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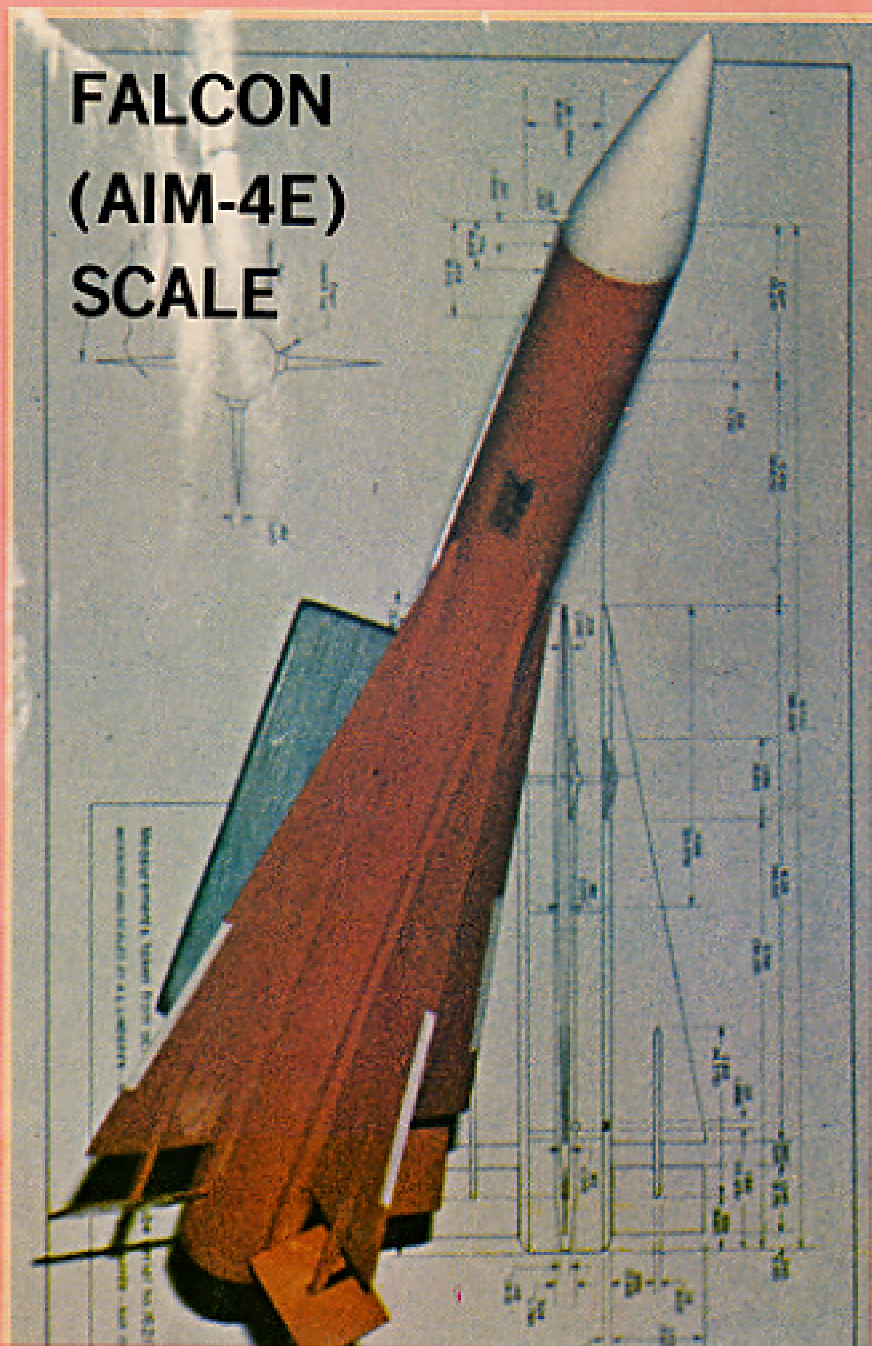

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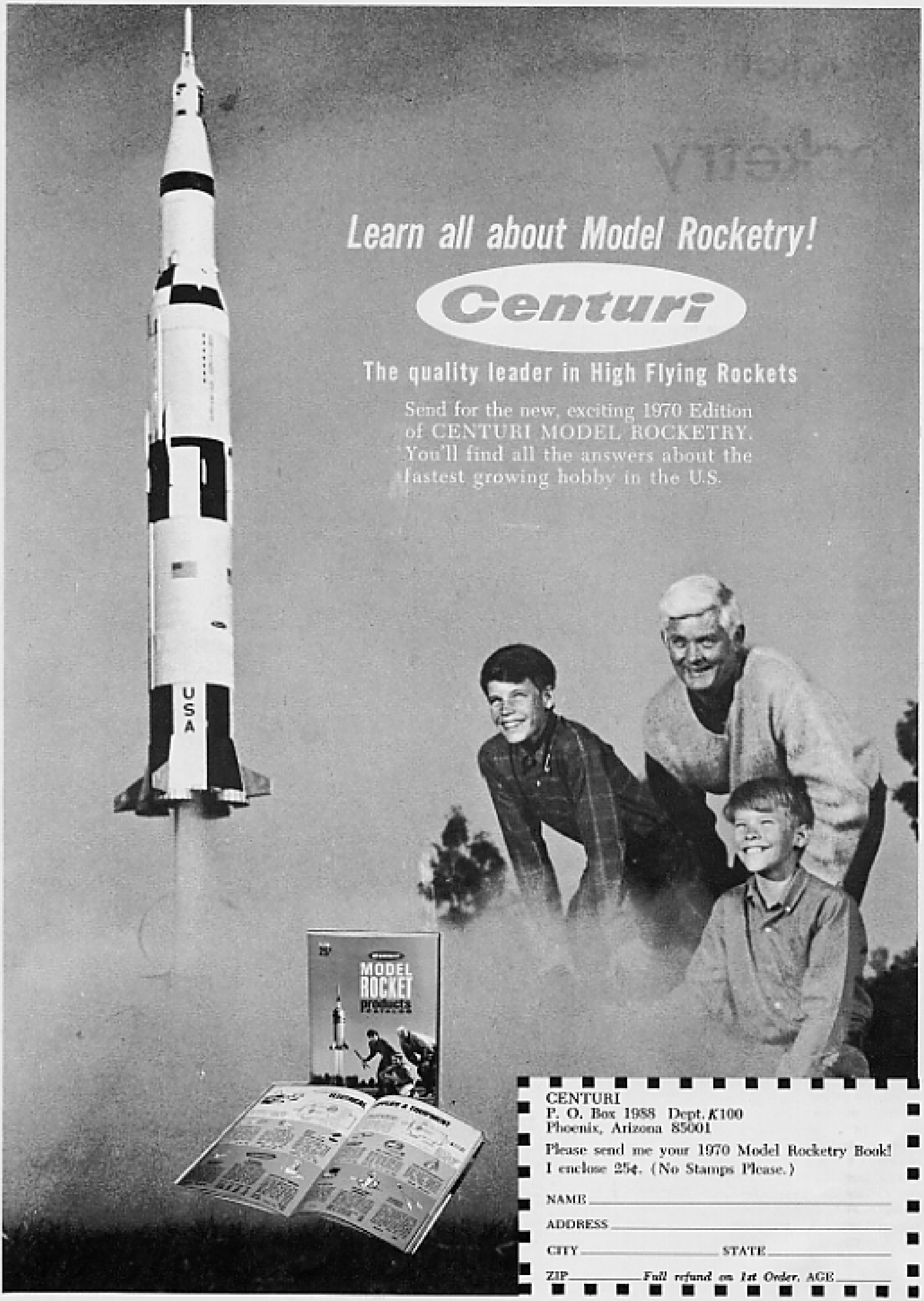

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Model Rocketry

Volume II, No. 12
September 1970

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Cover Photo

This month's cover shows a scale model of the USAF Falcon (AIM-4E) Air-to-Air missile. The model, as well as the plans and photos in this issue, were done from an actual missile airframe on loan from the Air Force. For complete plans see the article beginning on page 8.

Regular Features

Worldwide newsstand distribution by Eastern News Distributors, Inc., 155 West 15th Street, New York, New York 10011. Hobby shop distribution by Kalmbach Publishing Co., 1027 North Seventh St., Milwaukee, Wisconsin 53233.

Second class postage paid at Boston, MA and at additional mailing offices.

Model Rocketry magazine is published monthly by Model Rocketry, Inc., 595 Massachusetts Avenue, Cambridge, MA 02139.

Subscription Rates: US and Canada $6.00 per year, $3.50 for 6 months, 60 cents for single copy; Foreign $9.00 per year, $5.00 for 6 months, $1.00 for single copy. For change of address please notify Subscription Department, Model Rocketry, Box 214, Astor Street Station, Boston, MA 02123 at least 6 weeks in advance. Include former address or mailing label with the new address.

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

Undeliverable copies, notices of change of address, subscriptions, and material submitted for publication should be submitted to Model Rocketry, Box 214, Astor Street Station, Boston, MA 02123.

Printed in USA

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From the Editor

Once again summer vacation is over and most model rocketeers are starting to think about returning to school a few weeks hence. Perhaps we should take some time out to consider the newly developing role of model rocketry in education. It seems quite clear, at least from a prejudiced viewpoint, that the model rocket hobby has more educational promise than any other of the construction hobbies. Rocketry, being as yet a new hobby, provides challenges in design, payload construction, etc., which are subject to scientific solution by students in elementary schools, high schools, and colleges.

Many schools have in recent years, introduced rocketry as part of their science curriculum. A quick look at the newspaper clippings from a three day period last June turns up mention of school rocket programs in Costa Mesa, California; Ithaca, Michigan; Roswell, New Mexico; Rye, New York; Elk Grove, Illinois; Bend, Oregon; and Terre Haute, Indiana. A complete list of schools employing model rocketry as part of the curriculum or actively sponsoring a model rocket club would be too long to be included in a single issue of this magazine. In addition, model rocketry has received the endorsement of the National Science Teachers Association. At this year's meeting of the National Aerospace Education Council, two seminar sessions, including one conducted by Norm Avery of Estes Industries, explored the use of model rocketry in education. In a recent article in the **AIAA Student Journal** Dr. Gerald Gregorek described the use of model rocketry on a college level. In short, teachers across the country are recognizing the value of model rocketry as a teaching tool and are introducing it into their classrooms.

(Continued on page 47)

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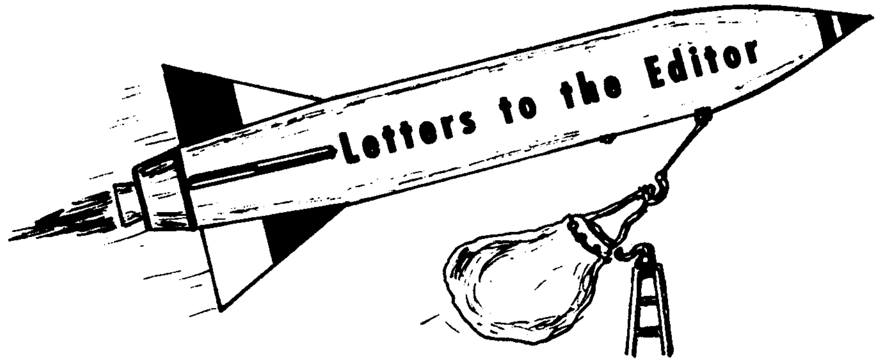

Gliding Rockets?

I think you might be interested in a recent experience I had with an Estes X-Ray rocket. This afternoon a friend and I decided to launch rockets. We loaded his X-Ray with a 1-ounce payload and a B6-4 engine. The rocket had earlier lost 1/8" from the tip of a fin because of a crash.

The flight was normal, but after ejection we noticed that the rocket was falling in two pieces. We discovered later that the shock cord had broken. However the rocket body, containing the spent engine, *glided* down, actually staying up longer than the payload section with its parachute.

Although no further work has been done yet, I will try to do more research to see if this rocket might possibly be modified as a boost/glider.

Greg Smith
Champaign, Illinois

It seems that many, if not most, standard rocket body tubes will "glide" down if properly balanced. Bob Parks had a similar experience with the sustainer section of his Orbital Transport. In addition, other rocketeers have reported similar experiences after shock cord failure. Thus far, though, there has been no serious study of this phenomona. Can the "glide" be improved to turn in times equivalent with good B/G's? Lets see some experiments!

Egglofting B/G's

I have been working on an egglofting boost/glider. My egg bill is getting pretty high, but I'm getting close to success. If anyone else has been working on this I would like to trade ideas.

T. D. Dailey
382 Chapel Hill
Columbus, Ohio 43228

Minimum PD Competition

I am new to model rocketry by virtue of the interest of my son, Scott Rider. It appears that there are several interesting and useful contest events commonly flown, but there is no mention of one which I think would be particularly exciting and challenging — Minimum Parachute Duration. In an event such as this the size of the parachute

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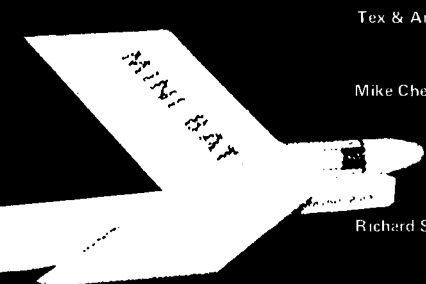

Tex & Art Team (CMRC) – 1st Place Sparrow B/G
MINI-BAT

Mike Chevernak (CMRC) – 2nd Place Sparrow B/G
MINI-BAT

Richard Sims (CMRC Vikings) – 3rd Place Sparrow B/G
MINI BAT

Karl Feldman (PVS) – 3rd Place Sparrow B/G
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MINI-BAT Boost Glider

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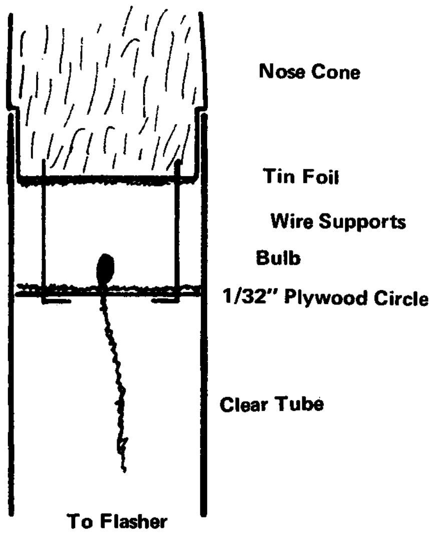
could be specified by the class of rocket, and the challenge would be in choosing the right delay and ballast to achieve opening as close as possible to the ground. The consequences of opening too late are obvious. Opening too early gives a higher duration and hence a lower score. The ideal flight for this event would have the parachute open just before the rocket touches the ground. Aside from providing contest excitement, this event would be less subject to wind interference than others.

T. H. Rider
Bedford, Massachusetts

Light Flasher

After seeing Forrest Mims article in the September '69 issue of **Model Rocketry**, and the letter in the March '70 issue, I decided to build what each of these articles was about — a light flasher. I chose to build the one described in the March '70 issue mainly because I had most of the parts needed on hand.

It seemed that the flash rate, one flash per second, could be used for time exposure photographic tracking, but not for tracking or watching with the naked eyes. Since a rocket can move quite a distance in a second, the one flash per second might cause loosing sight of the rocket, and maybe losing it completely.



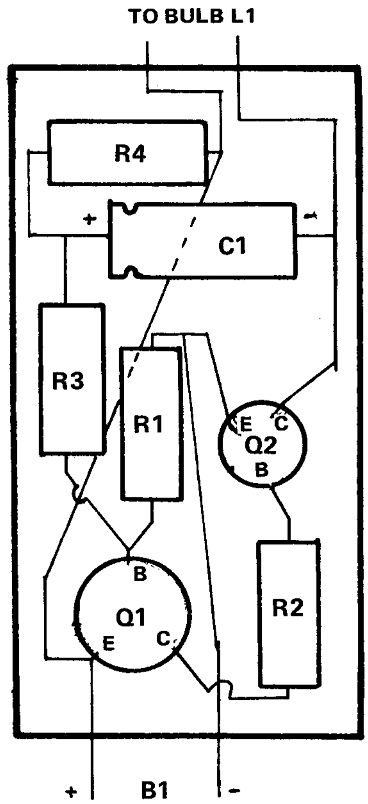
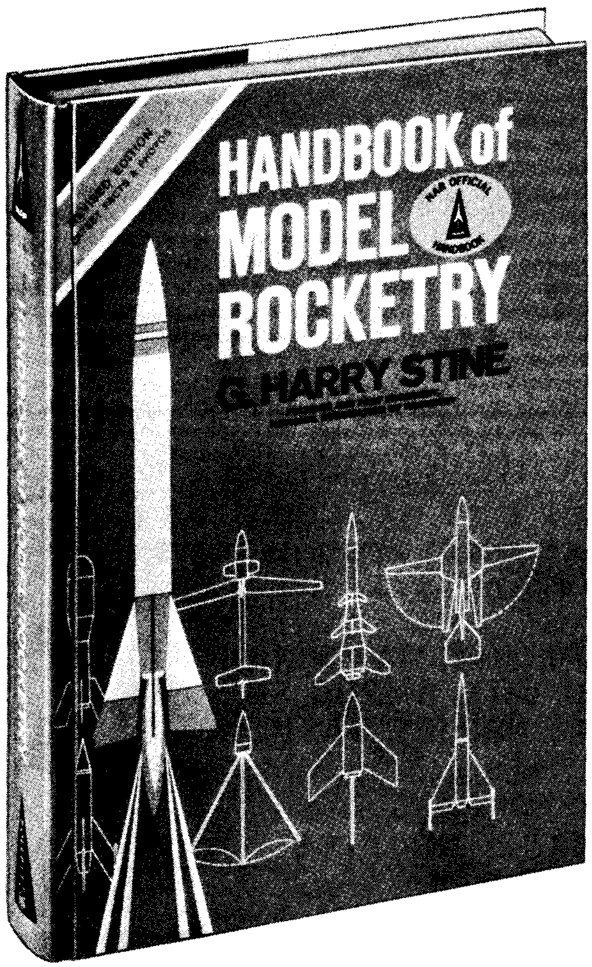


Diagram of parts layout (right) enlarged from actual size shows placement of components in Darrel Gardner's light flasher. (Above) Tin Foil attached to back of nose cone and front of plywood disk reflects light from the grain of wheat bulb out the sides of the clear plastic payload section.



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SOME COMMENTS ON EARLIER EDITIONS

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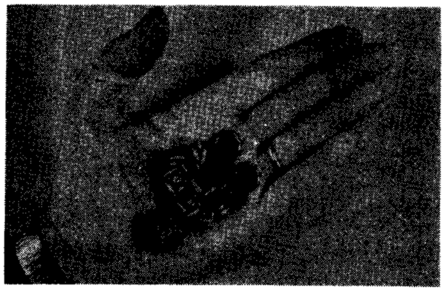

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I did a little experimenting and found that an extra 22,000 ohm resistor (R4) would raise the flash rate to nearly four times per second! In the unit I made, the optional resistor (R3) has a value of 4,700 ohms.

The flashes are distinct and very intense. The intensity can be raised even more by using a reflective bulb mount, which I have illustrated in the sketch.

If you don't care for etched circuits, but still want to mount your flasher on something light, strong, and easy to work with, then you're in luck! By using a piece of 1/32" fin-plywood (available at any hobby shop) and drilling 1/16" holes for the parts leads, you can still use salvaged parts with short leads and avoid the cost and MESS of etching your own circuit boards.

For those of you who can't read circuit diagrams, I've included a pictorial diagram of the modified unit with the parts in a logical layout. The parts needed are as follows:

B1	9 volt transistor battery
C1	2 mfd electrolytic capacitor
L1	2V, 60ma Grain of Wheat bulb
Q1	RCA SK-3011 NPN transistor (or equiv.)
Q2	RCA SK-3003 PNP transistor (or equiv.)
R1	1/4 watt, 820,000 ohm resistor
R2	1/4 watt, 1,000 ohm resistor
R3	1/4 watt, 4,700 ohm resistor
R4	1/4 watt, 22,000 ohm resistor

Darrel Gardner
Anchorage, Alaska

Utah Laws?

Utah legislation prohibits the use of sky rockets. Present legislation is vague about model rockets and so far has not had any effect on model rocketry in Utah. A local attorney is in the process of creating a bill to be introduced to the next legislature concerning model rocketry. The attorney has requested that I obtain information about model rocketry laws in other states.

I have been active in model rocketry for five years and have been a Senior member in the NAR and SCA. I feel that your experience in the area of model rocketry would be very helpful. Your magazine could provide support that otherwise may be hard to raise in this area. Your help in formulating this new legislation would be appreciated. Information about model rocketry laws in other states and comments from you and your readers about present model rocketry laws would be of considerable aid in formulating a law favorable to model rocketry in Utah.

L. C. Price
2700 Milo Way
Salt Lake City, Utah

In many states the fireworks laws were written before model rocketry was developed. Most states' fireworks laws date from the 1930's while the rocket hobby only began in 1957. For this reason, the status of model rockets is not clear under the state laws. Only in the states of California, Colorado, Connecticut, Maryland, Massachusetts, Michigan, New Jersey, and Washington have specific rules been written governing the use of model rockets. In all cases where specific legislation has been adopted, it has permitted adult supervised model rocket activities.

On The Spot Recovery Wadding

I have a suggestion for making recovery wadding if you run out and still want to continue launching. Take a roll of tissue and a full canteen of water along to the launch. Dampen the tissue completely, then squeeze out nearly all of the water. It's a little heavier than normal recovery wadding, but it will work. I have placed this stuff in a 250° flame for 30 seconds without even a scorch.

Roger Allen
Bethesda, Maryland

Polaris Plans

I think that some Polaris missile plans for a scale model rocket should be made available. I have looked for scale drawings and plans to construct such a model. I hope you will publish such plans in a future issue of **Model Rocketry.**

Michael Teerner
Fredericksburg, PA

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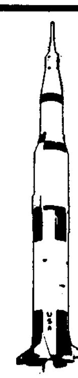

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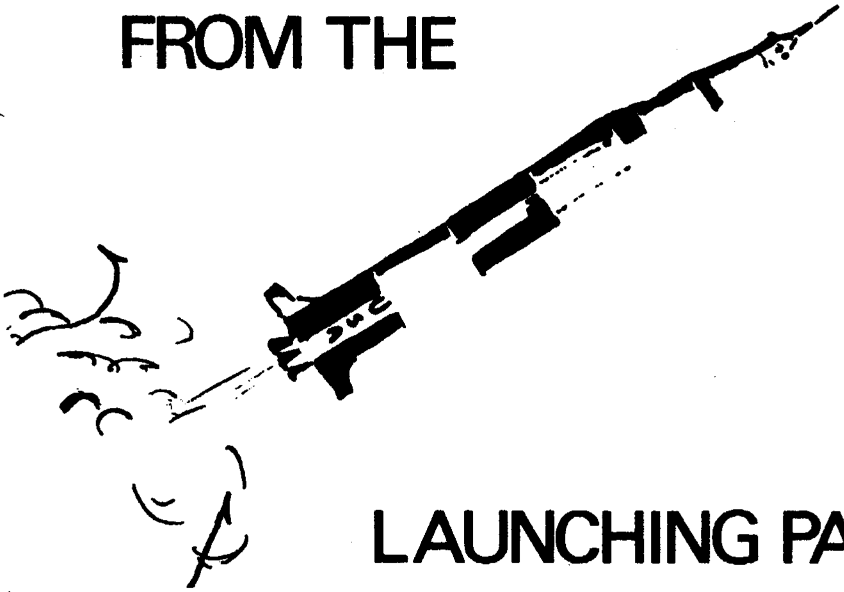


LAUNCHING PAD

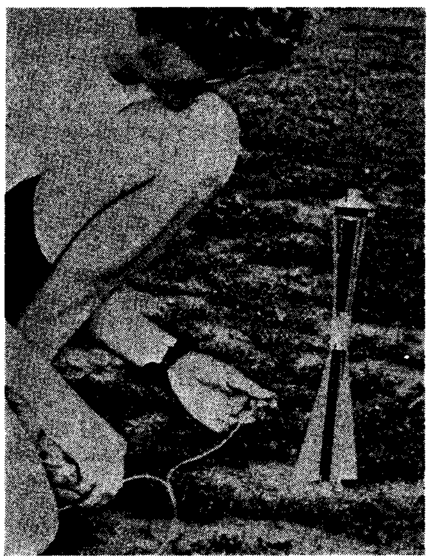
We are always on the lookout for good scale articles in other publications which might be of interest to model rocketeers. It seems this month that one has been published in the new British magazine **Scale Models**. The topic for their extensive scale treatment is the German World War II rocket plane — the Messerschmitt Me 163 "KOMET". With two full page drawings and 16 black and white photographs, Les Hunt does an excellent job of documenting everything down to the panel joints and rivet detail on the rocket powered plane which saw action late in the war. No one can fault his detailing, since the drawings were the result of personal inspection of several captured Me 163B aircraft on display in Great Britain.

The original Me 163's were powered a liquid fuel rocket engine burning Hydrogen Peroxide and a Hydrazine Hydrate — Methyl Alcohol mixture. So its quite legitimate to model it in scale competition. It's wings don't disqualify it from the rocket catagory. If you plan on a flying version, however, be prepared for some work — it takes quite a bit of nose weight to assure stability. Unfortunately, the only plastic model of the Me 163 available, a 1/72nd scale kit by Lindberg, is too small to accept an 18mm dia. engine, so a plastic conversion isn't possible right now.

If you're interested in this fine set of scale plans, get your hands on a copy of the July 1970 issue of **Scale Models**. It's published by Model & Allied Publications Ltd., 13-35 Bridge Street, Hemel Hempstead, Herts, England, and is sold at a number of US hobby shops specializing in plastic models as well as selected US newsstands.

Hillel Diamond and his Canadian Rocket Society have been putting on quite a series of interesting demonstration launches in Canada recently. They opened the 1969 Canadian National Science Fair exhibit at Eatons department store with a spectacular ribbon cutting display. A guide wire was stretched from floor to ceiling in Eatons, and a Big Bertha was placed on the guide wire. The mayor, having been instructed to push a button to officially open the display, was amazed to see the rocket lift-off, fly up the guide wire, and cut the ribbon with its fin. At the opening of the movie *2001* in a Toronto theater the Canadian Rocket Society came up with another display — this time only a static display of club launch equipment and model rockets. This type of public activity should go a long way in promoting the public acceptance of the hobby in Canada.

The *Escape Tower* seems to have some competition from South Seattle Model Rocket Society's Mike Medina. The last few issues of their newsletter — *The Modroc Flyer* — have contained a column called



Bob Parks' model of the Space Needle, built from the South Seattle Model Rocket Society plans.

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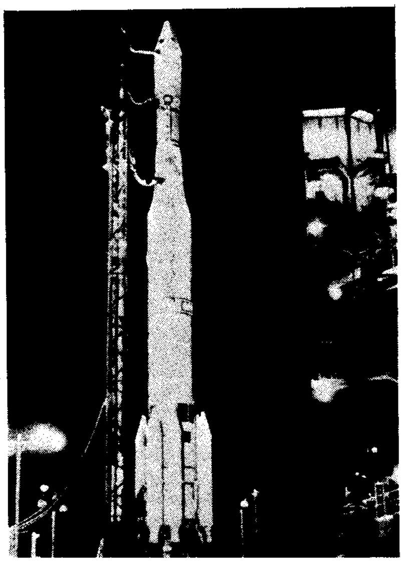

Now, a source for carefully selected black and white photographs for model rocket scale substantiation. The photos listed below are available immediately. More will be listed each month.

Delta-76, TAD w/6 strap-ons
D76-1: Rocket in Tower
D76-2: Strap-on Attachment
D76-3: Rocket on Pad
D76-4: Close-up of strap-ons
D76-5: Liftoff, 1/23/70

Delta-66, TAD w/3 strap-ons
D66-1: Liftoff, shows Tower

Little Joe I, (Mercury)
LJI-1: Checkout, Wallops
LJI-2: Liftoff, Wallops

Iris, Sounding Rocket
I-1: In-Flight, Wallops Tower

AS-506 (Apollo 11)
506-1: Mating 2nd stage
506-2: Mating 3rd stage
506-3: Liftoff (front view)
506-4: Liftoff (side view)

Nike-Zeus
NZ-1: Liftoff, White Sands

4 x 5	print	.60 each	5 for $2.50
8 x 10	print	$1.25 each	6 for $7.00

Rocket Equipment Co.
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"The Bird Brain", which features "oddball" plastic conversions and designs. The latest issue contains "scale plans" for a flying Space Needle — the prime attraction of Seattle's World's Fair of several years ago. Mike presents a very nice set of plans, and suggest that aside from being a fine sport model the Space Needle can be flown in the Spot Landing event in competition.

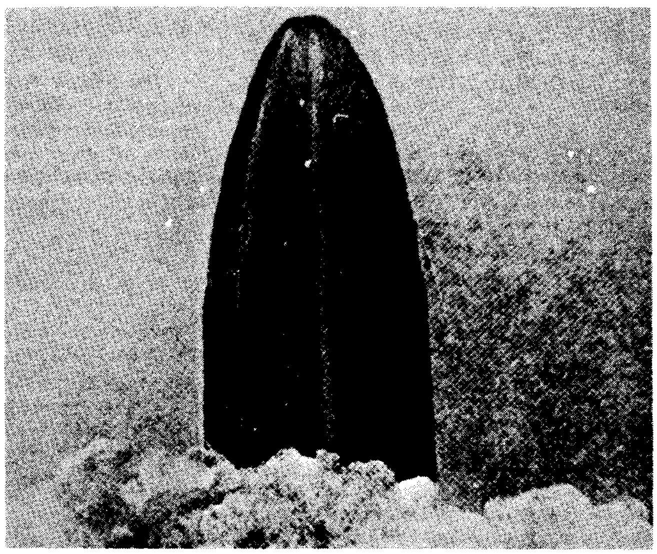
We've received many letters about the VOSTOK scale data contained in the past few issues of **Model Rocketry.** Perhaps a few words are in order about the difficulties involved in obtaining scale substantiation data on USSR space boosters. In many cases, though information is released by the Russians, its accuracy is highly questionable. According to the best available current information, the Sputnik I, II, and III satellites were launched with the same booster vehicle employed in the VOSTOK program. However, in 1957 the USSR released a photograph proportedly showing the launching of Sputnik II. The photo shows a rocket which actually appears to be a Soviet sounding rocket, and bears no resemblance to the RD-107 vehicle. Later, in a translation of a USSR book on the flight of Cosmonaut Yuri Gagarin, a photograph of the VOSTOK launch vehicle was published. This photo also bears no resemblance to the RD-107. Numerous additional photos of Soviet space boosters have been released by official USSR news agencies. The data provided by these photographs is *contradictory.*

In 1967, at that year's Paris Air Show, the USSR display contained a full size mock-up model of the RD-107 "VOSTOK" launch vehicle. For the first time the Russians disclosed that the VOSTOK booster was a 20 engine rocket employing four strap-on engine pods. Later this model was moved to a permanent display in Moscow, and *repainted with a different paint pattern.* When color movies of an actual VOSTOK launching were made available, it became clear that neither the Paris or Moscow display models were painted with the flight paint pattern. In fact the photos recently obtained by Rocket Equipment Company indicate that the VOSTOK vehicle is painted in the Russian Army equivalent of olive green.

It took G. Harry Stine quite a bit of research to produce the excellent scale drawings of the VOSTOK which appeared in our July 1970 issue. The material uncovered in his research was also provided to MPC for their flying scale VOSTOK model.

Some of the details of his efforts are contained in the release which accompanied the introduction of the RD-107 VOSTOK by MPC. In 1966 and 1968 he visited Czechoslovakia, where he looked through press files which contained data on the Russian space program. He reports: "I went through all the back clippings and releases and put all the relevent material into the little file folder I carried with me. Various technological journals from Europe and America also provided me with pieces of the jigsaw puzzle. Finally . . . I had all the information I needed [to] put together the specifications for the Vostok RD-107." That's what it takes to put together a scale article on the RD-107. But if you take a look at the plans, you'll have to admit it was worth the effort.

At the recent ARRA Model Rocket Convention in Montreal we had the opportunity



These two photos illustrate the confusion of Russian space boosters. At left is a widely distributed 1957 photo supposedly showing "the Sputnik 2 launch vehicle." Well, it's certainly not an RD-107 Vostok, or even anything similar to the RD-107. Above is a photo, from an official USSR history of Yuri Gagarin's space flight, which is claimed to show the lift-off of Vostok 1. Again, this USSR photo, released in 1961, shows a vehicle which bears no resemblance to the RD-107. The best current information indicates that the scale data contained in Model Rocketry's two part series on the Vostok is correct, but we'll never really know until the Russian veil of secrecy is lifted.

to discuss the Black Brant III rocket with Don Cruickshank of Bristol Aerospace, Ltd., manufacturers of that sounding rocket. He made several comments of interest to scale modelers. Since Bristol is in the instrumentation business as well as the rocket manufacturing business — in fact they take pride in pointing out that they offer scientists a "complete service" from designing the payload, and supervising the launching, to manufacturing the booster vehicle — many of their Black Brant nose cones are specially designed to accommodate a specific piece of scientific equipment. He reported that "very seldom do we have two that are made the same. Scientists may want trap doors that open, or a clamshell nose cone, or the whole nose to blow off, or any number of other things." That makes it pretty hard on the scale modeler, since its difficult to classify the BB III as a mass production vehicle when they are *all different.* In addition the BB III fins are set at very slight angles to achieve the desired roll rate. The angles are usually so small that they would not show up on the scale model, but they don't show up on the blueprint either since the angle is only selected after the desired roll rate of the payload is determined. If you take a look at Bristol's photos of the real Black Brant III's, they have the lettering "BRISTOL AEROSPACE" painted down the side in capital letters, not the fancy lettering an insignia on the display models (usually seen in photographs).

Bristol's latest project is a series of two meterological sounding rockets for the US Army. The first of these, a 4-1/2" diameter solid propellant rocket for meterology, was test flown from White Sands Missile Range in June, 1970. It is capable of carrying a 7 pound payload to 240,000 feet. In addition they are working on a much smaller rocket for tactical field meterology for the Army, which is capable of lofting a 2 pound payload to 30,000 feet. With the prices Bristol anticipates on these vehicles — the smaller one will sell for only $100 each in quantities of 25 thousand per year, which is the Army's anticipated need — these new Bristol rockets should be quite important in future meterological studies. We'll get to work on scale data on these.

It's just three weeks before NARAM as I'm writing this, and you can bet that quite a few new contest designs are shaping up on the work benches of **MRm's** staff. Among the novel concepts to be tested, we hope, at NARAM this year are the "flop-wing" B/G (see article elsewhere in this issue), perhaps a vacuum formed egglofter, also perhaps a fiberglass egglofter, some styrofoam wing B/G's, and many other things. In addition, I'm sure many modelers across the country have new, and good ideas that will be introduced at NARAM. We'll be on the lookout for successful new developments, and you can be sure that many of the articles you will be seeing this fall and winter in **Model Rocketry** will have their beginnings at NARAM.

George

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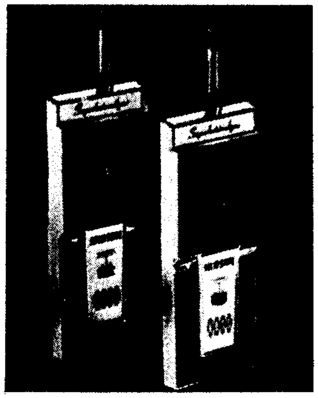

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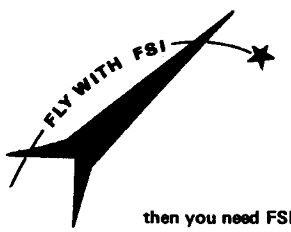

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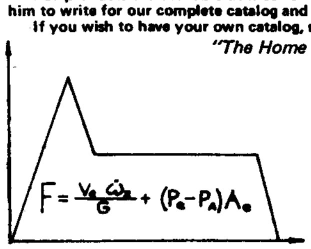
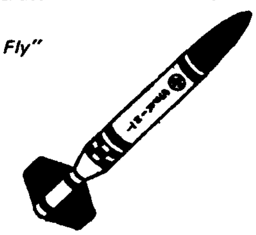




Scale Data:

USAF Falcon (AIM-4E)

by Al Lindgren

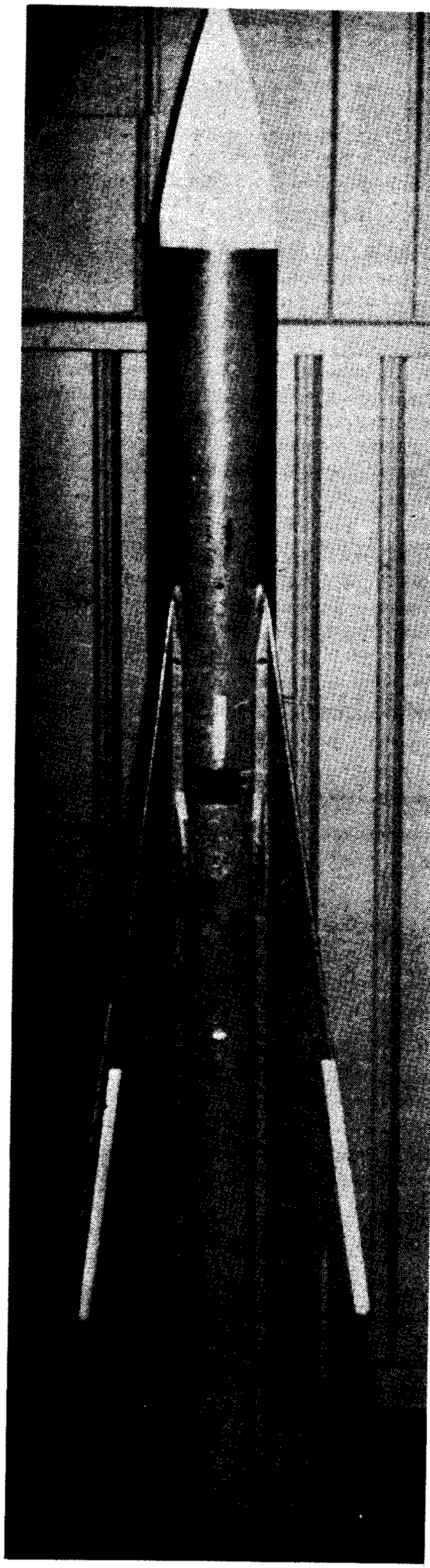


Photo by Bob Mullane

An actual USAF Falcon AIM-4E, serial number 162175, was used to determine the scale data. The overall paint color is orange with a white nose cone and white bands on the leading edges of all four fins. Also note the location of the Falcon emblem just forward of the fins, and the electrical connector on the body just to the rear of the forward part of the fin.

A scale modelers dream – to prepare the model with a prototype sitting next to the construction area for easy reference. Measure, and build, take a little off the nose cone, check with the prototype again, compare the paints . . . what more could any scale modeler dream about. Well, that's the way it was for my model of the USAF GAR-3A Falcon!

Late last year, Space Age Industries borrowed a production line Falcon airframe from the local Air Force base and the fun began. SAI wanted the Falcon to get data for their new Falcon scale kit (to be released later this month), but it seemed like an opportunity too good to pass up so I got started on the model.

When I decided to do the model I got out my tape measure and went over the prototype, then again . . . and again, just to be sure the data was accurate. You can't get any more accurate data than when you're sitting there staring at the prototype. And since the Falcon is a mass production missile, with over 25,000 of them delivered to the Air Force to date, the SAI prototype is identical (except for minor scratches) to the Falcon that sits under the wings of the USAF fighter planes.

Bob Thayer took Al's data and prepared the scale drawing which accompanies this article. He scaled the model around a 30mm tube (such as the SAI T-30), but the prototype dimensions (in millimeters) are given on the drawing in parenthesis. Since the prototype was available for photography, we also have a set of photos so you can fill in the fine details.

So much for the story of the project, now let's consider building the model. Even a quick look at the prototype indicates that this is *not* a model for beginners. The

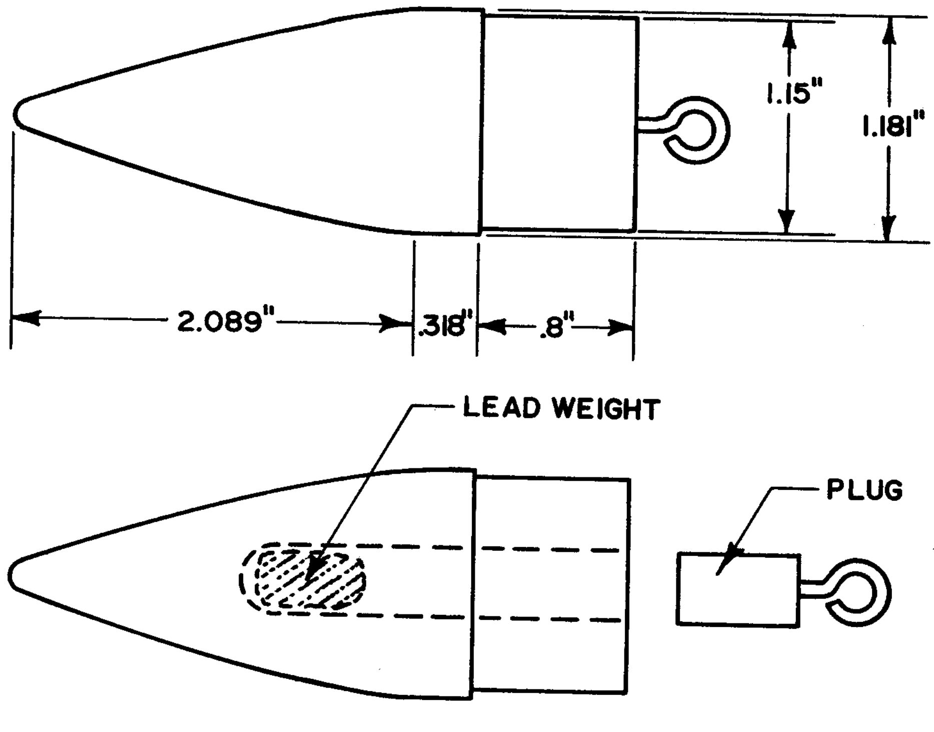


Figure 1: NOSE CONE. The nose cone is turned to the shape shown. The nose tip diameter is 0.091 inches. Dimensions are for a 30mm body diameter scale model. If additional nose weight is required, insert a lead weight as shown.

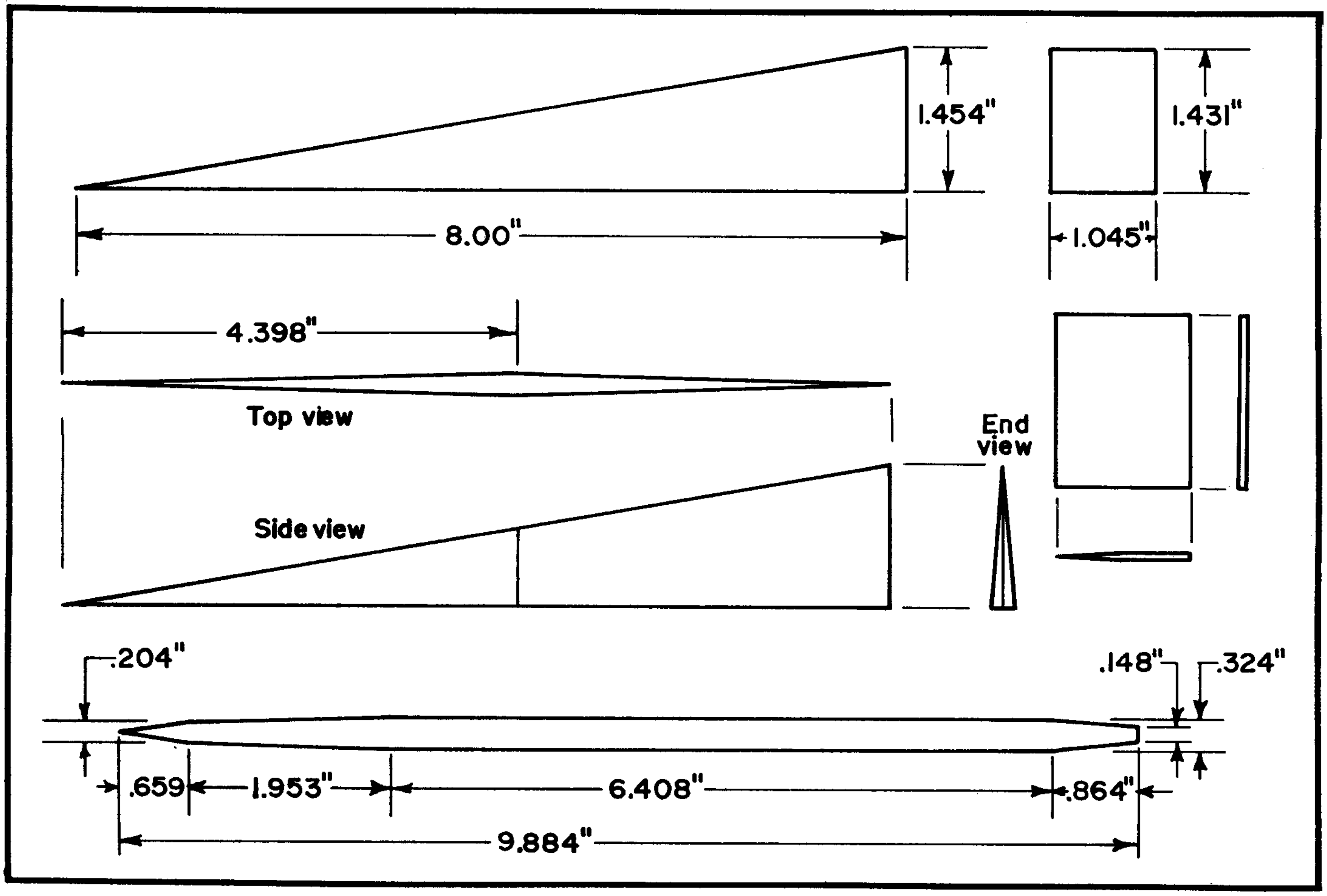


Figure 2: FIN ASSEMBLY. The foward fin section is cut from 3/16" balsa sheet, and shaped as shown. The rudder pieces are cut from 1/16" sheet balsa, and the fin root pieces are cut from 5/32" sheet balsa.

Falcon has a lot of forward fin area — and a correspondingly forward CP — so it will take a lot of nose weight to make it stable. Furthermore, the nose cone is not commercially available (though SAI is expected to include it in their kit) so you'll have to turn your own. Let's take a quick look into the history of the prototype, and then I'll go into details on the model construction.

History

Hughes Aircraft Company began developing an Air-to-Air weapon, the GAR-1, for the US Air Force in 1949. It wasn't until 1957 that the first version of this weapon was declared operational. In the intervening time, work was underway on numerous variations of the original Falcon. Aircraft generally carry mixed loads of Falcons with Infra-Red (heat seeking) and Radar guidance systems.

By 1958 the successor GAR-3 Falcon was ready for testing. The first 300 rounds, employing a semi-active radar homing system, were quickly superseded by the GAR-3A, later designated AIM-4E Super Falcon. The GAR-3A, standard production version since mid-1959, has a new dual thrust motor, furnished by Thiokol, and a guidance system more resistant to countermeasures. It can be distinguished from the GAR-1 and GAR-2 missiles by its short metal nose cone.

Model Construction

Nose Cone

The nose cone section should be turned to the shape shown in Figure 1. If you have the equipment available — wood lathe, etc. — turn the cone from hardwood such as maple, oak, or hard pine. If the cone is turned from block balsa *additional nose weight will be necessary to insure stability.* (Drill out the balsa cone with a 1/4" drill to a depth of about 1". Epoxy between 1-1/2 and 2 ounces of lead into the hole, then glue a plug into the hole. The plug serves as an attachment point for the screw eye.) Even if

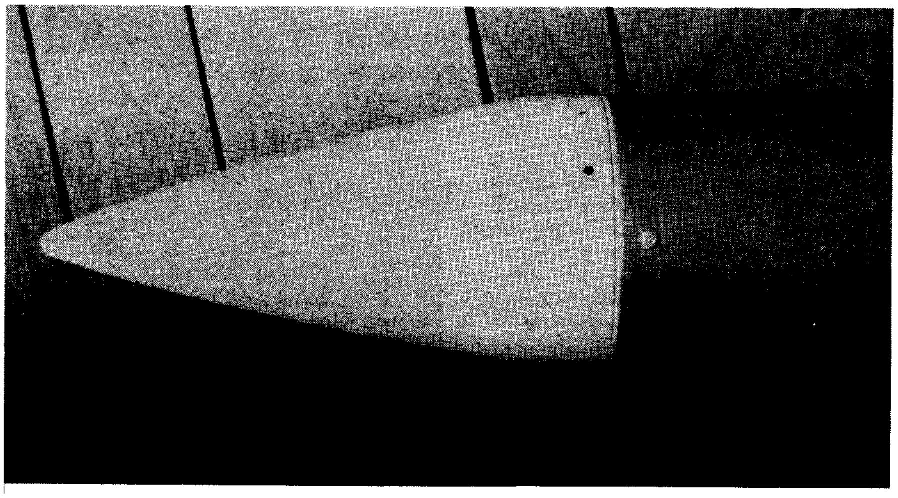
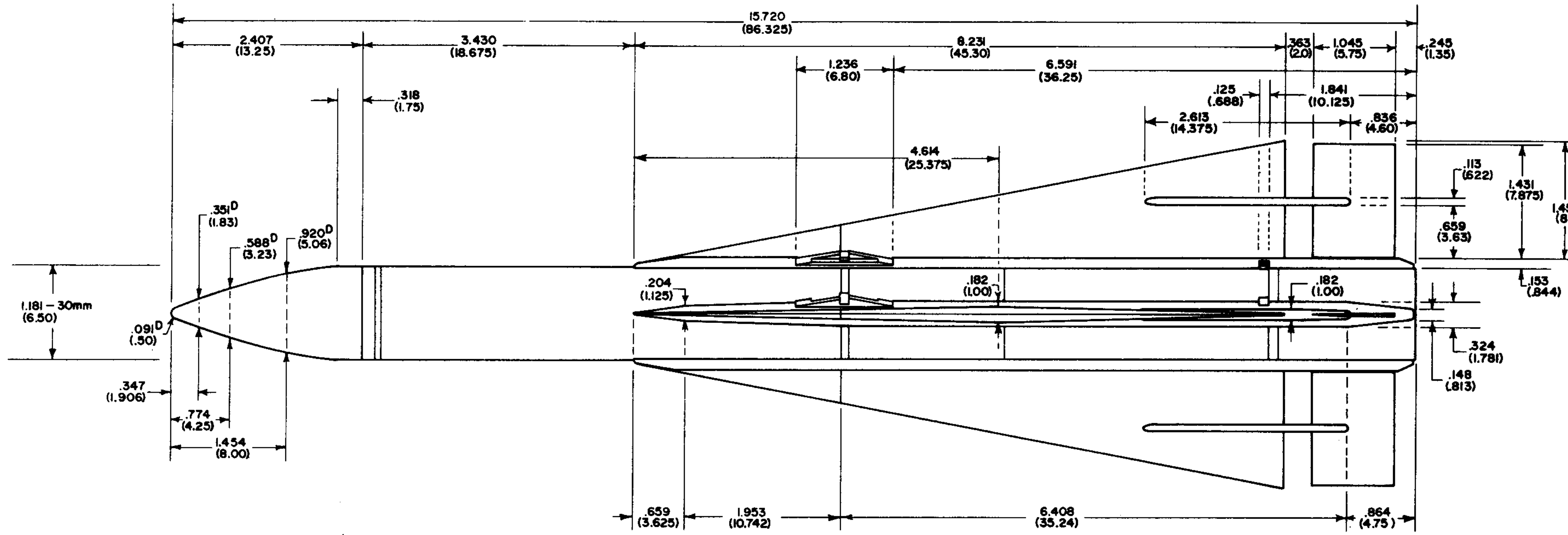
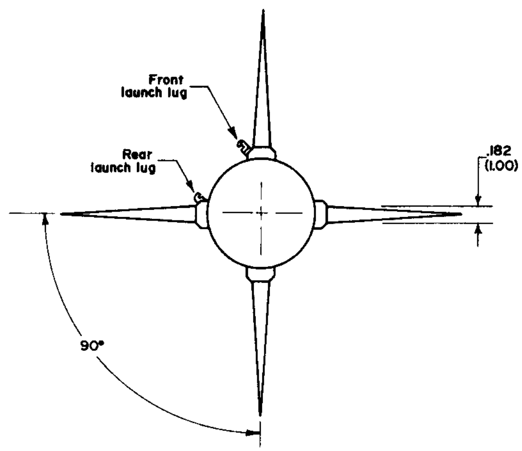


Photo by Bob Mullane

Nose Detail. The nose is smooth with no lettering on it. Note the lettering "NO LIFT" on the missile body just to the rear of the nose joint.





FALCON AIM-4E

U. S. Air Force Air-to-Air Missile

DEVELOPED BY HUGHES AIRCRAFT COMPANY

Scale Dimensions Given Using 30mm. Body Tube
Actual Dimensions Given in (---)

SCALE – 1:5.503

Measurements taken from actual missile — body tube serial no.162175

MEASURED AND SCALED BY A.L.LINDGREN — NAR 11501 *DRAWN BY R.E.THAYER — NAR 15521*

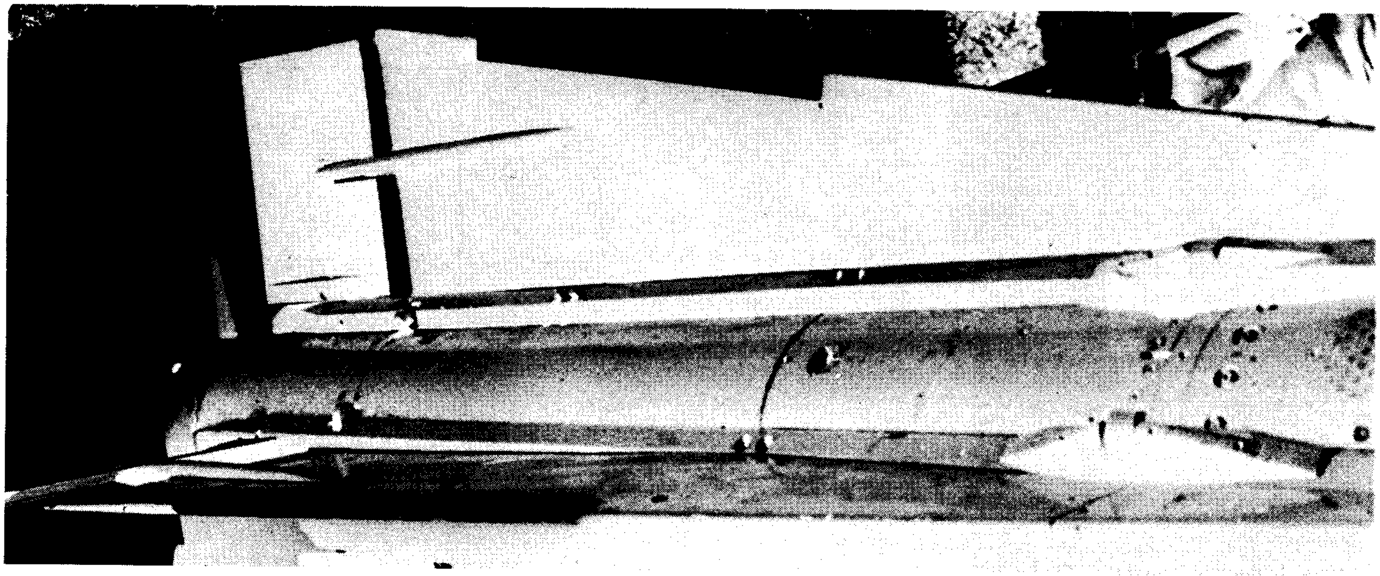


Photo by George Flynn

Fin Detail. The fin, rudder, and fin root piece placement is as shown. Note the location of attachment bolts, as well as the body break point. The launch rod guides can also be included on the scale model. Each fin has a white band on the leading edge bearing the lettering "TRIGGERING AREA - HANDLE WITH CARE" in orange.

a hardwood cone is used you *may* need additional nose weight depending on the density of the wood chosen. I've flown my Super Falcon, using a turned hardwood cone, with A5-2, A8-3, and B4-2 engines without additional noseweight. For a C6-3 engine additional weight was required.

Fins

The forward fin section should be cut from 3/16" sheet balsa to the shape shown in Figure 2. Sand to the airfoil also illustrated in Figure 2. The easiest way to sand a simple airfoil such as this one is to place the fin flat on a work table, and form the airfoil using a sanding block. Use number 320 or finer sandpaper for the shaping operation, corser sandpaper will gouge out ruts in the fin section requiring much filling work during the finishing operation.

The rudder pieces, 1.043" by 1.431" rectangles, should be cut from 1/16" balsa sheet, and sanded to the airfoil shown.

The fin root pieces should be cut from 5/32" balsa sheet and shaped as shown.

Fin Assembly

Slots are cut in the forward fin and rudder as shown in Figure 3. The control arms are cut from a 3/16" dowel, 2.613" long, and shaped as shown in Figure 3. The leading and trailing edges of the fin root pieces are beveled as shown.

The fin surfaces should be finished (except for final painting) *before* final assembly. Two coats of balsa filler, followed by at least two coats of sanding sealer, and then two coats of clear dope, will give a smooth finish. Sand with number 400 sandpaper between each finishing coat. The object of finishing is to fill the balsa grain, not to add thickness to the high areas of the surface, so sand down to the balsa between each finishing coat. As before, place the fin on your work table, and sand the surface with a flat sanding block. Do not apply filler, sealer, or dope to the root edges of

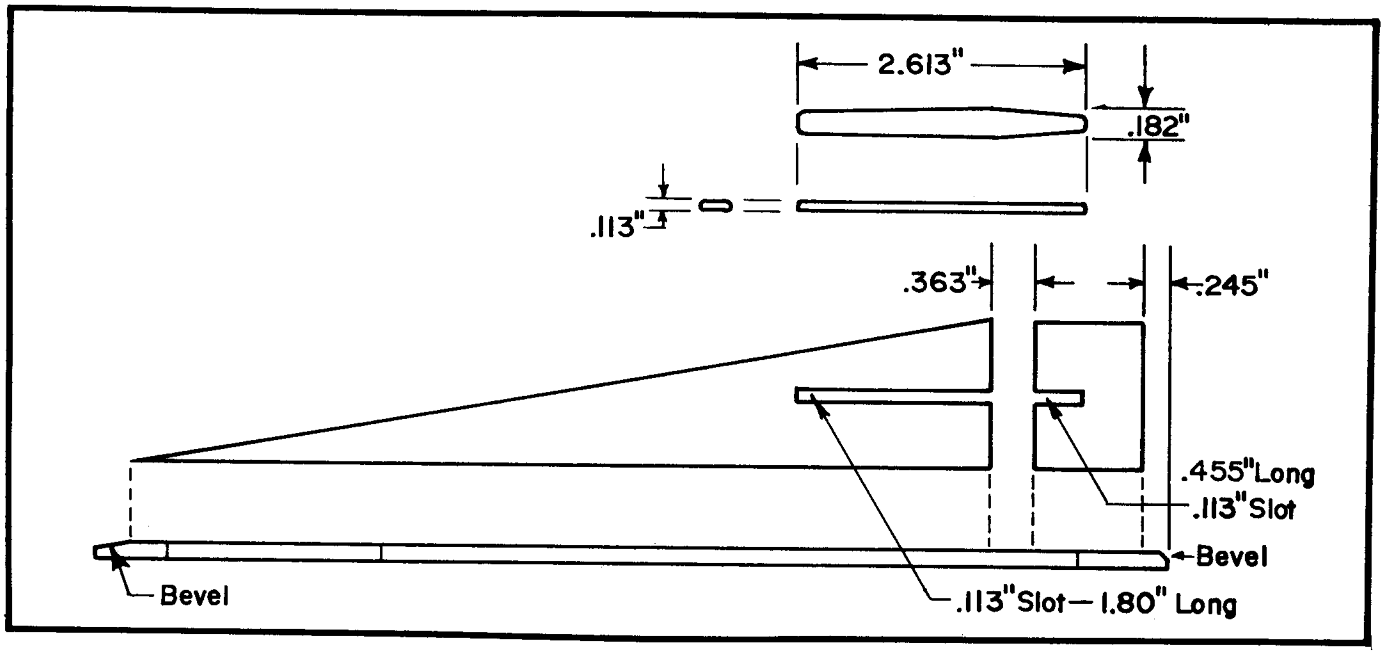
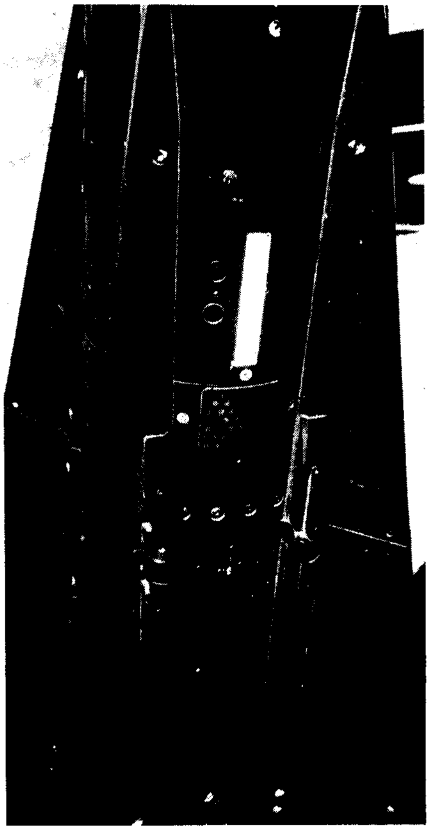


Figure 3: FIN FINAL ASSEMBLY. A slot is cut into the fin and rudder, and a piece of dowel is shaped to form the control assembly. Note that the fin root piece is beveled at front and rear as shown in the cross-section view.



An electric connector (black) appears on only one side of the missile just forward of the launching guides. The wording "HIGH VOLTAGE" is black on a white background. Note also the screw heads, and black "NO LIFT" lettering.

Englargement of the "Falcon" emblem on the side of the missile. No commercial decals are available, so you will have to hand paint this detail.

the fins (where a good glue joint will be important).

Glue each fin assembly (fin root piece, fin, rudder, and control assembly) together, and allow to dry thoroughly. After each fin assembly is finished and dry, lightly sand the bottom edge of each fin root to the contour of the body tube. This is done by wrapping a piece of fine sandpaper around the tube and sliding the fin root up and down the tube several times.

Final Assembly

Before mounting the fin assemblies on the body tube, assemble the engine holder and shock cord mount. Finish the tube by applying several coats of clear dope, with light sanding between each coat, continue until a smooth surface is obtained.

After the tube is finished, scrape the dope from the fin attachment areas, and securely glue the fins in place. Finish the rocket with two coats of orange paint. Apply light coats, and sand between each coat. The nose cone is painted flat white.

Additional detailing, such as the Falcon emblem, actual launch runners, and electrical hook-up assembly can be added from the detail shown in the photographs. The words "NO LIFT", in block capital letters, are painted in black on the forward end on the Falcon body and on the outer edge of the fins. The words "HIGH VOLTAGE" are painted in black on a rectangular white background just forward of the electrical connector (this detail appears on only one side of the missile). See photos.

Flying

As a result of the forward fin area the center of pressure of the Falcon model is considerably further forward than on most model rockets. In fact, the computed "Barrowman CP" is 9.101" from the tip of the nose of the model (when scaled to a 30mm body tube). For a good, stable flight the center of gravity should be about one body diameter (30mm) in front of the CP. Insert the engine into the rocket, and check to see that the balance point (CG location) is no more than 8.25" back from the tip of the nose. If it's further back than this, you need more noseweight! Be sure to test the Falcon's balance point with the largest engine you intend to use. You can fly the Falcon model, built as described, with A5-2, A8-3, and B4-2 engines, but more noseweight will be necessary for use with a C6-3 engine.

MODROC CALENDAR

EVA-II – September 5-6, 1970, Area meet sponsored by the Association of Bethlehem Modellers, and open to all NAR members within 100 mile radius of Bethlehem, Pennsylvania. Events: Quadrathon, Eggloft, Hornet B/G, and Plastic Model. Site: Saucon Valley Athletic Field of Lehigh University. Contact: Frank Osborn, 1408 Cottage Ave., Bethlehem, PA 18018.

TRI-SEC II – September 11-13, 1970, a regional meet for NAR members from Deleware, Maryland, Pennsylvania, New Jersey, Connecticut, and New York, sponsored by Gemini MRS. Events: Class 0 Altitude, Open Payload, Scale, Eagle B/G, and Class 1 PD. Site: Sand Pits Launch Facility, New Castle, Del. Contest Director: Scott Brown, 204 Deleware St., New Castle, Del. 19720.

MITSEC-1 – September 14, 1970, MIT Section meet open only to section members. Events: Hornet B/G (limited to ¼A engines), Class 1 Streamer Duration if included in new Pink Book (limited to ¼A engines), Class 1 Parachute Duration (limited to ½A engines). Site: MIT Briggs Field, Cambridge, Mass.

PASREC-1 – September 20, 1970. Pascack Valley Record Trials open to all NAR members. Attempts may be made for all in all NAR and FAI record catagories. Probable Site: St. Bernards School, Gladstone, New Jersey. Contact: Karl Feldmann, 4317 Cottage Ave., North Bergen, NJ 07047 or phone (201) 864-2291.

New Jersey Mini-Convention – October, 1970, the one day long convention will include discussion groups, a flight session, and post flight analysis. Open to all rocketeers. Contact: Mini-Convention, c/o Bob Mullane, 34 Sixth Street, Harrison, New Jersey 07029.

WESNAM-2 – October 4, 1970. Area meet open to NAR members from Mass., N.H., and Maine. Events: Hawk B/G, Egg Loft (20 N-sec limit), Class 2 Parachute Duration, Plastic Model (if this event is eliminated from the new "Pink Book", Streamer Spot Landing will be substituted). Site: Bridgewater, Mass. Contact: Trip Barber, MIT MRS, MIT Branch PO Box 110, Cambridge, Mass. 02139.

RASM-1 – October 17, 1970. Section meet sponsored by the Rockville Rocketeers, open to all NAR members not affiliated with any other Section in the Rockville, Maryland area. Contact: 949-3640.

PVARM-2 – October 18, 1970. Pascack Valley Annual Regional Meet. Events: Egg Lofting (10 nt-sec limit), Scale, Super Scale, Class 1 PD, Design Efficiency, Hornet B/G, and Open Spot Landing. Contact: Al Lindgren, 15 Hunter Ave., Fanwood, NJ 07023 or phone (201) 322-2248 in advance for entry forms.

MARS-V – October 23-25, 1970, Regional Meet sponsored by SSB Section, open to all NAR members from Maryland and neighboring states. Events: Sparrow Rocket Glider, Class 1 Drag Eff., Class 2 Streamer Dur., Robin Eggloft, Class 2 PD, Condor B/G, and Open Spot Landing. Site: Aberdeen Proving Grounds, MD. Contact: Howard Galloway, 428 Ben Oaks Dr., W., Severna Park, MD 21146.

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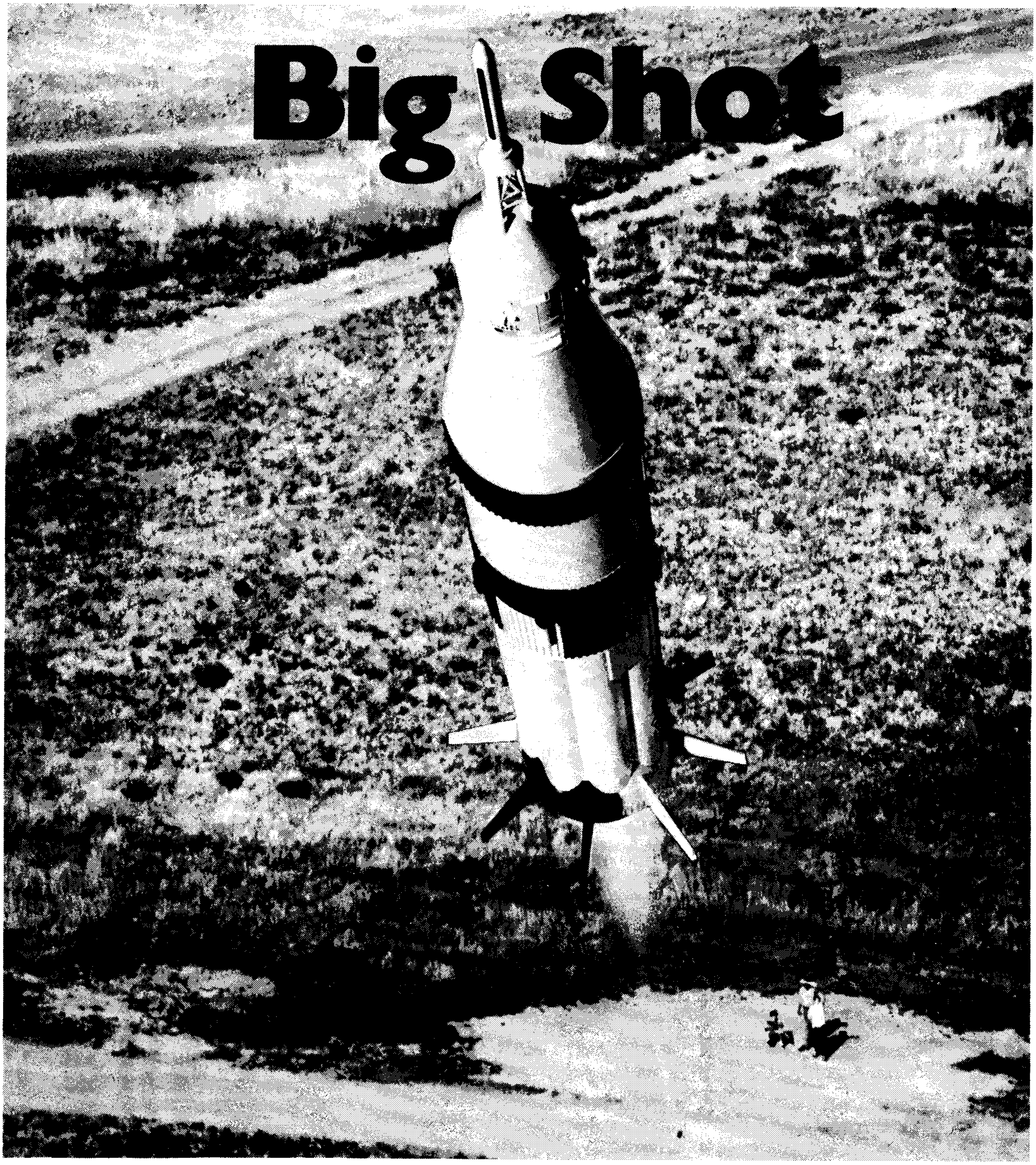

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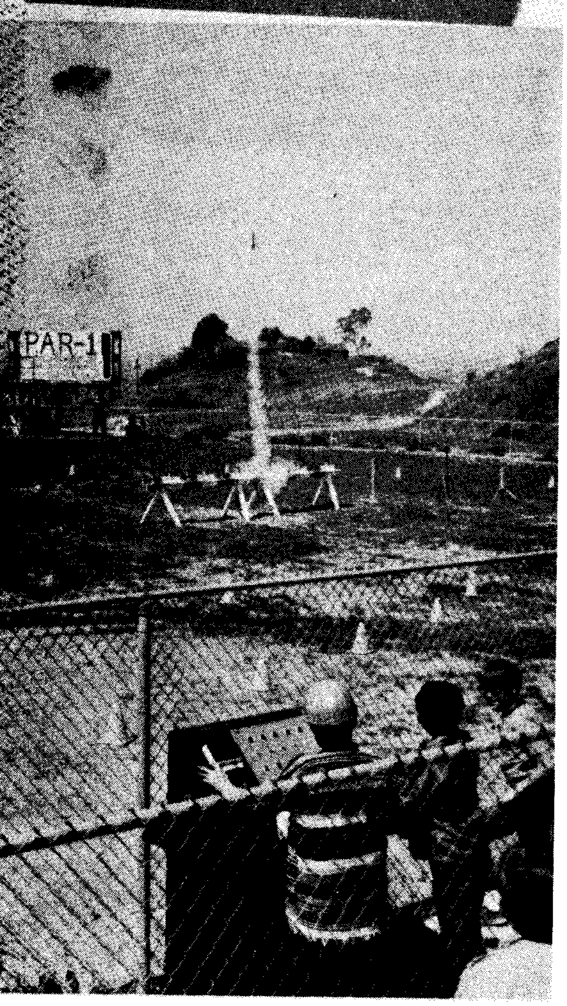


The First Pacific Coast Regional

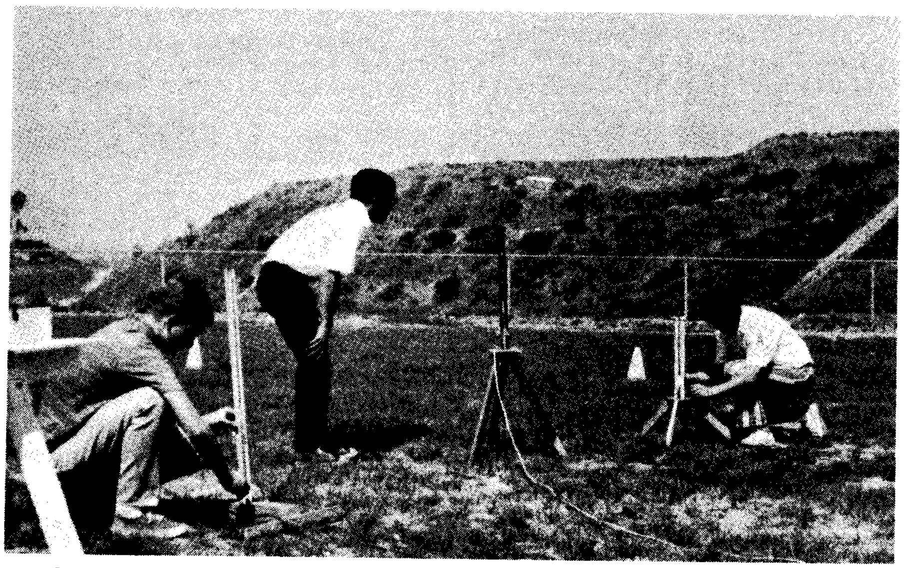
PAR - 1

by Mike Poss

The West Coast's first NAR sanctioned Regional Meet took place on March 21 and 22, 1970, at the West Covina Titan Section's permanent launch site in Galster Wilderness Park, West Covina, California. The two-day affair was hosted by the WCTS and was sponsored by the City of West Covina Recreation and Park Department. Contest Director for PAR-1 was Pacific Division Manager Dane Boles.

Over 110 NAR members from fifteen Sections and at least four states converged on West Covina to compete in eight events that challenged their modelling skills over the weekend. All NAR contest rules as well as the California state statutes which regulate model rocketry were followed at PAR-1 with a few additional limitations: no F engines could be used, clustering of D and E motors was *verboten,* and Design Efficiency models could be powered only with the equivalent total impulse of an A engine or less.

PAR-1 opened at about 9:45 on the morning of March 21 with a pre-meet briefing given by CD Dane Boles. The layout of the range and launching procedures were explained. It was noted that PAR-1 contestants were the first to use the new WCTS facility as the launch systems had been finished during the previous night. Two 12-pad racks, one in right- and one in left-field of the part-time baseball diamond, were utilized and each was controlled from a separate console next to its respective team dugout. Contestants fired their own models when announced and counted down by the range control officer at home plate. While one rack was being loaded the other was used for firing. Competition got underway a half an hour later as contestants submitted their Class 1 Scale Altitude and Scale entries to the judging tent and then prepped their birds for the other events that day, Design Efficiency and Dual Payload.



Contestants prepare their Design Efficiency models on three of the many custom rodless launchers used at PAR-1.

Design Efficiency ran until close to 1:00 in the afternoon. Top performance in this event was had by Seth Gutman in the LR/SR division with 117 m/nt-sec. Chris Pocock took the honors in JR division with 92.8 m/nt-sec. Contestants in this event made extensive use of rodless launchers; at least ten tower or rail jobs were in the pad area at all times and these were used continuously. Tracking closure for the event was above average.

Dual Payload came next on the agenda and contestants were restricted to single flights due to the lack of time. This particular event was rather difficult because of the 180 gram weight limit and that two NAR lead payloads had to be lofted. Several models were overweight because they were staged with two D engines. PAR-1 contestants generally flew their DP birds in one of three engine configurations: (1) with a single FSI E motor, (2) with two Estes D motors staged, and (3) with two FSI D motors staged. Rockets in the first category faired well as did those in the second. Modelers with entries of the third configuration learned that two FSI D's (staged) just can't hack Dual Payload. Many such models became unintended post-hole diggers. But the biggest disappointment of the event came later, no tracks closed in Dual Payload.

Class 1 Scale Altitude and Scale followed Dual Payload. Thanks to the hard work of scale judges Vince Jahn (Southland Section Advisor), Hank Lazano (North American Rockwell Art Dept.), Lee McMahon (WCTS member), and Mr. Dave Nichols (North American Space Division manager), all scale models were judged and ready to be prepped that afternoon. At least fifteen IQSY Tomohawks were on hand as were several Nike Smokes, Black Brants, Saturn 5's, Little Joes and Sandhawks. Doug Frost (NAR 3446) of ganged-engine and early NARAM fame showed up with his exquisite Beech AQM-37A Navy target drone which was previously entered at NARAM-10 in Virginia. Terry White of Pomona, Ca.

Scale judges hash out the NAR rules before digging into the scale models. Shown above (l to r) are Lee McMahon, Hank Lazano, Dave Nichols, and Vince Jahn. Leader/Senior winner Doug Frost (center photo) displays his AQM-37A target drone before a perfect qualification flight. At right, Terry White of the Polaris Section readies his Aerobee 150 in its special launch tower. At apogee the vehicle popped 'chutes for both stages.

was there with a huge Aerobee 150, including its operating booster. This was Terry's fourth model of the 150 and it turned in a perfect 100 point flight to take second place in Scale behind Doug Frost. The Aerobee "staging" was accomplished by a drogue and main 'chute system activated by restricted engine ejection. In the Junior division, Ken Lehman of WCTS took a first in Scale with his well-built Thrust Augmented Delta built from Douglas Aircraft Co. data.

Tomahawks ruled Scale Altitude and won Paul Trainer in LR/SR and David Reynolds in JR first place awards.

The range closed Saturday evening around sunset and everyone headed for dinner. At 7:00 the PAR-1 group assembled at the West Covina Youth Center for a scheduled Model Rocketry-Aerospace Industry Forum and Awards Presentation. There we were treated to films and talks on satellite rocket motors, the Grand Tour spacecraft, and the Apollo 11 flight. As a part of one movie, footage of the Little Joe II Boilerplate-22 breakup was seen. Representatives from JPL, North American Rockwell Space Division, and Bob Cannon from Estes Industries spoke at the gathering. After the Forum, trophies were given to the first, second, and third place event winners of the day. Contestants then viewed films of NARAM-5, courtesy of Doug Frost.

For those of us camping-out next to the launch site, Sunday began at about 6:00 AM as we awoke to the theme of "2001: A Space Odyssey" from a Southland member's tape recorder. That was pretty weird. A short time later about a dozen of us were out in the fields and on the hillsides heaving and hoping our boost-gliders into the air in order to trim them.

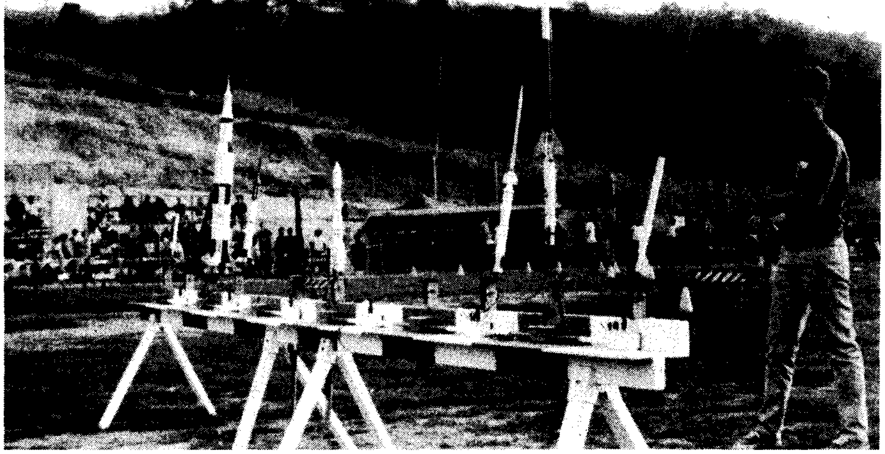
Competition resumed on Sunday morning with another meet briefing and then Sparrow B/G. Shades of NARAM-9! It was really fantastic to see so many gliders fly well, for a change. Winning times were well over one minute in LR/SR and over two minutes in the JR division. Donald Valkoma placed first in LR/SR Sparrow with 95 sec. and Bob Willsey topped the Juniors at 191 sec. with a FlatCat.

Class 1 Parachute Duration followed Sparrow B/G. And what a day it was for 'chute chasing! The upper 80 degree weather during both days of the meet made for some active thermals while the bowl-shape of the valley in which the launch site was located acted as an effective deterrent to model recovery. Because of these two factors, once a model drifted over the valley rim and out of sight you were very lucky if you recovered it. If you were fortunate enough to recover your bird then the West Covina smog had claimed your lungs in the meantime. Winning PD flights averaged about two minutes. John Baum took LR/SR with 130 sec. while the Orbits (Las Vegas) Team of McBride-McBride-Wrisht-Ribas copped the JR trophy with 168 sec.

Swift B/G times rivaled those clocked in the Sparrow event as most entrants flew their models in both events. Tops in LR/SR was Paul Trainer with 144 sec. Bob Willsey of the Polaris Section and his trusty FlatCat outdid the Juniors again with 199 sec.

Parachute Spot Landing was the last event of the day. Contestants attempted to place their birds as close as possible to a pylon located 75 to 80 feet from each launch rack. Norm Wood aced the LR/SR's with 2.56 m. and Bill Plummer took the JR division with a half a meter accuracy.

Sunday's competition ended in semi-darkness. The contest jury then sifted through the day's results and event winners were awarded their trophies under the illu-



Junior Scale winner Ken Lehman looks over the competition. On pads (l to r) are a Black Brant, Little John, Saturn 5, Mercury Redstone, Beech drone, TAD, Nike-Apache, Sandhawk/BT-3, and Tomahawk.

Southland Section officers Paul Veregge (hat) and Vince Jahn, Jr. adjust their B/G models.

mination of a single spotlight hung onto the baseball backstop. The Champ Section and High-Point Individual trophies were not given out at that time because of the time factor involved. Several days later, however, it was disclosed that the Titan Section had won the group award and that Paul Trainer in the LR/SR division had won the individual trophy.

With the close of the second award ceremony everyone started to pack their models (or scrap thereof), tables and tents and headed for home. PAR-1 was then history.

One final note: special credit should be given to Dane Boles of the Titan Section for organizing and directing PAR-1 with eight events in two days for over 100 entrants.

It was a job well done!

World parachute duration record holder (wearing NAR patch) checks in his swing-wing B/G. Unfortunately it was overweight for the Swift event.

PAR-1 RESULTS

Dual Payload

No tracks closed.

Design Efficiency

LR/ST	1. Seth Gutman, 11700		117 m/nt-sec
	2. Norm Wood, 10523	Titan	87.8 m/nt-sec
	3. Thomas Hills, 1724	Birch Lane	45.1 m/nt-sec
JR	1. Chris Pocock, 10206	S. Seattle	92.8 m/nt-sec
	2. Kirkman-Teague-Black Team 13565, 13867, 12948	Tri-City	92.5 m/nt-sec
	3. Steve Koonce, PEND	Polaris	91.5 m/nt-sec

Scale

LR/SR	1. Doug Frost, 3446	SCRA	Beech Drone
	2. Terry White, 11184	Polaris	Aerobee 150
	3. Mike Poss, 5702	Southland	Sandhawk/BT-3
JR	1. Ken Lehman, 10232	Titan	Improved Delta
	2. Paul Veregge, 11575	Southland	Sandhawk
	3. Chris Pocock, 10206	S. Seattle	Tomahawk

Class 1 Scale Altitude

LR/SR	1. Paul Trainer, 11488	SCRA	Tomahawk
	2. John Raum, 11114		Little Joe II
	3. Vince Jahn Jr., 11621	Southland	Nitehawk 9
JR	1. David Reynolds, 13366	Titan	Tomahawk
	2. John Fuller, PEND	Titan	Tomahawk
	3. Philip Kemp, 11301	Southland	Little Joe II

Class 1 Parachute Duration

LR/SR	1. John Raum, 11114		129.6 sec.
	2. Mike Poss, 5702	Southland	91.5 sec.
	3. Norm Wood, 10523	Titan	85.0 sec
JR	1. McBride-McBride-Wrisht-Ribas Team, 14164, 16218, 11700, 11701	Orbits	168.4 sec.
	2. Art Lopez, 13658	Canoga Park	134.0 sec.
	3. Cary Waddell, 15740	Titan	109.0 sec.

Sparrow B/G

LR/SR	1. Donald Valkoma, 15681	Cosmos/ Orbits	95 sec.
	2. Ken Romm, 11343	Southland	73 sec.
	3. Jess Medina, 14147	S. Seattle	64 sec.
JR	1. Bob Willsey, PEND	Polaris	191 sec.
	2. Kirkman-Teague-Black Team 13565, 13867, 12948	Tri-City	144 sec
	3. Brad Beebe, 14709	SCRA	127 sec

Swift B/G

LR/SR	1. Paul Trainer, 11488	SCRA	144 sec.
	2. Norm Wood, 10523	Titan	44 sec.
	3. Hinman-Derkovitz-Nieslson-Duncals Team, 14163, 14166, 14139, 13671	Orbits	39 sec.
JR	1. Bob Willsey, PEND	Polaris	199 sec.
	2. Tony Medina, 13897	S. Seattle	92 sec.
	3. Bruce Reynolds, 12491	Titan	62 sec.

Parachute Spot Landing

LR/SR	1. Norm Wood, 10523	Titan	2.56 m.
	2. Floyd Halzip, 13123	Woodland	3.89 m.
	3. Paul Trainer, 11488	SCRA	6.75 m.
JR	1. Bill Plummer, 14799	Titan	.48 m.
	2. Roland Zee, PEND	Polaris	1.27 m.
	3. Howard Line, 16234	Polaris	1.52 m.

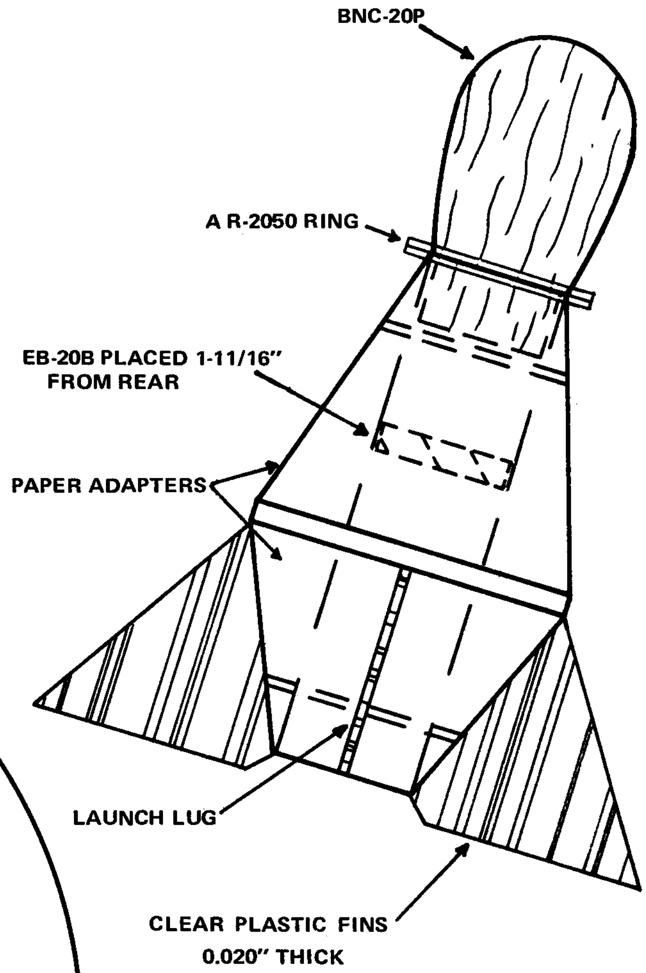
SECTION STANDINGS

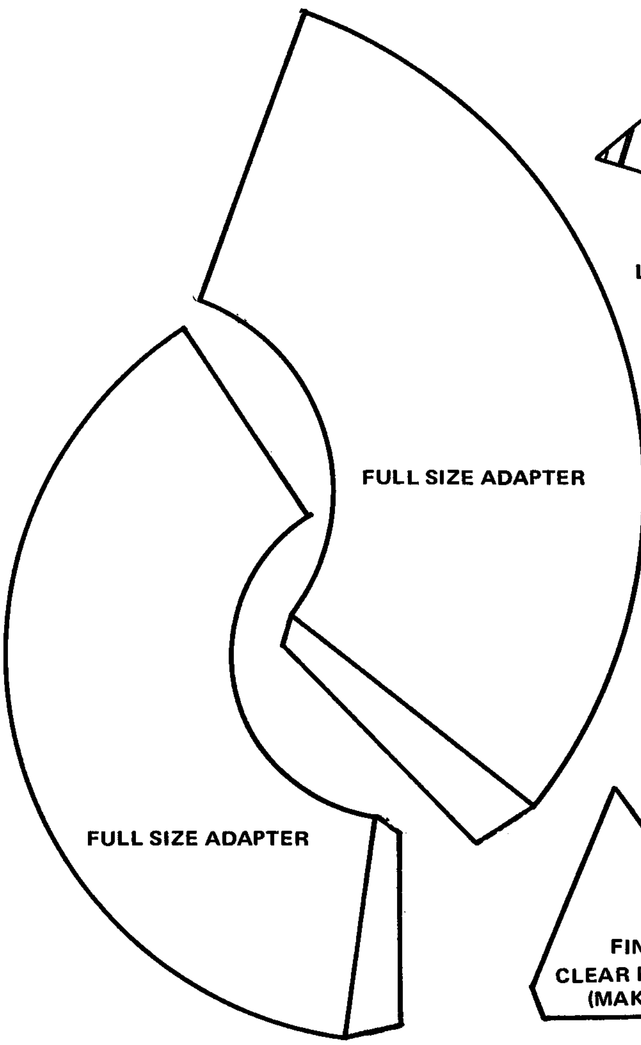
Arevalos	California	165 pts.
Birch Lane	California	126
Canoga Park	California	24
Cosmos/Orbits	California	69
Loyola High School	California	12
Orbits	Nevada	156
Polaris	California	516
Santa Clara (SCRA)	California	567
South Seattle	Washington	417
So. Calif. (SCRS)	California	180
Southland	California	672
SPEAR	California	21
Titan	California	1102
Tri-City	Oregon	192
Woodland Hills	California	129

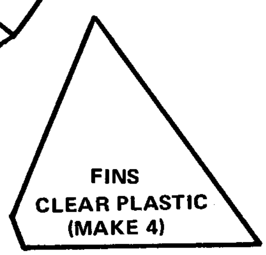
Reader Design Page

This month's Reader Design, the *Flying Bowling Pin,* was submitted by Mike Howell (NAR #16973) of Webster, New York. He explains that the rocket developed out of an attempt to combine both interests — bowling and model rocketry. Four clear plastic fins are used for stability, and the *Flying Bowling Pin* is powered by Series III engines only. Use the full size patterns below to make the paper adapters required. Featherweight recovery is used. All other parts are available from Estes Industries. Parts required are:

4 RA-2050 Rings
1 BNC-20P Nose Cone
1 EB-20B Engine Block
1 2-3/4" length of BT-20
Clear Plastic Fin Material







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

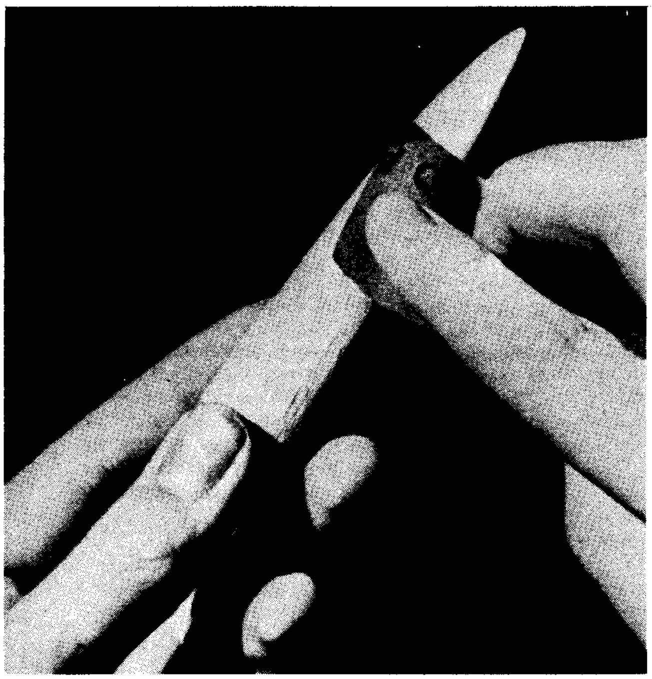
Quick and Easy Finishing for Balsa Fins and Nose Cones

by Bob Parks

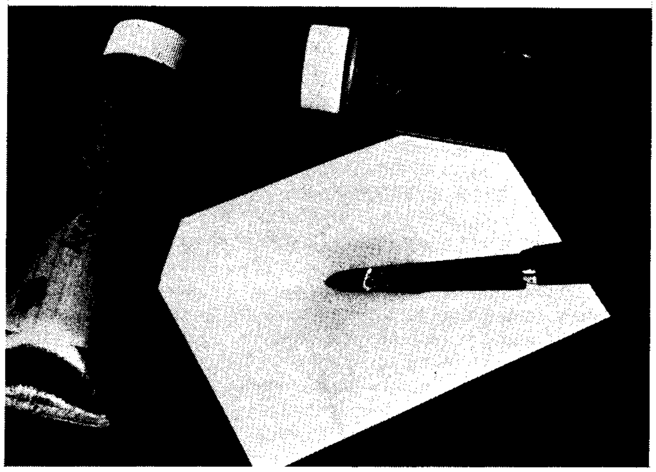
●●●●●●●●●●●●●●●●●●

Normally, achieving a good finish on a model rocket requires many, many coats of filler or sanding sealer . . . and much sanding. There is, however, a faster, easier way using epoxy glue as a filler. This method produces a perfectly smooth surface on balsa with a fraction of the work involved in more conventional methods. It also have the advantage of greatly increasing the strength of the parts it is used on. Fill, scrape, and add a final coat of paint, and your balsa nose cone or fins will have the same fine finish usually requiring many hours of work.

●●●●●●●●●●●●●●●●●●

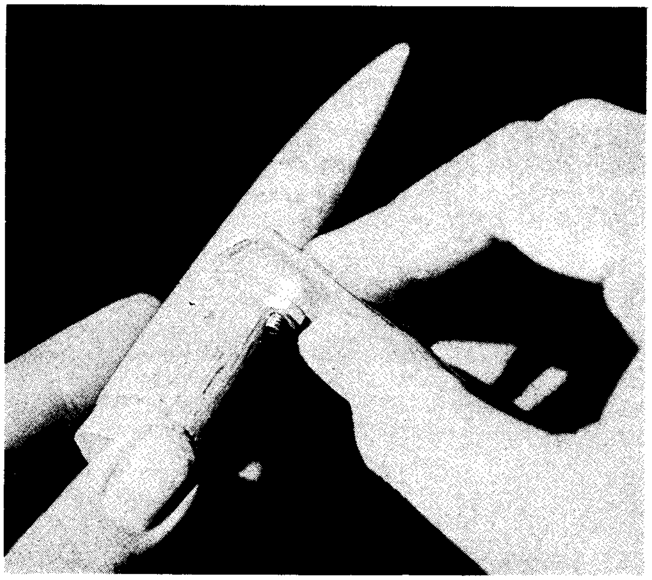


1. Sand the balsa wood (either fins or nose cone) smooth using fine sandpaper. It is generally easier to fill the fins before attaching them to the rocket. On small fins it is generally easier to leave a tab on the root edge to make handling the fin easier. The tab is removed before attaching the fins to the body.

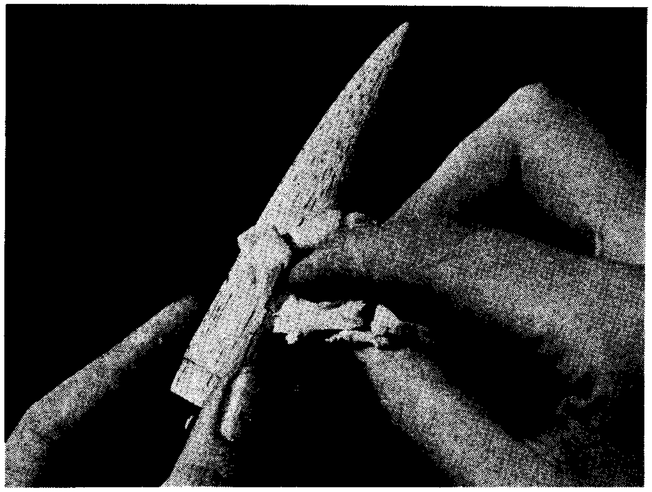


2. Mix up a batch of epoxy glue. After using this method a few times you should be able to very accurately estimate the amount of glue required. Use a GOOD epoxy, since some types will not cure in thin films. Hobbypoxy Formula II is excellent because it is specially formulated for thin film use. It allows plenty of time for woking and sets in a couple of hours.

3. Use a flexible bladed glue knife or a scrap of thin plywood to apply the epoxy. The idea is to force the epoxy into the wood grain. Try to obtain as even a film as is possible as this will save time later. Slight depressions in the balsa can be filled at this time.



4. Since epoxy is pretty hard, it doesn't sand very well. The best way to smooth out the surface is to scrape it down. A single edged razor blade can be used, however. Hobbypoxy makes a special blade for this purpose that doesn't gouge like a razor blade tends to. Scrape the surface until it is smooth and dull. A shiny area needs more scraping. Don't scrape all the way down to the wood.



5. Sand the surface with fine sandpaper. Wipe the surface to remove any dust. It is now ready for paint. The epoxy should be compatible with anything you could put on top of it.

Using this method, an average size rocket can be filled, scraped, and sanded with only 20 minutes of work. Of course the total time involved depends on the type of epoxy used. If you are really in a hurry, you can use one of the 5-minute epoxies. Don't try this until you have tried the method with a normal epoxy. Weight seems to be about the same as conventional methods, however there is a tremendous increase in strength. This would seem to make it especially useful on sport models. It should also be useful for scale models because it reduces handling of parts and thus reduces the chances of making a mistake and ruining a fin. For more information on epoxy fillers and also a descriptive booklet on the "Easy-Does-It" finishing method write to Hobbypoxy Products, Pettit Paint Co., 507R Main St., Belleville, N.J. 07109.

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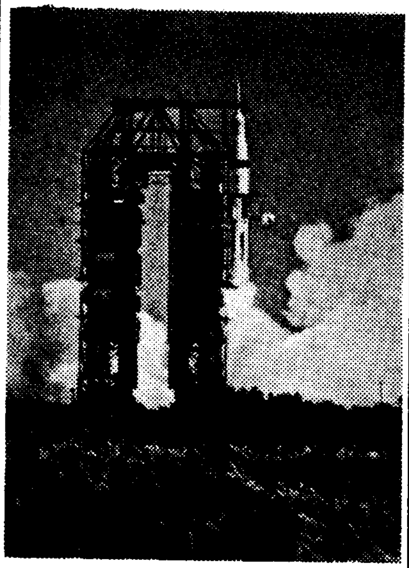
SPECIAL OFFER!

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



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

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

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Foxmitter II Accelerometer Module

by by Richard Fox

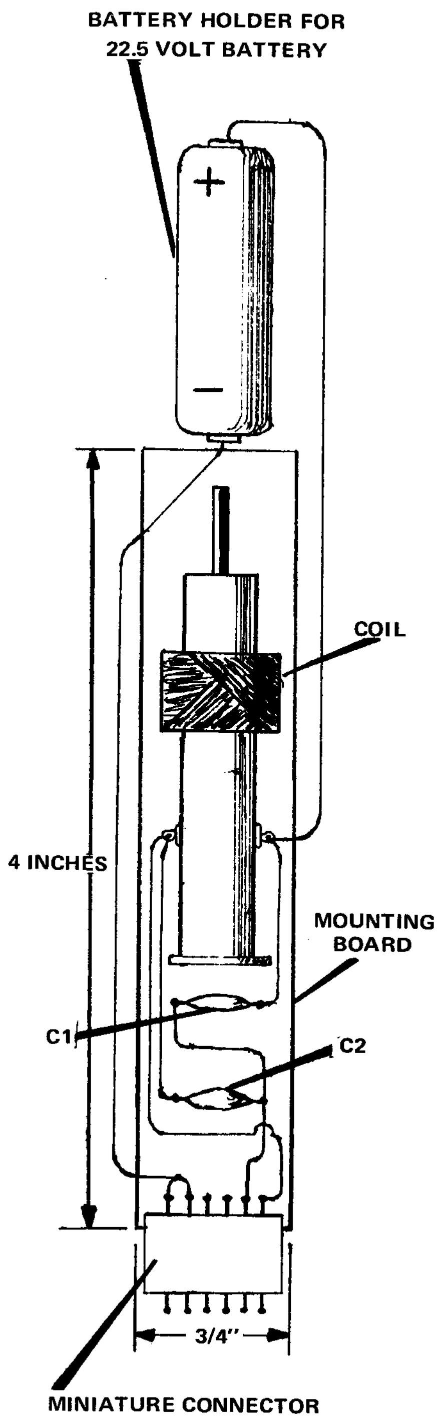


Figure 1: ACCELEROMETER

This article describes an acceleration transducer for use with the Foxmitter II model rocket telemetry transmitter. This accelerometer is an improved version of the accelerometer originally described in the August 1969 issue of **Model Rocketry.** The improved accelerometer is compatible with the Foxmitter II, and features improved signal stability. The basic function of an accelerometer is to measure forces applied to an object. In model rockets, an accelerometer can be used to measure the forces of engine thrust, drag during coasting, and impact with the ground. The measurement of these accelerations not only gives an accurate indication of the timing of the events of the rocket flight, but it also gives accurate data on the forces acting during the rocket flight.

The accelerometer-transmitter combination is nine inches long and fits in a .80 inch diameter body tube. The combination weighs a little over two and one-half ounces, including the battery. The accelerometer measures forces directed along the longitudinal axis of the rocket, within the range of 0 to 20 g's, and provides a continuous readout of the instantaneous value of acceleration throughout the flight.

The output of the accelerometer is a continuous tone which is transmitted to the ground for reception by a Citizen's Band walkie-talkie receiver. The tone can be tape recorded during the flight, and played back later for data interpretation.

Construction

The accelerometer module consists of an inductor and two capacitors, as shown in Figure 1. The inductor is converted to a force transducer by removing and discarding the sheet metal nut which holds the iron tuning slug in place. One end of the inductor tube is blocked off, and a spring is placed inside the tube between the tuning slug and the blocked off end. This arrangement allows acceleration forces to press the tuning slug against the spring inside the inductance tube. As the acceleration forces increase, the slug will compress the spring more, and the slug will travel further into the inductance tube. The new position of the slug will result in a higher value of inductance, and therefore a higher audio tone from the inductance-capacitance oscillator. In this manner, forces exerted on the rocket are converted to audio tones which are transmitted to the ground by the Foxmitter II.

Locating a suitable spring may be difficult. Hardware stores frequently carry

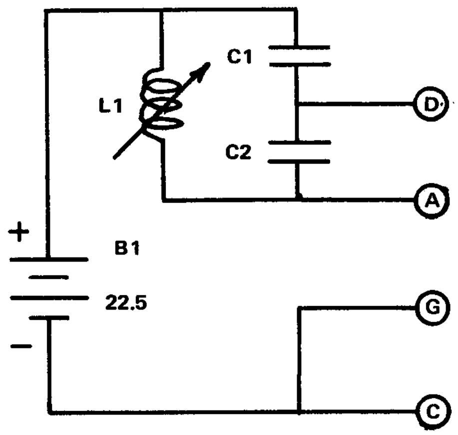


Figure 3: ACCELEROMETER SCHEMATIC DIAGRAM. This circuit is compatible with the Foxmitter II described in the June 1970 issue of Model Rocketry.

assortments of small springs, but if a suitable one is not available, one can be made from a piece of piano wire. The spring should be wound from one foot of .006 inch diameter piano wire. The spring should have a diameter of 1/8 inch and a length of 5/8 inches. The weight of the accelerometer tuning slug should cause the spring to compress about 1/8 inch.

The inductor is assembled as shown in Figure 2, and the assembly is wired as shown in Figure 1. Figure 3 shows the schematic of the wiring.

Data Reduction

The accelerometer produces a tone whose frequency is proportional to the accelerating forces experienced by the rocket. During the flight of the rocket the transmitted tone should be tape recorded, so that the tone may later be interpreted to obtain numerical values for the acceleration of the flight as a function of time. The process of converting the tone to acceleration data involves several steps. First the tones produced by the accelerometer must be *calibrated.* Two calibration tones can be created easily in the field. These are the tones associated with 0 g's (rocket laying on its side) and 1 g (rocket standing vertically). These two tones should be recorded in the field along with the flight data. They will be used later as a check on the condition of the tape recorder and transmitter batteries.

The calibration procedure can be completed by locating a group of objects which weigh exact multiples of the weight of the accelerometer slug. For instance you may be able to locate a nut which weighs the same as the inductor slug, a ball of solder which weighs twice as much, a bolt which weighs four times as much, and so on. When any of these weights is placed on top of the slug, it will cause the slug to sink into the coil the same amount as an acceleration force equal to the ratio of the weights. The nut would simulate a 1 g acceleration, the ball of solder would simulate a 2 g acceleration, and the bolt would simulate a 4 g acceleration. The audio tones created under these simulated conditions can be compared to the audio tones received during the flight, and in this way the amount of acceleration at any instant of time during the flight can be identified.

The batteries of the transmitter and the tape recorder should be in the same condition when the calibration is made as they were when the flight was made. To check this, compare the 0 g and 1 g calibration tones recorded in the field with those that the transmitter produces now. If they are not the same, the data obtained will be *wrong* and should be discarded.

The next step is to produce a graph of the acceleration as a function of time. The best way to accomplish this is to slow the recording of the flight to 1/4 of its original speed. This slow speed will allow accurate timing of the duration of each event of the flight. Slowing the tape recording down involves recording the data at a high speed and playing it back at a slow speed. Most tape recorders operate at one or more of three standard speeds: 7-1/2, 3-3/4, and 1-7/8 inches per second. If the data is recorded at 7-1/2 inches per second, and is played back at 1-7/8 inches per second, one second of flight time will take four seconds to play back. At the same time, the tones played back will be dropped by two octaves. One way to identify the g-force associated with the new, lower tones is to record the calibration tones at 7-1/2 inches per second

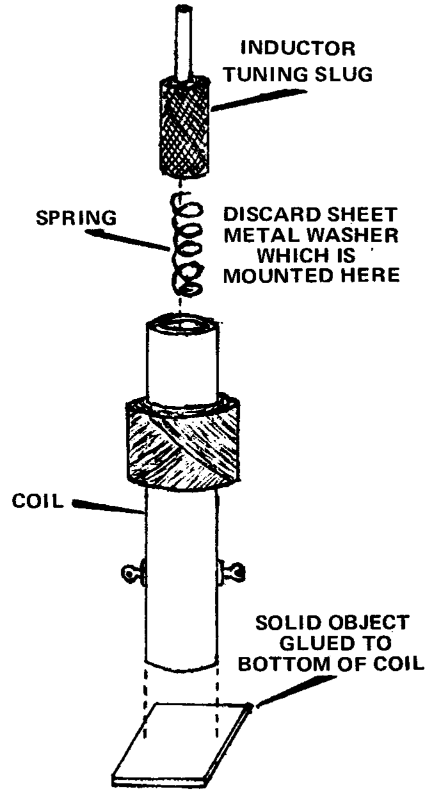


Figure 2: INDUCTOR ASSEMBLY

and play them back on a second tape recorder at 1-7/8 inches per second.

It is a fairly simple job to identify the g force associated with each tone recorded during the flight. The measurement of the duration of each of the g force levels is a little trickier. The most accurate method is to mark the tape at the start and stop of each tone. Then measure the length of that section of tape and divide by 1-7/8, or what ever tape speed you are using. The answer will be in seconds.

Figure 4

Parts List for Accelerometer

L	**Superex vari-choke model V-25 5-43 mh.**
C1,C2	**capacitor, .47 mfd at 10 volts**
B1	**battery, Burgess Y15 22.5 volt**
Battery Holder	**Keystone #50053**
Ultra-miniature connector	**R/C Craft model #19K61 6 pin**
Spring	**see text**

A complete kit of parts, including a mounting board but not the battery, is available from Astro-Communications, 3 Coleridge Place, Pittsburgh, Pa. 15201 for only $3.50.

Data Interpretation

The data from a flight is plotted in Figure Five. The accelerometer recorded the force of gravity as the rocket sat on the pad during the count-down. At lift-off the thrust of the engine exerted a force of 7 g's almost immediately. After 3/8ths of a second, the thrust dropped to 6 g's, and remained there for 3/4 of a second. The engine cut off at 1-1/8 seconds into the flight, and the rocket coasted upward at almost zero g's until the ejection charge went off 6.5 seconds into the flight. The accelerometer once again recorded 1 g and remained at that level until the rocket landed. The data in Figure Five was recorded on a rocket powered by a single C6-3 engine. You never could have guessed that from the data! A C6-3 engine is supposed to burn for 1.70 seconds. This engine produced useful thrust for only 1.16

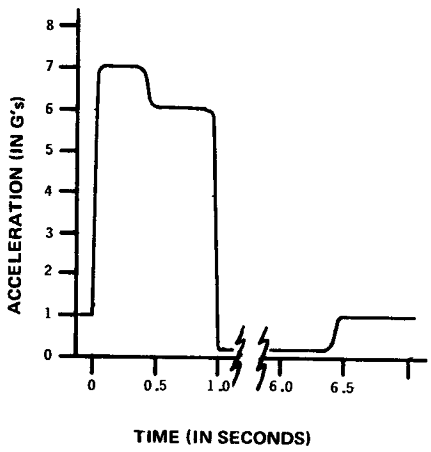


Figure 5: ACCELERATION OF A ROCKET POWERED BY A C6-3 ENGINE. By adding up the area under the acceleration curve, the velocity curve in Figure 6 can be determined.

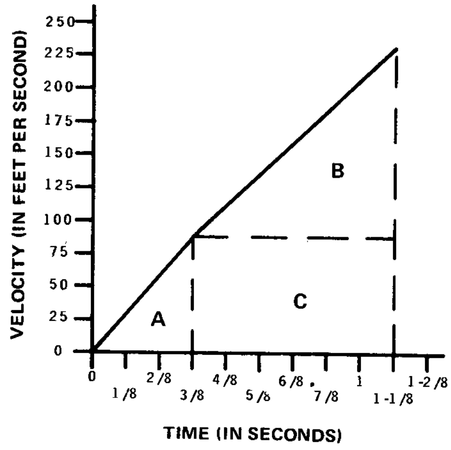


Figure 6: VELOCITY OF A ROCKET POWERED BY A C6-3 ENGINE. By adding up the area under this curve, you can determine the distance traveled as plotted in Figure 7.

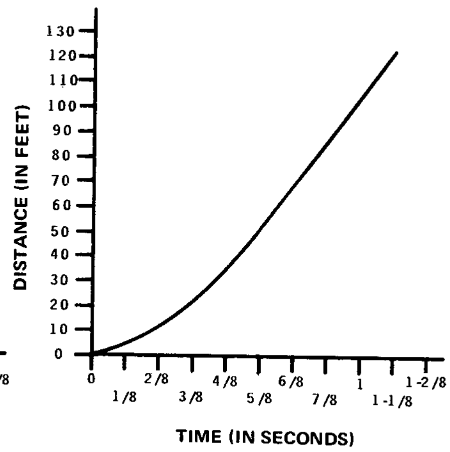


Figure 7: DISTANCE TRAVELED BY A ROCKET POWERED BY A C6-3 ENGINE. The rocket reached an altitude of approximately 125 feet at burnout (1-1/8 seconds into the flight).

seconds. The C6-3 engine should have ejected its parachute at 4.70 seconds. This engine ejected its parachute at 6.50 seconds.

There is more information hidden in this data. Because of the mathematical relationships between acceleration, velocity, distance, and time, if we know the acceleration as a function of time, we can calculate the velocity and distance traveled as a function of time. The proper mathematics for making this calculation is Calculus. Velocity is the integral of acceleration and distance is the double integral of acceleration. With a little bit of preparation, the answers fall out quite easily, however the answers may also be obtained by combining algebra, geometry, and some careful approximations.

The first algebraic formula to use is: Velocity = acceleration x time, provided the *ACCELERATION IS CONSTANT.* In the data above, the acceleration appears to have two distinct levels: 7 g's and 6 g's. The 7 g level is rather constant, but the 6 g level actually starts a little above 6 g's and drops to a little below 6 g's. The assumption that the engine maintained a constant force at 6 g's will not introduce much error. We can now calculate the velocity at the end of the 7 g thrust period (3/8ths of a second into the flight). The velocity of the rocket was 7 g's x 3/8 second. To convert this answer to usuable units, we must use the fact that one g is equivalent to 32.1 feet/second^2. Thus the velocity after 3/8ths of a second was 84 feet per second. The length of the 6 g thrust was 6/8ths of a second, and the additional velocity imparted to the rocket by that thrust period was 6 x 32.1 x 6/8 = 144 feet per second. Therefore at burnout the total velocity of the rocket was 84 + 144 = 228 feet per second. This information is plotted in Figure Six.

The next step is to determine the distance traveled as a function of time during the thrusting of the engine. The algebraic relationship between distance and velocity is: Distance = velocity x time, provided the *VELOCITY IS CONSTANT.* The graph of velocity and time in Figure Six indicates that at no time was the velocity constant. Therefore the above formula is of no use. Instead, we must use a geometrical simulation of the Calculus solution to the problem. Calculus tells us that the distance traveled is equal to the area under the velocity-time curve. The velocity-time curve can be broken up into Triangle A, triangle B, and rectangle C as shown in Figure Six. The distance traveled at the end of the 7 g thrust period is equal to the area under triangle A. This area is 1/2 x 3/8 x 84 because the area of triangle A is 1/2 its base times the height. The distance traveled at the end of that period is therefore 15 feet. The distance traveled during the 6 g thrust is equal to the area under the sum of triangle B and rectangle C. This area is equal to 60 for the triangle and 63 for the rectangle. Therefore the total distance traveled during the 6 g thrust period was 123 feet and the distance traveled at burnout was 123 + 15 = 138 feet. This data is plotted in Figure Seven.

The accuracy of these results is limited primarily by the amount of care taken in calibrating and reducing the data. The example presented here agrees fairly closely with predictions published for standard C6-3 engines, but the measured burnout velocity is higher than predicted, and the acceleration curve implies a burning of the fuel considerably different from that listed by the manufacturer.

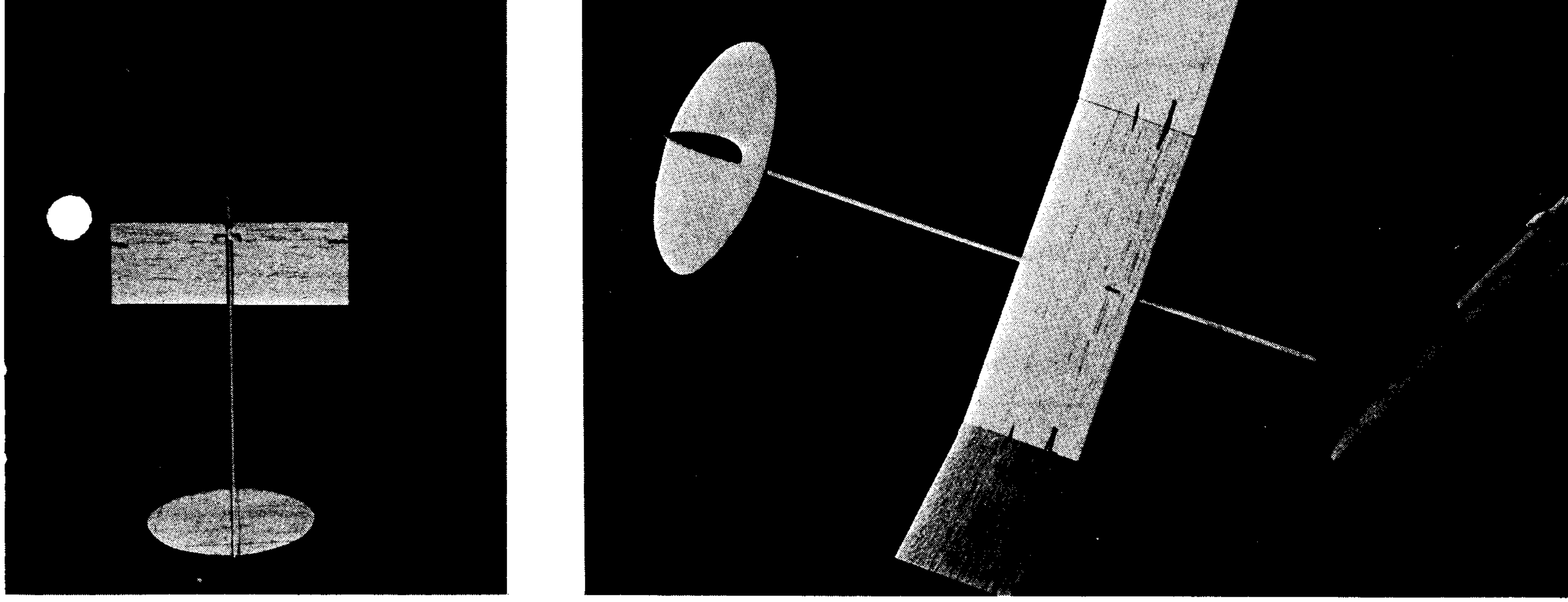
What about using the accelerometer to measure the drag of a rocket as it coasts upward to its peak altitude? The forces measured would be in the opposite direction to the forces of engine thrust and gravity. The inductance slug would have to be mounted between two springs. The slug would slide deeper into the coil during thrusting, and it would slide farther out of the coil during the deceleration caused by drag. It might be worth a try.

Coming Next Month:

Complete Plans For

The "Minimitter"

Lightweight Homing Beacon



Two overall views of the Dove III "flop-wing". The wing tip panels fold under for boost, thus reducing drag and increasing altitude. Other advantages of this new design are light-weight, and greater strength.

The Latest B G Competition Design

Dove III - - "Flop-Wing"

by Bob Parks

This is going to be somewhat different from most boost/glider design articles. First of all, I don't claim that this is the *"ultimate" glider*, the end result of a long series of gliders, etc., etc.... It is the first flop-wing for which all of the MECHANICAL problems have been solved satisfactorily. At this time, almost nothing has been done regarding wing thickness, aspect ratio, area, and other aerodynamic factors. The glider was designed to be durable so that it would survive if any of the gagetry failed to work. As it turned out the glider was very consistant, turning in times that varied only ± 5% from the average.

The "Dove III" is considerably easier to build than most of the early flop wings, some of which were pretty well covered with a maze of rubber bands, hooks, lines, music wire, etc. Needless to say, this mess on the Dove II did not contribute very much to reliability! Even though this has been pretty much eliminated, the Dove III is still not an easy B/G to build by today's standards. I don't suggest that you try to build this glider unless you have had previous experience with front engine pop-pod boost/gliders. Because of this, I'm only going to describe the details that differ from normal B/G construction.

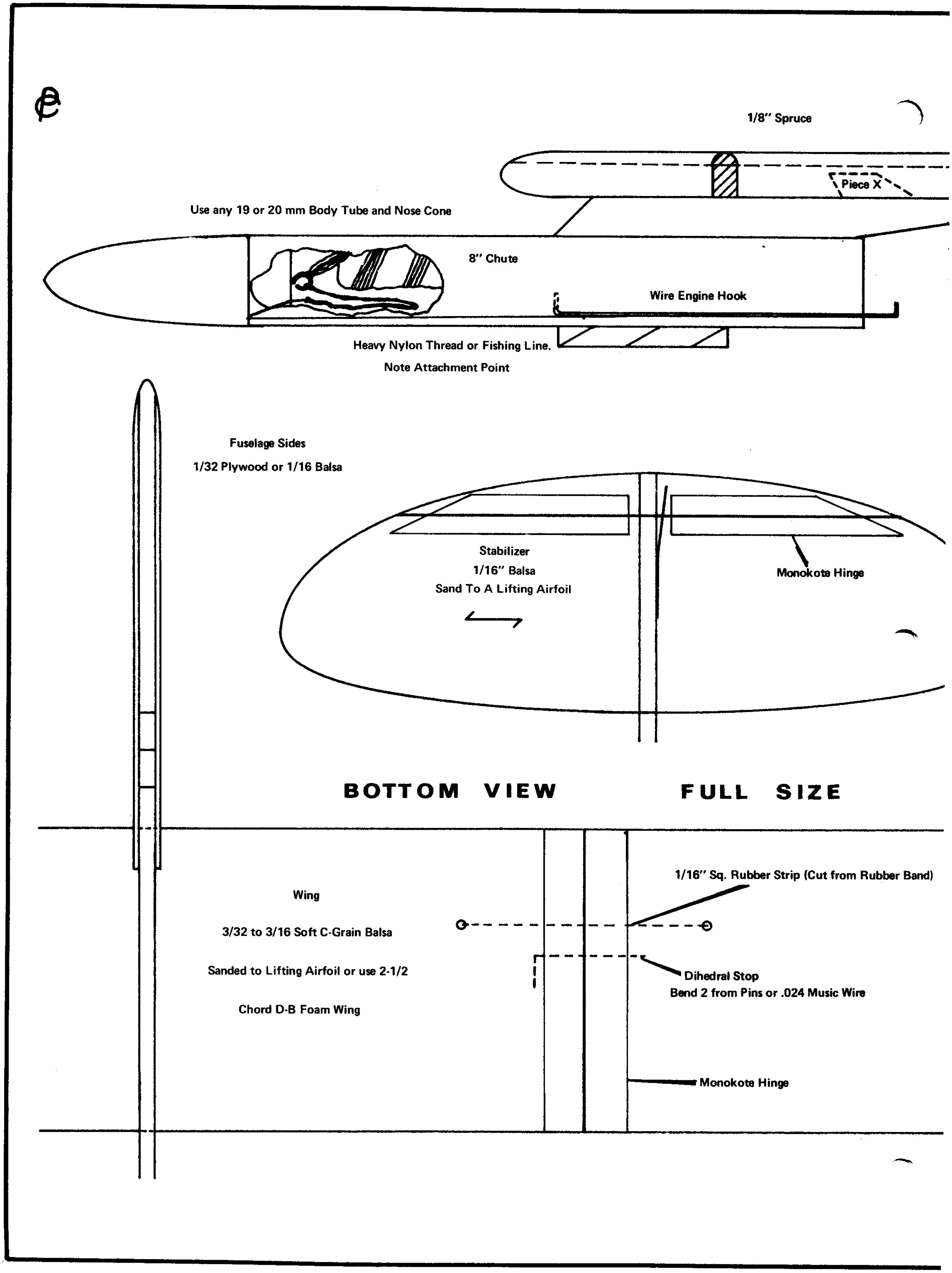
The first glider of this design that I built used a piece of rather heavy 3/32" balsa for the wing. The glider portion weighed about 17 grams. The glide was pretty bad, probably due to the weight and the poor airfoil. It would only do about 10 seconds from an altitude that I would usually expect one of my gliders to do at least 20, and preferably 30 seconds. However, considering that I was only trying to get a simple workable design, I didn't consider the glide to be important. It turned out that it had all the durability that it needed, and then some. This original "flop-wing" B/G was designed for A-engines, and was definitely NOT intended for anything larger. At one point, I deliberately tried to destroy it. A B4 caused no problems . . . while a C6 snapped the boom just in front of the stab. The wing came out of all this, including the highspeed flip that resulted from the boom failure with the C, completely *undamaged.* Glide times averaged about 90 seconds. The tests were conducted under all possible wind conditions that a B/G would conceivably have to fly in, from dead calm to 25 mph winds.

Another glider was built using a D-B foam wing. The glider was considerably lighter, although I never got around to actually weighing it. The glide was at least equal to that of one of my good conventional gliders. Due to circumstances beyond my control, the B/G has not yet been flown. However, assuming that the new glider would reach the same altitude (which would appear to be reasonable), and considering the hand launch glide data as an accurate representation of the glide that would occur in a typical flight, it would appear that the foam winged glider should give consistant times of at least 3 minutes. With a little more development work, I see no reason why times of 5 minutes in dead air can't be achieved.

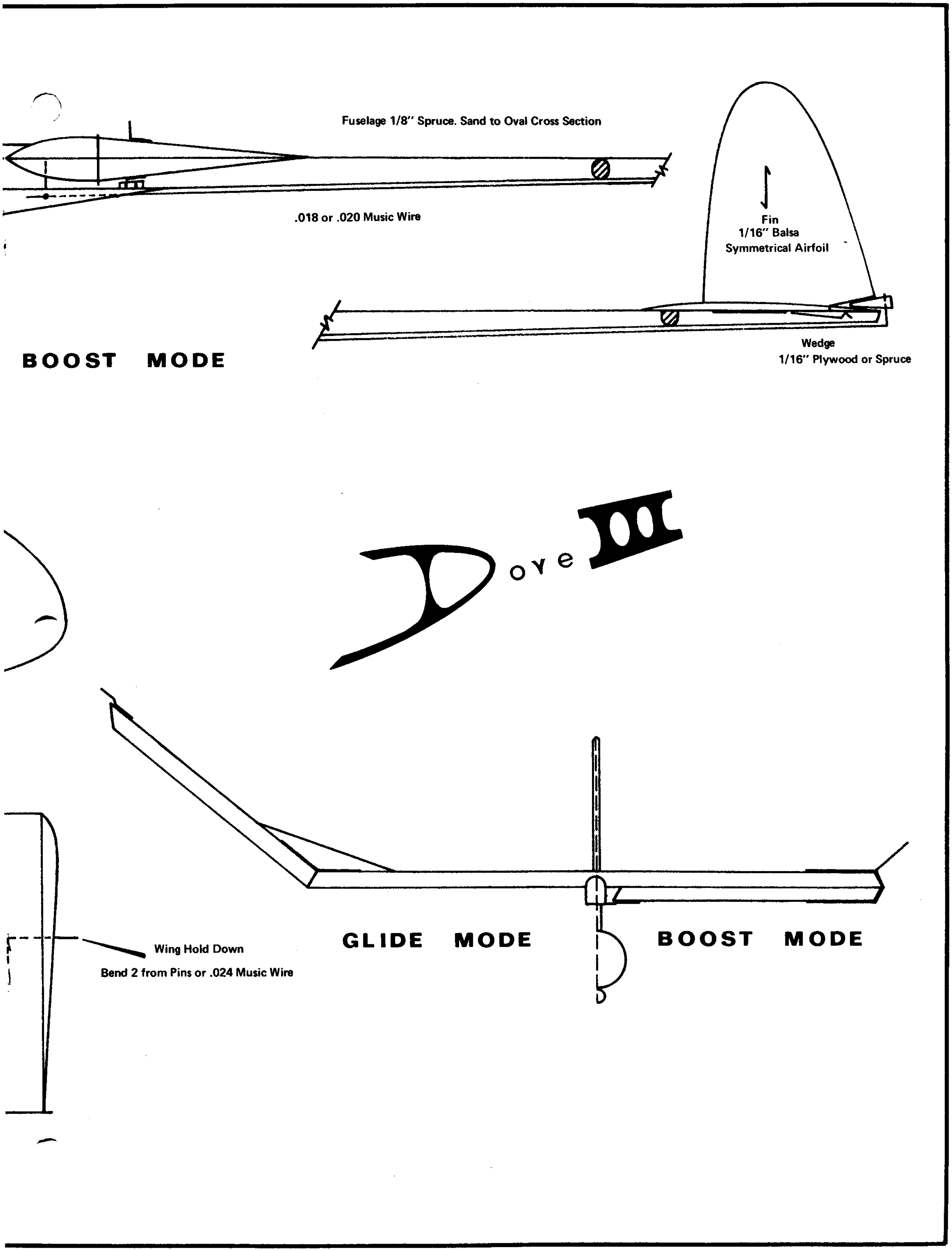
If you are going to build this or any other B/G, take your time and build it carefully! Compared with other hobbies, most model rocketeers have *LOUSY* workmanship. I've seen 8 and 9 year old kids building and flying power free flights. Most B/G's are trivially simple by comparison! Actually, a normal model rocket will fly reasonably well with fin misalignments of several degrees, particularly if the fins "happen" to be misaligned so that the rocket can spin! It just isn't the same thing on a glider. One degree can make a considerable difference and a fraction of a degree can keep a good glider from becoming an excellent glider. This, in my opinion is why there is such a high disqualification rate in B/G, it is also the reason for the abundance of 10 and 15 second flights. If you're going to build a B/G, or any other rocket for that matter, take your time and build it right!

For building this glider, I recommend the use of an aliphatic resin cement such as Ambroid Se-Cur-It. Don't use a cellulose based cement, particularly on foam. Also, don't use 5 minute epoxy, that is unless you have to save a few minutes and don't mind having your glider fall apart after a few days. The epoxy is good, but it has nowhere near the strength of normal epoxy, and it tends to turn brittle after a few days *unless* it is mixed to a tolerance greater than most people mix epoxy.

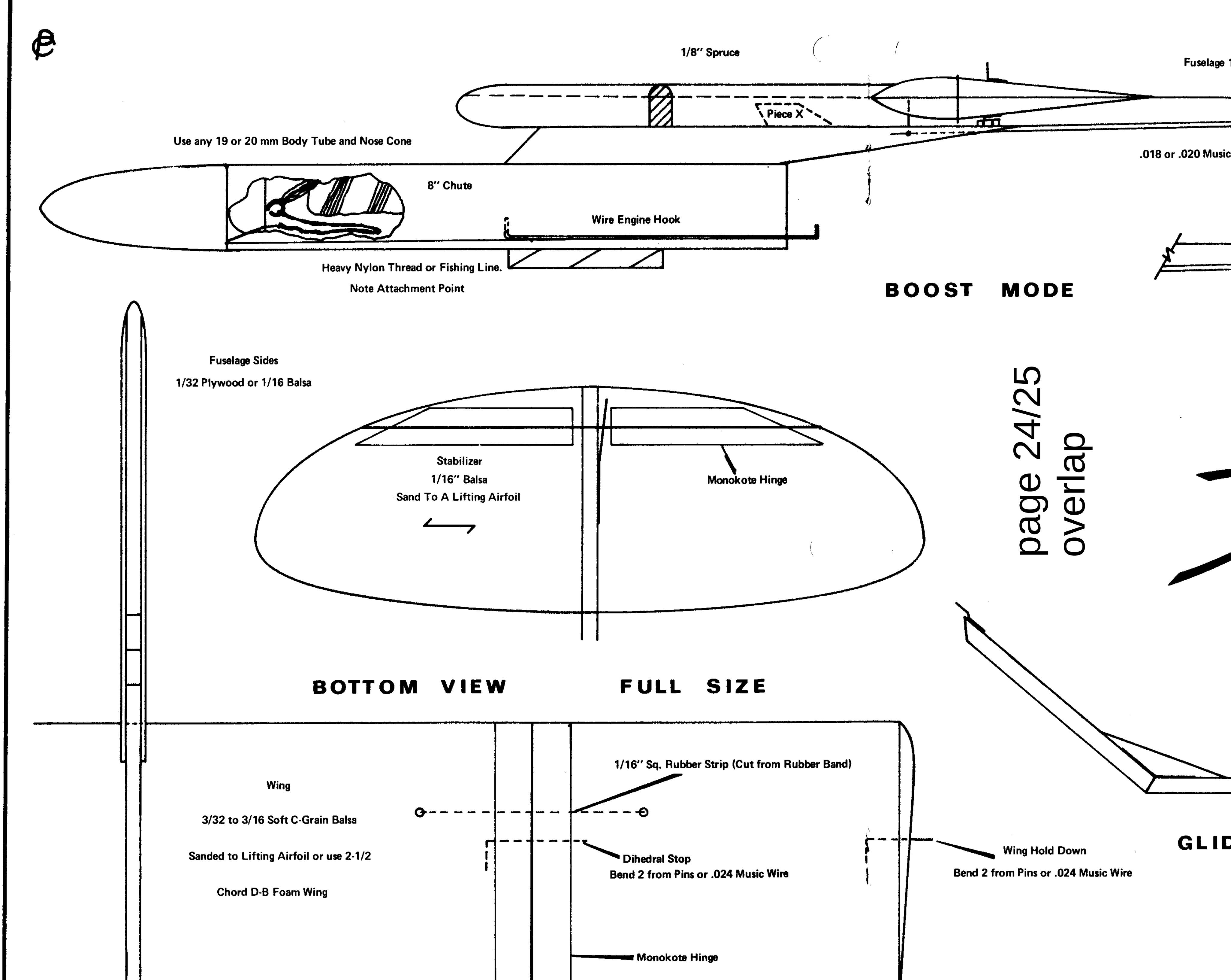
Either foam or balsa can be used for the wing. Use which ever you prefer. Foam is definitely faster and lighter, however balsa is stronger. It might be a good idea to use a spruce leading edge on the foam wing. For a balsa wing, take your time and sand in a good airfoil. A cardboard template is very

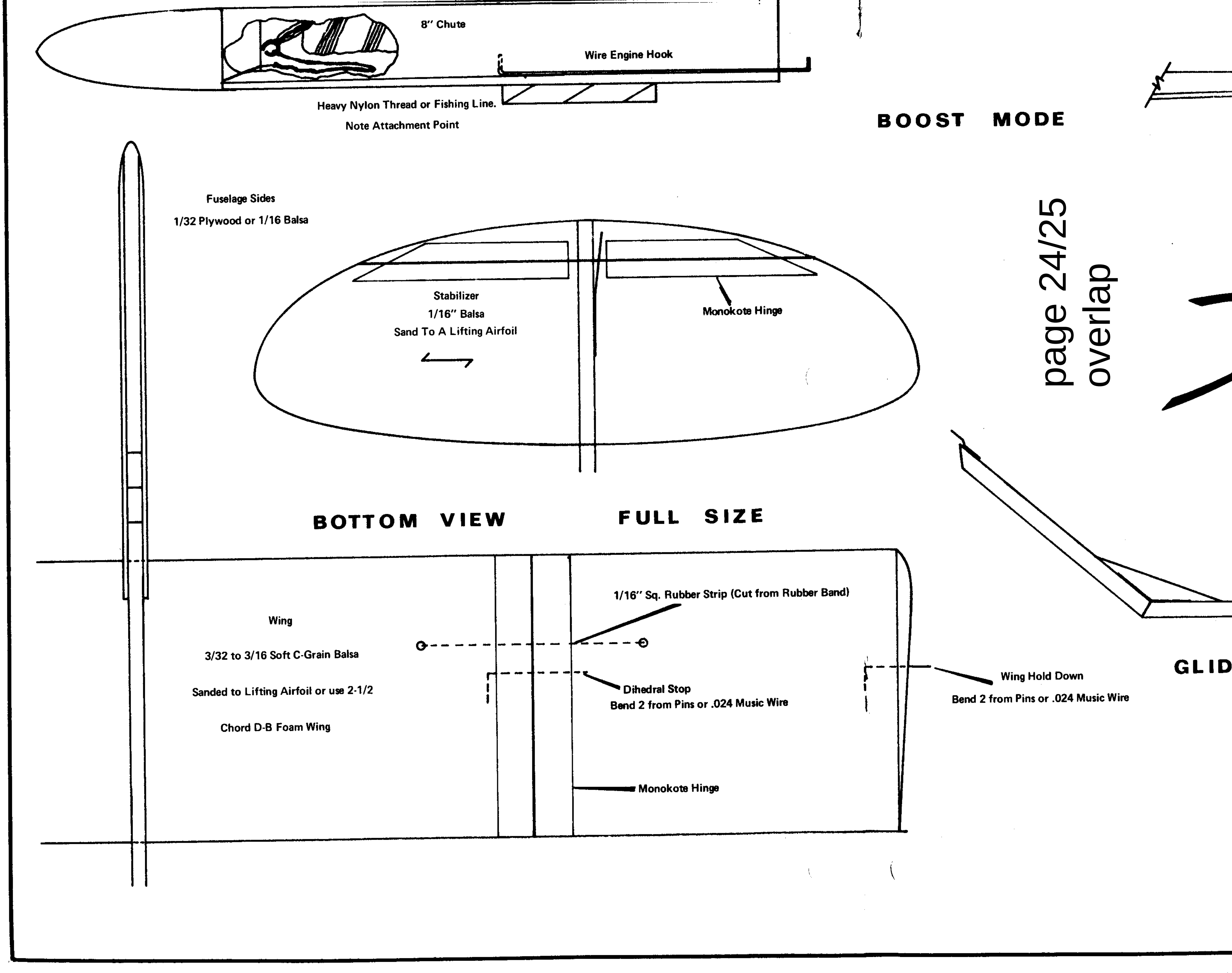


1/8" Spruce
Piece X
Use any 19 or 20 mm Body Tube and Nose Cone
8" Chute
Wire Engine Hook
Heavy Nylon Thread or Fishing Line.
Note Attachment Point
Fuselage Sides
1/32 Plywood or 1/16 Balsa
Stabilizer
1/16" Balsa
Sand To A Lifting Airfoil
Monokote Hinge
BOTTOM VIEW
FULL SIZE
1/16" Sq. Rubber Strip (Cut from Rubber Band)
Wing
3/32 to 3/16 Soft C-Grain Balsa
Sanded to Lifting Airfoil or use 2-1/2
Chord D-B Foam Wing
Dihedral Stop
Bend 2 from Pins or .024 Music Wire
Monokote Hinge



Fuselage 1/8" Spruce. Sand to Oval Cross Section
.018 or .020 Music Wire
Fin
1/16" Balsa
Symmetrical Airfoil
Wedge
1/16" Plywood or Spruce
BOOST MODE
Dove III
Wing Hold Down
Bend 2 from Pins or .024 Music Wire
GLIDE MODE
BOOST MODE


1/8" Spruce
Fuselage 1
Piece X
Use any 19 or 20 mm Body Tube and Nose Cone
.018 or .020 Music
8" Chute
Wire Engine Hook
Heavy Nylon Thread or Fishing Line.
Note Attachment Point
BOOST MODE
Fuselage Sides
1/32 Plywood or 1/16 Balsa
Stabilizer
1/16" Balsa
Sand To A Lifting Airfoil
Monokote Hinge
page 24/25
overlap
BOTTOM VIEW FULL SIZE
1/16" Sq. Rubber Strip (Cut from Rubber Band)
Wing
3/32 to 3/16 Soft C-Grain Balsa
Sanded to Lifting Airfoil or use 2-1/2
Chord D-B Foam Wing
Dihedral Stop
Bend 2 from Pins or .024 Music Wire
Wing Hold Down
Bend 2 from Pins or .024 Music Wire
GLID
Monokote Hinge



8" Chute
Wire Engine Hook
Heavy Nylon Thread or Fishing Line.
Note Attachment Point
BOOST MODE
Fuselage Sides
1/32 Plywood or 1/16 Balsa
Stabilizer
1/16" Balsa
Sand To A Lifting Airfoil
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BOTTOM VIEW
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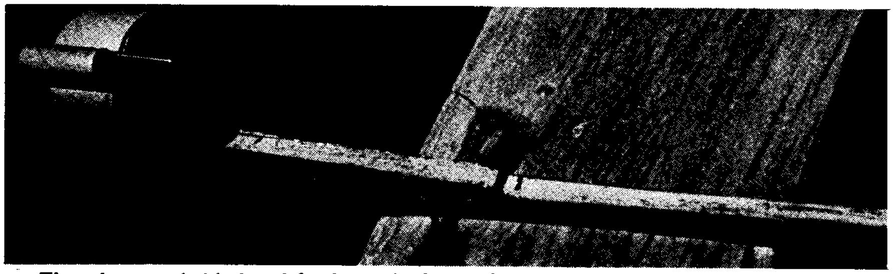


The wings are held closed for boost be bent wire pieces which fit under the rear of the pylon. Thin music wire or a pin can be used.

helpful in obtaining an airfoil that is consistant all the way across the wing. Apply whatever finish you are planning on at this time.

When cutting the wing at the hinge line, use some type of a guide to make the cut EXACTLY perpendicular to the leading and trailing edges. Now sand the wing at the cut so that the dihedral can be put in. Use a sanding block, and set the wing on the edge of a table with the tip blocked up the proper amount, and use the edge of the table as a guide. I find that is best to do half of the required sanding on each side of the joint.

The hinge is simply a piece of Monokote or aluminized pressure sensitive Mylar. It is just stuck on the bottom of the wing. Super Monokote has a stronger adhesive, although it requires heat. A cloth hinge could be glued in its place.

A small rubber band can be used to open the wings. I've also used "Lastex" cotton covered elastic thread, available in Woolworth's sewing department, on my small "flop-wing." Drill a hole in each of the wing panels about 3/4" from the hinge. Push one end of the rubber through the hole, and insert a piece of a toothpick, a small piece of music wire, etc. through the loop, put the slack back through the hole, put the other end through the hole in the other panel in the same manner. You will probably have to cut a notch to recess the toothpick so that it doesn't keep the wings from folding all the way. The rubber only needs to be tight enough to hold the wings completely open. This method of retaining the elastic is much better than the epoxy method described last month because it allows you to remove the elastic easily in case it needs replacing or if you want to store the glider with the wings folded. A torsion bar type of spring made from music wire could be made to work, and would reduce drag.

Now, if you did a good job on sanding the angle on the ends of the panels, both wing tips should be at about the same dihedral angle. If not you will have to make up the wire dihedral stops. They are glued onto the wing center section just behind the rubber. You might want to try them anyway, because they simplify adjustment.

Use spruce for the fuselage. HARD balsa could be used instead, but you will probably have to increase the thickness of the boom. Note the taper and the various cross sections shown on the plans. If you want to use B-engines the boom should be strengthened.

The auto-elevator is not essential. In fact, it's merits are somewhat debatable. I generally use one because I feel that it gives a better transition and better pitch stability. I once flew this B/G with an A5-4, so that it was in a well developed death dive when the pod came off. The glider went into a nice glide immediately. It is not all that much extra work, so try one and decide for yourself.

Cut the fin and stabilizer from light 1/16" C-grain balsa. Sand the fin to a symmetrical section. If you are using the Auto-elevator, the stab should have a lifting airfoil similar to the one on the wing. If not, use a symmetrical section. Cut the elevator off, and hinge it with Monokote. Glue the stab and fin to the body. Don't get any glue on the elevator. Glue the wing in place, making sure that it is aligned accurately. Glue the spruce strip in place on the top front of the body. This strengthens the pod attachment area, and also one of the areas of the wing where it is most prone to fail.

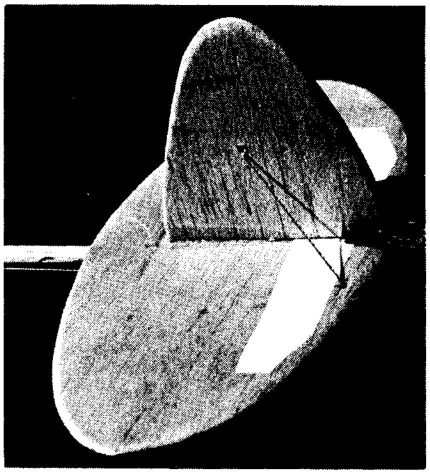
You can use either a piece X pod or a pin pod. Take your pick. The plans show the piece X pod because that was what I felt like building at the time. I generally use a metal engine clip for ease of changing engines. I then attach the line from the parachute to the clip. If the clip is placed on the side of the pod opposite the pylon, the chute will tend to swing out and away from the glider at ejection. The pylon shown is a little bit too high for an A5-2. It is much too low for a B4-2. A good useful R&D project for somebody to do would be to measure the maximum size of the exhaust plume of the various engines. Use whatever bodytube and nose cone that you feel is best.

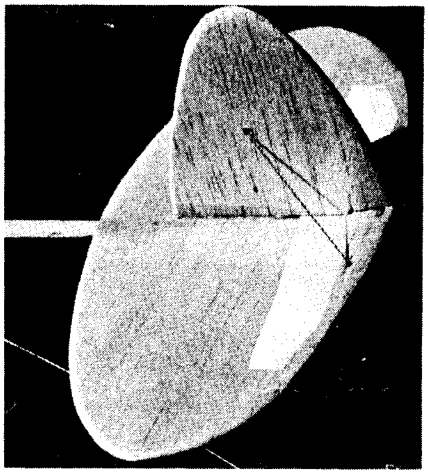
There are two ways to hold the wings closed for boost. A piece of music wire can be attached to the wingtip as shown, or a piece of wood can be glued onto the pod. Either method can be used satisfactorily.

Trim away the rudder so the elevator can move. The rudder serves as a stop to keep the elevator from moving up too far. About 3/32" at the rear should be OK. Either elastic thread or a music wire spring can be used to force the elevator to the up position. Form a wedge from 1/16" plywood or spruce to fit in between the elevator and the rudder to hold the elevator down for boost. The wedge is pulled out at pod separation. Sand the wedge to a smooth surface so that it pulls out easily. The elevator *must* be forced flat against the boom for boost!

The importance of proper glide trimming is underestimated by many rocketeers. No matter how good a design you have, and how well it is built it won't fly unless it is trimmed. Almost all model airplane flyers spend hours or days trimming their planes before a contest. They also try to get in a couple of flights before making an official flight at a contest, and generally, the results show it. There is no set "formula" for trimming a glider. Really all you can do is go out and fly. However, watch what the glider does, and try to improve it for the next flight. Since the idea is to achieve the longest duration possible, you will need some method of measuring sink rate. A stop watch is helpful, though a regular watch can be used. After a little experience you should be able to tell when a glider is doing it's best just by watching it.

The usual "point it at a spot on the ground 50 feet ahead" type of hand launch doesn't give any duration data. When you are trimming the glider by this method you are probably trimming it for maximum range, not maximum duration. More altitude and a circling glide will eliminate the effect of distance. This will also let the glider get into a stable glide, and reduces the effect of a poor launch. Hand gliding from a roof or second floor window can be done, but carrying the glider back up stairs after each flight can be tiring. Also, if there is some wind, there will generally be some tur-





The elevator is held flat against the boom during boost by the plywood wedge (see photo at left). The wedge is pulled out at pod ejection allowing the elastic to pull the elevator up to its glide position (see photo at right). The base of the rudder is used as an elevator stop in the glide configuration.

bulence near a building. Test gliding in a large gym can be helpful. A hand launch glider type throw can be used. For a conventional type glider, this means holding onto the glider fuselage with the thumb and middle finger, while the index finger is behind the wing. The glider is thrown upwards at an angle between 60 and 90 degrees, with a bank of about 45 degrees. The exact style depends on the flyer. Be careful when throwing this way, since hand launch gliders have finger rests to keep from tearing a wing in half. With this type of launch the glider should go up in a climbing turn and begin to glide off to your side or behind you. It is generally helpful if the glide circle is in the opposite direction on the launch circle. (Left glide circle for right handed launch.) When trying this type of a launch for the first time, don't do it with a nice new competition glider. Use something durable and try to do it over a soft, grassy field. Remember that you are trying to trim the glide, not the way it throws! If it's not transitioning properly, try changing the angle you throw it at. It's true that by using this method you are introducing one more variable, namely the launch. However, this is only important if you are using a watch. You should be able to get enough information about the glide by just watching. Keep changing the nose weight until you have what appears to be the glide you want.

On some of my flop-wings, I find that the following launch procedure works better than the one mentioned. Hold the glider upside down, using the thumb and ring finger to hold the fuselage, while the fingertips of the index and middle fingers hold the wings closed. It is thrown at the angles mentioned previously. The glider should go nearly forwards for a short distance, then the wings will begin to unfold and it will simultaneously roll to the right and turn to the left, until it is gliding level towards the left. The glider should have a right hand circle. The directions are reversed if you are left handed.

The exact type of trim that you want depends on the weather conditions at the time. I generally tend to classify air conditions in three general groups. They are covered separately below.

For *calm air* with no thermals (dead air), try for the lowest possible sink rate. This generally occurs between the maximum range trim and the trim where the glider stalls. Use a very wide circle.

For conditions where *thermals* are present, you would want a glider flying on the verge of a stall. You want a tight circle, about 30 to 40 feet in diameter. As the circle is tightened, nose weight will probably have to be removed to retain the desired trim.

For *windy* weather, good luck! A small glider is going to get tossed around pretty badly. Adding nose weight to increase the glide speed can sometimes help, but be careful not to go too far. All I can say is to keep trying until you have something that looks good.

All of the above stuff may seem like a lot of work, but if you don't go overboard with a lot of equipment it can be a lot of fun throwing a glider around for a couple of hours.

If at all possible, try to fly your models before an official flight. With a dethermalizer this can be done without fear of losing it. (The dethermalizer that was promised last month was not completed on time for this issue. It will however be printed in the near future.)

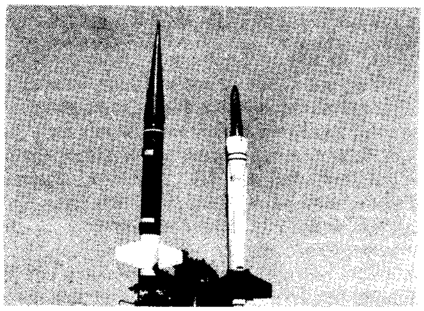
One thing that I have noticed about most people who fly boost-gliders is that they usually tend to set it up so that the pod is halfway up the launch rod. This means that the B/G has only 18" of usuable rod. Some of my test flights seem to show that a much straighter boost results if the speed at which the B/G leaves the launcher is increased. So, use a 54" rod or some type of a support so that the glider can start at the bottom of the rod.

A built up wing Eagle and Condor class flop-wing will be presented in the near future. The article was originally scheduled for next month, but there has been a delay due to lack of a field suitable for test flying such a large glider. This problem should be solved in time for the November issue.

I am interested in hearing from anyone who tries a flop-wing, and will try to answer any questions that are accompanied by a self-addressed, stamped envelope. Mail should be addressed to me c/o **Model Rocketry.**

New Product Notes

Model Products Corporation, Mt. Clemens, Mich., has introduced the company's first built-up, ready-to-launch plastic model rockets. The first two rockets in the new American Flyer Series are the Yankee I, which is 14 inches long, and the NIKE Clipper, measuring 19 inches.



Especially suitable for first-time rocketeers, the American Flyer rockets feature a large 14 inch parachute, permanent, reusable wadding, color decals and rigid, all-plastic construction and true scale detailing.

The rockets also contain a patented inner liner to protect the plastic rocket body from the heat generated during blast-offs. This liner is an exclusive MPC feature. The rockets are carefully constructed to provide a true flight pattern and eliminate chute damage during recovery.

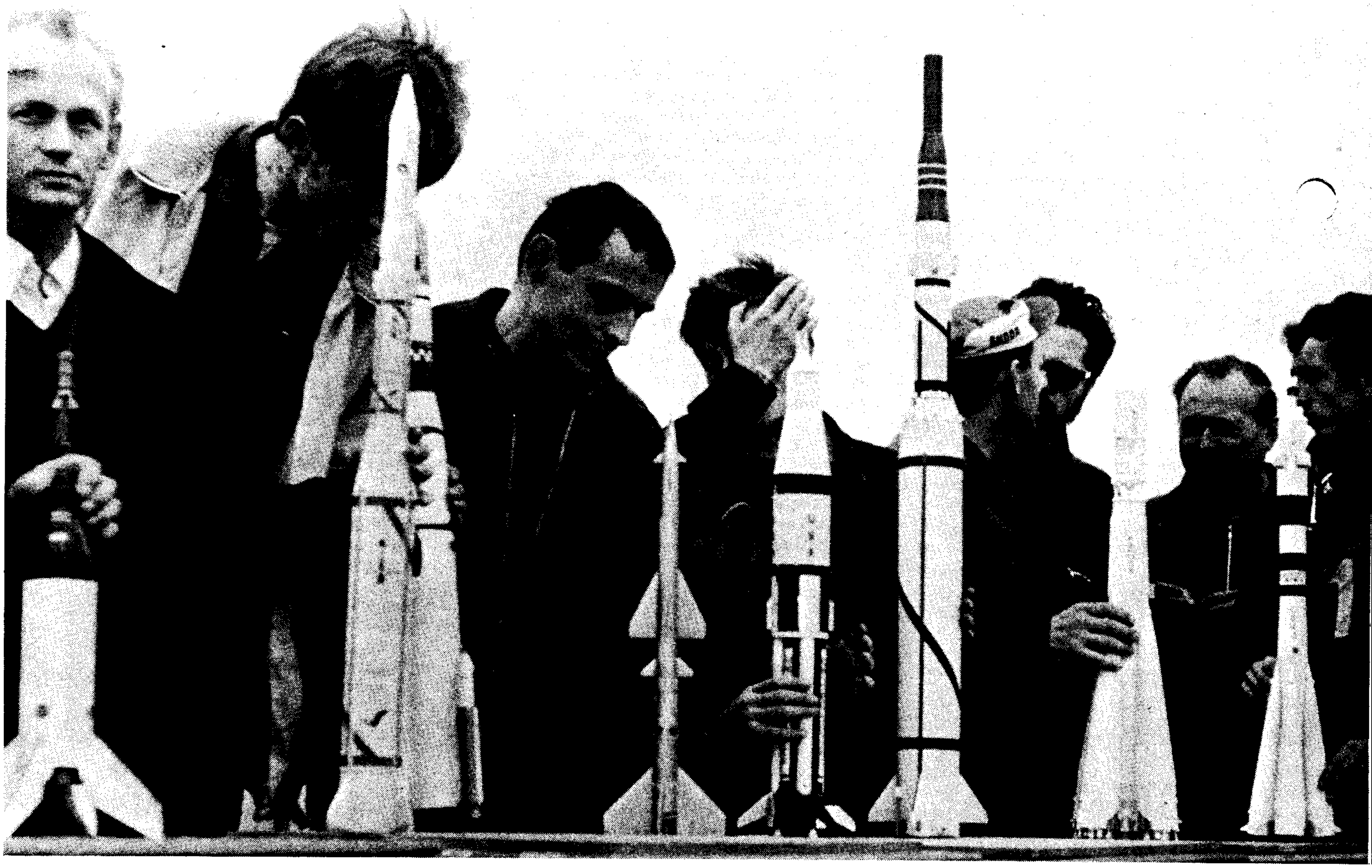
Spacemaster Enterpises, has recognized the need for a service to the space and rocket enthusiast. They are introducing a new illustrated catalog covering a complete line of space and model rocket kits available from the leading manufacturers of these products. Manufacturers of products that Spacemaster Enterprises handles by fast mail order are: MPC, L.M. Cox, Space Age Industries, Vashon Industries, Monogram, AMT, Revell and others. Plastic conversion

kits for models that have appeared in **Model Rocketry** are available from Spacemaster Enterprises. In the new catalog these models are noted and in which month of **Model Rocketry** the conversion plans are described.

The customer service department of Spacemaster Enterprises is another unique service offered to the model builder enthusiast. Models which are not listed in our catalog can be ordered through the customer service department which handles all types of model kits such as cars, planes, boats, etc. All models listed in the new catalog *are in stock* and *not* customer service department items.

Your first order with Spacemaster Enterprises will place you on their regular mailing list which if you have already placed an order with Spacemaster Enterprises, will entitle you to receive the new illustrated catalog and all future catalogs. If you would like to receive a copy of the new catalog, send 25¢ to Spacemaster Enterprises, P.O. Box 424, Dept. SE, Willoughby, Ohio 44094. With your copy of the new catalog you will receive a color print of the Apollo II lift off.

G. Harry Stine, a well-known authority on model rocketry, has signed a contract with Sentinel Books Publishers, to prepare an illustrated manual on model rocketry. The new book is designed to meet the needs of model rocketeers, young and old, who are just getting started in model rocketry and who buy their model rockets and accessories at hobby shops and other retail stores. It will provide practical information of a "how-to-do-it" nature on safety, construction, model rocket engines, launching, and flying areas. It will thus fill a current need for a simplified, inexpensive beginner's book on model rocketry. Ready September 1970. List price: $1.50. Inquiries should be addressed to Sentinel Books, 17 E. 22nd Street, New York, N.Y. 10010.

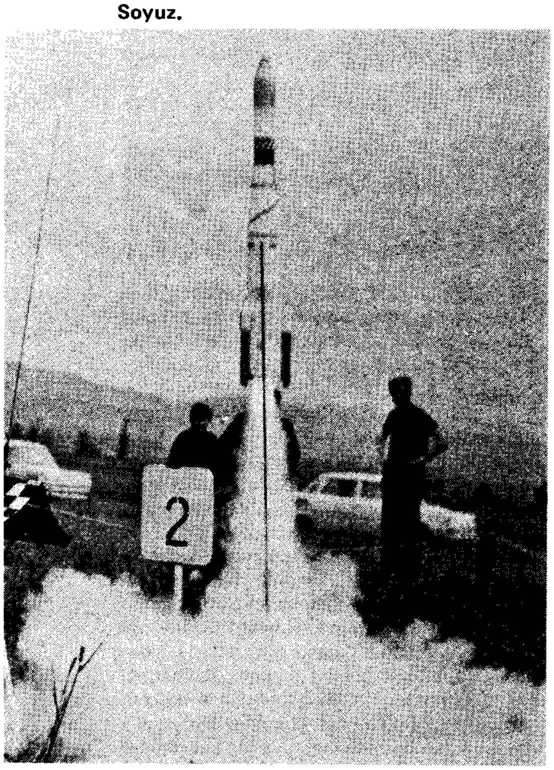


Scale models were seen in great variety in the Dubnica Contest. From left to right above are a scale Little Joe I, French Sattelite launcher Diamant, Thrust Augmented Thor-Agena, USSR Guideline, Saturn-1B, another French Diamant, USSR Vostok, and USSR Soyuz.

International Contest Report

"Dubnicky Maj"

by Jaroslav Divis



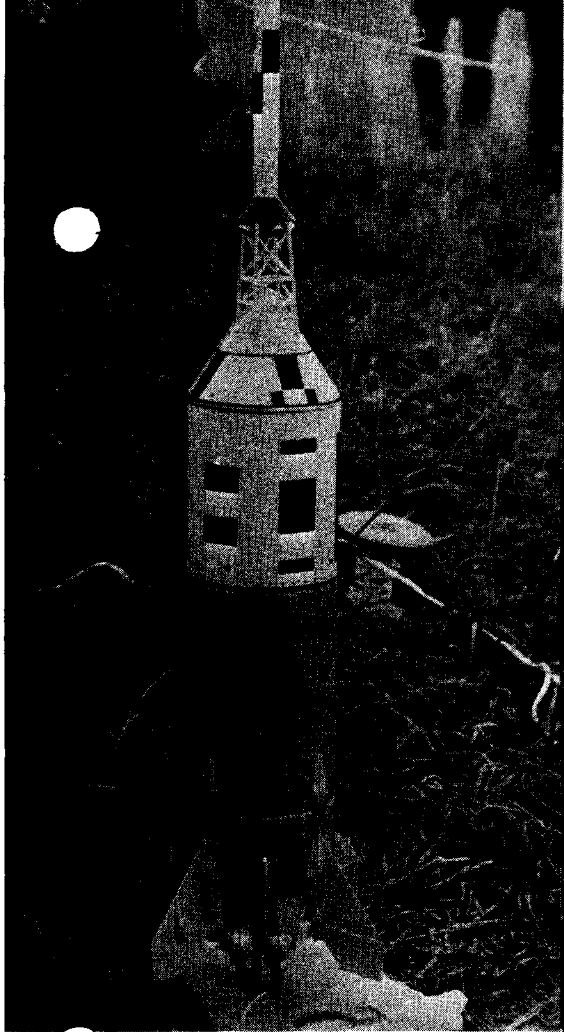
Horvath Trnava's Thor-Delta LV-2A lifts off with all engines burning.

An International Contest, with participants from Yugoslavia, Bulgaria, Poland, and Czechoslovakia, was held at the airport "Slavnica" in Dubnica nad Vahom, Czechoslovakia. The meet — "Dubnicky Maj" — took place from May 22 to 24, and served to select the Czechoslovakian team for the World Championships in Vrsac this September. During the contest the wind blew very strong, and there were times it rained. The events flown were 5 nt-sec Streamer Duration, 10 nt-sec Parachute Duration, 2.5 nt-sec Boost/Glide, and Scale.

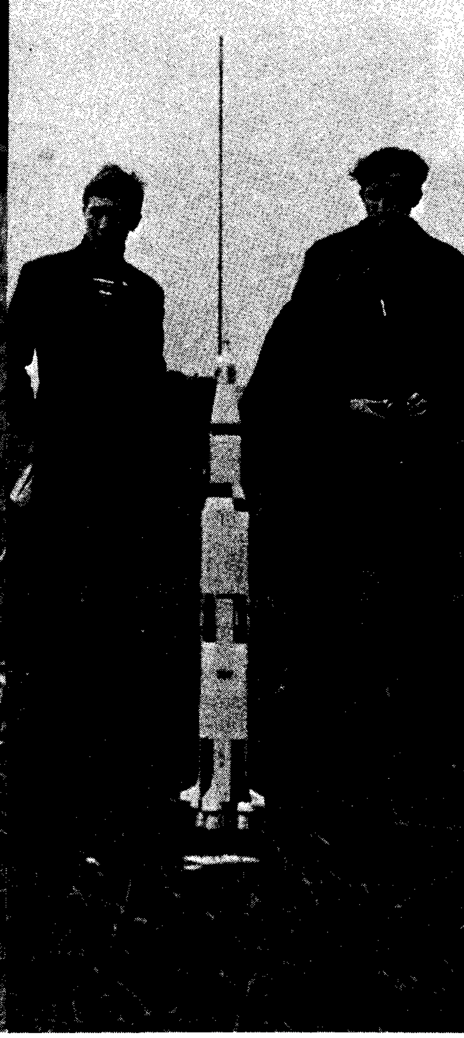
The times in the duration events were quite consistent, with Mitropolski's 174 second Boost/Glide flight just barely edging out Sabljak's 172 second flight. In the Streamer Duration Event Saffek's 90 second flight had only a five second edge on Nubaur's 85 second duration. Saffek also took first place in the Parachute Duration event with a 484 second flight.

The scale models excelled in accuracy of work, so the competition was very strong. There were about 50 scale models entered in the competition, with almost every type of rocket modeled. There were scale Little Joe I, Little Joe II, Thrust Augmented Delta, Guideline, Saturn 1B, Diamant, Vostok, Soyuz, Saturn 5, Corporal, Mercury Redstone, Iris, and Meteor-3 models at the contest. The best of them all was Jerabek's Vostok, painted in the white display colors, which took first place. Many of the other excellent scale models can be seen in the photographs.

At the competition the Czechoslovakian team for the 1970 World Championships was selected. Team members are Otakar Saffek (Prague), Alois Klain (Ostrava), Milan Horvath (Trnava), Milan Jelinek (Dubnica nad Vahom), Jaroslav Divis (Prague), and Karel Jerabek (Usti nad Labem). The events in which each team member will compete have not yet been deterimed.



This scale Little Joe II, built by J. Divis of Prague, took 4th place in the competition.



The second place model was a Saturn 5 built by Tomas Indruch of Czechoslovakia.

This Diamant scale model was entered by one of the Polish competitors.

Dubnicky Maj Results

5 nt-sec Streamer Duration

1st	Saffek	(Prague)	90 sec.
2nd	Nubaur	(Bulgaria)	85 sec.
3rd	Kyncl	(Prague)	82 sec.

2.5 nt-sec Boost/Glide

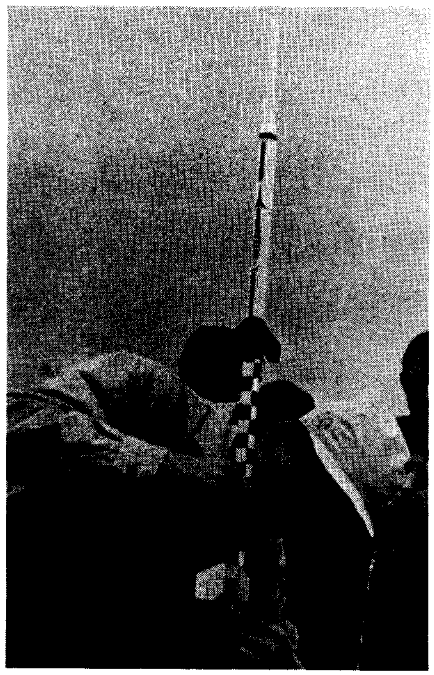
1st	Mitropolski	(Bulgaria)	174 sec.
2nd	Sabljak	(Yugoslavia)	172 sec.
3rd	Alturban	(Vyskov)	145 sec.

10 nt-sec Parachute Duration

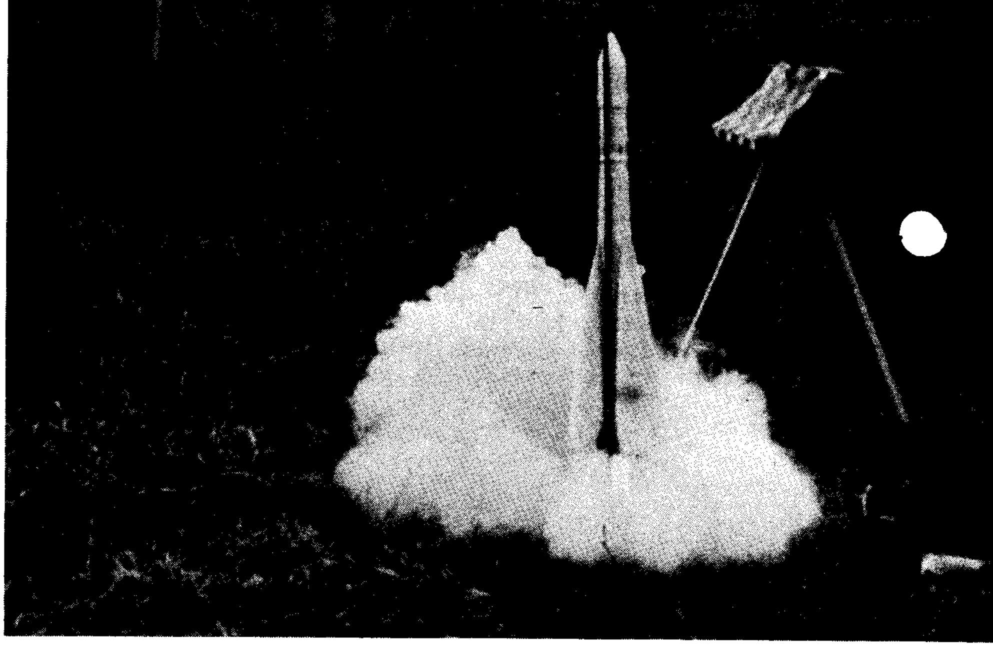
1st	Saffek	(Prague)	484 sec.
2nd	Hrluk	(Trnava)	396 sec.
3rd	Rozemberk	(Blansko)	324 sec.

Scale

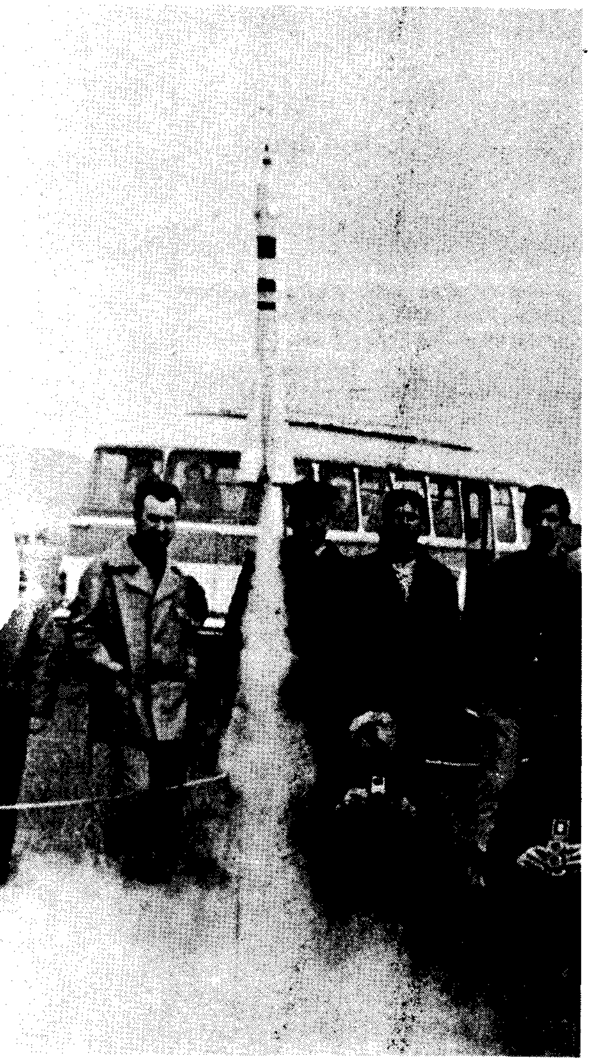
1st	Jerabek	(Usti n/L)	Vostok	899 points
2nd	Indruch	(Ostrava)	Saturn-5	865 points
3rd	Saffek	(Prague)	Little Joe II	848 points
4th	Divis	(Prague)	Little Joe II	835 points
5th	Klain	(Ostrava)	Diamant	809 points



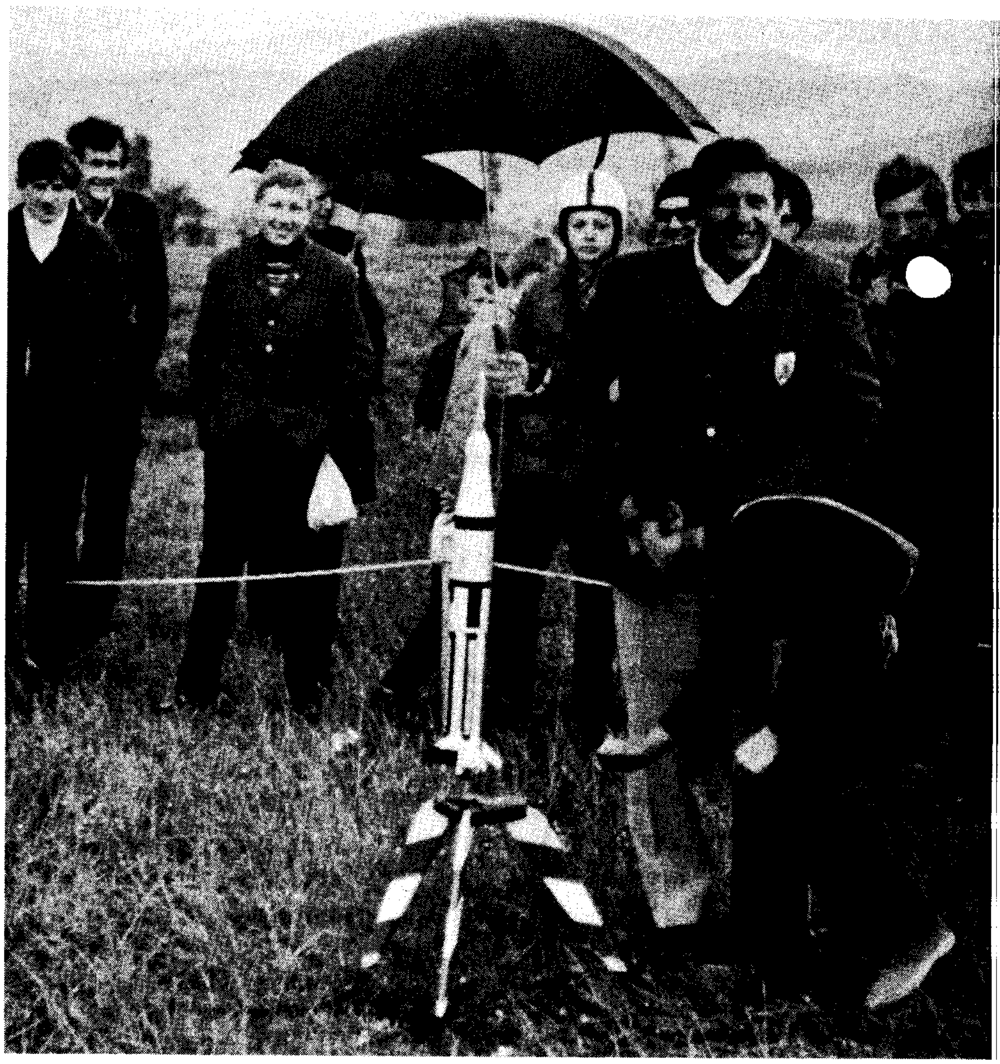
Stojanovic of Yugoslavia prepares his scale model of the Meteor-3 sounding rocket for launch.



At left Jerabek of Czechoslovakia prepares the 1st place winning USSR "Vostok." Notice the detail, especially on the interstage adapter. Above, Jerabek's "Vostok" lifts-off on its prize winning flight. The model was powered by four 10 nt-sec Adast motors.



A Soyuz model by one of the Polish competitors lifts-off the pad.



Rain hindered the scale launchings as one of the Polish competitors prepares a 1/80th Scale Saturn 1B model.

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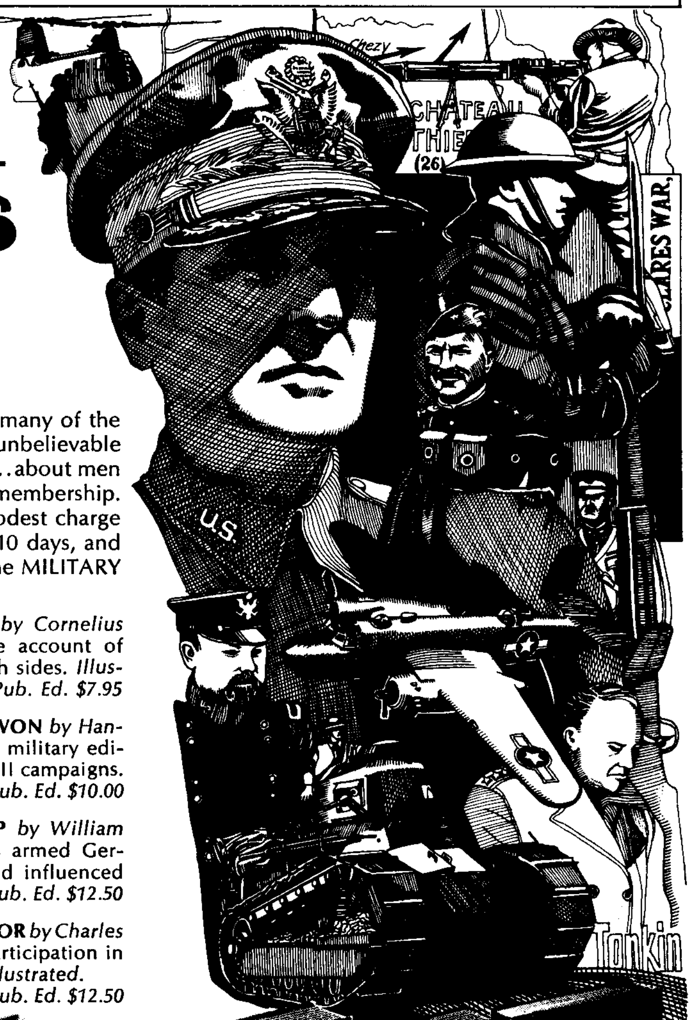

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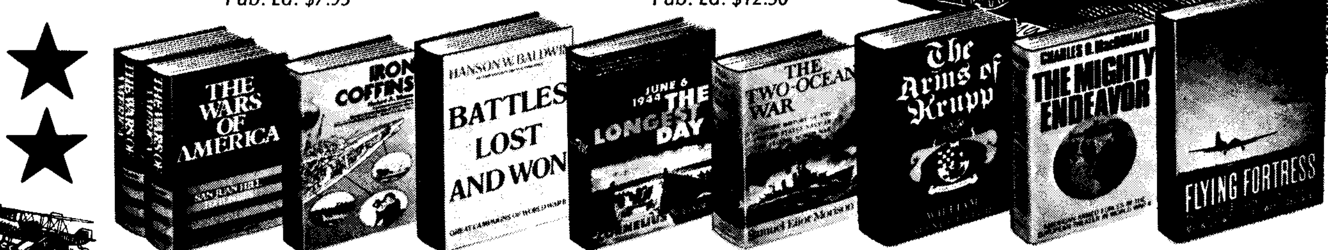

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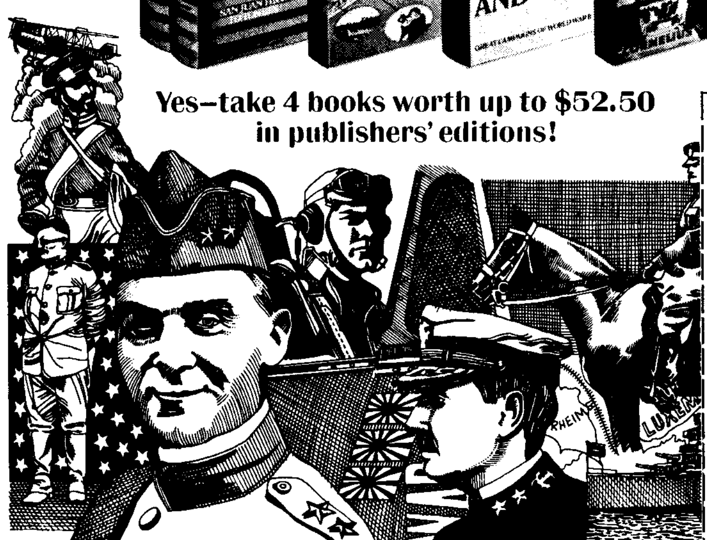

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Build the "BIO-1"

Part II

by Alan Stolzenberg

Last month's article contained the background and goals of this project and details of construction of a rocket capable of carrying a mouse and a transmitter. This month's segment contains construction details of the capsule, the procedure for prepping the rocket, and the results of preliminary flights.

Capsule

The capsule was form fitted for Herman, a size BT-50 black lab mouse. It consisted of a 6 inch length of clear plastic BT-50 tubing deformed to an oval cross section as shown in Figure 1. The mouse was placed inside the tubing and the photocell and lightbulb were placed under the mouse's belly on the outside of the tubing. A light tight section of BT-55 covered the whole assembly.

The design of the capsule was dictated by the behavioral patterns of mice with regard to orientation. There are two things which all mice seem to do. First, mice climb uphill only, regardless of which end of the mouse is up. Second, mice like to lie on their stomachs (with respect to gravity).

The first behavioral pattern makes capsule loading easy. If the mouse is held by his tail and the capsule is placed in a slanted position within reach he will climb in. However, if the capusle is held so that his tail is higher than his head, he will climb out.

The second pattern complicates sensor placement. The mouse always rotates itself to a belly down position. Since the photocell is taped to the tube, it will see the backbone instead of the belly when the mouse moves. The backbone does not expand and contract from breathing, and as a result modulation will be lost.

This problem led to experiments with attaching the sensor directly to the mouse. The sensor was placed on a BT-50 tube with a rubber band. The mouse was placed in the tube, and he climbed through it but was restrained by his tail. When his head emerged from the end of the tube the sensor and rubber band were quickly slid over his head. Unfortunately the mouse shot through too fast. Either the sensor fell of or he shook it off. The next attempt was to use string. The mouse was to walk through a loop with a slip knot which was to be tightened to secure the sensor to the mouse. This method resulted in the mouse becoming entangled in two feet of string. Our final resort was foam rubber strips with Velcro pads to fasten it. This too failed as the mouse was able to crawl out of the foam rubber.

After the failure of these methods we turned to the idea of a circular capsule and found that the mouse could turn over in it. To prevent this the tube was flattened to an *oval shape* with two wood strips and several strong rubber bands. This worked extremely well. Only the mouse's head could turn. However, when the capsule was inserted in the payload section, the Flight Systems tube was too small and it forced the capsule back into a circular shape. This is why a new payload section of BT-55 was designed.

As BT-55 was being used AR-5055 rings were employed to hold the wood strips against the clear plastic BT-50. In combination with several strong rubber bands enough flattening was created to restrain the mouse from rotating. One ring was notched to permit passage of the light bulb wires. Both ends were blocked off with cotton balls to cushion the mouse.

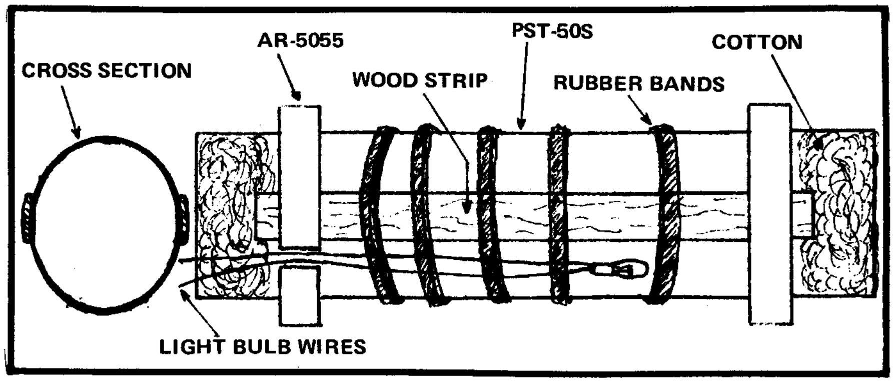


Figure 1: MOUSE CAPSULE. The mouse capsule is held in an elliptical cross-section by the wood strips and rubber bands. This prevents the mouse from rotating after the breathing rate sensor is adjusted.

Construction

After several flights it became evident that the payload section design published last month could be improved upon. This resulted in the design of a new payload section constructed from BT-55. The larger tube size allows rearranging of components in the payload section. The new arrangement is much easier to prep and gives better telemetry results. (Refer to Figure Two).

An 18 inch length of BT-55 should be cut into one 10 inch and one 8 inch length. The transmitter will be placed in the 10 inch length. If you intend to build a new booster from BT-55, glue a nose block in one end of the 10 inch length of BT-55. However, if you are going to use the Flight Systems tube in the booster, glue an adapter in place instead. The adapter will have to be homemade from balsa or another suitable wood. Put a hole for the antenna 3/4 inch above the top of the block or adapter. The transmitter will fit in the BT-55 tube mounted in a 9 inch length of BT-50 with a AR-5055 ring at each end. The rear ring of the BT-50 should be notched to let the antenna run from a hole directly above the ring. Cut a slot in the front of the 10 inch BT-55 for the photocell wires.

The 8 inch length of tube will be used for the mouse. In its rear end glue an AR-5055 ring with a stage coupler under it. This allows the mating of the transmitter and mouse sections and provides a block to support the mouse capsule. In order for the photocell to detect respiration, a hole must be cut near the rear to accomodate it. This hole should be located to allow the pnotocell to look at the part of the underbelly which moves most in respiration. The battery for the light source is located above the mouse capsule. To allow the nose cone to close over the battery, hollow the nose cone out. The recovery system was described last month. However only one leader line is necessary. The leader line attaches to a screw eye which is used to secure the nose cone rather than the pins which were described previously.

Prepping The Rocket

The first flight took a full hour and a half to prep. With experience and luck this time has been reduced to 45 minutes. If you have never flown a transmitter before, it will take two hours or more. For this reason fly the transmitter *alone* to build up experience.

The first thing to do is to prep the booster. Select your engine and secure it with lots of tape. Put in sufficient flameproof wadding, roll the streamer, and put the streamer in place. Next, untangle the bungee and leader line. The payload chute is then folded and packed into the booster. This completes work on the booster.

Before the transmitter is installed it should be checked to make sure it works. The antenna must be fished through the holes in both tubes. To do this a long stiff wire should be inserted from the outside of the antenna hole in the BT-50. This is taped to the end of the transmitter antenna and pulled back out again. When the end of the antenna appears from the hole, the tape may be removed. The antenna is gently pulled out of the tube and the transmitter is installed in the tube, making sure that the antenna comes out its full length and doesn't bunch up in the tube. Keep the transmitter far enough out to install the battery. Repeat the same fishing process with the antenna when installing the transmitter tube in the 10 inch BT-55. The antenna wire is placed in the notch in the AR-5055 ring at the rear of the BT-50 tube. This helps to reduce the friction and wear and tear on the antenna connections. Again keep the transmitter out far enough to allow installation of the battery.

Next, the mouse capsule must be prepared. Put two cotton balls in the front of the capsule and tape the end closed with scotch tape (two perpendicular strips are sufficient). Pick up the mouse by the tail and hold the rear of the capsule near his nose. It should be inclined at an angle. The mouse will then climb into the tube. When he is in, pack in his tail, put two cotton balls in, and tape this end shut. Check to make sure he can't turn over. Locate the sensor, where the breathing motion is. Check the lightbulb system, and if it works, tape it to the plastic capsule tube at the side of the underbelly area. Insert the capsule in the 8 inch BT-55 tube so that the underbelly can be seen in the photocell hole. Turn on the light, install the battery for the light, put on the nosecone, put the transmitter battery in place, and place the photocell in its hole. You should hear a modulation in the tone signal which corresponds to breathing. If you do not hear it, play with the light location and capsule orientation until you get the modulation. When the modulation is obtained push the transmitter all the way in, tape the photocell in its hole, turn on the light, install the battery, and put on the nosecone. Mate the two payload compartments and tape them together with electrical tape. Secure the nose cone with the leader line screw eye. Mate the payload to the booster and make another check of modulation.

Put the rocket on the launcher and hook it up. Check the receiver and tape recorder and start them up. Give a loud clear countdown, and launch the model.

After flight recover the model as soon as possible. Turn off both on-board electrical systems to preserve the batteries. Get the mouse out of his capsule as soon as possible. Allow the mouse to rest undisturbed for a while.

Decoding

The tape recording made during the flight will contain an audio tone whose frequency rises and falls with each breath of the mouse. To interpret the data after the flight, it is helpful to slow down the tape by a factor of two by playing it back half speed. Count the number of breaths in each five second period and record this data as a function of time. Interpret the data on the tape at least three times and average the three sets of data together. Divide the number of breaths in each five second period by 2.5 to obtain the real time number of breaths per second. From this data a good graph can be drawn.

Flight Data

Flight One

Flight one took place at a Steel City Section launch on April 26, at Shady Side Academy near Pittsburgh, Pennsylvania. Weather was less than ideal with cloud cover at 2000 feet and a strong wind aloft. This flight was made with a rocket constructed according to last month's plan. A circular capsule was used to hold the mouse. The rocket was powered by an F-100-8.

The rocket took an hour and a half to prep due to our inexperience with the systems, wires getting tangled, and Herman's unwillingness to co-operate. After everything was ready Herman turned over and the modulation stopped. I shook, tapped, and rolled the capsule until we heard the modulation again. The electric match was installed, the rocket hooked up to the launcher . . . and then launched!

Almost immediately the rocket broke the cloud cover. For 45 seconds we scanned the sky until the 30 inch chute was sighted. The fully opened chute descended slowly and drifted with the wind, while I ran after it as fast as my legs would carry me. It drifted for over five minutes and landed deep in the woods.

I went into the woods until its slope made it impassible. I tried to climb up the slope to what I thought was a road, but I kept sliding down the near vertical slope. I doubled back and met Dick Fox. This time we tried to approach what looked like a road in the distance. When we got to the area we found a corral complete with horse that adjoined a barn and a private estate. The walkie-talkie picked up the transmitter tone and we homed in on it. We found the payload section 60 ft. high in a huge old oak tree that stood near the barn. The chute, which was caught in the branch tips in five places, had missed clearing the tree by a foot.

We threw stones at the payload until eventually we attracted the attention of the estate owner. He offered his assistance, which we readily accepted. After three point blank shot-gun blasts directed at the bungee and leader line, he aimed for the parachute. The capsule fell and landed gently. Both mouse and transmitter had survived the hour and a half between launch and recovery.

The tapes were played back, and to our dismay the signal had been lost at launch. This was attributed to the transmitter shifting in the tube and deforming the antenna.

Flight Two

For this flight the new payload section design was used. This allowed fast loading

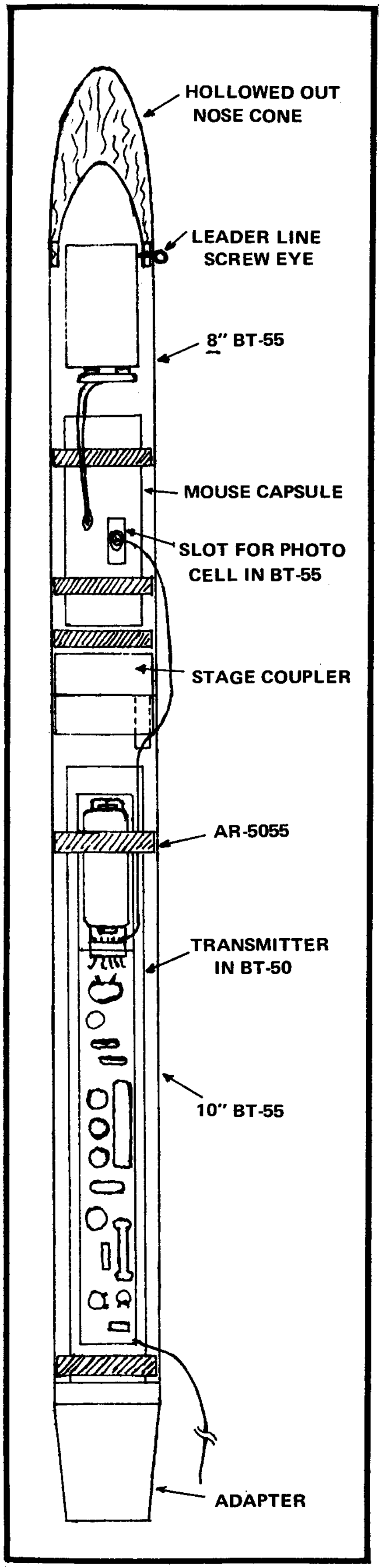


Figure 2: PAYLOAD SECTION.

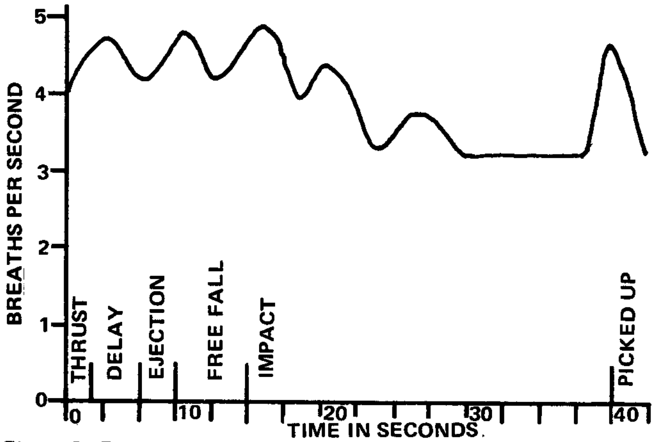


Figure 3: FLIGHT DATA. During flight number 2 the mouse experienced four peaks in breathing rate, corresponding to the onset of acceleration, ejection, impact, and pick-up.

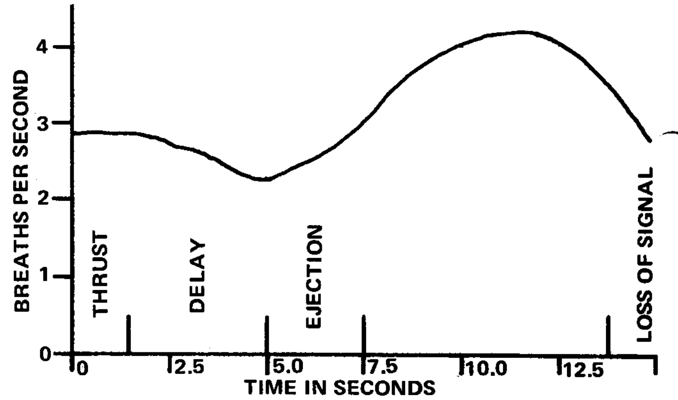


Figure 4: FLIGHT DATA. No similar sharp peaks were observed at the onset of acceleration or ejection charge during flight 3, however the mouse's breathing rate did increase significantly during the previously unexperienced "free fall."

and returned excellent data. The launch took place at NART-1 on May 16, 1970 at 7:00 PM. The field was Indiantown Gap Military Reservation. Cloud cover was about 1200 ft. and a strong wind was present. The rocket was prepped with a D 13-3 in a record time of 45 minutes. No difficulty was encountered, and the signal was excellent.

The rocket achieved an altitude of about 900 ft. A parachute failure resulted when the chute wedged into the stage coupler. The payload section free fell tail first and landed safely. Herman survived with no injury.

We decoded the data and found four peaks in breathing which corresponded in time roughly to acceleration, ejection, impact, and when the recovery crew picked up the rocket. Herman obviously thought we were going to harrass him more!

Flight Three

This launch took place 4:00 PM on May 17 at the same location as flight two. The cloud cover was much higher, and the sun had started to shine through. The field was inundated from the heavy rains that had fallen the night before.

The transmitter's antenna had fallen off during an earlier flight that day, and a new one had been attached by a makeshift soldering job. The rocket was prepped, but Herman's positioning had to be played with.

The rocket was launched and it achieved an altitude of about 800 ft. It arched over before ejection. This made Herman nervous as this had not happened in either of the other flights. We recovered the rocket and removed Herman. We decided to retire Herman as after all, no astronaut had ever made more than three flights.

The parachute had reefed so that the rocket landed after 13 seconds. The antenna wire broke off again resulting in loss of post flight data. Refer to Figure four for the data obtained in this flight.

Although this 44 inch vehicle is not the largest model rocket ever flown it probably was the most complex. It contained two recovery systems, a propulsion system, a telemetry system, a light source, two power sources, and a capsule with a form fitted mouse totaling eight systems and over 100 components, not including the mouse.

The project tested engineering, model rocketry skills, and our patience with the blasted squirming mouse. The results proved that biological telemetry and model rocketry are compatable and useful. In addition, it provided preliminary data on the emotions of a mouse during a model rocket flight. It is tempting to generalize and compare the similarities and differences in the two flights, however it is necessary for more data to be collected before any valid conclusion can be drawn. Later, when multiplexing has been accomplished we will attempt to fly experiments to correlate respiration with other flight parameters.

Finnagle's Law Applied to Rocketry

There is a universal law of science and technology that is attributed to the great German-Irish scientist, Wolfgang von Nagle (later changed to the Irish "Finnagle") which says that:

"Anything that can go wrong will go wrong."

Nothing could be more true in model rocketry. The following corrolaries to the basic Finnagle Law have been compiled for the elucidation and guidance of all who are interested in this specialized field of sporting technology.

As Applied to Design

A triple-checked C.P. calculation will always be in error so that the model is unstable.

All constants should be treated as variables, because they probably are.

Any part or component weighed in advance to determine a C.G. will turn out to have changed weight when the model is finally assembled.

All commercial nose cones will either be too long or too short to use in a scale model.

As Applied to Construction

If a model requires a special part, you won't have it.

And neither will the local hobby shop.

And when you order it, you will get the wrong part, anyway.

The most important part of any kit is immediately lost upon opening the kit.

Parts that absolutely cannot be assembled incorrectly will be.

Any body tube that you cut to custom length will always end up being too short.

If a model requires three of anything, you will have only two of them, and the local hobby store won't have any.

Any part you need at the local hobby store will have been sold precisely 7.5 minutes before you arrive.

As Applied to Flying

Nothing ever works right during a special demonstration for the local fire chief, police chief, and town officials.

A parachute will always get caught in the only tree around...and it will be impossible to climb the tree at all.

A boost-glider that trims perfectly during hand launches will not be trimmed at all when you fly it with power. If it is, it will not be trimmed when you fly it again in competition.

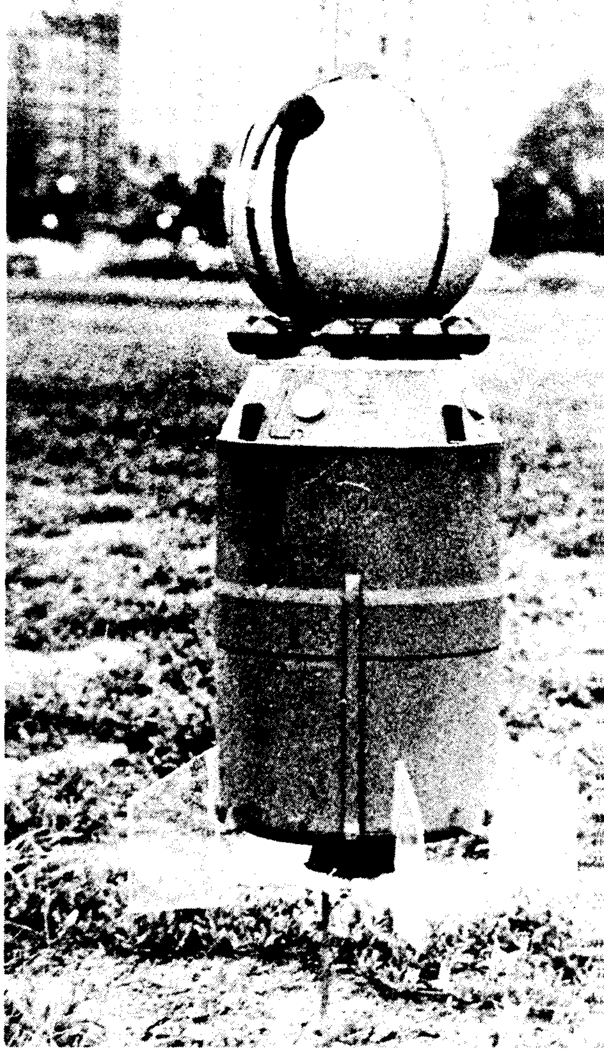
A dropped model will always land in a way that creates the most damage. Also true for the way a model lands after a flight. (Known as the Law of Selective Gravitation)

A competition model will always prang on its last test flight before the contest.

If it is vitally important for your model to be tracked, it won't be. If it is, the tracking won't close because somebody followed a pigeon in flight instead.

Any tool loaned on the flying field automatically becomes the property of the borrower.

The range PA amplifier protected by fast-acting fuse will protect the fuse by blowing first.



FLYING "VOSTOK" CAPSULE

Revell 1/24th Kit Conversion Plans

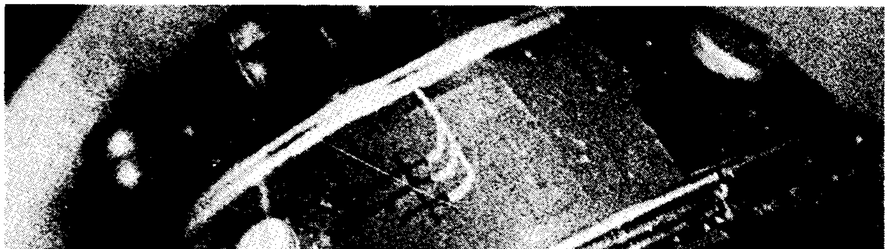
The topic for the month is the result of a letter from Ralph Lindberg of Great Falls, Montana. He described a conversion of the Revell 1/24 scale Vostok. A flying Vostok capsule intrigued me so I tried it, making a few modifications along the way.

Since the model looked rather heavy, I performed some rough calculations to predict the altitudes which could be achieved by using various engines. It was off the bottom of most of the charts! Since I like to include interior detail if at all possible, and I don't like under-powered models, the D13-3 seemed to be the only way to go. (Actually, an Estes D13 was nearly a *PERFECT* fit in the scale engine nozzle, and I just couldn't resist using it!)

Since the Vostok capsule violated nearly every assumption involved in the Barrowman CP equations, they were not of much use. The old (un?)reliable guesstimate method was used. A swing test *seemed* to show that the rocket was stable. At least it tested stable! Unfortunately, the rocket didn't seem to know that it was stable, and promptly went UNstable about 50 feet in the air! The nice powerful ejection charge in the D went off when the Vostok was about 5 feet off the ground and pointing straight down! The remaining pieces of the capsule were not really all that large. (It would be very helpful to have a way of determining whether a non-normal rocket will be stable. However, knowing what an unusual rocket is going to do before you fly it might take a lot of the fun out of flying it!) I did manage to collect enough of the pieces to reassemble the capsule, and have since corrected the stability problem. All it takes is a little more fin area.

The conversion is pretty easy, and it makes no difference whether you use a model you have already assembled or the kit.

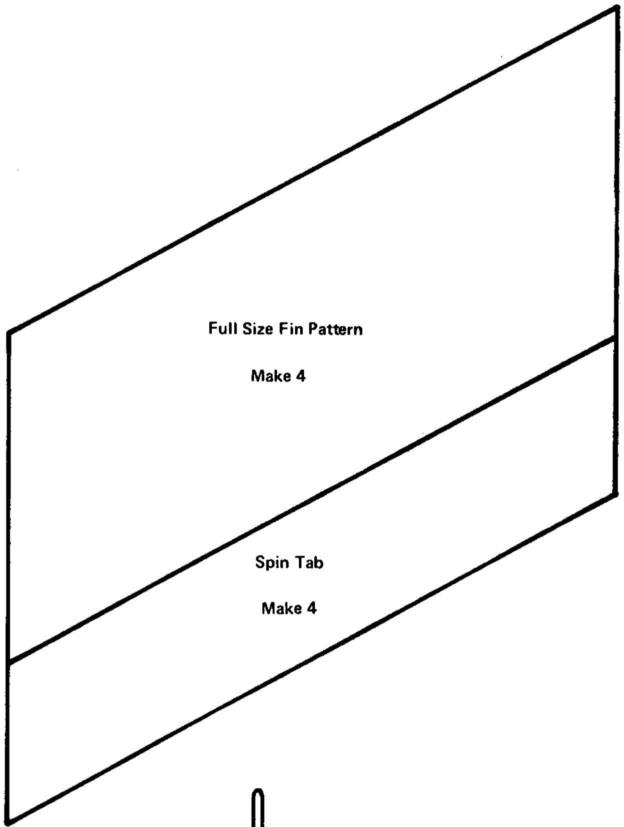
Start construction by assembling the equipment module and the capsule. You might as well include the interior detailing, because it isn't all that heavy and it serves as nose weight anyway. The hatch is simply taped in place with transparent tape for flight. The capsule should be glued permanently to the equipment module. There are some ridges around the base of the equipment module that are used to lock it to the upper stage. These should be filed or sanded down. I used a Dremel Moto-Tool for this and had the rings ground down in about a minute. Scrape up the plastic inside the retro-rocket nozzle. Epoxy an NB-50 or a piece cut from the back of a BT-50 nose cone into the nozzle.

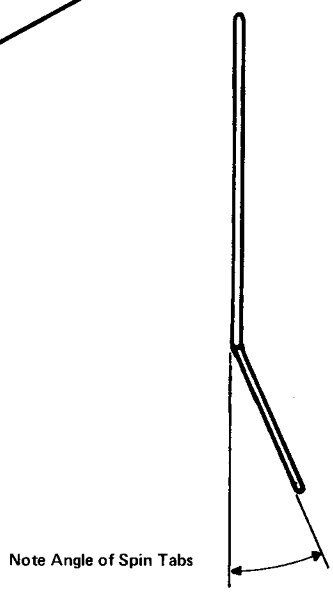


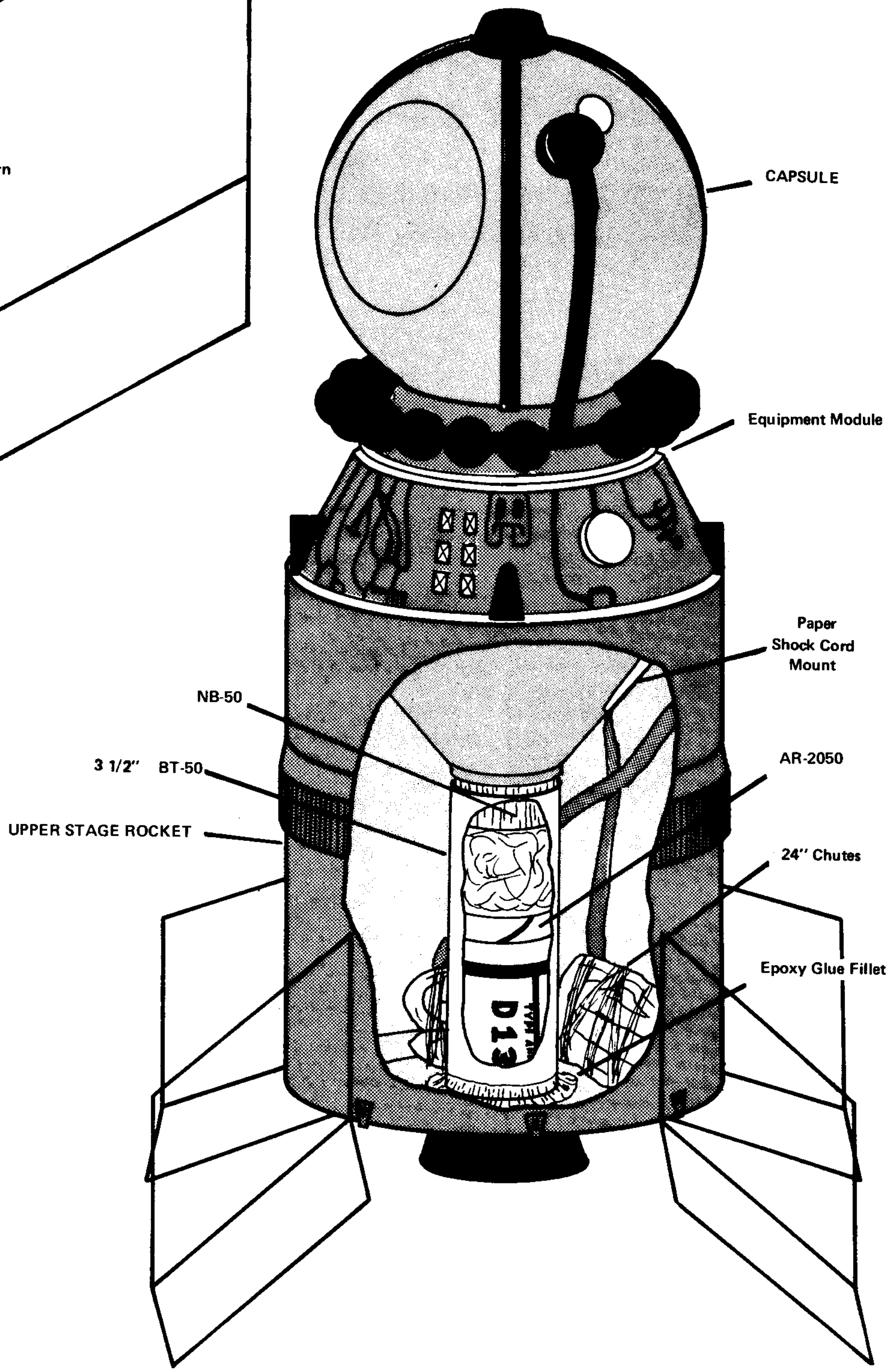
The ridges at the base of the equipment module should be removed by grinding with a Dremel Moto-Tool.

Assemble the final stage rocket according to the kit instructions. The locking tabs at the front of upper stage housing will have to be scraped out. A hole needs to be cut in the heat shield so a BT-50 tube can be inserted. Again I used the Moto-Tool, but a knife or soldering iron can be used. Cut a 3-1/2 inch piece of BT-50. Hold the equipment module in place on the front of final stage, and slide the body tube inside the scale nozzle and up over the nose block as far as possible. Carefully remove the equipment module. Apply a lot of epoxy around the tube plastic joint on the inside. Replace the equipment module to hold the tube in proper alignment until the epoxy cures.

Since normal nose cones have a tendancy to snap back on their shock cords, and damage the body tube, I didn't want to chance something similar with the Vostok. The best way to prevent this is to use separate chutes. Normal paper shock cord mounts are made up and epoxied to the model. Use at least a foot of 1/4-inch rubber shock cord for each section An 18-inch chute should be considered the minimum


Full Size Fin Pattern
Make 4
Spin Tab
Make 4


Note Angle of Spin Tabs


CAPSULE
Equipment Module
Paper Shock Cord Mount
NB-50
3 1/2" BT-50
AR-2050
UPPER STAGE ROCKET
24" Chutes
Epoxy Glue Fillet
D13

A BT-50 tube is epoxied into the Revell "Vostok" rocket body. A nose block is glued to the rear of the equipment module. The nose block engages into the top of the BT-50. Clear plastic fins are also attached to the rocket body.

size for safe recovery of each section.

Cut the fins from the Estes thick clear fin stock. Glue them in place with Epoxy or Du Pont No. 9011 Plastic Cement. (This should be available in most hardware stores. It comes in a blue and white tube.) Glue the spin tabs to the back of the fins at the angle shown.

I painted my version in accordance with the details visible in the Rocket Equipment Co. slides. The other details were painted as recommended in the Revell kit instructions. I used the Pactra Scale Model Flats series of paints, and found that they produced a very nice smooth even finish, especially when air-brushed. There is one problem, if you happen to smear any glue it will stand out grossly because it is shiny. However touching up the mistakes with clear flat paint made the minor mistakes almost unnoticeable.

When prepping the model, some extra attention must be given to the recovery system. Each chute should be folded and wrapped tightly in it's shroud lines. Insert the equipment module chute and shock cord into the bottom of the final stage. Place the final stage chute in such a way so that the shock cords are crossed. This allows the equipment module chute to pull the final stage chute out. Insert the engine. Fill as much as possible of the front of the body tube with FLAMEPROOF recovery wadding. This is to keep the plastic retro rocket assembly from melting from the heat of the ejection charge. Due to the large diameter of this rocket, it might be a good idea to launch from an adjustable tower. If you don't have a tower, a normal rod will suffice.

Now all that has to be done is to build an operating ejection seat so the Cosmonaut comes down on his own chute. Considering the first flight, that might not be a bad idea at all . . .

WHAT'S YOUR FAVORITE ARTICLE THIS MONTH?

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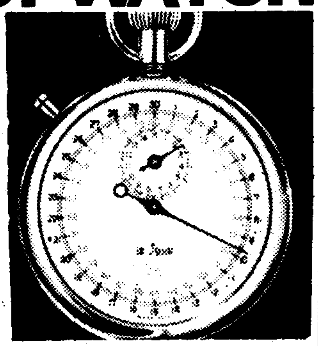

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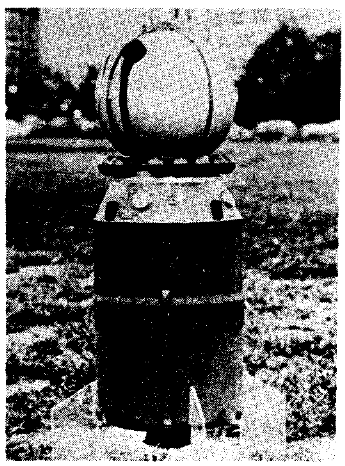

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Model Rocket Legislation Passed

PA Law Signed

On July 8, 1970 Governor Raymond Shafer signed a bill legalizing model rocket flights in the state of Pennsylvania. The bill, which goes into effect 60 days after its signing, took model rockets out of the category of fireworks and permits their operation in accordance with the normal NAR-HIAA and NFPA safety standards.

Under the law model rockets not exceeding 500 grams in weight and employing not more than four ounces of propellant are permitted. All engines sold or used within the Commonwealth must be certified by the National Association of Rocketry. (Use or sale of non-NAR certified engines is prohibited.)

Model rockets may be launched only in locations, not otherwise restricted by law, which meet the following standards:

1) There shall be a ground area whose shortest dimension is no less than one-forth the anticipated maximum altitude of the rocket to be flown.

2) The rocket's flight will not create a hazard to persons or property in the vicinity.

3) Flight areas shall not contain or be located adjacent to high voltage power lines, major highways, multi-story buildings, or other obstacles.

All solid propellant model rockets must be ignited by remote electrical means. At least one adult shall safety inspect each model before flight and shall supervise the launch operations.

MASS Law in Effect

The Board of Fire Prevention Regulations of the Commonwealth of Massachusetts has published a set of Rules and Regulations (FPR-15) governing the sale, storage and use of model rocket engines within the Commonwealth. The rules are in accordance with the nationally established standards of the National Fire Protection Association.

All sales of model rocket engines shall be made only to authorized permit holders, and all storage and launching of model rocket engines shall be under the supervision of a permit holding adult. Model rocket permits, under the provisions of FPR-15, will be issued by the local Fire Chief, to competant persons over the age of 21 who have in their possession a copy of the Rules and Regulations.

Only commercially manufactured engines may be employed in model rockets. All launch sites must be approved by a competent person holding a permit, and must conform to the following rules:

1) The flight area will be so located as not to create a hazard to persons and property in the area.

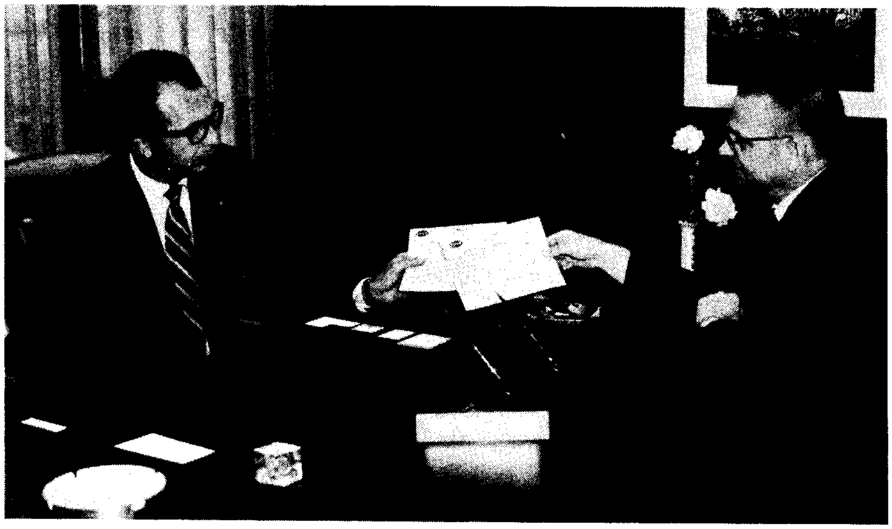
2) The launch site shall be at least 100 feet from the nearest building and 50 feet from the nearest road or obstruction.

3) Flight areas shall not contain or be located adjacent to limited access highways, building over four stories in height, or other similar obstacles.

Hobby shops and other retail outlets for model rocket engines must first obtain a permit for storage and sale from the head of the fire department of the town in which the storage and sale is to be made. These permits as well as the permits to supervise launchings will be in effect for one year.

NEWS NOTES

Estes Awards Scholarships



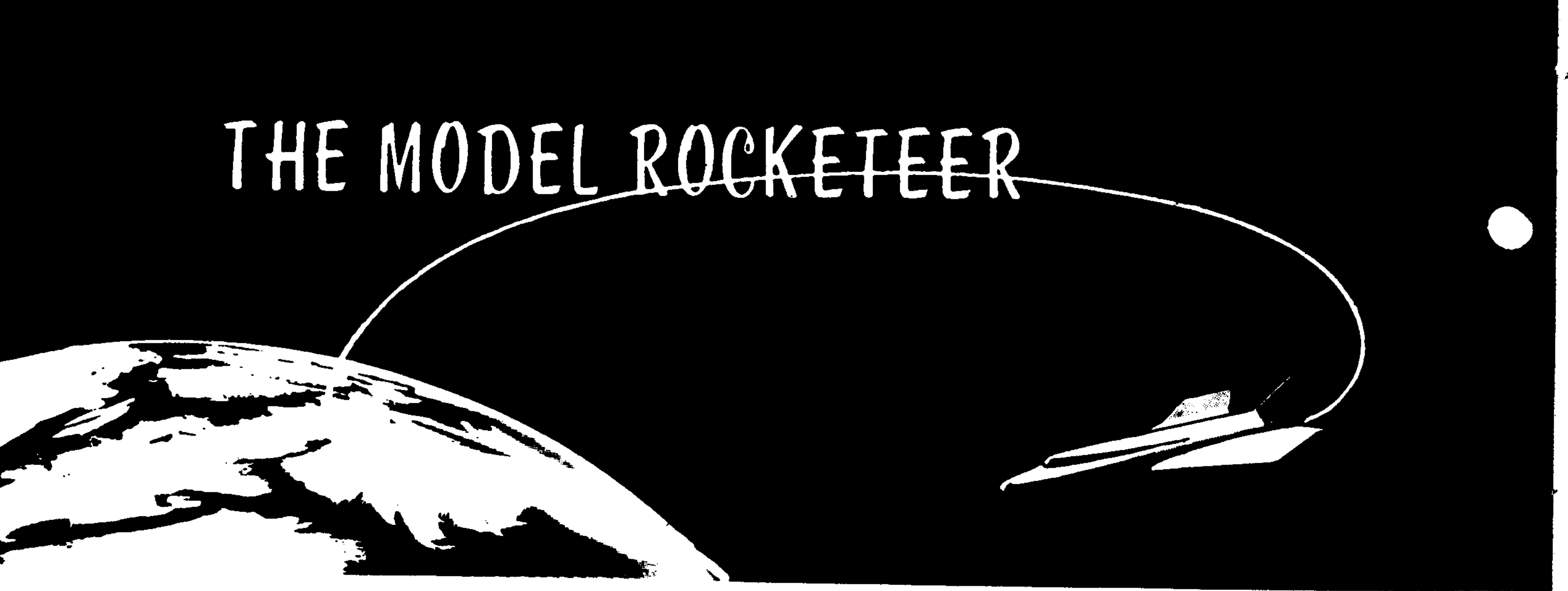
Two scholarship checks totaling $3,500 are presented by Vernon Estes (r), president of Estes Industries, to Lester Pagles, president of the First National Bank of Canon City, Colorado. A subsidiary of Damon Corporation, Estes Industries is the world's largest manufacturer of model rockets and supplies. The scholarships (one for $1,000 and five for $500 each) have been placed in a trust fund at the bank for six youngsters who were among the eight top winners in the 1968 and 1969 Estes "Launchstakes," a lucky-number sweepstakes. Another winner, rocketeer Sven Englund, went to Cape Kennedy last year with Vern Estes to watch Apollo 11 lift off for the Moon, and the eight winner chose to take $500 worth of Estes model rocket supplies as his prize.

PA Teachers Learn Rocketry At Goddard

"More rockets will be flying around Lehigh County than ever next year," said Edwin F. Wertman, Assistant County Superintendent of Schools in early June. Rocketry was one of the topics to be explained to 38 Lehigh County science teachers during a five day field trip to NASA's Goddard Space Flight Center in Greenbelt, Maryland. This is one of a series of summer workshop programs made available for teachers.

During the teacher's second and third days at Goddard they use their free time to build model rockets from kits they receive. They are given instruction in the history and educational uses of model rocketry. The launching, on their third day at Goddard, is under the supervision of Baltimore's Star Spangled Banner Section of the NAR.

Wertman explained that the general aim of the workshop programs and field trips is to have the participating teachers pass on what they learn to their pupils. He said of the rocketry demonstration: "This one is going to have as much or more impact than any of the others. I believe that as a result there are going to be some additional rocketry and astronomy clubs in the schools. Rocketry and astronomy have student-interest appeal."



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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1970 Pink Book Supplement– Major Changes Instituted

By now you should have had time to glance over your 1970 pink book supplement. If you just yawned, you'd better glance again. The 1970 supplement contains some major changes in our contest rules that strike to the heart of model rocket competition. Since the supplement will be in effect for only the 1970-71 contest year, including NARAM-13, the Contest Board felt that it would be an early opportunity to make some of the major changes slated for the 1971 Pink Book Revision. The member's constructive criticism and suggestions, based on actually having competer under the new rules, could then help mold the final 1971 Pink Book. That's the theory – it's up to you to make it work. Send your ideas to the contest board:

NAR Contest Board
c/o Mr. Richard Sipes
5012 60th Avenue
Hyattsville, Maryland 20781

Model Rocket Manufacturers Support U.S. International Team

A major portion of the funds to send a U.S. model rocket team to the World Championships at Vrsac, Yugoslavia this month is being donated by model rocket manufacturers. As of mid-July,

Model Products Corporation
Estes Industries
Centuri Engineering
L. M. Cox Manufacturing Co.

have each contributed $500.00 to the U. S. team's sponsorship fund. The NAR thanks these firms for their enthusiastic support.

Other model rocket companies as well as a number of aerospace industries have expressed an interest in supporting the team. The *Model Rocketeer* will keep the sponsor list up to date as it grows.

Pink Book Revision Summary

Below is a summary of some of the major changes in the U.S. Model Rocket Sporting Code made by the 1970 Supplement. This summary is in no way official or intended to replace the supplement as the source of rule change information.

- Model Rocket definitions and specifications as well as model rocket engine standards have been reworded in order to include cold propellant model rockets.

- Cold propellant model rockets may contain no more than 340 grams (12 Ounces) of cold propellant.

- The engine type classification of cold propellant engines is the same as the solid propellant types. However, the type code number is preceeded by the letters CP. Also, no time delay number is included since this may be varied by the modeler. An example of a cold propellant type code is CP-C9.

- The minimum size requirement for parachutes on ejected engine casings and pods has been reduced to 5 square centimeters. per gram (22 square inches per ounce). However, the streamer minimum size remains at 10 square centimeters per gram.

- Even though not many rocketeers were affected by it, it was legally important to bring the maximum allowable model rocket weight back to 453 grams in order to be within one pound.

- The event weighting factors were changed to more truly reflect the relative degrees of difficulty between the competition events. The new weighting factors span the full scale from 1 to 10.

- The number of events that can be flown in a single contest has been limited. Although any number of events may be run, the sum of the weighting factors of all the events run must no more than a maximum established for each contest classification. The maximums are: Section Meet, 30; Area, 35; and Regional, 45. Record trials and the National Meet have no limit.

- Juniors are now allowed to serve on the Contest Jury. This is to make contests feasible and legal for small sections composed only of juniors and a senior advisor.

- The static judging of all entries that are in competition with each other must now be done by the same judges. Also, persons with rocketry experience are officially allowed to perform static judging even though they are not NAR members.

- Although a $2.00 fee is still required with a protest submitted at a contest, the additional $2.00 fee for appeals to the Contest Board has been eliminated.

- One of the major changes instituted by the 1970 supplement is that flight points have been eliminated. One competition point will now go only to the entry that places fourth in an event.

- New age divisions have been established for competition use only. For want of better names, they have been labeled A through D. A is 12 and younger; B, 13 and 14; C, 15 through 17; and D, 18 and older.

- A new Altitude class, 00, has been established for 1/2A engines.

- Scale entries will be allowed only one chance at an official flight. Since nothing may be added or removed between static judging and flight except engines and recovery system, an entry experiencing a flight failure such as instability couldn't improve his model for a second flight anyway.

- Clear plastic fins and other flight fittings on a scale model must be judged for workmanship.

- Open Payload entries need carry only two payloads. This reduction from four payloads was caused by safety considerations.

- A Class 0 Parachute Duration event has been included for 1/2A engines.

- Under the 1970 supplement, the gliding portion of a boost glide does not have to be returned. However, all other duration rockets, including rocket gliders, must still be returned.

- Space Systems competition has undergone major changes. The changes are too specific to be summarized nicely. It would be best to read them as written in the supplement.

- R & D has been worded to include both projects advancing model rocket technology and those utilizing model rocketry as a research tool.

- In addition to a written report, R & D contestants must now submit a 250 – 300 word summary of their project. The summary can be used by the NAR to disseminate R & D information without interfering with the contestants rights to publish his work.

- Egg Lofting has been broken into classes. Appropriately, the classes are Robin, Pigeon, Ostrich, and Roc for C, D, E, and F engine respecitvely.

- Plastic Model has been expanded to include plastic model rocket kits.

- The launching device (launch rod, C-rail, etc.) must now be an integral part built into the Super Scale launching complex.

- A Streamer Duration event has been created. Of interest is the amount of verbage required to describe a simple streamer.

- A Rocket Glider event has been created for birds that do not eject their engines or separate into a number of different pieces. What goes up must come down – gliding.

- Drag Efficiency Competition has been created in an attempt to isolate drag reduction as a factor in good rocket construction.

The above summary doesn't include all the changes made by the 1970 Supplement. Much of the supplement is devoted to revising safety requirements and clarifying existing rules without changing their substance.

Join the.............

National Association of Rocketry

Box 178
McLean, VA 22101

NAR

Closed Breech Launchers Contest Board Ruling

Rule 5.5 of the U.S. Model Rocket Sporting Code specifically prohibits the model rocket launching device from imparting velocity or momentum to the model. On this basis, closed breech launchers that utilize any device, mechanical or otherwise, which imparts velocity or momentum to the model rocket are specifically prohibited from use in competition.

However, the use of a tubular launching device that encloses the model and is closed at one end is not prohibited provided that the energy to pressurize the tube is generated only by the model rocket engine(s) contained in or attached to the model rocket. When an entry is launched using a closed breech launcher, as described above, the total impulse of the engine(s) used to pressurize the tube must be included in the total impulse figure used to determine the event and/or class in which the entry may compete.

This ruling is in effect immediately.

–NAR Contest Board

Contest Forms & Procedures

In order to facilitate more efficient processing of meet results, the Contest Board was converted to a computerized system in April 1970. Since that time, a few problems have become evident with the manner in which the contest forms are being used.

Form (CB-1-70), the new **Contest Entry Blank**, has been designed to provide all the pertinent information on the contestant that the contest board might need. This form is used as a cross reference to check the information recorded on the Point Award Sheet by the local contest director. It must be filled out completely and legibly by the contestant and returned with the contest results.

Form CB-3-70, **Application for Contest Sanction**, is to be filled out by the senior member that is to act as the local contest director and received by the Contest Board at least 40 days in advance of the meet. It is important that the form be received as early as possible to allow sufficient time to be processed and contest material sent out. The contest material is sent out by 4th Class mail and this requires at least 10-14 days for delivery by the post office. The form must be signed by the Senior member that will act as contest director and the proper sanction fee must be enclosed. Please make checks or money orders payable to *NAR CONTEST BOARD, DO NOT SEND CASH.*

Form CB-4-70, the revised **Point Awards Sheet**, is probably the most important form to be filled out. This sheet is designed like a computer keypunch form. The completed form will be sent out by the Contest Board to a computer service to be keypunched into data cards for use by the computer program. Each line on the new form represents a single contestants data. It is very important that only the information asked for on the form be filled in, and that no additional use of the form be made. The Keypunchers will punch exactly what appears in each box and if additional information or wrong data is included this will cause the program to reject that card. The Section Number on the sheet is the number assigned by NAR Headquarters to each section and is located on the section charter received by each club. If a contestant is not a member of a section or does not want his points to be credited to the section, the form should be filled out with a––– in the section box. Make sure that each contestant has either a section number or a – – – on the form. Do not leave this section blank, as this is the only manner in which the computer can total the section points for a given meet. The Team Number is the area where the most trouble arises. This section is to be used only if the contestant is a member of an NAR TEAM ENTRY. The team number (example T309) is assigned only by the Contest Board and is not a number chosen by the contestant. This number is used the same way as an NAR number is used for the individual. Only the name and number of the member of the team that has the lowest NAR number is used to fill out the sheet. The other members of the team do not appear on the point awards sheet, but are referenced by the NAR team number. For example, if JOHN DOE NAR #21726JR AND JACK SMITH NAR #34678SR are assigned team number T309. Only JOHN DOE's name and NAR number would appear on the sheet. The division that the team will fly in is determined by the age of the oldest member. In this case it would be SENIOR.

The event points box, #1,2,3. . . . .10 will correspond to the event number on Form CB-1-70 (Entry Blank).

The last name and the first name are LEFT justified on the point awards sheet while the rest of the form is RIGHT justified.

If there are any further questions concerning the new forms please contact the Contest Board at 5012 60th Ave., Hyattsville, Maryland 20781. Phone 301-277-6742.

NEW SANCTION FEES

Due to the increased cost of mailing and the addition of computer services to the Contest Board it has become necessary to increase the contest sanction fee. The new rate for sanctions will no longer depend on the type of meet. Instead the sanction fee will depend on the number of contestants you expect. The new rate will be $1.00 per every Five (5) contestants or fraction thereof. Please try to estimate the number of contestants you will have as accurately as possible. If you find that you will have more than the estimated number of contestants please enclose the additional amount with the contest results.

NEW ENGINE CERTIFICATIONS

According to Dr. Gerald Gregorek, head of NAR Standards and Testing Committee the following model rocket engines have been Contest Certified as of July 15, 1970:

L. M. Cox Manufacturing

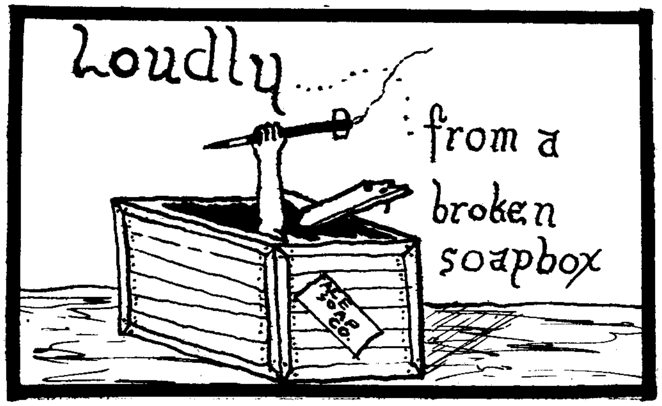
A6-0	B4-3	C6-0
A6-4	B4-5	C6-7
	B4-6	

Estes Industries
A5-2S
A5-4S

Model Products Corporation
B6-4

In addition, the following cold propellant engine has been Safety Certified:
Vashon Industries Inc.
CP-C9 (Trade Name, Valkeryie II)

Since the total impulse of cold propellant engine is known to vary with temperature, the standards and testing committee measures the engine performance at a standard temperature of 20°C (68°F).



In Defense of Balsa

by

Bruce Edward Blackistone, NAR 6413

Much has been written lately on the virtues of plastic; its ease of finishing, strength, and durability; how wronged it has been by certain ignorant conservative "Know Nothing" peasants; and how it is actually *the* classic material for model rocket building – ordained by powers far above those of mere mortal model rocketeers, etc., etc., etc. However, my purpose is not to bury plastics. You can't stop progress forever; and, as the termite in the Shel Silverstine song said, "Everything's gonna be plastic by'n'by." Therefore, while we yet have the time, let us extoll the virtues of balsa, and other noble natural woods.

The first virtue of wood is that it grows on trees. (Plastic, of course, grows along the side of the highway along with beer cans and soft drink bottles.) It is still fairly common to see a tree these days; and fairly efficient rocket can be made by attaching a few feet of straight branch to a body tube with a recovery system and firing up the classic "stick" rocket.

Balsa wood itself makes you design for maximum strength, since it does have a habit of disintegrating when the rocket is poorly designed; when it is traveling at excessive speeds; or when, for that matter, it runs into an object such as a tree, the earth, or another rocketeer. Unforunately, balsa does have this inherent weakness; so, unlike the far superior plastic, it will rarely reduce a person to corn beef hash if he should be struck.

Balsa can be ground down into unlikely shapes like nose cones for scale models and such. Of course, equally good nose cones can be made of plastic. However, it seems a pity that some crude barbarian using his father's electric drill in a vise and expending some hours of hard careful work, just might come up with something every bit as good as the true sophisticate with his expensive plastic injection molding equipment. (The author notes here that, for some strange reason still unbeknownst to him, vacu-formed plastics have not yet been mentioned in recent plastic sermons.)

Curiously enough, wood is still used by those people who have been building model airplanes for a mere forty odd years and therefore know very little about the true facts, since they still build most of their planes out of balsa. As a matter of fact some of them have the nerve to look askance at the all plastic "beginners" airplanes as something of the wrong sort of animal, the black sheep of the family.

Balsa has to be worked with (or butchered as some would have it). There is no such thing as "instant" balsa fins or nose cones. Our hobby is based on people going out and doing things for themselves. Unfortunately, there seems to be a trend away from that, to the point that some of the newer "kits" are seen by many people unfamiliar with the hobby as "toys." What is truly frightening, they might be right.

Maybe when all this is history (whatever that may be) and everything's plastic we can look back on this and laugh – or weep.

(Editors Note: The opinions expressed above are those of the author and do not reflect NAR policy. Threats, comments, suggestions, and other brick-bats may be sent to him (where the nastier ones will be duly considered) at 211 Whitestone Road, Silver Spring, Maryland 20901. The Model Rocketeer welcomes similar articles from anyone who wishes to express his opinions on any phase of model rocketry in an articulate and/or entertaining manner.)

NAR Changes Insurance Companies

Because of an excessive increase in premium charged by The Insurance Company of North America, the Academy of Model Aeronautics and NAR have taken out a new policy from The General Accident Fire and Life Assurance Corporation Ltd. The policy is identical to the one under which we have been covered for over a year. The GAFLAC policy number is GLA 38-918-52. The new policy was put into effect as of July 1, 1970.

Coverage and accident reporting procedures have not been changed. The policy covers liability for personal injury or property damage up to $300,000. Individual NAR members are protected while flying model rockets in accordance with NAR safety standards. NAR sections are protected during all section model rocket activities that are in accordance with NAR safety standards. The section coverage also includes non-flying activities involved in club meetings, contests, or demonstrations. If you or your NAR section is involved in a model rocket accident, send a written accident report directly to:

NAR Headquarters
P. O. Box 178
McLean, Virginia 22101

If, for some reason, the accident requires prompt action call Headquarters at: (703) 536-4299. However, a written report must still be sent to Headquarters as soon as possible after the accident.

The report should include the names, NAR numbers, addresses, and telephone numbers of all rocketeers directly involved as well as the names, addresses, and telephone numbers of all spectators directly involved. A brief but complete description of the accident should be written legibly or typed. An objective account telling who, what, when and where is best. No attempt should be made to fix blame or give excuses for the accident. Try to tell what happened – not why it happened. Be sure to keep a copy of the report for your own future reference.

If the accident victim is not an NAR member, feel free to give him the address and telephone number of NAR Headquarters as well as the name of our insurance company.

Accident reports sent to NAR Headquarters will be forwarded to the insurance company through The Academy of Model Aeronautics. Headquarters will send you an acknowledgment that it has received your report. Do not be concerned if you do not hear anything further from the NAR or the insurance company. The insurance company often contacts the accident victim directly. You may be contacted by a local insurance company representative. Be prepared to help him investigate the accident and to fill out claim forms.

Again, the change in insurance companies does not affect our coverage. It does mean the NAR can continue to provide its members and sections with good insurance coverage at a very low cost. Remember, your own personal attention to safety in model rocketry contributes to the NAR's unequalled safety record.

Editor's Nook

What ever happened to the educational aspects of model rocketry? A quick look at this month's issue of *The Model Rocketeer* would lead me to believe the NAR consisted solely of a committee to certify engines for contests; a committee to write rules for contests; and a committee to sanction and run contests – period. My conclusion would not be too far from the truth. At least I would be right in concluding the NAR has no program that stresses model rocketry as an educational tool.

Two of the major model rocket manufacturers, Estes Industries and Centuri Engineering, have extensive programs to reach and educate teachers about model rocketry. Both programs have introductory brochures; detailed how-to reports that cover construction through launching and tracking; classroom preparation material; activity schedules; and specially packaged kits and launch equipment. The NAR cannot hope to improve on the educational job being done by these manufacturers.

However, the manufacturers have concentrated on elementary, junior high and high schools. Comparatively little has been done by anybody to stress model rocketry as an educational tool on the college level. Two notable exceptions are the work of Dr. Gerald Gregorek, an NAR trustee who is an Assistant Professor of Aerospace Engineering at Ohio State University and a model rocket analysis, test and launch program at The University of Maryland (**MRm**, January 1970). However, these isolated activities only serve to emphasize the lack of a comprehensive nationwide college level educational program.

The NAR is currently in a much better position to promote college level model rocketry than any of the manufacturers. Our liasion with the American Institute of Aeronautics and Astronautics (AIAA) could provide us with an excellent vehicle for introducing both teachers and students to model rocketry. After introducing model rocketry to the campus through the AIAA student section, a joint NAR-AIAA college level program would be able to offer suggestions for theoretical and experimental exercises involving model rocketry to instructors and professors. A list of model rocketry references as well as a compendium of R & D activities are just the beginning of the communication lines that the NAR could foster at the college level.

The first step has already been taken. Dr. Gregorek has published a paper entitled *Model Rocketry: Aerospace Engineering in Miniature* in the April 1970 issue of the **AIAA Student Journal.** The NAR has obtained permission from the AIAA to reprint his article. What better use for this excellent introduction to college level model rocketry than as the first step toward a complete NAR-AIAA program?

Although our newly elected Board of Trustees and Officers will necessarily be concerned over the NAR's monetary, regulatory, and manpower problems, they should not neglect the educational purposes of the Association. The NAR should establish, organize, and support the goal of a joint NAR-AIAA college level program to utilize model rocketry as an educational tool.

National Association of Rocketry
Box 178
McLean, VA 22101

HEADQUARTERS ANNOUNCEMENTS

NEW NAR FLYER AVAILABLE

The NAR information flyer has been completely re-designed for wider distribution. Simple and direct, the new flyers quickly inform people about model rocketry and the NAR. They make excellent hand-outs for interested spectators at demonstrations and meets. Section information sheets can be inserted into the center of the flyers to advertise your own section activities. Sections or members interested in ordering a supply of flyer please write to Headquarters. If you are having a special demonstration or other publicity event, please let us know a couple months in advance. We'll send out a supply of flyers for your event. Until the exact demand is known, orders will be limited to 100 per section and 5 per individual member.

NAR License Replacements

NAR HQ reports that many members are requesting new NAR licenses to replace those lost or destroyed. Due to the time and expense involved in preparing new cards it will be necessary to charge a 50¢ fee for replacement of license. Perhaps this fee will remind members to keep safer guard over their present cards.

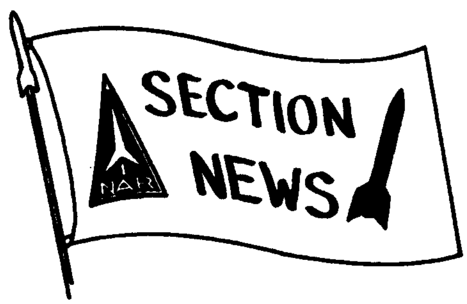
Pink Book Replacements

Pink Books or supplements can be ordered from Headquarters if yours is lost or too ragged to read. Please enclose 25¢ for each one ordered to cover the cost of processing and mailing. The $1.00 cost figure on the front of the Pink Book is intended for non-members.

What to Start a Section?

Section Organization Guides are available to any person interested in forming an NAR section. The guide includes NAR chartering requirements as well as a sample section constitution.

When writing Headquarters, please include your NAR number and section name with your signature.



By Charles Gordon

A reminder to all sections – "Get those flags in!"

For those who don't know, a request has gone out to all chartered sections that a drawing of the design of the flag of each section that has one be sent in for publication this winter. The deadline for receipt of these designs is the end of this month, so "GET THOSE FLAGS IN!"

* * * * * * *

The South Seattle (Washington) Rocket Society reports of plans to develop a range operations manual to cover standard procedures to be followed by members at the range. Use of this manual is hoped to help range operations run more smoothly and efficiently.

Their newsletter, *The MODROC FLYER*, also contained a Consumer Report on one of the models put out by a major manufacturer.

* * * * * * *

The Tri-City Cosmotarians (Gladstone, Oregon) stayed active this past summer. Besides a planned record trials meet, there were classes held for beginners and advanced modelers. New members received basic information on design and engine selection and use. More advanced members learned about Boost/Glide design and advanced rocket design and the use of the wind-tunnel in testing.

The section purchased the material for their wind-tunnel with funds made by conducting car washes in their area.

* * * * * * *

The MIT Model Rocket Society (Cambridge, Massachusetts) plans to hold a section meet in September and an area meet sometime after that. Rocketeers in that area should contact MIT M.R.S., MIT P.O. Box 110, Cambridge, for more information.

* * * * * * *

In June the first special issue of IGNITER CURRENT, newsletter of the Fairchester Section (Stamford, Connecticut) was distributed. Included in this 25¢-30 page booklet was a history of the section by G. Harry Stine, scale model plans and photos, technical reports, section news, and advertisements from various manufacturers. This is a very impressive piece of work. It is hoped that more will be forthcoming in the near future.

* * * * * * *

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

#207 CVT GILBERT APOLLOS
c/o Dr. Edna Hinman
1241 So. Seventh Street
Las Vegas, Nevada 89104

#208 HAMA ROCKET CLUB SECTION
c/o John Turner
811 The Terrace
Hagerstown, Maryland 21740

#209 BURGES CADET SQUADRON, CAP
c/o First Lt. Joe R. Myers, Sq. Comm.
4123 Hastings
El Paso, Texas 79903

#210 ASTRO-RESEARCH TEAM SECTION OF THE NAR
Thomas Cook
c/o Riverside Recreation Club
1115 C Street, SW
Cedar Rapids, Iowa 52404

#211 VFW POST 4103 AEROSPACE CLUB
George DeMello
7 Manzanita Avenue
Daly City, California 94015

#212 MODEL ROCKET CLUB OF NEW BRUNSWICK
Thomas Hendrickson
50 Richard Street
New Brunswick, N. J. 08882

* * * * * * *

Members of the Wheaton (Maryland) Rocket Association report attending the FSAM I area meet sponsored by the Laural (Maryland) Area Section in May.

In June WRA also sponsored a launch of rockets built by students at a local school for the handicapped. The launch was held at the Goddard Space Flight Center, Greenbelt, Md.

* * * * * * *

There is an NAR section being formed in the Hardin County, Kentucky area. Interested rocketeers please contact Terry Dean, 306 Cheryl Avenue, Vine Grove, Kentucky 40175.

* * * * * * *

The NARCAS Section (Camp Hill, Pennsylvania) reports of attending the Pittsburgh Region Area NAR Grandfallion (PhgRANG) meet held June 13 & 14. The meet was hosted by Steel City and Three Rivers Sections. Contestants also included members of the Pennsylvania MARS and Wanesburg groups.

* * * * * * *

The ABM Section (Bethlehem, Pa.) is planning a launch for September or October to open the new contest year. Members in the area should contact Doug List, 38 W. University Avenue, for information.

* * * * * * *

The South Seattle (Washington) Rocket Society also reports that there was a model rocketry event at the Boeing Management Association $1,500.00 Scholarship Contest, held June 20-21,.1970, at the Boeing Space Center site in Kent Valley. The NAR model rocketry category included Quadrathon and Swift Boost/Glide events. In addition, contestants were required to enter two events in the AMA model airplane category.

Congratulations to the BMA for their ever increasing involvement in the field of model rocketry.

* * * * * * *

The editor of N.A.R.S.N. would like to thank the following sections for sending in news and/or correspondence for this issue. Sorry we couldn't get yours in but keep it coming and good flying:

HAWKEYE SECTION (Davenport, Iowa)
SOUTHLAND SECTION (No. Hollywood, California)
DELTA V SECTION (Palo Alto, California)
ANNAPOLIS (Maryland) ASSOCIATION OF ROCKETRY
SULPHUR RIVER SECTION (Sulphur Springs, Texas)

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

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

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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Chicago, Ill. 60641

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CROSBY'S HOBBY CENTER
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(Club Notes, cont.)

man at 1096 Ashley Drive, Valley Stream, NY (CU 5-6190) or John Robson, 192 Ethel Street, Valley Stream, NY (825-0598).

The Monterey Park Model Rocket Club has been organized under that California town's Recreation Department. The club periodically launches its rockets from selected locations in the valley on selected weekends. Recreation Director Len Norman has urged that youngsters and parents from Monterey Park interested in joining the club contact the Recreation Department at 573-1211, ext. 13.

Five years ago Joe Olive, elementary school supervisor in Nevada, Missouri, initiated a unit of study in rocketry to be taught to the school's sixth graders. Each sixth grade class constructs a rocket under the supervision of science teacher John Fite. Each class assigns certain of its members to the launch crew, recovery crew, and safety crew. Then, under the supervision of the principal, the whole class goes out to the field for a launch day to top off the year's instruction.

The Cosmic-Apollo Model Rocketry Association (CAMRA) is looking for new members, ages 10 to 14, from Syosset, Long Island. Interested rocketeers in the area of Thompson Junior High School (Southeast Syosset) should contact Bruce Burger, 22 Park Drive East, Syosset, New York 11791 or phone WA 1-6672.

CAMRA has had three launches since its recent formation. Their 12 volt car battery was launched many rockets, including a 3-stager, a 1/45th scale Little Joe II, and a 1/100 scale Saturn V. The club has scheduled duration and spot landing competitions for later in the year. As soon as the CAMRA treasury is large enough to afford it, the club plans to build a multiple-position launcher and purchase trackers.

Thirty-three youngsters attended the organizational meeting of Merced, California's first model rocket club, being formed under the supervision of the Recreation and Parks Department. Tom DeVine, a city engineering department worker who will be in charge of the club's activities, was quoted in the Merced **Sun-Star** as reporting that the average age of the young rocketeers attending the meeting was about 15. The Merced club will be a continuing organization, not just a summer recreation project. The Recreation and Parks Department presently plans to use a city owned site for the launch area.

Two sixth grade classes at Breckenridge West Elementary School in Michigan have incorporated model rockets into the curriculum. Under the supervision of teachers Mrs. Suzanne Sowle and Mrs. Ruth Pavlik the classes have recently become interested in Egglofting. They took a scientific approach towards determining how to pack the egg for maximum chance of survival. "We had to find out just how much shock an egg could take without breaking," Mrs. Sowle explained. So the class spent a day testing various shock absorbing materials – cotton balls, flour, toilet paper, hay, soap powder, marshmallow, styrofoam, paper towels, etc. – by packing an egg in a box filled with the various materials and dropping them from a 25 foot window. The final score was 27 eggs remaining intact, 3 cracked, and 16 broken. As a result, the class determined that "those materials that had air pockets", such as styrofoam, crushed paper towels, and hay – worked best. Then the class set about building an Astron Scrambler to put their results to the real test.

A dual evening and morning launch was held by the Monterey Park Model Rocket Society during the last weekend in May. The club, the latest activity to be sponsored by the city's Recreation Department, has its own safety panel and four position multiple launcher. Area rocketeers wishing more information can inquire at Scott's Sporting Goods, 145 East Garvey, Monterey Park, California.

The town of Highland Model Rocket Club in Highland Falls, New York, has obtained permission from the US Military Academy at West Point for official club launches to be held on their grounds. Under the supervision of Michael J. Carcusio, adult advisor, the club now has 40 active members, and plans to soon charter as an NAR Section. On July 4th the club participated in the town's parade, and 35 of the club's membership turned out to march. In August the club held a cake sale to raise money for the purchase of T-shirts with the club's insignia on them.

Forty-two West Tennessee teachers built and launched model rockets as part of a three week training program at the Aerospace Education Workshop at Memphis State University. The program was sponsored by the Tennessee Aeronautics Commission which each year gives 40 scholarships to West Tennessee teachers to learn the latest advances in aeronautics and pass them on to their students.

The latest issue of *EMANON* – newsletter of the YMCA Space Pioneers of New Canaan, Connecticut – reports the results of their Section Meet SP-20. In the Space Systems event G. Harry Stine took Senior first place with an Asp, while the Stine team (Ellie and Connie Stine) took first in Junior also with an Asp. G. Gunther took first in Senior Scale flying an Asp, and Sven Englund took first in Junior also with an Asp. D. Joseph took first in Senior Design Efficiency while Gary Jacobsen won in the Junior Division. A. Fraser's 66 second flight took first in Senior Class I PD, while Gary Jacobsen took first in the Junior Division with 83 seconds. G. Gunther and Rob Dunbar took first in Senior and Junior Drag Race respectively. Overall Sven Englund took first place with 231 points, while Rob Dunbar (227 points) and the Stine Team (224 points) trailed close behind. In the Senior Division G. Harry Stine was first Overall with 287 points while A. Jacobsen trailed closely with 273 points.

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On June 7, 1970 a rocket meet was held between the St. Dominic Regional High School Model Rocket Society and the Livermore Falls High School Rocket Club both located near Lewsiton, Maine. The meet, hosted by the St. Dominic's Club at its new range in Greene, Maine, was the first contest for both groups, and perhaps the first contest held in Maine. In the Maximum Altitude event, restricted to 2.50 n-sec total impulse, John Poisson placed first with 620 feet, while Paul Giguere took second with 580 feet. In Parachute Duration, also restricted to 2.50 n-sec total impulse, Peter Bosse took first flying an Alpha to 188 seconds, while Paul Giguere's Alpha placed second with 109 seconds. Flying a Laser X Peter Bosse took first in Streamer Spot Landing with 45' 4", while John Poisson placed second with 54' 11". Overall Peter Bosse placed first, John Poisson second, Paul Giguere third, and Jim Grant fourth. The St. Dominic's club edged out Livermore Falls 24 points to 23 points. Maine rocketeers interested in future competitions with these clubs can contact Paul Giguere, President of the St. Dominic's club, at 181 Walnut St., Lewiston, Maine.

The Lakeview High School Rocket Club near Grove City, Pennsylvania staged a demonstration launch in mid-May under the supervision of Mrs. Sagulla of the science department. With seven recovery crews, all 15 rockets fired were recovered successfully.

The Space Research and Flight Control Center in Tampa Florida has been conducting various model rocket research projects and sponsoring lectures on space and related topics. The organization has a launch site located near Al Lopez Field near Tampa. Interested rocketeers can contact club president Charles Gutierrez at 2719 Nassau Street, Tampa, Florida 33607.

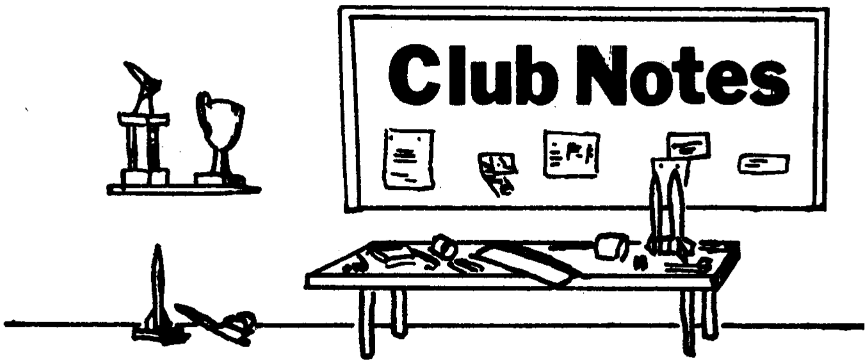
Send your club or section newsletters, contest announcements and results, and other news for this column to:

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

(From the Editor, cont.)

This introduction of rocketry into school programs serves two vital purposes to the hobby. First, any endorsement or use of the hobby by educators increases the public awareness and acceptance of the hobby. In the eyes of those public officials still opposed to model rocketry, the teacher who wants to use it in the school will stand a better chance of demonstrating the hobby's safety than a group of even ten or twenty fourteen year old rocketeers. More important, the use of model rocketry in the classroom will introduce more participants into the hobby. What this means is more and larger clubs, more frequent and better competitions, more and better educated rocketeers to investigate the still unsolved technical problems in the hobby.

What can the average rocketeer do? Start off by providing the science teacher in your school with some information on model rocketry. Suggest the possibility of forming a school rocketry club – perhaps as a section of an already existing science club. Show the teacher some of the areas of scientific research open to rocketeers. Suggest that he or she contact the Educational Director of the various model rocket manufacturers for more information on the educational uses of model rocketry. Only if you take an *active* interest in helping the hobby spread will it be able to *grow* to its full potential.



The sixth graders at Rosedale Elementary School near Townson, Maryland launched over 80 model rockets from their schoolyard on Tuesday June 9th. Their activity was in conjunction with their Science unit on Air and Space.

After a valiant, though wet, attempt to stage the Space Pioneers Quality Regional on Sunday June 21st, New Canaan Connecticut's YMCA Space Pioneers finally gave in to the weather and postponed the NAR Sanctioned Regional until Sunday July 12th. Eight-three contestants from Connecticut, Massachusetts, New York, and New Jersey had gathered at the Space Pioneers launch site in Waveny Park for the attempted Regional. Not wishing to cancel the meet after some contestants had traveled over 50 miles to the site, it was initially postponed from 1 PM to 2 PM, in hopes that the rain would let up. By 2 PM the officials area had been covered with tarpulins, and several of the contestants had raised umbrellas – but it was decided to give it a try. During the next hour about 50 of the competition rockets were launched, but the rain and haze continued. When the weather got worse it was decided to postpone the meet until Sunday July 12th.

Norman Pierce is looking for several rocket clubs in the Bradford County, Pennsylvania, area to form a "Districted NAR Section" as has been done by the Pascack Valley Section in New Jersey. He requests that all model rocket clubs in the Bradford County area contact him at 67 Lycoming, Canton, PA 17724, or call 673-5992.

On June 21, 1970, the Wyoming Valley Model Rocket Club in Wilkes-Barre, Pennsylvania, held its first annual model rocket event under poor, rainy conditions at Nesbitt Park. There was a good turnout, and all proceeds from the event went to charity. Two events were flown – Spot Landing, and Original Design.

Earlier this year the Wyoming Valley Model Rocket Club wrote a letter to Pennsylvania Representative Danial J. Flood, asking him to support legislation to remove model rockets from the fireworks category. On July 8th, 1970, that bill was signed by Governor Shafer, and will take effect in 60 days.

Results are in from the Steel City Section's SCRAM-24 Section Meet held in May, 1970. In Sparrow B/G the Liberto-Hausman team took first with a 62 second flight. With only one qualified flight in the Eggloft event, Richard Sentner took first, and only, place with 270 meters. Kenney Paul took first in Open Spot Landing with a 34 foot 8 inch distance from the target. In the Scale event Alan Stolzenberg and Marvin Lieberman tied for first place with 750 points each. On the Class I PD event Dave Crafton took first with a 77 second flight.

Two of Steel City's members spent the summer participating at summer science institutes. Marvin Lieberman, SCS president, attended a National Science Foundation program in California, while Kevin Barkes, editor of the SCS newsletter "Starburst", attended a Scientists of Tomorrow summer institute in Colorado.

Twenty-seven rockets were fired on May 24th, as the Thrusters Model Rocketeers held their first launch of the summer at Rayford Axres in Mount Harmony, West Virginia. The club of 14 boys and girls from Meadowdale and Mount Harmony, has members ranging in age from 8 to 14. Formed in September of 1969, the club has met every two weeks throughout the winter and spring. Their first launching was under the direction of club president Kimberly Helmick, and vice-president Kevin VanGilder.

The North Jersey Rocket Association held its first competition at the Northern Valley Regional High School in Demarest, New Jersey, in early June. In the egglofting event Gary Kaplan, NJRA president, reports that only 3 of 20 eggs flown were returned broken. Drag Race and Spot Landing competitions were also flown.

During the school year members of the J. D. Smith Junior High School in Las Vegas, Nevada, organized a model rocket club. Under the sponsorship of Rex Goodell, science teacher at the school, the club has put on several demonstrations in Hartke Park. In early June they held a display of their model rockets at the school's Open House.

The Milford High School Model Rocketry Society in Mildord, Massachusetts, is looking for interested rocketeers in the Milford area to join their new club. New members interested in electronics, photography, and technical drawing are especially welcome. For further information contact Patrick Griffith, Legion Street, Milford, Mass. 01757 or telephone 473-7654.

The Aerospace Engineering and Research Organization (A.E.R.O.) is now being organized in Tiffin, Ohio. Club officers are Alan Bilger, president, Robert Humes Jr., vice-president, and Allan Comeskey, secretary-treasurer. Mr. Randell Halen is the adult advisor. The club meets every two weeks, on Wednesday eveings, at the First English Lutheran Church. At present the club has 10 members. Membership is open to any model rocketeers in Tiffin or Seneca county. Interested rocketeers should contact Alan Bilger, Route 4, Box 93, Tiffin, Ohio 44883.

A new rocket club is being formed in the Dayton, Ohio area. Rocketeers interested in joining the Meadowdale Rocket Research Society are invited to contact Ronald A. Diehl, 4410 Faraday Ct., Dayton, Ohio or call 274-0995 after 6:00 PM.

The Centaur Model Rocket Club was recently formed in the Green Bay, Wisconsin area to promote safety and competition among area rocketeers. Officers are Chris Briener, president, Jim Smits, vice-president, and Arlen Briener, secretary. Membership in the CMRC is open to any person interested in model rocketry. For more information contact Chris Brienen, 1936 Fiesta Lane, Green Bay, WI 54302.

The Model Rocket Association of Augusta, Georgia, held its second contest on June 6th, 1970. Four events – Egg-lofting, Streamer Duration, Spot Landing, and Scale Kit Conversion – were scheduled. The Scale Kit Conversion event was canceled because of lack of entries. David Redmond, secretary of the MRA, won the Egg-Loft with a flight to nearly 400 feet with a C6-3 engine. Chip Edwards, MRA treasurer, took first place in the Streamer Duration event with a time of 65 seconds. (Streamers were limited to 36 inches long and 2 inches wide.) David Redmond took first in the Spot Landing competition with a flight to 10 feet from the target. Rocketeers interested in joining the MRA should contact Henry Saul, 2283 Overton Road, Augusta, Georgia 30904, or call 733-2846.

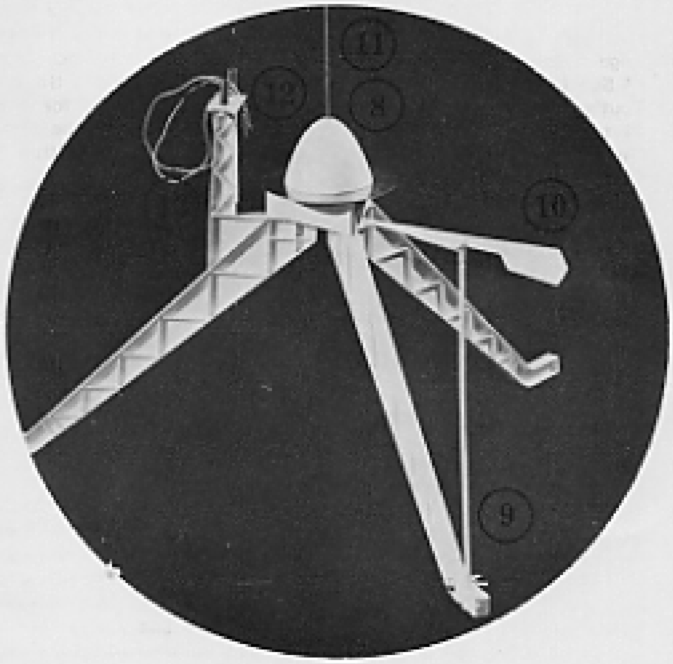
The Forest Park Model Rocket Club is looking for new members in the Forest Park area of Springfield, Massachusetts. Interested rocketeers between the ages of 11 and 15 years old are invited to contact Joe Scamardella, 21 Biltmore Street, Springfield, MA or phone 736-3113.

A new model rocket club is being formed in Nassau County, New York. Interested rocketeers between the ages of 13 and 15 years old are invited to contact Jeff Feld-

(Continued on page 46)

ONE GOOD THING...

LEADS TO ANOTHER



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