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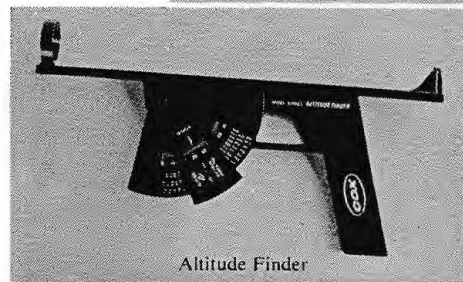
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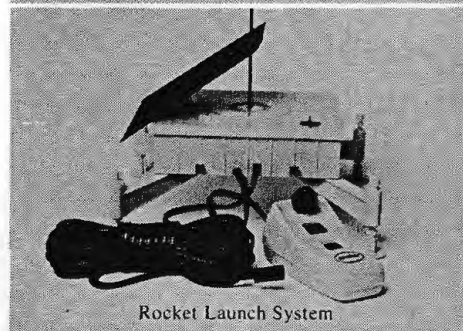
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COVER PHOTO

4H Club members with model rockets? Andy Krivoshik thinks it's a good idea. So do the members of New Jersey's Pascack Valley Section. See page 7 for the story. (Photo by Bob Mullane)

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EDITOR'S NOOK

This month we're starting a new column, "New from the Manufacturers". We'll be carrying news on the latest products, books, etc., as well as evaluations of those products by NAR members who've used them. Bob Lieber of Pittsburgh's Steel City Section will be putting this column together.

We'd like to remind all Section News correspondents that after August 10 Chuck Gordon will be back at his Laurel, Maryland address.

Next month's *Rocketeer* will be a special NARAM-14 issue. We want to bring coverage of the national meet to you as soon as possible.

At PACT, (June 30-July 2) NAR Trustee Lindsay Audin, in his keynote address, argued for the abolition of the NAR as we know it. He advocates a *daily* membership that would provide insurance, with a memberless organization carrying on Contest Board duties, engine certification, and other functions deemed necessary. Mr. Audin maintains that such an organization could be supported by the manufacturers and staffed by volunteers.

We agree that the NAR could do with some major changes, but his idea seems unworkable. We fear that it is a reflection of the panic that is sweeping some sectors of the organization, a panic which is unjustified and is only making existing conditions (which are, admittedly, not good) worse. Mr. Audin gave reasons for his pessimistic view of things, among them the fact that in March of 1972 the NAR had only \$15 in its treasury and could no longer pay for the *Model Rocketeer*. Well, we've managed to put out the April, May, June, July and August issues since then, so obviously that statement isn't quite true. What *is* true is that during the Christmas holidays, (the office is manned only by one person and Mrs. Ward had taken time out for a vacation) deposits were not made to the NAR account and a check from *Model Rocketry* was returned marked "Not Sufficient Funds". The deposits were immediately made and the check cleared the bank.

But let's analyze Mr. Audin's proposed organization. The biggest question seems to be "If the organization has no members, where will the volunteers come from?" NAR workers are working for the NAR and for the good of model rocketry in general (at least they should be), but they also get the satisfaction that being part of a national organization gives. They are, if they do their jobs well, praised by the membership. This probably can't be proved, but couldn't these be the reasons that the NAR *can* get volunteer workers. Will people give up large amounts of time, money, and effort to help an amorphous, anonymous group of un-members?

We think that the idea of one-day memberships should be considered, along with another class of membership that would give insurance and competition privileges for one year to people, but no magazine or voting rights. (Perhaps some provision should be made for providing those who don't receive magazines with the dates and locations of contests. Sections could be supplied with lists of such members so that they could be informed. This would probably be less expensive than NAR Headquarters mailing a list of contests to each members in the new category. This problem should be taken into consideration.) Such-a membership could be arranged for a dollar or two per year. The Board of Trustees has talked about new membership categories; we urge them to continue these efforts and take some action in the near future.

(Lindsay, if I got any of your statement wrong, I'm sorry. You said you'd send me a copy of your speech, but here it is five weeks after PACT and I don't have it. All my comments are based on notes taken by Steel City members who attended the event.)

Elaine

Elaine Sadowski

Send questions, ideas and gripes about NAR (don't forget about the "Loudly from a Broken Soapbox" and "If I Wrote the Pink Book" columns!) to:

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Any other articles, photographs, cartoons, ideas, etc. go to:
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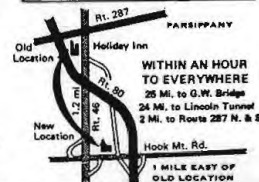
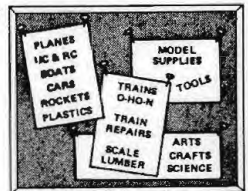
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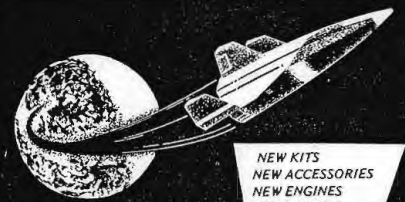
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NAR IN ACTION

1971-72 LEADER ADMINISTRATIVE COUNCIL REPORT

Reflecting the general downtrend of the NAR in the last few months, the 1971-72 Leader Administrative Council had a rather bad year. It was a year of apathy and lack of involvement on the part of LAC and NAR members. The council did, however, accomplish several things. This report will discuss the reasons for some of the problems, the current LAC projects, and some suggestions for the upcoming year.

At NARAM 13 and the LAC November meeting, many ideas and suggestions for projects were enthusiastically discussed and planned. Unfortunately, like many bright hopes, these goals dimmed. As the LAC Chairman the blame rests mostly on me. For this I would like to apologize to the NAR membership. I did not feel my enlistment in the Air Force would effect my duties severely. I expressed that thought in an open letter to LAC which was hand carried to the LAC Advisor, Lindsay Audin, at the January 15th Trustee meeting. The letter was neither presented at the meeting nor distributed to the LAC members. This led many people to believe that the LAC was without a chairman. This unfortunate event was compounded by the appointment of Lindsay to other committees leaving the LAC without any apparent leadership.

THE FOLLOWING ARE BRIEF SUMMARIES OF LAC PROJECTS:

Malfunctioning Engine Statistical Survey (MESS)—

A project in co-operation with the Standards and Testing Committee, the purpose of MESS is to collect information on faulty engines. Response has been good with over 200 forms being received, including one from a NAR member stationed in Germany. The first MESS project report was printed in the July issue of the *Model Rocketeer*. Among the results are documented failures of some engines that have ceramic end-caps. One drawback is that there presently is no efficient way to establish the percentage of failure. One idea that has been forwarded is a Contest MESS form to provide data on the percentage of failure at sanctioned competition. It would also ease paperwork.

Newsletter Award—

Andy Elliott, a leader member, volunteered to handle this year's annual LAC Newsletter Award. Various announcements have appeared in *MR*. The trophy will be presented at NARAM 14.

LAC Questionnaire—

Wanda Boggs is again handling this project which was published in the August *MR*. The last survey produced some interesting and valuable facts. Wanda has offered to compile the results of the survey as a service to next year's LAC.

R and D Summaries—

Trip Barber had expressed an interest in publishing R and D summaries as a LAC

project. These would be taken from all meets and conventions holding the event. This is a personal project that Trip has worked on previously. I have received no information on his progress.

Due to a lack of funds, several LAC/Publication Committee projects have suffered. The first LAC Scale Pak has been completed, but to my knowledge no date has been set for printing. The trustees have approved the pak as minimum data when presented along with a photograph. The program has run into snags since few people are willing to loan out their data to the LAC.

Bob Mullane and Lindsay Audin have been working on the Slide Presentation program. The first set, "Introduction to Model Rocketry" is being revised and formalized. Although the project has been received with great enthusiasm, lack of volunteer help and funds have delayed it.

Lastly, the Section Manual has been turned over to the Publication Committee, but again lack of funds have delayed its printing.

The key to a successful LAC is to get not only the LAC members involved, but also other members of the NAR. This year several non-LAC members have assisted the council in its projects. A good LAC/Trustee liaison is also important. As mentioned before, the LAC Advisor had been given a heavy load with positions on other committees. Such a schedule cut the effectiveness of his position. A full-time advisor should be chosen or picked from among the Trustees, or interested Senior members. Although several articles on the LAC have appeared in *MR*, few people have much knowledge of it or its projects. The theme of LAC should be more "Helping You to Help the NAR" rather than the "LAC Helping the NAR" that is most associated with the council. The LAC has tried to involve members but there has been little response from them. Finally, the Trustees should take a more active interest in LAC. The more support our projects have from the Trustees, the better the credibility with the membership. The council has always been open to their ideas and suggestions.

The Leader Administrative Council is a viable and useful body. The members of the new council will have the opportunity to carry out the current LAC projects and to try out their own ideas. The 1971-72 LAC would like to extend Best Wishes to them in the upcoming year.

The council would like to thank the following NAR members for their valuable assistance: Andy Elliott, Dr. Gerald Gregorek, Bonnie Kilgore, Bob Mullane, Elaine Sadowski, Ellie Stine, and Mike Wolfe.

Respectfully submitted,
Charles N. Russell
1971-72 LAC Chairman

nar news

OLD MODEL ROCKETRY MAGS SOUGHT

Marsha and Dennis Bishop of Honolulu, Hawaii, are will to pay \$1.00 for copies of *Model Rocketry* magazine. If you have any extras, send them to Mr. and Mrs. Dennis Bishop, 1545-1210 Linapuni Street, Honolulu, Hawaii 96819.

* * *

STINE RESIGNS FROM BOARD

G. Harry Stine has announced his resignation from NAR's Board of Trustees because he is embarking upon several ventures that might be construed by uninformed persons as being in conflict of interest with his position as a member of the Board of Trustees and chairman of one of the standing committees. No replacement has yet been named.

* * *

RECORD ATTEMPTS

The following are *attempts* at U.S. records. They are not official records.

Class I Streamer Duration—C Division—Ken Brodie, 24 June 1972, 78 seconds

Class II Streamer Duration—A Division—Roy Jacobsen, 18 June 1972, 66 seconds.

Class O Parachute Duration—B Division—Glenn Ronke, 11 June 1972, 138 seconds

D Division—Don Larson, 4 June 1972, 57 seconds

Class I Parachute Duration—B Division—James LaCroy, 4 June 1972, 661 seconds

D Division—Stine Team, 18 June 1972, 105 seconds

Class II Parachute Duration—C Division—Tony Medina, 11 June 1972, 707 seconds

Sparrow Boost/Glide—A Division—G.W. Stine, 18 June 1972, 24 seconds

D Division—A.A. Jacobsen, 18 June 1972, 98 seconds

Eagle Boost/Glide—B Division—James LaCroy, 18 June 1972, 134 seconds

Sparrow Rocket Glider—D Division—Jim Pommert, 10 June 1972, 194 seconds

Swift Rocket Glider—D Division—Jim Pommert, 10 June 1972, 395 seconds

Pee Wee Payload—A Division—G.W. Stine, 17 June 1972, 154 meters

B Division—R. Biedron, 17 June 1972, 164 meters

Robin Egg Loft—B Division—R. Biedron, 17 June 1972, 187 meters

Pigeon Egg Loft—C Division—Tony Medina, 18 June 1972, 512 meters

Design Efficiency—A Division—Wayne Gerhart, 18 June 1972, 152 m/NS

Class O Drag Efficiency—B Division—P. Bienkouski, 17 June 1972, 155 meters

D Division—Al Lindgren, 17 June 1972, 159 meters

PVS CO-HOSTS 4H MEET

by Bob Mullane

Photos by

Stephen Smargassi and Bob Mullane

The Pascack Valley NAR Section, in cooperation with the "Lunar Tics", the Union County, New Jersey 4H model rocketry club, co-hosted the first New Jersey 4H Model Rocketry Championships on July 7 and 9, 1972. This meet is also believed to mark the world's first real time use of a computer for data reduction during a meet.



Rockets, an 8' Saturn, a continuous slide show, and a drawing for rocket kits were featured at the Lunar-Tics booth.

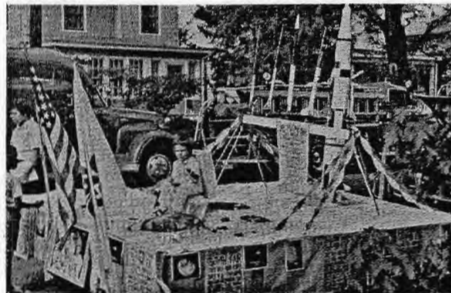
The meet was conducted as part of the Union County 4H Youth Fair. In addition to the meet, the Lunar Tics set up an 8' x 30' booth with displays of various types of rockets, a continuous slide show, a wind tunnel, launch racks, trophies (and the molds used to make them), a static test stand, literature of all sorts, and a free rocket kit raffle. The booth and its contents were so extensive that everything didn't arrive at the Fair until 3:00 a.m. Saturday, which resulted in an all-night building session (by headlight) to get the booth ready for the 9:00 a.m. judging of the booths and opening of the fair. The booth, by the way, received an "excellent" ribbon.



Bob Mullane (right) presents a "Thank You" trophy to a representative of the NASA Spacemobile.

On Saturday the meet was flown. There were three events— $\frac{1}{2}$ A Streamer Duration, $\frac{1}{2}$ A Altitude, and Open Spot Landing. They were similar to NAR events, but changed to fit the flying field and the requirements of 4H. The meet was flown in two age divisions—13 and under, and 14 through 21. (There is no senior competition in 4H, the stress is on the kids, and the adults don't get involved.) Competition was open to 4H members only, and invitations were sent to all of New Jersey's 21 counties and all known 4H clubs in the state. Seven counties and all but one of the state's 4H rocket clubs were represented.

The meet was delayed for a few hours because of some minor PA system and computer problems, and so people could finish building PVS's new trackers (which were put into service minutes after they were built.) The altitude event used a 4-way walkie-talkie communication set up. The tracking stations and range control each had one radio. The fourth was at the computer center at the Union County Technical High School (the Fair was held on the school's grounds). As each flight took place, the angles were radioed directly from the trackers to the computer center, where they were immediately inserted into the school's IBM 360 to calculate the altitude. By the time the next model was flown, the rocket's altitude was known.



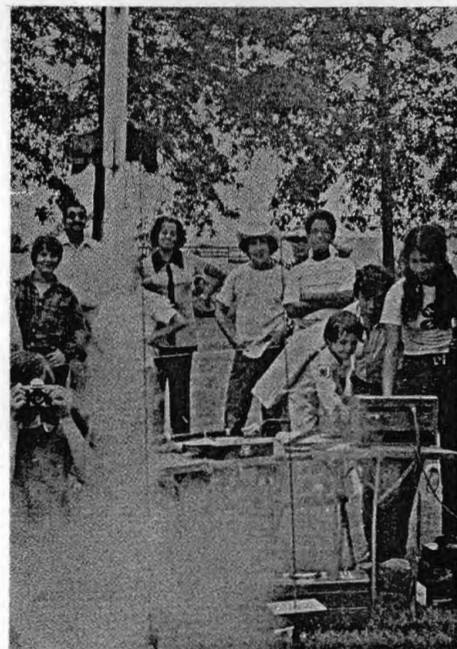
The Lunar-Tics' float in the Plainfield, N.J. Independence Day Parade helped publicize the Fair.

The system worked perfectly, and the new PVS trackers were so good that even with one inexperienced person tracking we had over 95% of the tracks closing.

Altitude was won by Fred Gluck in the 13 and under age group. Fred, only 9 years old, achieved the highest altitude of anyone in either group. Ken Montanye took first in the 14-21 age group. Under 13 Spot Landing was won by Mark Propsner, and Felix Soto won in the 14-21 division. 14-21 Streamer Duration went to Ed Orlando, while the 13 and under was taken by Mark Krivoshik.

The meet almost didn't take place since no one brought a battery. The day was saved by the National Guard Medical Battalion present at the Fair when they drove up their jeep and allowed us to use their battery.

After the launch, Steve Smargassi and Mike Manes retired to the school's darkroom to develop Camroc and Cineroc films that were taken at the launch. The Camroc was a success, but the school's water heaters were turned off, so Steve was unable to develop the color Cineroc film.



A special 4H rocket was launched to kick off the meet.

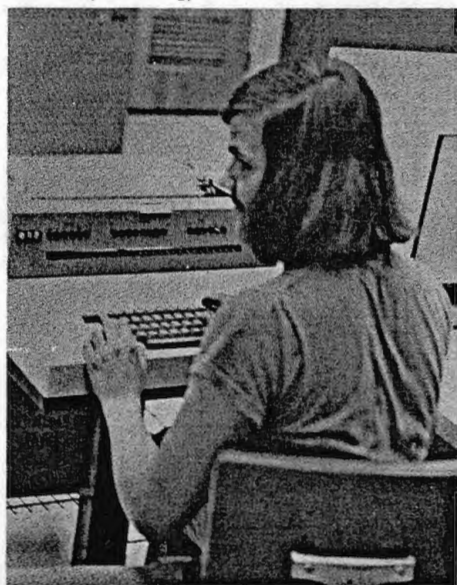
There were other rocket-oriented displays at the Fair. The National Guard brought a Nike Hercules, and a NASA Spacemobile show was given both days. On Sunday, NASA films, the Estes movie "T-1", and the first Steel City Section film (graciously loaned to PVS) were shown.

The awards were presented on Sunday by the NASA Spacemobile representative. PVS donated all first place trophies, and the Union County 4H provided ribbons for all places.

All in all, the Fair was a great success. Thousands of people witnessed what was probably the largest display of rocketry ever assembled in New Jersey.

Pascack Valley's involvement in 4H and other educational and public service activities has only begun. In a complete shift from its competition orientation of a few years ago, PVS has become totally committed to helping others.

The meet was co-chaired by Bob Mullane and Gary Bossong, both senior advisors to PVS.



Dave Krivoshik works at the computer console for real-time computer altitude data reduction.

WHY ELLIPTICAL FINS?

Article and drawings by Tom Milkie, NAR 11351

Anyone who has been to a model rocket competition recently has probably noticed the great number of high-performance designs using "elliptical" fins (see Figure 1). The uninformed rocketeer may ask why so many people use elliptically shaped fins. Supposedly, they reduce drag.

Whenever an airfoil produces lift, it also produces drag due to flow of air around the tip. This flow lets air "leak" around the fin or wing and reduces the effective lift. This drag, called "induced drag", is only present when the airfoil is producing lift. Calculations have shown that this induced drag is minimized for an elliptical wing shape. Note that the induced drag is not zero for an elliptical shape; it is just at a minimum.

On airplane wings, which must continually produce lift, induced drag makes up a large part of the total drag. To decrease this drag, some subsonic aircraft (notably the British "Spitfire") have a planform shaped like an ellipse. An elliptical lift distribution can also be created in rectangular wings by varying the airfoil shape or angle of attack along the wingspan. Many model airplane designs also have elliptical planforms. In both cases, however, the main disadvantages are the structural problems involved with a smooth, curved elliptical shape.

A model rocket fin acts to stabilize a rocket by acting like a wing and producing lift. Like the lift caused by a wing, that produced by a fin has induced drag associated with it. It is not difficult to construct an elliptically shaped fin from balsa or plywood, but just how important is this decrease in induced drag for a model rocket?

The graph in Figure 2 compares the induced drag of various fins with the same lift. The important point is that for even purely rectangular fins, the induced drag differs only minutely from that for elliptical fins. For trapezoidal fins, the difference is even less. The induced drag coefficient (C_{di}) in Figure 2 is proportional to the induced drag. The angle of attack (α) is the angle of the rocket relative to the air flow. Note that since the rectangular fin has less lift for the same area than the elliptical fin, the fin area has been increased. This data is based on vortex theory, which very accurately represents the air flow.

How large is the angle of attack for a model rocket in flight? This, of course, would depend on how smooth the launch is. If the rocket is "tipped off" at launch, it would oscillate a few times as the rocket approaches its peak velocity. I would guess that a good "average" angle of attack is about four degrees. For this angle, the difference in induced drag is quite small.

A regular, sharp-cornered rectangular fin of the same lift as an elliptical fin (aspect ratio=6.28) would have only about 1% more induced drag. By rounding the corners and getting closer to an ellipse, the difference in induced drag becomes negligible. It is interesting to note that a trapezoidal fin shape closely approximates an ellipse. The best trapezoid for reducing induced drag is the one with the tip chord 1/3 the length of the root. Even with sharp corners, this design is less than 0.2% more "draggy" than the ellipse.

Now that it is clear what isn't important, what is? The answer is "aspect ratio". The induced drag is increased with a decrease in the aspect ratio, defined as the square of the total fin span (2 fin spans) divided by the fin areas for 2 fins. The aspect ratio is based on two fins because two fins are essentially one "wing" (tip to tip). For a rectangular fin shape, the aspect ratio reduces to two times the length, divided by the width, of one fin. Fins, therefore, should have as large a span as possible if a reduction in induced drag is desired. The total effect of induced drag is illustrated in Figure 3 for varying aspect ratios.

Note that as the aspect ratio is decreased, the fin produces less lift and the fin area must be increased to compensate, as was done in comparing rectangular and elliptical fins. The graphs, however, do not show changes in other types of drag. The larger fin area will increase skin friction drag for short and rectangular fins, and this might be important.

One might be tempted to solve the whole problem of induced drag by a method sometimes used on airplanes—the wing tip plate. Since induced drag is caused by air flowing over the fin tip, it would be possible to stop the air flow by putting a fin tip plate on perpendicular to the fin. The major disadvantage here is that the "interference drag"—drag due to two airfoils meeting at 90 degrees—is far more damaging, and destroys any savings in drag.

While the elliptical fin is more aerodynamically advantageous, other designs such as the trapezoid may be easier to work with, or have an advantage in strength, without much difference in drag. As a matter of fact, one of the earliest fin designs for model rockets can be found in G. Harry Stine's *Handbook for Model Rocketry*. The design is a rounded trapezoid, very close in efficiency to the ellipse.

Tom Milkie is an Aerospace Engineering student at Georgia Tech. He has been a member of the NAR for five years. Tom is a former president of the MIT section and was one of the founders of Model Rocketry magazine. He is active in East Coast competition and currently holds a U.S. model rocket record.

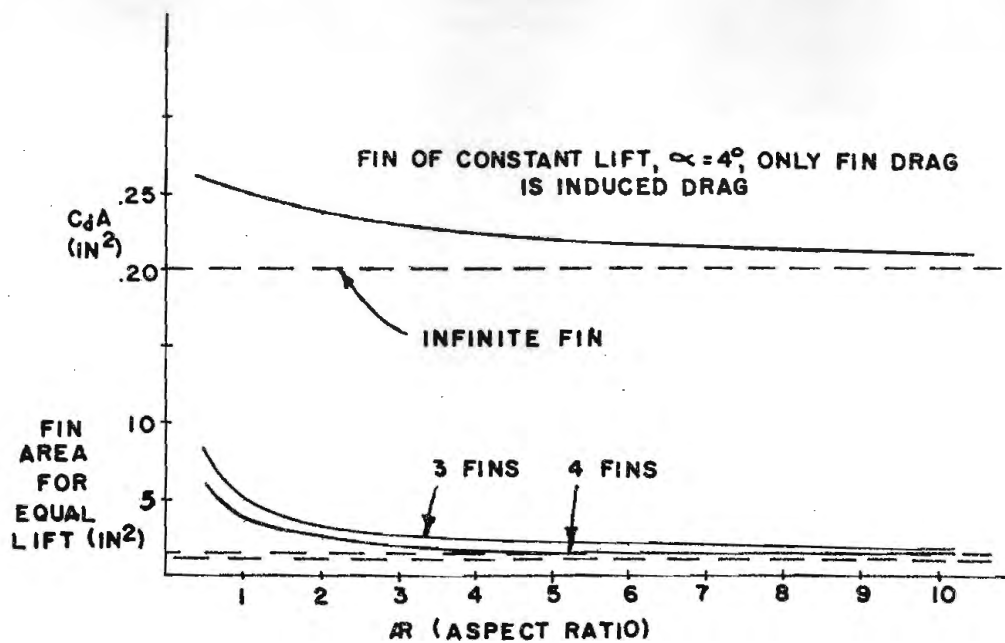


FIGURE 3

EFFECT OF ASPECT RATIO

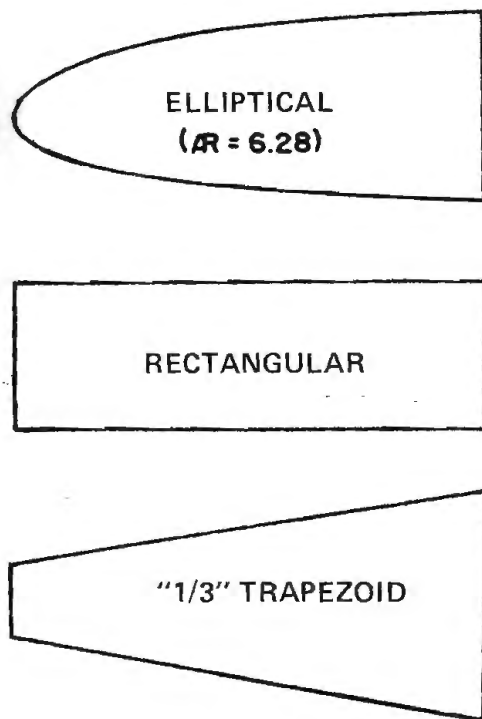


FIGURE 1

FIN SHAPES OF EQUAL AREA AND ASPECT RATIO

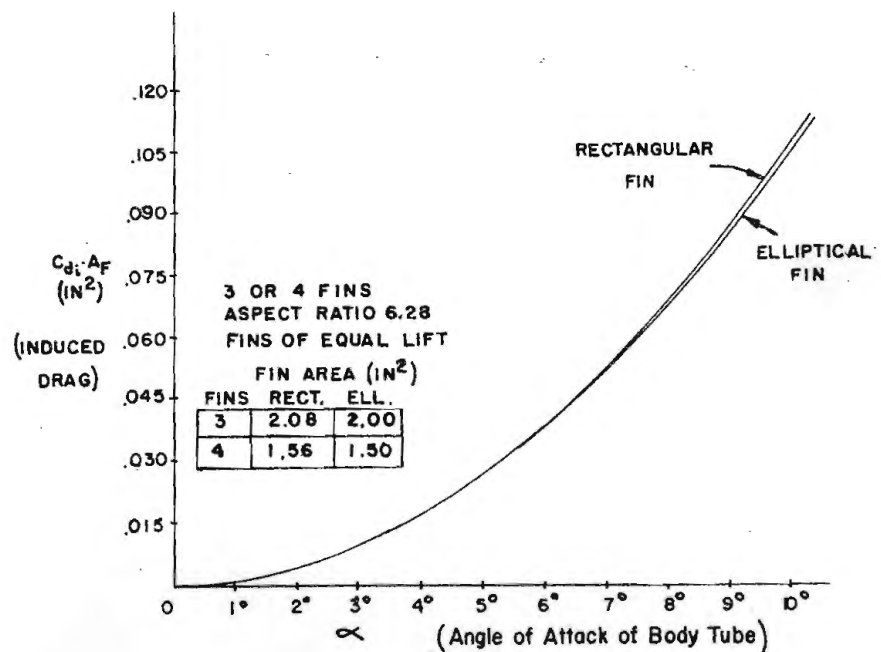


FIGURE 2

EFFECT OF α ON FIN INDUCED DRAG

WART-1

Story and photos by Steve Hudson
and Mike Burzynski
(Adapted from NOVAAR Free Press,
Vol. 1, No. 9, June 1972)

The first annual Washington Area Record Trials (WART-1) were held on Sunday, May 13, 1972, on a large field near Bristow, Virginia. Doug Plummer didn't come, but the rains did, and WART was definitely "for the frogs"

Apparently East Coast rocketeers didn't get the picture when they were told that the NART-3 record trials wouldn't be held this year. Only 34 persons applied as contestants to WART, and, unfortunately, only about 20 could make it on that rainy Sunday.

Although record attempts could be made in any timing event, most people stuck to the four competition events—Condor B/G, Swift RG, Class 2 SD, and Class O PD.

The most impressive Condor was the Burdick-Justis Team's "SPISFOWEK", a giant fluorescent orange monster powered by two D.12's and two C.6's. Enclosed in the top of the upper stage was what the inventors called "a single-pivot swing/flop wing", which was released at ejection from the break-away style payload section. Twice the SPISFOWEK failed due to its habit of not gliding.



Terry Lee of the Vikings returns his Class II Streamer Duration rocket after a 92 second flight. Terry went home with two trophies (SD and PD) and two second-place ribbons (Condor B/G and Swift RG).

Terry Lee, the NAR's "Southern Belle", had a slightly oversized Falcon powered by two E.5's. This well-trimmed glider turned in 116 seconds for second place in D Division.

The top Condor flight in D Division (and the meet) was Robert Lada's. His parasite glider was quite interesting. The four-foot tall booster carried two D.12's in a cutaway BT-60, and another in a pod supporting the glider. The NOVAAR cluster box never failed, and off went Robert's rocket. The glider stayed aloft for 122 seconds; not bad for a day's work.

The only other entry to qualify was the Thompson-Meyer team's, also a parasite. Powered by two E.5-6's, the tiny glider went out of sight after 97 seconds. This was long enough, however, for a first place in C Division.



Mike Burzynski preps his Mini-Oblivion IC, a Swift Rocket Glider. Mike has won both RG and B/G events with his Oblivion series.

Swift Rocket Glider wasn't much better than Condor B/G, having only four qualified flights. Steve Setzer of MARS took first in C Division with 74 seconds, tops for the event as well. The Thompson-Meyer team's Buzzard took second place with 41 seconds.

The Philmon team from NARHAMS walked away with D Division RG, (but they brought it back in time to take first place with a 21 second flight).

Terry Lee brought out his ancient "Swan" rocket glider, a weird canard contraption. Due to premature release of the canard, the Swan turned in a meager 9 second flight, but it took second place in D Division anyway.

Ross Iwamoto had two outstanding flights. One was 119 seconds in Streamer Duration, and the other was a 203 second Parachute Duration flight. Both were good enough for firsts in C Division.

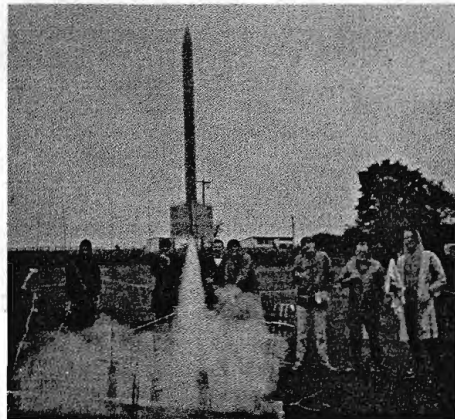
The rain finally ceased by the time Howard Kuhn began giving out the awards. The few contestants who attended WART-1 said that they enjoyed it, so plans for WART-2 are being made. But until next year, let the mud be our remembrance of WART-1.

Steve Hudson and Mike Burzynski are both members of NOVAAR and live in Fairfax, Virginia. Both work on the two newsletters put out by the club, Steve as editor of both the NOVAAR Free Press and the Newton Observer, and Mike as a writer on both publications. Steve is a junior at Fairfax High School and is editor of the school's student union newsletter. Mike, NOVAAR's chief photographer, is a senior at W.T. Woodson High. Both Steve and Mike have been NAR members for two years.

WART-1 was held on a very wet 70-acre corn field near Bristow, Virginia. (Below)



The Thompson-Meyer Team prepares their Condor B/G entry for flight. The tiny parasite glider, powered by two E.5's, went out of sight.



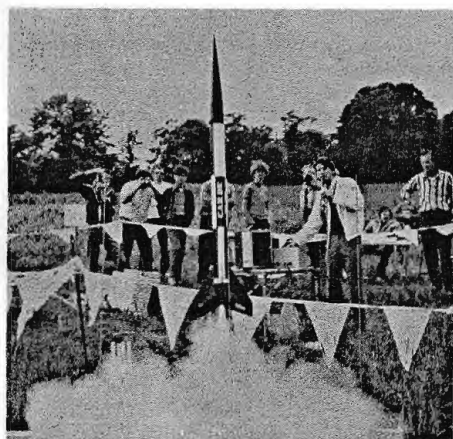
The Burdick-Justis Team's "SPISFOWEK" Condor B/G, a "single pivot swing/flop wing" which folds up into a booster, twice tried to glide, but it just wouldn't come out of a spiral.



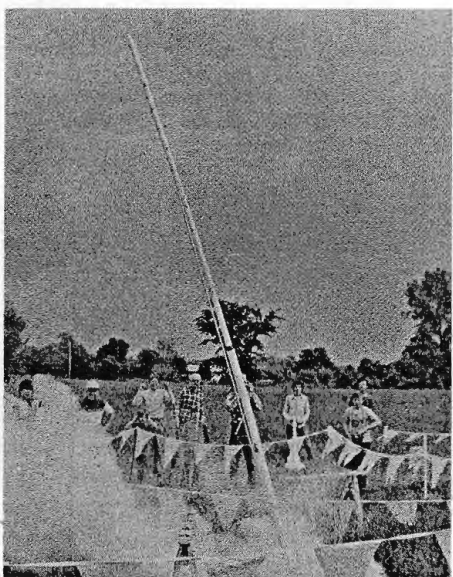
Howard Kuhn presents the Thompson-Meyer team with a trophy for first place in C Division Condor Boost/Glide.

MMRR '72

by Robert Lieber and Doug Pratt



Mike Howell's scale Black Brant lifts off. This bird was powered by a D.12-3 and took second place in D Division Scale. (Photo by Michael Micci)



No, it isn't the Leaning Tower of Pisa. Doug Pratt's NOVA-15 falls after its launcher collapsed. (Photo by Craig Streett)



The traditional MMRR opening salvo of red, white, and blue rockets is launched. At the firing panel is Mr. Micci. Dr. Gerald Gregorek looks on. (Michael Micci)

On the weekend of June 23, 24, and 25, Tropical Storm Agnes dumped tons of rain on the Eastern Seaboard as far west as Pittsburgh. This caused some of the worst flooding in the area's history. Columbus, Ohio, which is only about 200 miles from Pittsburgh was the site of an activity that weekend. What was it? MMRR 1972.

Upon leaving Pittsburgh Friday afternoon, the authors encountered a rather interesting situation; 15 minutes after we left a certain road, it was closed due to flooding. This, however, was the low point of the weekend.

When we arrived in Columbus we were greeted by some old friends. (Among them was Howard Kuhn. This was quite a surprise since most of Alexandria, Va. had been flooded.) The motel was beautiful, and it proved to be a restful place for those who badly needed sleep on Friday night.

On Saturday morning the flying began with Class 1 Streamer Duration. The one flight really worth mentioning was Harry Neuman's of 1 minute 55 seconds—with an A engine! Other first place winners were Andrew Knutson, J. Starks, and Fat Albert.

The three tracking events were next. The tracking was ably done by Dave Thurber and Mark Scheibenburger, with Jon Randolph handling base communications. First places in Robin Egg Loft (starting with A Division) went to Andrew Knutson, Mark Wladecki, Craig Streett, and Richard Evans. Pee Wee Payload was won by Dale Long, Mark Wladecki, Fat Albert, and J. Kalb. Walter Page, Jim Gazur, Jeff Shafer, and Fred Long took firsts in Design Efficiency. With the wind increasing and the temperature doing the opposite, Saturday's flying ended.

There was an interesting addition to Saturday's activities when Randy Gilbert of Centuri locked his keys in the trunk of his car and retrieved them through the back seat. What made this event interesting was a TV commercial shown that evening that said that this could not be done in cars like Mr. Gilbert's. Once again, model rocketeers accomplished the impossible.

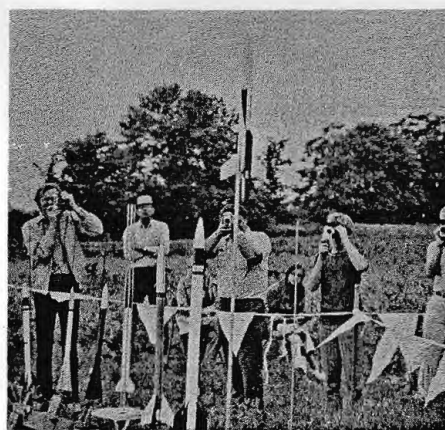
During Saturday's flying, we talked with Gil Lutz, who had some good news from Michigan. Gil told us that he, Harry Stine, and Mike Bergenske had recently acquired the rocketry division of MPC. Gil said that the new company is called Aerospace Vehicles, Inc. (Editor's Note: For more information on this, see "Model Products and Aerospace Vehicles, Inc. Announce Agreement" elsewhere in this issue.)

Later on, Dick Fox demonstrated his experimental multiplexer module, which will enable two sensors to be run through a single Foxmitter. This would permit, for example, flying both a roll-rate sensor and a temperature probe on one rocket.

Howard Kuhn of CMR was quite enthusiastic about marketing Astro-Communications products. (See page 15 for more about this.) He mentioned plans for improving the packaging and structure of the Foxmitter.

Sunday's flying featured the B/G's and RG's, and the MMRR tradition of tough competition continued. Swift B/G was won by Gregg Roe, John Starts, Charles Krallman, and Chas Russell, while Hornet honors went to Steve Behrends, David Mitson, David Gloger, and (a tie in D Division) F. Gnass and Chas Russell. Hornet RG was won by Walter, Page, David Mitson, Michael Micci, and Joseph McBride.

Then came Plastic Model. Last year one of the authors was almost struck down by a flying Gemini Capsule, and this year was to be no different. That very same Gemini Capsule pranged without a 'chute, but I promise you it



Chuck Krallman's Astrobee 1500 got a perfect flight with an Enerjet F. He took first place in C Division Scale. (Photo by Craig Streett)

will never kill again. The big surprise of the event was Joseph McBride's Monogram Saturn V. It was powered by 5 Minijets and flew perfectly to capture first place in D Division. Other winners were Gerry Fornes, James Gazur, and David Gloger.

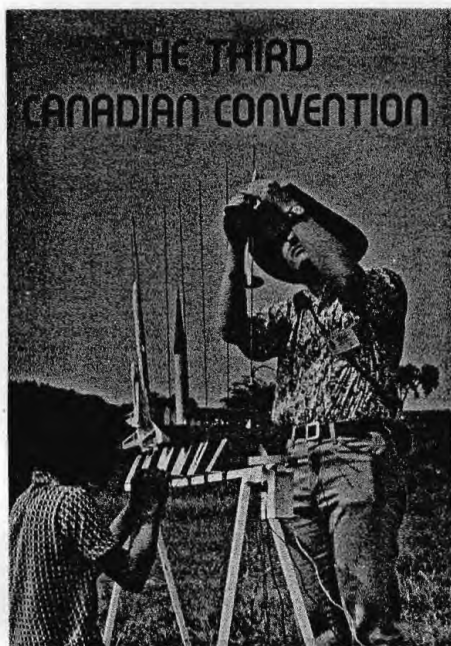
Scale was the final event, and the models were the finest we've seen since NARAM. Winners included Walter Page, Kerry Mechtly, Charles Krallman, and John Mechtly.

After Sunday's flying was completed, the manufacturers turned out for demonstrations. Howard Kuhn, who had been flying, breaking, and repairing a well-worn Buzzard RG all day, flew it and turned in a decent glide. He also flew a PD model and two others.

Centuri's Randy Gilbert had plenty of Enerjets and models which Enerjet has recently released as kits. Although plagued with bad luck on a Saturn V and a Space Shuttle, Gilbert turned in an exciting launch. A favorite was the new Enerjet Nike-Smoke scale kit, with a nosecone that ejects powder in the same way as the real rocket to produce a smoke trail. At the end, Gilbert and Dick Fox loaded a Foxmitter temperature probe into an Enerjet Nike-Ram kit and tracked it through a perfect flight.

One of the more frightening demonstration launches was the attempted launch of Douglas Pratt's 15-ft. tall model rocket, NOVA-15. Pratt explained later that his NOVA project started with an 8-ft. rocket almost two years ago. The NOVA-15, he said had flown successfully four times. This time the attempt was made with an FSI F.7-2. The model is launched from 14 feet of C-rail supported by an Estes Porta-Pad and stabilized by Pratt's spare tire. On that day, however, the system left something to be desired, as a slight bend in the rail held the rocket on the pad for the 8-second thrust duration of the engine. Then, the whole business fell majestically over and landed on a nearby launch rack. Pratt reported afterward that it would be repaired, and his next project would be to design "a decent launcher for the 20-foot rocket I have planned!"

The awards banquet that evening, at the Imperial House Motel, was another example of Dr. Gregorek's excellent planning. Each participant was given a free kit, and technical literature was passed around. The manufacturers' representatives awarded the prizes which their companies had donated. Craig Streett presented the first place gold medals which have become traditional at MMRR. After a showing of the "world famous" Steel City movie, MMRR came to a close, as well-fed, happy rocketeers went home to dream about next year. It was great!



Paul Shindman (left) and Ephriam Vishniac load their models for the competition.

Story and photographs
by David Klouser

The weather was warm and humid, with a definite possibility of showers, when Steve Kushneryk and twenty other rocketeers gathered for the opening ceremonies. Actually thirty participants were scheduled to attend the meeting, but the arrival times of the other people were spread over a two day period. Steve ran through the schedule of events and then explained the competition and displayed the trophies to be given to the winners. This year, a special Eggloft event was held in honor of Richard C. Carmel, who recently passed away.

At 7:30, Gordon Mandell began his group on "Trajectory Analysis". He was well-prepared with hand-outs, which not only gave equations for predicting a model's performance, but also some of the how and why behind them. Comparisons were drawn between predictions using drag free, small interval, and Feshkins-Malewicks methods. Although the drag free method was found unsatisfactory, the Feshkins-Malewicks method was very good for practical use when working with vertical flight.

Next, Saverio Prato's talk on Cineroc Film Analysis proved to be rather popular. Saverio is working with the Cinroc in a number of ways. By taking a reading on the Cinroc at parachute deployment from a fairly visible point on the ground, Saverio was able to calculate several interesting items. Although there were some inaccuracies in the system, it looks like much valuable information could be obtained through its use with a little more work. Following the group, most people returned to their lodging and retired in order to be ready for the next day.

Saturday's launching began right on schedule, with several of the people anxious to get their models in the air in the quest for the coveted prizes. Eggloft wasn't as varied as it usually is in the United States; the majority of

models were single-staged D engine models. One interesting flight was put in by Steve Kushneryk. Using a piston launcher, Steve's model seemed to jump off the pad and then flew straight up, resulting in a good flight but a lost egg. Other models fell victim to the local subway pit, which was a 50' ditch running the length of one field.

In Class O PD, Dr. Gregorek's two-minute plus flight with a $\frac{1}{2}$ A engine was more than enough to take first place. Recovery of the winning bird was hampered slightly by the neighborhood on-lookers, but the model was eventually retrieved.

Discussion groups for that night included Dr. Gregorek's talk on Aerodynamic Drag and Ferenc Roka's on Night and Payload Boost Gliders. These two discussion groups were followed by a film session and then the finale for the night, the night launch. Guff Griffith gave a rather spectacular show with some of his night flights, but almost every flight that night was spectacular in one way or another. Coolites were in abundance there, and some people followed Rosse Butterfield's idea of soaking a glider in Coolite for light-weight night tracking. Besides the Coolite, Blinkin' Beacon, flashing lights, non-flashing lights and flares were used for tracking. After the night launch, everyone, or just about everyone retired for the night.

Sunday morning began with Gordon Mandell speaking on aerodynamic stability. During the course of the discussion, several interesting aspects of static stability versus dynamic stability were brought out, using such examples as payload models. It seems that, although a model may be statically stable without fins, as many payload models are, it

isn't dynamically stable. The model still needs the corrective force of the fins to counteract any disturbing force.

Doctor Gregorek was up next; he gave the reason behind the designing of the "Basic Boost Glider", after which he explained the rules to follow in making one.

Following lunch, the R&D presentations were given. With five entries and six trophies, it was a sure bet that everyone would get something just for entering. In the Senior division, Robert Staehle captured first place with his talk on an audio beacon for finding misplaced rockets. In Junior, Peter Sauer took first place for his investigation into the use of all available space in a model rocket for various purposes.

Next, Robert Staehle led a group on Instrumentation, followed by Paul Schindman's group on the Cook Book (Canada's Pink Book), and Alan Cantor's talk on boost and rocket gliders.

The banquet and closing ceremonies, held at the Lucerne Motel, were climaxed with the keynote given by Jay Apt. Jay gave his talk on model rocketry as being more than just a hobby, but as a frontier where people work together to overcome great problems and difficulties. Following this speech, the awards were given, with a short talk by Gordon Mandell on each R&D project and its weak points. This gave the competitor a chance to improve on his project and to explore new areas.

The convention was closed by Steve Kushneryk, who announced his retirement from the post of Convention Chairman. He ended the gathering on the words, "We came in peace for all mankind!", and we certainly did.



Convention Chairman Steve Kushneryk (right) and Peter Sauer (left) open the Montreal Convention with an explanation of the schedule of events. On the far right are the trophies for R&D and Eggloft. The large of the two is the Richard C. Carmel Memorial Award for Eggloft.



Ferenc Roka shows his basic box frame for boost/gliders to those attending his "Payload and Night Boost/Gliders" discussion group.



Dr. Gerald Gregorek explains why he designed the "Basic Boost/Glider".



Gordon Mandell led discussion groups on both aerodynamic stability and trajectory analysis.



Saverio Prato led a discussion group on Cineroc analysis.

CONTEST alendar

August 19, 1972—Bel Air, Maryland. Name: WREC 1 (Warped Rocketeers Entered in Competition). Host: HASM 248. Events: Class 00 Parachute Duration, Swift Rocket Glider, Open Spot Landing, Scale, Class 0 Streamer Duration, Sparrow Boost Glide, Plastic Modelling. Contact: Bertram B. Grollman, RD 1, Box 55A, Darlington, Maryland 21034.

August 19,20, 1972—Bethlehem, Pennsylvania. Name: EAST COAST BOOST GLIDE CHAMPIONSHIPS II. Host: Bethlehem ABM 108. Events: Hornet Boost/Glide, Swift Boost/Glide, Eagle Boost/Glide, Sparrow Boost/Glide, Hawk Boost/Glide, Condor. Contact: J.C. Osborn, 1408 Cottage Avenue, Bethlehem, Pennsylvania 18018. Telephone: (215) 866-3127.

August 26, 1972—Fort Wayne, Indiana. Name: HOOSIERS EXTRA LARGE LAUNCH-1 (H.E.L.L.-1). Host: Summit City Aerospace Modelers 282. Events: Class 00 Parachute Duration, Plastic Model, Class 2 Underwater Streamer Duration, Sparrow Boost/Glide, and Sparrow Rocket Glider. Contact: Tom Hoelle, 2231 Charlotte, Fort Wayne, Indiana 46805 (phone (219) 484-5755).

This is strictly a state wide launch for Indiana!

August 27, 1972—Webster, New York. Name: MARS SM-IV '72. Host: Monroe Astronautical Rocket Society 136. Events: "A" Drag Efficiency, Sparrow Rocket Glider, Class 0 Parachute Duration, Parachute Spot Landing, Pigeon Eggloft. Contact: Michael G. Howell, 244 Inspiration Point Road, Webster, New York 14580. Telephone: 671-7012.

September 2-3, 1972—Bossier City, Louisiana. Name: DIRT-1 (Delightful Invigorating Record Trials). Host: Ark-La-Tex Rocketry Club 284. Any event may be launched. Contact: Tom Sullivan, 1905 Christine Avenue, Bossier City, Louisiana 71010 (Phone (318) 746-9461).

September 3, 1972—Richmond, Virginia. Name: RRRRM-1. Host: Vikings 203. Events: Class 0 Streamer Duration, Class 1 Parachute Duration, Swift Boost/Glide, Swift Rocket Glider, Single Payload, Robin Eggloft, Scale. Open to all Virginia NAR members. Contact: Jim Penney, 8308 Lansdowne Road, Richmond, Virginia 23229.

September 16-17, 1972—Highland Park, Illinois. Name: ETR-2 (MERA-TIROS Regional). Events: Hornet Boost/Glide, Condor Boost/Glide, Sparrow Rocket Glider, Hawk Rocket Glider, Class 2 Streamer Duration, Class 1 Parachute Duration, Pee Wee Payload, Robin Eggloft, Research and Development. Contact: Bob Finch, ETR-2 Contest Coordinator, 415 Lambert Tree Road, Highland Park, Illinois 60035. (Phone (312) 432-8996).

September 23, 1972—Winnipeg, Manitoba, Canada. Name: Manitoba Invitational Rocketry Meet (MIRM-1). Host: Winnipeg Association of

Rocketry. Events: Sparrow Boost Glide, Swift Boost Glide, Class 2 Parachute Duration, Pigeon Eggloft, and Class 1 Stream Duration. Contact: Doug Cook, 152 Marshall Crescent, Winnipeg, Manitoba, Canada, R3T 0R7.

October 14, 15, 1972—Aberdeen, Maryland. Name: Mid-Atlantic Regional Shoot VII

(MARS VII). Host: Star Spangled Banner 156. Events: Super Scale, Efficiency (Design), Hornet Rocket Glider, Class 0 Parachute Duration, Scale, Robin Egg Lofting, Hawk Boost Glide, Class 1 Streamer Duration. Contact: Howard Galloway, 428 Ben Oaks Drive, West, Severna Park, Maryland 21146. Telephone: (301) 987-4395.

TO: NAR TRUSTEE'S
SUBJECT: 1972 FINANCIAL REPORTS

July 8, 1972

I am submitting to you the NAR Financial Reports covering the periods, month of June 1972, the second quarter statement and the report of the first half of 1972. Each provides a view of our financial health.

The current membership count, as of June 30, 1972, is 3225 members and 81 sections. Not quite up to our 1971 totals, but certainly a good sign for the future. The Association has at least slowed down its reckless spending patterns of the past, but the need is to continue our efforts to insure our future financial health.

I must give all the credit for our current good health to the many members who have spent tireless hours in performing the many tasks necessary to the Association, and in a way that is beyond that of "just getting it done".

Respectfully Submitted,

A.L. Lindgren
Treasurer, NAR

NATIONAL ASSOCIATION OF ROCKETRY First Half Year Report January Thru June 1972

INCOME

BALANCE ON HAND AS OF DECEMBER 31, 1971	(\$ 597.42)
DUES '72 2132 MEMBERS	13,358.16
FEES '72 70 SECTIONS	472.50
CONTRIBUTIONS	164.00
CONTEST BOARD	769.90
FAI LICENSES	290.00
NARAM -13 CONTRIBUTION	1,600.00
PITTSBURGH CONVENTION PAYMENT	85.75
DONATION - ESTES INDUSTRIES	500.00
TRANSP0-72 REPAYMENT	587.18
CREDIT COUPONS	(152.25)
MISCELLANEOUS INCOME	140.81
TOTAL INCOME FOR PERIOD	17,816.05
TOTAL INCOME	17,218.58

EXPENSES

HEADQUARTERS SERVICES	\$3,620.25
TELEPHONE	340.55
POSTAGE	1,115.16
OFFICE SUPPLIES	827.26
PRINTING AND XEROXING	980.89
MODEL ROCKETEER MAGAZINE	3,378.32
NARAM-14	497.34
NARLETT	9.99
SECTION ACTIVITIES	220.29
COMMITTEE EXPENSES	265.52
CONTEST BOARD	448.55
NAA AFFILIATION	250.00
NAA TRANSP0-72	432.50
FIRE MARSHALL'S (CALIF.)	496.00
REFUNDS	65.00
MISCELLANEOUS EXPENSES	104.95
TOTAL EXPENSES FOR PERIOD	13,052.57
BALANCE ON HAND	4,166.01

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- ☐ JUNIOR MEMBERSHIP (Under 17 as of January 1) \$6.00
- ☐ LEADER MEMBERSHIP (Under 21 as of January 1) \$7.00
- ☐ SENIOR MEMBERSHIP (21 or over as of January 1) \$8.00

NEW

FROM THE MANUFACTURERS

CMR TO SELL FOXMITTERS

Astro Communications has announced that mail orders on all of their products will now be handled by Competition Model Rockets in Alexandria, Virginia.

MODEL PRODUCTS AND AEROSPACE VEHICLES, INC. ANNOUNCE AGREEMENT (Aerospace Communications Association)

Model Products (MPC) of the Fun Group at General Mills, Mount Clemens, Michigan, and Aerospace Vehicles, Inc. (AVI), a division of Genesis Corporation of Mineral Point, Wisconsin, have announced an agreement to transfer all of MPC's model rocket operations, inventory, and facilities to AVI.

AVI will continue to market the MPC model rocket kits, motors, parts, and accessories under the MPC label with a gradual, phase change-over to the AVI name and logo during the coming year.

Both MPC and AVI assured jobbers, dealers and model rocketeers that the new agreement would not adversely affect the availability of the MPC model rocket line, especially the contest-winning Minijet engines.

Myron D. Bergenske, President and General Manager of AVI, revealed that AVI plans no drastic changes in the former MPC product line in the immediate future. He stated that several new Miniroc championship series kits and several new types of Minijet engines would be released in the very near future to augment the existing line. These new additions were developed at the request of model rocket enthusiasts who have been setting U.S. and world records with the Minirocs and Minijets.

Mail order operations direct to consumers will be expanded. A new computerized complex is being installed to handle mail order business as well as to keep track of dealers and jobber orders and accounts, inventory, and production schedules.

The former facilities of MPC at Mineral Point, Wisconsin will form the nucleus of the new AVI operation with several additional buildings already under construction.

"This is a whole new ball game," Bergenske said. "We are going to build upon the work and experience of the past three years with MPC. We intend to be fully computerized to offer the finest and fastest services possible to all customers. Our sales policies are being expanded and revised. And we have some very interesting new products in the offing."

AVI's address is P.O. Box 77, Mineral Point, Wisconsin 53565.

ESTES TO SELL READY-TO-FLY BIRDS

On July 3, Estes Industries announced the introduction of the Firing Line, a line of three all-plastic, solid propellant models that require no building or painting. These rockets were developed to appeal to a mass market.

The three new rockets all use mini-engines. They are the Banshee, the Vampire, and a scale model X-15. There is also a starter kit made up of a Vampire, a Mini-Pad launch system, three engines, igniters, and recovery wadding.

ESTES INTRODUCES "CONVERTIBLE" COLD-PROPELLANT ROCKETS

The new Estes Green Line features six paper and balsa cold-propellant models that can be converted, with the installation of an engine mount, to solid fuel rockets. The Scamp, Yankee Five, Marauder, Honest John, Teros, and Shark all have die-cut balsa fins, press-on decals, and pre-assembled engines. They are powered by RP-100 propellant (Freon-12). The Green Line Flight kit includes a Scamp rocket, an engine, a launcher, and one 7½ oz. can of propellant. This line is aimed at a mass market.

R & D

summaries

These summaries are published essentially as received, with little technical editing. Our aim in publishing these summaries is to make NAR members aware of what is being done in R&D and who is doing it. *Model Rocketeer* does not guarantee the technical correctness or the validity of the author's methods or conclusions. Any questions concerning these summaries should be directed to the author. Editor's comments will be included where a matter of safety is concerned.

"Time Delayed Staging"

Robert R. Thompson, Jr., NAR 16310,
10814 First Street, Fairfax, Virginia 22030

*Third Place, MARS VI

The purpose of this project was to develop a reliable method of time delayed staging. I felt that if such a method could be developed, the altitudes obtained by double stage models would be greatly increased, thus making double stage models more practical for use in competition altitude events.

Since no engines are available with extremely short time delays, a booster engine had to be used in the bottom stage. A fuse was used to create a short time delay between burnout of the first stage and ignition of the second stage. This method brought up two problems. First, how could the gases from the first stage engine be stopped from igniting the second stage engine? And second, how long should the short time delay be?

An underwater fuse was selected for use in this project. This underwater fuse had several characteristics which made it suitable for this project.

Three methods were investigated for keeping the gases from the first engine from igniting the second engine. The method which was found to work best consisted of covering the nozzle of the second stage with flameproof wadding and allowing only the fuse to be exposed to the gases from the first engine. These gases are the means of lighting the fuse.

The next thing that had to be determined was the length of the time delay. If the burnout velocity of the first stage, the weight of the second stage, the aerodynamic drag acting on the second stage, and the location

of the center of gravity on the second stage are known, the proper delay time can be calculated. This determines the length of fuse that should be used.

The test firings proved that this method of time delayed staging is successful and that much higher altitudes can be obtained by using this method.

"Basic Boost/Glide Design" MARS VI

James Kerley, NAR 12091, 6313 Jason Street,
Cheverly, Maryland 20785

I am introducing a rocket glider design which is easy and reliable. I developed this design for the average modeler. In order to build the glider properly, the modeler should have an understanding of basic glider principles. If he takes care in construction and trimming, he should not have any problems with this glider.

I have found that this rocket glider flies best with an A.3-2T engine. The A.3-4T delay charge is too long; as a result, the pod doesn't move back until the glider is already heading down. When the A.3-2T is used, the pod moves at apogee. The glider is underpowered if ½A engines are used. The best engines to use are the mini-jet As.

This glider should be flown in a grassy field to prevent damage to the pod and the nose cone. The elastic cord is not necessary; it can be replaced by string.

This glider will give a 30 to 45 second flight when the A.3-2T engine is used. That is a very good time when compared with the times obtained using other designs that I have seen.

The materials used for construction are readily available from model rocket manufacturers, hobby shops, and drug stores (for the elastic thread).

No Title MARS VI

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Purpose: To find out if manufacturers' specifications for maximum recommended lift off weight are correct.

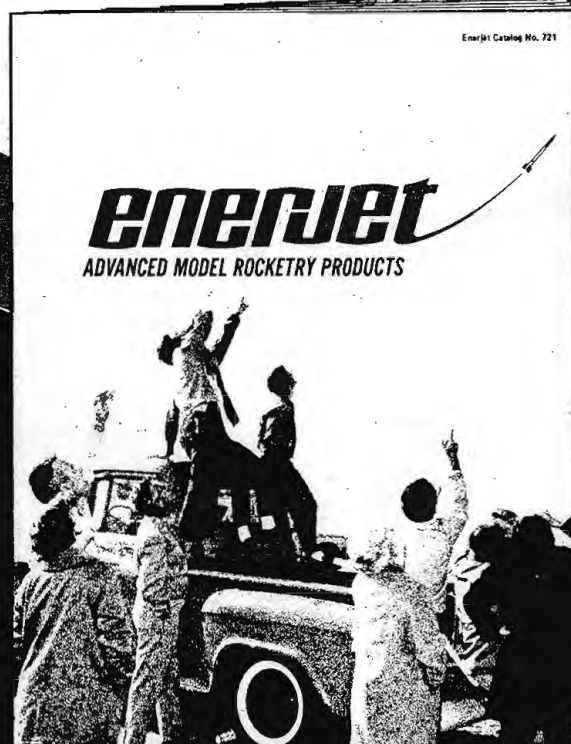
Procedure: Build a rocket with a variable payload, launch it with the maximum lift off weight for the engine being tested, and observe and record what happens. I soon found out that this was easier said than done, for my rocket was plagued by parachute and booster section failures. I finally obtained the data I needed, however.

Results: Seven engines out of thirty-eight DID NOT meet standards. These were FS1 B.3-4, B.3-6, C.4-6, D.18-4, and D.18-6, Centuri B.6-4, and Estes B.6-4. These engines made up 18 per cent of those tested. This percentage is rather high and I suggest that the manufacturers reexamine their figures before putting them in their catalogs.

(Editor's Note: The above opinions are those of the author alone and do not necessarily reflect the feelings of the *Model Rocketeer* or the NAR. Perhaps more work should be done on this topic, as experimenter used only one engine of each type for his experiment.)

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