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Model Rocketry

Volume III, No. 6
March 1971

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Cover Photo

This month's cover shows the "FIREFLY," a unique five-engine powered blinking-light model designed for night flying. Complete plans for the "FIREFLY" begin on page 10. (Photo by John Rupkalvis.)

From the Editor

One critical problem hampering the growth of model rocketry in urban and suburban areas is the *lack of suitable flying fields*. For an individual to find a field is almost impossible, unless he knows someone who owns a suitable piece of land. A club, or group of rocketeers, can exert a little more influence in establishing a "public launching site".

In seeking a flying field, the first step is to gather up and read all of the available information on the safety of model rocketry. The property owner (or public official in the case of public property) will, of course, be concerned with the possible hazards to his property. By citing the impressive safety record of the hobby, presenting the owner with copies of the safety literature (including the booklets on "Model Rocket Safety" prepared by Estes and MPC), and being prepared to answer his questions about the hobby, the club can gain the cooperation of the property owner.

In almost every town or city there is at least one suitable flying field — a schoolyard, park, or other public area. But, *don't* just march in and use this area. Seek a meeting with the official in charge, and gain his approval of your use of the field. The school principal, park director, or mayor of a small town will naturally be reluctant to approve an activity which he doesn't understand. That's why you must be thoroughly familiar with the safety aspects of the hobby — in order to answer his questions about safety. A demonstration launching for the official may also serve to convince him that model rocketry is not dangerous.

By seeking the cooperation of public officials, you can improve the public image of model rocketry in your town and increase the chances of obtaining a suitable flying field.

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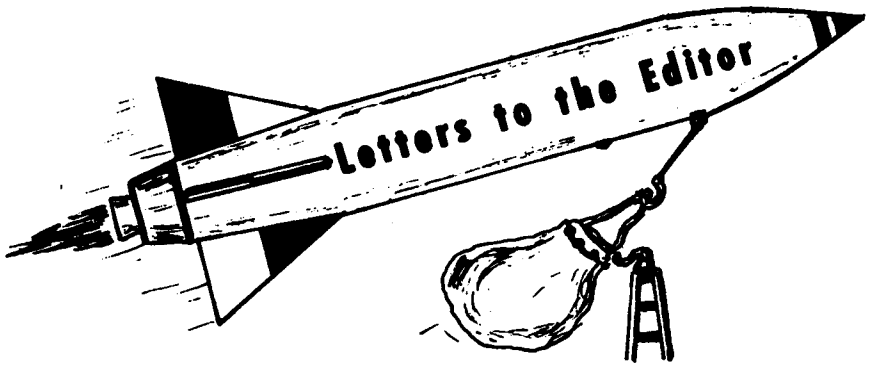

Winter Launching

Concerning the Editors Note on winter launchings, I have found that a frozen lake is an excellent launching field. There are no obstructions and the white surface makes it easy to spot the recovered bird. So winter is a perfect time for launching!

Tom Houghten
Royal Oak, Mich.

Ideas?

I would like to express a word of warning to the readers of your excellent publication. In the past I have seen articles on converting the Gemini-Titan to a Titan 3M spacecraft and converting the Revell Vostok kit for flight. I had previously thought of these ideas, but never got up enough steam (or thrust if you like) to build them.

So, my word of advice to the "Model Rocketeers of America" is don't dawdle! Send in those ideas of yours right away, before someone else thinks of them. By doing this we will create better communication and get these new ideas and developments going.

Dennis Holck
Lodi, California

Lightweight Light Flasher

For those rocketeers who like to launch at night and use light flashers for tracking, there is a very simple, inexpensive, lightweight flasher you can use. The flasher is simply a "twinkle type" Christmas light – one of the miniatur

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blinking bulbs. These lights range from 3 to 9 volts. All that is needed is a lightbulb and a battery. This eliminates the weight of transistors, resistors, and the like. The "twinkle bulb" is not as bright as those normally used in light flashers. Bulb intensity can be increased omewhat by wrapping a small aluminum foil cone around the base of the bulb. These bulbs don't draw much power, so you can use the lightweight hearing aid batteries in the circuit, however their light output is greatest when you apply a voltage just a little less than necessary to burn out the bulb.

Stephen Kurpiewski
Monroeville, Pa.

Parasite Gliders

Looking through the November 1970 issue of **MRm** I saw Bob Parks article on the North Pacific Parasite boost/glider. Seconds later I had an IDEA! That night I came up with a modified version of the Bob Parks B/G which could carry 8, yes eight, separate gliders. I am now submitting a rough draft of an addition to the B/G rules to the NAR Contest Board. Under these rules a Parasite B/G vehicle would carry at least 2 and not more than 6 gliders. This would allow the MPC Lunar Patrol, Centuri Super Swift (**MRm**, February 1970) and other kit and home designed parasite gliders to be used in competition.

There would be competition in all Parasite categories from Hornet to Condor, with the size and weight of each parasite glider to be governed by the class. When I have completed the project I will let you know the results. Hopefully we can add a new competition event to the NAR.

Robert Kiefer
Belleville, Ill.

A parasite B/G event sounds like an interesting idea. How about a set of rules where the number of parasites is fixed (at two or four) and the contestant's score is the sum of the times of all of the individual parasites. The winner being the contestant with the highest total score. Let's see, you add two more parasites to the MPC Lunar Patrol, add B engine, and the total duration should be over 3 minutes.

— GJF

Light Flashers

In the September 1969 issue of **Model Rocketry**, I found an article describing a very useful device called a "Transistorized Tracking Light" designed by Forrest Mims. Being an average rocketeer, I decided to build the flasher during the summer of 1970.

My budget went reasonably down from the cost of materials, but I'm telling you it was worth it. Finally, from all the painstaking soldering, the glue all over my clothes, etc., my construction was completed. The light flasher

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itself weighed seven ounces (gulp!), and the booster fully loaded and with the light flasher in place weighed 13 ounces. But it was a beauty, with five totally successful flights. I can still see the sky being lit up by my light flasher.

Marty Coghlan
Philadelphia, Pa.

Plans for the above mentioned light flasher were published in the September 1969 issue of **Model Rocketry.** *A limited supply of that issue is still available from our Back Issues Dept. (Box 214, Boston, Mass. 02123) at $0.75 each.*

B/G Construction Skill

In the December 1970 "Letters" column you printed a letter saying that boost/glide construction was extremely horrible. I cannot agree more! Model rocketry has a very good safety record. B/G's going wild and disintegrating all over the sky is not going to improve the safety record of model rocketry. Article 14 of the NAR Safety Code says that unproven designs should be tested in complete isolation. Rocket meets are not "in isolation." Rocket meets are, I feel, meant to show skill in the use of pre-tested designs.

Stephen Maire
Westwood, Mass.

Closed-Breech Launchers

While reading a "Letter to the Editor" on closed-breech launchers in the December '70 issue of **Model Rocketry**, an idea dawned on me on how to solve the whole mess of breech launchers being used in contests. I think a new contest should be flown for closed-breech launched models only. This would be an event in which a standard rocket, such as an Astron Alpha, is flown with a standard engine. All the rockets would weigh the same, and the altitude achieved would be based on the construction techniques of the launcher itself.

Tom Wikle
Tempe, Arizona

SOUTHWESTERN CONFERENCE SCHEDULED JULY 28-31

The Southwestern Model Rocketry Conference will be held on July 28-31, 1971, at Eastern New Mexico University. The three-and-a-half days of activities will include several new features for the conference involving speakers from the Los Alamos Scientific Laboratories and from the Manned Spacecraft Center in Houston, Texas.

In addition the conference will feature displays and films from NASA, company representatives, flight competition, R&D talks plus many, many other activities.

The entry fee will be around $25 and will include all meals, housing, and campus expenses. Write today for more information to:

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

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

PAR-II – April 3-4, 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 West Covina Recreation and Parks Department. Events: Scale, Super Scale, Class 0 PD, Class 0 Streamer Duration, Sparrow B/G, Hornet B/G, PeeWee Payload, Robin Eggloft, and Class 0 Drag Efficiency. Site: Galster Park, West Covina, CA. Contact: Norm Wood, 1444 W. Garvey Ave., West Covina, CA 91791.

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

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

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

Mail notices of your contests at least 90 days in advance for listing in Model Rocketry's "Modroc Calendar":
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Canadian Convention – July 2-4 1971. Second National Canadian Model Rocket Convention, sponsored by Montreal's ARRA club, and open to all rocketeers. Discussion groups, films, speakers, competition and a banquet. Full information from: Atmospheric Rocket Research Association, 7248 2nd Avenue, Montreal 329, Quebec, Canada.

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

Blackhawk Regional II – June 19, 1971. Regional competition sponsored by the Black Hawk 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, Class II PD, Class I Streamer Duration, and Pigeon Eggloft. Contact: Glenn Scherer, Jr., 1427 Seventh Ave., Rock Island, Ill., 61201.

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

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

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

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

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

FROM THE

LAUNCHING PAD

The first entries in **Model Rocketry's** "Winter Contest" are now coming in. Many of them are, as expected, from clubs in the far Northern United States, where the winter is typically quite cold. But none of these clubs or individuals seem to have waited for a really cold day and then gone out and launched. The temperatures they are reporting, in the 5° to 25° range, are normal daytime temperatures in their areas.

It seems that my comment of last month that we might have to come up with another contest in which our Southern readers would have a chance was quite misdirected. Early January brought a cold wave to the South, and thus far the best entry in the "Winter Contest" comes from a rocketeer in New Mexico who managed a launch in -17° temperature.

There are still a few more days remaining in the Winter. If you manage a really cold spell in your town, don't forget that **Model Rocketry** is offering a 1/100th scale Saturn V kit to the club or individual who launches in the coldest temperature this winter.

While we're on the subject of winter launching, there was an item of interest in the latest issue of *Starburst* – newsletter of Pittsburgh's Steel City NAR Section. Commenting on attendance at their own launches this winter, Steel City reports:

"There was a launch scheduled for December 20 at Hampton Field. Careful scientific observation has shown that the attendance at our launches follows this equation, known as Crafton's Excuse Equation:

$$A = (T/W)S - V$$

"This equation shows that the attendance (A) is proportional to the temperature (T). The colder it gets, the fewer people show up. Attendance is inversely proportional to the wind speed (W). It is also directly proportional to S, where S is the number of rockets Danny Sternglass has built in the last month. (He is one of the few members of the club who is actively building during the winter.) V is the quality of the television programming on the afternoon of the launch.

"As an example of the use of this equation, let us calculate the attendance at the December launch. The temperature was about 25 degrees, the wind was 20 miles per hour, Danny had 3 new rockets, and there was a good football game, a bad movie, and a panel discussion on putting Christ back in Xmas on the television. Let's rate the TV at 1 for the football game, 0.5 for the old flick, and 0 for the panel show. Solving the equation yields a value of 2.25 for the attendance. I guess that panel show must have been worth a quarter of a point. Only two

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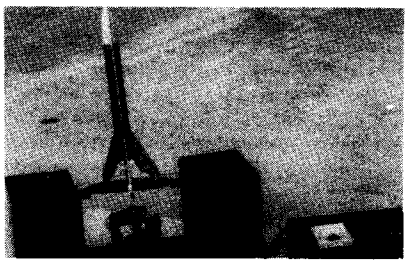

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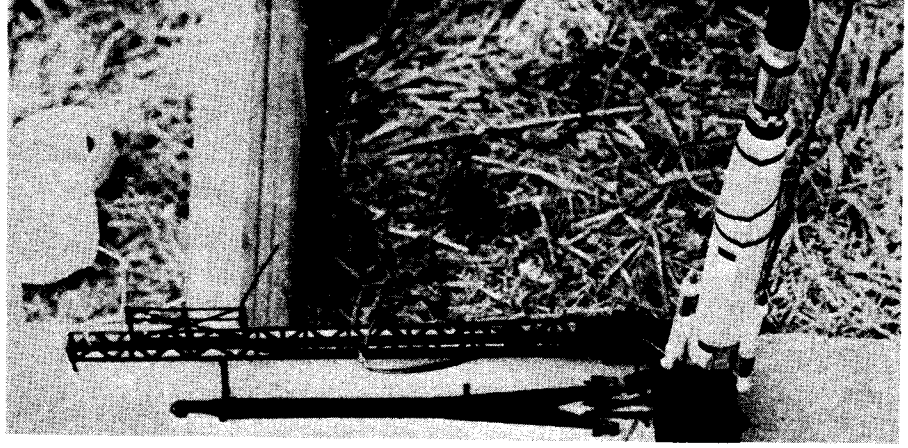
people showed up at the December launch!"

We hope this "scientific" explanation will not show up as an R&D report at NARAM-13!

This month we have an article on the use of Plastruct structural shapes – I beams, T beams, pipes, etc. – in the construction of a scale model launch complex. The Plastruct material, originally fabricated for use by architects and designers in construction of building models, has now been introduced to the hobby market. As Jon Randolph and Bill Allen point out in their article, fabrication of your launcher from Plastruct eliminates the need for expensive metal-working tools or multiple sanding and filling coats should you use metal or wood parts.

From my observations at NARAM last year, most of the Space Systems launchers were still being constructed from wood. Even after five to seven coats of filler, you could still see wood grain on many of these models! Since the prototype launchers were metal, this grain *detracted from the scale points* awarded to these models. By using a plastic material, such as Plastruct, this grain is eliminated.



Alan Stolzenberg's TAD launcher entered at NARAM-12. This launcher was constructed entirely from Plastruct structural shapes, and required only a single coat of paint to get a metal-like finish.

At least one NARAM launcher last year was built from Plastruct – the TAD launcher entered by Alan Stolzenberg of the Steel City Section. Though this launcher was put together at the last minute, it took only one or two coats of black paint to give a scale-like finish.

Just about everything in the model rocket hobby is invented, then reinvented by someone else, then reinvented again by another rocketeer. In fact, for almost every article we print on some novel concept, such as underwater launching or flight conversion of a particular plastic kit, we get ten or twenty letters from other rocketeers complaining that "I invented it first!"

So when Tom Milkie walked in with the plans for his "whistle rocket" described in this month's *Escape Tower* we tried a literature search. There's nothing in Stine's **Handbook** or any previous magazine articles referencing a "whistle rocket." But we continued the search . . . and found a previous reference. In our own files of articles submitted we discovered plans for a "whistle rocket" entered in our monthly *Reader Design* contest about a year ago. The entry, submitted by John Richardson of LaPuento, California, is not too different from the one described by Tom in his article. John's model uses two whistles attached near the nose, as well as "whistle holes" in the model's spin fins to produce a high pitched sound.

Next time you get that "I invented it" feeling, check through all of the available literature. You may save quite a bit of time if you find someone else's research which duplicates what you already have in mind.

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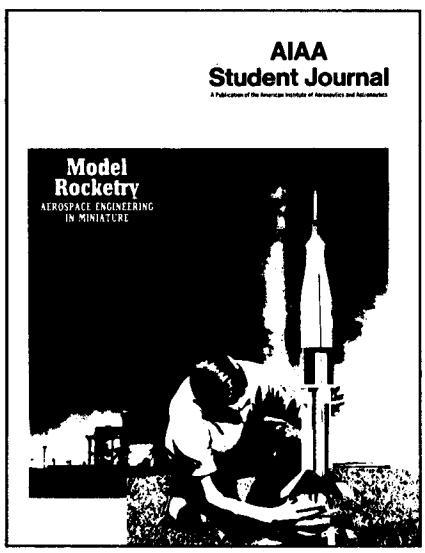

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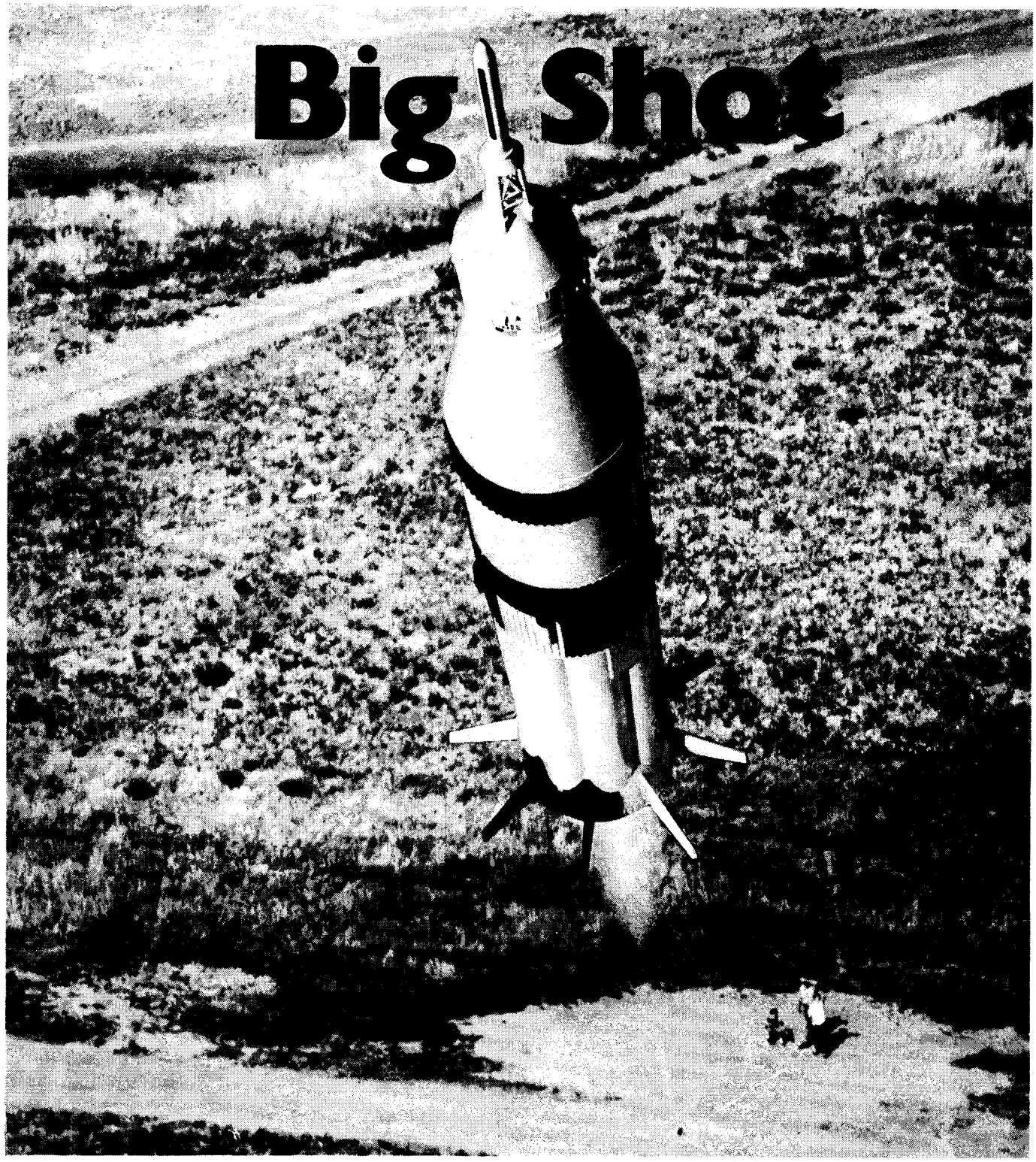

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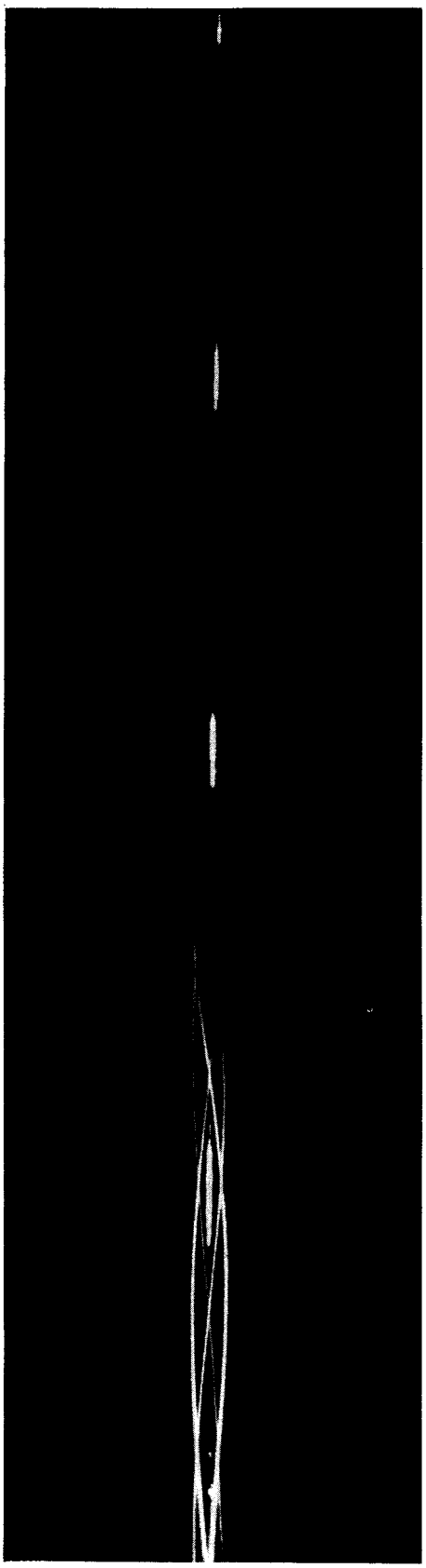


The "FIREFLY" sets up a fantastic light pattern during a night launch. This model had spin fins, as can be seen from the crisscrossed engine tracks. The blinking flasher light can also be seen on the centerline.

A MODEL ROCKET DESIGNED SPECIALLY FOR NIGHT FLYING, AND EMPLOYING A SPECIAL "BLINKING BEACON" PAYLOAD FOR TRACKING AND PHOTOGRAPHY.

THE FIREFLY

BY JOHN RUPKALVIS

Bright golden sparks and a flashing light arching into the night sky mark the path of the *Firefly,* the illuminated rocket. This vehicle, which transmits a visible signal for recovery location, is a beautiful sight to behold in flight, day or night. Painted fluorescent red-orange and white with black lettering decal, and ejecting smoke from up to five powerful engines while flashing its beacon, it is highly visible any time of the day, twilight, or night.

Construction

Construction techniques are similar to normal practice with the exception that somewhat stronger glue joints are required in the tail section. It is recommended that a high strength adhesive such as Elmer's Heavy Grip be used to attach the fins and outboard motor housings. Reinforcing the fairings with nylon cloth or mylar plastic can be helpful.

While normal design practice aims for light weight as a prime requisite, the unusual weight (by model rocket standards) of this payload requires strength in construction and higher thrust propulsion units (i.e., the brute force technology). Care in construction and balancing results in a graceful bird capable of good performance. The outrigger mounting of the four B14-5 engines makes for a flight stability seldom realized in either single or multi engine craft. But be sure to use a reliable cluster ignition system such as an on-the-pad relay unit and 12 volt auto battery. If one of those outboard engines fails to ignite the trajectory will be quite spectacular. They are mounted in normal BT-20 body tubes with open ends to allow passage of the gasses from the ejection charge. This charge is not used to actuate recovery devices, since the recovery charge in the C6-5 center engine serves that function. Instead it is utilized as a retro-rocket, to slow the ship down so that it reaches the apex of its trajectory earlier. Then the C6-5 ejection charge fires actuating the recovery system. This makes for less force on the shock cord and parachute lines when the chute is deployed. It is also more gentle on the fragile glass lamp. The firing of these "retros" is easily seen from the ground, and very dramatic.

Electronic Payload

The lamp is a No. 406 GE or Bright Star lantern flasher lamp, designed to operate on 3 volts DC. When warmed up it blinks on and off – thus the name *Firefly*. Since it takes a few seconds to warm the filament before the thermal contact will open, the lamp should be turned on before the ten second countdown is

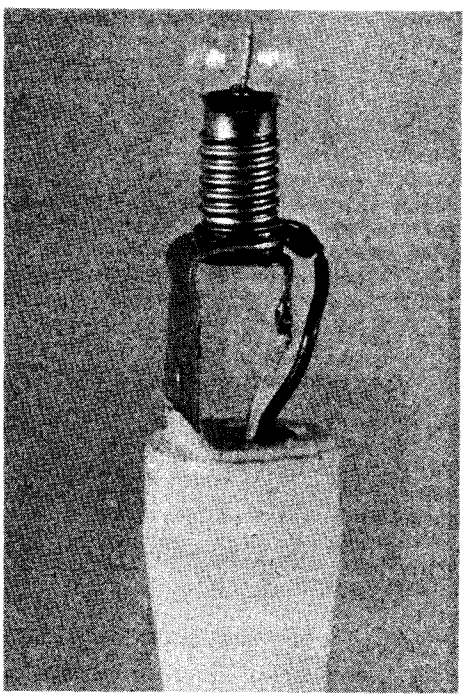


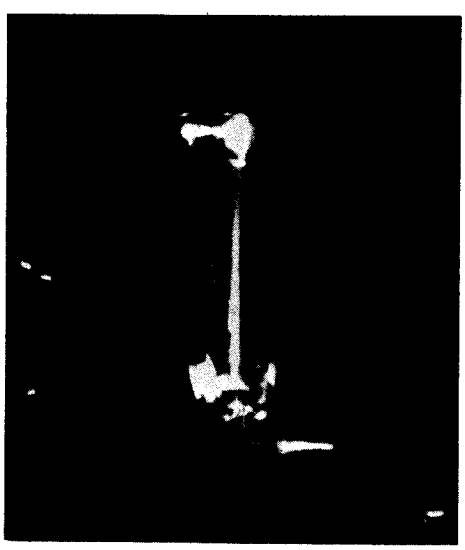
Figure 1: ASSEMBLED ELECTRONIC PAYLOAD. The lamp is located in a clear plastic payload section. The lamp mounting bracket is bent into a "U" shape.

started. The batteries may be the conventional penlight AA cell type, or rechargeable penlights such as the GE penlight AA cell. Actually the rechargeable batteries offer three advantages: 1) they are lighter in weight; 2) they won't corrode if left in the rocket; 3) and with the addition of two alligator clip leads to the charger they may be recharged without removing them from the rocket body. Thus they may be mounted permanently in the body tube if desired. The GE 406 lamp is available from Lectronix (Box 42, Madison Heights, Mich. 48071) at $.50 each or 3 for $1.00 postpaid. The mounting bracket is bent into a "U" shape and is glued directly to the the plans. It is glued directly to the tapered balsa adapter (Estes No. 651-TA-2050A) with Elmer's Heavy Grip. (The Heavy Grip adhesive should not be confused with Elmer's White Glue which is not nearly as strong.)

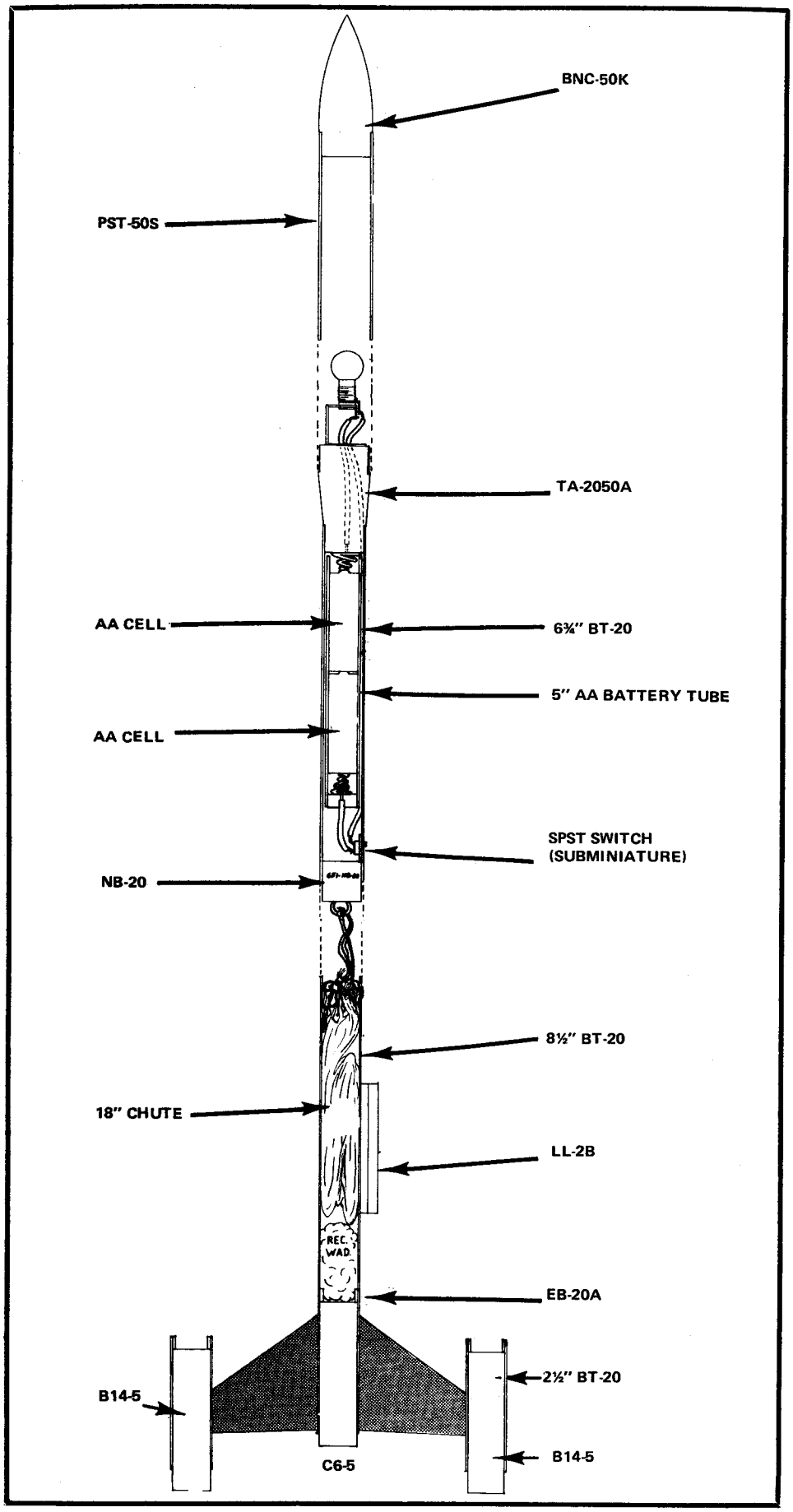
The SPST sub-miniature on-off switch shown on the plans should be checked carefully and tested before installation. Many of the switches tried do not make sufficiently positive contact to withstand the acceleration of the rocket while remaining in the on position. (An alternative design is to eliminate the switch entirely, turning the lamp on by screwing it into its socket.) While less convenient, it does away with the reliability problem and makes for a cleaner exterior design on the body of the rocket. Springs for battery contacts may be obtained from a battery holder, an old flashlight, or by winding copper wire around a cone shaped object such as the end of a large pencil. Although solder is heavy, no skimping should be made on the solder joints. Cold solder joints will never stand the force of acceleration.

All of the non-electrical parts shown on the drawing are Estes with the exception of the 5" of AA cell Battery Tube, available from radio supply houses, located INSIDE the 6¾" BT-20 Estes body tube in the center section. This tube was chosen as a battery holder since its I.D. is the same as the O.D. of a normal penlight battery. Naturally, the PST-50S body tube is clear plastic so that the light will shine through.

The *Firefly* can be flown with only a C6-3 in the center tube. In this case the outside tubes



The "Firefly" sits on the pad in preparation for launch. Photos of the launch site can be taken using the payload beacon as the only light source.



act as passive aerodynamic stabilizers. Tapering only one side of each fin edge or slanting each fin *very* slightly askew (all in either clockwise or counterclockwise direction viewed from the end) will impart a spin to the rocket that results in very interesting exhaust patterns.

Variations in the color of the light can be made either by dipping the bulb in transparent bulb lacquer (blue and amber flashbulb coating lacquer available at photographic supply houses, other colors for coloring instrument pilot lights are available at auto supply stores and electronic supply outlets) or by placing a tube of rolled colored cellophane or plastic inside the clear plastic payload body tube.

Assembly of non-load bearing parts may be made conventionally with white glue or cement. After sanding, the entire rocket except the clear section is painted with white model airplane dope. When dry, areas that are to remain white are masked off with masking tape. The contrasting color, a fluorescent aerosol dope such as Krylon No. 3102A is sprayed on. The word "Firefly" can be added using 3/8" high letters applied vertically such as Studio Micro Scale Decals No. 72-34 (black). A coating of clear protector such as SIG Decal Proofer is applied as a final coating.

Powered by the recommended five engines (the center engine is a C6-5 and the outriggers are B14-5) this model is capable of flights to 1,000 feet. It is recommended that high reliability igniters be used since all engines *must* fir simultaneously. The engines are all installed snugly in their tubes and the igniters wired together in *parallel.* A launching circuit with both a safety key and a separate firing switch is wired to a 12 volt automobile battery, a necessity for the high instantaneous current surge needed to heat the igniters to the same temperature at the same time.

The *Firefly* is only the beginning. Imaginative model rocketeers will no doubt come up with variations for the future. Night model rocketry is fun!

New Product Notes

A new source of instrumentation will open to the science-minded model rocketeer as Estes Industries introduces its ROCKETRONICS System, a versatile product line featuring precision, yet modestly-priced electronic components. "Our ROCKETRONICS System will add a new dimension to model rocketry and offer many exciting possibilities to the youngster who wants more when flying his bird," says President Vernon Estes. "Starting with a basic unit, the rocketeer will be able to add the components that best suit his needs and which literally become an integral part of the flight as his rocket streaks upward, sending data back to its very own 'Mission Control' on the ground."

The basic unit in the Estes ROCKETRONICS System is the TRANSROC, a four-inch long transmitter that fits neatly into a BT-50 body tube – the most popular body tube size on the market – or can be easily adapted to larger rockets. Powered by a 15-volt battery with a life of over 24 hours, this transmitter sends back an intermittent beep that can be picked up by standard walkie-talkies or other receivers set to Channel 14 of the 27 megahertz (megacycle) Citizen Band. No FCC license is required to operate the lightweight TRANSROC (0.6 ounces without the battery), which has an effective range of over one mile.

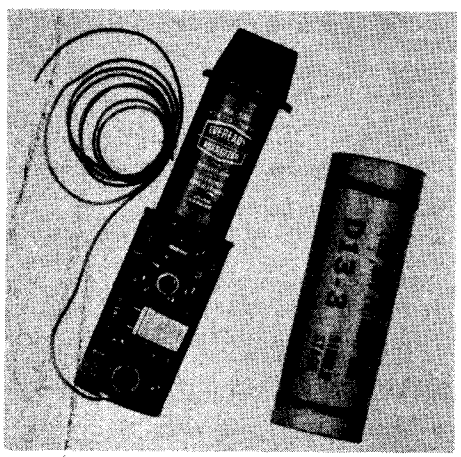
"Used by itself," explains President Estes, "the TRANSROC is just the thing to help the rocketeer find his model in a patch of tall weeds. It's also great for basic demonstrations of radio broadcast techniques. But that's only the first step into the exciting world of Estes ROCKETRONICS." Once he has become familiar with his TRANSROC, the model rocketeer has a choice of Estes components that will make his transmitter much more valuable. He can, for instance, add a microphone unit that will let him hear and record all the sounds from on board the rocket: countdown, lift-off, stage separation, wind noises, and parachute ejection. With a Roll Rate Sensor, he can study spin rate. And the soon to be available Telemetry Module will enable him to receive and analyze such important data as temperature, acceleration, velocity, altitude, etc. In addition, he can design his own telemetry attachments to monitor these and other functions.

"If the rocketeer wants a truly realistic flight," says Vern Estes, "all he has to do is to launch his TRANSROC with the Estes CINEROC – and produce a thrilling sound, color motion picture as the rocket zooms skyward." The TRANSROC kit (Cat. No. TX-1) will come complete with crystal and trailing wire antenna and will retail for $14.95, battery not included. The recommended battery (Eveready #504, Cat. No. PFB-15) sells for $1.50.

Upon request, Estes Industries will send, free of charge, a complete listing of the new ROCKETRONICS line, including extra and replacement parts, crystals, accessories packages and modules, receivers, etc. Write to Estes, Dept. 31-B, Penrose, Colorado 81240 and ask for the ROCKETRONICS catalog.

Also new from Estes Industries is the new A-20 Demon, designed for high altitude experimentation or just fun flying. Styled along the lines of a NASA research type space vehicle, the 26½-inch long A-20 Demon was designed by Wayne Kellner, of the Estes R&D staff, and is normally flown with a "D" engine, although it can also use less powerful engines when fitted with an EM-2050 adapter. The science-minded rocketeer will find the A-20 Demon's payload section ideal for high altitude experimentation, while the youngster who likes to fly his "bird" strictly for the fun of it will be equally pleased with the rocket's performance. In-flight tracking and parachute recovery of the A-20 Demon is a snap, thanks to the bright silver press-on trim that makes the rocket highly visible in the sky. Placed around the payload section, the foil acts as a flashing beacon as it reflects the sun's light. An impressive addition to the more than 50 model rocket kits offered by Estes, the A-20 Demon (Cat. No. K-58) retails for $3.95, not including engines.

Lectronix (Box 42, Madison Heights, Mich. 48071) has introduced the first complete model rocket light flasher and payload section. The complete Blinky Flasher with Payload Capsule Assembly (kit PC3A) features a transistorized light flasher including printed circuit board, plastic nose cone, and battery compartment. The unit can operate on 3 to 4½ volts. The complete kit is available for $4.50. For a limited time, Lectronix will include as a bonu a free 1/144 scale AMT Saturn V plastic kit.



The new Estes "TRANSROC" model rocket beacon transmitter is shown next to a D-engine to indicate size. The "TRANSROC" fits in a BT-50 payload tube and weighs only 0.6 ounces (without batteries).

The "A-20 Demon" is a new kit from Estes Industries. The model features a highly reflecting trim on the upper section for tracking ease.

Flying the Monogram

SATURN-V

BY E. V. BLAIZE JR.

At one time or another, we all have the urge to experiment. The only problem is, my urge is permanent! One day a flashy box caught my eye at the old hobby shop. "Saturn V," its cover announced. No, it wasn't by Centuri or Estes, these kits weren't out yet. Monogram was the name. Plastic kit . . . Hmmmm . . . very interesting. Looks big enough. The temptation was too great, so I hurriedly laid my money down, tucked the box under my arm, and drove home with visions of fire, smoke and blossoming parachutes filling my head. After a careful survey of the kit a hasty trip was made back to Ye Olde Hobby Shoppe, wherein I purchased various goodies to solidify the whole scheme. A raid on my vast collection of tubes, nose cones, balsa and other assorted model rocket gear yielded the necessary remaining parts.

"What? You're not building a rocket again?" was the protest from my wife. Excuses and answers followed. You kids in this hobby are lucky! When I can con her into attending a launch, she is my chief launch officer, and sometime button pusher.

Stability Factors

The main problems with non-flying plastic kits are twofold. First, the fin size of most scale rockets is woefully inadequate. Second, they are *HEAVY!* More weight means that more push is needed to get the darn thing off the pad. Generally the weight distribution in plastic birds is all wrong. They are like gas model airplanes without the engine – grossly tail-heavy. Unlike their aircraft counterparts, however, the situation is aggravated by the addition of more weight to the tail in the form of rocket motors. All of this must be compensated for by added fin area or added noseweight to keep the center of gravity ahead of the center of pressure.

Most "scale" models look ridiculous with very large fins. Thus some happy medium must be struck between reasonable fin size, and not too much added nose weight.

There are numerous methods of designing rockets. I have found one that is 98% efficient. This being the method treated by Jim Barrowman in Centuri Technical Report TIR-33. Follow the instructions carefully and you too can be the "field expert" where you fly! The fin size in this case was arbitrarily selected, then Barrowman's method used to find where the CG would have to be. Weight was added to the nose until a satisfactory CG was obtained. Then the Estes "string test" was made as outlined in Estes Technical Report TR-1. Stability was excellent, and this was borne out in later flight tests.

Construction

In addition to the Monogram kit, you will need the following materials:

- one Estes BT-60 Body tube.
- three Estes BT-20J Body tubes.
- three Estes EH-2 Engine holders.
- one Estes NB-60 Nose block.
- two Estes PL-1 Payload weights.
- two Estes PK-24 Parachute kits.
- one Estes PK-18 Parachute kit.
- three feet Pirelli ¼" Contest rubber, or other suitable shock cord.
- one Estes AR20-60 or AR50-60 Adapter ring.
- one sheet of stiff paper for shock cord anchors.
- one sheet 1/16" white styrene plastic stock. (This is usually available at model railroad supply centers, and comes in about 4" X 8" sheets.)
- one tube plastic cement (Tube type, don't use the stuff that comes in the bottle.)

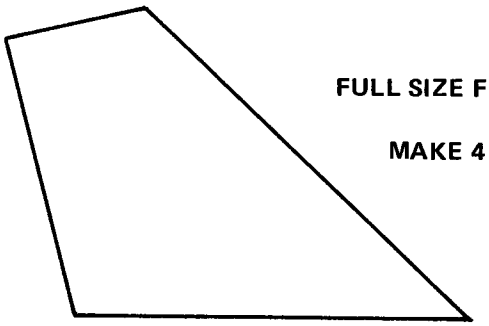
White glue, paint, modeling knife, sandpaper, medium size coarse half-round file, a pair of machinist's dividers or a common school compass, and a soldering iron. (If you own a Dremel hand grinder and a few cutters, this will take the place of the soldering iron and the file.)

Everything at hand, construction may begin. First, take the tail shroud (Part 5, Fig. 1 in the Monogram kit instructions) and cut a hole as indicated in the drawing to clear a BT-60 tube. The procedure is as follows. Find the center of the solid bulkhead on the top of the tail shroud. Scribe a circle the same diameter as the BT-60 tube on this bulkhead, using the dividers or compass. Then start the hole with the soldering iron, melting out a more or less round hole to within 1/8" of the scribe mark. A Dremel tool will perform this operation nicely instead if you can beg or borrow one.

The assembly instructions supplied with the kit should then be followed *EXCEPT* as outlined below:

Fig. 1 – Omit fins supplied.
Fig. 2 – Omit all steps.
Fig. 3 – Omit part 9, step 6.
Fig. 5 – Omit parts 12 and 16.
Fig. 6 – Omit all steps.
Fig. 8 – Omit parts 21, 22, 24 and 26.
Fig. 9 – Glue the LM covers together.
Fig. 10 – Omit the LM entirely.

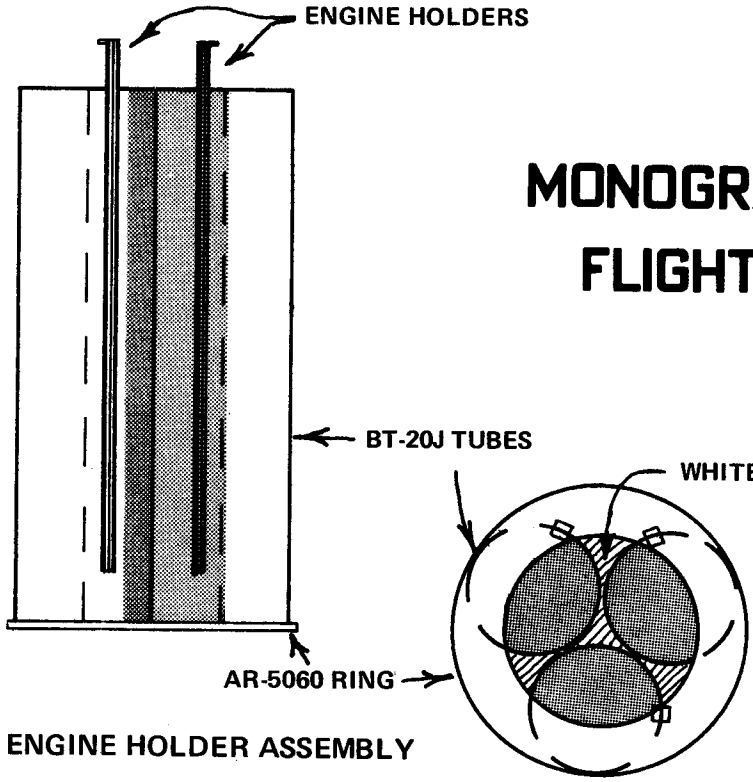
The author with his converted Monogram Saturn-V. This model can be converted to fly with either a cluster of three C-engines or a single Estes D-engine. The performance is quite impressive, though the conversion is relatively simple.



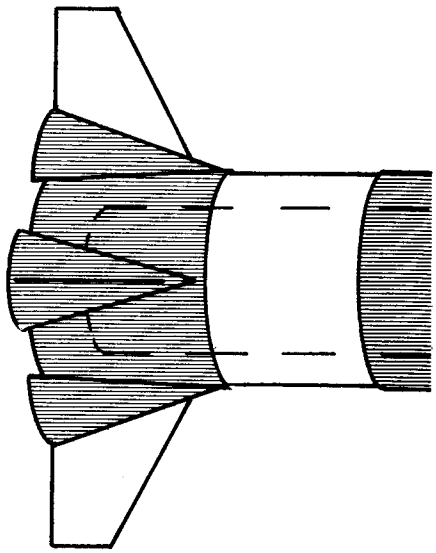
FULL SIZE FIN PATTERN

MAKE 4 FROM 1/16" WHITE STYRENE

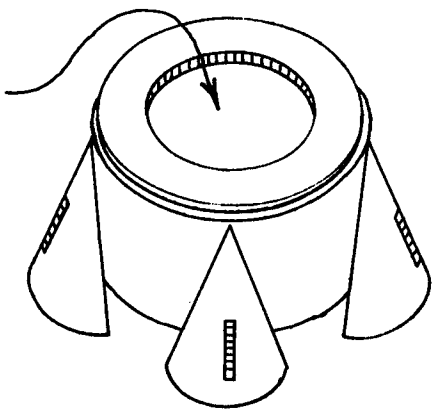
MONOGRAM SATURN V FLIGHT CONVERSION



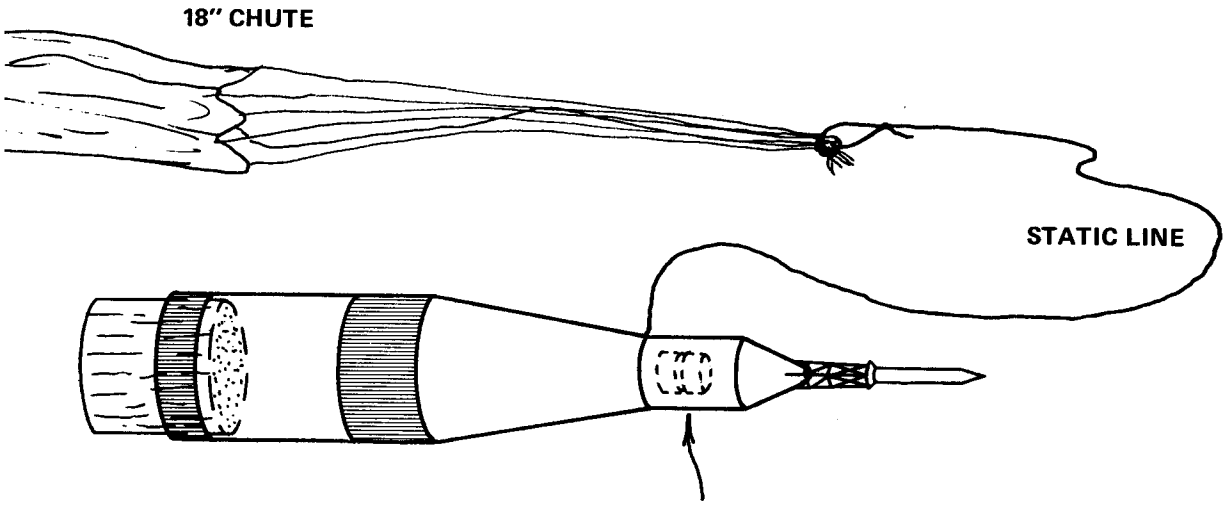
ENGINE HOLDER ASSEMBLY

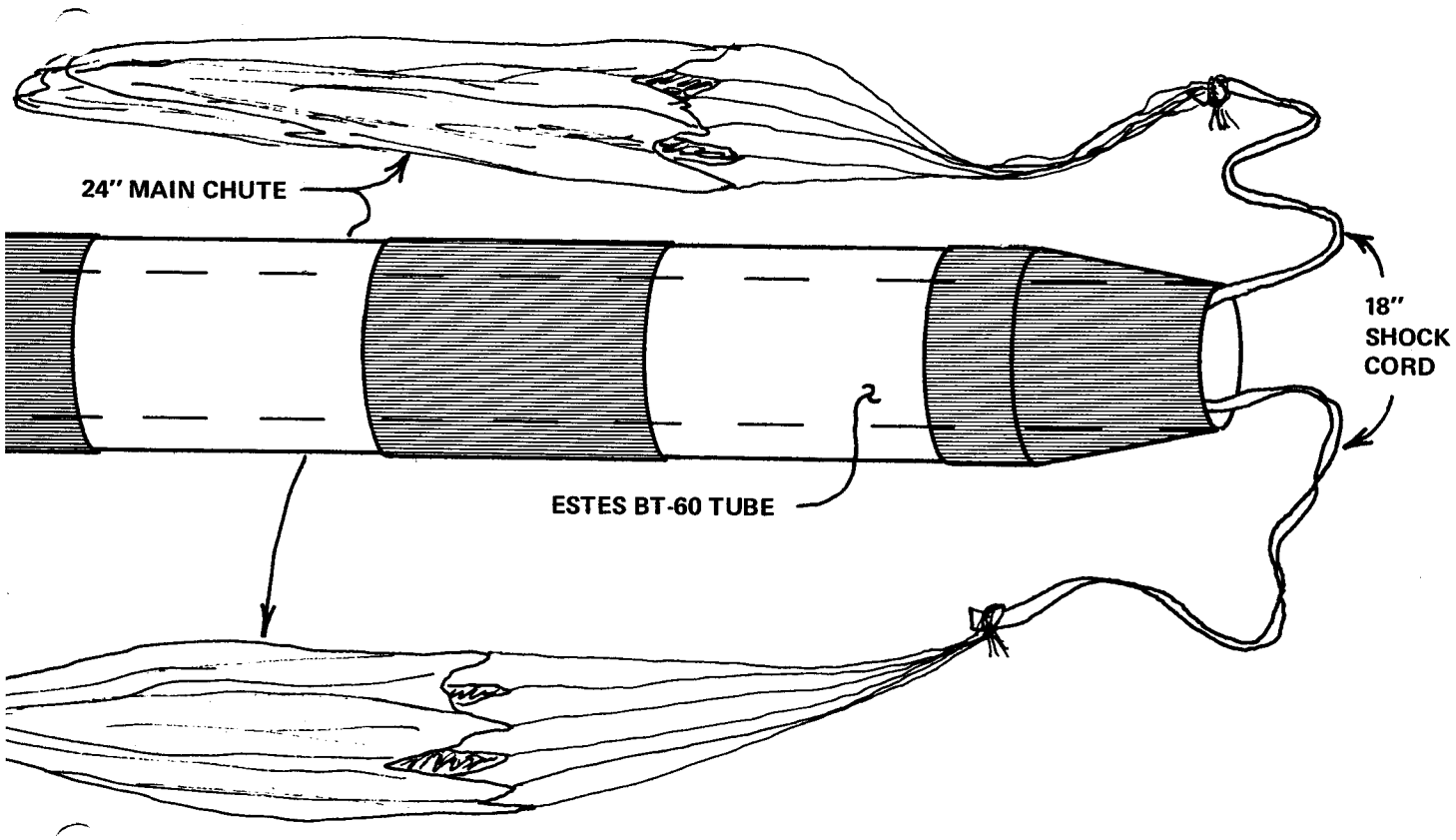


MAKE HOLE FOR
BT-60 TUBE



PLASTIC BASE ASSEMBLY





DESIGNED BY E. BLAIZE JR.
DRAWN BY R. SINGER 2-2-71

Fig. 11 – Omit part 35. Before cementing parts together, place the two NAR payload weights inside the service module and cement in. Cement the service module assembly to the top of the LM covers.

Fig. 12 – Omit the entire Apollo capsule.

Fig. 13 – Cement this assembly to the top of the service module.

Cut off the locking lugs as well as the flanges from the bottom of the 3rd stage (Fig. 8). This will allow you to push the NB-60 nose block into the bottom of this stage and glue it in.

Install the shock cords in the BT-60 tube as per drawing, using the tube slitting method or the paper anchor method.

Build the engine holder assembly as shown in the drawing. When this is dry, glue into the rear end of the BT-60 stuffer tube, making sure the ends of the engine tubes are even with the end of the BT-60 tube. If you prefer, an Estes D-engine mount can be substituted for the cluster unit.

When this entire stuffer tube assembly is dry, slide through the hole made previously in the rear shroud, until the upper end of the stuffer tube is *even* with the end of the upper shroud on the main body.

Make two standoffs 3/16" high, and 1" long, out of the same material as the fins. Glue 1" launch lugs to these and these assemblies in turn to the rocket. Be careful to line the launch lugs up between two of the fins or you may have trouble getting the bird on the launcher!

The model was finished and decals applied in the usual way. (USE ENAMEL, don't use dope on plastics!)

Flying

The only engines recommended are C6-3's or C6-5's. The C6-5's will give higher flights, but at the risk of a crash if only two engines ignite. As with any cluster system, use a reliable launch system. (If you built the model fc single D-power, use a D13-3.)

Two 24" parachutes were used on the main body while an 18" or 24" chute was used on the nosecone assembly. A static line should be attached to the nosecone assembly, as indicated in the plans, to prevent damage to the escape tower and rocket atop the command module.

My model has turned in some very nice flights. But remember, the all up on the pad weight of this Saturn is a whopping 15 ozs! Make *SURE* your cluster and launch system are "go" *before* you launch.

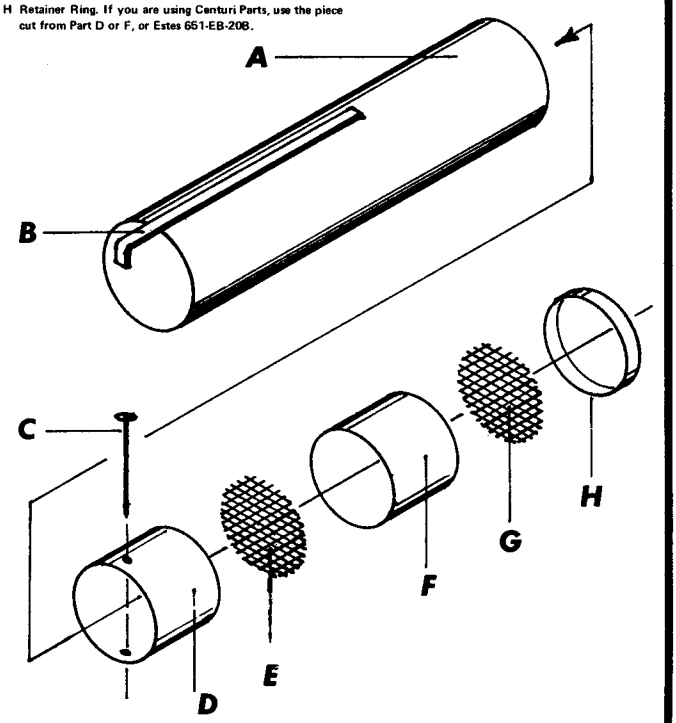
Ejection Heat Sink

by Gerry Stephens

After designing the *Sport* demo model, which required no ejection wadding to protect the chute, I found myself on occasion forgetting to put wadding in my other birds. Needless to say, those chutes didn't get very good mileage. The *Sport* incorporated a unique ejection system which routed the HOT ejection charge around the chute compartment and, as a result, required no wadding for protection. (See **Model Rocketry**, June 1970, page 18 for complete plans for the *Sport*).

PARTS LIST

A Engine Tube. Centuri ST-76 or Estes BT-20 cut 4½ inches long.
B Engine Lock. Centuri EL-1 or Estes 701 EH-2.
C Wad Catcher. Straight pin cut flush with part D.
D Spacer. Centuri HTC-7A (Cut to 3/4 inch) or Estes 651 JT 20C.
E Screen: Fabricate from window screen, see text.
F Spacer. Same as Part D.
G Screen. Same as Part E.
H Retainer Ring. If you are using Centuri Parts, use the piece cut from Part D or F, or Estes 651-EB-20B.



Since the *Sport* was designed, a commercial baffle has been introduced. This system is incorporated in several of Centuri's model rocket kits, and is available separately for use in rockets of your own design. The Centuri Baffle System is presently available for their Series 13, 16, and 20 body tubes ONLY.

The *"Ejection Heat-Sink"* presented here can be used in any size body tube, including the engine-size tubes such as Centuri ST-76, Estes BT-20, or MPC T-20. Basically, the Heat-Sink elements are installed immediately ahead of the engine. (See the diagram and Parts List for details.)

When the ejection charge fires, the paper cap is expelled, and stopped by the Catcher (Part C).

The cap bends in the middle and allows the ejection gasses to pass or the first Heat-Sink Screen (Part E). After passing through the first and second Heat-Sink Screens, the gasses pressurize the chute compartment and "blow" the nosecone as usual. The Heat-Sink Screens serve two very important functions. First, they tend to capture any burning pieces of material expelled in the ejection charge. Second, they absorb a little of the heat generated by the charge. After passing through the Heat-Sink, the ejection charge has been "cooled" and burning particles have been removed.

The first model of this Heat-Sink contained only one screen. It was observed that on occasion, however, slight damage to the chute resulted. The second screen (Part G) was added in all subsequent models, for increased protection.

Construction can be accomplished in one of two ways. The Heat-Sink elements can be installed piece by piece, or the entire unit can be assembled and then installed in the Engine tube. If installation is to be in a rocket which uses an engine-size body tube such as Centuri ST-76 or Estes BT-20, the latter method would be easier.

Install the engine lock (Part B) as usual in the engine tube, extend over the end of the tube about 1/4 inch. This assembly can be put aside for the moment. Push a straight-pin (Part C) through the Spacer (Part D) about 1/8 inch from one end. Glue the pin in place and cut off flush. Next, cut the 2 screens (Parts E and G) about the same O.D. as the spacer. These are made from ordinary copper or aluminum window screen. DON'T USE PLASTIC SCREEN! Remaining assembly of the Ejection Heat-Sink can follow either of the two previously mentioned procedures, referring to the diagram for the proper sequence.

As stated earlier, the Ejection Heat-Sink as shown can be used in larger rocket bodies, or should you desire, the O.D. of the elements can be made larger to fit the larger body tube.

Upon recovery, remove the spent engine from the rocket, and shake out the ejection cap that should be caught on the catcher. The rocket is now ready for re-loading.

Like power steering, once you get used to flying without "waddin you'll wonder why you didn't think of it before. So "KICK" the wadc habit, and install the Ejection Heat-Sink in your Birds.

CLUB CORNER

by Bob Mullane NAR 4157

How to Raise Money for Club Activities Without Really Trying

At one time or another, usually near the beginning of their existence, all clubs discover that one element which is essential to the success of any activity is *money*. Before you can buy equipment, print a newsletter, charter as a NAR section, or even send out post cards announcing a meeting, your club needs money. There are many ways to obtain this money, and we'll try to discuss a few this month.

The most obvious source of funds is from the membership of your club. This is your first source, but cannot remain your only source if you need large amounts of the green stuff (especially if you have a small membership). When the club is young, attempt to estimate what costs you'll have (postage, duplicating, equipment, etc.) and divide it evenly among the members. Of course, you will always continue to collect dues as part of the club's financial support, but you should attempt to obtain money from sources outside the club. But before we look at that, let's see how we can get money from the club's members in an indirect manner.

You can obtain a lot more money from members if they get something in return immediately. Rather than saying "It's for the good of the club," raffle something at meetings and meets if you can. Try to find an object to raffle which is cheap, but still is something everyone would like (engines, kits, food, etc.). If the raffle is held at some activity which is open to the public, let them take chances also, but raffle something they might want (a beginner's kit perhaps). To be worthwhile, the raffle should bring in about twice as much money as the object given away is worth. Your friendly neighborhood hobby dealer might be willing to donate a kit if the raffle is held at a public event, but be sure to thank him (in print if possible) if you want to stay on his good side.

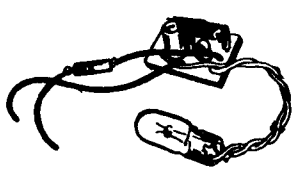
Another money maker is selling things to your members. Just about everyone wants something to drink after spending some time on a hot range. You can get a case of 24 cans of non-name brand soda for about $2. Let's see, at $ .20 a can that raises a lot of money on a hot day. (Make sure the soda is cold and you have an opener if the cans don't have pop tops.) For the cost of ingredients, someone's mom may be convinced to bake some cookies to sell. Or how about a portable grill and selling Hot Dogs? There are many other items which can be sold at meets and meetings; use your imagination. And, remember that anything you sell at public activities also brings money from non-members into the treasury. Again, try to buy everything at a discount and set the price high enough to assure a profit. If your club has a library, you may wish to charge a small fee for the loan of the materials in the library.

Now that we've seen some ways to get money from the members, let's try to find some ways to get money without putting a burden on the membership. If your club is sponsored by some group (such as a YMCA), chances are they will help support the club. Perhaps they can be convinced to finance the cost of your capital equipment – launch racks, panel, etc. This is something that should have been arranged when the club was formed. But if you didn't think of it then, it's not too late to go to your official contact and discuss the club's needs and the sponsoring organization's ability to aid. Another source of direct donations may be civic groups such as Elks, VFW, Boy's Club, etc. If one of your member's father is a member of one of these organizations, he may be a good starting point for checking if they'll help. If you don't have any direct contact, write to these organizations (especially any which you know aid clubs such as yours) asking for an opportunity to come and talk to them about help. Include some information about the club and model rocketry in the letter. If you are granted an interview, send one of your most articulate and best informed members to go and talk about the aid you want. In any such interviews, be specific. Tell them how much money you'll need, how it will be spent, and what *they* will be getting in return. If possible, bring your Senior Advisor along (adults can usually get more from other adults than "little kids" can). If you can't get an organization to sponsor you, don't despair. There are other ways to get money.

Have you considered working for the money? There are many ways you can work to get money for the club, but they involve voluntary slave labor from the membership. If your members really want to help the club, here's the way. One place to start is with your local hobby dealer. One club distributed flyers for their hobby shop in return for money for the treasury. How about a car wash some weekend? Or, do like the Girl Scouts – sell cookies or candy. Three members of the now defunct Mile High Section paid for a 4000 mile round trip to NARAM-5 by selling 30 cases of light bulbs door-to-door. Any of your neighbors need light bulbs? (Make sure you've cleared any such campaigns with the local authorities before you start.)

Are you interested in ecology? An aluminum can company is conducting a clean up drive in some parts of the country and will pay ½¢ a can for any group that wants to help clean up. Doesn't sound like much? Take a look at a highway or park some time and count the cans. At ½¢ a can, you can make a small fortune. This might also get you some publicity – "Rocketry Group Cleans Up." How about a "Rent a Slave" service? Does your club have a mimeograph machine? If so, look around and see who might want copies made. It sounds like a lot of work and time (which could be spent building that super scale) but if you want a good club, you'll have to make the sacrifices.

Now that you have all this money flowing into the club, you're probably looking for something on which to spend it. More on that in future issues. Keep those cards and letters coming in, folks.



BLINKIN' BEACON

Model Rocket Tracking Light

$2.95

SPACE AGE INDUSTRIES

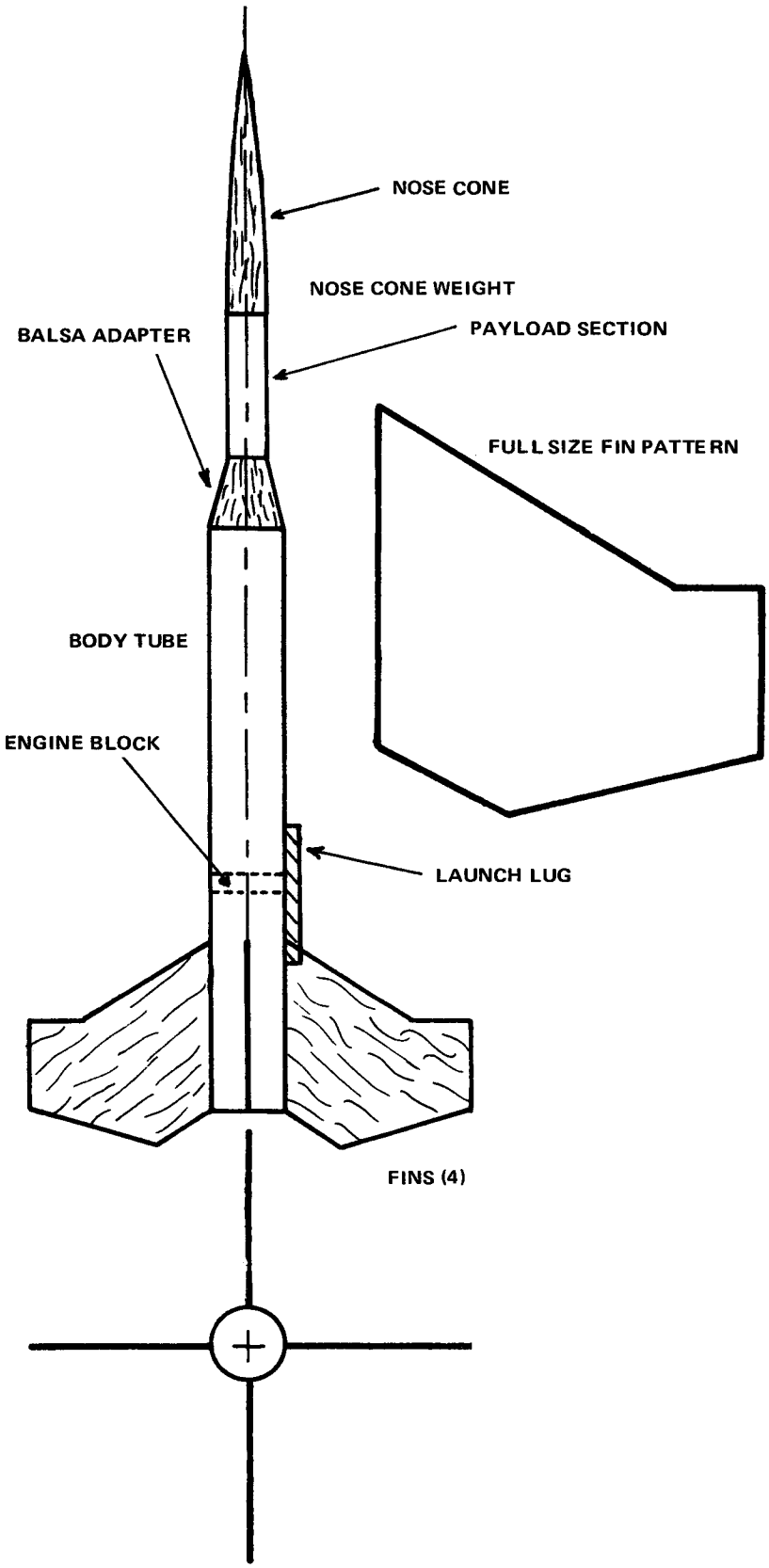
An electronic flasher of very small size that produces a brilliant white light for help in tracking or following the flight of rocket models. Kit includes complete instructions for assembly and using your Blinkin' Beacon.

At your local hobby shop, or by mail from Space Age Industries, 714 Raritan Ave., Highland Park, New Jersey.

Reader Design Page

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



This month's Reader Design is the Moonraker, designed by Carl Warner of Pottstown, Pennsylvania. The Moonraker is at first sight a very simple-looking rocket. It was designed that way. Mainly used for demonstration launchings, the Moonraker gives a very stable and a very high flight, time after time – the four slightly oversized fins providing the high stability.

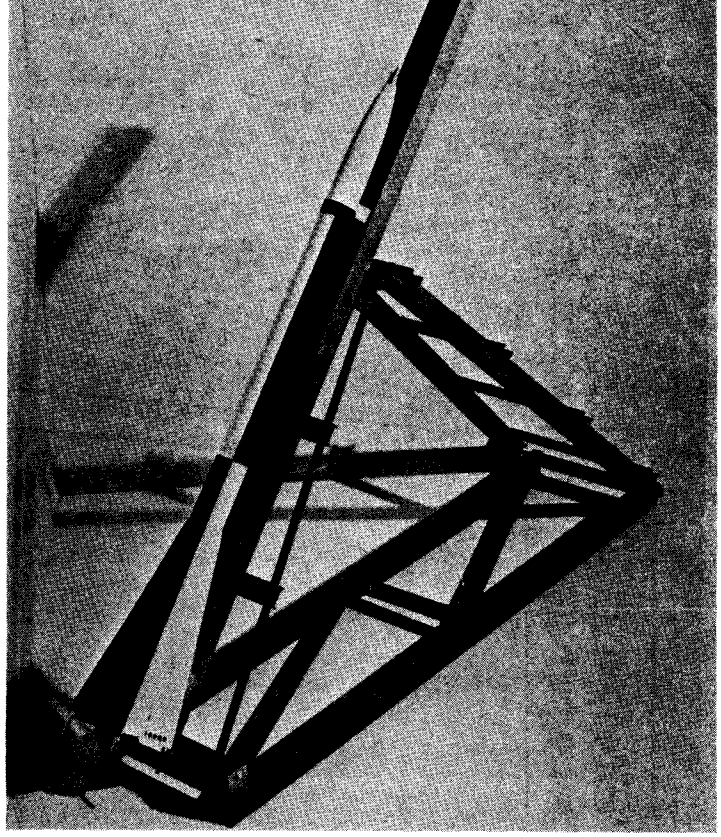
As an added attraction, a small payload section sits aloft the rocket. It may be flown with any "single stage" 18 X 70 mm engine.

PARTS LIST (All Estes)

Nose Cone	651-BNC-5W
Body Tube 6.5"	651-BT-20D
Body Tube 1.5"	651-BT-5P
Launch Lug	651-LL-2B
Parachute	691-PK-8
Balsa Adapter	651-TA-520
Shock Cord	671-SC-1
Engine Block	651-EB-20A
Fins	651-BFS-20
Screw Eye	651-SE-3

(Estes Industries parts numbers.)

COMPLETE CONSTRUCTION DETAILS FOR THE ASP SUPER SCALE LAUNCHER USING PLASTRUCT EASY-TO-WORK-WITH PLASTIC STRUCTURAL COMPONENTS.



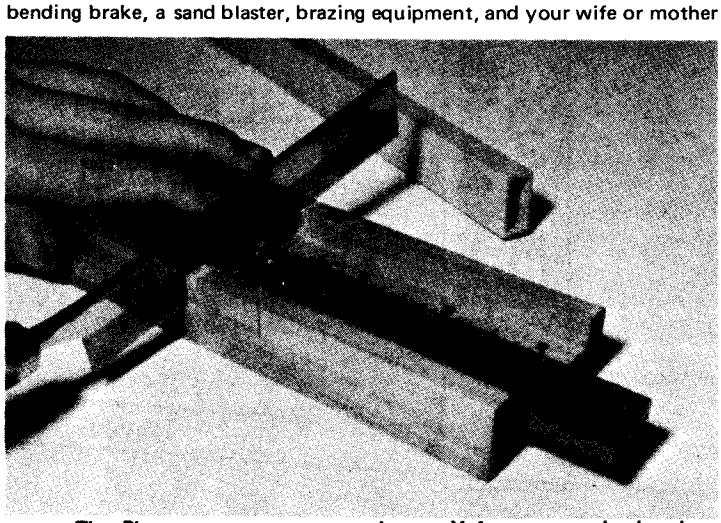
ASP LAUNCHER

BY JON RANDOLPH AND BOB ALLEN

Space Systems . . . those beautiful scale birds sitting on their miniature launchers, making the launch area look like a Cape Kennedy, a White Sands Proving Ground, or a Watlops Island! Far out . . .

Like to build one for the next area or regional meet? A good choice for Space Systems is the ASP, Operation Redwing Configuration. Why? Because (1) data is available (**MRm** May '69), (2) the ASP rocket flies well, and (3) the ASP has a good looking and fairly complex launcher. Assuming you've built several rockets, even kits, you already know the basic construction techniques and materials necessary to build the bird. One word of advice, however, would be to build it the same scale (in this case 1:7.16) as the launcher. But how do you build the launcher?

Since the construction technique depends on the material, let's talk about materials first. Fireproofing is not too important, unless part of the real launcher is perpendicular to the engine nozzle at ignition or you always cluster F-100's in your scale birds. If neither of these conditions are met, you are virtually unlimited in your choice of materials. You can use balsa, spruce, or basswood, all of which require several days of fillercoating and sanding. Or you can use metal as I did on my NARAM-12 winner – assuming, of course, you have a power sheet metal shear, a bending brake, a sand blaster, brazing equipment, and your wife or mother doesn't mind her kitchen looking like a metal shop for a week.



The Plastruct parts are cut using an X-Acto saw and miter box. Don't try to saw too fast or the plastic will heat and you will not get a clean cut.

Are you wondering about all that sanding, or all that sheet metal equipment, and thinking you'd rather not build a Space Systems entry after all? There is another material! Remember that strange new substance that Stine has been talking about for the past year or so? That's right, it's plastic! And it's even available in angles, beams, channels, and tubing: the basic components of most launchers. No sanding, no brazing, and easy to work with.

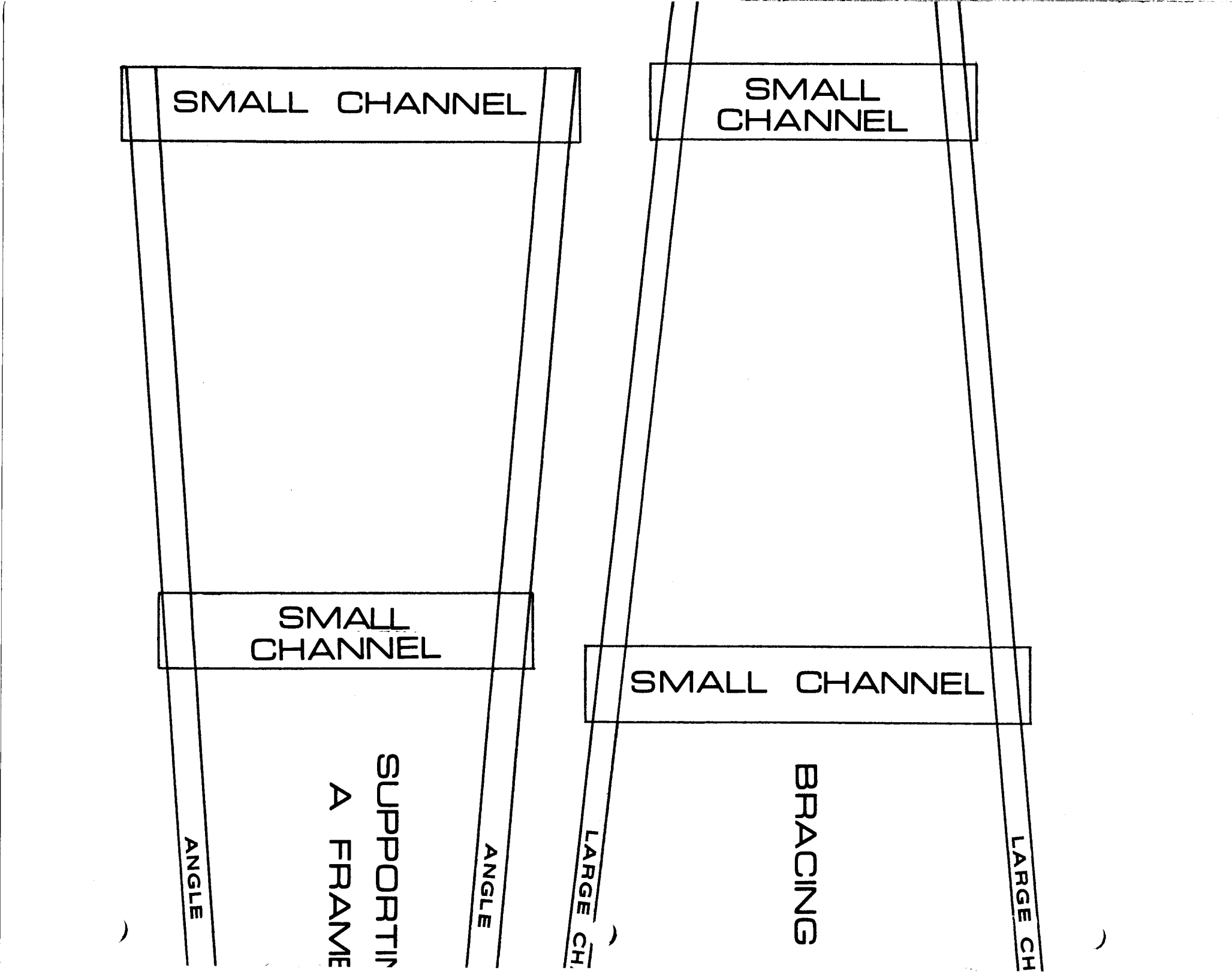
Let's take advantage of these labor saving characteristics and build a plastic ASP launcher. First you will need the following for the structural components. (If these are not available at your local hobby shop, they can be obtained directly from Plastruct, Inc., Dept. R, 1621 North Indiana Street, Los Angeles, California 90063.)

Quantity	Part No.	Length
3	A-8	24"
2	B-32	30"
1	C-20	30"
1	C-20	15"
1	RT-33	30"
1	STSS-2	24"
1	RT-24	15"
1	TB-4	15"
2	C-24	30"

Next, you will need the following tools at various times during launcher construction, so be sure they're available when you need them.

Plastic Weld Cement (available from Plastruct)
Small Brush
Miter Box (available for 98¢ from America's Hobby Center, 146 West 22nd Street, New York, New York 10011)
Razor Saw
Matte Gray Paint
12" Ruler
Yard Stick
#400 Sand Paper
Hand Drill and 1/8" Bit
2 X-Acto Clamps
X-Acto Knife and #11 Blade
Masking Tape
China Marking Pencil
Small Draftsman's Triangle or Machinist's Square

To begin construction, cut all the Plastruct parts to the required lengths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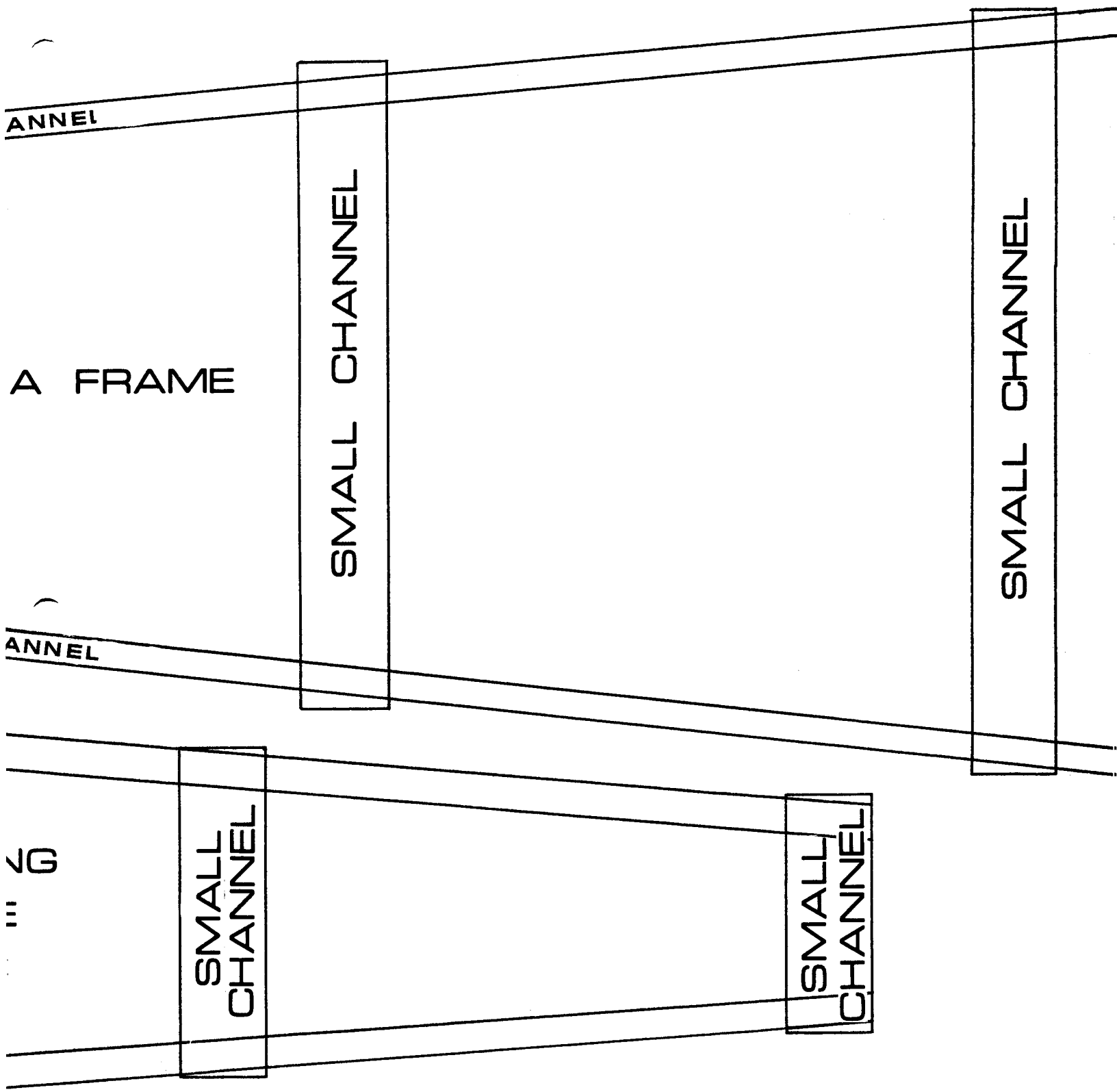

ASP LAUNCHER

1:7.16

A FRAME' TEMPLATE

DRAWN BY J. RANDOLPH

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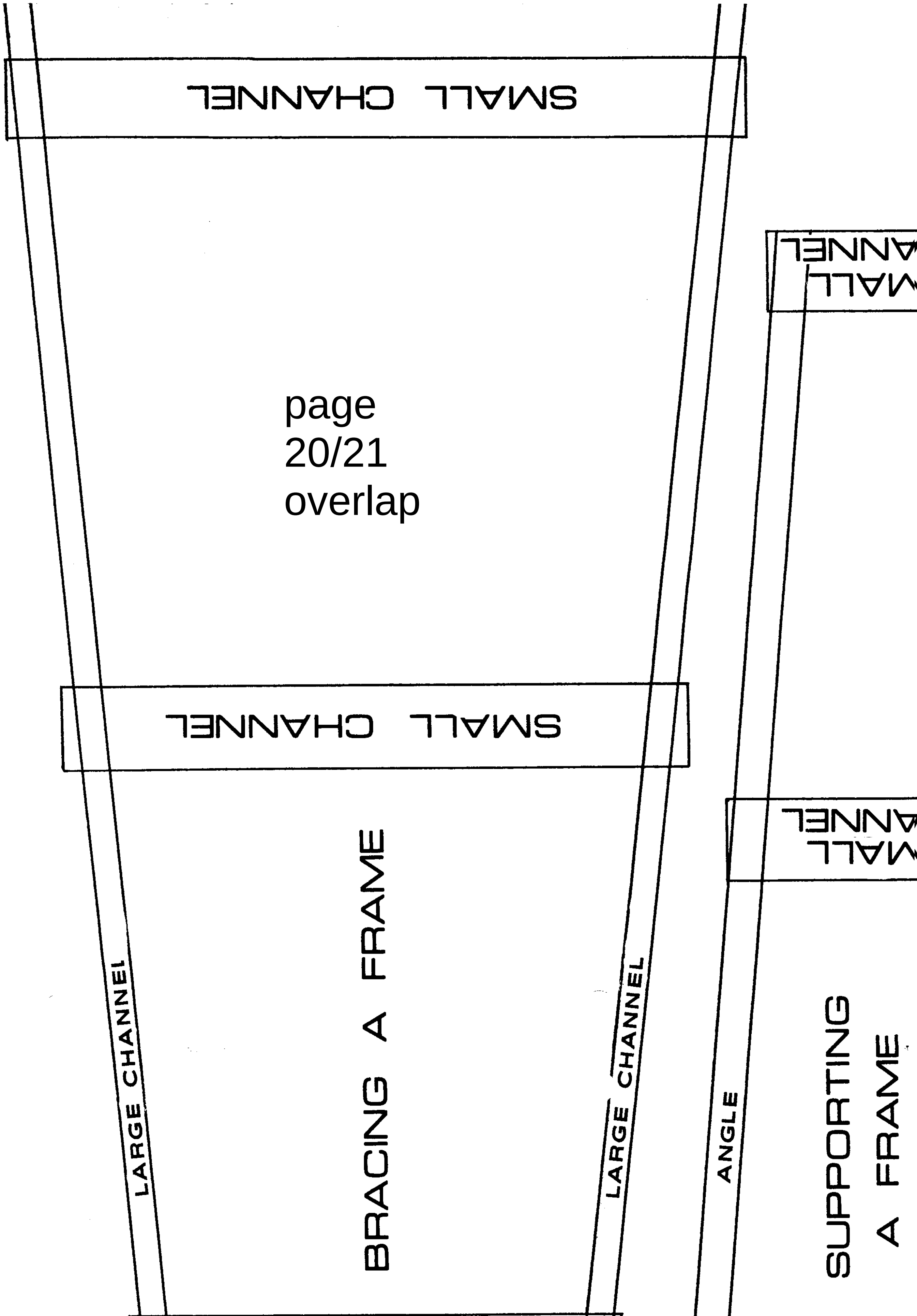

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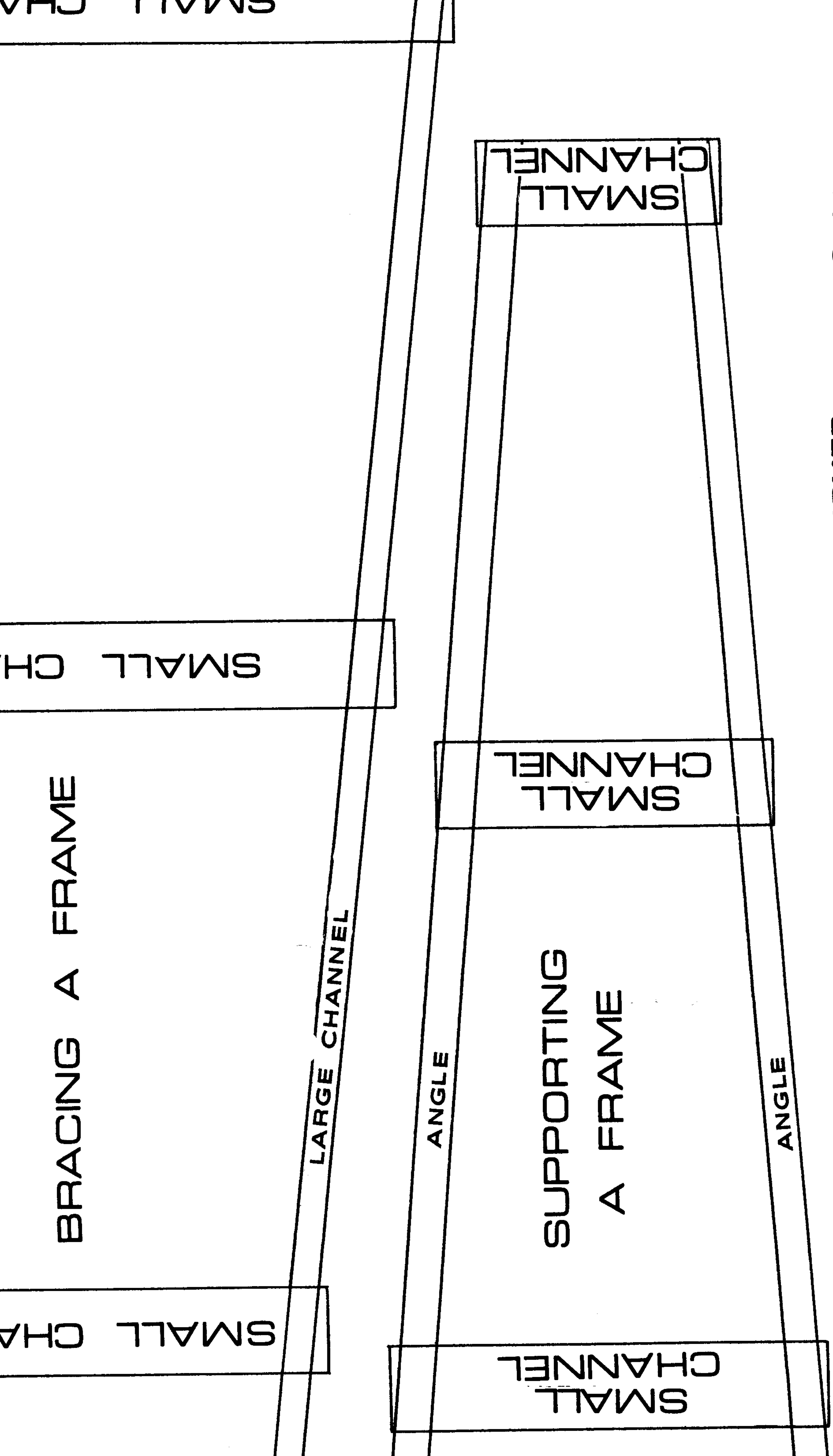
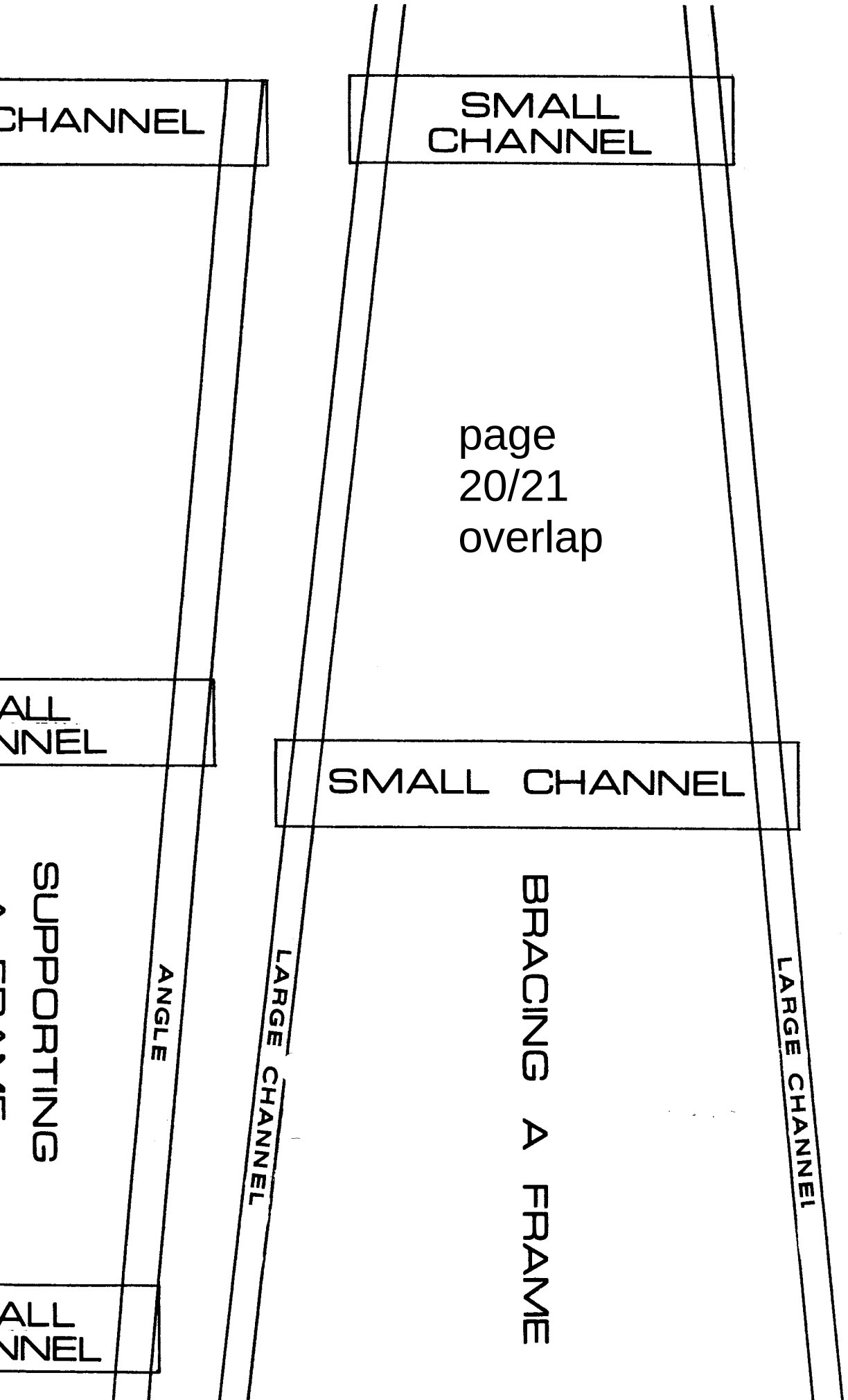
ASP LAUNCHER
1:7.16
A FRAME' TEMPLATE
DRAWN BY J. RANDOLPH

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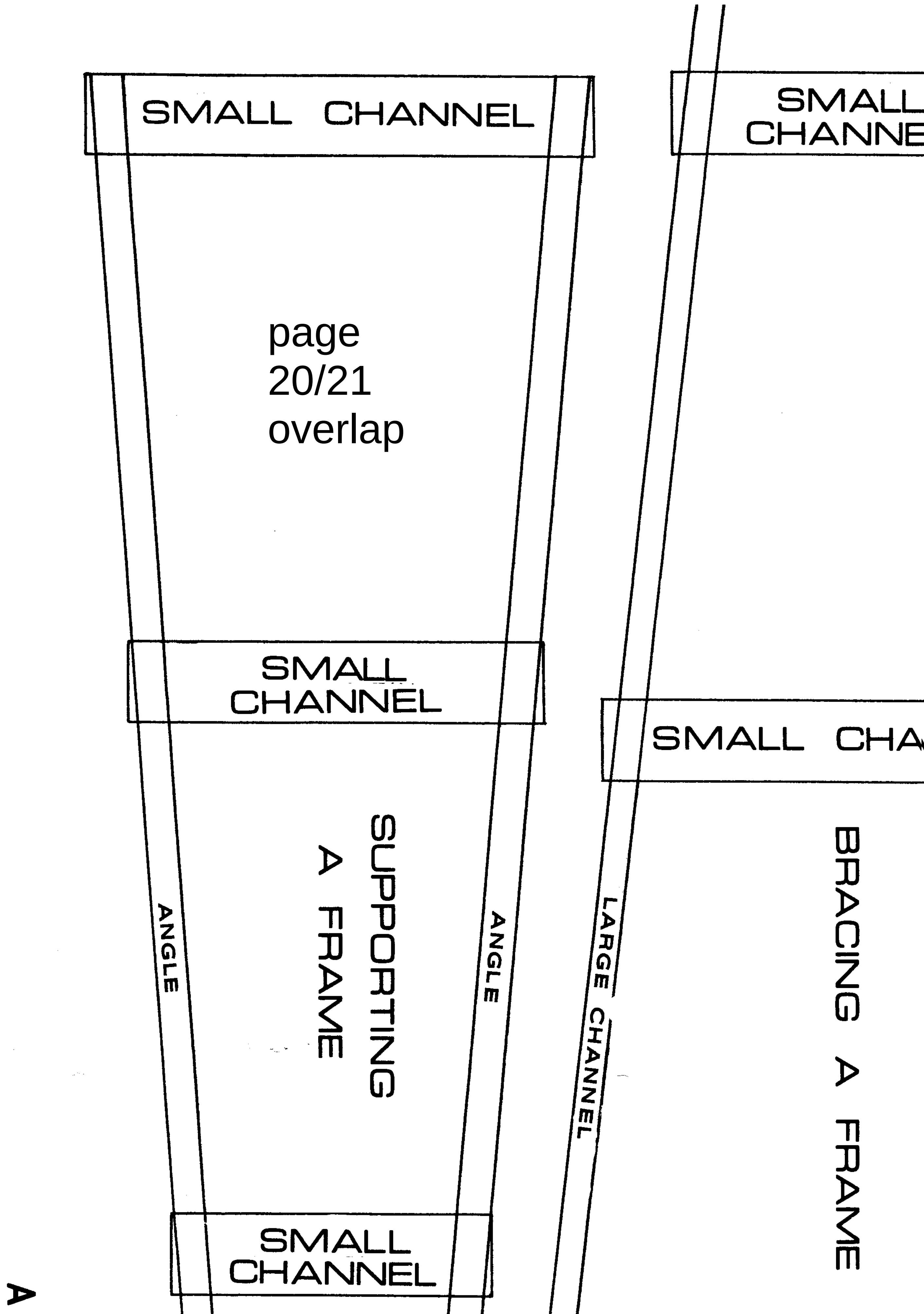
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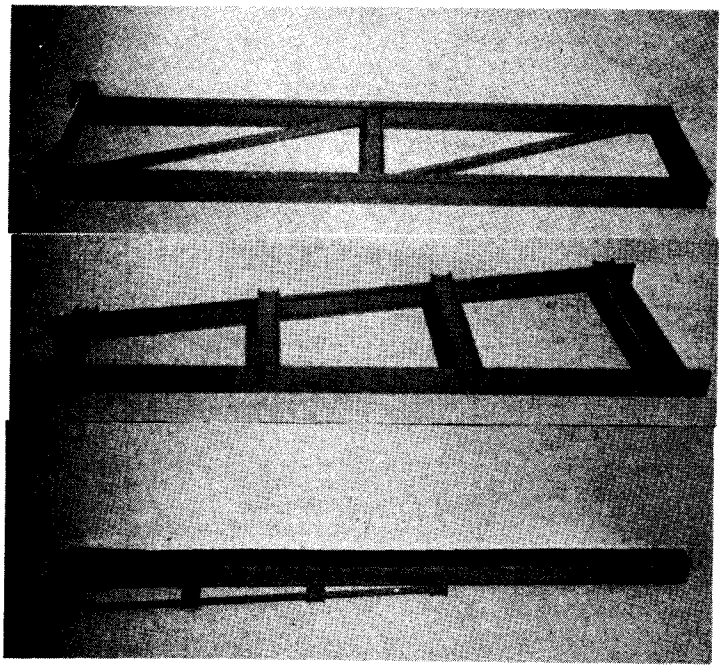


(Top) The assembled "Base" is shown in the normal upright position.

(Middle) The "Bracing 'A' Frame" is built by assembling the parts on top of the template on page 20-21.

(Bottom) The "Supporting 'A' Frame" is also assembled on the template.

using the miter box and razor saw. Take your time – if you saw too quickly you could cause the plastic dust to gum and ruin a clean cut.

Base

Piece	Number Required	Length
Beam	2	21-11/16"
Small Channel	3	4- 7/16"
Angle	2	11- 1/2 "
*Small Box Beam	2	5/8 "
Round Tubing	1	5 "

Bracing A Frame

Piece	Number Required	Length
*Large Channel	2	17- 1/8 "
Small Channel	1	5-13/16"
Small Channel	1	4-15/16"
Small Channel	1	3- 7/8 "
Small Channel	1	2-13/16"
Round Tubing	1	6 "
Round Tubing	1	2- 3/4 "

Supporting A Frame/Rail Assembly

Piece	Number Required	Length
Large Box Beam	1	23- 1/2 "
Angle	2	14- 3/8 "
Small Channel	1	3-15/16"
Small Channel	1	3- 3/16"
Small Channel	1	2- 1/2 "
Small Channel	1	1- 3/4 "

*These parts require 1/8" holes for pivots (round tubing). They may be drilled now or, as in the construction of the prototype for this article, immediately before final launcher assembly. See Stine's drawing in the May 1969 issue of **Model Rocketry** for locations.

Now, use a slightly different technique to cut the rail. First, cut the strip stock using the saw and miter box to the length of the large box beam (23½"). Mark a 1" width at each end of the strip and connect the marks with a line using the china marking pencil. Place the yard stick over the strip with the edge of the stick on the line previously drawn, and clamp securely. Using the edge of the yard stick as a cutting guide, make several light cuts with the X-Acto knife. When the total depth of the cut is approximately half the depth of the strip, break off the scrap piece along the cut. Remove the clamps and yard stick and you should have a piece of strip stock 1" X 23½".

The most difficult part of the launcher project is now completed. Segregate the pieces into three piles (if you have not done so already): Base, Bracing A Frame, and Supporting A Frame/Rail Assembly. At this time touch up any rough edges from the cutting process with the #400 sandpaper.

Before you start assembling the three components of the launcher, a few comments on Plastic Weld Cement. *IT IS HIGHLY FLAMMABLE!* It is also very strong and dries quickly. Merely apply it along the joint with the small brush and capillary action will do the rest. However, before you glue any part, it is suggested that you verify its location with the photographs accompanying this article, and Stine's drawing.

It is important to note that, during gluing, the Base will be in the inverted position. Place the two beams parallel to each other and approximately 4" apart. Glue the two end channels in place, open side down, and check for perpendicularity with the triangle. Measure off 10-7/8" along each beam from either end and mark. At this location, glue the central channel is position, open side down, and check with the triangle. Now glue the two angles, open side up, as braces between the central channel and each end channel. Place the Base in the normal upright position and glue the two short pieces of box beam, simulating the pivot blocks, flush with the edge of each beam. Cover the open top of each block with scrap plastic or plastic tape. You have now completed the Base.

The Bracing A Frame will also be assembled in the inverted position. First place the small channels, open side down, on their respective positions on the Bracing A Frame template accompanying this article, and secure with masking tape. Carefully align one of the channels, open side inward, and glue. Repeat this procedure for the remaining large channel. Remove masking tape. You have completed the Bracing A Frame.

The Supporting A Frame will be assembled in the same manner as the previous A Frame. Place the four channels face down on the template and secure with tape. Align the angle pieces and glue in place. At this time glue the rail to one of the narrow sides of the box beam, allowing approximately 1/8" overhang on each side, while making sure each end is flush with the ends of the box beam. Center and glue this assembly, rail up, on the Supporting A Frame, such that the end of the box beam is flush with the edge of the widest channel. You have completed the Supporting A Frame/Rail Assembly.

You may now perform any super detailing (such as the aft stop of the rail) you wish before final assembly. This is also the time to make any modifications to the launcher, i.e., making the Bracing A Frame adjustable, and to incorporate the launch rod into the launch complex. If you have not already done so, drill the pivot holes as previously mentioned.

Your launcher is now ready for assembly. Place the Base in the upright position and push the 5" pivot through the holes in the pivot blocks. Position the Supporting A Frame/Rail Assembly on the Base, locating the widest channel on the pivot and centering the box beam on the opposite end of the Base. Mark this position with the china marking pencil. Remove the Assembly and apply Plastic Weld liberally to the pivot and widest channel. Quickly replace the Assembly on the Base using the aforementioned mark as a guide to centering the box beam. Allow this to dry, checking the glue joint and reinforcing if necessary. Now insert the 6" and 2¾" pivots into the Bracing A Frame. Elevate the Supporting A Frame/Rail Assembly to the desired angle and place the Bracing A Frame in position, making sure the open side of the cross channels face away from the pivot blocks. Apply glue liberally at points of contact on Base and Supporting A Frame. Reinforce, if necessary.

Although your launcher is acceptable unpainted, masking off the rail and spraying the remainder of the launcher matte gray will improve its appearance. Plastruct's ABS (Acrylontrile-Butadiene-Styrene) surface is unaffected by most chemicals – even lacquer – so you may use almost any type of paint on your launcher without harming its surface! It is advisable to rinse the launcher in a mild soap solution before painting, to assure that the oil from your fingers will not interfere with paint adherance. Aerogloss Military Flat Gray was used on the launcher in the photographs, and the rail left its natural color.

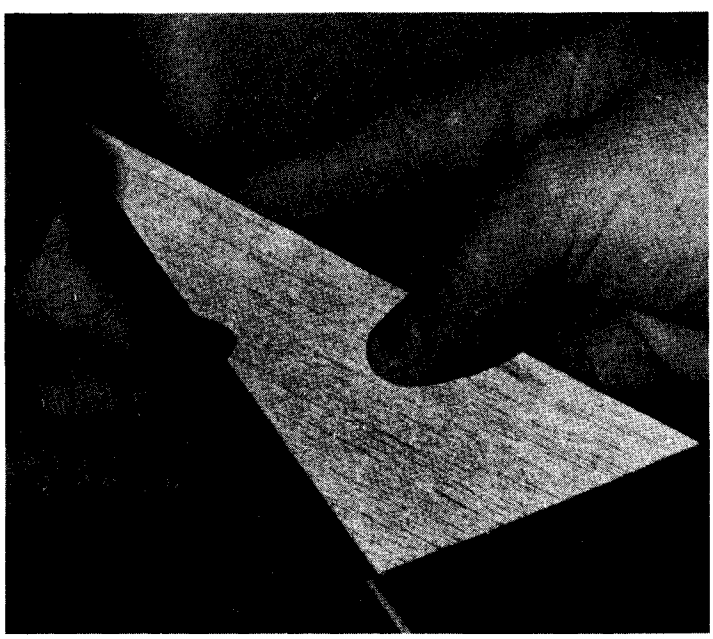
Your launcher is now completed, so get your ASP in gear and head for the launch site!

Build the • VALKYRIE

Designed by M. K. Tulloch

Within the last year "parasite gliders" have become increasingly popular for both competition and sport flying. The parasite glider is any glider which can be launched by attachment to the side of a booster rocket. In normal boost glide flying, the glider must be severely modified in order to allow it to be boosted by a rocket engine. Either a power-pod is added, or the glider fuselage is constructed out of a rocket body tube. In the case of a parasite glider, however, there are no restrictions on the construction of the gliding portion. It is merely attached near the rear of a large finned booster in some manner which will allow the glider to separate at ejection.

A major disadvantage with most parasite gliders is that the large forward wing area of the glider must be compensated for with a large rear fin area on the booster in order to assure stability during upward flight. Thus the ideal choice for a parasite glider is one with little or no forward wing area, so that small fins can be employed on the booster. The Manta or a canard wing design such as the Valkyrie have the necessary wing shape for use as an efficient parasite boost/glider.



A piece of sandpaper is wrapped around the boom, and the root edge of the wing run up and down the boom. A curve is sanded into the root edge to provide more contact surface for gluing.

As a competition model the Valkyrie will turn in creditable performances. Properly trimmed and powered by an A engine the prototype consistently gave 30 second to one minute durations. Stability is good, and the glider is exceptionally light for its wing area. Unfortunately there was no thermal activity during the development flights (early in the winter), but if your Valkyrie should happen to find a thermal you can expect to better its one minute time by a good margin. In addition, as with most parasite gliders, the forces during boost are not too high, so you can fly this model with a B engine (and perhaps even with a C engine) without fear of it disintegrating.

As a sport flyer the Valkyrie will certainly attract a lot of attention. The unusual design of a canard assures that other rocketeers will at least ask "what's that?" when you start prepping this bird.

Construction

To save on weight, the Valkyrie uses a 1/16" diameter hardwood dowel boom instead of the more standard 1/8" or larger spruce boom found on most other competition gliders. Select a *straight* 1/16" dowel, and cut it to a 10" length. Be sure the boom is straight! This thin dowel stock is notorious for "warping," especially if it has been sitting on the shelf for a while. A few minutes spent in selecting a good boom will save a lot of time trying to compensate for misalignments.

Except for the boom, construction of the Valkyrie is entirely from 1/16" thick sheet balsa. A 12" length of 3" wide stock is sufficient for construction of the entire glider, if you're careful about the parts layout. The wings, rudder, and canard should all be cut from the sheet balsa using the templates supplied on the plans.

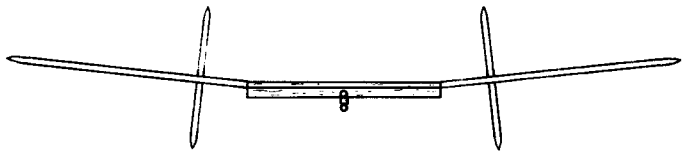
Wrap a sheet of fine sandpaper around the boom stock, and run the root edge of the wing up and down the boom several times until the root edge has a round indentation sanded into it (see photo). When the wing and boom are glued together, this round edge will provide more contact surface and result in a stronger glue joint.

Mark a line on each wing parallel to the root edge and 1½" in from the root edge. These lines will be used later for accurate alignment of the rudders.

Lightly sand the wing surfaces with #400 sandpaper until they are smooth. Round the leading and trailing edges as shown in the plans.

Apply a thin coat of wood glue, such as Ambroid, to the root edge of

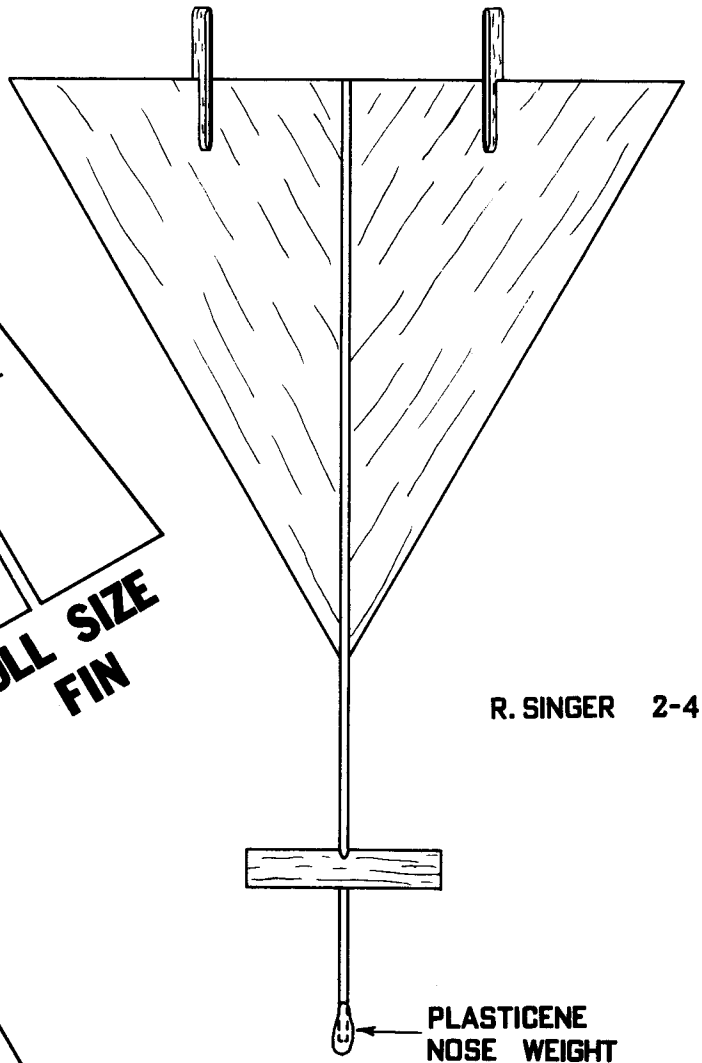
VALKYRIE

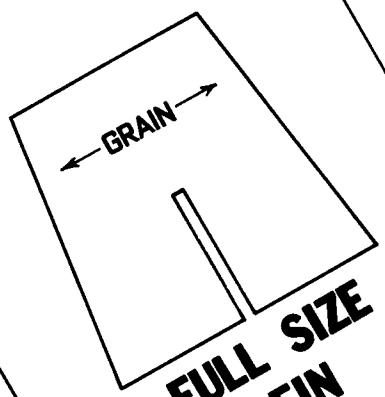


FULL SIZE

CANARD

ONE-HALF SIZE

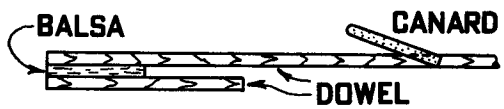




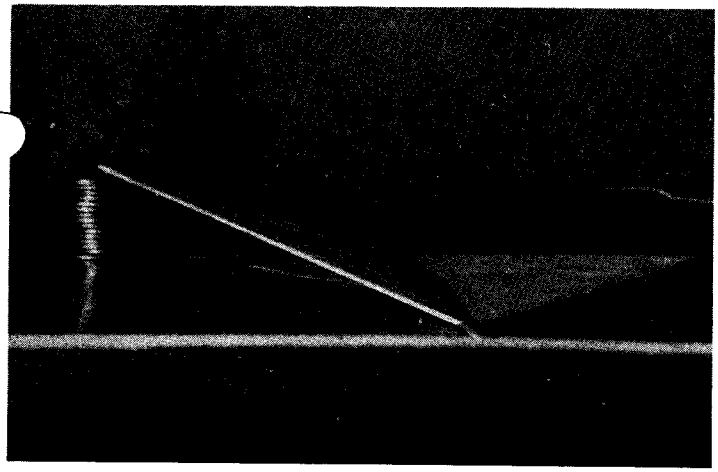
FULL SIZE FIN

R. SINGER 2-4-71

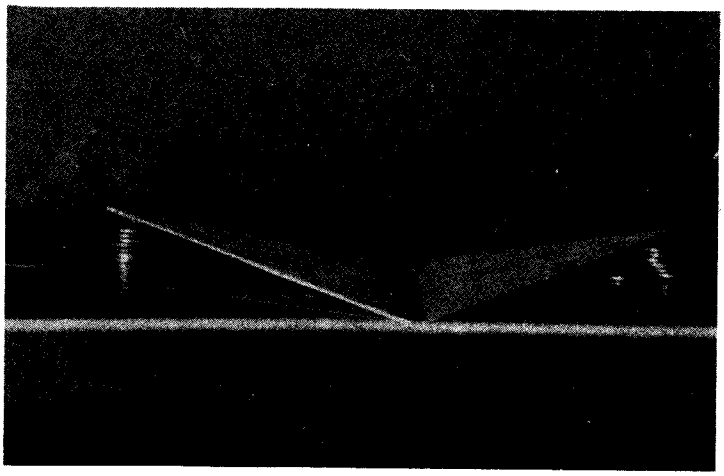
FULL SIZE WING



FULL SIZE NOSE



The dihedral angle is glued into the wing in the following manner. First the right wing is glued to the boom and allowed to dry. Then the left wing is glued to the boom and, with the right wing flat on the work surface, the left wingtip is propped up with a stack of 16 pennies. The entire assembly is allowed to dry with the dihedral angle so specified.



The canard must be glued into place level on the boom. The boom/wing assembly is placed on the work surface. Eight pennies are added under each wingtip to insure that the fuselage is level. Then the canard is attached in alignment with the flat work surface.

one of the wing panels. Place the wing panel flat on a sheet of waxed paper, and slide the boom into place so that the rear of the wing is flush with the rear of the boom. Smooth the glue into the joint, and set the entire assembly aside to dry.

Again using #400 sandpaper, lightly sand the surfaces of the rudder and canard until they are smooth. Round all edges of the rudders and canard.

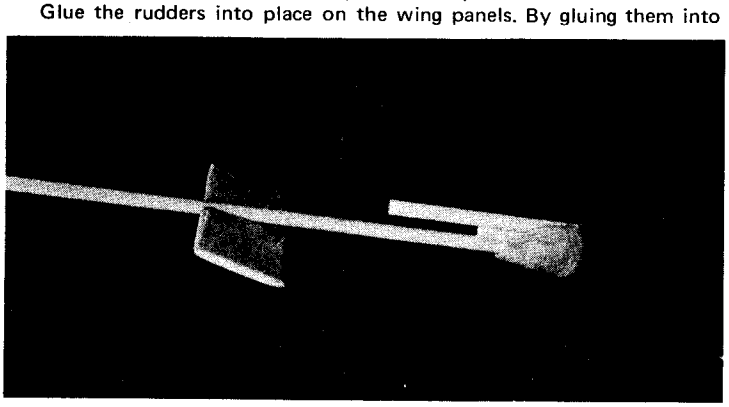
When the wing panel/boom assembly is completely dry, apply glue to the root edge of the second wing panel. Lay this wing panel flat on the waxed paper, and slide the previously assembled wing panel/boom assembly into place. Prop up the already attached wing so that the tip is approximately 3/4" off the work surface. (This can be done by inserting a stack of 16 pennies under the wing tip.) This forms a dihedral angle of about 5° under each wing. Smooth the glue into the joint, and set the entire assembly aside to dry.

The most critical step in the assembly is attachment of the canard to the boom. The canard must be accurately aligned — if it makes too large an angle with the boom it will unnecessarily increase the drag and necessitate excess noseweight to trim for glide, if it makes too small an angle with the boom excess tail weight will be necessary for proper glide trim.

Prop up each wingtip of the completed wing/boom assembly with a stack of 8 pennies. The boom will be flat on the work surface, with the wings level. Cut a groove into the rear edge of the canard, so that the canard can be seated on the boom. Lightly press the canard into place to assure that the proper groove has been cut. Remove the canard, apply glue, and again press the canard into place. The trailing edge should be pressed down until it rests on the surface of the work table. The leading edge should be propped up with two pennies, so that the canard will assume the proper angle. Set the entire assembly aside to dry.

Glue the rudders into place on the wing panels. By gluing them into place on the previously marked lines, the rudders will be parallel to the boom. As a result, the glider will fly straight. If you want the Valkyrie to turn, for ease of recovery, angle both rudders about 5° from the line. This will result in a circling glide with a radius of between 100 and 300 feet.

Cut a piece of balsa 1/16" X 1/16" X 1/2" and glue it on the bottom of the boom. The forward end of this balsa block should be flush with the front of the boom. Now cut a 1" length of 1/16" diameter wood dowel, and glue it to the balsa strip as shown in the plans. This serves as a pin to be inserted into a soda straw on the booster for glider attachment during boost.



The canard is glued to the boom at approximately a 15° angle. A piece of 1/16" dowel is added at the nose to act as an attachment to the body of the booster rocket.

Trimming the Valkyrie

Glide trimming of the Valkyrie proceeds as with any normal B/G. However, as with most canards, you'll find the Valkyrie to be more sensitive to small changes in trim weight than most "conventional" gliders. This makes it necessary to final trim the Valkyrie just before launching or a poor flight will result.

Try hand launching the Valkyrie. If it stalls, add a little nose weight to the top forward edge of the boom. If it dives, add tail weight at the rear of the boom above the wing.

The glide trim can also be changed by altering the angle of attack of the canard. This should only be done if the glider cannot be brought into trim with the addition of a reasonable amount of weight, since it requires breaking the glue joint and reattaching the canard at a slightly different angle of attack. If the glider stalls, the angle of attack of the canard should be decreased. Increasing the angle of attack of the canard will correct a diving tendency. Since small changes in the canard angle of attack are very difficult to make, it's easier to trim the Valkyrie by adding more nose or tail weight.

Flying the Valkyrie

The Valkyrie can be flown on almost any booster rocket within its power range. A soda straw is added near the front of the booster to engage the mounting pin on the glider. A 3/32" notch can be cut into the fin of the booster to slip fit the glider boom. This will keep the glider from "flapping" on the way up.

The most efficient booster design would, of course, be one which uses the glider's own wings as the two fins on a four-finned rocket. Since the major wing area of the Valkyrie is near the rear of the glider, such a design can be made stable without the addition of noseweight.

The rocket is prepped in the normal manner. Just before placing the Valkyrie on the pad, check to see that the glider fits *loosely* on the booster. It is important that the glider slip right off the booster at ejection.

If your Valkyrie is built as specified in the plans, it can be flown with A or B engines. A double size version, using 3/32" thick wings, can be flown from a larger booster powered by a D engine.

WITH THE NEW SWIFT ROCKET/GLIDER EVENT ON THE SCHEDULE, THERE WAS QUITE A BIT OF INTEREST IN THE PASCACK VALLEY FALL MEET. GOOD ENTRIES IN SCALE, AND SPACE SYSTEMS ALSO HIGHLIGHTED THE CONTEST .....

PVARM-II

by George Flynn

For the second straight year, New Jersey's Pascack Valley Section picked the first really cold weekend of the fall for their annual, one-day Regional Meet. Only one new event – Sparrow Rocket/Glider – was on the schedule, but there were many "old standbys" – Scale, Space Systems, Hornet and Sparrow Boost/Glider, Design Efficiency, and Robin Eggloft. After some searching for a launch site, Contest Director Al Lindgren settled for an open area behind a local school. Since the events were all low-powered, the relatively small field size was not expected to cause too many problems. Firing was from a Misfire Alley range, with each contestant supplying his own launch system.

Hornet B/G was the first event off the pad, beginning only a few minutes past the scheduled 10 AM starting time. This event was flown in a constant 10 to 15 MPH wind. This was too much for some of the lightly constructed Hornets, which were torn apart by the wind. Many of the contestants chose to wait until later in the event to fly in hopes that the wind would subside . . . but about half way through the Hornet flying the wind increased to about 20 MPH.

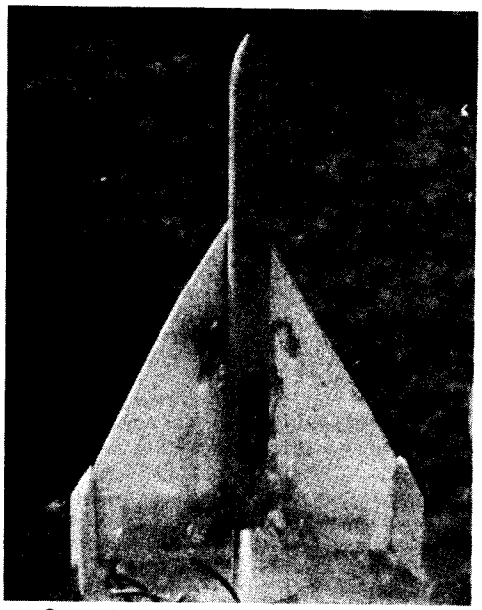
Perhaps the most surprising flight of the day was a FlatCat entered in Hornet by Glen November of North Shore. As everyone (well, almost everyone) knows, a FlatCat is too heavy to be flown with a ½A engine. But it lifted off, climbed straight up to about 12 feet peak altitude, arced over, and ejected its pop-pod about 4 feet above the ground. The FlatCat went into a beautiful, flat glide turning in a duration of 8.5 seconds. It was amazing for the spectators to see the entire flight of a B/G – boost, transition, and glide – all take place within 25 or 30 feet of them.

Fortunately, 8.5 seconds wasn't enough to win the event. Pascack Valley took firsts in all Divisions with Tony Mendel's 34 second flight topping the B Division, Gary Lindgren's 43 second flight leading the C Division, and Gary Bossong's 35.5 second flight capturing first in the D Division. There were no qualified flights in the A Division.

During the Hornet flying the tracking and communication crews were busy setting up the scopes for Design Efficiency and Egglofting. Overall, the Design Efficiency results were quite disappointing. Except for an 89 meter/nt-sec flight by Al Lindgren, all of the results were less than 80 meters/nt-sec.

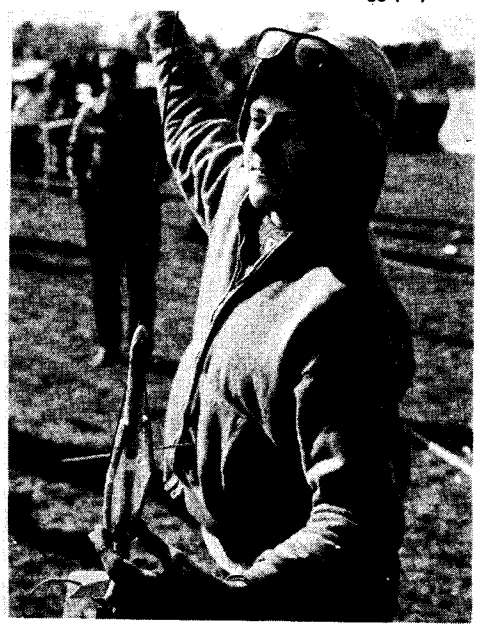
The altitudes were better in the Egglofting event which was being flown in the Robin (C engine) category. Again the event was dominated by Pascack Valley. Michael Buckham of North Shore managed a first in the B Division with 73 meters, but Pascack Valley captured firsts in all other Divisions. Robert Biedron captured first in the A Division with 113 meters, Victor Dricks took first in the C Division with 99 meters, and Bob Thayer won the D Division title with a 112 meter flight.

Bob Thayer's winning egglofter was a rather unusual design. The body was slowly tapered (a boat-tail beginning right after the egg payload

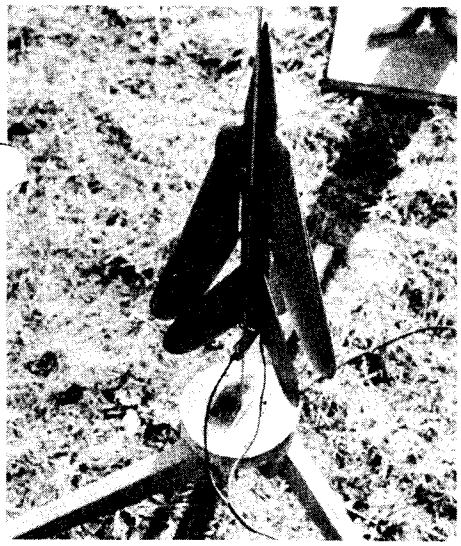


Strategies were many and varied in the Swift Rocket/Glider competition. Karl Feldmann's styrofoam model (above) turned in the best performance with a 38 second duration.

Mark Wargo flew a modified "Flying Jenny" in the R/G event. Moving the engine mount switched the model from boost to glide trim. Mark got a 21 second duration.



Tony Mendel employed a "flex-wing" R/G entry, to place second in B Division with an 18 second flight.



Al Lindgren's Rocket/Glider was a "swing-wing" variable-geometry design. The model boosted straight up, but was DQ'ed when the engine ejected.

Mike Heiberger's variable-geometry "swing-wing" failed when one wing deployed on during boost, causing the model to "pinwheel".

might be the best description) for low drag. The body was rolled from paper coated with glue around a form of the desired shape. Construction took quite a bit more time than some of the "standard" egglofters, but it was worth it as this model edged out its nearest competitor by 32 meters.

Mark Wargo went out of his way to demonstrate the value of the CMR egg capsule. He pranged his Eggloft model, tearing the forward section of the body tube to pieces. The rocket was destroyed, but the egg, in a CMR capsule, went undamaged! (Of course the flight was DQ'ed by the RSO.)

By 2 PM the first of the Sparrow B/G flights were set to leave the pad. By this time the wind had picked up even more, with gusts in excess of 25 MPH. It was blowing over chairs and "rearranging" the flight cards all over the field. The new rule eliminating the return of glider requirement was quite a help in qualifying many of the flights. The high wind was carrying some of the Sparrow gliders a half mile or more downrange. Since the weather was also cold, most of the contestants didn't even bother to chase the really good flights.

PVARM-II RESULTS

Design Efficiency

A Div.	1st	Leslie Lindgren (PV)	78 m/m-s
	2nd	Richard Cohen (PV)	68 m/m-s
	3rd	Frank Mendyk (NS)	65 m/m-s
B Div.	1st	Peter Korzen	60 m/m-s
	2nd	Betty Goss (PV)	58 m/m-s
	3rd	Michael Marks (PV)	57 m/m-s
C Div.	1st	Mike Benner (CMRC)	73 m/m-s
	2nd	George Stamy (CMRC)	59 m/m-s
	3rd	Bob Kratzer (PV)	46 m/m-s
D Div.	1st	Al Lindgren (PV)	89 m/m-s
	2nd	Ted Powell (CMRC)	84 m/m-s
	3rd	Karl Feldmann (PV)	68 m/m-s

Robin Egg Loft

A Div.	1st	Robert Bledron (PV)	113 m
	2nd	Leslie Lindgren (PV)	110 m
		(no other closed tracks)	
B Div.	1st	Michael Buckham (NS)	73 m
	2nd	Jim McGraw (Gemini)	72 m
	3rd	Steven Smargiasi (PV)	28 m
C Div.	1st	Victor Delois (PV)	99 m
	2nd	Kevin Clark (NS)	85 m
	3rd	Victor Chiu	54 m
D Div.	1st	Robert Thayer (PV)	112 m
	2nd	Karl Feldmann (PV)	80 m
	3rd	Floyd Beede (CMRC)	33 m

Sparrow Boost/Glider

(no qualified flights)

A Div.	1st	Greg Lindgren (PV)	33 sec
	2nd	Glen Neumann (NS)	31 sec
	3rd	Jim Gray (CMRC)	27 sec
B Div.	1st	Gary Lindgren (PV)	41 sec
	2nd	Bob Griffin (PV)	34 sec
	3rd	Mark Griffin	28 sec
C Div.	1st	Jerry Appel (PV)	41 sec
	2nd	Robert Thayer (PV)	40 sec
	3rd	Floyd Beede (CMRC)	24 sec

Hawk Boost/Glider

(no qualified flights)

A Div.	1st	Toby Mendez (PV)	34 sec
	2nd	Karen Calentano (NS)	32 sec
	3rd	Daniel Rasmussen (NS)	28 sec
B Div.	1st	Gary Lindgren (PV)	43 sec
	2nd	Kevin Clark (NS)	26 sec
	3rd	Earl Naumann (PV)	19 sec
C/D Div.	1st	Al Lindgren (PV)	39 sec
	2nd	Gary Lindgren (PV)	28 sec
	3rd	Greg Sargent (PV)	21 sec

Duffy Rocket/Glider

(no qualified flights)

A Div.			
B Div.	1st	Mark Wargo (PV)	21 sec
	2nd	Tony Mendez (PV)	18 sec
C Div.	1st	Victor Chiu	37 sec
	2nd	Stewart Zabacki (PV)	8 sec
	3rd	Robert Mendyk (NS)	3 sec
D Div.	1st	Karl Feldmann (PV)	34 sec
	2nd	Bill Grier (CMRC)	14 sec
		(no other qualified flights)	

Seeds

(no entries)

A Div.			
B Div.	1st	Mark Wargo (PV)	Hawk
	2nd	Greg Lindgren (PV)	Astr
	3rd	Kevin Flanagan (PV)	Phoenix
C Div.	1st	Gary Lindgren (PV)	Bright Brant IV
	2nd	Kevin Clark (NS)	V-2
	3rd	Mike Hagenger (NS)	Honest John
D Div.	1st	Gary Dossing (PV)	Phoenix
	2nd	Al Lindgren (PV)	Black Brant V
	3rd	Shirley Lindgren (PV)	Nike Apache

Space Systems

(no entries)

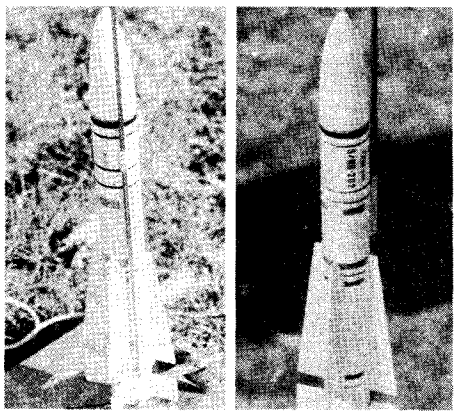
A Div.			
B Div.	1st	Mark Wargo (PV)	Aerobee
	2nd	Greg Lindgren (PV)	Astr
		(no other entries)	
C/D Div.	1st	Al Lindgren (PV)	Black Brant III
	2nd	Gary Lindgren (PV)	Terrapin
	3rd	Greg Sargent (PV)	Aerobee

Overall

A Div.	1st	Leslie Lindgren (PV)	199 points
	2nd	Robert Bledron (PV)	67 points
B Div.	1st	Mark Wargo (PV)	340 points
	2nd	Greg Lindgren (PV)	287 points
	3rd	Gary Lindgren (PV)	406 points
C Div.	1st	Kevin Clark (NS)	139 points
	2nd	Gary Dossing (PV)	100 points
	3rd	Al Lindgren (PV)	282 points

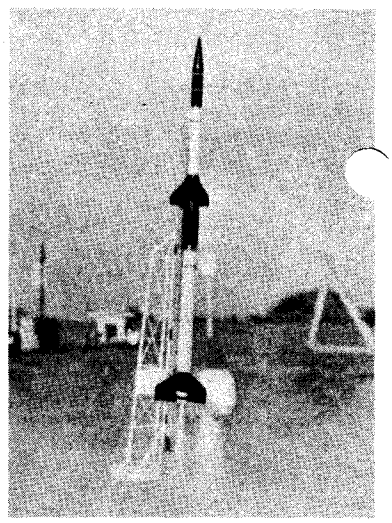
Club Standings

	1st	Pioneer Valley	2287 points
	2nd	Northshore	540 points
	3rd	Central Mass Model Rocket Club	301 points
	4th	Gemini	45 points



Two Phoenix models were entered in the scale competition. Kevin Flanagan's model (left), standing about a foot high, took third place in B Division. Garry Bossong took first in D Division with his Phoenix (right) in the same scale.

Gary Lindgren took 2nd place in C/D Space Systems with his Terrepin model. The launching pad included detailed sandbags used on the prototype.

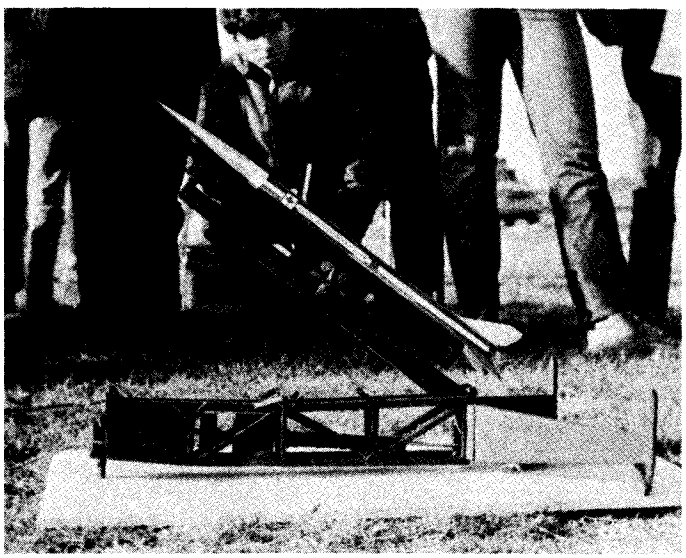


Third place in C/D Space Systems went to Gary Bossong with his Australian Aero-High model.

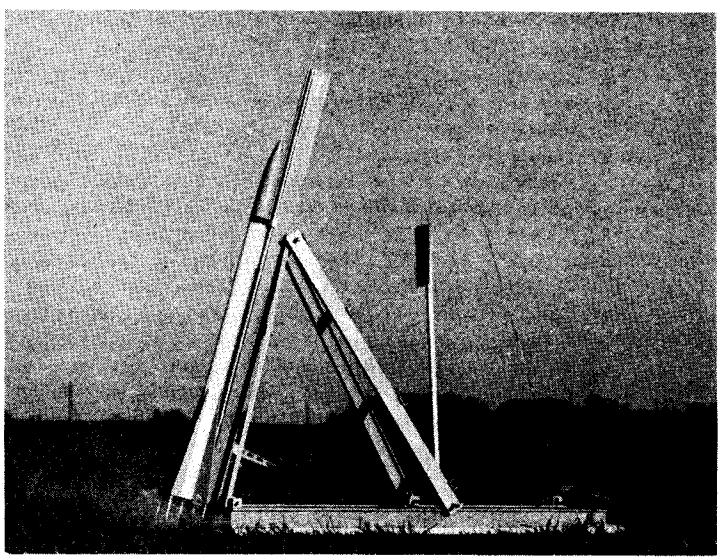
Mark Wargo's model of the Australian Aeolus sounding rocket took first in the B Division Space Systems contest. The model is only of average difficulty, but take a look at the tremendous detailing in that tower!

The largest scale model in the meet was Gary Lindgren's Black Brant IV. This four foot tall model took first place in C Division.

Another large model was the Honest John scale entry by Mike Heiberger which took third place in C Division.



Al Lindgren took first place in C/D Division Space Systems with his highly detailed Black Brant III rocket and launcher.



Shirley Lindgren's Asp model, flown in the Space Systems event, to 4th place in the C/D Division.

Just about every possible design was being flown in the Sparrow B/G event from Mantas and Bumble Bees to FlatCats and Mini-Bats. Pascack Valley wasn't in the mood to allow anyone else to walk off with their ribbons, so they captured first in all Divisions in this event. Greg Lindgren took first in the B Division with 33 seconds, while his brother Gary placed first in the C Division with 51 seconds. Jerry Appel took first in the D Division with 51.5 seconds. Again there were no qualified flights in the A Division.

Then came the event that everyone was waiting for – the new Sparrow Rocket/Glider event. Looking around the pads one observation was immediately evident – all the Rocket/Gliders were different! Each rocketeer seemed to have his own idea as to how to design for this new competition.

Mark Wargo took first in the B Division using a Flying Jenny, a bi-plane boost/glider designed several years ago by Pascack Valley's John Belkewitch. Mark's model used a moveable engine section to shift the CG from the boost position to the glide position. The engine is held forward during boost, then moves to the rear at ejection for proper glide trim. On four previous flights the Jenny's best time was 40 seconds. This time, Mark's model managed a 21 second duration. This flight edged out Tony Mendel's flex-wing Focket/Glider which had an 18 second flight.

The best Rocket/Glider flight of the meet was a 38 second performance turned in by Karl Feldmann. Karl's styrofoam model – a modified Wombat boost/glider trimmed to glide with the engine in place – boosted well and then transitioned into a fairly steep glide. Karl barely edged out Victor Chiu whose 37.5 second flight took second in C Division.

Though some of the other events had been disappointing, Scale and Space Systems certainly were not. Though there were few entries, most of those were quite well detailed.

There were no entries in either A Division Scale or Space Systems. There was plenty of competition in B, C, and D Division Scale; however in Space Systems the C and D Divisions were flown combined.

In B Division Scale Mark Wargo took first place with a nicely done Hawk model. Gary Lindgren, following the European example of building large scale models, topped the C Division with a Black Brant IV which stood about five feet tall. Also flying a large model, Mike Heigerger of North Shore took third place in the C Division with a two foot tall Honest John. Gary Bossong, going to the other extreme, took first place in D Division with a small model of the U.S. Navy Phoenix.

In the Space Systems competition Mark Wargo's beautifully detailed Aeolus, an Australian sounding rocket, took first. The rocket itself was of only normal difficulty, however the launching tower is extremely complex. In the combined C/D Division, Al Lindgren's Black Brant III placed first. This model was flown from a remote controlled pad on which the launch angle of the rocket can be altered.

All in all, Pascack Valley's second attempt at a Northeastern Regional was quite successful. It was a little cold and windy, but the contestants were quite satisfied with the results.

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the Escape Tower

By T. T. Milkie

ROCKET WHISTLES

If you want the crowd to notice the next rocket you send up, why not let it make some noise? One method of doing this might be to add a pound of gunpowder to your rocket, but that tends to singe the parachute. Why not add a whistle to your bird?

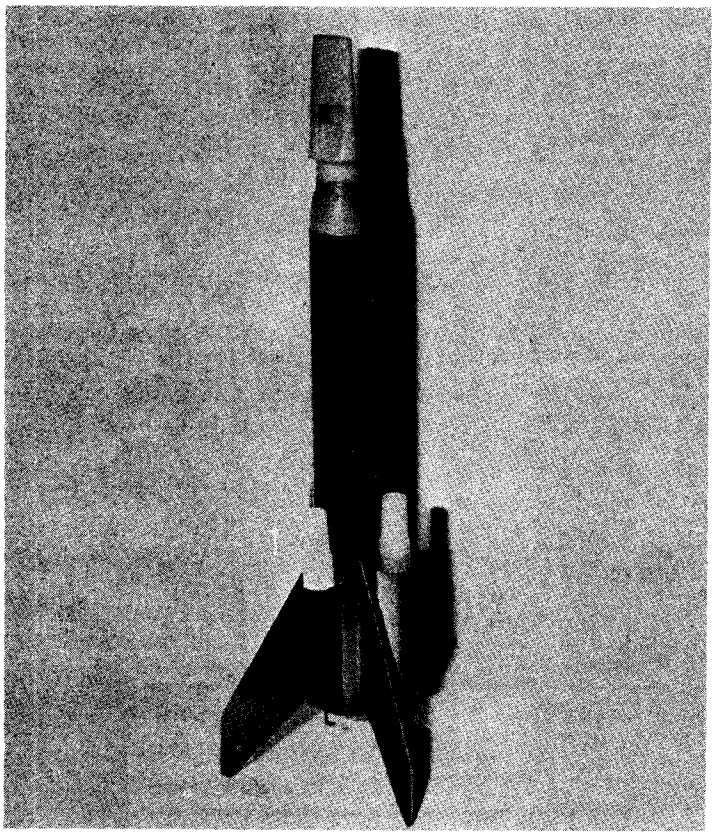
A lot of whistle and horn devices are available which can be added to the side of any rocket to sound off on take off. Dime stores and drug stores carry small children's horns, noisemakers, and party favors which can be modified for rocket flight. These are usually quite light and very inexpensive. They come in basically two types: those using thin plastic or metal vibrators (reed type horns) or specially shaped air cavities (true whistles). An enterprising hobbyist may also be able to design his own.

Modification of most small horns for model rocket use consists basically of cutting off the horn and using the plastic mouthpiece. Most small horn mouthpieces can easily fit in an Estes BT-5 tube. The BT-5 was chosen because it is the smallest modroc tube available. The tube can easily be mounted to a fin tip, fin structure, or body tube. If you presently have a model which uses BT-5's with the bottom open, it would be very simple to just insert a small horn mouthpiece in the tube, after removing any nosecone and tailcone. Very small horns may be inserted in large soda straws. Home-rolled tubes are also possible, though small diameters are quite tricky to roll. Plastic tubes, such as some ball point pens, may also be used. Finally, the horn can be just mounted directly to the rocket, provided it is shaped somewhat cylindrically.

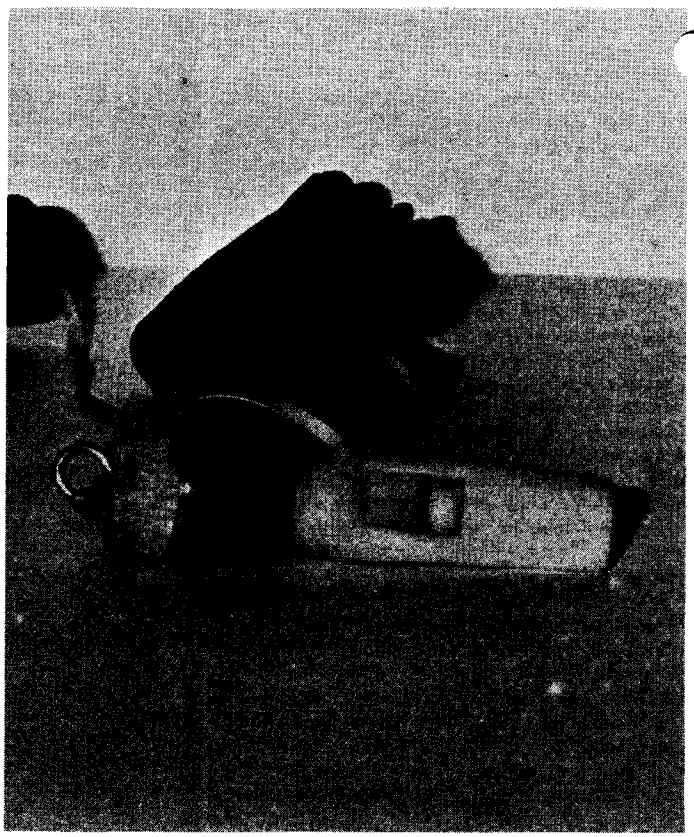
Whistles which do not need an open end (air escapes out the side) can be inserted in a variety of places on the rocket. A special nosecone, like the one shown, can easily be made from the right type of flute or whistle mouthpiece. A police whistle or other type can be mount right into the side of the body tube. A word o caution, however — as you may remember from Forrest Mims' articles on rocket guidance systems (February and March, 1970 **Model Rocketry**), putting a hole in front and letting air out the side can cause a rotating moment on the rocket and make it go erratic. Mounting the whistle so that the exit hole is near the center of gravity of the rocket will help avoid this problem.

If you just want to temporarily add a whistle to a rocket for a demonstration flight, for instance, a hook system can be used. Just mount a piece of wire (such as a bobby pin) to the piece of BT-5 containing the whistle. Hook the wire into the front end of the body tube, making certain that it doesn't interfere with the nose cone or recovery system. To prevent the whistle from being pushed off, tape the wire to the nose cone or tie a string to the wire and the shock cord. If your launch lug is big enough (or not used, when launching from a tower or when using an additional pop-lug) you could also hook the whistle onto it. If you don't mind being a little crude, it is also possible to attach the whistle to a rocket by taping it on with cellophane tape.

While the thought of adding such a "frill" to your rockets may seem like "going back to toy rockets," scientific possibilities of the system are evident. A method of velocity measurement



Here is an Estes Alpha converted with whistles mounted on BT-5's. Launch this bird with any dangerous rockets you have and you can be sure that everyone will be looking up!



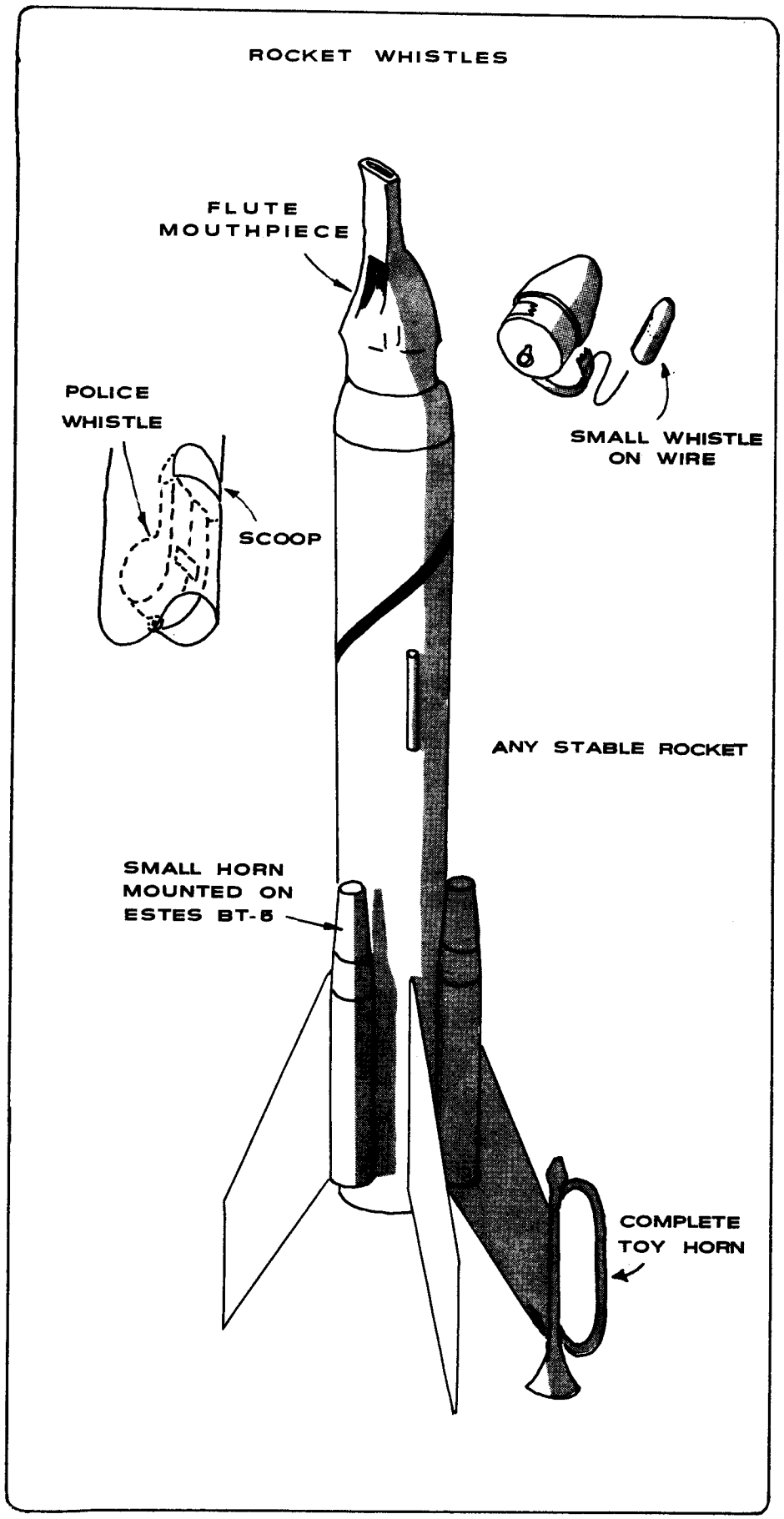
This flute mouthpiece (plastic) was mounted on a balsa nosecon Watch out when you use this system, though, because air flow out th side of the flute can cause erratic flight.

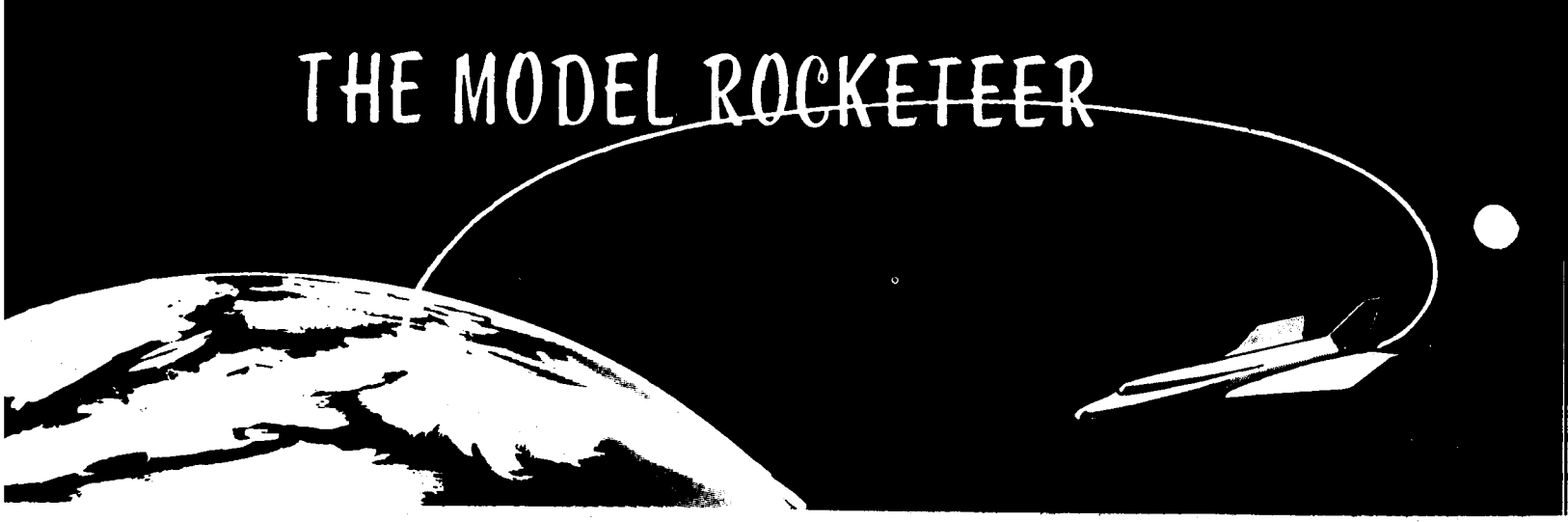
There are many very cheap party favors and toys that can easily be converted to model rocket use.

may be possible with the addition of a whistle. The pitch of normal whistles does not change with increased air velocity. However, the pitch will seem to decrease as the rocket takes off, away from you, due to a "doppler shift." The doppler shift" effect is caused by the fact that the sound waves are being emitted by a source that is traveling away from your ear at an appreciable speed. The sound waves are effectively "stretched," thus making the wavelength longer or the pitch lower. The determination of supersonic model rocket flight has been a sticky problem for those who have attempted to go faster than sound. (Though many claim to have gone faster than sound, I have seen no real proof of the fact.) Although there may be problems with a supersonic whistle, such a velocity-measuring device may be a way to that proof.

Other possibilities also exist for velocity measurement. Perhaps the pitch can be made velocity-dependent for low velocity flight (boost-gliders even?). You may have noticed that a certain whistle will sound off only after the rocket reaches a minimum velocity. By changing intakes, baffles, and whistles it may be possible to preset the velocity at which the whistle cuts in. A number of different whistles of different pitches might be used, so that the experimenter, with the aid of a tape recorder, can determine velocity during the model rocket flight.

One obvious advantage of whistles mounted on modrocs is the possible solution to an old model rocketry problem. If your ejection charge fails to eject the parachute and your bird comes diving in, at least with a whistle the crowd will know what's happening and look out, even if it does scare the daylights out of everyone. .....





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 a 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.

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Houston, Tex. 77055

NARAM-13

NARAM-13 will be held August 9-13, 1971 at the Parade Ground of Aberdeen Proving Ground, Maryland – the site of NARAM-7. The large U. S. Army Test and Evaluation Center is located about 30 miles east of Baltimore on U.S. Route 40.

Although there will be no Army housing provided, a campground will be provided near the launch area. Motel reservations will also be available through the Contest Director, Howard Galloway.

The following events are planned:

Eagle Boost/Glide
Sparrow Rocket/Glide
Robin Eggloft
Peewee Payload
Class III Streamer Duration
Class I Parachute Duration
Predicted Altitude
Scale
Super Scale
Research and Development (no points)

Any entry that fails to show reasonable care in design and workmanship will be disqualified at the safety check-in! The rules of good judgment and fair play are the guiding principles of this meet.

NAR members interested in attending NARAM-13 should send a postcard to:

NARAM-13 Contest Director
Howard L. Galloway, Jr.
428 Ben Oaks Drive, West
Severna Park, Md. 21146

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

Since the membership has required that a committee be selected to study and rewrite the NAR by-laws it is now timely to consider major changes in the structure of the NAR. In particular, the idea of *regionalization* should be discussed. At present Division Managers and State Department Heads are appointed by the Director of Section Activities. However, the exact function and duties of these officers is neither mentioned in the by-laws nor is it clear to the officers themselves. In fact, the geographical boundaries of the divisions were never formally decided by the NAR. There are currently six districts (see *Model Rocketeer* July, 1970), however, there may be good reason to change this number or alter the present boundaries.

Several members have suggested having one or two trustees elected by the members of each division in order to achieve a better geographical distribution of trustees. Also the officers (President, Vice-President, etc.) of the association could be elected by the membership at large and need not necessarily be one of the trustees. Presently the officers are elected by and from within the Board of Trustees.

The Contest Board could also be regionalized and could be composed of Division Contest Directors and a National Contest Director. This has proven necessary since the burden of running the entire operation is now too great for one member. The Division CD's would sanction meets and check contest results for their division and report only the final scores to the National CD who would compile the scores of each meet. This entire Contest Board would take action on protests, rule changes, and interpretations making it impossible for one member to have complete control over such controversial matters.

The precise role of several committees, most notably Publications Committee, should be redefined to reflect the present state of affairs in the association.

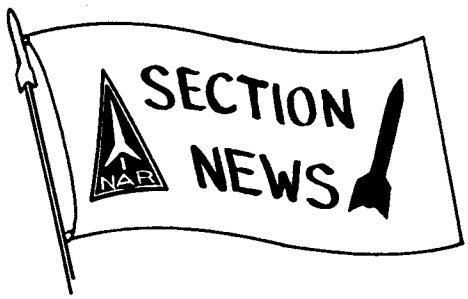
I would also like to see Trustee and Officer terms reduced from three to two years since it seems that many of these trustees lose their enthusiasm after about two years of activity. The election procedure might be changed to facilitate mail ballots.

NAR members and sections are invited to send their by-law revision ideas to NAR HQ for consideration by the committee after its formation.

Carl Kratzer

NAR RENEWAL FORMS

1970 NAR members received their 1971 membership renewal forms in December. These members will notice mention of a reduced rate for NAR membership without **Model Rocketry** subscription included, which was then crossed out and stamped, "SORRY, The $3.00 option is no longer available." This has caused some confusion as to the wording of the notice. Actually the $3.00 option was never available as it would have been a violation of the contract with **Model Rocketry.** Such a plan would not have been possible under the current membership dues structure due to the apportionment of **Model Rocketeer** costs over fewer NAR subscriptions. The NAR regrets any misunderstanding caused by the renewal forms.



SECTION NEWS

The Western, an unofficial newsletter of the Pacific Division, is being published by Chris Pocock. The purpose of the newsletter is to increase communication between sections and members in the Pacific Division. The idea of a division newsletter is new to the NAR and seems to be a worthwhile project for other divisions to undertake. Chris entertains guest editorials and suggestions for a new newsletter name. Ironically, Chris has recently transplanted to the East Coast but hopes to continue his efforts from school. Address correspondence to:

Chris Pocock
South Kent School
South Kent, Conn. 06785

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On November 14-15, 1970 the Tri-City Cosmotarians (Gladstone, Oregon) presented a static display at the 1st Annual Northwest Radio Control Model Show, sponsored by the Skynights Radio Control Club of Portland. Television advertisements were made for the show in which Mr. Hunt Jones (Area N.E.A. Director) represented the Cosmotarians.

The display included movies of previous section launches, models on display, a launch rack and equipment and various engines used. The club sent special thanks to the Skynights for the invitation to participate. The Skynights have invited the Cosmotarians to the 1971 show for another static display.

****

The Monroe Astronautical Rocket Society (Victor, New York) wishes to announce that the recently NAR-chartered model rocket section of the U. S. Air Force Academy has been invited to an area meet on the weekend of April 24-25, 1971. This special meet has been arranged through Cadet Wm. Arthur III, one of the original founders of MARS. Modelers from the upstate New York area will compete against the varsity and junior varsity teams of the Academy in: Hornet B/G, Class 1 Parachute Duration, Class 00 Altitude, Open Spot Landing, and Class 1 Streamer Duration.

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NAR Section News would like to thank the following sections for submitting news and/or information of their sections activities for this issue although none was used this time: BIRCH LANE; PASCACK VALLEY SECTION; SOUTH SEATTLE ROCKET SOCIETY; XAVERIAN SECTION; M.A.S.E.R. SECTION; STEEL CITY SECTION; NEW CANAAN SPACE PIONEERS.

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EDITORIAL COMMENT:

If you are wondering about the meager amount of news in this edition of NAR SECTION NEWS then indeed wonder why. This is all the useable news received for this issue. There are over 125 sections presently chartered with the NAR, but only 25 or so submit news regularly.

THE MODEL ROCKETEER

NAR SECTION NEWS was first organized in April, 1969 at which time all currently chartered sections were contacted and asked to submit news. Each new section, as it charters, is also contacted and asked to participate.

Right now, 83 sections have contacted NAR SECTION NEWS at one time or another. But of these 83 sections, only 25-30 write regularly. Why?

NAR SECTION NEWS is for all NAR members. Not just for members of sections or just for section secretaries. Surely each and every person would like to read news of his section or area. If I'm right, then why is no news being received?

NAR is still a young organization. Its activities cannot work out without the help of all of its members. NAR SECTION NEWS is another of its activities that needs your help.

Have you seen your section mentioned recently? Look back over previous issues of Model Rocketeer *and check. If not,* YOU *do something about it. Get your section secretary to write.* Don't wait. *Do it* NOW!!!

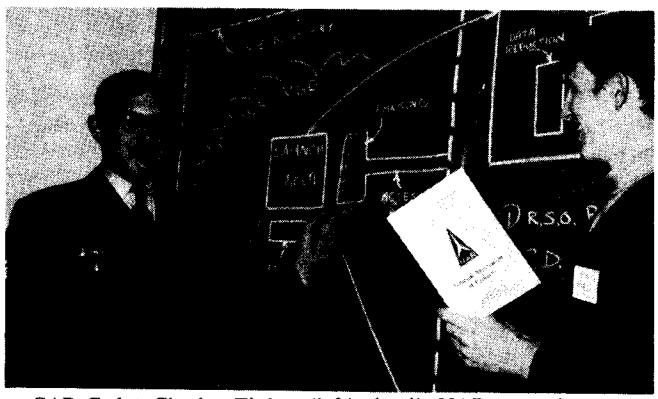
Charles Gordon
Editor, NAR SECTION NEWS

CAP WORKSHOP IN MISSOURI

A group of 28 rocketeers joined in a workshop at Richards-Gebaur AFB in November to improve organization of rocketeers in Missouri and Eastern Kansas. Those attending the discussion session included members of the Civil Air Patrol, NAR, and Boys Club.

Conducted by Captain Larry Loos (USAF), the workshop covered topics such as the hobby's history, potential, safety, educational advantages, and competition value both locally and nationally. Captain Loos was recently appointed the NAR State Department head of Kansas and Missouri in addition to his NAR-CAP liaison post.

NAR members in the Kansas City area interested in the program may contact Larry Loos by writing CMR Box 711, Richards-Gebaur AFB, Missouri 64030.



CAP Cadet Charles Finley (left) details NAR range layout at November workshop. Lytle Norton of Midwest Rocket Research Assn. (right) assisted the discussion.

NASA OPEN HOUSE

The Sounding Rocket Division of the NASA Goddard Space Flight Center in Beltsville, Maryland will hold open house for all model rocketeers and friends on Easter Monday, April 12, 1971 from 8:30 AM to 4:00 PM. More information on this special event will be available in the next issue. For further details contact:

Howard Galloway, Jr.
428 Ben Oaks Drive, West
Severna Park, Maryland 21146
Telephone: 301-987-4395

MODEL ROCKETRY AT SUMMER CAMP

By Charles Gordon

(The Editor of NAR Section News tells the story of how he spent last summer as a camp counselor and instructor of Model Rocketry.)

It all started in March when I sent an application to the New York office of Camp B'NAI B'RITH. I had never done this before and thought that being a camp counselor might be an interesting way to spend the summer. At the time there was no thought (except possibly in the very back of my mind) of connecting this job with model rocketry.

In April, I had my interview with the camp Director. During the course of the 2 hour discussion it came out that I had a hobby called model rocketry. I explained what it was, what it involved, how it came to be, and my own experiences and goals in the field.

The Director was intrigued by this and in fact quite interested. I asked him if it would be possible for me to teach a few campers about model rocketry. The answer as you may well guess, was yes.

The eight week camp session started on June 27. Before this there were many things to do. Besides preparing my own personal things such as clothing and supplies for the whole summer, a whole educational program had to be developed to cover all the basic areas of model rocketry in the time available. Although I am in the teacher preparation program at the University of Maryland, I have not as yet had any actual teaching experiences in the field or for that matter in the classroom. The only experience I had was that of being taught to.

I decided that the best things to teach my students were those basics that I was taught six years ago when I first joined the NARHAMS Section. I also developed my program by looking over the material available in many of the model rocketry supply catalogs. I took all of this information and broke it up to cover as much as possible in the eight class periods I would have available to me. I also had to include in the program ample time for the actual building of the models. One thing that I recognized from the beginning was the fact that just *teaching* about model rocketry was not enough. The campers would also have to build models to really gain from the experience.

Another thing that I had to decide and act upon was the choice

Author and camp instructor, Charles Gordon, provides aid to novice rocketeer. (Photo by Stephen Appelbaum)

of a launch system. I am convinced that although launchers such as the Estes Electro-Launch are adequate for individual use, they would be impractical were any large number of models to be launched. Systems such as the "misfire alley" are alright when everyone knows what they are doing but when you have a group that has never launched model rockets before, it just isn't feasible. I decided that the only thing to do was to acquire or build a launch rack. I finally ended up building a complete launch system capable of launching seven models in succession. Mr. Barrowman, NARHAM's section advisor was very helpful in suggesting a schematic diagram and in the location of materials for the system.

As part of my program I also had to acquire models for my "students" to build. I wrote to the three major model rocket manufacturers that I have had previous personal dealings with: Estes Industries, Centuri Engineering, and F.S.I., and asked them for information on ordering materials for this teaching activity. I explained what I was doing and requested information on ordering supplies for the class. I received a response from Estes only and therefore did all my ordering with them. And then the problem came up as to what I should order.

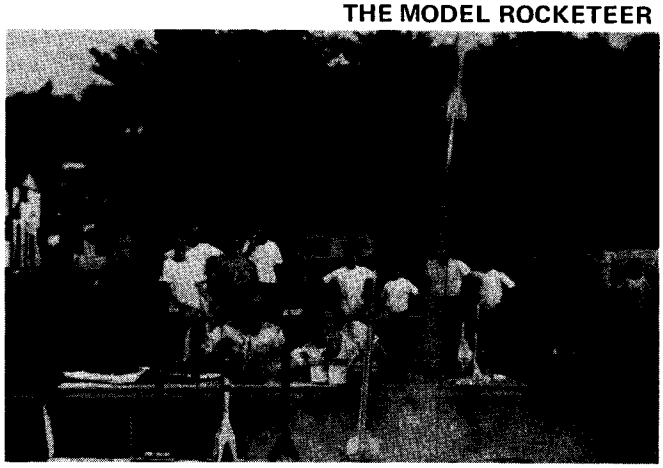
What would you do? I decided that the best thing was to have each camper build a model rocket kit. I felt that each could learn the very basics of model rocket construction this way. I selected various models such as the Alpha, Sky Hook, and Wac-Corporal as basic models for them to build since they are all single stage models that use a parachute recovery system. For those with a little more ambition I also ordered such models as the Big Bertha, Drifter, and V-2. These were for my older modelers and/or those with a little experience. After the first few weeks of instruction I had a chance to order more models, since I had three classes in consecutive two-week sessions. At this time I also ordered some 2-stage models such as the Beta and the Apogee II for the campers and some more advanced models for the staff who had suddenly become interested.

When I got to camp I was reminded of the fact that although I was a hobby group leader for eight hours per week (scheduled time), for all the rest of the time I was a counselor for nine 8½ year old boys. This right here was my real experience of the summer. Although this article is about model rocketry at summer camp I must say that the whole thing was a very enjoyable experience and that I am really glad that I did it. It was a weird experience to be a counselor of young boys, telling them the rules and enforcing them, organizing activities, being in actuality a "parent" for 7 weeks when I could still remember back when I was their age and attended camp and went through all of it as a camper.

My model rocketry class started by my giving a lecture on how model rocketry compared to amateur, professional, and "basement bombing." I quickly went through all the basics of what a model rocket consisted of and how it worked. It was sort of a preview of what was to come. I also showed them some already built models that I had brought with me as well as a fully equipped range box.

With the help of Mr. Barrowman and Mr. James Kukowski, Public Information Officer at NASA's Goddard Space Flight Center and long time member of the NAR, I was able to get a copy, on loan, of the NAR's publicity film. This was a very good film to have early in the program because it included action photos of model rockets and thus created a real enthusiasm in these new modelers who had never before seen a model rocket in flight.

My program was very simple and straightforward. These are the steps, in short, that I went through to prepare my campers to become model rocketeers. First the basics as I have already explained. Next I told of the NAR, what it was, why, when, where, and how. I then explained the various types of recovery systems in detail so that when we actually started building and flying they would know what and why they were doing it. Then we started the actual construction of the models. After most of the construction was completed I explained about launch systems and especially the one we would be using and why I had selected it. I also went into the full details of the operation of the system and how we would be



V-2 takes off at B'NAI B'RITH summer camp launch. All models were constructed by campers having no previous experience with model rockets. (Photo by Stephen Appelbaum)

working our launches. The final detail I covered was the finishing of the models. I detailed the types of paints useable, the good and bad points of different ones and especially in the selection of colors. All of my classes used spray enamel mostly because it was quick and easy and we were short of time.

Then came the launch. If you can think back to your own very first model rocket launch you may have some idea of the problems that came up then. Instead of having only one or two new and inexperienced modelers I had 12 of them. I must also mention that I was alone in my activity. There were no other experienced modelers among all of the staff. I was lucky that I did have two older campers who had a little experience and could help out on the range with such things as installing launch igniters. I was able to get a few of the staff to help with the actual launching while I ran the P.A. system. Our first launch, if I remember correctly, occurred on a parents visiting weekend and the parents all were interested in seeing this new thing called model rocketry.

All I can say is that it sure went over big!! Everyone stated that they really enjoyed the demonstration and that they were really surprised that "those little things really do fly, don't they?" I really don't have to tell you what it is like to watch a model rocket launch for the first time, or of the feelings of a crowd at such an event.

That is about all there was to it. I went through this three times over the course of the summer and each time was a better success than the first. At the end of the camp session I gave to each model rocketeer the address of the NAR along with the new flier that had just come out, the names of the seven manufacturers listed in the then-current issue of **Model Rocketry** magazine, and the names and addresses of NAR Sections in their area.

I found teaching a class in model rocketry last summer a very enjoyable way to spend the summer and indeed the whole experience of being a camp counselor was really great. I can't say that it is the easiest way to spend the summer or the best way to make a lot of money but it is one way to have a lot of fun, to be able to feel that you have accomplished something by helping to shape and be a part of the lives of so many young people, and to meet and become friends with others your own age from all over the country. If you are interested in doing this type of activity this summer then I suggest you get started right away. There are a few camps that already have a model rocketry program and there are many, many more, such as camp B'NAI B'RITH was last summer, that have never heard of model rocketry. Write to the camp and tell them you are interested in a job. Either when you apply or when you go for your interview explain your interest in model rocketry and take it from there.

Good luck and I hope you have as good a time this summer as I had last summer.

BOEING MANAGEMENT ASSOCIATION 1971 MODEL AERONAUTICS SCHOLARSHIP CONTEST

Dates: June 19 and 20, 1971.

Location: Boeing-Kent Space Center near Seattle, Washington.

Purpose: The purpose of the BMA Model Aeronautics Scholarship Contest is to reward excellence in designing, building, and flying model aircraft and rockets.

Contest Rules: The primary contest rules for entry are as follows: Anyone less than 19 years old on July 1, 1971, may enter. There are no restrictions in regard to race, sex or citizenship. Membership in AMA and/or NAR, and/or Model Aeronautic Association of Canada is required.

Scope of Contest: To scope the wide range of interests and capabilities of modeling youth, three categories were originally selected and will be repeated in 1971: Free Flight (6 events), Control Line (5 events), and Speciality (6 events). In each category at least one event is included for simplicity and one event for difficulty. The events are as follows: Free Flight, ½A Gas; Unlimited Rubber; Hand Launch Glider; Tow Line Glider (Combined Nordic A1 and A2); Cargo; and Helicopter. The five events included in Control Line are: 1. ½A Profile Proto Speed, 2. Navy Carrier, 3. Precision Aerobatics, 4. Control Line Scale Racing, and 5. Combined Speed/Record Ratio, where all models are flown against existing AMA record in their engine class. Events in this speciality category are: 1. Indoor Hand Launched Glider, 2. Indoor Easy "B" (AMA rules modified so that paper cover, wood propeller and solid stick fuselage, and no external bracing are required), 3. Rocket Quadrathon (per the NAR Sporting Code of 1967), 4. Rocket – Swift Boost/Glide, 5. Radio Control Class A Pattern, and 6. Design Craftsmanship (in this special event, model must have been entered in competition and must have flown and scored in an event). Damaged models are eligible. Judging will consider innovation, execution, quality, finish, accuracy and fit. All models will be displayed to the judges. A minimum of five judges will rank the models by elimination. A short entry form will be available to permit description of originality, tools, technique, materials, processes and such other features of the entry for the benefit of the judges and contestant. Supplemental analysis and descriptive data to be included and referenced in the entry form.

Scoring: Points will be awarded on the basis of 25 for 1st, 20 for 2nd, 15 for 3rd, 10 for 4th, and 5 for 5th place in each event. Contestants may enter any number of events. However, a maximum of three events in any one category will be scored. The contestant's best score in four events will be combined to determine the winner of the contest. Trophies will be awarded to the first three contestants in each event. Ties will be broken on the basis of the number of events won.

Scholarship: The Boeing Management Association will pay up to $1,500.00 for tuition, books, supplies and normal living expense in any one calendar year prior to the 21st birthday of the winner. The winner may enter any accredited college in the United States that will accept his enrollment.

Additional details are available from:

The Boeing Management Association
P. O. Box 3999
Seattle, Washington 98124

Attention: Mr. Herman Clegg
Organization 1-1835
Mail Stop 85-48

November, 1970 LAC Meeting

by Bob Mullane

On the evening of November 27, four members of the Leader Administrative Council (LAC) gathered at the Philadelphia International Airport Motel for an informal meeting. The next morning the members, Mark Barkasy, Chas Russell, Elaine Sadowski (secretary), and Bob Mullane (chairman) held the formal meeting to decide which projects would be handled during the 1970-71 term. Following is a brief description of the outcome of that meeting.

Now that the LAC Newsletter Award has been operating for two years (see Nov. 1970 *Model Rocketeer*), an analysis will be made of the manner in which the award has been administered and judged. This study will concentrate on the experience gained by the LAC in running the award and the opinions of the newsletter editors, and is being conducted by Elaine Sadowski who has run the award since its inception. Results of the study will be sent to all newsletter editors and will appear here in the **MRm.**

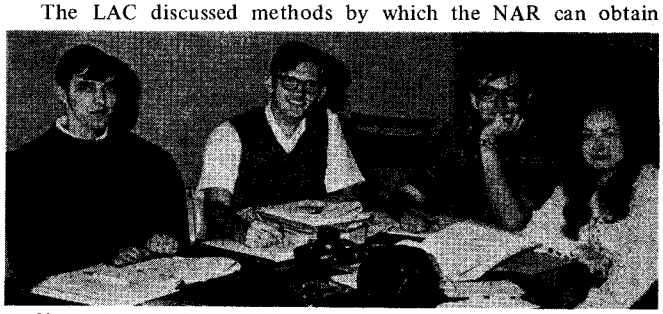
The first three chapters of the Section Manual being produced by the LAC will finally be available this year (they should be available about the time you read this) and the next three chapters are being revised under the control of Wanda Boggs. They will be available sometime after NARAM-13. Wanda is also compiling the results of the LAC questionnaire which was included in your NAR membership renewal packet in December. This survey was similar to NAR Evaluation Seminars conducted by the LAC at conventions and at NARAM-11 during 1969. It is hoped that the results of this survey can serve as a guide for the NAR in improving services to its members.

Mark Barkasy is conducting a study into the feasibility of producing a new NAR film and a set of slides for use by sections and individuals in publicizing the NAR, creating sections, and expanding sections. Mark is also compiling a list of films which are available from various sources which may be of interest to rocketeers.

A number of new scale plans are being prepared by Chas Russell for NARTS. These plans will be more complete than the present plans and it is hoped that the NAR Contest Board will allow these plans to be used as fulfilling the "minimum data" requirements of the Pink Book which the present plans do not fulfill. Rocket Equipment Company has agreed to make available glossy photos of the rockets which will be in the plans series. NARTS is also being aided by Bob Mullane who is co-ordinating the efforts of several NAR members in rewriting many of the Technical Reports available from NARTS. The plans and new reports should be available from NARTS before NARAM-13.

Acting on a request from NAR Section Director Bob Atwood, Richard Malecki will aid any Leader or Junior member who wishes to form and "wet nurse" a section for one year. Bob has requested that all Leader members aid in this effort. Anyone interested should contact Richard Malecki, Box 33698, Georgia Tech, Atlanta, Georgia 30332.

The LAC discussed methods by which the NAR can obtain



November LAC meeting with (l. to r.) Mark Barkasy, Chas Russell, Bob Mullane, and Elaine Sadowski. Unable to attend were Wanda Boggs, Richard Malecki, and Arnold Pittler.

financial aid in order to prevent further dues increases and will attempt to study this problem. One idea put forth (which will be given to the Board of Trustees for consideration) is that the NAR request that members publishing articles about model rocketry either in **MRm** or elsewhere donate a portion of the payment they receive for the articles to the NAR.

The LAC will again meet at the Pittsburgh Spring Convention this month and possibly at the MIT convention next month. These meetings are open to all NAR members, who are also invited to contribute comments at the end of the meetings. Announcement of time and place of the meetings will be made at the conventions. Anyone with suggestions or questions for the LAC, and any Junior and Leader members interested in aiding the LAC should contact: Bob Mullane, 34 Sixth St., Harrison, N. J. 07029. Any Leader member interested in running for election to the LAC should see the announcement elsewhere in this issue.

LAC ELECTION ANNOUNCEMENT

This year, balloting for the Leader Administrative Council will be open to all Leader and Senior NAR members. Any NAR member who will be a Leader at the time of NARAM-13 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:

Bob 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 received before April 20, 1971 at the above address.

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

LAC NEWSLETTER AWARD

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

To enter the newsletter contest, send one copy of each issue published since NARAM-12 to:

Elaine Sadowski
1824 Wharton Street
Pittsburgh, Pa. 15203

Winners will be announced and the rotating first-place trophy will be presented at NARAM-13.

AN ANALYTIC REPRESENTATION OF MODEL ROCKET THRUST-TIME CURVES

Manning Butterworth NAR #213

The discussion that follows pertains to the Series I type engine made by Estes Industries, Centuri Engineering, and Rocket Development Corporation, and is an attempt to represent the thrust time curves of these engines with a mathematical function. Data were taken from the **Handbook of Model Rocketry** and the manufacturers' catalogs.

This type of engine is characterized by a sharp peak soon after ignition and a subsequent plateau of very nearly constant thrust until burnout. The mode of attack used by the author is a common one in physical problems and consists of breaking the problem into two parts each treating one of these two distinct features. We may represent this generally as $F(t) = f1(t) + f2(t)$, where f1 represents the plateau and f2 represents the peak and t is the time.

It was decided arbitrarily that $f1(0) = f2(0) = 0$, hence f1(t) must approach the sustaining thrust asymptotically. Such a function is $fl(t) = at/(1 + bt)$; a, b are constants. As t approaches infinity fl(t) approaches a/b, the sustaining thrust.

We demand that f2 momentarily become large and then drop to zero; this produces an early peak and leaves the plateau unaffected. A function meeting the requirements of f2 is $f2(t) = ct/(1+hT(t))$; c, h constants, and T(t) some function of t. The simplest form of T(t) which gives the desired behavior is t^2 which clearly fulfills our demands, in fact, so does any function of the form t^n, n an integer greater than 1. The larger n is, the sharper the peak.

The remainder of the solution of the problem involves fitting a, b, c, h, and T(t) to the shape and the horizontal and vertical scales of the experimental thrust-time curve. The function we are *deriving is not a prediction* of what said curve should look like but what it does look like.

The constants easiest to fix are those of f1 since a/b = the sustaining thrust. The **Handbook of Model Rocketry** shows this as 10 ounces. Also, sustaining thrust is assumed at approximately 0.4 seconds; to achieve this, a and b should be about 500 and 50 respectively. The remaining unknowns must be found by trial and error and the following have been found to work reasonably well:

$$c = 150,\ h = 1600,\ T(t) = (t - .02)^4.$$

The constant .02 serves to shift the peak slightly to the right; the **Handbook** indicates this peak as occurring at .15 seconds approximately. Thus, we have $f2(t) = 150t/(1+1600(t - .02)^4)$.

Another important check on the final graph is the area under it or the total impulse. In computing this it was assumed that the thrust remained at the sustaining level until burnout when it dropped to zero. Total impulses for different engines were then calculated by simply truncating the same graph at different times. The function used for the graph shown and one of those tested for total impulse was $F(t) = 550t/(1+50t) + 150t/(1+1600(t - .02)^4)$ which agrees to within 5% of the published values for the total impulse of ½A, A, and B type engines. Definite conclusions are difficult to draw because of conflicting information – the durations indicated in the **Handbook** and in the catalogs do not agree. The durations from the catalogs were used giving values of the total impulse somewhat too small for B engines and somewhat too large for ½A and A engines. This suggested a slightly higher sustaining thrust than that shown in the **Handbook** and this is the reason for using a = 550 instead of 500. If the metric system is used multiply F(t) by a scale factor of 0.278 newtons/ounce.

Until more exact data become available there is little point in much refining the above approximation, which is not to say the above is the best approximation possible even now.

The final studies including the computation of the total impulse were done on a computer, and the result is intended principally as a simple formula which may be used in computer studies of model rocket flight.

(Club Notes, cont.)
Society's section meet, Seamee V, are reported in the latest issue of their newsletter. In the Sparrow Rocket/Glider event Ron Pera turned in the best time with 13.5 seconds. Jim Pommert topped the Swift Boost/Glide field with 201 seconds. In Hawk B/G the Medina Team placed first with 210 seconds. Alan Dayton placed first in the Eagle B/G event with a 174 second flight.

A new model rocket club has been formed in Fort Wayne, Indiana. The Smoking Saturns Rocket Club has had several launches. Interested rocketeers can contact Greg Stewart, 1324 Fletcher Ave., Ft. Wayne, Indiana 46803.

Send your club or section newsletters, contest announcements and results, and other news for this column to:
Club News Editor
Model Rocketry Magazine
P. O. Box 214
Astor Street Station
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:

SOUTH SEATTLE BOOST/GLIDE CONTEST

by Bone

It was the best of times. It was the worst of times. It was SEAMEE 5, an all B/G section meet held by the South Seattle Rocket Society way back on November 29, 1970. During that freezing, overcast day, three world records had been broken. Here's what happened.

The 1st official flight of the day was an Eagle class B/G built by the Medina Team. It was a parasite glider strapped on to Mike M's infamous Pusher – a 4-ft tall 4-engine clustered monster renamed the Pusher Delight. As if in feeble memory to NART-1 and the East Coast, the 5 in. parasite glider disintegrated into a dozen pieces.

Randy Sprague had a rocket glider constructed on the Space Plane principle, with an engine hook to catch the spent engine casing. Upon ignition, the little devil almost caught the ground, and Ron Pera to boot. It was the only entry in B Division so he didn't get any points.

Alan Dayton was at the range before the rest of the group came. He was testing his Mantas. He had Midi-Mantas, Maxi-Mantas, and Manta-Mantas. (Another H. Kuhn here!) His Swift entry really went up there, but the Manta wasn't quite trimmed. It would do a couple of forward rolls, somersalts if you will, then flatten out for a couple of turns, then go through the whole thing again. Duration, one minute and twenty seconds.

The Medina Team flew a new creation for Swift – they call it Grendel's Child. A perfect straight-up flight. There was a slight stall, but it still outflew Alan's Manta with 87 seconds.

In D division, Ron Pera got winged by the Red Baron. The streamer from the pod got hung up on the stabilizer, and fluttered behind it – in a glide. He got 29 seconds and 3rd place in Swift.

In C division, Jim Pommert had a fantastic flight for Swift. His bird, the "I'm Swift," stayed up the longest and was one out of three with flights over 200 seconds. It took an easy 1st place.

The 1st Condor flight of the day was a model built by the Medina Team. An F engine powered parasite glider, the Acapulco Blast was still thrusting after it broke through the cloud layer estimated at 1000'. It took over a minute before the booster came into sight, and the 3" glider wasn't far behind. The booster was recovered, but the glider was lost in the ankle deep grass. Time: 160.6 seconds, and a new world record. (Unfortunately, the record is unofficial because of a mixup.)

Alan Dayton brought out his entry for Condor. A Maxi-Manta, also powered by an F7-4. Like H. Kuhn's Maxi-Manta at NART-1, it had an 8 second flight. In other words, it power pranged. Both times! (Seattle dirt (mud) is a bit softer – it keeps damage to a minimum.)

Alan's entry in Eagle was a bit more successful, though. This was also a Maxi-Manta, this time powered by an E5-2. With a 174 second flight, it was good enough for 1st place and a world record. (This record is pending because he didn't get mixed up.)

The B division really messed up their Condor & Eagle flights, due to bad luck or inexperience with high powered models, or both. Don Beadle had a three D powered pop-pod, but a premature separation DQ'd him. James Schuchman had a three D job, but it suffered a catostrophic failure, also. It seemed to be a structural failure of just about everything. Randy Sprague had an old bird with a new twist: a Big Bertha with a *fold everything* inside. Flying it Hawk, it failed to unfold, thus failing to qualify, though it had worked previously.

Jess Medina had been doing a lot of work with swing-wings lately, and his Hawk entry had a fine upward flight, but the wings didn't completely spread out at ejection. The glide was kind of steep, but it did glide – looking like a Flying A. His Condor bird, called the "Kondor Killer," was on the large side. Using a three D pod, it had built-up wings with a wingspan of 42 inches, unfolded. He got all three D's to go, but about 250 feet up, something was seen leaving the model. It went unnoticed for the next few moments until ejection. Coming in a rather steep glide, it buried its nose into the soft Seattle sand. Upon recovery, 5" of the left wing tip was found to be missing. But it was the only entry in D division to have an otherwise safe glide, thus it placed first.

The Hawk B/G's really did well, with the best flights over two minutes. The Medina Team brought Grendel's Child out again, this time with a C6-3. Trimmed for a flat glide, it tuned in 210 sec. for 1st place and the 3rd flight of the day good enough for a world record. Again, there was a mixup, so the record remains unofficial.

The last flight of the day was a Bomarc flown by Pete Berg. As if in memory to the day's activities, it did a couple of loops under power!

SEAMEE V RESULTS

SPARROW R/G

no entries in A division			
B div.	one contestant		
C div.	1st	Medina Team	4 sec.
	All others DQ'd		
D div.	1st	Ron Pera	13.5 sec
	All others DQ'd		

SWIFT B/G

B div.	1st	Jim Schuchman	68 sec.
	2nd	Don Beadle	13.1 sec.
	3rd	Randy Sprague	10 sec.
C div.	1st	Jim Pommert	201 sec.
	2nd	Medina Team	87 sec.
	3rd	Alan Dayton	80.5 sec.
D div.	1st	Lew Walton	99.5 sec.
	2nd	Jess Medina	49 sec.
	3rd	Ron Pera	29 sec.

HAWK B/G

B div.	1st	Jimmy Jakeman	110 sec.
	2nd	Don Beadle	90 sec.
	3rd	Pete Berg	51 sec.
C div.	1st	Medina Team	210 sec.
	2nd	Alan Dayton	112 sec.
D div.	1st	Lew Walton	206 sec.
	2nd	Ron Pera	20 sec.
	3rd	Jess Medsna	10 sec.

EAGLE B/G

B div.	All DQ'd		
C div.	1st	Alan Dayton	174 sec.
D div.	1st	Lew Walton	65 sec.
	2nd	Ron Pera	60 sec.

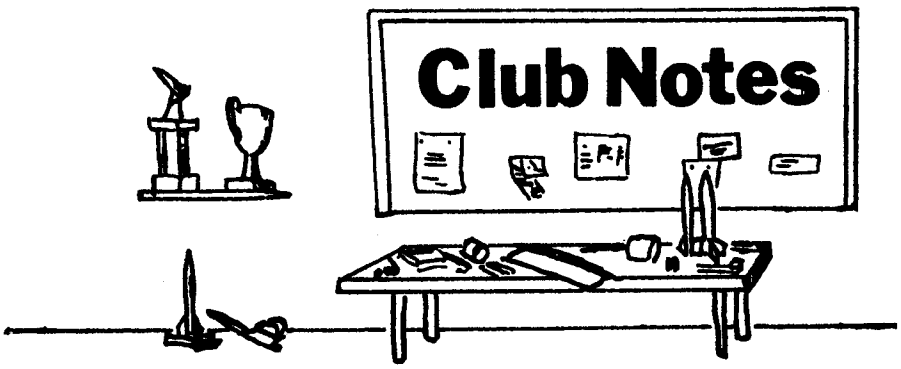
CONDOR B/G

B div.	All DQ'd		
C div.	1st	Medina Team	160.6 sec.
	All others DQ'd		
D div.	1st	Jess Medina	23.8 sec.
	All others DQ'd		

Tony Medina sets up Grendel's Child for its Swift B/G flight. The model turned in an 87 second flight to take second place in C Division.

Don Beadle preps his "swing-wing" Hawk entry. The model broke through the cloud level on the way up. It was timed for 90 seconds before it was lost.

Alan Dayton stands beside his enlarged Manta entry flown in the Eagle category. This model was well trimmed, and turned in a 174 second flight.



A new model rocket club is being formed in the Roanoke, Virginia area. Eventually the club plans to charter as an NAR section. Interested rocketeers are invited to contact Peter Andrews at 3622 Meadowlark Rd., Roanoke, Va. 24018, or Tom Sutton at 5340 Grandon Rd., Roanoke.

The Monroe Astronautical Rocket Society of Victor, New York has announced plans for a special meet to be held in the Spring. The recently organized model rocket club of the U.S. Air Force Academy has been invited to an area meet on the weekend of April 24-25, 1971. This meet was arranged through Cadet William Arthur III, an original founder of the Monroe Astros, who is now attending the Air Force Academy. Modelers from the upstate New York area will compete against the Air Force Academy teams in the following events: Hornet B/G, Class 1 PD, Class 00 Altitude, Open Spot Landing, and Class 1 Streamer Duration. Modelers wishing more information on this meet should contact Greg or Lee Howick at 2424 Turk Hill Road, Victor, New York 14564.

A new rocket club is being formed in the Greenacres subdivision of Bossier City, Louisiana. Rocketeers over the age of 8 are invited to join the club, which has already held six contests and employs two flying fields. Contact Carl Webster, 2412 Ashland Ave., Bossier City, La.

The Greater Jacksonville Model Rocket Club was formed last September in the Jacksonville, Florida area. The club meets on the second and third Saturdays of each month at the Rowland Laboratories. Rocketeers interested in joining the club should contact Richard Stamp, 2217 Bourget Dr., Jacksonville, Fla. 32210.

The latest issue of the Steel City newsletter – *The Starburst* – reports on the Pittsburgh and Ohio contest schedules for the remainder of this NAR contest year. The first meet on the schedule is an Ohio Area Meet, site as yet not announced, on April 17-18, 1971. Prang II, sponsored by the Steel City Section, will be held in the Pittsburgh area on May 1-2, 1971. Another Ohio Area Meet is scheduled for May 22-23, 1971, and the last meet on the schedule – MMRR-71 – is on June 26-27, 1971 in the Columbus, Ohio area. More details on these meets will be carried in the *Modroc Calendar* when they are received from the sponsoring clubs.

A model rocket club is being formed in the Portland/Corpus Christi, Texas, area. Interested modelers are asked to contact Ricky Snodgrass (643-3459) or Russell Owens (643-3129) for more information.

The Town of Highland Falls, New York, Model Rocket Club is planning to resume activities in the Spring. As they did in 1970, the club will hold their meetings in the Highland Falls Fire Department. On the schedule for their April 1971 meeting is the election of officers, scheduling of contests, fund raising drives, and discussion of a picnic for members later in the summer. Other clubs in the vicinity are invited to contact the Highland Falls club about the scheduling of a joint contest. Contact the Adult Advisor, Michael J. Carcusio, Rt. 218, Highland Falls, N.Y. 10928.

A model rocket club is being formed in Nashville, Tennessee. Rocketeers interested in joining this club should contact Tommy Brown, 2909 McGavock Pike, Nashville, Tenn., or Charlie Siler, 2914 McGavock Pike, Nashville, Tenn.

The Mount Hermon Model Rocket Society is going strong in its second year in Mt. Hermon, Massachusetts. The club plans a contest in the Spring. Club officers are: Jeff Kessler, president; Eric Van, vice-president; Rick Lindgren, secretary.

A new model rocket club is being formed in the Memphis, Tennessee area. The club, called the Whitehaven Model Aviation Club, is looking for new members. Interested rocketeers should contact John Barker, 4368 Hodge Rd., Memphis, Tenn. 38109.

A new NAR Section was formed in October 1970 in Charlotte, North Carolina. The Hornet's Nest Section has its own launch site, multiple-position launcher, and a 25 watt PA system. Presently the club has 42 members. Launches are held every Sunday (weather permitting) from the club's 50 acre cleared launch field. Rocketeers desiring more information on this club can write to: Hornet's Nest, 5012 Valley Stream Rd., Charlotte, NC 28209.

The SIMRAD club in Saginaw, Michigan has announced their officers for 1971. Newly elected are Michael Dillon, president; Roger Schneider, vice-president; Peter Beck, treasurer, and Chuck Richter, secretary. The club launches every Sunday at 1 PM from the Arthur Hill High School in Saginaw.

Results from the South Seattle Rocket

(Continued on page 38)

For the past two years Cub Pack 6B Scarboro West of Toronto, Canada, has been involved in model rocketry. Late last year the club divided into two Toronto chapters, one senior in the west and the other in the east involving intermediates and juniors. The group is called the Venturers Aeronautical and Space Administration (VASA), and is supervised by J. Ward. Toronto rocketeers interested in contacting VASA should write J. Ward, 70 Gilmour Ave., Toronto, Ontario, Canada.

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