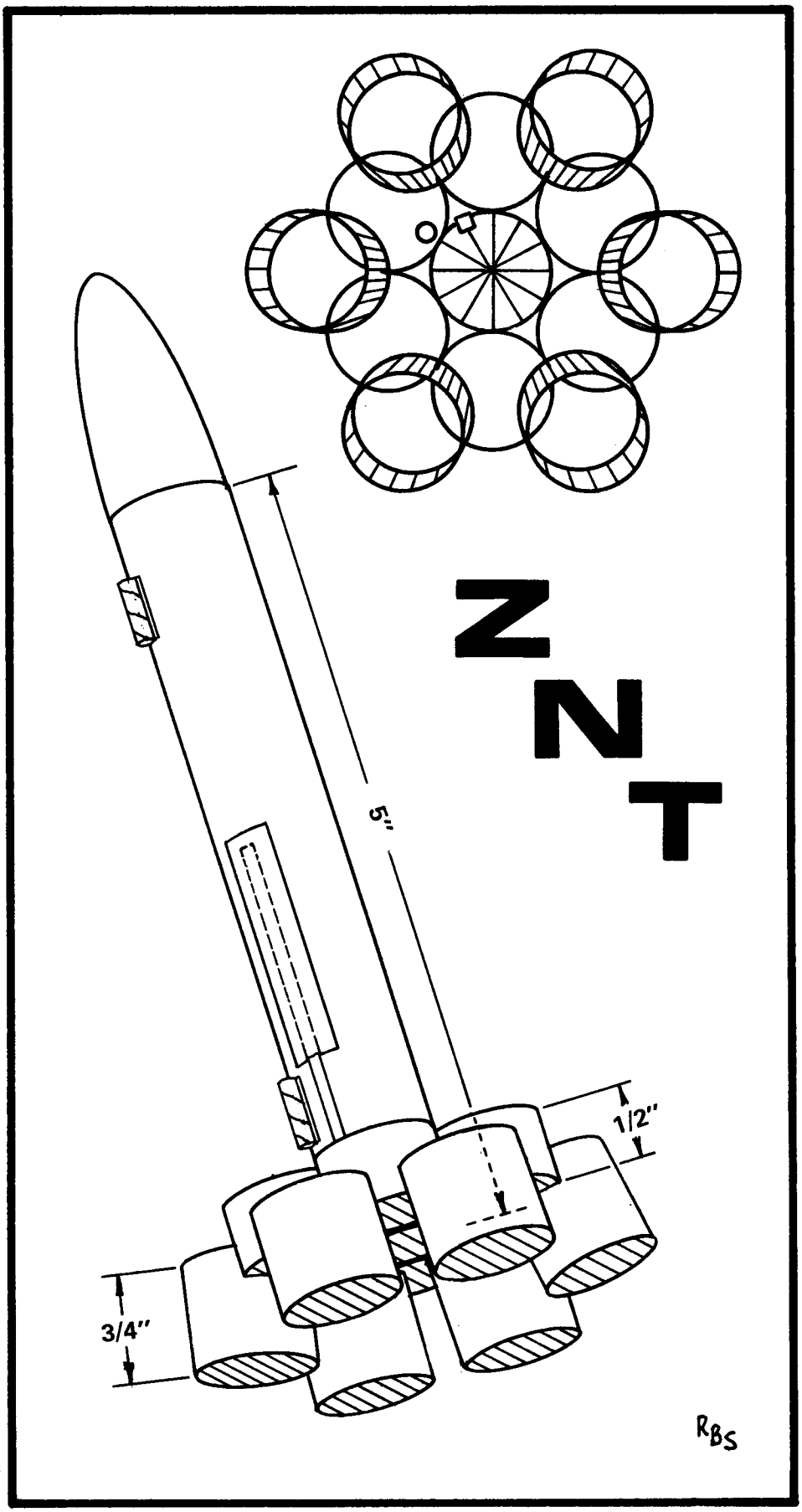
Just in case you're worried, the ZNT has actually been flown,... on a stable flight in fact!

How about some variations on this basic design, like having the stabilizing tubes 5" long and the main body only ¾" long. In that case, you'll have to put engines in the stabilizing tubes????.....

ZNT Parts List

BT-20	**Body Tube**
BNC-20B	**Nose Cone**
SE-2	**Screw Eye**
SC-1	**Shock Cord**
EH-2	**Engine Holder**
WD-2	**1/16" Dowel**
LL-2A	**Launch Lug**
SM-1	**Streamer**

(All Parts available from Estes Industries)



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Allow at least 6 weeks for delivery.

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CLUB CORNER

by Bob Mullane NAR 4157

EQUIPMENT

One of the most serious mistakes that any club can make is attempting to obtain every piece of equipment immediately. This can lead to wasted time, wasted money, unfinished projucts, arguements, and disbanding of clubs. Any one of these can be a serious problem. What equipment is essential? Let's take a look at the equipment many clubs have found useful.

The first area of equipment to be considered for any club is Range Gear. The equipment you'll need on the range depends on the size of your club, what activities you plan to hold, and whether you use racks or "mis-fire alley." For a small club (about 5 to 10 members) mis-fire alley is probably best, since it involves no expense to the club. (If you are unfamiliar with the mis-fire alley system, see the July 1969 issue of **MRm.**) A larger club will usually use racks in order to speed up launching and keep a tighter safety control. If your club owns a rack system, you will also be able to attract new rocketeers who can get started without the expense of purchasing a launch system. However, some large clubs have found the mis-fire alley system quite satisfactory.

Once you've decided on which system to use, you'll need to buy or make the gear associated with that system. If you're using racks, you'll need to get the racks. Most clubs build their own, but there are a few ready-made racks on the market. If you are using mis-fire alley, about all you'll need is a set of signs to mark off the firing areas.

Some equipment is common to both systems. If you have a fire hazard on your range, you'll want to have a fire-proof tarpaulin to place under each launcher. You may also want to keep fire extinguishers, a shovel, etc. on hand in case they are needed.

If you have a large number of spectators present at your launches or if you plan on on giving any public demonstration launches, you will need a Public Address system. Such a system can be purchased from a local electronics supply house such as Allied or Lafayette.

If you want to track for altitude, you will need tracking scopes and a communications system. The Centuri "Sky-Track" scopes, available in kit form, have proven quite popular with many clubs. The most commonly used communications systems are walkie-talkies or range telephones. A good phone system will cost about the same as the three walkie-talkies you'd need. The phones have several advantages over the radio system. Phones aren't affected by radio interference, can be patched into the PA system so everyone can hear what the trackers are doing, and the wire can be used as an easy and consistent way of measuring the baseline for the trackers. (Initially a small club can avoid the expense of tracking and communication equipment by flying only duration events.

Stopwatches are essential if you will be holding contests with duration events. Watches can often be borrowed from club members to avoid this expense for the club.

A few other items which aren't essential but can make life easier and your range more attractive can be made at home or borrowed. A club flag and a pole from which to fly it will increase club spirt. Folding tables (which can be borrowed) take your paper work, launch panel, PA system, and other equipment off the ground. Barriers (usually rope with some colored "flags" on it) are needed to keep the crowds away from the launch area.

If your club is research minded, there is some test equipment which you will eventually want to add. A wind tunnel can provide the most accurate pre-flight stability test available. A simple wind tunnel will provide that data. A more complex tunnel, including a balance, is needed for serious research. (Such a tunnel is described by Gordon Mandell in the August 1970 issue of **MRm.**) To test airfoils you'll need a smoke tunnel (see August 1969 **MRm** for plans). Any testing which requires measurement of engine thrust must be done on a static test stand. Unfortunately, there hasen't been a static test stand on the market since RDC stopped making theirs a few years ago. There are no good plans available either. This is a good area for the experimenter, to design an easy-to-build, accurate, test stand.

If your club has access to a mimeograph machine, you are on your way to starting a club newsletter. A newsletter provides a method of communication between meetings, announcing contests and flight sessions, and increasing club spirt. Your local hobby shop may also agree to distribute copies of your newsletter to new rocketeers as a method of attracting new members to your club.

How do you obtain all of the necessary equipment? Almost all of it can be easily built. Some items (such as the PA system) are available in kit form from electronics stores. Launch racks can be built from 2 x 4 lumber available at a lumber yard. When building your own equipment, be sure to make it SAFE, STRONG, RELIABLE, and (especially with test equipment) ACCURATE!

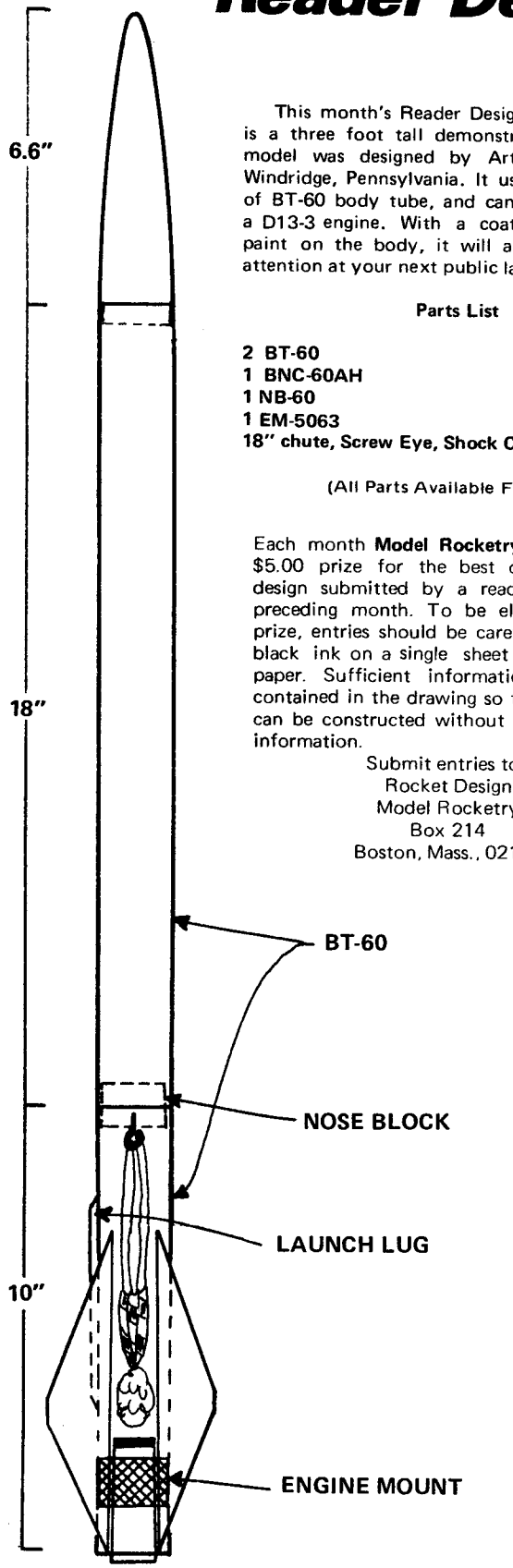
As mentioned earlier, much of the equipment can be borrowed while the club gradually builds or purchases the needed gear. Some equipment (such as tables) may never have to be bought. Don't forget government surplus houses when looking for communication equipment or electronic parts.

The first step is to decide what equipment is needed *now* and what equipment can be obtained at a later date. Set an order of priority for obtaining equipment, carefully study all of the sources to determine the best, then go out and get it.

Study all of the available sources for plans and ideas. The catalogs of all the model rocket manufacturers contain plans for building some equipment and a list of the technical reports they have available. Harry Stine's **Handbook of Model Rocketry** contains plans for some useful range gear. **Model Rocketry** magazine has published plans for range gear and test equipment (launch systems, January 1969, March 1969, July 1969, December 1969; wind tunnel, July 1970, August 1970; and smoke tunnel, August 1969). NAR members will also find a wealth of information and tech reports available from NARTS.

From time to time I will discuss and present plans for specific types of equipment. Let us in on any good sources for equipment or plans you discover so we can share them with all our readers.

Reader Design Page



This month's Reader Design, the DEMO 1, is a three foot tall demonstration bird. The model was designed by Art Sonneborn of Windridge, Pennsylvania. It uses a 28" length of BT-60 body tube, and can be powered by a D13-3 engine. With a coat of flourescent paint on the body, it will attract plenty of attention at your next public launching.

Parts List

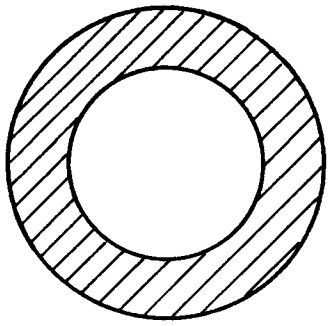
2 BT-60	**Body Tubes**
1 BNC-60AH	**Nose Cone**
1 NB-60	**Nose Block**
1 EM-5063	**Engine Mount**

18" chute, Screw Eye, Shock Cord, 1/8" balsa

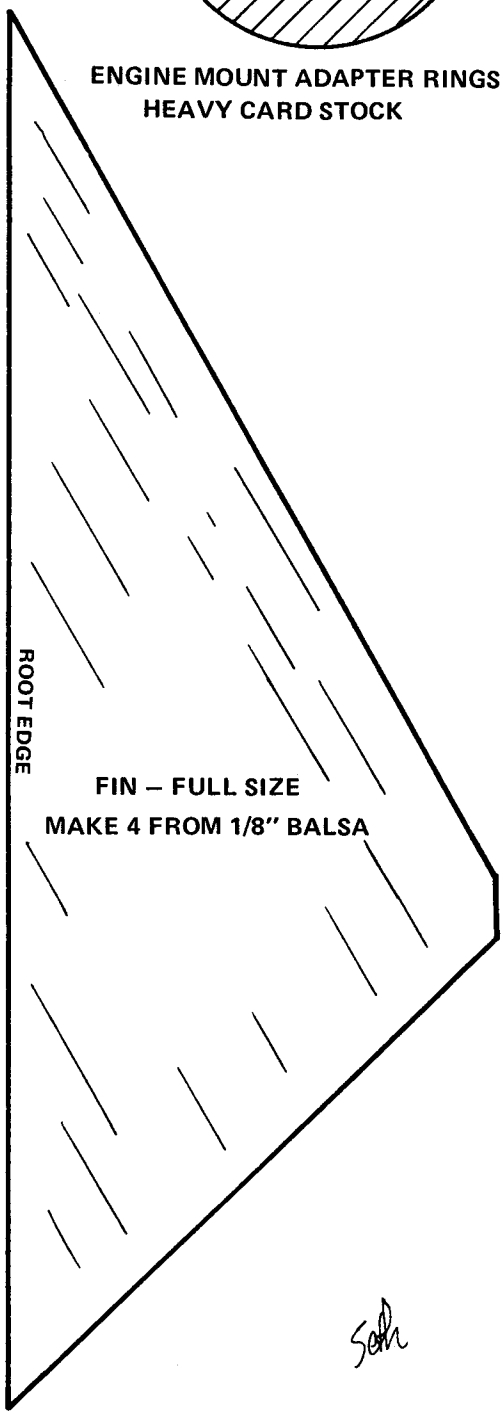
(All Parts Available From Estes)

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

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



ENGINE MOUNT ADAPTER RINGS (2)
HEAVY CARD STOCK



FIN – FULL SIZE
MAKE 4 FROM 1/8" BALSA

BUILD THE SPACE DART

HAWK B/G

DESIGNED BY LEW WALTON

The *Space Dart* is a high performance boost/glider designed for competition flying. Though it is a simple-to-build design, its light weight and proven reliability make it a good contest bird. Powered by a C engine, which is the limit its all balsa construction can withstand, the *Space Dart* will consistently turn in over two minute flights. At the South Seattle Rocket Society's mid-Winter contest it placed first in Hawk B/G with a 206 second duration!

For a Hawk boost/glider, the *Space Dart* is unusually light, thanks mostly to its balsa boom. The fuselage is constructed from three sheets of 1/8" thick sheet balsa, laminated together, and sanded to an to an oval shape. It is not as strong as spruce, so don't plan on pranging this bird too often, but it saves a few important grams in the overall weight column. When you go out to win a contest, you sometimes have to sacrifice a little durability to increase the performance.

The construction is straight foward, and should take no longer than four or five hours (excluding drying periods). Aside from the materials for the pod, the entire *Space Dart* is built from one 36" length of 1/8" thick by 3" wide balsa sheet (medium density), and one 12" length of 1/16" thick by 3" wide balsa sheet.

This bird will fly well even in strong, gusty wind. The swept back wing moves the CP back to provide a good stability margin during boost. The low frontal area gives the *Space Dart* good boost altitude. The negative angle on the stab assures quick transition, while light weight gives a good glide duration.

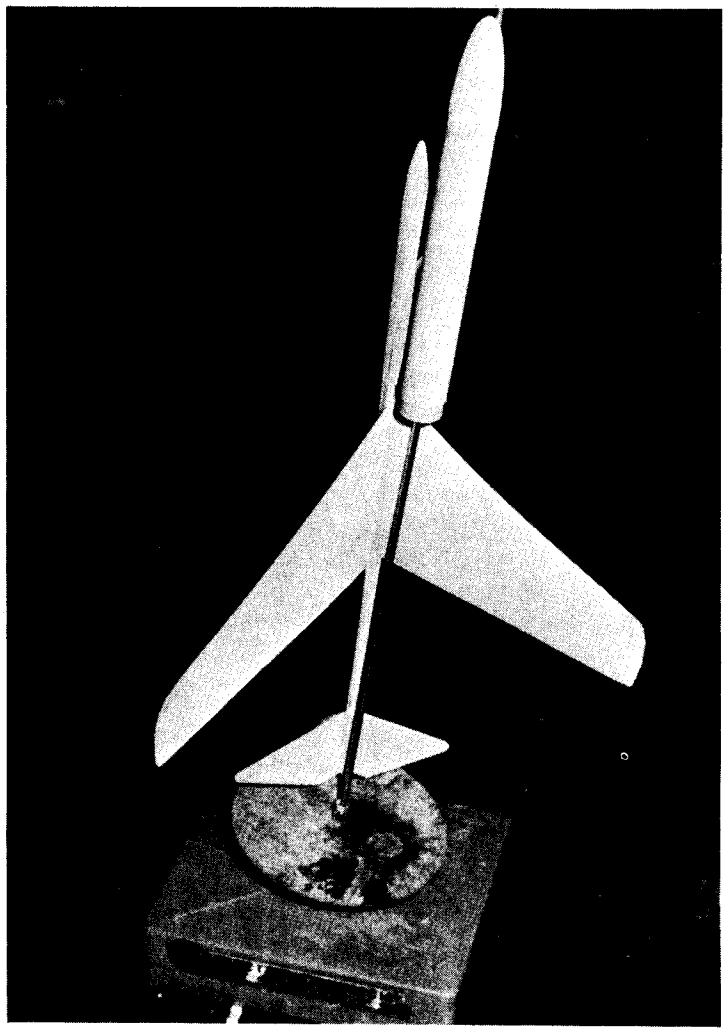
Fuselage Construction

The fuselage uses an unusual construction technique — three layers of sheet balsa are laminated together forming a boom almost as strong as the standard spruce boom. Three sheets of 1/8" thick balsa are cut to the fuselage outline shown in the plans. The "piece X" pocket is cut away from only one of the boom sections prior to assembly of the boom.

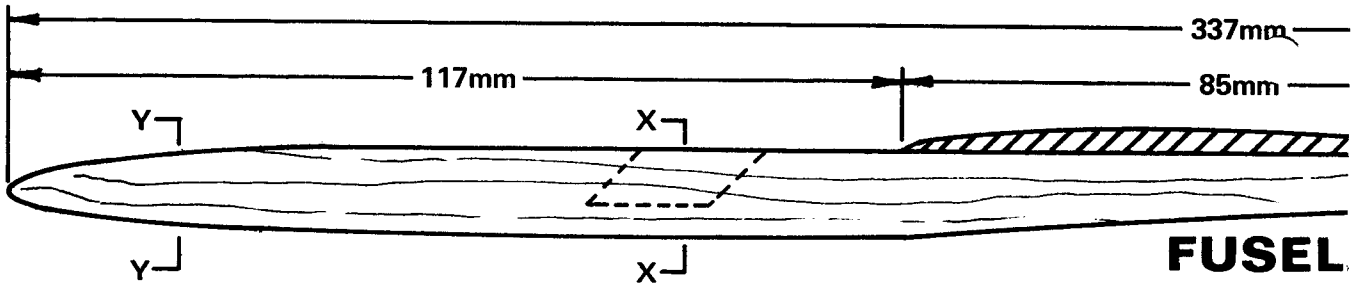
Apply a coating of glue such as Ambroid Se-Cur-It to one side of each of the outside boom pieces. Be careful not to apply glue near the "piece X" pocket or the pod will not properly slip fit. Align the three boom sections, and press them together. The entire assembly should be placed under a stack of books, and allowed to dry for several hours.

After the fuselage is completely dry, remove it from the stack of books. It should be sanded to the tapered elliptical shape shown in the plans (sections X-X, Y-Y, and Z-Z). The boom is tapered so that no weight is wasted in providing unnecessary strength where it not needed.

The *Space Dart* has proven the durability of the laminated balsa boom. It is lighter in weight than the standard spruce boom, and



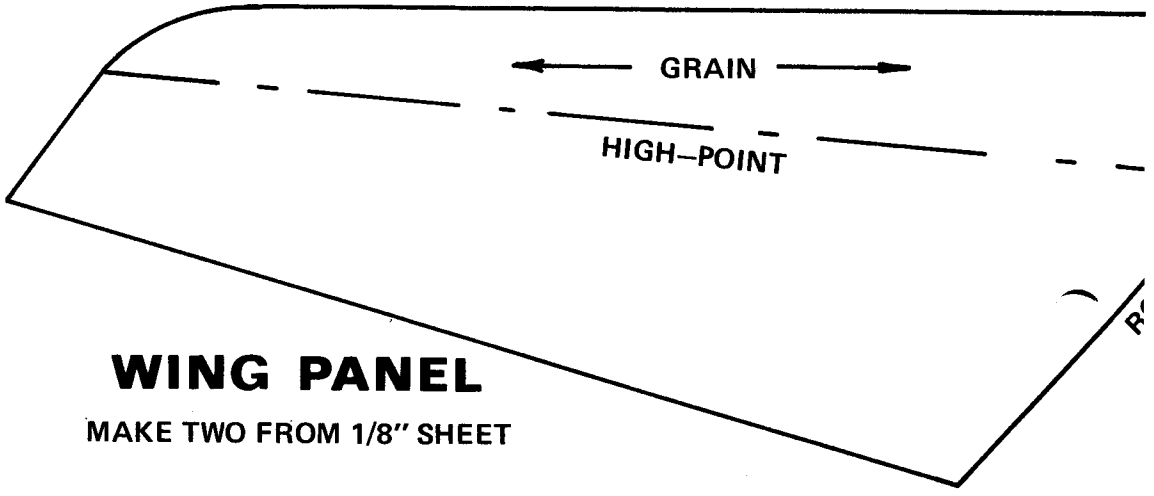
The Space Dart is a high performance, competition boost/glider. Last winter it took first place in a Hawk B/G contest with a 206 second duration.



FUSEL

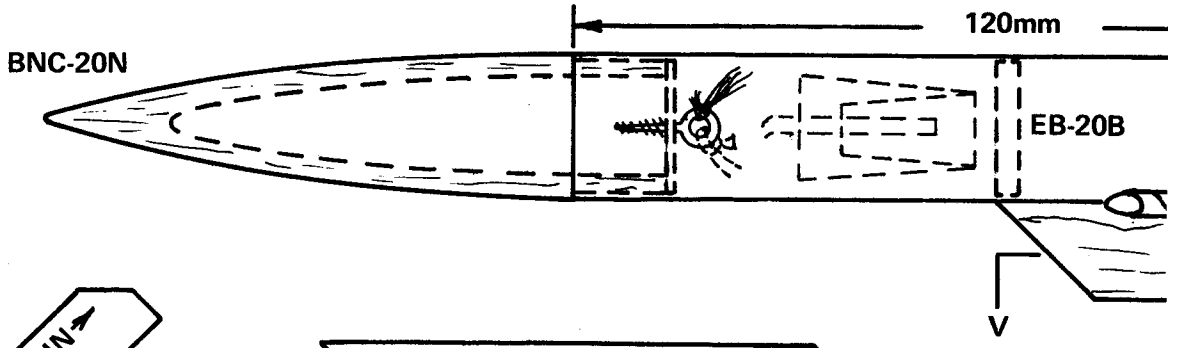
SECTION Y-Y

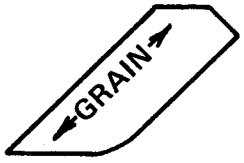
SECTION X-X



WING PANEL

MAKE TWO FROM 1/8" SHEET



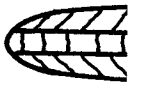


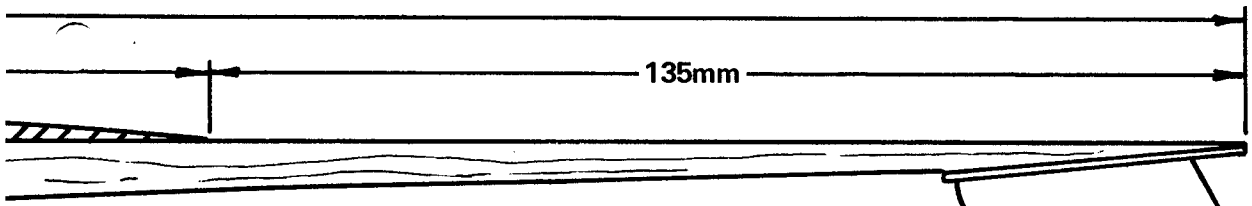
HOOK

MAKE ONE FROM 1/8" SHEET

PYLON

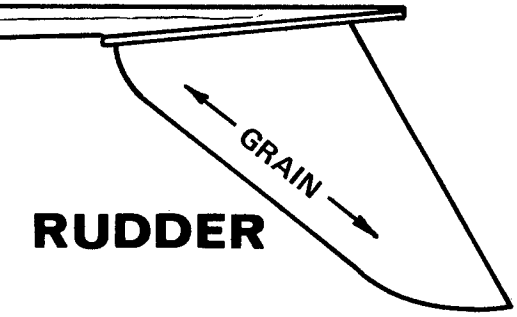
MAKE THREE FROM 1/8" SHEET





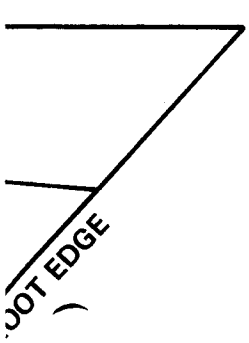
AGE

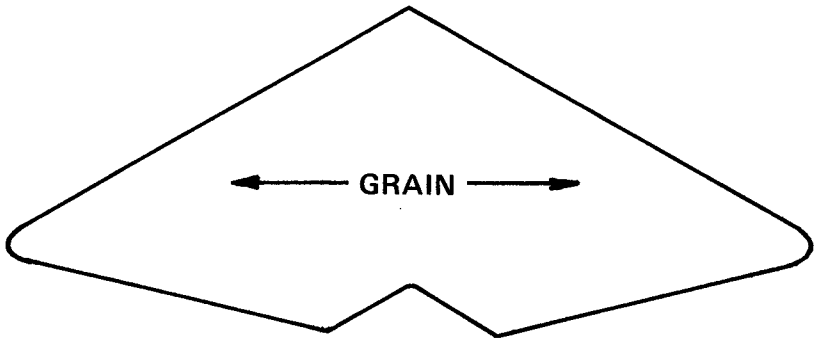
FRONT VIEW



RUDDER

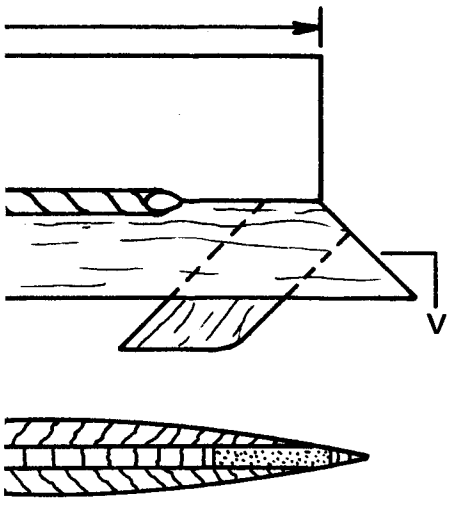
MAKE ONE FROM 1/16" SHEET





STABILIZER

MAKE ONE FROM 1/16" SHEET



SPACE DART

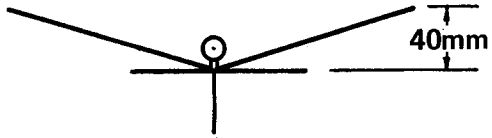
DESIGNED BY LEW WALTON

INKED BY R. SINGER

FUSELAGE

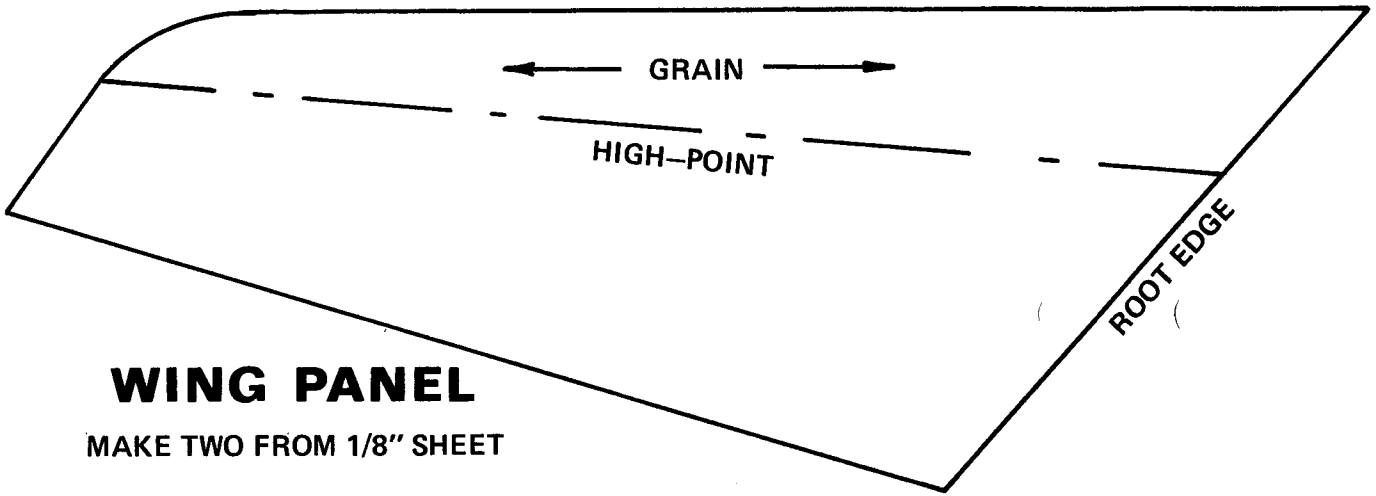
SECTION Y-Y

SECTION X-X



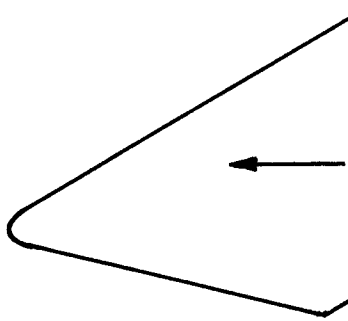
FRONT VIEW

page 20/21 overlap



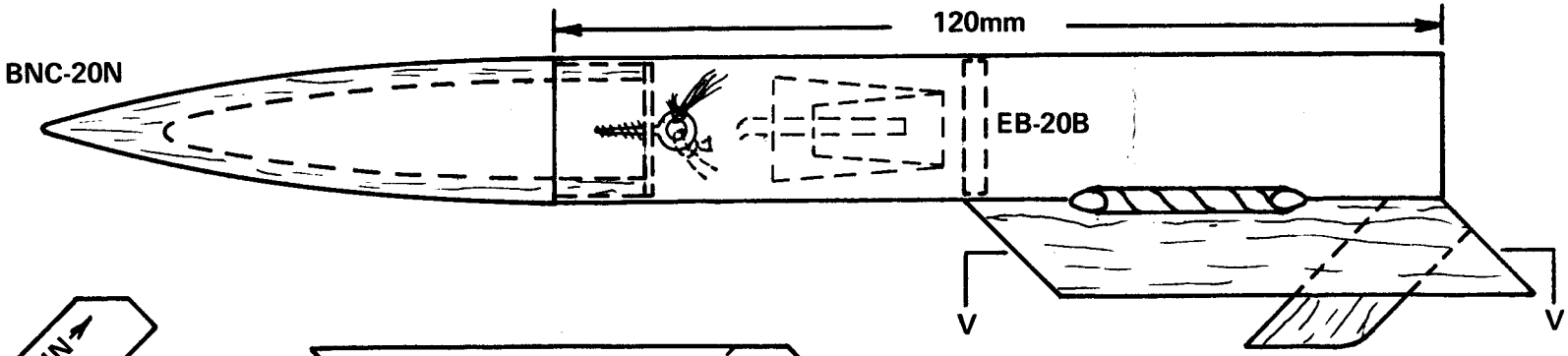
WING PANEL

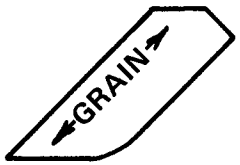
MAKE TWO FROM 1/8" SHEET



STA

MAKE ONE



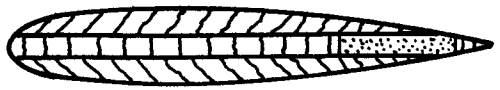


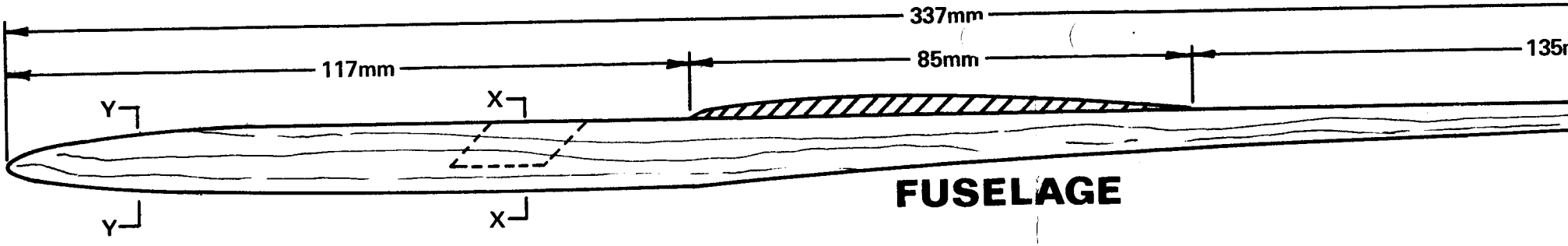
HOOK

AKE ONE FROM 1/8" SHEET

PYLON

MAKE THREE FROM 1/8" SHEET





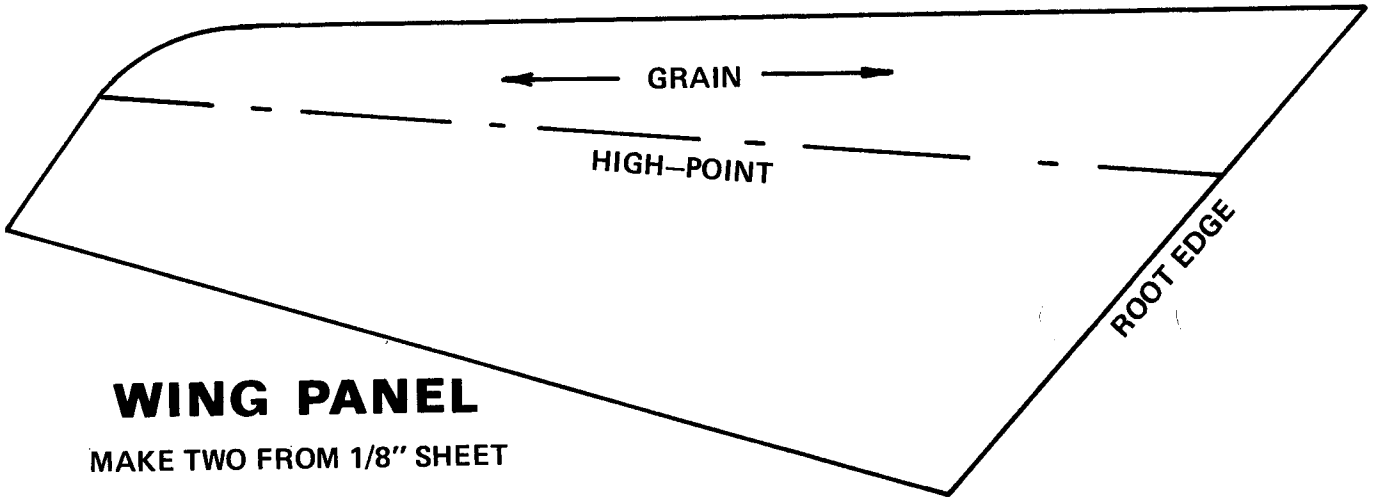
FUSELAGE

SECTION Y-Y

SECTION X-X

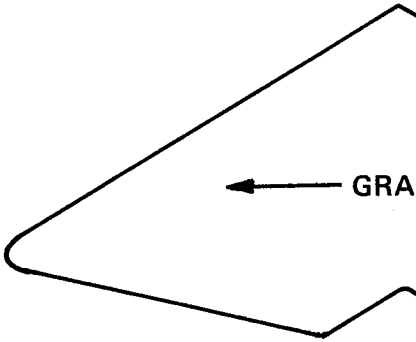
FRONT VIEW

page 20/21 overlap



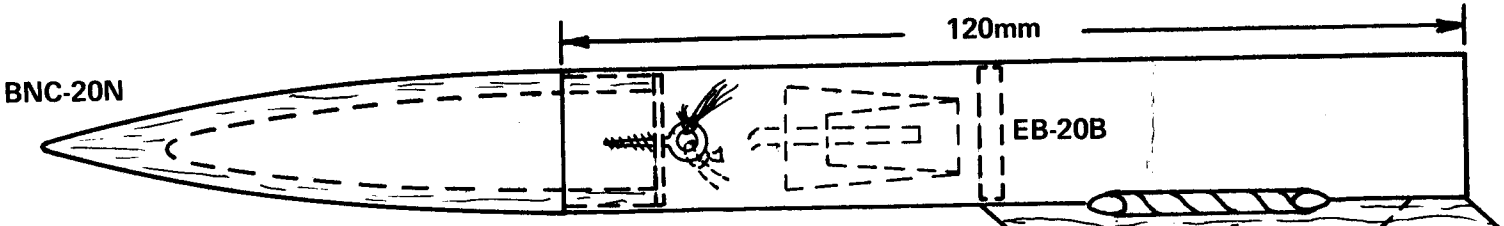
WING PANEL

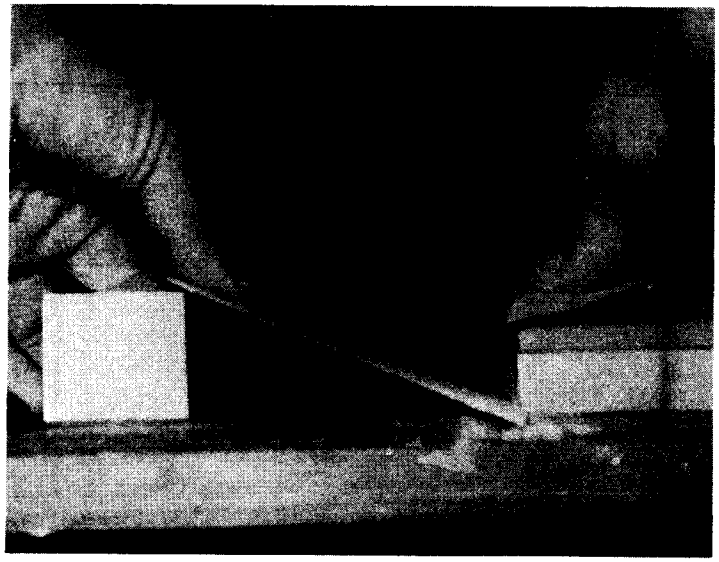
MAKE TWO FROM 1/8" SHEET



STABI

MAKE ONE FRO





The root edge of each wing panel is sanded to the appropriate angle for gluing in the dihedral. One wing is set up flat on a work board, the wing tip is raised to 40 mm and supported with a wood block, and the side of a sanding block is used to bevel the wing root edge.

quite a bit easier to sand to shape. Not only that, but it doesn't seem to be bothered by the flight stresses of a C engine.

Wing Construction

The wing area is slightly over 22 square inches — quite small for a Hawk boost/glider. The emphasis is on high boost altitude, so the frontal area is minimized. Using fairly low aspect ratio wings, the *Space Dart* obtains the needed wing strength without an overly thick wing.

Both wing panels should be cut from medium weight 1/8" thick sheet balsa. Each panel should be sanded to the airfoil cross-section shown in the plans. Initial shaping can be done with fine sandpaper, but final sanding should be done with 400 grit or finer finishing paper. The high point line is located 1/3 of the way back from the leading edge of the wing. The leading edge is rounded, and the wing tapers to 1/32" thick at the trailing edge.

Using fine sandpaper, the root edge of each wing should be beveled so that when the two wings are joined the tips are 40 mm higher than the center. This can be done by laying the panel on a work board and raising the wing tip 40 mm with a wood block. The root edge is sanded using the side of a square sanding block.

After the bevel has been sanded into both root edges, a thin layer of glue should be applied to each root edge and allowed to set. A second layer of glue is applied, and the root edges are pressed together. The wings should be propped up on a work board, with each tip supported 40 mm higher than the root joint. The entire assembly should be set aside to dry.

Rudder and Stabilizer

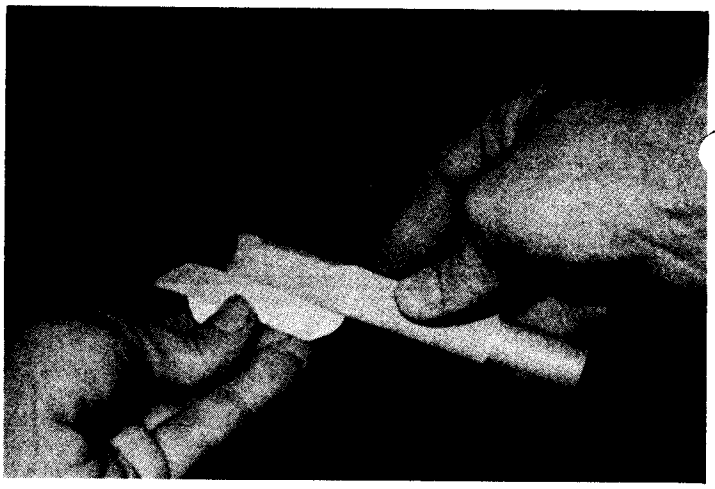
The stabilizer and rudder are cut from 1/16" sheet balsa using the templates given in the plans. Using 400 grit sandpaper, both surfaces of the rudder are sanded flat, the leading edge is rounded and the trailing adge is tapered. Do not sand the trailing edge.

Both sides of the stabilizer are also sanded flat using 400 grit sandpaper. Again, the leading edge is rounded and the trailing edge is tapered to a 1/32" thickness.

Pylon Assembly

The pylon structure is assembled from three sheets of 1/8" thick sheet balsa which are laminated together. Cut three identical pylon pieces to the pattern shown in the plans. A "hook" is also cut from 1/8" sheet balsa to the pattern shown.

Using a sharp X-Acto knife, cut away the area indicated by the the dotted lines from only one of the pylon pieces. The hook will be mounted in this area. Glue the hook in place in the cut-out



A sheet of sandpaper is wrapped around a piece of BT-20 tube. The tube is moved back and forth over the top edge of the pylon to cut a depression into the top edge of the pylon. This increases the gluing surface a provides a stronger glue joint.

section. Using Ambroid Se-Cur-It or other similar glue, laminate the two sides of the pylon to the center section containing the hook. Place the entire assembly under a pile of books and set aside to dry for several hours.

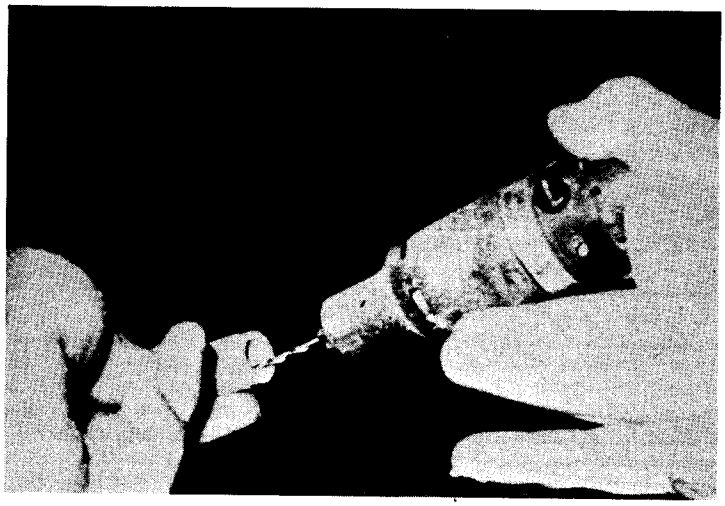
When completely dry, remove the pylon assembly. Check the fit of the hook into the hole in the fuselage section. It should fit tight enough so there is no wobble, but be loose enough so that when the pylon is turned upside down the fuselage falls off the pylon. If the fit is too tight, lightly sand the sides of the hook until a proper fit is obtained.

The pylon assembly should be sanded to the airfoil shape indicated in section V-V on the plans. Use fine sandpaper for the rough shaping, then switch to 400 grit sandpaper to give a smooth finish.

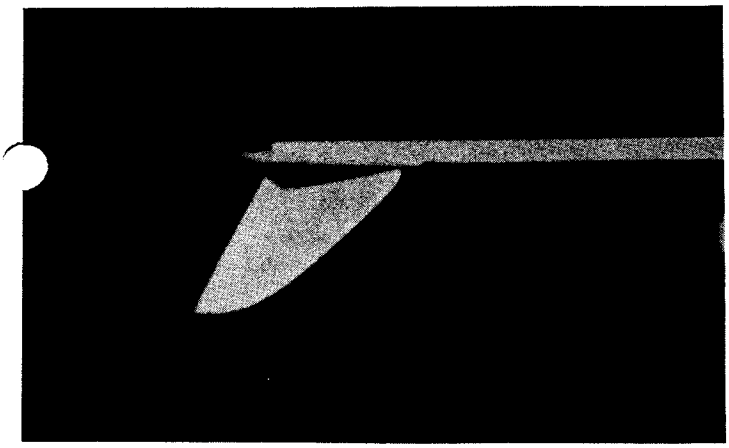
Wrap a sheet of 400 grit sandpaper around a piece of BT-20 body tube. The body tube should be run back and forth over the top edge of the pylon until an indentation in the shape of the tube has been sanded into the pylon. This provides more contact surface when the engine tube is glued to the pylon.

Cut a 120 mm length of BT-20 tube. This tube should be glued to the top of the pylon, with the rear edge of the tube flush with the rear edge of the pylon (see plans). Set this assembly aside to dry.

A BNC-20N nose cone is hollowed out to decrease its weight. The cone can be hollowed using a drill bit chucked in a Dremel Moto-Tool or using an X-Acto gouge. Cut a circle 0.710" in diameter from light



A Dremel Moto-Tool is used to hollow out the nose cone for increased performance. A drill bit is chucked into the Moto-Tool, and a hole is drilled into the base of the cone. Side pressure on the Moto-Tool enlarges the hole until the cone has been hollowed. Be careful, don't drill all the way through the cone wall.



Note that the stabilizer is attached to the fuselage at a large negative angle of attack relative to the wings. This gives the Space Dart excellent transition characteristics. Be sure to use the angle shown in the plans, if you make the angle too large the B/G will loop during boost.

card stock (such as a postcard). Punch a small hole in the center of the disk, add glue to the threads of a light screw eye (SE-3), and screw it into the disk. Add some Se-Cur-It glue around the base of the screw eye, and glue the disk into the base of the nose cone.

Glue the body tube to the pylon, and allow this assembly to dry. Add a launch lug to the side of the pylon. Twelve inches of shock cord, an 8" diameter parachute, and an engine block complete the pylon assembly.

Final Assembly

Glue the wing assembly to the fuselage in the position shown on the plans. Prop the fuselage between two wood blocks, attach the wing assembly to the top, and add two equal height blocks under the wing tips to assure accurate alignment. Allow this assembly to dry.

Glue the stabilizer into place on the boom. Note that the stabilizer is mounted at a significantly negative angle-of-attack. This helps raise the nose, and gives the *Space Dart* good transition characteristics. After the glue has dried, fillet both the stabilizer/fuselage and the wing/fuselage joints for greater strength.

The rudder is glued to the underside of the stabilizer. By locating the rudder at a slight angle to the fuselage axis, you can introduce a slight turn in the *Space Dart's* glide. An angle of 3^{o} to 5^{o} should be sufficient to keep it inside most fields while not introducing any problems during boost. Fillet the rudder/stabilizer joint for increased strength.

Finishing Procedure

As with most boost/gliders, no finish is necessary on the *Space Dart*. By sanding all exterior surfaces with 400 grit sandpaper before assembly, you have already given the glider a good, smooth finish. If you want to add some color to make the timers' job a bit easier, use this procedure. Lightly brush a layer of black or red writing ink onto the bottom of the wing and stabilizer. This procedure provides a colorful, lightweight finish. However, the water in the ink will raise the balsa surface in the painted areas. Again, lightly sand these areas with 400 grit paper to provide a smooth finish.

Glide Trimming

The *Space Dart* should be glide trimmed by a series of hand launch tests before attempting a powered flight. Small amounts of clay should be added to the nose or tail respectively if the glider tends to stall or dive during hand launching. If the glider is built according to the plans, very little trim weight should be needed. A little clay can be added to one wing to introduce or counteract a turning tendancy. Add weight to the wing on the side you wish the glider to turn towards. Initial powered test flying should be done with a B4-2 engine.

Remember, the *Space Dart* is a high-performance, competition design. For best performance, the glide trim should be checked by hand launching before every flight. Give this glider a try, and you'll soon find yourself with some good competition durations.

METALLIZING

FOR AUTHENTIC-LOOKING SCALE BIRDS

by George Flynn

Have you ever spent days assembling a good scale model only to be disappointed when it came to finishing it? If the prototype had large areas of unpainted metal on it and you tried to duplicate these with silver paint, your disappointment was almost certain before you began. Silver paint runs, fills in the rivet detail, and, more important, just doesn't look like the metal on the real bird.

Flat paints, gloss paints, and even special camouflage colors are available from your hobby shop, but you just can't simulate real metal with paint. Several years ago industerious hobbyists discovered an answer. What better way to simulate metal than with real metal! Standard aluminum foil was used to provide an impressive and realistic-looking finish on scale airplanes. However, this covering method was tedious and time consuming since the foil did not have an adhesive on the back.

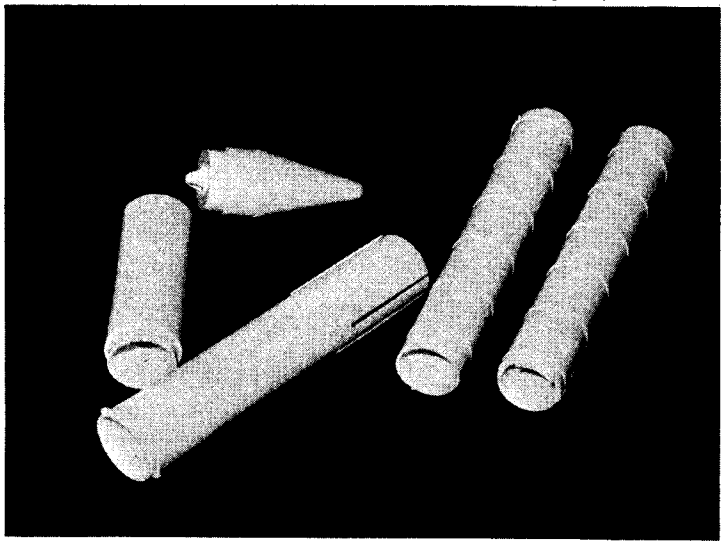
Now there is an easy-to-use answer. Two new "metalizing" foils, designed especially for finishing scale models, have just been introduced. These foils make it possible to easily obtain an authentic metal finish on your models.

"Metalskin" and "Bare-Metal" are thin, adhesive backed, metal foils designed for hobby use. Metalskin, the thicker of the two, comes in two 'shades' – a shiny aluminum and a dull aluminum. The material is a self-adhesive paper laminated to a smooth metal sheet. Metalskin is simply cut to shape, the backing paper peeled away, and the foil applied to the model. The self-adhesive material sticks instantly in place. A blunt instrument (such as the cap from a ball point pen) can be used to work the Metalskin into groves, scribe lines, depressions, etc. on the model's surface. The material will stretch a little, making it possible to work it into compound curves. (Metalskin is available from The Squadron Shop, 23500 John M. Hazel Park, Michigan 48030. Two sheets, one shiny and one dull, each 60 square inches, sell for $1.25.)

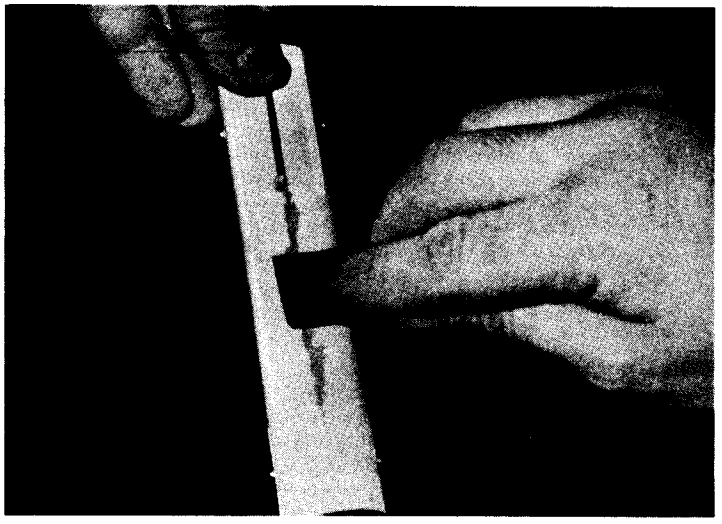
Bare-Metal is about as different from Metalskin as either one is from paint. It is simply an adhesive backed aluminum foil (no paper backing). Being quite a bit thinner, Bare-Metal can conform to more difficult compound curves than can Metalskin. However, since it is much thinner, it is easier to tear and a little harder to work with. Application procedure is similar to Metalskin. (Bare-Metal is sold by the El Dorado Foil Company, 19419 Ingram Way, Livonia, Michigan 48152. A 6"x12" sheet sells for $1.00.)

Since Bare-Metal and Metalskin both look the same, they can be used interchangably in covering the same model. Metalskin can be used for the conical and cylindrical surfaces, while Bare-Metal is used for the difficult curves.

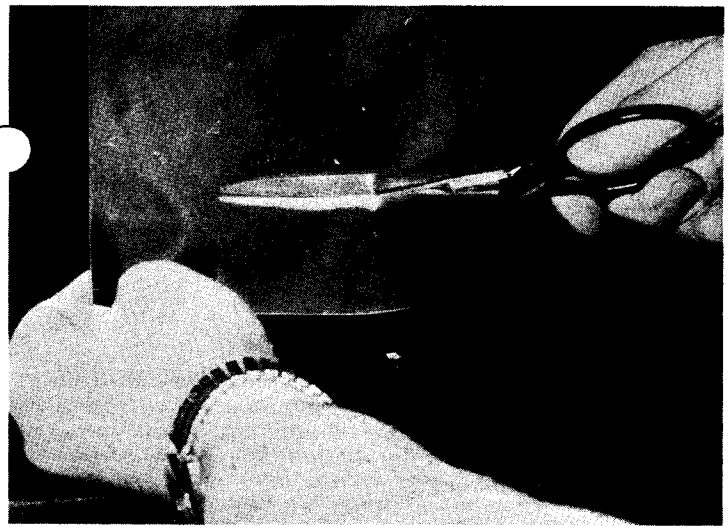
What better way to try out these two new materials than to use them to finish a model? The new MPC Titan IIIC, with its intricate corrugations, hatch covers, and other fine detailing provides an excellent 'test bed' for these new covering materials. Only a 'real' metal finish could do justice to the detailing which has been put into this fine kit, and these two new foil coverings certainly do a beautiful job on it. The IIIC model also offers one further advantage. The model has plain cylindrical surfaces, corrugations, spherical sections, simple curves, and just about every other type of surface you'll find on any scale bird. Thus, the methods used in covering the IIIC can be employed on any other scale bird you may be contemplating.



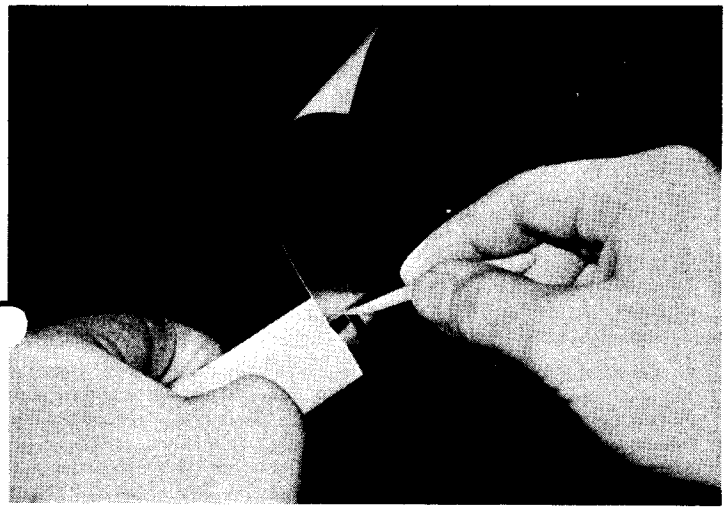
1. To make it easier to paint and 'metalize' the model, sub-assemblies will be put together, painted, and metalized before final assembly. The Center Tank, Second Stage, Side Tanks, and Nose Cone sub-assemblies are finished separately, then assembled.



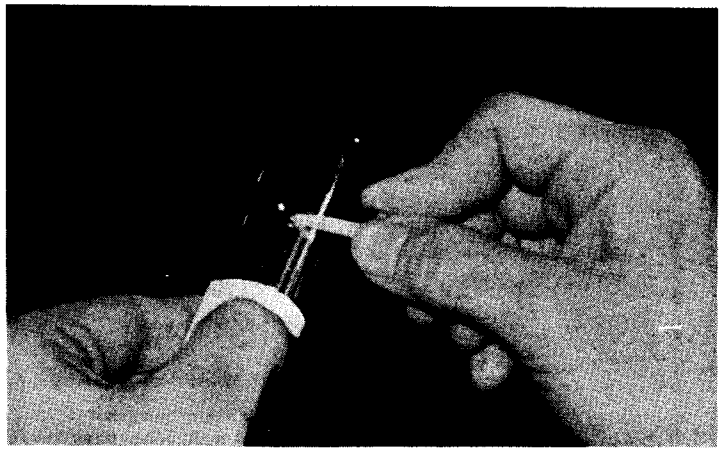
2. Since Metalskin and Bare-Metal are very thin, body joints will show through the covering. All seams must be filled with Hobbypoxy "Stuff" or AMT "Body Putty" and sanded flat. The entire model is sprayed with flat white paint. Areas to be painted flat black and gold are masked and painted prior to metalizing.



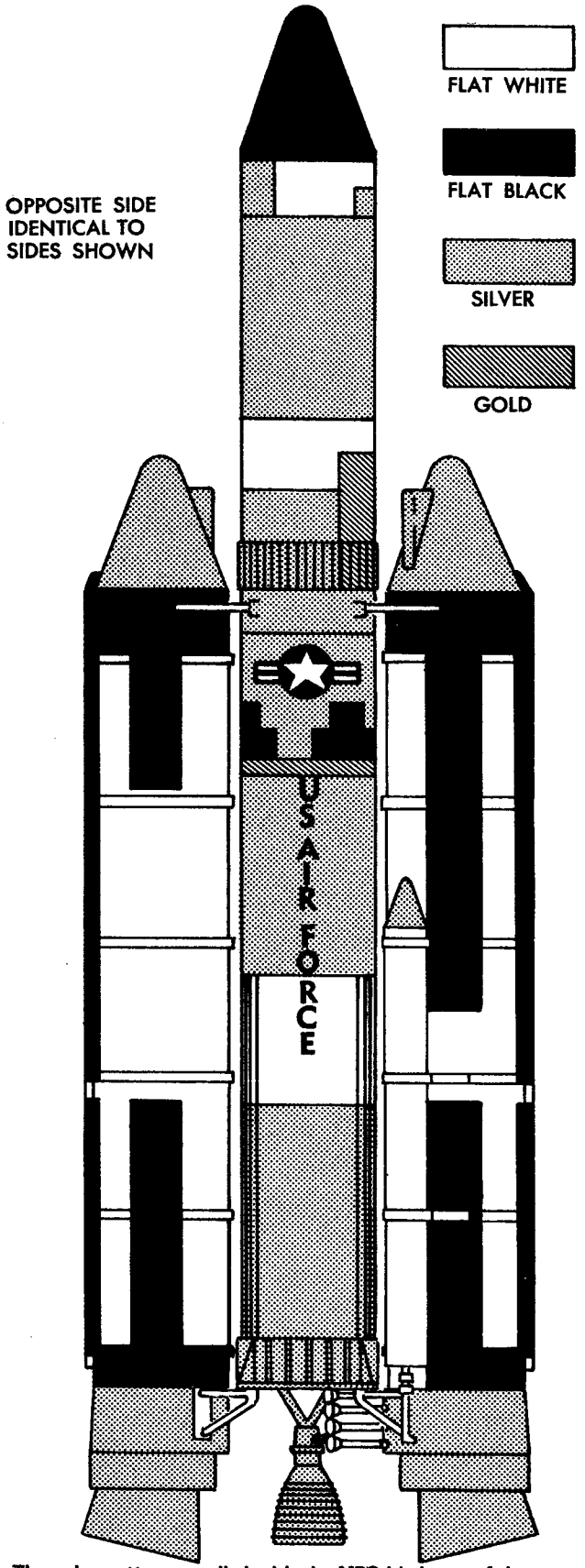
3. Now the fun begins. Cut a sheet of metal foil long enough to fit around the Center Tank, and 1-15/16" wide. This piece will be used to cover the lower tank assembly. Wipe the model clean with a cloth slightly moist with rubbing alcohol. The metal foil will not adhere to an oily surface.



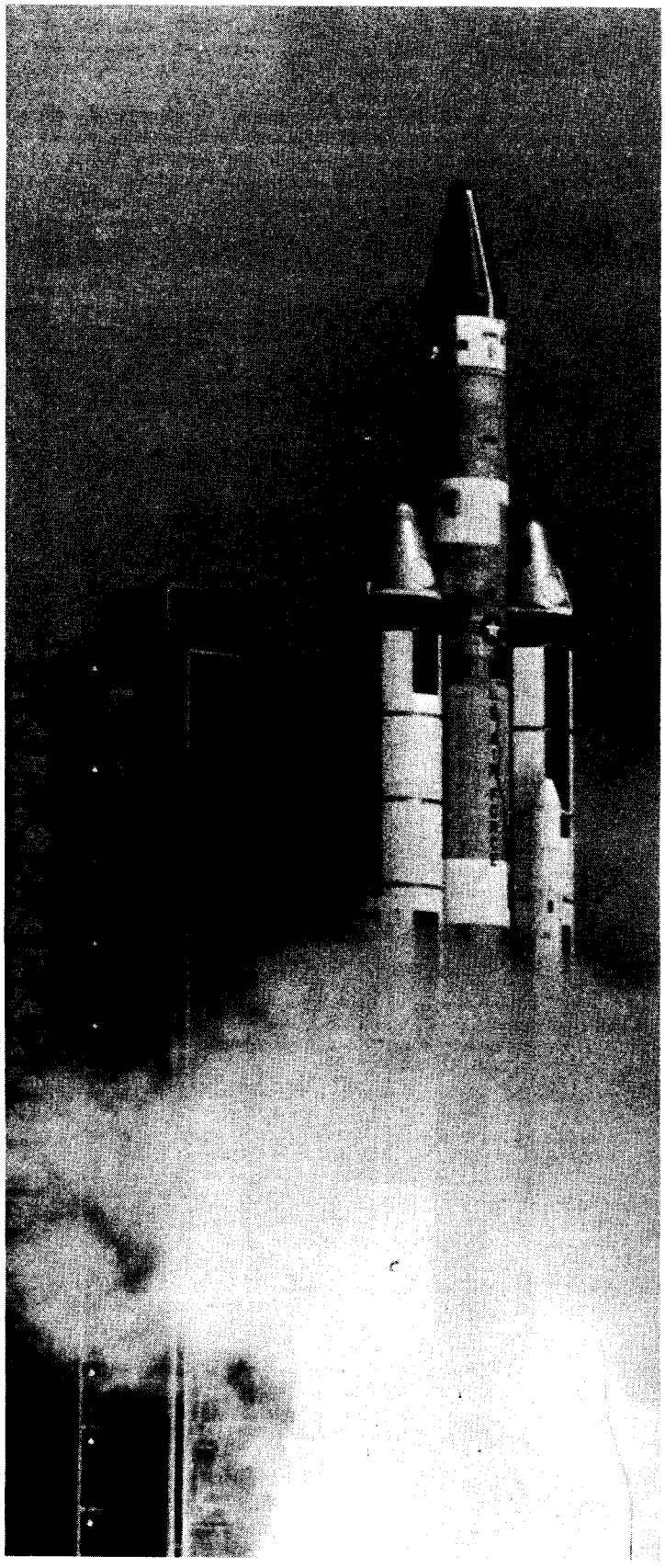
4. Peel the foil from the backing, and wrap it around the body. Press the foil into each indentation. The cap from a ball point pen makes a great tool for this. Metalskin will stretch slightly, so it can be pressed into the indentations without difficulty. Go slowly, and avoid tearing the Metalskin surface. If the surface is ripped, remove the Metalskin, cut another piece, and try again. After a little practice, it's quite easy to get a good finish.



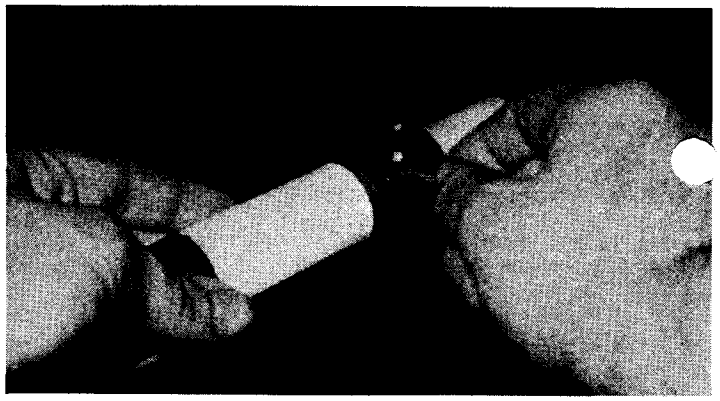
Even such fine detail as the indentations on the exterior pipeing an be brought out by running the pen cap over the surface. Press the foil into the indentation, and run the pen cap over it until the foil adheres.



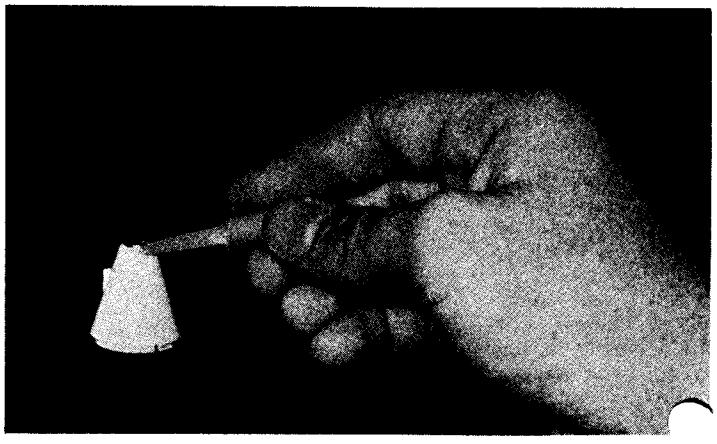
The color pattern supplied with the MPC kit is one of the many which have been used on the Titan IIIC. Though only a dozen IIIC's have been flown by the Air Force, each has had a slightly different paint pattern. The nose cones on the strap-ons and core vehicle vary from white to black to unpainted metal on different flight versions of the bird. The roll patterns also vary from flight to flight.



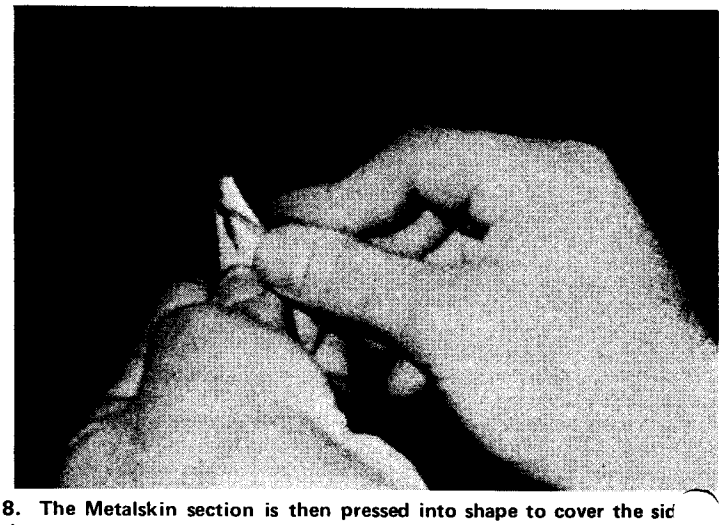
Liftoff of the first Titan IIIC R&D flight. This first flight in the IIIC series took place from Cape Kennedy on 18 June 1965. Note, the nose cone is flat black, the strap-on cones are silver with white access hatches, and the core vehicle is entirely silver except for a small white band. (USAF Photo 174608)



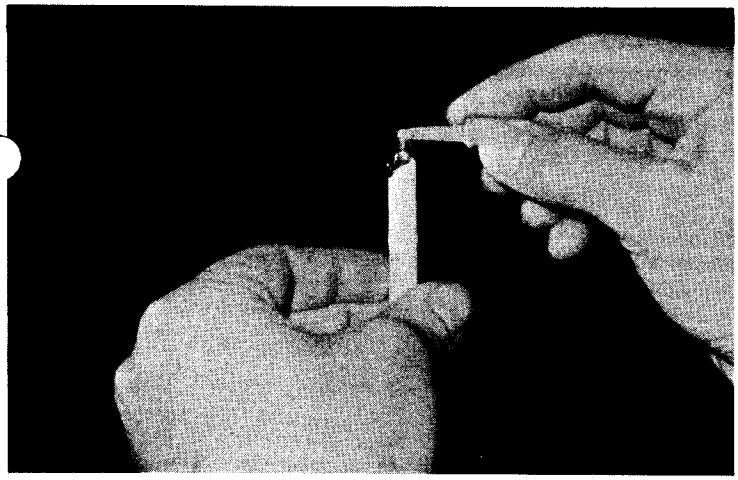
6. Apply a similar piece of foil to the upper section of the tank (above the gold band). The foil is applied directly over the gold band, then a sharp X-Acto knife is used to cut away the foil from the black areas. Using your thumbnail or the pen top, rub over the foil surface until the foil has conformed to the corrugation pattern. Follow the same procedure in covering the second stage.



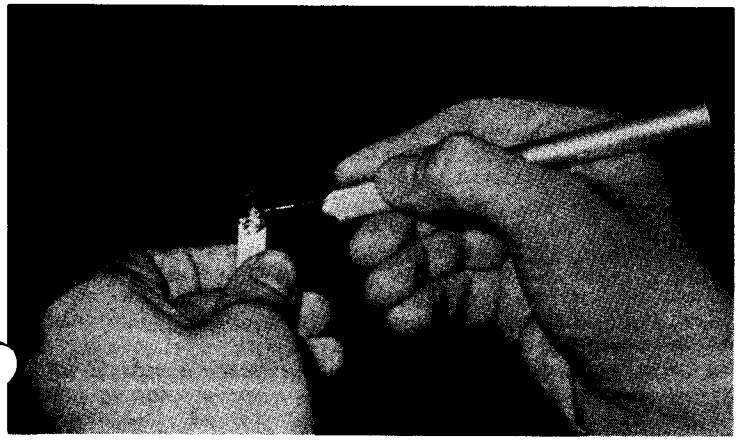
7. Covering conical and spherical surfaces presents more of a problem. The nose cones of the solid propellant strap-ons present a good example of this type of surface. Since Bare-Metal is thinner than Metalskin, it can more easily be stretched over these shapes. A small Bare-Metal disk is cut to cover the tip of the cone, while a piece of Metalskin is cut to cover the sides. The disk is pressed into shape over the tip of the cone. The pen top is used to press the foil until it conforms to the spherical surface. Don't try to cover the entire cone with a single piece of foil. This will result in a number of seams where layers of foil overlap. The best procedure in covering curved surfaces is to cover a small section at a time. Try to cut each piece of foil to the shape of a panel on the original bird.



8. The Metalskin section is then pressed into shape to cover the sid the cone.

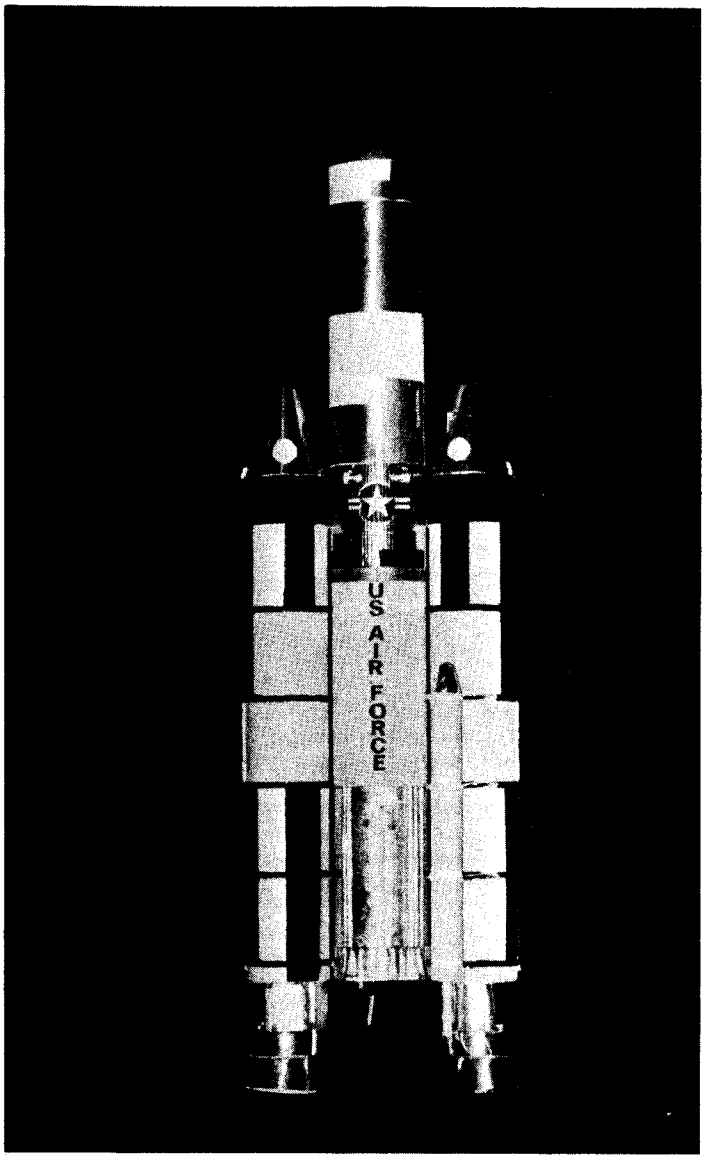


9. Very small curved pieces such as the nose cone on the small steering tanks on the side of the strap-ons present a different problem. The entire nose section is small enough to be covered with a single piece of Bare-Metal. A light coating of rubber cement on the plastic cone will help the foil adhere.



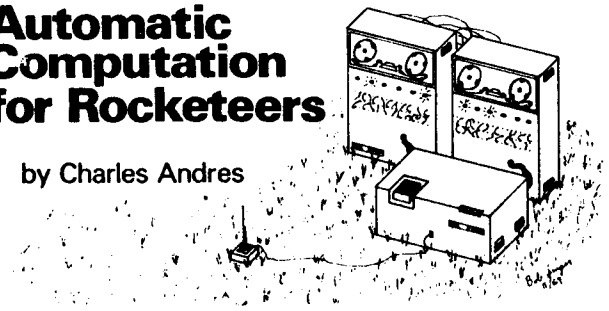
10. The foil is pressed into place as before using a pen cap. A sharp X-Acto knife is used to trim away the excess material. Similar procedures are used to cover the other small parts which require metallizing.

Metallizing your scale bird takes a little longer than the standard spray paint finish, but it looks a lot more realistic. The same procedure outlined for finishing the MPC Titan IIIC can be used on any other scale model.



11. The completed rocket will look like it was made from metal. Corrugations will show up, rivet detail and cover plate lines will appear authentic. Just think of how many extra scale finishing points you'll get for a real metal finish on your bird.

Automatic Computation for Rocketeers



by Charles Andres

"SUPERPROGRAMS"

This installment of the computer programming series will deal with combining several separate calculations for model rockets to make a "superprogram." Combinations of this type will save time for the rocketeer who wishes to analyse either one basic type of rocket or who wants a definite amount of information about many different rockets. Thus far in the series, we have published programs for calculating the center of pressure, center of gravity, single-staged altitude and related parameters, multi-staged altitude, and drag coefficients. Before going on to consider non-vertical trajectory analysis, dynamic parameters, and other programs, I will discuss those programs which incorporate all of the operations which have previously been carried out by individual programs.

At the Computer Programming Seminar at the 1970 MIT Convention last spring, one of the main points of the discussion centered on the coupling of various forms of equations together to obtain a more definite picture of the hypothetical rocket. This was thought to be able to be accomplished in two different ways. One method would take each set of equations to be analysed, such as those for dynamic stability and altitude, and couple one to the other to obtain a more definite idea of how one affects the other and how the rocket reacts under the influence of both.

Since more information is being fed in, more definite information on the trajectory would be obtained.

The alternate method would be to merely list all of the various sub-functions desired in a single program. There would be no interrelation between the equations. In this case one would have, for example, equations for determining the center of gravity and drag coefficient The program would yield two facts about the rocket from a single set of input data, however neither result would have an effect on the calculation of the other.

Both of these forms are valuable. Their use depends entirely on the needs of the individual programmer. The "superprogram" shown here employs both forms.

This "superprogram" was developed specifically to analyse the single-staged, small rockets which I seem to accumulate in great quantity. What this program does is to compute the liftoff weight, empty weight, burnout weight, and center of gravity in each of these three configurations. It also calculates the center of pressure, static stability margin at every stage of the flight, drag coefficient, burnout velocity, burnout altitude, coast altitude, coast time, total altitude, and total time of flight with A8-3, B4-4, and C6-5 rocket engines. The program requires a maximum of 42 input variables, eliminating duplicates whenever possible. In this case, the drag coefficient (Cd) portion affects all of the altitude equations, and the center of gravity (CG) and the center of pressure (CP) equations establish the static stability margin. The liftoff weight is computed by adding the weight of each portion of the rocket together, but this is where the interaction of the various parts of the program ends. From then on, each portion, which may be recognized from past articles, is independent and produces calculations which are not mathematically related to the other functions. The interaction should increase accuracy within the program, but keep in mind that if one parameter is computed incorrectly it will throw off all results related to it.

The "superprogram" is constructed as follows — Language: FORTRAN IV, Computer: IBM/360-40 in conj. with 2740 terminal. The first fifty lines consist of a directory for use with the program. All input variables whose values are taken from the rocket's dimension are defined here. This is not necessary, but it is handy to have with any large program which could cause confusion with so many variables. The DIMENSION statement allows the data to be identified with the name of the rocket, up to 32 characters, as in the previous programs. The REAL statement must be used to define all variables beginning with the letters J-O as being real numbers. Otherwise, in this particular system, they will be considered as just integers. The READ statement allows for all of the variables to be read in, and is continued for three lines because of the number of variables.

The first seventeen lines or so of the program are devoted to the computing the center of pressure for the rocket. For more information on this specific step refer to this column in the December 1969 issue of **Model Rocketry**. As previously mentioned, the equations allow the inclusion of one conical shoulder and/or boattail. Either three or four fins can be used.

gravity as well as all of the weights (liftoff, burnout, etc.). Up to ten different components can be used under the current program. More can be included using the method discussed in this column in August 1970.

The next ten lines concern the drag coefficient. This program is discussed in detail in the August 1970 issue of **Model Rocketry**. All of the variables and symbols used here are identical to those used in the previous articles.

The final thirty lines of equations deal with altitude computation. Since calculations are done for four different engine types, there are four differing lines for each equation. This presumes that one can only analyse for the specified engine types, but others can be substituted. (What I have done is to fill in the parameters corresponding to four specific engine types. These four engines should be capable of providing most of the useful data for rockets employing 18 X 70 mm engines. However, if you want to use a different engine type, it is only necessary to substitute the weight, burn time, and average thrust for the engine of interest for one of those in the program.)

There are a few more lines in this program which need a more thorough explanation, especially if you plan to modify the basic program. In the directory, all variables to be read in are defined in the order that they appear in the READ statement, with the following exceptions: N = number of fins was put at the end of the READ statement instead of at the beginning. This was to allow the ten parts of the rocket to conveniently cover a complete line for listing their weights, with their distances to the nose cone tip listed directly underneath . This makes it much easier to read in the data. In typing in the respective weights, it is not necessary to list the weight of the nosecone under W1, the weight of the screw eye under W2, etc., except that it is important to list the weight of the engine as W6. In the present program format, the empty weight is computed without W6, while the CG is computed with W6. (I normally use a C6-5 for computing the CG since it is the heaviest engine available in the 18 X 70 mm range. Thus it will cause the CG to move the farthest and consequentally is the one most likely to show that a rocket is

```
M.0076 BEGIN ACTIVITY
/input
/insert astroM.0073 ACTION IN PROGRESS
M.0070 ACTION COMPLETE

Ibex I
   1.50  1.60  1.50   .75   .736  .75 10.9   1.325 0.0   3.5
    .06   0.0   .117  .90   .009  .910  .015  .001  .144  .025
   2.6   5.5   6.7   4.2   9.86 11.55 11.95  8.7   8.0   5.1
   0.02  9.0    .736 0.0   0.0   0.0   0.0   0.0   0.0   0.0
   0.0   3.0
/end runM.0073 ACTION IN PROGRESS
END OF COMPILATION ROCKET
NAME/ IBEX I
TOTAL WEIGHT OF EMPTY ROCKET= 1.321 OUNCES
CENTER OF GRAVITY WITH ENGINE= 7.0707 IN FROM NOSE
CENTER OF PRESSURE= 10.693 IN FROM NOSE
DISTANCE BETWEEN CG AND CP= 3.622 INCHES
DRAG COEFFICIENT= .465658
ALT. BO ALT. BO VEL. COAST HT. COAST TIME  TOTAL  ALT
 A8-3   43.2   203.4   483.3      5.23      5.65   526.5
 B4-4  155.1   248.0   650.8      5.98      7.18   805.8
 B14-5  52.4   295.5   830.8      6.65      7.00   883.2
 C6-5  447.4   474.5   830.8      8.27      9.97  1278.2

/END CARD READ, JOB TERMINATED
M.0076 BEGIN ACTIVITY
```

FIGURE 2. Computer output showing the typing in of the 42 program variables and the corresponding calculations. A programming error caused the coast height for the C6-5 engine to be the same as that for a B14-5 engine. The coast height for the C6-5 should be different than the output shown above if the program shown in Figure 1 is utilized.

Figure 1: Model Rocket "SUPERPROGRAM"

```
/display rocket
M.0073 ACTION IN PROGRESS
L.0001 /JOB GO
  0002 C  DICTIONARY
  .0003 C
L.0004 C
L.0005 C
L.0006 C   N = NUMBER OF FINS
L.0007 C   S = FIN SPAN
L.0008 C   L1 = FIN CORD
L.0009 C   A = FIN ROOT HEIGHT
L.0010 C   B = FIN TIP HEIGHT
L.0011 C   R = BODY DIAMETER AT BASE OF ROCKET
L.0012 C   M = DISTANCE FROM FIN TIP TO ROOT TIP
L.0013 C   XF1 = DIS FROM NOSE CONE TIP TO FRONT EDGE
                                                 OF FIN
L.0014 C   AFN1 = AREA OF ONE FIN (ONE SIDE)
L.0015 C   L = LENGTH OF CONICAL NOSE
L.0016 C   L3 = LENGTH OF OGIVAL NOSE
L.0017 C   DI1 = DIS OF NOSE CG FROM NOSE TIP
L.0018 C   DI2 = DIS OF EYE CG FROM NOSE TIP
L.0019 C   DI3 = DIS OF CHUTE CG FROM NOSE TIP
L.0020 C   DI4 = DIS OF PAYLOAD CG FROM NOSE
L.0021 C   DI5 = DIS OF ENGINE BLOCK FROM NOSE
L.0022 C   DI6 = DIS OF ENGINE CG FROM NOSE
L.0023 C   DI7 = DIS OF FIN CG FROM NOSE
L.0024 C   DI8 = DIS OF LAUNCH LUG FROM NOSE
L.0025 C   DI9 = DIS OF BODY TUBE CG FROM NOSE
L.0026 C   DI10 = DIS OF ANY OTHER ITEM'S CG FROM NOSE
L.0027 C   W1 = WT OF NOSE
L.0028 C   W2 = WT OF SCREW EYE
L.0029 C   W3 = WT OF PARACHUTE
L.0030 C   W4 = WT OF PAYLOAD
L.0031 C   W5 = WT OF ENGINE BLOCK
L.0032 C   W6 = WT OF ENGINE
L.0033 C   W7 = WT OF FINS
L.0034 C   W8 = WT OF LAUNCH LUG
L.0035 C   W9 = WT of BODY TUBE
L.0036 C   W10 = WEIGHT OF OTHER ITEMS
L.0037 C   WX = WT DISCREPANCY FACTOR
L.0038 C   BL = LENGTH OF BODY TUBES (TOTAL)
L.0039 C   D = DIAMETER OF ROCKET AT BASE OF NOSE
L.0040 C   D1 = DIA OF ROCKET AT SM END OF CON SHLDR
L.0041 C   D2 = DIA OF ROCKET AT LG END OF CON SHLDR
L.0042 C   XCS1 = DIS FROM FRON OF CON SHLDR TO NOSE
L.0043 C   L4 = LENGTH OF CONICAL SHOULDER
L.0044 C   D22 = DIA OF ROCKET AT SM END OF BOATTAIL
  0045 C   D12 = DIA OF ROCKET AT LG END OF BOATTAIL
  .0046 C   L2 = LENGTH OF CONICAL BOATTAIL
L.0047 C   XCB1 = DIS FROM FRONT OF CB TO NOSE TIP
L.0048 C
L.0049 C
L.0050       DIMENSION I123(8)
L.0051       REAL KTB,M,L1,L2,L3,L4,MB,K,M1,M2,M3,M4,N,
                                                 MB1,MB2,MB3,MB4
L.0052 38    READ(5,26)(I123(J),J=1,8),S,L1,A,B,R,M,XF1,AFN1,L,
                                                 L3,W1,W2,W3,W4,
L.0053      1W5,W6,W7,W8,W9,W10,DI1,DI2,DI3,DI4,DI5,DI6,DI7,
                                                 DI8,DI9,DI10,WX,
L.0054      2BL,D,D1,D2,XCS1,L4,D22,D12,L2,XCB1,L2,N
L.0055    26 FORMAT(8A4/10F7.3/10F7.3/10F7.3/2F7.3)
L.0056       XN=.666666*L
L.0057       XN1=.466*L3
L.0058       CNACS=2*((D2/D)**2-(D1/D)**2)
L.0059       IF(L4)95,98,97
L.0060    98 XCS=0
L.0061       GO TO 96
L.0062    97 XCS=XCS1+(L4/3)*(1+(1-D1/D2)/(1-(D1/D2)**2))
L.0063    96 CNACB=2*((D22/D)**2-(D12/D)**2)
L.0064       IF(L2) 95,94,93
L.0065    94 XCB=0
L.0066       GO TO 92
L.0067    93 XCB=XCB1+(L2/3)*(1+(1-D12/D22)/(1-(D12/D22)**2))
L.0068    92 CNAF=(N*4*(S/D)**2)/(1+SQRT(1+(2*L1/A+B))**))
L.0069       KTB=1+.5*R/(.5*R+S)
L.0070       CNATB=KTB*CNAF
L.0071       XF=XF1+M*(A+2*B)/(3*(A+B))+(A+B-A*B/(A+B))/6
L.0072       CNA=2+CNACS+CNACB+CNATB
L.0073       X=(2*(XN+XN1)+CNACS*XCS+CNACB*XCB+CNATB*
                                                 XF)/CNA
L.0074       T1=W1*DI1
L.0075       T2=W2*DI2
L.0076       T3=W3*DI3
L.0077       T4=W4*DI4
L.0078       T5=W5*DI5
L.0079       T6=W6*DI6
L.0080       T7=W7*DI7
L.0081       T8=W8*DI8
L.0082       T9=W9*DI9
L.0083       T10=W10*DI10
L.0084       X1=W1+W2+W3+W4+W5+W6+W7+W8+W9+W10+WX
  .0085      X2=W1+W2+W3+W4+W5+W7+W8+W9+W10+WX
  .0086      X3=W1+W2+W3+W4+W5+W6+W7+W8+W9+W10
L.0087       Y=T1+T2+T3+T4+T5+T6+T7+T8+T9+T10
L.0088       Z=Y/X3
L.0089       AB=((.5*R)**2)*3.1416
L.0090       AF=((.5*D)**2)*3.1416
L.0091       ABD=(BL*D)*3.1416
L.0092       AFN=N*(AFN1*2)
L.0093       CDS=.22842-(.020*(1-(AB/AF)))
L.0094       RN=186200*BL
L.0095       CDBD=(.455*(ADB/AF))/(ALOG10(RN)**2.58)
L.0096       CDFN=(1.327*(AFN/AF))/SQRT(RN)
L.0097       CD=CDS+CDBD+(CDFN*2)
L.0098       MB1=(X2+(.57-.14688))/32.2
L.0099       MB2=(X2+(.74-.29376))/32.2
L.0100       MB3=(X2+(.69-.21984))/32.2
L.0101       MB4=(X2+(.91-.43968))/32.2
L.0102       Q=AB/AF
L.0103       IF(Q) 90, 80, 80
L.0104    90 K=.000154*AF*CD
L.0105       GO TO 70
L.0106    80 K=.000154*AB*CD
L.0107    70 M1=(X2+.57)/32.2
L.0108       M2=(X2+.74)/32.2
L.0109       M3=(X2+.69)/32.2
L.0110       M4=(X2+.91)/32.2
L.0111       XB1=(-MB1+SQRT((MB1**2)+K*.1764*(28.76-
                                                 (M1*32.2))))/K
L.0112       XB2=(-MB2+SQRT((MB2**2)+K*1.440*(14.39-
                                                 (M2*32.2))))/K
L.0113       XB3=(-MB3+SQRT((MB3**2)+K.1225*(50.33-
                                                 (M3*32.2))))/k
L.0114       XB4=(-MB4+SQRT((MB4**2)+K*2.890*(21.57-
                                                 (M4*32.2))))/K
L.0115       VB1=(.42*(28.76-(M1*32.2)))/SQRT((MB1**2)+
                                                 (K*((.42*2)*(28.76-M1
L.0116      1*32.2)))))
L.0117       VB2=(1.20*(14.38-(M2*32.2)))/SQRT((MB2**2)+
                                                 (K*((1.20**2)*(14.38-
L.0118      1(M2*32.2)))))
L.0119       VB3=(.35*(50.33-(M3*32.2)))/SQRT((MB3**2)+
                                                 (K*((.35**2)*(50.33-(M3
L.0120      1*32.2)))))
L.0121       VB4=(1.70*(21.57-(M4*32.2)))/SQRT((MB4**2)+
                                                 (K*((1.70**2)*(21.57-
L.0122      1(M4*32.2)))))
L.0123       HC1=(MB1/(2*K))*ALOG(((K*(VB1**2))/(MB1*
                                                 32.2))+1)
L.0124       HC2=(MB2/(2*K))*ALOG(((K*(VB2**2))/(MB2*
                                                 32.2))+1)
L.0125       HC3=(MB3/(2*K))*ALOG(((K*(VB3**2))/(MB3*
                                                 32.2))+1)
L.0126       HC4=(MB4/(2*K))*ALOG(((K*(VB4**2))/(MB4*
                                                 32.2))+1)
L.0127       TC1=SQRT(MB1/(32.2*K))*ATAN(SQRT(K/(MB1*
                                                 32.2))*VB1)
L.0128       TC2=SQRT(MB2/(32.2*K))*ATAN(SQRT(K/(MB2*
                                                 32.2))*VB2)
L.0129       TC3=SQRT(MB3/(32.2*K))*ATAN(SQRT(K/(MB3*
                                                 32.2))*VB3)
L.0130       TC4=SQRT(MB4/(32.2*K))*ATAN(SQRT(K/(MB4*
                                                 32.2))*VB4)
L.0131       HT1=HC1+XB1
L.0132       HT2=HC2+XB2
L.0133       HT3=HC3+XB3
L.0134       HT4=HC4+XB4
L.0135       TT1=TC1+.42
L.0136       TT2=TC2+1.20
L.0137       TT3=TC3+.35
L.0138       TT4=TC4+1.70
L.0139       V=X-Z
L.0140       WRITE(6,36)(I123(J),J=1,8),X2,Z,X,V,CD,XB1,VB1,
                                                 HC1,TC1,TT1,HT1,
L.0141      1XB2,VB2,HC2,TC2,TT2,HT2,XB3,VB3,HC3,TC3,TT3,
                                                 HT3,XB4,VB4,HC4,TC4,
L.0142      2TT4,HT4
L.0143    36 FORMAT('NAME/ ',8A4/' TOTAL WEIGHT OF
                EMPTY ROCKET= ',F7.3,' OUNCE
L.0144      1S '/' CENTER OF GRAVITY WITH ENGINE=
                ',F7.3,' IN FROM NOSE '/' CENTE
L.0145      2R OF PRESSURE= ',F7.3,' IN. FROM NOSE '/'
                DISTANCE BETWEEN CG AND
L.0146      3CP= ',F7.3,' INCHES '/' DRAG COEFFICIENT=
                ',F7.3,/' ALTITUDE ',8X,
L.0147      4'B'O'ALT  B'O' VEL  COAST HT  COAST TIME
                TOTAL TI
L.0148      5ME  TOTAL ALT'/10X'A 8-3',5X,F6.1,7X,F7.1,7X,
                F6.1,9X,F5.2,10X,
L.0149      6F5.2,10X,F6.1/10X'B 4-4',5X,F6.1,7X,F7.1,7X,F6.1,
                9X,F5.2,10X,F5.2,
L.0150      710X,F6.1/10X'B14-5',5X,F6.1,7X,F7.1,7X,F6.1,9X,
                F5.2,10X,F5.2,10X,F
L.0151      86.1/10X'C 6-5',5X,F6.1,7X,F7.1,7X,F6.1,9X,F5.2,
                10X,F5.2,10X,F6.1/)
L.0152       GO TO 38
L.0153    95 STOP 7734
L.0154       END
L.0155 /DATA
M.0070 ACTION COMPLETE.
M.0072 BEGIN ACTIVITY.
```

```
/update astro (abc-12)
/change 79
   T6A=(W6-.439)*D16
/change 86,86
   X3=(W1+W2+W3+W4+W5+(W6-.439)+W7+W8+W9+W10+WX
/change 88,88
   Y1=T1+T2+T3+T4+T5+T7+T8+T9+T10
   Y2=T1+T2+T3+T4+T5+T6A+T7+T8+T9+T10
   Z1=Y1/X2
   Z2=Y/X1
   Z3=Y2/X4
/change 139,145
   V1=X-Z1
   V2=X-Z2
   V3=X-Z3
   WRITE(6,36)(I123(J),J=1,8),X2,Z1,V1,X1,Z2,V2,X3,Z3,V3,X,
   CD, 1XB1, VB1,HC1, TC1, TT1, HT1, XB2, VB2, HC2, TC2, TT2,
   XB3, VB3, HC3, TC3, 2TT3, HT3, VB4, HC4, TC4, TT4, HT4
36 FORMAT(:NAME/ ',8A4/' ROCKET WEIGHT', 10X,'CG',10X,
   'SS MARGIN' 1/' -EMPTY', 3X, F7.3, 10X, F7.3/' -LOADED',
   2X, F7.3,210X, F7.3, 10X, F7.3/' -BURNOUT',1X, F7.3,10X,
   F7.3, 10X,F7.3/'
/end
```

Upper half of the readout now looks like this:

NAME/ IBEX I

ROCKET WEIGHT	CG	SS MARGIN
-EMPTY 1.321	4.117	6.576
-LOADED 2.231	7.148	3.545
-BURNOUT 1.792	6.015	4.678

CP= 10.693 INCHES

DRAG COEFFICIENT= .465658

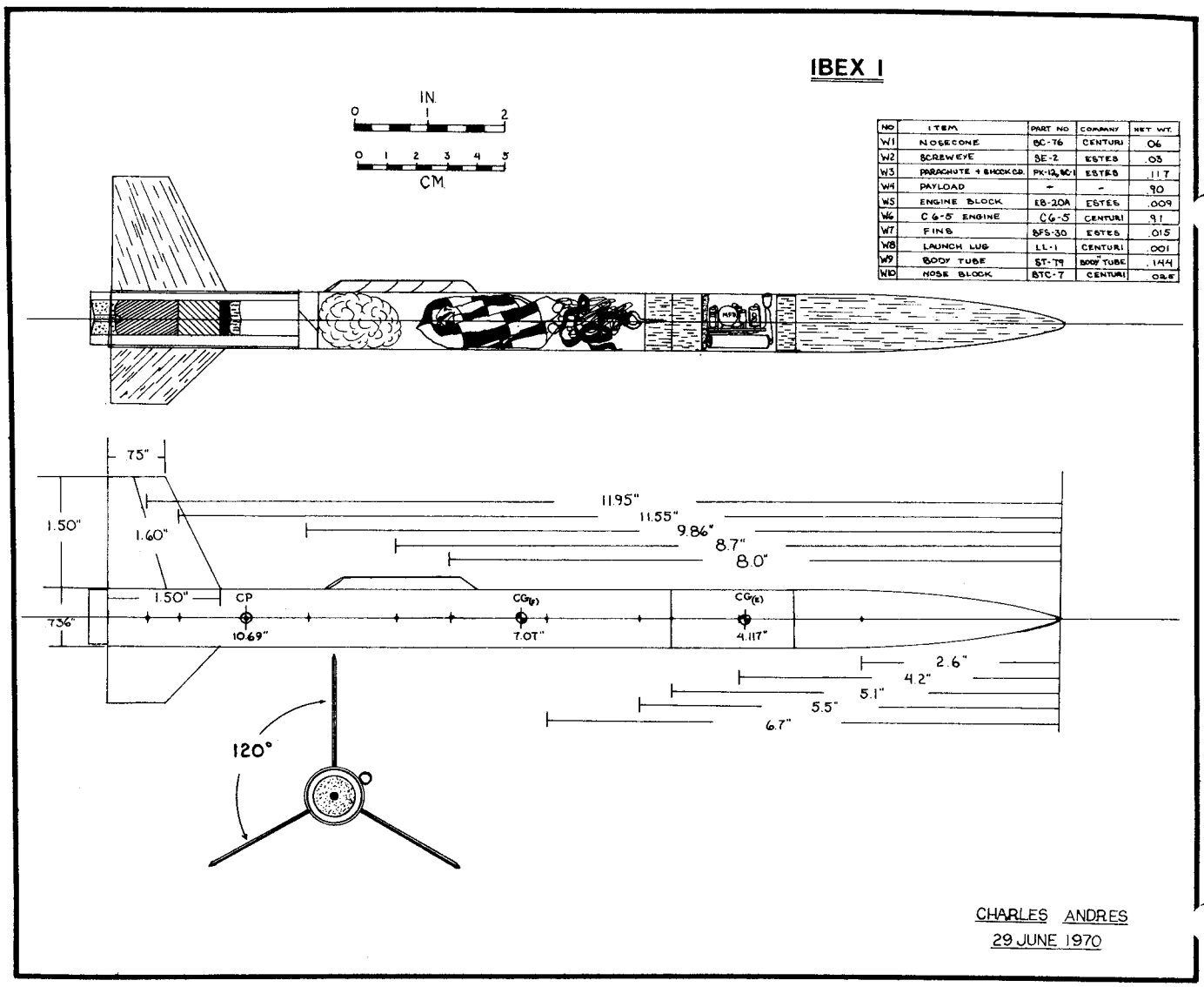
FIGURE 3. To list the empty weight, liftoff weight, and burnout weight along with the respective CG locations and stability margins, modify the program as shown above.

marginally stable.) WX is the weight discrepency factor. It serves two purposes. If the rocket is painted, the paint will add weight without significantly changing the CG position. Also, if the finished model is heavier than the sum of the weights of the major components, because of the addition of a shock cord, parachute, etc., this weight can be included in WX.

Since there are 42 different variables in the program, there are four rows of 10 variables with 2 in the fifth row. Any row completely filled with zeros may be left blank as long as nothing else is put in that row (ie., if the last row is to be left blank, it would be advisable to skip a line between the next to last row and /end run. As the program stands (see Figure 1), in lines L.0084 to L.0086, X1 = empty weight, with the engine weight listed under W6, X2 = empty weight, and X3 = CG weight (without the weight discrepency factor WX). If it is desired to list the empty weight, the liftoff weight, and the burnout weight along with the respective CG locations and static stability margins, one should change the program according to the update in Figure 2. The 'IF' statement at L.0103 is included in the event that the front end of the rocket is larger than the tail end, or vica-versa. Whichever end is larger, that is the end which will be used in determining the frontal area and drag constants.

In line L.0139, V = X – Z, the static stability margin (V) with a C6-5 or other engine of your choice is computed. If the CG is in front of the CP, and the distances with respect to the nose cone are taken for each, a positive value of V will indicate stability, while a negative value will indicate instability. A positive value of less than one body diameter indicates questionable stability.

If the format statements indicated in Figure 1 are adopted, the data



and answers should appear as they do in Figure 3. Answers received should closely approximate the solutions shown here.

In drawing conclusions from the results, the user should keep in mind that one portion of this program is dependent on the solution to other parts. If the Cd value is incorrect, then the altitudes will also be incorrectly calculated. (I have found that the Cd values computed using this program are usually a little lower that the altitude tracking data would indicate, and therefore the computed altitudes may be slightly overestimated. Since the degree of finish seems to govern the Cd value, it is difficult to get a correct estimate of the Cd emperically. The value must be determined experimentally, either by wind tunnel or altitude tracking measurements, and then used with the altitude portion of the program to produce accurate results.)

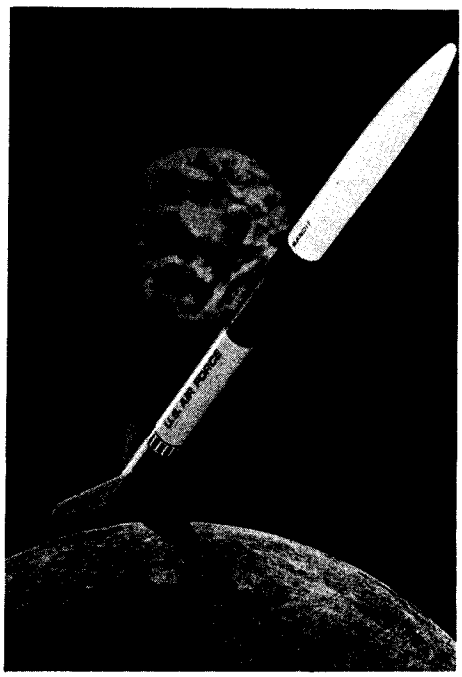
As previously mentioned, the particular combination of equations used in this "superprogram" is only an example of the types of combinations which can be done. It is through such experimental coupling of known equations, such as the dynamics and the non-vertical trajectory equations, that the next breakthroughs in theoretical model will be made.

The rocket used in the sample calculations — the Ibex 1 — is a high performance mini-payload model based on the Excalibur design. It can carry very small instruments such as the transistorized light flasher envisioned here. Standard construction techniques are used throughout, except that the nose block is cut to 1/4" to conserve space. The finished rocket empty weight assumes the payload weighs 0.9 ounces. The weight added by glue, paint, etc is 0.02 ounces. This 0.02 ounces is entered under WX, the weight discrepency factor. The computed results you obtain after running the program using the Ibex 1 input data should match that shown in the sample output.

New Product Notes

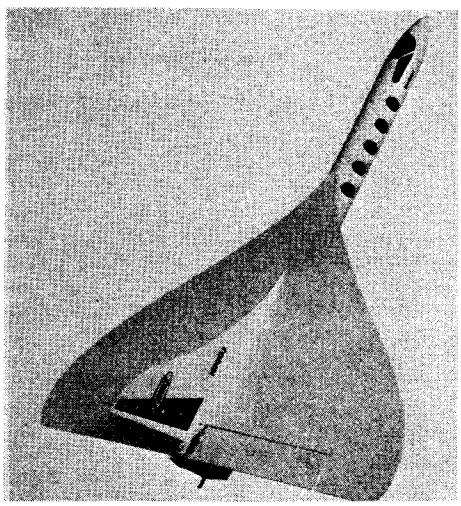
Called the SkyDart, the newest Estes boost/glider offers rocketeers the challange to build an exciting, futuristic looking, boost/glider styled for good looks and high performance. With its SkyDart, a 16" long bird with a 12.6" wing span, Estes Industries is introducing a revolutionary development in model rocketry. The new boost/glider, designed by Larry Renger of the Estes R&D staff, is the only model rocket kit of its kind to feature an internal rear ejection pod. The lightweight pod, which takes A through C engines, pops out at ejection with the spent engine still in place and is brought gently back to earth by parachute while the rocket glides down. When installed the pod is completely out of sight inside the body tube and in no way mars the stylish appearance of the glider.

The rocketeer building the SkyDart will quickly find out that his new rocket combines high performance with excellent reliability. The actuated elevator is carefully designed for positive stability change. Accurate glide adjustments can be made quickly and easily by moving the plastic trim screw up or down. The SkyDart sells for $3.35.



The "Bandit" is the newest sport model from Estes Industries. This kit, designed by Wayne Kellner of Estes, stands 25¾" tall.

The Bandit, a new addition to the Estes sport flying line, offers model rocketeers a welcome feature: an ejection ducting system that eliminates the need for recovery wadding. Not only will this new design save the rocketeer time in preparing his bird for flight, but it will also give him the opportunity to further his knowledge of model rocket techniques. In the Estes Bandit the ejection gases are cool enough when they reach the recovery system that there is no need for wadding. The secret is in the arrangement that forces the gases to change course twice, with the resulting heat dissipation. A series of holes in the engine tube and a baffle near the parachute compartment do the trick. Designed by Wayne Kellner, of the Estes R&D staff, the 25¾ inch Bandit is styled along the lines of a military type sounding rocket. Retail price of the Bandit (Cat. No. K-48) is $3.75, not including engines.



A futuristic looking Boost/Glider — the SkyDart, is the first B/G kit to feature an internal rear-ejection pod. Designed by Larry Renger, the SkyDart has been introduced by Estes Industries.

An updated version of the Estes Mark, an easy-to-build, easy-to-fly beginner's rocket has been introduced. The Mark II is the only model rocket of its type to have a mid-ejection recovery system. By eliminating the break between the nose cone and the body tube, drag is reduced and the rocket reaches higher altitudes than conventional models. The rocket's descent is also slower. All parts in the kit, including the fins, are pre-cut.

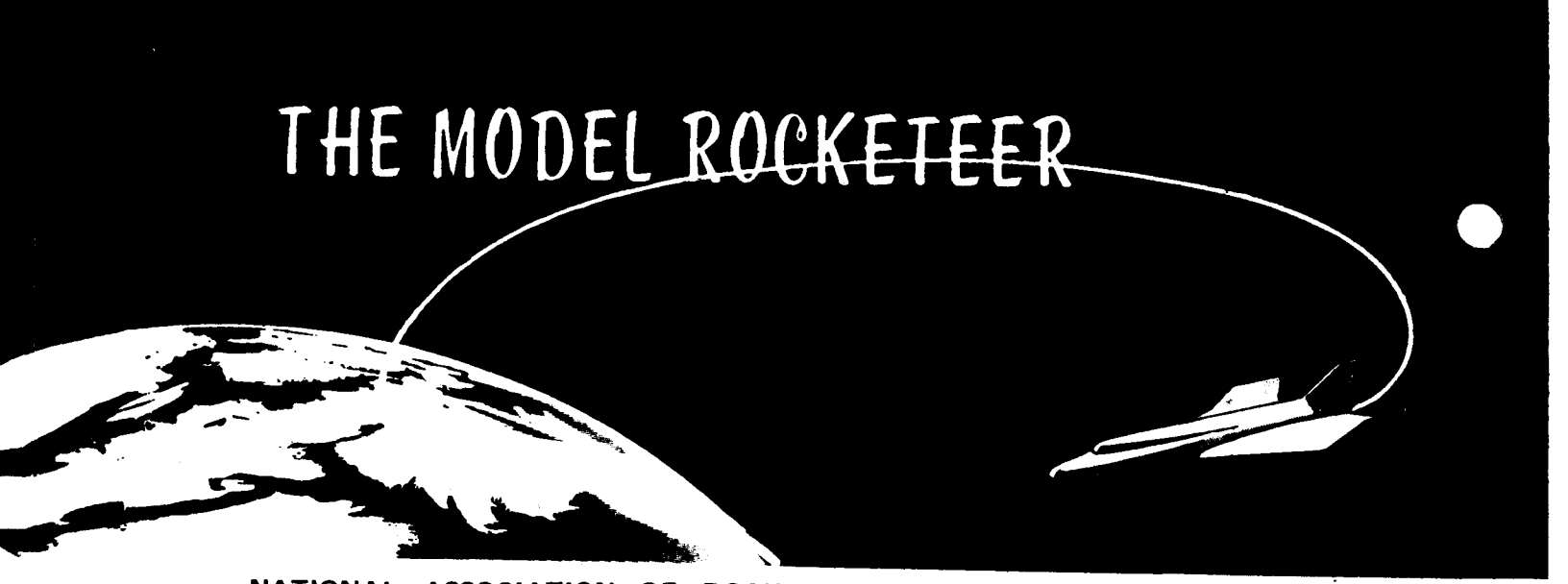
The streamer recovery Mark II was designed by Larry Renger of the Estes R&D staff, who chose a new type of spiral-wound tube that is lighter and truer in shape than standard body tubes. The new Estes Mark II (Cat. No. K-2A) retails for $1.35.

A new, low cost electronic light flasher and payolad capsule has been introduced by by J. C. Products (Box 42A, Madison Heights, Mich. 48071). The kit, including a plastic nose cone, sells for $1.50 including postage.

Simpliway Products Company (6 East Randolph St., Chicago, Ill. 60601) has introduced their new Electronic Ignition System. The system, a solid state device, draws less current than any other available unit, can be used with 6 or 12 volts, and provides the hottest and quickest ignition ever. The unit can be used with any launch pad, and will fire single or cluster engines. In addition, the 60 feet of wire and remote control launching handle furnished allow the rocketeer to observe the rocket's flight at quite a distance from the pad. If desired, an additional 200 feet of wire can be spliced into the system with negligible loss of power. The Simpliway Electronic Ignition System, assembled, retails for $9.95.

Color photographs of the earth taken on US space flights, many not previously seen, are featured in "This New Island," a new publication of the National Aeronautics and Space Administration. In the foward, NASA Acting Administrator Dr. George Low states: "Photographs such as this book contains increase the understanding of the retalionships between our activities and our enviornment. It is somewhat paradoxical that man's new ability to voyage in space has provided him with a valuable way to appreciate his earth." The 182 page book was edited by Oran W. Nicks, presently Deputy Director of the Langley Research Center. The book, NASA SP-250, is on sale at the Government Printing Office, Washington, DC 20402, for $6.00 per copy.

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.

NAR OFFICERS ELECTED

At the first meeting of the newly elected NAR Board of Trustees, held in Chicago on January 30, 1971, the tri-annual election of NAR officers took place. In attendance were trustees Thompson, Atwood, Worth, Stine, Gregorek, and Barrowman. Proxy votes were also received by trustees Galloway, McDowell, Sipes, Beetch, and Apt. The following were elected as officers for the next three year term:

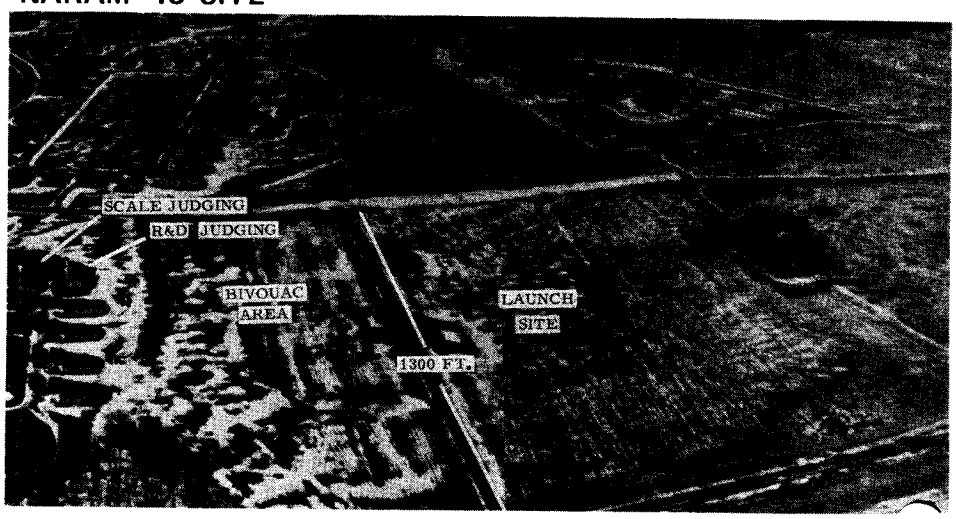
President — James S. Barrowman
Vice-President — Bryant A. Thompson
Secretary — Jay Apt
Treasurer — John Worth

President Barrowman appointed the following trustees to the Executive Committee: Worth, Galloway, and Barrowman. He also appointed the following committee chairmen:

Contest & Records — Dick Sipes
Standards & Testing — Gerry Gregorek
Liason — G. Harry Stine
Section Activities — Robert Atwood
Publications — Lindsay Audin
Technical Services — Bryant Thompson
LAC Advisor — Lindsay Audin
Public Affairs — Carl Kratzer

At this time the Chairmen of the Education, Membership, and By-Laws Revision Committees have not been selected. *The Model Rocketeer* congratulates all the new officers and also expresses thanks to the past officers and trustees for their previous services to the association.

NARAM—13 SITE



Aerial view of the NARAM-13 site at Aberdeen Proving Grounds.

NARAM–13 INFORMATION

Dates: August 9–13, 1971.
Location: NARAM-13 will be held at the Parade Ground of Aberdeen Proving Ground, Maryland. APG, the US Army's center for ordinance activities, was established in December 1917 by President Woodrow Wilson, Located about four miles from the town of Aberdeen, APG extends along the Chesapeake Bay for 35 miles and contains an area of 14,870 acres. It's original mission of testing ammunition and cannons began when the Army's former testing grounds at Sandy Hook, New Jersey was closed. Aberdeen was chosen as the new site because its weather conditions permitted year-round operations, and it is easily accessible from most of the nation's major manufacturing centers.

Besides the testing of ammunition and cannons, it's program also included the testing of air defense guns, trench mortars, and railway artillery. A school and a program for the development of small arms soon followed.

Today, Aberdeen Proving Grounds contains modern laboratories for human engineering, development and proof services, ordinance disposal, and ballistic research. For more than half a century APG has played an important part in our country's defense and remains one of our most active and diversified installations.

Events: Eagle Boost/Glide
Sparrow Rocket Glider
Robin Eggloft
Peewee Payload
Class III Streamer Duration
Class I Parachute Duration
Predicted Altitude
Scale
Super Scale
R&D (no points)

Transportation: Transportation to the town of Aberdeen is available by bus or train. If requested, transportation will be provided from the contestant's point of arrival in Aberdeen to his motel. Transportation will be provided from the motels to the NARAM-13 launch site.

Housing: Housing for contestants will be available at Aberdeen motels by special arrangements with the Contest Director. Also, campground facilities for tents and trailers will be provided at APG.

Dining: The town of Aberdeen has fancy resturants, simple resturants, a McDonalds, and a Gino's. The APG post has a patio carryout, service club cafeteria, and a chuckwagon at the field every day.

Recreation: There are, of course, swimming pools at motels and a bowling alley in town. Additionally, for card-carrying NAR members there will be a swimming pool, boat dock, gymnasium, and movie theatre on base. A coin operated laundromat is available in town. Churches are available both in town and on base.

Tours: NAR tours will be available through Aberdeen Proving Ground, NASA Goddard Space Flight Center, and other places of interest in the Washington, D.C. area.

The rules of good judgement and fair play are the guiding principles of this meet.

Howard Galloway
NARAM-13 Contest Director

LAC ANNOUNCEMENTS

This year, elections for the Leader Administrative Council will be open to all Leader and Senior NAR members. Any Leader member is eligible to run for one of the seven seats on the Council.

Any Leader member who wishes to have his name included on the ballot must submit a resume of his model rocket activities to:

Robert J. Mullane
34 Sixth Street
Harrison, New Jersey 07029

The resume must be typed on standard size paper and be less than 100 words. Those over 100 words will be disqualified. Please include your NAR number. Please be brief and to the point. The resume must be postmarked no later than April 15, 1971.

After all nominations have been received, a ballot and the resumes will be published in *The Model Rocketeer.* The results of the election will be announced at NARAM–13 and in this magazine.

The LAC is again sponsoring a section newsletter contest. The newsletters will be judged for variety and quality of content, and effectiveness as a means of communications both between sections and within the section itself. In an effort to promote intersection communications, the LAC encourages each section to distribute copies of its newsletter to as many sections as possible. In addition to recognition of outstanding newsletters on an overall basis, single articles, series of articles, or other features of exceptional merit will also be recognized

To enter the newsletter contest, send one copy of each issue published after the last NARAM to Elaine Sadowski, 1824 Wharton Street, Pittsburgh, PA 15203. Winners will be announced and the rotating first-prize trophy presented at NARAM–13.

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NAR Director of Section Activities Bob Atwood requests that all NAR members help foster a new NAR Section. To assist Mr. Atwood, the LAC has offered to provide assistance to anyone interested in forming a section. Such people should write to:

Richard Malecki
Box 33698
Georgia Institute of Technology
Atlanta, Georgia 30332

or during the summer to:

320 Marine Avenue
Brooklyn, New York

All inquiries will be answered and an ample supply of NAR literature will be sent to the interested person. Please include your NAR number with your letters.

With the election of new officers and trustees the next three year period appears to hold promise for many improvements in NAR structure and services. A committee will sonn be appointed by President Barrowman to study and revise the NAR By-Laws and present their product to the Board of Trustees for ratification. One issue of wide interest in this study will be the possible inclusion of voting privileges for Junior members.

An effort to contend with the rising costs of operating the Association is being made by Treasurer Worth. John's report on the findings of the NAR Audit Committee will be presented in *The Model Rocketeer* next month. Also a 1970 financial report and a 1971 budget are upcoming .

All chartered NAR Sections will soon be receiving an additional bonus. A new section communications bulletin on contest, records, section activities, and other dated materials. The bulletin is being produced by Ed Pearson, former editor of "NARLETT," and will presumably revert to that same title.

Contest Board operations are expected to run more smoothly now that Jim Barrowman has completed the computer processing system. Point standings and official records will soon resume publication in *The Model Rocketeer*. Records Subcommittee has been taken over by Howard Galloway following Mr. Stine's resignation. All correspondence relating to US and FAI records should be sent to:

NAR RECORDS SUBCOMMITTEE
Howard Galloway, Jr.
428 Ben Oaks Drive West
Severna Park, MD 21146

Howard's home phone number is 301-987-4395 and office number is 301-982-4865.

Don't forget to send your postcard to Howard if you are interested in attending NARAM–13. Only those members requesting an application will receive one. NARAM–13 promises to be the largest National Championships ever held.

–Carl Kratzer

Minutes of the Meeting of the National Association of Rocketry

17 January 1971

NASA—Goddard Space Flight Center

The meeting was called to order at 1:10 PM by Chairman Pro-Tem Robert G. Atwood.

Mr. Atwood presented a letter from NAR President Dr. Ellsworth Beetch appointing him chairman of this meeting.

A total of 43 NAR members were in attendance, 29 of whom were voting members. Since a quorum was present the conduct of business was in order.

Chairman Atwood waived committee reports and appointed a panel of tellers to make the final talley of the ballots for the NAR Board of Trustees and certify the election. The teller panel members were:

Mr. Raymond W. Werre, Chairman
Mrs. Carl Guernsey
Miss Deborah Gibbs
Miss Sheila Duck
Mr. David Pierce

A call for ballots from the floor was issued and those submitted were givin to Mr. Werre.

While the final count was in progress, Mr. Atwood opened the floor for an informal general discussion.

Mr. G. Harry Stine, Chairman of the NAR Liason Committee, reported on the FAI-CIAM meeting he had attended on 3 December 1970 in Paris, France. He reported that the name of the CIAM Subcommittee for Rocketry has been changed to Subcommittee for Space Models in order to remove any implications of explosives or weapons that might be made. Mr. Stine reported that the subcommittee is embarking on a world wide program of seminars on space modelling in order to diffuse existing knowledge and techniques to members of National Aero Clubs that do not now have active space modelling programs. Mr. Stine is organizing a seminar in the U.S.A. during the 1971 World Championships for R/C near Philadelphia, Pa. The next World Championships for Model Rocketry will be held in Yugoslavia in 1972. Mr. Stine indicated that it is imperative that Model Rocketry hold a World Championships at that time or the FAI will withd' international status from model rocketry.

Mr. Guill asked what action has been taken on the audit of NAR financial affairs required by President Beetch. As a member of the Audit Committee, Mr. Atwood stated that the Treasurers books had been fully audited with no discrepancies found; that a number of problems have arisen in the audit of the Contest Board and NARAM-12 records; and that a final financial report from Technical Services reveals no problems in that area.

Mr. Carl Kratzer asked why the Board of Trustees meeting in Chicago wasn't more widely publicized. Mr. Barrowman suggested that he ask Dr. Beetch.

Mr. Howard Galloway announced that an open house of Goddard Space Flight Center-Sounding Rocket Division will be held on Easter Monday, April 12, 1971. Tours and displays of Sounding Rocket Division activities will be featured. The open house will be for anyone who wishes to come.

Mr. Galloway asked about the origin and current importance of the 1961 NAR policy letter concerning NAR Board of Trustee members who are employees of model rocket manufacturers. Mr. A. W. Guill stated that the NAR by-law revision of 1967 superceeded all previous documents. He said the question of the policy letter and the 1967 by-law revision was considered during acceptance of nominations from the floor at the NARAM-12 meeting. Mr. Stine gave a brief history of the problems of NAR-manufacturer relationships. Mr. Guill indicated that he feels that the question of Manufacturer memberships in the NAR has never been fully answered by the Board of Trustees. Mr. Stine indicated that, with respect to his own position, that he notified the Board of Trustees of his employment by a model rocket manufacturer. He stated that he had been prepared to resign at the 1969 Board of Trustee meeting at NARAM-11 in Colorado Springs; but the Board felt that he did not have a conflict of interest at that time. Mr. Roy Rosenfeld said that he feels it is primarily important that no Trustee have any connection with the design or fabrication of model rocket engines used in competition.

Mr. Richard Toner asked why Junior members cannot vote in the NAR. Mr. Guill indicated he feels the NAR is in a position similar to the Boy Scouts in that we serve a generally younger membership that requires the leadership of older members. Mr. John Worth AMA Executive Director and NAR Trustee, indicated that the AMA has just removed the right to vote from its Junior members. He said this was done because in 31 years of experience the AMA found th junior members did not, in general, have a good knowledge of th candidates or issues. Also, junior votes were being manipulated by older associates in a way that distorted the true wishes of the membership. While it has been recognized that there are many intelligent, thinking youngsters at the top end of the junior age division, the majority of juniors are too young or immature to vote. Mr. Worth said that the NAR does differ enough from the AMA that a junior vote may be more feasible; but the AMA experience indicates that a junior vote is not necessarily desirable.

Mrs. Judy Barrowman said that Sam Atwood had expressed the the idea of a voter registration as a way to help assure a meaningful vote from all age divisions.

Mr. Stine stated that he feels that voting is not necessarily the key to control of an organization. Any person, juniors included, who shows a will and capability to work for a committee or sub-committee will be called on to make those decisions that really constitute control of an organization.

Mr. Ed Pearson asked why flight points were eliminated in the USMRSC revision. Mr. Barrowman stated that he was a member of the revision committee in favor of elimination of flight points. He indicated that there were three major reasons for the committees action. First, the growth of the NAR has put a heavy workload on NAR contest officials both national and local; the removal of flight points will alleviate this burden and make the running and tabulating of contests less of a chore. Second, the profusion of points on the national level has led to a great deal of confusion and discrepancies in the national point totals and, thus, decreases the probability of errors. Finally, the most important point, the removal of flight points allows large and small sections to compete on the basis of good modeling and not number ofcontestants.

A number of those in attendance expressed the concern that the elimination of flight points removed the incentive of many junior members to compete. Mr. Howard Kuhn said he feels the hobby of model rocketry and rocketeers themselves have progressed beyond t point where a successful flight deserved a special reward. Mr. P Connor he feels encourgaement of excellence in modeling is the basic purpose of competition and that flight points do not contribute to this purpose.

At this point the panel of tellers returned to the meeting. Mr. Werre reported that, on the basis of the final vote talley, the following persons have been elected to the board of trustees of the NAR:

Jay Apt
Robert G. Atwood
Lindsay Audin
James Barrowman
Dr. Ellsworth B. Beetch
Howard Galloway
Dr. Gerald Gregorek
Alfred L. Lindgren
Forrest McDowell
Richard Sipes
G. Harry Stine
Bryant A. Thompson
John Worth

The meeting was adjourned at 3:10PM.

Respectfully submitted,

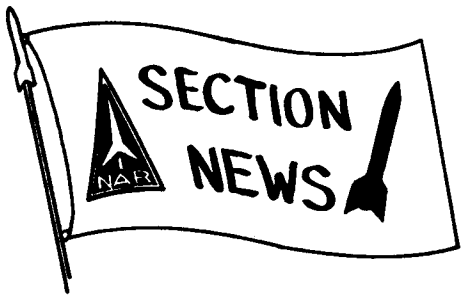
James S. Barrowman
Secretary pro-tem

NARAM—13 APPLICATIONS

NAR members wishing to attend NARAM—13 should send a postcard to:

Howard L. Galloway, Jr.
428 Ben Oaks Drive West
Severna Park, Maryland 21146

Cards must be postmarked no later than midnight Saturday, May 15, 1971 and should contain your name, address with Zip Code, NAF number, and NAR section (if any).



By Charles Gordon

The National Association of Rocketry would like to welcome the following Sections to the Association:

SOCIETY OF ARCADIA ROCKETEERS SECTION
c/o Ron Gibson
230 West Camino Real
Arcadia, California 91006

DAYTON ROCKET RESEARCH SOCIETY SECTION
Scott Layne
2213 Belloak Drive
Dayton, Ohio 45440

SAN GABRIAL VALLEY MODEL ROCKET SOCIETY
Donald C. Lewis (The Box Car)
128 West Main Street
Alhambra, California 91801

DESERT ROCKETRATS SECTION
W. E, Smith
100 Coral Sea Circle
China Lake, California 93555

BLOONFIELD JR' HIGH MODEL ROCKET CLUB
Mr. Carl R. Nebelsky
50 Harold Street
Hartford, Connecticut 06112

FORT WORTH AVENGERS SECTION
Everett D. Lawson.
6873 Chickering, Apt. 135
Fort Worth, Texas 76116

WOLVERINE ROCKETEERS OF DETROIT SECTION
Woodrow Woo
24001 Moritz
Oak Park, Michigan 48237

APOLLO 13 ROCKETRY CLUB OF THE
EASTERN UNION COUNTY YMHA
Peter R. Rosenbaum
c/o YHMA
Green Lane
Union, New Jersey 07083

MEMPHIS UNIVERSITY SCHOOL MODEL
ROCKET SOCIETY SECTION
Morris Jones
4288 Charleswood Road
Memphis, Tennessee 38117

NEW ENGLAND ROCKETRY FEDERATION
Patrick M. Griffith
Legion Road
Milford, Massachusetts 01757

MONTEREY PARK MODEL ROCKET SOCIETY
Scott Maiden
Verde Vista Drive
Monterey Park, California 91754

NAR GATEWAY ARCH SECTION
Randy Picolet
3236 Janurary
St. Louis, Missouri 63139

AREVALOS ROCKET ASSOCIATION SECTION
Reinhard H. Stolz
9463 El Valle Avenue
Fountain Valley, California 92708

EVANSTON MODEL ROCKETRY ASSOCIATION
Paul Pasco
504 Lee Street
Evanston, Illinois 60202

KENMORE–TONAWANDA ROCKET SOCIETY
Michael Reardon
3049 Delaware Avenue
Kenmore, New York 14217

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PROGRESS REPORT ON FLAGS. In case you are all wondering where the flags are that I have been calling for lately, they are on the drawing board, literally. Some flags have indeed been received but in order for them to be used they have to be redrawn in black ink for publication.

They are in the process of being redrawn and should be coming out very soon.

Thanks to the following Sections who have sent in their flag drawings or photographs: TRI-CITY COSMOTARIANS, THREE RIVERS SECTION, FAIRCHESTER, STAR SPANGLED BANNER, DELTA V, SOUTH SEATTLE ROCKET SOCIETY, NEW CANAAN SPACE PIONEERS, ANNAPOLIS ASSOCIATION OF ROCKETRY, HAWKEYE SECTION, NORTH SHORE, PASCACK VALLEY, ROCKVILLE ROCKETEERS, T.I.R.O.S. SECTION' BELAIR ASSOCIATION OF ROCKETRY, MONROE ASTRONAUTICAL ROCKET SOCIETY, BLOOMFIELD JUNIOR HIGH SECTION, AEROSPACE ASSOCIATION OF NORTHWESTERN PENNSYLVANIA.

Flags for all other sections are still welcome. Please send color coded drawings and/or photos to: NAR SECTION FLAGS, c/o Charles M. Gordon, 192 Charolette Drive, Laural, MD 20810.

****

Dick Toner succeeds as manager of NAR Section Activities in the Southland Division. Dick Sipes' resignation was based on the fact that the work of being National Contest Director and Division Manager was too heavy a load. Many thanks to Dick and good luck to Dick. Dick Toner's address is:

5012 Valley Stream Road
Charlotte, N.C. 28209

Telephone: 204-525-8590

****

Happy Anniversary to the Pascack Valley Section (Harrison, New Jersey). June will make it 10 years since the Section chartered with the NAR in June of 1961. Good Luck and Best Wishes P.V.S.

****

Congratulations to the following Sections on the publication of the first issues of their new Section newsletters. The Hornets Nest Section (Charlotte, North Carolina) with Volume 1 Number 1 of ***THE STINGER***. The Kenmore-Tonawanda Rocket Society Section (Kenmore, New York) with their Vol. 1 No. 1 of ***THE NEBULUS***. And the APOLLO-NASA Section (Houston, Texas) for their first issue of ***FREE FALL***.

****

On January 1, 1971 the Northside Rocket Club Section (Atlanta Georgia) merged with the Metro-Atlanta Society for Educational

Rocketry Section (MASER), to become the Northside District of that Section.

Each district will hold it's own meetings every other month and the whole section will meet those months district meetings aren't held.

The enlarged MASER Section now returns to its status as Georgia's first and only NAR Section.

****

For those modelers who don't know, model rocketry has been legalized in the state of Pennsylvania. The act signed by Governor Raymond Schafer, follows along the lines of the NAR Safety Code. Coipes of the entire bill may be obtained by writing Harrisburgh, Pa. and asking for House Bill No..1319, Session of 1969. (Thanks to the Three Rivers Section of Pittsburgh for this information.)

****

The MIT Model Rocket Society (Cambridge, Massachusetts) reports construction of a new portable launch system which, when disassembled, fits entirely into the 42" long, 3" diameter aluminum tube which is the main part of the rack. The 3 rods the aluminum tube legs, the power cables, and the clip leads all go inside, then aluminum caps are screwed onto the ends. The firing panel is built into the top of the battery case, a 9 X 9 X 13" electronics case (Gov't surplus) with carrying handles on the top. The battery is a small 30 amp-hour motorcycly battery.

****

NAR Section News would also like to thank the following Sections for sending in correspondence for this issue, although none was used: NARHAMS, STEEL CITY, STAR SPANGLED BANNER, ARREVALOS, DELTA V.

****

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

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

NARAM–13 ANNOUNCEMENT

The Contest Director has ruled, and the Contest Board has concurred, that for NARAM-13 an individual model rocket may not be entered in both Scale and Super Scale.

Although different birds must be used for Scale and Super Scale, the same prototype may be used for both events.

If a contestant uses the same prototype for Scale and Super Scale, he may use the same justification packet for both models. Members of an immediate family may share the same justification packet, if applicable, for Scale and/or Super Scale.

All prospective NARAM-13 contestants must send a postcard requesting NARAM information and application forms to:

Howard L. Galloway, Jr.
428 Ben Oaks Drive,
Severna Park, MD 19711

by May 15th, 1971.

BOARD OF TRUSTEES MEETING

A meeting of the Board of Trustees of the NAR has been called for May 1, 1971. The meeting will be held at the Goddard Space Flight Center, Greenbelt, Maryland. The meeting will begin at 1 PM. The meeting will be open to all NAR members, however the Board may hold a closed session between 4 and 5 PM.

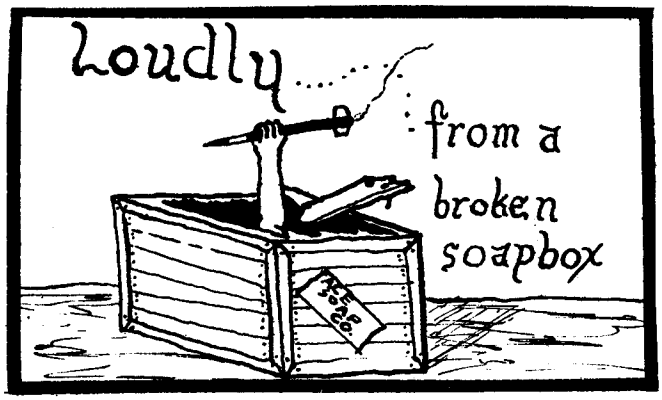
The agenda will include:

1 NAR Budget and Finances,
2 By-Laws Revision Committee,
3 Model Rocketry magazine contract proposal,
4 Regionalization.

FAI WORLD RECORDS

(As of December 31, 1970)

Open Payload Altitude Otakar Saffek (Czechoslavakia)—27 June 1970	**611 meters**
FAI Parachute Duration Ion N. Radu (Roumania)—23 September 1970	**17 min 46 sec**
Sparrow Boost/Glide Duration Otakar Saffek (Czechoslavakia)—27 June 1970	**3 min 31 sec**
Swift Boost/Glide Duration Daniel Cazacio (Roumania)—7 May 1970	**5 min 26 sec**
Hawk Boost/Glide Duration Premysl Kyncl (Czechoslavakia)—27 June 1970	**4 min 30 sec**
Eagle Boost/Glide Duration Milan Straka (Czechoslavakia)—27 June 1970	**6 min 30 sec**
Condor Boost/Glide Duration Otakar Saffek (Czechoslavakia)—28 June 1970	**2 min 23 sec**



SOME PINK BOOK COMMENTS

by Richard Hyman

Several months ago, NAR members received the white book revision. The revisions were, for the most part, needed for the Pink Book, yet a few changes have created doubt about their value.

The competition age divisions will be extremely helpful, as it is difficult many times for an 11 year old to compete against a 16 year old. The new event classes, too, will be helpful. For example ½A altitude and the breakdown of Eggloft will be good for ranges where tracking is limited.

A new event, rocket glider, is one of the most exciting additions to the Pink Book. Its complexity will challange designers to come up with a glider that won't sink like a rock.

Perhaps some of the changes should be questioned. One club member pointed out that an entry which makes a qualified flight receives the same points as an entry which is disqualified (ie. zero points). This isn't good for the individual who doesn't get credit for his work, but it is good for the small club that can earn the same number of points as a large club, the same large club that used to get lots of members out to meets just to get the qualifying points of its members.

Another revision which has been discussed to a fair degree in our own club is the new rule which says that a boost/glider (the gliding portion) does not have to be recovered. It's nice to think that you don't have to recover that super-duper B/G, but the glider wouldn't be in sight that long anyway because there is usually a breeze around. Let's look at it this way; if we are at a point where we can lose a glider easily, shouldn't we be at a point where we can do some designing and planning so that a glider will be more easily recovered? It's difficult for a modeler to think that he might have to lose his glider to get a good time. Perhaps one way to solve this problem would be to require glider recovery, but allow a glider to be replaced to complete the official flights. What's your opinion on this?

(Reprinted from "Full Blast,"
by the Monroe Astronautical Rocket Society)

Federation Aeronautique Internationale

Comission Internationale D'Aeromodelisme

SUBCOMMITTEE FOR SPACE MODELS

MINUTES

A meeting of the C.I.A.M. Subcommittee for Rocketry was held at 6, Rue Galilee, Paris, France at 1400 hours, 3 December 1970. Present were G. Harry Stine (USA) in the chair, Albert Roussel (Belgium), Kosta Sivcev (Yugoslavia), and Ion Bobocel (Roumania). Present as observers were Petco Petcov and Andrei Vlaitchev (Bulgaria) and John Worth (USA).

The purpose of the meeting was to establish programs for the increase in model rocket activity in more national aero clubs in 1971. This course of action was decided upon because of the entry of only four nations in the postponed World Championships for Rocket Models at Vrsac, Yugoslavia scheduled for September, 1970. The Chairman invited each Subcommittee member to present his views and suggested programs. Roussel and Sivcev presented programs; prior to the meeting, suggestions had been received by mail from the Yugoslavian Aero Club. No other Subcommittee member responded to the Chairman's letter and request.

The following action plan was adopted by the Subcommittee. Subcommittee members indicated volunteered to accomplish the tasks by the time and date stated or to report to the Chairman if it was not possible to complete the assigned task by the date stated. 1. Chairman would petition the C.I.A.M. to change the name of the Subcommittee to "The C.I.A.M. Subcommittee for Space Models". The Subcommittee determined that much of the reluctance of government authorities to permit our sport was caused by the fact that the word "rocket" in the minds of many people conveys the image of explosives, chemicals, and weapons. (This action was carried out by Stine and the change of name was adopted by the C.I.A.M. on 4 December 1970.)

2. All national aero clubs (NACs) would be asked to provide the name and private address of a person in their club who is interested in space model activity. Roussel prepared a request and distributed it in French (English at the C.I.A.M. Plenary Session on 4 December 1970. The nes and addresses will be collected by Stine in the USA who will than prepare a list and submit same to all Subcommittee members no later than 31 January 1971.

3. Members of the Subcommittee, working with the NACs, will attempt to organize seminars on space modelling with demonstrations, lectures, and flight demonstrations. Members of all NACs will be invited to these. The seminars will be used to diffuse existing knowledge and techniques to members of the NACs that do not now have active space model programs. Stine will attempt to organize a seminar in the USA during the 1971 World Championships for R/C in order that the American space modelers and manufacturers can get together with European modellers who may wish to take advantage of the special transatlantic transportation arrangements being made for that event. Sivcev will attempt to organize a seminar in Belgrade, Yugoslavia in in conjunction with the Second International Exposition of Space Technology to be held in late June 1971.

4. The Chairman will draft a suggested letter for F.A.I. Headquarters to send to all NACs and will discuss this matter with the Secretary General of F.A.I. This proposed letter would state the history, safety, sporting competition, and educational potential of space modelling and voice F.A.I.'s support of space modelling. It was felt that such a letter would provide great assistance to NACs in their efforts to gain governmental permission of space model activities in various nations. (The discussions were held with the F.A.I. Secretary General on 5 December 1970, and the letter will be sent to all NACs by the F.A.I. in December 1970.)

5. C.I.A.M. Space Modelling Secretariets were established by the Subcommittee according to the article found elsewhere in this issue. These Secretariets will be in constant postal communication with each other. Requests received by one Secretariet from individuals in another Secretariet's service area will be fowarded to the appropriate Secretariet for reply. Each Secretariet will assemble all of the information available in its service area and send sufficient copies of same the other Secretariets; this activity will permit bulk shipments of inted materials to the centrally-located Secretariets for distribution. and thus reduce the cost of mailing same. The Secretariets will be responsible to the Subcommittee for encouraging the development of space modelling activities in the nations in their service areas, and will work with NACs to accomplish this. The list of Secretariet and their service areas has been prepared and will be circulated by the F.A.I. to all NACs.

6. Stine will prepare a list of USA space modelling equipment necessary to conduct flight demonstrations in the FAI Section 4b competition catagories. He will determine the cost of same. He will notify the Secretariets of this before 1 January 1971.

7. Comment on the FAI General Assembly's action regarding the 4-year rule change freeze was postponed by the Chairman until the precise wording of the FAI regulation is available for study. (At the FAI General Conference in New Delhi, India in late November, 1970, a ruling was passed that "for a period of four years, there will be no changes made in the FAI Sporting Codes concerning matters of (a) existing model specifications, (b) World Championships, or (c) record attempts." According to the interpretation of this ruling by CIAM President Pimenoff, no new rules can be added to the Sporting Code during that period.)

CIAM SUBCOMMITTEE FOR SPACE MODELS –

List of Secretariets

PURPOSE: The CIAM Space Model Secretariets have been organized to provide centrally located sources of information about space models; to assist national aero clubs in their service areas to establish space model activities; to provide static and flight demonstrations for government authorities under the auspices of a national aero club; and to organize seminars for the purpose of acquainting people with the technical, sporting, and educational aspects of space modelling.

National aero clubs and interested individuals are invited to contact the CIAM Space Model Secretariet in their service area for information and assistance. If space modelling activities are not yet permissable in a nation, the cognizant Secretariet may be able to help the national aero club concerned by providing extensive information and technical assistance.

Service Area: North America, South America, Australia, Japan, and India:
G. Harry Stine
CIAM Space Model Secretariet – USA
127 Bickford Lane
New Canaan, Connecticut 06840
U.S.A.

Service Area: Germany, Netherlands, France, Monaco, Spain, Great Britain, Ireland, and Luxembourg:
Albert Roussel
CIAM Space Model Secretariet – BELGIQUE
Av. J.–B. Vandercammen, 29
Bruxelles 1160
BELGIUM

Service Area: Switzerland, Italy, Austria, Greece, Turkey, and Eastern Europe:
Kosta Civcev
CIAM Space Model Secretariet – JUGOSLAVIJA
l'Union Aeronautique de Yugoslavia
Uzun Mirkova 4/1
Beograd
YUGOSLAVIA

NAR BOOSTER

The first contribution to the National Association of Rocketry's newly inagurated booster program was received on January 25th from 14-year-old Gordon S. Barrett III of Redmond, Washington. The booster program, which started with 1971 renewals, has been created to decrease NAR deficit spending and further the aims of the organization.

Gordon in his letter accompanying his generous $5.00 check stated: "...this is my first year, but from what I hear the NAR is worth contributing to. Hope you get more support..."

Thank you, Gordon, for being the initial booster.

(Club Notes, continued)
rested rocketeers should contact the Jackson Hobby Shop in Jackson, New Jersey for more information.

A new club has been formed in Rhineback, New York. Thus far the group has had four demonstration launches. The biggest demonstration was at a World War I airport with about 750 spectators in attendance. Rocketeers interested in this club should contact Allen Brown, Salisbury Tpke., Rhinebeck, NY 12572.

Send your club newsletters, contest announcements and results, and other news for this column to:

Club News Editor
Model Rocketry Magazine
P.O. Box 214
Boston, Mass. 02123

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.

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Club Spotlight:

BOWARD COUNTY (FLORIDA) FALL MEET

by Bob Thurlow

One hundred eighty and a half seconds with a Sparrow B/G? That's the official duration of the flight that opened the Boward County Model Rocketry Association's Fall Competition last November in Fort Lauderdale. Although high winds (15 to 20 mph) and early morning rains threatened another postponement for the BCMRA, the skies cleared by 10 AM and, with a helping hand from everyone on hand, the meet started on time at 10:30.

In addition to members of the hosting club, competitors included members of Miami's Gold Coast Model Rocketry Association. After several demonstration flights, BCMRA's youngest member, Howie Thurlow, showed how it's done in boost/glide. It was his lead-off flight with a foam wing Sparrow B/G entry that turned in 180.5 seconds, a time not surpassed during the contest.

Swift B/G entries encountered a lot of problems with pods and streamers tangling to the booms. The Mantas, which dominated in number of entries, also experienced trimming problems due to the high wind. Despite all this, Carl Anderson's Manta turned in a firat place time of 95 seconds. Lynn Fletcher took second with 56.4 seconds.

Scale competition followed the B/G's. First place went to John Norcross for a beautiful model of the "PARCA" French sounding rocket. The detail was excellent, as was the flight performance. All four strap-on boosters separated simultaneously, and the chute on the core deployed properly. Ed Worthington's 1/100th Saturn 1B and Steve Peretz' original scale of the Nike-Herculus deserved their second and third place awards.

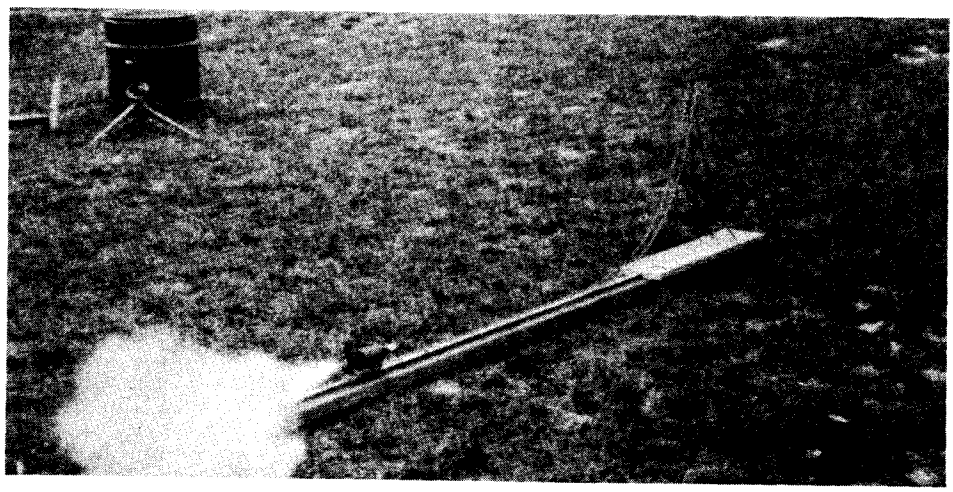
The three tracking events — Class 0 Altitude, PeeWee Payload, & Class 1 Altitude — followed. Top altitude of the day was achieved by Marc Murphy flying an original design from a lugless tower launcher. Several lost tracks and DQ's due to ejected engines kept the number of successful flights relatively low. Marc's B6-6 powered bird closed at 900' in Class 1. PeeWee was a tight race, with only 20' separating first and third place.

The final event of the day was the one all the spectators and contestants had been anticipating, and none were let down because of the imaginative entries in the Engineering Class, BCMRA's version of R&D. Greg Browning entered his version of the Foxmitter and Breathing Rate sensor. His report, along with the successful flight of a white mouse, earned him first place. Except for a short period during the boost, an excellent telemetry signal was received during the entire flight. After hearing the recorded signal several times, it appears that the little rodent, who almost refused to enter his capsule during pre-launch preparations, has learned to hold his breath during lift-off. Greg will be using the information gathered in a school project.

Jim Bunce "vaporized" the crowd and himself into second place with a spectacular underwater launch of the Polaris (**MRm**, October 1970). The short delay between ignition and surfacing only intensified the crowd's interest as the Polaris streaked skyward in a flawless flight.

The crowd was buzzing about the Polaris flight while John Norcross was setting up the equipment for his Rail Assisted Takeoff (RAT) entry. At ignition, the Jules Verne type spacecraft sped horozontally down a two rail track for approximately 8 feet, curved upward to a vertical position, and was released by an ingenious tripping device, sending the craft heavenward. A minor stability problem caused a rather eratic flight.

With the competition completed successfully, the crowd was impressed with the "state-of-the-art" of the hobby. Trophies and certificates were presented to the winners.



Photos by Jim Bunce and Bob Thurlow

There goes the RAT! John Norcross' entry in the Engineering Competition — a Rail Assisted Takeoff vehicle — took third place in the contest. The model accelerates horozontally across the ground, on two rails, then is directed vertically, and leaves the rails. Performance on the track was fine, but once airborne the rocket proved unstable.

BCMRA Results

SPARROW B/G

1st	H. Thurlow	180.5 sec.
2nd	B. Thurlow	169.8 sec.
3rd	D. Lange 56.1 sec.	

SWIFT B/G

1st	C. Anderson	95.0 sec.
2nd	L. Fletcher	56.4 sec.
3rd	S. Peretz	38.0 sec.

SCALE

1st	J. Norcross	Parca
2nd	E. Worthington	Saturn 1B
3rd	S. Peretz	Nike-Herc.

CLASS 0 ALTITUDE

1st	D. Peretz	515 feet
2nd	D. Locke	500 feet
3rd	M. Murphy	415 feet

PEEWEE PAYLOAD

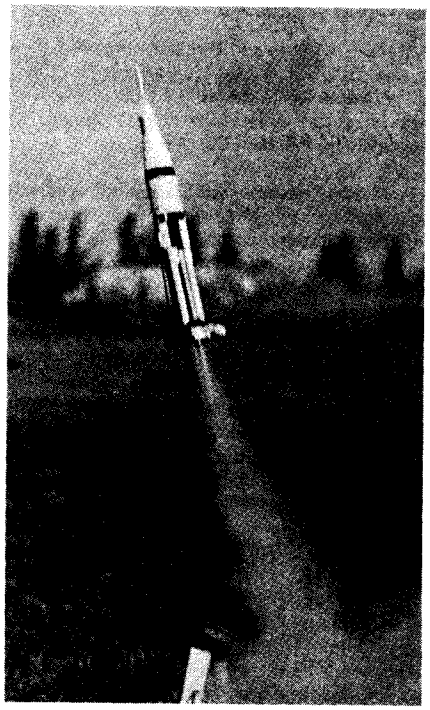
1st	E. Worthington	565 feet
2nd	B. Seigler	555 feet
3rd	B. Thurlow	545 feet

CLASS 1 ALTITUDE

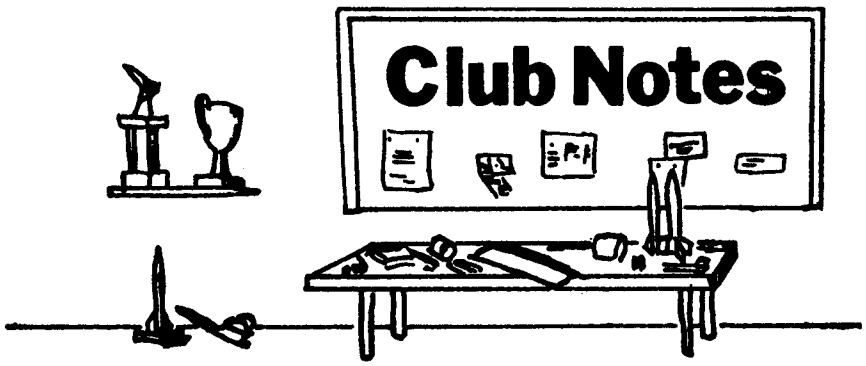
1st	M. Murphy	900 feet
2nd	J. Norcross	880 feet
3rd	R. Phillips	735 feet

ENGINEERING

1st	G. Browning
2nd	J. Bunce
3rd	J. Norcross



Ed Worthington's 1/100th scale Saturn 1B lifts off to a perfect flight and second place in the scale event.



A new District of New Jersey's Pascack Valley Section has recently been organized. The Union District, with 5 members, is seeking additional members from the towns of Union, Hillside, Kenilworth, Springfield, Cranford, Roselle Park, Milburn, Maplewood, Roselle, Elizabeth, and Irvington, New Jersey. Interested rocketeers are asked to contact the District's president, Michael Manes, 1218 Erhardt Street, Union New Jersey 07083.

Students from the "gifted science class" at the Nansen School in Chicago's South End staged a launching in a Chicago park in mid December. Under the supervision of Harriet Lightenberg, the school's science teacher, the students had constructed models during class.

A rocket demonstration and contest was staged on January 9th in Goldsboro, North Carolina. The launch field was the Greenwood School, and youngsters from the town were given the opportunity to fly models they had built.

Model rocketeers in the Monongahela, Pennsylvania area are invited to contact Eric Jones who is interested in forming a club in that area. Rocketeers can write him at 409 Fourth St., Monongahela, PA 15063.

A model rocket club is being organized in the Cherry Hill, New Jersey area. Interested rocketeers should contact Mark Orthner at 103 Kitty Hawk Rd., Cherry Hill, NJ 08034.

Rocketeers in the Southeast are invited to participate in the Second Annual North Georgia Regional Meet. The contest will be held June 18th and 19th at a site near Atlanta, Georgia. Interested rocketeers should contact Richard Wallace, Metro-Atlanta Society for Educational Rocketry, 4676 Kingsdown Rd., Dunwoody, Georgia 30338 for more information and application forms.

A new NAR Section has been formed in the Gateway area of St. Louis, Missouri. The NAR Gateway Area Section (NARGAS) now has about 20 members and is still growing. At a recent launch in 25 degree weather over 30 rockets were flown in a 1½ hour period. The most impressive flight was a 139 second Hornet B/G duration. Any rocketeers in the St. Louis area interested in joining NARGAS should contact Thomas Kuechler, 7924 Madison Dr., St. Louis, MO 63133.

A model rocket club is being organized in the Kelmhurst, Illinois area. The club has a launching system and firing field. Interested rocketeers should contact Jim Ives, 818 Parkside, Elmhurst, Ill. 60126.

The Quincy Rocket Club is looking for new members in the Quincy, Illinois area. Eventually the group plans to organize an NAR Section. Interested rocketeers should contact the club at 14 Riverside, Quincy, Ill. 62301.

The 1971 Midwest Model Rocket Regional will be held on June 26-27, 1971 in Columbus, Ohio. Events in the annual meet, sponsored by the Columbus Society for the Advancement of Rocketry, will be: Scale, Swift B/G, Hornet B/G, Sparrow Rocket/Glider, Robin Eggloft, Predicted Altitude, Plastic Model, Class 0 PD, Class 2 Streamer Duration. Advance application forms are available from MMRR '71, 1191 Shanley Dr., Columbus, Ohio 43229;

Rocketeers in the Monroe County area of New York interested in joining an NAR Section should contact Robert Staehle, Huntington Hills, Rochester, NY, or call 467-8177. The Monroe Astro's Section currently has 32 members.

A new club has been organized in Houston, Texas. The Houston Association of Rocketry reports in the first issue of their newsletter — the HAR Informer — that the club is seeking new members. Rocketeers can contact the group through David Kirkland, 3620 Inverness, Houston, TX 77019.

The newly formed Western Disasters Model Rocket Club in Denver, Colorado, is attempting to form an NAR Section. Rocketeers interested in joining this group are invited to contact Rex Winderspahn, 7935 Vallejo St., Denver, Colorado 80221.

A new model rocket club has been organized in Oradell, New Jersey. The Albatrosses has applied for sanction as an NAR Section and would welcome the opportunity to compete with other clubs in the area. The club can be contacted through secretary Steve Treimel, 610 Schaefer Ave., Oradell, NJ 07649.

The Kerman Rocket Club was formed in Kerman, California. Initially organized with a membership of 10, the club has grown to a current membership of 55. The club constructed a dual launch rack system and tracking scopes. Interested rocketeers can contact the Kerman Rocket Club through John Lutz at 14141 W. Kearney, Kerman, CA 93630.

Rocketeers in the Newton-Hull, Massachusetts area are invited to contact Robert Barger, 5 Sharpe Rd., Newton, MA 02159.

The Christian Brothers Academy Rocket Society of Lincroft, New Jersey is now preparing for its second year of operation. The club was founded in December 1969 by Steve McMenim, presently vice-president, and now has over 20 members. Other club officers are Tom Martin, president; Don Riemer, secretary-treasurer. The club is now seeking to schedule competitions with other clubs in the Central New Jersey area. They can be contacted at 4 Indiana Ave., Jackson, NJ.

The latest issue of ***Reaction*** — newsletter of the Midwest Rocket Research Association — reports on the club's plans to host the first major model rocket competition ever held in eastern Kansas. The Eastern Kansas Area Meet, scheduled for March 7th, will include competition in the Eggloft (80 nt-sec), Class 1 PD, Design Efficiency, and Scale events. The club also plans a regional meet in eastern Kansas for sometime in the summer. Further information on the MRRA is available from George Dibos, MRRA President, 7800 Chadwick, Prarie Village, Kansas 66208.

The Monterey Park Model Rocket Society in California held its semi-annual election of officers on February 4th. Elected were: Jim Pierson, president; Paul Yokoyama, vice-president; Dave Raplh, secretary ; and Steve Pedregon, treasurer. The club held its first public model rocket show and demonstration launch on February 6th at the Highlands school grounds. NBC TV news covered the event at which over 100 rockets were launched. Rocketeers interested in joining this club are invited to contact Scott Maiden, 1795 Verde Vista Dr., Monterey Park, CA 91754.

A model rocket club has been organized at the West Elementary School in Sutherlin, Oregon. Last fall one of the students suggested organizing the club, and the instructor, Mr. Tom Patoine, used this as an opportunity to teach students the subjects from parliamentary procedure (to organize the club) to trigonometry (for tracking). The club now has 40 members, and other clubs are being organized in other classes at the school. They plan a competition between the classes in spring.

The YMCA of Lakewood, New Jersey has announced a series of seminars on various topics of interest to serious model rocketeers. In general, the lectures will be given by Steve McMenamin, however there will be guest speakers on occasion. At present no definite schedule is available, but some topics to be discussed are: Computers and Rocketry, Modeling for Competition, Radio Telemetry, Designing with Computers, and Air Pollution Telemetry. Inter-

(Continued on page 38)

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